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 [±.005] and angles have a tolerance of ±2°. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of 62-Position Metrimate Connector Assembly with Secondary Locking Feature. The plug connector is designed to mate with a 62-Position Metrimate Printed Circuit (PC) Board Connector. The plug connector provides secondary locking and terminal position assurance to eliminate backout problems. Contacts used in the plug connector are applicable to hand or automatic machine and semi-automatic crimping tools.

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.

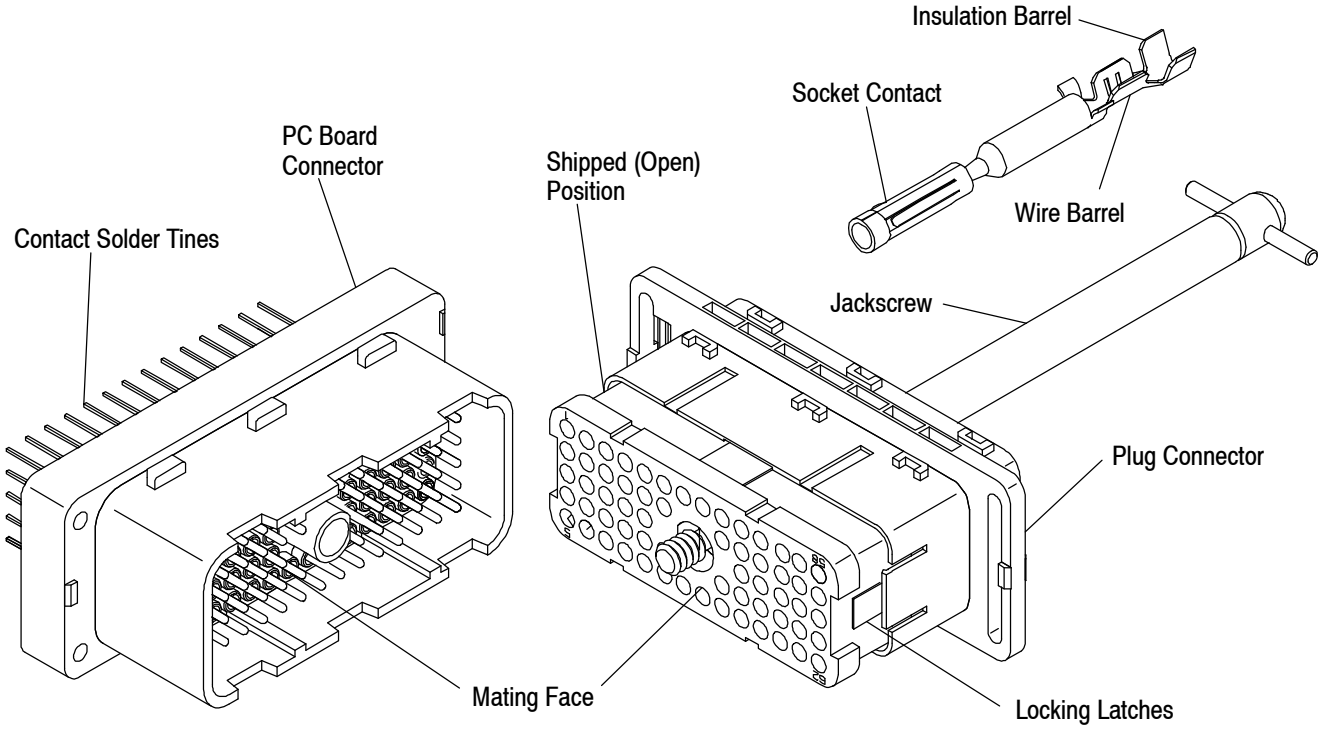


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements
- New logo and format

2.2. Customer Assistance

Reference Base Part Number 1604520 and Product Code 5019 are representative numbers of the 62-Position Metrimate Connector Assembly with Secondary Locking Feature. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local Tyco Electronics Representative or, after purchase, by calling the Tooling Assistance Center or the Product Information number at the bottom of this page.

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

Design Objective⁘ 108–2180 provides expected product performance requirements and test information.

2.5. Manuals

Manual 402–40 is available upon request and can be used as a guide in soldering. This manual provides information on various flux types and characteristics along with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

2.6. Instructional Material

The following list includes 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.

Document Number	Document Title
408–3295	Preparing Reel of Contacts for Application Tooling
408–7424	Checking Terminal Crimp Height or Gaging Die Closure
408–8040	Heavy Duty Miniature Quick–Change Applicators (Side–Feed)
408–8059	General Preventive Maintenance for Applicators
408–8547	CERTI–CRIMP* II Straight Action Hand Tools
408–8912	62–Position Metrimate Connector Assembly with Secondary Locking Feature
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
408–9965	PRO–CRIMPER III Hand Crimping Tool 90870–1
409–5128	AMP–O–LECTRIC* Model “K” Terminating Machines
409–5842	AMP–O–LECTRIC Model “G” Terminating Machine 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–[ ]
409–10027	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 housing material.

B. Reel Storage

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

C. Shelf Life

Each connector is packaged and shipped in an individual antistatic tube container or tape and reel. To prevent damage to the housings and contact solder tines, the connectors should remain in the container until ready for installation. Also, to prevent possible storage contamination and ensure maximum solderability, the connectors should be used on a first in, first out basis.

D. Chemical Exposure

Do not store contacts near any of the following chemicals as they may cause stress corrosion.

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

⁘Status of specification when this document was released.

NOTE

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

3.2. Material

The connector housings are made of UL 94V-0 rated black, high-temperature thermoplastic. The plug connector socket contacts are made of copper alloy and selectively plated with gold in the mating area, and tin on the crimp barrels. The pc board connectors' contacts are made from copper alloy and plated with gold. The solder tines are made from copper alloy, plated tin-lead.

3.3. Exposure Limitations

The operating temperature range of this connector assembly is -40° to 105°C [-40° to 221°F].

3.4. Wire Selection and Preparation

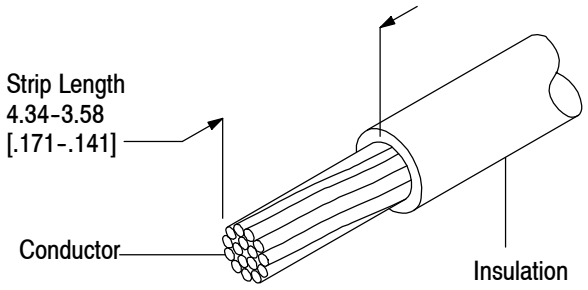
Contacts are available for the wire sizes and insulation diameters specified in the table in Figure 2. The wire must be stripped to the dimension shown in Figure 2.

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.



WIRE SIZE RANGE, AWG	WIRE SIZE, AWG	INSULATION DIAMETER	WIRE BARREL CRIMP RANGE		INSULATION BARREL CRIMP WIDTH RANGE
			HEIGHT	WIDTH	
24-20	24	1.02-2.03 [.040-.080]	0.86-1.054 [.034-.0415]	1.57-1.75 [.062-.069]	2.08-2.49 [.082-.098]
	22		0.91-1.054 [.036-.0415]		
	20		0.952-1.12 [.0375-.044]		
	24	1.52-3.43 [.060-.135]	0.76-0.97 [.030-.038]	1.57-1.75 [.062-.069]	2.84-3.25 [.112-.128]
	22		0.81-1.07 [.032-.040]		
	20		0.91-1.12 [.036-.044]		
18-16	18	2.03-2.54 [.080-.100]	1.24-1.35 [.049-.053]	2.03-2.21 [.080-.087]	2.84-3.25 [.112-.128]
	16		1.24-1.47 [.049-.058]		
18-14	18	2.79-3.81 [.110-.150]	1.24-1.37 [.049-.054]	2.29-2.46 [.090-.097]	3.73-4.14 [.147-.163]
	16		1.24-1.78 [.049-.061]		
	14		1.68-1.78 [.066-.070]		

Figure 2

3.5. Contact Crimp Requirements

The contact must be crimped onto the wire according to instructions packaged with applicable tooling. After crimping, the contact should appear as shown in Figure 3.

CAUTION

The wire insulation must not be damaged during the crimping process.

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.

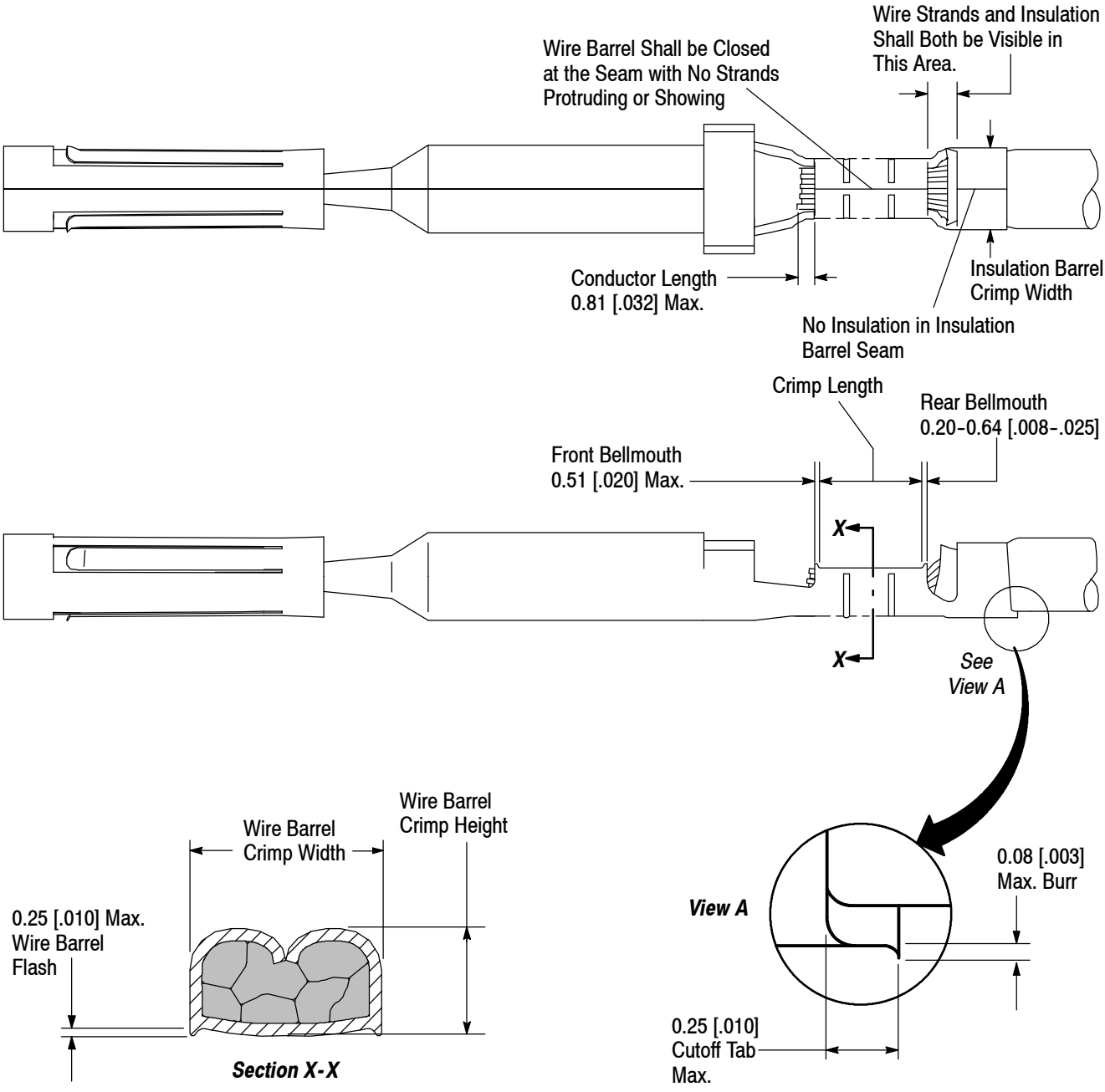


Figure 3

B. Effective Crimp Length

For optimum crimp effectiveness, the crimp must be within the area shown in Figure 3 and must meet the crimp dimensions provided in Figure 2. 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.

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. A slight cut in the insulation by the insulation barrel is permissible as this causes no problems in actual use. 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 as shown in Figure 3.

I. Conductor Extension

The conductor may extend beyond the wire barrel to the maximum shown in Figure 3.

J. Wire Barrel Seam

The wire barrel seam must be closed with no evidence of loose wire strands visible in the seam as shown in Figure 3.

1. The carrier cutoff tab length shall not exceed the dimensions given in Figure 3.

2. The wire barrel seam shall be closed adequately to confine all strands of the wire. There shall be no loose strands. Wire strands should not be embedded in the outside of the wire barrel.

3.6. Axial Concentricity

The axial concentricity of a crimped contact must be within an area defined by the diameter of a circle that has the same center as the centerline of the contact. The diameter of the circle will depend on the wire sizes. See Figure 4. This measurement does not apply to posted contacts.

WIRE SIZE, AWG	CIRCLE DIAMETER
24 - 20	3.96 [.156]
18 - 16	3.96 [.156]
18 - 14	3.96 [.156]

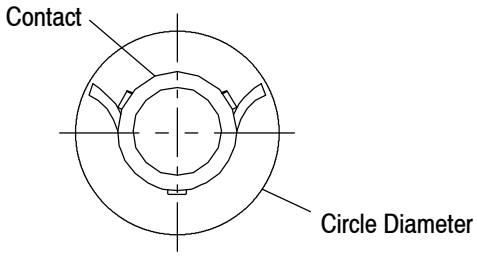


Figure 4

3.7. Placement of Crimped Contact in Housing

A. Assembly

1. Insert the crimped socket contact into the wire side of the plug assembly by grasping the wire directly behind the insulation barrel and pushing the contact into the cavity until the contact stops and the contact locking latches are engaged. See Figure 5.

NOTE

After the contacts have been fully inserted, pull back lightly on the wire with a force of 4.5 to 8.9 N [1 to 2 lbs]. This will ensure that the contact is locked in place as shown in Figure 5.

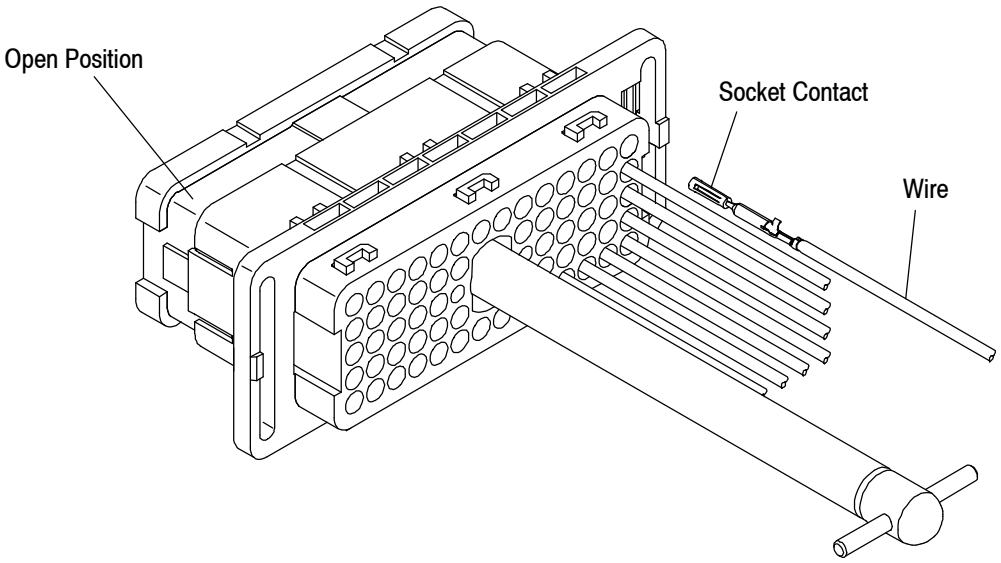


Figure 5

2. After all required contacts have been inserted, the front housing must be closed. To close the front housing, push the housing into the rear housing until the final latch engages on both ends of the connector. See Figure 6.

NOTE

If the front housing does not close freely, check to ensure that all the contacts are properly seated in the connector.

CAUTION

Do NOT force the housings together as it may damage the connector.

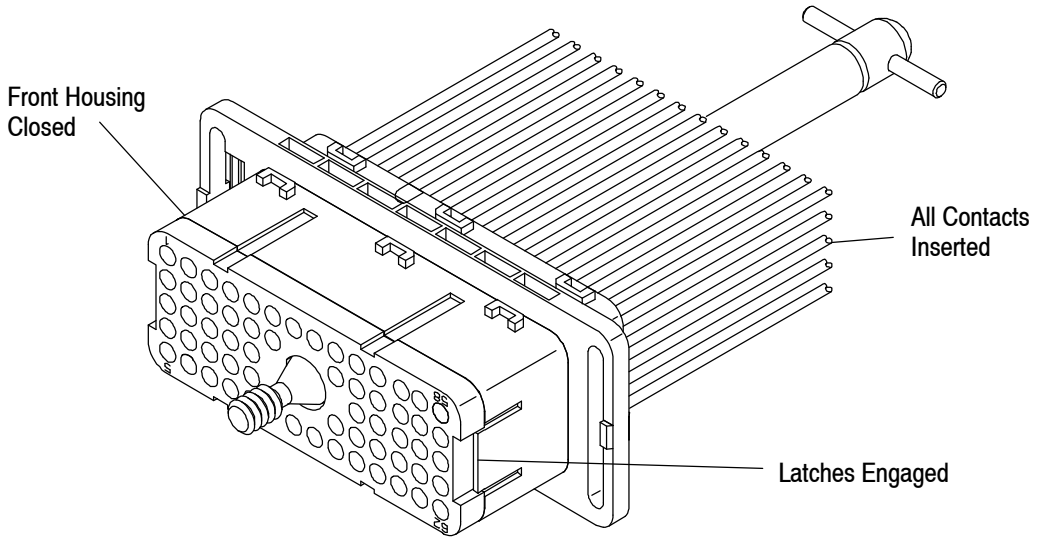


Figure 6

B. Disassembly

1. Using a small screwdriver, deflect the housing latches on one end to disengage the latch and move the front housing slightly forward. Repeat on the other end of the connector. Slide the front housing forward until the secondary latches engage. With the housings in this position, the contacts can be removed. See Figure 7.

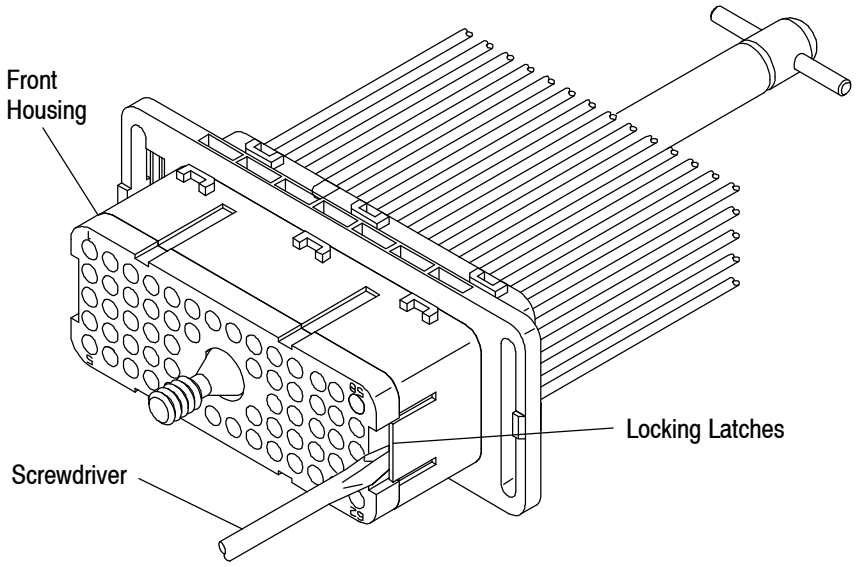


Figure 7

2. To remove a contact, grasp the wire directly behind the insulation barrel and pull the wire with a twisting motion until the contact disengages from the housing. Repeat for other contacts. See Figure 8.

NOTE

For small wires, the contact may not rotate when the wire is twisted and the contact may not release. In this case, to remove the contacts, the front housing must be removed completely. Using a small screwdriver, deflect the latches a second time to release the secondary latches and pull the housing straight out of the rear housing. Then, using a finger or a pencil with an eraser, press on the mating end of the contact with a rotating motion until the contact releases. Pull the contact out of the housing with the wire.

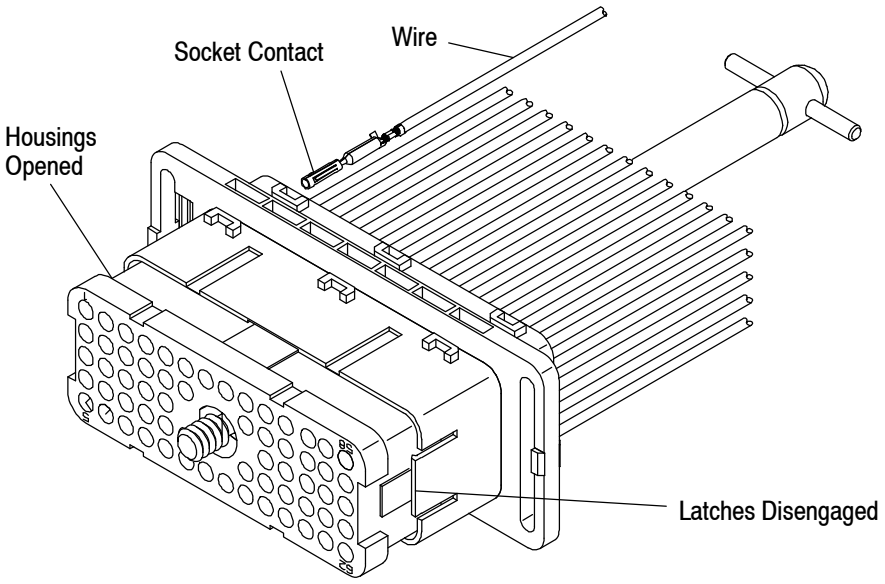


Figure 8

3.8. Strain Relief and Wire Dress

If necessary, wires can be bundled together and supported with cable ties or similar devices.

3.9. PC Board

A. Material and Thickness

1. Board material will be glass epoxy (FR-4, G-10).

2. The receptacle pin connector can be installed on 1.57-2.38 mm [.062-.093 in.] thick pc boards. Board thickness may vary depending upon the application; however, contact tine length through the pc board becomes important for wave soldering operations. A recommended minimum of 0.50 mm [.020 in.] of the contact solder tine should protrude through the pc board.

NOTE

Contact the Product Information Center or the Tooling Assistance Center number listed at the bottom of page 1 for suitability of other board materials, thicknesses, specialized board designs or applications.

B. Tolerance

Maximum allowable bow of the pc board shall be 0.03 mm [.001 in.] over the length of the receptacle pin connector.

C. PC Board Layout

The mounting and contact holes in the pc board must be precisely located to ensure proper placement and optimum performance of the connector. See Figure 9. The connectors may be placed on the pc board manually or by machine.

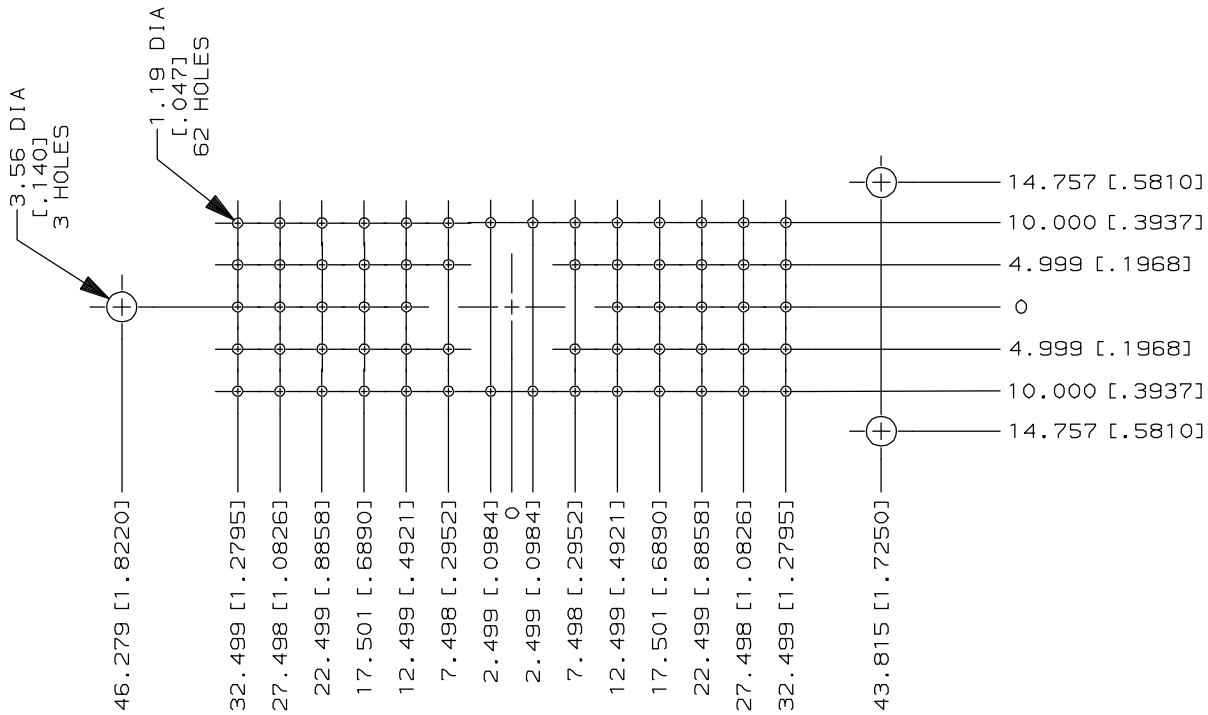


Figure 9

D. Contact Tine Hole Configuration

These connectors are used with plated through holes. The drilled hole size, plating types and plating thickness are dependent on customer application requirements. The finished hole size must be as stated in Figure 10 to provide unrestricted insertion and ensure adequate application of the solder to the connector solder tines.

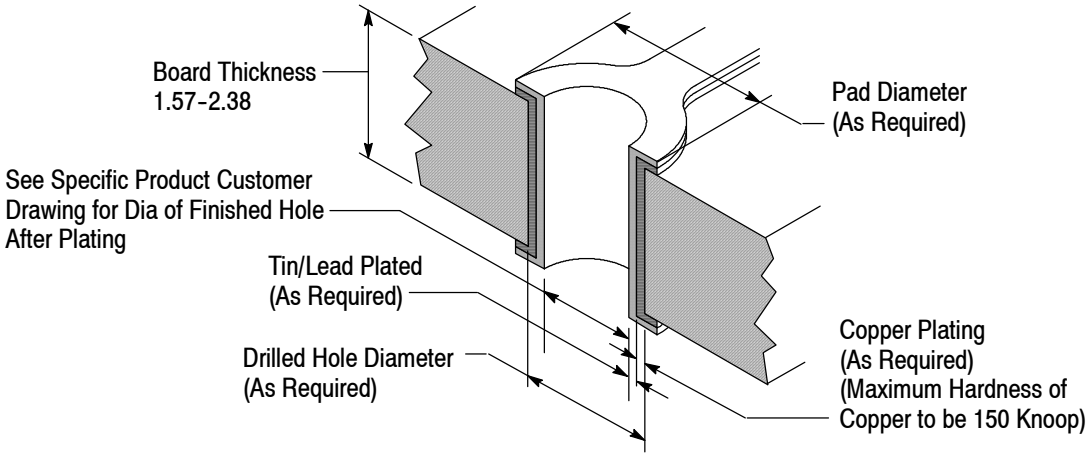


Figure 10

3.10. Connector Placement on PC Board

CAUTION

The pc board connector should be handled only by the housing to prevent deformation or other damage to the solder tines.

A. Manual Placement

Align the receptacle connector solder tines with the appropriate holes in the pc board. Start all solder tines into the board, then press on the connector until it seats on the pc board.

B. Robotic Placement

The robotic equipment must be adjusted to feed, pick up, and place the connectors on the pc board with an accuracy of 0.25 mm [.010 in.]. The connector datum surfaces detailed on the customer drawing will ensure correct placement of the connector. For information on robotic equipment, see Section 5, TOOLING.

3.11. Soldering

A. Soldering Guidelines

Metrimate Receptacle Pin Connectors can be soldered using wave, vapor phase (VPR), double sided non-focused infrared reflow processes (IR) or equivalent soldering techniques. The temperatures and exposure time shall be within the ranges specified in Figure 11. We recommend using SN60 or SN62 solder for these connectors.

SOLDERING PROCESS	TEMPERATURE		TIME (At Max Temperature)
	CELSIUS	FAHRENHEIT	
WAVE SOLDERING	260❋	500❋	5 Seconds
VAPOR PHASE SOLDERING	215	419	5 Minutes

❋ Wave Temperature

Figure 11

NOTE

Manual 402-40 provides some guidelines for establishing soldering practices. Refer to Paragraph 2.5, Manuals.

B. Fluxing

The 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 number at the bottom of page 1 for consideration of other types of flux. Some fluxes that are compatible with these sockets are provided in Figure 12.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER	ALPHA
Type RMA (Mildly Activated)	Mild	Noncorrosive	185/197	611
Center (Activated)	Medium	May be Corrosive	1544, 1545, 1547	711, 809, 811

Figure 12

C. 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 sockets. The sockets will be unaffected by any of these solvents for 5 minutes at room temperature.

Cleaners must be free of dissolved flux and other contaminants. We recommend cleaning with the pc board on its edge. If using an aqueous cleaner, we recommend standard equipment such as a soak–tank or an automatic in–line machine. See Figure 13.

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 13

DANGER

Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Trichloroethylene and Methylene Chloride can be used with no harmful affect to the sockets; however, Tyco Electronics Corporation 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.

NOTE

If you have a particular solvent that is not listed, contact the Product Information number at the bottom of page 1.

D. Drying

When drying clean assemblies and pc boards, air drying is recommended. Temperature for the connectors should not exceed 105°C [221°F] for a period of five minutes with no degradation to the connector components. Degradation of the contacts could result from extreme temperatures.

E. Checking Installed Socket

The connector must be seated on the pc board to the dimensions shown in Figure 14. All solder joints should conform to those specified in Test Specification 109–11.

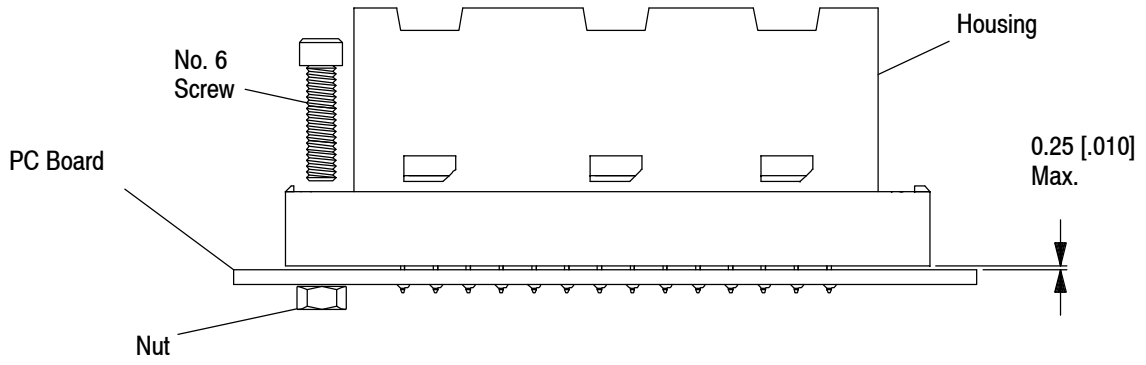


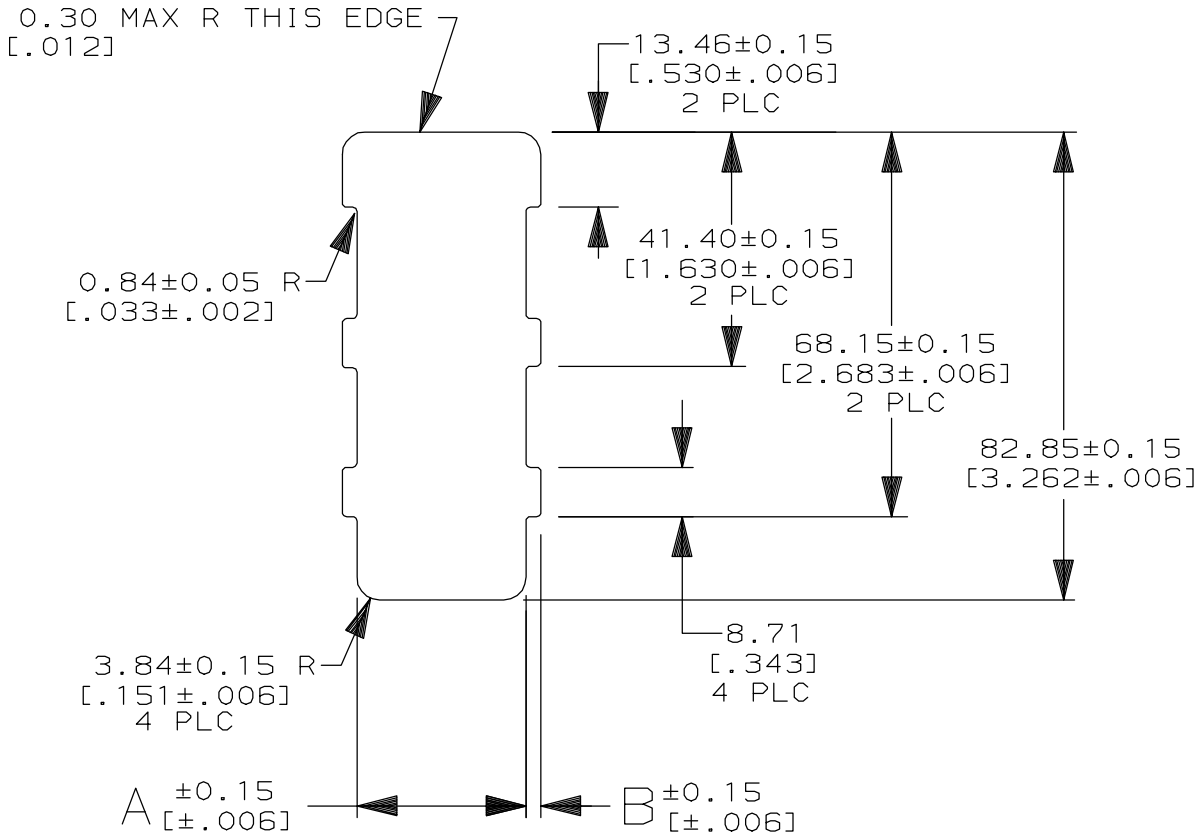
Figure 14

3.12. Mounting Hardware

Three customer supplied No. 6 screws are required to mount the pin receptacle connector assembly to the pc board. See Figure 14.

3.13. Panel Cutout

The pc board pin connector may also be rear panel mounted. No mounting hardware is required. Refer to Figure 15 for the cutout dimensions.



PANEL THICKNESS	DIMENSION	
	"A"	"B"
0.79-.1.40 [.031-.055]	30.05 [1.183]	2.74 [.108]
1.40-1.98 [.055-.078]	32.36 [1.274]	1.75 [.069]

Figure 15

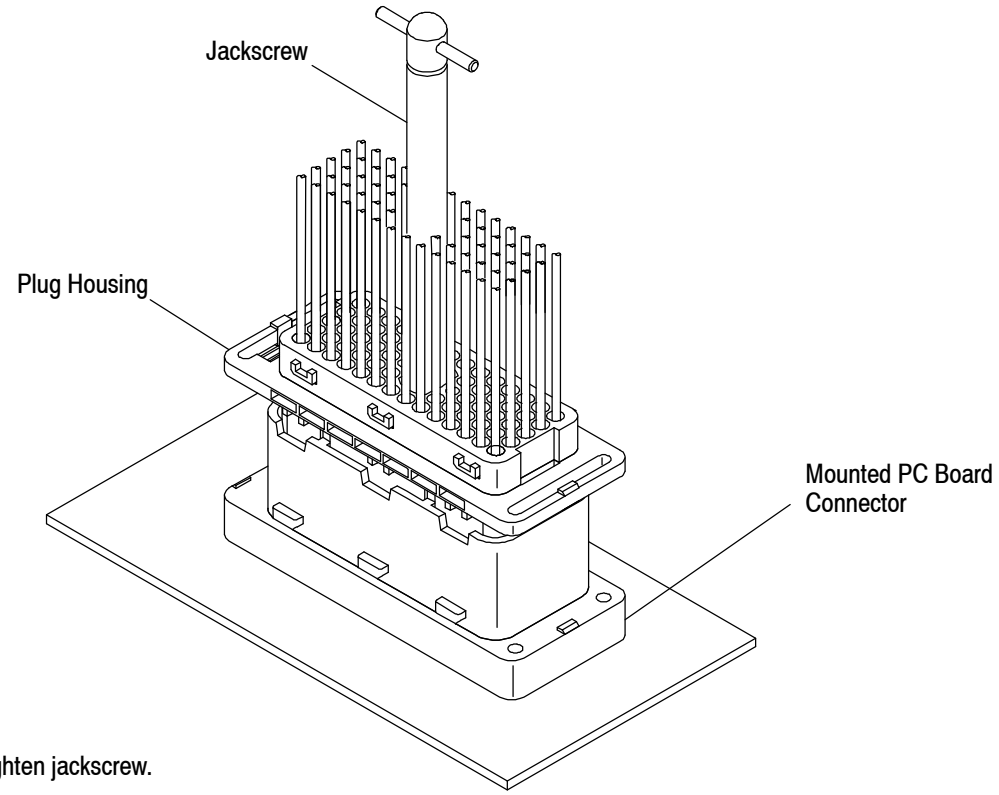
3.14. Connector Mating

A. Polarization

The pc board receptacle connector assembly and plug assembly has polarization features designed with offset keying slots and protrusions in the housings. Also the locking jackscrew has a flat spot as an additional polarization feature to prevent incorrect mating of the connectors.

B. Mating of Connectors

The polarizing features on the plug and pc board receptacle connector must be properly oriented. Insert the plug connector into the pc board receptacle connector evenly until all sockets and pins are aligned. Turn the locking jackscrew clockwise until the connectors have bottomed on each other. See Figure 16.



CAUTION: Do not over-tighten jackscrew.

Figure 16

3.15. Repair/Replacement

Damaged crimped contacts or housings must be removed, discarded, and replaced with new components. Use the information provided in Paragraph 3.6.B.2 to remove individual contacts from connectors for replacement or for relocation to another housing cavity.

CAUTION

If a damaged contact is evident before the contacts are inserted into the housing, cut the wire in back of the contact and re-terminate with a new contact. If the contact or connector is damaged after insertion, remove the contact and cut the wire in back of the contact and reterminate a new contact and re-insert into an undamaged connector.

CAUTION

When removing connector from pc boards, reasonable care should be taken to remove the connectors straight and in-line in relation to the pc boards. In free-hanging applications, the wires must be supported during removal to prevent excess strain on the contacts. Improper removal could result in damage to the wires, housing, contacts, or pc board.

4. QUALIFICATIONS

The 62-Position Metrimate Connector Assemblies have not yet been submitted for agency evaluation and approval.

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. A list of tooling recommendations and instructional material packaged with the tooling covering the full wire size range is provided in Figure 17.

NOTE

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

- **Robotic Equipment**
  The robotic equipment must have a true position accuracy tolerance of 0.25 mm [.010 in.] to properly locate the connectors for insertion. This includes gripper and fixture tolerances as well as equipment repeatability.
- **Board Supports**
  A pc board support must be used to prevent bowing of the pc board during the placement of a connector on the board. It should have flat surfaces with holes or a channel wide enough and deep enough to receive the contact solder tails and boardlocks or other attaching hardware during installation of the connector on the board.
- **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 at the bottom of page 1 for specific changes.

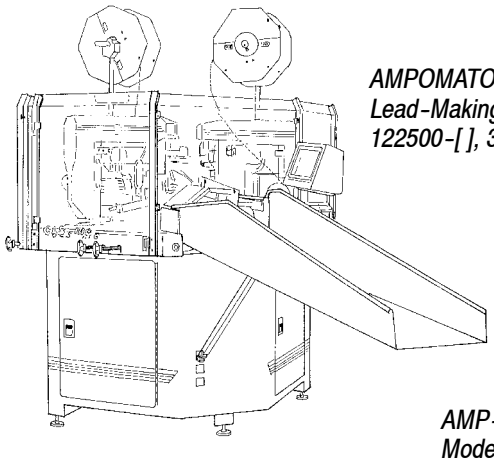
- **Power Units**
  A power unit is an automatic or semi-automatic device used to assist in the application of a product. Power unit includes the power source used to supply the force or power to an applicator.
- **Hand Tools**
  Hand crimping tools are designed for prototype, low-volume applications, and repair.

WIRE		TOOLING		
WIRE SIZE RANGE, AWG	INSULATION DIAMETER	APPLICATOR (DOCUMENT)	MACHINE (DOCUMENT)	HAND TOOL (DOCUMENT)
24-20	1.52-3.43 [.060-.135]	466383-4 (408-8040)	565435-5 (409-5128)	91542-1 (408-8547)
			1725950-3, -4, -8 (---)	
			354500-1 (409-5842)	
			1583090-2 (---)	
		567363-1 (408-8040)	122500-2, -3 (409-5852)	
			356500-1, -2 (409-5878)	
		567363-2 (408-8040)	565435-5 (409-5128)	
			1583090-2 (---)	
			1725950-3, -4, -8 (---)	
			354500-1 (409-5842)	
		567806-1 (---)	1320895-2, -4 (409-10012)	

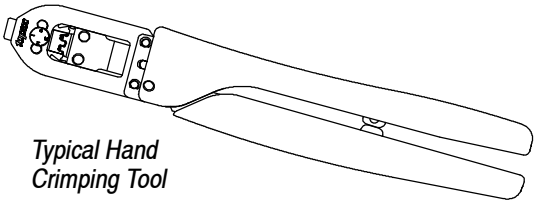
Figure 17 (cont'd)

WIRE		TOOLING		
WIRE SIZE RANGE, AWG	INSULATION DIAMETER	APPLICATOR (DOCUMENT)	MACHINE (DOCUMENT)	HAND TOOL (DOCUMENT)
24-20	1.02-2.03 [.040-.080]	466323-3 (408-8040)	122500-2, -3 (409-5852)	91505-1 (408-8547) or 91515-1 (408-8547)
			356500-1, -2 (409-5878)	
		466323-4, -5 (408-8040)	565435-5 (409-5128)	
			1725950-3, -4, -8 (---)	
			354500-1 (409-5842)	
			1583090-2 (---)	
		466323-6 (408-8040)	354500-1, -9, -11 (409-5842)	
			1490501-1 (---)	
			1583090-1 (---)	
			1725950-1, -2, -5, -6, -7, -9 (---)	
			1725910-1, -2, -3, -4 (---)	
18-16	2.03-2.54 [.080-.100]	466325-1 (408-8040)	122500-2, -3 (409-5852)	91505-1 (408-8547) or 91523-1 (408-8547)
			356500-1, -2 (409-5878)	
		466325-2, -4 (408-8040)	565435-5 (409-5128)	
			1725950-3, -4, -8 (---)	
			354500-1 (409-5842)	
			1583090-2 (---)	
		466325-5 (408-8040)	354500-1, -9, -11 (409-5842)	
			1490501-1 (---)	
			1583090-1 (---)	
			1725950-1, -2, -5, -6, -7, -9 (---)	
			1725910-1, -2, -3, -4 (---)	
18-14	2.79-3.81 [.110-.150]	567364-1 (408-8040)	122500-2, -3 (409-5852)	91521-1 (408-8547)
			356500-1, -2 (409-5878)	
		567364-2, -4 (408-8040)	565435-5 (409-5128)	
			1725950-3, -4, -8 (---)	
			354500-1 (409-5842)	
			1583090-2 (---)	
		567364-3 (408-8040)	354500-1, -9, -11 (409-5842)	
			1490501-1 (---)	
			1583090-1 (---)	
			1725950-1, -2, -5, -6, -7, -9 (---)	
			1725910-1, -2, -3, -4 (---)	
		567834-1 (---)	1320895-2, -4 (409-10012)	

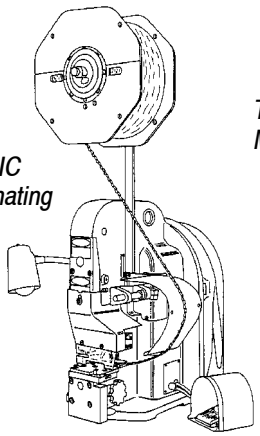
Figure 17 (cont'd)



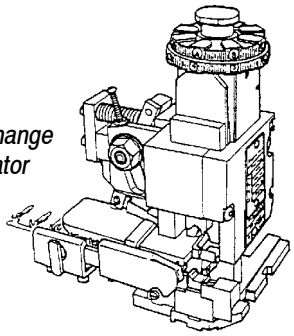
AMPOMATOR CLS
Lead-Making Machines
122500-[ ], 356500-[ ]



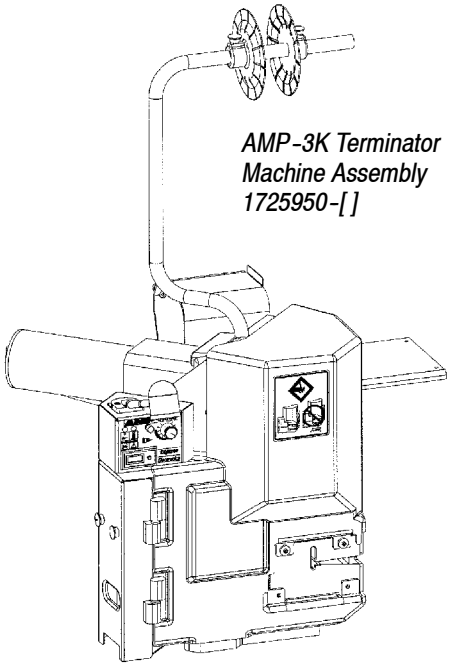
Typical Hand
Crimping Tool



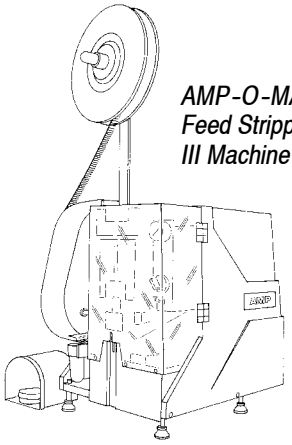
AMP-O-LECTRIC
Model "K" Terminating
Unit 565435-[ ]



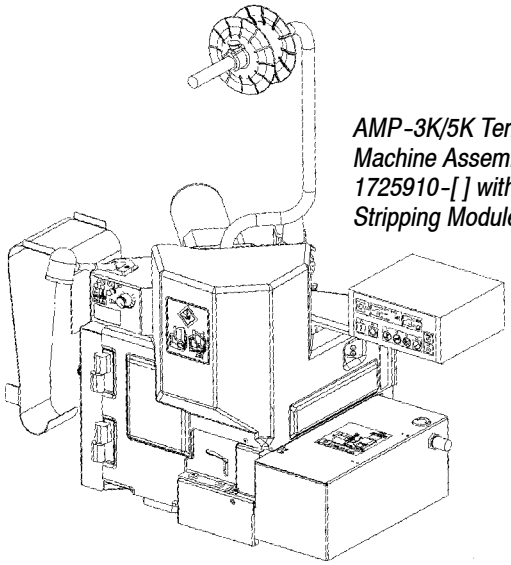
Typical Quick-Change
Miniature Applicator



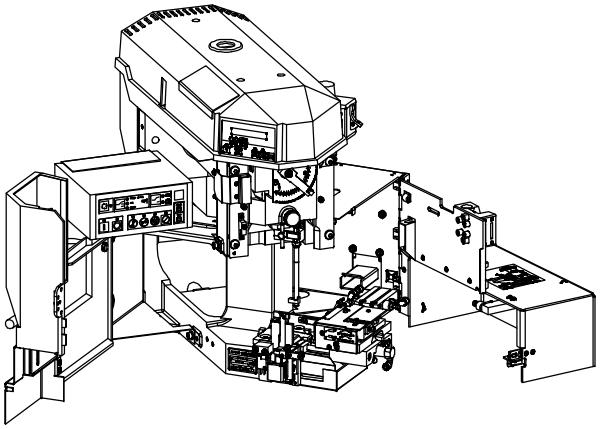
AMP-3K Terminator
Machine Assembly
1725950-[ ]



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



AMP-3K/5K Terminator
Machine Assembly
1725910-[ ] with
Stripping Module



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

Figure 17 (end)

6. VISUAL AID

Figure 18 shows a typical application of a 62–Position Metrimate Connector Assembly. 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.

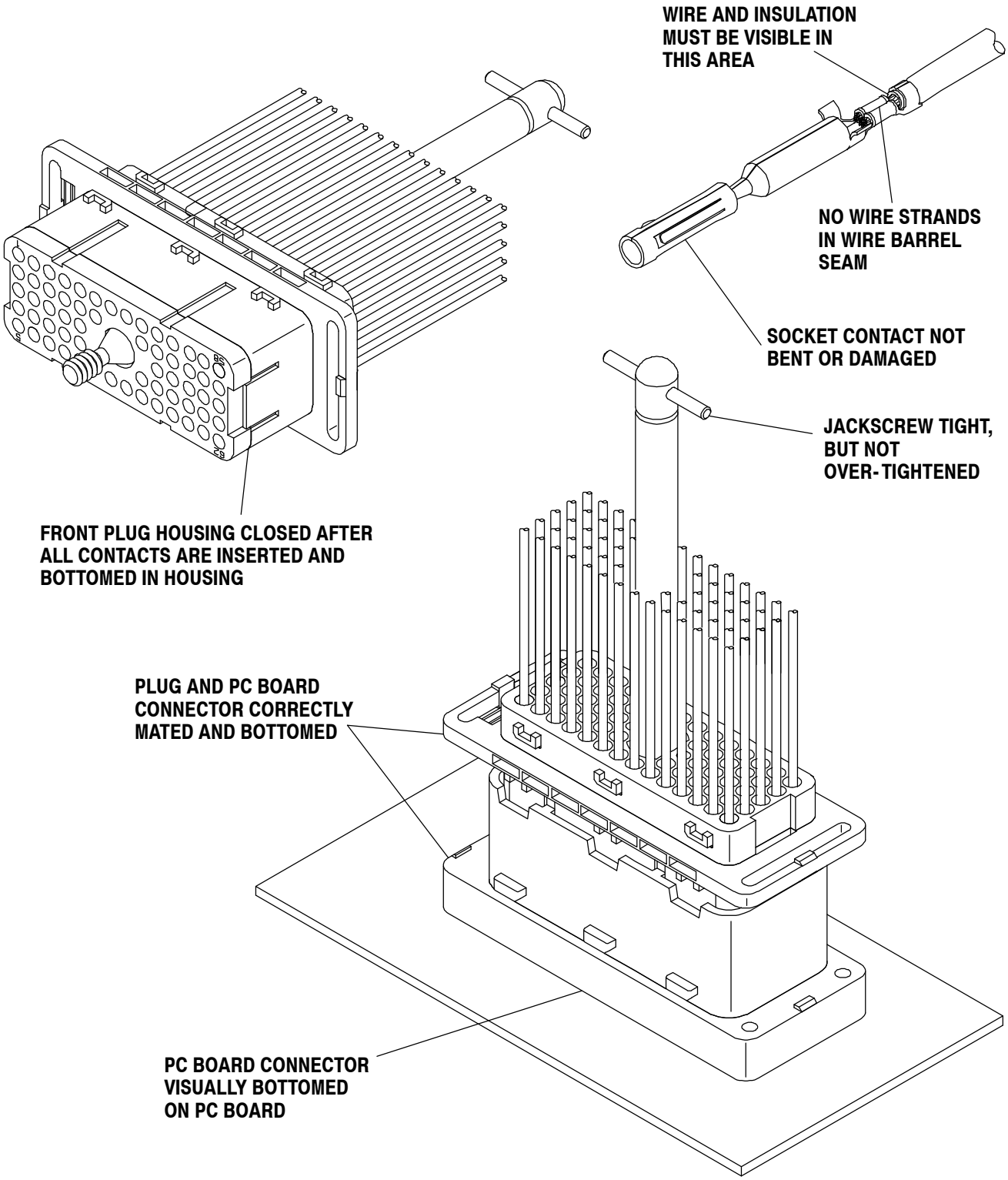


FIGURE 18. VISUAL AID