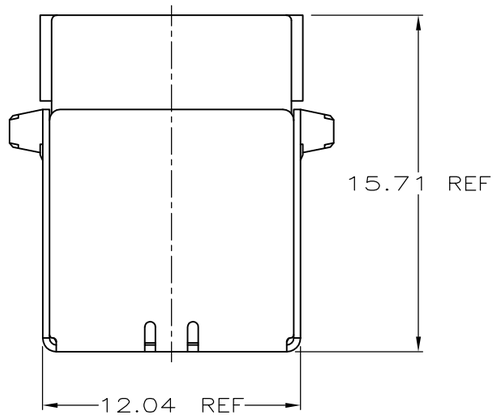
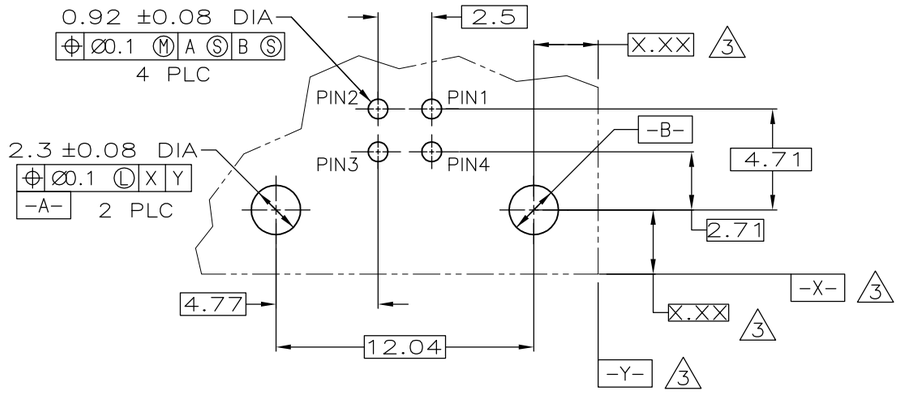
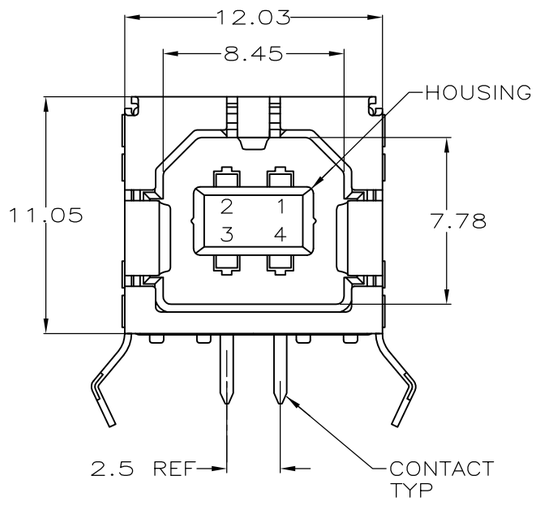
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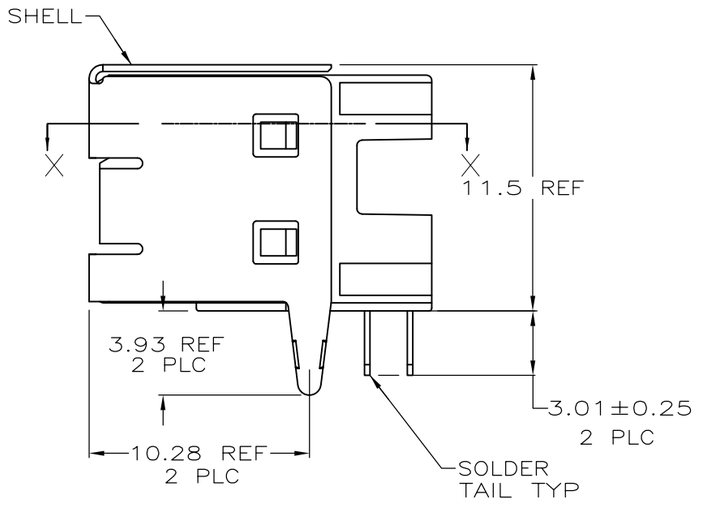
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ES	00	P	LTR	DESCRIPTION	DATE	DWN	APVD
			D4	REVISED ECR-17-010413	20JUL17	T.Z	H.W

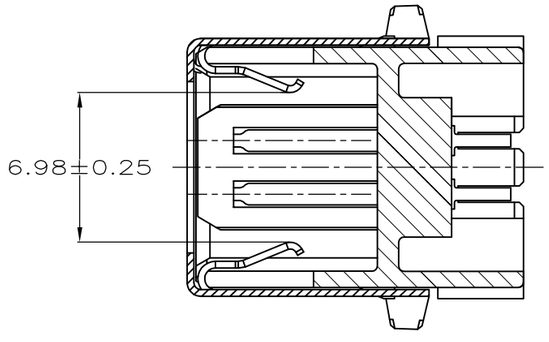




PC BOARD MOUNTING DIMENSIONS 4







SECTION X-X

1 MATERIAL:
D3 SHELL : STAINLESS STEEL.
CONTACTS: COPPER ALLOY.
HOUSING: UL 94V-0 RATED, THERMOPLASTIC, BLACK.

2 PLATING:
CONTACTS: 0.076μm MINIMUM GOLD OVER 0.76μm MINIMUM PALLADIUM-NICKEL ON MATING AREA.
3.8μm MINIMUM MATTE TIN ON SOLDER TAILS.
BOTH OVER 1.27μm MINIMUM NICKEL.
CONTACT ALTERNATE PLATING: 0.76μm MIN GOLD ON MATING AREA, 3.8μm MIN MATTE TIN ON SOLDER TAILS, BOTH OVER 1.27μm MIN NICKEL.
SHELL: 2.0~5.0μm MINIMUM TIN.

3 DATUM AND BASIC DIMENSIONS ESTABLISHED BY CUSTOMER.

4 RECOMMENDED PC BOARD THICKNESS OF 1.57.

5 PLATING:
CONTACTS: 0.76μm MINIMUM GOLD ON MATING AREA, 3.8μm MINIMUM MATTE TIN ON SOLDER TAILS, BOTH OVER 1.27μm MINIMUM NICKEL.
SHELL: 2.0~5.0μm MINIMUM TIN.

6 PLATING:
CONTACTS: 0.38μm MINIMUM GOLD ON MATING AREA, 3.8μm MINIMUM MATTE TIN ON SOLDER TAILS, BOTH OVER 1.27μm MINIMUM NICKEL.
SHELL: 2.0~5.0μm MINIMUM TIN.

7 RECOMMEND:
MATING FORCE: 35N MAX.
UNMATING FORCE: 13N MIN.
RECOMMENDED MATING PLUG SHOULD MEET USB2.0 STANDARD.

6	NO	BLACK	292304-5
5	NO	BLACK	292304-4
2	YES	BLACK	292304-3
2	YES	NATURAL	292304-2
2	NO	BLACK	292304-1
PLATING	HIGH TEMPERATURE COMPATIBLE	HOUSING COLOR	PART NUMBER

勝特力電材超市-龍山店 886-3-5773766
勝特力電材超市-光復店 886-3-5729570
胜特力电子(上海) 86-21-34970699
胜特力电子(深圳) 86-755-83298787
http://www.100y.com.tw

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DIMENSIONS: mm

TOLERANCES UNLESS OTHERWISE SPECIFIED:
0 PLC ±-
1 PLC ±-
2 PLC ±0.1
3 PLC ±-
4 PLC ±-
ANGLES ±-

MATERIAL 1
FINISH 2

DWN	J.JIANG	23FEB04
CHK	S.YAO	23FEB04
APVD	T.SASAKI	23FEB04
PRODUCT SPEC	—	
APPLICATION SPEC	—	
WEIGHT	—	

CUSTOMER DRAWING

Tyco Electronics
Tyco electronics coporation
Shanghai, P.R.China, 200233

NAME
RECEPTACLE ASSEMBLY, RIGHT ANGLE, 4 POSITION, THRU-HOLE, TYPE B UNIVERSAL SERIAL BUS, LEAD FREE VERSION

SIZE	CAGE CODE	DRAWING NO
A2	00779	C-292304

SCALE	SHEET	REV
5:1	1 OF 1	D4

292304

Translated 040217.101735 (YYMMDD.HHMMSS) from Computervision, Inc., Medusa Revision 12.2.5T

Universal Serial Bus (USB) Connectors

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 Universal Serial Bus Connectors. The plug connector is available in a 4-position configuration which accepts cable diameter of 3.4 to 5.3 mm [.134 to .209 in.] and discrete wire size range of 28-20 AWG. The pc board receptacle connector is available in a 4-position or double stack 8-position configuration and comes with pre-installed contacts and can be placed on the pc board by hand or robotic equipment.

When corresponding with TE Connectivity 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.

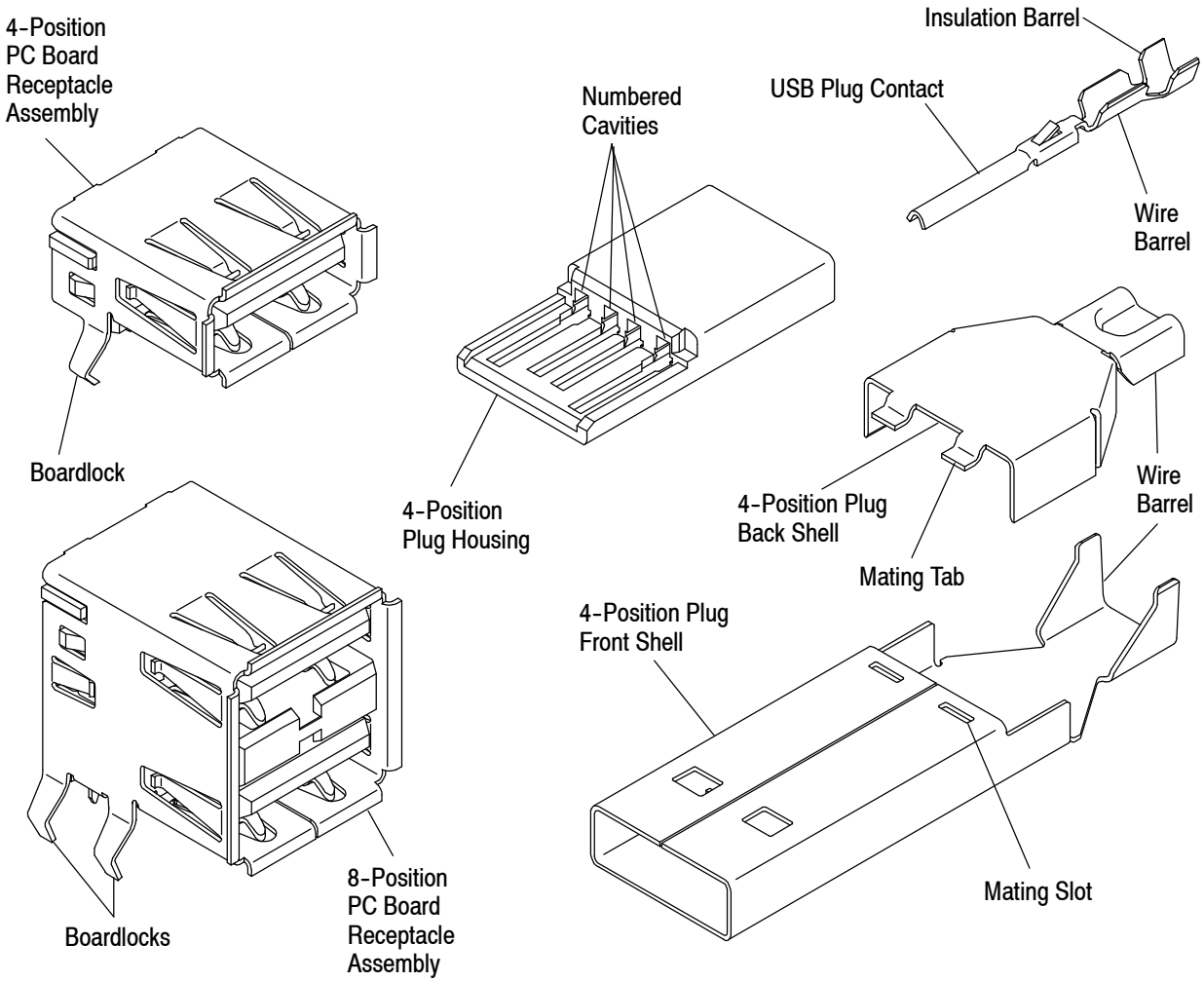


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Material

- Updated document to corporate requirements.

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*Trademark

TE Connectivity, TE connectivity (logo), and TE (logo) are trademarks. Other logos, product and/or Company names may be trademarks of their respective owners.

2.2. Customer Assistance

Reference Part Number 787616 and Product Code 3936 are representative numbers of Universal Serial Bus Connectors. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local TE Representative or, after purchase, by calling the Tooling Assistance Center or the Product Information Center number at the bottom of page 1.

2.3. Drawings

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

2.4. 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.

2.5. Specifications

Product Specification 108-1586 provide product performance requirements and test information.

2.6. 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.

Document Number	Document Title
408-3295	Preparing Reel of Contacts for Applicator Tooling
408-4222	Straight Action Hand Tool 90712-1 for Serial Bus Contacts
408-4223	Straight Action Hand Tool 90713-1 for Serial Bus Contacts
408-4229	Serial Bus Contact Extraction Tool 224899-1
408-6923	Manual Arbor Frame Assembly 58024-1
408-7777	Manual Arbor Frame Assembly 91085-2
408-8040	Heavy Duty Miniature Quick-Change Applicators (Side-Feed Type), With Mechanical Feed System
408-8053	Conversion Guide for Miniature Quick Change Applicators
408-9746	AMPLIMITE* .050 Series Crimper Assembly 856684-1
408-9816	Handling of Reeled Products
409-5128	Basic AMP-O-LECTRIC* Model “K” Terminating Machine, Accessories, and Modified Machines
409-5842	AMP-O-LECTRIC Model “G” Terminating Machine 354500-[ ]
409-5855	AMP-O-MATIC* Side Feed Stripper-Crimper Model II Machine No. 854040-3, and -4

3. REQUIREMENTS

3.1. Storage

A. Ultraviolet Light

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

B. Shelf Life

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

C. Reeled Contacts

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

D. Chemical Exposure

Do not store housings or connectors near any chemicals listed below, as they may cause stress corrosion cracking in the components.

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

NOTE

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

3.2. Special Characteristics

USB Plug Connectors utilize color-coded wire for orientation. The pc board receptacle connector is available in 4-position or a double stack 8-position configuration. Both plug and receptacle connectors have numbered cavities for orientation. See Figure 1.

3.3. Cable Selection and Preparation

USB Connector shells accept braided cable while the discrete wire within the cable is used in the individual plug contacts in the connector assembly.

A. Cable Selection

Select the cable diameter and discrete wire size according to your production requirements.

B. Cable Preparation

Strip the cable and discrete wire to the dimensions shown in Figure 2.

CAUTION

Remove any plastic filler or foil underneath the cable jacket and discard. Also DO NOT nick, cut, or scrape the conductors or the braided cable shield during the stripping operation.

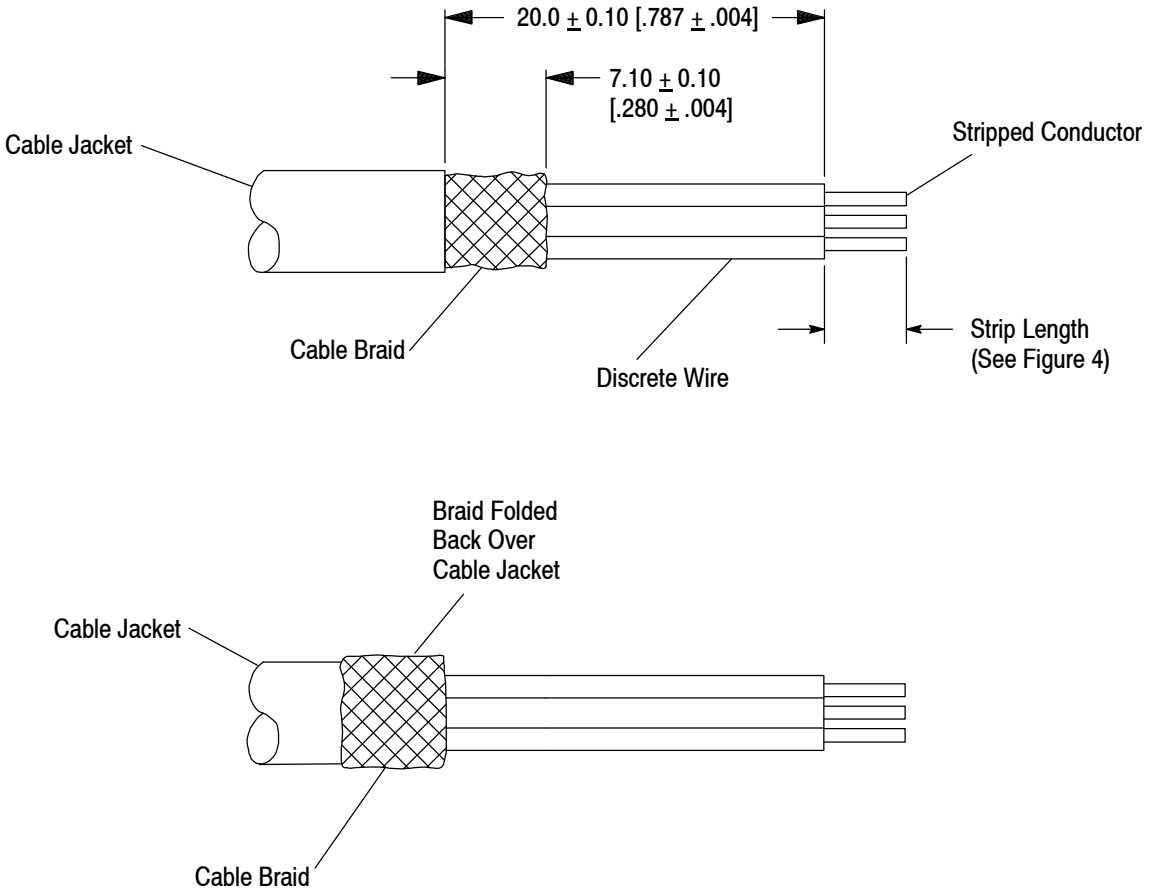


Figure 2

3.4. Terminated Strip Length

Terminated strip length for the outer cable jacket shall be as indicated in Figure 3.

TERMINATED STRIP LENGTH

CONTACT POSITION	"B" LENGTH
4	13 [.512]

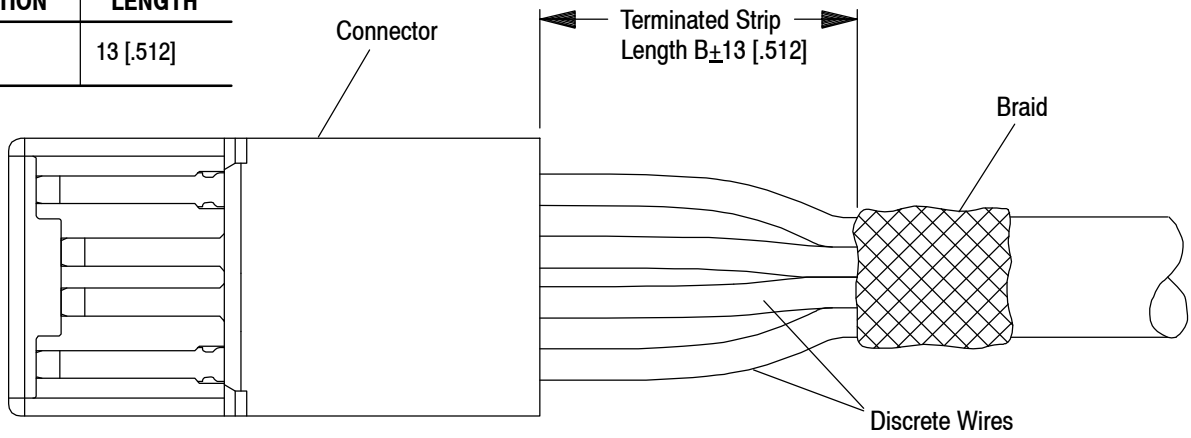


Figure 3

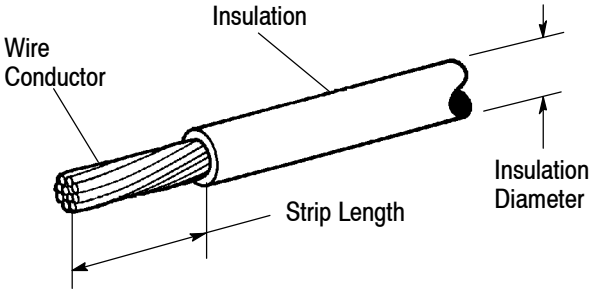
3.5. Discrete Wire

A. Wire Size

USB Plug Contacts accept a wire size range of 28 to 26 or 24 to 20 AWG and may be terminated to either stranded or solid wire. Figure 4 lists the insulation diameter range and strip length as determined by the contact wire size range used.

B. Discrete Wire Preparation

When stripping the wire, care must be taken to avoid scraping, nicking, or cutting the conductor. Care must also be used when handling the wire during stripping and crimping to prevent cracking or breaking of the conductor and insulation.



Note: Not to Scale

WIRE SIZE, AWG	INSULATION DIA RANGE	STRIP LENGTH
28-26	1.02-0.76 [.040-.030]	4.95-3.56 [.195-.140]
24-20	1.58-1.02 [.062-.040]	4.32-3.56 [.170-.140]

Figure 4

3.6. Crimped Plug Contact Requirements

The contact shall be located in desired tooling and crimped according to the instructions packaged with that tooling, if available. 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. Contact Crimp Features

Figure 5 shows a typical contact as it should appear after crimping.

1. *Crimp Location*

For optimum crimp effectiveness, the crimp must be within the area shown and must meet the crimp requirements provided in Figure 5.

2. *Crimp Height*

The crimp applied to the wire barrel portion of the contact is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the terminated contact. The contact wire barrel crimp height must be within the dimension provided in Figure 5.

3. *Effective Crimp Length*

Effective crimp length shall be defined as that portion of the wire barrel, excluding bellmouth(s), fully formed by the crimping tool. See Figure 5.

4. *Conductor Extension*

The conductor may extend beyond the wire barrel to the maximum shown in Figure 5.

5. *Wire Barrel Seam*

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

6. *Conductor/Insulation*

The conductor and insulation must both be visible in the area between the insulation barrel and the wire barrel.

7. *Bellmouth*

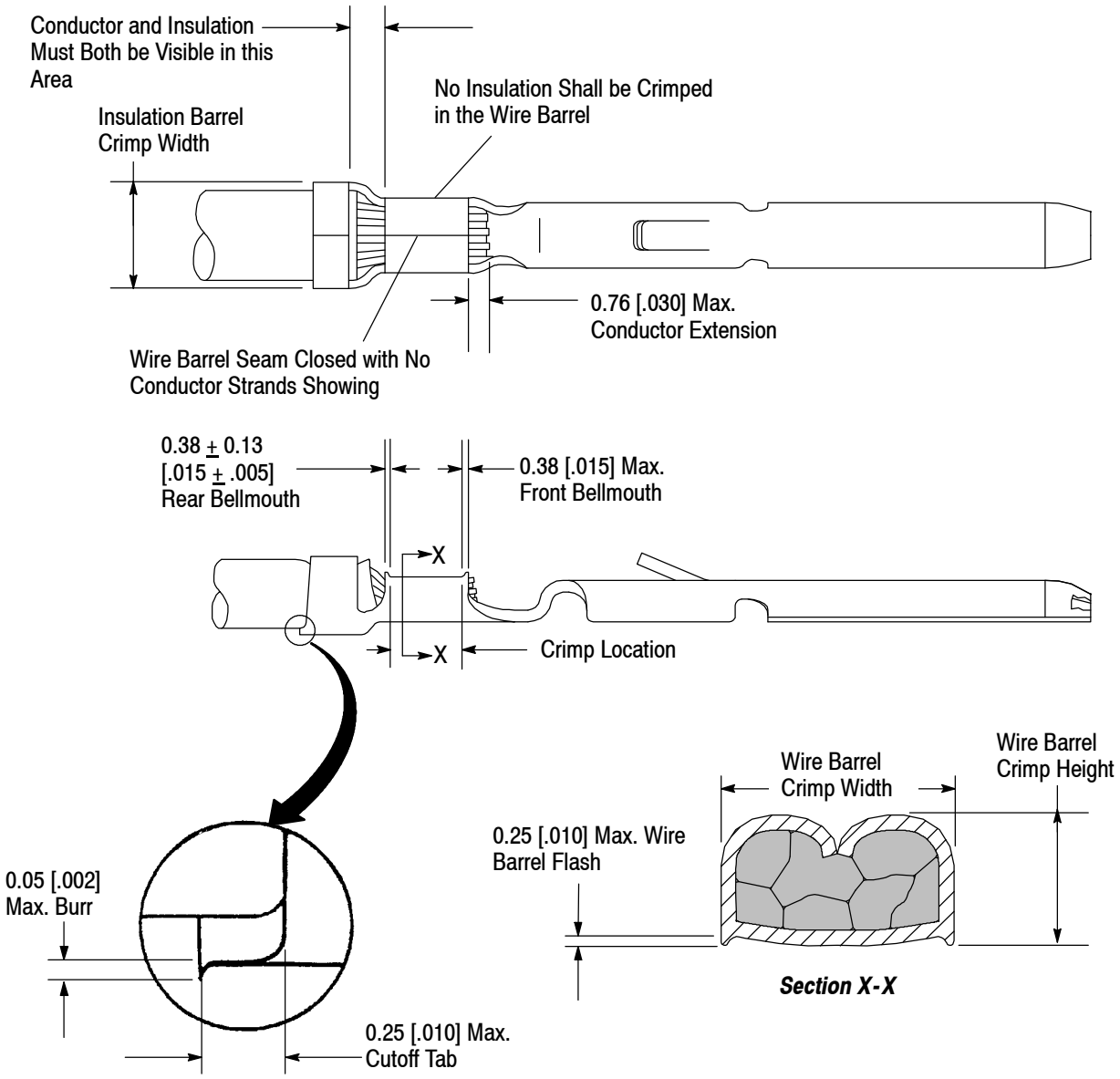
The front and rear bellmouths are caused by the extrusion of metal during crimping and must be within the range specified in Figure 5.

8. *Cutoff Tab and Burr*

The cutoff tab and burr resulting from the contact being cut from the carrier strip must be within limits to allow the contact to be fully inserted and seated in the housing. See Figure 5.

9. *Flash*

The wire barrel flash at the bottom of the wire barrel results from applied crimp pressure and must be within the dimension provided in Section X–X of Figure 5.



WIRE SIZE, AWG	INSULATION DIA RANGE	WIRE BARREL CRIMP		INSULATION BARREL CRIMP
		HEIGHT	WIDTH	WIDTH
28	1.02-0.76 [.040-.030]	0.76-0.64 [.030-.025]	1.12-1.02 [.044-.040]	1.27-1.17 [.050-.046]
26				
24	1.52-1.02 [.060-.040]	0.86-0.76 [.034-.030]	1.45-1.35 [.057-.053]	1.83-1.73 [.072-.068]
22		0.94-0.76 [.037-.030]		
20		1.04-0.94 [.041-.037]		

Figure 5

B. Twist and Roll

There shall be no twist, roll, deformation, or other damage to the mating portion of the crimped contact that will prevent proper mating. See Figure 6.

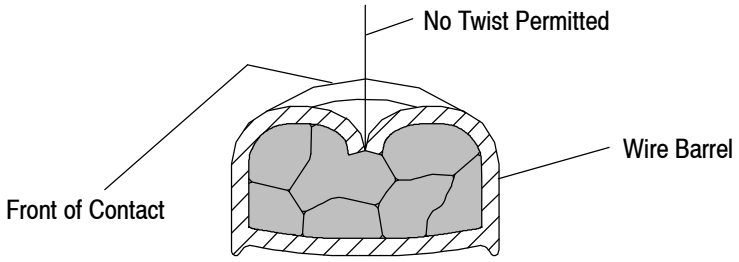


Figure 6

C. Straightness

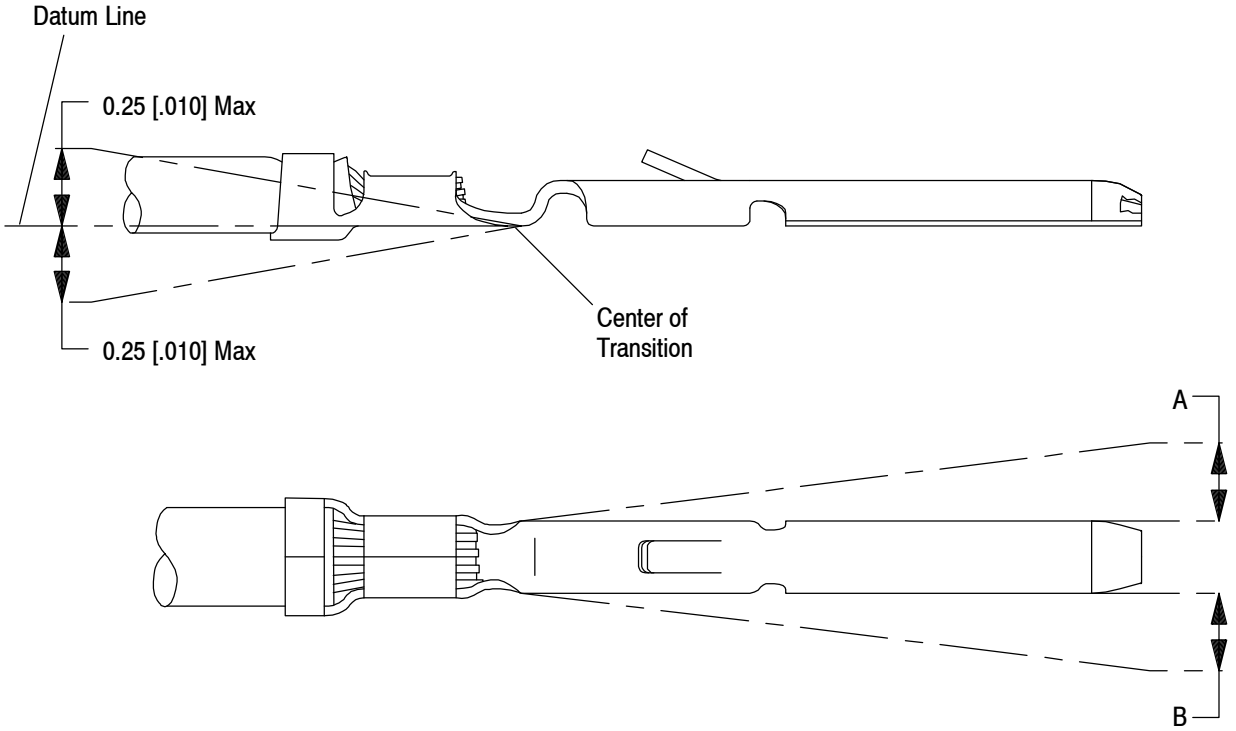
The force applied during crimping may cause some bending between the crimped wire barrel and the mating portion of the contact. Such deformation is acceptable within the following limits.

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 in Figure 7.

2. *Side to Side*

The side-to-side bending of the contact may not exceed the limits provided in Figure 7.



NOTE: The side-to-side bending of the contact shall be such that the difference between the "A" and "B" dimensions does not exceed 0.25 [.010].

Figure 7

NOTE

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

3.7. Tensile Inspection

Crimped contacts should hold the wire firmly and have a crimp pull-out test value meeting that specified in the table in Figure 8.

NOTE

Adjust tensile testing machine for head travel of 25.4 mm [1 inch] per minute. Directly and gradually apply force for one minute.

CRIMP PULL-OUT TEST	
Wire Size, AWG	**Minimum Force, Newtons [Pounds]**
28	12 [2.7]
26	17 [3.8]
24	25 [5.6]
22	40 [9.0]
20	60 [13.5]

Figure 8

3.8. Placement of Crimped Contact in Housing

USB Connectors allow for adaptability of color coded wiring configuration. The wires must be placed in the housing in the order of colors shown in Figure 9.

The contact must be inserted in the back of the cable plug housing and snapped into place. When fully inserted, the locking lance will engage the housing and prevent backing out during mating of the connector. After inserting contact into housing, pull back lightly on the wire to ensure contact is fully seated. In order to ensure mating compatibility, the contacts must be within the dimensions shown in Figure 9.

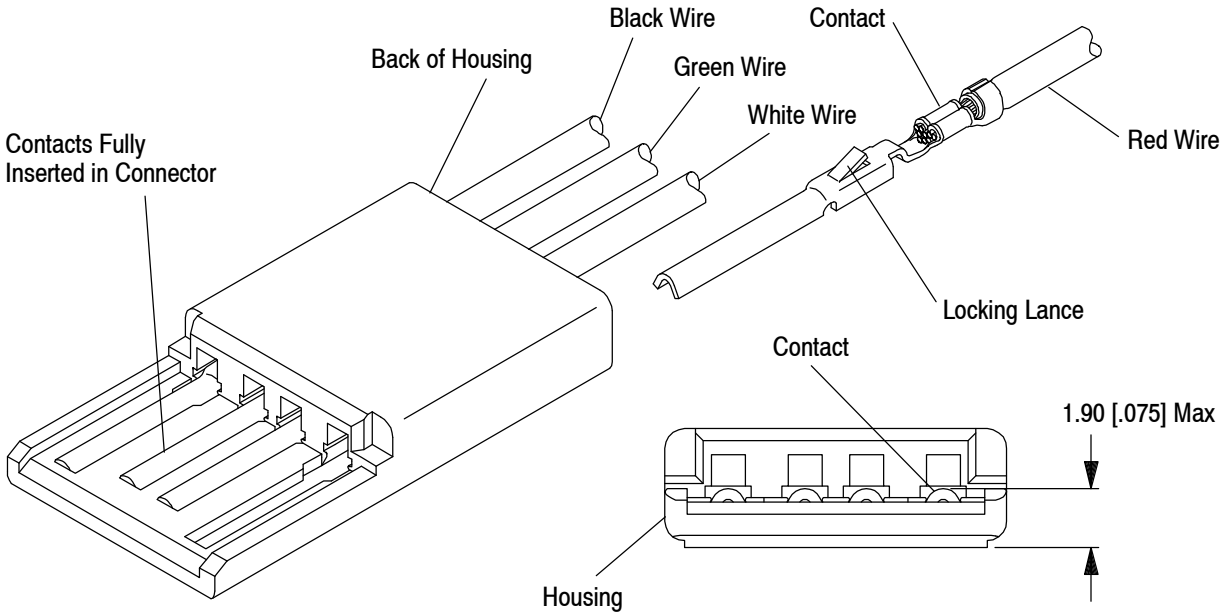


Figure 9

3.9. Overmold Hardware Kit Assembly

The following procedures explain the assembly of the plug housing to the front and back shell components for the overmold assembly kit.

1. Orient the front shell so the wire barrel is facing up. Insert the housing in the rear of the front shell with the open (logo side) of the housing facing down.

2. Guide the housing into the front shell and push the housing until it becomes flush with the front of the front shell. Orient the back shell and place the latches in the corresponding holes in the front shell and close as shown in Figure 10.

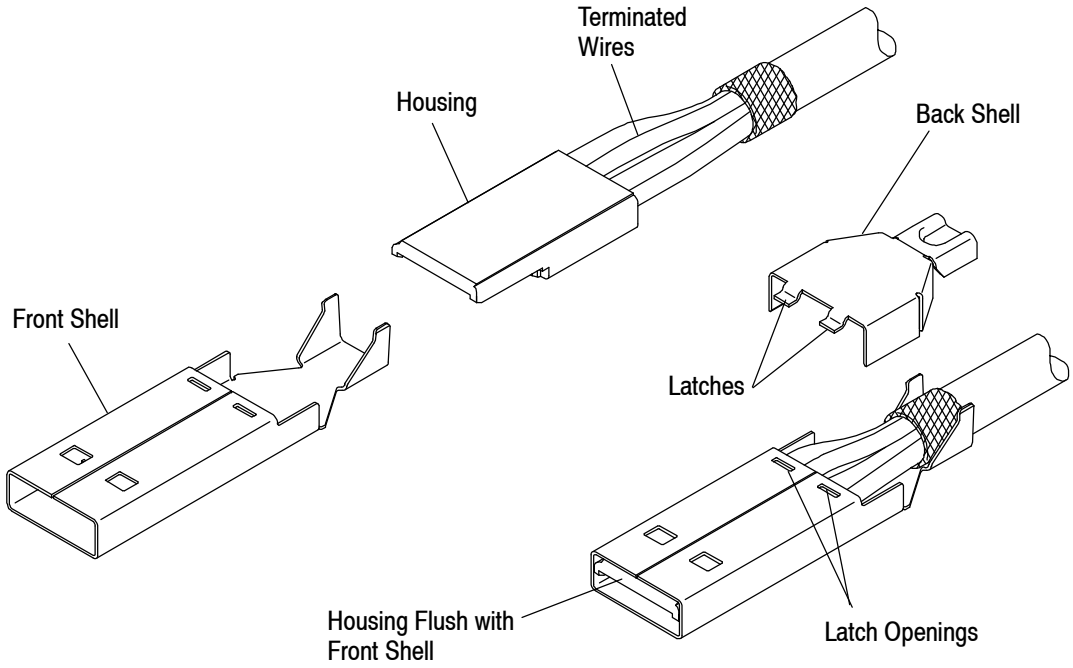


Figure 10

3. Place the unterminated shell assembly in the arbor press where the guides are located and terminate the assembly according to the directions provided with the arbor press. The terminated shell assembly should appear as shown in Figure 11.

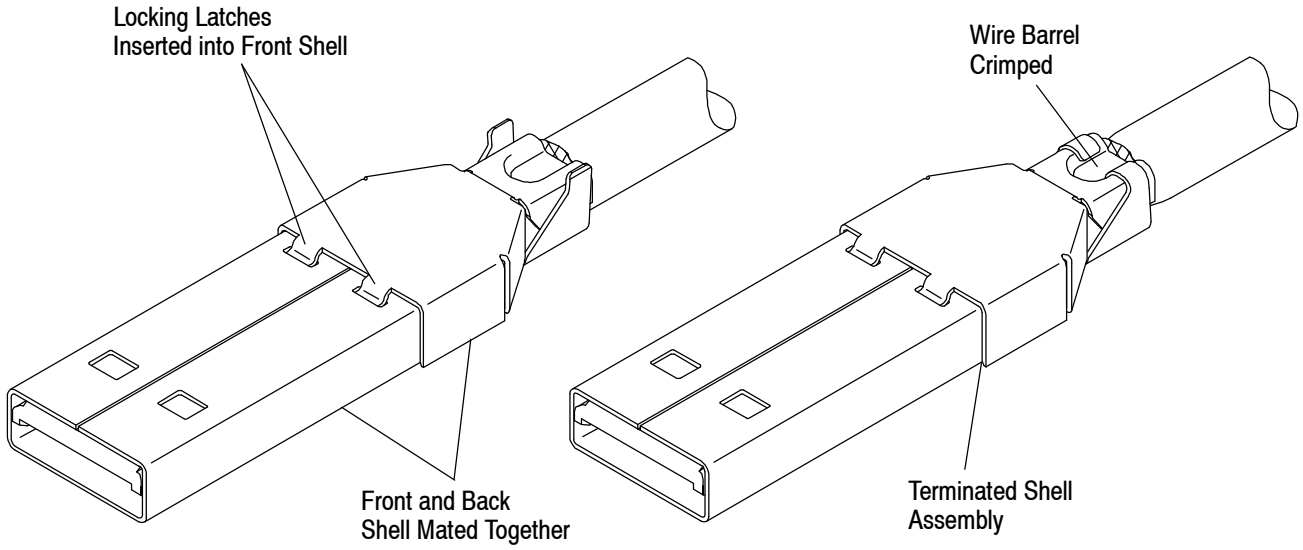
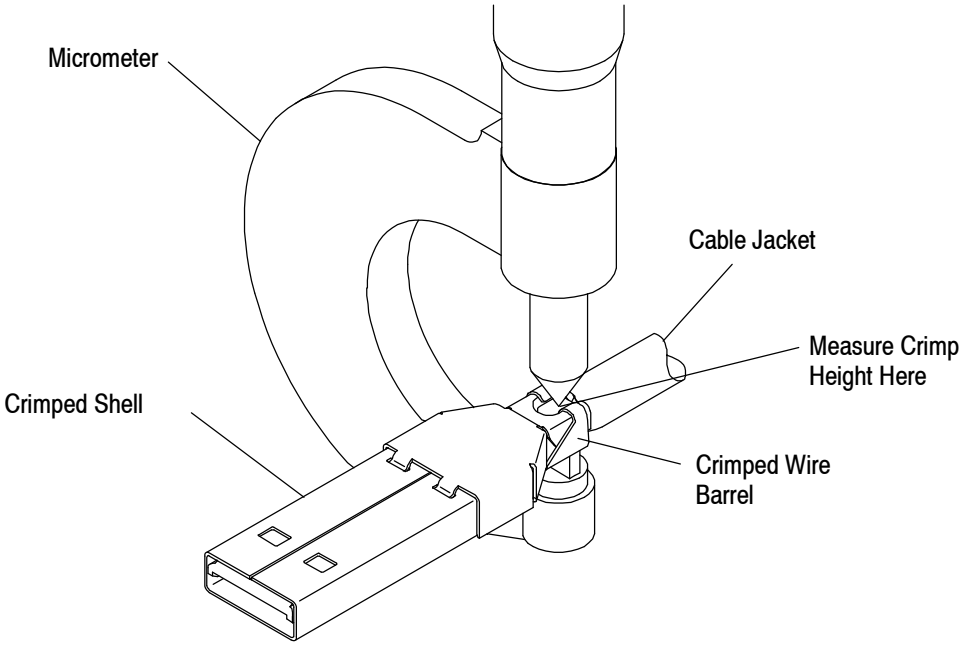


Figure 11

3.10. Checking Cable Crimp Height

Based on the cable size terminated, use the following table to check cable crimp height. The crimp height is measured at the point shown in Figure 12.



USB SHELL CABLE CRIMP HEIGHT			
CABLE DIA	CRIMP HEIGHT	CABLE DIA	CRIMP HEIGHT
3.4 [.134]	3.42 [.135]	4.35 [.171]	4.13 [.163]
3.5 [.138]	3.48 [.137]	4.4 [.173]	4.17 [.164]
3.6 [.142]	3.54 [.139]	4.5 [.177]	4.23 [.167]
3.7 [.146]	3.6 [.142]	4.6 [.181]	4.3 [.169]
3.8 [.150]	3.66 [.144]	4.7 [.185]	4.36 [.172]
3.9 [.154]	3.72 [.146]	4.8 [.189]	4.43 [.174]
4.0 [.157]	3.78 [.149]	4.9 [.193]	4.5 [.177]
4.1 [.161]	3.84 [.151]	5.0 [.197]	4.56 [.180]
4.2 [.165]	3.9 [.154]	5.1 [.201]	4.63 [.182]
4.3 [.169]	3.96 [.156]	5.2 [.205]	4.69 [.185]
4.34 [.171]	3.98 [.156]	5.3 [.209]	4.76 [.187]

Figure 12

3.11. Panel Mounting

Panel mounting is optional for these USB Connectors. For pc board receptacles, it will provide additional support for the solder joints during mating and unmating of connectors. Panel mounting configurations must provide enough space around the connectors to maintain ease of application and performance.

3.12. USB PC Board Receptacle Connectors

PC board connectors are supplied with pre-installed contacts that have right-angle solder tines and boardlocks. They are designed to mate with cable plug connectors that have precision formed, crimp-type contacts inserted into a four-position housing.

3.13. PC Board

A. Material and Thickness

1. Board material will be glass epoxy (FR-4, G-10).
2. Board thickness shall be 1.57 ± 0.18 mm [.062 ± .007 in.].

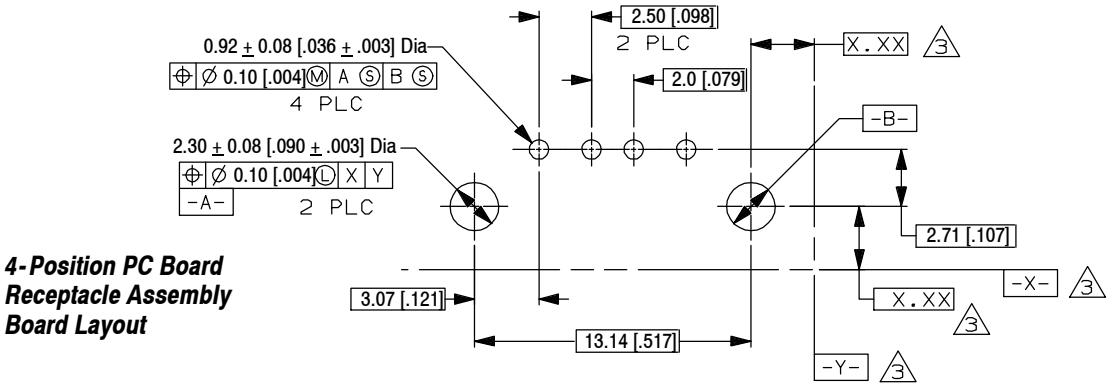
Contact the Product Information Center or the Tooling Assistance Center number listed at the bottom of page 1 for suitability of other board materials or thicknesses.

B. Tolerance

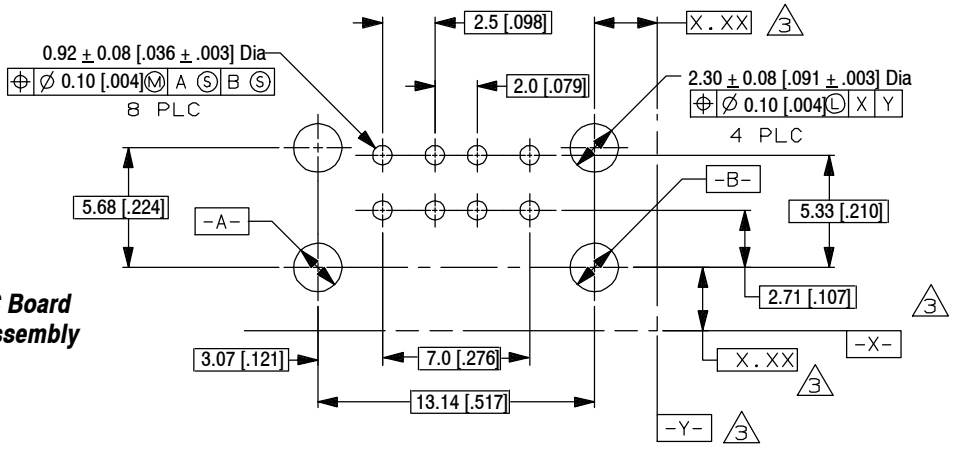
Maximum allowable bow of the pc board shall be 0.03 mm [.001 in.] over the length of the connector.

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. The “X” and “Y” symbols on the pc board layout represent customer established datums. They are the origin for the basic dimension (XXX and YYY datum), the point from which ALL hole positions must be located. Design the pc board using the dimensions provided in Figure 13. The layout shows the top (connector) side of the board.



4-Position PC Board Receptacle Assembly Board Layout



8-Position PC Board Receptacle Assembly Board Layout

3 Datum and basic dimensions established by customer.

Figure 13

3.14. PC Board Contact Tine Holes

The holes in the pc board for the contact tines must be drilled and plated through to specific dimensions. See Figure 14.

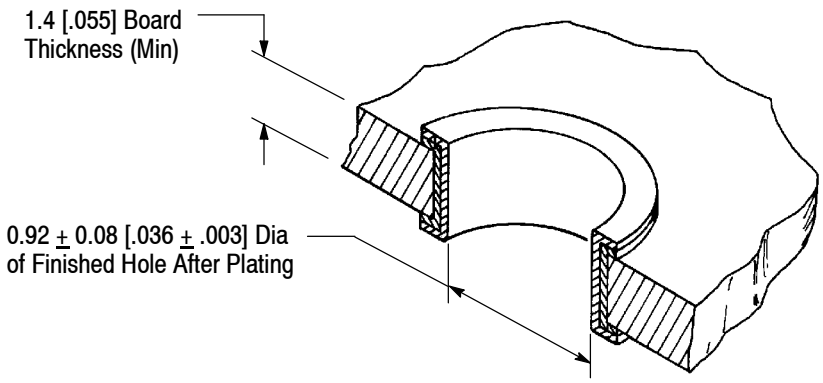


Figure 14

3.15. PC Board Receptacle Connector Retention

Boardlocks designed into the USB Receptacle PC Board Connector have gripping shoulders that pass through the pc board at the same time the contact tines are inserted through the board. They lock into position when the housing is seated on the board.

3.16. PC Board Connector Placement

CAUTION

The connectors should be handled only by the housing to prevent deformation or other damage to the contact tines.

A. Manual Placement

Align the connector contact tines with the appropriate holes in the pc board. Start all solder tines into the board; then, when the boardlock starts to engage the board, 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 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.

After the connector is snapped into the pc board, the boardlocks are soldered with the connector solder tines during the soldering process.

3.17. Soldering

A. Flux Selection

Contact solder tines must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other components mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements. Call the Product Information phone number at the bottom of page 1 for consideration of other types of flux. Some fluxes that are compatible with these connectors are provided in Figure 15.

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

Figure 15

B. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. The following is a listing of common cleaning solvents that will not affect the connectors for the time and temperature specified. See Figure 16.

DANGER

Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the manufacturer's Material Safety Data Sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and Methylene Chloride can be used with no harmful affect to the connectors; however TE does not recommend them because of the harmful occupational and environmental effects. Both are carcinogenic (cancer-causing) and Trichloroethylene is harmful to the earth's ozone layer.

NOTE

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

CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
BIOACT EC-7	Solvent	5	100°C [212°F]
Butyl CARBITOL	Solvent	1	Ambient Room
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous	5	100°C [212°F]
KESTER 5779	Aqueous	5	100°C [212°F]
LONCOTERGE 520	Aqueous	5	100°C [212°F]
LONCOTERGE 530	Aqueous	5	100°C [212°F]
Terpene Solvent	Solvent	5	100°C [212°F]

Figure 16

C. Drying

When drying cleaned assemblies and printed circuit boards, make certain that temperature limitations are not exceeded: -55° to 105°C [-67° to 221°F] for standard temperature products and -55° to 215°C [-67° to 419°F] for high temperature products. Excessive temperatures may cause housing degradation.

D. Soldering Guidelines

USB PC Board Connectors can be soldered using wave, vapor phase (VPR), double sided non-focused infrared reflow processes (IR) or equivalent soldering techniques. Housing material Polybutylene Terephate (PBT) is for wave soldering and liquid crystal polyester is for vapor phase/infrared reflow soldering. The temperatures and exposure time shall be within the ranges specified in Figure 17. We recommend using SN60 or SN62 solder for these connectors.

NOTE

Manual 402-40 provides some guidelines for establishing soldering practices. Refer to Paragraph 2.4, Manuals.

SOLDERING PROCESS	TEMPERATURE		TIME (At Max Temperature)
	CELSIUS	FAHRENHEIT	
WAVE SOLDERING	260❋	500❋	5 Seconds
VAPOR PHASE SOLDERING	215	419	5 Minutes
INFRARED REFLOW SOLDERING	230	446	5 Minutes

❋ Wave Temperature

Figure 17

3.18. Checking Installed Connector

The USB PC Board Receptacle Connector must be seated on the pc board to the dimensions shown in Figure 18.

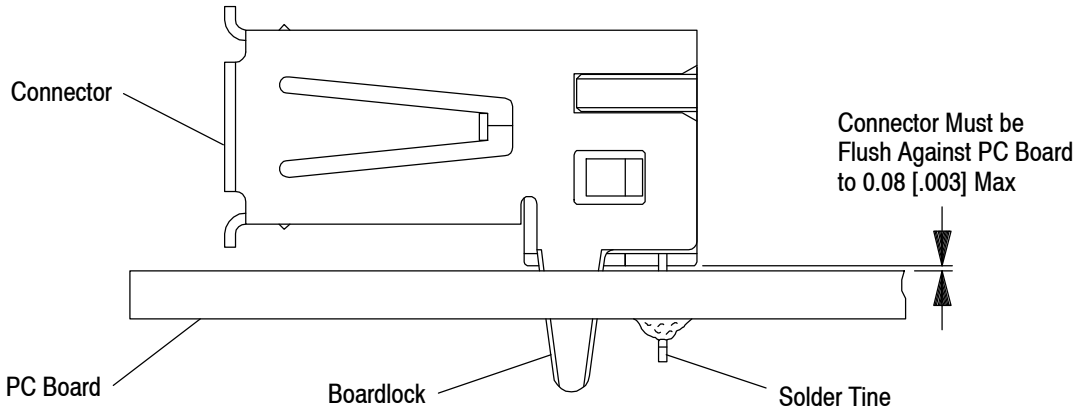


Figure 18

3.19. Polarization

USB Connectors are polarized by the configuration of the mating faces.

3.20. Shielding

These connectors feature tin-plated steel shells which provide continuity for EMC (Electro Magnetic Compatibility) applications. When mated together, shielding and grounding continuity are achieved. Use of the boardlocks provides an additional degree of electrical continuity to any ground path on the pc board.

3.21. Mating of Connectors

To ensure a proper circuit connection, the connectors must be mated as shown in Figure 19.

3.22. Mating Dimension

The dimension in Figure 19 is needed to ensure full mating of connectors. This dimension must be considered when determining location and panel considerations when mounting connectors.

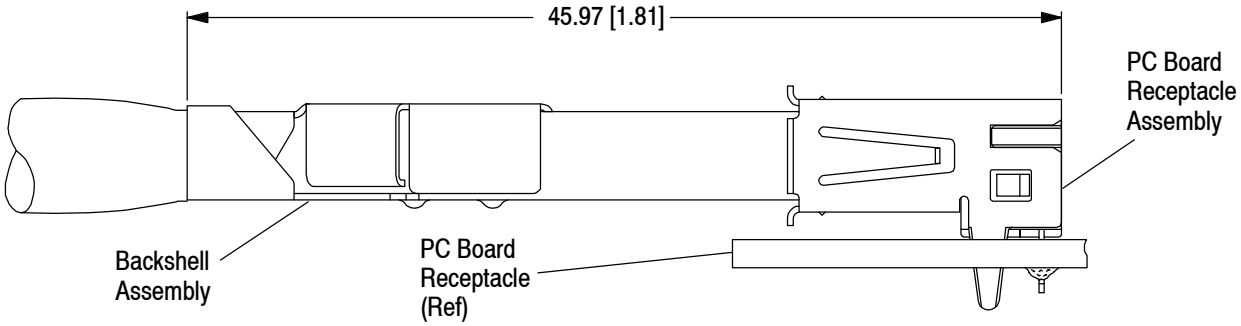


Figure 19

3.23. Connector Spacing

Care must be used to avoid interference between adjacent connectors and/or other components. The information provided in Figure 20 is to ensure proper mating.

NOTE

The information provided are for manual placement of connectors. If robotic equipment is used, other space allowances will be required for the grippers.

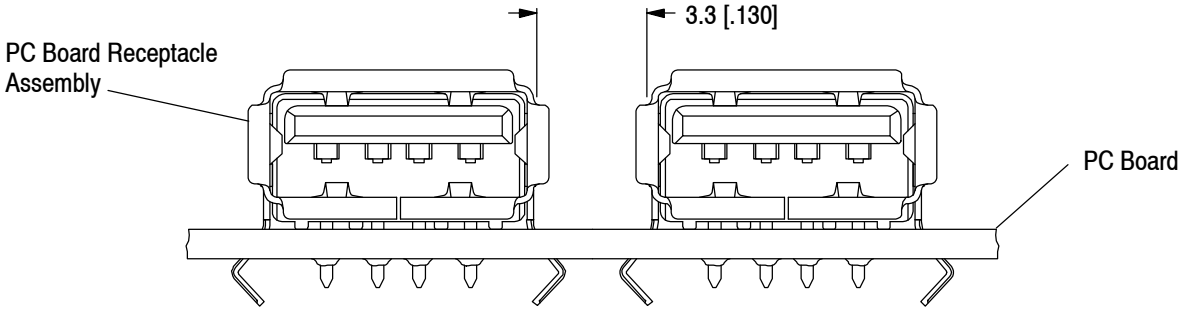


Figure 20

3.24. Repair/Removal

Use an extraction tool to remove individual contacts from connectors for replacement or for relocation to another housing cavity. Extraction Tool 224899-1 (Instruction Sheet 408-4229) is used to extract contacts from plug connectors. See Figure 21. Damaged or worn contacts may be replaced provided there is sufficient slack, after restripping the wire, to insert the new contact into the connector. Refer to Section 5, TOOLING. Damaged pc board connectors may be removed from the pc board by standard de-soldering methods.

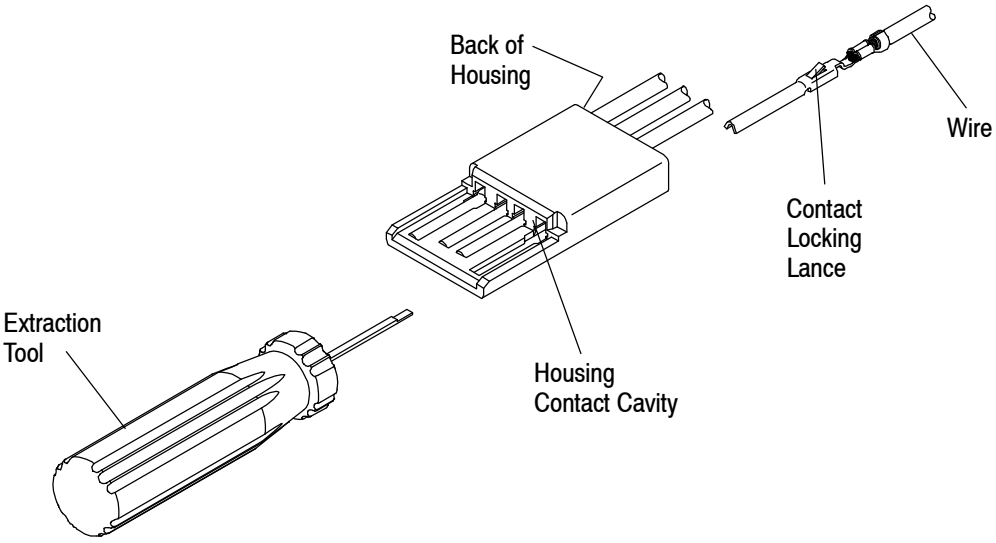


Figure 21

4. QUALIFICATIONS

Universal Serial Bus Connectors have been Component Recognized by Underwriters Laboratories Inc. (UL) in File No. E81956 and also Certified to CSA International by UL by the same file number.

5. TOOLING

Figure 22 provides tool part numbers and instructional material related to USB Connectors.

NOTE

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

- **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.

- **Die Assemblies**
  Dies Assemblies for crimping the contacts are available for the specific ferrule. They are designed for easy installation and removal in hand crimping tool frame assemblies or applicators.
- **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-LECTRIC Terminating Machine PN 565435-5 (Customer Manual 409-5128) 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.

- **Robotic Equipment**
  Robotic equipment for placement of connectors on a pc board must have a true position accuracy of 0.25 mm [.010 in.] to ensure proper location and insertion of the contact tines. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the connector datum surface to ensure reliable connector placement. If you need assistance in setting up prototype or production line equipment, contact TE Tooling Engineering through your local TE Representative or call the Tooling Assistance Center number at the bottom of page 1.
- **PC Board Support**
  A pc board support must be used to prevent bowing of the pc board during insertion of the connectors. It should have a flat surface with holes or a channel large enough to receive the contact tines during installation.
- **Extraction Tools**
  Extraction Tools are designed to release the contacts inside the connector housing without damaging the housing or contacts.

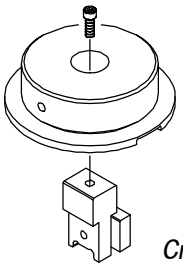
USB PLUG CONTACT TOOLING

WIRE SIZE RANGE, AWG	INSULATION DIA RANGE	HAND TOOL (DOCUMENT)	APPLICATOR (DOCUMENT)	POWER UNIT (DOCUMENT)
28-26	1.02-0.76 [.040-.030]	90712-1 (408-4222)	567842-1	854040-4 (409-5855)
			567911-1	854040-3 (409-5855)
			680156-2 (408-8040)	565435-5 (409-5128)
				354500-1 (409-5842)
24-20	1.52-1.02 [.060-.040]	90713-1 (408-4223)	567843-1	854040-4 (409-5855)
			567912-1	854040-3 (409-5855)
			680157-2 (408-8040)	565435-5 (409-5128)
				354500-1 (409-5842)

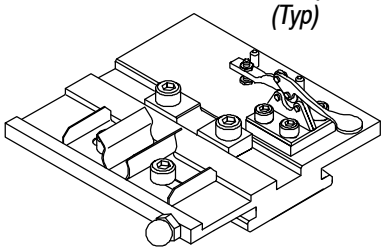
USB BACKSHELL TOOLING

CABLE DIA RANGE	CRIMPER ASSEMBLIES (DOCUMENT)	POWER UNIT (DOCUMENT)
3.4-4.34 [.134-.171]	318865-1, 356171-1	91085-2 (408-7777)
4.35-5.3 [.171-.209]	224840-1, 318870-1, 356174-1, 856684-1 (408-9746)	

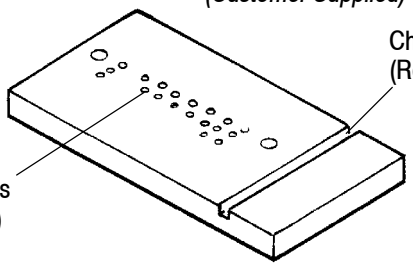
Figure 22 (cont'd)



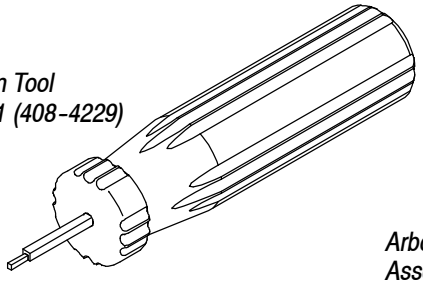
Crimper Assemblies (Typ)

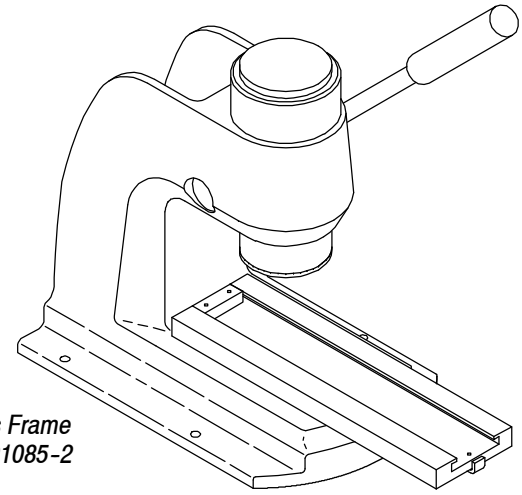


PC Board Support (Customer Supplied)

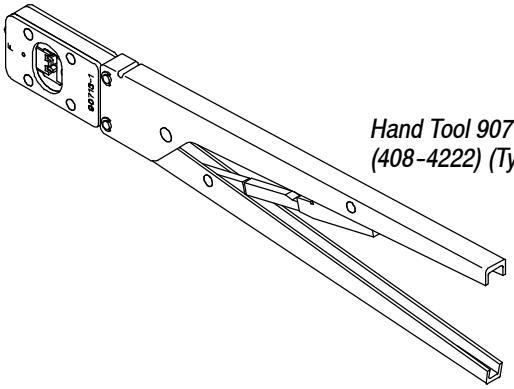


Extraction Tool 224899-1 (408-4229)



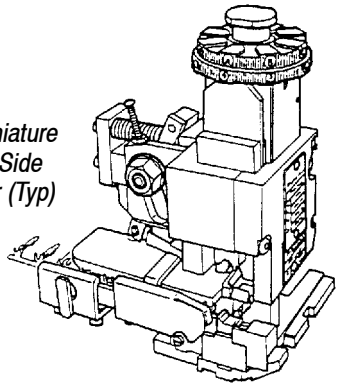


Arbor Press Frame Assembly 91085-2 (408-7777)

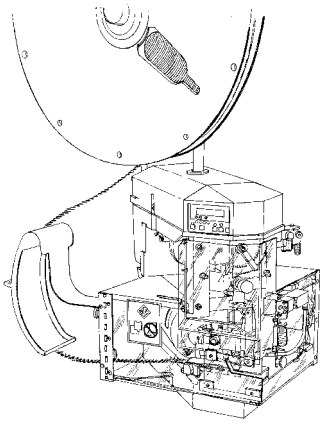


Hand Tool 90712-1 (408-4222) (Typ)

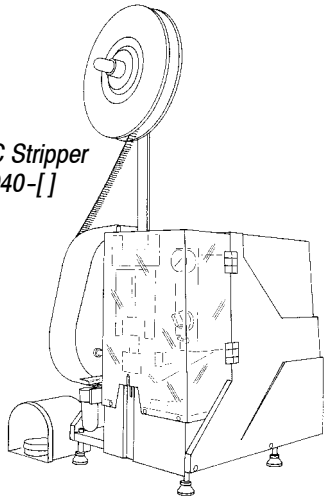
Heavy Duty Miniature Quick-Change Side Feed Applicator (Typ)



AMP-O-LECTRIC Model "G" Terminating Machine 354500-1 (409-5842)



AMP-O-MATIC Stripper Crimper II 854040-[ ] (409-5855)



AMP-O-LECTRIC Model "K" Terminating Machine 565435-5 (409-5128)

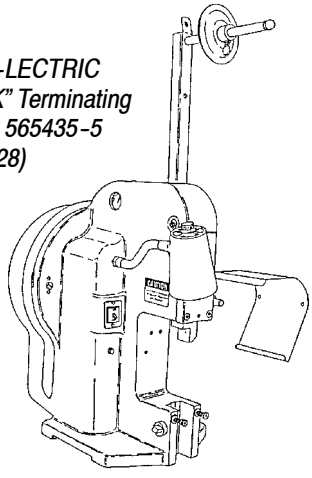


Figure 22 (end)

6. VISUAL AID

Figure 23 shows a typical application of USB Connectors. 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.

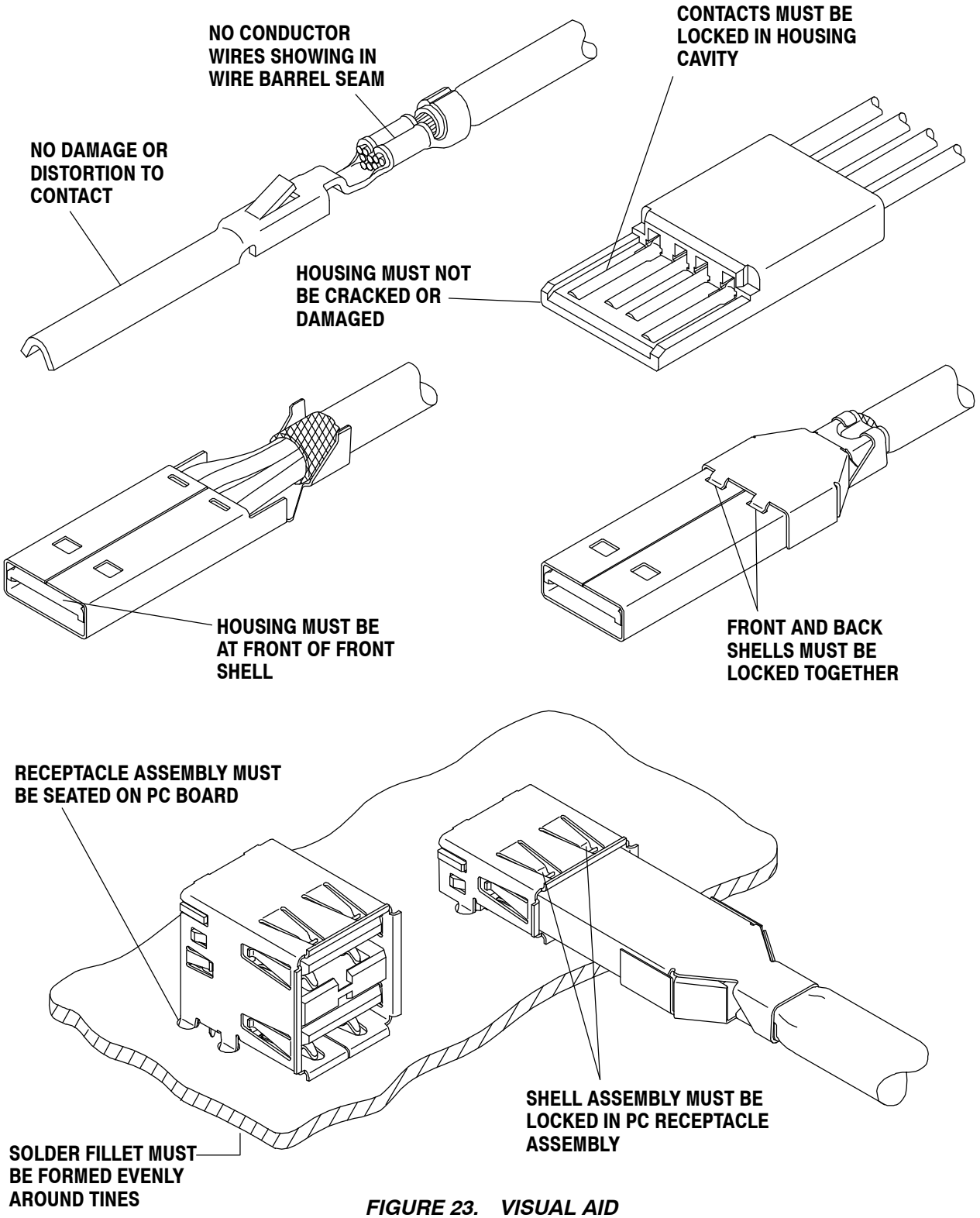


FIGURE 23. VISUAL AID