

NOTE

All numerical values are in metric units. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of ± 0.13 and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of the AMP* 2.5mm Metric Interconnect System (MIS). This system includes two-piece connectors consisting of a crimp-type receptacle that mates with a pin header assembly, and one-piece crimp-type AMP-IN* connectors. Both are available in 2- through 13-position configurations which accept wire size range of 24 to 28 AWG. The connectors are mass-terminated using double-slot insulation displacement technology on 2.5 centerlines. These requirements are applicable to hand, bench, semi-automatic, and automatic application tooling.

The receptacle consists of a housing with a single row of contact cavities containing insulation displacement contacts. These contacts are locked securely in place and are not removable. The pin header assembly consists of a housing preloaded with 0.64 diameter round posts. The posts are designed with a retention leg which holds the pin header assembly for mounting onto the pc board.

The one-piece connector has the combined function of the receptacle and pin header assembly. The contact is of similar design with a bifurcated tip. The tip acts as a spring which allows the contact solder time to be inserted into the pc board without stubbing and retain the connector for mounting on the pc board. These connectors are available in polarized and nonpolarized styles.

When corresponding with AMP personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of these connectors are provided in Figure 1.

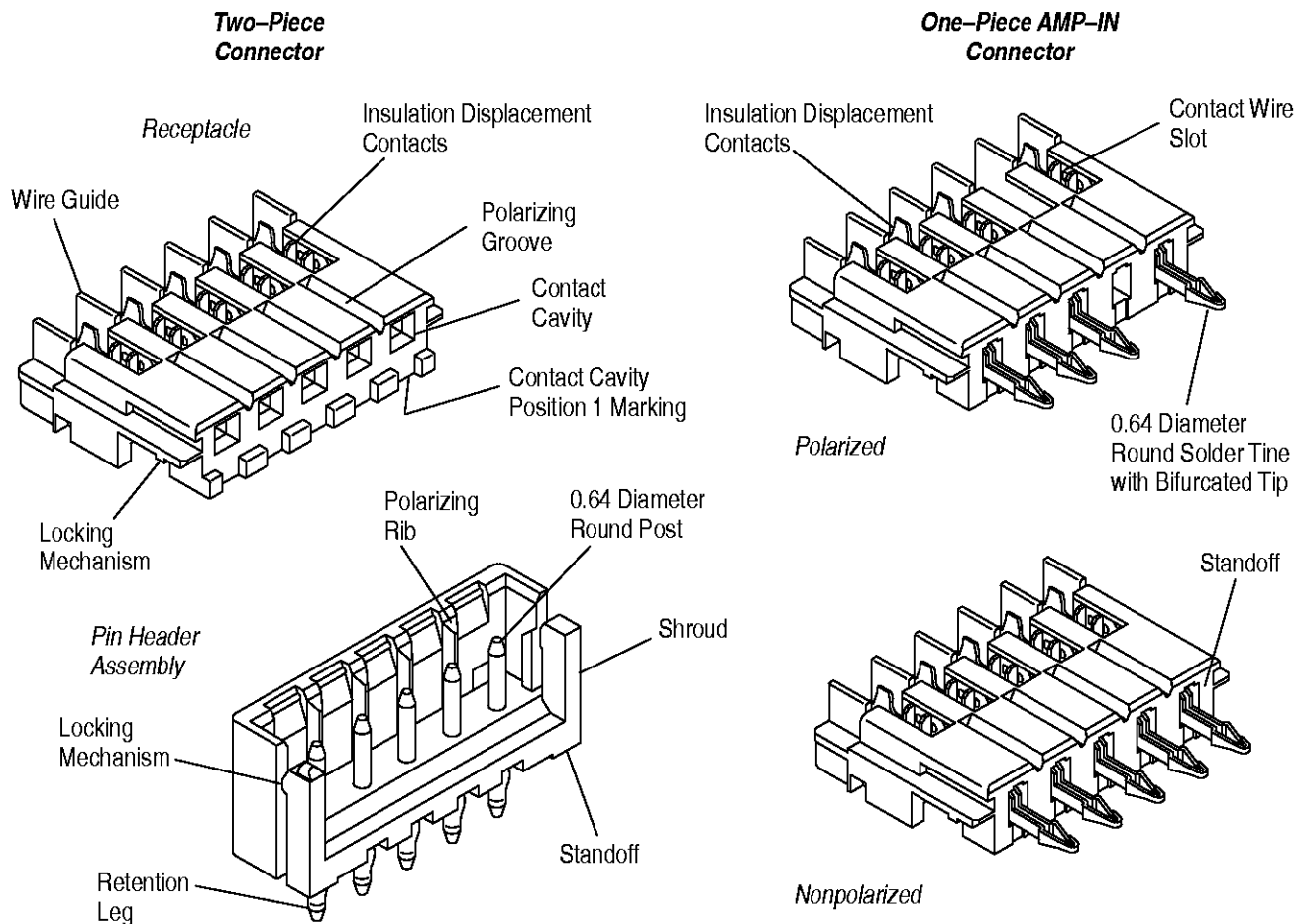


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

The following revision summary of changes and additions have been made to this specification for this revision.

Per EC 0990–0428–96:

- Added information for metric interconnect system
- Changed product part number in Paragraph 2.2
- Added cable jacket strip length and individual wire cut lengths for connector contact cavity positions
- Added UL and CSA file numbers to Section 4
- Added tooling information to Section 5

2.2. Customer Assistance

Product Part Number 177534 and Product Code 1436 are representative of the AMP Metric Interconnect System for IDC and pc board connectors. Use of these numbers will identify the product line and expedite your inquiries through an AMP service network established to help you obtain product and tooling information. Such information can be obtained through a local AMP Representative (Field Service Engineer, Field Applications Engineer, etc.) or, after purchase, by calling the Tooling Assistance Center number at the bottom of page 1.

2.3. Drawings

AMP Customer Drawings for product part numbers 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 other technical documentation supplied by AMP Incorporated.

2.4. Specifications

AMP Product Specifications 108–5385 and 108–5421 provide product performance and test information.

2.5. Bulletins

AMP Corporate Bulletin 52 is available upon request and can be used as a guide to soldering. This bulletin provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is attached to the bulletin as a guide for information on soldering problems.

2.6. Instructional Material

AMP instruction sheets (408–series) and customer manuals (409–series) contain detailed assembly instructions and repair procedures for product and tooling. Documents available which pertain to the Metric Interconnect System for IDC and pc board connectors are:

- | | |
|----------|--|
| 408–4267 | Pistol Grip Head 58584–1 |
| 408–6790 | Pistol Grip Manual Handle Assembly 58074–1 |
| 408–6927 | Design Recommendations for Printed Circuit Board Support Fixture |
| 408–9393 | Pneumatic Power Bench Assembly 58338–1 |
| 409–5746 | Electric Power Unit 931800–1 |

NOTE

Refer to Section 5 for additional tooling information. Contact AMP Tooling Assistance Center for availability and operating procedures.

3. REQUIREMENTS

3.1. Material

The insulation displacement contacts are made of pre-tinned phosphor bronze and the preloaded pin header assembly posts are made of pre-tinned brass. Housings are made of 94V–0 rated nylon.

3.2. Storage

A. Ultraviolet Light

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

B. Shelf Life

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

3.3. Special Features (See Figure 1)**A. Polarization**

The two-piece connector housings are fully polarized by ribs (pin header assembly) and grooves (receptacle) to prevent inadvertent engagement.

The one-piece polarized style connector contains an empty contact cavity.

B. Locking Mechanism

Two-piece connectors are designed with a positive locking mechanism provided on each side of the housing to prevent accidental disengagement of the pin header assembly and receptacle.

C. Shroud

The pin header assembly is shrouded on three sides to protect the posts when engaging the receptacle.

D. Circuit Identification

The end contact cavity is marked on the back of the receptacle and one-piece connector housings to provide circuit identification.

E. Wire Guides

Wire guides are provided on the receptacle and one-piece connector housings behind each contact insulation barrel. The wire guides help position each wire into the contact wire slot ensuring one wire per contact for termination.

F. Standoffs

The pin header assemblies and one-piece connector housings are designed with standoffs to allow easy pc board cleaning after the soldering operation.

3.4. Chemical Exposure

Do not store connectors near any chemical 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

3.5. Wire Selection and Preparation

The preloaded contacts will accept a wire size range of 24 to 28 AWG in solid, stranded and prefused, or overcoated with an insulation diameter range of 1 to 1.5. All wire gauges shall be in accordance with UL Style 1007 (105C rating).

The wire jacket strip length must be sufficient to facilitate wire handling, bottoming of the wire against the wire stop, allowing slack for strain relief, and providing flexibility between connector and wire. The strip length of the wire jacket should be at the dimension shown in Figure 2.

All wires must be proportionately the same length from the center of the connector to ensure even pressure at all termination points and prevent buckling of the wires. When determining wiring positions of a connector with polarization, the polarized position must be counted as a wire position; therefore, the wire cut length for that position would be skipped and the next cut length used. Cut individual wires according to Figure 2.

Discrete wire requires no preparation.

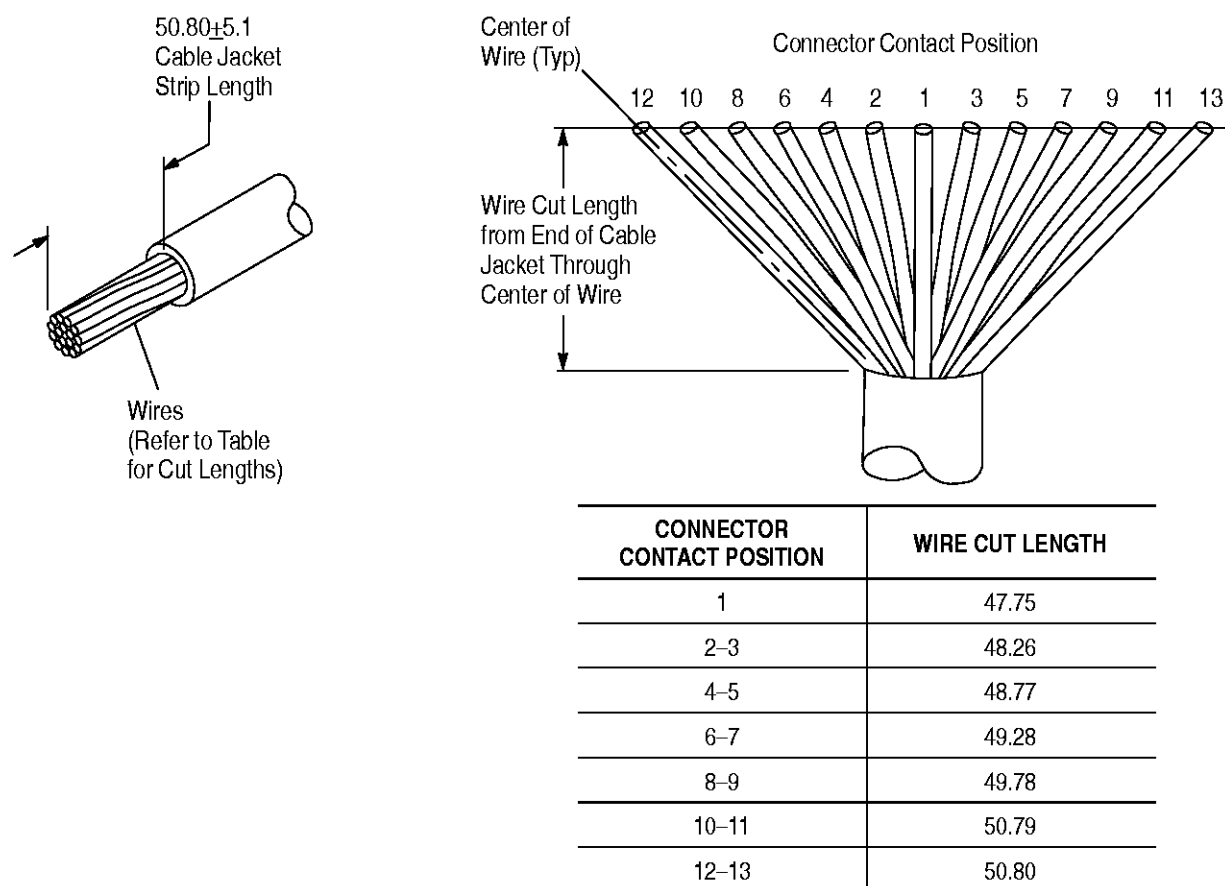


Figure 2

3.6. Crimp Requirements

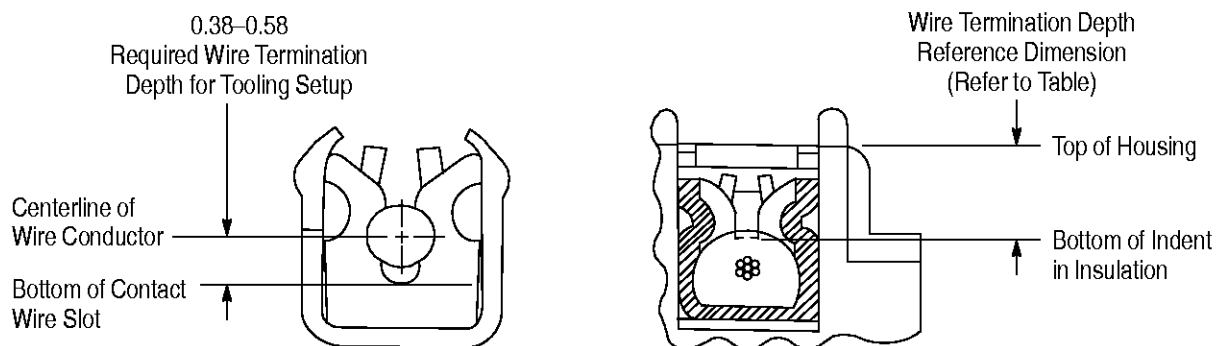
A. Wire Conductors

All termination tooling must be set up to provide the required depth of the wire in the contact wire slots. Measurement of this parameter requires removing the contact from the housing, removing the insulation from the wire, and inspecting the termination depth using a toolmaker's microscope or equivalent. This inspection is destructive to any subsequent use of the contact; however, the dimension controls the ultimate quality of the terminations as shown in Figure 3.

After the tooling has been set up, a *reference* measurement of the wire termination depth can be made that is not destructive to the contact. This reference dimension is measured from the top of the housing to the bottom of the indent in the insulation caused by the tooling. Because the insulation tends to relax, the reference measurement must be made immediately after termination in order to obtain an accurate dimension. The reference dimension for specific wire size and insulation diameter are shown in Figure 3.

NOTE

The reference dimensions must be used for reference only. Final criteria for a quality termination depth is shown in Figure 3.



WIRE		TERMINATION DEPTH REFERENCE DIMENSION
SIZE (AWG)	INSULATION DIAMETER (Max)	
28	1.20	1.25 +0.15/-0.05
26	1.30	1.25 +0.05/-0.15
24	1.42	1.25 +0.05/-0.15

Figure 3

B. Contact Wire Slot

The contact wire slot must not be closed and the upper edges of the slot must be uniform. The beams must not be crushed or nicked. Any gap between the contact beam and the wire insulation not exceeding the thickness of the contact is permitted as shown in Figure 4.

C. Contact Straightness

There shall be no bending of the contact in the connector housing. The contact must be bottomed on the housing surface as shown in Figure 4.

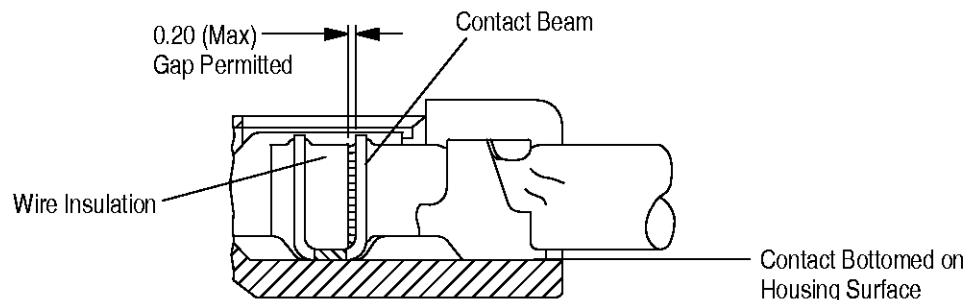


Figure 4

D. Wire Clearance

There must be no clearance between the wire insulation and the contact insulation barrel. The tip of the wire must extend beyond the end of the housing contact slot in each contact cavity at the dimension shown in Figure 5.

E. Contact Insulation Barrel

The contact insulation barrel must be formed adequately over the wire insulation and without the sides of the barrel wrapped over each other. The insulation barrel prevents the wire from moving and provides stability for the insulation displacement termination. The termination must not appear distorted or deformed. See Figure 5.

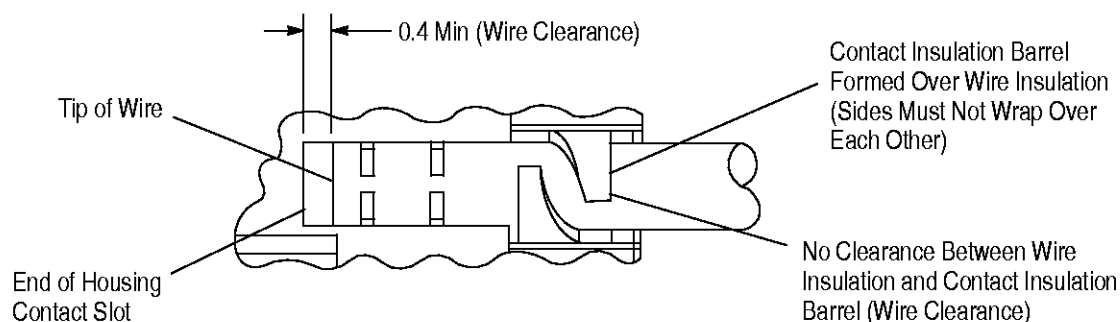


Figure 5

F. Housing Marks

The housing and contact slot must appear intact without evidence of damage or breakage. Light marking on both ends of the housing caused by the tooling is permitted. Scraping on the contact insulation barrel, on the condition that the plated surface is not peeled off, is also permitted. Refer to Figure 6.

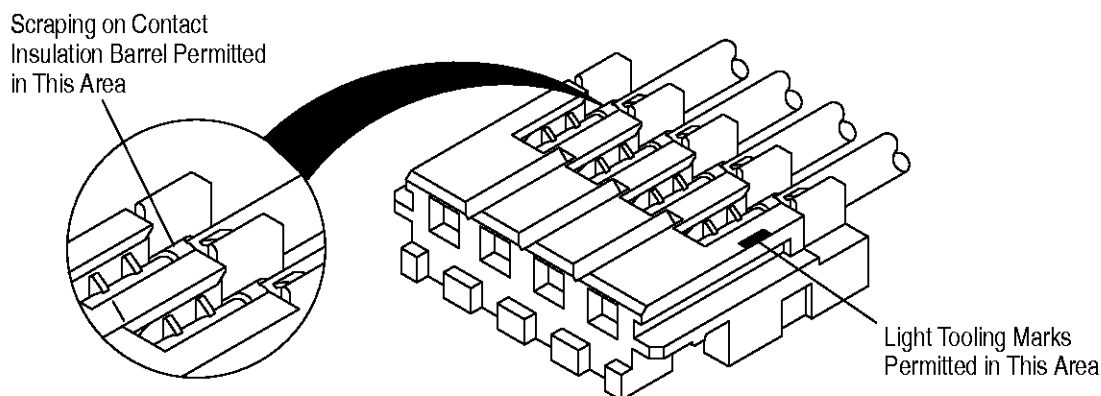


Figure 6

3.7. PC Board

A. Material and Thickness

Board material must be glass epoxy (FR-4, G-10). Consult AMP Engineering for suitability of other board materials. The pin header assemblies and one-piece connectors are designed for 1.0– through 1.6–thick pc boards.

B. Connector Spacing

The space needed between connectors must be checked before making placement layout on the pc board. The dimension, which does not include space requirements for other pc board components, tooling, or multiple connectors between two pc boards, is provided in Figure 7.

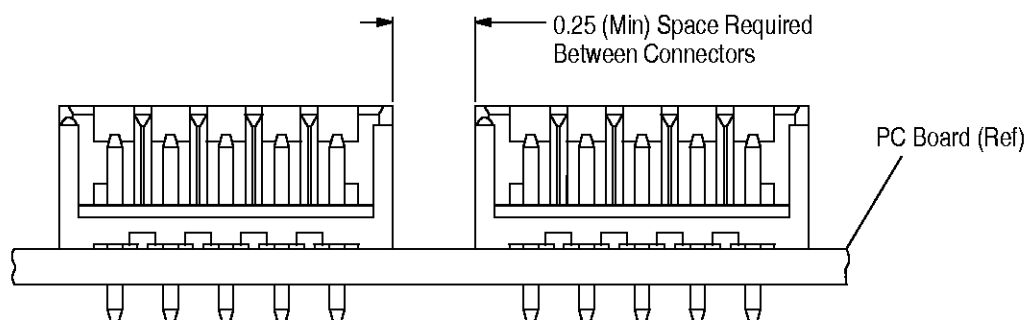


Figure 7

C. PC Board Hole Dimensions

These connectors may be used with or without plated through holes. If plated, the drilled or punched hole size, plating types, and plating thickness are dependent on the application requirements. The finished hole size must be as stated to provide unrestricted insertion and ensure adequate application of solder to the solder tines. See Figure 8.

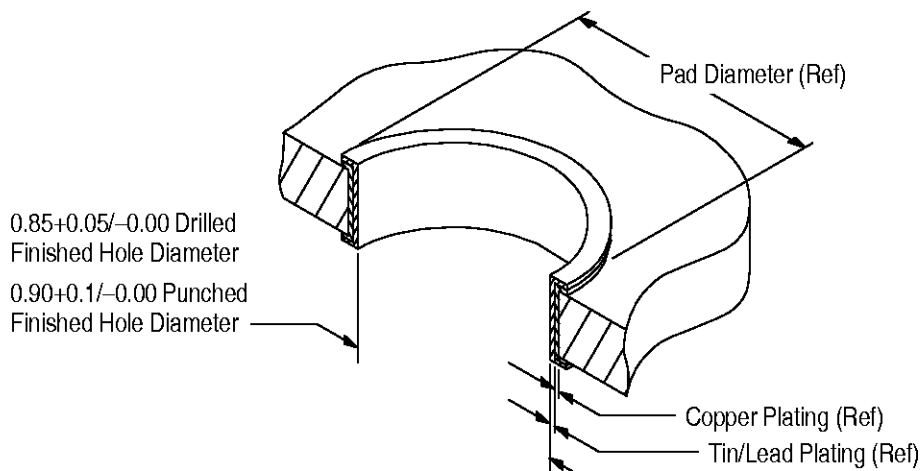


Figure 8

D. Layout

The recommended pc board layouts for the pc board pin header assemblies and one-piece connectors are shown in Figure 9.

Recommended PC Board Layout

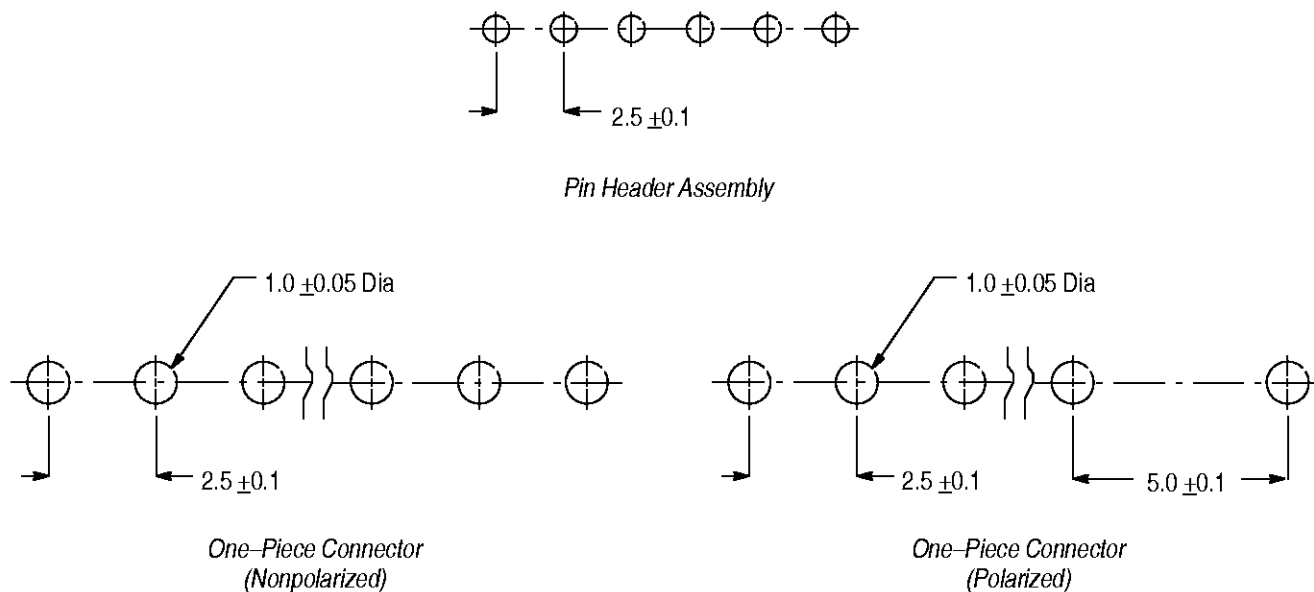


Figure 9

3.8. Soldering

A. Flux Selection

Contact solder lines 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. Some fluxes that are compatible with these connectors are provided in Figure 10.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER ⁸⁸	ALPHA [■]
Type RMA (Mildly Activated)	Mild	Noncorrosive	186	611

⁸⁸ Product of Kester Solder Co.

■ Product of Alphametals Inc.

Figure 10

B. Soldering Guidelines

The connectors can be soldered using wave or equivalent soldering techniques. Refer to AMP Corporate Bulletin 52 for soldering guidelines. SN60 or SN62 solder is recommended for use on these connectors.

SOLDERING PROCESS	WAVE TEMPERATURE		TIME (At Maximum Temperature)
	CELSIUS	FAHRENHEIT	
Wave Soldering	260	500	5 Seconds

Figure 11

C. Soldering Process

Solder pads must be fluxed before soldering using only a mildly activated rosin base flux. Selection of flux will depend on the type of pc board and any components mounted on the board. Flux must be compatible with the wave solder line and with manufacturing and safety requirements.

CAUTION

Flux and solder contamination of the internal components must be avoided to ensure reliable performance of the connector.

D. Recommended Solder Paste Characteristics

1. Alloy Type: either 63% Sn/37% Pb or 60% Sn/40% Pb
2. Flux: RMA type
3. Solids by weight: 85% minimum
4. Mesh particle size: –200 to +325 designation
5. Minimum viscosity of screen print: 5×10^5 cp (centipoise)
6. Minimum viscosity of stencil print: 7.5×10^5 cp (centipoise)

E. Solder Paste Volume

Contact solder pad: 0.603 mm^3 [$.0000367 \text{ in.}^3$] per contact

NOTE

Solder paste volume may vary depending on solder paste composition.

F. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Cleaning methods depend on the type of flux used. Consult the supplier of solder and flux for recommended cleaning solvents. The following are common cleaning solvents that can be used on these connectors at the times and temperatures listed without any adverse effects on contacts or housing. See Figure 12.

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 Ambience	
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

■ Product of Fry's Metals, Inc. ◆ Product of Petroferm, Inc. ● Product of Union Carbide Corp. ⚡ Product of Litton Systems, Inc.

Figure 12

DANGER

Consideration must be given to toxicity and other safety and health requirements as recommended in the Material Safety Data Sheet (MSDS) supplied by the solvent manufacturer.

NOTE

If you have a particular solvent that is not listed, consult an AMP Representative before using it with these connectors.

G. Drying

When drying cleaned assemblies, make certain the recommended temperature limitations of -25° to 105°C [-77° to 221°F] are not exceeded. Excessive temperatures may cause connector degradation.

3.9. Connector Placement

Pin header assemblies and one-piece connectors can be placed on the pc board by hand or by robotic equipment equipped with a vacuum pickup. Make sure that the Number 1 contact is oriented to align with the Number 1 hole in the pc board, then start the row of contacts into the pc board holes. Slowly rotate the connector to the other side while making sure all contacts enter their respective holes in the pc board, then seat the connector housing on the pc board.

NOTE

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

The robotic equipment must be adjusted to feed, pick up, and place connectors on the pc board with an accuracy of 0.25. The connector datum surfaces detailed on the customer drawing will ensure correct placement of the connector.

3.10. Mating and Unmating (Two-Piece Connectors)

The receptacle is placed flush on the pin header assembly until a "clicking" sound is heard. The pressure used to mate and unmate connectors must be applied evenly and in-line with the connectors to prevent deformation or other damage to the contacts, housing, or surrounding board components. The knifing or peeling action of applying force to one end or one side must be avoided.

3.11. Checking Installed Connector

All solder joints should conform to those specified in AMP Workmanship Specification 101-21 and all other requirements specified in this document. The housing standoffs must be seated on the pc board not exceeding the dimension shown in Figure 13.

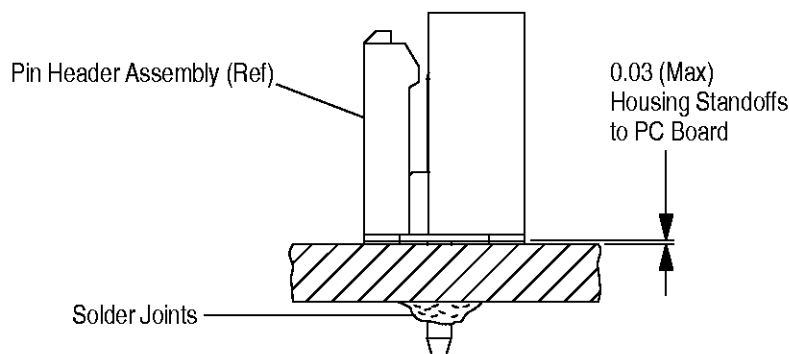


Figure 13

3.12. Repair

These connectors will require the desoldering of all contact solder tines, removing and discarding the damaged connector, and replacing it with a new one. The contacts are not removable from the housings.

4. QUALIFYING SUPPORT

AMP 2.5mm MIS connectors are certified by Canadian Standards Association (CSA) File LR7189 and recognized under the Component Program of Underwriters Laboratories Inc. (UL) File E28476.

5. TOOLING

5.1. Power Units and Manually-Operated Tooling

Pneumatic and electric-powered bench machines and manually-operated tooling are available for production needs. The power units and manual assembly are fitted with a terminating head to terminate discrete wire or jacketed wire with insulated conductors onto the connector assemblies, using the insulation displacement contact terminating technique. Machine and tooling part numbers and instructional material, packaged with the tooling, are shown in Figure 14.

NOTE

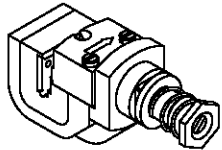
AMP DECAM* D-1A Machine 934155-1 and MIS Air Mini-Press 1-909190-3 terminate wire sizes 28 through 24 AWG only. The DECAM D-1A machine is designed for high-volume production.

5.2. PC Board Support

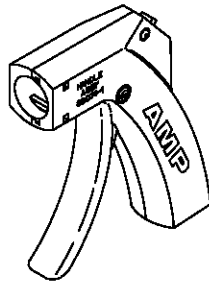
A pc board support must be used to prevent bowing of the pc board during placement of the connectors on the pc board and to allow the contact solder tines to go through the pc board without deformation. The support should have a flat surface with holes or a channel large enough to receive the contact solder tines during installation. Refer to 408-6927.

5.3. Robotic Equipment

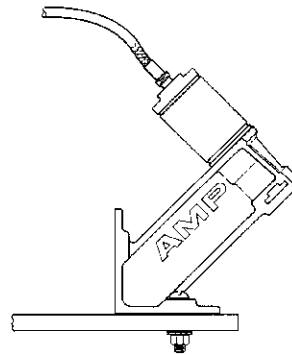
Robotic equipment for placement of connectors on a pc board must have a true position accuracy of 0.25 to ensure proper location and insertion of the contact solder tines. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the connector datum surface to ensure reliable connector placement. AMP Tooling Engineers have designed machines for a variety of application requirements. If you need assistance in setting up prototype or production line equipment, contact AMP Tooling Engineering through your local AMP Representative or call the AMP Tooling Assistance Center number at the bottom of page 1.



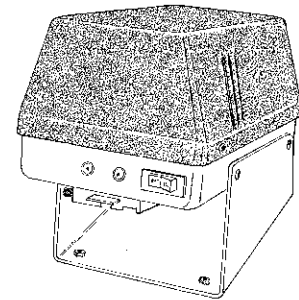
*Pistol Grip Head
58584-1 (408-4267)*



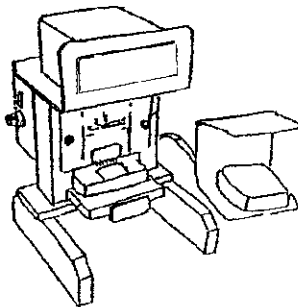
*Pistol Grip Manual Handle
Assembly 58074-1
(408-6790)*



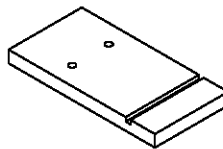
*Pneumatic Power Bench
Assembly 58338-1
(408-9393)*



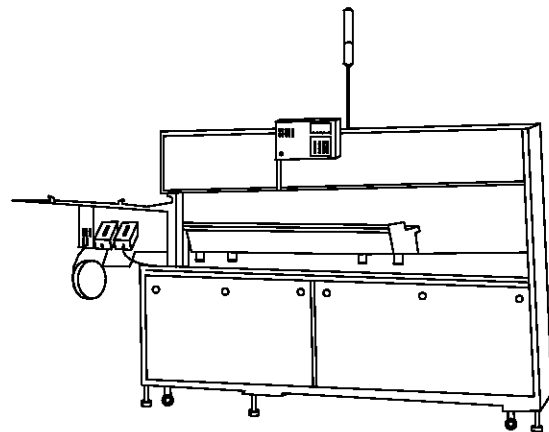
*Electric Power Unit
931800-1 (409-5746)*



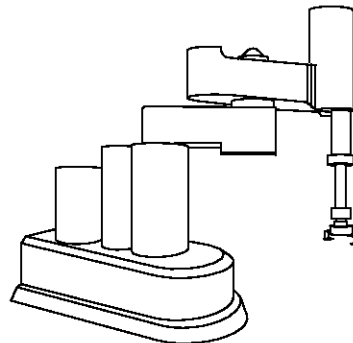
*MIS Air Mini-Press 1-909190-3
(Contact AMP Tooling Assistance
Center for availability and instruction)*



*PC Board Support
(Designed Upon Request)
(408-6927)*



*DECAM D-1A Machine 934155-1
(Contact AMP Tooling Assistance
Center for availability and instruction)*



*Robotic Equipment
(Designed Upon Request)*

Figure 14

6. VISUAL AID

The illustration below shows a typical application of the 2.5mm Metric Interconnect System for IDC and vertical pc board 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.

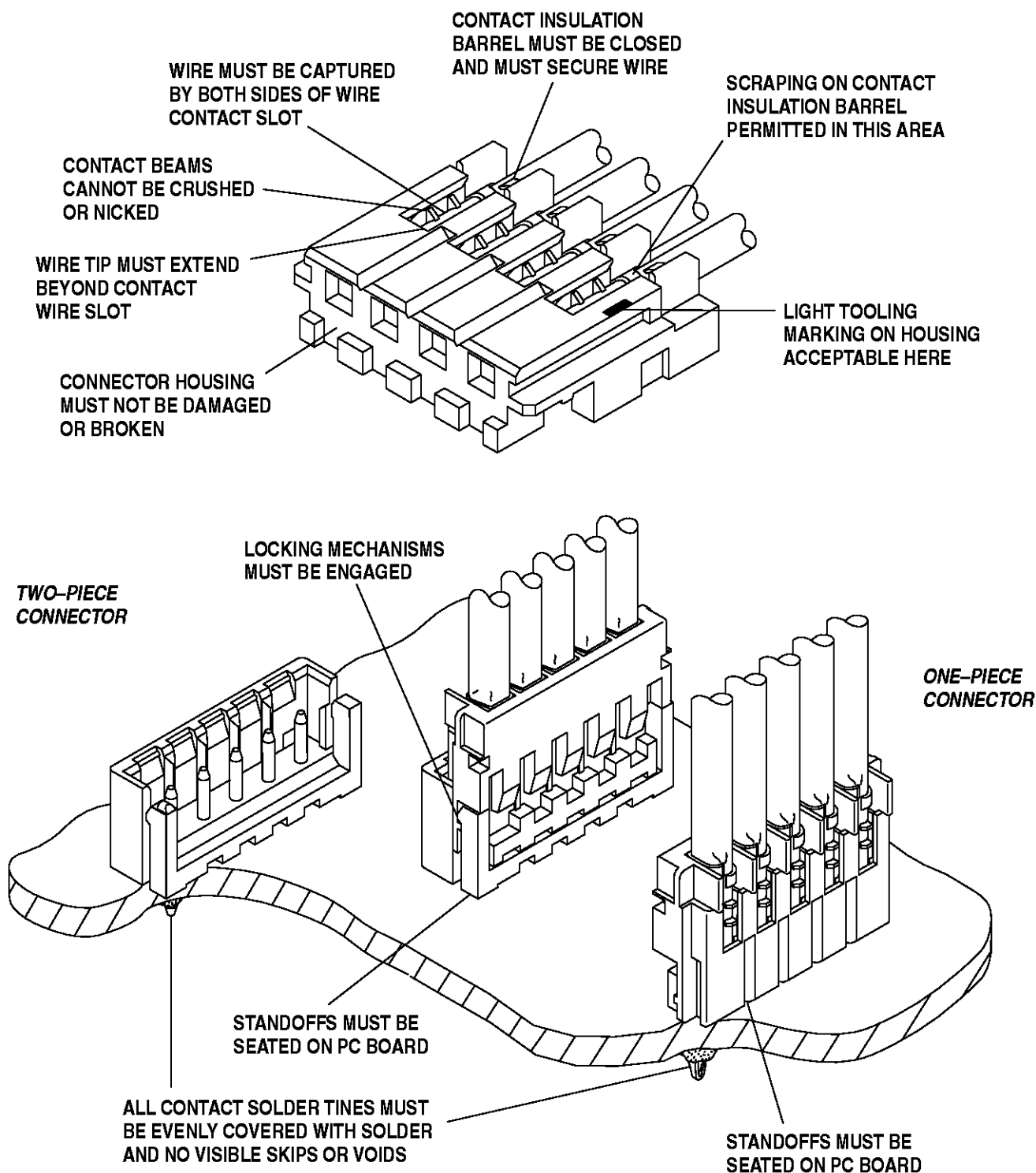


FIGURE 15. VISUAL AID