

Metrimate Self-Locking 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 [± 0.005] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers requirements for the application of Metrimate self-locking connectors. They are true metric specification connectors designed for panel, free-hanging, or printed circuit (pc) board application.

All connector housings are made of UL rated 94V-0 thermoplastic for high electrical performance and maximum economy. Except for preloaded versions, the housings accept combinations of contacts for mixing power and signal circuits.

Square grid connectors are available in 4-, 6-, 9-, 12-, 18-, 24-, and 36-position plug and receptacle housings; they can be panel-mounted or used for free-hanging applications. Square grid pc board-mount pin headers and socket headers are available in matching position configurations.

In-line connectors are available in 1-, 3-, 6-, 10-, and 16-position free-hanging plug and receptacle housings.

The single-position hermaphroditic housing accepts one pin or socket and mates with itself. It is available in two configurations: with positive latch, or with breakaway latch.

In-line pc board-mount pin headers or socket headers are available in straight-through and right-angle versions with 3, 6, 10, and 16 positions. Pin headers and socket headers do not mate.

Special in-line connectors are also available in 5.08 [.200] centerline versions. They are 6-, 10-, and 19-position plug housings and mating right-angle pin headers.

All Metrimate connector plug and receptacle housings are repairable and come without contacts, which must be ordered separately. See Chart on Page 9 for contact wire selection.

All Metrimate pin headers and socket headers are preloaded.

Figure 1 shows several types of connector configurations and terms of their features. These terms will be referred to throughout this document and should be used when consulting with Representatives.

Revision Summary

Revisions to this application specification include:

- Changed company name and logo

SQUARE GRID CONNECTORS

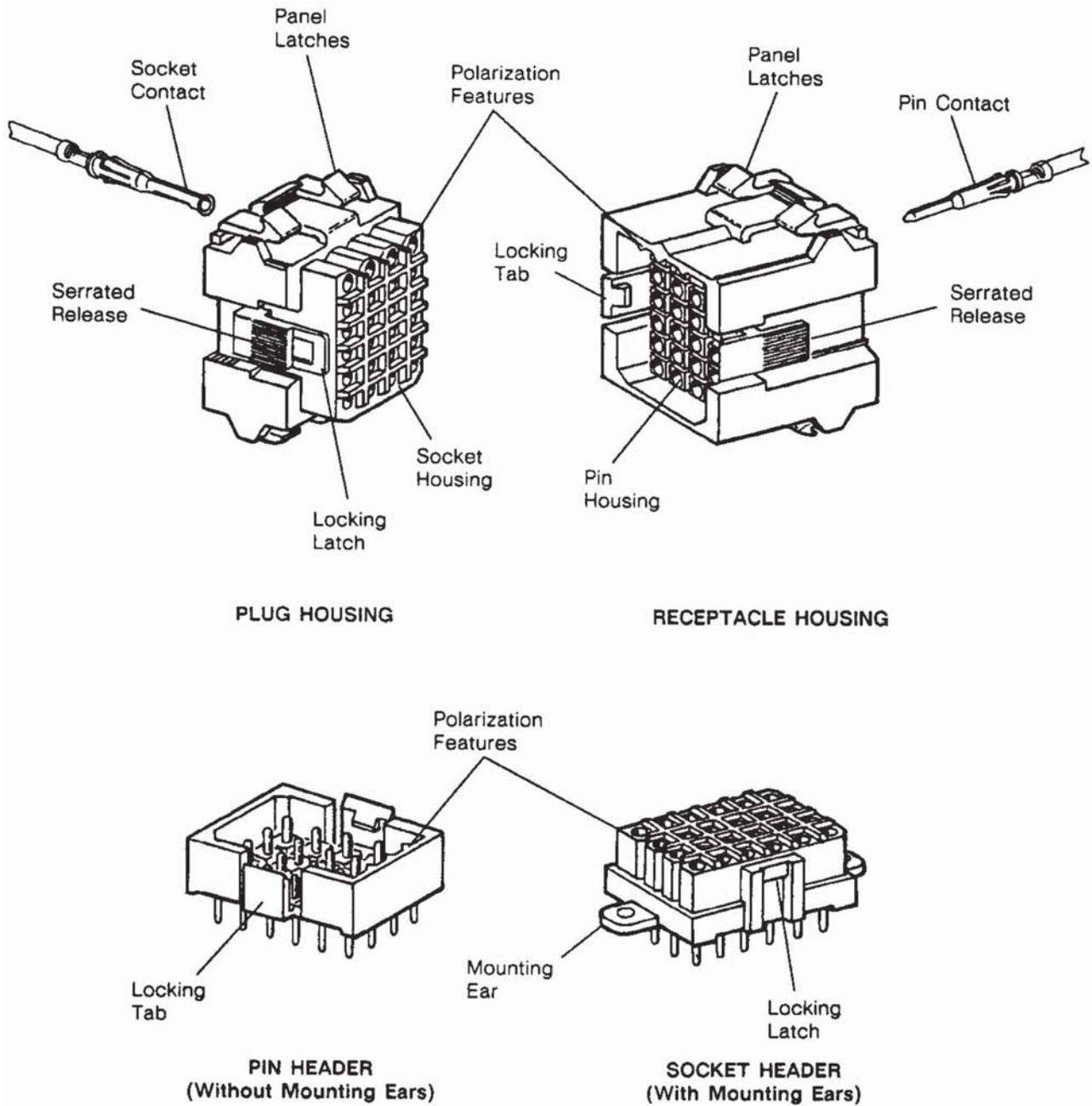
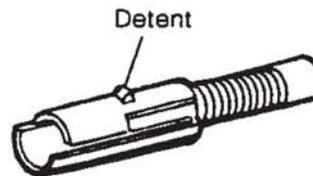
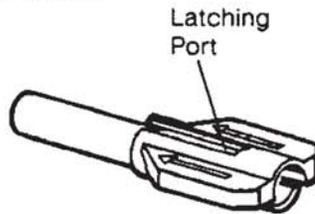
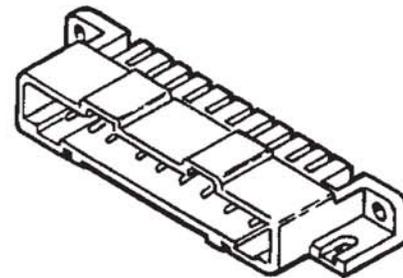
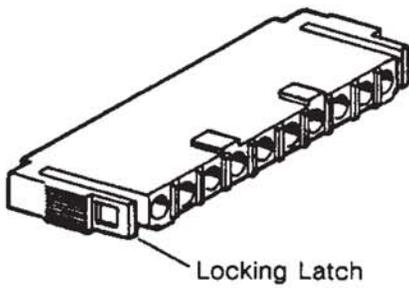
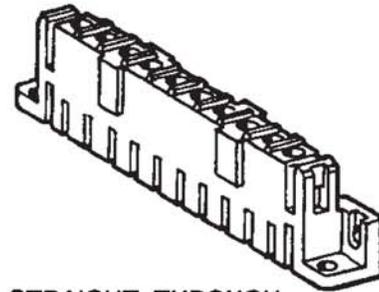
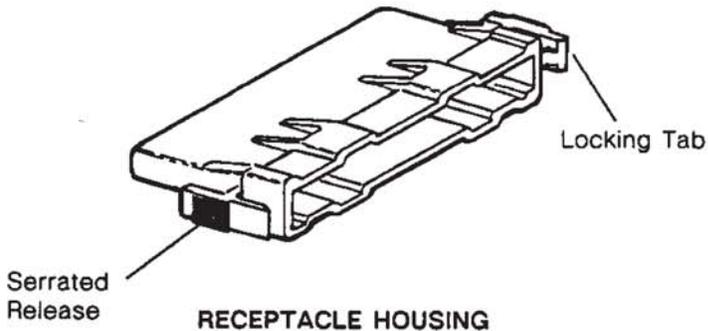


Fig. 1. Product Features (continued on next page)

IN-LINE CONNECTORS



SINGLE-POSITION HERMAPHRODITIC HOUSING

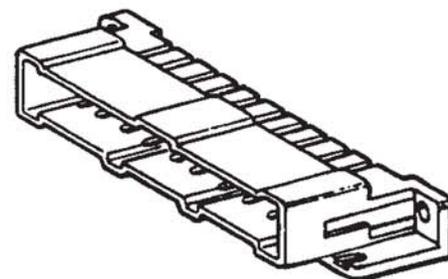
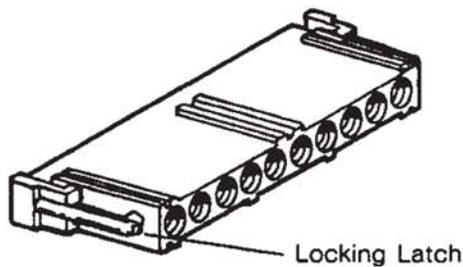


Fig. 1. Product Features (end)

2. REFERENCE MATERIAL

2.1. Customer Assistance

Product Part Number 207015 and Product Code 5019 are representative of Metrimate 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 Representative

2.2. Engineering Drawings

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

2.3. Specifications

Product Specifications provide performance test information and quality requirements. Application Specifications provide application requirements and reference materials.

A. Product Specifications:

- 108-10033 – Metrimate Connectors
- 108-10039 – Type II Screw Machine Contacts
- 108-10042 – Type III+ Contacts
- 108-12011 – Subminiature COAXICON* Connectors

B. Application Specification:

- 114-10004 – Type III+ Contacts
- 114-10006 – Type III+ and VI, Using Hand Tool No. 90277-1
- 114-10007 – Type VI Insulation Grip Contacts
- 114-10026 – Type II Screw Machine Contacts

2.4. Instructional Material

Instruction Sheets (IS) contain detailed assembly instructions and repair procedures. Customer Manuals (CM) and Application Instruction Sheets (AI) provide information for machine setup and operation procedures.

A. Instruction Sheets:

- IS 7846 – Metrimate Connectors (Square Grid)
- IS 1379 – Pin and Socket Contacts
- IS 7347 – Insertion Tool (Pin and Socket Contacts)
- IS 1216 – Extraction Tool (Type III+ and Subminiature COAXICON Contacts)
- IS 2024-2,3 – Subminiature COAXICON Contacts
- IS 2484 – Cable Preparation and Terminating Procedures for Dual Coaxial Cables Size RG 178 or 196 with Subminiature COAXICON Contacts
- IS 6610, IS 6613, IS 6614, IS 7414, IS 7574, IS 1786, IS 7773 – Hand Tools

B. A Customer Manuals:

- CM 5619 – AMPOMATOR* CLS Model II Lead Making Machine
- CM 5128 – AMP-O-LECTRIC* Terminating Machine
- CM 5651 – AMP-O-MATIC* Stripper/Crimper Machine

C. Applicator Instruction Sheets:

- AI 8040 – Heavy Duty, Side Feed, Miniature, Quick-Change Applicators with Mechanical Feed System for Crimping Contacts

2.5. Soldering Information

Bulletin No. 52 is available upon request and can be used as a guide in soldering. This bulletin provides information on various flux types and characteristics along with commercial designation and flux removal procedures. A checklist is attached to the bulletin as a guide for information on soldering problems.

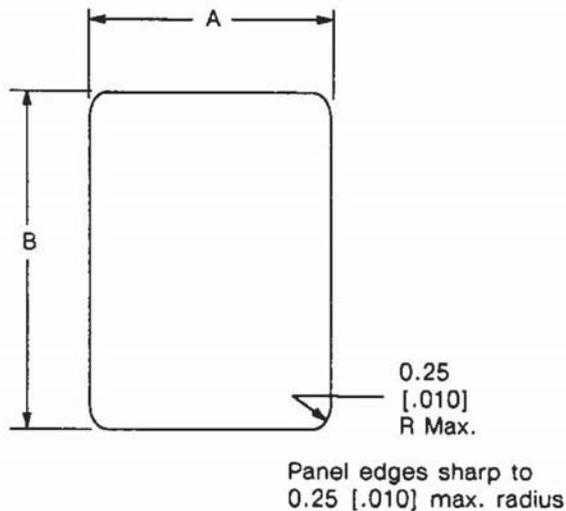
3. REQUIREMENTS

3.1. Mounting Requirements (Square Grid Connector)

The plug or receptacle may be front or rear panel-mounted using the snap-in feature. For front mounting, align connector with front of panel; for rear mounting, align connector with rear of panel. Then orient panel latch with wide end of panel cutout. Insert connector straight into cutout and slide in until panel latches engage.

To remove connector from panel, depress the panel latch beams and push the connector through the panel.

Panel cutout requirements are given in the following figure.



Number of Positions Per Housing	Panel Cutout Dimensions			
	A		B	
	mm	[Inches]	mm	[Inches]
4	18.1	.712	20.3	.799
6	18.1	.712	25.1	.988
9	24	.945	25.1	.988
12	24	.945	30	1.181
18	24	.945	40.5	1.594
24	28.3	1.114	40.5	1.594
36	28.3	1.114	55.5	2.185

Fig. 2. Panel Cutout Requirements

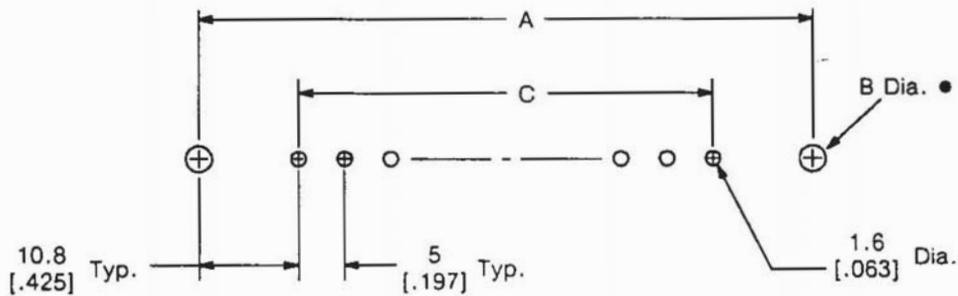
3.2. PC Board Requirements (Pin and Socket Headers)

A. Thickness

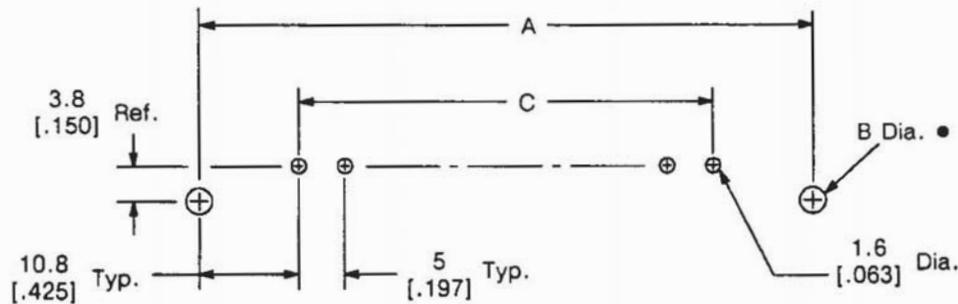
PC boards shall have a thickness of 1.6 [.0625].

B. Layout

The following three figures give dimensions and recommended pc board layouts for pin or socket headers.



STRAIGHT-THROUGH 3-, 6-, 10-, AND 16-POSITION HEADERS

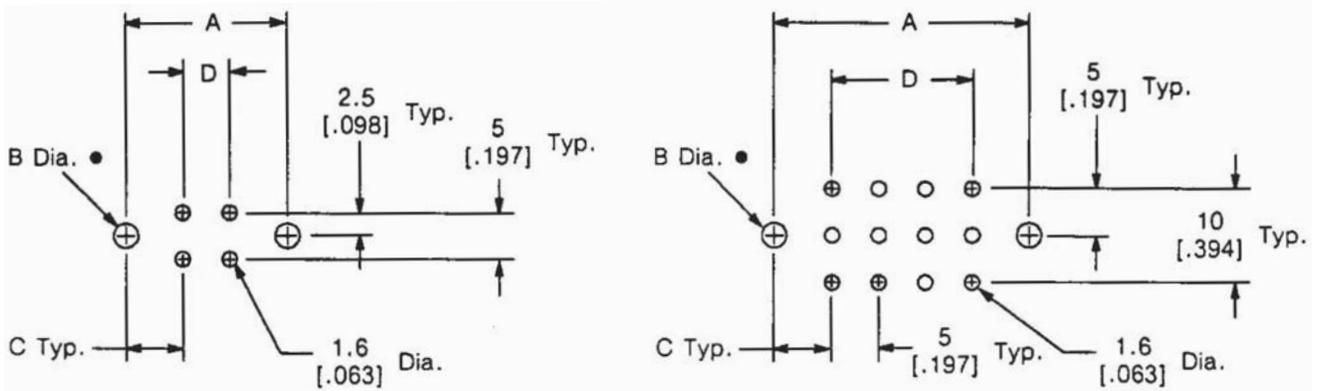
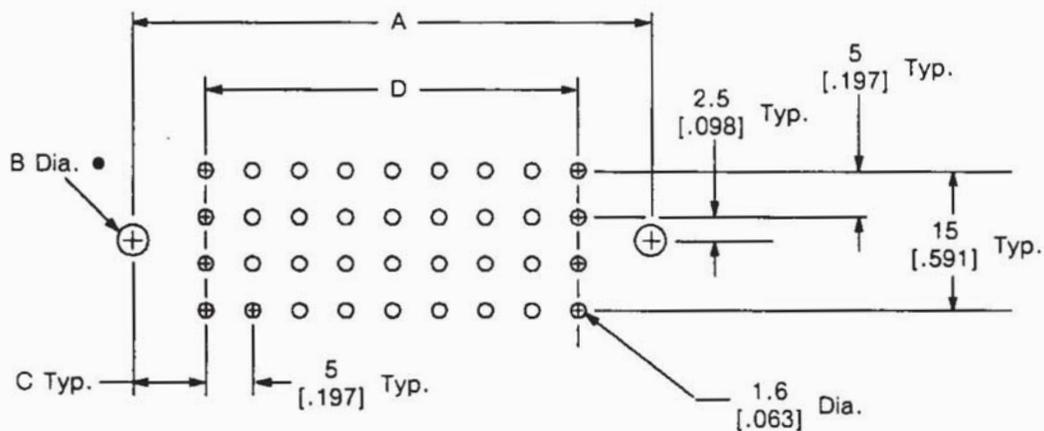


RIGHT-ANGLE 3-, 6-, 10-, AND 16-POSITION HEADERS

Number of Positions Per Header	PC Board Layout Dimensions					
	A		B●		C	
	mm	[Inches]	mm	[Inches]	mm	[Inches]
3	31.6	1.244	2.65	.104	10	.394
6	46.6	1.834	2.65	.104	25	.984
10	66.6	2.622	2.85	.112	45	1.772
16	96.6	3.803	2.85	.112	75	2.953

● B Dia. — 2.65 [.104] for No. 2 screw; 2.85 [.112] for No. 3 screw.

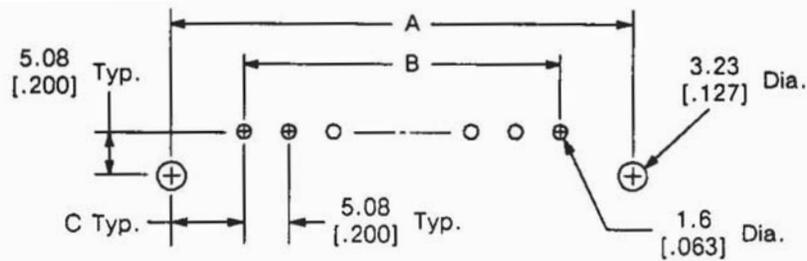
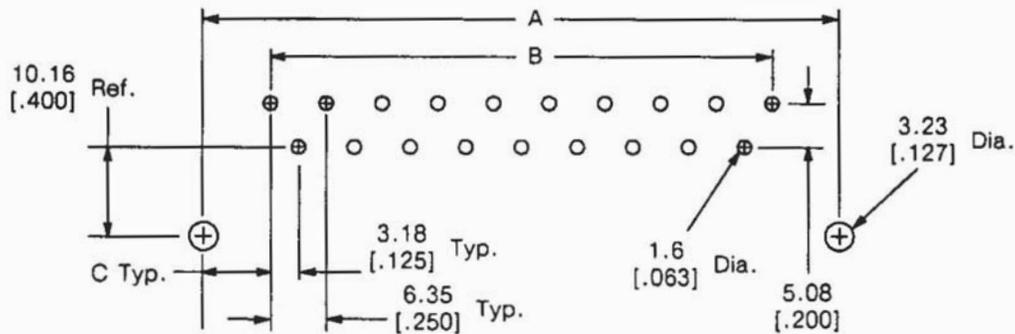
Fig. 3. PC Board Layout for In-Line Pin or Socket Headers


4- AND 6-POSITION HEADERS
9-, 12-, AND 18-POSITION HEADERS

24- AND 36-POSITION HEADERS

Number of Positions Per Header	PC Board Layout Dimensions							
	A		B●		C		D	
	mm	[Inches]	mm	[Inches]	mm	[Inches]	mm	[Inches]
4	17.4	.685	2.65	.104	6.2	.244	5	.197
6	22.4	.882	2.65	.104	6.2	.244	10	.394
9	22.4	.882	2.65	.104	6.2	.244	10	.394
12	27.3	1.075	2.65	.104	6.2	.244	15	.591
18	40.6	1.598	3.3	.130	7.8	.307	25	.984
24	40.6	1.598	3.3	.130	7.8	.307	25	.984
36	55.58	2.188	3.3	.130	7.8	.307	40	1.575

● B Dia. — 2.65 [.104] for No. 2 screw; 3.3 [.130] for No. 4 screw.

Fig. 4. PC Board Layout for Square Grid Pin or Socket Headers


6- AND 10-POSITION HEADERS

19-POSITION HEADER

Number of Positions Per Header	PC Board Layout Dimensions					
	A		B		C	
	mm	[Inches]	mm	[Inches]	mm	[Inches]
6	41.91	1.650	25.4	1.000	8.26	.325
10	62.23	2.450	45.72	1.800	8.26	.325
19	72.39	2.850	57.15	2.250	7.62	.300

Fig. 5. PC Board Layout for 5.08 [.200] Center Line Right-Angle Pin Header

3.3. Soldering

A. Fluxing

Solder tails must be fluxed prior to soldering using a mildly activated rosin flux.

B. Cleaning

After soldering, all fluxes, residues, and activators must be removed. We recommend the following solvents for use with ultrasonic wash followed by water rinse.

BIOACT EC-7[■] / Terpene Solvent
 AXREL-38[†] / Hydrocarbons Solvent

DANGER

Pay strict attention to recommendations given by the solvent manufacturer on the Material Safety Data Sheet regarding toxicity and other safety requirements.

C. Drying

We recommend air drying the cleaned assemblies.

[■] Trademark

[†] Trademark of E.I. DuPont de Nemours and Co., Inc.

3.4. Contact Selection

Metrimate Square Grid and In-Line Connectors accept size 16 contacts, with a pin diameter of 1.57 [.062]. Wire ranges covering 0.05 – 2.00 mm² [30 – 14 AWG] for Multimate versions II, III+, VI, and Subminiature COAXICON Contacts are listed in the following tables.

CONTACT	WIRE RANGE		INSULATION DIA. RANGE	
	mm ²	[AWG]	mm	[inches]
TYPE II	0.03-1.4	32-16	0.76-2.67	.030-.105
	0.8-1.4	18-16	No Insulation Support	
	0.8-0.9 (Two)	18 (Two)		
	2	14		
TYPE III+	0.05-2	30-14	1.02-3.81	.040-.150
TYPE III+ Grounding Pin	0.12-1.4	26-16	0.89-2.49	.035-.098
TYPE III+ Solder Version	0.12-1.4	26-16	Preformed Wire Barrel/Insulation Support	
TYPE VI	0.8-1.4	28-16	0.89-3.43	.035-.135

CONTACT	mm ²	[AWG]	WIRE DESCRIPTION
Subminiature COAXICON (Twisted Pair and Shielded Wire)	0.05	30	Twisted Pair, Solid
	0.08-0.09	28	Twisted Pair, Stranded 7 Str., 0.13 [.005] Dia.
	0.08-0.09	28	
	0.12-0.15	26	Twisted Pair, Stranded 7 Str., 0.16 [.0063] Dia.
	0.12-0.15	26	Shielded 1.91 [.075] Max. O.D.

CONTACT	CABLE SIZE (RG/U)	WIRE DESCRIPTION
Subminiature COAXICON (Coaxial Cable)	178, 196	Single Shield
	196	Double Braid
	174, 188, 316	Single Shield
	174	Double Braid
	179, 187	Single Shield
	187	Double Braid
	161	Single Shield

3.5. Crimping

Contacts must be crimped on wire. Strip form contacts should be crimped with a semi-automatic or automatic machine. Loose piece contacts should be crimped with a hand tool. See Section 5 for a list of tools and applicable instruction material. Requirements for crimped contacts are given in application specifications listed in Section 2.3.

3.6. Loading

Normally an insertion tool is not needed to insert contacts. But, if the wire is small and fragile, or if the cable bundle is too Insertion Tool No. 91002 can be used to insert contacts.

To insert contacts, grip wire directly behind the contact and push straight into the back of connector until it bottoms. Pull back lightly on the wire to be sure contact is locked in position. Extraction Tool No. 305183 will release contacts through the front of the connector to extract them from the back. See Section 5 for specific instruction material.

3.7. Mating and Unmating

To mate connectors, orient both plug and receptacle to align polarizing features. Be sure mating faces are parallel to each other, then push connector halves together until the locks engage.

To unmate connectors, depress both serrated releases of either the plug or receptacle while pulling connector halves straight away from each other.

3.8. Polarizing and Keying

Metrimate connectors have polarizing features on each connector housing. To prevent mismatching of same-size connectors, keying plugs may be placed in socket cavities of connector plug. See Figure 6. Keying plugs are available under Part No. 207654-1 (IS 7846).

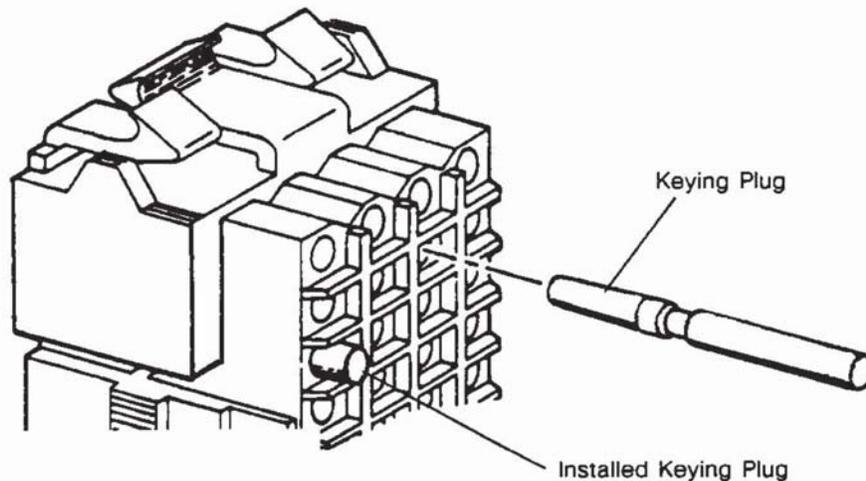


Fig. 6. Keying Plugs

3.9. Strain Relief (Square Grid Connector)

If attached wires are subjected to strain, prevent damage to housing and/or contacts by use of a strain relief. See Figure 7. Strain relief kits are available for use with connector plugs or receptacles having more than four positions. IS 7846 contains a complete list of part numbers and installation instructions.

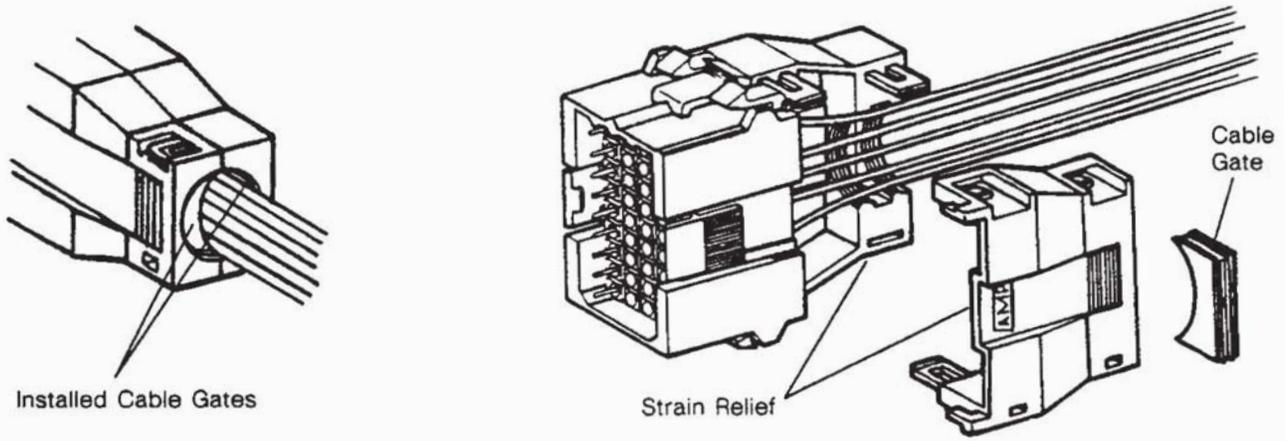


Fig. 7. Strain Relief

3.10. Wire Dress

When wires need to be tied off, a minimum of 50 mm [2 in.] is required between the connector and a cable tie, also between the connector and any bend of the wires. See Figure 8.

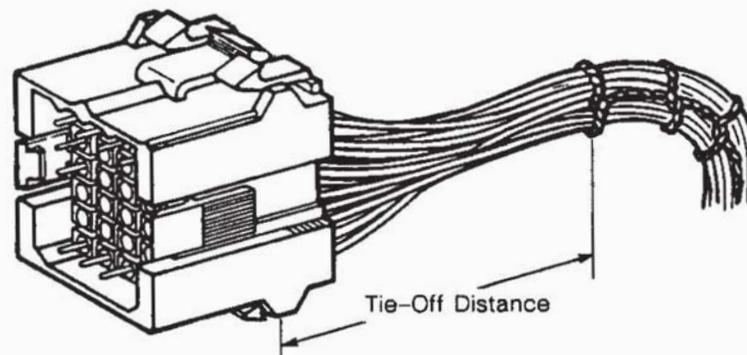


Fig. 8. Wire Dress

4. QUALIFICATIONS

Metrimate Connectors are:

recognized under the Component Program of Underwriters' Laboratories, Inc. (UL), File No. E28476;

certified by the Canadian Standard Association (CSA) under File No. LR16455;

tested to VDE (Verband Deutscher Electrotechniker) requirements outlined in VDE Test Report No. 4751-1430-4014/A1D;

designed to meet International Electrotechnical Commission (IEC) (440V) requirements.

5. TOOLING

Various tools are available to meet your exact production requirements. Some typical tooling types are pictured in Figure 9 on Page 15.

The use of Insertion Tool 91002, designed to insert contacts crimped to fragile wires, is covered in IS 7347. See Figure 9.

The use of Extraction Tool 305183, designed to remove contacts from connector, is covered in IS 1216. See Figure 9.

The tables in this section show tools and instruction material related by contact type and wire size and style. Hand tools and applicators include integral dies. Automatic machines that hold applicators are coded as follows:

C = AMPOMATOR CLS II Lead Making Machine (CM 5619)

K = AMP-O-LECTRIC Terminating Machine (CM 5128)

S = AMP-O-MATIC Stripper/Crimper (CM 5651)

CONTACT TYPE	WIRE RANGE mm ² [AWG]	INSULATION DIAMETER RANGE mm [Inches]	HAND TOOL AND (APPLICABLE INSTRUCTION SHEET)	DIES FOR AMP-TAPETRONIC* MACHINE MOD. 69875 (INSTR. MATL.)	DIES FOR PNEUMATIC TOOL 69365 (INSTR. MATL.)
II	0.03-0.2 [32-24]	0.76-1.65 [.030-.065]	58305-1 (IS 1786) 90118 (IS 1786) or 601967-1 (IS 7516)	90249-2 (IS 7453)	90230-1 (IS 7420) (CM 1983)
	0.08-0.2 [28-24]	2.41-2.79 [.095-.110]	90093 (IS 1786) or 601967-1 (IS 7516)		
	0.2-0.6 [24-20]	1.02-2.16 [.040-.085]	58305-1 (IS 1786) 90118 (IS 1786) 601967-1 (IS 7516) or 90281-1▲ (IS 6810)	90408-1 (IS 7453)	---
	0.8-1.4 [18-16]	2.03-2.67 [.080-.105]	90136-1 (IS 7267) or 601967-1 (IS 7516)		
			45098 (IS 1786) 601967-1 (IS 7516) or 90281-1▲ (IS 6810)		
	0.8-0.9 [18] (Two)	No Insulation Diameter	45098 (IS 1786) or 601967-1 (IS 7516)	90250-1 (IS 7453)	90231-2 (IS 7420) (CM 1983)
2 [14]	45098 (IS 1786) 601967-1 (IS 7516) or 90281-1▲ (IS 6810)				

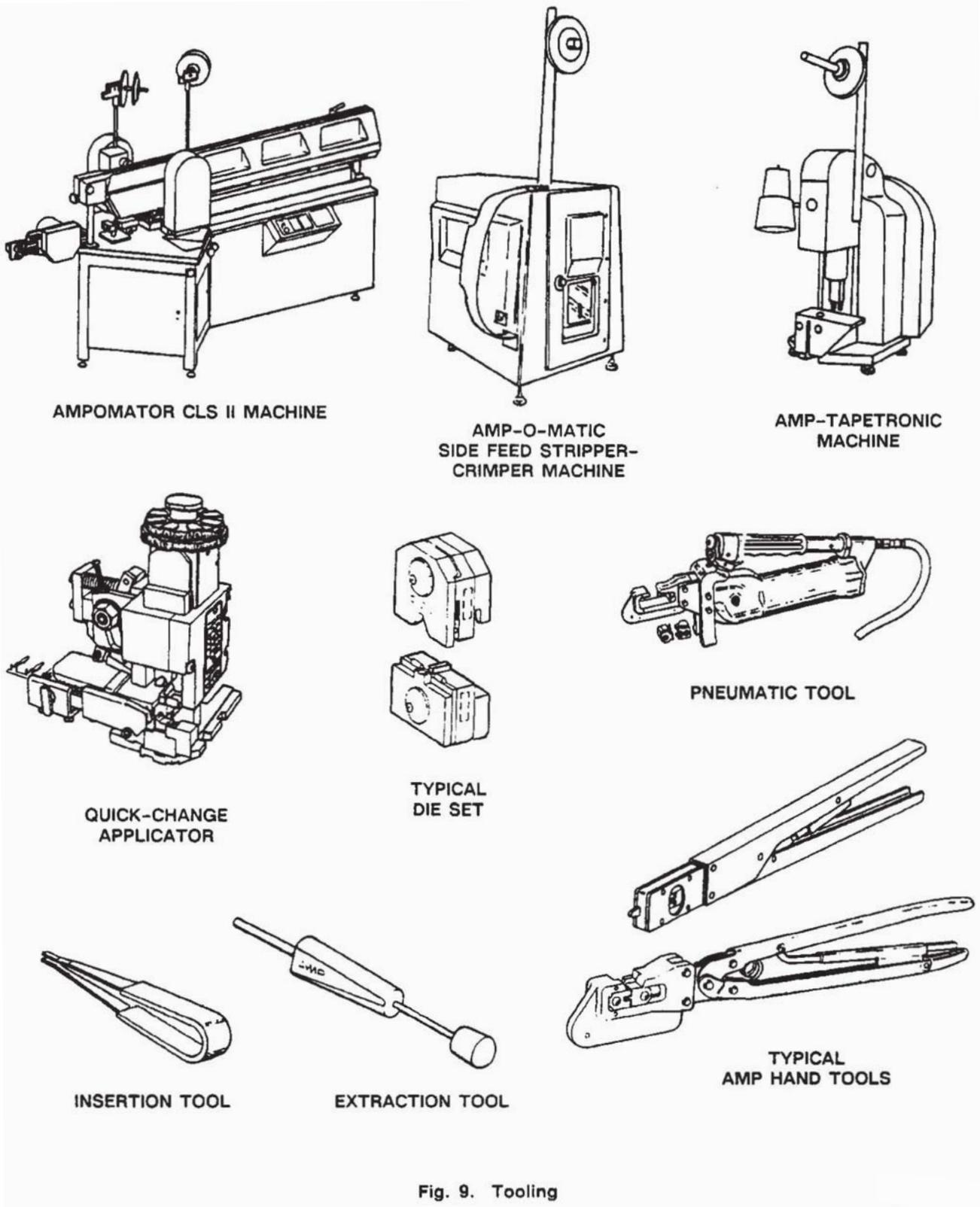
▲ Economy hand tool for field repair only.

CONTACT TYPE	WIRE RANGE mm ² [AWG]	INSULATION DIAMETER RANGE mm [Inches]	HAND TOOL AND (APPLICABLE INSTRUCTION SHEET)	STRIP FORM APPLICATOR	MACHINE USED
III+	0.05-0.15 [30-26]	1.02-1.52 [.040-.060]	90066-7 (IS 6610)	466598-1	C and K
		0.36-0.76 [.014-.030]	90225-2 (IS 7414)	466585-3	
	0.12-0.2 [26-24]	0.89-1.4 [.035-.055]	90066-7 (IS 6610) or 90277-1▲ (IS 7574)	466321-4 or 466908-2	C and K S
	0.2-0.6 [24-20]	1.02-2.03 [.040-.080]	90066-7 (IS 6610) 90067-4 (IS 6613) or 90277-1▲ (IS 7574)	466323-4 or 466907-2	C and K S
		2.03-2.54 [.080-.100]	90067-5 (IS 6614) 90225-2 (IS 7414) or 90277-1▲ (IS 7574)	466324-2 or 466942-1	C and K S
	0.8-1.4 [18-16]	2.03-2.54 [.080-.100]	90067-4 (IS 6613) 90067-5 (IS 6614) or 90277-1▲ (IS 7574)	466325-2 or 466906-1	C and K S
	0.8-2 [18-14]	2.03-2.54 [.080-.100]	90310-3 (IS 9387)	466326-4 or 466923-2	C and K S
		2.79-3.18 [.110-.150]	90310-2 (IS 7942)	466756-2 or 466958-1	S
III+ Grounding Pin	0.12-0.2 [26-24]	0.89-1.4 [.035-.055]	90066-7 (IS 6610)	466321-3 or 466321-4	C K
	0.2-0.6 [24-20]	1.14-1.78 [.045-.070]	90066-7 (IS 6610) or 90067-4 (IS 6613)	466323-3 or 466323-4	C K
		1.52-3.43 [.060-.135]	90331-1 (IS 7773)	466383-1 or 466383-2	K
	0.8-1.4 [18-16]	1.98-2.49 [.078-.098]	90067-4 (IS 6613) or 90067-5 (IS 6614)	466741-1 or 466741-2	C K
VI	0.08-0.2 [28-24]	0.89-1.4 [.035-.055]	90277-1 (IS 7574) 90066-7 (IS 6610)	466321-3 466321-4 466908-2	C K S
	0.02-0.6 [24-20]	1.02-2.03 [.040-.080]	90277-1 (IS 7574) 90066-7 (IS 6610)	466323-3 466323-4 466907-2	C K S
	0.8-1.4 [18-16]	2.03-2.54 [.080-.100]	90277-1 (IS 7574)	466325-1 466325-2	C K
	0.8-2 [18-14]	2.03-3.43 [.080-.135]	90310-1 (IS 7680)	687997-4	S

▲ Economy hand tool for field repair only.

CONTACT TYPE	CABLE SIZE mm ² [AWG]	CABLE TYPE	HAND TOOL (IS 2024-2)	DIES (IS 2024-3)
Subminiature COAXICON Contacts	0.05 [30]	Twisted Pair, Solid	69656-2	69690
	0.08-0.09 [28]	Twisted Pair, Solid	69656	
	0.08-0.09 [28]	Twisted Pair, Stranded; 7 Str., 0.13 [.005] Dia.	69656-1 or 69656-2	69690-1 or 69690-2
	0.12-0.15 [26]	Twisted Pair, Stranded; 7 Str., 0.16 [.0063] Dia.	69656	69690
	0.12-0.15 [26]	Shielded, 1.91 [.075] Max. O.D.	69656-3	69690-3

CONTACT TYPE	CABLE SIZE RG/U	CABLE TYPE	HAND TOOL (IS 2024-2)
Subminiature COAXICON Contacts	178, 196	Coaxial	69656-2
	174, 188, 316		69656
	179, 187		69656-1
	161		69656-5
	196	Coaxial (Double Braid)	69656-9
	187		69656-8
	174		69656-7



6. VISUAL AID

The illustration below provides features that will help an assembler recognize a good installation. Applications which DO NOT appear correct should be inspected using the information in the main body of this specification and in the instructions shipped with the product or tooling.

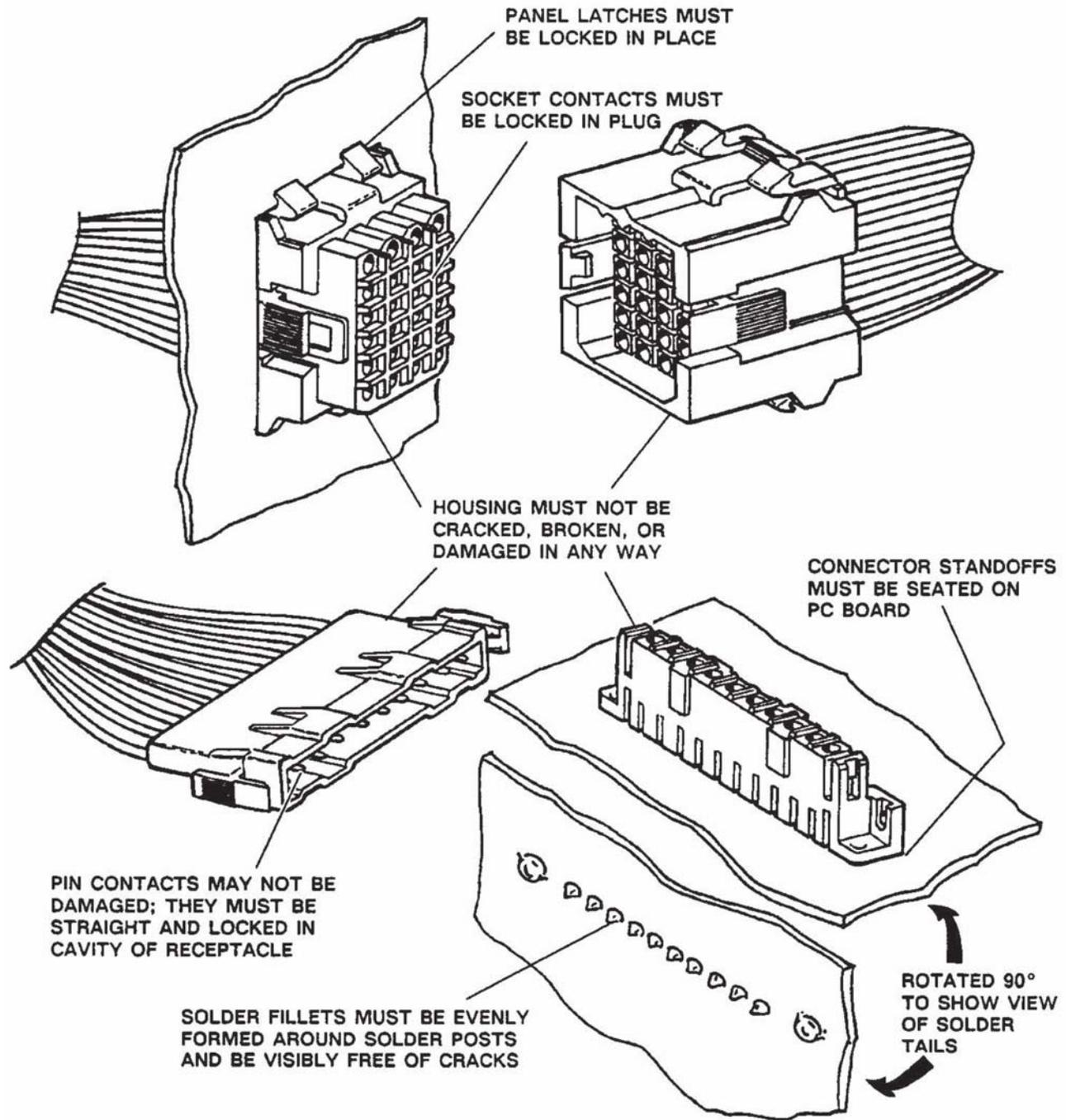


FIG. 10. VISUAL AID