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|-----|--------|---|--------------------------|
| REV | REASON | AMP* CIRCULAR PLASTIC CONNECTORS (CPC) | ENGINEERING RELEASE DATE |
| | | | 3-15-90 |
| | | | APPROVAL |
| | | | MARYANN KAPEZYNSKI |

1. INTRODUCTION

This specification covers the requirements for application of AMP Circular Plastic Connectors (CPC). The connectors are available in various shell sizes and standard or reverse sex configurations. The four series available include standard, high, and power density connectors, and a combination standard and power density connector.

The CPCs are designed for use with various contacts. Applicable wire sizes range from 30 to 8 AWG and can be crimped with hand tools or by automatic machines.

Figure 1 shows typical products (Series 1) and their features. The terms identifying the features are used throughout this specification.

NOTE All dimensions in this document are in inches. Dimensional tolerances are +.007 and angular tolerances are $\pm 3^\circ$ unless otherwise specified. Metric equivalents (mm) can be calculated by multiplying given dimensions by 25.4.

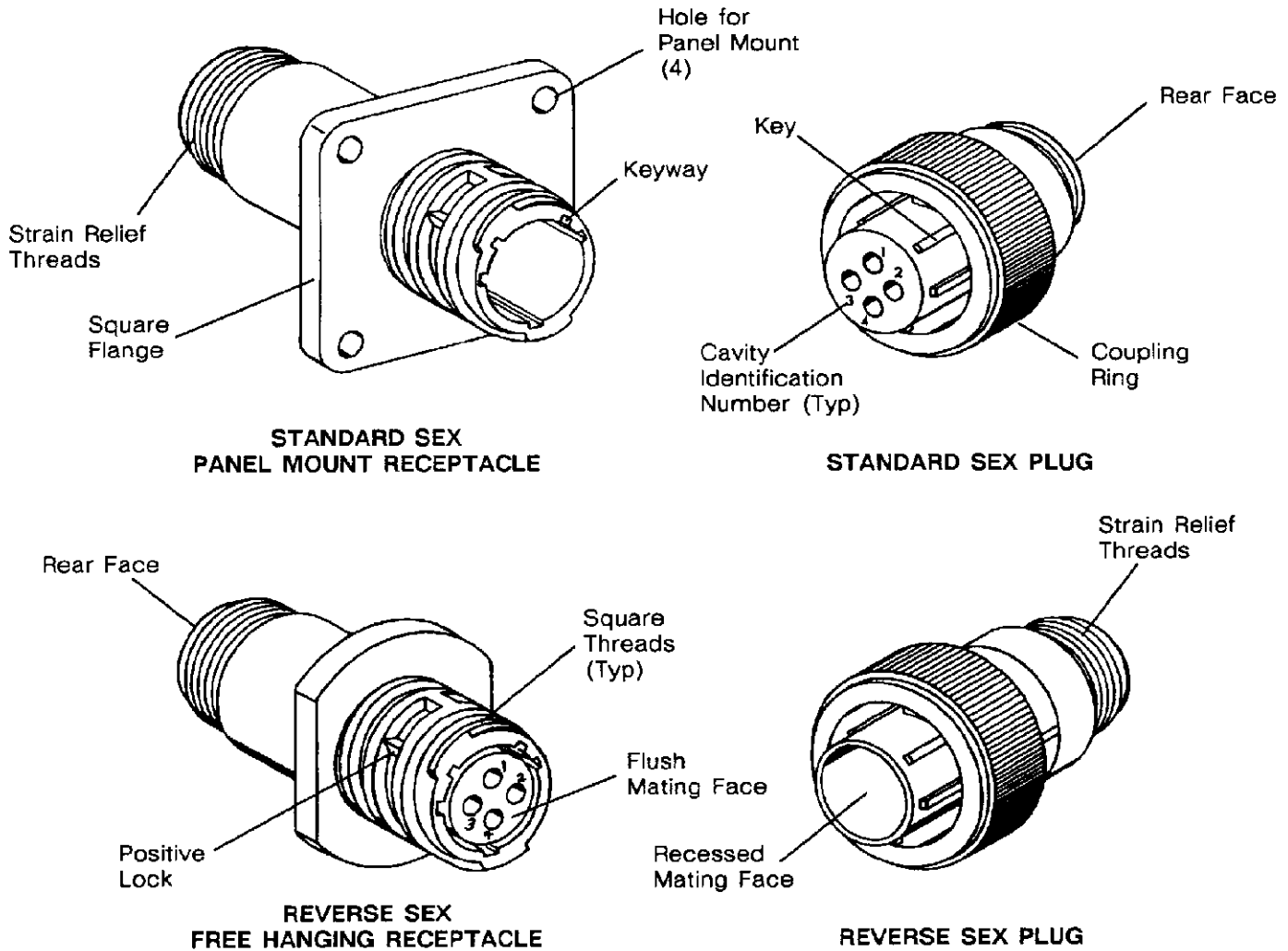


Fig. 1. Product Features

2. REFERENCE MATERIAL

2.1. Customer Assistance

Product Part Number 206060 and Product Code 5029 are representative of the AMP Circular Plastic 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 Sales Engineer, etc) or, after purchase, by calling the CUSTOMER HOTLINE at the top of page 1.

2.2. Engineering Drawings

Customer drawings for specific 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 by AMP Incorporated.

2.3. Specifications

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

Product Specifications:

- 108-10024 — CPC Connectors 108-10037 – Type XII Contacts
- 108-10042 — Type III+ Contacts 108-12011 – Subminiature COAXICON* Contacts

Application Specifications:

- 114-10000 — 20DF (Series 2) Contacts
- 114-10004 — Type III+ (Series 1) Contacts 114-10005 – Type XII (Series 3) Contacts

2.4. Instructional Material

AMP Instruction Sheets contain detailed assembly instructions and repair procedures. The CPC Connectors and Accessories are covered in IS 7593 and IS 7582. Instruction Sheets pertaining to crimping the various contact types used in CPCs are listed in Figure 2. IS 7347, IS 1216, IS 6736, IS 9404, IS 7508 and IS 7276 cover insertion and extraction procedures. AMP Customer Manuals CM 1983, CM 5128, CM 5253, CM 5651 and Application Instruction Sheet AI 8040 provide information for machine set-up and operation procedures.

| CONTACT TYPE | | | | | |
|--------------|---------|----------|---------|-----------------------|----------|
| TYPE III+ | | 20 DF | 20 DM | SUBMINIATURE COAXICON | TYPE XII |
| IS 6610 | IS 7586 | IS 6695 | IS 7516 | IS 2024-2 | IS 2095 |
| IS 6614 | IS 7773 | IS 6709 | | IS 2024-3 | IS 2723 |
| IS 7414 | IS 7942 | IS 7521 | | IS 2095 | IS 6510 |
| IS 7574 | | IS 7954 | | | |
| | | IS 7799● | | | |

● Solder Pot Contact

Fig. 2. Instruction Sheets for Hand Crimping Tools

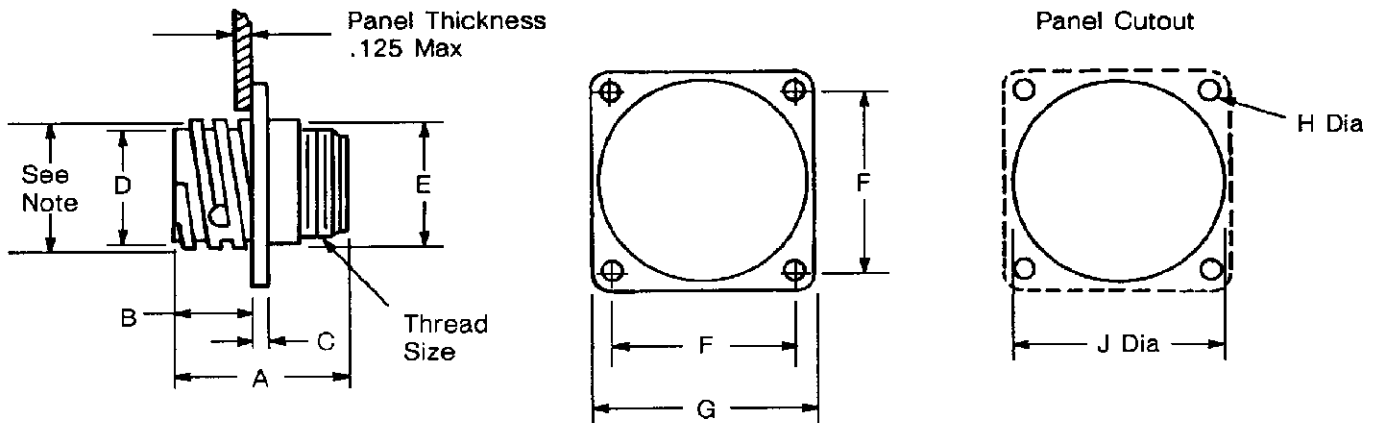
2.5. Soldering Information

AMP Corporate 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 the 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 Holes and Panel Cutouts

Dimensions and layout for mounting holes and panel cutouts are shown in Figure 3.



| | ARRANGE- MENT NO. | SEX | A MAX | B ±.015 | C ±.010 | D ±.010 | E MAX | F ±.010 | G ±.025 | H +.007 -.000 | J | THREAD SIZE |
|----------|-------------------------|--------------|----------|------------|------------|------------|----------|------------|------------|---------------------|---------------------|---------------------|
| SERIES 1 | 11-4 | Rev | 1.070 | .420 | .094 | 0.687 | .740 | .844 | 1.125 | .125 | 0.840 | 5/8-24 UNEF-2A |
| | | Std | 1.350 | | | | | | | | | |
| | 13-9 | Std | 1.350 | .420 | .094 | 0.812 | .879 | .969 | 1.281 | .125 | 0.979 | 3/4-20 UNEF-2A |
| | 17-14 | Rev | 1.070 | .420 | .094 | 1.050 | 1.110 | 1.125 | 1.435 | .150 | 1.210 | 15/16-20 UNEF-2A |
| | | Std | 1.350 | | | | | | | | | |
| | 23-24 | Std | 1.350 | .520 | .156 | 1.438 | 1.510 | 1.438 | 1.750 | .150 | 1.610 | 1-3/8-18 UNEF-2A |
| 23-37 | Rev | 1.070 | .520 | .156 | 1.438 | 1.510 | 1.438 | 1.750 | .150 | 1.610 | 1-3/8-18 UNEF-2A | |
| | Std | 1.350 | | | | | | | | | | |
| SERIES 2 | 11-8 | Std | 0.809 | .420 | .094 | 0.688 | 0.630 | .844 | 1.125 | .125 | 0.840 | 5/8-24 UNEF-2A |
| | | Rev | | | | | | | | | | |
| | 11-9 | Std | 0.809 | .420 | .094 | 1.050 | 0.943 | 1.125 | 1.435 | .150 | 1.210 | 15/16-20 UNEF-2A |
| | 17-28 | Std | 0.809 | .420 | .094 | 1.050 | 0.943 | 1.125 | 1.435 | .150 | 1.210 | 15/16-20 UNEF-2A |
| | | Rev | | | | | | | | | | |
| 23-57 | Rev | 0.924 | .420 | .156 | 1.438 | 1.515 | 1.438 | 1.750 | .150 | 1.610 | 1-3/8-18 UNEF-2A | |
| 23-63 | Std | 0.924 | .420 | .156 | 1.438 | 1.515 | 1.438 | 1.750 | .150 | 1.610 | 1-3/8-18 UNEF-2A | |
| SERIES 3 | 17-3 | Std | 1.635 | .420 | .094 | 1.050 | 1.110 | 1.125 | 1.435 | .150 | 1.210 | 15/16-20 UNEF-2A |
| | 23-7 | Std & Rev | 1.635 | .520 | .156 | 1.438 | 1.510 | 1.438 | 1.750 | .150 | 1.610 | 1-3/8-18 UNEF-2A |
| SERIES 4 | 23-16M | Std | 1.635 | .520 | .156 | 1.438 | 1.510 | 1.438 | 1.750 | .150 | 1.610 | 1-3/8-18 UNEF-2A |
| | 23-22M | | | | | | | | | | | |

NOTE: The first number of the Arrangement No. represents the dimension (in sixteenths) over the threads; the number after the hyphen represents the number of circuits per connector.

Fig. 3. Mounting Requirements

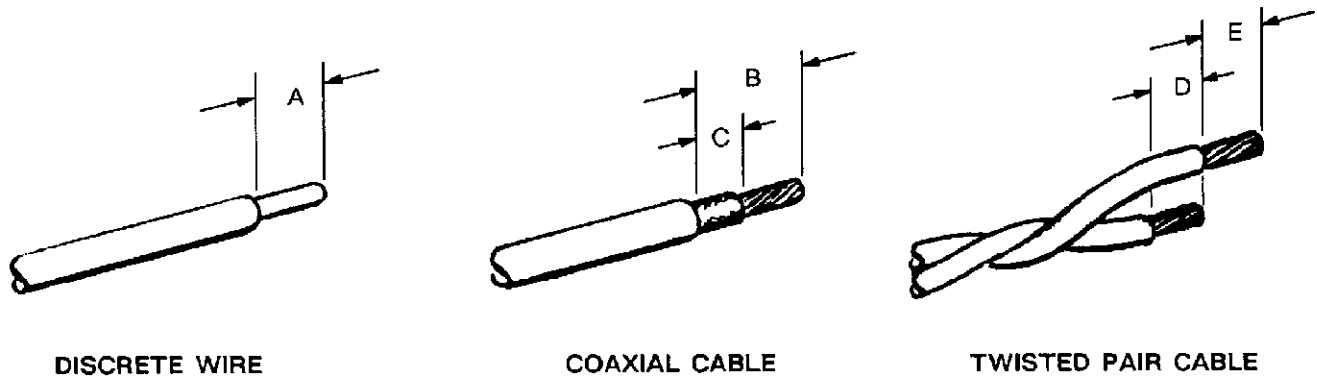
3.2. Wire Size and Preparation

Jacketed or discreet wire may be used with this product. Jacketed cable will provide more protection from damage. Look for information on jacketed cable sealing kits in IS 7582.

Contacts are available for the wire sizes specified. Prepare wire for crimping by stripping insulation according to dimensions in Figure 4. DO NOT nick, scrape, or cut the stranded or solid wire conductor during stripping operation.

NOTE

When using twisted pair cable, one wire should be cut shorter than the other by the same distance as the strip length of the longer wire (E).



| WIRE SIZE RANGE (AWG) | CONTACT TYPE | | WIRE STRIP LENGTH |
|-----------------------|------------------------|---|--|
| 30-14 | III+ | Crimp Type | .156(A) |
| 26-16 | | Solder Type | |
| | | Solder Type (With Preformed Wire Barrel Insulation Support) | |
| 24-20 | 20 DM (Screw Machine) | | .140(A) |
| 28-20 | 20 DF Precision Formed | With Insulation Support | .100(A) |
| | | Without Insulation Support | .109(A) |
| 28-20 | 20 DF (Solder Pot) | | .141(A) |
| 16-18 | XIII | | .281(A) |
| Coaxial Cable | Subminiature COAXICON | | Cable Jacket .344(B) Center Conductor .219(C) |
| Twisted Pair 30-28 | | | Short Wire .125(D) Long Wire .219(E) |

Fig. 4. Wire Preparation

3.3. Loading Contact into Housing

Normally an insertion tool is not required to insert contacts into housings. However, if the wire bundle is large or the individual wires are fragile, the use of an insertion tool is recommended. Refer to Paragraph 5.

3.4. Shield and Strain Relief

If wire at the rear of the housing is subjected to strain, use of a strain relief will prevent damage to the contacts, wires, and housing.

A. Strain Relief Kits

Several types and sizes of strain relief kits are available. Shield and strain relief kits include a shield, strain relief clamps, and two self-tapping screws. They can be attached to the plug and/or receptacle of free-hanging or panel-mounted connectors. Flexible strain relief boots and grippers are used with jacketed cable (or firmly taped discrete wires) to provide wire protection and prevent contact pullout when severe cable-angle applications are encountered, or when connectors are frequently disconnected and reconnected. See Figure 5. Heat shrink sealing boots can also provide a splash-proof strain relief for jacketed cable. See Paragraph 3.4. B.

NOTE

If a strain relief is used on the connector, the wires may be dressed to an angle at the end of the strain relief. However, without use of a strain relief, the wires should not be dressed closer than 2.50 inches from the back of the housing. To prevent damage to contacts and/or housing, avoid exerting stress on wire.

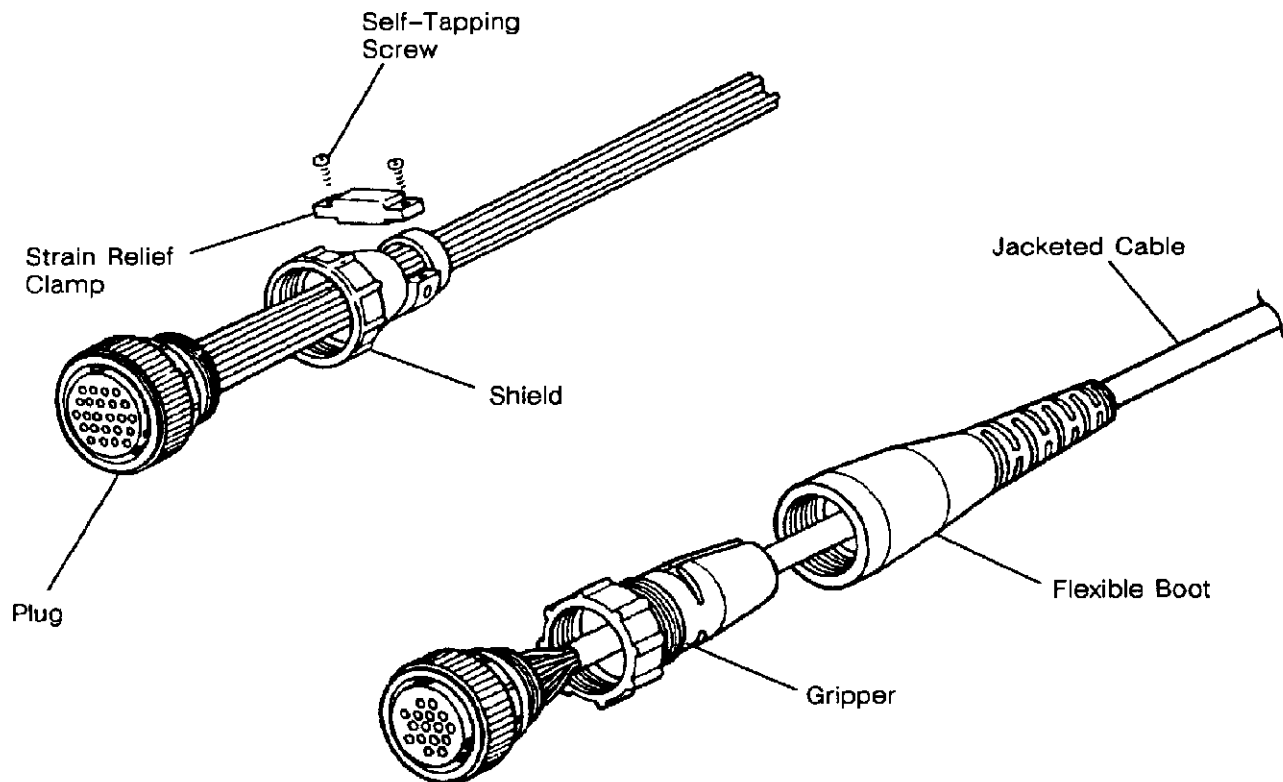


Fig. 5. Strain Relief Kits

B. Boots and Seals

Rubber boots are available and can be used with jacketed cable to provide splash-proof connections for Series 1 and Series 3 connectors. Heat shrinkable sealing boots are available for use with jacketed cable. They will provide an environmentally sealed wire-to-connector system and can be used with plugs or receptacles. A jacketed cable seal will also provide an environmentally sealed connection for jacketed cable. Peripheral seals (for receptacles only) are recommended for use in sealing splash-proof applications, or where connectors will be subject to vibration. Instruction material is included in shipments.

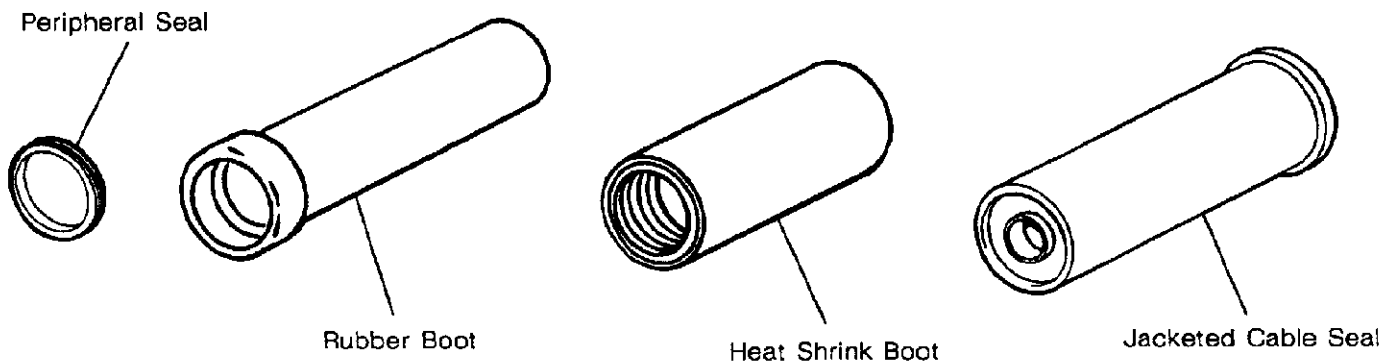


Fig. 6. Boots and Seals

C. Cable Bundle Tie-Off

When no strain relief is used and wires need to be tied off, tie-off distance should be 2.00 in. minimum for up to 12 circuits and 3.00in. minimum for 12 circuits or more. Supporting the cable with wire harness tie-off will avoid strain on the contact retention system, and will prevent contact back-out or failures. See Figure 7.

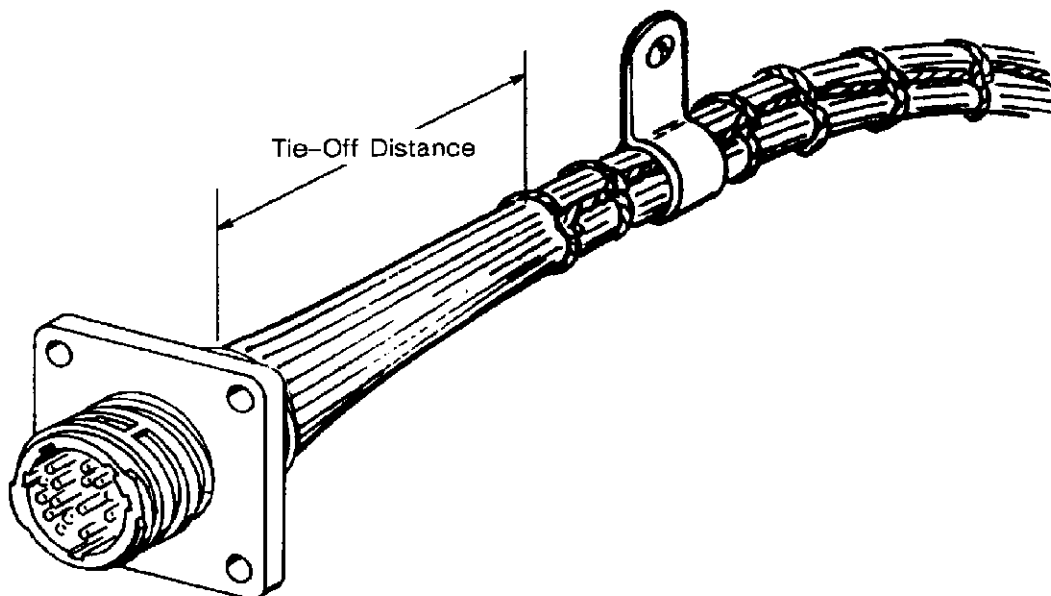


Fig. 7. Wire Tie-Off

3.5. Polarizing and Keying Features

A. Mating

To prevent accidental disengagement, the CPCs have a positive lock feature. They are designed with polarizing keys and keyways for easy alignment.

NOTE

Align polarizing keys and keyways and insert plug into receptacle; rotate coupling ring clockwise until positive lock snaps into position.

B. Keying Plugs

Use of keying plugs provides keying capabilities for all connector series. Keying plugs are used in socket cavities of standard sex plugs and reverse sex receptacles. They are available in three configurations. See Figure 8.

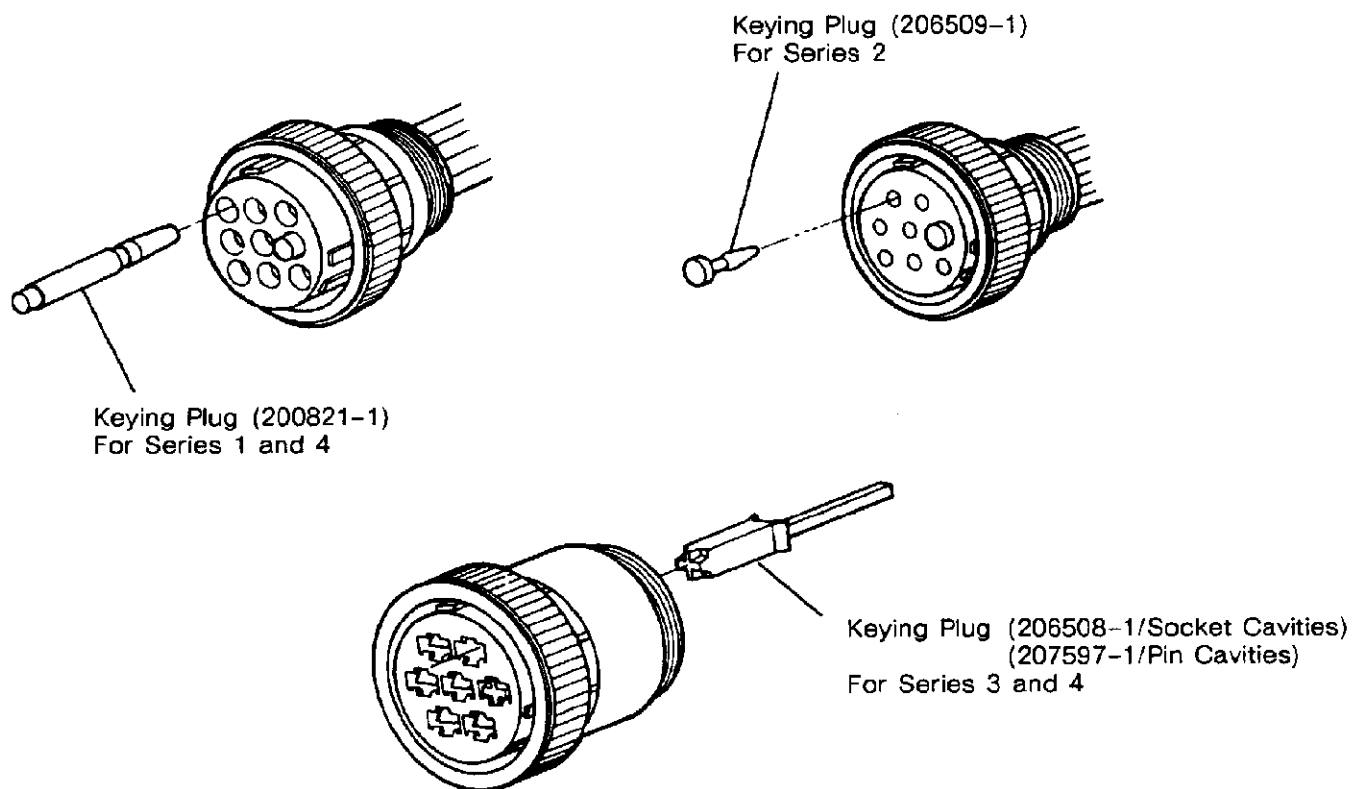


Fig. 8. Keying Plugs

3.6. Contact Crimp Criteria

Contacts must be crimped to a designated height. Refer to Application Specification for particular type of contacts.

3.7. Connector Application

Receptacle connectors are available with mounting flanges for front or rear panel-mount applications, and without flanges for free-hanging applications. Refer to Paragraph 2.4 for applicable instruction sheets on mounting connectors. Square flange receptacles which are preloaded with square posted contacts are available.

3.8. Soldering and Cleaning (Solder Pot Contacts Only)

A. Flux Selection

Solder pot contacts must be fluxed prior to soldering. Selection of flux must be compatible with the solder method used, and safety requirements.

B. Cleaning

Removal of fluxes, residues, and activators is mandatory. Cleaning procedures will depend on the type of flux used.

 DANGER

Consideration must be given to toxicity and safety requirements recommended by the solvent manufacturer.

 NOTE

Consult your local AMP Representative for suitable cleaning solvents that can be used with these connectors.

C. Drying

When drying cleaned assemblies, make certain the temperature limitations of -55° to 105° C are not exceeded. Excessive temperatures may cause housing degradation.

D. Soldering Guidelines

Refer to Paragraph 2.4. for instruction material that is available for establishing soldering guidelines.

3.9. Repair

 CAUTION

Care must be exercised to prevent damage to coupling rings of free-hanging connectors.

A. Coupling Ring Replacement

In the event it becomes damaged, the coupling ring, an integral part of the plug housing, can be replaced. Look for instruction sheet information under Paragraph 2.4 of this document.

B. Contacts

Crimped wire contacts as well as solder pot contacts are repairable. Find instructions in applicable IS sheet listed under Paragraph 2.4.

4. QUALIFICATIONS

The AMP Circular Plastic Connector is recognized under the Component Program of Underwriters' Laboratories, Inc., for 250-Volt service, File No. E28476. Each CPC Assembly has a UL flammability rating of 94 V-1. They are CSA certified under File No. LR7189. Some connectors are recognized for 600-Volt service. Consult AMP Incorporated for more details.

5. TOOLING

AMP Hand Crimping Tools and Applicators are available for applying crimp type contacts, also Insertion Tools and Extraction Tools assist in assembly and repair. Instruction Sheets and Applicator Instructions, describing tool operations, are packaged with the tool. See Figure 9.

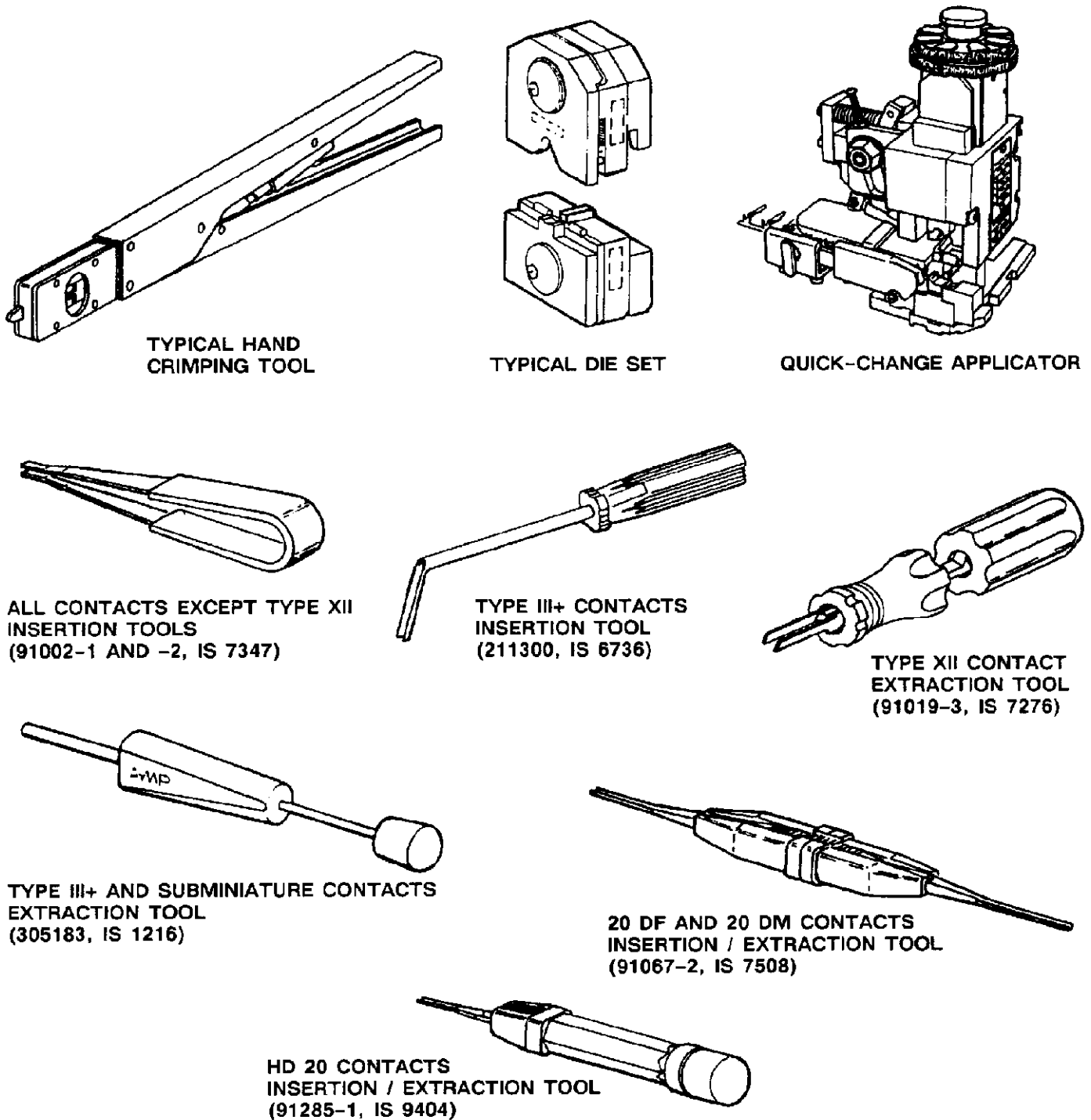


Fig. 9. Tooling (cont'd next page)

| CONTACT TYPE | WIRE SIZE (AWG) | HAND TOOL NUMBER | INSTRUCT. MATERIAL | CONTACT TYPE | WIRE SIZE (AWG) | APPLICATOR NUMBER | INSTRUCT. MATERIAL |
|------------------|-------------------------------------|------------------|--------------------|--------------|--------------------|-------------------|--------------------|
| III+ | 30-20 | 90066-7 | IS 6510 | III+ | 30-20 | 466598-2 | AI 8040 CM 5128 |
| | | 90225-2 | IS 7414 | | | 466585-3 | |
| | | 90282-1 | IS 7586 | | 26-24 | 466321-4 | |
| | 90067-4 | IS 6613 | 466908-2 | | | | |
| | 24-16 | 90067-5 | IS 6614 | | 24-20 | 466323-4 | |
| | | 90310-2 | IS 7942 | | | 466907-2 | |
| 18-14 | 90310-3 | IS 9387 | 466324-2 | | | | |
| | 20DF | 28-24 | 90312-1 | | | IS 7694 | |
| 90374-1 | | | IS 7954 | | 466383-2 | | |
| 90302-1 | | | IS 7634 | | 18-16 | 466325-2 | |
| 90265-1 | | | IS 7521 | | | 466906-1 | |
| 20DM | 26-22 | 90406-1 | IS 6709 | | 18-14 | 466752-2 | |
| | 22-18 | 90405-1 | IS 6695 | | | 466958-1 | |
| XII | 24-20 | 601966-1 | IS 7516 | | | 466326-4 | |
| | 16 | 90145-2 ● | IS 7175 | | | 466923-2 | |
| | 16-12 | 90382-2 | IS 6561 | | 20DF | 466423-1 | |
| | 14-12 | 90145-1 ● | IS 7175 | | | 466423-2 | |
| | 10-8 | 90140-1 ● | IS 7175 | | | 28-24 | |
| 90384-1 | | IS 6510 | 466758-1 | | | | |
| SUB-MINI-COAXIAL | 28 (Twisted Pair/Solid) | 69690 ● | IS 2024-3 | 466758-2 | | | |
| | 26 (Twisted Pair/Solid or Stranded) | | | 466963-1 | | | |
| | 28 (Twisted Pair/Stranded) | 69690-1 ● | | 26-22 | 567036-1 | | |
| | 30 (Twisted Pair/Solid) | 69690-2 ● | | | 567036-2 | | |
| 69690-2 ● | | 24-20 | 466422-1 | | | | |
| 69710-1 | IS 2095 | | 466422-2 | | | | |
| SUB-MINI-COAXIAL | 28 (Twisted Pair/Stranded) | 69690-1 ● | IS 2024-3 | 466900-1 | | | |
| | | 69690-2 ● | | 28-24 | 466506-1 | | |
| | 69690-2 ● | 466506-2 | | | | | |
| | 30 (Twisted Pair/Solid) | 69710-1 | | IS 2095 | 24-20 | 466903-1 ■ | |
| | | 69710-1 | | IS 2095 | | 466505-1 | |
| | 20DM | 24-20 | | 599406-7 † | CM 5253 | 466505-2 | |
| | | 24-20 | | 599406-7 † | CM 5253 | 466902-1 ■ | |
| | XII | 16-12 | | 466425-2 | AI 8040 CM 5128 | 567033-1 | |
| | | 10-8 | | 466425-1 | | 567033-2 | |
| | | | | 567021-2 | | | |

- Dies to be Used with Hand Tool Assembly 69710-1 or Pneumatic Tool 69365, CM 1983
- Stripper / Crimper Applicator
- † AMP-TAPEMATIC* Stripper / Crimper Machine Requiring a Funnel

Fig. 9. Tooling (end)

6. VISUAL AID

Figure 10 shows a typical CPC application. This illustration should be used by production personnel to insure a correctly applied product. Applications which do NOT appear correct should be inspected using the information in the main body of this specification and in the instructional material shipped with product or the tooling.

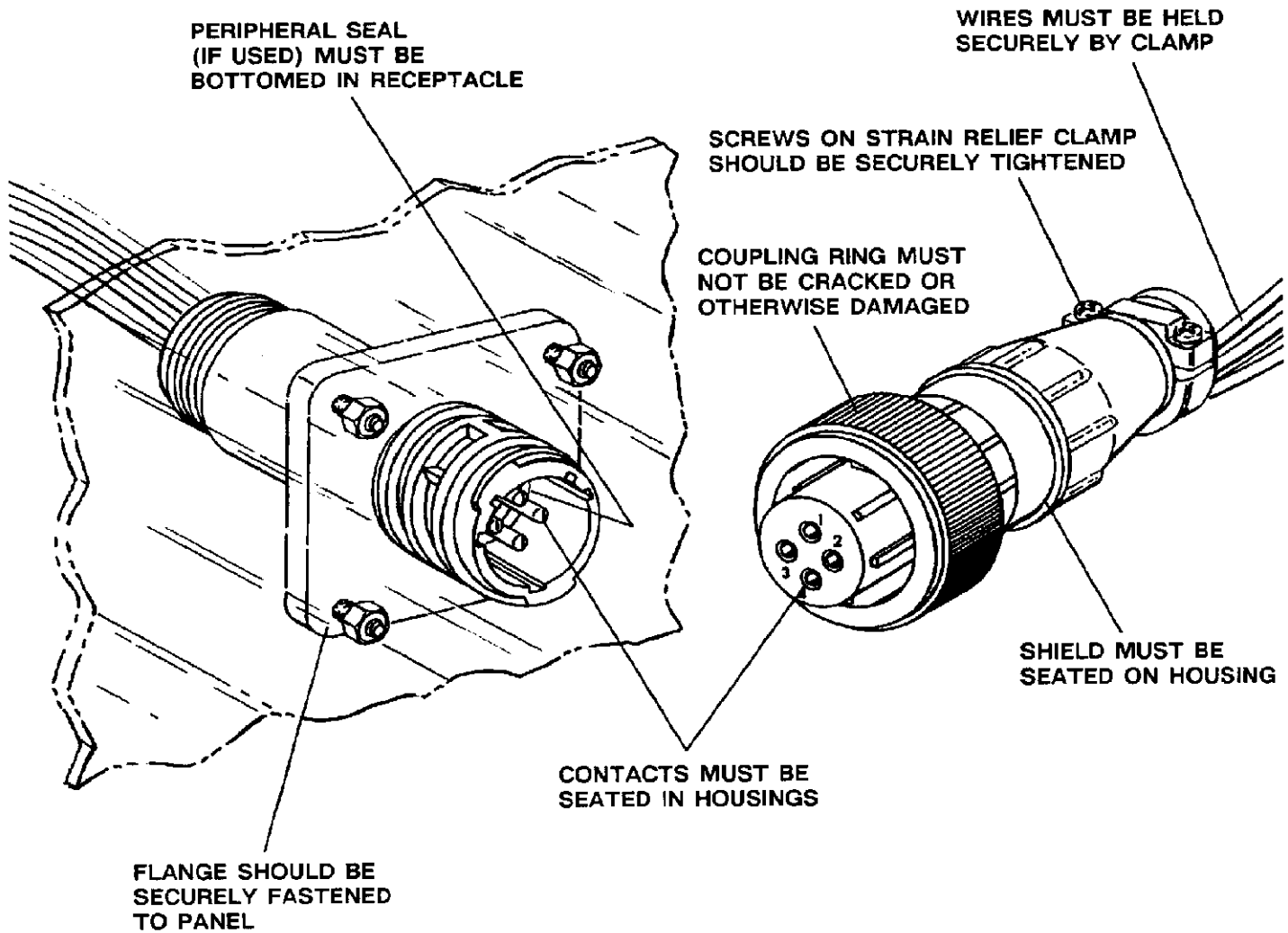


FIG. 10. VISUAL AID