AMP MATE–N–LOK* LGH* 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 ±0.10 [.004] 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 AMP* MATE–N–LOK LGH connectors. The plug and receptacle connectors are available with nine positions (eight signal circuit positions and a dedicated make first, break last ground position). These connectors are designed for high voltage wire–to–wire (free hanging or panel mounted) applications. The connectors provide a reliable and economic means of grouping multiple–lead connections in computers, computer/peripheral equipment, business machines, entertainment centers, and appliances. These requirements are applicable to hand, semi–automatic, and automatic application tooling.

Housings of both plug and receptacle connectors have individually numbered cavity identification marked on the front (mating end) and back (wire end). The housings are designed to accept Type XI pin contacts (for receptacles) and socket contacts (for plugs) crimped onto single conductor high voltage wire sizes 20 to 30 AWG with a maximum insulation diameter of 2.54 [.100] for the pin contacts and 3.70 [.145] for the socket contacts, or coaxial cable size RG–59. The connectors can be uniquely identified with keying pins to prevent inadvertent mating of similar connectors (keying cavities are also marked on the front and back). The connectors are designed with features for easy polarization, self–mounting, and positive mating.

The pin and sockets contacts are included as components in kits for the connectors. Strain relief for the coaxial cable is also available as a kit and is designed to be assembled to the plug housing to relieve the stress of the cable on the contacts and provide a means to ground the cable braid.

NOTE *Application and inspection requirements for the contacts using single conductor wire with a maximum insulation diameter of 1.65 [.065] are covered in Application Specification 114–10002. Requirements for contacts using coaxial cable and single conductor wire with an insulation diameter larger than 1.65 [.065] are covered in this specification.*

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.

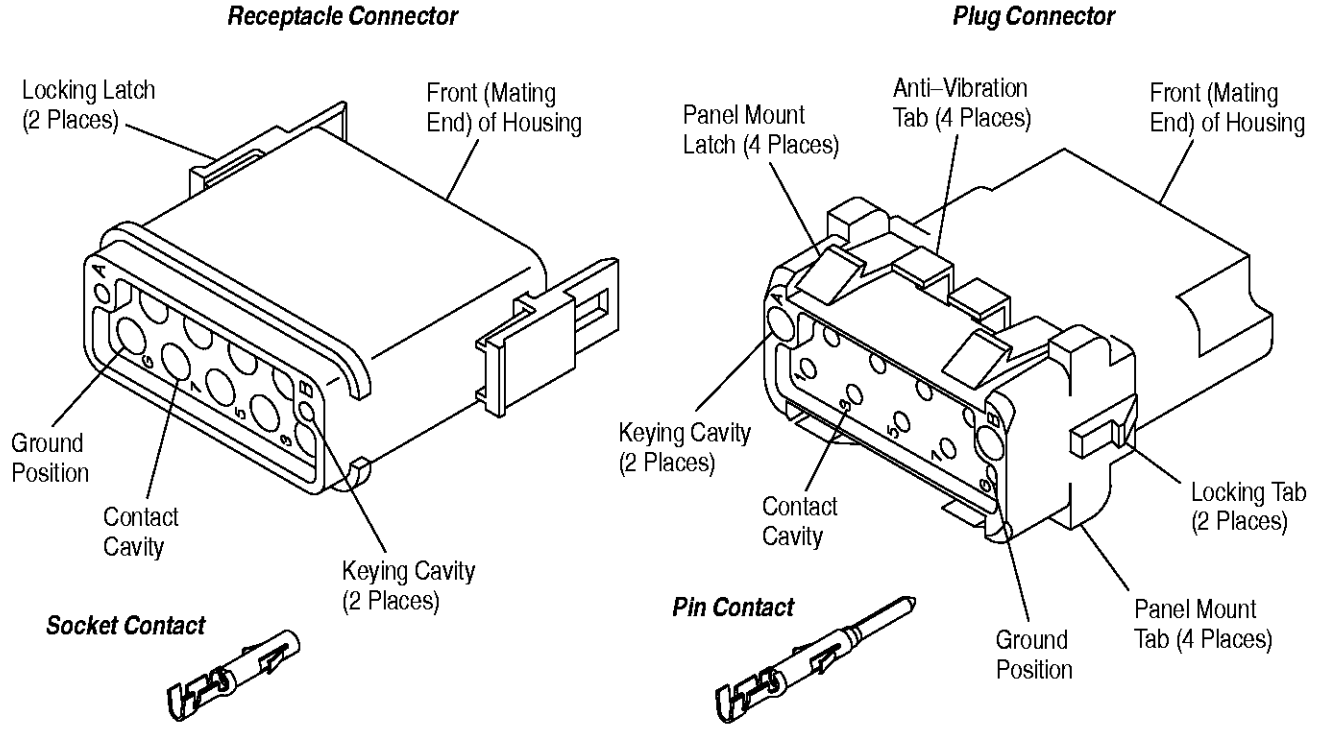


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

This paragraph is reserved for a revision summary of changes and additions made to this specification. No summary is required on this initial release (Rev O).

2.2. Customer Assistance

Product Part Number 443160 and Product Code 4085 are representative of the AMP MATE–N–LOK LGH 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 Specification 108–1711 provides product performance requirements and test information.

2.5. Instructional Material

AMP instruction sheets (408–series) and customer manuals (409–series) provide assembly instructions for product, and operation and maintenance procedures for tooling. Documents available which pertain to the MATE–N–LOK LGH connectors are:

408–2774 Hand Crimping Tool 220187–2
408–3382 MATE–N–LOK LGH 9–Position Plug Connector Kit 443161–[ ] and Strain Relief Kit 443162–[ ]
408–4336 MATE–N–LOK LGH 9–Position Receptacle Connector Kit 443160–[ ]
408–4368 Extraction Tool 443352–1
408–7400 Hand Crimping Tool 90223–5
408–7484 Hand Crimping Tool 90260–1
408–8040 Heavy Duty Miniature Applicator 466558–2
409–5842 AMP–O–LECTRIC* Model "G" Terminating Machine 354500–1

3. REQUIREMENTS

3.1. Material

The contact bodies are made of brass and are plated with tin over nickel flash, and the sleeves are made of stainless steel; other plating options are gold over nickel and gold flash over nickel. Housings are made of 94V–2 rated nylon.

3.2. Limitations

Connector assemblies are designed to operate in a temperature range of –67° to 186°F [–55° to 85°C].

3.3. Storage

A. Shelf Life

The connectors should remain in the shipping containers until ready for use to prevent damage 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.

B. Reel Storage

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

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. Special Features (Figure 2)

A. Contact

The contact features an integral wire stop tab and a contact retention stop. The wire stop tab ensures that wire, when inserted into the wire barrel, does not enter the mating area of the contact. The contact retention stop is an important feature in holding the crimped contact in the connector housing.

B. Housing

The plug housing features a strain relief flange to properly place the strain relief covers onto the plug housing. The receptacle housing has chamfered corners to help guide the housing into a panel cutout without stubbing.

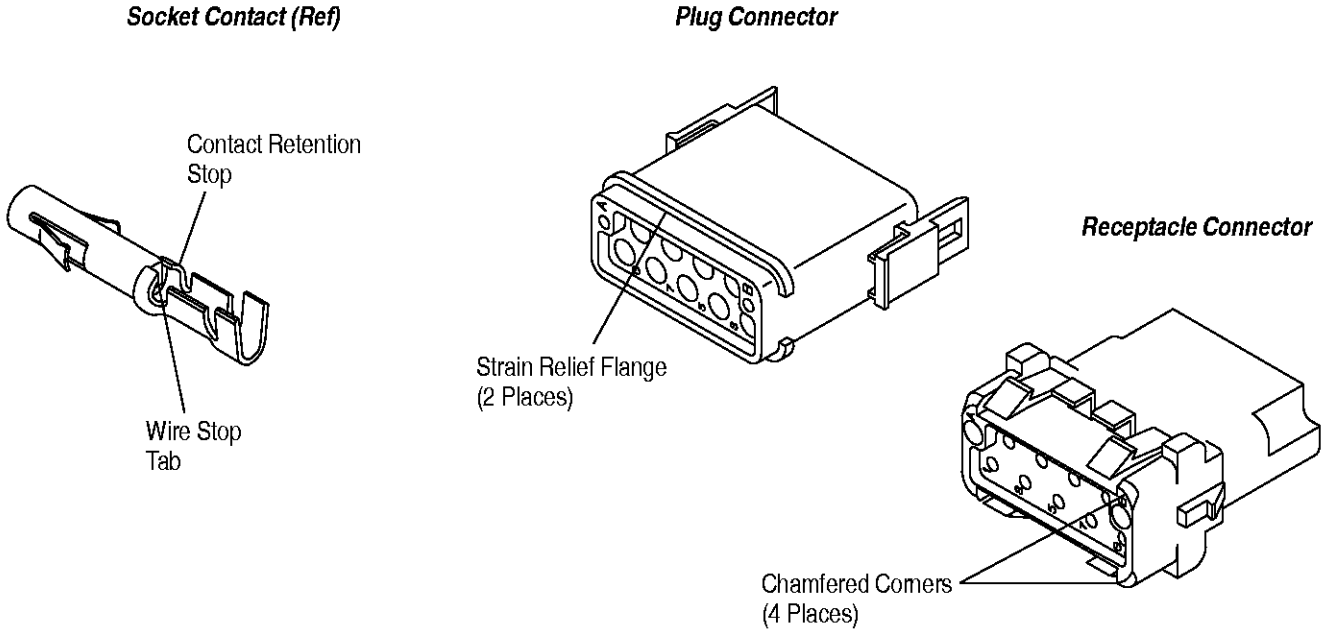


Figure 2

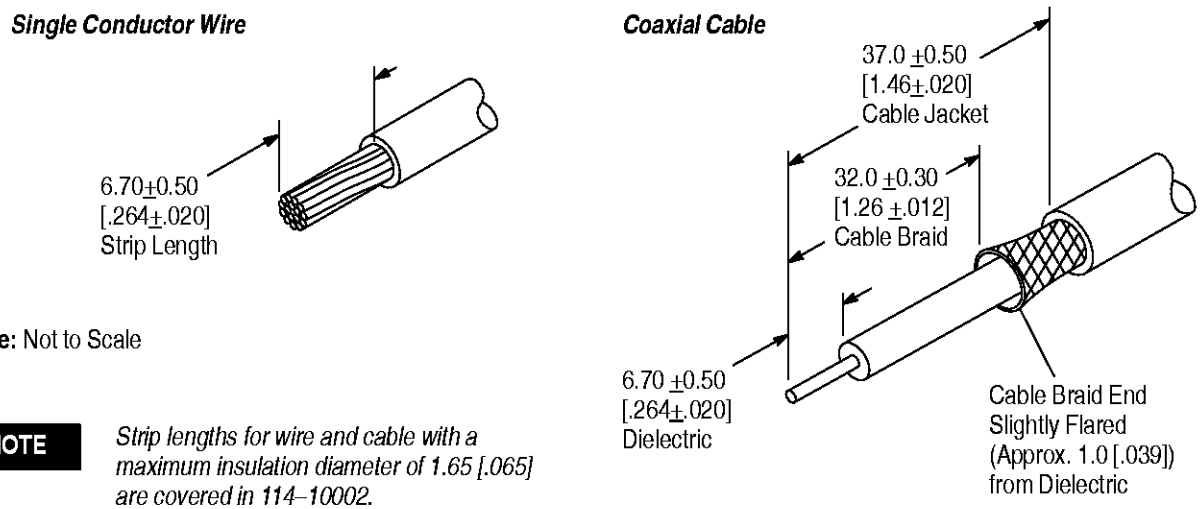
3.6. Wire Selection and Preparation

The connector housings will accept contacts crimped onto single conductor high voltage wire sizes 20 to 30 AWG with a maximum insulation diameter of 2.54 [.100] for the pin contacts and 3.70 [.145] for the socket contacts, or coaxial cable size RG–59. The strip length of the wire and the stripping dimensions of the coaxial cable are shown in Figure 3.

NOTE *For suitability of other cable sizes, contact AMP Product Engineering.*

Reasonable care must be taken not to nick, scrape, or cut any strands during the stripping operation. After stripping the coaxial cable, the end of the cable braid must be slightly flared from the dielectric to approximately the dimension shown in Figure 3.

CAUTION *Care should be taken not to deform the cable braid.*



Note: Not to Scale

NOTE *Strip lengths for wire and cable with a maximum insulation diameter of 1.65 [.065] are covered in 114–10002.*

Figure 3

3.7. Crimped Ferrule Requirements

A ferrule (included with the strain relief kit) is required for terminating the coaxial cable. The ferrule must be crimped onto the jacket of the cable. The braid strands of the cable must be positioned between the ferrule sleeve and eyelet. The sleeve of the ferrule must overlap the cable jacket and the eyelet must be positioned from the end of the cable dielectric at the dimension shown in Figure 4.

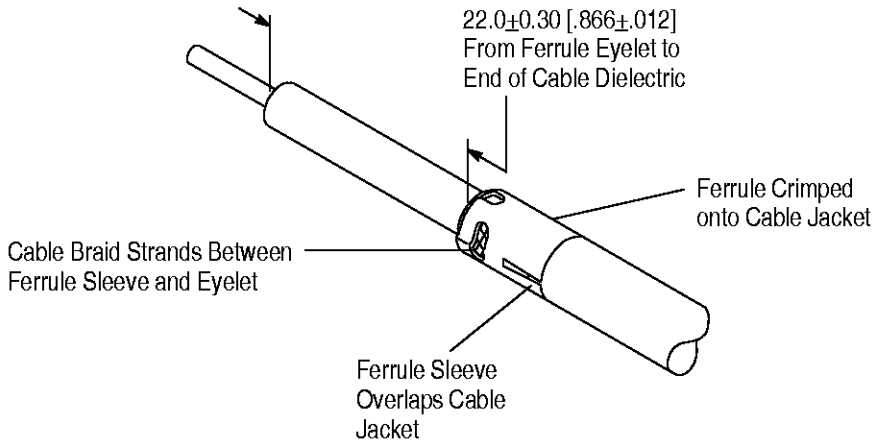


Figure 4

3.8. Crimped Contact Requirements

A. Cutoff Tab and Burr

For reeled contacts, the cutoff tab and burr resulting from the contact being cut from the carrier strip must be within limits shown to allow the contact to be fully inserted and seated in the connector housing. See Figure 5.

B. Wire Barrel Crimp

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 crimped contact. The crimp height must be within the dimensions provided in Figure 5.

C. Insulation Barrel Crimp

The insulation must not enter the contact insulation barrel; however, the insulation barrel is formed during the crimping operation to help support the conductor and protect the wire barrel. There must be a gap between the contact insulation barrel and the wire insulation or cable dielectric of the dimension provided in Figure 5.

CAUTION *DO NOT cut or break insulation or dielectric during the crimping operation.*

D. Conductor Location

After crimping, the conductor must be visible in the transition area between the wire barrel and insulation barrel. Care must be taken not to allow the wire insulation or cable dielectric to be crimped in the insulation barrel or wire barrel. The conductor end must be flush with the front end of the wire barrel or extend to the dimension provided in Figure 5.

E. Bellmouths

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

F. Effective Crimp Length

The effective crimp length is the area where the crimp pressure is applied over the length of the wire barrel. It should be approximately centered and does not include the bellmouths. The effective crimp length is provided in Figure 5.

G. Wire Barrel Seam

Wire barrel seam must be completely closed with no conductor strands protruding from it. See Figure 5.

H. Wire Barrel 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 Figure 5.

I. Locking Lances

Locking lances must not be deformed. The height of the locking lance, measuring from the contact body, must be within the specified limit provided in Figure 5.

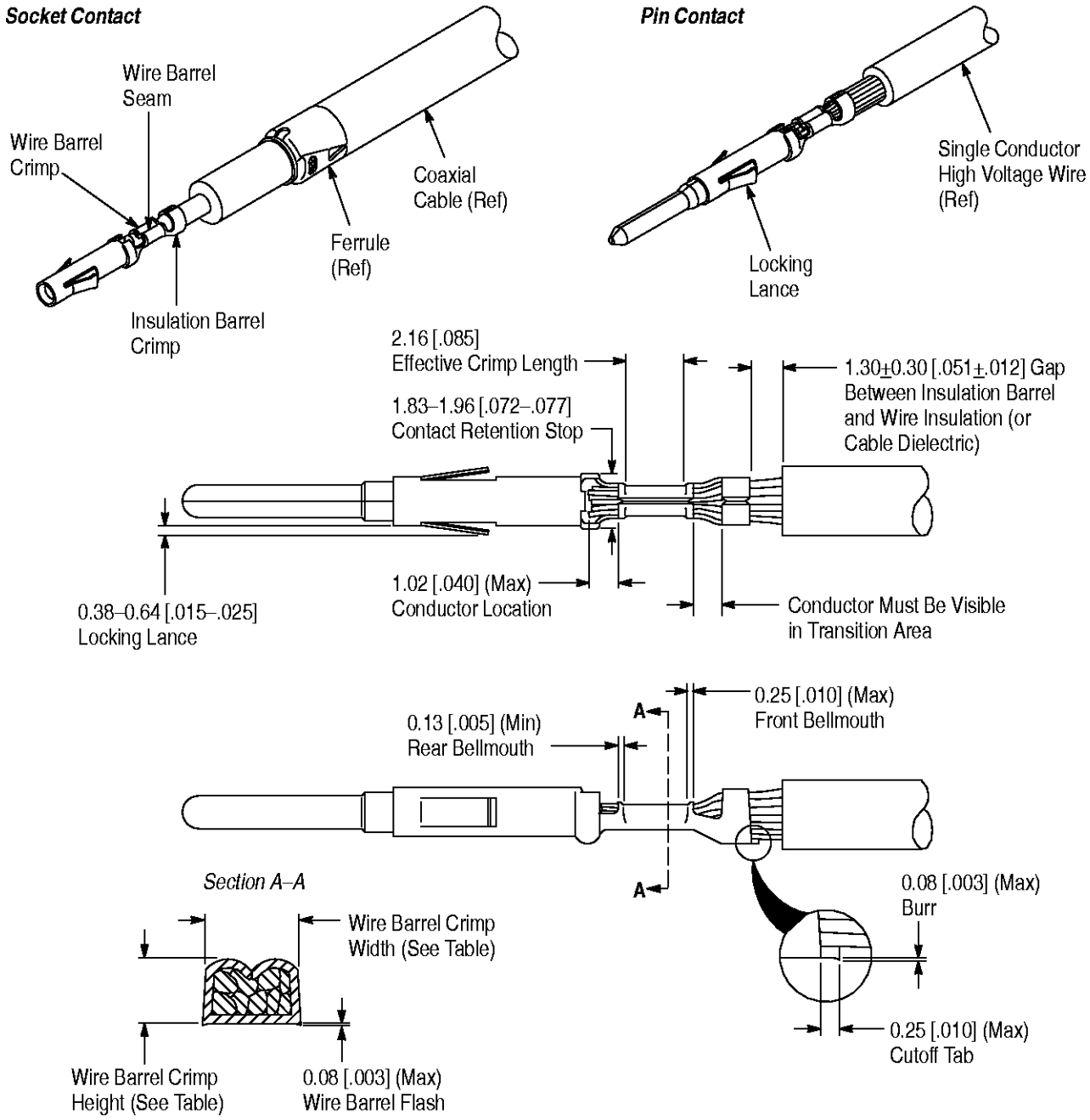
J. Contact Retention Stop

The contact retention stop must not be deformed and the measured width must be within the specified limit provided in Figure 5.

K. Tensile Strength

Crimped contacts should hold the wire firmly and have a pull–test tensile value meeting that specified in Figure 5.

NOTE *Tensile strength must be tested using a standard testing machine at a rate of 25.4 [1.0] per minute (directly and gradually apply force for one minute).*



WIRE SIZE	WIRE BARREL CRIMP		
	WIDTH	HEIGHT ±0.05 [±.002]	TENSILE STRENGTH N [lb]
20	1.397 [.0550]	0.876 [.0345]	88.96 [20.0]
22		0.724 [.0285]	53.38 [12.0]
24			35.58 [8.0]
26		0.686 [.0270]	22.24 [5.0]
28			13.34 [3.0]
30			7.56 [1.7]

Figure 5

L. Straightness

The crimped contact must pass through a 15.8 [.625] long straight metal tube with an inside diameter of 2.01 [.079]. The mating end of the contact must be inserted into the tube and there must be no interference between the inside diameter of the tube and contact cutoff tab. The force applied during crimping may cause some bending between the crimped wire barrel and the uncrimped portion of the contact. Such deformation is acceptable.

M. Twist and Roll

There must be no twist and roll in the crimped portion of the contact in relation to the mating end that will impair usage of the contact. See Figure 6.

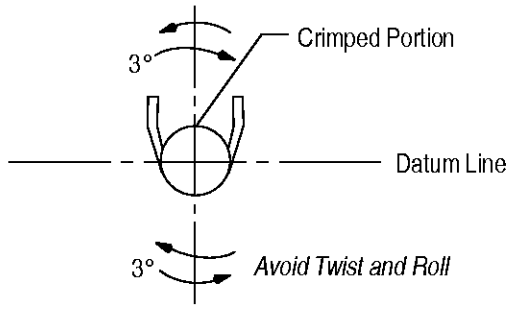


Figure 6

3.9. Housings

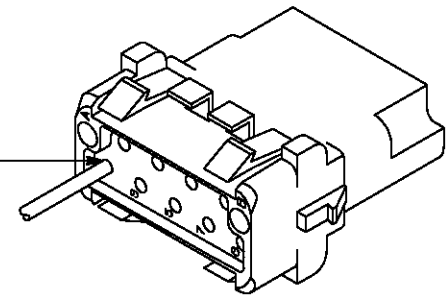
Plug and receptacle housings have individually numbered circuit identification and a ground cavity (marked with a "G") on the front and back. Plug connectors are numbered from left to right, top row first when the connector is viewed from the front (looking at the mating face). Receptacle connectors are numbered as a mirror image of plug connectors. It is important to use the strain relief kit on the plug housings to relieve the stress of coaxial cable on the contacts and provide a means to ground the cable braid.

A. Contact Insertion

Pin and socket contacts cannot be intermixed; pin contacts must be inserted into the receptacle housing and socket contacts into the plug housing. The crimped contact (pin or socket) must be inserted by aligning it with the desired contact cavity in the BACK (wire side) of the housing (the ground contact must be inserted into the cavity marked "G"). Grasp the wire—directly behind the insulation barrel—and push the contact straight into the cavity until it bottoms (an audible click). 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. The contact should have a small amount of movement (less than 1.0 [.04]).

NOTE *If your application does not require the use of all cavities, the contacts should be distributed evenly throughout the connector. See Figure 7.*

NUMBER OF CONTACTS	CONTACT CAVITY POSITION	
	BOTTOM ROW	TOP ROW
1	1▪	8▪
2	1	2
3	1, 3	2
4	1, 3	2, 4
5	1, 3, 5	2, 4
6	1, 3, 5	2, 4, 6
7	1, 3, 5, 7	2, 4, 6



▪For proper strain relief (on plug connectors), contact cavity Position 1 or Position 8 must be loaded when using only one contact.

Figure 7

B. Strain Relief Assembly

The strain relief kit consists of green TERMASHIELD* ferrules (up to eight are included), a ground strap assembly, two strain relief covers and inserts, and four self–tapping screws. The assembled strain relief must have the following requirements (refer to Paragraph 3.7 for crimped ferrule requirements):

1. The insulation of the pre–stripped wire (part of the ground strap assembly) must be crimped in the insulation barrel of the "ground" contact. The "ground" contact must be secure in the plug housing contact cavity marked "G" and have a small amount of movement (less than 1.0 [.04]). See Figure 8. The depth of the "G" cavity in the receptacle assembly is deeper than the other cavities, which causes it to make contact first when mating the plug assembly with the receptacle assembly.

2. The TERMI–FOIL* connector (part of the ground strap assembly) must be seated flush to or recessed in the square part of the cavity of the strain relief insert and the braid in the channel of the insert. See Figure 8.

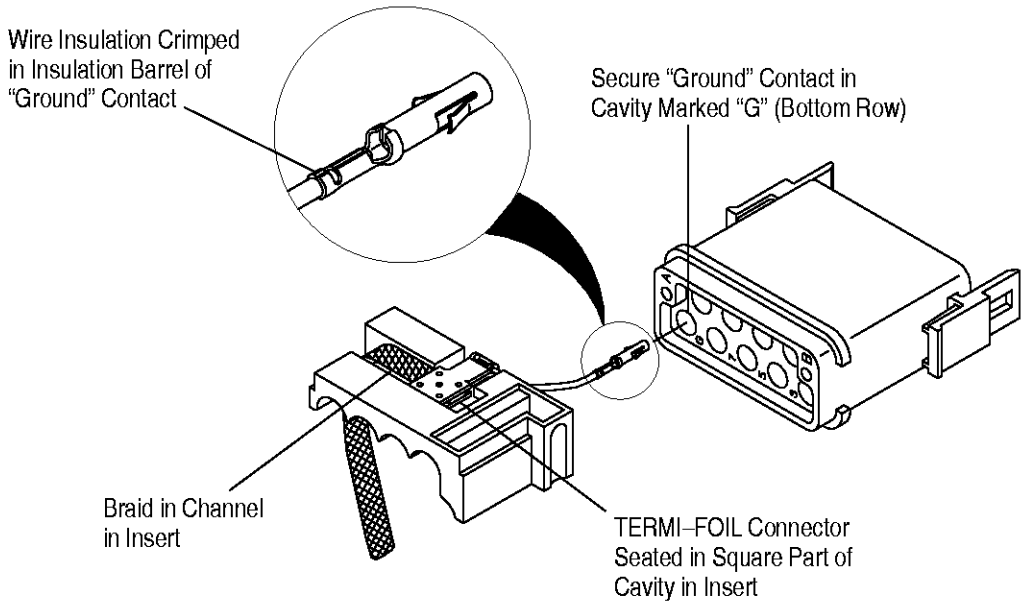


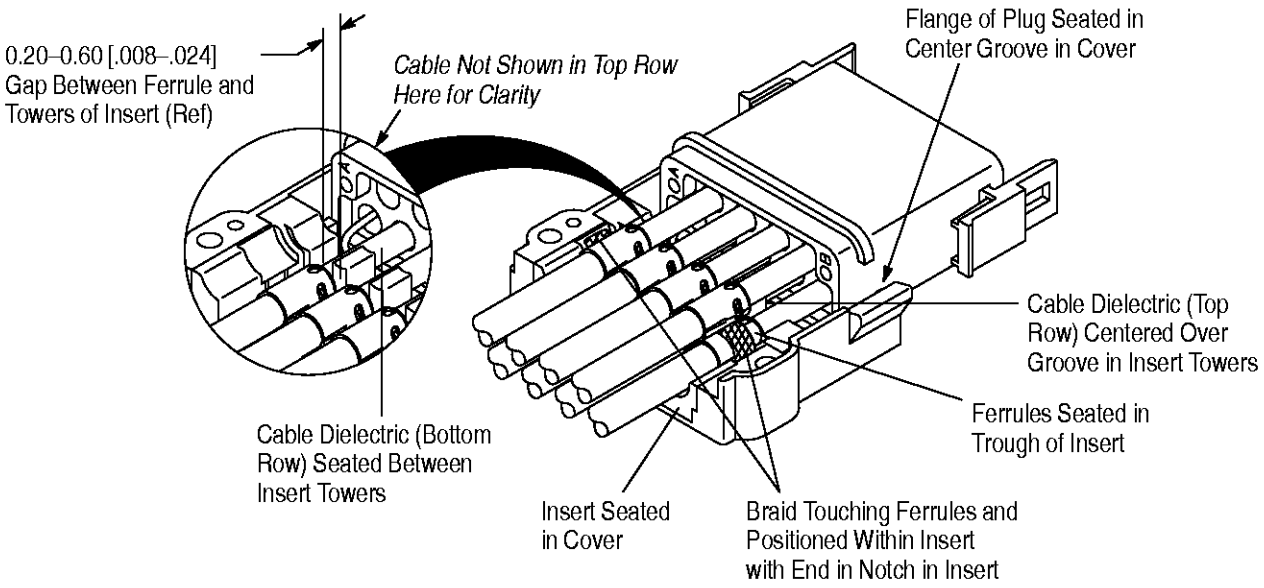
Figure 8

3. The strain relief inserts must be seated in the strain relief covers. See Figure 9.

4. The flange of the plug must be seated in the center groove in the strain relief cover. See Figure 9.

5. The cable dielectric for the bottom row (cavities marked "1, 3, 5, 7") of contacts must be seated between the towers of the insert. The cable dielectric for the top row (cavities marked "2, 4, 6, 8") must be centered over the groove in the towers of the insert. The ferrules must be seated in the troughs with the end of the ferrule against the towers (gap range shown in Figure 9 is optimal).

6. The braid (from the ground strap assembly) must touch the ferrules and must be positioned within the insert with the end in the notch in the insert. See Figure 9.



Note: Plug Shown Assembled to Part of Strain Relief

Figure 9

7. The top and bottom strain relief covers must align properly and the four self–tapping screws must be secured to the covers. See Figure 10.

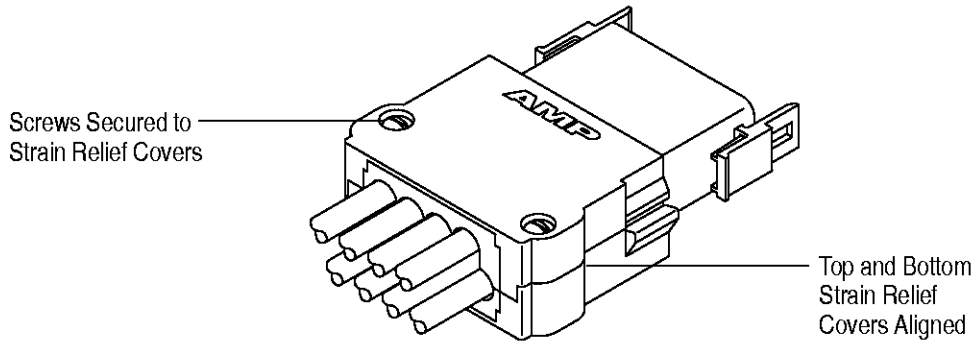


Figure 10

C. Disassembly

The contacts and keying pins can be removed from plug and receptacle housings with an extraction tool (see Paragraph 5.4). One or both of the strain relief covers and inserts must be removed before extracting contacts from plug housings and the entire strain relief must be removed before extracting keying pins.

3.10. Potting

NOTE *Potting can only be used for connectors with single conductor high voltage wire. Plug connectors with coaxial cable cannot be potted.*

The maximum operating voltage that the connector can perform can be obtained through potting. If your application does not require increased operating voltage, potting is not necessary. The potting material must adhere to the wire insulation and to the connector housing. We recommend using silicone rubber compound, such as RTV (room temperature vulcanizing)–511□ or Sylgard 170▦, and silicone or silicone–coated Teflon◇ wire. Each contact (including the ground contact) must be sealed with silicone rubber adhesive (such as DC RTV–3145▦) before insertion.

NOTE *If recommended materials cannot be used, make sure that the potting compound is compatible with the wire insulation.*

CAUTION *Do not use hard potting materials. Hard potting materials prevent contacts from "floating" and cause difficulty when mating the connectors.*

If less than eight signal contact cavities are used, a crimped contact (without a wire) with adhesive must be inserted into each empty signal contact cavity—unused cavities must be sealed.

Each *individual* contact cavity must be filled with appropriate potting compound, taking care to minimize any voids in the compound. The potting area (at wire end of the connector) must be filled with potting compound so that the recessed part of the housing is covered. There may not be any visible voids. See Figure 11.

The potting compound must be cured thoroughly before applying voltage.

NOTE *Contacts cannot be extracted from the connector after potting is applied.*

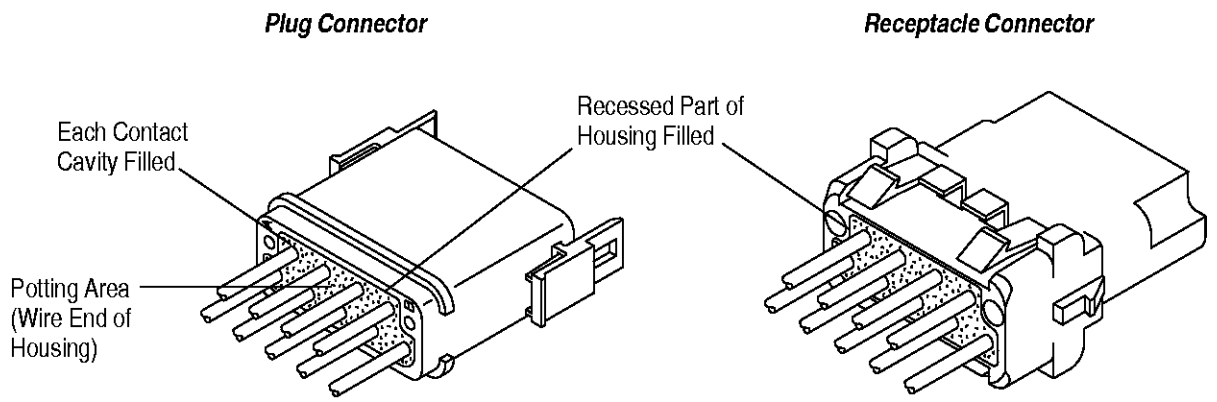


Figure 11

When using mating connectors with single conductor wire, both plug and receptacle must be potted to obtain maximum operating voltage performance. When using coaxial cable, only the receptacle must be potted.

3.11. Inspection

External inspections can be made on assembled connectors. Internal inspections should be made during setup and periodically to ensure that the connectors are being properly assembled.

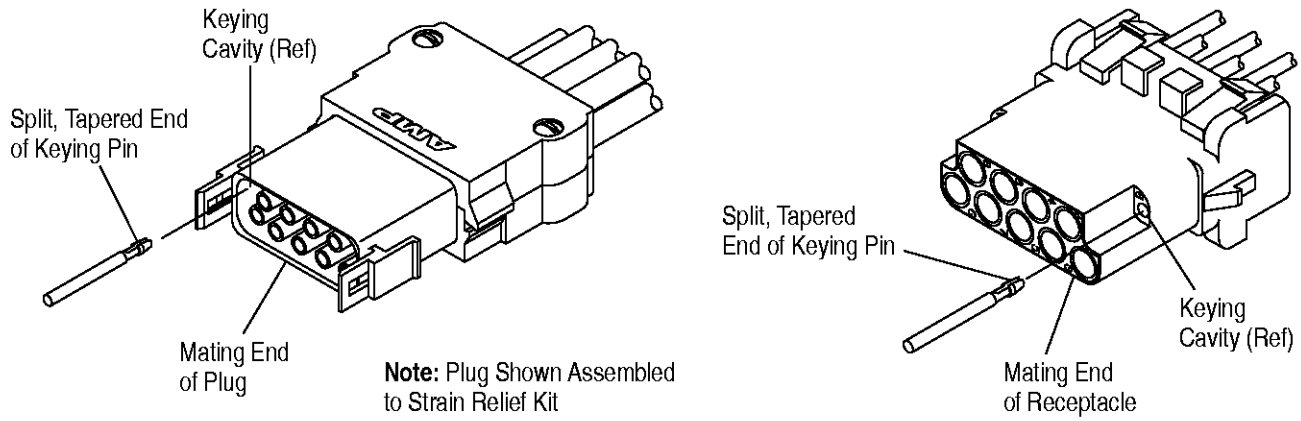
□ Manufactured by General Electric Company
▦ Manufactured by Dow Corning, Corp.
◇ Trademark of E.I. DuPont de Nemours & Co.

3.12. Keying

The connector contains two keying cavities: one marked "A" and the other "B." The keying pins are available in long and short lengths, thereby providing three discrete keying options. For proper usage, keying pins must be in the opposite keying cavities of mating connectors with the split, tapered end inserted into cavity at mating end of connector. See Figure 12.

NOTE *If necessary, a drive pin punch (or similar tool) with an end diameter no greater than 1.52 [.060] and a shaft no shorter than 10 [.394] can be used to aid in fully inserting the short keying pins.*

CAUTION *Connectors without keying pins will mate with connectors with keying pins in any position.*



PLUG KEYING OPTION	KEYING PIN FOR KEYING CAVITY	
	A	B
1	Empty	Long
2	Long	Empty
3	Short	Short

RECEPTACLE KEYING OPTION	KEYING PIN FOR KEYING CAVITY	
	A	B
1	Long	Empty
2	Empty	Long
3	Short	Short

Figure 12

3.13. Panel Cutout

The receptacle housing features four panel latches, four panel mount tabs, and four anti–vibration tabs for insertion into a panel (no mounting hardware is required). The receptacle can be installed from the front (mating side) of the panel only. The panel cutout dimensions provide the necessary minimum clearance of all four sides of the connector. The dimensions required for mounting the receptacles are provided in Figure 13.

NOTE *Any sharp edges on the side of panel cutout that the connector will be inserted must be removed; otherwise, insertion will be difficult.*

After the connector has been inserted into the panel, the panel latches must engage the panel and the anti–vibration tabs must be seated against the surface of the panel. The anti–vibration tabs are flexible to accommodate the thickness of the panel to the dimension shown in Figure 13. The panel mount tabs will not seat against the panel unless a panel with maximum thickness is being used. In this case, both the anti–vibration tabs and the panel mount tabs must seat against the panel.

The panel latches must be depressed before removing the receptacle from the panel.

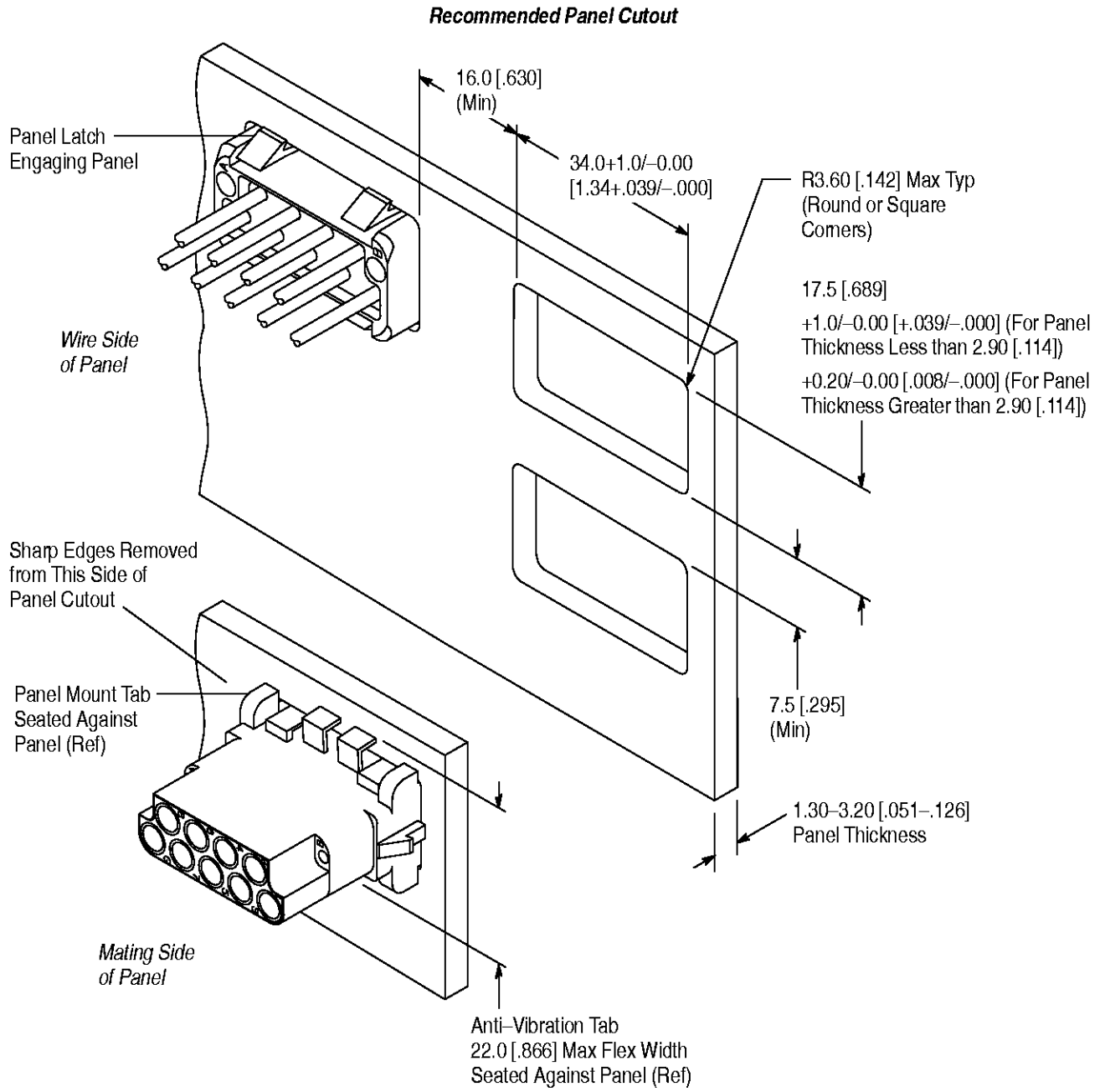


Figure 13

3.14. Connector Mating and Unmating

Plug housings containing socket contacts will mate only with receptacle housings containing pin contacts in identical circuit positions (socket contacts mate with pin contacts). Connectors must be pushed straight in when mating. The plug housing locking latches must be "snapped" into position, and fully seated and latched to the receptacle housing locking tabs when mated. See Figure 14.

When unmating, the locking latches must be squeezed inward (at the opposite end of the latch) and the connectors pulled straight out. A slight side–to–side motion may be used to start extraction, but it must not continue through full extraction cycle.

CAUTION *The use of uneven or off–angle forces during mating and unmating of the connectors could cause overstress and damage to the contacts and/or housings. Do NOT use the "peel–back" method of unmating one end and pulling it until the other end is unmated. Also, do NOT use a severe side–to–side rocking motion to unmate connectors.*

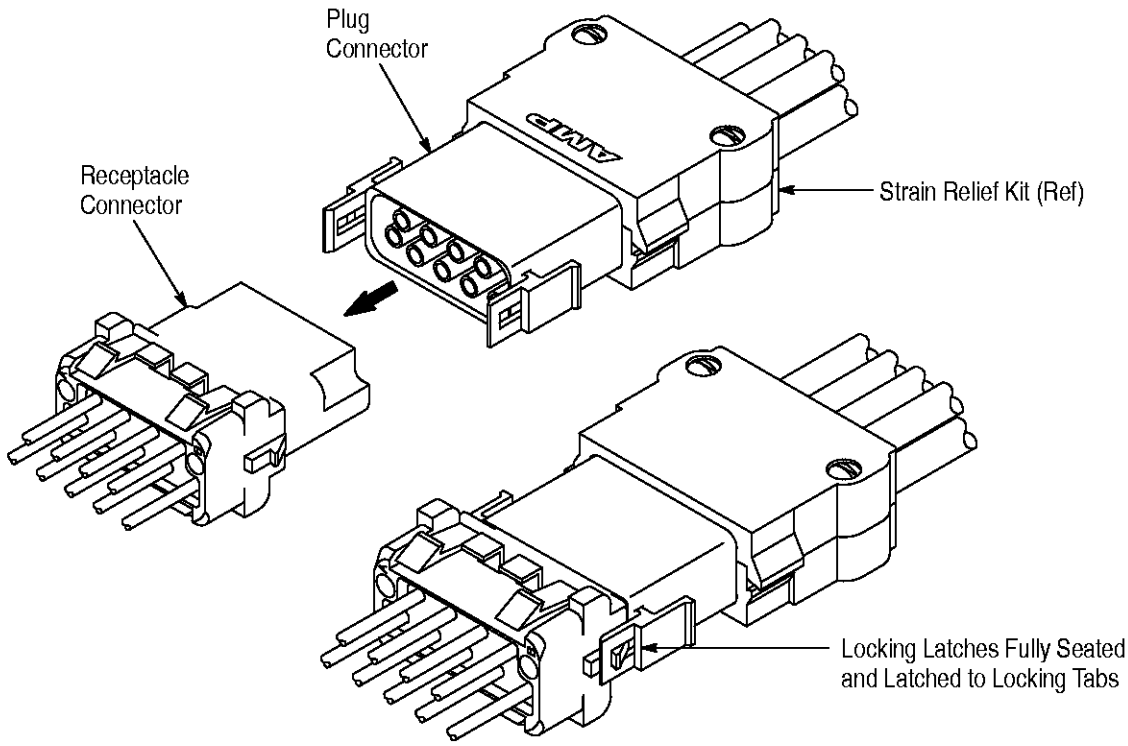


Figure 14

3.15. Repair

Damaged crimped contacts or housings must be removed, discarded, and replaced with new components.

NOTE *If a damaged contact is evident before the contacts are inserted into the housing, cut the wire in back of the contact and re–terminate the wire end. If contact or housing is damaged after insertion, remove the contact with the extraction tool and cut the wire in back of the contact and re–terminate wire end.*

If the locking lance on a contact becomes flattened, it can be carefully re–adjusted to the dimensions shown in Figure 5.

CAUTION *To avoid further damage, do not overstress the locking lance when re–adjusting it.*

4. QUALIFYING SUPPORT

Listing under the Component Program of Underwriters Laboratories Inc. (UL) and certification from Canadian Standards Association (CSA) for these connectors are pending at the time of publication of this document.

5. TOOLING

Machine and tooling part numbers and instructional material packaged with the tooling are shown in Figure 15.

5.1. Hand Crimping Tools

Hand crimping tools that accommodate the full wire size range are designed for prototype and low–volume applications such as repair of damaged contacts. Tools must be fitted with the appropriate die assembly according to the wire size being used.

5.2. Applicator

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.*

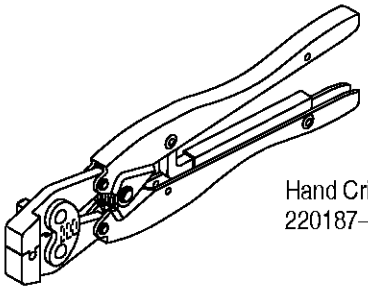
5.3. Power Unit

The power unit is an automatic or semi–automatic device used to assist in the application of the contacts. Power unit includes the power source used to supply the force or power to the applicator.

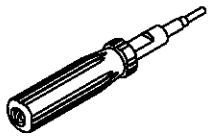
NOTE *AMP–O–LECTRIC Model "K" Terminating Machine 565435–5 has been superseded by Model "G" Terminating Machine 354500–1 for new applications. For existing applications, the Model "K" is still recommended because of the large number of installed machines.*

5.4. Extraction Tool

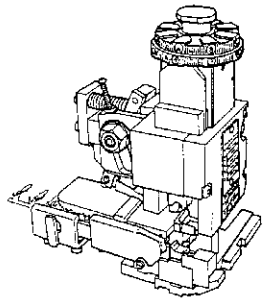
The extraction tool is available to remove the contacts and keying pins from the connector. The tool is designed to depress the locking lances without deforming them.



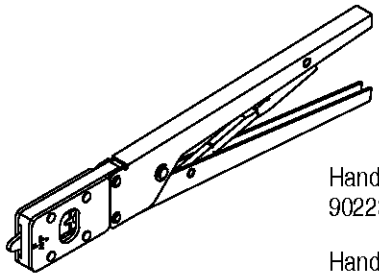
Hand Crimping Tool
220187–2 (408–2774)



Extraction Tool
443352–1 (408–4368)

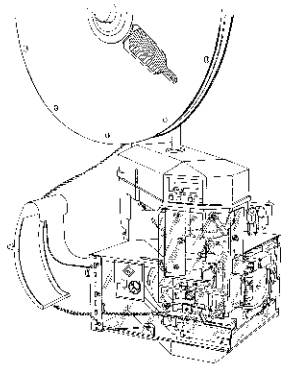


Heavy Duty Miniature
Applicator 466558–2
(408–8040)



Hand Crimping Tool
90223–5 (408–7400)

Hand Crimping Tool
90260–1 (408–7484)



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

WIRE		HAND CRIMPING TOOL FOR	
SIZE	INSUL DIA (Max)	CONTACT	FERRULE
30–26	1.22 [.048]	90223–5	—
24–20	3.70 [.145]	90260–1	—
RG–59	—	90260–1	220187–2

Figure 15

6. VISUAL AID

The illustration below shows a typical application of the MATE–N–LOK LGH 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.

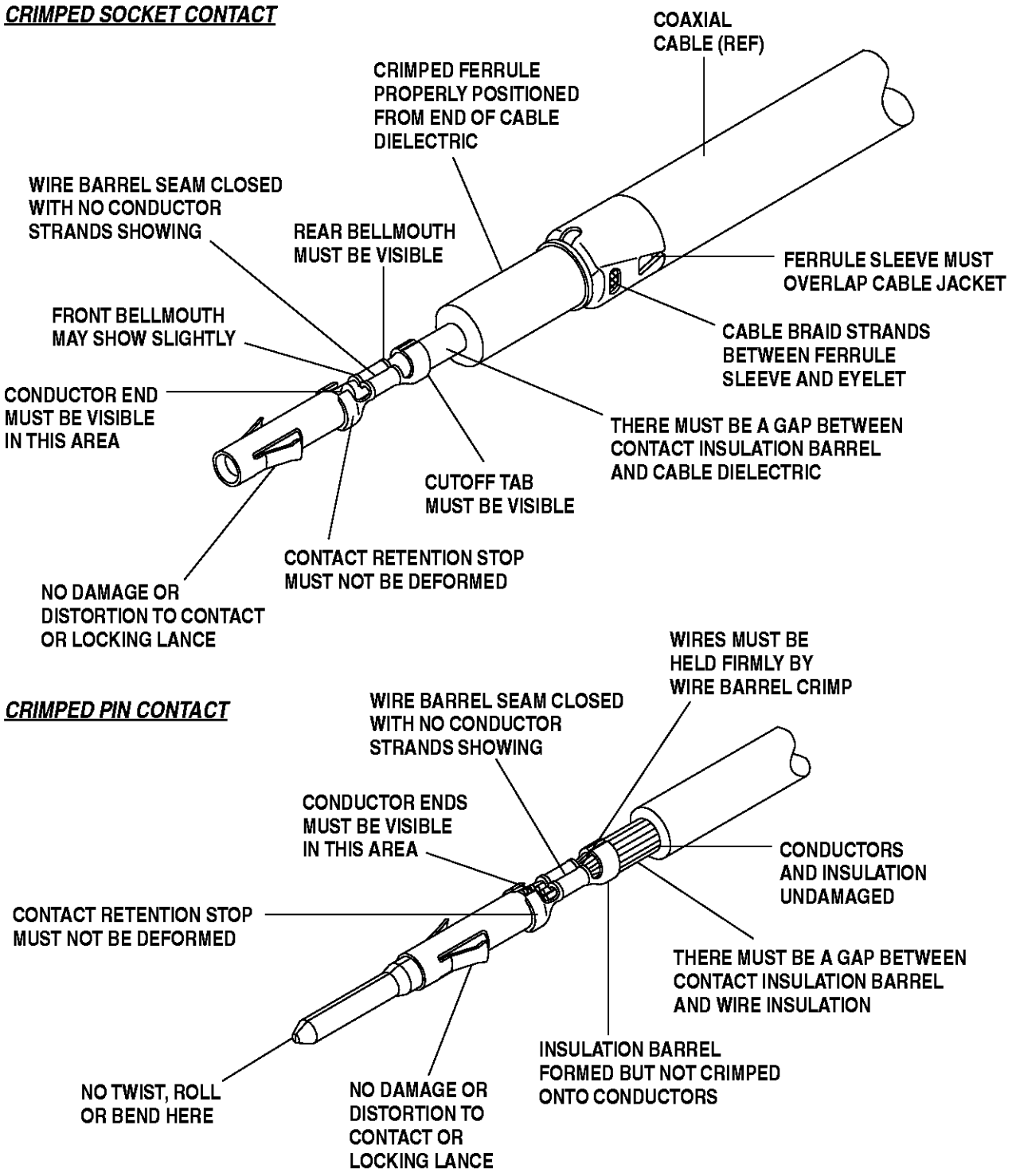


FIGURE 16. VISUAL AID (Continued)

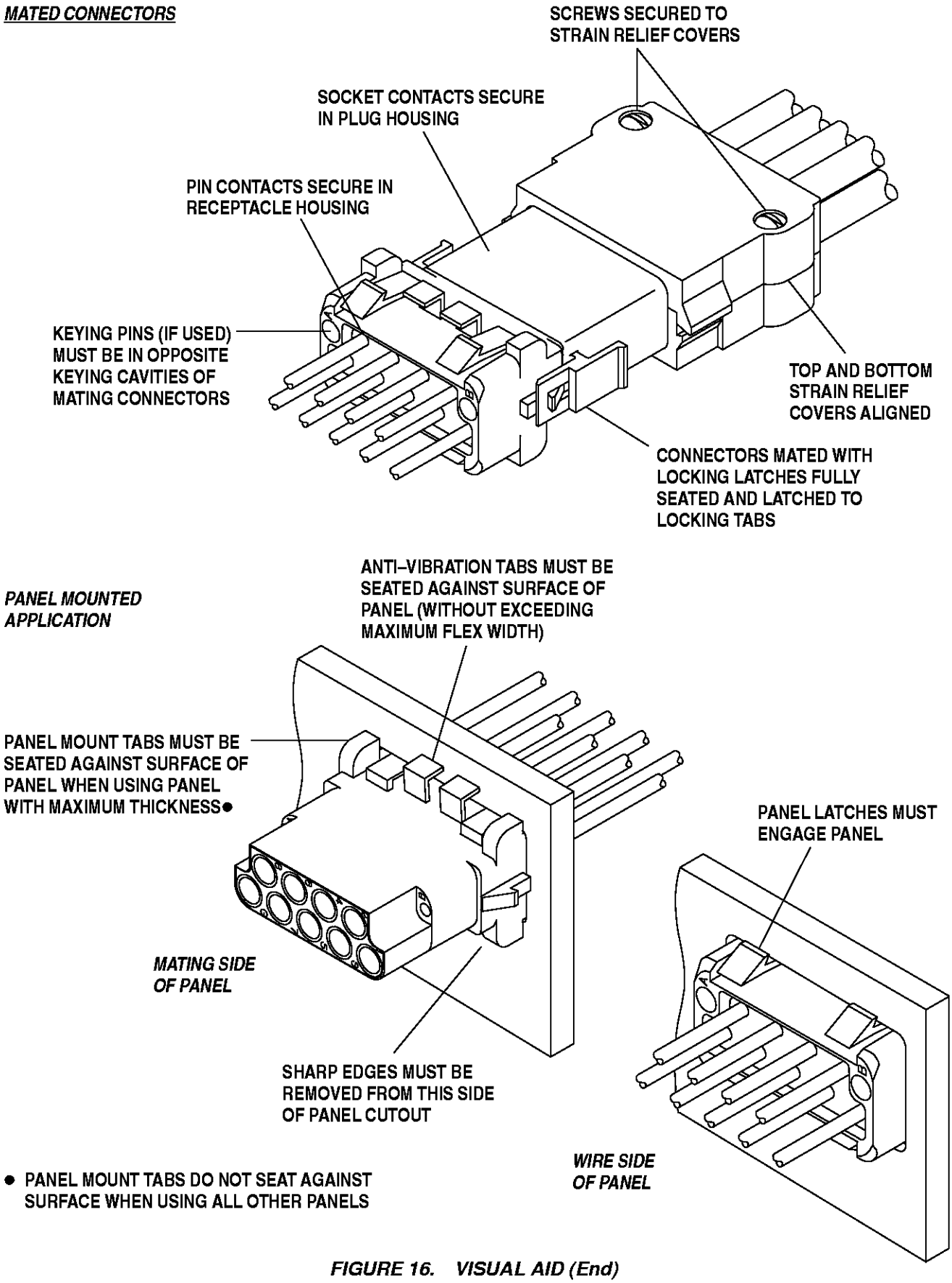


FIGURE 16. VISUAL AID (End)