NOTE

All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ±0.13 [±.005] and angles have a tolerance of ±2°. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirement for application of high performance modular plug connectors for voice and data applications. The modular plugs are available in unshielded or shielded with 8 positions on 1.02 [.040] centerline spacing. These modular plugs are also available in line and keyed housing styles. The modular plugs contain terminals which accept solid or stranded cable (specific cable types and sizes are described in this document and on the customer drawing for the specific connector).

The modular plug consists of a housing and a load bar. Each modular plug features an internal primary strain relief to protect the modular plug-to-cable interface from damage when subjected to pulling or bending forces. These modular plugs are terminated using the insulation piercing technique. The modular plugs are available in loose piece for terminating with manual or pneumatically-powered tools.

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

Unshielded Modular Plug (Shielded Not Shown)

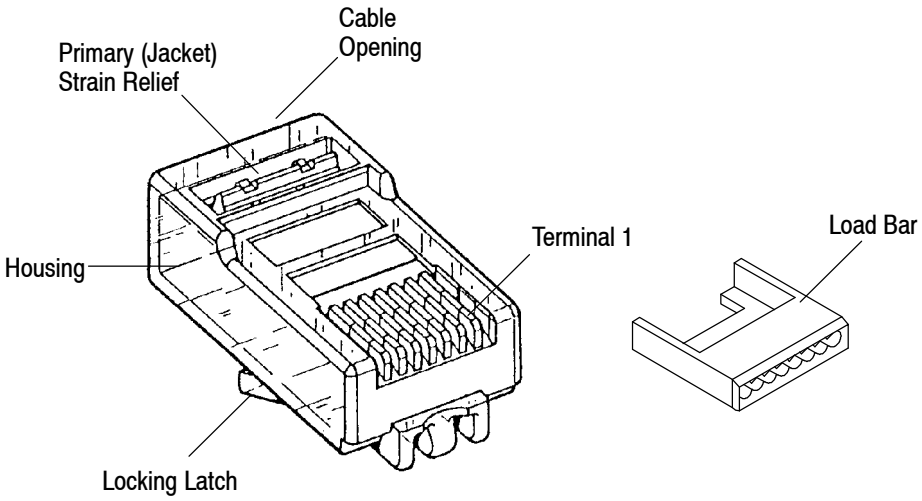


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements

2.2. Customer Assistance

Reference Product Base Part Number 558530 and Product Code 2241 are representative of high performance modular plug 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 or, after purchase, by calling PRODUCT INFORMATION at the number at the bottom of page 1.

2.3. Drawings

Customer Drawings for part numbers of these connectors are available from the service network. If there is a conflict between the information contained in those Customer Drawings and this specification or with any other technical documentation supplied, the information contained in those Customer Drawings takes priority.

2.4. Specifications

Product Specification 108-1163 provides product performance and test information.

2.5. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tooling setup and operation procedures and Customer Manuals (409-series) provide machine setup and operating procedures. Documents available which pertain to this product are:

408-4389	Crimp Height Gage 904170-1
408-9743	Terminating Modules 856196-[ ] for Use with Modular Plug Dual Terminators 1320840-[ ]
408-9767	Modular Plug Hand Tools (Premium Grade) 231652-[ ]
408-9919	Modular Plug Single Terminators 354711-[ ] and Tooling Kits 354714-[ ]
409-10010	Modular Plug Dual Terminators 1320840-[ ]

2.6. Standard Support

High performance modular plug connectors are intended to be used for Category 5e system applications when properly terminated in accordance with the requirements given in this document. These requirements comply with standards developed by Telecommunications Industry Association and Electronic Industries Alliance (TIA/EIA).

3. REQUIREMENTS

3.1. Material

Modular plug housings are made of flame retardant polycarbonate rated Underwriter Laboratories, Inc. (UL) 94 V-0. The terminals are made of phosphor bronze under-plated with nickel; contact area is plated with gold. Shields are made of brass plated with tin or nickel. External strain reliefs are made of brass plated with tin and under-plated with copper.

3.2. Storage

A. Ultraviolet Light

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

B. Shelf Life

The modular plugs should remain in the shipping containers until ready for use to prevent plating damage to the terminals. The modular plugs should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

3.3. Chemical Exposure

Do not store modular plugs near any chemical listed below as they may cause stress corrosion cracking in the terminals.

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

3.4. Cable Selection

The modular plugs accept round unshielded or shielded 8-conductor cable, solid or stranded (7 strands) with insulated conductors sizes 26 through 24 AWG having an outside insulation diameter range of 0.89 through 0.99 [.035 through .039]. The conductor maximum insulation diameter MUST NOT be exceeded.

Category 5e cable jacket insulation types and insulation diameters are:

NOTE

Other performance-rated cable meeting the construction requirements stated in this document may be used; however, they might not meet the requirements for Category 5e system.

1. Unshielded
   Pliable loose — 4.83 through 5.59 [.190 through .220]
   Rigid hard — 4.83 through 5.08 [.190 through .200]
2. Shielded
   Pliable loose — 4.83 through 5.21 [.190 through .205]
   Rigid hard — 4.83 through 5.08 [.190 through .200]

Shield type: metalized polyester foil only; braided shield should not be used.

3.5. Cable Preparation

A. Unshielded

Proper strip length is necessary to properly insert unshielded cable into the modular plugs. The strip length for the cable is given in Figure 2.

NOTE

Reasonable care must be taken not to nick or cut the cable conductor insulation during the stripping operation.

B. Shielded

Shielded cable must be prepared according to the following. Refer to Figure 2:

1. Insert a blade tip between the shield and jacket. Slit the jacket 25.4 [1.0] back from the end. The conductor insulation must not be nicked.
2. Pull the jacket away from the shield, and fold it back over the cable. Cut off the slit portion of the jacket. Care shall be taken not to cut the shield. The conductors enclosed by the shield should extend 25.4 [1.0].
3. Find the overlap seam in the shield, and pull the shield away from the conductors while being careful not to damage the shield.
4. Fold the shield back over the cable.
5. Trim the shield to approximately 9.52 [$^{3}/_{8}$] in length. Form the shield smoothly around the outside of the cable. Make sure that the conductive surface of the shield is exposed; if it is not, form another fold.
6. Bend the drain wire back tightly across the center of the cable shield on the side of the cable that will face the locking latch side of the modular plug when the cable is inserted. Trim the drain wire to the same length as the cable shield.

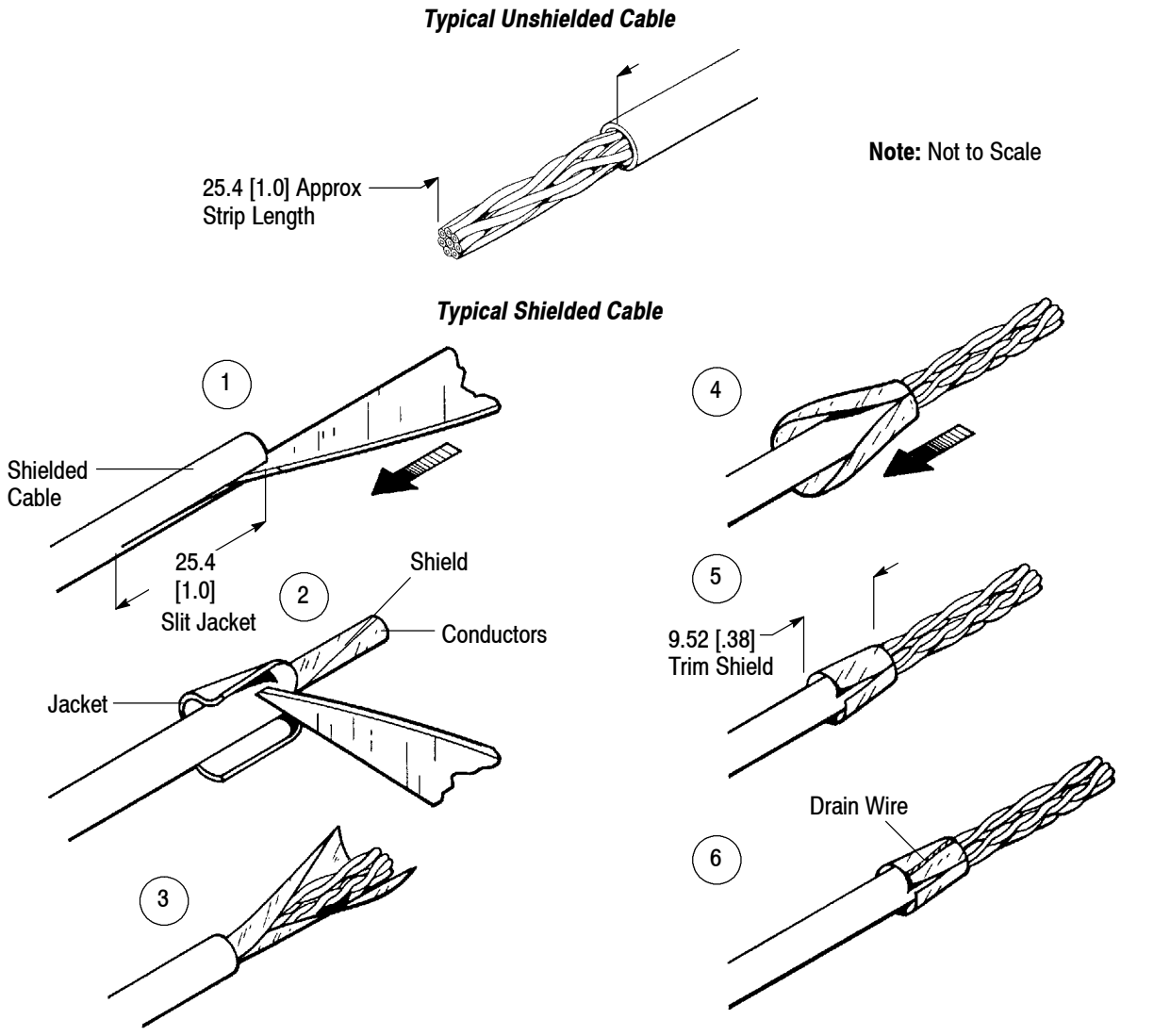


Figure 2

C. Conductor Arrangement

1. The conductors must be grouped in pairs according to the desired electrical schematic (T568A or T568B) given in Figure 3, and the conductor pairs must be arranged in the sequence shown in Figure 3, Detail A.

2. The end of the cable jacket must be squeezed so that approximately 8 [.30] of the jacket flattens and the conductor pairs are side-by-side. The sequence of the conductor pairs should extend into the flat portion of the cable jacket. Refer to Figure 3, Detail A.

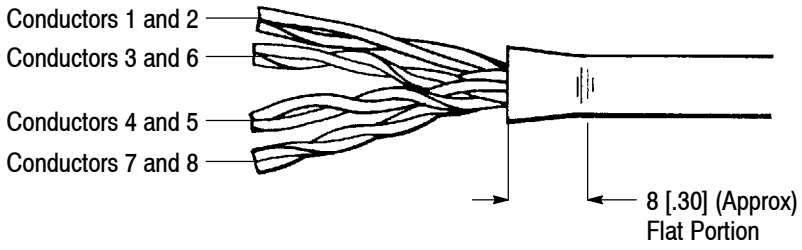
3. While holding the end of the cable jacket, the conductor pairs must be untwisted and arranged in the modular plug positions for the chosen electrical schematic (T568A or T568B) as shown in Figure 3, Detail B. IT IS CRITICAL that the conductor pairs DO NOT untwist inside the cable jacket. Conductor 6 must be crossed *over* Conductors 4 and 5. It is *extremely important* that the twist for Conductor 6 be maintained as it crosses over top of Conductors 4 and 5. Refer to Figure 3, Detail C.

4. Maintaining the proper orientation of the conductors, the conductors must be trimmed evenly—leaving approximately 19 [.75] from the end of the jacket to the tips of the conductors. See Figure 3, Detail C.

NOTE

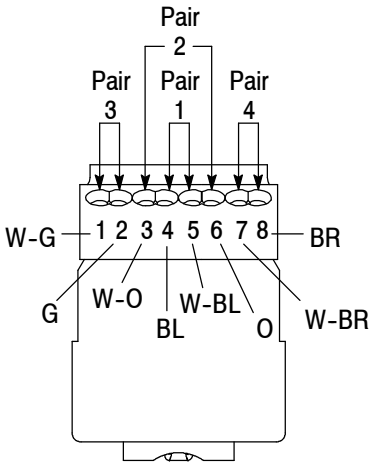
It is recommended to maintain twist on any conductor pair outside the cable jacket if it can be achieved with conductor pairs remaining in the chosen electrical schematic.

Detail A

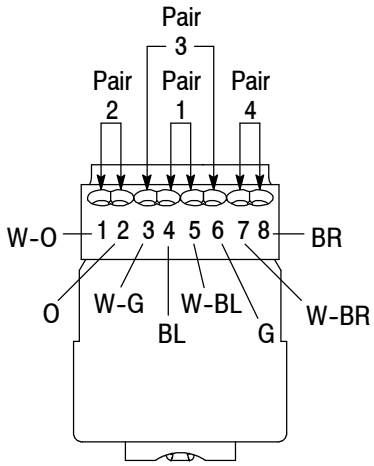


Detail B

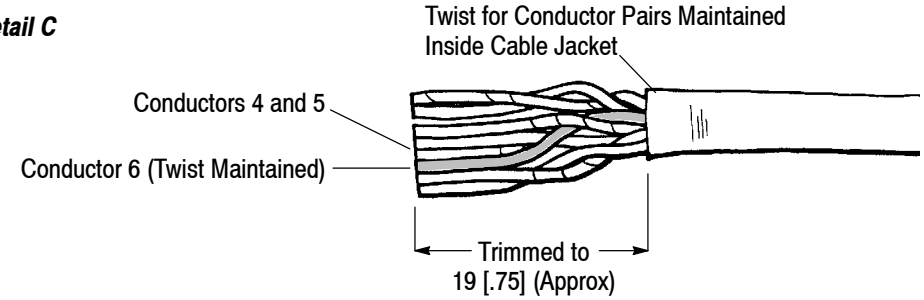
Modular Plug Positions for T568A



Modular Plug Positions for T568B



Detail C



CONDUCTOR PAIR NUMBER	CONDUCTOR COLOR CODE (Abbreviation)		CONDUCTOR NUMBER For Electrical Schematic (See Note)	
	OPTION 1	OPTION 2	T568A	T568B
1	White-Blue (W-BL)	Green (G)	5	5
	Blue (BL)▪	Red (R)	4	4
2	White-Orange (W-O)	Black (BK)	3	1
	Orange (O)	Yellow (Y)	6	2
3	White-Green (W-G)	Blue (BL)	1	3
	Green (G)▪	Orange (O)	2	6
4	White-Brown (W-BR)	Brown (BR)	7	7
	Brown (BR)▪	Slate (S)	8	8

▪ A white marking is acceptable.

Note: Because of their identical pair groupings, cables arranged according to either T568A or T568B may be used interchangeably provided both ends are arranged with the same pin/pair scheme.

Figure 3

3.6. Termination Requirements

A. Conductor Location

1. The conductors must be fully inserted into the load bar in the proper orientation. The floor of the load bar between the cable notch and conductor constraining area may be used to bring the 8-conductor tips into the same plane (this can be an aid for inserting the conductors into the load bar). The edge of the cable jacket should rest against the notch of the load bar. The conductors must be trimmed evenly and square to the front edge of the load bar so that approximately 5 [.20] of each conductor protrudes from the front of the load bar. Refer to Figure 4, Detail A.

2. The load bar must be slid toward the tips of the conductors so that approximately 1 [.04] of each conductor is exposed. The conductors must not extend too far into the load bar; otherwise, the load bar will twist and become deformed. Refer to Figure 4, Detail B.

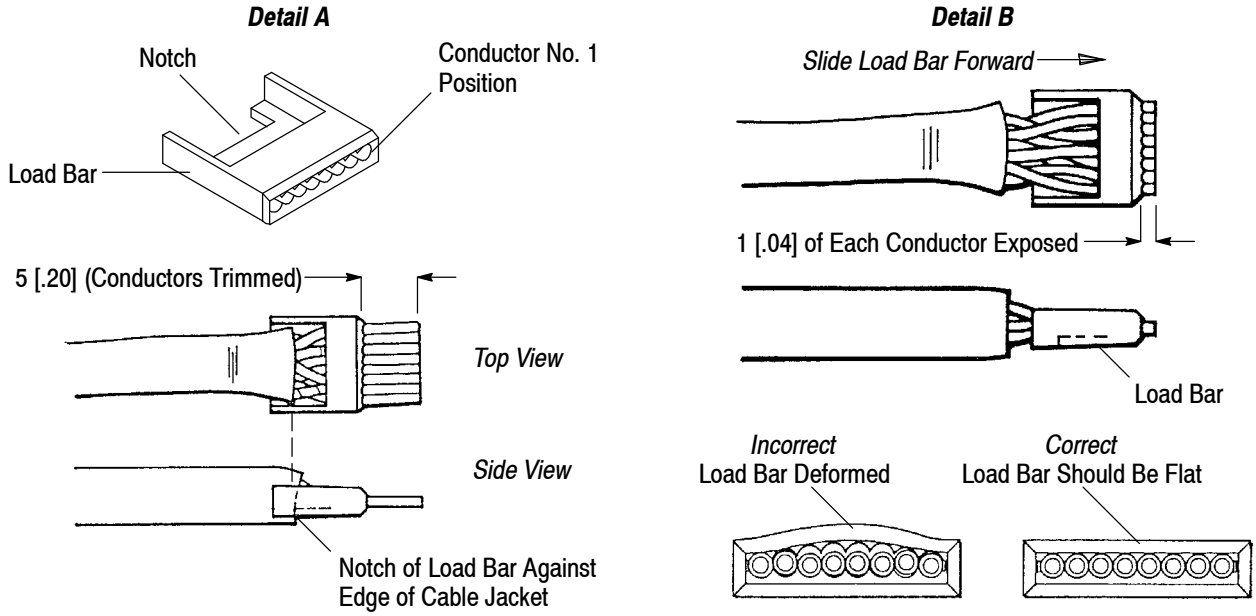


Figure 4

3. The load bar must be fully inserted into the mating feature within the housing of the modular plug. See Figure 5, Detail A. The conductors must be completely inserted and bottomed in the wire circuits and clearly visible through the front of the housing. See Figure 5, Detail B.

NOTE

If the conductors are not bottomed in the wire circuits, the load bar must be remove, conductors re-trimmed, and the conductors re-inserted. If the conductors are too short, the conductors must be re-stripped.

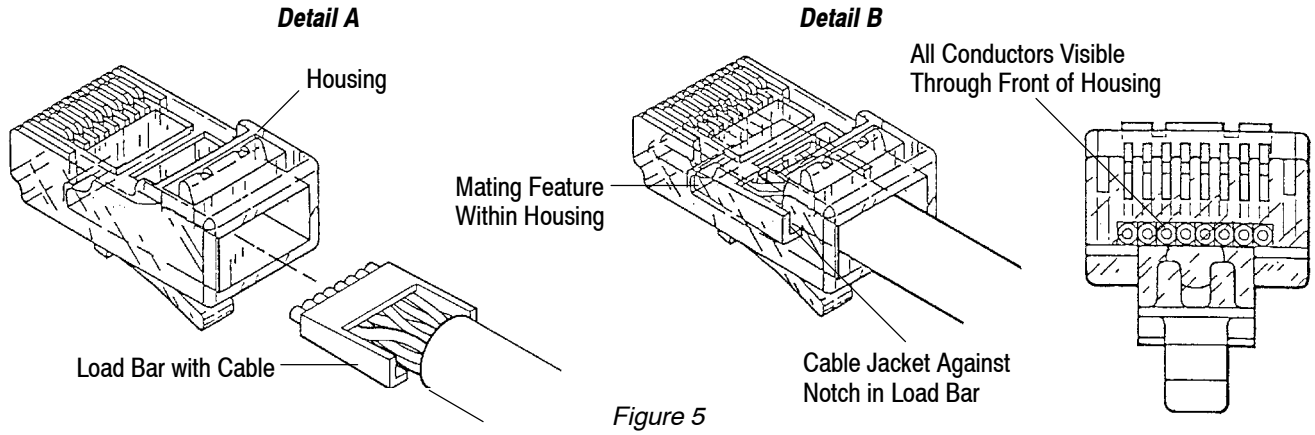


Figure 5

4. After termination, it is preferred that all conductors are bottomed against the end of the wire entry circuits. If individual conductors are not completely inserted in the housing, they must be inserted at least past the terminal and into the reference zone to ensure a proper electrical interface. Refer to Figure 6.

B. Crimp Height

The crimp height shall be measured from the top of the terminals to the bottom of the housing (not including locking tab) and must be within the dimension provided in Figure 6.

NOTE

All terminals must be at approximately the same height. A crimp height gage is available for measuring modular plug crimp height (refer to Section 5 for part number and description).

C. Internal Strain Reliefs

The primary strain relief must be fully engaged on the cable jacket. The primary strain relief must be fully engaged to isolate the termination area from external forces applied to the cable. It is acceptable for the primary strain relief to cut into the jacket as long as the conductor insulation is not compromised. See Figure 6.

NOTE

For unshielded modular plug, the primary strain relief can be visually inspected through the side of the housing.

Cross Section Shown

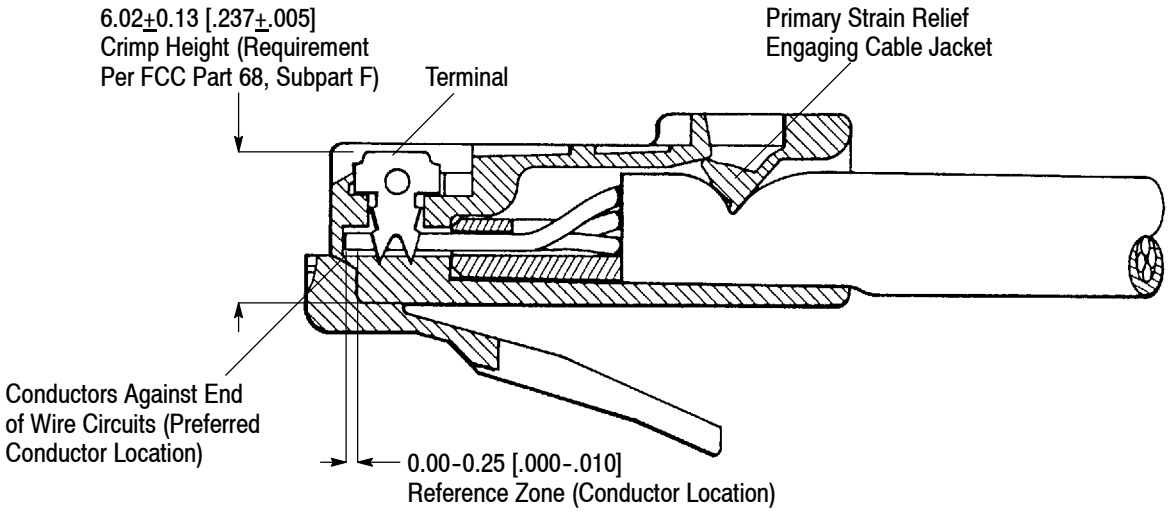


Figure 6

3.7. Mating

The modular plug must be inserted into the mating jack until it bottoms. When fully inserted, the modular plug locking tab will engage the jack housing and prevent the connectors from separating. The connectors will not unmate unless the modular plug locking latch is fully depressed. After mating, there will be a small amount of axial movement (travel) between the mated modular plug and jack, and with some combinations, depending on tolerance variations between original equipment manufacturers (OEM), could be up to 0.76 [.030].

3.8. Repair

These modular plugs cannot be repaired; damaged modular plugs must be removed and discarded. The cable must be cut from the modular plug and re-terminated onto a new modular plug.

4. QUALIFICATION

High performance modular plug connectors are Component Recognized by Underwriters Laboratories Inc. (UL) in File E81956 (DUXR2/DUXR8), and Certified by CSA International in File 164196-1046618.

5. TOOLING

Tooling part numbers and instructional material packaged with the tooling are shown in Figure 7.

5.1. Hand Tools

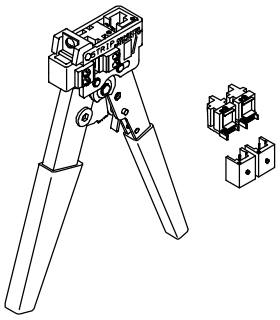
The premium grade modular plug hand tool terminates these modular plugs to all types of cable indicated in this document. The tool also cuts and strips unshielded flat oval cable. This tool is designed for field application, installation, and repair.

5.2. Terminators

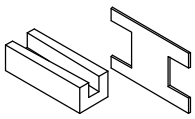
The terminators are pneumatically powered, bench-mounted tools controlled by a foot valve to terminate modular plugs to create a cable assembly. Terminating modules fit interchangeably into the dual terminators. During termination, the dual terminators test the assembly for electrical circuit continuity. The single terminators require a specific tooling kit to terminate one modular plug style and does not provide testing. These tools provide for high-volume applications.

5.3. Crimp Height Gage

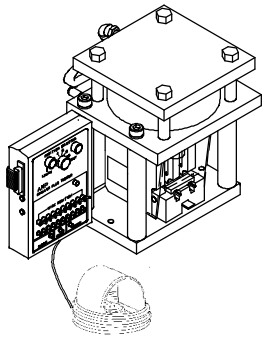
The crimp height gage is used to measure the crimp height of the terminated modular plug. The gage consists of a connector nest and a GO/NO-GO spanner.



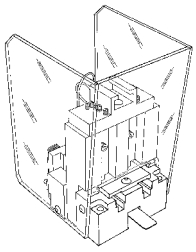
Modular Plug Hand Tools
(Premium Grade) 231652-[ ]
with Die Set 1-853400-0
(408-9767)



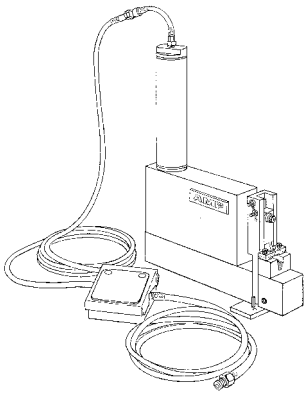
Crimp Height Gage
904170-1 (408-4389)



Modular Plug Dual Terminator
1320840-1 (408-9743)



Terminating Module
1-856196-1 (408-9743)



Modular Plug Single Terminators
354711-[ ] and Tooling Kits 354714-7
(408-9919)

Figure 7

6. VISUAL AID

The illustration below shows a typical application of high performance modular plug 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.

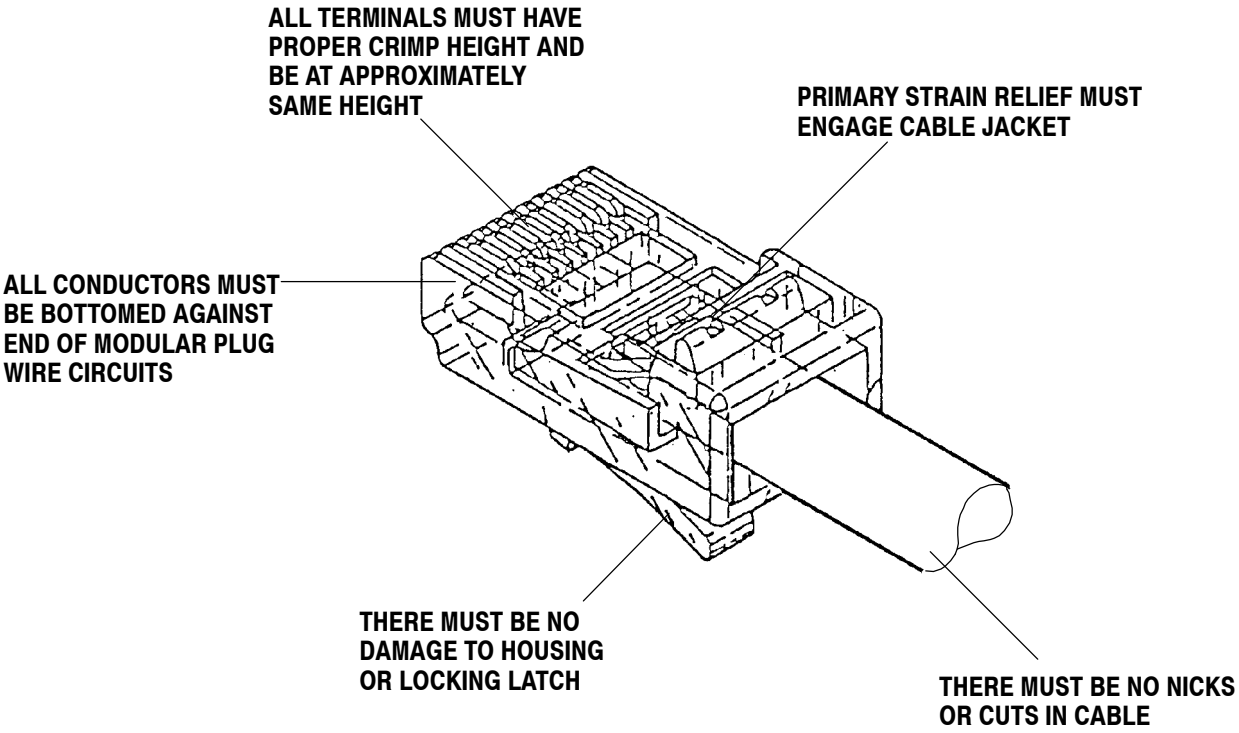


FIGURE 8. VISUAL AID