

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 [$\pm .005$] 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 the requirements for application of Power Series 15, 30, and 45 (single-pole) connector assemblies used in high-current systems for office furniture, power supplies, battery chargers, telecommunications, and material handling equipment. Each connector assembly consists of a housing and an open-barrel barrel (cold-headed) or closed-barrel (stamped-and-formed) contact. Accessories available for the connector assemblies are a cable clamp kit, spiral retainer pin, spacer (short and long), mounting wing, mounting clamp, plug frame (with latches and without latches), and panel mount frame.

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.

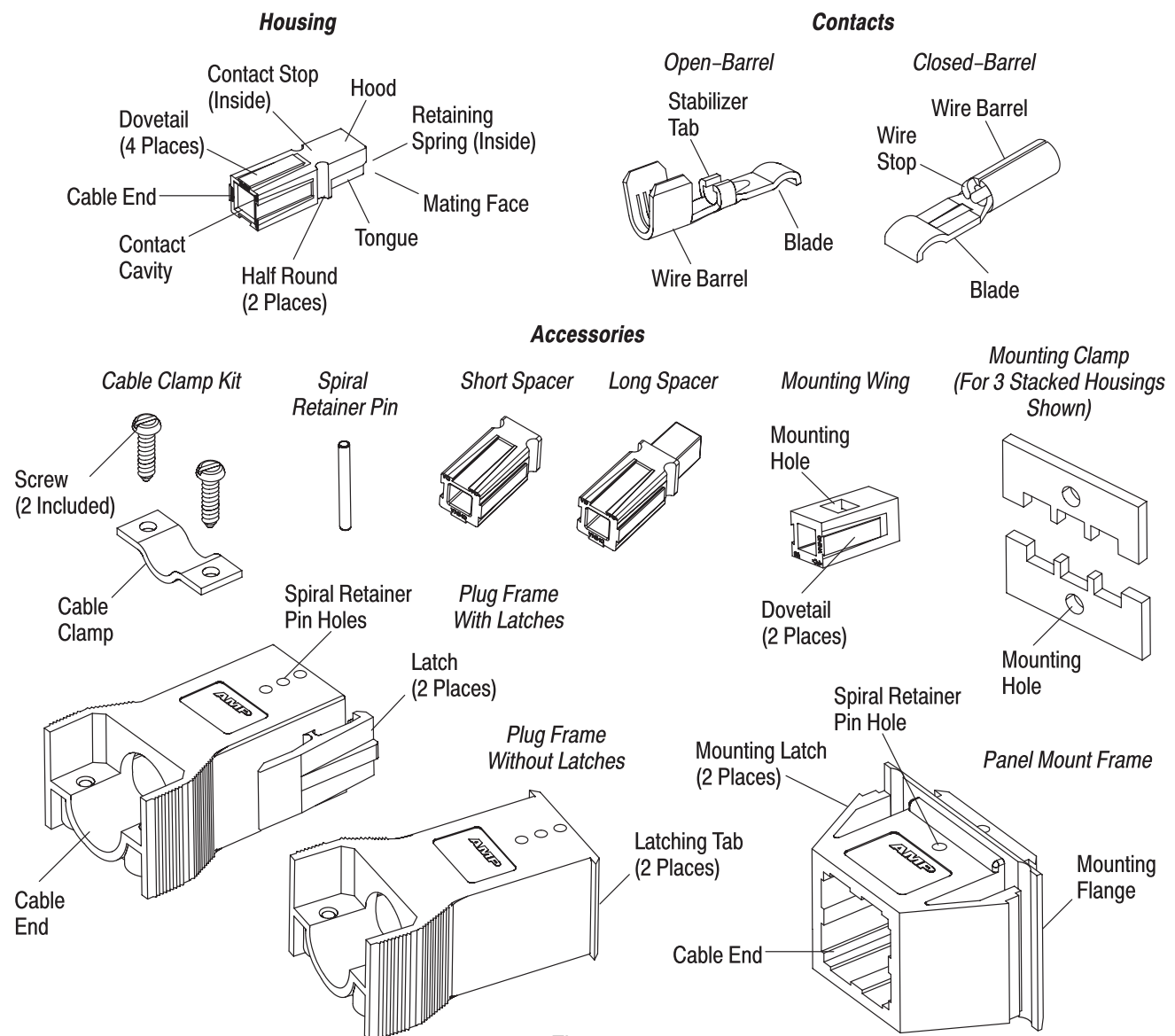


Figure 1

These connectors are designed for free-hanging, surface mount, and panel mount applications.

1.1. Features

The housing features a contact cavity, dovetails, and half rounds. The contact cavity has an internal retaining spring that retains the contact in the housing. The housings can be joined with other housings on all four sides using the dovetails. The hermaphroditic design of the housing ensures proper polarity in mating. The housings are color coded to provide visual reference for proper mating of the connectors.

The open-barrel contact features a wire barrel, blade, and stabilizer tab. When the contact is inserted into the housing, the stabilizer tab ensures proper insertion depth for the blade to engage the internal retaining spring. These contacts are available in reeled form for terminating with a semi-automatic machine and loose piece form for terminating with a manual hand tool.

The closed-barrel contact features a wire barrel, blade, and wire stop. When the contact is inserted into the housing, the wire stop ensures proper insertion depth for the blade to engage the internal retaining spring. These contacts are available in loose-piece form for terminating with a manual hand tool.

1.2. Accessories

A. Cable Clamp Kit

The cable clamp kit consists of a cable clamp and two screws. The kit is designed to be installed onto the the plug frame to provide strain relief for the cable. The kit is available for 4-, 6-, and 8-pole (number of stacked housings) plug frames.

B. Spiral Retainer Pin

The spiral retainer pin is used to hold stacked housings together or retain the stacked housings in the frame. The spiral retainer pin is available in three lengths: 6.35 [.25] (short; for use in a single row of housings), 11.18 [.44] (medium; for use in a double row of housings), and 21.6 [.85] (long; for use in a frame).

C. Spacer

The spacer is available in short and long. The short spacer is used to fill voids in an uneven amount of stacked housings, and the long spacer is used in conjunction with the short spacer to create polarized keying. The spacers are color coded to provide visual reference for matching corresponding spacers.

D. Mounting Wing

The mounting wing is used to mount housings onto a surface. The mounting wing features dovetails that are used to interlock the housings and adjacent mounting wings. The mounting wing must be secured to the surface using commercially available hardware.

E. Mounting Clamp

The mounting clamp is used to mount housings onto a panel. The mounting clamp is secured to the panel using commercially available hardware.

F. Frames

The frames—plug with latches, plug without latches, and panel mount—accommodate 2 to 8 housings (a double row with a maximum of 4 housings). The frames are used for orderly cable management. The integral latches and latching tabs prevent accidental disconnection of mated connectors. The plug frame with latches mates with the plug without latches for free-hanging applications or with the panel mount frame for panel mount applications.

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this application specification include:

- Updated document to corporate requirements
- Changed product code in Paragraph 2.2
- Changed nomenclature for contacts
- Added text to Paragraph 3.9
- Added document reference for extraction tool and changed part number for Model “K” terminating machine in Figure 20

2.2. Customer Assistance

Reference Product Part Number 1604116 and Product Code H300 are representative of Power Series 15, 30, and 45 connector assemblies. 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 product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, call PRODUCT INFORMATION at the number at the bottom of page 1.

2.4. 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 operation procedures. Documents available which pertain to this product are:

- 408–8040 Heavy Duty Miniature Quick–Change Side Feed Applicator
- 409–5128 AMP–O–LECTRIC* Model “K” Terminating Machine
- 409–5842 AMP–O–LECTRIC Model “G” Terminating Machine 354500–1

3. REQUIREMENTS

3.1. Material

The housing, mounting wing, and spacer are made of polycarbonate, rated 94 V–0 by Underwriter Laboratories, Inc. (UL). The contacts are made of copper plated with silver or tin. The spiral retainer pin is made of stainless steel.

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

C. Chemical Exposure

Do not store housings or contacts near any chemical listed below as they may cause discoloration of the plated finish of the contacts or stress corrosion cracking in the housing or contact material.

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

3.3. Cable Selection and Preparation

The contacts accept stranded copper cable sizes 20 through 10 AWG with a minimum of 19 wire strands and a maximum insulation diameter of 18.16 [.175].

NOTE

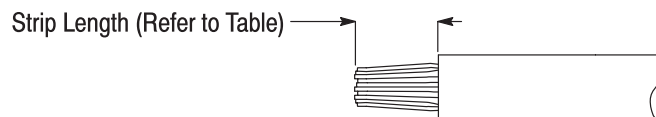

Cable with less than 19 wire strands must not be used. Cable with less than 19 wire strands is too stiff and could cause the contact to twist inside the housing when dressing the cable.

The cable must be cut to length. Proper strip length is necessary to properly insert the wires into the contact. The strip length of the cable is shown in Figure 2.

CAUTION


Reasonable care must be taken not to nick or scrape any part of the cable during the stripping.

Recommended Cable Strip Length



Note: Not to Scale

CONNECTOR SERIES	CABLE SIZE RANGE (AWG)	CABLE STRIP LENGTH	
		Open-Barrel Contact	Closed-Barrel Contact
15	20-16	4.30-6.48 [.170-.255]	—
	18-16	—	7.87-8.89 [.309-.350]
30	16-12	4.30-6.48 [.170-.255]	—
	14-12	—	7.87-8.89 [.309-.350]
45	14-10	5.71-6.98 [.225-.275]	—

Figure 2

3.4. Crimp Requirements

The following crimp requirements result from using the tooling described in Section 5.

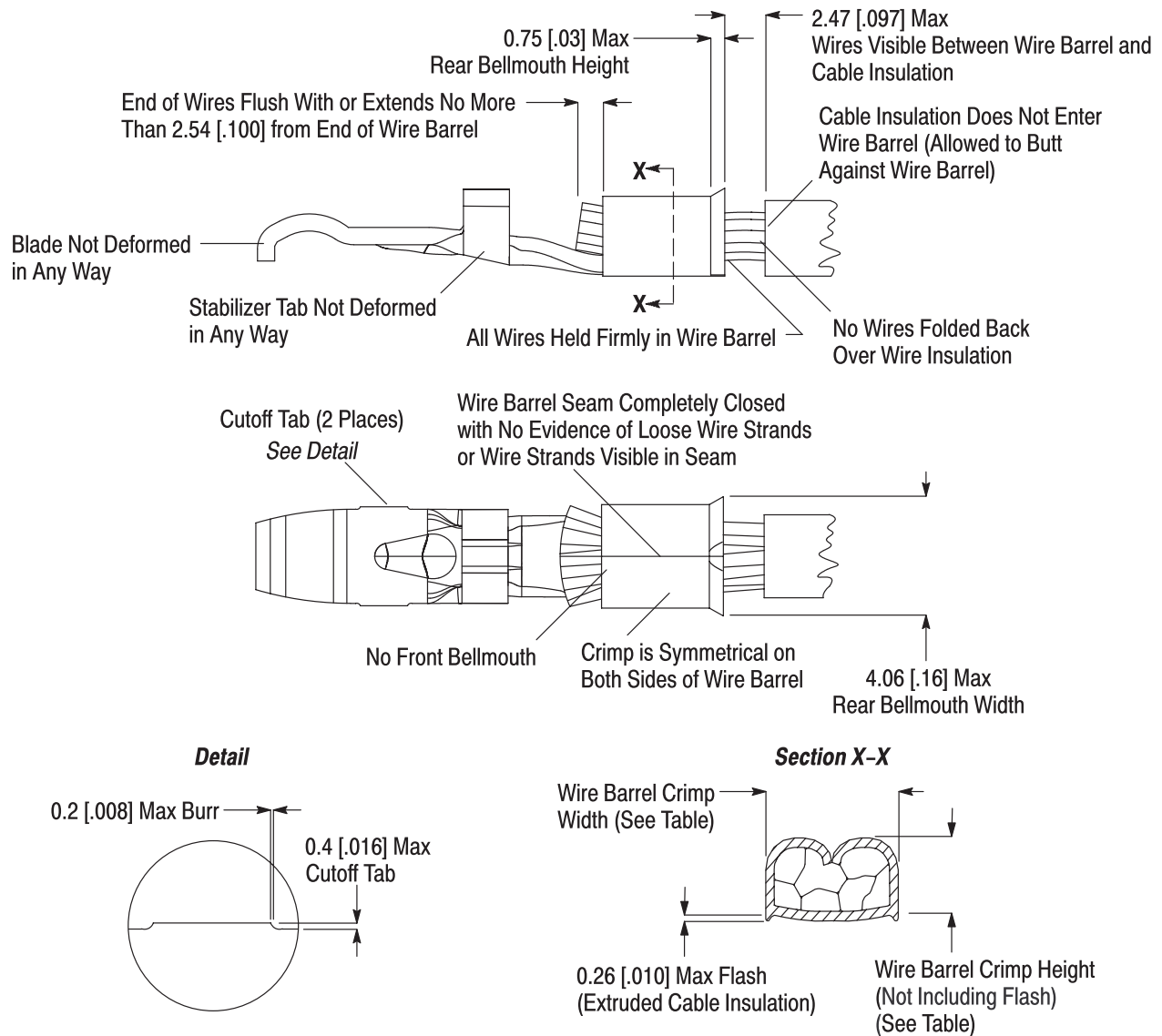
A. Open-Barrel Contact Using Semi-Automatic Machine

The crimped open-barrel contact using the semi-automatic machines must meet the requirements given in Figure 3.

The cutoff tab is the remaining portion of the carrier strip after the contact is cut from the strip. The cutoff tab and the burr resulting from the cutoff tab shearing must not exceed the dimension given in Figure 3 (Detail).

All cable wires must be held firmly inside the wire barrel. The crimp applied to the wire barrel is the most compressed area and most critical in ensuring optimum performance of the crimped contact. The crimped area must be symmetrical on both sides of the wire barrel. The crimp height and width must be within the dimensions provided in Figure 3.

**Open-Barrel Contact Crimp Requirements
Using Semi-Automatic Machines**



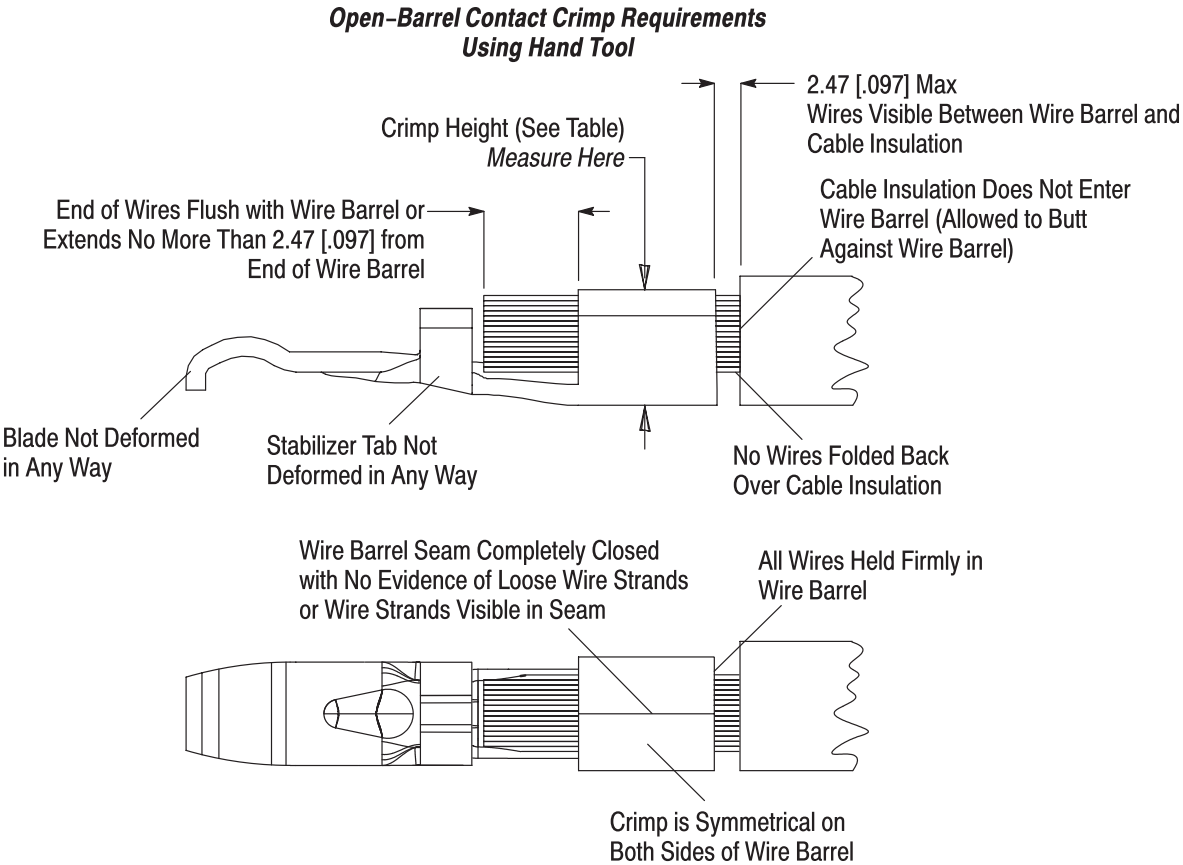
CONNECTOR SERIES	CABLE SIZE (AWG)	CRIMP HEIGHT ± 0.08 [$\pm .003$]	CRIMP WIDTH ± 0.08 [$\pm .003$]
15	20	1.50 [.059]	3.05 [.120]
	18	1.63 [.064]	
	16	1.75 [.069]	
30	16	1.96 [.077]	3.56 [.140]
	14	2.13 [.084]	
	12	2.39 [.094]	
45	14	2.44 [.096]	3.94 [.155]
	12	2.67 [.105]	
	10	2.95 [.116]	

Figure 3

B. Open-Barrel Contact Using Hand Tool

The crimped open-barrel contact using the hand tool must meet the requirements given in Figure 4.

The crimp applied to the wire barrel is the most compressed area and most critical in ensuring optimum performance of the crimped contact. The crimp height and width must be within the dimensions provided in Figure 4.



CONNECTOR SERIES	CABLE SIZE (AWG)	CLOSED-BARREL CONTACT	
		CRIMP HEIGHT ±0.08 [±.003]	CRIMP WIDTH ±0.08 [±.003]
45	10	3.12 [.123]	4.47 [.176]

Figure 4

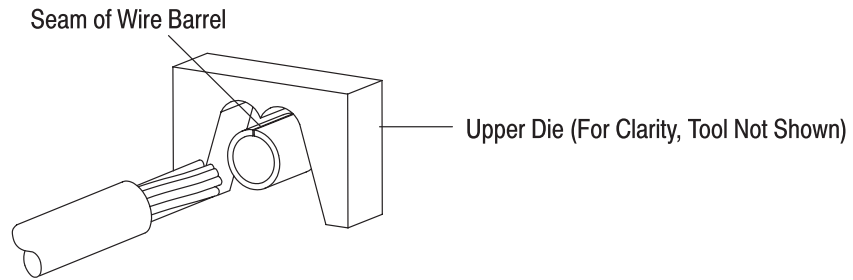
C. Closed-Barrel Contact Using Hand Tool

When placing the closed-barrel contact in the tool, it is important to make sure that the contact is not positioned upside-down. The contact must be positioned in the tool with the seam of the wire barrel facing squarely toward the upper die. See Figure 5.

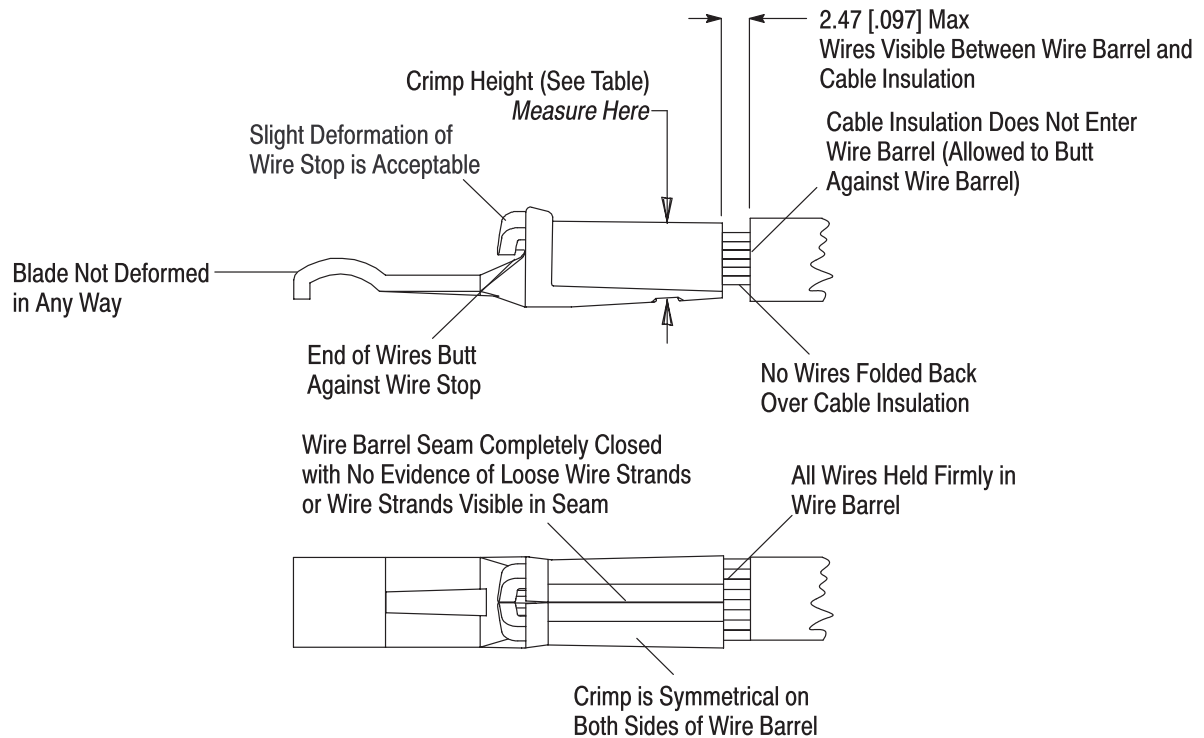
The crimped closed-barrel contact using the hand tool must meet the requirements given in Figure 5.

The crimp applied to the wire barrel is the most compressed area and most critical in ensuring optimum performance of the crimped contact. The crimp height and width must be within the dimensions provided in Figure 5.

Proper Position of Closed-Barrel Contact in Hand Tool



Closed-Barrel Contact Crimp Requirements Using Hand Tool



CONNECTOR SERIES	CABLE SIZE RANGE (AWG)	CLOSED-BARREL CONTACT	
		CRIMP HEIGHT ± 0.08 [± 0.003]	CRIMP WIDTH ± 0.08 [± 0.003]
15	14-12	1.83 [.072]	3.23 [.127]
30	18-16	1.96 [.077]	3.56 [.140]

Figure 5

3.5. Twist and Roll

There should be no twist or roll of the wire barrel of the crimped contact that would cause overstress or impair usage. See Figure 6.

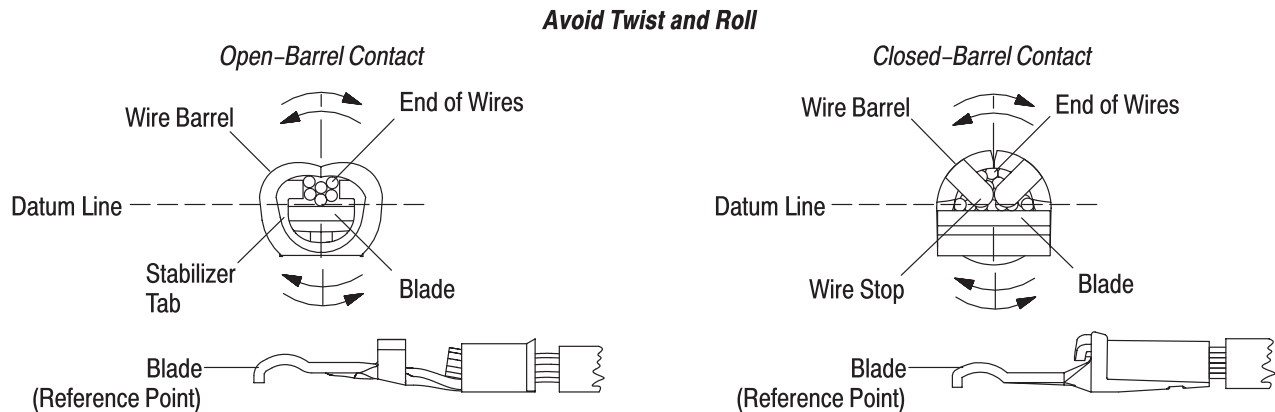


Figure 6

3.6. Bend Allowance

The force applied during crimping may cause some bending between the wire barrel and cable. Such deformation is acceptable within the following limits.

1. Up and down — the contact must not be bent beyond the limits shown in Figure 7.
2. Side-to-side — the crimped portion of the contact must not be bent from one side to the other.

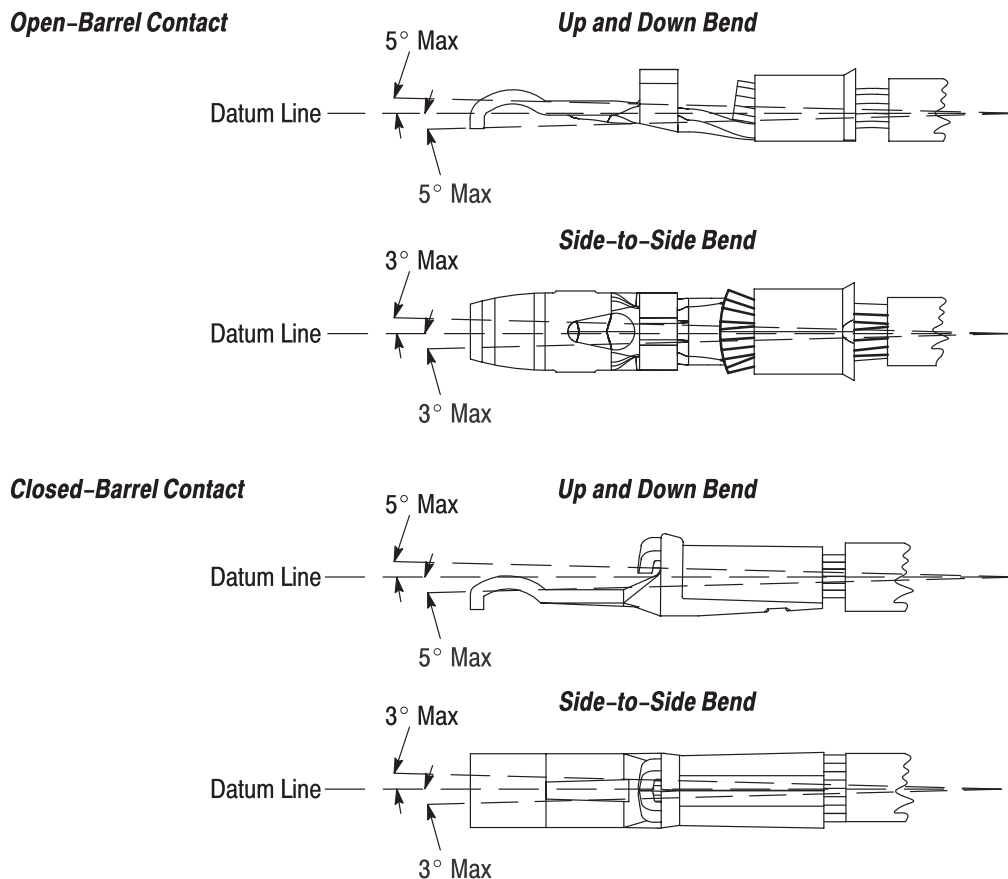


Figure 7

3.7. Special Assembly Considerations

- For optimum results, it is recommended intermating housings containing contacts with the same plating (tin to tin or silver to silver).
- DO NOT restrict movement of the contacts that would affect their performance (such as bending unsupported cables).
- DO NOT restrict heat dissipation from the connectors.

3.8. Installing Contact into Housing

A contact must be inserted into the cable end of the housing with the bottom of the contact facing the retaining spring of the housing. The contacts **MUST NOT** be forced into the housing. The installed contact must meet the requirements given in Figure 8.

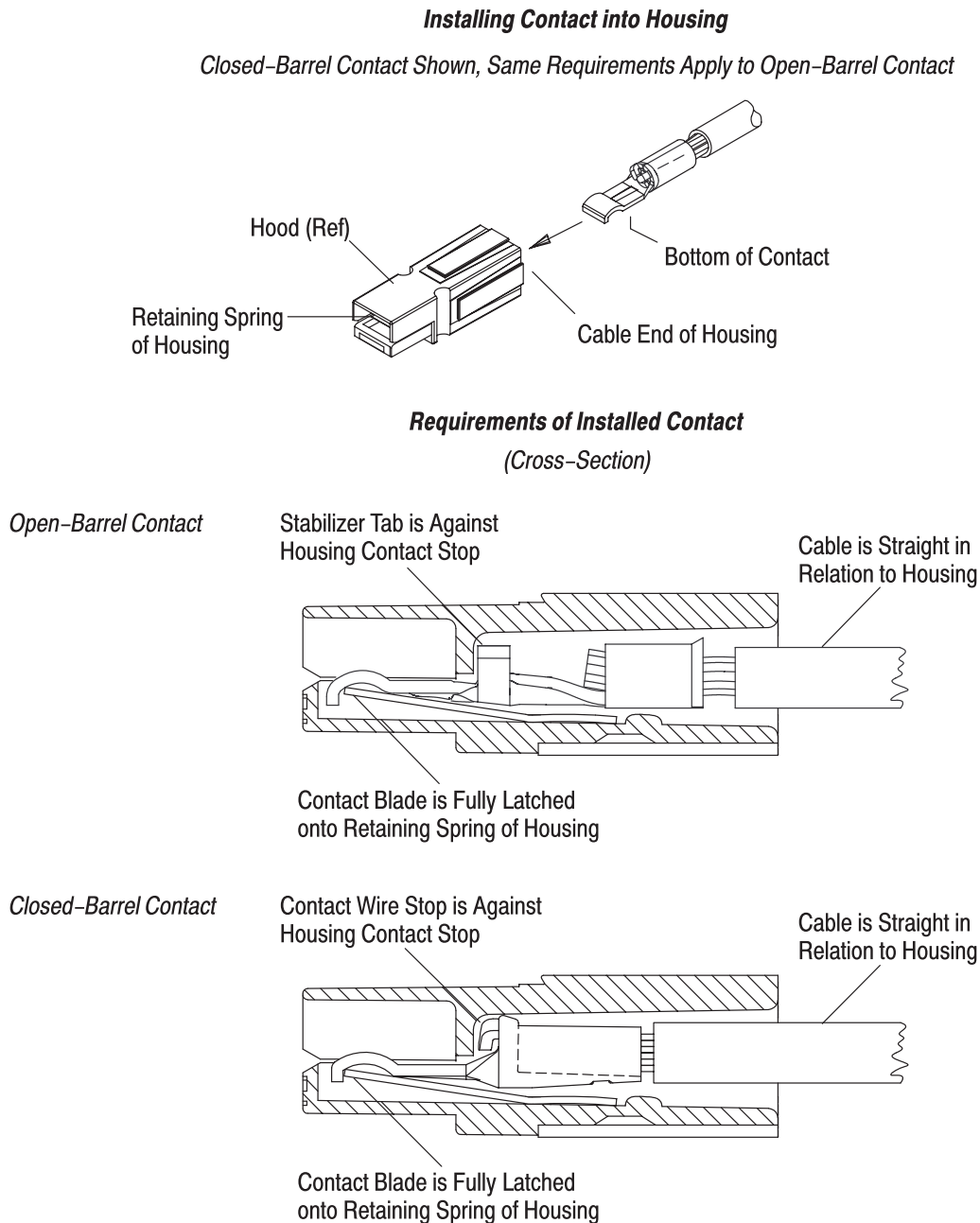


Figure 8

3.9. Stacking Housings and Installing Spiral Retainer Pins

The housings must be interlocked using the dovetails. A housing must be slid onto another housing from the mating face of the housings until the dovetails are engaged, the ends of the housings are flush, and the half rounds of the housings form a hole. Refer to Figure 9, Detail A.

The housings can be stacked in a vertical, horizontal, or block configuration. A spiral retainer pin—using a short for horizontal and a medium for block—should be inserted into the formed hole to hold the stacked housings together. When seated, the spiral retainer pin must be flush with the top and bottom of the stacked housings. One spiral retainer pin should be installed into each formed hole. For 2 vertical stacked housings, one retainer pin should be inserted into one of the formed half holes. See Figure 9, Detail B.



CAUTION Commercially available roll pins **MUST NOT** be used. Roll pins could fall out of the housings and cause damage to the system.

Stacked housings can be permanently bonded by applying a small drop of cyanoacrylate glue to the joint between the dovetails.

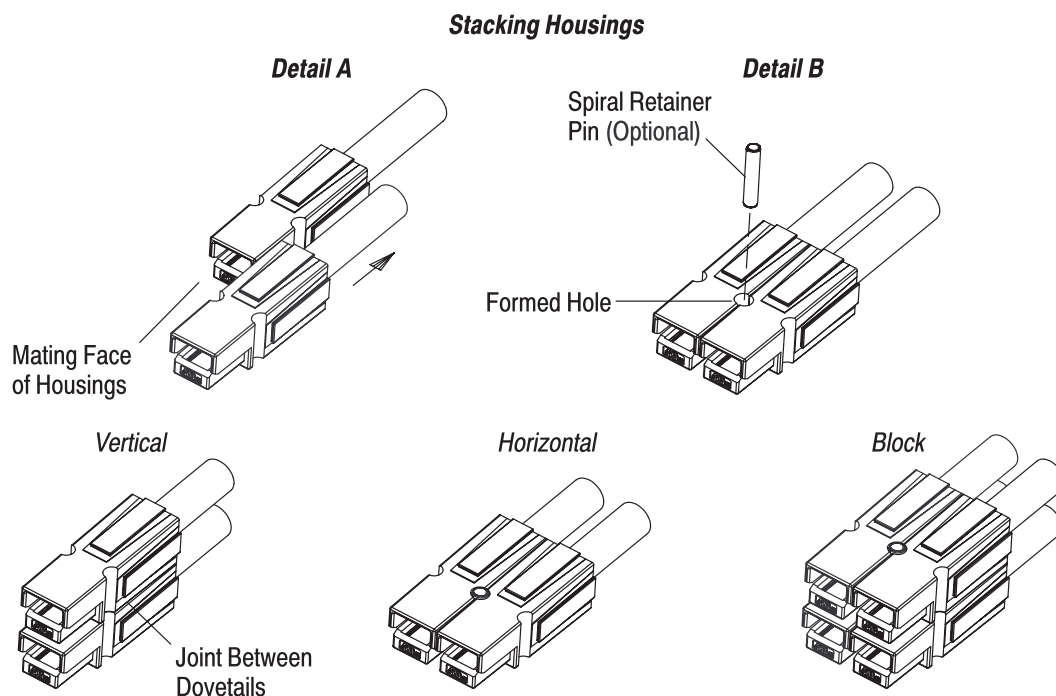


Figure 9

Standard direct current (DC) connectors recommended by the Radio Amateur Civil Emergency Service (RACES) must be stacked as shown in Figure 10. Red (as positive) and black (as negative) are the recommended housing colors.

RACES Recommended Standard DC Connectors

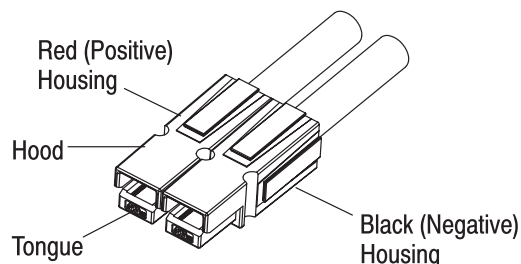


Figure 10

3.10. Installing Spacer

When stacking an uneven amount of housings, a short spacer must be used to fill the void(s). If keying is desired, a short spacer must be used in one stack and a long spacer must be used in the mating stack. The spacers must be installed in corresponding positions of the mating housings. Refer to Figure 11.

The housings and spacers must be interlocked using the dovetails. The half rounds of the housings and spacers must form a hole.

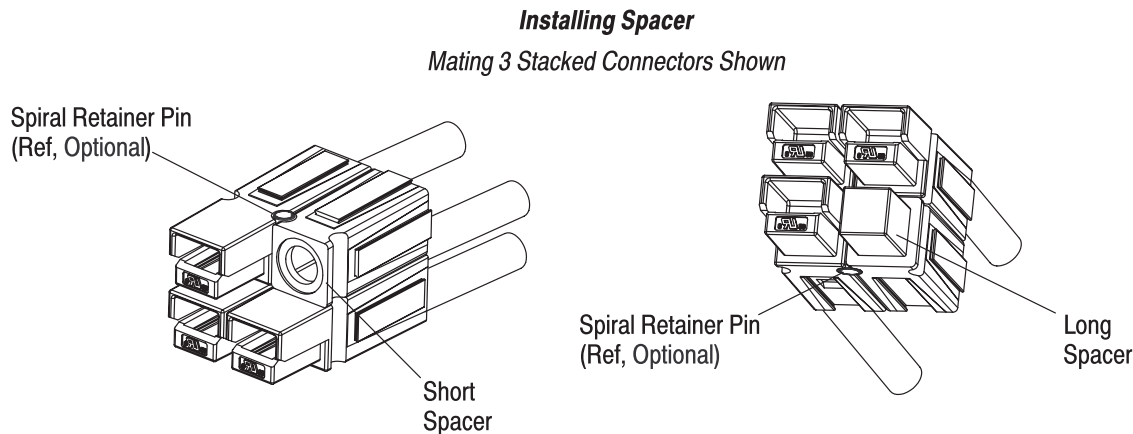


Figure 11

3.11. Installing Plug Frame, Panel Mount Frame, and Spiral Retainer Pins

Stacked housings to be installed into a frame must not contain any spiral retainer pins. The cable of the stacked housings must be fed through the mating face of the frame until the housings are seated in the frame. A long spiral retainer pin must be used to retain the stacked housings (and if used, spacers) in the frame. Exploded view is shown in Figure 12.

The spiral retainer pin must be installed through a spiral retainer pin hole in the frame and into the formed hole of the stacked housings (and if used, spacers). When seated, the spiral retainer pin must be flush with the top and bottom of the frame. One spiral retainer pin should be installed for each formed hole of the stacked housings.



CAUTION *Commercially available roll pins MUST NOT BE USED. Roll pins could fall out of the frame and cause damage to the system.*

Spiral retainer pins must be installed in compatible hole positions for the mating frames. To ensure compatibility, there must be two empty holes between the spiral retainer pins of mated frames. Compatible hole positions are given in Figure 12.

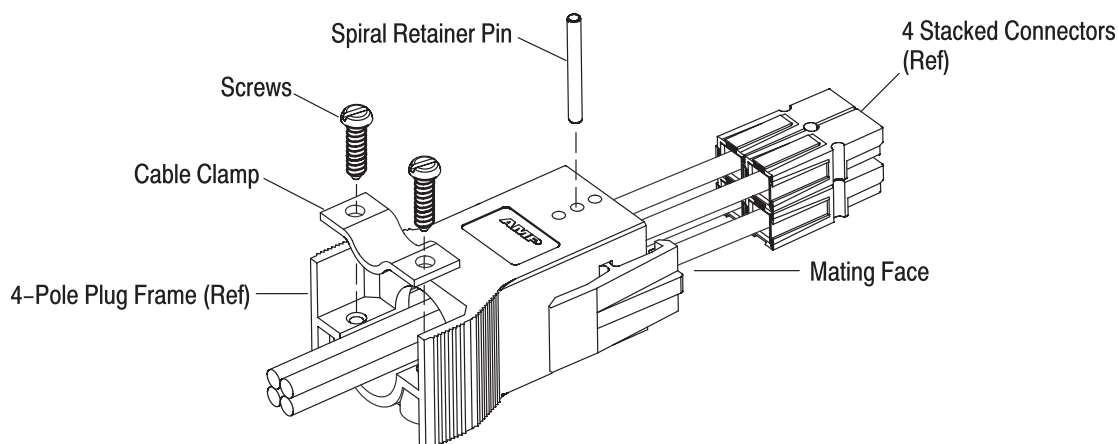
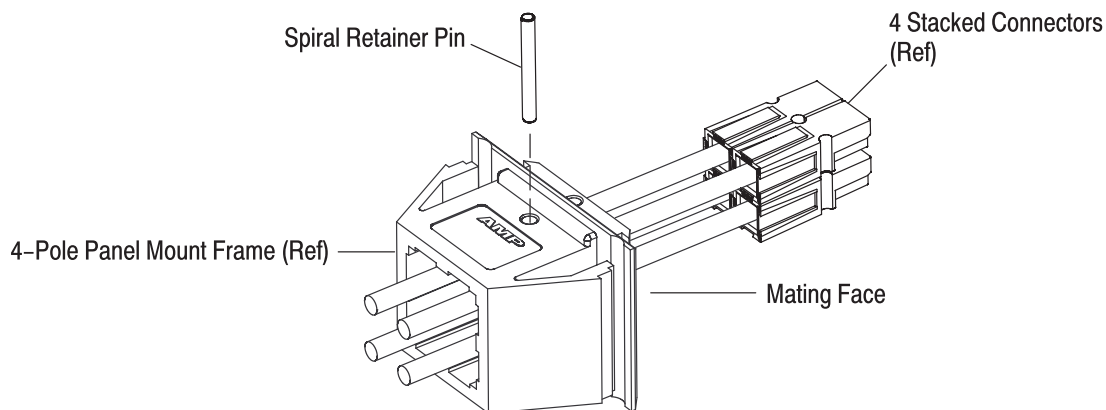
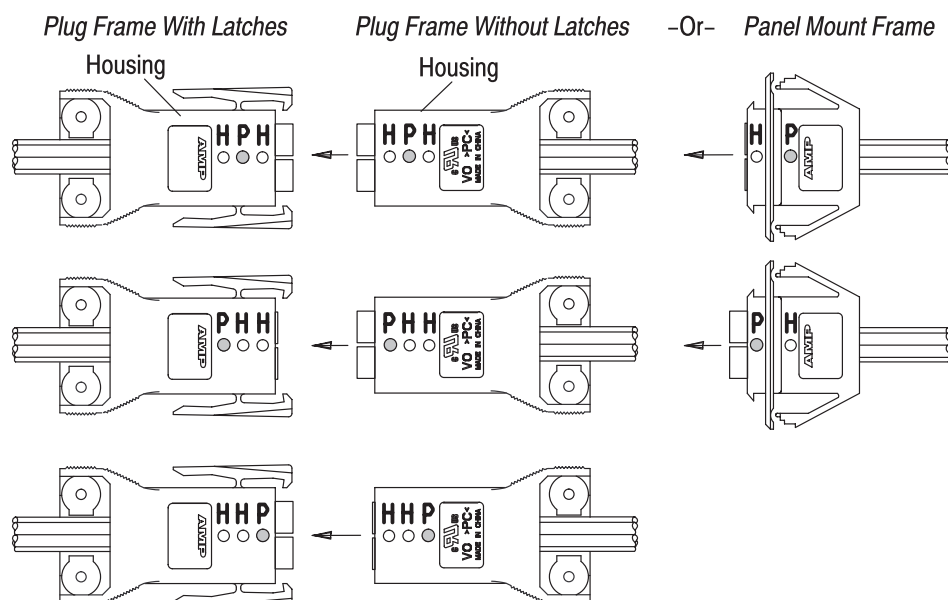
Spiral retainer pins installed in incompatible hole positions prevent the connectors from mating. This arrangement could be used for keying purposes or to prevent the energized side of the connection from accidental exposure to a shorting object.

3.12. Installing Cable Clamp Kit

The cable clamp must be installed over the cable and onto the plug frame so that the ends of the cable clamp are flat against the frame. The cable must not be pinched. The screws must be secure. An exploded view is shown in Figure 12.

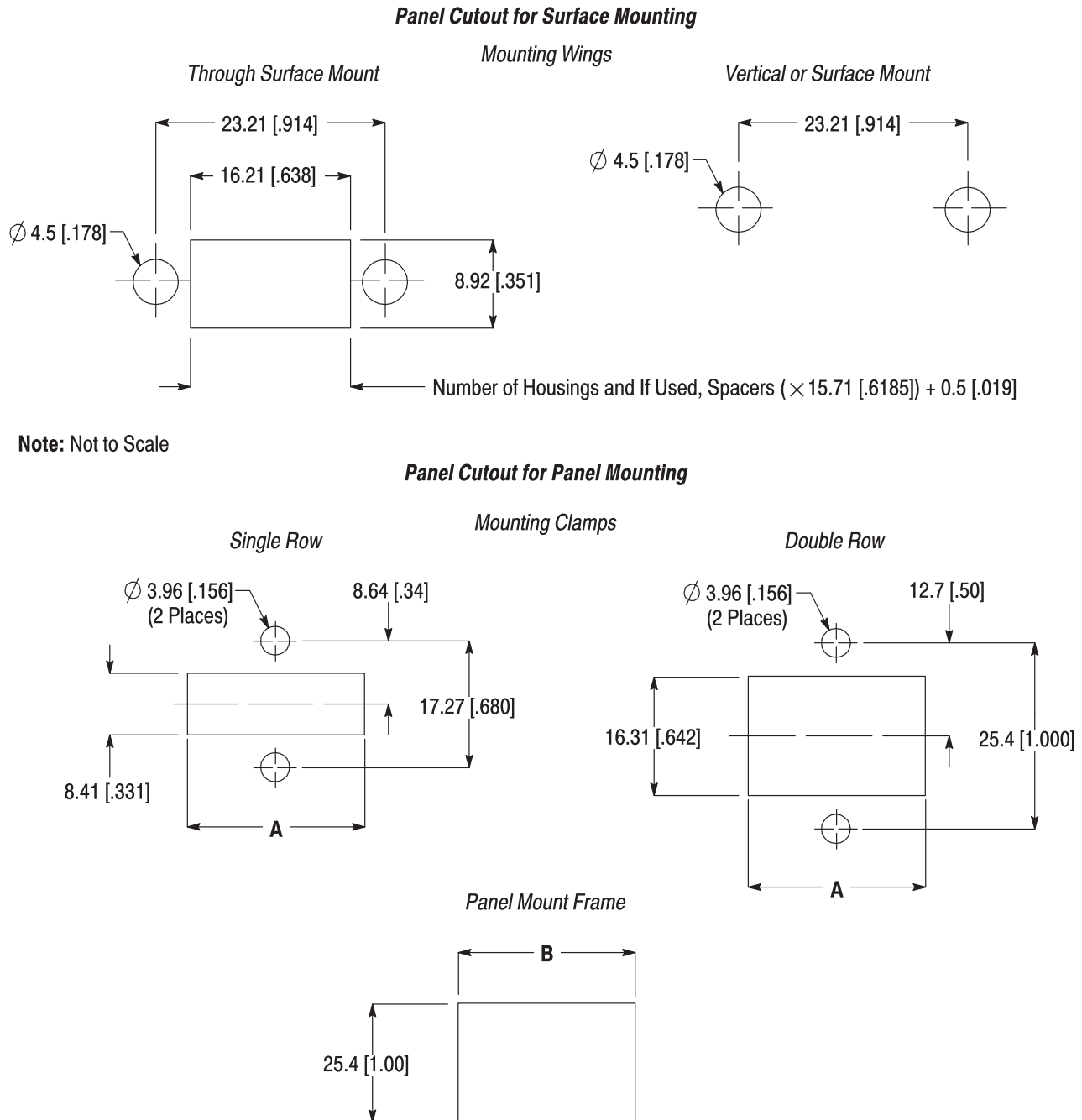


CAUTION *To avoid damage to the frame, screws must not be over-tightened.*

Installing Plug Frame (Exploded View)*Plug Frame With Latches Shown, Same Requirements Apply to Plug Frame Without Latches***Installing Panel Mount Frame (Exploded View)****Compatible Hole Positions of Spiral Retainer Pins for Mating Frames**H is Hole, P is Spiral Retainer Pin**Figure 12**

3.13. Panel Cutout

The panel thickness range shall be 0.76 through 3.40 [.030 through .134]. The panel must be cut using the dimensions provided in Figure 13.



TOTAL NUMBER OF HOUSINGS AND SPACERS		DIMENSION	
Single Row	Double Row	A	B
2	4	16.31 [.642]	31.75 [1.25]
3	6	24.21 [.953]	41.15 [1.62]
4	8	32.11 [1.264]	47.75 [1.88]

Figure 13

3.14. Surface Mounting

Two mounting wings—one on each side of a housing or stacked housings—and commercially-available hardware (two No. 6 pan head screws and nuts) are required to mount housings onto the surface. The length of the screws must be determined by measuring the thickness of the surface, mounting wing, and nut. Mounting wings can be used with up to 8 stacked housings. Spacers must be used with an uneven amount of stacked housings.

The mounting wings are designed to provide sufficient support for NO MORE than 8 stacked housings.

Each mounting wing must be installed onto the housing from the mating face of the housings so that the dovetails engage, and the end of mounting wings are even with the housings. Refer to Figure 14.

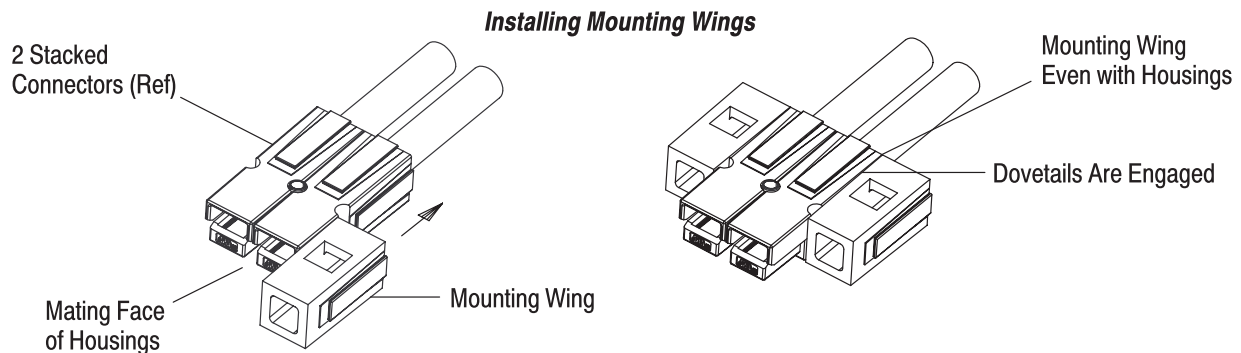


Figure 14

The housings can be mounted onto the front or back of the surface with the housings through the surface, on the surface, or vertical to the surface. To ensure proper mating, care must be used to avoid interference between adjacent mounted housings and other components. When installed, the mounting wings must be fully seated on the panel and the hardware secure. See Figure 15.

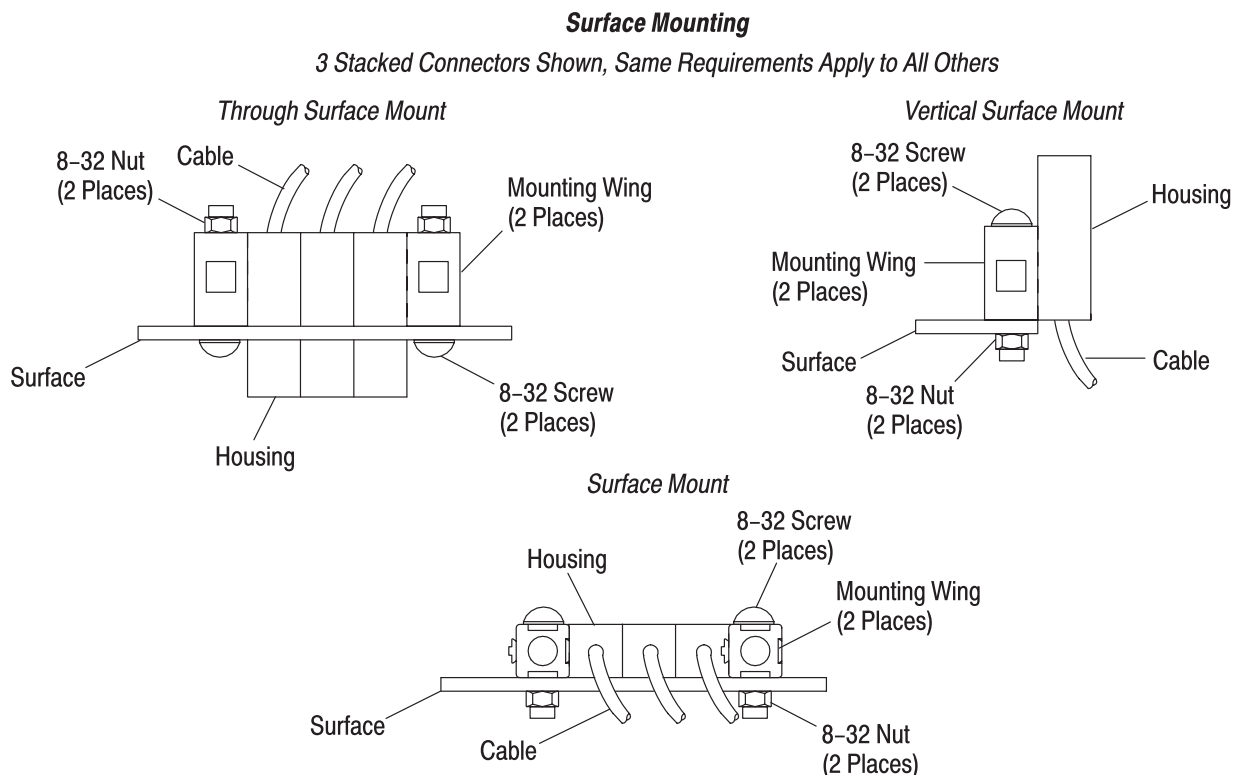
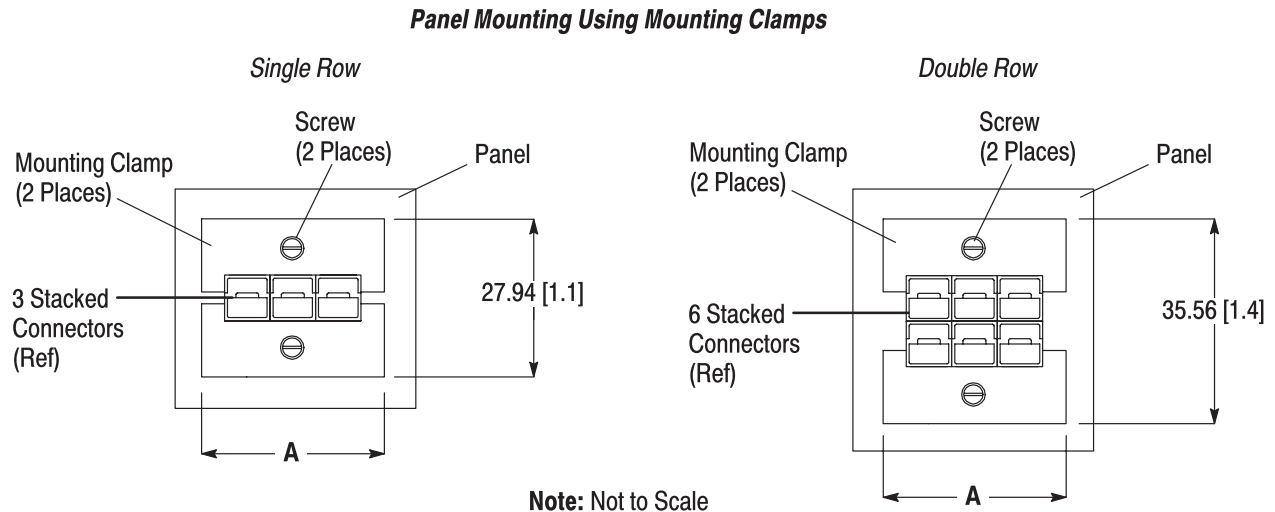


Figure 15

3.15. Panel Mounting

A. Using Mounting Clamp

Two mounting clamps—one on top and one on bottom of the stacked housings—and commercially-available hardware (two No. 6 pan head screws and nuts) are required to mount housings onto the panel. The length of the screws must be determined by measuring the thickness of the panel, mounting clamp, and nut. The mounting clamps are designed to be used with housings not containing spiral retainer pins. The mounting clamp is available for up to 8 stacked housings. When installed, the mounting clamp must be flat against the panel and the hardware secure. Dimensions for clearance are given in Figure 16.

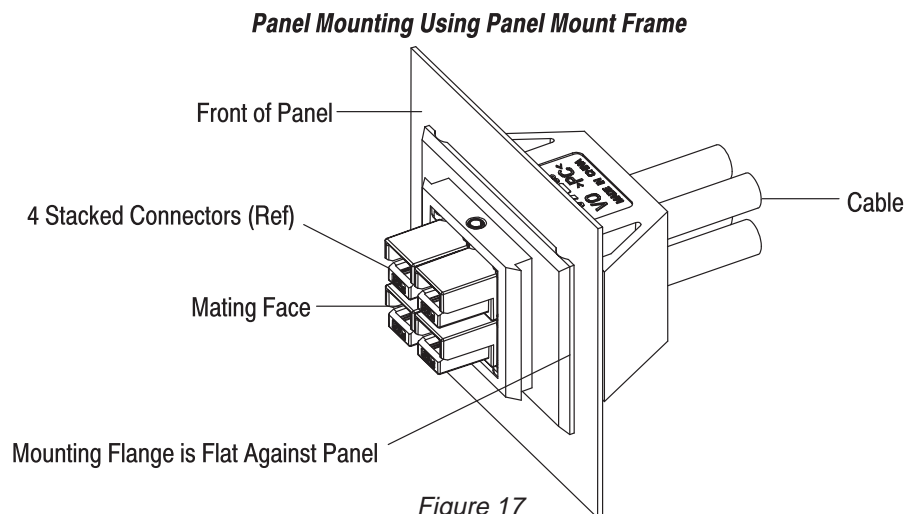


NUMBER OF HOUSINGS AND, IF USED, SPACERS		DIMENSION A
Single Row	Double Row	
2	4	22.85 [.9]
3	6	33.02 [1.3]
4	8	40.64 [1.6]

Figure 16

B. Using Panel Mount Frame

The panel mount frame is designed to be front panel mounted. The mounting flange of the panel mount frame must be flat against the panel. See Figure 17.



3.16. Mating

A. Housings

Housings must be slid together until there is no gap between the hood of the housing and the mated housing. Refer to Figure 18.

Mating Housings

Free-Hanging Housings Shown, Same Requirements Apply to Surface-Mounted and Panel-Mounted Housings

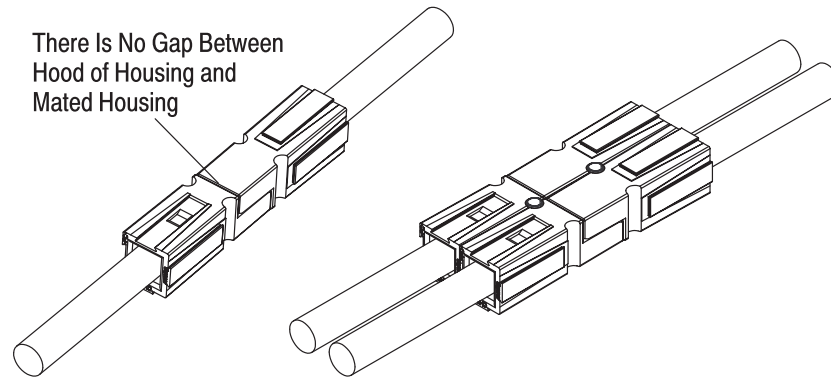


Figure 18

B. Frames

The mating faces of the plug frames must be aligned, then pushed together until the latch engages the latching tab. Refer to Figure 19.

NOTE



Spiral retainer pins located in incompatible hole positions will prevent frames from latching.

Mating Frames

*Plug Frame With Latches Mated to Plug Frame Without Latches Shown
Same Requirements Apply to Panel Mount Frame*

(Top View)

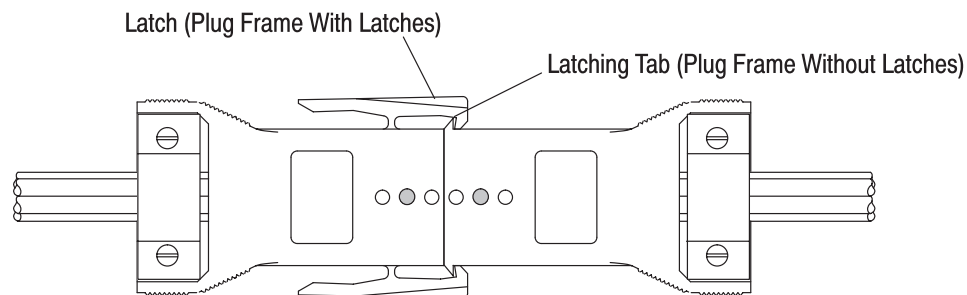


Figure 19

3.17. Strain Relief

When bending or forming cable, the bundle must be held at least 6.35 [.250] beyond the back of the housing or frame before bending in any direction. For mated housings, if the installation is to be subject to bending forces, strain relief should be provided on the cable bundle approximately 25.4 [1.0] from the back of the housing.

CAUTION

Unsupported cable must not be bent as this may cause strain on the contacts inside the housing.

**3.18. Disassembly****A. Unmating Housings and Extracting Contact**

If used, the spiral retainer pin must be removed (the pin must be pushed through the formed hole of the housings until exposed, then pulled out of the opposite side). The housings must be unmated by grasping the housings and pulling them straight apart. **DO NOT** disconnect under load (not for interrupting current).

CAUTION

*To avoid personal injury, electrical supply **MUST BE DISCONNECTED BEFORE** unmating housings.*



Contacts must be extracted by inserting the tip of the tool into the front of the housing, depressing the retaining spring toward the tongue of the housing, then grasping the cable, the contact can be pulled straight out of the housing (refer to Section 5 for description of tooling).

B. Accessories

The frames must be unmated by depressing the latches of the plug frame, then pulling the frames straight apart. The accessories must be disassembled in the following order:

Plug Frame — 1) remove cable clamp, 2) remove spiral retainer pin(s): each pin must be pushed through the hole of frame until exposed, then pulled out of the opposite side, 3) remove housings: the cable must be pushed until the housing stack is out of the frame.

Panel Mount Frame — 1) remove frame from panel: mounting latches must be depressed, then the frame can be pushed through the panel, 2) remove spiral retainer pin(s): each pin must be pushed through the hole of the frame until exposed, then pulled out of the opposite side, 3) remove housings: the cable must be pushed until the housing stack is out of the frame.

3.19. Repair

Damaged or defective connectors, contacts, or accessories **MUST NOT** be used. Contacts **MUST NOT** be re-used by removing the cable.

4. QUALIFICATION

Power Series 15, 30, or 45 connector assemblies are Component Recognized by Underwriter Laboratories, Inc. (UL) under File E28476 and have been Investigated to CSA International Standards by UL.

5. TOOLING

Tooling part numbers and instructional material packaged with the tooling are given in Figure 20.

5.1. Extraction Tool

The extraction tool or a standard insulated screwdriver with a 1/8-in. or 2-mm flat blade must be used to remove a contact from the housing.

5.2. Hand Tool

Commercially-available hand tools for manual application of loose-piece contacts are available. It is recommended using the PWRcrimp powerpole crimp tool from West Mountain Radio (<http://www.westmountainradio.com>). This hand tool should be used for field repair only.

NOTE

Consult manufacturer's literature for information on using the tool.

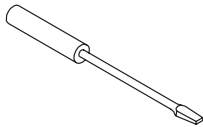


5.3. Applicators

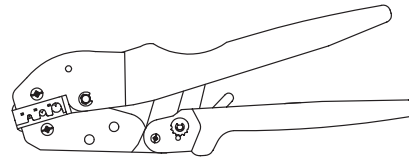
The applicators are designed to crimp reeled open-barrel contacts onto pre-stripped cable. Crimping dies are included with the applicator.

5.4. Semi-Automatic Machines

The machines provide the force required to drive the applicator. These machines are designed to be bench mounted and are operated by a foot pedal. These machines provide for high volume, heavy duty production requirements.



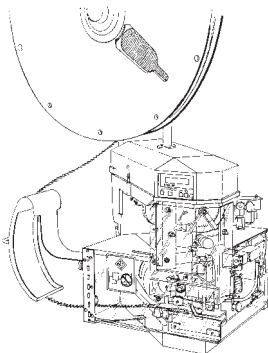
Extraction Tool 68265-1
(Refer to 408-2597)
or Standard Insulated Screwdriver
With $\frac{1}{8}$ -in. or 2-mm Flat Blade



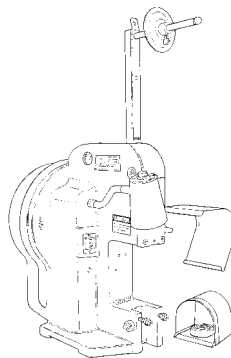
PWRcrimp Powerpole Crimp Tool
(Available from West Mountain Radio)

CABLE SIZE RANGE (AWG)	CONNECTOR SERIES	CONTACT TYPE
14-12	15	Closed Barrel
18-16	30	
10	45	Open Barrel

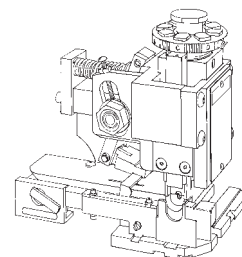
Strip Form Open-Barrel Contact



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



AMP-O-LECTRIC Model "K"
Terminating Machine
2-565435-2 (409-5128)



Heavy Duty Miniature Quick-Change
Side Feed Applicator (Refer to Table)
(408-8040)

CABLE SIZE RANGE (AWG)	CONNECTOR SERIES	APPLICATOR
20-16	15	1385450-3
16-12	30	1385468-3
14-10	45	1385469-3

Figure 20

6. VISUAL AID

The illustration below shows a typical application of Power Series 15, 30, and 45 connector assemblies. 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.

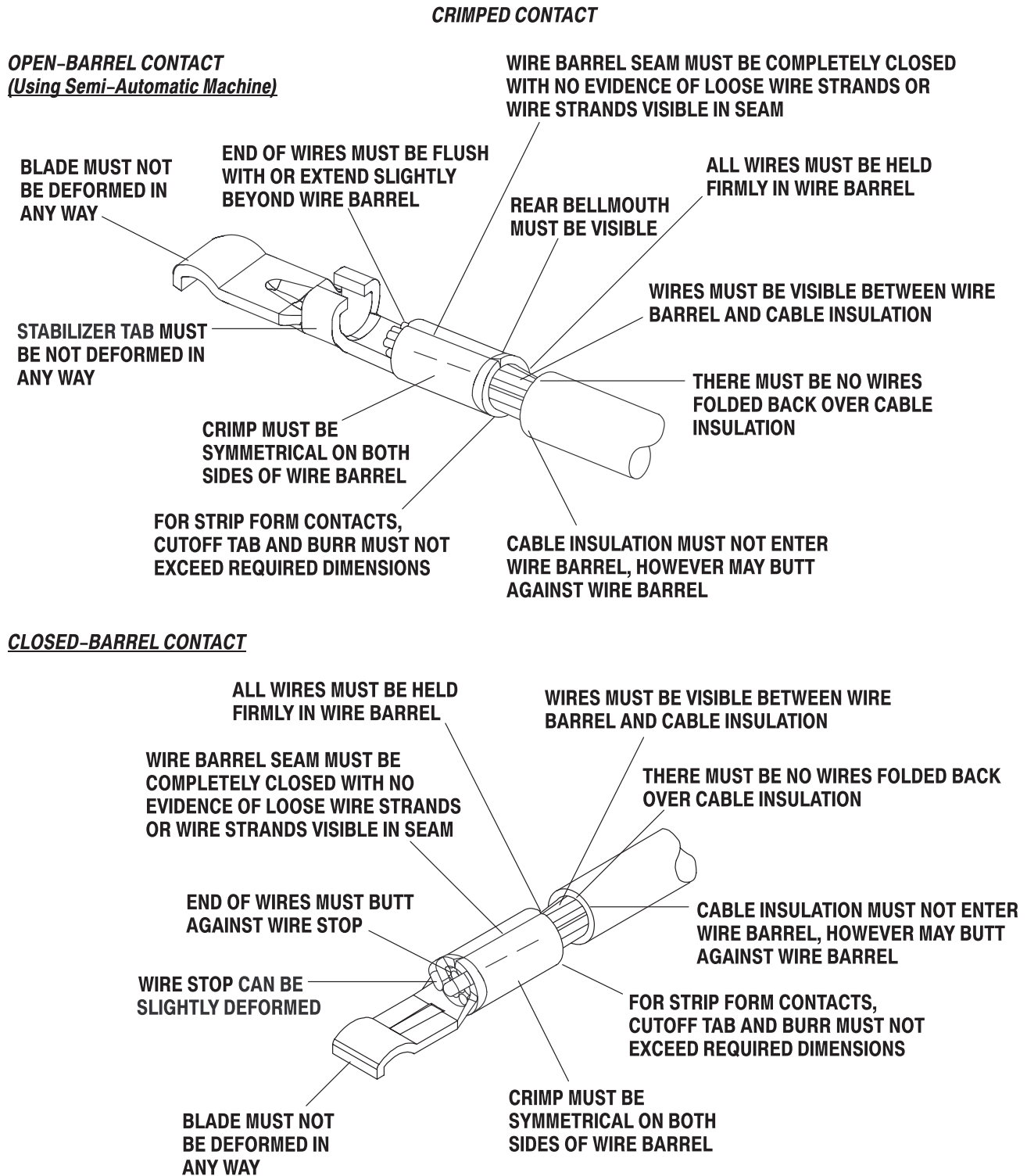
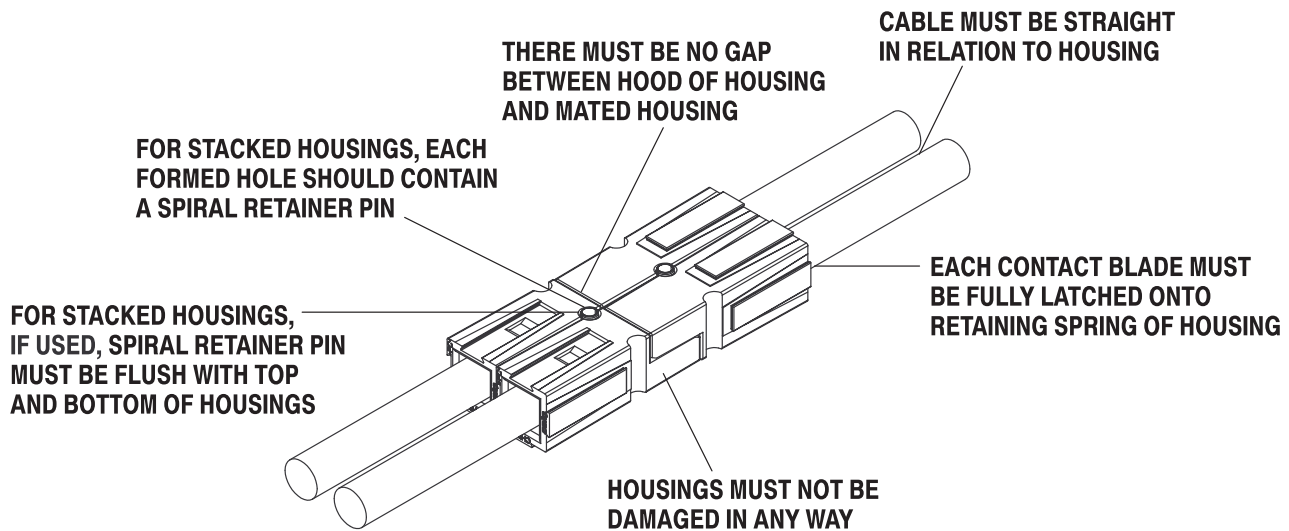
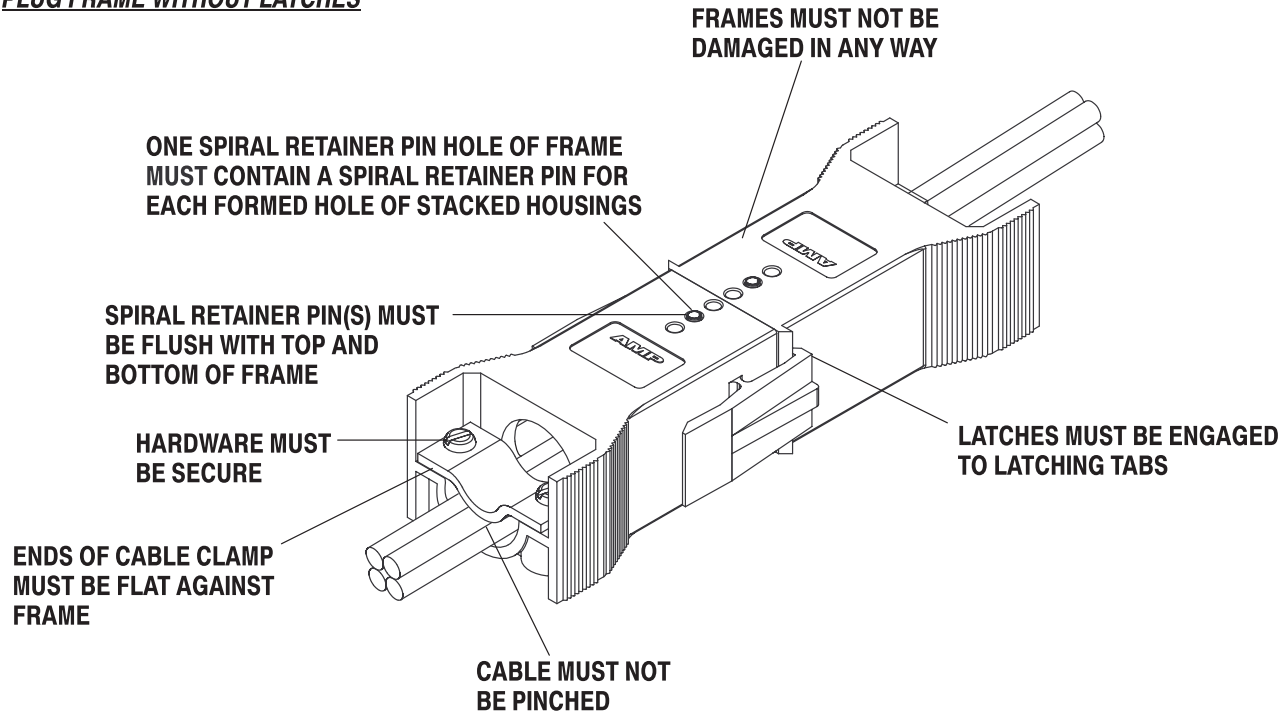


FIGURE 21. VISUAL AID (CONT'D)

FREE-HANGING APPLICATION**HOUSING MATED TO HOUSING****PLUG FRAME WITH LATCHES MATED TO PLUG FRAME WITHOUT LATCHES****FIGURE 21. VISUAL AID (CONT'D)**

SURFACE MOUNT APPLICATION**MOUNTING WINGS**

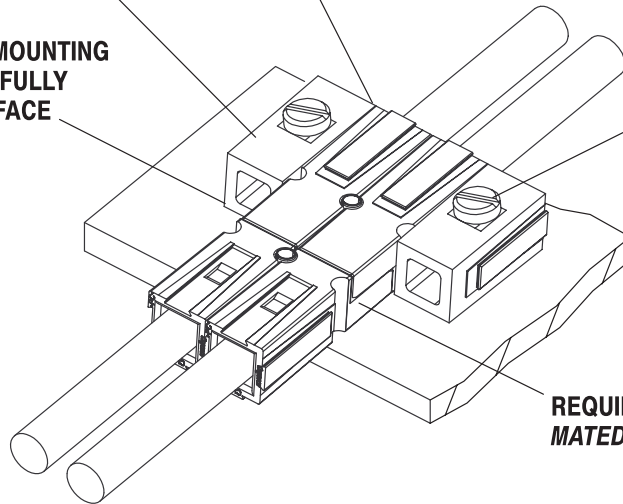
**MOUNTING WINGS MUST NOT
BE DAMAGED IN ANY WAY**

**END OF MOUNTING WINGS
MUST BE EVEN WITH HOUSINGS**

**HOUSINGS AND MOUNTING
WINGS MUST BE FULLY
SEATED ON SURFACE**

**HARDWARE MUST
BE SECURE**

**REQUIREMENTS FOR HOUSING
MATED TO HOUSING ALSO APPLY**

**PANEL MOUNT APPLICATION****MOUNTING CLAMP**

**HARDWARE MUST
BE SECURE**

**HOUSINGS ARE SHOWN UNMATED
FOR CLARITY OF HOUSING
ORIENTATION (WHEN MATED,
REQUIREMENTS FOR HOUSINGS
MATED TO HOUSING ALSO APPLY)**

**MOUNTING CLAMP MUST BE
FLAT AGAINST PANEL**

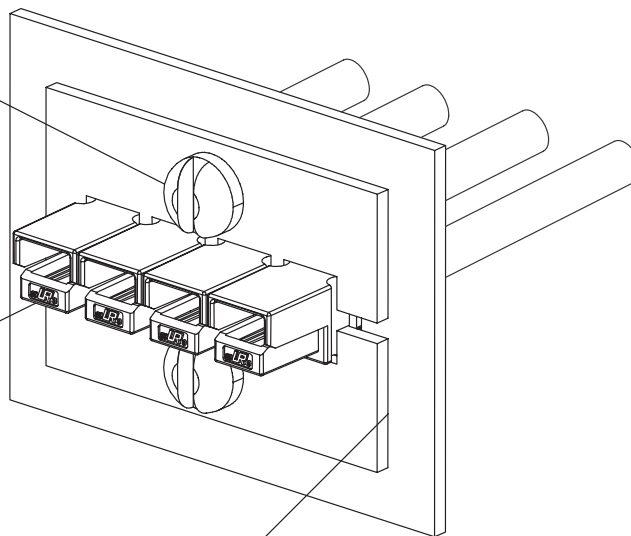


FIGURE 21. VISUAL AID (CONT'D)

PLUG FRAME WITH LATCHES
MATED TO PANEL MOUNT FRAME

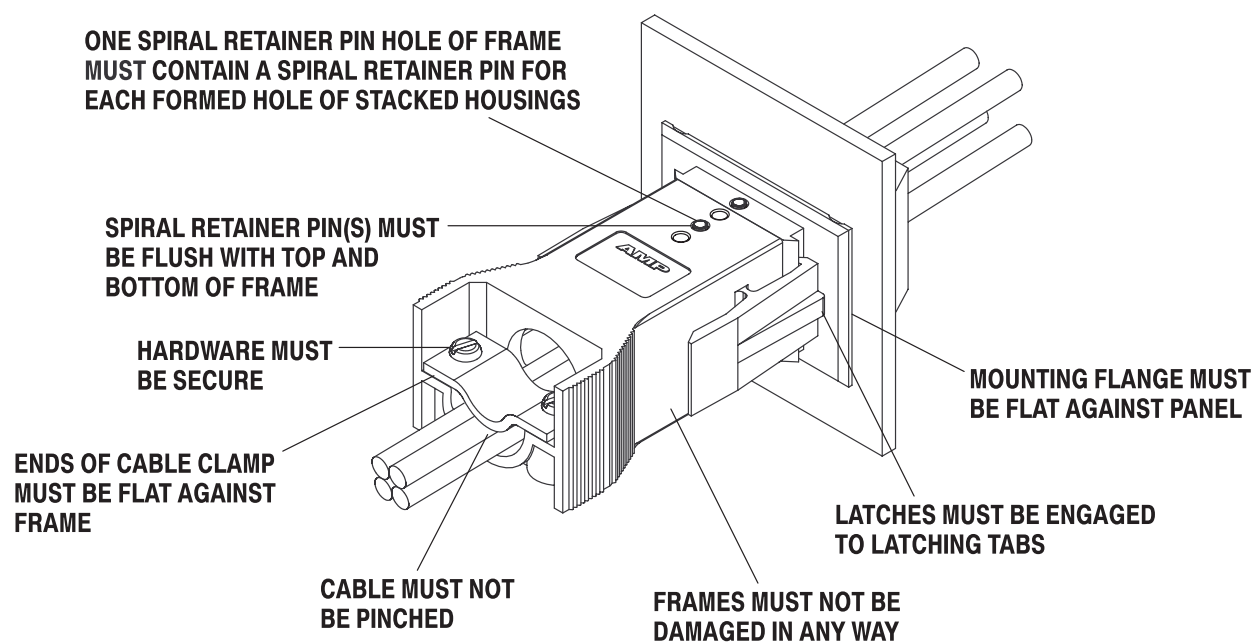


FIGURE 21. VISUAL AID (END)