



**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  $\pm 0.13$  mm [ $\pm .005$  in.] 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 the AMPSEAL 16 Hybrid Lever Connector System. The connector system includes a plug assembly, cap assembly, mounting clip and wire exit cover. The connector system accepts the circular stamped and formed or screw machine terminals. The connector system offers environmental protection by providing sealing to the wires, between the connector halves and to the panel. The design allows for the tool-less mounting of the connector to the panel.

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

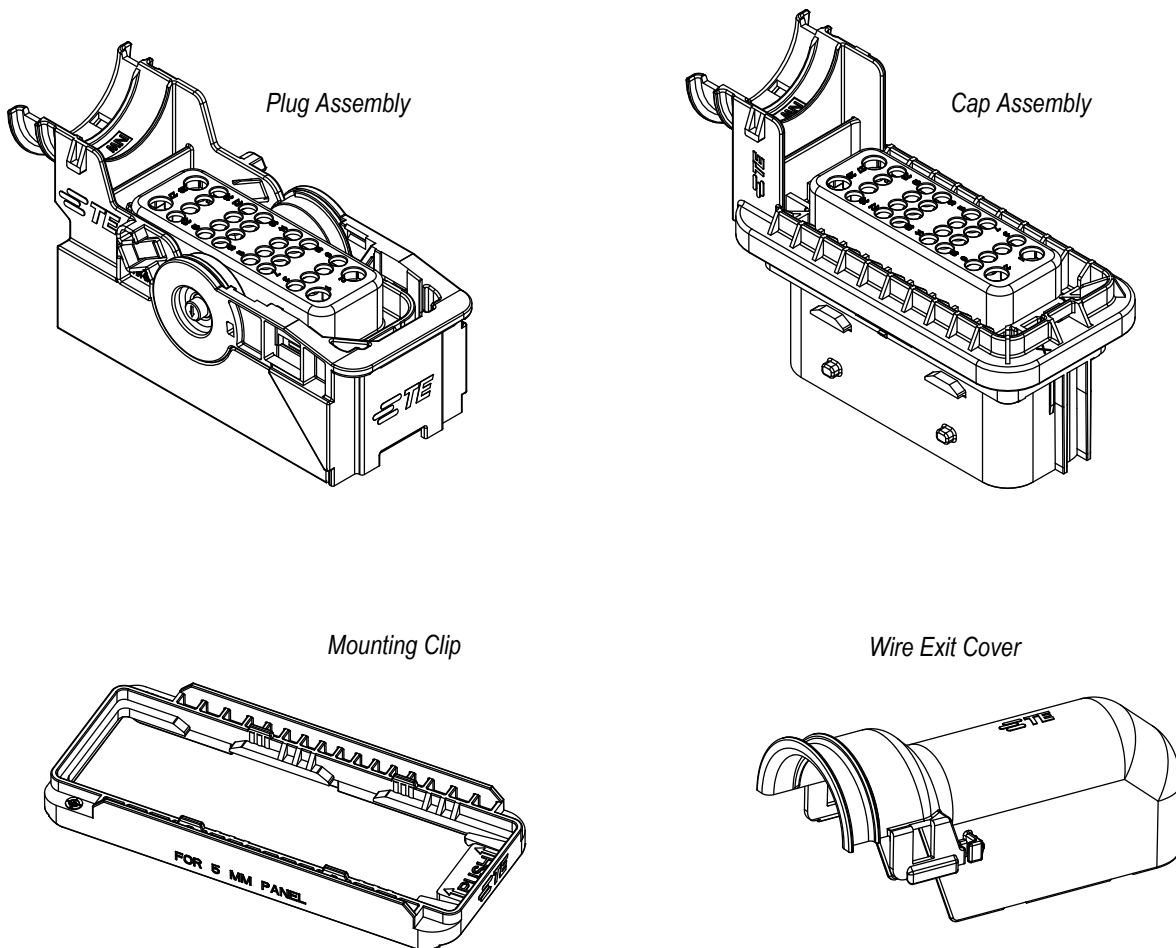


Figure 1

**2. REFERENCE MATERIAL**

**2.1. Revision Summary**

Initial release of application specification

## 2.2. Customer Assistance

Reference Product Base Part Numbers 2138839, 2138846, 2138852, 2138853 and Product Code M097 are representative of the AMPSEAL 16 Hybrid Lever Connector System. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information can be obtained through a local TE Representative, by visiting our website at [www.te.com](http://www.te.com), or by calling PRODUCT INFORMATION or the TOOLING ASSISTANCE CENTER at the numbers 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, the information contained in the Customer Drawings takes priority. Refer to the Customer Drawings listed below for specific crimp information for various wire sizes:

|                               |  |
|-------------------------------|--|
| <a href="#">0425-205-0000</a> | Crimp Information for Solid Contacts                       |
| <a href="#">0425-208-0000</a> | Crimp Information for Size 12 Stamped Contacts (12-14 AWG) |
| <a href="#">0425-041-0000</a> | Crimp Information for Size 12 Stamped Contacts (10-12 AWG) |

## 2.4. Specifications

Refer to the Application Specification [114-13045](#) for information on HDSF Size 16 Pin and Socket Contacts.

## 3. REQUIREMENTS

### 3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

### 3.2. Storage

#### A. Reel Storage

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

#### B. Ultraviolet Light

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

#### C. Shelf Life

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

#### D. Chemical Exposure

Do not store product near any chemical listed below as they may cause stress corrosion cracking in the material.

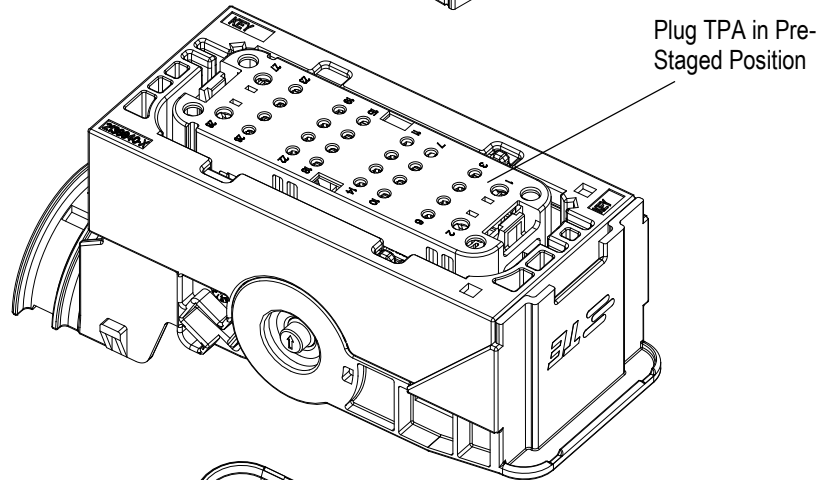
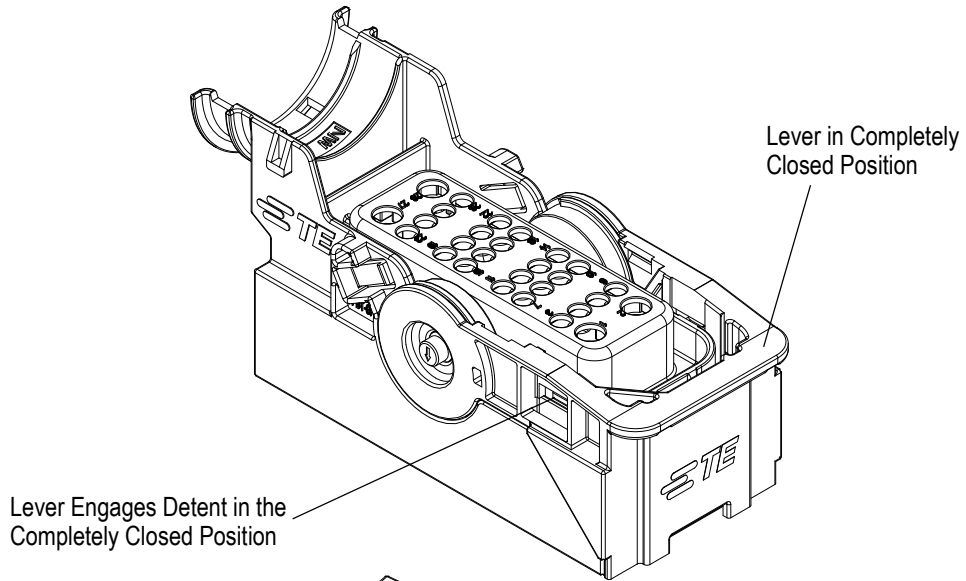
|          |            |          |                 |          |                  |
|----------|------------|----------|-----------------|----------|------------------|
| Alkalies | Ammonia    | Citrates | Phosphates      | Citrates | Sulfur Compounds |
| Amines   | Carbonates | Nitrites | Sulfur Nitrites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

### 3.3. Shipping Features

#### A. Shipped Condition

The "As Shipped" state of the connectors is as shown in Figure 2. The lever of the plug assembly is in the closed position and the plug TPA is in the "Pre-Staged" position. In the cap assembly, the cap TPA is also in the "Pre-Staged" position. See Figure 2.

Plug Assembly



Cap Assembly

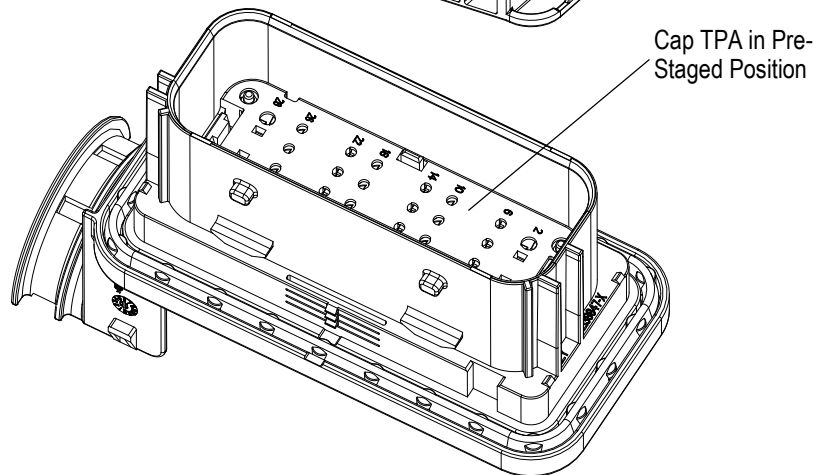


Figure 2

**B. Pre-Staged TPA**

The plug and cap assemblies both ship with the TPA's in the pre-staged position. This prevents the customer from having to assemble the TPA's prior to inserting crimped leads into the connectors. Figure 3 shows the TPA's in the pre-staged position.

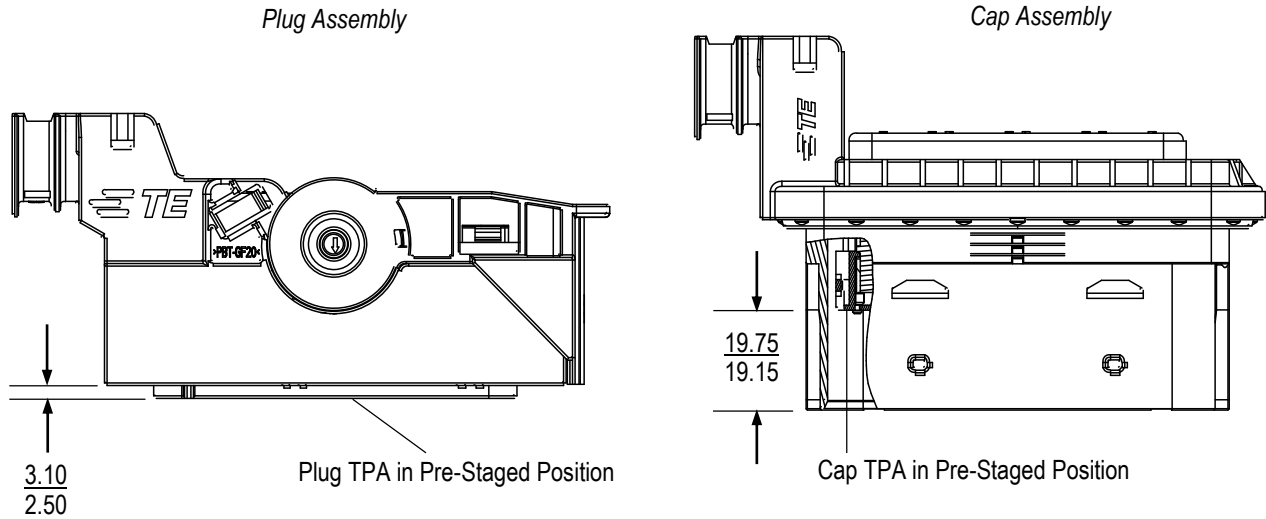


Figure 3

### 3.4. Mechanical Keying and Color Coding

The connector system has slots in the plug assembly and corresponding ribs in the cap assembly. These features act as mechanical keys and prevent mismatching of the connector. For easy identification the assemblies have key markings and the color of the housings change as the key configuration changes. Refer to Figure 4A for information on the mechanical keying and Figure 4B for color-coding.

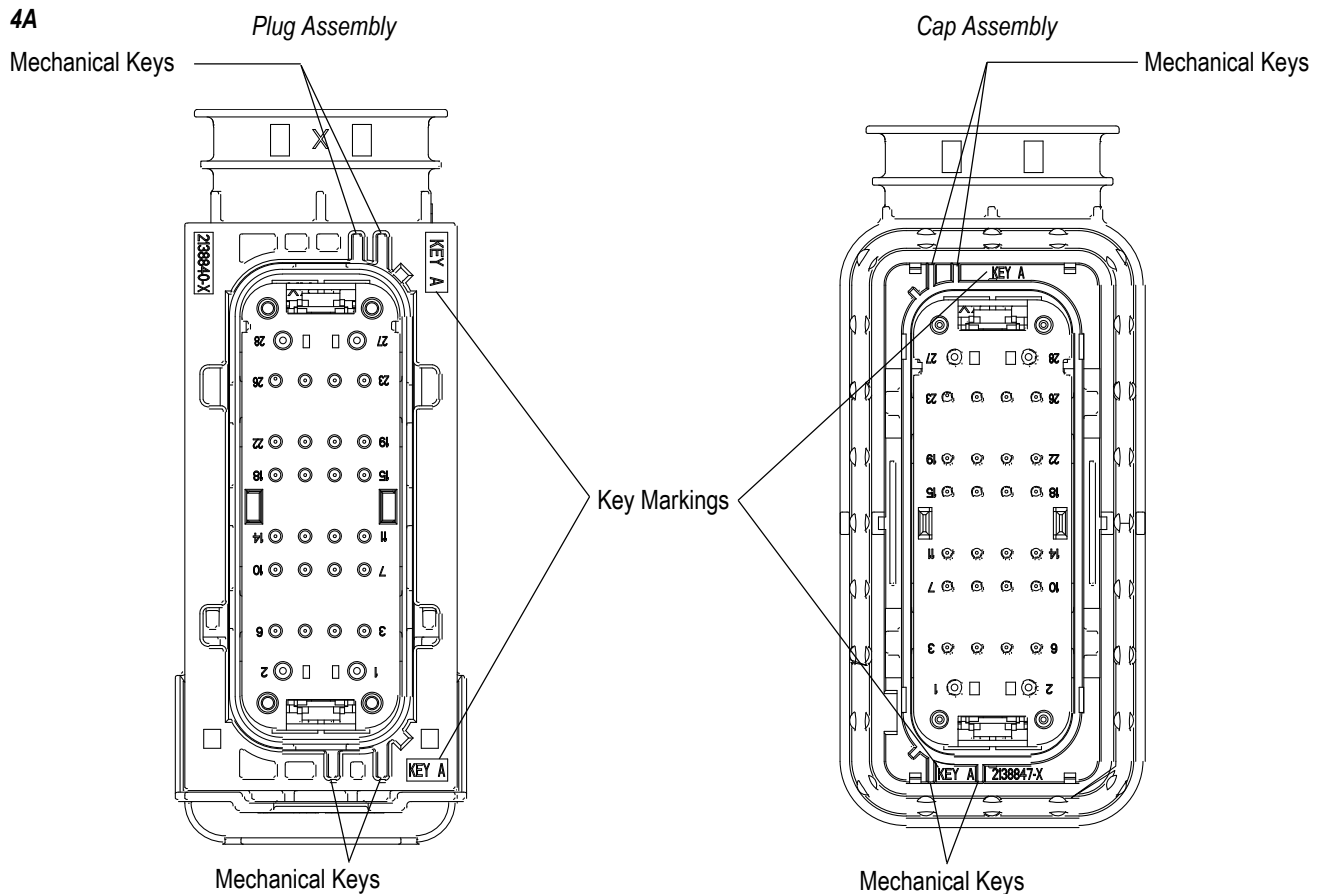
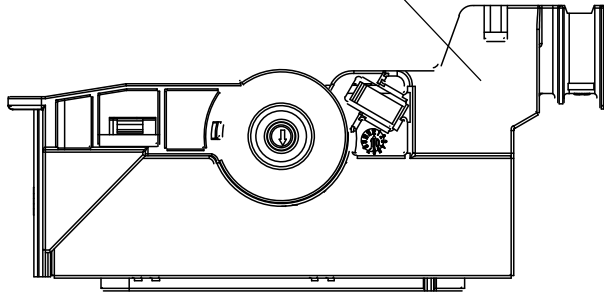


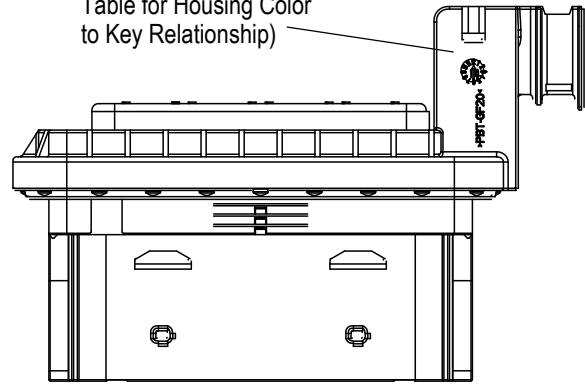
Figure 4 (cont'd)

4B

Plug Housing (See Table for Housing Color to Key Relationship)



Cap Housing (See Table for Housing Color to Key Relationship)



| PLUG ASSEMBLY | CAP ASSEMBLY | KEY ID | HOUSING COLOR |
|---------------|--------------|--------|---------------|
| 2138839-1     | 2138846-1    | Key A  | Black         |
| 2138839-2     | 2138846-2    | Key B  | Brown         |

Figure 4 (end)

### 3.5. Sealing

The connector system provides for sealing to the wires using a mat seal, sealing between connector halves using a peripheral seal and sealing to the panel using a flange seal. The wire range that can be accommodated in the mat seal is listed in Figure 5.

Plug Assembly

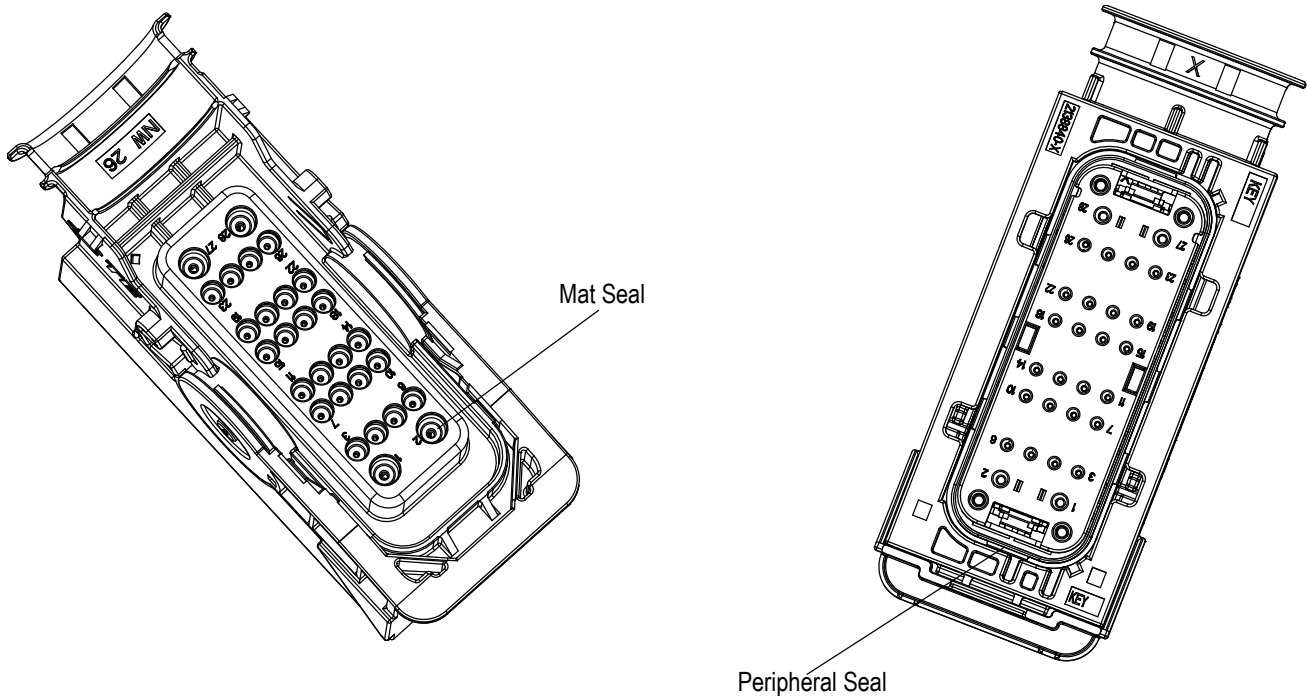
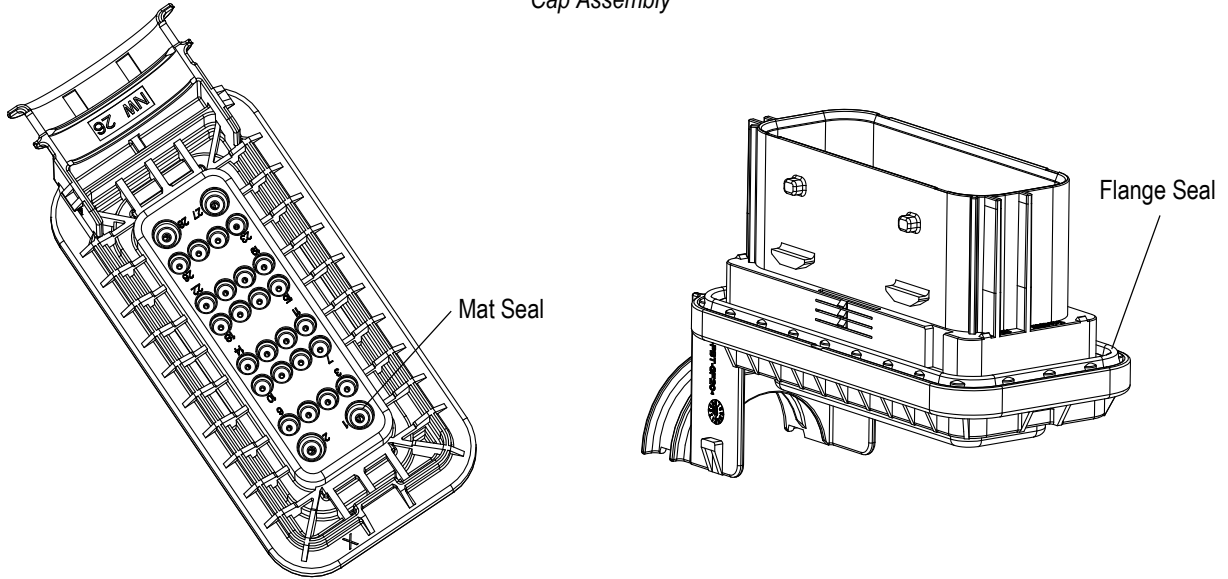


Figure 5 (cont'd)

Cap Assembly



| PLUG ASSEMBLY          | CAP ASSEMBLY           | INSULATION DIAMETER RANGE (SIZE 16 CIRCUITS) | INSULATION DIAMETER RANGE (SIZE 12 CIRCUITS) | SEALING PLUG |
|------------------------|------------------------|--|--|--------------|
| 2138839-1<br>2138839-2 | 2138846-1<br>2138846-2 | 1.68-2.77                                    | 2.82-4.09                                    | 776363-1     |

Figure 5 (end)



**CAUTION**

Only wires with insulation diameters which are within the recommended insulation diameters should be used with this product.



**NOTE**

Sealing plug 776363-1 should be used in any circuit which is not loaded with a crimped lead.

**3.6. Panel Keying**

The cap assembly is provided with a slot which can be used to orient it on the customer's panel. Refer to Figure 6 for details.

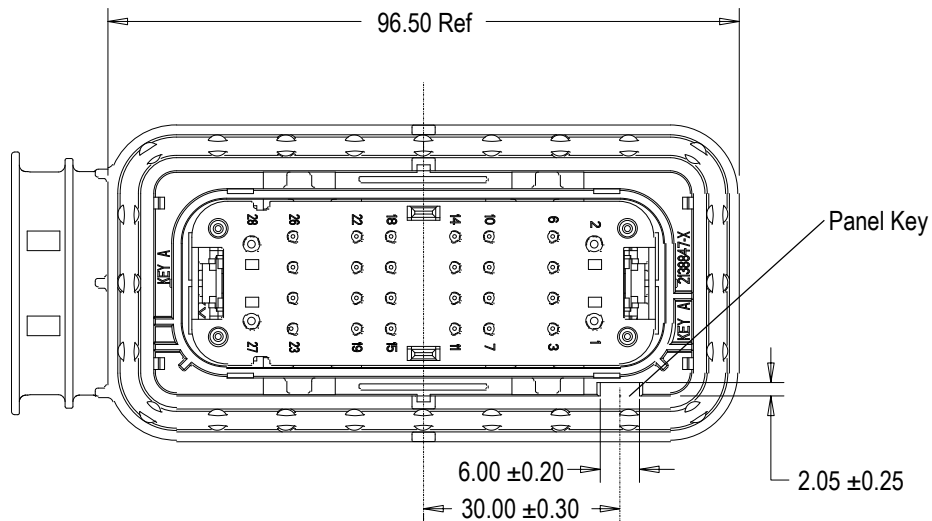


Figure 6

### 3.7. Panel Cutout

The panel cutout dimensions are as shown in Figure 7. For improved temporary panel retention, it is recommended that the edges facing the mounting clip be sharp.

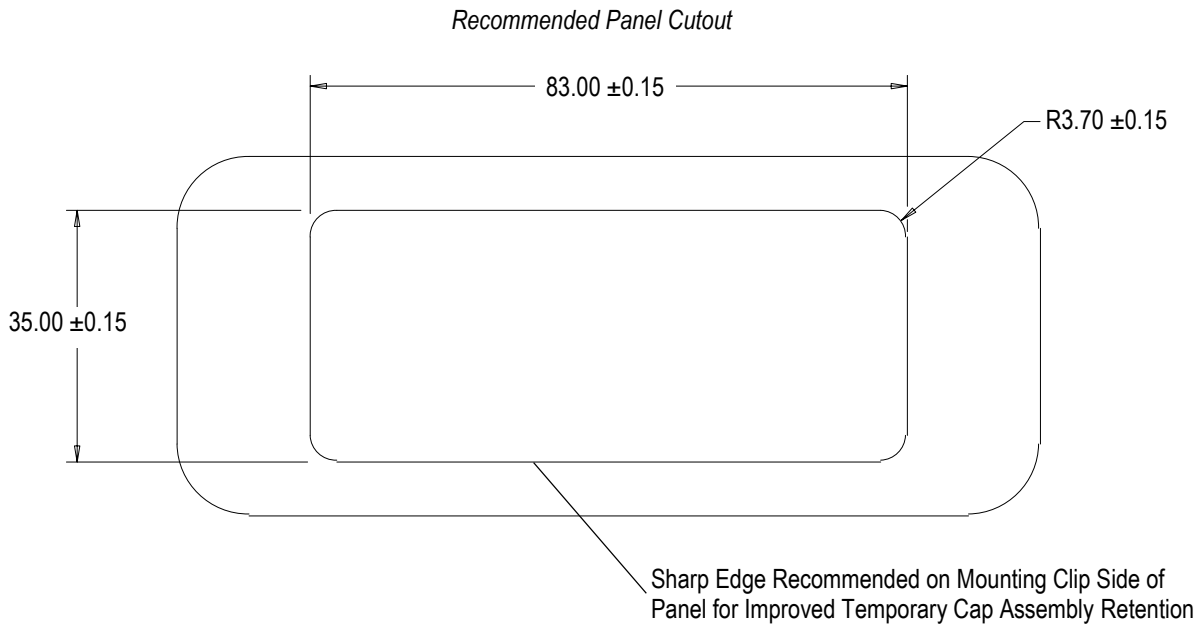
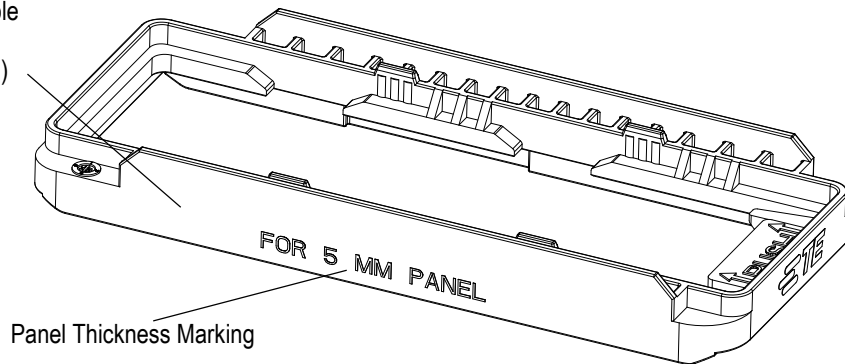


Figure 7

### 3.8. Panel Mounting

Mounting clips are to be used to mount the cap assembly to the panel. The mounting clips are sold as separate saleable part numbers. Different panel thicknesses will need different mounting clips. The mounting clip is marked with the panel thickness and the color of the mounting clip also changes depending on the panel thickness that it is designed for. Refer to Figure 8.

Mounting Clip Color (See Table for Mounting Clip Color to Panel Thickness Relationship)



| MOUNTING CLIP | RECOMMENDED PANEL THICKNESS | MOUNTING CLIP COLOR |
|---------------|-----------------------------|---------------------|
| 2138852-1     | 5.0 ± 0.10                  | Red                 |
| 2138852-2     | 4.0 ± 0.10                  | Yellow              |
| 2138852-3     | 3.0 ± 0.10                  | Black               |

Figure 8

### 3.9. Temporary Panel Retention

The cap assembly has the latches which temporarily hold it onto the panel. The temporary panel retention latches can accommodate panel thickness from 1.50 mm to 6.50 mm. See Figure 9.

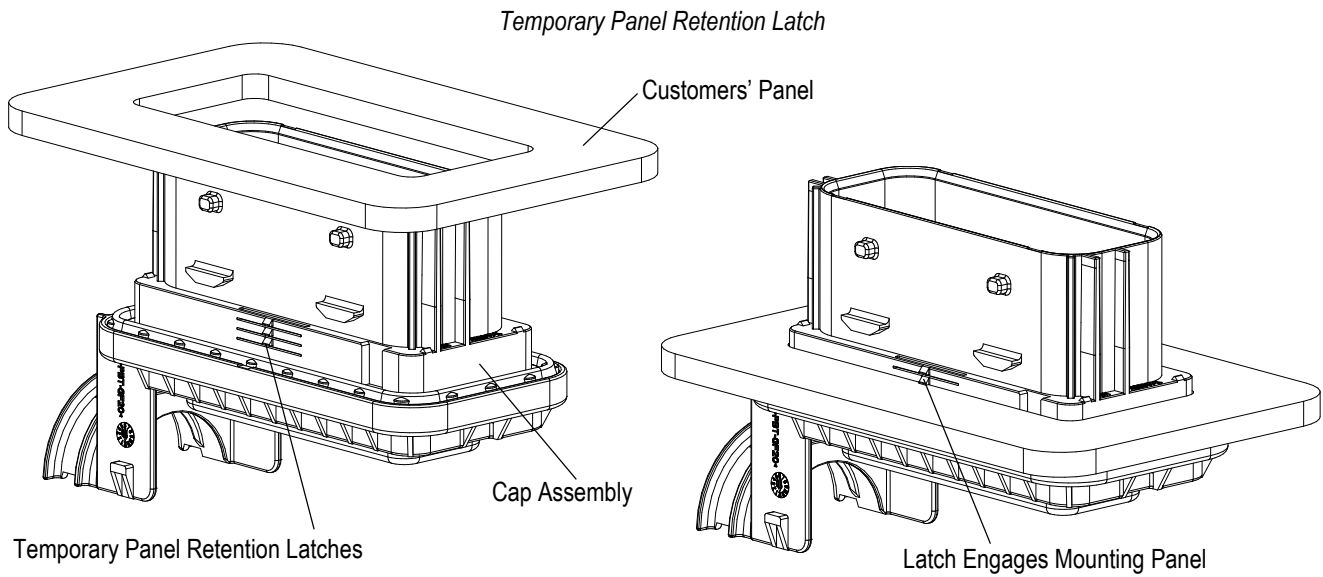


Figure 9

### 3.10. Connector Pre-Staging

The connector system allows for the pre-staging of the plug assembly onto the cap assembly thus enabling the mating cycle to be completed by one hand. The pre-staging allows the operator to reposition the hand and complete the mating cycle. Refer Figure 10 for details.

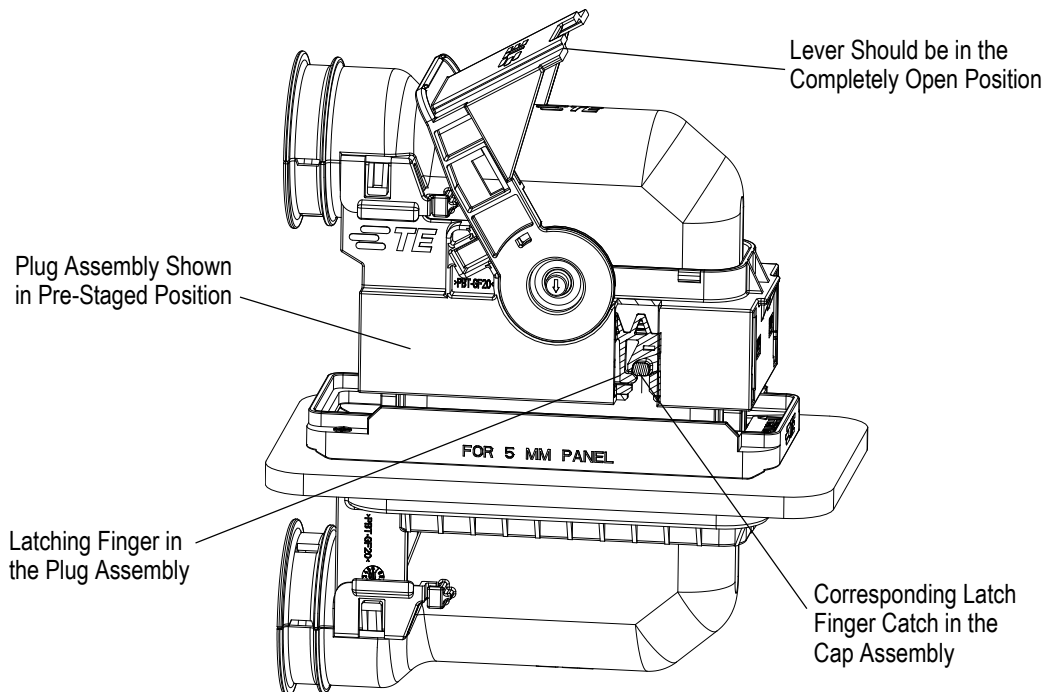


Figure 10



### 3.11. Mounting Clip Locking

The mounting clip has tabs on it which engage with corresponding slots in the plug assembly when the plug assembly is completely mated. This prevents accidental disengagement of the mounting clip once the connector system is completely mated. Refer to Figure 11 for details.

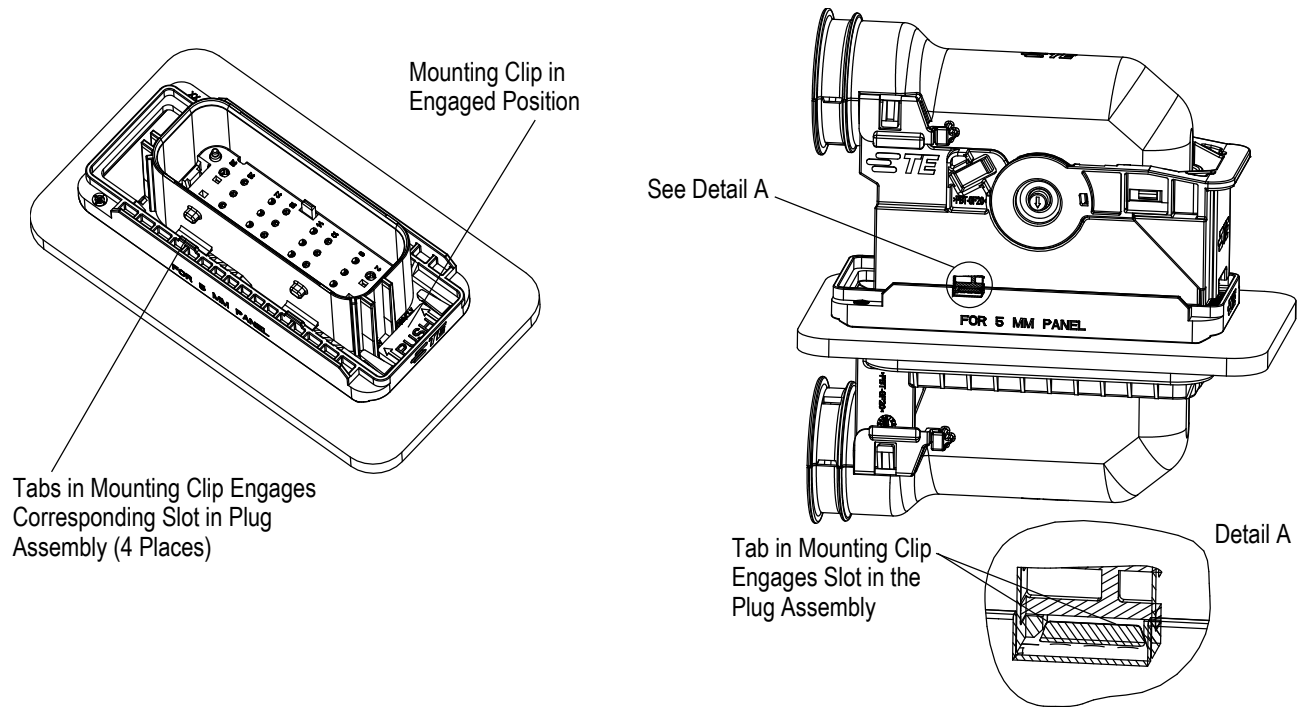


Figure 11

### 3.12. Assembly Procedure

#### A. Terminal Insertion

Terminals crimped on leads per the applicable crimp specifications (refer to Paragraph 2.3 and 2.4) shall be manually loaded into the plug and cap assemblies. Socket terminals are to be inserted into the plug assembly while the pin terminals are to be inserted into the cap assembly. Refer to Figure 12 and the steps outlined below to insert terminals into the assemblies.

1. Align the appropriate crimped terminal with the desired cavity at the rear of the plug or cap assembly.
2. While holding the wire as close as possible to the terminal push it straight into the cavity until the terminal retention latch snaps behind the terminal retention shoulder as indicated by a tactile and audible “click”.



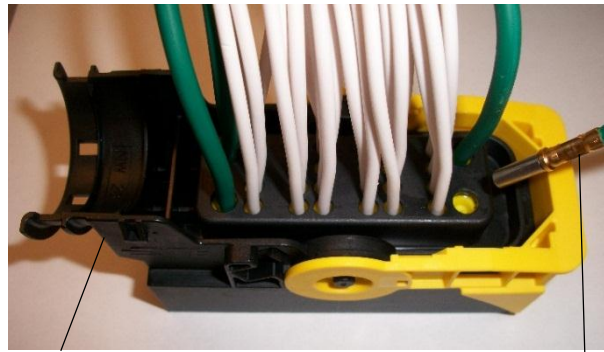
**CAUTION**

Verify that the TPA's are in the pre-staged position prior to inserting the terminals.



**CAUTION**

A sealing plug must be used in any circuit cavity that is not loaded with a crimped lead to ensure there is no leak path.



Plug Assembly



Cap Assembly

Socket Terminal

Pin Terminal

Figure 12

### B. TPA Seating

When all the required terminals have been inserted into the assemblies and any unused circuits have been blocked off with sealing plugs, complete the assembly by seating the TPA into its fully locked position. To seat the TPA's, squeeze the latches inwards while pushing down. Refer to Figures 13 and 14 for a pictorial depiction.

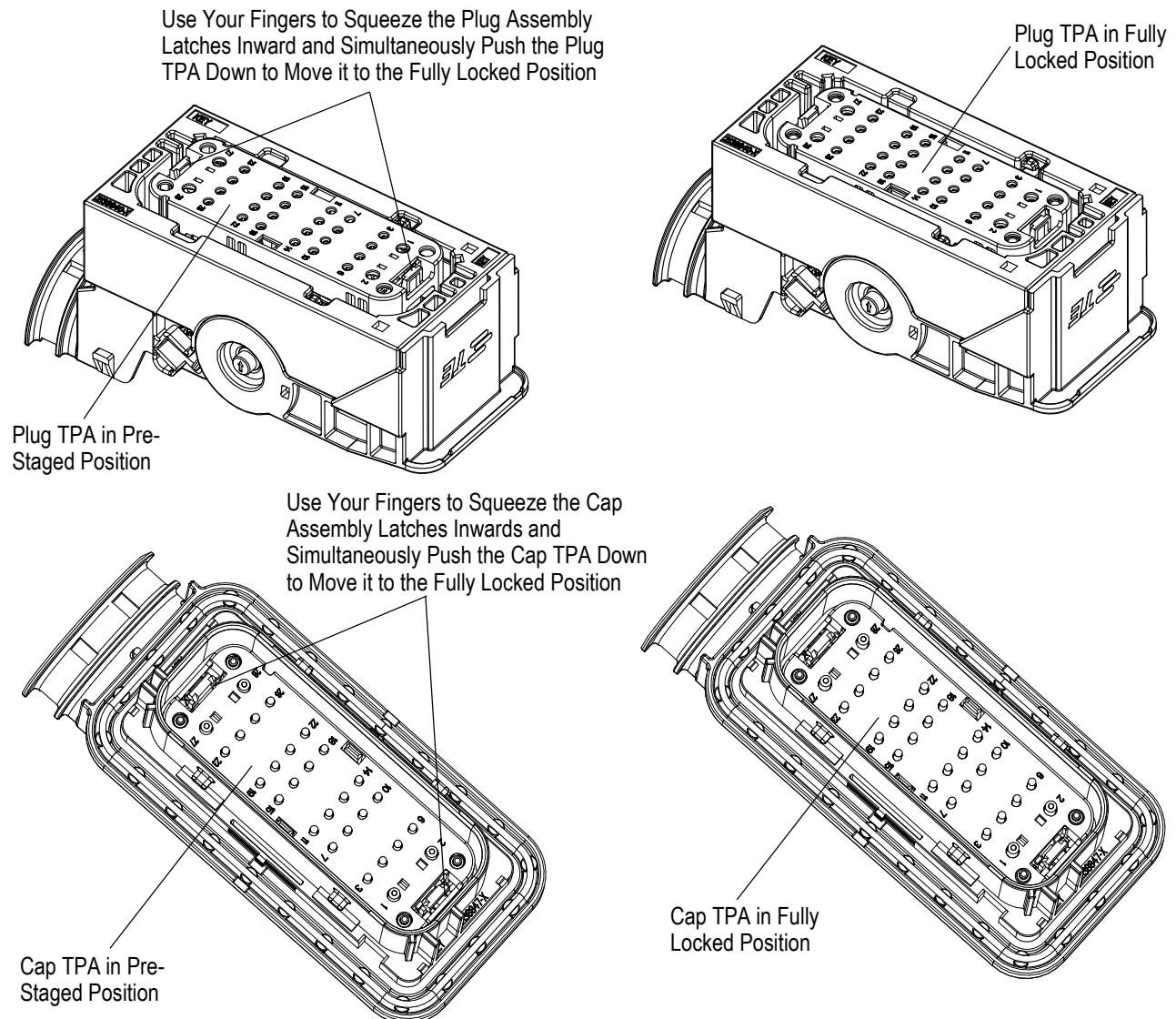


Figure 13



**CAUTION**

Do not press down on the plug TPA in the center. This will not seat the plug TPA. See Figure 14.



**CAUTION**

Do not push on the cap TPA with a screw driver as this will not seat the TPA and could potentially damage the pins. See Figure 14.

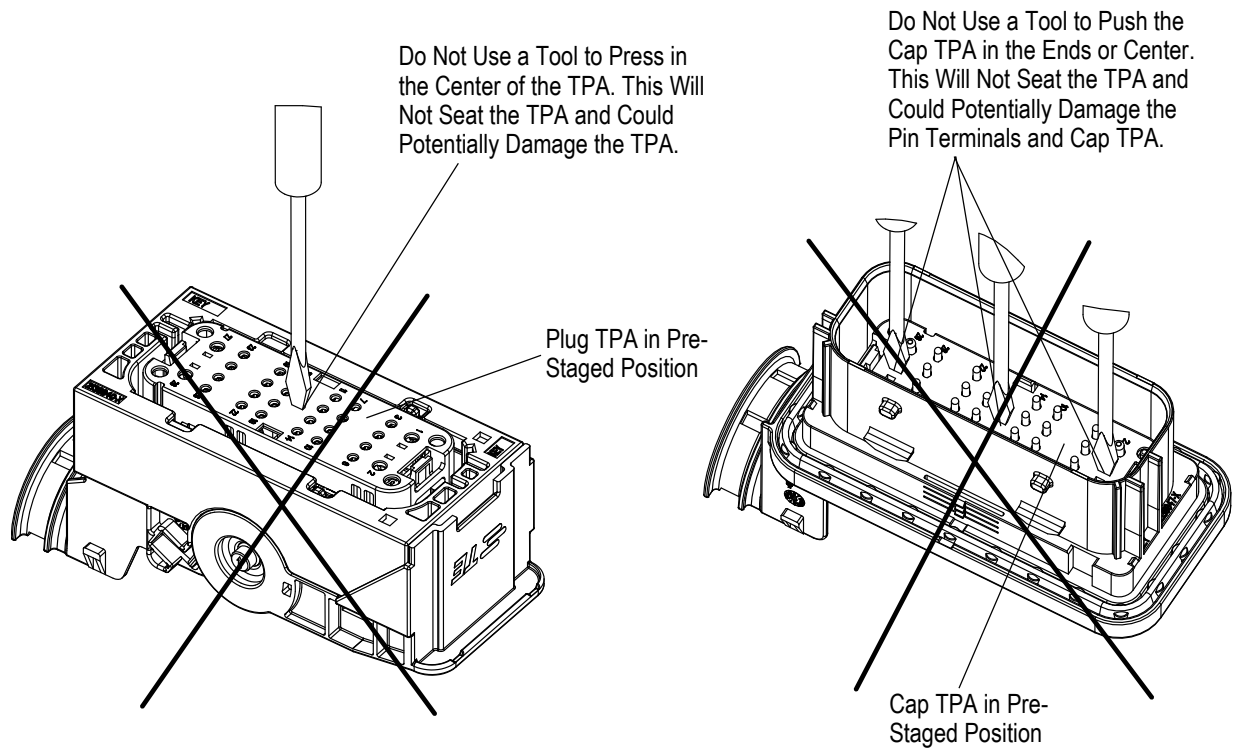


Figure 14



**NOTE**

Verify that all contacts are locked in place by giving a slight tug on each wire with a force of 4.5 to 9 N (1 to 2 lbf).

**C. Wire Routing (With and Without Conduit and Application of the Wire Exit Cover)**

Once all the circuits have been populated with crimped leads and/or sealing plugs, the wire bundle can be routed with the help of wire routing features present on both the plug and cap assemblies. Customers can tie down the wire bundle or use a conduit as per their requirements. A wire exit cover (2138853-1) is available to help route the wire bundle and is used to secure the conduit. The wire exit cover can be used on both the plug assembly and cap assembly.



**CAUTION**

When routing wires, care must be taken to provide a generous bend radius to the wires. Pulling too aggressively on the wires can side load the mat seal which can potentially cause a leak.



**CAUTION**

The wire exit cover must be used in applications where there is a likelihood of the connector being exposed to high pressure spray.



**NOTE**

The plug and cap assemblies can accommodate a Normal Profile NW26 Conduit. Both un-slit and slit conduits may be used.

1. Bend the wires with a generous bend radius to create a wire bundle. See Figure 15.

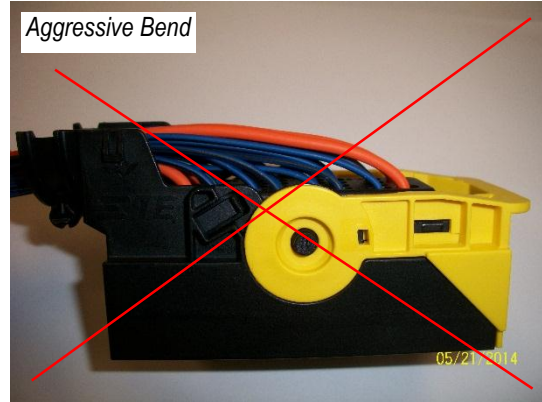
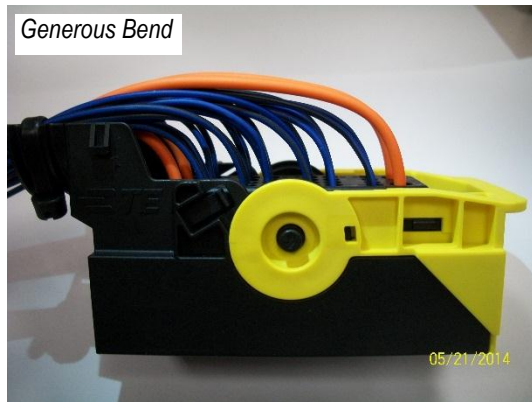


Figure 15

2. If a conduit is not being used, the wire bundle should be tied down using wire ties in slots present on the connector halves. If needed, the wire bundle can be split into two and each half can be tied down separately. See Figure 16.

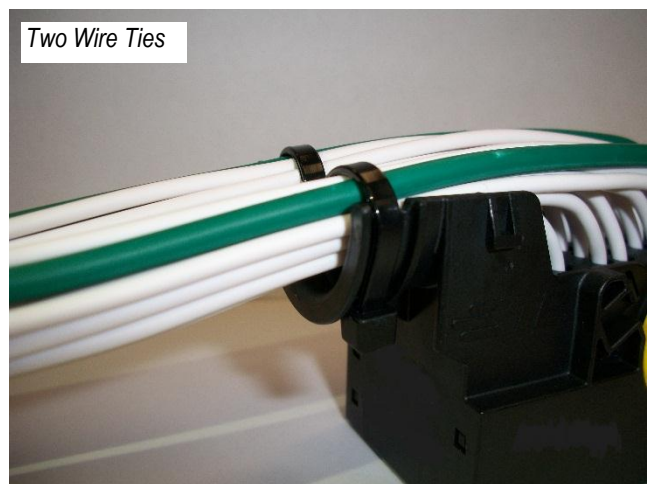
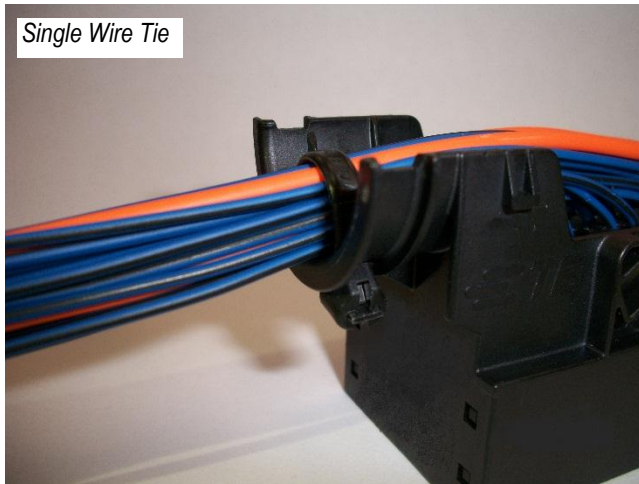


Figure 16

3. In applications that use a conduit, insert the conduit up to the stop in the connector halves. Ensure that the rib in the connector engages the slot in the conduit. See Figure 17.

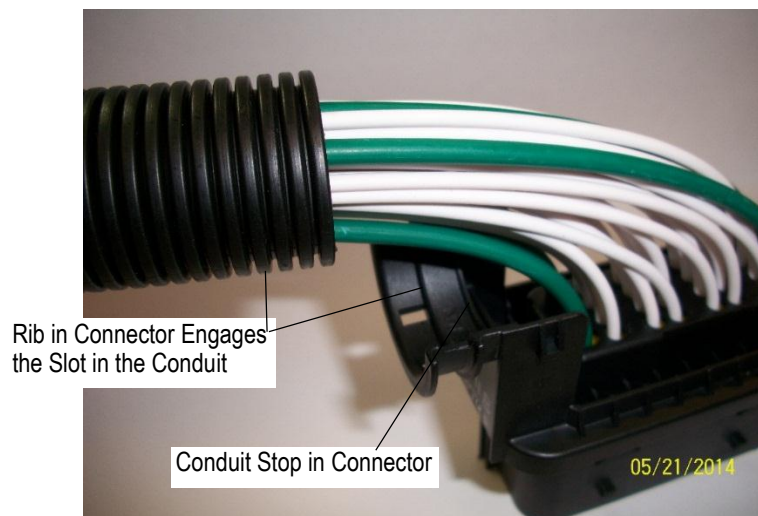


Figure 17

4. Insert the tab in the wire exit cover into slots in the connector halves and pivot the wire exit cover so that the latches snap in place. For applications using a conduit, ensure that the rib in the wire exit cover engages the slot in the conduit. See Figure 18.

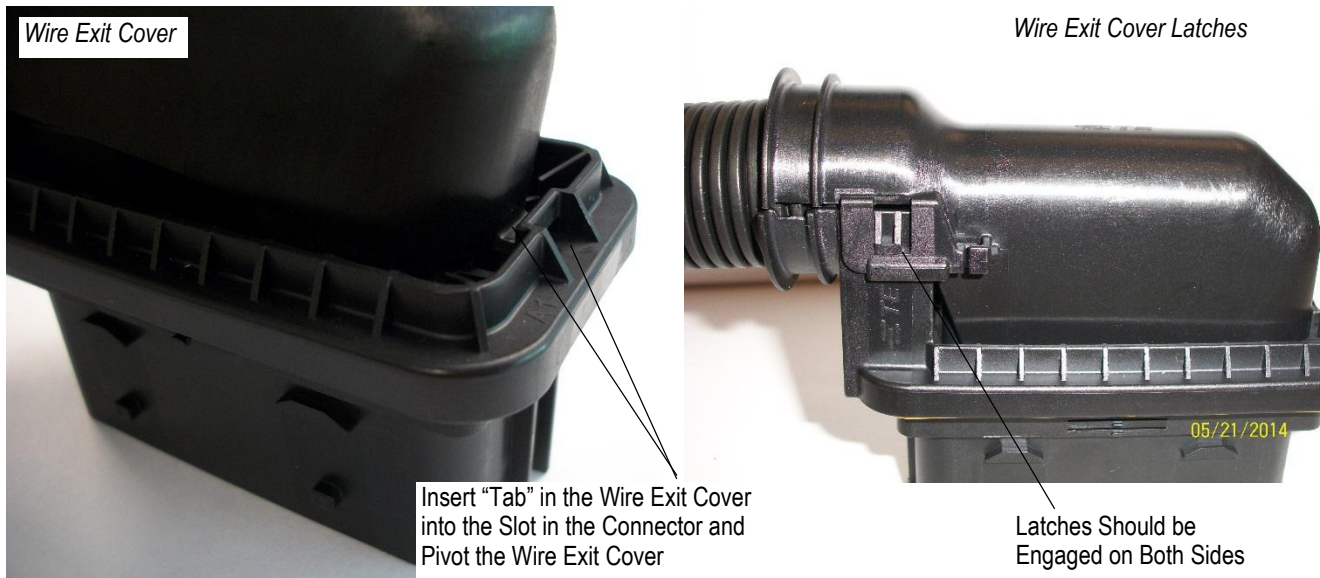


Figure 18

5. For added strain relief, it is recommended that a wire tie be used to secure the wire exit cover to the connector. See Figure 19.

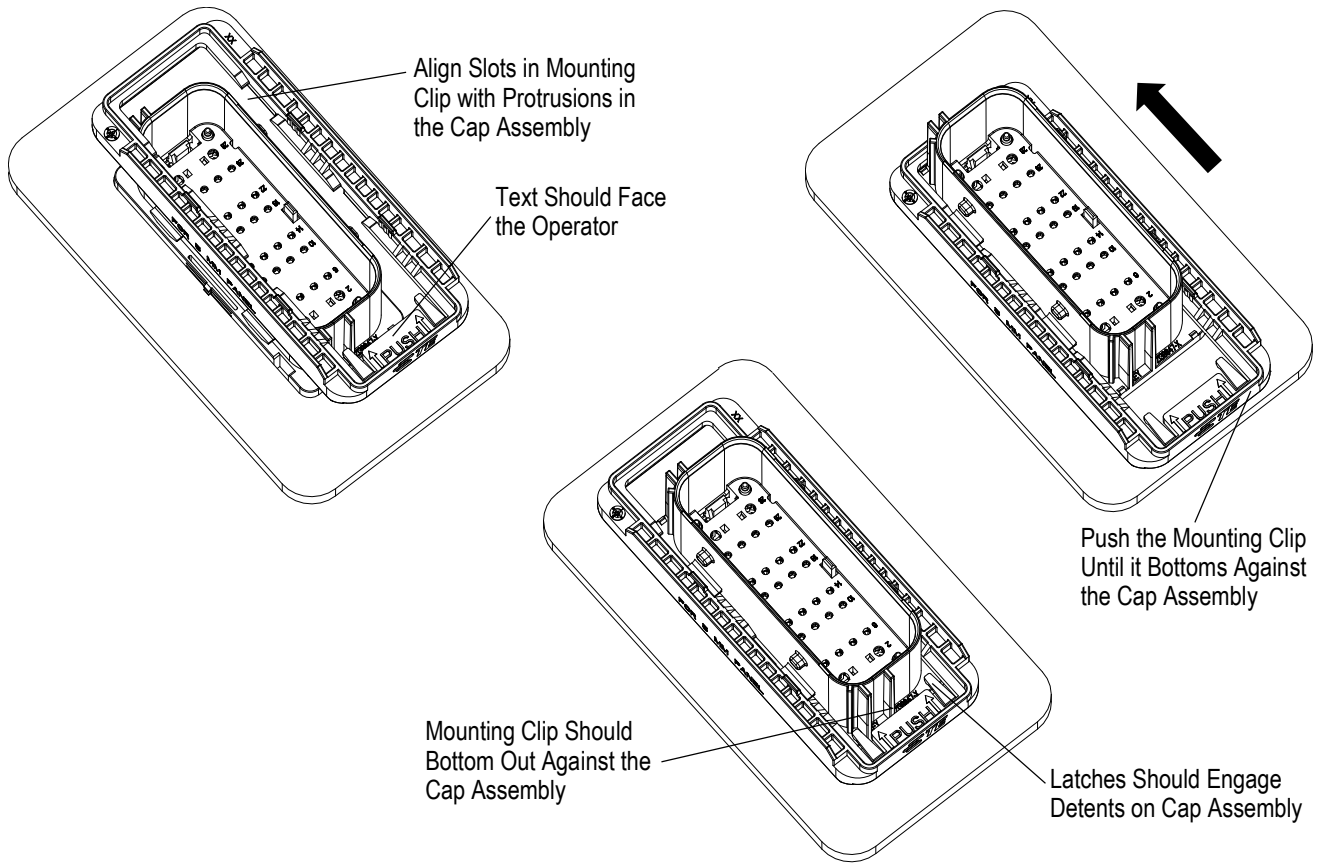


Figure 19

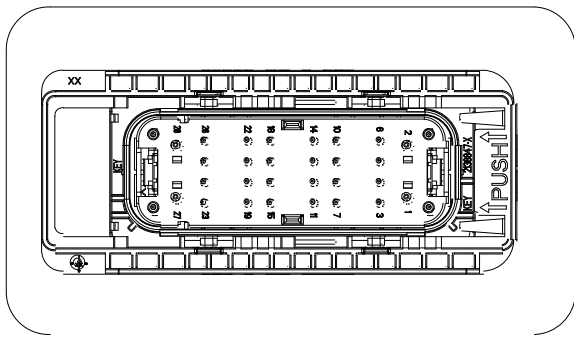
#### D. Mounting the Cap Assembly to the Panel

1. Insert the cap assembly through the panel opening. If the cap assembly is to be keyed to the panel, ensure that the slot in the cap assembly is aligned with the panel key during insertion.
2. With the temporary panel retention latches holding the cap assembly, align the openings in the mounting clip with the ramps on the cap assembly. Insert the mounting clip over the cap assembly and slide it to lock it in place. Ensure that the latches on the mounting clip engage the detents on the cap assembly. Depending on the customer's preference, the mounting clip can be inserted such that it can be pushed to either side to lock it in place. See Figure 20.

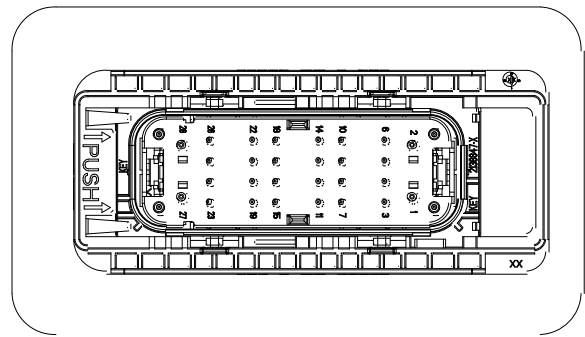
*Applying the Mounting Clip*



*Mounting Clip Can Be Assembled Either From the Right or the Left, Depending on the Customers' Preference*



*Mounting Clip Engaged to the Left*



*Mounting Clip Engaged to the Right*

*Figure 20*



**CAUTION**

*It is recommended to mount the cap assembly so that the flange seal is on the “dry side” of the panel. This will ensure that there is no direct line between the high pressure jet and the flange seal. See Figure 21.*

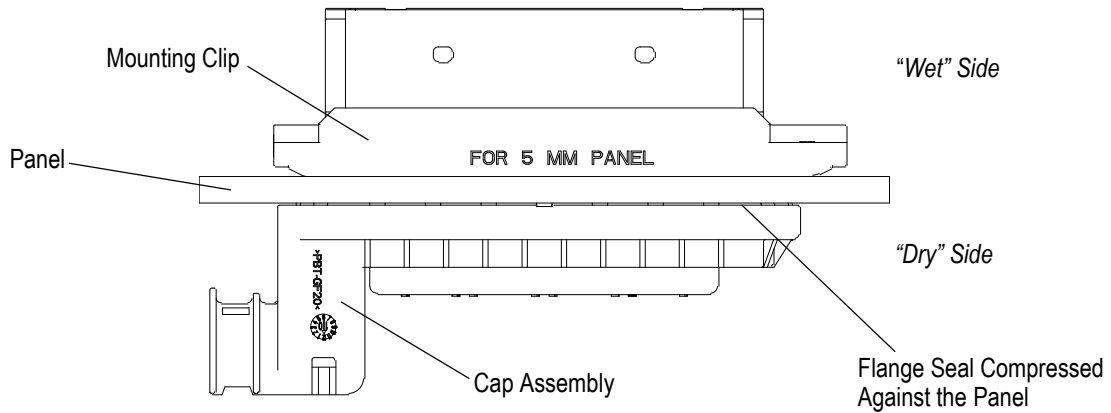


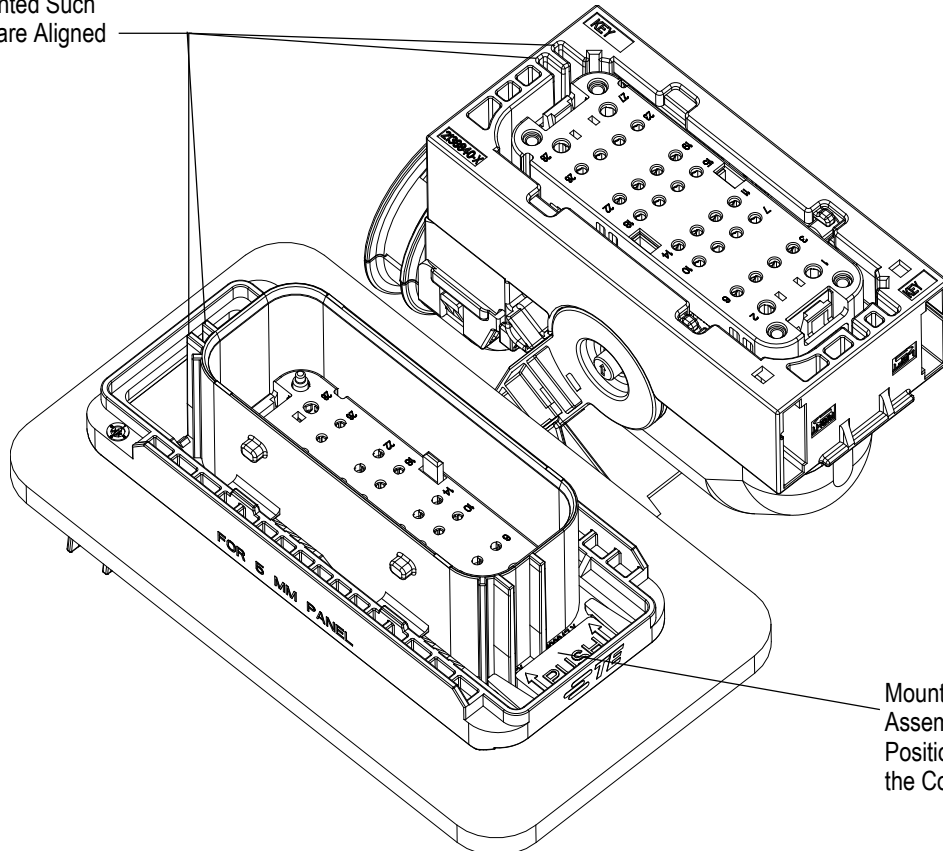
Figure 21

### E. Mating Connector Halves

1. Ensure the lever on the plug assembly is in the completely open position. Orient the plug assembly such that the keying features are aligned (see Figure 22). Push the plug assembly onto the cap assembly until the connector pre-staging features engage. An audible “click” can be heard when the connector is pre-staged. See Figure 23.

Ensure Plug Assembly is Correctly Oriented Such that the Keys are Aligned

#### Connector Assembly - Orientation



Mounting Clip Must be Assembled and Locked in Position Before Mating the Connector Halves

Figure 22

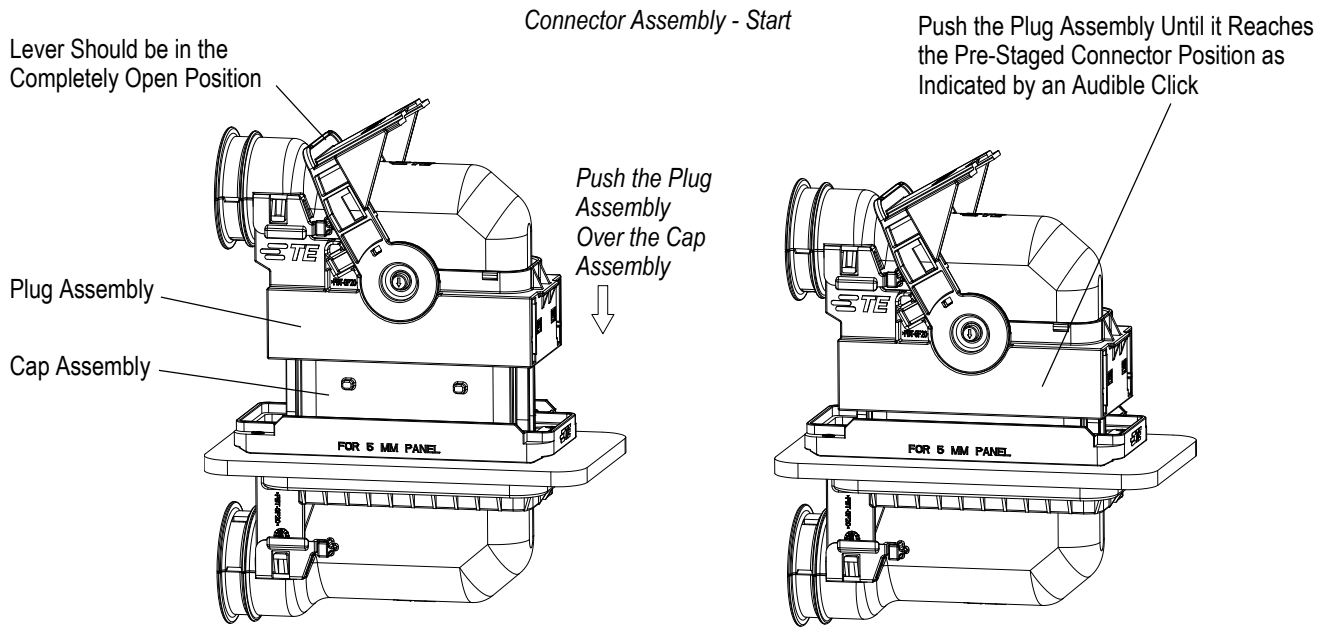


Figure 23

2. Rotate the lever completely till it bottoms out and engages the detents on the plug assembly. An audible “click” can be heard when the lever engages the detents. See Figure 24.

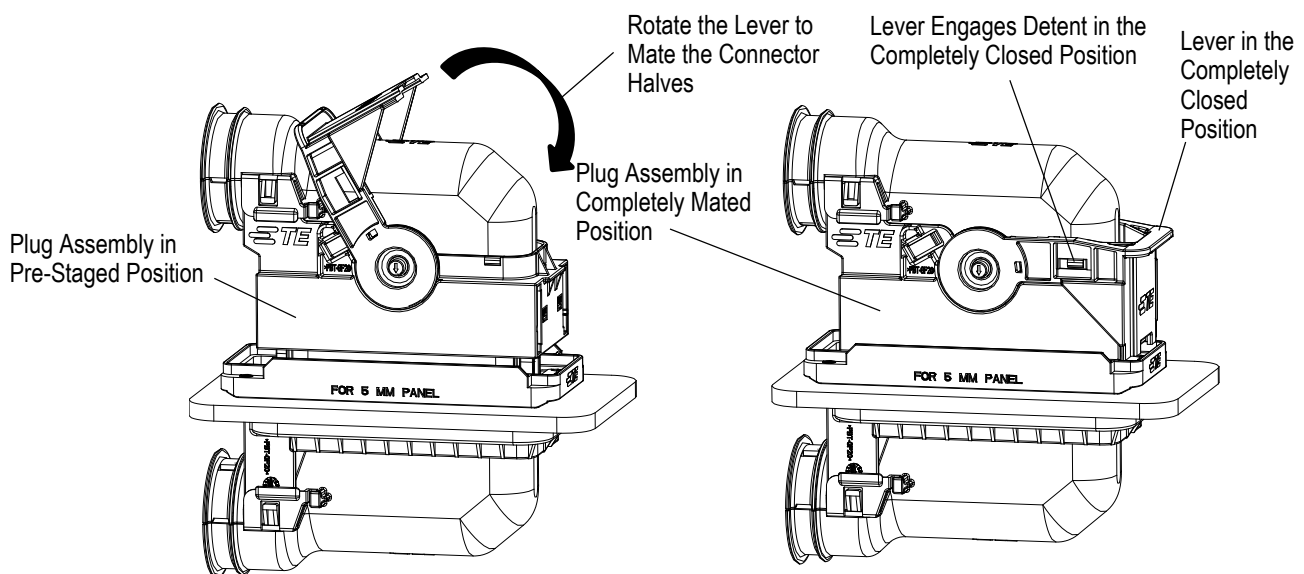


Figure 24

**i** **NOTE** Verify that the connector is completely mated by pulling on the plug assembly with a force of 18 to 22 N [4-5 lbf].

### 3.13. Disassembly Procedure and Servicing the Connector

#### A. Unmating the Connector

To un-mate the connector, rotate the lever from the “closed position” to the “open position”. This moves the plug assembly from the “mated” position to the “pre-staged” position. Thereafter, manually pull the plug assembly to overcome the connector pre-staging latch and separate the two connector halves. See Figure 25.



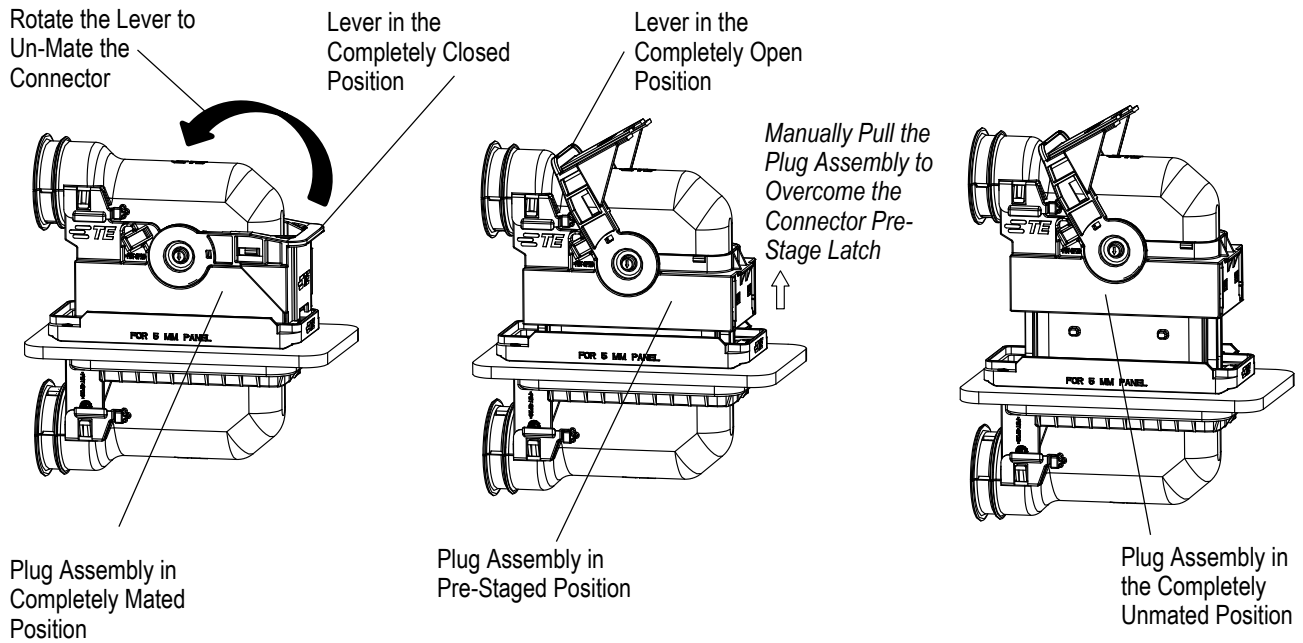


Figure 25

**B. Disengaging the Mounting Clip and Un-mounting the Cap Assembly** (Figure 26)

To disengage the mounting clip, slide it in the direction to overcome the latches and align the openings in the mounting clip with the ramps on the cap assembly. Thereafter remove the mounting clip by moving it over the cap assembly.

The cap assembly will be temporarily held in place by the temporary panel retention latches. To un-mount the cap assembly, press the panel retention latches and push the cap assembly down.

**i** **NOTE**  
*The process of pushing down the cap assembly may damage the temporary panel retention latches. This is an acceptable condition.*

*Disengaging the Mounting Clip*

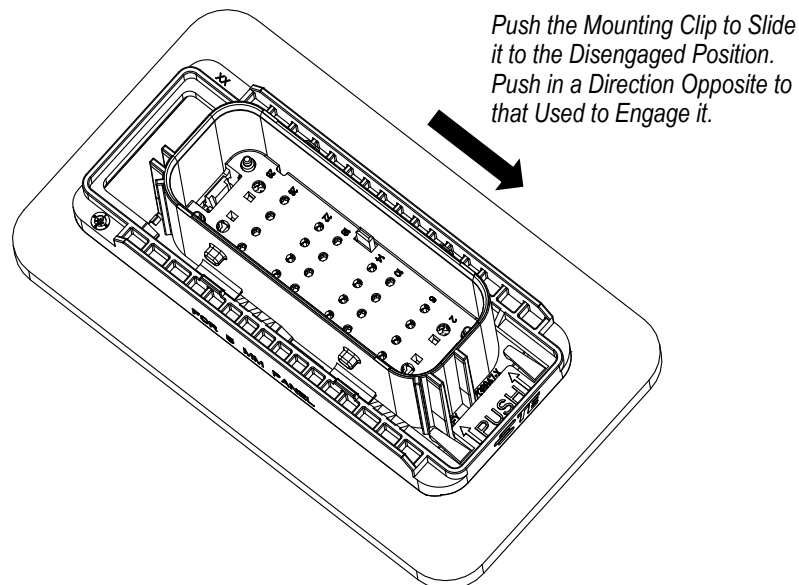


Figure 26 (cont'd)

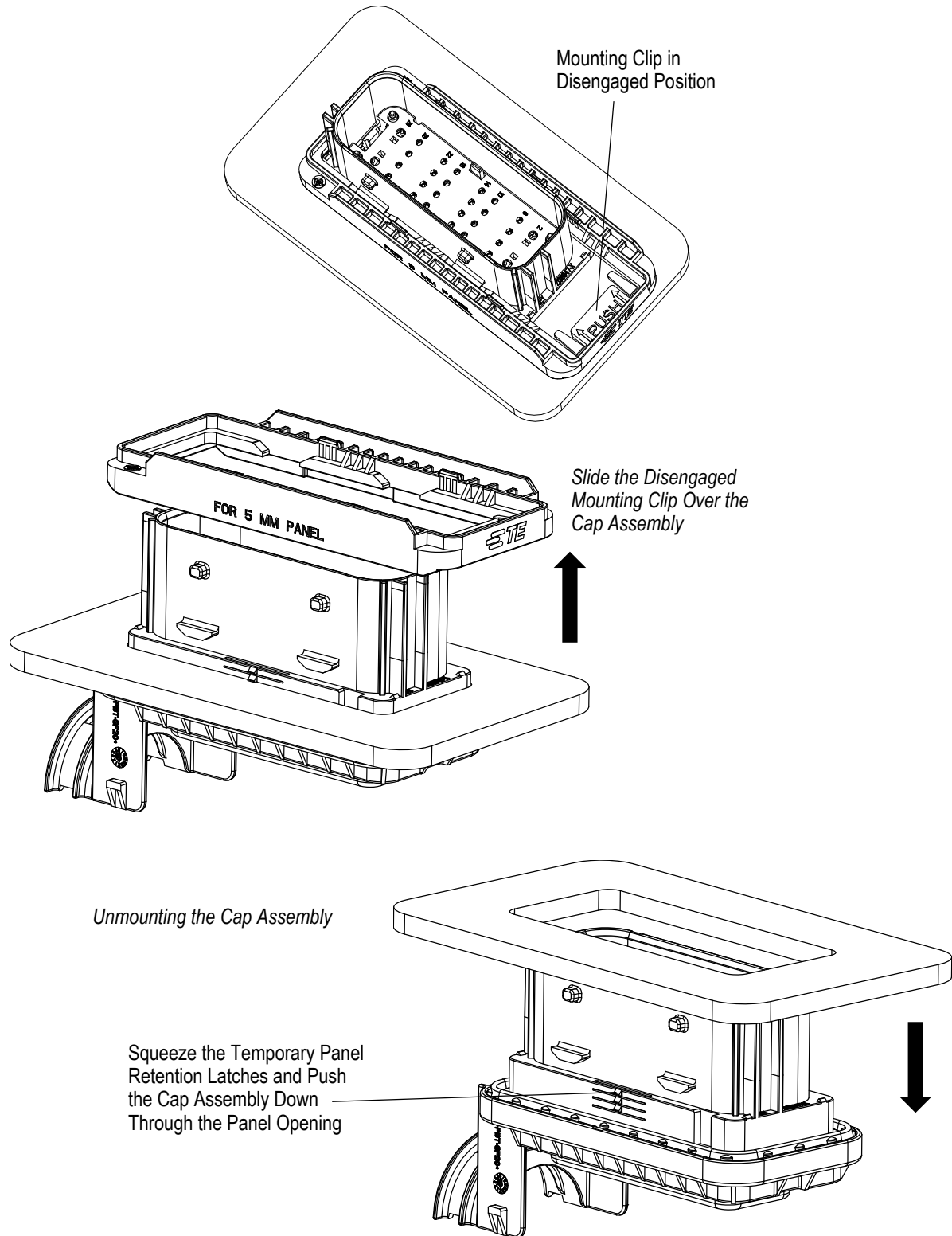


Figure 26 (end)

**C. Disassemble the Wire Exit Cover**

To disassemble the wire exit cover, slide the tip of a flat blade screwdriver under the latch tip and rotate the screwdriver to unlatch it. See Figure 27.

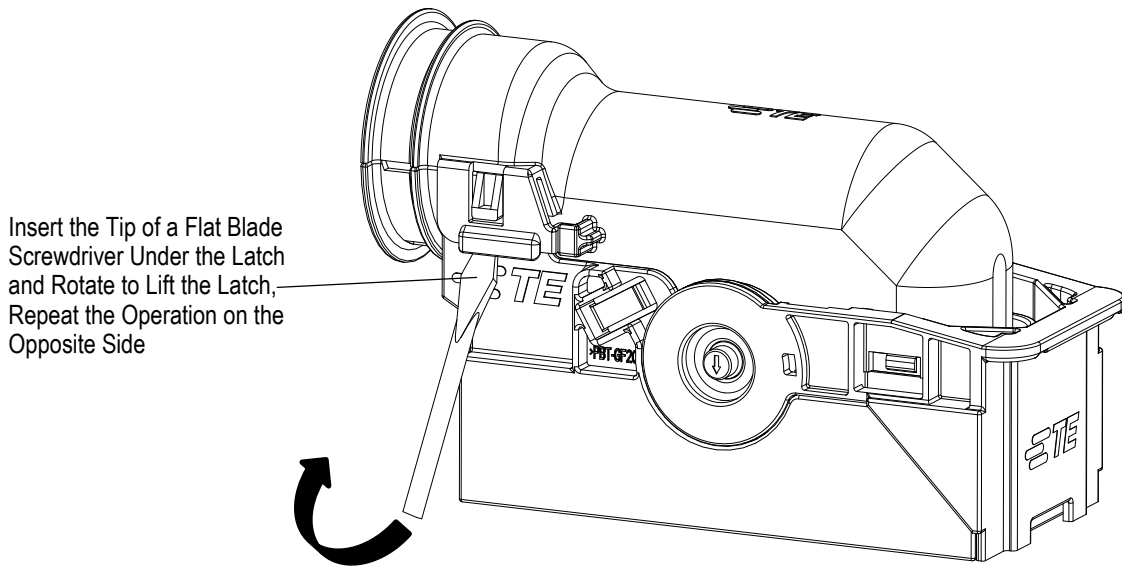


Figure 27

**D. TPA Removal**

On the plug assembly, the plug TPA can be removed by squeezing the plug TPA latches inwards and pulling them up simultaneously. Alternatively, TE TPA removal tool 776441-1 can be used for TPA removal on the plug and cap assemblies. Use the notch in the tool to hook on to the TPA latches. Squeeze the latch inwards while simultaneously pulling the TPA out. Repeat the procedure on the opposite latch. When using the TPA removal tool it may be necessary to alternate between the latches more than once to unseat the TPA. See Figure 28.



**NOTE**

*It is necessary to use the TPA removal tool on the cap assembly.*

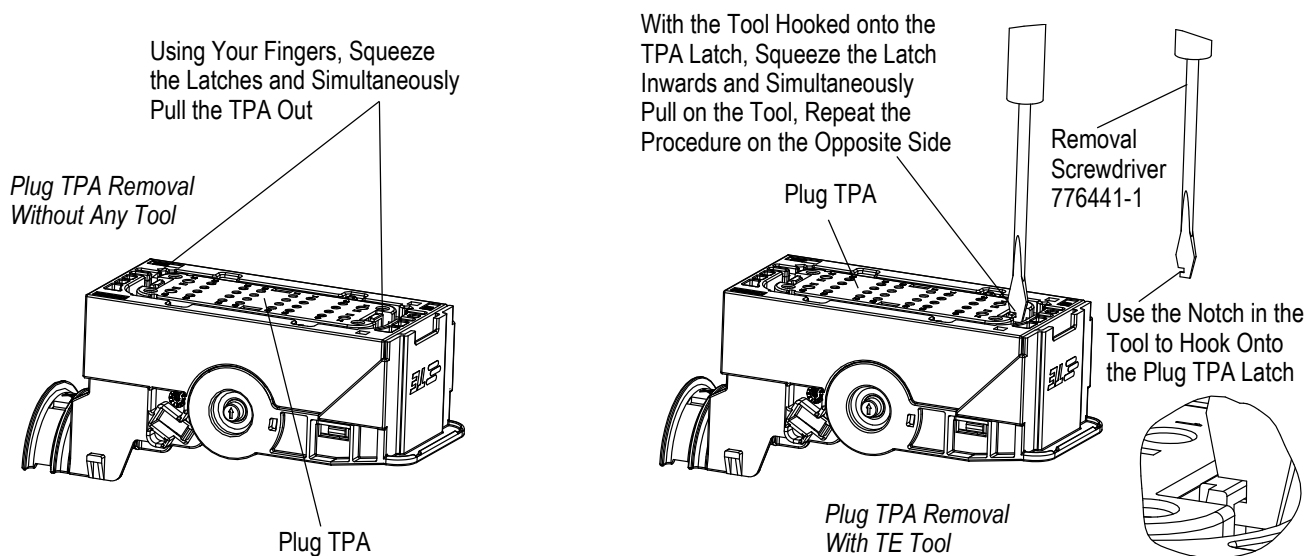


Figure 28

### E. Terminal Removal

Ensure that the plug TPA or cap TPA is removed prior to terminal removal. Insert a precision flat blade screw driver into the terminal cavity and deflect the terminal retention latch down. With the terminal latch deflected, gently pull the wire until the terminal is free. Repeat this procedure to service other terminals if needed. See Figure 29.

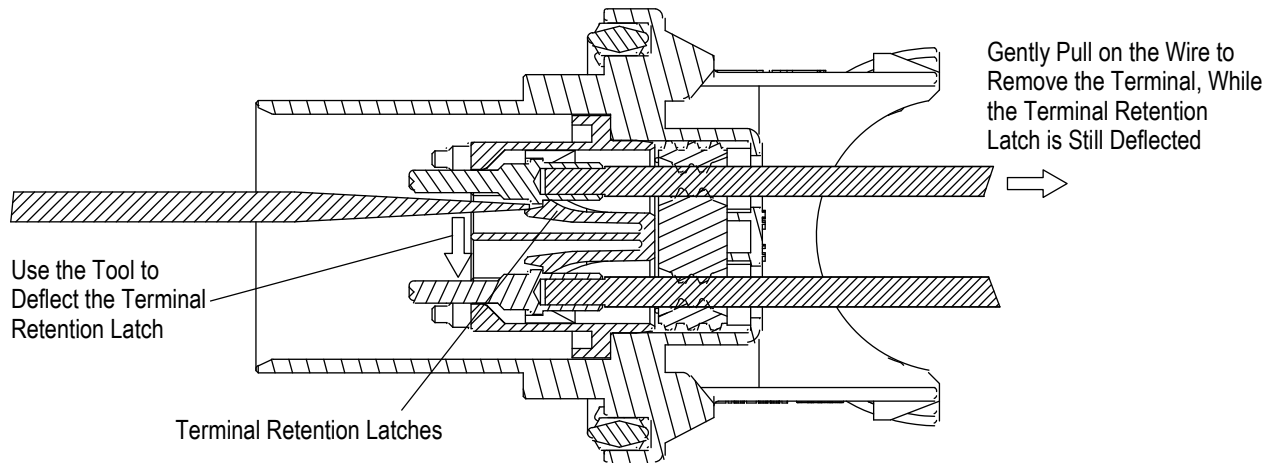


Figure 29

### F. TPA Re-Installation

The plug TPA and cap TPA's are keyed to the respective terminal blocks to ensure that the circuit id markings on the TPA's match the markings on the housings. To re-install the TPA's align the slots in the plug and cap TPA's with the ribs in the respective terminal blocks. Thereafter with the latches deflected inwards push the TPA's to their respective "fully locked positions". See Figure 30.

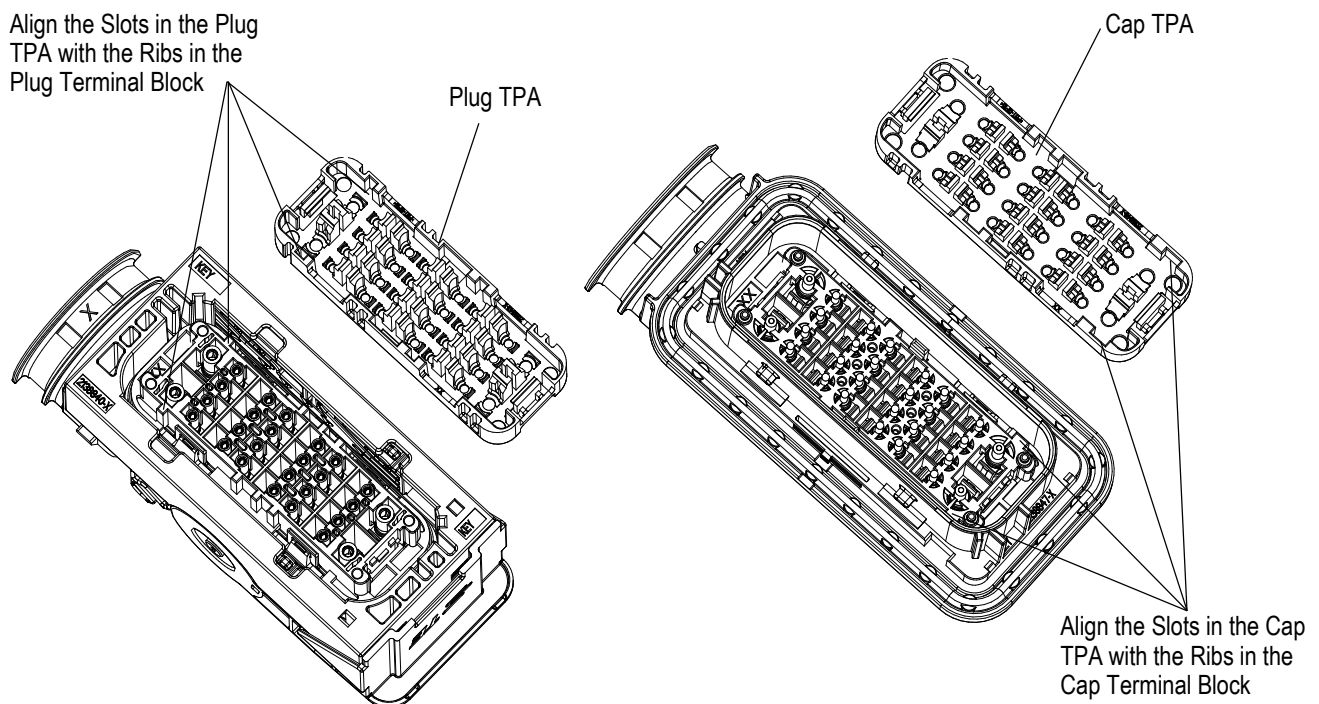


Figure 30

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#### 4. QUALIFICATION

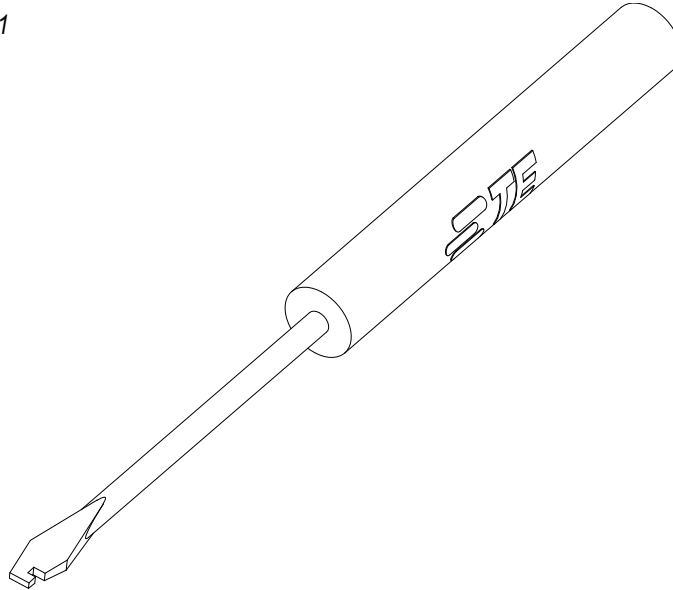
AMPSEAL 16 Hybrid Lever Connectors are not required to be agency evaluated and tested.

#### 5. TOOLING

Figure 31 shows TE TPA Removal Tool 776441-1.

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*TE TPA Removal Tool 776441-1*

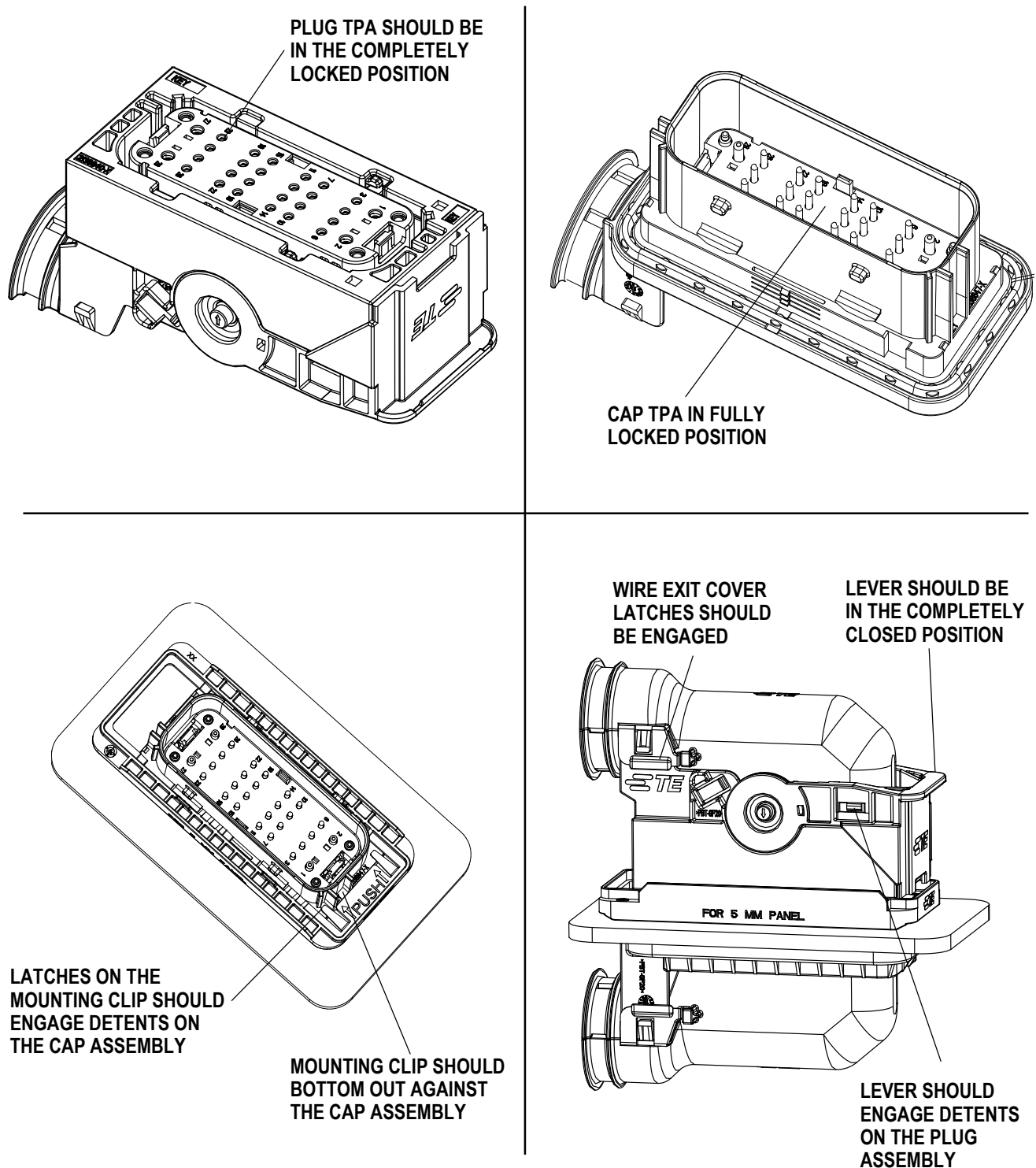


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*Figure 31*

## 6. VISUAL AID

The illustration below shows a typical application of the AMPSEAL 16 Hybrid Lever Connector. 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 32. VISUAL AID**