



707, 727-787

## STANDARD WIRING PRACTICES MANUAL

### SHIELDED CABLES

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**STANDARD WIRING PRACTICES MANUAL****SHIELDED CABLES**

This Subject gives the general data about:

- The functions of a shielded cable in the aircraft
- The configurations of a shielded cable
- The procedures to attach a shield to an electrical connector
- Related data in other subjects of the Standard Wiring Practices Manual (SWPM).

**1. GENERAL DATA****A. High Energy Impulses**

It is necessary to keep a high energy impulse out of a wire on the aircraft because:

- It can be read, in error, as data by the electronic equipment on the aircraft
- It can cause damage to the electronic equipment that is connected to the wires.

**B. Functions of a Shield**

A shield supplies the necessary protection for the wires and the equipment when it transmits the unwanted energy from the conductors in the shield to the electrical ground through these routings:

- From the shield to the plug connector strain relief to the plug connector backshell
- From the plug connector backshell to the plug connector
- From the plug connector to the receptacle connector
- From the receptacle connector to the ground of the aircraft structure.

The shield on a shielded cable only does its function correctly when these conditions occur:

- There is a low electrical impedance at each interface in the routing
- The length of the connection between the interfaces is short; the more sensitive the electrical circuit is, the shorter the connection between the shield and the backshell must be
- The shield coverage is in proportion to the sensitivity of the electrical circuits that the shield protects; very sensitive electrical circuits must have 100 percent coverage and less sensitive electrical circuits can have less than 100 percent coverage.

**C. Functions of a Shielded Cable**

A shielded cable does not let:

- The high energy, electrical impulses, that are caused by lightning, go into the wires in the shield
- The high intensity radio frequency (HIRF) energy from the different radio sources that are external to the aircraft go into the wires in the shield
- The radio frequency energy from the different electrical and electronic sources in the aircraft go into the wires in the shield
- The radio frequency energy from the wires in the shield come out and cause the incorrect performance of other equipment or systems on the aircraft.

**D. Configurations of Shielded Cable**

A shielded cable is an electrical cable that has a conductive shield around the wires in the cable. Usually, the conductive shield is metal.

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### SHIELDED CABLES

Different shielded cables have shields that are made with:

- Braided, round conductors
- Braided, flat conductors
- Wrapped, round conductors
- Wrapped, flat conductors
- Wrapped, foil conductor
- A mixture of the braided or wrapped conductors.

Some shielded cables:

- Have one layer of shield material
- Have more than one layer of shield material
- Have insulation on top of the shield
- Do not have insulation on top of the shield
- Have insulation between the shields.

## 2. PROCEDURES TO ATTACH A SHIELDED CABLE TO AN ELECTRICAL CONNECTOR

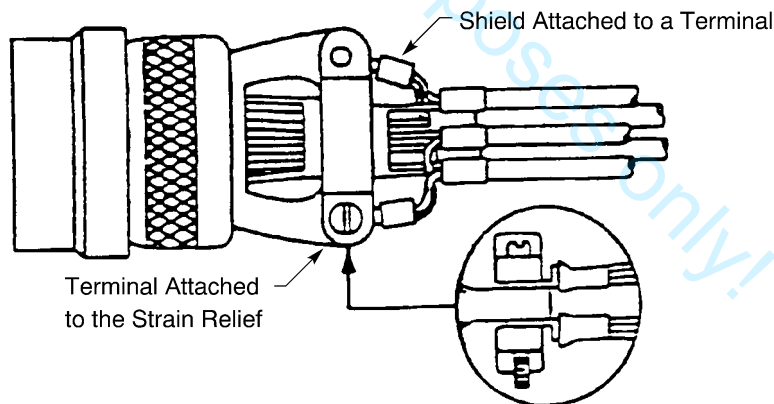
There are 2 usual procedures.

### A. Connection of a Shield to the Connector Strain Relief

Refer to Figure 1.

Either of these connections is satisfactory:

- The shield is attached directly to a terminal and the terminal is attached to the connector strain relief.
- One end of a shield ground wire is attached to the shield and the other end is attached to a terminal that is subsequently attached to the connector strain relief.



SHIELD CONNECTED TO THE CONNECTOR STRAIN RELIEF

Figure 1

### B. Connection of a Shield to the Connector Backshell through a Faying Surface Bond

**NOTE:** This procedure is recommended to connect the shields of the electrical circuits that are sensitive.

Refer to Figure 2 and Figure 3.

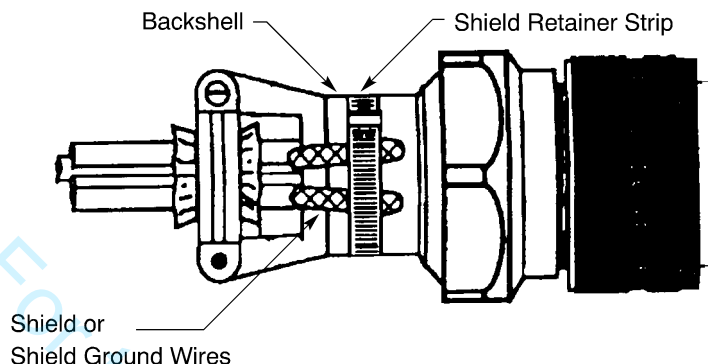
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### SHIELDED CABLES

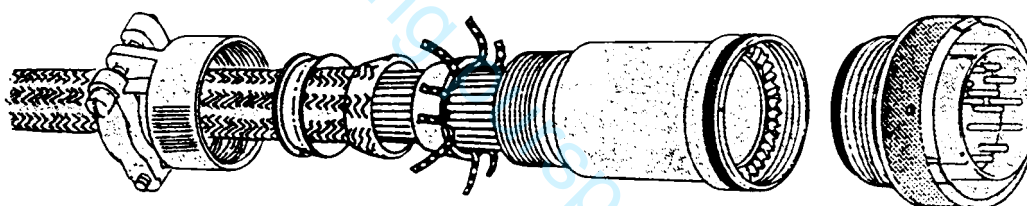
To keep the faying surface bond in position, either of these connections is satisfactory:

- A shield retainer strip is used to press the shield against the surface of the backshell
- The internal components in the backshell and the position of the shield in relation to these components make the bond.



**SHIELD CONNECTION WITH A SHIELD RETAINER STRIP**

**Figure 2**



**SHIELD CONNECTION WITH A PERIPHERAL BACKSHELL**

**Figure 3**

### 3. RELATED DATA IN OTHER SWPM SUBJECTS

#### A. Bonding and Grounding of Electrical Connectors

For the procedure to make low impedance bond between the receptacle connector and the aircraft structure, refer to Subject 20-20-00.

#### B. Faying Surface Bond

For the procedures to install a faying surface bond, refer to Subject 20-20-00.

#### C. Overall Shield Termination

For the procedures to install overall shield braid on wire bundles, refer to Subject 20-25-11.

#### D. Strain Relief Shield Termination

For the procedures to assemble and maintain connections from the shield to the connector strain relief, refer to Subject 20-25-12.

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### SHIELDED CABLES

#### **E. Peripheral Shield Termination**

For the procedures to assemble and maintain connections from the shield to the internal components in the backshell, refer to Subject 20-25-13.

#### **F. Shield Braid Retainer Strip Termination**

For the procedures to assemble and maintain connections that use a shield retainer strip to connect the shield to the backshell, refer to Subject 20-25-14.

#### **G. Connector Assembly**

For the procedures to connect the connector plug to the connector receptacle so that a low impedance interface occurs, refer to the Subject for the assembly of the connector.

For training purposes only!

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### OVERBRAID SHIELDS ON WIRE BUNDLES

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**STANDARD WIRING PRACTICES MANUAL****OVERBRAID SHIELDS ON WIRE BUNDLES**

Critical system wiring has shielded wires and overbraid shields for protection. This Subject gives these procedures for overbraid shields:

- Installation
- Repair
- Rework.

**1. GENERAL DATA****A. Lightning Strike Energy**

Lightning strike energy:

- Can be transferred or coupled through non-metallic skin panels to electrical wiring and equipment
- Can have a sufficient magnitude to cause a system failure if it is not attenuated.

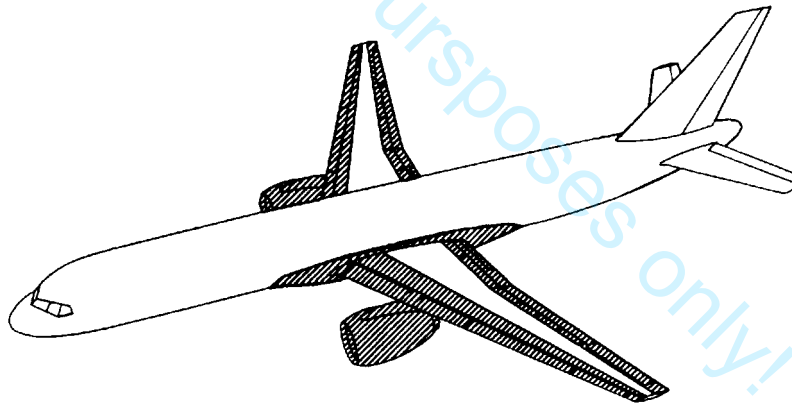
As a result of extensive studies, the aircraft have lightning protection which include:

- Transient suppression filters
- Metallic shields over the wire bundles.

**B. Susceptible Areas**

Refer to Figure 1 for the usual areas where electrical wiring is susceptible to interference or damage from lightning; the areas of the wheel wells are included.

NOTE: Almost all wire bundles in the susceptible areas have braided, metallic overbraid shields for protection.



**AREAS SUSCEPTIBLE TO DAMAGE OR INTERFERENCE FROM LIGHTNING**

**Figure 1**

**C. Bonds or Grounds of Connectors**

When it is necessary to bond or ground connectors, circuits, or backshell hardware to maintain lightning protection, refer to Subject 20-20-00.

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## STANDARD WIRING PRACTICES MANUAL

### OVERBRAID SHIELDS ON WIRE BUNDLES

#### 2. GENERAL CONDITIONS FOR OVERBRAID SHIELDS

##### A. Identification

A wire bundle that has an overbraid shield installed must be identified with a W number at these locations:

- Within 18 inches of all connectors
- Within 18 inches of all shield terminations
- At branches
- Every six feet.

An example is W3108.

##### B. Selection of an Overbraid Shield

For the selection of a shield material for an overbraid shield, the shield must have the same or higher temperature grade as the wire bundle.

**Table 1**  
**SHIELD MATERIALS**

Description	Temperature Grade	Boeing Standard	Assembly Procedure
Overbraid Shield, Tin Coated	B	BAC3108-()	Paragraph 3.
			Paragraph 4.
Overbraid Shield, Nickel Coated	D	BAC3106-()	Paragraph 3.

NOTE: The BAC3106-() overbraid shield is nickel coated and must be assembled without solder.

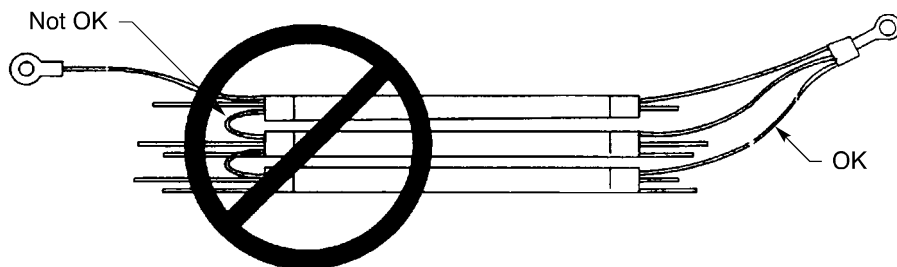
NOTE: For sizes and suppliers of shield materials, refer to Subject 20-00-11.

##### C. Conditions for the Installation of an Overbraid Shield

Overbraid shields must be:

- A tight fit on the wire bundle
- Attached to ground at both ends.
- Terminated within 4 inches of the center of a seal fitting.

The overbraid shields of the wire bundle and the individual shield ground wires of the cables must not be installed so that they are connected from shield to shield. Refer to Figure 2.



**CONFIGURATION OF SHIELD GROUND WIRES AND OVERBRAID SHIELDS**  
**Figure 2**

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### OVERBRAID SHIELDS ON WIRE BUNDLES

#### D. Shield Ground Wires, Short Wire Bundle Branches, and Adjacent Wires

It is not necessary to install an overbraid shield on these wires when they are 6 inches or less in length:

- Shield ground wires of each shielded cable of the wire bundle
- Short branches of a wire bundle.

**NOTE:** The length of an unshielded wire must be kept as short as possible.

Shield ground wires and short wire bundle branches must have either of these type of protection from the abrasive overbraid shield:

- A heat shrinkable sleeve; refer to Subject 20-10-14
- The necessary layers of TFE Teflon tape.

Refer to Figure 3.

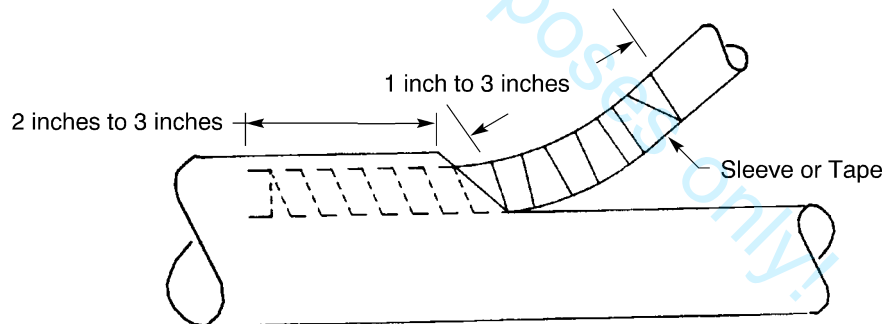
Adjacent wires must have protection from the abrasive overbraid shield. The protection is given by the installation of an expando sleeve. Refer to Subject 20-00-11.

**NOTE:** If the separation of the adjacent wires and the overbraid shield is not possible with an expando sleeve, the satisfactory alternatives are:

- A heat shrinkable sleeve; refer to Subject 20-10-14
- The necessary layers of TFE Teflon tape.

These conditions are applicable:

- It is not necessary for the sleeve of a shielded wire to obey the conditions for color code separation
- A layer of TFE Teflon tape must be installed on each end of an expando sleeve
- If the overbraid shield is soldered, a layer of TFE Teflon tape must be installed on the wire bundle or cable directly under the soldered area of the shield.



**PROTECTION OF A SHORT WIRE BUNDLE BRANCH**  
Figure 3

#### E. Wire Bundle Ties

Refer to Subject 20-10-11.

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### OVERBRAID SHIELDS ON WIRE BUNDLES

Wire bundle ties:

- Must be installed on the overbraid shield every 4 inches, unless it is specified that the bundle must be tied every 2 inches
- Must be used to hold the end of a layer of tape
- Must be used to support a branch of a wire bundle
- Are not necessary under the overbraid shield.

### 3. ASSEMBLY OF AN OVERBRAID SHIELD WITHOUT SOLDER

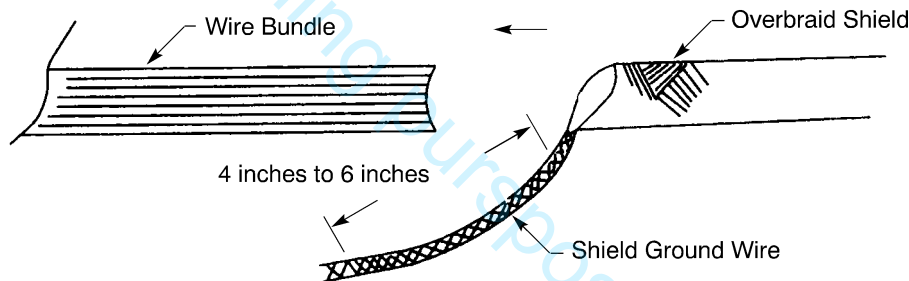
#### A. Overbraid Shield Installation

- (1) Make a selection of a shield material from Table 1.

Make sure that the shield is the correct size for a tight fit on the wire bundle.

**NOTE:** For alternative shield materials, refer to Subject 20-00-11.

- (2) Cut the necessary length of the shield so that a 4 inch to 6 inch shield ground wire can be made at both ends.
- (3) Make a hole in the shield 4 inches 6 inches from each end. Refer to Figure 4.  
Make sure that the location of the hole is correct in relation to the configuration of the wire bundle.



**INSTALLATION OF THE OVERBRAID SHIELD ON THE WIRE BUNDLE**  
**Figure 4**

- (4) Put the necessary length of an expando sleeve on the wire bundle.
- (5) Put a layer of TFE Teflon tape or a heat shrinkable sleeve on the ends of the expand sleeve so that either the tape or the heat shrinkable sleeve:
  - Makes an overlap with the expando sleeve
  - Extend 1 inch to 2 inches beyond the end of the overbraid shield.
- (6) Pull the shield over the wires or cables so that the hole is the correct position on the wire bundle.

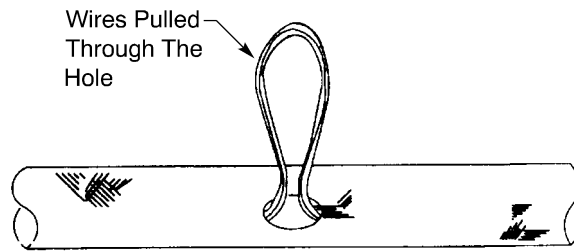
**CAUTION:** DO NOT INSTALL THE SHIELD OVER A WIRE BUNDLE TIE.

- (7) If it is possible, pull the wires or cable through the hole. Refer to Figure 5.

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### OVERBRAID SHIELDS ON WIRE BUNDLES



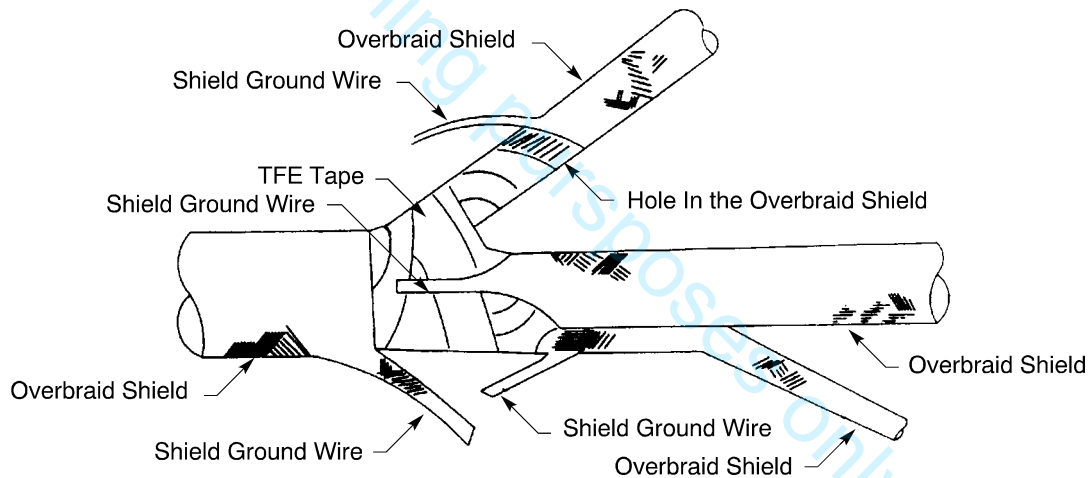
### WIRES PULLED THROUGH THE HOLE IN THE SHIELD

Figure 5

- (8) If the wires or cables cannot be pulled through the hole in the shield because of the configuration of the wire bundle, a shield can be installed on each wire or cable. Refer to Figure 6.

**NOTE:** To make the installation easier, more than one shield can be installed on the wire bundle; refer to Figure 7. These conditions are applicable:

- Each shield is installed on the wires or cable that are attached to the same connector
- A larger wire bundle diameter is permitted.



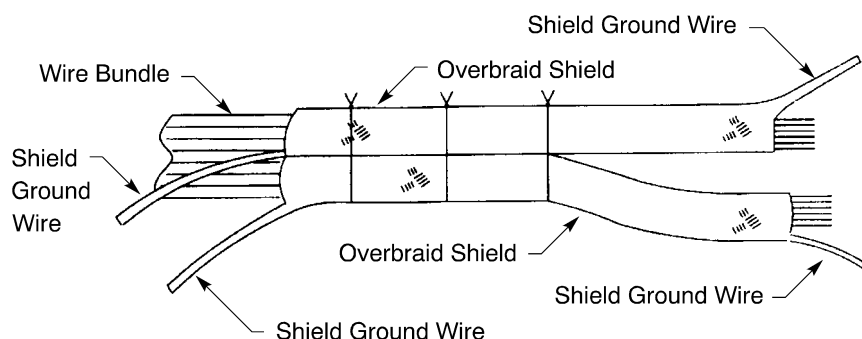
### OVERBRAID SHIELD INSTALLED ON EACH WIRE OR CABLE

Figure 6

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## STANDARD WIRING PRACTICES MANUAL

### OVERBRAID SHIELDS ON WIRE BUNDLES



**MORE THAN ONE OVERBRAID SHIELD INSTALLED ON A WIRE BUNDLE**  
Figure 7

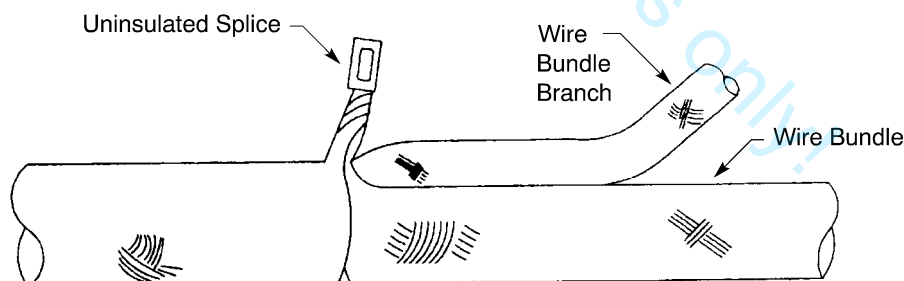
- (9) Install an expando sleeve on each shield. Refer to Paragraph 2.D.
- (10) Assemble the necessary quantity of wire bundle ties in the applicable positions on the wire bundle. Refer to Paragraph 2.E. and Subject 20-10-11.

**CAUTION:** DO NOT INSTALL AN EXPANDO SLEEVE OVER A WIRE BUNDLE TIE.

#### B. Connection of Overbraid Shields

- (1) On the end of the shield ground wires at the 2 adjacent ends of the overbraid shields on the wire bundle, move the strands of the shield ground wires apart.
- (2) Twist the two ends of the shield ground wires together.
- (3) Find the equivalent wire size of the attached shield ground wires at approximately one inch from the wire bundle.
- (4) Install an uninsulated splice on the attached shield ground wires so that the end of the splice is 1 inch maximum from the wire bundle.

Refer to Subject 20-30-12 and Figure 8.



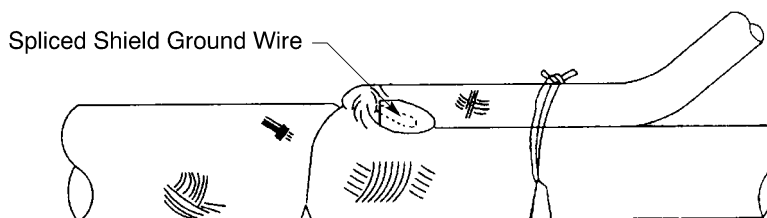
**CONNECTION OF TWO OVERBRAID SHIELDS**  
Figure 8

- (5) Make the spliced shield ground wire flat against the overbraid shield on the wire bundle. Refer to Figure 9.

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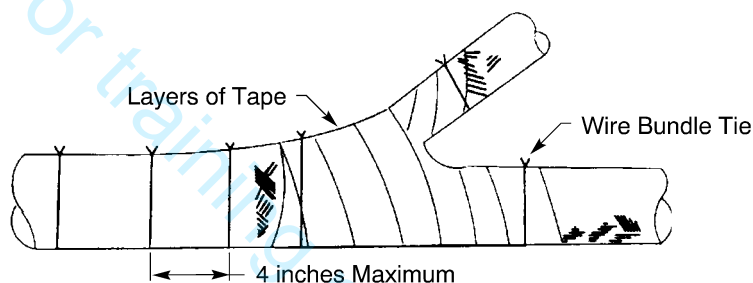
## STANDARD WIRING PRACTICES MANUAL

### OVERBRAID SHIELDS ON WIRE BUNDLES



**POSITION OF THE SPLICE AGAINST THE OVERBRAID SHIELD**  
Figure 9

- (6) Put a layer of TFE Teflon tape wrap over the connection of the overbraid shields on the wire bundle. Refer to Figure 10.



**TAPE ON THE CONNECTION OF THE OVERBRAID SHIELDS**  
Figure 10

#### C. Overbraid Shield Termination

**Table 2**  
**SHIELD GROUND WIRE TERMINALS**

Overbraid Shield			Boeing Standard
Inside Diameter (inch)	Number of Conductors	Number of Ends	
0.109	24	96	BACT12AC3
0.172	24	168	BACT12AC8
0.203	24	384	BACT12AC12
0.375	48	384	BACT12AC12
0.500	48	528	BACT12AC15
0.781	48	864	BACT12AC19
0.875	48	336	BACT12AC15
1.00	48	864	BACT12AC19

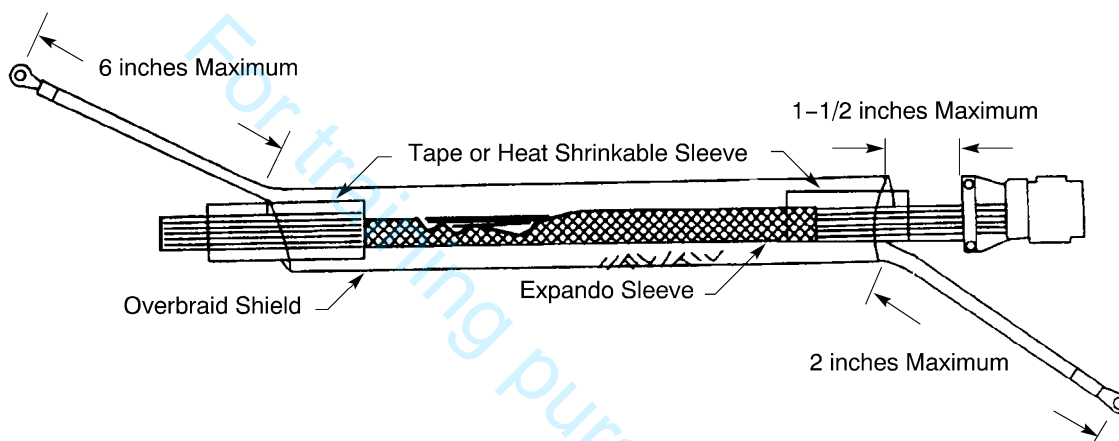
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### OVERBRAID SHIELDS ON WIRE BUNDLES

- (1) On each end of the overbraid shield, cut the shield ground wire so that it is a maximum length of:
  - 2.0 inches for termination at a connector strain relief
  - 6 inches for other terminations.
- (2) Move the strands of the shield apart on the last 1/2 inch of each shield ground wire.
- (3) Twist the strands of the shield to make a wire.
- (4) Make a selection of a terminal from Table 2.
- (5) Assemble a terminal on each shield ground wire. Refer to Subject 20-30-11 and Figure 11.

**NOTE:** To make it easier to put the terminal on the shield ground wire, the terminal can be twisted in the same direction as the twisted strands of the shield.

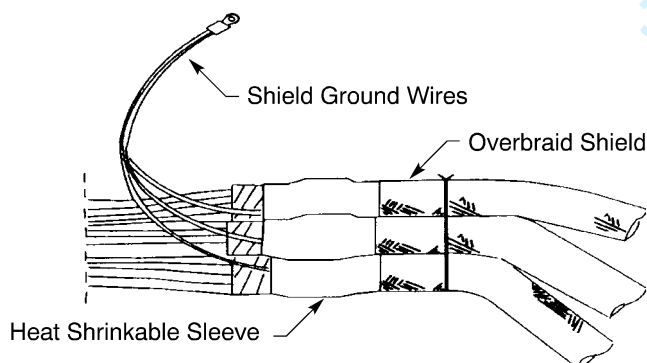


#### TERMINATION OF A SHIELD GROUND WIRE

Figure 11

- (6) Install the necessary length of a heat shrinkable sleeve on the end of the overbraid shield. Refer to Figure 12.

Make sure that the end of the sleeve extends 1/2 inch to 3/4 inch beyond the location where the shield ground wire comes out of the shield.



#### TERMINATION OF THE OVERBRAID SHIELD

Figure 12

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# STANDARD WIRING PRACTICES MANUAL

## OVERBRAID SHIELDS ON WIRE BUNDLES

### 4. ASSEMBLY OF AN OVERBRAID SHIELD WITH SOLDER

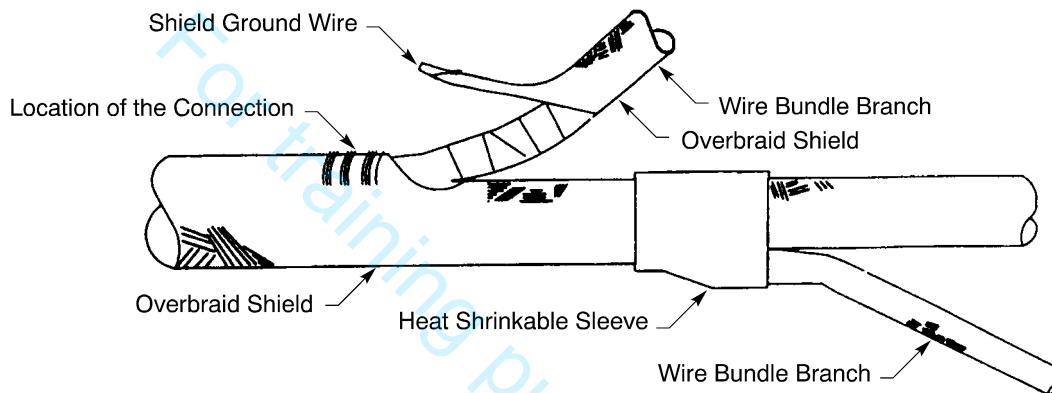
#### A. Overbraid Shield Installation

Refer to Paragraph 3.A. for the procedure to install the shield.

**NOTE:** When it is necessary to terminate the overbraid shield on a connector with a Sunbank S2408-XX-XX cable clamp, make sure that the ends of the expando sleeve and the TFE tape are:

- Under the clamp
- A minimum of 1/2 inch from the connector grommet.

#### B. Connection of Overbraid Shields with a Shield Ground Wire Soldered to the Shield



#### CONNECTION OF A BRANCH SHIELD TO THE WIRE BUNDLE SHIELD

Figure 13

**NOTE:** This procedure cannot be used for nickel coated overbraid shield. For nickel coated overbraid shield, refer to Paragraph 3.

- (1) Make a selection of the location on the overbraid shield of the wire bundle where the shield ground wire at the end of the overbraid shield of the wire bundle branch can be soldered.

Make sure that the distance from the end of the branch shield to the bundle shield is not greater than 0.25 inch.

**NOTE:** The assembly of the necessary number of wire bundle ties at the ends of adjacent shields can make the solder procedure easier.

- (2) At the location of the connection, put the end of the shield ground wire under 3 to 12 strands of the overbraid shield on the wire bundle. Refer to Figure 13.
- (3) Apply solder to the shield ground wire and the surface of the shield so that the length of the soldered area is:
  - At least equal to the diameter of the wire bundle
  - Not less than 0.25 inch.

- (4) Remove the length of the unwanted shield ground wire from the end of the soldered area.

- (5) Put a heat shrinkable sleeve over the soldered area. Refer to Figure 13.

**NOTE:** If it is necessary, the sleeve can be installed over the wire bundle ties from Step (1).

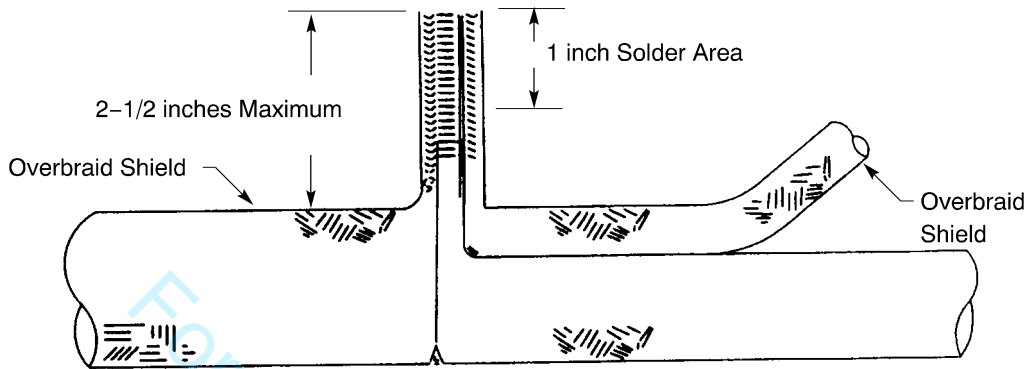
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### OVERBRAID SHIELDS ON WIRE BUNDLES

- (6) Shrink the sleeve into position. Refer to Subject 20-10-14.

#### C. Connection of Overbraid Shields with the Shield Ground Wires Soldered Together



#### CONNECTION OF A BRANCH SHIELD TO THE WIRE BUNDLE SHIELD

Figure 14

- (1) Make the shield ground wires of the adjacent overbraid shields flat.
- (2) Cut both of the shield ground wires so that the distance from the end of the wires to the shield on the wire bundle is 2-1/2 inches maximum.

Refer to Figure 14.

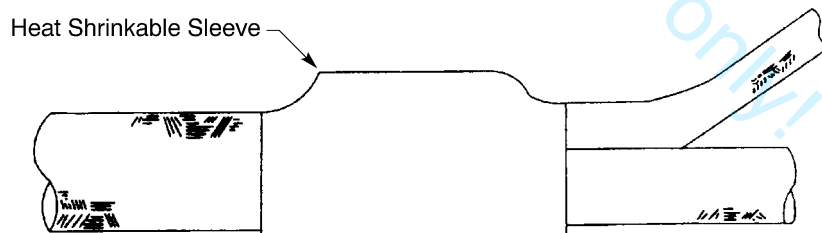
- (3) Solder the shield ground wires together.

Make sure that the solder is applied from the end of the wires to 1 inch from the ends.

- (4) Fold the soldered wires so that they are against the overbraid shield.

- (5) Put a heat shrinkable sleeve over the soldered area.

- (6) Shrink the sleeve into position. Refer to Figure 15 and Subject 20-10-14.



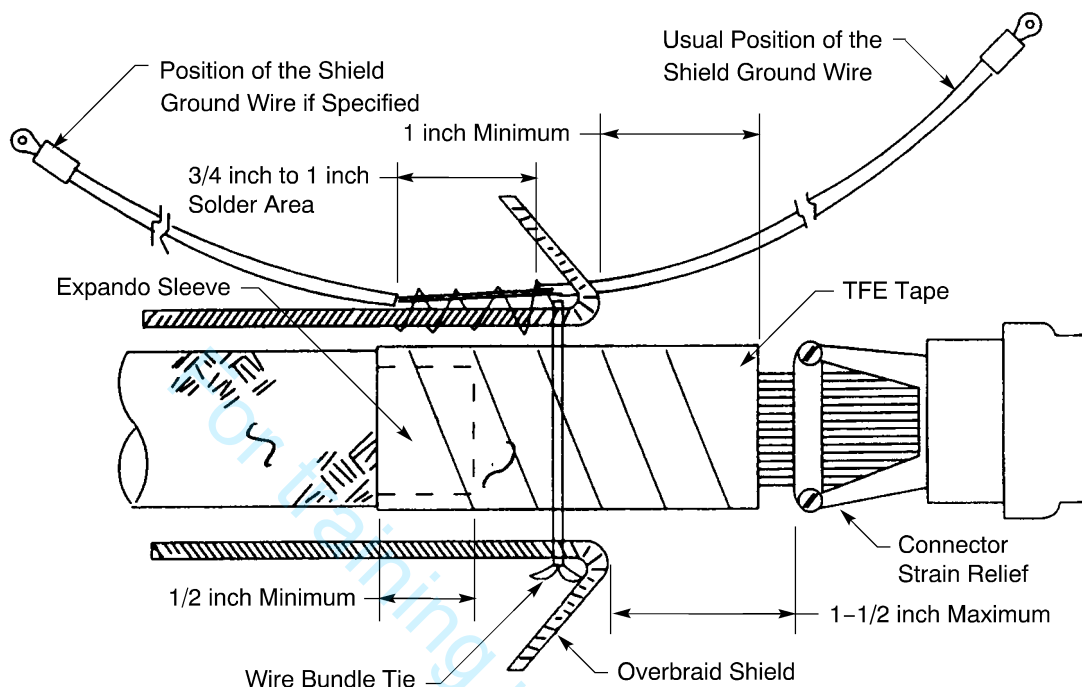
#### POSITION OF THE HEAT SHRINKABLE SLEEVE

Figure 15

# STANDARD WIRING PRACTICES MANUAL

## OVERBRAID SHIELDS ON WIRE BUNDLES

### D. Overbraid Shield Termination



### OVERBRAID SHIELD TERMINATION AT THE CONNECTOR STRAIN RELIEF

Figure 16

- (1) Prepare the shield ground wire:
  - (a) Make a selection of a shield ground wire. Refer to Subject 20-10-15.
  - (b) Cut a length of the wire so that it is a maximum of:
    - 2.0 inches for termination at a connector strain relief
    - 6 inches for other terminations.
  - (c) Assemble one of these terminals on end of the shield ground wire:
    - A general purpose terminal
    - A high temperature terminal.
 Refer to Subject 20-30-11.
  - (d) Remove 3/4 inch to 1 inch of insulation from the other end of the wire.
- (2) Prepare the overbraid shield. Refer Figure 16.
  - (a) Fold the shield back so that the distance from the location where the shield is folded to:
    - The end of the shield is, at the minimum, equal to the diameter of the wire bundle
    - The end of the TFE tape is 1-1/2 inches maximum.

**NOTE:** A white wire bundle tie can be assembled to hold the shield in position so it can be folded back.

- (b) Make a small hole in the shield at the location where the shield is folded.
- (3) Put the end of the shield ground wire without any solder through the hold in the shield.

## STANDARD WIRING PRACTICES MANUAL

### OVERBRAID SHIELDS ON WIRE BUNDLES

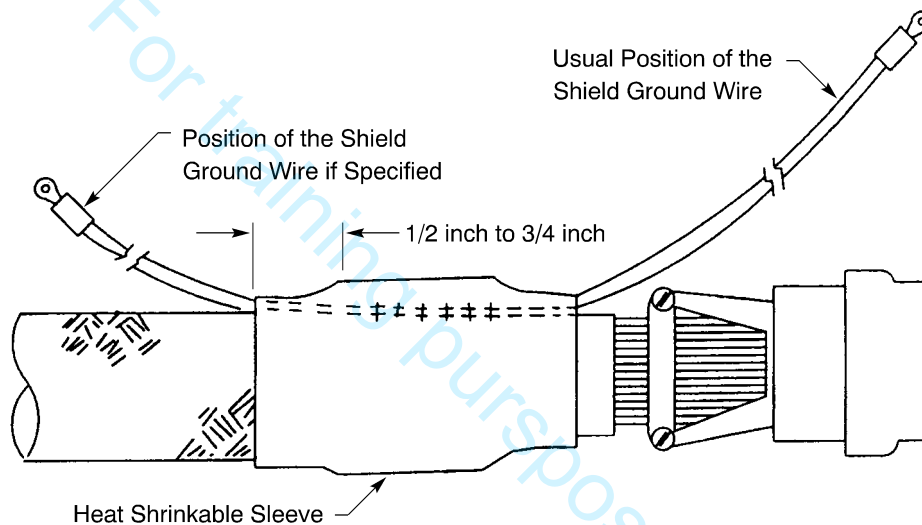
- (4) At the location for the connection of the shield ground wire to the shield, put the end of the wire under 3 to 6 strands of the overbraid shield on the wire bundle.

Refer to Figure 16.

- (5) Apply solder to the shield ground wire and the surface of the shield so that all of the strands of the shield that touch the shield ground wire are soldered.
- (6) Put the necessary length of a heat shrinkable sleeve on the connection of the shield ground wire and the overbraid shield so that the sleeve is over the free end of the shield. Refer to Figure 17.

Make sure that the rearward end of the sleeve is is 1/2 inch minimum beyond either of these locations:

- The rearward end of the shield
- The rearward end of the soldered area.



**POSITION OF THE HEAT SHRINKABLE SLEEVE**

**Figure 17**

## 5. ASSEMBLY OF A SHIELD GROUND WIRE WITH SHIELDED WIRE

**NOTE:** Shield ground wires that are assembled with shielded wire are only necessary when the specified length of the shield ground wire is greater than 6 inches.

### A. General Conditions

When a ground wire that is assembled with a shielded wire terminates the shield at a dual termination ground, the unshielded distance between the end of the shield and the end of the ground wire terminal must be:

- 3 inches minimum
- 3-1/2 inches maximum.

# STANDARD WIRING PRACTICES MANUAL

## OVERBRAID SHIELDS ON WIRE BUNDLES

### B. Shield Ground Wire Assembly

Table 3  
SHIELDED WIRE TYPES

Wire Specification	Type
BMS 13-31	III
	VII
BMS 13-51	IX
	XV
	XXX

Table 4  
SHIELD CAU OF SHIELDED WIRE OR CABLE

Wire			Shield Size (CAU)
Size (AWG)	Specification	Class	
22	BMS 13-51	1	6
		2	11
		3	12
20	BMS 13-31	1	9
		2	18
		3	19
	BMS 13-51	1	7
		2	13
		3	14
18	BMS 13-31	1	10
		2	20
		3	22
	BMS 13-51	1	8
		2	15
		3	16
16	BMS 13-31	1	10
		2	22
		3	24
	BMS 13-51	1	8
		2	16
		3	18

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# STANDARD WIRING PRACTICES MANUAL

## OVERBRAID SHIELDS ON WIRE BUNDLES

Table 4 (continued)

Wire			Shield Size (CAU)
Size (AWG)	Specification	Class	
14	BMS 13-31	1	13
		2	25
		3	27
12	BMS 13-31	1	14
		2	28
		3	31

Table 5  
CAU OF CONDUCTOR SIZES

Wire Size (AWG)	Conductor Size (CAU)
22	8
20	12
18	19
16	24
14	38
12	59

- (1) Make a selection of a shielded wire or cable for the shield ground wire from Table 3 and Table 4.
- (2) Find the total CAU of the wire or wires and the shield.
 

**NOTE:** CAU is Circular Area Units. Refer to Subject 20-30-22.

  - (a) Find the CAU of the shield in Table 4.
  - (b) Find the CAU of the conductor in Table 5.
  - (c) Add the CAU of the conductor multiplied by the number of conductors to the CAU of the shield.
- (3) With the total CAU, make a selection of a terminal. Refer to Subject 20-30-11.
- (4) Prepare the shielded wire for the assembly of the terminal:
  - (a) Remove the necessary length of the outer insulation of the wire or cable plus:
    - 1/8 inch more for a cable with 1 conductor
    - 1 inch to 1-1/4 inches more for a cable with more than 1 conductor.

Refer to Subject 20-30-11 for the necessary length.

- (b) Fold the shield back over the outer insulation.
- (c) Remove the necessary length of the inner insulation from the each conductor. Refer to Subject 20-30-11.
- (d) Fold the shield back over the conductor or conductors.

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## STANDARD WIRING PRACTICES MANUAL

### OVERBRAID SHIELDS ON WIRE BUNDLES

- (e) For cables with more than 1 conductor, install a 1-1/2 inch to 1-3/4 inch length of heat shrinkable sleeve on the cable.

Refer to Subject 20-10-11.

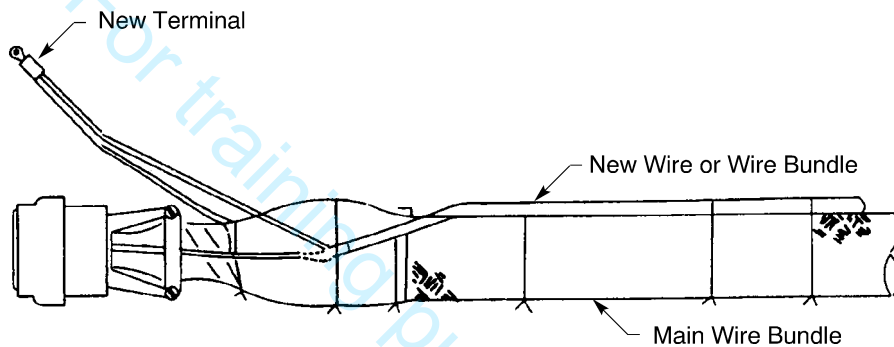
- (5) Assemble the terminal. Refer to Subject 20-30-11.

**NOTE:** If the insulation build-up of the wire combination is too large for the terminal, one of the conductors may be doubled back.

#### 6. MODIFICATION OF A WIRE BUNDLE WITH AN OVERBRAID SHIELD

This paragraph gives the procedure to add a wire or wires to a wire bundle when it is not possible to open the overbraid shield.

##### A. Installation of a New Wire



#### INSTALLATION OF A NEW WIRE OR WIRE BUNDLE

Figure 18

- (1) Install the overbraid shield on the new wire as if it were a different wire bundle. Refer to Paragraph 3. for nickel or tin coated over braid shield or Paragraph 4. for tin coated overbraid shield.

**NOTE:** TFE tape wrap can be used as the alternative to a heat shrinkable sleeve at the branches or shield terminations. Make sure to assemble wire bundle ties to hold the ends of tape.

- (2) Align the locations of termination of the new bundle with the terminations of the main wire bundle. Refer to Figure 18.

**NOTE:** It is not necessary to assemble wire bundle ties on tape or sleeves of the new bundle.

- (3) Terminate the shield ground wire of the new bundle in the same terminal as the main bundle:
  - (a) Remove the terminal from the shield ground wire of the main bundle.
  - (b) Assemble a new terminal on the shield ground wires of the new bundle and the main bundle. Refer to Paragraph 3. for nickel or tin coated overbraid shield or Paragraph 4. for tin coated overbraid shield.

- (4) Remove the wire bundle ties from the overbraid shield of the main bundle that is adjacent to the shield of the new bundle.

**NOTE:** Do not remove ties that hold the TFE tape or heat shrinkable sleeve over a soldered area.

- (5) Assemble new wire bundle ties every 4 inches to hold the new bundle to the main bundle. Refer to Figure 18.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

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## 20-25-12 CONTENTS

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

This Subject gives the procedures to assemble strain relief backshells that terminate shields with shield ground wires and terminal lugs. For the procedures to assemble other strain relief backshells, refer to:

- Subject 20-60-09 for the assembly of backshells that do not terminate a shield
- Subject 20-25-13 for the assembly of backshells that terminate shields with inner and outer ground rings
- Subject 20-25-14 for the assembly of backshells that terminate shields with a shield terminator band
- Subject 20-25-15 for the assembly of backshells that have a braided shield sock.

#### 1. PART NUMBERS AND DESCRIPTION

##### A. Backshell Part Numbers

**Table 1**  
**BACKSHELL PART NUMBERS**

Part Number	Configuration	Description	Supplier
620AA028Z1-()	90 Degree	Anti-Rotation Teeth, Stainless Steel	Glenair
620AS048ZM-()	90 Degree	Anti-Rotation Teeth, Stainless Steel	Glenair
620HA048ZM-()	90 Degree	Anti-Rotation Teeth, Stainless Steel	Glenair
AS85049-38S()	Straight	Anti-Rotation Teeth, Aluminum	QPL
BACC10HD	Straight	Stainless Steel	Boeing
BACC10HE	90 Degree	Stainless Steel	Boeing
BACC10HF	Straight	Aluminum	Boeing
BACC10HG	90 Degree	Aluminum	Boeing
BACC10JV()A	Straight	Ground Spring, Aluminum	Boeing
BACC10JV()S	Straight	Ground Spring, Stainless Steel	Boeing
BACC10JW()A	90 Degree	Ground Spring, Aluminum	Boeing
BACC10JW()S	90 Degree	Ground Spring, Stainless Steel	Boeing
BACC10KA	Straight	Anti-Rotation Teeth, Stainless Steel	Boeing
BACC10KB	90 Degree	Anti-Rotation Teeth, Stainless Steel	Boeing
BACC10KC	45 Degree	Anti-Rotation Teeth, Stainless Steel	Boeing
BACC10KD	Straight	Anti-Rotation Teeth, Aluminum	Boeing
BACC10KE	90 Degree	Anti-Rotation Teeth, Aluminum	Boeing
BACC10KF	45 Degree	Anti-Rotation Teeth, Aluminum	Boeing
G8993-()	Straight	Anti-Rotation Teeth, Aluminum	Glenair
G8993M()	Straight	Anti-Rotation Teeth, Aluminum	Glenair
G8994-()	90 Degree	Anti-Rotation Teeth, Aluminum	Glenair
G8994M()	90 Degree	Anti-Rotation Teeth, Aluminum	Glenair
M85049-38S()	Straight	Anti-Rotation Teeth, Aluminum	QPL
S1347-()	90 Degree	Aluminum	Sunbank
S2277-()	45 Degree	Aluminum	Sunbank

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

Table 1 (continued)

Part Number	Configuration	Description	Supplier
S2408-()	Straight	Aluminum	Sunbank

Table 2

#### APPROVED SUPPLIERS OF BOEING STANDARD BACKSHELL PART NUMBERS

Backshell	Supplier
BACC10HD	Glenair
	Electro Adapter
	Sunbank
BACC10HE	Electro Adapter
	Glenair
	Sunbank
BACC10HF	Electro Adapter
	Glenair
	Sunbank
BACC10HG	Electro Adapter
	Glenair
	Sunbank
BACC10JV()A	Glenair
BACC10JV()S	Glenair
BACC10JW()A	Glenair
BACC10JW()S	Glenair
BACC10KA	Glenair
	Sunbank
BACC10KB	Glenair
	Sunbank
BACC10KC	Glenair
	Sunbank
BACC10KD	Glenair
	Sunbank
BACC10KE	Glenair
	Sunbank

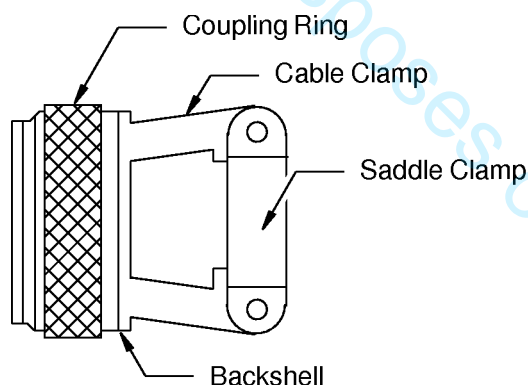
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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

Table 3  
ALTERNATIVE STRAIN RELIEF BACKSHELLS

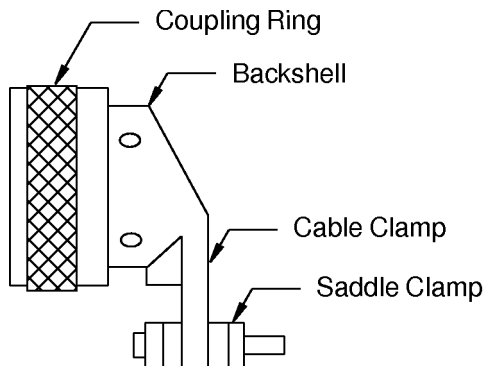
Specified Backshell		Alternative Backshell	
Part Number	Supplier	Part Number	Supplier
BACC10HD	Boeing	BACC10HD()A	Boeing
		BACC10KA	Boeing
BACC10HE	Boeing	BACC10HE()A	Boeing
		BACC10KB	Boeing
BACC10HF	Boeing	BACC10KD	Boeing
BACC10HG	Boeing	BACC10HG()A	Boeing
		BACC10KE	Boeing
M85049/38S	QPL	AS85049/38S	QPL
G8993M()	Glenair	BACC10HF()A	Boeing
		G8993-()	Glenair
G8993M()NF	Glenair	BACC10HF()C	Boeing
G8994M()	Glenair	BACC10HG()A	Boeing
		G8993-()	Glenair
G8994M()NF	Boeing	BACC10HG()C	Boeing



STRAIGHT STRAIN RELIEF BACKSHELL  
Figure 1

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS



**90 DEGREE STRAIN RELIEF BACKSHELL**

**Figure 2**

#### B. Spacer Part Numbers

**Table 4  
SPACER PART NUMBERS**

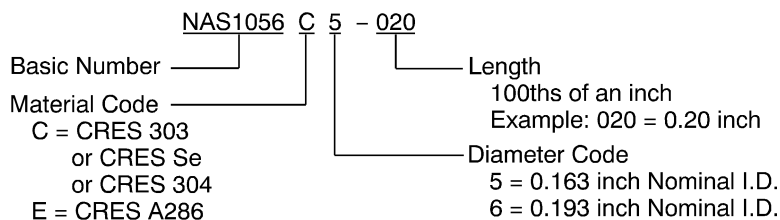
Connector Shell Size		Spacer		Reference
Minimum	Maximum	Part Number	Supplier	
8	16	NAS1056C5-()	QPL	Figure 3
		NAS1056C6-()	QPL	Figure 3
		NAS1057T1-()	QPL	Figure 4
		NAS1057W1-()	QPL	Figure 4
		NAS43DD1-()	QPL	Figure 5
18	28	NAS1056E5-()	QPL	Figure 3
		NAS1056E6-()	QPL	Figure 3
		NAS1057T3-()	QPL	Figure 4
		NAS1057W3-()	QPL	Figure 4
		NAS43DD3-()	QPL	Figure 5
36	36	BACS13S297B	Boeing	-

**Table 5  
APPROVED SUPPLIERS OF BOEING STANDARD SPACERS**

Spacer	Supplier
BACS13S	Thomas & Betts

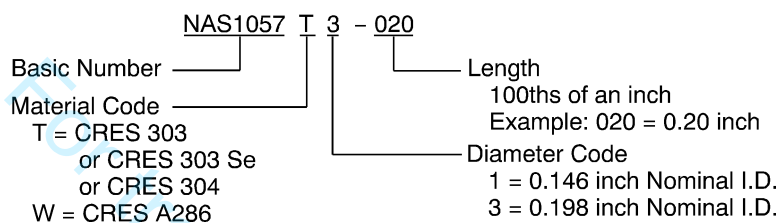
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS



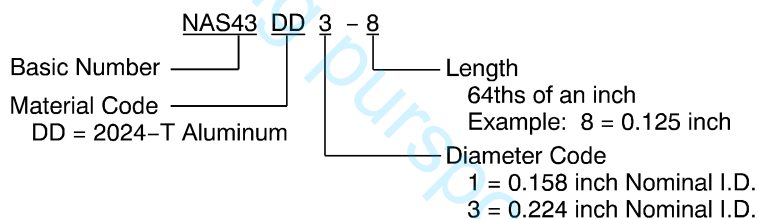
#### NAS1056 SPACER PART NUMBER STRUCTURE

Figure 3



#### NAS1057 SPACER PART NUMBER STRUCTURE

Figure 4



#### NAS43 SPACER PART NUMBER STRUCTURE

Figure 5

## 2. NECESSARY TOOLS

### A. Connector Backshell Tools

Table 6  
CONNECTOR BACKSHELL TOOLS

Backshell Tool	Part Number	Supplier
Strap Wrench	AT508K	Aircraft Tools
	ST2596G	Boeing
	ST2596C	Boeing
	TG-70	Glenair
Torque Driver	-	Available source
Torque Wrench	-	Available source

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

#### 3. BACKSHELL DISASSEMBLY

##### A. Backshell Disassembly

- (1) If the backshell has safety wire, remove the safety wire from the cable clamp screws and the backshell coupling ring.
- (2) Remove the strain relief clamp screws.
- (3) Put the saddle bars, the screws, and the washers in a safe place.
- (4) Make a selection of a strap wrench from Table 6.
- (5) Disengage the threads of the backshell and the connector.

#### 4. BACKSHELL ASSEMBLY

For the procedure to assemble a backshell without a shield ground wire termination, refer to Subject 20-60-09.

##### A. General Data

**Table 7**  
**BACKSHELL INSTALLATION TORQUE VALUES**

Shell Size	Torque Wrench		Torque Value (inch-pounds)			
	Position (degree)	Reference	Aluminum Backshell		Stainless Steel Backshell	
			Minimum	Maximum	Minimum	Maximum
08	0	Figure 6	35	40	85	90
	45	Figure 7	35	40	85	90
	90	Figure 8	40	45	100	105
09	0	Figure 6	35	40	85	90
	45	Figure 7	35	40	85	90
	90	Figure 8	40	45	100	105
10	0	Figure 6	40	45	85	90
	45	Figure 7	40	45	85	90
	90	Figure 8	45	50	100	105
11	0	Figure 6	40	45	85	90
	45	Figure 7	40	45	85	90
	90	Figure 8	45	50	100	105
12	0	Figure 6	55	60	85	90
	45	Figure 7	55	60	85	90
	90	Figure 8	60	65	100	105
13	0	Figure 6	55	60	85	90
	45	Figure 7	55	60	85	90
	90	Figure 8	60	65	100	105

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

Table 7 (continued)

Shell Size	Torque Wrench		Torque Value (inch-pounds)			
	Position (degree)	Reference	Aluminum Backshell		Stainless Steel Backshell	
			Minimum	Maximum	Minimum	Maximum
14	0	Figure 6	65	70	120	125
	45	Figure 7	65	70	120	125
	90	Figure 8	75	80	140	145
15	0	Figure 6	65	70	120	125
	45	Figure 7	65	70	120	125
	90	Figure 8	75	80	140	145
16	0	Figure 6	75	80	120	125
	45	Figure 7	75	80	120	125
	90	Figure 8	90	95	140	145
17	0	Figure 6	75	80	120	125
	45	Figure 7	75	80	120	125
	90	Figure 8	90	95	140	145
18	0	Figure 6	95	100	140	145
	45	Figure 7	95	100	140	145
	90	Figure 8	115	120	160	165
19	0	Figure 6	95	100	140	145
	45	Figure 7	95	100	140	145
	90	Figure 8	115	120	160	165
20	0	Figure 6	105	110	165	170
	45	Figure 7	105	110	165	170
	90	Figure 8	125	130	190	195
21	0	Figure 6	105	110	165	170
	45	Figure 7	105	110	165	170
	90	Figure 8	125	130	190	195
22	0	Figure 6	105	110	165	170
	45	Figure 7	105	110	165	170
	90	Figure 8	125	130	190	195
23	0	Figure 6	105	110	165	170
	45	Figure 7	105	110	165	170
	90	Figure 8	125	130	190	195

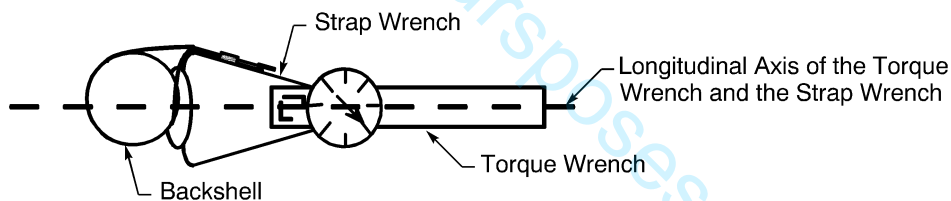
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# STANDARD WIRING PRACTICES MANUAL

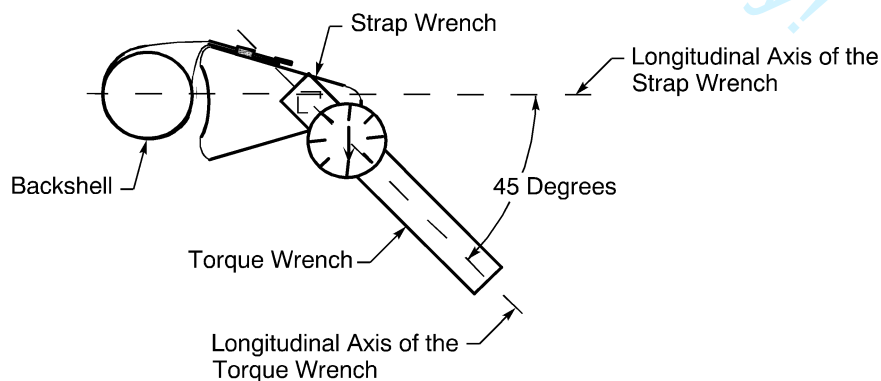
## ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

Table 7 (continued)

Shell Size	Torque Wrench		Torque Value (inch-pounds)			
	Position (degree)	Reference	Aluminum Backshell		Stainless Steel Backshell	
			Minimum	Maximum	Minimum	Maximum
24	0	Figure 6	105	110	165	170
	45	Figure 7	105	110	165	170
	90	Figure 8	125	130	190	195
25	0	Figure 6	105	110	165	170
	45	Figure 7	105	110	165	170
	90	Figure 8	125	130	190	195
28	0	Figure 6	110	115	165	170
	45	Figure 7	110	115	165	170
	90	Figure 8	130	135	190	195
32	0	Figure 6	120	125	170	175
	45	Figure 7	120	125	170	175
	90	Figure 8	140	145	190	195



**TORQUE WRENCH IN THE 0 DEGREE POSITION**  
Figure 6

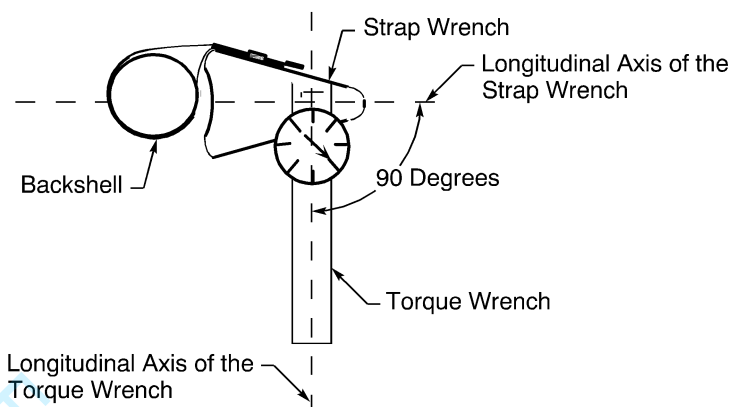


**TORQUE WRENCH IN THE 45 DEGREE POSITION**  
Figure 7

**20-25-12**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS



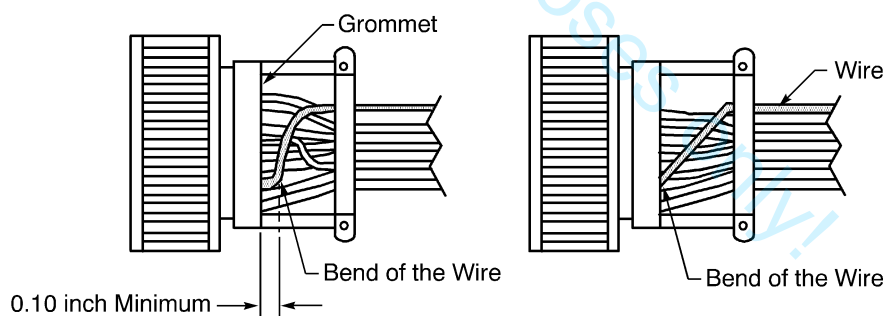
**TORQUE WRENCH IN THE 90 DEGREE POSITION**

**Figure 8**

#### B. Applicable Conditions for Backshell Assembly

These conditions are applicable for a wire harness in a backshell with a cable clamp:

- Strain must not be put on the wires
- The wires must not have tension that pulls the seal webs of the grommet out of their shape
- The crimp barrel of a contact cannot be seen in the rear grommet of an environmental connector
- When a wire makes an exit from the rear of the connector grommet at an angle that is less than 60 degrees, the distance from the rear of the grommet to the bend must be 0.10 inch minimum
- Safety wire must be installed on the coupling ring of the backshell if the applicable conditions occur; refer to Subject 20-60-07.



**SATISFACTORY BEND**

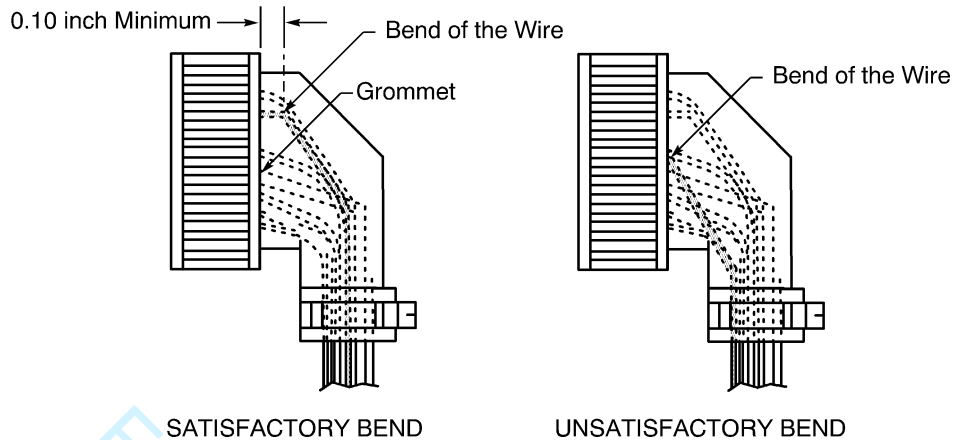
**UNSATISFACTORY BEND**

**BEND OF THE WIRE IN A STRAIGHT BACKSHELL**

**Figure 9**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS



**BEND OF THE WIRE IN A 90 DEGREE BACKSHELL**

**Figure 10**

#### C. Applicable Conditions for Strain Relief Assembly

These conditions are applicable for the assembly of the strain relief:

- The wires must not go across each other in the cable clamp
- The wire harness must have a minimum of two layers of tape for protection
- The tape must not be between the saddle bar and the backshell leg
- The wire harness must be held tightly in the cable clamp
- The cable clamp must not crush the wire harness
- The cable clamp screws must be tight.

The diameter of a wire harness must be increased when these conditions occur:

- The cable clamp does not hold the wire harness tightly
- The wire harness has a small number of wires
- The contact assemblies are installed only near the outer edge of the connector grommet

These conditions are applicable for the layers of tape:

- The forward and rear edges of the tape must extend a minimum of 0.06 inch farther than the edges of the saddle bar
- The edge of one layer is a maximum of 0.05 inch from the edge of a different layer
- For U shaped tape, each layer makes a 100 percent overlap.

Spacers must be installed between the saddle bar and the backshell leg when these conditions occur:

- The diameter of the wire harness is much larger than the diameter of the clamp
- The clamp crushes the wire harness before the screws are fully tightened.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

#### D. Necessary Materials

**Table 8**  
**NECESSARY MATERIALS**

Material	Temperature Grade	Description	Part Number or Specification	Supplier
Filler Rod	C	Silicone	69B47691-()	Boeing
			BMS1-52	Boeing
	D	PTFE	AMS 3656	QPL
Tape	D	Silicone	912-10X12	Arlon
			Scotch 70	3M
		PTFE	P-212HD	Permaceal
			P-421	Permaceal
			P-440	Permaceal
Tape, U Shaped	C	Silicone, 0.5 inch width	10-62034-1	Boeing
		Silicone, 0.4 inch width	10-62034-2	Boeing

#### E. Assembly of the Terminal Lug on the Shield Ground Wire

**Table 9**  
**EQUIVALENT STUD SIZE**

Screw Diameter (inch)	Equivalent Stud Size
0.1120	4
0.1380	6
0.1640	8

**Table 10**  
**RECOMMENDED TERMINAL LUGS**

Maximum Temperature Grade	Boeing Standard Terminal Lug
B	BACT12AC()
D	BACT12M()

- (1) Measure the diameter of the cable clamp screw.
- (2) Find the equivalent size of the stud for the terminal lug. Refer to Table 9.
- (3) Make a selection of a terminal lug. Refer to Table 10 and Subject 20-30-11.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

Make sure that:

- The type of terminal lug is applicable for the type of the shield ground wire
- The type of the terminal lug is applicable for the location of the installation of the connector
- The stud size hole of the terminal lug is applicable for the cable clamp screw.

(4) Assemble the terminal lug. Refer to Subject 20-30-11.

#### F. Backshell Assembly

(1) Make a selection of a strap wrench from Table 6.

(2) Put the necessary backshell components on the wire harness.

Make sure that the cable clamp of the backshell is pointed away from the end of the wire harness.

(3) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.

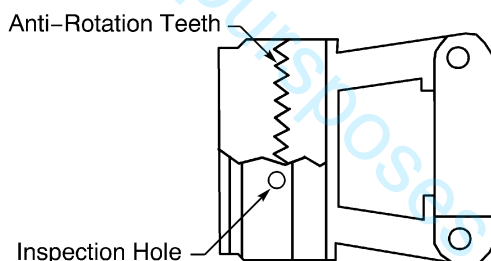
(4) Put the wires into their positions.

Make sure that:

- The wires do not go across each other
- The wires do not have tension that pulls the seal web out of its shape
- Strain is not put on the wires.

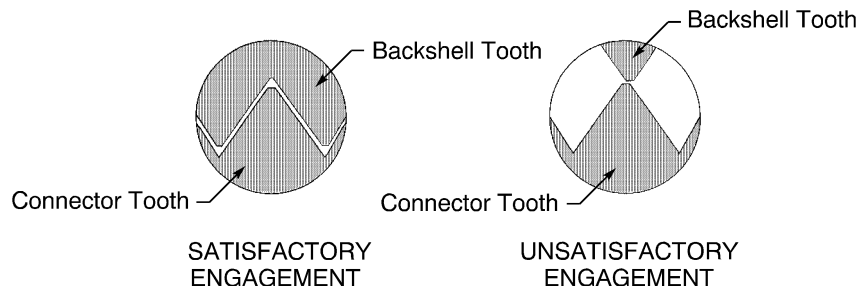
(5) If the backshell has anti-rotation teeth, examine the teeth of the backshell through the inspection hole. Refer to Figure 11.

Make sure that the backshell teeth are engaged with the connector teeth. Refer to Figure 12.



**BACKSHELL WITH ANTI-ROTATION TEETH**

**Figure 11**



**ENGAGEMENT OF THE CONNECTOR TEETH AND THE BACKSHELL TEETH**

**Figure 12**

(6) Tighten the backshell on the connector with the strap wrench.

**20-25-12**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

Make sure that:

- The backshell does not make more than 1/8 turn with the strap wrench
- The backshell is in the correct clock position.

**CAUTION:** DO NOT TIGHTEN THE BACKSHELL MORE THAN NECESSARY. DAMAGE TO THE BACKSHELL CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CONNECTOR OR THE BACKSHELL.

- (7) If the backshell has set screws, tighten one of the set screws.
- (8) Try to loosen the backshell manually.

**NOTE:** The backshell is installed correctly when the backshell does not move in relation to the connector.

- (9) If the backshell is loose, do Step (6) through Step (8) again.
- (10) Assemble the strain relief.

Refer to:

- Paragraph 4.G. for the assembly of the strain relief of a straight backshell
- Paragraph 4.H. for assembly of the strain relief of a 45 degree or a 90 degree backshell.

#### G. Strain Relief Assembly - Straight Backshell

**Table 11**  
**CABLE CLAMP SCREW TORQUE VALUES**

Screw Size	Torque (inch-pounds)	
	Minimum	Maximum
4	10	12
6	15	23
8	25	30

- (1) Make a selection of a torque driver from Table 6.
- (2) Make a selection of a tape from Table 8.

Make sure that the tape is a minimum of 0.12 inch wider than the saddle bar.

**NOTE:** An equivalent tape is a satisfactory alternative. Refer to Subject 20-00-11.

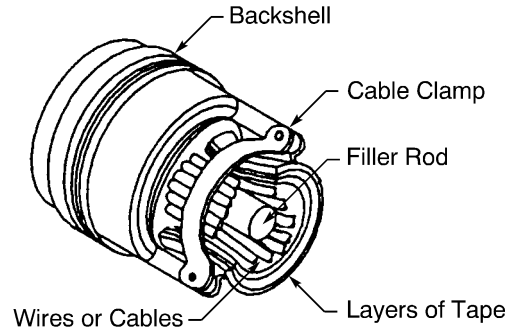
**NOTE:** A thicker tape is recommended when the difference between the initial diameter of the wire harness and the inner diameter of the strain relief is large.

- (3) Align the screw holes in a saddle bar with the screw holes in the legs of the backshell.
- (4) Make a mark on the wire harness at the center of the width of the saddle bar.
- (5) If the assembled contacts are installed only near the outer edge of the connector grommet:
  - (a) Make a selection of a filler rod from Table 8.
  - (b) Put the filler rod in the center of the group of wires where the saddle bars go across the wire harness. Refer to Figure 13.

# 20-25-12

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

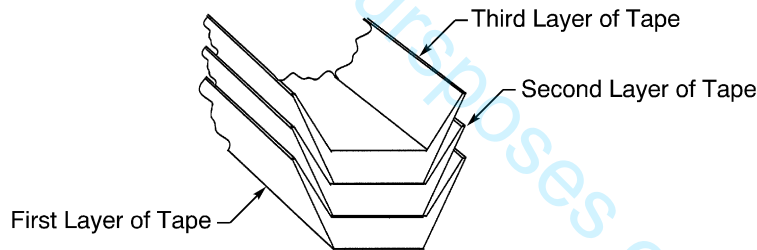


**POSITION OF THE FILLER ROD**  
**Figure 13**

- (6) Put a minimum of two layers of tape on the wires or cables at the location of the mark.

Make sure that:

- The outer diameter of the wire harness with the layers of tape is larger than the inner diameter of the strain relief
- The center of the layers of tape is aligned with the center of the saddle bar
- The edge of the tape extends a minimum of 0.06 inch farther than each edge of the saddle bar
- The edge of one layer of the tape is a maximum of 0.05 inch from the edge of a different layer of tape
- For U shaped tape, each layer of tape makes a 100 percent overlap.

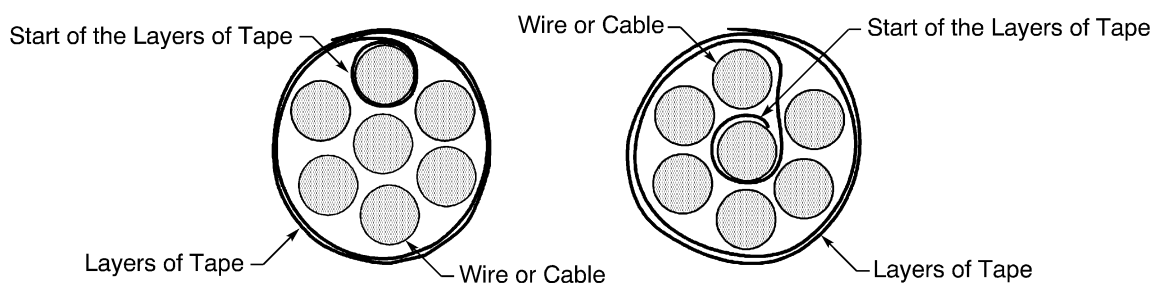


**CONFIGURATION OF THE LAYERS OF U SHAPED TAPE**  
**Figure 14**

- (a) Wind the tape around one wire to hold it in its position. Refer to Figure 15.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS



FIRST CONFIGURATION

SECOND CONFIGURATION

#### CONFIGURATIONS OF THE LAYERS OF TAPE

Figure 15

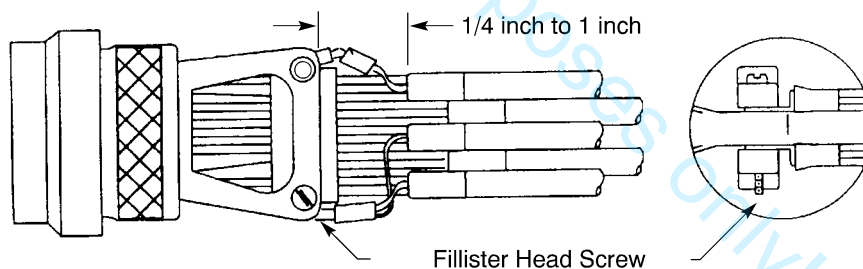
- (b) Continue to wind the tape around the wire harness until the tape is fully installed.
- (7) If spacers are necessary, specified, or installed on the initial backshell assembly, make a selection of a spacer from Table 4.

Make sure that the spacer is the smallest that can make a tight fit of the wire harness in the strain relief.

**NOTE:** A minimum of two spacers are necessary, one for each screw.

**NOTE:** The initial spacers can be installed again if they do not have damage.

- (8) If lockwashers are supplied, put a lockwasher on each screw.
- (9) If 1 to 4 terminal lugs must be installed, put each terminal lug in its position. Refer to Figure 16.



#### CABLE CLAMP CONFIGURATION WITH 1 TO 4 TERMINAL LUGS

Figure 16

- (a) Put a screw through a hole in a saddle bar.
- (b) Put a terminal lug on the screw.
- (c) If spacers are necessary, put a spacer on the screw.
- (d) Put the saddle bar with the screw against the backshell legs.
- (e) Put the screw through the hole in the backshell leg.

From the rear of the backshell, make sure that the head of the screw on the right is pointed up and the head on the screw on the left is pointed down.

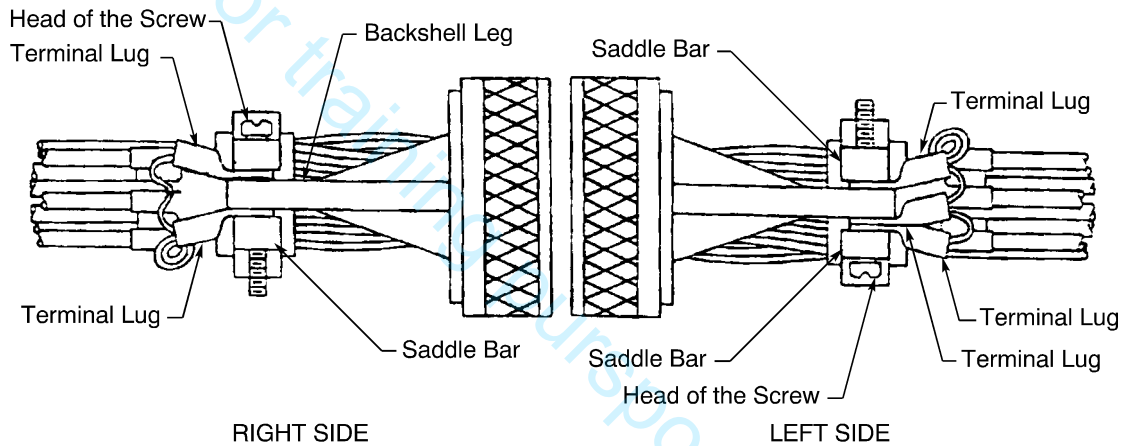
- (f) If the wire harness has more terminal lugs, put a terminal lug on the screw.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

- (g) Put the other saddle bar against the backshell legs.
- (h) Engage the threads of the screw and the threads of the nut.
- (i) Put a screw through the empty hole in the saddle bar.  
From the rear of the backshell, make sure that the head of the screw on the right is pointed up and the head on the screw on the left is pointed down.
- (j) If the wire harness has more terminal lugs, put a terminal lug on the screw.
- (k) Push the screw through the hole in the backshell leg.
- (l) If the wire harness has more terminal lugs, put a terminal lug on the screw.
- (m) If spacers are necessary, put a spacer on the screw.
- (n) Engage the threads of the screw and the threads of the nut.
- (10) If 5 terminal lugs must be installed, put each terminal lug in its position. Refer to Figure 17.



**CABLE CLAMP CONFIGURATION WITH 5 TERMINAL LUGS**

**Figure 17**

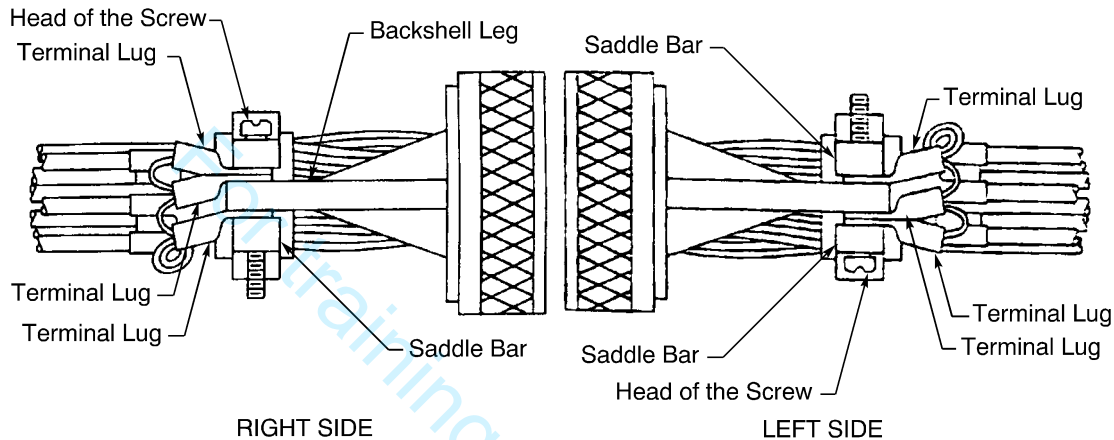
- (a) Put a screw through a hole in a saddle bar.
- (b) Put a terminal lug on the screw.
- (c) Put a different terminal lug on the screw.
- (d) If spacers are necessary, put a spacer on the screw.
- (e) Put the saddle bar with the screw against the backshell legs.
- (f) Put the screw through the hole in the backshell leg.  
From the rear of the backshell, make sure that the head of the screw on the right is pointed up and the head on the screw on the left is pointed down.
- (g) Put a terminal lug on the screw.
- (h) Put the other saddle bar against the backshell legs.
- (i) Engage the threads of the screw and the threads of the nut.
- (j) Put a screw through the empty hole in the saddle bar.  
From the rear of the backshell, make sure that the head of the screw on the right is pointed up and the head on the screw on the left is pointed down.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

- (k) Put a terminal lug on the screw.
  - (l) Put the screw through the hole in the backshell leg.
  - (m) If spacers are necessary, put a spacer on the screw.
  - (n) Put the remaining terminal lug on the screw.
  - (o) Engage the threads of the screw and the threads of the nut.
- (11) If the 6 terminal lugs must be installed, put each terminal lug in its position. Refer to Figure 18.



**CABLE CLAMP CONFIGURATION WITH 6 TERMINAL LUGS**

**Figure 18**

- (a) Put a screw through a hole in a saddle bar.
- (b) Put a terminal lug on the screw.
- (c) Put a different terminal lug on the screw.
- (d) If spacers are necessary, put a spacer on the screw.
- (e) Put the saddle bar with the screw against the backshell legs.
- (f) Put the screw through the hole in the backshell leg.  
From the rear of the backshell, make sure that the head of the screw on the right is pointed up and the head on the screw on the left is pointed down.
- (g) Put a terminal lug on the screw.
- (h) Put the other saddle bar against the backshell legs.
- (i) Engage the threads of the screw and the threads of the nut.
- (j) Put a screw through the empty hole in the saddle bar.  
From the rear of the backshell, make sure that the head of the screw on the right is pointed up and the head on the screw on the left is pointed down.
- (k) Put a terminal lug on the screw.
- (l) Put a different terminal lug on the screw.
- (m) Put the screw through the hole in the backshell leg.
- (n) If spacers are necessary, put a spacer on the screw.
- (o) Put the remaining terminal lug on the screw.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

- (p) Engage the threads of the screw and the threads of the nut.
- (12) Tighten the cable clamp screws.
- Make sure that:
- The cable clamp does not crush or pinch the wire harness
  - If the saddle bar and the backshell leg do not touch, the distance between the saddle bar and the backshell leg is approximately equal on each side of the cable clamp
  - The layers of tape are not pinched between the saddle bars and the backshell leg
  - The screws do not cause an interference with a wire harness or a component.

**NOTE:** It is not necessary for the saddle bars to touch the legs of the backshell.

- (13) If the wire harness is not held tightly:
- Remove the cable clamp screws.
  - Wind two layers of tape on the wire harness on the existing layers of tape.
  - Do Step (9), Step (10), or Step (11) again.
  - Do Step (12) again.
- (14) Torque the screws to the specified value in Table 11.

Make sure that:

- The saddle bars are tight against the shield ground wire terminal lug
- The shield ground wire terminal lug is tight against the backshell leg
- The clamp does not crush or pinch the wire harness
- The layers of tape are not pinched between the saddle bars and the backshell leg
- The screws do not cause an interference with a wire harness or a component.

#### H. Strain Relief Assembly - 45 Degree or 90 Degree Backshell

**Table 12**  
**CABLE CLAMP SCREW TORQUE VALUES**

Screw Size	Torque (inch-pounds)	
	Minimum	Maximum
4	10	12
6	15	23
8	25	30

**Table 13**  
**FLAT WASHER PART NUMBERS**

Part Number	Supplier
NAS620()	Available source

- Make a selection of a torque driver from Table 6.
- Make a selection of a tape from Table 8.

## STANDARD WIRING PRACTICES MANUAL

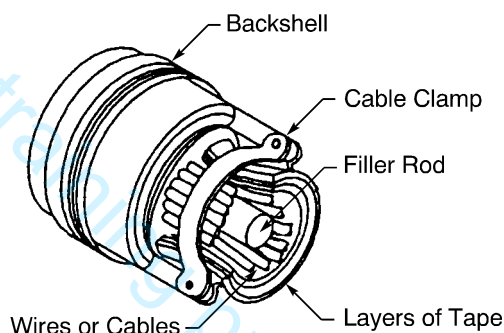
### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

Make sure that the tape is a minimum of 0.12 inch wider than the saddle bar.

**NOTE:** An equivalent tape is a satisfactory alternative. Refer to Subject 20-00-11.

**NOTE:** A thicker tape is recommended when the difference between the initial diameter of the wire harness and the inner diameter of the strain relief is large.

- (3) Align the screw holes in a saddle bar with the screw holes in the legs of the backshell.
- (4) Make a mark on the wire harness at the center of the width of the saddle bar.
- (5) If the assembled contacts are installed only near the outer edge of the connector grommet:
  - (a) Make a selection of a filler rod from Table 8.
  - (b) Put the filler rod in the center of the group of wires where the saddle bar goes across the wire harness. Refer to Figure 19.



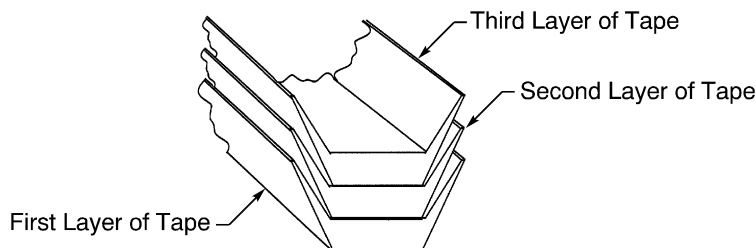
**POSITION OF THE FILLER ROD**

**Figure 19**

- (6) Put a minimum of two layers of tape on the wires or cables at the location of the mark.

Make sure that:

- The outer diameter of the wire harness with the layers of tape is larger than the inner diameter of the saddle bars
- The center of the layers of tape is aligned with the center of the saddle bar
- The edge of the tape extends a minimum of 0.06 inch farther than each edge of the saddle bar
- The edge of one layer of the tape is a maximum of 0.05 inch from the edge of a different layer of tape
- For U shaped tape, each layer of tape makes a 100 percent overlap.



**CONFIGURATION OF THE LAYERS OF U SHAPED TAPE**

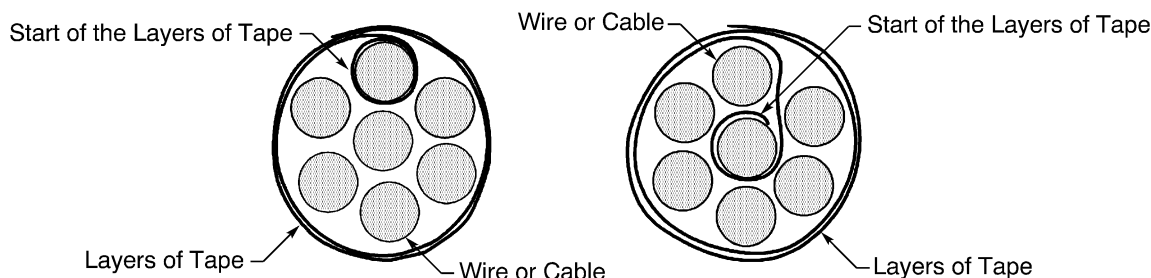
**Figure 20**

**20-25-12**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

- (a) Wind the tape around one wire to hold it in its position. Refer to Figure 21.



FIRST CONFIGURATION

SECOND CONFIGURATION

#### CONFIGURATIONS OF THE LAYERS OF TAPE

Figure 21

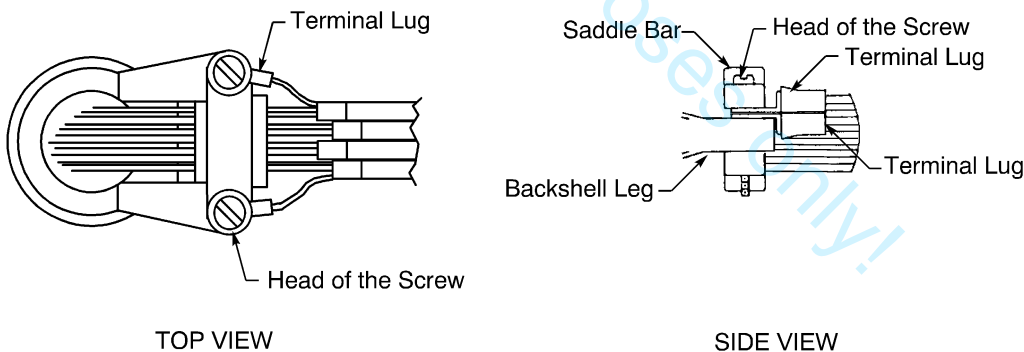
- (b) Continue to wind the tape around the wire harness until the tape is fully installed.
- (7) If spacers are necessary, specified, or installed on the initial backshell assembly, make a selection of a spacer from Table 4.

Make sure that the spacer is the smallest that can make a tight fit of the wire harness in the strain relief.

**NOTE:** A minimum of two spacers are necessary, one for each screw.

**NOTE:** The initial spacers can be installed again if they do not have damage.

- (8) If 1 to 4 terminal lugs must be installed, put each terminal lug in its position. Refer to Figure 22.



TOP VIEW

SIDE VIEW

#### CABLE CLAMP CONFIGURATION WITH 1 TO 4 TERMINAL LUGS

Figure 22

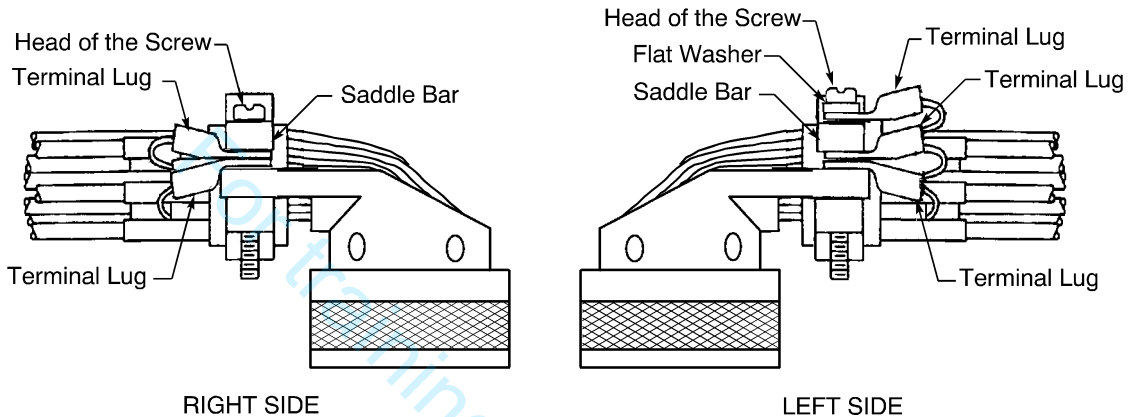
- (a) If lockwashers are supplied, put a lockwasher on each screw.
- (b) Put a screw through a hole in the saddle bar.
- (c) Put a terminal lug on the screw.
- (d) If the wire harness has more terminal lugs, put a terminal lug on the screw.
- (e) If spacers are necessary, put a spacer on the screw.
- (f) Put the saddle bar against the backshell legs.

**20-25-12**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS

- (g) Engage the threads of the screw and the threads of the nut.
- (h) Put the remaining screw through the hole in the other end of the saddle bar.
- (i) If the wire harness has more terminal lugs, put the remaining terminal lugs on the screw.
- (j) If spacers are necessary, put a spacer on the screw.
- (k) Engage the threads of the screw and the threads of the nut.
- (9) If 5 terminal lugs must be installed, put each terminal lug in its position. Refer to Figure 23.



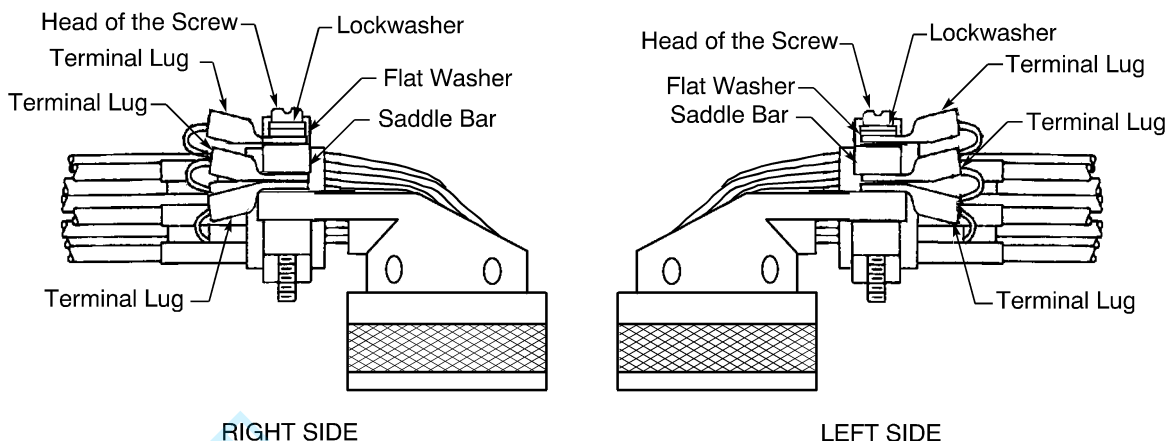
**CABLE CLAMP CONFIGURATION WITH 5 TERMINAL LUGS**

**Figure 23**

- (a) Make a selection of the applicable size of flat washer from Table 13.
- (b) If lockwashers are supplied, put a lockwasher on each screw.
- (c) Put the flat washer on the one of the screws.
- (d) Put a terminal lug on the screw against the flat washer.
- (e) Put the screw through the hole in the saddle bar.
- (f) Put a terminal lug on the screw.
- (g) Put a different terminal lug on the screw.
- (h) If spacers are necessary, put a spacer on the screw.
- (i) Put the saddle bar against the backshell legs.
- (j) Engage the threads of the screw and the threads of the nut.
- (k) Put the other screw through the hole on the other end of the saddle bar.
- (l) Put a terminal lug on the screw.
- (m) If spacers are necessary, put a spacer on the screw.
- (n) Put the remaining terminal lug on the screw.
- (o) Engage the threads of the screw and the threads of the nut.
- (10) If 6 terminal lugs must be installed, put each terminal lug in its position. Refer to Figure 24.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS



**CABLE CLAMP CONFIGURATION WITH 6 TERMINAL LUGS**  
Figure 24

- (a) Make a selection of the applicable size of flat washer from Table 13.
  - (b) If lockwashers are supplied, put a lockwasher on each screw.
  - (c) Put a flat washer on each screw.
  - (d) Put a terminal lug on the screw against the flat washer.
  - (e) Put the screw through the hole in the saddle bar.
  - (f) Put a terminal lug on the screw.
  - (g) Put a different terminal lug on the screw.
  - (h) If spacers are necessary, put a spacer on the screw.
  - (i) Put the saddle bar against the backshell legs.
  - (j) Engage the threads of the screw and the threads of the nut.
  - (k) Put a terminal lug on the remaining screw.
  - (l) Put the screw through the hole on the other end of the saddle bar.
  - (m) Put a terminal lug on the screw.
  - (n) Put a different terminal lug on the screw.
  - (o) If spacers are necessary, put a spacer on the screw.
  - (p) Engage the threads of the screw and the threads of the nut.
- (11) Tighten the cable clamp screws.
- Make sure that:
- The cable clamp does not crush or pinch the wire harness
  - If the saddle bar and the backshell leg do not touch, the distance between the saddle bar and the backshell leg is approximately equal on each side of the cable clamp
  - The layers of tape are not pinched between the saddle bars and the backshell leg
  - The screws do not cause an interference with a wire harness or a component.
- NOTE:** It is not necessary for the saddle bars to touch the legs of the backshell.
- (12) If the wire harness is not held tightly:
- (a) Remove the cable clamp screws.

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF STRAIN RELIEF BACKSHELLS AND SHIELD TERMINATION WITH TERMINAL LUGS**

- (b) Wind two layers of tape on the wire harness on the existing layers of tape.
  - (c) Do Step (8), Step (9), or Step (10) again.
  - (d) Do Step (11) again.
- (13) Torque the screws to the specified value in Table 12.
- Make sure that:
- The saddle bars are tight against the shield ground wire terminal lug
  - The shield ground wire terminal lug is tight against the backshell leg
  - The clamp does not crush or pinch the wire harness
  - The layers of tape are not pinched between the saddle bars and the backshell leg
  - The screws do not cause an interference with a wire harness or a component.
- (14) If screws are too long and screws with a shorter length are not available, cut off the unwanted length.
- Make sure that the end of the screw is smooth and has no rough edges.
- CAUTION:** DO NOT LET METAL SAWDUST OR THE UNWANTED LENGTH OF THE SCREW FALL ON OR INTO THE WIRE HARNESS OR ON THE REAR GROMMET OF THE CONNECTOR. SHARP METAL PIECES CAN CAUSE DAMAGE TO THE WIRES AND THE CONNECTOR.
- (15) If safety wire is necessary, install safety wire on each screw.
- Refer to Subject 20-60-07 for:
- The applicable conditions that make the installation of the safety wire on the cable clamp screw necessary
  - The procedures to install the safety wire.



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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

<u>Paragraph</u>	<u>Page</u>
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B. Connector Backshell Description	1
<b>2. <u>BACKSHELL DISASSEMBLY</u></b>	<b>3</b>
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B. Disassembly of a Peripheral Backshell with 2 Ground Rings	4
<b>3. <u>TORQUE VALUES FOR BACKSHELL ASSEMBLY</u></b>	<b>6</b>
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<b>5. <u>ASSEMBLY OF THE GLENAIR 380()003, 387(), G9034(), AND G9166() PERIPHERAL BACKSHELLS</u></b>	<b>8</b>
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## 20-25-13 CONTENTS

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

This Subject gives the procedures to assemble strain relief backshells that have inner and outer ground rings. For the procedures to assemble other strain relief backshells, refer to:

- Subject 20-60-09 for the assembly of backshells that do not terminate a shield
- Subject 20-25-12 for the assembly of backshells that terminate shields with shield ground wires and terminal lugs
- Subject 20-25-14 for the assembly of backshells that terminate shields with a shield terminator band
- Subject 20-25-15 for the assembly of backshells that have a braided shield sock.

#### 1. PART NUMBERS AND DESCRIPTION

##### A. Connector Backshell Part Numbers

**Table 1**  
**PERIPHERAL BACKSHELL PART NUMBERS**

Boeing Specification	Configuration	Part Number	Supplier
-	-	380()001()	Glenair
-	-	380()003	Glenair
-	-	387()	Glenair
S280W605()-1	Straight Cable	467AS009LF10FR	Glenair
S280W605()-2	45 Degree Cable	467AH009LF10FR	Glenair
S280W605()-3	90 Degree Cable	467AJ009LF10FR	Glenair
-	-	G387()	Glenair
-	-	G4993	Glenair
-	-	G9034()	Glenair
-	-	G9166()	Glenair

##### B. Connector Backshell Description

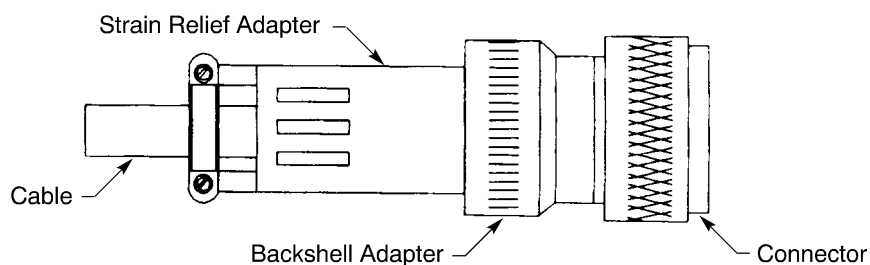
The peripheral backshell has these technical features:

- It is conductive
- It gives a low impedance connection from the connector to the cable shield
- It can be repaired.

**NOTE:** Many components of the different peripheral backshells have the same configuration. The primary difference between the backshells are the design and configuration of the ground rings.

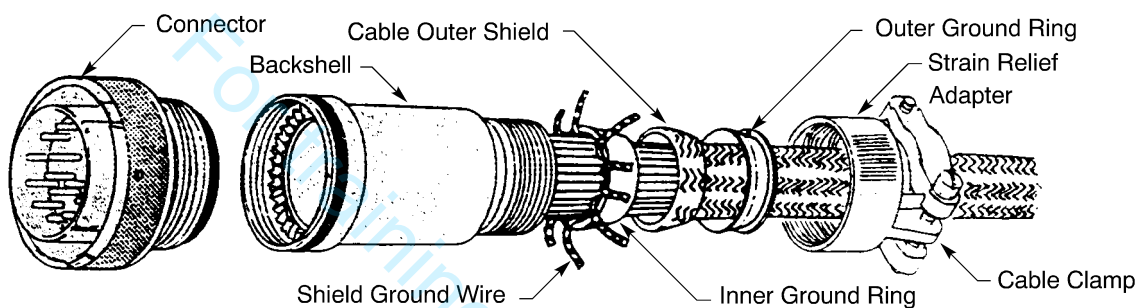
# STANDARD WIRING PRACTICES MANUAL

## ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS



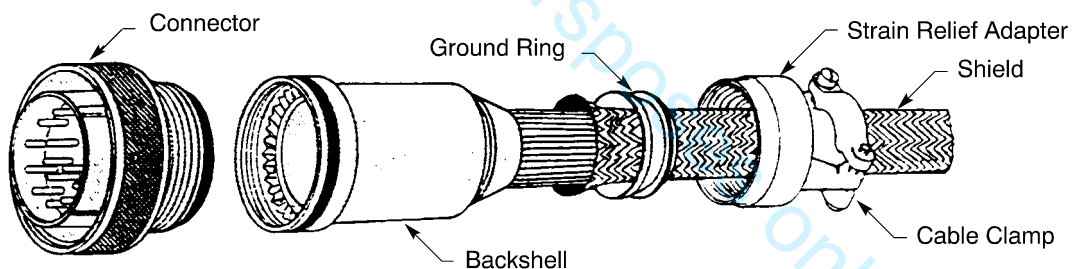
**S280W605() PERIPHERAL BACKSHELL ASSEMBLY**

**Figure 1**



**CONFIGURATION OF THE GLENAIR 380()001() PERIPHERAL BACKSHELL**

**Figure 2**

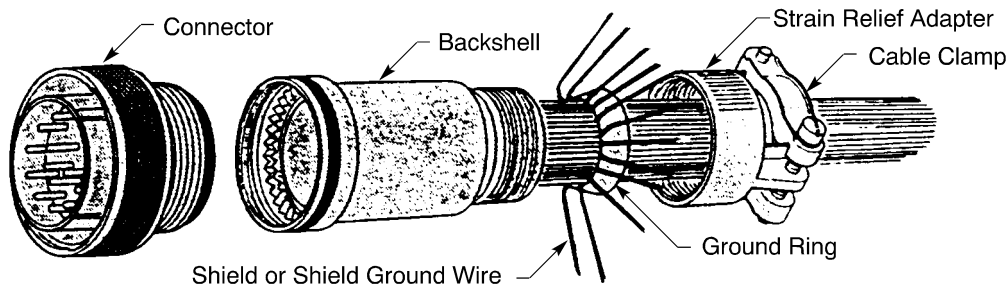


**CONFIGURATION OF THE GLENAIR G387() AND G4993 PERIPHERAL BACKSHELLS**

**Figure 3**

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS



#### CONFIGURATION OF THE GLENAIR 380()003, 387(), G9034(), AND G9166() PERIPHERAL BACKSHELLS

Figure 4

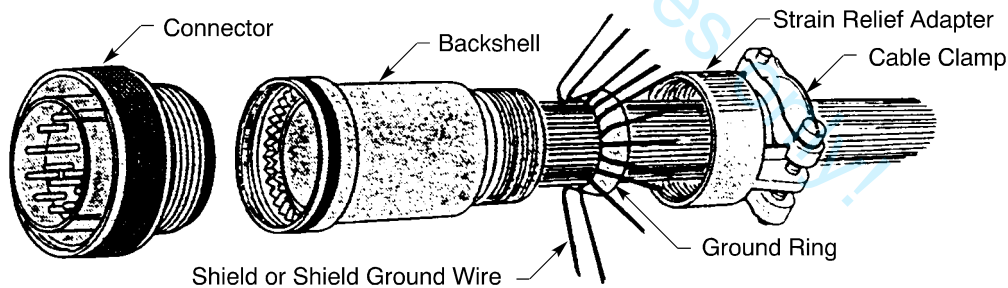
## 2. BACKSHELL DISASSEMBLY

### A. Disassembly of a Peripheral Backshell with 1 Ground Ring

This paragraph gives the procedure to disassemble these Glenair peripheral backshells:

- 380()003
- 387()
- G387()
- G4993
- G9034()
- G9166().

**NOTE:** Figure 6 and Figure 5 show straight backshells. The procedure to disassemble the 45 degree configuration and 90 degree configuration is the same as the procedure for the straight configuration.

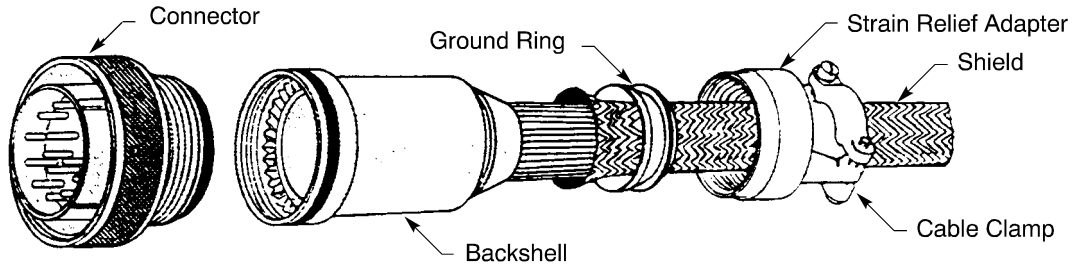


#### DISASSEMBLY OF THE GLENAIR 380()003, 387(), G9034(), AND G9166() BACKSHELLS

Figure 5

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS



**DISASSEMBLY OF THE GLENAIR G387() AND G4993 BACKSHELLS**  
Figure 6

- (1) Loosen the cable clamp screws of the strain relief adapter.
  - (2) Remove any insulation tape on the cable that was the saddle bars of the clamp.
  - (3) Loosen the strain relief adapter until it is free from the body of the backshell.
  - (4) Push the adapter away from the body of the backshell.
  - (5) Push the ground ring away from the body of the backshell.
  - (6) Push the strands of the outer shield of the primary cable against the surface of the cable so that the end of the shield is flat against the wires in the cable.
  - (7) Loosen the body of the backshell from the connector.
  - (8) Carefully push the body of the backshell away from the connector.
- Make sure that:
- The end of the shield goes into the cable exit at the rear of the backshell
  - The backshell moves smoothly on the surface of the shield
  - The shield stays symmetrical around the wires in the cable.
- (9) Disassemble the connector. Refer to the applicable Subject.
  - (10) Remove these components from the cable:
    - The body of the backshell
    - The ground ring
    - The strain relief adapter.

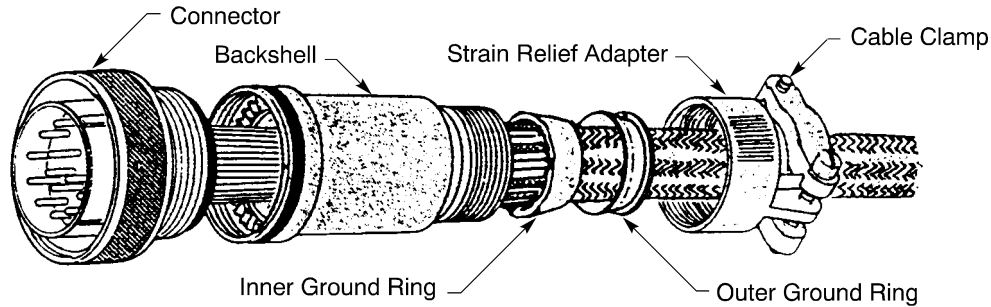
#### B. Disassembly of a Peripheral Backshell with 2 Ground Rings

This paragraph gives the procedure to disassemble the Glenair 380()001() peripheral backshell.

**NOTE:** Figure 7 shows a straight backshell. The procedure to disassemble the 45 degree configuration and 90 degree configuration is the same as the procedure for the straight configuration.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS



#### DISASSEMBLY OF THE GLENAIR 380(0010) BACKSHELL

Figure 7

- (1) Loosen the cable clamp screws of the strain relief adapter.
- (2) Remove any insulation tape on the cable that was the saddle bars of the clamp.
- (3) Loosen the strain relief adapter until it is free from the body of the backshell.
- (4) Push the adapter away from the body of the backshell.
- (5) Push the outer ground ring away from the body of the backshell.
- (6) Push the strands of the outer shield of the primary cable under the end of the inner ground ring with a plastic awl or an equivalent tool.  
Make sure that the end of the shield is flat against the wires in the cable.
- (7) Move the inner ground ring away from the body of the backshell.  
Make sure that:
  - The ground ring moves smoothly on the surface of the shield
  - The shield stays symmetrical around the wires in the cable.
- (8) Loosen the body of the backshell from the connector.
- (9) Carefully push the body of the backshell away from the connector.  
Make sure that:
  - The end of the shield goes into the cable exit at the rear of the backshell
  - The backshell moves smoothly on the surface of the shield
  - The shield stays symmetrical around the wires in the cable.
- (10) Disassemble the connector. Refer to the applicable Subject.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

(11) Remove these components from the cable:

- The body of the backshell
- The inner ground ring
- The outer ground ring
- The strain relief adapter.

### 3. TORQUE VALUES FOR BACKSHELL ASSEMBLY

#### A. Backshell to Connector Torque

Table 2  
BACKSHELL TO CONNECTOR TORQUE VALUES

Connector Shell Size	Coupling Ring Torque (inch-pound)		Torque Wrench Setting (inch-pound)	
	Minimum	Maximum	Minimum	Maximum
10	45	50	39	44
12	65	70	56	61
14	85	90	73	78
16	105	110	91	96
18	135	140	117	122
20	145	150	125	130
22	145	150	125	130
24	145	150	125	130
28	155	160	134	139

#### B. Strain Relief Adapter to Backshell Torque

Table 3  
STRAIN RELIEF ADAPTER TO BACKSHELL TORQUE VALUES

Connector Shell Size	Strain Relief Torque (inch-pound)		Torque Wrench Setting (inch-pound)	
	Minimum	Maximum	Minimum	Maximum
10	45	50	39	44
12	45	50	39	44
14	45	50	39	44
16	45	50	39	44
18	55	60	48	53
20	75	80	65	70
22	85	90	73	78
24	95	100	81	86

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

Table 3 (continued)

Connector Shell Size	Strain Relief Torque (inch-pound)		Torque Wrench Setting (inch-pound)	
	Minimum	Maximum	Minimum	Maximum
28	105	110	91	96

#### 4. ASSEMBLY OF THE GLENAIR G387() AND G4993 PERIPHERAL BACKSHELLS

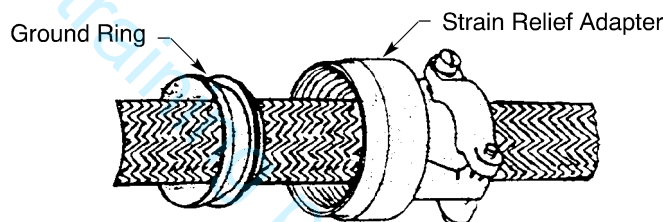
This paragraph gives the procedures to attach the end of the one shield of the primary cable to a backshell.

##### A. Cable Preparation

(1) In order, put these components on the end of the cable:

- The strain relief adapter
- The ground ring.

Refer to Figure 8.



#### POSITION OF THE GROUND RING AND THE STRAIN RELIEF ADAPTER ON THE CABLE

Figure 8

- (2) Temporarily attach the backshell to the connector.
- (3) Push the end of the cable into the backshell until the end of the cable touches the rear grommet of the connector.
- (4) If the cable has an outer jacket:
  - (a) Make a mark on the jacket 0.5 inches away from the rear end of the backshell.
  - (b) Remove the length of jacket between the mark and the end of the cable. Refer to Subject 20-00-15.
- (5) If the cable does not have a jacket, make a mark on the shield of the cable at the rear end of the backshell.
- (6) Remove the backshell from the connector.
- (7) Put the backshell on the end of the cable so that the front end of the backshell is beyond the end of the cable.
- (8) If the cable does not have a jacket, remove the length of shield between the end of the cable and the mark from Step (5). Refer to Subject 20-00-15.
- (9) If the cable has a jacket remove the necessary length of the shield so that the distance from the end of the shield to the end of the jacket is 0.5 inch. Refer to Subject 20-00-15.
- (10) Assemble the connector. Refer to the applicable Subject for the connector.

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**STANDARD WIRING PRACTICES MANUAL****ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS****B. Backshell Installation**

- (1) Push the backshell along the cable until the front of the backshell touches the back of the connector.
- (2) Engage the threads of the backshell and the connector.
- (3) Torque the backshell to the value specified in Table 2 with a strap wrench that has a 0.375 inch drive.

**C. Strain Relief Adapter Installation**

- (1) Move the strands at the end of the shield apart with a plastic awl or an equivalent tool.
- (2) Put the strands of the shield in sequence on the outer surface of the slope at the rear end of the backshell body.

Make sure that the strands of the shield do not make an overlap with each other.

- (3) Push the ground ring against the rear surface of the backshell so that the strands of the shield are between the ring and the slope of the backshell.
- (4) If the strands of the shield extend beyond the outer edge of the ground ring, cut the strands so that the end of the strands is aligned with the edge of the ground ring.
- (5) If it is necessary, put the sufficient layers of Scotch 70 insulation tape on the cable so that:
  - The layers of tape will be under the cable clamp
  - The quantity of the tape is sufficient for the cable clamp to hold the cable firmly in position.
- (6) Push the strain relief adapter against the rear of the backshell.
- (7) Engage the threads of the adapter and the backshell.
- (8) Torque the adapter to the value specified in Table 3 with a strap wrench that has a 0.375 inch drive.
- (9) Tighten the screws of the cable clamp.

**5. ASSEMBLY OF THE GLENAIR 380()003, 387(), G9034(), AND G9166() PERIPHERAL BACKSHELLS**

This paragraph gives the procedures to assemble and attach the shield ground wires of these shields to a backshell:

- The shield of the primary cable
- The adjacent shields of a primary cable
- The shield of each wire or cable in the primary cable.
- The adjacent shields of each wire or cable in the primary cable.

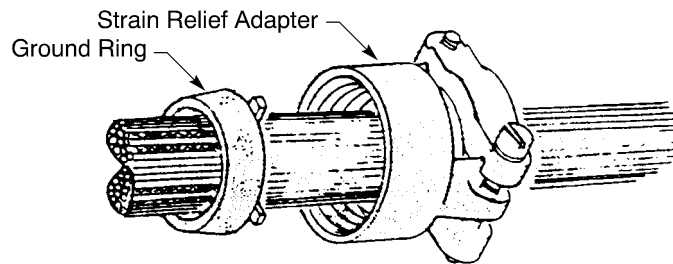
**A. Cable Preparation**

- (1) In order, put these components on the end of the cable:
  - The strain relief adapter
  - The ground ring

Refer to Figure 9.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS



#### POSITION OF THE GROUND RING AND THE STRAIN RELIEF ADAPTER ON THE CABLE

Figure 9

- (2) Temporarily attach the backshell to the connector.
- (3) Push the end of the cable into the backshell until the end of the cable touches the rear grommet of the connector.
- (4) If the cable has an outer jacket:
  - (a) Make a mark on the jacket at the rear end of the backshell.
  - (b) Remove the length of jacket between the mark and the end of the cable. Refer to Subject 20-00-15.
- (5) If the cable does not have a jacket, make a mark on the shield of the cable at the rear end of the backshell.
- (6) Remove the backshell from the connector.
- (7) Put the backshell on the cable.
- (8) Assemble an uninsulated shield ground wire on the end of the shield of the primary cable. Refer to Subject 20-10-15.  
Make sure that the shield ground wire configuration is applicable for the shielded cable.
- (9) Assemble an uninsulated shield ground wire on the shield of each shielded wire or shielded cable in the primary cable. Refer to Subject 20-10-15.  
Make sure that the shield ground wire configuration is applicable for each shielded cable or shielded wire.
- (10) Assemble the connector. Refer to the applicable Subject for the connector.

#### B. Backshell Installation

- (1) Push the backshell along the cable until the front of the backshell touches the back of the connector.
- (2) Engage the threads of the backshell and the connector.
- (3) Torque the backshell to the value specified in Table 2 with a strap wrench that has a 0.375 inch drive.

#### C. Strain Relief Adapter Installation

- (1) Put the shield ground wire or wires in sequence around the body of the backshell.  
Make sure that each shield ground wire does not make an overlap with another shield ground wire.
- (2) Push the ground ring against the rear surface of the backshell so that the shield ground wires are between the ring and the rear end of the backshell.

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**STANDARD WIRING PRACTICES MANUAL****ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS**

- (3) If it is necessary, put the sufficient layers of Scotch 70 insulation tape on the cable so that:
  - The layers of tape will be under the cable clamp
  - The quantity of the tape is sufficient for the cable clamp to hold the cable firmly in position.
- (4) Make a selection of the location of the end of the shield ground wires for the completed assembly.
- (5) If the ends of the shield ground wires are at the rear end of the backshell:
  - (a) Cut each shield ground wire so that the end of each wire is aligned with the forward edge of the ground ring.
  - (b) Push the strain relief adapter against the rear of the backshell.
- (6) If the ends of the shield ground wires are at the rear end of the strain relief:
  - (a) Fold each shield ground wire back over the ground ring the wires are flat against the outer surface of the primary cable.
  - (b) Push the strain relief adapter over the shield ground wires until the adapter is against the rear of the backshell.  
Make sure that each shield ground wire is inside the adapter.
- (7) Engage the threads of the adapter and the backshell.
- (8) Torque the adapter to the value specified in Table 3 with a strap wrench that has a 0.375 inch drive.
- (9) Tighten the screws of the cable clamp.

**6. ASSEMBLY OF THE GLENAIR 380(001) PERIPHERAL BACKSHELL**

This paragraph gives the procedures to assemble and attach the shield ground wires of these shields to a backshell:

- The shield of each wire or cable in the primary cable.
- The adjacent shields of each wire or cable in the primary cable.

**A. Cable Preparation**

- (1) In order, put these components on the end of the cable:
  - The strain relief adapter
  - The outer ground ring
  - The inner ground ring.
- (2) Temporarily attach the backshell to the connector.
- (3) Push the end of the cable into the backshell until the end of the cable touches the rear grommet of the connector.
- (4) If the cable has an outer jacket:
  - (a) Make a mark on the jacket 0.5 inches away from the rear end of the backshell.
  - (b) Remove the length of jacket between the mark and the end of the cable. Refer to Subject 20-00-15.
- (5) If the cable does not have a jacket, make a mark on the shield at the rear end of the backshell.
- (6) Remove the backshell from the connector.
- (7) Put the backshell on the cable.
- (8) If the cable has a jacket remove the necessary length of the shield so that the distance from the end of the shield to the end of the jacket is 0.5 inch. Refer to Subject 20-00-15.
- (9) If the cable does not have a jacket, remove the length of shield between the end of the cable and the mark from Step (5). Refer to Subject 20-00-15.

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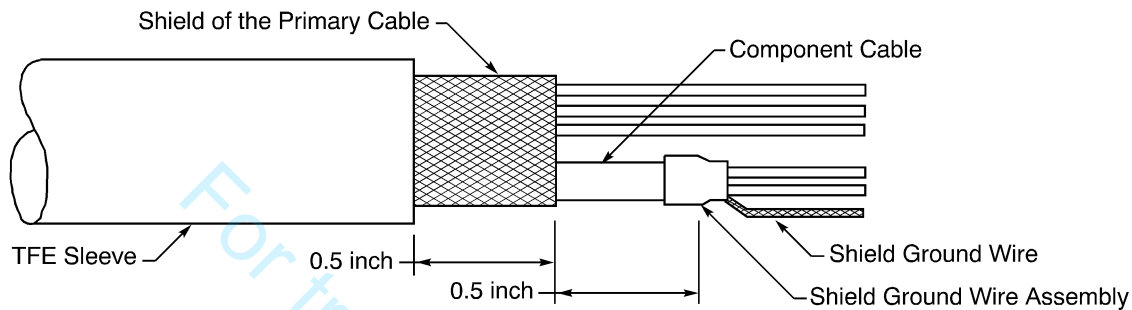
## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

- (10) Assemble an uninsulated shield ground wire on the shield of each shielded wire or shielded cable. Refer to Subject 20-10-15.

Make sure that:

- The shield ground wire configuration is applicable for each shielded cable or shielded wire
- The start of each shield ground wire is approximately 0.5 inch from the end of the shield of the primary cable; refer to Figure 10.



**CONFIGURATION OF A COMPONENT SHIELD GROUND WIRE AND THE SHIELD OF THE PRIMARY CABLE**  
**Figure 10**

- (11) Assemble the connector. Refer to the applicable Subject for the connector.

#### B. Backshell Installation

- (1) Push the backshell along the cable until the front of the backshell touches the back of the connector.
- (2) Engage the threads of the backshell and the connector.
- (3) Torque the backshell to the value specified in Table 2 with a strap wrench that has a 0.375 inch drive.

#### C. Strain Relief Adapter Installation

- (1) Put each shield ground wire of the cable or wires of the primary cable in sequence against the rear end of the backshell.

Make sure that each shield ground wire does not make an overlap with another shield ground wire.

- (2) Push the inner ground ring against the rear surface of the backshell so that the shield ground wires are between the ring and the rear end of the backshell.
- (3) At the end of the shield of the primary cable, move the strands of the shield apart with a plastic awl or an equivalent tool.
- (4) Put the strands of the shield of the primary cable in sequence on the outer surface of the inner ground ring.

Make sure that the strands of the shield do not make an overlap with each other.

- (5) Fold each shield ground wire back over the outer surface of the inner ground ring so that each shield ground wire:
  - Does not make an overlap with another shield ground wire
  - Makes an overlap with the strands of the shield of the primary cable
  - Is flat against the outer surface of the primary cable.
- (6) Make a selection of the location of the end of the shield ground wires for the completed assembly.
- (7) If the ends of the shield ground wires are at the rear end of the backshell:

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

- (a) Cut each shield ground wire so that the end of each wire is aligned with the rear edge of the inner ground ring.
  - (b) Push the outer ground ring over each shield ground wire until it is against the inner ground ring.
  - (c) Push the strain relief adapter against the rear of the backshell.
- (8) If the ends of the shield ground wires are at the rear end of the strain relief:
- (a) Push the outer ground ring over the shield ground wires until it is against the inner ground ring.
  - (b) Push the strain relief adapter over the shield ground wires until the adapter is against the inner ground ring.
- Make sure that each shield ground wire is inside the adapter.
- (9) Engage the threads of the adapter and the backshell.
  - (10) Torque the adapter to the value specified in Table 3 with a strap wrench that has a 0.375 inch drive.
  - (11) Tighten the screws of the cable clamp.

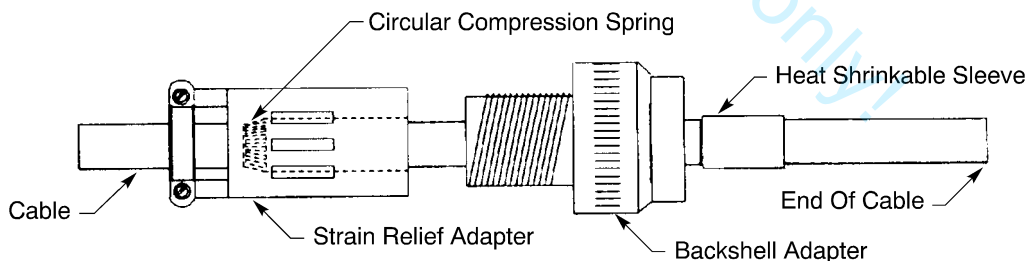
#### 7. ASSEMBLY OF THE S280W605-() PERIPHERAL BACKSHELL

**NOTE:** The assembly procedures for the 45 degree backshell and the 90 degree backshell are the same the procedures for the straight backshell.

##### A. Cable Preparation

**Table 4**  
**OUTER JACKET REMOVAL LENGTH**

Cable Exit Configuration	Removal Length L (inch)		
	Minimum	Target	Maximum
Straight	1.55	1.60	1.60
45 Degrees	2.35	2.40	2.40
90 Degrees	2.55	2.60	2.60



#### POSITION OF THE STRAIN RELIEF ADAPTER AND THE BACKSHELL ADAPTER

**Figure 11**

- (1) Look at the circular compression spring inside the strain relief adapter.  
Make sure that the spring is in the correct position.
- (2) Make a selection of a Grade B, Class 1 heat shrinkable sleeve from Subject 20-00-11.

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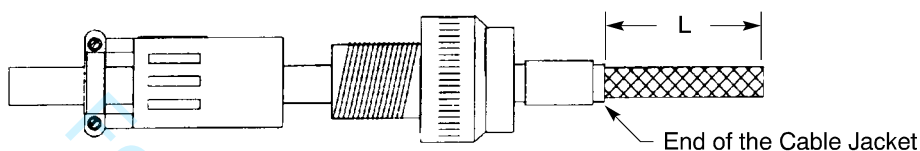
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

- (3) In order, put these components on the cable:
- The strain relief adapter
  - The backshell adapter
  - A 0.45 inch  $\pm 0.03$  inch length of the heat shrinkable sleeve.

Refer to Figure 11.

- (4) Remove the length L of the outer jacket from the end of the cable.

Refer to Table 4 and Figure 12.



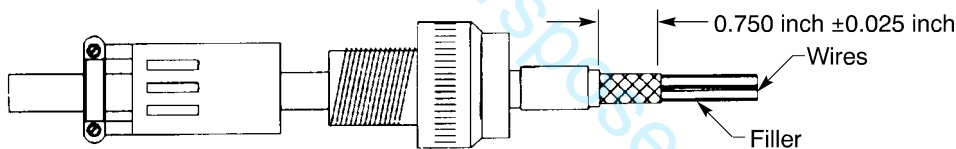
**OUTER JACKET REMOVAL**

**Figure 12**

- (5) Remove the necessary length of the shields so that the distance from the end of the cable jacket to the end of the shields is 0.75 inch  $\pm 0.03$  inch.

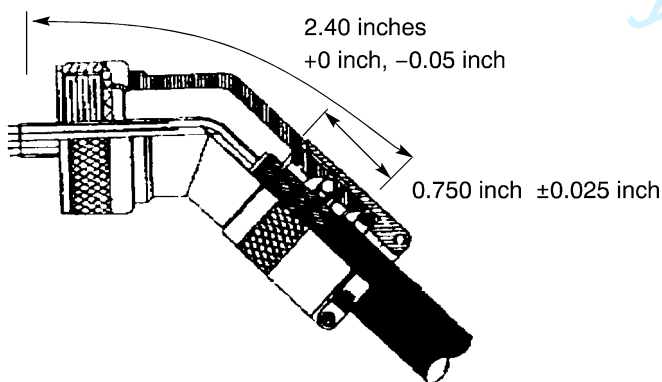
Refer to:

- Figure 13 for the straight configuration
- Figure 14 for the 45 degree configuration
- Figure 15 for the 90 degree configuration.



**SHIELD REMOVAL LENGTH FOR A STRAIGHT CONFIGURATION BACKSHELL**

**Figure 13**



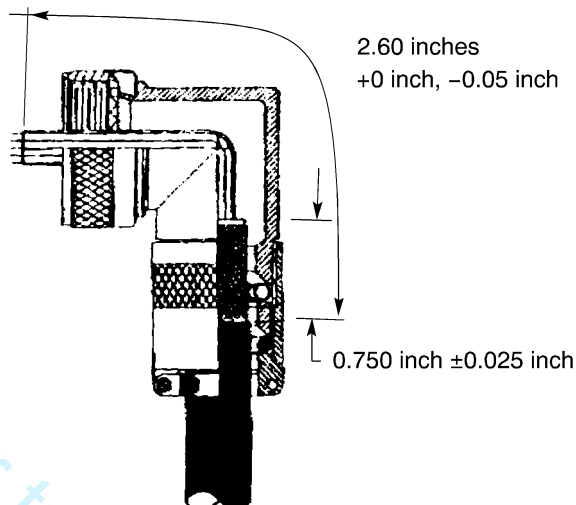
**SHIELD REMOVAL LENGTH FOR A 45 DEGREE CONFIGURATION BACKSHELL**

**Figure 14**

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## STANDARD WIRING PRACTICES MANUAL

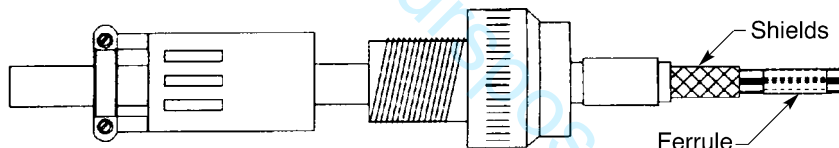
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS



#### SHIELD REMOVAL LENGTH FOR A 90 DEGREE CONFIGURATION BACKSHELL

Figure 15

- (6) Put the ferrule on the cable. Refer to Figure 16.  
Make sure that all the wires and the fillers are in the ferrule.



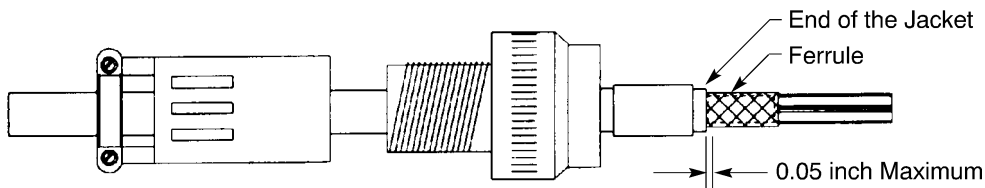
#### POSITION OF THE FERRULE OVER THE WIRES AND FILLERS OF THE CABLE

Figure 16

- (7) Carefully push the shields back away from the end the cable so that the shields become loose.  
(8) Push the ferrule under both shields. Refer to Figure 17.

Make sure that:

- The end of the ferrule is against the end of the cable jacket
- The distance from the end of the cable jacket to the rear end of the ferrule is not greater than 0.05 inch.



#### POSITION OF THE FERRULE UNDER THE SHIELDS

Figure 17

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## STANDARD WIRING PRACTICES MANUAL

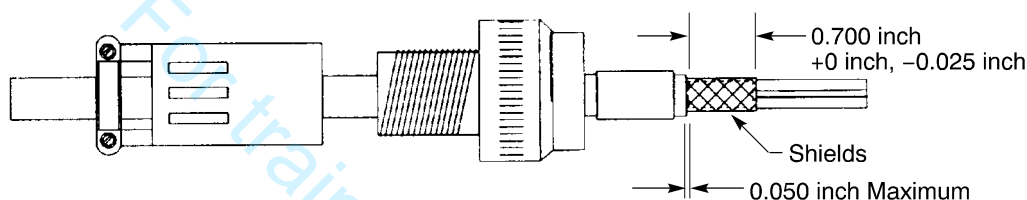
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

- (9) Cut the cable fillers so that the ends of the fillers are aligned with the forward end of the ferrule.
- (10) To make the shields smooth, carefully push the shields toward end of the cable.

Make sure that:

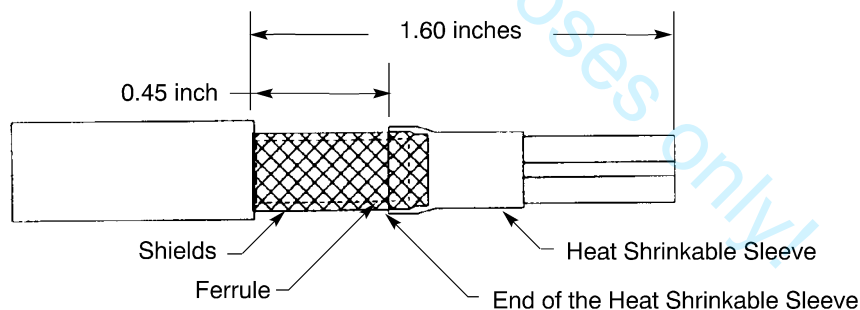
- The ferrule does not move
  - The distance from the end of the cable jacket to the rear end of the ferrule is not greater than 0.05 inch.
- (11) Cut the shields so that the distance from the ends of the shields to the end of the cable jacket 0.70 inch  $+0$  inch,  $-0.03$  inch. Refer to Figure 18.

Make sure that the ends round conductors of the outer shield are aligned with the ends of the flat conductors of the inner shield.



**DISTANCE FROM THE END OF THE CABLE JACKET TO THE END OF THE SHIELDS**  
Figure 18

- (12) Put the wires in a sequence that agrees with the contact configuration of the connector.
- (13) Push the heat shrinkable sleeve over the shields and the ferrule until the distance from the end of the cable jacket to the rear end of the sleeve is 0.45 inch  $\pm 0.03$  inch. Refer to Figure 19.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE SHIELD**  
Figure 19

- (14) Shrink the sleeve into position. Refer to Subject 20-10-14.
- (15) Examine the cable to make sure that the distance from the end of the cable jacket to the end of the wires agrees with the specified distance in Table 4.
- (16) If distance from the end of the jacket to the end of any wire is longer than the specified distance, cut the necessary length from the end of the wire.
- (17) Assemble the connector. Refer to the applicable Subject for the connector.

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

#### B. Backshell Installation

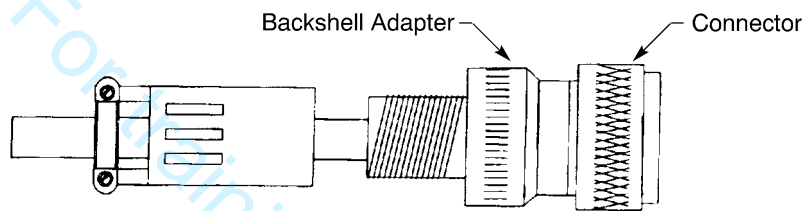
- (1) To hold the connector in position, attach the connector to a plug board.

**NOTE:** A satisfactory alternative is to use some other tool that:

- Can hold the connector stable
- Does not cause damage to the connector.

- (2) Push the backshell adapter toward the connector until the teeth in the adapter are against the teeth at the rear of the connector.
- (3) Carefully turn the coupling nut of the adapter until the teeth are fully engaged with the teeth in the back of the connector.

Refer to Figure 20.



**POSITION OF THE BACKSHELL ADAPTER ON THE CONNECTOR**

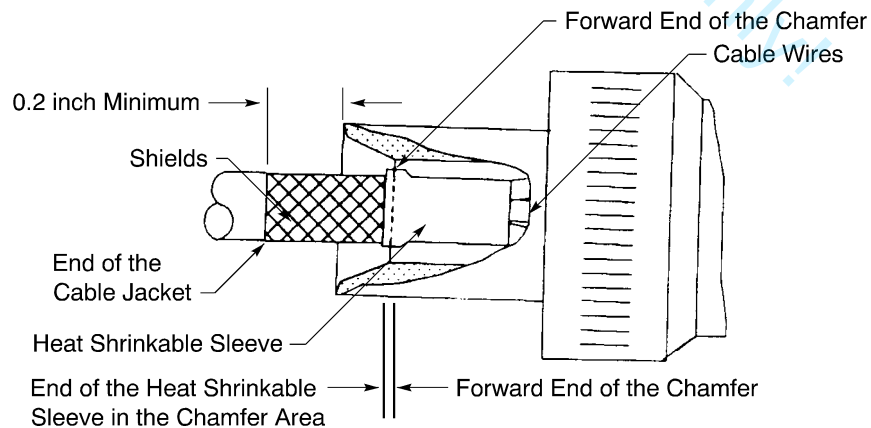
**Figure 20**

- (4) Torque the adapter to 75 inch-pounds  $\pm 5$  inch-pounds.
- (5) Examine the position of the heat shrinkable sleeve in relation to the chamfer of the backshell adapter.

Make sure that the rear edge of the heat shrinkable sleeve is aligned with or inside the forward edge of the chamfer.

Refer to:

- Figure 21 for the incorrect position of the sleeve
- Figure 22 for the correct position of the sleeve.



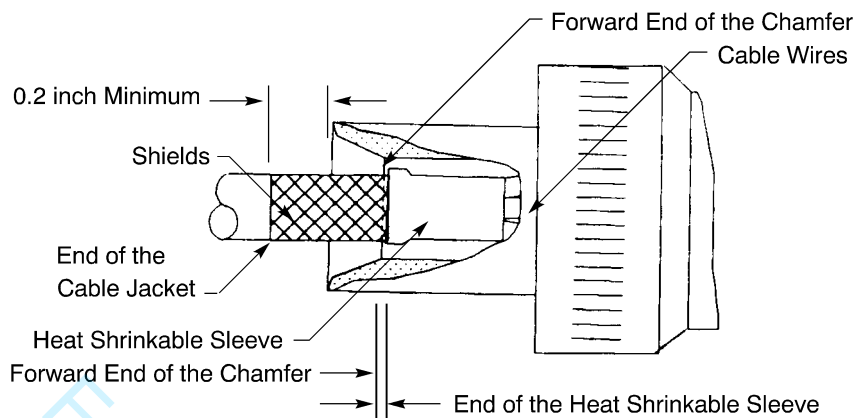
**INCORRECT POSITION OF THE HEAT SHRINKABLE SLEEVE**

**Figure 21**

**20-25-13**

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS

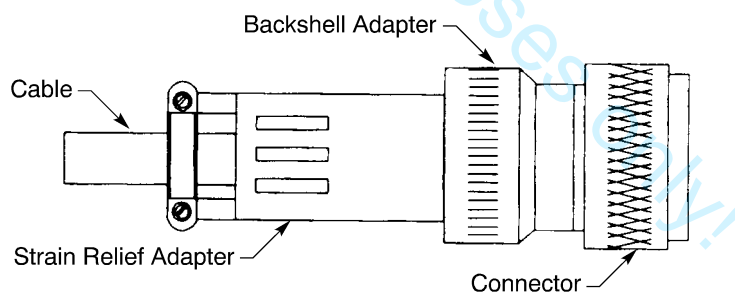


**CORRECT POSITION OF THE HEAT SHRINKABLE SLEEVE**  
Figure 22

- (6) If the position of the sleeve is not correct:
    - (a) Disconnect the backshell adapter from the connector.
    - (b) Disassemble the connector. Refer to the applicable Subject for the connector.
    - (c) Remove the heat shrinkable sleeve.
    - (d) Do the cable preparation and the backshell installation again.
- Refer to Paragraph 7.A. and Paragraph 7.B.

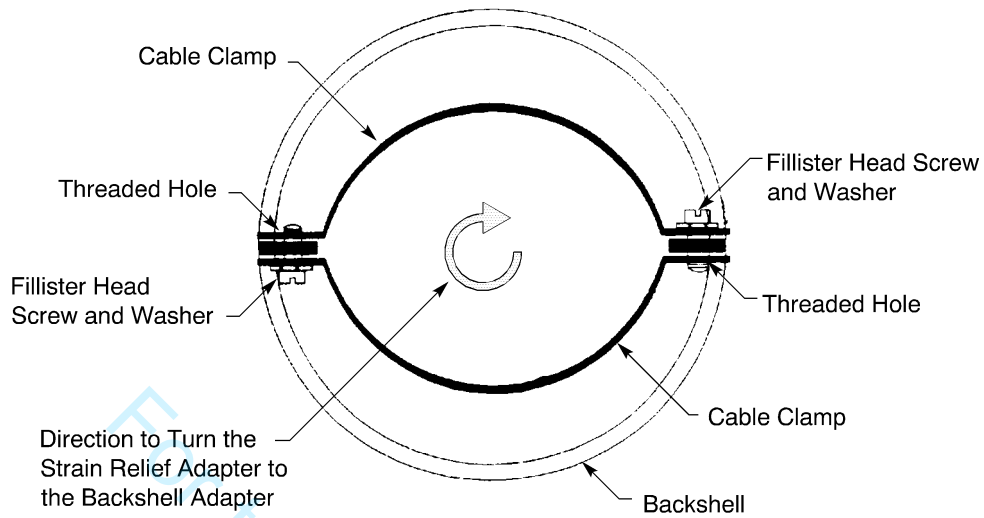
#### C. Strain Relief Adapter Installation

- (1) Push the strain relief adapter until it is against the backshell adapter. Refer to Figure 23.



**POSITION OF THE STRAIN RELIEF ADAPTER**  
Figure 23

- (2) Engage the threads of the strain relief adapter and the backshell adapter.
- (3) Torque the strain relief adapter to 25 inch-pound  $\pm$  5 inch-pounds.
- (4) Install the saddle clamps. Refer to Figure 24.

**STANDARD WIRING PRACTICES MANUAL**
**ELECTRICAL CONNECTION OF SHIELDED CABLES AND BACKSHELLS THAT HAVE INNER AND OUTER GROUND RINGS**

**INSTALLATION OF THE SADDLE CLAMPS**
**Figure 24**

- (5) Tighten the cable clamp screws so that the clamp holds the cable tightly.  
Make sure that the surfaces of the saddle clamps are against the surfaces of the strain relief adapter.

**NOTE:** It is not necessary to put tape on the cable for protection.

**20-25-13**

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

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# STANDARD WIRING PRACTICES MANUAL

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

This Subject gives the procedures to assemble strain relief backshells that terminate a shield with a shield terminator band. For the procedures to assemble other strain relief backshells, refer to:

- Subject 20-60-09 for the assembly of backshells that do not terminate a shield
- Subject 20-25-12 for the assembly of backshells that terminate shields with shield ground wires and terminal lugs
- Subject 20-25-13 for the assembly of backshells that terminate shields with inner and outer ground rings
- Subject 20-25-15 for the assembly of backshells that have a braided shield sock.

#### 1. PART NUMBERS AND DESCRIPTION

##### A. Applicable Backshells

Table 1 gives the part numbers of the connector backshells that can be assembled with the BACB42F() and the Glenair 687-062-0() shield terminator bands.

**NOTE:** When the shield or the shield ground wire must make a specified electrical bond with the outer surface of the backshell, either the BACB42F() shield terminator band assembly or the Glenair 687-062-0() shield terminator band assembly gives a satisfactory performance.

**NOTE:** When only a small area to make the bond is available, the backshell assembly with a BACB42F() shield terminator band gives a better result.

Refer to:

- Figure 1 for the Glenair 387( )020 backshell
- Figure 2 for the S280W603-( ) backshell
- Figure 4 and Figure 3 for the Glenair 527-212 backshell
- Figure 5, Figure 6 and Figure 7 for the Glenair 557-( ) backshell
- Figure 8 for the Glenair 440( )031 and 440( )069 backshells.

**Table 1**  
**BACKSHELL PART NUMBERS**

Boeing Specification	Backshell			
	Part Number	Supplier	Configuration	Assembly Procedure
-	387()A020	Glenair	EMI/RFI Backshell 90 Degree, Stainless Steel	Paragraph 3.
	387()B020	Glenair	EMI/RFI Backshell 45 Degree, Stainless Steel	Paragraph 3.
	387()S020	Glenair	EMI/RFI Backshell Straight, Stainless Steel	Paragraph 3.
-	440()H031	Glenair	EMI/RFI Backshell 45 Degree, Stainless Steel	Paragraph 10.
	440()J031	Glenair	EMI/RFI Backshell 90 Degree, Stainless Steel	Paragraph 10.
	440()S031	Glenair	EMI/RFI Backshell Straight, Stainless Steel	Paragraph 10.

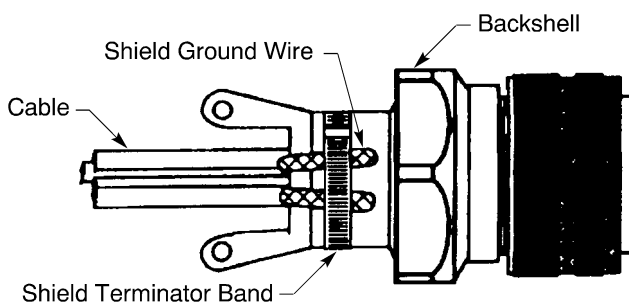
# 20-25-14

# STANDARD WIRING PRACTICES MANUAL

## ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Table 1 (continued)

Boeing Specification	Backshell			
	Part Number	Supplier	Configuration	Assembly Procedure
-	440()J069	Glenair	EMI/RFI Backshell 90 Degree, Stainless Steel	Paragraph 10.
	440()S069	Glenair	EMI/RFI Backshell Straight, Stainless Steel	Paragraph 10.
-	527-187()	Glenair	Rectangular, Aluminum for Size 1 ARINC 600 Plugs	Paragraph 7.
-	527-212()	Glenair	Rectangular, Aluminum for Size 2 ARINC 600 Plugs - Assembly with Shield Tape	Paragraph 8.
			Rectangular, Aluminum for Size 2 ARINC 600 Plugs - Assembly with Shield Ground Wires	Paragraph 9.
-	557-()	Glenair	Rectangular, Aluminum for D-Subminiature Connectors	Paragraph 10.
S280W603-1()	S3929()-34	Sunbank	EMI/RFI Backshell Straight, Cadmium Plated, Aluminum	Paragraph 4.
S280W603-2()	S3929A()-34	Sunbank	EMI/RFI Backshell, 45 Degree, Cadmium Plated, Aluminum	Paragraph 4.
S280W603-3()	S3929R()-34	Sunbank	EMI/RFI Backshell, 90 Degree, Cadmium Plated, Aluminum	Paragraph 4.
S280W604-1()	S3930()-34	Sunbank	EMI/RFI Backshell, Straight, Cadmium Plated, Aluminum	Paragraph 5.
				Paragraph 6.
S280W604-2()	S3930A()-34	Sunbank	EMI/RFI Backshell, 45 Degree, Cadmium Plated, Aluminum	Paragraph 5.
				Paragraph 6.
S280W604-3()	S3930R()-34	Sunbank	EMI/RFI Backshell, 90 Degree, Cadmium Plated, Aluminum	Paragraph 5.
				Paragraph 6.



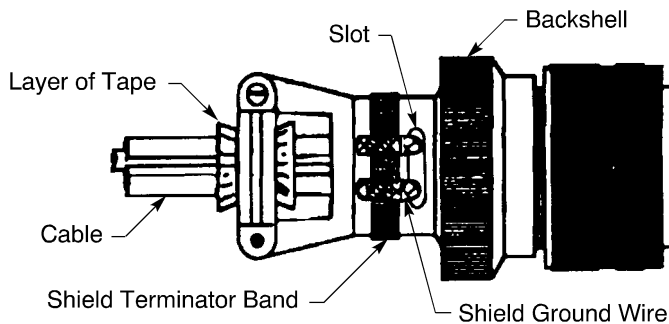
THE GLENAIR 387( )020 BACKSHELL

Figure 1

20-25-14

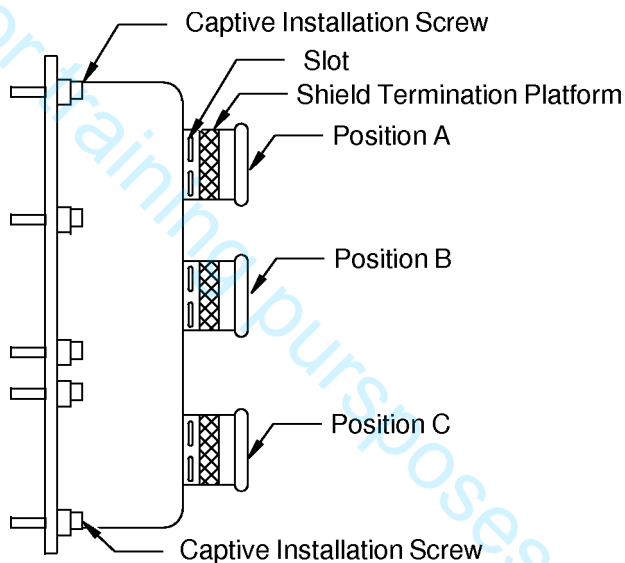
# STANDARD WIRING PRACTICES MANUAL

## ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



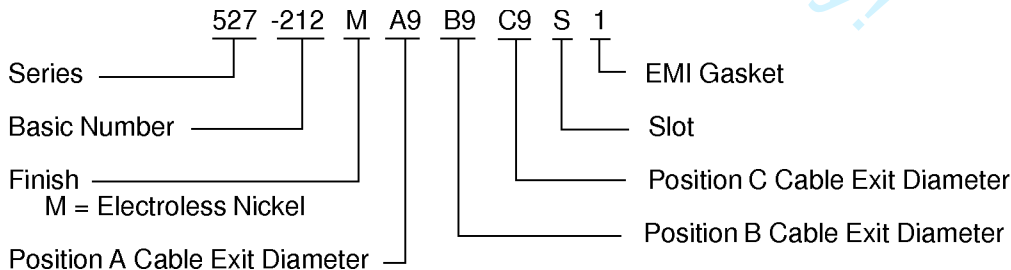
**THE S280W603 BACKSHELL**

**Figure 2**



**THE GLENAIR 527-212 BACKSHELL**

**Figure 3**

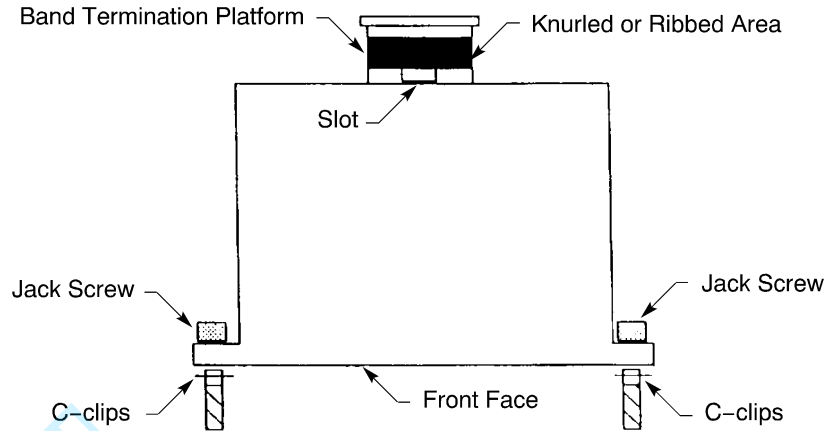


**GLENAIR 527-212 PART NUMBER STRUCTURE**

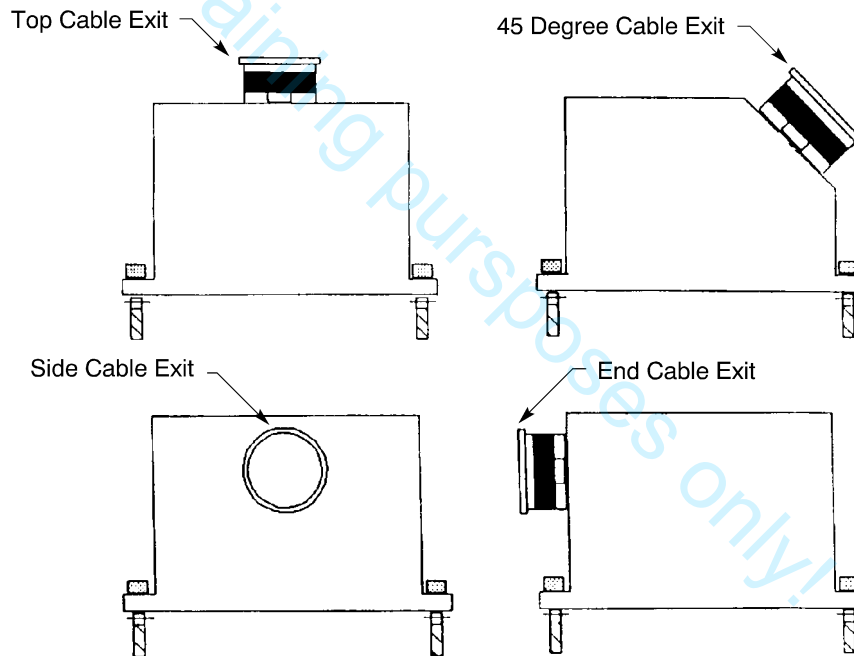
**Figure 4**

**STANDARD WIRING PRACTICES MANUAL**

**ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS**



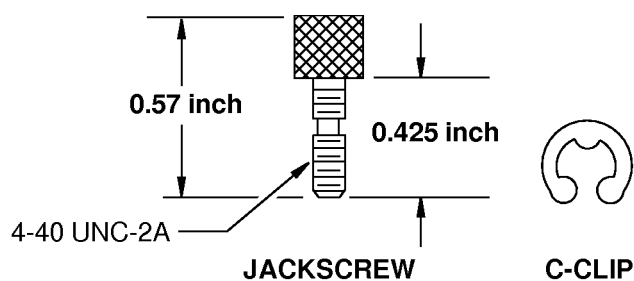
**THE GLENAIR 557-( ) BACKSHELL**  
**Figure 5**



**CONFIGURATIONS OF THE GLENAIR 557-( ) BACKSHELL**  
**Figure 6**

# STANDARD WIRING PRACTICES MANUAL

## ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



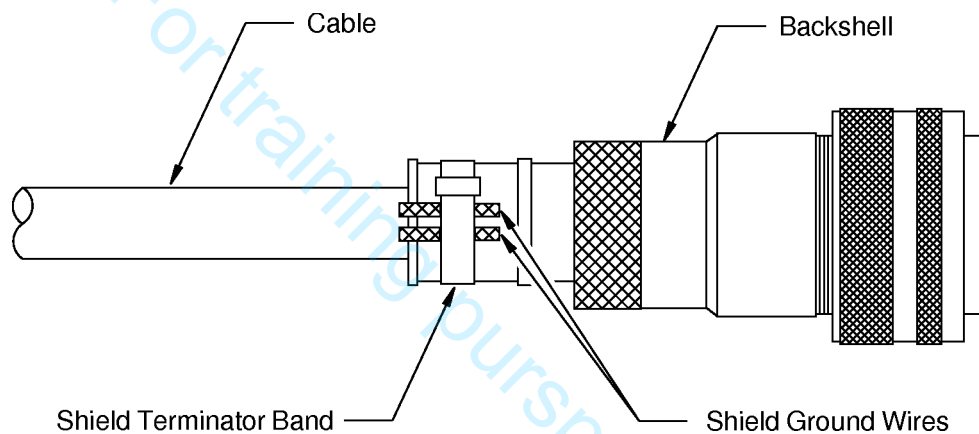
**JACK SCREWS SUPPLIED  
WITH GLENAIR 557-( ) BACKSHELLS**

**Two Socket Head Jackscrews and  
Two C-clips ( MS16633-4011 )**

**Supplied unassembled:  
Glenair part number 687-172**

### JACKSCREWS FOR GLENAIR 557-( ) BACKSHELLS

Figure 7



### THE GLENAIR 440( )031 AND 440( )069 BACKSHELL

Figure 8

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

#### B. Glenair Shield Terminator Bands

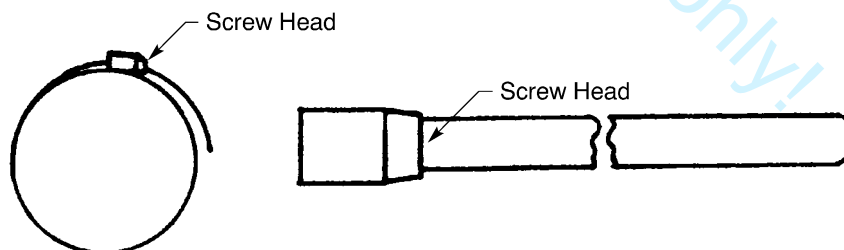
Table 2  
GLENAIR SHIELD TERMINATOR BAND PART NUMBERS

Backshell	Part Number	Diameter (inch)		Shell Size	Supplier
		Minimum	Maximum		
387()020	687-062-01	0.44	0.78	08	Glenair
				10	
	687-062-02	0.50	0.90	12	Glenair
				14	
	687-062-03	0.69	1.25	16	Glenair
				18	
	687-062-04	0.82	1.50	20	Glenair
	687-062-05	0.82	1.75	22	Glenair
				24	
				28	
	687-062-06	1.06	2.00	-	Glenair

Refer to Figure 9.

The Glenair 687-062-() shield terminator band has these technical properties:

- It is easy to assemble and disassemble
- It is reusable
- It accepts many shield ground leads
- It is applicable for Zero Length grounds
- It gives a low impedance electrical bond.



CONFIGURATION OF THE GLENAIR 687-062-() SHIELD TERMINATOR BAND  
Figure 9

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

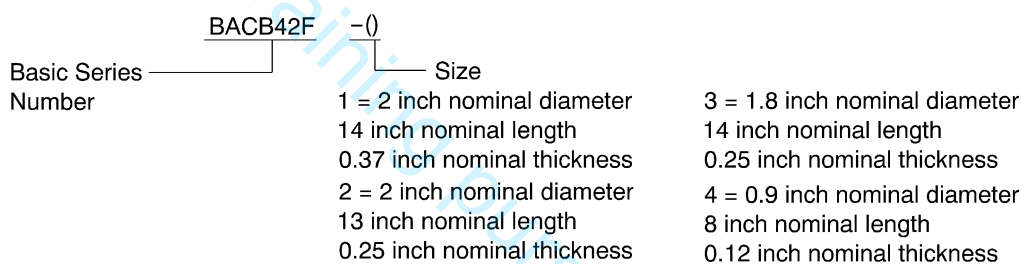
#### C. BACB42F() Shield Terminator Bands

The BACB42F() shield terminator band can be installed on these backshells:

- Boeing S280W603, and S280W604 backshells for circular connectors
- Glenair 387()020, 440() 031 and 440() 069 backshells for circular connectors
- Glenair 527-187() backshell for ARINC 600 shell size 1 plug connectors
- Glenair 527-212() backshell for ARINC 600 shell size 2 plug connectors
- Glenair 557-() backshell for M24308/() D-subminiature connectors.

**Table 3**  
**BACB42F() SHIELD TERMINATOR BAND PART NUMBERS**

Boeing Standard	Width (inch)	Nominal Diameter (inch)	Supplier
BACB42F3	0.24	1.8	Refer to Subject 20-00-11
BACB42F4	0.12	0.9	Refer to Subject 20-00-11



#### BACB42F() SHIELD TERMINATOR BAND PART NUMBER STRUCTURE

**Figure 10**

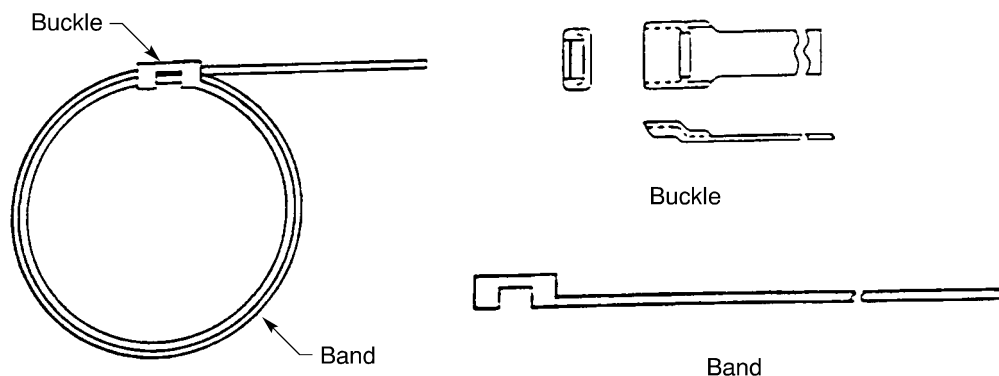
Refer to Figure 11.

The BACB42F() shield terminator band has these technical properties:

- It is easy to assemble and disassemble
- It is not reusable
- It accepts many shield ground leads
- It is applicable for Zero Length grounds
- It gives a low impedance electrical bond.

**STANDARD WIRING PRACTICES MANUAL**

**ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS**



**CONFIGURATION OF THE BACB42F() SHIELD TERMINATOR BAND**  
**Figure 11**

**D. Necessary Materials for Backshell Assembly**

**Table 4**  
**NECESSARY MATERIALS**

Part or Material	Part Number	Supplier
Adhesive Sealant, Gray	DC 3145 RTV	Dow
Insulation Tape, Gray	Scotch 70	3M
Sleeve, Heat Shrinkable	AMS-DTL-23053/5 Class 1	Available source
	MIL-LT	Raychem

**2. SHIELD TERMINATOR BAND REMOVAL**

**A. Removal of the Glenair 687-062-0() Shield Terminator Band**

- (1) Loosen the screw until:
  - The end of the band goes through the screw head
  - The band disengages from the screw head.
- (2) Remove the band from the assembly.

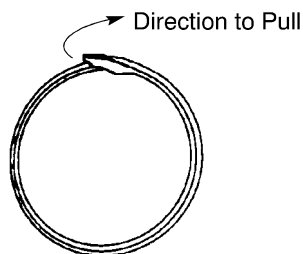
**B. Removal of the BACB42F() Shield Terminator Band**

- (1) Hold the free end of the buckle on the band with a pair of needle nose pliers.
- (2) To release the buckle, pull the free end of the buckle:
  - In a direction that is up and away from the band
  - Until the end of the band is free from the buckle.

Refer to Figure 12.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



#### BUCKLE RELEASE OF THE SHIELD TERMINATOR BAND

Figure 12

- (3) Remove the band from the assembly.
- (4) Discard the BACB42F() shield terminator band.

### 3. ASSEMBLY OF THE GLENAIR 387()020 BACKSHELL

This paragraph gives the procedure to assemble and attach the shield ground wires of these shields to a backshell:

- The shield of a wire or cable
- The adjacent shields of a wire or cable.

#### A. Backshell Part Numbers

Table 5  
BACKSHELL PART NUMBERS

Part Number	Supplier
387AA020	Glenair
387AB020	Glenair
387AS020	Glenair
387HA020	Glenair
387HB020	Glenair
387HS020	Glenair

#### B. Preparation of Cable with a Tin Plated or a Silver Plated Shield

**NOTE:** If the cable has one round conductor shield or two adjacent round conductor shields, the procedure to prepare a cable that has a nickel plated shield is a satisfactory alternative. Refer to Paragraph 3.C.

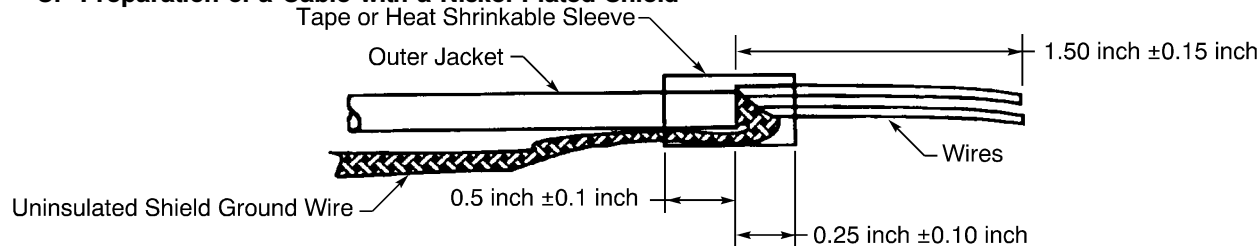
- (1) Remove 1.5 inches  $\pm 0.1$  inch of the outer jacket from the end of the cable.
- (2) Remove 1.25 inches  $\pm 0.01$  inch of the shield from the end of the cable.
- (3) Assemble a shield ground wire with a solder sleeve that has an uninsulated integral wire. Refer to Subject 20-10-15.

Make sure that the shield ground wire is pointed back away from the end of the cable.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

#### C. Preparation of a Cable with a Nickel Plated Shield



**CABLE PREPARATION**

**Figure 13**

Refer to Figure 13.

- (1) Remove approximately 1.75 inches of the outer jacket from the end of the cable.
- (2) Cut the wires of the cable to make the distance from the end of the wires to the end of the cable jacket equal to 1.50 inches  $\pm 0.15$  inch.
- (3) Assemble a shield ground wire with a shield pull through. Refer to Subject 20-10-15.

**CAUTION:** A SHIELD GROUND WIRE ASSEMBLY WITH A SOLDER SLEEVE IS NOT APPLICABLE FOR A SHIELD THAT HAS NICKEL PLATED CONDUCTORS. THE SOLDER DOES NOT MAKE A SATISFACTORY CONNECTION TO THE SHIELD.

Make sure that:

- The shield ground wire is pointed back away from the end of the cable
- The forward end of the tape or heat shrinkable sleeve extends 0.25 inch  $\pm 0.10$  inch farther than the end of the outer jacket
- The rear end of the tape or heat shrinkable sleeve extends 0.5 inch  $\pm 0.1$  inch farther than the end of the outer jacket.

#### D. Connector Assembly

- (1) Put the all the applicable cables through backshell.
- (2) Assemble the connector. Refer to the applicable Subject for the connector.

#### E. Backshell Installation

- (1) Push the backshell over the wires of the cables until the backshell is against the rear of the connector.

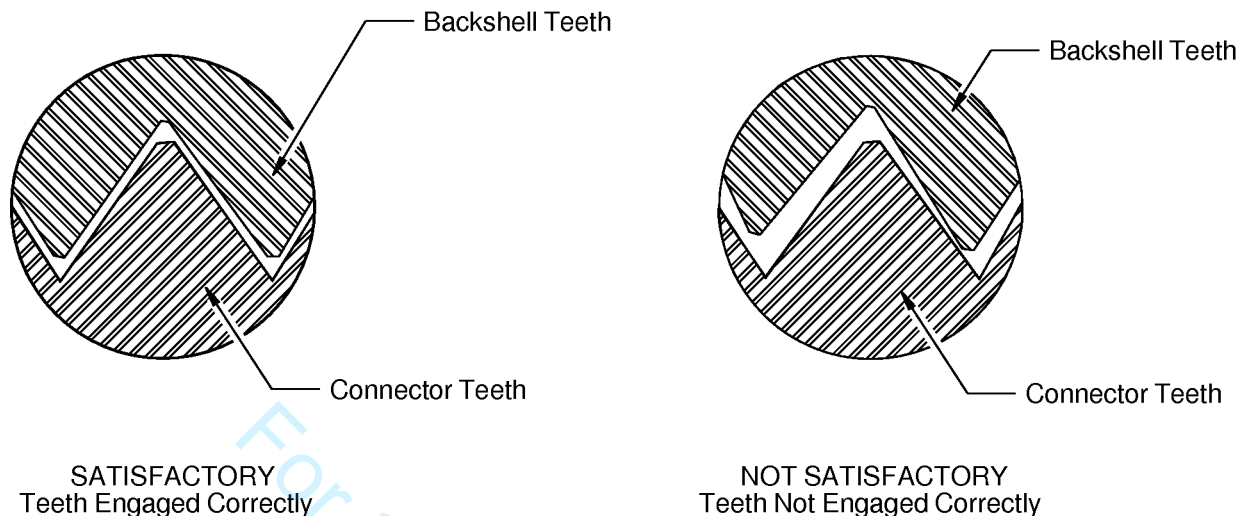
Make sure that the shield ground wires of all the cables come out of the rear end of the backshell.

- (2) Carefully, push and turn the backshell until the teeth of the backshell are fully engaged with the teeth of the connector.
- (3) Look in the inspection hole of the backshell adapter. Refer to Figure 14.

Make sure that the teeth of the backshell adapter are fully engaged with the teeth of the MIL-C-26500 connector.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE MIL-C-26500 TEETH AND THE BACKSHELL TEETH**  
Figure 14

- (4) Torque the backshell to the specified value in Table 6 with a torque wrench.

**Table 6**  
**BACKSHELL INSTALLATION TORQUE VALUES**

Shell Size	Torque (inch-pound)	
	Minimum	Maximum
28	180	200
24	180	200
22	180	200
20	180	200
18	150	170
16	150	170
14	150	170
12	90	110
10	90	110
8	90	110

#### F. Installation of the Glenair 687-062-0() Shield Terminator Band

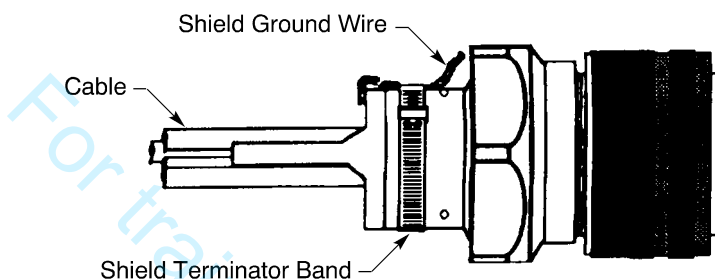
- (1) Make a selection of a shield terminator band from Table 2.
- (2) Put the band on the cable.

**STANDARD WIRING PRACTICES MANUAL**

**ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS**

- (3) Put each shield ground wire on the outer surface of the backshell so that the shield ground wires:
  - Are parallel to the longitudinal axis of the connector backshell
  - Are even and symmetrical around the circumference of the backshell
  - Do not make an overlap with another shield ground wire.
- (4) Push the shield terminator band toward the connector until:
  - The band is on the ribbed area on the rear of the backshell
  - There are no shield ground wires under the clamp components.

Refer to Figure 15.



**POSITION OF THE SHIELD TERMINATOR BAND ON THE BACKSHELL**

**Figure 15**

- (5) Torque the shield terminator band to the applicable torque in Table 7.

**Table 7**

**SHIELD TERMINATOR BAND INSTALLATION TORQUE VALUES**

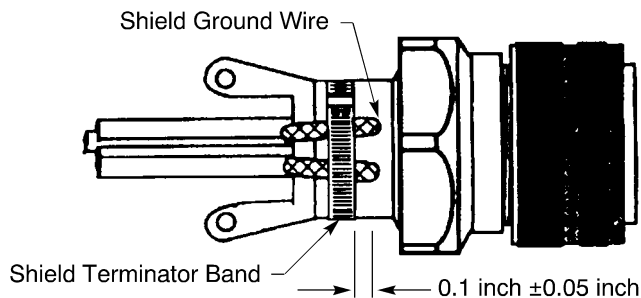
Shell Size	Torque (inch-pound)	
	Minimum	Maximum
28	45	55
24	45	55
22	45	55
20	45	55
18	45	55
16	45	55
14	15	25
12	15	25
10	15	25
08	15	25

- (6) If the free end of the shield terminator band is more than 0.4 inch from the end of the screw head, bend the free end of the band so that the distance from the end of the band to the body of the clamp is 0.02 inch or less.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

- (7) Cut each shield ground wire so that the end of each wire is 0.1 inch  $\pm$  0.05 inch from the edge of the band. Refer to Figure 16.

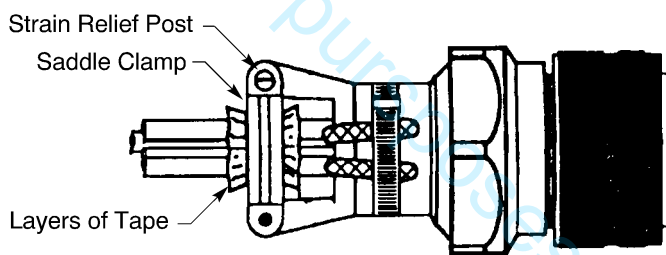


**POSITION OF THE END OF THE SHIELD GROUND WIRES**  
Figure 16

- (8) Put the necessary layers of insulation tape on the cable so that the outer diameter of the cable is increased. Refer to Figure 17.

Make sure that:

- The tape is in the location where the saddle clamp holds the cable
- The outer diameter of the cable is equal to the inner diameter of the cable clamps
- The clamp will hold the cable satisfactorily.



**POSITION OF THE INSULATION TAPE ON THE CABLE**  
Figure 17

- (9) Tighten the cable clamps.

**STANDARD WIRING PRACTICES MANUAL****ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS**

Make sure that:

- The inner surface of the cable clamps is against the outer surface of the strain relief posts on the backshell
- The cable clamps hold the cable tightly, but does not cut into the cable jacket.

**4. ASSEMBLY OF THE S280W603 BACKSHELL**

This paragraph gives the procedure to assemble and attach the shield ground wires of these shields to a backshell:

- The shield of a wire or a cable
- The adjacent shields of a wire or a cable.

**A. Cable Preparation**

- (1) For the assembly of a shield ground wire, make a selection of:
  - A shield ground wire with a Shield Pull Through
  - A shield ground wire with a Solder Sleeve if the shield is not nickel or nickel plated.
- (2) For the assembly of the shield ground wire with a Shield Pull Through:
  - (a) Remove a 4.0 inch  $\pm$  0.2 inch length of the outer jacket from the end of the cable.
  - (b) Assemble a shield ground wire with a Shield Pull Through. Refer to Subject 20-10-15.  
Make sure that the shield ground wire is pointed back away from the end of the cable.
- (3) For the assembly of the shield ground wire with a Solder Sleeve:
  - (a) Remove a 1.5 inch  $\pm$  0.1 inch length of the outer jacket from the end of the cable.
  - (b) Remove 1.25 inches  $\pm$  0.10 inch from the end of the shield.
  - (c) Assemble a shield ground wire with a solder sleeve that has an uninsulated integral wire. Refer to Subject 20-10-15.

Make sure that the shield ground wire is pointed back away from the end of the cable.

**B. Connector Assembly**

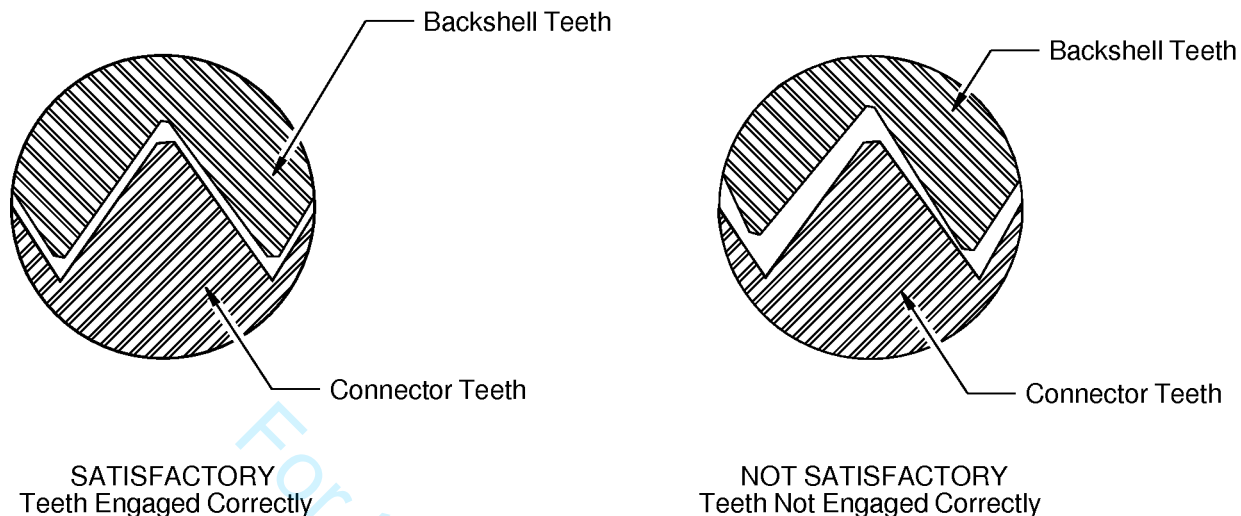
- (1) Put the all the applicable cables through backshell.
- (2) Assemble the connector. Refer to the applicable Subject for the connector.

**C. Backshell Installation**

- (1) Put the shield ground wires against each cable so that the wires are:
  - Flat and symmetrical around the circumference of each cable
  - Aligned with the longitudinal axis of each cable.
- (2) Push the backshell over the wires of the cables and the shield ground wires until the backshell is against the rear of the connector.  
Make sure that each shield ground wire comes out of the end of the backshell that has the cable retention clamps.
- (3) Carefully, push and turn the backshell until the teeth of the backshell are fully engaged with the teeth of the connector.
- (4) Look in the inspection hole of the backshell adapter. Refer to Figure 18.  
Make sure that the teeth of the backshell adapter are fully engaged with the teeth of the MIL-C-26500 connector.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE MIL-C-26500 TEETH AND THE BACKSHELL TEETH**  
**Figure 18**

- (5) Torque the backshell to the specified value in Table 8 with a torque wrench.

**Table 8**  
**BACKSHELL INSTALLATION TORQUE VALUES**

Shell Size	Torque (inch-pound)	
	Minimum	Maximum
28	180	200
24	180	200
22	180	200
20	180	200
18	150	170
16	150	170
14	150	170
12	90	110
10	90	110
8	90	110

#### D. Installation of the BACB42F() Shield Terminator Band

- (1) Pull the shield ground wires through the slots in the backshell with a plastic awl or an equivalent tool.
- (2) Carefully, pull the free ends of the shield ground wires tightly so that the wires are not loose inside the backshell.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

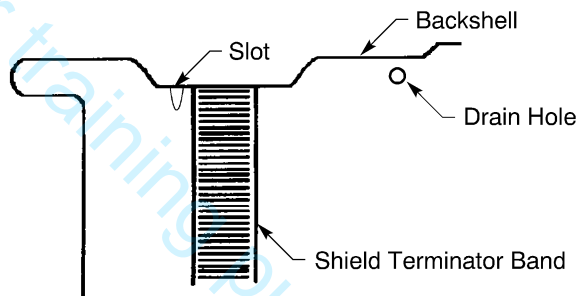
- (3) Put the shield ground wires around on the outer surface of the backshell so that the wires:
  - Are even and symmetrical around the outer surface of the backshell
  - Do not make an overlap with another shield ground wire.
- (4) Make a selection of a shield terminator band from Table 3.
- (5) Attach the shield terminator band to the backshell.

Refer to:

- Figure 19 for the location of the installation
- Paragraph 11. for the installation procedure.

Make sure that:

- The band does not move the position of the shield ground wires
- The buckle of the band is not over a shield ground wire on the backshell
- The buckle of the band is not over a slot in the backshell.



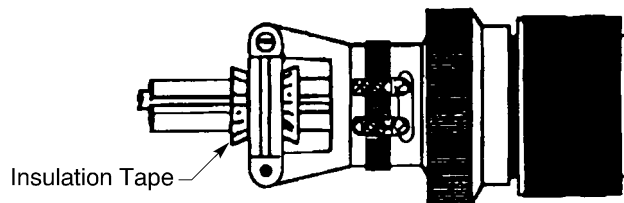
**POSITION OF THE SHIELD TERMINATOR BAND ON THE BACKSHELL**

**Figure 19**

- (6) Fold the shield ground wires back across the shield terminator band.
- (7) Cut the ends of the shield ground wires so that end of each wire is aligned with the edge of the band that is adjacent to the connector.
- (8) To prevent the abrasive movement of the cable under the clamp, install either of these types of protection at the location of the clamp on the cable or cables:
  - A BACI12Z insert
  - The sufficient layers of insulation tape.

If the protection is insulation tape, make sure that the outer diameter of the cable and the insulation tape is sufficient for the clamp to hold the cable tightly.

Refer to Figure 20.



**POSITION OF THE INSULATION TAPE OR INSERT UNDER THE CABLE CLAMP**

**Figure 20**

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

- (9) Tighten the cable clamps.

Make sure that the inner surface of the clamp is against the outer surface of the strain relief posts on the backshell.

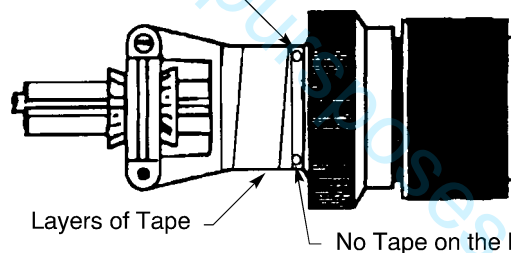
#### E. Insulation of the Shield Terminator Band

- (1) Clean the area of the electrical connection of the shield terminator band and the backshell with isopropyl alcohol. Refer to Figure 19.
- (2) Cut the sufficient length Scotch 70 insulation tape to put two layers of tape around the circumference of the backshell and shield terminator band.
- (3) Cut the length of tape again so that the width is 0.4 inch  $\pm$  0.1 inch.
- (4) Put the two layers of tape around the circumference of the shield terminator band and the backshell so that:
  - Each layer of tape makes a small overlap
  - The tape is on the band termination area
  - The tape is on the body of the backshell on the both sides of the shield terminator band termination.

Refer to Figure 21.

**CAUTION:** DO NOT PUT THE TAPE OVER THE DRAIN HOLES IN THE BACKSHELL. DAMAGE TO THE CONNECTOR CAN OCCUR.

No Tape on the Drain Hole



**POSITION OF THE INSULATION TAPE ON THE BACKSHELL**

**Figure 21**

- (5) Apply a 0.02 inch thick, continuous layer of DC 3145 RTV adhesive sealant on the electrical connection with a clean spatula.

Refer to Figure 22.

Make sure that the layer of adhesive sealant:

- Is over the surface and the edges of the tape
- Is over the surface of the backshell from the edge of the tape that is adjacent to the connector to the forward edge of the strain relief of the backshell
- Has no cracks or openings to the surface of the insulation tape or the surface of the backshell.

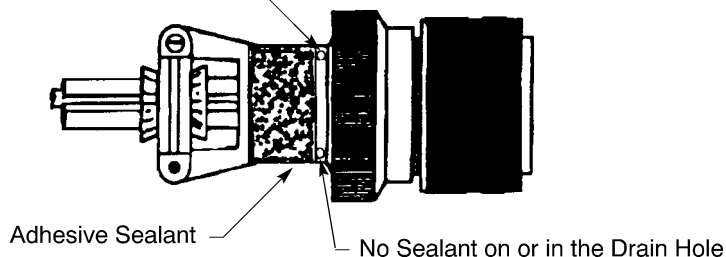
## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

**CAUTION:** DO NOT PUT THE ADHESIVE SEALANT IN OR ON THE DRAIN HOLES IN THE BACKSHELL. DAMAGE TO THE CONNECTOR CAN OCCUR.

**NOTE:** It is acceptable if the layer of sealant is not smooth or symmetrical.

No Sealant on or in the Drain Hole



#### LOCATION OF THE ADHESIVE SEALANT

Figure 22

#### 5. ASSEMBLY OF THE S280W604 BACKSHELL

**NOTE:** This procedure is not applicable for assembly of S280W604 backshells on S280W501 cable. Refer to Subject 20-14-11 for the assembly procedure for S280W604 backshells on S280W501 cable.

This paragraph gives the procedure to:

- Attach the shield of a primary cable to a backshell
- Attach the adjacent shields of a primary cable to a backshell
- Assemble the shield ground wires of each shielded wire or cable in the primary cable and attach them to a backshell
- Assemble the shield ground wires of each shielded wire or cable with adjacent shields in the primary cable and attach them to a backshell.

##### A. Cable Preparation

Table 9  
PRIMARY CABLE JACKET REMOVAL LENGTH

Shell Size	Backshell Configuration	Removal Length (inch)	
		Target	Tolerance
22	Straight	2.0	± 0.05
	45 Degrees	2.3	
	90 Degrees	3.2	
20	Straight	2.0	± 0.05
	45 Degrees	2.3	
	90 Degrees	3.2	

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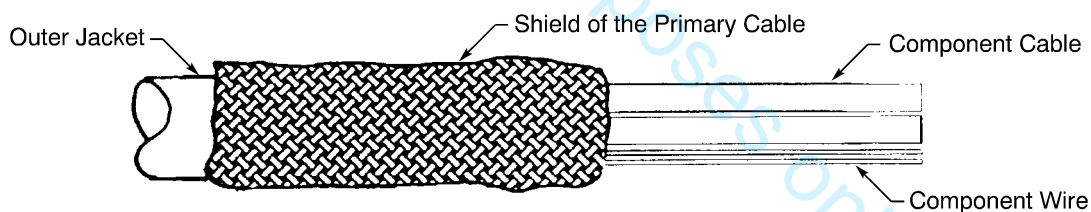
# STANDARD WIRING PRACTICES MANUAL

## ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Table 9 (continued)

Shell Size	Backshell Configuration	Removal Length (inch)	
		Target	Tolerance
18	Straight	2.0	± 0.05
	45 Degrees	2.3	
	90 Degrees	3.2	
16	Straight	2.0	± 0.05
	45 Degrees	2.3	
	90 Degrees	3.0	
14	Straight	2.0	± 0.05
	45 Degrees	2.3	
	90 Degrees	3.0	
12	Straight	2.0	± 0.05
	45 Degrees	2.3	
	90 Degrees	3.0	

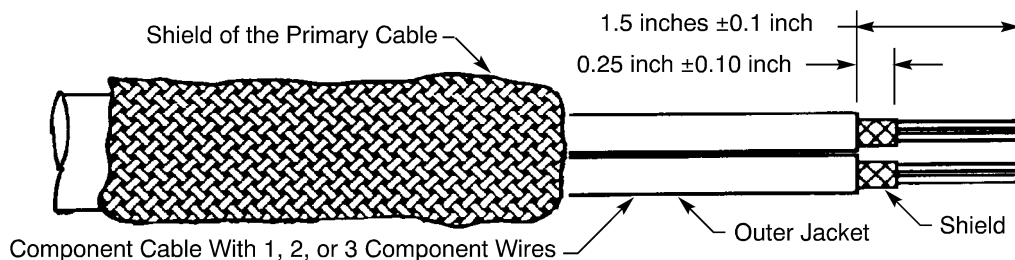
- (1) Put the strain relief adapter on the cable.
- (2) Remove the necessary length of the outer jacket from the end of the primary cable. Refer to Table 9.
- (3) Fold the shield or shields of the primary cable back on the outer jacket. Refer to Figure 23.


**POSITION OF THE SHIELD**
**Figure 23**

- (4) If inner shielded cables exist, remove 1.5 inches ± 0.1 inch of the outer jacket of each inner cable.
- (5) Remove the necessary length of the shield from each inner cable to make the distance from the end of the outer jacket to the end of the shield equal to 0.25 inch ± 0.10 inch. Refer to Figure 24.

# STANDARD WIRING PRACTICES MANUAL

## ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

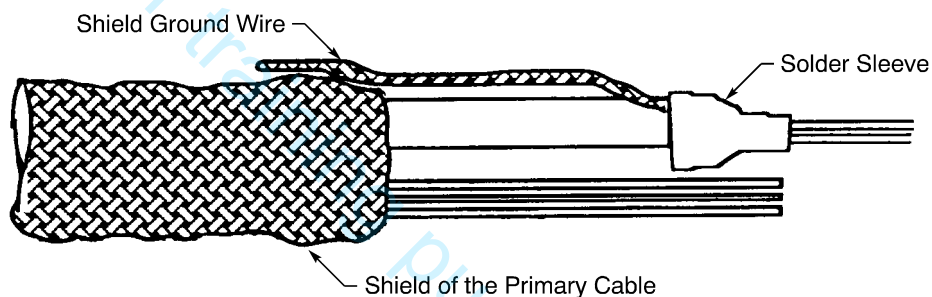


### PREPARATION OF THE INNER CABLES

Figure 24

- (6) Assemble a shield ground wire with a solder sleeve that has an uninsulated integral wire on each inner cable. Refer to Figure 25 and Subject 20-10-15.

Make sure the shield ground wire is pointed back away from the end of the cable.

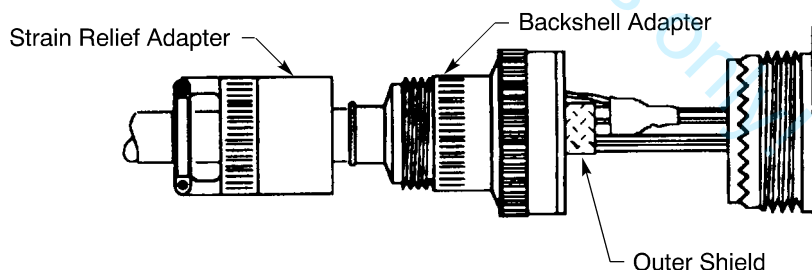


### POSITION OF THE SOLDER SLEEVE AND SHIELD GROUND WIRE

Figure 25

- (7) Put the backshell adapter on the cable. Refer to Figure 26.

Make sure that the forward end of the adapter is against the shield of the primary cable.



### POSITION OF THE BACKSHELL ADAPTER

Figure 26

## B. Connector Assembly

- (1) Assemble the connector. Refer to the applicable Subject for the connector.

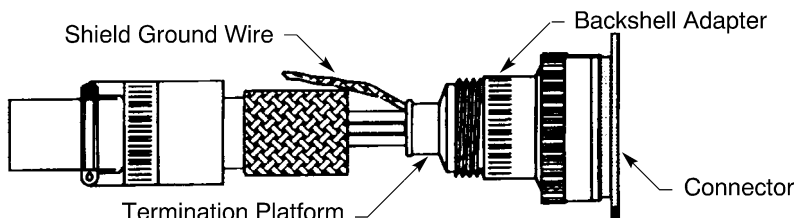
## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

#### C. Backshell Installation

- (1) Push the backshell adapter over the wires of the cables and the shield ground wires until the adapter is against the rear of the connector. Refer to Figure 27.

Make sure that the end of each shield ground wire is through the backshell adapter.

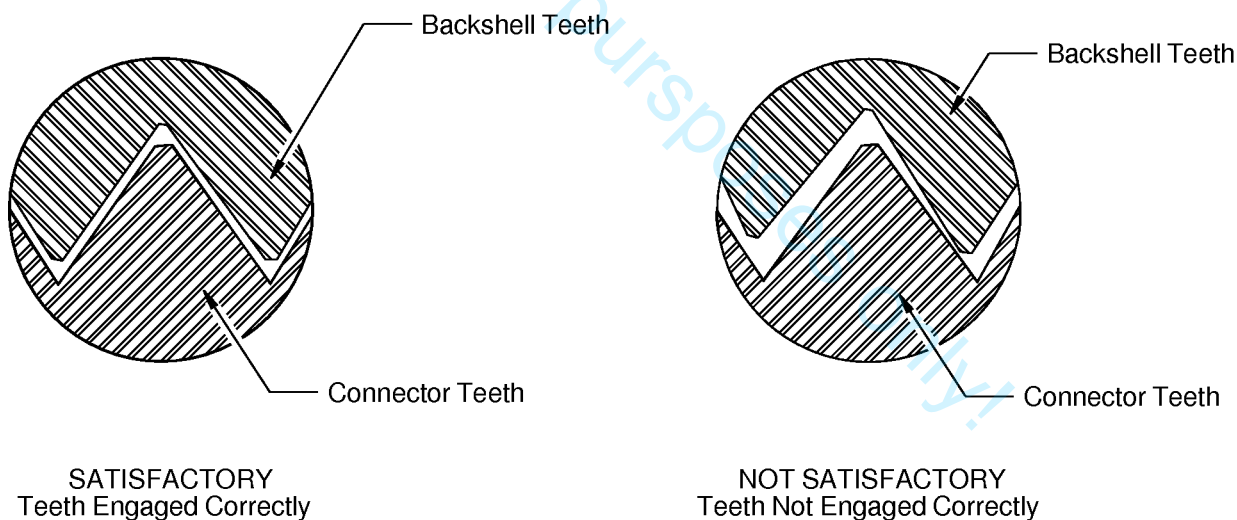


**BACKSHELL ADAPTER AND SHIELD GROUND WIRES**

**Figure 27**

- (2) Carefully, push and turn the backshell adapter until the teeth of the adapter are fully engaged with the teeth of the connector.
- (3) Look in the inspection hole of the backshell adapter. Refer to Figure 28.

Make sure that the teeth of the backshell adapter are fully engaged with the teeth of the MIL-C-26500 connector.



**POSITION OF THE MIL-C-26500 TEETH AND THE BACKSHELL TEETH**

**Figure 28**

- (4) Torque the backshell to the specified value in Table 10 with a torque wrench.

**NOTE:** Do not install lockwire to hold the backshell adapter in position on the connector.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Table 10  
BACKSHELL INSTALLATION TORQUE VALUES

Shell Size	Torque (inch-pound)	
	Minimum	Maximum
28	120	130
24	115	125
22	115	125
20	115	125
18	105	115
16	80	90
14	70	80
12	55	65
10	40	50
8	32	42

#### D. Installation of the BACB42F() Shield Terminator Band

- (1) Fold each shield ground wire back over the termination platform of the backshell adapter.

Make sure that the shield ground wires:

- Are even and symmetrical around the platform
- Do not make an overlap with another shield ground wire.

- (2) Push the end of the shield or shields of the primary cable onto the termination platform.

Make sure that the end of the shield is:

- Aligned with the forward edge of the termination platform
- Over the shield ground wires
- Smooth.

- (3) Make a selection of a shield terminator band from Table 3.

- (4) Attach the shield terminator band to the backshell.

Refer to:

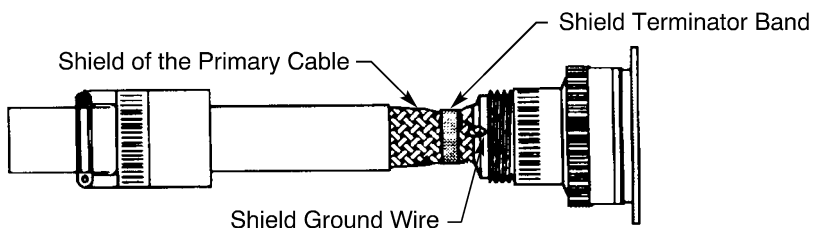
- Figure 29 for the location of the installation
- Paragraph 11. for the installation procedure.

Make sure that:

- The band is on the knurled or ribbed area of the termination platform
- The buckle of the band is not over a shield ground wire on the backshell.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

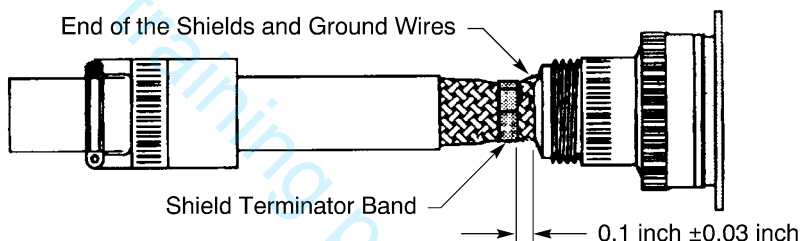


**POSITION OF THE TERMINATOR BAND ON THE BACKSHELL ADAPTER**

**Figure 29**

- (5) Cut the unwanted length of the shield or shields of the primary cable and the shield ground wires to make the distance from the forward edge of the band and the end of the shield and wires equal to 0.10 inch  $\pm$  0.03 inch.

Refer to Figure 30.



**POSITION OF THE SHIELD AND THE SHIELD GROUND WIRES**

**Figure 30**

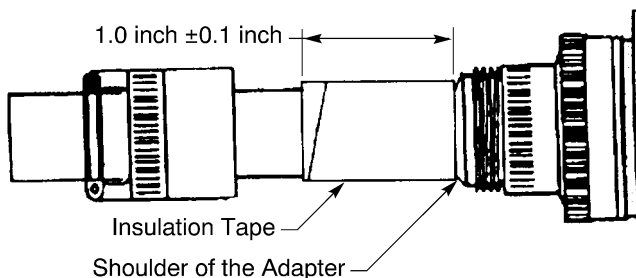
#### E. Insulation of the Shield Terminator Band

- (1) Clean these areas of the electrical connection of the shield terminator band with isopropyl alcohol:
  - The shoulder of the backshell adapter
  - The shield terminator band
  - The shield of the primary cable
  - The outer jacket of the primary cable.
- (2) Cut the sufficient length of Scotch 70 insulation tape to put a layer of the tape around the circumference of the area of the electrical connection.
- (3) Cut the length of tape again so that the width is 0.75 inch  $\pm$  0.10 inch.
- (4) Put the layer of tape on the backshell so that the tape:
  - Makes a small overlap
  - Is on the band termination area
  - Extends 1.0 inch  $\pm$  0.1 inch from the shoulder of the backshell adapter to the outer jacket of the primary cable.

Refer to Figure 31.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE INSULATION TAPE ON THE BACKSHELL**

**Figure 31**

- (5) Apply a 0.02 inch thick, continuous layer of DC 3145 RTV adhesive sealant on the electrical connection with a clean spatula.

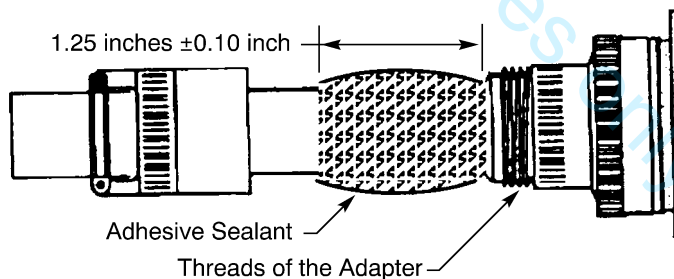
Refer to Figure 32.

Make sure that layer of adhesive sealant:

- Is on the surface and the edges of the insulation tape
- Increases the outside diameter of the cable to a size that is less than the inside diameter of the backshell
- Has no cracks or openings to the surface of the insulation tape or the surface of the backshell.

**CAUTION:** ADHESIVE SEALANT MUST NOT BE APPLIED ON THE THREADS OF THE BACKSHELL ADAPTER. THE THREADS OF STRAIN RELIEF ADAPTER WILL NOT ENGAGE THE THREADS OF THE BACKSHELL ADAPTER.

**NOTE:** It is acceptable if the layer of sealant is not smooth or symmetrical.



**LOCATION OF THE ADHESIVE SEALANT**

**Figure 32**

- (6) Cure the sealant at room temperature for 3 hours minimum.

**NOTE:** If the relative humidity is lower than 30 percent, the time for the sealant to fully cure will be longer than normal.

Until the sealant is fully cured, do not:

- Do any other work on the assembly
- Put the assembly in a package.

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## STANDARD WIRING PRACTICES MANUAL

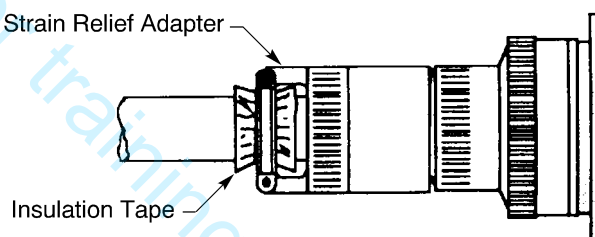
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

#### F. Installation of the Strain Relief Adapter

- (1) Push the strain relief adapter until it is against the backshell adapter.
- (2) Engage the threads of the strain relief adapter and the threads of the backshell adapter.
- (3) Turn the strain relief adapter until it stops.
- (4) To prevent the abrasive movement of the cable under the clamp, install either of these types of protection at the location of the clamp on the cable or cables:
  - A BACI12Z insert
  - The sufficient layers of insulation tape.

If the protection is insulation tape, make sure that the outer diameter of the cable and the insulation tape is sufficient for the clamp to hold the cable tightly.

Refer to Figure 33.



**POSITION OF THE INSULATION TAPE OR INSERT UNDER THE CABLE CLAMP**

**Figure 33**

- (5) Tighten the cable clamps.

Make sure that the inner surface of the clamp is against the outer surface of the strain relief posts on the backshell.

#### 6. ASSEMBLY OF THE S280W604 BACKSHELL WITH POTTING COMPOUND

**NOTE:** This procedure is not applicable for assembly of S280W604 backshells on S280W501 cable. Refer to Subject 20-14-11 for the assembly procedure for S280W604 backshells on S280W501 cable.

This paragraph gives the procedure to assemble and seal each connector and backshell on both ends of the wire harness.

#### A. Necessary Materials

**Table 11**  
**NECESSARY MATERIALS**

Material	Part Number or Specification
Potting Compound	MIL-PRF-8516 Type II Class 2
Shield Material	BAC3108
Sleeve, Insulation	DWP-125
Sleeve, Protection	TFE 4X
Sleeve, Fuel Resistant	DR-25

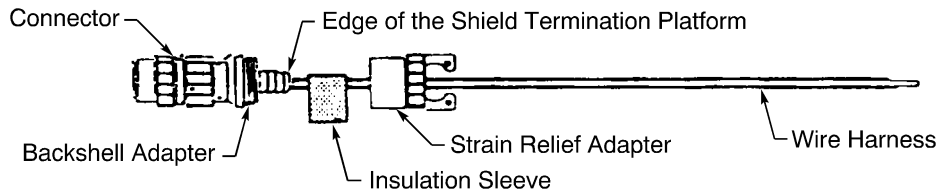
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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

**NOTE:** For sizes and suppliers of shield materials and sleeves, refer to Subject 20-00-11.

#### B. Assembly of the First Connector



**CONNECTOR ASSEMBLY**  
Figure 34

- (1) Prepare the cable. Refer to Paragraph 5.A..
- (2) Make a selection of an insulation sleeve from Table 11.  
**NOTE:** For alternative insulation sleeves, refer to Subject 20-00-11.
- (3) Put the backshell on the cable.
- (4) Put a 1.25 inch  $\pm 0.06$  inch length of 1 inch diameter insulation sleeve on the cable. Refer to Figure 34.
- (5) Assemble the connector. Refer to the applicable Subject for the connector.

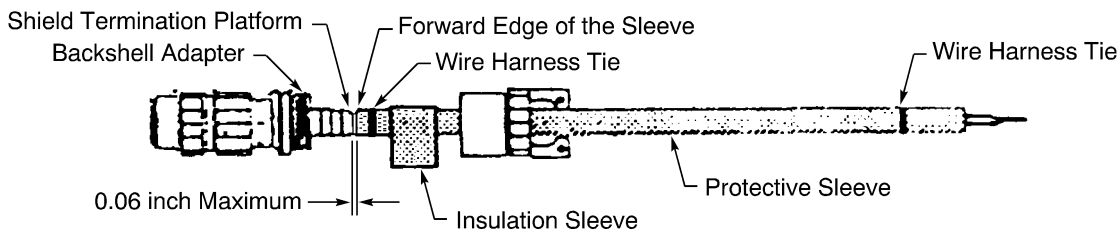
#### C. Assembly of the First Backshell

- (1) Push the backshell adapter over the wires of the cable and each shield ground wire until the adapter is against the rear of the connector. Refer to Figure 27.  
Make sure that the end of each shield ground wire is through the backshell adapter.
- (2) Carefully, push and turn the backshell adapter until the teeth of the adapter are fully engaged with the teeth of the connector.
- (3) Look in the inspection hole of the backshell adapter. Refer to Figure 28.  
Make sure that the teeth of the backshell adapter are fully engaged with the teeth of the connector.
- (4) Torque the backshell to the specified value in Table 10 with a torque wrench.

**NOTE:** Do not install lockwire to hold the backshell adapter in position on the connector.

#### D. Installation of the Wire Harness Protection

- (1) Install a protective sleeve on the cable. Refer to Figure 35.

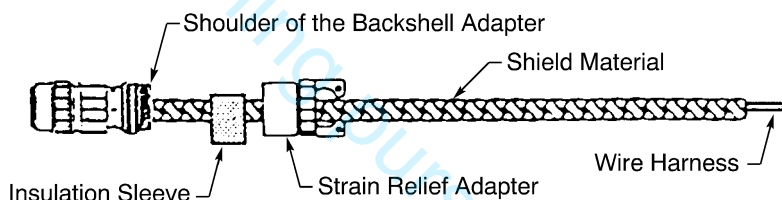


**POSITION OF THE PROTECTIVE SLEEVE ON THE WIRE HARNESS**  
Figure 35

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

- (a) Make a selection of a protective sleeve from Table 11.  
Make sure that the protective sleeve has a diameter that is sufficiently large to move over the wire harness.
  - NOTE: For alternative protective sleeves, refer to Subject 20-00-11.
  - (b) Cut the necessary length of the protective sleeve. Refer to Figure 39.  
Make sure that the length of the protective sleeve is equal to the distance:
    - From the edge of the shield termination platform of the backshell adapter at one end of the wire harness
    - To the edge of the shield termination platform of the backshell adapter at the other end of the wire harness.
  - (c) Put the protective sleeve on the wire harness through the strain relief adapter and the insulation sleeve.  
Make sure that the distance between the edge of the shield termination platform and the protective sleeve is 0.06 inch maximum.
  - (d) Assemble a temporary wire harness tie on each end of the protective sleeve.
- (2) Install a shield on the wire harness. Refer to Figure 36.



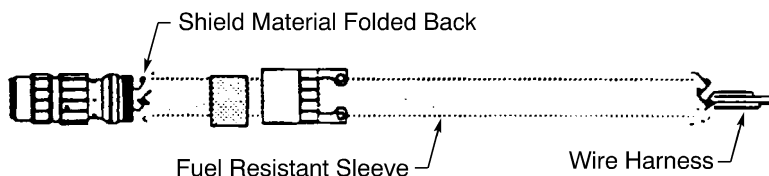
**POSITION OF THE SHIELD MATERIAL ON THE WIRE HARNESS**

**Figure 36**

- (a) Make a selection of a shield material from Table 11.  
Make sure that the shield material has a diameter that is sufficiently large to move over the sleeve on the wire harness.
  - NOTE: For alternative shield materials, refer to Subject 20-00-11.
  - (b) Cut the necessary length of the shield material. Refer to Figure 39.  
Make sure that the length of the shield material is 10 percent longer than the distance:
    - From the shoulder of the backshell adapter on one end of the wire harness
    - To the shoulder of the backshell adapter on the other end of the wire harness.
  - (c) Put the shield material on the wire harness through the strain relief adapter and the adhesive sleeve.  
Make sure that the shield termination platform is between the shield and the wire harness.
- (3) Install a fuel resistant sleeve on the wire harness. Refer to Figure 37.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

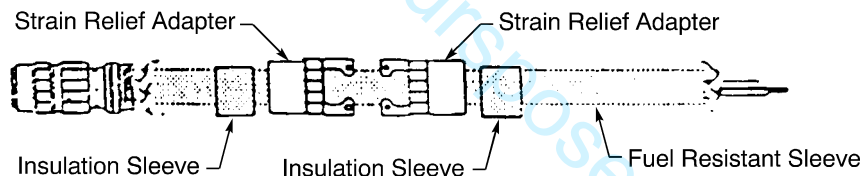


**POSITION OF THE FUEL RESISTANT SLEEVE ON THE WIRE HARNESS**

**Figure 37**

- (a) Make a selection of a fuel resistant sleeve from Table 11. Make sure that the fuel resistant sleeve has a diameter that is sufficiently large to move over the shield.
- (b) Cut the necessary length of the fuel resistant sleeve. Refer to Figure 39.  
Make sure that the length of the fuel resistant sleeve is 10 percent longer than the distance:
  - From the shield termination platform of the backshell adapter at one end of the wire harness
  - To the shield termination platform of the backshell adapter at the other end of the wire harness.
- (c) Put the fuel resistant sleeve on the wire harness through the strain relief adapter and adhesive sleeve.
- (4) If the shield material is longer than the fuel resistant sleeve, fold the shield material back over the ends of the sleeve at both ends of the wire harness.

#### E. Assembly of the Second Connector



**POSITION OF THE STRAIN RELIEF ADAPTERS ON THE WIRE HARNESS**

**Figure 38**

- (1) Prepare the cable. Refer to Paragraph 5.A.
- (2) Make a selection of an insulation sleeve from Table 11.  
**NOTE:** For alternative insulation sleeves, refer to Subject 20-00-11.
- (3) Put the backshell on the cable.
- (4) Put a 1.25 inch  $\pm 0.06$  inch length of 1 inch diameter insulation sleeve on the cable. Refer to Figure 38.
- (5) Assemble the connector. Refer to the applicable Subject for the connector.

#### F. Assembly of the Second Backshell

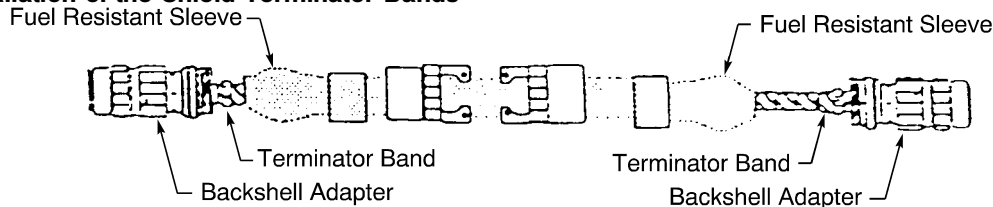
- (1) Push both ends of the fuel resistant sleeve back approximately 2 inches from each end of the wire harness.
- (2) Remove the temporary wire harness ties at each end of the protective sleeve. Refer to Figure 35.
- (3) Assemble the backshell. Refer to Paragraph 6.C.

# 20-25-14

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

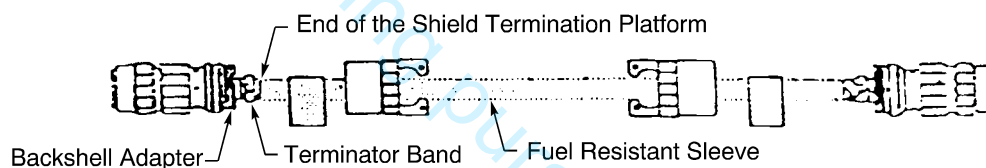
#### G. Installation of the Shield Terminator Bands



#### POSITION OF THE SHIELD TERMINATOR BANDS

**Figure 39**

- (1) Install the terminator band on the shield at each end of the wire harness.  
Refer to Figure 39 and Paragraph 5.D.
- (2) Shrink the fuel resistant sleeve into its position. Refer to Subject 20-10-14.  
Make sure that the heat is applied from the center of the wire harness toward the ends.
- (3) Remove the length of the fuel resistant sleeve that makes an overlap with the shield termination platform of the backshell adapters at each end of the wire harness.  
Refer to Figure 40.

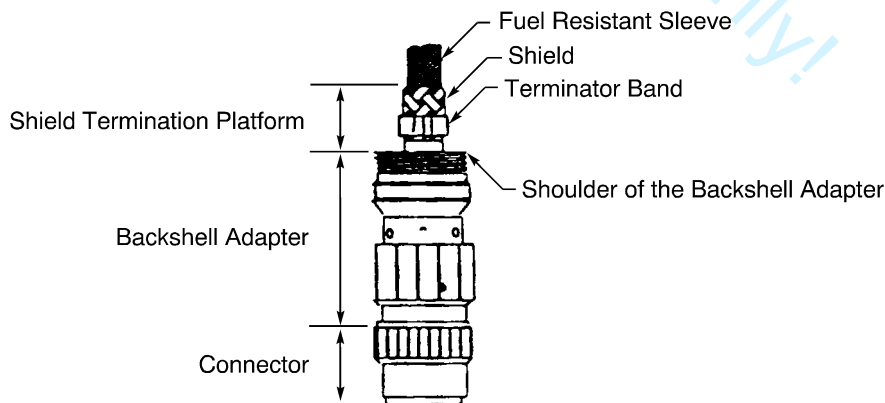


#### REMOVAL OF THE UNWANTED LENGTH OF THE FUEL RESISTANT SLEEVE

**Figure 40**

#### H. Seal of the Connector Assembly with Potting Compound

- (1) Put the connector and the wire harness in the vertical position with the forward end of the connector pointed down. Refer to Figure 41.



#### POSITION OF THE CONNECTOR AND THE WIRE HARNESS

**Figure 41**

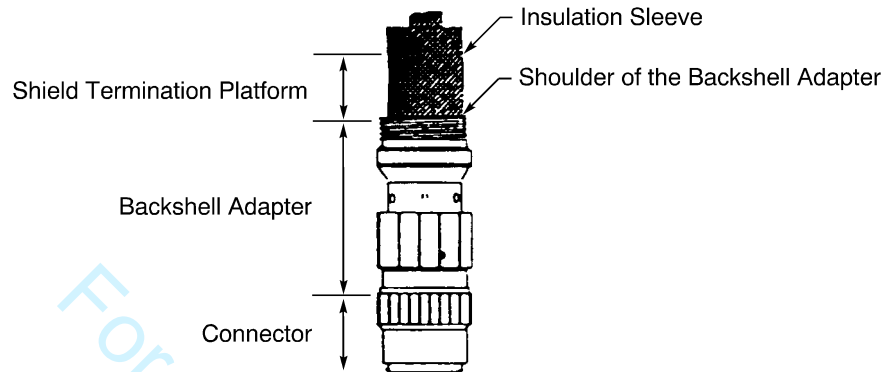
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- (2) Push the insulation sleeve over the shield termination platform until the edge of the sleeve is against the shoulder of the backshell adapter.

Refer to Figure 42.



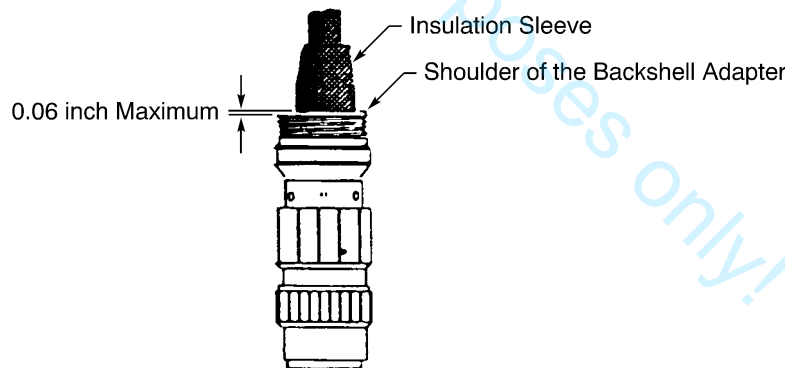
**POSITION OF THE INSULATION SLEEVE BEFORE THE HEAT IS APPLIED**

**Figure 42**

- (3) Shrink the insulation sleeve into its position. Refer to Subject 20-10-14 and Figure 43.

Make sure that:

- A downward force is lightly applied on the insulation sleeve as the heat is applied to keep the edge of the sleeve against the shoulder of the backshell adapter.
- The distance between the shoulder of the backshell adapter and the edge of the insulation sleeve is not greater than 0.06 inch.



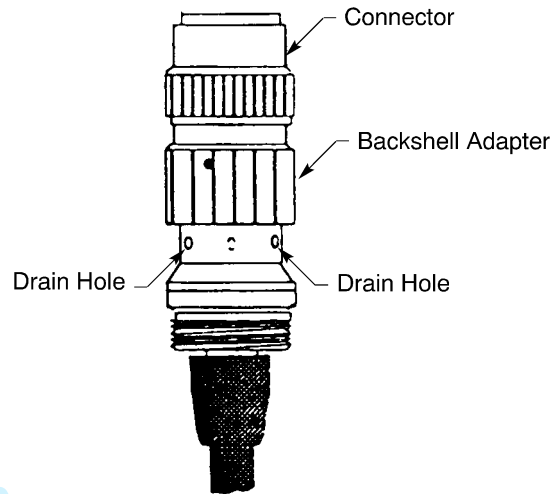
**POSITION OF THE INSULATION SLEEVE AFTER THE HEAT IS APPLIED**

**Figure 43**

- (4) Put the connector and the wire harness in the vertical position with the forward end of the connector pointed up. Refer to Figure 44.

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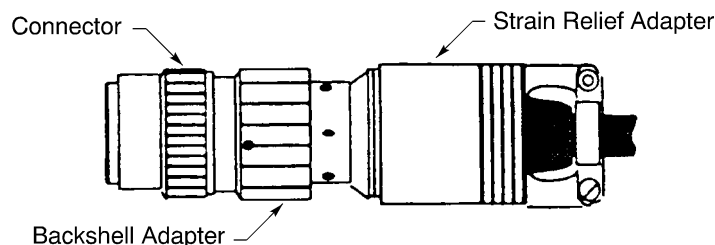
#### POSITION OF THE CONNECTOR AND THE WIRE HARNESS

Figure 44

- (5) Put a temporary layer of tape over one of the 3 drain holes in the side of the backshell adapter.
- (6) Make a selection of a potting compound from Table 11.
- (7) Put the potting compound into one of the remaining drain holes until the potting compound comes out the other remaining drain hole.
- (8) Remove the tape from the first drain hole.
- (9) Put more potting compound into the drain hole until the compound comes out all 3 drain holes.
- (10) Remove any unwanted potting compound from the assembly.
- (11) Let the potting compound cure for 24 hours.  
Make sure that the connector assembly stays in the vertical position.
- (12) Do Step (1) through Step (11) again for the connector assembly at the other end of the wire harness.

#### I. Installation of the Strain Relief Adapter

- (1) Install the strain relief adapter on the backshell adapter at each end of the wire harness. Refer to Figure 45 and Paragraph 5.F.



#### POTTED S280W604 BACKSHELL ASSEMBLY

Figure 45

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

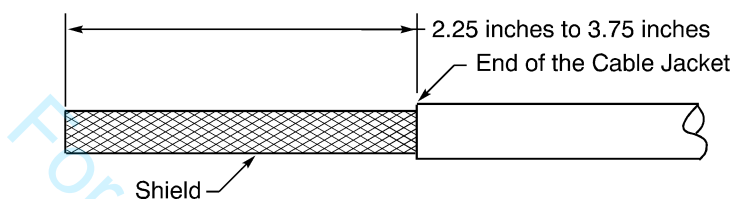
#### 7. ASSEMBLY OF THE GLENAIR 527-187() BACKSHELL ON A SHELL SIZE 1 ARINC 600 PLUG CONNECTOR

##### A. Preparation of Shielded Cables

This procedure is applicable for cables with shields that must be attached to the backshell.

- (1) Remove 2.25 inches minimum, to 3.75 inches maximum, of the jacket from the end of a shielded cable. Refer to Figure 46.

Make sure that the jacket removal length is different for each cable in the group of cables that have routing to each connector insert. Refer to Figure 47.



**CABLE PREPARATION**

**Figure 46**

- (2) Assemble a solder sleeve with an integral uninsulated shield ground wire on the shielded cable. Make sure that the rear end of the solder sleeve is on the end of the cable jacket. Refer to Subject 20-10-15 for the procedure to assemble the solder sleeves.
- (3) Do Step (1) and Step (2) again for each shielded cable.

##### B. Backshell Assembly

**Table 12  
NECESSARY MATERIALS**

Material	Part Number	Supplier
Sleeve, Heat Shrinkable	AMS-DTL-23053/12 Class 5	An available source
	RT850	Raychem
	RW175	Raychem
	TFE 4X	Chemplast
		Zeus
Tape, Insulation	Scotch 70	3M

- (1) Make a selection of a shield terminator band from Table 3 for each backshell wire entrance that has shielded wires.  
Use the outside diameter of the wire entrance of the backshell to make the selection.
  - (2) Make a selection of an insulation tape from Table 12.
  - (3) Make a selection of a heat shrinkable sleeve from Table 12.
- NOTE:** A satisfactory alternative to a heat shrinkable sleeve is a layer of insulation tape.
- (4) Put a 2.0 inch  $\pm 0.25$  inch length of heat shrinkable sleeve on each group of wires at each backshell wire entrance.

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Make sure that the sleeve has the smallest diameter that can easily move on the backshell wire entrance after the terminator band, and the insulation tape are installed.

**NOTE:** The diameter of the backshell entrance will be increased by the terminator band, and the layers of insulation tape.

- (5) Prepare the ends of the specified shielded cables. Refer to Paragraph 7.A.
- (6) Assemble the contacts on the ends of the wires. Refer to Subject 20-71-14.
- (7) Install the contacts in the connector. Refer to Subject 20-71-14.
- (8) Remove the ten screws on the rear of the connector shell that hold the insert retainer plates on the shell.

**NOTE:** Do not remove the insert retainer plates or the connector inserts.

- (9) Discard the screws.

**NOTE:** These screws do not have the sufficient length.

- (10) Install one half of the backshell on the rear of the connector with the screws and lockwashers supplied with the backshell.

Make sure that the retainer plate is between the connector shell and the backshell.

- (a) Align a screw and lockwasher with the applicable backshell installation hole in the backshell.
  - (b) Tighten the screw.
  - (c) Do Step (a) and Step (b) again for each remaining backshell installation screw.
- (11) Wind a sufficient number of layers of tape around the wire harness at each backshell wire entrance to increase the harness diameter to the diameter of the backshell wire entrance hole.
- (12) Install the other half of the backshell on the rear of the connector; Do Step (10) again.
- (13) Put the shield ground wires against the backshell around the circumference of the band termination platform. Refer to Figure 47.

Make sure that:

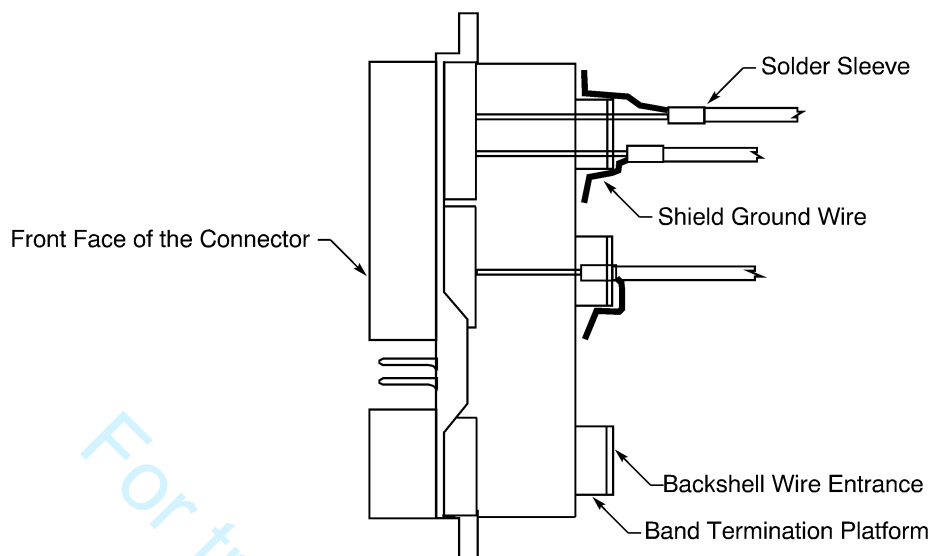
- The distance between each of the shield ground wires is equal around the band termination platform
- The shield ground wires do not make an overlap with each other.

**NOTE:** Tape can be used on the connector shell to temporarily hold the shield ground wires in their positions until the band is installed.

**CAUTION:** DO NOT PUT TAPE ON THE BAND TERMINATION PLATFORMS OF THE BACKSHELL.

## STANDARD WIRING PRACTICES MANUAL

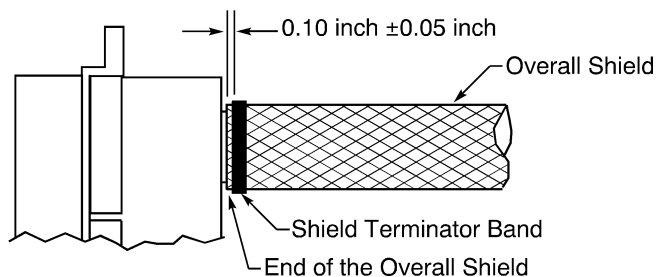
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



#### CONFIGURATION OF THE SHIELD GROUND WIRES ON THE BAND TERMINATION PLATFORMS OF THE BACKSHELL

Figure 47

- (14) If the wire harness has an overall shield:
  - (a) If the wire harness has a protective sleeve below the overall shield, assemble a wire harness tie on the protective sleeve approximately 2 inches from the rear end of the shield terminations.
  - (b) Pull the end of the overall shield forward on the band termination platform.
  - (c) If the band termination platform has shield ground wires on it, put the end of the overall shield braid on the shield ground wires against the band termination platform.
- (15) Install a shield terminator band on the band termination platform. Refer to Paragraph 11.  
Make sure that no tape is under the shield terminator band.
- (16) Remove the tape used to hold the shield ground wires in their positions.
- (17) Remove the unwanted length of the overall shield. Refer to Figure 48.  
Make sure that the length of the remaining shield braid is 0.10 inch  $\pm$  0.05 inch.



#### POSITION OF THE OVERALL SHIELD

Figure 48

- (18) If the band termination platform has shield ground wires installed, fold the shield ground wires back on the band and on the wire harness.

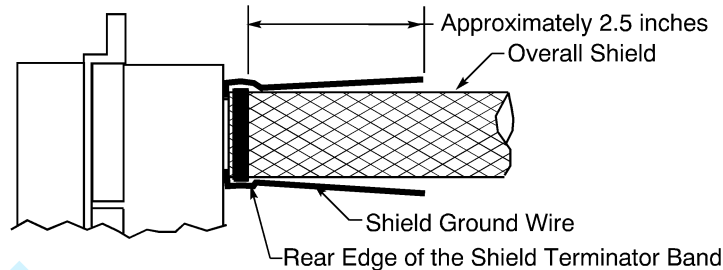
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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

- (19) Cut the ends of the shield ground wires. Refer to Figure 49.

Make sure that the remaining length of the shield ground wires is approximately 2.5 inches from the rear edge of the band.

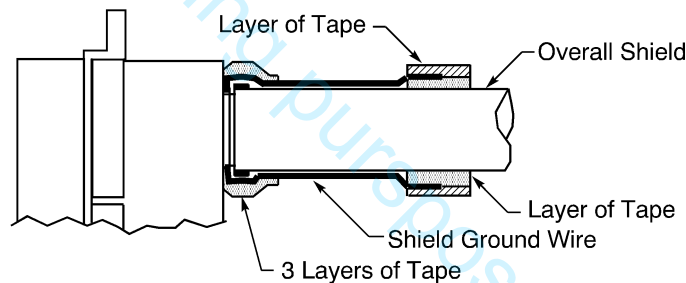


**POSITION OF THE SHIELD GROUND WIRES**

**Figure 49**

- (20) Wind a sufficient number of layers of insulation tape on the wire harness to hold the ends of the shield ground wires to the harness. Refer to Figure 50.

Make sure that the ends of the shield ground wires are between the layers of tape.



**POSITION OF THE INSULATION TAPE**

**Figure 50**

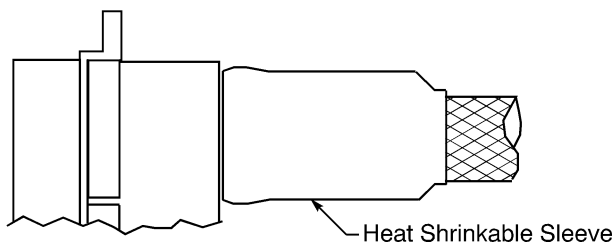
- (21) Wind a minimum of 3 layers of insulation tape on the shield terminator band. Refer to Figure 50.
- (22) If the wire harness has a protective sleeve on the overall shield:
- Pull the end of the protective sleeve forward on the band termination platform.
  - Assemble a wire harness tie on the protective sleeve and the band termination platform. Refer to Subject 20-10-11.
- (23) If a length of heat shrinkable sleeve is on the harness:
- Push the length of heat shrinkable sleeve forward until it is against the rear of the backshell. Make sure that the forward edge of the sleeve is against the rear surface of the backshell.
  - Shrink the sleeve into its position.

Refer to:

- Figure 51 for the location of the sleeve
- Subject 20-10-14 for the procedure to shrink a heat shrinkable sleeve.

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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE HEAT SHRINKABLE SLEEVE**

**Figure 51**

- (24) If a length of heat shrinkable sleeve is not on the harness, wind another layer of insulation tape on the harness.

Make sure that:

- The insulation tape wrap has a 50 percent overlap
- The insulation tape layers extend a minimum of 0.5 inch farther rearward than the ends of the shield ground wires.

- (25) Do Step (13) through Step (24) again for each backshell wire entrance.

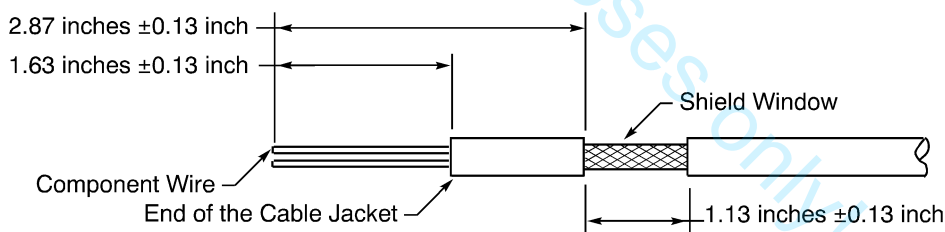
#### **8. ASSEMBLY OF THE GLENAIR 527-212() BACKSHELL ON A SHELL SIZE 2 ARINC 600 PLUG CONNECTOR WITH SHIELD TAPE**

##### **A. Preparation of Wires and Cables**

This procedure is applicable for specified wires, and cables with shields that must be attached to the backshell.

- (1) Prepare the ends of the specified shielded cables:

Refer to Figure 52.



**SHIELDED CABLE PREPARATION**

**Figure 52**

- At a distance of 2.87 inches  $\pm 0.13$  inch from the end of the cable, remove a 1.13 inch  $\pm 0.13$  inch length of the jacket from the shielded cable.
- Remove a 1.63 inches  $\pm 0.13$  inch length of the jacket and the shield from the end of the cable.
- Put a 0.5 inch  $\pm 0.1$  inch length of heat shrinkable sleeve on the forward end of the jacket. Refer to Figure 53.

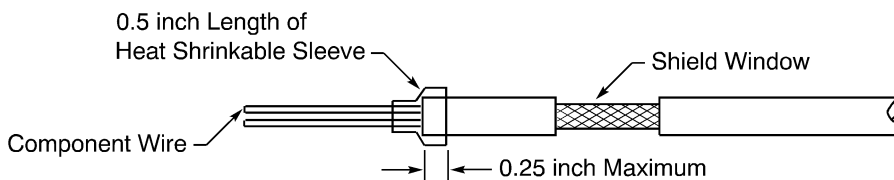
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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Make sure that:

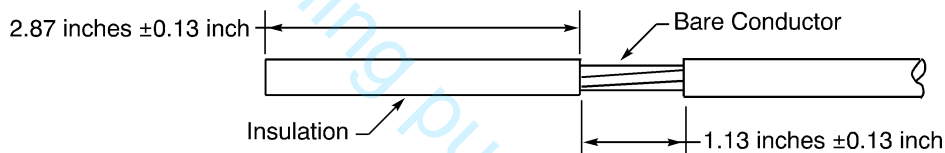
- The sleeve has the smallest diameter that can easily move on the cable
- The distance from the end of the jacket to the rear end of the sleeve is not more than 0.25 inch.



#### POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE SHIELDED CABLE

Figure 53

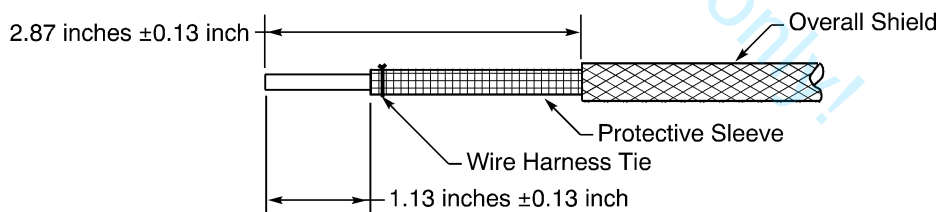
- (d) Shrink the sleeve into its position. Refer to Subject 20-10-14.
- (2) Prepare the specified single conductor wires:
  - (a) At a distance of 2.87 inches  $\pm 0.13$  inch from the end of the wire, remove a 1.13 inches  $\pm 0.13$  inch length of the insulation from the wire. Refer to Figure 54.



#### SINGLE CONDUCTOR WIRE PREPARATION

Figure 54

- (3) Prepare the ends of the specified coax cables that have a protective sleeve, and an overall shield:
  - (a) Remove the necessary length of the overall shield to make the distance from the end of the cable to the end of the overall shield equal to 2.87 inches  $\pm 0.13$  inch. Refer to Figure 55.



#### PREPARATION OF COAX CABLE THAT HAS A PROTECTIVE SLEEVE AND AN OVERALL SHIELD

Figure 55

- (b) Remove the necessary length of the protective sleeve to make the distance from the end of the cable to the end of the protective sleeve equal to 1.13 inches  $\pm 0.13$  inch. Refer to Figure 55.
- (c) Assemble a lacing tape wire harness tie near the end of the protective sleeve.

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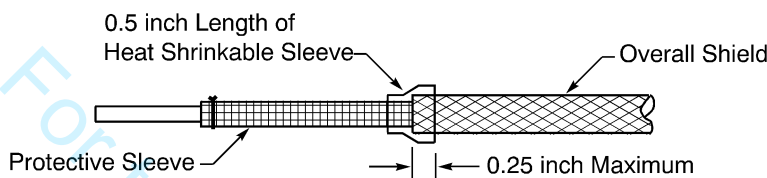
Refer to:

- Figure 55 for the location of the wire harness tie
- Refer to Subject 20-10-11 for the procedure to assemble a lacing tape wire harness tie.

- (d) Put a 0.5 inch  $\pm$  0.1 inch length of heat shrinkable sleeve on the forward end of the shield. Refer to Figure 56.

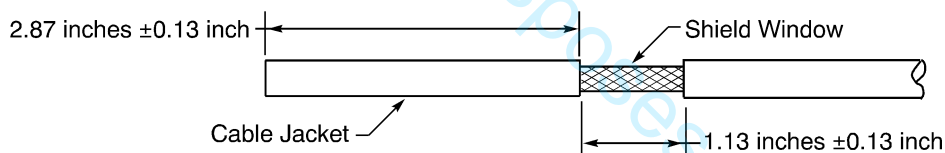
Make sure that:

- The sleeve has the smallest diameter that can easily move on the cable
- The distance from the end of the shield to the forward end of the sleeve is not more than 0.25 inch.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE COAX CABLE**  
Figure 56

- (e) Shrink the sleeve into its position. Refer to Subject 20-10-14.
- (4) Prepare the ends of the specified coax cables that do not have a protective sleeve, or an overall shield:
- (a) At a distance of 2.87 inches  $\pm$  0.13 inch from the end of the cable, remove a 1.13 inch  $\pm$  0.13 inch length of the jacket from the cable. Refer to Figure 57.



**COAX CABLE PREPARATION**  
Figure 57

#### B. Backshell Assembly

**Table 13**  
**NECESSARY MATERIALS**

Material	Part Number	Supplier
Sleeve, Heat Shrinkable	AMS-DTL-23053/12 Class 5	An available source
	RT850	Raychem
	RW175	Raychem
	TFE 4X	Chemplast
		Zeus

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Table 13 (continued)

Material	Part Number	Supplier
Tape, Insulation	P-440	Permacel
	Scotch 70	3M
	912-10	Arlon
Tape, Shield	Scotch 24	3M

Table 14

#### ALTERNATIVE SCREWS AND LOCKWASHERS

Description	Part Number	Supplier
Lockwasher	BACW10EC-04-CD	Boeing
Screw	NAS1801-04-5	An available source

Table 15

#### SUPPLIERS OF BOEING STANDARD LOCKWASHERS

Part Number	Supplier
BACW10EC()	Anillo
	Mellowes

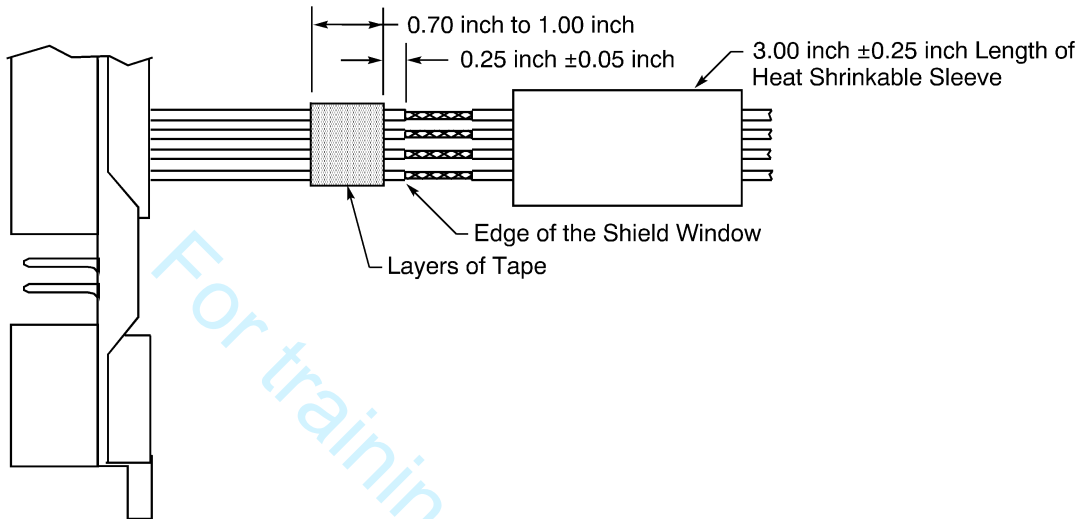
- (1) Make a selection of a shield terminator band from Table 3 for each backshell wire entrance.  
Use the outside diameter of the wire entrance of the backshell to make the selection.
- (2) Make a selection of a insulation tape from Table 13.
- (3) Make a selection of a shield tape from Table 13.
- (4) Make a selection of a heat shrinkable sleeve from Table 13.  
**NOTE:** A satisfactory alternative to a heat shrinkable sleeve is a layer of insulation tape.
- (5) Put a 3.00 inch  $\pm$  0.25 inch length of heat shrinkable sleeve on each group of wires at each backshell wire entrance.  
Make sure that the sleeve has the smallest diameter that can easily move on the backshell wire entrance after the shield tape, the terminator band, and the insulation tape are installed.  
**NOTE:** The diameter of the backshell entrance will be increased by the layers of shield tape, the terminator band, and the layers of insulation tape.
- (6) Prepare the ends of the specified wires and cables. Refer to Paragraph 8.A.
- (7) Assemble the contacts on the ends of the wires. Refer to Subject 20-71-14.
- (8) Install the contacts in the connector. Refer to Subject 20-71-14.
- (9) Wind a sufficient number of layers of insulation tape around the wire harness at each backshell wire entrance until the harness diameter is equal to the diameter of the backshell wire entrance hole. Refer to Figure 58.

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Make sure that:

- The distance from the rear edge of the layers of the insulation tape to the forward end of the shield windows is 0.25 inch  $\pm$  0.05 inch.
- The width of the layers of tape is 0.70 inch to 1.00 inch.

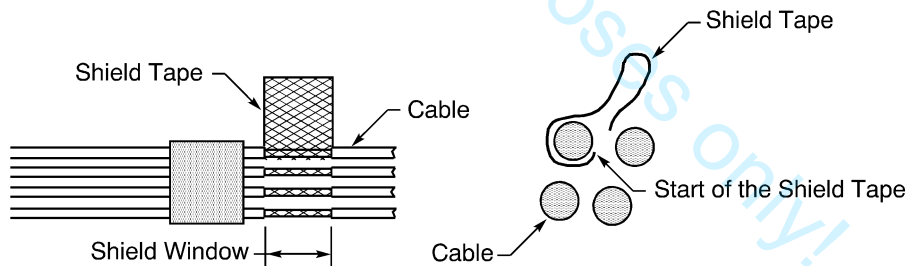


**POSITION OF THE LAYERS OF INSULATION TAPE**

**Figure 58**

- (10) Put the end of the shield tape on the shield window of one cable. Refer to Figure 59.

Make sure that the center of the shield tape is aligned with the center of the shield window.



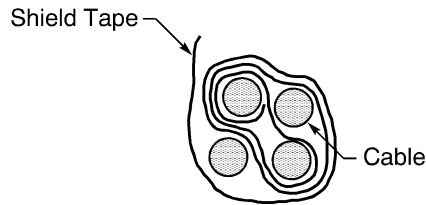
**POSITION OF THE SHIELD TAPE ON ONE CABLE**

**Figure 59**

- (11) Wind a layer of shield tape on the shield window of one wire. Refer to Figure 59.
- (12) Continue to wind the shield tape on the shield window of each wire. Refer to Figure 60.
- Make sure that the surface of the shield tape is against the shield of each cable.

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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



#### POSITION OF THE SHIELD TAPE IN THE HARNESS

Figure 60

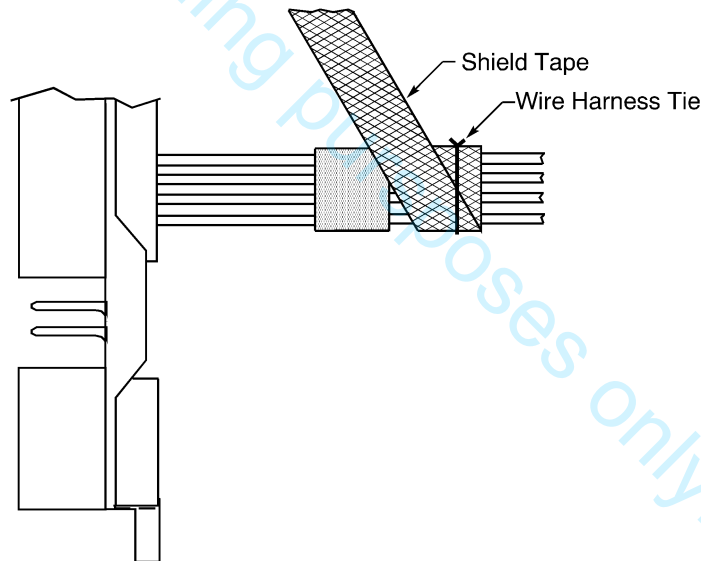
- (13) Wind two full layers of shield tape on all of the cables at the location of the shield windows.
- (14) Assemble a lacing tape wire harness tie on the shield tape.

Refer to:

- Figure 61 for the location of the wire harness tie
- Subject 20-10-11 for the procedure to assemble a wire harness tie.

Make sure that the shield tape that comes out from below the wire harness tie:

- Points to the connector.
- Has sufficient length to do Step (22) through Step (25).



#### CONFIGURATION OF THE SHIELD TAPE ON THE SHIELD WINDOWS

Figure 61

- (15) Do Step (9) through Step (14) again for the harnesses that have routing to each connector insert.
- (16) Remove the ten screws on the rear of the connector shell that hold the insert retainer plates on the shell.

NOTE: Do not remove the insert retainer plates or the connector inserts.

- (17) Discard the screws.

NOTE: These screws do not have the sufficient length.

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- (18) Discard the backshell gaskets supplied with the backshell.
- (19) Install one half of the backshell on the rear of the connector with the screws and lockwashers supplied with the backshell.

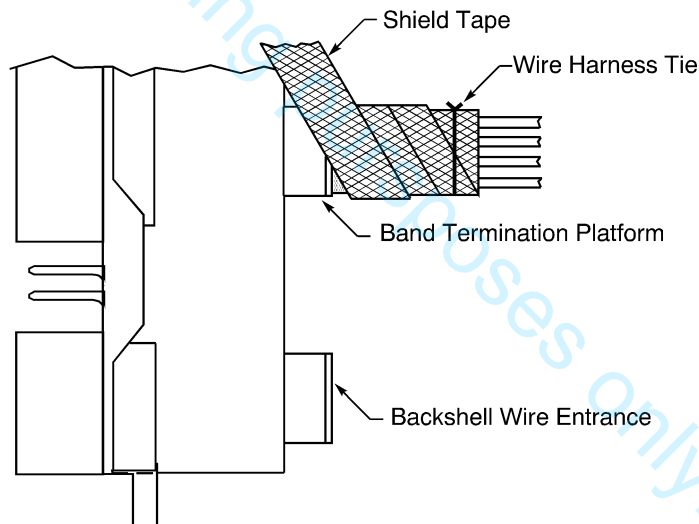
**NOTE:** The screws and lockwashers in Table 14 are a satisfactory alternative to the screws supplied with the backshell.

Make sure that the retainer plate is between the connector shell and the backshell.

- (a) Align a screw and lockwasher with the applicable backshell installation hole in the backshell.
- (b) Tighten the screw.
- (c) Do Step (a) and Step (b) again for each remaining backshell installation screw.
- (20) Install the other half of the backshell on the rear of the connector; Do Step (19) again.
- (21) Wind more layers of shield tape on the harness until the diameter of the shield tape layers is the same as the diameter of the insulation tape layers.
- (22) Continue to wind the shield tape on the harness forward to the backshell. Refer to Figure 62.

Make sure that:

- The shield tape wrap has a 50 percent overlap
- The shield tape tension is kept moderate and constant.

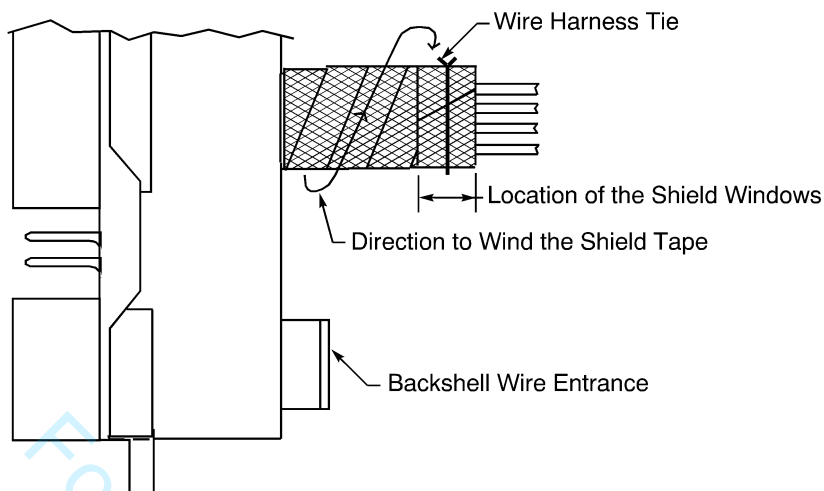


**POSITION OF THE SHIELD TAPE LAYERS**  
**Figure 62**

- (23) At the backshell, wind two layers of shield tape on the band termination platform.  
Make sure that the forward edge of the shield tape layers is aligned with the rear surface of the backshell.
- (24) Continue to wind the shield tape rearward to the location of the shield windows. Refer to Figure 63.  
Make sure that:
  - The shield tape wrap has a 50 percent overlap
  - The shield tape tension is kept moderate and constant.

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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



#### POSITION OF THE LAST LAYER OF SHIELD TAPE

Figure 63

- (25) At the location of the shield windows, wind one full layer of shield tape on the harness.
- (26) Assemble a lacing tape wire harness tie on the shield tape at the center of the shield window area.

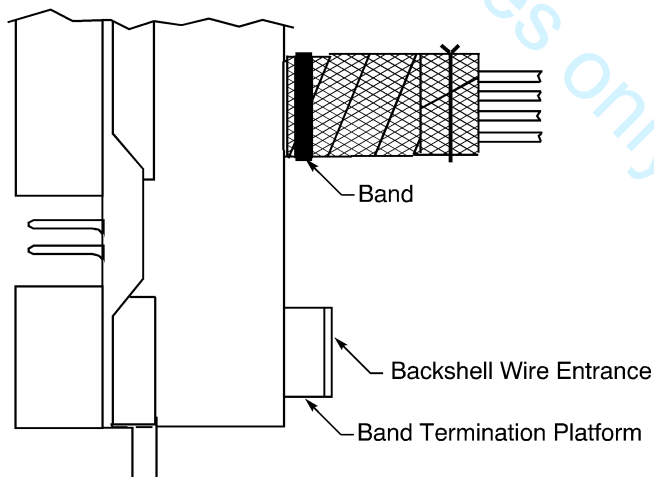
Refer to:

- Figure 63 for the location of the wire harness tie
- Refer to Subject 20-10-11 for the procedure to assemble a lacing tape wire harness tie.

- (27) Install a shield terminator band on the band termination platform.

Refer to:

- Figure 64
- Paragraph 11. for the procedure to install the shield terminator band.



#### LOCATION OF THE WIRE HARNESS TIE AND THE SHIELD TERMINATOR BAND ON THE SHIELD TAPE

Figure 64

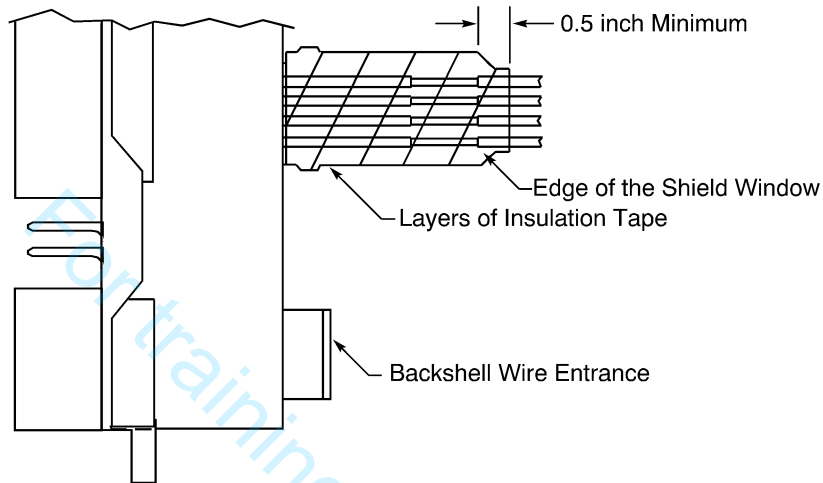
## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

(28) Wind layers of insulation tape on the shield tape. Refer to Figure 65.

Make sure that:

- The insulation tape wrap has a 50 percent overlap
- The insulation tape layers extend a minimum of 0.5 inch farther rearward than the rear edge of the shield window.



**CONFIGURATION OF THE INSULATION TAPE LAYERS**

**Figure 65**

(29) Continue to wind layers of insulation tape until the diameter of the harness is approximately the same as the inside diameter of the heat shrinkable sleeve.

(30) If a length of heat shrinkable sleeve is on the harness:

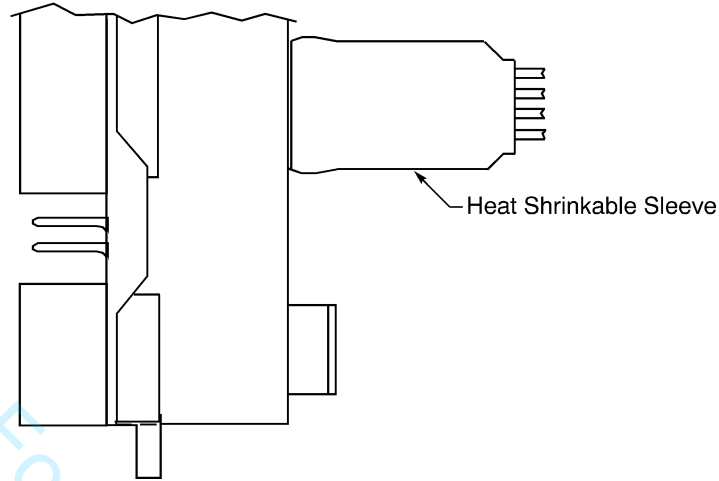
- Push the length of heat shrinkable sleeve forward until it is against the rear of the backshell. Make sure that the forward edge of the sleeve is against the rear surface of the backshell.
- Shrink the sleeve into its position.

Refer to:

- Figure 66 for the position of the sleeve
- Subject 20-10-14 for the procedure to shrink a heat shrinkable sleeve.

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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE HEAT SHRINKABLE SLEEVE**

**Figure 66**

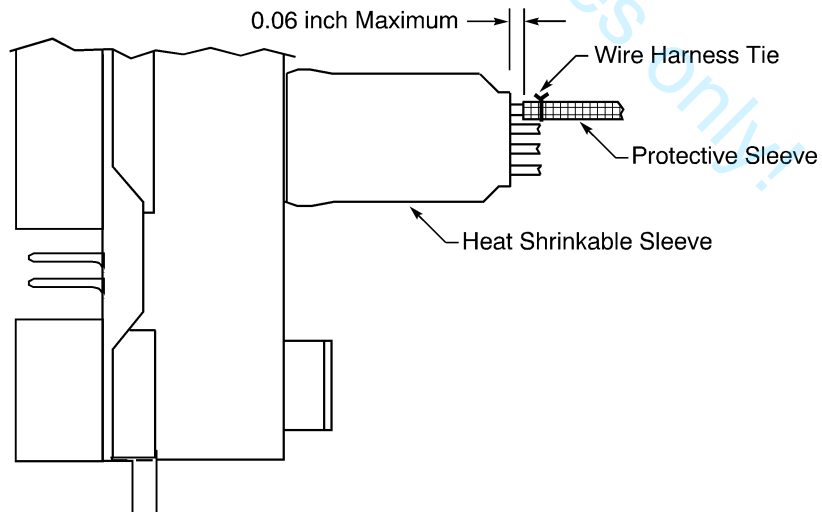
- (31) If a length of heat shrinkable sleeve is not on the harness, wind another layer of insulation tape on the harness.

Make sure that:

- The insulation tape wrap has a 50 percent overlap
- The insulation tape layers extend a minimum of 0.5 inch farther rearward than the shield window area.

- (32) If a coax cable has a protective sleeve, push the protective sleeve forward to the rear edge of the heat shrinkable sleeve. Refer to Figure 67.

Make sure that the forward edge of the protective sleeve is not more than 0.06 inch from the rear edge of the heat shrinkable sleeve.



**POSITION OF THE PROTECTIVE SLEEVE OF THE COAX CABLE**

**Figure 67**

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

(33) Assemble a wire harness tie near on each protective sleeve near the end of the sleeve.

Refer to:

- Figure 67 for the location of the wire harness tie
- Subject 20-10-11 for the procedure to assemble the tie.

(34) Do Step (21) through Step (33) again for each backshell wire entrance.

#### 9. ASSEMBLY OF THE GLENAIR 527-212() BACKSHELL ON A SHELL SIZE 2 ARINC 600 PLUG CONNECTOR WITH SHIELD GROUND WIRES

##### A. Glenair 527-212 Backshell - Cable Preparation for a Solder Sleeve Shield Termination

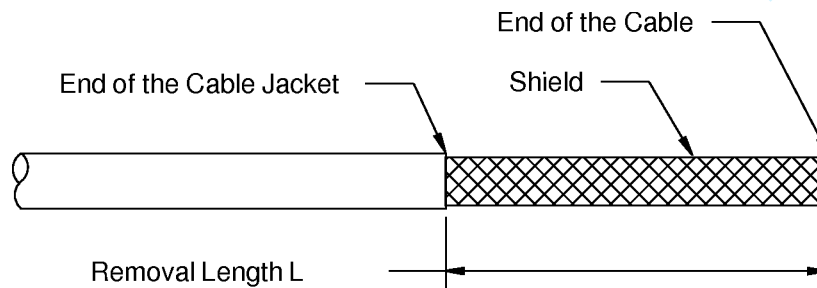
**Table 16**  
**CABLE JACKET REMOVAL LENGTH**

Solder Sleeve	Removal Length L (inch)	
	Target	Tolerance
BACS13CT	2.00	$\pm 0.06$
BACS13DG	2.00	$\pm 0.06$
D-104	2.10	$\pm 0.06$
D-108	2.17	$\pm 0.06$

- (1) For a 527-212MA9B9C4S backshell:
  - (a) Make a selection of a Grade B, Class 1 heat shrinkable sleeve from Subject 20-00-11.
  - (b) Put a 4.0 inch length of the heat shrinkable sleeve on each wire harness.
- (2) Make a selection of a solder sleeve with an integral shield ground wire from Table 16.
- (3) Put the solder sleeve on the cable.  
Make sure that the shield ground wire is pointed rearward away from the end of the cable.
- (4) Remove the necessary length of jacket from the end of the cable.

Refer to:

- Figure 68 for the cable jacket removal length
- Subject 20-00-15 for the procedure to remove the cable jacket.



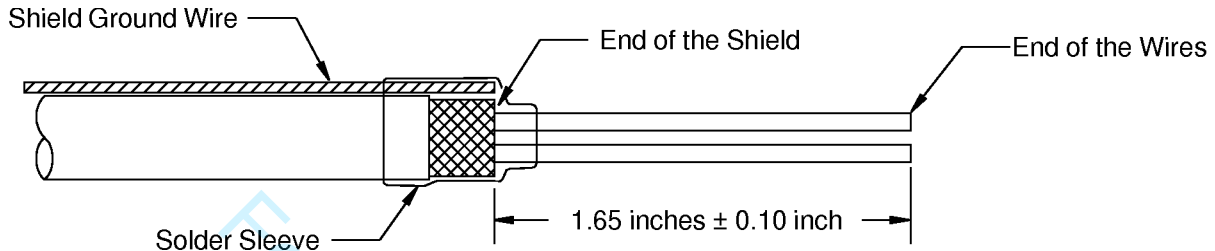
**CABLE PREPARATION**  
**Figure 68**

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

- (5) Assemble an uninsulated shield ground wire at the end of the cable jacket. Refer to Subject 20-10-15. Make sure that the free end of the shield ground wire is pointed rearward, away from the end of the wires.
- (6) Remove the necessary length from the end of each component wire to make the distance from the end of the shield to the end of the wire equal to 1.65 inches  $\pm$  0.10 inch. Refer to Figure 69.



**LENGTH OF THE COMPONENT WIRES**

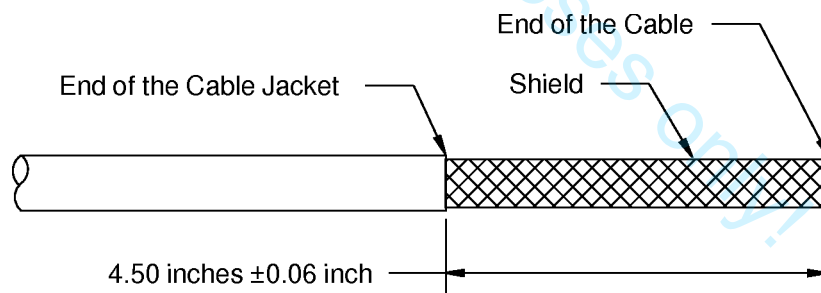
**Figure 69**

#### B. Glenair 527-212 Backshell - Cable Preparation for a Shield Pull Through Shield Termination

- (1) For a 527-212MA9B9C4S backshell:
  - (a) Make a selection of a Grade B, Class 1 heat shrinkable sleeve from Subject 20-00-11.
  - (b) Put a 4.0 inch length of the heat shrinkable sleeve on each wire harness.
- (2) Remove 4.50 inches  $\pm$  0.06 inch of jacket from the end the cable.

Refer to:

- Figure 70
- Subject 20-00-15 for the procedure to remove the cable jacket.



**CABLE JACKET REMOVAL**

**Figure 70**

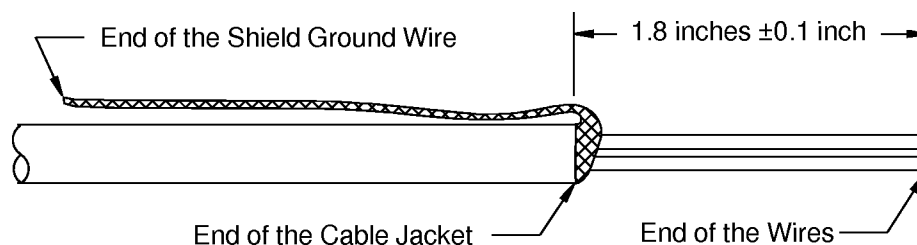
- (3) Assemble the shield pull through shield ground wire.

Refer to:

- Figure 71
- Subject 20-10-15 for the procedure to assemble the shield ground wire.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



#### LENGTH OF THE COMPONENT WIRES

Figure 71

- (4) Remove the necessary length from the end of each component wire to make the distance from the end of the shield to the end of the wire equal to 1.8 inches  $\pm 0.1$  inch. Refer to Figure 71.

#### C. Glenair 527-212 Backshell Installation

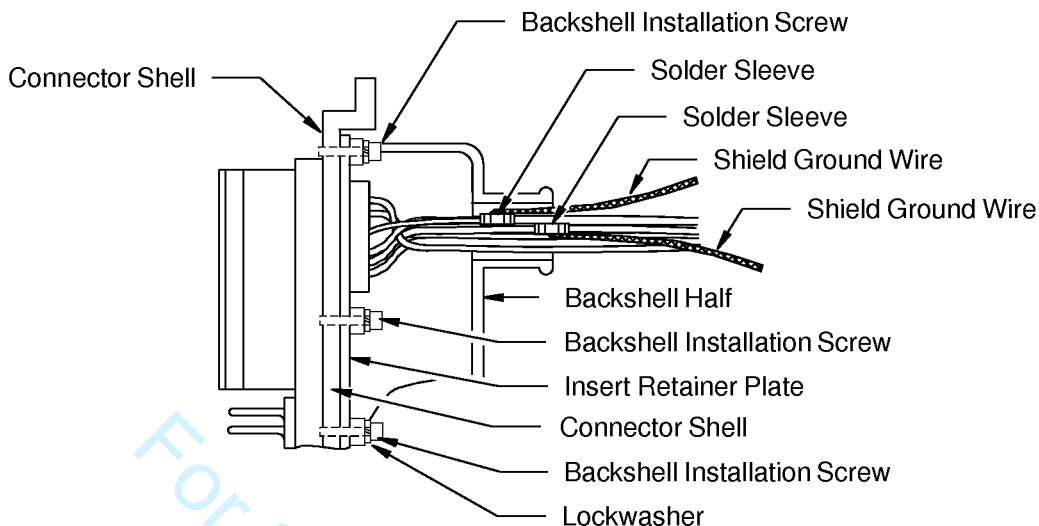
Table 17  
NECESSARY TOOLS

Tool	Size	Supplier
Screw Bit, Phillips	#0	An available source
	#00	An available source
Screwdriver, Phillips	#0	An available source
	#00	An available source
Screwdriver, Torque	-	An available source

- (1) For the 527-212MA9B9C4S backshell, put a 4.0 inch length of a Class 1, Grade B heat shrinkable sleeve on each wire harness.
- (2) Make a selection of a screwdriver from Table 17.
- (3) At the rear of the connector, remove the ten screws that hold the insert retainer plates on the connector shell.  
Make sure that the insert retainer plates are not removed.
- (4) Discard the screws.  
**NOTE:** The screws do not have the sufficient length for the installation of the backshell.
- (5) Discard the backshell gaskets that are supplied with the backshell.
- (6) Put one of the backshell halves on the wire harness against the rear of the connector shell. Refer to Figure 72.  
Make sure that the insert retainer plates are between the connector shell and the backshell.

## STANDARD WIRING PRACTICES MANUAL

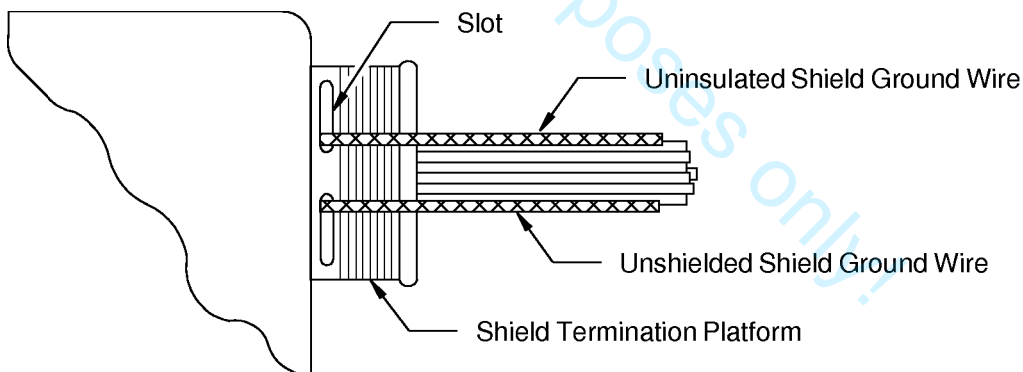
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE BACKSHELL ON THE CONNECTOR**

**Figure 72**

- (7) Put a lock washer that is supplied with the backshell on each backshell installation screw against the head of each screw.
- (8) Fully engage the threads of the each backshell installation screw and the threads of the applicable installation hole on the rear surface of the connector shell. Refer to Figure 72.
- (9) Put approximately half of the shield ground wires through the slots in the shield termination platform. Refer to Figure 73.



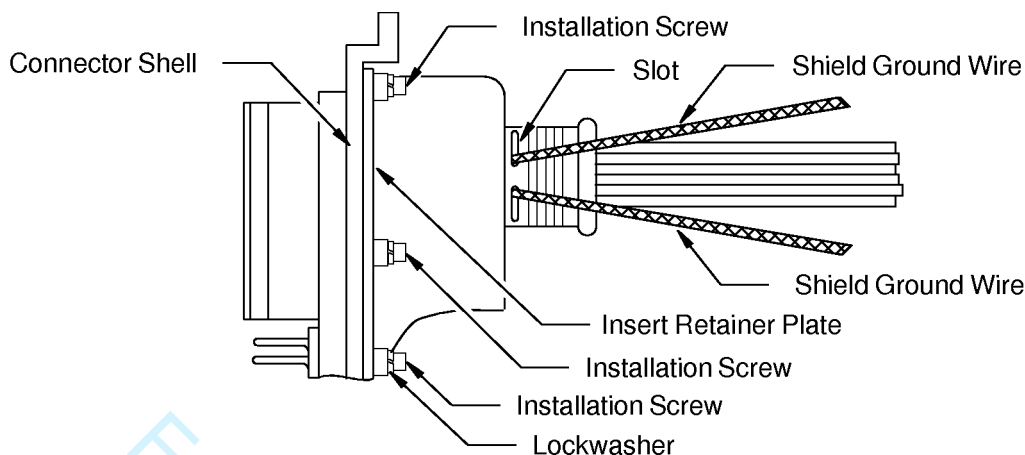
**POSITION OF THE SHIELD GROUND WIRES IN THE SLOTS**

**Figure 73**

- (10) If the slots do not have sufficient space for the shield ground wires, fold the remaining shield ground wires forward on the wire harness. Refer to Figure 72.
- (11) Put the other half of the backshell on the wire harness against the rear of the connector shell.
- (12) Do Step 8 and Step 9 again for the other half of the backshell. Refer to Figure 74.

**STANDARD WIRING PRACTICES MANUAL**

**ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS**



**POSITION OF THE SHIELD GROUND WIRES IN THE SLOT**  
**Figure 74**

- (13) Put a lockwasher that is supplied with the backshell on each backshell installation screw against the head of the screw.
- (14) Fully engage the threads of the each backshell installation screw and the threads of the applicable installation hole on the rear surface of the connector shell. Refer to Figure 74.
- (15) Torque each backshell installation screw 6 inch-pounds to 8 inch-pounds.

**D. Glenair 527-212MA9B9C4S Backshell - Shield Ground Wire Termination**

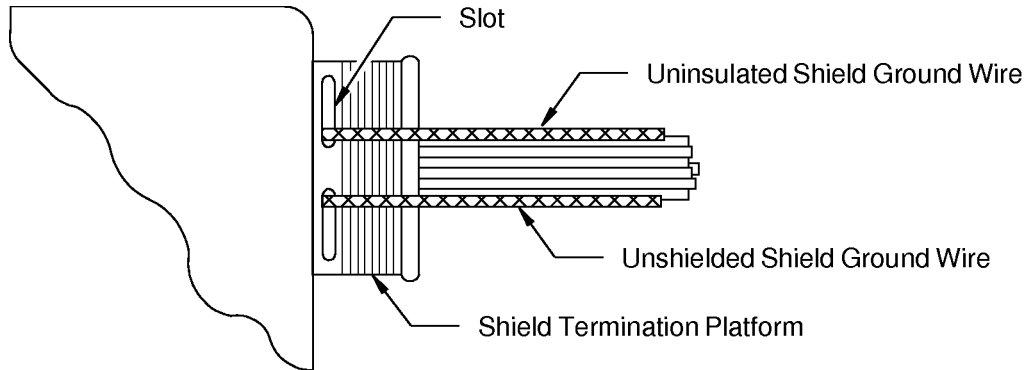
**Table 18**  
**NECESSARY MATERIALS**

Component	Type	Specification
Tape	PTFE	A-A-59474
	Silicone, Type I	A-A-59163
	Silicone, Type II	A-A-59163

- (1) For the shield ground wires that are in the slots:
  - (a) Lightly pull the end of each shield ground wire.  
For a solder sleeve shield termination, make sure that the solder sleeve does not come out of the slot of the termination platform.
  - (b) Put the shield ground wires across the shield termination platform at approximately equal intervals around its circumference. Refer to Figure 75.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE SHIELD GROUND WIRES ON THE SHIELD TERMINATION PLATFORM**  
**Figure 75**

- (2) For the shield ground wires that are folded forward on the wire harness:
  - (a) Lightly pull the end of each shield ground wire in cable exit of the backshell.
  - (b) Fold the shield ground wire forward across the shield termination platform between the shield ground wires that are in the slots.

Make sure that a shield ground wire does not make an overlap with a different shield ground wire on the platform.
- (3) Install the shield terminator band on the shield ground wires at the rear of the slot on the shield termination platform.

Refer to:

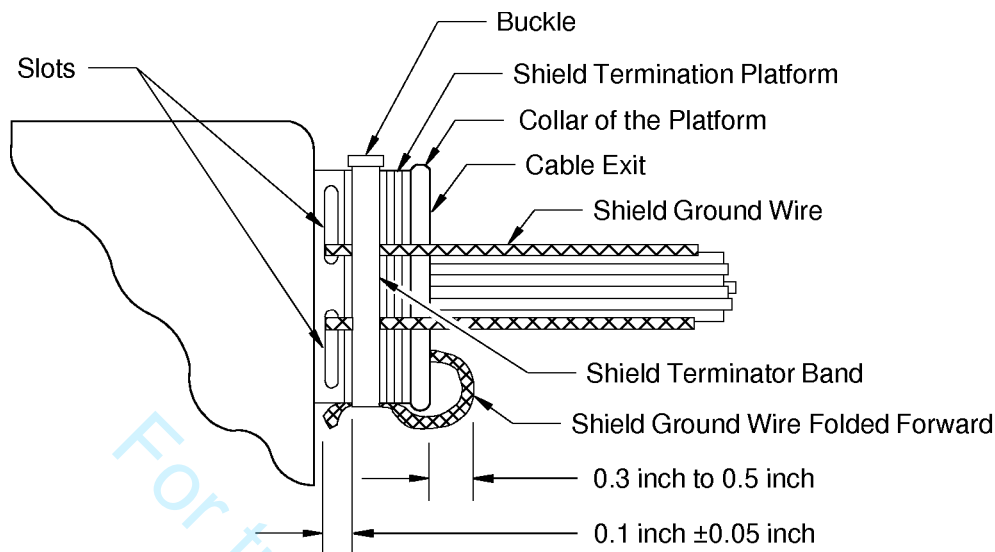
- Figure 76
- Paragraph 11.A. for the procedure to install the band.

Make sure that:

- The buckle of the band is flat against the platform
- The buckle of the band does not make an overlap with the shield ground wires
- The buckle of the band does not make an overlap with the slots on the platform
- The buckle of the band does not make an overlap with the collar of the platform
- The shield ground wires are tight against the platform
- The distance between the rear edge of the cable exit and each shield ground wire that is folded forward is between 0.3 inch and 0.5 inch.

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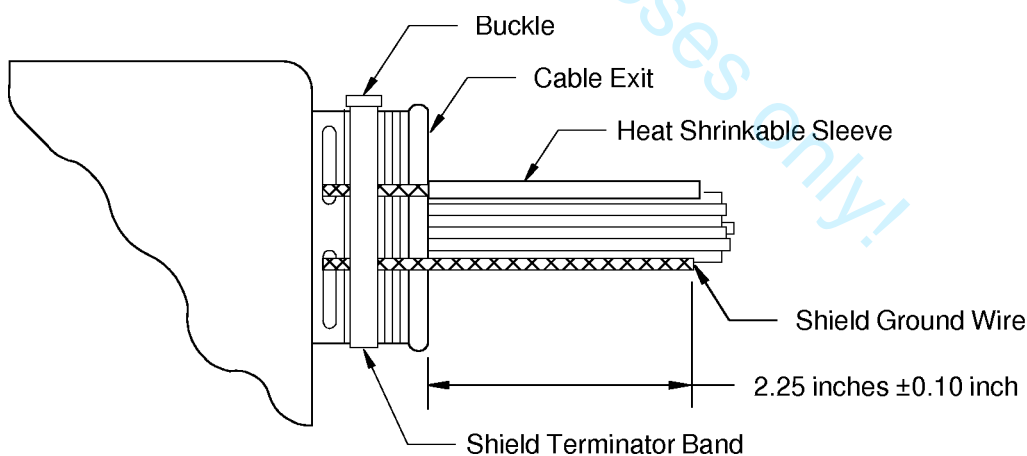
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE SHIELD TERMINATOR BAND ON THE SHIELD GROUND WIRES**

**Figure 76**

- (4) For the shield ground wires that are folded forward across the shield termination platform, cut each shield ground wire 0.10 inch  $\pm$  0.05 inch from the forward edge of the shield terminator band. Refer to Figure 76.
- (5) For the shield ground wires that are in the slots:
  - (a) Remove the necessary length of each shield ground wire to make the distance from the backshell to the end of the shield ground wire equal to 2.25 inches  $\pm$  0.10 inch. Refer to Figure 77.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE SHIELD GROUND WIRE**

**Figure 77**

- (b) Cut a 3.00 inch  $\pm$  0.10 inch length of the specified heat shrinkable sleeve for each shield ground wire.
- (c) Install a heat shrinkable sleeve on each shield ground wire.

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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Refer to:

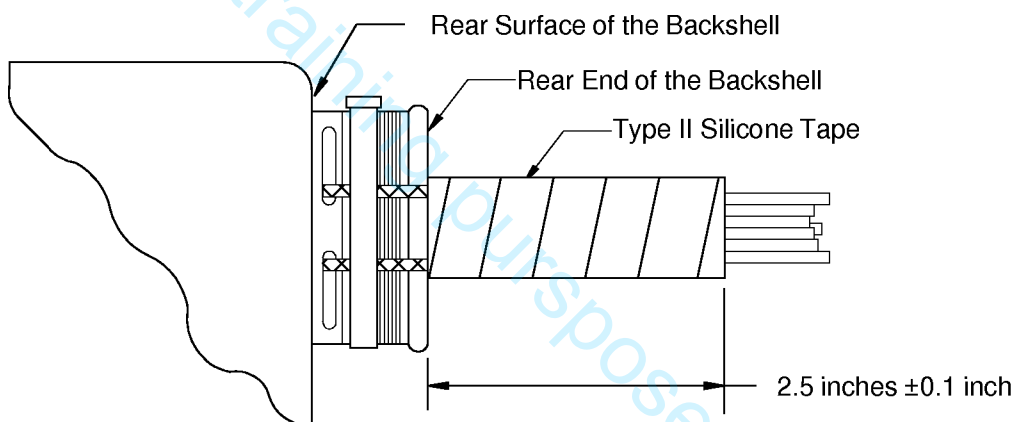
- Figure 77
- Subject 20-10-14 for the procedure to shrink the sleeve.

Make sure that the heat shrinkable sleeve is installed as close as possible to the backshell.

- (6) Put 2 to 3 layers of the PTFE tape on the shield terminator band.
- (7) Put 2 to 3 layers of the Type I silicone tape on the PTFE tape.
- (8) Put the necessary layers of the Type II silicone tape on the wire harness and the shield ground wires until the diameter of the wire harness is a small amount smaller than the outer diameter of the rear end of the backshell. Refer to Figure 78.

Make sure that the layers of tape:

- Start at the rear end of the backshell
- Extend 2.5 inches  $\pm 0.10$  inch from the rear end of the backshell
- Do not make an overlap with the backshell
- Have a 50 percent overlap.



**POSITION OF THE TAPE ON THE WIRE HARNESS**

**Figure 78**

- (9) Push the 4.0 inch length of heat shrinkable sleeve forward until the forward edge of the sleeve is against the rear surface of the backshell. Refer to Figure 78.
- (10) Shrink the sleeve into its position. Refer to Subject 20-10-14.

#### E. Glenair 527-212MA9B9C6S Backshell - Shield Ground Wire Termination

**Table 19**  
**NECESSARY MATERIALS**

Component	Type	Specification
Tape	PTFE	A-A-59474
	Silicone, Type I	A-A-59163
	Silicone, Type II	A-A-59163

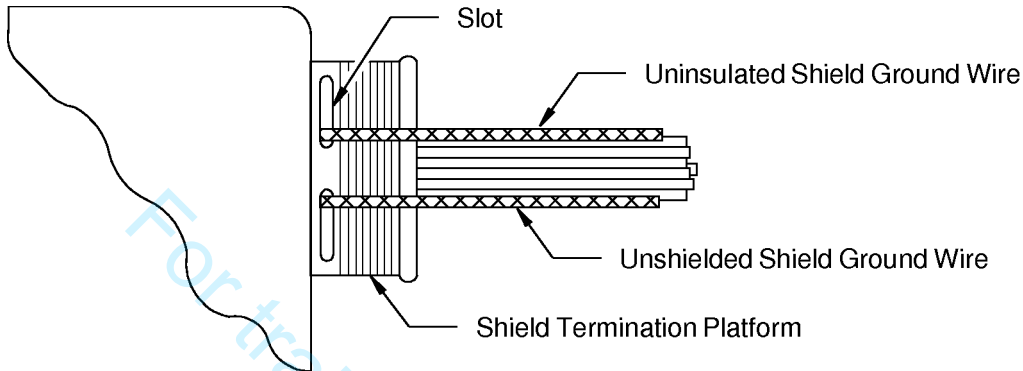
- (1) For the shield ground wires that are in the slots:

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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

- (a) Lightly pull the end of each shield ground wire.  
For a solder sleeve shield termination, make sure that the solder sleeve does not come out of the slot of the termination platform.
- (b) Put the shield ground wires across the shield termination platform at approximately equal intervals around its circumference. Refer to Figure 79.



**POSITION OF THE SHIELD GROUND WIRES ON THE SHIELD TERMINATION PLATFORM**

**Figure 79**

- (2) For the shield ground wires that are folded back on the wire harness:
  - (a) Lightly pull the end of each shield ground wire in cable exit of the backshell.
  - (b) Fold the shield ground wire forward across the shield termination platform between the shield ground wires that are in the slots.  
Make sure that a shield ground wire does not make an overlap with a different shield ground wire on the platform.

- (3) Install the shield terminator band on the shield ground wires at the rear of the slot on the shield termination platform.

Refer to:

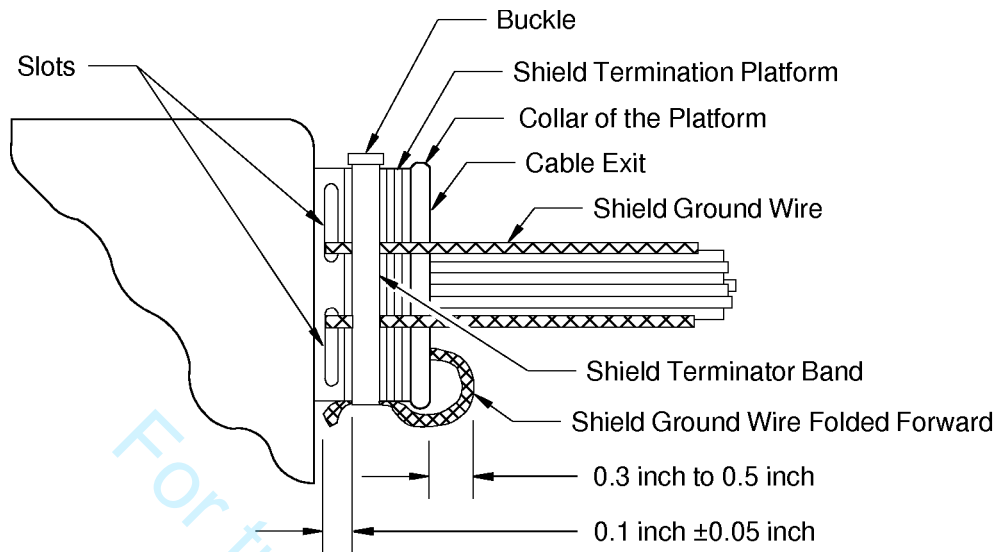
- Figure 80
- Paragraph 11.A. for the procedure to install the band.

Make sure that:

- The buckle of the band is flat against the platform
- The buckle of the band does not make an overlap with the shield ground wires
- The buckle of the band does not make an overlap with the slots on the platform
- The buckle of the band does not make an overlap with the collar of the platform
- The shield ground wires are tight against the platform
- The distance between the rear edge of the cable exit and each shield ground wire that is folded forward is between 0.3 inch and 0.5 inch.

## STANDARD WIRING PRACTICES MANUAL

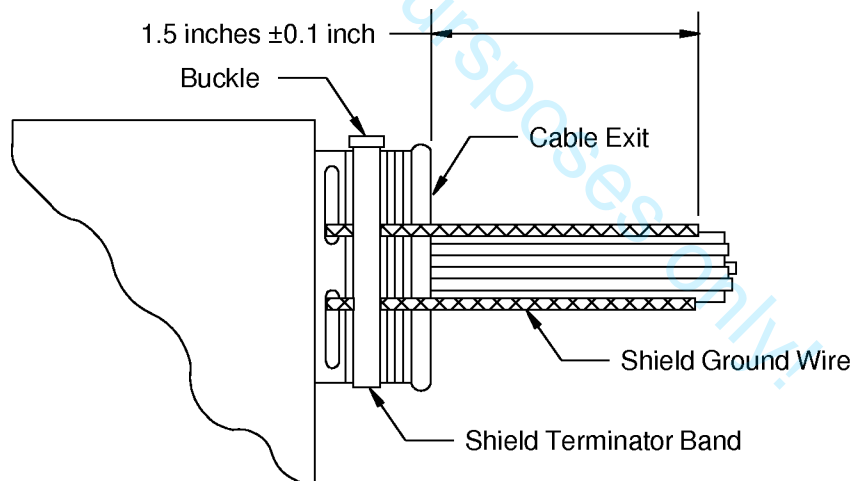
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE SHIELD TERMINATOR BAND ON THE SHIELD GROUND WIRES**

**Figure 80**

- (4) For the shield ground wires that are in the slots, remove the necessary length of each shield ground wire to make the distance from the backshell to the end of the shield ground wire equal to 1.5 inches  $\pm 0.1$  inch. Refer to Figure 81.



**LENGTH OF THE SHIELD GROUND WIRES**

**Figure 81**

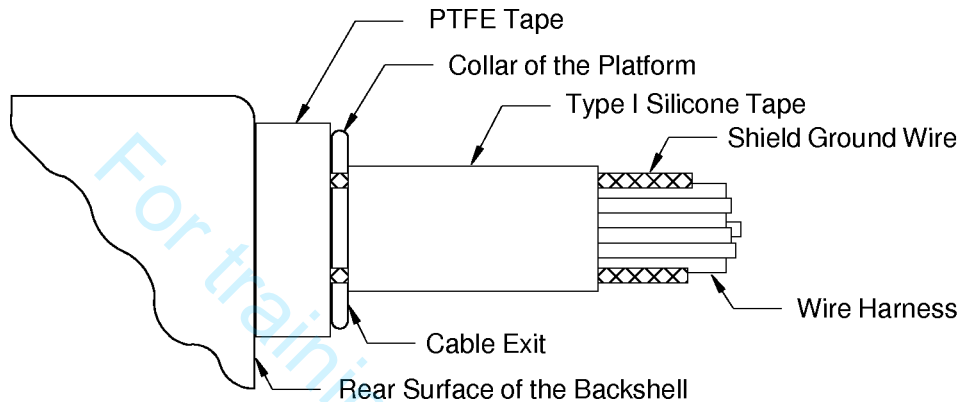
- (5) For the shield ground wires that are folded forward across the shield termination platform, cut each shield ground wire 0.10 inch  $\pm 0.05$  inch from the forward edge of the shield terminator band.
- (6) Put the necessary layers of Type I silicone tape on the wire harness and the shield ground wires at the rear of the cable exit. Refer to Figure 82.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Make sure that:

- The layers of tape make an approximately 100 percent overlap
- If the O.D. of the wire harness is equal to or larger than 75 percent of the O.D. of the cable exit, a minimum of two layers of tape are put on
- If the O.D. of the wire harness is smaller than 75 percent of the O.D. of the cable exit, the necessary layers of tape are put on to make the O.D. of the wire harness approximately equal to 75 percent of the O.D. of the cable exit.



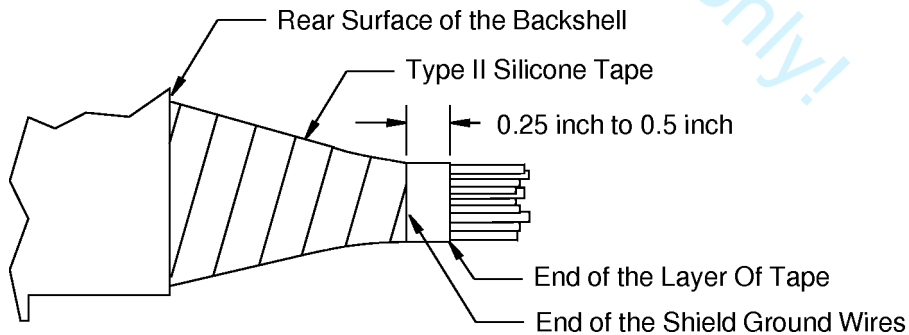
**POSITION OF THE TAPE ON THE WIRE HARNESS**

**Figure 82**

- (7) Put 2 to 3 layers of the PTFE tape on the shield terminator band.
- (8) Put a layer of Type II silicone tape on the wire harness and the shield ground wires. Refer to Figure 83.

Make sure that the layer of tape:

- Starts 0.25 inch maximum rearward from the end of the longest shield ground wire
- Ends at the rear surface of the backshell
- Makes approximately a 50 percent overlap.



**POSITION OF THE TAPE ON THE WIRE HARNESS**

**Figure 83**

- (9) Put a second layer of Type II silicone tape on the wire harness and the shield ground wires. Refer to 83.

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### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Make sure that the layer of tape:

- Starts at the rear surface of the backshell
- Extends 0.25 inch to 0.5 inch farther than the longest shield ground wire
- Makes approximately a 50 percent overlap
- At the rear end makes approximately a 100 percent overlap.

#### F. Disassembly of the 527-212MA9B9C4S Backshell

**Table 20**  
**NECESSARY TOOLS**

Tool	Size	Supplier
Screw Bit, Phillips	#0	An available source
	#00	An available source
Screwdriver, Phillips	#0	An available source
	#00	An available source

- (1) Make a selection of a screwdriver from Table 20.
- (2) Remove the overall heat shrinkable sleeve from the wire harness.
- (3) Remove the layers of silicone tape from the wire harness.
- (4) Remove the layers of PTFE tape from the shield termination platform.
- (5) Remove the shield terminator band from the backshell. Refer to Paragraph 11.A..
- (6) Disengage the backshell installation screws on one backshell half.
- (7) Carefully pull the shield ground wires out of the slots in the backshell half.
- (8) Do Step (6) and Step (7) again for the other half of the backshell.

#### G. Disassembly of the 527-212MA9B9C6S Backshell

**Table 21**  
**NECESSARY TOOLS**

Tool	Size	Supplier
Screw Bit, Phillips	#0	An available source
	#00	An available source
Screwdriver, Phillips	#0	An available source
	#00	An available source

- (1) Make a selection of a screwdriver from Table 21.
- (2) Remove the layers of silicone tape from the wire harness.
- (3) Remove the shield terminator band from the backshell. Refer to Paragraph 11.A..
- (4) Disengage the backshell installation screw on one backshell half.
- (5) Carefully pull the shield ground wires out of the slots in the backshell half.
- (6) Do Step (4) and Step (5) again for the other half of the backshell.

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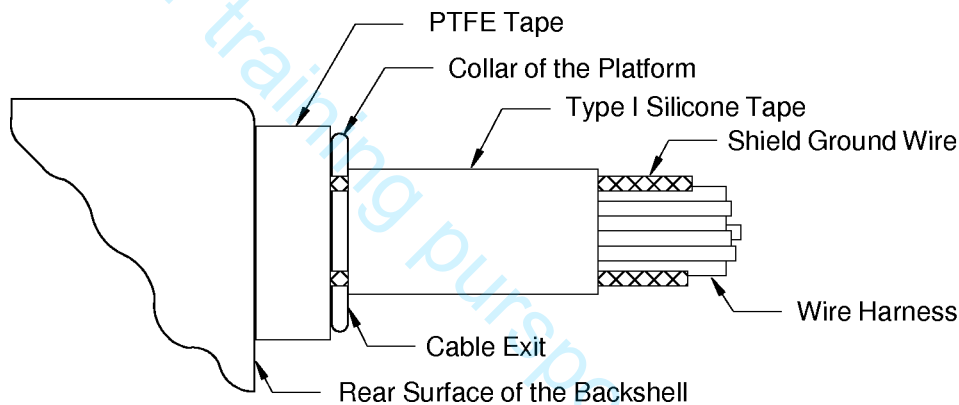
### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

#### H. Replacement of the Overall Heat Shrinkable Sleeve

- (1) Remove the overall heat shrinkable sleeve from the wire harness.
- (2) Remove the layers of silicone tape from the wire harness and the backshell.  
Make sure that the PTFE tape on the shield terminator band stays on the band.
- (3) Put the necessary layers of Type I silicone tape on the wire harness and the shield ground wires at the rear of the cable exit. Refer to Figure 84.

Make sure that:

- The layers of tape make an approximately 100 percent overlap
- If the O.D. of the wire harness is equal to or larger than 75 percent of the O.D. of the cable exit, a minimum of two layers of tape are put on
- If the O.D. of the wire harness is smaller than 75 percent of the O.D. of the cable exit, the necessary layers of tape are put on to make the O.D. of the wire harness approximately equal to 75 percent of the O.D. of the cable exit.



**POSITION OF THE TAPE ON THE WIRE HARNESS**  
**Figure 84**

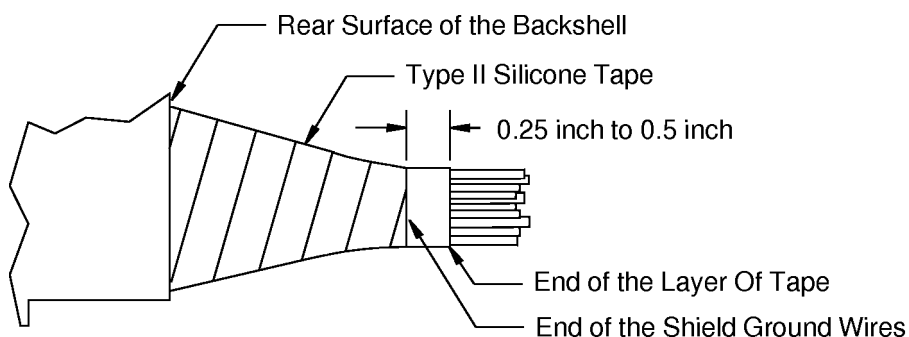
- (4) Put a layer of Type II silicone tape on the wire harness and the shield ground wires. Refer to Figure 85.

Make sure that the layer of tape:

- Starts 0.25 inch maximum rearward from the end of the longest shield ground wire
- Ends at the rear surface of the backshell
- Makes approximately a 50 percent overlap.

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**POSITION OF THE TAPE ON THE WIRE HARNESS**  
**Figure 85**

- (5) Put a second layer of Type II silicone tape on the wire harness and the shield ground wires. Refer to Figure 85.

Make sure that the layer of tape:

- Starts at the rear surface of the backshell
- Extends 0.25 inch to 0.5 inch farther than the longest shield ground wire
- Makes approximately a 50 percent overlap
- At the rear end makes approximately a 100 percent overlap.

#### 10. ASSEMBLY OF THE GLENAIR 557-(I) BACKSHELL

This paragraph gives the procedure to assemble and attach the shield ground wires of these shields to a backshell:

- The shield of a wire or a cable
- The adjacent shields of a wire or a cable.

Refer to Table 22 for the applicable connector part numbers.

##### A. Connector Part Numbers

**Table 22**  
**APPLICABLE M24308 CONNECTOR PART NUMBERS**

Part Number	Supplier
DBMA()	ITT Cannon
CAMA()	ITT Cannon
CBMA()	ITT Cannon
CCMA()	ITT Cannon

##### B. Wire Harness Preparation

**NOTE:** If the wire or the cable has two adjacent shields, the shields are prepared as one shield.

- (1) Make a selection of a solder sleeve with an uninsulated integral wire. Refer to Subject 20-10-15.
- (2) If it is necessary, remove the C-clips on the 2 jack screws of the backshell with a C-clip removal tool.
- (3) Remove the 2 jack screws from the backshell.

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- (4) Put the jack screws and the C-clips, if any, in a safe place.

The screws and the clips are necessary to attach the backshell to the connector.

- (5) Make a selection of a heat shrinkable sleeve from Table 4.

Make sure that the diameter of the sleeve is greater than the outer diameter of the backshell cable exit.

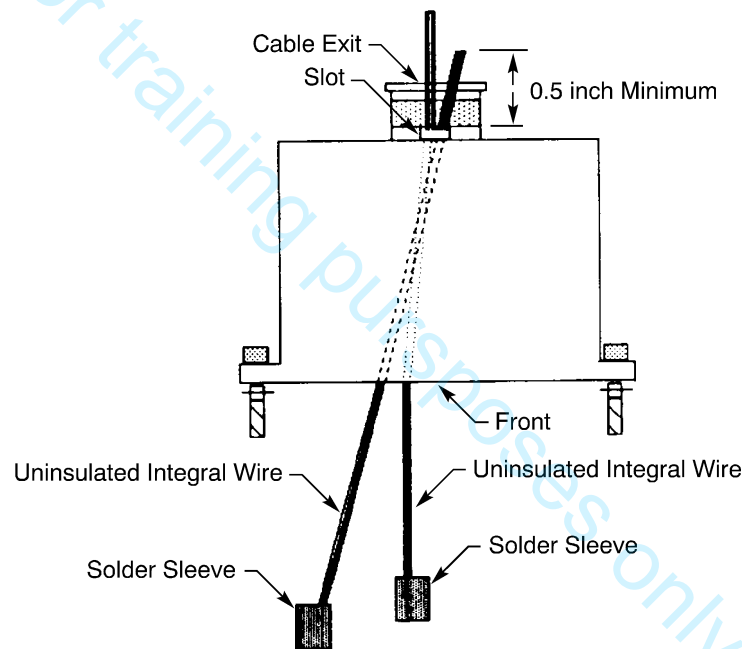
**NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.

- (6) Put an approximate 4 inch length of the heat shrinkable sleeve on the wire harness.

- (7) For each shielded cable in the wire harness, put an uninsulated integral wire of a solder sleeve into the front of the backshell and through the slot in the cable exit.

Refer to Figure 86.

Make sure that approximately 0.5 inch of each uninsulated wire extends out of the slot.



**POSITION OF THE UNINSULATED INTEGRAL WIRES**

**Figure 86**

- (8) Put the backshell on the wire harness.

Make sure that the uninsulated wires stay in the slot in the cable exit.

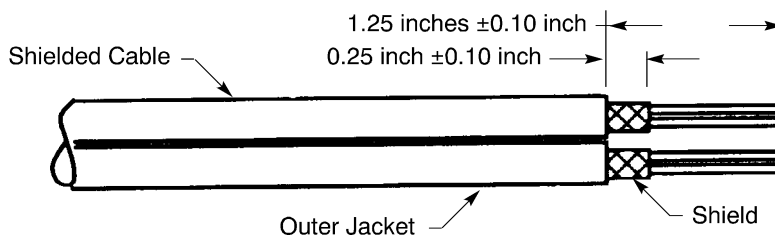
- (9) Remove 1.25 inches  $\pm 0.10$  inch of the outer jacket from the end one of the shielded cables.

- (10) Remove the necessary length of the shield to make the distance from the end of the shield to the end of the outer jacket equal to 0.25 inch  $\pm 0.10$  inch.

Refer to Figure 87.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

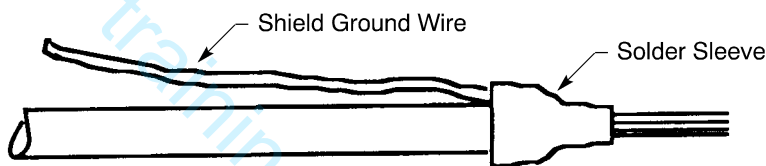


**CABLE PREPARATION**  
**Figure 87**

(11) Put the solder sleeve on the cable. Refer to Figure 88.

Make sure that:

- The end of the solder sleeve that has the integral wire is put on the cable first
- The inner edge of the seal ring is aligned with the end of the outer jacket.



**POSITION OF THE SOLDER SLEEVE ON THE CABLE**  
**Figure 88**

(12) Shrink the solder sleeve into position. Refer to Subject 20-10-14.

Make sure that:

- The solder sleeve stays in the correct position
- A minimum of seventy-five percent of the indicator ring on top of the solder ring is melted.

(13) Do Step (9) through Step (12) for the remaining shielded cables in the wire harness.

#### C. Connector Assembly

(1) Assemble the connector. Refer to the applicable Subject for the connector.

#### D. Backshell Installation

- (1) Carefully pull the end of each shield ground wire until the slack in the wires is removed.
- (2) Turn the backshell to the specified clock position for the connector.

Refer to Table 23 and Figure 89.

**Table 23**  
**CLOCK POSITIONS OF THE GLENAIR 557-() BACKSHELL**

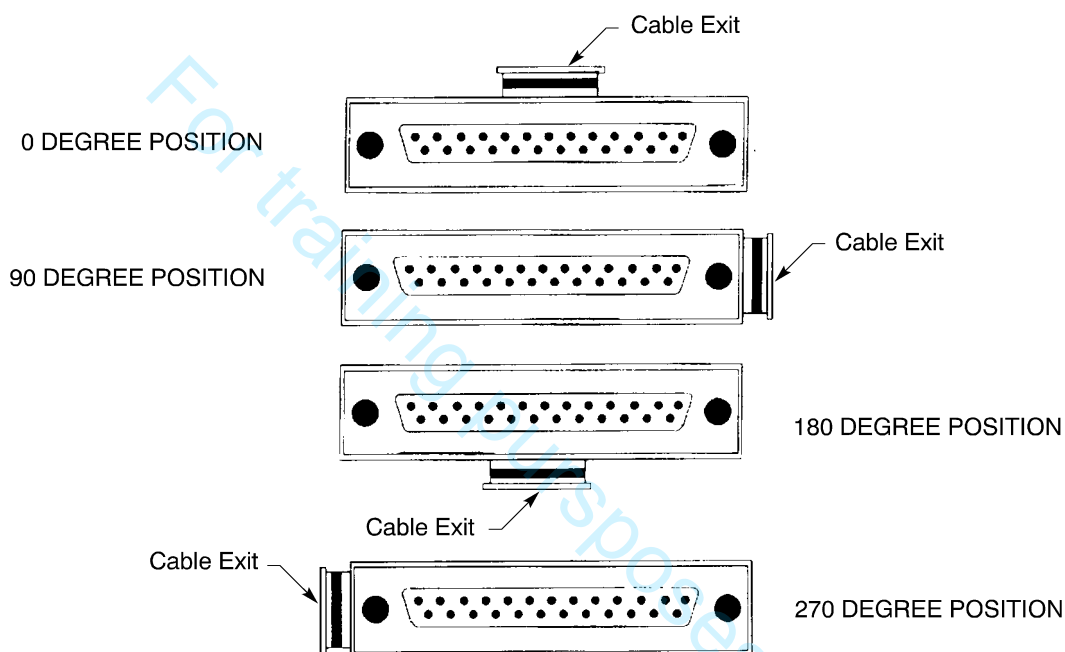
Backshell	Clock Position (degrees)	Cable Exit
557B()	90	End
	270	45 Degree

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Table 23 (continued)

Backshell	Clock Position (degrees)	Cable Exit
557E()	90	End
	270	45 Degree
557T()	0	Side
	180	



**CLOCK POSITIONS OF THE GLENAIR 557-() BACKSHELL**

**Figure 89**

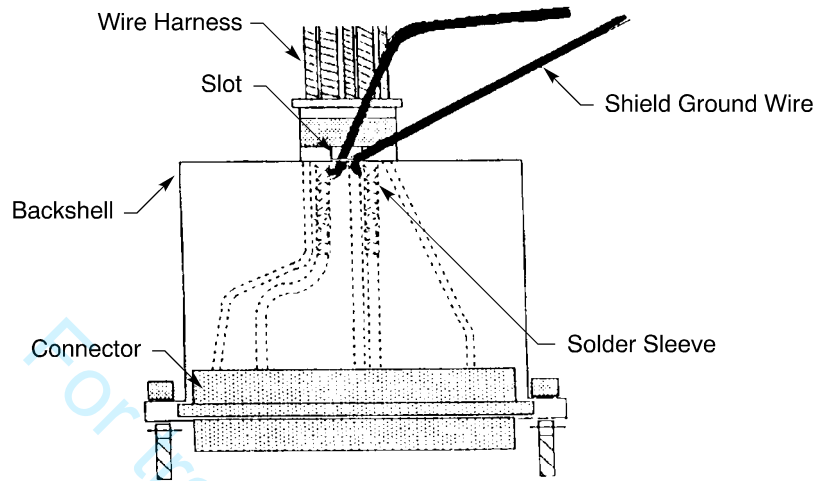
- (3) At the same time, carefully push the backshell until it is against the rear of the connector and pull the end of shield ground wires away from the backshell.
- (4) Align the screw holes in the backshell with the screw holes in the connector.
- (5) For a backshell with jack screws:
  - (a) Push the jack screws through the screw holes in the backshell and the screw holes in the connector.
  - (b) Install a C-clip on each jack screw where there are no threads.
- (6) For a backshell without jack screws:
  - (a) Put two 0.088 inch 4-40 screws into the two screw holes on the front of the connector.
  - (b) Tighten the screws with a screwdriver.
- (7) Carefully, pull each shield ground wire so that any unwanted length of the wire is removed from the backshell.

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

Refer to Figure 90.



**POSITION OF THE BACKSHELL ON THE CONNECTOR**  
Figure 90

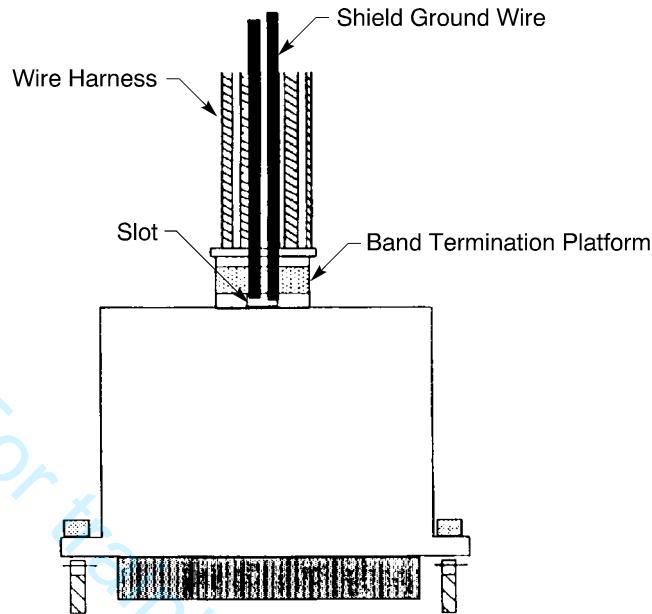
#### E. Installation of the BACB42F() Shield Terminator Band

- (1) Put each shield ground wire against band termination platform on the cable exit of the backshell so that the shield ground wires:
  - Are tight, even, and symmetrical around the termination platform
  - Do not make an overlap with another shield ground wire.

Refer to Figure 91.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE SHIELD GROUND WIRES**

**Figure 91**

- (2) Make a selection of a shield terminator band from Table 3.
- (3) Attach the shield terminator band to the backshell.

Refer to:

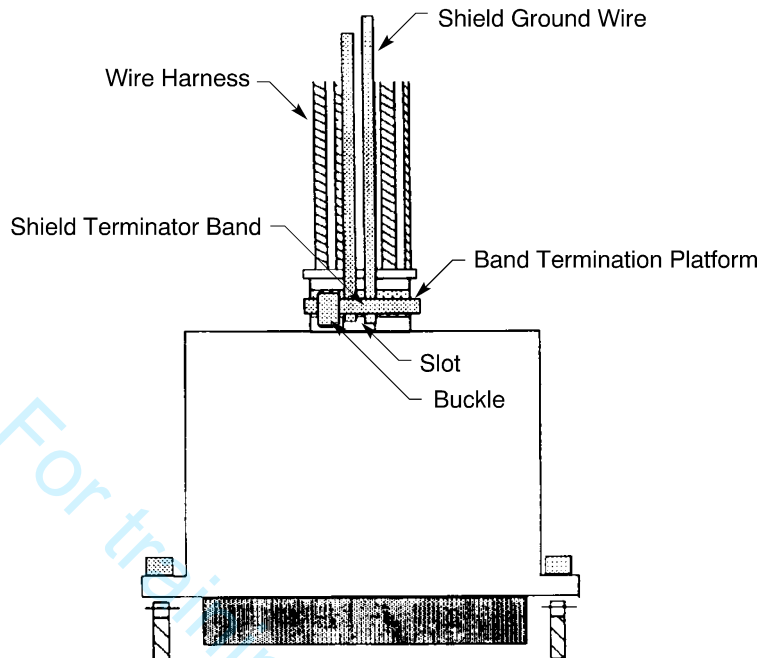
- Figure 92 for the location of the installation
- Paragraph 11. for the installation procedure.

Make sure that:

- The band is on the knurled or ribbed area of the band termination platform of the backshell
- There is no unwanted length of shield ground wire between the slot and the shield terminator band
- The buckle of the band is not over a shield ground wire on the backshell
- The buckle of the band is not over a slot in the backshell.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE SHIELD TERMINATOR BAND ON THE BACKSHELL**

**Figure 92**

#### F. Insulation of the Shield Terminator Band

- (1) Cut each shield ground wire so that the distance from the end of the wire to the shield terminator band is approximately 2.5 inches.
  - (2) Make a selection of a 0.19 inch diameter heat shrinkable sleeve from Table 4.
- NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.
- (3) Put a 3.0 inch  $\pm 0.10$  inch length of the heat shrinkable sleeve on each shield ground wire.
  - (4) Shrink each sleeve in position. Refer to Subject 20-10-14.
  - (5) Align the shield ground wires with the longitudinal axis of the wire harness.

Make sure that the shield ground wire do not make any overlaps that are not necessary.

**NOTE:** An overlap is acceptable when these conditions occur:

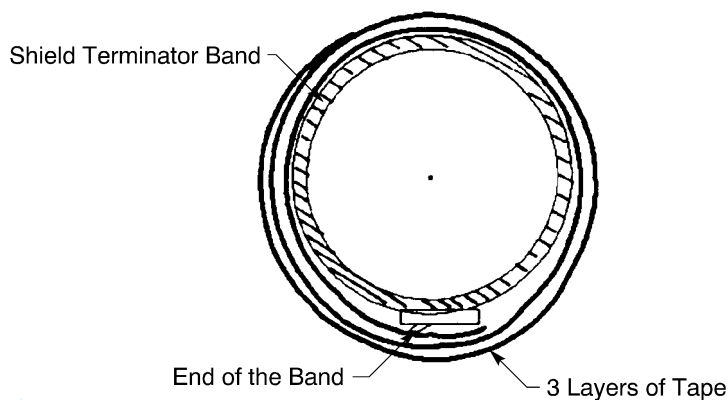
- The diameter of the wire harness is so small that the shield ground wires automatically make an overlap
  - A large number of shield ground wires does not permit them to lie along the wire harness without an overlap.
- (6) Cut a length of Scotch 70 insulation tape that is approximately 2.5 times the distance around the outer surface of the band termination platform.
  - (7) Cut the length of tape again so that the width is 0.25 inch  $\pm 0.03$  inch.
  - (8) Put one end of the tape on the end of the shield terminator band that was cut.
  - (9) Apply the remaining tape around the band until all the tape is on the band.

Refer to Figure 93 and Figure 94.

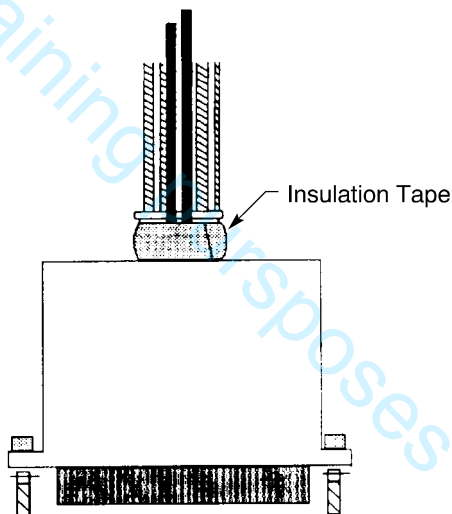
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# STANDARD WIRING PRACTICES MANUAL

## ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**SCOTCH 70 INSULATION TAPE IN POSITION ON THE BAND**  
**Figure 93**



**POSITION OF THE INSULATION TAPE ON THE BAND TERMINATION PLATFORM**  
**Figure 94**

- (10) Push the 4 inch length of the heat shrinkable sleeve until the end of the sleeve is against the rear surface of the backshell.

Make sure that the all the wires that will be subsequently connected with a splice are in the harness.

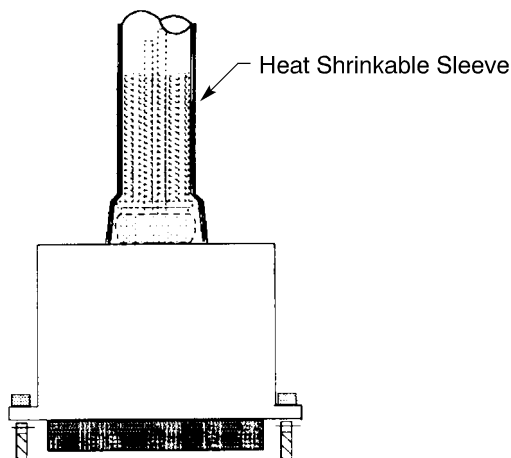
**NOTE:** If it is necessary to install splice on any of the wires from the connector, put the splice approximately 1 inch from the rear end of the heat shrinkable sleeve.

- (11) Shrink the sleeve in position. Refer to Subject 20-10-14 and Figure 95.

Make sure that the sleeve does not have any cracks.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE WIRE HARNESS**

**Figure 95**

- (12) If the diameter of the heat shrinkable sleeve does not decrease to the diameter of the wire harness, assemble the necessary number of wire harness ties on the sleeve.  
Refer to Subject 20-10-15 and Subject 20-10-11.

- (13) If the heat shrinkable sleeve is removed from the wire harness, replace the sleeve after the necessary work is done:

- (a) Make a selection of a heat shrinkable sleeve from Table 4.

Make sure that the diameter of the sleeve is greater than the outer diameter of the backshell cable exit.

NOTE: For alternative heat shrinkable sleeves, refer to Subject 20-00-11.

- (b) Cut an approximate 4 inch length of the heat shrinkable sleeve.

- (c) Cut the sleeve again along the longitudinal axis.

- (d) Put the sleeve on the cable exit of the backshell and the wire harness.

Make sure that the longitudinal axis of the sleeve is aligned with the longitudinal axis of the wire harness.

- (e) Assemble the necessary number of wire harness ties on the sleeve to hold it in position. Refer to Subject 20-10-15.

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## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

#### 11. INSTALLATION OF THE SHIELD TERMINATOR BAND

##### A. Installation of the Shield Terminator Band

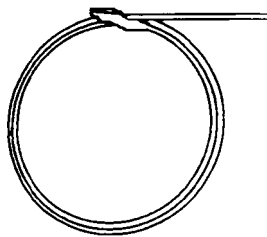
**Table 24**  
**SHIELD TERMINATOR BAND INSTALLATION TOOLS**

Shield Terminator Band	Installation Tool		
	Type	Part Number	Supplier
BACB42F3()	Manual	600-058	Glenair
		A40199	Band-It Idex
	Power	600-051	Glenair
		A75099	Band-It Idex
BACB42F4()	Manual	600-061	Glenair
		A30199	Band-It Idex

**CAUTION:** THE INCORRECT INSTALLATION OF THE SHIELD TERMINATOR BAND, THE SHIELD OF THE CABLE, AND THE SHIELD GROUND WIRE ON THE SHIELD TERMINATION PLATFORM CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE SYSTEM.

**CAUTION:** IF A SHIELD TERMINATOR BAND HAS BEEN USED, IT MUST NOT BE USED AGAIN. THE INSTALLATION OF A USED BAND CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE SYSTEM.

- (1) Make a selection of an installation tool from Table 24.
- (2) Clean these components with isopropyl alcohol and a brush:
  - The band
  - The shield of the cable
  - The shield ground wires.
- (3) If the shield terminator band is flat, make the band into a coil around the wire harness. Refer to Figure 96.



#### INSTALLATION CONFIGURATION OF THE BACB42F() SHIELD TERMINATOR BAND

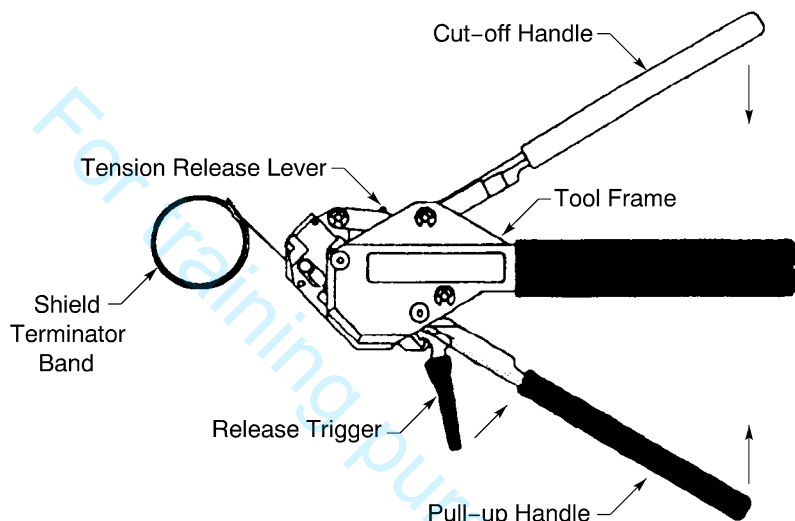
**Figure 96**

- (a) Put the free end of the band through the thin slot in the buckle.
- (b) Pull the free end through the buckle until the diameter of the loop is approximately the same size as the diameter of the backshell.

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

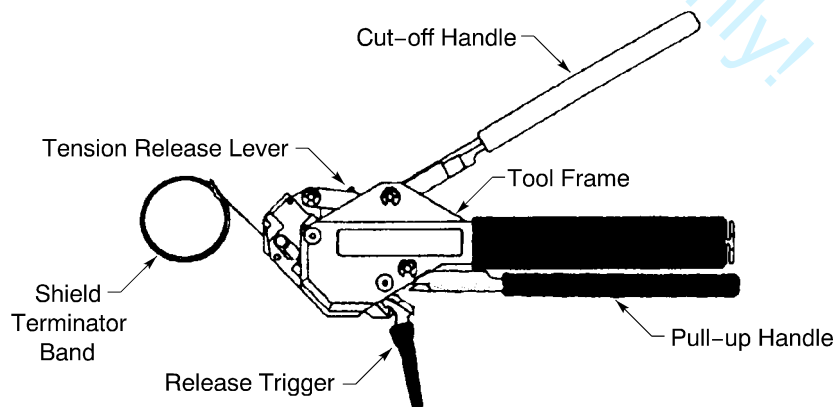
- (c) Put the free end of the BACB42F() shield terminator band through the thin slot in the buckle again.
- (d) Pull the free end through the buckle until the inner surface of the second loop touches the surface of the first loop.
- (4) Pull the release trigger of the tool in the direction of the pull-up handle.
- (5) Put the free end of the terminator band into the tool. Refer to Figure 97.  
Make sure that the loop is away from the tool.



**POSITION OF THE BACB42F() SHIELD TERMINATOR BAND IN THE TOOL**

**Figure 97**

- (6) Pull the pull-up handle toward the tool frame to complete one cycle. Refer to Figure 98.  
Make sure that the terminator band is held in the internal grip mechanism of the tool.



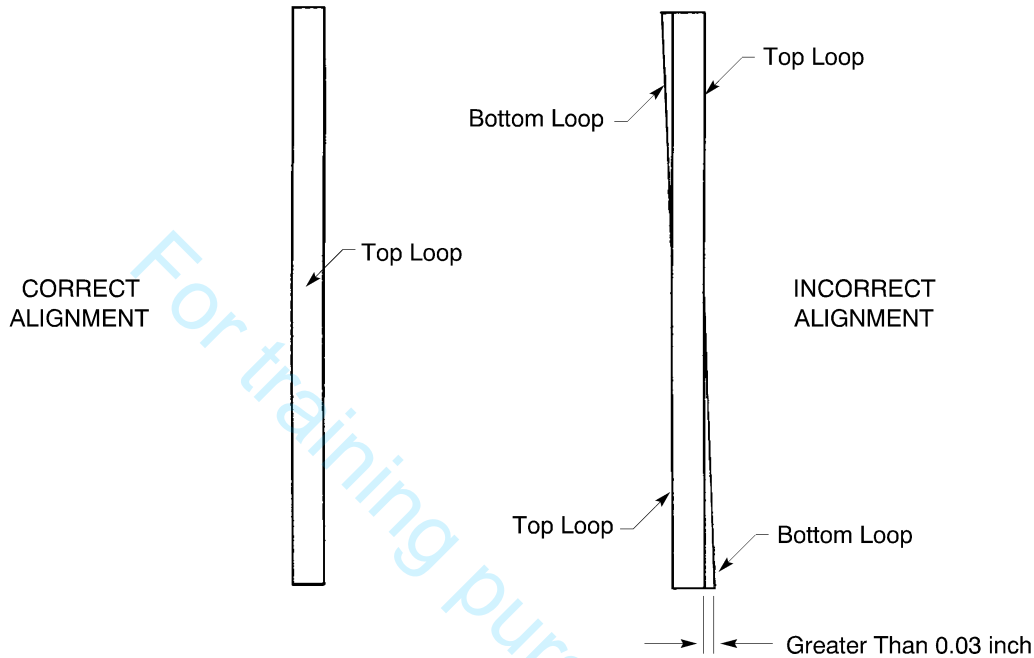
**POSITION OF THE PULL-UP HANDLE AT THE END OF A CYCLE**

**Figure 98**

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS

- (7) Put the shield terminator band on the shield termination platform of the backshell.
  - (8) Align the edges of the two loops of the terminator band. Refer to Figure 99.
- Make sure that the edge of either loop is not more that 0.03 inch beyond the edge of the other.



**ALIGNMENT OF THE LOOPS OF THE SHIELD TERMINATOR BAND**

**Figure 99**

- (9) Pull the pull-up handle through the necessary cycles until the terminator band is tight around the backshell.

**NOTE:** Always let the pull-up handle return to the initial open position before the handle is pulled again. If the handle stops in a cycle, push the handle down to the initial open position. Refer to Figure 97.

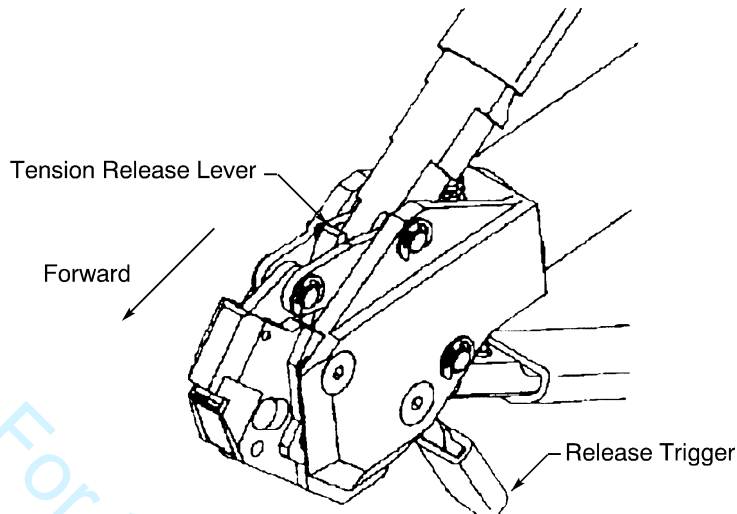
Make sure that pull-up handle is locked against the tool frame. Refer to Figure 98.

**CAUTION:** DO NOT USE FORCE TO OPEN THE PULL-UP HANDLE AFTER IT IS LOCKED IN POSITION. IF FORCE IS USED, DAMAGE TO THE TOOL OCCURS.

- (10) Examine the alignment of the loops of the band. Refer to Figure 99.
- (11) If the alignment is incorrect, loosen the band, Refer to Figure 100..

## STANDARD WIRING PRACTICES MANUAL

### ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS



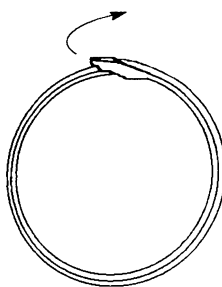
#### OPERATION OF THE TENSION RELEASE LEVER

Figure 100

- (a) Hold the pull-up handle tightly.
- (b) Push the tension release lever forward.
- (c) Release the pull-up handle.

**NOTE:** The pull-up handle will open automatically.

- (d) Pull the release trigger toward the tool frame.
- (e) Loosen the band and do the installation again from Step (4).
- (f) If it is necessary, remove the band and do the installation again from Step (4).
- (12) Pull the cut-off handle toward the tool frame until it is against the tool frame..
- (13) Pull the release trigger in the direction of the pull-up handle to cut the unwanted length of the band.
- (14) Remove the unwanted length of the band from the tool.
- (15) If the installation of the shield terminator band is incorrect, remove the band. Refer to Figure 101.



#### REMOVAL OF THE SHIELD TERMINATOR BAND

Figure 101

- (a) Hold the end of the band at the buckle with pliers or wire cutters.

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## **STANDARD WIRING PRACTICES MANUAL**

### **ELECTRICAL CONNECTION OF SHIELDED CABLES AND CONNECTOR BACKSHELLS WITH SHIELD TERMINATOR BANDS**

- (b) Bend the buckle back in the direction of the top loop of the coil until the loop is released.
- (c) Discard the used band.
- (d) Do the installation again from Step (3) with an unused band.

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**

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### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

This Subject gives the procedures to assemble strain relief backsells that have a braided shield sock. For the procedures to assemble other strain relief backsells, refer to:

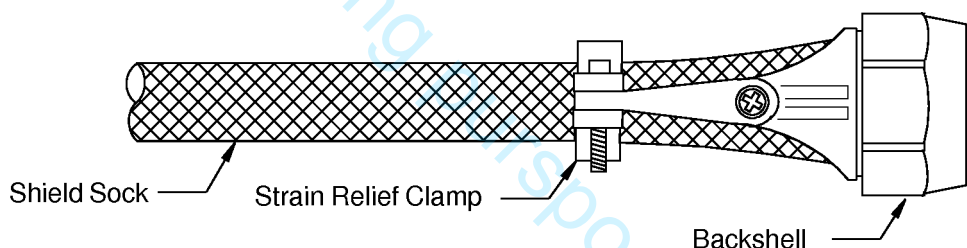
- Subject 20-60-09 for the assembly of backsells that do not terminate a shield
- Subject 20-25-12 for the assembly of backsells that terminate shields with shield ground wires and terminal lugs
- Subject 20-25-13 for the assembly of backsells that terminate shields with inner and outer ground rings
- Subject 20-25-14 for the assembly of backsells that terminate shields with a shield terminator band.

#### 1. PART NUMBERS AND DESCRIPTION

##### A. Backshell Description

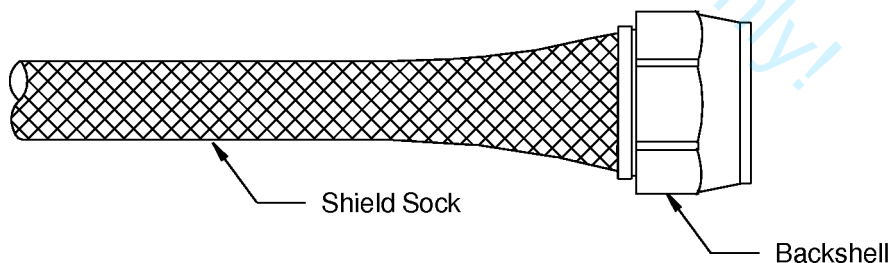
These backsells have these technical features:

- Have a light weight composite body that has a nickel or cadmium finish
- Are available with an adjustable swing arm and saddle clamp to provide strain relief
- Are available without an adjustable swing arm and saddle clamp to provide strain relief with a heat shrinkable boot
- The termination of the shield sock provides the shield termination and the EMI protection
- Have a hex shape, composite, self-locking coupling ring that must be tightened using special tools.



**BACKSHELL THAT HAS A SHIELD SOCK AND A STRAIN RELIEF CLAMP THAT HAS AN ADJUSTABLE SWING ARM**

**Figure 1**



**BACKSHELL THAT HAS A SHIELD SOCK THAT WILL USE A HEAT SHRINKABLE BOOT FOR STRAIN RELIEF**

**Figure 2**

# 20-25-15

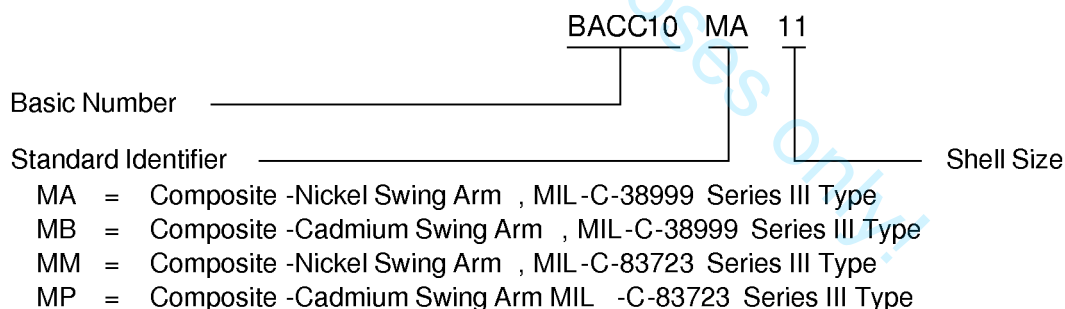
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

### B. Backshell Part Numbers

Table 1  
BACKSHELL PART NUMBERS

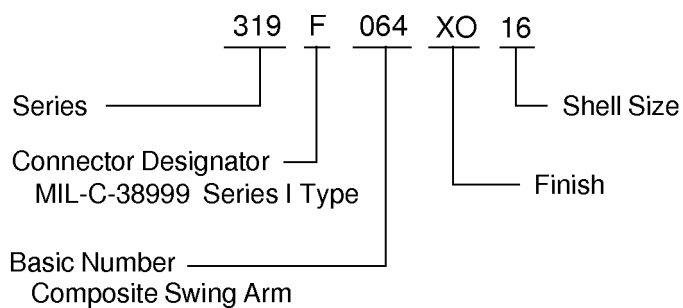
Part Number	Material	Coupling Ring	Cable Exit	Strain Relief	Approved Supplier	Part Number Structure
319AS110BM	Composite	Hex	90 Degree	90 Degree Boot	Glenair	Figure 5
	Composite	Hex	Straight	Straight Boot	Glenair	Figure 5
319F064XO	Composite	Hex	0-45-90 Degree	Cable Clamp	Glenair	Figure 4
319HS110BM	Composite	Hex	Straight	90 Degree Boot	Glenair	Figure 5
447HA557	Composite	Hex	90 Degree	Cable Clamp	Glenair	Figure 6
BACC10MA	Composite	Hex	0-45-90 Degree	Cable Clamp	Glenair	Figure 3
BACC10MB	Composite	Hex	0-45-90 Degree	Cable Clamp	Glenair	Figure 3
BACC10MM	Composite	Hex	0-45-90 Degree	Cable Clamp	Glenair	Figure 3
BACC10MP	Composite	Hex	0-45-90 Degree	Cable Clamp	Glenair	Figure 3



**BOEING STANDARD SWING ARM BACKSHELL PART NUMBER STRUCTURE**  
Figure 3

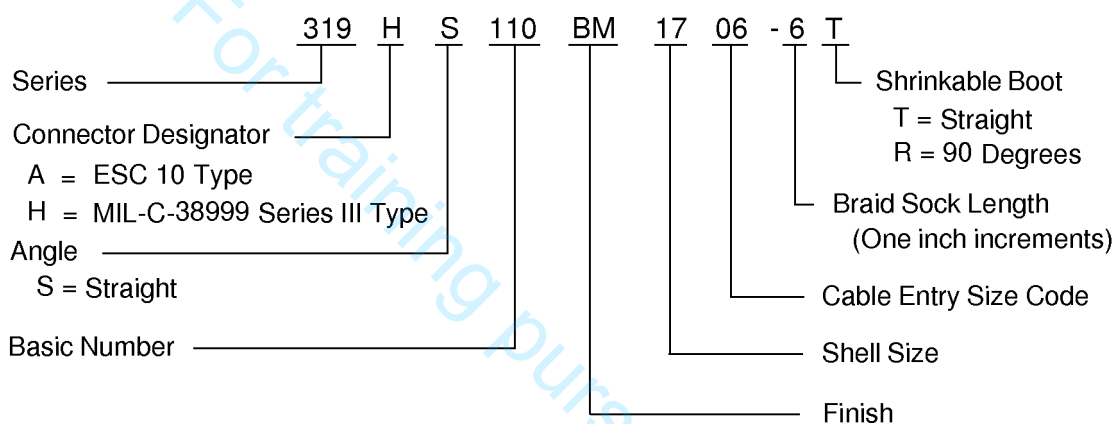
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



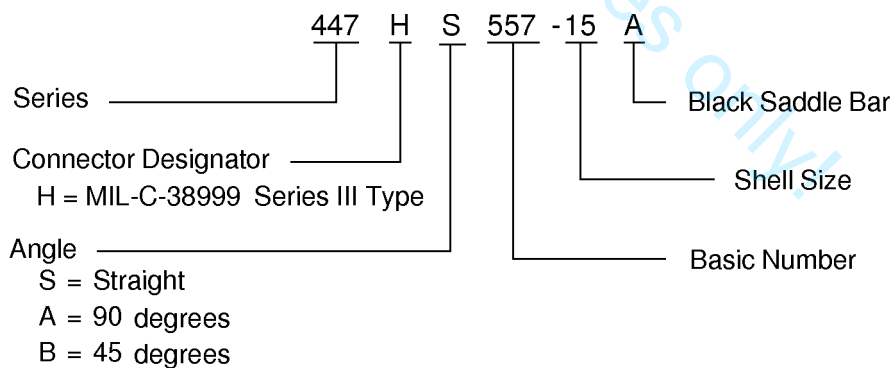
#### GLENAIR 319(064) SWING ARM BACKSHELL PART NUMBER STRUCTURE

Figure 4



#### GLENAIR 319(110) BACKSHELL PART NUMBER STRUCTURE

Figure 5



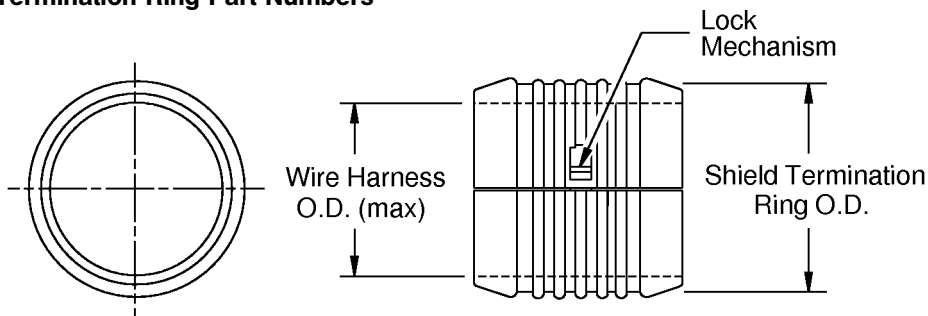
#### GLENAIR 447(557) BACKSHELL PART NUMBER STRUCTURE

Figure 6

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

### C. Shield Termination Ring Part Numbers



MIL-C-85049/93-( ) SHIELD TERMINATION RING

Figure 7

Table 2  
SHIELD TERMINATION RING PART NUMBERS AND SIZES

Part Number	Maximum Wire Harness O.D. (inch)	Shield Termination Ring O.D. (inch)	Supplier
M85049/93-04	.25	.36	Refer to Subject 20-00-11
M85049/93-06	.38	.49	Refer to Subject 20-00-11
M85049/93-08	.50	.61	Refer to Subject 20-00-11
M85049/93-10	.63	.74	Refer to Subject 20-00-11
M85049/93-12	.75	.86	Refer to Subject 20-00-11
M85049/93-14	.88	.99	Refer to Subject 20-00-11
M85049/93-16	1.00	1.10	Refer to Subject 20-00-11
M85049/93-18	1.13	1.24	Refer to Subject 20-00-11
M85049/93-20	1.25	1.36	Refer to Subject 20-00-11
M85049/93-22	1.38	1.49	Refer to Subject 20-00-11
M85049/93-24	1.50	1.61	Refer to Subject 20-00-11
M85049/93-26	1.63	1.74	Refer to Subject 20-00-11
M85049/93-28	1.75	1.86	Refer to Subject 20-00-11

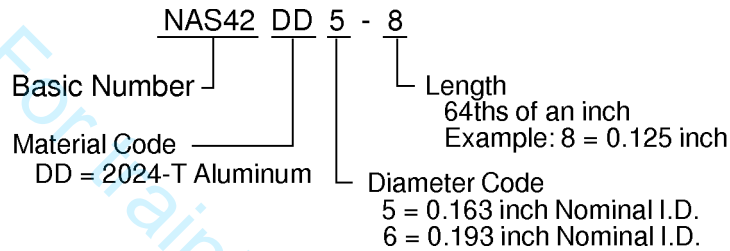
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

#### D. Spacer Part Numbers

Table 3  
SPACER PART NUMBERS

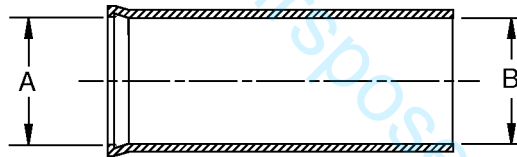
Component	Type	Part Number	Supplier	Reference
Spacer	Size 4 Saddle Clamp Screw	NAS42DD5-()	QPL	Figure 8
	Size 6 Saddle Clamp Screw	NAS42DD6-()	QPL	Figure 8



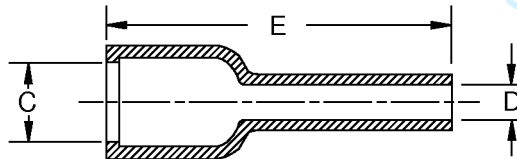
#### NAS42 SPACER PART NUMBER STRUCTURE

Figure 8

#### E. Heat Shrinkable Boot Part Numbers



AS SUPPLIED



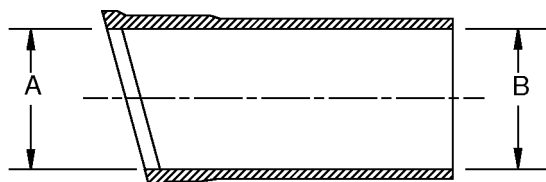
AFTER HEAT SHRINK

#### 809S102-( ) STRAIGHT HEAT SHRINKABLE BOOT

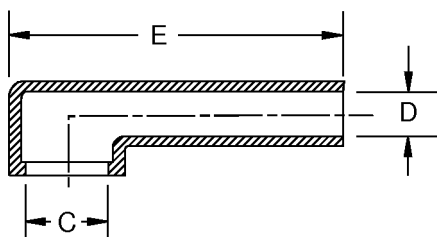
Figure 9

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



AS SUPPLIED



AFTER HEAT SHRINK

### 809A102-( ) 90 DEGREE HEAT SHRINKABLE BOOT

Figure 10

Table 4  
HEAT SHRINKABLE BOOT PART NUMBERS

Part Number	Configuration	Dimension (inches)					Supplier
		A	B	C	D	E	
809S102-1	Straight	.88	.88	.45	.25	4.17	Glenair
809S102-2	Straight	1.01	1.01	.59	.29	4.77	Glenair
809S102-3	Straight	1.16	1.16	.74	.33	5.46	Glenair
809S102-4	Straight	1.34	1.34	.90	.38	6.28	Glenair
809S102-5	Straight	1.47	1.47	1.16	.41	7.00	Glenair
809S102-6	Straight	1.72	1.72	1.34	.48	8.00	Glenair
809S102-7	Straight	1.97	1.97	1.62	.56	8.00	Glenair
809S102-8	Straight	2.47	2.47	1.85	.69	8.00	Glenair
809S102-9	Straight	2.73	2.73	2.35	.77	8.00	Glenair
809S102-10	Straight	3.22	3.22	2.64	.90	8.00	Glenair
809A102-1	90 Degree	.88	.88	.45	.25	4.14	Glenair
809A102-2	90 Degree	1.01	1.01	.59	.29	4.88	Glenair
809A102-3	90 Degree	1.16	1.16	.74	.33	5.76	Glenair
809A102-4	90 Degree	1.34	1.34	.90	.38	6.78	Glenair

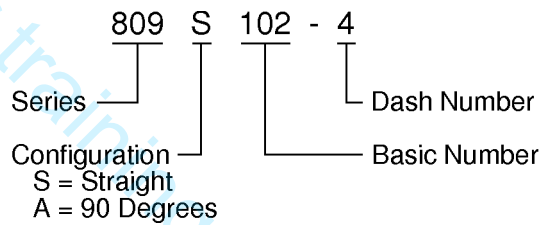
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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 4 (continued)

Part Number	Configuration	Dimension (inches)					Supplier
		A	B	C	D	E	
809A102-5	90 Degree	1.47	1.47	1.16	.41	7.29	Glenair
809A102-6	90 Degree	1.72	1.72	1.34	.48	8.41	Glenair
809A102-7	90 Degree	1.97	1.97	1.62	.56	8.84	Glenair
809A102-8	90 Degree	2.47	2.47	1.85	.69	8.95	Glenair
809A102-9	90 Degree	2.73	2.73	2.35	.77	9.19	Glenair
809A102-10	90 Degree	3.22	3.22	2.64	.90	9.33	Glenair



#### GLENAIR 809( )102-( ) HEAT SHRINKABLE BOOT PART NUMBER STRUCTURE

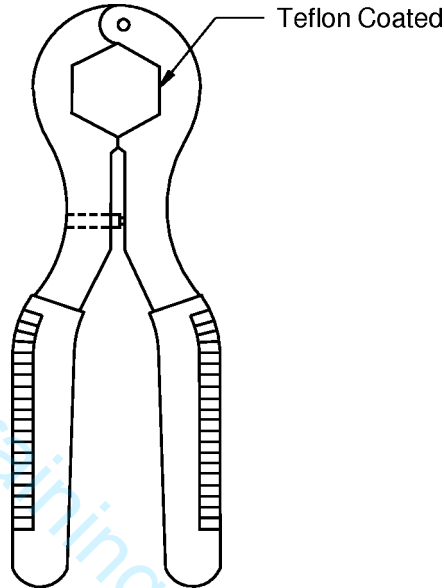
Figure 11

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

#### 2. NECESSARY TOOLS

##### A. Necessary Tools



**BACKSHELL HEX NUT TOOL**

**Figure 12**

**CAUTION:** DO NOT USE A STRAP WRENCH TO APPLY TORQUE TO A COMPOSITE COUPLING NUT. ONLY USE A BACKSHELL HEX NUT TOOL TO APPLY TORQUE TO A COMPOSITE COUPLING NUT. FAILURE TO USE THE SPECIFIED BACKSHELL HEX NUT TOOL CAN CAUSE DAMAGE TO THE COUPLING NUT AND UNSATISFACTORY PERFORMANCE OF THE BACKSHELL.

**Table 5**  
**HEX COUPLING NUT TOOLS**

Shell Size	Tool	
	Part Number	Supplier
8	600-091-08	Glenair
9	600-091-08	Glenair
10	600-091-10	Glenair
11	600-091-10	Glenair
12	600-091-12	Glenair
13	600-091-12	Glenair
14	600-091-14	Glenair
15	600-091-14	Glenair
16	600-091-16	Glenair

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 5 (continued)

Shell Size	Tool	
	Part Number	Supplier
17	600-091-16	Glenair
18	600-091-18	Glenair
19	600-091-18	Glenair
20	600-091-20	Glenair
21	600-091-20	Glenair
22	600-091-22	Glenair
23	600-091-22	Glenair
24	600-091-24	Glenair
25	600-091-24	Glenair
28	600-091-28	Glenair
32	600-091-32	Glenair

Table 6  
TORQUE TOOL

Backshell Shell Size		Tool		
Minimum	Maximum	Type	Minimum Torque Capability (inch-pounds)	Supplier
08	19	Torque Driver	35	An Available Source
20	28	Torque Driver	80	An Available Source
32	32	Torque Driver	115	An Available Source

Table 7  
CONNECTOR ADAPTER TOOL SETS

Connector Series	Tool Set		Refer to
	Part Number	Supplier	
8D0()M	CM-S-389T	Daniels	TABLE 8
8D5()M	CM-S-389TR	Daniels	TABLE 9
BACC45FT	CM-S-837	Daniels	TABLE 10
BACC63BP	CM-S-837	Daniels	TABLE 10
BACC63CB	CM-S-837	Daniels	TABLE 10
BACC63CC	CM-S-837RB	Daniels	TABLE 11
BACC63CM	CM-S-837	Daniels	TABLE 10
BACC63CN	600E005	Glenair	TABLE 12

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 7 (continued)

Connector Series	Tool Set		Refer to
	Part Number	Supplier	
BACC63CT	CM-S-389T	Daniels	TABLE 8
BACC63CU	CM-S-389TR	Daniels	TABLE 9
BACC63DB	CM-S-389T	Daniels	TABLE 8
BACC63DC	CM-S-389TR	Daniels	TABLE 9
BACC68E	CM-S-389TR	Daniels	TABLE 9
BACC68F	CM-S-389T	Daniels	TABLE 8
D38999/24	CM-S-389T	Daniels	TABLE 8
D38999/26	CM-S-389TR	Daniels	TABLE 9
MS27467	CM-S-389L	Daniels	TABLE 13
MS3450	CM-S-5015R	Daniels	TABLE 15
MS3459	CM-S-5015	Daniels	TABLE 14
MS3475	CM-S-264	Daniels	TABLE 16
MS3476	CM-S-264R	Daniels	TABLE 17
MS83723/75	CM-S-837	Daniels	TABLE 10
MS83723/77	CM-S-837	Daniels	TABLE 10
MS83723/78	CM-S-837	Daniels	TABLE 10
MS83723/83	CM-S-837RB	Daniels	TABLE 11
MS83723/95	CM-S-837	Daniels	TABLE 10
MS83723/98	CM-S-837	Daniels	TABLE 10

Table 8

### ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-389T TOOL SET

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
9	N, C, D	CM389T-9A	1/4
	A, B, E	CM389T-9B	
11	N, D, E	CM389T-11A	1/4
	A, B, C	CM389T-11B	
13	N, D, E	CM389T-13A	1/4
	A, B, C	CM389T-13B	
15	N, D, E	CM389T-15A	1/4
	A, B, C	CM389T-15B	

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 8 (continued)

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
17	N, A, B	CM389T-17A	1/4
	C, D, E	CM389T-17B	
19	N, A, B	CM389T-19A	3/8
	C, D, E	CM389T-19B	
21	N, A, B	CM389T-21A	3/8
	C, D, E	CM389T-21B	
23	N, A, B	CM389T-23A	3/8
	C, D, E	CM389T-23B	
25	N, A, B	CM389T-25A	3/8
	C, D, E	CM389T-25B	

Table 9

### ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-389TR TOOL SET

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
9	N	CM389TR-9A	1/4
	A, B, C, D, E	CM389TR-9B	
11	N	CM389TR-11A	1/4
	A, B, C, D, E	CM389TR-11B	
13	N	CM389TR-13A	1/4
	A, B, C, D, E	CM389TR-13B	
15	N	CM389TR-15A	1/4
	A, B, C, D, E	CM389TR-15B	
17	N	CM389TR-17A	1/4
	A, B, C, D, E	CM389TR-17B	
19	N	CM389TR-19A	3/8
	A, B, C, D, E	CM389TR-19B	
21	N	CM389TR-21A	3/8
	A, B, C, D, E	CM389TR-21B	
23	N	CM389TR-23A	3/8
	A, B, C, D, E	CM389TR-23B	
25	N	CM389TR-25A	3/8
	A, B, C, D, E	CM389TR-25B	

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**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**
**Table 10**
**ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-837 TOOL SET**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
8	N, 8, 9	CM837-8A	1/4
	6, 7	CM837-8B	1/4
	N, 8, 9	CM837-8C	1/4
	6, 7	CM837-8D	1/4
10	N, 8, 9	CM837-10A	1/4
	6, 7, 10	CM837-10B	3/8
12	N, 6, 8	CM837-12A	3/8
	7, 9, 10	CM837-12B	3/8
14	N, 6, 8	CM837-14A	3/8
	7, 9, 10	CM837-14B	3/8
16	N, 6, 8	CM837-16A	3/8
	7, 9, 10	CM837-16B	3/8
18	N, 6, 8	CM837-18A	3/8
	7, 9, 10	CM837-18B	3/8
20	N, 6, 8	CM837-20A	3/8
	7, 9, 10	CM837-20B	3/8
22	N, 6, 8	CM837-22A	3/8
	7, 9, 10	CM837-22B	3/8
24	N, 6, 8	CM837-24A	3/8
	7, 9, 10	CM837-24B	3/8
28	N, 6, 8	CM837-28A	3/8
	7, 9, 10	CM837-28B	3/8

**Table 11**
**ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-837RB TOOL SET**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
8	All	CM837RB-8	1/4
10	All	CM837RB-10	1/4
12	All	CM837RB-12	1/4
14	All	CM837RB-14	1/4
16	All	CM837RB-16	1/4

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**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**
**Table 11 (continued)**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
18	All	CM837RB-18	3/8
20	All	CM837RB-20	3/8
22	All	CM837RB-22	3/8
24	All	CM837RB-24	3/8

**Table 12**
**ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE GLENAIR 600E005 TOOL SET**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
8	N	600E005-8RN	1/4
	6	600E005-8R6	1/4
	7	600E005-8R7	1/4
	8	600E005-8R8	1/4
	9	600E005-8R9	1/4
	10	600E005-8R10	1/4
10	N	600E005-10RN	1/4
	6	600E005-10R6	1/4
	7	600E005-10R7	1/4
	8	600E005-10R8	1/4
	9	600E005-10R9	1/4
	10	600E005-10R10	1/4
12	N	600E005-12RN	1/4
	6	600E005-12R6	1/4
	7	600E005-12R7	1/4
	8	600E005-12R8	1/4
	9	600E005-12R9	1/4
	10	600E005-12R10	1/4
14	N	600E005-14RN	3/8
	6	600E005-14R6	3/8
	7	600E005-14R7	3/8
	8	600E005-14R8	3/8
	9	600E005-14R9	3/8
	10	600E005-14R10	3/8

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**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**
**Table 12 (continued)**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
16	N	600E005-16RN	3/8
	6	600E005-16R6	3/8
	7	600E005-16R7	3/8
	8	600E005-16R8	3/8
	9	600E005-16R9	3/8
	10	600E005-16R10	3/8
18	N	600E005-18RN	3/8
	6	600E005-18R6	3/8
	7	600E005-18R7	3/8
	8	600E005-18R8	3/8
	9	600E005-18R9	3/8
	10	600E005-18R10	3/8
20	N	600E005-20RN	3/8
	6	600E005-20R6	3/8
	7	600E005-20R7	3/8
	8	600E005-20R8	3/8
	9	600E005-20R9	3/8
	10	600E005-20R10	3/8
22	N	600E005-22RN	3/8
	6	600E005-22R6	3/8
	7	600E005-22R7	3/8
	8	600E005-22R8	3/8
	9	600E005-22R9	3/8
	10	600E005-22R10	3/8
24	N	600E005-24RN	3/8
	6	600E005-24R6	3/8
	7	600E005-24R7	3/8
	8	600E005-24R8	3/8
	9	600E005-24R9	3/8
	10	600E005-24R10	3/8

**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**
**Table 12 (continued)**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
28	N	600E005-28RN	3/8
	6	600E005-28R6	3/8
	7	600E005-28R7	3/8
	8	600E005-28R8	3/8
	9	600E005-28R9	3/8
	10	600E005-28R10	3/8

**Table 13**
**ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-389L TOOL SET**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
9	All	CM389L-9	1/4
11	All	CM389L-11	1/4
13	All	CM389L-13	1/4
15	All	CM389L-15	1/4
17	All	CM389L-17	1/4
19	All	CM389L-19	3/8
21	All	CM389L-21	3/8
23	All	CM389L-23	3/8
25	All	CM389L-25	3/8

**Table 14**
**ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-5015 TOOL SET**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
8	All	CM5015-8	1/4
10	All	CM5015-10	1/4
12	All	CM5015-12	1/4
14	All	CM5015-14	1/4
16	All	CM5015-16	1/4
18	All	CM5015-18	1/4
20	All	CM5015-20	3/8
22	All	CM5015-22	3/8
24	All	CM5015-24	3/8

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**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**
**Table 14 (continued)**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
28	All	CM5015-28	3/8
32	All	CM5015-32	3/8
36	All	CM5015-26	3/8
40	All	CM5015-40	3/8
44	All	CM5015-44	3/8
48	All	CM5015-48	3/8

**Table 15**
**ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-5015R TOOL SET**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
8	All	CM5015R-8	1/4
10	All	CM5015R-10	1/4
12	All	CM5015R-12	1/4
14	All	CM5015R-14	1/4
16	All	CM5015R-16	1/4
18	All	CM5015R-18	1/4
20	All	CM5015R-20	3/8
22	All	CM5015R-22	3/8
24	All	CM5015R-24	3/8
28	All	CM5015R-28	3/8
32	All	CM5015R-32	3/8
36	All	CM5015R-26	3/8
40	All	CM5015R-40	3/8
44	All	CM5015R-44	3/8
48	All	CM5015R-48	3/8

**Table 16**
**ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-264 TOOL SET**

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
8	All	CM264-8	1/4
10	All	CM264-10	1/4
12	All	CM264-12	1/4

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 16 (continued)

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
14	All	CM264-14	1/4
16	All	CM264-16	1/4
18	All	CM264-18	3/8
20	All	CM264-20	3/8
22	All	CM264-22	3/8
24	All	CM264-24	3/8

Table 17

#### ADAPTER PART NUMBERS AND DRIVE HANDLE SIZES FOR THE DANIELS CM-S-264R TOOL SET

Connector Shell Size	Connector Keyway Position	Adapter Part Number	Handle Drive Size (inch)
8	All	CM264R-8	1/4
10	All	CM264R-10	1/4
12	All	CM264R-12	1/4
14	All	CM264R-14	1/4
16	All	CM264R-16	1/4
18	All	CM264R-18	3/8
20	All	CM264R-20	3/8
22	All	CM264R-22	3/8
24	All	CM264R-24	3/8

### 3. BACKSHELL DISASSEMBLY

#### A. Backshell Disassembly

Table 18

#### BACKSHELL DISASSEMBLY TOOLS

Tool	Description	Part Number	Backshell Size		Screw Size	Supplier
			Smallest Size	Largest Size		
Screw Driver	Phillips #1	-	08	11	4	An available source
	Phillips #2	-	12	32	6	An available source
Knife	-	-	-	-	-	An available source
Diagonal Cutters	-	-	-	-	-	An available source

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 18 (continued)

Tool	Description	Part Number	Backshell Size		Screw Size	Supplier
			Smallest Size	Largest Size		
Spudger	Black Stick	SP3010	-	-	-	3M
	Nylon Stick	-	-	-	-	An available source
	Orangewood Stick	-	-	-	-	An available source
	Plastic Awl	-	-	-	-	An available source

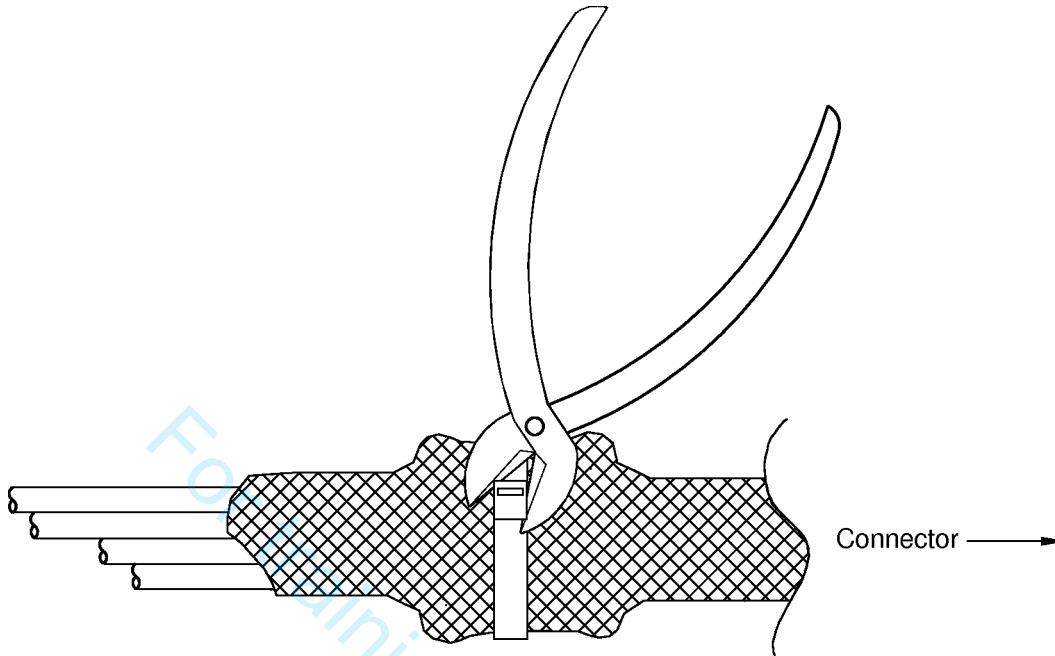
- (1) If the backshell to be disassembled has a saddle clamp:
  - (a) Make a selection of a screw driver from Table 18.
  - (b) Remove the saddle bar screws, washers, spacers, and the saddle bars.
  - (c) Put the saddle bars, the screws, the washers, and the spacers in a safe place.
  - (d) Remove the tape that is:
    - At the location where the saddle bars hold the wire harness
    - Around the end of the shield sock
    - Around the shield terminator band.
  - (e) Remove the wire harness ties.
- (2) If there is a protective sleeve on the braided shield sock, remove the protective sleeve.
- (3) If the backshell to be disassembled has a strain relief boot:
  - (a) Make a selection of a knife from Table 18.
  - (b) Carefully make a longitudinal cut from one end of the strain relief boot to the other end of the boot.

**CAUTION:** DO NOT FULLY CUT THROUGH THE STRAIN RELIEF BOOT. DAMAGE TO THE SHIELD SOCK, WIRES, CABLES, OR OTHER COMPONENTS OF THE WIRE HARNESS CAN OCCUR.

  - (c) Apply heat the area that is cut to split the boot.
  - (d) Remove the strain relief boot from the assembly.
  - (e) Examine the shield sock.  
Make sure that the shield sock does not have damage.
  - (f) Remove the tape that is:
    - Around the end of the shield sock
    - Around the shield terminator band.
- (4) Make a selection of a pair of diagonal cutters from Table 18.
- (5) Remove the shield terminator band from the braided shield sock. Refer to Figure 13.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



### REMOVAL OF THE SHIELD TERMINATOR BAND

Figure 13

- (a) Hold the buckle of the shield terminator band with the cutters.
  - (b) Rotate the cutters and lift the buckle of the band away from the braided shield sock until the buckle releases or the band breaks.
  - (c) Remove the shield terminator band.
- (6) If the backshell to be disassembled is attached to a receptacle connector:  
Make sure that the receptacle connector shell is held by mounting screws or by other means and cannot rotate.
- (a) Make a selection of a backshell hex coupling nut tool from Table 5.

**CAUTION:** DO NOT USE A STRAP WRENCH TO LOOSEN A COMPOSITE COUPLING NUT. USE ONLY THE SPECIFIED BACKSHELL HEX NUT TOOL. FAILURE TO USE THE SPECIFIED BACKSHELL HEX NUT TOOL CAN CAUSE DAMAGE TO THE COUPLING NUT AND UNSATISFACTORY PERFORMANCE OF THE BACKSHELL.

- (b) Use the tool to loosen the coupling ring of the backshell.
  - (c) Disengage the threads of the backshell coupling ring from the connector.
- (7) If the backshell to be disassembled is attached to a plug connector:
- (a) Disconnect the plug connector from the receptacle connector.
  - (b) Use the connector shell size and the connector keyway position to make a selection of:
    - A backshell hex coupling nut tool from Table 5
    - An adapter tool set from Table 7.
    - An adapter tool and driver from Tables 8 through Table 17.

Make sure that the driver is the correct size for the adapter tool.

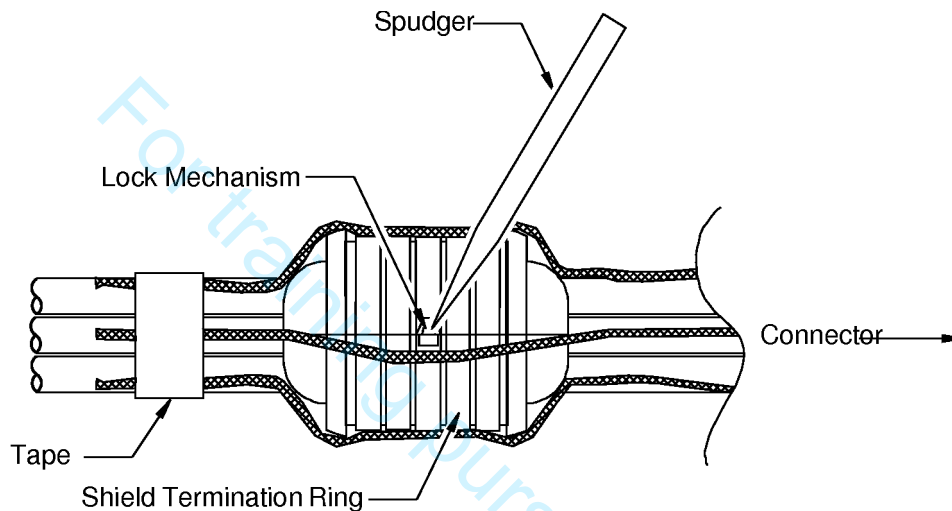
# 20-25-15

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

**CAUTION:** DO NOT USE A STRAP WRENCH TO LOOSEN A COMPOSITE COUPLING NUT. USE ONLY THE SPECIFIED BACKSHELL HEX NUT TOOL. FAILURE TO USE THE SPECIFIED BACKSHELL HEX NUT TOOL CAN CAUSE DAMAGE TO THE COUPLING NUT AND UNSATISFACTORY PERFORMANCE OF THE BACKSHELL.

- (c) Use the adapter tool and drive handle to hold the engaging face of the plug connector.
- (d) Use the backshell hex nut tool to loosen the backshell coupling ring.
- (e) Disengage the threads of the backshell coupling ring from the connector.
- (8) Remove the shield termination ring:



#### SHIELD TERMINATION RING REMOVAL

Figure 14

- (a) Make a selection of a spudger from Table 18.
- NOTE:** A different tool that gives equivalent results is a satisfactory alternative.
- (b) Push the rear end of the shield sock toward the connector.  
Make sure that you can see the shield termination ring.
  - (c) Use the tip of the spudger to push against the lock mechanism of the shield termination ring. Refer to Figure 14.
  - (d) Remove the shield termination ring from the wire harness.
  - (9) Push the backshell and shield sock along the wire harness away from the connector.
  - (10) Remove the layers of tape from the wire harness.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

#### 4. CABLE PREPARATION PROCEDURES, BACKSHELL ASSEMBLY AND BACKSHELL INSTALLATION

This Paragraph gives the procedures to prepare the ends of shielded cables and to assemble a strain relief backshell that has a braided shield sock. For the procedures to assemble other strain relief backshells, refer to:

- Subject 20-60-09 for the assembly of backshells that do not terminate a shield
- Subject 20-25-12 for the assembly of backshells that terminate shields with shield ground wires and terminal lugs
- Subject 20-25-13 for the assembly of backshells that terminate shields with inner and outer ground rings
- Subject 20-25-14 for the assembly of backshells that terminate shields with a shield terminator band.

##### A. Necessary Materials

**Table 19**  
**NECESSARY MATERIALS**

Material	Temperature Grade	Fluid Class	Type	Part Number or Specification	Description	Supplier
Insulation Sleeve, Heat Shrinkable	-	-	-	Refer to Subject 20-00-11	-	-
Insulation Tape	B	1	PTFE	A-A-59474, Type I	PTFE, pressure sensitive, silicone polymer adhesive	QPL
				Scotch 63	TFE fluorocarbon film; pressure sensitive acrylic adhesive; 0.0035 inch thick, 1/2 inch wide	3M
	D	2	Silicone	A-A-59163, Type I	Self-bonding silicone rubber, high temperature, rectangular cross-section, 0.5, 0.75, 1.0, 1.25, and 1.5 inch widths	QPL
				A-A-59163, Type II	Self-bonding silicone rubber, high temperature, triangular cross-section, one inch wide	QPL
				Scotch 70	Self-bonding silicone rubber, high temperature; 0.012 inch thick, 1 inch wide	3M

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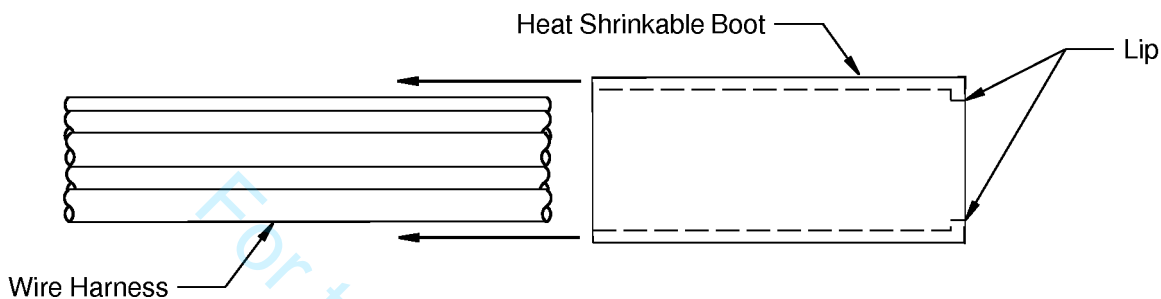
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

#### B. Backshell Assembly Preparation

- (1) If heat shrinkable sleeve is specified, put the sleeve on the wire harness.
- (2) If the backshell strain relief is a heat shrinkable boot, put the boot on the wire harness.

Make sure that the end of the boot that has the lip is pointed forward toward the end of the wire harness. Refer to Figure 15.

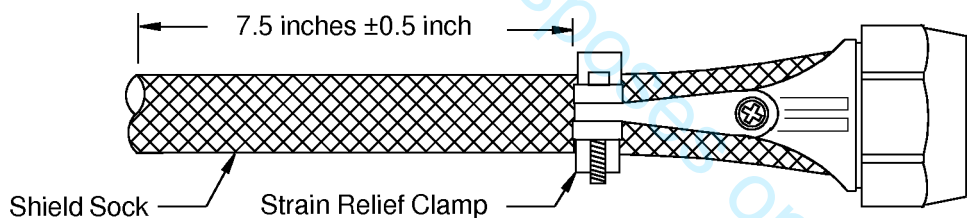


**INSTALLATION OF THE STRAIN RELIEF BOOT**  
Figure 15

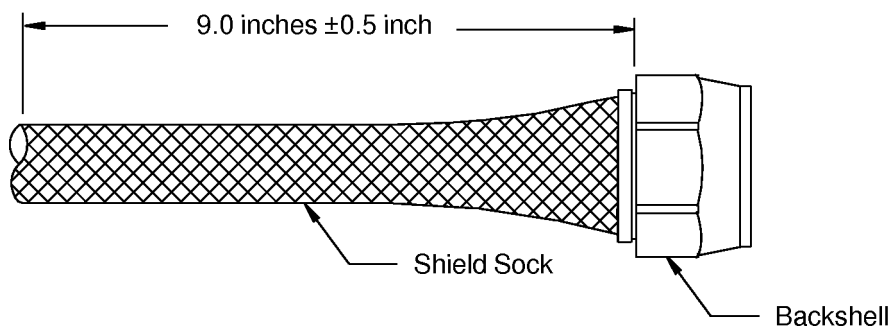
- (3) For a wire harness that does not have a splice assembly between the shield termination ring and the strain relief clamp, remove the necessary length of the shield sock.

For a backshell that has:

- A swing arm and strain relief clamp, refer to Figure 16
- A strain relief boot, refer to Figure 17.



**LENGTH OF THE SHIELD SOCK FOR A STRAIN RELIEF CLAMP BACKSHELL**  
Figure 16



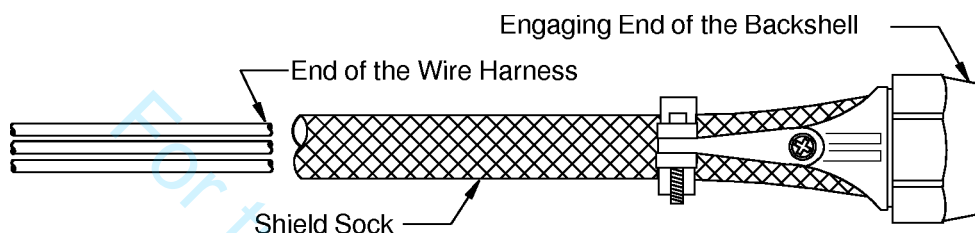
**LENGTH OF THE SHIELD SOCK FOR A STRAIN RELIEF BOOT**  
Figure 17

**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

- (4) For a backshell that has a strain relief clamp:
  - (a) Make a selection of these tools from Table 18.
    - A screw bit driver
    - A screw bit.
  - (b) Remove the saddle clamp bars from the clamp.
  - (c) Keep the saddle clamp bars and the screws in a safe place.
- (5) Put the wire harness in the backshell and shield sock. Refer to Figure 18.



**POSITION OF THE BACKSHELL IN RELATION TO THE WIRE HARNESS**

**Figure 18**

- (6) Move the backshell and shield sock rearward on the wire harness away from the end of the wire harness.  
Make sure that the engaging end of the backshell is pointed forward toward the end of the wire harness.
- (7) Prepare the cables for shield termination. Refer to Paragraph 4.C..

#### C. Selection of a Cable Preparation Procedure

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

**Table 20**

**SHIELD TERMINATION CONFIGURATION DEFINITIONS**

Shield Termination Configuration	Definition
End Strip	The cable jacket and shield removal for non-EMI configurations where the location of the shield termination can occur between the shield termination ring and the strain relief clamp
Standard	The cable jacket and shield removal for EMI configurations where the location of the shield termination must occur between the strain relief clamp and the connector

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 21  
SPECIAL CABLE PREPARATION PROCEDURES

Cable	Outer Shield		Inner Shield		Assembly Procedure
	Shield Ground Wire	Termination Configuration	Shield Ground Wire	Termination Configuration	
CAN22TDT120-260, Two Adjacent Shields	Solder Sleeve	Standard	-	-	Paragraph 4.F.

Table 22  
STANDARD CABLE PREPARATION PROCEDURES

Shielded Cable Configuration	Outer Shield		Inner Shield		Assembly Procedure
	Shield Ground Wire	Termination Configuration	Shield Ground Wire	Termination Configuration	
One Shield	Solder Sleeve	Standard	-	-	Paragraph 4.E.
	Solder Sleeve	End Strip	-	-	Paragraph 4.G.
	Shield Pull Through	Standard	-	-	Paragraph 4.H.
	Shield Pull Through	End Strip	-	-	Paragraph 4.H.
Two Adjacent Shields	Solder Sleeve	Standard	-	-	Paragraph 4.E.
	Solder Sleeve	End Strip	-	-	Paragraph 4.G.
	Shield Pull Through	Standard	-	-	Paragraph 4.H.
	Shield Pull Through	End Strip	-	-	Paragraph 4.H.

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 22 (continued)

Shielded Cable Configuration	Outer Shield		Inner Shield		Assembly Procedure
	Shield Ground Wire	Termination Configuration	Shield Ground Wire	Termination Configuration	
Two Isolated Shields	Shield Pull Through	Standard	Shield Pull Through	Standard	Paragraph 4.I.
	Shield Pull Through	End Strip	Shield Pull Through	Standard	Paragraph 4.J.
	Shield Pull Through	End Strip	Shield Pull Through	End Strip	Paragraph 4.J.
	Shield Pull Through	Standard	Solder Sleeve	Standard	Paragraph 4.K.
	Shield Pull Through	End Strip	Solder Sleeve	Standard	Paragraph 4.L.
	Shield Pull Through	Standard	Dead End	Standard	Paragraph 4.M.
	Shield Pull Through	End Strip	Dead End	End Strip	Paragraph 4.M.
	Solder Sleeve	End Strip	Solder Sleeve	Standard	Paragraph 4.N.
	Solder Sleeve	End Strip	Solder Sleeve	End Strip	Paragraph 4.O.
	Solder Sleeve	End Strip	Dead End	Standard	Paragraph 4.P.

### D. Cable Preparation Dimensions

Table 23

#### CABLE PREPARATION DIMENSIONS - CONDUCTOR NOT FOLDED BACK

Backshell	Shell Size		Removal Length (inch)			
			Dimension A		Dimension B	
	Min	Max	Target	Tolerance	Target	Tolerance
319AS110BM	10	24	2.75	±0.10	1.95	±0.10
319F064XO	9	19	3.75	±0.10	1.95	±0.10
319HS110BM	9	17	2.75	±0.10	1.95	±0.10
447HA557	9	19	3.5	±0.10	1.95	±0.10
BACC10MA	9	19	3.75	±0.10	1.95	±0.10
	21	25	4.25	±0.10	1.95	±0.10
BACC10MB	9	19	3.75	±0.10	1.95	±0.10
	21	25	4.25	±0.10	1.95	±0.10

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 23 (continued)

Backshell	Shell Size		Removal Length (inch)			
			Dimension A		Dimension B	
	Min	Max	Target	Tolerance	Target	Tolerance
BACC10MM	10	18	3.75	± 0.10	1.95	± 0.10
	20	24	4.25	± 0.10	1.95	± 0.10
BACC10MP	12	18	3.75	± 0.10	1.95	± 0.10
	20	22	4.25	± 0.10	1.95	± 0.10

Table 24

### CABLE PREPARATION DIMENSIONS - CONDUCTOR FOLDED BACK

Backshell	Shell Size		Removal Length (inch)			
			Dimension A		Dimension B	
	Min	Max	Target	Tolerance	Target	Tolerance
319AS110BM	10	24	2.75 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
319F064XO	9	19	3.75 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
319HS110BM	9	17	2.75 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
447HA557	9	19	3.5 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
BACC10MA	9	19	3.75 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
	21	25	4.25 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 24 (continued)

Backshell	Shell Size		Removal Length (inch)			
			Dimension A		Dimension B	
	Min	Max	Target	Tolerance	Target	Tolerance
BACC10MB	9	19	3.75 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
	21	25	4.25 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
BACC10MM	10	18	3.75 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
	20	24	4.25 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
BACC10MP	12	18	3.75 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10
	20	22	4.25 plus 1/2 of the insulation removal length	± 0.10	1.95 plus 1/2 of the insulation removal length	± 0.10

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

#### E. Solder Sleeve Shield Termination - Standard Configuration

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

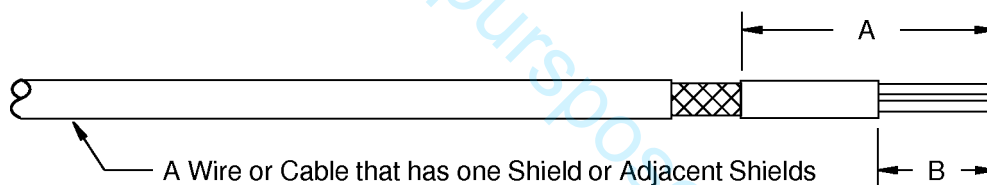
**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary length of the jacket and the shield from the end of the cable.

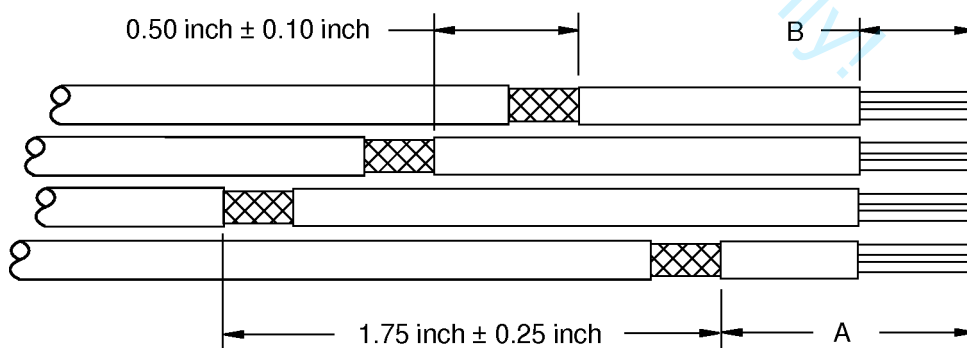
**NOTE:** If the contact assembly specifies the fold back of the conductor, Dimension A and Dimension B must be increased by one half of the insulation removal length that is applicable for the wire size and the contact crimp barrel size.

Refer to:

- Table 23 for the cable jacket removal length when the conductor is not folded back
- Table 24 for the cable jacket removal length when the conductor is folded back
- Figure 19 for 3 or less cables
- Figure 20 for 4 or more cables
- Subject 20-00-15 for the procedure to remove the cable jacket.



**CABLE PREPARATION FOR 3 OR LESS CABLES - STANDARD CONFIGURATION**  
Figure 19



**CABLE PREPARATION FOR 4 OR MORE CABLES - STANDARD CONFIGURATION**  
Figure 20

- (2) Assemble a solder sleeve that has an integral uninsulated shield ground wire.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

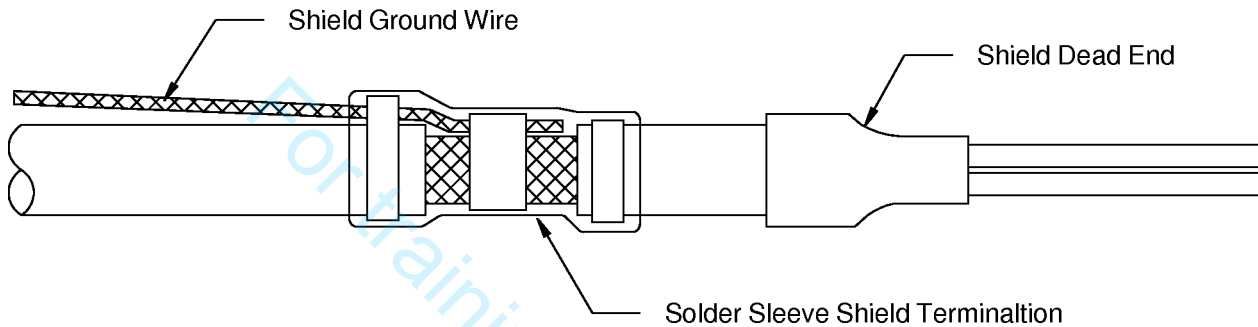
Refer to:

- Figure 21
- Subject 20-10-15 for the procedure to assemble the solder sleeve.

Make sure that the shield ground wire is pointed away from the end of the wire harness.

**NOTE:** An overlap of the solder sleeves is permitted when the wire harness has 3 cables or less.

**NOTE:** When the wire harness has 4 or more cables, the solder sleeves must be installed in equal sets at equal distances in the 1.75 inch length area. Refer to Figure 20.



**POSITION OF THE SHIELD GROUND WIRE**

**Figure 21**

- (3) Assemble a shield dead end on the cable.

Refer to:

- Figure 21
- Subject 20-10-15 for the procedure to assemble the shield dead end.

#### **F. Solder Sleeve Shield Termination - Standard Configuration, Tensolite CAN22TT120-260 Cable**

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Put a 1.25 inch  $\pm 0.10$  inch length of the specified heat shrinkable sleeve on the cable.
- (2) Move the length of heat shrinkable sleeve away from the end of the cable.
- (3) Remove the necessary length of the jacket and the shield from the end of the cable.

**NOTE:** If the contact assembly specifies the fold back of the conductor, Dimension A and Dimension B must be increased by one half of the insulation removal length that is applicable for the wire size and the contact crimp barrel size.

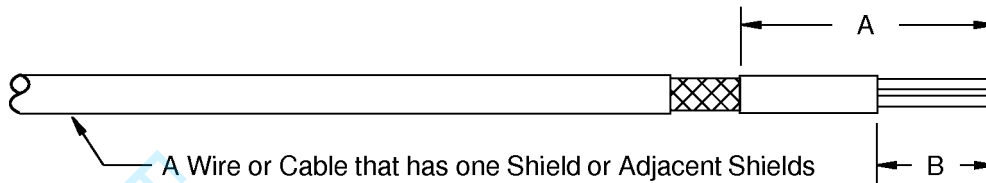
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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

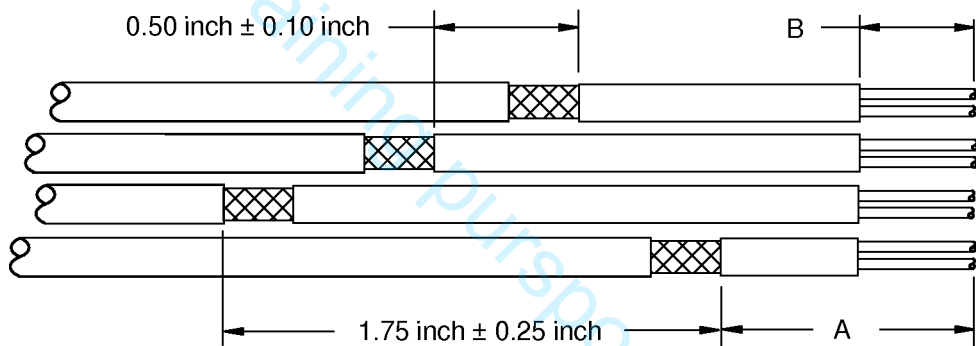
Refer to:

- Table 23 for the cable jacket removal length when the conductor is not folded back
- Table 24 for the cable jacket removal length when the conductor is folded back
- Figure 22 for 3 or less cables
- Figure 23 for 4 or more cables
- Subject 20-00-15 for the procedure to remove the cable jacket.



**CABLE PREPARATION FOR 3 OR LESS CABLES - STANDARD CONFIGURATION**

**Figure 22**



**CABLE PREPARATION FOR 4 OR MORE CABLES - STANDARD CONFIGURATION**

**Figure 23**

- (4) Assemble a solder sleeve that has an integral uninsulated shield ground wire.

Refer to:

- Figure 24
- Subject 20-10-15 for the procedure to assemble the solder sleeve..

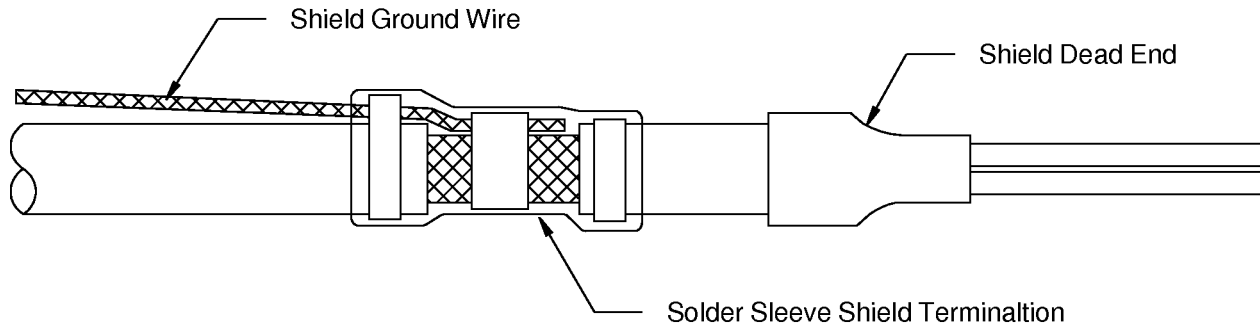
Make sure that the shield ground wire is pointed away from the end of the wire harness.

**NOTE:** An overlap of the solder sleeves is permitted when the wire harness has 3 cables or less.

**NOTE:** When the wire harness has 4 or more cables, the solder sleeves must be installed in equal sets at equal distances in the 1.75 inch length area. Refer to Figure 23.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



### POSITION OF THE SHIELD GROUND WIRE

Figure 24

- (5) Assemble a shield dead end on the cable.

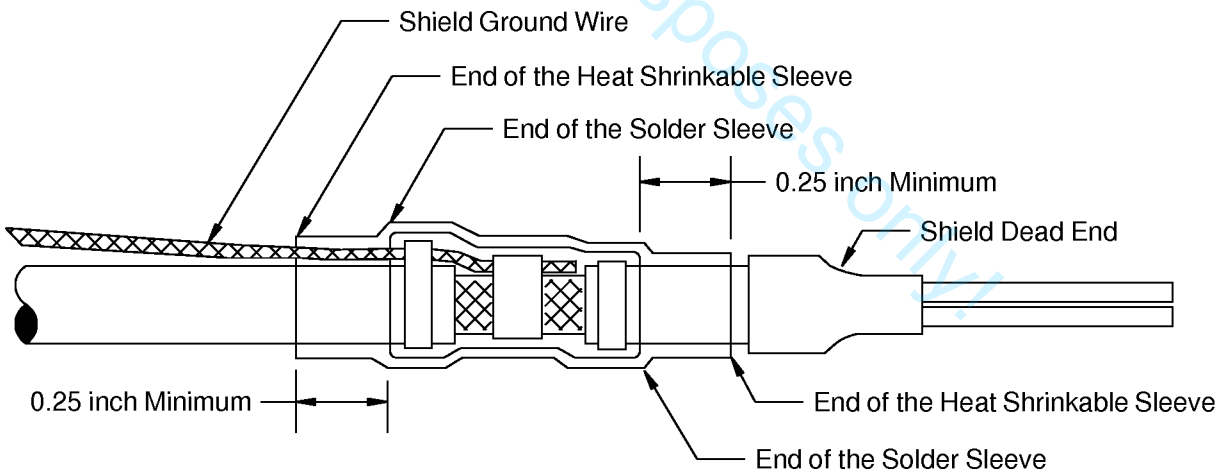
Refer to:

- Figure 24
- Subject 20-10-15 for the procedure to assemble the shield dead end.

- (6) Push the heat shrinkable sleeve forward until the center of the sleeve and the center of the solder sleeve are approximately aligned. Refer to Figure 25

Make sure that:

- The forward end of the sleeve is not farther than 0.25 inch from the rear end of the shield dead end
- The rear end of the sleeve is not farther than 0.25 inch from the rear end of the solder sleeve.



### POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE SOLDER SLEEVE

Figure 25

- (7) Shrink the sleeve into its position.

Refer to:

- Figure 25
- Subject 20-10-14 for the procedure to shrink the sleeve.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

#### G. Solder Sleeve Shield Termination - End Strip Configuration

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

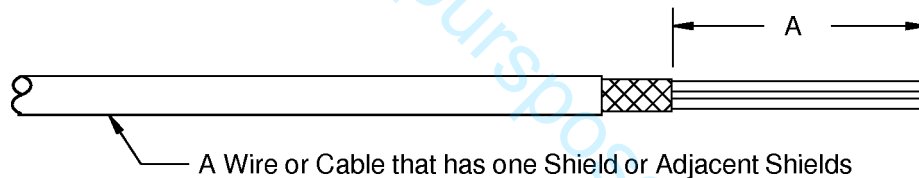
**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary length of the jacket and the shield from the end of the cable.

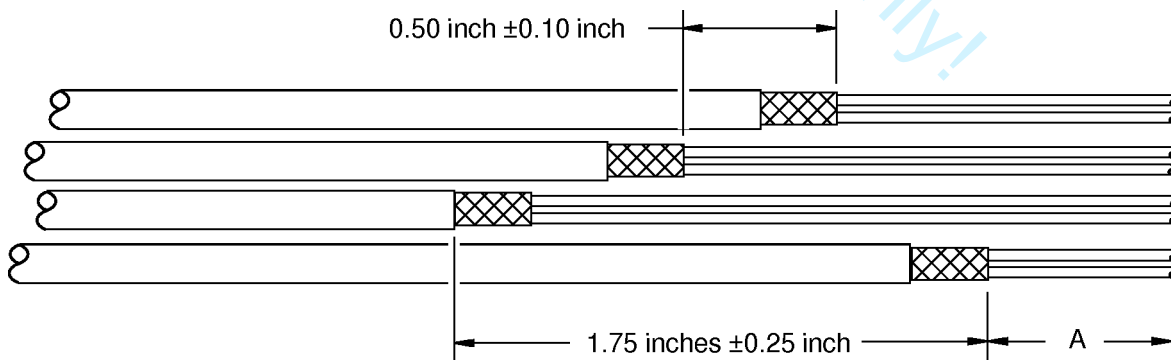
**NOTE:** If the contact assembly specifies the fold back of the conductor, dimension A must be increased by one half of the insulation removal length that is applicable for the wire size and the contact crimp barrel size.

Refer to:

- Table 23 for the cable jacket removal length when the conductor is not folded back
- Table 24 for the cable jacket removal length when the conductor is folded back
- Figure 26 for 3 or less cables
- Figure 27 for 4 or more cables
- Subject 20-00-15 for the procedure to remove the cable jacket.



**CABLE PREPARATION FOR 3 OR LESS CABLES - END STRIP CONFIGURATION**  
Figure 26



**CABLE PREPARATION FOR 4 OR MORE CABLES - END STRIP CONFIGURATION**  
Figure 27

- (2) Assemble a solder sleeve that has an uninsulated shield ground wire on each cable.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

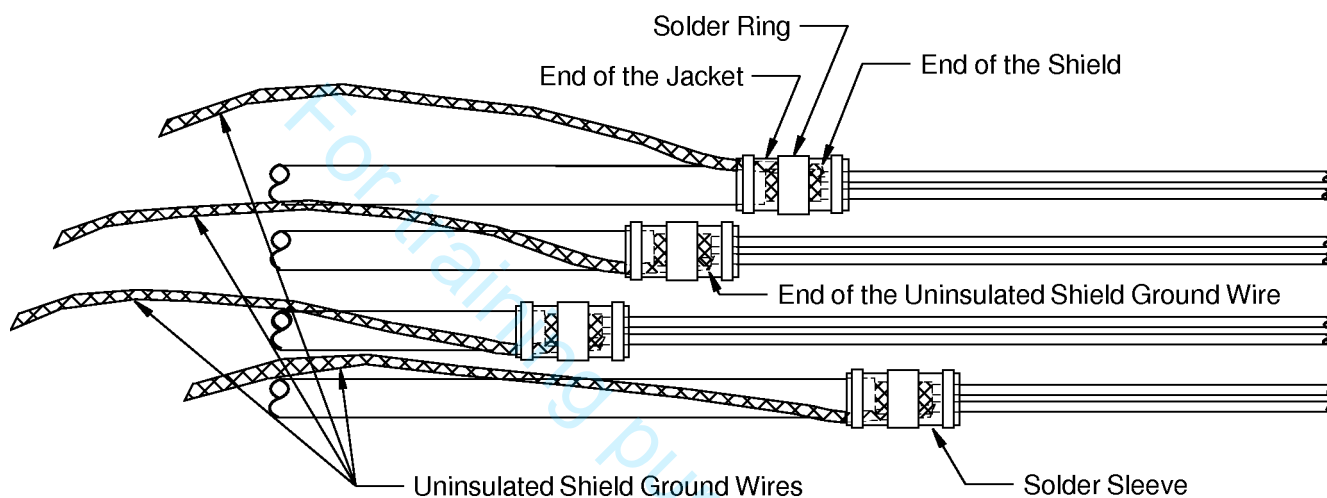
Make sure that the shield ground wires point away from the end of the wire harness.

Refer to:

- Figure 28
- Subject 20-10-15 for the procedure to assemble the solder sleeves.

**NOTE:** An overlap of the solder sleeves is permitted when the wire harness has 3 cables or less.

**NOTE:** When the wire harness has 4 or more cables, the solder sleeves must be installed in equal sets at equal distances in a 1.75 inch length area. Refer to Figure 27.



### POSITION OF SOLDER SLEEVES THAT HAVE INTEGRAL UNINSULATED SHIELD GROUND WIRES

Figure 28

#### H. Shield Pull Through Shield Termination

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary length of the jacket from the end of the cable.

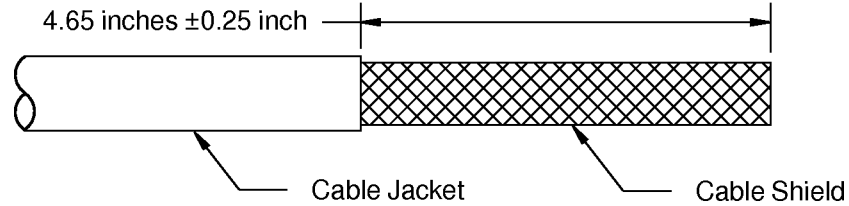
Refer to:

- Figure 29 for the shield ground wire between the strain relief clamp and the connector
- Figure 29 for the shield ground wire for a strain relief boot backshell
- Figure 30 for the shield ground wire between the shield termination ring and the strain relief clamp
- Subject 20-00-15 for the procedure to remove the cable jacket.

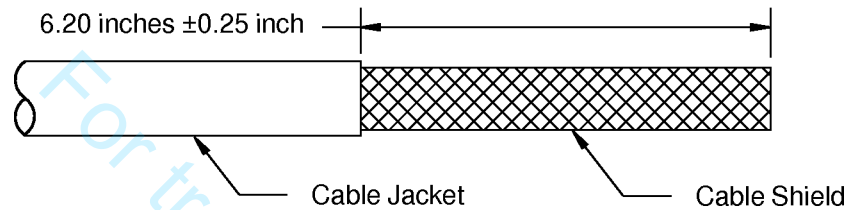
# 20-25-15

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



**CABLE PREPARATION - STANDARD CONFIGURATION**  
Figure 29

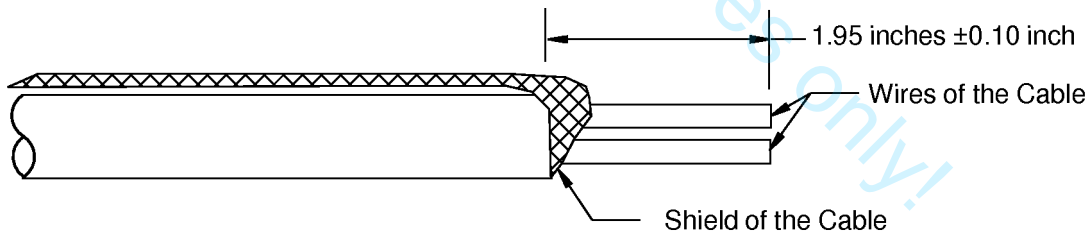


**CABLE PREPARATION - END STRIP CONFIGURATION**  
Figure 30

(2) Assemble the shield pull through shield ground wires.

Refer to:

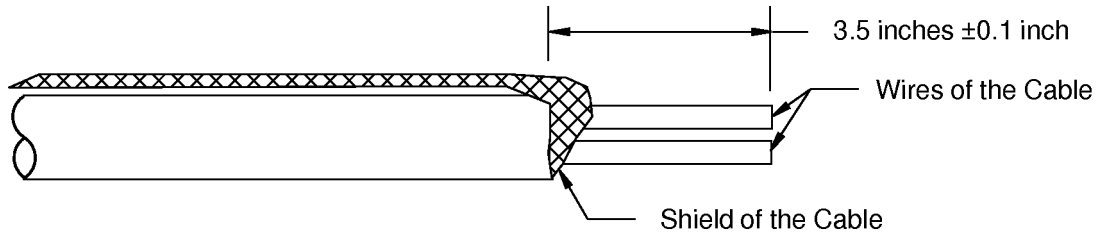
- Figure 31 for the shield ground wire between the strain relief clamp and the connector
- Figure 31 for the shield ground wire for a strain relief boot backshell
- Figure 32 for the shield ground wire between the shield termination ring and the strain relief clamp
- Subject 20-10-15 for the procedure to assemble the pull through shield ground wire.



**SHIELD PULL THROUGH SHIELD GROUND WIRE - STANDARD CONFIGURATION**  
Figure 31

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



**SHIELD PULL THROUGH SHIELD GROUND WIRE - END STRIP CONFIGURATION**  
**Figure 32**

- (3) Remove the necessary length from the end of the wires.

Refer to:

- Figure 31 for the shield ground wire between the strain relief clamp and the connector
- Figure 32 for the shield ground wire between the shield termination ring and the strain relief clamp.

#### I. Isolated Shields - Outer Shield Standard Shield Pull Through, Inner Shield Standard Shield Pull Through Shield Termination

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

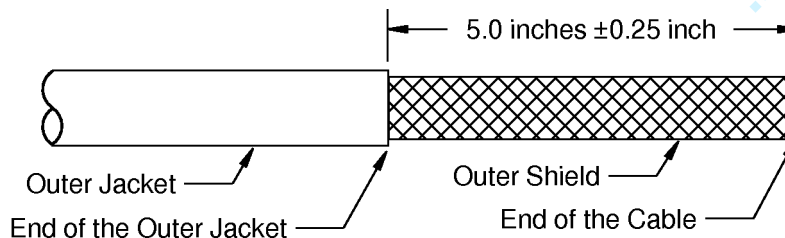
- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary length of the outer jacket from the end of the cable.

Refer to:

- Figure 33 for the shield ground wire between the strain relief clamp and the connector
- Figure 33 for the shield ground wire for a strain relief boot backshell
- Subject 20-00-15 for the procedure to remove the cable jacket.



**OUTER JACKET REMOVAL - STANDARD CONFIGURATION**  
**Figure 33**

- (2) Assemble the shield pull through shield ground wire of the outer shield. Refer to Subject 20-10-15.

**20-25-15**

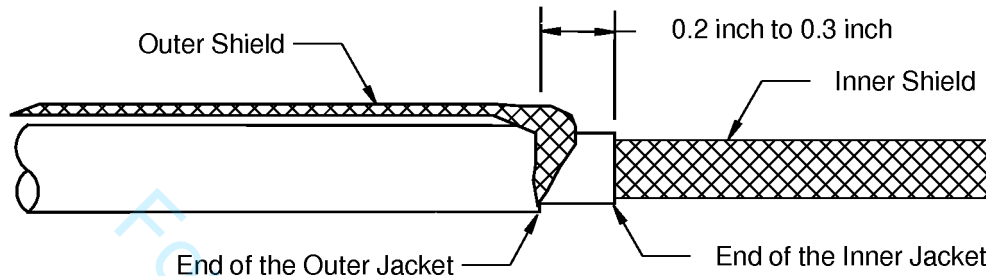
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

- (3) Remove the necessary length of inner jacket to make the distance from the end of the outer jacket to the end of the inner jacket equal to 0.2 inch to 0.3 inch.

Refer to:

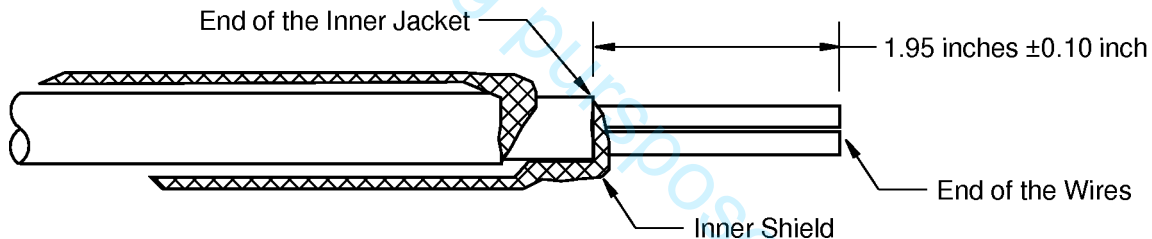
- Figure 34
- Subject 20-00-15 for the procedure to remove the cable jacket.



**INNER JACKET REMOVAL - STANDARD CONFIGURATION**

**Figure 34**

- (4) Assemble the shield pull through shield ground wire of the inner shield. Refer to Subject 20-10-15.
- (5) Remove the necessary length from the end of the wires of the cable. Refer to Figure 35.



**LENGTH OF THE INNER SHIELD SHIELD GROUND WIRE**

**Figure 35**

#### J. Isolated Shields - Outer Shield End Strip Shield Pull Through, Inner Shield Standard or End Strip Shield Pull Through Shield Terminations

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

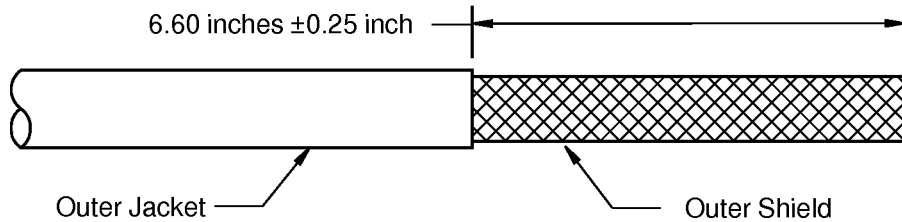
- (1) Remove the necessary length of the outer jacket from the end of the cable.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Refer to:

- Figure 36
- Subject 20-00-15 for the procedure to remove the cable jacket.



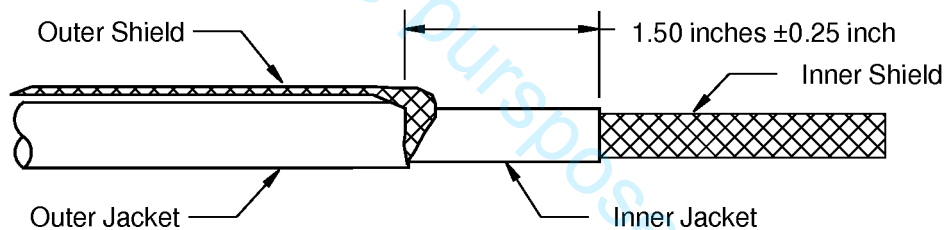
#### OUTER JACKET REMOVAL - END STRIP CONFIGURATION

Figure 36

- (2) Assemble a shield pull through shield ground wire of the outer shield. Refer to Subject 20-10-15.
- (3) Remove the necessary length of inner jacket from the end of the cable.

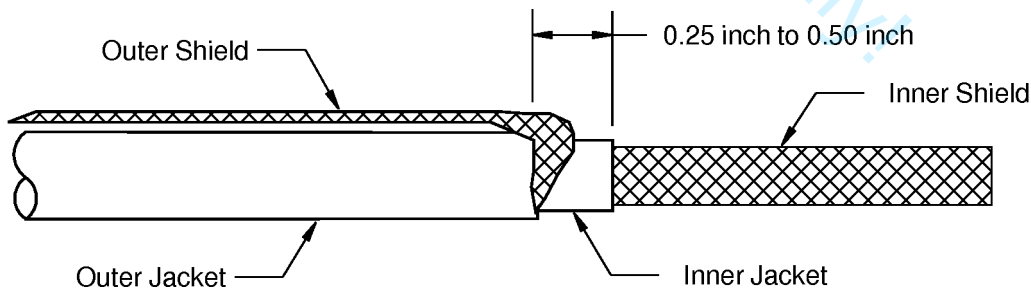
Refer to:

- Figure 37
- Figure 38
- Subject 20-00-15 for the procedure to remove the cable jacket.



#### INNER JACKET REMOVAL - STANDARD CONFIGURATION

Figure 37



#### INNER JACKET REMOVAL - END STRIP CONFIGURATION

Figure 38

- (4) Assemble a shield pull through shield ground wire of the inner shield. Refer to Subject 20-10-15.
- (5) Remove the necessary length from the end of the wires of the cable.

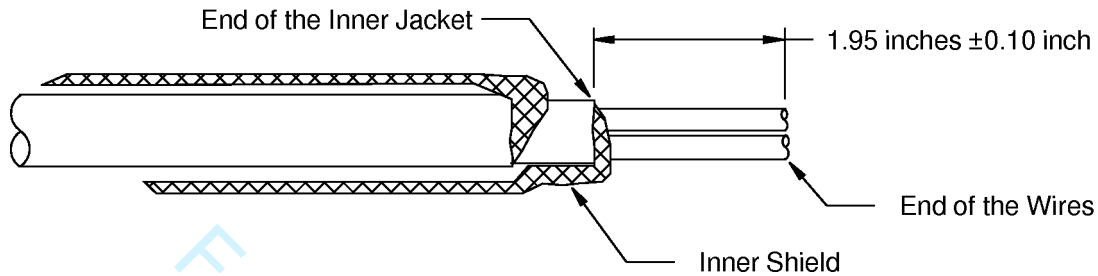
**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

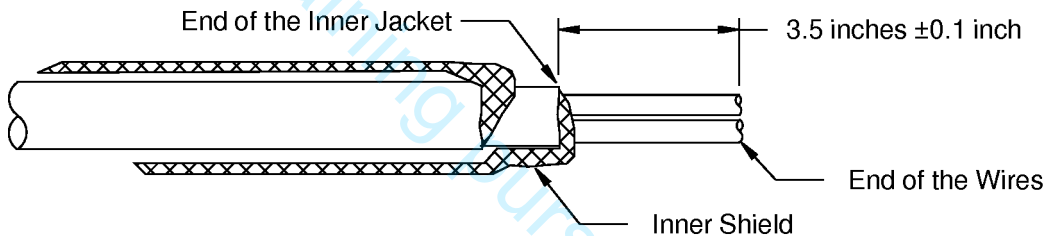
Refer to:

- Figure 39 for the shield ground wire between the strain relief clamp and the connector
- Figure 40 for the inner shield ground wire between the shield termination ring and the strain relief clamp.



**LENGTH OF THE WIRES OF THE CABLE - STANDARD CONFIGURATION**

**Figure 39**



**LENGTH OF THE INNER SHIELD SHIELD GROUND - END STRIP CONFIGURATION**

**Figure 40**

#### **K. Isolated Shields - Outer Shield Standard Shield Pull Through, Inner Shield Standard Solder Sleeve Shield Terminations**

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary length of outer jacket from the end of the cable.

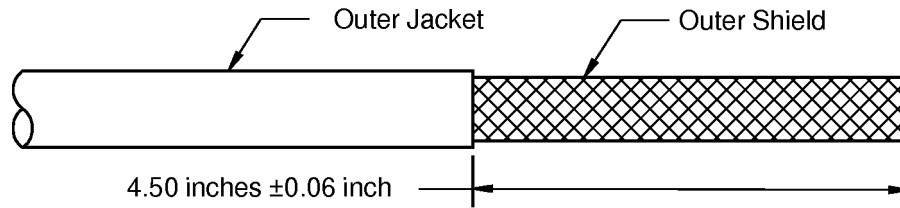
Refer to:

- Figure 41
- Subject 20-00-15 for the procedure to remove the cable jacket.

**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



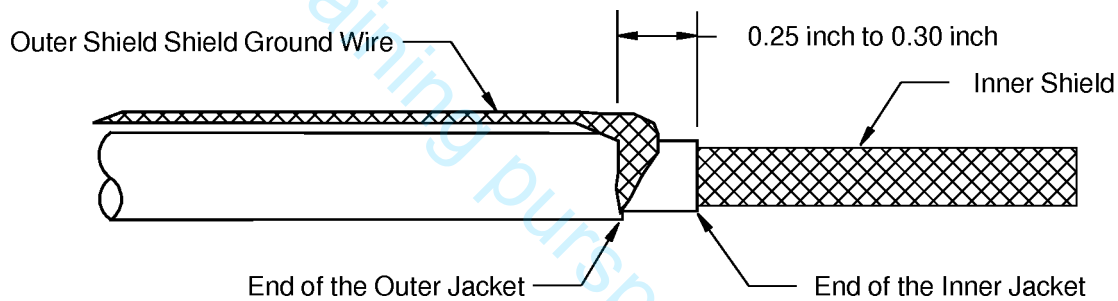
**OUTER JACKET REMOVAL - STANDARD CONFIGURATION**

**Figure 41**

- (2) Assemble a shield pull through shield ground wire of the outer shield. Refer to Subject 20-10-15.
- (3) Remove the necessary length of the inner jacket to make the distance from the end of the outer jacket to the end of the inner jacket equal to 0.25 inch to 0.30 inch.

Refer to:

- Figure 42
- Subject 20-00-15 for the procedure to remove the cable jacket.



**INNER JACKET REMOVAL - STANDARD CONFIGURATION**

**Figure 42**

- (4) Assemble a solder sleeve that has an insulated shield ground wire at the end of the inner jacket.

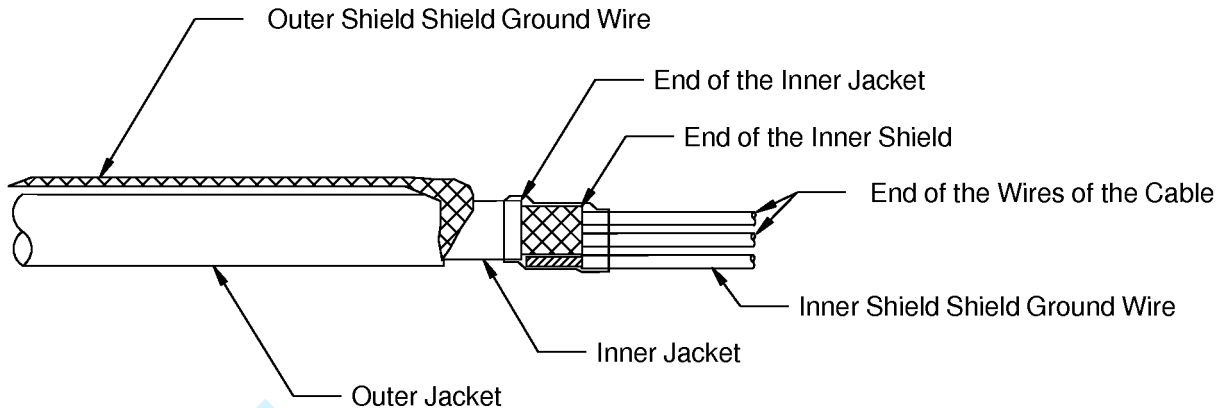
Refer to:

- Figure 43
- Subject 20-10-15 for the procedure to assemble the shield ground wire.

Make sure that the end of the shield ground wire is pointed forward toward the end of the cable.

## STANDARD WIRING PRACTICES MANUAL

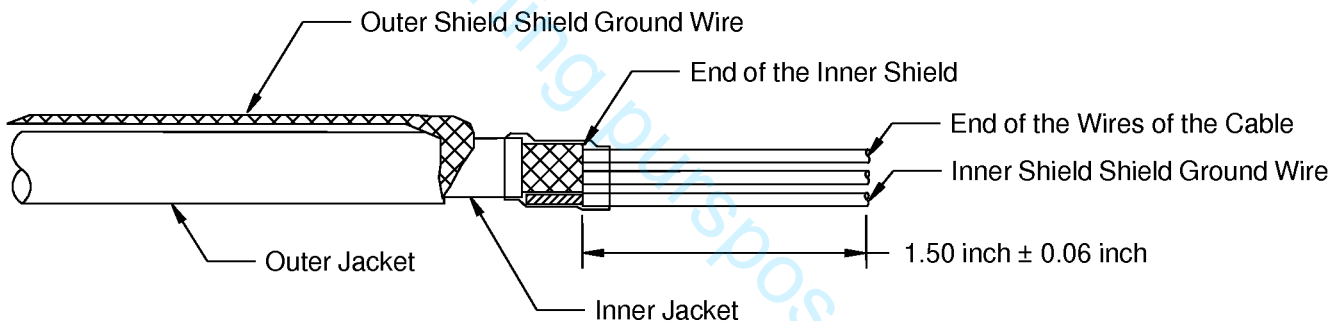
### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



#### SHIELD GROUND WIRE OF THE INNER SHIELD

Figure 43

- (5) Remove the necessary length from the end of the wires of the cable and from the end of the inner shield shield ground wire. Refer to Figure 44.



#### LENGTH OF THE SHIELD GROUND WIRE OF THE INNER SHIELD AND THE WIRES OF THE CABLE

Figure 44

#### L. Isolated Shields - Outer Shield End Strip Shield Pull Through, Inner Shield Solder Sleeve Shield Terminations

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

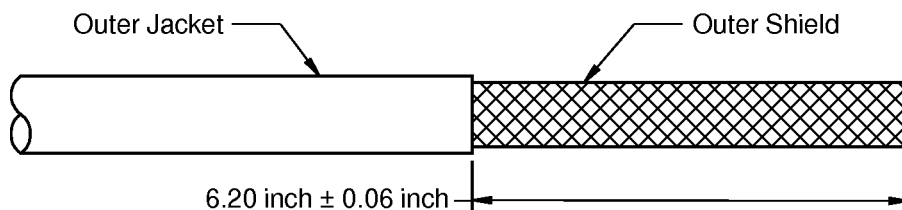
- (1) Remove the necessary length of the outer jacket from the end of the cable.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Refer to:

- Figure 45
- Subject 20-00-15 for the procedure to remove the cable jacket.



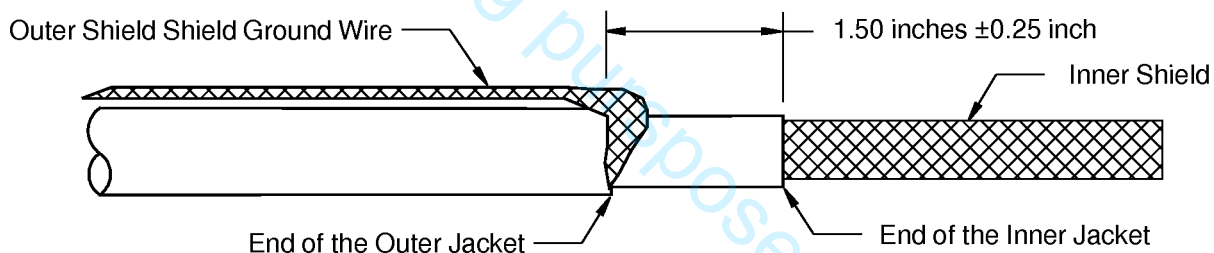
**OUTER JACKET REMOVAL - END STRIP CONFIGURATION**

**Figure 45**

- (2) Assemble a shield pull through shield ground wire of the outer shield. Refer to Subject 20-10-15.
- (3) Remove the necessary length of the inner jacket to make the distance from the end of the outer jacket to the end of the inner jacket equal to 1.50 inches  $\pm 0.25$  inch.

Refer to:

- Figure 46
- Subject 20-00-15 for the procedure to remove the cable jacket.



**INNER JACKET REMOVAL - STANDARD CONFIGURATION**

**Figure 46**

- (4) Assemble a solder sleeve shield ground wire at the end of the inner jacket.

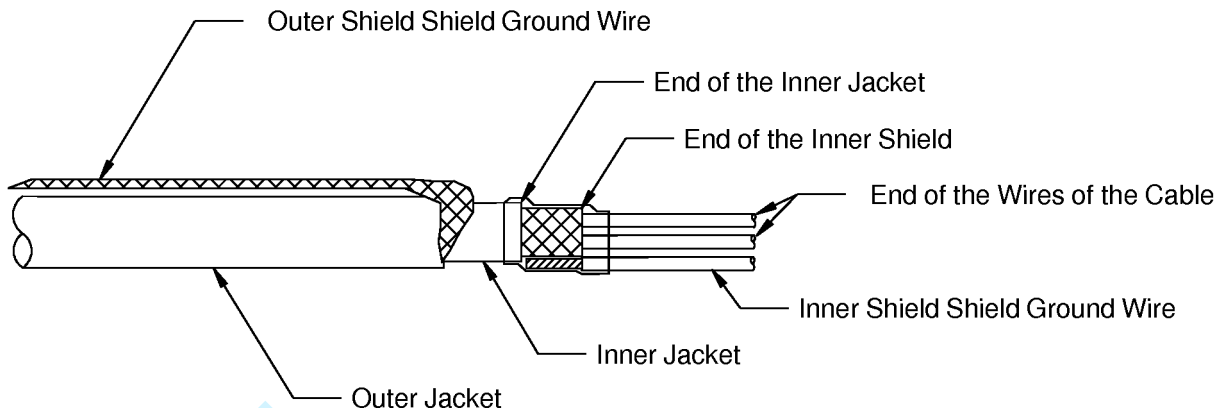
Refer to:

- Figure 47
- Subject 20-10-15 for the procedure to assemble the solder sleeve shield ground wire.

Make sure that the end of the shield ground wire is pointed forward toward the end of the cable.

## STANDARD WIRING PRACTICES MANUAL

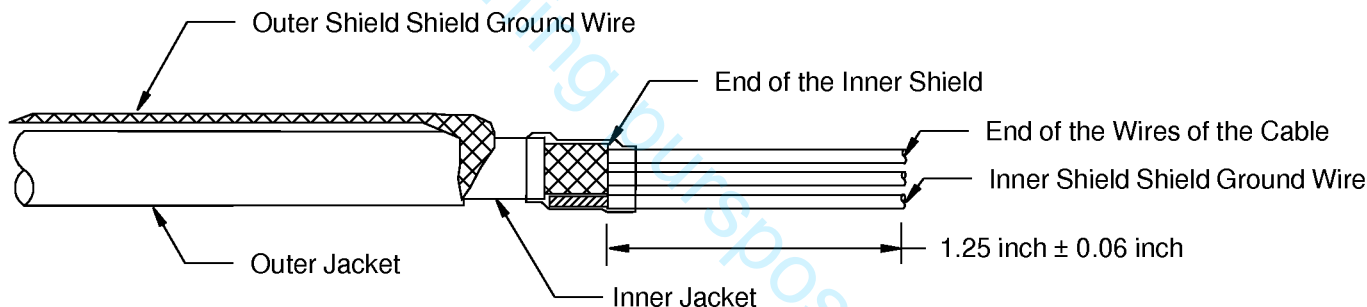
### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



#### INNER SHIELD SHIELD GROUND WIRE

Figure 47

- (5) Remove the necessary length from the end of the wires of the cable and from the end of the shield ground wire of the inner shield. Refer to Figure 48.



#### LENGTH OF THE INNER SHIELD SHIELD GROUND WIRE AND THE WIRES OF THE CABLE

Figure 48

#### M. Isolated Shields - Outer Shield Standard or End Strip Shield Pull Through, Inner Shield Standard or End Strip Shield Dead End Shield Terminations

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

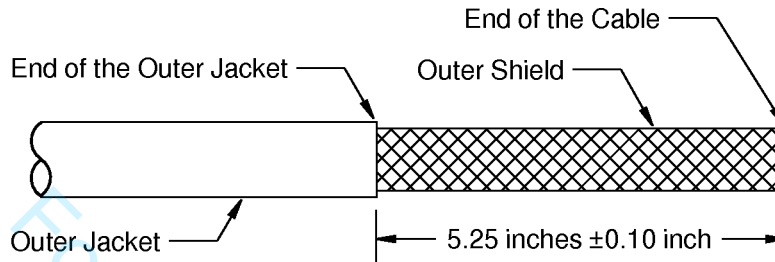
- (1) Remove the necessary length of the outer jacket from the end of the cable.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

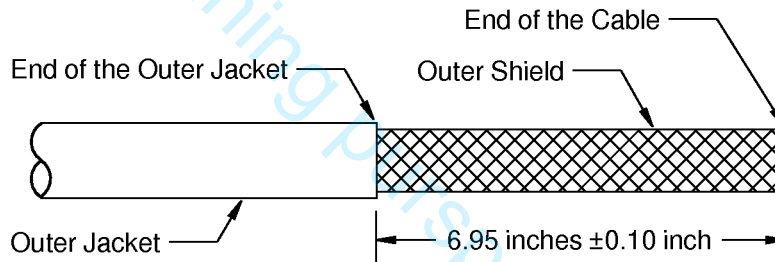
Refer to:

- Figure 49 for the shield ground wire between the strain relief clamp and the connector
- Figure 50 for the shield ground wire between the shield termination ring and the strain relief clamp
- Subject 20-00-15 for the procedure to remove the cable jacket.



**OUTER JACKET REMOVAL - STANDARD CONFIGURATION**

**Figure 49**



**OUTER JACKET REMOVAL - END STRIP CONFIGURATION**

**Figure 50**

- (2) Assemble a shield pull through shield ground wire of the outer shield. Refer to Subject 20-10-15.
- (3) Remove the necessary length of the inner jacket and the inner shield to make the distance from the end of the outer jacket to the end of the inner jacket equal to 0.75 inch  $\pm 0.03$  inch.

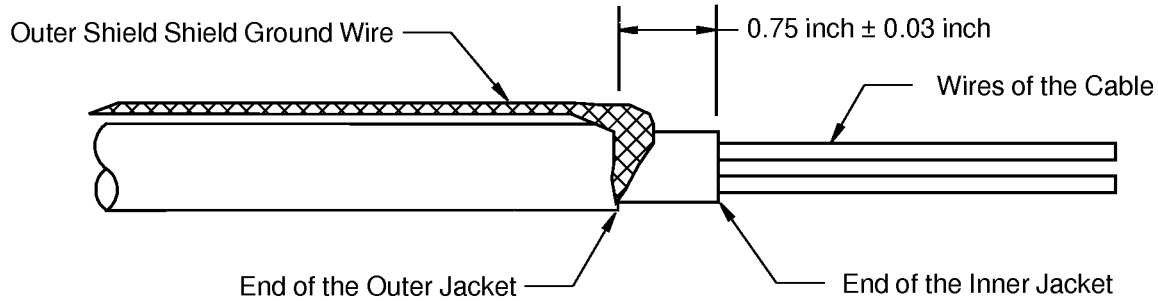
Refer to:

- Figure 51
- Subject 20-00-15 for the procedure to remove the cable jacket.

**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



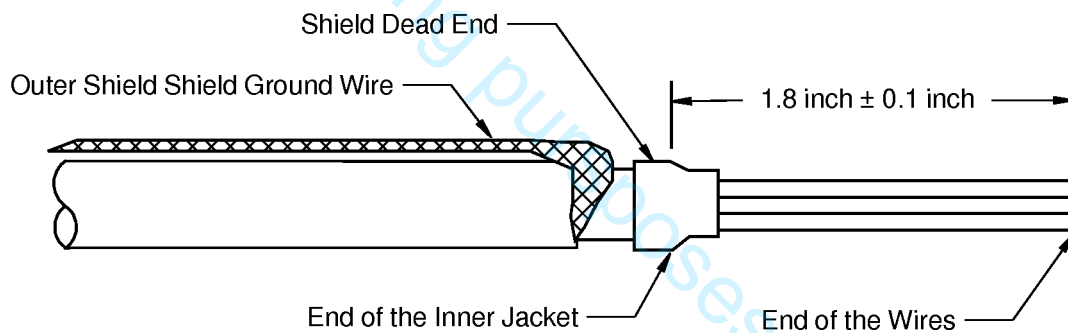
#### INNER JACKET AND INNER SHIELD REMOVAL

Figure 51

- (4) Assemble a shield dead end of the inner shield. Refer to Subject 20-10-15.
- (5) Remove the necessary length from the end of the wires of the cable.

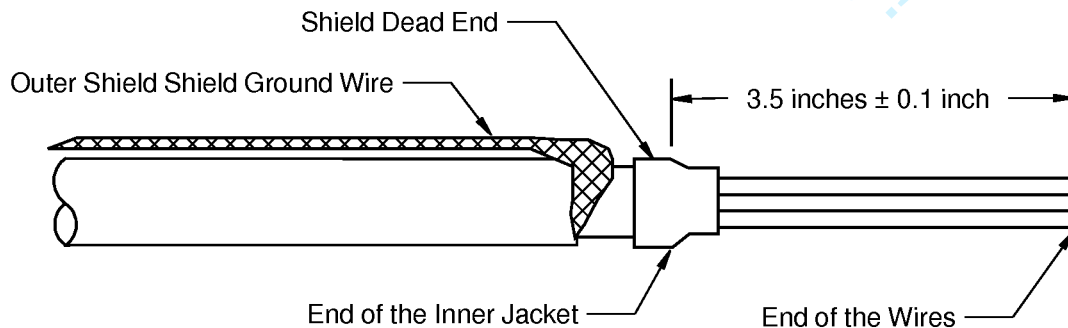
Refer to:

- Figure 52 for the shield ground wire between the strain relief clamp and the connector
- Figure 53 for the shield ground wire between the shield termination ring and the strain relief clamp.



#### SHIELD DEAD END OF THE INNER SHIELD - STANDARD CONFIGURATION

Figure 52



#### SHIELD DEAD END OF THE INNER SHIELD - END STRIP CONFIGURATION

Figure 53

**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

#### N. Isolated Shields - Outer Shield End Strip Solder Sleeve, Inner Shield Standard Solder Sleeve Shield Terminations

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

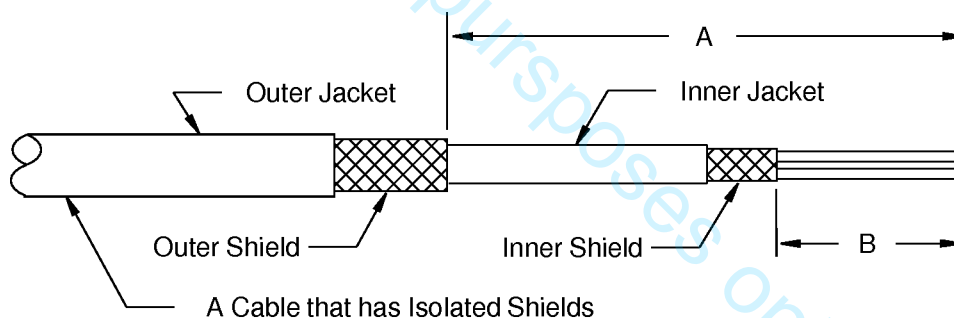
**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary lengths of the outer and inner jackets and shields from the cable.

**NOTE:** If the contact assembly specifies the fold back of the conductor, dimension A and dimension B must be increased by one half of the insulation removal length that is applicable for the wire size and the contact crimp barrel size.

Refer to:

- Figure 54
- Table 23 for the cable jacket removal length when the conductor is not folded back
- Table 24 for the cable jacket removal length when the conductor is folded back
- Subject 20-00-15 for the procedure to remove the cable jacket.



#### CABLE PREPARATION - OUTER SHIELD END STRIP AND INNER SHIELD STANDARD CONFIGURATIONS

Figure 54

- (2) Assemble the solder sleeve shield ground wires.

Refer to:

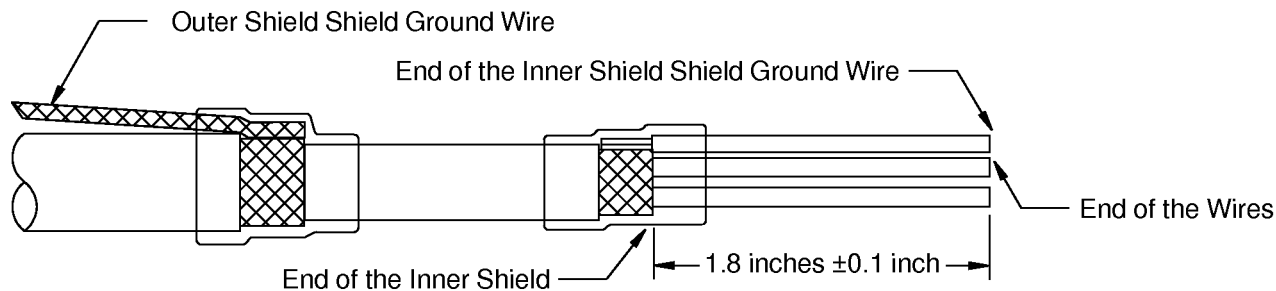
- Figure 55
- Subject 20-10-15 for the procedure to assemble the solder sleeve shield ground wires.

Make sure that:

- The shield ground wire of the inner shield is pointed toward from the end of the wire harness
- The shield ground wire of the outer shield is pointed away from the end of the wire harness.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



**POSITION OF THE SHIELD GROUND WIRES**

**Figure 55**

#### O. Isolated Shields - Outer Shield End Strip Solder Sleeve, Inner Shield End Strip Solder Sleeve Shield Termination

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must not be terminated.

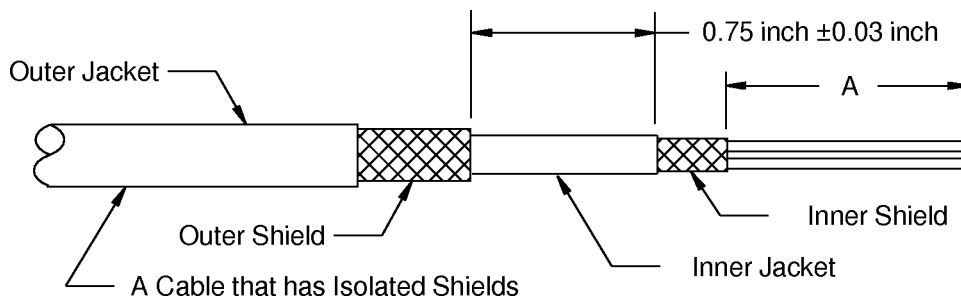
**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary lengths of the outer and inner jackets and shields from the cable.

**NOTE:** If the contact assembly specifies the fold back of the conductor, increase dimension A by one half of the insulation removal length that is applicable for the wire size and the contact crimp barrel size.

Refer to:

- Figure 56
- Table 23 for the cable jacket removal length when the conductor is not folded back
- Table 24 for the cable jacket removal length when the conductor is folded back
- Subject 20-00-15 for the procedure to remove the cable jacket.



**CABLE PREPARATION - OUTER SHIELD END STRIP AND INNER SHIELD STANDARD CONFIGURATIONS**

**Figure 56**

# 20-25-15

## STANDARD WIRING PRACTICES MANUAL

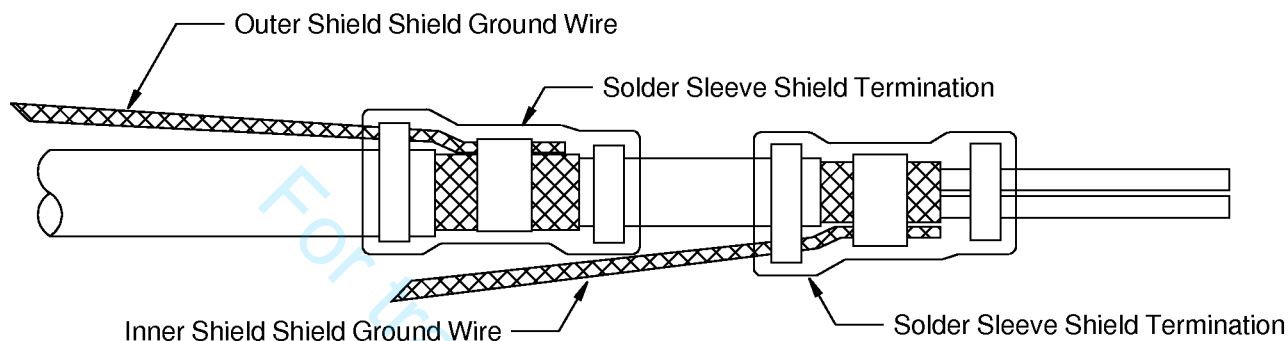
### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

- (2) Assemble the solder sleeve shield ground wires.

Refer to:

- Figure 57
- Subject 20-10-15 for the procedures to assemble a solder sleeve shield ground wire.

Make sure that the shield ground wires are pointed away from the end of the wires of the cable.



**POSITION OF THE SOLDER SLEEVE SHIELD GROUND WIRES**

**Figure 57**

#### **P. Isolated Shields - Outer Shield End Strip Solder Sleeve, Inner Shield Standard Shield Dead End Shield Terminations**

For the conditions that are applicable for this procedure, refer to Paragraph 4.C..

**NOTE:** If a wire harness is to be reterminated, the repaired configuration must be the same as the initial configuration:

- Shields that were terminated initially, must be terminated.
- Shields that were not terminated initially, must **not** be terminated.

**CAUTION:** A SHIELD TERMINATION, OR AN ELECTRICAL CONNECTION, BETWEEN THE SHIELD TERMINATION RING, AND A CABLE SHIELD THAT IS NOT SPECIFIED TO BE TERMINATED, CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (1) Remove the necessary lengths of the outer and inner jacket and shield from the cable.

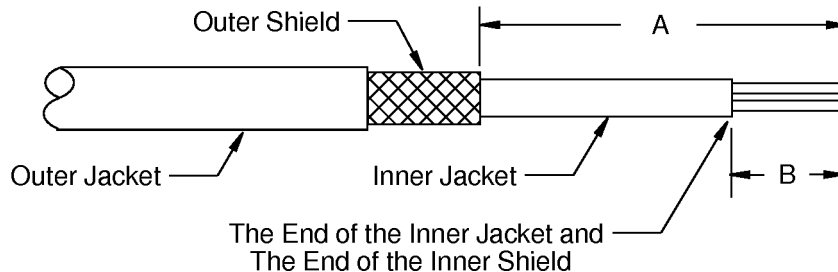
**NOTE:** If the contact assembly specifies the fold back of the conductor, increase dimension A and dimension B by one half of the insulation removal length that is applicable for the wire size and the contact crimp barrel size.

Refer to:

- Figure 58
- Table 23 for the cable jacket removal length when the conductor is not folded back
- Table 24 for the cable jacket removal length when the conductor is folded back
- Subject 20-00-15 for the procedure to remove the cable jacket.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



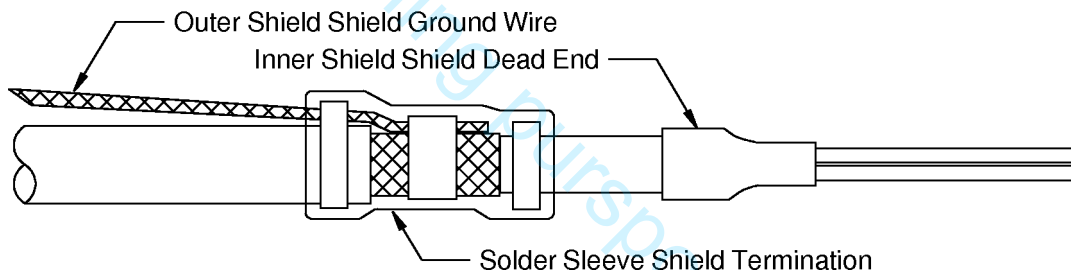
### CABLE PREPARATION - OUTER SHIELD END STRIP AND INNER SHIELD DEAD END CONFIGURATIONS

**Figure 58**

- (2) Assemble a solder sleeve shield ground wire on the outer shield.  
Make sure that the shield ground wire is pointed away from the end of the wire harness.

Refer to:

- Figure 59
- Subject 20-10-15 for the procedure to assemble the solder sleeve.



### POSITION OF THE SHIELD GROUND WIRE

**Figure 59**

- (3) Assemble a shield dead end on end of the inner jacket.

Refer to:

- Figure 59
- Subject 20-10-15 for the procedure to assemble the shield dead end.

### **Q. Assembly of a Backshell that has a Strain Relief Clamp**

**Table 25  
NECESSARY TOOLS**

Tool	Description	Supplier
Brush	Fine brush with bristles that are not affected by alcohol	An available source

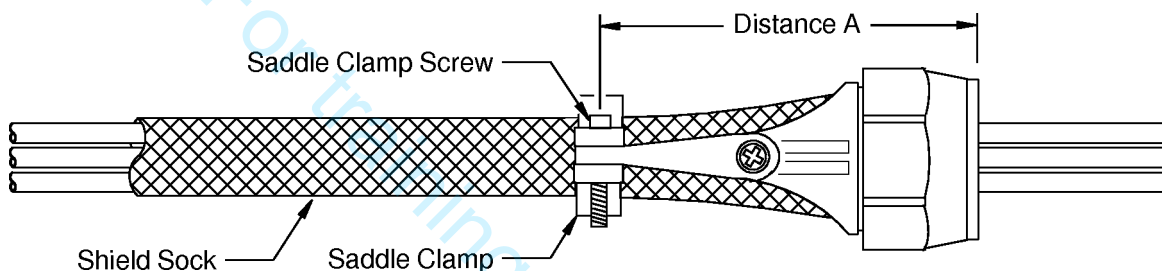
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 26  
BACKSHELL ASSEMBLY SCREW TORQUE VALUES

Shell Size		Screw Size	Torque (inch-pound)	
Minimum	Maximum		Minimum	Maximum
8	11	4	4	6
12	28	6	6	8

- (1) Make a selection of a torque tool and a screw bit from Table 6.
- (2) Measure Distance A from the front of the backshell to the center of the saddle clamp screws. Refer to Figure 60.



LOCATION OF THE PTFE TAPE  
Figure 60

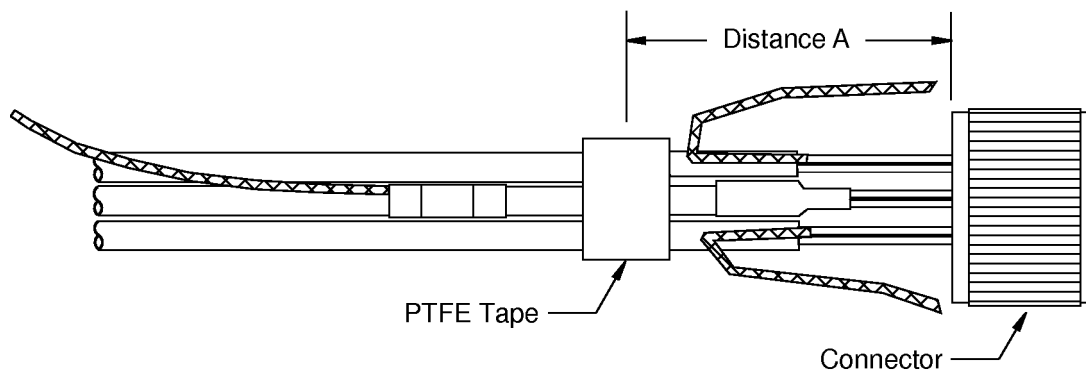
- (3) Make a selection of PTFE tape from Table 19.  
Make sure that the temperature grade and the fluid class of the tape is applicable for the location on the airplane.
- (4) Wind two to four layers of the PTFE tape around the diameter of the wire harness at the location on the harness that is equal to Distance A from the rear of the connector coupling ring or connector mounting flange. Refer to Figure 61.

Make sure that:

- The center of the tape is at Distance A
- The tape makes an overlap with itself
- The tape is not on a shield ground wire.

# STANDARD WIRING PRACTICES MANUAL

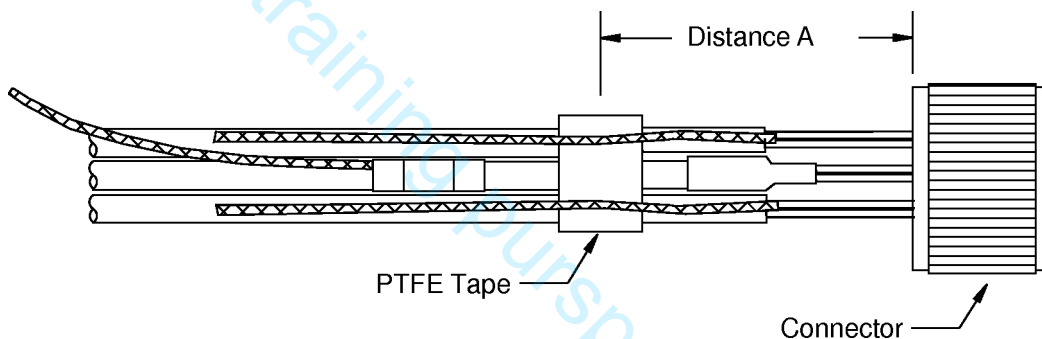
## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



**POSITION OF THE PTFE TAPE ON THE WIRE HARNESS**

**Figure 61**

- (5) Fold each shield pull through shield ground wire back on the tape. Refer to Figure 62.



**POSITION OF THE SHIELD PULL THROUGH SHIELD GROUND WIRES ON THE PTFE TAPE**

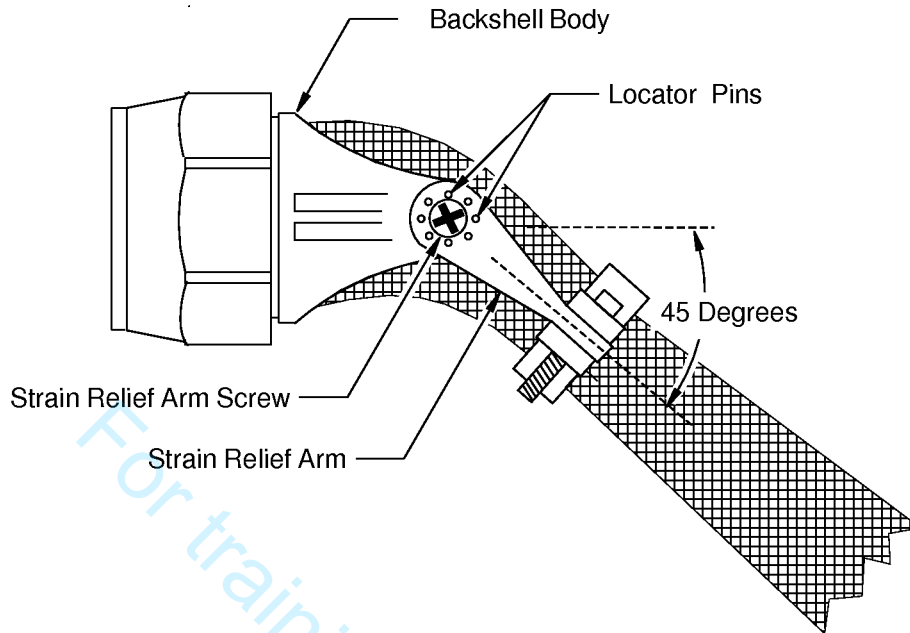
**Figure 62**

- (6) If a 45 degree or a 90 degree angle of strain relief arm of the backshell is specified, adjust the angle of the strain relief arms. Refer to Figure 63.

**CAUTION:** IF A 45 DEGREE OR A 90 DEGREE ANGLE FOR THE STRAIN RELIEF ARMS OF THE BACKSHELL IS NECESSARY, THE STRAIN RELIEF ARMS OF THE BACKSHELL MUST BE PUT IN THE SPECIFIED POSITION BEFORE THE STRAIN RELIEF CLAMP IS ASSEMBLED. UNSATISFACTORY PERFORMANCE OF THE SHIELD SOCK CAN OCCUR.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



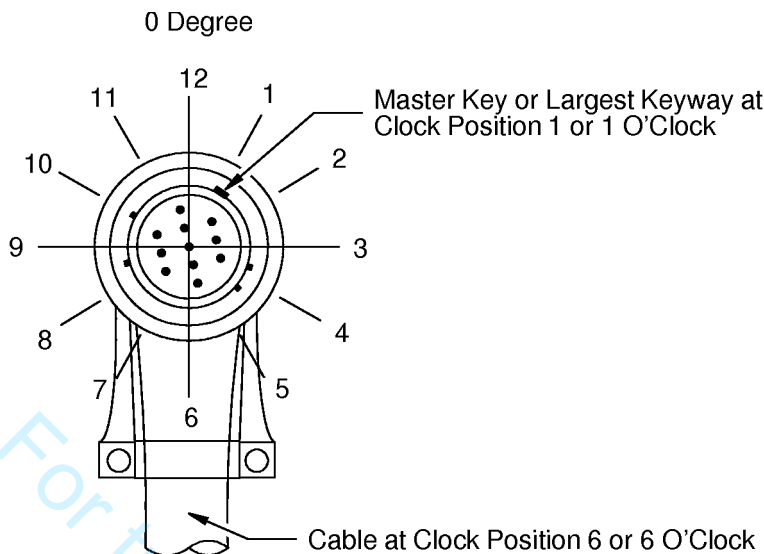
#### 45 DEGREE POSITION OF THE STRAIN RELIEF ARMS

Figure 63

- (a) Loosen the strain relief arm screws on the two sides of the strain relief arms.  
Make sure that:
    - The saddle clamp screws are loose
    - The strain relief arm screws are not fully removed.
  - (b) At the same time, pull the backshell arms apart until the locator pins are released.  
NOTE: If the locator pins cannot be released, the screws can be loosened more.
  - (c) Adjust the position of the arm to the specified angle and release the side of the arm.  
Make sure that the locator pins on the arms are engaged in the backshell body.  
NOTE: Each hole position for the locator-pins on the backshell body is equal to 45-degrees.
  - (d) Torque the strain relief arm screws.  
Refer to:
    - Figure 63 for the location of the strain relief arm screws
    - Figure 3 through Figure 6 to find the shell size of the backshell
    - Table 26 for the screw size and torque value.
- (7) Put the Master Key or Keyway of the connector in the specified clock position:  
Refer to Figure 64:

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



**1 O'CLOCK POSITION OF THE CONNECTOR AND THE BACKSHELL**

**Figure 64**

- (a) For a backshell with a 45 degree or a 90 degree angle of the strain relief arms, hold the backshell and the wire harness in the 6 o'clock position  $\pm$  the specified tolerance.
 

**NOTE:** If the tolerance is not specified, put the strain relief arm in the 6 o'clock position  $\pm$  1 hour or  $\pm$  30 degrees.
- (b) Put the Master Key or Keyway of the connector in the specified clock position in relation to the 6 o'clock wire harness position.
 

**NOTE:** If the clock position is not specified, put the Master Key or Keyway in clock position 12.
- (8) Clean the threads of the backshell and the connector.
  - (a) Make a selection of these materials from Subject 20-00-11:
    - A solvent
    - A canned air.

**NOTE:** An equivalent canned air is a satisfactory alternative.
  - (b) Make a selection of a brush from Table 25.
  - (c) Apply a sufficient quantity of solvent with the brush to clean the threads of the backshell and the connector.
  - (d) Let the threads of the backshell and the connector dry for approximately 30 seconds.
- (9) Engage the threads of the backshell and the connector.
 

Make sure that the connector teeth and the backshell teeth are engaged.
- (10) Install the backshell on the connector.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Refer to:

- Figure 3 through Figure 6 for the shell size of the backshell
- Paragraph 4.X. for the procedure to install the backshell.

Make sure that the strain relief arms are in the correct position in relation to the clock position of the master keyway of the connector.

- (11) Fully extend the shield sock rearward along the wire harness.

Make sure that the shield sock does not have a vertical, horizontal, or diagonal separation of the strands that is larger than 0.13 inch.

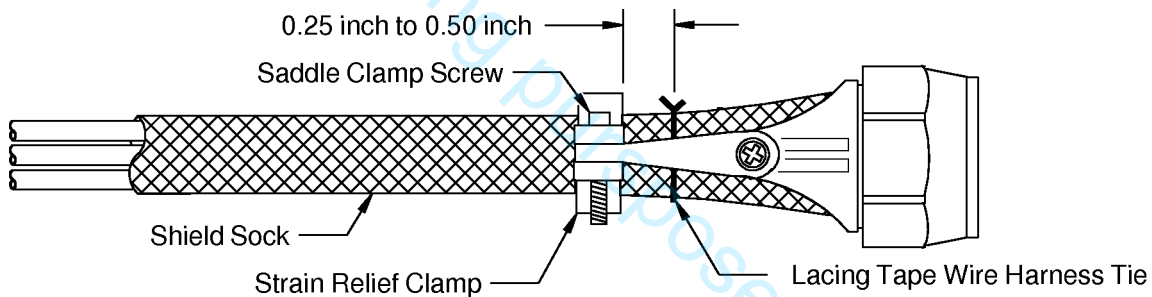
- (12) Wind the necessary layers of Type I silicone tape on the shield sock to increase the diameter where the strain relief clamp holds the wire harness.

Make sure that the tape is not put on the bend of the jumper wire.

**NOTE:** The diameter of the wire harness must be sufficient for the strain relief clamp to hold the wire harness tightly.

- (13) Assemble a lacing tape wire harness tie on the shield sock 0.25 inch to 0.50 inch forward of the strain relief clamp of the backshell. Refer to Figure 65.

Make sure that the shield sock does not have a vertical, horizontal, or diagonal separation of the strands that is larger than 0.13 inch.



**POSITION OF THE LACING TAPE WIRE HARNESS TIE ON THE SHIELD SOCK**

**Figure 65**

- (14) Put the saddle bar that has the captive fasteners on the wire harness and the legs of the backshell.

Make sure that sleeves of the captive fasteners are in the holes of the legs.

- (15) Align the holes of the remaining saddle bar with the holes in the legs.

- (16) Engage the threads of each saddle clamp screw and the captive fasteners.

- (17) Tighten a saddle clamp screw on one side of the saddle bar with the hand.

- (18) Tighten the saddle clamp screw on the other side of the saddle bar with the hand.

Make sure that:

- The ends of the saddle bars are fully against the legs of the backshell
- The saddle bars are against the wire harness
- The shield sock does not have a vertical, horizontal, or diagonal separation of the strands that is larger than 0.13 inch.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

**CAUTION:** DO NOT FULLY TIGHTEN ONE SCREW IF THE OTHER SCREW IS NOT INSTALLED. DAMAGE TO THE STRAIN RELIEF CLAMP CAN OCCUR.

- (19) If the ends of the saddle bars are not fully against the legs of the backshell:
  - (a) Remove the saddle bars.
  - (b) Put one spacer on each side of the saddle bar that has the captive fasteners.
  - (c) Do Step (14) through Step (18) again.
- (20) Torque the saddle clamp screws.

Refer to:

- Figure 3 through Figure 6 to find the shell size of the backshell
- Table 26 for the torque values.

Make sure that:

- The wire harness does not move in the saddle bars
- The shield sock does not have a vertical, horizontal, or diagonal separation of the strands that is larger than 0.13 inch
- Each screw extends a minimum of one thread from the captive fastener
- Each screw does not extend more than 0.25 inch from the captive fastener.

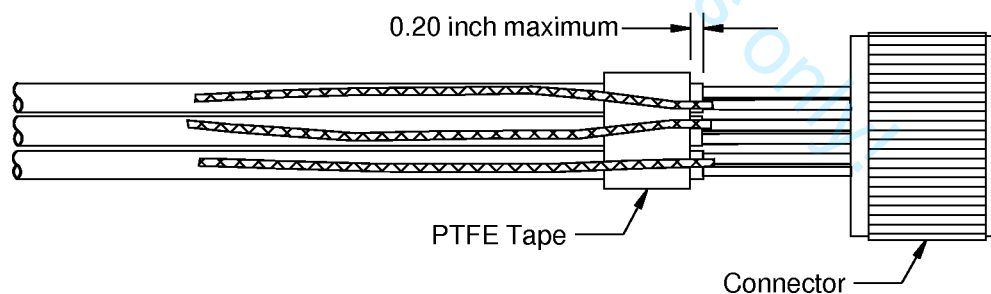
#### R. Wire Harness Preparation for the Assembly of a Backshell That Has a Strain Relief Boot

- (1) For a wire harness with a shield pull through shield ground wires:
  - (a) Wind two to three layers of PTFE tape on the wire harness at the end of the cable jacket. Refer to Figure 66.

Make sure that:

- The forward edge of the tape is not more than 0.20 inch from the end of the cable jacket
- The tape makes an overlap with itself
- The tape is not on a shield ground wire.

- (b) Fold each shield ground wire back on the tape. Refer to Figure 66.



**POSITION OF THE TAPE ON THE WIRE HARNESS**

**Figure 66**

- (2) Push the backshell forward until it is against the rear of the connector.

**NOTE:** If the diameter of the shield termination ring is smaller than the inside diameter of the backshell, the backshell can be assembled after the shield ground wire termination to make the assembly easier.

- (3) Clean the threads of the backshell and the connector.

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**

(a) Make a selection of these materials from Subject 20-00-11:

- A solvent
- A canned air.

NOTE: An equivalent canned air is a satisfactory alternative.

(b) Make a selection of a brush from Table 25.

(c) Apply a sufficient quantity of solvent with the brush to clean the threads of the backshell and the connector.

(d) Let the threads of the backshell and the connector dry for approximately 30 seconds.

(4) Engage the threads backshell and the connector.

Make sure that the connector teeth and the backshell teeth are engaged.

(5) Install the backshell on the connector. Refer to Paragraph 4.X..

Refer to Figure 3 through Figure 6 to find the shell size of the backshell.

**S. Assembly of the Shield Termination Ring**

- (1) Push the end of the shield sock forward until the end of the sock is between the strain relief arms of the backshell.
- (2) Wind a minimum of one layer of Type I silicone tape around the wire harness at the location of the shield termination ring.

Refer to:

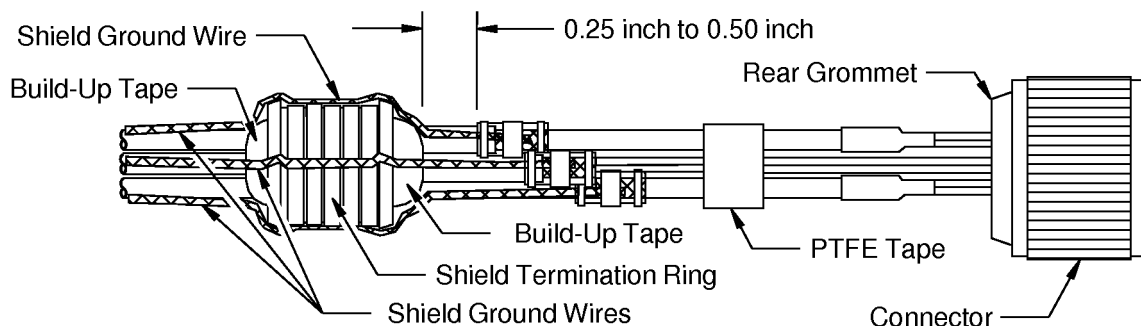
- Figure 67 for the configuration with solder sleeve shield ground wires
- Figure 68 for the configuration with shield pull through shield ground wires without an end strip shield termination
- Figure 69 for the configuration with shield pull through shield ground wires with one or more end strip shield terminations
- Figure 70 for the configuration with solder sleeve and shield pull through shield ground wires
- Figure 71 for the configuration with a splice area between the strain relief clamps and the shield termination ring
- Figure 72 for the configuration with shield pull through shield ground wires and a protective sleeve.

Make sure that:

- The edges of the tape are approximately aligned
- The tape is not on a shield ground wire
- The tape is not located on the bend of the jumper wire.

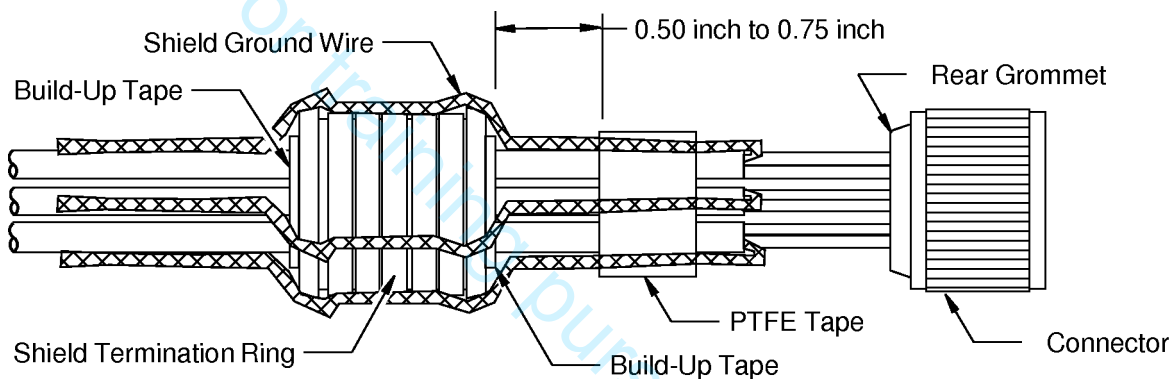
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



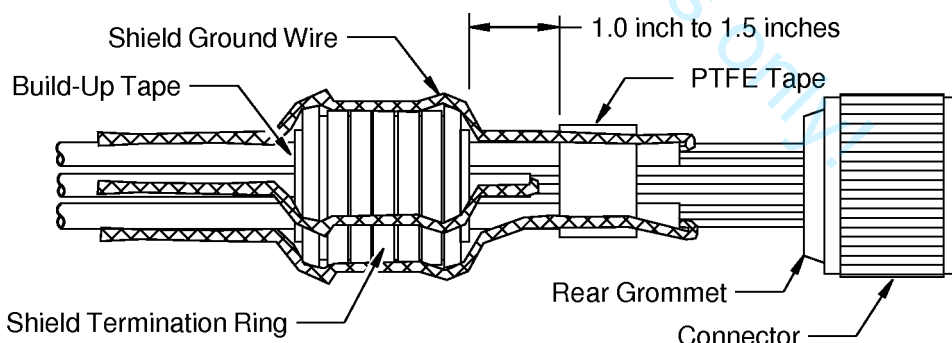
### SHIELD TERMINATION RING - SOLDER SLEEVE SHIELD GROUND WIRES

Figure 67



### SHIELD TERMINATION RING - SHIELD PULL THROUGH SHIELD GROUND WIRES WITHOUT AN END STRIP SHIELD TERMINATION

Figure 68

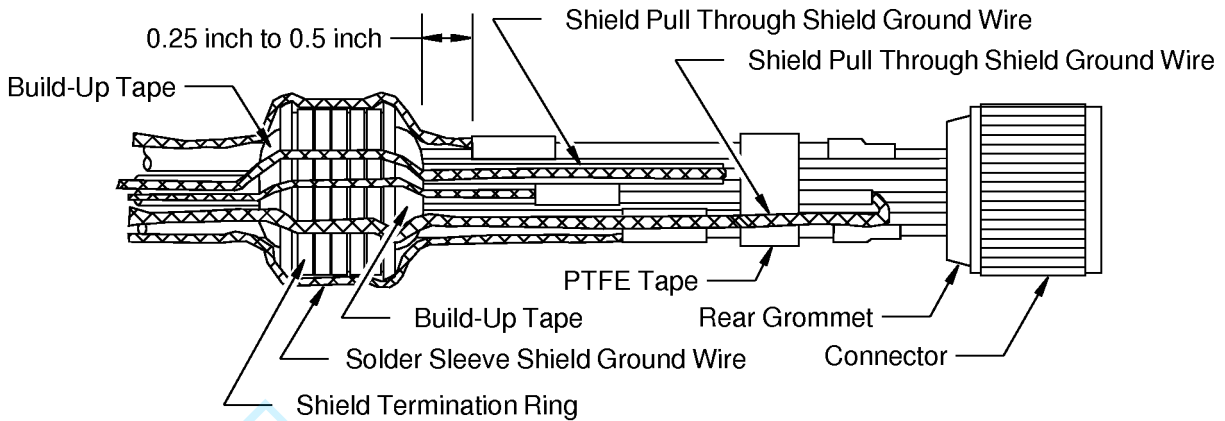


### SHIELD TERMINATION RING - SHIELD PULL THROUGH SHIELD GROUND WIRES WITH ONE OR MORE END STRIP SHIELD TERMINATIONS

Figure 69

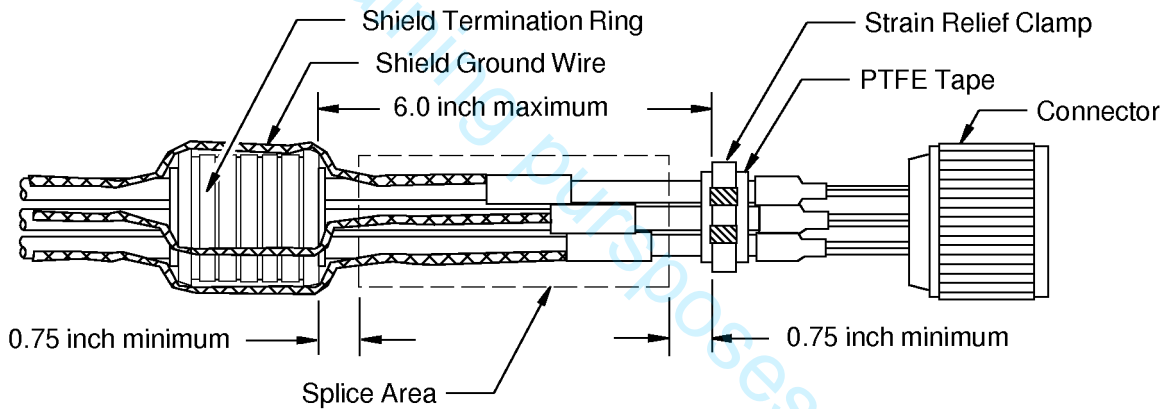
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



## SHIELD TERMINATION RING - SOLDER SLEEVE AND SHIELD PULL THROUGH SHIELD GROUND WIRES

Figure 70

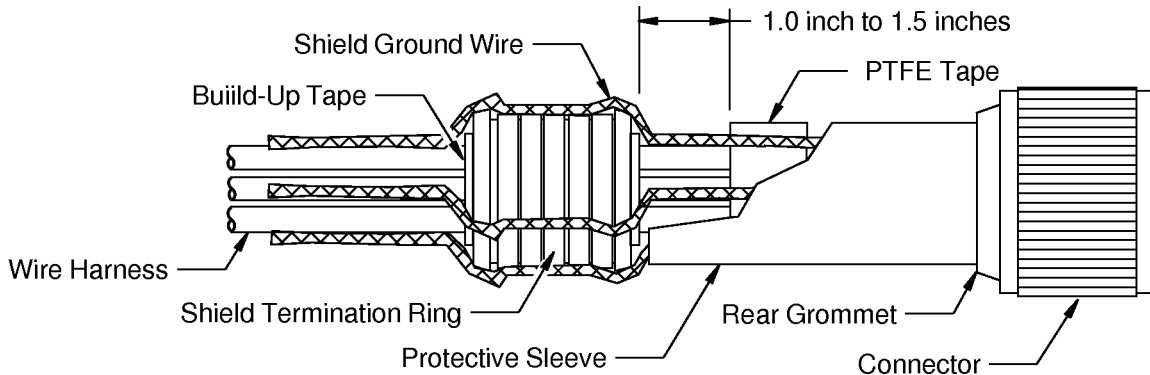


## SHIELD TERMINATION RING - SPLICE ASSEMBLY BETWEEN THE STRAIN RELIEF AND THE TERMINATION RING

Figure 71

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



#### SHIELD TERMINATION RING - SHIELD PULL THROUGH SHIELD GROUND WIRES AND A PROTECTIVE SLEEVE

Figure 72

- (3) For a wire harness with guard wire or ground connection wire, put each guard wire or ground connection wire shield ground wire against the layer of tape.  
Make sure that the shield ground wires do not go across each other.
  - (4) Assemble the two halves of the shield termination ring on the center of the silicone tape.  
Make sure that:
    - A minimum of one side of the shield termination ring has a key and key hole that does not have damage
    - The shield ground wire of a guard wire, a ground connection wire, or an equipment ground wire is between the tape and the shield termination ring
    - The other shield ground wires are not between the tape and the shield termination ring
    - The keys of one half are aligned with the keyholes of the other half
    - The shield termination ring is fully closed
    - The shield termination ring does not move on the wire harness.
- NOTE:** The shield termination ring makes a click when it is assembled correctly.
- (5) If the tape does not prevent the movement of the shield termination ring, wind more layers of the tape on the harness.  
Make sure that:
    - The keys of one half are aligned with the keyholes of the other half
    - The shield termination ring is fully closed
    - The shield termination ring does not move on the wire harness
    - The shield ground wires are not between the tape and the shield termination ring.
  - (6) Put the shield ground wires on the shield termination ring at approximately equal intervals.  
Make sure that the shield ground wires do not go across each other.
  - (7) For a wire harness that has a guard wire, a ground connection wire, or an equipment ground wire:
    - (a) Fold each shield ground wire back on the shield termination ring. Refer to Figure 73 and Figure 74.

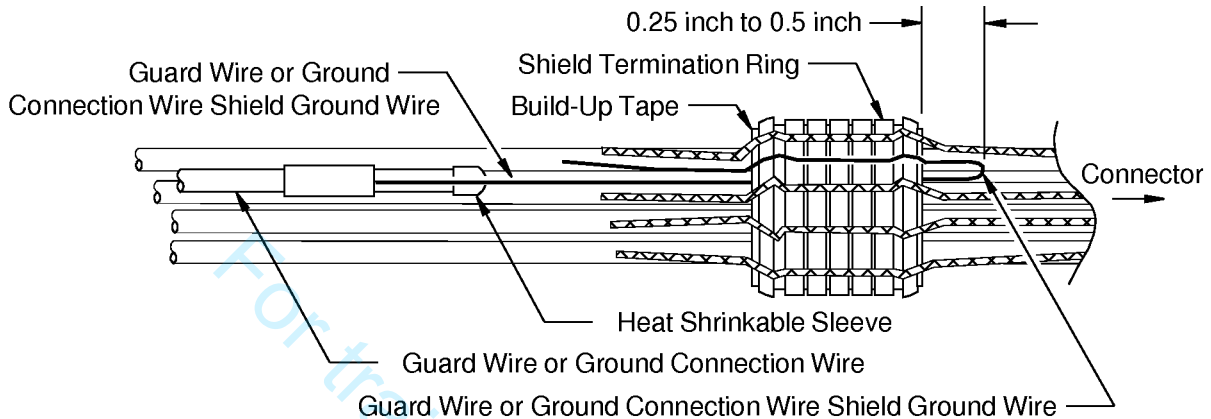
**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

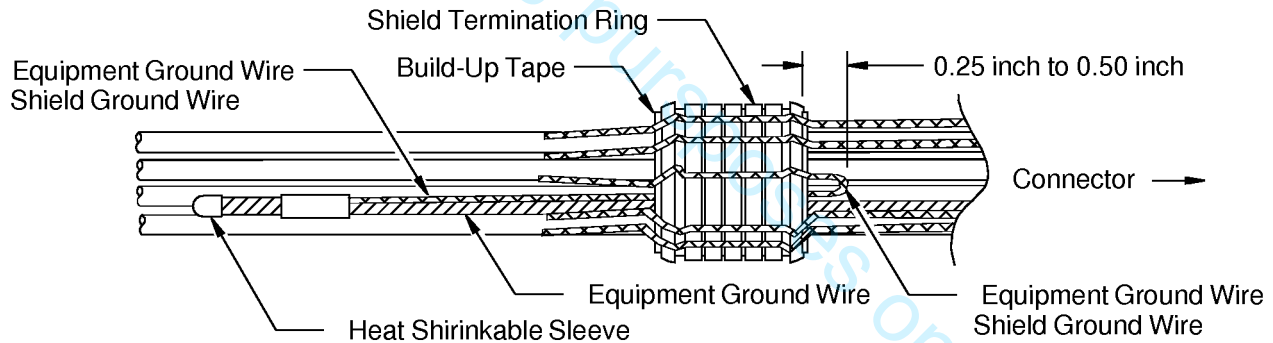
### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Make sure that:

- The fold of the shield ground wire is 0.25 inch to 0.5 inch forward from the shield termination ring
- Each shield ground wire does not go across a different shield ground wire.



**POSITION OF A GUARD WIRE OR A GROUND CONNECTION WIRE SHIELD GROUND WIRE**  
Figure 73



**POSITION OF AN EQUIPMENT GROUND WIRE SHIELD GROUND WIRE**  
Figure 74

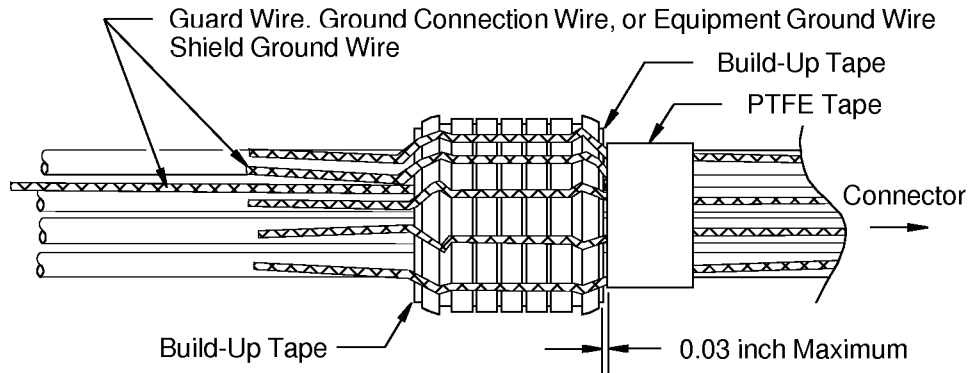
- (b) Wind 2 to 3 layers of PTFE tape on the folded shield ground wires and the wire harness. Refer to Figure 75.

Make sure that the distance between the build-up tape and the PTFE tape is not more than 0.03 inch.

**NOTE:** PTFE tape on shield ground wires that are not a guard wire, a ground connection wire, or an equipment ground wire shield ground wire is not necessary.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



#### POSITION OF THE TAPE ON A GUARD WIRE, A GROUND CONNECTION WIRE, OR AN EQUIPMENT GROUND WIRE SHIELD GROUND WIRE

Figure 75

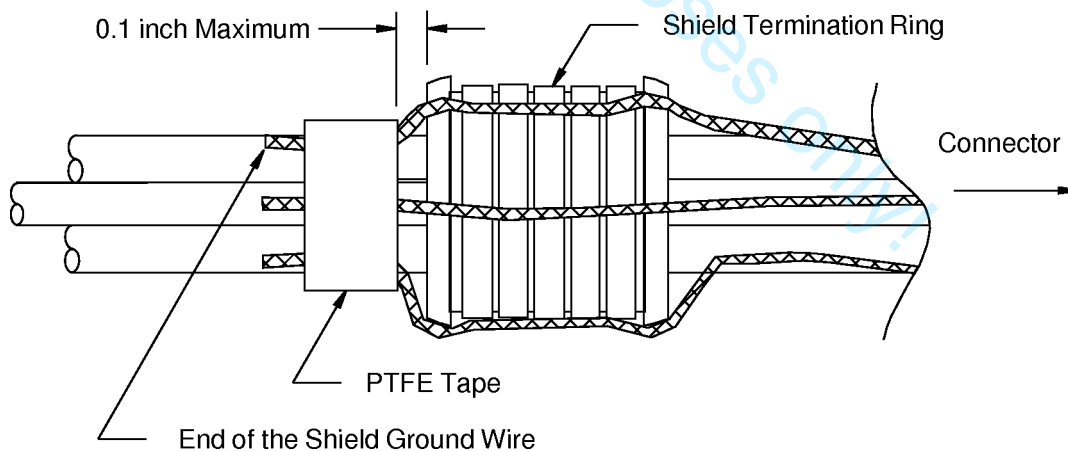
- (8) Wind 2 to 4 layers of PTFE tape on the end of the shield ground wires and the wire harness.

Refer to:

- Figure 76 for the configuration of the wire harness shield ground wires
- Figure 77 for the configuration of a guard wire or a ground connection wire shield ground wire
- Figure 78 for the configuration of an equipment ground wire shield ground wire.

Make sure that:

- The tape does not make an overlap with the shield termination ring
- The layers of tape make an approximately 100 percent overlap
- The shield ground wires are not loose.

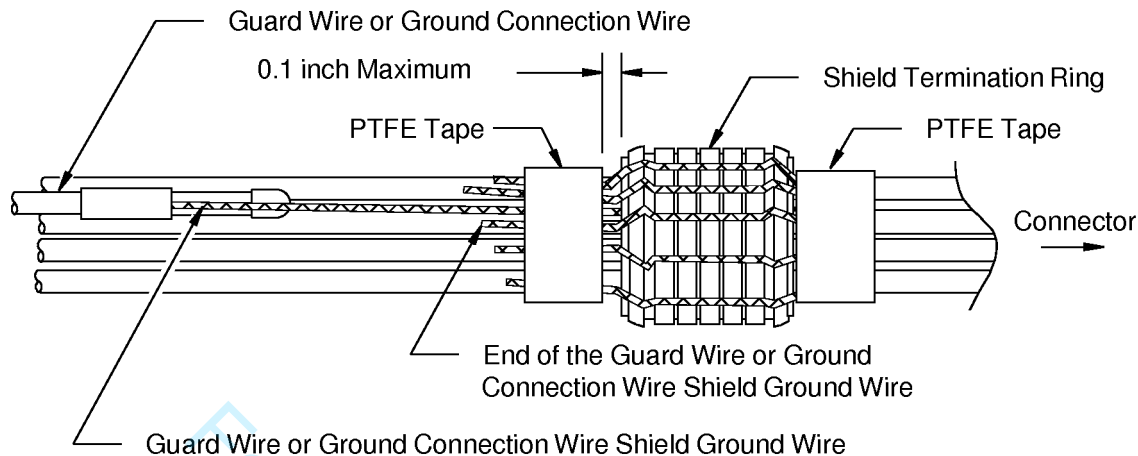


#### POSITION OF THE TAPE ON THE SHIELD GROUND WIRES

Figure 76

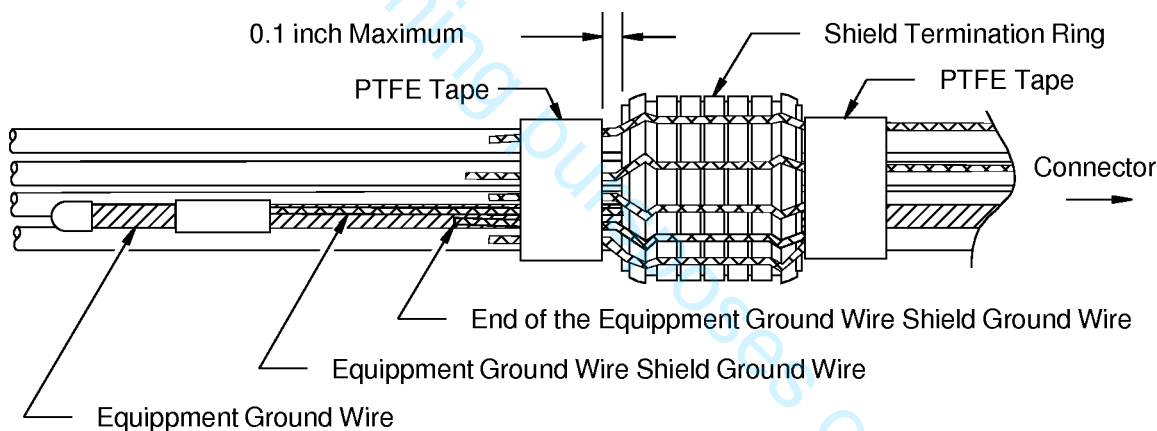
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



#### POSITION OF THE TAPE ON A GUARD WIRE OR GROUND CONNECTION WIRE SHIELD GROUND WIRE

Figure 77



#### POSITION OF THE TAPE ON AN EQUIPMENT GROUND WIRE SHIELD GROUND WIRE

Figure 78

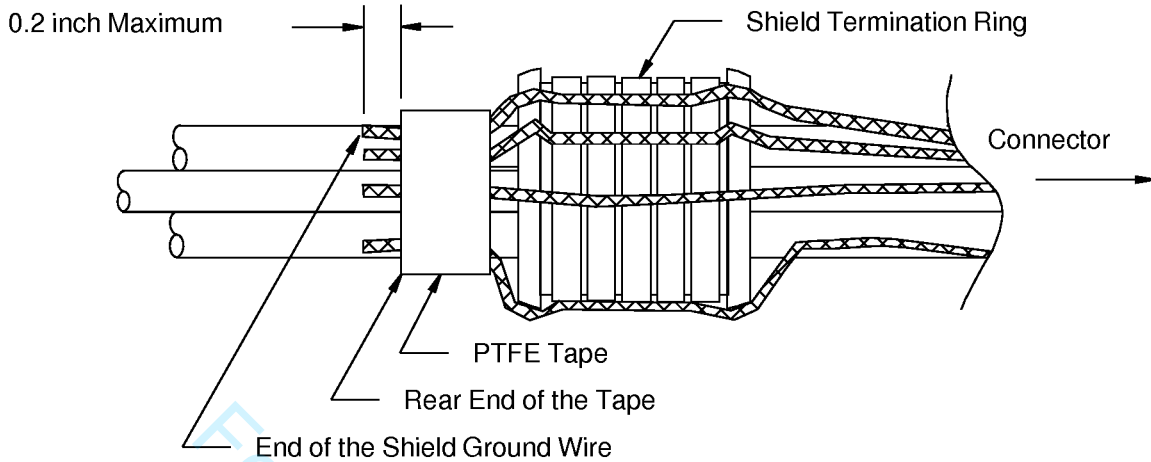
- (9) Remove the unwanted length from the end of the shield ground wires. Refer to Figure 79.

Make sure that:

- The end of the shield ground wire does not extend farther than 0.2 inch from the rear end of the tape
- The shield ground wires are not loose.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



### POSITION OF THE END OF THE SHIELD GROUND WIRES

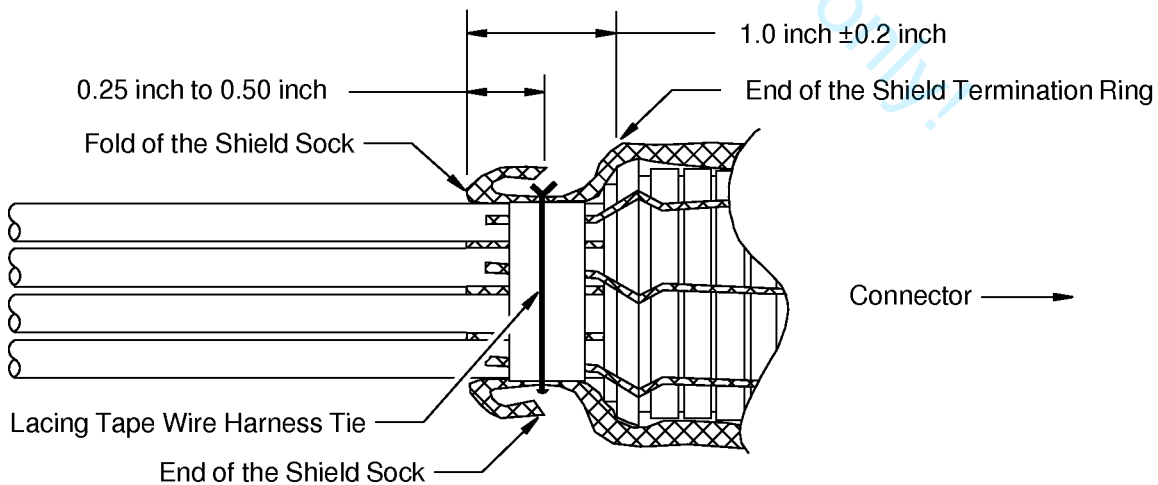
Figure 79

#### T. Shield Sock Termination for a Backshell with a Strain Relief Clamp

- (1) Fully extend the shield sock rearward on the shield termination ring and the wire harness.  
Make sure that the shield sock does not have a vertical, horizontal, or diagonal separation of the strands that is larger than 0.13 inch.
- (2) Install a shield terminator band on the shield sock at the center of the shield termination ring. Refer to Subject 20-25-14.
- (3) Wind 2 to 3 layers of 0.5 inch wide PTFE tape around the shield terminator band.
- (4) Assemble a lacing tape wire harness tie on the end of the shield sock to hold it on the wire harness.

Refer to:

- Figure 80.
- Subject 20-10-11 for the procedure to assemble the lacing tape wire harness tie.



### SHIELD SOCK TERMINATION

Figure 80

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

- (5) Fold the free end of the shield sock back on the lacing tape wire harness tie.
- (6) Remove the necessary length of the shield sock to make the distance from the end of the fold to the end of the sock equal to 0.25 inch to 0.50 inch. Refer to Figure 80.

**NOTE:** Individual broken strands of the shield sock can be cut to align the end of the strand with the surface of the shield sock.

**NOTE:** A maximum of five damaged shield sock strands is permitted.

- (7) Wind a layer of Type II silicone tape around the wire harness on the free end of the folded shield sock.

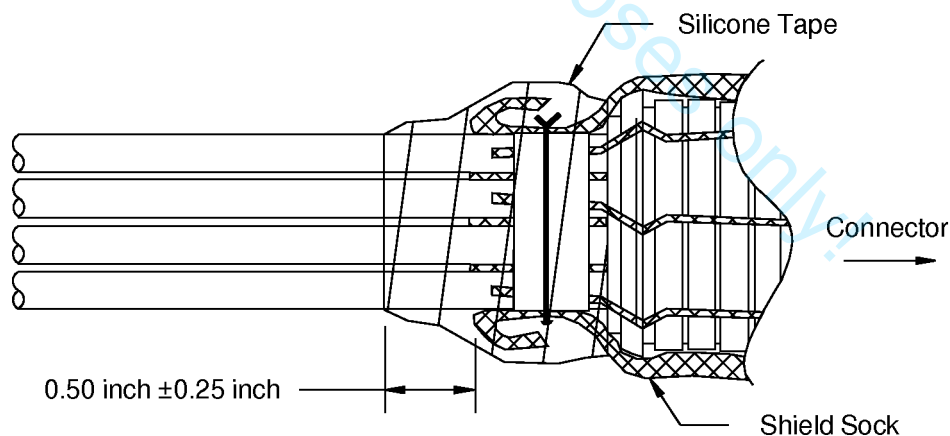
Refer to:

- Figure 81 for the tape on a wire harness without a guard wire, a ground connection wire, or an equipment ground wire
- Figure 82 for the tape on a wire harness with a guard wire, a ground connection wire, or an equipment ground wire.

Make sure that:

- The end of the folded shield sock extends 1.0 inch  $\pm$  0.2 inch from the end of the shield termination ring
- The tape extends 0.50 inch  $\pm$  0.25 inch farther than the end of the shield sock
- The loose end of the shield sock has a layer tape
- The tape makes approximately a 50 percent overlap with itself
- The tape makes approximately a 100 percent overlap at the end.

**NOTE:** A continuous layer of Type II silicone tape on the free end of the folded shield sock and on the layer of PTFE tape on the shield terminator band is a satisfactory alternative. Refer to Step (8).

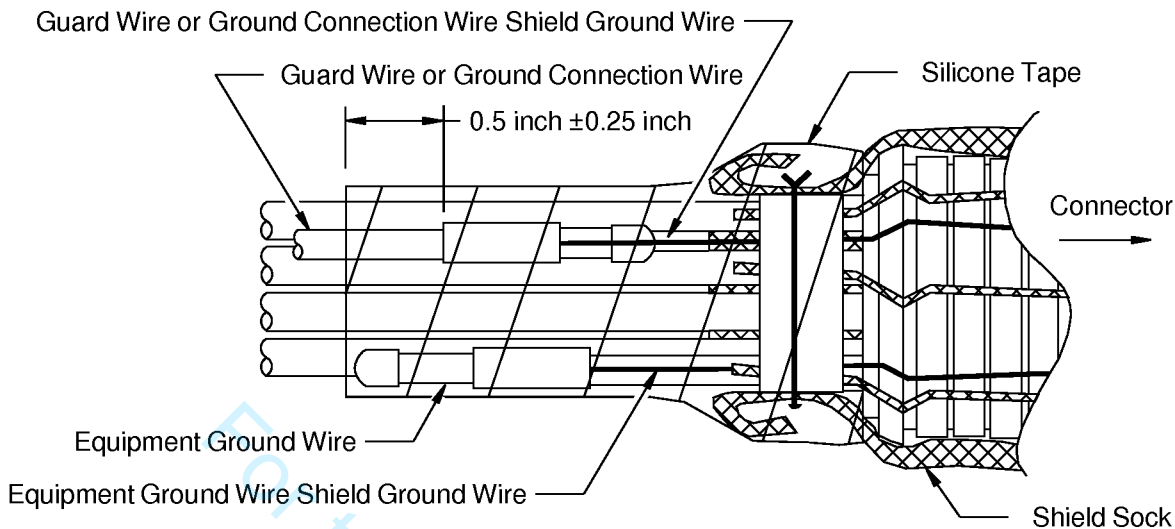


### SILICONE TAPE AROUND THE WIRE HARNESS WITHOUT A GUARD WIRE, A GROUND CONNECTION WIRE, OR AN EQUIPMENT GROUND WIRE

Figure 81

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



## SILICONE TAPE AROUND THE WIRE HARNESS WITH A GUARD WIRE, A GROUND CONNECTION WIRE, OR AN EQUIPMENT GROUND WIRE

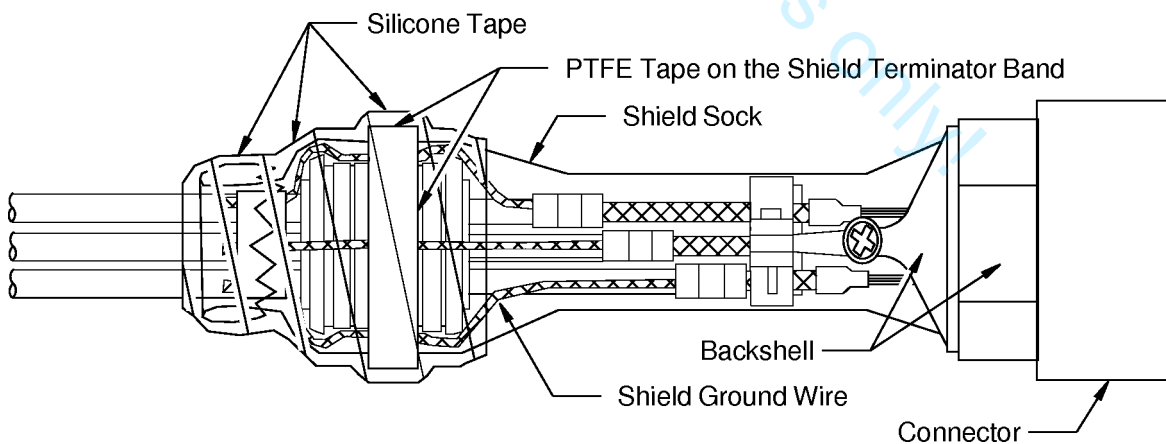
Figure 82

- (8) Wind 2 to 3 layers of 1 inch wide Type I silicone tape on the PTFE tape that is on the shield terminator band.

Refer to:

- Figure 83 for the configuration of the silicone tape on the shield terminator band with solder sleeve shield ground wires
- Figure 84 for the configuration of the silicone tape on the shield terminator band with shield pull through shield ground wires.

Make sure that the surface of the band cannot be seen.



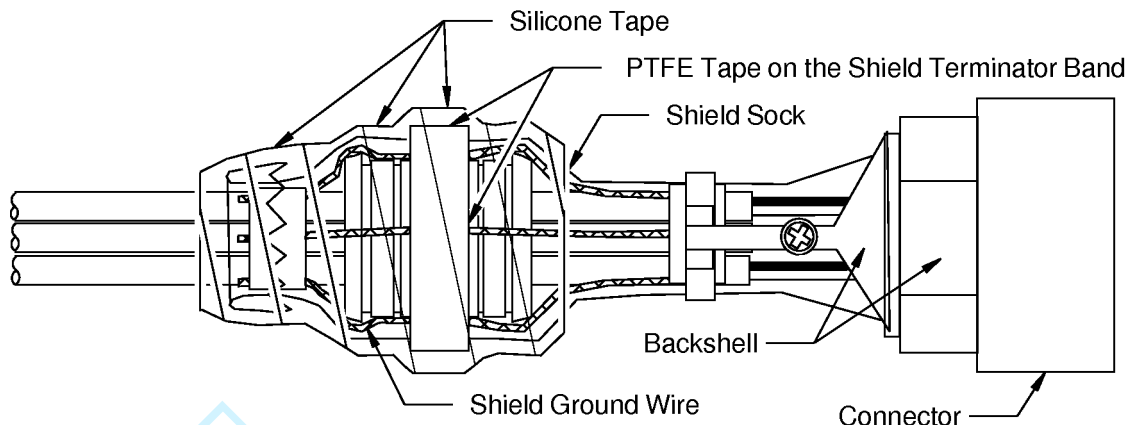
## TAPE LAYERS ON THE SHIELD TERMINATOR BAND - SOLDER SLEEVE SHIELD GROUND WIRES

Figure 83

**20-25-15**

# STANDARD WIRING PRACTICES MANUAL

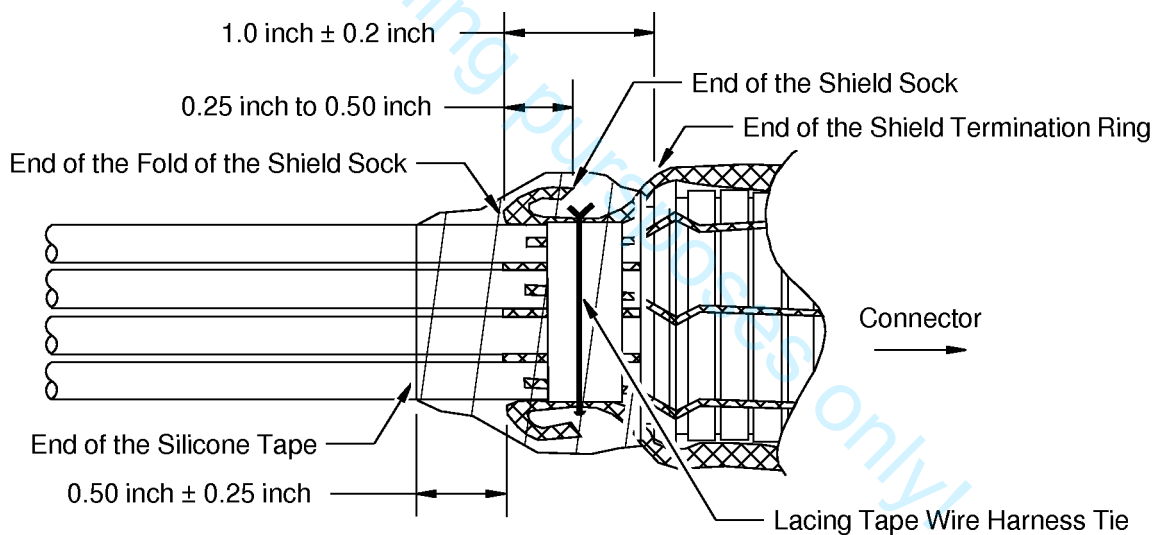
## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



### TAPE LAYERS ON THE SHIELD TERMINATOR BAND - SHIELD PULL THROUGH SHIELD GROUND WIRES

Figure 84

#### U. Shield Sock Termination with a Splice Area between the Backshell and the Shield Termination Ring



### SHIELD SOCK TERMINATION

Figure 85

Refer to Figure 85:

- (1) Fully extend the shield sock rearward on the shield termination ring and the wire harness.  
Make sure that the shield sock does not have a vertical, horizontal, or diagonal separation of the strands that is larger than 0.13 inch.
- (2) Install a shield terminator band on the shield sock at the center of the shield termination ring.  
Refer to Subject 20-25-14 for the procedure to assemble a shield terminator band.
- (3) Wind 2 to 3 layers of 0.5 inch wide PTFE tape around the shield terminator band.

# 20-25-15

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

- (4) Assemble a lacing tape wire harness tie on the shield sock at end of the shield sock to hold its position on the wire harness.

Refer to Subject 20-10-11 for the procedure to assemble a lacing tape wire harness tie.

- (5) Fold the end of the shield sock forward on the lacing tape wire harness tie.
- (6) Remove the necessary length from the end of the shield sock to make the distance from the end of the fold to the end of the shield sock equal to 0.25 inch to 0.50 inch.

**NOTE:** A broken strand of the shield sock can be cut to align the end of the strand with the surface of the shield sock.

**NOTE:** A maximum of five damaged shield sock strands is permitted.

- (7) Wind a layer of Type II silicone tape around the wire harness on the free end of the folded shield sock.

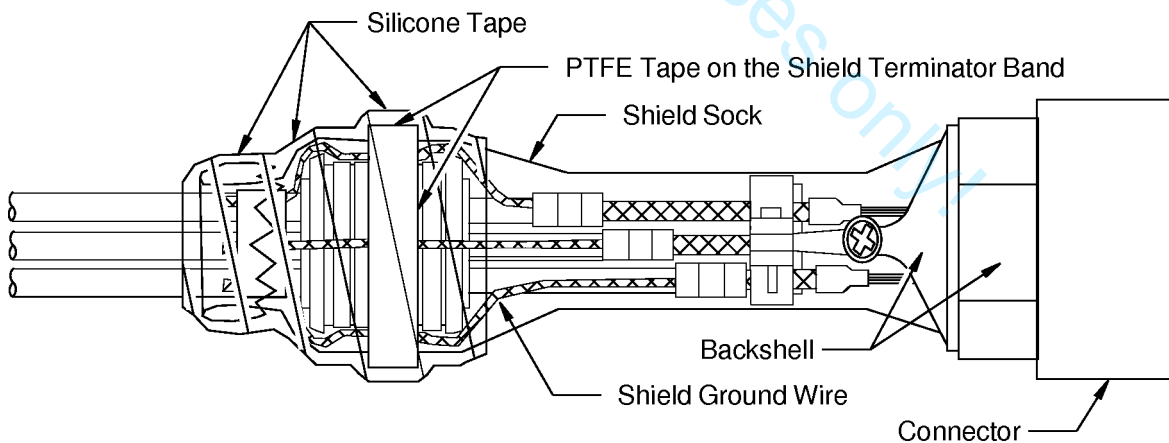
Make sure that:

- The end of the folded shield sock extends 1.0 inch  $\pm$  0.2 inch from the end of the shield termination ring
- The tape extends 0.50 inch  $\pm$  0.25 inch farther than the end of the shield sock
- The loose end of the shield sock has a tape layer
- The tape makes approximately a 50 percent overlap with itself
- The tape makes approximately a 100 percent overlap at the end.

**NOTE:** A continuous layer of Type II silicone tape on the free end of the folded shield sock and on the layer of PTFE tape on the shield terminator band is a satisfactory alternative. Refer to Step (8).

- (8) Wind 2 to 3 layers of 1 inch wide Type I silicone tape on top of the PTFE tape. Refer to Figure 86 and Figure 87.

Make sure that the surface of the band cannot be seen.



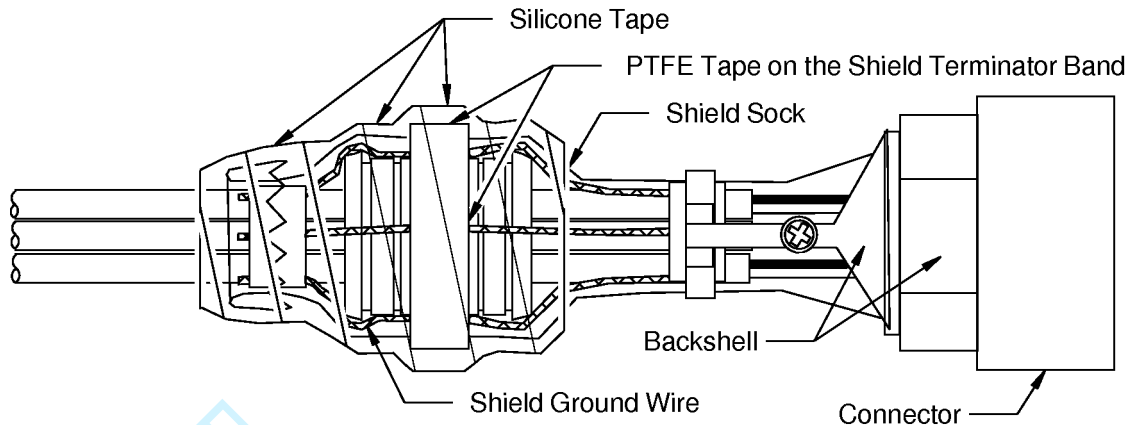
**LAYERS OF TAPE ON THE SHIELD TERMINATOR BAND - SOLDER SLEEVE SHIELD GROUND WIRES**

**Figure 86**

**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

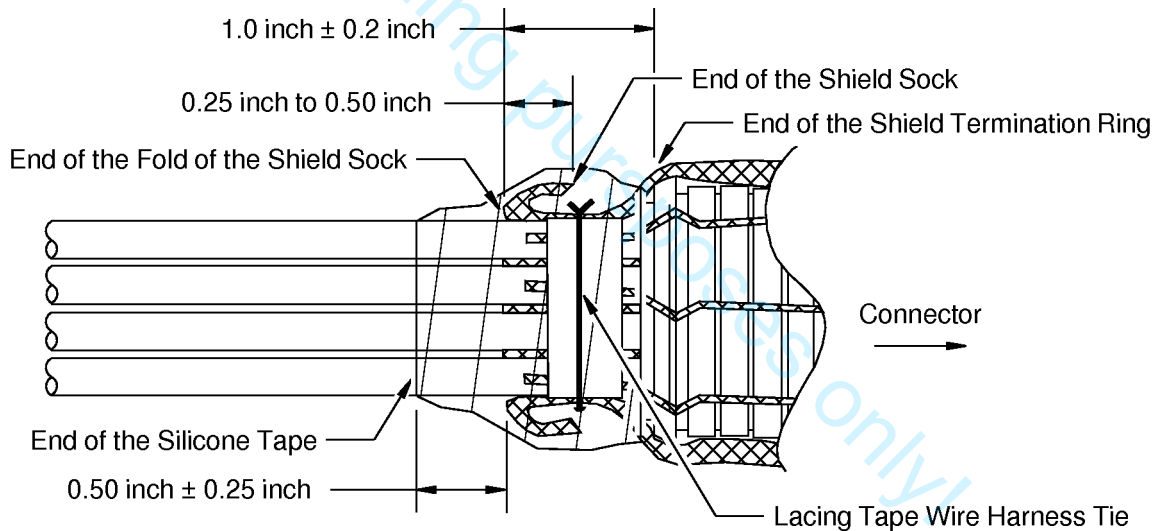
### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



#### LAYERS OF TAPE ON THE SHIELD TERMINATOR BAND - SHIELD PULL THROUGH SHIELD GROUND WIRES

Figure 87

#### V. Shield Sock Termination for a Backshell with a Strain Relief Boot



#### SHIELD SOCK TERMINATION

Figure 88

Refer to Figure 88:

- (1) Fully extend the shield sock rearward on the shield termination ring and the wire harness.  
Make sure that the shield sock does not have a vertical, horizontal, or diagonal separation of the strands that is larger than 0.13 inch.
- (2) Install a shield terminator band on the shield sock at the center of the shield termination ring. Refer to Subject 20-25-14.
- (3) Wind 2 to 3 layers of 0.5 inch wide PTFE tape on the shield terminator band.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

- (4) Assemble a lacing tape wire harness tie on the shield sock at end of the shield sock to hold its position on the wire harness.

Refer to Subject 20-10-11 for the procedure to assemble a lacing tape wire harness tie.

- (5) Fold the end of the shield sock forward on the lacing tape wire harness tie.
- (6) Remove the necessary length from the end of the shield sock to make the distance from the end of the fold to the end of the shield sock equal to 0.25 inch to 0.50 inch.

**NOTE:** A broken strand of the shield sock can be cut to align the end of the strand with the surface of the shield sock.

**NOTE:** A maximum of five damaged shield sock strands is permitted.

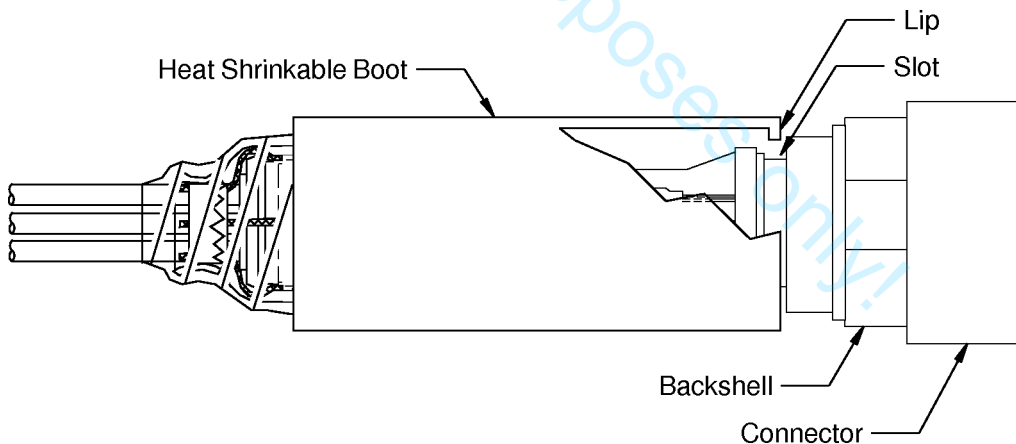
- (7) Wind a layer of Type II silicone tape on the end of the shield sock.

Make sure that:

- The end of the folded shield sock extends 1.0 inch  $\pm$  0.2 inch from the end of the shield termination ring
- The tape extends 0.50 inch  $\pm$  0.25 inch farther than the end of the shield sock
- The loose end of the shield sock has a layer of tape
- The tape makes approximately a 50 percent overlap with itself
- The tape makes approximately a 100 percent overlap at the end.

#### W. Installation of a Heat Shrinkable Strain Relief Boot

- (1) Push the strain relief boot forward until the forward end of the boot is against the rear of the backshell.
- (2) Align the lip of the boot with the slot in backshell. Refer to Figure 89.



**POSITION OF THE STRAIN RELIEF BOOT AGAINST THE BACKSHELL**

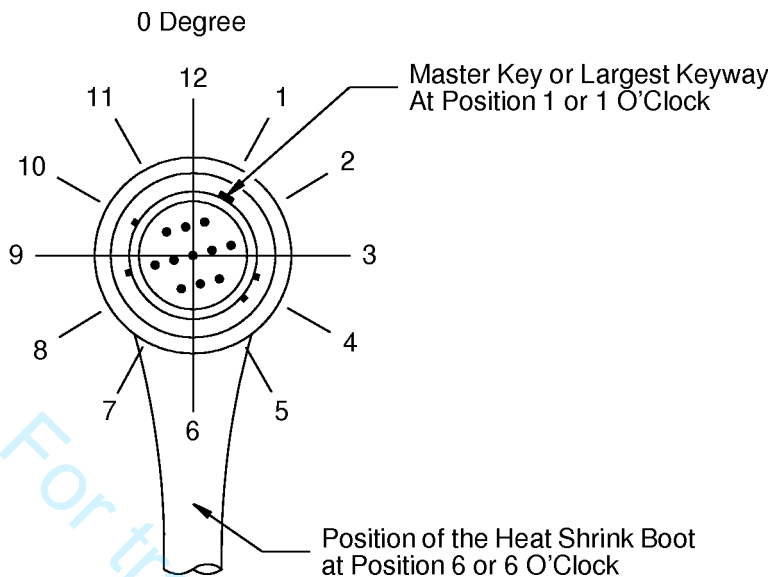
**Figure 89**

- (3) Put Master Key or Keyway of the connector in the specified clock position. Refer to Figure 90.

**NOTE:** If the clock position is not specified, put the Master Key or Keyway in clock position 12.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



**ONE O'CLOCK POSITION OF THE CONNECTOR AND THE BACKSHELL**  
**Figure 90**

- (4) For a backshell with a 45 degree or a 90 degree angle of the strain relief, put the heat shrinkable boot in the 6 o'clock position  $\pm 1$  hour or  $\pm 30$  degrees. Refer to Figure 90.

Make sure that the bump in the boot at the rear of the backshell is in the 12 o'clock position  $\pm 1$  hour or  $\pm 30$  degrees to make the bundle turn down to the 6 o'clock position  $\pm 1$  hour or  $\pm 30$  degrees.

- (5) Shrink the boot into its position.

Make sure the lip of the boot stays in the groove of the backshell.

Refer to:

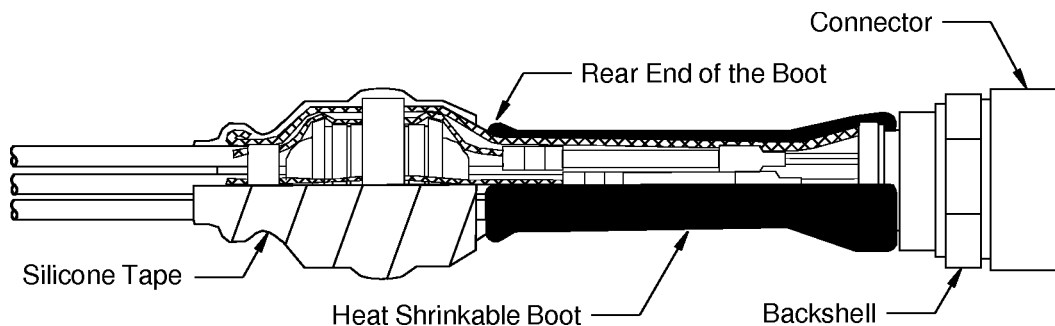
- Figure 91
- Figure 92
- Subject 20-10-14 for the procedure to shrink the boot.

**NOTE:** It is satisfactory if the location of the end of the boot on the shield termination ring assembly is different than the location that is shown in Figure 91 and Figure 92.

**NOTE:** The boot can be turned manually around the backshell and the wire harness.

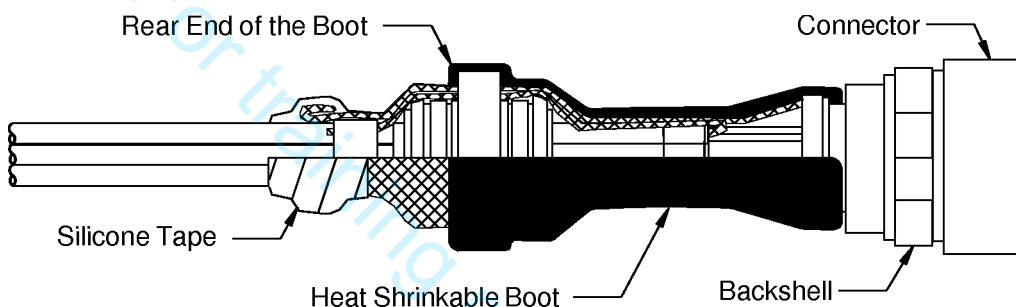
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



## STRAIN RELIEF BOOT INSTALLATION - SOLDER SLEEVE SHIELD GROUND WIRES

Figure 91



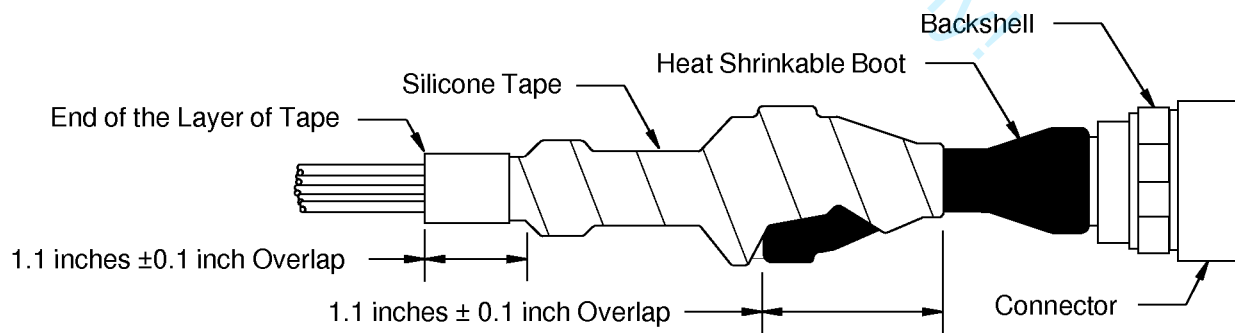
## STRAIN RELIEF BOOT INSTALLATION - SHIELD PULL THROUGH SHIELD GROUND WIRES

Figure 92

- (6) Put a layer of Type II silicone tape on the strain relief boot and the wire harness. Refer to Figure 93.

Make sure that the tape:

- Starts 1.1 inch  $\pm$  0.1 inch from the end of the strain relief boot
- Stops 1.1 inch  $\pm$  0.1 inch farther than the end of the shield sock
- Makes approximately a 50 percent overlap with itself
- Makes approximately a 100 percent overlap at the end.



## POSITION OF THE SILICONE TAPE ON THE STRAIN RELIEF BOOT

Figure 93

- (7) If a heat shrinkable sleeve is on the wire harness:

**20-25-15**

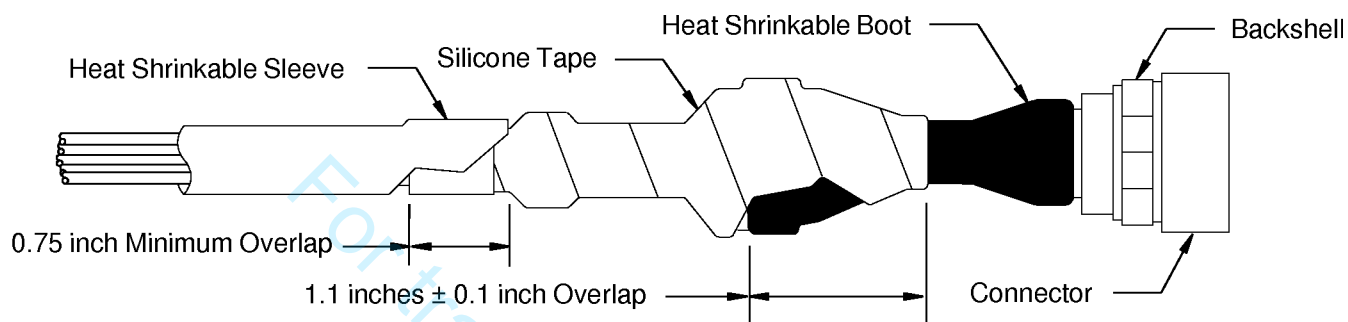
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

- Move the heat shrinkable sleeve forward until the forward end of the sleeve makes a minimum of 0.75 inch overlap with the rear end of the tape.
- Shrink the sleeve into its position.

Refer to:

- Figure 94
- Subject 20-10-14 for the procedure to install the sleeve.



### POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE SILICONE TAPE ON THE STRAIN RELIEF BOOT

Figure 94

#### X. Backshell Installation

Table 27

#### BACKSHELL INSTALLATION TORQUE VALUES

Shell Size	Torque (inch-pounds)	
	Minimum	Maximum
8	35	40
9	35	40
10	40	45
11	40	45
12	40	45
13	40	45
14	40	45
15	40	45
16	40	45
17	40	45
18	40	45
19	40	45
20	80	85
21	80	85

**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK

Table 27 (continued)

Shell Size	Torque (inch-pounds)	
	Minimum	Maximum
22	80	85
23	80	85
24	80	85
25	80	85
28	80	85
32	115	120

- (1) Make a selection of a hex coupling nut tool from Table 5.

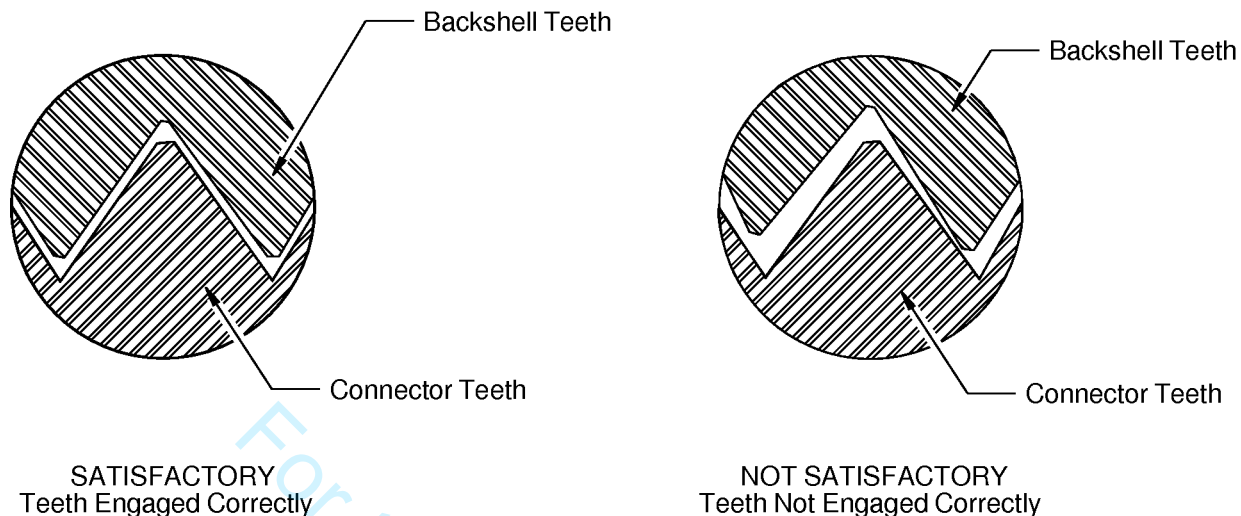
**CAUTION:** DO NOT USE A STRAP WRENCH TO APPLY TORQUE TO A COMPOSITE COUPLING NUT. ONLY USE A BACKSHELL HEX NUT TOOL TO APPLY TORQUE TO A COMPOSITE COUPLING NUT. FAILURE TO USE THE SPECIFIED BACKSHELL HEX NUT TOOL CAN CAUSE DAMAGE TO THE COUPLING NUT AND UNSATISFACTORY PERFORMANCE OF THE BACKSHELL.

- (2) Make a selection of a torque tool from Table 6.
- (3) Make a selection of a connector adapter tool set from Table 7.
- (4) Set the necessary torque of the torque tool. Refer to Table 27.
- (5) Put the holder on the square drive of the torque tool.
- (6) Fully engage the threads of the backshell and the connector.
- (7) Tighten the backshell coupling nut with the hand.
- (8) Examine the teeth of the backshell and the connector through the inspection hole. Refer to Figure 95. Make sure that the backshell teeth are fully engaged with the connector teeth.

**20-25-15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK



#### ENGAGEMENT OF THE BACKSHELL TEETH AND THE CONNECTOR TEETH

Figure 95

- (9) Fully engage the connector adapter and the connector.
- (10) Tighten the backshell coupling nut with a hex coupling nut holding tool, a torque tool, and a connector adapter.

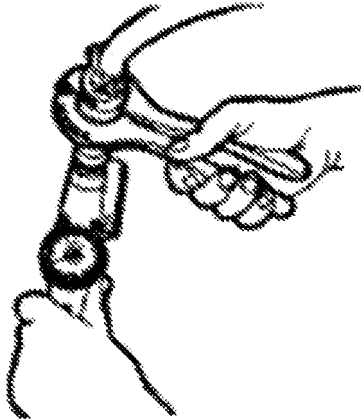
Refer to:

- Table 5 for a hex coupling nut tool
- Table 6 for a torque tool
- Table 7 for a connector adapter tool
- Figure 96 for a hand torque tool
- Figure 97 for a bench torque tool.

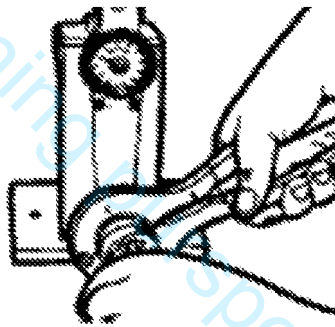
**CAUTION:** DO NOT USE A STRAP WRENCH TO APPLY TORQUE TO A COMPOSITE COUPLING NUT. ONLY USE A BACKSHELL HEX NUT TOOL TO APPLY TORQUE TO A COMPOSITE COUPLING NUT. FAILURE TO USE THE SPECIFIED BACKSHELL HEX NUT TOOL CAN CAUSE DAMAGE TO THE COUPLING NUT AND UNSATISFACTORY PERFORMANCE OF THE BACKSHELL.

**CAUTION:** DO NOT HOLD THE HANDLES TOO TIGHTLY.

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF COMPOSITE BACKSHELLS THAT HAVE A BRAIDED SHIELD SOCK**

**POSITION OF THE HAND TORQUE TOOL**  
**Figure 96**



**POSITION OF THE BENCH TORQUE TOOL**  
**Figure 97**

- (11) When the coupling nut starts to tighten:
- (a) Open the hex coupling nut holding tool and rotate it back 90 degrees.
  - (b) Continue to tighten the coupling nut.
  - (c) Do Step a and Step b again until the specified torque is applied.

**CAUTION:** DO NOT APPLY TOO MUCH TORQUE. DAMAGE TO THE COUPLING NUT CAN OCCUR.

**CAUTION:** FOR AN ELECTRONIC TORQUE TOOL, DO NOT APPLY MORE TORQUE THAN THE INITIAL SETTING. TOO MUCH TORQUE CAN RESET THE INITIAL SETTING WHICH CAN CAUSE AN INCORRECT TORQUE INDICATION.

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

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B. MISTY Insert Part Numbers	2
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E. Heat Shrinkable Boot Part Numbers	3
<b>2. <u>WIRE HARNESS DISASSEMBLY</u></b>	<b>3</b>
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B. Cable Preparation - Solder Sleeve Shield Termination	6
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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

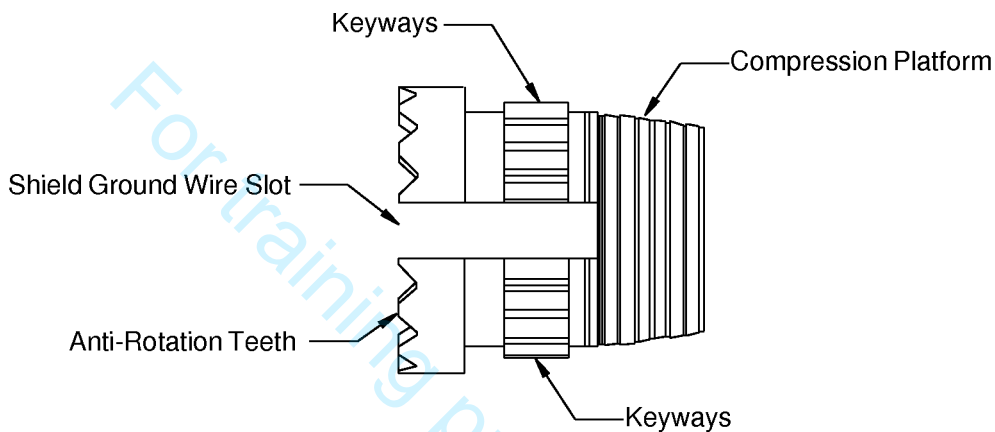
#### 1. PART NUMBERS AND DESCRIPTION

##### A. MST Insert Part Numbers

MST Insert Family 300-321 -17 Shell Size

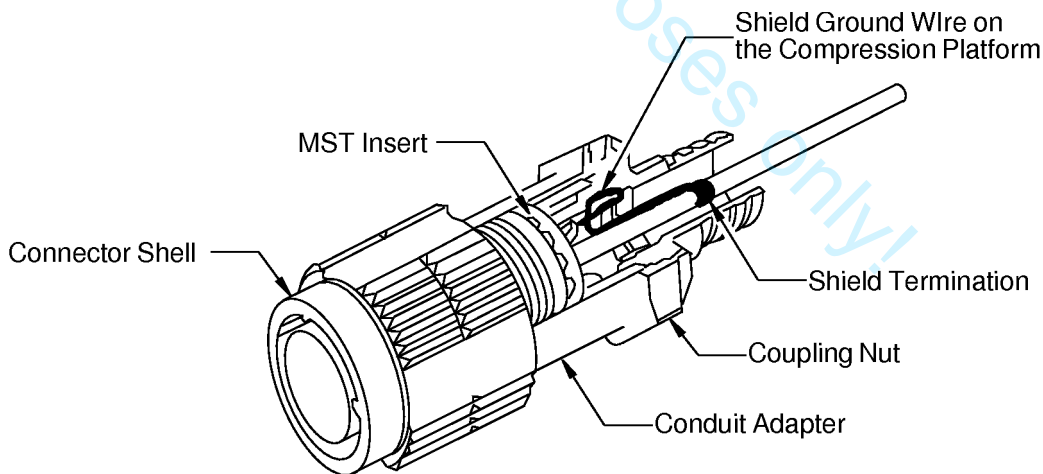
#### MST INSERT PART NUMBER STRUCTURE

Figure 1



#### MST INSERT

Figure 2



#### SHIELD TERMINATION WITH A MST INSERT

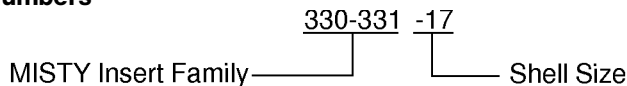
Figure 3

**20-25-16**

## STANDARD WIRING PRACTICES MANUAL

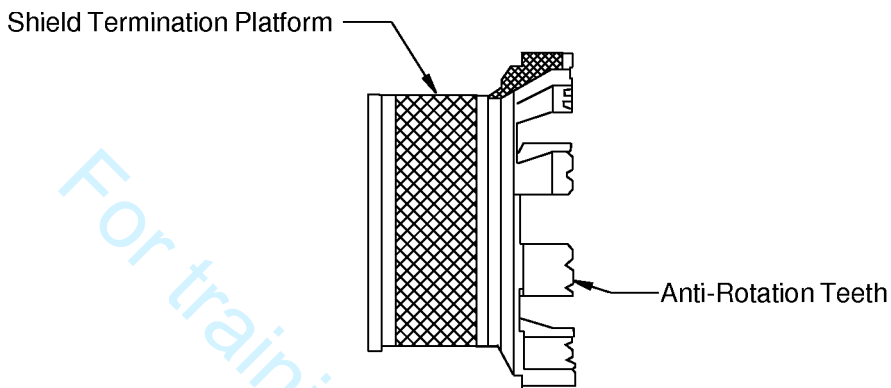
### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

#### B. MISTY Insert Part Numbers

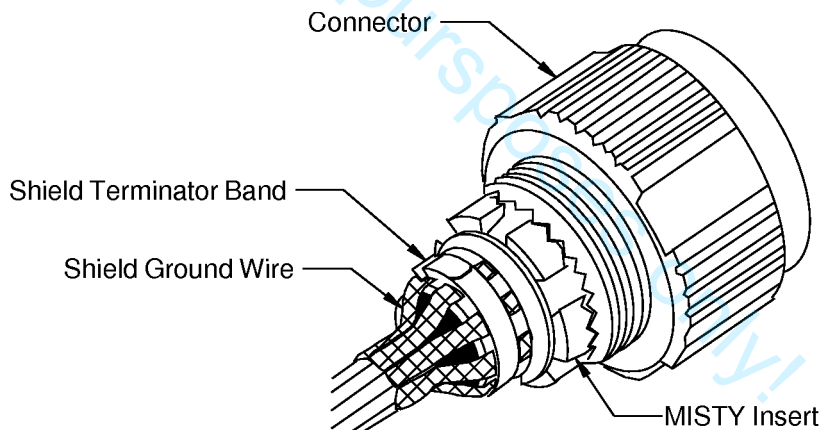


#### MISTY INSERT PART NUMBER STRUCTURE

Figure 4



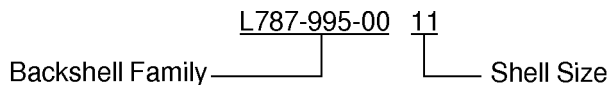
MISTY INSERT  
Figure 5



#### SHIELD TERMINATION WITH A MISTY INSERT

Figure 6

#### C. Backshell Part Numbers



#### BACKSHELL PART STRUCTURE

Figure 7

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

### D. Wiring Assembly Components

Table 1  
WIRING ASSEMBLY COMPONENTS

Component	Type	Specification
Tape	PTFE	A-A-59474

### E. Heat Shrinkable Boot Part Numbers

Table 2  
HEAT SHRINKABLE BOOT PART NUMBERS

Part Number	Strain Relief Type
202D121-3/86-0	Straight
292D142-3/86-0	Straight
202D153-3/86-0	Straight
222D121-3/86	90 Degree
222D152-3/86	90 Degree
243D012-3/86	45 Degree
264W012-3/86	30 Degree

## 2. WIRE HARNESS DISASSEMBLY

### A. Wire Harness Disassembly

Table 3  
WIRE HARNESS DISASSEMBLY TOOLS

Tool	Supplier
Knife	An available source
Diagonal Cutters	An available source
Open End Wrench	An available source

Table 4  
CONDUIT ADAPTER DISASSEMBLY TOOL SIZE

Shell Size	Tool Size (inch)
9	5/8
11	3/4
13	13/16
15	1
17	1-1/8

# 20-25-16

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Table 4 (continued)

Shell Size	Tool Size (inch)
19	1-3/16
21	1-5/16
23	1-7/16
25	1-9/16

- (1) If the wire harness to be disassembled has a backshell:
  - (a) Make a selection of a knife from Table 3.
  - (b) Carefully make a longitudinal cut from one end of the strain relief boot to the other end of the boot.
 

**CAUTION:** DO NOT FULLY CUT THROUGH THE STRAIN RELIEF BOOT. DAMAGE TO THE SHIELD GROUND WIRES, WIRES, CABLES, OR OTHER COMPONENTS OF THE WIRE HARNESS CAN OCCUR.
  - (c) Remove the strain relief boot.
  - (d) Examine the shield ground wires.
 

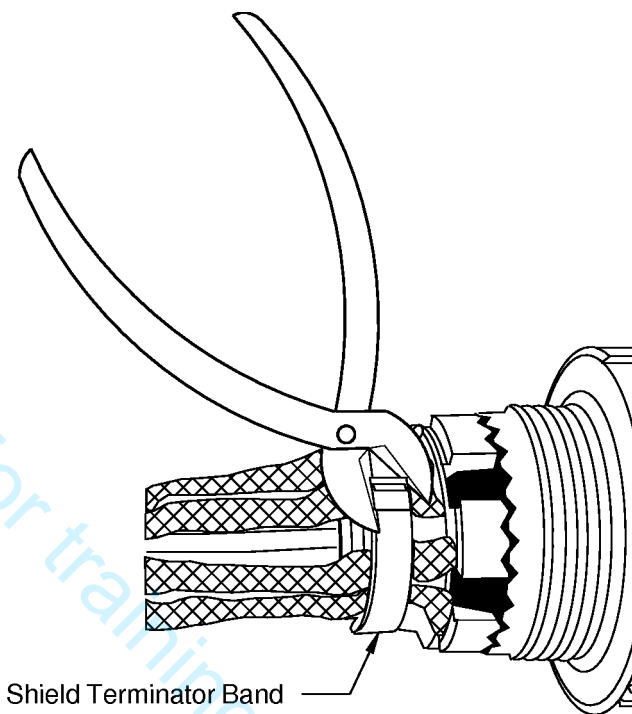
Make sure that the shield ground wires do not have damage.
  - (e) Make a selection of an open end wrench.
 

Make sure that the size of the wrench is applicable for the shell size. Refer to Table 4.
  - (f) Use the open end wrench to loosen the backshell coupling ring.
  - (g) Disengage the threads of the backshell coupling ring from the connector.
- (2) If the wire harness to be disassembled has a conduit adapter:
  - (a) Make a selection of an open end wrench.
 

Make sure that the size of the wrench is applicable for the shell size. Refer to Table 4.
  - (b) Use the open end wrench to loosen the conduit adapter coupling nut.
  - (c) Disengage the threads of the conduit adapter coupling ring from the connector.
- (3) If the wire harness to be disassembled has a MST insert shield termination:
  - (a) Remove the tape that is around the cut end of the shield ground wires.
  - (b) Carefully pull each shield ground wire away from the MST insert.
  - (c) Remove the MST insert from the connector.
- (4) If the wire harness to be disassembled has a MISTY insert shield termination:
  - (a) Remove the tape that is
    - Around the shield ground wires
    - Around the shield terminator band.
  - (b) Remove the shield terminator band from the shield termination platform. Refer to Figure 8.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



#### REMOVAL OF THE SHIELD TERMINATOR BAND

Figure 8

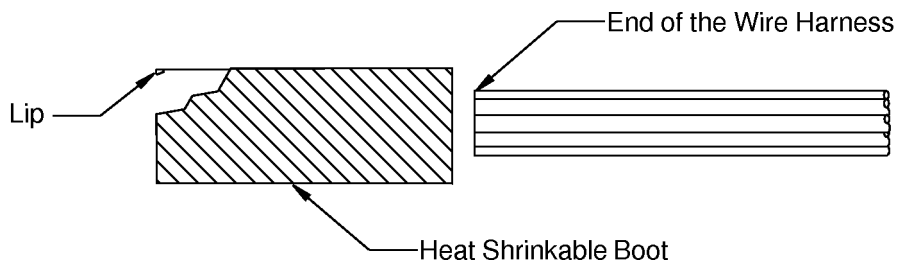
- (c) Hold the buckle of the shield terminator band with the cutters.
- (d) Rotate the cutters and lift the buckle of the band away from the shield termination platform until the buckle releases or the band breaks.
- (e) Remove the shield terminator band.
- (f) Remove the MISTY insert from the connector.

### 3. SHIELD TERMINATION WITH A MST INSERT

#### A. Backshell or Conduit Adapter Installation Preparation

- (1) If a heat shrinkable boot is specified, put the boot on the wire harness.

Make sure that the end of the boot with the lip is pointed forward toward the end of the wire harness. Refer to Figure 9.



#### POSITION OF THE LIP ON THE END OF THE STRAIN RELIEF BOOT

Figure 9

**20-25-16**

## STANDARD WIRING PRACTICES MANUAL

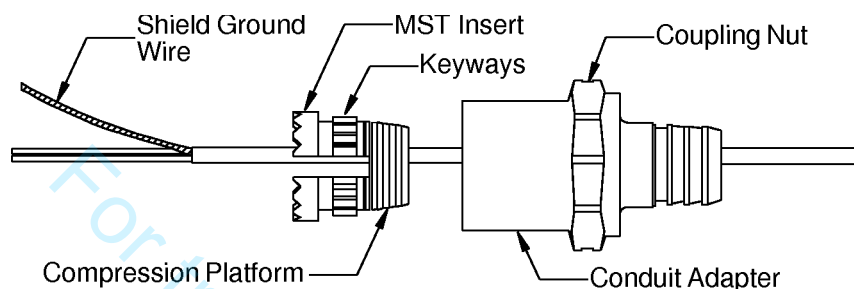
### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

- (2) Put the shield termination components on the wire harness.

Refer to:

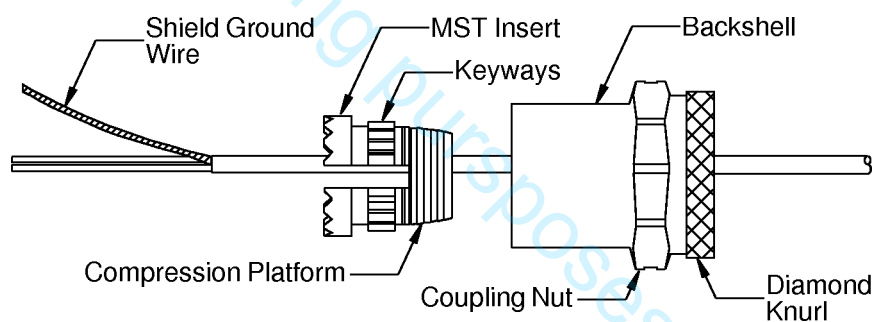
- Figure 10 for the MST insert with a conduit adapter
- Figure 11 for the MST insert with a backshell.

Make sure that the end of the MST insert with the compression platform is pointed away from the end of the cable.



**POSITION OF THE MST INSERT AND THE CONDUIT ADAPTER ON THE WIRE HARNESS**

**Figure 10**



**POSITION OF THE MST INSERT AND THE BACKSHELL ON THE WIRE HARNESS**

**Figure 11**

#### B. Cable Preparation - Solder Sleeve Shield Termination

- (1) Remove the necessary length of the jacket from the end of the cable.

Refer to:

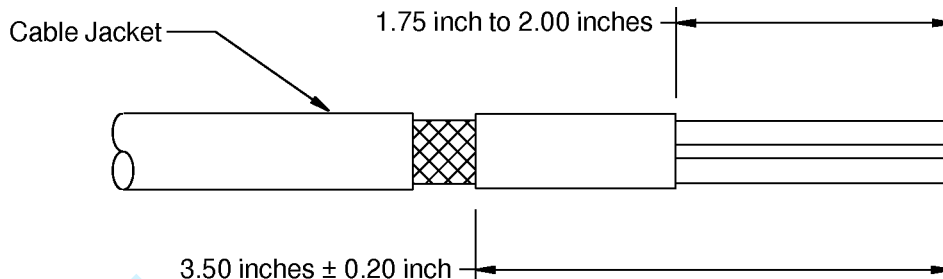
- Figure 12 and Figure 13 for the standard shield terminations
- Figure 14 and Figure 15 for the end strip shield terminations
- Figure 16 for the standard and end strip shield terminations
- Subject 20-00-15 for the procedure to remove the cable jacket.

**NOTE:** The termination of a shield to the rear of the conduit adapter is permitted only when the End Strip shield termination is specified by Engineering.

## STANDARD WIRING PRACTICES MANUAL

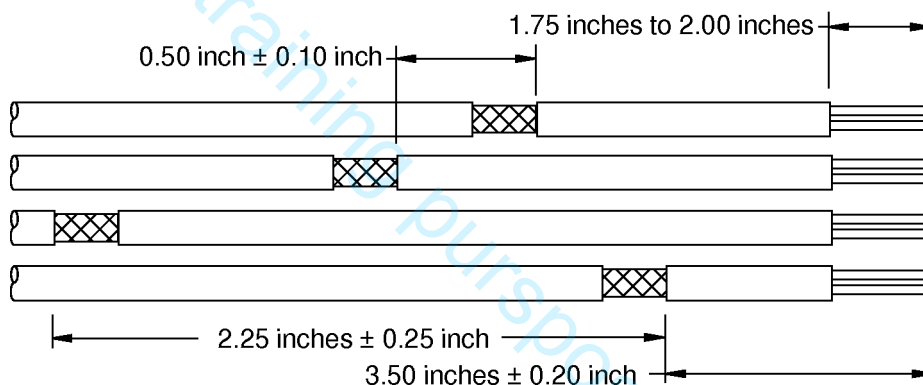
### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

**CAUTION:** A SHIELD TERMINATION TO THE REAR OF THE CONDUIT ADAPTER ON A CABLE THAT IS NOT SPECIFIED BY ENGINEERING CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.



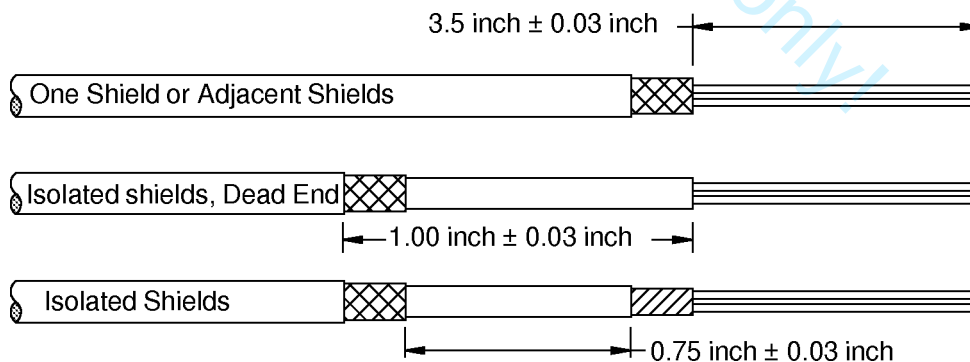
#### STANDARD CABLE PREPARATION - 3 OR LESS CABLES

Figure 12



#### STANDARD CABLE PREPARATION - 4 OR MORE CABLES

Figure 13

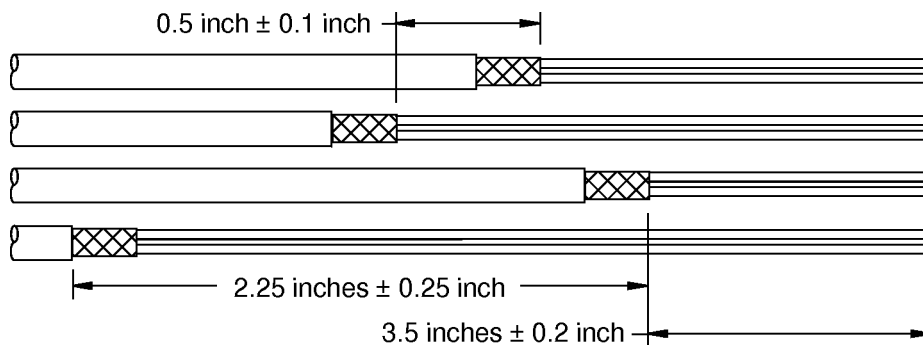


#### END STRIP CABLE PREPARATION - 3 OR LESS CABLES

Figure 14

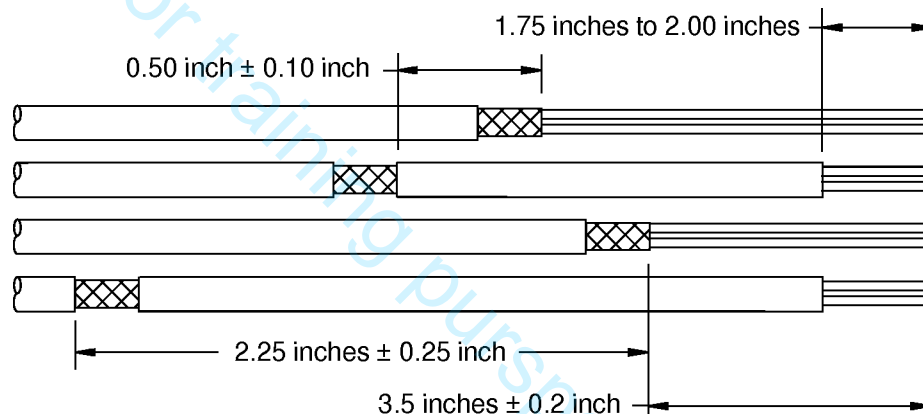
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



### END STRIP CABLE PREPARATION - 4 OR MORE CABLES

Figure 15



### STANDARD AND END STRIP STANDARD CABLE PREPARATION - 4 OR MORE CABLES

Figure 16

- (2) Assemble a shield dead end on each cable where the shield termination is not at the end of the cable jacket. Refer to Subject 20-10-15.
- (3) Assemble each shield ground wire. Refer to Subject 20-10-15.

Make sure that:

- Each shield ground wire is pointed forward toward the end of the cable
- When the wire harness has 4 or more cables, the solder sleeves must be assembled at equal distances in the 2.25 inch length of the cables of the wire harness.

**NOTE:** An overlap of the solder sleeves is permitted when the wire harness has 3 cables or less.

### C. Cable Preparation - Shield Pull Through Shield Termination

This section gives the procedure to assemble a shield pull through shield ground wire for cables with:

- One round conductor shield
- Two adjacent round conductor shields.

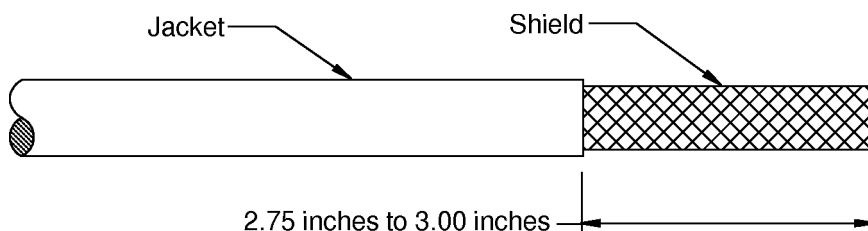
- (1) Remove 2.75 inches to 3.00 inches of the jacket from the end of the cable.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Refer to:

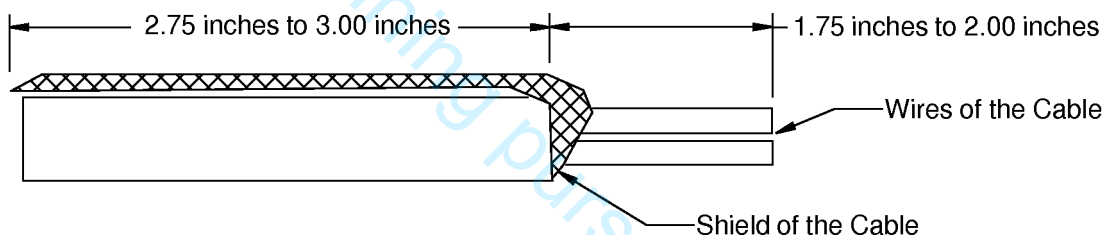
- Figure 17
- Subject 20-00-15 for the procedure to remove the cable jacket.



**CABLE JACKET REMOVAL LENGTH**

**Figure 17**

- (2) Assemble the shield ground wire. Refer to Subject 20-10-15.
- (3) Remove the necessary length from the end of the wires of the cable to make the distance from the end of the jacket to the end of the wires equal to 1.75 inches to 2.00 inches. Refer to Figure 18.



**LENGTH OF THE WIRES OF THE CABLE**

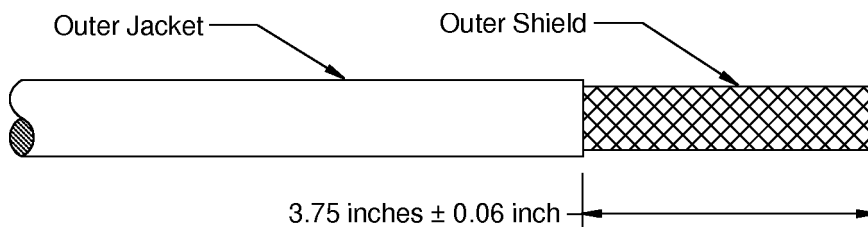
**Figure 18**

#### D. Cable Preparation - Shield Pull Through Shield Termination, Isolated Shields

- (1) Remove 3.75 inches  $\pm 0.06$  inch of outer jacket from the end of the cable.

Refer to:

- Figure 19
- Subject 20-00-15 for the procedure to remove the cable jacket.



**OUTER JACKET REMOVAL LENGTH**

**Figure 19**

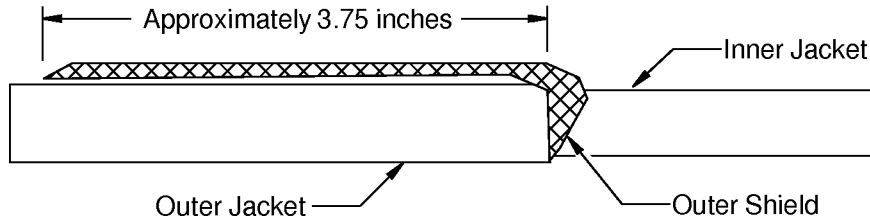
- (2) Assemble the shield pull through shield ground wire of the outer shield.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Refer to:

- Figure 20
- Subject 20-10-15 for the procedure to assemble the shield ground wire.



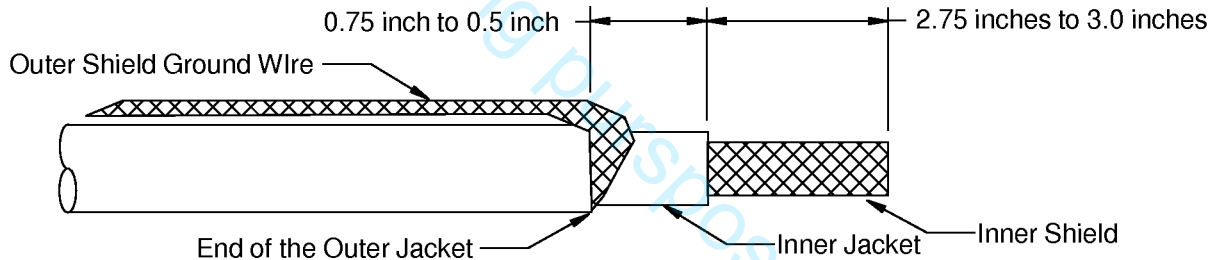
**OUTER SHIELD GROUND WIRE**

**Figure 20**

- (3) Remove the necessary length of inner jacket to make the distance from the end of the outer jacket to the end of the inner jacket equal to 0.75 inch to 0.50 inch.

Refer to:

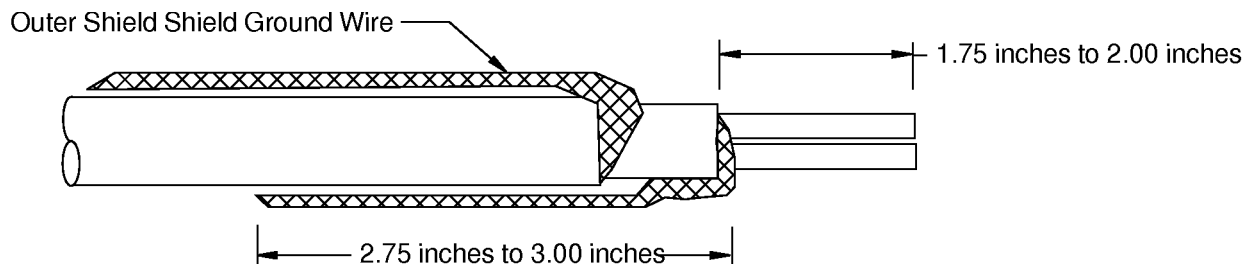
- Figure 21
- Subject 20-00-15 for the procedure to remove the cable jacket.



**INNER JACKET REMOVAL LENGTH**

**Figure 21**

- (4) Assemble the shield pull through shield ground wire of the inner shield. Refer to Subject 20-10-15.
- (5) Remove the necessary length from the end of the wires of the cable to make the distance from the end of the inner jacket to the end of the wires equal to 1.75 inches to 2.0 inches. Refer to Figure 22.



**LENGTH OF THE WIRES OF THE CABLE**

**Figure 22**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

#### E. Shield Termination Assembly

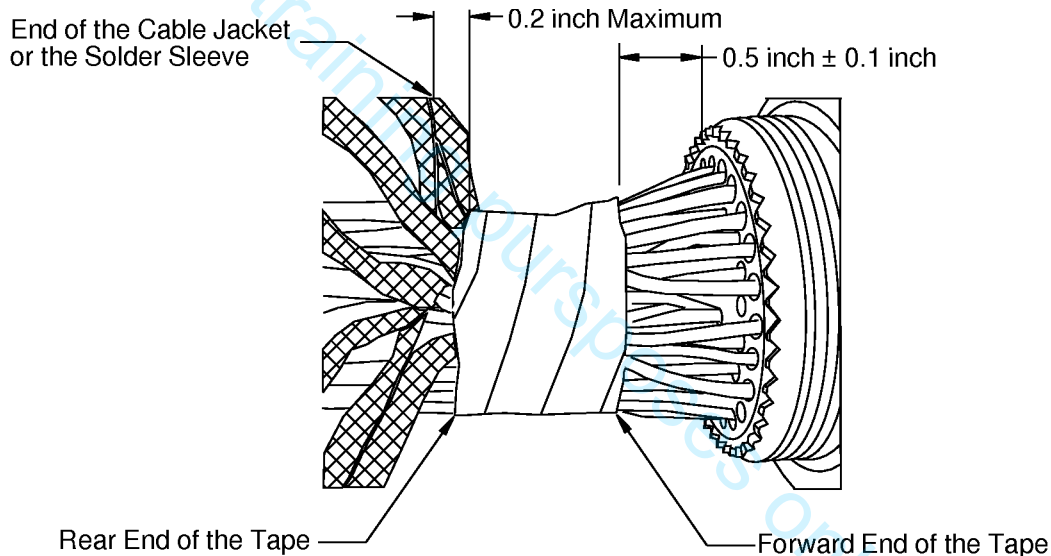
**NOTE:** If a MST insert shield termination is specified for each end of the wire harness, the connector on one end of the harness can be assembled before the wiring is put into the conduit to make the assembly of the connector easier.

**NOTE:** The contact assemblies must be installed in the connector before the assembly of the shield terminations.

- (1) If the wire harness has shield pull through shield ground wires, make them flat.
- (2) Fold the shield ground wires rearward away from the connector.
- (3) Wrap 2 to 4 layers of the PTFE tape on the wires of the cables. Refer to Figure 23.

Make sure that:

- The wires are axially aligned with the connector
- The wires do not have too much tension that pulls the seal webs of the grommet out of their shape.



**POSITION OF THE TAPE ON THE WIRES**  
**Figure 23**

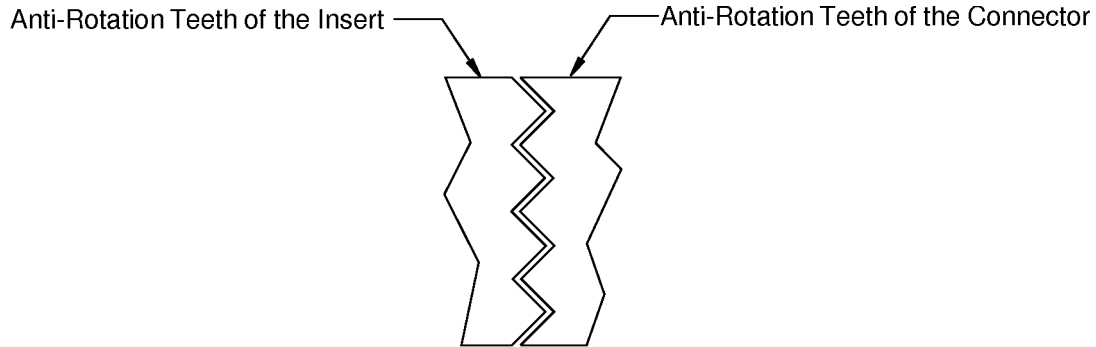
- (4) Fold each shield ground wire forward toward the connector.
- (5) Push the insert against the connector.

Make sure that:

- The shield ground wires are in the slots of the adapter
- The anti-rotation teeth of the insert and the connector are correctly aligned; refer to Figure 24.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

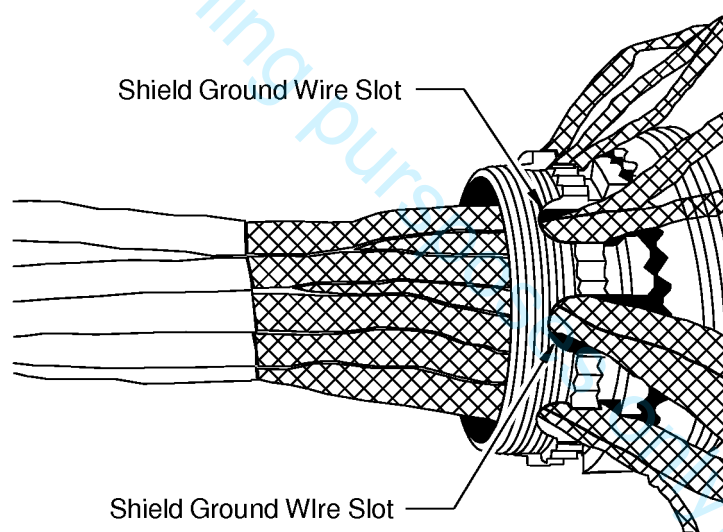


**ALIGNMENT OF THE ANTI-ROTATION TEETH OF THE INSERT AND THE CONNECTOR**  
Figure 24

- (6) Fold the shield ground wires back in the slots of the insert. Refer to Figure 25.

Make sure that:

- The number of shield ground wires in each slot is approximately the same
- The anti-rotation teeth of the insert and the connector are correctly aligned.



**POSITION OF THE SHIELD GROUND WIRES IN THE SLOTS OF THE INSERT**  
Figure 25

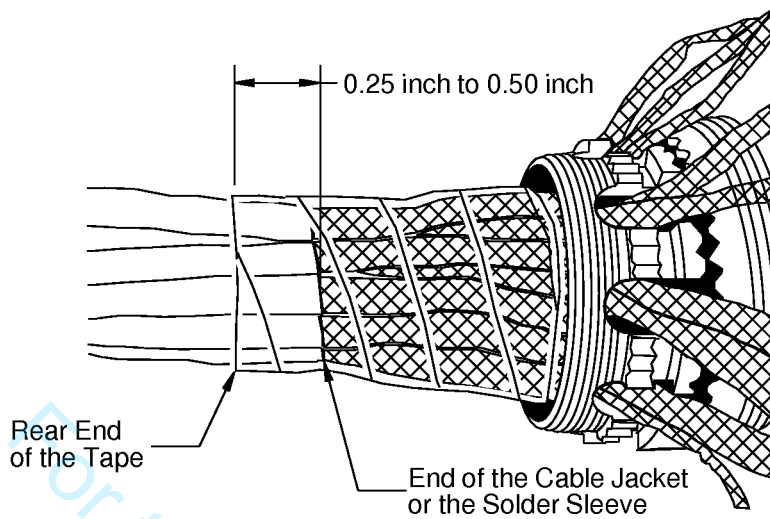
- (7) Wrap 2 to 4 layers of the PTFE tape on the wires. Refer to Figure 26.

Make sure that:

- The forward end of the tape is not more than 0.20 inch from the end of the insert
- For a conduit that is longer than 12 inches, the tape extends 0.25 inch to 0.50 inch rearward from the end of the cable jackets.
- For a conduit that is shorter than 12 inches, the tape extend a minimum 0.25 inch rearward from the rear end of the MST insert
- The anti-rotation teeth of the insert and the connector are correctly aligned.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



**POSITION OF THE TAPE ON THE WIRE HARNESS**

**Figure 26**

- (8) Hold the insert against the connector and carefully pull each shield ground wire tight against the compression platform of the insert. Refer to Figure 27.

Make sure that:

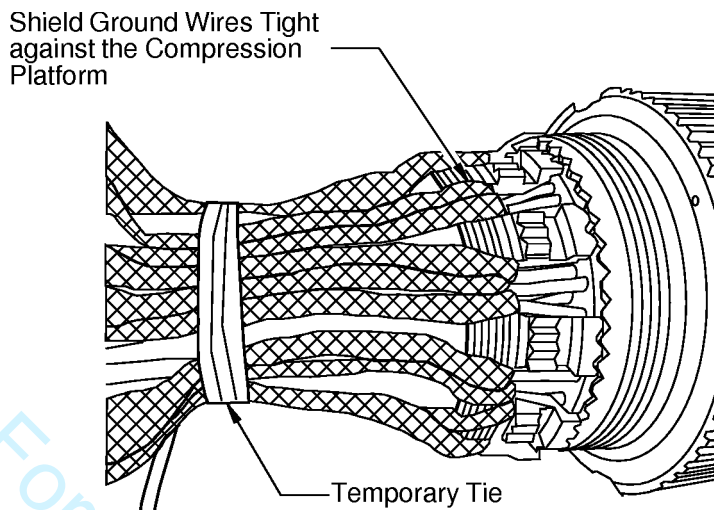
- The shield ground wires do not make an overlap with each other
- The shield ground wires are flat against the compression platform
- The anti-rotation teeth of the insert and the connector are correctly aligned.

**CAUTION:** DO NOT CAUSE DAMAGE TO THE SHIELD GROUND WIRES. THE DAMAGE CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE SHIELD TERMINATIONS.

**NOTE:** The shield ground wires can be tied in position temporarily to make the installation easier.

**STANDARD WIRING PRACTICES MANUAL**

**ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS**



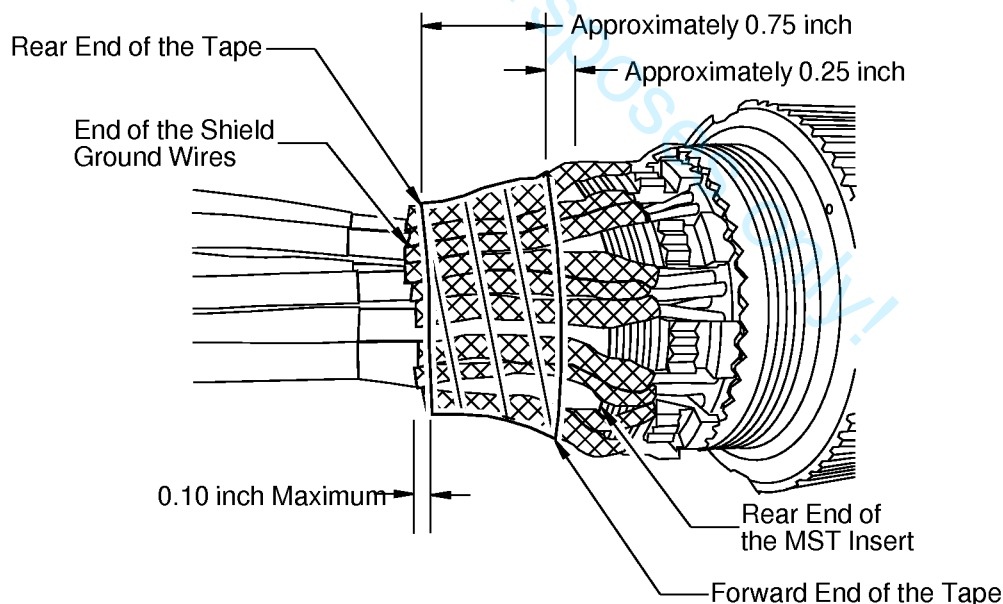
**POSITION OF THE SHIELD GROUND WIRES AGAINST THE COMPRESSION PLATFORM**

**Figure 27**

- (9) Wrap 2 to 4 layers of PTFE tape on the shield ground wires. Refer to Figure 28.

Make sure that:

- The forward end of the tape is not more than 0.25 inch from the rear end of the insert
- The layer of tape extends rearward approximately 0.75 inch from the forward end of the tape
- The anti-rotation teeth of the insert and the connector are correctly aligned.



**POSITION OF THE TAPE ON THE SHIELD GROUND WIRES**

**Figure 28**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

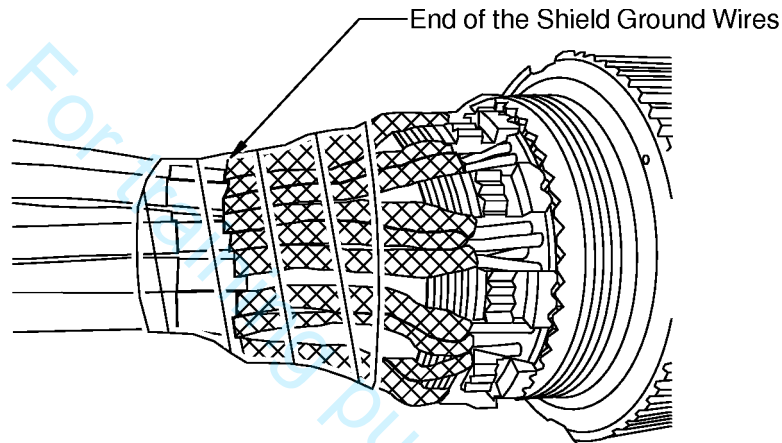
- (10) Remove the unwanted length of each shield ground wire at the rear end of the tape. Refer to Figure 28.

Make sure that:

- The shield ground wires do not extend farther than 0.10 inch from the tape
- The anti-rotation teeth of the insert and the connector are correctly aligned.

- (11) For a conduit that is longer than 12 inches, wrap 2 to 4 layers of the PTFE tape on the end of the shield ground wires. Refer to Figure 29.

Make sure that the center of the tape and the end of the shield ground wires are aligned approximately.



**PTFE TAPE ON THE CUT END OF THE SHIELD GROUND WIRES**

**Figure 29**

- (12) If a pull cord is specified:

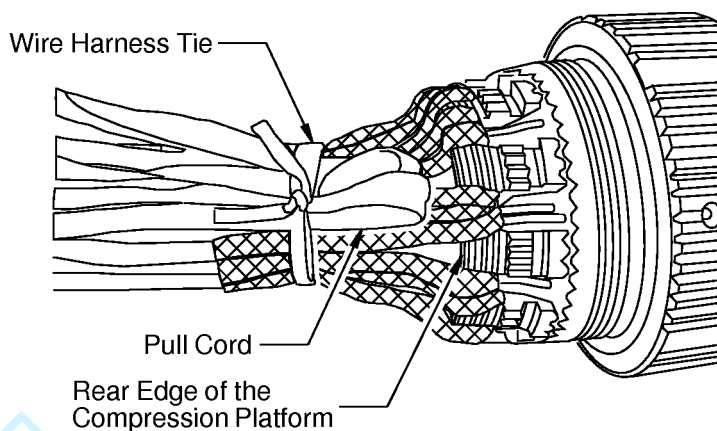
- (a) Put the pull cord in its position. Refer to Figure 30.

Make sure the pull cord does not make an overlap with the compression platform.

**NOTE:** The folded lengths of the pull cord can be put at approximately equal intervals around the wire harness.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



**POSITION OF THE PULL CORD**  
**Figure 30**

- (b) Assemble a wire harness tie on the pull cord.

Refer to:

- Figure 30.
- Subject 20-10-11 for the procedure to assemble the wire harness tie.

#### F. Conduit Adapter Installation

**Table 5**  
**CONDUIT ADAPTER INSTALLATION TOOL SIZE**

Shell Size	Tool Size (inch)
9	5/8
11	3/4
13	13/16
15	1
17	1-1/8
19	1-3/16
21	1-5/16
23	1-7/16
25	1-9/16

**Table 6**  
**CONDUIT ADAPTER INSTALLATION TORQUE VALUES**

Shell Size	Initial Torque (inch pound)		Final Torque (inch pound)	
	Target	Tolerance	Target	Tolerance
9	60	± 5	50	± 5

# 20-25-16

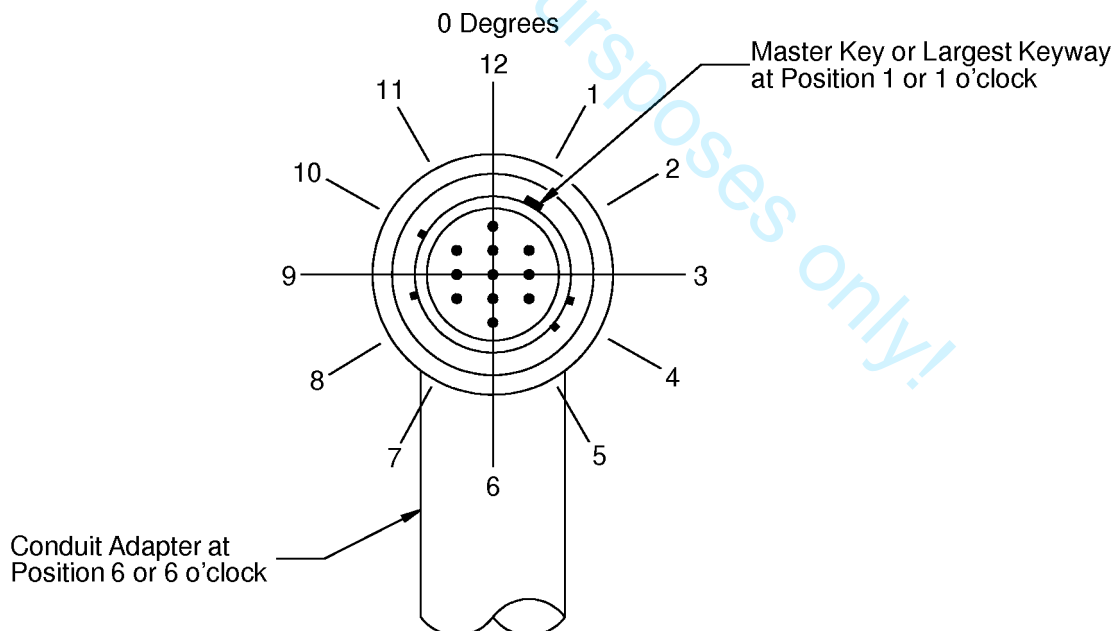
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Table 6 (continued)

Shell Size	Initial Torque (inch pound)		Final Torque (inch pound)	
	Target	Tolerance	Target	Tolerance
11	60	± 5	50	± 5
13	90	± 5	75	± 5
15	90	± 5	75	± 5
17	90	± 5	75	± 5
19	120	± 5	100	± 5
21	120	± 5	100	± 5
23	150	± 5	125	± 5
25	150	± 5	125	± 5

- (1) Carefully push the adapter forward until it is against the connector.  
Make sure that the keys of the adapter and the keyways of the MST insert are aligned.
  - (2) Engage the threads of the adapter and the connector.
  - (3) Put Master Key or Keyway of the connector in the specified clock position. Refer to Figure 31.
- NOTE:** If the clock position is not specified, put the Master Key or Keyway in clock position 12.



### ONE O'CLOCK POSITION OF THE CONNECTOR AND THE CONDUIT ADAPTER

Figure 31

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

- (4) For a conduit with a 45 degree or a 90 degree angle, put the conduit in the 6 o'clock position at the specified tolerance. Refer to Figure 31.

**NOTE:** If the tolerance is not specified, put the strain relief arm in the 6 o'clock position hour or 30 degrees.

- (5) Tighten the coupling nut manually.  
Make sure that the conduit adapter is in the specified clock position. Refer to Figure 31.
- (6) Make a selection of an open end wrench.  
Make sure that the size of the wrench is applicable for the shell size. Refer to Table 5

- (7) Tighten the coupling nut to the initial torque value. Refer to Table 6.
- (8) Loosen the torque adaptor approximately one half turn.
- (9) Torque the coupling nut to the final torque value for 50 seconds to 60 seconds. Refer to Table 6.
- (10) Release the coupling nut.
- (11) If the coupling nut moves, do Step 9 and Step 10 again.

**CAUTION:** IF THE COUPLING NUT MOVES BACK FROM THE FINAL TORQUE POSITION, UNSATISFACTORY PERFORMANCE OF THE CONDUIT ADAPTER OCCURS.

#### G. Backshell Installation

**Table 7**  
**BACKSHELL INSTALLATION TOOL SIZE**

Shell Size	Tool Size (inch)
11	3/4
17	1-1/8
21	1-5/16
25	1-9/16

**Table 8**  
**BACKSHELL INSTALLATION TORQUE VALUES**

Shell Size	Initial Torque (inch pound)		Final Torque (inch pound)	
	Target	Tolerance	Target	Tolerance
11	60	± 5	50	± 5
17	90	± 5	75	± 5
21	120	± 5	100	± 5
25	120	± 5	125	± 5

- (1) If the heat shrinkable boot does not have a straight strain relief, put the necessary layers of PTFE tape on the wire harness at the location of the cable exit of the backshell when the backshell is installed.

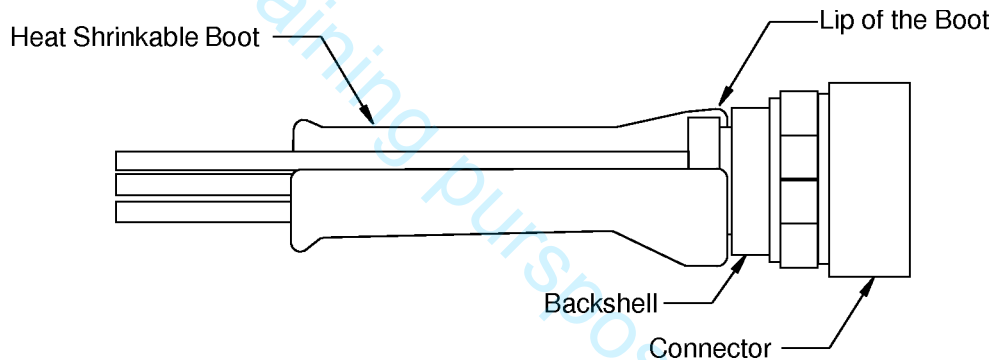
# 20-25-16

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Make sure that:

- The layers of tape make an approximately 100 percent overlap
  - The forward edge of the tape extends a minimum 0.25 inch forward from the rear end of the cable exit of the backshell
  - If the O.D. of the wire harness is equal to or larger than 75 percent of the inner diameter of the cable exit, a minimum of two layers of tape are put on
  - If the O.D. of the wire harness is smaller than 75 percent of the inner diameter of the cable exit, the necessary layers of tape are put on to make the O.D. of the wire harness approximately equal to 75 percent of the inner diameter of the cable exit.
- (2) Carefully push the backshell forward until it is against the connector.
- Make sure that the keys of the backshell and the keyways of the MST insert are aligned.
- (3) Engage the threads of the backshell and the connector.
- (4) Push the heat shrinkable boot forward until the forward end of the boot is against the rear of the boot adapter.
- (5) Align the lip of the boot in the slot in the adapter. Refer to Figure 32.



**POSITION OF THE HEAT SHRINKABLE BOOT ON THE BACKSHELL**

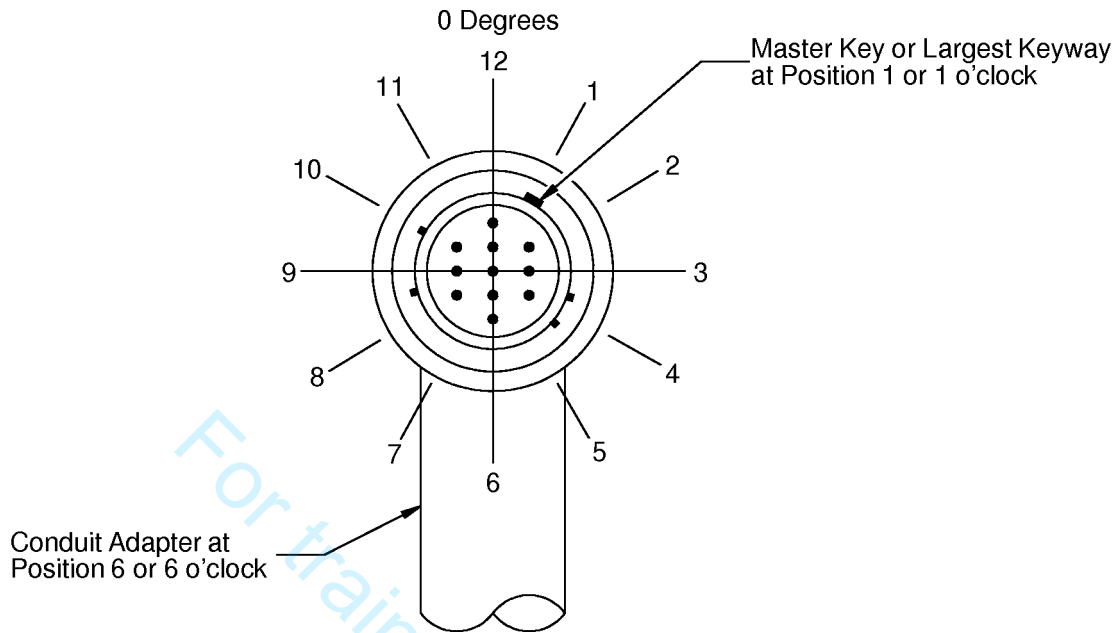
**Figure 32**

- (6) Put the Master Key or Keyway of the connector in the specified clock position. Refer to Figure 33.

NOTE: If the clock position is not specified, put the Master Key or Keyway in clock position 12.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



#### ONE O'CLOCK POSITION OF THE CONNECTOR AND THE HEAT SHRINKABLE BOOT

Figure 33

- (7) For a boot that does not have a straight strain relief, put the boot in the 6 o'clock position and the specified tolerance. Refer to Figure 33.

**NOTE:** If the tolerance is not specified, put the strain relief arm in the 6 o'clock position  $\pm 1$  hour or  $\pm 30$  degrees.

- (8) Tighten the coupling nut manually.  
Make sure that the backshell is in the specified clock position. Refer to Figure 33.
- (9) Make a selection of an open end wrench.  
Make sure that the size of the wrench is applicable for the shell size. Refer to Table 7.
- (10) Torque the backshell:
- Torque the backshell to the initial torque. Refer to Table 8.
  - Loosen the torque adapter approximately one half turn.
  - Torque the backshell to the final torque for 50 seconds to 60 seconds. Refer to Table 8.
  - Release the backshell.
  - If the coupling nut moves, do Step c and Step d again.

**CAUTION:** IF THE COUPLING NUT MOVES BACK FROM THE FINAL TORQUE POSITION, UNSATISFACTORY PERFORMANCE OF THE BACKSHELL OCCURS.

- (11) Shrink the boot into its position. Refer to Figure 32.  
Make sure the lip of the boot stays in the groove of the backshell.

## STANDARD WIRING PRACTICES MANUAL

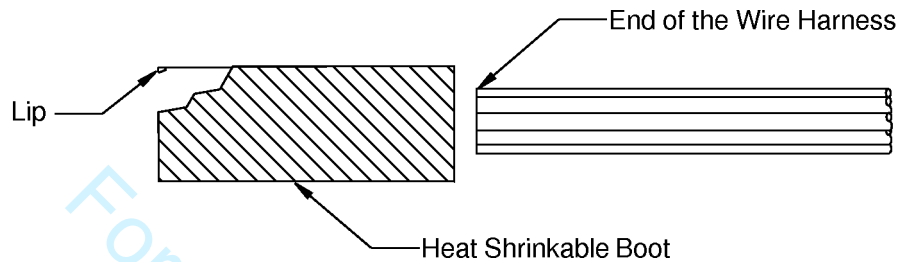
### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

#### 4. SHIELD TERMINATION WITH A MISTY INSERT

##### A. Backshell or Conduit Assembly Installation Preparation

- (1) If a heat shrinkable boot is specified, put the boot on the wire harness.

Make sure that the end of the boot with the lip is pointed forward toward the end of the wire harness.  
Refer to Figure 34.



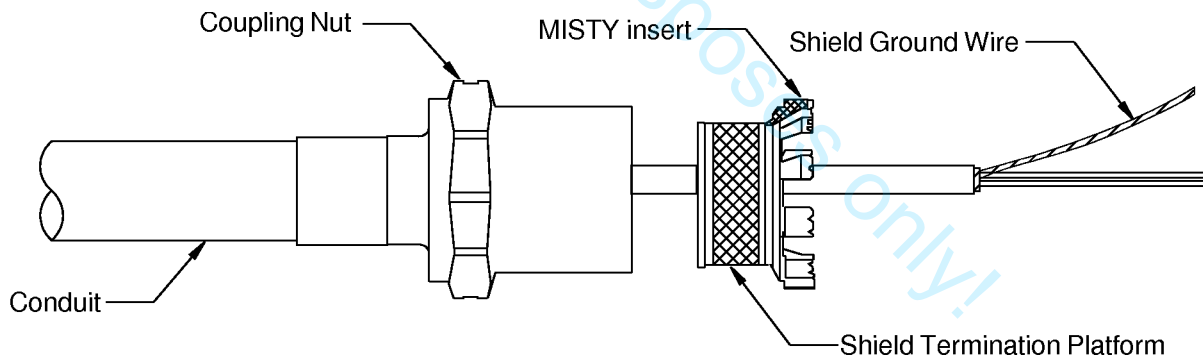
**POSITION OF THE LIP ON THE END OF THE STRAIN RELIEF BOOT**  
**Figure 34**

- (2) Put the shield termination components on the wire harness.

Refer to:

- Figure 35 for the MISTY insert with a conduit assembly
- Figure 35 for the MISTY insert with a backshell.

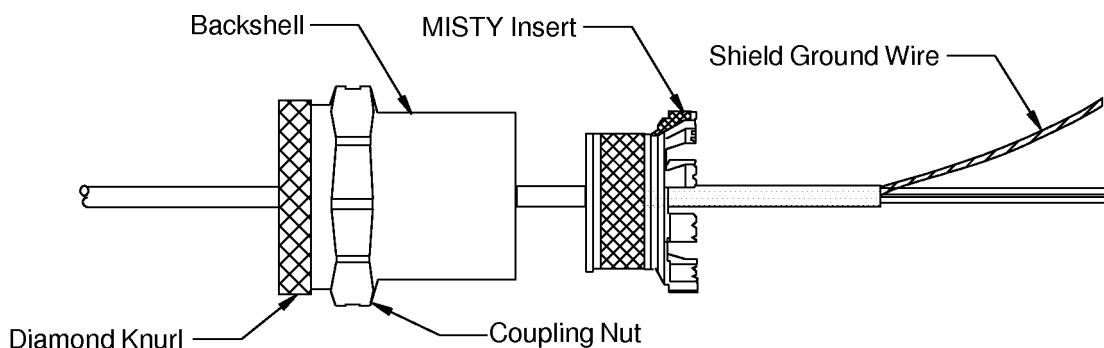
Make sure that the end of the MISTY insert with the shield termination platform is pointed away from the end of the cable.



**POSITION OF THE MISTY INSERT AND THE CONDUIT ASSEMBLY ON THE WIRE HARNESS**  
**Figure 35**

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



### POSITION OF THE MISTY INSERT AND THE BACKSHELL ON THE WIRE HARNESS

Figure 36

## B. Cable Preparation - Solder Sleeve Shield Termination

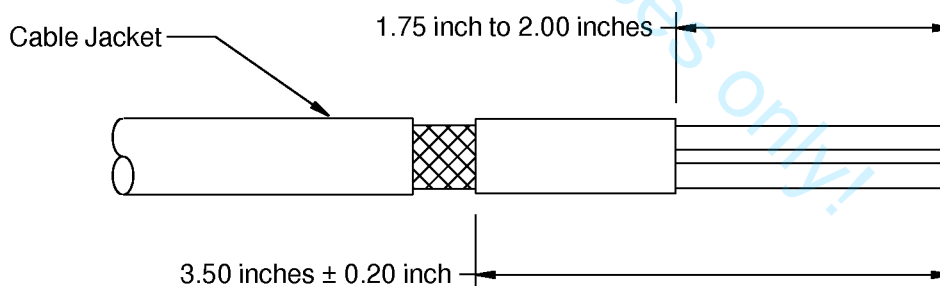
- (1) Remove the necessary length of the jacket from the end of the cable.

Refer to:

- Figure 37 and Figure 38 for the standard shield terminations
- Figure 39 and Figure 40 for the end strip shield terminations
- Figure 41 for the standard and end strip shield terminations
- Subject 20-00-15 for the procedure to remove the cable jacket.

**NOTE:** The termination of a shield to the rear of the conduit adapter is permitted only when the End Strip shield termination is specified by Engineering.

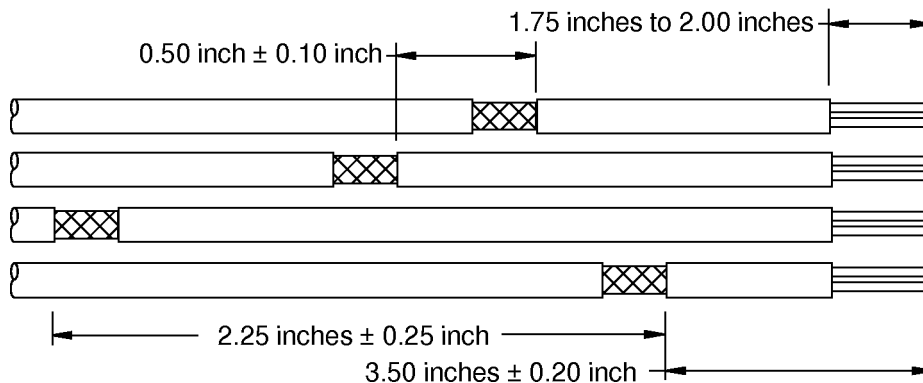
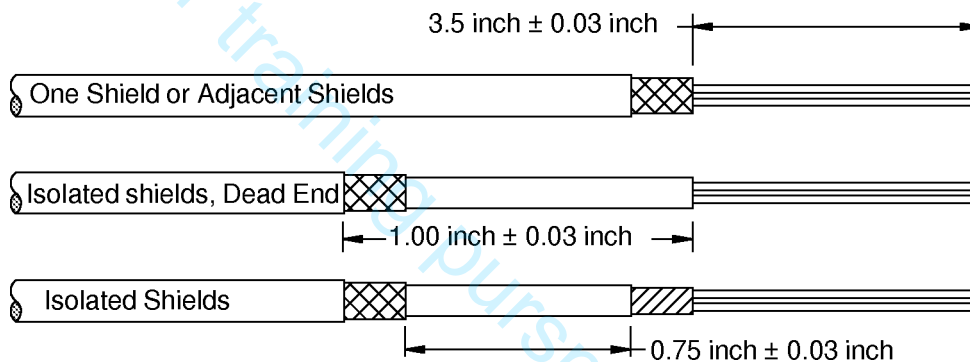
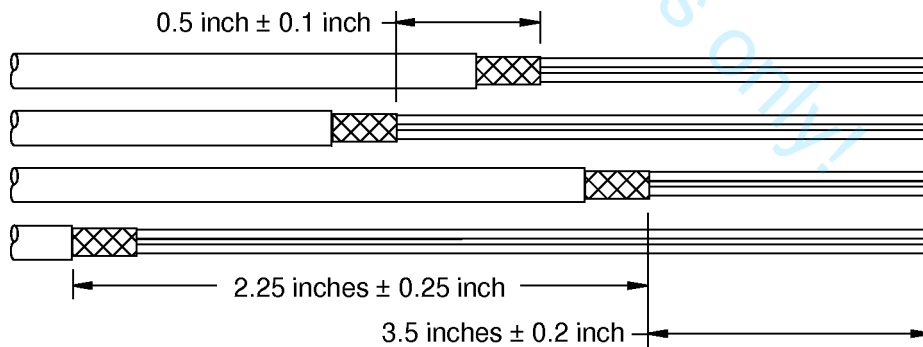
**CAUTION:** A SHIELD TERMINATION TO THE REAR OF THE CONDUIT ADAPTER ON A CABLE THAT IS NOT SPECIFIED BY ENGINEERING CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.



### STANDARD CABLE PREPARATION - 3 OR LESS CABLES

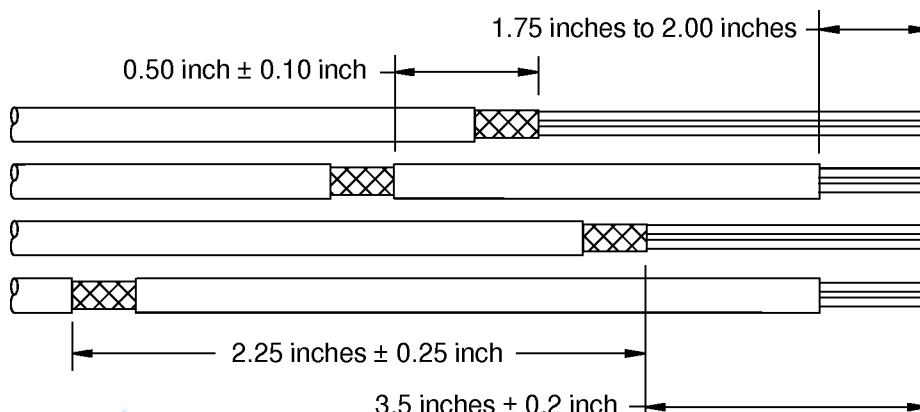
Figure 37

**20-25-16**

**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS**

**STANDARD CABLE PREPARATION - 4 OR MORE CABLES**
**Figure 38**

**END STRIP CABLE PREPARATION - 3 OR LESS CABLES**
**Figure 39**

**END STRIP CABLE PREPARATION - 4 OR MORE CABLES**
**Figure 40**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



### STANDARD END STRIP STANDARD CABLE PREPARATION - 4 OR MORE CABLES

Figure 41

- (2) Assemble a shield dead end on each cable where the shield termination is not at the end of the cable jacket. Refer to Subject 20-10-15.
- (3) Assemble each shield ground wire. Refer to Subject 20-10-15.

Make sure that:

- Each shield ground wire is pointed rearward away from the end of the cable
- When the wire harness has 4 or more cables, the solder sleeves must be assembled at equal distances in the 2.25 inch length of the cables of the wire harness.

**NOTE:** An overlap of the solder sleeves is permitted when the wire harness has 3 cables or less.

### C. Cable Preparation - Shield Pull Through Shield Termination

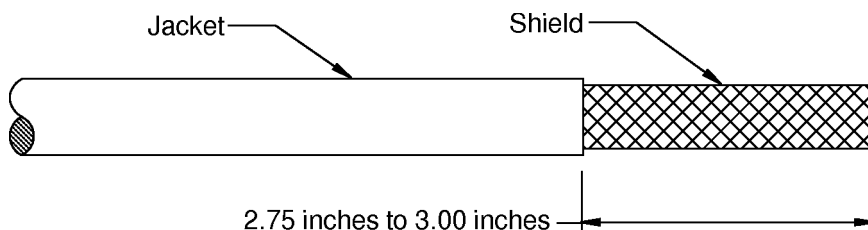
This section gives the procedure to assemble a shield pull through shield ground wire for cables with:

- One round conductor shield
- Two adjacent round conductor shields.

- (1) Remove 2.75 inches to 3.00 inches of the jacket from the end of the cable.

Refer to:

- Figure 42.
- Subject 20-00-15 for the procedure to remove the cable jacket.



### CABLE JACKET REMOVAL LENGTH

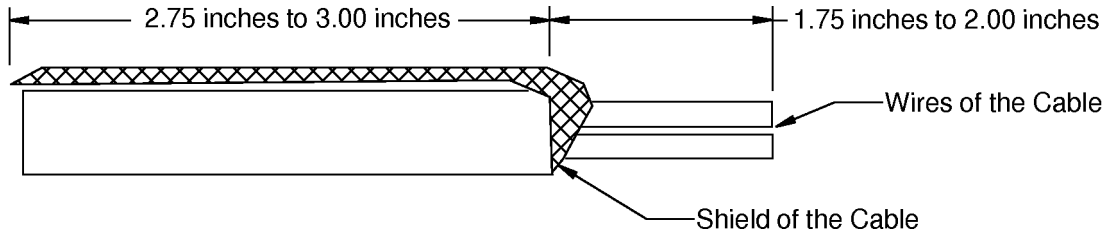
Figure 42

- (2) Assemble the shield ground wire. Refer to Subject 20-10-15.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

- (3) Remove the necessary length from the end of the wires of the cable to make the distance from the end of the jacket to the end of the wires equal to 1.75 inches to 2.00 inches. Refer to Figure 43.



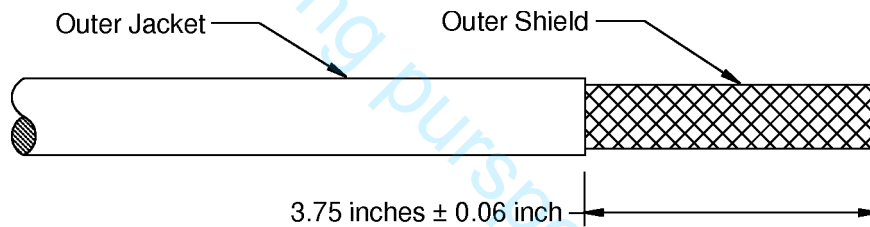
**LENGTH OF THE WIRES OF THE CABLE**  
Figure 43

#### D. Cable Preparation - Shield Pull Through Shield Termination, Isolated Shields

- (1) Remove 3.75 inches  $\pm 0.06$  inch of outer jacket from the end of the cable.

Refer to:

- Figure 44.
- Subject 20-00-15 for the procedure to remove the cable jacket.

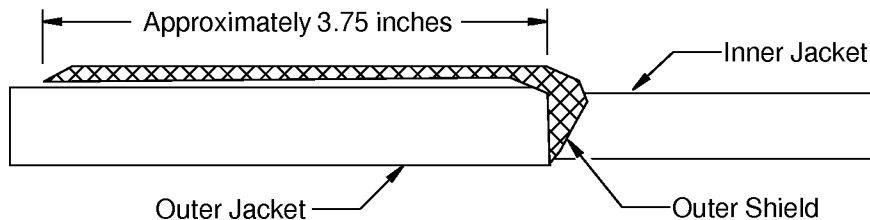


**OUTER JACKET REMOVAL LENGTH**  
Figure 44

- (2) Assemble the shield pull through shield ground wire of the outer shield.

Refer to:

- Figure 45
- Subject 20-10-15 for the procedure to assemble the shield ground wire.



**OUTER SHIELD SHIELD GROUND WIRE**  
Figure 45

- (3) Remove the necessary length of inner jacket to make the distance from the end of the outer jacket to the end of the inner jacket equal to 0.75 inch to 0.50 inch.

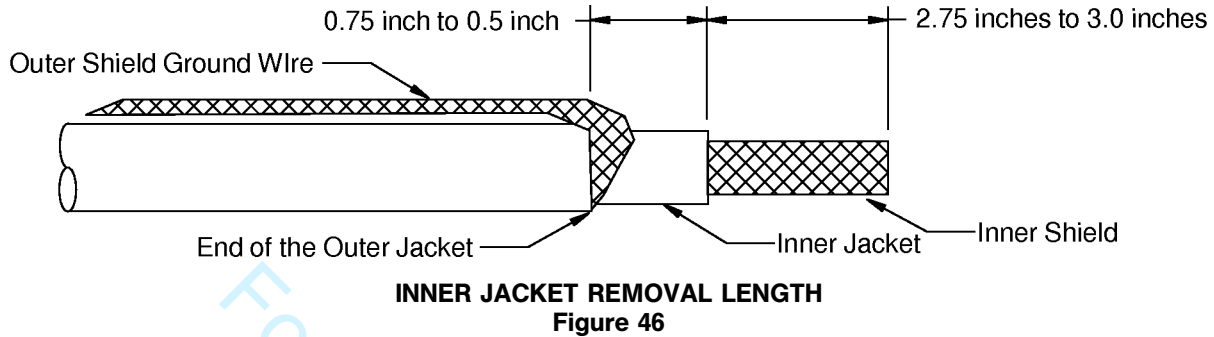
**20-25-16**

## STANDARD WIRING PRACTICES MANUAL

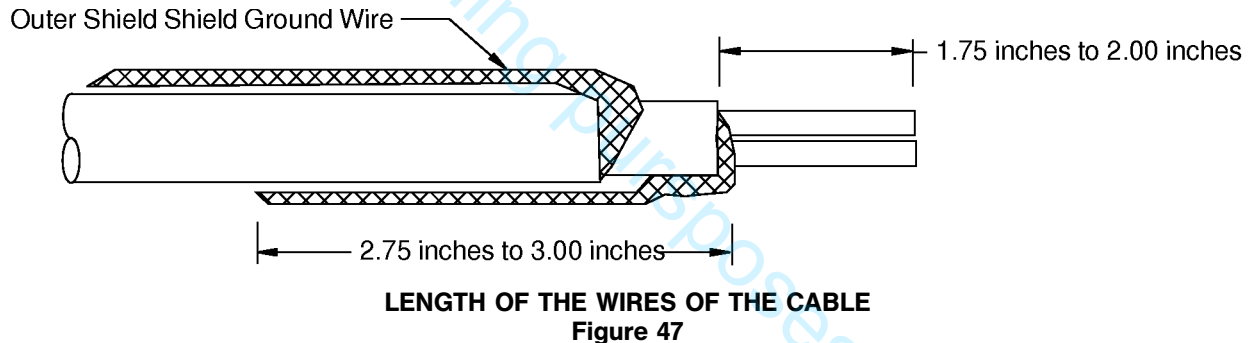
### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Refer to:

- Figure 46
- Subject 20-00-15 for the procedure to remove the cable jacket.



- (4) Assemble the shield pull through shield ground wire of the inner shield. Refer to Subject 20-10-15.
- (5) Remove the necessary length from the end of the wires of the cable to make the distance from the end of the jacket to the end of the wires equal to 1.75 inches to 2.0 inches. Refer to Figure 47.



#### E. Shield Termination Assembly

**NOTE:** If a MISTY insert shield termination is specified for each end of the wire harness, the connector on one end of the harness can be assembled before the wiring is put into the conduit to make the assembly of the connector easier.

**NOTE:** The contact assemblies must be installed in the connector before the assembly of the shield terminations.

- (1) If the wire harness has shield pull through shield ground wires, make them flat.
- (2) Fold the shield ground wires rearward away from the connector.
- (3) Put 2 to 3 layers of the PTFE tape on the wires of the cables. Refer to Figure 48.

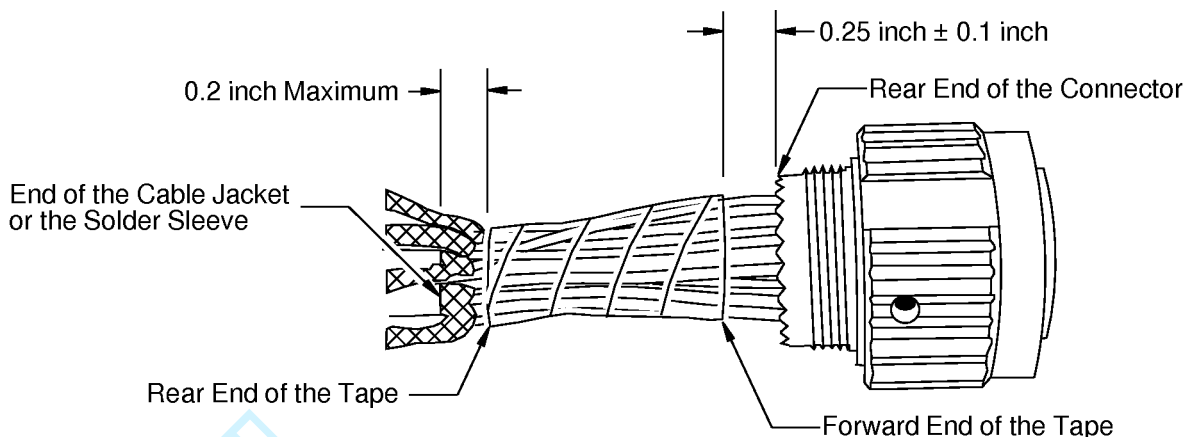
Make sure that:

- The wires are axially aligned with the connector
- The wires do not have too much tension that pulls the seal webs of the grommet out of their shape.

**20-25-16**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

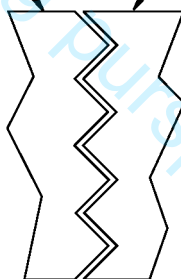


#### POSITION OF THE TAPE ON THE WIRES

Figure 48

- (4) Push the insert forward on top of the shield ground wires.
- (5) Align the anti-rotation teeth of the insert and the connector. Refer to Figure 49.

Anti-Rotation Teeth of the Insert      Anti-Rotation Teeth of the Connector



#### ALIGNMENT OF THE ANTI-ROTATION TEETH OF THE INSERT AND THE CONNECTOR

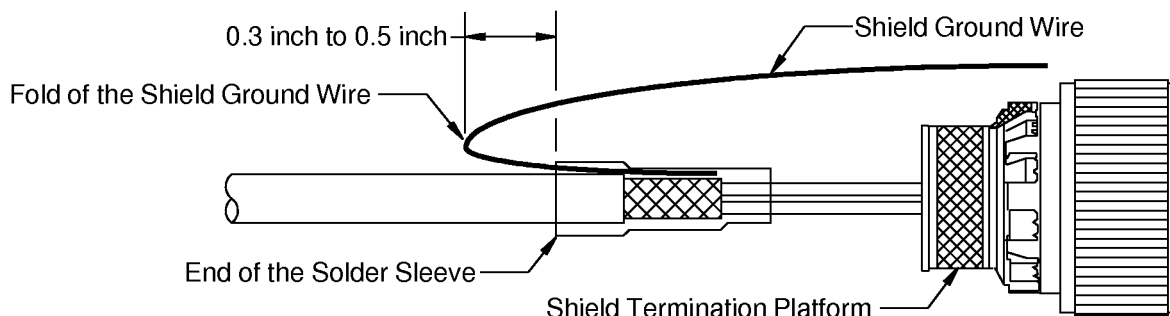
Figure 49

- (6) For the solder sleeve shield ground wires, fold each shield ground wire forward across the shield termination platform. Refer to Figure 50.

Make sure that the distance between the rear edge of the solder sleeve and the fold of the shield ground wire is between 0.3 inch and 0.5 inch.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

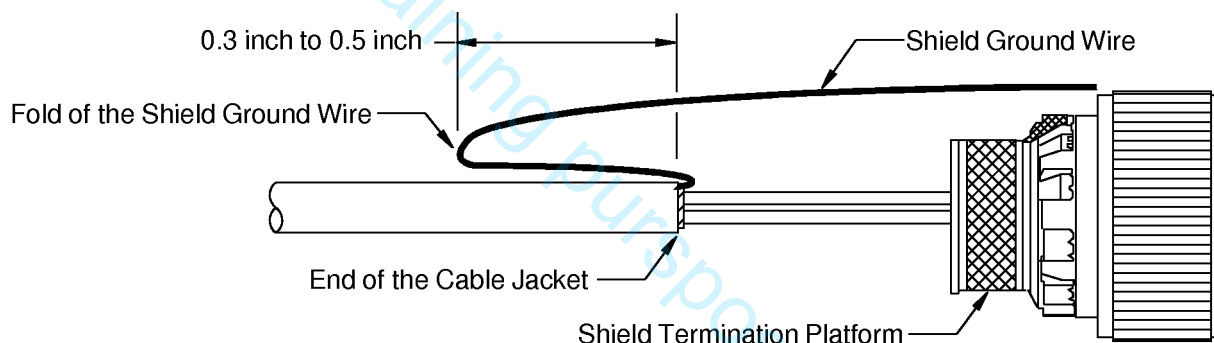


**FOLD OF THE SOLDER SLEEVE SHIELD GROUND WIRE**

**Figure 50**

- (7) For the shield pull through shield ground wires, fold each shield ground wire across the shield termination platform. Refer to Figure 51.

Make sure that the distance between the end of the cable jacket and the fold of the shield ground wire is between 0.3 inch and 0.5 inch.



**FOLD OF THE SHIELD PULL THROUGH SHIELD GROUND WIRE**

**Figure 51**

- (8) Install a shield terminator band on the shield ground wires on the shield termination platform.

Refer to:

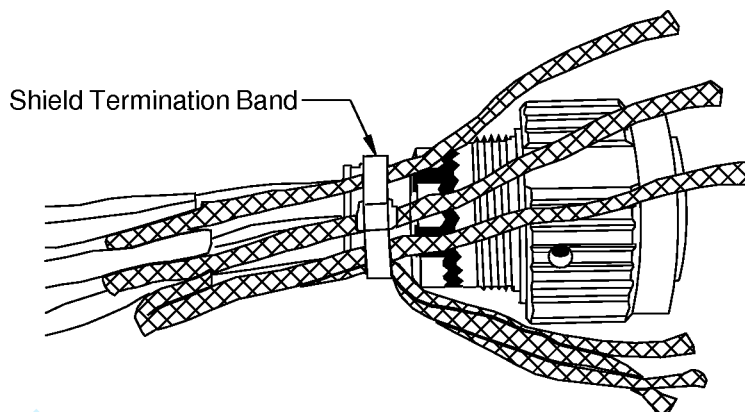
- Figure 52
- Subject 20-25-14 for the procedure to install the band.

Make sure that:

- The shield ground wires are even and symmetrical around the circumference of the platform
- A shield ground wire does not make an overlap with a different shield ground wire
- The buckle of the band is flat against the platform
- The buckle of the band does not make an overlap with the shield ground wires
- The buckle of the band does not make an overlap with the collar of the platform
- The shield ground wires are tight against the platform.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

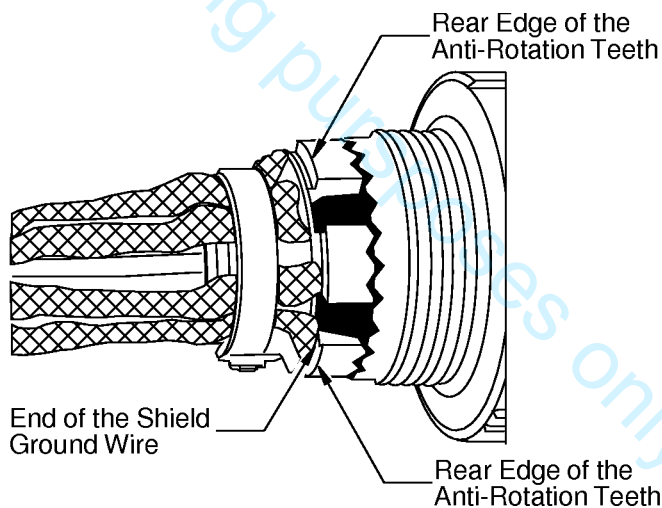


### POSITION OF THE SHIELD TERMINATION BAND ON THE SHIELD TERMINATION PLATFORM

Figure 52

- (9) Cut the end of each shield ground wire 0.10 inch  $\pm$  0.05 inch from the forward edge of the shield termination platform. Refer to Figure 53.

Make sure that the end of each shield ground wire does not extend farther than the rear edge of the anti-rotation teeth.



### POSITION OF THE SHIELD GROUND WIRES AGAINST THE SHIELD TERMINATION PLATFORM

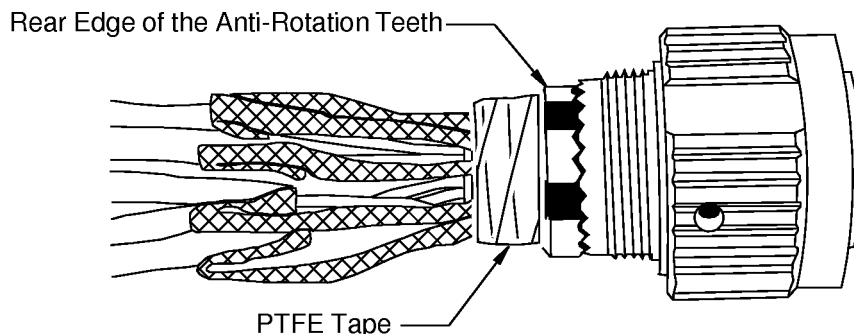
Figure 53

- (10) Put 2 to 3 layers of PTFE tape on the shield terminator band. Refer to Figure 54.

Make sure that the forward edge of the tape does not extend farther than the rear edge of the anti-rotation teeth.

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### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

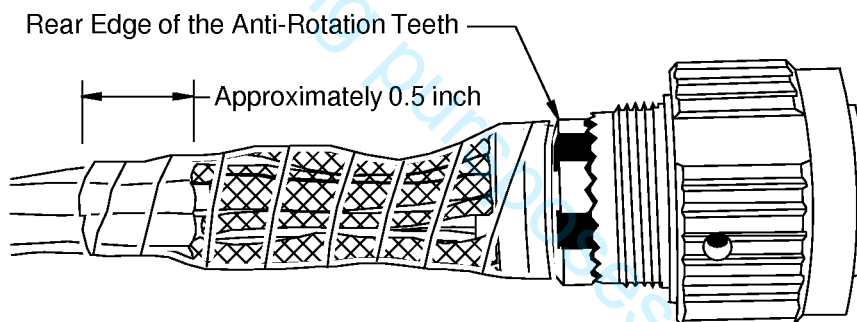


**POSITION OF THE PTFE TAPE ON THE SHIELD TERMINATOR BAND**  
Figure 54

- (11) Put 2 layers of PTFE tape on the shield ground wires. Refer to Figure 55.

Make sure that the tape:

- Starts approximately 0.5 inch from the rear of the folded end of the longest shield ground wire
- Ends on the shield termination platform
- Makes a 50 percent overlap with itself
- Does not make an overlap with the rear edge of the anti-rotation teeth.



**POSITION OF THE PTFE TAPE ON THE SHIELD GROUND WIRES**  
Figure 55

- (12) If a pull cord is specified:

- (a) Put the pull cord in its position.

Make sure that the pull cord does not make an overlap with the shield termination platform.

**NOTE:** The folded lengths of the pull cord can be put at approximately equal intervals around the wire harness.

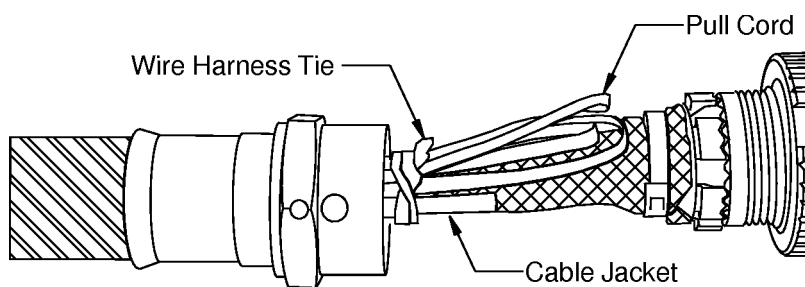
- (b) Assemble a wire harness tie on the pull cord and the jackets of the cable.

Refer to:

- Figure 56
- Subject 20-10-11 for the procedure to assemble the wire harness tie.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



POSITION OF THE WIRE HARNESS TIE ON THE PULL CORD

Figure 56

### F. Conduit Adapter Installation

Table 9  
CONDUIT ADAPTER INSTALLATION TOOL SIZE

Shell Size	Tool Size (inch)
9	5/8
11	3/4
13	13/16
15	1
17	1-1/8
19	1-3/16
21	1-5/16
23	1-7/16
25	1-9/16

Table 10  
CONDUIT ADAPTER INSTALLATION TORQUE VALUES

Shell Size	Torque Value (inch-pounds)	
	Target	Tolerance
9	50	± 5
11	50	± 5
13	75	± 5
15	75	± 5
17	75	± 5
19	100	± 5
21	100	± 5
23	125	± 5

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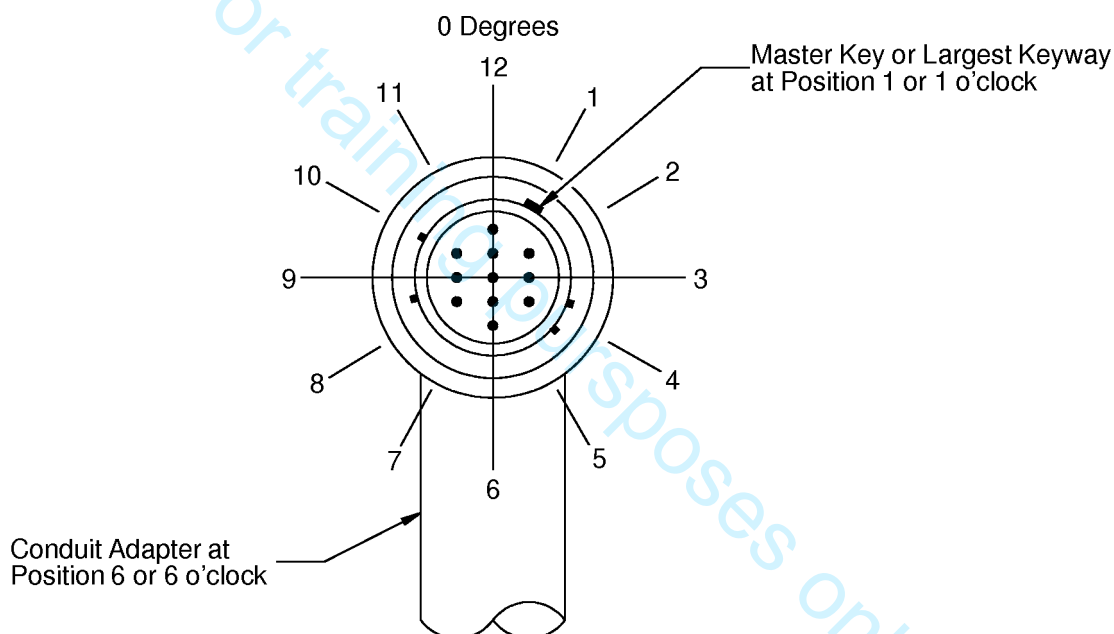
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Table 10 (continued)

Shell Size	Torque Value (inch-pounds)	
	Target	Tolerance
25	125	$\pm 5$

- (1) Carefully push the adapter forward until it is against the connector.  
Make sure that the keys of the adapter and the keyways of the MISTY insert are aligned.
  - (2) Engage the threads of the adapter and the connector.
  - (3) Put the Master Key or Keyway of the connector in the specified clock position. Refer to Figure 57
- NOTE:** If the clock position is not specified, put the Master Key or Keyway in clock position 12.



**ONE O'CLOCK POSITION OF THE CONNECTOR AND THE CONDUIT ADAPTER**  
**Figure 57**

- (4) For a conduit with a 45 degree or a 90 degree angle, put the conduit in the 6 o'clock position and the specified tolerance. Refer to Figure 57.

**NOTE:** If the tolerance is not specified, put the strain relief arm in the 6 o'clock position  $\pm 1$  hour or  $\pm 30$  degrees.

- (5) Tighten the coupling nut manually. Refer to Figure 58.

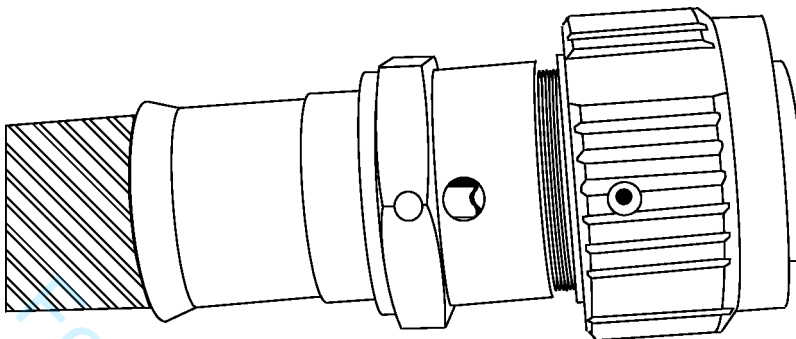
Make sure that:

- The conduit adapter is in the specified clock position; refer to Figure 57..
- The conduit and the connector are held together while the coupling nut is tightened.
- The anti-rotation teeth of the insert and the connector stay aligned.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

**CAUTION:** IF THE CONDUIT AND THE CONNECTOR ARE NOT HELD TOGETHER WHILE THE COUPLING NUT IS TIGHTENED, DAMAGE TO THE WIRE HARNESS OR THE SHIELD GROUND WIRES CAN OCCUR.



**POSITION OF THE CONDUIT ADAPTER ON THE CONNECTOR**

**Figure 58**

- (6) Make a selection of an open end wrench.  
Make sure that the size of the wrench is applicable for the shell size. Refer to Table 9.
- (7) Tighten the coupling nut to the specified torque value. Refer to Table 10.  
Make sure that the anti-rotation teeth of the insert and the connector stay aligned.
- (8) Release the coupling nut.
- (9) If the coupling nut moves, do Step 7 and Step 8 again.

**CAUTION:** IF THE COUPLING NUT MOVES BACK FROM THE SPECIFIED TORQUE POSITION, UNSATISFACTORY PERFORMANCE OF THE CONDUIT ADAPTER OCCURS.

#### G. Backshell Installation

**Table 11**  
**BACKSHELL INSTALLATION TOOL SIZE**

Shell Size	Tool Size (inch)
9	5/8
11	3/4
13	13/16
15	1
17	1-1/8
19	1-3/16
21	1-5/16
23	1-7/16
25	1-9/16

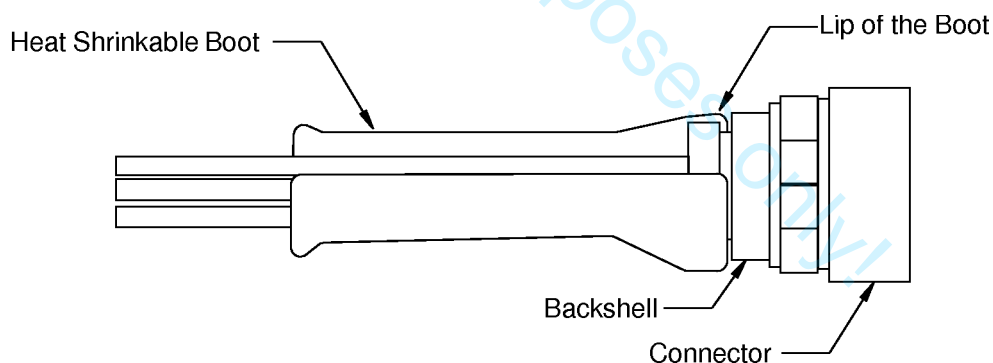
# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

Table 12  
BACKSHELL INSTALLATION TORQUE VALUES

Shell Size	Initial Torque (inch-pounds)	
	Target	Tolerance
9	50	± 5
11	50	± 5
13	75	± 5
15	75	± 5
17	75	± 5
19	100	± 5
21	100	± 5
23	125	± 5
25	125	± 5

- (1) Carefully push the backshell forward until it is against the connector.  
Make sure that the keys of the backshell and the keyways of the MISTY insert are aligned.
- (2) Engage the threads of the backshell and the connector.
- (3) Push the heat shrinkable boot forward until the forward end of the boot is against the rear of the backshell.
- (4) Align the lip of the boot in the slot in the backshell. Refer to Figure 59.



POSITION OF THE HEAT SHRINKABLE BOOT ON THE BACKSHELL

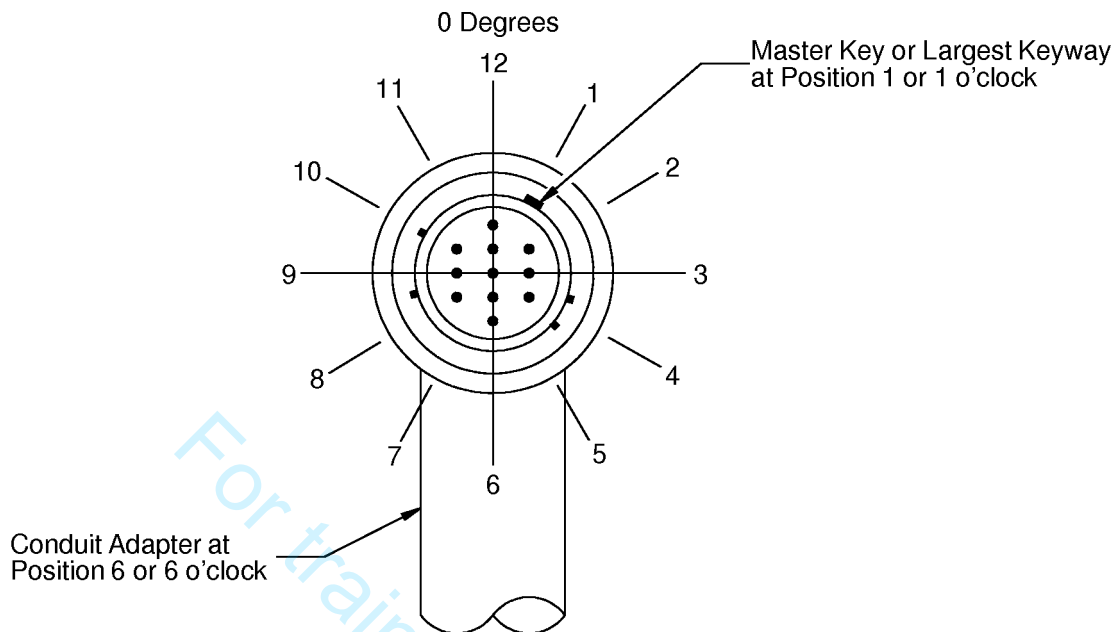
Figure 59

- (5) Put the Master Key or Keyway of the connector in the specified clock position. Refer to Figure 60.

**NOTE:** If the clock position is not specified, put the Master Key or Keyway in clock position 12.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS



**CLOCK POSITIONS OF THE HEAT SHRINKABLE BOOT**

**Figure 60**

- (6) For a boot with a 45 degree or a 90 degree angle, put the boot in the 6 o'clock position and the specified tolerance. Refer to Figure 60.

**NOTE:** If the tolerance is not specified, put the strain relief arm in the 6 o'clock position  $\pm 1$  hour or  $\pm 30$  degrees.

- (7) Tighten the coupling nut manually.

Make sure that:

- The backshell is in the specified clock position; refer to Figure 60
- The body of the backshell and the connector are held together while the coupling nut is tightened
- The anti-rotation teeth of the insert and the connector stay aligned.

**CAUTION:** IF THE BODY OF THE BACKSHELL AND THE CONNECTOR ARE NOT HELD TOGETHER WHILE THE COUPLING NUT IS TIGHTENED, DAMAGE TO THE WIRE HARNESS AND SHIELD GROUND WIRES CAN OCCUR.

- (8) Make a selection of an open end wrench.

Make sure that the size of the wrench is applicable for the shell size. Refer to Table 11.

- (9) Tighten the coupling nut to the specified torque value. Refer to Table 12.

Make sure that the anti-rotation teeth of the insert and the connector stay aligned.

- (10) Release the coupling nut.

- (11) If the coupling nut moves, do Step 9 and Step 10 again.



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### ASSEMBLY OF MST AND MISTY INSERT SHIELD TERMINATIONS

**CAUTION:** IF THE COUPLING NUT MOVES BACK FROM THE FINAL TORQUE POSITION, UNSATISFACTORY PERFORMANCE OF THE BACKSHELL CAN OCCUR.

- (12) Shrink the boot into its position. Refer to Figure 59.

Make sure that the lip of the boot stays in the groove of the backshell.

For training purposes only!

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