

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

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**STANDARD WIRING PRACTICES MANUAL****REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES**

This Subject gives the conditions and the procedures for the repair or replacement of these Primary Flight Control System (PFCS) components:

- The S280W501-() cable
- The S280W654-() jumper cable assemblies
- The S280W655-() cable assemblies
- The S280W657-() jumper cable assemblies.

**1. CONDITIONS FOR REPAIR OR REPLACEMENT OF A CABLE ASSEMBLY****A. General Conditions**

A PFCS wire harness repair can be:

- A splice assembled on a cable
- The replacement of a connector
- A layer of tape to repair the damage of a cable jacket
- A layer of tape to repair the damage of a cable shield.

These conditions are applicable:

- A cable must be replaced if a necessary repair makes the total number of repairs greater than 3
- The location of repair must not be under a clamp or another support
- The location of repair must not be inside a connector backshell
- A repair of a damaged cable jacket that does not go through the jacket is a permanent repair.

**B. S280W501-() Cables and S280W655-() Cable Assemblies**

Repair of the cable is necessary if:

- The cable jacket has damage that goes through the jacket
- Either shield of the cable has damage
- A connector has damage.

A cable with a repair must be replaced in less than 6000 flight hours. If it is necessary to install a new wire harness with a 287W1619-() vapor seal assembly, refer to Paragraph 7.

**C. S280W654-() and S280W657-() Jumper Cable Assemblies**

These repairs are not permitted:

- A splice assembled on a cable
- The replacement of a connector.

Repair of the cable is necessary if:

- The cable jacket has damage that goes through the jacket
- Either shield of the cable has damage.

A cable with a repair must be replaced in less than 100 flight hours. If it is necessary to install a new wire harness with a 287W1619-() vapor seal assembly, refer to Paragraph 7.

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**STANDARD WIRING PRACTICES MANUAL****REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES****2. CABLE PART NUMBERS AND DESCRIPTION****A. Cable Configurations**

The S280W501-() cable has:

- A yellow, extruded ETFE jacket
- Two nickel-plated copper shields
- BMS 13-48 conductors
- 5 cable configurations; refer to Figure 1 through Figure 5.

The S280W655-() cable assembly has:

- An S280W501-() cable
- An overmolded connector and backshell.

The cable of the S280W654-() and S280W657-() jumper cable assemblies have:

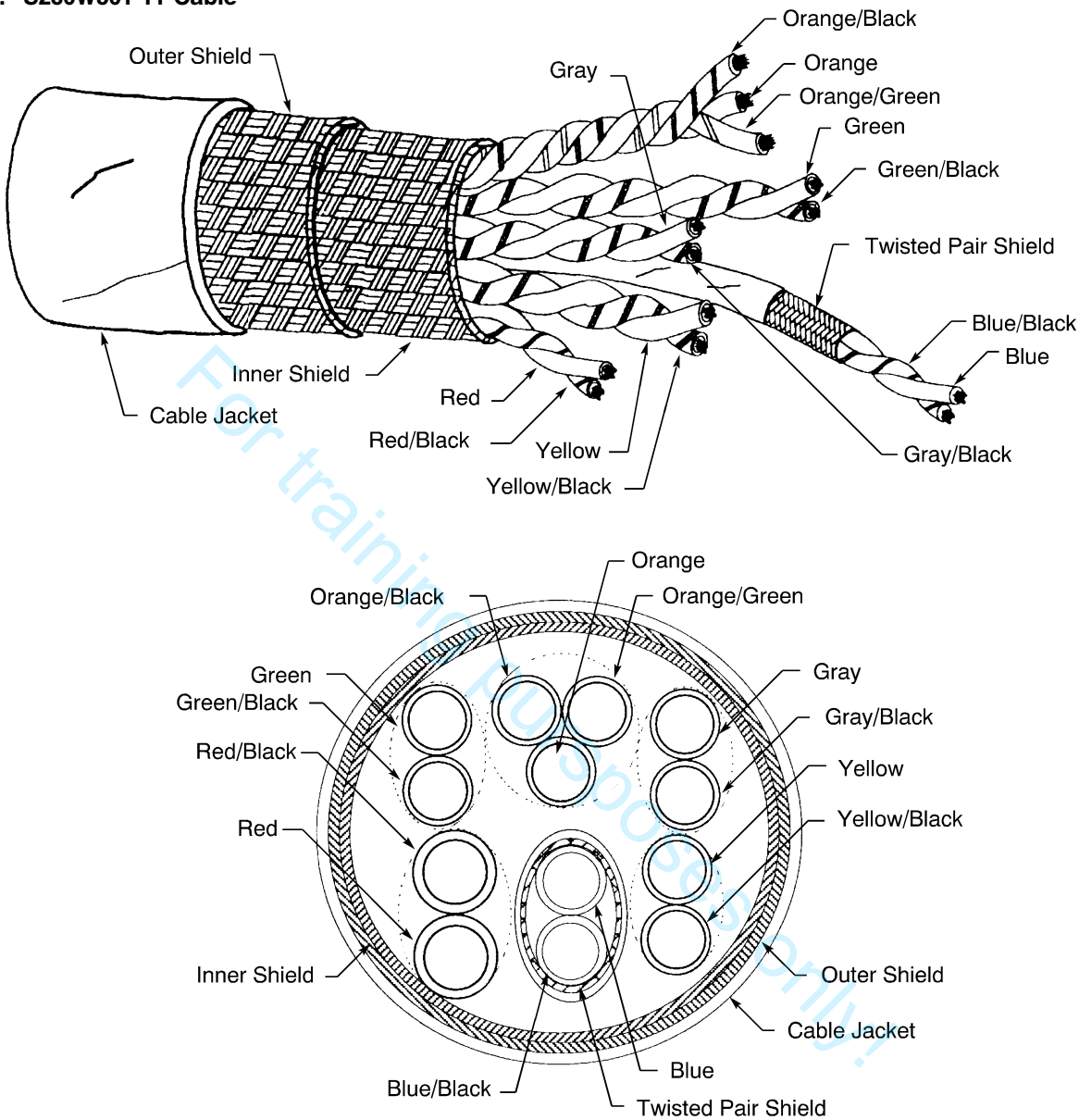
- A yellow, PTFE wrapped tape jacket
- Two nickel-plated shields
- Nickel plated 65 strand copper conductors
- An overmolded connector and backshell
- 7 cable configurations.

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**B. S280W501-11 Cable**



**CONFIGURATION OF THE S280W501-11 CABLE**

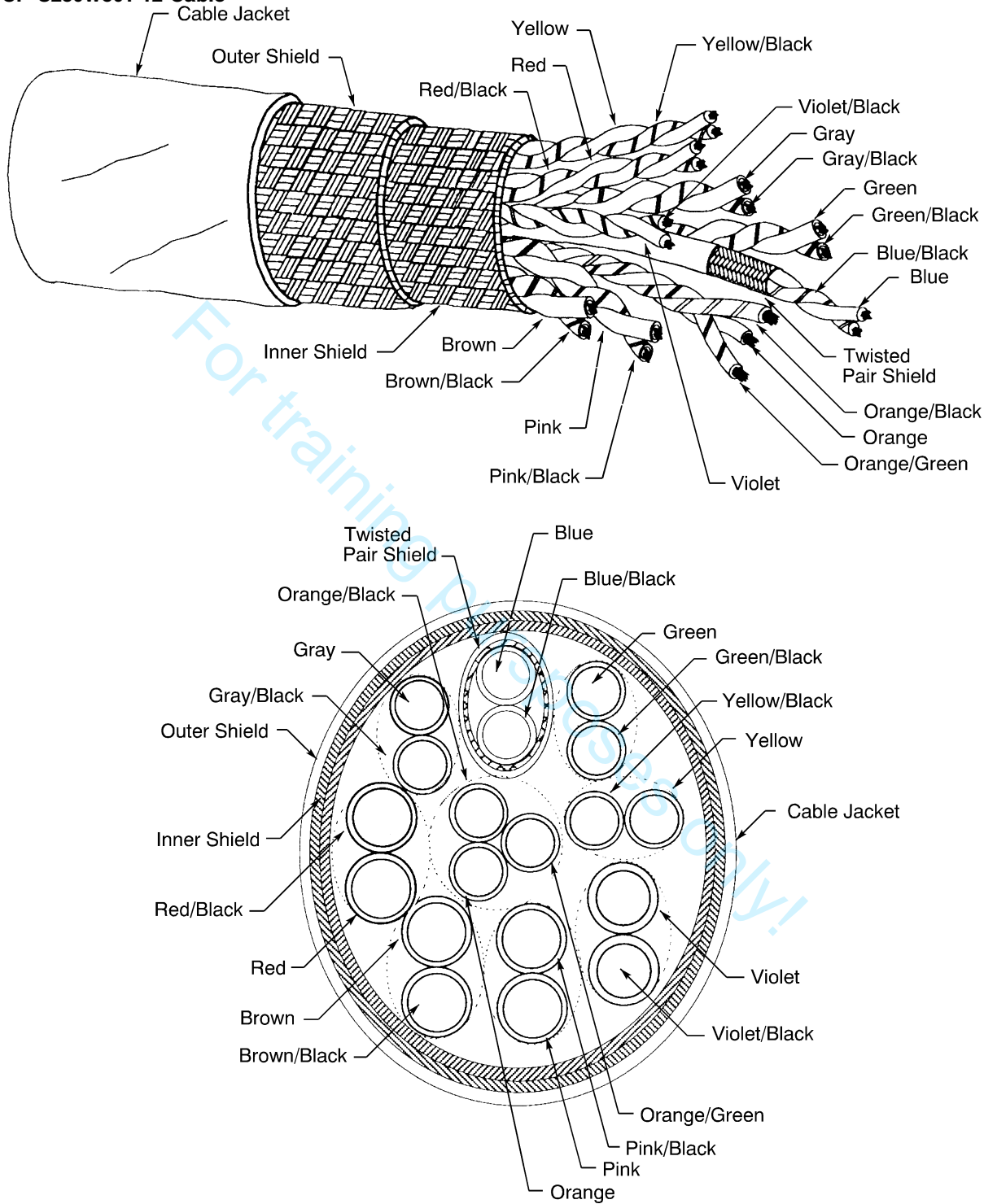
**Figure 1**

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**STANDARD WIRING PRACTICES MANUAL**

**REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES**

**C. S280W501-12 Cable**



**CONFIGURATION OF THE S280W501-12 CABLE**

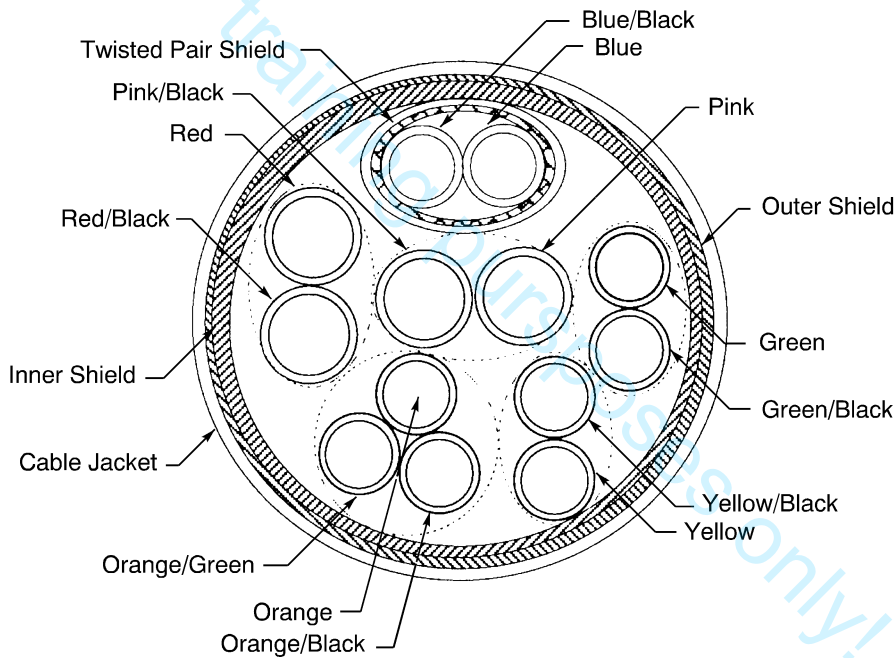
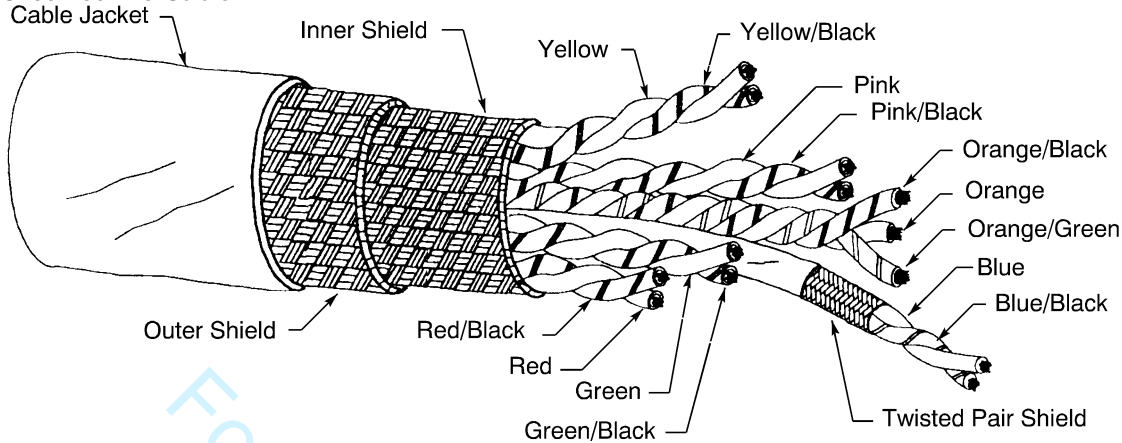
**Figure 2**

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**STANDARD WIRING PRACTICES MANUAL**

**REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES**

**D. S280W501-13 Cable**



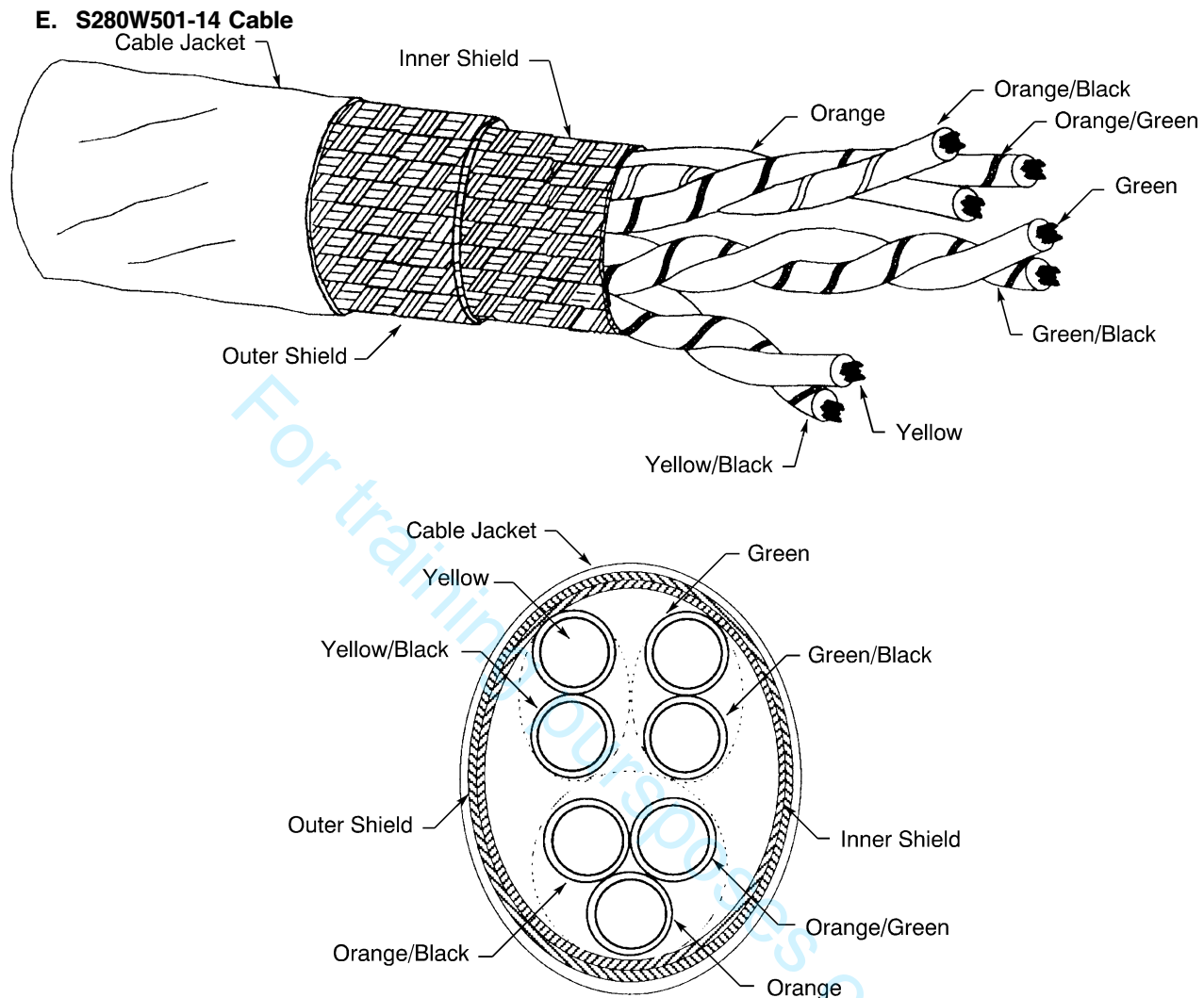
**CONFIGURATION OF THE S280W501-13 CABLE**

**Figure 3**

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**REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESES**



**CONFIGURATION OF THE S280W501-14 CABLE**

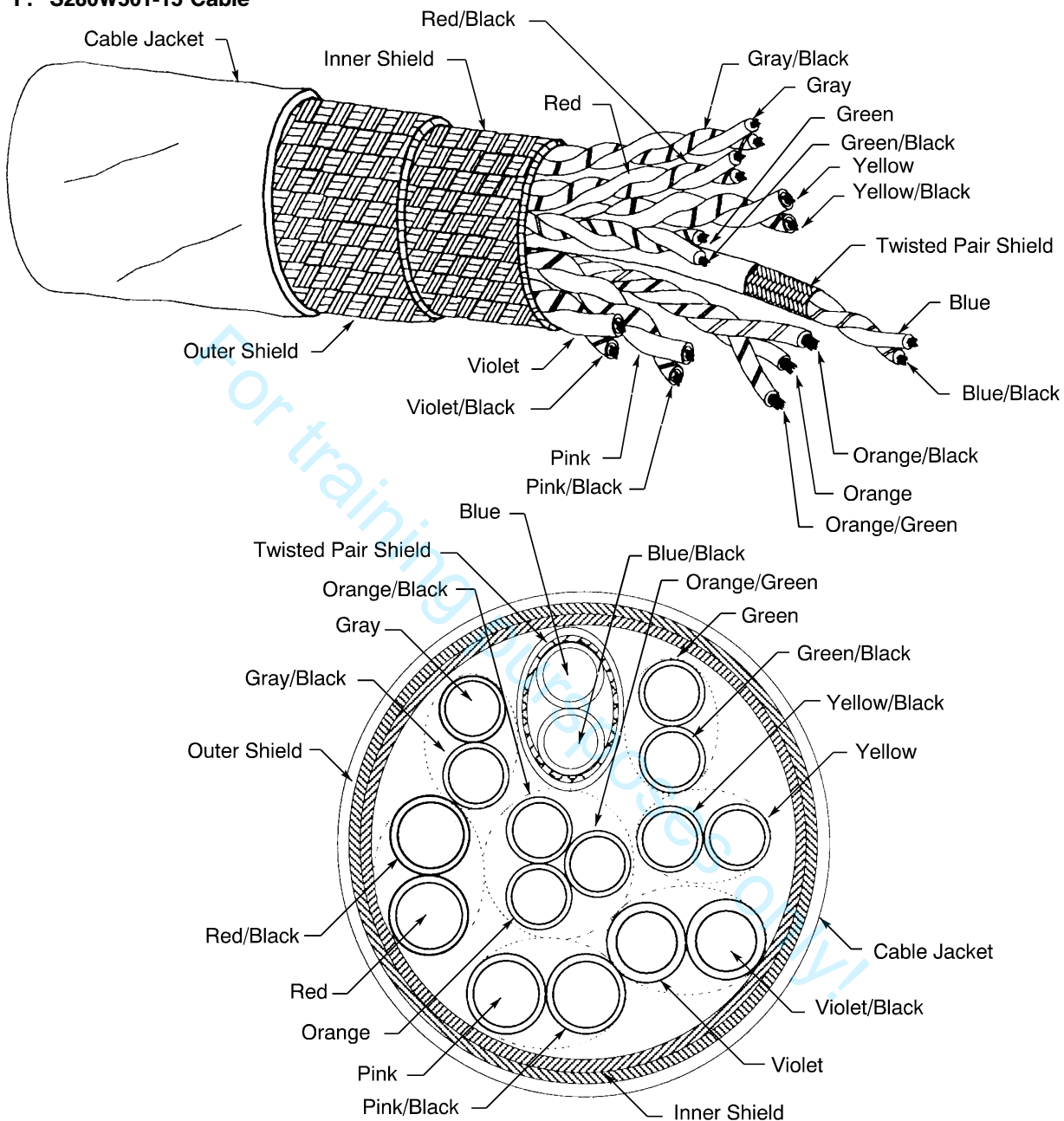
**Figure 4**

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**REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES**

**F. S280W501-15 Cable**



**CONFIGURATION OF THE S280W501-15 CABLE**

**Figure 5**

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**STANDARD WIRING PRACTICES MANUAL****REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES****3. PFCS WIRE HARNESS REPAIR****A. Selection of a Repair Procedure**

- (1) Repair the cable jacket if all of these conditions are applicable:

- The jacket of the cable is damaged
- Both of the shields of the cable are not damaged.

Refer to the procedure to repair the insulation of a wire or cable in Subject 20-10-13.

- (2) Repair the cable jacket and the shields if all of these conditions are applicable:

- Either of the shields of the cable is damaged
- The damage of the shield or shields is less than 1 inch in length and less than 25 percent of the circumference of the shield
- The wires of the cable are not damaged.

Refer to the procedure to repair the shield of a wire or cable in Subject 20-10-13.

- (3) Repair the cable with a splice if all of these conditions are applicable:

- Either of the shields of the cable is damaged
- The damage of the shield or shields is greater than 1 inch in length or greater than 25 percent of the circumference of the shield
- The wires of the cable are not damaged.

Refer to Paragraph 4.

- (4) Repair the cable with a splice if one or more wires of the cable is damaged.

Refer to Paragraph 4.

- (5) Repair the connector if all of these conditions are applicable:

- The connector is damaged
- The connector has a backshell that is not potted.

Refer to:

- Subject 20-61-11 for the connector disassembly and assembly procedures
- Paragraph 6. for the backshell assembly procedure.

- (6) Replace the connector if one or more of these conditions are applicable:

- The connector of an overmolded cable assembly is damaged
- A connector with a potted backshell is damaged and the cable has the sufficient length for the replacement.

Refer to:

- Paragraph 5. for the connector replacement procedure
- Paragraph 6. for the backshell assembly procedure.

**4. SPLICE ASSEMBLY FOR PFCS WIRE HARNESS CABLES****A. Conditions for Repair with a Splice**

NOTE: The replacement of a cable assembly is recommended over the repair of that cable with a splice.

NOTE: The maximum number of splices that a cable can have is 3.

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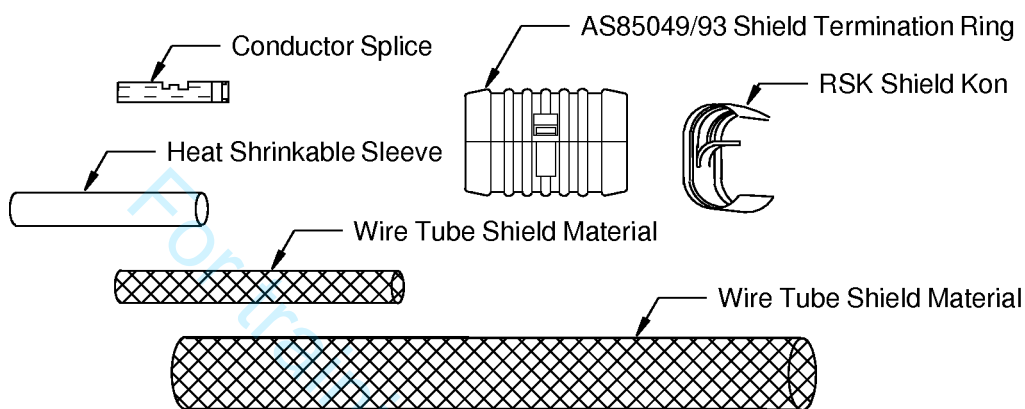
## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

A splice must not be assembled or installed:

- Under a clamp or other support
- Inside a connector backshell or adapter
- On the wire harness where the wire harness is frequently bent.

#### B. Cable and Splice Configurations



**NECESSARY COMPONENTS FOR SPLICE ASSEMBLY**

**Figure 6**

**Table 1**

**SPLICE ASSEMBLY DATA**

Cable	Reference
S280W501-11	Paragraph 4.E.
S280W501-12	Paragraph 4.F.
S280W501-13	Paragraph 4.G.
S280W501-14	Paragraph 4.H.
S280W501-15	Paragraph 4.I.

#### C. Necessary Materials

**Table 2**

**NECESSARY MATERIALS**

Material	Part Number or Description	Supplier
Sealant	DC3145	Dow Corning
Sleeve, Heat Shrinkable	TFE2-X	Refer to Subject 20-00-11
Tape, Insulation	Silicone Tape, Grade D	Refer to Subject 20-00-11

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**STANDARD WIRING PRACTICES MANUAL**
**REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES**
**D. Splice Assembly**

**Table 3**  
**CONDUCTOR SPLICE CRIMP TOOLS**

<b>Splice</b>	<b>Crimp Tool</b>			
	<b>Basic Unit</b>		<b>Die</b>	
	<b>Part Number</b>	<b>Supplier</b>	<b>Part Number</b>	<b>Supplier</b>
D-609-06	49935	Tyco/AMP	-	-
	AD-1377	Tyco/Raychem	-	-
	1213804-3	Tyco/AMP	1-1804834-1	Tyco/AMP

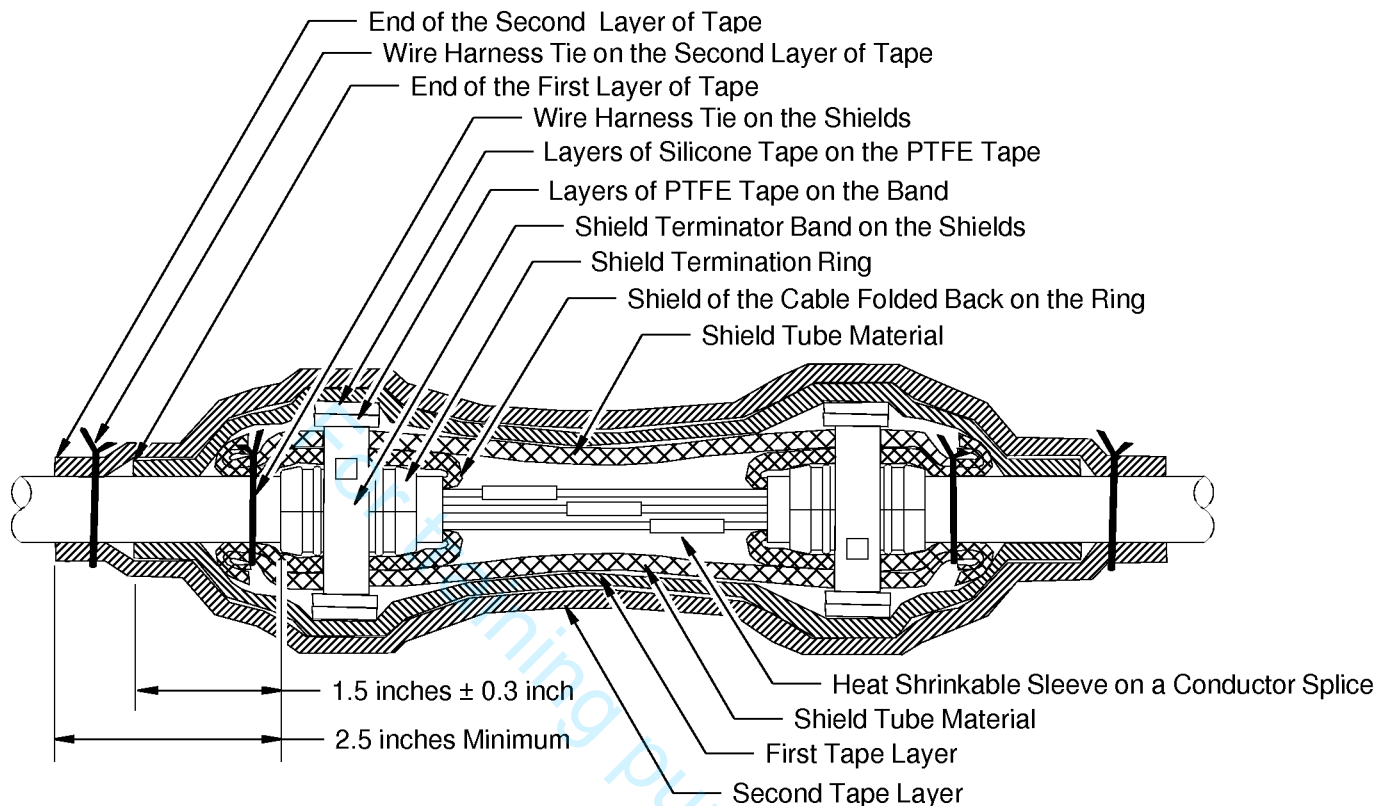
**Table 4**  
**RSK SHIELD-KON CRIMP TOOLS FOR THE SHIELD OF A TWISTED SHIELDED PAIR**

<b>RSK Shield-Kon</b>	<b>Crimp Tool</b>			
	<b>Basic Unit</b>		<b>Die</b>	
	<b>Part Number</b>	<b>Supplier</b>	<b>Part Number</b>	<b>Supplier</b>
RSK-301	WT740	Thomas & Betts	301G	Thomas & Betts

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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



### CONFIGURATION OF THE SPLICE ASSEMBLY

Figure 7

**CAUTION:** DO NOT APPLY HEAT TO THE HEAT SHRINKABLE SLEEVES IN THIS PROCEDURE. HEAT GUNS OR HOT AIR GUNS CANNOT BE USED ON A FUELED AIRPLANE.

Refer to Figure 7:

- (1) Find the cable in Table 1.
- (2) Find the splice assembly data for the cable. Refer to the applicable paragraph for the cable configuration.
- (3) Remove the length of cable that has damage:
  - (a) On one side of the damage, cut the cable so that the end of the cable is perpendicular to the longitudinal axis of the cable.
  - (b) On the other side of the damage, cut the cable so that the end of the cable is perpendicular to the longitudinal axis of cable.
- (4) Put a temporary identification label on each cable:
  - (a) Identify one cable as Cable A.
  - (b) Identify the other cable as Cable B.
- (5) Make a selection of an overall braided wire tube shield material for the cable assembly.

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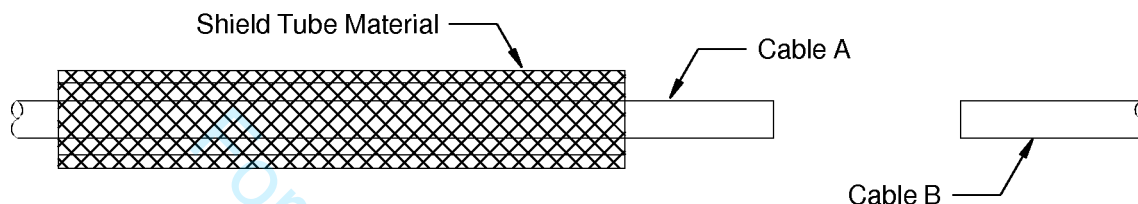
## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

Refer to:

- Table 7 for the S280W501-11 cable
- Table 9 for the S280W501-12 cable
- Table 11 for the S280W501-13 cable
- Table 13 for the S280W501-14 cable
- Table 15 for the S280W501-15 cable.

Put the specified length of the large braided wire shield tube material on Cable A.



#### TEMPORARY POSITION OF THE OVERALL BRAIDED SHIELD TUBE MATERIAL ON THE CABLE

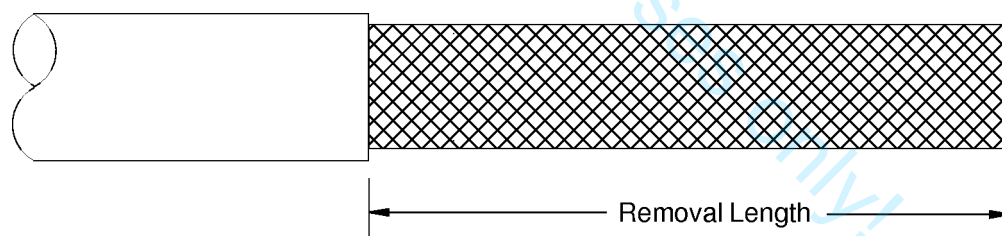
Figure 8

- (6) Remove the necessary length of outer cable jacket from the end of each cable.

Refer to:

- Table 5
- Figure 9
- Subject 20-00-15 for the jacket removal procedures.

**CAUTION:** DO NOT CUT THE SHIELD OF THE CABLE. DAMAGE TO THE SHIELD CAN CAUSE UNSATISFACTORY PERFORMANCE.



#### SHIELDED CABLE PREPARATION

Figure 9

Table 5  
REMOVAL LENGTH OF THE CABLE JACKET

Cable	Removal Length (inch)
S280W501-11	4
S280W501-12	5
S280W501-13	6
S280W501-14	3

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### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

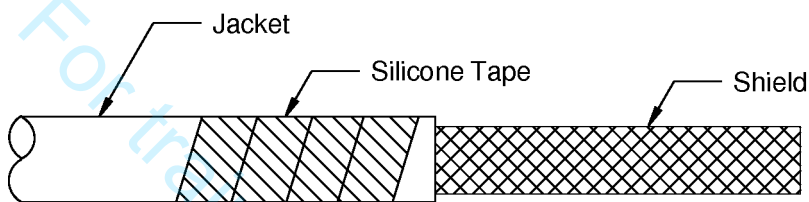
Table 5 (continued)

Cable	Removal Length (inch)
S280W501-15	5

- (7) Wrap a minimum of one layer of Temperature Grade D Type I silicone tape on the jacket on each side of the repair location where each shield termination ring will be located.

Refer to Figure 10.

**NOTE:** Additional wraps of silicone tape may be necessary on the cable jacket to give a proper fit for the shield termination ring.



POSITION OF THE SILICONE TAPE ON THE CABLE JACKET

Figure 10

- (8) Make a selection of two shield termination rings.

Refer to:

- Table 7 for the S280W501-11 cable
- Table 9 for the S280W501-12 cable
- Table 11 for the S280W501-13 cable
- Table 13 for the S280W501-14 cable
- Table 15 for the S280W501-15 cable.

Make sure that:

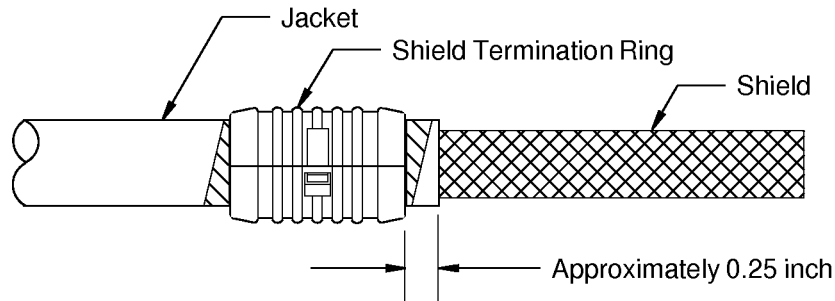
- The shield termination rings have the smallest diameter that can go on the outer jacket of the cable
- Both shield termination rings are the same size.

- (9) Put a shield termination ring on the tape layer on the jacket on each side of the repair location. Refer to Figure 10.

Make sure that the distance from the end of the jacket to the forward edge of the shield terminator band is approximately 0.25 inch.

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



**POSITION OF THE SHIELD TERMINATION RING ON THE CABLE**

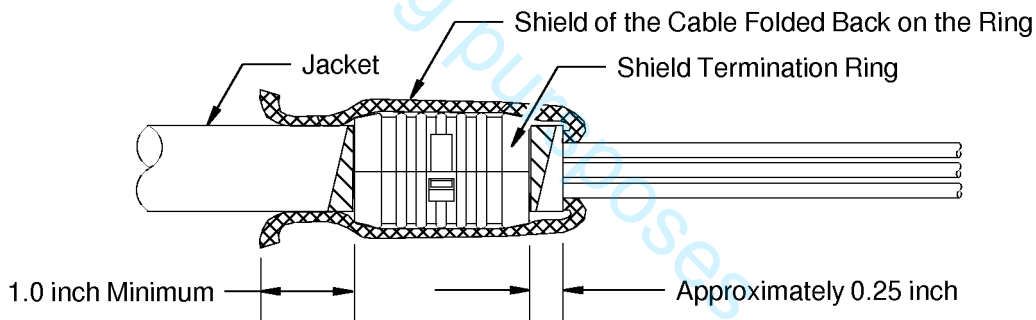
**Figure 11**

- (10) Fold the end of the cable shield back on each shield termination ring. Refer to Figure 12.

Make sure that the ends of the shield material extend approximately one inch farther than the rear end of each shield termination ring.

If it is necessary:

- The strands at the end of the shield material can be moved apart to make it easier to put the shield material on the shield termination ring.
- An additional length of the jacket can be removed to give more shield length.



**SHIELD OF THE CABLE FOLDED BACK ON A SHIELD TERMINATION RING**

**Figure 12**

- (11) Put a temporary layer of tape around the end of each cable shield to make sure that the shield does not move.
- (12) Move the wires apart on each cable.
- (13) Cut the end of each wire.

Make sure that the distance from the end of the cable jacket to the end of the wire is the specified length in the splice assembly data.

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

Refer to:

- Table 8 and Figure 26 for the S280W501-11 cable
- Table 10 and Figure 27 for the S280W501-12 cable
- Table 12 and Figure 28 for the S280W501-13 cable
- Table 14 and Figure 29 for the S280W501-14 cable
- Table 16 and Figure 30 for the S280W501-15 cable.

(14) If the cable has a twisted shielded pair:

- (a) Remove the necessary length of cable jacket from the end of each twisted shielded pair cable. Refer to Table 6.

**CAUTION:** DO NOT CUT THE SHIELD OF THE CABLE. DAMAGE TO THE SHIELD CAN CAUSE UNSATISFACTORY PERFORMANCE.

Table 6

REMOVAL LENGTH OF THE JACKET OF THE TWISTED SHIELDED PAIR

Cable	Cable A Twisted Pair Removal Length (inch)	Cable B Twisted Pair Removal Length (inch)
S280W501-11	3	3
S280W501-12	4	3.25
S280W501-13	3	3
S280W501-15	4	3.25

- (b) On the ends of the twisted shielded pair, fold the end of the shield back over each cable jacket.
- (c) Remove the necessary length of each shield.

Make sure that the distance from the end of the shield to the end of the twisted shielded pair jacket is 0.5 inch.

**CAUTION:** DO NOT CUT THE CABLE JACKET. DAMAGE TO THE CABLE JACKET CAN CAUSE UNSATISFACTORY PERFORMANCE.

(15) If the cable has a twisted shielded pair, assemble the splice for the twisted shielded pair:

- (a) Move the wires apart in the twisted shielded pair.
- (b) Cut the end of each wire in the twisted shielded pair.

Make sure that the distance from the end of the jacket of the twisted shielded pair to the end of the wire is the specified length in the splice assembly data.

Refer to:

- Table 8 and Figure 26 for the S280W501-11 cable
- Table 10 and Figure 27 for the S280W501-12 cable
- Table 12 and Figure 28 for the S280W501-13 cable
- Table 16 and Figure 30 for the S280W501-15 cable.

- (c) Put the specified length of the smaller braided wire tube on the longer Cable B twisted shielded pair.
- (d) Remove 0.25 inch of insulation from the end of each wire in the Cable A and Cable B twisted shielded pair.

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

**CAUTION:** DO NOT CUT THE CONDUCTOR. DAMAGE TO THE CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE

- (e) Put the end of the shorter Cable A wire in one end of a conductor splice.
- (f) Crimp the splice.
- (g) Put the end of the shorter Cable B wire in one end of another conductor splice.
- (h) Crimp the splice.
- (i) Put a 1.15 inch length of heat shrinkable sleeve on the longer wire in the Cable B twisted shielded pair.
- (j) Put the end of the longer Cable B wire in the other end of the conductor splice with the shorter Cable A wire.
- Make sure the same color wire is in both ends of the splice.
- (k) Crimp the splice.
- (l) Put a 1.15 inch length of heat shrinkable sleeve on the longer wire in the Cable A twisted shielded pair.
- (m) Put the end of the longer Cable A wire in the other end of the conductor splice with the shorter Cable B wire.
- Make sure the same color wire is in both ends of the splice.
- (n) Crimp the splice.
- (o) Wind a 0.75 inch to 1.0 inch length of silicone tape around each conductor splice assembly.

Make sure that:

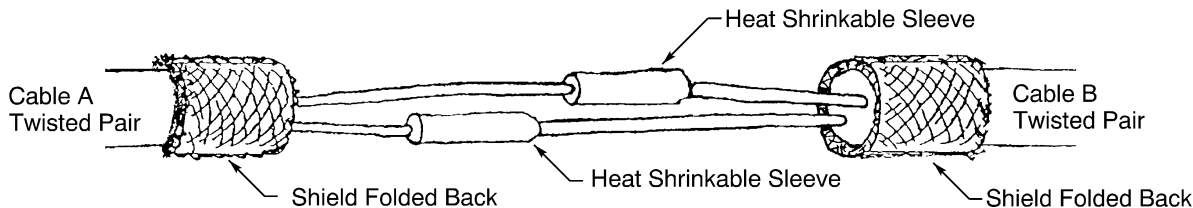
- The tape is smooth and symmetrical around the circumference of the splice assembly
- The center of the layer of tape is aligned with the center of the conductor splice
- The splice assembly has a minimum of two layers of tape.

- (p) Align the center of each heat shrinkable sleeve with the center of each conductor splice assembly. Refer to Figure 13.

Make sure that the sleeve is centered on the conductor splice.

**NOTE:** A necessary amount of tape can be removed from the conductor splice to allow the sleeve to be put in the correct position on the conductor splice.

**CAUTION:** DO NOT APPLY HEAT TO THE HEAT SHRINKABLE SLEEVES IN THIS PROCEDURE. HEAT GUNS OR HOT AIR GUNS CANNOT BE USED ON A FUELED AIRPLANE.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE CONDUCTOR SPLICE ASSEMBLY**  
Figure 13

- (q) Make a selection of 2 Shield -Kons.

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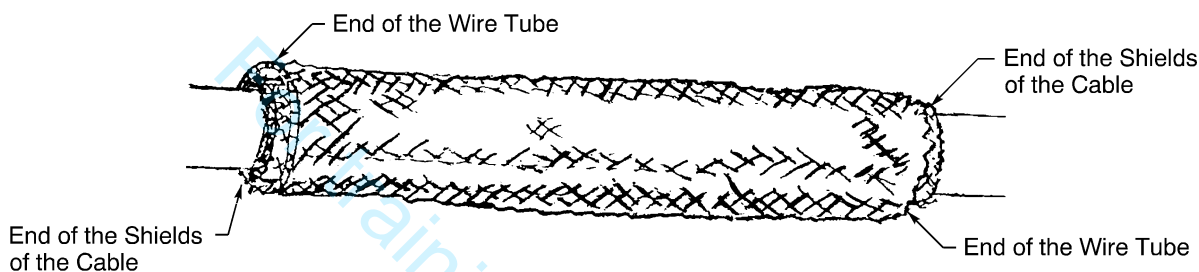
### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

Refer to:

- Table 7 for the S280W501-11 cable
- Table 9 for the S280W501-12 cable
- Table 11 for the S280W501-13 cable
- Table 15 for the S280W501-15 cable.

- (r) Make a selection of a Shield-Kon crimp tool from Table 4.
- (s) Align one end of the wire tube with the end of the shield of the twisted shielded pair. Refer to Figure 14.

Make sure that the heat shrinkable sleeves on the conductor splice assemblies are not moved.

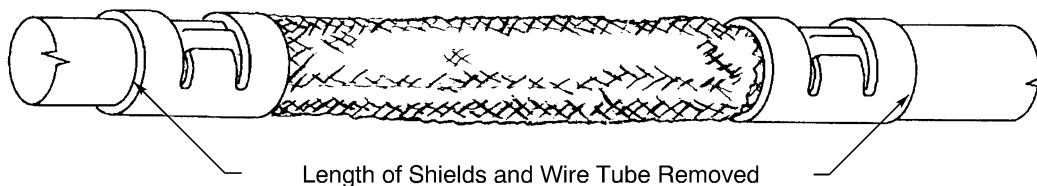


**POSITION OF THE BRAIDED WIRE TUBE ON THE TWISTED SHIELDED PAIR IN THE CABLE**

**Figure 14**

- (t) Put one of the Shield-Kons on the twisted shielded pair cable  
Make sure that the edge of the Shield-Kon is approximately aligned with the end of the wire tube and folded back shields of the twisted shielded pair cable.
- (u) Crimp the Shield-Kon.
- (v) Make sure that the tube is smooth and tight
- (w) Put the other Shield-Kon on the other end of the cable.  
Make sure that the edge of the Shield-Kon is approximately aligned with the end of the wire tube and shields of the cable.
- (x) Crimp the Shield-Kon.
- (y) Remove the unwanted ends of the shield and wire tube  
Make sure that the ends are aligned with the outside edges of each Shield-Kon. Refer to Figure 15.

Figure 16 shows the position of the splice of the twisted shielded pair in the cable.



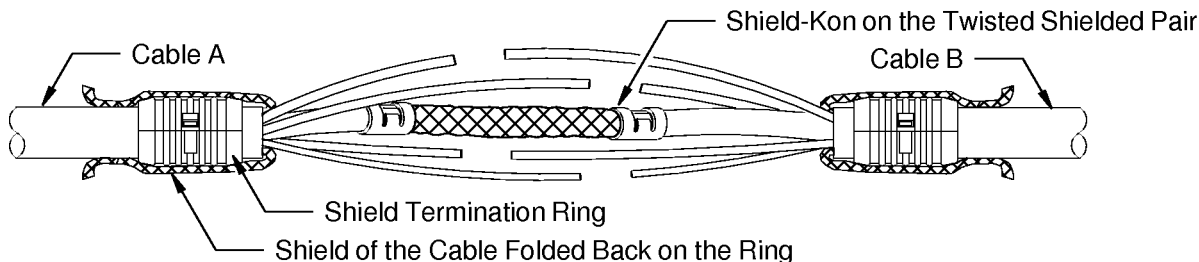
**SHIELD SPLICE ASSEMBLY FOR THE TWISTED SHIELDED PAIR IN THE CABLE**

**Figure 15**

**20-14-11**

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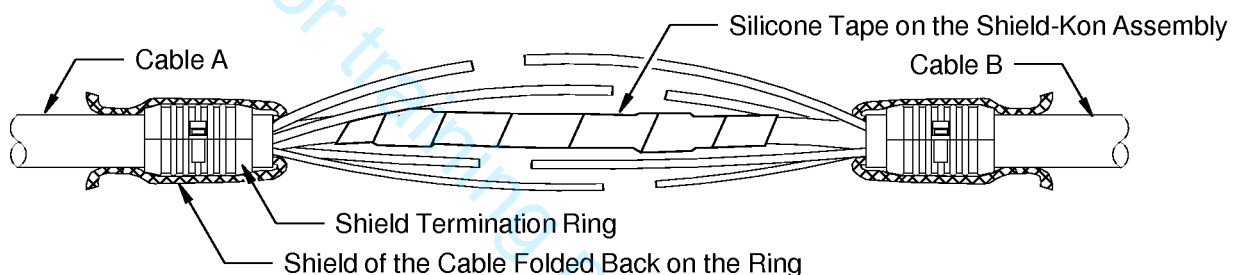
## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



**POSITION OF THE SPLICE OF THE TWISTED SHIELDED PAIR IN THE CABLE**

**Figure 16**

- (z) Wind a minimum of two layers of silicone tape on the splice of the twisted shielded pair in the cable. Refer to Figure 17.



**POSITION OF THE TAPE ON THE SPLICE OF THE TWISTED SHIELDED PAIR**

**Figure 17**

- (16) Make a selection of a conductor splice for one wire to one wire.

Refer to:

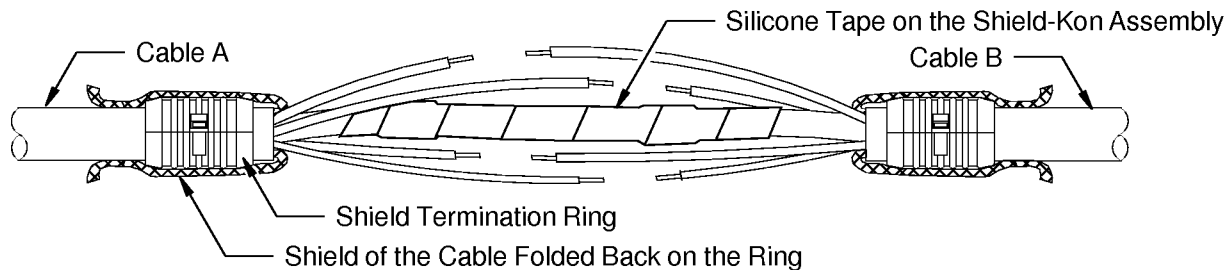
- Table 7 for the S280W501-11 cable
- Table 9 for the S280W501-12 cable
- Table 11 for the S280W501-13 cable
- Table 13 for the S280W501-14 cable
- Table 15 for the S280W501-15 cable.

- (17) Remove 0.25 inch of insulation from the end of each wire in Cable A and Cable B. Refer to Figure 18.

**CAUTION:** DO NOT CUT THE CONDUCTOR. DAMAGE TO THE CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE.

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



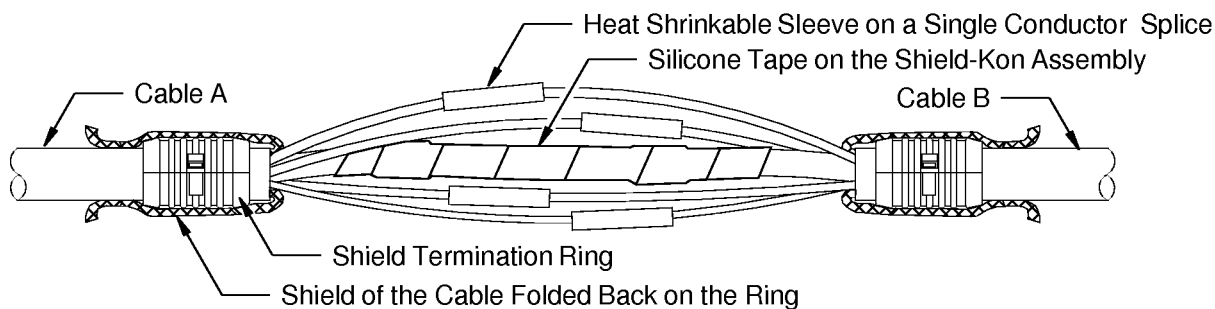
### PREPARATION OF THE WIRE ENDS

Figure 18

- (18) Make a selection of a splice crimp tool from Table 3.
- (19) For each wire in Cable A and Cable B:
  - (a) Put the end of the Cable A wire in one end of the conductor splice.
  - (b) Crimp the splice
  - (c) Put the 1.15 inch length of heat shrinkable sleeve on the longer of the Cable A wire or the Cable B wire with the same color.
  - (d) Put the end of the Cable B wire with the same color as the Cable A wire in the other end of the conductor splice.  
Make sure the same color wire is in both ends of the splice.
  - (e) Crimp the splice
  - (f) Wind a 0.75 inch to 1.0 inch length of tape around the conductor splice assembly:  
Make sure that:
    - The tape is smooth and symmetrical around the circumference of the splice assembly
    - The center of the layer of tape is aligned with the center of the conductor splice
    - The splice assembly has a minimum of two layers of tape.

- (20) Align the center of each heat shrinkable sleeve with the center of each conductor splice assembly.  
Refer to Figure 19.

**CAUTION:** DO NOT APPLY HEAT TO THE HEAT SHRINKABLE SLEEVES IN THIS PROCEDURE. HEAT GUNS OR HOT AIR GUNS CANNOT BE USED ON A FUELED AIRPLANE.



### POSITIONS OF THE HEAT SHRINKABLE SLEEVES ON THE CONDUCTOR SPLICES

Figure 19

20-14-11

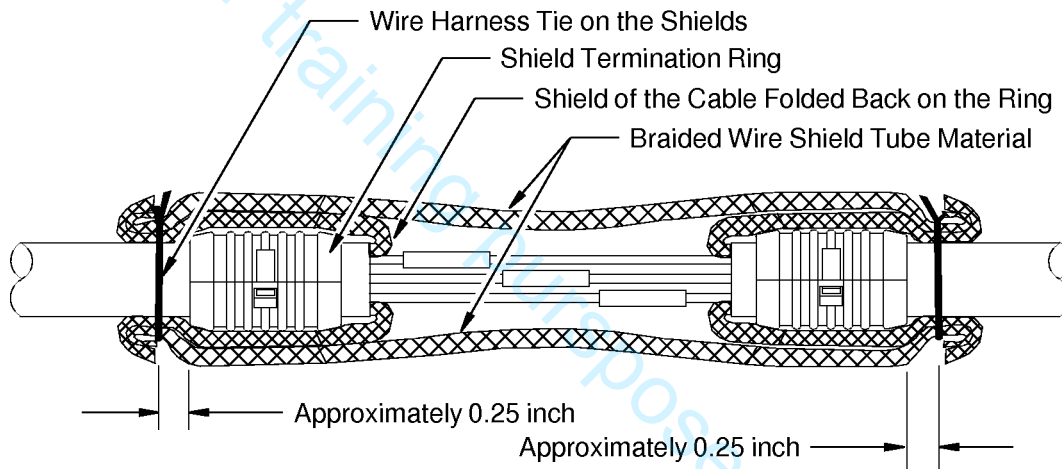
## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

- (21) If a sleeve cannot be aligned or moved on the tape:
  - (a) Remove the necessary amount of tape on the splice.
  - (b) Make the tape smooth.
  - (c) Do Step (20) again.
- (22) Push the overall shield tube material onto the splice assembly.
- (23) Remove the temporary layer of tape around the end of each cable shield.
- (24) Align the ends of the shield tube material and the ends of the folded back shields. Refer to Figure 20.
- (25) Assemble a lacing tape wire harness tie on the shields approximately 0.25 inch from the rear end of each shield termination ring.

Refer to:

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



**POSITION OF THE SHIELD MATERIAL ON THE CABLE**

**Figure 20**

- (26) Make a selection of a shield terminator band for each shield termination ring.

Refer to:

- Table 7 for the S280W501-11 cable
- Table 9 for the S280W501-12 cable
- Table 11 for the S280W501-13 cable
- Table 13 for the S280W501-14 cable
- Table 15 for the S280W501-15 cable.

Assemble a shield terminator band on the shields on each shield termination ring.

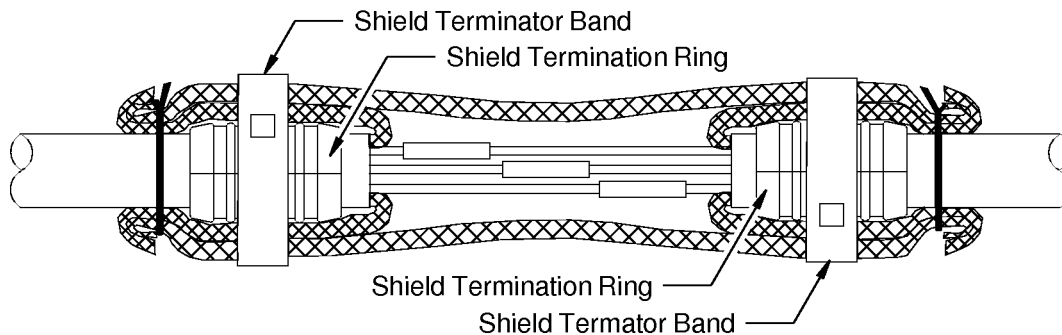
Refer to:

- Figure 21
- Refer to Paragraph 6.C. for the procedure to install the band.

**20-14-11**

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



#### POSITION OF THE SHIELD TERMINATOR BANDS ON THE SHIELDS

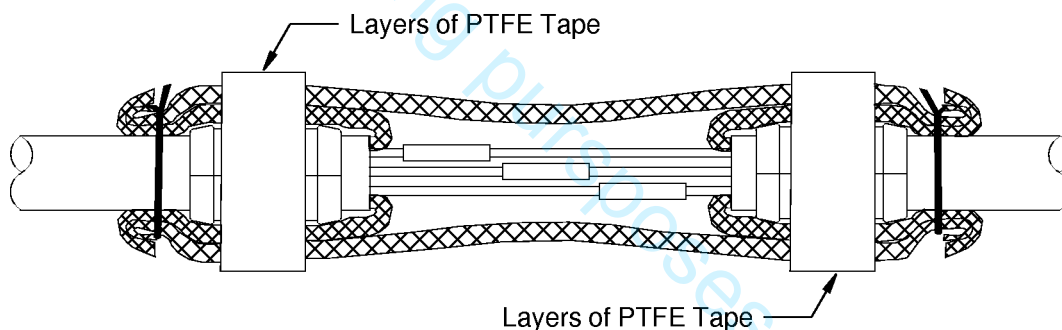
Figure 21

- (27) Wind 2 to 3 layers of PTFE tape on each shield terminator band.

Make sure that the tape makes a one hundred percent overlap.

Refer to:

- Figure 22
- Subject 20-00-11 for the PTFE tape.



#### POSITION OF THE PTFE TAPE ON THE SHIELD TERMINATOR BANDS

Figure 22

- (28) Wind 2 to 3 layers of 1 inch wide Temperature Grade D Type I silicone tape on top of the PTFE tape on the bands.

Make sure that:

- The tape makes a one hundred percent overlap
- The surface of the band cannot be seen.

Refer to:

- Figure 22
- Subject 20-00-11 for the silicone tape.

- (29) Tightly wind a layer of Temperature Grade D Type II silicone tape on the splice assembly.

## STANDARD WIRING PRACTICES MANUAL

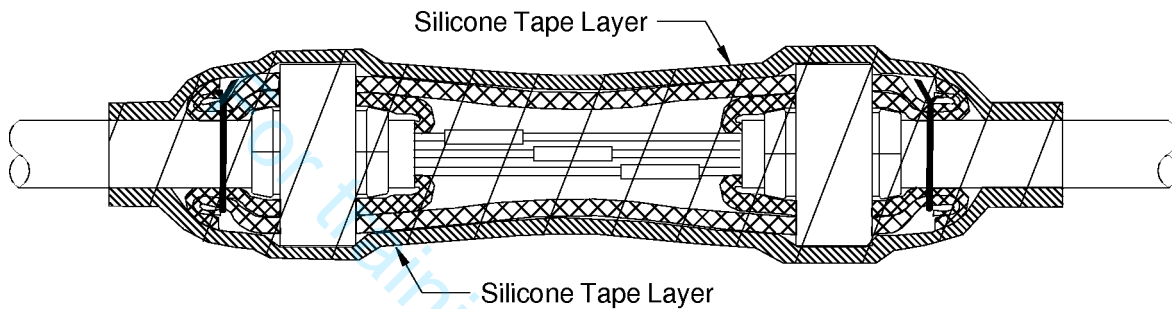
### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

Refer to:

- Figure 23
- Subject 20-00-11 for the tape.

Make sure that the layer of tape:

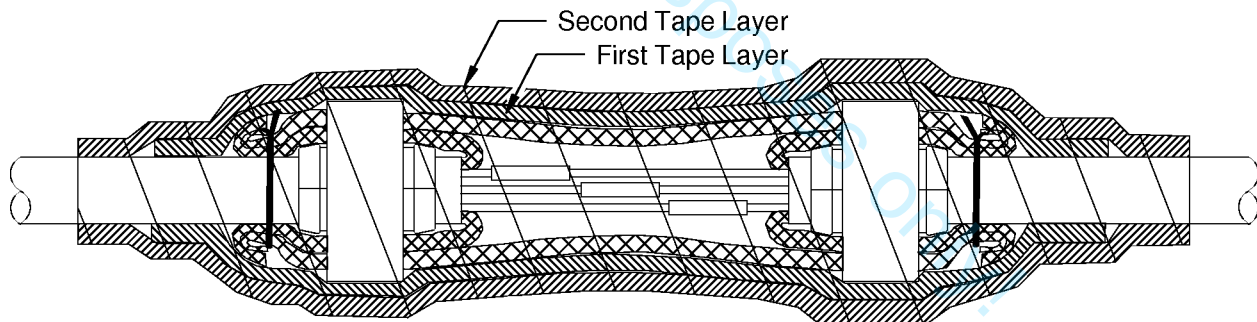
- Starts 1 inch minimum farther than the rear end of the shields on end A of the splice
- Stops 1 inch minimum farther than the rear end of the shields on end B of the splice
- The tape makes approximately a 50 percent overlap with itself
- The tape makes approximately a 100 percent overlap at the ends.



**THE FIRST LAYER OF SILICONE TAPE ON THE SPLICE ASSEMBLY**

**Figure 23**

- (30) Tightly wind a second layer of Temperature Grade D Type II silicone tape on the splice assembly. Refer to Figure 24.



**THE SECOND LAYER OF SILICONE TAPE ON THE SPLICE ASSEMBLY**

**Figure 24**

Make sure that the layer of tape:

- Starts where the first layer of tape stops
- Stops where the first layer of tape starts
- The tape makes approximately a 50 percent overlap with itself
- The tape makes approximately a 100 percent overlap at the ends.

- (31) Assemble a lacing tape wire harness tie on each end of the splice assembly approximately 0.5 inch to 0.7 inch from the end of the tape.

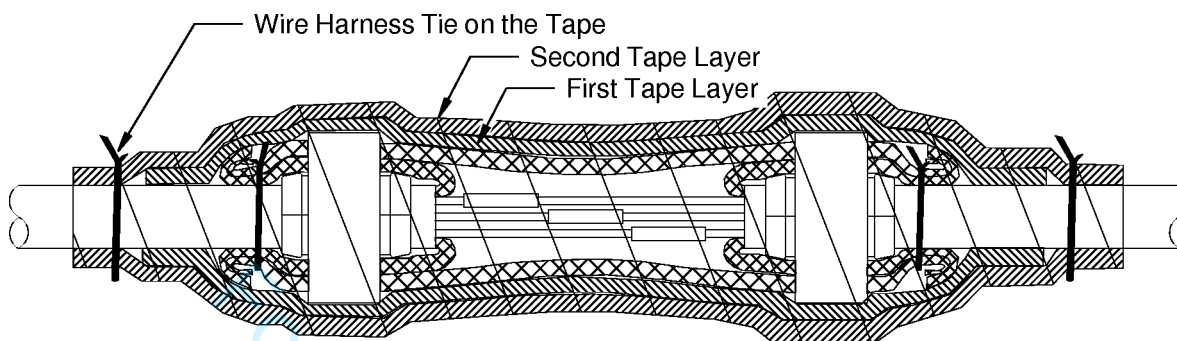
**20-14-11**

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

Refer to:

- Figure 25
- Subject 20-10-11 for the procedure to assemble a lacing tape wire harness tie.



**POSITION OF THE WIRE HARNESS TIES ON THE SPLICE ASSEMBLY**

**Figure 25**

### E. S280W501-11 Cable Splice Data

**Table 7**

**SPLICE ASSEMBLY COMPONENTS FOR AN S280W501-11**

Component	Part Number	Quantity	Length (inch)	Supplier
Shield-Kon	RSK301	2	-	Thomas & Betts
Shield Termination Ring	M85049/93-06 or M85049/93-08	2	-	Refer to Subject 20-00-11
Shield Terminator Band	BACB42F4	2	-	Refer to Subject 20-00-11
Splice, Butt	D-609-06	13	-	Tyco/Raychem
Wire Tube, Braided, Nickel Coated	BAC3106-6	1	14	Refer to Subject 20-00-11
Wire Tube, Braided, Tin Coated	BAC3108-1G	1	6	Refer to Subject 20-00-11

**Table 8**

**S280W501-11 CABLE PREPARATION**

Wire	Cable A Wire Length (inch)	Cable B Wire Length (inch)
Green/Black	4.00	1.50
Orange/Green	4.00	1.50
Gray/Black	4.00	1.50
Red/Black	4.00	1.50
Gray	3.25	2.25
Red	3.25	2.25

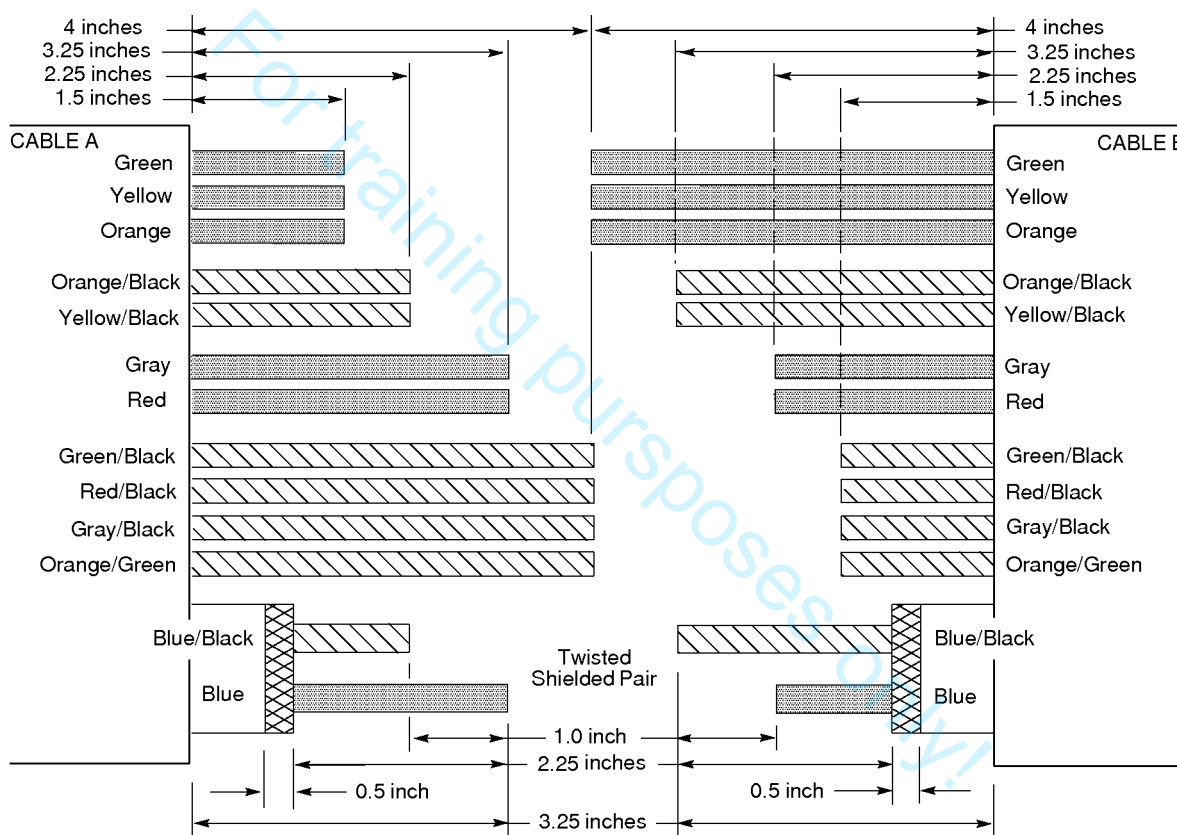
# 20-14-11

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

Table 8 (continued)

Wire	Cable A Wire Length (inch)	Cable B Wire Length (inch)
Yellow/Black	2.25	3.25
Orange/Black	2.25	3.25
Green	1.50	4.00
Yellow	1.50	4.00
Orange	1.50	4.00



**S280W501-11 CABLE PREPARATION**  
Figure 26

20-14-11

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

### F. S280W501-12 Cable Splice Data

**Table 9**  
**SPLICE ASSEMBLY COMPONENTS FOR AN S280W501-12**

Component	Part Number	Quantity	Length (inch)	Supplier
Shield-Kon	RSK301	2	-	Thomas & Betts
Shield Termination Ring	M85049/93-08	2	-	Refer to Subject 20-00-11
Shield Terminator Band	BACB42F4	2	-	Refer to Subject 20-00-11
Splice, Conductor	D-609-06	19	-	Tyco/Raychem
Wire Tube, Braided, Nickel Coated	BAC3106-6	1	16	Refer to Subject 20-00-11
Wire Tube, Braided, Tin Coated	BAC3108-1G	1	6	Refer to Subject 20-00-11

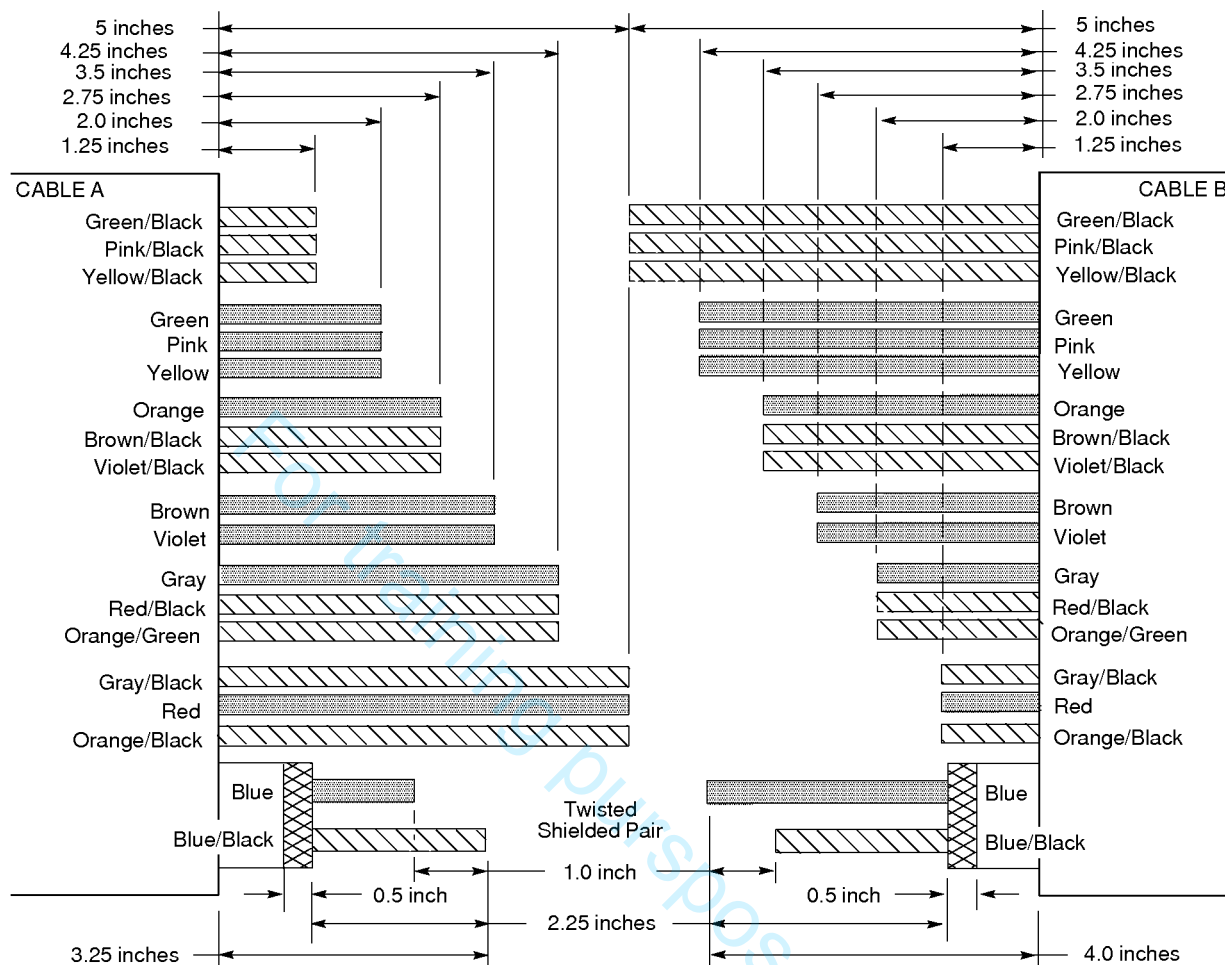
**Table 10**  
**S280W501-12 CABLE PREPARATION**

Wire	Cable A Wire Length (inch)	Cable B Wire Length (inch)
Orange/Black	5.00	1.25
Gray/Black	5.00	1.25
Red	5.00	1.25
Orange/Green	4.25	2.00
Gray	4.25	2.00
Red/Black	4.25	2.00
Violet	3.50	2.75
Brown	3.50	2.75
Orange	2.75	3.50
Brown/Black	2.75	3.50
Violet/Black	2.75	3.50
Green	2.00	4.25
Yellow	2.00	4.25
Pink	2.00	4.25
Pink/Black	1.25	5.00
Green/Black	1.25	5.00
Yellow/Black	1.25	5.00

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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



**S280W501-12 CABLE PREPARATION**  
**Figure 27**

### G. S280W501-13 Cable Splice Data

**Table 11**  
**SPLICE ASSEMBLY COMPONENTS FOR AN S280W501-13**

Component	Part Number	Quantity	Length (inch)	Supplier
Shield-Kon	RSK301	2	-	Thomas & Betts
Shield Termination Ring	M85049/93-06 or M85049/93-08	2	-	Refer to Subject 20-00-11
Shield Terminator Band	BACB42F4	2	-	Refer to Subject 20-00-11
Splice, Conductor	D-609-06	13	-	Tyco/Raychem
Wire Tube, Braided, Nickel Coated	BAC3106-6	1	14	Refer to Subject 20-00-11
Wire Tube, Braided, Tin Coated	BAC3108-1G	1	6	Refer to Subject 20-00-11

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

Table 12  
S280W501-13 CABLE PREPARATION

Wire	Cable A Wire Length (inch)	Cable B Wire Length (inch)
Green/Black	4.00	1.50
Orange/Green	4.00	1.50
Pink/Black	4.00	1.50
Red/Black	4.00	1.50
Red	3.25	2.25
Pink	3.25	2.25
Yellow/Black	2.25	3.25
Orange/Black	2.25	3.25
Green	1.50	4.00
Yellow	1.50	4.00
Orange	1.50	4.00

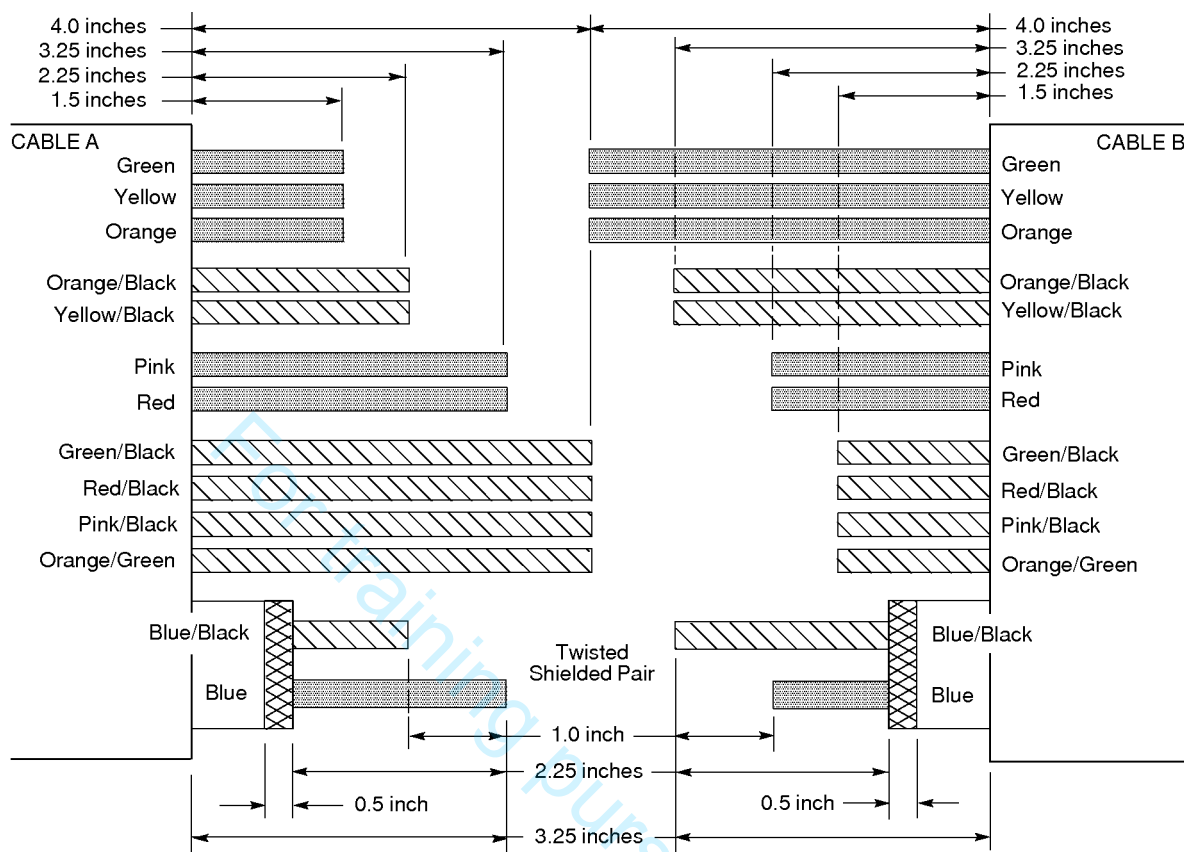
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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



**S280W501-13 CABLE PREPARATION**  
Figure 28

### H. S280W501-14 Cable Splice Data

**Table 13**  
**SPLICE ASSEMBLY COMPONENTS FOR AN S280W501-14**

Component	Part Number	Quantity	Length (inch)	Supplier
Shield Termination Ring	M85049/93-06	2	-	Refer to Subject 20-00-11
Shield Terminator Band	BACB42F4	2	-	Refer to Subject 20-00-11
Splice, Conductor	D-609-06	7	-	Tyco/Raychem
Wire Tube, Braided, Nickel Coated	BAC3106-6	1	11	Refer to Subject 20-00-11

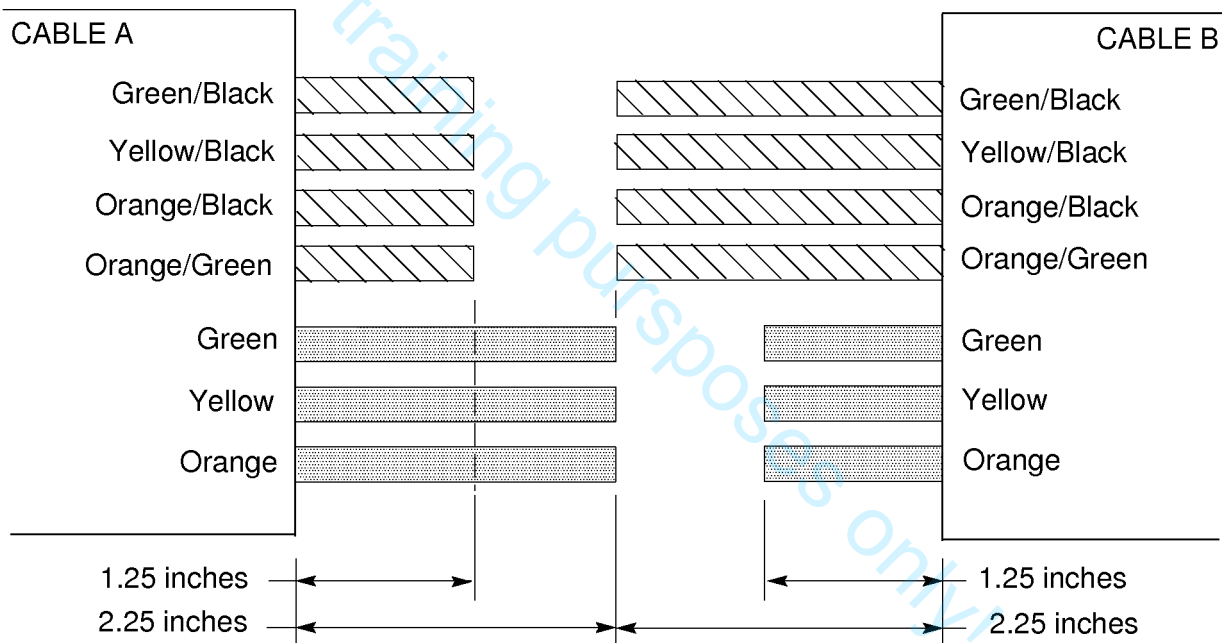
# 20-14-11

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

Table 14  
S280W501-14 CABLE PREPARATION

Wire	Cable A Wire Length (inch)	Cable B Wire Length (inch)
Green	2.25	1.25
Yellow	2.25	1.25
Orange	2.25	1.25
Green/Black	1.25	2.25
Yellow/Black	1.25	2.25
Orange/Black	1.25	2.25
Orange/Green	1.25	2.25



S280W501-14 CABLE PREPARATION  
Figure 29

### I. S280W501-15 Cable Splice Data

Table 15  
SPLICE ASSEMBLY COMPONENTS FOR AN S280W501-15

Component	Part Number	Quantity	Length (inch)	Supplier
Shield-Kon	RSK301	2	-	Thomas & Betts
Shield Termination Ring	M85049/93-08	2	-	Refer to Subject 20-00-11

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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

Table 15 (continued)

Component	Part Number	Quantity	Length (inch)	Supplier
Shield Terminator Band	BACB42F4	2	-	Refer to Subject 20-00-11
Splice, Conductor	D-609-06	17	-	Tyco/Raychem
Wire Tube, Braided, Nickel Coated	BAC3106-6	1	16	Refer to Subject 20-00-11
Wire Tube, Braided, Tin Coated	BAC3108-1G	1	6	Refer to Subject 20-00-11

Table 16

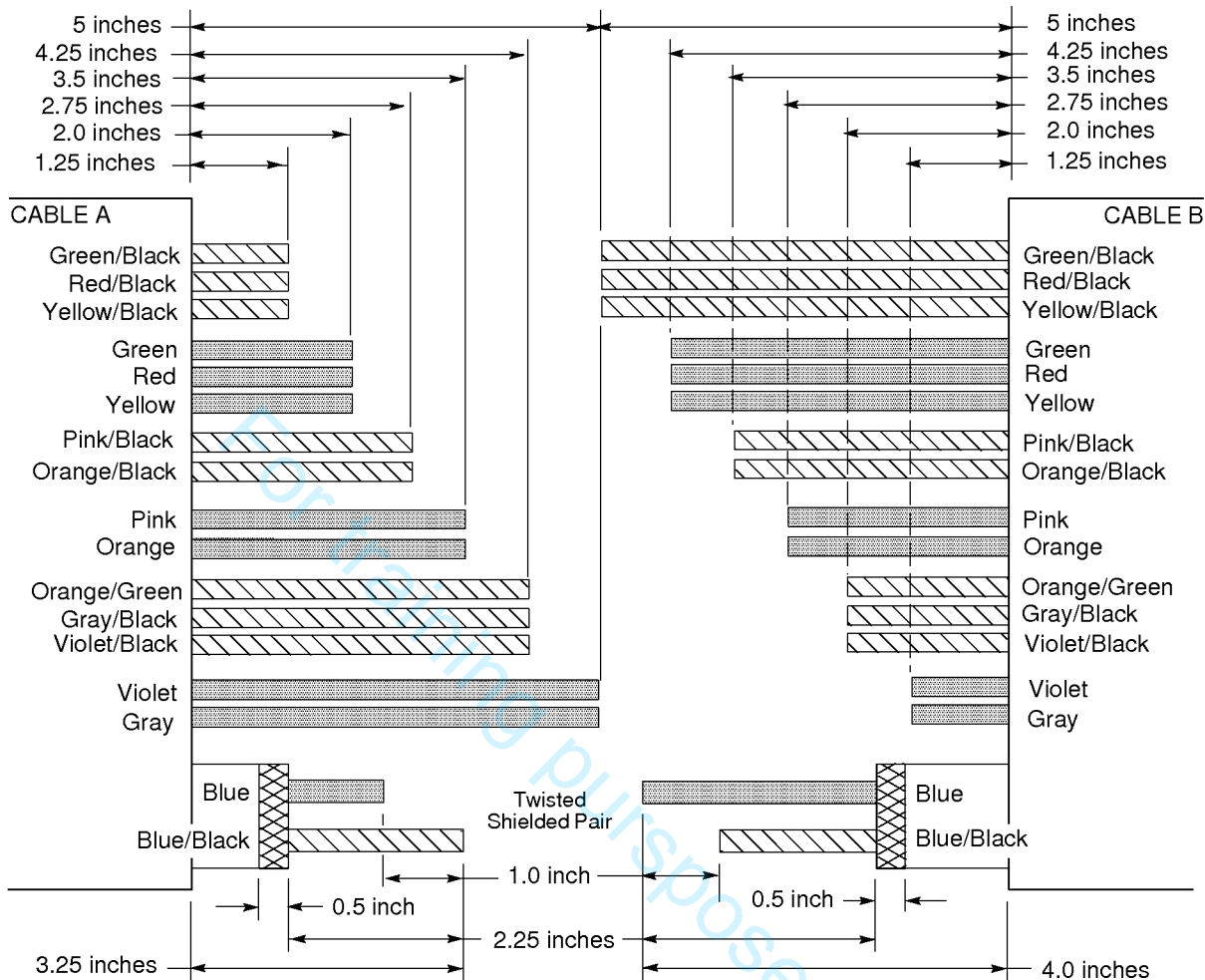
### S280W501-15 CABLE PREPARATION

Wire	Cable A Wire Length (inch)	Cable B Wire Length (inch)
Gray	5.00	1.25
Violet	5.00	1.25
Orange/Green	4.25	2.00
Gray/Black	4.25	2.00
Violet/Black	4.25	2.00
Orange	3.50	2.75
Pink	3.50	2.75
Orange/Black	2.75	3.50
Pink/Black	2.75	3.50
Green	2.00	4.25
Yellow	2.00	4.25
Red	2.00	4.25
Green/Black	1.25	5.00
Yellow/Black	1.25	5.00
Red/Black	1.25	5.00

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



S280W501-15 CABLE PREPARATION

Figure 30

## 5. CONNECTOR REPLACEMENT

### A. Connector Selection

**CAUTION:** FOR THIS REPAIR PROCEDURE, THE SPECIFIED CONNECTORS DO NOT HAVE ACCEPTABLE ALTERNATIVE PART NUMBERS. IF THE SPECIFIED CONNECTOR IS NOT USED, THE SYSTEM CAN GIVE UNSATISFACTORY PERFORMANCE.

Refer to Subject 20-61-11 for:

- The part number structures
- The insert configurations
- The contact part numbers
- The acceptable alternative contact part numbers.

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**STANDARD WIRING PRACTICES MANUAL**
**REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES**

**Table 17**  
**REPLACEMENT CONNECTOR PART NUMBERS**

<b>Connector</b>	<b>Description</b>
1167A18G14SN	Modified BACC63BV Receptacle
BACC63CB12-12P9	Bayonet Coupled, Vibration Resistant Plug with Ground Spring
BACC63CB12-12PN	Bayonet Coupled, Vibration Resistant Plug with Ground Spring
BACC63CB16-24P6	Bayonet Coupled, Vibration Resistant Plug with Ground Spring
BACC63CB16-24P7	Bayonet Coupled, Vibration Resistant Plug with Ground Spring
BACC63CB16-24P8	Bayonet Coupled, Vibration Resistant Plug with Ground Spring
BACC63CB16-24P9	Bayonet Coupled, Vibration Resistant Plug with Ground Spring
BACC63CB16-24PN	Bayonet Coupled, Vibration Resistant Plug with Ground Spring
BACC63BP12C12P6	Self Locking, Thread Coupled, Vibration Resistant Plug
BACC63BP12C12P7	Self Locking, Thread Coupled, Vibration Resistant Plug
BACC63BP12C12PN	Self Locking, Thread Coupled, Vibration Resistant Plug
BACC63BP16C24PN	Self Locking, Thread Coupled, Vibration Resistant Plug
BACC63BP16C24P6	Self Locking, Thread Coupled, Vibration Resistant Plug
BACC63BP16C24P7	Self Locking, Thread Coupled, Vibration Resistant Plug
BACC63BV12F12P6	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV12F12PN	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV12F12S7	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV14F7S7	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV14F7SN	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV16F24PN	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV16F24S6	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV16F24S7	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV20F16SN	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV22F19P8	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV22F19PN	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV22F19S6	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV22F19S8	Self Locking, Thread Coupled, Vibration Resistant Receptacle
BACC63BV22F19SN	Self Locking, Thread Coupled, Vibration Resistant Receptacle

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

### B. Backshell Selection

**Table 18**  
**BACKSHELL PART NUMBERS**

Wire Harness			Backshell		
Connector Shell Size	Harness System	Cable Part Number	Configuration	Cable Entry Diameter (inch)	Part Number
12	Flaperon, Aileron, or Spoiler	S280W501-14	Straight	0.438	S280W604-10
			45 degree	0.438	S280W604-20
14	Flaperon, Aileron, or Spoiler	S280W501-14	Straight	0.438	S280W604-11
			90 degrees	0.438	S280W604-31
16	Flaperon, Aileron, or Spoiler	S280W501-11	Straight	0.438	S280W604-12
		S280W501-13	Straight	0.438	S280W604-12
		S280W501-15	Straight	0.438	S280W604-12
	Elevator or Rudder	S280W501-12	Straight	0.500	S280W604-13
		S280W501-15	Straight	0.500	S280W604-13
	Flaperon, Aileron, or Spoiler	S280W501-11	45 degrees	0.438	S280W604-22
		S280W501-13	45 degrees	0.438	S280W604-22
	Elevator or Rudder	S280W501-12	45 degrees	0.500	S280W604-23
		S280W501-15	45 degrees	0.500	S280W604-23
	Flaperon, Aileron, or Spoiler	S280W501-11	45 degrees	0.438	S280W604-24
			90 degrees	0.438	S280W604-34
20	Flaperon, Aileron, or Spoiler	S280W501-13	Straight	0.438	S280W604-16
			45 degrees	0.438	S280W604-26
22	Elevator or Rudder	S280W501-12	Straight	0.500	S280W604-19
		S280W501-15	Straight	0.500	S280W604-19
			90 degrees	0.500	S280W604-39

**Table 19**  
**BACKSHELL SUPPLIERS**

Part Number	Supplier
S280W604-()	Glenair

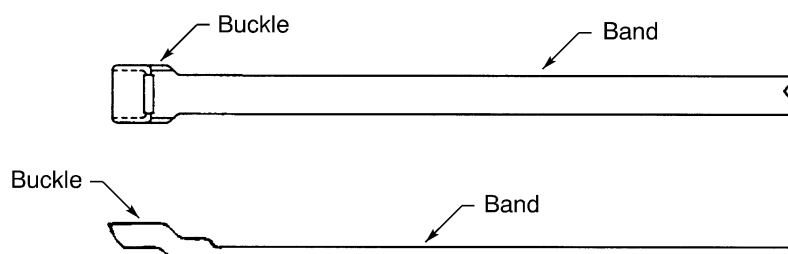
**Table 20**  
**SHIELD TERMINATOR BAND PART NUMBERS**

Boeing Standard	Supplier Part Number	Supplier
BACB42F3	Refer to Subject 20-00-11	Refer to Subject 20-00-11

# 20-14-11

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



**SHIELD TERMINATOR BAND**

**Figure 31**

### C. Necessary Parts and Materials

**Table 21**  
**NECESSARY PARTS AND MATERIALS**

Material	Specification or Part Number	Supplier	Size
Shield-Kon	RSK301	Thomas & Betts	-
Sleeve, Solder	BACS13CT-2-B	QPL	-
	SO63-2-9030	Raychem	-

### D. Connector Removal

- (1) Find the location where the overmold starts on the cable.
- (2) Cut the cable at that location so that the end of the cable is perpendicular to the longitudinal axis of the cable.
- (3) Examine the end of the cable.
- (4) If it is necessary, remove the necessary length of cable so that the cable has no remaining overmolded material inside the outer diameter of the cable.

### E. Cable Preparation

**Table 22**  
**REMOVAL LENGTH OF THE CABLE JACKET**

Backshell		Removal Length (inch)	
Shell Size	Configuration	Target	Tolerance
12	Straight	2.00	± 0.05
	45 degrees	2.30	± 0.05
14	Straight	2.00	± 0.05
	45 degrees	2.30	± 0.05
	90 degrees	3.00	± 0.05
16	Straight	2.00	± 0.05
	45 degrees	2.30	± 0.05

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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

Table 22 (continued)

Backshell		Removal Length (inch)	
Shell Size	Configuration	Target	Tolerance
20	Straight	2.00	$\pm 0.05$
	45 degrees	2.30	$\pm 0.05$
22	Straight	2.00	$\pm 0.05$
	90 degrees	3.20	$\pm 0.05$

(1) If it is necessary, put a permanent label on the cable to show:

- The equipment number
- The hookup number

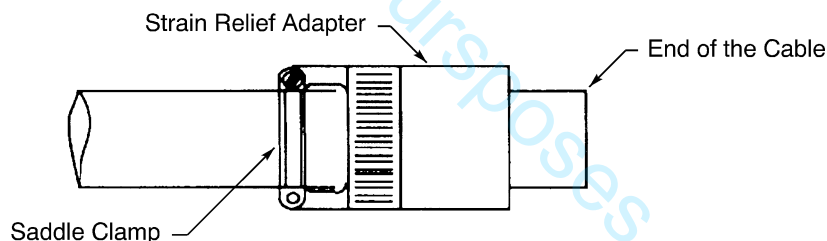
(2) Make a selection of the connector. Refer to Table 17.

**CAUTION:** THE SPECIFIED CONNECTORS DO NOT HAVE ACCEPTABLE ALTERNATIVE PART NUMBERS. IF THE SPECIFIED CONNECTOR IS NOT USED, THE SYSTEM CAN GIVE UNSATISFACTORY PERFORMANCE

(3) Make a selection of a backshell. Refer to Table 18.

(4) Put the strain relief adapter of the backshell on the cable. Refer to Figure 32.

Make sure that the end with the saddle clamp is pointed away from the end of the cable.



**POSITION OF THE STRAIN RELIEF ADAPTER ON THE CABLE**

**Figure 32**

(5) Remove the necessary length of the jacket from the end of the cable. Refer to Table 22.

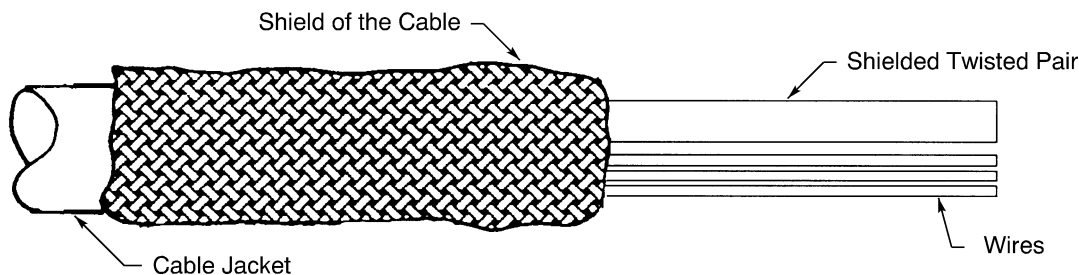
**CAUTION:** DO NOT CUT THE SHIELD OF THE CABLE. DAMAGE TO THE SHIELD CAN CAUSE UNSATISFACTORY PERFORMANCE.

(6) Fold the shield back over the cable jacket. Refer to Figure 33.

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

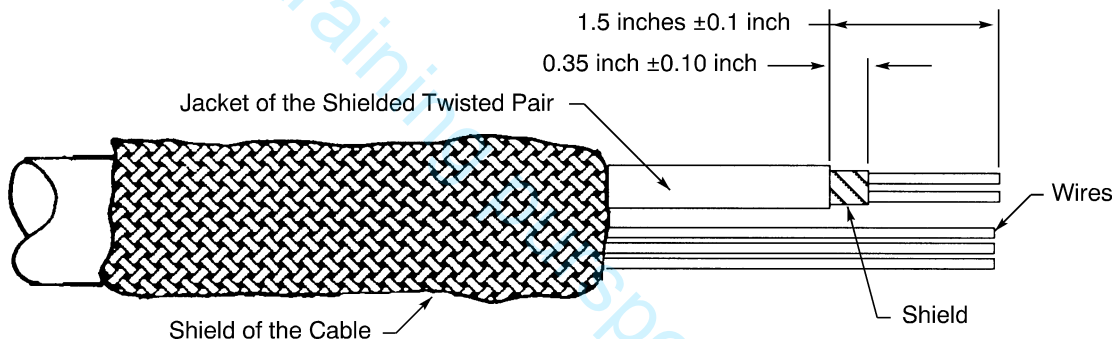


**SHIELD FOLDED BACK OVER THE JACKET OF THE CABLE**

**Figure 33**

- (7) Prepare the shielded twisted pair. Refer to Figure 34.

**NOTE:** If it is permitted to use a heat source, the assembly of a shield ground wire with a solder sleeve is a satisfactory alternative to the assembly of a shield ground wire with an RSK Shield-Kon. Refer to Subject 20-10-15.



**PREPARATION OF THE SHIELDED TWISTED PAIR**

**Figure 34**

- (a) Remove 1.5 inches  $\pm 0.1$  inch of jacket from the end of the shielded twisted pair.

**CAUTION:** DO NOT CUT THE SHIELD OF THE CABLE. DAMAGE TO THE SHIELD CAN CAUSE UNSATISFACTORY PERFORMANCE.

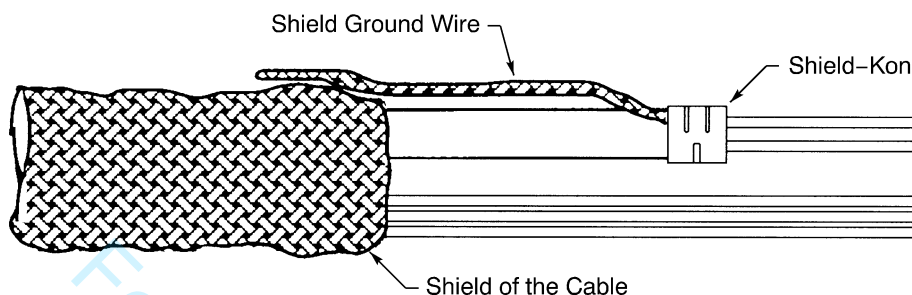
- (b) Remove the necessary length of shield so that the distance from the end of the shield to the end of the jacket is 0.35 inch  $\pm 0.10$  inch.
- (c) Make a selection of these components from Table 21:
- A solder sleeve with a shield ground wire
  - A Shield-Kon.
- (d) Remove the ground wire from the solder sleeve.
- (e) Discard the solder sleeve.
- (f) Assemble the shield ground wire.

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

Refer to:

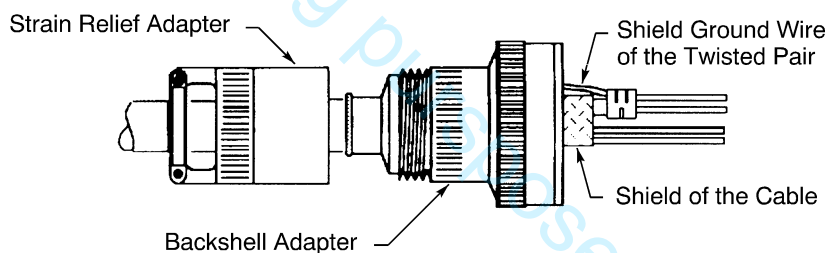
- Figure 35
- Subject 20-10-15 for the procedure to assemble a shield ground wire with an RSK Shield-Kon.



**SHIELD GROUND WIRE OF THE TWISTED PAIR**  
**Figure 35**

### F. Connector Assembly

- (1) Put the backshell adapter on the cable so that the forward end of the adapter is pointed toward the end of the cable. Refer to Figure 36.



**POSITION OF THE BACKSHELL ADAPTER ON THE CABLE**  
**Figure 36**

- (2) Assemble the connector. Refer to Subject 20-61-11.

## 6. BACKSHELL ASSEMBLY

### A. Necessary Materials

**Table 23**  
**NECESSARY MATERIALS**

Material	Specification or Part Number	Supplier	Description
Alcohol, Isopropyl	-	An available source	-
Lacquer, Marking	F925 Yellow	Organic Products	-

**20-14-11**

# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

Table 23 (continued)

Material	Specification or Part Number	Supplier	Description
Sealant, Standard Cure	BMS 5-95 Class B	QPL	-
	Pro-Seal 870 B-1/2	Courtaulds Aerospace	-
	Pro-Seal 870 B-2		-
Sealant, Fast Cure	PR-1826 Class B	Courtaulds Aerospace	-
	PR-1828 Class B	Courtaulds Aerospace	-
Tape, Adhesive	-	An available source	-
Tape, Protective	P-440	Permacel	0.50 inch width
Tape, Insulation	Scotch 70	3M	0.75 inch width

### B. Installation of the Backshell Adapter

Table 24  
BACKSHELL INSTALLATION TORQUE VALUES

Shell Size	Torque (inch-pound)	
	Minimum	Maximum
12	55	65
14	70	80
16	80	90
20	115	125
22	115	125

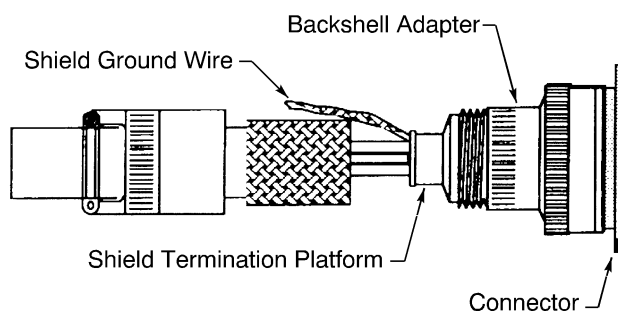
**NOTE:** It is not necessary to install safety wire to hold the backshell adapter in position on the connector.

- (1) Push the backshell adapter toward the connector until the forward end of the adapter is against the rear of the connector. Refer to Figure 37.

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

## STANDARD WIRING PRACTICES MANUAL

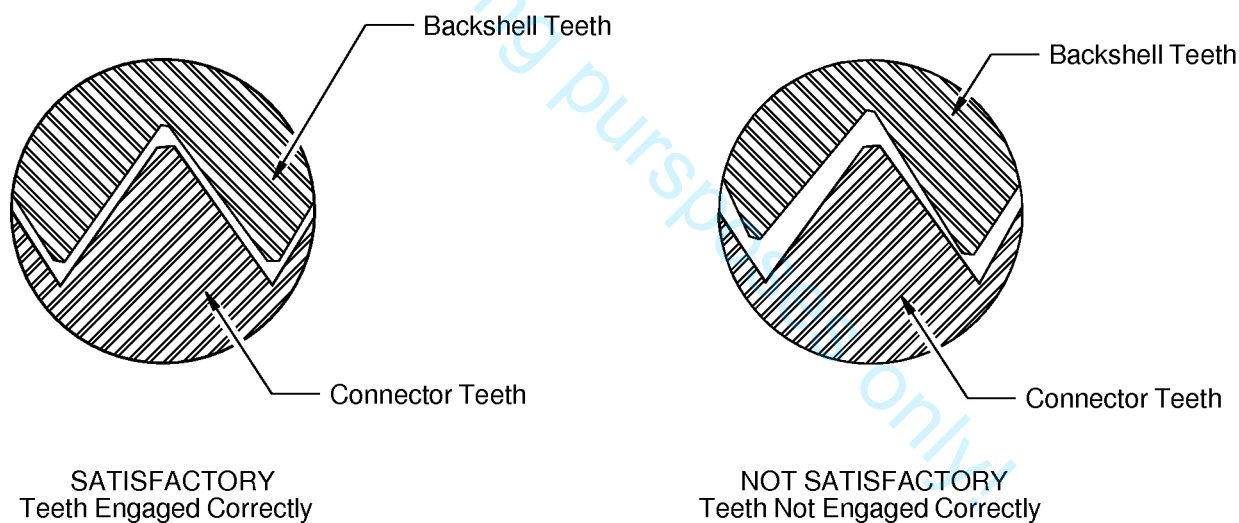
### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



#### POSITION OF THE BACKSHELL ADAPTER AND SHIELD GROUND WIRE

Figure 37

- (2) Engage the threads of the backshell adapter and the connector.
  - (3) Turn the backshell adapter until the teeth of the adapter are fully engaged with the teeth of the connector.
  - (4) Look in the inspection hole of the backshell adapter. Refer to Figure 38.
- 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

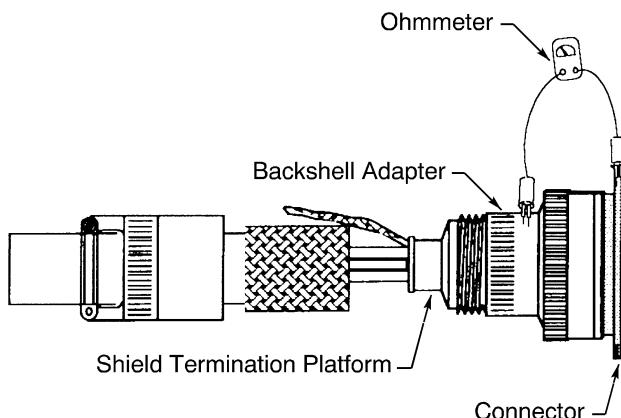
Figure 38

- (5) Tighten the backshell to the specified value in Table 24 with a torque wrench.
  - (6) Make a selection of an electrical bond meter. Refer to Subject 20-20-00.
  - (7) Measure the resistance between the backshell adapter and the connector. Refer to Figure 39.
- Make sure that resistance between the backshell adapter and the connector is not greater than 0.5 milliohms.

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**STANDARD WIRING PRACTICES MANUAL**

**REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES**



**RESISTANCE MEASUREMENT BETWEEN THE BACKSHELL ADAPTER AND THE CONNECTOR SHELL**  
**Figure 39**

**C. Installation of the Shield Terminator Band**

**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.

**Table 25**  
**SHIELD TERMINATOR BAND INSTALLATION TOOLS**

Shield Band	Installation Tool		
	Type	Part Number	Supplier
BACB42F3	Manual	600-058	Glenair
		A40199	Band-It Idex
	Pneumatic	600-051	Glenair
		A75099	Band-It Idex

(1) Make a selection of a shield terminator band from Table 20.

**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.

(2) Make a selection of a shield terminator band installation tool from Table 25.

(3) Clean these components with isopropyl alcohol and a brush:

- The band
- The shield of the cable
- The shield ground wires.

(4) Fold the shield ground wire back over the shield termination platform of the backshell adapter.

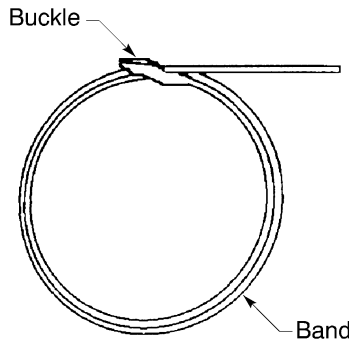
(5) Fold the shield of the cable back over the termination platform.

**STANDARD WIRING PRACTICES MANUAL****REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES**

Make sure that the end of the shield is:

- Aligned with the forward edge of the termination platform
- Over the shield ground wire
- Smooth and tight.

- (6) If the band is flat, make the band into a coil. Refer to Figure 40.

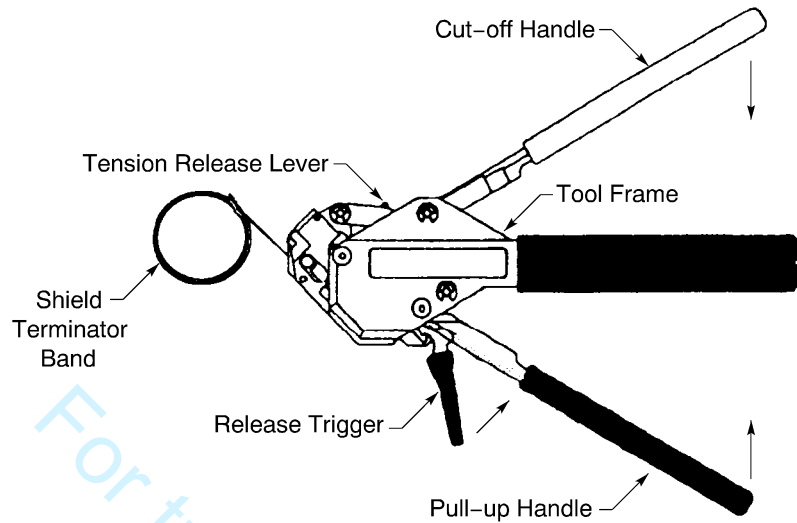
**COIL CONFIGURATION OF THE SHIELD TERMINATOR BAND****Figure 40**

- Put the free end of the band through the thin slot in the buckle.
  - Pull the free end through the buckle until the diameter of the loop is smallest size that can freely move over the flange of the connector.
  - Put the free end of the band through the thin slot in the buckle again.
  - Pull the free end through the buckle until the inner surface of the second loop touches the surface of the first loop.
- (7) Pull the release trigger of the installation tool in the direction of the pull-up handle.
- (8) Put a minimum of 2.5 inches of the free end of the band into the tool. Refer to Figure 41.

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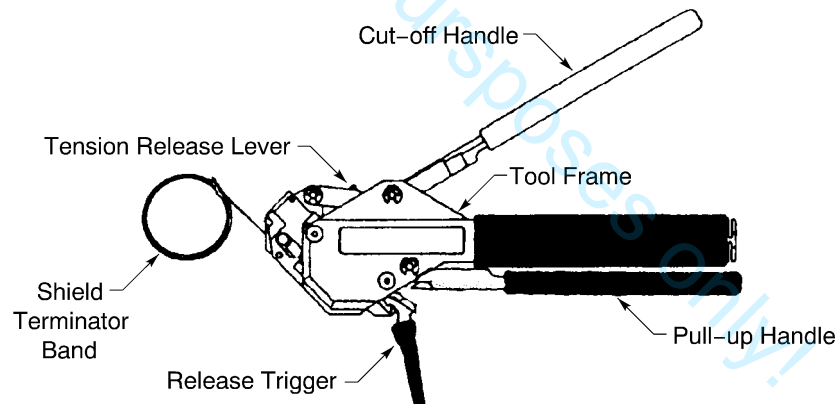
## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



**POSITION OF THE SHIELD TERMINATOR BAND IN THE INSTALLATION TOOL**  
**Figure 41**

- (9) Pull the pull-up handle toward the tool frame. Refer to Figure 42.  
Make sure that the band is held in the internal grip mechanism of the tool.



**POSITION OF THE PULL-UP HANDLE TO PULL THE BAND**  
**Figure 42**

- (10) Put the connector and backshell adapter assembly through the coil of the band.  
(11) Put the band against the connector shell.  
(12) Pull the pull-up handle through the necessary cycles until the band is almost tight on the knurled or ribbed area of the termination platform.

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

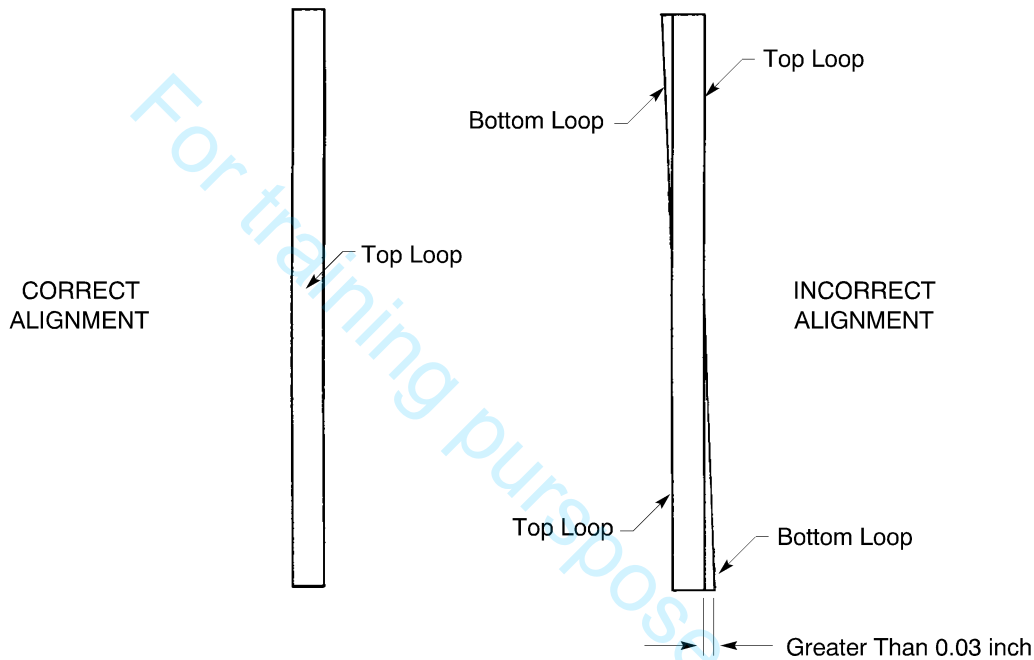
Make sure that the buckle of the band does not make an overlap with the shield ground wire.

**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 41.

- (13) Align the edges of the two loops of the band.

Make sure that the edge of either loop is not more than 0.03 inch beyond the edge of the other.

Refer to Figure 43.



**ALIGNMENT OF THE LOOPS OF THE SHIELD TERMINATOR BAND**

**Figure 43**

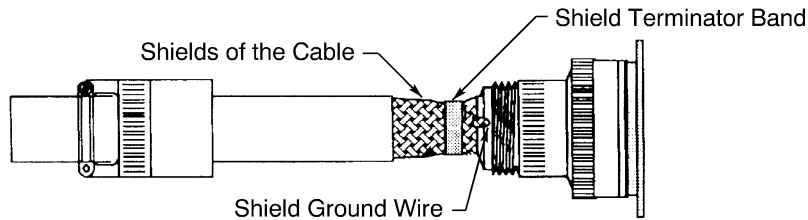
- (14) Pull the pull-up handle through the necessary cycles until the band is tight on the knurled or ribbed area of the termination platform. Refer to Figure 44.

Make sure that pull-up handle is locked against the tool frame. Refer to Figure 42.

**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.

## STANDARD WIRING PRACTICES MANUAL

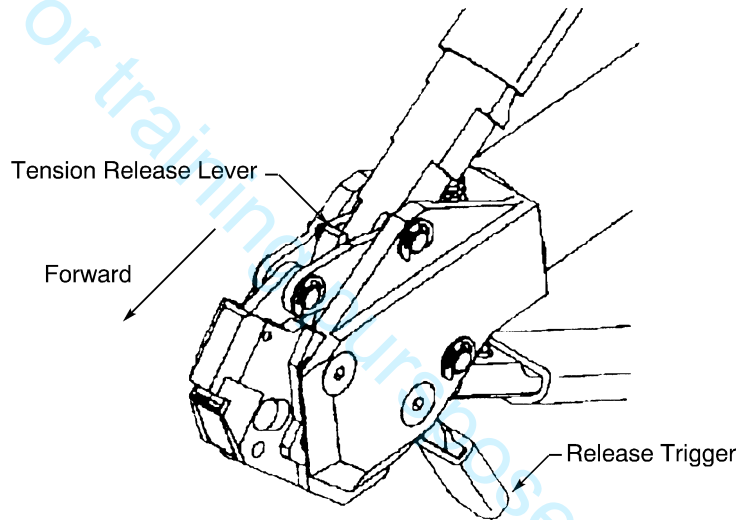
### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



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

**Figure 44**

- (15) Examine the alignment of the loops of the band. Refer to Figure 43.
- (16) If the alignment is incorrect, loosen the band. Refer to Figure 45.



**OPERATION OF THE TENSION RELEASE LEVER**

**Figure 45**

- (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 opens automatically.
- (d) Pull the release trigger toward the tool frame.
  - (e) Loosen the band.
  - (f) Do the installation again from Step (7).
- (17) Pull the cut-off handle until it is fully closed against the tool frame.
  - (18) Pull the release trigger in the direction of the pull-up handle to remove the unwanted length of band from the tool.
  - (19) Cut the end of the shields and the shield ground wire.

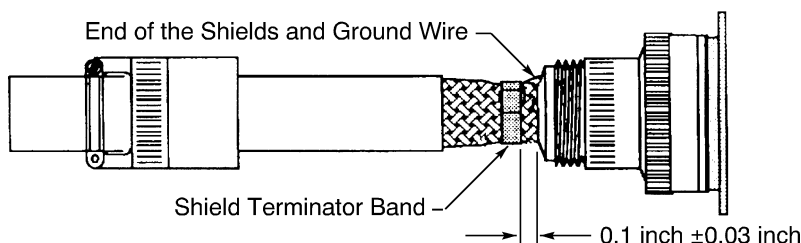
**20-14-11**

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

Make sure that the distance from the forward edge of the band to the end of the shields and ground wire is 0.1 inch  $\pm$  0.03 inch.

Refer to Figure 46.



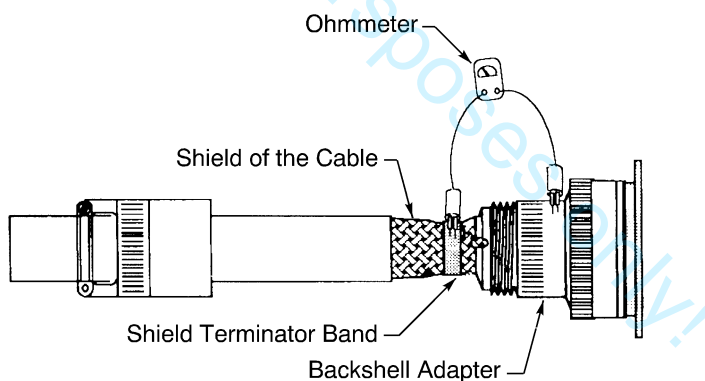
#### LOCATION OF THE END OF THE SHIELDS AND SHIELD GROUND WIRE

Figure 46

- (20) Make a selection of an electrical bond meter. Refer to Subject 20-20-00.
- (21) Measure the resistance between the buckle of the shield terminator band and the backshell adapter. Refer to Figure 47.

**CAUTION:** DO NOT LET THE TEST PROBE OF THE METER TOUCH THE SHIELD. IF THE PROBE OF THE METER TOUCHES THE SHIELD, DAMAGE TO THE SHIELD CAN OCCUR WHICH CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE SYSTEM.

Make sure that resistance between the buckle of the band and the backshell adapter is not greater than 2 milliohms.



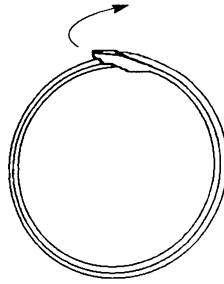
#### RESISTANCE MEASUREMENT BETWEEN THE BUCKLE OF THE SHIELD TERMINATOR BAND AND THE BACKSHELL ADAPTER

Figure 47

- (22) If the installation of the shield terminator band is incorrect, remove the band. Refer to Figure 48.

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



#### REMOVAL OF THE SHIELD TERMINATOR BAND

Figure 48

- (a) Hold the end of the band at the buckle with pliers or wire cutters.
  - (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 (6) with an unused band.
- (23) Put a stripe of yellow marking lacquer on the joint between the backshell adapter and the coupling ring of the backshell adapter.
- Make sure that the stripe:
- Is approximately 0.125 inch wide
  - Goes 0.25 inch beyond on each side of the joint.

#### D. Assembly of the Backshell Adapter Seal

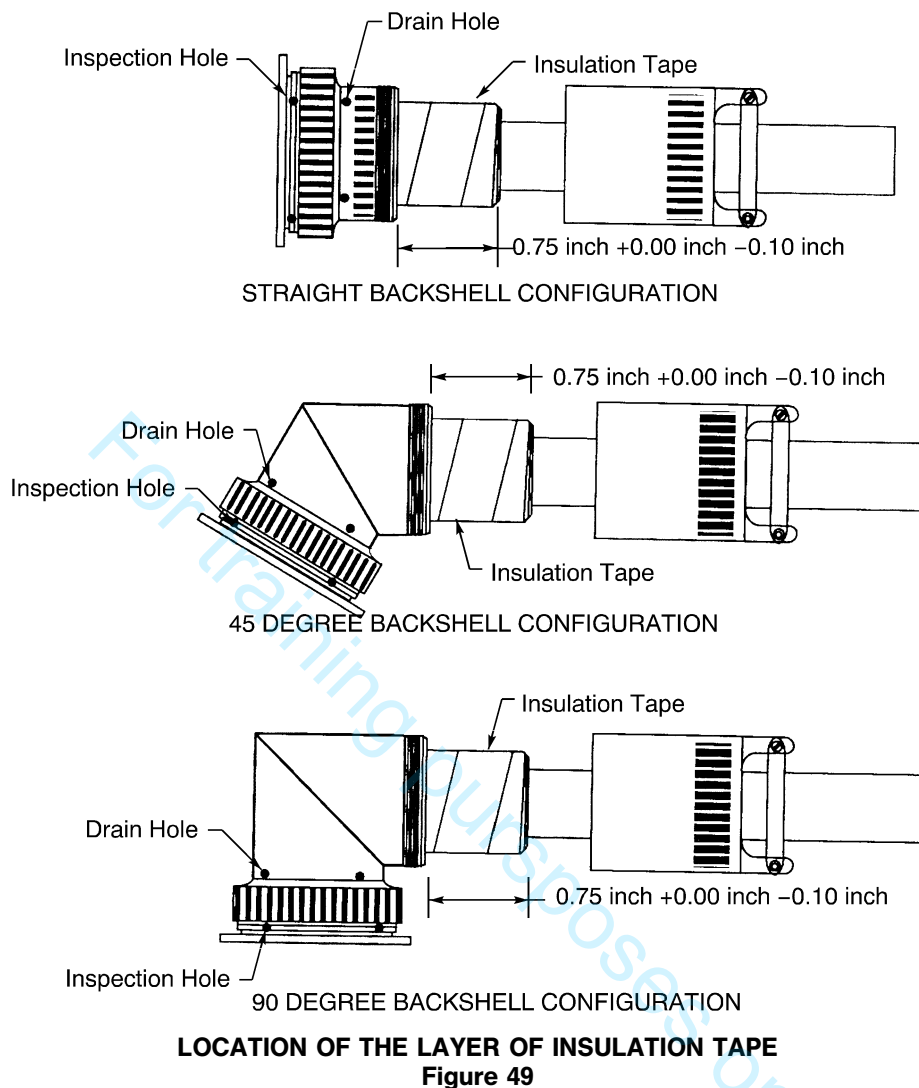
- (1) Make a selection of these materials from Table 23:
  - An adhesive tape
  - An insulation tape
  - A standard cure time sealant or a fast cure sealant.
- (2) Clean these components with isopropyl alcohol and a brush:
  - The jacket of the cable
  - The shield of the cable
  - The shield terminator band
  - The shoulder of the backshell adapter.
- (3) Put a layer of 0.75 inch wide insulation tape on the shield so that the layer of tape:
  - Starts on the shoulder of the backshell adapter
  - Stops on the jacket of the cable
  - Does not prevent the installation of the strain relief adapter.

Refer to Figure 49.

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



- (4) Put a piece of adhesive tape over one of the three inspection holes in the backshell adapter.
- (5) Put the sealant into the second inspection hole until the sealant comes out of the third inspection hole.
- NOTE:** It is not necessary to use a primer for this assembly.
- (6) Remove the adhesive tape from the first inspection hole.
- (7) Continue to put the sealant into the second inspection hole until the sealant starts to come out of the first inspection hole.
- (8) Remove all of the sealant from the outer surface of the backshell adapter.
- (9) Do Step (4) through Step (8) again for the drain holes of the backshell adapter. Refer to Figure 49.
- (10) Let the sealant cure:

**NOTE:** The strain relief adapter can be installed and the seal of the strain relief adapter can be assembled before the sealant is fully cured. Refer to Paragraph 6.E. and Paragraph 6.F.

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## STANDARD WIRING PRACTICES MANUAL

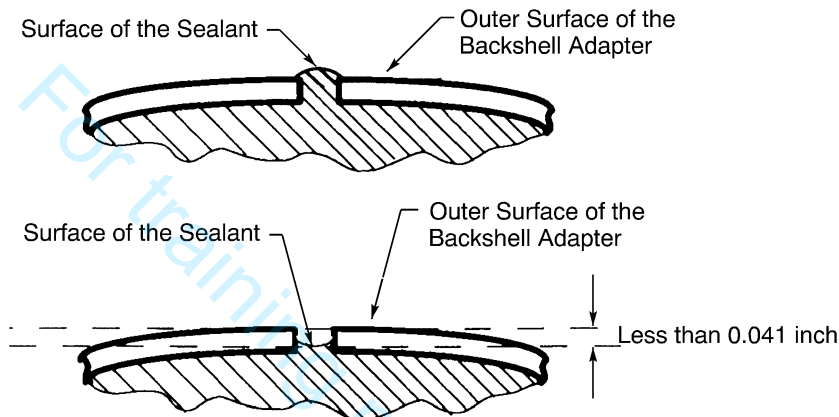
### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES

- (a) If the sealant has a standard cure time, let the sealant cure for approximately 8 hours.
- (b) If the sealant has a fast cure time, let the sealant cure for approximately 1 hour.
- (11) Examine the sealant.

Make sure that the distance from the surface of the sealant in the inspection and drain holes to the outer surface of the backshell adapter is less than 0.041 inch.

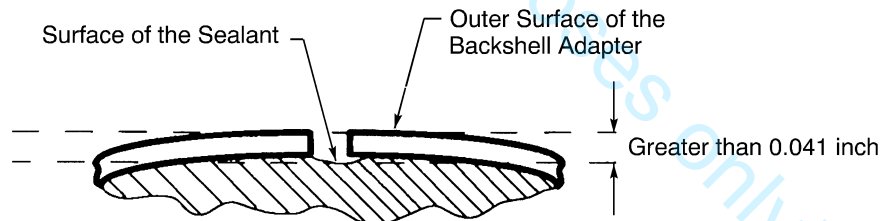
Refer to:

- Figure 50 for satisfactory levels of sealant
- Figure 51 for an unsatisfactory level of sealant.



**SATISFACTORY LEVELS OF SEALANT IN THE BACKSHELL ADAPTER**

**Figure 50**



**UNSATISFACTORY LEVEL OF SEALANT IN THE BACKSHELL ADAPTER**

**Figure 51**

- (12) If the level of sealant in one of the inspection holes or drain holes is unsatisfactory:
  - (a) Put more sealant in the hole.
  - (b) Remove all of the sealant from the outer surface of the backshell adapter.
  - (c) Let the sealant cure.

For the correct cure time, refer to Step (10).

**STANDARD WIRING PRACTICES MANUAL****REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES****E. Installation of the Strain Relief Adapter**

- (1) Make a selection of these materials from Table 23:
  - A protective tape
  - A standard cure time sealant or a fast cure sealant.
- (2) Push the strain relief adapter toward the connector until the end of the strain relief adapter is against the backshell adapter.
- (3) Make a mark on the cable under the center of the saddle clamp
- (4) Move the strain relief adapter away from the backshell adapter and the shield.
- (5) Put the necessary layers of tape around the circumference of the cable at the mark to sufficiently increase the diameter of the cable for the saddle clamp.

Make sure that:

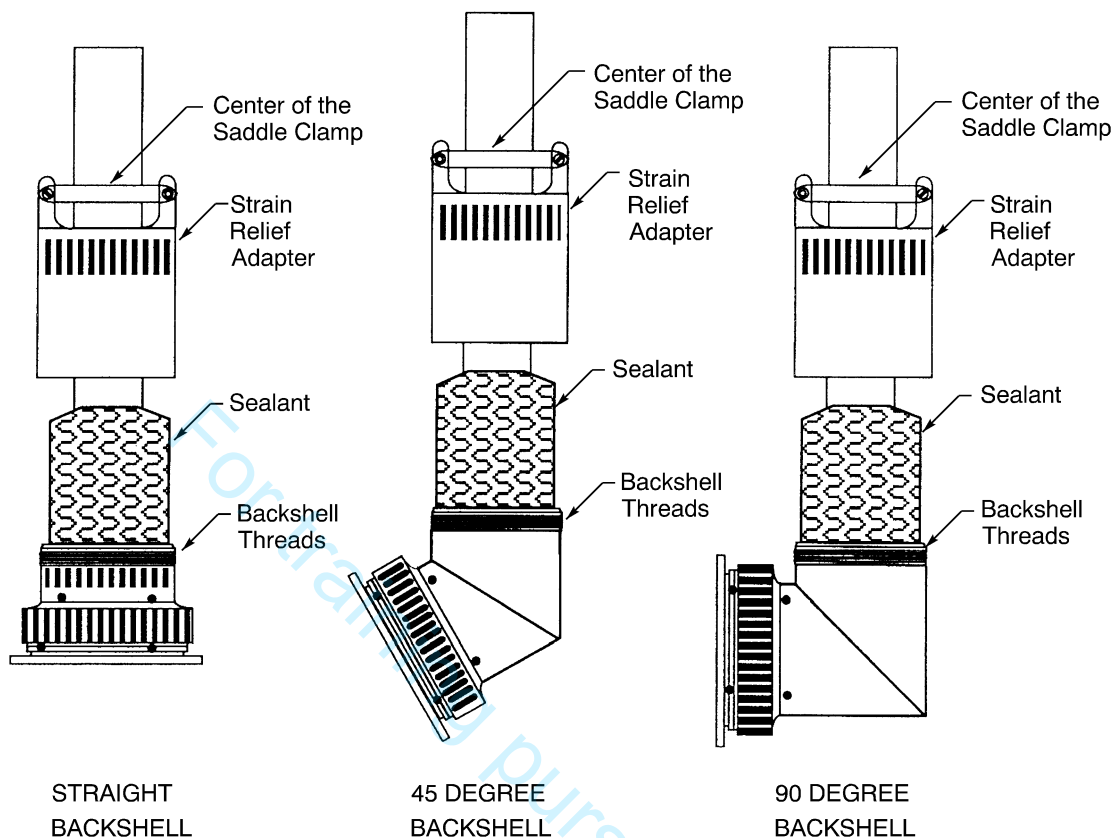
- The center of the tape is aligned with the mark
  - Each layer makes a 100 percent overlap.
- (6) Apply a layer of sealant layer on the layer of insulation tape so that the layer of sealant:
    - Makes an overlap with the cable jacket
    - Makes an overlap with the shoulder of the backshell adapter
    - Has a smaller diameter than the diameter of the strain relief adapter.

Refer to Figure 52.

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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES



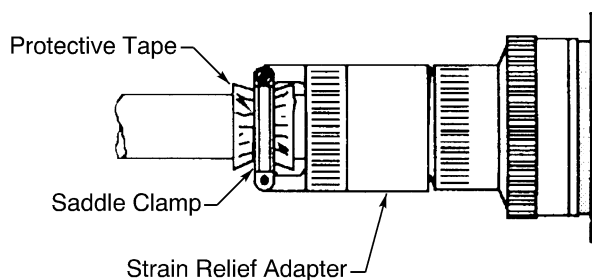
### LAYER OF SEALANT ON THE LAYER OF INSULATION TAPE

Figure 52

- (7) Engage the threads of the strain relief adapter and the backshell adapter.
- (8) Tighten the strain relief adapter with a strap wrench or an equivalent tool.
- (9) Tighten the screws of the saddle clamp. Refer to Figure 53.

Make sure that the saddle clamp is tight against:

- The surface of the strain relief adapter
- The layers of protective tape on the cable.



### POSITION OF THE SADDLE CLAMP ON THE CABLE

Figure 53

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## STANDARD WIRING PRACTICES MANUAL

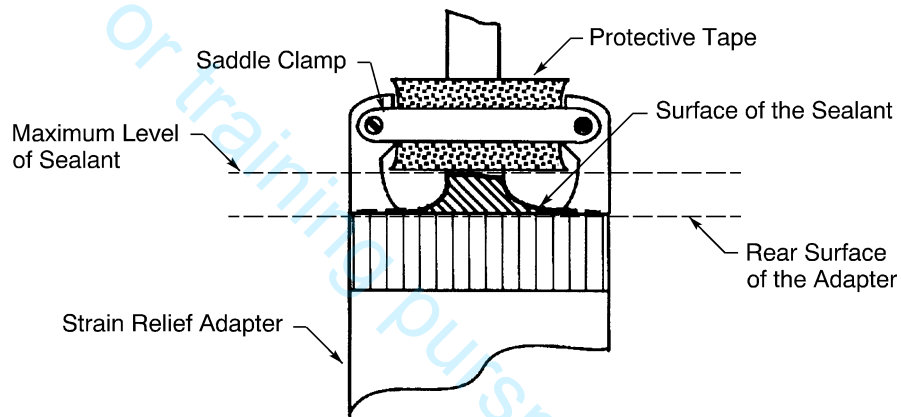
### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

#### F. Assembly of the Strain Relief Adapter Seal

- (1) Put the cable and connector assembly in the position where the face of the connector is pointed down.
- (2) Fill the inner cavity of the strain relief adapter with sealant so that:
  - The lowest level of the surface of the sealant is equal to or higher than the level of the rear surface of the adapter
  - The highest level of the surface of the sealant is lower than the lower edge of the protective tape under the saddle clamp.

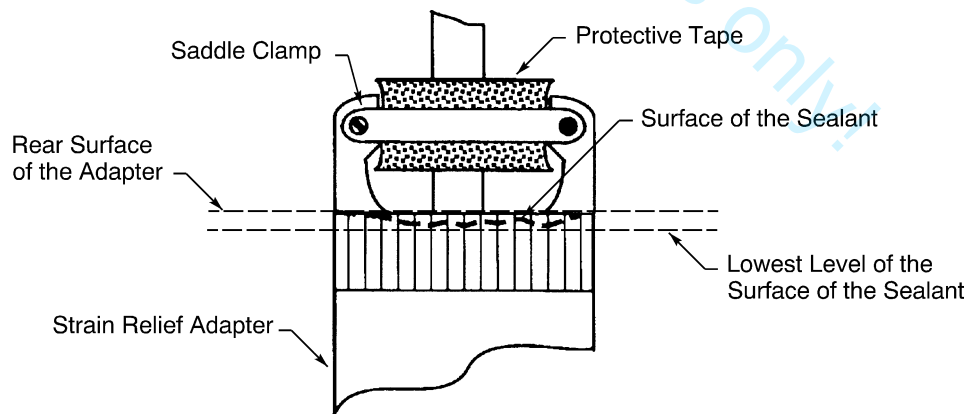
Refer to:

- Figure 54 for a satisfactory level of sealant
- Figure 55 for an unsatisfactory level of sealant.



**SATISFACTORY LEVEL OF SEALANT IN THE STRAIN RELIEF ADAPTER**

**Figure 54**



**UNSATISFACTORY LEVEL OF SEALANT IN THE STRAIN RELIEF ADAPTER**

**Figure 55**

- (3) Remove all of the sealant from the outer surface of the strain relief adapter.

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**STANDARD WIRING PRACTICES MANUAL****REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSSES**

(4) Let the sealant cure for approximately 8 hours.

(5) After eight hours, examine the seal.

Make sure that:

- The lowest level of the surface of the sealant is equal to or higher than the level of the rear surface of the adapter
- The highest level of the surface of the sealant is lower than the lower edge of the protective tape under the saddle clamp.

Refer to Figure 54 and Figure 55.

(6) If the level of sealant is unsatisfactory:

- (a) Put more sealant in the strain relief adapter.
- (b) Remove all of the sealant from the outer surface of the strain relief adapter.
- (c) Let the sealant cure for approximately 8 hours.

**7. INSTALLATION OF A 287W1619 VAPOR SEAL****A. Vapor Seal Part Numbers****Table 26****VAPOR SEAL ASSEMBLY PART NUMBERS**

Boeing Standard	Supplier
287W1619-()	QPL

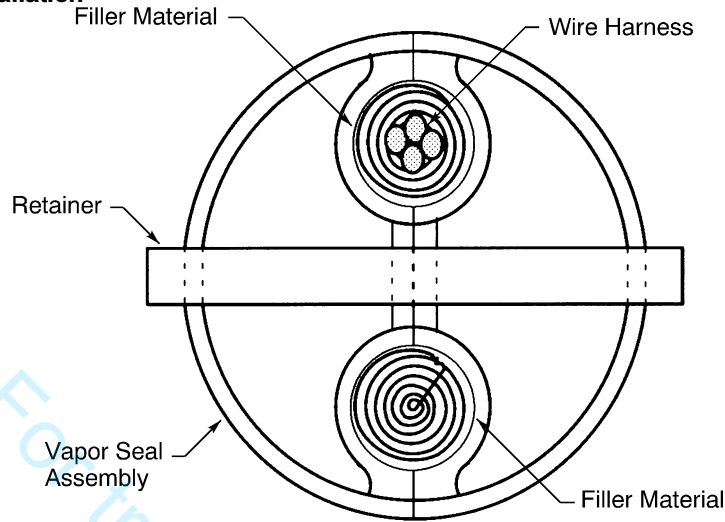
**B. Necessary Materials****Table 27****NECESSARY MATERIALS**

Material	Boeing Specification	Part Number	Supplier
Filler Material	BMS 8-300 Type I Grade 0.06	Solimide AC-406	Imi-Tech
Sealant	BMS 5-95 Class B-2	Pro-Seal 870 B-2	Courtaulds Aerospace

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

#### C. Vapor Seal Installation



#### VAPOR SEAL INSTALLATION

Figure 56

- (1) Assemble the components of the seal in the structure so that the wire harness is in one of the holes of the seal. Refer to Figure 56.
- (2) If the wire harness does not have a tight fit in the hole of the seal assembly:
  - (a) Make a selection of a filler material from Table 27.
  - (b) Cut the sufficient length of the material so that the width is  $0.625 \pm 0.125$  inch.
  - (c) Remove one half of the seal assembly.
  - (d) Wind the necessary length of the material around the wire harness at the location of the seal to increase the diameter of the wire harness.
  - (e) Install the half of the seal assembly again.

Make sure that the wire harness has a tight fit in the hole of the seal.
- (3) If the seal assembly has a hole that is not used:
  - (a) Make a selection of a filler material from Table 27.
  - (b) Cut the sufficient length of the material so that the width is  $0.625 \pm 0.125$  inch.
  - (c) Make a coil with the length of the material.
  - (d) Compress the coil.
  - (e) Put the coil in the hole.

Make sure that the coil has a tight fit in the hole of the seal.
- (4) Make a selection of a sealant from Table 27.

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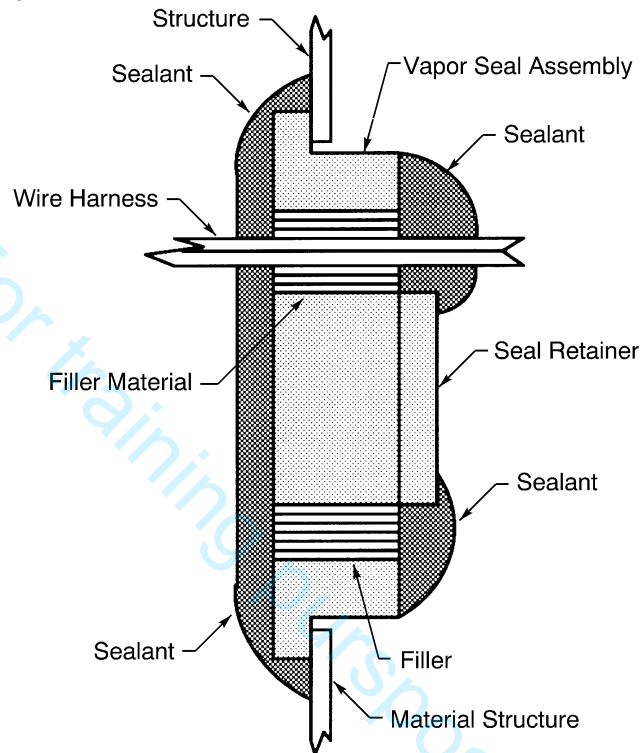
## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF PRIMARY FLIGHT CONTROL SYSTEM WIRE HARNESSES

(5) Put a layer of sealant on both sides of the seal assembly so that:

- The flat side of the seal has a layer of sealant that makes an overlap with the structure
- The holes of the other side of the seal has a layer of sealant that makes an overlap with the seal retainer.

Refer to Figure 57.



#### LOCATION OF THE SEALANT ON THE VAPOR SEAL ASSEMBLY

Figure 57

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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

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# STANDARD WIRING PRACTICES MANUAL

## REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

### 1. GENERAL DATA

#### A. General Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-10-13.

#### B. Airworthiness Limitations

These wire configurations are controlled by Critical Design Configuration Control Limitations (CDCCL) requirements.

- Fuel System Wiring that has Airworthiness Limitations
- Wiring that is installed adjacent to the fuel tank. Refer to Subject 20-10-11.

CDCCLs identify certain design configuration features intended to prevent a fuel tank ignition source for the operational life of the airplane. CDCCLs are mandatory and cannot be changed or deleted without the approval of the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency.

**WARNING:** OBEY THE MANUFACTURER'S PROCEDURES WHEN YOU DO MAINTENANCE THAT HAS AN EFFECT ON A CDCCL. IF YOU DO NOT OBEY THE PROCEDURES, IT CAN INCREASE THE RISK OF A SOURCE OF FUEL TANK IGNITION. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR IF THERE IS A FIRE OR EXPLOSION.

The use of parts, methods, techniques or practices not contained in the applicable CDCCL must meet the approval of the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency.

Design features that are CDCCLs are defined and controlled by Special Federal Aviation Regulation (SFAR) 88. For more information, refer to the applicable Airworthiness Limitation, Certification Maintenance Requirements, or Maintenance Planning Document.

To find more data about CDCCL wiring, refer to Table 1 for the document that is applicable for the airplane model.

**Table 1**  
**BOEING DOCUMENTS FOR AIRWORTHINESS LIMITATIONS**

Airplane Model	Boeing Document
707	D6-7552-AWL
727	D6-8766-AWL
737-100,-200,-200C,-300,-500	D6-38278-CMR
747-100,-200,-300,-SP	D6-13747-CMR
737-600,-700,-800 and later 737 models	Boeing Aircraft Maintenance Manual 28-00-00
747-400 and later 747 models	
757	
767	
777	
787	D011Z009-03-04

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#### C. Applicable Repair Conditions

These conditions are applicable:

- The condition that is the cause of the damage must be removed to prevent more damage.
- A repair must be done with clean hands and clean tools to prevent contamination that can cause a bad seal of the insulation materials.
- If an FQIS wire bundle is replaced or repaired, do not change the initial FQIS bundle to airplane wiring separation. The sleeving installed on the initial FQIS wire bundle can be used again.
- Tape is not permitted in the fuel tank.
- The maximum number of splices that a wire or a cable can have is three.
- The end of the splice assembly must be a minimum distance of 1 inch and a maximum distance of 1.5 inches from a clamp.
- The repair with a splice is permanent.

## 2. NECESSARY PARTS AND MATERIALS

#### A. Splice Part Numbers

**Table 2**  
**SPLICE PART NUMBERS**

Part Number	Supplier
31818	AMP
NAS1387-4	QPL

#### B. Shielded Contact Part Numbers

**Table 3**  
**SHIELDED CONTACT PART NUMBERS**

Configuration	Part Number	Supplier
Pin	10-60479-41	Boeing
	CN0941-16	Cinch
Socket	10-60479-44	Boeing
	CN0941-15	Cinch

**Table 4**  
**APPROVED SUPPLIERS OF BOEING STANDARD SHIELDED CONTACTS**

Boeing Standard	Approved Supplier
10-60479-41	Boeing
10-60479-44	Boeing

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## C. Ferrule Part Numbers

Table 5  
FERRULE PART NUMBERS

Part Number	Boeing Standard	Supplier
BACS13S156C	BACS13S	Boeing

Table 6  
APPROVED SUPPLIERS OF BOEING STANDARD FERRULES

Boeing Standard	Approved Supplier
BACS13S	Thomas & Betts Corporation

## D. Necessary Materials and Tools

Table 7  
NECESSARY MATERIALS

Material	Part Number or Boeing Specification	Class	Supplier
Sealant, Polysulfide	Pro-Seal 860	-	PRC Desoto International
	BMS 5-45	B	Boeing
Sleeve, Transparent Standard Wall	TFE 2X	-	Zeus Industrial Products
		-	Chemplast

Table 8  
APPROVED SUPPLIERS OF BOEING STANDARD SEALANTS

Boeing Material Standard	Approved Supplier
BMS 5-45	PRC Desoto International
	La Joint Francais
	Yokohama Rubber Company Ltd.

Table 9  
SOLVENTS

Solvent	Specification	Supplier
Alcohol, Isopropyl	TT-I-735 Grade A	An available source
	TT-I-735 Grade B	An available source
Alcohol, Denatured, Ethyl	O-E-760	An available source

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Table 10  
NECESSARY TOOLS

Material or Tool	Description	Boeing Specification	Class	Supplier
Injection Tool	Sealant injection tool with a small tip	-	-	An available source
Sealant Application Brush	Brush, soft bristle	-	-	An available source
Solvent Application Brush	Brush, soft bristle	-	-	An available source
Wiper	Absorbent	BMS 15-5	A	Boeing

Table 11  
APPROVED SUPPLIERS OF BOEING STANDARD WIPERS

Boeing Material Standard	Approved Supplier
BMS 15-5	American Fiber & Finishing Incorporated
	BBA Nonwovens Walpole
	DeRoyal Textiles
	Ho Chang Medical Company
	Nippon Weston Company

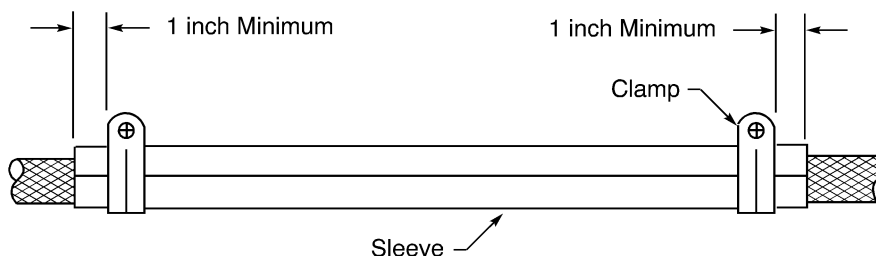
### 3. REPAIR OF A LOW-Z OR A HIGH-Z WIRE WITH GREEN OUTER BRAID

#### A. Repair of the Green Braid - Temporary

**CAUTION:** REPLACEMENT OF A WIRE WITH TEMPORARY REPAIR IS NECESSARY. THE WIRE MUST BE REPLACED AT A MAXIMUM OF 4000 FLIGHT HOURS.

Table 12  
NECESSARY MATERIALS

Material	Part Number	Supplier
Sleeve, Heat Shrinkable	AMS-DTL-23053/12-234	An available source



CONFIGURATION OF THE SLEEVE ON WIRE  
Figure 1

- (1) Measure the distance from the outer edge of one clamp to the outer edge of the other clamp.

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### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

- (2) Make a selection of a 1.5 inch diameter sleeve from Table 12.

Make sure that the length of the sleeve is a minimum of two inches greater than the distance from outer edge of the clamp to the outer edge of the other clamp.

- (3) Make a cut along the longitudinal axis of the sleeve.  
 (4) Loosen the clamp on each side of the damage.  
 (5) Put the sleeve on the wire.

Make sure that:

- The longitudinal edges of the sleeve make an overlap of not less than 50 percent of the circumference of the wire harness
- The sleeve goes through each clamp
- The end of the sleeve extends a minimum of 1 inch farther than the outer edge of each clamp.

- (6) Tighten each clamp.

#### B. Repair of the Green Braid - Permanent Repair

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

Material	Part Number	Supplier
Sleeve, Transparent Heat Shrinkable	AMS-DTL-23053/12-228	An available source
	TFE 2X	Chemplast
		Zeus Industrial Products

- (1) Make a selection of a solvent from Table 9.

**WARNING:** SOLVENTS ARE FLAMMABLE. MAKE SURE THAT THE QUANTITY OF SOLVENT NEAR THE AIRPLANE IS NOT MORE THAN THE QUANTITY THAT IS NECESSARY TO CLEAN THE WIRE OR CABLE.

**CAUTION:** A SOLVENT THAT IS NOT SPECIFIED FOR THE MATERIALS AND THE COMPONENTS IN A WIRE OR CABLE MUST NOT BE APPLIED. DAMAGE TO THE WIRE OR CABLE CAN OCCUR.

- (2) Make a selection of a solvent application brush from Table 10.  
 (3) Make a selection of a wiper from Table 10.  
 (4) Make a selection of an injection tool from Table 10.  
 (5) Make a selection of a 2 inch length of 3/8 inch diameter transparent heat shrinkable sleeve from Table 13.

**NOTE:** An equivalent transparent heat shrinkable sleeve is a satisfactory alternative. Refer to Subject 20-00-11.

- (6) Cut the loose outer braid strands at the area of damage.

**CAUTION:** DO NOT MAKE A CUT OR A NICK IN THE WIRE JACKET. DAMAGE TO THE WIRE JACKET CAN CAUSE UNSATISFACTORY PERFORMANCE AND RELIABILITY OF THE WIRE.

- (7) Clean the outer braid with a brush moist with alcohol.

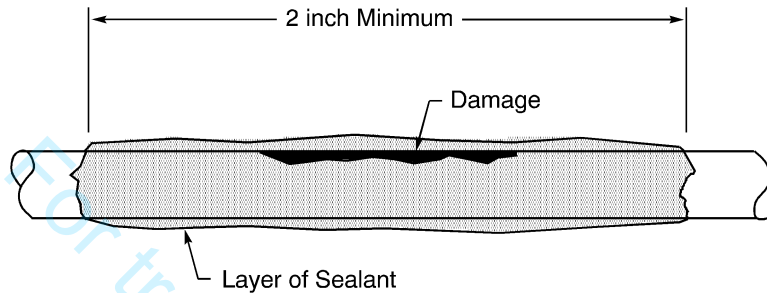
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### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSES

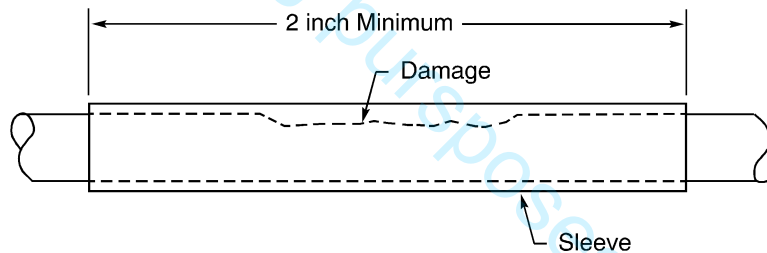
Make sure that the cleaned area extends a minimum of 2 inches from the end of the area with damage.

- (8) Dry the cleaned area with a wiper.
- (9) Disconnect one end of the wire.
- (10) Put the end of the wire through the sleeve.
- (11) Apply a continuous layer of sealant on the area of braid with damage. Refer to Figure 2.



**LAYER OF SEALANT ON THE DAMAGED GREEN OUTER BRAID**  
Figure 2

- (12) Align the center of the sleeve with the center of the area with damage. Refer to Figure 3.



**POSITION OF THE SLEEVE ON THE CABLE**  
Figure 3

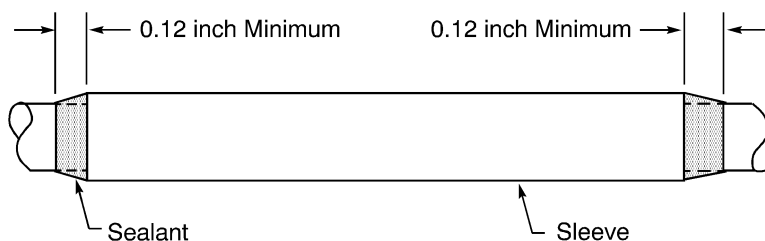
- (13) Put a layer of sealant between each end of the sleeve and wire. Refer to Figure 4.

Make sure that:

- The layer is continuous around the circumference of the wire
- The distance from the end of the sleeve to the end of the sealant is 0.5 inch minimum
- The area between the outer braid and the sleeve is full of sealant.

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSES



**CONFIGURATION OF THE SLEEVE AND THE SEALANT**

**Figure 4**

(14) Let the sealant cure for the specified cure time. Refer to Table 14.

**Table 14**  
**SEALANT CURE TIME**

Sealant	Minimum Cure Time (Hours)
BMS 5-45 Class B	48
Proseal 860	8

(15) Put the wire harness in its initial installed configuration.

#### 4. REPAIR OF AN UNSHIELDED LOW-Z WIRE

##### A. Assembly of a Splice in an Lo-Z (Unshielded) Wire

- (1) Prepare the ends of the wire. Refer to Paragraph 4.B..
- (2) Install the sleeve and assemble the splice. Refer to Paragraph 4.C..
- (3) Seal the splice. Refer to Paragraph 4.D.

##### B. Wire Preparation for the Splice Assembly

- (1) Cut the wire.  
Make sure that the area of the wire with damage is removed.
- (2) Make a selection of a solvent from Table 9.

**WARNING:** SOLVENTS ARE FLAMMABLE. MAKE SURE THAT THE QUANTITY OF SOLVENT NEAR THE AIRPLANE IS NOT MORE THAN THE QUANTITY THAT IS NECESSARY TO CLEAN THE WIRE OR CABLE.

**CAUTION:** A SOLVENT THAT IS NOT SPECIFIED FOR THE MATERIALS AND THE COMPONENTS IN A WIRE OR CABLE MUST NOT BE APPLIED. DAMAGE TO THE WIRE OR CABLE CAN OCCUR.

- (3) Make a selection of a wiper from Table 10.
- (4) Clean each end of the wire:
  - With a wiper moist with alcohol
  - From the end of the wire to a minimum of 2 inches from the end of the wire.
- (5) Dry the cleaned area with a new wiper.
- (6) Remove the necessary length of insulation from the end of each wire.

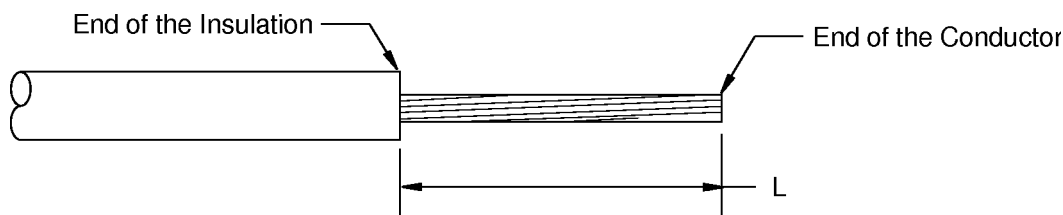
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### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

Refer to:

- Figure 5
- Table 15 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedures.



**INSULATION REMOVAL LENGTH**

**Figure 5**

**Table 15  
INSULATION REMOVAL LENGTH**

Splice	Removal Length L (inch)	
	Target	Tolerance
31818	0.28	± 0.03
NAS1387-4	0.28	± 0.03

(7) Remove the contamination from the end of the conductor and the cable jacket a minimum of 1.5 inch from the end of the wire.

(8) Dry the cleaned area with a new wiper.

#### C. Splice Assembly

**Table 16  
CRIMP TOOLS**

Crimp Barrel Size	Crimp Tool			
	Basic Unit	Head	Die	Nest (AWG)
22-18	314590-()	-	314656-1	-
	314700-()	-	314656-1	-
	46673	-	-	-
	49900	-	-	22-18
	49935	-	-	22-18
	69005	300454	-	-
	M22520/5-01	-	Y641	22-18
	PHRPU2	PHMT1005	-	-

(1) Make a selection of a splice from Table 2.

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## STANDARD WIRING PRACTICES MANUAL

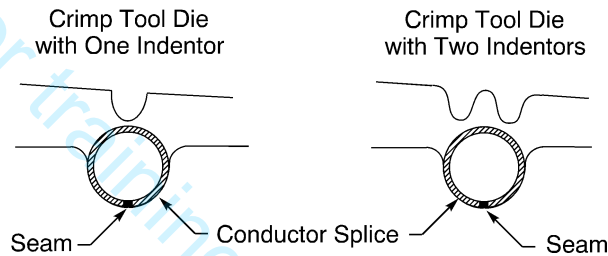
### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

- (2) Make a selection of a crimp tool from Table 16.
- (3) Make a selection of a 1.5 ± 0.1 inch length of 3/8 inch diameter transparent heat shrinkable sleeve from Table 7.

**NOTE:** An equivalent transparent heat shrinkable sleeve is a satisfactory alternative. Refer to Subject 20-00-11.

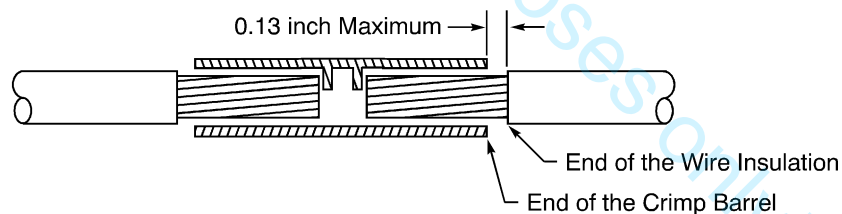
**NOTE:** HEAT SHRINKABLE SLEEVE TO REMAIN UNSHRUNK.

- (4) Put the sleeve on the end of one wire.
- (5) Assemble one end of the splice:
  - (a) Put the splice in the crimp tool.
  - (b) If the splice has a seam, align the seam opposite the indenter. Refer to Figure 6.



**POSITION OF THE SPLICE IN THE CRIMP TOOL**  
**Figure 6**

- (c) Hold the splice in position with light pressure.
- (d) Put the wire in the end of the splice. Refer to Figure 7.



**POSITION OF THE WIRE IN THE SPLICE**  
**Figure 7**

Make sure that:

- The end of the conductor does not make an overlap with the wire stop
- The wire insulation is not in the crimp barrel
- The end of the wire insulation is not more than 0.13 inch from the end of the crimp barrel.

- (e) Crimp the splice.
- (6) Do Step (5) again to assemble the other end of the splice.
- (7) Seal the splice assembly. Refer to Paragraph 4.D..

#### D. Seal of the Splice Assembly

- (1) Make a selection of a solvent from Table 9.

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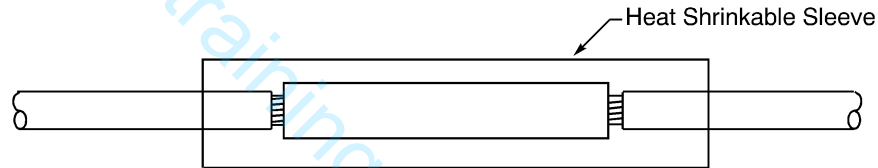
## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSES

**WARNING:** SOLVENTS ARE FLAMMABLE. MAKE SURE THAT THE QUANTITY OF SOLVENT NEAR THE AIRPLANE IS NOT MORE THAN THE QUANTITY THAT IS NECESSARY TO CLEAN THE WIRE.

**CAUTION:** A SOLVENT THAT IS NOT SPECIFIED FOR THE MATERIALS AND THE COMPONENTS IN A WIRE MUST NOT BE APPLIED. DAMAGE TO THE WIRE CAN OCCUR.

- (2) Make a selection of an injection tool from Table 10.
- (3) Make a selection of a wiper from Table 10.
- (4) Remove the contamination with a wiper moist with alcohol from:
  - The splice
  - The splice to a minimum of 2 inches from each end of the splice.
- (5) Dry the cleaned area with a new wiper.
- (6) Make a selection of a sealant from Table 7.
- (7) Align the center of the sleeve with the center of the splice. Refer to Figure 8.



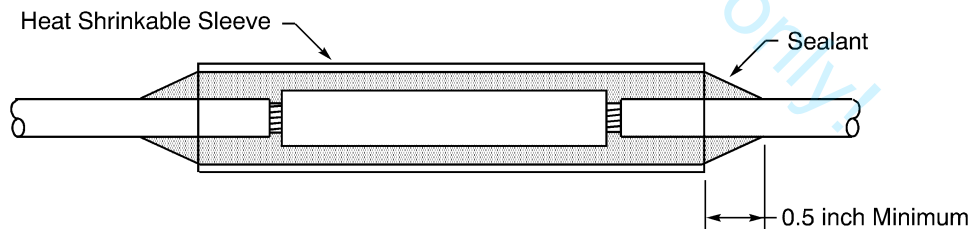
**POSITION OF THE SLEEVE ON THE SPLICE ASSEMBLY**

**Figure 8**

- (8) Put a layer of sealant between the sleeve and the splice. Refer to Figure 9.

Make sure that:

- The layer is continuous
- The distance from the end of the sleeve to the end of the sealant is 0.5 inch minimum
- The area between the splice and the sleeve is full of sealant.



**AREA OF SEALANT**

**Figure 9**

- (9) Let the sealant cure for the specified cure time. Refer to Table 17.

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

**Table 17**  
**SEALANT CURE TIME**

Sealant	Minimum Cure Time (Hours)
BMS 5-45 Class B	48
Proseal 860	8

#### E. Replacement of a Ring Terminal on an Unshielded Wire

**Table 18**  
**NECESSARY PARTS**

Description	Crimp Barrel Size	Stud Hole Size	Part Number
Terminal Lug	22-18	10	BACT12M4

- (1) Remove the end of the wire that has damage or corrosion.
- (2) Make a selection of a new terminal from Table 18.
- (3) Install the terminal on the end of the conductor:
  - (a) Remove the necessary length of the insulation from the end of the wire.  
Refer to Subject 20-30-11.
  - (b) Make a selection of a solvent from Table 9.
  - (c) Make a selection of a wiper from Table 10.
  - (d) Use the solvent and the wiper to clean the conductors of the wire.  
Refer to Subject 20-60-01.
  - (e) Install the terminal on the end of the wire.  
Refer to Subject 20-30-11.
- (4) Make a selection of a sealant from Table 7.
- (5) Make a selection of a sealant application brush from Table 10.
- (6) Apply a layer of the sealant on all exposed conductor surfaces.
- (7) Make a selection of a sealant injection tool Table 10.
- (8) Inject the sealant between the insulating sleeve and the terminal body.  
Make sure that:
  - The the area at the rear of the terminal lug between the insulating sleeve and the terminal body is filled with sealant
  - Sealant is not on the surfaces of the ring of the terminal lug.

#### 5. REPAIR OF A SHIELDED HI-Z WIRE

##### A. Assembly of a Shielded Wire Splice

This paragraph gives the procedure to assemble a splice in a Hi-Z (shielded) wire.

NOTE: The splice in the shielded wire is made from a sealed, engaged pair of shielded contacts.

- (1) Prepare the ends of the wire. Refer to Paragraph 5.B..

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

- (2) Assemble the contacts, Install the sleeve, and engage the contacts. Refer to Paragraph 5.C..
- (3) Seal the engaged contacts. Refer to Paragraph 5.D..

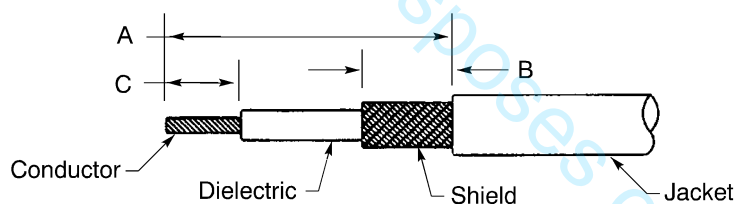
#### B. Cable Preparation

- (1) Cut the cable at each edge of the area of damage.  
Make sure that the area of the cable with damage is removed.
- (2) Make a selection of a solvent from Table 9.

**WARNING:** SOLVENTS ARE FLAMMABLE. MAKE SURE THAT THE QUANTITY OF SOLVENT NEAR THE AIRPLANE IS NOT MORE THAN THE QUANTITY THAT IS NECESSARY TO CLEAN THE CABLE.

**CAUTION:** A SOLVENT THAT IS NOT SPECIFIED FOR THE MATERIALS AND THE COMPONENTS IN A CABLE MUST NOT BE APPLIED. DAMAGE TO THE CABLE CAN OCCUR.

- (3) Make a selection of a wiper from Table 10.
- (4) Clean each end of the cable:
  - With a wiper moist with alcohol
  - From the end of the cable to a minimum of 2 inches from the end of the cable.
- (5) Dry the cleaned area with a new wiper.
- (6) Prepare the cable. Refer to:
  - Figure 10
  - Table 19 for the removal lengths
  - Subject 20-00-15 for the insulation removal procedures.



**WIRE PREPARATION**  
Figure 10

**Table 19**  
**INSULATION REMOVAL LENGTH**

Contact	Removal Length L		
	Dimension	Target (inch)	Tolerance (inch)
10-60479-41	A	0.50	± 0.03
	B	0.22	± 0.03
	C	0.18	± 0.03

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**STANDARD WIRING PRACTICES MANUAL****REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES****Table 19 (continued)**

<b>Contact</b>	<b>Removal Length L</b>		
	<b>Dimension</b>	<b>Target (inch)</b>	<b>Tolerance (inch)</b>
10-60479-44	A	0.50	± 0.03
	B	0.22	± 0.03
	C	0.18	± 0.03
CN0940-41	A	0.50	± 0.03
	B	0.22	± 0.03
	C	0.18	± 0.03
CN0940-44	A	0.50	± 0.03
	B	0.22	± 0.03
	C	0.18	± 0.03

- (a) Remove the necessary length of jacket from the end of the cable to make the distance from the end of the jacket to the end of the cable equal to Dimension A.

**CAUTION:** DO NOT CUT OR MAKE A NICK IN THE SHIELD. DAMAGE TO THE SHIELD CAN CAUSE UNSATISFACTORY CABLE PERFORMANCE AND RELIABILITY OF THE CABLE.

- (b) Remove the necessary length of the shield to make the distance from the end of the shield to the end of the cable jacket equal to Dimension B.

**CAUTION:** DO NOT CUT OR MAKE A NICK IN THE DIELECTRIC. DAMAGE TO THE DIELECTRIC CAN CAUSE UNSATISFACTORY PERFORMANCE AND RELIABILITY OF THE CABLE.

- (c) Remove the necessary length of the dielectric to make the distance from the end of the conductor to the end of the dielectric equal to Dimension C.

**CAUTION:** DO NOT CUT OR MAKE A NICK IN THE CONDUCTOR. DAMAGE TO THE CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE AND RELIABILITY OF THE CABLE.

- (7) Clean each end of the cable again:
- With a wiper moist with alcohol
  - From the end of the cable to a minimum of 2 inches from the end of the cable.
- (8) Dry the cleaned area with a new wiper.

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## REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

### C. Assembly of the Shielded Contacts

Table 20  
CENTER CONTACT CRIMP TOOLS

Wire Size (AWG)	Center Contact Size	Crimp Tool		
		Basic Unit		Locator
		Part Number	Setting	
24	20	M22520/1-01	2	M22520-1-02
		M22520/2-01	5	M22520/2-02
		ST2220-1-Y	-	ST2220-1-15A
		WA22	5	M22520/2-02
		WA27F	2	M22520-1-02
22	20	M22520/1-01	3	M22520-1-02
		M22520/2-01	6	M22520/2-02
		ST2220-1-Y	-	ST2220-1-15A
		WA22	6	M22520/2-02
		WA27F	3	M22520-1-02
20	20	M22520/1-01	4	M22520-1-02
		M22520/2-01	7	M22520/2-02
		ST2220-1-Y	-	ST2220-1-15A
		WA22	7	M22520/2-02
		WA27F	4	M22520-1-02

Table 21  
FERRULE CRIMP TOOLS

Basic Unit	Die	
	Part Number	Cavity
M22520/5-01	M22520/5-10	-
	M22520/5-39	-
ST965-1	-	-
WT-202	-	-
WT-202-06-08	-	S

- (1) Make a selection of a socket contact and a pin contact from Table 3.
- (2) Discard these items from the contact kit:
  - The seal boot
  - The outer ferrule.
- (3) Make a selection of an outer ferrule from Table 5.

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### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

- (4) Make a selection of one 2.5 inch  $\pm$  0.1 inch length of 3/8 inch diameter transparent heat shrinkable sleeve from Table 7.

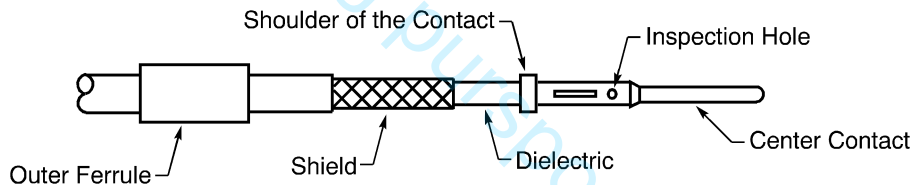
**NOTE:** An equivalent transparent heat shrinkable sleeve is a satisfactory alternative. Refer to Subject 20-00-11.

- (5) Make a selection of a center contact crimp tool from Table 20.
- (6) Make a selection of a ferrule crimp tool from Table 21.
- (7) Put the sleeve on the end of one cable.
- (8) Assemble the contact:
- Put the outer ferrule on the end of the cable.
  - If the strands of the center conductor are apart, twist the strands together in their initial direction.
  - Push the center conductor into the crimp barrel of the center contact until the inner dielectric is against the shoulder of the center contact.

Make sure that:

- All of the strands of the conductor are in the crimp barrel
- The strands of the conductor can be seen in the inspection hole
- The dielectric is against the shoulder of the center contact.

Refer to Figure 11.



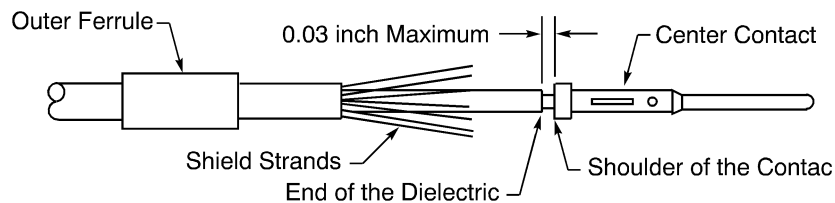
**POSITION OF THE CENTER CONTACT ON THE CABLE**

**Figure 11**

- (d) Crimp the center contact.

Make sure that the distance from the end of the dielectric to the contact is not more than 0.03 inch.

- (9) Move the strands of the shield apart. Refer to Figure 12.



**CONFIGURATION OF THE SHIELD STRANDS**

**Figure 12**

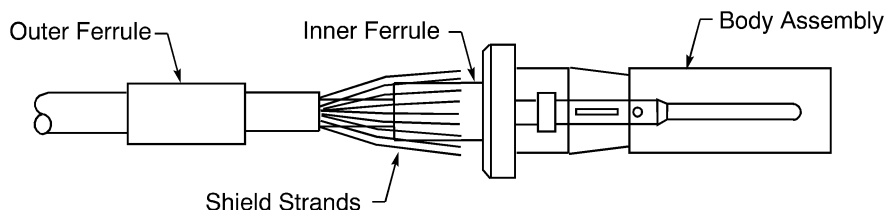
- (10) Put the body assembly on the center contact. Refer to Figure 13.

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

Make sure that the inner ferrule of the body assembly is between the shield strands and the inner dielectric.



**POSITION OF THE BODY ASSEMBLY ON THE CENTER CONTACT**

**Figure 13**

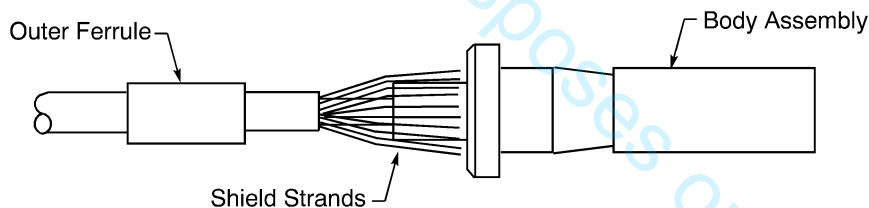
- (11) Push the center contact into the body assembly until it is locked in the body assembly.
- (12) To make sure that the center contact is locked, hold the body of the contact and lightly pull the cable.

**CAUTION:** DO NOT PULL THE CABLE WITH A STRONG OR A SUDDEN FORCE. THE FORCE CAN CAUSE DAMAGE TO THE CONNECTOR OR THE CONTACT.

**CAUTION:** DO NOT MAKE A DENT IN THE WIRE INSULATION WITH THE FINGERNAILS. DAMAGE TO THE WIRE INSULATION CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (13) If the center contact moves out of the body assembly, do Step (11) and Step (12) again.
- (14) Put the strands of the shield on the inner ferrule. Refer to Figure 14.

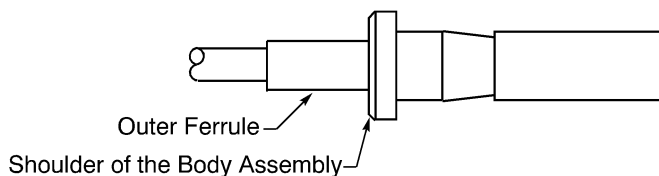
Make sure that the strands of the shield are symmetrical around the inner ferrule.



**POSITION OF THE SHIELD ON THE INNER FERRULE**

**Figure 14**

- (15) Push the outer ferrule forward to the end of the cable until the forward end of the outer ferrule is against the shoulder of the body assembly. Refer to Figure 15.



**POSITION OF THE OUTER FERRULE**

**Figure 15**

- (16) Crimp the outer ferrule.

**20-14-12**

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

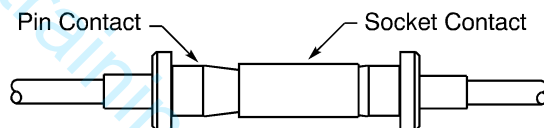
#### D. Seal of Engaged Contacts

- (1) Make a selection of a solvent from Table 9.

**WARNING:** SOLVENTS ARE FLAMMABLE. MAKE SURE THAT THE QUANTITY OF SOLVENT NEAR THE AIRPLANE IS NOT MORE THAN THE QUANTITY THAT IS NECESSARY TO CLEAN THE CABLE ASSEMBLY.

**CAUTION:** A SOLVENT THAT IS NOT SPECIFIED FOR THE MATERIALS AND THE COMPONENTS IN A CABLE ASSEMBLY MUST NOT BE APPLIED. DAMAGE TO THE CABLE ASSEMBLY CAN OCCUR.

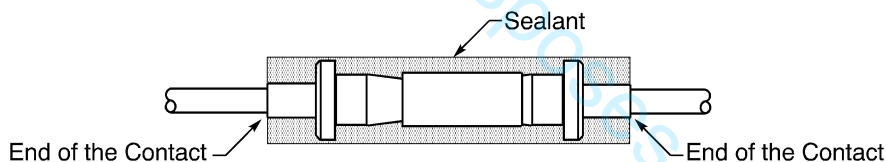
- (2) Make a selection of a wiper from Table 10.
- (3) Clean the cable from the forward end of the contact to a minimum of 2 inches from the end of the contact.
- (4) Dry the cleaned area with a new wiper.
- (5) Engage the pin and socket contact. Refer to Figure 16.



**ENGAGED PIN AND SOCKET CONTACTS**

**Figure 16**

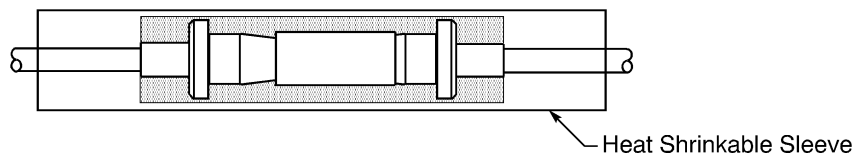
- (6) Apply a continuous layer of sealant on the area of the engaged contacts. Refer to Figure 17.



**LAYER OF SEALANT ON THE ENGAGED CONTACTS**

**Figure 17**

- (7) Slowly push the sleeve until the center of the sleeve is aligned with the center of the engaging contacts. Refer to Figure 18.



**POSITION OF THE SLEEVE ON THE ENGAGED CONTACTS**

**Figure 18**

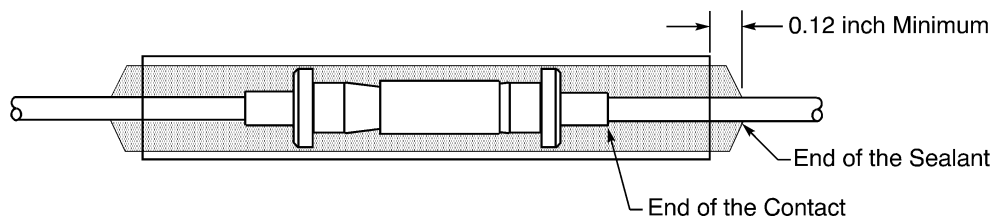
- (8) Apply a continuous layer of sealant between the sleeve and the engaged contacts. Refer to Figure 19.

## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

Make sure that:

- The engaged contacts has a full layer of sealant on the length and circumference of the contact surface
- The sealant extends a minimum of 0.12 inch farther than each end of the sleeve.



**AREA OF SEALANT**  
**Figure 19**

- (9) Apply pressure with the fingers to the sleeve to push the air bubbles out.
- (10) Let the sealant cure for the specified time. Refer to Table 22.

**Table 22**  
**SEALANT CURE TIME**

Sealant	Minimum Cure Time (Hours)
BMS 5-45 Class B	48
Proseal 860	8

#### E. Replacement of Ring Terminals on a Shielded Wire

**Table 23**  
**NECESSARY PARTS**

Description	Crimp Barrel Size	Application	Stud Hole Size	Part Number
Terminal Lug	22-18	Shield Ground Wire	6	BACT12M130
		Center conductor	10	BACT12M4

**NOTE:** Some Hi-Z wires have a solder sleeve that connects the shield ground wire to the shield. It is NOT permitted to repair these wires with a solder sleeve, because the necessary heat sources are not allowed inside the fuel tank. A repair to these wires must use mechanical ferrules and this procedure.

- (1) Cut off the terminal from the wire that has damage or corrosion.
- (2) Cut off the end of the wire that has damage or corrosion.
- (3) Make a selection of a terminal for the center conductor and a terminal for the shield ground wire from Table 23.
- (4) Prepare the center conductor. Refer to Subject 20-10-15.
- (5) Prepare the shield. Refer to Subject 20-10-15.

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

- (6) Make a selection of a solvent from Table 9.
- (7) Make a selection of a wiper from Table 10.
- (8) Use the solvent and the wiper to clean the conductors of the wire.  
Refer to Subject 20-60-01
- (9) Assemble an inner ferrule, an outer ferrule and a shield ground wire. Refer to Subject 20-10-15 Shield Terminations for Boeing 10-60875 Cable.
- (10) Assemble the BACT12M130 terminal lug to the end of the shield ground wire.  
Refer to Subject 20-30-11.
- (11) Assemble the BACT12M4 terminal lug to the center conductor.  
Refer to Subject 20-30-11.
- (12) Make a selection of a sealant application brush from Table 10.
- (13) Apply a layer of the sealant on all exposed conductor surfaces.
- (14) Make a selection of a sealant injection tool from Table 10.
- (15) Inject the sealant between the insulating sleeve and the terminal body on each terminal lug.  
Make sure that:
  - The the area at the rear of the terminal lug between the insulating sleeve and the terminal body is filled with sealant
  - Sealant is not on the surfaces of the ring of the terminal lug.

#### 6. APPROVED TOOL SUPPLIERS

##### A. Crimp Tools

**Table 24**  
**CRIMP TOOL SUPPLIERS**

Crimp Tool	Supplier
300454	AMP
314590-()	AMP
314656-1	AMP
314700-()	AMP
46673	AMP
49900	AMP
49935	AMP
69005	AMP
M22520-1-02	QPL
M22520/1-01	QPL
M22520/2-01	QPL
M22520/2-02	QPL
M22520/5-01	QPL
M22520/5-10	QPL

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## STANDARD WIRING PRACTICES MANUAL

### REPAIR OF FUEL QUANTITY INDICATOR SYSTEM (FQIS) WIRE HARNESSSES

Table 24 (continued)

Crimp Tool	Supplier
M22520/5-39	QPL
PHMT1005	Daniels
PHRPU2	Daniels
ST2220-1-15A	Boeing
ST2220-1-Y	Boeing
ST965-1	Boeing
WA22	Daniels
WA27F	Daniels
WT-202	Daniels
WT-202-06-08	Daniels
Y641	Daniels

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## STANDARD WIRING PRACTICES MANUAL

### INSTALLATION OF BACG20AN SEAL FITTINGS

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<b>1. <u>PART NUMBERS AND DESCRIPTION</u></b>	<b>1</b>
A. Seal Fitting Part Numbers	1
B. Necessary Materials	2
<b>2. <u>REMOVAL OF THE BACG20AN SEAL FITTING</u></b>	<b>2</b>
A. Seal Removal	2
<b>3. <u>INSTALLATION OF A BACG20AN SEAL FITTING</u></b>	<b>3</b>
A. Installation of a Seal Fitting with Tie Tabs	3
B. Installation of a Seal Fitting without Tie Tabs	5
<b>4. <u>INSTALLATION OF UNSEALED WIRE HARNESSSES IN BACG20AN SEAL FITTINGS</u></b>	<b>7</b>
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B. Surface Preparation for Sealant Application	9
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## 20-14-14 CONTENTS

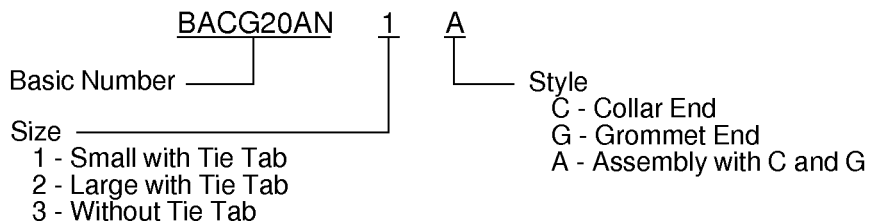
## STANDARD WIRING PRACTICES MANUAL

### INSTALLATION OF BACG20AN SEAL FITTINGS

This Subject gives the procedures to seal a wire harness that has a routing through the pressure bulkhead.

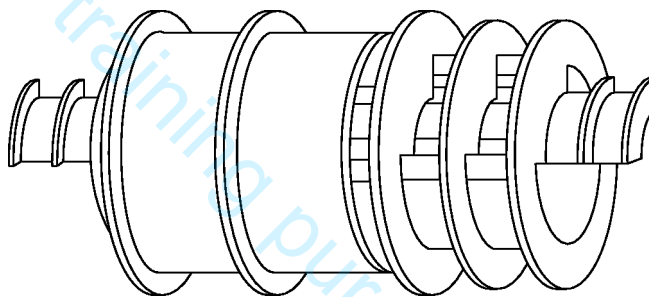
#### 1. PART NUMBERS AND DESCRIPTION

##### A. Seal Fitting Part Numbers



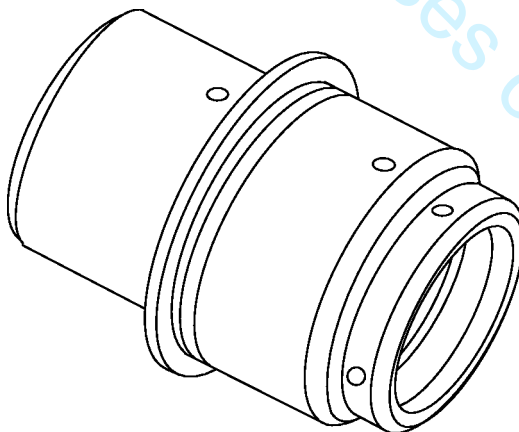
#### BACG20AN PART NUMBER STRUCTURE

Figure 1



SEAL FITTING WITH TIE TABS

Figure 2



SEAL FITTING WITHOUT TIE TABS

Figure 3

# STANDARD WIRING PRACTICES MANUAL

## INSTALLATION OF BACG20AN SEAL FITTINGS

### B. Necessary Materials

Table 1  
NECESSARY MATERIALS

Material	Specification	Part Number	Supplier
Sealant	BMS 5-45	Class A Grade 1	QPL
		Class A-2 Grade 2	QPL
		Class B-1/2 Form B	QPL
		Class B-2	QPL
		Class C-24	QPL
		Class C-48 Form B	QPL
		Class C-168 Form K	QPL
Solvent	TT-I-735	-	An available source
	TT-N-95 Type I	-	An available source
	TT-N-95 Type II	-	An available source
Tape, Adhesive, Plastic	-	P-29	Permacel
Tape, Lacing	BMS 13-54	BMS13-54GBT1C1FC85-14WH	QPL
Tie Strap, Plastic	BACS38W	BACS38W	QPL

## 2. REMOVAL OF THE BACG20AN SEAL FITTING

### A. Seal Removal

**CAUTION:** DO NOT CAUSE DAMAGE TO:

- THE STRUCTURE
- THE WIRE HARNESS, IF THE WIRE HARNESS MUST BE USED AGAIN.

- (1) Make a selection of a scraper made of wood or plastic.

**CAUTION:** DO NOT USE A SCRAPER THAT IS MADE OF A MATERIAL THAT IS HARDER THAN 2024-T3 ALUMINUM. A HARDER MATERIAL CAN CAUSE DAMAGE TO THE STRUCTURE.

- (2) Make a selection of a solvent from Table 1.
- (3) Remove the sealant on and around the installation hardware of the seal fitting.
- (4) Remove the installation hardware.
- (5) Remove the seal fitting from the structure:
  - (a) Carefully put the scraper between the seal fitting and the structure.
  - (b) Move the two halves of the seal apart.
- (6) If the fitting must be replaced, discard the seal fitting.
- (7) If the wire harness must be installed again:
  - (a) Carefully remove the sealant from each wire or cable.

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**STANDARD WIRING PRACTICES MANUAL****INSTALLATION OF BACG20AN SEAL FITTINGS**

**CAUTION:** DO NOT USE A SHARP TOOL OR TOO MUCH FORCE TO REMOVE SEALANT. DAMAGE TO THE WIRES CAN OCCUR.

- (b) Clean the wire or cable with solvent.
- (8) Remove the sealant from each side of the structure with the scraper.

**CAUTION:** DO NOT USE A SCRAPER THAT IS MADE OF A MATERIAL THAT IS HARDER THAN 2024-T3 ALUMINUM. A HARDER MATERIAL CAN CAUSE DAMAGE TO THE STRUCTURE.

- (9) Clean each side of the structure with solvent.
- (10) Remove the remaining solvent with a clean, dry cloth.

**3. INSTALLATION OF A BACG20AN SEAL FITTING****A. Installation of a Seal Fitting with Tie Tabs**

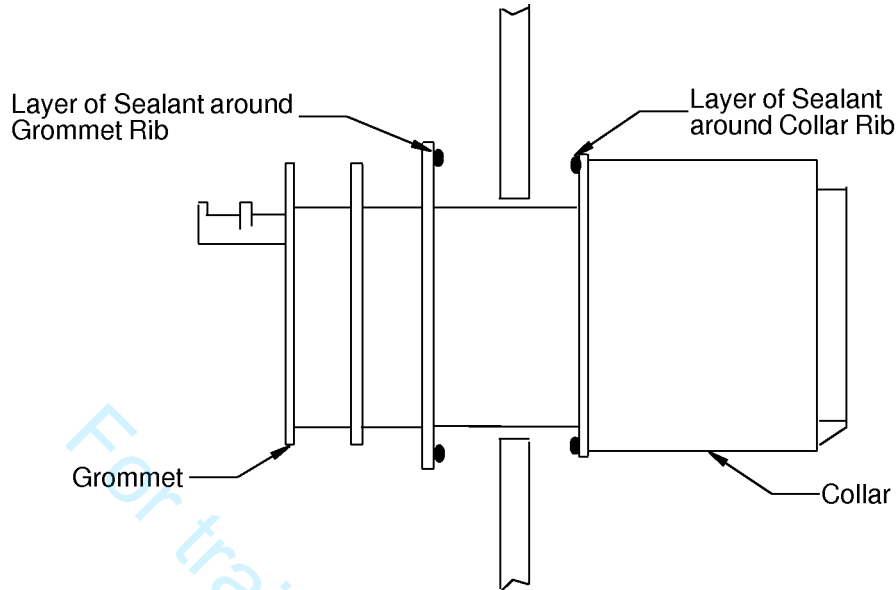
**Table 2**  
**NECESSARY TOOLS**

<b>Tool</b>	<b>Part Number</b>	<b>Supplier</b>
Fairing Tool, Non-Metallic	Specified by supplier	An available source
Sealant Gun	Specified by supplier	An available source
Strap Wrench	TG-70	Glenair

- (1) Make a selection of a sealant from Table 1.
- (2) Make a selection of a sealant gun and a fairing tool from Table 2.
- (3) Clean the faying surfaces. Refer to Paragraph 5.B..
- (4) Put a layer of the specified sealant around the surface of collar rib that goes against structure. Refer to Figure 4.

# STANDARD WIRING PRACTICES MANUAL

## INSTALLATION OF BACG20AN SEAL FITTINGS



### POSITION OF THE SEALANT ON THE SEAL FITTINGS

Figure 4

- (5) Put a layer of the specified sealant around the surface of grommet rib that goes against structure. Refer to Figure 4.
- (6) Put the grommet in the hole in the structure.  
Make sure that the tie tab on grommet is in the specified position.
- (7) Engage the threads of the collar and the threads of the grommet.
- (8) Tighten the collar with the hand.

**NOTE:** As an alternative to make the installation easier, a strap wrench can be used to fully engage the grommet and the collar. Refer to Table 2.

- (9) Make a fillet seal with the sealant on the edge of the rib of the collar and the structure. Refer to Figure 5.

Make sure that the layer of sealant:

- Is continuous around the collar and the structure.
- Makes an overlap with the top surface of the rib.

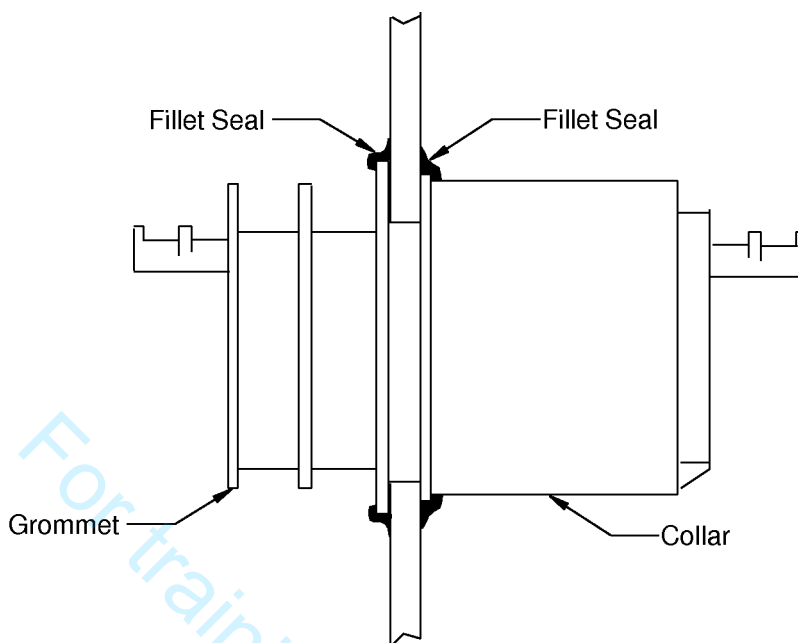
**NOTE:** A fairing tool can be used to adjust the sealant.

**NOTE:** A mix of 1:5 or 1:6 isopropyl alcohol in distilled water can be used to keep the sealant off the fairing tool.

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# STANDARD WIRING PRACTICES MANUAL

## INSTALLATION OF BACG20AN SEAL FITTINGS



**POSITION OF THE FILLET SEALS**

**Figure 5**

- (10) Make a fillet seal with the sealant on the edge of the rib of the grommet and the structure. Refer to Figure 5.

Make sure that the layer of sealant:

- Is continuous around the grommet and the structure.
- Makes an overlap with the top surface of the rib.

NOTE: A fairing tool can be used to adjust the sealant.

NOTE: A mix of 1:5 or 1:6 isopropyl alcohol in distilled water can be used to keep the sealant off the fairing tool.

### B. Installation of a Seal Fitting without Tie Tabs

**Table 3**  
**NECESSARY TOOLS**

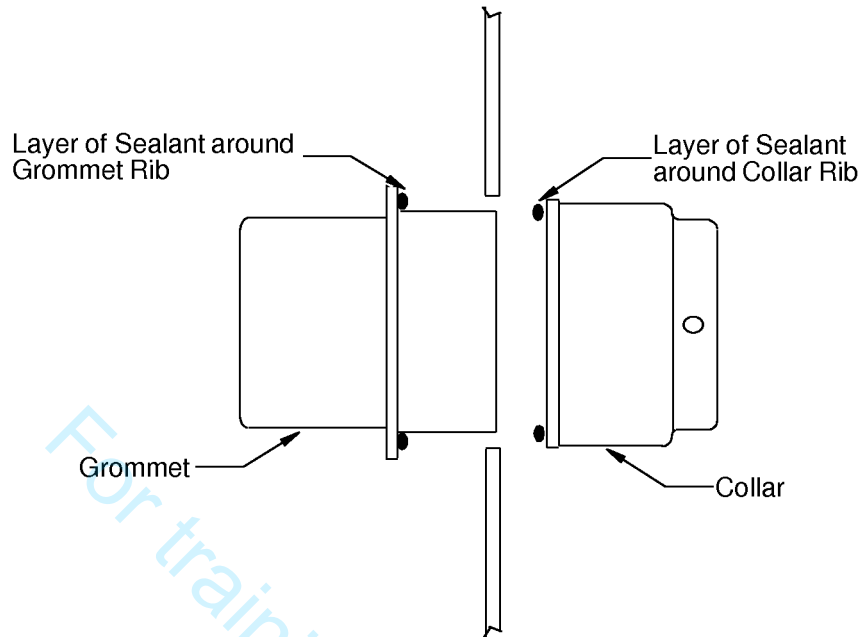
Tool	Part Number	Supplier
Fairing Tool, Non-Metallic	Specified by supplier	An available source
Sealant Gun	Specified by supplier	An available source
Strap Wrench	TG-70	Glenair

- (1) Make a selection of a sealant from Table 1.
- (2) Make a selection of a sealant gun and a fairing tool from Table 2.
- (3) Clean the faying surfaces. Refer to paragraph 5.B..
- (4) Put a layer of the sealant around the surface of collar rib that goes against structure. Refer to Figure 6.

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## STANDARD WIRING PRACTICES MANUAL

### INSTALLATION OF BACG20AN SEAL FITTINGS



#### POSITION OF THE SEALANT ON THE SEAL FITTINGS

Figure 6

- (5) Put a layer of the sealant around the surface of grommet rib that goes against structure. Refer to Figure 6.
- (6) Put the grommet in the hole in the structure.
- (7) Engage the threads of the collar and the grommet.
- (8) Tighten the collar with the hand.

**NOTE:** As an alternative to make the installation easier, a strap wrench can be used to fully engage the grommet and the collar. Refer to Table 3.

- (9) Apply a fillet seal with the sealant around the outer edge of the grommet rib. Refer to Figure 7.

Make sure that the layer of sealant:

- Is continuous around the grommet
- Makes an overlap with the top surface of the rib.

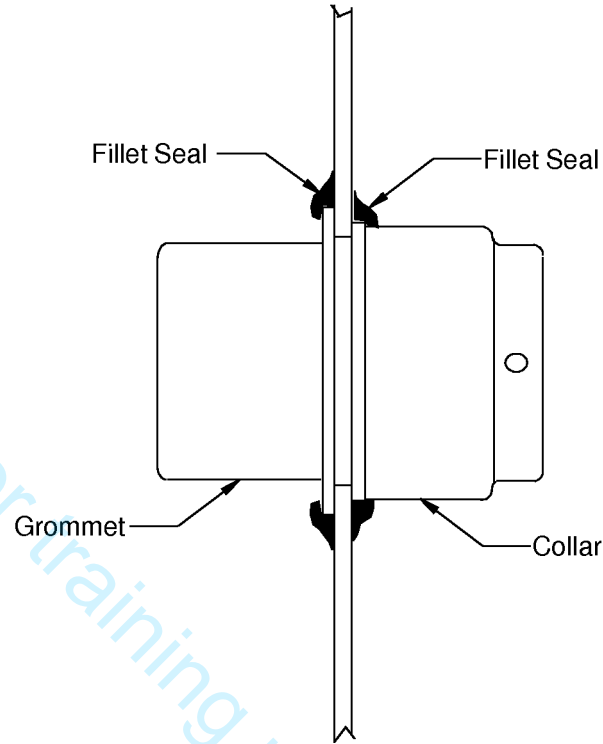
**NOTE:** A fairing tool can be used to adjust the sealant.

**NOTE:** A mix of 1:5 or 1:6 isopropyl alcohol in distilled water can be used to keep the sealant off the fairing tool.

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## STANDARD WIRING PRACTICES MANUAL

### INSTALLATION OF BACG20AN SEAL FITTINGS



**POSITION OF THE FILLET SEALS**  
**Figure 7**

- (10) Apply fillet seal with the sealant around the outer edge of the collar rib. Refer to Figure 7.

Make sure that the layer of sealant:

- Is continuous around the collar
- Makes an overlap with the top surface of the rib.

NOTE: A fairing tool can be used to adjust the sealant.

NOTE: A mix of 1:5 or 1:6 isopropyl alcohol in distilled water can be used to keep the sealant off the fairing tool.

#### **4. INSTALLATION OF UNSEALED WIRE HARNESSSES IN BACG20AN SEAL FITTINGS**

##### **A. Installation of Unsealed Wire Harnesses in BACG20AN Seal Fittings**

- (1) Put the correct end of the wire harness assembly through the seal fitting.  
Make sure that the flag markers are in the correct location.
- (2) Assemble two plastic ties on the wire harness and each tie tab.

## STANDARD WIRING PRACTICES MANUAL

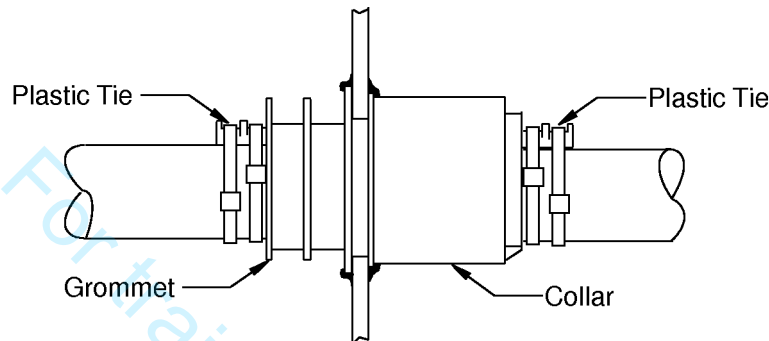
### INSTALLATION OF BACG20AN SEAL FITTINGS

Refer to:

- Figure 8.
- Subject 20-10-11 for the procedure to assemble the tie.

Make sure that the ties are:

- On the wire harness and the tie tab
- In the groove of each tie tab.



LOCATION OF THE PLASTIC TIES

Figure 8

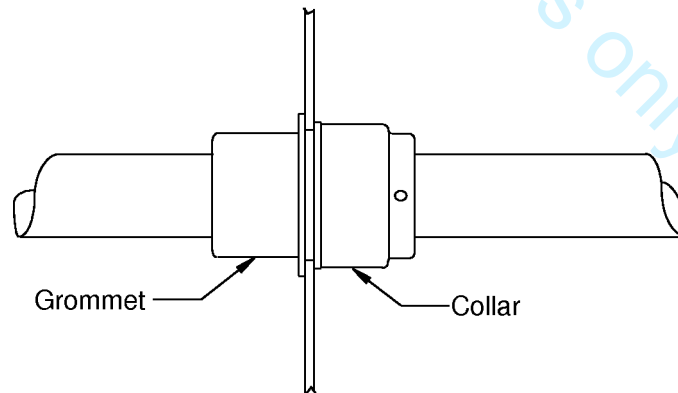
#### 5. INSTALLATION OF SEALED WIRE HARNESSES IN BACG20AN SEAL FITTINGS

##### A. Installation of a Wire Harness in a Seal Fitting without Tie Tabs

- (1) Put the correct end of the wire harness assembly through the seal fitting. Refer to Figure 9.

Make sure that:

- The flag markers on the wire harness are in the correct location
- The center of each coil spacer is approximately aligned with the center of the seal fitting.



INSTALLATION OF THE WIRE HARNESS IN THE SEAL FITTING

Figure 9

**20-14-14**

# STANDARD WIRING PRACTICES MANUAL

## INSTALLATION OF BACG20AN SEAL FITTINGS

### B. Surface Preparation for Sealant Application

**Table 4**  
**NECESSARY TOOLS**

Description	Specification	Supplier
Brush, soft bristle	-	An available source
Wiper	BMS15-5 Class A	QPL
	BMS15-5 Class B	QPL

- (1) Make a selection of a solvent from Table 1.  
Make a selection of a wiper or a soft bristle brush from Table 4.  
NOTE: An equivalent wiper is a satisfactory alternative.
- (2) Make a selection of a solvent from Table 1.
- (3) Make a selection of a wiper or a soft bristle brush from Table 4.  
NOTE: An equivalent wiper is a satisfactory alternative.
- (4) Wet the wiper or the brush with solvent.
- (5) Clean the fay surfaces of the wire and the seal housing with the wiper or the brush.  
Make sure that all dust, dirt, grease, and metal chips are removed.  
NOTE: The solvent can be sprayed or flowed over the area to help clean and rinse the area.
- (6) Remove the excess solvent with a clean wiper.  
Make sure that the area is dry.

### C. Application of Sealant

**Table 5**  
**NECESSARY TOOLS**

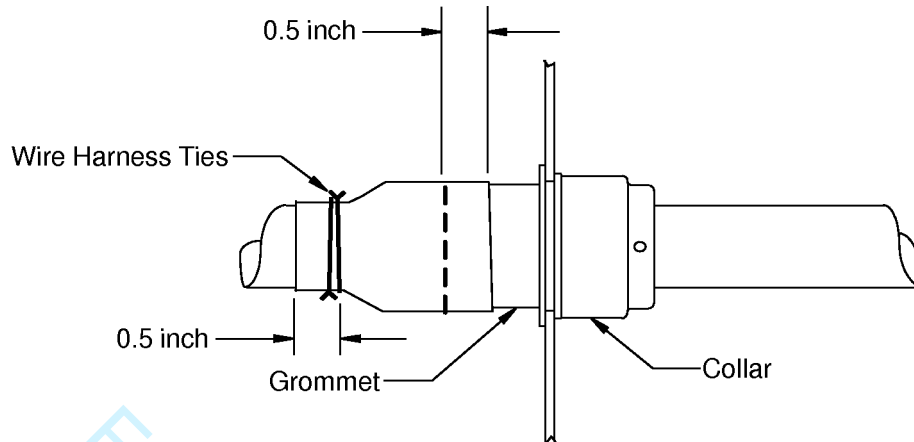
Tool	Supplier
Sealant Injection Tool	An available source

- (1) Make a selection of these materials from Table 1.
  - A sealant
  - A lacing tape
  - A plastic tape.
- (2) Make a selection of a sealant injection tool from Table 5.
- (3) Put 2 to 4 layers of the plastic tape around the end of the grommet and the wire harness. Refer to Figure 10.  
Make sure that:
  - The edge of the tape makes a minimum 0.5 inch overlap with the end of the grommet
  - Each layer of tape makes a 100 percent overlap with the other layers.

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## STANDARD WIRING PRACTICES MANUAL

### INSTALLATION OF BACG20AN SEAL FITTINGS



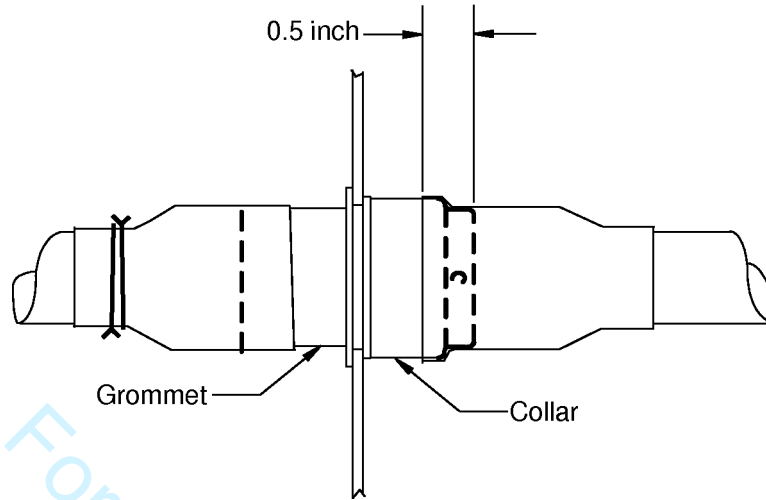
#### ASSEMBLY OF THE TAPE MOLD ON THE GROMMET

Figure 10

- (4) Assemble two lacing tape wire harness ties on the layers of the plastic tape. Refer to Figure 10. Make sure that the ties are:
  - Approximately 0.5 inches from the rear edge of the tape
  - On all of the layers of tape.
- (5) Put the sealant in the injection tool.
- (6) Put the tip of the injection tool between the collar and the wire harness.
- (7) Inject the sealant into the grommet assembly until:
  - The tape mold is full of sealant
  - The grommet assembly is full of sealant
  - The sealant can be seen in each hole of the collar.
- (8) Remove the injection tool.
- (9) Put 2 to 4 layers of the plastic tape around the end of the collar and the wire harness. Refer to Figure 11.
  - The end of the tape that is away from the collar is open
  - The edge of the tape makes a minimum 0.5 inch overlap with the seal housing
  - The tape is on the seal filler holes
  - Each layer of tape makes a 100 percent overlap with the other layers.

## STANDARD WIRING PRACTICES MANUAL

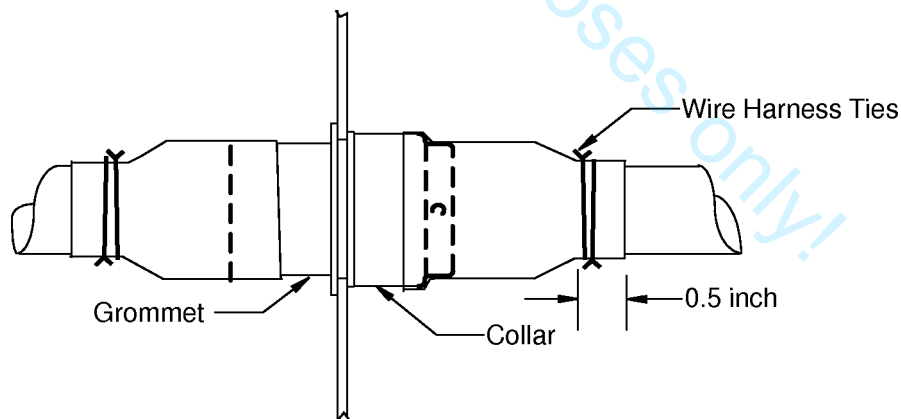
### INSTALLATION OF BACG20AN SEAL FITTINGS



**ASSEMBLY OF THE TAPE MOLD ON THE COLLAR**

**Figure 11**

- (10) Put the tip of the injection tool between the layers of tape and the wire harness.
- (11) Fill the tape mold with sealant.  
Make sure that the tape mold is full of sealant.
- (12) Assemble two lacing tape wire harness ties on the layers of the plastic tape. Refer to Figure 12.  
Make sure that the ties are:
  - Approximately 0.5 inches from the rear edge of the tape
  - On all of the layers of tape.



**ASSEMBLY OF THE WIRE HARNESS TIES**

**Figure 12**

- (13) Let the sealant fully cure.
- (14) Remove the wire harness ties and the tape from each end of the seal fitting.



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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF THE FLIGHT RECORDER-AIDS WIRE HARNESS WITH A BACC63AF() FIREWALL CONNECTOR

<u>Paragraph</u>	<u>Page</u>
1. <b><u>PART NUMBERS AND DESCRIPTION</u></b>	1
A. Connector Part Numbers	1
B. Necessary Materials	1
C. Necessary Tools	1
2. <b><u>CONNECTOR DISSASSEMBLY</u></b>	1
3. <b><u>CONNECTOR ASSEMBLY</u></b>	1
A. Contact Assembly	1
B. Contact Insertion	2
C. Backshell Assembly	2

## 20-14-51 CONTENTS

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF THE FLIGHT RECORDER-AIDS WIRE HARNESS WITH A BACC63AF() FIREWALL CONNECTOR

#### 1. PART NUMBERS AND DESCRIPTION

##### A. Connector Part Numbers

**Table 1**  
**CONNECTOR PART NUMBERS**

Boeing Standard	Type
BACC63AF24-30P10	Receptacle

##### B. Necessary Materials

**Table 2**  
**NECESSARY MATERIALS**

Material	Specification	Size	Supplier
Alcohol, Isopropyl	-	-	An available Source
Rod, Filler	69B47961-3	3/8 inch diameter	Boeing
Sleeve, Heat Shrinkable	MIL-LT	3/4 inch diameter	Raychem
Clamp, Filler	10-62034-1	0.5 inch width, 0.1 inch thickness	Kirkhill Rubber Co.
	10-62034-2	0.4 inch width, 0.06 inch thickness	Kirkhill Rubber Co.

**Table 3**  
**ALTERNATIVE THREAD LOCK COMPOUNDS**

Material	Part Number	Supplier
Thread Lock Compound	Vibratite	The Oakland Corporation
	222	Locktite

##### C. Necessary Tools

**Table 4**  
**NECESSARY TOOLS**

Tool	Part Number	Supplier
Strap Wrench	TG-70	Glenair

#### 2. CONNECTOR DISSASSEMBLY

Refer to Subject 20-61-11.

#### 3. CONNECTOR ASSEMBLY

##### A. Contact Assembly

(1) Assemble each contact. Refer to Subject 20-61-11.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF THE FLIGHT RECORDER-AIDS WIRE HARNESS WITH A BACC63AF() FIREWALL CONNECTOR

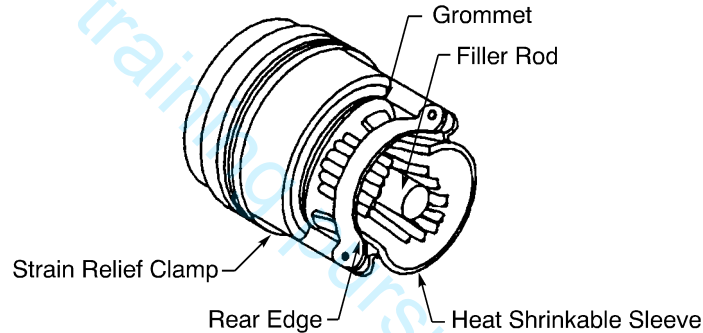
#### B. Contact Insertion

- (1) Put the strain relief clamp on the wire harness.
- (2) Make a selection of a heat shrinkable sleeve from Table 2.
- (3) Put a 3.0 inch  $\pm 0.10$  inch length of heat shrinkable sleeve on the wire harness.
- (4) Install each contact. Refer to Subject 20-61-11.

#### C. Backshell Assembly

- (1) Make a selection of these materials from Table 2:
  - A filler rod
  - A filler tape.
- (2) Put a 2.75 inch length of the filler rod in the center of the wires at the rear of the connector. Refer to Figure 1.

Make sure that the forward end of the rod is between 0.25 inch and 0.34 inch from the grommet.



**POSITION OF THE FILLER ROD AND THE HEAT SHRINKABLE SLEEVE**

**Figure 1**

- (3) Push the heat shrinkable sleeve forward until the forward end of the sleeve is 0.34 inch  $\pm 0.03$  inch from the rear end of the connector grommet.
- (4) Shrink the sleeve in position. Refer to Subject 20-10-14.
- (5) Make a selection of a thread lock compound. Refer to Subject 20-00-11.  
Refer to Table 3 for satisfactory alternative thread lock compounds.
- (6) Put a thin layer of the compound on one or two threads of the clamp around the circumference of the clamp.
- (7) Put a thin layer of the compound on one or two threads of the connector around the circumference of the connector.
- (8) Engage the threads of the clamp and the connector.

Make sure that the threads of the connector and the clamp are fully engaged.

**NOTE:** Isopropyl alcohol can be put on the connector grommet to make the installation easier. Refer to Table 1.

- (9) Manually tighten the coupling nut of the clamp.
- (10) Make a selection of a strap wrench from Table 2.
- (11) Tighten the clamp and the connector with the strap wrench.

# 20-14-51

**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF THE FLIGHT RECORDER-AIDS WIRE HARNESS WITH A BACC63AF() FIREWALL CONNECTOR**

Make sure that the clamp does not make more than 1/8 turn with the strap wrench.

**CAUTION:** DO NOT TIGHTEN THE CLAMP MORE THAN NECESSARY. DAMAGE OF THE CONDUCTOR OR THE WIRED CONTACT CAN CAUSE UNSATISFACTORY PERFORMANCE.

- (12) Try to loosen the clamp manually.

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

- (13) If the clamp is loose, do Step (11) and Step (12) again.

- (14) Put the necessary layers of tape on the wire harness to make a tight fit in the saddle clamp.

Make sure that:

- Each layer of tape makes a 100 percent overlap
- The center of the layers of tape is aligned with the center of the saddle clamp
- The forward edge of the tape extends a minimum of 0.06 inch farther than the forward edge of the clamp
- The rear edge of the tape extends a minimum of 0.06 inch farther than the rear edge of the clamp.

- (15) Tighten the saddle clamp screws.

Make sure that the wire harness has a tight fit in the clamp.

- (16) Assemble the a wire harness tie 0.5 inch  $\pm$  0.06 inch from the rear end of the layers of filler tape.

- (17) Assemble the necessary wire harness ties every two inches on the remaining length of the wire harness.

- (18) Put the wire identification sleeve 4 inches from the rear of the connector.



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## STANDARD WIRING PRACTICES MANUAL

### AIRBORN RM342() CABLE ASSEMBLIES

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## 20-14-52 CONTENTS

# STANDARD WIRING PRACTICES MANUAL

## AIRBORN RM342() CABLE ASSEMBLIES

### 1. GENERAL DATA

#### A. Conditions for Repair or Replacement

The cable assembly must be replaced or repaired when one or more of these conditions occur:

- The connector has a crack
- The connector has damage that causes a short circuit between two or more contact cavities
- A contact has damage
- A contact retention mechanism does not lock a contact in a contact cavity
- The jackscrew hardware does not tightly hold the receptacle and the plug together
- A wire has damage; refer to Subject 20-10-13 for damage conditions of wire.

A cable assembly repair can be:

- The replacement of a damaged connector with a new connector
- The replacement of a damaged connector with a connector of a new cable assembly
- The repair or replacement of a damaged wire; refer to Subject 20-10-13 for applicable wire repair procedure.

#### B. Necessary Conditions for the Connection of the Plug and the Receptacle

The interfacial seal of the plug connector on the equipment must be replaced when one or more of these conditions occur:

- The interfacial seal is missing
- The interfacial seal has damage that extends from one contact cavity to a different contact cavity
- The interfacial seal has damage that extends from the outer edge of the seal to a contact cavity
- The interfacial seal has damage that extends from a jackscrew hole to a contact cavity.

### 2. PART NUMBERS AND DESCRIPTION

#### A. Cable Assembly Part Numbers

**NOTE:** The contacts in the connectors of the cable assemblies that are specified in Table 1 cannot be replaced.

**Table 1**  
**CABLE ASSEMBLY PART NUMBERS**

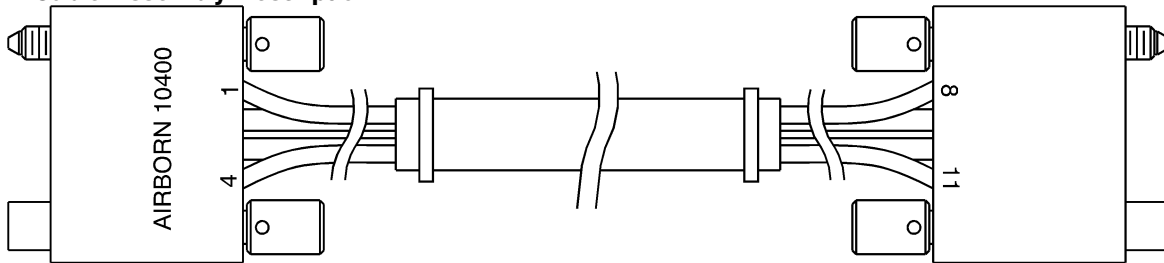
Part Number	Description	Wire		Supplier
		Specification	Size (AWG)	
RM342-011-581-5900-E47	Jumper Assembly	BMS13-48 Type 9 Class 1	24	AirBorn
RM342-023-581-5900-E58	Harness Assembly	BMS13-48 Type 9 Class 1	24	AirBorn

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# STANDARD WIRING PRACTICES MANUAL

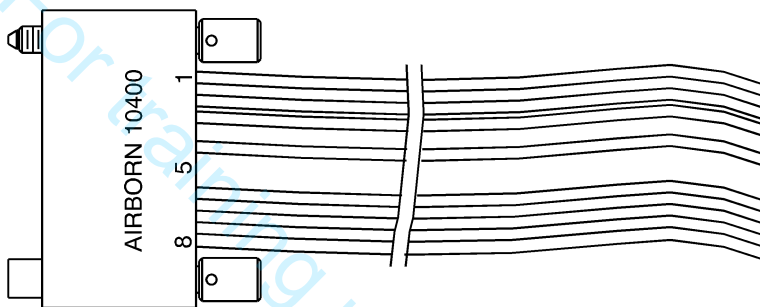
## AIRBORN RM342() CABLE ASSEMBLIES

### B. Cable Assembly Description



**JUMPER ASSEMBLY CONFIGURATION**

**Figure 1**



**HARNESS ASSEMBLY CONFIGURATION**

**Figure 2**

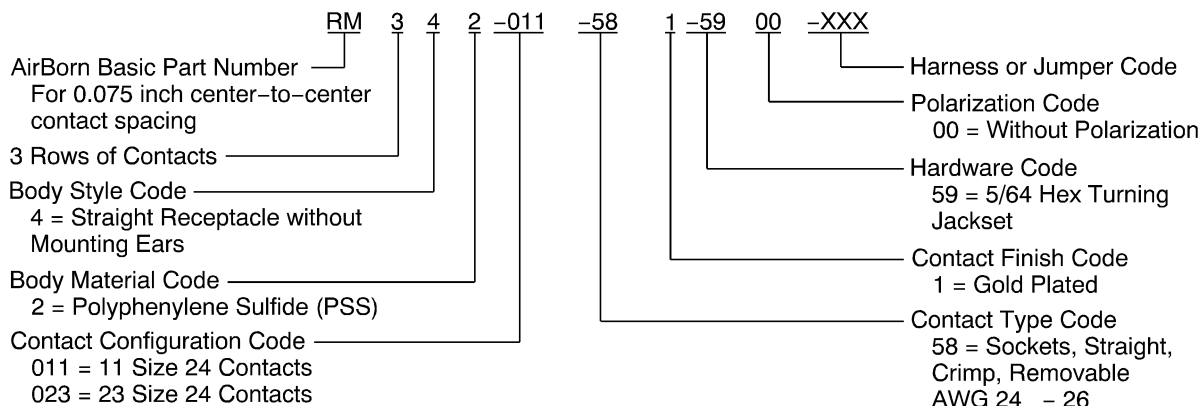
### C. Connector Part Numbers

**Table 2  
CONNECTOR PART NUMBERS**

Part Number	Type	Supplier
RM342-011-581-5900	Receptacle	AirBorn
RM342-023-581-5900	Receptacle	AirBorn

## STANDARD WIRING PRACTICES MANUAL

### AIRBORN RM342() CABLE ASSEMBLIES



### CONNECTOR PART NUMBER STRUCTURE

Figure 3

Table 3

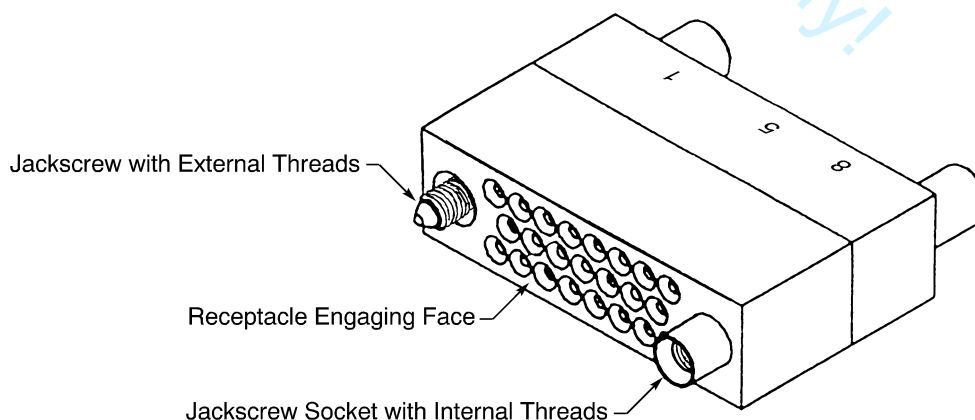
#### CONNECTOR INTERFACIAL SEAL PART NUMBERS

Part Number	Connector Type	Contact Configuration	Supplier
CDG11195	Plug	011	Airborn
CDG11196	Plug	023	Airborn

#### D. Connector Description

The connectors have these technical features:

- Rectangular shape
- 3 rows of contacts
- 0.075 inch center-to-center contact spacing
- Two jackscrew coupling devices
- Size 24 crimp socket contacts
- Contacts installed from the connector rear.



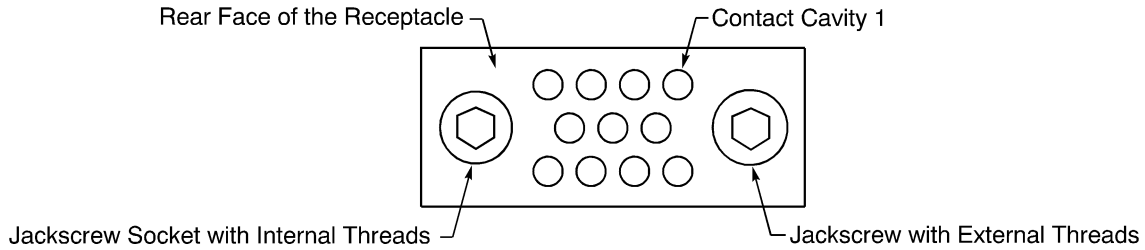
#### AIRBORN RM 342-() CONNECTOR

Figure 4

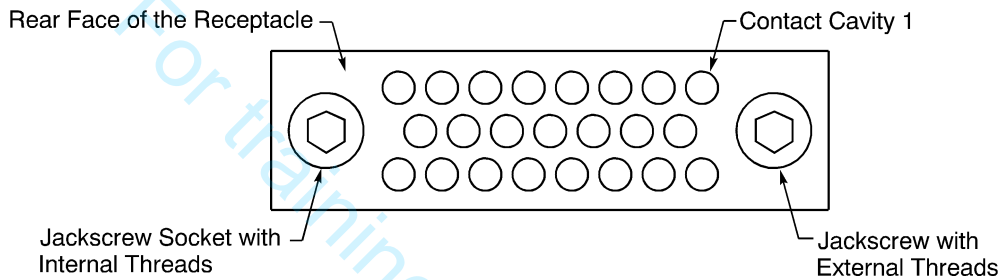
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# STANDARD WIRING PRACTICES MANUAL

## AIRBORN RM342() CABLE ASSEMBLIES



**RM342-011-581-5900 RECEPTACLE**  
**Figure 5**



**RM342-023-581-5900 RECEPTACLE**  
**Figure 6**

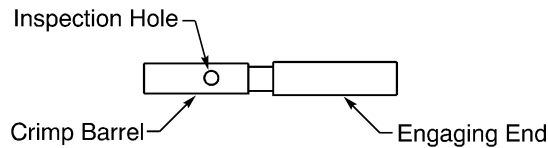
### E. Contact Part Numbers

**Table 4**  
**CONTACT PART NUMBERS**

Contact Size		Contact Type	Part Number	Supplier
Engaging End	Crimp Barrel			
24	24	Socket	RM300-000-581-0000	AirBorn

Engaging End Size 16 16 Crimp Barrel Size

**EXAMPLE OF CONTACT SIZE**  
**Figure 7**



**SOCKET CONTACT**  
**Figure 8**

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# STANDARD WIRING PRACTICES MANUAL

## AIRBORN RM342() CABLE ASSEMBLIES

### F. Alternative Wires

Table 5  
ALTERNATIVE WIRES

Specified Wire		Alternative Wire	
Specification	Size (AWG)	Specification	Supplier
BMS 13-48 Type 9 Class 1	24	MIL-W-22759/35-24	QPL

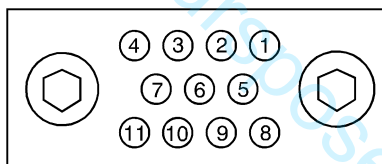
### 3. CONTACT CONFIGURATIONS

#### A. AirBorn RM342() Connectors

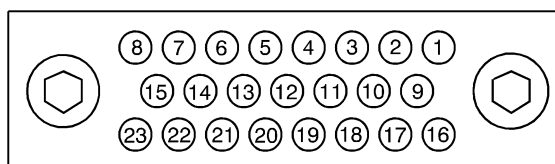
Table 6  
CONTACT CONFIGURATIONS

Contact Configuration	Contact		Cavity	Reference
	Count	Size		
011	11	24	1 through 11	Figure 9
023	23	24	1 through 23	Figure 10

**NOTE:** Figure 9 and Figure 10 show the rear side of the receptacle with socket contacts. The view of a plug for pin contacts is a mirror image of this view.



011 CONTACT CONFIGURATION  
Figure 9



023 CONTACT CONFIGURATION  
Figure 10

## STANDARD WIRING PRACTICES MANUAL

### AIRBORN RM342() CABLE ASSEMBLIES

#### 4. CABLE ASSEMBLY REPAIR

##### A. Replacement of a Connector with a New Connector

Table 7  
NECESSARY TOOLS

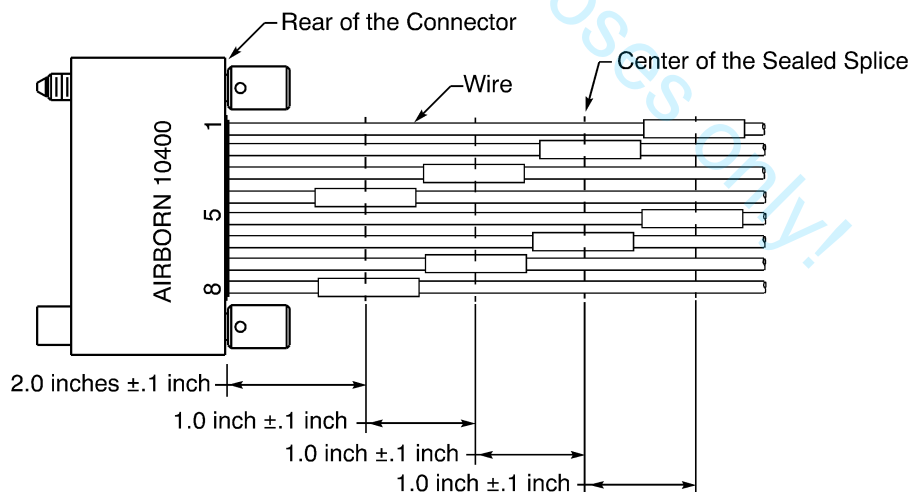
Tool	Type
Cutter	Diagonal Cutter

- (1) Make a selection of the applicable connector from Table 2.
- (2) Make a selection of a cutter from Table 7.
- (3) Disconnect the receptacle from the plug. Refer to Paragraph 5.A.
- (4) Cut one of the wires on the old connector as close as possible to the rear of the connector.
- (5) Assemble a contact with the wire. Refer to Paragraph 6.A.
- (6) Install the contact in the new connector. Refer to Paragraph 6.B.
- (7) Do Step (4) through Step (6) for each wire in the old connector.
- (8) Seal the new connector. Refer to Paragraph 6.C.

##### B. Replacement of a Connector with the Connector of a New Cable Assembly

Table 8  
NECESSARY TOOLS

Tool	Type
Cutter	Diagonal Cutter



#### LOCATION OF SPLICE ASSEMBLIES

Figure 11

Refer to Figure 11.

- (1) Make a selection of the applicable cable assembly from Table 1.

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## STANDARD WIRING PRACTICES MANUAL

### AIRBORN RM342() CABLE ASSEMBLIES

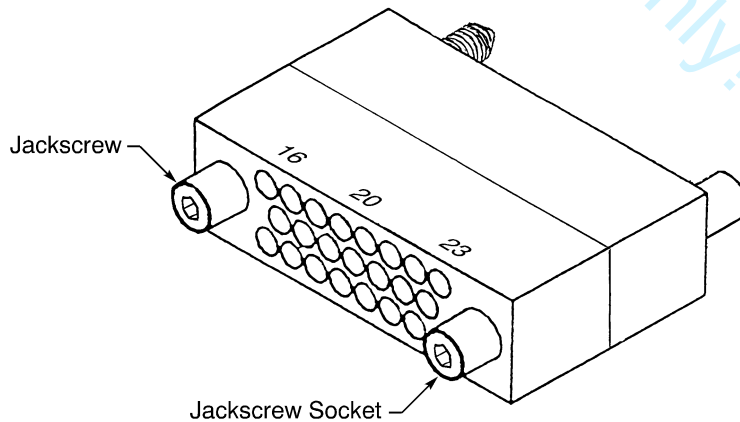
- (2) Make a selection of a cutter from Table 8.
- (3) Disconnect the receptacle from the plug. Refer to Paragraph 5.A.
- (4) Cut one of the wires that is nearest to one of the ends of the old connector 2.0 inches  $\pm 0.1$  inch from the rear of the connector.
- (5) Cut the wire in the same contact position of the new connector 2.0 inches  $\pm 0.1$  inch from the rear of the new connector.
- (6) Assemble a sealed butt splice with the wire of the new connector and the wire of the harness.  
Refer to Subject 20-30-12 for the selection of a sealed splice configuration.
- (7) Cut the next wire of the old connector at the location that is the same distance from the rear of the connector as the last wire plus 1.0 inch  $\pm 0.1$  inch.
- (8) Cut the wire in the same contact position of the new connector at the location that is the same distance from the connector as the last wire plus 1.0 inch  $\pm 0.1$  inch.
- (9) Assemble a sealed butt splice with the wire of the new connector and the wire of the harness.  
Refer to Subject 20-30-12 for the selection of a sealed splice.
- (10) Do Step (7) through Step (9) again until approximately half of the wires of the harness have a splice.
- (11) Do Step (4) through Step (9) again for each of the remaining wires of the old connector.  
Make sure to start with the next wire on the old connector.

#### 5. CONNECTOR DISASSEMBLY

##### A. Separation of the Plug and the Receptacle

**Table 9**  
**NECESSARY TOOLS**

Tool	Type	Size (inch)
Driver	Allen Wrench	5/64
	Screwdriver, Hex	5/64



**LOCATION OF THE JACKSCREW HARDWARE**

**Figure 12**

**20-14-52**

## STANDARD WIRING PRACTICES MANUAL

### AIRBORN RM342() CABLE ASSEMBLIES

Refer to Figure 12.

- (1) Make a selection of a driver from Table 9.

**NOTE:** The driver can have a ball style end.

- (2) On one end of the receptacle, loosen the jackscrew hardware a small amount.
- (3) On the other end of the receptacle, loosen the jackscrew hardware a small amount.
- (4) Do Step (2) and Step (3) again until the jackscrews and the jackscrew sockets are fully disengaged.
- (5) Pull the receptacle from the plug.

#### B. Contact Removal

**NOTE:** If the connector is sealed, the contacts cannot be removed.

**Table 10**  
**CONTACT REMOVAL TOOLS**

Engaging End Size	Removal Tool
24	CDG8161

- (1) Make a selection of a removal tool from Table 10.

**CAUTION:** DO NOT USE A REMOVAL TOOL THAT HAS A DEFECT. A REMOVAL TOOL THAT HAS A DEFECT CAN CAUSE DAMAGE TO THE RETENTION CLIP.

- (2) Put the tip of the removal tool on the wire near the rear of the connector.
- (3) Axially align the removal tool and the contact cavity.
- (4) Carefully push the removal tool straight into the contact cavity until it stops.
- (5) Carefully pull the wire and the removal tool straight out of the contact cavity at the same time.
- (6) If the contact is not released:
  - (a) Pull the contact removal tool out of the contact cavity.
  - (b) Turn the removal tool approximately 90 degrees.
  - (c) Do Step (2) through Step (5) again.

## 6. CONNECTOR ASSEMBLY

#### A. Contact Assembly

**Table 11**  
**INSULATION REMOVAL LENGTH**

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)	
		Target	Tolerance
24	24	0.15	± 0.03

# STANDARD WIRING PRACTICES MANUAL

## AIRBORN RM342() CABLE ASSEMBLIES

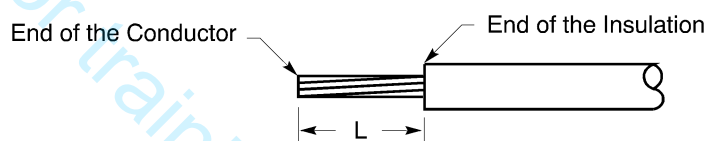
**Table 12**  
**CONTACT CRIMP TOOLS**

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool	
		Basic Unit	Locator
24	24	M22520/2-01	CDG4602

- (1) Make a selection of a crimp tool from Table 12.
- (2) Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 13
- Table 11 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedures.



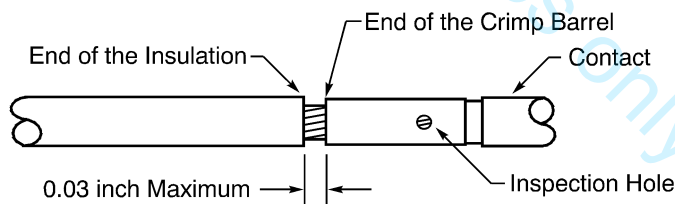
### INSULATION REMOVAL LENGTH

**Figure 13**

- (3) Put the end of the wire in the crimp barrel of the contact. Refer to Figure 14.

Make sure that:

- All of the strands of the conductor are in the crimp barrel
- The conductor can be seen in the inspection hole
- The distance from the end of the insulation to the end of the crimp barrel is not more than 0.03 inch.



### POSITION OF THE WIRE IN THE CRIMP BARREL

**Figure 14**

- (4) Crimp the contact.

Make sure that:

- All of the strands of the conductor are in the crimp barrel
- The conductor can be seen in the inspection hole
- The distance from the end of the insulation to the end of the crimp barrel is not more than 0.03 inch.

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## STANDARD WIRING PRACTICES MANUAL

### AIRBORN RM342() CABLE ASSEMBLIES

#### B. Contact Insertion

- (1) Carefully push the contact assembly straight into the contact cavity until it stops.
- (2) Lightly pull the wire to make sure that the contact is locked in the contact cavity.

**CAUTION:** DO NOT PULL THE WIRE WITH A STRONG OR A SUDDEN FORCE. THE FORCE CAN CAUSE DAMAGE TO THE CONNECTOR OR THE CONTACT.

**CAUTION:** DO NOT MAKE A DENT IN THE WIRE INSULATION WITH THE FINGERNAILS. DAMAGE TO THE WIRE INSULATION CAN CAUSE UNSATISFACTORY PERFORMANCE AND RELIABILITY OF THE WIRE.

- (3) If the contact assembly is not locked in the contact cavity:
  - (a) Pull the contact assembly from the contact cavity.
  - (b) Do Step (1) and Step (2) again.

#### C. Seal of the Connector

**NOTE:** After the connector is sealed, the contacts cannot be removed.

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

Material	Specification	Part Number	Supplier
Sealant	BMS 5-92 Type 1	EC-2216	3M

- (1) Make a selection of a sealant from Table 13.
- (2) Make a selection of a contact from Table 4.
- (3) Install an unwired contact in each empty contact cavity.  
Make sure that each unwired contact is locked in the contact cavity.
- (4) Apply a layer of sealant on the rear surface of the connector:
  - Around each wire
  - On each contact cavity with an unwired contact.

Make sure that the sealant is not applied on the jackscrew hardware.

**NOTE:** A piece of tape or paper can be used as a temporary barrier to keep the sealant away from the jackscrew hardware.

**CAUTION:** THE SEALANT MUST NOT BE APPLIED ON THE JACKSCREW HARDWARE. THE SEALANT PREVENTS THE CORRECT OPERATION OF THE JACKSCREWS.

- (5) Let the sealant cure for 120 minutes  $\pm$  10 minutes.

#### D. Plug and Receptacle Connection

**Table 14**  
**NECESSARY TOOLS**

Tool	Type	Size (inch)
Driver	Allen Wrench	5/64
	Screwdriver, Hex	5/64

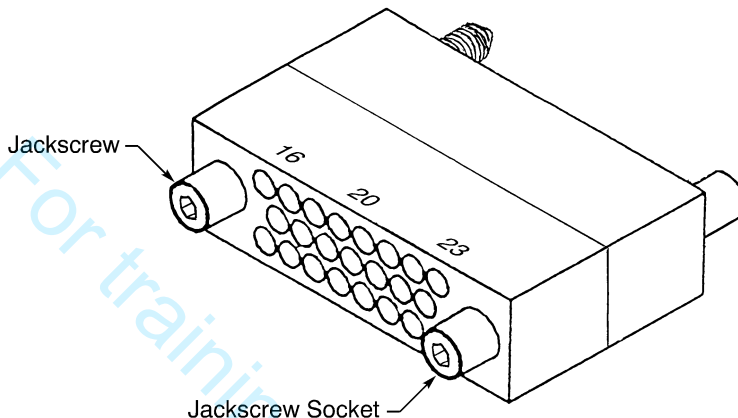
# 20-14-52

# STANDARD WIRING PRACTICES MANUAL

## AIRBORN RM342() CABLE ASSEMBLIES

Table 14 (continued)

Tool	Type	Size (inch)
Torque	Allen Wrench	5/64
	Screwdriver, Hex	5/64



### LOCATION OF THE JACKSCREW HARDWARE

Figure 15

Refer to Figure 15.

- (1) Make a selection of a driver from Figure 15.

**NOTE:** The driver can have a ball style end.

- (2) If the plug connector does not have an interfacial seal:

- (a) Make a selection of an interfacial seal from Table 3.
- (b) Install the seal on the engaging face of the plug.

Make sure that:

- The engaging end of each pin contact in the plug goes through the applicable hole in the seal.
- The jackscrew hardware on each end of the plug goes through the applicable hole in the seal.

- (3) Align the jackscrew and the jackscrew socket of the receptacle with the jackscrew socket and the jackscrew of the plug.

**CAUTION:** IF THE INTERFACIAL SEAL IS NOT INSTALLED ON THE ENGAGING FACE OF THE PLUG CONNECTOR, DAMAGE TO THE PLUG CONNECTOR CAN OCCUR.

- (4) Push the receptacle straight against the plug.
- (5) On one end of the receptacle, engage the threads of the jackscrew and the jackscrew socket a small amount.
- (6) On the other end of the receptacle, engage the threads of the jackscrew socket and the jackscrew a small amount.

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**STANDARD WIRING PRACTICES MANUAL****AIRBORN RM342() CABLE ASSEMBLIES**

- (7) Tighten the jackscrew a small amount.
- (8) Tighten the jackscrew socket a small amount.
- (9) Do Step (7) and Step (8) again until the receptacle is against the interfacial seal of the plug connector.
- (10) Torque the jackscrew and jackscrew socket 3.75 inch-pounds  $\pm 0.25$  inch-pound.

**CAUTION:** DO NOT APPLY MORE THAN THE SPECIFIED TORQUE. DAMAGE TO THE PLUG CONNECTOR CAN OCCUR.

**7. APPROVED TOOL SUPPLIERS****A. Contact Removal Tools**

**Table 15**  
**CONTACT REMOVAL TOOL SUPPLIERS**

<b>Removal Tool</b>	<b>Supplier</b>
CDG8161	AirBorn

**B. Contact Crimp Tools**

**Table 16**  
**CONTACT CRIMP TOOL SUPPLIERS**

<b>Crimp Tool</b>	<b>Supplier</b>
M22520/2-01	QPL
CDG4602	AirBorn