

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION

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For the conditions that are applicable for the procedures in this Subject, refer to the Subject that is applicable for the assembly of the connector.

#### 1. PART NUMBERS AND DESCRIPTION

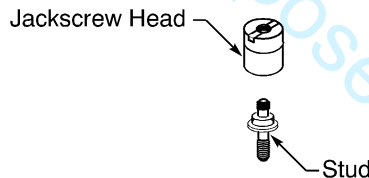
##### A. Jackscrew and Jackpost Installation Hardware Part Numbers

Table 1  
JACKSCREW AND JACKPOST KITS

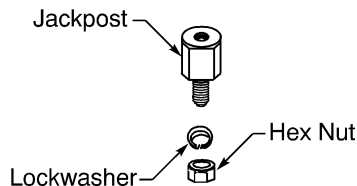
Kit	Part Number	Supplier	Reference
Jackscrew Kit	D110550	ITT Cannon	Figure 1
Jackpost Kit	D110551	ITT Cannon	Figure 2

Table 2  
JACKSCREW AND JACKPOST KIT COMPONENTS

Kit	Kit Component	
	Description	Quantity
Jackscrew	Jackscrew Head	2
	Stud	2
Jackpost	Jackpost	2
	Lockwasher	2
	Nut	2



JACKSCREW INSTALLATION HARDWARE  
Figure 1



JACKPOST INSTALLATION HARDWARE  
Figure 2

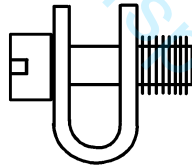
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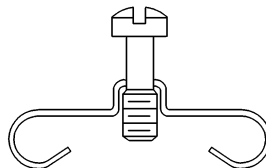
#### B. Screw Lock Installation Hardware Part Numbers

Table 3  
SCREW LOCK INSTALLATION COMPONENTS

Component	Length L (inch)	Shell Size		Specification	Supplier	Reference
		M24308 Part Number	Supplier Part Number			
Male Screw Lock, Single Clip	-	All	All	MIL-DTL-24308/25-6	QPL	Figure 3
Male Screw Lock, Double Clip	-	1	E	MIL-DTL-24308/25-9	QPL	Figure 4
		2	A	MIL-DTL-24308/25-9	QPL	Figure 4
		3	B	MIL-DTL-24308/25-9	QPL	Figure 4
		4	C	MIL-DTL-24308/25-9	QPL	Figure 4
		5	D	MIL-DTL-24308/25-10	QPL	Figure 4
Female Screw Lock	0.312	All	All	D20418-2	ITT Cannon	Figure 5
				MIL-DTL-24308/26-1	QPL	Figure 5
	0.625	All	All	D20418-39	ITT Cannon	Figure 5
				MIL-DTL-24308/26-2	QPL	Figure 5



SINGLE CLIP MALE SCREW LOCK INSTALLATION HARDWARE  
Figure 3

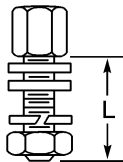


DOUBLE CLIP MALE SCREW LOCK INSTALLATION HARDWARE  
Figure 4

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**FEMALE SCREW LOCK INSTALLATION HARDWARE**

**Figure 5**

### C. Slide Latch Installation Hardware Part Numbers

**Table 4**  
**SLIDE LATCH KITS**

Kit	Shell Size		Part Number	Supplier	Reference
	M24308 Part Number	Supplier Part Number			
Slide Latch Kit	1	E	DE51224-1	ITT Cannon	Figure 6
	2	A	DA51220-1	ITT Cannon	Figure 6
	3	B	DB51221-1	ITT Cannon	Figure 6
	4	C	DC51222-1	ITT Cannon	Figure 6
	5	D	DD51223-1	ITT Cannon	Figure 6
Slide Lock Post Kit	All	All	D53018	ITT Cannon	Figure 7

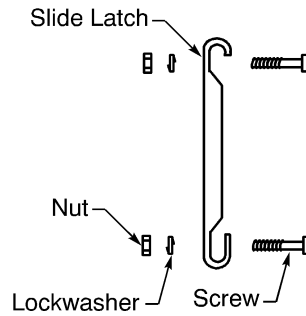
**Table 5**  
**SLIDE LATCH KIT COMPONENTS**

Kit	Kit Component	
	Description	Quantity
Slide Latch Kit	Lock Washer	2
	Nut	2
	Screw	2
	Slide Latch	1
Slide Lock Post Kit	Hex Nut	1
	Lock Washers	1
	Slide Lock Post	1
	Spacer Washers	2

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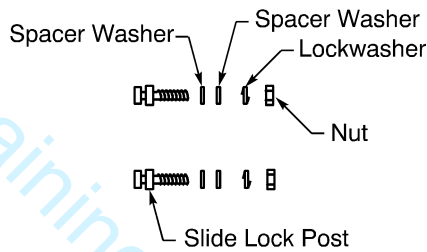
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### D SUBMINIATURE CONNECTORS: INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION



**SLIDE LATCH INSTALLATION HARDWARE**

**Figure 6**



**SLIDE LOCK POST INSTALLATION HARDWARE**

**Figure 7**

#### D. Spring Latch Installation Hardware Part Numbers

**Table 6**  
**SPRING LATCH KITS**

Kit	Shell Size		Part Number	Supplier	Reference
	M24308 Part Number	Supplier Part Number			
Spring Latch Plate Kit	1	E	D110278	ITT Cannon	Figure 8
	2	A	D110278	ITT Cannon	Figure 8
	3	B	D110278	ITT Cannon	Figure 8
	4	C	D110278	ITT Cannon	Figure 8
	5	D	D110279	ITT Cannon	Figure 8
Spring Plate Kit	1	E	D110277	ITT Cannon	Figure 9
	1	E	D110277-1	ITT Cannon	Figure 9
	2	A	D110277	ITT Cannon	Figure 9
	3	B	D110277	ITT Cannon	Figure 9
	4	C	D110277	ITT Cannon	Figure 9

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Table 6 (continued)

Kit	Shell Size		Part Number	Supplier	Reference
	M24308 Part Number	Supplier Part Number			
Spring Plate and Spring Latch Plate Kit	1	E	17-529	Amphenol	Figure 8 Figure 9
	1	E	17-529	WPI	Figure 8 Figure 9
	2	A	17-529	Amphenol	Figure 8 Figure 9
	2	A	17-529	WPI	Figure 8 Figure 9
	3	B	17-529	Amphenol	Figure 8 Figure 9
	3	B	17-529	WPI	Figure 8 Figure 9
	4	C	17-529	Amphenol	Figure 8 Figure 9
	4	C	17-529	WPI	Figure 8 Figure 9
	5	D	17-770	Amphenol	Figure 8 Figure 9
	5	D	17-770	WPI	Figure 8 Figure 9

Table 7  
SPRING PLATE KIT SCREW DIMENSIONS

Kit	Screw Length (inch)
D110277	0.312
D110277-1	0.375

Table 8  
SPRING LATCH KIT COMPONENTS

Kit		Kit Component	
Description	Part Number	Description	Quantity
Spring Latch Plate	D110278	Lockwasher	1
		Nut	1
		Screw	1
		Spring Latch Plate	1
Spring Plate	D110277	Lockwasher	1
		Nut	1
		Screw	1
		Spring Plate	1

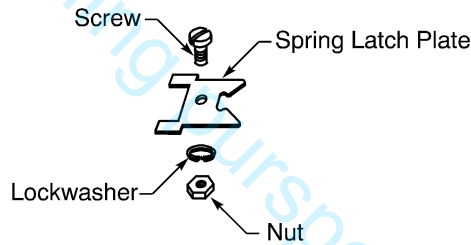
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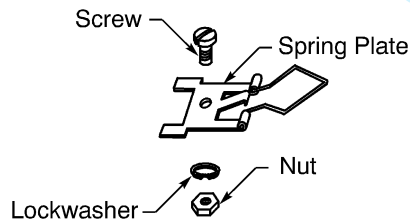
Table 8 (continued)

Kit		Kit Component	
Description	Part Number	Description	Quantity
Spring Latch Plate and Spring Plate	17-529	Spring Latch Plate	2
		Spring Plate	2
		Lockwasher	4
		Nut	4
		Screw	4
Spring Latch Plate and Spring Plate	17-770	Spring Latch Plate	2
		Spring Plate	2
		Lockwasher	4
		Nut	4
		Screw	4



**SPRING LATCH PLATE INSTALLATION HARDWARE**

**Figure 8**



**SPRING PLATE INSTALLATION HARDWARE**

**Figure 9**

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### D SUBMINIATURE CONNECTORS: INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION

#### E. Necessary Materials

Table 9  
NECESSARY MATERIALS

Material	Part Number	Supplier
Thread Lock Compound	222	Loctite
	83	Loctite
	Product 081	Loctite

## 2. CONNECTOR INSTALLATION HARDWARE ASSEMBLY

### A. Connector Installation Hardware Assembly Configurations

Table 10  
SELECTION OF A INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION CONFIGURATION

Applicable Conditions		Assembly Procedure
Connector Installation Configuration	Installation Hardware	
No Panel	JackscREW	Paragraph 3.A.
	Jackpost	Paragraph 3.B.
	Male Screw Lock - Single Clip	Paragraph 4.A.
	Male Screw Lock - Double Clip	Paragraph 4.B.
	Female Screw Lock	Paragraph 4.C.
	Slide Latch	Paragraph 5.A.
	Slide Lock Posts	Paragraph 5.B.
	Spring Plate	Paragraph 6.A.
	Spring Latch Plate	Paragraph 6.A.
Panel	Jackpost	Paragraph 3.C.
	Female Screw Lock	Paragraph 4.D.
	Slide Lock Posts	Paragraph 5.C.
	Spring Plate	Paragraph 6.B.

## 3. INSTALLATION HARDWARE ASSEMBLY - JACKSCREW AND JACKPOST

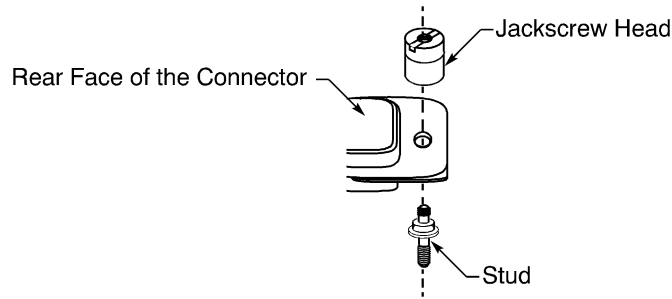
### A. Jackscrew Assembly

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

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#### JACKSCREW ASSEMBLY

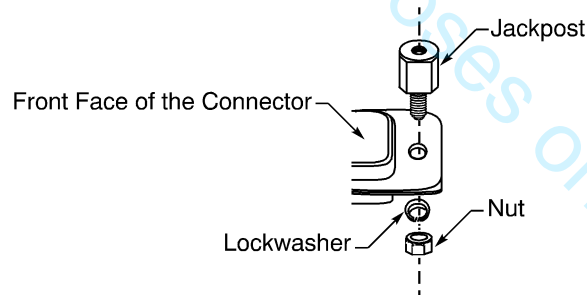
Figure 10

Refer to Figure 10.

- (1) Make a selection of a thread lock compound from Table 9.
- (2) Put two hex nuts on the stud.
- (3) From the front of the connector, put a stud in the installation hole in the connector shell.
- (4) Apply a drop of thread lock compound on the threads of the stud.
- (5) Put the jackscrew head on the stud.
- (6) Fully tighten the jackscrew head.
- (7) Remove the two hex nuts from the stud.
- (8) Do Step (2) through Step (7) again to install a jackscrew in the other installation hole of the connector.

#### B. Jackpost Assembly

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



#### JACKPOST ASSEMBLY

Figure 11

Refer to Figure 11.

- (1) From the front of the connector, put a jackpost in the installation hole in the connector shell.
- (2) Put a lockwasher on the jackpost.
- (3) Put the nut on the jackpost.
- (4) Fully tighten the jackpost.
- (5) Do Step (1) through Step (4) again to install a jackpost in the other installation hole of the connector.

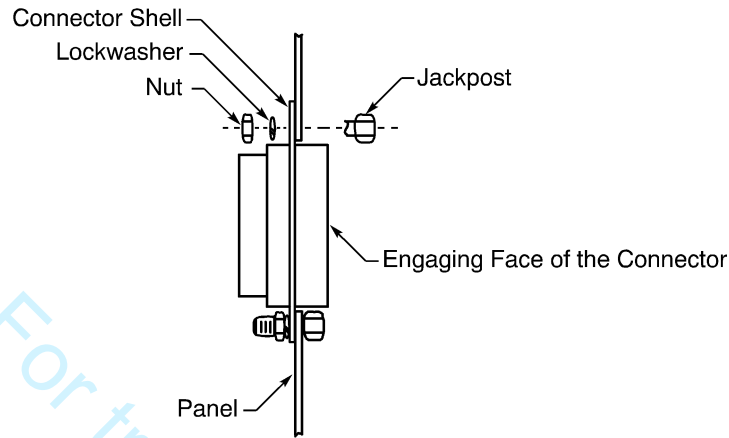
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#### C. Jackpost Assembly and Connector Installation in a Panel

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**JACKPOST ASSEMBLY AND CONNECTOR INSTALLATION**  
Figure 12

Refer to Figure 12.

- (1) From the rear of the panel, put the connector in the hole in the panel.
- (2) Align the installation holes in the connector with the holes in the panel.
- (3) Put the jackpost in the hole in the panel and the connector shell.
- (4) Put a lockwasher on the jackpost.
- (5) Put the nut on the jackpost.  
Make sure the jackpost is not fully tightened.
- (6) Do Step (3) through Step (5) again to install a jackpost in the other installation hole of the connector.
- (7) Fully tighten each jackpost.

Make sure that the connector does not move in the panel.

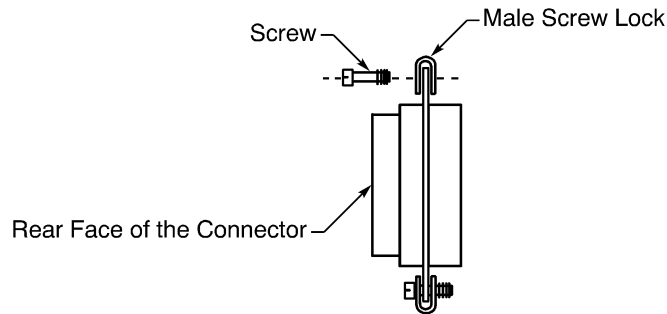
#### 4. INSTALLATION HARDWARE ASSEMBLY - MALE AND FEMALE SCREW LOCK

##### A. Single Clip Male Screw Lock Assembly

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

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### D SUBMINIATURE CONNECTORS: INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION



#### SINGLE CLIP MALE SCREW LOCK ASSEMBLY

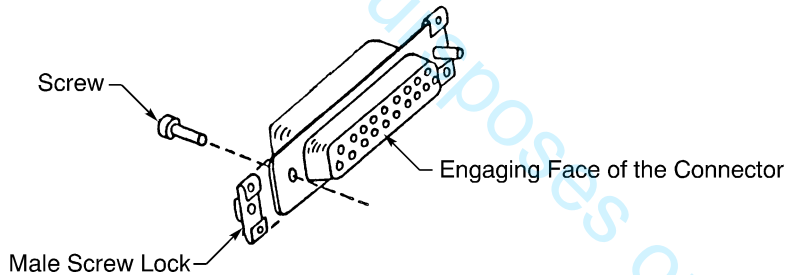
Figure 13

Refer to Figure 13.

- (1) Put a male screw lock on one end of the connector shell.
- (2) Align the installation hole of the screw lock and the connector shell.
- (3) Put a screw in the screw lock from the rear of the connector.
- (4) Do Step (1) through Step (3) again to assemble a screw lock in the other installation hole of the connector.

#### B. Double Clip Male Screw Lock Assembly

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



#### DOUBLE CLIP MALE SCREW LOCK ASSEMBLY

Figure 14

Refer to Figure 14.

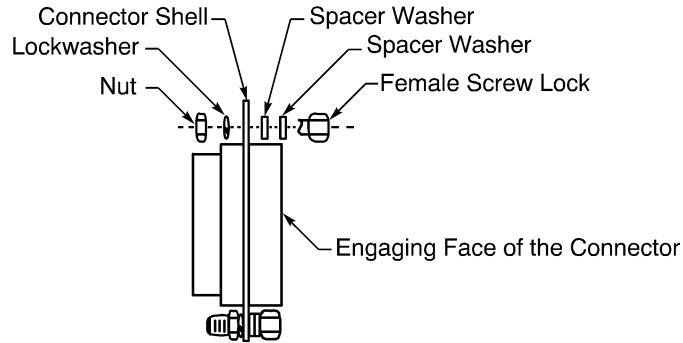
- (1) Put a male screw lock on one end of the connector shell.
- (2) Align the installation hole of the screw lock and the connector shell.
- (3) Put the screw in the screw lock from the rear of the connector.
- (4) Do Step (1) through Step (3) again to assemble a screw lock at the other installation hole of the connector.

#### C. Female Screw Lock Assembly

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

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### D SUBMINIATURE CONNECTORS: INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION



**FEMALE SCREW LOCK ASSEMBLY**

**Figure 15**

Refer to Figure 15.

- (1) Put two spacer washers on a screw lock.
- (2) From the front of the connector, put the screw lock in installation hole in the connector shell.
- (3) Put a lockwasher on the screw lock.
- (4) Put a nut on the screw lock.
- (5) Fully tighten the screw lock.
- (6) Do Step (1) through Step (5) again to install a screw lock in the other installation hole of the connector.

#### D. Female Screw Lock Assembly and Connector Installation in a Panel

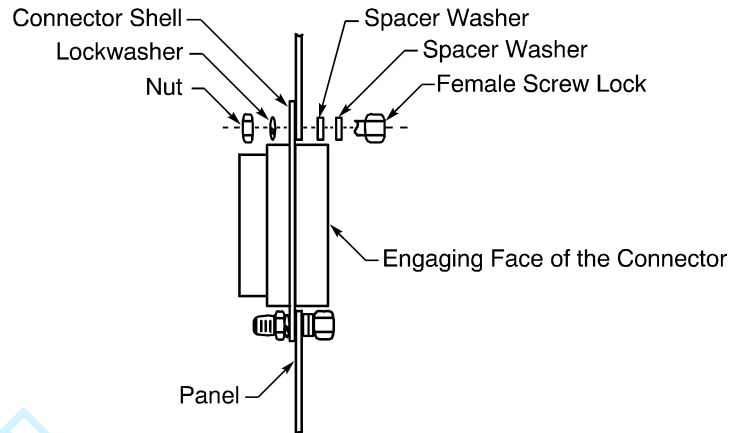
For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

**Table 11**  
**SPACER WASHERS FOR DIFFERENT PANEL THICKNESSES**

Panel Thickness (inch)		Necessary Number of Washers
Minimum	Maximum	
0.000	0.030	2
0.031	0.060	1
0.061	0.090	0

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**FEMALE SCREW LOCK ASSEMBLY AND CONNECTOR INSTALLATION**

**Figure 16**

Refer to Figure 16.

- (1) Measure the thickness of the panel.
  - (2) Find the number of washers that are necessary as spacers. Refer to Table 11.
  - (3) If one or more washers are specified in Table 11, put the specified quantity of washers on the screw lock.
  - (4) From the rear of the panel, put the connector in the hole in the panel.
  - (5) Align the installation holes in the connector with the holes in the panel.
  - (6) Put the screw lock in the hole in the panel and the connector shell.
  - (7) Put a lockwasher on the screw lock.
  - (8) Put the nut on the screw lock.
- Make sure that the screw lock is not fully tightened.
- (9) Do Step (3) through Step (8) again to install a screw lock in the other installation hole of the connector.
  - (10) Fully tighten each screw lock.

Make sure that the connector does not move in the panel.

#### **5. INSTALLATION HARDWARE ASSEMBLY - SLIDE LATCH AND SLIDE LOCK POST**

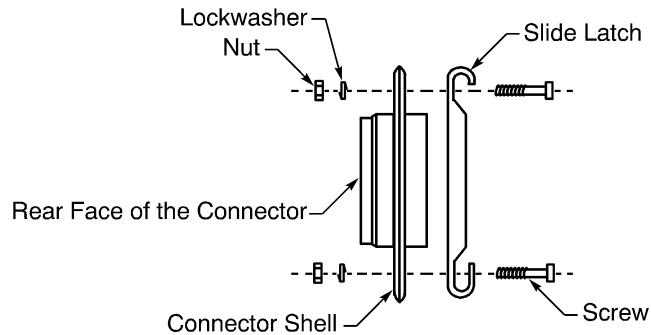
##### **A. Slide Latch Assembly**

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

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### D SUBMINIATURE CONNECTORS: INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION



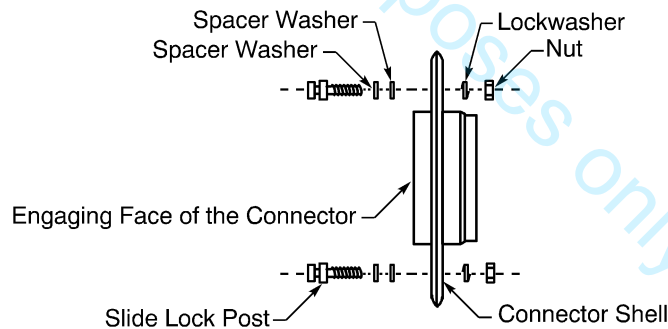
**SLIDE LATCH ASSEMBLY**  
**Figure 17**

Refer to Figure 17.

- (1) Align the installation hole of the slide latch with the installation hole in the connector shell.
- (2) From the front of the connector, put a screw through the hole in the slide latch and the connector shell.
- (3) Put a lockwasher on the screw.
- (4) Put the nut on the screw.
- (5) Fully tighten the screw.
- (6) Do Step (1) through Step (5) again for the other installation hole of the connector.

#### B. Slide Lock Post Assembly

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**SLIDE LOCK POST ASSEMBLY**  
**Figure 18**

Refer to Figure 18.

- (1) Put two spacer washers on a slide latch post.
- (2) From the front of the connector, put the slide latch post through the installation hole of the connector shell.
- (3) Put a lockwasher on the post.
- (4) Put the nut on the post.
- (5) Fully tighten the post.

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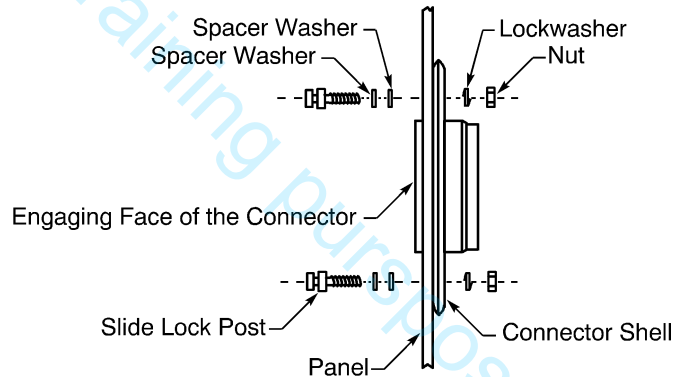
- (6) Do Step (1) through Step (5) again to install a slide lock post in the other installation hole of the connector.

#### C. Slide Lock Post Assembly and Connector Installation in a Panel

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

**Table 12**  
**SPACER WASHERS FOR DIFFERENT PANEL THICKNESSES**

Panel Thickness (inch)		Necessary Number of Washers
Minimum	Maximum	
0.000	0.030	2
0.031	0.060	1
0.061	0.090	0



**SLIDE LOCK POST ASSEMBLY AND CONNECTOR INSTALLATION**  
**Figure 19**

Refer to Figure 19.

- (1) Measure the thickness of the panel.
  - (2) Find the number of washers that are necessary as spacers. Refer to Table 12.
  - (3) If one or more washers are specified in Table 12, put the specified quantity of washers on the screw lock.
  - (4) From the rear of the panel, put the connector in the hole in the panel.
  - (5) Align the installation holes in the connector with the holes in the panel.
  - (6) Put the slide lock post in the hole in the panel and the connector shell.
  - (7) Put a lockwasher on the slide lock post.
  - (8) Put the nut on the slide lock post.
- Make sure that the slide lock post is not fully tightened.
- (9) Do Step (5) through Step (8) again to install the other slide lock post in the other installation hole of the connector.

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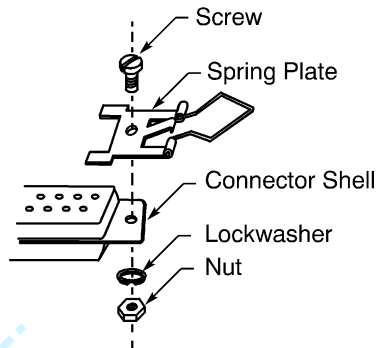
(10) Fully tighten each slide lock post.

Make sure that the connector does not move in the panel.

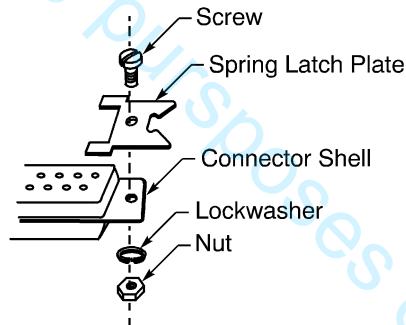
#### 6. INSTALLATION HARDWARE ASSEMBLY - SPRING PLATE AND SPRING LATCH PLATE

##### A. Spring Plate or Spring Latch Plate Assembly

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**SPRING PLATE ASSEMBLY**  
Figure 20



**SPRING LATCH PLATE ASSEMBLY**  
Figure 21

Refer to Figure 21 and Figure 20.

- (1) Align the installation hole of the spring latch plate or spring plate with the installation hole in the connector shell.
- (2) From the front of the connector, put a screw through the installation hole of the spring latch plate or spring plate and the connector shell.
- (3) Put a lockwasher on the screw.
- (4) Put the nut on the screw.
- (5) Fully tighten the screw.
- (6) Do Step (1) through Step (5) again for the other installation hole of the connector.

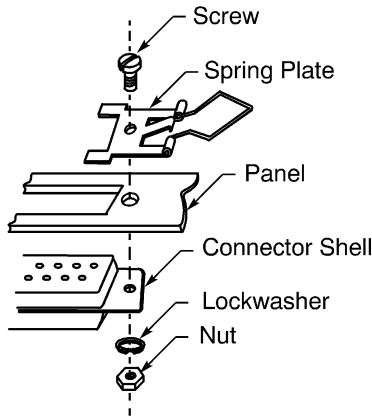
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### D SUBMINIATURE CONNECTORS: INSTALLATION HARDWARE ASSEMBLY AND CONNECTOR INSTALLATION

#### B. Spring Plate Assembly and Connector Installation in a Panel

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**SPRING PLATE ASSEMBLY AND CONNECTOR INSTALLATION**  
Figure 22

Refer to Figure 22.

- (1) From the rear of the panel, put the connector in the hole in the panel.
- (2) Put a screw in the installation hole of the spring plate.
- (3) Align the installation holes in the connector with the holes in the panel.
- (4) Put the screw in the hole in the panel and the connector shell.
- (5) Put the lockwasher on the screw.
- (6) Put the nut on the screw.  
Make sure that the screw is not fully tightened.
- (7) Do Step (2) through Step (6) again for the other installation hole of the connector.
- (8) Fully tighten each screw.  
Make sure that the connector does not move in the panel.

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## D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

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For the conditions that are applicable for the procedures in this Subject, refer to the Subject that is applicable for the assembly of the connector.

#### 1. PART NUMBERS AND DESCRIPTION

##### A. Backshell Part Numbers

Table 1  
BACKSHELL PART NUMBERS

Part Number	Shell Size	Configuration	Description	Strain Relief	Supplier	Reference
17-310-1	E	Straight	Short, Open	Round Cable Clamp	Amphenol	Figure 1
17-310-1	E	Straight	Short, Open	Round Cable Clamp	WPI	Figure 1
17-311-1	A	Straight	Short, Open	Round Cable Clamp	Amphenol	Figure 1
17-311-1	A	Straight	Short, Open	Round Cable Clamp	WPI	Figure 1
17-312-1	B	Straight	Short, Open	Round Cable Clamp	Amphenol	Figure 1
17-312-1	B	Straight	Short, Open	Round Cable Clamp	WPI	Figure 1
17-313-1	C	Straight	Short, Open	Round Cable Clamp	Amphenol	Figure 1
17-313-1	C	Straight	Short, Open	Round Cable Clamp	WPI	Figure 1
17-314-1	D	Straight	Short, Open	Round Cable Clamp	Amphenol	Figure 1
17-314-1	D	Straight	Short, Open	Round Cable Clamp	WPI	Figure 1
DA19678-1	A	Straight	Short, Closed	Cable Clamp Bars	ITT Cannon	Figure 4
DA19977-1	A	Right Angle	Closed	Round Cable Clamp	ITT Cannon	Figure 6
DA20961	A	Straight	Short, Open	Round Cable Clamp	ITT Cannon	Figure 3
DA24658	A	Straight	Long, Closed	Cable Clamp Bars	ITT Cannon	Figure 5
DB19678-2	B	Straight	Short, Closed	Cable Clamp Bars	ITT Cannon	Figure 4
DB19977-2	B	Right Angle	Closed	Round Cable Clamp	ITT Cannon	Figure 6
DB20962	B	Straight	Short, Open	Round Cable Clamp	ITT Cannon	Figure 3
DB24659	B	Straight	Long, Closed	Cable Clamp Bars	ITT Cannon	Figure 5
DC19678-3	C	Straight	Short, Closed	Cable Clamp Bars	ITT Cannon	Figure 4
DC19977-3	C	Right Angle	Closed	Round Cable Clamp	ITT Cannon	Figure 6
DC20963	C	Straight	Short, Open	Round Cable Clamp	ITT Cannon	Figure 3
DC24660	C	Straight	Long, Closed	Cable Clamp Bars	ITT Cannon	Figure 5
DD19678-4	D	Straight	Short, Closed	Cable Clamp Bars	ITT Cannon	Figure 4
DD19977-4	D	Right Angle	Closed	Round Cable Clamp	ITT Cannon	Figure 6
DD20964	D	Straight	Short, Open	Round Cable Clamp	ITT Cannon	Figure 3
DD24661	D	Straight	Long, Closed	Cable Clamp Bars	ITT Cannon	Figure 5
DE19977-5	E	Right Angle	Closed	Round Cable Clamp	ITT Cannon	Figure 6

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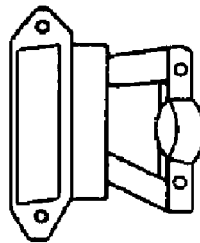
Table 1 (continued)

Part Number	Shell Size	Configuration	Description	Strain Relief	Supplier	Reference
DE24657	E	Straight	Long, Closed	Cable Clamp Bars	ITT Cannon	Figure 5
DE44994	E	Straight	Short, Open	Round Cable Clamp	ITT Cannon	Figure 3
DSB-3	B	Straight	Flat	Wire Harness Tie Tab	Cory Components	Figure 2
DSB-3	B	Straight	Flat	Wire Harness Tie Tab	Tri-Star	Figure 2
DSB-4	C	Straight	Flat	Wire Harness Tie Tab	Cory Components	Figure 2
DSB-4	C	Straight	Flat	Wire Harness Tie Tab	Tri-Star	Figure 2
DSB-5	D	Straight	Flat	Wire Harness Tie Tab	Cory Components	Figure 2
DSB-5	D	Straight	Flat	Wire Harness Tie Tab	Tri-Star	Figure 2

Table 2

### ALTERNATIVE BACKSHELL PART NUMBERS

Specified Backshell		Alternative Backshell	
Part Number	Supplier	Part Number	Supplier
17-31()-1	Amphenol	17-31()-1	WPI
DSB-()	Cory Components	DSB-()	Tri-Star

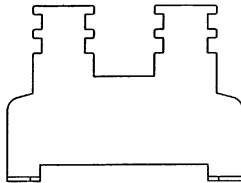


17-()() SERIES BACKSHELL  
Figure 1

20-72-08

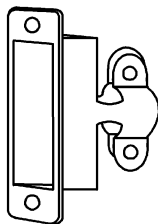
## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



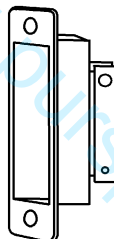
**DSB-() SERIES BACKSHELL**

**Figure 2**



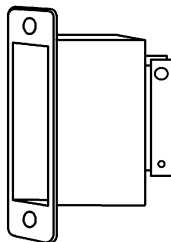
**SHORT OPEN BACKSHELL**

**Figure 3**



**SHORT CLOSED BACKSHELL**

**Figure 4**

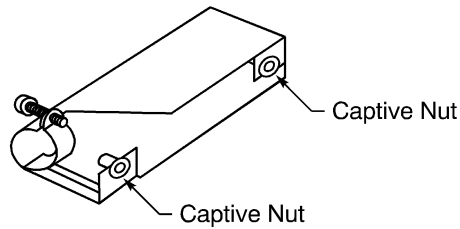


**LONG CLOSED BACKSHELL**

**Figure 5**

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**RIGHT ANGLE BACKSHELL**  
**Figure 6**

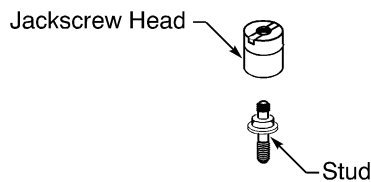
#### B. Jackscrew and Jackpost Installation Hardware Part Numbers

**Table 3**  
**JACKSCREW AND JACKPOST KITS**

Kit	Part Number	Supplier	Reference
Jackscrew Kit	D110550	ITT Cannon	Figure 7
Jackpost Kit	D110551	ITT Cannon	Figure 8

**Table 4**  
**JACKSCREW AND JACKPOST KIT COMPONENTS**

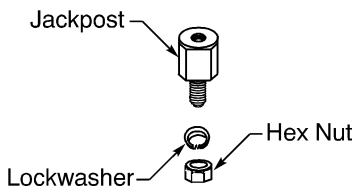
Kit	Kit Component	
	Description	Quantity
Jackscrew	Jackscrew Head	2
	Stud	2
Jackpost	Jackpost	2
	Lockwasher	2
	Nut	2



**JACKSCREW INSTALLATION HARDWARE**  
**Figure 7**

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

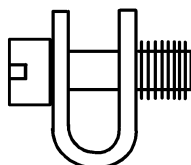


**JACKPOST INSTALLATION HARDWARE**  
Figure 8

### C. Screw Lock Installation Hardware Part Numbers

**Table 5**  
**SCREW LOCK INSTALLATION COMPONENTS**

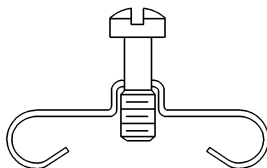
Component	Length L (inch)	Shell Size		Specification	Supplier	Reference
		M24308 Part Number	Supplier Part Number			
Male Screw Lock, Single Clip	-	All	All	MIL-DTL-24308/25-6	QPL	Figure 9
Male Screw Lock, Double Clip	-	1	E	MIL-DTL-24308/25-9	QPL	Figure 10
		2	A	MIL-DTL-24308/25-9	QPL	Figure 10
		3	B	MIL-DTL-24308/25-9	QPL	Figure 10
		4	C	MIL-DTL-24308/25-9	QPL	Figure 10
		5	D	MIL-DTL-24308/25-10	QPL	Figure 10
Female Screw Lock	0.312	All	All	D20418-2	ITT Cannon	Figure 11
				MIL-DTL-24308/26-1	QPL	Figure 11
	0.625	All	All	D20418-39	ITT Cannon	Figure 11
				MIL-DTL-24308/26-2	QPL	Figure 11



**SINGLE CLIP MALE SCREW LOCK INSTALLATION HARDWARE**  
Figure 9

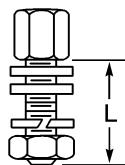
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## D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**DOUBLE CLIP MALE SCREW LOCK INSTALLATION HARDWARE**

**Figure 10**



**FEMALE SCREW LOCK INSTALLATION HARDWARE**

**Figure 11**

### D. Slide Latch Installation Hardware Part Numbers

**Table 6**  
**SLIDE LATCH KITS**

Kit	Shell Size		Part Number	Supplier	Reference
	M24308 Part Number	Supplier Part Number			
Slide Latch Kit	1	E	DE51224-1	ITT Cannon	Figure 12
	2	A	DA51220-1	ITT Cannon	Figure 12
	3	B	DB51221-1	ITT Cannon	Figure 12
	4	C	DC51222-1	ITT Cannon	Figure 12
	5	D	DD51223-1	ITT Cannon	Figure 12
Slide Lock Post Kit	All	All	D53018	ITT Cannon	Figure 13

**Table 7**  
**SLIDE LATCH KIT COMPONENTS**

Kit	Kit Component	
	Description	Quantity
Slide Latch Kit	Lock Washer	2
	Nut	2
	Screw	2
	Slide Latch	1

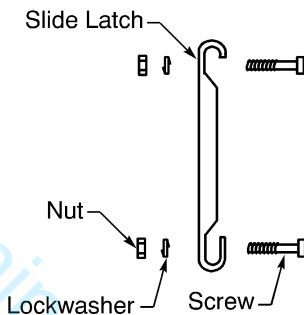
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## D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

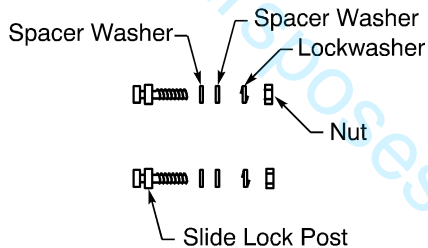
Table 7 (continued)

Kit	Kit Component	
	Description	Quantity
Slide Lock Post Kit	Hex Nut	1
	Lock Washers	1
	Slide Lock Post	1
	Spacer Washers	2



SLIDE LATCH INSTALLATION HARDWARE

Figure 12



SLIDE LOCK POST INSTALLATION HARDWARE

Figure 13

# STANDARD WIRING PRACTICES MANUAL

## D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

### E. Spring Latch Installation Hardware Part Numbers

**Table 8**  
**SPRING LATCH KITS**

Kit	Shell Size		Part Number	Supplier	Reference
	M24308 Part Number	Supplier Part Number			
Spring Latch Plate Kit	1	E	D110278	ITT Cannon	Figure 14
	2	A	D110278	ITT Cannon	Figure 14
	3	B	D110278	ITT Cannon	Figure 14
	4	C	D110278	ITT Cannon	Figure 14
	5	D	D110279	ITT Cannon	Figure 14
Spring Plate Kit	1	E	D110277	ITT Cannon	Figure 15
	1	E	D110277-1	ITT Cannon	Figure 15
	2	A	D110277	ITT Cannon	Figure 15
	3	B	D110277	ITT Cannon	Figure 15
	4	C	D110277	ITT Cannon	Figure 15
Spring Plate and Spring Latch Plate Kit	1	E	17-529	Amphenol	Figure 14 Figure 15
	1	E	17-529	WPI	Figure 14 Figure 15
	2	A	17-529	Amphenol	Figure 14 Figure 15
	2	A	17-529	WPI	Figure 14 Figure 15
	3	B	17-529	Amphenol	Figure 14 Figure 15
	3	B	17-529	WPI	Figure 14 Figure 15
	4	C	17-529	Amphenol	Figure 14 Figure 15
	4	C	17-529	WPI	Figure 14 Figure 15
	5	D	17-770	Amphenol	Figure 14 Figure 15
	5	D	17-770	WPI	Figure 14 Figure 15

**Table 9**  
**SPRING PLATE KIT SCREW DIMENSIONS**

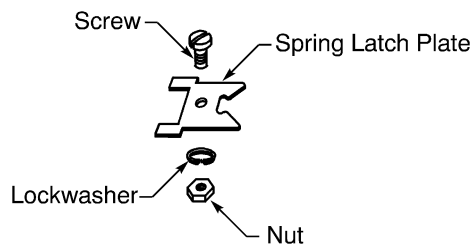
Kit	Screw Length (inch)
D110277	0.312
D110277-1	0.375

# STANDARD WIRING PRACTICES MANUAL

## D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

Table 10  
SPRING LATCH KIT COMPONENTS

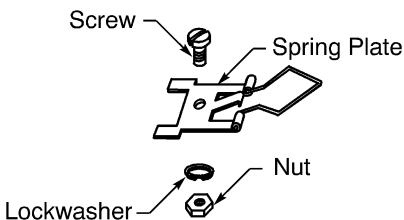
Kit		Kit Component	
Description	Part Number	Description	Quantity
Spring Latch Plate	D110278	Lockwasher	1
		Nut	1
		Screw	1
		Spring Latch Plate	1
Spring Plate	D110277	Lockwasher	1
		Nut	1
		Screw	1
		Spring Plate	1
Spring Latch Plate and Spring Plate	17-529	Spring Latch Plate	2
		Spring Plate	2
		Lockwasher	4
		Nut	4
		Screw	4
Spring Latch Plate and Spring Plate	17-770	Spring Latch Plate	2
		Spring Plate	2
		Lockwasher	4
		Nut	4
		Screw	4



SPRING LATCH PLATE INSTALLATION HARDWARE  
Figure 14

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**SPRING PLATE INSTALLATION HARDWARE**

**Figure 15**

#### F. Flat Washer Part Numbers

**Table 11**  
**FLAT WASHER PART NUMBERS**

Part Number	Hole Size	Thickness (inch)	Material
NAS1149DN416J	4	0.16	Aluminum

#### G. Necessary Materials

**Table 12**  
**NECESSARY MATERIALS**

Material	Part Number	Supplier
Tape	912-10X12	Arlon, Silicone Technologies Division
	P-440	Permacel
	Scotch 70	3M
	SG26-03	Saint-Gobain Performance Plastics
Thread Lock Compound	222	Loctite
	83	Loctite
	Product 081	Loctite

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

#### 2. BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

##### A. Backshell Assembly and Connector Installation Configurations

Table 13

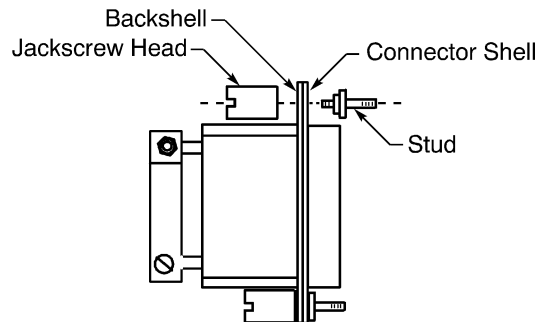
**SELECTION OF A BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION CONFIGURATION**

Applicable Conditions		Assembly Procedure
Connector Installation Configuration	Installation Hardware	
No Panel	Jackscrew	Paragraph 3.A.
	Jackpost	Paragraph 3.B.
	Male Screw Lock - Single Clip	Paragraph 4.A.
	Male Screw Lock - Double Clip	Paragraph 4.B.
	Female Screw Lock	Paragraph 4.C.
	Slide Latch	Paragraph 5.A.
	Slide Lock Posts	Paragraph 5.C.
	Spring Plate	Paragraph 6.A.
	Spring Latch Plate	Paragraph 6.A.
	Spring Plate and a DSB-() Backshell	Paragraph 6.B.
	Spring Latch Plate and a DSB-() Backshell	Paragraph 6.B.
Panel	Jackpost	Paragraph 3.C.
	Female Screw Lock	Paragraph 4.D.
	Slide Lock Posts	Paragraph 5.B.
	Spring Plate	Paragraph 6.C.

#### 3. BACKSHELL ASSEMBLY - JACKSCREW AND JACKPOST INSTALLATION HARDWARE

##### A. Backshell Assembly with Jackscrew Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.


**BACKSHELL ASSEMBLY**
**Figure 16**

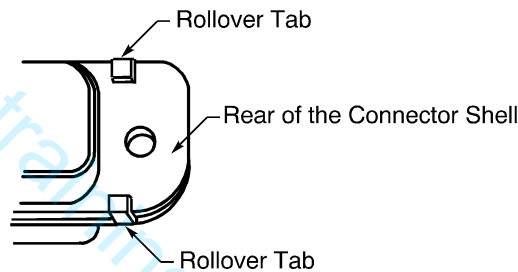
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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

Refer to Figure 16.

- (1) Make a selection of a thread lock compound from Table 12.
- (2) Put the connector backshell on the wire harness.  
Make sure that the end of the backshell that has the cable clamp is pointed rearward away from the end of the wire harness.
- (3) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (4) Put two hex nuts on the stud.
- (5) From the front of the connector, put a stud in the installation hole in the connector shell.
- (6) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 17.



**ROLLOVER TABS OF THE CONNECTOR SHELL**

**Figure 17**

- (a) Make a selection of a flat washer from Table 11.

**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.

- (b) Put the washer on the stud.
- (7) Hold the stud in its position and align the installation hole of the backshell with the stud.
- (8) Apply a drop of thread lock compound on the threads of the stud.
- (9) Put the jackscrew head on the stud.
- (10) Do Step (4) through Step (9) again to install a jackscrew in the other installation hole of the connector.
- (11) Fully tighten each jackscrew head.
- (12) Remove the two hex nuts from each stud.
- (13) Assemble the strain relief.

For a backshell that has:

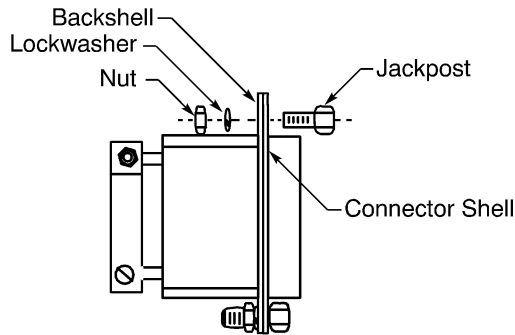
- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

#### **B. Backshell Assembly with Jackpost Installation Hardware**

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

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### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**BACKSHELL ASSEMBLY**

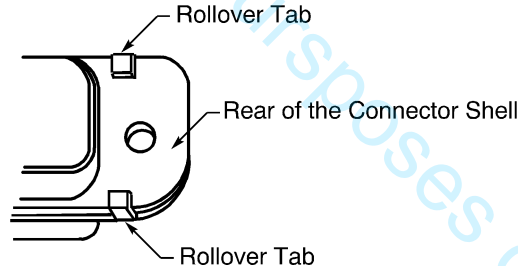
**Figure 18**

Refer to Figure 18.

- (1) Put the connector backshell on the wire harness.

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

- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) From the front of the connector, put a jackpost in the installation hole in the connector shell.
- (4) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 19.



**ROLLOVER TABS OF THE CONNECTOR SHELL**

**Figure 19**

- (a) Make a selection of a flat washer from Table 11.

**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.

- (b) Put the washer on the jackpost.
- (5) Hold the jackpost in its position and align the installation hole of the backshell with the jackpost.
- (6) If the backshell has a captive nut, put the jackpost in the nut.  
Make sure that the jackpost is not fully tightened.
- (7) If the backshell does not have captive nut:
  - (a) Put a lockwasher on the jackpost.
  - (b) Put the nut on the jackpost.

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Make sure that the jackpost is not fully tightened.

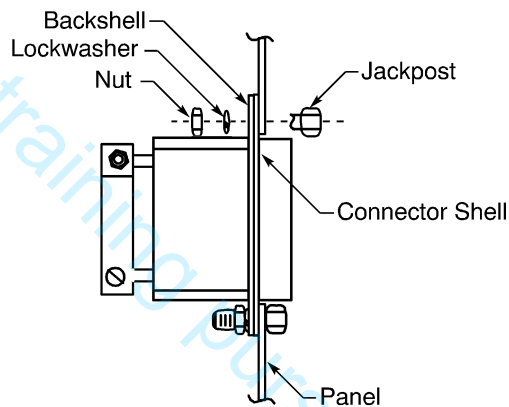
- (8) Do Step (3) through Step (7) again to install a jackpost in the other installation hole of the connector.
- (9) Fully tighten each jackpost.
- (10) Assemble the strain relief.

For a backshell that has:

- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

### C. Backshell Assembly and Connector Installation in a Panel with Jackpost Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION**  
Figure 20

Refer to Figure 20.

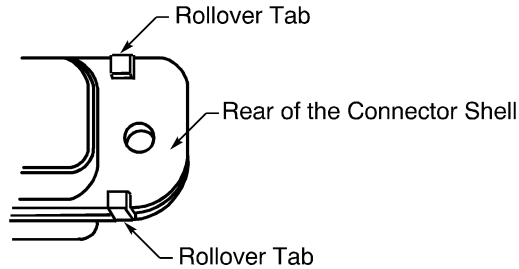
- (1) Put the connector backshell on the wire harness.

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

- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) From the rear of the panel, put the connector in the hole in the panel.
- (4) Align the installation holes in the connector with the holes in the panel.
- (5) Put the jackpost in the hole in the panel and the connector shell.
- (6) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 21.

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### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**ROLLOVER TABS OF THE CONNECTOR SHELL**  
**Figure 21**

- (a) Make a selection of a washer from Table 11.

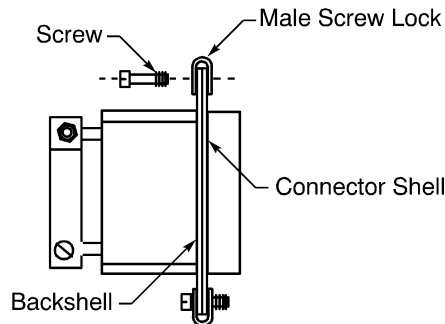
**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.

- (b) Put a washer on the jackpost.
- (7) Hold the installation jackpost in its position and align the installation hole of the backshell with the jackpost.
- (8) If the backshell has a captive nut, put the jackpost in the nut.  
Make sure that the jackpost is not fully tightened.
- (9) If the backshell does not have captive nut:
- (a) Put a lockwasher on the jackpost.
  - (b) Put the nut on the jackpost.
- Make sure that the jackpost is not fully tightened.
- (10) Do Step (5) through Step (9) again to install a jackpost in the other installation hole of the connector.
- (11) Fully tighten each jackpost.  
Make sure that the connector does not move in the panel.

#### 4. **BACKSHELL ASSEMBLY - MALE AND FEMALE SCREW LOCK INSTALLATION HARDWARE**

##### A. Backshell Assembly with Single Clip Male Screw Lock Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**BACKSHELL ASSEMBLY**  
**Figure 22**

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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

Refer to Figure 22.

- (1) Put the connector backshell on the wire harness.

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

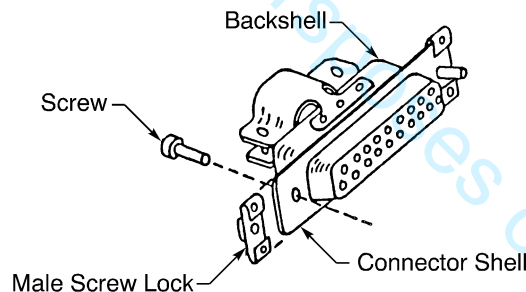
- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) Align the backshell with the connector shell.
- (4) Put a male screw lock on one end of the connector shell and the backshell.  
Make sure that the clip of the screw lock holds the connector shell flange and the backshell flange.
- (5) Align the hole in the screw lock with the hole in the backshell flange and the connector shell flange.
- (6) Put the screw in the screw lock.
- (7) Do Step (4) through Step (6) again to install a screw lock in the other installation hole of the connector.
- (8) Assemble the strain relief.

For a backshell that has:

- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

### B. Backshell Assembly with Double Clip Male Screw Lock Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**BACKSHELL ASSEMBLY**  
**Figure 23**

Refer to Figure 23.

- (1) Put the connector backshell on the wire harness.

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

- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) Align the backshell with the connector shell.
- (4) Put a male screw lock on one end of the connector shell and the backshell.

Make sure that the clips of the screw lock hold the connector shell flange and the backshell flange.

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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

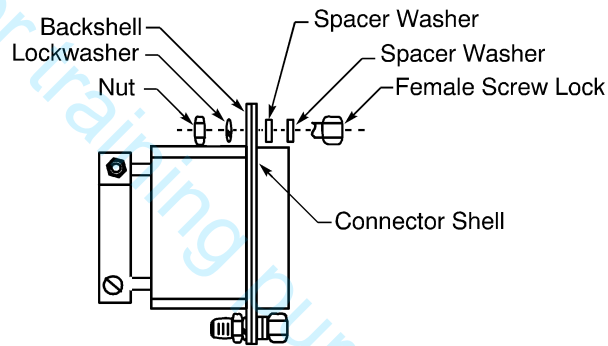
- (5) Align the installation hole of the backshell, the connector shell and the screw lock.
- (6) Put the screw in the screw lock.
- (7) Do Step (4) through Step (6) again to install a screw lock in the other installation hole of the connector.
- (8) Assemble the strain relief.

For a backshell that has:

- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

### C. Backshell Assembly with Female Screw Lock Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**BACKSHELL ASSEMBLY**

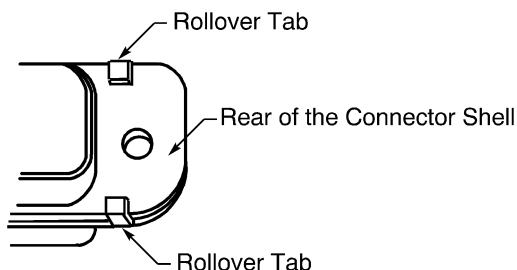
**Figure 24**

Refer to Figure 24.

- (1) Put the connector backshell on the wire harness.  
Make sure that the end of the backshell that has the cable clamp is pointed rearward away from the end of the wire harness.
- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) Put two spacer washers on a screw lock.
- (4) From the front of the connector, put the screw lock in installation hole in the connector shell.
- (5) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 25.

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**ROLLOVER TABS OF THE CONNECTOR SHELL**

**Figure 25**

- (a) Make a selection of a flat washer from Table 11.

**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.

- (b) Put the washer on the screw lock.
- (6) Hold the screw lock in its position and align the installation hole of the backshell with the screw lock.
- (7) If the backshell has a captive nut, put the screw lock in the nut.  
Make sure that the screw lock is not fully tightened.
- (8) If the backshell does not have captive nut:
- (a) Put a lockwasher on the screw lock.
- (b) Put a nut on the screw lock.  
Make sure that the screw lock is not fully tightened.
- (9) Do Step (3) through Step (8) again to install a screw lock in the other installation hole of the connector.
- (10) Fully tighten each screw lock.
- (11) Assemble the strain relief.

For a backshell that has:

- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

#### D. Backshell Assembly and Connector Installation in a Panel with Female Screw Lock Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

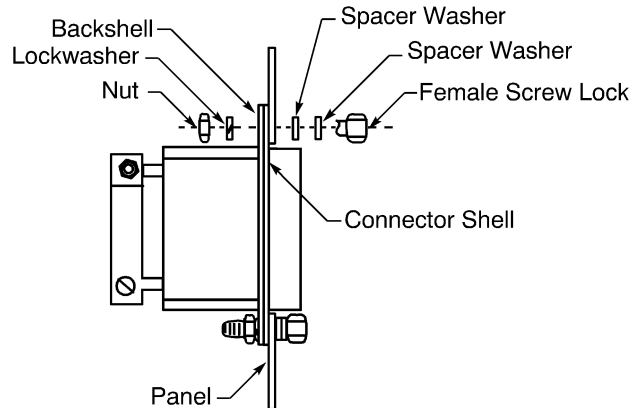
**Table 14**  
**SPACER WASHERS FOR DIFFERENT PANEL THICKNESSES**

Panel Thickness (inch)		Necessary Number of Washers
Minimum	Maximum	
0.000	0.030	2
0.031	0.060	1
0.061	0.090	0

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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

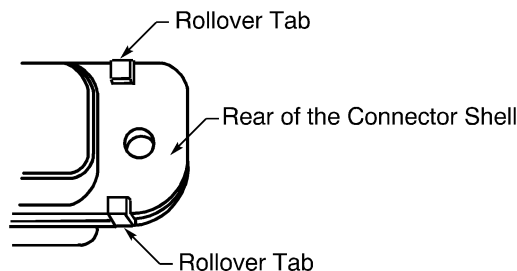


#### BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

Figure 26

Refer to Figure 26.

- (1) Put the connector backshell on the wire harness.  
Make sure that the end of the backshell that has the cable clamp is pointed rearward away from the end of the wire harness.
- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) Measure the thickness of the panel.
- (4) Find the number of washers that are necessary as spacers. Refer to Table 14.
- (5) If one or more washers are specified in Table 14, put the specified quantity of washers on the screw lock.
- (6) From the rear of the panel, put the connector in the hole in the panel.
- (7) Align the installation holes in the connector with the holes in the panel.
- (8) Put the screw lock in the hole in the panel and the connector shell.
- (9) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 27.



#### ROLLOVER TABS OF THE CONNECTOR SHELL

Figure 27

- (a) Make a selection of a washer from Table 11.

**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.

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## STANDARD WIRING PRACTICES MANUAL

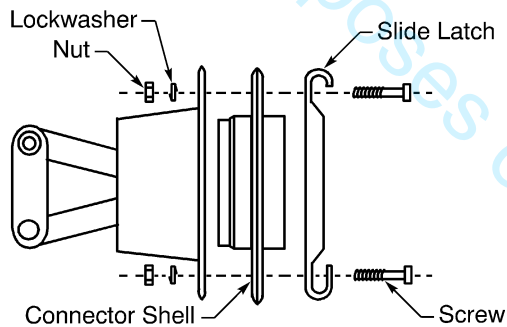
### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

- (b) Put a washer on the screw lock.
- (10) Hold the installation screw lock in its position and align the installation hole of the backshell with the screw lock.
- (11) If the backshell has a captive nut, put the screw lock in the nut.  
Make sure that the screw is not fully tightened.
- (12) If the backshell does not have captive nut:
  - (a) Put a lockwasher on the screw lock.
  - (b) Put the nut on the screw lock.
 Make sure that the screw lock is not fully tightened.
- (13) Do Step (7) through Step (12) again to install a screw lock in the other installation hole of the connector.
- (14) Fully tighten each screw lock.  
Make sure that the connector does not move in the panel.
- (15) Assemble the strain relief.  
For a backshell that has:
  - A right angle configuration, refer to Paragraph 7.A.
  - A round cable clamp, refer to Paragraph 7.B.
  - Two cable clamp bars, refer to Paragraph 7.C.

### 5. BACKSHELL ASSEMBLY - SLIDE LATCH AND SLIDE LOCK POST INSTALLATION HARDWARE

#### A. Backshell Assembly with Slide Latch Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



**BACKSHELL ASSEMBLY**  
**Figure 28**

Refer to Figure 28.

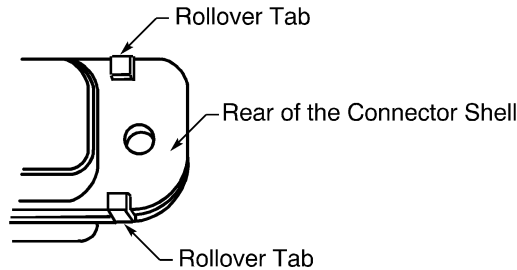
- (1) Put the connector backshell on the wire harness.  
Make sure that the end of the backshell that has the cable clamp is pointed rearward away from the end of the wire harness.
- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) Align the installation hole of the slide latch with the installation hole in the connector shell.

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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

- (4) From the front of the connector, put a screw through the hole in the slide latch and the connector shell.
- (5) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 29.



**ROLLOVER TABS OF THE CONNECTOR SHELL**  
**Figure 29**

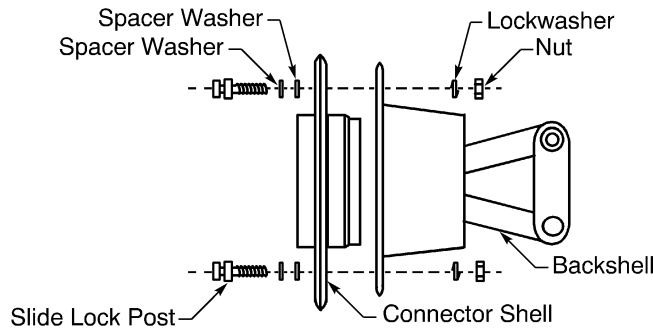
- (a) Make a selection of a flat washer from Table 11.  
**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.
- (b) Put the washer on the screw.
- (6) Hold the screw in its position and align the installation hole of the backshell with the screw.
- (7) If the backshell has a captive nut, put the screw in the nut.  
Make sure that the screw is not fully tightened.
- (8) If the backshell does not have captive nut:
  - (a) Put a lockwasher on the screw.
  - (b) Put the nut on the screw.  
Make sure that the screw is not fully tightened.
- (9) Do Step (3) through Step (8) again for the other installation hole of the connector.
- (10) Fully tighten each screw.
- (11) Assemble the strain relief.  
For a backshell that has:
  - A right angle configuration, refer to Paragraph 7.A.
  - A round cable clamp, refer to Paragraph 7.B.
  - Two cable clamp bars, refer to Paragraph 7.C.

#### B. Backshell Assembly with Slide Lock Post Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

## STANDARD WIRING PRACTICES MANUAL

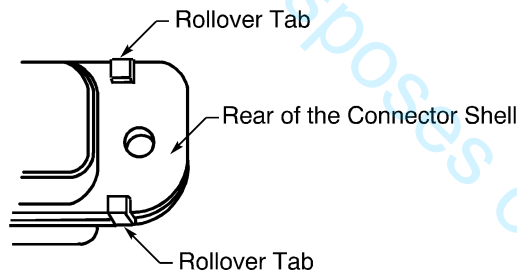
### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**BACKSHELL ASSEMBLY**  
Figure 30

Refer to Figure 30.

- (1) Put the connector backshell on the wire harness.  
Make sure that the end of the backshell that has the cable clamp is pointed rearward away from the end of the wire harness.
- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) Put two spacer washers on a slide latch post.
- (4) From the front of the connector, put the slide latch post through the installation hole of the connector shell.
- (5) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 31.



**ROLLOVER TABS OF THE CONNECTOR SHELL**  
Figure 31

- (a) Make a selection of a flat washer from Table 11.  
**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.
- (b) Put the washer on the post.
- (6) Hold the post in its position and align the installation hole of the backshell with the post.
- (7) If the backshell has a captive nut, put the post in the nut.  
Make sure that the post is not fully tightened.
- (8) If the backshell does not have captive nut:
  - (a) Put a lockwasher on the post.

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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

- (b) Put the nut on the post.  
Make sure that the post is not fully tightened.
- (9) Do Step (3) through Step (8) again to install a slide lock post in other installation hole of the connector.
- (10) Tighten each post.
- (11) Assemble the strain relief.

For a backshell that has:

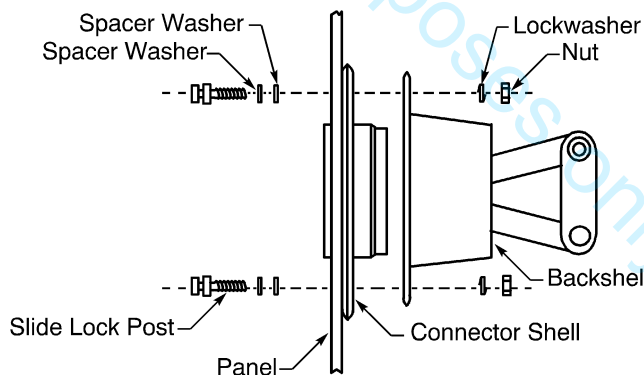
- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

### C. Backshell Assembly and Connector Installation in a Panel with Slide Lock Post Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

**Table 15**  
**SPACER WASHERS FOR DIFFERENT PANEL THICKNESSES**

Panel Thickness (inch)		Necessary Number of Washers
Minimum	Maximum	
0.000	0.030	2
0.031	0.060	1
0.061	0.090	0



**BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION**  
**Figure 32**

Refer to Figure 32.

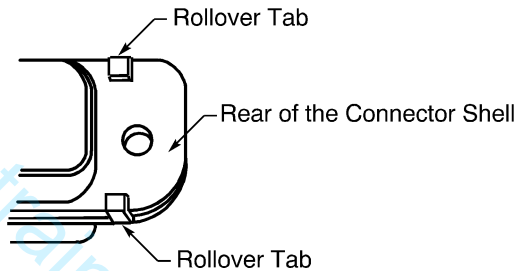
- (1) Put the connector backshell on the wire harness.  
Make sure that the end of the backshell that has the cable clamp is pointed rearward away from the end of the wire harness.
- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.

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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

- (3) Measure the thickness of the panel.
- (4) Find the number of washers that are necessary as spacers. Refer to Table 15.
- (5) From the rear of the panel, put the connector in the hole in the panel.
- (6) If one or more washers are specified in Table 15, put the specified quantity of washers on the slide lock post.
- (7) Align the installation holes in the connector with the holes in the panel.
- (8) Put the slide lock post in the hole in the panel and the connector shell.
- (9) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 33.



**ROLLOVER TABS OF THE CONNECTOR SHELL**  
**Figure 33**

- (a) Make a selection of a washer from Table 11.  
**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.
- (b) Put a washer on the slide lock post.
- (10) Hold the installation slide lock post in its position and align the installation hole of the backshell with the slide lock post.
- (11) If the backshell has a captive nut, put the slide lock post in the nut.  
Make sure that the slide lock post is not fully tightened.
- (12) If the backshell does not have captive nut:
  - (a) Put a lockwasher on the slide lock post.
  - (b) Put the nut on the slide lock post.  
Make sure that the slide lock post is not fully tightened.
- (13) Do Step (7) through Step (12) again to install a slide lock post in the other installation hole of the connector.
- (14) Fully tighten each slide lock post.  
Make sure that the connector does not move in the panel.
- (15) Assemble the strain relief.

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

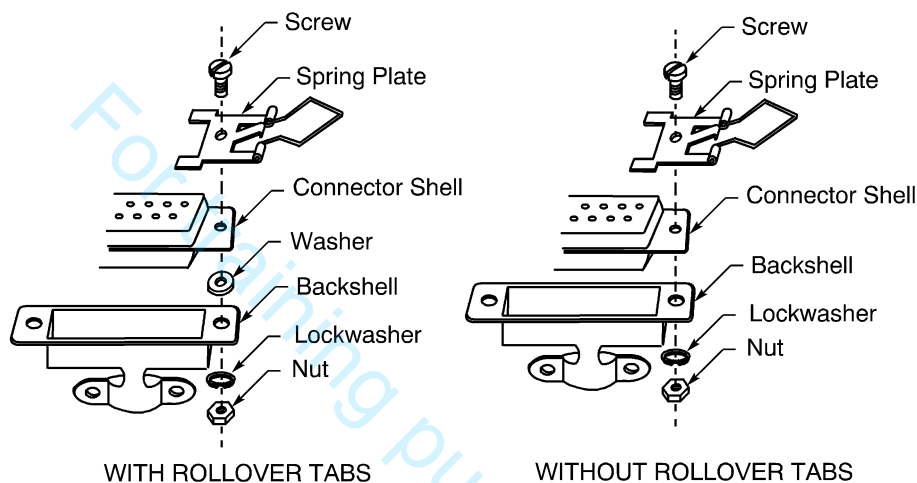
For a backshell that has:

- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

#### 6. BACKSHELL ASSEMBLY - SPRING PLATE AND SPRING LATCH PLATE HARDWARE

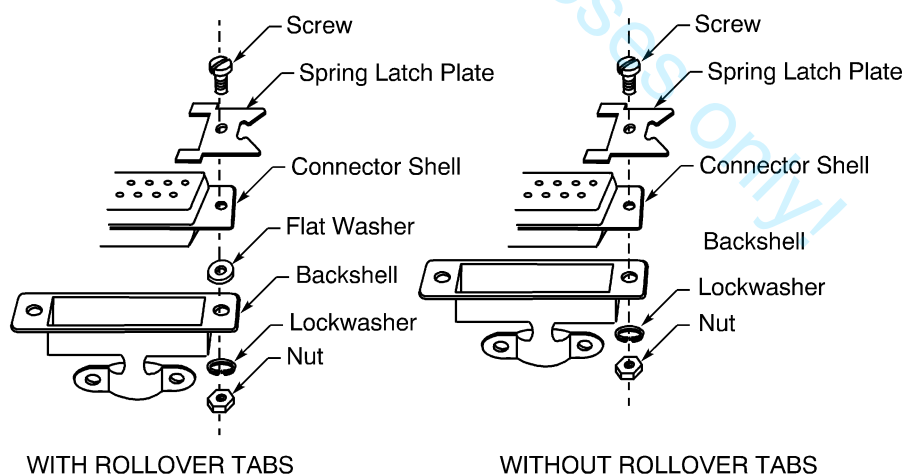
##### A. Backshell Assembly with Spring Plate or Spring Latch Plate Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



#### BACKSHELL ASSEMBLY WITH SPRING PLATE HARDWARE

Figure 34



#### BACKSHELL ASSEMBLY WITH SPRING LATCH PLATE HARDWARE

Figure 35

Refer to Figure 35 and Figure 34.

- (1) Put the connector backshell on the wire harness.

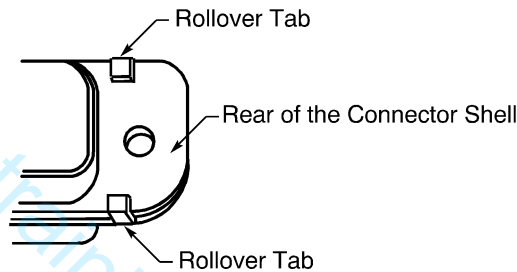
20-72-08

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### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

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

- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) Align the installation hole of the spring latch plate or spring plate with the installation hole in the connector shell.
- (4) From the front of the connector, put a screw through the installation hole of the spring latch plate or spring plate and the connector shell.
- (5) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 36.



**ROLLOVER TABS OF THE CONNECTOR SHELL**

**Figure 36**

- (a) Make a selection of a flat washer from Table 11.
- NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.
- (b) Put the washer on the screw.
  - (6) Hold the installation screw in its position and align the installation hole of the backshell with the screw.
  - (7) If the backshell has a captive nut, put the screw in the nut.  
Make sure that the screw is not fully tightened.
  - (8) If the backshell does not have captive nut:
    - (a) Put a lockwasher on the screw.
    - (b) Put the nut on the screw.  
Make sure that the screw is not fully tightened.
  - (9) Do Step (3) through Step (8) again for the other installation hole of the connector.
  - (10) Fully tighten each screw.
  - (11) Assemble the strain relief.

For a backshell that has:

- A right angle configuration, refer to Paragraph 7.A.
- A round cable clamp, refer to Paragraph 7.B.
- Two cable clamp bars, refer to Paragraph 7.C.

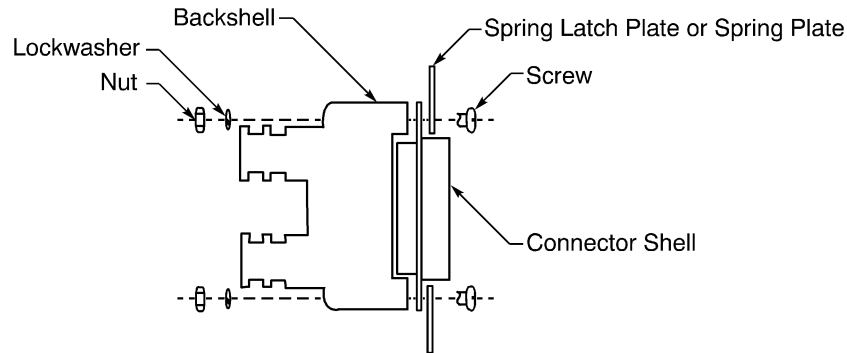
### B. DSB-() Backshell Assembly with Spring Plate or Spring Latch Plate Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.

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## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

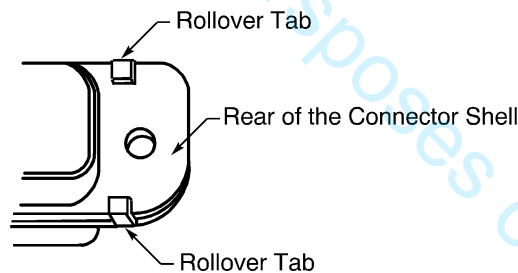


**BACKSHELL ASSEMBLY**

**Figure 37**

Refer to Figure 37.

- (1) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (2) Make a selection of a tape from Table 12.
- (3) Align the installation hole of the spring latch plate or spring plate with the installation hole in the connector shell.
- (4) From the front of the connector, put a screw through the installation hole of the spring latch plate or spring plate and the connector shell.
- (5) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 38.



**ROLLOVER TABS OF THE CONNECTOR SHELL**

**Figure 38**

- (a) Make a selection of a flat washer from Table 11.

**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.

- (b) Put the washer on the screw.
- (6) Hold the installation screw in its position and align the installation hole of the backshell with the screw.
- (7) Put a lockwasher on the screw.
- (8) Put the nut on the screw.

Make sure that the screw is not fully tightened.

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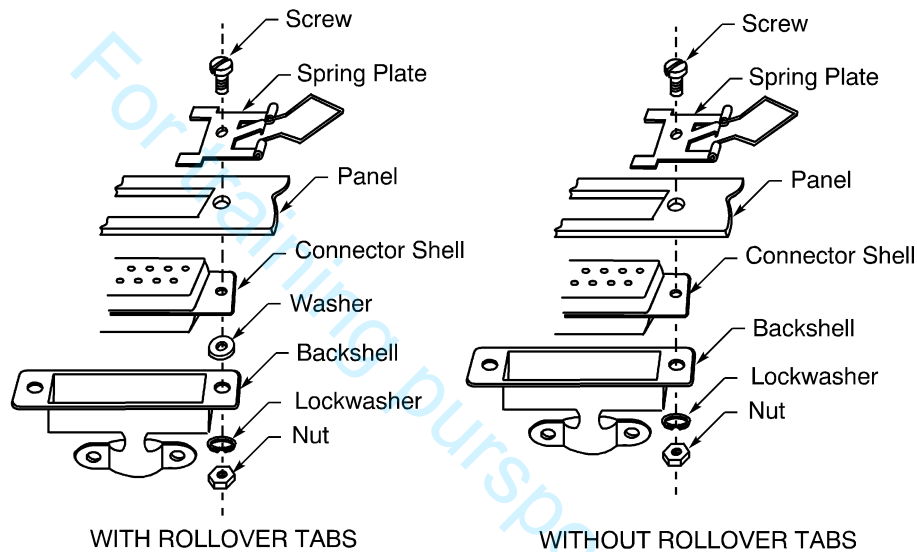
## STANDARD WIRING PRACTICES MANUAL

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- (9) Do Step (3) through Step (8) again for the other installation hole of the connector.
  - (10) Fully tighten each screw.
  - (11) Assemble the strain relief:
    - (a) Wind 2 layers of tape on the wire harness where the harness is against the tie tab.
    - (b) Assemble a wire harness tie on the wire harness and the tie tab.
- Refer to Subject 20-10-11 for the assembly of a wire harness tie.

### C. Backshell Assembly and Connector Installation in a Panel with Spring Plate Installation Hardware

For the conditions that are applicable for this procedure, refer to Paragraph 2.A.



### BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION

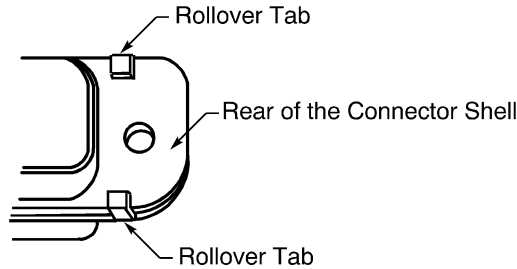
Figure 39

Refer to Figure 39.

- (1) Put the connector backshell on the wire harness.  
Make sure that the end of the backshell that has the cable clamp is pointed rearward away from the end of the wire harness.
- (2) Install the contacts in the connector. Refer to the Subject that is applicable for the assembly of the connector.
- (3) From the rear of the panel, put the connector in the hole in the panel.
- (4) Put a screw in the installation hole of the spring plate.
- (5) Align the installation holes in the connector with the holes in the panel.
- (6) Put the screw in the hole in the panel and the connector shell.
- (7) If the connector shell has rollover tabs, install a washer as a spacer. Refer to Figure 40.

## STANDARD WIRING PRACTICES MANUAL

### D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION



**ROLLOVER TABS OF THE CONNECTOR SHELL**

**Figure 40**

- (a) Make a selection of a washer from Table 11.

**NOTE:** A washer that has the same material, thickness, and hole size is a satisfactory alternative.

- (b) Put the washer on the screw.
- (8) Hold the installation screw in its position and align the installation hole of the backshell with the screw.
- (9) If the backshell has a captive nut, put the screw in the nut.  
Make sure that the screw is not fully tightened.
- (10) If the backshell does not have captive nut:
- Put the lockwasher on the screw.
  - Put the nut on the screw.
- Make sure that the screw is not fully tightened.
- (11) Do Step (4) through Step (10) again for the other installation hole of the connector.
- (12) Fully tighten each screw.  
Make sure that the connector does not move in the panel.
- (13) Assemble the strain relief.  
For a backshell that has:
- A right angle configuration, refer to Paragraph 7.A.
  - A round cable clamp, refer to Paragraph 7.B.
  - Two cable clamp bars, refer to Paragraph 7.C.

### 7. STRAIN RELIEF ASSEMBLY

#### A. Strain Relief Assembly - Right Angle Backshell

- Remove one of the screws that hold the saddle bar to the cable clamp.
- Move the saddle bar to open the cable clamp.
- Align the wire harness with the cable clamp.  
Make sure that the wires or cables do not go across each other in the clamp.

**NOTE:** This condition is not applicable for twisted wires.

- Make a mark on the wire harness at the center of the saddle bar of the cable clamp.
- Put the saddle bar that was removed against the other saddle bar in its original position.

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- (6) Push the saddle bars of the cable clamp together.
  - (7) If the cable clamp does not hold the wire harness tightly, increase the diameter of the wire harness with tape.
    - (a) Make a selection of a tape from Table 12.
    - (b) Remove the saddle bar.
    - (c) Wind 2 or 3 layers of tape around the wire harness at the mark on the wire harness.Make sure that:
    - The center of the layers of tape is aligned with the mark on the wire harness
    - Each edge of the tape is 0.06 inch minimum from the edge of the cable clamp
    - The layers of tape make a 100 percent overlap.
  - (8) Put the saddle bars in position.
  - (9) Engage the threads of each cable clamp screw and the applicable screw hole.
  - (10) Tighten the screws until the ends of the saddle bars are against each other.
- Make sure that:
- The wires do not have unwanted tension that put strain on the contacts
  - The wire harness is tight in the cable clamp
  - The saddle bars do not crush or pinch the wire harness
  - The cable clamp screws are tight.

**B. Strain Relief Assembly - Round Cable Clamp**

- (1) Remove the screws and nuts that hold the saddle bars together.
- (2) Align the wire harness with the cable clamp.

Make sure that the wires or cables do not go across each other in the clamp.

NOTE: This condition is not applicable for twisted wires.
- (3) Make a mark on the wire harness at the center of the saddle bars of the cable clamp.
- (4) Push the saddle bars of the cable clamp together.
- (5) If the cable clamp does not hold the wire harness tightly, increase the diameter of the wire harness with tape.
  - (a) Move the backshell rearward on the harness.
  - (b) Make a selection of a tape from Table 12.
  - (c) Wind 2 or 3 layers of tape around the wire harness at the mark on the wire harness.Make sure that:
  - The center of the layers of tape is aligned with the mark on the wire harness
  - Each edge of the tape is 0.06 inch minimum from the edge of the cable clamp
  - The layers of tape make a 100 percent overlap.
- (6) Put the backshell against the connector shell.
- (7) Engage the threads of each saddle bar screw and the applicable nut.
- (8) Tighten the screws until the ends of the saddle bars are against each other.

**STANDARD WIRING PRACTICES MANUAL****D SUBMINIATURE CONNECTORS: BACKSHELL ASSEMBLY AND CONNECTOR INSTALLATION**

Make sure that:

- The wires do not have unwanted tension that put strain on the contacts
- The saddle bars do not crush or pinch the wire harness
- The wire harness is tight in the cable clamp
- The cable clamp screws are tight.

**C. Strain Relief Assembly - Two Cable Clamp Bars**

- (1) Remove the screws that hold the cable clamp bars on the wire harness.
- (2) Align the wire harness with the cable clamp.

Make sure that the wires or cables do not go across each other in the clamp.

NOTE: This condition is not applicable for twisted wires.

- (3) Make a mark on the wire harness at the center of the cable clamp bars.
- (4) Push the saddle bars of the cable clamp together.
- (5) If the cable clamp does not hold the wire harness tightly, increase the diameter of the wire harness with tape.
  - (a) Make a selection of a tape from Table 12.
  - (b) Remove the backshell from the connector.
  - (c) Wind 2 or 3 layers of tape around the wire harness at the mark on the wire harness.

Make sure that:

- The center of the layers of tape is aligned with the mark on the wire harness
- Each edge of the tape is 0.06 inch minimum from the edge of the cable clamp
- The layers of tape make a 100 percent overlap.

- (6) Put the backshell in its position.
- (7) Engage the threads of each cable clamp screw and the applicable screw hole.
- (8) Tighten the screws until the cable clamp bars are against each other.

Make sure that:

- The wires do not have unwanted tension that put strain on the contacts
- The wire harness is tight in the cable clamp
- The cable clamp bars do not crush or pinch the wire harness
- The cable clamp screws are tight.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

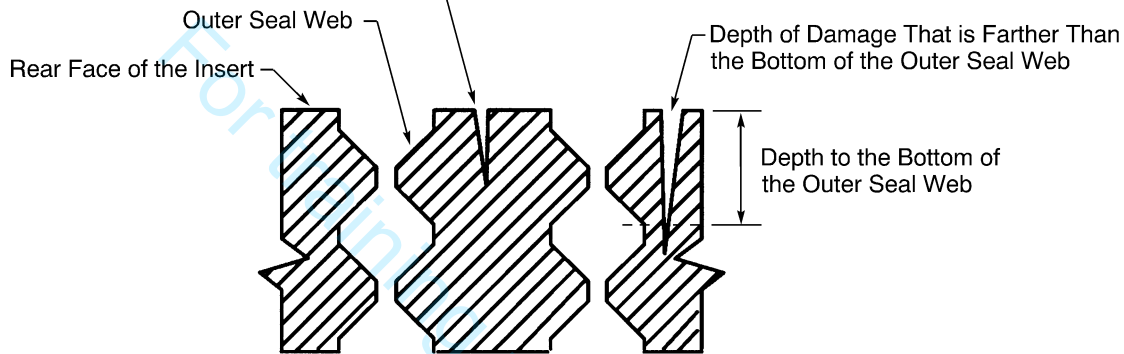
#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Insert

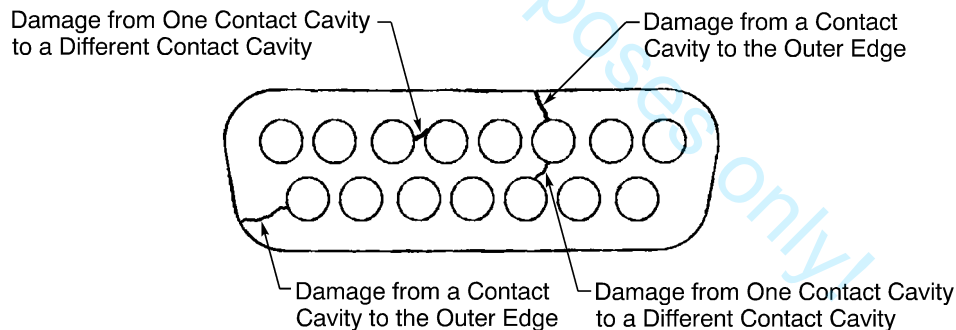
It is necessary to replace the connector if one or more of these conditions occur:

- If the connector has a grommet, the depth of the damage extends farther than the bottom of the outer seal web; refer to Figure 1
- The damage extends from one contact cavity to a different contact cavity; refer to Figure 2
- The damage extends from one contact cavity to the outer edge of the insert; refer to Figure 2.

Depth of the Damage That is not Farther Than the Bottom of the Seal Web



REAR FACE OF THE ENVIRONMENTAL INSERT - DEPTH OF DAMAGE  
Figure 1



REAR FACE OF THE INSERT - LENGTH OF DAMAGE  
Figure 2

##### B. Damage Conditions - Front Face of the Insert

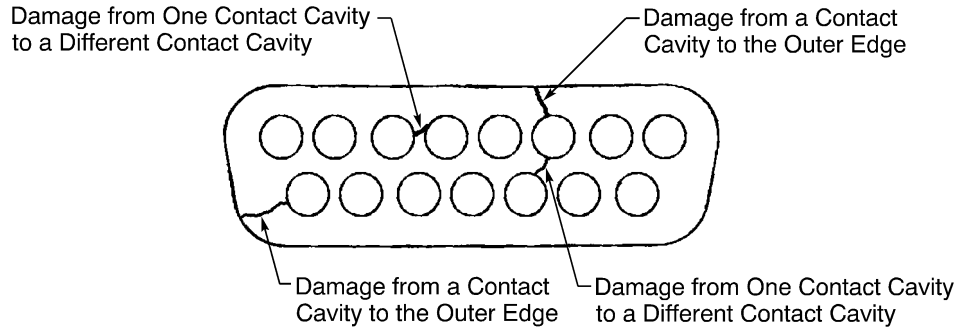
It is necessary to replace the connector if one of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 3.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



FRONT FACE OF THE INSERT - LENGTH OF DAMAGE

Figure 3

## 2. PART NUMBERS AND DESCRIPTION

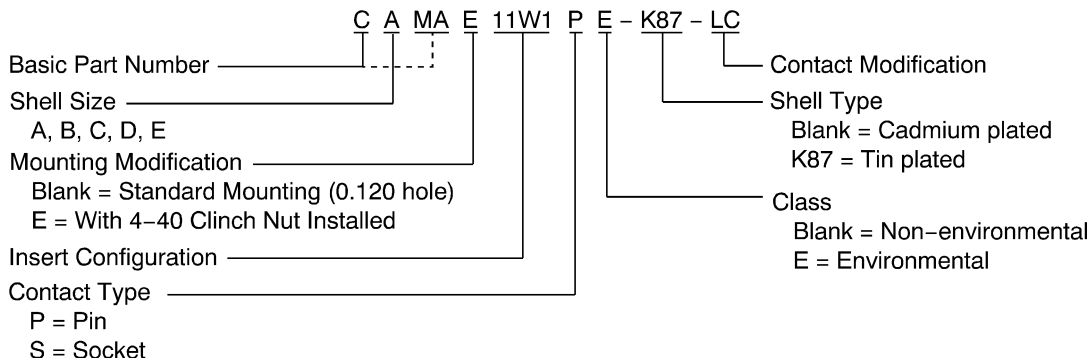
### A. Connector Part Numbers

Table 1  
CONNECTOR PART NUMBERS

Part Number	Supplier
CAMA()	Cory Components
CAMA()	Tri-Star
CBMA()	Cory Components
CBMA()	Tri-Star
CCMA()	Cory Components
CCMA()	Tri-Star
CDMA()	Cory Components
CDMA()	Tri-Star
CEMA()	Cory Components
CEMA()	Tri-Star

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



## TRI-STAR C()MA AND CORY C()MA SERIES CONNECTOR PART NUMBER STRUCTURE

Figure 4

Table 2  
ALTERNATIVE CONNECTOR PART NUMBERS

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Applicable Subject
CAMA()	Cory Components	CAMA()	Tri-Star	Subject 20-72-10
CAMA15P	-	17-20150-1	Amphenol	Subject 20-72-11
		17-20150-1	WPI	Subject 20-72-11
		17-303-1	Amphenol	Subject 20-72-11
		17-303-1	WPI	Subject 20-72-11
		DAMA15P	ITT Cannon	Subject 20-72-12
		M24308/4-2	QPL	Subject 20-72-13
CAMA15S	-	17-10150-1	Amphenol	Subject 20-72-11
		17-10150-1	WPI	Subject 20-72-11
		17-302-1	Amphenol	Subject 20-72-11
		17-302-1	WPI	Subject 20-72-11
		DAMA15S	ITT Cannon	Subject 20-72-12
		M24308/2-2	QPL	Subject 20-72-13
CAMA26P	Tri-Star	M24308/4-12	QPL	Subject 20-72-13
CAMA26S	Tri-Star	M24308/2-12	QPL	Subject 20-72-13
CBMA()	Cory Components	CBMA()	Tri-Star	Subject 20-72-10

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 2 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Applicable Subject
CBMA25P	-	17-20250-1	Amphenol	Subject 20-72-11
		17-20250-1	WPI	Subject 20-72-11
		17-305-1	Amphenol	Subject 20-72-11
		17-305-1	WPI	Subject 20-72-11
		DBMA25P	ITT Cannon	Subject 20-72-12
		M24308/4-3	QPL	Subject 20-72-13
CBMA25S	-	17-10250-1	Amphenol	Subject 20-72-11
		17-10250-1	WPI	Subject 20-72-11
		17-304-1	Amphenol	Subject 20-72-11
		17-304-1	WPI	Subject 20-72-11
		DBMA25S	ITT Cannon	Subject 20-72-12
		M24308/2-3	QPL	Subject 20-72-13
CCMA()	Cory Components	CCMA()	Tri-Star	Subject 20-72-10
CCMA37P	-	17-20370-1	Amphenol	Subject 20-72-11
		17-20370-1	WPI	Subject 20-72-11
		17-307-1	Amphenol	Subject 20-72-11
		17-307-1	WPI	Subject 20-72-11
		DCMA37P	ITT Cannon	Subject 20-72-12
		M24308/4-4	QPL	Subject 20-72-13
CCMA37S	-	17-10370-1	Amphenol	Subject 20-72-11
		17-10370-1	WPI	Subject 20-72-11
		17-306-1	Amphenol	Subject 20-72-11
		17-306-1	WPI	Subject 20-72-11
		DCMA37S	ITT Cannon	Subject 20-72-12
		M24308/2-4	QPL	Subject 20-72-13
CDMA()	Cory Components	CDMA()	Tri-Star	Subject 20-72-10
CDMA50P	-	17-20500-1	Amphenol	Subject 20-72-11
		17-20500-1	WPI	Subject 20-72-11
		17-309-1	Amphenol	Subject 20-72-11
		17-309-1	WPI	Subject 20-72-11
		DDMA50P	ITT Cannon	Subject 20-72-12
		M24308/4-5	QPL	Subject 20-72-13

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 2 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Applicable Subject
CDMA50S	-	17-10500-1	Amphenol	Subject 20-72-11
		17-10500-1	WPI	Subject 20-72-11
		17-308-1	Amphenol	Subject 20-72-11
		17-308-1	WPI	Subject 20-72-11
		DDMA50S	ITT Cannon	Subject 20-72-12
		M24308/2-5	QPL	Subject 20-72-13
CDMA78P	-	DDMA78P	ITT Cannon	Subject 20-72-12
		M24308/4-15	QPL	Subject 20-72-13
CDMA78S	-	DDMA78S	ITT Cannon	Subject 20-72-12
		M24308/2-15	QPL	Subject 20-72-13
CEMA()	Cory Components	CEMA()	Tri-Star	Subject 20-72-10
CEMA9P	-	17-20090-1	Amphenol	Subject 20-72-11
		17-20090-1	WPI	Subject 20-72-11
		17-301-1	Amphenol	Subject 20-72-11
		17-301-1	WPI	Subject 20-72-11
		DEMA9P	ITT Cannon	Subject 20-72-12
		M24308/4-1	QPL	Subject 20-72-13
CEMA9S	-	17-10090-1	Amphenol	Subject 20-72-11
		17-10090-1	WPI	Subject 20-72-11
		17-300-1	Amphenol	Subject 20-72-11
		17-300-1	WPI	Subject 20-72-11
		DEMA9S	ITT Cannon	Subject 20-72-12
		M24308/2-1	QPL	Subject 20-72-13

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## STANDARD WIRING PRACTICES MANUAL

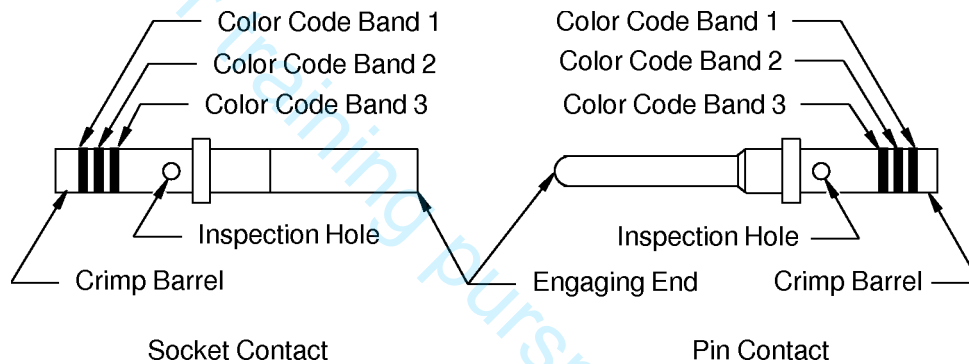
### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

#### B. Connector Description

The C()MA rectangular connectors have these properties:

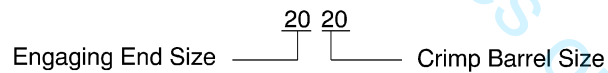
- D subminiature rectangular configuration
- Metal shells
- Rear release, crimp type size 2020 and size 1616 pin contacts in the plug
- Rear release, crimp type size 2020 and size 1616 socket contacts in the receptacle
- Front release size 0816, 0812, and 0808 special purpose pin contacts in the plug
- Front release size 0816, 0812, and 0808 special purpose socket contacts in the receptacle
- Front release coax pin contacts in the plug
- Front release coax socket contacts in the receptacle
- Size 2018 special purpose contacts that cannot be removed.

#### C. Contact Part Numbers



#### REAR RELEASE STANDARD CONTACTS

Figure 5



#### EXAMPLE OF A CONTACT SIZE

Figure 6

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

**Table 3**  
**REAR RELEASE STANDARD CONTACT PART NUMBERS**

Contact Size	Contact Engaging End Size	Contact Crimp Barrel Size	Contact Type	Contact Part Number	Supplier
22D	22	22	Pin	030-2042-000	ITT Cannon
				030-2042-002	ITT Cannon
				M39029/58-360	QPL
				315-2222-103	Tri-Star
			Socket	031-1147-000	ITT Cannon
				031-1147-002	ITT Cannon
				M39029/57-354	QPL
				316-2222-103	Tri-Star
20	20	20	Pin	330-5291-000	ITT Cannon
				330-5291-037	ITT Cannon
				M39029/64-369	QPL
			Socket	031-1007-000	ITT Cannon
				031-1007-042	ITT Cannon
				M39029/63-368	QPL
16	16	16	Pin	M39029/58-364	QPL
			Socket	M39029/57-358	QPL

**Table 4**  
**STANDARD CONTACT COLOR CODES**

Contact	Color Code		
	Band 1	Band 2	Band 3
031-1007-000	-	-	-
031-1007-042	Orange	Blue	Gray
330-5291-000	-	-	-
330-5291-037	Orange	Blue	White
M39029/57-354	Orange	Green	Yellow
M39029/57-358	Orange	Green	Gray
M39029/58-360	Orange	Blue	Black
M39029/58-364	Orange	Blue	Yellow
M39029/63-368	Orange	Blue	Gray
M39029/64-369	Orange	Blue	White

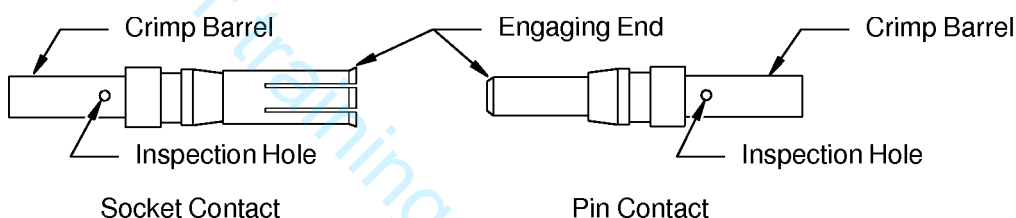
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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 5  
NON REMOVABLE SPECIAL PURPOSE CONTACTS

Contact Size	Contact Engaging End Size	Contact Crimp Barrel Size	Contact Type	Contact Part Number	Supplier
2018	20	18	Pin	CB004-5	Cory Components
					Tri-Star
				330-5291-001	ITT Cannon
			Socket	CB005-5	Cory Components
					Tri-Star
				031-1007-000	ITT Cannon



## FRONT RELEASE SPECIAL PURPOSE CONTACTS

Figure 7

Table 6  
FRONT RELEASE SPECIAL PURPOSE CONTACT PART NUMBERS

Contact Size	Contact Engaging End Size	Contact Crimp Barrel Size	Contact Type	Contact Part Number	Supplier	Conditions for Installation
0816	08	16	Pin	CMP002-P103	Cory Components	Alignment Ring
				CMP002-P103	Tri-Star	Alignment Ring
			Socket	CMP002-S103	Cory Components	-
				CMP002-S103	Tri-Star	-
0812	08	12	Pin	CMP003-P103	Cory Components	Alignment Ring
				CMP003-P103	Tri-Star	Alignment Ring
			Socket	CMP003-S103	Cory Components	-
				CMP003-S103	Tri-Star	-
0808	08	08	Pin	CMP004-P103	Cory Components	Alignment Ring
				CMP004-P103	Tri-Star	Alignment Ring
			Socket	CMP004-S103	Cory Components	-
				CMP004-S103	Tri-Star	-

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

**Table 7**  
**ALTERNATIVE SPECIAL PURPOSE CONTACT PART NUMBERS**

Specified Contact		Alternative Contact	
Part Number	Supplier	Part Number	Supplier
CB004-5	Cory Components	CB004-5	Tri-Star
CB005-5	Cory Components	CB005-5	Tri-Star
CMP002-P103	Cory Components	CMP002-P103	Tri-Star
CMP002-S103	Cory Components	CMP002-S103	Tri-Star
CMP003-P103	Cory Components	CMP003-P103	Tri-Star
CMP003-S103	Cory Components	CMP003-S103	Tri-Star
CMP004-P103	Cory Components	CMP004-P103	Tri-Star
CMP004-S103	Cory Components	CMP004-S103	Tri-Star

### D. Coax Contact Part Numbers

**Table 8**  
**SIZE 8 COAX CONTACT PART NUMBERS**

Contact					Applicable Coax Cable
Configuration	Type	Center Contact		Part Number	
		Type	Termination		
90 Degrees	Pin	Socket	Solder	CMX010-P502	BMS13-65 Type 0F
					S280W503-2
	Socket	Pin	Solder	CMX010-S502	BMS13-65 Type 0F
					S280W503-2
Straight	Pin	Socket	Solder	CMX006-P102	RG-174
					RG-188
					RG-316
	Socket	Pin	Solder	CMX006-S102E	RG-174
					RG-188
					RG-316
Straight	Pin	Socket	Crimp	CQMEM-200A	BMS13-65 Type 0F
					S280W503-2
	Socket	Pin	Crimp	CQMEF-200	BMS13-65 Type 0F
					S280W503-2

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 8 (continued)

Contact					Applicable Coax Cable
Configuration	Type	Center Contact		Part Number	
		Type	Termination		
Straight	Pin	Socket	Crimp	CQMEM-316A	RG-316
					RG-179
	Socket	Pin	Crimp	CQMEF-316A	RG-316
					RG-179
Straight	Pin	Socket	Crimp	CQMEM-501D	BMS13-65 Type 0E
					S280W503-1
	Socket	Pin	Crimp	CQMEF-501D	BMS13-65 Type 0E
					S280W503-1
Straight	Pin	Socket	Crimp	CQMEM-502	BMS13-65 Type 0F
					S280W503-2
	Socket	Pin	Crimp	CQMEF-502A	BMS13-65 Type 0F
					S280W503-2
Straight	Pin	Socket	Crimp	CQMEM-503	BMS13-65 Type 0G
					S280W503-3
	Socket	Pin	Crimp	CQMEF-503	BMS13-65 Type 0G
					S280W503-3

Table 9

## SIZE 8 COAX CONTACT PART NUMBERS FOR SELECTED CONNECTORS

Connector	Contact			
	Type	Center Contact		Part Number
		Type	Termination	
CAMA11A1S	Pin	Socket	Solder	CMX006-P102
CAMA11Q1P	Pin	Socket	Crimp	CQMEM-501D
				CQMEM-502
CAMA11Q1S	Socket	Pin	Crimp	CQMEF-501D
				CQMEF-502A
CAMA11W1S-LF	Socket	Pin	Crimp	CQMEF-200
CAMA11W1S	Socket	Pin	Solder	CMX006-S102

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 10  
COAX CONTACT COLOR CODES

Contact	Color Code	
	Band 1	Band 2
CMX006-P102	-	-
CMX006-S102	-	-
CMX010-P202	-	-
CMX010-P502	-	-
CMX010-S202	-	-
CMX010-S502	-	-
CQMEF-200	Black	Black
CQMEF-316A	-	-
CQMEF-501D	Brown	White
CQMEF-502A	White	White
CQMEF-503	-	-
CQMEM-200A	Black	Black
CQMEM-316A	-	-
CQMEM-501D	Brown	White
CQMEM-502	White	White
CQMEM-503	-	-

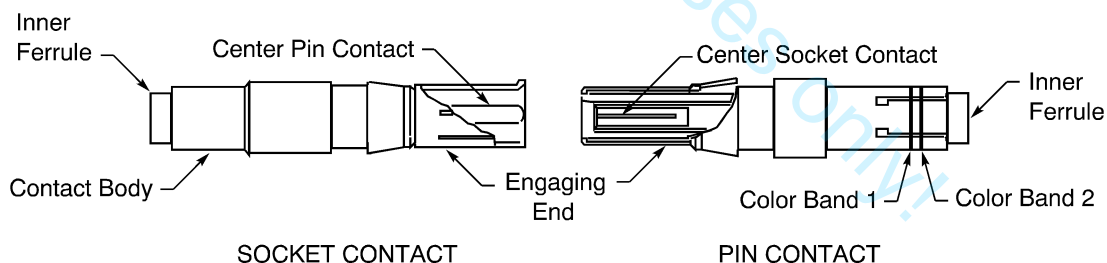


Table 11  
ALTERNATIVE COAX CONTACT PART NUMBERS

Specified Coax Contact		Alternative Coax Contact	
Part Number	Supplier	Part Number	Supplier
CMX006-P102	Cory Components	CMX006-P102	Tri-Star
CMX006-S102	Cory Components	CMX006-S102E	Tri-Star

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 11 (continued)

Specified Coax Contact		Alternative Coax Contact	
Part Number	Supplier	Part Number	Supplier
CMX010-P202	Cory Components	CMX010-P202	Tri-Star
CMX010-P502	Cory Components	CMX010-P502	Tri-Star
CMX010-S202	Cory Components	CMX010-S202	Tri-Star
CMX010-S502	Cory Components	CMX010-S502	Tri-Star
CQMEF-200	Cory Components	CQMEF-200	Tri-Star
CQMEF-316	Cory Components	CQMEF-316A	Tri-Star
CQMEF-501	Cory Components	CQMEF-501D	Tri-Star
CQMEF-502	Cory Components	CQMEF-502A	Tri-Star
CQMEF-503	Cory Components	CQMEF-503	Tri-Star
CQMEM-200	Cory Components	CQMEM-200A	Tri-Star
CQMEM-316	Cory Components	CQMEM-316A	Tri-Star
CQMEM-501	Cory Components	CQMEM-501D	Tri-Star
CQMEM-502	Cory Components	CQMEM-502	Tri-Star
CQMEM-503	Cory Components	CQMEM-503	Tri-Star

#### E. Contact Alignment Ring Part Numbers

Table 12

#### CONTACT ALIGNMENT RING PART NUMBERS

Part Number	Supplier
CRA-1	Cory Components

Table 13

#### ALTERNATIVE CONTACT ALIGNMENT RING PART NUMBERS

Specified Alignment Ring		Alternative Alignment Ring	
Part Number	Supplier	Part Number	Supplier
CRA-1	Cory Components	CRA-1	Tri-Star

### 3. INSERT CONFIGURATIONS

#### A. Insert configurations for C()MA Connectors

**NOTE:** The contact cavity size that is specified in Table 14 is equivalent to the size of the engaging end of the contact.

**NOTE:** Figure 9 through Figure 25 show the rear face of an insert that has pin contacts. The view of the rear face of an insert that has socket contacts is the mirror image of this view.

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 14  
CONNECTOR INSERT CONFIGURATIONS

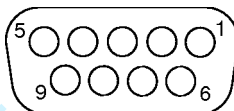
Shell Size	Insert Configuration	Contact Cavity		Applicable Contact Type	Reference
		Count	Size		
A	11A1	10	20	Standard or Special Purpose	Figure 11
		1	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	
	11Q1	10	20	Standard or Special Purpose	Figure 11
		1	8	Special Purpose, CQME() Coax Except CQME()-200	
	11W1	10	20	Standard or Special Purpose	Figure 11
		1	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	
	15	15	20	Standard or Special Purpose	Figure 12
B	3W3	3	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	Figure 10
		26	22D	Standard	Figure 13
	15P5	10	20	Standard or Special Purpose	Figure 15
		5	16	Standard	
	21W1	20	20	Standard or Special Purpose	Figure 16
		1	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	
	25	25	20	Standard or Special Purpose	Figure 17
C	5W5	5	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	Figure 14
		12	20	Standard or Special Purpose	Figure 19
	17W5	5	8	Special Purpose or Coax	
		17	20	Standard or Special Purpose	Figure 20
	21WA4	4	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	
		22	20	Standard or Special Purpose	Figure 21
	25W3	3	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	
		37	20	Standard or Special Purpose	Figure 22
	8W8	8	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	Figure 18

# STANDARD WIRING PRACTICES MANUAL

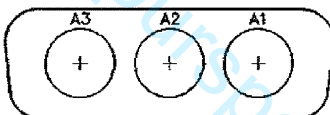
## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 14 (continued)

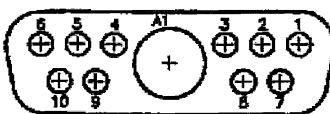
Shell Size	Insert Configuration	Contact Cavity		Applicable Contact Type	Reference
		Count	Size		
D	24W7	17	20	Standard or Special Purpose	Figure 23
		7	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	
	36W4	32	20	Standard or Special Purpose	Figure 24
		4	8	Special Purpose, CMX() Coax, or CQME()-200 Coax	
	50	50	20	Standard or Special Purpose	Figure 25
E	9	9	20	Standard or Special Purpose	Figure 9



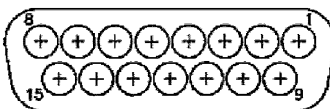
9 INSERT CONFIGURATION  
Figure 9



3W3 INSERT CONFIGURATION  
Figure 10



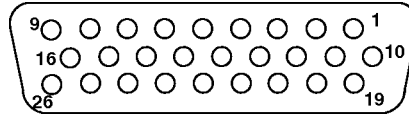
11A1, 11Q1 AND 11W1 INSERT CONFIGURATION  
Figure 11



15 INSERT CONFIGURATION  
Figure 12

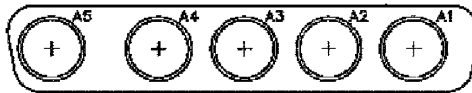
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



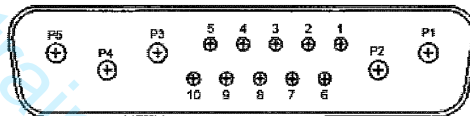
**26 INSERT CONFIGURATION**

**Figure 13**



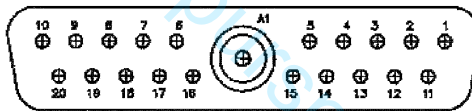
**5W5 INSERT CONFIGURATION**

**Figure 14**



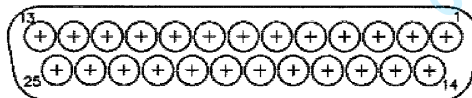
**15P5 INSERT CONFIGURATION**

**Figure 15**



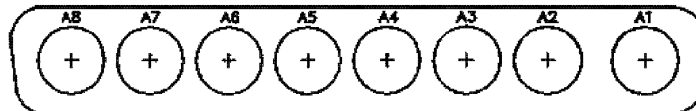
**21W1 INSERT CONFIGURATION**

**Figure 16**



**25 INSERT CONFIGURATION**

**Figure 17**

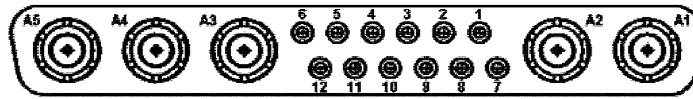


**8W8 INSERT CONFIGURATION**

**Figure 18**

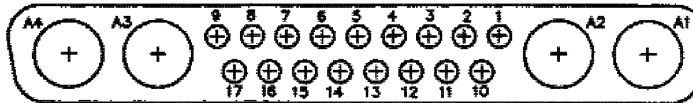
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



17W5 INSERT CONFIGURATION

Figure 19



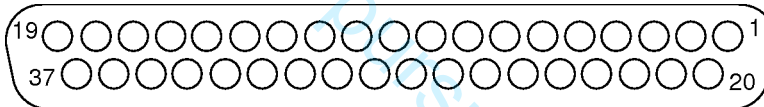
21WA4 INSERT CONFIGURATION

Figure 20



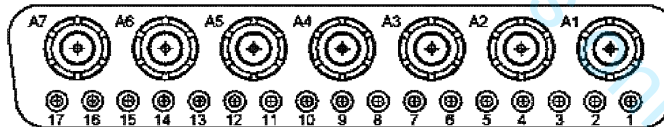
25W3 INSERT CONFIGURATION

Figure 21



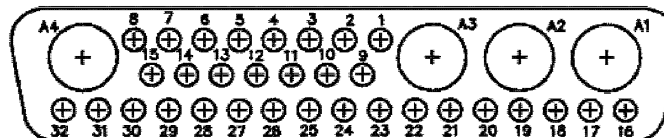
37 INSERT CONFIGURATION

Figure 22



24W7 INSERT CONFIGURATION

Figure 23

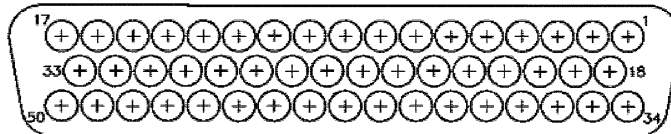


36W4 INSERT CONFIGURATION

Figure 24

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



**50 INSERT CONFIGURATION**

**Figure 25**

#### 4. CONNECTOR DISASSEMBLY

##### A. Contact Removal

This paragraph gives the procedure to remove standard contacts.

For the procedure to remove coax contacts and special purpose contacts, refer to Paragraph 4.B..

NOTE: Size 2018 special purpose contacts are not removable from the connector.

NOTE: The backshell must be removed from the connector before a contact can be removed.

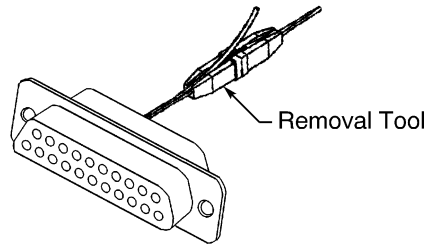
**Table 15**  
**CONTACT REMOVAL TOOLS**

Crimp Barrel Size	Removal Tool	
	Part Number	Color
20	6500-043-020-628	-
	6500-045-020	-
	CIET-20HD	White
	CET 20-11	-
	M24308/18-2	-
	M81969/1-02	-
	M81969/14-02	-
	MS18278-1	-
	MS27534-20	-
	NAS1664-20	-
16	M81969/14-03	-

- (1) Make a selection of a contact removal tool from Table 15.
  - (2) Put the tip of the tool on the wire.
  - (3) At the rear of the connector, axially align the tool and the contact cavity.
  - (4) Carefully push the tool into the contact cavity until it stops. Refer to Figure 26.
- Make sure that the tool stays aligned with the contact cavity.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



#### POSITION OF THE REMOVAL TOOL IN THE CONTACT CAVITY

Figure 26

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (5) Hold the wire against the tool.
- (6) Pull the tool and the wire out from the contact cavity at the same time.  
Make sure that the tool stays aligned with the contact cavity.
- (7) If the contact is not released:
  - (a) Carefully remove the tool.
  - (b) Turn the tool approximately 90 degrees.
  - (c) Do Step (2) through Step (6) again.

#### B. Removal of Size 8 Special Purpose Contacts and Size 8 Coax Contacts

**NOTE:** Size 2018 special purpose contacts are not removable from the connector.

Table 16  
CONTACT REMOVAL TOOLS

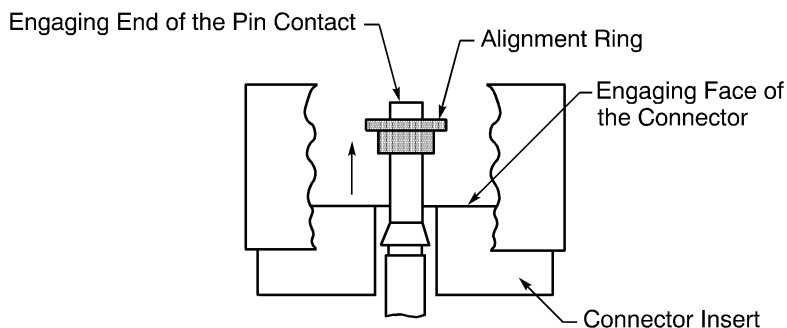
Contact Cavity Size	Removal Tool
08	DRK38

**NOTE:** The backshell must be removed from the connector before the contacts can be removed.

- (1) For a size 0808, 0812, 0816 pin contact, or a size 8 coax pin contact, remove the alignment ring from the contact at the front of the connector. Refer to Figure 27.

## STANDARD WIRING PRACTICES MANUAL

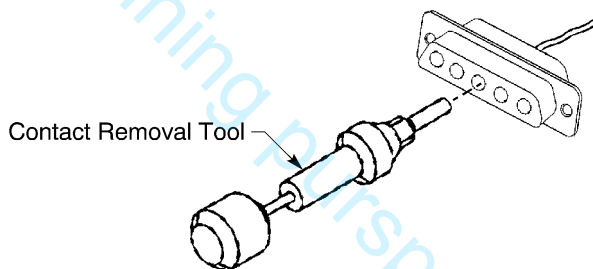
### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



#### REMOVAL OF THE ALIGNMENT RING

Figure 27

- (2) Make a selection of a contact removal tool from Table 16.
- (3) At the front of the connector, axially align the tool with the engaging end of the contact. Refer to Figure 28.



#### ALIGNMENT OF THE REMOVAL TOOL AND THE CONTACT

Figure 28

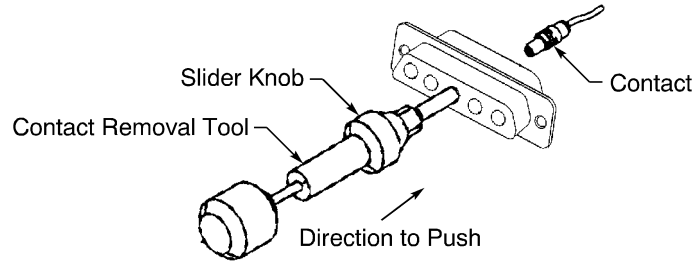
- (4) Put the tip of the tool on the contact.
- (5) Push the tool forward until the first mark on the tool is aligned with the front face of the connector.

**CAUTION:** IF THE REMOVAL TOOL IS PUSHED FARTHER THAN THE SPECIFIED MARK, DAMAGE TO THE RETENTION CLIPS OF THE CONTACT CAN OCCUR.

- (6) Hold the tool and the connector tightly in position.
- (7) Push the slider knob forward to release the contact. Refer to Figure 29.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



**OPERATION OF THE REMOVAL TOOL SLIDER KNOB**  
**Figure 29**

(8) From the rear of the connector, carefully pull the cable or the contact crimp barrel.

#### 5. CONTACT ASSEMBLY

##### A. Contact Assembly

This paragraph gives the procedure to assemble standard contacts.

For the procedure to assemble:

- Special purpose contacts, refer to Paragraph 5.B.
- Coax contacts, refer to Paragraph 5.C.

**Table 17**  
**INSULATION REMOVAL LENGTH**

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)		Special Instructions
		Target	Tolerance	
26	20	0.40	$\pm 0.03$	Fold back conductor
24	20	0.20	$\pm 0.03$	-
22	20	0.20	$\pm 0.03$	-
20	20	0.20	$\pm 0.03$	-
16	16	0.20	$\pm 0.03$	-

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 18  
CONTACT CRIMP TOOLS

Wire Size (AWG)	Contact		Crimp Tool		
	Crimp Barrel Size	Type	Basic Unit		Locator
			Part Number	Setting	
26	20	Pin	AFM 8	6	K41
				6	M22520/2-06
			M22520/2-01	6	K41
				6	M22520/2-06
			WA22	6	K41
				6	M22520/2-06
			WA22LC	6	K41
				6	M22520/2-06
		Socket	AFM 8	6	K41
				6	M22520/2-06
			M22520/2-01	6	K41
				6	M22520/2-06
			WA22	6	K41
				6	M22520/2-06
			WA22LC	6	K41
				6	M22520/2-06

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 18 (continued)

Wire Size (AWG)	Contact		Crimp Tool		
	Crimp Barrel Size	Type	Basic Unit		Locator
			Part Number	Setting	
24	20	Pin	AFM 8	5	K13-1
				5	M22520/2-06
			M22520/2-01	5	K13-1
				5	M22520/2-06
			MS3191-1	-	P20-3191-1
			ST2220-1-Y	-	11697-1
				-	ST2220-1-43
			WA22	5	K13-1
				5	M22520/2-06
			WA22AP	5	KAP13-1
			WA22LC	5	K13-1
				5	M22520/2-06
		Socket	AFM 8	5	K13-1
				5	M22520/2-06
			M22520/2-01	5	K13-1
				5	M22520/2-06
			MS3191-1	-	P20-3191-1
			ST2220-1-Y	-	11697-1
				-	ST2220-1-43
			WA22	5	K13-1
				5	M22520/2-06
			WA22AP	5	KAP13-1
			WA22LC	5	K13-1
				5	M22520/2-06

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 18 (continued)

Wire Size (AWG)	Contact		Crimp Tool		
	Crimp Barrel Size	Type	Basic Unit		Locator
			Part Number	Setting	
22	20	Pin	AFM 8	6	K13-1
				6	M22520/2-06
			M22520/2-01	6	K13-1
				6	M22520/2-06
			MS3191-1	-	P20-3191-1
			ST2220-1-Y	-	11697-1
				-	ST2220-1-43
			WA22	6	K13-1
				6	M22520/2-06
			WA22AP	6	KAP13-1
			WA22LC	6	K13-1
				6	M22520/2-06
		Socket	AFM 8	6	K13-1
				6	M22520/2-06
			M22520/2-01	6	K13-1
				6	M22520/2-06
			MS3191-1	-	P20-3191-1
			ST2220-1-Y	-	11697-1
				-	ST2220-1-43
			WA22	6	K13-1
				6	M22520/2-06
			WA22AP	6	KAP13-1
			WA22LC	6	K13-1
				6	M22520/2-06

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 18 (continued)

Wire Size (AWG)	Contact		Crimp Tool		
	Crimp Barrel Size	Type	Basic Unit		Locator
			Part Number	Setting	
20	20	Pin	AFM 8	7	K13-1
				7	M22520/2-08
			M22520/2-01	7	K13-1
				7	M22520/2-08
			MS3191-1	-	P20-3191-1
			ST2220-1-Y	-	11697-1
				-	ST2220-1-43
			WA22	7	K13-1
				7	M22520/2-08
			WA22AP	7	KAP13-1
			WA22LC	7	K13-1
				7	M22520/2-08
		Socket	AFM 8	7	K13-1
				7	M22520/2-08
			M22520/2-01	7	K13-1
				7	M22520/2-08
			MS3191-1	-	P20-3191-1
			ST2220-1-Y	-	11697-1
				-	ST2220-1-43
			WA22	7	K13-1
				7	M22520/2-08
			WA22AP	7	KAP13-1
			WA22LC	7	K13-1
				7	M22520/2-08
	16	Pin	M22520/1-01	4	M22520/1-01
			WA27F	4	M22520/1-01
		Socket	M22520/1-01	4	M22520/1-01
			WA27F	4	M22520/1-01

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

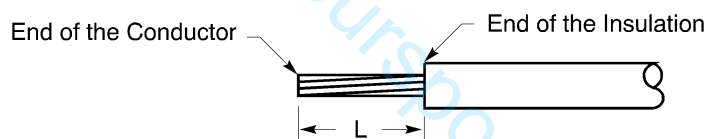
Table 18 (continued)

Wire Size (AWG)	Contact		Crimp Tool		
	Crimp Barrel Size	Type	Basic Unit		Locator
			Part Number	Setting	
18	16	Pin	M22520/1-01	5	M22520/1-01
			WA27F	5	M22520/1-01
		Socket	M22520/1-01	5	M22520/1-01
			WA27F	5	M22520/1-01
16	16	Pin	M22520/1-01	6	M22520/1-01
			WA27F	6	M22520/1-01
		Socket	M22520/1-01	6	M22520/1-01
			WA27F	6	M22520/1-01

- Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 30
- Table 17 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedures.

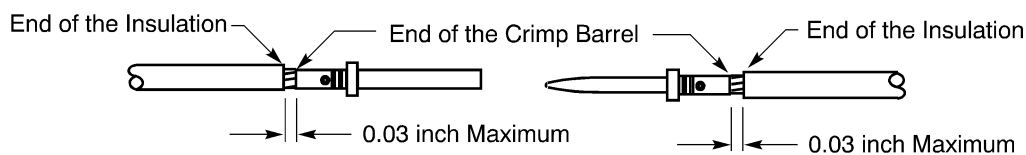


**WIRE PREPARATION**  
Figure 30

- Make a selection of a crimp tool from Table 18.
- Push the conductor into the crimp barrel of the contact until the end of the conductor is against the end of the crimp barrel. Refer to Figure 31.

Make sure that:

- All 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 WIRE IN THE CRIMP BARREL OF THE CONTACT**  
Figure 31

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

(4) Crimp the contact.

Make sure that:

- All 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.

#### B. Special Purpose Contact Assembly

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

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)	
		Target	Tolerance
20	16	0.28	± 0.02
18	18	0.25	± 0.02
18	16	0.28	± 0.02
16	16	0.28	± 0.02
14	12	0.28	± 0.02
12	12	0.28	± 0.02
10	8	0.28	± 0.02
8	8	0.28	± 0.02

**Table 20**  
**CONTACT CRIMP TOOLS**

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool		
		Basic Unit		Locator
		Part Number	Setting	
20	16	M309	1	TP884
18	18	M22520/2-01	8	K250
18	16	M309	2	TP884
16	16	M309	3	TP884
14	12	M309	3	TP884
12	12	M309	4	TP884
		WA27-309-EP	4	TP884
10	8	M309	5	TP884
8	8	M309	6	TP884
		WA27-309-EP	6	TP884

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

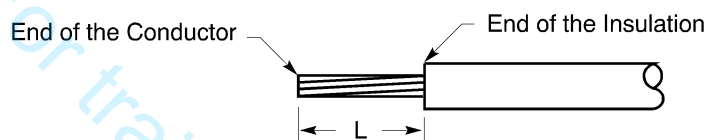
**Table 21**  
**NECESSARY MATERIALS**

Material	Part Number	Supplier
Sleeve, Heat Shrinkable	MIL-LT	Raychem
	PLF 100	Plastronic

- (1) Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 32
- Table 19 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedures.



**WIRE PREPARATION**  
**Figure 32**

- (2) Make a selection of a crimp tool from Table 20.
- (3) For a size 8 contact, make a selection of 0.5 to 0.75 inch length of heat shrinkable sleeve from Table 21.

**NOTE:** For equivalent heat shrinkable sleeves, refer to Subject 20-00-11.

- (a) Put the sleeve on the wire.

- (4) For a 330-5291-001 contact, make a selection of a  $0.75 \pm 0.12$  inch length of heat shrinkable sleeve from Table 21.

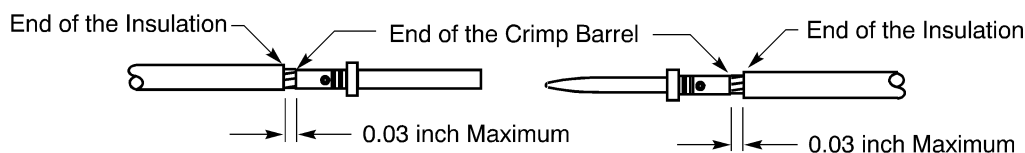
**NOTE:** For equivalent heat shrinkable sleeves, refer to Subject 20-00-11.

- (a) Put the sleeve on the wire.

- (5) Push the conductor into the crimp barrel of the contact until the end of the conductor is against the end of the crimp barrel. Refer to Figure 33.

Make sure that:

- All 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 WIRE IN THE CRIMP BARREL OF THE CONTACT**  
**Figure 33**

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

(6) Crimp the contact.

Make sure that:

- All 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.

(7) For a size 8 contact, install the contact. Refer to Paragraph 6.B.

(a) Move the sleeve forward until the distance from the edge of the sleeve the edge of the connector is 0.06 inch.

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

(8) For a 330-5291-001 contact, move the sleeve forward until the forward end of the sleeve is aligned with the forward end of the contact crimp barrel.

Make sure that the sleeve makes a 100 percent overlap with the contact crimp barrel.

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

Make sure that the sleeve makes a 100 percent overlap with the contact crimp barrel.

(b) Install the contact in the connector. Refer to Paragraph 6.B.

**NOTE:** Size 2018 special purpose contacts are not removable from the connector.

### C. Coax Contact Assembly

This paragraph gives the procedure to assemble these coax contacts:

- CQME()-200
- CQME()-316
- CQME()-501
- CQME()-502.

For the procedure to assemble:

- CMX006()- contacts, refer to Paragraph 5.D.
- CMX010()- contacts, refer to Paragraph 5.E.

**Table 22**  
**COAX CONTACT CENTER CONTACT CRIMP TOOLS**

Contact	Crimp Tool		
	Basic Unit		Locator
	Part Number	Setting	
CQMEF-200	M22520/2-01	5	M22520/2-14
	WA22	5	M22520/2-14
	WA22LC	5	M22520/2-14
CQMEF-200A	M22520/2-01	5	M22520/2-14
	WA22	5	M22520/2-14
	WA22LC	5	M22520/2-14

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 22 (continued)

Contact	Crimp Tool		
	Basic Unit		Locator
	Part Number	Setting	
CQMEF-316	M22520/2-01	1	M22520/2-03
	WA22	1	M22520/2-03
	WA22LC	1	M22520/2-03
CQMEF-316A	M22520/2-01	1	M22520/2-03
	WA22	1	M22520/2-03
	WA22LC	1	M22520/2-03
CQMEF-501A	M22520/2-01	6	M22520/2-14
	WA22	6	M22520/2-14
	WA22LC	6	M22520/2-14
CQMEF-501B	M22520/2-01	6	M22520/2-14
	WA22	6	M22520/2-14
	WA22LC	6	M22520/2-14
CQMEF-501C	M22520/2-01	6	M22520/2-14
	WA22	6	M22520/2-14
	WA22LC	6	M22520/2-14
CQMEF-501D	M22520/2-01	6	M22520/2-14
	WA22	6	M22520/2-14
	WA22LC	6	M22520/2-14
CQMEF-502A	M22520/2-01	5	M22520/2-14
	WA22	5	M22520/2-14
	WA22LC	5	M22520/2-14
CQMEM-200	M22520/2-01	4	M22520/2-06
	WA22	4	M22520/2-06
	WA22LC	4	M22520/2-06
CQMEM-200A	M22520/2-01	4	M22520/2-06
	WA22	4	M22520/2-06
	WA22LC	4	M22520/2-06
CQMEM-316	M22520/2-01	1	M22520/2-03
	WA22	1	M22520/2-03
	WA22LC	1	M22520/2-03

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 22 (continued)

Contact	Crimp Tool		
	Basic Unit		Locator
	Part Number	Setting	
CQMEM-316A	M22520/2-01	1	M22520/2-03
	WA22	1	M22520/2-03
	WA22LC	1	M22520/2-03
CQMEM-501	M22520/2-01	6	M22520/2-06
	WA22	6	M22520/2-06
CQMEM-501A	WA22	6	M22520/2-06
	WA22LC	6	M22520/2-06
CQMEM-501B	WA22	6	M22520/2-06
	WA22LC	6	M22520/2-06
CQMEM-501C	WA22	6	M22520/2-06
	WA22LC	6	M22520/2-06
CQMEM-501D	WA22	6	M22520/2-06
	WA22LC	6	M22520/2-06
CQMEM-502	M22520/2-01	6	M22520/2-06
	WA22	6	M22520/2-06
	WA22LC	6	M22520/2-06

Table 23  
COAX CONTACT BODY CRIMP TOOLS

Contact	Crimp Tool		
	Basic Unit	Die	
		Part Number	Cavity
CQMEF-200	M22520/5-01	M22520/5-41	B
CQMEF-200A	M22520/5-01	M22520/5-41	B
CQMEF-316	M22520/5-01	M22520/5-39	B
CQMEF-316A	M22520/5-01	M22520/5-41	B
CQMEF-501B	M22520/5-01	M22520/5-39	B
CQMEF-501C	M22520/5-01	M22520/5-39	B
CQMEF-501D	M22520/5-01	M22520/5-39	B
CQMEF-502A	M22520/5-01	M22520/5-41	B
CQMEM-200	M22520/5-01	M22520/5-41	B

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 23 (continued)

Contact	Crimp Tool		
	Basic Unit	Die	
		Part Number	Cavity
CQMEM-200A	M22520/5-01	M22520/5-41	B
CQMEM-316	M22520/5-01	M22520/5-39	B
CQMEM-316A	M22520/5-01	M22520/5-41	B
CQMEM-501	M22520/5-01	M22520/5-39	B
CQMEM-501A	M22520/5-01	M22520/5-39	B
CQMEM-501B	M22520/5-01	M22520/5-39	B
CQMEM-501C	M22520/5-01	M22520/5-39	B
CQMEM-501D	M22520/5-01	M22520/5-39	B
CQMEM-502	M22520/5-01	M22520/5-41	B

Table 24  
NECESSARY MATERIALS

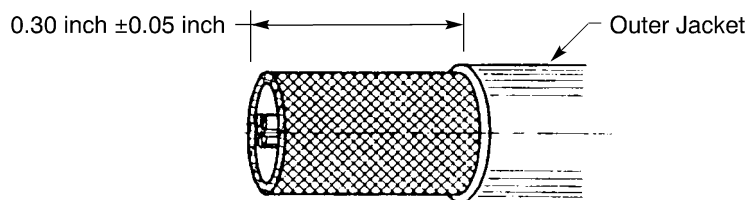
Material	Part Number	Supplier
Sleeve, Heat Shrinkable	MIL-LT	Raychem
	PLF 100	Plastronic
	RW-175	Raychem

- (1) Make a selection of a center contact crimp tool from Table 22.
- (2) Make a selection of a contact body crimp tool from Table 23.
- (3) Make a selection of a 3/16 inch diameter heat shrinkable sleeve from Table 24.

**NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.

- (4) Cut the cable to make the end of the cable perpendicular to the longitudinal axis of the cable.
- (5) Put a 1.75 inch  $\pm 0.13$  inch length of the heat shrinkable sleeve on the cable.
- (6) Remove 0.30 inch  $\pm 0.05$  inch of the outer jacket from the end of the cable. Refer to Figure 34.

**CAUTION:** DAMAGE TO THE SHIELD, THE DIELECTRIC, OR THE CENTER CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.



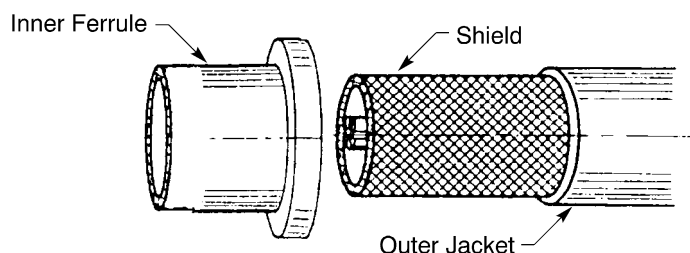
OUTER JACKET REMOVAL LENGTH  
Figure 34

# 20-72-10

## STANDARD WIRING PRACTICES MANUAL

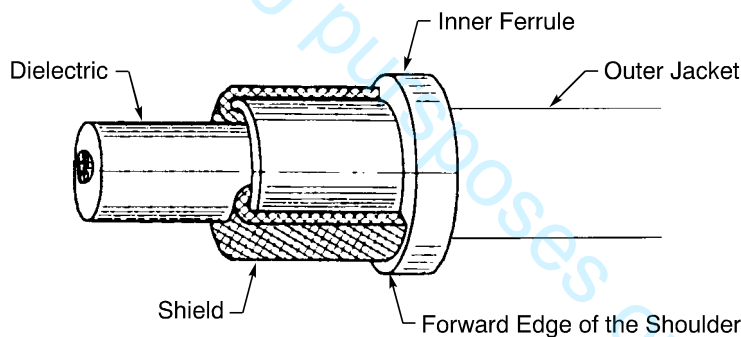
### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

- (7) Align the inner ferrule and the end of the cable. Refer to Figure 35.



**ALIGNMENT OF THE INNER FERRULE AND THE END OF THE CABLE**  
Figure 35

- (8) Push the inner ferrule rearward until the shoulder of the ferrule is against the end of the outer jacket.
- (9) If the cable has a flat conductor outer shield and a round conductor inner shield, cut the flat conductor shield at the forward edge of the inner ferrule.
- (10) Fold the shield back on the outer surface of the inner ferrule.  
Make sure that the strands of the shield are symmetrical around the circumference of the ferrule.
- (11) Cut the strands of the shield at the forward edge of the shoulder of the inner ferrule. Refer to Figure 36.

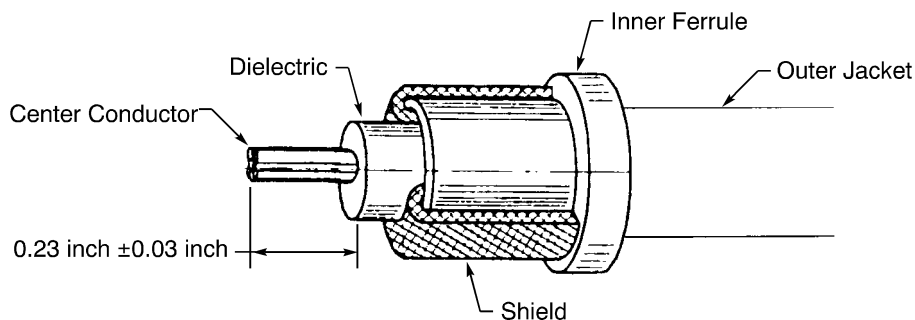


**POSITION OF THE SHIELD ON THE INNER FERRULE**  
Figure 36

- (12) Remove 0.23 inch  $\pm$  0.03 inch of the dielectric from the end of the cable. Refer to Figure 37.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

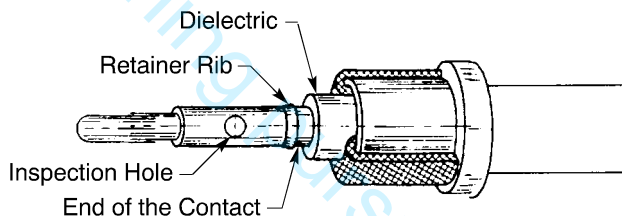


#### DIELECTRIC REMOVAL

Figure 37

- (13) If all of the strands of the center conductor are not together, twist the strands together in their initial direction.
- (14) Push the center conductor into the crimp barrel of the center contact until the end of the dielectric is against the end of the center contact. Refer to Figure 38.

Make sure that the strands of the conductor can be seen in the inspection hole.



#### POSITION OF THE CENTER CONTACT ON THE CENTER CONDUCTOR

Figure 38

- (15) Crimp the center contact.
- (16) Put the contact body on the center contact.
- (17) Push the center contact into the contact body until the retainer rib of the center contact is locked in the contact body.
- (18) Lightly pull the cable to make sure that the center contact is locked in the contact body.
- (19) If the center contact is not locked in the contact body, do Step (17) and Step (18) again.
- (20) Put the contact in the crimp die.
- Make sure that the rear end of the contact is aligned with the edge of the crimp die.
- (21) Crimp the contact body. Refer to Figure 39.

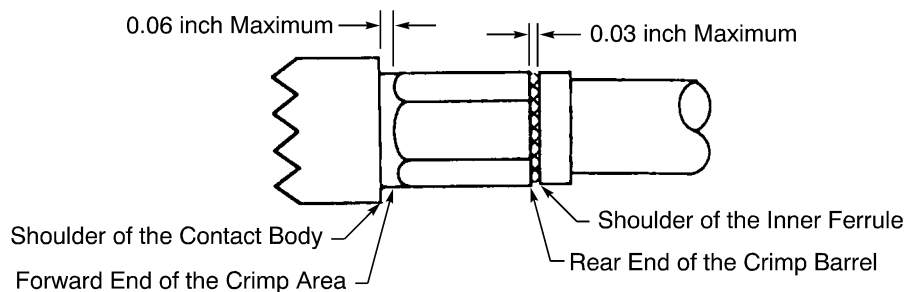
Make sure that the distance from:

- The forward end of the crimp area to the shoulder of the contact body is not more than 0.06 inch
- The rear end of the crimp barrel to the shoulder of the inner ferrule is not more than 0.03 inch.

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## STANDARD WIRING PRACTICES MANUAL

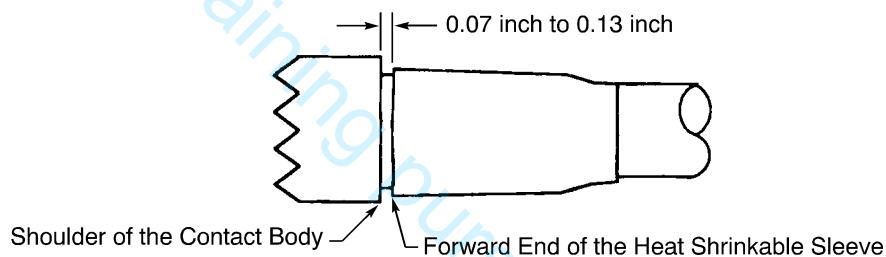
### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



**POSITION OF THE CONTACT BODY**

**Figure 39**

- (22) Remove the unwanted length of the strands of the shield.  
Make sure that the end of the shield is aligned with the rear end of the contact body.
- (23) Push the heat shrinkable sleeve forward until the forward end of the sleeve is 0.07 inch to 0.13 inch from the shoulder of the contact body. Refer to Figure 40.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE CONTACT ASSEMBLY**

**Figure 40**

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

#### D. CMX006-() Coax Contact Assembly

**Table 25**  
**COAX FERRULE CRIMP TOOLS**

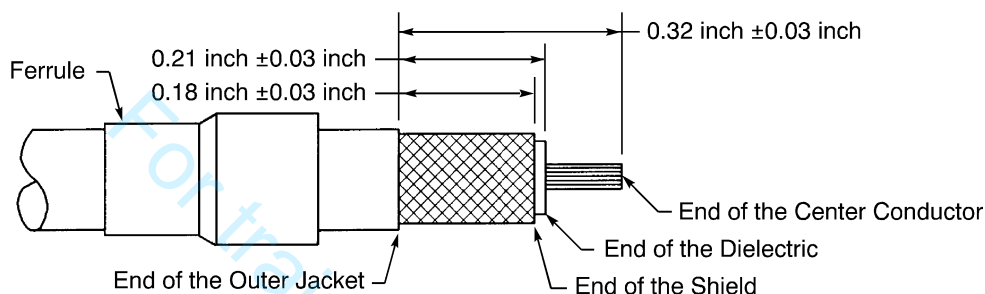
Contact	Crimp Tool		
	Basic Unit	Die	
		Part Number	Cavity
CMX006-()	M22520/5-01	M22520/5-03	A
		M22520/5-08	-
		M22520/5-35	B
		Y119	B

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 26  
NECESSARY MATERIALS

Material	Part Number	Supplier
Sleeve, Heat Shrinkable	MIL-LT	Raychem
	PLF 100	Plastronic
	RW-175	Raychem



COAX CABLE PREPARATION  
Figure 41

- (1) Make a selection of a contact body crimp tool from Table 25.
  - (2) Make a selection of a 3/16 inch diameter heat shrinkable sleeve from Table 26.
- NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.
- (3) Cut the cable to make the end of the cable perpendicular to the longitudinal axis of the cable.
  - (4) Put a 1.5 inch  $\pm$  0.1 inch length of the heat shrinkable sleeve on the cable.
  - (5) Put the ferrule on the cable.
  - (6) Remove 0.32 inch  $\pm$  0.03 inch of the outer jacket from the end of the cable. Refer to Figure 41.

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

- (7) Remove the necessary length of shield to make the distance from the end of the outer jacket to the end of the shield equal to 0.18 inch  $\pm$  0.03 inch.

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

- (8) Remove the necessary length of dielectric to make the distance from the end of the outer jacket to the end of the dielectric equal to 0.21 inch  $\pm$  0.03 inch.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

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

(9) Tin these components of the contact cavity:

- The center conductor
- The contact solder cup.

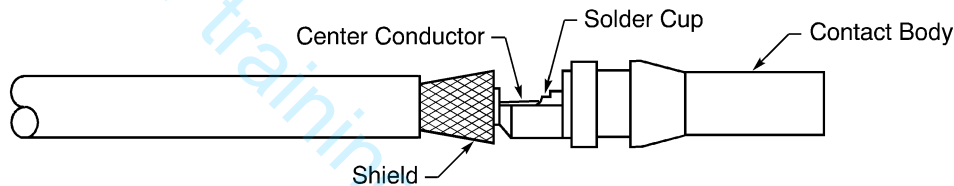
(10) Open the end of the shield.

Make sure that the shield strands are not moved apart.

(11) Push the contact body on the end of the wire until the dielectric is against the end of the solder cup. Refer to Figure 42.

Make sure that:

- The crimp barrel is between the dielectric and the shield
- All of the strands of the center conductor are in the center contact solder cup.



**POSITION OF THE CENTER CONDUCTOR IN THE SOLDER CUP**

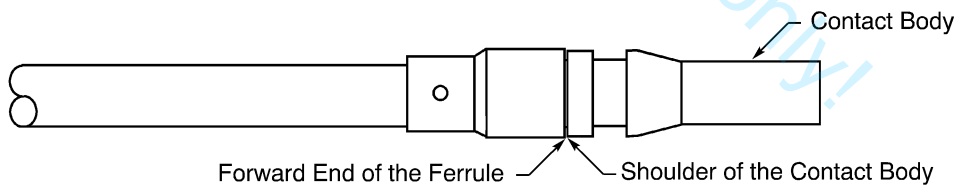
**Figure 42**

(12) Solder the end of the center conductor in the solder cup.

(13) Push the shield against the crimp barrel.

Make sure that the strands of the shield are symmetrical around the circumference of the crimp barrel.

(14) Push the ferrule forward on the shield until the forward end of the ferrule is against the shoulder of the contact body. Refer to Figure 43.



**POSITION OF THE FERRULE AND THE CONTACT BODY**

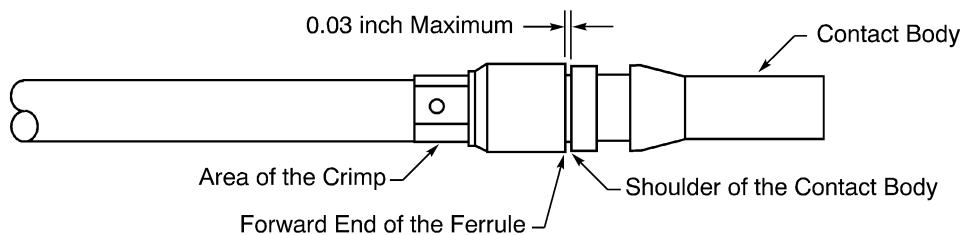
**Figure 43**

(15) Crimp the ferrule. Refer to Figure 44.

Make sure that the distance from the forward end of the ferrule to the shoulder of the contact body is less than 0.03 inch.

## STANDARD WIRING PRACTICES MANUAL

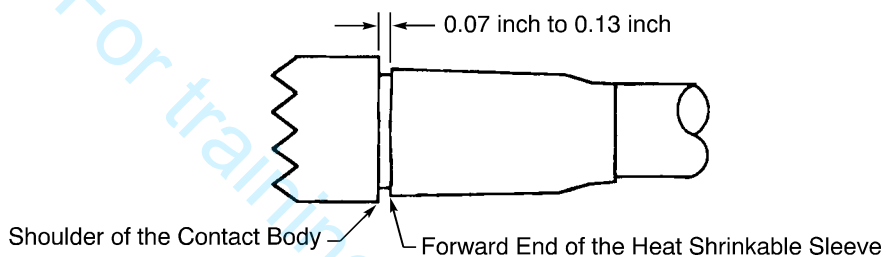
### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



**POSITION OF THE FERRULE CRIMP**

**Figure 44**

- (16) Push the heat shrinkable sleeve forward until the forward end of the sleeve is 0.07 inch to 0.13 inch from the shoulder of the contact body. Refer to Figure 45.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE CONTACT ASSEMBLY**

**Figure 45**

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

#### **E. CMX010-() Coax Contact Assembly**

**Table 27  
COAX FERRULE CRIMP TOOLS**

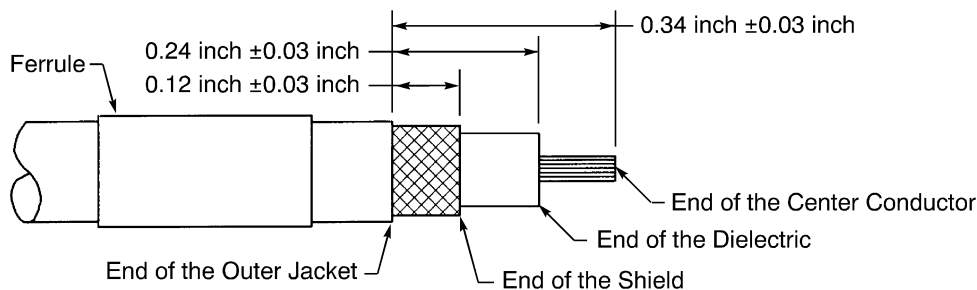
Contact	Crimp Tool		
	Basic Unit	Die	
		Part Number	Cavity
CMX010-()	M22520/5-01	M22520/5-39	B
		Y139	B

**Table 28  
NECESSARY MATERIALS**

Material	Part Number	Supplier
Sleeve, Heat Shrinkable	MIL-LT	Raychem
	PLF 100	Plastronic
	RW-175	Raychem

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



#### COAX CABLE PREPARATION

Figure 46

- (1) Make a selection of a contact body crimp tool from Table 27.
  - (2) Make a selection of a 3/16 inch diameter heat shrinkable sleeve from Table 28.
- NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.
- (3) Cut the cable to make the end of the cable perpendicular to the longitudinal axis of the cable.
  - (4) Put the ferrule on the cable.
  - (5) Put a 1.5 inch  $\pm 0.1$  inch length of the heat shrinkable sleeve on the cable.
  - (6) Remove 0.34 inch  $\pm 0.03$  inch of the outer jacket from the end of the cable. Refer to Figure 46.

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

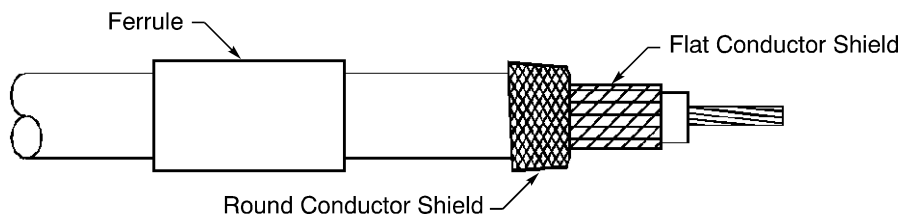
- (7) Remove the necessary length of shield to make the distance from the end of the outer jacket to the end of the shield equal to 0.12 inch  $\pm 0.03$  inch.

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

- (8) Remove the necessary length of dielectric to make the distance from the end of the outer jacket to the end of the dielectric equal to 0.24 inch  $\pm 0.03$  inch.

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

- (9) Fold the round conductor shield back on the outer jacket. Refer to Figure 47.



#### ROUND CONDUCTOR SHIELD FOLDED BACK

Figure 47

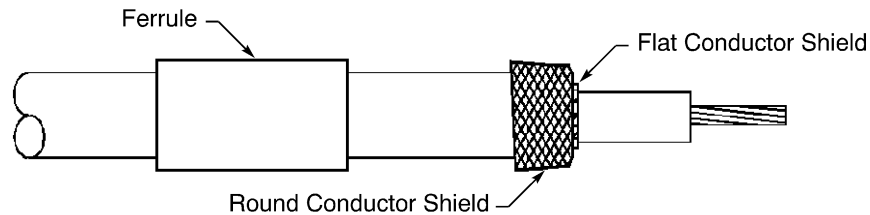
- (10) If the cable has two shields, remove the length of flat conductor shield that extends farther than the end of the folded back edge of the round conductor shield. Refer to Figure 48.

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

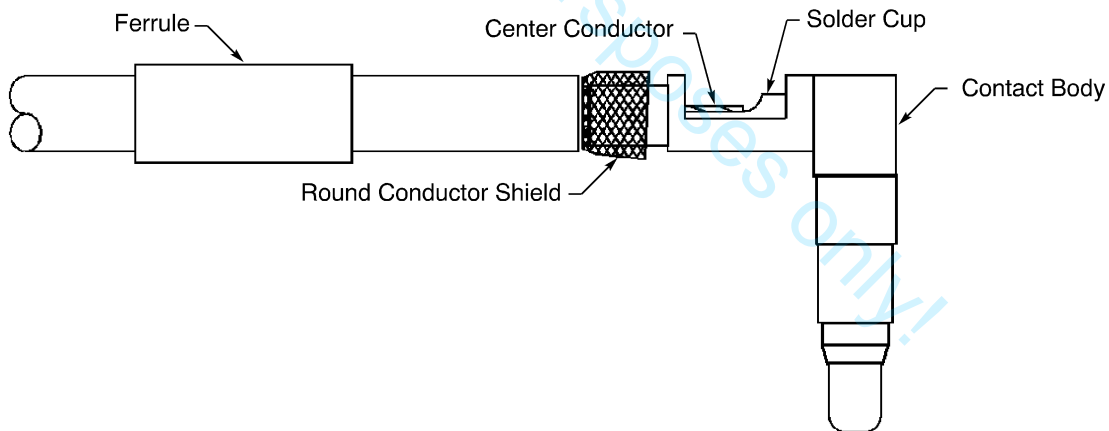
Make sure that the edge of the flat conductor shield is aligned with the folded back edge of the round shield.



#### FLAT CONDUCTOR SHIELD REMOVAL

Figure 48

- (11) Tin these components of the contact cavity:
    - The center conductor
    - The contact solder cup.
  - (12) Open the end of the round conductor shield.  
Make sure that the shield strands are not moved apart.
  - (13) Push the contact body on the end of the wire until the dielectric is against the end of the solder cup.  
Refer to Figure 49.
- Make sure that:
- The crimp barrel is between the dielectric and the shield
  - All of the strands of the center conductor are in the center contact solder cup.



#### POSITION OF THE CENTER CONDUCTOR IN THE SOLDER CUP

Figure 49

- (14) Solder the end of the center conductor in the solder cup.
- (15) Push the shield against the crimp barrel.  
Make sure that the strands of the shield are symmetrical around the circumference of the crimp barrel.
- (16) Move the ferrule forward until the forward end of the ferrule is against the shoulder of the contact body.

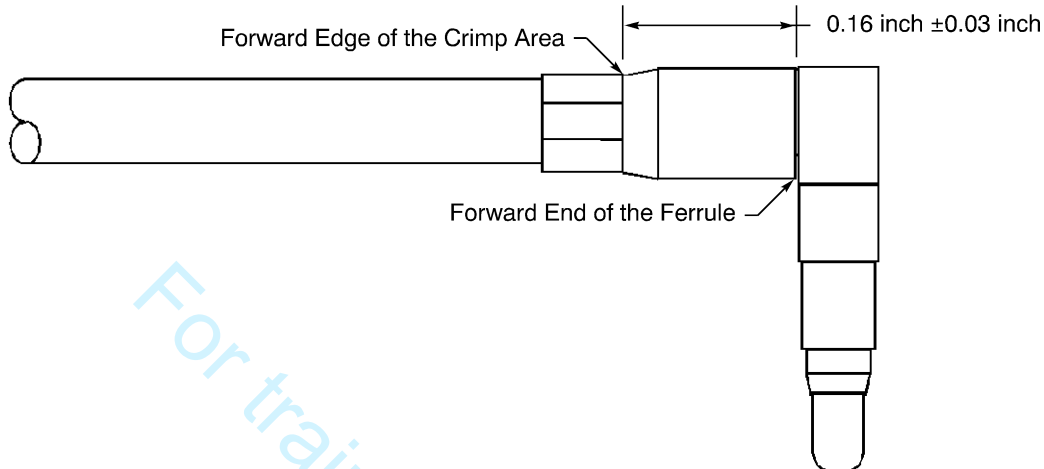
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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

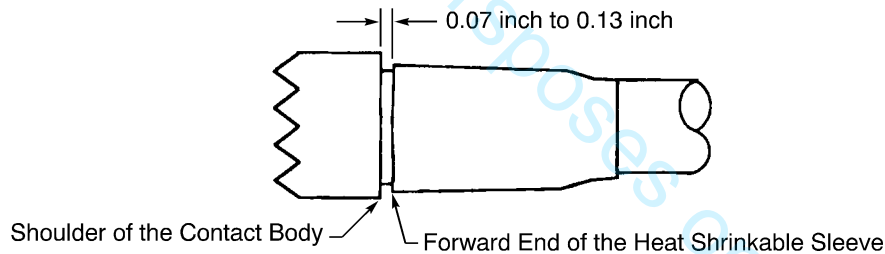
- (17) Crimp the ferrule. Refer to Figure 50.

Make sure that the distance from the forward edge of the crimp area to the forward end of the ferrule is 0.16 inch  $\pm$  0.03 inch.



**POSITION OF THE FERRULE AND THE CONTACT BODY**  
Figure 50

- (18) Push the heat shrinkable sleeve forward until the forward end of the sleeve is 0.07 inch to 0.13 inch from the shoulder of the contact body. Refer to Figure 51.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE CONTACT ASSEMBLY**  
Figure 51

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

## 6. CONNECTOR ASSEMBLY

### A. Contact Insertion

This paragraph gives the procedure to install standard contacts.

For the procedure to install coax contacts and special purpose contacts, refer to Paragraph 6.B..

**NOTE:** If a backshell is specified, the necessary backshell components must be installed on the wire harness before the insertion of the contacts into the connector. Refer to Paragraph 6.D.

- (1) If a backshell is specified, put the backshell on the wire harness.

Make sure that the cable clamp points rearward on the wire harness.

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

- (2) Axially align the contact assembly and the contact cavity at the rear of the connector.

**NOTE:** A tool is not necessary for the insertion of a contact assembly.

- (3) Carefully push the contact assembly into the contact cavity until it stops.  
(4) 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 OF THE WIRE.

- (5) If the contact is not locked in the contact cavity:  
(a) Pull the contact assembly out of the contact cavity.  
(b) Do Step (1) through Step (3) again.

### B. Insertion of Special Purpose Contacts and Coax Contacts

**Table 29**  
**SPECIAL PURPOSE CONTACT INSERTION TOOLS**

Crimp Barrel Size	Insertion Tool
16	ST2220-2-4
12	ST2220-2-5
08	ST2220-2-5

**Table 30**  
**COAX CONTACT INSERTION TOOLS**

Contact Size	Contact Type	Insertion Tool
8	Pin	ST2220-2-5
8	Socket	ST2220-2-5

**Table 31**  
**CONTACT ALIGNMENT RING INSTALLATION TOOLS**

Contact Size	Contact Type	Installation Tool
8	Pin	M81969/14-04

- (1) Make a selection of a contact insertion tool from:
- Table 29 for a special purpose contact
  - Table 30 for a coax contact.

**NOTE:** A contact insertion tool is not necessary for the installation of:

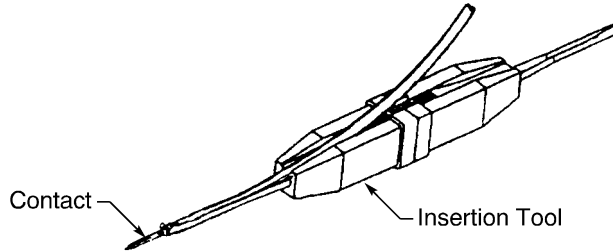
- A size 8 coax contact assembly
- A size 8 contact assembly.

- (2) Put the contact assembly in the insertion tool. Refer to Figure 52.

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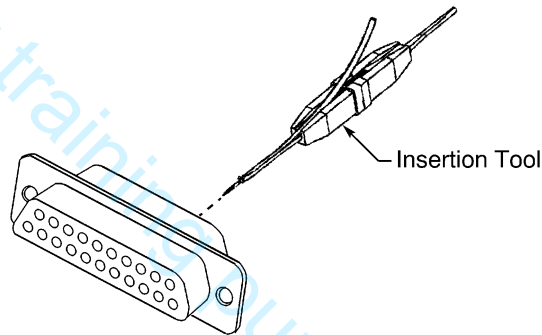
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**  
**Figure 52**

- (3) At the rear of the connector, axially align the contact assembly, the insertion tool, and the contact cavity. Refer to Figure 53.



**ALIGNMENT OF THE CONTACT ASSEMBLY, THE INSERTION TOOL, AND THE CONTACT CAVITY**  
**Figure 53**

- (4) Carefully push the tool into the contact cavity until it stops.  
If a tool is not used, carefully push the contact assembly into the contact cavity until it stops.  
Make sure that the tool and the contact stay aligned with the contact cavity.

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (5) If an installation tool is used, carefully pull the tool from the contact cavity.  
(6) 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. DAMAGE TO THE CONNECTOR OR THE CONTACT CAN OCCUR.

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

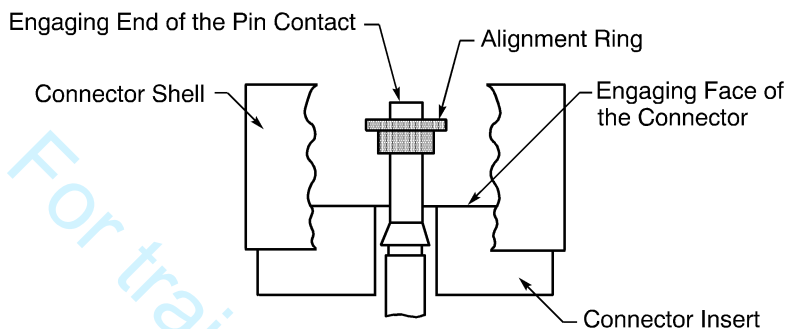
- (7) If the contact is not locked in the contact cavity:

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### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

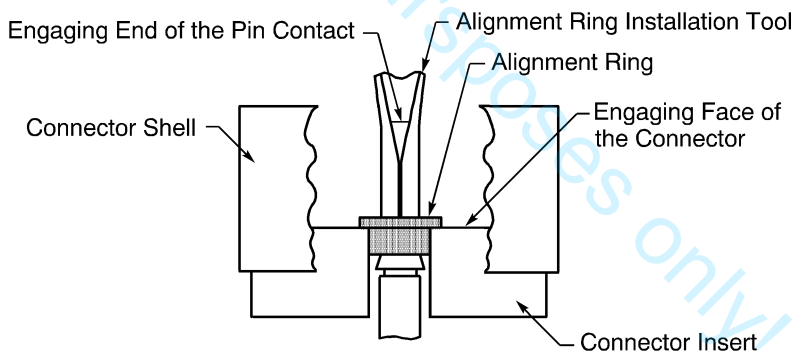
- (a) Pull the contact assembly out of the cavity.
- (b) Do Step (2) through Step (6) again.
- (8) For a size 8 coax pin contact or a size 8 pin contact:
  - (a) Make a selection of a contact alignment ring from Table 12.
  - (b) Make a selection of a contact alignment ring installation tool from Table 31.
  - (c) Put the alignment ring on the engaging end of the contact. Refer to Figure 54.



**INITIAL POSITION OF THE ALIGNMENT RING**

**Figure 54**

- (d) Put the end of the alignment ring installation tool on the engaging end of the contact.
- (e) Push the alignment ring forward to the engaging face of the connector. Refer to Figure 55.



**POSITION OF THE ALIGNMENT RING AGAINST THE FACE OF THE CONNECTOR**

**Figure 55**

- (f) Remove the tool from the engaging end of the contact.

#### C. Seal of an Empty Contact Cavity

For environmental connectors, an empty contact cavity must be sealed with a seal rod or a seal plug. Refer to Figure 4 and Subject 20-60-08.

#### D. Backshell Assembly

- (1) If a backshell is specified, assemble the backshell. Refer to Subject 20-72-08.

**20-72-10**

**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS****E. Connector Installation Hardware Assembly**

- (1) If a backshell is not specified, assemble the connector installation hardware. Refer to Subject 20-72-07.

NOTE: If a backshell is specified, the connector installation hardware is assembled when the backshell is assembled. Refer to Paragraph 6.D.

**7. CONNECTOR INSTALLATION****A. Connector Installation in a Panel**

For installation of a connector:

- With a backshell, installation in a panel occurs when the backshell is assembled. Refer to Paragraph 6.D.
- Without a backshell, the installation in a panel occurs when the connector installation hardware is assembled. Refer to Paragraph 6.E.

**B. Connection of the Plug and the Receptacle**

**Table 32**  
**NECESSARY TOOLS**

Tool	Type
Screwdriver	Flat Tip

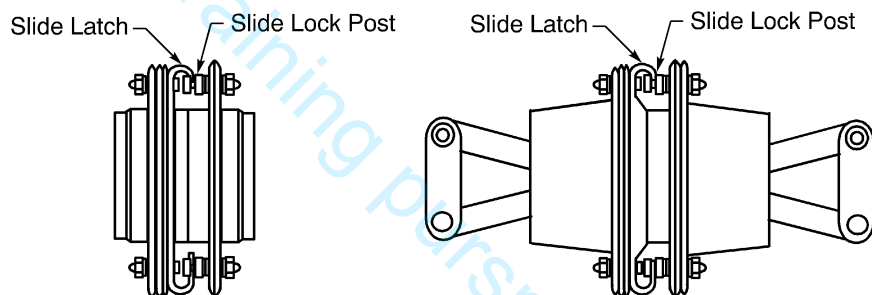
- (1) For connectors with jackscrew and jackpost installation hardware:
- Make a selection of a tool from Table 32.
  - Align the engaging face of the plug with the engaging face of the receptacle.
  - Push the plug into the receptacle.  
Make sure that connectors are fully engaged.
  - Put each jackscrew in the applicable jackpost.
  - Turn one jackscrew clockwise two or three turns.
  - Turn the other jackscrew clockwise two or three turns.
  - Do Step (e) and Step (f) again until the jackscrews are fully engaged.
  - Tighten each jackscrew.
- (2) For connectors with male and female screw lock installation hardware:
- Make a selection of a tool from Table 32.
  - Align the engaging face of the plug with the engaging face of the receptacle.
  - Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - Put each screw in the applicable female screw lock.
  - Turn one screw clockwise two or three turns.
  - Turn the other screw clockwise two or three turns.
  - Do Step (e) and Step (f) again until the screws are fully engaged.
  - Tighten each jackscrew.

**20-72-10**

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

- (3) For connectors with spring plate and spring latch plate installation hardware:
  - (a) Align the engaging face of the plug with the engaging face of the receptacle.
  - (b) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (c) Engage each spring with the applicable spring latch plate.
- (4) For connectors with slide latch and slide lock post installation hardware:
  - (a) Align the engaging face of the plug with the engaging face of the receptacle.  
Make sure that the slide latch is retracted to the open position.
  - (b) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (c) Engage the slot in the slide latch with the slide lock posts.
  - (d) Push the slide latch to the closed position. Refer to Figure 56.  
Make sure the connectors are locked together.



**CONNECTION OF THE PLUG AND THE RECEPTACLE - SLIDE LATCH HARDWARE**  
Figure 56

## 8. APPROVED TOOL SUPPLIERS

### A. Contact Removal Tools

**Table 33**  
**CONTACT REMOVAL TOOL SUPPLIERS**

Removal Tool	Supplier
6500-043-020-628	Daniels
6500-045-020	Daniels
CET 20-11	ITT Cannon
CIET-20HD	ITT Cannon
DRK38	Daniels
M24308/18-2	QPL
M81969/14-03	QPL
M81969/1-02	QPL

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS

Table 33 (continued)

Removal Tool	Supplier
M81969/14-02	QPL
MS18278-1	QPL
MS27534-20	QPL
NAS1664-20	QPL

### B. Contact Crimp Tools

Table 34  
CONTACT CRIMP TOOL SUPPLIERS

Crimp Tool	Supplier
11697-1	Buchanan
AFM 8	Daniels
K13-1	Daniels
K250	Daniels
K41	Daniels
KAP13-1	Daniels
M22520/1-01	QPL
M22520/2-01	QPL
M22520/2-03	QPL
M22520/2-06	QPL
M22520/2-14	QPL
M22520/5-01	QPL
M22520/5-03	QPL
M22520/5-08	QPL
M22520/5-35	QPL
M22520/5-39	QPL
M22520/5-41	QPL
M309	Daniels
MS3191-1	QPL
P20-3191-1	ITT Cannon
ST2220-1-43	Boeing
ST2220-1-Y	Boeing
TP884	Daniels

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**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: TRI-STAR C()MA AND CORY C()MA CONNECTORS****Table 34 (continued)**

<b>Crimp Tool</b>	<b>Supplier</b>
WA22	Daniels
WA22AP	Daniels
WA22LC	Daniels
WA27-309-EP	Daniels
WA27F	Daniels
Y119	Daniels
Y139	Daniels

**C. Contact Alignment Ring Installation Tools****Table 35****CONTACT ALIGNMENT RING INSTALLATION TOOL SUPPLIERS**

<b>Insertion Tool</b>	<b>Supplier</b>
M81969/14-04	QPL

**D. Contact Insertion Tools****Table 36****CONTACT INSERTION TOOL SUPPLIERS**

<b>Insertion Tool</b>	<b>Supplier</b>
ST2220-2-4	Boeing
ST2220-2-5	Boeing

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

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## STANDARD WIRING PRACTICES MANUAL

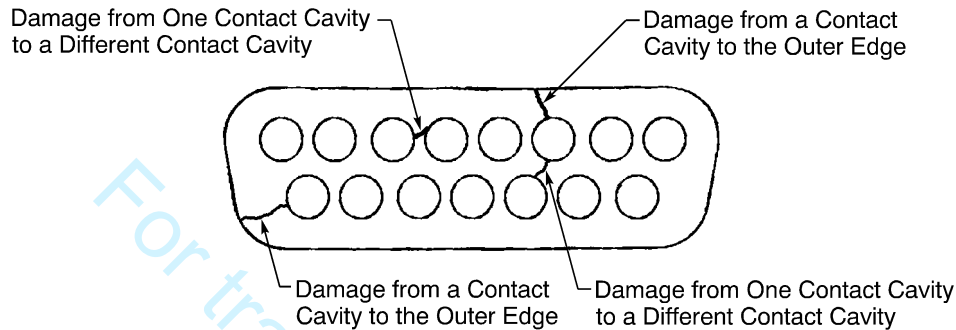
### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Insert

It is necessary to replace the connector if one or more of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity; refer to Figure 1
- The damage extends from one contact cavity to the outer edge of the insert; refer to Figure 1.



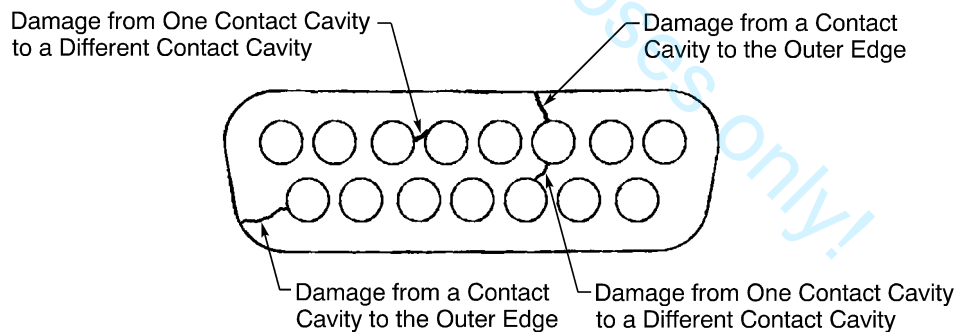
**REAR FACE OF THE INSERT - LENGTH OF DAMAGE**  
Figure 1

##### B. Damage Conditions - Front Face of the Insert

It is necessary to replace the connector if one of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 2.



**FRONT FACE OF THE INSERT - LENGTH OF DAMAGE**  
Figure 2

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

### 2. PART NUMBERS AND DESCRIPTION

#### A. Connector Part Numbers

Table 1  
CONNECTOR PART NUMBERS

Part Number	Type	Shell Size	Insert Configuration	Contact Assembly	Supplier
17-10090	Receptacle	E	9	Solder	Amphenol
17-10090	Receptacle	E	9	Solder	WPI
17-10090-1	Receptacle	E	9	Crimp	Amphenol
17-10090-1	Receptacle	E	9	Crimp	WPI
17-10150	Receptacle	A	15	Solder	Amphenol
17-10150	Receptacle	A	15	Solder	WPI
17-10150-1	Receptacle	A	15	Crimp	Amphenol
17-10150-1	Receptacle	A	15	Crimp	WPI
17-10250	Receptacle	B	25	Solder	Amphenol
17-10250	Receptacle	B	25	Solder	WPI
17-10250-1	Receptacle	B	25	Crimp	Amphenol
17-10250-1	Receptacle	B	25	Crimp	WPI
17-10370	Receptacle	C	37	Solder	Amphenol
17-10370	Receptacle	C	37	Solder	WPI
17-10370-1	Receptacle	C	37	Crimp	Amphenol
17-10370-1	Receptacle	C	37	Crimp	WPI
17-10500	Receptacle	D	50	Solder	Amphenol
17-10500	Receptacle	D	50	Solder	WPI
17-10500-1	Receptacle	D	50	Crimp	Amphenol
17-10500-1	Receptacle	D	50	Crimp	WPI
17-20090	Plug	E	9	Solder	Amphenol
17-20090	Plug	E	9	Solder	WPI
17-20090-1	Plug	E	9	Crimp	Amphenol
17-20090-1	Plug	E	9	Crimp	WPI
17-20150	Plug	A	15	Solder	Amphenol
17-20150	Plug	A	15	Solder	WPI
17-20150-1	Plug	A	15	Crimp	Amphenol
17-20150-1	Plug	A	15	Crimp	WPI
17-20250	Plug	B	25	Solder	Amphenol

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

Table 1 (continued)

Part Number	Type	Shell Size	Insert Configuration	Contact Assembly	Supplier
17-20250	Plug	B	25	Solder	WPI
17-20250-1	Plug	B	25	Crimp	Amphenol
17-20250-1	Plug	B	25	Crimp	WPI
17-20370	Plug	C	37	Solder	Amphenol
17-20370	Plug	C	37	Solder	WPI
17-20370-1	Plug	C	37	Crimp	Amphenol
17-20370-1	Plug	C	37	Crimp	WPI
17-20500	Plug	D	50	Solder	Amphenol
17-20500	Plug	D	50	Solder	WPI
17-20500-1	Plug	D	50	Crimp	Amphenol
17-20500-1	Plug	D	50	Crimp	WPI
17-300-1	Receptacle	E	9	Crimp	Amphenol
17-300-1	Receptacle	E	9	Crimp	WPI
17-301-1	Plug	E	9	Crimp	Amphenol
17-301-1	Plug	E	9	Crimp	WPI
17-302-1	Receptacle	A	15	Crimp	Amphenol
17-302-1	Receptacle	A	15	Crimp	WPI
17-303-1	Plug	A	15	Crimp	Amphenol
17-303-1	Plug	A	15	Crimp	WPI
17-304-1	Receptacle	B	25	Crimp	Amphenol
17-304-1	Receptacle	B	25	Crimp	WPI
17-305-1	Plug	B	25	Crimp	Amphenol
17-305-1	Plug	B	25	Crimp	WPI
17-306-1	Receptacle	C	37	Crimp	Amphenol
17-306-1	Receptacle	C	37	Crimp	WPI
17-307-1	Plug	C	37	Crimp	Amphenol
17-307-1	Plug	C	37	Crimp	WPI
17-308-1	Receptacle	D	50	Crimp	Amphenol
17-308-1	Receptacle	D	50	Crimp	WPI
17-309-1	Plug	D	50	Crimp	Amphenol
17-309-1	Plug	D	50	Crimp	WPI

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

**Table 2**  
**ALTERNATIVE CONNECTOR PART NUMBERS**

Specified Amphenol or WPI Connector		Alternative Amphenol or WPI Connector	
Part Number	Supplied	Part Number	Supplied
17-10090-1	With Crimp Contacts	17-10090	With Solder Contacts
		17-300-1	Without Contacts
17-10150-1	With Crimp Contacts	17-10150	With Solder Contacts
		17-302-1	Without Contacts
17-10250-1	With Crimp Contacts	17-10250	With Solder Contacts
		17-304-1	Without Contacts
17-10370-1	With Crimp Contacts	17-10370	With Solder Contacts
		17-306-1	Without Contacts
17-10500-1	With Crimp Contacts	17-10500	With Solder Contacts
		17-308-1	Without Contacts
17-20090-1	With Crimp Contacts	17-20090	With Solder Contacts
		17-301-1	Without Contacts
17-20150-1	With Crimp Contacts	17-20150	With Solder Contacts
		17-303-1	Without Contacts
17-20250-1	With Crimp Contacts	17-20250	With Solder Contacts
		17-305-1	Without Contacts
17-20370-1	With Crimp Contacts	17-20370	With Solder Contacts
		17-307-1	Without Contacts
17-20500-1	With Crimp Contacts	17-20500	With Solder Contacts
		17-309-1	Without Contacts

**Table 3**  
**OTHER ALTERNATIVE CONNECTOR PART NUMBERS**

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
17-()	Amphenol	17-()	WPI	Subject 20-72-11
17-10090-1	-	CEMA9S	Cory Components	Subject 20-72-10
		CEMA9S	Tri-Star	Subject 20-72-10
		DEMA9S	ITT Cannon	Subject 20-72-12
		DEMAM9S	ITT Cannon	Subject 20-72-12
		M24308/2-1	QPL	Subject 20-72-13

# 20-72-11

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

Table 3 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
17-10150-1	-	CAMA15S	Cory Components	Subject 20-72-10
		CAMA15S	Tri-Star	Subject 20-72-10
		DAMA15S	ITT Cannon	Subject 20-72-12
		DAMAM15S	ITT Cannon	Subject 20-72-12
		M24308/2-2	QPL	Subject 20-72-13
17-10250-1	-	CBMA25S	Cory Components	Subject 20-72-10
		CBMA25S	Tri-Star	Subject 20-72-10
		DBMA25S	ITT Cannon	Subject 20-72-12
		DBMAM25S	ITT Cannon	Subject 20-72-12
		M24308/2-3	QPL	Subject 20-72-13
17-10370-1	-	CCMA37S	Cory Components	Subject 20-72-10
		CCMA37S	Tri-Star	Subject 20-72-10
		DCMA37S	ITT Cannon	Subject 20-72-12
		DCMAM37S	ITT Cannon	Subject 20-72-12
		M24308/2-4	QPL	Subject 20-72-13
17-10500-1	-	CDMA50S	Cory Components	Subject 20-72-10
		CDMA50S	Tri-Star	Subject 20-72-10
		DDMA50S	ITT Cannon	Subject 20-72-12
		DDMAM50S	ITT Cannon	Subject 20-72-12
		M24308/2-5	QPL	Subject 20-72-13
17-20090-1	-	CEMA9P	Cory Components	Subject 20-72-10
		CEMA9P	Tri-Star	Subject 20-72-10
		DEMA9P	ITT Cannon	Subject 20-72-12
		DEMAM9P	ITT Cannon	Subject 20-72-12
		M24308/4-1	QPL	Subject 20-72-13
17-20150-1	-	CAMA15P	Cory Components	Subject 20-72-10
		CAMA15P	Tri-Star	Subject 20-72-10
		DAMA15P	ITT Cannon	Subject 20-72-12
		DAMAM15P	ITT Cannon	Subject 20-72-12
		M24308/4-2	QPL	Subject 20-72-13

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

Table 3 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
17-20250-1	-	CBMA25P	Cory Components	Subject 20-72-10
		CBMA25P	Tri-Star	Subject 20-72-10
		DBMA25P	ITT Cannon	Subject 20-72-12
		DBMAM25P	ITT Cannon	Subject 20-72-12
		M24308/4-3	QPL	Subject 20-72-13
17-20370-1	-	CCMA37P	Cory Components	Subject 20-72-10
		CCMA37P	Tri-Star	Subject 20-72-10
		DCMA37P	ITT Cannon	Subject 20-72-12
		DCMAM37P	ITT Cannon	Subject 20-72-12
		M24308/4-4	QPL	Subject 20-72-13
17-20500-1	-	CDMA50P	Cory Components	Subject 20-72-10
		CDMA50P	Tri-Star	Subject 20-72-10
		DDMA50P	ITT Cannon	Subject 20-72-12
		DDMAM50P	ITT Cannon	Subject 20-72-12
		M24308/4-5	QPL	Subject 20-72-13
17-300-1	-	CEMA9S	Cory Components	Subject 20-72-10
		CEMA9S	Tri-Star	Subject 20-72-10
		DEMA9S	ITT Cannon	Subject 20-72-12
		DEMAM9S	ITT Cannon	Subject 20-72-12
		M24308/2-1	QPL	Subject 20-72-13
17-301-1	-	CEMA9P	Cory Components	Subject 20-72-10
		CEMA9P	Tri-Star	Subject 20-72-10
		DEMA9P	ITT Cannon	Subject 20-72-12
		DEMAM9P	ITT Cannon	Subject 20-72-12
		M24308/4-1	QPL	Subject 20-72-13
17-302-1	-	CAMA15S	Cory Components	Subject 20-72-10
		CAMA15S	Tri-Star	Subject 20-72-10
		DAMA15S	ITT Cannon	Subject 20-72-12
		DAMAM15S	ITT Cannon	Subject 20-72-12
		M24308/2-2	QPL	Subject 20-72-13

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

Table 3 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
17-303-1	-	CAMA15P	Cory Components	Subject 20-72-10
		CAMA15P	Tri-Star	Subject 20-72-10
		DAMA15P	ITT Cannon	Subject 20-72-12
		DAMAM15P	ITT Cannon	Subject 20-72-12
		M24308/4-2	QPL	Subject 20-72-13
17-304-1	-	CBMA25S	Cory Components	Subject 20-72-10
		CBMA25S	Tri-Star	Subject 20-72-10
		DBMA25S	ITT Cannon	Subject 20-72-12
		DBMAM25S	ITT Cannon	Subject 20-72-12
		M24308/2-3	QPL	Subject 20-72-13
17-305-1	-	CBMA25P	Cory Components	Subject 20-72-10
		CBMA25P	Tri-Star	Subject 20-72-10
		DBMA25P	ITT Cannon	Subject 20-72-12
		DBMAM25P	ITT Cannon	Subject 20-72-12
		M24308/4-3	QPL	Subject 20-72-13
17-306-1	-	CCMA37S	Cory Components	Subject 20-72-10
		CCMA37S	Tri-Star	Subject 20-72-10
		DCMA37S	ITT Cannon	Subject 20-72-12
		DCMAM37S	ITT Cannon	Subject 20-72-12
		M24308/2-4	QPL	Subject 20-72-13
17-307-1	-	CCMA37P	Cory Components	Subject 20-72-10
		CCMA37P	Tri-Star	Subject 20-72-10
		DCMA37P	ITT Cannon	Subject 20-72-12
		DCMAM37P	ITT Cannon	Subject 20-72-12
		M24308/4-4	QPL	Subject 20-72-13
17-308-1	-	CDMA50S	Cory Components	Subject 20-72-10
		CDMA50S	Tri-Star	Subject 20-72-10
		DDMA50S	ITT Cannon	Subject 20-72-12
		DDMAM50S	ITT Cannon	Subject 20-72-12
		M24308/2-5	QPL	Subject 20-72-13

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

Table 3 (continued)

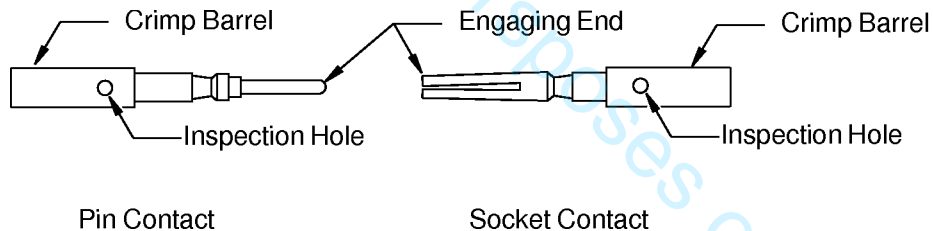
Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
17-309-1	-	CDMA50P	Cory Components	Subject 20-72-10
		CDMA50P	Tri-Star	Subject 20-72-10
		DDMA50P	ITT Cannon	Subject 20-72-12
		DDMAM50P	ITT Cannon	Subject 20-72-12
		M24308/4-5	QPL	Subject 20-72-13

#### B. Connector Description

The 17-() connectors have these properties:

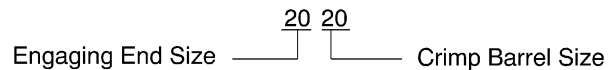
- D subminiature rectangular configuration
- Metal shells
- Crimp type, and solder type, front release pin contacts in the plug
- Crimp type, and solder type, front release socket contacts in the receptacle
- Size 2020 and size 2016 crimp type contacts
- Size 2020 solder type contacts

#### C. Contact Part Numbers



#### CRIMP TYPE CONTACTS FOR 17 SERIES, POKE HOME, D-SUBMINIATURE CONNECTORS

Figure 3



#### EXAMPLE OF A CONTACT SIZE

Figure 4

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

**Table 4**  
**CRIMP TYPE CONTACT PART NUMBERS**

Contact Size		Contact Type	Part Number	Supplier
Engaging End	Crimp Barrel			
20	20	Pin	17-766-2	Amphenol
			17-766-2	WPI
		Socket	17-763-2	Amphenol
			17-763-2	WPI
	16	Pin	17-1005	Amphenol
			17-1005	WPI
		Socket	17-1006	Amphenol
			17-1006	WPI

**Table 5**  
**SOLDER TYPE CONTACT PART NUMBERS**

Contact Size		Contact Type	Part Number	Supplier
Engaging End	Solder Barrel			
20	20	Pin	17-765-2	Amphenol
			17-765-2	WPI
		Socket	17-264-2	Amphenol
			17-264-2	WPI

**Table 6**  
**ALTERNATIVE CONTACT PART NUMBERS**

Specified Contact		Alternative Contact	
Part Number	Supplier	Part Number	Supplier
17-1005	Amphenol	17-1005	WPI
17-1006	Amphenol	17-1006	WPI
17-763-2	Amphenol	17-763-2	WPI
17-764-2	Amphenol	17-764-2	WPI
17-765-2	Amphenol	17-765-2	WPI
17-766-2	Amphenol	17-766-2	WPI

### 3. INSERT CONFIGURATIONS

#### A. 17-() Connectors

**NOTE:** The contact cavity size that is specified in Table 7 is equivalent to the size of the engaging end of the contact.

# 20-72-11

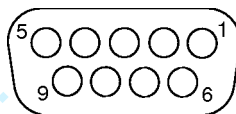
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

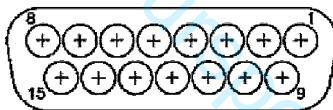
**NOTE:** Figure 5 through Figure 9 show the rear face of an insert that has pin contacts. The view of the rear face of an insert that has socket contacts is the mirror image of this view.

**Table 7**  
**CONNECTOR INSERT CONFIGURATIONS**

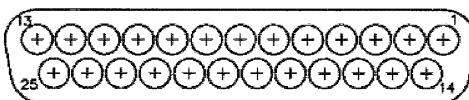
Insert Configuration	Contact Cavity		Reference
	Count	Size	
9	9	20	Figure 5
15	15	20	Figure 6
25	25	20	Figure 7
37	37	20	Figure 8
50	50	20	Figure 9



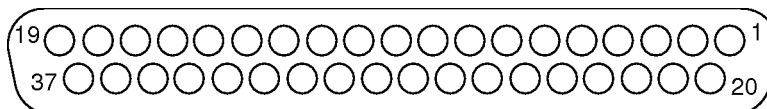
**9 INSERT CONFIGURATION**  
**Figure 5**



**15 INSERT CONFIGURATION**  
**Figure 6**



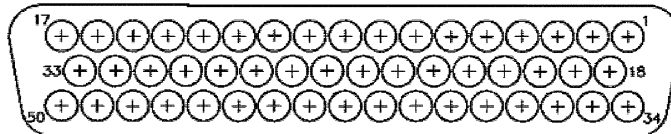
**25 INSERT CONFIGURATION**  
**Figure 7**



**37 INSERT CONFIGURATION**  
**Figure 8**

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS



**50 INSERT CONFIGURATION**

**Figure 9**

#### 4. CONNECTOR DISASSEMBLY

##### A. Contact Removal

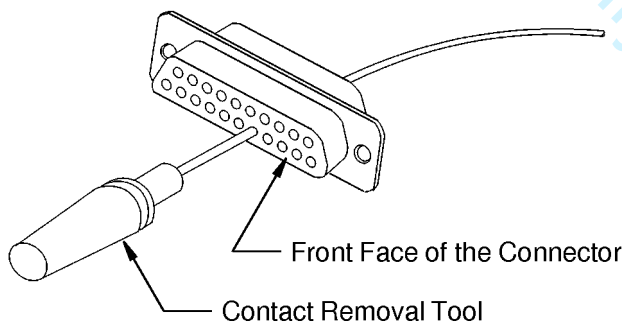
**Table 8**  
**CONTACT REMOVAL TOOLS**

Engaging End Size	Wire Barrel Size	Contact Type	Removal Tool	
			Handle	Bit
20	20	Pin	ATA 2040	-
			356-200	356-400-6
		Socket	ATA 2040	-
			356-200	356-400-5
	16	Pin	356-200	356-400-6
		Socket	356-200	356-400-5

**NOTE:** The backshell must be removed from the connector before the contacts can be removed.

- (1) Make a selection of a removal tool from Table 8.
- (2) Axially align the tool and the contact cavity at the front face of the connector.
- (3) At the front face of the connector, push the tool into the contact cavity until the contact moves out from the rear of the connector. Refer to Figure 10.

Make sure that the removal tool stays axially aligned with the contact cavity.



**POSITION OF THE REMOVAL TOOL IN THE CONTACT CAVITY**

**Figure 10**

- (4) Carefully remove the tool from the contact cavity.

**20-72-11**

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

(5) Pull the contact out of the contact cavity from the rear of the connector.

#### 5. CONNECTOR ASSEMBLY

##### A. Crimp Contact Assembly

Table 9  
INSULATION REMOVAL LENGTH

Wire Size	Crimp Barrel Size	Removal Length L (inch)	
		Target	Tolerance
24	20	0.19	$\pm 0.03$
22	20	0.19	$\pm 0.03$
20	20	0.19	$\pm 0.03$
18	16	0.19	$\pm 0.03$
16	16	0.19	$\pm 0.03$

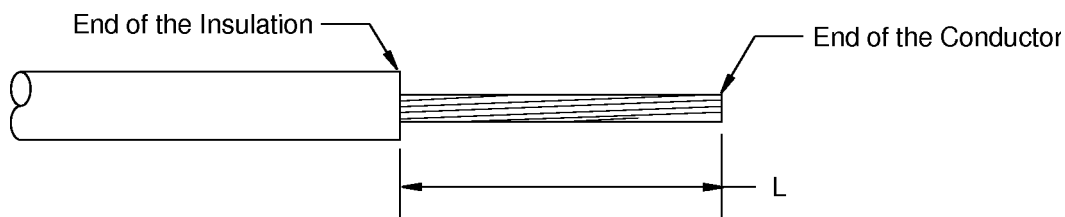
Table 10  
CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool		
		Basic Unit		Locator
		Part Number	Setting	
24	20	357-100	5	357-300-02
22	20	357-100	6	357-300-02
20	20	357-100	7	357-300-02
18	16	357-105	0.053 inch $\pm 0.003$ inch	357-305-03
16	16	357-105	0.058 inch $\pm 0.003$ inch	357-305-03

(1) Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 11
- Table 9 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedure.



INSULATION REMOVAL LENGTH

Figure 11

# 20-72-11

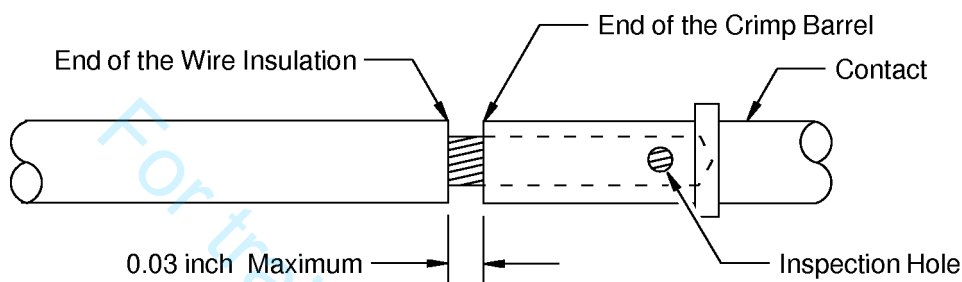
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

- (2) Make a selection of a crimp tool from Table 10.
- (3) Put the conductor in the crimp barrel of the contact.

Make sure that:

- All 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 OF THE CONTACT**  
Figure 12

- (4) Crimp the contact.

Make sure that:

- All 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.

#### B. Solder Contact Assembly

**CAUTION:** THE CONDUCTOR MUST BE SOLDERED IN THE CONTACT BEFORE THE CONTACT IS INSTALLED IN THE CONNECTOR.

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

Wire Size	Crimp Barrel Size	Removal Length L (inch)	
		Target	Tolerance
24	20	0.12	± 0.03
22	20	0.12	± 0.03
20	20	0.12	± 0.03

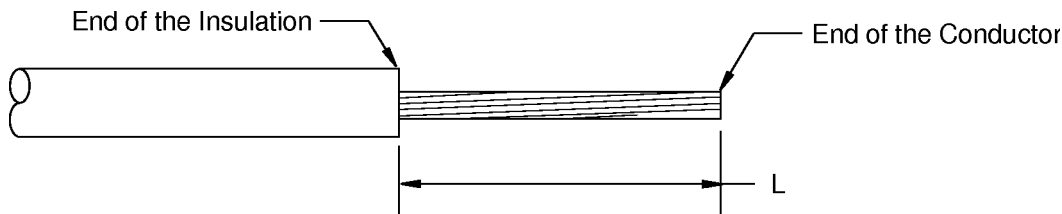
- (1) Remove the necessary length of insulation from the end of the wire.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

Refer to:

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



#### INSULATION REMOVAL LENGTH

Figure 13

(2) Solder the conductor in the contact.

(a) Tin these components of the contact assembly:

- The wire
- The contact solder cup.

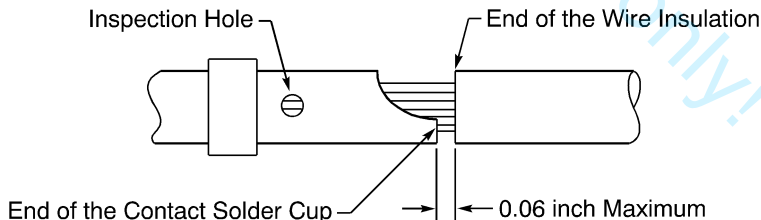
(b) Solder the end of the wire in the solder cup. Refer to Figure 14.

Make sure that the distance from the forward end of the insulation to the end of the solder cup is not more than 0.06 inch.

**CAUTION:** DO NOT APPLY MORE THAN THE NECESSARY AMOUNT OF HEAT. DAMAGE TO THE CONTACT OR THE WIRE CAN OCCUR.

**CAUTION:** DO NOT LET THE STRANDS OF THE CONDUCTOR THAT ARE IN THE INSULATION OF THE WIRE ABSORB THE SOLDER. THE WIRE:

- CANNOT BEND AT THE NECESSARY LOCATION
- CAN BREAK AT THE END OF THE SOLDER.



#### POSITION OF THE WIRE IN THE CONTACT

Figure 14

### C. Contact Insertion

**NOTE:** If a backshell is specified, the necessary backshell components must be installed on the wire harness before the insertion of the contacts into the connector. Refer to Paragraph 5.E.

**20-72-11**

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

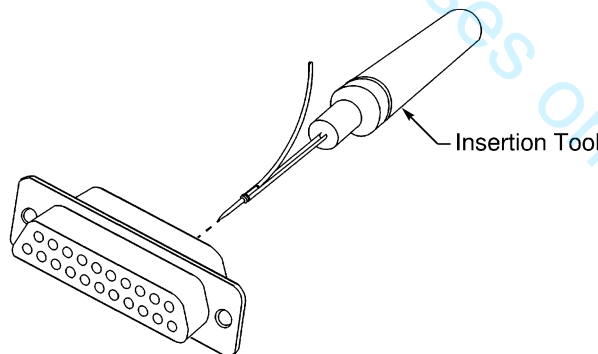
**Table 12**  
**CONTACT INSERTION TOOLS**

Crimp Barrel Size	Insertion Tool
20	356-400-1
	356-400-10
	ATA 1040
16	356-400-2

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

Material	Part Number	Supplier
Sleeve, Heat shrinkable	MIL-LT	Raychem
Sleeve, Heat shrinkable	PLF 100	Plastronic

- (1) Make a selection of a heat shrinkable sleeve from Table 13.  
Make sure that the sleeve has the smallest diameter that will move easily on the wire.  
NOTE: An equivalent sleeve is a satisfactory alternative. Refer to Subject 20-00-11.
- (2) Make a selection of a contact insertion tool from Table 12.
- (3) Put a 0.75 inch to 1.0 inch length of the heat shrinkable sleeve on the wire.
- (4) Put the contact assembly in the insertion tool.  
Make sure that the end of the insertion tool is against the contact shoulder.
- (5) At the rear of the connector, axially align the insertion tool and the contact cavity.



**ALIGNMENT OF THE CONTACT ASSEMBLY, THE INSERTION TOOL, AND THE CONTACT CAVITY**  
**Figure 15**

- (6) Carefully push the insertion tool and the contact assembly into the contact cavity until it stops.  
Make sure that the insertion tool stays axially aligned with the contact cavity.
- (7) Carefully pull the tool out of the contact cavity.
- (8) Lightly pull the wire to make sure that the contact is locked in the contact cavity.

**20-72-11**

**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS**

**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 OF THE WIRE.

- (9) If the contact is not locked in the contact cavity:
  - (a) Pull the contact assembly out of the contact cavity.
  - (b) Do Step (4) through Step (8) again.
- (10) Move the heat shrinkable sleeve forward until it is against the rear of the connector.  
Make sure that the distance from the rear of the connector to the forward end of the sleeve is less than 0.06 inch.
- (11) Shrink the sleeve into its position. Refer to Subject 20-10-14.  
Make sure that the distance from the rear of the connector to the forward end of the sleeve is less than 0.06 inch.

**NOTE:** If more than one contact must be installed in the connector, all of the sleeves can be shrunk at the same time.

**D. Seal of an Empty Contact Cavity**

The seal of an empty contact cavity is not necessary.

**E. Backshell Assembly**

- (1) If a backshell is specified, assemble the backshell. Refer to Subject 20-72-08.

**F. Connector Installation Hardware Assembly**

- (1) If a backshell is not specified, assemble the connector installation hardware. Refer to Subject 20-72-07.

**NOTE:** If a backshell is specified, the connector installation hardware is assembled when the backshell is assembled. Refer to Paragraph 5.E.

**6. CONNECTOR INSTALLATION****A. Connector Installation in a Panel**

For installation of a connector:

- With a backshell, installation in a panel occurs when the backshell is assembled. Refer to Paragraph 5.E.
- Without a backshell, the installation in a panel occurs when the connector installation hardware is assembled. Refer to Paragraph 5.F.

**B. Connection of the Plug and the Receptacle**

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

Tool	Type
Screwdriver	Flat Tip

- (1) For connectors with jackscrew and jackpost installation hardware:

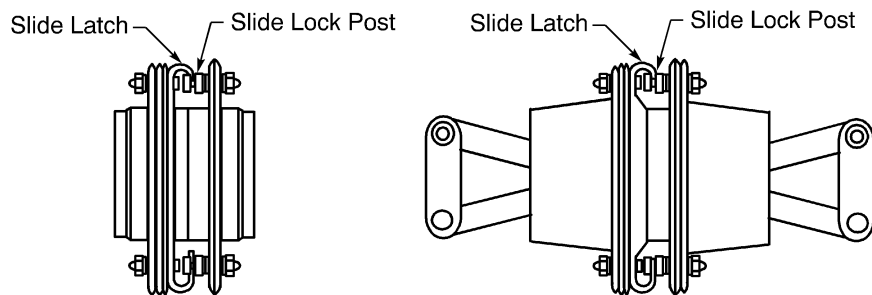
**20-72-11**

**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS**

- (a) Make a selection of a tool from Table 14.
  - (b) Align the engaging face of the plug with the engaging face of the receptacle.
  - (c) Push the plug into the receptacle.  
Make sure that connectors are fully engaged.
  - (d) Put each jackscrew in the applicable jackpost.
  - (e) Turn one jackscrew clockwise two or three turns.
  - (f) Turn the other jackscrew clockwise two or three turns.
  - (g) Do Step (e) and Step (f) again until the jackscrews are fully engaged.
  - (h) Tighten each jackscrew.
- (2) For connectors with male and female screw lock installation hardware:
- (a) Make a selection of a tool from Table 14.
  - (b) Align the engaging face of the plug with the engaging face of the receptacle.
  - (c) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (d) Put each screw in the applicable female screw lock.
  - (e) Turn one screw clockwise two or three turns.
  - (f) Turn the other screw clockwise two or three turns.
  - (g) Do Step (e) and Step (f) again until the screws are fully engaged.
  - (h) Tighten each jackscrew.
- (3) For connectors with spring plate and spring latch plate installation hardware:
- (a) Align the engaging face of the plug with the engaging face of the receptacle.
  - (b) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (c) Engage each spring with the applicable spring latch plate.
- (4) For connectors with slide latch and slide lock post installation hardware:
- (a) Align the engaging face of the plug with the engaging face of the receptacle.  
Make sure that the slide latch is retracted to the open position.
  - (b) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (c) Engage the slot in the slide latch with the slide lock posts.
  - (d) Push the slide latch to the closed position. Refer to Figure 16.  
Make sure the connectors are locked together.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS



CONNECTION OF THE PLUG AND THE RECEPTACLE - SLIDE LATCH HARDWARE

Figure 16

## 7. APPROVED TOOL SUPPLIERS

### A. Contact Removal Tools

Table 15  
CONTACT REMOVAL TOOL SUPPLIERS

Tool	Supplier
356-200	WPI
356-400-5	WPI
356-400-6	WPI
ATA 2040	Astro

### B. Contact Crimp Tools

Table 16  
CONTACT CRIMP TOOL SUPPLIERS

Tool	Supplier
357-100	WPI
357-105	Amphenol
357-300-02	WPI
357-305-03	Amphenol

### C. Contact Insertion Tools

Table 17  
CONTACT INSERTION TOOL SUPPLIERS

Tool	Supplier
356-400-1	WPI
356-400-10	WPI

# 20-72-11



707, 727-787

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: WPI 17-() AND AMPHENOL 17-() CONNECTORS

Table 17 (continued)

Tool	Supplier
356-400-2	WPI
ATA 1040	Astro

For training purposes only!

**20-72-11**

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## STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

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## STANDARD WIRING PRACTICES MANUAL

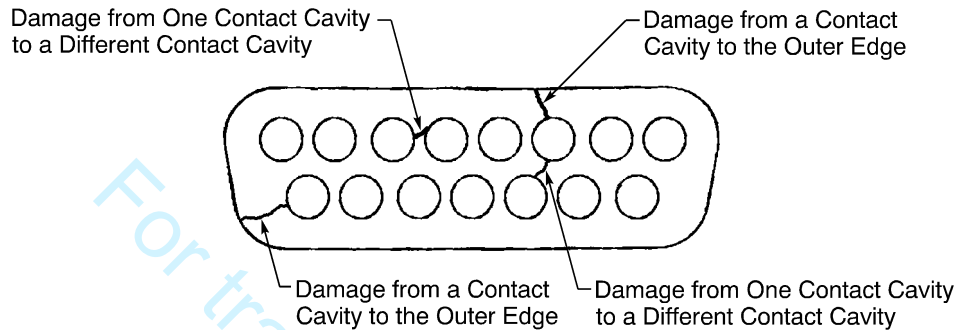
### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Insert

It is necessary to replace the connector if one or more of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity; refer to Figure 1
- The damage extends from one contact cavity to the outer edge of the insert; refer to Figure 1.



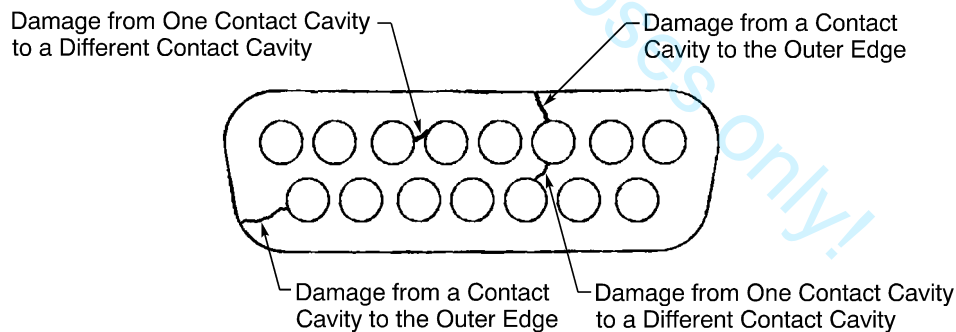
**REAR FACE OF THE INSERT - LENGTH OF DAMAGE**  
Figure 1

##### B. Damage Conditions - Front Face of the Insert

It is necessary to replace the connector if one of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 2.



**FRONT FACE OF THE INSERT - LENGTH OF DAMAGE**  
Figure 2

# STANDARD WIRING PRACTICES MANUAL

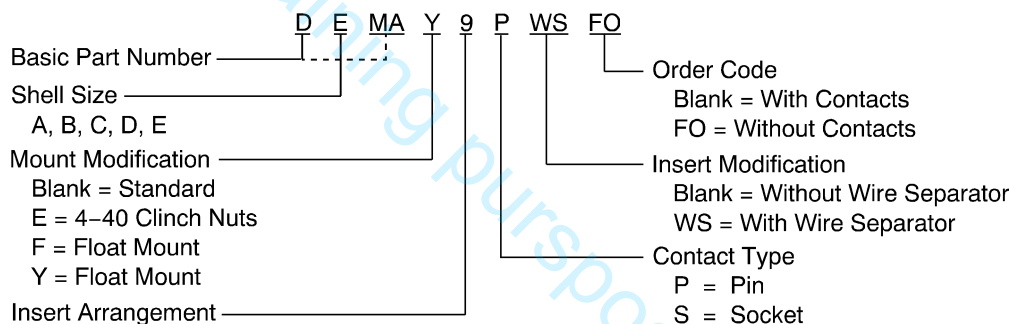
## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

### 2. PART NUMBERS AND DESCRIPTION

#### A. Connector Part Numbers

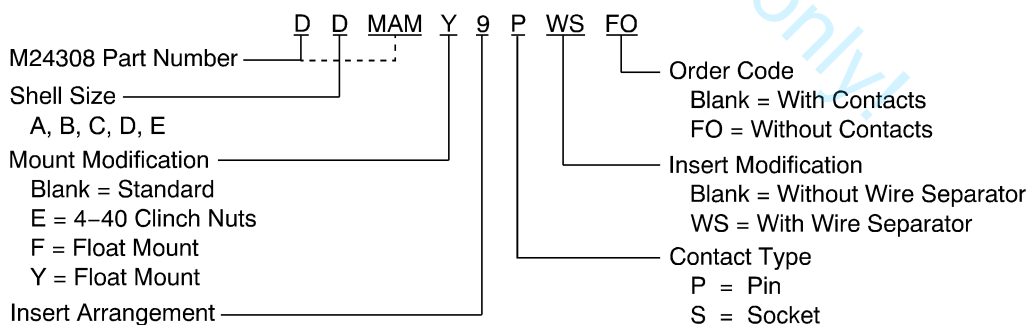
Table 1  
CONNECTOR PART NUMBERS

Part Number	Supplier
DAMA()	ITT Cannon
DBMA()	ITT Cannon
DBMAM()	ITT Cannon
DCMA()	ITT Cannon
DDMA()	ITT Cannon
DDMAM()	ITT Cannon
DEMA()	ITT Cannon



#### ITT CANNON D()MA CONNECTOR PART NUMBER STRUCTURE

Figure 3



#### ITT CANNON D()MAM CONNECTOR PART NUMBER STRUCTURE

Figure 4

**NOTE:** ITT CANNON DAMA(), DBMA(), DCMA(), DDMA(), DEMA() CONNECTORS THAT HAVE INSERT ARRANGEMENTS THAT HAVE COAX CONTACT CAVITIES, CAN BE SUPPLIED WITH COAX CONTACTS FOR SPECIFIED CABLES.

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 2  
ALTERNATIVE CONNECTOR PART NUMBERS

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
DAMA11W1P	ITT Cannon	CAMA11W1P	Cory Components	Subject 20-72-10
		CAMA11W1P	Tri Star	Subject 20-72-10
DAMA11W1S	ITT Cannon	CAMA11W1S	Cory Components	Subject 20-72-10
		CAMA11W1S	Tri Star	Subject 20-72-10
DAMA15P	ITT Cannon	17-20150-1	WPI	Subject 20-72-11
		17-303-1	WPI	Subject 20-72-11
		CAMA15P	Cory Components	Subject 20-72-10
		CAMA15P	Tri Star	Subject 20-72-10
		DAMAM15P	ITT Cannon	Subject 20-72-12
		M24308/4-2	QPL	Subject 20-72-13
DAMA15S	ITT Cannon	17-10150-1	WPI	Subject 20-72-11
		17-302-1	WPI	Subject 20-72-11
		CAMA15S	Cory Components	Subject 20-72-10
		CAMA15S	Tri Star	Subject 20-72-10
		DAMAM15S	ITT Cannon	Subject 20-72-12
		M24308/2-2	QPL	Subject 20-72-13
DAMA3W3P	ITT Cannon	CAMA3W3P	Cory Components	Subject 20-72-10
		CAMA3W3P	Tri Star	Subject 20-72-10
DAMA3W3S	ITT Cannon	CAMA3W3S	Cory Components	Subject 20-72-10
		CAMA3W3S	Tri Star	Subject 20-72-10
DBMA21W1P	ITT Cannon	CBMA21W1P	Cory Components	Subject 20-72-10
		CBMA21W1P	Tri Star	Subject 20-72-10
DBMA21W1S	ITT Cannon	CBMA21W1S	Cory Components	Subject 20-72-10
		CBMA21W1S	Tri Star	Subject 20-72-10
DBMA25P	ITT Cannon	17-20250-1	WPI	Subject 20-72-11
		17-305-1	WPI	Subject 20-72-11
		CBMA25P	Cory Components	Subject 20-72-10
		CBMA25P	Tri Star	Subject 20-72-10
		DBMAM25P	ITT Cannon	Subject 20-72-12
		M24308/4-3	QPL	Subject 20-72-13

# 20-72-12

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 2 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
DBMA25S	ITT Cannon	17-10250-1	WPI	Subject 20-72-11
		17-304-1	WPI	Subject 20-72-11
		CBMA25S	Cory Components	Subject 20-72-10
		CBMA25S	Tri Star	Subject 20-72-10
		DBMAM25S	ITT Cannon	Subject 20-72-12
		M24308/2-3	QPL	Subject 20-72-13
DBMA5W5P	ITT Cannon	CBMA5W5P	Cory Components	Subject 20-72-10
		CBMA5W5P	Tri Star	Subject 20-72-10
DBMA5W5S	ITT Cannon	CBMA5W5S	Cory Components	Subject 20-72-10
		CBMA5W5S	Tri Star	Subject 20-72-10
DCMA17W5P	ITT Cannon	CCMA17W5P	Cory Components	Subject 20-72-10
		CCMA17W5P	Tri Star	Subject 20-72-10
DCMA17W5S	ITT Cannon	CCMA17W5S	Cory Components	Subject 20-72-10
		CCMA17W5S	Tri Star	Subject 20-72-10
DCMA21WA4P	ITT Cannon	CCMA21WA4P	Cory Components	Subject 20-72-10
		CCMA21WA4P	Tri Star	Subject 20-72-10
DCMA21WA4S	ITT Cannon	CCMA21WA4S	Cory Components	Subject 20-72-10
		CCMA21WA4S	Tri Star	Subject 20-72-10
DCMA25W3P	ITT Cannon	CCMA25W3P	Cory Components	Subject 20-72-10
		CCMA25W3P	Tri Star	Subject 20-72-10
DCMA25W3S	ITT Cannon	CCMA25W3S	Cory Components	Subject 20-72-10
		CCMA25W3S	Tri Star	Subject 20-72-10
DCMA37P	ITT Cannon	17-20370-1	WPI	Subject 20-72-11
		17-307-1	WPI	Subject 20-72-11
		CCMA37P	Cory Components	Subject 20-72-10
		CCMA37P	Tri Star	Subject 20-72-10
		DCMAM37P	ITT Cannon	Subject 20-72-12
		M24308/4-4	QPL	Subject 20-72-13

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 2 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
DCMA37S	ITT Cannon	17-10370-1	WPI	Subject 20-72-11
		17-306-1	WPI	Subject 20-72-11
		CCMA37S	Cory Components	Subject 20-72-10
		CCMA37S	Tri Star	Subject 20-72-10
		DCMAM37S	ITT Cannon	Subject 20-72-12
		M24308/2-4	QPL	Subject 20-72-13
DCMA8W8P	ITT Cannon	CCMA8W8P	Cory Components	Subject 20-72-10
		CCMA8W8P	Tri Star	Subject 20-72-10
DCMA8W8S	ITT Cannon	CCMA8W8S	Cory Components	Subject 20-72-10
		CCMA8W8S	Tri Star	Subject 20-72-10
DDMAF()	ITT Cannon	DDMAY()	ITT Cannon	Subject 20-72-12
DDMAMF()	ITT Cannon	DDMAMY()	ITT Cannon	Subject 20-72-12
DDMA24W7P	ITT Cannon	CDMA24W7P	Cory Components	Subject 20-72-10
		CDMA24W7P	Tri Star	Subject 20-72-10
DDMA24W7S	ITT Cannon	CDMA24W7S	Cory Components	Subject 20-72-10
		CDMA24W7S	Tri Star	Subject 20-72-10
DDMA36W4P	ITT Cannon	CDMA36W4P	Cory Components	Subject 20-72-10
		CDMA36W4P	Tri Star	Subject 20-72-10
DDMA36W4S	ITT Cannon	CDMA36W4S	Cory Components	Subject 20-72-10
		CDMA36W4S	Tri Star	Subject 20-72-10
DDMA50P	ITT Cannon	17-20500-1	WPI	Subject 20-72-11
		17-309-1	WPI	Subject 20-72-11
		CDMA50P	Cory Components	Subject 20-72-10
		CDMA50P	Tri Star	Subject 20-72-10
		DDMAM50P	ITT Cannon	Subject 20-72-12
		M24308/4-5	QPL	Subject 20-72-13
DDMA50S	ITT Cannon	17-10500-1	WPI	Subject 20-72-11
		17-308-1	WPI	Subject 20-72-11
		CDMA50S	Cory Components	Subject 20-72-10
		CDMA50S	Tri Star	Subject 20-72-10
		DDMAM50S	ITT Cannon	Subject 20-72-12
		M24308/2-5	QPL	Subject 20-72-13

# 20-72-12

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 2 (continued)

Specified Connector		Alternative Connector		
Part Number	Supplier	Part Number	Supplier	Assembly Procedure
DDMA78P	ITT Cannon	CDMA78P	Cory Components	Subject 20-72-10
		CDMA78P	Tri Star	Subject 20-72-10
		DDMAM78P	ITT Cannon	Subject 20-72-12
		M24308/4-15	QPL	Subject 20-72-13
DDMA78S	ITT Cannon	CDMA78S	Cory Components	Subject 20-72-10
		CDMA78S	Tri Star	Subject 20-72-10
		DDMAM78S	ITT Cannon	Subject 20-72-12
		M24308/2-15	QPL	Subject 20-72-13
DEMA9P	ITT Cannon	17-20090-1	WPI	Subject 20-72-11
		17-301-1	WPI	Subject 20-72-11
		CEMA9P	Cory Components	Subject 20-72-10
		CEMA9P	Tri Star	Subject 20-72-10
		DEMAM9P	ITT Cannon	Subject 20-72-12
		M24308/4-1	QPL	Subject 20-72-13
DEMA9S	ITT Cannon	17-10090-1	WPI	Subject 20-72-11
		17-300-1	WPI	Subject 20-72-11
		CEMA9S	Cory Components	Subject 20-72-10
		CEMA9S	Tri Star	Subject 20-72-10
		DEMAM9S	ITT Cannon	Subject 20-72-12
		M24308/2-1	QPL	Subject 20-72-13

#### B. Connector Description

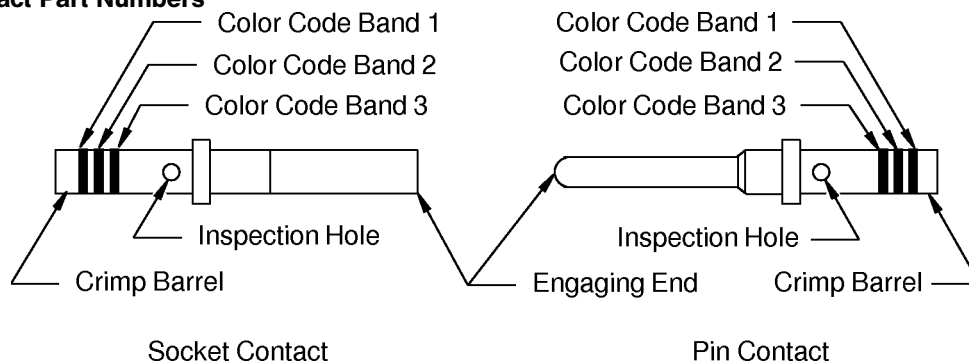
The D()MA() rectangular connectors have these properties:

- D subminiature rectangular configuration
- Metal shells
- Crimp type, rear release pin contacts in the plug
- Crimp type, rear release socket contacts in the receptacle
- Rear release coax pin contacts in the plug
- Rear release coax socket contacts in the receptacle.

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

### C. Contact Part Numbers



### STANDARD REAR RELEASE CONTACTS

Figure 5

Table 3

### STANDARD CONTACT PART NUMBERS

Contact Size	Contact Engaging End Size	Contact Crimp Barrel Size	Contact Type	Part Number	Supplier
22D	22	22	Pin	030-2042-000	ITT Cannon
				030-2042-002	ITT Cannon
				M39029/58-360	QPL
			Socket	031-1147-000	ITT Cannon
				031-1147-002	ITT Cannon
				M39029/57-354	QPL
20	20	20	Pin	330-5291-000	ITT Cannon
				330-5291-037	ITT Cannon
				M39029/64-369	QPL
			Socket	031-1007-000	ITT Cannon
				031-1007-042	ITT Cannon
				M39029/63-368	QPL

Table 4

### STANDARD CONTACT COLOR CODES

Contact	Color Code		
	Band 1	Band 2	Band 3
030-2042-000	Orange	Blue	Black
030-2042-002	-	-	-
031-1007-000	-	-	-
031-1007-042	Orange	Blue	Gray

20-72-12

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 4 (continued)

Contact	Color Code		
	Band 1	Band 2	Band 3
031-1147-000	Orange	Green	Yellow
031-1147-002	-	-	-
330-5291-000	-	-	-
330-5291-037	Orange	Blue	White
M39029/57-354	Orange	Green	Yellow
M39029/58-360	Orange	Blue	Black
M39029/63-368	Orange	Blue	Gray
M39029/64-369	Orange	Blue	White

### D. Coax Contact Part Numbers

Table 5  
COAX CONTACT PART NUMBERS

Size	Type	Part Number	Supplier
08	Pin	DMA43717-6	ITT Cannon
		DMA43717-7	ITT Cannon
	Socket	DMA43716-6	ITT Cannon
		DMA43716-7	ITT Cannon

Table 6  
COAX CONTACTS FOR SPECIFIED COAX CABLES

Coax Cable	Coax Contact	
	Type	Part Number
5021K1011	Pin	DMA43717-7
	Socket	DMA43716-7
5024A1314	Pin	DMA43717-6
	Socket	DMA43716-6
RG-180	Pin	DMA43717-6
	Socket	DMA43716-6
RG-58	Pin	DMA43717-7
	Socket	DMA43716-7

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

### 3. INSERT CONFIGURATIONS

#### A. D()MA Series Connectors

**NOTE:** The contact cavity size that is specified in Table 7 is equivalent to the size of the engaging end of the contact.

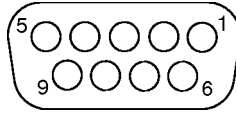
**NOTE:** Figure 6 through Figure 21 show the rear face of an insert that has pin contacts. The view of the rear face of an insert that has socket contacts is the mirror image of this view.

**Table 7**  
**CONNECTOR INSERT CONFIGURATIONS**

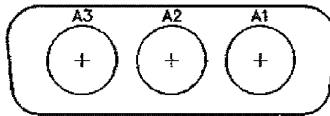
Shell Size	Insert Configuration	Contact Cavity		Contact Type	Reference
		Count	Size		
A	11W1	10	20	Standard	Figure 8
		1	8	Coax	
	15	15	20	Standard	Figure 9
	3W3	3	8	Coax	Figure 7
B	21W1	20	20	Standard	Figure 11
		1	8	Coax	
	25	25	20	Standard	Figure 12
	5W5	5	8	Coax	Figure 10
C	17W5	12	20	Standard	Figure 14
		5	8	Coax	
	21WA4	17	20	Standard	Figure 15
		4	8	Coax	
	25W3	22	20	Standard	Figure 16
		3	8	Coax	
	37	37	20	Standard	Figure 17
	8W8	8	8	Coax	Figure 13
D	24W7	17	20	Standard	Figure 18
		7	8	Coax	
	36W4	32	20	Standard	Figure 19
		4	8	Coax	
	50	50	20	Standard	Figure 20
	78	78	22D	Standard	Figure 21
E	9	9	20	Standard	Figure 6

# STANDARD WIRING PRACTICES MANUAL

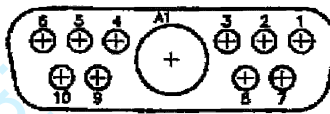
## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS



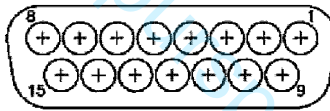
**9 INSERT CONFIGURATION**  
Figure 6



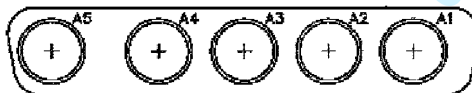
**3W3 INSERT CONFIGURATION**  
Figure 7



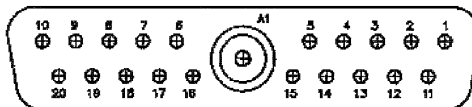
**11W1 INSERT CONFIGURATION**  
Figure 8



**15 INSERT CONFIGURATION**  
Figure 9



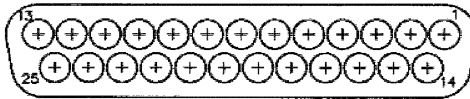
**5W5 INSERT CONFIGURATION**  
Figure 10



**21W1 INSERT CONFIGURATION**  
Figure 11

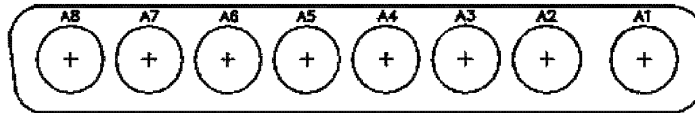
# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS



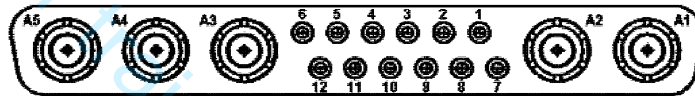
**25 INSERT CONFIGURATION**

**Figure 12**



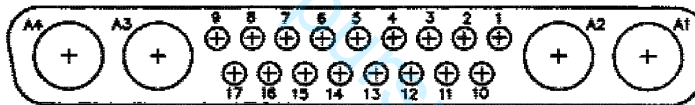
**8W8 INSERT CONFIGURATION**

**Figure 13**



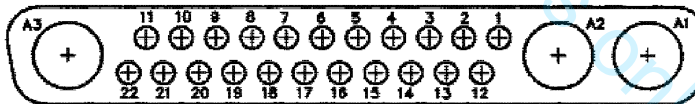
**17W5 INSERT CONFIGURATION**

**Figure 14**



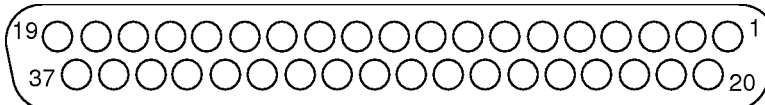
**21WA4 INSERT CONFIGURATION**

**Figure 15**



**25W3 INSERT CONFIGURATION**

**Figure 16**

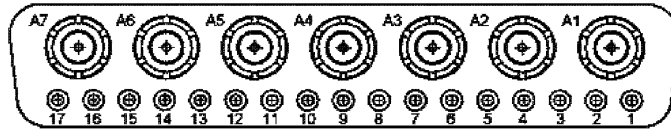


**37 INSERT CONFIGURATION**

**Figure 17**

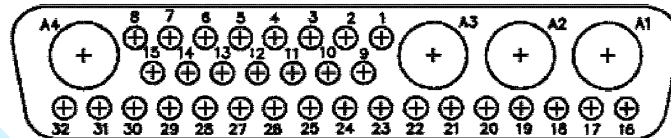
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS



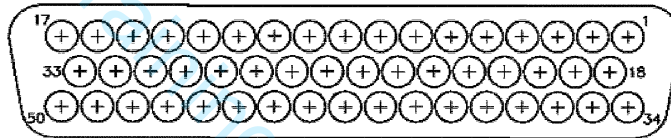
24W7 INSERT CONFIGURATION

Figure 18



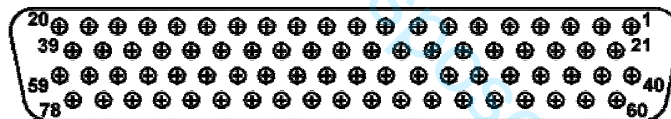
36W4 INSERT CONFIGURATION

Figure 19



50 INSERT CONFIGURATION

Figure 20



78 INSERT CONFIGURATION

Figure 21

#### 4. CONNECTOR DISASSEMBLY

##### A. Contact Removal

This paragraph gives the procedure to remove standard contacts. For the procedure to remove coax contacts, refer to Paragraph 4.B.

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

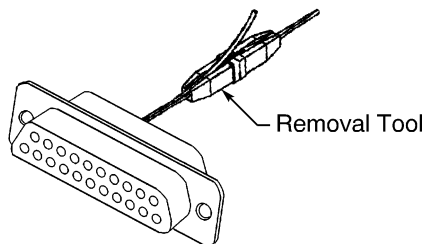
Table 8  
CONTACT REMOVAL TOOLS

Contact Size	Removal Tool	
	Part Number	Color
22D	CIET-22D	White
	CIET-22MKJ	White
	DRK95-22M	-
	M81969/1-04	-
	M81969/14-01	-
	M24308/18-1	-
	MS27534-22D	-
20	6500-043-020-628	-
	6500-045-020	-
	CET 20-11	-
	CIET-20HD	-
	M24308/18-2	-
	M81969/1-02	-
	M81969/14-02	-
	MS18278-1	-
	MS27534-20	-
	NAS1664-20	-

**NOTE:** The backshell must be removed from the connector before the contacts can be removed.

- (1) Make a selection of a contact removal tool from Table 8.
- (2) Put the tip of the tool on the wire.
- (3) At the rear of the connector, axially align the tool and the contact cavity at the rear of the connector.
- (4) Carefully push the tool into the contact cavity until it stops. Refer to Figure 22.

Make sure that the tool stays aligned with the contact cavity.



POSITION OF THE REMOVAL TOOL IN THE CONTACT CAVITY  
Figure 22

# 20-72-12

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

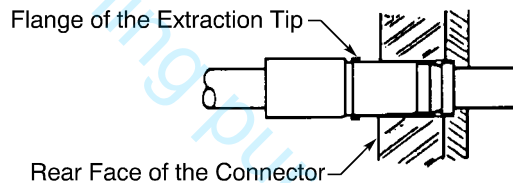
**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (5) Hold the wire against the tool.
- (6) Pull the tool and the wire out from the contact cavity at the same time.  
Make sure that the tool stays aligned with the contact cavity.
- (7) If the contact is not released:
  - (a) Carefully remove the tool.
  - (b) Turn the tool approximately 90 degrees.
  - (c) Do Step (2) through Step (6) again.

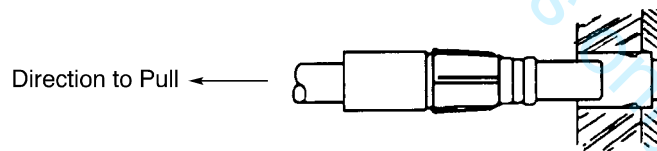
#### B. Coax Contact Removal

- (1) Push the flange of the extraction tip of the contact to the rear face of the connector. Refer to Figure 23.



**COAX CONTACT EXTRACTION TIP**  
Figure 23

- (2) Carefully pull the coax contact assembly from the connector. Refer to Figure 24.



**COAX CONTACT REMOVAL**  
Figure 24

## 5. CONNECTOR ASSEMBLY

### A. Contact Assembly

This paragraph gives the procedure to assemble standard contacts with stranded wire. For the procedure to assemble:

- Standard contacts with solid conductor wire, refer to Paragraph 5.B.
- Coax contacts, refer to Paragraph 5.C.

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 9  
INSULATION REMOVAL LENGTH

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)		Special Instructions
		Target	Tolerance	
26	22	0.32	±0.01	Fold back the conductor
	20	0.40	±0.01	Fold back the conductor
24	22	0.16	±0.01	-
	20	0.20	±0.01	-
22	22	0.16	±0.01	-
	20	0.20	±0.01	-
20	20	0.20	±0.01	-

Table 10  
CONTACT CRIMP TOOLS FOR STRANDED WIRE

Contact Size	Contact Type	Wire Size (AWG)	Crimp Tool				
			Basic Unit			Locator	
			Part Number	Setting	Die Closure (inch)		
					Min		Max
22D	Socket	26	612118	-	-	-	612521
			M22520/2-01	2	-	-	M22520/2-06
			WA22	2	-	-	M22520/2-06
			WA22LC	2	-	-	M22520/2-06
		24	612118	-	-	-	612521
			M22520/2-01	3	-	-	M22520/2-06
			WA22	3	-	-	M22520/2-06
			WA22LC	3	-	-	M22520/2-06
		22	612118	-	-	-	612521
			M22520/2-01	4	-	-	M22520/2-06
			WA22	4	-	-	M22520/2-06
			WA22LC	4	-	-	M22520/2-06

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 10 (continued)

Contact Size	Contact Type	Wire Size (AWG)	Crimp Tool				
			Basic Unit			Locator	
			Part Number	Setting	Die Closure (inch)		
					Min		Max
22D	Pin	26	612118	-	-	-	612521
			M22520/2-01	2	-	-	M22520/2-09
			WA22	2	-	-	M22520/2-09
			WA22LC	2	-	-	M22520/2-09
		24	612118	-	-	-	612521
			M22520/2-01	3	-	-	M22520/2-09
			WA22	3	-	-	M22520/2-09
			WA22LC	3	-	-	M22520/2-09
		22	612118	-	-	-	612521
			M22520/2-01	4	-	-	M22520/2-09
			WA22	4	-	-	M22520/2-09
			WA22LC	4	-	-	M22520/2-09
20	Pin or Socket	26	612118	-	0.024	0.026	612513
			AFM8	6	-	-	K13-1
							M22520/2-08
			M22520/2-01	6	-	-	K13-1
							M22520/2-08
			WA22	6	-	-	K13-1
							M22520/2-08
			WA22LC	6	-	-	K13-1
							M22520/2-08

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 10 (continued)

Contact Size	Contact Type	Wire Size (AWG)	Crimp Tool				
			Basic Unit				Locator
			Part Number	Setting	Die Closure (inch)		
					Min	Max	
20	Pin or Socket	24	612118	-	0.024	0.026	612513
			AFM8	5	-	-	K13-1
							M22520/2-08
			M22520/2-01	5	-	-	K13-1
							M22520/2-08
			MS3191-1	-	-	-	P20-3191-1
			ST2220-1	-	-	-	P20-3191-1
							ST2220-1-43
			ST2220-1-Y	-	-	-	11697-1
							P20-3191-1
							ST2220-1-43
			WA22	5	-	-	K13-1
							M22520/2-08
			WA22AP	5	-	-	KAP13-1
			WA22LC	5	-	-	K13-1
							M22520/2-08

# 20-72-12

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 10 (continued)

Contact Size	Contact Type	Wire Size (AWG)	Crimp Tool				
			Basic Unit				Locator
			Part Number	Setting	Die Closure (inch)		
					Min	Max	
20	Pin or Socket	22	612118	-	0.024	0.026	612513
			AFM8	6	-	-	K13-1
							M22520/2-08
			M22520/2-01	6	-	-	K13-1
							M22520/2-08
			MS3191-1	-	-	-	P20-3191-1
			ST2220-1	-	-	-	P20-3191-1
							ST2220-1-43
			ST2220-1-Y	-	-	-	11697-1
							P20-3191-1
							ST2220-1-43
			WA22	6	-	-	K13-1
							M22520/2-08
			WA22AP	6	-	-	KAP13-1
			WA22LC	6	-	-	K13-1
							M22520/2-08

20-72-12

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

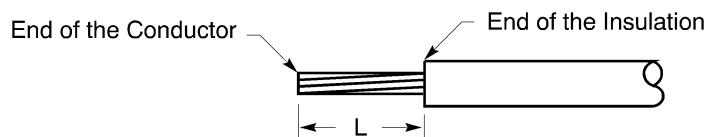
Table 10 (continued)

Contact Size	Contact Type	Wire Size (AWG)	Crimp Tool				
			Basic Unit				Locator
			Part Number	Setting	Die Closure (inch)		
					Min	Max	
20	Pin or Socket	20	612118	-	0.029	0.031	612513
			AFM8	7	-	-	K13-1
							M22520/2-08
			M22520/2-01	7	-	-	K13-1
							M22520/2-08
			MS3191-1	-	-	-	P20-3191-1
			ST2220-1	-	-	-	P20-3191-1
							ST2220-1-43
			ST2220-1-Y	-	-	-	11697-1
							P20-3191-1
							ST2220-1-43
			WA22	7	-	-	K13-1
							M22520/2-08
			WA22AP	7	-	-	KAP13-1
			WA22LC	7	-	-	K13-1
							M22520/2-08

(1) Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 25
- Table 9 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedures.



**WIRE PREPARATION**  
Figure 25

(2) If it is specified, fold the conductor back on itself.

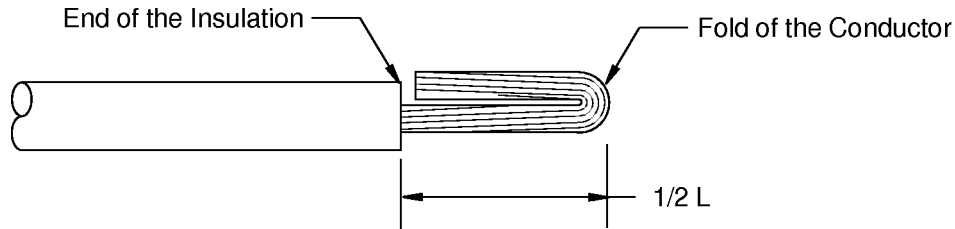
# 20-72-12

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Refer to:

- Table 9
- Figure 26.



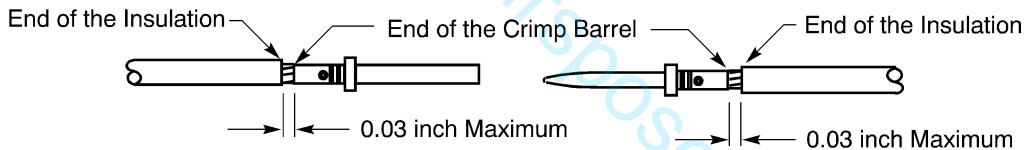
**FOLDED BACK CONDUCTOR**

**Figure 26**

- (3) Make a selection of a crimp tool from Table 10.
- (4) Push the conductor into the crimp barrel of the contact until the end of the conductor is against the end of the crimp barrel. Refer to Figure 27.

Make sure that:

- All 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 WIRE IN THE CRIMP BARREL OF THE CONTACT**

**Figure 27**

- (5) Crimp the contact.

Make sure that:

- All 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.

#### B. Assembly of a Contact with Solid Conductor Wire

This paragraph gives the procedure to assemble contacts with solid conductor wire and stranded filler wire.

NOTE: Only stranded wire can be used for the filler wire.

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

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

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)	
		Target	Tolerance
26	22	0.16	± 0.02
	20	0.20	± 0.02
24	22	0.16	± 0.02
	20	0.20	± 0.02
22	22	0.16	± 0.02
	20	0.20	± 0.02
20	20	0.20	± 0.02

**Table 12**  
**CONTACT CRIMP TOOLS FOR SOLID CONDUCTOR WIRE**

Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
22D	Pin	30	24	AFM8	3	K41
						M22520/2-06
				M22520/2-01	3	K41
						M22520/2-06
				WA22	3	K41
						M22520/2-06
		28	24	WA22LC	3	K41
						M22520/2-06
				AFM8	3	K41
						M22520/2-06
				M22520/2-01	3	K41
						M22520/2-06
				WA22	3	K41
						M22520/2-06
				WA22LC	3	K41
						M22520/2-06

# 20-72-12

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 12 (continued)

Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
22D	Pin	26	24	AFM8	4	K41
						M22520/2-06
				M22520/2-01	4	K41
						M22520/2-06
				WA22	4	K41
						M22520/2-06
				WA22LC	4	K41
						M22520/2-06
		24	26	AFM8	4	K41
						M22520/2-06
				M22520/2-01	4	K41
						M22520/2-06
				WA22	4	K41
						M22520/2-06
				WA22LC	4	K41
						M22520/2-06

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 12 (continued)

Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
20	Pin or Socket	30	22	AFM8	6	K13-1
						M22520/2-08
				M22520/2-01	6	K13-1
						M22520/2-08
				WA22	6	K13-1
						M22520/2-08
		28	22	WA22LC	6	K13-1
						M22520/2-08
				AFM8	6	K13-1
						M22520/2-08
				M22520/2-01	6	K13-1
						M22520/2-08
				WA22	6	K13-1
						M22520/2-08
				WA22LC	6	K13-1
						M22520/2-08

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 12 (continued)

Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
20	Pin or Socket	26	22	AFM8	7	K13-1
						M22520/2-08
				M22520/2-01	7	K13-1
						M22520/2-08
				WA22	7	K13-1
						M22520/2-08
		24	22	WA22LC	7	K13-1
						M22520/2-08
				AFM8	7	K13-1
						M22520/2-08
				M22520/2-01	7	K13-1
						M22520/2-08
				WA22	7	K13-1
						M22520/2-08
				WA22LC	7	K13-1
						M22520/2-08

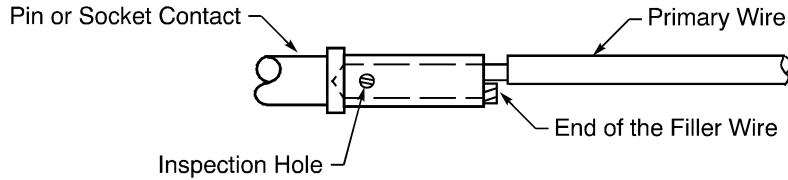
- (1) Make a selection of a crimp tool from Table 12.
- (2) Remove the necessary length of insulation from the end of the solid conductor wire.  
Refer to:
  - Table 11 for the insulation removal length
  - Subject 20-00-15 for the insulation removal procedures.
- (3) Remove 0.5 inch of insulation from the end of the specified filler wire.  
Refer to:
  - Table 12 for the size of the specified filler wire.
  - Subject 20-00-15 for the insulation removal procedures.
- (4) Put the end of the solid conductor wire and the filler wire in the crimp barrel of the contact.  
Make sure that:
  - All of the strands of the filler wire and the solid conductor are in the crimp barrel of the contact
  - The strands of the conductors are visible in the inspection hole of the contact
  - The distance between the end of the crimp barrel and the insulation of the primary solid conductor wire is a maximum of 0.03 inch.
- (5) Crimp the contact.

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

- (6) Carefully remove the unwanted length of the strands of the filler wire as close as possible to the end of the crimp barrel. Refer to Figure 28.



**REMOVAL OF THE UNWANTED LENGTH OF THE FILLER WIRE**  
Figure 28

**CAUTION:** DO NOT CAUSE DAMAGE TO THE CONDUCTOR OF THE PRIMARY WIRE. DAMAGE TO THE CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE WIRE.

#### C. Coax Contact Assembly

**Table 13**  
**COAX CONTACT FERRULE CRIMP TOOLS**

Basic Unit	Locator	
	Part Number	Cavity
CCT-DM	Y322	A
HX4	Y322	A

**Table 14**  
**NECESSARY MATERIALS**

Material	Part Number	Supplier
Heat Shrinkable Sleeve	RW-175	Raychem

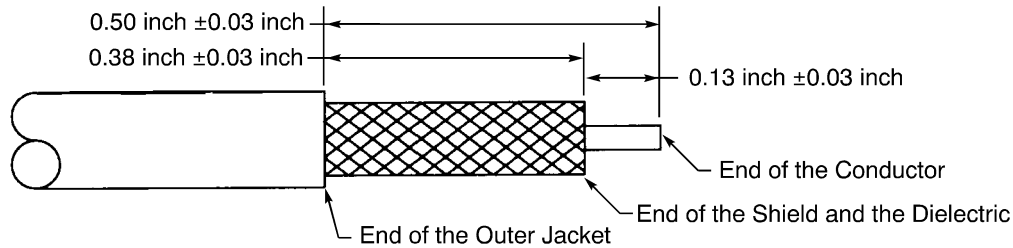
- (1) Make a selection of a ferrule crimp tool from Table 13.
- (2) Make a selection of a heat shrinkable sleeve from Table 14.
- (3) In this sequence, put these components on the cable:
  - The extraction tip
  - A 1.5 inch length of heat shrinkable sleeve
  - The ferrule
  - A 0.75 inch length of heat shrinkable sleeve
  - A 0.75 inch length of heat shrinkable sleeve.

Make sure that each sleeve that has the smallest diameter that can be moved easily on the cable.

- (4) Prepare the cable. Refer to Figure 29.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS



#### COAX CABLE PREPARATION

Figure 29

- (a) Remove 0.50 inch  $\pm 0.03$  inch of the outer jacket from the end of the cable.
 

**CAUTION:** DO NOT CUT OR MAKE A NICK IN THE SHIELD. DAMAGE TO THE SHIELD CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.
- (b) Remove the necessary length of the shield to make the distance from the end of the outer jacket to the end of the shield to equal to 0.38 inch  $\pm 0.03$  inch.
- (c) Remove the necessary length of the dielectric to make the distance from the end of the to outer jacket to the end of the dielectric equal to 0.38 inch  $\pm 0.03$  inch.
 

**CAUTION:** DO NOT CUT OR MAKE A NICK IN THE CENTER CONDUCTOR. DAMAGE TO THE CENTER CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.
- (d) Remove the necessary length of the conductor to make the distance from the end of the dielectric to the end of the conductor equal to 0.13 inch  $\pm 0.03$  inch.
- (5) Align the forward edge of the first 0.75 inch length of heat shrinkable sleeve with the end of the outer jacket.
- (6) Shrink the sleeve into its position. Refer to Subject 20-10-14.
- (7) Align the forward edge of the second 0.75 inch length of heat shrinkable sleeve with the end of the outer jacket.
- (8) Shrink the sleeve into its position. Refer to Subject 20-10-14.
- (9) Tin these components:
  - The center conductor
  - The solder cup of the contact.
- (10) Open the end of the shield.
 

Make sure that the strands of the shield are not moved apart.
- (11) Push the contact body on the end of the cable until the dielectric is against the end of the solder cup.
 

Make sure that:

  - The crimp barrel of the contact is between the dielectric and the shield
  - The center conductor is in the solder cup.
- (12) Solder the conductor to the solder cup.
- (13) Align the forward end of the ferrule with the shoulder of the contact body.
 

Make sure that the strands of the shield are symmetrical around the circumference of the contact body.
- (14) Crimp the ferrule.

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

- (15) Remove the unwanted shield strands that extend farther than the forward end of the ferrule.
- (16) Align the forward end of the 1.5 inch length of sleeve with the shoulder of the contact body.
- (17) Shrink the sleeve into its position. Refer to Subject 20-10-14.
- (18) Push the extraction tip forward on the contact body until the flange of the extraction tip is against the shoulder of the contact body.

#### D. Contact Insertion

This paragraph gives the procedure to insert standard contacts. For the procedure to insert coax contacts, refer to Paragraph 5.E.

**NOTE:** If a backshell is specified, the necessary backshell components must be installed on the wire harness before the insertion of the contacts into the connector. Refer to Paragraph 5.G.

**Table 15**  
**CONTACT INSERTION TOOLS**

Contact Size	Insertion Tool	
	Part Number	Color
22D	CIET-22D	Green
	CIET-22MKJ	Green
	DAK95-22M	-
	M81969/1-04	-
	M81969/14-01	-
	M24308/18-1	-
	MS27534-22D	-
20	6500-043-020-628	-
	6500-045-020	-
	CET 20-11	Red
	CIET-20HD	Red
	M24308/18-2	-
	M81969/1-02	-
	M81969/14-02	-
	MS18278-1	-
	MS27534-20	-
	NAS1664-20	-

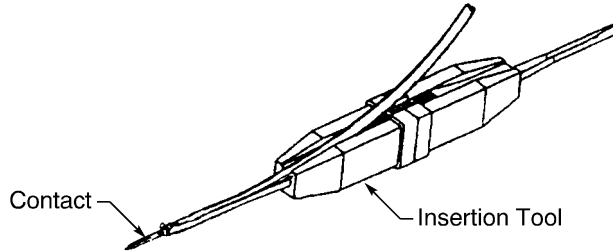
- (1) Make a selection of an insertion tool from Table 15.

**NOTE:** Contacts can be inserted by hand.

- (2) Put the contact assembly in the insertion tool. Refer to Figure 30.

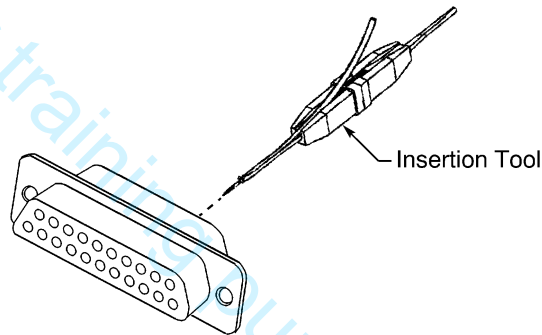
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**  
**Figure 30**

- (3) At the rear of the connector, axially align the contact assembly, the insertion tool, and the contact cavity. Refer to Figure 31.



**ALIGNMENT OF THE CONTACT ASSEMBLY, THE INSERTION TOOL, AND THE CONTACT CAVITY**  
**Figure 31**

- (4) Push the tool into the contact cavity until it stops.  
Make sure that the tool stays aligned with the contact cavity.

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (5) Carefully pull the tool out of the contact cavity.  
(6) 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 OF THE WIRE.

- (7) If the contact is not locked in the contact cavity:  
(a) Pull the contact assembly out of the contact cavity.

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**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS**

- (b) Do Step (1) through Step (6) again.

**E. Coax Contact Insertion**

**NOTE:** If a backshell is specified, the necessary backshell components must be installed on the wire harness before the insertion of the contacts into the connector. Refer to Paragraph 5.G.

- (1) Axially align the coax contact assembly and the contact cavity at the rear of the connector.

**NOTE:** A tool is not necessary for the insertion of a coax contact assembly.

- (2) Carefully push the coax contact assembly into the contact cavity until it stops.

**NOTE:** The retention clip in the connector engages with the shoulder of the contact when the contact is fully inserted.

- (3) 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 OF THE WIRE.

- (4) If the contact is not locked in the contact cavity:

- (a) Pull the contact assembly out of the contact cavity.  
(b) Do Step (1) through Step (3) again.

**F. Seal of an Empty Contact Cavity**

The seal of an empty contact cavity is not necessary.

**G. Backshell Assembly**

- (1) If a backshell is specified, assemble the backshell. Refer to Subject 20-72-08.

**H. Connector Installation Hardware Assembly**

- (1) If a backshell is not specified, assemble the connector installation hardware. Refer to Subject 20-72-07.

**NOTE:** If a backshell is specified, the connector installation hardware is assembled when the backshell is assembled. Refer to Paragraph 5.G.

**6. CONNECTOR INSTALLATION****A. Connector Installation in a Panel**

For the installation of a connector:

- With a backshell, installation in a panel occurs when the backshell is assembled. Refer to Paragraph 5.G.
- Without a backshell, the installation in a panel occurs when the connector installation hardware is assembled. Refer to Paragraph 5.H.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

#### B. Connection of the Plug and the Receptacle

**Table 16**  
**NECESSARY TOOLS**

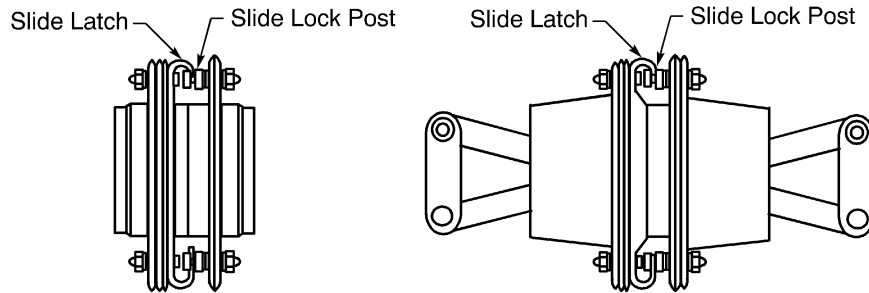
Tool	Type
Screwdriver	Flat tip

- (1) For connectors with jackscrew and jackpost installation hardware:
  - (a) Make a selection of a tool from Table 16.
  - (b) Align the engaging face of the plug with the engaging face of the receptacle.
  - (c) Push the plug into the receptacle.  
Make sure that connectors are fully engaged.
  - (d) Put each jackscrew in the applicable jackpost.
  - (e) Turn one jackscrew clockwise two or three turns.
  - (f) Turn the other jackscrew clockwise two or three turns.
  - (g) Do Step (e) and Step (f) again until the jackscrews are fully engaged.
  - (h) Tighten each jackscrew.
- (2) For connectors with male and female screw lock installation hardware:
  - (a) Make a selection of a tool from Table 16.
  - (b) Align the engaging face of the plug with the engaging face of the receptacle.
  - (c) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (d) Put each screw in the applicable female screw lock.
  - (e) Turn one screw clockwise two or three turns.
  - (f) Turn the other screw clockwise two or three turns.
  - (g) Do Step (e) and Step (f) again until the screws are fully engaged.
  - (h) Tighten each jackscrew.
- (3) For connectors with spring plate and spring latch plate installation hardware:
  - (a) Align the engaging face of the plug with the engaging face of the receptacle.
  - (b) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (c) Engage each spring with the applicable spring latch plate.
- (4) For connectors with slide latch and slide lock post installation hardware:
  - (a) Align the engaging face of the plug with the engaging face of the receptacle.  
Make sure that the slide latch is retracted to the open position.
  - (b) Push the plug into the receptacle.  
Make sure that the connectors are fully engaged.
  - (c) Engage the slot in the slide latch with the slide lock posts.
  - (d) Push the slide latch to the closed position. Refer to Figure 32.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Make sure the connectors are locked together.



CONNECTION OF THE PLUG AND THE RECEPTACLE - SLIDE LATCH HARDWARE  
Figure 32

## 7. APPROVED TOOL SUPPLIERS

### A. Contact Insertion Tools

Table 17  
CONTACT INSERTION TOOL SUPPLIERS

Insertion Tool	Supplier
6500-043-020-628	Daniels
6500-045-020	Daniels
CET 20-11	ITT Cannon
CIET-20HD	ITT Cannon
CIET-22D	ITT Cannon
CIET-22MKJ	ITT Cannon
DAK95-22M	Daniels
M24308/18-1	QPL
M24308/18-2	QPL
M81969/1-02	QPL
M81969/1-04	QPL
M81969/14-01	QPL
M81969/14-02	QPL
MS18278-1	QPL
MS27534-20	QPL
MS27534-22D	QPL
NAS1664-20	QPL

**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS****B. Contact Removal Tools**

**Table 18**  
**CONTACT REMOVAL TOOL SUPPLIERS**

<b>Removal Tool</b>	<b>Supplier</b>
6500-043-020-628	Daniels
6500-045-020	Daniels
CET 20-11	ITT Cannon
CIET-20HD	ITT Cannon
CIET-22D	ITT Cannon
CIET-22MKJ	ITT Cannon
DRK95-22M	Daniels
M24308/18-1	QPL
M24308/18-2	QPL
M81969/1-02	QPL
M81969/1-04	QPL
M81969/14-01	QPL
M81969/14-02	QPL
MS18278-1	QPL
MS27534-20	QPL
MS27534-22D	QPL
NAS1664-20	QPL

**C. Contact Crimp Tools**

**Table 19**  
**CONTACT CRIMP TOOL SUPPLIERS**

<b>Crimp Tool</b>	<b>Supplier</b>
612118	Buchanan
612521	Buchanan
CCT-DM	ITT Cannon
HX4	Daniels
M22520/2-01	QPL
M22520/2-06	QPL
MS3191-1	QPL
P20-3191-1	ITT Cannon
ST2220-1	Boeing

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: ITT CANNON D()MA CONNECTORS

Table 19 (continued)

Crimp Tool	Supplier
ST2220-1-43	Boeing
ST2220-1-Y	Boeing
Y322	Daniels

For training purposes only!

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### D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

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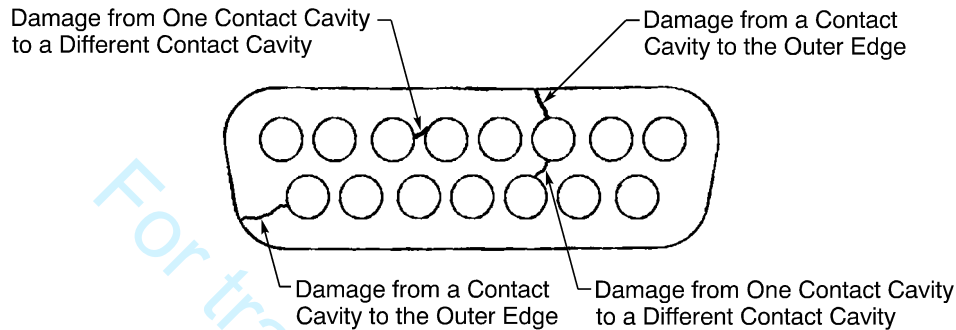
### D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Insert

It is necessary to replace the connector if one or more of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity; refer to Figure 1
- The damage extends from one contact cavity to the outer edge of the insert; refer to Figure 1.



**REAR FACE OF THE INSERT - LENGTH OF DAMAGE**

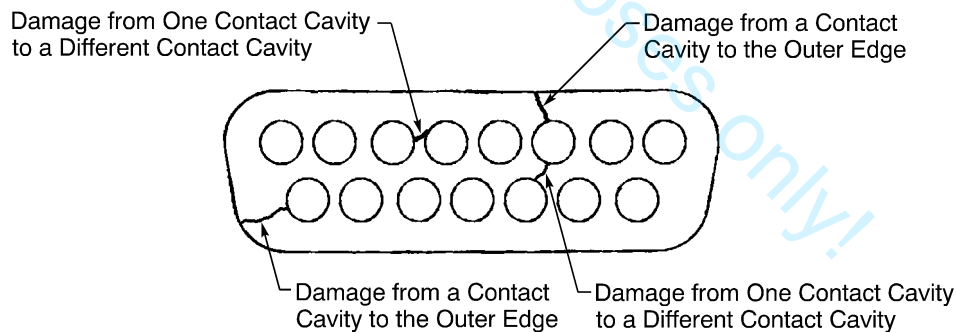
**Figure 1**

##### B. Damage Conditions - Front Face of the Insert

It is necessary to replace the connector if one of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 2.



**FRONT FACE OF THE INSERT - LENGTH OF DAMAGE**

**Figure 2**

# STANDARD WIRING PRACTICES MANUAL

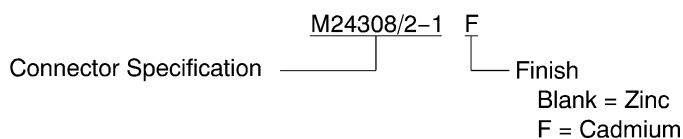
## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

### 2. PART NUMBERS AND DESCRIPTIONS

#### A. Connector Part Numbers

Table 1  
CONNECTOR PART NUMBERS

Part Number	Type	Shell Size	Insert Configuration	Contact Type	Supplier
M24308/2-1	Receptacle	1	A-1-1	Socket	QPL
M24308/2-2	Receptacle	2	A-2-1	Socket	QPL
M24308/2-3	Receptacle	3	A-3-1	Socket	QPL
M24308/2-4	Receptacle	4	A-4-1	Socket	QPL
M24308/2-5	Receptacle	5	A-5-1	Socket	QPL
M24308/2-11	Receptacle	1	A-1-2	Socket	QPL
M24308/2-12	Receptacle	2	A-2-2	Socket	QPL
M24308/2-13	Receptacle	3	A-3-2	Socket	QPL
M24308/2-14	Receptacle	4	A-4-2	Socket	QPL
M24308/2-15	Receptacle	5	A-5-2	Socket	QPL
M24308/2-281	Receptacle	1	A-1-1	Socket	QPL
M24308/2-282	Receptacle	2	A-2-1	Socket	QPL
M24308/2-288	Receptacle	3	A-3-2	Socket	QPL
M24308/2-32	Receptacle	5	A-5-2	Socket	QPL
M24308/4-1	Plug	1	A-1-1	Pin	QPL
M24308/4-2	Plug	2	A-2-1	Pin	QPL
M24308/4-3	Plug	3	A-3-1	Pin	QPL
M24308/4-4	Plug	4	A-4-1	Pin	QPL
M24308/4-5	Plug	5	A-5-1	Pin	QPL
M24308/4-11	Plug	1	A-1-2	Pin	QPL
M24308/4-12	Plug	2	A-2-2	Pin	QPL
M24308/4-14	Plug	4	A-4-2	Pin	QPL
M24308/4-15	Plug	5	A-5-2	Pin	QPL



M24308/( ) CONNECTOR PART NUMBER STRUCTURE  
Figure 3

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 2  
ALTERNATIVE CONNECTOR PART NUMBERS

Part Number	Alternative Connector		
	Part Number	Supplier	Applicable Subject
M24308/2-1	17-10090-1	Amphenol	Subject 20-72-11
	17-10090-1	WPI	Subject 20-72-11
	17-300-1	Amphenol	Subject 20-72-11
	17-300-1	WPI	Subject 20-72-11
	CEMA9S	Cory Components	Subject 20-72-10
	CEMA9S	Tri-Star	Subject 20-72-10
	DEMA9S	ITT Cannon	Subject 20-72-12
	DEMAM9S	ITT Cannon	Subject 20-72-12
M24308/2-12	CAMA26S	Tri-Star	Subject 20-72-10
M24308/2-15	CDMA78S	Cory Components	Subject 20-72-10
	CDMA78S	Tri-Star	Subject 20-72-10
	DDMA78S	ITT Cannon	Subject 20-72-12
	DDMAM78S	ITT Cannon	Subject 20-72-12
M24308/2-2	17-10150-1	Amphenol	Subject 20-72-11
	17-10150-1	WPI	Subject 20-72-11
	17-302-1	Amphenol	Subject 20-72-11
	17-302-1	WPI	Subject 20-72-11
	CAMA15S	Cory Components	Subject 20-72-10
	CAMA15S	Tri-Star	Subject 20-72-10
	DAMA15S	ITT Cannon	Subject 20-72-12
	DAMAM15S	ITT Cannon	Subject 20-72-12
M24308/2-3	17-10250-1	Amphenol	Subject 20-72-11
	17-10250-1	WPI	Subject 20-72-11
	17-304-1	Amphenol	Subject 20-72-11
	17-304-1	WPI	Subject 20-72-11
	CBMA25S	Cory Components	Subject 20-72-10
	CBMA25S	Tri-Star	Subject 20-72-10
	DBMA25S	ITT Cannon	Subject 20-72-12
	DBMAM25S	ITT Cannon	Subject 20-72-12

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 2 (continued)

Part Number	Alternative Connector		
	Part Number	Supplier	Applicable Subject
M24308/2-4	17-10370-1	Amphenol	Subject 20-72-11
	17-10370-1	WPI	Subject 20-72-11
	17-306-1	Amphenol	Subject 20-72-11
	17-306-1	WPI	Subject 20-72-11
	CCMA37S	Cory Components	Subject 20-72-10
	CCMA37S	Tri-Star	Subject 20-72-10
	DCMA37S	ITT Cannon	Subject 20-72-12
	DCMAM37S	ITT Cannon	Subject 20-72-12
M24308/2-5	17-10500-1	Amphenol	Subject 20-72-11
	17-10500-1	WPI	Subject 20-72-11
	17-308-1	Amphenol	Subject 20-72-11
	17-308-1	WPI	Subject 20-72-11
	CDMA50S	Cory Components	Subject 20-72-10
	CDMA50S	Tri-Star	Subject 20-72-10
	DDMA50S	ITT Cannon	Subject 20-72-12
	DDMAM50S	ITT Cannon	Subject 20-72-12
M24308/2-281	M24308/2-1	QPL	Subject 20-72-13
M24308/2-282	M24308/2-2	QPL	Subject 20-72-13
M24308/2-288	M24308/2-13	QPL	Subject 20-72-13
M24308/4-1	17-20090-1	Amphenol	Subject 20-72-11
	17-20090-1	WPI	Subject 20-72-11
	17-301-1	Amphenol	Subject 20-72-11
	17-301-1	WPI	Subject 20-72-11
	CEMA9P	Cory Components	Subject 20-72-10
	CEMA9P	Tri-Star	Subject 20-72-10
	DEMA9P	ITT Cannon	Subject 20-72-12
	DEMAM9P	ITT Cannon	Subject 20-72-12
M24308/4-12	CAMA26P	Tri-Star	Subject 20-72-10
M24308/4-15	CDMA78P	Cory Components	Subject 20-72-10
	CDMA78P	Tri-Star	Subject 20-72-10
	DDMA78P	ITT Cannon	Subject 20-72-12
	DDMAM78P	ITT Cannon	Subject 20-72-12

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 2 (continued)

Part Number	Alternative Connector		
	Part Number	Supplier	Applicable Subject
M24308/4-2	17-20150-1	Amphenol	Subject 20-72-11
	17-20150-1	WPI	Subject 20-72-11
	17-303-1	Amphenol	Subject 20-72-11
	17-303-1	WPI	Subject 20-72-11
	CAMA15P	Cory Components	Subject 20-72-10
	CAMA15P	Tri-Star	Subject 20-72-10
	DAMA15P	ITT Cannon	Subject 20-72-12
	DAMAM15P	ITT Cannon	Subject 20-72-12
M24308/4-3	17-20250-1	Amphenol	Subject 20-72-11
	17-20250-1	WPI	Subject 20-72-11
	17-305-1	Amphenol	Subject 20-72-11
	17-305-1	WPI	Subject 20-72-11
	CBMA25P	Cory Components	Subject 20-72-10
	CBMA25P	Tri-Star	Subject 20-72-10
	DBMA25P	ITT Cannon	Subject 20-72-12
	DBMAM25P	ITT Cannon	Subject 20-72-12
M24308/4-4	17-20370-1	Amphenol	Subject 20-72-11
	17-20370-1	WPI	Subject 20-72-11
	17-307-1	Amphenol	Subject 20-72-11
	17-307-1	WPI	Subject 20-72-11
	CCMA37P	Cory Components	Subject 20-72-10
	CCMA37P	Tri-Star	Subject 20-72-10
	DCMA37P	ITT Cannon	Subject 20-72-12
	DCMAM37P	ITT Cannon	Subject 20-72-12
M24308/4-5	17-20500-1	Amphenol	Subject 20-72-11
	17-20500-1	WPI	Subject 20-72-11
	17-309-1	Amphenol	Subject 20-72-11
	17-309-1	WPI	Subject 20-72-11
	CDMA50P	Cory Components	Subject 20-72-10
	CDMA50P	Tri-Star	Subject 20-72-10
	DDMA50P	ITT Cannon	Subject 20-72-12
	DDMAM50P	ITT Cannon	Subject 20-72-12

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## STANDARD WIRING PRACTICES MANUAL

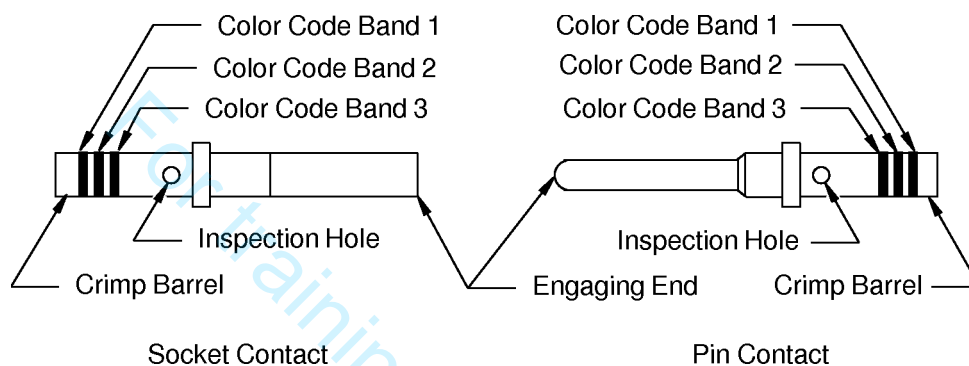
### D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

#### B. Connector Description

The M24308 series connectors have these properties:

- D subminiature rectangular configuration
- Metal shells
- Crimp type, rear release pin contacts in the plug
- Crimp type, rear release socket contacts in the receptacle

#### C. Contact Part Numbers



**STANDARD CONTACTS**

**Figure 4**

**Table 3**

**CONTACT PART NUMBERS**

Contact Size	Contact Engaging End Size	Contact Crimp Barrel Size	Contact Type	Part Number	Supplier
22D	22	22	Pin	M39029/58-360	QPL
			Socket	M39029/57-354	QPL
20	20	20	Pin	M39029/64-369	QPL
			Socket	M39029/63-368	QPL

**Table 4**

**CONTACT COLOR CODES**

Contact	Color Code		
	Band 1	Band 2	Band 3
M39029/57-354	Orange	Green	Yellow
M39029/58-360	Orange	Blue	Black
M39029/63-368	Orange	Blue	Gray
M39029/64-369	Orange	Blue	White

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

### 3. INSERT CONFIGURATIONS

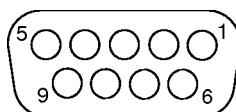
#### A. M24308 Series Connectors

**NOTE:** The contact cavity size that is specified in Table 5 is equivalent to the size of the engaging end of the contact.

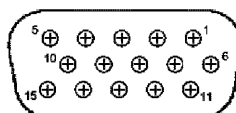
**NOTE:** Figure 5 through Figure 14 show the rear face of an insert that has pin contacts. The view of the rear face of an insert that has socket contacts is the mirror image of this view.

**Table 5**  
**CONNECTOR INSERT CONFIGURATIONS**

Insert Configuration	Contact Cavity		Reference
	Count	Size	
A-1-1	9	20	Figure 5
A-1-2	15	22D	Figure 6
A-2-1	15	20	Figure 7
A-2-2	26	22D	Figure 8
A-3-1	25	20	Figure 9
A-3-2	44	22D	Figure 10
A-4-1	37	20	Figure 11
A-4-2	62	22D	Figure 12
A-5-1	50	20	Figure 13
A-5-2	78	22D	Figure 14



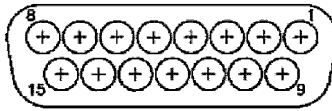
**A-1-1 INSERT CONFIGURATION**  
**Figure 5**



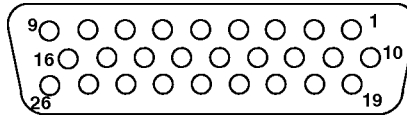
**A-1-2 INSERT CONFIGURATION**  
**Figure 6**

# STANDARD WIRING PRACTICES MANUAL

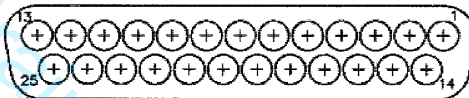
## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS



**A-2-1 INSERT CONFIGURATION**  
Figure 7



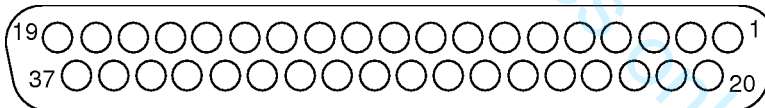
**A-2-2 INSERT CONFIGURATION**  
Figure 8



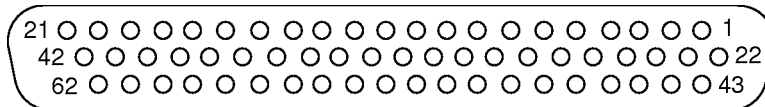
**A-3-1 INSERT CONFIGURATION**  
Figure 9



**A-3-2 INSERT CONFIGURATION**  
Figure 10



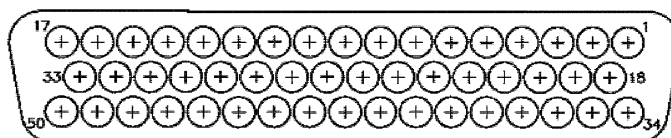
**A-4-1 INSERT CONFIGURATION**  
Figure 11



**A-4-2 INSERT CONFIGURATION**  
Figure 12

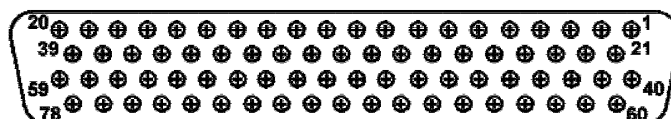
# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS



**A-5-1 INSERT CONFIGURATION**

**Figure 13**



**A-5-2 INSERT CONFIGURATION**

**Figure 14**

### 4. CONNECTOR DISASSEMBLY

#### A. Contact Removal

**Table 6**  
**CONTACT REMOVAL TOOLS**

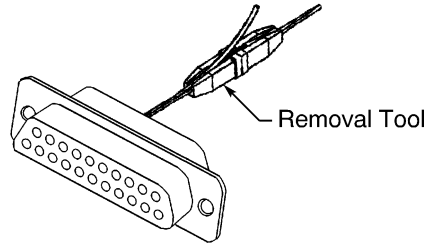
Contact Size	Removal Tool	
	Part Number	Color
22D	CIET-22D	White
	CIET-22MKJ	White
	DRK95-22M	-
	M81969/1-04	-
	M81969/14-01	-
	M24308/18-1	-
	MS27534-22D	-
20	6500-043-020-628	-
	6500-045-020	-
	CET 20-11	-
	CIET-20HD	-
	M24308/18-2	-
	M81969/1-02	-
	M81969/14-02	-
	MS18278-1	-
	MS27534-20	-
	NAS1664-20	-

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**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS**

**NOTE:** The backshell must be removed from the connector before the contacts can be removed.

- (1) Make a selection of a contact removal tool from Table 6.
  - (2) Put the tip of the tool on the wire.
  - (3) At the rear of the connector, axially align the tool and the contact cavity.
  - (4) Carefully push the tool into the contact cavity until it stops. Refer to Figure 15.
- Make sure that the tool stays aligned with the contact cavity.

**POSITION OF THE REMOVAL TOOL IN THE CONTACT CAVITY****Figure 15**

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (5) Hold the wire against the tool.
  - (6) Pull the tool and the wire out of the contact cavity at the same time.
- Make sure that the tool stays aligned with the contact cavity.
- (7) If the contact is not released:
    - (a) Carefully pull the tool out of the contact cavity.
    - (b) Turn the tool approximately 90 degrees.
    - (c) Do Step (2) through Step (6) again.

**5. CONNECTOR ASSEMBLY****A. Contact Assembly**

This paragraph gives the procedure to assemble standard contacts with stranded wire. For the procedure to assemble Standard contacts with solid conductor wire, refer to Paragraph 5.B.:

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 7  
INSULATION REMOVAL LENGTH

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)		Special Instructions
		Target	Tolerance	
26	22	0.32	± 0.01	Fold back the conductor
	20	0.40	± 0.02	Fold back the conductor
24	22	0.16	± 0.01	-
	20	0.20	± 0.01	-
22	22	0.16	± 0.01	-
	20	0.20	± 0.01	-
20	20	0.20	± 0.01	-

Table 8  
CONTACT CRIMP TOOLS FOR STRANDED WIRE

Contact		Wire Size (AWG)	Crimp Tool				
			Basic Unit			Locator	
Size	Type		Part Number	Setting	Die Closure (inch)		
					Min		Max
22D	Socket	26	612118	-	-	-	612521
			M22520/2-01	2	-	-	M22520/2-06
			WA22	2	-	-	M22520/2-06
			WA22LC	2	-	-	M22520/2-06
		24	612118	-	-	-	612521
			M22520/2-01	3	-	-	M22520/2-06
			WA22	3	-	-	M22520/2-06
			WA22LC	3	-	-	M22520/2-06
		22	612118	-	-	-	612521
			M22520/2-01	4	-	-	M22520/2-06
			WA22	4	-	-	M22520/2-06
			WA22LC	4	-	-	M22520/2-06

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 8 (continued)

Contact		Wire Size (AWG)	Crimp Tool				
			Basic Unit				Locator
Size	Type		Part Number	Setting	Die Closure (inch)		
					Min	Max	
22D	Pin	26	612118	-	-	-	
			M22520/2-01	2	-	-	M22520/2-09
			WA22	2	-	-	M22520/2-09
			WA22LC	2	-	-	M22520/2-09
		24	612118	-	-	-	612521
			M22520/2-01	3	-	-	M22520/2-09
			WA22	3	-	-	M22520/2-09
			WA22LC	3	-	-	M22520/2-09
		22	612118	-	-	-	612521
			M22520/2-01	4	-	-	M22520/2-09
			WA22	4	-	-	M22520/2-09
			WA22LC	4	-	-	M22520/2-09
20	Pin or Socket	26	612118	-	0.024	0.026	612513
			AFM8	6	-	-	K13-1
							M22520/2-08
			M22520/2-01	6	-	-	K13-1
							M22520/2-08
			WA22	6	-	-	K13-1
							M22520/2-08
			WA22LC	6	-	-	K13-1
							M22520/2-08

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 8 (continued)

Contact		Wire Size (AWG)	Crimp Tool				
			Basic Unit			Locator	
Size	Type		Part Number	Setting	Die Closure (inch)		
					Min		Max
20	Pin or Socket	24	612118	-	0.024	0.026	612513
			AFM8	5	-	-	K13-1
							M22520/2-08
			M22520/2-01	5	-	-	K13-1
							M22520/2-08
			MS3191-1	-	-	-	P20-3191-1
			ST2220-1	-	-	-	P20-3191-1
							ST2220-1-43
			ST2220-1-Y	-	-	-	11697-1
							P20-3191-1
							ST2220-1-43
			WA22	5	-	-	K13-1
M22520/2-08							
WA22AP	5	-	-	KAP13-1			
WA22LC	5	-	-	K13-1			
				M22520/2-08			

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 8 (continued)

Contact		Wire Size (AWG)	Crimp Tool				
			Basic Unit			Locator	
Size	Type		Part Number	Setting	Die Closure (inch)		
					Min		Max
20	Pin or Socket	22	612118	-	0.024	0.026	612513
			AFM8	6	-	-	K13-1
							M22520/2-08
			M22520/2-01	6	-	-	K13-1
							M22520/2-08
			MS3191-1	-	-	-	P20-3191-1
			ST2220-1	-	-	-	P20-3191-1
							ST2220-1-43
			ST2220-1-Y	-	-	-	11697-1
							P20-3191-1
							ST2220-1-43
			WA22	6	-	-	K13-1
							M22520/2-08
			WA22AP	6	-	-	KAP13-1
			WA22LC	6	-	-	K13-1
							M22520/2-08

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

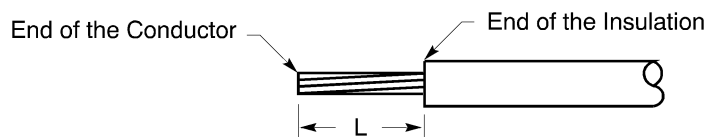
Table 8 (continued)

Contact		Wire Size (AWG)	Crimp Tool				
			Basic Unit			Locator	
Size	Type		Part Number	Setting	Die Closure (inch)		
					Min		Max
20	Pin or Socket	20	612118	-	0.029	0.031	612513
			AFM8	7	-	-	K13-1
							M22520/2-08
			M22520/2-01	7	-	-	K13-1
							M22520/2-08
			MS3191-1	-	-	-	P20-3191-1
			ST2220-1	-	-	-	P20-3191-1
							ST2220-1-43
			ST2220-1-Y	-	-	-	11697-1
							P20-3191-1
							ST2220-1-43
			WA22	7	-	-	K13-1
							M22520/2-08
			WA22AP	7	-	-	KAP13-1
			WA22LC	7	-	-	K13-1
							M22520/2-08

(1) Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 16
- Table 7 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedures.



**WIRE PREPARATION**  
Figure 16

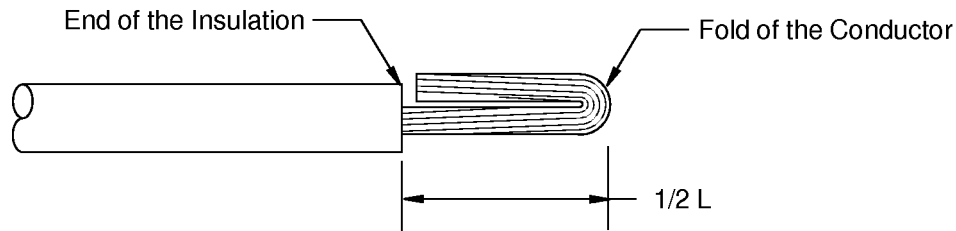
(2) If it is necessary, fold the conductor back on itself.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Refer to:

- Table 7
- Figure 17.



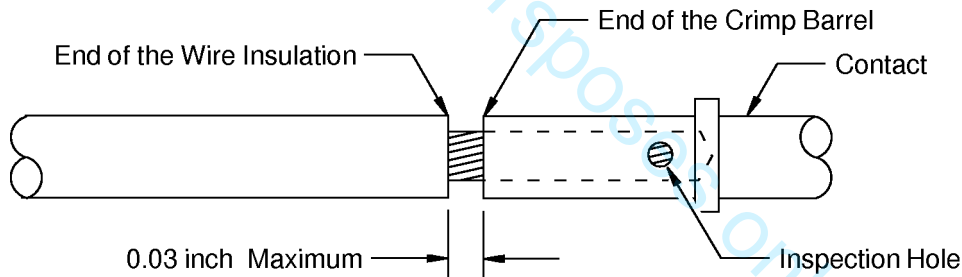
**FOLDED BACK CONDUCTOR**

**Figure 17**

- (3) Make a selection of a crimp tool from Table 8.
- (4) Push the conductor into the crimp barrel of the contact until the end of the conductor is against the end of the crimp barrel. Refer to Figure 18.

Make sure that:

- All 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 WIRE IN THE CRIMP BARREL OF THE CONTACT**

**Figure 18**

- (5) Crimp the contact.

Make sure that:

- All 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.

#### B. Assembly of a Contact with Solid Conductor Wire

This paragraph gives the procedure to assemble contacts with solid conductor wire and stranded filler wire.

NOTE: Only stranded wire can be used for the filler wire.

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# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 9  
INSULATION REMOVAL LENGTH

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)	
		Target	Tolerance
26	22	0.16	± 0.02
	20	0.20	± 0.02
24	22	0.16	± 0.02
	20	0.20	± 0.02
22	22	0.16	± 0.02
	20	0.20	± 0.02
20	20	0.20	± 0.02

Table 10  
CONTACT CRIMP TOOLS FOR SOLID CONDUCTOR WIRE

Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
22D	Pin	30	24	AFM8	3	K41
						M22520/2-06
				M22520/2-01	3	K41
						M22520/2-06
				WA22	3	K41
						M22520/2-06
		28	24	WA22LC	3	K41
						M22520/2-06
				AFM8	3	K41
						M22520/2-06
				M22520/2-01	3	K41
						M22520/2-06
				WA22	3	K41
						M22520/2-06
				WA22LC	3	K41
						M22520/2-06

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**STANDARD WIRING PRACTICES MANUAL**
**D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS**
**Table 10 (continued)**

Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
22D	Pin	26	24	AFM8	4	K41
						M22520/2-06
				M22520/2-01	4	K41
						M22520/2-06
				WA22	4	K41
						M22520/2-06
				WA22LC	4	K41
						M22520/2-06
		24	26	AFM8	4	K41
						M22520/2-06
				M22520/2-01	4	K41
						M22520/2-06
				WA22	4	K41
						M22520/2-06
				WA22LC	4	K41
						M22520/2-06

**STANDARD WIRING PRACTICES MANUAL**
**D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS**
**Table 10 (continued)**

Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
20	Pin or Socket	30	22	AFM8	6	K13-1
						M22520/2-08
				M22520/2-01	6	K13-1
						M22520/2-08
				WA22	6	K13-1
						M22520/2-08
		28	22	WA22LC	6	K13-1
						M22520/2-08
				AFM8	6	K13-1
						M22520/2-08
				M22520/2-01	6	K13-1
						M22520/2-08
				WA22	6	K13-1
						M22520/2-08
				WA22LC	6	K13-1
						M22520/2-08

# STANDARD WIRING PRACTICES MANUAL

## D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

Table 10 (continued)

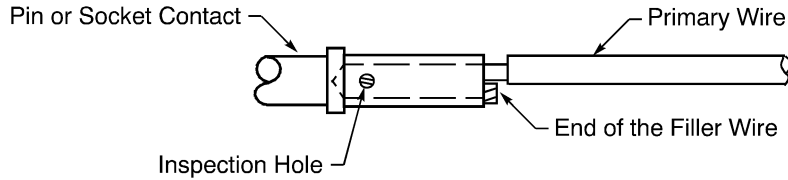
Contact		Solid Wire Size (AWG)	Stranded Filler Wire Size (AWG)	Crimp Tool		
				Basic Unit		Locator
Size	Type			Part Number	Setting	
20	Pin or Socket	26	22	AFM8	7	K13-1
						M22520/2-08
				M22520/2-01	7	K13-1
						M22520/2-08
				WA22	7	K13-1
						M22520/2-08
		24	22	WA22LC	7	K13-1
						M22520/2-08
				AFM8	7	K13-1
						M22520/2-08
				M22520/2-01	7	K13-1
						M22520/2-08
				WA22	7	K13-1
						M22520/2-08
				WA22LC	7	K13-1
						M22520/2-08

- (1) Make a selection of a crimp tool from Table 7.
- (2) Remove the necessary length of insulation from the end of the solid conductor wire.  
Refer to:
  - Table 9 for the insulation removal length
  - Subject 20-00-15 for the insulation removal procedures.
- (3) Remove 0.5 inch of insulation from the end of the specified filler wire.  
Refer to:
  - Table 7 for the size of the specified filler wire.
  - Subject 20-00-15 for the insulation removal procedures.
- (4) Put the end of the solid conductor wire and the filler wire in the crimp barrel of the contact.  
Make sure that:
  - All of the strands of the filler wire and the solid conductor are in the crimp barrel of the contact
  - The strands of the conductors are visible in the inspection hole of the contact
  - The distance between the end of the crimp barrel and the insulation of the primary solid conductor wire is a maximum of 0.03 inch.
- (5) Crimp the contact.

## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

- (6) Carefully remove the unwanted length of the strands of the filler wire as close as possible to the end of the crimp barrel. Refer to Figure 19.



**REMOVAL OF THE UNWANTED LENGTH OF THE FILLER WIRE**  
Figure 19

**CAUTION:** DO NOT CAUSE DAMAGE TO THE CONDUCTOR OF THE PRIMARY WIRE. DAMAGE TO THE CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE WIRE.

#### C. Contact Insertion

**NOTE:** If a backshell is specified, the necessary backshell components must be installed on the wire harness before the insertion of the contacts into the connector. Refer to Paragraph 5.E.

**Table 11**  
**CONTACT INSERTION TOOLS**

Contact Size	Insertion Tool	
	Part Number	Color
22D	CIET-22D	Green
	CIET-22MKJ	Green
	DAK95-22M	-
	M81969/1-04	-
	M81969/14-01	-
	M24308/18-1	-
	MS27534-22D	-
20	6500-043-020-628	-
	6500-045-020	-
	CET 20-11	Red
	CIET-20HD	Red
	M24308/18-2	-
	M81969/1-02	-
	M81969/14-02	-
	MS18278-1	-
	MS27534-20	-
	NAS1664-20	-

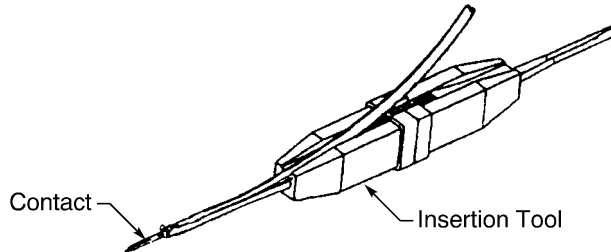
## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

- (1) Make a selection of the contact insertion tool from Table 11.

**NOTE:** Contacts can be inserted by hand.

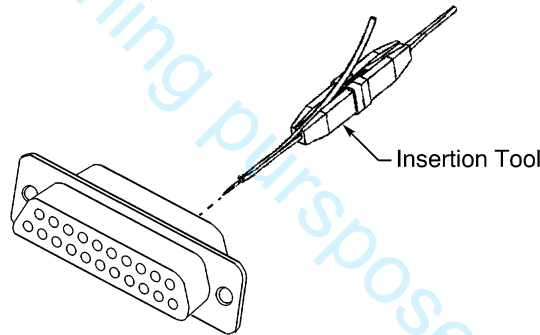
- (2) Put the contact assembly in the insertion tool. Refer to Figure 20.



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**

**Figure 20**

- (3) At the rear of the connector, axially align the contact assembly, the insertion tool, and the contact cavity. Refer to Figure 21.



**ALIGNMENT OF THE CONTACT ASSEMBLY, THE INSERTION TOOL, AND THE CONTACT CAVITY**

**Figure 21**

- (4) Push the tool into the contact cavity until it stops.

Make sure that the tool stays aligned with the contact cavity.

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (5) Carefully pull the tool from the contact cavity.
- (6) Lightly pull the wire to make sure that the contact is locked in the contact cavity.

**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS**

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

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

- (7) If the contact is not locked in the contact cavity:
- Pull the contact assembly out of the cavity.
  - Do Step (3) through Step (6) again.

**D. Seal of an Empty Contact Cavity**

The seal of an empty contact cavity is not necessary.

**E. Backshell Assembly**

- (1) If a backshell is specified, assemble the backshell. Refer to Subject 20-72-08.

**F. Connector Installation Hardware Assembly**

- (1) If a backshell is not specified, assemble the connector installation hardware. Refer to Subject 20-72-07.

**NOTE:** If a backshell is specified, the connector installation hardware is assembled when the backshell is assembled. Refer to Paragraph 5.E.

**6. CONNECTOR INSTALLATION****A. Connector Installation in a Panel**

For the installation of a connector:

- With a backshell, installation in a panel occurs when the backshell is assembled. Refer to Paragraph 5.E.
- Without a backshell, the installation in a panel occurs when the connector installation hardware is assembled. Refer to Paragraph 5.F.

**B. Connection of the Plug and the Receptacle**

**Table 12**  
**NECESSARY TOOLS**

Tool	Type
Screwdriver	Flat tip

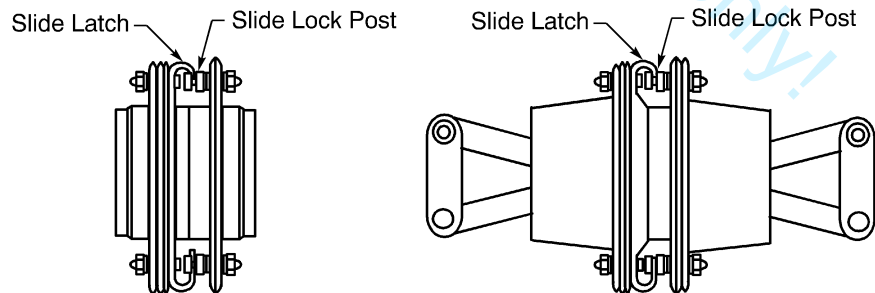
- (1) For connectors with jackscrew and jackpost installation hardware:
- Make a selection of a tool from Table 12.
  - Align the engaging face of the plug with the engaging face of the receptacle.
  - Push the plug into the receptacle.  
Make sure that connectors are fully engaged.
  - Put each jackscrew in the applicable jackpost.
  - Turn one jackscrew clockwise two or three turns.
  - Turn the other jackscrew clockwise two or three turns.

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## STANDARD WIRING PRACTICES MANUAL

### D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS

- (g) Do Step (e) and Step (f) again until the jackscrews are fully engaged.
- (h) Tighten each jackscrew.
- (2) For connectors with male and female screw lock installation hardware:
  - (a) Make a selection of a tool from Table 12.
  - (b) Align the engaging face of the plug with the engaging face of the receptacle.
  - (c) Push the plug into the receptacle.
  - Make sure that the connectors are fully engaged.
  - (d) Put each screw in the applicable female screw lock.
  - (e) Turn one screw clockwise two or three turns.
  - (f) Turn the other screw clockwise two or three turns.
  - (g) Do Step (e) and Step (f) again until the screws are fully engaged.
  - (h) Tighten each jackscrew.
- (3) For connectors with spring plate and spring latch plate installation hardware:
  - (a) Align the engaging face of the plug with the engaging face of the receptacle.
  - (b) Push the plug into the receptacle.
  - Make sure that the connectors are fully engaged.
  - (c) Engage each spring with the applicable spring latch plate.
- (4) For connectors with slide latch and slide lock post installation hardware:
  - (a) Align the engaging face of the plug with the engaging face of the receptacle.
  - Make sure that the slide latch is retracted to the open position.
  - (b) Push the plug into the receptacle.
  - Make sure that the connectors are fully engaged.
  - (c) Engage the slot in the slide latch with the slide lock posts.
  - (d) Push the slide latch to the closed position. Refer to Figure 22.
  - Make sure the connectors are locked together.



**CONNECTION OF THE PLUG AND THE RECEPTACLE - SLIDE LATCH HARDWARE**  
**Figure 22**

**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS****7. APPROVED TOOL SUPPLIERS****A. Contact Removal Tools**

**Table 13**  
**CONTACT REMOVAL TOOL SUPPLIERS**

<b>Removal Tool</b>	<b>Supplier</b>
6500-043-020-628	Daniels
6500-045-020	Daniels
CET 20-11	ITT Cannon
CIET-20HD	ITT Cannon
CIET-22D	ITT Cannon
CIET-22MKJ	ITT Cannon
DRK95-22M	Daniels
M24308/18-1	QPL
M24308/18-2	QPL
M81969/1-02	QPL
M81969/1-04	QPL
M81969/14-01	QPL
M81969/14-02	QPL
MS18278-1	QPL
MS27534-20	QPL
MS27534-22D	QPL
NAS1664-20	QPL

**B. Contact Crimp Tools**

**Table 14**  
**CONTACT CRIMP TOOL SUPPLIERS**

<b>Crimp Tool</b>	<b>Supplier</b>
M22520/2-01	QPL
M22520/2-06	QPL
M22520/2-08	QPL
M22520/2-09	QPL

**STANDARD WIRING PRACTICES MANUAL****D-SUBMINIATURE CONNECTORS: M24308 SERIES CONNECTORS****C. Contact Insertion Tools**

**Table 15**  
**CONTACT INSERTION TOOL SUPPLIERS**

<b>Insertion Tool</b>	<b>Supplier</b>
6500-043-020-628	Daniels
6500-045-020	Daniels
CET 20-11	ITT Cannon
CIET-20HD	ITT Cannon
CIET-22D	ITT Cannon
CIET-22MKJ	ITT Cannon
DAK95-22M	Daniels
M24308/18-1	QPL
M24308/18-2	QPL
M81969/1-02	QPL
M81969/1-04	QPL
M81969/14-01	QPL
M81969/14-02	QPL
MS18278-1	QPL
MS27534-20	QPL
MS27534-22D	QPL
NAS1664-20	QPL

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ITT CANNON D(U) D SUBMINIATURE CONNECTORS

<u>Paragraph</u>	<u>Page</u>
1. <b><u>PART NUMBERS AND DESCRIPTION</u></b>	<b>1</b>
A. Connector Part Numbers	1
B. Contact Part Numbers	1
C. Insert Configurations for ITT Cannon D Subminiature Connectors	2
2. <b><u>CONNECTOR DISASSEMBLY</u></b>	<b>3</b>
A. Contact Removal	3
3. <b><u>CONNECTOR ASSEMBLY</u></b>	<b>4</b>
A. Contact Assembly	4
B. Contact Insertion	4

For training purposes only!

## 20-72-16 CONTENTS

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF ITT CANNON D(U) D SUBMINIATURE CONNECTORS

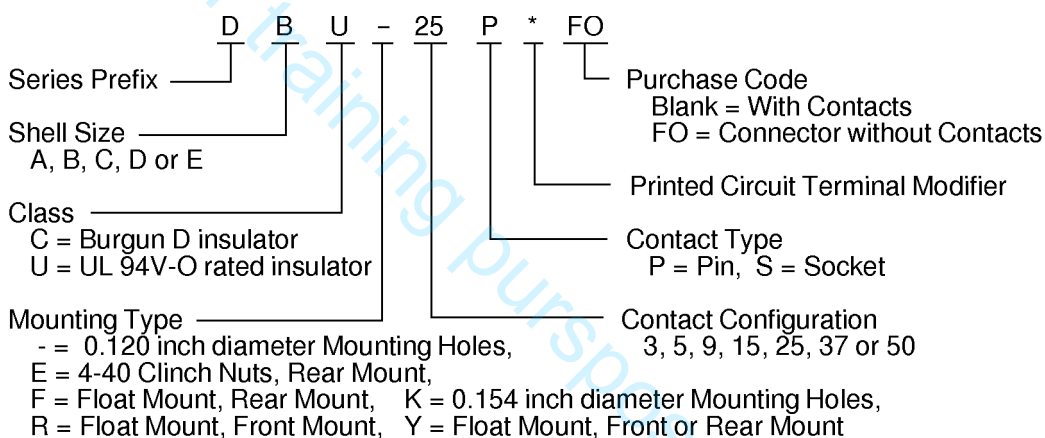
### 1. PART NUMBERS AND DESCRIPTION

#### A. Connector Part Numbers

Table 1

D SUBMINIATURE CONNECTOR PART NUMBERS

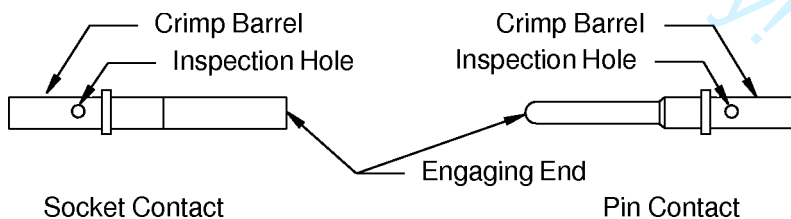
Part Number	Supplier
DAU( )	ITT Cannon
DBU( )	ITT Cannon
DCU( )	ITT Cannon
DDU( )	ITT Cannon
DEU( )	ITT Cannon



### ITT CANNON D SUBMINIATURE CONNECTOR PART NUMBER STRUCTURE

Figure 1

#### B. Contact Part Numbers



### REAR RELEASE CONTACTS

Figure 2

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ITT CANNON D(U) D SUBMINIATURE CONNECTORS

Table 2  
CONTACT PART NUMBERS

Contact Type	Contact Size	Engaging End Size	Crimp Barrel Size	Part Number	Supplier
Pin	20HD	20	20	030-1952-000	ITT Cannon
Socket	20HD	20	20	030-1953-000	ITT Cannon

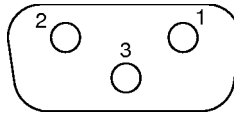
#### C. Insert Configurations for ITT Cannon D Subminiature Connectors

NOTE: The contact cavity size that is specified in Table 3 is equivalent to the size of the engaging end of the contact.

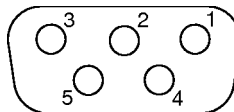
NOTE: Figure 3 through Figure 9 show the rear face of an insert that has pin contacts. The view of the rear face of an insert that has socket contacts is the mirror image of this view.

Table 3  
CONNECTOR INSERT CONFIGURATIONS

Insert Configuration	Connector Shell Size	Contact Cavity		Reference
		Count	Size	
3	E	3	20	Figure 3
5	E	5	20	Figure 4
9	E	9	20	Figure 5
15	A	15	20	Figure 6
25	B	25	20	Figure 7
37	C	37	20	Figure 8
50	D	50	20	Figure 9



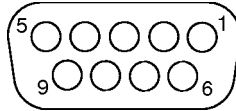
INSERT CONFIGURATION 3  
Figure 3



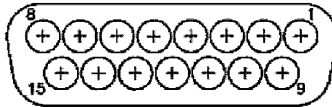
INSERT CONFIGURATION 5  
Figure 4

## STANDARD WIRING PRACTICES MANUAL

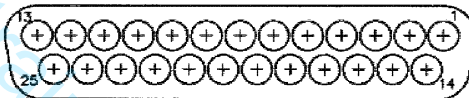
### ASSEMBLY OF ITT CANNON D(U) D SUBMINIATURE CONNECTORS



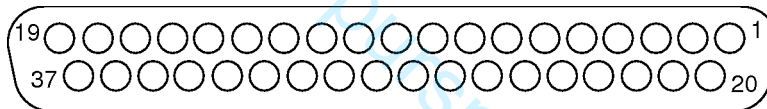
**INSERT CONFIGURATION 9**  
Figure 5



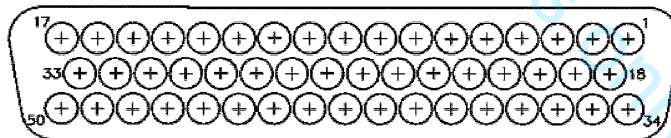
**INSERT CONFIGURATION 15**  
Figure 6



**INSERT CONFIGURATION 25**  
Figure 7



**INSERT CONFIGURATION 37**  
Figure 8



**INSERT CONFIGURATION 50**  
Figure 9

## 2. CONNECTOR DISASSEMBLY

### A. Contact Removal

**Table 4**  
**CONTACT REMOVAL TOOLS**

Removal Tool	Color	Supplier
CIET-20HD	White	ITT Cannon
CIET-20HDB	-	ITT Cannon

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ITT CANNON D(U) D SUBMINIATURE CONNECTORS

- (1) At the rear of the connector, put the tip of the removal tool on the wire of the contact.
- (2) Push the tool into the contact cavity at the rear of the connector until it stops.  
Make sure that the removal tool stays perpendicular to the rear surface of the connector.
- (3) Hold the wire against the tool and pull the tool and the contact out of the contact cavity at the same time.

### 3. CONNECTOR ASSEMBLY

#### A. Contact Assembly

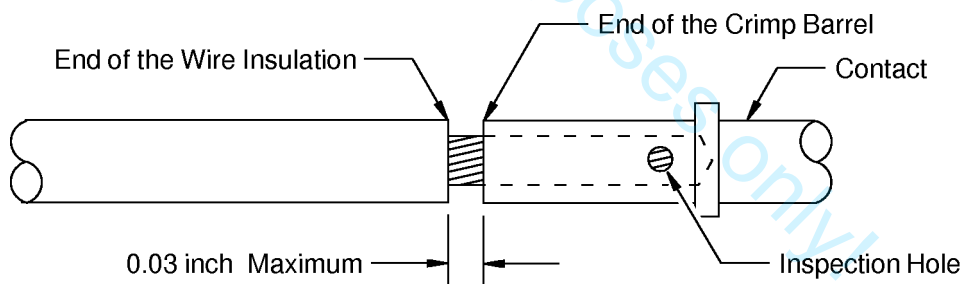
**Table 5**  
**CONTACT CRIMP TOOLS**

Basic Unit		Locator	
Part Number	Supplier	Part Number	Supplier
M22520/1-01	QPL	TH 185	Daniels
MS 3191-1	Buchanan	P-20-3191-37	Buchanan

- (1) Remove 5/32 inch to 3/16 inch of wire insulation.
- (2) Make a selection of a crimp tool from Table 5.
- (3) Put the wire in the contact crimp barrel. Refer to Figure 10.

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 crimp barrel is not more than 0.03 inch.



**POSITION OF THE WIRE IN A CONTACT**  
**Figure 10**

- (4) Crimp the contact.

#### B. Contact Insertion

**Table 6**  
**CONTACT INSERTION TOOLS**

Insertion Tool	Color	Supplier
CIET-20HD	Red	ITT Cannon
CIET-20HDB	-	ITT Cannon

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF ITT CANNON D(U) D SUBMINIATURE CONNECTORS**

- (1) Make a selection of the insertion tool from Table 6.

**NOTE:** Contacts may be inserted by hand.

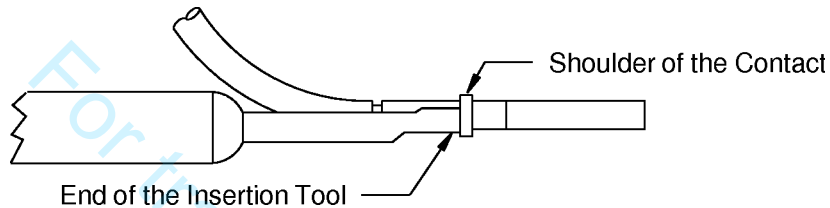
- (2) Examine the contact.

Make sure that the contact:

- Is straight
- Does not have damage.

- (3) Put the contact assembly in the insertion tool. Refer to Figure 11.

Make sure that the end of the insertion tool is against the rear edge of the shoulder of the contact.



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**

**Figure 11**

- (4) At the rear of the connector, axially align the insertion tool, the contact assembly, and the contact cavity.

Make sure that the insertion tool is perpendicular to the rear face of the insert

- (5) Carefully push the contact assembly into the contact cavity until it stops.

Make sure that the insertion tool stays axially aligned with the contact cavity.

**CAUTION:** DO NOT TURN THE INSERTION TOOL IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (6) Carefully pull the insertion tool out of the contact cavity.

- (7) 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 OF THE WIRE.

- (8) If the contact is not locked in the contact cavity:

- (a) Pull the contact assembly out of the contact cavity.
- (b) Do Step (3) through Step (7) again.



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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147-() CONNECTORS

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

#### 1. GENERAL DATA

##### A. Conditions for Repair and Replacement of a Wire Wrap Pin

If the post of a wire wrap pin is bent, it is permitted to make the post straight.

A wire wrap pin that has any of these types of damage must be replaced:

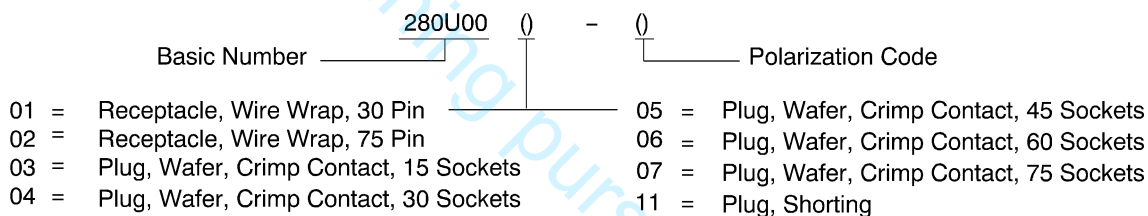
- The post is broken
- The engaging end is broken
- The post is bent so that it is not possible to make it straight again
- The engaging end is bent so that it is not possible to make it straight again.

If it is necessary to replace the same wire wrap pin more than three times, the wafer must be replaced.

**CAUTION:** IF THE SAME WIRE WRAP PIN MUST IS REPLACED MORE THAN THREE TIMES. THE STRENGTH OF THE CONTACT RETENTION OF THE WAFER CAN BE DECREASED SO THAT IT IS NOT SUFFICIENT TO HOLD THE WIRE WRAP PIN IN POSITION.

#### 2. PART NUMBERS AND DESCRIPTION

##### A. 280U00()-() Connector Part Numbers



#### BOEING 280U000()-() CONNECTOR PART NUMBER STRUCTURE

Figure 1

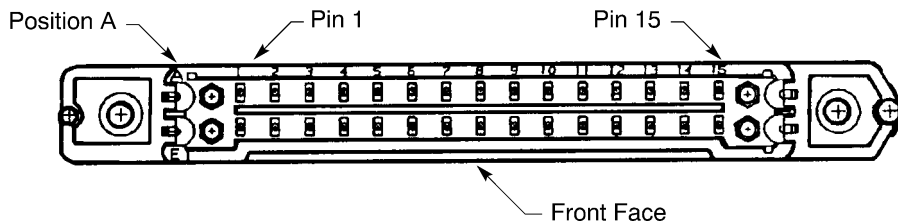
Table 1  
BOEING 280U00()-() CONNECTOR PART NUMBERS

Boeing Specification	Part Number	Supplier	Configuration	Contact Configuration	
				Type	Quantity
280U0001()-()	213395-1	AMP	Receptacle	Wire Wrap Pin	30
280U0002()-()	213396-1	AMP	Receptacle	Wire Wrap Pin	75
280U0003()-()	-	QPL	Plug	Crimp Socket	15
280U0004()-()	-	QPL	Plug	Crimp Socket	30
280U0005()-()	-	QPL	Plug	Crimp Socket	45
280U0006()-()	-	QPL	Plug	Crimp Socket	60
280U0007()-()	-	QPL	Plug	Crimp Socket	75
280U0011()-()	-	QPL	Shorting Plug	-	-

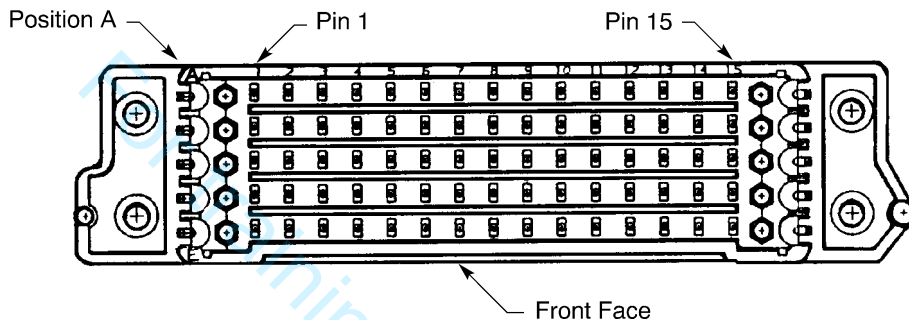
# 20-72-17

# STANDARD WIRING PRACTICES MANUAL

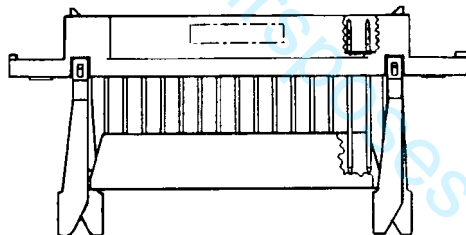
## ASSEMBLY OF BOEING 280U000(-) AND 284U1147(-) CONNECTORS



**BOEING 280U0001(-) RECEPTACLE**  
Figure 2



**BOEING 280U0002(-) RECEPTACLE**  
Figure 3



**RECEPTACLE HOUSING**  
Figure 4

**Table 2**  
**CONNECTOR COMPONENT PART NUMBERS**

Component	Part Number	Supplier
Wafer	213408-1	AMP

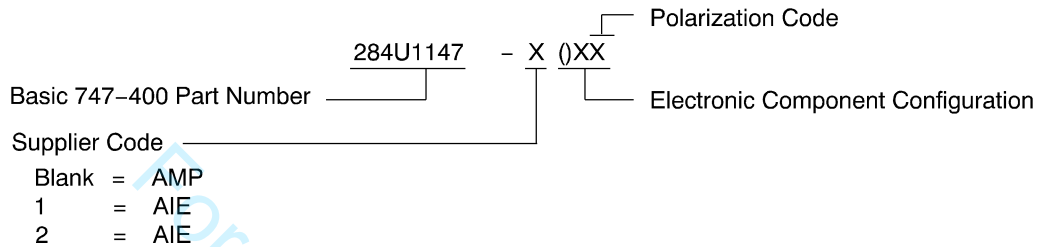
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

#### B. 284U1147()-() Connector Part Numbers

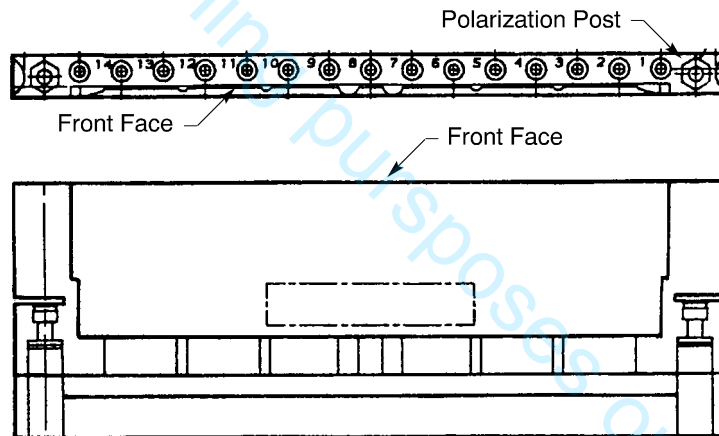
The 284U1147()-() assembly is made with one or more of these components:

- A plug module wafer
- A capacitor
- A diode
- A resistor.



#### BOEING 284U1147()-() CONNECTOR PART NUMBER STRUCTURE

Figure 5



#### AMP 213389()-() WAFER

Figure 6

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 3  
BOEING 284U1147()-() CONNECTOR PART NUMBERS

Number of Wafers	Part Number	Component Configuration			Supplier
		Component	Quantity	Polarity	
1	284U1147-()	Diode	3	Same	AMP
	284U1147-1()	Diode	3	Same	
	284U1147-2()	Resistor	2	-	
	284U1147-3()	Resistor	3	-	
	284U1147-4()	Resistor	3	-	
	284U1147-6()	Diode	3	Different	
	284U1147-7()	Resistor	2	-	
	284U1147-8()	Resistor	2	-	
	284U1147-72	Resistor	2	-	
	284U1147-10()	Diode	3	Same	AIE
	284U1147-11()	Diode	3	Same	
	284U1147-12()	Resistor	2	-	
	284U1147-13()	Resistor	3	-	
	284U1147-14()	Resistor	3	-	
	284U1147-16()	Diode	3	Different	
	284U1147-17()	Resistor	2	-	
	284U1147-18()	Resistor	2	-	
	284U1147-1072	Resistor	2	-	
	284U1147-1166	Resistor	3	-	
	284U1147-1919	Resistor	3	-	
	284U1147-2001	Resistor	3	-	
2	284U1147-2()	Resistor	1	-	AMP
	284U1147-3()	Resistor	1	-	
	284U1147-4()	Resistor	1	-	
	284U1147-6()	Resistor	1	-	
	284U1147-12()	Resistor	1	-	AIE
	284U1147-13()	Resistor	1	-	
	284U1147-14()	Resistor	1	-	
	284U1147-16()	Resistor	1	-	
	284U1147-1824	Resistor	1	-	
	284U1147-1826	Resistor	1	-	

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 3 (continued)

Number of Wafers	Part Number	Component Configuration			Supplier
		Component	Quantity	Polarity	
3	284U1147-831	Capacitor	1	-	AMP
	284U1147-834	Capacitor	1	-	
	284U1147-837	Capacitor	1	-	
	284U1147-840	Capacitor	1	-	
	284U1147-1831	Capacitor	1	-	AIE
	284U1147-1834	Capacitor	1	-	
	284U1147-1837	Capacitor	1	-	
	284U1147-1840	Capacitor	1	-	

Table 4

#### CONNECTOR ASSEMBLY COMPONENT PART NUMBERS

Component	Part Number	Supplier
Polarization Post	213384-1	AMP
Plug Latch	213388-1	AMP
	213388-2	AMP
	213388-3	AMP
	213408-2	AMP
Wafer, Middle	213389-1	AMP
Wafer, Single	213389-2	AMP
Wafer, Side	213389-3	AMP

#### C. Contact Part Numbers

Table 5

#### CONTACT PART NUMBERS

Contact Type	Contact Size	Contact Engaging End Size	Contact Crimp Barrel Size	Boeing Standard	Part Number	Supplier
Wire Wrap Pin	20	20	-	-	213400-3	AMP
Crimp Socket	2020HD	20	20	BACC47EG2	-	QPL

**NOTE:** The wire wrap pin has a pin contact engaging end and a wire wrap post at the rear.

**NOTE:** In these connectors, the size 20 wire wrap pin contacts and the size 2020HD socket contacts have the same center-to-center contact spacing.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

#### D. Wafer Latch Part Numbers

The AMP 213388()-() wafer plug latch or AIE AL00LH()-() latch hook hold:

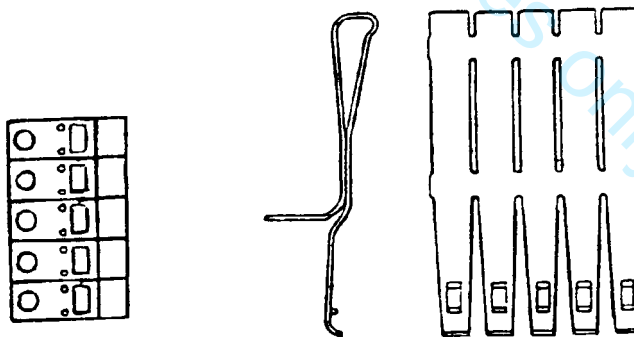
- The plug module in position
- The plug and receptacle in position.

Refer to:

- Figure 7 for the plug latch
- Figure 8 for the latch hook.

**Table 6**  
**WAFER LATCH PART NUMBERS**

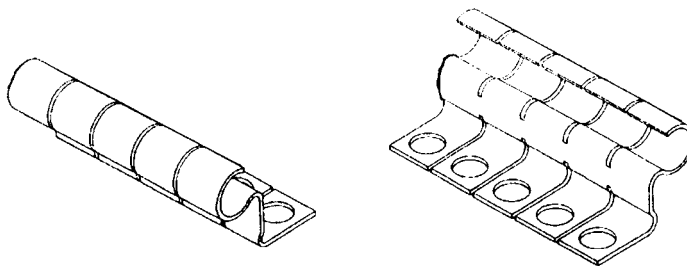
Number of Wafers	Plug Latch		
	Part Number	Type	Supplier
1	213388-1	Plug Latch	AMP
	AL00LH01	Latch Hook	AIE
2	213388-2	Plug Latch	AMP
	AL00LH02	Latch Hook	AIE
3	213388-3	Plug Latch	AMP
	AL00LH03	Latch Hook	AIE
4	213388-4	Plug Latch	AMP
	AL00LH04	Latch Hook	AIE
5	213388-5	Plug Latch	AMP
	AL00LH05	Latch Hook	AIE



**AMP WAFER PLUG LATCH**  
**Figure 7**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS



**AIE LATCH HOOK**  
Figure 8

#### E. Wire Wrap Connector Lifter Latch System Part Numbers

**Table 7**  
**LIFTER LATCH SYSTEM PART NUMBERS**

Component	Part Number	Supplier
End Block	AL10EB()	AIE
Hinge Pin	AL00LA()	AIE
Jack Nut	AL00LA()	AIE
Jack Screw	AL00LA()	AIE
Lifter Block	AL00LA()	AIE
Latch Hook	AL00LH()	AIE
Latch Rail	AL10LR()	AIE
Receptacle	280U00()-()	QPL
Rod Assembly	AL10RA()	AIE
Spacer	AL10SI()	AIE
Wafer Plug Module	280U00()-1()	QPL

### 3. CONNECTOR POLARIZATION

#### A. 280U00()-() Connector Polarization

**Table 8**  
**280U00()-() CONNECTOR POLARIZATION**

Connector	Reference
280U0001()-()	Figure 10
280U0002()-()	Figure 10
280U0003()-()	Figure 11
280U0004()-()	Figure 12
280U0005()-()	Figure 13
280U0006()-()	Figure 14

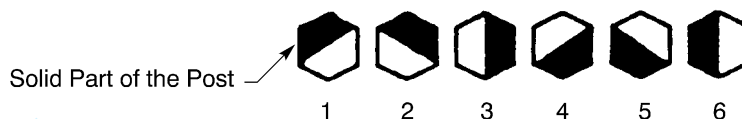
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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 8 (continued)

Connector	Reference
280U0007()-()	Figure 15
280U0011()-()	Figure 16
	Figure 17



**POLARIZATION POST POSITIONS**  
Figure 9

**Table 9**  
**CONNECTOR POLARIZATION - POST POSITION**

Plug Post			Receptacle Post		
Polarization Code	Left	Right	Polarization Code	Left	Right
01	2	2	01	4	4
02	3	2	02	4	3
03	4	2	03	4	2
04	5	2	04	4	1
05	6	2	05	4	6
06	1	2	06	4	5
07	2	1	07	5	4
08	3	1	08	5	3
09	4	1	09	5	2
10	5	1	10	5	1
11	6	1	11	5	6
12	1	1	12	5	5
13	2	6	13	6	4
14	3	6	14	6	3
15	4	6	15	6	2
16	5	6	16	6	1
17	6	6	17	6	6
18	1	6	18	6	5
19	2	5	19	1	4
20	3	5	20	1	3

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 9 (continued)

Plug Post			Receptacle Post		
Polarization Code	Left	Right	Polarization Code	Left	Right
21	4	5	21	1	2
22	5	5	22	1	1
23	6	5	23	1	6
24	1	5	24	1	5
25	2	4	25	2	4
26	3	4	26	2	3
27	4	4	27	2	2
28	5	4	28	2	1
29	6	4	29	2	6
30	1	4	30	2	5
31	2	3	31	3	4
32	3	3	32	3	3
33	4	3	33	3	2
34	5	3	34	3	1
35	6	3	35	3	6
36	1	3	36	3	5

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U000()-() AND 284U1147()-() CONNECTORS

Polarization Code			Polarization Code			Polarization Code		
Left		Right	Left		Right	Left		Right
4	1	4	5	7	4	6	16	1
4	2	3	5	8	3	6	17	6
280U0001-1			5	9	2	6	18	5
4	4	1	5	10	1	1	19	4
4	5	6	5	11	6	1	20	3
280U0001-2			280U0002-2			280U0002-7		
5	7	4	6	13	4			
5	8	3	6	14	3			
280U0001-3			6	15	2			
5	10	1	6	16	1			
5	11	6	6	17	6			
280U0001-4			280U0002-3					
6	13	4	1	19	4			
6	14	3	1	20	3			
280U0001-5			1	21	2			
6	16	1	4	1	4			
6	17	6	4	2	3			
280U0001-6			280U0002-4					
1	19	4	4	4	1			
1	20	3	4	5	6			
280U0001-7			4	6	5			
4	1	4	5	7	4			
4	2	3	5	8	3			
4	3	2	280U0002-5					
4	4	1	5	10	1			
4	5	6	5	11	6			
280U0002-1			5	12	5			
			6	13	4			
			6	14	3			
			280U0002-6					

Position in the Receptacle

Engaging Face of the Receptacle

## 280U0001()-() AND 280U0002()-() POLARIZATION POST POSITIONS

Figure 10

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U000(-) AND 284U1147(-) CONNECTORS

Left	Polarization Code	Right		Left	Polarization Code	Right	
2	1	2	A	3	2	2	E
280U0003-1 / -101				280U0003-20 / -120			
3	2	2	B	5	4	2	A
280U0003-2 / -102				280U0003-21 / -121			
4	3	2	C	6	5	2	B
280U0003-3 / -103				280U0003-22 / -122			
5	4	2	D	1	6	2	C
280U0003-4 / -104				280U0003-23 / -123			
6	5	2	E	2	7	1	D
280U0003-5 / -105				280U0003-24 / -124			
2	7	1	A	3	8	1	E
280U0003-6 / -106				280U0003-25 / -125			
3	8	1	B	5	10	1	A
280U0003-7 / -107				280U0003-26 / -126			
4	9	1	C	6	11	1	B
280U0003-8 / -108				280U0003-27 / -127			
5	10	1	D	1	12	1	C
280U0003-9 / -109				280U0003-28 / -128			
6	11	1	E	2	13	6	D
280U0003-10 / -110				280U0003-29 / -129			
2	13	6	A	3	14	6	E
280U0003-11 / -111				280U0003-30 / -130			
3	14	6	B	5	16	6	A
280U0003-12 / -112				280U0003-31 / -131			
4	15	6	C	6	17	6	B
280U0003-13 / -113				280U0003-32 / -132			
5	16	6	D	1	18	6	C
280U0003-14 / -114				280U0003-33 / -133			
6	17	6	E	2	19	5	D
280U0003-15 / -115				280U0003-34 / -134			
2	19	5	A	3	20	5	E
280U0003-16 / -116				280U0003-35 / -135			
3	20	5	B				
280U0003-17 / -117							
4	21	5	C				
280U0003-18 / -118							
2	1	2	D				
280U0003-19 / -119							

280U0003(-) POLARIZATION POST POSITIONS

Figure 11

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U000()-() AND 284U1147()-() CONNECTORS

Polarization Code				Polarization Code				Polarization Code			
Left		Right		Left		Right		Left		Right	
2	1	2	A	4	15	6	C	5	10	1	A
3	2	2	B	5	16	6	D	6	11	1	B
280U004-1 / -101				280U004-11 / -111				280U004-21 / -121			
3	2	2	B	5	16	6	D	6	11	1	B
4	3	2	C	6	17	6	E	1	12	1	C
280U004-2 / -102				280U004-12 / -112				280U004-22 / -122			
4	3	2	C	2	19	5	A	1	12	1	C
5	4	2	D	3	20	5	B	2	13	6	D
280U004-3 / -103				280U004-13 / -113				280U004-23 / -123			
5	4	2	D	3	20	5	B	2	13	6	D
6	5	2	E	4	21	5	C	3	14	6	E
280U004-4 / -104				280U004-14 / -114				280U004-24 / -124			
2	7	1	A	4	21	5	C	5	16	6	A
3	8	1	B	2	1	2	D	6	17	6	B
280U004-5 / -105				280U004-15 / -115				280U004-25 / -125			
3	8	1	B	2	1	2	D	6	17	6	B
4	9	1	C	3	2	2	E	1	18	6	C
280U004-6 / -106				280U004-16 / -116				280U004-26 / -126			
4	9	1	C	5	4	2	A	1	18	6	C
5	10	1	D	6	5	2	B	2	19	5	D
280U004-7 / -107				280U004-17 / -117				280U004-27 / -127			
5	10	1	D	6	5	2	B	2	19	5	D
6	11	1	E	1	6	2	C	3	20	5	E
280U004-8 / -108				280U004-18 / -118				280U004-28 / -128			
2	13	6	A	1	6	2	C				
3	14	6	B	2	7	1	D				
280U004-9 / -109				280U004-19 / -119							
3	14	6	B	2	7	1	D				
4	15	6	C	3	8	1	E				
280U004-10 / -110				280U004-20 / -120							

Engaging Face of the Receptacle

Position in the Receptacle

Engaging Face  
of the Receptacle

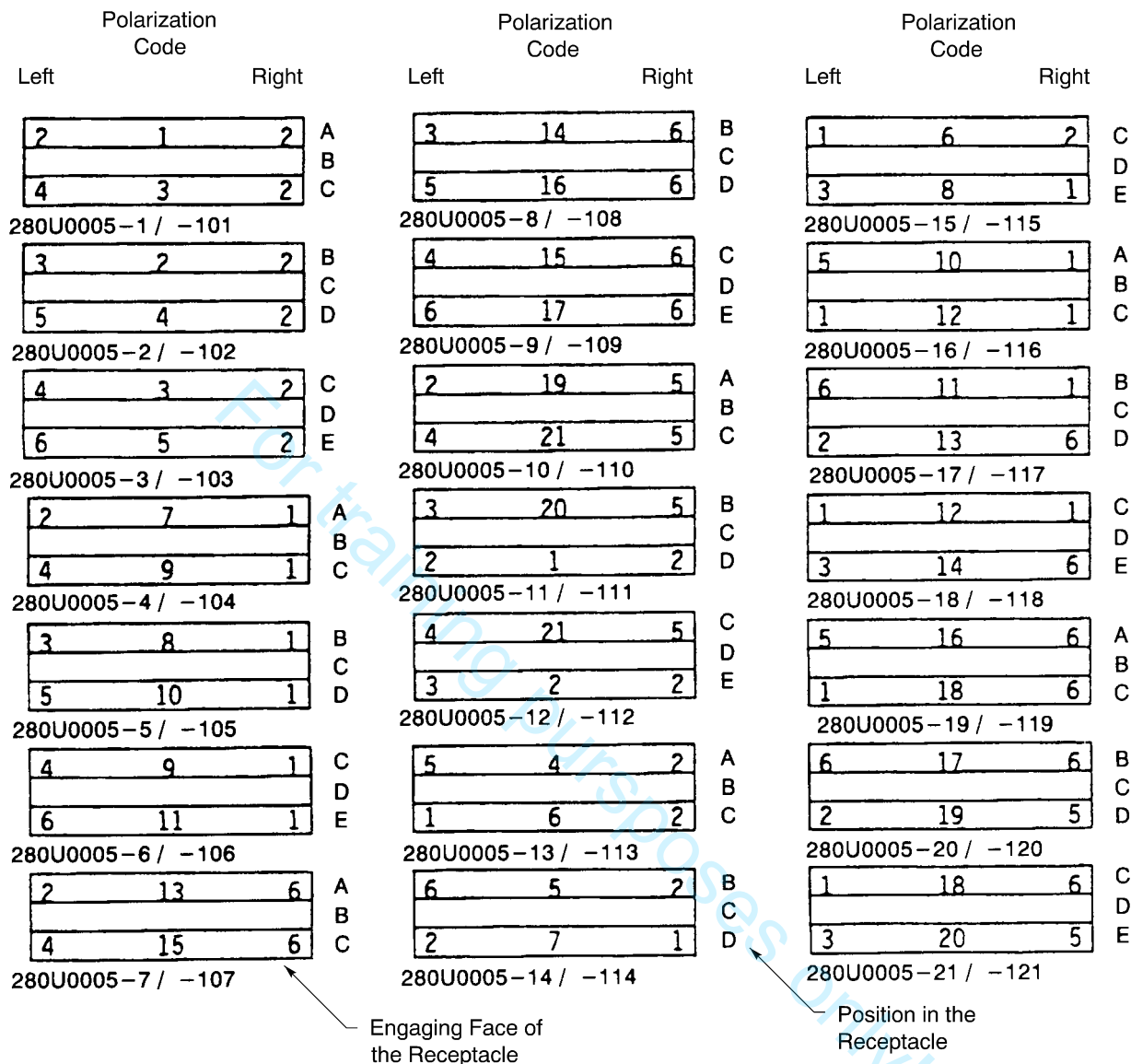
Position in the Receptacle

### 280U0004()-() POLARIZATION POST POSITIONS

Figure 12

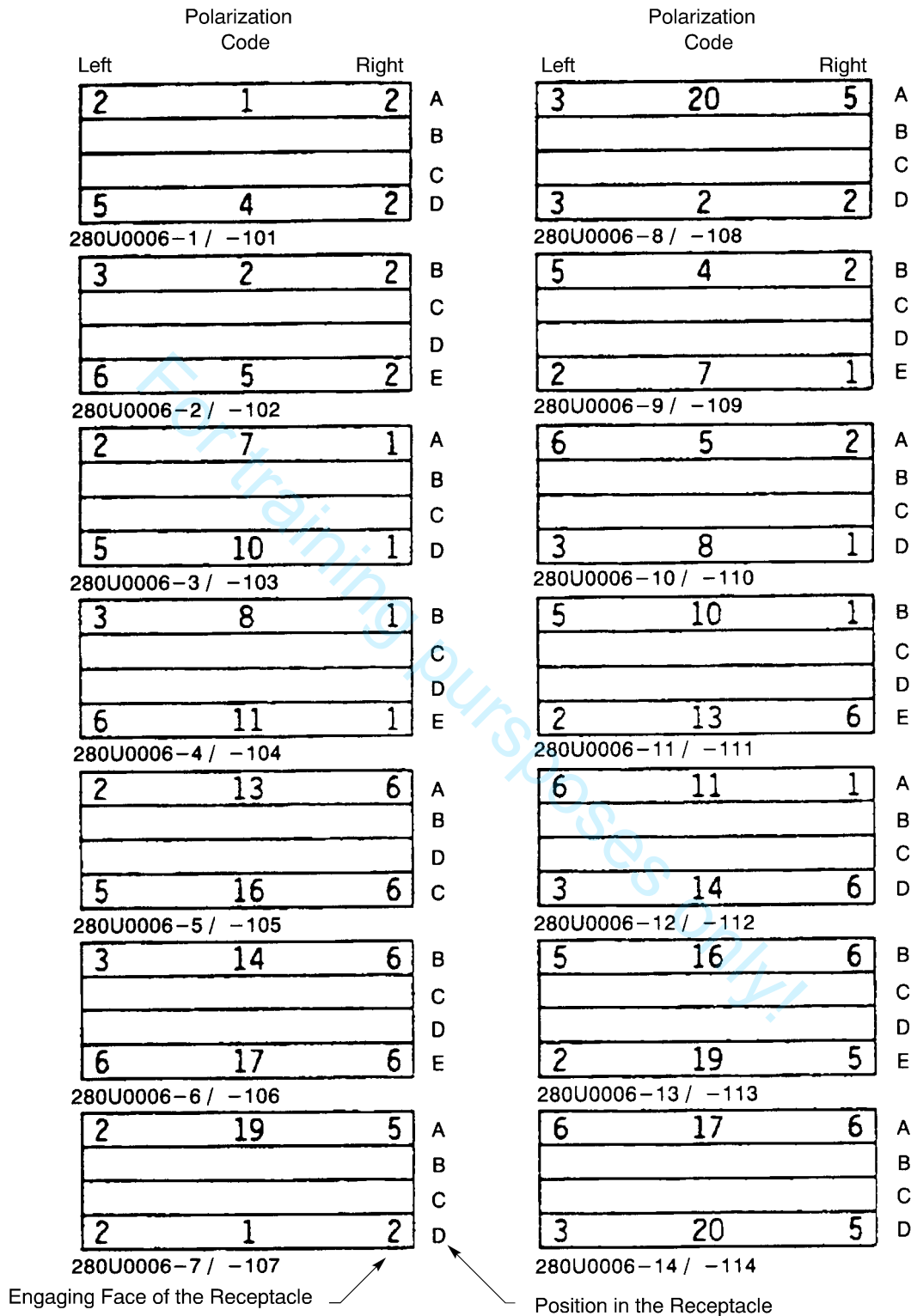
# STANDARD WIRING PRACTICES MANUAL

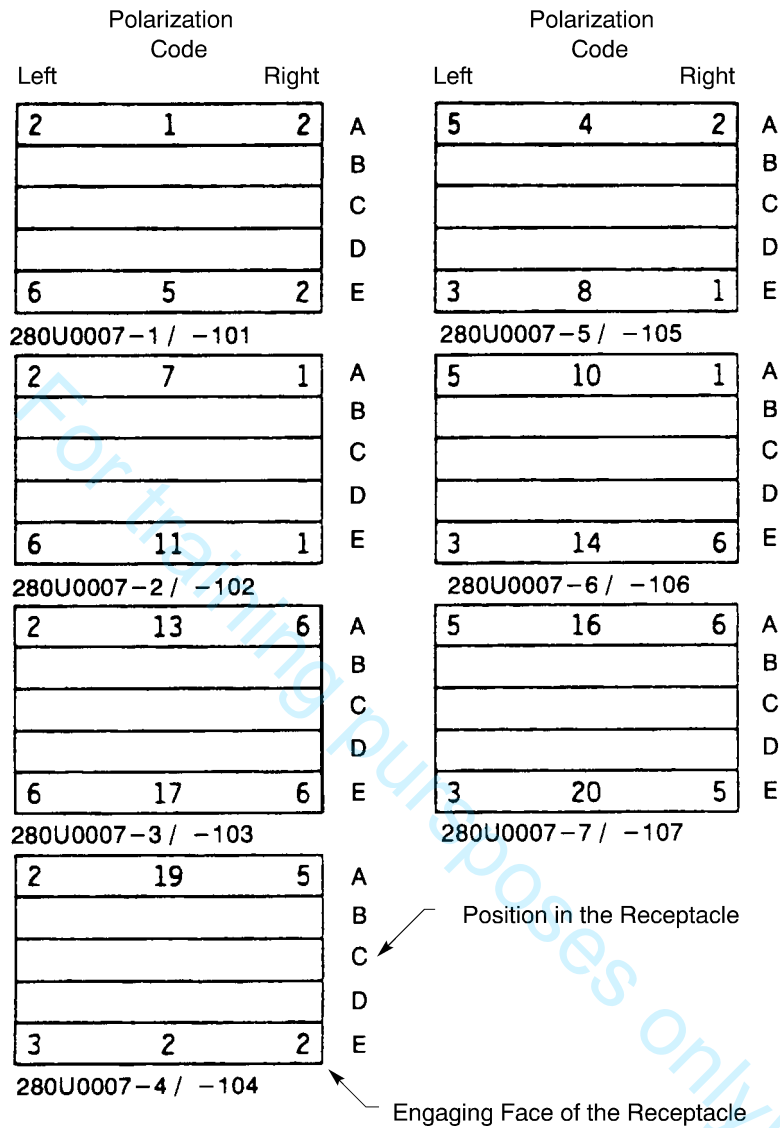
## ASSEMBLY OF BOEING 280U000(-) AND 284U1147(-) CONNECTORS



# STANDARD WIRING PRACTICES MANUAL

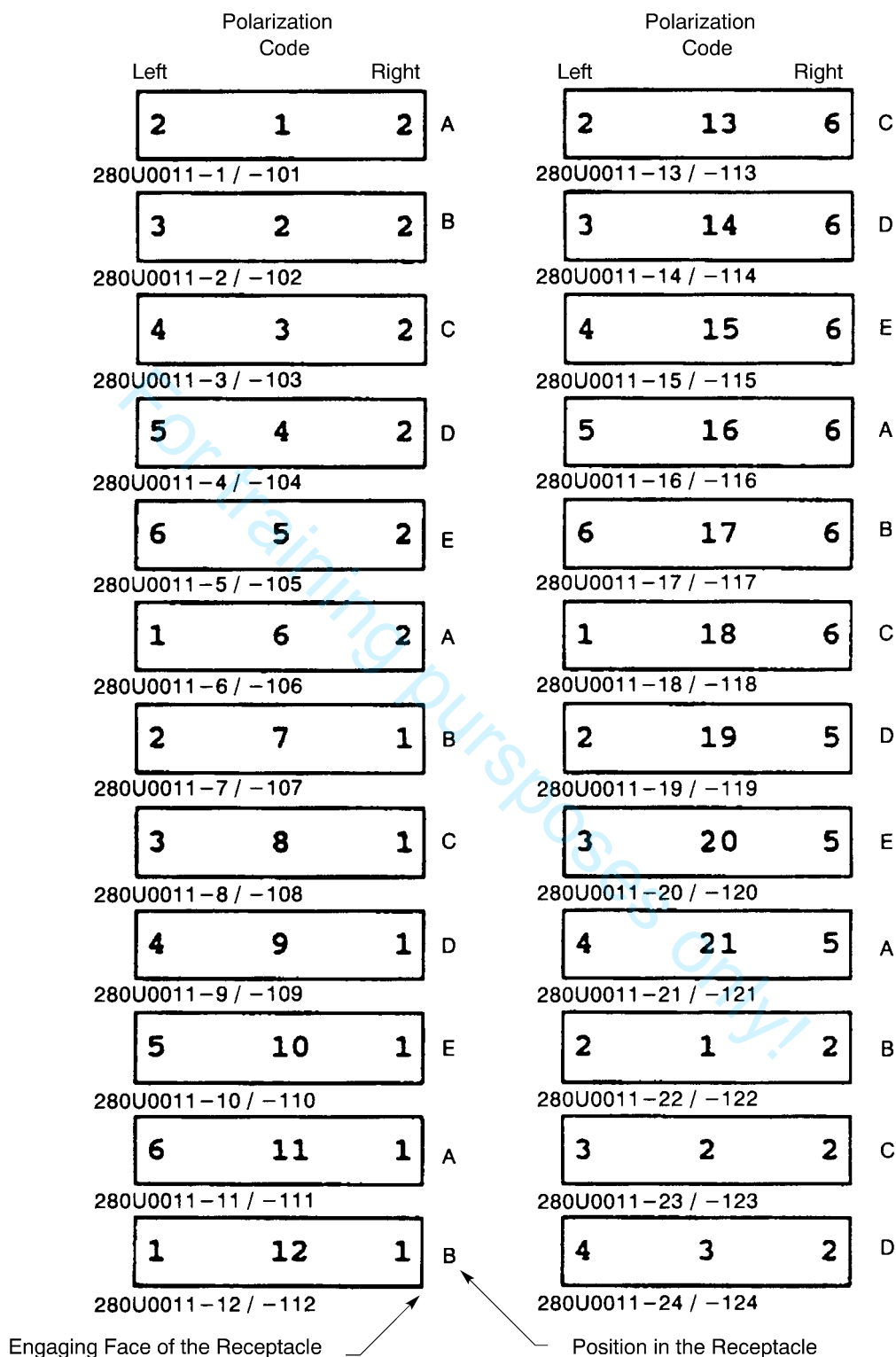
## ASSEMBLY OF BOEING 280U000(-) AND 284U1147(-) CONNECTORS



**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF BOEING 280U000()-() AND 284U1147()-() CONNECTORS**

**280U0007()-() POLARIZATION POST POSITIONS**
**Figure 15**

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U000()-() AND 284U1147()-() CONNECTORS

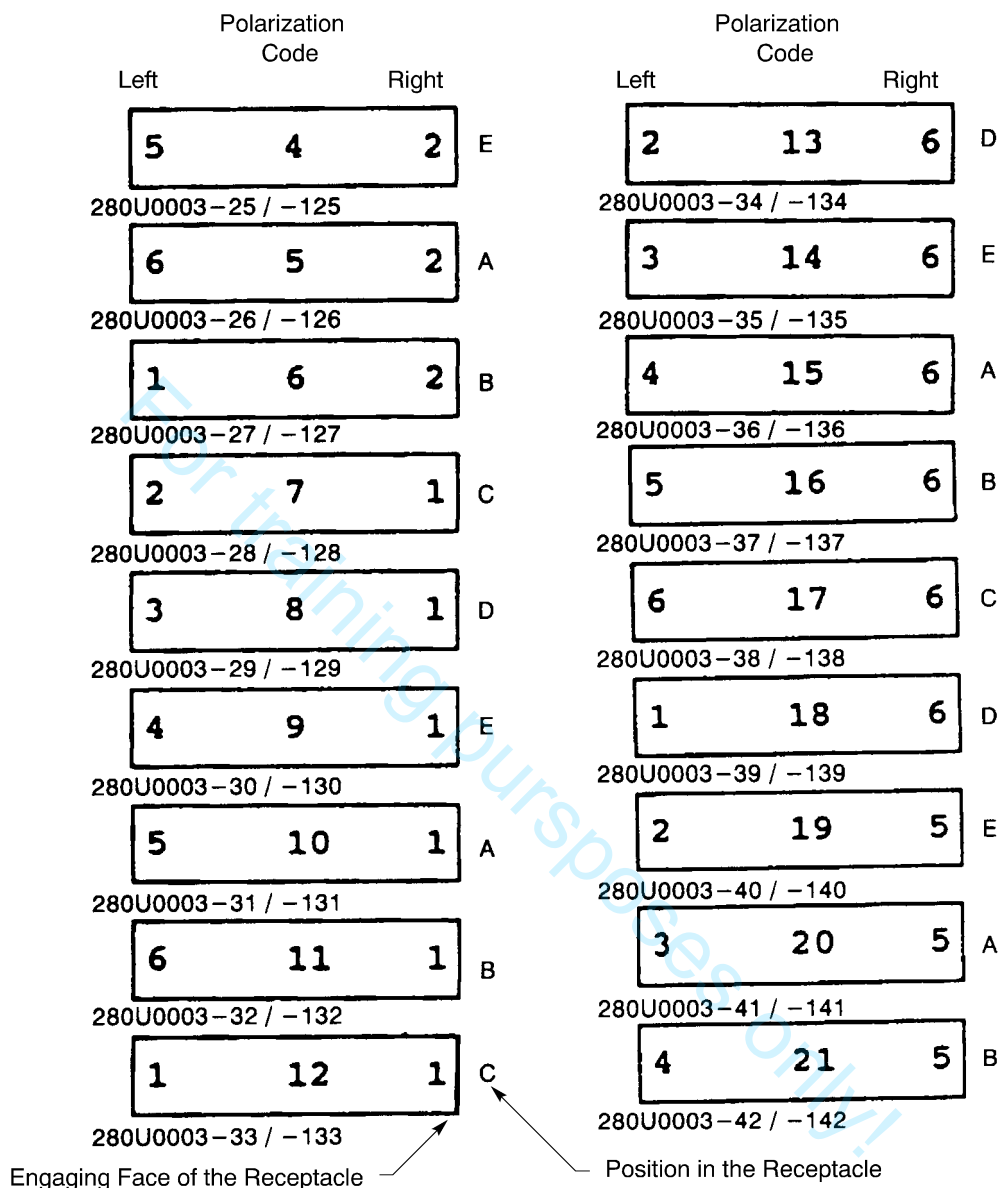


280U0011()-() POLARIZATION POST POSITIONS

Figure 16

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U000()-() AND 284U1147()-() CONNECTORS



280U0011()-() POLARIZATION POST POSITIONS (CONTINUED)

Figure 17

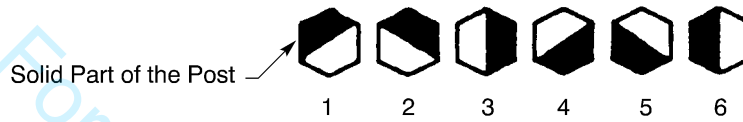
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

#### B. 284U1147()-() Connector Polarization

Table 10  
284U1147()-() CONNECTOR POLARIZATION

Connector	Number of Wafers	Reference
284U1147()-()	1	Figure 19
	2	Figure 20
	3	Figure 21



POLARIZATION POST POSITIONS  
Figure 18

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Wafer	Left	Polarization Code	Right	Left	Polarization Code	Right	Wafer
213389-1	2	01	2	2	13	6	213389-1
213389-1	3	02	2	3	14	6	213389-1
213389-1	4	03	2	4	15	6	213389-1
213389-1	5	04	2	5	16	6	213389-1
213389-1	6	05	2	6	17	6	213389-1
213389-1	1	06	2	1	18	6	213389-1
213389-1	2	07	1	2	19	5	213389-1
213389-1	3	08	1	3	20	5	213389-1
213389-1	4	09	1	4	21	5	213389-1
213389-1	5	10	1	1	66	2	213389-1
213389-1	6	11	1	1	72	1	213389-1
213389-1	1	12	1	Engaging Face of the Plug is Shown			

### 284U1147()-() POLARIZATION POST POSITIONS FOR ONE WAFER MODULES

Figure 19

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Wafer	Left	Polarization Code	Right	Left	Polarization Code	Right	Wafer
213389-2	6	24	2	6	40	1	213389-2
213389-3	5		2	5		1	213389-3
213389-2	2	26	1	1	41	1	213389-2
213389-3	1		2	6		1	213389-3
213389-2	3	31	2	2	42	6	213389-2
213389-3	2		2	1		1	213389-3
213389-2	4	32	2	3	43	6	213389-2
213389-3	3		2	2		6	213389-3
213389-2	5	33	2	4	44	6	213389-2
213389-3	4		2	3		6	213389-3
213389-2	6	34	2	5	45	6	213389-2
213389-3	5		2	4		6	213389-3
213389-2	1	35	2	6	46	6	213389-2
213389-3	6		2	5		6	213389-3
213389-2	2	36	1	1	47	6	213389-2
213389-3	1		2	6		6	213389-3
213389-2	3	37	1	2	48	5	213389-2
213389-3	2		1	1		6	213389-3
213389-2	4	38	1	3	49	5	213389-2
213389-3	3		1	2		5	213389-3
213389-2	5	39	1	4	50	5	213389-2
213389-3	4		1	3		5	213389-3
Engaging Face of the Plug is Shown				2	51	2	213389-2
				4		5	213389-3

## 284U1147()-() POLARIZATION POST POSITIONS FOR TWO WAFER MODULES

Figure 20

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Wafer	Polarization Code			Left	Code	Right	Wafer
	Left		Right				
213389-3	2		2	2		6	213389-3
213408-2		31			37		213408-2
213389-2	4		2	4		6	213389-2
213389-3	2		1	2		5	213389-3
213408-2		34			40		213408-2
213389-2	4		1	4		5	213389-2

Engaging Face of the Plug is Shown

### 284U1147()-() POLARIZATION POST POSITIONS FOR THREE WAFER MODULES

Figure 21

#### 4. CONNECTOR DISASSEMBLY

This paragraph gives the procedures to disassemble both the 280U00()-() and the 284U1147()-() connector plug modules.

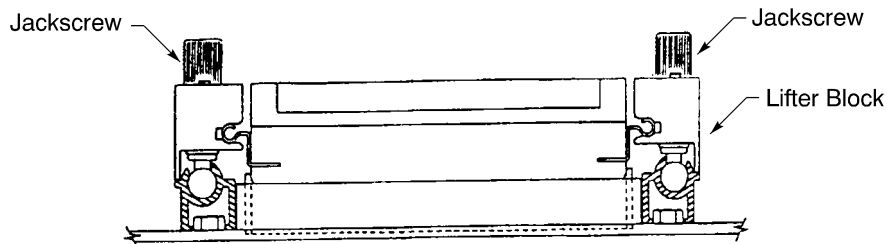
##### A. Separation of the Plug from the Receptacle

- (1) Turn off all power to the Wire Integration Unit (WIU). Refer to the decal on the WIU cover.

**WARNING:** IF THE POWER IS NOT TURNED OFF, PHYSICAL HARM TO PERSONNEL CAN OCCUR.

**CAUTION:** IF THE POWER IS NOT TURNED OFF, DAMAGE TO THE EQUIPMENT CAN OCCUR.

- (2) Remove the protective cover from the back of the WIU.
- (3) Pull the AIE rod assembly from both end blocks on both sides of the connector plug. Refer to Figure 45.
- (4) Loosen the jackscrews of the lifter blocks on both sides of the connector plug at the same time. Refer to Figure 22.



### LOCATION OF THE LIFTER BLOCK JACKSCREWS

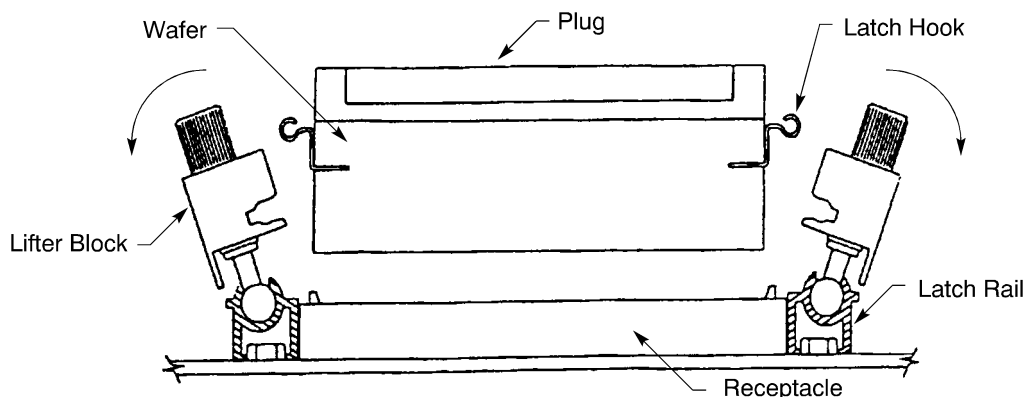
Figure 22

- (5) Move the lifter blocks away from the connector plug. Refer to Figure 23.

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS



### LATCH HOOKS RELEASED FROM THE LIFTER BLOCKS

Figure 23

(6) Pull the plug from the receptacle.

### B. Disassembly of a Plug with More Than One Wafer

- (1) Remove each polarization post.
- (2) Remove each wafer plug latch or latch hook.

Refer to:

- Figure 29 for a plug assembly with plug latches
- Figure 31 for a plug assembly with latch hooks.

### C. Contact Removal

This paragraph gives the procedure to remove crimp contacts. Refer to Paragraph 4.D. for the procedure to remove wire wrap pin contacts.

Table 11  
CONTACT REMOVAL TOOLS

Contact Size	Removal Tool
2020HD	282-891
	910066-4
	CIET-20HDL
	DRK145
	M81969/1-02
	MS3156-20

- (1) Make a selection of a removal tool from Table 11.
- (2) Put the wide part of the tool on the wire.
- (3) Push the wire into the narrow part of the tool.
- (4) Axially align the tool with the contact cavity.
- (5) If the removal tool has an indicating ring, push the tool into the contact cavity until the indicating ring is aligned with the surface of the grommet.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

- (6) If the removal tool does not have an indicating ring, carefully push the tool into the contact cavity until the retention mechanism is released.
- (7) Pull the wire and the removal tool from the contact cavity at the same time.
- (8) If the contact does not release:
  - (a) Remove the tool from the contact cavity and the wire.
  - (b) Turn the tool approximately 90 degrees.
  - (c) Do Step (2) through Step (7) again.

#### D. Wire Wrap Post Removal

The wire wrap post is:

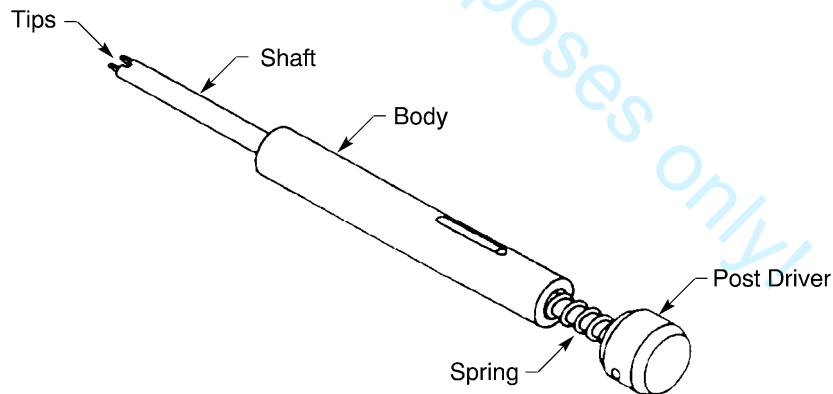
- Released from the rear of the receptacle
- Removed from the front of the receptacle.

**NOTE:** The AIE wire wrap receptacles are not removeable.

**Table 12**  
**WIRE WRAP POST REMOVAL TOOLS**

Contact Size	Removal Tool
20	58324-1-0
	DRK347

- (1) Remove the protective cover from the receptacle.
- (2) Remove all of the wire from the wire wrap post. Refer to Subject 20-72-18.
- (3) Make a selection of a post removal tool from Table 12. Refer to Figure 24.

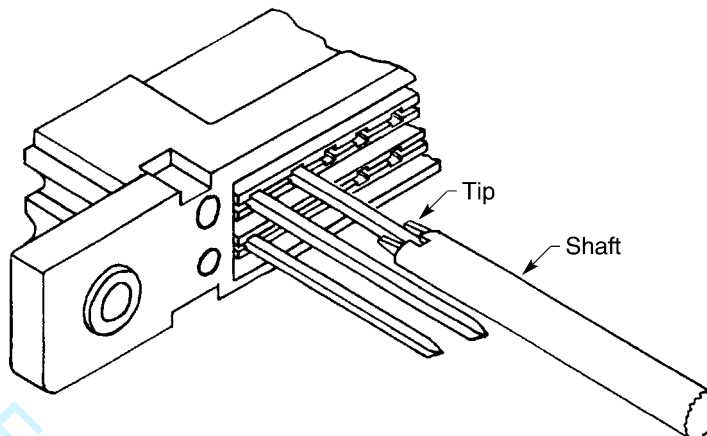


**WIRE WRAP POST REMOVAL TOOL**  
**Figure 24**

- (4) Carefully put the tool tip on the post so that the tool is axially aligned with the post. Refer to Figure 25.

## STANDARD WIRING PRACTICES MANUAL

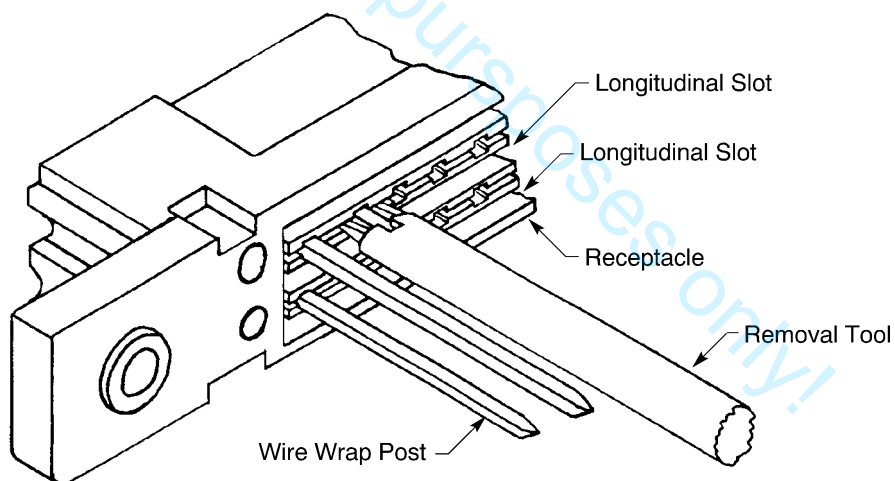
### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS



**ALIGNMENT OF THE REMOVAL TOOL AND THE POST**  
Figure 25

- (5) Push the tool onto the post until the tips of the tool are in the slots that are adjacent to the sides of the post. Refer to Figure 26.

**CAUTION:** IF THE REMOVAL TOOL DOES NOT STAY AXIALLY ALIGNED WITH THE POST, DAMAGE TO THE RECEPTACLE CAN OCCUR.



**POSITION OF THE TIPS OF THE REMOVAL TOOL IN THE LONGITUDINAL SLOT**  
Figure 26

- (6) Hold the tool in position against the receptacle.
- (7) Push the post driver of the tool until the pin is released from the contact retention mechanism.
- (8) Remove the wire wrap pin from the front of the receptacle.

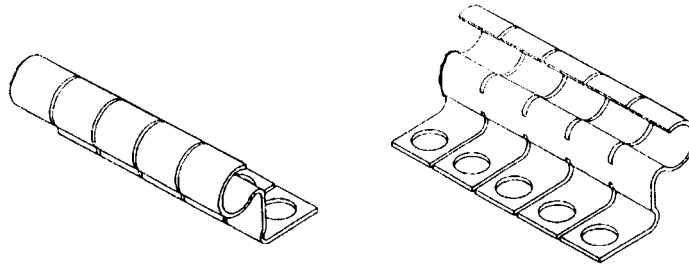
**20-72-17**

## STANDARD WIRING PRACTICES MANUAL

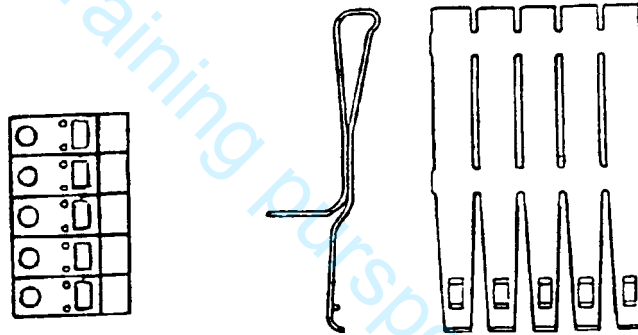
### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

#### 5. ASSEMBLY OF THE PLUG MODULE

##### A. Wafer Assembly



**AIE LATCH HOOK**  
Figure 27

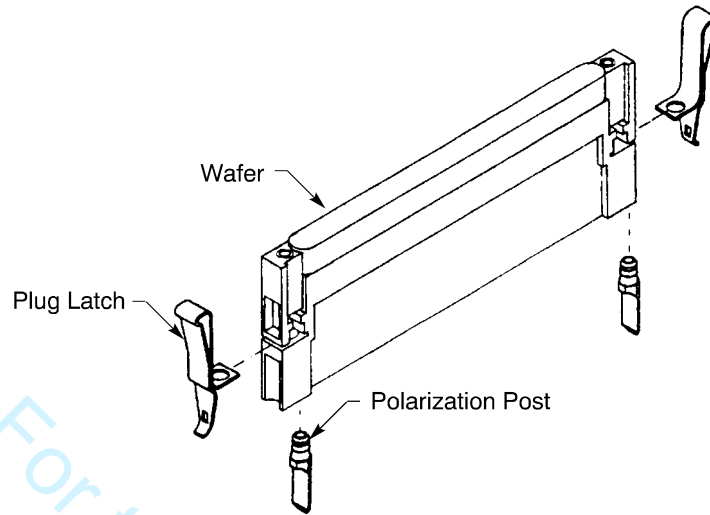


**AMP PLUG LATCH**  
Figure 28

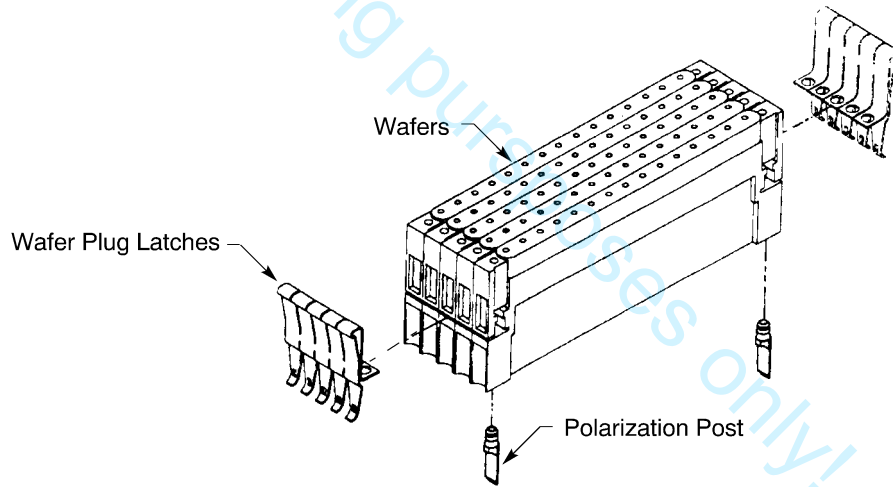
- (1) Make a selection of plug latches or latch hooks from Table 6. Refer to Figure 27 and Figure 28. Make sure that the selection agrees with the connector installation retention mechanism of the lifter latch system. Refer to Paragraph 8.A.
  - (2) If the connector has more than one wafer, put the wafers together so that:
    - The sides of the wafers are against each other
    - The ends of the wafers are aligned.
  - (3) Install the wafer latches or the latch hooks in both lower slots of each wafer.
- Refer to:
- Figure 29 and Figure 30 for a wafer assembly with plug latches
  - Figure 31 and Figure 32 for a wafer assembly with latch hooks.

**STANDARD WIRING PRACTICES MANUAL**

**ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS**



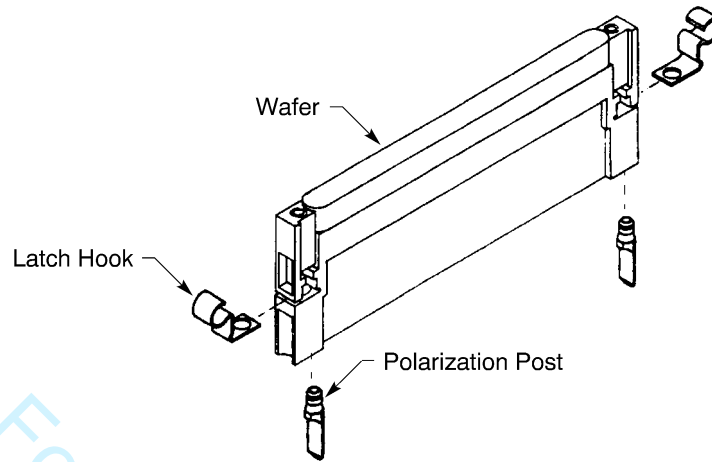
**SINGLE WAFER WITH PLUG LATCHES**  
**Figure 29**



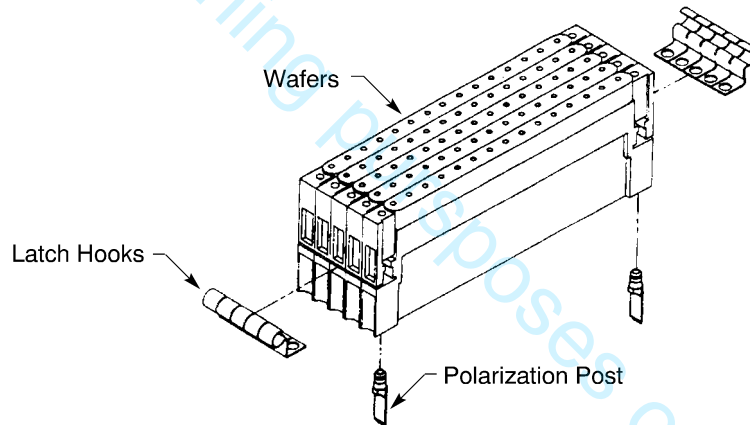
**FIVE WAFERS WITH PLUG LATCHES**  
**Figure 30**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS



**SINGLE WAFER WITH LATCH HOOKS**  
Figure 31



**FIVE WAFERS WITH LATCH HOOKS**  
Figure 32

- (4) Put the polarization post into the plug module so that:
- The polarization post is in the correct position
  - The plug latches or the latch hooks stay in position.

Refer to Table 9 for the post polarization codes.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Refer to:

- Figure 19 for a one wafer module
- Figure 20 for a two wafer module
- Figure 21 for a three wafer module.

#### 6. 280U00()-() CONNECTOR ASSEMBLY

##### A. Wafer Assembly

Refer to Paragraph 5.

##### B. Contact Assembly

**Table 13**  
**CONTACT CRIMP TOOLS**

Contact Size	Wire Size (AWG)	Crimp Tool		
		Basic Unit		Locator
		Part Number	Setting	
2020HD	24	AFM8	5	K13-1
		M22520/2-01		M22520/2-08
	22	AFM8	6	K13-1
		M22520/2-01		M22520/2-08
	20	AFM8	7	K13-1
		M22520/2-01		M22520/2-08

- (1) Make a selection of a contact crimp tool from Table 13.
- (2) Remove a 0.16 inch  $\pm 0.03$  inch length of insulation from the end of the wire.
- (3) Put the wire in the crimp barrel of the contact.

Make sure that:

- The end of the conductor is against the bottom of the crimp barrel
- All of the conductor strands are in the crimp barrel
- The conductor strands can be seen in the inspection hole.

- (4) Crimp the contact.

Make sure that the distance from the end of the wire insulation to the end of the crimp barrel is not more than 0.06 inch.

##### C. Contact Insertion

This paragraph gives the procedure to install crimp contacts. Refer to Paragraph 6.D. for the procedure to install wire wrap pin contacts.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 14  
CONTACT INSERTION TOOLS

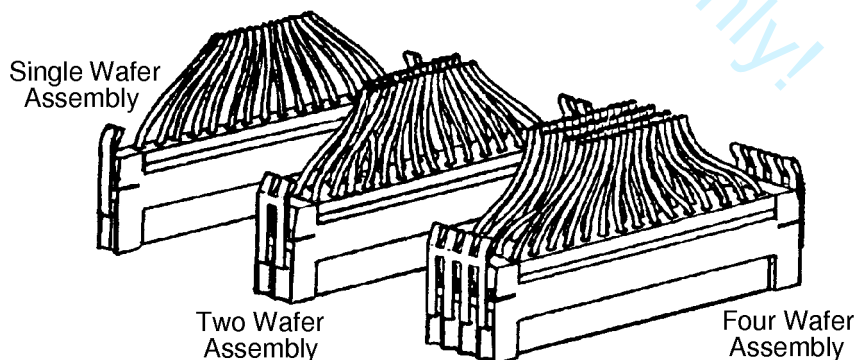
Contact Size	Part Number	Supplier
2020HD	282881	Radiall
	91066-4	Amp
	ATC1072	Astro
	CIET-20HDL	ITT Cannon
	DAK145J	Daniels
	M81969/1-02	QPL
	MS3156-20	QPL

- (1) Make a selection of an insertion tool from Table 14.
- (2) Put the insertion tool on the contact.
- (3) Axially align the contact with the contact cavity.
- (4) Push the contact into the contact cavity until it stops.
- (5) Carefully pull the insertion tool out of the contact cavity.
- (6) 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 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.

- (7) If the contact is not locked in the contact cavity:
  - (a) Pull the contact out of the contact cavity.
  - (b) Do Step (2) through Step (6) again.



WIRED WAFER ASSEMBLIES

Figure 33

## STANDARD WIRING PRACTICES MANUAL

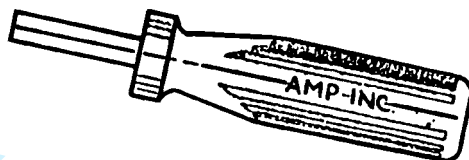
### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

#### D. Wire Wrap Pin Insertion

Table 15  
WIRE WRAP PIN INSERTION TOOLS

Contact Size	Insertion Tool
20	58347
20	DAK346

- (1) Make a selection of a wire wrap pin insertion tool from Table 15. Refer to Figure 34.



AMP WIRE WRAP PIN INSERTION TOOL  
Figure 34

- (2) Put the wire wrap pin into the front of the receptacle so that:
- The pin end points toward the contact cavity
  - The pin is axially aligned with the contact cavity.
- (3) Align the center of the tool tip hole with the end of the wire wrap pin.
- (4) Put the shaft of the tool over the wire wrap pin.
- (5) Push the tool until the tip is against the shoulder of the wire wrap pin.
- (6) Carefully push the tool into the contact cavity until the tip of the tool is against the front face of the receptacle.

**CAUTION:** THE INSERTION TOOL MUST STAY PERPENDICULAR TO THE FRONT FACE OF THE RECEPTACLE. DAMAGE TO THE RECEPTACLE CAN OCCUR.

#### 7. 284U1147()-() CONNECTOR ASSEMBLY

##### A. Wafer Assembly

Refer to Paragraph 5.

##### B. Configuration of Contact Assembly Components

Table 16  
284U1147()-() COMPONENT CONFIGURATION

Connector	Wafers	Component Configuration			
		Component	Specification	Position	Reference
284U1147()-()	1	Diode	JANTX1N5618	1	Figure 39
				2	
				3	

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 16 (continued)

Connector	Wafers	Component Configuration			
		Component	Specification	Position	Reference
284U1147-1()	1	Diode	JANTX1N5552	1	Figure 39
				2	
				3	
284U1147-10()	1	Diode	JANTX1N5618	1	Figure 39
				2	
				3	
284U1147-1072	1	Resistor	RLR05C4221F	1	Figure 41
			RLR05C2001F	2	
284U1147-11()	1	Diode	JANTX1N5552	1	Figure 39
				2	
				3	
284U1147-1166	1	Resistor	RLR07C1211F	1	Figure 42
				2	
				3	
284U1147-12()	1	Resistor	RLR05C4871F	1	Figure 41
			RLR05C1211F	2	
284U1147-13()	1	Resistor	RLR07C4701G	1	Figure 42
				2	
				3	
284U1147-14()	1	Resistor	RLR07C4992F	1	Figure 42
				2	
				3	
284U1147-16()	1	Diode	JANTX1N5618	1	Figure 40
				2	
				3	
284U1147-17()	1	Resistor	RLR05C4321F	1	Figure 41
			RLR05C1691F	2	
284U1147-18()	1	Resistor	RLR05C4221F	1	Figure 41
			RLR05C1821F	2	
284U1147-1919	1	Resistor	RLR07C2000F	1	Figure 42
				2	
				3	

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 284U00()-() AND 284U1147()-() CONNECTORS

Table 16 (continued)

Connector	Wafers	Component Configuration			
		Component	Specification	Position	Reference
284U1147-2()	1	Resistor	RLR05C4871F	1	Figure 41
			RLR05C1211F	2	
284U1147-2001	1	Resistor	RLR20C6200G	1	Figure 42
				2	
				3	
284U1147-3()	1	Resistor	RLR07C4701G	1	Figure 42
				2	
				3	
284U1147-4()	1	Resistor	RLR07C4992F	1	Figure 42
				2	
				3	
284U1147-6()	1	Diode	JANTX1N5618	1	Figure 40
				2	
				3	
284U1147-7()	1	Resistor	RLR05C4321F	1	Figure 41
			RLR05C1691F	2	
284U1147-72	1	Resistor	RLR05C4221F	1	Figure 41
			RLR05C2001F	2	
284U1147-8()	1	Resistor	RLR05C4221F	1	Figure 41
			RLR05C1821F	2	
284U1147-12()	2	Resistor	RWR84S1R00FR	1	Figure 43
284U1147-13()	2	Resistor	RWR84S1400FR	1	Figure 43
284U1147-14()	2	Resistor	RWR84S5490FR	1	Figure 43
284U1147-16()	2	Resistor	RCR32C10R0FR	1	Figure 43
284U1147-1824	2	Resistor	RWR89S1001FR	1	Figure 43
284U1147-1826	2	Resistor	RWR89S1001FR	1	Figure 43
284U1147-2()	2	Resistor	RWR84S1R00FR	1	Figure 43
284U1147-3()	2	Resistor	RWR84S1400FR	1	Figure 43
284U1147-4()	2	Resistor	RWR84S5490FR	1	Figure 43
284U1147-6()	2	Resistor	RCR32C10R0FR	1	Figure 43
284U1147-1831	3	Capacitor	M39022-01-1413	1	Figure 44
284U1147-1834	3	Capacitor	M39022-01-1413	1	Figure 44

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 16 (continued)

Connector	Wafers	Component Configuration			
		Component	Specification	Position	Reference
284U1147-1837	3	Capacitor	M39022-01-1413	1	Figure 44
284U1147-1840	3	Capacitor	M39022-01-1413	1	Figure 44
284U1559-831	3	Capacitor	M39022-01-1413	1	Figure 44
284U1559-834	3	Capacitor	M39022-01-1413	1	Figure 44
284U1559-837	3	Capacitor	M39022-01-1413	1	Figure 44
284U1559-840	3	Capacitor	M39022-01-1413	1	Figure 44

Table 17  
ALTERNATE RESISTOR PART NUMBER SERIES

Number of Wafers	Resistor			Alternative Resistor		
	Part Number Series	Resistance Tolerance (percent)	Failures per 1000 hours (percent)	Part Number Series	Resistance Tolerance (percent)	Failures per 1000 hours (percent)
1	R()FR	1	0.01	R()GR	2	0.01
	R()FS	1	0.001	R()FR	1	0.01
				R()GR	2	0.01
	R()GS	2	0.001	R()GR	2	0.01
2	R()FR	1	0.01	R()GR	2	0.01
	R()FS	1	0.001	R()FR	1	0.01
				R()GR	2	0.01
	R()GS	2	0.001	R()GR	2	0.01

Table 18  
COMPONENT CONDUCTOR CONFIGURATION DIMENSIONS

Component	Configuration Dimension		
	Dimension	Target (inch)	Tolerance (inch)
JANTX1N5552	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 18 (continued)

Component	Configuration Dimension		
	Dimension	Target (inch)	Tolerance (inch)
JANTX1N5618	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
M39022-01-1413	D	1.30	± 0.10
	L	1.47	± 0.10
	R	0.03	-0
	S	3.00	± 0.10
	T	0.03	-0
RCR32C10R0FS	D	1.35	± 0.10
	L	1.52	± 0.10
	R	0.03	-0
	S	3.00	± 0.10
	T	0.03	-0
RLR05C1211FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR05C2001FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR05C4221FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 18 (continued)

Component	Configuration Dimension		
	Dimension	Target (inch)	Tolerance (inch)
RLR05C4321FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR05C4871FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR07C1211FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR07C2000FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR07C4701GS	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR07C4992FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 18 (continued)

Component	Configuration Dimension		
	Dimension	Target (inch)	Tolerance (inch)
RLR20C6200G	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR05C1691FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RLR05C1821FR	D	0.50	± 0.10
	L	0.67	± 0.10
	R	0.03	-0
	S	1.00	± 0.10
	T	0.03	-0
RWR84S1400FR	D	1.35	± 0.10
	L	1.52	± 0.10
	R	0.03	-0
	S	3.00	± 0.10
	T	0.03	-0
RWR84S1R00FR	D	1.35	± 0.10
	L	1.52	± 0.10
	R	0.03	-0
	S	3.00	± 0.10
	T	0.03	-0
RWR84S5490FS	D	1.35	± 0.10
	L	1.52	± 0.10
	R	0.03	-0
	S	3.00	± 0.10
	T	0.03	-0

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

Table 18 (continued)

Component	Configuration Dimension		
	Dimension	Target (inch)	Tolerance (inch)
RWR89S1001FR	D	1.35	$\pm 0.10$
	L	1.52	$\pm 0.10$
	R	0.03	-0
	S	3.00	$\pm 0.10$
	T	0.03	-0

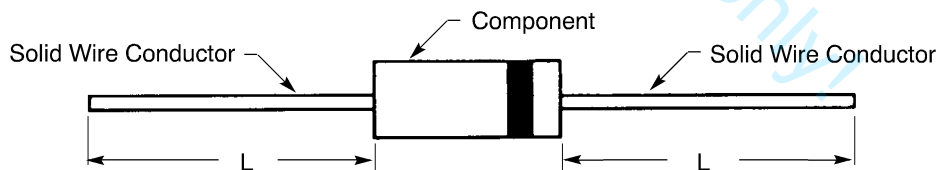
Table 19

### COMPONENT CONDUCTOR CONFIGURATION REFERENCES

Dimension	Reference
D	Figure 36
L	Figure 35
R	Figure 37
S	Figure 37
T	Figure 37

- (1) Make a selection of a wafer from Table 4.
  - (2) Make a selection of the necessary components from Table 16.
- NOTE:** For the satisfactory alternatives to the resistors in Table 16, refer to Table 17.
- (3) Remove the necessary length of the solid wire conductor so that the distance from the end of the component to the end of the solid wire conductor is dimension L.

Refer to Table 18 and Table 19.


**SOLID WIRE CONDUCTOR TRIM DIMENSION**
**Figure 35**

- (4) Install a contact on each component conductor.
  - (a) Make a selection of:
    - A Sn63 solder
    - A RMA Flux.

Refer to Subject 20-00-11.
  - (b) Put 0.2 inch of the end of the conductor into RMA flux momentarily.

# 20-72-17

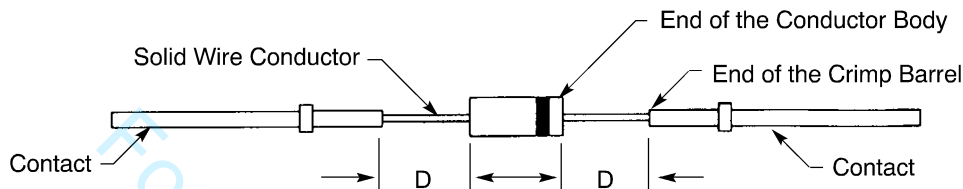
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

- (c) Put the crimp barrel of the contact into RMA flux momentarily.  
Make sure that no flux touches the front socket area of the contact.
- (d) Put the conductor into the crimp barrel so that the distance from the end of the crimp barrel to the component body is dimension D.

Refer to:

- Table 18
- Table 19.



**POSITION OF THE CONTACT ON THE COMPONENT CONDUCTOR**

**Figure 36**

- (e) Apply heat to the crimp barrel of the contact so that contact is soldered to the conductor.

**CAUTION:** DO NOT APPLY MORE THAN THE NECESSARY AMOUNT OF HEAT FOR LONGER THAN THE NECESSARY AMOUNT OF TIME TO MELT THE SOLDER.

**CAUTION:** DO NOT PUT SOLDER ON THE OUTSIDE OF THE CRIMP BARREL. SOLDER ON THE OUTSIDE OF THE CONTACT CAN PREVENT THE INSERTION OF THE CONTACT INTO THE CONTACT CAVITY.

- (f) Remove the flux from the component conductor and contact.

#### C. Contact Insertion

- (1) Bend each conductor so that:
  - The contacts are parallel with each other
  - The distance between the axial center of the contacts is dimension S
  - The minimum length of the straight axial conductor from the component to the first bend is dimension T
  - The minimum bend radius of the conductor is dimension R.

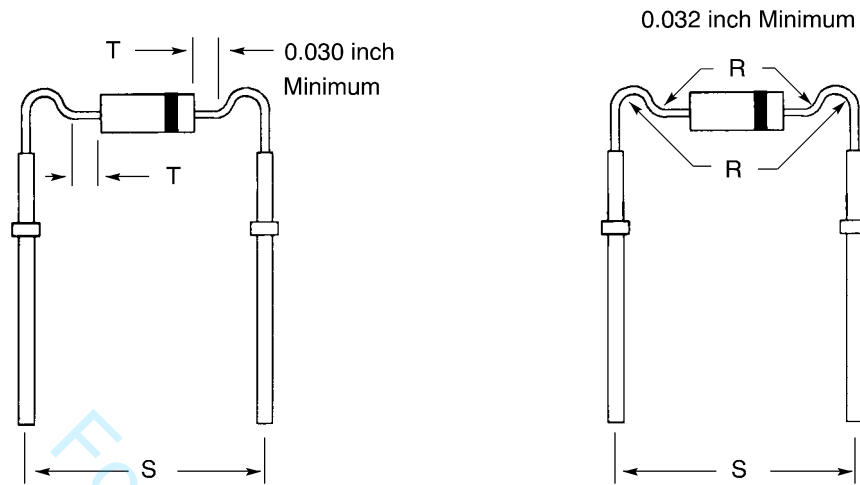
Refer to:

- Table 18 for the dimensions
- Table 19 for the Figures that show the dimensions.

**NOTE:** For a satisfactory alternative configuration of the components, refer to Figure 38.

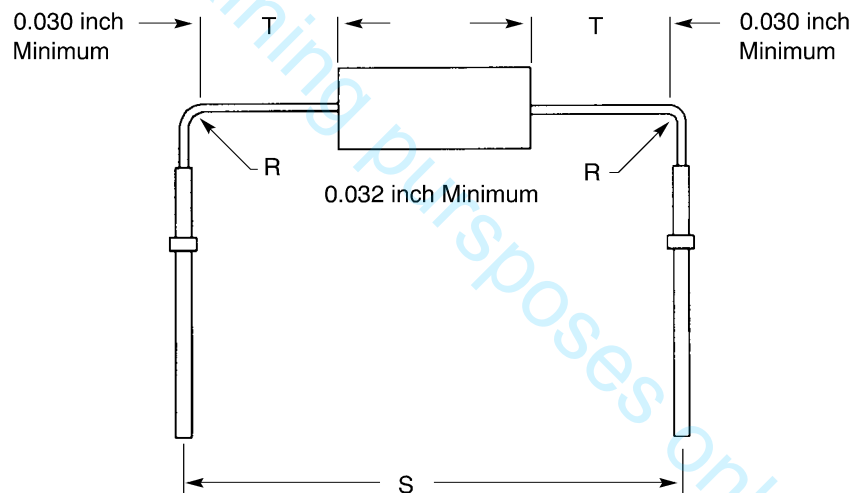
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS



#### RECOMMENDED COMPONENT CONFIGURATION

Figure 37



#### ALTERNATIVE COMPONENT CONFIGURATION

Figure 38

- (2) Push the two contacts into the correct cavities of the wafer at the same time.

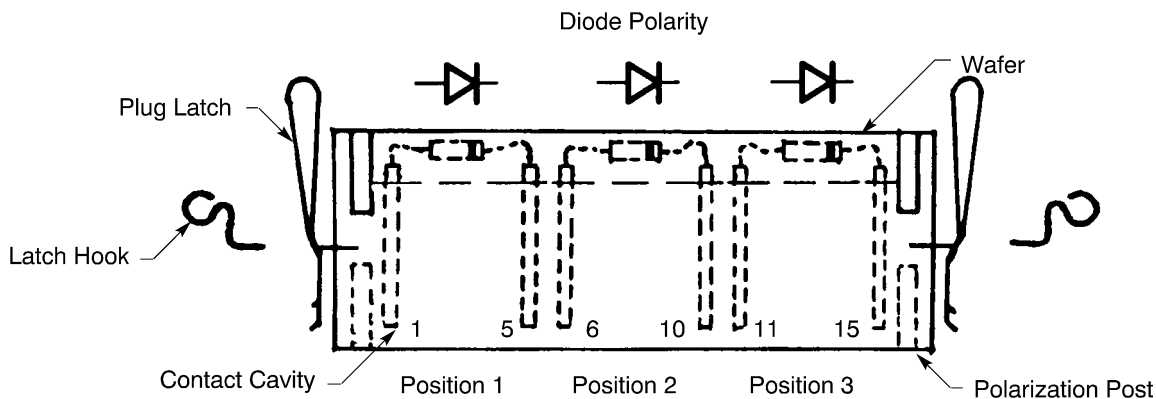
Make sure that:

- Each component has the correct polarization
- Each contact is fully installed.

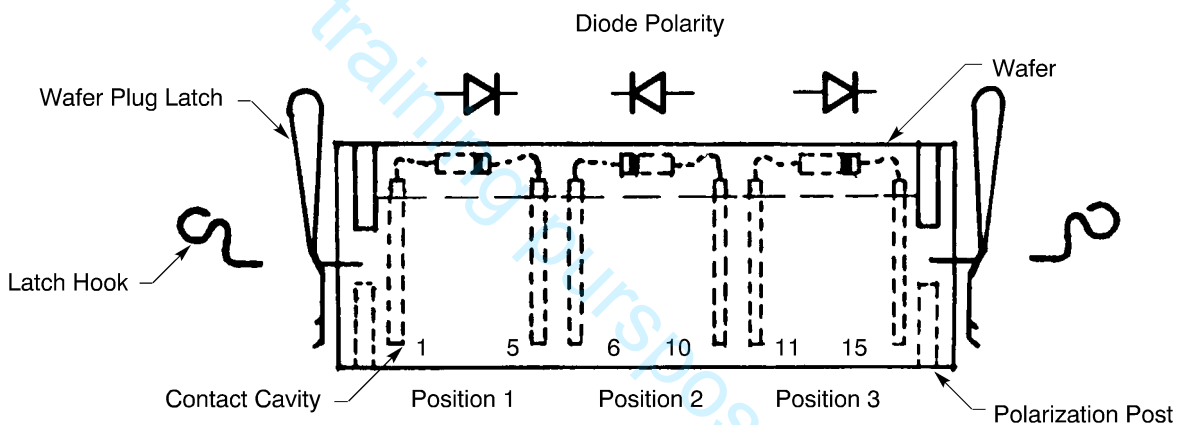
**NOTE:** The black band on the diode identifies the cathode.

**STANDARD WIRING PRACTICES MANUAL**

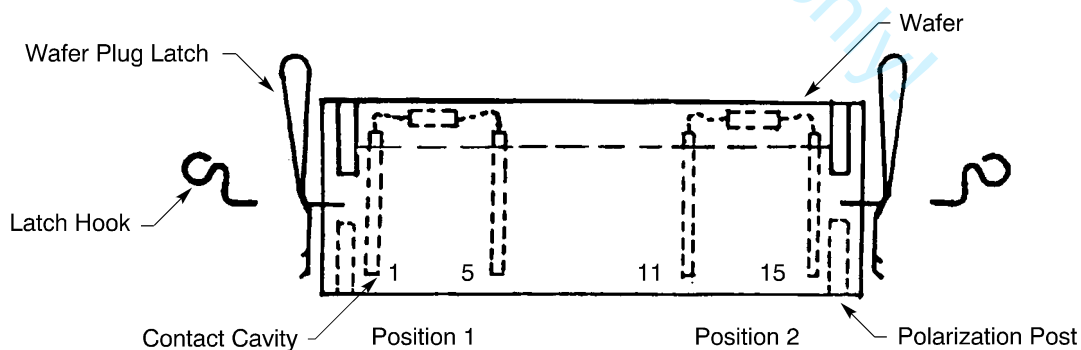
**ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS**



**ONE WAFER PLUG WITH THREE DIODES THAT HAVE THE SAME POLARITY**  
**Figure 39**



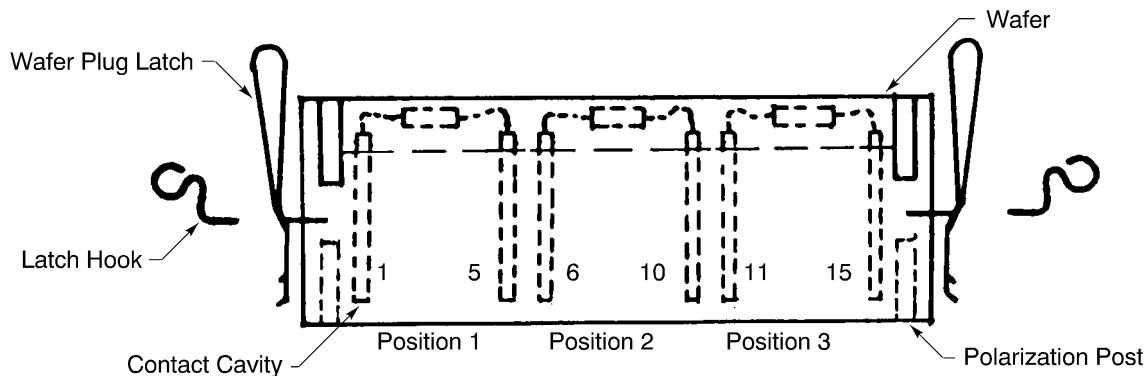
**ONE WAFER PLUG WITH THREE DIODES WITH DIFFERENT POLARITY**  
**Figure 40**



**ONE WAFER PLUG WITH TWO RESISTORS**  
**Figure 41**

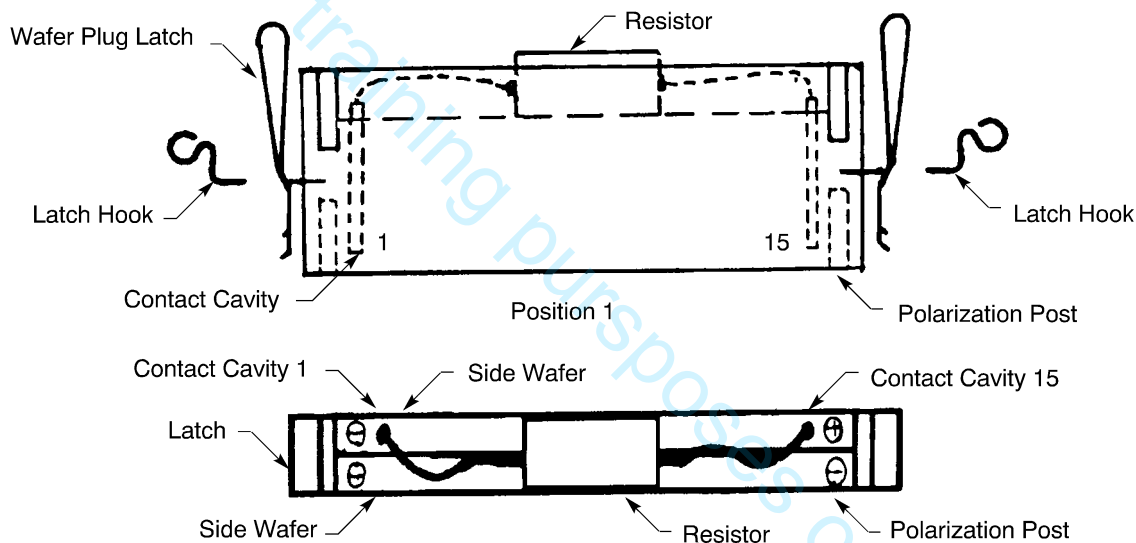
**STANDARD WIRING PRACTICES MANUAL**

**ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS**



**ONE WAFER PLUG WITH THREE RESISTORS**

**Figure 42**

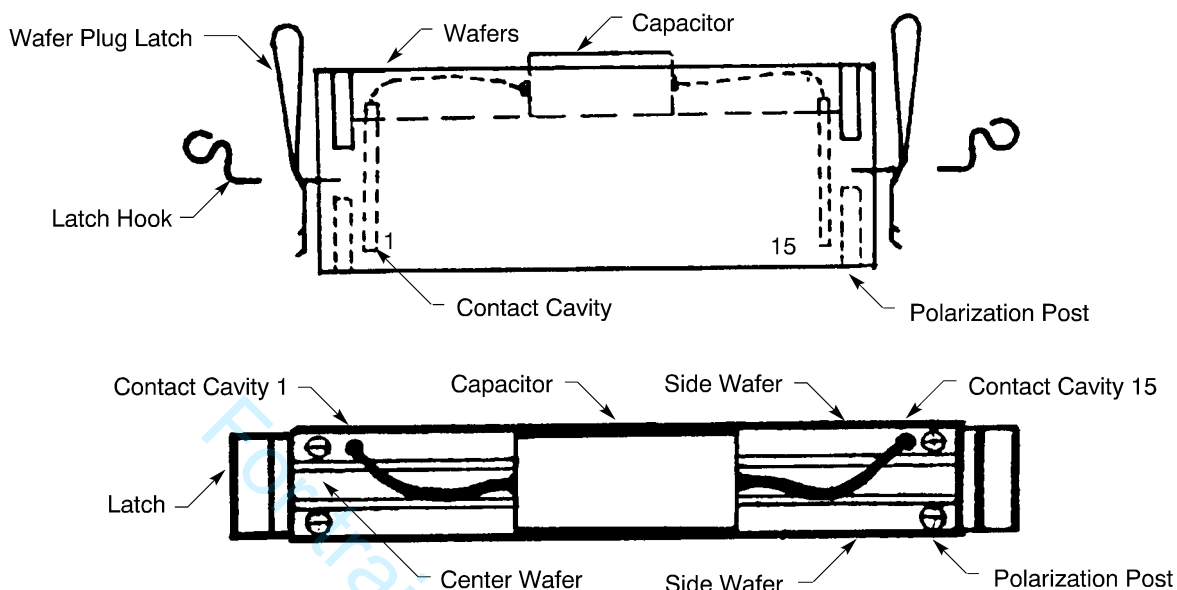


**TWO WAFER PLUG MODULE WITH ONE RESISTOR**

**Figure 43**

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS



**THREE WAFER PLUG MODULE WITH ONE CAPACITOR**  
Figure 44

## 8. CONNECTOR INSTALLATION

### A. General Conditions

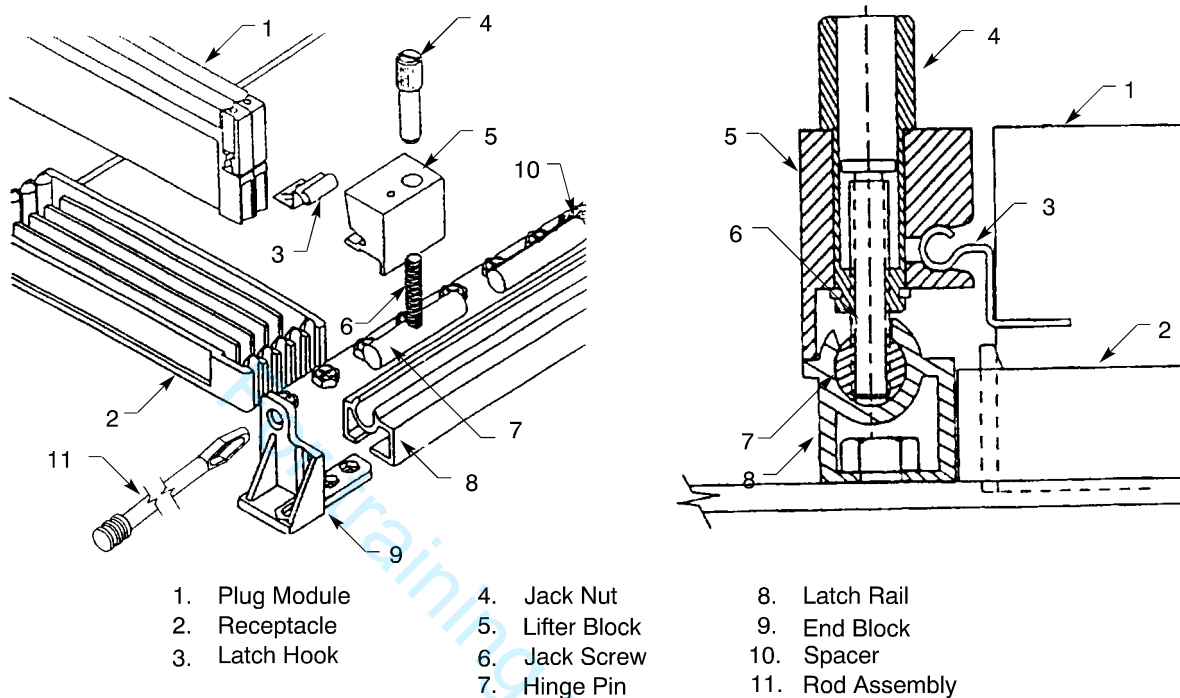
These conditions are applicable:

- A plug module that is assembled with latch hooks must be installed in a receptacle assembly that has a lifter latch system with lifter blocks
- If a lifter latch system does not have any lifter blocks, a plug module that is assembled with latch hooks can be assembled again with plug latches
- A plug module that is assembled with plug latches can be installed in a lifter latch system that does or does not have lifter blocks.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

### B. Assembly of the Lifter Latch System with Lifter Blocks

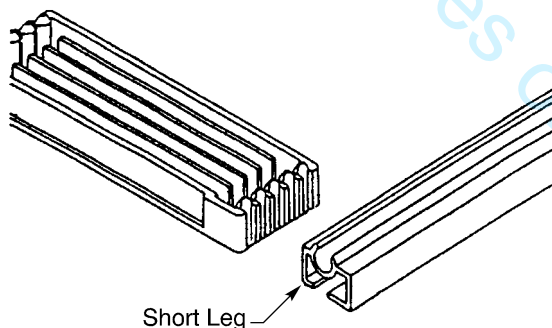


### AIE LIFTER LATCH SYSTEM WITH LIFTER BLOCKS

Figure 45

Refer to Figure 45.

- (1) Put the rail in the correct position. Refer to Figure 46.



### POSITION OF THE LATCH RAIL IN RELATION TO THE RECEPTACLE

Figure 46

- (2) Put each of these components on the rail:
  - The spacers
  - The receptacle
  - The lifter blocks.
- (3) Install the mounting hardware on the end blocks.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

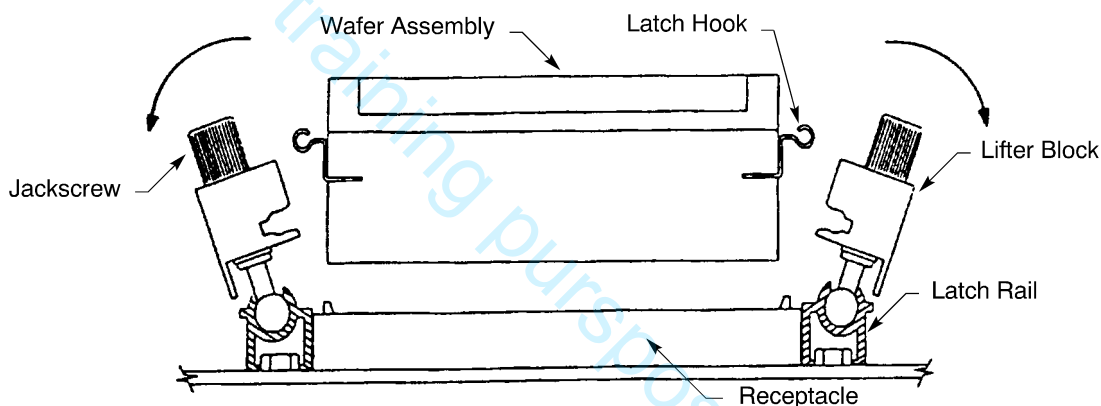
- (4) Put the end blocks into the rails.  
Make sure that the end blocks have the correct polarization.
- (5) Put the mounting hardware through the mounting holes.
- (6) Tighten the mounting hardware.

#### C. Installation of the Plug

- (1) If the plug is assembled with plug latches, push the plug into the receptacle until the plug latches are locked in the internal latch mechanism of the receptacle.

**CAUTION:** IF THE PLUG LATCHES ARE NOT LOCKED IN POSITION, UNSATISFACTORY PERFORMANCE CAN OCCUR.

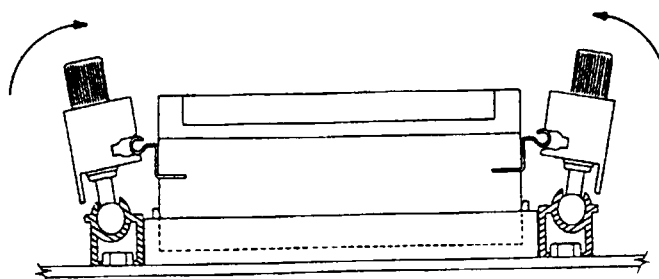
- (2) If the plug is assembled with latch hooks:
  - (a) If it is necessary, loosen the jackscrews of the lifter blocks on both sides of the receptacle.
  - (b) Push both lifter blocks away from the receptacle. Refer to Figure 47.



**LIFTER BLOCKS IN THE OPEN POSITION**

**Figure 47**

- (c) Push the plug into the receptacle.
- (d) Push both lifter blocks toward the plug so that the latch hooks go into the lifter blocks. Refer to Figure 48.



**DIRECTION TO MOVE THE LIFTER BLOCK**

**Figure 48**

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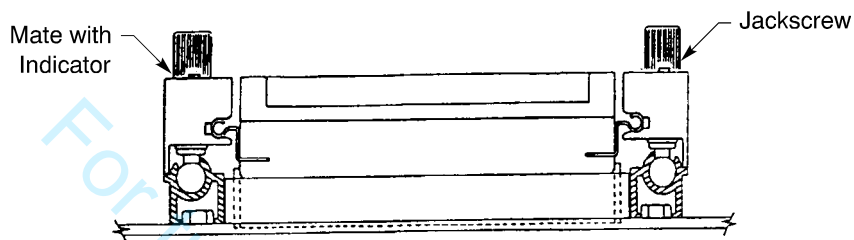
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS

- (e) Tighten each jackscrew at the same time until:
- The plug is fully installed in the receptacle
  - The latch hooks are locked in position
  - The mate with indicator can be seen.

Refer to Figure 49.

**CAUTION:** IF THE LATCH HOOKS ARE NOT LOCK IN POSITION, UNSATISFACTORY PERFORMANCE CAN OCCUR.



**POSITION OF THE LIFTER BLOCKS AND LATCH HOOKS**  
**Figure 49**

- (3) If the lifter latch system has lifter blocks, install the rod assembly so that:
- The rod goes through the hole in one end block
  - The rod goes through the hole in the other end block
  - The shoulder of the rod assembly touches the first end block.

## 9. APPROVED TOOL SUPPLIERS

### A. Contact Removal Tools

**Table 20**  
**REMOVAL TOOL SUPPLIERS**

Removal Tool	Supplier
282-891	Radiall
58324-1-0	AMP
91066-4	AMP
CIET-20HDL	ITT Cannon
DRK145	Daniels
DRK347	Daniels
M81969/1-02	QPL
MS3156-20	QPL

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF BOEING 280U00()-() AND 284U1147()-() CONNECTORS****B. Contact Crimp Tools**

**Table 21**  
**CRIMP TOOL SUPPLIERS**

<b>Crimp Tool</b>	<b>Supplier</b>
AFM8	Daniels
K13-1	Daniels
M22520/2-01	QPL
M22520/2-08	QPL

**C. Contact Insertion Tools**

**Table 22**  
**INSERTION TOOL SUPPLIERS**

<b>Insertion Tool</b>	<b>Supplier</b>
282-881	Radiall
58347	AMP
91066-4	AMP
ATC1072	Astro
CIET-20HDL	ITT Cannon
DAK145J	Daniels
DAK346	Daniels
M81969/1-02	QPL
MS3156-20	QPL

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## STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

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## STANDARD WIRING PRACTICES MANUAL

### WIRE WRAP CONNECTIONS

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**STANDARD WIRING PRACTICES MANUAL****WIRE WRAP CONNECTIONS****1. GENERAL DATA****A. Definitions**

A wire wrap connection is a continuous, solid, and uninsulated wire that is tightly wrapped around a terminal post without any overlaps to make a mechanically and electrically stable connection.

**Table 1**  
**DEFINITIONS**

<b>Term</b>	<b>Definition</b>
End Tail	The end of the last turn of uninsulated wire
End Turn	The last or top turn of a wire wrap connection
Gas Tight Area	The area where the wire touches the terminal post and where no gas fumes are permitted when the wire wrap connection is correct
High Turn	A turn of wire raised off the post by interference with an adjacent turn of wire; a condition that can be caused by more than the necessary pressure applied to the tool
Insulation Removal	The removal of insulation from the end of the wire
Lead Turn	The first or lowest turn of the wire on the post
Manual Wire Wrap	A wire wrap connection that is made with a manual tool
Overwrap	A wire turn on top of another wire turn in the same wire wrap connection
Strip Force	The force that is necessary to move the entire wrapped connection the length of one connection
Terminal Post	A rigid, metallic post with a rectangular or square cross section on which a solid round wire is wrapped
Turn	Refer to Wire Turn
Unwrap Tool	A tool used to unwrap the wire turns in order to remove a wire wrap connection
Wire Dress	The direction or position of the wiring between the connections of the assembly
Wire Routing	The physical location and position of the wiring
Wire Turn	One full turn of the wire around the terminal post so that the wire touches all of the corners of the post; to count turns, count the number of times the wire goes across the corner of the post above the first corner touched by the wire
Wrap Tool	A tool that has a bit and a sleeve assembly and is used to wrap a solid conductor wire around a terminal post
Wrap Level	The area of the terminal post that has the wire wrap connection; the 1st level is at the base of the post; the 2nd level is at the middle post; the 3rd level is at the top of the post

**B. General Conditions for Assembly and Installation**

For the protection of all personnel, it is necessary that the power to all applicable circuits in the Wire Integration Unit (WIU) is set to the OFF position before and during the work that is done on the WIU.

**STANDARD WIRING PRACTICES MANUAL****WIRE WRAP CONNECTIONS**

For the protection of the equipment and any circuit that is connected to the equipment, it is necessary that:

- The power to all applicable circuits in the WIU is set to the OFF position
- A connector cover is on a connector set while no work is done on the set
- The cover is on the WIU at all times while no work is done on the WIU
- Damage from Electrostatic Discharge is prevented; refer to Subject 20-41-01.

**C. Process Control for the Assembly of Wire Wrap Connections**

Some tests can and should be done to make sure that the wire wrap process, that is the procedures and the tools, has results that are serviceable. These tests include:

- The Resistance Test to measure the resistance between the terminal post and the conductor: refer to Paragraph 9.B.
- The Terminal Strip Force Test to measure the force that is necessary to axially move a wrapped wire along the terminal post; refer to Paragraph 9.C.
- The Unwrap Test to find a broken conductor after the wire has been wrapped; refer to Paragraph 9.D.
- The Gas Tight Test to make sure that there is a gas tight joint between the terminal post and the conductor; refer to Paragraph 9.E.

NOTE: It is recommended that the tests are done on prepared samples and not on the aircraft hardware.

These tests are recommended as standard practices:

- The Resistance Test
- The Terminal Strip Force Test.

The aircraft operator can make the decision to do these tests:

- The Unwrap Test
- The Gas Tight Test.

**D. General Conditions of the Wire Wrap Tests**

These conditions are applicable for the test samples:

- 24 samples for initial tests
- 6 samples for regular schedule tests
- 2 wrap levels on each post with some space between the levels
- Sufficient space between the first level and the terminal base for an insulation removal tool; refer to Figure 23.

**E. Initial Tests**

The initial tests are done:

- On new tools
- On tools that have been repaired, adjusted, or modified
- On tools that have not had an initial test for a six month period
- Every ten working days on tools that are constantly used.

These tests are done in sequence on 12 of the samples:

- The Resistance Test
- The Terminal Strip Force Test
- The Unwrap Test.

The Gas Tight Test is done on the remaining 12 samples.

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

### F. Regular Schedule Tests

The regular schedule tests are done:

- On the tools that are constantly used
- After any tool bit, sleeve, or wrapper is changed
- On a tool that has been dropped or has not been handled correctly so that it is possible that the operation of the tool is not satisfactory.

These tests are done in sequence on the 6 samples:

- The Terminal Strip Force Test
- The Unwrap Test.

## 2. PART NUMBERS AND DESCRIPTION

### A. Wire Wrap Connector Part Numbers

**Table 2**  
**WIRE WRAP CONNECTOR PART NUMBERS**

Part Number	Supplier	Cover Configuration	
		Quantity	Cover
AM1R57P6031	AMP	1	285T0631-1
BACC65T114	QPL	2	285T0625-2
BACC65T66	QPL	1	285T0625-1
BACC66E	QPL	2	285T0626-1
BACC66G	QPL	4	285T0626-1
BACC66J	QPL	8	285T0626-1
DBMM25P-F179A	ITT Cannon	1	285T0632-1
DBMM37P-F179A	ITT Cannon	1	285T0632-3
DBMM50P-F179A	ITT Cannon	1	285T0632-2
HPF052UFZL0320-BEC	SI-TAC	2	285U0173-2
HPF160UFZL0320-BEC	SI-TAC	2	285U0173-1

### B. Connector Cover Part Numbers

**Table 3**  
**CONNECTOR COVER PART NUMBERS**

Part Number	Supplier
285T0625-1	QPL
285T0625-2	QPL
285T0626-1	QPL
285T0631-1	QPL
285T0632-1	QPL

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

Table 3 (continued)

Part Number	Supplier
285T0632-2	QPL
285T0632-3	QPL
285U0173-1	QPL
285U0173-2	QPL

### 3. NECESSARY TOOLS

#### A. Insulation Removal Tools

Table 4  
INSULATION REMOVAL TOOLS

Wire Size (AWG)	Insulation Removal Tool	
	Part Number	Supplier
26	ST550	OK Industries
	45-145	Ideal Industries
	990732	The Cooper Group
24	ST550	OK Industries
	45-145	Ideal Industries
	990732	The Cooper Group
22	ST550	OK Industries
	45-145	Ideal Industries
	990732	The Cooper Group
20	ST550	OK Industries
	45-145	Ideal Industries
	990732	The Cooper Group
18	ST550	OK Industries
	45-145	Ideal Industries
	990732	The Cooper Group

Table 5  
REPLACEMENT BLADES FOR THE IDEAL STRIPMASTER MODEL 45-145

Wire Size (AWG)	Replacement Blade			
	Part Number	Size	Cutting Diameter (inch)	Counterbore Diameter (inch)
26	45-1696-1	26	0.018	0.028
24	45-1594-1	26	0.023	0.033

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

Table 5 (continued)

Wire Size (AWG)	Replacement Blade			
	Part Number	Size	Cutting Diameter (inch)	Counterbore Diameter (inch)
22	45-1594-1	24	0.028	0.040
20	45-1594-1	22	0.034	0.046
18	45-1594-1	20	0.043	0.055

### B. Wire Wrap Tool Kits

Table 6  
WIRE WRAP TOOL KITS

Part Number	Description	Supplier
B-WWK-1	-	OK Industries
B-WWK-2	Hand wrap tools for AWG 26 through AWG 20 wires	OK Industries
SPBK-1	-	Standard Pneumatic
SPBK-2	Hand wrap tools for AWG 26 through AWG 20 wires	Standard Pneumatic
WBC747-400	-	The Cooper Group

### C. Wire Wrap Tools

Table 7  
MANUAL WIRE WRAP TOOLS

Wire Size (AWG)	Wrap Tool		
	Basic Unit	Sleeve	Supplier
26	G100/R3278	-	OK Industries
	SP42621	-	Standard Pneumatic
24	G100/R3278	-	OK Industries
	SP42422	-	Standard Pneumatic
22	G100/R3278	-	OK Industries
	SP42222	-	Standard Pneumatic
20	517219	990715	Cooper Tools
	990713	990715	Cooper Tools
	G100/R3278	-	OK Industries
	SP42020	-	Standard Pneumatic

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

Table 7 (continued)

Wire Size (AWG)	Wrap Tool		
	Basic Unit	Sleeve	Supplier
18	517219	990716	Cooper Tools
	990713	990716	Cooper Tools
	SP41810	-	Standard Pneumatic

Table 8  
SEMI-AUTOMATIC WIRE WRAP TOOLS

Wire Size (AWG)	Wrap Tool		
	Bit	Sleeve	Supplier
26	502118	512056	Cooper Tools
	502118	990722	Cooper Tools
	990717	990722	Cooper Tools
	WB26M	P2224	OK Industries
	52621	60200	Standard Pneumatic
24	504155	18840	Cooper Tools
	504155	990723	Cooper Tools
	990718	990723	Cooper Tools
	WB24DH	P2224	OK Industries
	52420	60200	Standard Pneumatic
22	504939	507939	Cooper Tools
	504939	990724	Cooper Tools
	990719	990724	Cooper Tools
	WB22MLD	P212	OK Industries
	WB2275M	P2224	OK Industries
	52222	60100	Standard Pneumatic
20	990720	990725	Cooper Tools
	WB20M	P194LN	OK Industries
	52020	60000	Standard Pneumatic
18	504222	18285	Cooper Tools
	504222	990726	Cooper Tools
	990721	990726	Cooper Tools
	KB18	P194	OK Industries
	51820	60000	Standard Pneumatic

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

### D. Wire Wrap and Unwrap Tools

Table 9  
WIRE WRAP AND UNWRAP TOOLS

Wire Size (AWG)	Wrap and Unwrap Tool		
	Part Number	Wrap Type	Supplier
26	HW-UW-26	Regular	OK Industries
	HW-UW-26SM	Modified	OK Industries
24	HW-UW-224-1	Regular	OK Industries
22	HW-UW-224-1	Regular	OK Industries
	HW-UW-22	Regular	OK Industries
20	HW-UW-20	Regular	OK Industries
18	HW-UW-18-19	Regular	OK Industries

### E. Wire Unwrap Tools

Table 10  
WIRE UNWRAP TOOLS

Wire Size (AWG)	Wire Wrap Post Size (inch)	Unwrap Tool		
		Type	Part Number	Supplier
26	0.025 x 0.025	Power	505084	Cooper Tools
			505244	Cooper Tools
			518921	Cooper Tools
			681	Cooper Tools
	0.045 x 0.045	Manual	515716	Cooper Tools
			SP690	Standard Pneumatic
			UW1	OK Industries
		Power	504769	Cooper Tools
			A31478	Cooper Tools
24	0.025 x 0.025	Power	505084	Cooper Tools
			505244	Cooper Tools
	0.045 x 0.045	Manual	515716	Cooper Tools
			SP690	Standard Pneumatic
			UW1	OK Industries
		Power	504769	Cooper Tools
			A31478	Cooper Tools

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

Table 10 (continued)

Wire Size (AWG)	Wire Wrap Post Size (inch)	Unwrap Tool		
		Type	Part Number	Supplier
22	0.045 x 0.045	Manual	515716	Cooper Tools
			SP690	Standard Pneumatic
			UW1	OK Industries
		Power	504769	Cooper Tools
			A31478	Cooper Tools
20	0.045 x 0.045	Manual	515716	Cooper Tools
			SP690	Standard Pneumatic
			UW1	OK Industries
		Power	504769	Cooper Tools
			A31478	Cooper Tools
18	0.045 x 0.045	Manual	A25195L	Cooper Tools

### 4. GENERAL CONDITIONS FOR THE WIRE ROUTING

This paragraph gives the necessary conditions for the wire routing in the Wire Integration Unit (WIU).

#### A. Effect of Wire Routing on the Tension of the Wires

The tension that the wire routing puts on the wires must not:

- Move the wires away from the wire wrap post
- Cause the number of corners of the wire wrap post that the one turn of insulated wire is against to fall below the limit that is specified in Table 11
- Put any force on the wire wrap post
- Put any force on the area where the wire is attached to the wire wrap post.

#### B. Directions of the Wire Routing

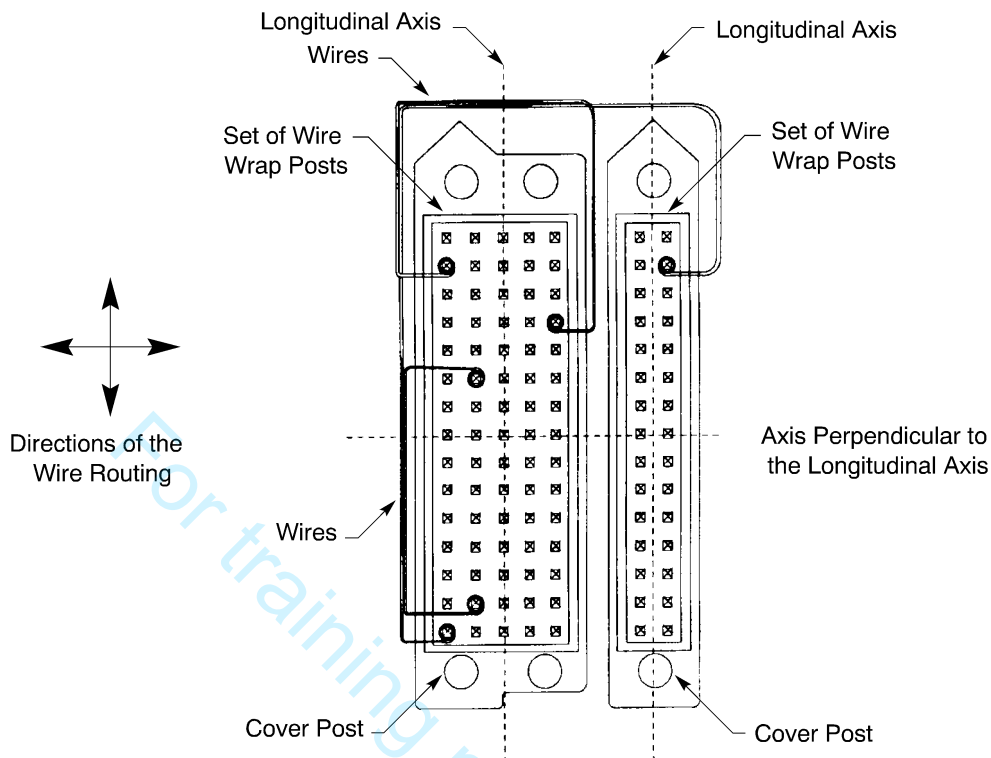
Refer to Figure 1 and Figure 2.

The direction of the wire routing from one wire wrap post to another wire wrap post in a set of wire wrap posts is:

- Parallel to the longitudinal axis of the set of wire wrap posts
- Parallel to the axis that is perpendicular to the longitudinal axis.

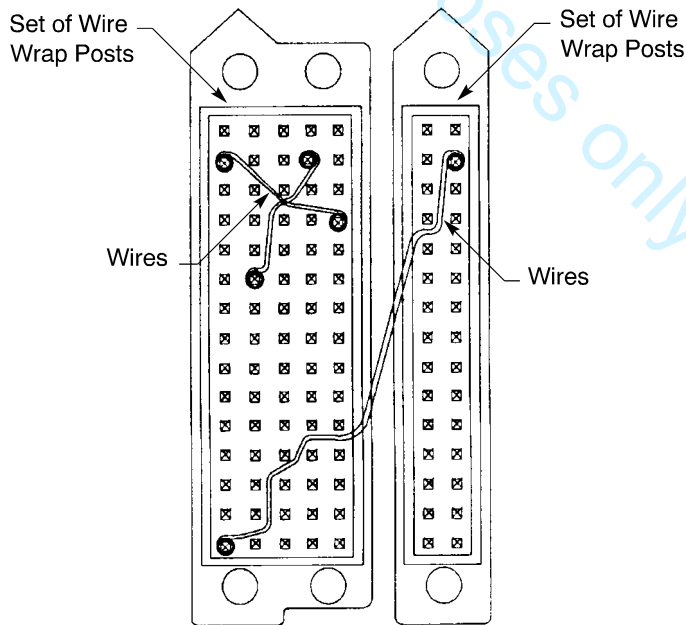
**STANDARD WIRING PRACTICES MANUAL**

**WIRE WRAP CONNECTIONS**



**SATISFACTORY DIRECTION OF THE WIRE ROUTING**

**Figure 1**



**UNSATISFACTORY DIRECTION OF THE WIRE ROUTING**

**Figure 2**

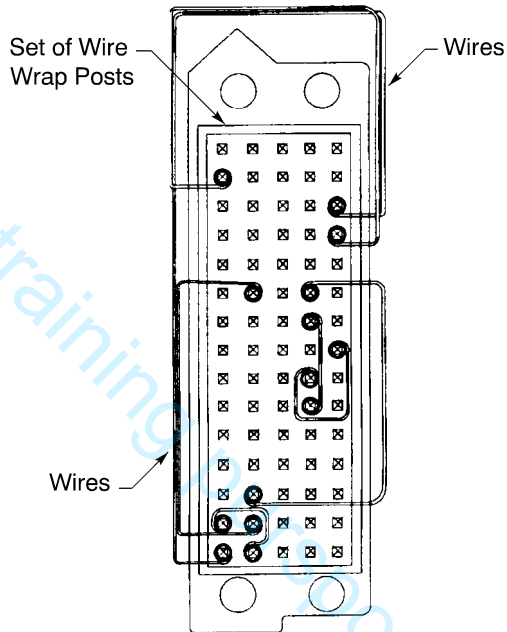
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**STANDARD WIRING PRACTICES MANUAL****WIRE WRAP CONNECTIONS****C. Wire Routing in the Same Set of Wire Wrap Posts**

The wire routing in the same set of wire wrap posts goes from one wire wrap post to another wire wrap post:

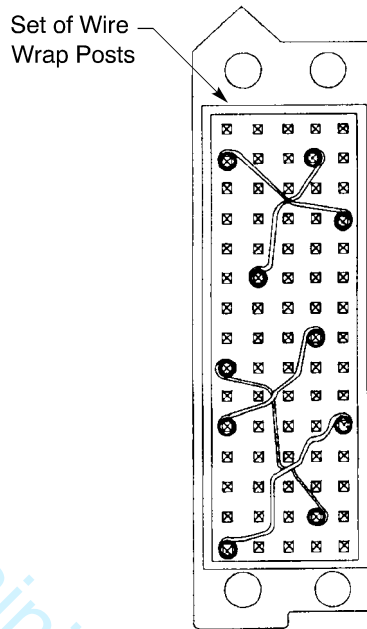
- Between the wire wrap posts
- Around the outside of the perimeter of the wire wrap posts and the cover posts.

Refer to Figure 3 and Figure 4.



**SATISFACTORY WIRE ROUTING IN THE SAME SET OF WIRE WRAP POSTS**

**Figure 3**

**STANDARD WIRING PRACTICES MANUAL**
**WIRE WRAP CONNECTIONS**


**UNSATISFACTORY WIRE ROUTING IN THE SAME SET OF WIRE WRAP POSTS**  
**Figure 4**

**D. Wire Routing Between Adjacent Sets of Wire Wrap Posts**

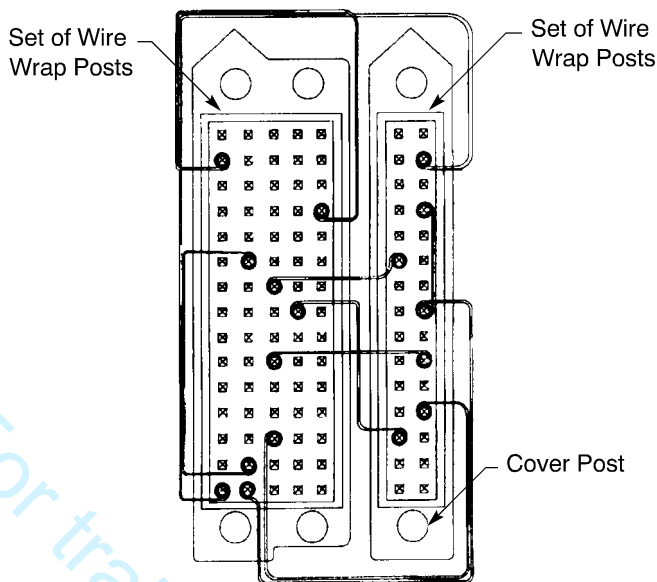
The wire routing between adjacent sets of wire wrap posts goes from a post in one set to a post in the adjacent set:

- Between the posts
- Around the outer of the perimeter of the wire wrap posts and the cover posts.

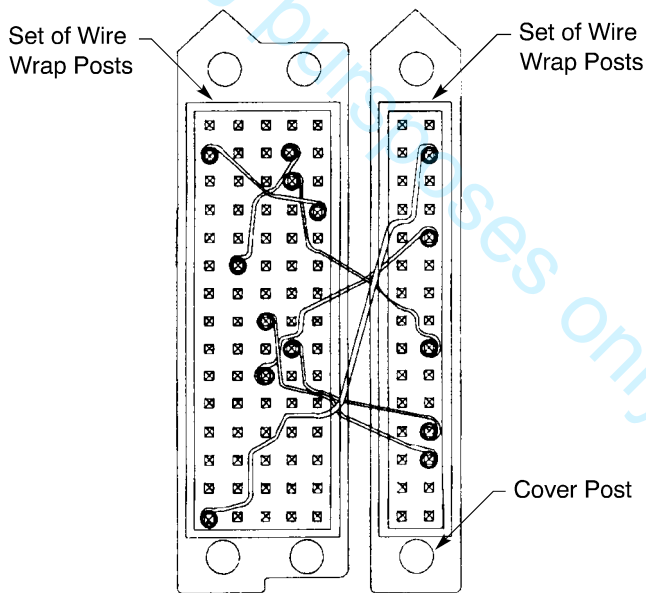
Refer to Figure 5 and Figure 6.

**STANDARD WIRING PRACTICES MANUAL**

**WIRE WRAP CONNECTIONS**



**SATISFACTORY WIRE ROUTING BETWEEN ADJACENT SETS OF WIRE WRAP POSTS**  
Figure 5



**UNSATISFACTORY WIRE ROUTING BETWEEN ADJACENT SETS OF WIRE WRAP POSTS**  
Figure 6

## STANDARD WIRING PRACTICES MANUAL

### WIRE WRAP CONNECTIONS

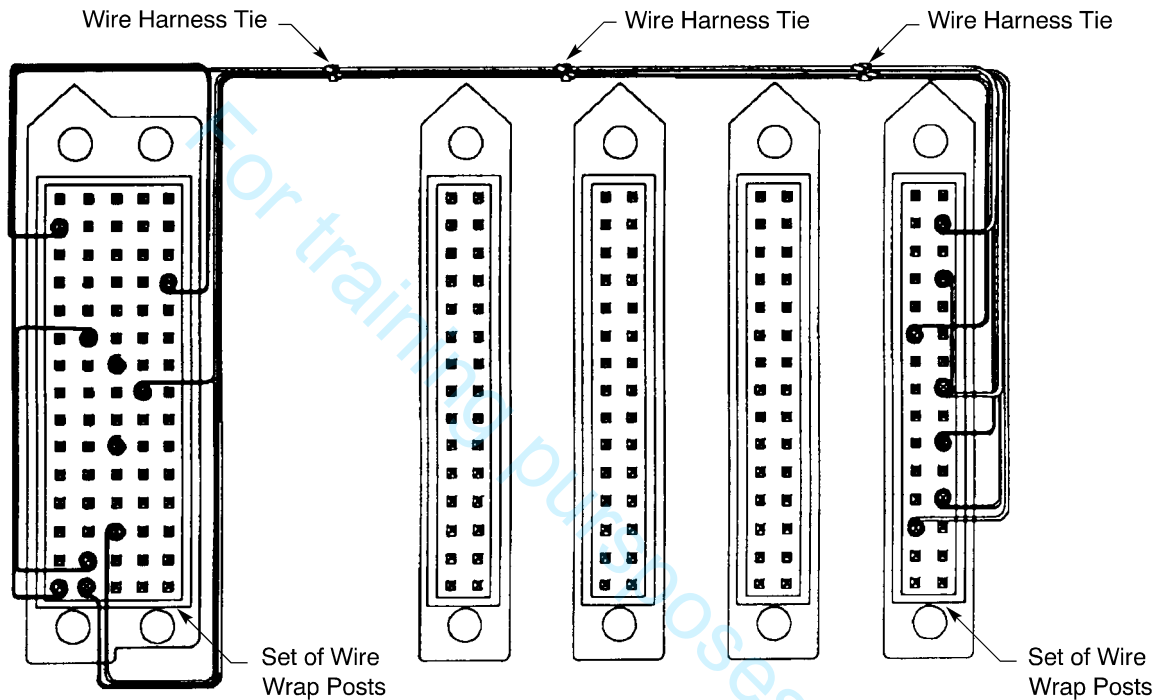
#### E. Wire Routing Between Sets of Wire Wrap Posts That Are Not Adjacent

The wire routing:

- Between the sets of wire wrap posts that are not adjacent goes from a post in one set to a post in another set around the outside of the perimeter of the wire wrap posts and the cover posts
- Keeps wires that are not in the same separation category apart.

A wire harness tie is assembled on the wires that have the same separation category.

Refer to Figure 7 and Figure 8.

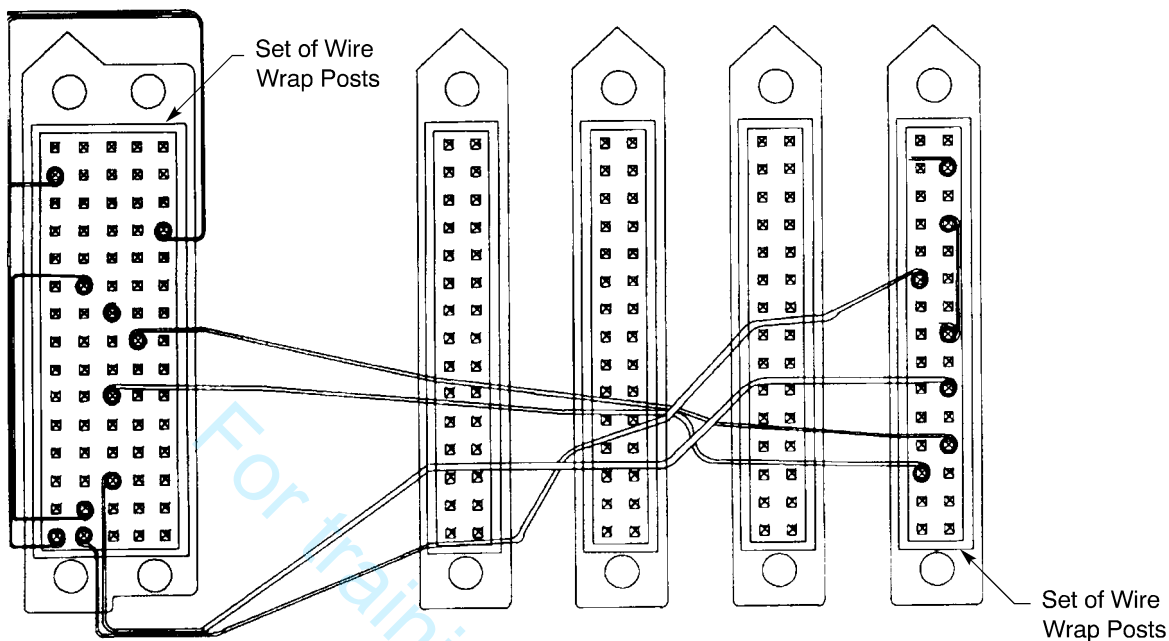


**SATISFACTORY WIRE ROUTING BETWEEN SETS OF WIRE WRAP POSTS THAT ARE NOT ADJACENT**

**Figure 7**

# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS



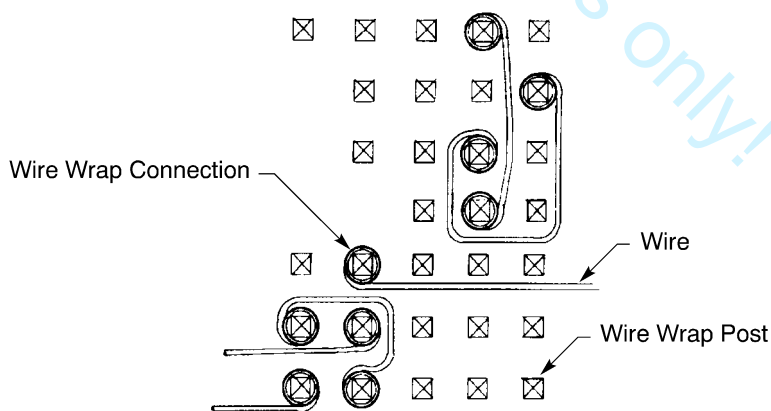
**UNSATISFACTORY WIRE ROUTING BETWEEN SETS OF WIRE WRAP POSTS THAT ARE NOT ADJACENT**

**Figure 8**

### F. Position of the Wires in Relation to the Wire Wrap Posts

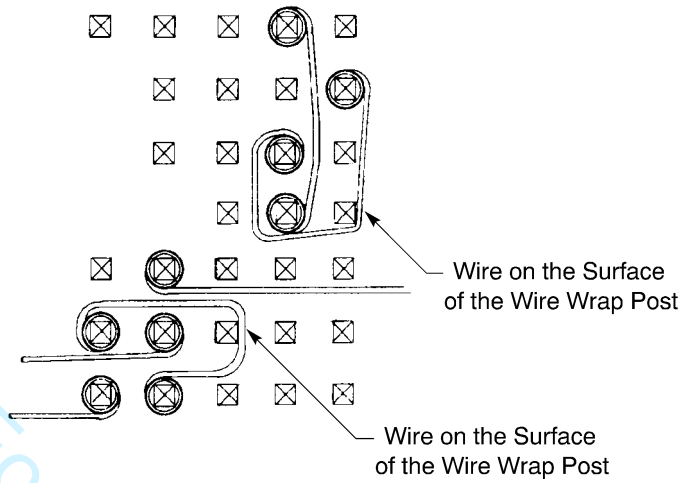
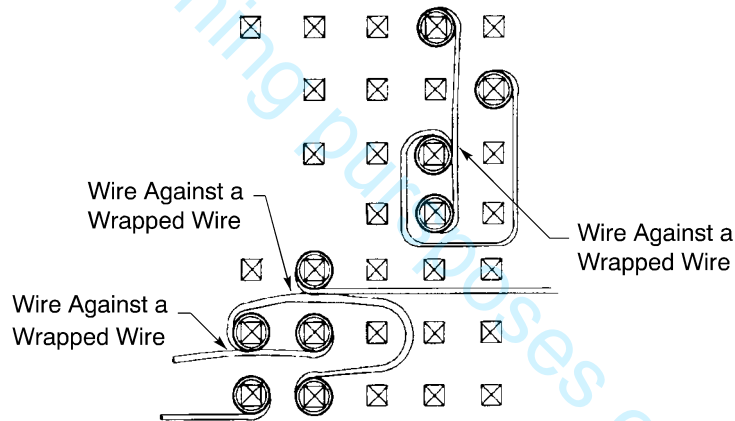
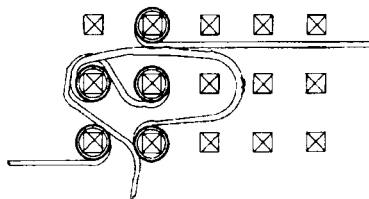
The wires that go between the wire wrap posts:

- Do not touch the posts; refer to Figure 9 and Figure 10.
- Can touch the wires that are already installed on the wire wrap posts; refer to Figure 11 and Figure 12.



**SATISFACTORY WIRE ROUTING BETWEEN THE WIRE WRAP POSTS**

**Figure 9**

**STANDARD WIRING PRACTICES MANUAL**
**WIRE WRAP CONNECTIONS**

**UNSATISFACTORY WIRE ROUTING BETWEEN THE WIRE WRAP POSTS**
**Figure 10**

**SATISFACTORY WIRE ROUTING BETWEEN WIRE WRAP POSTS WITH WRAPPED WIRE**
**Figure 11**

**UNSATISFACTORY WIRE ROUTING BETWEEN WIRE WRAP POSTS WITH WRAPPED WIRE**
**Figure 12**

# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

### 5. APPLICABLE CONDITIONS FOR A WIRE WRAP CONNECTION

#### A. Conditions for Repair of Damage

A wire wrap post must be replaced if it has damage that:

- Shows the primary metal of the post
- Can be seen with 5X magnification.

Refer to Paragraph 6.A.

If the conductor cannot be seen, these types of damage to the wire insulation of the wire turns are permitted:

- The insulation has cut
- The insulation is torn
- The insulation has a gouge
- The insulation is crushed.

#### B. Approved Tools

The wire wrap connections must be made only with the approved wire wrap tools. Refer to Paragraph 3.

#### C. General Conditions for a Wire Turn on a Wire Wrap Post

These conditions are applicable:

- The connection must have one turn of an insulated length of wire at the start of the connection near the rear face of the connector or board, or the end of the last level of the wrap on the post; refer to Figure 13
- The insulation of the one turn of the length of the insulated wire must touch a specified number of the corners of the wire wrap post; refer to Table 11.
- The length of the uninsulated wire, that starts at the end of the one turn of the length of the insulated wire and goes up the post to the end of the wire, must make a specified number of turns; refer to Table 11

**Table 11**  
**NECESSARY NUMBER OF WIRE TURNS**

Wire Size (AWG)	Terminal Post Size (inch)	Number of Post Corners For the Turn of the Insulated Length of Wire		Number of Turns of the Uninsulated Length of Wire	
		Minimum	Maximum	Minimum	Maximum
26	0.025 x 0.025	3	9	6	7
	0.045 x 0.045	4	9	6	7
24	0.025 x 0.025	3	9	5	6
	0.045 x 0.045	4	9	5	6
22	0.045 x 0.045	4	9	5	6
20	0.045 x 0.045	4	9	4	5
18	0.045 x 0.045	0	9	4	5

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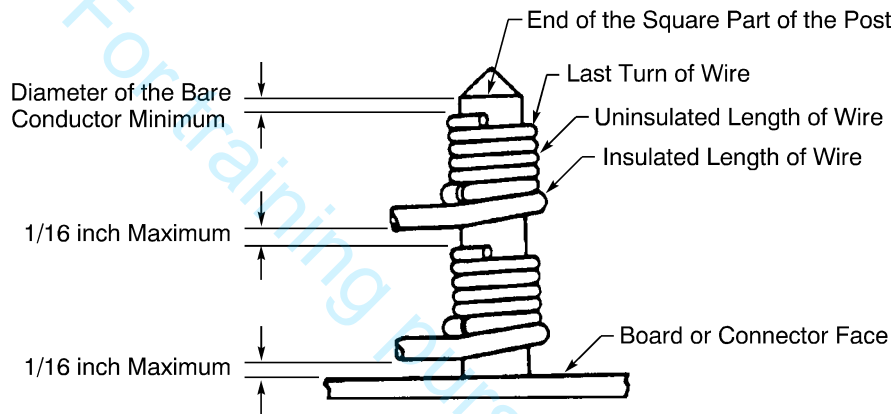
## STANDARD WIRING PRACTICES MANUAL

### WIRE WRAP CONNECTIONS

#### D. Configuration of the Wire Turns on the Wire Wrap Post

These conditions are applicable:

- The maximum distance between the start of the first wire turn and the rear face of the connector or board is 1/16 inch; refer to Figure 13
- The maximum distance between one wrap level and an adjacent wrap level on the same post is 1/16 inch; refer to Figure 13
- The minimum distance between the end turn of the last wrap level and the end of the square part of the post is the diameter of the bare conductor; refer to Figure 13
- A wrap level can have a maximum of 3 turns that are not against an adjacent turn; refer to Figure 17
- The maximum distance between adjacent turns is 1/2 the diameter of the wire; refer to Figure 17.



**POSITION OF THE WRAP LEVELS ON THE WIRE WRAP POST**

**Figure 13**

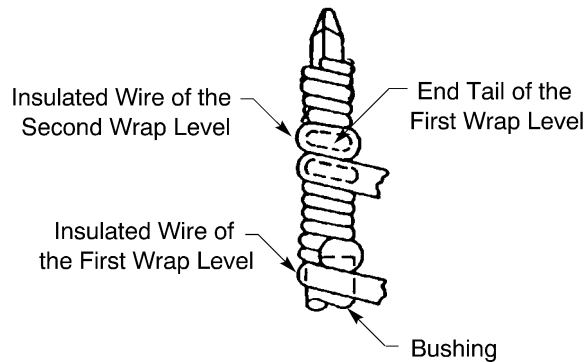
These positions of the wires are satisfactory alternatives:

- On the first wrap level, the first turn of the insulated wire can make an overlap with the terminal bushing
- On the second or third wrap levels, the first turn of the insulated wire can make an overlap with the uninsulated, end wire turns of the wrap level that is already installed.

Refer to Figure 14.

## STANDARD WIRING PRACTICES MANUAL

### WIRE WRAP CONNECTIONS



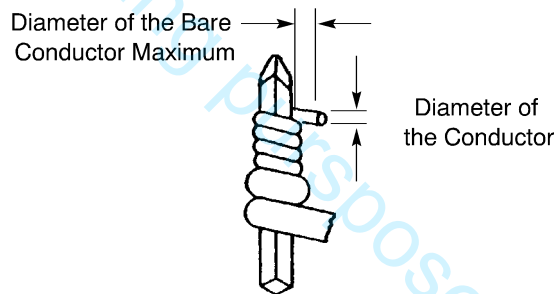
### ALTERNATIVE POSITIONS OF THE WRAP LEVELS ON THE WIRE WRAP POST

Figure 14

#### E. Length of a Free End Tail

The maximum length of the end tail that is not against the wire wrap post is the diameter of the bare conductor.

Refer to Figure 15.



### MAXIMUM LENGTH OF A FREE END TAIL

Figure 15

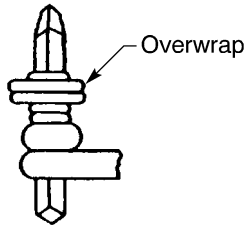
#### F. Unsatisfactory Wire Wrap Connections

These wire wrap connections are not satisfactory:

- An overlap of the wire turns in the same wrap level; refer to Figure 16
- Too much distance between adjacent wire turns; refer to Figure 17
- A wire turn that has a larger outer diameter than the other turns in the wrap level; refer to Figure 18.

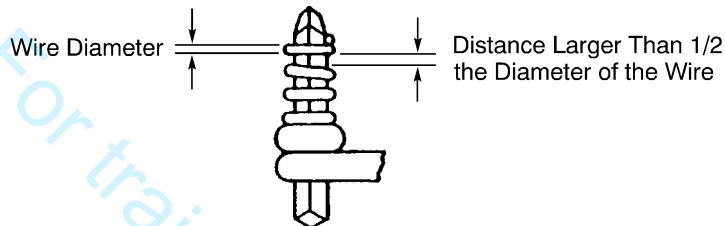
## STANDARD WIRING PRACTICES MANUAL

### WIRE WRAP CONNECTIONS



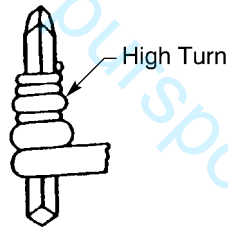
OVERLAP OF WIRE TURNS IN THE SAME WRAP LEVEL

Figure 16



TOO MUCH DISTANCE BETWEEN ADJACENT WIRE TURNS

Figure 17



WRAP LEVEL WITH A HIGH TURN

Figure 18

#### 6. CHANGES TO WIRE INTEGRATION UNIT

Usually, the changes to Wire Integration Unit (WIU) are:

- The removal of a wire
- The replacement of a wire
- The installation of a new circuit.

**CAUTION:** TO GIVE THE NECESSARY PROTECTION TO PERSONNEL AND THE EQUIPMENT:

- THE ELECTRICAL POWER TO THE WIU MUST BE SET TO THE OFF POSITION BEFORE THE REMOVAL OF THE WIU COVER
- THE INSTRUCTIONS ON THE DECAL ON THE WIU COVER MUST BE READ AND FOLLOWED.

#### A. Replacement of a Damaged Wire Wrap Post

- (1) Remove and replace the damaged wire wrap post. Refer to Subject 20-72-17.

**STANDARD WIRING PRACTICES MANUAL****WIRE WRAP CONNECTIONS****B. Repair of a Bent Ground Bus Post**

- (1) If the ground bus post is bent, make it straight.

NOTE: The ground bus post cannot be removed; it is permanently installed.

**C. Removal of a Wire**

- (1) Make a selection of a removal tool from Table 9 or Table 10.
- (2) Find the cover of the applicable connector or connectors.
- (3) Remove the necessary covers.
- (4) Find the ends of the wire.
- (5) Unwrap the wire from the wire wrap post at one end of the wire.
- (6) Unwrap the wire from the wire wrap post at the other end of the wire.
- (7) Remove any unwanted material from the area.
- (8) If there is no more work:
  - (a) Install the connector covers that were removed.
  - (b) Install the WIU cover.

**D. Replacement of a Wire**

- (1) Remove the applicable wire from the WIU. Refer to Paragraph 6.C.
- (2) Make a selection of the replacement wire.

These properties are used to make the selection:

- The wire routing
  - The wire type
  - The wire size.
- (a) If the replacement wire has a wire routing that is the same as the routing of the wire that is removed, use the same type and size of wire.
  - (b) If the replacement wire has a wire routing that is different from the routing of the wire that is removed, use a wire that has:
    - A solid copper conductor
    - A shield
    - A jacket on the shield
    - The same size as the wire that is removed.

NOTE: For example, the BMS13-46 Type 4 Class 1 wire is a satisfactory selection.

**STANDARD WIRING PRACTICES MANUAL****WIRE WRAP CONNECTIONS**

The reasons for this selection are:

- It is necessary to keep the correct wire separation categories
- It is necessary that wires with different wire separation categories are not put together
- The replacement wire routing, that is different from the routing of the wire that is replaced, can touch or be near the wire routing that has a different separation category than the category of the replacement wire routing
- The shield of the replacement wire automatically gives, without a more careful analysis, the mechanical protection for wires that must have mechanical separation
- The shield of the replacement wire automatically gives, without a more careful analysis, the EMI protection for wires that must have EMI separation.

(3) Install the replacement wire. Refer to Paragraph 6.E.

**E. Installation of a New Wire**

(1) Make a selection of the new wire.

These properties are used to make the selection:

- A solid copper conductor
- A shield
- A jacket on the shield
- A maximum size AWG 22 for 0.045 x 0.045 wire wrap posts.

NOTE: For example, the BMS13-46 Type 4 Class 1 wire is a satisfactory selection.

Shielded wire is used to keep the correct wire separation categories.

(2) Prepare each end of the wire:

- (a) Remove 2.0 inches  $\pm 0.1$  inch of the jacket from the end of the wire.
- (b) Remove 1.6 inches  $\pm 0.1$  inch of the shield.
- (c) Fold the remaining shield back over the cable jacket.

(3) Install a heat shrinkable sleeve on each end of the wire.

NOTE: A layer of insulation tape is a satisfactory alternative to the heat shrinkable sleeve.

- (a) Make a selection of a Grade B, Class 1 heat shrinkable sleeve from Subject 20-00-11.  
Make sure that the sleeve has the smallest diameter that can move easily on the wire.

- (b) Push a length of the sleeve on the shield.

Make sure that the end of the sleeve is aligned with the end of the shield.

- (c) Shrink the sleeve in position. Refer to Subject 20-10-14.

(4) Remove 1.4 inches  $\pm 0.1$  inch of the dielectric from the end of the conductor.

(5) Remove the cover from the WIU.

(6) Find the cover of the applicable connector or connectors.

(7) Remove the necessary covers.

(8) Wrap one end of the wire on the applicable wire wrap post.

(9) Put the wire in the correct routing. Refer to Paragraph 4.

(10) Wrap the other end of the wire on the applicable wire wrap post.

(11) Do a continuity test.

# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

### 7. CONNECTOR DISASSEMBLY

#### A. General Conditions for the Removal of a Wire from the Wire Wrap Post

These conditions are applicable:

- The wire must be unwrapped only with the approved tools. Refer to Paragraph 3.
- The wire of the wire turn of an unwrapped wire must not be used again.

#### B. Removal of an Epoxied Connector Cover

- (1) Make a selection of a hot air gun. Refer to Subject 20-10-13.

**CAUTION:** MAKE SURE TO OBEY ALL THE RECOMMENDED SAFETY PRECAUTIONS FOR THE USE OF HEAT GUNS AND HOT AIR GUNS ON AIRPLANES THAT ARE IN SERVICE. REFER TO SUBJECT 20-00-10.

- (2) Find the cover of the applicable connector or connectors.
- (3) Remove the printed circuit board (PCB) assembly that is attached to the connector.
- (4) Remove any other assemblies that are necessary to get access to the connector.
- (5) Hold the heat gun one inch from the cover.
- (6) Apply heat to the cover until the adhesive becomes soft. This usually occurs in 10 to 15 seconds.

**WARNING:** DO NOT APPLY THE HEAT TO ANY ONE AREA FOR MORE THAN 20 SECONDS SO THAT DAMAGE TO THE WIRES DOES NOT OCCUR.

- (7) Apply an even, upward force on the cover to remove the cover.
- (8) Examine the wire wrap to make sure that no damage has occurred.
- (9) Discard the used cover.

### 8. CONNECTOR ASSEMBLY

#### A. Insulation Removal

**Table 12**  
**INSULATION REMOVAL LENGTH**

Wire Size (AWG)	Wire	Wire Wrap Post Size (inch)	Removal Length (inch)	
			Target	Tolerance
26	BMS 13-46 Type 1	0.045 x 0.045	1.4	± 0.10
		0.025 x 0.025	1.0	± 0.10
	BMS 13-46 Type 7	0.045 x 0.045	1.4	± 0.10
		0.025 x 0.025	1.0	± 0.10
	BMS 13-46 Type 3	0.045 x 0.045	1.4	± 0.10
		0.025 x 0.025	1.0	± 0.10

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

Table 12 (continued)

Wire Size (AWG)	Wire	Wire Wrap Post Size (inch)	Removal Length (inch)	
			Target	Tolerance
24	BMS 13-46 Type 1	0.045 x 0.045	1.4	± 0.10
		0.025 x 0.025	1.0	± 0.10
	BMS 13-46 Type 7	0.045 x 0.045	1.4	± 0.10
		0.025 x 0.025	1.0	± 0.10
	BMS 13-46 Type 3	0.045 x 0.045	1.4	± 0.10
		0.025 x 0.025	1.0	± 0.10
22	BMS 13-46 Type 1	0.045 x 0.045	1.4	± 0.10
	BMS 13-46 Type 7	0.045 x 0.045	1.4	± 0.10
	BMS 13-46 Type 3	0.045 x 0.045	1.4	± 0.10
20	BMS 13-46 Type 1	0.045 x 0.045	1.4	± 0.10
	BMS 13-46 Type 7	0.045 x 0.045	1.4	± 0.10
	BMS 13-46 Type 3	0.045 x 0.045	1.4	± 0.10
18	BMS 13-46 Type 1	0.045 x 0.045	1.4	± 0.10
	BMS 13-46 Type 7	0.045 x 0.045	1.4	± 0.10
	BMS 13-46 Type 3	0.045 x 0.045	1.4	± 0.10

- (1) Make a selection of an insulation removal tool from Table 4.
- (2) Remove the necessary length of insulation from the end of the wire. Refer to Table 12.

**CAUTION:** MAKE SURE THAT DAMAGE TO THE CONDUCTOR DOES NOT OCCUR. IF THE BASE METAL OF THE CONDUCTOR CAN BE SEEN, THE CONDUCTOR CAN GIVE UNSATISFACTORY PERFORMANCE.

### B. Assembly of a Wire Wrap Connection with Stranded Wire and a TermaPost Solder Sleeve

This paragraph gives the procedure to attach one or two stranded conductors to a 0.025 inch x 0.025 inch wire wrap post with a Raychem TermaPost solder sleeve.

**NOTE:** If it is necessary to assemble the connection with two wires, the wires must be the same size.

# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS

**CAUTION:** THIS PROCEDURE PUTS SOLDER ON THE WIRE WRAP POST. IT IS NOT POSSIBLE TO WRAP A WIRE WITH A SOLID CONDUCTOR DIRECTLY ON A WIRE WRAP POST THAT HAS SOLDER ON THE CORNERS OF THE POST. THE SOLDER ON THE POST CAN CAUSE UNSATISFACTORY PERFORMANCE OF A WIRE WRAP CONNECTION.

**Table 13**  
**TERMAPOST SOLDER SLEEVE PART NUMBERS**

Wires Size (AWG)	Number of Wires	Solder Sleeve		
		Part Number	Color of Dot	Supplier
30	1	D-141-0111	Red	Raychem
	2			
28	1	D-141-0111	Red	Raychem
	2	D-141-0112	Blue	Raychem
26	1	D-141-0111	Red	Raychem
	2	D-141-0112	Blue	Raychem
24	1	D-141-0112	Blue	Raychem
	2	D-141-0113	Yellow	Raychem
22	1	D-141-0112	Blue	Raychem
	2	D-141-0114	Green	Raychem
20	1	D-141-0113	Yellow	Raychem
18	1	D-141-0114	Green	Raychem

**Table 14**  
**TERMAPOST INSTALLATION TOOLS**

Wire Size (AWG)	Number of Wires	Installation Tool		
		Part Number	Color of Dots	Supplier
30	1	AD-1545	Red and Blue	Raychem
	2			
28	1	AD-1545	Red and Blue	Raychem
	2			
26	1	AD-1545	Red and Blue	Raychem
	2			
24	1	AD-1545	Red and Blue	Raychem
	2	AD-1546	Yellow and Green	Raychem
22	1	AD-1545	Red and Blue	Raychem
	2	AD-1546	Yellow and Green	Raychem
20	1	AD-1546	Yellow and Green	Raychem
18	1	AD-1546	Yellow and Green	Raychem

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**STANDARD WIRING PRACTICES MANUAL****WIRE WRAP CONNECTIONS**

**Table 15**  
**NECESSARY TOOLS**

<b>Tool</b>	<b>Description</b>	<b>Supplier</b>
RH-3900	Resistance Heater, 115V	Raychem
AA-400-MK4	Resistance Heater, 115V	Raychem

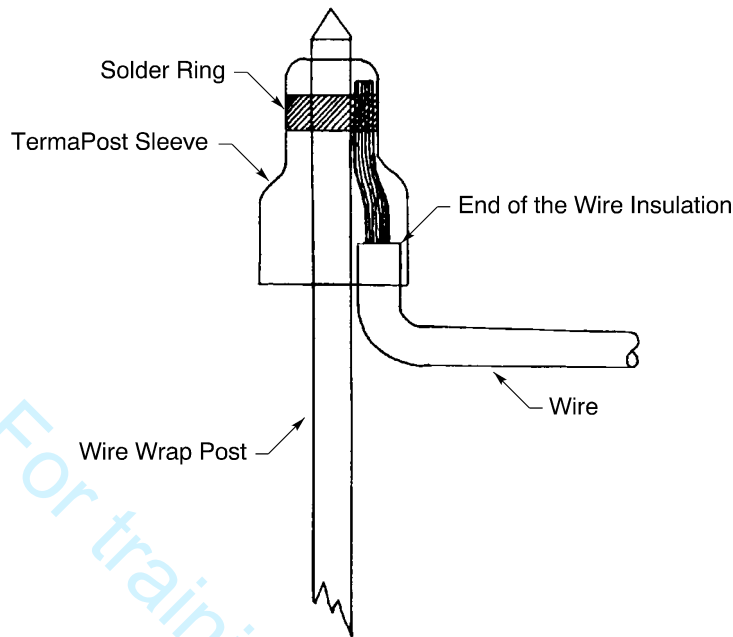
- (1) Make a selection of the solder sleeve from Table 13.
- (2) Make a selection:
  - An insulation removal tool from Table 4
  - An installation tool from Table 14
  - A resistance heater from Table 15.
- (3) Put the small end of the sleeve into the end of the installation tool with the spring clip.
- (4) Prepare the wire:
  - (a) Remove 0.15 inch  $\pm$  0.015 inch of insulation from the end of each wire.
  - (b) Put the conductor in the hole in the other end of the tool.
  - (c) Carefully push the conductor into the hole until the end of the conductor is against the bottom of the hole in the tool.
  - (d) Bend the conductor at the edge of the hole in the tool so that the conductor makes an angle of 90 degrees  $\pm$  10 degrees.
  - (e) Remove the bent conductor from the tool.
  - (f) If it is necessary to assemble the connection with two wires, do Step (b) through Step (e) for the second wire.
- (5) Push each bent conductor into the sleeve on the other end of the tool until it stops.
- (6) Axially align the tool and the wire wrap post.
- (7) Push the tool, the sleeve, and each conductor down the wire wrap post until the end of the post:
  - Goes through the hole in the top of the sleeve
  - Is against the end of the hole inside the tool.

Make sure that the tool and the post stay axially aligned.
- (8) Remove the tool from the wire wrap post.

Make sure that the end of the insulation of each wire is inside the insulation of the sleeve. Refer to Figure 19.

# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS



**POSITION OF THE TERMAPOST SOLDER SLEEVE ON THE WIRE WRAP POST**

**Figure 19**

(9) Solder the sleeve and the conductor or conductors to the post:

- Set the control of the resistance heater on 90.
- Hold the heater against the top of the wire wrap post above the sleeve so that the two electrodes are against the post.

**NOTE:** The temperature of the post is not increased if both electrodes do not touch the post.

- Apply heat to the post until the solder ring melts and a fillet is made between the post and each conductor.

This condition usually occurs in 3 seconds to 5 seconds.

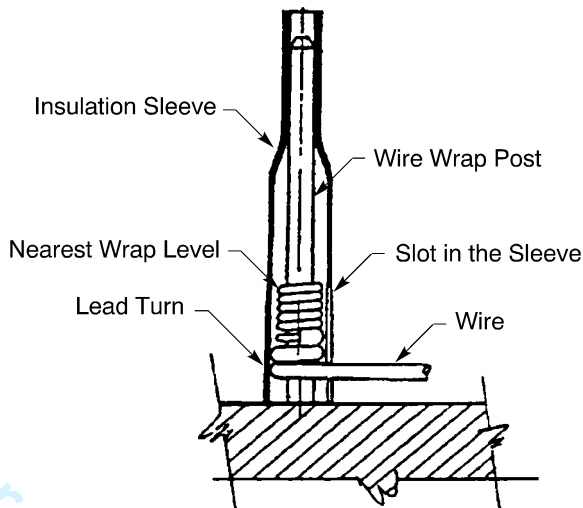
### C. Installation of an Insulation Sleeve on a Wire Wrap Post

**Table 16**  
**INSULATION SLEEVE PART NUMBERS**

Part Number	Supplier
T-Fit 063-2	Raychem

# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS



**POSITION OF THE INSULATION SLEEVE ON A POST WITH ONE WRAP LEVEL**

**Figure 20**

- (1) Make a selection of an insulation sleeve from Table 16.
- (2) Axially align the sleeve with the wire wrap post so that the slot of the sleeve is above the wire at the start of the lead turn of the nearest wrap level. Refer to Figure 20.
- (3) Push the sleeve down on the post until the bottom of the sleeve is against either of these objects:
  - The face of the receptacle or board
  - The wire at the start of the lead turn of the first wrap level if the wire is in a different position than the position of the wire in the slot.

Make sure that:

- At least one wire is in the slot of sleeve
- The friction between the sleeve and the post holds the sleeve in position.

### D. Installation of an Epoxied Connector Cover

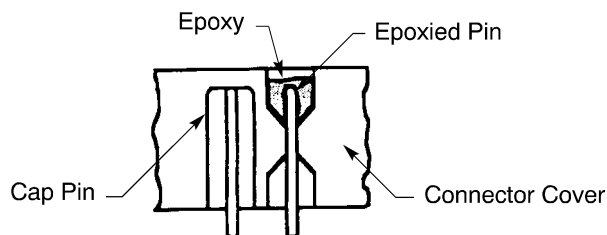
**Table 17**  
**EPOXY ADHESIVES**

Epoxy		Primer		Cure Time (Hours)
Part Number	Supplier	Part Number	Supplier	
BMS 5-92 Type I	QPL	-	-	24
BMS 5-92 Type III	QPL	-	-	24
BMS 5-105 Type I	QPL	BMS 10-83 Type I	QPL	6
DP-100	3M Scotch	-	-	24

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# STANDARD WIRING PRACTICES MANUAL

## WIRE WRAP CONNECTIONS



**POSITION OF THE CONNECTOR COVER ON THE CONNECTOR**

**Figure 21**

Refer to Figure 21.

- (1) Make a selection of a cover for the connector from Table 2.
- (2) Make a selection of an adhesive from Table 17.
- (3) Push the cover, with equal pressure, down on the connector until the cover is fully installed on the cap pins. Refer to Figure 21.  
Make sure that the cover is fully installed or, as a minimum, has direct contact with the second wrap level.
- (4) Apply the adhesive in the upper half of the pin groove until the pin is under the adhesive.

## 9. TEST PROCEDURES FOR WIRE WRAP CONNECTIONS

### A. Test Failure Conditions

If any of the wire wrap connections do not pass the necessary test, these conditions are applicable:

- The tool must be adjusted or repaired, if it is possible
- Another set of tests must be done.
- It is possible that the wire wrap connections, made with the tool before the test, are unsatisfactory and should be examined.

### B. Resistance Test

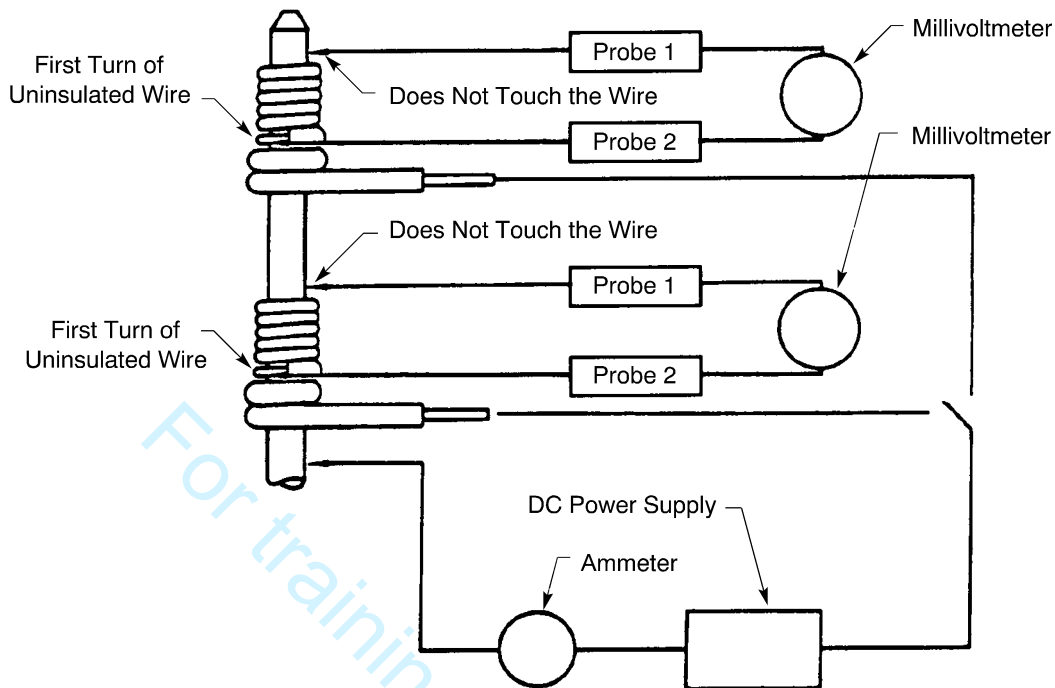
**Table 18**  
**WIRE WRAP RESISTANCE TEST VALUES**

Wire Size (AWG)	DC Current	
	Target (ampere)	Tolerance (percent)
30	1.0	± 2
28	2.0	± 2
26	2.4	± 2

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**STANDARD WIRING PRACTICES MANUAL**

**WIRE WRAP CONNECTIONS**



**CONFIGURATION OF THE WIRE WRAP RESISTANCE TEST**

**Figure 22**

- (1) Set the power supply on zero.
- (2) Make the necessary wire wrap connections. Refer to Figure 22.
- (3) Slowly increase the voltage until the ammeter shows the specified value for the size of wire. Refer to Table 18.
- (4) Read the millivoltmeter.

If the millivoltmeter shows more than 4 millivolts, the electrical connection is not satisfactory.

**C. Terminal Strip Force Test**

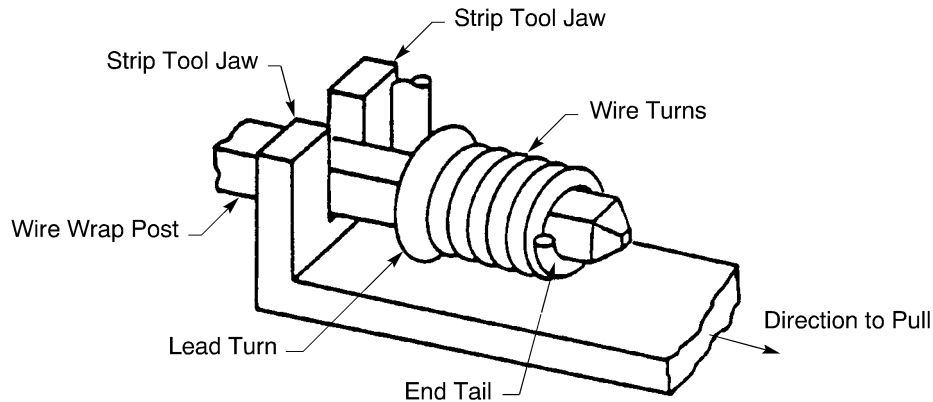
**Table 19  
TERMINAL STRIP FORCE**

Wire Size (AWG)	Strip Force (pounds)
30	3
28	4
26	6
24	7
22	8
20	9
18	15

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## STANDARD WIRING PRACTICES MANUAL

### WIRE WRAP CONNECTIONS



### CONFIGURATION OF THE TERMINAL STRIP FORCE TEST

Figure 23

Refer to Figure 23.

- (1) Put the jaws of the strip tool on the post so that the longitudinal axis of the post is at an angle of 90 degrees  $\pm$  10 degrees from the surface of the jaws.

Make sure that:

- The surfaces of both jaws of the strip tool are aligned so that those surfaces touch the lead turn at the same time
  - There is a minimum clearance between the jaws of the strip tool and the post so that there is no interference
  - The total clearance between the post and the jaws of the strip tool is not greater than 70 percent of the diameter of the uninsulated wire.
- (2) Slowly pull the jaws of the strip tool against the lead turn in the direction toward the end of the post. If the wrap level moves before the force is equal to the specified value in Table 19, the electrical connection is not satisfactory.

#### D. Unwrap Test

- (1) Put the unwrap tool on the terminal post.
- (2) Engage the tool with the end turn of the wrap level.
- (3) Turn the tool counterclockwise until either of these conditions occur:
  - All of the wire is transferred to the tool
  - The wrap level becomes loose and is removed from post.
- (4) If the wire is not transferred to the tool, put a cylinder or rod that can go into the center of the unwrapped wire for support.
- (5) Hold the insulated part of the wire tightly.
- (6) Turn the tool or the rod to straighten the wire.

**NOTE:** It is not necessary for the wire to be fully straight.

If the wire breaks when it is straightened, the electrical connection is not satisfactory.

#### E. Gas Tight Test

In the gas tight test, the wire wrap connection has exposure to aqua regia fumes first, and then to ammonium sulfide gas.

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**STANDARD WIRING PRACTICES MANUAL****WIRE WRAP CONNECTIONS**

Make sure that test solutions do not touch the connection during the test.

- (1) Put 1 milliliter to 2 milliliters of aqua regia solution, made of a 1:1 concentrated hydrochloric and nitric acid mixture, in a 16 x 15 milliliter test tube.
- (2) Put 1 milliliter of concentrated ammonium sulfide solution in another test tube.
- (3) Hang the wire wrap connection in the test tube with the aqua regia solution.
- (4) Put a cork on the end of the test tube.
- (5) Let the connection have exposure to the fumes for 10 minutes minimum.
- (6) Put the connection in the other test tube with the concentrated ammonium sulfide solution.
- (7) Put a cork on the end of the test tube.
- (8) Let the connection have exposure to the fumes until the wire becomes dark.  
The color of the dark area should be copper or gold sulfide.
- (9) Remove connection from the test tube.
- (10) Let the connection dry.
- (11) Unwrap the connection with a tool that does not put any scratches on the post.
- (12) Examine the post.

**NOTE:** The gas tight area should be light in color when it is compared to the dark post.

If the wire wrap is not gas tight on 75 percent of the corners that touch the uninsulated wire, except for the lead turn and the end turn, the electrical connection is not satisfactory.



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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS

<u>Paragraph</u>	<u>Page</u>
<b>1. <u>PART NUMBERS AND DESCRIPTION</u></b>	<b>1</b>
A. Connector Part Numbers	1
B. Contact Part Numbers	1
<b>2. <u>INSERT CONFIGURATIONS AND POLARIZATION</u></b>	<b>2</b>
A. Connector Insert Configurations	2
B. Polarization Position	2
C. Polarization Code Change	4
<b>3. <u>CONNECTOR DISASSEMBLY</u></b>	<b>5</b>
A. Contact Removal	5
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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS

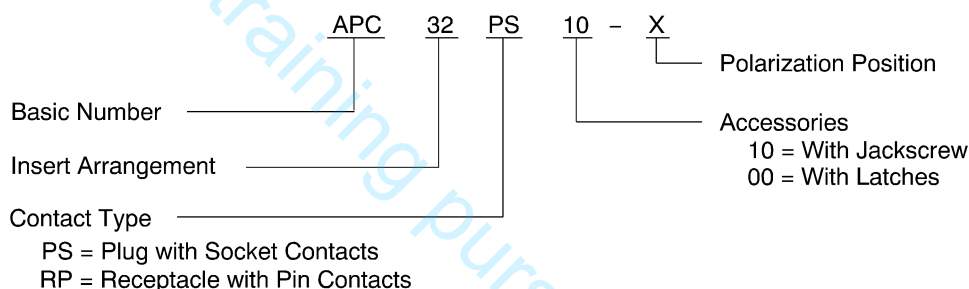
This Subject gives the procedures to disassemble and assemble the Arizona Integrated Electronics (AIE) APC() series connectors.

#### 1. PART NUMBERS AND DESCRIPTION

##### A. Connector Part Numbers

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

Part Number	Configuration	Supplier
APC32PS()	Plug	Arizona Integrated Electronics
APC32RP()	Receptacle	Arizona Integrated Electronics
APC60PS()	Plug	Arizona Integrated Electronics
APC60RP()	Receptacle	Arizona Integrated Electronics



#### AIE APC() SERIES CONNECTOR PART NUMBER STRUCTURE

**Figure 1**

**Table 2**  
**CONNECTOR COMPONENT KIT PART NUMBERS**

Part Number	Description	Insert Configuration
APC32PC10	Protective Cover Kit	32 Position Receptacle
APC32SR10	Strain Relief Kit	32 Position Plug
APC60PC10	Protective Cover Kit	60 Position Receptacle
APC60SR10	Strain Relief Kit	60 Position Plug

##### B. Contact Part Numbers

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

Wire Size (AWG)	Contact Size		Contact Type	Boeing Standard	Supplier
	Engaging End	Crimp Barrel			
20	20	20	Socket	BACC47EG2	Boeing

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS

Table 3 (continued)

Wire Size (AWG)	Contact Size		Contact Type	Boeing Standard	Supplier
	Engaging End	Crimp Barrel			
16	16	16	Socket	BACC47EG3	Boeing

Table 4

### WIRE WRAP CONTACT PART NUMBERS

Engaging End Size	Contact Type	Part Number	Supplier
20	Pin	APC20T00	Arizona Integrated Electronics
16	Pin	APC16T00	Arizona Integrated Electronics

## 2. INSERT CONFIGURATIONS AND POLARIZATION

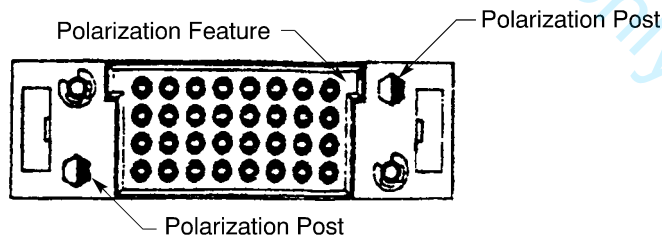
### A. Connector Insert Configurations

Table 5

### INSERT CONFIGURATIONS

Insert Configuration	Contact	
	Count	Size
32 Position	8	16
	24	20
60 Position	16	16
	44	20

### B. Polarization Position



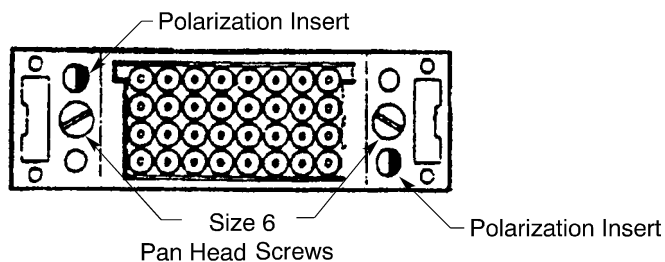
PLUG POLARIZATION POSTS

Figure 2

20-72-19

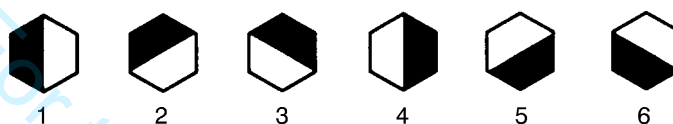
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS



#### RECEPTACLE POLARIZATION INSERTS

Figure 3



Dark Area Shows Solid Portion Of Post or Insert

#### POLARIZATION POSITIONS

Figure 4

Table 6  
POST POLARIZATION POSITIONS

Plug			Receptacle		
Position	Left Post	Right Post	Position	Left Post	Right Post
01	1	1	01	1	1
02	2	1	02	1	6
03	3	1	03	1	5
04	4	1	04	1	4
05	5	1	05	1	3
06	6	1	06	1	2
07	1	2	07	6	1
08	2	2	08	6	6
09	3	2	09	6	5
10	4	2	10	6	4
11	5	2	11	6	3
12	6	2	12	6	2
13	1	3	13	5	1
14	2	3	14	5	6
15	3	3	15	5	5
16	4	3	16	5	4
17	5	3	17	5	3

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS

Table 6 (continued)

Plug			Receptacle		
Position	Left Post	Right Post	Position	Left Post	Right Post
18	6	3	18	5	2
19	1	4	19	4	1
20	2	4	20	4	6
21	3	4	21	4	5
22	4	4	22	4	4
23	5	4	23	4	3
24	6	4	24	4	2
25	1	5	25	3	1
26	2	5	26	3	6
27	3	5	27	3	5
28	4	5	28	3	4
29	5	5	29	3	3
30	6	5	30	3	2
31	1	6	31	2	1
32	2	6	32	2	6
33	3	6	33	2	5
34	4	6	34	2	4
35	5	6	35	2	3
36	6	6	36	2	2

- (1) For plugs, install the polarization posts. Refer to Figure 5, Figure 4, and Table 6.  
Make sure to tighten the polarization post screws.
- (2) For receptacles, install the polarization inserts. Refer to Figure 7, Figure 4, and Table 6.
- (3) If the polarization post or the insert position is changed, the polarization code on the connector must be changed. Refer to Paragraph 2.C.

**NOTE:** A portion of the connector part number has the polarization post code.

#### C. Polarization Code Change

- (1) If the polarization code is stamped on the connector:
  - (a) Erase the old polarization code numbers.
  - (b) Use a steel stamp to stamp the new code adjacent to the original number.  
Make sure that the stamp is the same size as the original connector part number.
- (2) If the code is printed in ink on the connector:
  - (a) Put Independent 73X NW black ink on the old polarization code.

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS**

- (b) Put the new code on the connector with Independent 73X NW Opaque ink.  
Make sure to add the new numbers adjacent to the original number.
- (c) After the ink dries, apply a layer of Akzo 683-3-2 or 3M EC-776 coating over the ink mark.

**3. CONNECTOR DISASSEMBLY****A. Contact Removal**

**Table 7**  
**CONTACT REMOVAL TOOLS**

Crimp Barrel Size	Removal Tool	
	Part Number	Supplier
20	ATMS2078	Astro
16	ATR2112	Astro

- (1) Make a selection of a contact removal tool from Table 7.
- (2) Remove the contact.

**4. CONNECTOR PLUG ASSEMBLY****A. Plug Assembly**

Refer to Figure 5 and Subject 20-71-14.

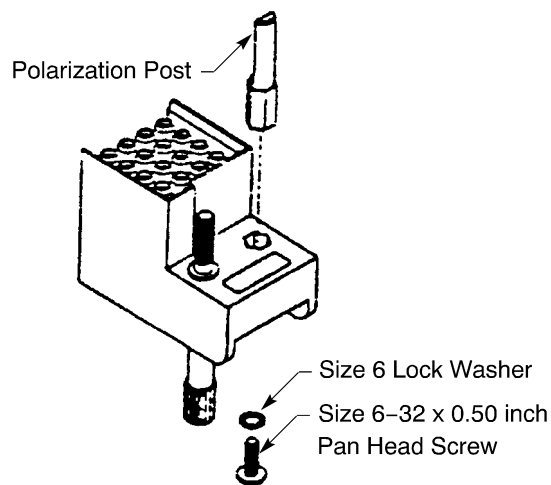
Make sure to use the tools in Table 8 to insert the contacts.

**Table 8**  
**CONTACT INSERTION TOOLS**

Crimp Barrel Size	Insertion Tool	
	Part Number	Supplier
20	ATR1079	Astro
16	ATR1106	Astro
	88294001	Astro

## STANDARD WIRING PRACTICES MANUAL

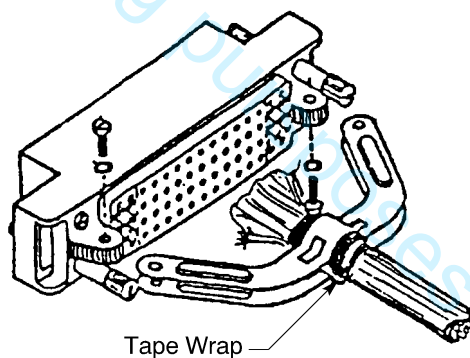
### ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS



**PLUG ASSEMBLY**  
Figure 5

#### B. Strain Relief Clamp Installation

Refer to Figure 6 and Subject 21-61-00.



**STRAIN RELIEF CLAMP**  
Figure 6

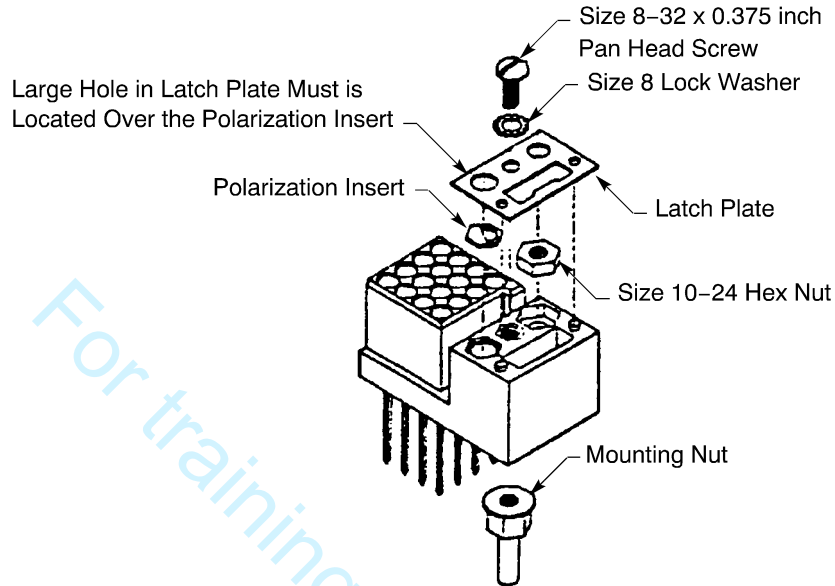
- (1) Form and hold the wires with a string or plastic tie.
- (2) Make a selection of a strain relief clamp from Table 2.
- (3) Put the strain relief clamp on the wires and align the clamp holes with the holes on the connector.
- (4) Put a layer of insulation tape around the wires where the clamp touches the wires.
- (5) Apply an additional 1, 2, or 3 layers of these tapes:
  - Strip-n-Stick 220A silicone sponge rubber adhesive tape
  - 3M Scotch 70 silicone rubber tape.
- (6) Tighten the clamp screws.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ARIZONA INTEGRATED ELECTRONICS APC() SERIES CONNECTORS

#### 5. CONNECTOR RECEPTACLE ASSEMBLY

##### A. Receptacle Assembly



**RECEPTACLE ASSEMBLY**

**Figure 7**

- (1) Wrap the wires onto the wire wrap posts. Refer to Subject 20-72-18.
- (2) Install the latch plate. Refer to Figure 7.
- (3) Make a selection of a protective cover from Table 2.
- (4) Install the protective cover.



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## STANDARD WIRING PRACTICES MANUAL

ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK  
AND PANEL CONNECTORS

<u>Paragraph</u>	<u>Page</u>
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C. Souriau Part Numbers	1
D. Tri-Star Part Numbers	2
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B. Vertical Installation	5
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A. Contact Assembly	8
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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK AND PANEL CONNECTORS

#### 1. PART NUMBERS AND DESCRIPTION

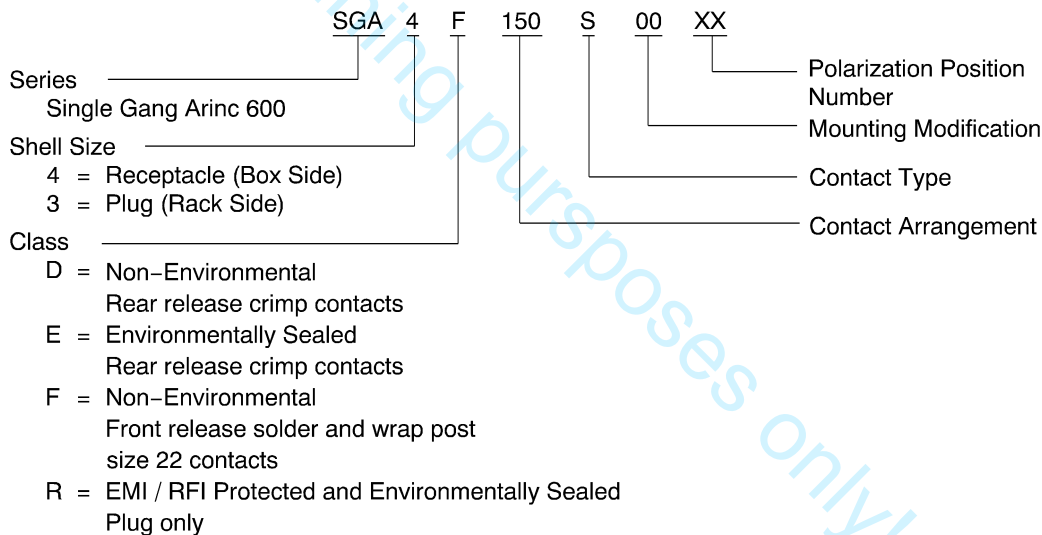
These connectors are similar to ARINC 600 connectors, but have only one 150-contact insert which is the same insert as insert A of the standard size 2 ARINC 600 connector.

##### A. Connector Part Numbers

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

Part Number	Supplier
SGA()	ITT Cannon
30-00053-()	Souriau
30-00054-()	Souriau
C-06BC-01()-1112	Tri-Star

##### B. ITT Cannon Part Numbers



#### ITT CANNON SGA() CONNECTOR PART NUMBER STRUCTURE

**Figure 1**

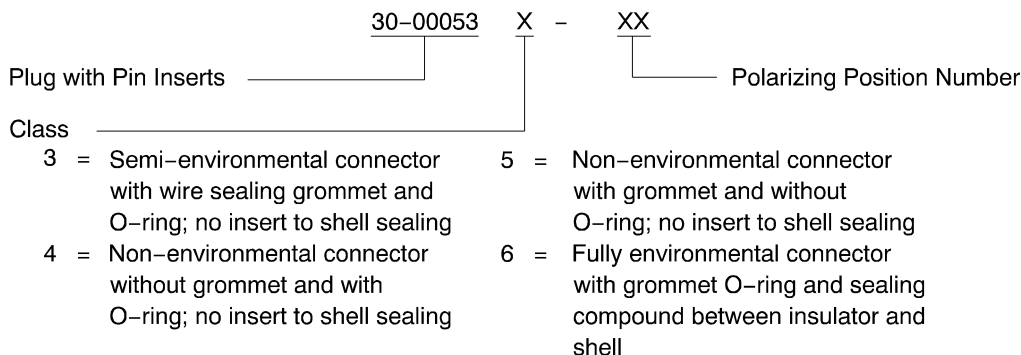
##### C. Souriau Part Numbers

**CAUTION:** DO NOT USE CLASS 3 AND 4 CONNECTORS. THE O-RING CAN PREVENT THE SHELLS TO INCORRECTLY CONNECT.

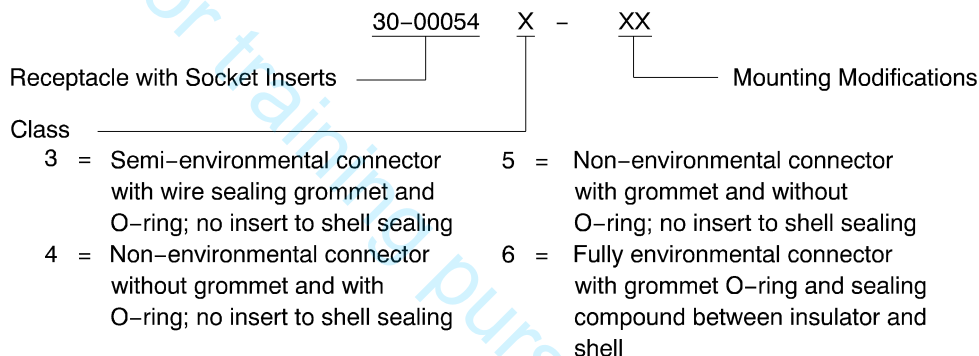
**NOTE:** To convert a Class 3 connector to a Class 5 connector, remove and discard the O-ring.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK AND PANEL CONNECTORS

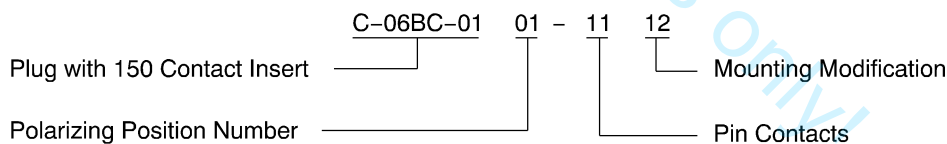


**SOURIAU 30-00053() CONNECTOR PART NUMBER STRUCTURE**  
Figure 2



**SOURIAU 30-00054() CONNECTOR PART NUMBER STRUCTURE**  
Figure 3

#### D. Tri-Star Part Numbers

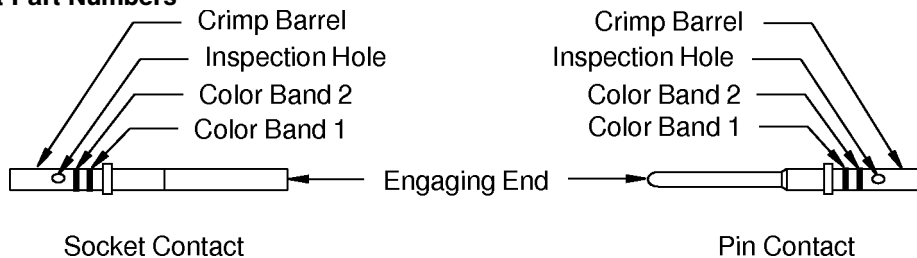


**TRI-STAR C-06BC-01() CONNECTOR PART NUMBER STRUCTURE**  
Figure 4

## STANDARD WIRING PRACTICES MANUAL

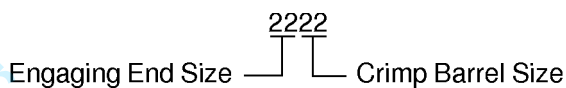
### ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK AND PANEL CONNECTORS

#### E. Contact Part Numbers



#### STANDARD REAR RELEASE CONTACTS

Figure 5



#### EXAMPLE OF A CONTACT SIZE

Figure 6

Table 2  
CONTACT PART NUMBERS

Contact Size		Boeing Standard	Contact Type
Engaging End	Crimp Barrel		
22	22	BACC47EF1	Pin
22	22	BACC47EG1	Socket

For other contacts, refer to Subject 20-71-14.

#### F. Insert Configurations

NOTE: The contacts shown in Table 3 are for plug connectors.

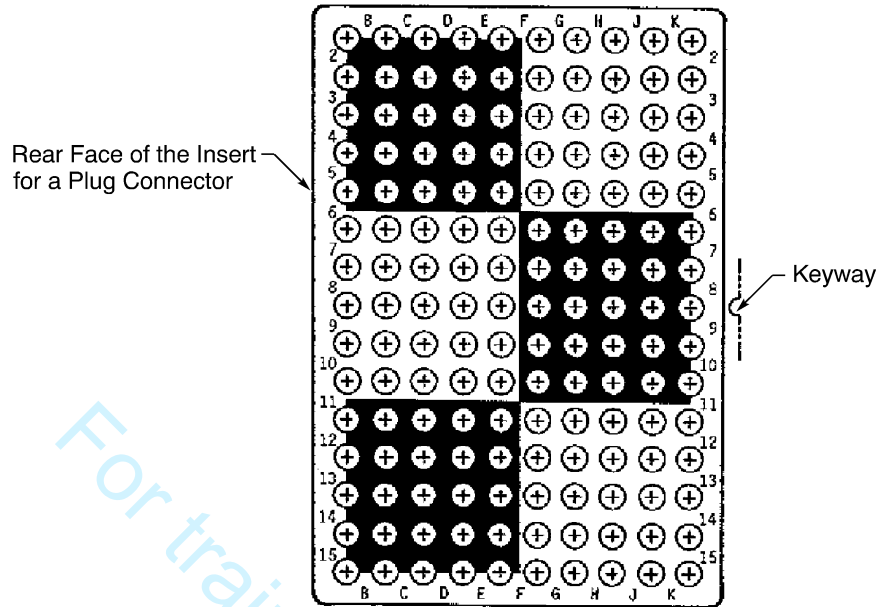
Table 3  
INSERT CONFIGURATIONS

Insert Configuration	Contact Cavity			Reference
	Count	Size	Applicable Contacts	
BACI10AH02	150	22	BACC47EF1 Pin	Figure 7

For other insert configurations, refer to Subject 20-71-14.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK AND PANEL CONNECTORS



**BACH10AH INSERT 02**  
**Figure 7**

## 2. CONNECTOR POLARIZATION

### A. General

Connectors are polarized:

- Vertically by post and key at the bottom and the top of a connector shell; refer to Figure 8
- Horizontally by post and key at the left side and the right side of a connector shell; refer to Figure 10.

These components are supplied with each connector:

- Polarization posts
- Polarization keys
- Retaining plates
- Screws.

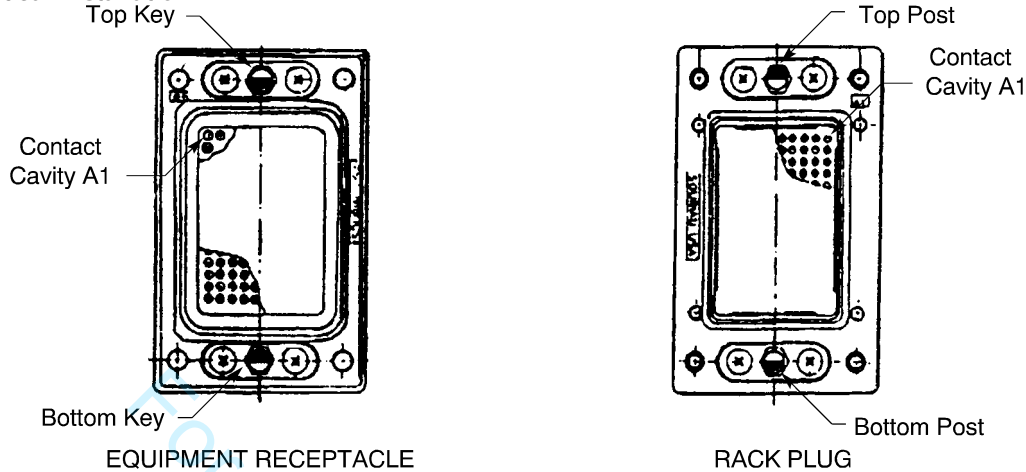
The components can be installed in or changed to any of the 36 combinations in:

- Table 4; refer to Figure 9
- Table 5; refer to Figure 11.

## STANDARD WIRING PRACTICES MANUAL

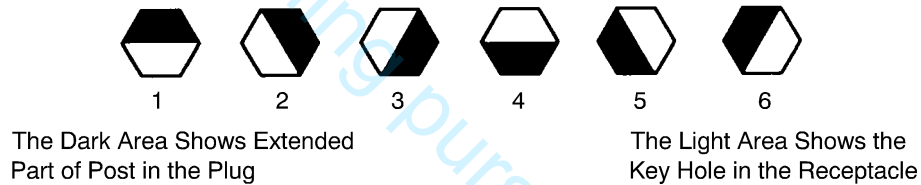
### ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK AND PANEL CONNECTORS

#### B. Vertical Installation



#### POLARIZATION POST POSITION 19 - VERTICAL INSTALLATION

Figure 8



#### POST POSITIONS FOR VERTICAL INSTALLATION

Figure 9

Table 4

#### POLARIZATION POST POSITION FOR VERTICAL INSTALLATION

Post Position	Equipment Receptacle Key		Rack Plug Key	
	Top	Bottom	Top	Bottom
01	1	1	4	4
02	3	4	2	1
03	2	4	3	1
04	1	4	4	1
05	6	4	5	1
06	5	4	6	1
07	4	5	1	6
08	3	5	2	6
09	2	5	3	6
10	1	5	4	6
11	6	5	5	6

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ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK  
AND PANEL CONNECTORS

Table 4 (continued)

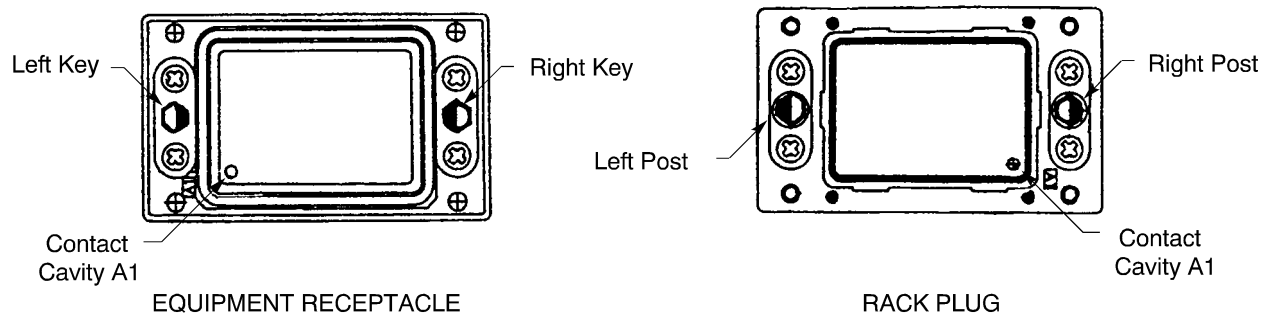
Post Position	Equipment Receptacle Key		Rack Plug Key	
	Top	Bottom	Top	Bottom
12	5	5	6	6
13	4	6	1	5
14	3	6	2	5
15	2	6	3	5
16	1	6	4	5
17	6	6	5	5
18	5	6	6	5
19	4	1	1	4
20	3	1	2	4
21	2	1	3	4
22	4	4	1	1
23	6	1	5	4
24	5	1	6	4
25	4	2	1	3
26	3	2	2	3
27	2	2	3	3
28	1	2	4	3
29	6	2	5	3
30	5	2	6	3
31	4	3	1	2
32	3	3	2	2
33	2	3	3	2
34	1	3	4	2
35	6	3	5	2
36	5	3	6	2

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## STANDARD WIRING PRACTICES MANUAL

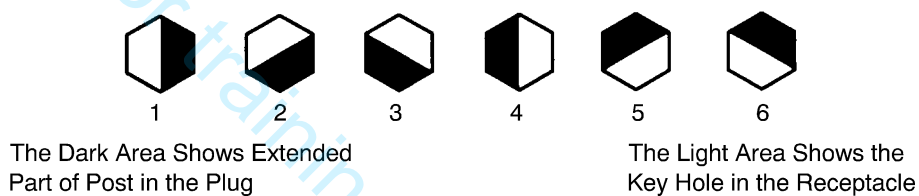
### ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK AND PANEL CONNECTORS

#### C. Horizontal Installation



#### POLARIZATION POST POSITION 19 - HORIZONTAL INSTALLATION

Figure 10



#### POST POSITIONS FOR HORIZONTAL INSTALLATION

Figure 11

Table 5

#### POLARIZATION POST POSITION FOR HORIZONTAL INSTALLATION

Post Position	Equipment Receptacle Key		Rack Plug Key	
	Left	Right	Left	Right
01	1	1	4	4
02	3	4	2	1
03	2	4	3	1
04	1	4	4	1
05	6	4	5	1
06	5	4	6	1
07	4	5	1	6
08	3	5	2	6
09	2	5	3	6
10	1	5	4	6
11	6	5	5	6
12	5	5	6	6
13	4	6	1	5
14	3	6	2	5

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF ITT CANNON SGA(), SOURIAU 30-00053-() AND 30-00054-() AND TRI-STAR C-06BC-01()-1112 RACK AND PANEL CONNECTORS

Table 5 (continued)

Post Position	Equipment Receptacle Key		Rack Plug Key	
	Left	Right	Left	Right
15	2	6	3	5
16	1	6	4	5
17	6	6	5	5
18	5	6	6	5
19	4	1	1	4
20	3	1	2	4
21	2	1	3	4
22	4	4	1	1
23	6	1	5	4
24	5	1	6	4
25	4	2	1	3
26	3	2	2	3
27	2	2	3	3
28	1	2	4	3
29	6	2	5	3
30	5	2	6	3
31	4	3	1	2
32	3	3	2	2
33	2	3	3	2
34	1	3	4	2
35	6	3	5	2
36	5	3	6	2

### 3. CONNECTOR ASSEMBLY

#### A. Contact Assembly

Refer to Subject 20-71-14.

#### B. Connector Assembly

NOTE: The maximum wire size for contact assembly is AWG 22.

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

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C. Contact Insertion Tools	46

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

### 1. GENERAL DATA

#### A. Minimum Wire O.D. for an Environmentally Sealed Connector

Refer to:

- Subject 20-60-08 for the identification of an environmentally sealed connector
- Table 1 for the minimum wire O.D. that is necessary for a satisfactory seal of a contact cavity hole
- Subject 20-60-08 for the procedure to increase the diameter of the wire.

**Table 1**  
**MINIMUM WIRE O.D. FOR A SATISFACTORY SEAL**

Contact Cavity Size	Minimum Wire O.D. (inch)
20	0.040
16	0.068

### 2. PART NUMBERS AND DESCRIPTION

#### A. Connector Part Numbers

**Table 2**  
**CONNECTOR PART NUMBERS**

Connector		Contact			Supplier
Part Number	Type	Type	Termination	Retention	
1167060	Receptacle	Pin	Solder	Not Removable	Hughes Aircraft
1167061	Receptacle	Socket	Solder	Not Removable	Hughes Aircraft
1167062-1	Plug	Pin	Crimp	Rear Release	Hughes Aircraft
1167062-2	Plug	Pin	Crimp	Rear Release	Hughes Aircraft
1167062-3	Plug	Pin	Crimp	Rear Release	Hughes Aircraft
1167063-1	Plug	Socket	Crimp	Rear Release	Hughes Aircraft
1167063-2	Receptacle	Socket	Crimp	Rear Release	Hughes Aircraft
1167063-3	Plug	Socket	Crimp	Rear Release	Hughes Aircraft
CB02-15P	Receptacle	Pin	Solder	Not Removable	Cory Components
CB02-15P	Receptacle	Pin	Solder	Not Removable	Tri-Star
CB02-15S	Receptacle	Socket	Solder	Not Removable	Cory Components
CB02-15S	Receptacle	Socket	Solder	Not Removable	Tri-Star
CB02C-15P	Receptacle	Pin	Crimp	Rear Release	Cory Components
CB02C-15P	Receptacle	Pin	Crimp	Rear Release	Tri-Star
CB02C-15S	Receptacle	Socket	Crimp	Rear Release	Cory Components
CB02C-15S	Receptacle	Socket	Crimp	Rear Release	Tri-Star
CB05-15P	Plug	Pin	Crimp	Rear Release	Cory Components

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 2 (continued)

Connector		Contact			Supplier
Part Number	Type	Type	Termination	Retention	
CB05-15P	Plug	Pin	Crimp	Rear Release	Tri-Star
CB05-15S	Plug	Socket	Crimp	Rear Release	Cory Components
CB05-15S	Plug	Socket	Crimp	Rear Release	Tri-Star
CB06-15P	Plug	Pin	Crimp	Rear Release	Cory Components
CB06-15P	Plug	Pin	Crimp	Rear Release	Tri-Star
CB06-15S	Plug	Socket	Crimp	Rear Release	Cory Components
CB06-15S	Plug	Socket	Crimp	Rear Release	Tri-Star
CB08-15P	Plug	Pin	Crimp	Rear Release	Cory Components
CB08-15P	Plug	Pin	Crimp	Rear Release	Tri-Star
CB08-15S	Receptacle	Socket	Crimp	Rear Release	Cory Components
CB08-15S	Receptacle	Socket	Crimp	Rear Release	Tri-Star
CB08T-15P	Plug	Pin	Crimp	Rear Release	Cory Components
CB08T-15P	Plug	Pin	Crimp	Rear Release	Tri-Star
CB08T-15S	Plug	Socket	Crimp	Rear Release	Cory Components
CB08T-15S	Plug	Socket	Crimp	Rear Release	Tri-Star
CB24P-4	Plug	Socket	Crimp	Front Release	Cory Components
CB24P-4	Plug	Socket	Crimp	Front Release	Tri-Star
CBCX12R-1	Receptacle	Socket	Crimp	Front Release	Cory Components
CBCX12R-1	Receptacle	Socket	Crimp	Front Release	Tri-Star
CBME05-15S	Plug	Socket	Crimp	Rear Release	Cory Components
CBME05-15S	Plug	Socket	Crimp	Rear Release	Tri-Star
CBRE02-15P-1	Shorting Receptacle	Pin	-	Not Removable	Cory Components
CBRE02-15P-1	Shorting Receptacle	Pin	-	Not Removable	Tri-Star
CBRE02C-15P	Receptacle	Pin	Crimp	Rear Release	Cory Components
CBRE02C-15P	Receptacle	Pin	Crimp	Rear Release	Tri-Star
CBX12PM-1A	Plug	Pin	Crimp	Front Release	Cory Components
CBX12PM-1A	Plug	Pin	Crimp	Front Release	Tri-Star

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 3  
ALTERNATIVE CONNECTOR PART NUMBERS

Specified Connector		Alternative Connector	
Part Number	Supplier	Part Number	Supplier
1167060	Hughes Aircraft	CB02-15P	Tri-Star
1167061	Hughes Aircraft	CB02-15S	Tri-Star
1167062-1	Hughes Aircraft	CB06-15P	Tri-Star
1167062-2	Hughes Aircraft	CB08-15P	Tri-Star
1167062-3	Hughes Aircraft	CB08T-15P	Tri-Star
1167063-1	Hughes Aircraft	CB06-15S	Tri-Star
1167063-2	Hughes Aircraft	CB08-15S	Tri-Star
1167063-3	Hughes Aircraft	CB08T-15S	Tri-Star
CB02-15P	Cory Components	CB02-15P	Tri-Star
CB02-15S	Cory Components	CB02-15S	Tri-Star
CB02C-15P	Cory Components	CB02C-15P	Tri-Star
		CBRE02C-15P	Cory Components
	Tri-Star	CB02C-15P	Tri-Star
		CBRE02C-15P	Cory Components
		CB02C-15P	Tri-Star
		CBRE02C-15P	Cory Components
CB02C-15S	Cory Components	CB02C-15S	Tri-Star
CB05-15P	Cory Components	CB05-15P	Tri-Star
CB05-15S	Cory Components	CB05-15S	Tri-Star
		CBME05-15S	Cory Components
	Tri-Star	CB05-15S	Tri-Star
		CBME05-15S	Cory Components
		CB05-15S	Tri-Star
		CBME05-15S	Cory Components
CB06-15P	Cory Components	CB06-15P	Tri-Star
CB06-15S	Cory Components	CB06-15S	Tri-Star
CB08-15P	Cory Components	CB08-15P	Tri-Star
CB08-15S	Cory Components	CB08-15S	Tri-Star
CB08T-15P	Cory Components	CB08T-15P	Tri-Star
CB08T-15S	Cory Components	CB08T-15S	Tri-Star
CB24P-4	Cory Components	CB24P-4	Tri-Star

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 3 (continued)

Specified Connector		Alternative Connector	
Part Number	Supplier	Part Number	Supplier
CBCX12R-1	Cory Components	CBCX12R-1	Tri-Star
CBME05-15S	Cory Components	CBME05-15S	Tri-Star
CBRE02-15P-1	Cory Components	CBRE02-15P-1	Tri-Star
CBRE02C-15P	Cory Components	CBRE02C-15P	Tri-Star
CBX12PM-1A	Cory Components	CBX12PM-1A	Tri-Star

#### B. Connector Description

The Tri-Star CB(), Cory CB(), and Hughes 116706()-() Series connectors have these features:

- Plastic shells with a keyhole shape
- Wire seal grommets in the environmental CBME() and CBRE() connectors
- Solder tail contacts in the 1167060, 1167061, CB02-15P, and CB02-15S connectors

The connectors with solder tail contacts:

- Are usually used as a component in electronic equipment
- Can be used as a connector on the end of a wire harness
- Are assembled with crimp type socket contacts that are soldered on the solder tails at the rear of the connector; refer to Paragraph 6.

For the configuration of:

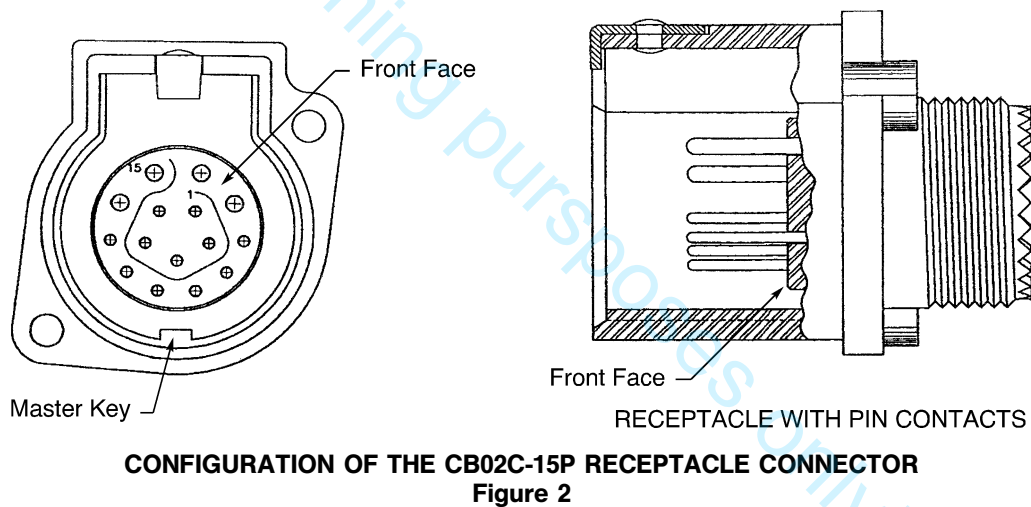
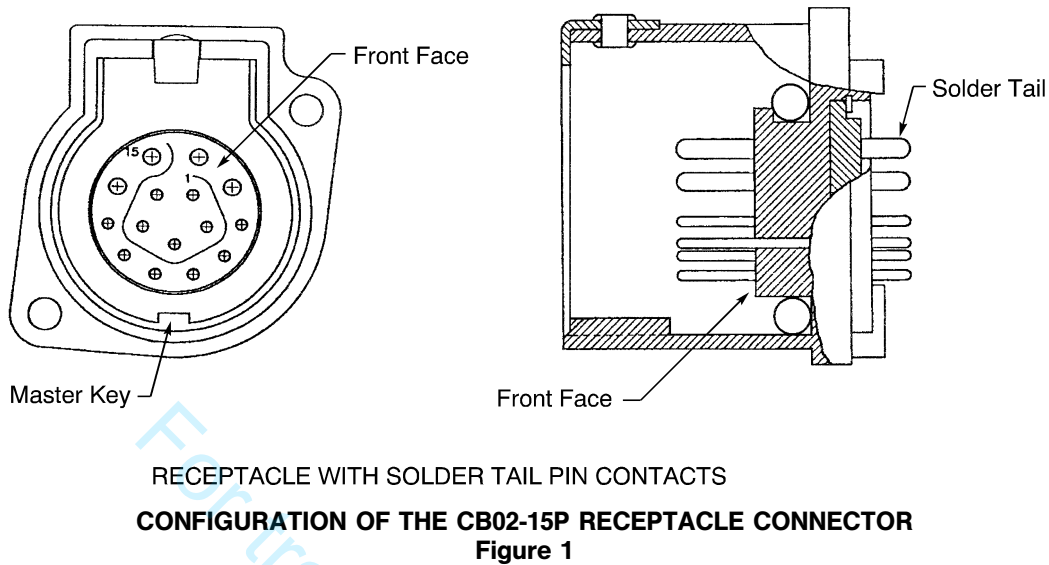
- The CB02-15P receptacle, refer to Figure 1
- The CB02C-15P receptacle, refer to Figure 2
- The CB05-15S plug, refer to Figure 3
- The CB06-15S plug, refer to Figure 4
- The CB08-15P plug, refer to Figure 5
- The CB08T-15P plug, refer to Figure 5
- The CB24P-4 plug, refer to Figure 6
- The CBCX12R-1 receptacle, refer to Figure 7
- The CBME05-15S plug, refer to Figure 8
- The CBRE02-15P-1 shorting receptacle, refer to Figure 9
- The CBRE02C-15P receptacle, refer to Figure 10
- The CBX12PM-1A plug, refer to Figure 11.

The shell of:

- The CB02-15S receptacle is the same as the CB02-15P receptacle; refer to Figure 1
- The CB02C-15S receptacle is the same as the CB02C-15P receptacle; refer to Figure 2
- The CB05-15P plug is the same as the CB05-15S plug; refer to Figure 3
- The CB06-15P plug is the same as the CB06-15S plug; refer to Figure 4
- The CB08-15S plug is the same as the CB08-15P plug; refer to Figure 5
- The CB08T-15S plug is the same as the CB08T-15P plug; refer to Figure 5.

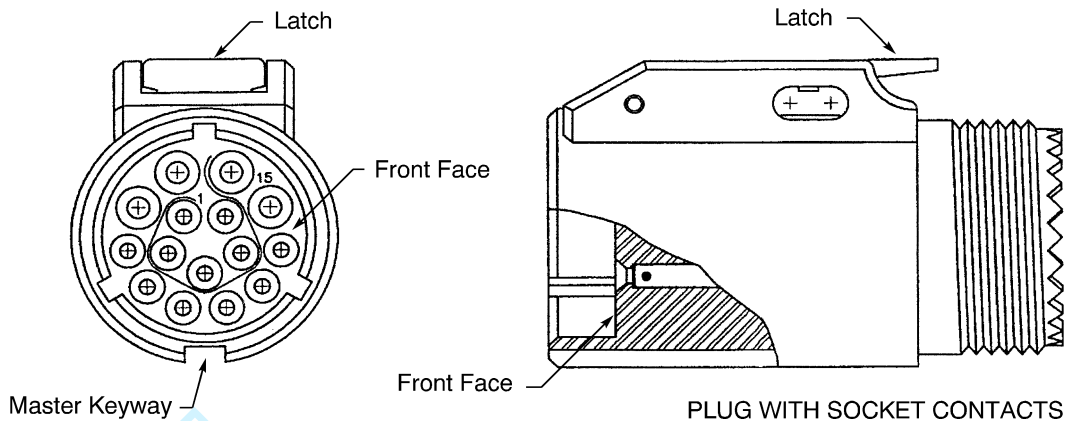
**STANDARD WIRING PRACTICES MANUAL**

**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**



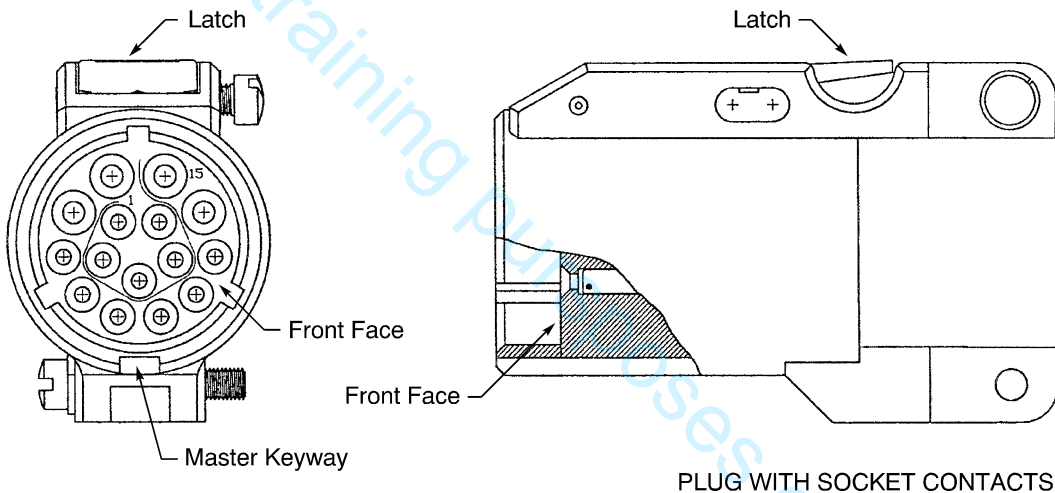
**STANDARD WIRING PRACTICES MANUAL**

**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**



**CONFIGURATION OF THE CB05-15S PLUG CONNECTOR**

**Figure 3**

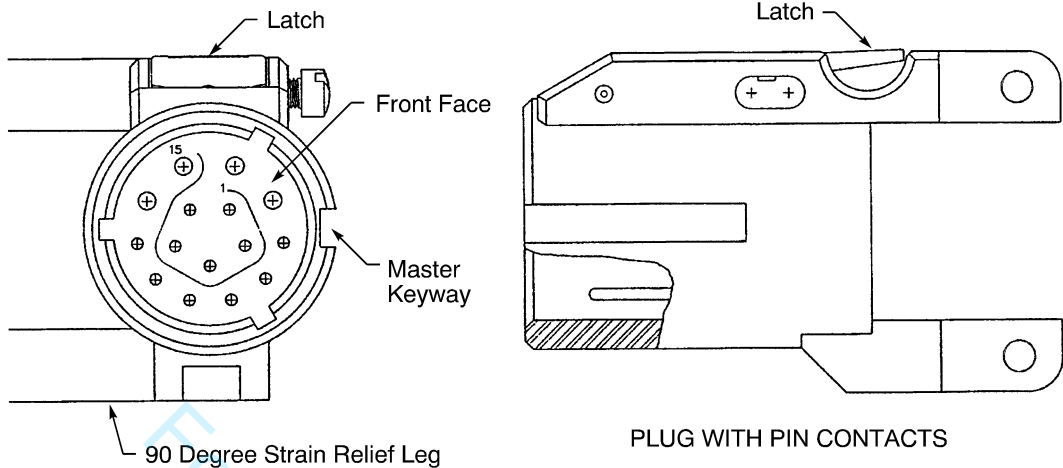


**CONFIGURATION OF THE CB06-15S PLUG CONNECTOR**

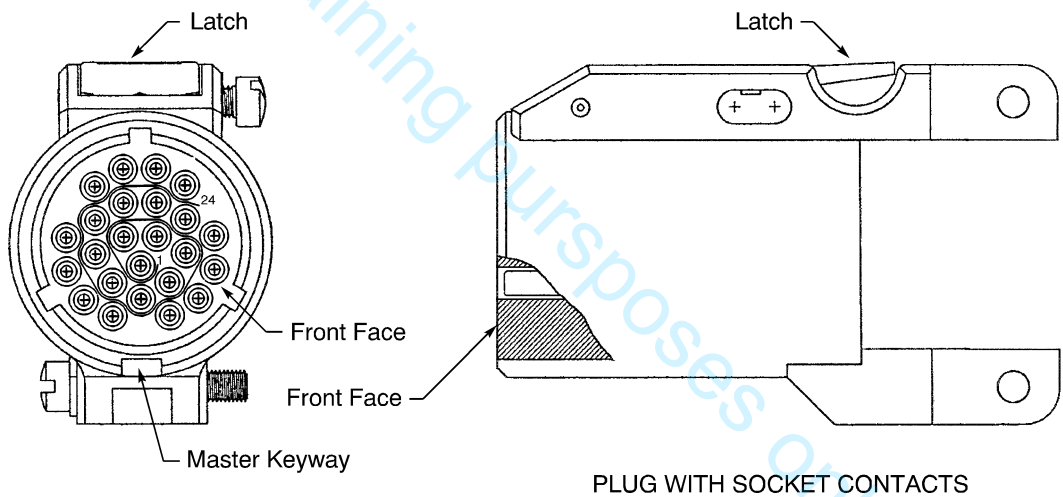
**Figure 4**

**STANDARD WIRING PRACTICES MANUAL**

**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**



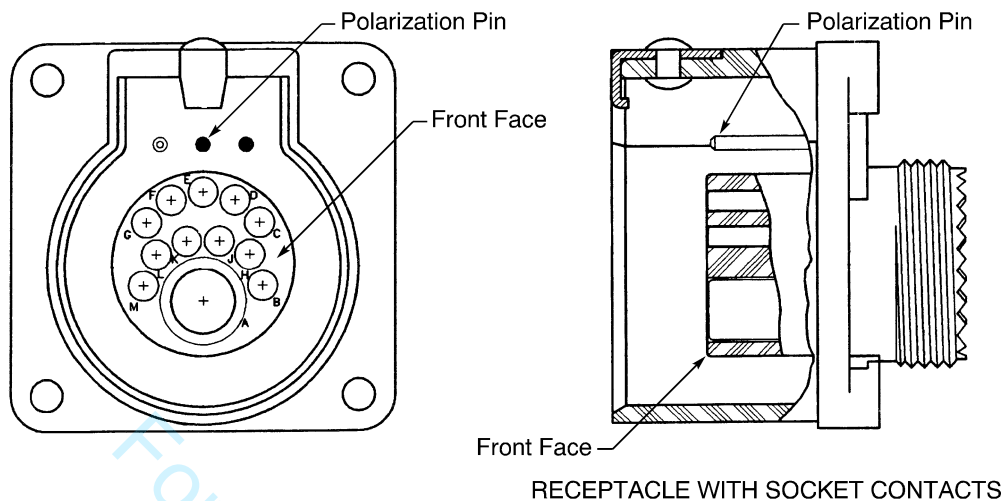
**CONFIGURATION OF THE CB08-15P AND CB08T-15P PLUG CONNECTORS**  
Figure 5



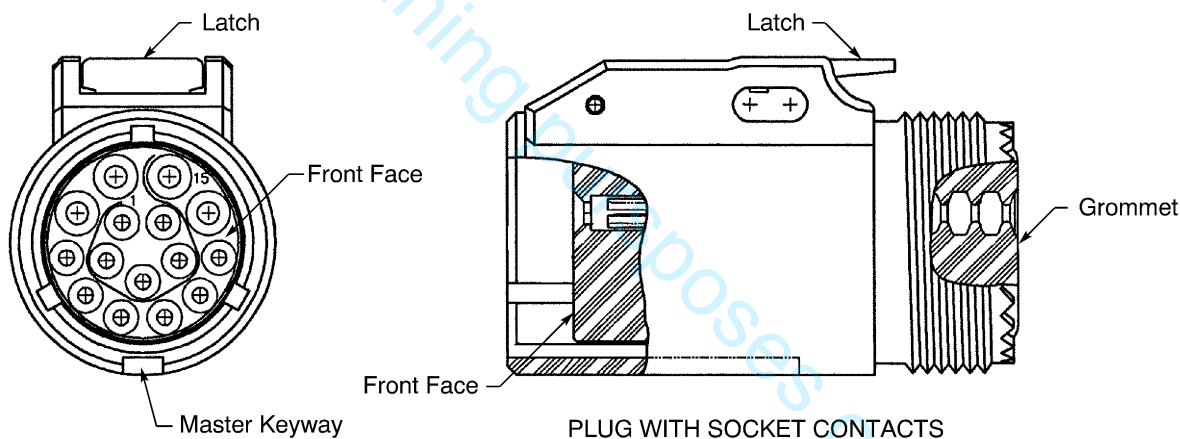
**CONFIGURATION OF THE CB24P-4 PLUG CONNECTOR**  
Figure 6

**STANDARD WIRING PRACTICES MANUAL**

**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**



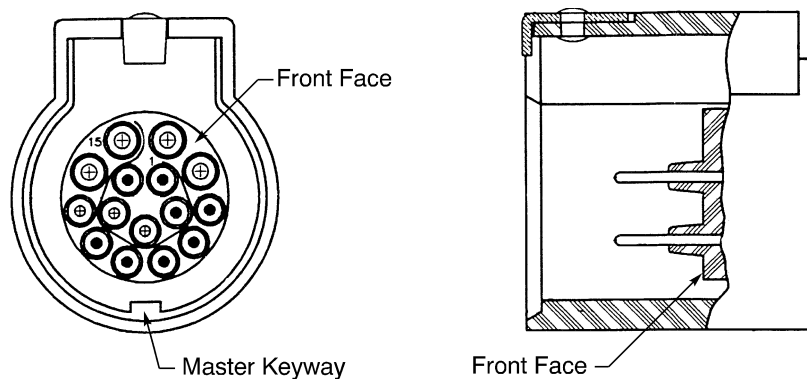
**CONFIGURATION OF THE CBCX12R-1 RECEPTACLE CONNECTOR**  
Figure 7



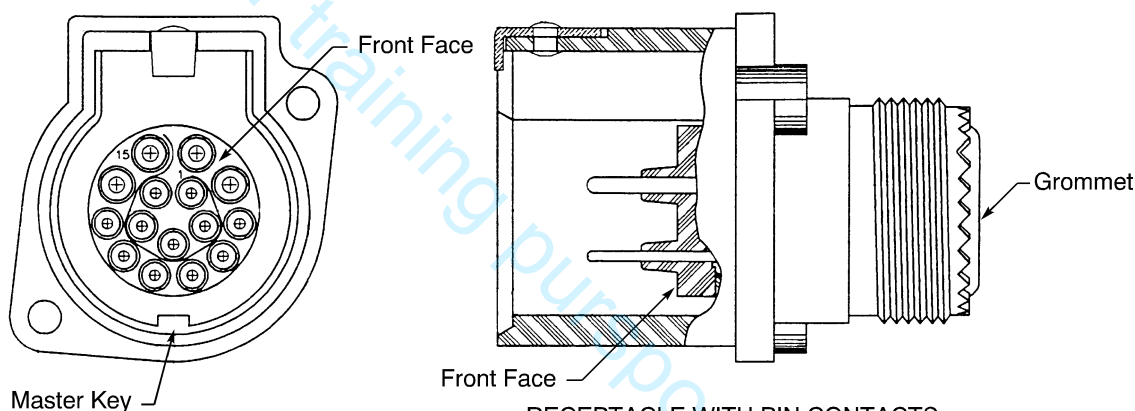
**CONFIGURATION OF THE CBME05-15S PLUG CONNECTOR**  
Figure 8

**STANDARD WIRING PRACTICES MANUAL**

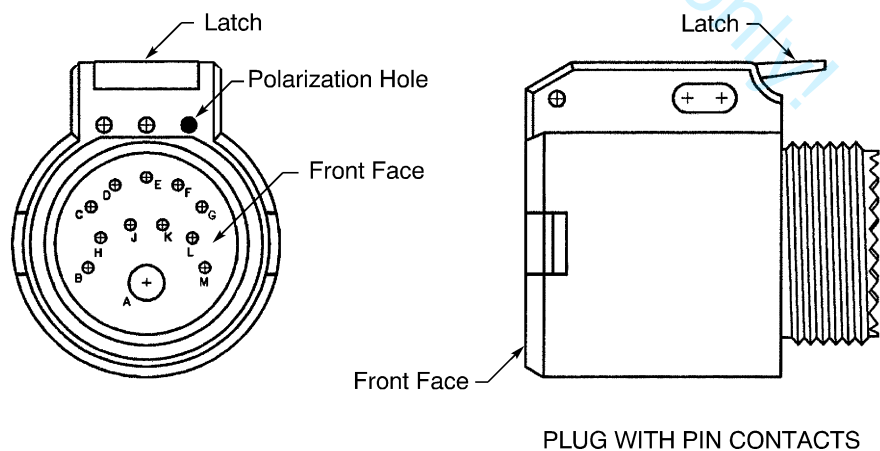
**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**



**CONFIGURATION OF THE CBRE02-15P-1 SHORTING RECEPTACLE**  
**Figure 9**

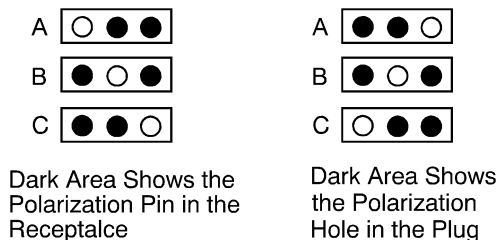


**CONFIGURATION OF THE CBRE02C-15P RECEPTACLE CONNECTOR**  
**Figure 10**



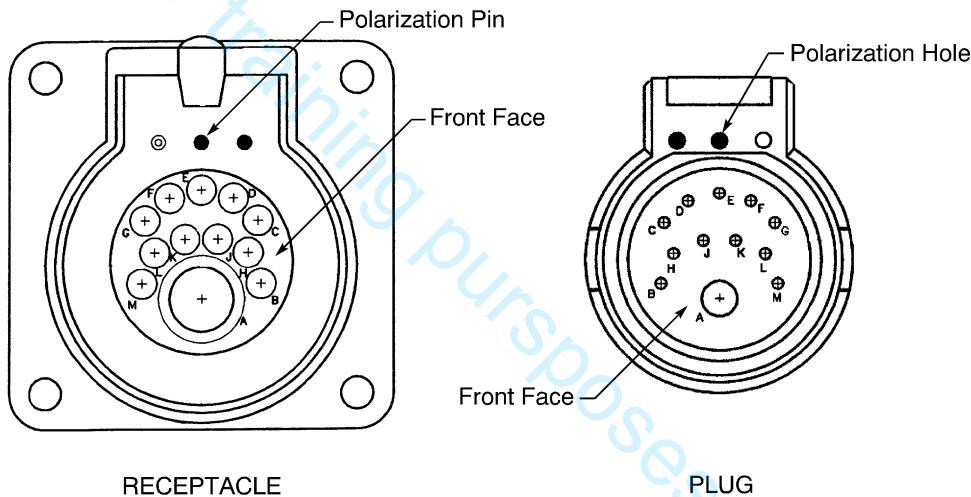
**CONFIGURATION OF THE CBX12PM-1A PLUG CONNECTOR**  
**Figure 11**

**20-72-22**

**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**
**C. CBCX12R-1 Connector Polarization**


**CBCX12R POLARIZATION POSITIONS**  
**Figure 12**

NOTE: The polarization of the CBCX12R connector cannot be changed.



**CBCX12R CONNECTOR POLARIZATION**  
**Figure 13**

**D. Strain Relief Configurations**

**Table 4**  
**STRAIN RELIEF CONFIGURATIONS**

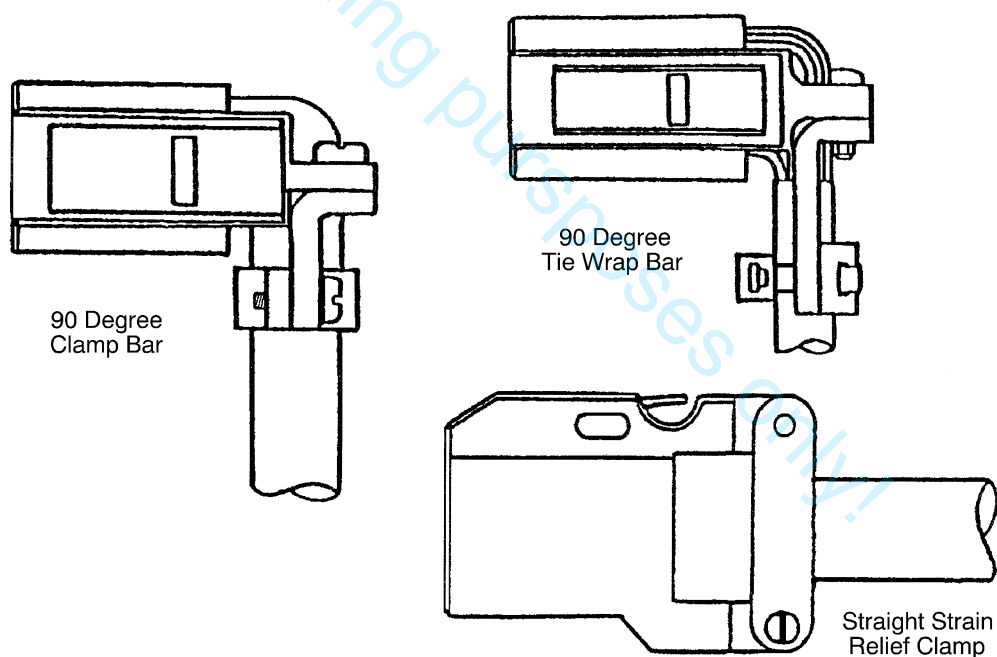
Connector	Strain Relief	Reference
CB02-15P	Potting boot and sealant	Figure 37
CB02-15S	Potting boot and sealant	Figure 37
CB02C-15P	Backshell; refer to Table 12	Figure 18
CB02C-15S	Backshell; refer to Table 12	Figure 18
CB05-15P	Backshell; refer to Table 12	Figure 18
CB05-15S	Backshell; refer to Table 12	Figure 18

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 4 (continued)

Connector	Strain Relief	Reference
CB06-15P	Integral Straight Clamp	Figure 14
CB06-15S	Integral Straight Clamp	Figure 14
CB08-15P	Integral 90 Degree Clamp	Figure 14
CB08-15S	Integral 90 Degree Clamp	Figure 14
CB08T-15P	Integral 90 Degree Tie Wrap Bar	Figure 14
CB08T-15S	Integral 90 Degree Tie Wrap Bar	Figure 14
CB24P-4	Integral Straight Clamp	Figure 14
CBCX12R-1	Backshell; refer to Table 12	Figure 18
CBME05-15S	Backshell; refer to Table 13	Figure 19
CBRE02C-15P	Backshell; refer to Table 13	Figure 19
CBX12PM-1	Backshell; refer to Table 12	Figure 18



INTEGRAL STRAIN RELIEF CONFIGURATIONS

Figure 14

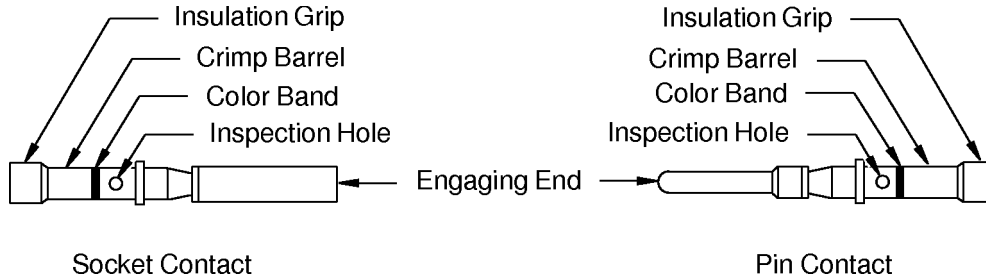
**STANDARD WIRING PRACTICES MANUAL**
**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**
**E. Contact Part Numbers**

**Table 5  
CONTACT SELECTION**

Connector	Applicable Contact	
	Type	Part Numbers
1167062-1	Standard Rear Release Pin	Table 7
1167062-2	Standard Rear Release Pin	Table 7
1167062-3	Standard Rear Release Pin	Table 7
1167063-1	Standard Rear Release Socket	Table 7
1167063-2	Standard Rear Release Socket	Table 7
1167063-3	Standard Rear Release Socket	Table 7
CB02C-15P	Tri-Star Rear Release Pin	Table 9
CB02C-15S	Tri-Star Rear Release Socket	Table 9
CB05-15P	Tri-Star Rear Release Pin	Table 9
CB05-15S	Tri-Star Rear Release Socket	Table 9
CB06-15P	Standard Rear Release Pin	Table 7
CB06-15S	Standard Rear Release Socket	Table 7
CB08-15P	Standard Rear Release Pin	Table 7
CB08-15S	Standard Rear Release Socket	Table 7
CB08T-15P	Standard Rear Release Pin	Table 7
CB08T-15S	Standard Rear Release Socket	Table 7
CB24P-4	Standard Front Release Socket	Table 6
CBCX12R-1	Standard Front Release Socket	Table 6
	Coax Socket	Table 11
CBME05-15S	Tri-Star Rear Release Socket	Table 9
CBRE02C-15P	Tri-Star Rear Release Pin	Table 9
CBX12PM-1A	Standard Front Release Pin	Table 6
	Coax Pin	Table 11

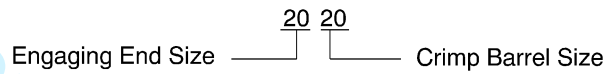
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS



#### STANDARD FRONT RELEASE CONTACTS

Figure 15



#### EXAMPLE OF A CONTACT SIZE

Figure 16

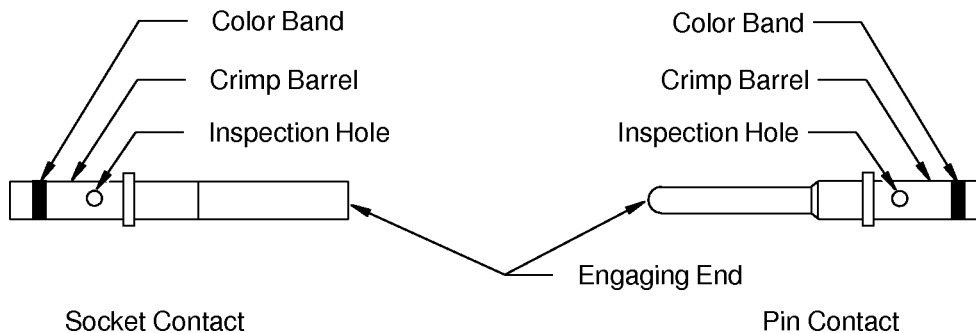
Table 6

#### STANDARD FRONT RELEASE CONTACT PART NUMBERS

Contact Size		Contact Type	Part Number	Supplier
Engaging End	Crimp Barrel			
20	20	Pin	BACC47CN1	Boeing
			CRC20W-3	Tri-Star
		Socket	BACC47CP1	Boeing
			CRM20W-3P	Tri-Star
			M39029/32-260	QPL
	18	Pin	31A-2016-035	Tri-Star
		Socket	CRC20W-18	Tri-Star
			P-209541-D	Pyle-National
	16	Pin	CRM20W-4P	Tri-Star
		Socket	318-2016-035	Tri-Star
			CRC20W-4	Tri-Star

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS



#### STANDARD REAR RELEASE CONTACTS

Figure 17

Table 7

#### STANDARD REAR RELEASE CONTACT PART NUMBERS

Contact Size		Contact Type	Part Number	Supplier
Engaging End	Crimp Barrel			
20	20	Pin	BACC47ES1	Boeing
			M39029/4-110	QPL
		Socket	BACC47ET1	Boeing
			M39029/5-115	QPL
16	16	Pin	BACC47ES2	Boeing
			M39029/4-111	QPL
		Socket	BACC47ET2	Boeing
			M39029/5-116	QPL

Table 8

#### APPROVED SUPPLIERS OF BOEING STANDARD CONTACTS

Contact	Supplier
BACC47CN	Amphenol
	Framatome Connectors
	Labinal
	Pyle-National
	Tri-Star
BACC47CP	Amphenol
	Framatome Connectors
	Pyle-National
	Tri-Star

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 8 (continued)

Contact	Supplier
BACC47ES	Amphenol
	Tri-Star
BACC47ET	Amphenol
	Tri-Star

Table 9

### TRI-STAR REAR RELEASE CONTACT PART NUMBERS

Contact Size		Contact Type	Part Number	Supplier
Engaging End	Crimp Barrel			
20	20	Pin	K4004-0001-2005	Cory Components
			K4004-0001-2005	Tri-Star
		Socket	K3004-0001-2005	Cory Components
			K3004-0001-2005	Tri-Star
16	16	Pin	K4004-0002-1605	Cory Components
			K4004-0002-1605	Tri-Star
		Socket	K3004-0002-1605	Cory Components
			K3004-0002-1605	Tri-Star

Table 10

### ALTERNATIVE CONTACT PART NUMBERS

Specified Contact		Alternative Contact	
Part Number	Supplier	Part Number	Supplier
K4004-0001-2005	Cory Components	K4004-0001-2005	Tri-Star
K3004-0001-2005	Cory Components	K3004-0001-2005	Tri-Star
K4004-0002-1605	Cory Components	K4004-0002-1605	Tri-Star
K3004-0002-1605	Cory Components	K3004-0002-1605	Tri-Star

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 11  
COAX CONTACT PART NUMBERS

Contact Size	Contact Type	Part Number	Supplier	Coax Cable
8	Pin	CRMEM-501	Tri-Star	BMS 13-65 Type OE
				S280W503-1
		CRMEM-501A	Tri-Star	BMS 13-65 Type OE
				S280W503-1
		CRMEM-501C	Tri-Star	BMS 13-65 Type OE
				S280W503-1
8	Socket	CRMEM-502	Tri-Star	BMS 13-65 Type OF
				S280W503-2
		CRMEF-501	Tri-Star	BMS 13-65 Type OE
				S280W503-1
		CRMEF-501A	Tri-Star	BMS 13-65 Type OE
				S280W503-1
		CRMEF-501C	Tri-Star	BMS 13-65 Type OE
				S280W503-1
		CRMEF-502	Tri-Star	BMS 13-65 Type OF
				S280W503-2
		CRMEF-502A	Tri-Star	BMS 13-65 Type OF
				S280W503-2

### F. Backshell Part Numbers

Table 12  
BACKSHELL PART NUMBERS FOR NON-ENVIRONMENTAL CONNECTORS

Configuration	Backshell	Supplier
Straight	CT-14S	Cory Components
	CT-14S	Tri-Star
45 Degrees	CTF-14S	Cory Components
	CTF-14S	Tri-Star
90 Degrees	CTR-14S	Cory Components
	CTR-14S	Tri-Star

# STANDARD WIRING PRACTICES MANUAL

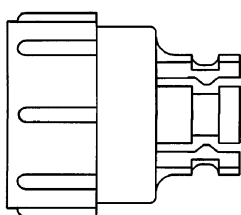
## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

**Table 13**  
**BACKSHELL PART NUMBERS FOR ENVIRONMENTAL CONNECTORS**

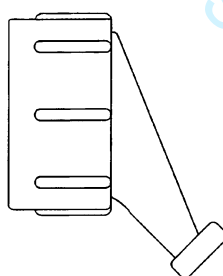
Configuration	Backshell	Supplier
45 Degrees	CTF-16	Cory Components
	CTF-16	Tri-Star
90 Degrees	CTR-16	Cory Components
	CTR-16	Tri-Star
Straight	CTS-16	Cory Components
	CTS-16	Tri-Star

**Table 14**  
**ALTERNATIVE BACKSHELL PART NUMBERS**

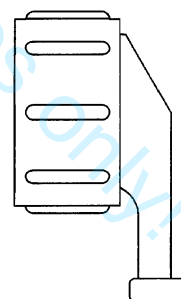
Specified Backshell		Alternative Backshell	
Part Number	Supplier	Part Number	Supplier
CT-14S	Cory Components	CT-14S	Tri-Star
CTF-14S	Cory Components	CTF-14S	Tri-Star
CTF-16	Cory Components	CTF-16	Tri-Star
CTR-14S	Cory Components	CTR-14S	Tri-Star
CTR-16	Cory Components	CTR-16	Tri-Star
CTS-16	Cory Components	CTS-16	Tri-Star



CT-14S



CTF-14S

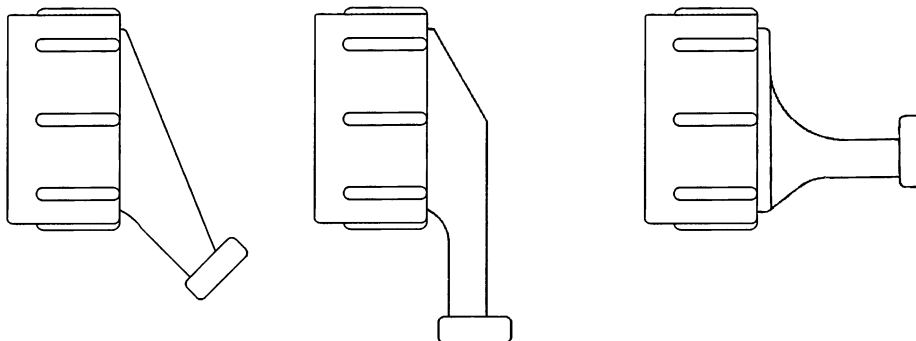


CTR-14S

**BACKSHELL CONFIGURATIONS FOR NON-ENVIRONMENTAL CONNECTORS**  
**Figure 18**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS



CTF-16

CTR-16

CTS-16

### BACKSHELL CONFIGURATIONS FOR ENVIRONMENTAL CONNECTORS

Figure 19

### 3. INSERT CONFIGURATIONS

#### A. CB()-() and 116706()-() Series Connectors

NOTE: The contact cavity size specified in Table 15 is equivalent to the engaging end size of the contact.

Table 15

#### INSERT CONFIGURATIONS - CONNECTORS WITH CRIMP CONTACTS

Connector	Contact Cavity		Reference
	Quantity	Size	
1167062-1	11	20	Figure 21
	4	16	
1167062-2	11	20	Figure 21
	4	16	
1167062-3	11	20	Figure 21
	4	16	
1167063-1	11	20	Figure 21
	4	16	
1167063-2	11	20	Figure 21
	4	16	
1167063-3	11	20	Figure 21
	4	16	
CB02C-15P	11	20	Figure 21
	4	16	
CB02C-15S	11	20	Figure 21
	4	16	

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## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 15 (continued)

Connector	Contact Cavity		Reference
	Quantity	Size	
CB05-15P	11	20	Figure 21
	4	16	
CB05-15S	11	20	Figure 21
	4	16	
CB06-15P	11	20	Figure 21
	4	16	
CB06-15S	11	20	Figure 21
	4	16	
CB08-15P	11	20	Figure 21
	4	16	
CB08-15S	11	20	Figure 21
	4	16	
CB08T-15P	11	20	Figure 21
	4	16	
CB08T-15S	11	20	Figure 21
	4	16	
CB24P-4	24	20	Figure 22
CBCX12R-1	11	20	Figure 20
	1	8	
CBME05-15S	11	20	Figure 21
	4	16	
CBRE02C-15P	11	20	Figure 21
	4	16	
CBX12PM-1A	11	20	Figure 20
	1	8	

Table 16

### INSERT CONFIGURATIONS - CONNECTORS WITH SOLDER TYPE CONTACTS

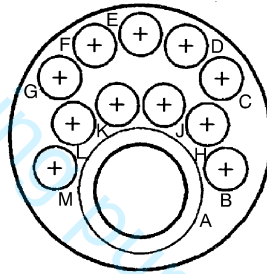
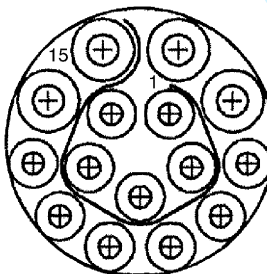
Connector	Contact		Reference
	Quantity	Size	
1167060	11	20	Figure 21
	4	16	

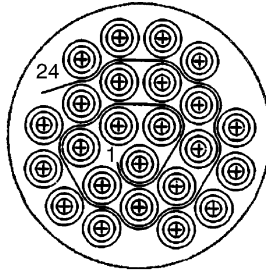
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**ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**
**Table 16 (continued)**

Connector	Contact		Reference
	Quantity	Size	
1167061	11	20	Figure 21
	4	16	
CB02-15P	11	20	Figure 21
	4	16	
CB02-15S	11	20	Figure 21
	4	16	

**NOTE:** Figure 20, Figure 21, and Figure 22 show the rear face of the plug connector. The rear face of the receptacle connector is the opposite view.


**12 POSITION CONFIGURATION**
**Figure 20**

**15 POSITION CONFIGURATION**
**Figure 21**

**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**

**24 POSITION CONFIGURATION**  
**Figure 22**

**4. CONNECTOR DISASSEMBLY****A. Integral Strain Relief Removal**

Refer to Figure 14 for the configurations of the integral strain relief cable clamps.

- (1) If the connector has an integral straight strain relief with a clamp bar, or an integral 90 degree strain relief with a clamp bar:
  - (a) Disengage the screws that hold the clamp bar to the strain relief legs of the connector.
  - (b) Remove the screws.
  - (c) Remove the clamp bar from the wire harness.
- (2) If the connector has an integral 90 degree tie wrap bar:
  - (a) Cut the plastic tie strap or wire harness tie that holds the wire harness to the tie wrap bar.

**CAUTION:** DO NOT CUT THE INSULATION OF THE WIRES IN THE WIRE HARNESS. DAMAGE TO THE WIRE INSULATION CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE WIRE.

- (b) Disengage the screws that hold the tie wrap bar to the strain relief legs of the connector.
- (c) Remove the screws.
- (d) Remove the tie wrap bar.

**B. Backshell Removal**

Refer to Figure 18 and Figure 19 for the configurations of the backshells.

- (1) Cut the plastic tie strap or wire harness tie that holds the wire harness on the backshell.

**CAUTION:** DO NOT CUT THE INSULATION OF THE WIRES IN THE WIRE HARNESS. DAMAGE TO THE WIRE INSULATION CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE WIRE.

- (2) If the wire harness has a layer of tape or a sleeve at the strain relief, remove the tape or the sleeve from the harness.
- (3) Disengage the threads of the backshell and the connector.
- (4) Push the backshell rearward away from the connector.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

#### C. Contact Removal - Front Release Contact

**Table 17**  
**CONTACT REMOVAL TOOLS**

Engaging End Size	Removal Tool
20	M81969/19-07

**NOTE:** The deadface of the CBX12PM-1 connector must be removed before the contacts can be removed.

- (1) If it is necessary, remove the strain relief or the backshell from the connector.

Refer to:

- Paragraph 4.A. for the removal of the integral strain relief
- Paragraph 4.B. for the removal of the backshell.

- (2) If the connector has a deadface, remove the deadface. Refer to Paragraph 4.F.

- (3) Make a selection of a contact removal tool from Table 17.

- (4) Axially align the tool and the contact cavity at the front face of the connector.

Make sure that the plunger of the removal tool is fully retracted.

- (5) Push the tool into the contact cavity until it stops.

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE REMOVAL TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (6) Push the plunger of the tool until the contact starts to come out of the contact cavity.

- (7) Carefully pull the tool out of the contact cavity.

Make sure that the removal tools stays axially aligned with the contact cavity.

- (8) Pull the contact out of the contact cavity from the rear of the connector.

#### D. Contact Removal - Rear Release Contact

**Table 18**  
**CONTACT REMOVAL TOOLS - STANDARD CONTACTS**

Contact Engaging End Size	Removal Tool	
	Part Number	Color
20	6500-001-20	-
	CET20-24	Red
	CIET-20	-
	M81969/14-02	White
16	6500-001-16	-
	CET16-21	Blue
	CIET-16	-
	M81969/14-03	White

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### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

**Table 19**  
**CONTACT REMOVAL TOOLS - TRI-STAR CONTACTS**

Contact Engaging End Size	Removal Tool	
	Part Number	Color
20	M81969/8-06	-
	M81969/14-02	White
16	M81969/8-08	-
	M81969/14-03	White

- (1) If it is necessary, remove the strain relief or the backshell from the connector.

Refer to:

- Paragraph 4.A. for the removal of the integral strain relief
- Paragraph 4.B. for the removal of the backshell.

- (2) Make a selection of a contact removal tool from Table 18 or Table 19.
- (3) Axially align the tool and the contact cavity at the rear face of the connector.
- (4) Push the tool into the contact cavity until it stops.
- Make sure that the tool is not turned in the contact cavity.

**CAUTION:** IF THE REMOVAL TOOL IS TURNED WHILE IT IS IN THE CONTACT CAVITY, DAMAGE TO THE CONNECTOR CAN OCCUR.

- (5) Carefully pull the wire and the tool from the contact cavity at the same time.
- Make sure that the removal tool stays axially aligned with the contact cavity.
- (6) If the contact is not released:
- Carefully remove the tool.
  - Turn the tool approximately 90 degrees.
  - Do Step (3) through Step (5) again.

#### E. Contact Removal - Coax Contact

**Table 20**  
**COAX CONTACT REMOVAL TOOLS**

Contact Cavity Size	Removal Tool
8	M81969/19-03

**NOTE:** The deadface of the CBX12PM-1 connector must be removed before the contacts can be removed.

- (1) If it is necessary, remove the strain relief or the backshell from the connector.
- Refer to:
- Paragraph 4.A. for the removal of the integral strain relief
  - Paragraph 4.B. for the removal of the backshell.
- (2) If the connector has a deadface, remove the deadface. Refer to Paragraph 4.F.
- (3) Make a selection of a contact removal tool from or Table 20.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

- (4) Axially align the tool and the contact cavity at the front face of the connector.  
Make sure that the plunger of the removal tool is fully retracted.
- (5) Push the tool into the contact cavity until it stops.

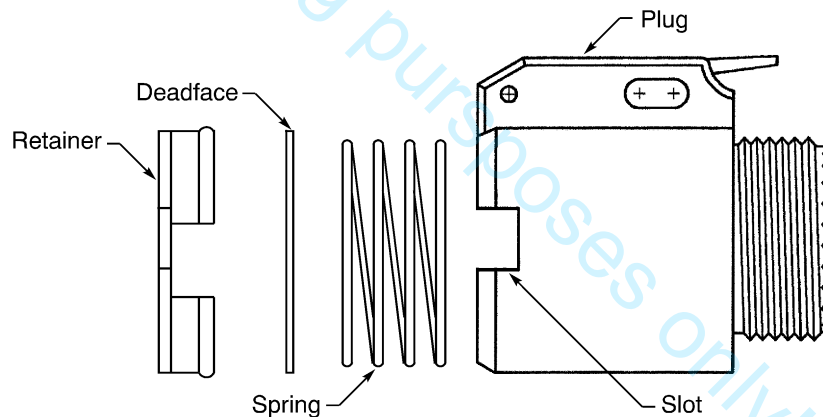
**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE REMOVAL TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (6) Push the plunger of the tool until the contact starts to come out of the contact cavity.
- (7) Carefully pull the tool out of the contact cavity.  
Make sure that the removal tools stays axially aligned with the contact cavity.
- (8) Pull the contact out of the contact cavity from the rear of the connector.

#### F. Deadface Removal

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

Tool	Type	Tip Size (inch)
Screwdriver	Flat Blade	1/4



**CBX12PM-1 CONNECTOR DEADFACE COMPONENTS**

**Figure 23**

Refer to Figure 23.

- (1) Make a selection of a flat blade screwdriver from Table 21.
- (2) Push the deadface in and hold it away from the front face of the connector.
- (3) Continue to hold the deadface and put the tip of the screwdriver in one of the slots on the side of the connector near the front face.
- (4) Continue to hold the deadface and twist the screwdriver until the side of the retainer moves away from the connector.
- (5) Do Step (3) and Step (4) again for the slot on the other side of the connector.
- (6) Remove the retainer, the deadface, and the spring.

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## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

### 5. ASSEMBLY OF A CONNECTOR WITH CRIMP TYPE CONTACTS

#### A. Wire Preparation

The Paragraph gives the procedure to prepare a wire for the assembly of a front release or a rear release contact.

**Table 22**  
**INSULATION REMOVAL LENGTH**

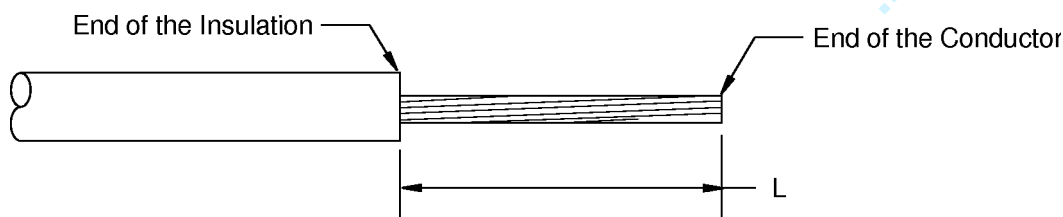
Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)		Special Instructions
		Target	Tolerance	
26	20	0.19	$\pm 0.03$	-
24	20	0.19	$\pm 0.03$	-
	16	0.50	$\pm 0.03$	Fold the conductor back on itself
22	20	0.19	$\pm 0.03$	-
	16	0.25	$\pm 0.03$	Use a Y6015C eyelet; refer to Subject 20-60-00
		0.50	$\pm 0.03$	Fold the conductor back on itself
20	20	0.19	$\pm 0.03$	-
	16	0.25	$\pm 0.03$	-
18	16	0.25	$\pm 0.03$	-
16	16	0.25	$\pm 0.03$	-

- (1) Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 24
- Table 22 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedure.

**NOTE:** If the wire size and a larger crimp barrel size are not specified in Table 22, the size of the conductor must be increased. Refer to Subject 20-60-00.



**INSULATION REMOVAL**  
**Figure 24**

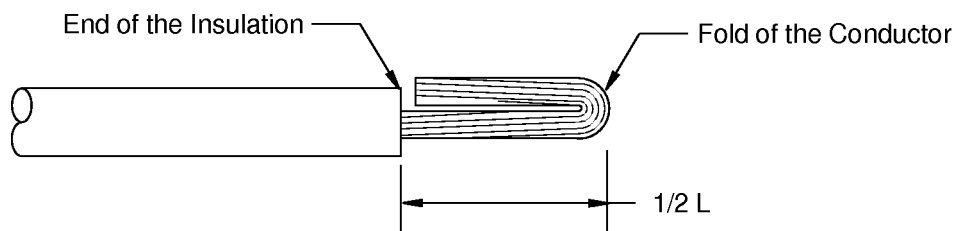
- (2) For CBME and CBRE connectors:
- (a) Measure the O.D. of the wire.

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- (b) If the O.D. of the wire is less than the minimum seal diameter of the connector grommet hole, increase the O.D. of the wire. Refer to Paragraph 1.A.
- (3) If it is specified, fold the conductor back. Refer to Figure 25.



**FOLDED BACK CONDUCTOR**

**Figure 25**

#### B. Contact Assembly

This paragraph gives the procedure to assemble:

- A standard front release contact
- A standard rear release contact
- A Tri-Star rear release contact.

For the procedure to assemble a coax contact, refer to Paragraph 5.C.

**Table 23**

**STANDARD FRONT RELEASE CONTACT CRIMP TOOLS**

Wire Size (AWG)	Contact Size		Crimp Tool				
	Engaging End	Crimp Barrel	Basic Unit			Locator	
			Part Number	Setting	Die Set	Part Number	Color
24	20	20	85-220	5	-	M22520/2-02	-
			85-550	2	-	M22520/1-02	Red
			M10S	-	S-5	SL-3	-
			M22520/1-01	2	-	M22520/1-02	Red
			M22520/2-01	5	-	M22520/2-02	-
			WA22	5	-	M22520/2-02	-
			WA22LC	5	-	M22520/2-02	-
			WA27F	2	-	M22520/1-02	Red
	16	16	85-550	4	-	M22520/1-02	Blue
			M22520/1-01	4	-	M22520/1-02	Blue
			WA27F	4	-	M22520/1-02	Blue

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## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 23 (continued)

Wire Size (AWG)	Contact Size		Crimp Tool				
	Engaging End	Crimp Barrel	Basic Unit			Locator	
			Part Number	Setting	Die Set	Part Number	Color
22	20	20	85-220	6	-	M22520/2-02	-
			M10S	-	S-6	SL-3	-
			M22520/1-01	3	-	M22520/1-02	Red
			M22520/2-01	6	-	M22520/2-02	-
			ST2220-1-Y	-	-	ST2220-1-1	-
			WA22	6	-	M22520/2-02	-
			WA22LC	6	-	M22520/2-02	-
			WA27F	3	-	M22520/1-02	Red
	16	16	85-550	5	-	M22520/1-02	Blue
			M22520/1-01	5	-	M22520/1-02	Blue
			WA27F	5	-	M22520/1-02	Blue
20	20	20	85-220	7	-	M22520/2-02	-
			85-550	4	-	M22520/1-02	Red
			M10S	-	S-6	SL-3	-
			M22520/1-01	4	-	M22520/1-02	Red
			M22520/2-01	7	-	M22520/2-02	-
			ST2220-1-Y	-	-	ST2220-1-1	-
			WA22	7	-	M22520/2-02	-
			WA22LC	7	-	M22520/2-02	-
			WA27F	4	-	M22520/1-02	Red
	16	16	85-550	4	-	M22520/1-02	Blue
			M10S	-	S-7	SL-2	-
			M22520/1-01	4	-	M22520/1-02	Blue
			ST2220-1-Y	-	-	ST2220-1-2	-
			WA27F	4	-	M22520/1-02	Blue

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Table 23 (continued)

Wire Size (AWG)	Contact Size		Crimp Tool				
	Engaging End	Crimp Barrel	Basic Unit			Locator	
			Part Number	Setting	Die Set	Part Number	Color
18	20	18	M22520/1-01	5	-	M22520/1-02	Red
			M22520/2-01	8	-	M22520/2-02	-
			WA22	8	-	M22520/2-02	-
			WA27F	5	-	M22520/1-02	Red
	16	16	85-550	5	-	M22520/1-02	Blue
			M10S	-	S-7	SL-2	-
			M22520/1-01	5	-	M22520/1-02	Blue
			ST2220-1-Y	-	-	ST2220-1-2	-
			WA27F	5	-	M22520/1-02	Blue
16	20	16	M22520/1-01	6	-	M22520/1-02	Red
			M22520/2-01	8	-	K977	-
			M22520/2-01	8	-	M22520/2-02	-
			ST2220-1-Y	-	-	ST2220-1-45	-
	16	16	85-550	6	-	M22520/1-02	Blue
			M10S	-	S-7	SL-3	-
			M22520/1-01	6	-	M22520/1-02	Blue
			ST2220-1-Y	-	-	ST2220-1-2	-
			WA27F	6	-	M22520/1-02	Blue

Table 24

## STANDARD REAR RELEASE CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool				
		Basic Unit		Locator		
		Part Number	Setting	Part Number	Color	Block
26	20	85-220	4	M22520/2-02	-	-
		M22520/1-01	1	M22520/1-02	Red	-
		M22520/2-01	4	M22520/2-02	-	-
		WA22	4	K1S	-	-
		WA22LC	4	K1S	-	-
		WA27F	1	TH1A	-	-

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 24 (continued)

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool				
		Basic Unit		Locator		
		Part Number	Setting	Part Number	Color	Block
24	20	612916	-	-	Yellow	Black
		85-220	5	M22520/2-02	-	-
		M22520/1-01	2	M22520/1-02	Red	-
		M22520/2-01	5	M22520/2-02	-	-
		WA22	5	K1S	-	-
		WA22LC	5	K1S	-	-
		WA27F	2	TH1A	-	-
	16	M22520/1-01	4	M22520/1-02	Blue	-
		WA27F	4	TH1A	-	-
22	20	11148	-	-	Red	Black
		85-220	6	M22520/2-02	-	-
		M22520/1-01	3	M22520/1-02	Red	-
		M22520/2-01	6	M22520/2-02	-	-
		MS3191-1	-	MS3191-20A	-	-
		ST2220-1-Y	-	ST2220-1-1	-	-
		WA22	6	K1S	-	-
		WA22LC	6	K1S	-	-
		WA27F	3	TH1A	-	-
	16	M22520/1-01	5	M22520/1-02	Blue	-
		WA27F	5	TH1A	-	-
20	20	11148	-	-	Red	Black
		85-220	7	M22520/2-02	-	-
		M22520/1-01	4	M22520/1-02	Red	-
		M22520/2-01	7	M22520/2-02	-	-
		MS3191-1	-	MS3191-20A	-	-
		ST2220-1-Y	-	ST2220-1-1	-	-
		WA22	7	K1S	-	-
		WA22LC	7	K1S	-	-
		WA27F	4	TH1A	-	-
	16	M22520/1-01	4	M22520/1-02	Blue	-
		WA27F	4	TH1A	-	-

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 24 (continued)

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool				
		Basic Unit		Locator		
		Part Number	Setting	Part Number	Color	Block
18	16	M22520/1-01	5	M22520/1-02	Blue	-
		WA27F	5	TH1A	-	-
16	16	M22520/1-01	6	M22520/1-02	Blue	-
		MS3191-1	-	MS3191-16A	-	-
		ST2220-1-Y	-	ST2220-1-2	-	-
		WA27F	6	TH1A	-	-

Table 25

### TRI-STAR REAR RELEASE CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool			
		Basic Unit		Locator	
		Part Number	Setting	Part Number	Color
24	20	M22520/1-01	2	M22520/1-02	Red
		M22520/2-01	5	M22520/2-02	-
22	20	M22520/1-01	3	M22520/1-02	Red
		M22520/2-01	6	M22520/2-02	-
		MS3191-1	-	MS3191-20A	-
20	20	M22520/1-01	4	M22520/1-02	Red
		M22520/2-01	7	M22520/2-02	-
		MS3191-1	-	MS3191-20A	-
	16	M22520/1-01	4	M22520/1-02	Blue
18	16	M22520/1-01	5	M22520/1-02	Blue
16	16	M22520/1-01	6	M22520/1-02	Blue
		MS3191-1	-	MS3191-16A	-

- (1) Make a selection of a crimp tool from:
  - Table 23 for a standard front release contact
  - Table 24 for a standard rear release contact
  - Table 25 for a Tri-Star rear release contact.
- (2) Put the end of the wire in the crimp barrel of the contact.

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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.

(3) 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.

#### C. Coax Contact Assembly

**Table 26**  
**COAX CONTACT CENTER CONTACT CRIMP TOOLS**

Contact	Center Contact	Crimp Tool		
		Basic Unit		Locator
		Part Number	Setting	
CQMEF-501A	Pin	M22520/2-01	6	M22520/2-14
		WA22	6	M22520/2-14
		WA22LC	6	M22520/2-14
CQMEF-501C	Pin	M22520/2-01	6	M22520/2-14
CQMEF-502A	Pin	M22520/2-01	5	M22520/2-14
		WA22	5	M22520/2-14
		WA22LC	5	M22520/2-14
CQMEM-501	Socket	M22520/2-01	6	M22520/2-06
		WA22	6	M22520/2-06
		WA22LC	6	M22520/2-06
CQMEM-501C	Socket	M22520/2-01	6	M22520/2-06
CQMEM-502	Socket	M22520/2-01	6	M22520/2-06
		WA22	6	M22520/2-06
		WA22LC	6	M22520/2-06
CRMEF-501	Socket	M22520/2-01	6	M22520/2-06
CRMEF-502	Socket	M22520/2-01	6	M22520/2-06
CRMEM-501A	Socket	M22520/2-01	3	M22520/2-06
CRMEM-502	Socket	M22520/2-01	6	M22520/2-06

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## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 27  
COAX CONTACT BODY CRIMP TOOLS

Coax Contact	Crimp Tool		
	Basic Unit	Die	
		Part Number	Cavity
CQMEF-501A	M22520/5-01	M22520/5-39	B
CQMEF-501C	M22520/5-01	M22520/5-41	B
CQMEF-502A	M22520/5-01	M22520/5-41	B
CQMEM-501	M22520/5-01	M22520/5-39	B
CQMEM-501C	M22520/5-01	M22520/5-41	B
CQMEM-502	M22520/5-01	M22520/5-41	B
CRMEF-501	M22520/5-01	M22520/5-39	B
CRMEF-502	M22520/5-01	M22520/5-05	B
CRMEM-501A	M22520/5-01	Y475	.163 HEX
CRMEM-502	M22520/5-01	M22520/5-41	B

Table 28  
NECESSARY MATERIALS

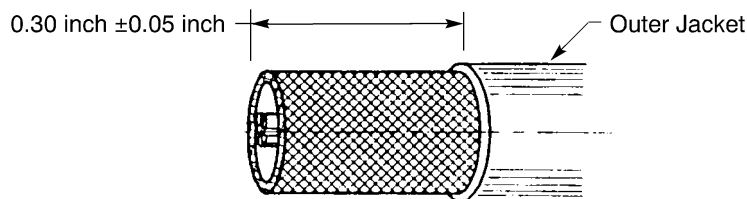
Material	Part Number	Supplier
Sleeve, Heat Shrinkable	AMS-DTL-23053/8	Available source
	RW-175	Raychem

- (1) Make a selection of a center contact crimp tool from Table 26.
- (2) Make a selection of a contact body crimp tool from Table 27.
- (3) Make a selection of a heat shrinkable sleeve from Table 28.

**NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.

- (4) Put a 1.75 inch  $\pm 0.13$  inch length of 3/16 inch diameter heat shrinkable sleeve on the cable.
- (5) Remove 0.30 inch  $\pm 0.05$  inch of the outer jacket from the end of the cable. Refer to Figure 26.

**CAUTION:** DAMAGE TO THE SHIELDS, THE DIELECTRIC, OR THE CENTER CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.



OUTER JACKET REMOVAL LENGTH

Figure 26

# 20-72-22

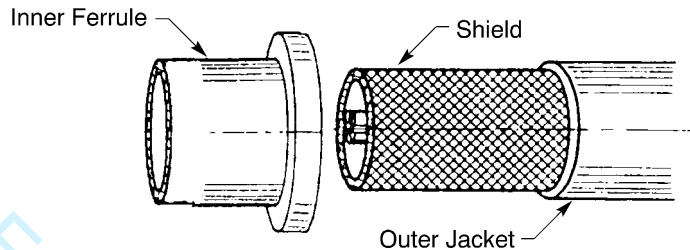
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

- (6) Put the inner ferrule on the cable. Refer to Figure 27.

Make sure that:

- The end of the ferrule with the shoulder is put on the cable first
- The inner shoulder of the ferrule is against the end of the outer jacket.



**ALIGNMENT OF THE INNER FERRULE AND THE CABLE**

**Figure 27**

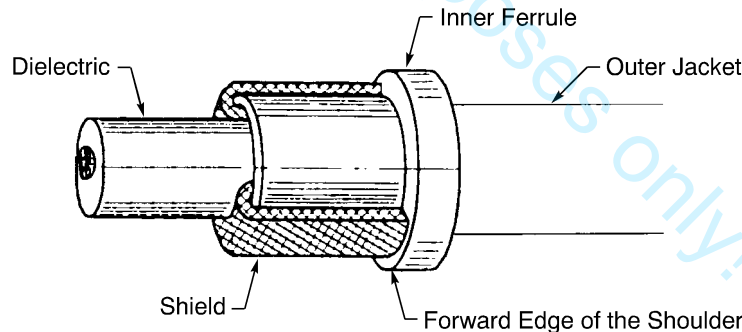
- (7) Fold the outer round conductor shield back on the inner ferrule.

Make sure that the strands of the shield are equal and symmetrical around the circumference of the ferrule.

- (8) Remove the inner flat conductor shield at the forward edge of the inner ferrule.

**CAUTION:** DAMAGE TO THE OUTER SHIELD, THE DIELECTRIC, OR THE CENTER CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (9) Cut the strands of the outer shield at the forward edge of the shoulder of the inner ferrule. Refer to Figure 28.



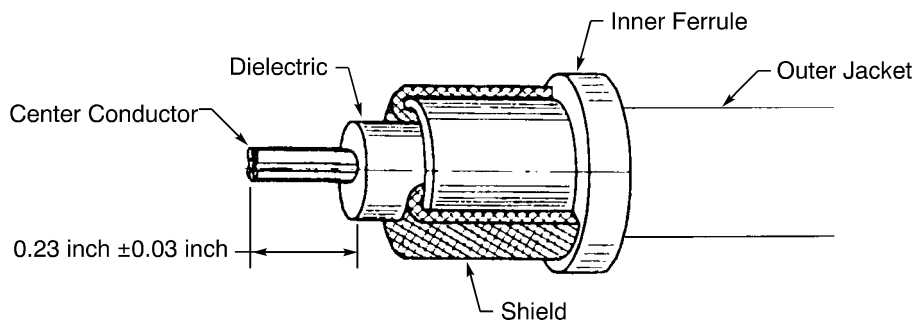
**POSITION OF THE OUTER SHIELD ON THE INNER FERRULE**

**Figure 28**

- (10) Remove 0.23 inch  $\pm$  0.03 inch of the dielectric from the end of the cable. Refer to Figure 29.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS



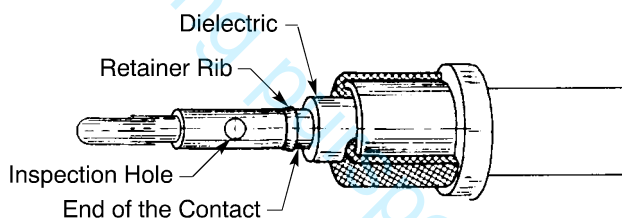
#### DIELECTRIC REMOVAL

Figure 29

- (11) If all of the strands of the center conductor are not together, twist the strands together in their initial direction.
- (12) Put the center conductor in the crimp barrel of the center contact. Refer to Figure 30.

Make sure that:

- The end of the dielectric is against the end of the center contact
- The strands of the conductor can be seen in the inspection hole.



#### POSITION OF THE CENTER CONTACT ON THE CENTER CONDUCTOR

Figure 30

- (13) Crimp the center contact.
- (14) Put the contact body on the center contact.  
Make sure that the retainer rib of the center contact is locked in the contact body.
- (15) Lightly pull the cable to make sure that the center contact is locked in the body assembly.
- (16) If the center contact is not locked in the contact body, do Step (14) and Step (15) again.
- (17) Put the contact body in the die of the contact body crimp tool.

Make sure that the distance from:

- The forward edge of the crimp tool die to the shoulder of the contact body is not more than 0.06 inch
- The rear end of the crimp barrel to the forward edge of the shoulder of the inner ferrule is not more than 0.035 inch.

- (18) Crimp the contact body. Refer to Figure 31.

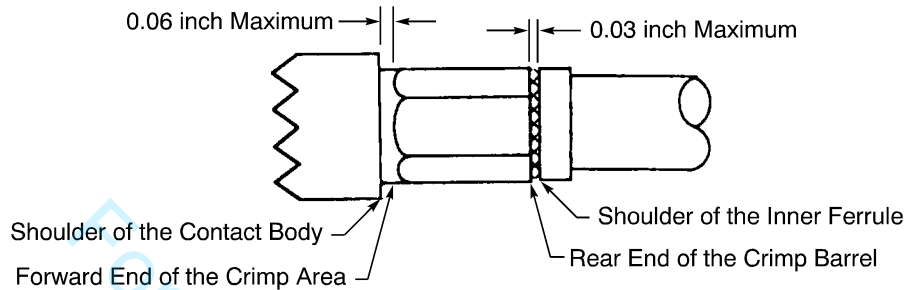
# 20-72-22

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Make sure that the distance from:

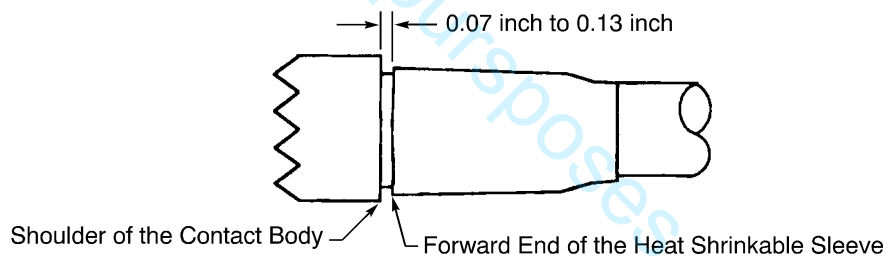
- The forward end of the crimp area to the shoulder of the contact body is not more than 0.06 inch
- The rear end of the crimp barrel to the forward edge of the shoulder of the inner ferrule is not more than 0.035 inch.



#### POSITION OF THE CONTACT BODY ON THE INNER FERRULE

Figure 31

- (19) Remove the unwanted length of the strands of the shield from the end of the contact body to the end of the shield.
- (20) Push the heat shrinkable sleeve forward until the forward end of the sleeve is 0.035 inch maximum from the rear edge of the shoulder of the contact body. Refer to Figure 32.



#### POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE CONTACT BODY

Figure 32

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

#### D. Contact Insertion

This paragraph gives the procedure to install:

- A standard front release contact
- A standard rear release contact
- A Tri-Star rear release contact.

For the procedure to install a coax contact, refer to Paragraph 5.E.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

**Table 29**  
**CONTACT INSERTION TOOLS**

Crimp Barrel Size	Insertion Tool	
	Part Number	Color
20	6500-001-20	-
	CIET-20	Red
	M81969/14-02	-
16	6500-001-16	-
	CIET-16	Blue
	M81969/14-03	-

- (1) Make a selection of an insertion tool from Table 29.
- (2) Put the necessary backshell components on the wire harness.  
Make sure that the strain relief end of the backshell is pointed away from the end of the wire harness.
- (3) Put the contact assembly in the insertion tool.  
Make sure that the end of the tool is against the rear shoulder of the contact.
- (4) Axially align the insertion tool and the contact cavity at the rear of the connector.
- (5) Carefully push the insertion tool and the contact assembly in the contact cavity until it stops.  
Make sure that the insertion tool stays axially aligned with the contact cavity.

**CAUTION:** DO NOT TURN THE INSERTION TOOL IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (6) Carefully pull the tool out of the contact cavity.
- (7) 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 OF THE WIRE.

- (8) If the contact is not locked in the contact cavity:
  - (a) Pull the contact assembly out of the contact cavity.
  - (b) Do Step (3) through Step (7) again.

#### E. Coax Contact Insertion

- (1) If the connector has a backshell, put the backshell on the wire harness.  
Make sure that the strain relief end of the backshell is pointed away from the end of the wire harness.
- (2) Axially align the coax contact assembly with the contact cavity.
- (3) Carefully push the contact into the contact cavity until it stops.
- (4) Lightly pull the cable to make sure that the contact is locked in the contact cavity.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

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

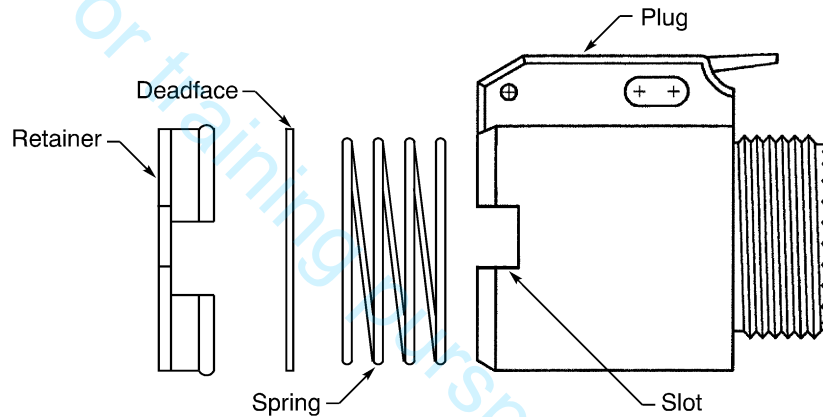
**CAUTION:** DO NOT MAKE A DENT IN THE CABLE JACKET WITH THE FINGERNAILS. DAMAGE TO THE CABLE JACKET CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

- (5) If the contact is not locked in the contact cavity:
  - (a) Pull the contact assembly out of the contact cavity.
  - (b) Do Step (2) through Step (4) again.

#### F. Seal of an Empty Contact Cavity

If the connector has a rear grommet, all empty contact cavities must be sealed. Refer to Subject 20-60-08.

#### G. Deadface Installation



**CBX12PM-1 CONNECTOR DEADFACE COMPONENTS**

**Figure 33**

Refer to Figure 33.

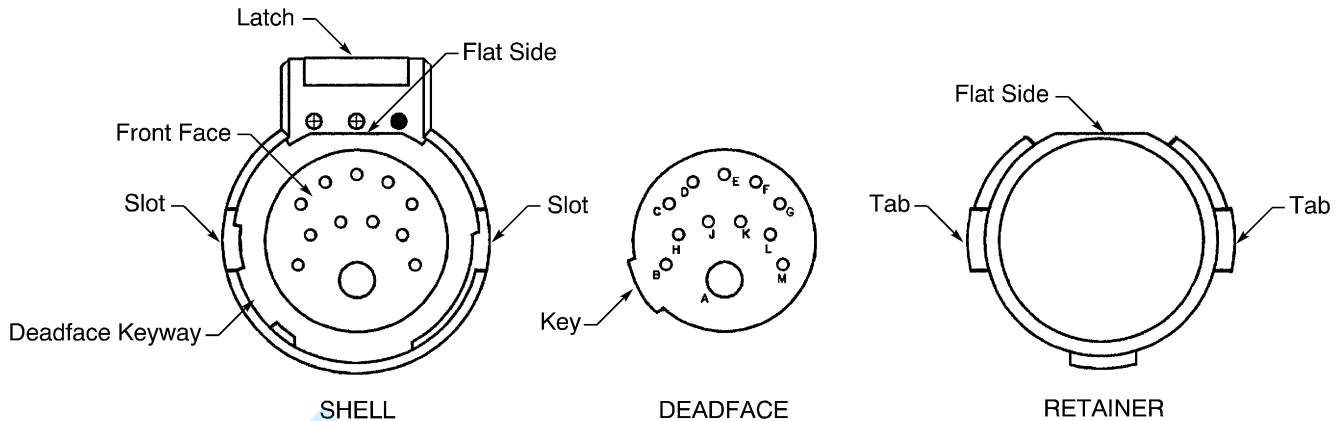
- (1) Put the spring in the front face of the connector.
- (2) Put the deadface on the spring. Refer to Figure 34.

Make sure that:

- The side of the deadface with the contact cavity identification is to the front.
- The key of the deadface is aligned with the keyway in the connector shell.
- The contact holes in the deadface are aligned with the contacts or contact cavities in the connector.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS



#### ALIGNMENT OF THE CONNECTOR SHELL, THE DEADFACE, AND THE RETAINER

Figure 34

- (3) Align the flat side of the retainer with flat side of the connector. Refer to Figure 34. Make sure that the deadface stays aligned with the connector.
- (4) Push the retainer into the connector shell until it makes a click.

#### H. Integral Strain Relief Assembly

Refer to Figure 14 for the configurations the integral strain relief cable clamps.

- (1) If the connector has a straight strain relief clamp with a clamp bar, or a 90 degree strain relief with a clamp bar:
  - (a) Put the clamp bar on the wire harness.
  - (b) Align the holes of the clamp bar with the holes in the strain relief legs of the connector.
  - (c) Install the clamp screws.
- (2) If the connector has a 90 degree tie wrap bar:
  - (a) Attach the legs of the tie wrap bar to the strain relief legs of the connector.
  - (b) Install a plastic tie strap or assemble a wire harness tie to hold the wire harness in its position.

Refer to:

- Subject 20-10-11 for procedure to install a plastic tie strap
- Subject 20-10-11 for the procedure to assemble a wire harness tie.

#### I. Backshell Assembly

Refer to:

- Figure 18 for the configurations of backshells for non-environmental connectors
- Figure 19 for the configurations of backshells for environmental connectors.

- (1) If the connector has a CT-14S backshell:
  - (a) Fully engage the threads of the backshell and the connector.
  - (b) Make a mark on the wire harness or the wires at the end of the backshell.

**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS**

**CAUTION:** MAKE SURE THAT THE MARK DOES NOT CAUSE DAMAGE TO THE WIRE INSULATION. DAMAGE TO THE WIRE INSULATION CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE WIRE.

- (c) Disengage the threads of the backshell and the connector.
- (d) Put the necessary layers of protective tape or the necessary quantity of heat shrinkable sleeves on the wire harness to make a tight fit in the rear hole of the backshell.

Refer to Subject 20-00-11 for the protective tape or heat shrinkable sleeve.

- (e) Fully engage the threads of the backshell and the connector.
- (f) Install a plastic tie strap or assemble a wire harness tie on the wire harness and the strain relief of the backshell.

Refer to:

- Subject 20-10-11 for procedure to install a plastic tie strap
- Subject 20-10-11 for the procedure to assemble a wire harness tie.

- (2) If the connector has a CTS-16 backshell:

- (a) Fully engage the threads of the backshell and connector.
- (b) Install a plastic tie strap or assemble a wire harness tie on the wire harness and the strain relief of the backshell.

Refer to:

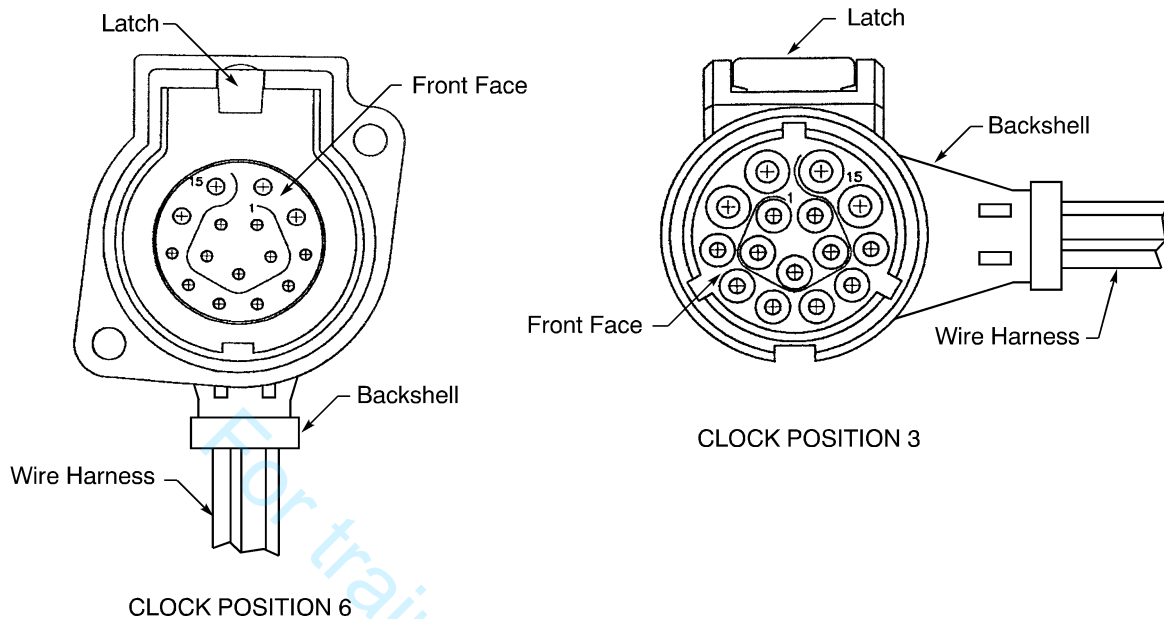
- Subject 20-10-11 for procedure to install a plastic tie strap
- Subject 20-10-11 for the procedure to assemble a wire harness tie.

- (3) If the connector has a CTF-14S, a CTR-14S, a CTF-16, or a CTR-16 backshell:

- (a) Engage the threads of the backshell and connector.
- (b) Put the backshell in the specified clock position. Refer to Figure 35 for examples of clock positions.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS



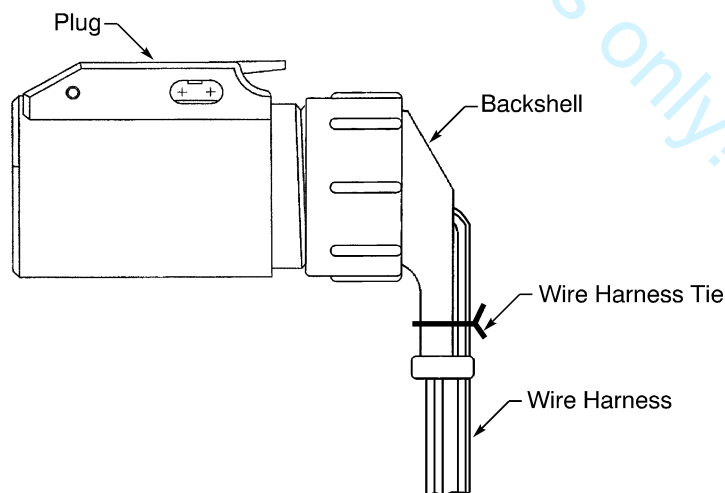
**BACKSHELL CLOCK POSITION 6 AND CLOCK POSITION 3**

**Figure 35**

- (c) Fully tighten the threads of the backshell on the connector.
- (d) Install a plastic tie strap or assemble a wire harness tie on the wire harness and the strain relief of the backshell.

Refer to:

- Figure 36
- Subject 20-10-11 for procedure to install a plastic tie strap
- Subject 20-10-11 for the procedure to assemble a wire harness tie.



**BACKSHELL ASSEMBLY**

**Figure 36**

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

#### 6. ASSEMBLY OF A CONNECTOR WITH SOLDER TYPE CONTACTS

This Paragraph gives the procedures to assemble the connectors that have solder tail contacts.

Refer to Figure 1 for the configuration of the CB02-15() connector.

##### A. Necessary Parts and Materials

**Table 30**  
**NECESSARY MATERIALS**

Material	Part Number or Specification	Description	Supplier
Sealant	BMS5-37	Standard Cure	Boeing
	BMS5-95 Class B	Standard Cure	Boeing
	PR-1826 Class B	Fast Cure	Courtaulds Aerospace
	PR-1828 Class B	Fast Cure	Courtaulds Aerospace
	Pro-Seal 870 B-1/2	Standard Cure	Courtaulds Aerospace
	Pro-Seal 870 B-2	Standard Cure	Courtaulds Aerospace
Sleeve, Heat Shrinkable	AMS-DTL-23053/5 Class 1	-	Available source
	AMS-DTL-23053/5 Class 3	-	Available source
	MIL-LT	-	Raychem
	PLF 100	-	Plastronic

**Table 31**  
**APPROVED SUPPLIERS OF BOEING STANDARD SEALANTS**

Boeing Standard	Supplier
BMS5-37	PRC-DeSoto International
BMS5-95 Class B	Le Joint Francais
BMS5-95 Class B	PRC-DeSoto International
BMS5-95 Class B	Yokohama Rubber

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 32  
SOCKET CONTACT PART NUMBERS

Solder Tail Contact Size	Socket Contact			
	Contact Size		Part Number	Supplier
	Engaging End	Crimp Barrel		
20	22	22	031-1287-000	ITT Cannon
			208264-2	AMP
			318-2222-301	Tri-Star
			620300	Radiall-Sogie
			8660-206	Souriau
			BACC47EG1	Boeing
16	16	16	BACC47CP2A	Boeing
			BACC47CP2T	Boeing
			BACC47ET2	Boeing
			M39029/32-248	QPL
			M39029/5-116	QPL
			MS24255-16S	QPL

Table 33  
POTTING BOOTS

Part Number	Supplier
M85049/74-12-1	QPL
M85049/75-12-1	QPL

### B. Wire Preparation

Table 34  
LOCATION OF SOCKET CONTACT ASSEMBLY PROCEDURES

Socket Contact	Crimp Barrel Size	Reference
031-1287-000	22	Subject 20-71-14
208264-2	22	Subject 20-71-14
318-2222-301	22	Subject 20-71-14
620300	22	Subject 20-71-14
8660-206	22	Subject 20-71-14
BACC47CP2A	16	Subject 20-61-11
BACC47CP2T	16	Subject 20-61-11

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

Table 34 (continued)

Socket Contact	Crimp Barrel Size	Reference
BACC47EG1	22	Subject 20-71-14
BACC47ET2	16	Paragraph 5.B.
M39029/32-248	16	Subject 20-61-11
M39029/5-116	16	Paragraph 5.B.
MS24255-16S	16	Subject 20-61-11

- (1) If it is specified, assemble a shield ground wire. Refer to Subject 20-10-15.

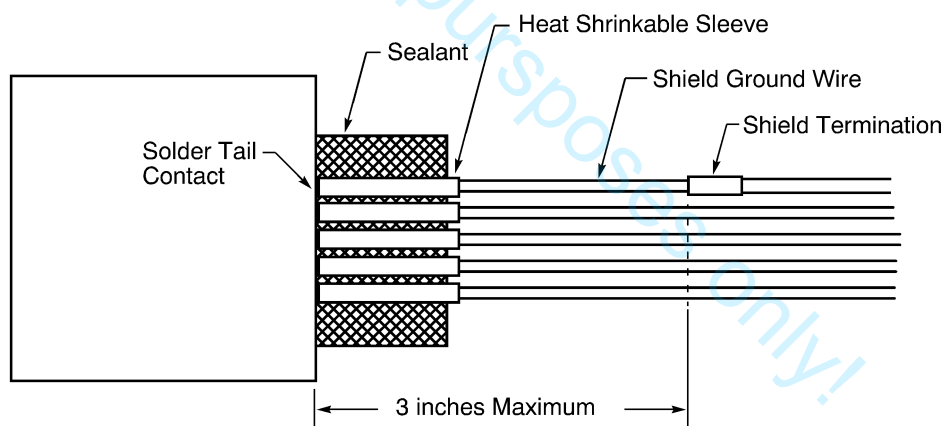
Make sure that the maximum distance from the shield termination on the wire harness to the rear face of the connector is 3.0 inches. Refer to Figure 37.

- (2) Make a selection of a contact from Table 32.
- (3) Make a selection of a heat shrinkable sleeve from Table 30.

**NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.

- (4) Put a 1.5 inch  $\pm$  0.25 inch length of heat shrinkable sleeve on the wire.
- (5) Assemble the contact. Refer to Table 34.

### C. Contact Assembly



**FULLY ASSEMBLED TRI-STAR CB02-15() RECEPTACLE CONNECTOR**

**Figure 37**

- (1) Make a selection of a potting boot from Table 33.

**NOTE:** A satisfactory alternative to a boot is a plastic connector dust cap that has:

- An outer diameter less than or equal to 0.925 inch
- An inner diameter more than or equal to 0.70 inch
- The closed end removed.

- (2) Make a selection of a sealant from Table 30.
- (3) Put the boot or the cap on the wire harness.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

- (4) Put a 0.06 inch to 0.1 inch length of solder in the engaging end of the socket contact on the end of the wire.
- (5) Start to engage the socket contact and the solder tail.
- (6) Apply heat to the contact and at the same time push it forward until the end of the contact is against the rear face of the connector.

**CAUTION:** MAKE SURE TO REMOVE THE SOLDER OR SOLDER FLUX THAT MAKES A BRIDGE BETWEEN ADJACENT CONTACTS.

- (7) Push the heat shrinkable sleeve forward until the end of the sleeve is against the rear face of the connector. Refer to Figure 37.
- (8) Shrink the sleeve into its position. Refer to Subject 20-10-14.

**CAUTION:** MAKE SURE TO USE ONLY THE MINIMUM AMOUNT OF HEAT THAT IS NECESSARY TO SHRINK THE SLEEVE. IF TOO MUCH HEAT IS APPLIED, DAMAGE TO SOLDER JOINT OCCURS.

- (9) Point the front face of the connector down.
- (10) Push the boot down until the forward end of the boot is against the body of the connector.
- (11) Fill the boot fully with sealant.
- (12) Let the sealant cure the necessary amount of time.
- (13) If the potting boot is a connector dust cap, remove it.

**NOTE:** It is not necessary to remove a potting boot that is specified in Table 33.

## 7. APPROVED TOOL SUPPLIERS

### A. Contact Removal Tools

**Table 35**  
**CONTACT REMOVAL TOOL SUPPLIERS**

Removal Tool	Supplier
6500-001-16	Matrix
6500-001-20	Matrix
CET16-21	ITT Cannon
CET20-24	ITT Cannon
CIET-16	ITT Cannon
CIET-20	ITT Cannon
M81969/8-06	QPL
M81969/8-08	QPL
M81969/14-02	QPL
M81969/14-03	QPL
M81969/19-03	QPL
M81969/19-07	QPL

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# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS

### B. Contact Crimp Tools

Table 36  
CONTACT CRIMP TOOL SUPPLIERS

Crimp Tool	Supplier
11148	Buchanan
612916	Buchanan
85-220	Daniels
85-550	Daniels
K1S	Daniels
K977	Daniels
M10S	Burndy
M22520/1-01	QPL
M22520/1-02	QPL
M22520/2-01	QPL
M22520/2-02	QPL
M22520/2-06	QPL
M22520/2-14	QPL
M22520/5-01	QPL
M22520/5-39	QPL
M22520/5-41	QPL
MS3191-1	QPL
MS3191-16A	QPL
MS3191-20A	QPL
S-5	Burndy
S-6	Burndy
S-7	Burndy
SL-2	Burndy
SL-3	Burndy
ST2220-1-1	Boeing
ST2220-1-2	Boeing
ST2220-1-45	Boeing
ST2220-1-Y	Boeing
TH1A	Daniels
WA22	Daniels
WA27F	Daniels

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**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF TRI-STAR CB()-(), CORY CB()-(), AND HUGHES 116706()-() SERIES CONNECTORS****Table 36 (continued)**

<b>Crimp Tool</b>	<b>Supplier</b>
WA22LC	Daniels

**C. Contact Insertion Tools****Table 37  
CONTACT INSERTION TOOL SUPPLIERS**

<b>Insertion Tool</b>	<b>Supplier</b>
6500-001-16	Matrix
6500-001-20	Matrix
CIET-16	ITT Cannon
CIET-20	ITT Cannon
M81969/14-02	QPL
M81969/14-03	QPL

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# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

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## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

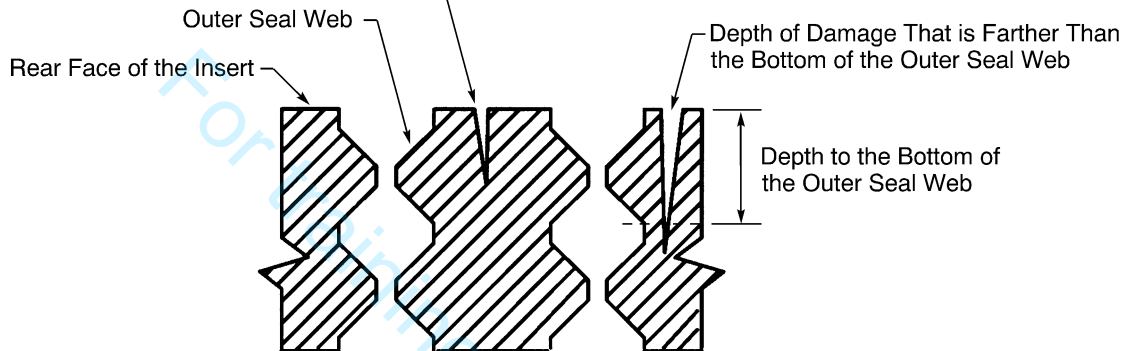
#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Insert

It is necessary to replace the connector if one or more of these conditions occur:

- The depth of the damage extends farther than the bottom of the outer seal web; refer to Figure 1
- The damage extends from one contact cavity to a different contact cavity; refer to Figure 2
- The damage extends from one contact cavity to the outer edge of the insert; refer to Figure 2.

Depth of the Damage That is not Farther Than the Bottom of the Seal Web

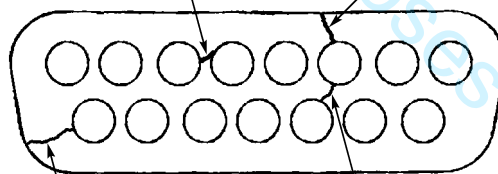


**REAR FACE OF THE INSERT - DEPTH OF DAMAGE**

**Figure 1**

Damage from One Contact Cavity to a Different Contact Cavity

Damage from a Contact Cavity to the Outer Edge



Damage from a Contact Cavity to the Outer Edge

Damage from One Contact Cavity to a Different Contact Cavity

**REAR FACE OF THE INSERT - LENGTH OF DAMAGE**

**Figure 2**

##### B. Damage Conditions - Front Face of the Insert

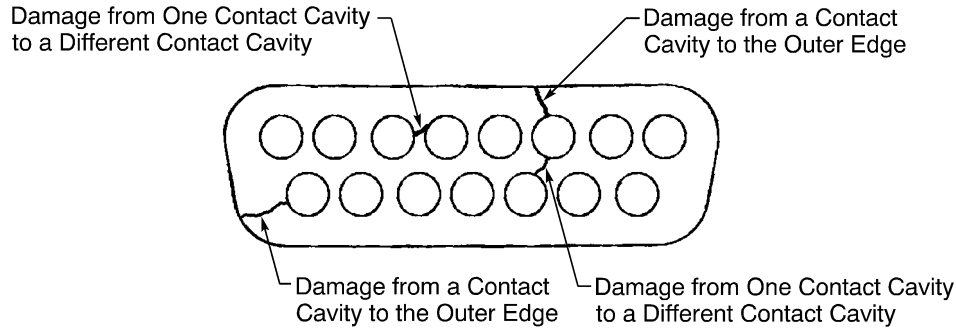
It is necessary to replace the connector if one of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 3.

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



#### FRONT FACE OF THE INSERT - LENGTH OF DAMAGE

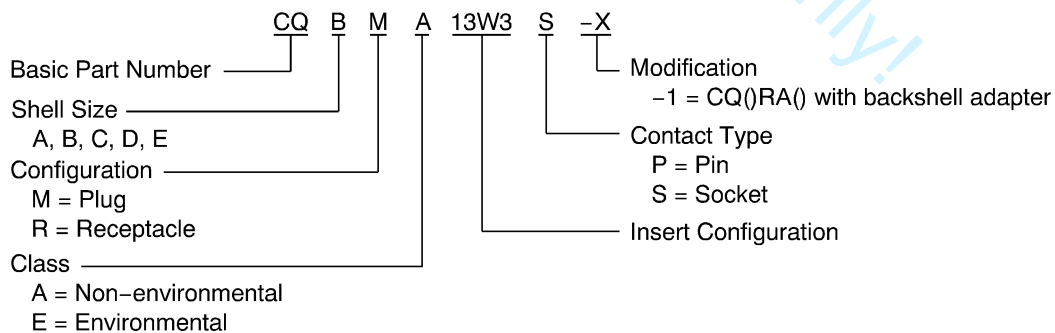
Figure 3

## 2. CONNECTOR PART NUMBERS AND DESCRIPTION

### A. Connector Part Numbers

Table 1  
CONNECTOR PART NUMBERS

Part Number	Type	Supplier
CQ()MA()	Plug	Cory Components
CQ()MA()	Plug	Tri-Star
CQ()ME()	Plug	Cory Components
CQ()ME()	Plug	Tri-Star
CQ()RA()	Receptacle	Cory Components
CQ()RA()	Receptacle	Tri-Star
CQ()RE()	Receptacle	Cory Components
CQ()RE()	Receptacle	Tri-Star



### TRI-STAR CQ() AND CORY CQ() CONNECTOR PART NUMBER STRUCTURE

Figure 4

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

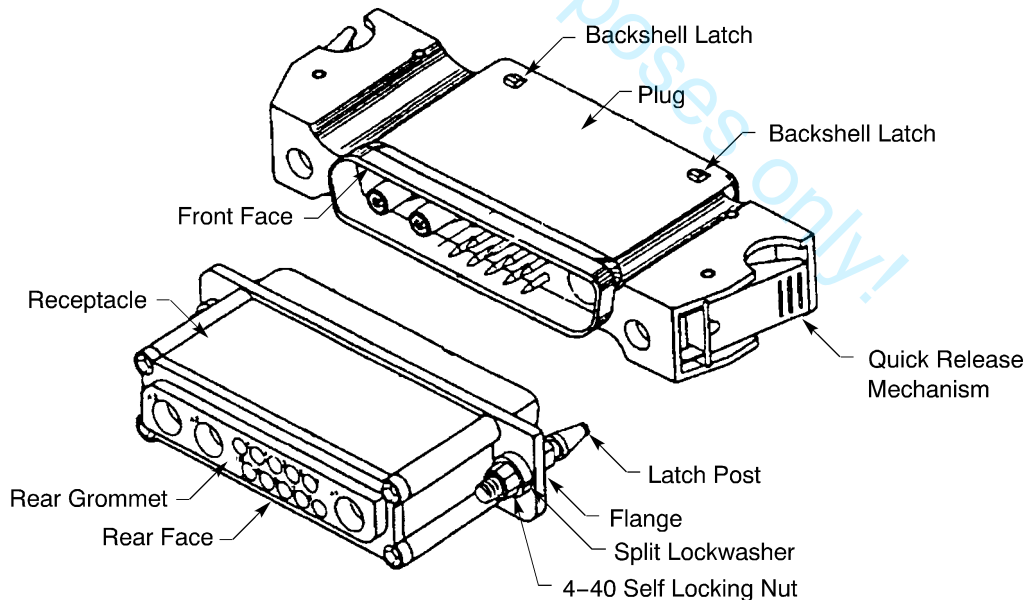
Table 2  
ALTERNATIVE CONNECTOR PART NUMBERS

Specified Connector		Alternative Connector	
Part Number	Supplier	Part Number	Supplier
CQ()MA()	Cory Components	CQ()MA()	Tri-Star
CQ()ME()	Cory Components	CQ()ME()	Tri-Star
CQ()RA()	Cory Components	CQ()RA()	Tri-Star
CQ()RE()	Cory Components	CQ()RE()	Tri-Star

#### B. Connector Description

The CQ() rectangular connectors have these properties:

- A D subminiature rectangular configuration
- A plastic shell for the plug
- A quick release latch mechanism
- Crimp type contacts
- Rear release, rear removable size 2020HD contacts
- Front release, rear removable size 0816, 0812, and 0808 special purpose contacts
- Front release, rear removable coax contacts
- Size 2018 special purpose contacts that cannot be removed
- A removable, snap-on, plastic backshell with a cable tie strain relief.



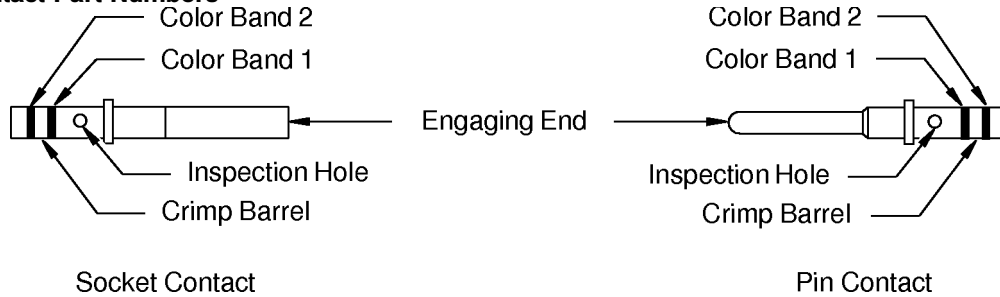
CQ() PLUG AND RECEPTACLE CONNECTORS

Figure 5

## STANDARD WIRING PRACTICES MANUAL

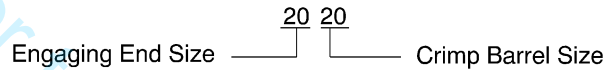
### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

#### C. Contact Part Numbers



#### REAR RELEASE STANDARD CONTACTS

Figure 6



#### EXAMPLE OF A CONTACT SIZE

Figure 7

**NOTE:** The size 2020HD contact has a size 20 engaging end and a size 20 crimp barrel.

Table 3

#### REAR RELEASE STANDARD CONTACT PART NUMBERS

Contact Size	Engaging End Size	Crimp Barrel Size	Contact Type	Boeing Standard	Color Code	
					Band	Color
2020HD	20	20	Pin	BACC47EF2	1	Orange
					2	Red
			Socket	BACC47EG2	1	Orange
					2	Red

Table 4

#### STANDARD CONTACT COLOR CODES

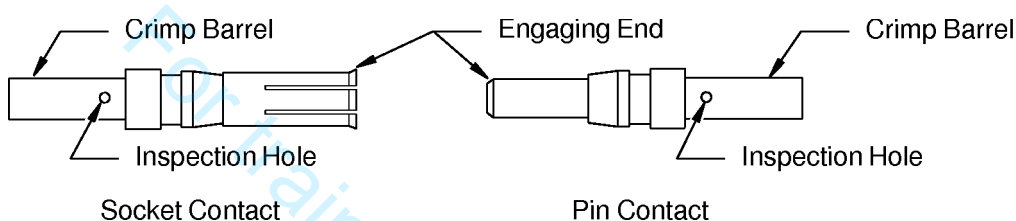
Contact	Color Code	
	Band 1	Band 2
BACC47EF2	Orange	Red
BACC47EG2	Orange	Red

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 5  
NON REMOVABLE SPECIAL PURPOSE CONTACTS

Contact Size		Contact Type	Contact	
Engaging End	Crimp Barrel		Part Number	Supplier
20	18	Pin	CB008-5P	Cory Components
			CB008-5P	Tri-Star
		Socket	CB009-5P	Cory Components
			CB009-5P	Tri-Star



FRONT RELEASE SPECIAL PURPOSE CONTACTS  
Figure 8

Table 6  
FRONT RELEASE SPECIAL PURPOSE CONTACT PART NUMBERS

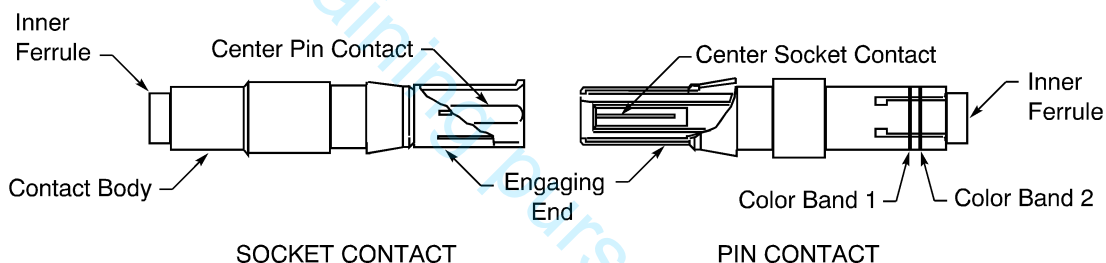
Contact Size		Contact Type	Contact		Conditions for Installation
Engaging End	Crimp Barrel		Part Number	Supplier	
08	16	Pin	CMP002-P103	Cory Components	Alignment Ring
			CMP002-P103	Tri-Star	Alignment Ring
		Socket	CMP002-S103	Cory Components	-
			CMP002-S103	Tri-Star	-
	12	Pin	CMP003-P103	Cory Components	Alignment Ring
			CMP003-P103	Tri-Star	Alignment Ring
		Socket	CMP003-S103	Cory Components	-
			CMP003-S103	Tri-Star	-
	08	Pin	CMP004-P103	Cory Components	Alignment Ring
			CMP004-P103	Tri-Star	Alignment Ring
		Socket	CMP004-S103	Cory Components	-
			CMP004-S103	Tri-Star	-

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

**Table 7**  
**ALTERNATIVE SPECIAL PURPOSE CONTACT PART NUMBERS**

Specified Contact		Alternative Contact	
Part Number	Supplier	Part Number	Supplier
CB008-5P	Cory Components	CB008-5P	Tri-Star
CB009-5P	Cory Components	CB009-5P	Tri-Star
CMP002-P103	Cory Components	CMP002-P103	Tri-Star
CMP002-S103	Cory Components	CMP002-S103	Tri-Star
CMP003-P103	Cory Components	CMP003-P103	Tri-Star
CMP003-S103	Cory Components	CMP003-S103	Tri-Star
CMP004-P103	Cory Components	CMP004-P103	Tri-Star
CMP004-S103	Cory Components	CMP004-S103	Tri-Star



### FRONT RELEASE COAX CONTACTS

**Figure 9**

**Table 8**  
**FRONT RELEASE COAX CONTACT PART NUMBERS**

Part Number	Contact Type	Size	Center Contact Type	Supplier	Conditions for Installation
CQMEF-316	Socket	08	Pin	Cory Components	-
CQMEF-316A	Socket	08	Pin	Cory Components	-
CQMEF-316A	Socket	08	Pin	Tri-Star	-
CQMEF-501A	Socket	08	Pin	Cory Components	-
CQMEF-501B	Socket	08	Pin	Cory Components	-
CQMEF-501C	Socket	08	Pin	Cory Components	-
CQMEF-501D	Socket	08	Pin	Cory Components	-
CQMEF-501D	Socket	08	Pin	Tri-Star	-
CQMEF-502A	Socket	08	Pin	Cory Components	-
CQMEF-502A	Socket	08	Pin	Tri-Star	-

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# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 8 (continued)

Part Number	Contact Type	Size	Center Contact Type	Supplier	Conditions for Installation
CQMEF-503	Socket	08	Pin	Cory Components	-
CQMEF-503	Socket	08	Pin	Tri-Star	-
CQMEM-316	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-316A	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-316A	Pin	08	Socket	Tri-Star	Alignment Ring
CQMEM-501	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-501A	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-501B	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-501C	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-501D	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-501D	Pin	08	Socket	Tri-Star	Alignment Ring
CQMEM-502	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-502	Pin	08	Socket	Tri-Star	Alignment Ring
CQMEM-503	Pin	08	Socket	Cory Components	Alignment Ring
CQMEM-503	Pin	08	Socket	Tri-Star	Alignment Ring

Table 9

### COAX CONTACT COLOR CODES

Contact	Color Code	
	Band 1	Band 2
CQMEF-316	-	-
CQMEF-316A	-	-
CQMEF-501C	Brown	White
CQMEF-501D	Brown	White
CQMEF-502A	White	White
CQMEF-503	-	-
CQMEM-316	-	-
CQMEM-316A	-	-
CQMEM-501C	Brown	White
CQMEM-501D	Brown	White
CQMEM-502	White	White
CQMEM-503	-	-

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# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

**Table 10**  
**ALTERNATIVE COAX CONTACT PART NUMBERS**

Specified Contact		Alternative Contact	
Part Number	Supplier	Part Number	Supplier
CQMEF-316	Cory Components	CQMEF-316A	Tri-Star
CQMEF-316A	Cory Components	CQMEF-316A	Tri-Star
CQMEF-501A	Cory Components	CQMEF-501D	Tri-Star
CQMEF-501B	Cory Components	CQMEF-501D	Tri-Star
CQMEF-501C	Cory Components	CQMEF-501D	Tri-Star
CQMEF-501D	Cory Components	CQMEF-501D	Tri-Star
CQMEF-502A	Cory Components	CQMEF-502A	Tri-Star
CQMEF-503	Cory Components	CQMEF-503	Tri-Star
CQMEM-316	Cory Components	CQMEM-316A	Tri-Star
CQMEM-316A	Cory Components	CQMEM-316A	Tri-Star
CQMEM-501	Cory Components	CQMEM-501D	Tri-Star
CQMEM-501A	Cory Components	CQMEM-501D	Tri-Star
CQMEM-501B	Cory Components	CQMEM-501D	Tri-Star
CQMEM-501C	Cory Components	CQMEM-501D	Tri-Star
CQMEM-501D	Cory Components	CQMEM-501D	Tri-Star
CQMEM-502	Cory Components	CQMEM-502	Tri-Star
CQMEM-503	Cory Components	CQMEM-503	Tri-Star

**Table 11**  
**COAX CONTACTS FOR SPECIFIED COAX CABLES**

Coax Cable	Contact Type	Part Number
BMS13-65 Type 0E	Pin	CQMEM-501
		CQMEM-501A
		CQMEM-501B
		CQMEM-501C
		CQMEM-501D
	Socket	CQMEF-501A
		CQMEF-501B
		CQMEF-501C
		CQMEF-501D

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 11 (continued)

Coax Cable	Contact Type	Part Number
BMS13-65 Type 0F	Pin	CQMEM-502
	Socket	CQMEF-502A
BMS13-65 Type 0G	Pin	CQMEM-503
	Socket	CQMEF-503
RG-316	Pin	CQMEM-316
		CQMEM-316A
	Socket	CQMEF-316
		CQMEF-316A
S280W503-1	Pin	CQMEM-501
		CQMEM-501A
		CQMEM-501B
		CQMEM-501C
		CQMEM-501D
	Socket	CQMEF-501A
		CQMEF-501B
		CQMEF-501C
		CQMEF-501D
S280W503-2	Pin	CQMEM-502
	Socket	CQMEF-502A
S280W503-3	Pin	CQMEM-503
	Socket	CQMEF-503

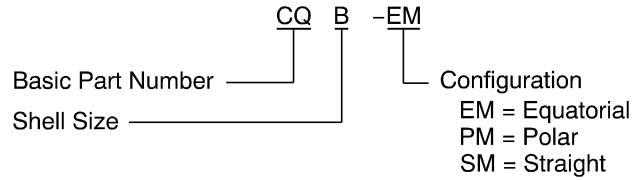
### D. Backshell Part Numbers

Table 12  
BACKSHELL PART NUMBERS

Part Number	Configuration	Reference	Supplier
CQ()-EM	Equatorial	Figure 11	Cory Components
CQ()-EM	Equatorial	Figure 11	Tri-Star
CQ()-PM	Polar	Figure 12	Cory Components
CQ()-PM	Polar	Figure 12	Tri-Star
CQ()-SM	Straight	Figure 13	Cory Components
CQ()-SM	Straight	Figure 13	Tri-Star

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



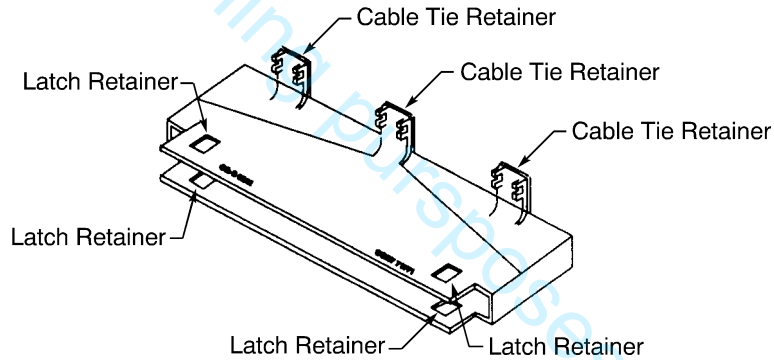
### BACKSHELL PART NUMBER STRUCTURE

Figure 10

Table 13

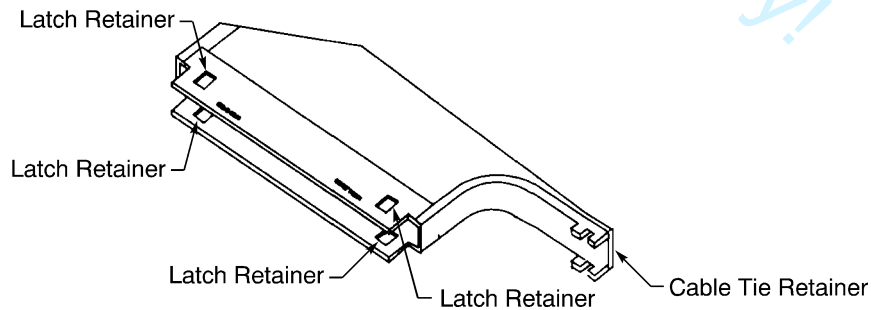
### ALTERNATIVE BACKSHELL PART NUMBERS

Specified Backshell		Alternative Backshell	
Part Number	Supplier	Part Number	Supplier
CQ()-EM	Cory Components	CQ()-EM	Tri-Star
CQ()-PM	Cory Components	CQ()-PM	Tri-Star
CQ()-SM	Cory Components	CQ()-SM	Tri-Star



### EQUATORIAL BACKSHELL

Figure 11

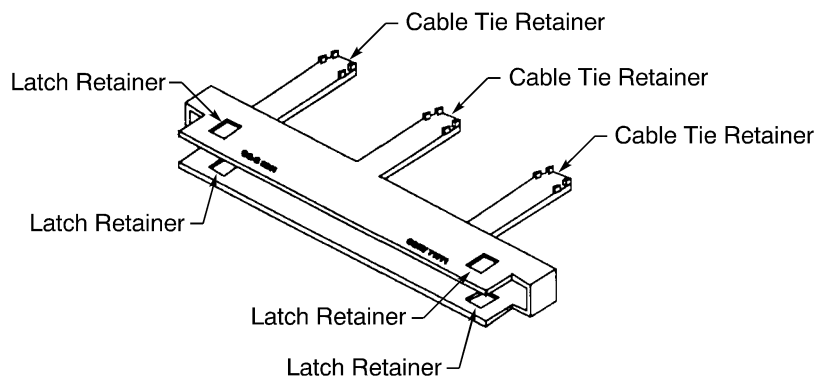


### POLAR BACKSHELL

Figure 12

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



#### STRAIGHT BACKSHELL

Figure 13

#### E. Contact Alignment Ring Part Numbers

Table 14

CONTACT ALIGNMENT RING PART NUMBERS

Part Number	Supplier
CRA-1	Cory Components
CRA-1	Tri-Star

Table 15

ALTERNATIVE CONTACT ALIGNMENT RING PART NUMBERS

Specified Alignment Ring		Alternative Alignment Ring	
Part Number	Supplier	Part Number	Supplier
CRA-1	Cory Components	CRA-1	Tri-Star

### 3. INSERT CONFIGURATIONS

#### A. CQ() Connectors

**NOTE:** The contact cavity size that is specified in Table 16 is equivalent to the size of the engaging end of the contact.

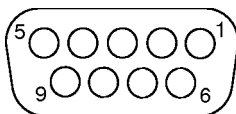
**NOTE:** Figure 14 through Figure 26 show the rear face of an insert that has pin contacts. The view of the rear face of an insert that has socket contacts is the mirror image of this view.

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 16  
CONNECTOR INSERT CONFIGURATIONS

Shell Size	Insert Configuration	Contact Cavity		Contact Type	Reference
		Count	Size		
A	11W1	10	20	Standard	Figure 15
		1	8	Coax or Special Purpose	
	15	15	20	Standard	Figure 16
B	13W3	3	8	Coax or Special Purpose	Figure 17
		10	20	Standard	
	17W2	15	20	Standard	Figure 18
		5	8	Coax or Special Purpose	
	25	25	20	Standard	Figure 21
C	21WA4	17	20	Standard	Figure 19
		4	8	Coax or Special Purpose	
	25W3	22	20	Standard	Figure 22
		3	8	Coax or Special Purpose	
	37	37	20	Standard	Figure 24
D	24W7	17	20	Standard	Figure 20
		7	8	Coax or Special Purpose	
	36W4	32	20	Standard	Figure 23
		4	8	Coax or Special Purpose	
	47W1	46	20	Standard	Figure 25
		1	8	Coax or Special Purpose	
	50	50	20	Standard	Figure 26
E	9	9	20	Standard	Figure 14

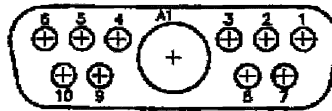


9 INSERT CONFIGURATION  
Figure 14

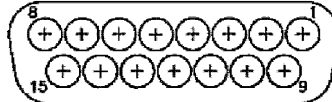
# 20-72-23

**STANDARD WIRING PRACTICES MANUAL**

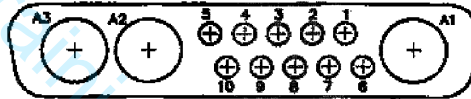
**TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS**



**11W1 INSERT CONFIGURATION**  
Figure 15



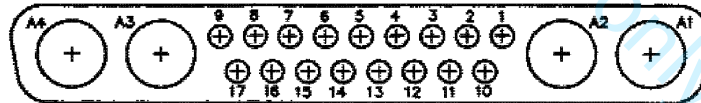
**15 INSERT CONFIGURATION**  
Figure 16



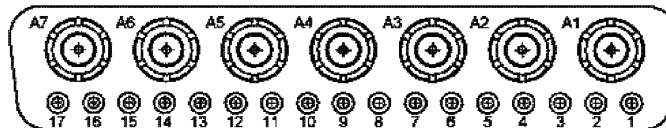
**13W3 INSERT CONFIGURATION**  
Figure 17



**17W2 INSERT CONFIGURATION**  
Figure 18



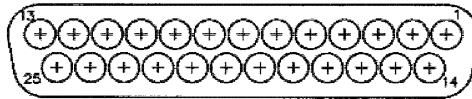
**21WA4 INSERT CONFIGURATION**  
Figure 19



**24W7 INSERT CONFIGURATION**  
Figure 20

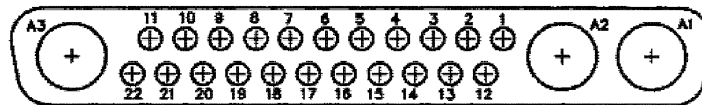
**STANDARD WIRING PRACTICES MANUAL**

**TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS**



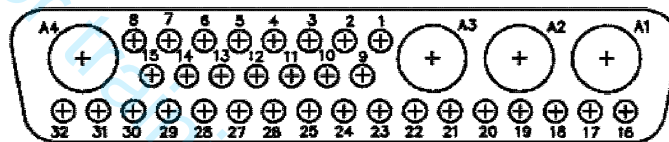
**25 INSERT CONFIGURATION**

**Figure 21**



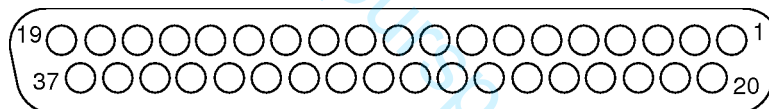
**25W3 INSERT CONFIGURATION**

**Figure 22**



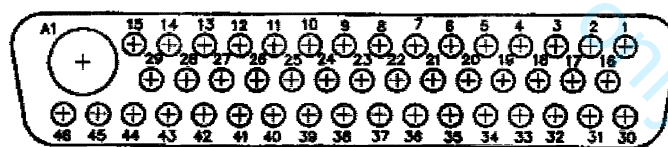
**36W4 INSERT CONFIGURATION**

**Figure 23**



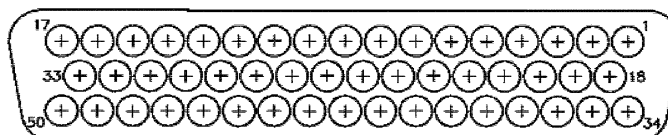
**37 INSERT CONFIGURATION**

**Figure 24**



**47W1 INSERT CONFIGURATION**

**Figure 25**



**50 INSERT CONFIGURATION**

**Figure 26**

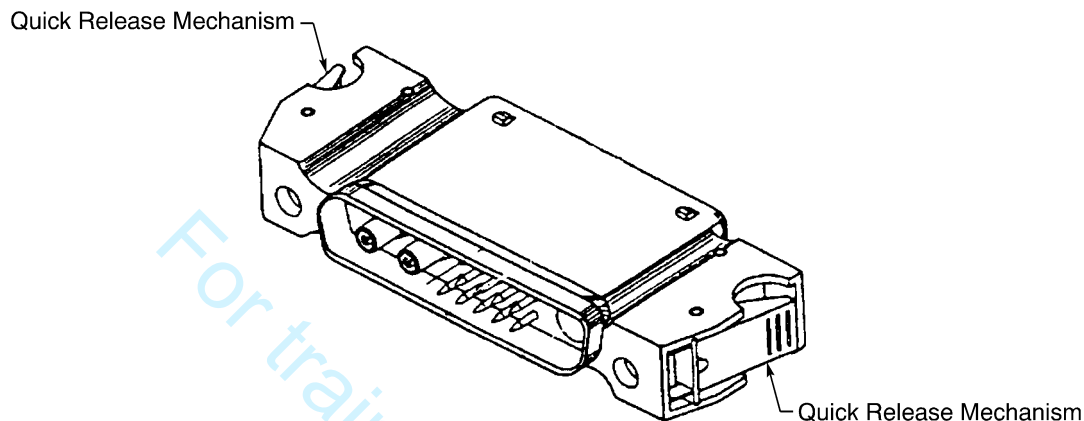
**STANDARD WIRING PRACTICES MANUAL**

**TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS**

**4. CONNECTOR DISASSEMBLY**

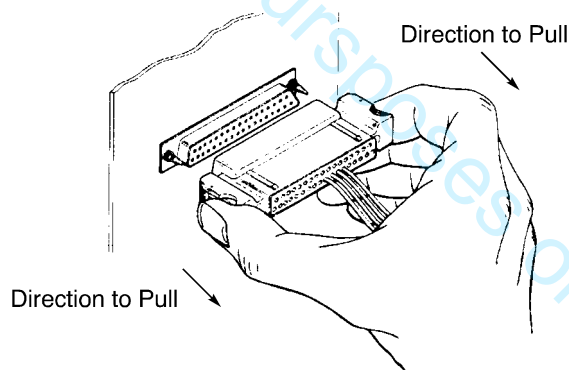
**A. Separation of the Plug and the Receptacle**

- (1) Push and hold the quick release mechanism on each side of the plug at the same time. Refer to Figure 27.



**LOCATION OF THE QUICK RELEASE MECHANISM ON THE PLUG**  
**Figure 27**

- (2) Pull the plug from the receptacle. Refer to Figure 28.



**SEPARATION OF THE PLUG FROM THE RECEPTACLE**  
**Figure 28**

**B. Removal of the Receptacle from a Panel**

**Table 17**  
**NECESSARY TOOLS**

Tool	Size (inch)
Nut Driver	3/16
Wrench	3/16

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## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

- (1) Make a selection of a tool from Table 17.
- (2) Remove the 4-40 self locking nuts at the rear of the receptacle.

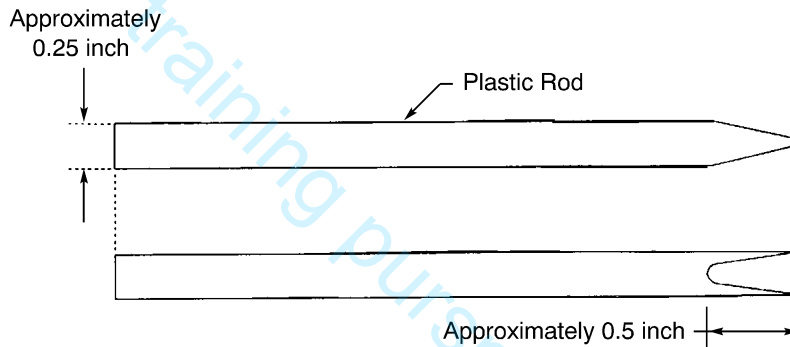
**NOTE:** Make sure to keep the nuts in a safe location; they are necessary to install the receptacle in the panel again.

- (3) Remove the receptacle from the panel.

#### C. Backshell Removal

**Table 18**  
**NECESSARY TOOLS**

Tool	Diameter (inch)	Reference
Awl, Plastic	0.25	Figure 29



**DIMENSIONS OF THE PLASTIC AWL**  
**Figure 29**

- (1) Make a selection of an awl from Table 18.
- (2) Put the tip of the awl between the backshell and the connector at one of the four backshell latches. Refer to Figure 5 for the location of the backshell latches on the connector.  
For the location of the backshell latch retainers on a connector that has:
  - An equatorial backshell, refer to Figure 11
  - A polar backshell, refer to Figure 12
  - A straight backshell, refer to Figure 13.
- (3) Lift the latch retainer of the backshell away from the plug shell.
- (4) Do Step (2) and Step (3) again for each remaining latch.
- (5) Remove the backshell from the connector.

#### D. Contact Removal

This paragraph gives the procedure to remove standard contacts.

For the procedure to remove:

- Special purpose contacts, refer to Paragraph 4.E.
- Coax contacts, refer to Paragraph 4.F.

# STANDARD WIRING PRACTICES MANUAL

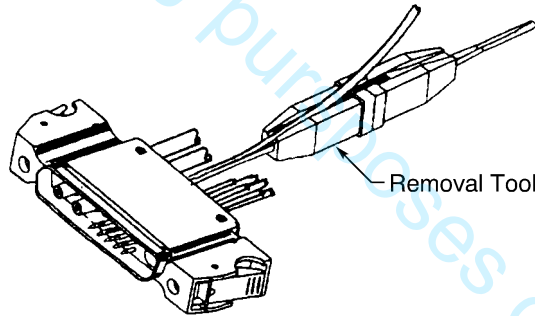
## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 19  
CONTACT REMOVAL TOOLS

Contact Size	Removal Tool
2020HD	282-891
	91066-4
	CIET-20HDL
	DAK125
	M81969/1-02
	MS3156-20

**NOTE:** The backshell must be removed from the connector before the contacts can be removed. Refer to Paragraph 4.C.

- (1) Make a selection of a contact removal tool from Table 19.
- (2) Put the tip of the tool on the wire.
- (3) At the rear of the connector, axially align the tool and the contact cavity.
- (4) Carefully push the tool into the contact cavity until it stops. Refer to Figure 30.  
Make sure that the tool stays aligned with the contact cavity.



POSITION OF THE REMOVAL TOOL IN THE CONTACT CAVITY  
Figure 30

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (5) Hold the wire against the tool.
- (6) Pull the tool and the wire out of the contact cavity at the same time.  
Make sure that the tool stays aligned with the contact cavity.
- (7) If the contact is not released:
  - (a) Carefully pull the tool out of the contact cavity.

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

- (b) Turn the tool approximately 90 degrees.
- (c) Do Step (2) through Step (6) again.

#### E. Special Purpose Contact Removal

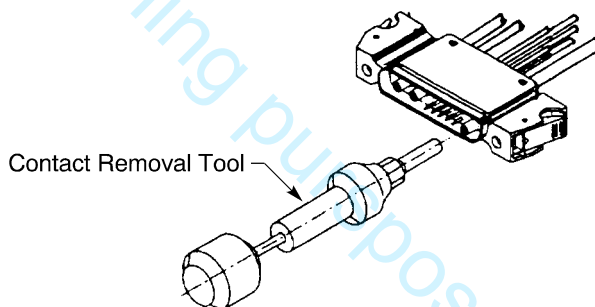
**NOTE:** Size 2018 special purpose contacts cannot be removed from the connector.

**Table 20**  
**CONTACT REMOVAL TOOLS**

Contact Cavity Size	Removal Tool
08	DRK38

**NOTE:** The backshell must be removed from the connector before the contacts can be removed. Refer to Paragraph 4.C.

- (1) For a pin contact, remove the alignment ring from the contact at the front of the connector.
- (2) Make a selection of a contact removal tool from Table 20.
- (3) At the front of the connector, axially align the tool with the engaging end of the contact. Refer to Figure 31.



**ALIGNMENT OF THE REMOVAL TOOL AND THE CONTACT**  
**Figure 31**

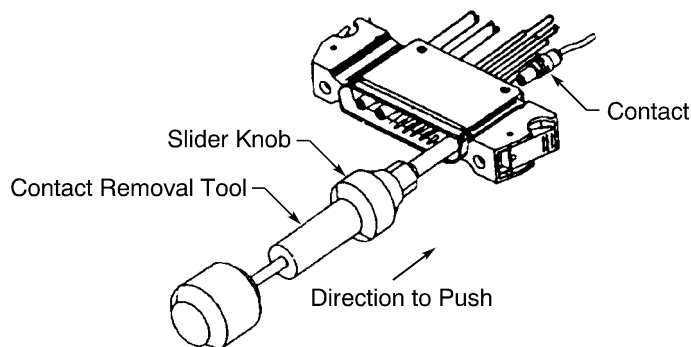
- (4) Put the tip of the tool on the contact.
- (5) Push the tool forward until the first mark on the tool is aligned with the front face of the connector.

**CAUTION:** IF THE REMOVAL TOOL IS PUSHED FARTHER THAN THE SPECIFIED MARK, DAMAGE TO THE RETENTION CLIPS OF THE CONTACT CAN OCCUR.

- (6) Hold the tool and the connector tightly in position.
- (7) Push the slider knob forward to release the contact. Refer to Figure 32.

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



### OPERATION OF THE REMOVAL TOOL SLIDER KNOB

Figure 32

(8) From the rear of the connector, carefully pull the cable or the contact crimp barrel.

#### F. Coax Contact Removal

The procedure to remove coax contacts is the same as the procedure to remove special purpose contacts. Refer to Paragraph 4.E.

### 5. CONNECTOR ASSEMBLY

#### A. Contact Assembly

This paragraph gives the procedure to assemble standard and special purpose contacts.

For the procedure to assemble:

- The CQME()-316, CQME()-501, and CQME()-502 coax contacts, refer to Paragraph 5.B.
- The CQME()-503 coax contacts, refer to Paragraph 5.C.

Table 21  
INSULATION REMOVAL LENGTH

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)	
		Target	Tolerance
24	20HD	0.17	± 0.01
22	20HD	0.17	± 0.01
20	20HD	0.17	± 0.01
	16	0.28	± 0.02
18	18	0.17	± 0.01
	16	0.28	± 0.02
16	16	0.28	± 0.02
14	12	0.28	± 0.02
12	12	0.28	± 0.02
10	08	0.28	± 0.02
8	08	0.28	± 0.02

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# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 22  
STANDARD CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool		
		Basic Unit		Locator
		Part Number	Setting	
24	20HD	GVF-101	5	-
		M22520/2-01	5	M22520/2-08
		ST2220-1-Y	-	ST2220-1-43
		WA22	5	M22520/2-08
		WA22LC	5	M22520/2-08
22	20HD	GVF-101	5	-
		M22520/2-01	6	M22520/2-08
		ST2220-1-Y	-	ST2220-1-43
		WA22	6	M22520/2-08
		WA22LC	6	M22520/2-08
20	20HD	GVF-101	5	-
		M22520/2-01	7	M22520/2-08
		ST2220-1-Y	-	ST2220-1-43
		WA22	7	M22520/2-08
		WA22LC	7	M22520/2-08

Table 23  
SPECIAL PURPOSE CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool		
		Basic Unit		Locator
		Part Number	Setting	
20	16	M309	1	TP884
18	18	M22520/2-01	8	M22520/2-08
	16	M309	2	TP884
16	16	M309	3	TP884
14	12	M309	3	TP884
12	12	M309	4	TP884
10	08	M309	5	TP884
08	08	M309	6	TP884

(1) Remove the necessary length of insulation from the end of the wire.

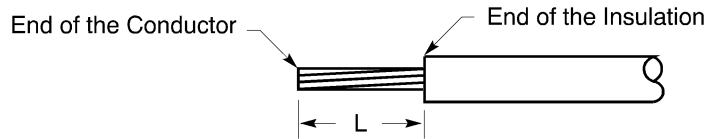
# 20-72-23

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Refer to:

- Figure 33
- Table 21 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedures.

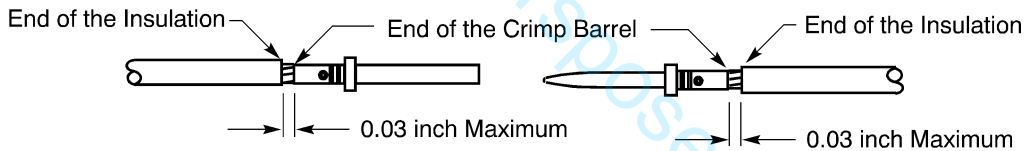


**WIRE PREPARATION**  
**Figure 33**

- (2) Make a selection of a crimp tool from:
  - Table 22 for standard contacts
  - Table 23 for special purpose contacts.
- (3) Push the conductor into the crimp barrel of the contact until the end of the conductor is against the end of the crimp barrel. Refer to Figure 34.

Make sure that:

- All 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 WIRE IN THE CRIMP BARREL OF THE CONTACT**  
**Figure 34**

- (4) Crimp the contact.

Make sure that:

- All 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.

#### B. Coax Contact Assembly

This paragraph gives the procedure to assemble these coax contacts:

- CQME()-316
- CQME()-501
- CQME()-502.

For the procedure to assemble a CQME()-503 coax contact, refer to Paragraph 5.C.

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 24  
COAX CONTACT CENTER CONTACT CRIMP TOOLS

Contact	Crimp Tool		
	Basic Unit		Locator
	Part Number	Setting	
CQMEF-316	M22520/2-01	1	M22520/2-03
CQMEF-316	WA22	1	M22520/2-03
CQMEF-316	WA22LC	1	M22520/2-03
CQMEF-316A	M22520/2-01	1	M22520/2-03
CQMEF-316A	WA22	1	M22520/2-03
CQMEF-316A	WA22LC	1	M22520/2-03
CQMEF-501A	M22520/2-01	6	M22520/2-14
CQMEF-501A	WA22	6	M22520/2-14
CQMEF-501A	WA22LC	6	M22520/2-14
CQMEF-501B	M22520/2-01	6	M22520/2-14
CQMEF-501B	WA22	6	M22520/2-14
CQMEF-501B	WA22LC	6	M22520/2-14
CQMEF-501C	M22520/2-01	6	M22520/2-14
CQMEF-501C	WA22	6	M22520/2-14
CQMEF-501C	WA22LC	6	M22520/2-14
CQMEF-501D	M22520/2-01	6	M22520/2-14
CQMEF-501D	WA22	6	M22520/2-14
CQMEF-501D	WA22LC	6	M22520/2-14
CQMEF-502A	M22520/2-01	5	M22520/2-14
CQMEF-502A	WA22	5	M22520/2-14
CQMEF-502A	WA22LC	5	M22520/2-14
CQMEM-316	M22520/2-01	1	M22520/2-03
CQMEM-316	WA22	1	M22520/2-03
CQMEM-316	WA22LC	1	M22520/2-03
CQMEM-316A	M22520/2-01	1	M22520/2-03
CQMEM-316A	WA22	1	M22520/2-03
CQMEM-316A	WA22LC	1	M22520/2-03
CQMEM-501	M22520/2-01	6	M22520/2-06
CQMEM-501	WA22	6	M22520/2-06
CQMEM-501A	WA22	6	M22520/2-06

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# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 24 (continued)

Contact	Crimp Tool		
	Basic Unit		Locator
	Part Number	Setting	
CQMEM-501A	WA22LC	6	M22520/2-06
CQMEM-501B	WA22	6	M22520/2-06
CQMEM-501B	WA22LC	6	M22520/2-06
CQMEM-501C	WA22	6	M22520/2-06
CQMEM-501C	WA22LC	6	M22520/2-06
CQMEM-501D	M22520/2-01	3	M22520/2-06
CQMEM-501D	WA22	6	M22520/2-06
CQMEM-501D	WA22LC	6	M22520/2-06
CQMEM-502	M22520/2-01	4	M22520/2-06
CQMEM-502	WA22	6	M22520/2-06
CQMEM-502	WA22LC	6	M22520/2-06

Table 25  
COAX CONTACT BODY CRIMP TOOLS

Contact	Crimp Tool		
	Basic Unit	Die	
		Part Number	Cavity
CQMEF-316	M22520/5-01	M22520/5-39	B
CQMEF-316A	M22520/5-01	M22520/5-41	B
CQMEF-501B	M22520/5-01	M22520/5-39	B
CQMEF-501C	M22520/5-01	M22520/5-39	B
CQMEF-501D	M22520/5-01	M22520/5-41	B
CQMEF-502A	M22520/5-01	M22520/5-41	B
CQMEM-316	M22520/5-01	M22520/5-39	B
CQMEM-316A	M22520/5-01	M22520/5-41	B
CQMEM-501	M22520/5-01	M22520/5-39	B
CQMEM-501A	M22520/5-01	M22520/5-39	B
CQMEM-501B	M22520/5-01	M22520/5-39	B
CQMEM-501C	M22520/5-01	M22520/5-39	B
CQMEM-501D	M22520/5-01	M22520/5-41	B
CQMEM-502	M22520/5-01	M22520/5-41	B

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# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 26  
NECESSARY MATERIALS

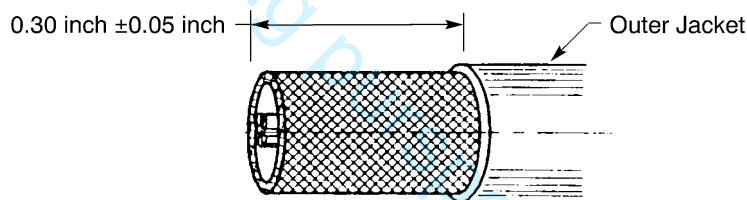
Material	Part Number	Supplier
Sleeve, Heat Shrinkable	MIL-LT	Raychem
	PLF 100	Plastronic
	RW-175	Raychem

- (1) Make a selection of a center contact crimp tool from Table 24.
- (2) Make a selection of a contact body crimp tool from Table 25.
- (3) Make a selection of a 3/16 inch diameter heat shrinkable sleeve from Table 26.

**NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.

- (4) Cut the cable to make the end of the cable perpendicular to the longitudinal axis of the cable.
- (5) Put a 1.75 inch  $\pm 0.13$  inch length of the heat shrinkable sleeve on the cable.
- (6) Remove 0.30 inch  $\pm 0.05$  inch of the outer jacket from the end of the cable. Refer to Figure 35.

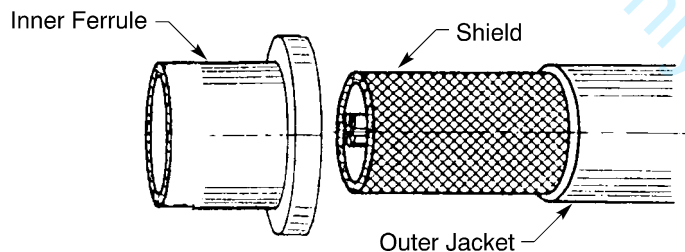
**CAUTION:** DAMAGE TO THE SHIELD, THE DIELECTRIC, OR THE CENTER CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.



### OUTER JACKET REMOVAL LENGTH

Figure 35

- (7) Align the inner ferrule and the end of the cable. Refer to Figure 36.



### ALIGNMENT OF THE INNER FERRULE AND THE END OF THE CABLE

Figure 36

- (8) Push the inner ferrule rearward until the shoulder of the ferrule is against the end of the outer jacket.
- (9) If the cable has a flat conductor outer shield and a round conductor inner shield, cut the flat conductor shield at the forward edge of the inner ferrule.
- (10) Fold the shield back on the outer surface of the inner ferrule.

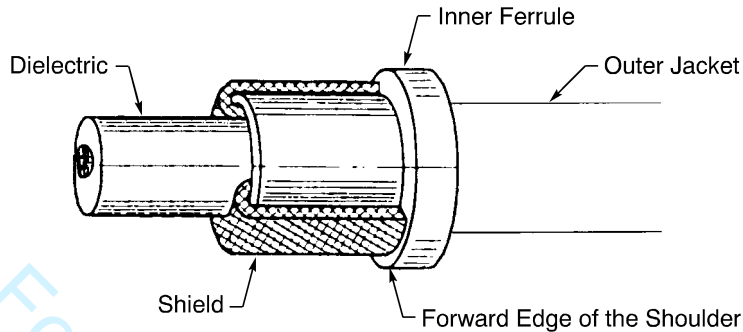
# 20-72-23

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

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

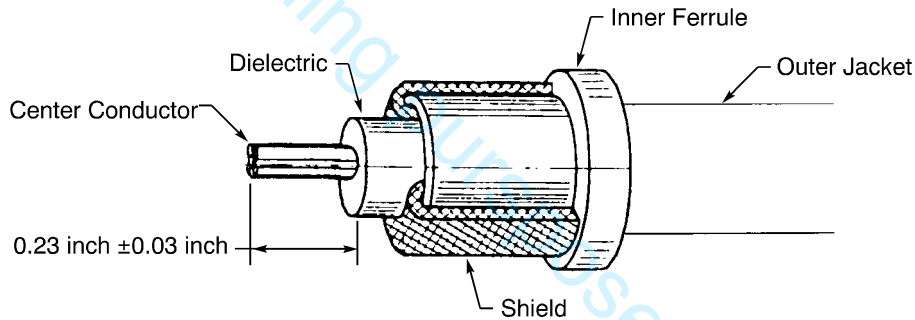
- (11) Cut the strands of the shield at the forward edge of the shoulder of the inner ferrule. Refer to Figure 37.



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

**Figure 37**

- (12) Remove 0.23 inch  $\pm$  0.03 inch of the dielectric from the end of the cable. Refer to Figure 38.

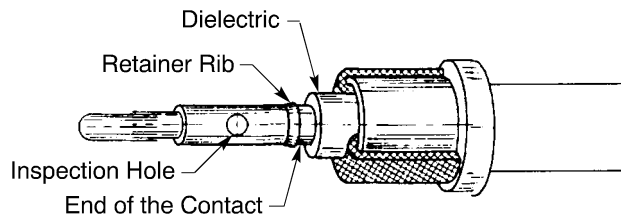


**DIELECTRIC REMOVAL**

**Figure 38**

- (13) If all of the strands of the center conductor are not together, twist the strands together in their initial direction.
- (14) Push the center conductor into the crimp barrel of the center contact until the end of the dielectric is against the end of the center contact. Refer to Figure 39.

Make sure that the strands of the conductor can be seen in the inspection hole.



**POSITION OF THE CENTER CONTACT ON THE CENTER CONDUCTOR**

**Figure 39**

**20-72-23**

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

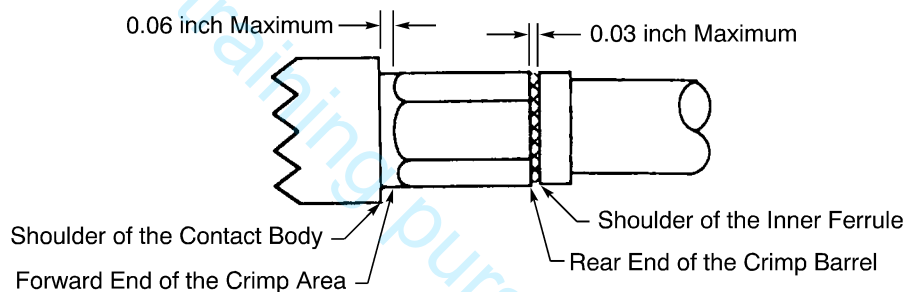
- (15) Crimp the center contact.
- (16) Put the contact body on the center contact.
- (17) Push the center contact into the contact body until the retainer rib of the center contact is locked in the contact body.
- (18) Lightly pull the cable to make sure that the center contact is locked in the contact body.
- (19) If the center contact is not locked in the contact body, do Step (17) and Step (18) again.
- (20) Put the contact in the crimp die.

Make sure that the rear end of the contact is aligned with the edge of the crimp die.

- (21) Crimp the contact body. Refer to Figure 40.

Make sure that the distance from:

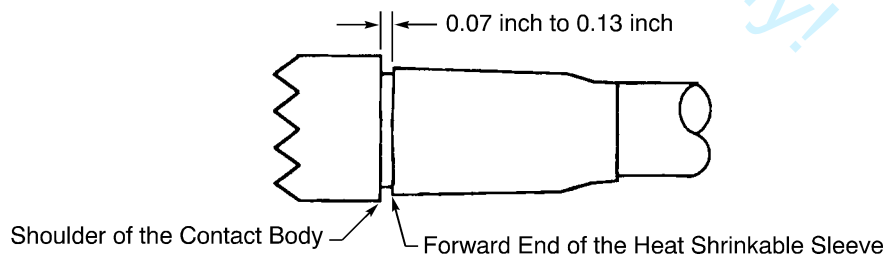
- The forward end of the crimp area to the shoulder of the contact body is not more than 0.06 inch
- The rear end of the crimp barrel to the shoulder of the inner ferrule is not more than 0.03 inch.



**POSITION OF THE CONTACT BODY**

**Figure 40**

- (22) Remove the unwanted length of the strands of the shield.  
Make sure that the end of the shield is aligned with the rear end of the contact body.
- (23) Push the heat shrinkable sleeve forward until the forward end of the sleeve is 0.07 inch to 0.13 inch from the shoulder of the contact body. Refer to Figure 41.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE CONTACT ASSEMBLY**

**Figure 41**

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

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

### C. CQME()-503 Coax Contact Assembly

Table 27

#### COAX CONTACT CENTER CONTACT CRIMP TOOLS

Basic Unit		Locator
Part Number	Setting	
M22520/2-01	6	M22520/2-14
		K709

Table 28

#### COAX CONTACT OUTER FERRULE CRIMP TOOLS

Basic Unit	Die	
	Part Number	Cavity
M22520/5-01	Y248	B

Table 29

#### NECESSARY MATERIALS

Material	Part Number	Supplier
Sleeve, Heat Shrinkable	MIL-LT	Raychem
	PLF 100	Plastronic
	RW-175	Raychem

- (1) Make a selection of a coax center contact crimp tool from Table 27.
- (2) Make a selection of a coax outer ferrule crimp tool from Table 28.
- (3) Make a selection of a 1/4 inch diameter heat shrinkable sleeve from Table 29.

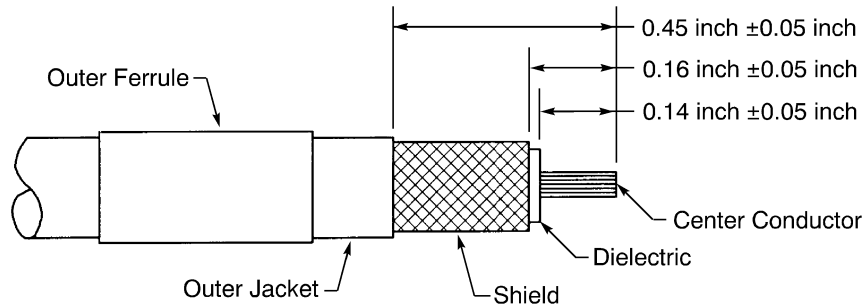
**NOTE:** For alternative heat shrinkable sleeves, refer to Subject 20-00-11.

- (4) Put a 1.50 inch  $\pm 0.13$  inch length of heat shrinkable sleeve on the cable.
- (5) Put the outer ferrule on the cable.
- (6) Prepare the cable. Refer to Figure 42.

**CAUTION:** DAMAGE TO THE SHIELD, THE DIELECTRIC, OR THE CENTER CONDUCTOR CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE CABLE.

## STANDARD WIRING PRACTICES MANUAL

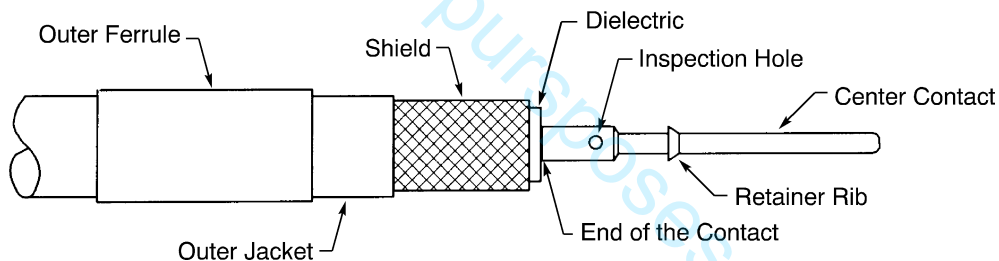
### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



#### COAX CABLE PREPARATION

Figure 42

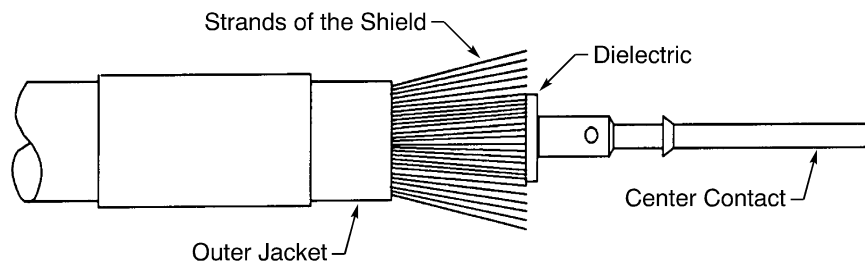
- (a) Remove 0.45 inch  $\pm$  0.05 inch of the outer jacket.
  - (b) Remove 0.16 inch  $\pm$  0.05 inch of the shield.
  - (c) Remove 0.14 inch  $\pm$  0.05 inch of the dielectric.
  - (7) If all of the strands of the center conductor are not together, twist the strands together in their initial direction.
  - (8) Push the center conductor into the crimp barrel of the center contact until the end of the center contact is against the end of the dielectric. Refer to Figure 43.
- Make sure that the strands of the conductor can be seen in the inspection hole.



#### POSITION OF THE CENTER CONTACT ON THE CENTER CONDUCTOR

Figure 43

- (9) Crimp the center contact.
- (10) Move the strands of the shield apart.
- (11) Align the strands of the shield with the longitudinal axis of the cable. Refer to Figure 44.



#### ALIGNMENT OF THE STRANDS OF THE SHIELD

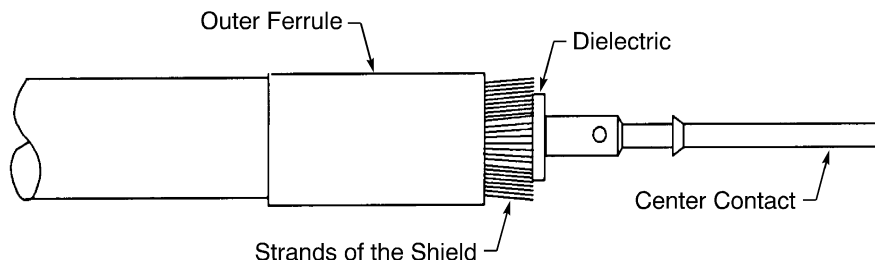
Figure 44

**20-72-23**

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

- (12) Push the outer ferrule forward until the ferrule makes an approximate 75 percent overlap with the strands of the shield. Refer to Figure 45.

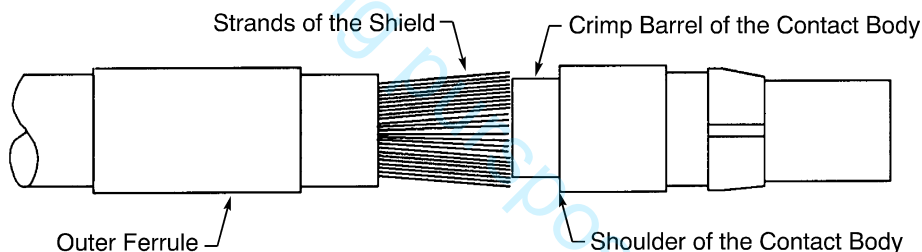


**POSITION OF THE OUTER FERRULE ON THE SHIELD**

**Figure 45**

- (13) Move the outer ferrule rearward away from the end of the cable jacket.  
 (14) Push the center contact assembly into the contact body until the retainer rib of the center contact is locked in the contact body. Refer to Figure 46.

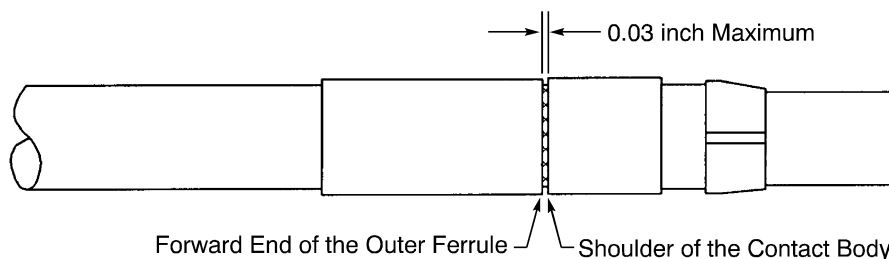
Make sure that the crimp barrel of the contact body is between the dielectric and all of the strands of the shield.



**POSITION OF THE CONTACT BODY**

**Figure 46**

- (15) Lightly pull the cable to make sure that the center contact is locked in the contact body.  
 (16) If the center contact is not locked in the contact body, do Step (14) and Step (15) again.  
 (17) Push the outer ferrule forward until the forward edge of the ferrule is 0.35 inch maximum from the shoulder of the contact body. Refer to Figure 47.



**POSITION OF THE OUTER FERRULE ON THE CONTACT BODY**

**Figure 47**

## STANDARD WIRING PRACTICES MANUAL

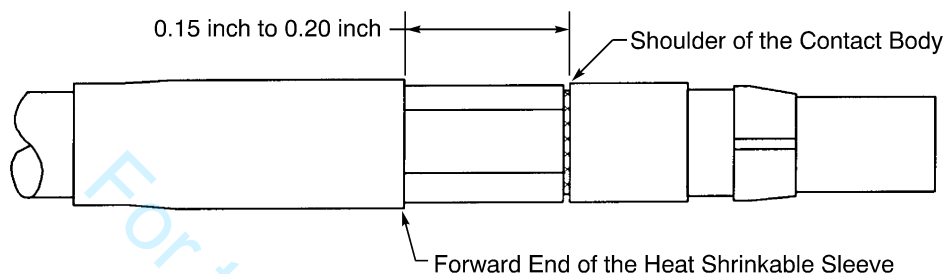
### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

- (18) Crimp the outer ferrule.

Make sure that the distance from the forward end of the outer ferrule to the shoulder of the contact body is 0.035 inch maximum.

- (19) Cut the unwanted strands of the shield at the forward edge of the outer ferrule. Refer to Figure 47.

- (20) Push the heat shrinkable sleeve forward until the forward end of the sleeve is 0.15 inch to 0.20 inch from the shoulder of the contact body. Refer to Figure 48.



**POSITION OF THE HEAT SHRINKABLE SLEEVE ON THE CONTACT ASSEMBLY**

**Figure 48**

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

#### D. Contact Insertion

This paragraph gives the procedure to install:

- Standard contacts
- Size 2018 special purpose contacts.

For the procedure to install:

- Other special purpose contacts, refer to Paragraph 5.E.
- Coax contacts, refer to Paragraph 5.E.

**Table 30**  
**CONTACT INSERTION TOOLS**

Contact Size	Insertion Tool
2020HD	282-881
	91066-4
	ATC1072
	CIET-20HDL
	DAK145J
	M81969/1-02
	MS3156-22

# STANDARD WIRING PRACTICES MANUAL

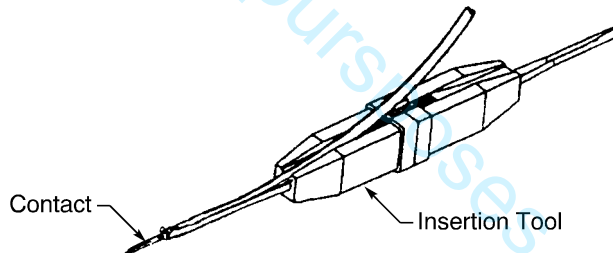
## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 30 (continued)

Contact Size	Insertion Tool
2018	282-881
	91066-4
	ATC1072
	CIET-20HDL
	DAK145J
	M81969/1-02
	MS3156-22

**NOTE:** A size 2018 special purpose contact cannot be removed after it is inserted.

- (1) If a backshell is specified, put the backshell on the wire harness.  
Make sure that the end of the backshell with the latch retainers is pointed forward to the end of the wire harness.
- (2) Make a selection of the contact insertion tool from Table 30.
- (3) If it is necessary to install an unwired contact in an empty contact cavity, install each unwired contact. Refer to Paragraph 5.F.
- (4) Put the contact assembly in the insertion tool. Refer to Figure 49.

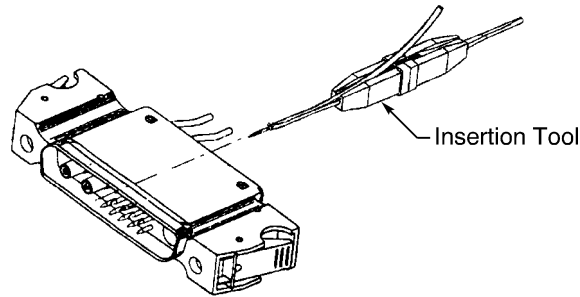


**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**  
**Figure 49**

- (5) At the rear of the connector, axially align the contact assembly, the insertion tool, and the contact cavity. Refer to Figure 50.

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



#### ALIGNMENT OF THE CONTACT ASSEMBLY, THE INSERTION TOOL, AND THE CONTACT CAVITY

Figure 50

- (6) Push the tool into the contact cavity until it stops.

Make sure that the tool stays aligned with the contact cavity.

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (7) Carefully pull the tool from the contact cavity.

- (8) 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. DAMAGE TO THE CONNECTOR OR THE CONTACT CAN OCCUR.

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

- (9) If the contact is not locked in the contact cavity:

- Pull the contact assembly out of the cavity.
- Do Step (4) through Step (8) again.

#### E. Insertion of Special Purpose and Coax Contacts

For the conditions that are applicable for this procedure, refer to Paragraph 5.D.

**Table 31**  
**SPECIAL PURPOSE CONTACT INSERTION TOOLS**

Crimp Barrel Size	Insertion Tool
16	ST2220-2-4
12	ST2220-2-5
08	ST2220-2-5

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

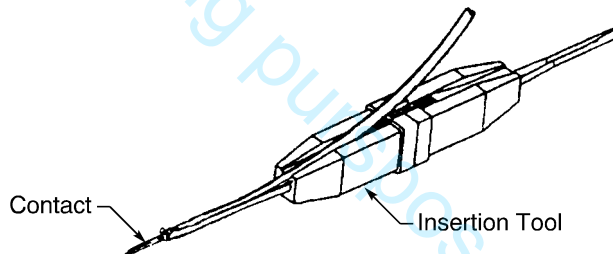
**Table 32**  
**COAX CONTACT INSERTION TOOLS**

Contact Type	Insertion Tool
Pin	ST2220-2-5
Socket	ST2220-2-5

**Table 33**  
**CONTACT ALIGNMENT RING INSTALLATION TOOLS**

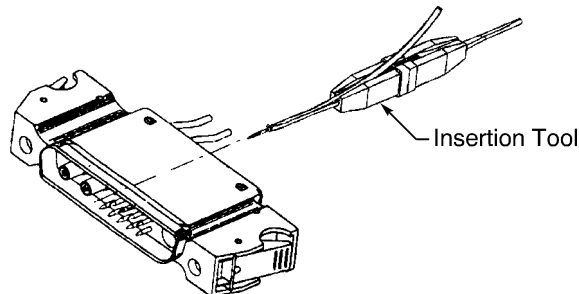
Contact Type	Installation Tool
Pin	M81969/14-04

- (1) Make a selection of a contact insertion tool from:
  - Table 31 for a special purpose contact
  - Table 32 for a coax contact.
- (2) If it is necessary to install an unwired contact in an empty contact cavity, install each unwired contact. Refer to Paragraph 5.F.
- (3) Put the contact assembly in the insertion tool. Refer to Figure 51.



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**  
**Figure 51**

- (4) At the rear of the connector, axially align the contact assembly, the insertion tool, and the contact cavity. Refer to Figure 52.



**ALIGNMENT OF THE CONTACT ASSEMBLY, THE INSERTION TOOL, AND THE CONTACT CAVITY**  
**Figure 52**

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

- (5) Push the tool into the contact cavity until it stops.

Make sure that the tool stays aligned with the contact cavity.

**CAUTION:** DO NOT USE MORE THAN THE NECESSARY AMOUNT OF FORCE TO PUSH THE TOOL INTO THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

**CAUTION:** DO NOT TURN THE TOOL CLOCKWISE OR COUNTERCLOCKWISE WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE CONTACT RETENTION CLIPS CAN OCCUR.

- (6) Carefully pull the tool from the contact cavity.

- (7) 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. DAMAGE TO THE CONNECTOR OR THE CONTACT CAN OCCUR.

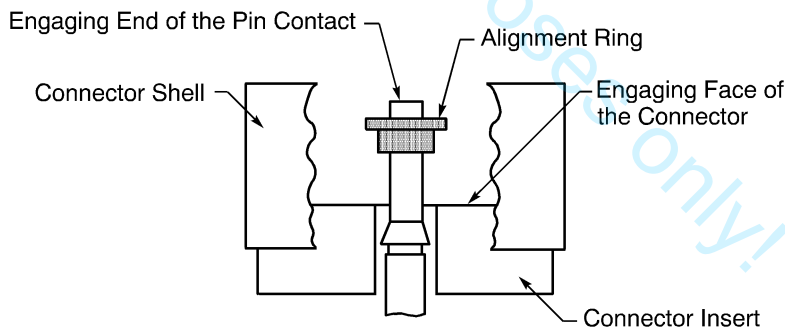
**CAUTION:** DO NOT MAKE A DENT IN THE WIRE INSULATION WITH THE FINGERNAILS. DAMAGE TO THE WIRE INSULATION CAN CAUSE UNSATISFACTORY PERFORMANCE OF THE WIRE.

- (8) If the contact is not locked in the contact cavity:

- Pull the contact assembly out of the cavity.
- Do Step (3) through Step (7) again.

- (9) For a pin contact:

- Make a selection of a contact alignment ring from Table 14.
- Make a selection of an alignment ring installation tool from Table 33.
- Put the alignment ring on the engaging end of the contact. Refer to Figure 53.



**INITIAL POSITION OF THE ALIGNMENT RING**

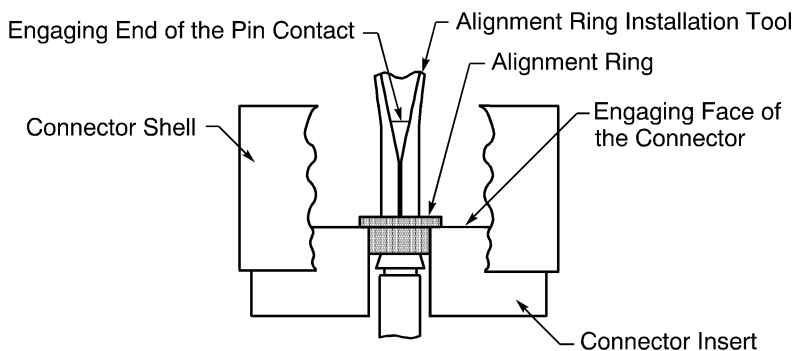
**Figure 53**

- Put the end of the tool on the engaging end of the contact.

- Push the alignment ring forward to the engaging face of the connector. Refer to Figure 54.

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



**POSITION OF THE ALIGNMENT RING AGAINST THE FACE OF THE CONNECTOR**  
Figure 54

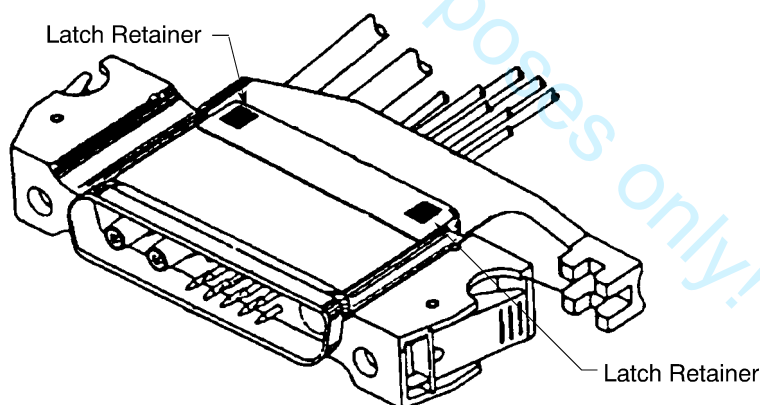
- (f) Remove the tool from the engaging end of the contact.

#### F. Seal of an Empty Contact Cavity

For environmental connectors, an empty contact cavity must be sealed with a seal rod or a seal plug. Refer to Figure 4 and Subject 20-60-08.

#### G. Backshell Installation

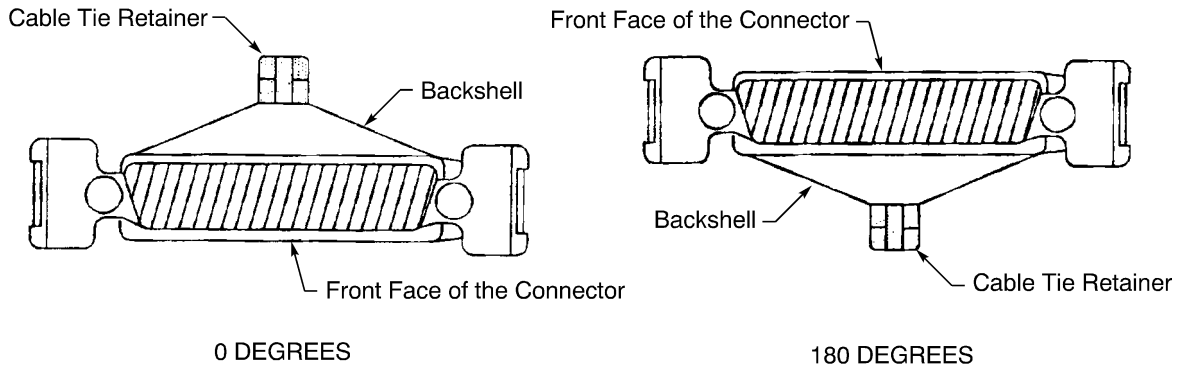
- (1) Align the forward end of the backshell with the rear end of the connector.
  - (2) Engage the four latches on the connector with the latch retainers on the backshell. Refer to Figure 55.
- If the backshell is an equatorial backshell or a polar backshell, make sure that the backshell is in the correct clock position. Refer to Figure 56 and Figure 57.



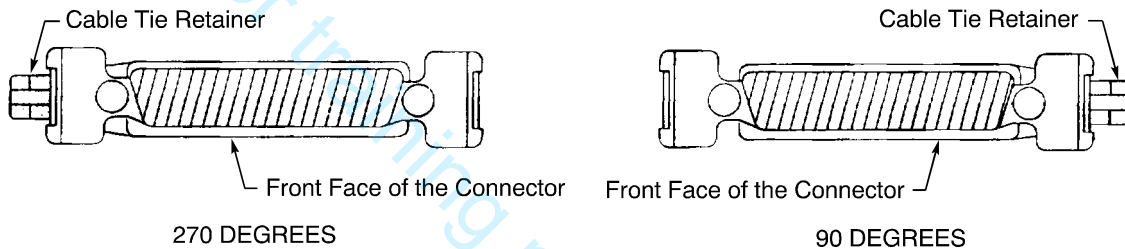
**POSITION OF THE LATCH RETAINERS AND THE LATCHES**  
Figure 55

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



**CLOCK POSITIONS OF THE EQUATORIAL BACKSHELLS**  
**Figure 56**



**CLOCK POSITIONS OF THE POLAR BACKSHELLS**  
**Figure 57**

(3) Assemble the strain relief.

For the assembly of the strain relief of a wire harness that:

- Does not have a coax cable, refer to Paragraph 5.H.
- Has a coax cable, refer to Paragraph 5.I.

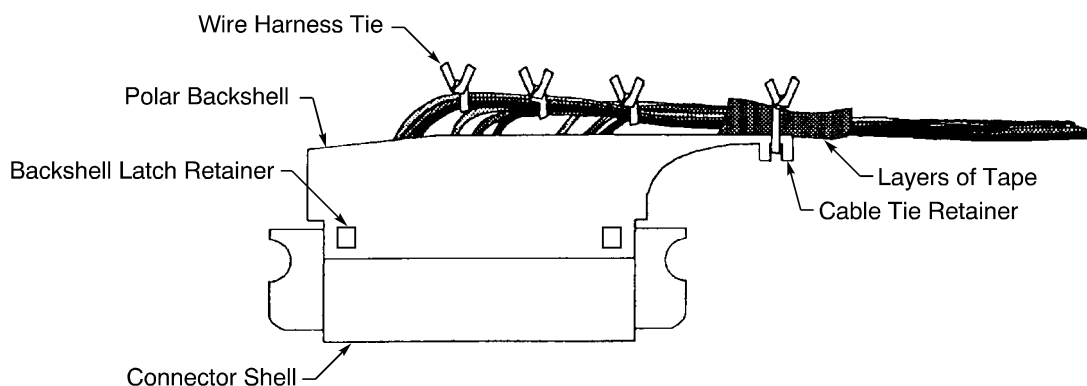
### H. Strain Relief Assembly

This paragraph gives the procedure to assemble the strain relief for a wire harness that does not have a coax cable.

For the procedure to assemble the strain relief for a wire harness that has a coax cable, refer to Paragraph 5.I.

# STANDARD WIRING PRACTICES MANUAL

## TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



### CONFIGURATION OF THE WIRE HARNESS TIES OF THE STRAIN RELIEF

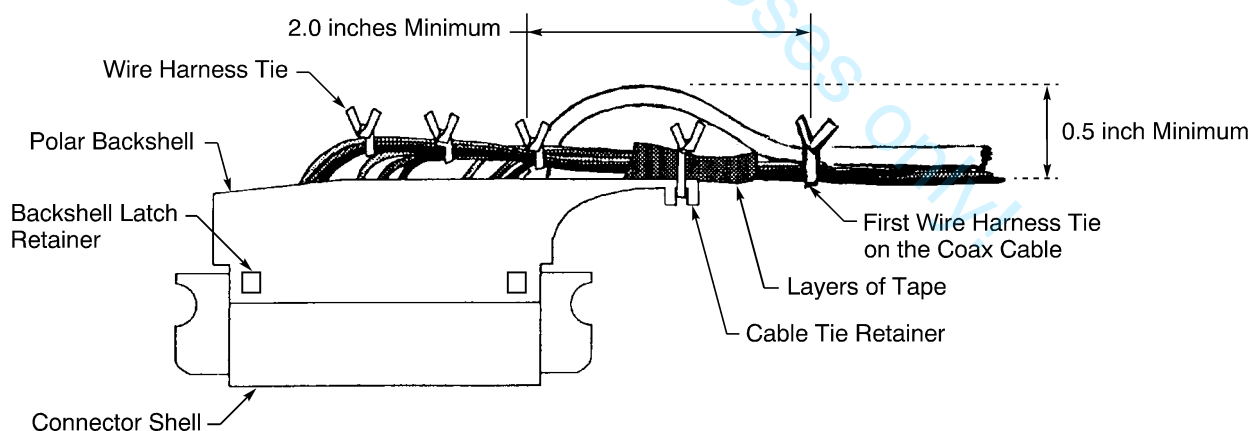
Refer to Figure 58.

- (1) Make a selection of a silicone tape. Refer to Subject 20-10-11.
- (2) Put a minimum of two layers of the tape around the wire harness at the location that is adjacent to the cable tie retainer of the backshell.
- (3) Assemble the wire harness ties around:
  - The wires and cables of the wire harness
  - The wire harness and the cable tie retainer.

Refer to Subject 20-10-11.

NOTE: A plastic tie strap is an acceptable alternative to a wire harness tie. Refer to Subject 20-10-11.

## I. Strain Relief Assembly for a Wire Harness with a Coax Cable



**CONFIGURATION OF THE WIRE HARNESS TIES OF THE STRAIN RELIEF**  
**Figure 59**

Refer to Figure 59.

- (1) Make a selection of a silicone tape. Refer to Subject 20-10-11.

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**STANDARD WIRING PRACTICES MANUAL****TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS**

- (2) At the location that is adjacent to the cable tie retainer of the backshell, put a minimum of two layers of the tape around:
- The wires of the harness
  - The cables of the wire harness that are not coax cables.
- (3) If the connector has a straight backshell, assemble a wire harness tie around:
- The wires and cables of the wire harness
  - The cable tie retainer.

Refer to Subject 20-10-11.

**NOTE:** A plastic tie strap is an acceptable alternative to a wire harness tie. Refer to Subject 20-10-11.

- (4) If the connector has a polar or an equatorial backshell and the distance from the rear end of the coax contact to the cable tie retainer is equal to or more than 2.0 inches, assemble a wire harness tie around:
- The wires and cables of the wire harness
  - The cable tie retainer.

Refer to Subject 20-10-11.

Make sure that the radius of the curve of the coax cable is not less than the minimum bend radius for coax cable. Refer to Subject 20-10-11.

**CAUTION:** IF THE COAX CABLE IS ATTACHED TO THE CABLE TIE RETAINER WHEN THE DISTANCE FROM THE COAX CONTACT TO THE CABLE TIE RETAINER IS LESS THAN 2.0 INCHES, DAMAGE TO THE COAX CONTACT OR THE COAX CABLE CAN OCCUR.

**NOTE:** A plastic tie strap is an acceptable alternative to a wire harness tie. Refer to Subject 20-10-11.

- (5) If the connector has a polar or an equatorial backshell and the distance from the rear end of the coax contact to the cable tie retainer is less than 2.0 inches:
- (a) Assemble a wire harness tie around:
- The wires of the harness
  - The cables of the wire harness that are not coax cables
  - The cable tie retainer.

Refer to Subject 20-10-11.

**NOTE:** A plastic tie strap is an acceptable alternative to a wire harness tie. Refer to Subject 20-10-11.

- (b) At a location that is equal to or more than 2.0 inches from the rear end of the coax contact, assemble a wire harness tie around:
- The coax cable
  - The wire harness.

Refer to Subject 20-10-11.

Make sure that the radius of the curve of the coax cable is not less than the minimum bend radius for coax cable. Refer to Subject 20-10-11.

## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

**CAUTION:** IF THE COAX CABLE IS ATTACHED TO THE WIRE HARNESS AT A LOCATION THAT IS LESS THAN 2.0 INCHES, DAMAGE TO THE COAX CONTACT OR THE COAX CABLE CAN OCCUR.

**NOTE:** A plastic tie strap is an acceptable alternative to a wire harness tie. Refer to Subject 20-10-11.

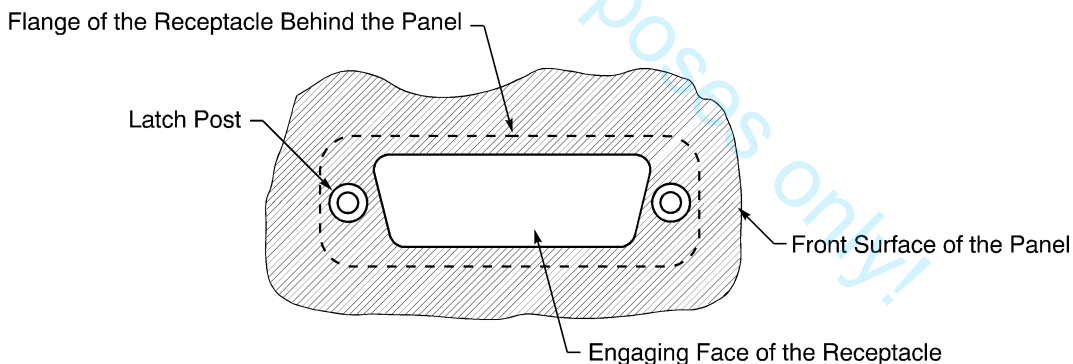
#### 6. CONNECTOR INSTALLATION

##### A. Installation of a Receptacle in a Panel

**Table 34**  
**NECESSARY TOOLS**

Tool	Size (inch)
Hex Nut Driver	3/16
Wrench	3/16

- (1) Make a selection of a tool from Table 34.
- (2) Remove these components from the flanges of the receptacle:
  - The two latch posts
  - The lockwashers
  - The 4-40 self-locking nuts.
- (3) From the front of the panel, align the receptacle with the hole in the panel. Refer to Figure 60.  
Make sure that the top of the receptacle is in the correct position in relation to the top of the hole.



#### POSITION OF THE RECEPTACLE IN THE PANEL

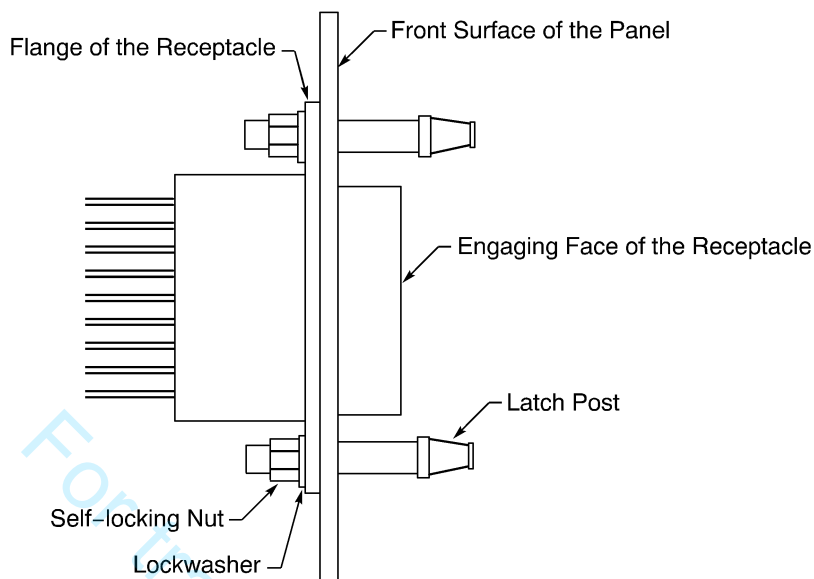
**Figure 60**

- (4) Push the front of the receptacle through the hole until the front surface of the receptacle is against the rear surface of the panel.
- (5) Align the holes on the flange of the receptacle with the holes in the panel.
- (6) From the front of the panel, push a latch post through the each hole until the shoulder of the latch post is against the front of the flange. Refer to Figure 61.

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## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS



**CONFIGURATION OF THE LATCH POST ASSEMBLIES**

**Figure 61**

- (7) From the rear of the panel, put a lockwasher on each latch post.
- (8) Put a self-locking nut on each latch post.
- (9) Tighten the nuts.

Make sure that the receptacle does not move in the panel.

#### **B. Connection of a Plug and a Receptacle**

- (1) Align the front face of the plug with the front face of the receptacle.
- (2) Push the plug into the receptacle until it makes a click.
- (3) Lightly pull the plug to make sure that the plug is locked in the receptacle.

### **7. APPROVED TOOL SUPPLIERS**

#### **A. Contact Removal Tools**

**Table 35**  
**CONTACT REMOVAL TOOL SUPPLIERS**

Removal Tool	Supplier
282-891	Radiall
91066-4	AMP
CIET-20HDL	ITT Cannon
DAK125	Daniels
DRK38	Daniels
M81969/1-02	QPL
MS3156-20	QPL

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**STANDARD WIRING PRACTICES MANUAL****TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS****B. Contact Crimp Tools**

**Table 36**  
**CONTACT CRIMP TOOL SUPPLIERS**

<b>Crimp Tool</b>	<b>Supplier</b>
GVF-101	Gaard
K709	Daniels
M22520/2-01	QPL
M22520/2-03	QPL
M22520/2-06	QPL
M22520/2-08	QPL
M22520/2-14	QPL
M22520/5-01	QPL
M22520/5-39	QPL
M22520/5-41	QPL
M309	Daniels
ST2220-1-43	Boeing
ST2220-1-Y	Boeing
TP884	Daniels
WA22	Daniels
WA22LC	Daniels
Y248	Daniels

**C. Contact Insertion Tools**

**Table 37**  
**CONTACT INSERTION TOOL SUPPLIERS**

<b>Insertion Tool</b>	<b>Supplier</b>
282-881	Sogie/Radiall
91066-4	AMP
ATC1072	Astro
CIET-20HDL	ITT Cannon
DAK145J	Daniels
M81969/1-02	QPL
M81969/14-04	QPL
MS3156-22	QPL
ST2220-2-4	Boeing

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## STANDARD WIRING PRACTICES MANUAL

### TRI-STAR CQ() AND CORY CQ() RECTANGULAR CONNECTORS

Table 37 (continued)

Insertion Tool	Supplier
ST2220-2-5	Boeing

For training purposes only!

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

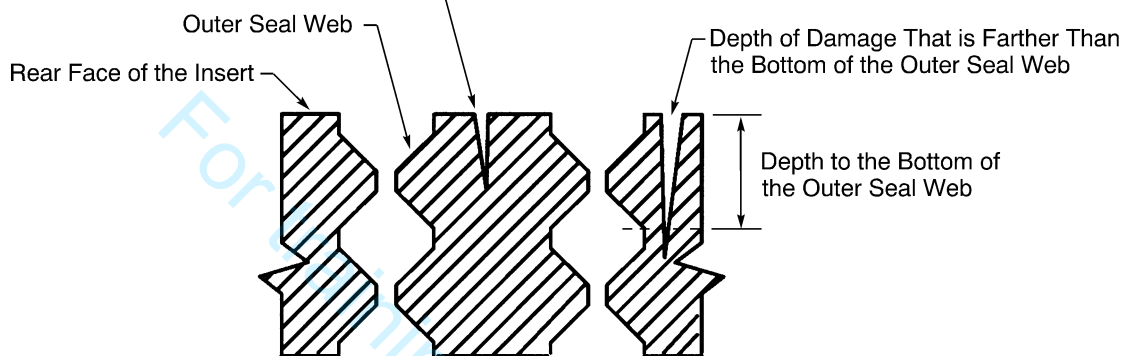
#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Connector

The connector must be replaced when one or more of these conditions occur:

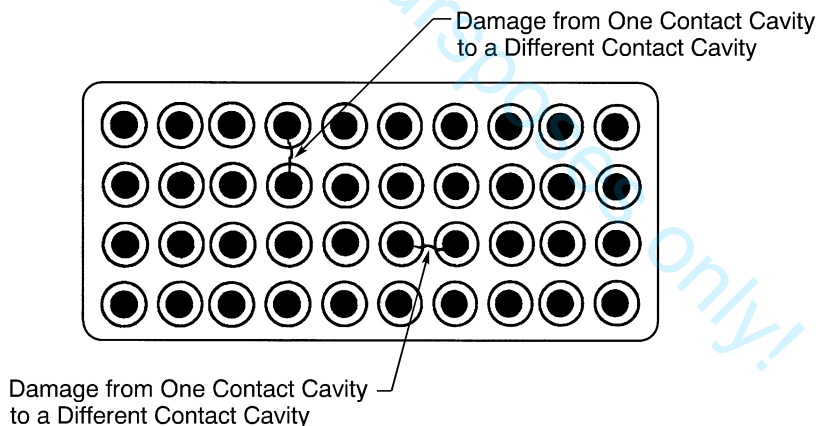
- The depth of the damage extends farther than the bottom of the outer seal web; refer to Figure 1
- The damage extends from one contact cavity to a different contact cavity; refer to Figure 2.

Depth of the Damage That is not Farther Than the Bottom of the Seal Web



REAR FACE OF THE CONNECTOR - DEPTH OF DAMAGE

Figure 1



REAR FACE OF THE CONNECTOR - LENGTH OF DAMAGE

Figure 2

##### B. Damage Conditions - Front Face of the Connector

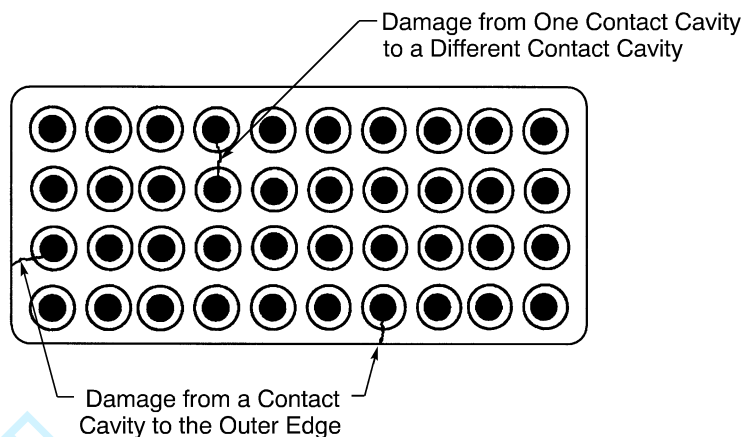
The connector must be replaced when one or more of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 3.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS



**FRONT FACE OF THE CONNECTOR - LENGTH OF DAMAGE**  
Figure 3

#### C. Minimum Wire O.D. for an Environmentally Sealed Connector

Refer to:

- Subject 20-60-08 for the identification of an environmentally sealed connector
- Table 1 for the minimum wire O.D. for a satisfactory seal of a contact cavity
- Subject 20-60-08 for the procedure to increase the diameter of the wire.

**Table 1**  
**MINIMUM WIRE O.D. FOR A SATISFACTORY SEAL**

Connector	Contact Cavity Size	Minimum Wire O.D. (inch)
BACC65AJ	20	0.033
	16	0.068
BACC65AK	20	0.033
	16	0.068
S280W557-1	22	0.033
	20	0.033
	16	0.068
S280W557-2	22	0.033
	20	0.033
	16	0.068

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

#### 2. PART NUMBERS AND DESCRIPTION

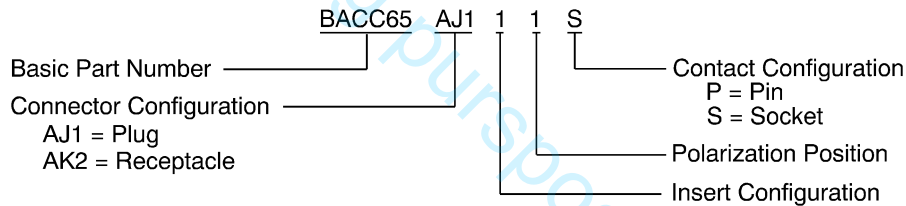
##### A. Connector Part Numbers

Table 2  
CONNECTOR PART NUMBERS

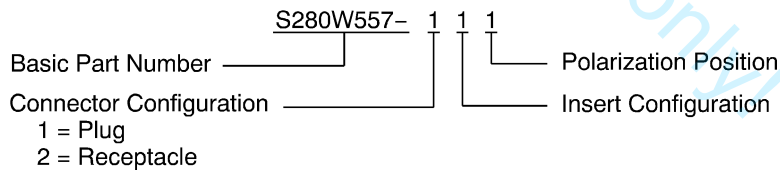
Boeing Standard	Configuration	Supplier
BACC65AJ()	Plug	Viking Electronics
BACC65AK()	Receptacle	Viking Electronics
S280W557-1()	Plug	Viking Electronics
S280W557-2()	Receptacle	Viking Electronics

Table 3  
ALTERNATIVE CONNECTOR PART NUMBERS

Specified Connector	Alternative Connector
S280W557-1()	BACC65AJ1()S
S280W557-2()	BACC65AK2()P



BACC65AJ() AND BACC65AK() CONNECTOR PART NUMBER STRUCTURE  
Figure 4



S280W557-() CONNECTOR PART NUMBER STRUCTURE  
Figure 5

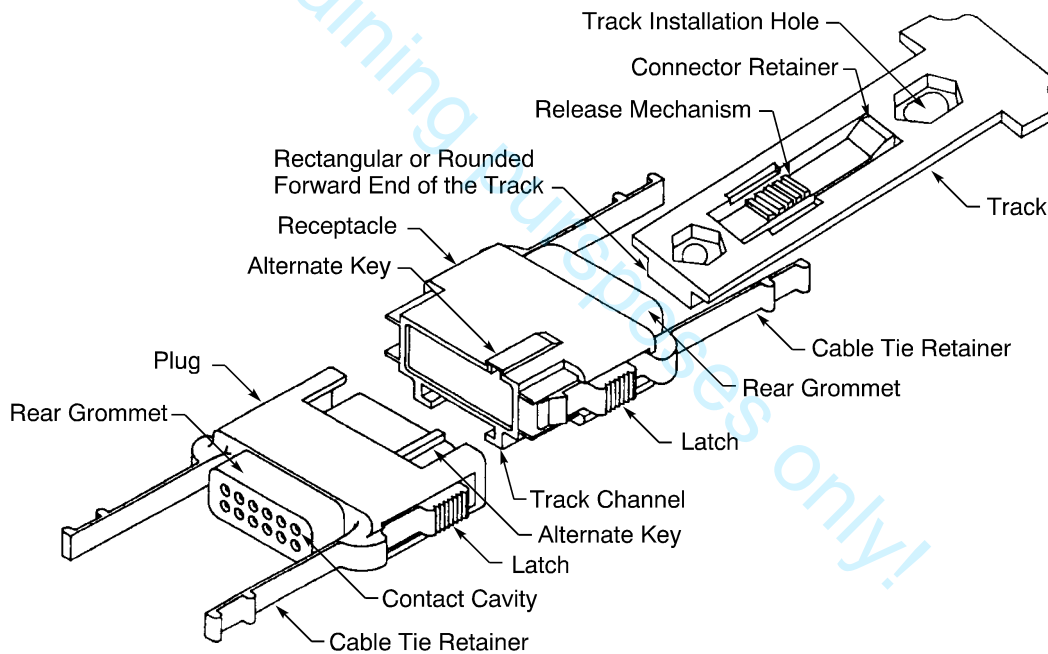
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

#### B. Connector Description

The connectors have these technical features:

- A plastic, rectangular shell
- A rectangular insert configuration
- An environmental seal
- A cable tie retainer
- Rear release, rear removable contacts
- A plug with socket contacts
- A receptacle with pin contacts
- An integral track channel for installation on a track
- A separate installation track
- A polarization key position
- A latch for quick disconnection of the plug and receptacle
- The BACC65AJ() plug can be connected to the S280W557-2() receptacle
- The S280W557-1() plug can be connected to the BACC65AK() receptacle.



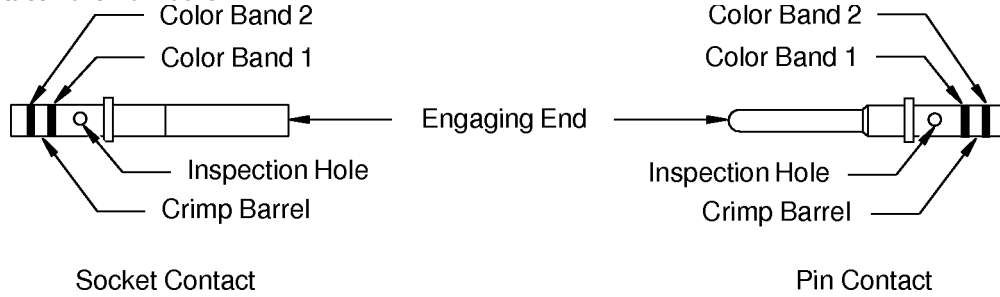
**BACC65AJ AND BACC65AK CONNECTORS**

**Figure 6**

## STANDARD WIRING PRACTICES MANUAL

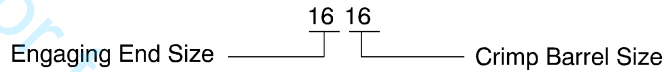
### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

#### C. Contact Part Numbers



#### REAR RELEASE CONTACTS

Figure 7



#### EXAMPLE OF CONTACT SIZE

Figure 8

**NOTE:** The size 2020HD contact has a size 20 engaging end and a size 20 crimp barrel.

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

Contact Size	Engaging End Size	Crimp Barrel Size	Contact Type	Boeing Standard	Color Code	
					Band	Color
2020HD	20	20	Pin	BACC47EF2	1	Orange
					2	Red
			Socket	BACC47EG2	1	Orange
					2	Red
1616	16	16	Pin	BACC47EF3	1	Orange
					2	Blue
			Socket	BACC47EG3	1	Orange
					2	Blue

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

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

Contact	Supplier
BACC47EF( )	AMP
	ITT Cannon
	Radiall
	Souriau
	Tri-Star
BACC47EG( )	AMP
	ITT Cannon
	Radiall
	Souriau
	Tri-Star

#### D. Track Part Numbers

**Table 6**  
**TRACK PART NUMBERS**

Boeing Standard	Configuration	Supplier
BACT44E1S	Straight	Viking Electronics
S280W557-1	Straight	Viking Electronics

**Table 7**  
**ALTERNATIVE TRACK PART NUMBERS**

Specified Track	Alternative Track
BACT44E1S	S280W557-1
S280W557-1	BACT44E1S

### 3. INSERT CONFIGURATIONS

#### A. BACC65AJ, BACC65AK, S280W557-1, and S280W557-2 Connectors

**NOTE:** The contact cavity size that is specified in Table 8 is equivalent to the size of the engaging end of the contact.

**Table 8**  
**CONNECTOR INSERT CONFIGURATIONS**

Insert Configuration	Contact Cavity		Reference
	Count	Size	
1	8	16	Figure 9

# 20-72-24

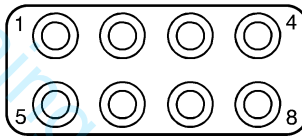
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

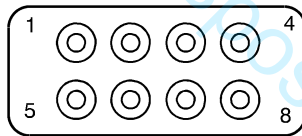
Table 8 (continued)

Insert Configuration	Contact Cavity		Reference
	Count	Size	
2	8	20	Figure 10
3	4	20	Figure 11
	8	16	
4	12	20	Figure 12
5	16	16	Figure 13
6	18	20	Figure 14
7	24	20	Figure 15

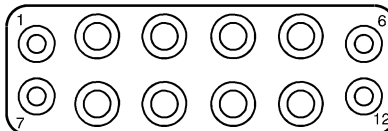
**NOTE:** Figure 9 through Figure 15 show the rear side of an insert that has pin contacts. The view of the rear side of an insert that has socket contacts is a mirror image of this view.



**INSERT CONFIGURATION 1**  
Figure 9



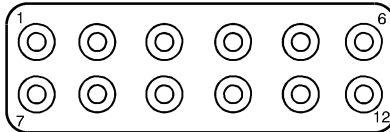
**INSERT CONFIGURATION 2**  
Figure 10



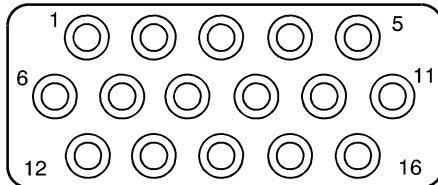
**INSERT CONFIGURATION 3**  
Figure 11

# STANDARD WIRING PRACTICES MANUAL

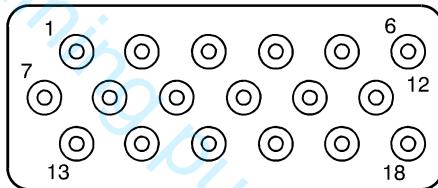
## ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS



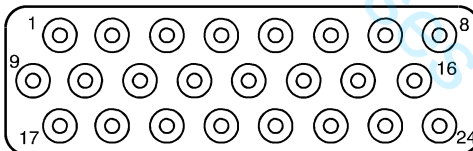
**INSERT CONFIGURATION 4**  
**Figure 12**



**INSERT CONFIGURATION 5**  
**Figure 13**



**INSERT CONFIGURATION 6**  
**Figure 14**



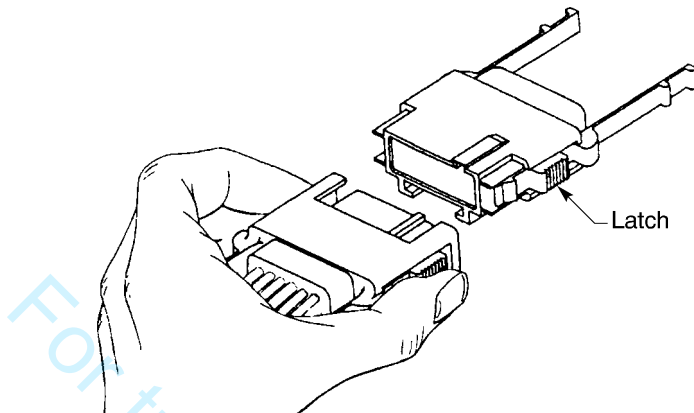
**INSERT CONFIGURATION 7**  
**Figure 15**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

#### 4. CONNECTOR DISASSEMBLY

##### A. Connector Separation



**CONNECTOR SEPARATION**

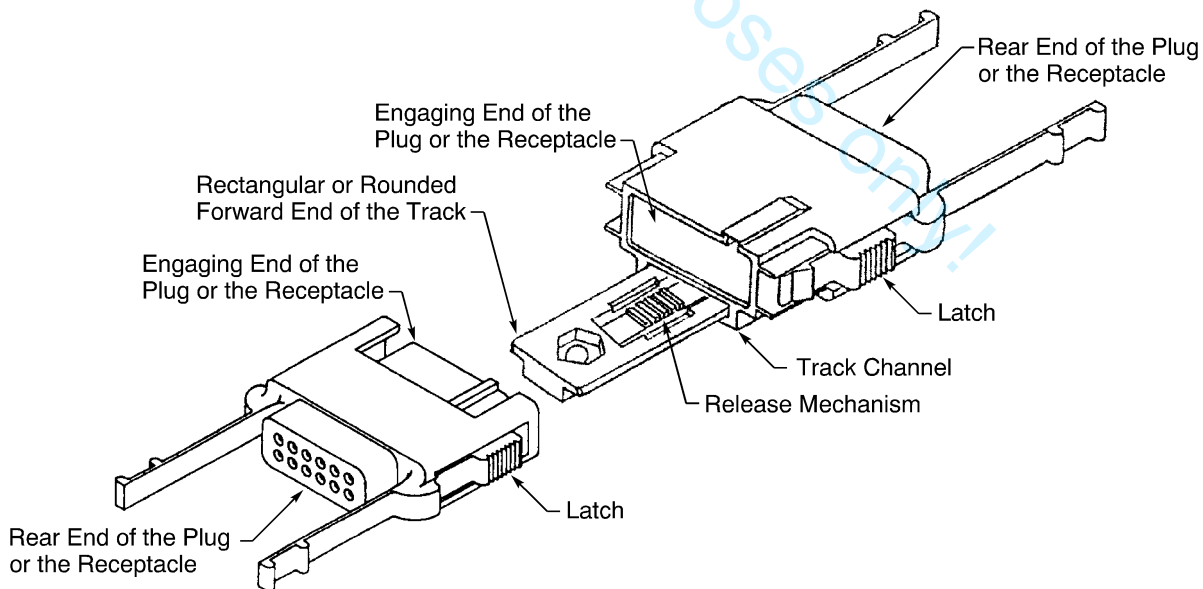
**Figure 16**

Refer to Figure 16.

- (1) Push the latches on each side of one of the connectors.
- (2) Pull one connector away from the mating connector.

##### B. Removal of a Connector from a Track

- (1) Push the connector release mechanism down. Refer to Figure 17.



**LOCATION OF THE RELEASE MECHANISM ON THE TRACK**

**Figure 17**

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

- (2) Hold the mechanism down.
- (3) Move the connector forward until the edge of the front face of the connector makes an overlap with the edge of the release mechanism.
- (4) Release the mechanism.
- (5) Push the connector forward until it comes off the track.

#### C. Contact Removal

**Table 9**  
**CONTACT REMOVAL TOOLS**

Contact Size	Removal Tool
2020HD	282-891
	91066-4
	CIET-20HDL
	DAK125
	M81969/1-02
	MS3156-20
1616	282-892
	91066-3
	CET-16-15
	DRK83-16
	M81969/1-03
	MS3156-16

- (1) Make a selection of a contact removal tool from Table 9.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) If it is necessary, carefully cut the plastic tie strap or the wire harness tie that holds the wire harness to the cable tie retainer.
- (3) Put the wire into the slot of the tool.
- (4) At the rear of the connector, axially align the removal tool and the contact cavity.
- (5) Carefully push the tool into the contact cavity until it stops.
- (6) If the O.D. of the wire is too large for the removal tool to go into the contact cavity, replace the contact. Refer to Subject 20-63-00.
- (7) Carefully pull the wire and the tool out of the contact cavity at the same time.

**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS**

**CAUTION:** DO NOT PULL THE WIRE AND THE REMOVAL TOOL WITH TOO MUCH FORCE. DAMAGE TO THE CONTACT RETENTION CLIPS IN THE CONTACT CAVITY CAN OCCUR.

- (8) If the removal tool does not release the contact from the contact cavity, do these steps a maximum of 3 times:
- (a) Carefully pull the tool out of the contact cavity.
  - (b) Turn the tool approximately 90 degrees.

**CAUTION:** DO NOT TURN THE REMOVAL TOOL WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE RETENTION CLIPS IN THE CONTACT CAVITY CAN OCCUR.

- (c) Do Step (3) through Step (7) again.
- (9) If the contact cannot be removed, replace the contact. Refer to Subject 20-63-00.

**D. Seal Plug and Seal Rod Removal**

**Table 10**  
**NECESSARY TOOLS**

Tool	Type
Pliers	Needle Nose

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

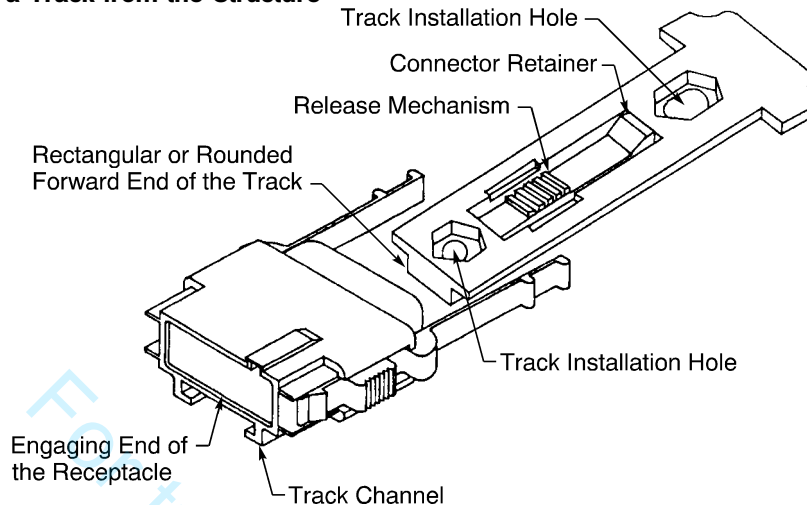
**CAUTION:** MAKE SURE THAT THE PLIERS HAVE SMOOTH SURFACES AND NO SHARP EDGES. PLIERS WITH A ROUGH SURFACE OR A SHARP EDGE CAN CAUSE DAMAGE TO THE REAR GROMMET.

- (2) If it is necessary, carefully cut the plastic tie strap or the wire harness tie that holds the wire harness to the cable tie retainer.
- (3) Tightly hold the end of the seal plug or the seal rod in the jaws of the pliers.
- (4) Pull the seal plug or the seal rod out of the contact cavity.

# **STANDARD WIRING PRACTICES MANUAL**

## **ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS**

### **E. Removal of a Track from the Structure**



**TRACK REMOVAL**  
**Figure 18**

Refer to Figure 18.

- (1) Remove the two installation screws that hold the track on the structure or the stringer clip.

**NOTE:** The stringer clip has an insert with threads for the installation screw.

- (2) Put the screws and the washers in a safe area because they are necessary when the track is installed again.

## **5. CONNECTOR ASSEMBLY**

### **A. Contact Assembly**

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

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)		Special Instructions
		Target	Tolerance	
24	20HD	0.28	± 0.03	-
	16	0.56	± 0.03	Fold the conductor back
22	20HD	0.28	± 0.03	-
	16	0.56	± 0.03	Fold the conductor back
20	20HD	0.28	± 0.03	-
	16	0.28	± 0.03	-
18	16	0.28	± 0.03	-
16	16	0.28	± 0.03	-

# STANDARD WIRING PRACTICES MANUAL

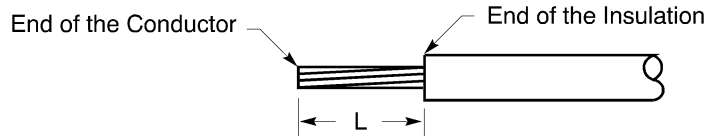
## ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

Table 12  
CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool			
		Basic Unit		Locator	
		Part Number	Setting	Part Number	Color
24	20HD	GVF-101	5	-	-
		M22520/2-01	5	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	5	M22520/2-08	-
		WA22LC	5	M22520/2-08	-
22	20HD	GVF-101	5	-	-
		M22520/2-01	6	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	6	M22520/2-08	-
		WA22LC	6	M22520/2-08	-
	16	M22520/1-01	4	M22520/1-02	Blue
20	20HD	GVF-101	5	-	-
		M22520/2-01	7	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	7	M22520/2-08	-
		WA22LC	7	M22520/2-08	-
	16	M22520/1-01	4	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	4	M22520/1-02	Blue
18	16	M22520/1-01	5	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	5	M22520/1-02	Blue
16	16	M22520/1-01	6	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	6	M22520/1-02	Blue

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS



**WIRE PREPARATION**  
**Figure 19**

- (1) Remove the necessary length of insulation from the end of the wire.

Refer to:

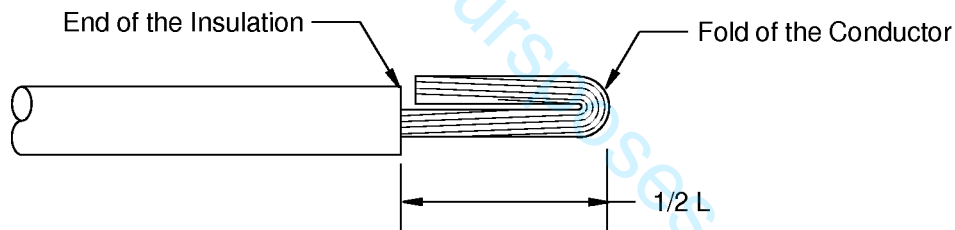
- Figure 19
- Table 11 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedure.

**NOTE:** If the wire size and a larger crimp barrel size are not given in Table 11, refer to Subject 20-60-00.

- (2) Measure the O.D. of the wire.
- (3) If the O.D. of the wire is less than the minimum seal diameter of the connector grommet hole, increase the O.D. of the wire. Refer to Paragraph 1.C.

Make sure that a Raychem RT-850 heat shrinkable sleeve is used to increase the O.D. of a 24 AWG wire installed in a size 20 contact cavity.

- (4) If it is specified, fold the conductor back. Refer to Figure 20.



**FOLDED BACK CONDUCTOR**  
**Figure 20**

**NOTE:** As an alternative, the conductor size can be increased with filler wires or an eyelet. Refer to Subject 20-60-00.

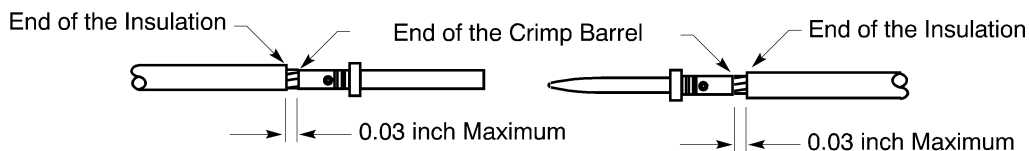
- (5) Make a selection of a crimp tool from Table 12.
- (6) Put the end of the wire in the crimp barrel of the contact. Refer to Figure 21.

Make sure that:

- All 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.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS



POSITION OF WIRE IN THE CRIMP BARREL OF THE CONTACT

Figure 21

- (7) Crimp the contact.
- (8) Examine the contact assembly for these types of damage:
  - A crack in the crimp barrel
  - Broken strands of the conductor
  - Base metal can be seen on the strands of the conductor.

#### B. Contact Insertion

Table 13  
CONTACT INSERTION TOOLS

Contact Size	Insertion Tool
2020HD	282-881
	91066-4
	ATC1072
	CIET-20HDL
	DAK145J
	M81969/1-02
	MS3156-20
1616	282-892
	282-929
	91066-3
	ATR1106
	DAK55-16
	M81969/1-03
	MS3156-16

- (1) Make a selection of a contact insertion tool from Table 13.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

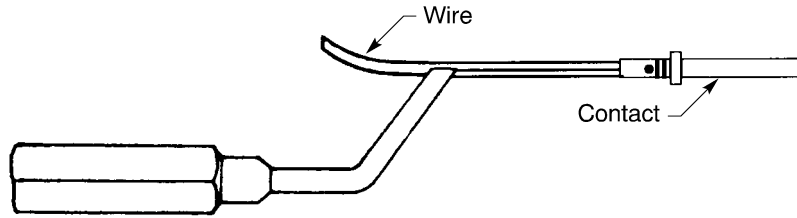
**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) Put the contact assembly in the end of the insertion tool. Refer to Figure 22.

**20-72-24**

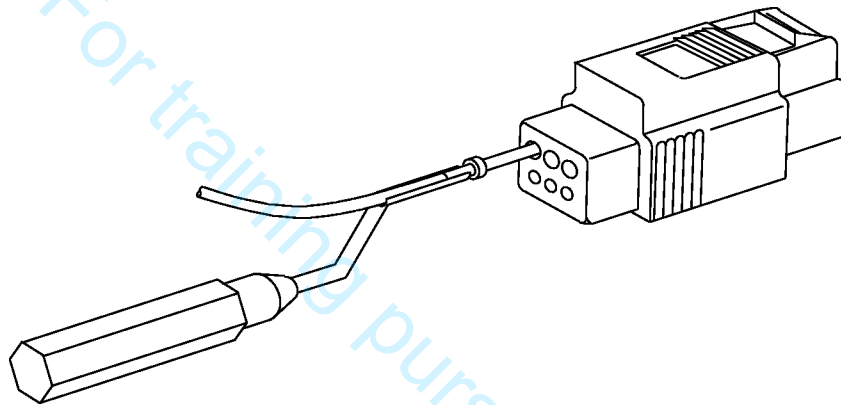
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**  
Figure 22

- (3) At the rear of the connector, axially align the contact, the tool, and the correct contact cavity. Refer to Figure 23.



**ALIGNMENT OF THE CONTACT, THE INSERTION TOOL, AND THE CONTACT CAVITY**  
Figure 23

- (4) Carefully push the tool into the contact cavity until it stops.  
(5) Carefully pull the tool out of the contact cavity.  
(6) Lightly pull the wire to make sure that the contact is locked in the contact cavity.

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

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

- (7) If the contact is not locked in the contact cavity:  
(a) Pull the contact assembly out of the cavity.  
(b) Do Step (2) through Step (6) again.  
(8) Examine the rear grommet for damage. Refer to Paragraph 1.A.

#### C. Unwired Contact Installation

Refer to Subject 20-60-08.

If it is necessary to install unwired contacts:

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

- (1) Make a selection of a contact insertion tool from Table 13.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) Put the contact in the contact cavity.  
 (3) Axially align the contact and the tool with the correct contact cavity.  
 (4) Carefully push the tool into the contact cavity until it stops.  
 (5) Carefully pull the tool out of the contact cavity.

#### D. Seal of an Empty Contact Cavity

Empty contact cavities in these connectors must be sealed with an unwired pin contact and a seal plug or a seal rod:

- BACC65AK
- S280W557-2().

For all other connectors, empty contact cavities must be sealed with a seal plug or a seal rod.

Refer to Subject 20-60-08.

#### E. Assembly of a Wire Harness Strain Relief

Table 14  
NECESSARY MATERIALS

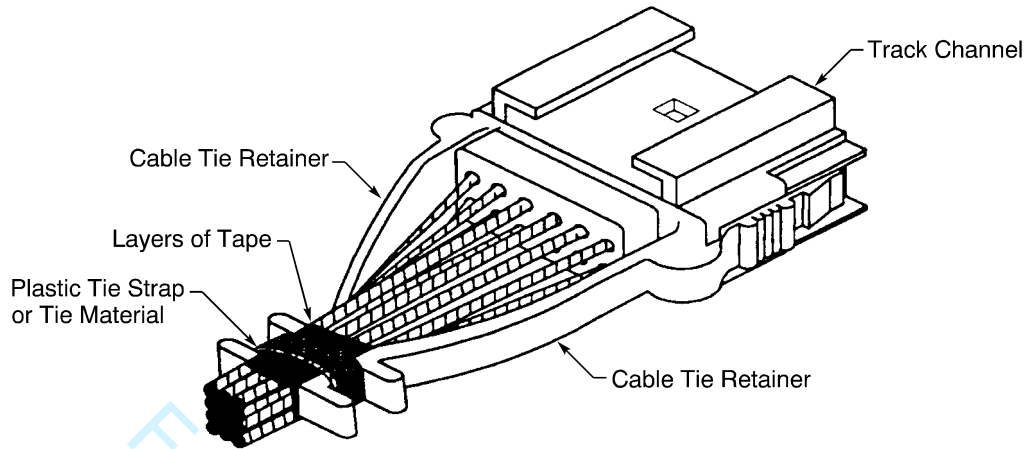
Material	Boeing Standard	Part Number	Supplier
Tape	Douglas Material Specification, DMS 2186, Type 1	-	QPL
Tape	-	Scotch 70	3M

Table 15  
NECESSARY PARTS

Part	Boeing Standard	Part Number	Supplier
Plastic Tie Strap	BACS38K1	-	Panduit
		-	Tyton
	-	M23190/3-1	QPL

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS



**POSITION OF THE PLASTIC TIE STRAP OR TIE MATERIAL**

**Figure 24**

- (1) If it is not necessary to assemble the wire harness strain relief, cut each cable tie retainer as near the connector as possible.

Make sure that the remaining length of each retainer:

- Has no sharp edges
- Is not more than 0.20 inch.

- (2) Make a selection of a tape from Table 14.
- (3) Put a minimum of 2 layers of the tape around the wire bundle at the location adjacent to the cable tie retainer when the retainer is in the correct position.
- (4) Attach the wire bundle to the cable tie retainer with a wire harness tie.

Refer to:

- Figure 24
- Subject 20-10-11 for the assembly of a wire harness tie.

- (5) Examine each cable tie retainer.

## STANDARD WIRING PRACTICES MANUAL

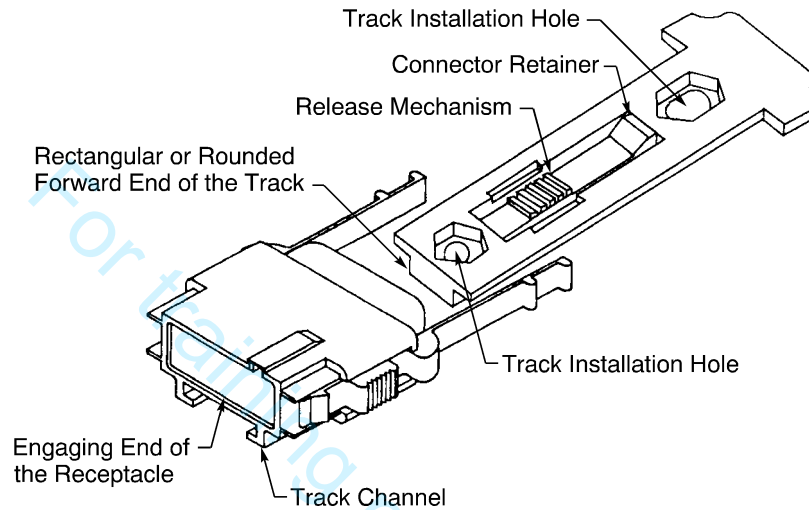
### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

Make sure that the retainer:

- Is not broken
- Does not have a crack.

#### 6. CONNECTOR INSTALLATION

##### A. Installation of a Track



#### TRACK INSTALLATION

Figure 25

Refer to Figure 25.

- (1) Align the installation holes in the track and the holes in the structure.
- (2) Install the track to the structure with the necessary installation screws and washers.

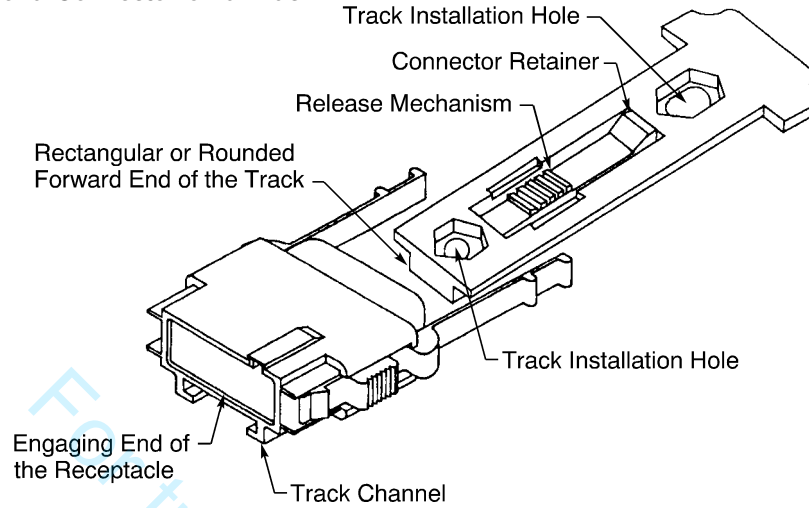
Make sure that:

- The forward end of the track is pointed in the same direction as the engaging end of the connector
- The screws are tight.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

#### B. Installation of a Connector on a Track



**CONNECTOR INSTALLATION ON A TRACK**  
**Figure 26**

Refer to Figure 26.

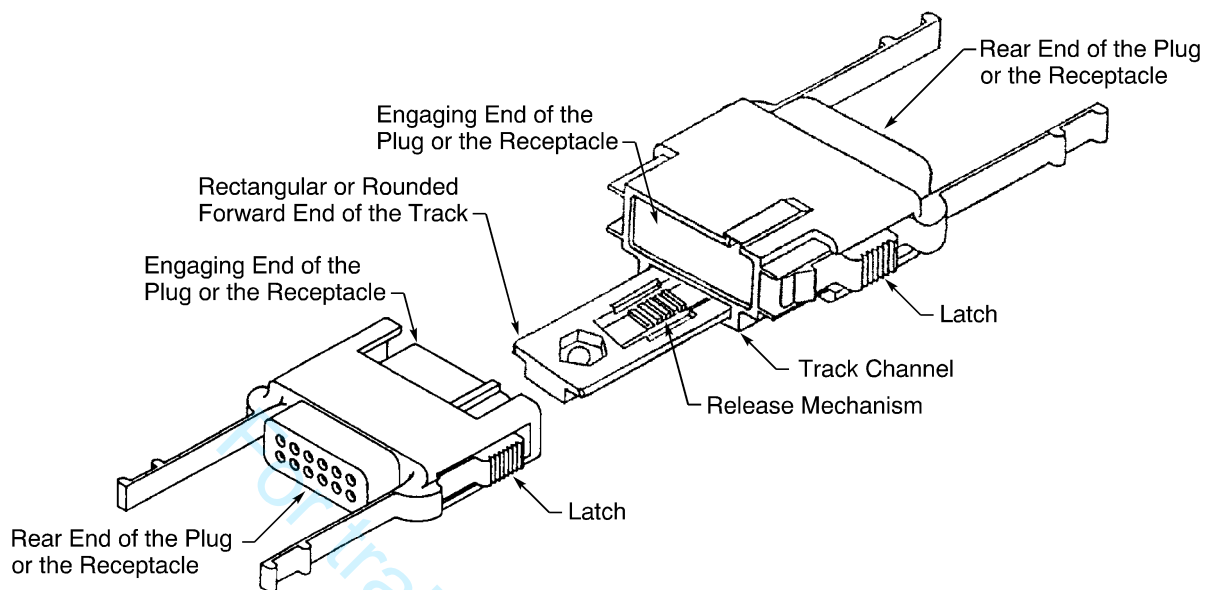
- (1) Put the track channel at the rear end of the connector on the forward end of the track.
- (2) Push the connector to the rear end of the track until it makes a click.
- (3) Lightly pull the connector forward to make sure that it is locked in the track.

#### C. Plug and Receptacle Connection

This paragraph gives the procedure to connect a plug or a receptacle, with a mating plug or a mating receptacle installed on a track.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS



#### PLUG AND RECEPTACLE CONNECTION

Figure 27

Refer to Figure 27.

- (1) Put the track channel at the engaging end of the connector on the forward end of the track.
- (2) Push the connector to the rear end of the track until the latches on each side of the plug and the receptacle are locked.
- (3) Lightly pull back on the connector to make sure that it locks to the connector on the track.

#### 7. APPROVED TOOL SUPPLIERS

##### A. Contact Removal Tools

Table 16  
CONTACT REMOVAL TOOL SUPPLIERS

Removal Tool	Supplier
282-891	Radiall-Sogie
282-892	Radiall-Sogie
91066-3	AMP
91066-4	AMP
CET-16-15	ITT Cannon
CIET-20HDL	ITT Cannon
DAK125	Daniels
DRK83-16	Daniels
M81969/1-02	QPL
M81969/1-03	QPL

**20-72-24**

## STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

Table 16 (continued)

Removal Tool	Supplier
MS3156-16	QPL
MS3156-20	QPL

## B. Contact Crimp Tools

Table 17  
CRIMP TOOL SUPPLIERS

Crimp Tool	Supplier
GVF-101	Gaard
M22520/1-01	QPL
M22520/1-02	QPL
M22520/2-01	QPL
M22520/2-08	QPL
ST2220-1-2	Boeing
ST2220-1-43	Boeing
ST2220-1-Y	Boeing
WA22	Daniels
WA22LC	Daniels
WA27F	Daniels

## C. Contact Insertion Tools

Table 18  
CONTACT INSERTION TOOL SUPPLIERS

Insertion Tool	Supplier
282-881	Radiall-Sogie
282-892	Radiall-Sogie
282-929	Radiall-Sogie
91066-3	AMP
91066-4	AMP
ATC1072	Astro
ATR1106	Astro
CIET-20HDL	ITT Cannon
DAK145J	Daniels

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF BACC65AJ, BACC65AK, S280W557-1, AND S280W557-2 CONNECTORS

Table 18 (continued)

Insertion Tool	Supplier
DAK55-16	Daniels
M81969/1-02	QPL
M81969/1-03	QPL
MS3156-16	QPL
MS3156-20	QPL

For training purposes only!

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

<b><u>Paragraph</u></b>	<b><u>Page</u></b>
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B. Damage Conditions - Front Face of the Connector	1
C. Minimum Wire O.D. for an Environmentally Sealed Connector	2
<b>2. <u>PART NUMBERS AND DESCRIPTION</u></b>	<b>3</b>
A. Connector Part Numbers	3
B. Connector Description	4
C. Contact Part Numbers	4
<b>3. <u>INSERT CONFIGURATIONS AND POLARIZATION</u></b>	<b>5</b>
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<b>4. <u>CONNECTOR DISASSEMBLY</u></b>	<b>6</b>
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B. Contact Removal	7
C. Seal Plug and Seal Rod Removal	8
D. Removal of the Receptacle from the Structure	9
<b>5. <u>CONNECTOR ASSEMBLY</u></b>	<b>9</b>
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B. Contact Insertion	12
C. Unwired Contact Installation	13
D. Seal of an Empty Contact Cavity	14
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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

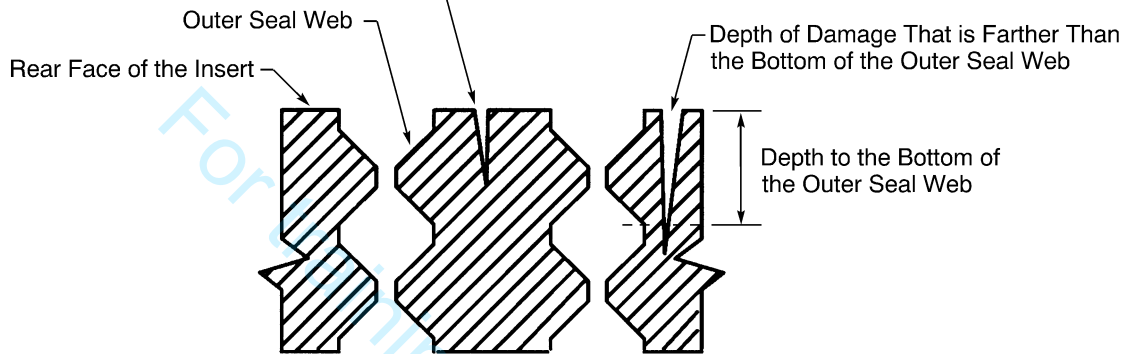
#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Connector

The connector must be replaced when one or more of these conditions occur:

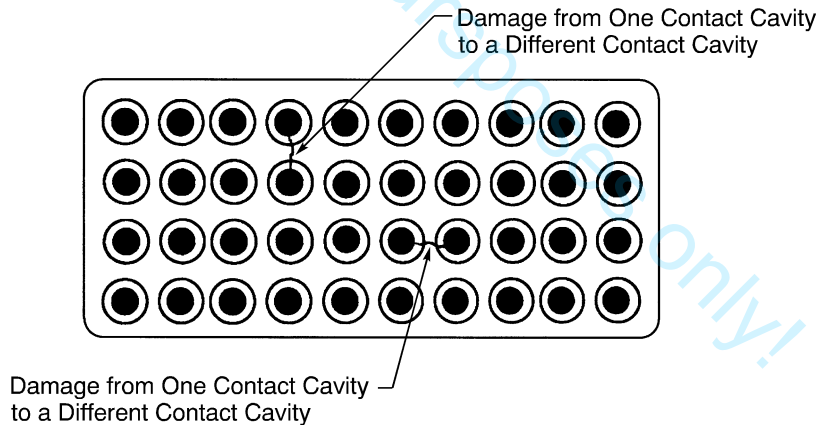
- The depth of the damage extends farther than the bottom of the outer seal web; refer to Figure 1
- The damage extends from one contact cavity to a different contact cavity; refer to Figure 2.

Depth of the Damage That is not Farther Than the Bottom of the Seal Web



REAR FACE OF THE CONNECTOR - DEPTH OF DAMAGE

Figure 1



REAR FACE OF THE CONNECTOR - LENGTH OF DAMAGE

Figure 2

##### B. Damage Conditions - Front Face of the Connector

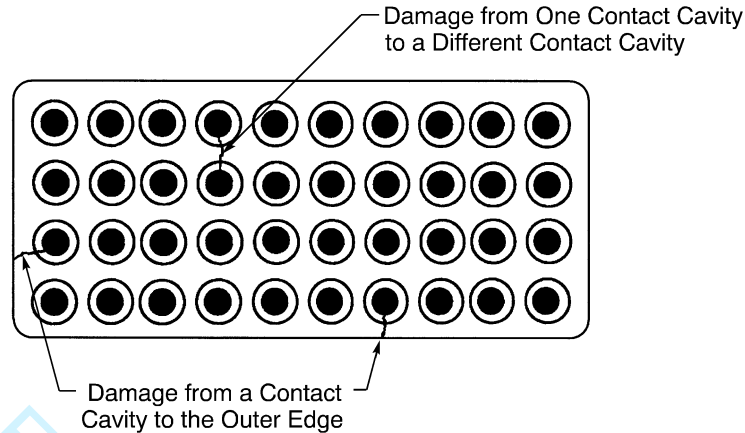
The connector must be replaced when one or more of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 3.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS



**FRONT FACE OF THE CONNECTOR - LENGTH OF DAMAGE**  
Figure 3

#### C. Minimum Wire O.D. for an Environmentally Sealed Connector

Refer to:

- Subject 20-60-08 for the identification of an environmentally sealed connector
- Table 1 for the minimum wire O.D. that is necessary for a satisfactory seal of a contact cavity hole
- Subject 20-60-08 for the procedure to increase the diameter of the wire.

**Table 1**  
**MINIMUM WIRE O.D. FOR A SATISFACTORY SEAL**

Connector	Description	Contact Cavity Size	Minimum Wire O.D. (inch)
BACC65AL	Rear release, rear removal contacts	20	0.033
		16	0.068
002368-0802	Rear release, rear removal contacts	20	0.033
		16	0.068
S280W557-801	Rear release, rear removal contacts	20	0.033
		16	0.068
S280W557-802	Rear release, rear removal contacts	20	0.033
		16	0.068

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

#### 2. PART NUMBERS AND DESCRIPTION

##### A. Connector Part Numbers

**Table 2**  
**CONNECTOR PART NUMBERS**

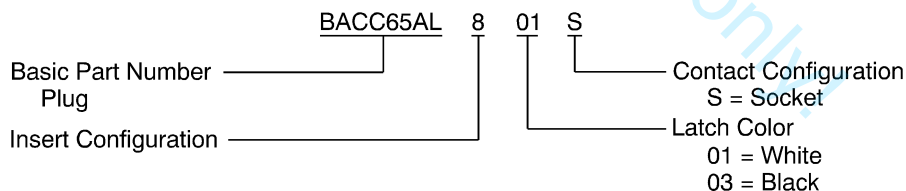
Part Number	Configuration	Supplier
BACC65AL()	Plug	Boeing
002368-0802	Receptacle	Viking Electronics
S280W557-801	Plug	Boeing
S280W557-802	Receptacle	Boeing

**Table 3**  
**APPROVED SUPPLIER OF BOEING STANDARD CONNECTORS**

Connector	Supplier
BACC65AL()	Viking Electronics
S280W557-801	Viking Electronics
S280W557-802	Viking Electronics

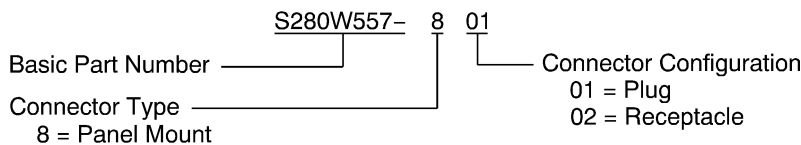
**Table 4**  
**ALTERNATIVE CONNECTOR PART NUMBERS**

Specified Connector	Mating Connector	Alternative Connector
S280W557-801	LC2R20640	BACC65AL801S
	S280W557-802	BACC65AL803S
S280W557-802	S280W557-801	002368-0802



#### BACC65AL() CONNECTOR PART NUMBER STRUCTURE

**Figure 4**



#### S280W557-8() CONNECTOR PART NUMBER STRUCTURE

**Figure 5**

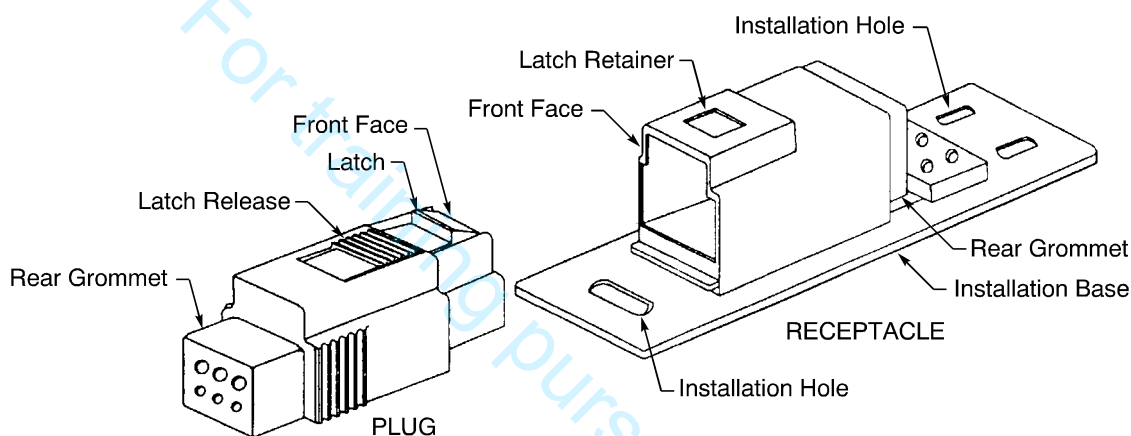
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

#### B. Connector Description

The connectors have these technical features:

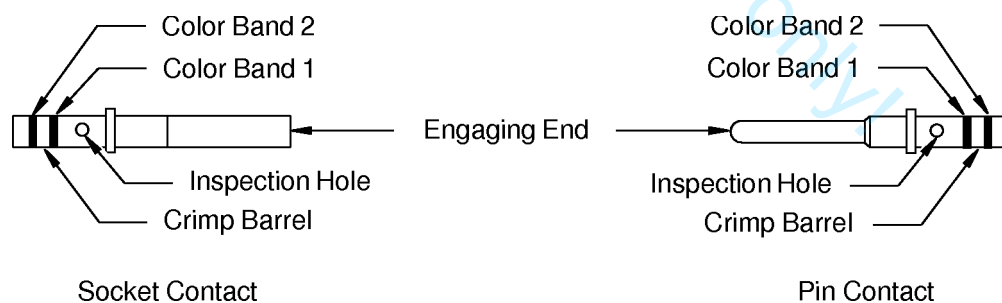
- A plastic, rectangular shell
- A rectangular insert configuration
- An environmental seal
- Rear release, rear removable contacts
- A plug with socket contacts
- A receptacle with pin contacts
- An integral installation base on the receptacle
- A latch for quick disconnection of the plug and receptacle.



002368-0802, BACC65AL, AND S280W557-8() CONNECTORS

Figure 6

#### C. Contact Part Numbers



REAR RELEASE CONTACTS

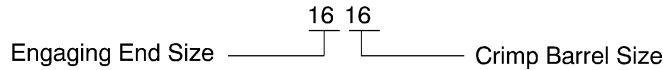
Figure 7



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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS



**EXAMPLE OF CONTACT SIZE**  
**Figure 8**

**NOTE:** The size 2020HD contact has a size 20 engaging end and a size 20 crimp barrel.

**Table 5**  
**CONTACT PART NUMBERS**

Contact Size	Engaging End Size	Crimp Barrel Size	Contact Type	Boeing Standard	Color Code	
					Band	Color
2020HD	20	20	Pin	BACC47EF2	1	Orange
					2	Red
			Socket	BACC47EG2	1	Orange
					2	Red
1616	16	16	Pin	BACC47EF3	1	Orange
					2	Blue
			Socket	BACC47EG3	1	Orange
					2	Blue

**Table 6**  
**APPROVED SUPPLIERS OF BOEING STANDARD CONTACTS**

Contact	Supplier
BACC47EF()	AMP
	ITT Cannon
	Radiall
	Souriau
	Tri-Star
BACC47EG()	AMP
	ITT Cannon
	Radiall
	Souriau
	Tri-Star

### 3. INSERT CONFIGURATIONS AND POLARIZATION

#### A. 002368-0802, BACC65AL, and S280W557-8 Connectors

**NOTE:** The contact cavity size that is specified in Table 7 is equivalent to the size of the engaging end of the contact.

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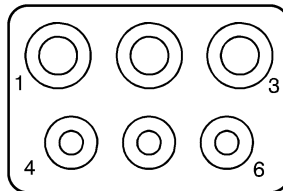
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

Table 7  
CONNECTOR INSERT CONFIGURATIONS

Insert Configuration	Contact Cavity		Reference
	Count	Size	
8	3	20	Figure 9
	3	16	

**NOTE:** Figure 9 shows the rear side of an insert that has pin contacts. The view of the rear side of an insert that has socket contacts is a mirror image of this view.

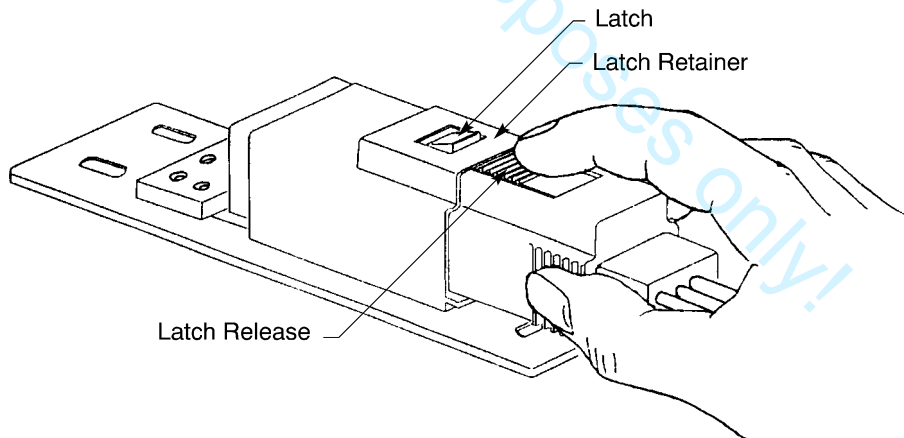


INSERT CONFIGURATION 8  
Figure 9

#### 4. CONNECTOR DISASSEMBLY

##### A. Connector Separation

- (1) Put the hand in the correct position on the plug. Refer to Figure 10.

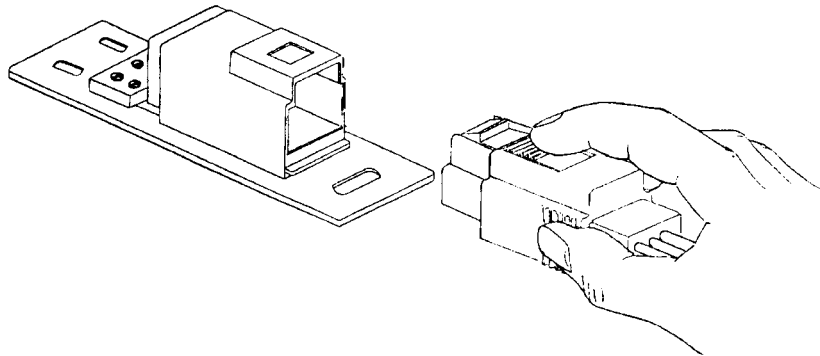


POSITION OF THE HAND ON THE PLUG  
Figure 10

- (2) Push and hold down the latch release.  
Make sure that the latch moves below the latch retainer of the receptacle.
- (3) Pull the plug away from the receptacle. Refer to Figure 11.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS



**CONNECTOR SEPARATION**  
Figure 11

#### B. Contact Removal

**Table 8**  
**CONTACT REMOVAL TOOLS**

Contact Size	Removal Tool
2020HD	282-891
	91066-4
	CIET-20HDL
	DAK125
	M81969/1-02
	MS3156-20
1616	282-892
	91066-3
	CET-16-15
	DRK83-16
	M81969/1-03
	MS3156-16

- (1) Make a selection of a contact removal tool from Table 8.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) If it is necessary, carefully cut the plastic tie strap or the wire harness tie near the end of the wire harness.
- (3) Put the wire into the slot of the tool.

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## STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

- (4) At the rear of the connector, axially align the removal tool and the contact cavity.
- (5) Carefully push the tool into the contact cavity until it stops.
- (6) If the O.D. of the wire is too large for the removal tool to go into the contact cavity, replace the contact. Refer to Subject 20-63-00.
- (7) Carefully pull the wire and the tool out of the contact cavity at the same time.

**CAUTION:** DO NOT PULL THE WIRE AND THE REMOVAL TOOL WITH TOO MUCH FORCE. DAMAGE TO THE CONTACT RETENTION CLIPS IN THE CONTACT CAVITY CAN OCCUR.

- (8) If the removal tool does not release the contact from the contact cavity, do these steps a maximum of 3 times:
  - (a) Carefully pull the tool out of the contact cavity.
  - (b) Turn the tool approximately 90 degrees.

**CAUTION:** DO NOT TURN THE REMOVAL TOOL WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE RETENTION CLIPS IN THE CONTACT CAVITY CAN OCCUR.

- (c) Do Step (3) through Step (7) again.
- (9) If the contact cannot be removed, replace the contact. Refer to Subject 20-63-00.

**C. Seal Plug and Seal Rod Removal**

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

Tool	Type
Pliers	Needle Nose

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

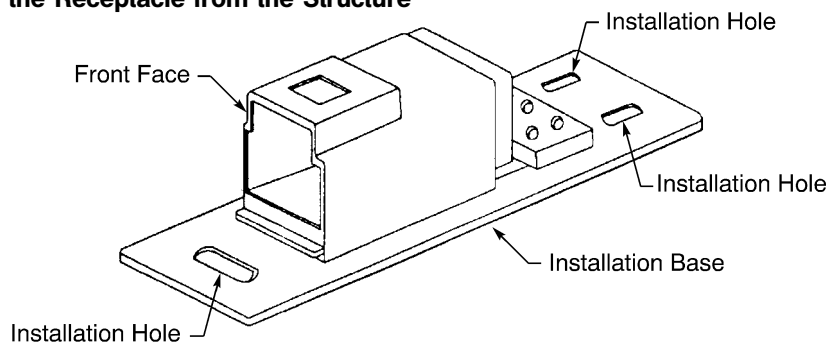
**CAUTION:** MAKE SURE THAT THE PLIERS HAVE SMOOTH SURFACES AND NO SHARP EDGES. PLIERS WITH A ROUGH SURFACE OR A SHARP EDGE CAN CAUSE DAMAGE TO THE REAR GROMMET.

- (2) If it is necessary, carefully cut the plastic tie strap or the wire harness tie near the end of the wire harness.
- (3) Tightly hold the end of the seal plug or the seal rod in the jaws of the pliers.
- (4) Pull the seal plug or the seal rod out of the contact cavity.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

#### D. Removal of the Receptacle from the Structure



#### RECEPTACLE REMOVAL

Figure 12

Refer to Figure 12.

- (1) Remove the installation screws that hold the installation base on the structure.
- (2) Put the screws and the washers in a safe area because they are necessary when the receptacle is installed again.

#### 5. CONNECTOR ASSEMBLY

##### A. Contact Assembly

Table 10  
INSULATION REMOVAL LENGTH

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)		Special Instructions
		Target	Tolerance	
24	20HD	0.28	$\pm 0.03$	-
	16	0.56	$\pm 0.03$	Fold the conductor back
22	20HD	0.28	$\pm 0.03$	-
	16	0.56	$\pm 0.03$	Fold the conductor back
20	20HD	0.28	$\pm 0.03$	-
	16	0.28	$\pm 0.03$	-
18	16	0.28	$\pm 0.03$	-
16	16	0.28	$\pm 0.03$	-

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# STANDARD WIRING PRACTICES MANUAL

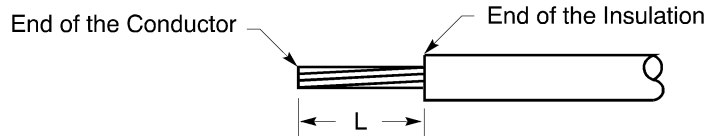
## ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

Table 11  
CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool			
		Basic Unit		Locator	
		Part Number	Setting	Part Number	Color
24	20HD	GVF-101	5	-	-
		M22520/2-01	5	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	5	M22520/2-08	-
		WA22LC	5	M22520/2-08	-
22	20HD	GVF-101	5	-	-
		M22520/2-01	6	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	6	M22520/2-08	-
		WA22LC	6	M22520/2-08	-
	16	M22520/1-01	4	M22520/1-02	Blue
20	20HD	GVF-101	5	-	-
		M22520/2-01	7	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	7	M22520/2-08	-
		WA22LC	7	M22520/2-08	-
	16	M22520/1-01	4	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	4	M22520/1-02	Blue
18	16	M22520/1-01	5	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	5	M22520/1-02	Blue
16	16	M22520/1-01	6	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	6	M22520/1-02	Blue

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS



**WIRE PREPARATION**  
**Figure 13**

- (1) Remove the necessary length of insulation from the end of the wire.

Refer to:

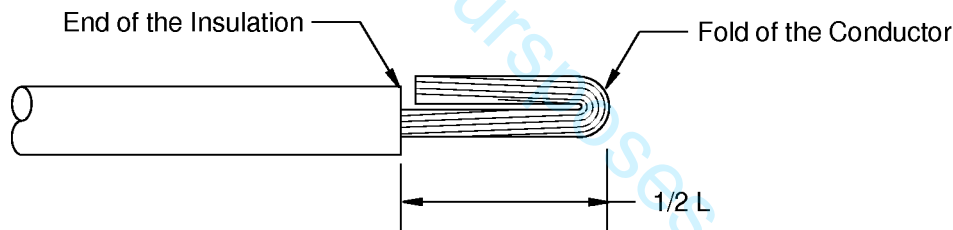
- Figure 13
- Table 10 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedure.

**NOTE:** If the wire size and a larger crimp barrel size are not given in Table 10, refer to Subject 20-60-00.

- (2) Measure the O.D. of the wire.
- (3) If the O.D. of the wire is less than the minimum seal diameter of the connector grommet hole, increase the O.D. of the wire. Refer to Paragraph 1.C.

Make sure that a Raychem RT-850 heat shrinkable sleeve is used to increase the O.D. of a 24 AWG wire installed in a size 20 contact cavity.

- (4) If it is specified, fold the conductor back. Refer to Figure 14.



**FOLDED BACK CONDUCTOR**  
**Figure 14**

**NOTE:** As an alternative, the conductor size can be increased with filler wires or an eyelet. Refer to Subject 20-60-00.

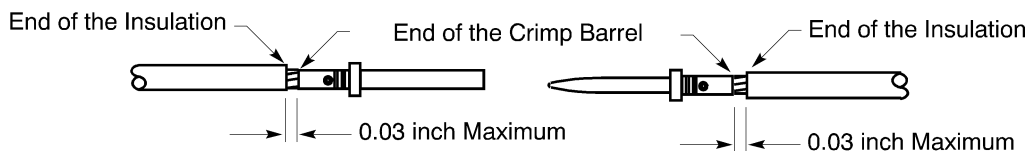
- (5) Make a selection of a crimp tool from Table 11.
- (6) Put the end of the wire in the crimp barrel of the contact. Refer to Figure 15.

Make sure that:

- All 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.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS



#### POSITION OF WIRE IN THE CRIMP BARREL OF THE CONTACT

Figure 15

- (7) Crimp the contact.
- (8) Examine the contact assembly for these types of damage:
  - A crack in the crimp barrel
  - Broken strands of the conductor
  - Base metal can be seen on the strands of the conductor.

#### B. Contact Insertion

Table 12  
CONTACT INSERTION TOOLS

Contact Size	Insertion Tool
2020HD	282-881
	91066-4
	ATC1072
	CIET-20HDL
	DAK145J
	M81969/1-02
	MS3156-20
1616	282-892
	282-929
	91066-3
	ATR1106
	DAK55-16
	M81969/1-03
	MS3156-16

- (1) Make a selection of a contact insertion tool from Table 12.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

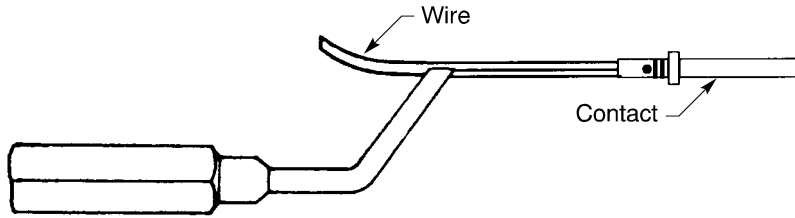
**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) Put the contact assembly in the end of the insertion tool. Refer to Figure 16.

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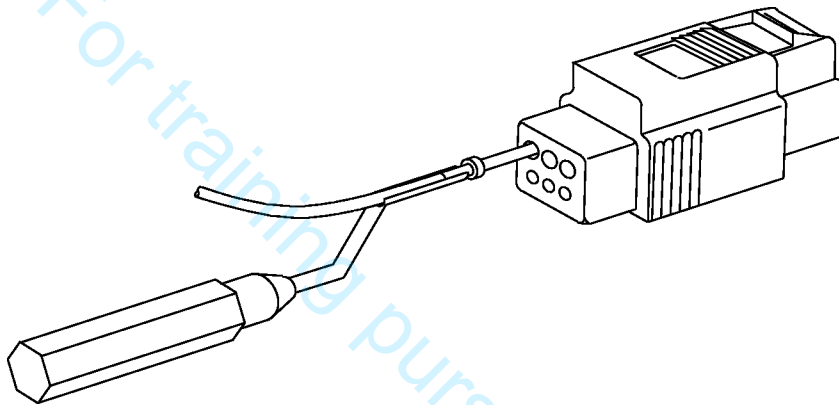
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**  
Figure 16

- (3) At the rear of the connector, axially align the contact, the tool, and the correct contact cavity. Refer to Figure 17.



**ALIGNMENT OF THE CONTACT, THE INSERTION TOOL, AND THE CONTACT CAVITY**  
Figure 17

- (4) Carefully push the tool into the contact cavity until it stops.  
(5) Carefully pull the tool out of the contact cavity.  
(6) Lightly pull the wire to make sure that the contact is locked in the contact cavity.

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

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

- (7) If the contact is not locked in the contact cavity:  
(a) Pull the contact assembly out of the cavity.  
(b) Do Step (2) through Step (6) again.  
(8) Examine the rear grommet for damage. Refer to Paragraph 1.A.

#### C. Unwired Contact Installation

Refer to Subject 20-60-08.

If it is necessary to install unwired contacts:

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

- (1) Make a selection of a contact insertion tool from Table 12.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) Put the contact in the contact cavity.
- (3) Axially align the contact, the tool, and the correct contact cavity.
- (4) Carefully push the tool into the contact cavity until it stops.
- (5) Carefully pull the tool out of the contact cavity.

#### D. Seal of an Empty Contact Cavity

Empty contact cavities in these connectors must be sealed with an unwired pin contact and a seal plug or a seal rod:

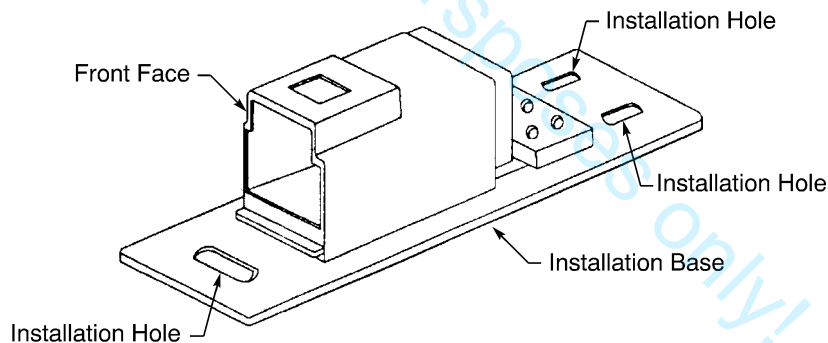
- 002368-0802
- S280W557-802.

For all other connectors, empty contact cavities must be sealed with a seal plug or a seal rod.

Refer to Subject 20-60-08.

## 6. CONNECTOR INSTALLATION

### A. Installation of a Receptacle



**RECEPTACLE INSTALLATION**

**Figure 18**

Refer to Figure 18.

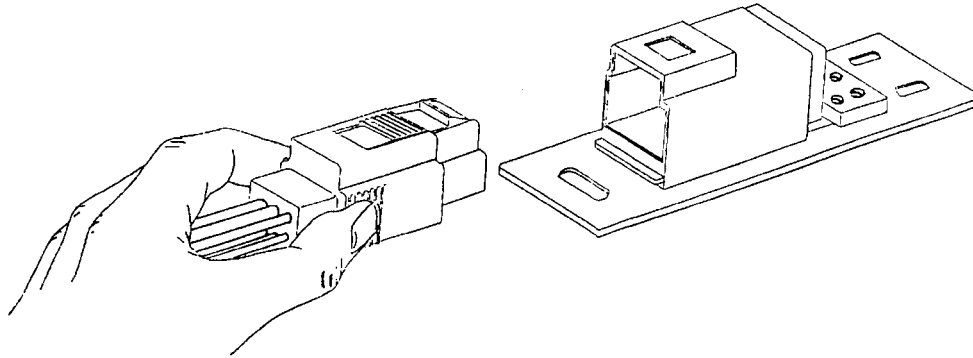
- (1) Align the installation holes and the holes in the structure.
  - (2) Install the receptacle to the structure with the necessary installation screws and washers.
- Make sure that the screws are tight.

### B. Plug and Receptacle Connection

- (1) Align the plug with the receptacle. Refer to Figure 19.
- Make sure that the latch is aligned with the latch retainer.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

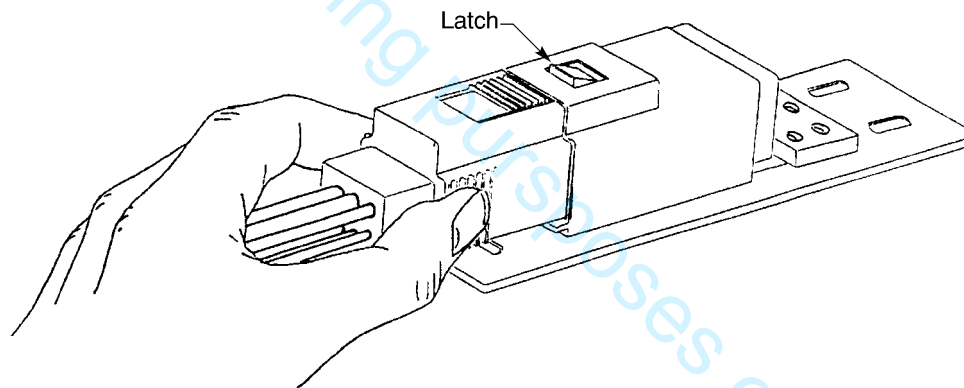


#### ALIGNMENT OF THE PLUG AND THE RECEPTACLE

Figure 19

- (2) Push the plug into the receptacle until:
  - The plug stops
  - The latch engages the latch retainer.

Refer to Figure 20.



#### PLUG AND RECEPTACLE CONNECTION

Figure 20

- (3) Lightly pull back on the plug to make sure that it locks to the receptacle.
- (4) If the plug is not locked in the receptacle:
  - (a) Remove the plug from the receptacle.
  - (b) Do Step (1) through Step (3) again.

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## ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

7. APPROVED TOOL SUPPLIERS

## A. Contact Removal Tools

Table 13  
CONTACT REMOVAL TOOL SUPPLIERS

Removal Tool	Supplier
282-891	Radiall-Sogie
282-892	Radiall-Sogie
91066-3	AMP
91066-4	AMP
CET-16-15	ITT Cannon
CIET-20HDL	ITT Cannon
DAK125	Daniels
DRK83-16	Daniels
M81969/1-02	QPL
M81969/1-03	QPL
MS3156-16	QPL
MS3156-20	QPL

## B. Contact Crimp Tools

Table 14  
CRIMP TOOL SUPPLIERS

Crimp Tool	Supplier
GVF-101	Gaard
M22520/1-01	QPL
M22520/1-02	QPL
M22520/2-01	QPL
M22520/2-08	QPL
ST2220-1-2	Boeing
ST2220-1-43	Boeing
ST2220-1-Y	Boeing
WA22	Daniels
WA22LC	Daniels
WA27F	Daniels

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## STANDARD WIRING PRACTICES MANUAL

ASSEMBLY OF 002368-0802, BACC65AL, AND S280W557-8 CONNECTORS

### C. Contact Insertion Tools

Table 15  
CONTACT INSERTION TOOL SUPPLIERS

Insertion Tool	Supplier
282-881	Radiall-Sogie
282-892	Radiall-Sogie
282-929	Radiall-Sogie
91066-3	AMP
91066-4	AMP
CIET-20HDL	ITT Cannon
ATC1072	Astro
ATR1106	Astro
DAK145J	Daniels
DAK55-16	Daniels
M81969/1-02	QPL
M81969/1-03	QPL
MS3156-16	QPL
MS3156-20	QPL

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

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B. Connector Description	3
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### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

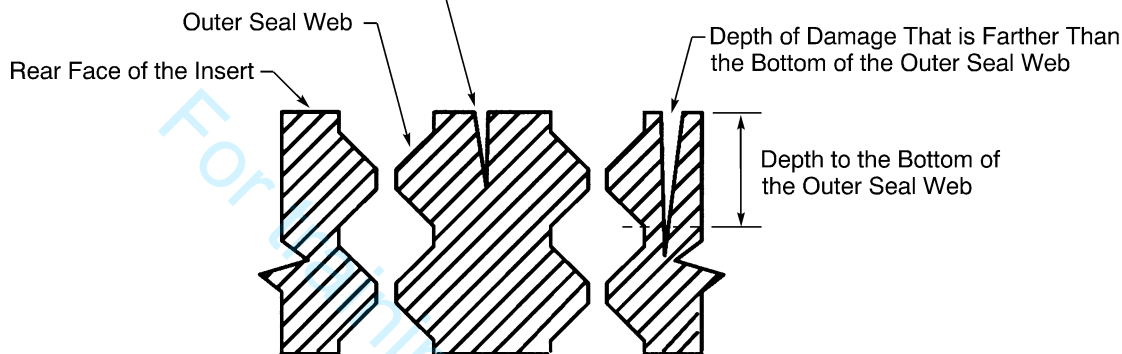
#### 1. GENERAL DATA

##### A. Damage Conditions - Rear Face of the Connector

The connector must be replaced when one or more of these conditions occur:

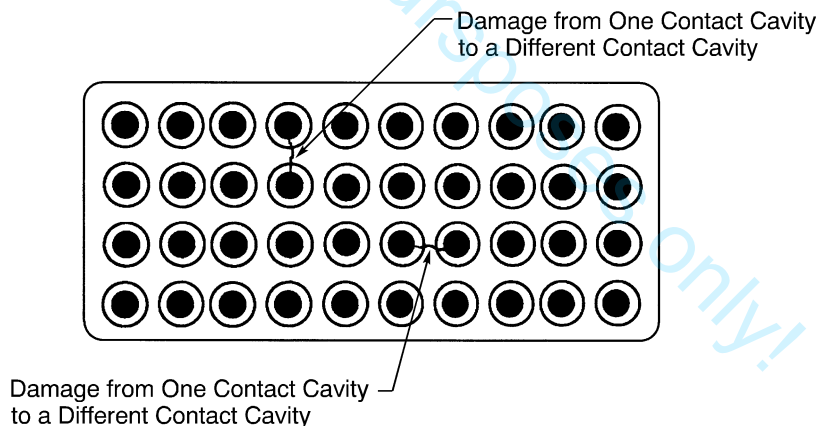
- The depth of the damage extends farther than the bottom of the outer seal web; refer to Figure 1
- The damage extends from one contact cavity to a different contact cavity; refer to Figure 2.

Depth of the Damage That is not Farther Than the Bottom of the Seal Web



REAR FACE OF THE CONNECTOR - DEPTH OF DAMAGE

Figure 1



REAR FACE OF THE CONNECTOR - LENGTH OF DAMAGE

Figure 2

##### B. Damage Conditions - Front Face of the Connector

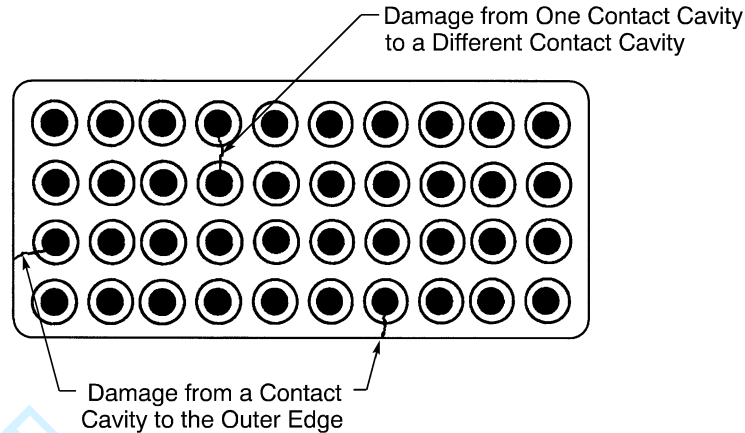
The connector must be replaced when one or more of these conditions occur:

- The damage extends from one contact cavity to a different contact cavity
- The damage extends from one contact cavity to the outer edge of the insert.

Refer to Figure 3.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS



**FRONT FACE OF THE CONNECTOR - LENGTH OF DAMAGE**  
Figure 3

## 2. PART NUMBERS AND DESCRIPTION

### A. Connector Part Numbers

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

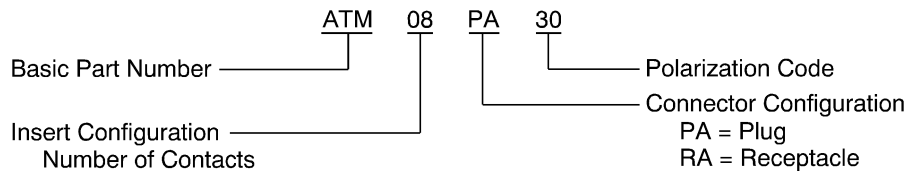
Part Number	Configuration	Supplier
ATM08PA30	Plug	Viking Electronics
ATM08PA50	Plug	Viking Electronics
ATM08RA30	Receptacle	Viking Electronics
ATM08RA50	Receptacle	Viking Electronics
ATM12PA00	Plug	Viking Electronics
ATM12PA10	Plug	Viking Electronics
ATM12PA30	Plug	Viking Electronics
ATM12RA00	Receptacle	Viking Electronics
ATM12RA10	Receptacle	Viking Electronics

**Table 2**  
**ALTERNATIVE CONNECTOR PART NUMBERS**

Specified Connector	Alternative Connector
ATM12PA00	ATM12PA10
ATM12PA10	ATM12PA00

# **STANDARD WIRING PRACTICES MANUAL**

## **ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS**



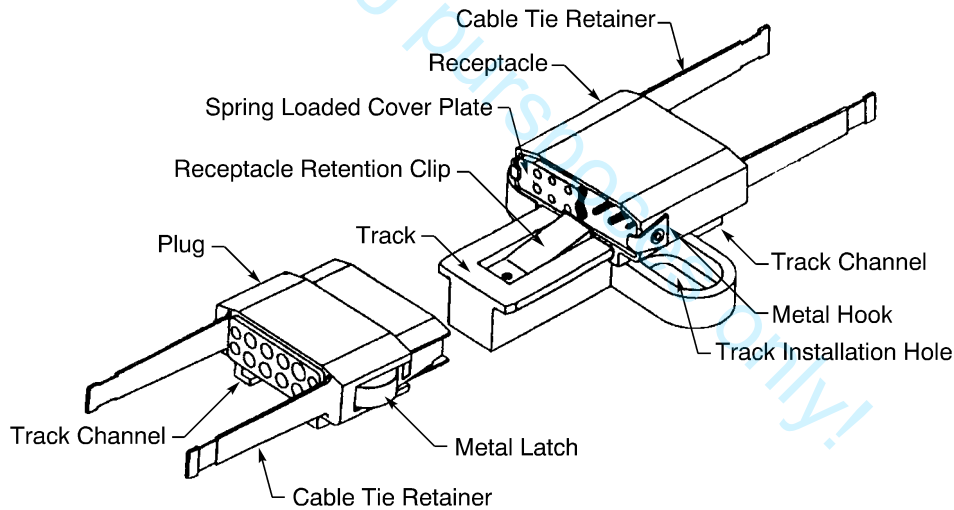
### **CONNECTOR PART NUMBER STRUCTURE**

**Figure 4**

#### **B. Connector Description**

The connectors have these technical features:

- A plastic, rectangular shell
- A rectangular insert configuration
- A cable tie retainer
- Rear release, rear removable contacts
- A plug with socket contacts
- A receptacle with pin contacts
- An integral track channel for installation on a track
- A separate installation track
- A latch for quick disconnection of the plug and receptacle.



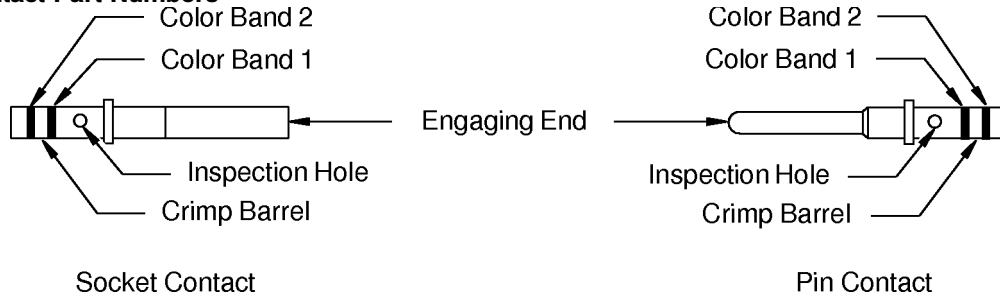
### **ATM() CONNECTOR**

**Figure 5**

## STANDARD WIRING PRACTICES MANUAL

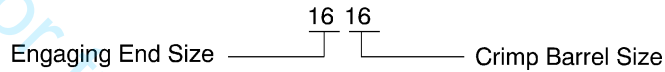
### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

#### C. Contact Part Numbers



#### REAR RELEASE CONTACTS

Figure 6



#### EXAMPLE OF CONTACT SIZE

Figure 7

**NOTE:** The size 2020HD contact has a size 20 engaging end and a size 20 crimp barrel.

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

Contact Size	Engaging End Size	Crimp Barrel Size	Contact Type	Boeing Standard	Color Code	
					Band	Color
2020HD	20	20	Pin	BACC47EF2	1	Orange
					2	Red
			Socket	BACC47EG2	1	Orange
					2	Red
1616	16	16	Pin	BACC47EF3	1	Orange
					2	Blue
			Socket	BACC47EG3	1	Orange
					2	Blue

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

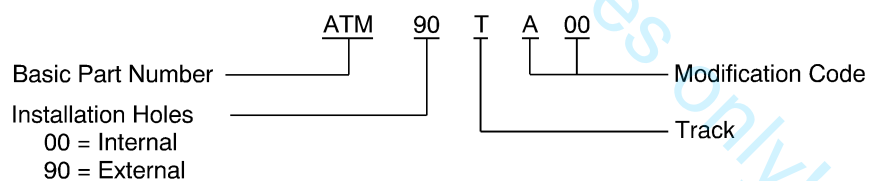
**Table 4**  
**APPROVED SUPPLIERS OF BOEING STANDARD CONTACTS**

Contact	Supplier
BACC47EF()	AMP
	ITT Cannon
	Radiall
	Souriau
	Tri-Star
BACC47EG()	AMP
	ITT Cannon
	Radiall
	Souriau
	Tri-Star

### D. Track Part Numbers

**Table 5**  
**TRACK PART NUMBERS**

Part Number	Configuration	Supplier
ATM00TA00	Internal Installation Holes	Viking Electronics
ATM90TA00	External Installation Holes	Viking Electronics



**TRACK PART NUMBER STRUCTURE**  
**Figure 8**

### 3. INSERT CONFIGURATIONS

#### A. ATM() Connectors

**NOTE:** The contact cavity size that is specified in Table 6 is equivalent to the size of the engaging end of the contact.

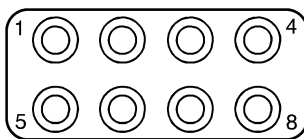
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

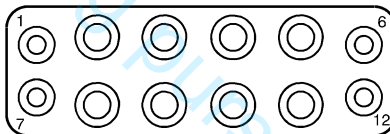
Table 6  
CONNECTOR INSERT CONFIGURATIONS

Insert Configuration	Contact Cavity		Reference
	Count	Size	
08	8	16	Figure 9
12	4	20	Figure 10
	8	16	

**NOTE:** Figure 9 through Figure 10 show the rear side of an insert that has pin contacts. The view of the rear side of an insert that has socket contacts is a mirror image of this view.



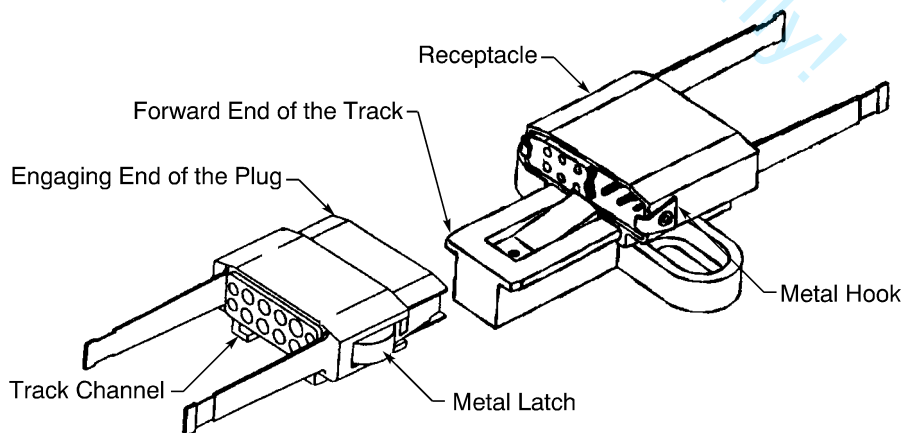
INSERT CONFIGURATION 08  
Figure 9



INSERT CONFIGURATION 12  
Figure 10

#### 4. CONNECTOR DISASSEMBLY

##### A. Connector Separation



CONNECTOR SEPARATION  
Figure 11

**20-72-26**

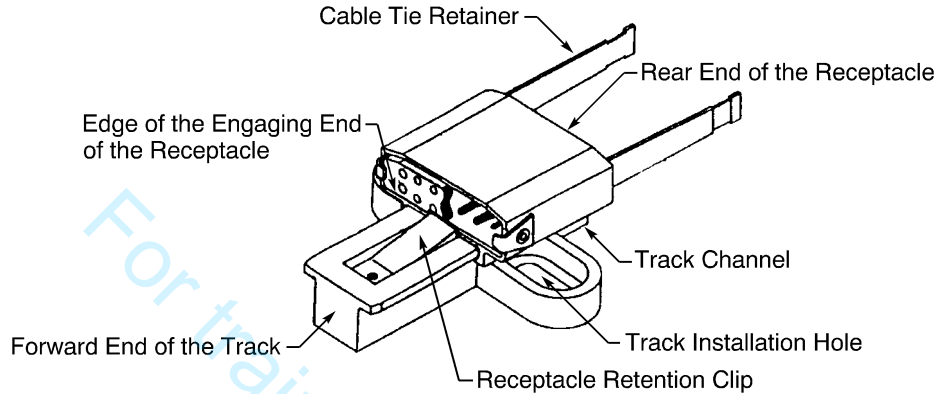
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

Refer to Figure 11.

- (1) Push the latches on each side of the plug.
- (2) Pull the plug away from the receptacle.

#### B. Removal of a Receptacle from a Track



#### RECEPTACLE REMOVAL FROM THE TRACK

Figure 12

Refer to Figure 12.

- (1) Push the receptacle retention clip down.
- (2) Hold the clip down.
- (3) Move the receptacle forward.

Make sure that:

- The edge of the engaging end of the receptacle makes an overlap with the edge of the clip.
- The clip is held down.

- (4) Release the clip.
- (5) Push the receptacle forward until it comes off the track.

#### C. Contact Removal

Table 7  
CONTACT REMOVAL TOOLS

Contact Size	Removal Tool
2020HD	282-891
	91066-4
	CIET-20HDL
	DAK125
	M81969/1-02
	MS3156-20

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

Table 7 (continued)

Contact Size	Removal Tool
1616	282-892
	91066-3
	CET-16-15
	DRK83-16
	M81969/1-03
	MS3156-16

- (1) Make a selection of a contact removal tool from Table 7.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) If it is necessary, carefully cut the plastic tie strap or the wire harness tie that holds the wire harness to the cable tie retainer.
- (3) Put the wire into the slot of the tool.
- (4) At the rear of the connector, axially align the removal tool and the contact cavity.
- (5) Carefully push the tool into the contact cavity until it stops.
- (6) If the O.D. of the wire is too large for the removal tool to go into the contact cavity, replace the contact. Refer to Subject 20-63-00.
- (7) Carefully pull the wire and the tool out of the contact cavity at the same time.

**CAUTION:** DO NOT PULL THE WIRE AND THE REMOVAL TOOL WITH TOO MUCH FORCE. DAMAGE TO THE CONTACT RETENTION CLIPS IN THE CONTACT CAVITY CAN OCCUR.

- (8) If the removal tool does not release the contact from the contact cavity, do these steps a maximum of 3 times:
- (a) Carefully pull the tool out of the contact cavity.
- (b) Turn the tool approximately 90 degrees.

**CAUTION:** DO NOT TURN THE REMOVAL TOOL WHEN IT IS IN THE CONTACT CAVITY. DAMAGE TO THE RETENTION CLIPS IN THE CONTACT CAVITY CAN OCCUR.

- (c) Do Step (3) through Step (7) again.
- (9) If the contact cannot be removed, replace the contact. Refer to Subject 20-63-00.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

#### D. Seal Plug and Seal Rod Removal

Table 8  
NECESSARY TOOLS

Tool	Type
Pliers	Needle Nose

- (1) Make a selection of pliers from Table 8.

**CAUTION:** MAKE SURE THAT THE PLIERS HAVE SMOOTH SURFACES AND NO SHARP EDGES. PLIERS WITH A ROUGH SURFACE OR A SHARP EDGE CAN CAUSE DAMAGE TO THE REAR GROMMET.

- (2) If it is necessary, carefully cut the plastic tie strap or the wire harness tie that holds the wire harness to the cable tie retainer.
- (3) Tightly hold the end of the seal plug or the seal rod in the jaws of the pliers.
- (4) Pull the seal plug or the seal rod out of the contact cavity.

#### E. Removal of a Track from the Structure

- (1) Remove the two installation screws that hold the track on the structure or the stringer clip.

**NOTE:** The stringer clip has an insert with threads for the installation screw.

- (2) Put the screws and the washers in a safe area because they are necessary when the track is installed again.

### 5. CONNECTOR ASSEMBLY

#### A. Contact Assembly

Table 9  
INSULATION REMOVAL LENGTH

Wire Size (AWG)	Crimp Barrel Size	Removal Length L (inch)		Special Instructions
		Target	Tolerance	
24	20HD	0.28	$\pm 0.03$	-
	16	0.56	$\pm 0.03$	Fold the conductor back
22	20HD	0.28	$\pm 0.03$	-
	16	0.56	$\pm 0.03$	Fold the conductor back
20	20HD	0.28	$\pm 0.03$	-
	16	0.28	$\pm 0.03$	-
18	16	0.28	$\pm 0.03$	-
16	16	0.28	$\pm 0.03$	-

# STANDARD WIRING PRACTICES MANUAL

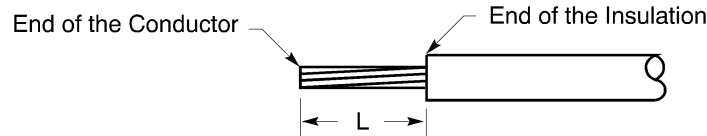
## ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

Table 10  
CONTACT CRIMP TOOLS

Wire Size (AWG)	Crimp Barrel Size	Crimp Tool			
		Basic Unit		Locator	
		Part Number	Setting	Part Number	Color
24	20HD	GVF-101	5	-	-
		M22520/2-01	5	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	5	M22520/2-08	-
		WA22LC	5	M22520/2-08	-
22	20HD	GVF-101	5	-	-
		M22520/2-01	6	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	6	M22520/2-08	-
		WA22LC	6	M22520/2-08	-
	16	M22520/1-01	4	M22520/1-02	Blue
20	20HD	GVF-101	5	-	-
		M22520/2-01	7	M22520/2-08	-
		ST2220-1-Y	-	ST2220-1-43	-
		WA22	7	M22520/2-08	-
		WA22LC	7	M22520/2-08	-
	16	M22520/1-01	4	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	4	M22520/1-02	Blue
18	16	M22520/1-01	5	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	5	M22520/1-02	Blue
16	16	M22520/1-01	6	M22520/1-02	Blue
		ST2220-1-Y	-	ST2220-1-2	-
		WA27F	6	M22520/1-02	Blue

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS



**WIRE PREPARATION**  
**Figure 13**

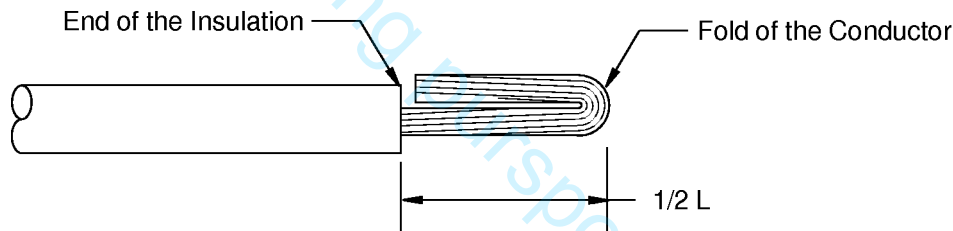
- (1) Remove the necessary length of insulation from the end of the wire.

Refer to:

- Figure 13
- Table 9 for the insulation removal length
- Subject 20-00-15 for the insulation removal procedure.

**NOTE:** If the wire size and a larger crimp barrel size are not given in Table 9, refer to Subject 20-60-00.

- (2) If the O.D. of the wire is less than the minimum seal diameter of the grommet holes, increase the O.D. of the wire. Refer to Subject 20-60-08.
- (3) If it is specified, fold the conductor back. Refer to Figure 14.



**FOLDED BACK CONDUCTOR**  
**Figure 14**

**NOTE:** As an alternative, the conductor size can be increased with filler wires or an eyelet. Refer to Subject 20-60-00.

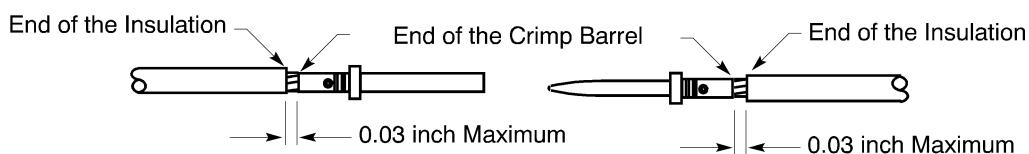
- (4) Make a selection of a crimp tool from Table 10.
- (5) Put the end of the wire in the crimp barrel of the contact. Refer to Figure 15.

Make sure that:

- All 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.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS



#### POSITION OF WIRE IN THE CRIMP BARREL OF THE CONTACT

Figure 15

- (6) Crimp the contact.
- (7) Examine the contact assembly for these types of damage:
  - A crack in the crimp barrel
  - Broken strands of the conductor
  - Base metal can be seen on the strands of the conductor.

#### B. Contact Insertion

Table 11  
CONTACT INSERTION TOOLS

Contact Size	Insertion Tool
2020HD	282-881
	91066-4
	ATC1072
	CIET-20HDL
	DAK145J
	M81969/1-02
	MS3156-20
1616	282-892
	282-929
	91066-3
	ATR1106
	DAK55-16
	M81969/1-03
	MS3156-16

- (1) Make a selection of a contact insertion tool from Table 11.

**CAUTION:** DO NOT USE A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK. DAMAGE TO THE GROMMET OF THE CONNECTOR OR THE CONTACT RETENTION CLIPS CAN OCCUR.

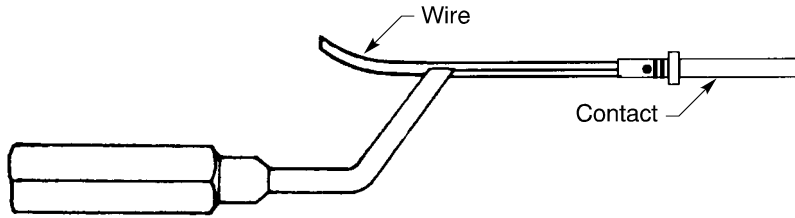
**WARNING:** A TOOL WITH A TIP THAT IS BENT, BROKEN, OR HAS A CRACK CAN CAUSE INJURY TO PERSONNEL.

- (2) Put the contact assembly in the end of the insertion tool. Refer to Figure 16.

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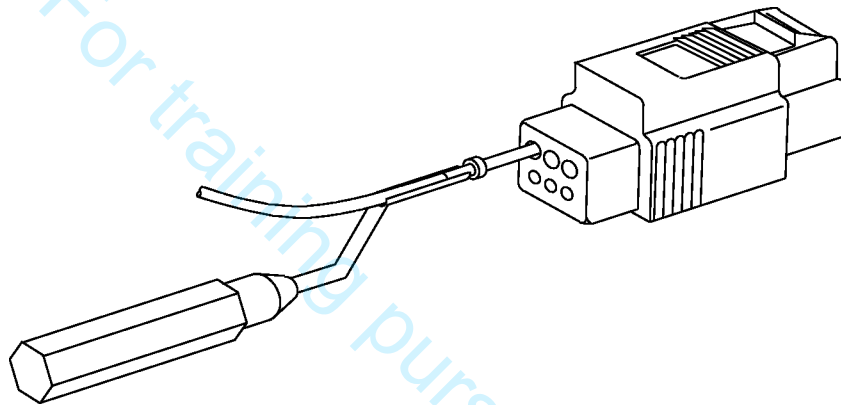
## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS



**POSITION OF THE CONTACT ASSEMBLY IN THE INSERTION TOOL**  
Figure 16

- (3) At the rear of the connector, axially align the contact, the tool, and the correct contact cavity. Refer to Figure 17.



**ALIGNMENT OF THE CONTACT, THE INSERTION TOOL, AND THE CONTACT CAVITY**  
Figure 17

- (4) Carefully push the tool into the contact cavity until it stops.  
(5) Carefully pull the tool out of the contact cavity.  
(6) Lightly pull the wire to make sure that the contact is locked in the contact cavity.

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

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

- (7) If the contact is not locked in the contact cavity:  
(a) Pull the contact assembly out of the cavity.  
(b) Do Step (2) through Step (6) again.  
(8) Examine the rear grommet for damage. Refer to Paragraph 1.A.

#### C. Seal of an Empty Contact Cavity

Empty contact cavities must be sealed. Refer to Subject 20-60-08.

# STANDARD WIRING PRACTICES MANUAL

## ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

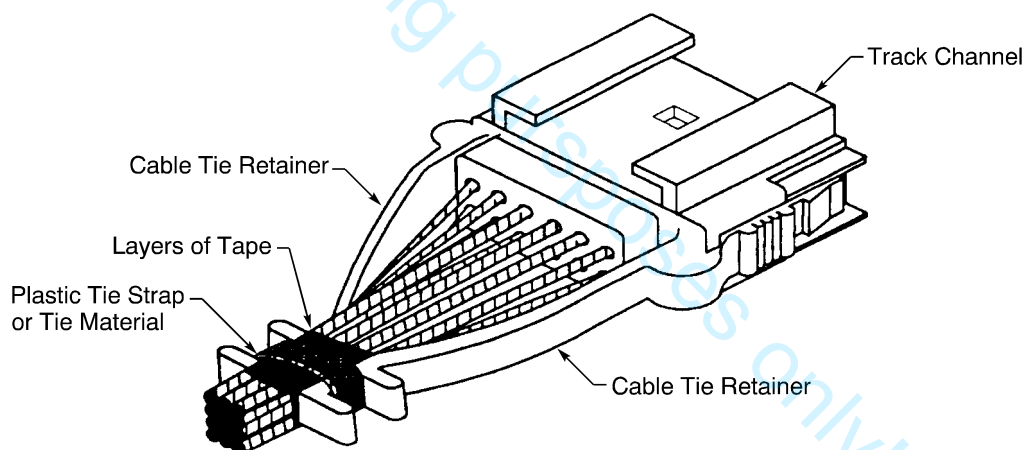
### D. Assembly of a Wire Harness Strain Relief

**Table 12**  
**NECESSARY MATERIALS**

Material	Boeing Standard	Part Number	Supplier
Tape	DMS 2186, Type 1	-	Moxness Products
		-	RM Engineered Products
	-	Scotch 70	3M

**Table 13**  
**NECESSARY PARTS**

Part	Boeing Standard	Part Number	Supplier
Plastic Tie Strap	BACS38K1	-	Panduit
		-	Tyton
	-	M23190/3-1	QPL



**POSITION OF THE PLASTIC TIE STRAP OR TIE MATERIAL**

**Figure 18**

- (1) If it is not necessary to assemble the wire harness strain relief, cut each cable tie retainer as near the connector as possible.

Make sure that the remaining length of each retainer:

- Has no sharp edges
- Is not more than 0.20 inch.

- (2) Make a selection of a tape from Table 12.
- (3) Put a minimum of 2 layers of the tape around the wire bundle at the location adjacent to the cable tie retainer when the retainer is in the correct position.
- (4) Attach the wire bundle to the cable tie retainer with a wire harness tie.

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## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS

Refer to:

- Figure 18
- Subject 20-10-11 for the assembly of a wire harness tie.

(5) Examine each cable tie retainer.

Make sure that the retainer:

- Is not broken
- Does not have a crack.

#### 6. CONNECTOR INSTALLATION

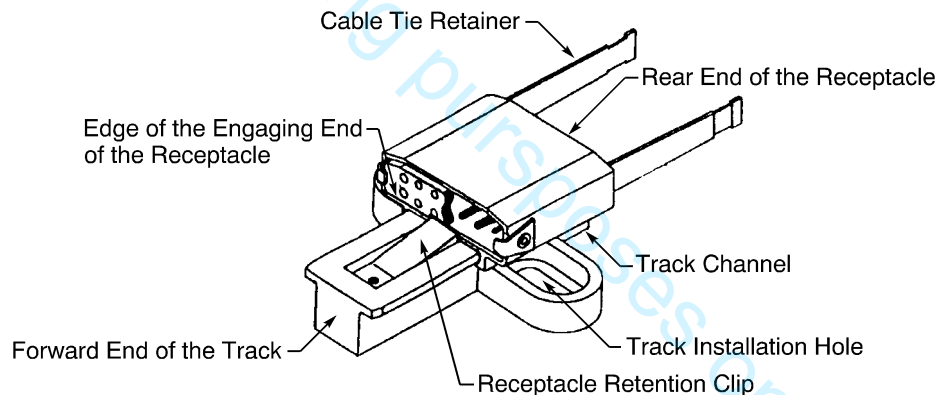
##### A. Installation of a Track

- (1) Align the installation holes in the track and the holes in the structure.
- (2) Install the track to the structure with the necessary installation screws and washers.

Make sure that:

- The forward end of the track is pointed in the same direction as the front face of the receptacle
- The screws are tight.

##### B. Installation of a Receptacle on a Track



#### RECEPTACLE INSTALLATION ON A TRACK

Figure 19

Refer to Figure 19.

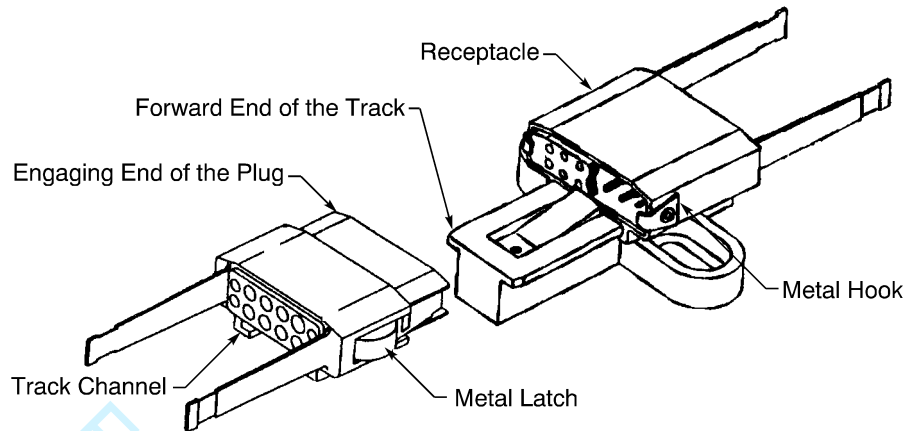
- (1) Put the track channel at the rear end of the receptacle on the forward end of the track.
- (2) Push the receptacle to the rear end of the track until it makes a click.
- (3) Lightly pull the receptacle forward to make sure that it is locked in the track.

##### C. Plug and Receptacle Connection

This paragraph gives the procedure to connect a plug and receptacle installed on a track.

## STANDARD WIRING PRACTICES MANUAL

### ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS



**PLUG AND RECEPTACLE CONNECTION**

**Figure 20**

Refer to Figure 20.

- (1) Put the track channel at the engaging end of the plug on the forward end of the track.
- (2) Push the plug to the rear end of the track until the latch and the hook on each side of the plug and the receptacle are locked.
- (3) Lightly pull back on the plug to make sure that it locks to the receptacle.

## 7. APPROVED TOOL SUPPLIERS

### A. Contact Removal Tools

**Table 14**  
**CONTACT REMOVAL TOOL SUPPLIERS**

Removal Tool	Supplier
282-891	Radiall-Sogie
282-892	Radiall-Sogie
91066-3	AMP
91066-4	AMP
CET-16-15	ITT Cannon
CIET-20HDL	ITT Cannon
DAK125	Daniels
DRK83-16	Daniels
M81969/1-02	QPL
M81969/1-03	QPL
MS3156-16	QPL
MS3156-20	QPL

**STANDARD WIRING PRACTICES MANUAL****ASSEMBLY OF VIKING ELECTRONICS ATM() CONNECTORS****B. Contact Crimp Tools**

**Table 15**  
**CRIMP TOOL SUPPLIERS**

<b>Crimp Tool</b>	<b>Supplier</b>
GVF-101	Gaard
M22520/1-01	QPL
M22520/1-02	QPL
M22520/2-01	QPL
M22520/2-08	QPL
ST2220-1-2	Boeing
ST2220-1-43	Boeing
ST2220-1-Y	Boeing
WA22	Daniels
WA22LC	Daniels
WA27F	Daniels

**C. Contact Insertion Tools**

**Table 16**  
**CONTACT INSERTION TOOL SUPPLIERS**

<b>Insertion Tool</b>	<b>Supplier</b>
282-881	Radiall-Sogie
282-892	Radiall-Sogie
282-929	Radiall-Sogie
91066-3	AMP
91066-4	AMP
ATC1072	Astro
ATR1106	Astro
CIET-20HDL	ITT Cannon
DAK145J	Daniels
DAK55-16	Daniels
M81969/1-02	QPL
M81969/1-03	QPL
MS3156-16	QPL
MS3156-20	QPL

**20-72-26**