



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

TABLE OF CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
1.	<u>GENERAL DATA</u>	2
A.	Applicable Conditions for the PW4000/777 Power Plant Wiring Repair Data	2
B.	PW4000/777 Power Plant Wiring Repair Data and Procedures	2
C.	Applicable Subjects for Power Plant Part Numbers	3

20-24-00

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Page 1
Oct 15/2015



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

This Subject gives the applicable PW4000/777 power plant part numbers and the related repair Subjects.

1. GENERAL DATA

A. Applicable Conditions for the PW4000/777 Power Plant Wiring Repair Data

The data and procedures that are given in Subject 20-24-00 through Subject 20-24-27 are applicable only for the PW4000/777 power plant wire harnesses that have Pratt & Whitney part numbers. Refer to Table 2.

CAUTION: THE DATA AND PROCEDURES IN SUBJECT 20-24-00 THROUGH SUBJECT 20-24-27 ARE NOT APPLICABLE FOR THE REPAIR OF THE WIRING OF OTHER POWER PLANTS, OF OTHER POWER PLANT MANUFACTURERS, OR OF PW4000/777 WIRING THAT HAS A BOEING PART NUMBER. REPAIRS THAT ARE NOT APPROVED CAN CAUSE UNSATISFACTORY PERFORMANCE OR RELIABILITY OF THE WIRING.

Refer to:

- The remainder of the SWPM for a PW4000/777 power plant wire harness that has a Boeing part number
- Pratt & Whitney for problems with the PW4000/777 power plant wiring repair data and procedures.

B. PW4000/777 Power Plant Wiring Repair Data and Procedures

Table 1
WIRING REPAIR DATA AND PROCEDURES

Wiring Repair Data or Procedure	Location
General Data for Wiring Repair	Subject 20-24-01
Wiring Component and Tool Suppliers	Subject 20-24-02
Connector Insert Configurations and Polarization	Subject 20-24-12
Assembly of Wire Harness Ties	Subject 20-24-14
Connector and Backshell Replacement	Subject 20-24-20
Contact Replacement	Subject 20-24-21
Cable Jacket Repair	Subject 20-24-22
Replacement of a Shielded Cable	Subject 20-24-24
Connector Adapter Plate Replacement	Subject 20-24-25
Replacement of Terminal Lugs	Subject 20-24-26
Repair of Wiring Identification Markers	Subject 20-24-27
Safety Practices	Subject 20-24-00

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

C. Applicable Subjects for Power Plant Part Numbers

Table 2 gives the Illustrated Parts Catalog (IPC) reference and the applicable SWPM Subjects for the specified power plant part numbers.

Table 2
APPLICABLE SUBJECTS FOR PW4000/777 POWER PLANT WIRING PART NUMBERS

Part Number	Description	IPC		Applicable Subject
		Reference Number	Figure-Item	
M77001	E Flange Transducer	77-31-00	04-001	Subject 20-24-20
				Subject 20-24-21
M77002	No. 1 Bearing Transducer	77-31-00	01-100	Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-25
M77004	Exhaust Case Vibration Sensor	77-31-00	03-001	Subject 20-24-20
				Subject 20-24-21
W0601	Harness	73-21-00	09-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
W0602	Harness	73-21-00	10-001	Subject 20-24-27
				Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

Table 2 APPLICABLE SUBJECTS FOR PW4000/777 POWER PLANT WIRING PART NUMBERS
(Continued)

Part Number	Description	IPC		Applicable Subject
		Reference Number	Figure-Item	
W0603	Harness	73-21-00	11-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0604	Harness	73-21-00	08-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-25
W0605	Harness	73-21-00	12-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-25
				Subject 20-24-27

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

Table 2 APPLICABLE SUBJECTS FOR PW4000/777 POWER PLANT WIRING PART NUMBERS
(Continued)

Part Number	Description	IPC		Applicable Subject
		Reference Number	Figure-Item	
W0606	Harness	73-21-00	13-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0607	Harness	73-21-00	14-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0608	Harness	73-21-00	15-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

Table 2 APPLICABLE SUBJECTS FOR PW4000/777 POWER PLANT WIRING PART NUMBERS
(Continued)

Part Number	Description	IPC		Applicable Subject
		Reference Number	Figure-Item	
W0609	Harness	73-21-00	16-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0610	Harness	73-21-00	17-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0611	Harness	73-21-00	18-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

Table 2 APPLICABLE SUBJECTS FOR PW4000/777 POWER PLANT WIRING PART NUMBERS
(Continued)

Part Number	Description	IPC		Applicable Subject
		Reference Number	Figure-Item	
W0621	Harness	73-21-00	19-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-25
				Subject 20-24-27
W0622	Harness	73-21-00	20-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0623	Harness	73-21-00	21-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-26
				Subject 20-24-27

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

Table 2 APPLICABLE SUBJECTS FOR PW4000/777 POWER PLANT WIRING PART NUMBERS
(Continued)

Part Number	Description	IPC		Applicable Subject
		Reference Number	Figure-Item	
W0624	Harness	73-21-00	22-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0625	Harness	73-21-00	23-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27
W0626	Harness	73-21-00	24-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-27

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: WIRING REPAIR

Table 2 APPLICABLE SUBJECTS FOR PW4000/777 POWER PLANT WIRING PART NUMBERS
(Continued)

Part Number	Description	IPC		Applicable Subject
		Reference Number	Figure-Item	
W0628	Harness	73-21-00	25-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-25
				Subject 20-24-27
W0629	Harness	73-21-00	26-001	Subject 20-24-01
				Subject 20-24-02
				Subject 20-24-12
				Subject 20-24-14
				Subject 20-24-20
				Subject 20-24-21
				Subject 20-24-22
				Subject 20-24-24
				Subject 20-24-25
				Subject 20-24-26
				Subject 20-24-27
W0635	Harness, EGT	77-21-00	02-001	Subject 20-24-20
				Subject 20-24-21
W0636	Harness, T3 and TCA	73-21-00	27-040	Subject 20-24-20
				Subject 20-24-21
W0641	Harness, AVM	77-31-00	02-001	Subject 20-24-20
				Subject 20-24-21

20-24-00



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: GENERAL DATA FOR WIRING REPAIR

TABLE OF CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
1.	<u>GENERAL DATA</u>	2
	A. Applicable Conditions	2
	B. Equipment Identification Numbers	2
	C. Cable Identification	2
	D. Cable Jacket Colors	2
	E. Primary Wire Color Codes	2
2.	<u>REPAIR AND REPLACEMENT OF WIRING COMPONENTS</u>	3
	A. Necessary Repair Conditions	3
	B. Necessary Conditions for the Replacement of a Wire or a Cable	3
	C. Necessary Conditions for the Replacement of a Terminal Lug, a Connector, a Contact, or a Backshell	3

20-24-01



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: GENERAL DATA FOR WIRING REPAIR

This Subject gives the general data for the repair of the PW4000/777 power plant wiring.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data of this Subject, refer to Subject 20-24-00.

B. Equipment Identification Numbers

All of the wire harnesses, components, and connectors of the power plant have an Equipment Identification Number.

C. Cable Identification

Each cable has an identification label.

NOTE: 2953 is an example of a cable circuit identification.

D. Cable Jacket Colors

The jackets of the cables in the harnesses have specified colors to show the related system. Refer to Table 1.

Table 1
COLORS OF POWER PLANT CABLES

Color	System
Blue	Electronic Engine Control (EEC) Channel A
Gray	Circuits that are not related to the EEC
Green	Electronic Engine Control (EEC) Channel B
Yellow	Thermocouple Circuits

E. Primary Wire Color Codes

Table 2
COLOR CODES OF POWER PLANT PRIMARY WIRES

Color Code	Color	Description
B	Blue	General power plant wire
O	Orange	General power plant wire
R	Red	Alumel Thermocouple wire
W	White	General power plant wire
Y	Yellow	Chromel Thermocouple wire

20-24-01



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: GENERAL DATA FOR WIRING REPAIR

2. REPAIR AND REPLACEMENT OF WIRING COMPONENTS

A. Necessary Repair Conditions

A wire harness must be repaired when one or more of these conditions occur:

- The insulation of a cable or a wire has damage
- The conductor of a wire has damage
- The shield of a cable or a wire has damage
- A terminal lug is broken
- A connector has contacts that are bent, broken, or recessed
- A connector has threads that are worn or stripped
- A backshell threads that are broken, worn, or stripped.

A wiring component must be replaced if the amount of damage makes it unserviceable.

Refer to:

- Paragraph 2.B. for the conditions that are applicable for the replacement of a wire or a cable
- Paragraph 2.C. for the conditions that are applicable for the replacement of a terminal lug, a connector, a contact, or a backshell
- Subject 20-24-00 for the applicable repair procedure.

B. Necessary Conditions for the Replacement of a Wire or a Cable

If replacement is necessary, a wire or a cable must be replaced with a new wire that has the same part number.

Refer to the Wiring Diagram Manual (WDM) Chapter 91 Wire List for:

- The wire identification number
- The correct part number of the wire
- The size of the wire
- The length of the wire.

Refer to Subject 20-24-00 for the applicable replacement procedure.

C. Necessary Conditions for the Replacement of a Terminal Lug, a Connector, a Contact, or a Backshell

If replacement is necessary, a terminal lug, a connector, a contact, or a backshell must be replaced with a new component that has the same part number or a specified alternative.

CAUTION: IF A TERMINAL LUG, A CONNECTOR, A CONTACT, OR A BACKSHELL IS REPLACED WITH A COMPONENT THAT DOES NOT HAVE THE SAME PART NUMBER OR A COMPONENT THAT IS NOT A SPECIFIED ALTERNATIVE, DAMAGE TO THE COMPONENT OR THE SYSTEM CAN OCCUR.

Make sure that:

- The location of the connection is correct
- The Equipment Identification Number of the component is correct.

Refer to:

- The WDM Equipment List for the correct part number of the terminal lug, the connector, the contact, or the backshell
- The Airplane Illustrated Parts Catalog (AIPC) for the specified alternative part numbers
- Subject 20-24-00 for the applicable replacement procedure.

20-24-01



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: WIRING COMPONENT AND TOOL SUPPLIERS

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
2. <u>SUPPLIER DATA</u>	2
A. Component and Tool Suppliers	2

20-24-02



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: WIRING COMPONENT AND TOOL SUPPLIERS

This Subject gives the suppliers of the components and the tools that are necessary for the repair of PW4000/777 power plant wire harnesses.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data of this Subject, refer to Subject 20-24-00.

2. SUPPLIER DATA

A. Component and Tool Suppliers

Table 1
WIRING COMPONENT AND TOOL SUPPLIERS

Supplier Code	Supplier	Location
00779	AMP Incorporated	Harrisburg, Pennsylvania
04963	3M - Adhesive Coatings and Sealer Division	Austin, Texas
06324	Glenair Incorporated	Glendale, California
06324	Glenair International Limited	Mansfield Notts, England
07099	Moxness Products Incorporated	Racine, Wisconsin
11139	Deutsch - Engineered Connecting Devices	Banning, California
11851	Daniels Manufacturing Corporation	Orlando, Florida
13556	Cinch Connectors	Elk Grove Village, Illinois
14283	Matrix Science Corporation	Hampshire, England
14283	Matrix Science Corporation	Torrance, California
16902	Simpson Electric Company - Simpson Instruments Division	Elgin, Illinois
31746	Cannon Electronics	Woodbury, Tennessee
49367	Pyle-National Company	Chicago, Illinois
56501	Thomas & Betts Corporation	Raritan, New Jersey
71785	Labinal Components and Systems	Elk Grove Village, Illinois
74116	New England Electrical Wire Corporation	Lisbon, New Hampshire
77445	Pratt and Whitney - Commercial Parts Support	East Hartford, Connecticut
77820	Amphenol Corporation	Sidney, New York
80164	Keithley Instruments Incorporated	Cleveland, Ohio
82110	Gudebrod Incorporated	Pottstown, Pennsylvania
83311	Simmonds Precision Engine Systems - BF Goodrich Aerospace	Norwich, New York
K1636	AMP Incorporated of Great Britain Limited	Middlesex, England
U0419	Glenair International Limited	Mansfield Notts, England
U0425	Pyle-National Limited	Nottingham, England

20-24-02



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
2. <u>PART NUMBERS AND DESCRIPTION</u>	2
A. Connector Part Numbers	2
B. MIL-C-26500 Type Connectors	3
C. MIL-C-38999 Series III Connectors	4
D. MIL-C-5015 Connectors	5
E. MIL-C-83723 Series III Type Connectors	5
F. Connector Contact Retention	6
G. Contact Part Numbers	6
3. <u>INSERT CONFIGURATIONS</u>	6
A. MIL-C-26500 Type Connectors	6
B. MIL-C-38999 Series III Connectors	11
C. MIL-C-5015 Connectors	12
D. MIL-C-83723 Series III Type Connectors	14
4. <u>CONNECTOR POLARIZATION</u>	17
A. MIL-C-26500 Type and MIL-C-83723 Series III Type Connectors	17
B. MIL-C-38999 Series III Connectors	18
C. MIL-C-5015 Connectors	19

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

This Subject gives the configuration data of the connectors in the PW4000/777 power plant wiring.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data of this Subject, refer to Subject 20-24-00.

2. PART NUMBERS AND DESCRIPTION

A. Connector Part Numbers

Table 1
CONNECTOR PART NUMBERS

Part Number	Connector Series	Supplier	Connector Data	
			Type	Reference
CN0966()	Modified MIL-C-26500	Cinch	Part Number Structure	Figure 1
			Insert Configurations	Paragraph 3.A.
			Polarization	Paragraph 4.A.
CN0967()	Modified MIL-C-26500	Cinch	Part Number Structure	Figure 1
			Insert Configurations	Paragraph 3.A.
			Polarization	Paragraph 4.A.
D38999()	MIL-C-38999 Series III	QPL	Part Number Structure	Figure 3
			Insert Configurations	Paragraph 3.B.
			Polarization	Paragraph 4.B.
ESC10()	Modified MIL-C-83723 Series III	QPL	Part Number Structure	Figure 5
			Insert Configurations	Paragraph 3.D.
			Polarization	Paragraph 4.A.
FPK()	Modified MIL-C-26500	Pyle-National	Part Number Structure	Figure 2
			Insert Configurations	Paragraph 3.A.
			Polarization	Paragraph 4.A.
M83723()	MIL-C-83723 Series III	QPL	Part Number Structure	Figure 6
			Insert Configurations	Paragraph 3.D.
			Polarization	Paragraph 4.A.
MS3459()	MIL-C-5015	QPL	Part Number Structure	Figure 4
			Insert Configurations	Paragraph 3.C.
			Polarization	Paragraph 4.C.

CAUTION: A CONNECTOR FROM ONE SERIES MUST NOT BE CONNECTED TO A CONNECTOR FROM DIFFERENT SERIES. DAMAGE TO THE CONNECTORS CAN OCCUR.

Make sure that:

- An ESC10 connector is only connected to an ESC10 connector

20-24-12

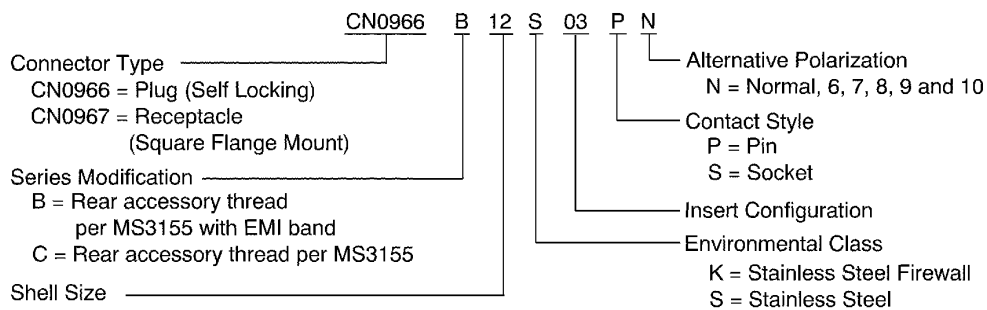


707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

- A modified MIL-C-26500 connector is only connected to modified MIL-C-26500 connector
- A MIL-C-38999 Series III connector is only connected to a MIL-C-38999 Series III connector
- A MIL-C-5015 connector is only connected to MIL-C-5015 connector
- A MIL-C-83723 Series III connector is only connected to MIL-C-83723 Series III connector.

B. MIL-C-26500 Type Connectors



2445624 S00061544907_V1

CINCH CN0966 AND CN0967 CONNECTOR PART NUMBER STRUCTURE

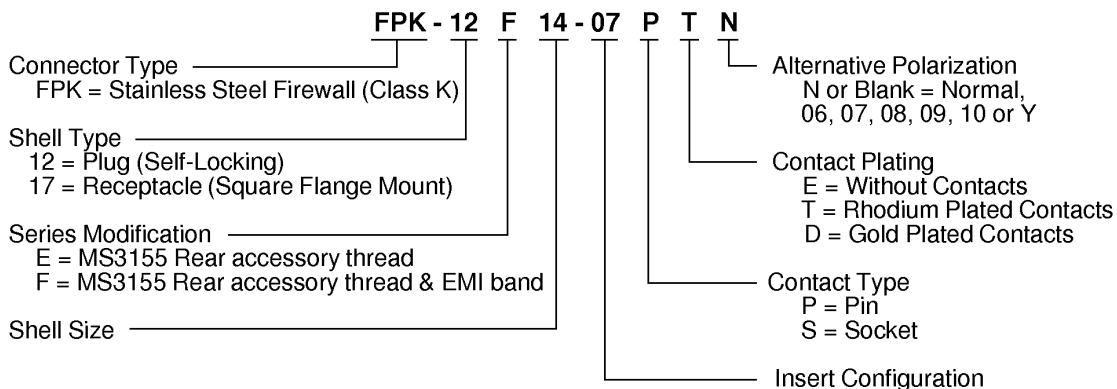
Figure 1

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

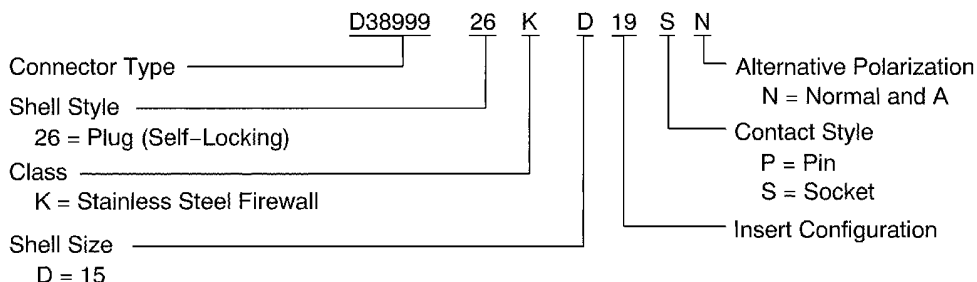


2445629 S00061544908_V1

PYLE-NATIONAL FPK CONNECTOR PART NUMBER STRUCTURE

Figure 2

C. MIL-C-38999 Series III Connectors



2445625 S00061544909_V1

D38999 CONNECTOR PART NUMBER STRUCTURE

Figure 3

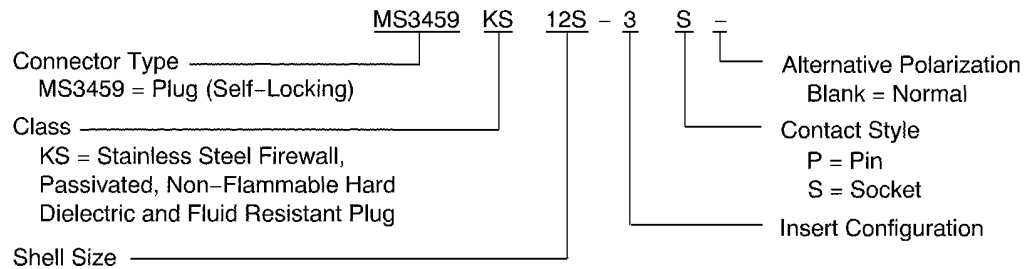
20-24-12



707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

D. MIL-C-5015 Connectors

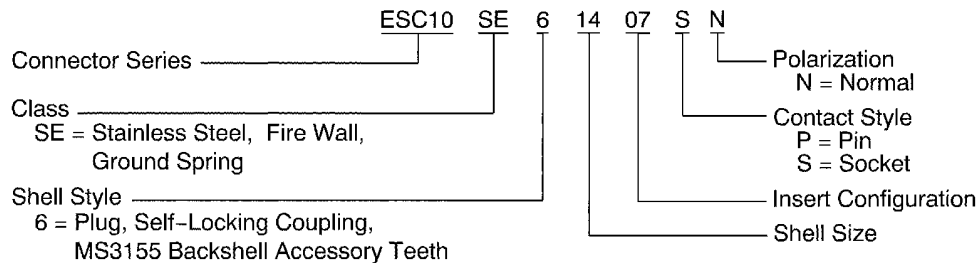


2445628 S00061544910_V1

MS3459 CONNECTOR PART NUMBER STRUCTURE

Figure 4

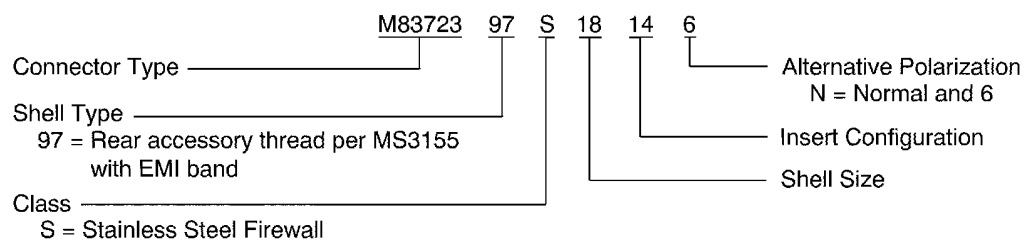
E. MIL-C-83723 Series III Type Connectors



2445626 S00061544911_V1

ESC10 CONNECTOR PART NUMBER STRUCTURE

Figure 5



2445627 S00061544912_V1

M83723 CONNECTOR PART NUMBER STRUCTURE

Figure 6

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

F. Connector Contact Retention

Table 2
CONNECTOR CONTACT RETENTION

Connector Series	Contact Retention
MIL-C-26500 Type	Front Release, Rear Removal and Insertion
MIL-C-38999 Series III	Rear Release, Rear Removal and Insertion
MIL-C-5015	Rear Release, Rear Removal and Insertion
MIL-C-83723 Series III Type	Rear Release, Rear Removal and Insertion

G. Contact Part Numbers

Refer to the WDM Equipment List for the correct part numbers of the contacts for the applicable connector.

3. INSERT CONFIGURATIONS

A. MIL-C-26500 Type Connectors

NOTE: The insert configurations that are specified in Table 3 include the connector shell size as the first part of the configuration. Refer to Paragraph 2.B. for the part number structure that is applicable for the connector.

NOTE: The contact cavity size that is specified in Table 3 is equivalent to the size of the engaging end of the contact.

Table 3
CONNECTOR INSERT CONFIGURATIONS

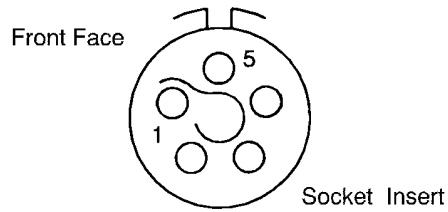
Insert Configuration	Contact Cavity			Reference
	Quantity	Size	Type	
10-05	5	20	Socket	Figure 7
12-03	3	16	Socket	Figure 8
14-07	7	16	Socket	Figure 9
16-10	10	16	Socket	Figure 10
18-14	14	16	Socket	Figure 11
20-16	16	16	Socket	Figure 12
22-19	19	16	Socket	Figure 13
24-30	30	16	Socket	Figure 14
28-42	42	16	Socket	Figure 15

20-24-12



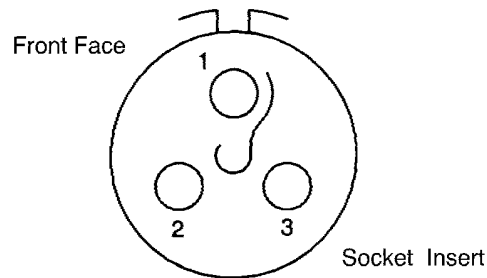
707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445630 S00061544913_V1

10-05 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS
Figure 7



2445631 S00061544914_V1

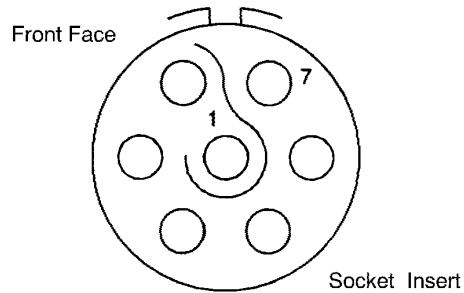
12-03 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS
Figure 8

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

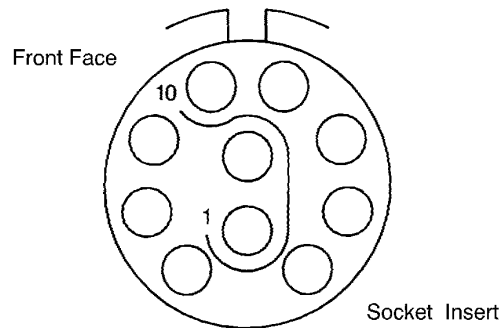
PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445632 S00061544915_V1

14-07 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS

Figure 9



2445633 S00061544916_V1

16-10 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS

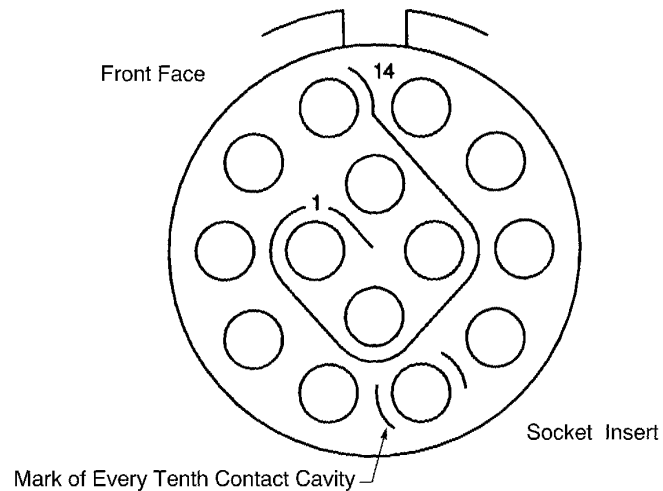
Figure 10

20-24-12



707, 727-787
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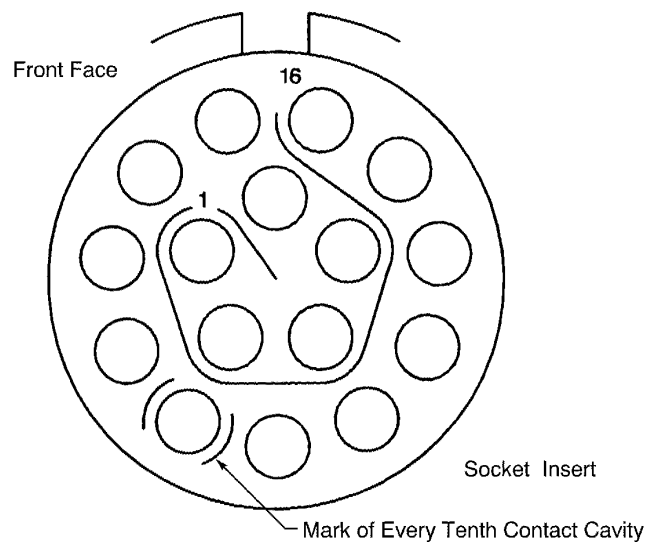
PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445634 S00061544917_V1

18-14 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS

Figure 11



2445635 S00061544918_V1

20-16 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS

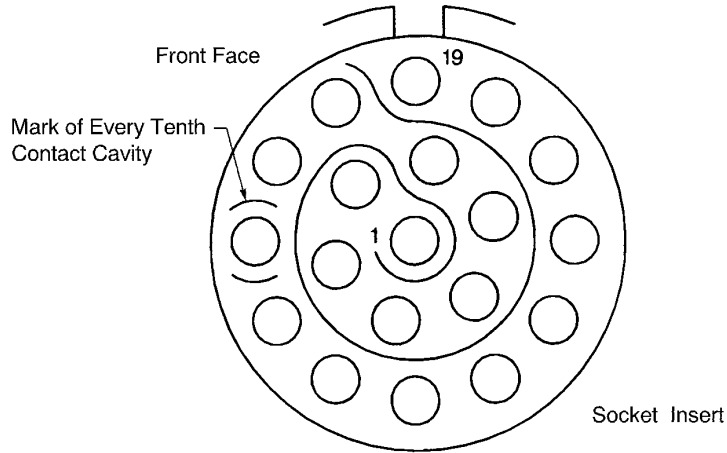
Figure 12

20-24-12



**707, 727-787
STANDARD WIRING PRACTICES MANUAL**

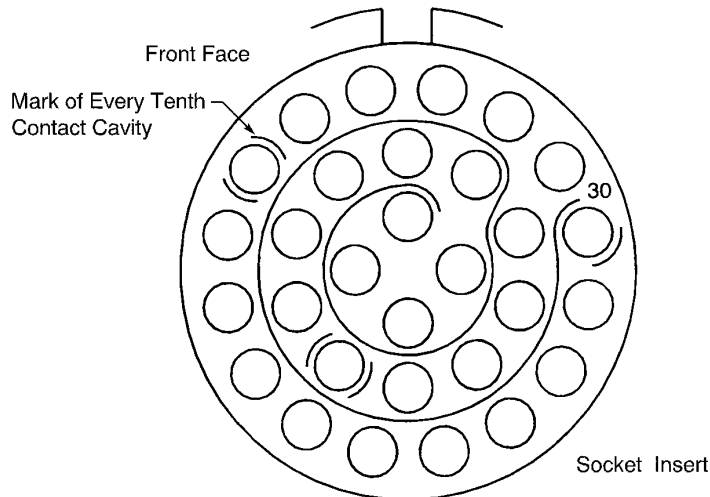
PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445636 S00061544919_V1

22-19 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS

Figure 13



2445637 S00061544920_V1

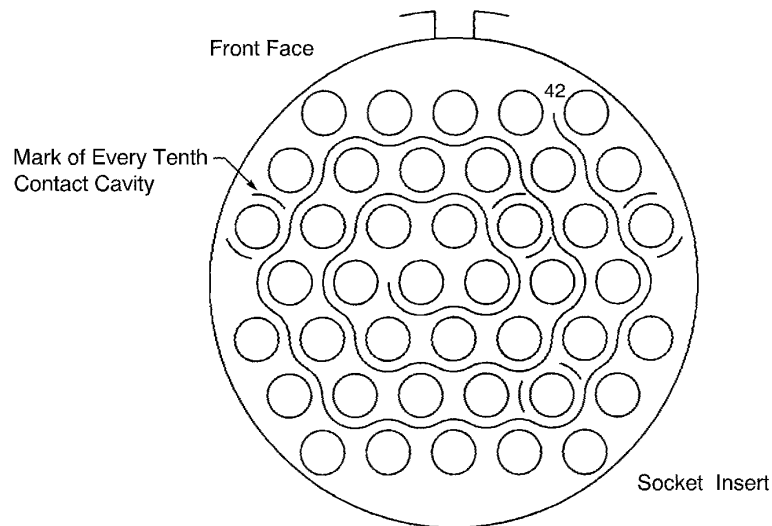
24-30 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS

Figure 14

20-24-12

**707, 727-787
STANDARD WIRING PRACTICES MANUAL**

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445638 S00061544921_V1

28-42 INSERT CONFIGURATION FOR MIL-C-26500 TYPE CONNECTORS

Figure 15

B. MIL-C-38999 Series III Connectors

NOTE: The insert configurations that are specified in Table 4 include the connector shell size as the first part of the configuration. Refer to Paragraph 2.C. for the part number structure that is applicable for the connector.

NOTE: The contact cavity size that is specified in Table 4 is equivalent to the size of the engaging end of the contact.

**Table 4
CONNECTOR INSERT CONFIGURATIONS**

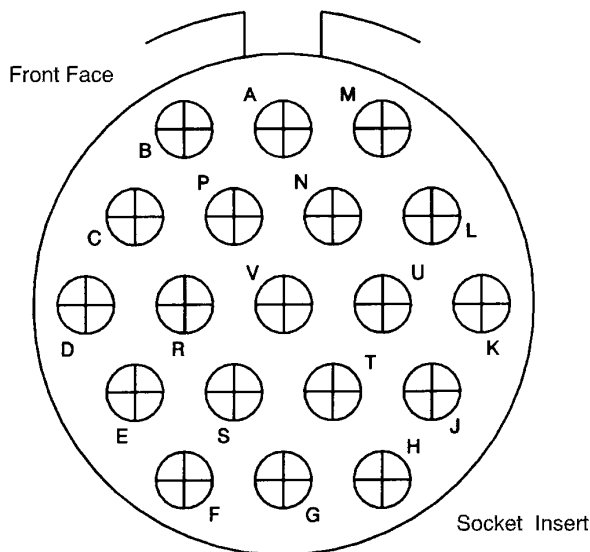
Insert Configuration	Contact Cavity			Reference
	Quantity	Size	Type	
15-19	19	20	Socket	Figure 16

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445639 S00061544922_V1

15-19 INSERT CONFIGURATION FOR MIL-C-38999 CONNECTORS

Figure 16

C. MIL-C-5015 Connectors

NOTE: The insert configurations that are specified in Table 5 include the connector shell size as the first part of the configuration. Refer to Paragraph 2.D. for the part number structure that is applicable for the connector.

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

Table 5
CONNECTOR INSERT CONFIGURATIONS

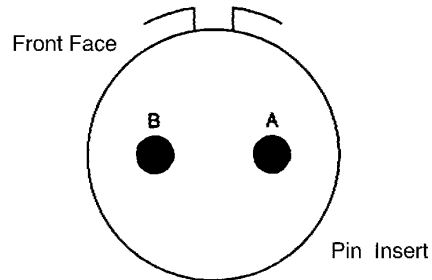
Insert Configuration	Contact Cavity			Reference
	Quantity	Size	Type	
12S-3	2	16	Pin	Figure 17
14S-7	3	16	Pin	Figure 18

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

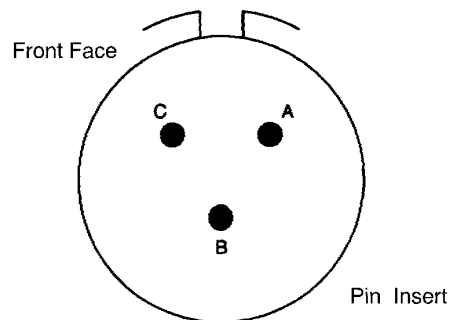
PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445646 S00061544923_V1

12S-3 INSERT CONFIGURATION FOR MIL-C-5015 CONNECTORS

Figure 17



2445647 S00061544924_V1

14S-7 INSERT CONFIGURATION FOR MIL-C-5015 CONNECTORS

Figure 18

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

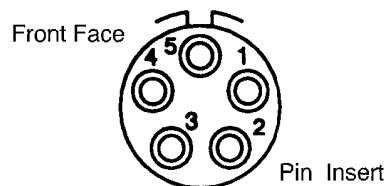
D. MIL-C-83723 Series III Type Connectors

NOTE: The insert configurations that are specified in Table 6 include the connector shell size as the first part of the configuration. Refer to Paragraph 2.E. for the part number structure that is applicable for the connector.

NOTE: The contact cavity size that is specified in Table 6 is equivalent to the size of the engaging end of the contact.

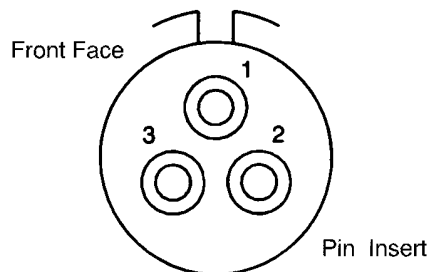
Table 6
CONNECTOR INSERT CONFIGURATIONS

Insert Configuration	Contact Cavity			Reference
	Quantity	Size	Type	
10-05	5	20	Pin	Figure 19
12-03	3	16	Pin	Figure 20
14-07	7	16	Pin	Figure 21
16-10	10	16	Pin	Figure 22
18-14	14	16	Pin	Figure 23
24-30	30	16	Pin	Figure 24



2445640 S00061544925_V1

10-05 INSERT CONFIGURATION FOR MIL-C-83723 TYPE CONNECTORS
Figure 19



2445641 S00061544926_V1

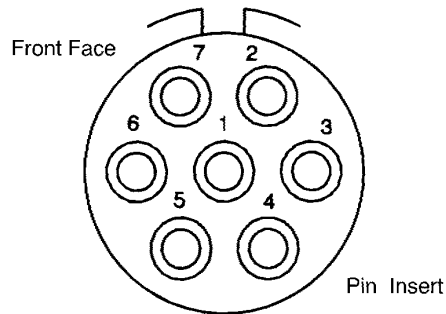
12-03 INSERT CONFIGURATION FOR MIL-C-83723 TYPE CONNECTORS
Figure 20

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

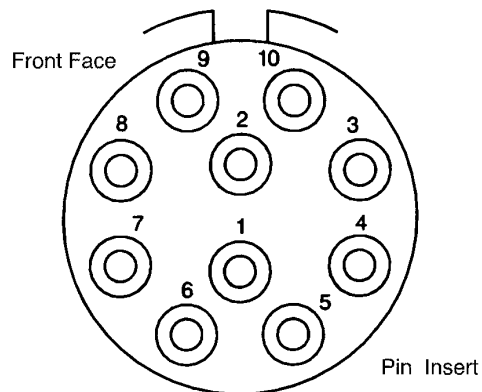
PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445642 S00061544927_V1

14-07 INSERT CONFIGURATION FOR MIL-C-83723 TYPE CONNECTORS

Figure 21



2445643 S00061544928_V1

16-10 INSERT CONFIGURATION FOR MIL-C-83723 TYPE CONNECTORS

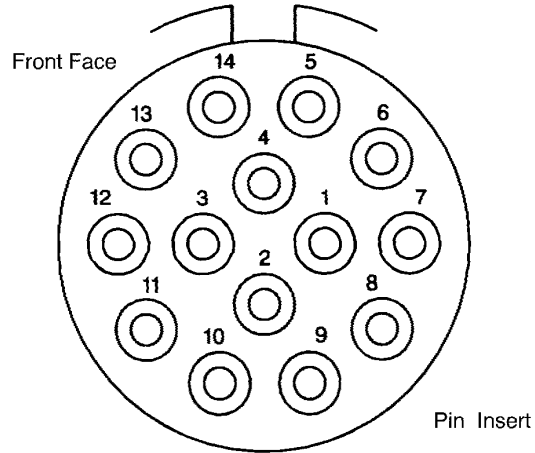
Figure 22

20-24-12



707, 727-787
STANDARD WIRING PRACTICES MANUAL

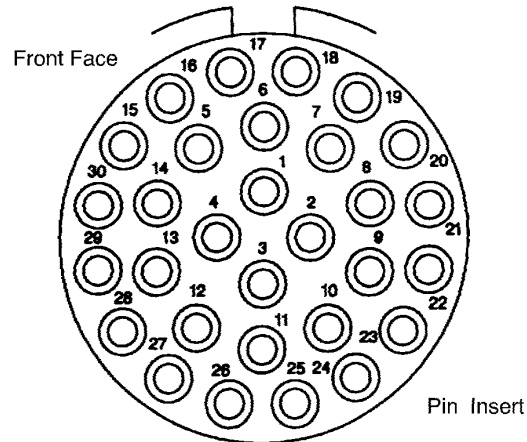
PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION



2445644 S00061544929_V1

18-14 INSERT CONFIGURATION FOR MIL-C-83723 TYPE CONNECTORS

Figure 23



2445645 S00061544930_V1

24-30 INSERT CONFIGURATION FOR MIL-C-83723 TYPE CONNECTORS

Figure 24

20-24-12

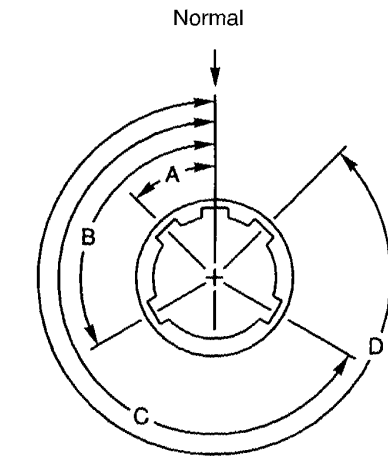


707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

4. CONNECTOR POLARIZATION

A. MIL-C-26500 Type and MIL-C-83723 Series III Type Connectors



The Angles are Counterclockwise
from the Normal Keyway

For the Front Face of the Plug Shell,
the Key Locations Are Clockwise

Front Face of the Receptacle Shell

POSITION	FOR CONNECTORS SIZE 8 AND 10				FOR CONNECTORS SIZE 12, 14, 16, 18, 20, 22, 24 AND 28			
	A	B	C	D	A	B	C	D
NORMAL	105°	140°	215°	265°	105°	140°	215°	265°
6	102°	132°	248°	320°	18°	149°	192°	259°
7	80°	118°	230°	312°	92°	152°	222°	342°
8	35°	140°	205°	275°	84°	152°	204°	334°
9	64°	155°	234°	304°	24°	135°	199°	240°
Y(10*)	25°	115°	220°	270°	98°	152°	268°	338°

* Not Available In Size 8 Connector

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POLARIZATION POSITIONS FOR MIL-C-26500 TYPE AND MIL-C-83723 SERIES III TYPE CONNECTORS
Figure 25

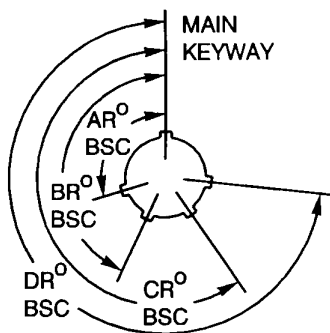
20-24-12



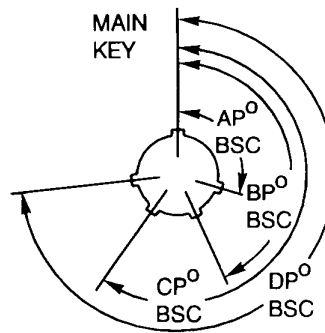
707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

B. MIL-C-38999 Series III Connectors



Front Face of the Socket Insert



Front Face of the Pin Insert

SHELL SIZE	KEY & KEYWAY ARRANGEMENT IDENTIFICATION LETTER	AR° OR AP° BSC	BR° OR BP° BSC	CR° OR CP° BSC	DR° OR DP° BSC
9	N	105	140	215	265
	A	102	132	248	320
	B	80	118	230	312
	C	35	140	205	275
	D	64	155	234	304
11, 13 AND 15	E	91	131	197	240
	N	95	141	208	236
	A	113	156	182	292
	B	90	145	195	252
	C	53	156	220	255
17 AND 19	D	119	146	176	298
	E	51	141	184	242
	N	80	142	196	293
	A	135	170	200	310
	B	49	169	200	244
21, 23 AND 25	C	66	140	200	257
	D	62	145	180	280
	E	79	153	197	272
	N	80	142	196	293
	A	135	170	200	310

All of the Angles are Basic

The Main Keys and Keyways, and Inserts are Fixed in the Normal Polarization Position

The Auxiliary Keys and Keyways Are Moved for the Alternative Polarization

2445649 S00061544932_V1

POLARIZATION POSITIONS FOR MIL-C-38999 CONNECTORS

Figure 26

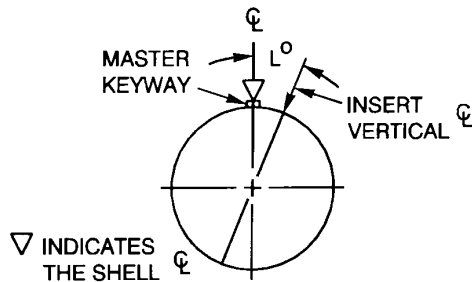
20-24-12

707, 727-787

STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR INSERT CONFIGURATIONS AND POLARIZATION

C. MIL-C-5015 Connectors



Front Face of the Pin Insert

In the normal position, the insert vertical, the key, and the keyway are the same: $L = 0$ degrees.

In the alternative positions W, X, Y, and Z, the insert is turned in relation to the centerline of the master key or keyway of the shell:

- The pin insert is turned clockwise in the shell; the position is the angle between the index radius and the centerline of the master key or keyway
- The socket insert is turned counterclockwise in the shell; the position is the angle between the index radius and the centerline of the master key or keyway.

SHELL SIZE	INSERT ARRANGEMENTS	CONTACTS		ALTERNATE INSERT POSITIONS L DEGREES			
		QTY.	SIZE	W	X	Y	Z
12S	12S-3	2	16	70	145	215	290
14S	14S-7	3	16	90	180	270	-

2445650 S00061544933_V1

POLARIZATION POSITIONS FOR MIL-C-5015 CONNECTORS

Figure 27



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
B. Wire Harness Components	2
C. Wire Routing	2
D. Necessary Materials	2
2. <u>CONFIGURATION OF WIRE HARNESS TIES</u>	2
A. Types of Knots	2
B. Location and Position of Wire Harness Ties	3
3. <u>ASSEMBLY OF WIRE HARNESS TIES</u>	4
A. Assembly of a Standard Wire Harness Tie	4
B. Assembly of a Wire Harness Tie That Supports a Wire Harness Branch	6
C. Assembly of a Wire Harness Tie on Spiral Wrap	7

20-24-14



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES

This Subject gives the procedures to assemble wire harness ties.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it

C. Wire Routing

These conditions are applicable:

- The twists of cable in a wire harness must be kept to a minimum
- The routing of the wire harness must be as straight as possible.

D. Necessary Materials

NOTE: Alternatives to the materials in Table 2 must be equivalent materials. Refer to Subject 20-00-11.

Table 2
NECESSARY MATERIALS

Material	Part Number	Supplier Code
Tape, Lacing, White	718Z	82110

2. CONFIGURATION OF WIRE HARNESS TIES

A. Types of Knots

A wire harness tie has two knots:

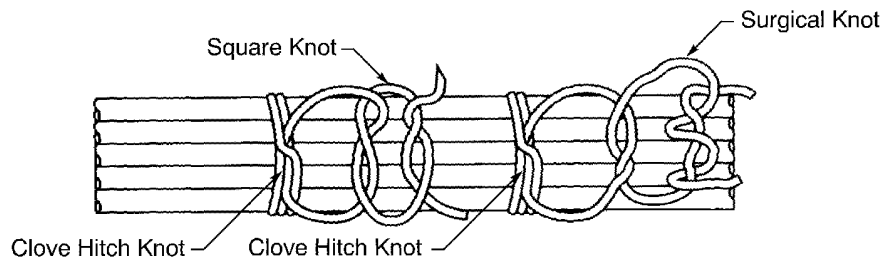
- A clove hitch knot; refer to Figure 1
- A square knot or a surgical knot; refer to Figure 1.

A square knot or a surgical knot is used to prevent the unwanted movement of a clove hitch on the harness.



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES



2445651 S00061543161_V1

TYPES OF KNOTS FOR WIRE HARNESS TIES

Figure 1

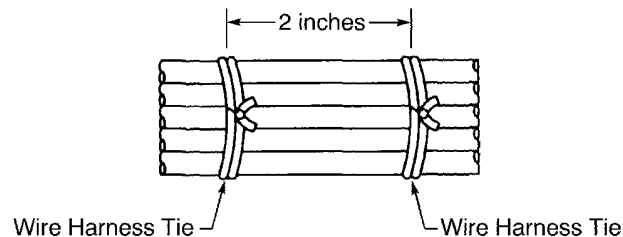
B. Location and Position of Wire Harness Ties

These general conditions are applicable:

- A wire harness must have wire harness ties if the harness has two or more cables
- If it is necessary to disassemble a wire harness tie or replace a damaged wire harness tie, a new tie must be put in the same location
- The maximum interval between two wire harness ties is 2 inches (50.8 mm); refer to Figure 2.
- If the diameter of the wire harness is larger than 1.5 inches (38.1 mm), two wire harness ties must be put at the same location; refer to Figure 3.

These conditions are applicable for wire harnesses with wire harness branches:

- The wire harness must have a wire harness tie on each side of a branch
- The branch must have a wire harness tie at the wire harness.



2447517 S00061544935_V1

STANDARD INTERVAL FOR WIRE HARNESS TIES

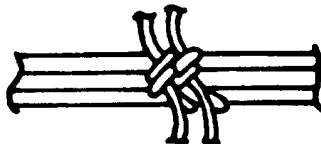
Figure 2

20-24-14



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES



2445652 S00061544936_V1

TWO WIRE HARNESS TIES AT THE SAME LOCATION

Figure 3

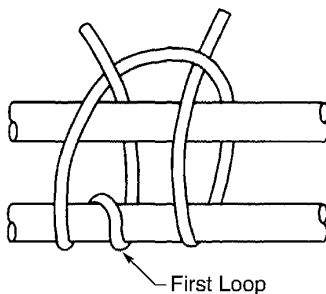
3. ASSEMBLY OF WIRE HARNESS TIES

A. **Assembly of a Standard Wire Harness Tie**

- (1) Make a clove hitch on the harness. Refer to Figure 4 and Figure 5.
Make sure that the knot is tight.

CAUTION: DO NOT MAKE THE FIRST LOOP ON:

- A THERMOCOUPLE CABLE (YELLOW JACKET)
- A THERMOCOUPLE WIRE (RED OR YELLOW INSULATION)



2445654 S00061543162_V1

CLOVE HITCH KNOT

Figure 4

20-24-14

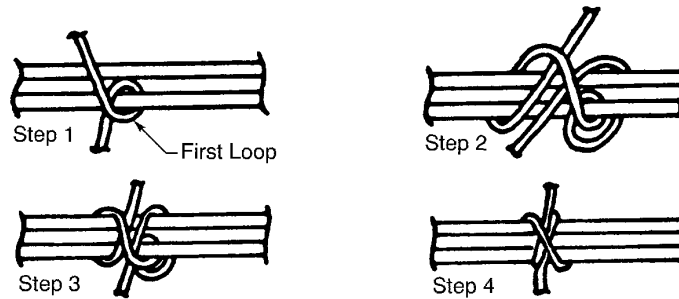
Page 4
Oct 15/2015

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707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES

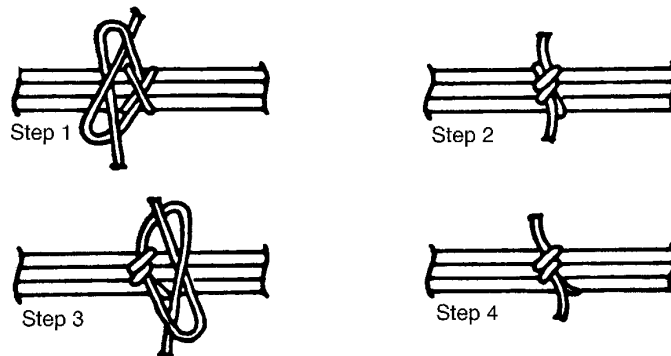


2445653 S00061544938_V1

STEPS TO MAKE A CLOVE HITCH KNOT

Figure 5

- (2) Make a square knot or surgical knot on top of the clove hitch knot. Refer to Figure 6.



2445655 S00061544939_V1

STEPS TO MAKE A SQUARE KNOT

Figure 6

20-24-14



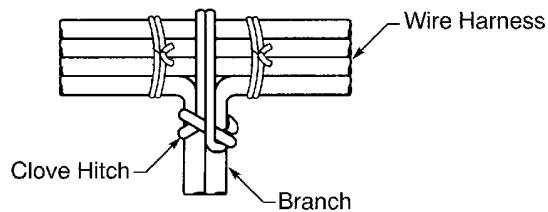
707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES

- (3) Cut the two ends of the tie material to make the distance between each end and the knot equal to:
- A minimum of 0.25 inch (6.35 mm)
 - A maximum of 0.50 inch (12.7 mm).

B. Assembly of a Wire Harness Tie That Supports a Wire Harness Branch

- (1) Assemble a wire harness tie on the wire harness on both sides of the branch.
- (2) Make a loose clove hitch on the wire harness and the branch. Refer to Figure 7.
Make sure that the clove hitch is not tight.



2445656 S00061544940_V1

CLOVE HITCH AROUND THE WIRE HARNESS AND THE BRANCH

Figure 7

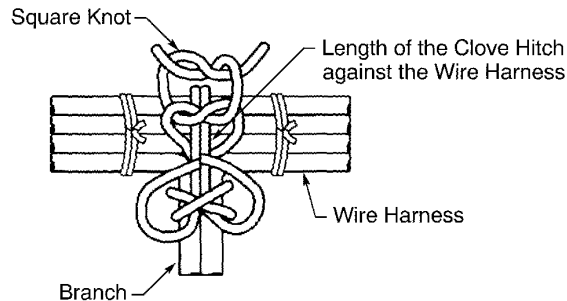
- (3) Put each end of the tie material across the other and between the wire harness and the lengths of the clove hitch that are against wire harness. Refer to Figure 8.

20-24-14



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES



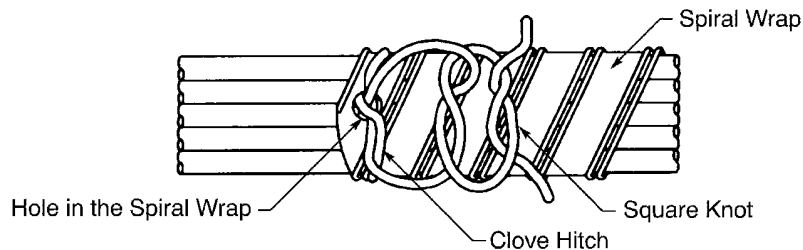
2445657 S00061544941_V1

SQUARE KNOT ON TOP OF THE CLOVE HITCH

Figure 8

- (4) Tighten the clove hitch.
- (5) Make a square knot or surgical knot on top of the clove hitch knot. Refer to Figure 8.
- (6) Cut the two ends of the tie material to make the distance between each end and the knot equal to:
 - A minimum of 0.25 inch (6.35 mm)
 - A maximum of 0.50 inch (12.7 mm).

C. Assembly of a Wire Harness Tie on Spiral Wrap



2445658 S00061544942_V1

POSITION OF THE WIRE HARNESS TIE ON THE SPIRAL WRAP

Figure 9

Refer to Figure 9.

- (1) Make a 0.075 inch to 0.175 inch (1.9 mm to 4.4 mm) diameter hole in the spiral wrap at the end.

20-24-14



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: ASSEMBLY OF WIRE HARNESS TIES

- (2) Put one end of the tie material through the hole.
- (3) Assemble a wire harness tie on the spiral wrap. Refer to Paragraph 3.A.

20-24-14



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
B. Wire Harness Components	2
C. Disconnect Identification Number	2
D. Alternative Part Numbers	2
E. Wire Data	2
F. More References	2
G. Connector or Backshell Replacement	2
2. <u>STANDARD EQUIPMENT</u>	3
A. Tools	3
B. Necessary Materials	5
3. <u>CONNECTOR DISASSEMBLY</u>	5
A. Connector Separation	5
B. Backshell Removal	7
C. Contact Removal	10
D. Front Release Contact Contact Removal	10
E. Rear Release Contact Contact Removal	11
4. <u>CONNECTOR ASSEMBLY</u>	13
A. Contact Assembly	13
B. Contact Insertion	13
C. Contact Retention Test	15
D. Seal of an Empty Contact Cavity	15
E. Backshell Assembly	16
F. Strain Relief Clamp Assembly	20
G. Hose Clamp Installation	22
5. <u>ELECTRICAL CHECKS</u>	23
A. Wire Continuity	23
B. Insulation Resistance	24
C. Engine	24

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

This Subject gives the procedures to replace a connector or a backshell on a wire harness or cable assembly.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it
Stubwire Assembly	A 4 inch wire that is sealed with a cap on one end and has a contact crimped to the other end

C. Disconnect Identification Number

Refer to the Equipment List of the Wiring Diagram Manual (WDM) to find the Disconnect Identification Number for the correct connector and backshell part numbers.

D. Alternative Part Numbers

To identify alternative part numbers, refer to the Airplane Illustrated Parts Catalog (AIPC).

E. Wire Data

Refer to the WDM Wire List (Chapter 91) for detailed pin to pin and wire color data.

F. More References

Refer to:

- Subject 20-24-12 for the insert configurations of the connectors
- Subject 20-24-14 for the assembly of the wire harness ties
- Subject 20-24-25 for the adapter plate assembly.

G. Connector or Backshell Replacement

These conditions are applicable when a connector or backshell must be replaced:

- The connector or backshell must be replaced with a connector or backshell that has the same part number; refer to the WDM Equipment list
- The part number must be correct for the Disconnect Identification Number location
- If a contact cavity of the old connector has a stub wire assembly, the same contact cavity of the new connector must have a stub wire assembly
- If a contact cavity of the old connector has an unwired contact and a seal plug, the same contact cavity of the new connector must have an unwired contact and a seal plug.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

2. STANDARD EQUIPMENT

A. Tools

WARNING: TO AVOID INJURY TO PERSONS OR DAMAGE TO EQUIPMENT WHILE AN ON-WING REPAIR IS MADE, DO NOT USE THESE TOOLS:

- A HEAT GUN
- A SOLDERING GUN
- A SOLDERING IRON.

NOTE: Alternatives to the tools specified in Table 2 must be equivalent tools.

Table 2
TOOLS

Tool	Procedure	Part Number	Supplier Code
Adapter Kit, Connector	Backshell removal from the MIL-C-83723, modified MIL-C-26500, and ESC10 connectors	CM-S-837	11851
	Backshell removal from the MIL-C-38999 series plug connectors	CM-S-389T	11851
	Backshell removal from the MIL-C-5015 series plug connectors	CM-S-5015S	11851
Contact Insertion Tool	MIL-C-26500 connector size 20 contact insertion	M81969/17-03	11851
	MIL-C-26500 connector size 16 contact insertion	M81969/17-04	11851
	MIL-C-38999 connector size 20 contact insertion	M81969/8-05	11851
	MIL-C-83723 and MIL-C-5015 connector size 20 contact insertion	M81969/14-02	11851
	MIL-C-83723 and MIL-C-5015 connector size 16 contact insertion	M81969/14-03	11851

20-24-20



**707, 727-787
STANDARD WIRING PRACTICES MANUAL**

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

Table 2 TOOLS (Continued)

Tool	Procedure	Part Number	Supplier Code
Contact Removal Tool	MIL-C-26500 connector size 20 contact front release removal	AT 2020	58164
		ATML 1907	58164
		DRK20	11851
		M81969/19-07	11851
		M81969/19-07	58164
		MS24256R20	11851
		MS24256R20	58164
	MIL-C-26500 connector size 16 contact front release removal	AT 2016	58164
		ATML 1908	58164
		DRK16	11851
		M81969/19-08	11851
		M81969/19-08	58164
		MS24256R16	11851
		MS24256R16	58164
		ST2220-3-14	81205
	MIL-C-26500 connector size 12 contact front release removal	AT 2012	58164
		ATML 1909	58164
		DRK12	11851
		M81969/19-02	11851
		M81969/19-09	58164
		MS24256R12	11851
		MS24256R12	58164
		ST2220-3-15	81205
	MIL-C-38999 connector size 20 rear release contact removal	M81969/8-06	11851
	MIL-C-83723 and MIL-C-5015 connector size 20 contact rear release removal	M81969/14-02	11851
	MIL-C-83723 and MIL-C-5015 connector size 16 contact rear release removal	M81969/14-03	11851
Digital Multimeter	Continuity measurement	Model 177	80164
Ohmmeter	Continuity measurement	Model 260	16902
Pliers, Soft Jaw	Connector and backshell removal and installation	BT-SJ-468	11851
		TG-69	06324
		TG-69	11851
Retention Test Tool	Contact retention test	HT250-4	11851

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

Table 2 TOOLS (Continued)

Tool	Procedure	Part Number	Supplier Code
Retention Test Tool Tip for Pin Contacts	Retention test for size 16 contacts	68-016-01	11851
	Retention test for size 20 contacts	68-020-01	11851
Retention Test Tool Tip for Socket Contacts	Retention test for size 16 contacts	67-016-01	11851
	Retention test for size 20 contacts	67-020-01	11851
Wrench, Strap	Connector and backshell removal and installation	BT-BS-6()	11851
		TG-70	06324
		TG-70	11851

B. Necessary Materials

NOTE: Alternatives to the materials specified in Table 3 must be equivalent materials.

Table 3
NECESSARY MATERIALS

Material	Part Number	Supplier Code
Oil, Lubricating, Turbine Engine	PWA 521B, Type II	77445
Tape, Silicone Rubber, Self-bonding, Black	Moxness 620-1	07099

3. CONNECTOR DISASSEMBLY

A. Connector Separation

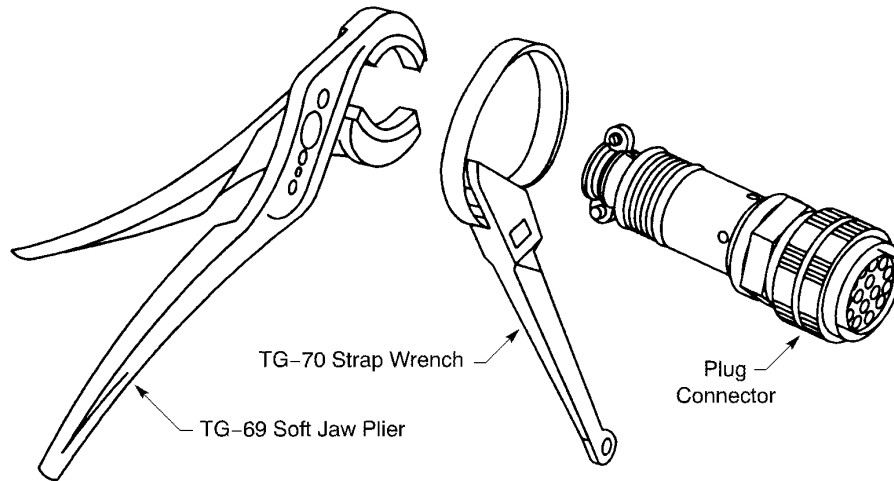
- (1) Disconnect the plug from the receptacle with the TG-69 pliers or the TG-70 strap wrench. Refer to Figure 1.

20-24-20



**707, 727-787
STANDARD WIRING PRACTICES MANUAL**

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT



2445659 S00061544945_V1

CONNECTOR SEPARATION TOOLS

Figure 1

- (2) If it is necessary, remove the adapter plate assembly and the receptacle from the engine bracket. Refer to Subject 20-24-25.

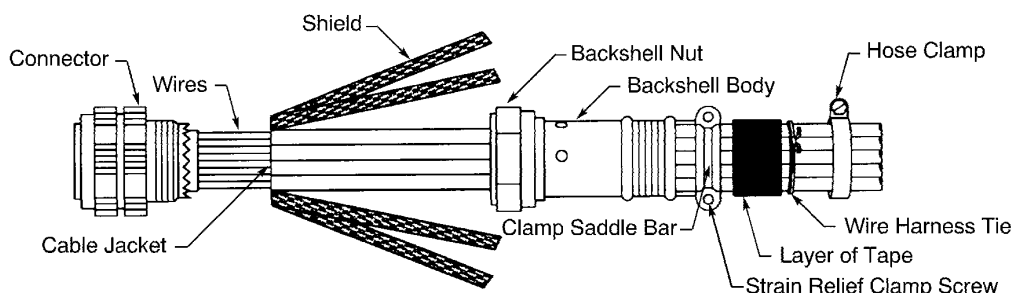
20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

B. Backshell Removal



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BACKSHELL REMOVAL

Figure 2

Refer to Figure 2.

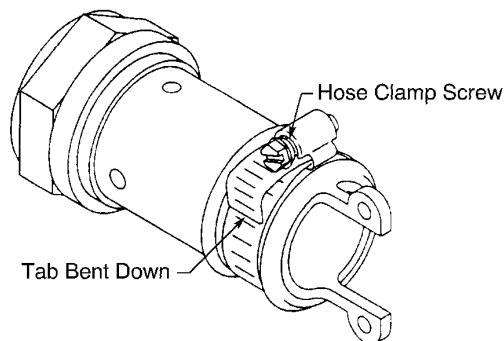
- (1) Make a mark on the connector backshell in relation to the master key or keyway on the front of the connector.
NOTE: The backshell is installed at an angular or the straight position in relation to the master key on the connector. The position must be the same after the backshell is removed and attached to the connector again.
- (2) If it is necessary to replace the backshell, make a mark on a new backshell in the same position as the mark on the old backshell.
- (3) Make a record of the direction and position of the hose clamp screw in relation to the master key on the front of the connector.
- (4) Move the hose clamp away from the repair area. Refer to Figure 3.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT



2445661 S00061544947_V1

POSITION OF THE HOSE CLAMP ON THE BACKSHELL

Figure 3

- (a) Loosen the hose clamp screw.
NOTE: If it is necessary, the tab of the hose clamp can be bent to make it straight.
- (b) Push the hose clamp rearward away from the backshell.
NOTE: If the saddle bars of the strain relief clamp stop the hose clamp, the hose clamp can be fully removed.
- (5) Loosen the strain relief clamp screws sufficiently.
NOTE: To make the removal of the backshell easier, the saddle bars of the strain relief clamp can be fully removed.
- (6) If it is necessary to remove the saddle bars:
 - (a) Make a record of the direction and position of the saddle bars and screws of the strain relief clamp in relation to the master key on the front of the connector.
NOTE: The position of the saddle bars and the screws must be the same after the backshell is assembled again.
 - (b) Remove the strain relief clamp screws.
- (7) Fold the ends of the shields rearward against the wire harness.
Make sure that the shields are flat and symmetrical around the circumference of the wire harness.
- (8) For the plug connector:
 - (a) Make a selection of a connector adapter kit from Table 2.

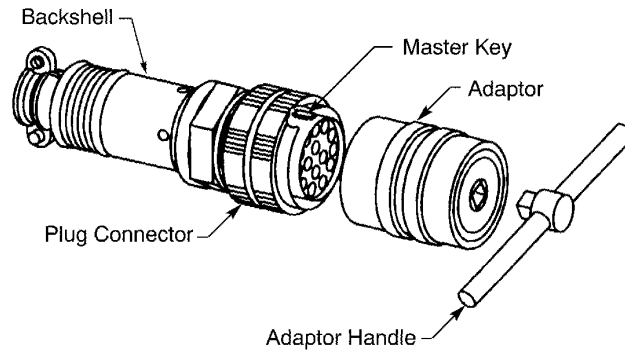
20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

- (b) Align the master key on the engaging end of the connector and the master keyway of the adaptor. Refer to Figure 4.



2445671 S00061544948_V1

ALIGNMENT OF THE ADAPTER AND THE PLUG CONNECTOR

Figure 4

- (c) Engage the adapter and the plug.
- (9) Hold the plug connector and the adaptor or the flange of the receptacle connector with a standard wrench or a small vise.
- (10) Put the TG-69 pliers or the TG-70 strap wrench on the backshell.
- NOTE:** A standard crowsfoot wrench is a satisfactory alternative.
- (11) Turn the backshell in a counterclockwise direction until it is disengaged from the connector.
- (12) Push the black rubber tape rearward away from the backshell.
- NOTE:** If it is necessary, the tape can be fully removed from the wire harness.
- (13) Push the backshell rearward away from the rear of the connector.

CAUTION: DO NOT CAUSE DAMAGE TO THE CABLES, THE WIRES, OR THE SHIELDS. DAMAGE CAN CAUSE UNSATISFACTORY PERFORMANCE OR RELIABILITY OF THE SYSTEM.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

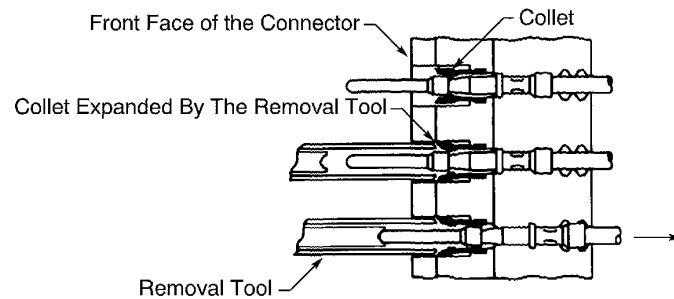
C. Contact Removal

Table 4
CONTACT REMOVAL PROCEDURES

Connector Series	Contact Retention	Procedure
D38999	Rear Release	Paragraph 3.E.
ESC10	Rear Release	Paragraph 3.E.
MIL-C-26500	Front Release	Paragraph 3.D.
MIL-C-5015	Rear Release	Paragraph 3.E.
MIL-C-83723	Rear Release	Paragraph 3.E.

- (1) If it is necessary, remove the tie material to permit the removal of the contacts.
- (2) Make a selection of a contact removal procedure. Refer to Table 4.

D. Front Release Contact Contact Removal



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FRONT RELEASE CONTACT REMOVAL
Figure 5

Refer to Figure 5.

- (1) Make a selection of a contact removal tool from Table 2.
- (2) Put the removal tool on the contact from the front face of the connector.
- (3) Axially align the removal tool and the contact.
- (4) Push the removal tool into the grommet until it stops.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

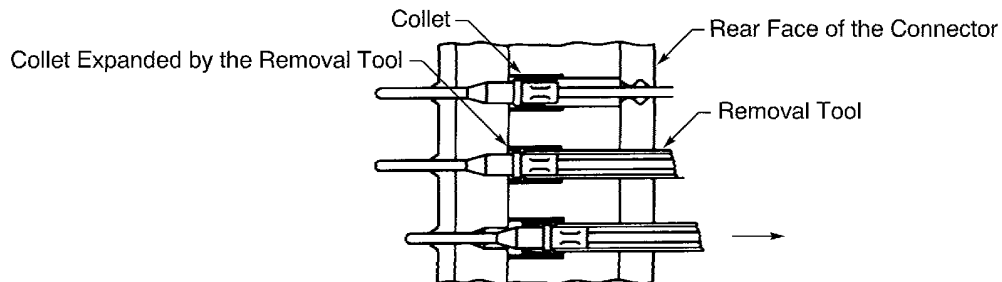
CAUTION: IF TOO MUCH PRESSURE IS APPLIED, DAMAGE TO THE COLLET, THE CONTACT, OR THE GROMMET CAN OCCUR.

NOTE: When the tool is fully inserted, it:

- Expands the collet
- Releases the contact
- Starts to push the contact out of the contact cavity.

- (5) From the rear of the connector, pull the contact out of the contact cavity.
- (6) Remove the tool from the grommet.
- (7) For a contact that is assembled with a wire:
 - (a) Make a label that identifies the contact number
 - (b) Put the label on the wire.

E. Rear Release Contact Contact Removal



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REAR RELEASE CONTACT REMOVAL
Figure 6

Refer to Figure 6.

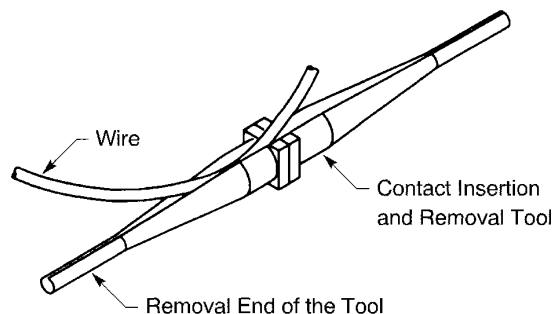
- (1) Make a selection of a contact removal tool from Table 2.
- (2) At the rear of the connector, put the removal tool on the wire. Refer to Figure 7.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT



2445664 S00061544953_V1

POSITION OF THE WIRE IN THE CONTACT REMOVAL TOOL

Figure 7

- (3) Hold the wire tight and move the tool on the wire in the direction away from the contact to make the wire go into the slot of the tool.
- (4) Axially align the removal tool and the contact.
- (5) Push the tool forward into the connector grommet until it stops.

CAUTION: IF TOO MUCH PRESSURE IS APPLIED, DAMAGE TO THE COLLET, THE CONTACT, OR THE GROMMET CAN OCCUR.

NOTE: When the tool is fully inserted, it:

- Expands the collet
- Releases the contact.

- (6) Hold the wire against the serrated shoulder of the tool.
- (7) Pull the tool and the contact assembly from the connector.
- (8) Remove the wire from the tool.
- (9) Make a label that identifies the contact number.
- (10) Put the label on the wire.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

4. CONNECTOR ASSEMBLY

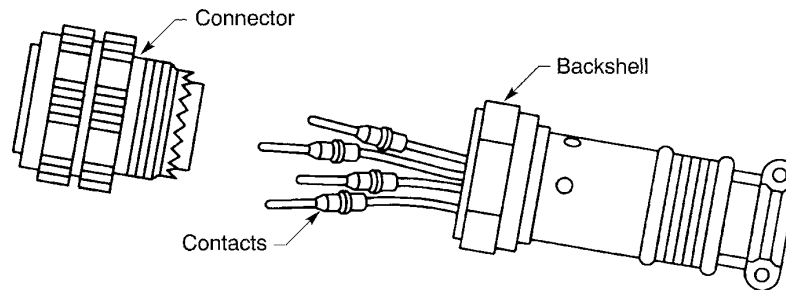
A. **Contact Assembly**

Refer to Subject 20-24-21.

B. **Contact Insertion**

NOTE: If more than one contact must be installed, it is easier to start in the center of the connector insert.

- (1) Put the backshell on the wire harness.
- (2) Push the backshell away from the end of the wire harness. Refer to Figure 8.



2445666 S00061544954_V1

POSITION OF THE BACKSHELL FOR CONTACT INSERTION

Figure 8

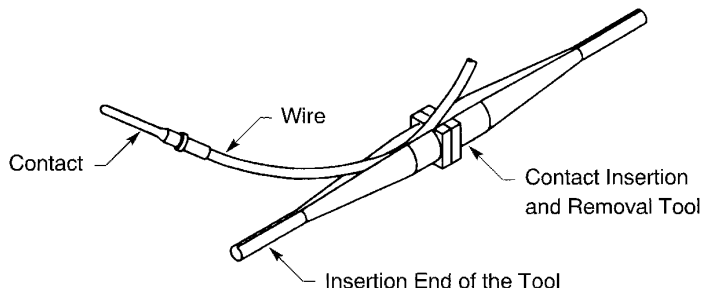
- (3) Make a selection of a contact insertion tool from Table 2.
- (4) Examine the label on the wire.
Make sure that the contact cavity is correct for the contact. Refer to the WDM Chapter 91 Wire List for the detailed wire data.
- (5) Put the insertion tool on the wire. Refer to Figure 9.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT



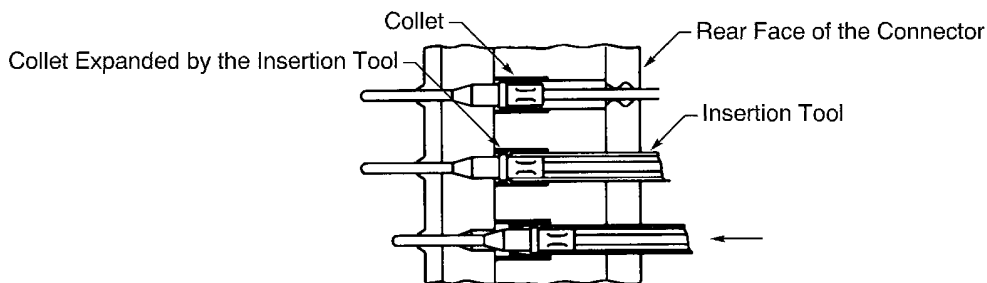
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POSITION OF THE WIRE IN THE CONTACT INSERTION TOOL

Figure 9

- (6) Hold the wire tight and move the tool on the wire in the direction away from the contact to make the wire go into the slot of the tool.
- (7) Push the tool forward until the tip of the tool is against the rear shoulder of the contact.
- (8) Carefully push the contact into the contact cavity. Refer to Figure 10.

CAUTION: IF TOO MUCH PRESSURE IS APPLIED, DAMAGE TO THE COLLET, THE CONTACT, OR THE GROMMET CAN OCCUR.



2445668 S00061544956_V1

CONTACT INSERTION

Figure 10

- (9) Remove the tool.
- (10) Lightly pull the wire.
Make sure that the contact is locked in the collet.

20-24-20

707, 727-787 STANDARD WIRING PRACTICES MANUAL

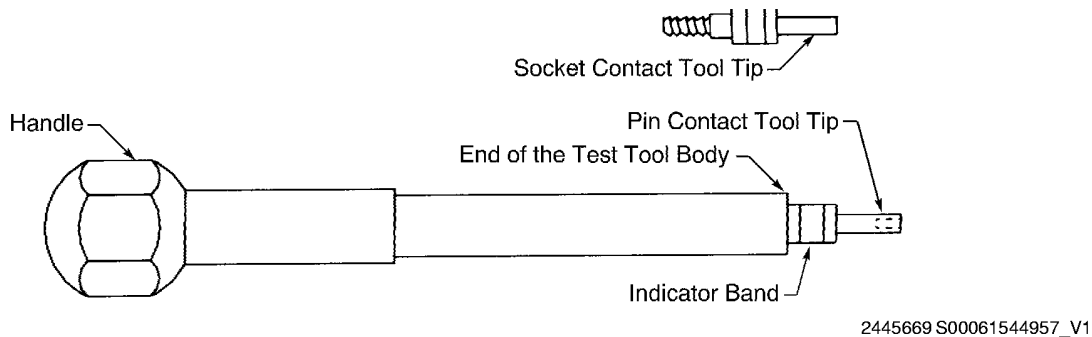
PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

(11) Do the contact retention test. Refer to Paragraph 4.C.

C. Contact Retention Test

NOTE: The contact retention force that is necessary to make sure that the contact is locked in the connector is 10 pounds to 15 pounds (44.5 Newtons to 66.7 Newtons).

(1) Make a selection of a contact retention test tool and tool tip from Table 2. Refer to Figure 11.



CONTACT RETENTION TEST TOOL

Figure 11

(2) Put the tool tip in the retention test tool.

(3) Axially align the tip and the engaging end of the contact.

(4) Put the tip on the engaging end of the contact.

NOTE: For the most accurate measurement, the test tool must stay axially aligned with the contact.

(5) Carefully apply pressure on the tool handle forward until the indicator band on the tip is aligned with the end of the body of the tool.

Make sure to keep the tip and the engaging end of the contact axially aligned.

CAUTION: IF THE CONTACT RETENTION TEST TOOL TIP AND THE CONTACT ARE NOT AXIALLY ALIGNED, DAMAGE TO THE CONTACT, THE CONNECTOR, OR THE TOOL CAN OCCUR.

NOTE: At this point, the pressure is 13 pounds (57.8 Newtons). If the contact stays in position, the contact retention is satisfactory.

D. Seal of an Empty Contact Cavity

All unused contact cavities must be sealed with the specified:

- Stub wire assembly
- An unwired contact and a seal plug.

Refer to the applicable conditions for connector replacement in Paragraph 1.G.

(1) If a stubwire assembly is specified, install the stubwire. Refer to Paragraph 4.B.

(2) If an unwired contact and seal plug are specified:

- (a) Make a selection of a contact insertion tool from Table 2.
- (b) Put the contact in the contact cavity.

707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

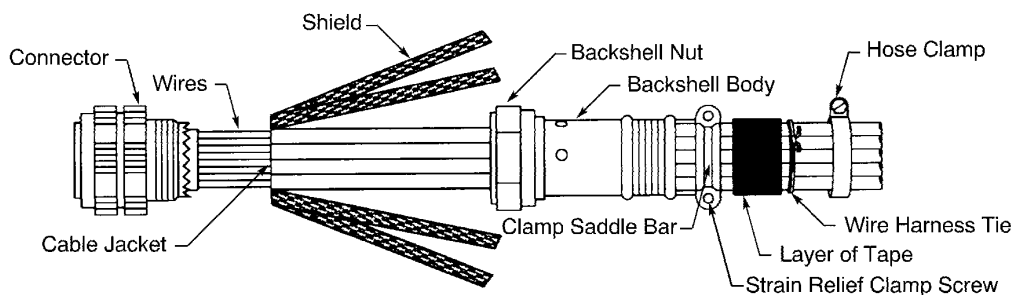
- (c) Put the end of the insertion tool on the rear shoulder of the contact.
- (d) Carefully push the contact into the contact cavity.

CAUTION: IF TOO MUCH PRESSURE IS APPLIED, DAMAGE TO THE COLLET, THE CONTACT, OR THE GROMMET CAN OCCUR.

- (e) Remove the tool.
- (f) Do the contact retention test. Refer to Paragraph 4.C.
- (g) Install a seal plug in the contact cavity.

Make sure that the large end of the seal plug is put in the contact cavity first.

E. Backshell Assembly



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BACKSHELL ASSEMBLY

Figure 12

Refer to Figure 12.

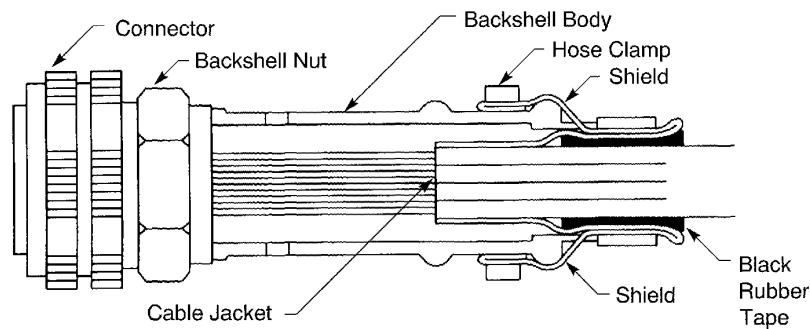
- (1) Assemble the necessary wire harness ties. Refer to Subject 20-24-14.
- (2) Fold the ends of the shields rearward against the wire harness.
Make sure that the shields are flat and symmetrical around the circumference of the wire harness.
NOTE: If it is necessary, tape can be used to temporarily hold the shields on the harness.
- (3) Move the backshell forward until the backshell nut is against the rear of the connector. Refer to Figure 13.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT



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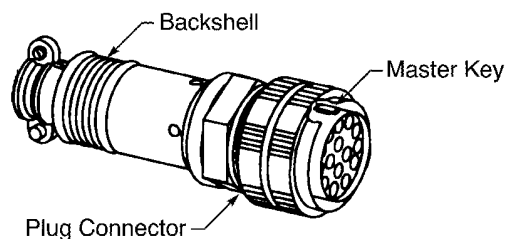
POSITION OF THE BACKSHELL AGAINST THE REAR OF THE CONNECTOR

Figure 13

- (4) Align the mark on the backshell, from the removal of the backshell in Paragraph 3.B., with the master key on the front face of the connector. Refer to Figure 14.

CAUTION: IF THE MARK ON THE BACKSHELL IS NOT ALIGNED WITH THE MASTER KEY ON THE CONNECTOR:

- THE CONNECTOR AND THE BACKSHELL DO NOT ENGAGE CORRECTLY
- DAMAGE TO THE ANTI-ROTATION TEETH OF THE CONNECTOR OR THE BACKSHELL CAN OCCUR.



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ALIGNMENT OF THE BACKSHELL AND THE MASTER KEY OF THE CONNECTOR

Figure 14

- (5) Engage the threads of the backshell nut and the connector.

20-24-20

707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

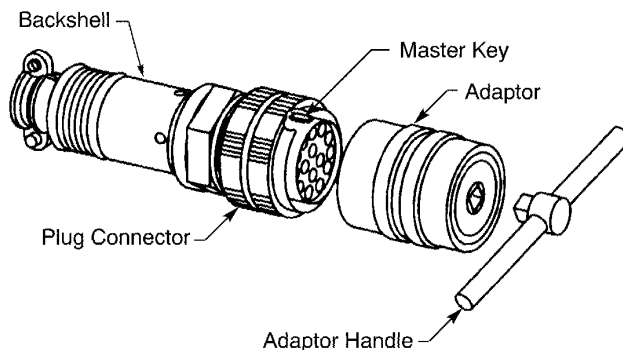
- (6) Tighten the nut and, at the same time, lightly twist the backshell clockwise and counterclockwise to engage the anti-rotation teeth.

Make sure that:

- The mark on the backshell stays aligned with the master key on the connector
- The anti-rotation teeth of the connector and the backshell engage correctly.

NOTE: The anti-rotation teeth can be examined through the inspection hole on the coupling nut of the backshell.

- (7) For the plug connector:
- (a) Make a selection of a connector adapter kit from Table 2.
 - (b) Align the master key on the engaging end of the connector and the master keyway of the adapter. Refer to Figure 15.



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ALIGNMENT OF THE ADAPTER AND THE PLUG CONNECTOR

Figure 15

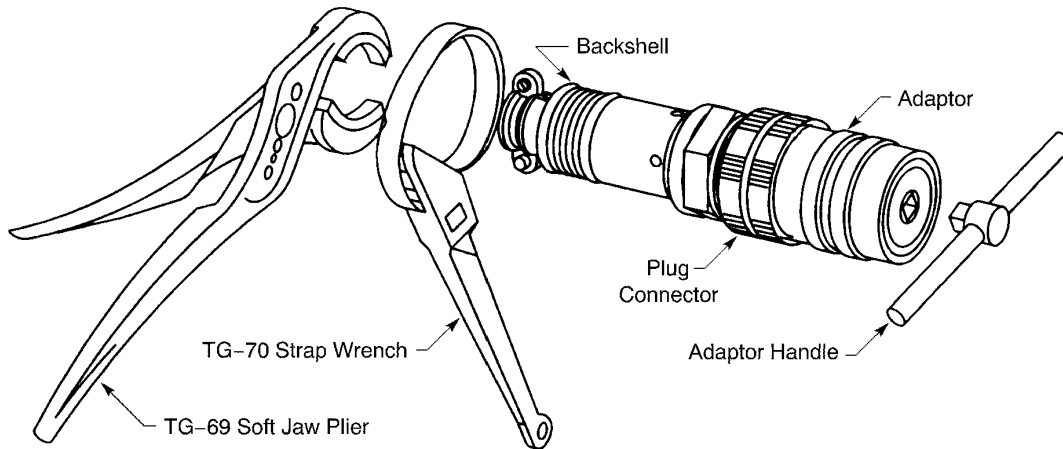
- (c) Engage the adapter and the plug.
- (8) Hold the plug connector and the adaptor or the flange of the receptacle connector with a standard wrench or a small vise.
- (9) Put the TG-69 pliers or the TG-70 strap wrench on the backshell. Refer to Figure 16.

NOTE: As an alternative, a standard crowsfoot wrench can be used.



**707, 727-787
STANDARD WIRING PRACTICES MANUAL**

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT



2445672 S00061544962_V1

BACKSHELL INSTALLATION ON A PLUG CONNECTOR

Figure 16

- (10) To make sure that the anti-rotation teeth in the connector and the backshell are engaged correctly:
 - (a) Move the backshell from one side of the longitudinal axis of the wire harness to the other side.
 - (b) Twist the backshell in a clockwise and counterclockwise direction.
- (11) Torque the backshell nut 115 inch-pounds to 125 inch-pounds (511.5 Newton-meters to 556 Newton-meters).
- (12) Remove the temporary layer of tape that holds the shields to the harness.

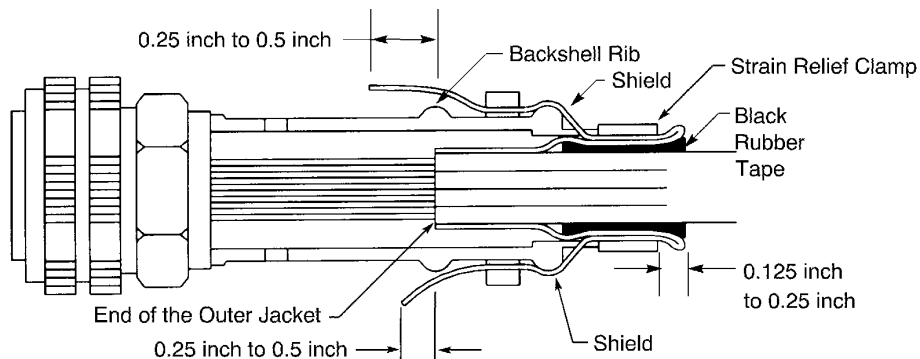
20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

F. Strain Relief Clamp Assembly



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POSITION OF THE CABLE SHIELDS

Figure 17

Refer to Figure 17.

- (1) Put the wire harness in the correct position.
Make sure that the end of the outer jacket of each cable extends 0.25 inch to 0.50 inch (6.35 mm to 12.7 mm) forward from the rear end of the primary backshell body.
NOTE: The strain relief clamp part of the backshell is not part of the primary backshell body.
- (2) Fold the shields forward on top of the backshell.
Make sure that the shields are flat and symmetrical around the circumference of the backshell.
- (3) Remove the necessary length from the end of each shield to make the distance from the forward rib of the backshell to the end of the shield equal to 0.24 inch to 0.5 inch.
- (4) If the black rubber tape is on the wire harness:
 - (a) Hold the cables tight from the rear.
 - (b) Carefully push the tape forward until the center of the tape is aligned with the screw holes in the ears of the strain relief clamp.
- (5) If the black rubber tape is not on the wire harness:
 - (a) Make a selection of a black rubber tape from Table 3.
 - (b) Put the necessary layers of the tape on the harness between the ears of the strain relief clamp.

Make sure that:

20-24-20



707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

- The layers of tape make a 100 percent overlap
 - The number of layers of the tape is sufficient for the saddle bars to hold the wire harness tightly.
- (c) Hold the cables tight from the rear.
- (d) Carefully push the tape forward until the center of the tape is aligned with the screw holes in the ears of the strain relief clamp.
- (6) Install the saddle bars on the strain relief clamp:
- (a) Align the screw holes of the saddle bars with the holes in the strain relief clamp ears.
- Make sure that the position of the saddle bars is the same as the position of the saddle bars before the backshell was disassembled.
- (b) Engage the first two or three threads of the clamp screws with the threads of the clamp ears.
- Make sure that the direction that the screws are pointed is the same as the direction that the screws pointed before the backshell was disassembled.
- (7) Fold each shield forward between the layer of tape and the saddle bars.
- Make sure that:
- The shields are flat and symmetrical around the circumference of the backshell
 - A shield does not make an overlap with the other shields
 - The rear end of the shield is 0.125 inch to 0.25 inch (3.2 mm to 6.4 mm) from the rear end of the saddle bar of the strain relief clamp.
- (8) Tighten each screw two turns at a time until the saddle bars are against the clamp ears.
- Make sure that:
- The wire harness does not move in the clamp
 - The tape is not between the clamp ears and the saddle bars.
- (9) If the saddle bars are not against the clamp ears:
- (a) Remove the saddle bars.
- (b) Remove the necessary layers of the tape.
- (c) Do Step 4.F.(4) through Step 4.F.(8) again.
- (10) If the clamp does not hold the wire harness tightly:
- (a) Remove the saddle bars.
- (b) Add the necessary layers of the tape.
- (c) Do Step 4.F.(4) through Step 4.F.(8) again.

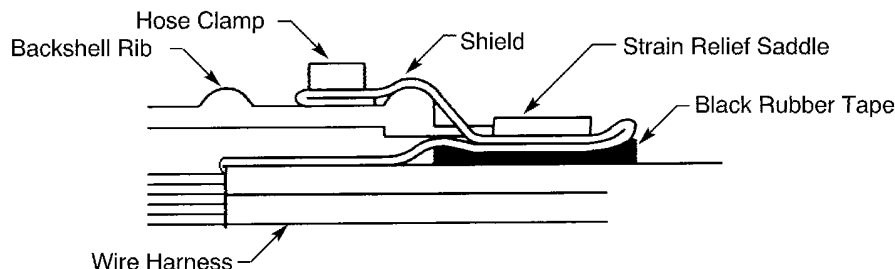
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707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

G. Hose Clamp Installation



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POSITION OF THE HOSE CLAMP ON THE BACKSHELL
Figure 18

Refer to Figure 18.

- (1) Fold the end of each shield rearward and down against the body of the backshell.
Make sure that:
 - The shields are flat and symmetrical around the circumference of the backshell
 - A shield does not make an overlap with the other shields.
- (2) Put the hose clamp on the shields in the area between the backshell ribs.
Make sure that the position of the hose clamp is the same as the initial position before the removal of the backshell.
- (3) Carefully align each shield under the clamp.
Make sure that:
 - The folded edge of each shield extends a small distance farther the edge of the clamp
 - A shield is not put between the backshell and the hose clamp screw.

CAUTION: IF A SHIELD IS PUT THE BACKSHELL AND THE HOSE CLAMP SCREW, DAMAGE TO THE SHIELD CAN OCCUR.

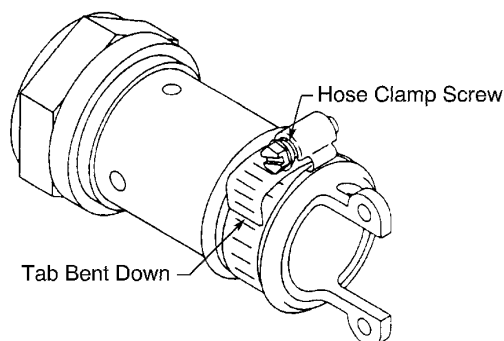
- (4) Tighten the screw.
- (5) Bend the end of the hose clamp down until it is against the part of the hose clamp that is against the backshell. Refer to Figure 19.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT



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POSITION OF THE END OF THE HOSE CLAMP
Figure 19

- (6) Do the necessary electrical checks. Refer to Paragraph 5.

5. **ELECTRICAL CHECKS**

Electrical checks must be done for all circuits. Refer to the WDM Chapter 91 Wire List for the detailed pin to pin and the wire color data.

A. **Wire Continuity**

- (1) Disconnect the wire harness connectors from the ends of the circuit with the TG-69 pliers or the TG-70 strap wrench.
- (2) Make a selection of a multimeter or an ohmmeter from Table 2.
- (3) Do the wire continuity check from the contact on one end of the wire to the contact on the other end of the wire.

Make sure that each circuit has continuity from the contact on one end of the wire to the contact on the other end of the wire.

CAUTION: DO NOT PUT STRESS ON OR BEND THE CONTACTS. DAMAGE TO THE CONNECTOR OR THE CONTACTS CAN OCCUR.

20-24-20



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR AND BACKSHELL REPLACEMENT

B. Insulation Resistance

WARNING: A MEGOHMMETER MUST NOT BE USED FOR THE INSULATION RESISTANCE TEST OF THE ON-WING WIRE REPAIR. A MEGOHMMETER CAN CAUSE:

- PERSONAL INJURY
- DAMAGE TO THE AIRPLANE.

CAUTION: DO NOT PUT STRESS ON OR BEND THE CONTACTS. DAMAGE TO THE CONNECTOR OR THE CONTACTS CAN OCCUR.

- (1) Make a selection of a multimeter or an ohmmeter from Table 2.
- (2) Set the ohmmeter scale to 100K ohms.
- (3) Disconnect all of the connectors on the circuit before the insulation resistance check.

CAUTION: IF ALL OF THE CONNECTORS ARE NOT DISCONNECTED:

- UNSATISFACTORY RESISTANCE INDICATION CAN OCCUR
- POSSIBLE DAMAGE TO THE CIRCUITS CAN OCCUR.

- (4) Measure the insulation resistance:
 - (a) Attach one lead of the ohmmeter to a contact.
 - (b) With the other lead of the ohmmeter, touch the contacts of a different circuit one at a time.

NOTE: The minimum resistance is 100K ohms.
 - (c) Attach one lead of the ohmmeter to the connector backshell.
 - (d) With the other lead of the ohmmeter, touch the contacts of a different circuit one at a time.

NOTE: The minimum resistance is 100K ohms.

- (5) Install and connect the plugs and receptacles again. Refer to Subject 20-24-25.

C. Engine

Refer to the test reference table in the Aircraft Maintenance Manual 71-00-00/501.



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: CONTACT REPLACEMENT

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
B. Wire Harness Components	2
C. Conditions for Contact Replacement	2
D. Contact Part Numbers	2
E. References	2
2. <u>STANDARD EQUIPMENT</u>	3
A. Tools	3
B. Necessary Materials	3
3. <u>CONTACT REPLACEMENT</u>	3
A. Connector Disassembly	3
B. Connector Assembly	5
4. <u>CONTACT ASSEMBLY</u>	5
A. Contact Selection	5
B. Crimp Tool Preparation	5
C. Contact Assembly	6

20-24-21



707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONTACT REPLACEMENT

This Subject gives the procedure to replace a pin or a socket contact in a connector.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it

C. Conditions for Contact Replacement

Before the first replacement of a contact, each wire is a minimum of 0.250 inch (6.35 mm) longer than the minimum length that is necessary for insertion of the contact and the assembly of the backshell.

These conditions are applicable:

- A contact on a wire can be replaced twice before the wire is too short for insertion of the contact into the connector
- If it is necessary to replace a contact on a wire in a cable more than 2 times, the cable must be replaced; refer to Subject 20-24-24.

D. Contact Part Numbers

Refer to:

- The Wiring Diagram Manual (WDM) Equipment List for the connector Disconnect Identification Number for the correct contact part numbers
- The Aircraft Illustrated Parts Catalog (AIPC) for alternate part numbers.

E. References

Refer to:

- The WDM Chapter 91 Wire List for the contact to contact hookup and wire color data
- Subject 20-24-12 for the insert configurations of the connectors
- Subject 20-24-14 for the assembly of the wire harness ties
- Subject 20-24-20 for the procedures to replace the connector and the connector backshell
- Subject 20-24-24 for the procedures to replace the wire harness cables
- Subject 20-24-25 for the adapter plate assembly.

20-24-21



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONTACT REPLACEMENT

2. STANDARD EQUIPMENT

A. Tools

NOTE: Alternatives to the tools specified in Table 2 must be equivalent tools.

WARNING: TO AVOID INJURY TO PERSONS OR DAMAGE TO EQUIPMENT WHILE AN ON-WING REPAIR IS MADE, DO NOT USE THESE TOOLS:

- A HEAT GUN
- A SOLDERING GUN
- A SOLDERING IRON.

Table 2
TOOLS

Tool	Procedure	Part Number	Supplier Code
Contact Crimp Tool Basic Unit	Contact assembly	M22520/7-01	11851
Contact Crimp Tool Locator	Size 20 contact assembly for MIL-C-38999 connectors	M22520/7-08	11851
	Size 20 contact assembly except for MIL-C-38999 connectors	M22520/7-02	11851
	Size 16 contact assembly	M22520/7-03	11851
Pliers, Soft Jaw	Connector and backshell removal and installation	BT-SJ-468	11851
		TG-69	06324
		TG-69	11851
Wire Insulation Removal Tool	Removal of the wire insulation	45-092	11851
Wrench, Strap	Connector and backshell removal and installation	BT-BS-6()	11851
		TG-70	06324
		TG-70	11851

B. Necessary Materials

No materials are necessary for the replacement of a contact.

3. CONTACT REPLACEMENT

A. Connector Disassembly

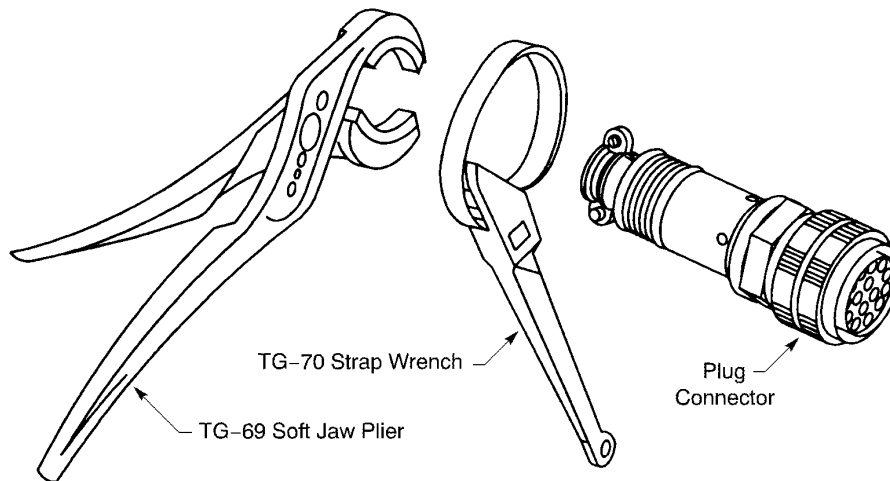
Refer to Paragraph 1.C. for the conditions that are applicable for contact replacement.

- (1) Disconnect the plug from the receptacle with the TG-69 pliers or the TG-70 strap wrench. Refer to Figure 1.

20-24-21



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: CONTACT REPLACEMENT

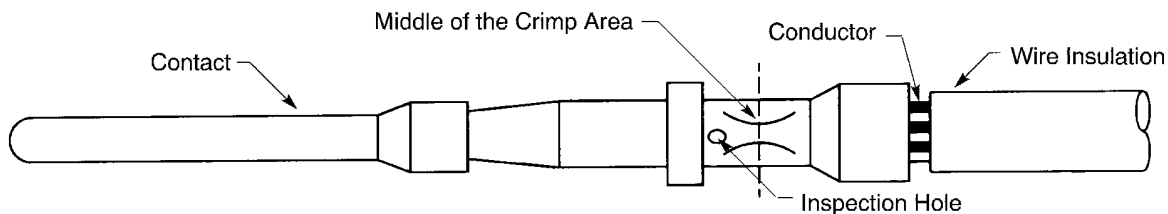


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CONNECTOR SEPARATION TOOLS

Figure 1

- (2) If it is necessary, remove the adapter plate assembly and the receptacle from the engine bracket. Refer to Subject 20-24-25.
- (3) If the connector has a backshell, remove it. Refer to Subject 20-24-20.
- (4) Remove the contact from the connector. Refer to Subject 20-24-20.
- (5) Cut the contact in the middle of the crimp area on the contact barrel. Refer to Figure 2.



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LOCATION TO CUT THE CONTACT

Figure 2

- (6) Carefully remove the remaining part of the crimp barrel that is on the conductor.

20-24-21



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONTACT REPLACEMENT

B. Connector Assembly

- (1) Assemble the contact. Refer to Paragraph 4.
- (2) Assemble the connector. Refer to Subject 20-24-20.
Make sure to do all the necessary electrical checks.

4. CONTACT ASSEMBLY

A. Contact Selection

- (1) Find the contact part number that is related to Connector Disconnect Identification Number. Refer to the WDM Equipment List.

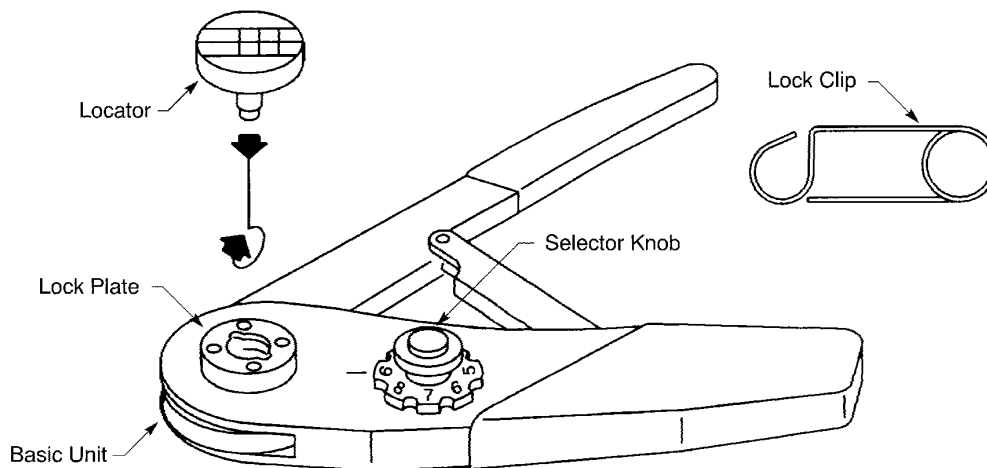
NOTE: For the part numbers of the alternative contacts, refer to the AIPC.

B. Crimp Tool Preparation

- (1) Make a selection of a crimp tool from Table 2.
Make sure to use the correct locator for each contact size.
- (2) Assemble the crimp tool. Refer to Figure 3.

CAUTION: TO AVOID DAMAGE TO THE CRIMP TOOL, THE HANDLE OF THE BASIC UNIT MUST BE IN THE OPEN POSITION WHEN THE LOCATOR IS:

- INSTALLED
- REMOVED
- RELEASED.



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CONTACT CRIMP TOOL
Figure 3

20-24-21



707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONTACT REPLACEMENT

- (a) Remove the lock clip from the lock ring on the locator.
 - (b) Put the locator in the lock plate of the basic unit.
 - (c) Align the locator pins with the ring slots on the lock plate.
 - (d) Push the locator into the basic unit.
 - (e) Turn the locator in a clockwise direction until it locks in position, approximately 90 degrees.
 - (f) Put the lock clip in the lock ring.
- (3) Adjust the crimp tool.

CAUTION: IF THE SELECTOR KNOB OF THE BASIC UNIT IS IN AN INCORRECT POSITION WHEN THE CONTACT IS CRIMPED:

- DAMAGE TO THE CONTACT CAN OCCUR
- UNSATISFACTORY RELIABILITY AND PERFORMANCE OF THE CONTACT ASSEMBLY CAN OCCUR.

- (a) Remove the lock clip from the lock ring hole in the selector knob.
- (b) Raise and turn the selector knob of the basic unit until the number on the knob is the same as the number on the locator data plate for the wire size.
- (c) Put the lock clip in the lock ring hole.
- (d) Align the number on the knob to the index mark on the basic unit and release the knob.

C. Contact Assembly

- (1) Make a selection of a wire insulation removal tool from Table 2.
- (2) Remove the necessary length of the insulation from the end of the wire to make the distance from the end of the insulation to the end of the conductor equal to 0.250 inch (6.35 mm). Refer to Figure 4.

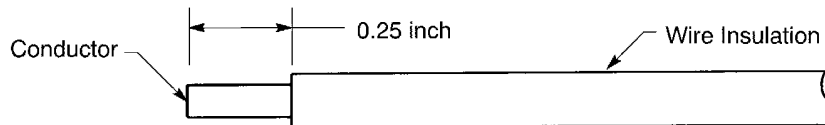
CAUTION: IF LESS THAN THE SPECIFIED LENGTH OF INSULATION IS REMOVED, THE END OF THE CONDUCTOR DOES NOT TOUCH THE FORWARD END OF THE CRIMP BARREL OF THE CONTACT.

CAUTION: IF MORE THAN THE SPECIFIED LENGTH OF INSULATION IS REMOVED, TOO MUCH BARE CONDUCTOR IS OUTSIDE THE REAR END OF CRIMP BARREL OF THE CONTACT.

20-24-21



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: CONTACT REPLACEMENT

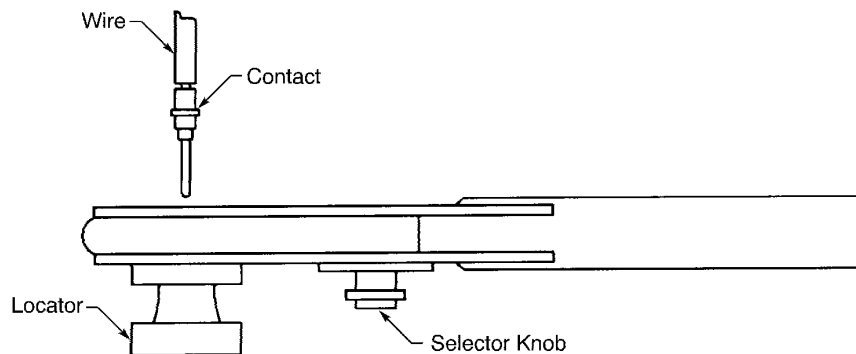


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INSULATION REMOVAL LENGTH

Figure 4

- (3) If it is necessary, carefully twist the strands of the conductor together.
Make sure that the strands are twisted in the same direction as the strands are twisted before the removal of the insulation.
- (4) Put the end of the wire in the crimp barrel of the contact.
Make sure that:
 - The end of the wire is against the forward end of the crimp barrel
 - The strands of the conductor can be seen in the inspection hole.
- (5) Put the wire and the contact in the locator of the crimp tool. Refer to Figure 5.
Make sure that the forward end of the contact is against the bottom of the locator.



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ALIGNMENT OF THE WIRE, THE CONTACT, AND THE CRIMP TOOL

Figure 5

20-24-21



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONTACT REPLACEMENT

- (6) Close the handles of the basic unit until the ratchet is released.

CAUTION: DO NOT RELEASE THE LATCH FOR THE LOCATOR WHEN THE BASIC UNIT HANDLE IS IN THE CLOSED POSITION.

- (7) Remove the contact assembly from the tool.
- (8) Hold the wire and lightly pull the contact to make sure that the contact is crimped on the conductor.

20-24-21



707, 727-787
STANDARD WIRING PRACTICES MANUAL
PW4000/777 POWER PLANT: CABLE JACKET REPAIR

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
B. Wire Harness Components	2
C. Conditions for the Replacement of a Cable	2
D. Conditions for the Repair of a Cable	2
E. References	2
2. <u>STANDARD EQUIPMENT</u>	3
A. Tools	3
B. Necessary Materials	3
3. <u>REPAIR OF A CABLE JACKET</u>	3
A. Cable Preparation	3
B. Installation of the Tape	4
C. Installation of the Wire Harness	5

20-24-22



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CABLE JACKET REPAIR

This Subject gives the procedure to repair the damaged outer jacket of a cable.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it

C. Conditions for the Replacement of a Cable

Refer to Paragraph 1.D. for the conditions that are applicable for the repair of a cable.

A cable must be replaced if one or more of these conditions occur:

- The shield of a shielded cable has damage
- The cable jacket has damage that is more than 50 percent of the circumference of the cable
- The cable jacket has damage that is more than 2.0 inches (50.8 mm) in length parallel to the length of the cable.

For the procedures to replace a shielded cable, refer to Subject 20-24-24.

D. Conditions for the Repair of a Cable

The jacket of a cable can be repaired when these conditions occur:

- If the cable has a shield, the shield of the cable does not have damage
- The wires of the cable do not have damage
- The cable jacket has damage that is less than or equal to 50 percent the circumference of the cable
- The cable jacket has damage that is less than or equal to 2.0 inches (50.8 mm) in length parallel to the length of the cable.

Refer to Paragraph 3.

E. References

Refer to Subject 20-24-14 for the procedures to assemble a wire harness tie.

20-24-22



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CABLE JACKET REPAIR

2. STANDARD EQUIPMENT

A. Tools

No special tools are necessary for the repair of a cable jacket.

WARNING: TO AVOID INJURY TO PERSONS OR DAMAGE TO EQUIPMENT WHILE AN ON-WING REPAIR IS MADE, DO NOT USE THESE TOOLS:

- A HEAT GUN
- A SOLDERING GUN
- A SOLDERING IRON.

B. Necessary Materials

NOTE: Alternatives to the materials specified in Table 2 must be equivalent materials.

Table 2
NECESSARY MATERIALS

Material	Part Number	Supplier Code
Alcohol, Isopropyl	TT-I-735	Local
Cloth, Clean, Lint Free	-	Local
Tape, Electrical Silicone, Inner Layer	Scotch No. 92	04963
Tape, Electrical Silicone, Outer Layer	Scotch No. 62	04963
Tape, Lacing, White	718Z	82110

3. REPAIR OF A CABLE JACKET

A. Cable Preparation

- (1) If it necessary to get sufficient access to the area where the jacket of the cable has damage, remove the wire harness.
- (2) If it not necessary to remove the wire harness:
 - (a) Remove the necessary wire harness ties.
 - (b) Loosen the necessary hinged clamp bolts.
- (3) Put a small amount of isopropyl alcohol on a clean cloth. Refer to Table 2.
Make sure to use the necessary skin and eye protection.

WARNING: ISOPROPYL ALCOHOL:

- IS FLAMMABLE
 - IS DANGEROUS TO THE SKIN, THE EYES, AND THE RESPIRATORY SYSTEM
 - MUST BE USED IN A WORK AREA THAT HAS A GOOD FLOW OF AIR
 - MUST NOT BE HANDLED FOR LONG PERIODS OF TIME.
- (4) With the moist cloth, clean:
 - The area of the damaged jacket

20-24-22

707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CABLE JACKET REPAIR

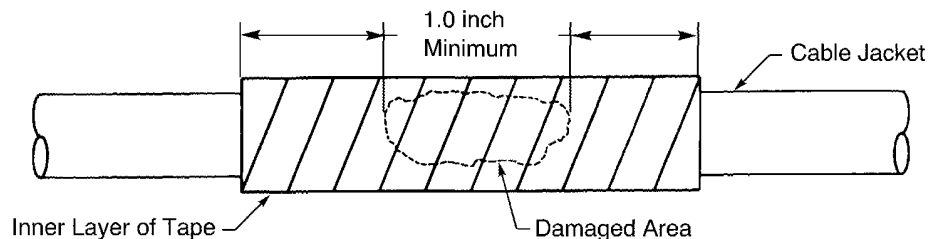
- 3.0 inches (76.2 mm) of the cable on both sides of the damaged area.

B. Installation of the Tape

- (1) Make a selection of a tape for the inner layer from Table 2.
- (2) Put a layer of the tape on the cable. Refer to Figure 1.

Make sure that:

- Each end of the layer of tape is 1.0 inch (25.4 mm) minimum farther than the ends of the damaged area
- The layer of tape makes a 20 percent overlap.



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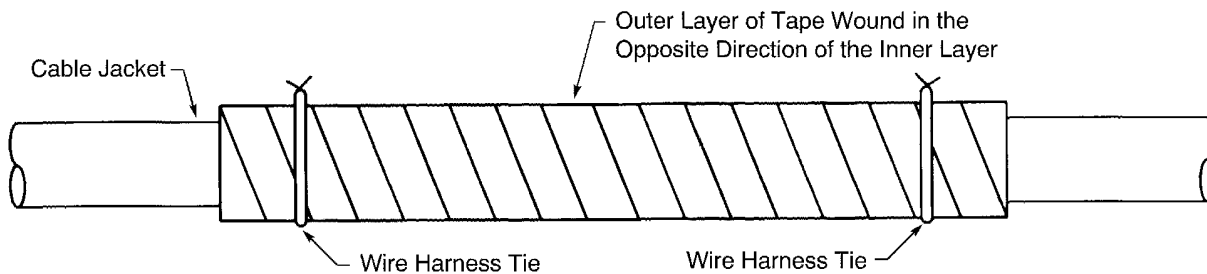
INNER LAYER OF TAPE

Figure 1

- (3) Make a selection of a tape for the outer layer from Table 2.
- (4) Put one more layer of the tape on the cable. Refer to Figure 2.

Make sure that:

- Each end of the layer of tape is 0.5 inch (12.7 mm) minimum farther than the ends of the inner layer
- The layer of tape is wound in the opposite direction of the inner layer
- The layer of tape makes a 20 percent overlap.



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OUTER LAYER OF TAPE LAYER

Figure 2

- (5) Assemble a wire harness tie on the cable at each end of the tape.
Refer to:

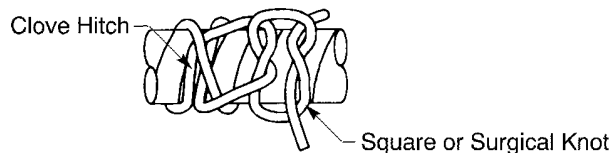
20-24-22



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CABLE JACKET REPAIR

- Figure 2
- Figure 3
- Subject 20-24-14.



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TIE ON THE END OF THE TAPE
Figure 3

C. Installation of the Wire Harness

- (1) If the wire harness is removed from the hinged clamps:
 - (a) Put the harness back into the clamps.
Make sure that the tracer cord stays on the outboard side of the harness.
 - (b) Torque the bolts 36 inch-pounds to 40 inch-pounds (4.067 Newton-meters to 4.519 Newton-meters).
- (2) If wire harness ties are removed, assemble new ties on the harness in the same location. Refer to Subject 20-24-14.
- (3) If the bolts of a hinged clamp are loosened, torque the bolts 36 inch-pounds to 40 inch-pounds (4.067 Newton-meters to 4.519 Newton-meters).

20-24-22



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE

TABLE OF CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
1.	<u>GENERAL DATA</u>	2
	A. Applicable Conditions	2
	B. Wire Harness Components	2
	C. Conditions for the Replacement of a Shielded Cable	2
	D. Conditions for the Repair of a Shielded Cable	2
	E. Removal of the Damaged Cable	3
	F. Disconnect Identification Number	3
	G. Alternative Part Numbers	3
	H. Wire Data	3
	I. References	3
2.	<u>STANDARD EQUIPMENT</u>	3
	A. Tools	3
	B. Necessary Materials	4
3.	<u>REPLACEMENT OF A SHIELDED CABLE</u>	4
	A. Installation of the New Cable on the Wire Harness	4
	B. Preparation of the New Cable	6
	C. Insulation of the Damaged Cable	7
	D. Connector Assembly	8
	E. Electrical Checks	9

20-24-24



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE

This Subject gives the procedure to replace a damaged or open circuit shielded cable with a new shielded cable.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it

C. Conditions for the Replacement of a Shielded Cable

Refer to Paragraph 1.D. for the conditions that are applicable for the repair of a shielded cable.

A shielded cable must be replaced if one or more of these conditions occur:

- The shield of the cable has damage
- The cable jacket has damage that is more than 50 percent of the circumference of the cable
- The cable jacket has damage that is more than 2.0 inches (50.8 mm) in length parallel to the length of the cable.

The replacement cable must be:

- The same type of cable as the damaged cable
- Installed on the outer surface of the wire harness
- Installed in the harness clamps.

D. Conditions for the Repair of a Shielded Cable

The jacket of a cable can be repaired when these conditions occur:

- The shield of the cable does not have damage
- The cable jacket has damage that is less than or equal to 50 percent the circumference of the cable
- The cable jacket has damage that is less than or equal to 2.0 inches (50.8 mm) in length parallel to the length of the cable.

Refer to Subject 20-24-22.

20-24-24



707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE

E. Removal of the Damaged Cable

The damaged cable can be removed from the wire harness when one of these conditions occur:

- The wire harness is removed from the engine
- The next maintenance of the power plant is done.

F. Disconnect Identification Number

Refer to the Equipment List of the Wiring Diagram Manual (WDM) to find the Disconnect Identification Number for the correct contact part numbers.

G. Alternative Part Numbers

To identify alternative part numbers, refer to the Airplane Illustrated Parts Catalog (AIPC).

H. Wire Data

Refer to the WDM Wire List (Chapter 91) for wire type, size, pin to pin, and wire color data.

I. References

Refer to:

- Subject 20-24-12 for the insert configurations of the connectors
- Subject 20-24-14 for the assembly of wire harness ties
- Subject 20-24-20 for the replacement of the backshell and the connector
- Subject 20-24-21 for the replacement of the contacts
- Subject 20-24-25 for the replacement of the adapter plates.

2. STANDARD EQUIPMENT

A. Tools

WARNING: TO AVOID INJURY TO PERSONS OR DAMAGE TO EQUIPMENT WHILE AN ON-WING REPAIR IS MADE, DO NOT USE THESE TOOLS:

- A HEAT GUN
- A SOLDERING GUN
- A SOLDERING IRON.

NOTE: Alternatives to the tools specified in must Table 2 be equivalent tools.

**Table 2
TOOLS**

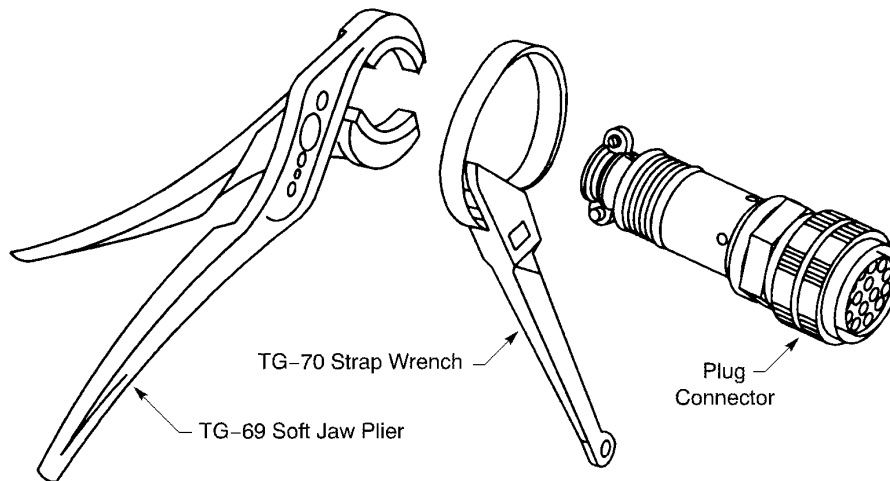
Tool	Procedure	Part Number	Supplier Code
Pliers, Soft Jaw	Connector and backshell removal and installation	BT-SJ-468	11851
		TG-69	06324
		TG-69	11851
Wrench, Strap	Connector and backshell removal and installation	BT-BS-6()	11851
		TG-70	06324
		TG-70	11851
Wire Insulation Removal Tool	Removal of wire insulation	45-092	11851

20-24-24



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE



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CONNECTOR SEPARATION AND ASSEMBLY TOOLS

Figure 1

B. Necessary Materials

NOTE: Alternatives to the materials specified in Table 3 must be equivalent materials.

Table 3
NECESSARY MATERIALS

Material	Part Number	Supplier Code
Tape, Lacing, White	718Z	82110
Tape, Silicone Rubber, Self-bonding, Black	Moxness 620-1	07099

3. REPLACEMENT OF A SHIELDED CABLE

A. Installation of the New Cable on the Wire Harness

- (1) Identify the connectors that are attached to the ends of the damaged cable.
- (2) Make a selection of a replacement cable. Refer to the WDM Chapter 91 Wire List.
Make sure that the replacement cable type is the same type as the damaged cable.
- (3) Make a selection of silicone rubber tape from Table 3.
- (4) Temporarily attach the end of the replacement cable to one end of the wire harness with tape.
Make sure that:
 - The end of the replacement cable extends 6 inches (150 mm) farther than the connector of the damaged cable
 - The replacement cable is on the outer surface of the harness

20-24-24



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE

- The tape is in a location where it can be removed.
- (5) Temporarily attach the replacement cable to the other end of the harness.
- (6) Cut the replacement cable at the location that is 6 inches (150 mm) farther than the connector on the end of the damaged cable.
- (7) Put the replacement cable in the same hinged clamps that hold the harness.

Make sure:

- To do one clamp at a time
- To start with the clamp that is the nearest the connector on one end of the harness
- That the routing of the harness tracer cord is outboard along the full length of the harness.

CAUTION: DO NOT ALLOW THE FULL WEIGHT OF THE HARNESS TO HANG ON AN ELECTRICAL CONNECTOR WITHOUT OTHER SUPPORT. DAMAGE TO THE CONNECTOR OR THE HARNESS CAN OCCUR.

- (a) Open the hinged clamp.
 - (b) Put the cable in the hinged clamp.
 - (c) Pull the cable to make it:
 - Tight
 - Flat against the harness
 - Parallel to the harness.
 - (d) Close the hinged clamp.
- (8) Assemble the necessary wire harness ties on the harness and the replacement cable. Refer to Subject 20-24-14.
- Make sure that each tie is assembled:
- Between each of the hinged clamps
 - At the center point between the two clamps.
- (9) Torque the hinged clamp bolts 36 inch-pounds to 40 inch-pounds (4.067 Newton-meters to 4.519 Newton-meters).
- (10) If it is necessary, cut the other end of the replacement cable again at the location that 6 inches (155 mm) farther than the connector of the damaged cable.
- (11) Disassemble each connector on the damaged cable. Refer to Subject 20-24-20.
- Make sure that each wired contact that is removed from each connector is identified with a label.

20-24-24

707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE

B. Preparation of the New Cable

- (1) Remove the necessary length of the jacket from the end of the new cable.

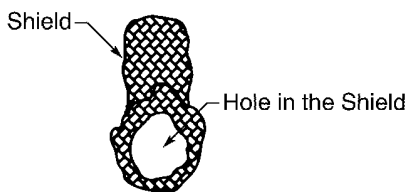
CAUTION: DO NOT CUT OR NICK THE WIRES OR THE SHIELD OF THE NEW CABLE. DAMAGE TO THE CABLE CAN OCCUR.

Make sure that:

- The end of the jacket is in the same location in relation to the end of the jacket on the damaged cable
 - The colors of the wire insulation of the new cable are the same as the colors of the wire insulation of the damaged cable.
- (2) Push the end of the shield rearward to the end of the jacket.
 - (3) Near the end of the jacket, move the strands of the shield apart to make a hole in the shield. Refer to Figure 2.

CAUTION: DO NOT CUT THE STRANDS OF THE SHIELD. THE SHIELD MUST NOT HAVE DAMAGE.

Make sure that the hole is sufficiently large to pull the wires the wires of the cable through.

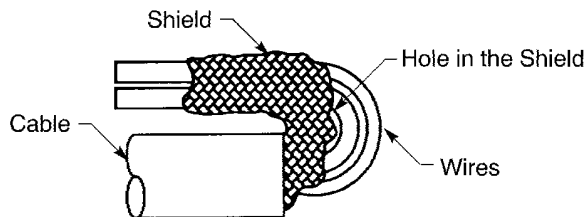


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SHIELD PREPARATION

Figure 2

- (4) Fold the wires and the shield back. Refer to Figure 3.



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POSITION OF THE WIRES AND THE SHIELD

Figure 3

- (5) Pull the wires through the hole in the shield one at a time.

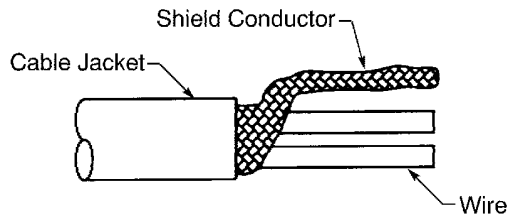
20-24-24



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE

- (6) Pull the shield tight to make a flat and symmetrical conductor. Refer to Figure 4.



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CONFIGURATION OF THE SHIELD CONDUCTOR

Figure 4

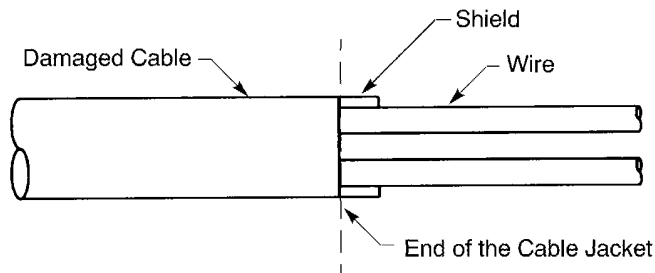
- (7) Cut the wires of the new cable to make the lengths the same as the wires of the damaged cable.
(8) Move the contact number labels from the wires of the damaged cable to the wires of the new cable.

Make sure that:

- One label at a time is done
- That the color of the insulation of the new wire is the same as the color of the insulation of the wire of the damaged cable.

C. Insulation of the Damaged Cable

- (1) Cut each end of the damaged cable at the end of the cable jacket. Refer to Figure 5.



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LOCATION TO CUT THE DAMAGED CABLE

Figure 5

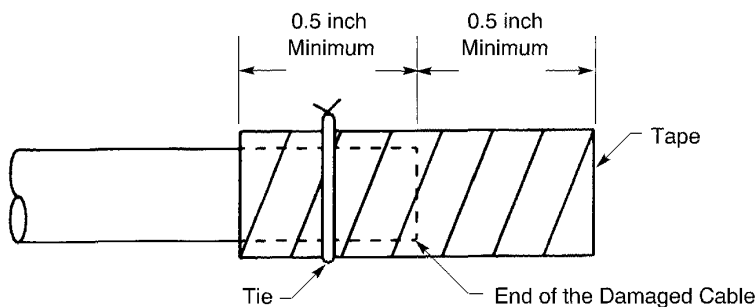
- (2) Install the necessary insulation on each end of the damaged cable. Refer to Figure 6.

20-24-24



**707, 727-787
STANDARD WIRING PRACTICES MANUAL**

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE



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INSULATION ON THE END OF THE DAMAGED CABLE

Figure 6

- (a) Make a selection of a black rubber tape from Table 3.
- (b) Put a layer of the tape on the cable.
Make sure that:
 - The rear end of the tape is 0.5 inch (12.7 mm) minimum from the end of the cable
 - The forward end of the tape extends 0.5 inch (12.7 mm) minimum farther than the end of the cable.
- (c) Put a second layer of tape on the first layer.
- (d) Assemble a wire harness tie on the cable 0.25 inch (6.35 mm) from the rear end of the tape.

Refer to Subject 20-24-14.

D. Connector Assembly

- (1) Assemble each contact. Refer to Subject 20-24-21.
- (2) Assemble the connector. Refer to Subject 20-24-20.

20-24-24



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF A SHIELDED CABLE

E. Electrical Checks

- (1) Do the necessary electrical checks. Refer to Subject 20-24-20.

20-24-24



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR ADAPTER PLATE REPLACEMENT

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
B. Wire Harness Components	2
C. Identification of the Adapter Assembly Part Number	2
D. Additional References	2
2. <u>STANDARD EQUIPMENT</u>	2
A. Tools	2
B. Necessary Materials	3
3. <u>ADAPTER PLATE REPLACEMENT</u>	4
A. Connector Separation	4
B. Adapter Plate Removal	4
C. Adapter Plate Installation	5
D. Plug and Receptacle Connection	5

20-24-25



707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR ADAPTER PLATE REPLACEMENT

This Subject gives the procedures to remove and install a connector adapter plate on an engine bracket.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it

C. Identification of the Adapter Assembly Part Number

- (1) Identify the number on the wire harness.

These are the PW4000/777 power plant wire harness numbers:

- W0621
- W0628
- W0629
- W0604
- W0605.

- (2) Refer to the wire harness located in the Airplane Illustrated Parts Catalog (AIPC) for the correct adapter assembly part number.

D. Additional References

Refer to:

- Subject 20-24-02 for supplier codes, names, and addresses
- Subject 20-00-11 for alternative materials
- The Aircraft Maintenance Manual (AMM).

2. STANDARD EQUIPMENT

A. Tools

WARNING: TO AVOID INJURY TO PERSONS OR DAMAGE TO EQUIPMENT WHILE AN ON-WING REPAIR IS MADE, DO NOT USE THESE TOOLS:

- A HEAT GUN
- A SOLDERING GUN
- A SOLDERING IRON.

NOTE: Alternatives to the tools specified in must Table 2 be equivalent tools.

20-24-25

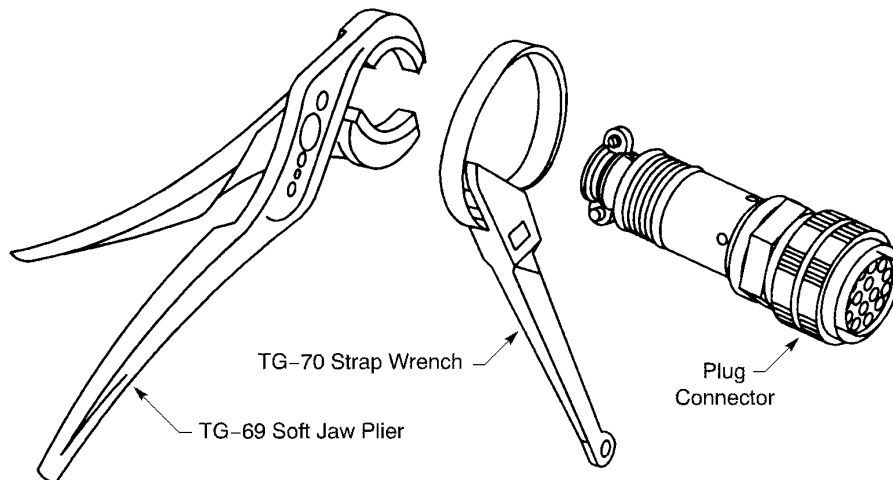


707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR ADAPTER PLATE REPLACEMENT

Table 2
TOOLS

Tool	Procedure	Part Number	Supplier Code
Pliers, Soft Jaw	Connector and backshell removal and installation	BT-SJ-468	11851
		TG-69	06324
		TG-69	11851
Wrench, Strap	Connector and backshell removal and installation	BT-BS-6()	11851
		TG-70	06324
		TG-70	11851



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CONNECTOR SEPARATION AND ASSEMBLY TOOLS

Figure 1

B. Necessary Materials

NOTE: Alternatives to the materials specified in Table 3 must be equivalent materials.

Table 3
NECESSARY MATERIALS

Material	Part Number	Supplier Code
Oil, Lubricating, Turbine Engine	PWA 521B Type II	77445

20-24-25



707, 727-787
STANDARD WIRING PRACTICES MANUAL

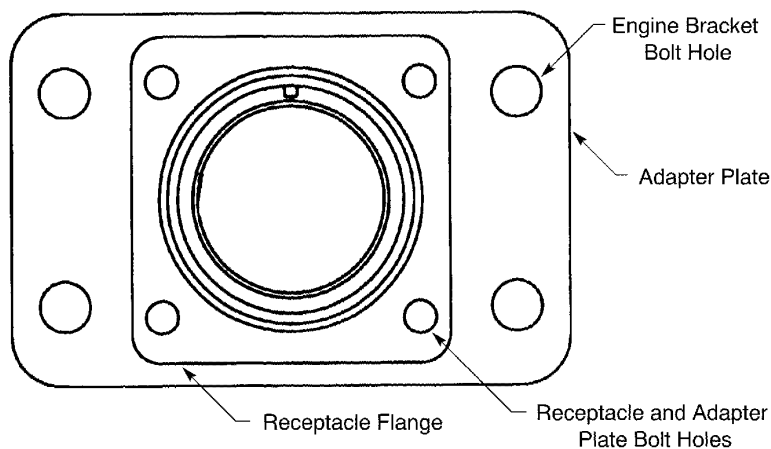
PW4000/777 POWER PLANT: CONNECTOR ADAPTER PLATE REPLACEMENT

3. ADAPTER PLATE REPLACEMENT

A. Connector Separation

- (1) Make a selection of a connector separation tool from Table 2.
Refer to Figure 1.
- (2) Put the pliers or the strap wrench on the coupling nut of the plug.
- (3) Turn the coupling nut until the threads are fully disengaged.
- (4) Pull the plug from the receptacle.

B. Adapter Plate Removal



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ADAPTER PLATE CONFIGURATION

Figure 2

Refer to Figure 2.

- (1) Remove the adapter plate and receptacle from the engine bracket:
 - (a) Remove the bolts that attach the adapter plate to the engine bracket.
NOTE: Adapter plates that have different shapes can have a different quantity of bolt holes.
 - (b) Make a mark on the adapter plate to show the position of the master keyway of the receptacle.
- (2) Remove the nuts and screws that attach the adapter plate to the receptacle.
- (3) Remove the adapter plate from the receptacle.

20-24-25



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR ADAPTER PLATE REPLACEMENT

C. Adapter Plate Installation

Table 4
MAXIMUM TORQUE FOR RECEPTACLE INSTALLATION NUTS

Nut Size	Maximum Torque	
	Standard (inch-pound)	Metric (Newton-meter)
4-40	5	0.565
6-32	10	1.130

- (1) Make a mark on the new adapter plate in the same location as the mark on the old adapter plate.
- (2) Align the master keyway of the receptacle with mark on the adapter plate.
- (3) Put the screws through the holes of the adapter plate and the receptacle.
- (4) Engage the threads of an installation nut and each installation screw.
- (5) Torque the nuts. Refer to Table 4.
- (6) Install the adapter plate on the engine bracket:
 - (a) Make a selection of a lubricating oil from Table 3.
 - (b) Put a light layer of the oil on each bolt.
 - (c) Align the adapter plate with the engine bracket.
 - (d) Put the bolts through the engine bracket bolt holes.
 - (e) Torque the bolts 36 inch-pounds to 40 inch-pounds (4.067 Newton-meters to 4.519 Newton-meters).

D. Plug and Receptacle Connection

- (1) Align the master key of the plug with the master keyway of the receptacle.
- (2) Engage the plug and the receptacle.
- (3) Engage the threads of the coupling nut and the receptacle.
- (4) Move the backshell from one side to the other side to fully engage the contacts.
- (5) Turn the coupling nut again with light pressure until it is tight.
- (6) Make a selection of a connector installation tool from Table 2. Refer to Figure 1.

CAUTION: DO NOT USE A TOOL THAT HAS METAL JAWS TO TIGHTEN THE CONNECTOR. DAMAGE TO THE CONNECTOR CAN OCCUR.

- (7) Put the pliers or the strap wrench on the coupling nut.
- (8) Tighten the coupling nut until the pliers or strap wrench move on the surface of the nut.

Make sure that:

- The forward edge of the knurled nut on the plug goes farther than the top of the color indicator band
- No part of the color indicator band can be seen.

20-24-25



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: CONNECTOR ADAPTER PLATE REPLACEMENT

CAUTION: THE FULL ENGAGEMENT INDICATOR BAND ON THE RECEPTACLE, THE COLORED BAND NEAREST THE THREADS OF THE RECEPTACLE, IS NOT A STOP LINE.

- (9) Do the necessary engine tests.

Refer to the test reference table in the AMM 71-00-00-700/501.

20-24-25



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
B. Wire Harness Components	2
C. Ground Wire Terminal Lug on a Thermocouple Termination Assembly	2
D. Fan Overheat Terminal Lug	2
E. References	2
2. <u>STANDARD EQUIPMENT</u>	2
A. Terminal Lug Part Numbers	2
B. Tools	3
C. Necessary Materials	3
3. <u>REPLACEMENT OF A GROUND WIRE TERMINAL LUG ON A THERMOCOUPLE TERMINATION ASSEMBLY</u>	3
A. Terminal Lug Removal	3
B. Terminal Lug Assembly	4
C. Continuity Check	5
D. Terminal Lug Installation	5
E. Power Plant Tests	5
4. <u>REPLACEMENT OF A FAN OVERHEAT TERMINAL LUG</u>	5
A. Terminal Lug Removal	5
B. Terminal Lug Assembly	6
C. Continuity Check	7
D. Terminal Lug Installation	7
E. Power Plant Tests	8

20-24-26



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS

This Subject gives the procedures to replace:

- The ground wire terminal lug on a thermocouple termination assembly
- A fan overheat terminal lug.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it

C. Ground Wire Terminal Lug on a Thermocouple Termination Assembly

The part numbers of the PW4000/777 power plant wire harnesses that have ground wire terminations are:

- W0602
- W0603
- W0623
- W0629.

D. Fan Overheat Terminal Lug

The part numbers of the PW4000/777 power plant wire harnesses that have ground wire terminations are:

- W0602
- W0603.

E. References

Refer to:

- Subject 20-24-02 for the supplier codes, names, and addresses
- The Aircraft Maintenance Manual (AMM) for the engine test reference table.

2. STANDARD EQUIPMENT

A. Terminal Lug Part Numbers

Table 2
TERMINAL LUG PART NUMBERS

Description	Part Number	Size	Supplier Code
Terminal Lug, Fan Overheat	79208	8	83311

20-24-26



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS

Table 2 TERMINAL LUG PART NUMBERS (Continued)

Description	Part Number	Size	Supplier Code
Terminal Lug, Ground Wire, Thermocouple Termination Assembly	158376	10	83311

B. Tools

WARNING: TO AVOID INJURY TO PERSONS OR DAMAGE TO EQUIPMENT WHILE AN ON-WING REPAIR IS MADE, DO NOT USE THESE TOOLS:

- A HEAT GUN
- A SOLDERING GUN
- A SOLDERING IRON.

NOTE: Alternatives to the tools specified in Table 3 must be equivalent tools.

Table 3
STANDARD EQUIPMENT

Tool	Procedure	Part number	Supplier Code
Crimp Tool	Assembly of the ground wire terminal	49935	00779
Digital Multimeter	Continuity measurement	Model 177	80164
Ohmmeter	Continuity measurement	Model 260	16902
Wire Insulation Removal Tool	Removal of the wire insulation	45-092	11851

C. Necessary Materials

NOTE: Alternatives to the materials specified in Table 4 must be equivalent materials.

Table 4
NECESSARY MATERIALS

Description	Part Number	Code
Oil, Lubricating, Turbine Engine	PWA 521B Type II	77445

3. REPLACEMENT OF A GROUND WIRE TERMINAL LUG ON A THERMOCOUPLE TERMINATION ASSEMBLY

A. Terminal Lug Removal

- (1) Remove the bolt that attaches the ground wire terminal lug to the engine.
- (2) Cut the terminal lug from the ground wire.

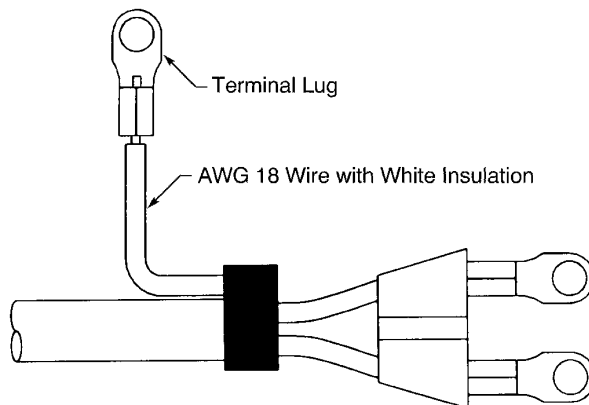
20-24-26



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS

B. Terminal Lug Assembly



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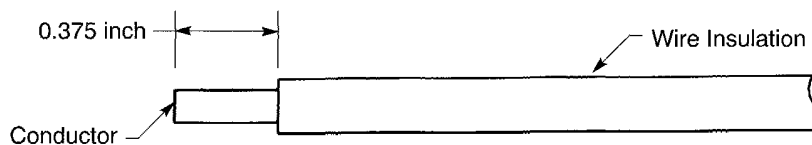
GROUND WIRE TERMINAL LUG ASSEMBLY

Figure 1

Refer to Figure 1.

- (1) Make a selection of an insulation removal tool from Table 3.
- (2) Remove the necessary length of the insulation from the end of the wire to make the distance from the end of the insulation to the end of the wire equal to 0.375 inch (9.525mm).

Refer to Figure 2.



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INSULATION REMOVAL LENGTH

Figure 2

- (3) Make a selection of a ground wire terminal lug from Table 2.
- (4) Make a selection of a crimp tool from Table 3.
- (5) Put the wire in the crimp barrel of the terminal lug.

20-24-26



707, 727-787 STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS

Make sure that the strands of the conductor can be seen at the forward end of the crimp barrel.

- (6) Put the terminal lug and the wire in the crimp tool.

Make sure that:

- The terminal lug is in the correct set of crimp dies for the size
- The center of the crimp barrel is aligned with the center crimp dies.

- (7) Crimp the terminal lug.

Make sure that the wire cannot be pulled out of the crimp barrel.

C. Continuity Check

- (1) Make a selection of a multimeter or an ohmmeter from Table 3.
- (2) Set the resistance scale to 100 ohms.
- (3) Attach one test lead to the backshell on the end of the harness.
- (4) Attach the other lead to the terminal lug.
- (5) Measure the resistance.

Make sure that the resistance is less than 1 ohm.

- (6) Remove the test leads.

D. Terminal Lug Installation

- (1) Make a selection of a lubricating oil from Table 4.
- (2) Put a light layer of the oil on the bolt.
- (3) Put the bolt through the terminal lug and into the engine bracket.
- (4) Torque the bolt 36 inch-pounds to 40-inch pounds (4.067 Newton-meters to 4.519 Newton-meters).

E. Power Plant Tests

- (1) Do the necessary engine tests.

Refer to the test reference table in the AMM 71-00-00-700/501.

4. REPLACEMENT OF A FAN OVERHEAT TERMINAL LUG

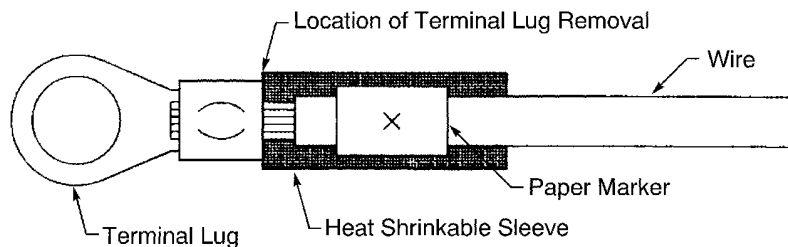
A. Terminal Lug Removal

- (1) Remove the bolt that attaches the fan overheat terminal lug to the engine.
- (2) Cut the terminal lug from the wire. Refer to Figure 2.



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS

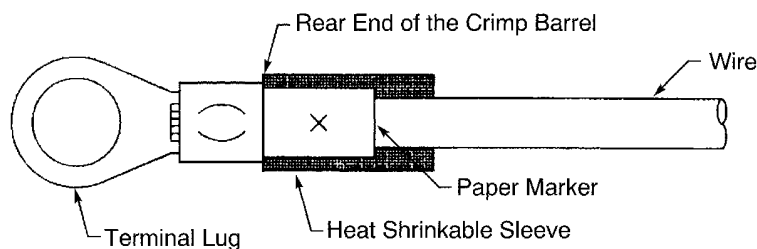


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REMOVAL OF THE FAN OVERHEAT TERMINAL LUG

Figure 3

B. Terminal Lug Assembly



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OVERHEAT FAN TERMINAL LUG ASSEMBLY

Figure 4

- (1) Move the paper marker away from the end of the wire approximately 0.500 inch (12.7 mm).
- (2) Move the heat shrinkable sleeve away from the end of the wire approximately 0.500 inch (12.7 mm).
- (3) Make a selection of an insulation removal tool from Table 3.
- (4) Remove the necessary length of the insulation from the end of the wire to make the distance from the end of the insulation to the end of the wire equal to 0.375 inch (9.525mm).

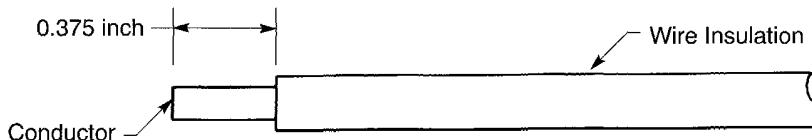
Refer to Figure 5.

20-24-26



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS



2445687 S00061544995_V1

INSULATION REMOVAL LENGTH

Figure 5

- (5) Make a selection of a fan overheat terminal lug from Table 2.
- (6) Make a selection of a crimp tool from Table 3.
- (7) Put the wire in the crimp barrel of the terminal lug. Refer to Figure 4.
Make sure that the strands of the conductor can be seen at the forward end of the crimp barrel.
- (8) Put the terminal lug and wire in the crimp tool.
Make sure that:
 - The terminal lug is in the correct set of crimp dies for the size
 - The center of the crimp barrel is aligned with the center crimp dies.
- (9) Crimp the terminal lug.
Make sure that the wire cannot be pulled out of the crimp barrel.
- (10) Push the paper marker forward until the forward end of the marker is against the rear end of the crimp barrel.
- (11) Push the heat shrinkable forward until the forward end of the sleeve is against the rear end of the crimp barrel.

C. Continuity Check

- (1) Check the continuity of the terminal lug assembly. Refer to Subject 20-24-20.

D. Terminal Lug Installation

- (1) Make a selection of a lubricating oil from Table 4.
- (2) Put a light layer of the oil on the stud.
- (3) Put the terminal lug on the stud.
- (4) Install the nut.
- (5) Torque the nut:
 - 30 inch-pounds to 35 inch-pounds (3.39 Newton-meters to 3.95 Newton-meters) for a size 10 nut
 - 20 inch-pounds to 25 inch-pounds (2.6 Newton-meters to 2.82 Newton-meters) for a size 8 nut.

20-24-26



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPLACEMENT OF TERMINAL LUGS

E. Power Plant Tests

- (1) Do the necessary engine tests.

Refer to the test reference table in the AMM 71-00-00-700/501.

20-24-26



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPAIR OF WIRING IDENTIFICATION MARKERS

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>PAGE</u>
1. <u>GENERAL DATA</u>	2
A. Applicable Conditions	2
B. Wire Harness Components	2
C. Identification Markers	2
D. References	2
2. <u>STANDARD EQUIPMENT</u>	2
A. Tools	2
B. Necessary Materials	3
3. <u>IDENTIFICATION MARKER REPAIR</u>	3
A. Identification Marker Removal	3
B. Identification Marker Assembly	3

20-24-27



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPAIR OF WIRING IDENTIFICATION MARKERS

This Subject gives the procedure to repair an identification marker on a wire harness.

1. GENERAL DATA

A. Applicable Conditions

For the conditions that are applicable to the data and procedures of this Subject, refer to Subject 20-24-00.

B. Wire Harness Components

Table 1
DEFINITIONS

Term	Definition
Cable	A group of wires in a metal shield and an insulated jacket
Harness	One or more cables with connectors or terminal lugs attached to the ends of the cables
Wire	A single electrical conductor with insulation around it

C. Identification Markers

Each harness has one harness identification marker.

The disconnect identification markers are:

- Near each end of the harness
- Near each connector and each backshell assembly.

D. References

Refer to:

- Subject 20-24-02 for the supplier codes, names, and addresses
- Subject 20-24-14 for the assembly of wire harness ties.

2. STANDARD EQUIPMENT

A. Tools

No special tools are necessary for this procedure.

WARNING: TO AVOID INJURY TO PERSONS OR DAMAGE TO EQUIPMENT WHILE AN ON-WING REPAIR IS MADE, DO NOT USE THESE TOOLS:

- A HEAT GUN
- A SOLDERING GUN
- A SOLDERING IRON.

20-24-27



707, 727-787
STANDARD WIRING PRACTICES MANUAL

PW4000/777 POWER PLANT: REPAIR OF WIRING IDENTIFICATION MARKERS

B. Necessary Materials

NOTE: Alternatives to the materials specified in Table 2 must be equivalent materials.

Table 2
NECESSARY MATERIALS

Description	Part Number	Supplier Code
Ink, Permanent, Black	-	Local
Tape, Fiberglass	Scotch 69	04963

3. IDENTIFICATION MARKER REPAIR

A. Identification Marker Removal

- (1) Remove the wire harness ties.
- (2) Remove the chafe guard sleeve that covers the identification marker.
- (3) Remove the tape.

NOTE: This tape can be used again.

- (4) Remove the marker from the harness.

B. Identification Marker Assembly

- (1) Make a selection of a permanent ink from Table 2.
- (2) Make a line through the old identification number with the ink.
- (3) Write the new identification number on the marker with the ink.
- (4) Put the new marker in the same location as the old marker on the harness.
- (5) Make a selection of a fiberglass tape from Table 2.

NOTE: As an alternative, the tape that was removed can be used again.

- (6) Put two layers of tape around each edge of the marker.
Make sure that the tape does not make an overlap with the marker label.
- (7) Install the chafe guard sleeve over the marker.
- (8) Assemble a wire harness tie on the chafe guard sleeve. Refer to Subject 20-24-14.

20-24-27