



AP113D-1810-1

2nd Edition May 1984

(Superseding Initial Issue
dated June 1969)

CANNON CONNECTORS

TYPE MS

GENERAL AND TECHNICAL INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

Mike Whitmore.

Ministry of Defence

F
290

Sponsored for use in the

ROYAL NAVY by DGA (N)

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ROYAL AIR FORCE by CSDE (DEA 92) for D Air Eng (RAF)

Publications authority ATP/MOD (PE)

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AMENDMENT RECORD

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CONTENTS

Preliminary material

Title page
Amendment record
Advance information leaflet record
Contents (this list)

GENERAL AND TECHNICAL INFORMATION (-1)

Chapter

| | |
|---|---------------------------------|
| 1 | Description |
| 2 | Contact assembly instructions |
| 3 | Connector assembly instructions |

TECHNICAL ENQUIRIES

R.A.F.

Technical enquiries concerning these connectors should be directed to the Delegated Engineering Authority for Electrical Connectors, ESS, EEW, CSDE, RAF Swanton Morley. Telephone RAF Swanton Morley (894), extension 290 for urgent enquiries only.

Technical enquiries concerning tooling for these connectors should be directed to the Delegated Engineering Authority for Electrical Hand Tools, OC, GSS, RAF Swanton Morley. Telephone RAF Swanton Morley (894), extension 286 for urgent enquiries only.

R.N.

Technical enquiries concerning these connectors or tooling for these connectors should be directed to O.C. NATEC, HMS DAEDALUS, Lee-on-the-Solent, Hants.

Chapter 1DESCRIPTION

CONTENTS

Para.

- 1 Introduction
- 2 Description
- 3 Specification
- 4 Intermountability and intermateability
- 5 Connector identification
- 6 Connector styles
- 7 Connector class
- 8 Shell size and insert arrangement
- 9 Contacts
- 10 Standard range
- 11 Orientation
- 12 Modifications
- 13 Environmental sealing
- 14 Temperature range
- 15 Lubrication and cleaning
- 16 Tooling
- 17 Accessories
- 18 Dummy receptacle
- 19 Protective caps, plastic
- 20 Protective caps, metal
- 21 Conductor size measurement

Table

| | | Page |
|----|--|------|
| 1 | Shell size and insert arrangements ... | 10 |
| 2 | Standard contacts - solder pot type... | 12 |
| 3 | Standard contacts - crimp pot type ... | 13 |
| 4 | Thermocouple contacts ... | 14 |
| 5 | Modification code... | 15 |
| 6 | Wire sealing range ... | 15 |
| 7 | Filler plugs ... | 16 |
| 8 | Cable clamps ... | 17 |
| 9 | Telescopic bushings ... | 18 |
| 10 | Dummy receptacles... | 18 |
| 11 | Protective caps, metal, MS25042 | 19 |
| 12 | Protective caps, metal, MS25043 | 19 |

Fig.

| | | Page |
|----|---|------|
| 1 | Style 3100, wall mounting receptacle | 4 |
| 2 | Style 3101, cable connecting receptacle | 4 |
| 3 | Style 3102, box mounting receptacle... | 4 |
| 4 | Style 3106, straight plug ... | 5 |
| 5 | Style 3108, 90 deg angle plug... | 5 |
| 6 | Style TBF, through bulkhead receptacle | 5 |
| 7a | Insert arrangements : shell sizes 10, 12, 14 and 16 | 6 |

| Fig. | | Page |
|------|---|------|
| 7b | Insert arrangements : shell sizes 18 and 20 ... | 7 |
| 7c | Insert arrangements : shell sizes 22 and 24 ... | 8 |
| 7d | Insert arrangements : shell sizes 28, 32 and 36 ... | 9 |
| 8 | Environmental straight plugs : exploded view ... | 16 |
| 9 | Cable clamp : bushing fitted ... | 17 |
| 10 | Telescopic bushing ... | 17 |
| 11 | Dummy receptacle ... | 18 |

Introduction

1 The Cannon Type MS connectors are a range of general purpose and environmental resistant, threaded coupling, circular connectors manufactured by ITT Cannon Electric.

DESCRIPTION

Specification

2 Cannon Type MS connectors meet the requirements of specification MIL-C-5015.

Intermountability and intermateability

3 Cannon MS connectors are intermountable and intermateable with connectors complying with specification MIL-C-5015. In service connectors complying with specification MIL-C-5015 are as follows :-

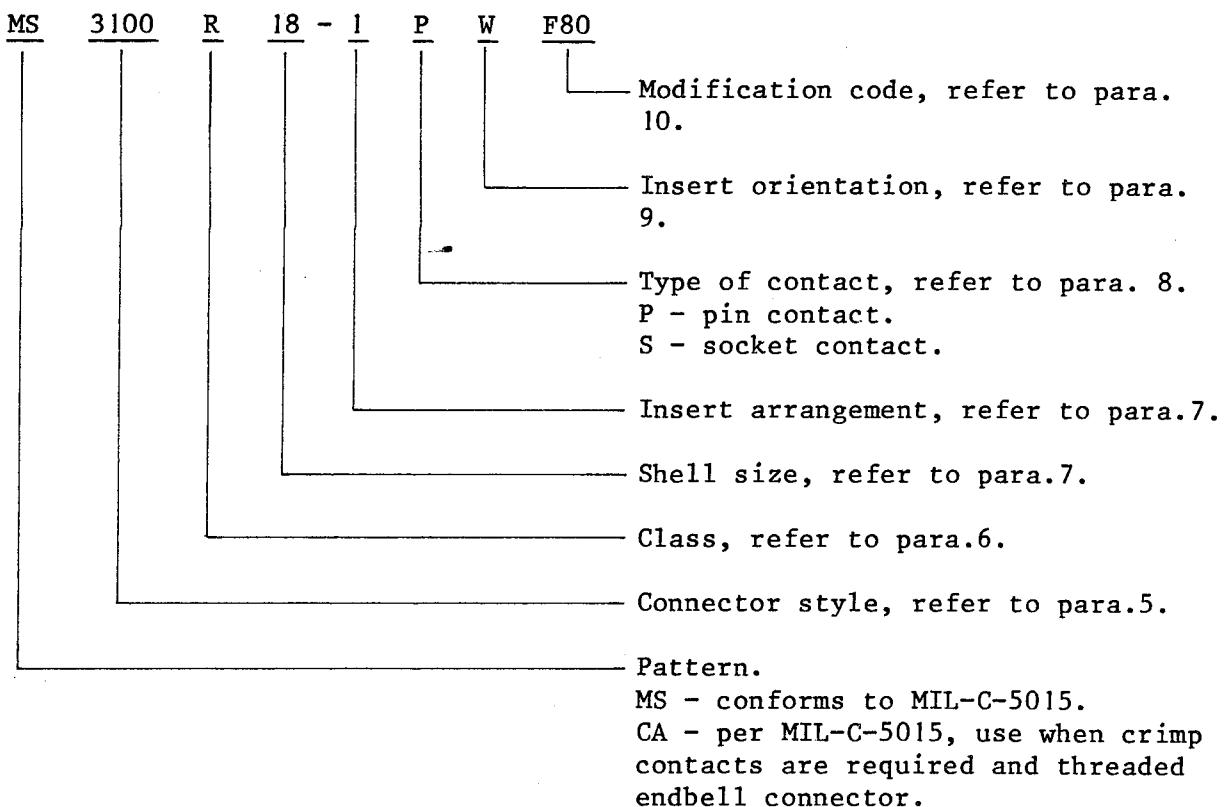
- 3.1 Hellermann Deutsch HAN series.
- 3.2 Plessey UK-AN series.
- 3.3 Amphenol MS series.
- 3.4 Thorn MS series.
- 3.5 Cannon CA series.

Note ...

When Cannon MS connectors are fitted, they must not be substituted without reference to the relevant engineering authority for the equipment involved. To do so may denigrate the design standard of the equipment.

Connector identification

4 Cannon MS connectors are identified by the manufacturer's part number. A typical part number is as follows:-



Connector styles

5 The connectors are available in six styles. The styles are shown in figs. 1 to 6 and are as follows:-

- 5.1 3100 - wall mounting receptacle.
- 5.2 3101 - cable connecting receptacle.
- 5.3 3102 - box mounting receptacle.
- 5.4 3106 - straight plug.
- 5.5 3108 - 90 deg angle plug.
- 5.6 TBF - through bulkhead, mates with 3106 and 3108 plugs.

Connector class

6 The method of shell and termination construction and the applications in which the connectors may be used are denoted by classification letters as follows:-

- 6.1 A - general duty, solid shell.
- 6.2 B - general duty, split shell.
- 6.3 C - general duty, pressurized.
- 6.4 E and F - environmental resistant with cable clamp.
- 6.5 R - environmental resistant with integrated endbell.

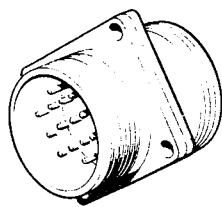


Fig.1 Style 3100, wall mounting receptacle

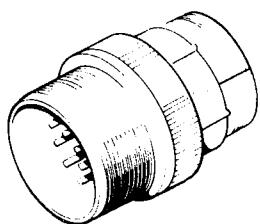


Fig.2 Style 3101, cable connecting receptacle

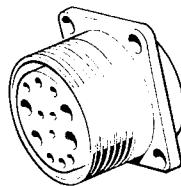


Fig.3 Style 3102, box mounting receptacle

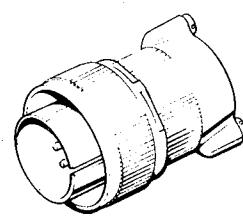


Fig.4 Style 3106, straight plug

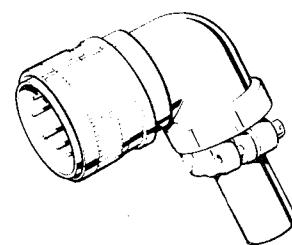


Fig.5 Style 3108, 90 deg angle plug

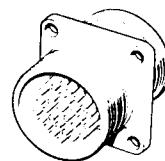


Fig.6 Style TBF, through bulkhead receptacle

SHELL SIZE 10



SHELL SIZE 12



SHELL SIZE 14



SHELL SIZE 16



Fig.7a Insert arrangements : shell sizes 10,12,14 and 16

SHELL SIZE 18

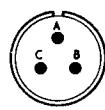
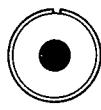
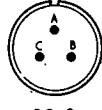
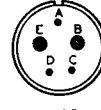
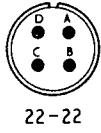
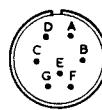
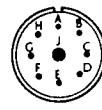
18-4
4 - #1618-5
1 - #16 (A)
2 - #12 (B, C)18-6
1 - #418-8
7 - #16 (A-G)
1 - #12 (H)18-9
5 - #16 (B, C, E-G)
2 - #12 (A, D)18-11
5 - #1218-13
3 - #12 (B, C)
1 - #8 (A)

SHELL SIZE 20

20-2
1 - #020-4
4 - #1220-7
8 - #1620-16
7 - #16 (A-G)
2 - #12 (H, I)20-17
1 - #16 (F)
5 - #12 (A-E)20-24
2 - #16 (A, C)
2 - #8 (B, D)20-27
14 - #1620-29
17 - #1620-33
11 - #16

Fig.7b Insert arrangements : shell sizes 18 and 20

SHELL SIZE 22

22-2
3 - # 822-7
1 - # 022-9
3 - # 1222-12
3 - # 16 (A,C,D)
2 - # 8 (B,E)22-14
19 - # 1622-19
14 - # 1622-22
4 - # 822-23
7 - # 1622-27
8 - # 16 (A-H)
1 - # 8 (J)

SHELL SIZE 24

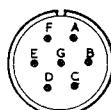
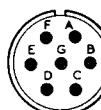
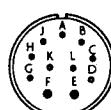
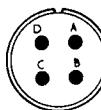
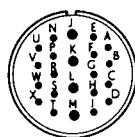
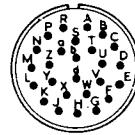
24-2
7 - # 1224-10
7 - # 824-11
6 - # 12 (A-C, G-I)
3 - # 8 (D-F)24-20
9 - # 16 (A-D, G-L)
2 - # 12 (E, F)24-22
4 - # 824-28
24 - # 16

Fig.7c Insert arrangements : shell sizes 22 and 24

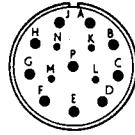
SHELL SIZE 28



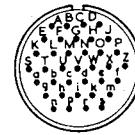
28-11
18 - #16 (A-I, N-X)
4 - #12 (J-M)



28-12
26 - #16

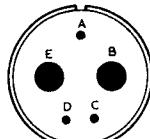


28-20
4 - #16 (K-N)
10 - #12 (A-J, P)

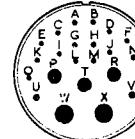


28-21
37 - #16

SHELL SIZE 32



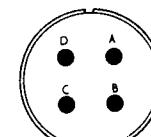
32-1
3 - #12 (A,C,D)
2 - #0 (B,E)



32-6
16 - #16 (A-O,S)
2 - #12 (U,V)
3 - #8 P-T, 2 - #4 (W,X)

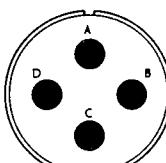


32-7
28 - #16 (A-N,W-Z,a-k)
7 - #12 (O-V)

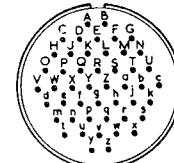


32-17
4 - #4

SHELL SIZE 36



36-5
4 - #0



36-10
48 - #16

Fig.7d Insert arrangements : shell sizes 28,32 and 36

Shell size and insert arrangement (fig.7)

7 The available insert arrangements in ascending order of shell size are shown in fig.7. The number and sizes of the contacts are detailed in Table 1.

TABLE 1 SHELL SIZE AND INSERT ARRANGEMENTS

| Shell size/insert arrangement | No. of contacts | | | | |
|-------------------------------|-----------------|---------|--------|--------|--------|
| | Size 16 | Size 12 | Size 8 | Size 4 | Size 0 |
| 10SL-3 | 3 | - | - | - | - |
| 12S-3 | 2 | - | - | - | - |
| 12-5 | - | 1 | - | - | - |
| 14S-5 | 5 | - | - | - | - |
| 14S-6 | 6 | - | - | - | - |
| 14S-7 | 3 | - | - | - | - |
| 16S-1 | 7 | - | - | - | - |
| 16S-8 | 5 | - | - | - | - |
| 16-7 | 2 | - | 1 | - | - |
| 16-9 | 2 | 2 | - | - | - |
| 16-10 | - | 3 | - | - | - |
| 16-11 | - | 2 | - | - | - |
| 18-4 | 4 | - | - | - | - |
| 18-5 | 1 | 2 | - | - | - |
| 18-6 | - | - | - | 1 | - |
| 18-8 | 7 | 1 | - | - | - |
| 18-9 | 5 | 2 | - | - | - |
| 18-11 | - | 5 | - | - | - |
| 18-13 | - | 3 | 1 | - | - |
| 20-2 | - | - | - | - | 1 |
| 20-4 | - | 4 | - | - | - |
| 20-7 | 8 | - | - | - | - |
| 20-16 | 7 | 2 | - | - | - |
| 20-17 | 1 | 5 | - | - | - |
| 20-24 | 2 | - | 2 | - | - |
| 20-27 | 14 | - | - | - | - |
| 20-29 | 17 | - | - | - | - |
| 20-33 | 11 | - | - | - | - |
| 22-2 | - | - | 3 | - | - |
| 22-7 | - | - | - | - | 1 |
| 22-9 | - | 3 | - | - | - |
| 22-12 | 3 | - | 2 | - | - |
| 22-14 | 19 | - | - | - | - |
| 22-19 | 14 | - | - | - | - |
| 22-22 | - | - | 4 | - | - |
| 22-23 | - | 8 | - | - | - |
| 22-27 | 8 | - | 1 | - | - |
| 24-2 | - | 7 | - | - | - |
| 24-10 | - | - | 7 | - | - |
| 24-11 | - | 6 | 3 | - | - |
| 24-20 | 9 | 2 | - | - | - |
| 24-22 | - | - | 4 | - | - |
| 24-28 | 24 | - | - | - | - |

(continued)

TABLE 1 SHELL SIZE AND INSERT ARRANGEMENTS (continued)

| Shell size/insert arrangement | No. of contacts | | | | |
|-------------------------------|-----------------|---------|--------|--------|--------|
| | Size 16 | Size 12 | Size 8 | Size 4 | Size 0 |
| 28-11 | 18 | 4 | - | - | - |
| 28-12 | 26 | - | - | - | - |
| 28-20 | 4 | 10 | - | - | - |
| 28-21 | 37 | - | - | - | - |
| 32-1 | - | 3 | - | - | 2 |
| 32-6 | 16 | 2 | 3 | 2 | - |
| 32-7 | 28 | 7 | - | - | - |
| 32-17 | - | - | - | 4 | - |
| 36-5 | - | - | - | - | 4 |
| 36-10 | 48 | - | - | - | - |

Contacts

Standard range

8 Contact pins or contact sockets can be specified for all connector styles. Standard contacts are supplied with the connector. Table 2 details the contact data by contact size. Short pin contacts and short socket contacts are only to be used in shell sizes 10SL, 12S, 14S and 16S. Contacts are normally of the solder pot type. Crimp pot contacts can be specified in sizes 12 and 16 only, see para.10. and Table 3.

Orientation

9 To prevent the cross-mating of identical connectors in the vicinity of each other, the connector insert can be orientated to give one of five positions as follows:

9.1 Insert orientation - W, X, Y, Z or N (normal).

Modifications

10 The modification codes detailed in Table 5 list the variations in finish and contacts.

TABLE 2 STANDARD CONTACTS - SOLDER POT TYPE

| Size | Contact type | Current rating (max) | Contact accommodation (a.w.g.) | Contact ident. | Service Ref No./ NATO Stock No. | Part No |
|------|---------------|----------------------|--------------------------------|----------------|------------------------------------|---------|
| 16 | Pin, short | 22A | 16 | | | |
| 16 | Pin, long | 22A | 16 | | | |
| 16 | Socket, short | 22A | 16 | | | |
| 16 | Socket, long | 22A | 16 | | | |
| 12 | Pin | 41A | 12 | | | |
| 12 | Socket | 41A | 12 | | | |
| 8 | Pin | 73A | 8 | | | |
| 8 | Socket | 73A | 8 | | | |
| 4 | Pin | 135A | 4 | | | |
| 4 | Socket | 135A | 4 | | | |
| 0 | Pin | 245A | 0 | | | |
| 0 | Socket | 245A | 0 | | | |

TABLE 3 STANDARD CONTACTS - CRIMP POT TYPE

| Size | Contact type | Current rating (max) | Contact accommodation (a.w.g.) | Contact ident. | Service Ref No./ NATO Stock No. | Part No |
|------|---------------|----------------------|--------------------------------|----------------|------------------------------------|--------------|
| 16 | Pin, short | 22A | 16 | | 5935-99-972-3256 | 330-0345-016 |
| 16 | Pin, long | 22A | 16 | | 5X/9723255 | 330-0351-016 |
| 16 | Socket, short | 22A | 16 | | 5X/9723262 | 031-0554-161 |
| 16 | Socket, long | 22A | 16 | | 5X/9723260 | 031-0560-161 |
| 12 | Pin | 4 1A | 12 | | 5X/9723257 | 330-0351-012 |
| 12 | Socket | 4 1A | 12 | | 5X/9723261 | 031-0560-121 |

TABLE 4 THERMOCOUPLE CONTACTS

| Size | Contact type | Contact accommodation (a.w.g.) | Contact ident. | Service Ref No./ NATO Stock No. | Part No |
|------|------------------------|--------------------------------|----------------|------------------------------------|--------------|
| 16 | Pin, short, chromal | 20-16 | | 5999-99-625-9756 | 330-0347-016 |
| 16 | Pin, short, alumel | 20-16 | | 5999-99-625-9755 | 330-0346-016 |
| 16 | Socket, short, chromal | 20-16 | | 5999-99-625-9783 | 031-0556-161 |
| 16 | Socket, short, alumel | 20-16 | | 5999-99-625-9782 | 031-0555-161 |
| 12 | Pin, long, chromal | 14-12 | | | 330-0353-016 |
| 12 | Pin, long, alumel | 14-12 | | | 330-0352-016 |
| 12 | Socket, long, chromal | 14-12 | | 5X/14 158 | 031-0562-161 |
| 12 | Socket, long, alumel | 14-12 | | 5X/14 157 | 031-0561-161 |

TABLE 5 MODIFICATION CODE

| Mod.No. | Description of variation from standard |
|---------|--|
| *A29 | Anodize natural finish |
| *A30 | Anodize black finish |
| *A95 | Contacts, gold plate finish over silver plate |
| *A101 | Yellow chromate coating over cadmium finish |
| *A105 | Clear chromate coating over cadmium finish |
| *A115 | Contacts, heavy gold plate finish over silver plate |
| *C32 | Insert made from diallyl phthalate |
| *B1 | Contacts for welded terminations |
| *FO | Without contacts |
| *F1 | Box mount receptacle with small flange |
| *F2 | Box mount receptacle with small flange and plastic insert |
| *F3 | Box mount receptacle with intermediate flange |
| *F4 | Box mount receptacle with intermediate flange and plastic insert |
| *F16 | Connector supplied with plastic dust cap |
| *F30 | Short solder pot on contacts |
| *F110 | Crimp, snap-in contacts supplied with, but not installed in, two piece plastic insulator. Connectors with size 12 and 16 contact only. |
| *F80 | Crimped contacts supplied, but not installed. Sizes 12 and 16 contacts only. |

Note ...

* Class A, B and C connectors.

** Class E and R connectors.

Environmental sealing (fig.8)

11 Rear sealing, in the E, F and R connectors, is provided by a grommet. The grommet is designed to seal on wires having the overall diameters detailed in Table 6. The grommet has internal restrictions within the wire cavities which act as 'O' rings around each wire. This allows the wires to slide easily when assembling the connector, yet when the ferrule is sealed and the endbell is tightened provides a perfect seal over a wide variety of wire diameters.

TABLE 6 WIRE SEALING RANGE

| Contact size | Wire size (a.w.g.) | Insulation o.d. (in) | |
|--------------|-----------------------|----------------------|-------|
| | | Min | Max |
| 16 | 22 - 16 | 0.064 | 0.130 |
| 12 | 14 - 12 | 0.114 | 0.170 |
| 8 | 10 - 8 | 0.159 | 0.255 |
| 4 | 6 - 4 | 0.280 | 0.370 |
| 0 | 2 - 0 | 0.400 | 0.550 |

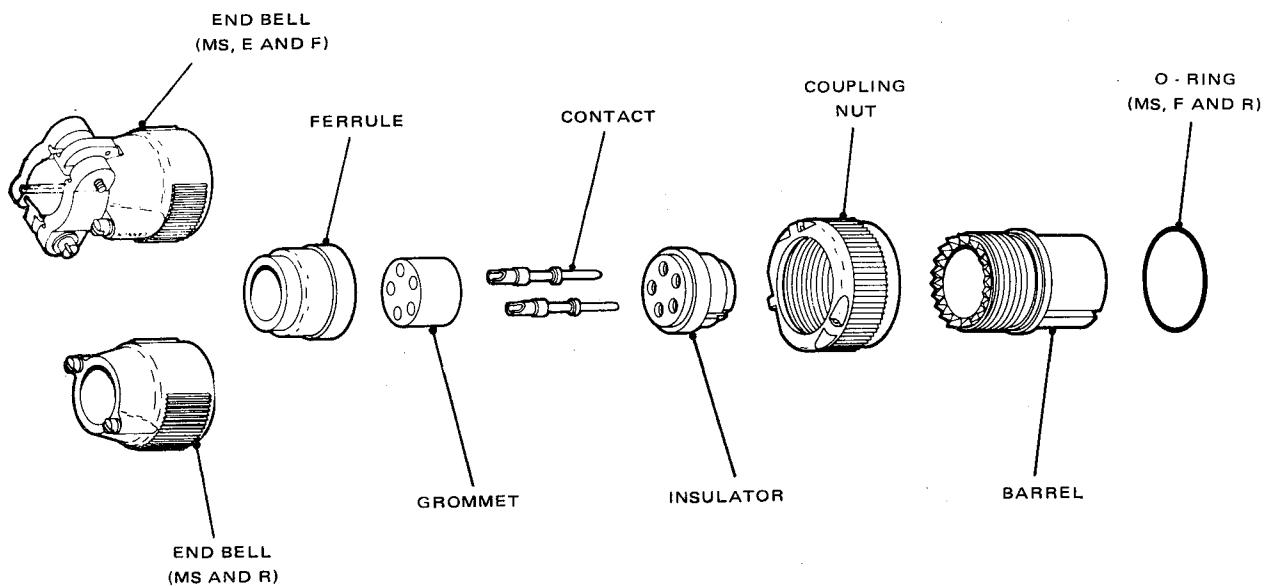


Fig 8 Environmental straight plugs : exploded view

12 In cavities which are not wired, filler plugs must be fitted behind unwired contacts. Table 7 details the filler plugs available.

TABLE 7 FILLER PLUGS

| Contact size | Wire size (a.w.g.) | Colour code | Service Ref No/ NATO stock No. | Part No. |
|--------------|-----------------------|-------------|-----------------------------------|--------------|
| 16S/16 | 16 | Blue | | 225-0017-000 |
| 12 | 12 | Yellow | 5X/1126885 | 225-0018-000 |
| 8 | 8 | White | | 225-0019-000 |
| 4 | 4 | Green | | 225-8502-000 |
| 0 | 0 | Black | | 225-8503-000 |

Temperature range

13 The operating temperature range of these connectors is - 55 deg C to + 150 deg C. The upper limit quoted is the maximum internal hot spot temperature resulting from any combination of ambient temperature and heating due to current.

Lubrication and cleaning

14 ZX-36 may be used for light lubrication of contacts and guide pins when inserting contacts. Connectors can be cleaned using, sparingly, Ark lone P (33D/2204018) or safecleane aerosol (33D/511).

Tooling

15 When crimp pot contacts are used, select the correct tooling from the appropriate contact work sheet detailed in Chap.2, or connector assembly

instructions detailed in Chap.3. No tooling is supplied with the connectors.

ACCESSORIES

16 These connectors are supplied with back end accessories as required, refer to para. 5. Other accessories may be ordered separately and these are detailed Tables 8 to 12 (figs 9 to 11).

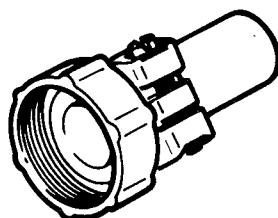


Fig 9 Cable clamp : bushing fitted

TABLE 8 CABLE CLAMPS

| Shell size | Bushing * accommodation | Service Ref.No/ NATO Stock No. | Part No |
|---------------|-------------------------|-----------------------------------|-------------|
| 10SL, 12S, 12 | MS 3420-4 | 5X/1933511 | MS 3057-4A |
| 14S, 14 | MS 3420-6 | 5X/5193787 | MS 3057-6A |
| 16S, 16 | MS 3420-8 | 5X/1987419 | MS 3057-8A |
| 18 | MS 3420-10 | 5X/9153509 | MS 3057-10A |
| 20, 22 | MS 3420-12 | 5X/5195806 | MS 3057-12A |
| 24, 28 | MS 3420-16 | 5X/4501410 | MS 3057-16A |
| 32 | MS 3420-20 | | MS 3057-20A |
| 36 | MS 3420-24 | 105X/2802192 | MS 3057-24A |

* Bushing detailed in Table 9

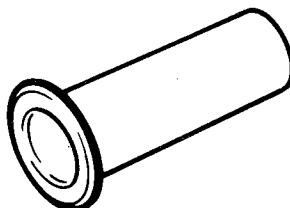


Fig 10 Telescopic bushing

TABLE 9 TELESCOPIC BUSHINGS

| Shell size | Service Ref No./ NATO Stock No. | Part No. |
|---------------|------------------------------------|------------|
| 8S, 10S | | MS 3420-3 |
| 10SL, 12S, 12 | | MS 3420-4 |
| 14S, 14 | | MS 3420-6 |
| 16S, 16 | 5340-99-914-9901 | MS 3420-8 |
| 18 | | MS 3420-10 |
| 20, 22 | | MS 3420-12 |
| 24, 28 | | MS 3420-16 |
| 32 | | MS 3420-20 |
| 36 | | MS 3420-24 |

Dummy receptacle

17 The dummy receptacle holds style 3106 or 3108 connectors when not in use.

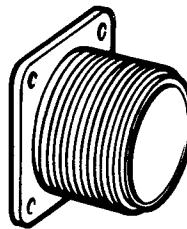


Fig 11 Dummy receptacle

TABLE 10 DUMMY RECEPTACLES

| Shell size | Service Ref No./ NATO Stock No. | Part No. |
|------------|------------------------------------|-------------|
| 10S, 10SL | | MS 3105-10S |
| 12S | | MS 3105-12S |
| 14S | 5935-99-109-5348 | MS 3105-14S |
| 16S | | MS 3105-16S |
| 12 | | MS 3105-12 |
| 14 | | MS 3105-14 |
| 16 | | MS 3105-16 |
| 18 | | MS 3105-18 |
| 20 | 5X/6424841 | MS 3105-20 |
| 22 | | MS 3105-22 |
| 24 | | MS 3105-24 |
| 28 | 5X/6287547 | MS 3105-28 |
| 32 | | MS 3105-32 |
| 36 | | MS 3105-36 |

Protective caps, plastic

18 Light duty plastic caps are designed to cover the coupling and conduit ends of connectors. These caps, of red polyethylene provide protection against damage or ingress of foreign matter during storage and transit. The caps may be re-used, but are not to be used in lieu of metal caps (see modification code, Table 5).

Protective caps, metal

19 Two types of protective caps, metal are available. Type MS25042 is for use with style 3106 and 3108 connectors. Type MS24043 is for use with style 3100, 3101 and 3102 connectors. Table 11 details MS24042 caps and Table 12 details MS25043 caps.

TABLE 11 PROTECTIVE CAPS, METAL, MS25042

| Shell size | Service Ref No./ NATO Stock No. | Part No. |
|------------|------------------------------------|--------------|
| 10SL | | MS 25042-10D |
| 12S, 12 | 5X/14079 | MS 25042-12D |
| 14S, 14 | 5X/4501454 | MS 25042-14D |
| 16S, 16 | | MS 25042-16D |
| 18 | 5935-99-633-0828 | MS 25042-18D |
| 20 | 5935-99-633-0827 | MS 25042-20D |
| 22 | | MS 25042-22D |
| 24 | 5935-99-633-0831 | MS 25042-24D |
| 28 | 5X/6400398 | MS 25042-28D |
| 32 | | MS 25042-32D |
| 36 | | MS 25042-36D |

TABLE 12 PROTECTIVE CAPS, METAL, MS25043

| Shell size | Service Ref No./ NATO Stock No. | Part No. |
|------------|------------------------------------|--------------|
| 10SL | 5X/13716 | MS 25043-10D |
| 12S, 12 | | MS 25043-12D |
| 14S, 14 | 5X/9997864 | MS 25043-14D |
| 16S, 16 | 5935-99-640-2634 | MS 25043-16D |
| 18 | 5935-99-450-0442 | MS 25043-18D |
| 20 | 5935-99-519-2400 | MS 25043-20D |
| 22 | 5935-99-622-5763 | MS 25043-22D |
| 24 | 5935-99-631-2737 | MS 25043-24D |
| 28 | 5935-99-999-7860 | MS 25043-28D |
| 32 | | MS 25043-32D |
| 36 | | MS 25043-36D |

Conductor size measurement

20 The contact which sheets in Chapter 2 detail each contact size and the standard a.w.g. wire size that contact size will accomodate.

Note ...

Where either it is suspected that the cable conductor (wire) is not standard a.w.g. or the integrity of the crimp is in doubt, then either DEA 92, CSDE, RAF Swanton Morley, extension 290 (RAF) or OC NATEC, HMS DAEDALUS (RN) should be contacted for cable (wire) identification.

Chapter 2CONTACT ASSEMBLY INSTRUCTIONS

CONTENTS

Para.

- 1 Introduction
- 2 Procedure

Contact Work Sheets

| | | | | | | | | | | | | Page |
|---|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|------|
| 1 | Standard contact size 16 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3 | |
| 2 | Standard contact size 12 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 5 | |
| 3 | Thermocouple contact size 16 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 7 | |
| 4 | Thermocouple contact size 12 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 9 | |

Introduction

1 This chapter comprises a number of work sheets detailing the procedure for crimping each size and type of crimp pot contact to the range of wire sizes they are designed to accommodate.

Procedure

2 Proceed as follows :

- 2.1 Identify the size and type of contact to be crimped.
- 2.2 Select the appropriate contact work sheet.
- 2.3 Identify the size of cable conductor (wire size) being used.
- 2.4 Carry out the stripping and crimping procedures detailed in the contact work sheet.

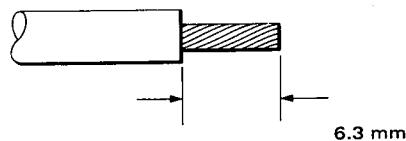
Contact Work Sheet 1STANDARD CONTACT SIZE 16

Fig. 1 Stripping dimensions

Wire insulation range

0.130 in max.

Wire conductor range

Wire size 16 a.w.g.

Procedure

- 1 Check that the wire, to which the contact is to be crimped, is within the insulation and conductor ranges given in this work sheet.
- 2 Strip the wire to the dimensions given in fig. 1. Ensure that the insulation is completely removed and that the conductor is undamaged.

Note ...

Information on wire stripping is detailed in AP 113D-1700-1 (RAF) and AP 120M-0600-1 (RN).

- 3 Select the appropriate crimping tool from Tables 1, 2 or 3.

TABLE 1 RAF CRIMPING TOOL

| Crimping tool | | Turret | | |
|---------------|------------|---------------|------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| M22520/1-01 | 1M/1653912 | M22520/1-02 | 1M/6278075 | Blue |

Note ...

The tool and turret detailed in Table 1 are available as part of Crimping tool kit Ref. No. 1M/949. Units are to demand the tool kit rather than individual tools and turrets.

TABLE 2 RAF ALTERNATIVE CRIMPING TOOL

| Crimping tool | | Locator | | |
|---------------|------------|----------------------------------|------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| MS 3191 | IM/4658819 | M3191-16A (Part No. 602520/3) | IM/1300394 | Blue |

TABLE 3 RN CRIMPING TOOL

| Crimping tool | | Turret | | |
|---------------|--------------|---------------|--------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| M22520/1-01 | 0273-1380390 | M22520/1-02 | 0273-1380391 | Blue |

4 Where the crimping tool detailed in Tables 1 and 3 is to be used, select the appropriate tool setting from Table 4.

TABLE 4 CRIMPING TOOL MS22520/1-01 TOOL SETTING

| Wire size | Tool setting |
|-----------|--------------|
| 16 | 6 |

5 Crimp the contact to the wire.

Note ...

Information on the use of crimping tools is detailed in AP 120M-0602-1 (RAF) and AP 120M-0600-1 (RN).

6 Inspect the crimp joint for the following:-

6.1 All conductor strands enter the crimping barrel and the conductor is visible through the inspection hole.

6.2 The contact is not distorted and the crimp barrel is free from fractures.

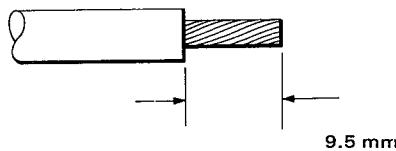
Contact Work Sheet 2STANDARD CONTACT SIZE 12

Fig. 1 Stripping dimensions

Wire insulation range

0.70 in max.

Wire conductor range

Wire size 12 a.w.g.

Procedure

- 1 Check that the wire, to which the contact is to be crimped, is within the insulation and conductor ranges given in this work sheet.
- 2 Strip the wire to the dimensions given in fig. 1. Ensure that the insulation is completely removed and that the conductor is undamaged.

Note ...

Information on wire stripping is detailed in AP 113D-1700-1 (RAF) and AP 120M-0600-1 (RN).

- 3 Select the appropriate crimping tool from Tables 1, 2 or 3.

TABLE 1 RAF CRIMPING TOOL

| Crimping tool | | Turret | | |
|---------------|------------|---------------|------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| M22520/1-01 | IM/1653912 | M22520/1-02 | IM/6278075 | Yellow |

Note ...

The tool and turret detailed in Table 1 are available as part of Crimping tool kit Ref. No. IM/949. Units are to demand the tool kit rather than individual tools and turrets.

TABLE 2 RAF ALTERNATIVE CRIMPING TOOL

| Crimping tool | | Locator | | |
|---------------|------------|----------------------------------|------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| MS 3191 | 1M/4658819 | M3191-12A (Part No. 602520/4) | 1M/1300395 | Yellow |

TABLE 3 RN CRIMPING TOOL

| Crimping tool | | Turret | | |
|---------------|--------------|---------------|--------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| M22520/1-01 | 0273-1380390 | M22520/1-02 | 0273-1380391 | Yellow |

4 Where the crimping tool detailed in Tables 1 and 3 is to be used, select the appropriate tool setting from Table 4.

TABLE 4 CRIMPING TOOL MS22520/1-01 TOOL SETTING

| Wire size | Tool setting |
|-----------|--------------|
| 12 | 8 |

5 Crimp the contact to the wire.

Note ...

Information on the use of crimping tools is detailed in AP 120M-0602-1 (RAF) and AP 120M-0600-1 (RN).

6 Inspect the crimp joint for the following:-

6.1 All conductor strands enter the crimping barrel and the conductor is visible through the inspection hole.

6.2 The contact is not distorted and the crimp barrel is free from fractures.

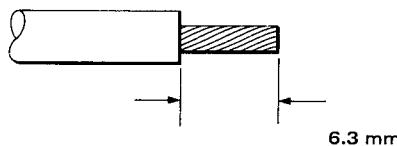
Contact Work Sheet 3THERMOCOUPLE CONTACT, SIZE 16

Fig. 1 Stripping dimensions

Wire insulation range

0.130 in max.

Wire conductor range

Wire size 20-16 a.w.g.

Procedure

- 1 Check that the wire, to which the contact is to be crimped, is within the insulation and conductor ranges given in this work sheet.
- 2 Strip the wire to the dimensions given in fig. 1. Ensure that the insulation is completely removed and that the conductor is undamaged.

Note ...

Information on wire stripping is detailed in AP 113D-1700-1 (RAF) and AP 120M-0600-1 (RN).

- 3 Select the appropriate crimping tool from Tables 1, 2 or 3.

TABLE 1 RAF CRIMPING TOOL

| Crimping tool Specification | Sect. Ref. | Turret Specification | Sect. Ref. | Colour code |
|--------------------------------|------------|-------------------------|------------|-------------|
| M22520/1-01 | IM/1653912 | M22520/1-02 | IM/6278075 | Blue |

Note ...

The tool and turret detailed in Table 1 are available as part of Crimping tool kit ref. No. IM/949. Units are to demand the tool kit rather than individual tools and turrets.

TABLE 2 RAF ALTERNATIVE CRIMPING TOOL

| Crimping tool | | Locator | | |
|---------------|------------|----------------------------------|------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| MS 3191 | 1M/4658819 | M3191-16A (Part No. 602520/3) | 1M/1300394 | Blue |

TABLE 3 RN CRIMPING TOOL

| Crimping tool | | Turret | | |
|---------------|--------------|---------------|--------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| M22520/1-01 | 0273-1380390 | M22520/1-02 | 0273-1380391 | Blue |

4 Where the crimping tool detailed in Tables 1 and 3 is to be used, select the appropriate tool setting from Table 4.

TABLE 4 CRIMPING TOOL M22520/1-01 TOOL SETTING

| Wire size | Tool setting |
|-----------|--------------|
| 20 | 4 |
| 18 | 5 |
| 16 | 6 |

5 Crimp the contact to the wire.

Note ...

Information on the use of crimping tools is detailed in AP 120M-0602-1 (RAF) and AP 120M-0600-1 (RN).

6 Inspect the crimp joint for the following:-

6.1 All conductor strands enter the crimping barrel and the conductor is visible through the inspection hole.

6.2 The contact is not distorted and the crimp barrel is free from fractures.

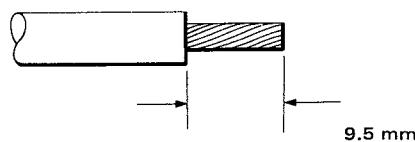
Contact Work Sheet 4THERMOCOUPLE CONTACT SIZE 12

Fig. 1 Stripping dimensions

Wire insulation range

0.70 in max.

Wire conductor range

Wire size 14-12 a.w.g.

Procedure

- 1 Check that the wire, to which the contact is to be crimped, is within the insulation and conductor ranges given in this work sheet.
- 2 Strip the wire to the dimensions given in fig. 1. Ensure that the insulation is completely removed and that the conductor is undamaged.

Note ...

Information on wire stripping is detailed in AP 113D-1700-1 (RAF) and AP 120M-0600-1 (RN).

- 3 Select the appropriate crimping tool from Tables 1, 2 or 3.

TABLE 1 RAF CRIMPING TOOL

| Crimping tool | | Turret | | |
|---------------|------------|---------------|------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| M22520/1-01 | 1M/1653912 | M22520/1-02 | 1M/6278075 | Yellow |

Note ...

The tool and turret detailed in Table 1 are available as part of Crimping tool kit Ref. No. 1M/949. Units are to demand the tool kit rather than individual tools and turrets.

TABLE 2 RAF ALTERNATIVE CRIMPING TOOL

| Crimping tool | | Locator | | |
|---------------|------------|----------------------------------|------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| MS 3191 | 1M/4658819 | M3191-12A (Part No. 602520/4) | 1M/1300395 | Yellow |

TABLE 3 RN CRIMPING TOOL

| Crimping tool | | Turret | | |
|---------------|--------------|---------------|--------------|-------------|
| Specification | Sect. Ref. | Specification | Sect. Ref. | Colour code |
| M22520/1-01 | 0273-1380390 | M22520/1-02 | 0273-1380391 | Yellow |

4 Where the crimping tool detailed in Tables 1 and 3 is to be used, select the appropriate tool setting from Table 4.

TABLE 4 CRIMPING TOOL MS22520/1-01 TOOL SETTING

| Wire size | Tool setting |
|-----------|--------------|
| 14 | 7 |
| 12 | 8 |

5 Crimp the contact to the wire.

Note ...

Information on the use of crimping tools is detailed in AP 120M-0602-1 (RAF) and AP 120M-0600-1 (RN).

6 Inspect the crimp joint for the following:-

6.1 All conductor strands enter the crimping barrel and the conductor is visible through the inspection hole.

6.2 The contact is not distorted and the crimp barrel is free from fractures.

Chapter 3CONNECTOR ASSEMBLY INSTRUCTIONSSOLDER POT CONTACTS

1 No special tools are required for dismantling standard connectors. When making wiring connections it is only necessary to remove the connector endbell and accessories to gain access to the contact solder cups. The contacts are soldered in situ.

Wiring connectors

2 When wiring multi-cored cables to a plan careful trimming of each conductor wire is necessary to allow the contacts to be evenly seated in their correct positions in the insert. To prepare the cable :-

2.1 Trim the outer sheath of the cableform back sufficiently to allow the conductors to spread out to the peripheral contacts, but ensure the end of the sheath will be housed within the cable clamp or endbell.

2.2 Apply a whipping to the end of the sheath to prevent the possibility of the sheath being split when the conductors are spread.

2.3 Cut the individual conductor to the length required to reach the appropriate contact.

2.4 Trim back the insulation of each conductor to the length shown in Table 1.

2.5 Tin the bared ends of the conductors ensuring that all strands of the conductor wires are laid evenly along the conductor.

2.6 Fit insulating sleeves on to each conductor and slide each sleeve along the conductor and clear of the tinned wire.

2.7 Remove the endbell and accessories from the connector to be wired.

2.8 Pass the cableform through the appropriate solid cable fittings e.g. the endbell of the MSA types, assembly ring of the MSB types and the bushing endbell and ferrules of the MSB and R types.

2.9 For E and R types only fit each conductor through its appropriate hole in the grommet and ensure that the grommet is pushed up clear of the bared ends of the wires.

Note ...

The conductors should be connected one at a time, starting with the most central contact and working outwards towards the perimeter of the insert.

2.10 Insert the tinned end of each conductor into its appropriate contact solder cup in turn. Apply the heat to the closed side of the cup so that the solder flow may be observed.

2.11 Slide the sealing grommet down on to the joints for E and R types, and the insulating sleeves over the joints for all other types.

2.12 Position and tighten the endbells and accessories as required, on to the connectors.

TABLE 1 CABLE STRIPPING LENGTHS - SOLDER POT CONTACTS

| Contact size | Stripping length maximum (in) |
|--------------|----------------------------------|
| 16 | 0.250 |
| 12 | 0.375 |
| 8 | 0.500 |
| 4 | 0.625 |
| 0 | 0.625 |

CRIMP POT CONTACTS

Contact insertion

Note ...

Contacts are to be inserted into the connector, starting from the centre and working to the outside.

3 Proceed as follows :-

3.1 Slide the endbell, ferrule and grommet over the wire bundle.

3.2 Select the correct insertion tool from Table 2.

Note ...

The insertion tool must be maintained parallel to the contact during the following operation.

3.3 Insert the contact into the rear of the insulator, position the insertion tool behind the contact and apply firm steady pressure until the contact locates into position.

3.4 Withdraw the insertion tool from the rear of the insulator.

3.5 Fill all unused cavities with unwired contacts and fit filler plugs.

3.6 Inspect the front face of the insulator, ensuring that there are no bent contacts and that all contacts are even.

3.7 Slide the rear accessories over the wire bundle and fit the accessories to the connector.

Extraction of contacts

4 Proceed as follows :-

4.1 Disconnect all accessories fitted to the rear of the connector and slide the accessories over the wire bundle.

4.2 Select the correct extract tool from Table 3.

4.3 Working at the front face of the connector, carefully locate the extraction tool on the contact to be removed.

Notes ...

- (1) The extract tool is double-ended, the tip being reversible in the handle, to provide a socket tip or pin tip.
- (2) The extract tool must be maintained parallel to the contact during the contact removal.
- (3) During the removal process care must be taken to ensure that the extract tool does not damage the insulator.

4.4 Exert pressure until the contact is pushed clear of its location. Remove the contact by hand and withdraw the extract tool.

TABLE 2 CONTACT INSERTION TOOLS

| Contact size | Part No. | Service Ref No./ NATO Stock No. |
|--------------|------------|------------------------------------|
| 16 | CIT-F80-16 | |
| 12 | CIT-F80-12 | |

TABLE 3 CONTACT EXTRACTION TOOLS

| Contact size | Part No. | Service Ref No./ NATO Stock No. |
|--------------|----------|------------------------------------|
| 16 | CET16-4 | |
| 12 | CET12-2 | |

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