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dated February 1968)

CONNECTORS, AMPHENOL, 48 SERIES

GENERAL AND TECHNICAL INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

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PREFACE

Amendments

1 Each page of this publication bears the date of issue. Subsequent amendments to the initial issue will bear the date and number of the amendment list with which they were issued.

2 New or amended technical matter will be indicated within the individual pages by black triangles thus (► ..... ◄) at the beginning and end of the amendment. Triangles will not normally be used where a minor working alteration is made to clarify, rather than change, the requirement. When publications are produced on word processors the symbols > and < may be used in lieu of triangles, alternatively vertical marginal lines positioned 2 character spaces out, in both left and right hand margins shall be used to indicate the extent of amended text. However, where the word processor software dictates, a single line on the outer edge margin is permitted.

3 When a page is reissued without any changes whatsoever, but solely because it backs onto a changed page, the issue/amendment caption will remain unchanged from the previous issue.

4 When a chapter is completely rewritten the note '(Completely revised)' will appear below the chapter title. Triangles will not be used.

TECHNICAL ENQUIRIES

RAF

1 Technical enquiries concerning these connectors should be directed to the Engineering Authority SM43c2(RAF), RAF Wyton. Telephone RAF Wyton (95371), extension 5893 for urgent enquiries.

2 Technical enquiries concerning tooling for these connectors should be directed to the Engineering Authority for Electrical hand tools, Tooling Cell RAF Wyton. Telephone RAF Wyton (95371), extension 7183 for urgent enquiries.

RN

3 Technical enquiries concerning these connectors or tooling for these connectors should be directed to DGA(N)L1.3, Room 110B, Aircraft Support Executive, Yeovilton, Somerset, BA22 8HW.

WARNINGS

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH

MAKE SURE YOU KNOW THE SAFETY PRECAUTIONS AND FIRST AID INSTRUCTIONS BEFORE YOU USE A HAZARDOUS SUBSTANCE

READ THE LABEL ON THE CONTAINER IN WHICH THE SUBSTANCE IS SUPPLIED

READ THE DATA SHEET APPLICABLE TO THE SUBSTANCE

OBEY THE LOCAL ORDERS AND INSTRUCTIONS

WARNINGS

(1) ELECTRICAL SAFETY. BEFORE STARTING WORK ON ANY ELECTRICAL SYSTEM ENSURE THAT THE POWER SUPPLY IS ISOLATED. SUITABLE PRECAUTIONS ARE TO BE TAKEN TO PREVENT REINSTATEMENT OF POWER WHILST WORKING ON THE SYSTEM. eg PLACARDS DISPLAYED, CBs TRIPPED, FUSES REMOVED.

(2) HIGH VOLTAGE ELECTRICAL SYSTEMS. WHEN WORKING WITH HIGH VOLTAGE ELECTRICAL SYSTEMS REQUIRING EXPOSURE TO LIVE UNPROTECTED CONDUCTORS, A SECOND SAFETY PERSON (SAFETY MAN) IS ALWAYS TO BE IN ATTENDANCE.

LEADING PARTICULARS

Voltage rating ... 500 V rms
Wire sizes:
- size 20 contact ... 24-22-20 AWG
- size 16 contact ... 18-16 AWG
- size 12 contact ... 14-12 AWG

Contact plating ... Rhodium over silver
Dielectric ... Silicone rubber
Shells ... Aluminium forgings
Current ratings:
- size 20 contact ... 7.5 A
- size 16 contact ... 22 A
- size 12 contact ... 41 A

Millivolt drop at max. rated current:
- size 20 contact ... 13.5 mV
- size 16 contact ... 20 mV
- size 12 contact ... 21 mV

MODIFICATION RECORD

The following record confirms that this publication incorporates all technical changes necessitated by the modifications listed below.

Mod. No.	Amdt No.	Mod. No.	Amdt No.	Mod No.	Amdt No.	Mod. No.	Amdt No.	Mod. No.	Amdt No.	Mod. No.	Amdt No

•	Incorporated in initial issue	C	Cancelled
NA	Not applicable		

CHAPTER 1

DESCRIPTION

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Fig

Introduction

1 The range of Amphenol miniature connectors in the 48 series meets the requirements of Specification EL. 1987 and, as such can be used to replace, or be used in conjunction with, MS type connectors to US Specifications MIL-C-26500, and 38300. The connectors are circular, contact arrangements conventional, and the units provide a range intermediate between the standard size and micro-miniature connectors. They are available in a variety of constructions with bayonet or threaded coupling with a density of contacts ranging from 2 to 61 contacts.

GENERAL

2 The shell styles within the range make provision for fixed and free units fully sealed against extreme environmental conditions. Shells are of aluminium with monoblock construction inserts. When connectors are mated, insert faces compress to form a resilient dielectric seal around each individual contact. A version of these connectors designated 'Ultra-Mate', is identical to other connectors in the 48 Series but the socket inserts have a hard face of glass-filled epoxy and, whilst having closed entry, can still be serviced from the front. Wrong size contacts or oversize test prods cannot be inserted in the apertures of the hard dielectric faces of the socket inserts. In the hermetically sealed version of the 48 Series, receptacles are available in either of two shell styles: solder flange or single hole mounting shells with hexagonal fixing nut. They take any of the inserts available (with pin contacts only). The shells of hermetic receptacles are of non-magnetic stainless steel with contacts of rhodium plated alloy. Either bayonet or threaded receptacles in both shell styles are obtainable.

FREE UNITS

3 Typical free plugs are shown in Fig 1 and a sectional view of a mated pair in Fig 2. These units will mate with the corresponding fixed receptacles either single hole or square flange mounted. When correctly assembled and mated the contacts are individually sealed and a continuous barrier on the periphery of the socket insert mates with a recess around the pin insert to form an additional pressure seal. An 'O' ring seal, marked J in Fig 2 between mated shells constitutes yet another barrier to the ingress of dirt and moisture and protects the integrity of the face seals. Together with the monoblock construction these factors jointly form a trouble-free contact throughout the entire connector length. The monoblock construction with bonded interfaces between the dielectric components (insert, antideflection disc, and grommet) eliminates air pockets and protects connectors from moisture and other atmospheric conditions. A pressurizing seal around each contact prevents the passage of air or moisture through the contact location hole and triple risers at each wire hole in the grommet (marked B in Fig 2) provide independent sealing for each connecting wire. These risers form pressure seals which ensure complete sealing up to 30 lb/in^2. When the 'Ultra-Mate' connector is mated the chamfered entry in the hard dielectric guides the pins into correct engagement with the socket contacts. Badly bent pins cannot be engaged and the hard dielectric thus avoids any risk of mismating.

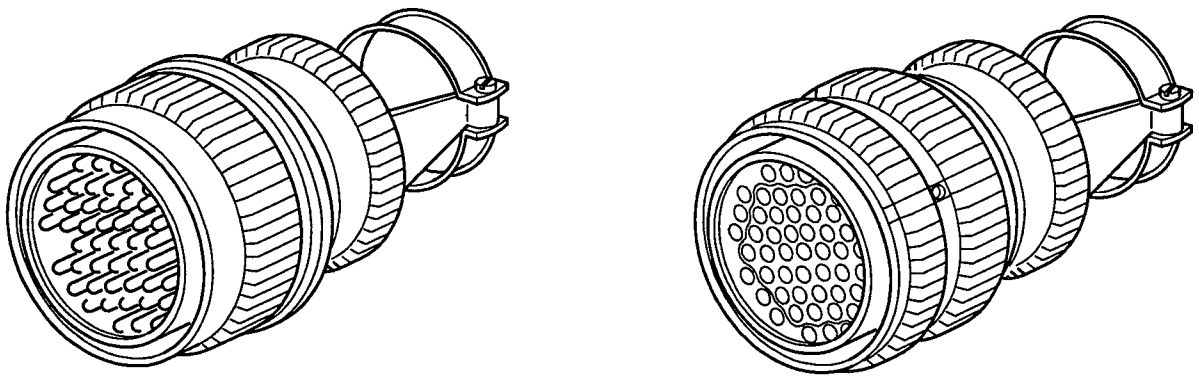
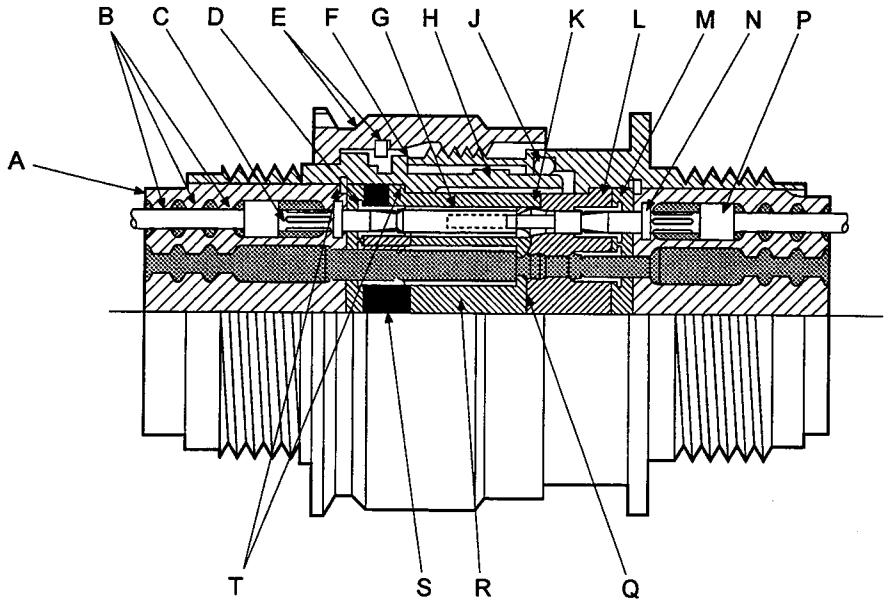


Fig 1 Typical free plugs, upper threaded coupling, lower bayonet coupling



A GROMMET
B WIRE SEALING RISERS
C SOCKET CONTACT
D CONTACT RETENTION CLIP
E BAYONET OR THREADED COUPLING SHOWING PERMANENT CAPTIVATION
F METAL TO METAL SHOULDER
G RELEASING SLEEVE
H FIVE KEY SHELL POLARIZATION
J DYNAMIC 'O' RING SHELL SEAL
K INSERT RIM SEAL
L RESILIENT PIN INSERT
M ANTI DEFLECTION DISC
N CONTACT PRESSURIZING SEAL
P PIN CONTACT
Q INSERT STATIC FACE SEAL
R CLOSED ENTRY HARD DIELECTRIC 'ULTRAMATE' FRONT INSERT
S RESILIENT REAR INSERT
T POSITIVE LOCATION CAPTIVATED INSERT SHOWING MECHANICAL INTERLOCK

Fig 2 Sectional view of a mated pair

FIXED UNITS

4 Fixed units are available in corresponding types i.e. either bayonet or threaded coupling. Mounting arrangements comprise square flange with four hole fixing (Fig 3) and single hole with hexagonal fixing nut (Fig 4). In all units the insert arrangement is such that the maximum number of contacts is available for the specific area and the smallest contact (No. 20) has a current rating of 7.5 amp (MIL-C-26500).

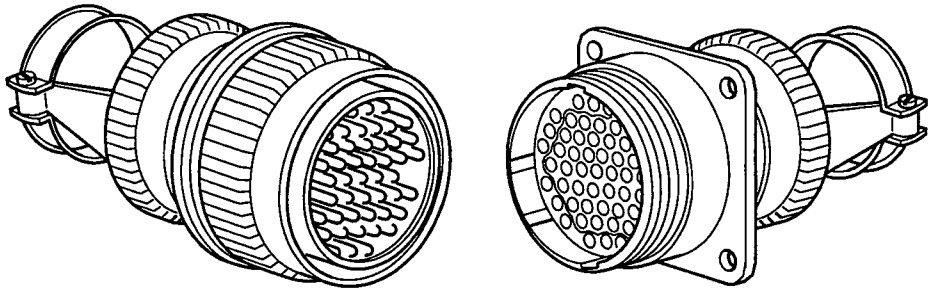


Fig 3 Fixed square flanged receptacle with mating plug

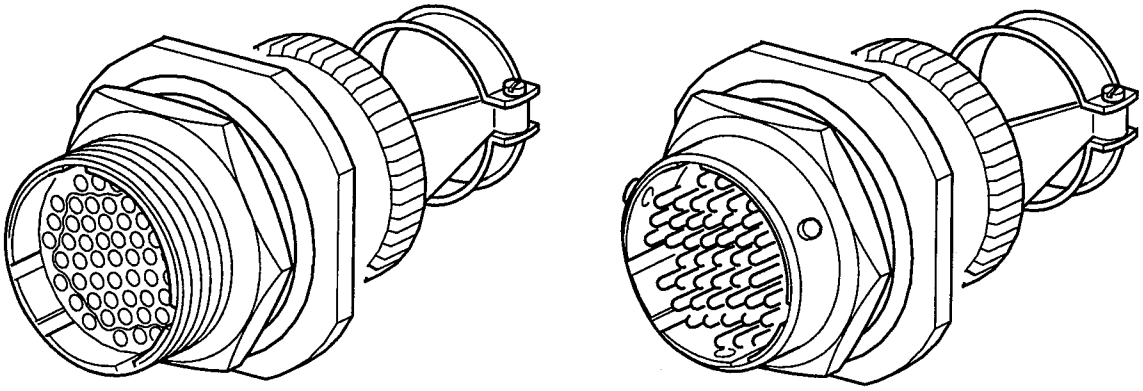


Fig 4 Typical single-hole mounting receptacles

CABLE SUPPORT

5 Cable clamps support cable at the plug or receptacle and are intended to prevent the flexing of the connecting wires in the immediate vicinity of the risers in the seal, so avoiding the risk of leaks at this point.

SQUARE FLANGE MOUNTING

6 Square flange receptacles with either threaded or bayonet coupling (Figs 3 and 5) are available for front or rear of panel mounting. The hermetically sealed feed-through receptacle is shown in Fig 6.

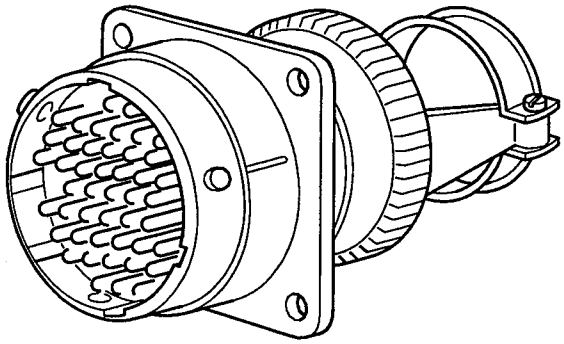


Fig 5 Fixed square flanged receptacle, bayonet coupling

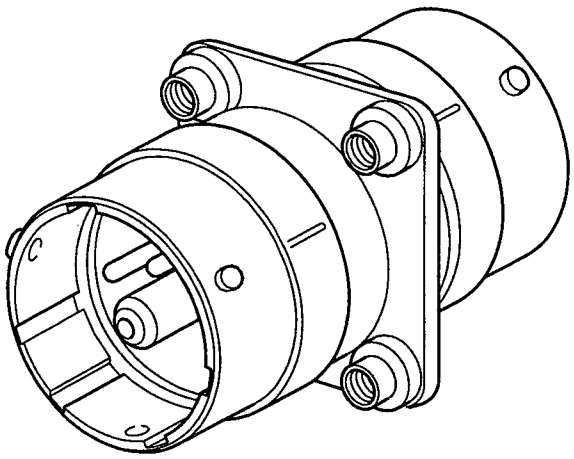


Fig 6 Hermetically sealed feed-through receptacle

SINGLE HOLE MOUNTING

7 Single hole mounting variants (Fig 4) for bayonet or threaded coupling, in standard or hermetically sealed units are included throughout the range. A different panel cut-out is required (i.e. unkeyed) for the solder flange hermetically sealed receptacle (Fig 7).

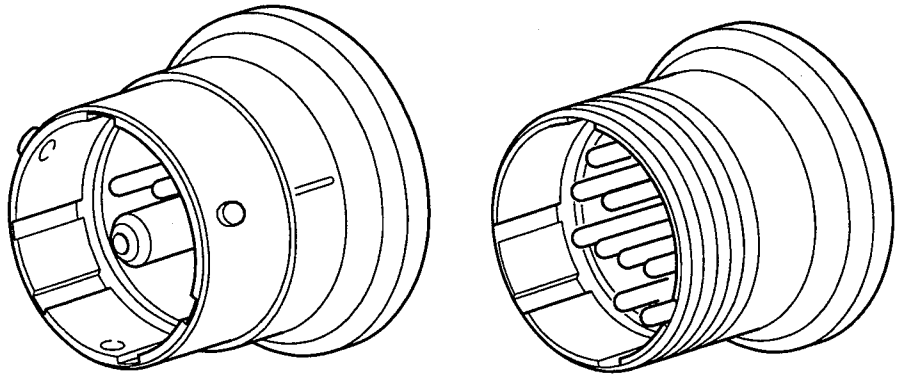


Fig 7 Solder flange hermetic receptacles

ACCESSORIES

8 Protective metal caps provide an environmental seal for the connector face for unmated receptacles. These caps have a woven steel chain so that they can be easily attached near to their point of use. Styles are available for threaded and bayonet coupling. See Fig 8 and Tables 1 and 2 for details. In addition to these protective caps, dummy receptacles and cable supports are available for use as an anchoring place for disconnected plugs. These prevent plugs from swinging freely and, at the same time provide a limited air seal which excludes foreign matter from the face of the plug. See Figs 9 and 10 and Tables 3 to 5 for details.

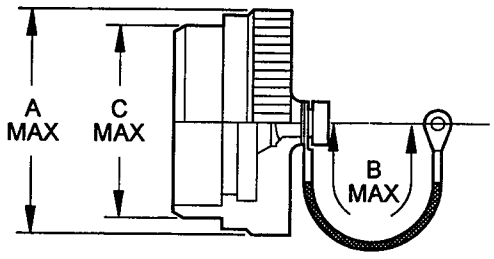
TABLE 1 CAP AND CHAIN PART NUMBERS

	Size	PLUG		RECEPTACLE	
		AMPHENOL	MS	AMPHENOL	MS
BAYONET CAP AND CHAIN	10	48-2144	MS27293-1	48-2150	MS27295-1
	12	48-2143	MS27293-2	48-2149	MS27295-2
	14	48-2142	MS27293-3	48-2148	MS27295-3
	16	48-2141	MS27293-4	48-2147	MS27295-4
	18	48-2140	MS27293-5	48-2146	MS27295-5
	22	48-2139	MS27293-6	48-2145	MS27295-6
THREADED CAP AND CHAIN	10	48-2340-10	MS27292-1	48-2301-10	MS27294-1
	12	48-2340-12	MS27292-2	48-2301-12	MS27294-2
	14	48-2340-14	MS27292-3	48-2301-14	MS27294-3
	16	48-2340-16	MS27292-4	48-2301-16	MS27294-4
	18	48-2340-18	MS27292-5	48-2301-18	MS27294-5
	22	48-2340-22	MS27292-6	48-2301-22	MS27294-6

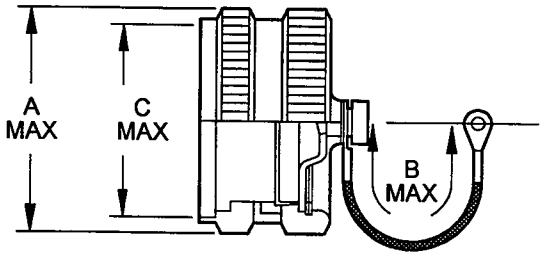
TABLE 2 CAP AND CHAIN DIMENSIONS
(Dimensions in inches, read with Fig 8)

			Bayonet Cap and Chain C		Threaded Cap and Chain C-Coupling Thread	
Size	**A Max Dia**	**B Chain Length**	**Plug Cap +0.000 -0.005**	**Receptacle Cap +0.005 -0.000**	**Plug UNEF-2A**	**Receptacle UNEF-2B**
10	0.906	3.00	0.659	0.662	11/16-24	11/16-24
12	1.078	3.00	0.829	0.832	7/8-20	7/8-20
14	1.141	3.00	0.898	0.901	15/16-20	15/16-20
16	1.266	5.00	1.025	1.028	1 1/16-18	1 1/16-18
18	1.375	5.00	1.131	1.134	1 3/16-18	1 3/16-18
22	1.625	5.00	1.381	1.384	1 7/16-18	1 7/16-18

BAYONET

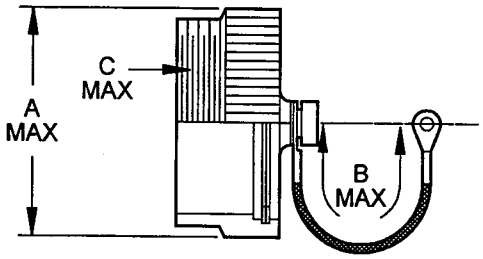


PLUG CAP

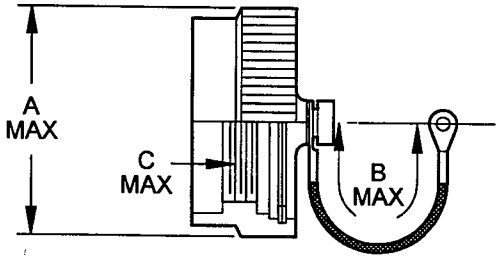


RECEPTACLE CAP

THREADED



PLUG CAP



RECEPTACLE CAP

Fig 8 Cap and chain dimensions

TABLE 3 DUMMY RECEPTACLE PART NUMBERS

SIZE	BAYONET		THREADED	
	AMPHENOL	MS	AMPHENOL	MS
10	48-149-10000	MS27297-1	48-172-10000	MS27296-1
12	48-149-12000	MS27297-2	48-172-12000	MS27296-2
14	48-149-14000	MS27297-3	48-172-14000	MS27296-3
16	48-149-16000	MS27297-4	48-172-16000	MS27296-4
18	48-149-18000	MS27297-5	48-172-18000	MS27296-5
22	48-149-22000	MS27297-6	48-172-22000	MS27296-6

TABLE 4 DUMMY RECEPTACLE DIMENSIONS, BAYONET AND THREADED

(Dimensions in inches, read with Fig 9)

Size	Threaded Size UNEF-2A	A ±0.005 Square	B ±0.005	C Max Dia	D Min Dia
10	11/16-24	0.719	0.937	0.696	0.748
12	7/8-20	0.812	1.031	0.875	0.913
14	15/16-18	0.906	1.125	0.935	0.980
16	1 1/16-18	0.968	1.250	1.062	1.107
18	1 3/16-18	1.062	1.343	1.187	1.209
22	1 7/16-18	1.250	1.562	1.437	1.452

TABLE 5 CABLE SUPPORT ASSEMBLY PART NUMBERS AND DIMENSIONS

(Dimensions in inches, read with Fig 10)

Size	Part Numbers		Dimensions (inches)				
	AMPHENOL	MS	A Max Dia	B ±0.015	X Dia ±0.015	E Thread UNEF-2B	P Max
10	48-2341	MS27291-1	0.731	0.935	0.270	9/16-24	0.914
12	48-2342	MS27291-2	0.919	0.935	0.400	3/4-20	1.026
14	48-2343	MS27291-3	0.981	1.170	0.460	13/16-20	1.090
16	48-2344	MS27291-4	1.106	1.170	0.610	15/16-20	1.250
18	48-2345	MS27291-5	1.231	1.170	0.690	1 1/16-18	1.358
22	48-2346	MS27291-6	1.481	1.170	0.940	1 3/16-18	1.604

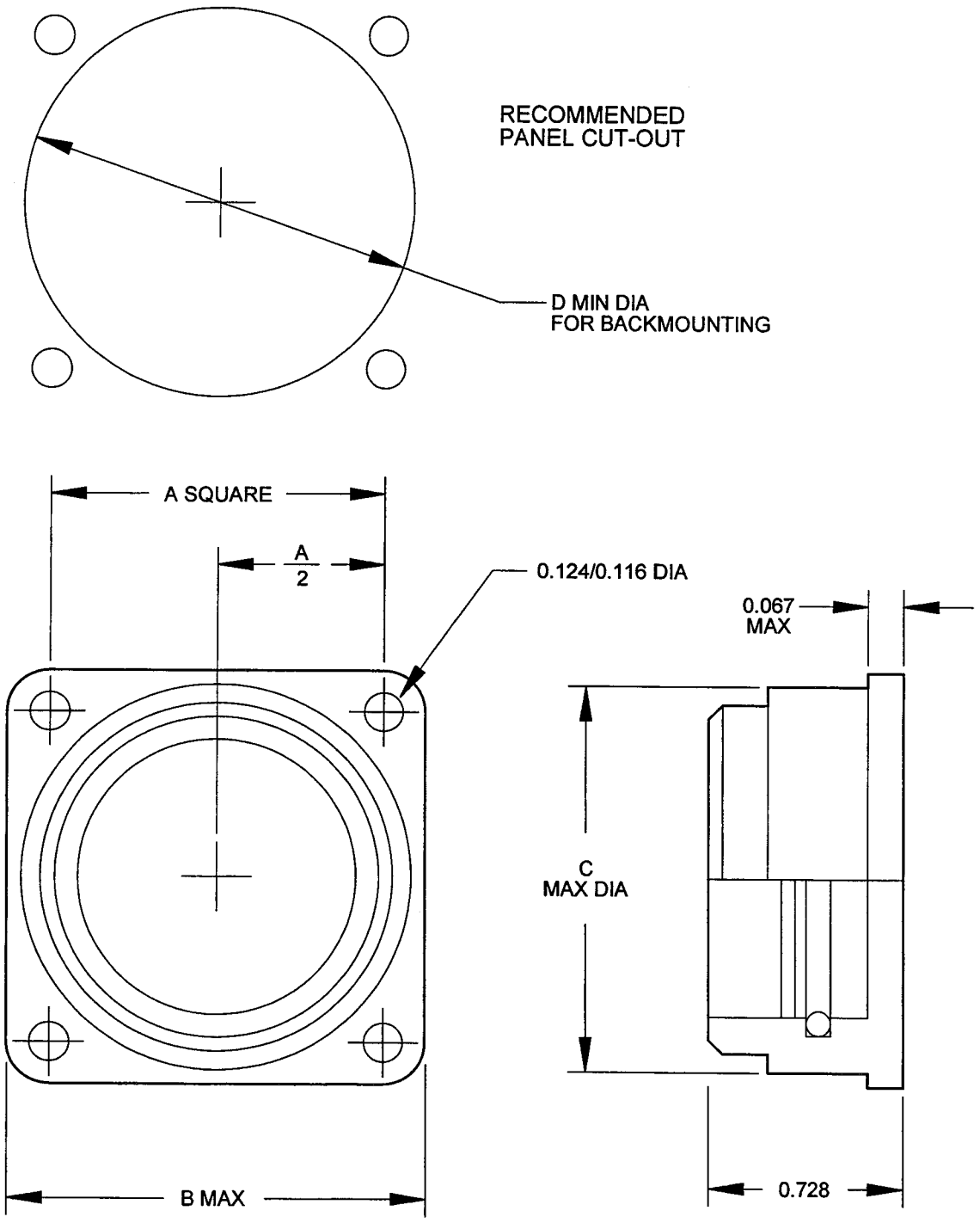


Fig 9 Dummy receptacle dimensions

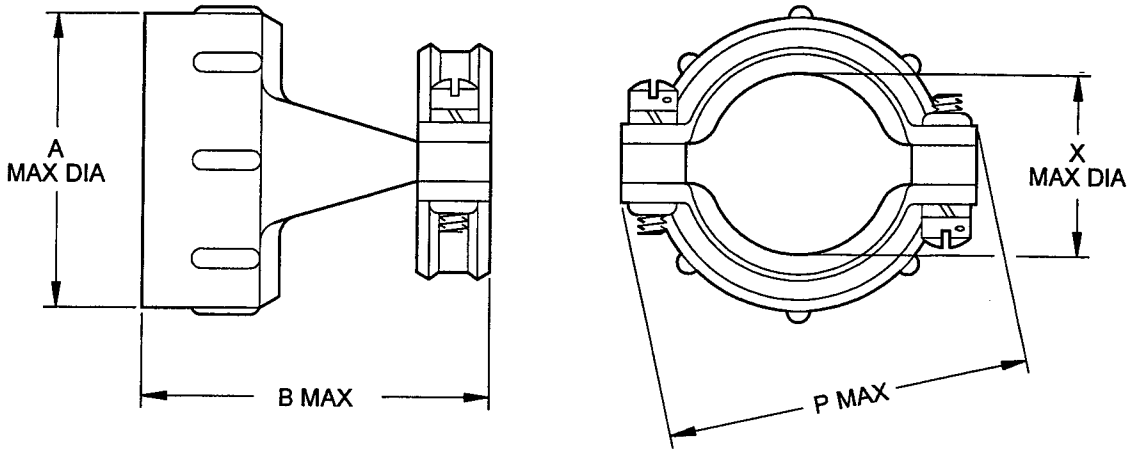


Fig 10 Cable support assembly dimensions

CONTACTS AND INSULATION

9 The contacts used throughout the series are front release, rear insertion and removal type and provide easy access for the servicing of connector circuits without disassembling the connector from its mounting, or disturbing adjacent contacts. Contacts are crimped quickly and reliably with either hand or power operated tools. The contacts, which have high electrical conductivity, are available in sizes 20, 16, 12 and shielded construction. They are retained in an insulating material which may be one of three types: the standard silicone elastomer insert, the hard dielectric 'Ultra-Mate' insert or glass dielectric for the hermetically sealed range. Contacts are made of copper alloy with rhodium-over-silver. Table 6 provides contact data and Fig. 11 shows typical contacts. Contacts in hermetically sealed connectors are permanently bonded to the glass dielectric at the time of manufacture and are therefore not removable. Sealing plugs are available for use when the full complement of contacts is not required.

TABLE 6 CONTACT DATA

Contact Size and Colour Code	Max Current Rating	Wire Size	AMPHENOL Part No.	
			Pin	Socket
No. 20 Red	7.5 amps	24-22-20 AWG	48-1595-02	48-100-2000S-02
No. 16 Blue	22 amps	18-16 AWG	48-1825-02	48-100-1600S-02
No. 12 Yellow	41 amps	14-12 AWG	48-1827-02	48-1215-02
No. 1* (shielded)	3 amps	RG179/U, 179A/U, 187/U, 188/U, 161/U	48-1226-50	48-1227-50
No. 2** (shielded)	7.5 amps	RG195/U	48-2187-50	48-2188-50
No. 2** (shielded)	7.5 amps	—	48-2187-02	48-2188-02

NOTES

(1)* Cables RG178/U, RG178A/U, and RG196/U can be accommodated with modification to shielded contacts.

(2)** AWG 18, 20, and 22 shielded wire per MIL-C-7078 TYPE 11 or MIL-C-27500 (USAL) can be accommodated with modification to shielded contacts.

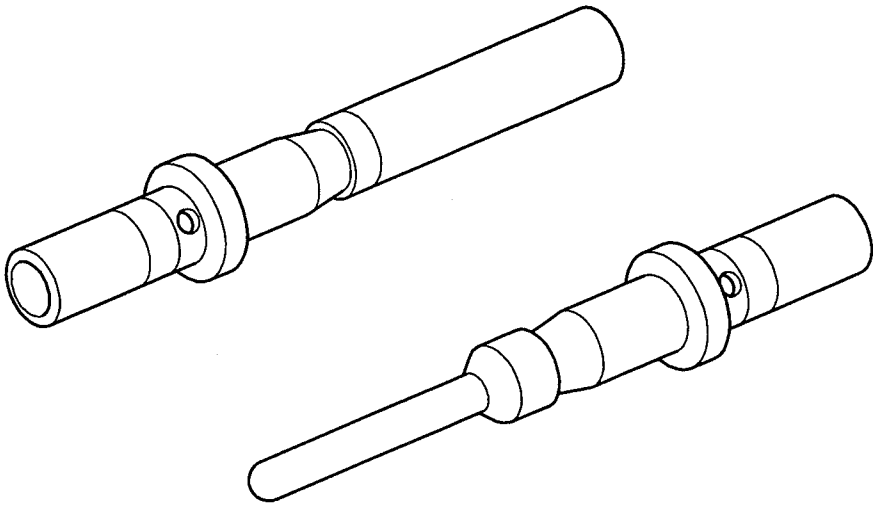


Fig 11 Pin and socket contacts

Contact arrangements

10 The full range of possible contact arrangements is shown in Fig 12. The illustrations are arranged numerically in shell size sequence and showing the front face of the socket insert.

Socket inserts

11 Viewed on the mating face, a chosen contact near the centre is marked 1 and, working in a counter-clockwise spiral along a marked path every tenth contact is marked thus ( ). The final contact is also numbered.

Pin inserts

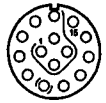
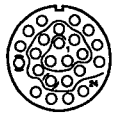
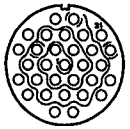
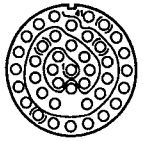
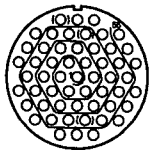
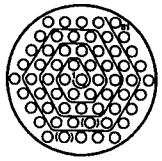
12 Pin inserts are numbered as above, but the helix is clockwise.

NOTE

Early connectors in this range used the spiral numbering process described above, but without the marked path and numbering only selected contacts.

KEY/KEYWAY ORIENTATIONS

13 To avoid possible mismating of connectors where similar types are employed in close proximity, provision is made for six alternative key/keyway orientations for connectors size 10 to 24 inclusive. Fig 13 illustrates alternative key positions and Tables 7 and 8 give key/keyway orientations for each shell size.

Shell Size	10	12	14	16	18	20	22	24
								
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				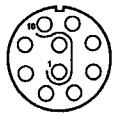	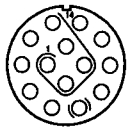	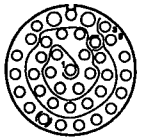	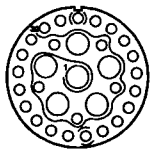	
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			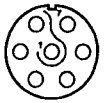		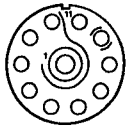	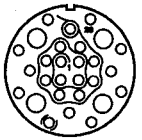	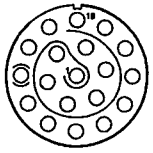	
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					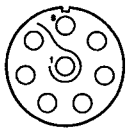	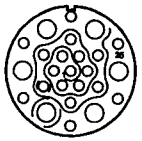	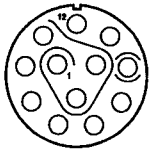	
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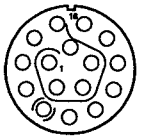
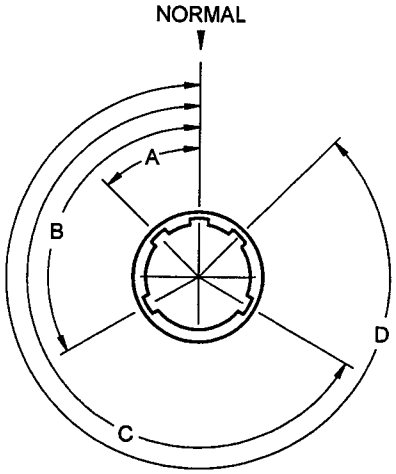
								
			2#16 1#2 3 CONTACTS			16#16 16 CONTACTS		

IN SPECIFYING THE PART NO. OF THE COMPLETE CONNECTOR (SEE PARA. 14) THE INSERT CODE COMPRISES THE SHELL SIZE AND NUMBER OF CONTACTS. e.g. INSERT REFERENCE 22 - 32 SIGNIFIES A SIZE 22 INSERT WITH 32 CONTACTS. REFERENCE TO THE DIAGRAM UNDER THE HEADING "22" SHOWS THAT THE 32 CONTACT INSERT HAS 26 SIZE 20 CONTACTS AND 6 SIZE 12.

Fig 12 Contact arrangements



FRONT FACE OF RECEPTACLE SHOWN

NOTE: ALTERNATE POSITIONS 6 TO 10 INCORPORATE SPECIAL SHELL POLARIZING KEY AND KEYWAYS. ALL INSERTS REMAIN IN THE NORMAL POSITION

Fig 13. Alternative shell positions

TABLE 7 ALTERNATIVE KEY/KEYWAY ORIENTATIONS FOR CONNECTORS SIZE 8 AND 10

Position	A	B	C	D
Normal	105°	140°	215°	265°
6	102°	132°	248°	320°
7	80°	118°	230°	312°
8	35°	140°	205°	275°
9	64°	155°	234°	304°
10*	25°	115°	220°	270°

NOTE*

Position 10 is not available in size 8 connector.

TABLE 8 ALTERNATIVE KEY/KEYWAY ORIENTATIONS FOR CONNECTORS SIZE 12, 14, 16, 18, 20, 22 AND 24

Position	A	B	C	D
Normal	105°	140°	215°	265 °
6	18°	149°	192°	259°
7	92°	152°	222°	342°
8	84°	152°	204°	334°
9	24°	135°	199°	240°
10	98°	152°	268°	338°

SIGNIFICANCE OF PART NUMBERS

14 A typical part number for an Amphenol Series 48 miniature connector, remembering that only the inserts shown in Fig 12 are available, is 48-06R22-55P6-(102). The significance of the various letters and digits is given in Table 9.

TABLE 9 48 SERIES DESIGNATION AND ALTERNATIVES

48- Series Designation	Alternatives
0 - Coupling type	0 - Threaded 1 - Bayonet
6 - Shell style	0 - Square flange 3 - Single-hole mounting receptacle 5 - Solder flange mounting receptacle 6 - Straight plug
R - Environmental class	R - MIL-C-26500 (USAF) C - MIL-C-38300 (USAF) (Ultra-Mate) H - Hermetically sealed
22 - Shell size	8, 10, 12, 14, 16, 18, 20, 24
55 - Number of contacts	2, 3, 4, 5, 7, 8, 10, 11, 12, 14, 15. 16, 19, 24, 25, 28, 31, 32, 39, 41, 43, 55, 57, 61
P - Contact style	P - Pin S - Socket
6 - Alternative shell position	See Fig 13
102 - Deviations	(100) - Connector for potting (102) - Connector less cable support (105) - Connector less contacts (106) - Connector less contacts and less cable support (107) - Shell assembly--less insert assembly (108) - Hermetic receptacle with solder cup contact (113) - Gold iridite finish on shell and grommet nut, and less cable support (114) - Gold iridite finish on shell and grommet nut, and less cable support and contacts (117) - Hermetic with solder flowed on mounting flange surface (118) - (108) and (117) combined (136) - Ferrule style connector (obsolescent) (145) - MIL-C-38300 Contact style 'P' only

15 All qualified Amphenol connectors are marked with MS connector numbers which follow the pattern below for connectors qualified to ML-C-26500, a typical number being MS 24266 R 22 T 55 P 6 X. The significance of the various letters and digits is given in Table 10.

TABLE 10 MS CONNECTOR NUMBERS AND ALTERNATIVES

MS Shell Drawing	Alternatives
MS 24266	MS 24264 - Square flange receptacle MS 24265 - Single hole mounting receptacle MS 24266 - Straight plug MS 27034 - Solder flange mounting receptacle (Hermetic only)
R - Environmental class	R - Meets MIL-C-26500 (USAF) H - Hermetically sealed* Y - Hermetically sealed flattened and sealed contacts
22 - Shell size	10, 12, 14, 16, 18 or 22
T - Coupling Type	T - Threaded B - Bayonet
55 - Number of contacts	3, 4, 5, 7, 8, 11, 12, 14, 15, 19, 24, 31 or 55
P - Contact style	P - Pin S - Socket
6 - Alternative shell position	See Fig 13
X - Cable support	X - Less cable support (Omit if cable is desired)

NOTES

(1)* Hermetic receptacles available in shell styles MS 24265 and MS 27034 only.

(2) For coding on connectors qualified to MIL-C-38300 (marked M 38300/xxxx-xx) reference should be made to the latest issue of the specification.

CHAPTER 2

SERVICING

CONTENTS

Para

Table Page

Fig

WARNINGS

(1) ELECTRICAL SAFETY. BEFORE STARTING WORK ON ANY ELECTRICAL SYSTEM ENSURE THAT THE POWER SUPPLY IS ISOLATED. SUITABLE PRECAUTIONS ARE TO BE TAKEN TO PREVENT REINSTATEMENT OF POWER WHILST WORKING ON THE SYSTEM. eg PLACARDS DISPLAYED, CBs TRIPPED, FUSES REMOVED.

(2) HIGH VOLTAGE ELECTRICAL SYSTEMS. WHEN WORKING WITH HIGH VOLTAGE ELECTRICAL SYSTEMS REQUIRING EXPOSURE TO LIVE UNPROTECTED CONDUCTORS, A SECOND SAFETY PERSON (SAFETY MAN) IS ALWAYS TO BE IN ATTENDANCE.

TOOLS REQUIRED

1 The tools required to service the connectors are given in Table 1.

TABLE 1 TOOLS REQUIRED

Item	Description	Part No./Ref No.
1	500V insulation resistance tester, Type A	Ref No. 5G/6625-99-953-1154
2	Crimping tool	Pt No. 615708 Ref No. 1M/1653912
3	Locater size 20	Pt No. 611062 Ref No. 1M/1300396
4	Locater size 16	Pt No. 602520-3 Ref No. 1M/1300394
5	Locater size 12	Pt No. 602520-4 Ref No. 1M/1300395
6	Size 20 contact insertion tool	Pt No. MS 24256A-20 Ref No. 1H/1300349
7	Size 16 contact insertion tool	Pt No. MS 24256A-16 Ref No. 1H/4665486
8	Size 12 contact insertion tool	Pt No. MS 24256A-12 Ref No. 1H/0794600
9	Size 20 contact removal tool	Pt No. MS 24256R-20 Ref No. 1H/1240746
10	Size 16 contact removal tool	Pt No. MS 24256R-16 Ref No. 1H/1240747
11	Size 12 contact removal tool	Pt No. MS 24256R-12 Ref No. 1H/1240745
12	Ultra-Mate contact removal tool, size 20 contacts	Pt No. 294-215 Ref No. 1H/1240762
13	Ultra-Mate contact removal tool, size 16 contacts	Pt No. 294-180 Ref No. 1H/1240758
14	Ultra-Mate contact removal tool, size 12 (shielded) contacts	Pt No. 294-183 Ref No. 1H/
15	Ultra-Mate contact removal tool, size 2 (shielded) contacts	Pt No. 294-184 Ref No. 1H/1240759

2 In addition to the tools listed in Table 1, the manufacturers also recommend the tools listed in Table 2 for removal of contacts. These avoid the damage which may result when unskilled operators use the dual purpose removal tools listed in Table 1.

TABLE 2 ADDITIONAL TOOLS FOR THE REMOVAL OF CONTACTS

Item	Description	Part No.
1	Contact removal tool size 12 pin	294-73-1
2	Contact removal tool size 12 socket	294-73-2
3	Contact removal tool size 20 pin,	294-89-1
4	Contact removal tool size 20 socket	294-89-2
5	Contact removal tool size 16 pin	294-97-1
6	Contact removal tool size 16 socket	294-97-2

3 Connectors must be subjected to a physical examination for damage to contacts, dielectric material and hardware. Should cleaning be necessary, due to contamination with oil, grease, etc., any approved cleaning agent may be used, e.g. trichlorethane Ref No. 33D/452.

WIRE SIZE ACCOMMODATION

4 Specifications MIL-C-26500 (USAF) and MIL-C-26636 (USAF) specify that the wire sizes listed in Chap 1 Table 6 may be crimped to a respective contact size. The limiting insulation jacket diameter is also specified.

TO CRIMP WIRE TO CONTACTS

5 Cut the wire to the desired length and strip the insulation at the wire end as detailed in Table 3 ensuring that the wire strands are not cut or galled by the stripping tool.

TABLE 3 WIRE STRIPPING LENGTH

Contact Size	Wire Gauge Range	Max OD of Wire Insulation in inches	Wire Stripping Length in inches
20	20, 22, 24 AWG	0.090	0.187 - 0.234
16	16, 18 AWG	0.130	0.220 - 0.260
12	12, 14 AWG	0.170	0.220 - 0.260

6 Insert the wire into the contact wire pocket and observe that the wire is visible through the inspector hole on the side of the contact barrel.

7 Ensure that the correct nest bushing is fitted to the crimping tool. Insert the contact into the crimping tool, ensuring that the contact is fully seated in the nest bushing. Crimp the contact by closing the handles of the crimping tool with one even and complete motion. Release the tool handles and remove the crimped contact from the tool.

NOTE

The crimping tool is designed not to release until it has completed its stroke and the ratchet mechanism is released. Do not attempt to remove the contact after a partial cycle; every cycle must be complete.

REMOVAL OF CONTACTS

8 Removal of contacts is shown in Fig 1. Before removing contacts from the connector, uncouple the connector, and remove the cable support.

CAUTION

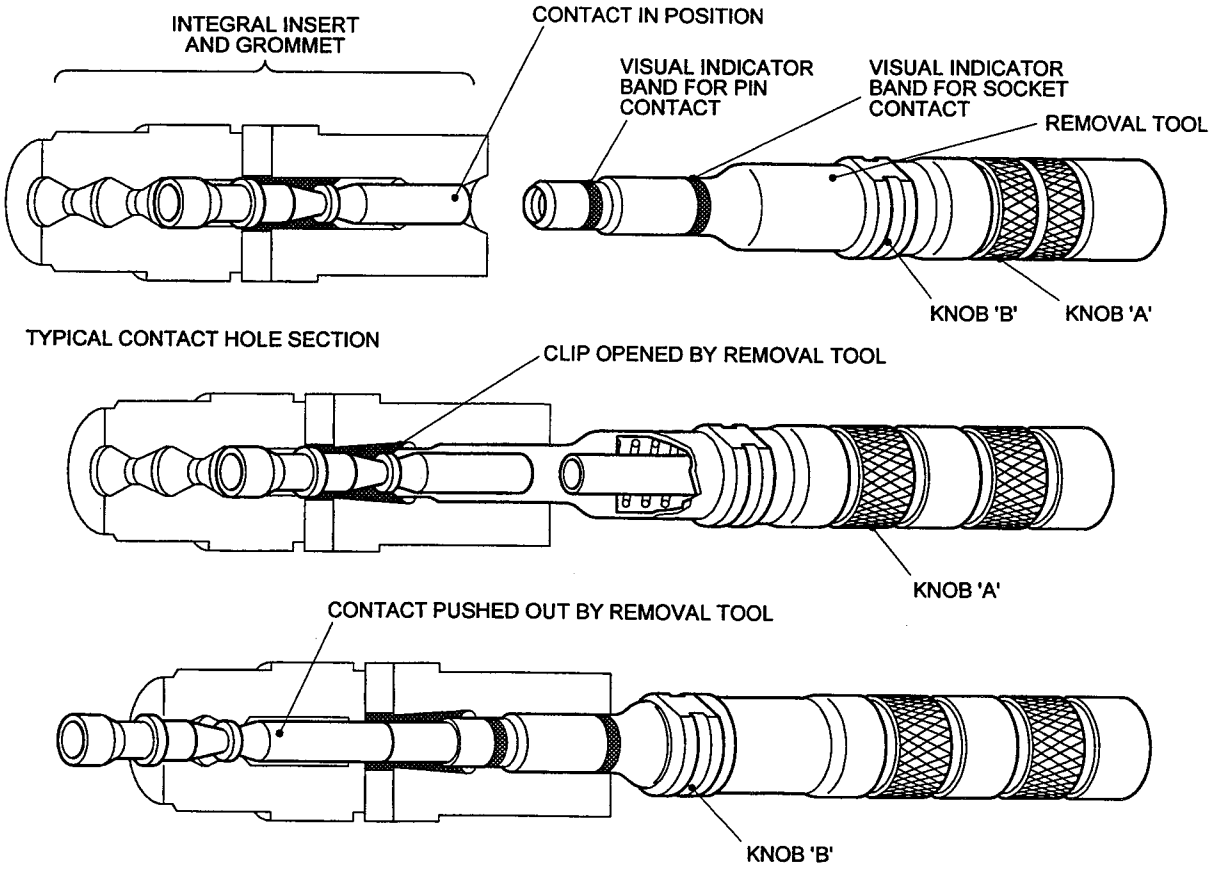
The tool probe must not be inserted beyond the visual indicator lines marked on the tool barrel.

9 Push the tool probe into the required hole in the front (mating) face of the insert. When the probe has opened the retaining clip and is positively seated, the contact is released and ready for ejection. The correct depth of penetration is shown by visual indicator lines marked on the tool barrel.

10 When the correct contact ejection position is achieved on pin contacts the first indicator line from the front of the probe will be recessed and out of sight at the male insert face.

11 Push the movable knob fully forward, ejecting the contact which is then exposed at the rear grommet. Remove the contact by pulling on the wire.

12 When removing contacts from socket inserts, the second indicator line shows the limit of probe penetration. When the probe has reached the retaining clip and has released the contact, the second indicator line will be recessed out of sight at the socket insert face. The contact is then ejected by pushing the movable knob as in Para 11.



NOTE: SOCKET CONTACT SHOWN
REMOVAL OF PIN CONTACT
EMPLOYS THE SAME SEQUENCE

Fig 1 Contact removal

INSERTION OF CONTACTS

13 Select the appropriate contact insertion tool, Table 1, and wherever possible commence insertion at the centre and work outward to the contacts nearest to the shell. Use of the tool is shown in Fig 2. Connectors, contacts and sealing plugs are ordinarily contained in one package. Sealing plugs are listed in Table 4.

14 The crimped contact or sealing plug should be placed in the contact insertion tool and, gripping the connector shell firmly, insert the wired contact or sealing plug into the appropriate hole In the moulding and exert a steady and even pressure on the contact insertion tool keeping in line with the axis of the hole until the collar of the tool meets the rear face of the moulding.

15 To remove the contact insertion tool, maintain the grip on the shell of the connector and remove the tool with a steady and even pull. Check that the contact is firmly in position by applying a gentle push-and-pull movement.

16 To maintain a pressure seal in the complete connector all holes in the insert must be fitted either with contacts or sealing plugs

17 Should cable clamps be required, it may be necessary to slide them over the cables before inserting contacts into the insert.

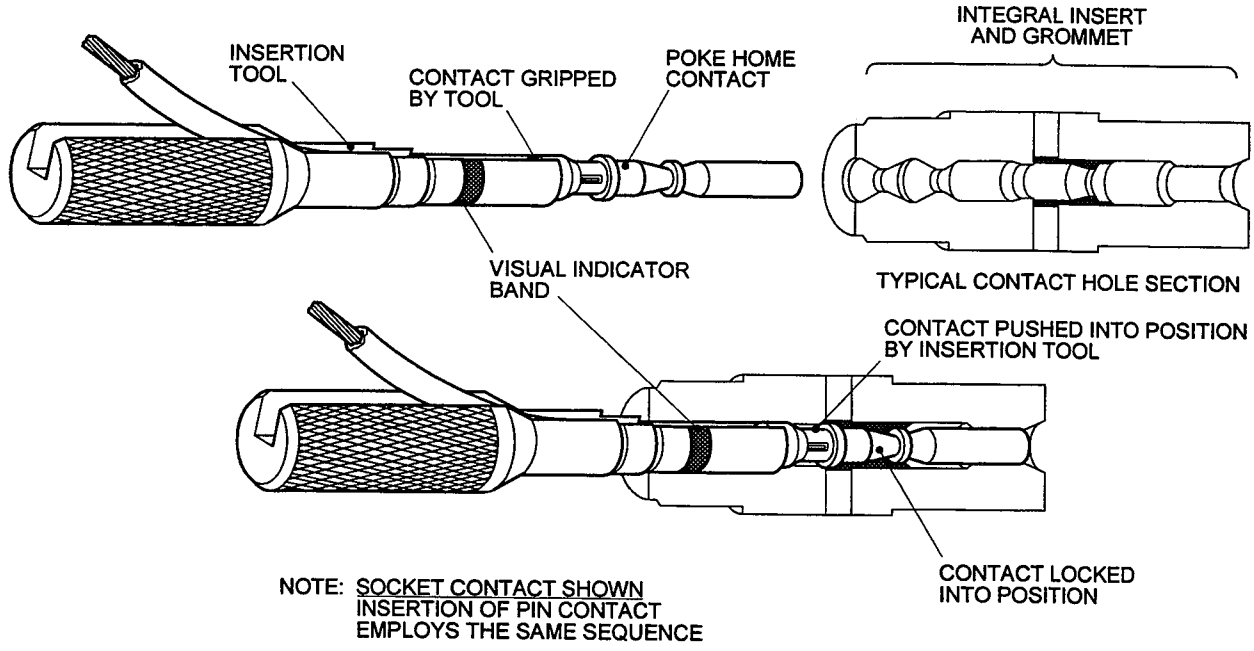


Fig 2 Contact insertion

CONTACT RESISTANCE

18 This may be checked by measuring the mV drop across mated contacts with the full rated current flowing. The reading should be not greater than the relevant value given in the Leading Particulars which are given in the Preliminary pages of this AP.

INSULATION RESISTANCE

19 Using a 500V insulation resistance tester, Type A Ref No. 5G/1621, measure the insulation resistance between adjacent contacts and the shell. The reading should be not less than 5 megohms.

TABLE 4 SEALING PLUGS

Colour Code	Size	AMPHENOL Part No.
Yellow	12	48-2221-12
Blue	16	48-2221-16
Red	20	48-2221-20
White	2 shielded	48-1458