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TERMINATING AND JOINTING ELECTRIC WIRES AND CABLES

Chapter 123

ROUND PLAN PLUGS AND SOCKETS - METHODS OF ASSEMBLY

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INTRODUCTION

1. The purpose of this chapter is to provide information on the termination of multicore cables into circular plugs and sockets. Information on splicing and jointing of multicore cables is to be found in Chap 130.

STRUCTURE OF CHAPTER

2. This chapter provides the following:-

a. General information on the construction of circular plugs and sockets.

b. Information on the various patterns in Service use.

c. Illustrations giving the general principles of terminating and connecting cables to the contacts of circular plugs and sockets and it will be periodically amended as further information becomes available.

GENERAL

3. Circular plugs and sockets consist of three main components:-

a. the shell,

b. the insert,

c. the contacts.

Shells

4. The shell houses and protects the insert and contacts, it can act as a moisture seal along with the insert and when panel mounted serves to maintain pressure in the main or sub-assembly of an equipment. The material used in shell manufacture varies according to requirement. It may be machined steel, formed steel, die cast or sand cast alloy. Bronze or other copper alloy shells are used for undersea applications where they will be exposed to salt water. Brass is used in the construction of non-magnetic shells. The shell finish may be nickel or cadmium plated, passivated, and can be coloured black, brown, olive drab or yellow.

Shell styles

5. Shells are manufactured as male shells and female shells and when mated complete the combination. A shell designed for attachment to and forming part of an instrument is termed a 'fixed' shell and a shell designed for attachment to the end of a cable is termed a 'free' shell.

Shell coupling

6. Various methods are in use for holding the shells together when mated. The two main systems in use at present are:-

a. Threaded coupling.

b. Bayonet coupling.

7. The former system has a thread on the outside of the female shell and a corresponding inner thread on a captive coupling ring on the male shell. The coupling ring is screwed up finger tight onto the female shell thread after the two shells have been mated.

8. The latter system has three pins fitted around the periphery of the female shell which engage three mating slots on the inside of the captive coupling ring of the male shell. After mating the shells are locked together by turning the coupling ring clockwise relative to the female shell.

Inserts

9. The insert provides insulation between the individual contacts and between the contacts and the shell. It is made from a moisture resistant material and provides pressurization in conjunction with the shell. The temperature range of a plug or socket is usually determined by the temperature limits of the insert material. High temperatures will cause breakdown rather than low temperatures, but the major cause of failure is condensation.

10. The insert is moulded to carry the contacts, which may be pins, and the insert is then termed a PLUG. If the contacts are in tube form the insert is termed a SOCKET. A plug or a socket insert may be fitted to either a fixed or a free shell.

Contacts

11. These are the main part of the plug or socket and should have

a. maximum conductivity

b. ease of engagement and disengagement.

12. High conductivity is attained by maximum contact area using high grade gold or silver plated copper alloy. The force required for engagement and disengagement is reduced by careful design and good alignment of plug and socket contacts.

CONTACT RETENTION

Fixed contacts

13. The contacts are held in position in the inserts in a number of ways. In the past, rigid phenolic inserts with recesses to hold the contacts have been used, with ancillary rubber washers or glands to seal the connector and prevent the ingress of moisture. Because of increasingly severe environmental conditions this type of insert has been replaced by a one piece assembly with the contacts bonded into shaped channels (see Fig 1).

Removable contacts

14. Inserts having removable contacts are now in service, these contacts may be designed for

a. front insertion and extraction

b. rear insertion and extraction.

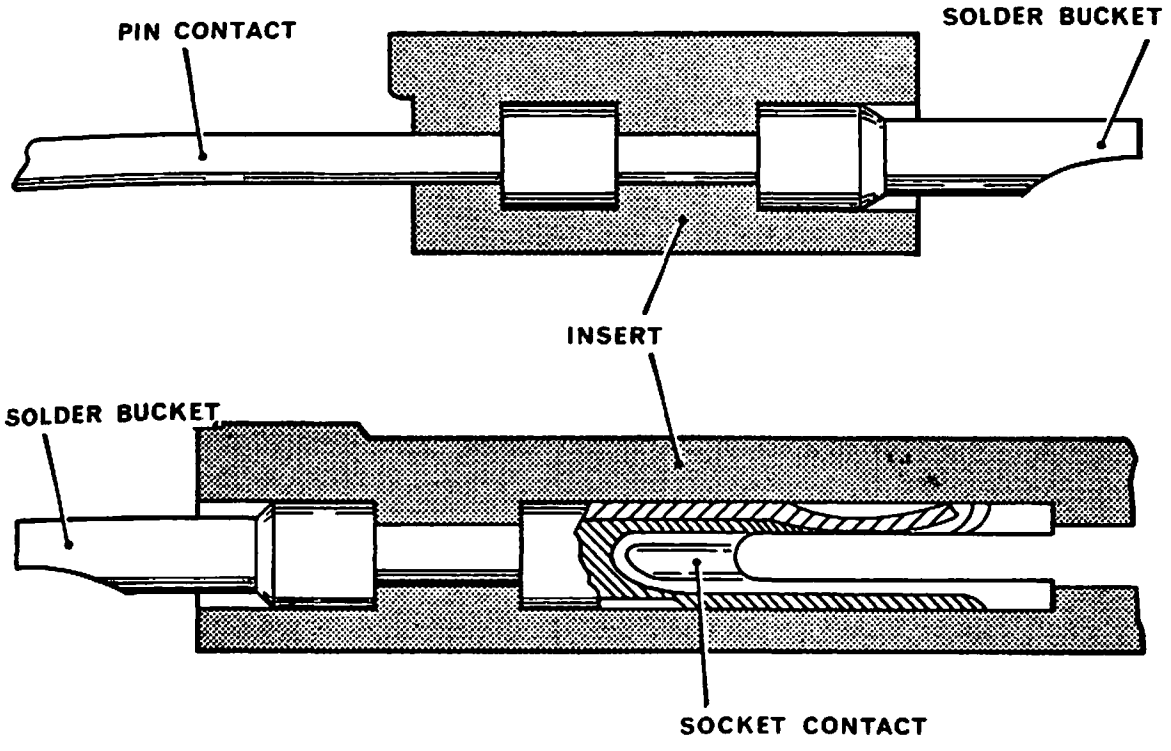


Fig 1 - Contacts moulded into the insert

15. They are lodged into the insert by means of a hand insertion tool after the cables have been terminated into the contact barrels. The contacts may be removed at any time by the use of a hand extraction tool. The contacts are held in position by prongs of metal clips which are moulded into the insert made from hard thermo-setting insulating material as shown in Fig 2.

16. The prongs of the clip snap in behind the shoulder of the contact. The removal tool displaces the prongs of the clip sufficiently to allow the contact to be withdrawn. The contacts are provided loose and are all inserted even when not terminated. Sealing plugs are provided for filling unused grommet holes when required. This type of contact is designed for solder-less or crimp termination of the conductors into the contact barrel.

Termination of wires

17. Until recent years, the normal method of connecting the wires to the contacts has been by soldering. Another method that has been developed and which is now almost as common as soldering, is crimping. Both methods produce connections with about the same electrical characteristics.

18. Soldering is normally carried out with the contacts permanently fitted in position in the insert. One advantage with soldering is the fact that should repairs be necessary only a soldering iron and a pair of pliers are required.

19. It is now common practice to use crimped connections instead of soldering. With this type of connection the insulation is removed, the conductor is placed into the contact barrel which is then compressed by a crimping tool and the contact fitted into the insert.

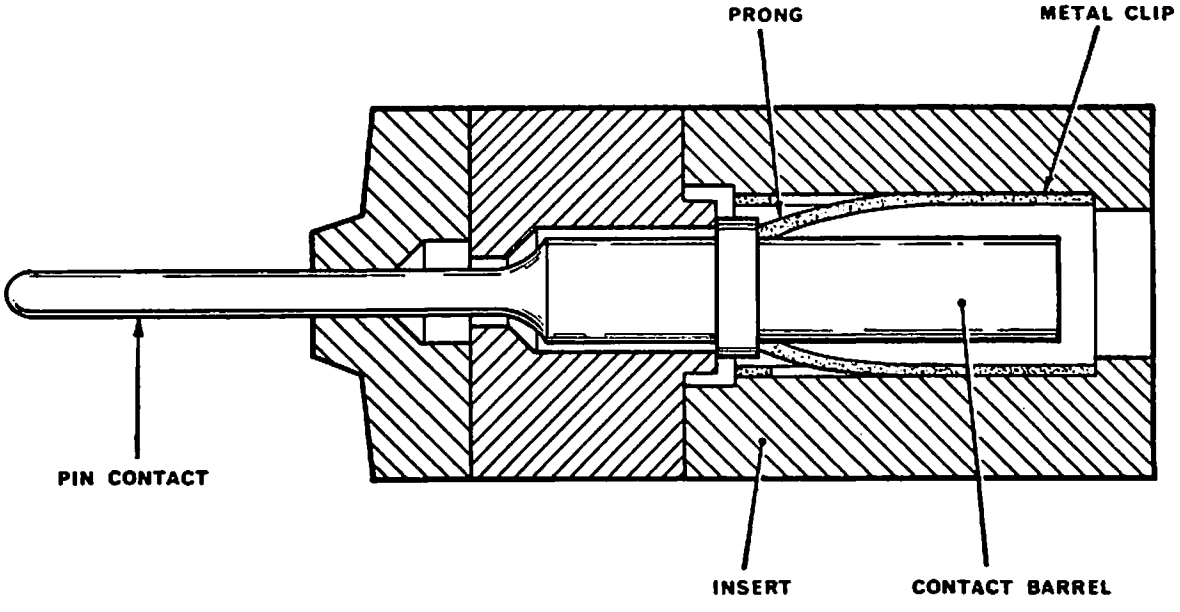
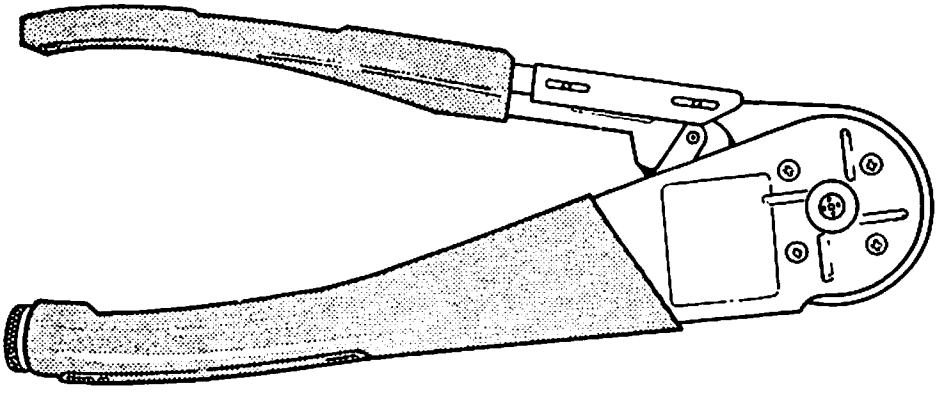


Fig 2 – Removable contact (Rear insertion and extraction)

HAND INSERTION TOOL



HAND CRIMPING TOOL

Fig 3 – Hand insertion and crimping tools

20. The pressure and depth of the crimped joint is controlled by the tool producing uniform connections without any skill or ability of the operator. This procedure is described in Chap 121 of this EMER. A hand insertion and crimping tool are shown in Fig 3.

Orientation

21. In order to prevent mis-mating or cross-plugging of adjacent similar plugs or sockets, orientation is provided by:-

a. varying the angular disposition of the minor key/keyways relative to the main key/keyway of the shell

b. rotating the insert within the shell relative to the main key/keyway

Note:- a. is the 'preferred' orientation

b. is the 'permissible' orientation.

22. Key/keyway orientations are denoted as Normal B, C, E and F see Fig 4(a).

Note: Positions A, and D are not recommended for new applications due to the possibility of cross-mating. They are available, however, for replacement purposes.

23. Insert orientations are denoted as Normal W, X, Y, Z see Fig 4(b).

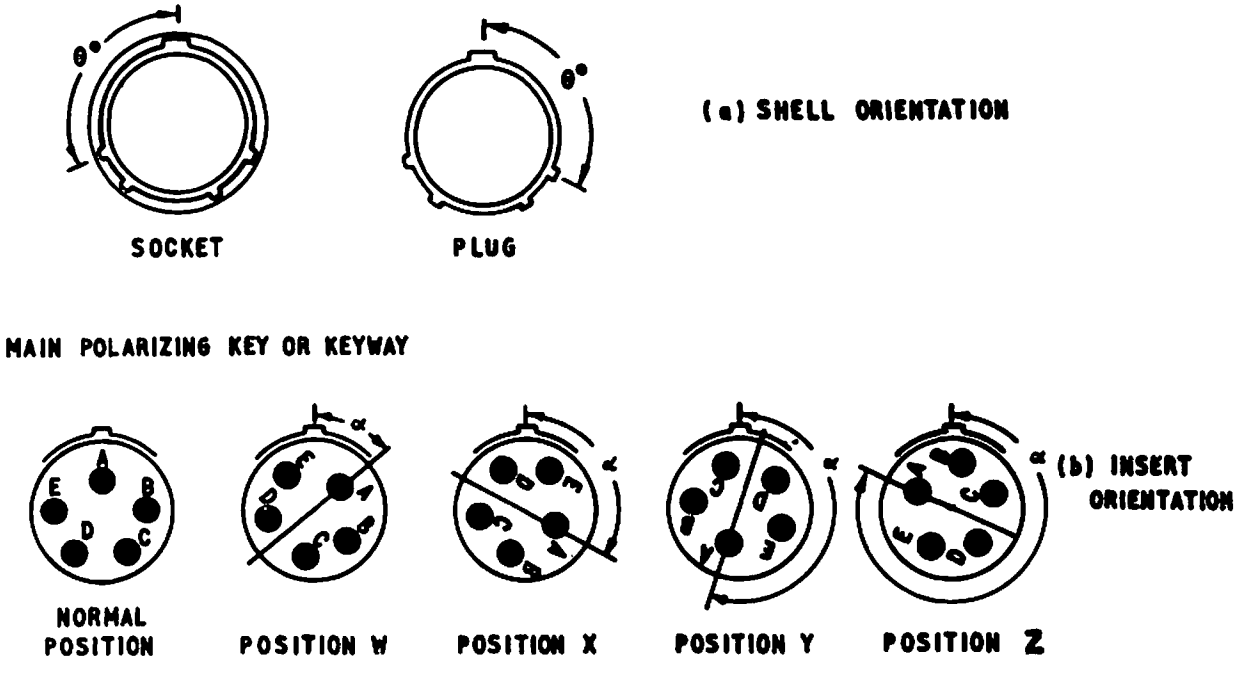


Fig 4 - Orientation positions

24. It should be noted that if the mating face of a plug insert is rotated clockwise in the shell, the mating face of the corresponding socket insert will be rotated counter-clockwise by the same number of degrees.

Shell sizes

25. With the exception of the Mk 4, Pattern 104 and Pattern 123 plugs and sockets the shell size is quoted as a number eg 8, 10, 12 etc. The shell number indicates the outside diamenter, in sixteenths of an inch, across the thread of the threaded coupling shells and the outside diameter of the female shell of the bayonet coupling shell, ie a size 12 shell is 3/4 in. diameter.

26. The Mk 4 and Pattern 104 shell sizes are given in para 31 while the Pattern 123 shell sizes are as stipulated in para 114.

Scooping

27 The pin contacts of an insert can be misaligned if the mating shell is accidently wiped across them during the mating process. This is termed 'scooping'. To prevent this damage and to make the item scoop proof the insert carrying the pins is positioned down the inside and away from the mating face of the shell. Two alternatives are available to provide scoop proof conditions

a. 50% no scoop, is achieved when the pin carrying insert is located inside the female shell

b. 100% no scoop, is provided by fitting the pin carrying insert to the male shell.

28. A 50% no scoop plug is shown in Fig 5.

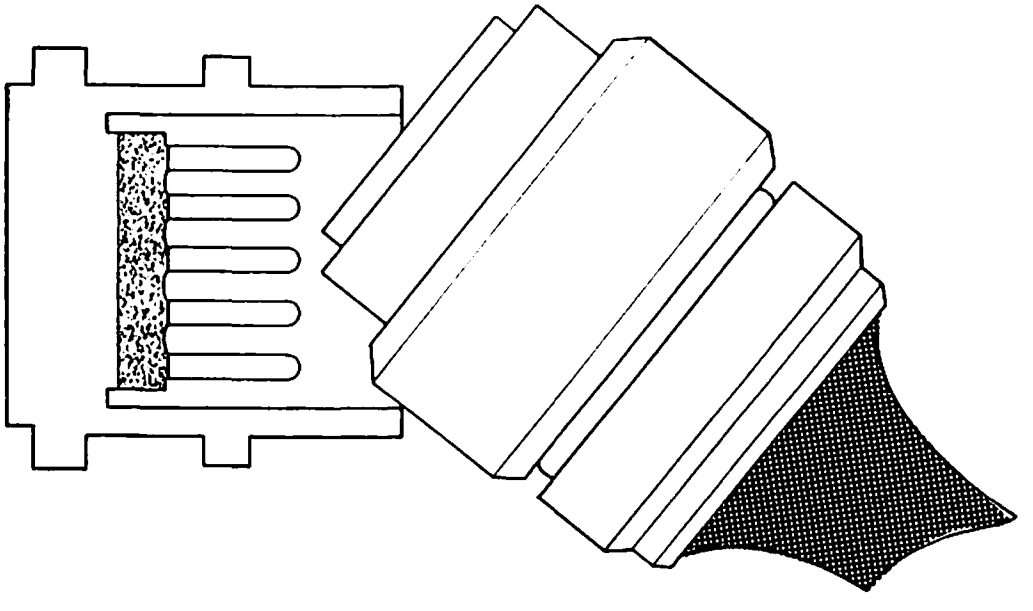


Fig 5 - Scoop proof principle

DEFINITIONS

29.	Contact	A single current-carrying element in an electrical plug or socket incorporating half the breakable joint face.
	Plug, electrical	An interconnecting device carrying a majority of male contacts for connection with a corresponding electrical socket.
	Socket, electrical	An interconnecting device carrying a majority of female contacts for connection with a corresponding electrical plug.
	Fixed item	A fixed electrical plug or socket is one designed for attachment to a chassis or piece of apparatus.
	Free item	A free electrical plug or socket is one designed for attachment to the end of a cable.
	Plug/Socket coupler	That Plug/Socket type which replaces a Plug/Socket, fixed, in a cable to cable coupling application.
	Mating set of plugs and sockets, electrical	The combination of an electrical plug or socket and its mating part.
	Shield, electrical, plug-socket	An item specifically designed to enclose that portion of an electrical plug or socket which contains the facilities for attaching wires or cables. It is used for shielding against electrical interference and/or mechanical damage.
	Maintenance standards	Components which have been superseded for Joint Services use by new standards, but are not completely interchangeable with them, and which are still required for maintenance purposes.
	Style reference	The style references used, are abbreviations to identify families of plugs and sockets, electrical. They are correlated to the NATO stock numbers and NATO type designations where appropriate.

MK 4 RANGE

30. The Mk 4 range of plugs and sockets was introduced around 1950 to meet the growing requirements of electronic equipments but are now obsolescent and are being expended out of the service. However, they are to be found in some older equipments that are still in use.

Mk 4 shell sizes and types

31. The Mk 4 plugs and sockets (see Fig 6) are made in two ranges Mk 4A and Mk 4B each range having three sizes of shell-small, size 1; medium, size 2;

and large size 3. For identification purposes the approximate outside diameter of the female shells are

Mk 4A No 1 = 13/16 inch; No 2 = 1.1/16 inch; No 3 = 1.7/16 inch
Mk 4B No 1 = 15/16 inch; No 2 = 1.3/16 inch; No 3 = 1.9/16 inch.

32. Mk 4A - Aluminium shells have a fine thread (20 t.p.i.) and are available in the following types:-

Plug or socket, free, male shell
Plug or socket, fixed, female shell
Plug coupler, free, female shell
Adaptor, bulkhead.

33. Mk 4B - Plated brass shells, having a coarse thread (6 t.p.i.) designed for quick coupling and uncoupling and are available in the following types:-

Plug or socket, free, male shell
Plug or socket, fixed, female shell
Plug coupler, free, female shell.

34. The inserts are common parts to each size of shell ie a No 1 insert will fit any type of No 1 size shell. The insert may carry male contacts (pins) or female contacts (sockets). All types of shell may be combined with the appropriate insert to form a plug or socket, or, in the case of the adaptor, bulkhead, made up as a plug at one end and a socket at the other (see Fig 6). Plugs and sockets, except adaptor, bulkhead, and aluminium fixed female shells, will normally require a cable entry fitting.

35. Terminations should be arranged so that the socket is always on the live side, ie the plug is always offered to the source. The exploded and assembled views of a panel mounted component as shown in Fig 7.

Mating of shells

36. The male shell is fitted with keys which mate with the keyways on the female shell. Electrical contact should not be possible until the keys and keyways are correctly aligned. When mated, the shells are held together by a coupling nut running free, but held captive, on the male shell which screws on to the female shell. When this nut is finger tight the shells are locked together to provide a water and vibration proof joint which places no strain on the electrical connections and provides continuity of screening.

37. A small amount of lubricant XG-275 is required on the threads to prevent locking. The shell requires a number of component parts, which vary according to type, to make up a complete plug or socket as shown in Fig 7.

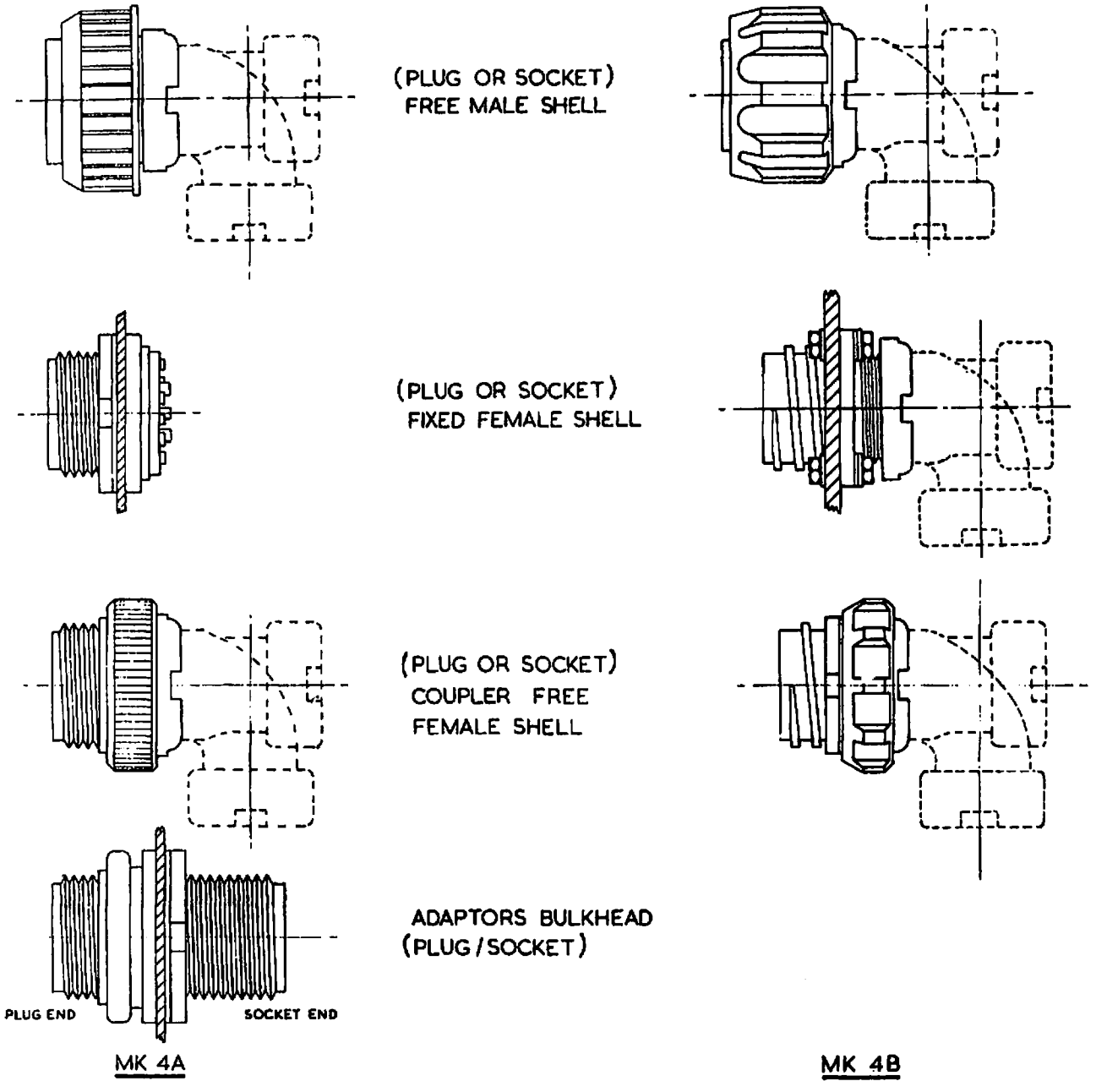


Fig 6 – Types of Mk 4A and Mk 4B plugs and sockets

Applications of items (See Fig 6)

38. a. Plugs or socket, free, male shell

This is used to terminate a cable. It fits inside the female shell and carries the coupling nut for mating the two parts together. The contacts in the insert may be either pins or sockets.

b. Plug or socket, fixed, female shell

This is designed for panel mounting and may be mounted on either side of the panel. The term female shell refers to the fact that this shell fits outside the male shell of the mating component and is gripped by the coupling nut of the male shell.

c. Plug coupler, free, female shell

This is used for cable termination when cables have to be joined. It mates with a socket, free, male shell.

d. Adaptor bulkhead

Designed for mounting on a panel and provides a plug at one end and a socket at the other so that the cable may be broken at either side of the panel such as a bulkhead. Both ends of the shell are female.

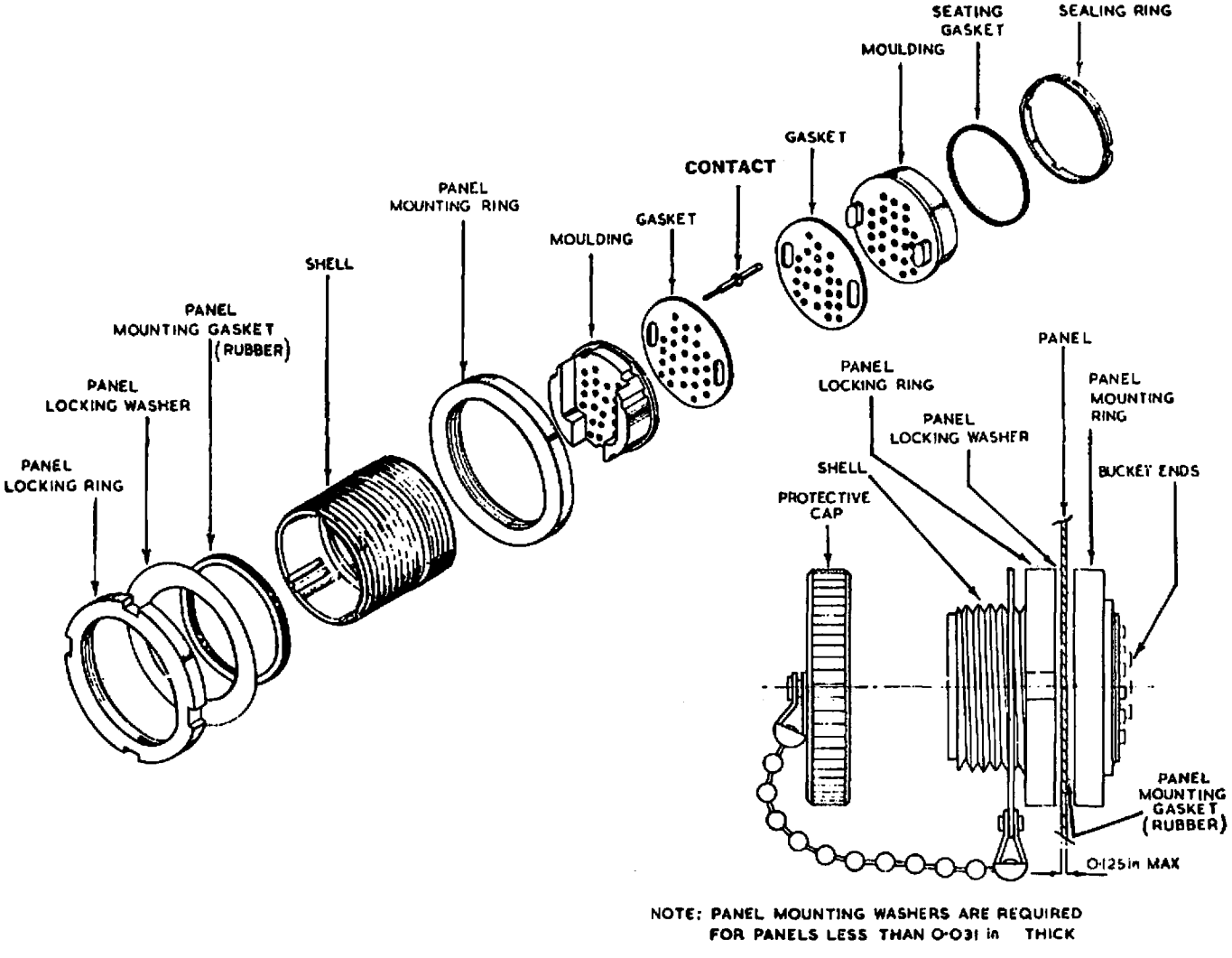


Fig 7 - Exploded and assembled views of a panel mounted component

Insert location

39. The pole face of a typical plug/socket is shown in Fig 8. The lug is a locating device which determines the orientation of the pole face of the insert relative to the shell. Six positions are possible, numbered 0 to 5 inclusive hence six outlets of the same size and number of contacts are available without being intermateable. Each orientation bears a different N.A.T.O. stock number.

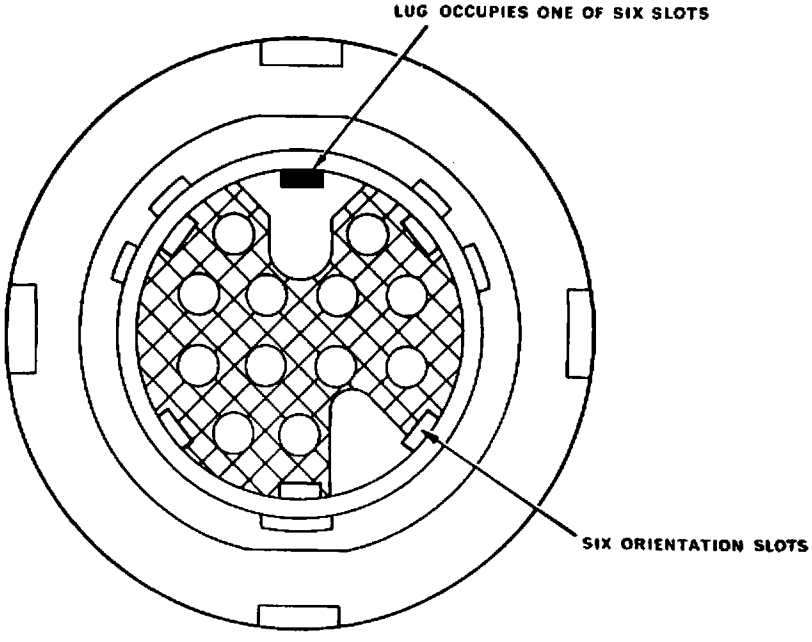


Fig 8 - Typical pole face

40. The position of the insert on the mating face relative to the shell is shown in Fig 27 for plugs and in Fig 28 for sockets. It should be noted that the orientation position of the PLUG insert is rotated clockwise from the single key/keyway and anti-clockwise from the single key/keyway in the SOCKET looking at the mating face.

41. Dismantling of these connectors for re-orientation of the insert will destroy the seal and is not advised except in an emergency. An emergency conversion procedure is detailed in para 47.

Cable outlets

42. Plugs and sockets, free male shell, and plugs, coupler, free female shell, have a cable outlet to guard the cable at the point where it leaves the shell. This may be straight or right angled, and if the latter, may be fitted in any of the eight angular positions by means of a castellated flange as shown in Fig 9. The cable outlet is secured by means of an outlet nut.

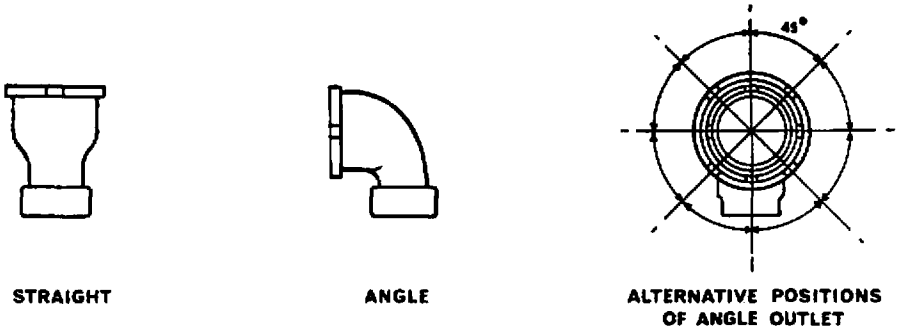


Fig 9 - Outlet elbows and alternative positions

Fitting a Mk 4A panel plug/socket

43. A kit of tools, 5180-99-013-9202, Tool kit, electrical, plug, socket, is available for fitting the Mk 4A panel mounting plug/socket to a panel and the method is detailed in para 44 and shown in Fig 10.

44. It may be fitted from either the front, (a), or the rear, (b), of the panel. The rubber panel mounting gasket must always be in the groove of the panel mounting ring. Before fixing, the panel mounting ring must be screwed up until the recess in it just comes into contact with the panel mounting gasket. This ensures a moisture proof seal between both sides of the panel when the panel locking ring is tightened. The panel locking washer is placed between the panel locking ring and the panel with the inner flat edge located on the D flat of the shell. After tightening the locking ring the outside of the locking washer should then be prised into one of the slots of the locking ring. The anchor ring of the protective cap is screwed on to the shell and not fitted under the panel locking ring (See Fig 7).

Use of the adjustable spanner and body holder

45. The adjustable spanner is used in conjunction with the body holder to turn the outlet nut and to hold the outlet nut when removing the union nut, see Fig 11. It should not be used in place of the semi-tubular spanner for removing locking rings.

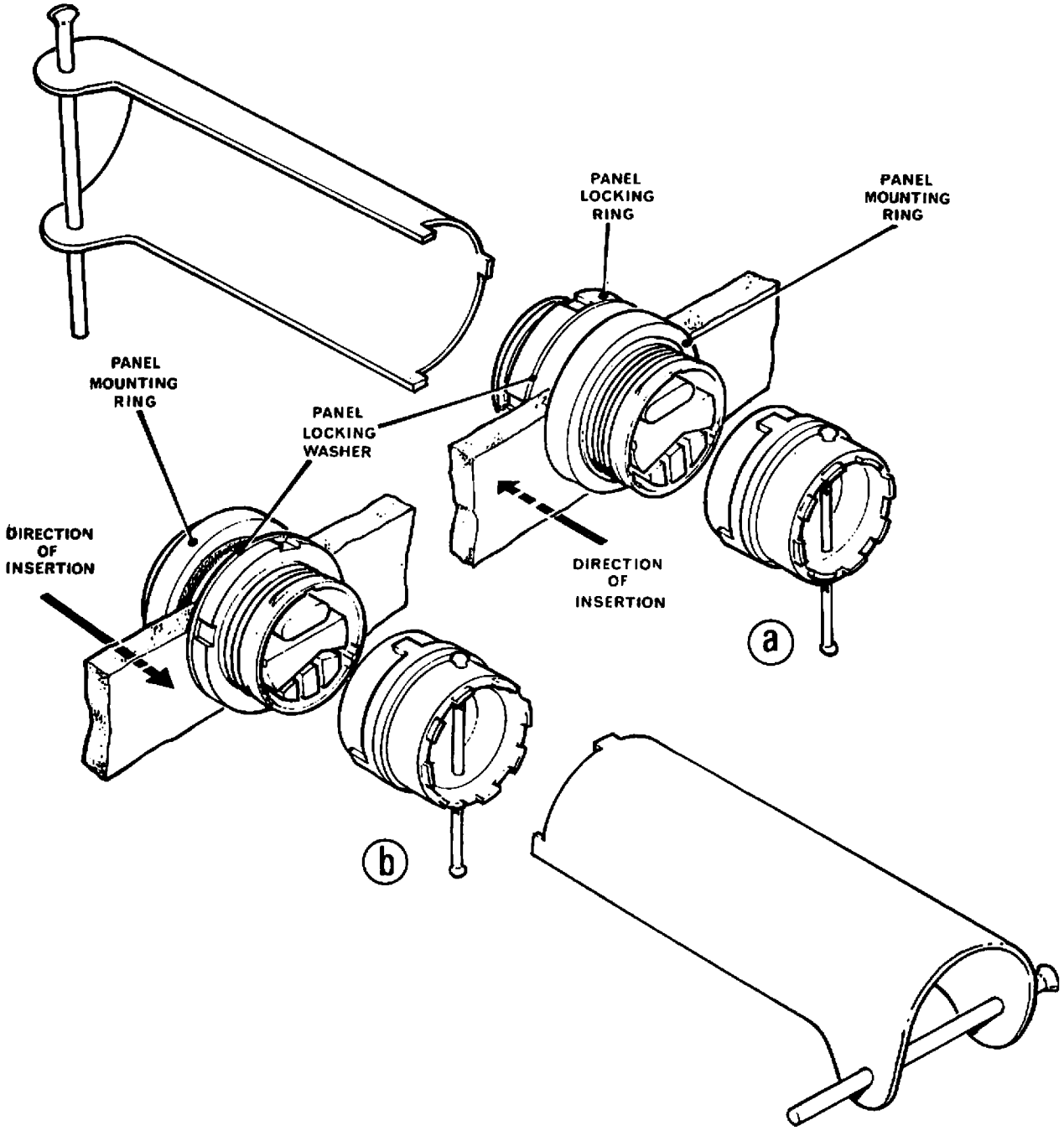


Fig 10 - Fitting Mk 4A panel item

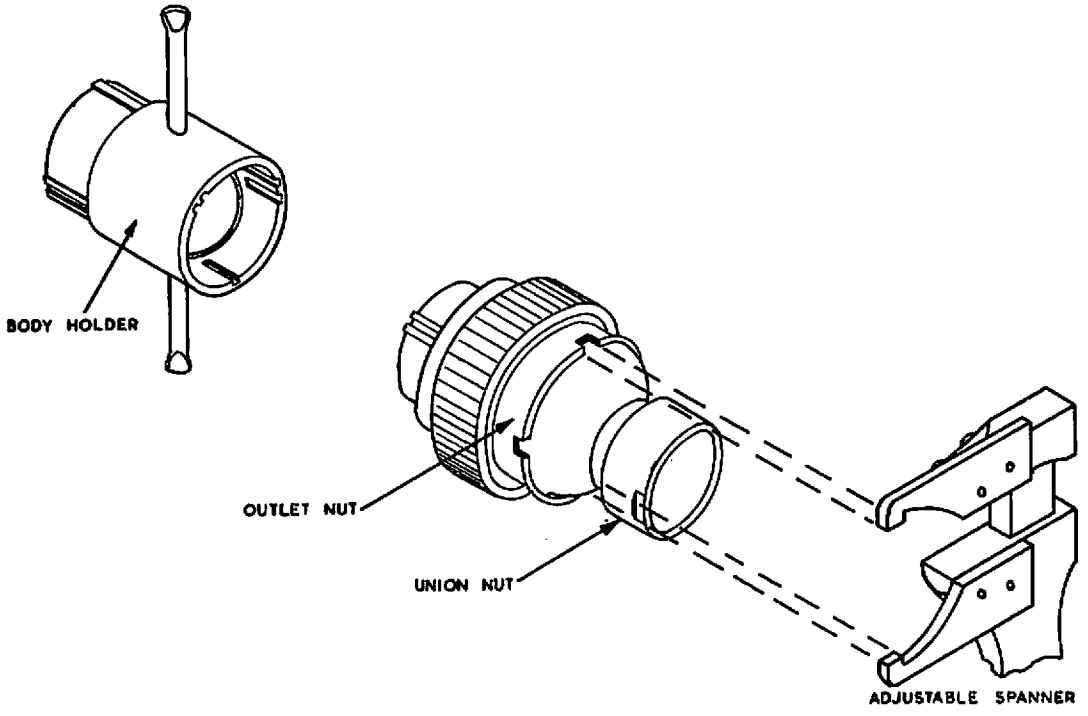


Fig 11 - Use of spanner and body holder

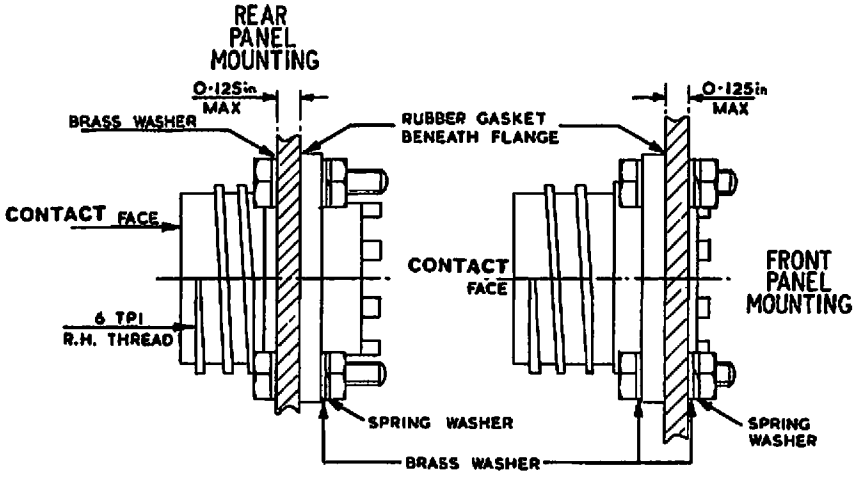


Fig 12 - Fitting Mk 4B panel items

Method of mounting a Mk 4B panel plug/socket

46. This item may be mounted from the front or rear of the panel and is shown in Fig 12. Nuts, bolts, rubber bushes and washers are supplied as a kit of parts. The spring washer must be inserted under the nut as shown and the bolts inserted from the front of the panel in all cases. A panel mounting gasket is supplied with each assembly and this must be inserted in the groove in the flange adjacent to the panel.

Re-orientation procedure

47. In an emergency (and only then) requiring the conversion of Mk 4 connectors to a different orientation, adopt the following procedure:-

a. Manufacture a semi-tubular spanner to fit the sealing ring.

b. Locate the position of the sealing ring relative to the shell by means of a scratch mark.

c. Using the spanner and the appropriate body holder (see para 45 and Fig 11) unscrew the sealing ring, counting the number of turns.

d. Slide out the entire insert assembly, maintaining all the component parts in the same relative position.

e. Rotate the insert to the required orientation.

f. Replace the insert and screw up the sealing ring by the same number of turns counted in c, making the final adjustment by lining up the scratch mark from b.

g. The re-oriented component should be replaced by the correct component as soon as possible.

Contact rating - Mk 4A range

48. The range of Mk 4A plugs and sockets consist of nine basic types accomodated in three shell sizes.

Table 1 - Mk 4A contact ratings

Size	No of Contacts available	Recommended working volts	Recommended working amps
No 1 (small)	2 3 4 6	350 350 350 350	16 2.5 2.5 2.5
No 2 (Medium)	4 6(Note 1) 12	350 1500 350	16 2.5 2.5
No 3 (Large)	18 25	(Note 2) 350	2.5 2.5

Notes: 1. Used with 4 cores of either Sextocorevinmetsmall or Sextocore-metvinsmall.

2. Contacts A, B, C, 1500V contacts-to-contacts and contact-to-mounting.
Contacts D to P, 350V contacts-to-contacts and contact-to-mounting.
Contacts Q, R, S, 350V contacts-to-contacts and 1500V contact-to-mounting.

Contact ratings - additions to the Mk 4B range

49. As the same contact assembly is used for the Mk 4B plugs and sockets as in the Mk 4A type the contact ratings are identical. There are however three additional plug/sockets in the large, size 3 shell range of the Mk 4B type which have no equivalent in the Mk 4A range. These are:-

a. one 19A per contact, 9 contact connector

b. one 5 contact plug/socket having two contacts rated at 60A and 3 contacts rated at 19A

c. one 4 contact plug/socket having three contacts rated at 60A and one contact rated at 19A.

CABLING PROCEDURE

Jointing

50. The miniature cables used with this range of plugs and sockets are insulated with polythene which can be easily damaged during soldering operations. The compact design of the plugs/sockets necessitates special soldering techniques.

51. When soldering Mk 4 plugs and sockets having up to four contacts satisfactory connections can be made using a soldering iron. When six or more contacts are to be soldered the heat should be applied electrically.

52. This can be done by using a transformer having a low voltage high current secondary winding. One side of the secondary of this transformer is joined to the front of the contacts to be soldered by means of a suitable mating item. The other side of the transformer secondary is applied to the solder bucket at the back of the contacts via a flexible lead and an aluminium or carbon bit see Fig 15. The resulting short circuit will provide sufficient heat for soldering to be carried out.

Electric soldering

53. A circuit diagram for a electric soldering apparatus is given in Fig 13. One side of the high current transformer secondary is connected by a flexible lead to an aluminium bit. The other side of the secondary is permanently wired to a change-over link.

54. From the side of this link marked B in the diagram a flexible connection is taken to a soldering adaptor. From point A on the link, connection may be

made to a separate panel on which is mounted one of each type of Mk 4 plug. The high current transformer will be required to deliver a short-circuit current of from 80A to 100A depending on the type of contact being soldered so all joints and terminals on the secondary side must be able to carry these currents for short periods.

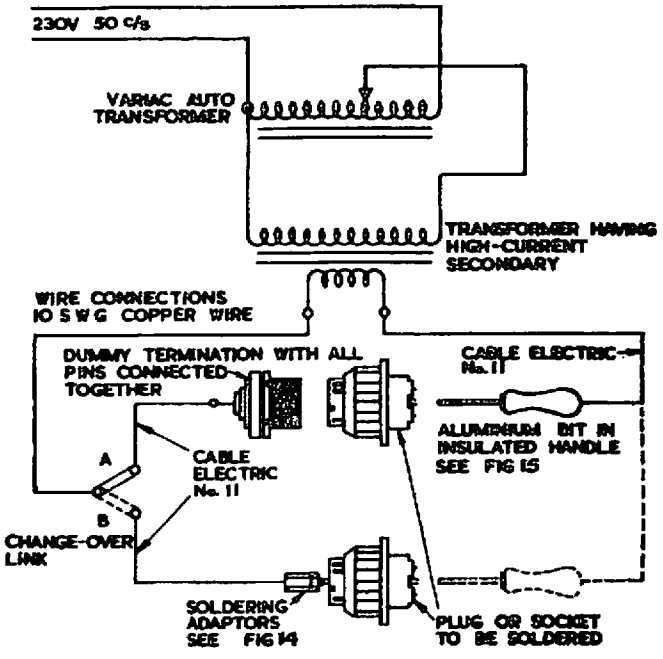


Fig 13 - Circuit for electric soldering

Current transformer details

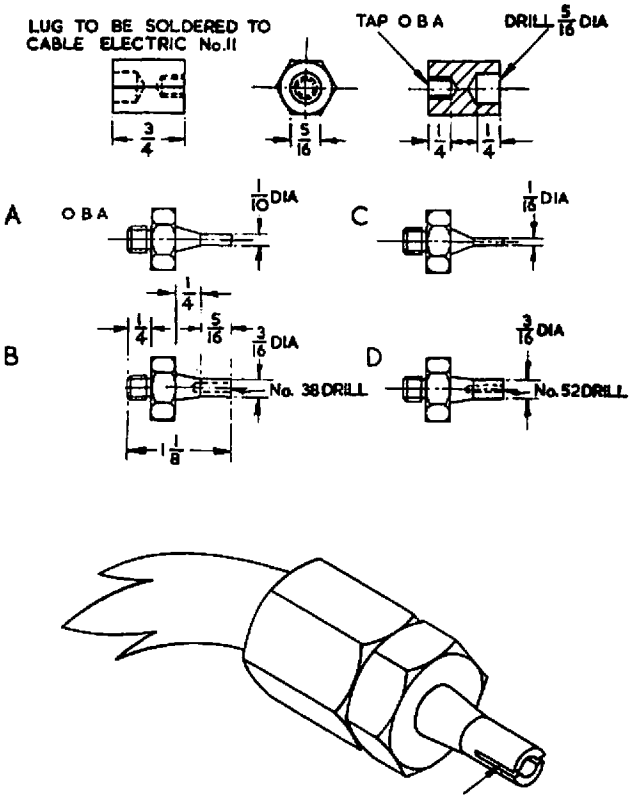
55. The following specification is given as a guide to the type of transformer which will be required:-

Overall core size:-	6.1/4 in by 5.1/4 in. by 2.1/4 in.
Window size:-	3.3/4 in. by 1.5/8 in.
Primary winding:-	650 to 750 turns of No 20 SWG enamelled copper wire.
Secondary winding:-	5 turns of No 10 SWG double cotton covered copper wire.

56. For satisfactory results, the number of turns on the secondary should be adjusted so that the heat generated in the contact being soldered is sufficient to melt the solder after two seconds application of the electrode.

Soldering Adaptors

57. Four different sizes of adaptors are required when soldering the conductors to the contacts. Large male and female adaptors will be necessary for 19A pins and smaller male and female adaptors for use with the 5A pins. These adaptors are illustrated in Fig 14.



Female Adaptors should be split to facilitate insertion on Pin Contacts

In use one of the adaptors A,B,C & D is screwed into Lug.

Fig 14 - Detail of soldering adaptors

58. When it is necessary to solder the contacts of free plugs or sockets (used for terminating leads) the plug or socket should be clamped in a vice with the contacts horizontal. The appropriate adaptor should be selected and connected to the flexible lead by screwing it into the lug. The adaptor should then be mated with each contact to be soldered using the most convenient sequence on the plug or socket. The ends of the cables should now be prepared for soldering.

Soldering methods

59. Sufficient insulation should be carefully removed to allow the conductor to be fully inserted into the solder bucket. Tin the conductor strands to within 1/16 in. of the insulation using a minimum of heat, preferably by dipping them momentarily into a bath of molten solder, or alternatively by using a soldering iron. Synthetic rubber sleeves should now be fitted, if required, so that after soldering they can be rolled over the joints.

60. Before soldering the wires to the contacts, ensure that any outlet ancillaries are threaded on to the cable in the correct order according to the manufacturers instructions. The solder buckets are usually supplied already tinned and filled with solder, if not, this should be effected. Any excess of solder must be avoided and any surplus flux should be removed. Soldering can now be completed.

61. Holding the appropriate conductor ready, the tip of the bit (see Fig 15) should be brought into contact with the bucket. As soon as the solder in this bucket has melted the conductor should be inserted into the molten solder and the bit instantly removed. The conductor should be held rigid until the solder has solidified. The minimum of solder should be used, and all blobs and spikes avoided. The same procedure should then be followed for the other contacts.

62. After each joint has been completed it should be checked by a slight pull and the sleeves, if fitted, should be rolled down over the joint until the ends are flush with the surface of the moulding leaving no metal surfaces exposed. At the end of the operation the rear face of the insert must be cleaned of any flux, solder or other matter which could impair performance.

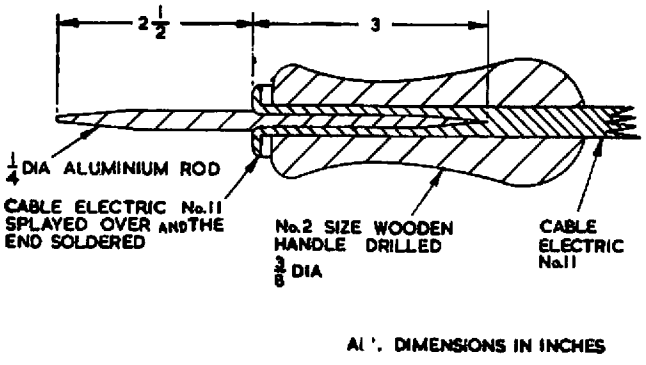


Fig 15 - Aluminium bit for electric soldering

Wiring fixed items

63. Fixed Mk 4 plugs and sockets ie those which are panel mounted, may be similiarly soldered using the electric soldering apparatus and adaptors. The method of mounting fixed items vary between equipments and it is therefore impossible to lay down specific instructions for holding the fixture while soldering. If the rear of the plug/socket is easily accessible, the re-wiring may be undertaken with the item in the normal position on the panel. If the rear of the plug/socket is not easily accessible, it may be pulled forward through the hole in the panel and clamped in a jig of the type illustrated in Fig 16.

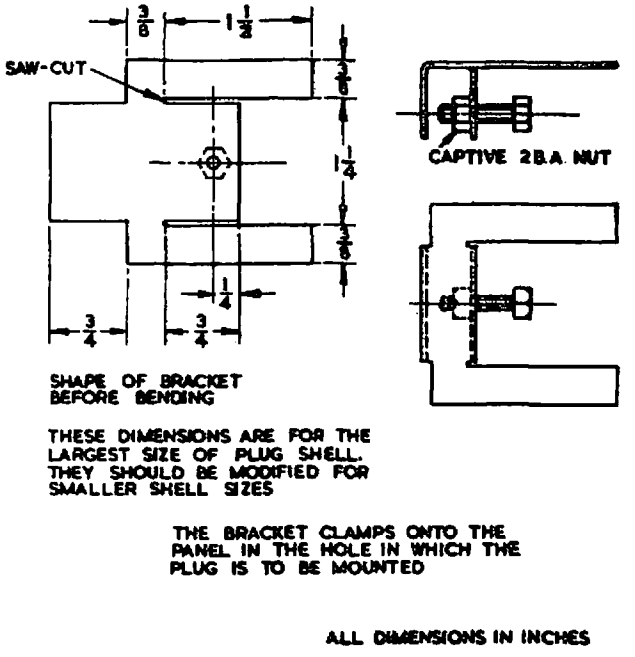


Fig 16 - Bracket for holding fixed Mk 4 items

64. The soldering process may then be carried out as explained in paras 59 to 62. If the rear of the plug/socket is inaccessible and there is insufficient length of cable to allow it to be pulled far enough through the panel hole it will be necessary to replace the entire cable-form. If this has to be done, sufficient length should be left on the new cable-form to allow the item to be withdrawn in future if required.

Repair practice

65. If it is necessary to repair a faulty connection in the centre of an insert having twelve or more contacts it is essential that sufficient of the surrounding conductors be unsoldered to allow easy access. After the repair is completed the disconnected conductors should be re-soldered in the appropriate order.

66. Should the repair of a single soldered joint result in the shortening of one conductor whereby the weight of the entire cable-form would be carried by this conductor all connections should be removed. The conductors should then be cut equal lengths and the cable re-connected.

67. When a considerable amount of soldering work on free plugs/sockets is to be undertaken the construction of a panel as illustrated in Fig 17 is recommended. This panel should be fitted with one of each type of Mk 4 mating item. All the contacts should be connected together using sufficient solder to give the joints a high thermal capacity. A heavy brass terminal should be mounted on the panel and joined to all these contacts using No 10 SWG copper wire.

68. When required for use connection should be made, using Cable, electric No 11, between terminal A of the changeover link on the electric soldering apparatus and the terminal on the dummy panel. This will join one side of the high current transformer to all the contacts of each dummy item. The item

to be soldered should then be mated with the appropriate dummy plug or socket and soldered accordingly. If the case of fixed plugs and sockets are encountered it will be necessary to include appropriate mating items on the panel.

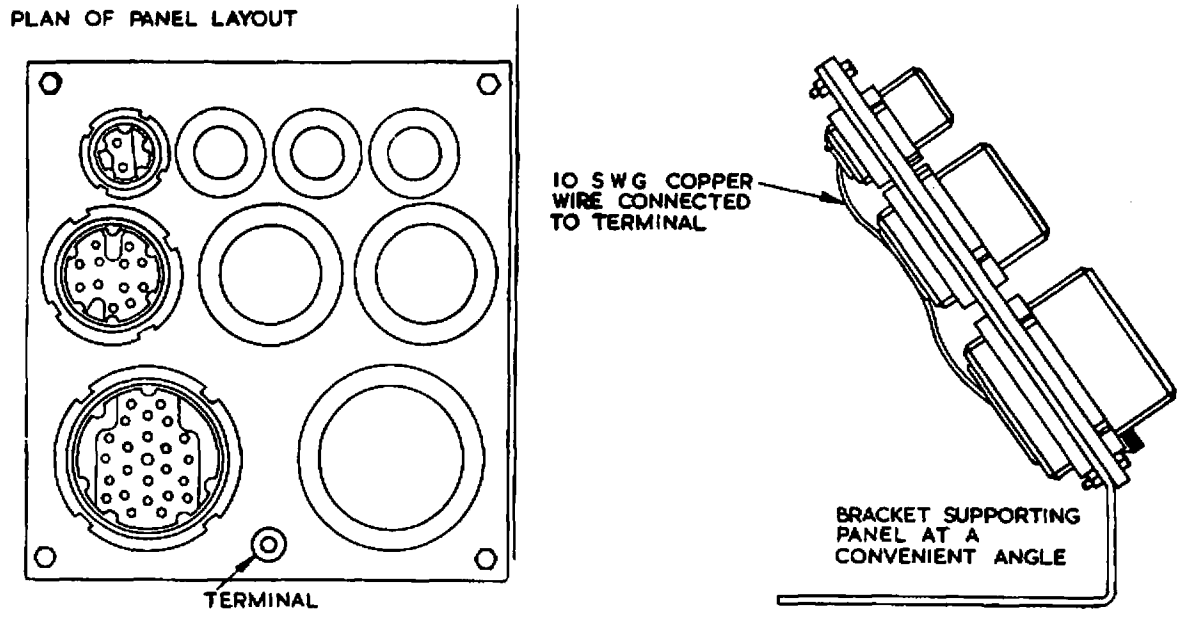


Fig 17 - Dummy panel layout

PREPARING AND TERMINATING CABLES

General

69. When preparing a cable for connection to Mk 4 and Pattern 104 plugs/ sockets bare one end for about half an inch and examine the colour sequence. Referring to the table (Table 2) pick out the colours to be joined to the contacts A and B of the termination to be used. If the sequence of these two colours in the cable is clockwise then that end should be connected to a socket and if counter-clockwise they should be connected to a plug. By this means the terminations can be assembled without crossing any of the cores of the cable and the table has been compiled with this object in mind. This facilitates soldering and avoids any unnecessary strain on the cores.

70. Soldering should be done with a small hot iron with the bit sharpened to a point. The bucket ends of the contacts should be filled with solder. The hot iron is applied to the bucket until the solder melts, the prepared end is then inserted into the bucket, the iron is then removed and the joint allowed to cool.

71. Make the joints one at a time and roll the rubber sleeves down over the soldered joints as each one is made. Care should be taken to ensure that small pieces of solder do not lodge in the spaces between the bucket ends. Excess flux should be removed by washing out with cleaning compound, see Chapter 110, Table 1.

72. A jig to hold the plug/socket while the cable is being connected is recommended. This can be made from a mating component mounted on the bench at an angle of approximately 30° from the vertical or the body holder may be clamped lightly in a vice. An alternative method, using electric soldering technique as described in paras 50 to 62 may be used. The lengths L in Fig 18 and 19 refer to the length between terminations when they are fitted with union nuts. When clamp nuts are fitted add 3/4 in. to obtain length L.

73. The cables referred to in this chapter are included in DEFENCE STANDARD 61-12 (Part 5), Issue 1, and are of the following types:-

Type of cable	Description
2A, B, C, D	Twisted pair
2P, R	Two LT unscreened cores laid parallel
6A, B, C, D, E	Six cores laid up around central dummy
6F, H, J	Two screened or unscreened LT and four HT screened cores, laid up around central dummy
10C	Five pairs of unscreened laid up
12A, B, C, D, E	Three central cores
12F	Four HT screened cores central; eight LT screened cores for first layer
18A, B, C, D	Eighteen screened or unscreened LT cores laid up as follows; Central Dummy core; first layer, six cores; second layer, twelve cores
18F, H, J	Three LT cores central, first layer eight LT cores; second layer 7 HT cores
25 all types	Three central, first layer, eight cores, second layer, 14 cores

DEF STAN type H cable (outer braiding)

74. a. Cut cable to required length, strip outer braiding and P.V.C. sheathing to dimensions B and C (Fig 19).

b. Thread on cable outlet parts as for types B and Q (Fig 23.a. and 23.b. operations 2, 3 and 4).

c. Cut back P.V.C. tape and any filler cores flush with the sheathing.

d. Fit the bonding clip tightly, flush with the end of the sheathing.

e. Comb out sufficient braiding around individual screened leads and twist to form tails. Anchor each tail tightly under lugs of the bonding clip and solder Fig 25).

f. Remove the last 1/8 in. of P.V.C. covering of every core to expose inner conductors. Twist the inner conductors of each core together and tin dip for half their length.

g. Slip synthetic rubber sleeves over all the inner cores, solder the cores to appropriate bucket ends and roll the rubber sleeves over the soldered joints as each one is completed.

h. Solder a short length of P.V.C. covered flexible wire between the bonding clip and the slot in the earth contact. (The earth contact is usually longer than the other contacts).

j. Assemble the outlet parts as for types B and Q (Fig 24b operation 5).

DEF STAN type J cable (outer P.V.C. sheathing)

75. a. Cut cable to required length (Fig 19) and thread on cable outlet parts as for type C and R (Fig 23a, operation 2).

b. Strip P.V.C. sheathing and outer braiding to dimensions B and C (Fig 19).

c. Comb out the braiding, bend back over the outer sheathing and bind temporarily in place with fine bare tinned copper wire.

d. Fit the bonding clip tightly with the lugs towards the end of the cable and flush with the inner dimension C.

e. Cut back P.V.C. tape and filler cores flush with bonding clip.

f. Proceed as in para 74 e. to h.

g. Assemble the outlet parts as for type C and R (Fig 23a and 23b operations 3, 4 and 5).

DEF STAN type D, E and F cables (outer P.V.C. sheathing, all inner cores individually braided)

76. Details for stripping these cables and assembly of terminations are given in Fig 20, 21 and 22.

DEF STAN type B, Q, C and R cables

77. Details for assembling these cables are given in Fig 23a, 23b and 24a, 24b. Stripping details are given in Tables 3 and 4.

Open wiring

78. The method of assembling terminations to open wiring is given in Fig 26.

Table 2 – Wiring details

Contact letter	Core colour
2 AND 3 CONTACT	
A	Red
B	Blue
C	Green
4 CONTACT L.T.	
A	Red
B	Blue (braid termination)
C	Yellow
D	Green
4 CONTACT H.T.	
A	Red
B	Blue (braid termination)
C	Yellow
D	Green
6 CONTACT L.T.	
A	Red
B	Blue (braid termination)
C	Black
D	Green
E	White
F	Yellow
6 CONTACT H.T.	
F	White l.t.
E	Black l.t. (braid termination)
A	Red h.t.
B	Blue h.t.
C	Dark green h.t.
D	Yellow h.t.

Contact letter	Core colour	Core identification
6 CONTACT MIC–TEL		
A	Red	TEL+
B	Blue	TEL –
C	Dark green	MIC –
D	Yellow	MIC +
E	White	P to M
F	Black	P to M
12 CONTACT L.T.		
A	White	
B	Black (braid termination)	
C	Yellow	
D	Red	
E	Blue	
F	Brown	
G	Natural	
H	Light green	
J	Dark green	
K	Mauve	
L	Pink	
M	Orange	
18 CONTACT L.T.		
A	Violet	
B	Orange	
C	Pink	
D	Brown	
E	Red	
F	Blue	
G	Dark green	
H	Light green	
J	Red–brown (braid termination)	
K	Red–black	
L	Black	
M	White	
N	Yellow	
O	Red–blue	
P	Natural	
Q	Red–white	

Table 2 - (cont)

Contact letter	Core colour
18 CONTACT L.T. - (cont)	
R	Red-yellow
S	Red-dark green
18 CONTACT H.T.	
A	White h.t.
B	Black h.t.
C	Brown h.t.
D	Blue
E	Red
F	Light green
G	Brown
H	Mauve
J	Black (braid termination)
K	White
L	Yellow
M	Green
N	Pink
O	Orange
P	Red h.t. (used as l.t.)
Q	Yellow h.t.
R	Dark green h.t.
S	Blue h.t.

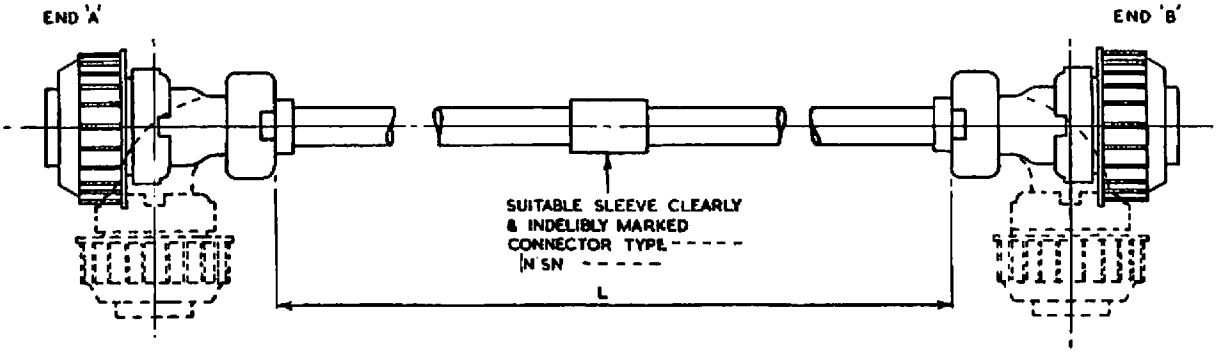
Contact letter	Core colour
25 CONTACT	
A	Grey
B	Green-white (braid termination)
C	Green-orange
D	Yellow
E	Light green
F	Red-blue
G	Red
H	Green-yellow
J	White
K	Pink
L	Red-green
M	Blue
N	Blue-orange
O	Black
P	Orange
Q	Red-yellow
R	Green
S	Blue-black
T	Brown
U	Mauve
V	Red-white
W	Red-brown
X	Blue-white
Y	Red-black
Z	Blue-yellow

Table 3 - Stripping details - cables DEF STAN types C and R

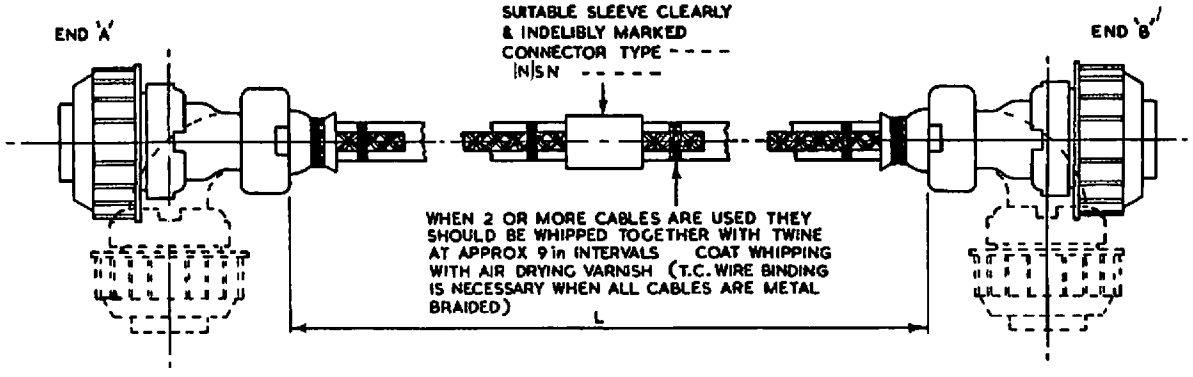
Shell size	No of contacts	Straight outlet			90° outlet		
		A	B	C	A	B	C
1	2-16A	7/8	5/8	3/16	1.3/8	1.1/8	3/16
1	3-2.5A	1	3/4	1/8	1.1/8	7/8	1/8
1	4-2.5A	1.1/8	7/8	1/8	1.1/4	1	1/8
1	6-2.5A	1.1/8	7/8	1/8	1.1/4	1	1/8
2	4-16A	1	3/4	3/16	1.3/8	1	3/16
2	6-1.5kV	2	1.1/2	1/8	1.3/4	1.3/8	1/8
2	12-2.5A	1	3/4	1/8	1.1/2	1.1/8	1/8
3	18-1.5kV	1.7/8	1.3/8	1/8	2.5/8	2.1/8	1/8
3	25-2.5A	1.1/8	7/8	1/8	1.3/4	1.1/4	1/8
ALL DIMENSIONS IN INCHES							

Table 4 - Stripping details - cables DEF STAN types B and Q

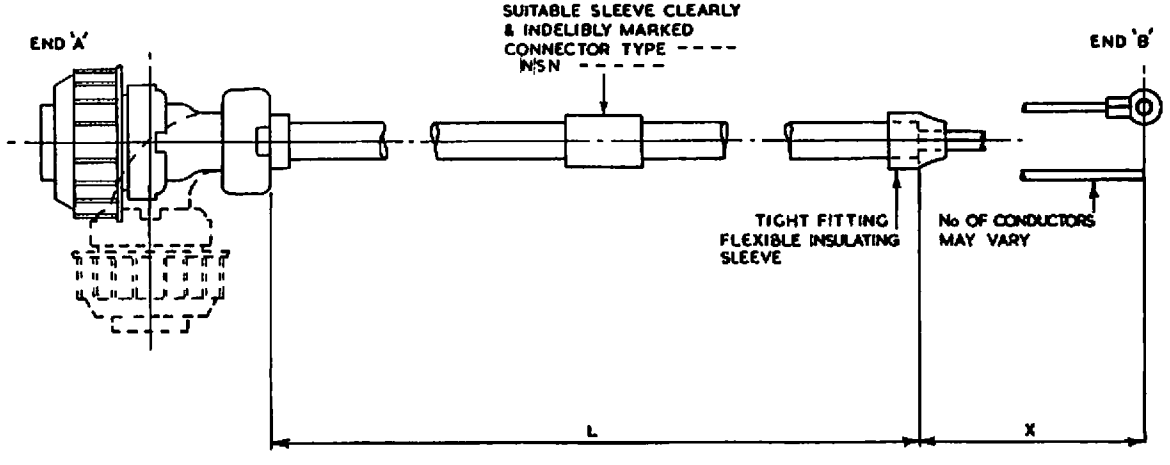
Shell size	No of contacts	Straight outlet			90° outlet		
		A	B	C	A	B	C
1	2-16A	3/4	1/2	3/16	1.1/8	7/8	3/16
1	3-2.5A	3/4	1/2	1/8	7/8	5/8	1/8
1	4-2.5A	3/4	1/2	1/8	1	3/4	1/8
1	6-2.5A	7/8	5/8	1/8	1	3/4	1/8
2	4-16A	3/4	1/2	3/16	1.1/8	7/8	3/16
2	6-1.5kV	1.3/4	1.1/8	1/8	1.3/8	1.1/8	1/8
2	12-2.5A	7/8	5/8	1/8	1.1/4	1	1/8
3	18-1.5kV	1.5/8	1.1/8	1/8	2.1/8	1.5/8	1/8
3	25-2.5A	1	7/8	1/8	1.1/4	1	1/8
ALL DIMENSIONS IN INCHES							



TYPE 1



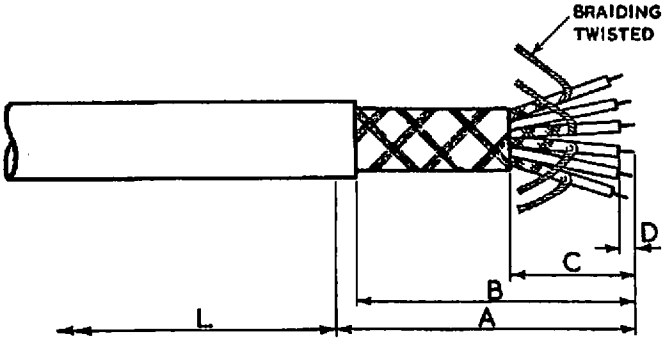
TYPE 2



TYPE 3

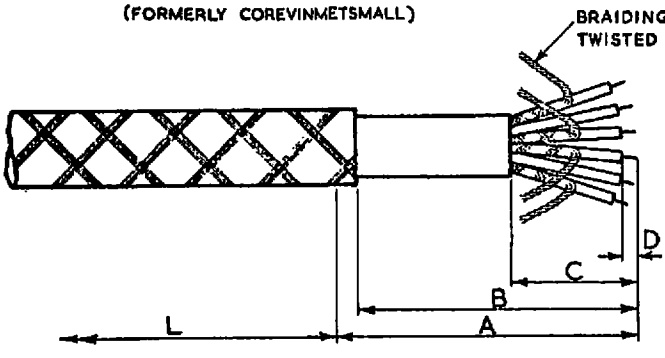
Fig 18 - Typical assembled connections

(PORMERLY COREMETVINSMALL)



CABLE	STRAIGHT OUTLET				90° OUTLET			
	A in	B in	C in	D in	A in	B in	C in	D in
MINIATURE CABLE 6 WAY	2¼	1⅞	1⅛	⅛	2⅝	2¼	1	⅛
MINIATURE CABLE 18 WAY	2½	2⅛	1⅜	⅛	3⅜	3	1⅜	⅛

(FORMERLY COREVINMETSMALL)

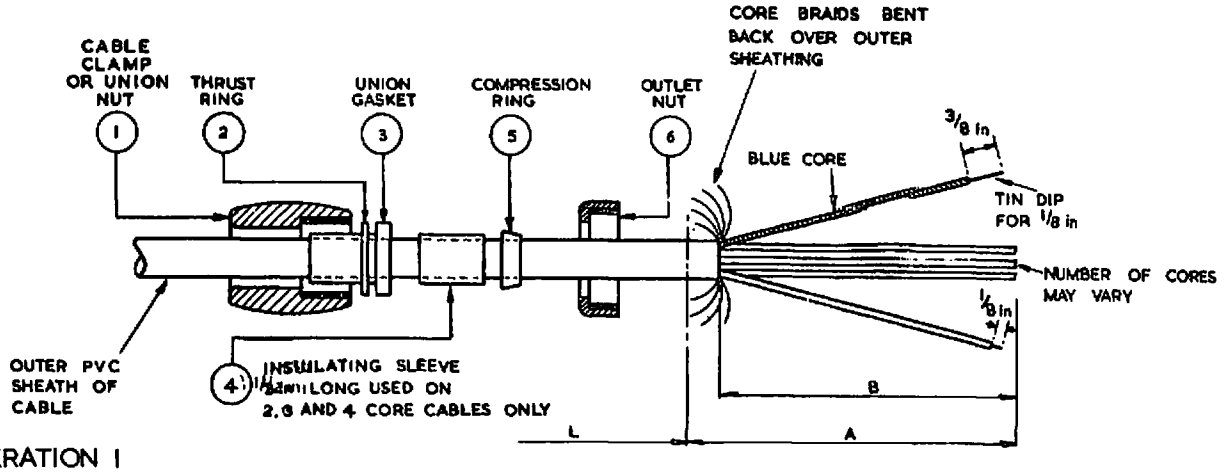


CABLE	STRAIGHT OUTLET				90° OUTLET			
	A in	B in	C in	D in	A in	B in	C in	D in
MINIATURE CABLE 6 WAY	2¼	1⅞	1⅛	⅛	2⅝	2¼	1	⅛
MINIATURE CABLE 18 WAY	2½	2⅛	1⅜	⅛	3⅜	3	1⅜	⅛

NOTES:

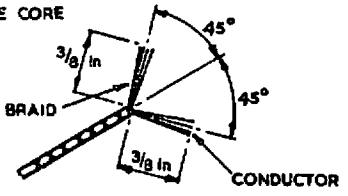
1. ON 18-WAY CABLES THOSE CORES WHICH ARE TO BE CONNECTED TO OUTER RING OF PINS MUST BE CUT 1/8 in LONGER THAN REMAINDER
2. TOTAL LENGTH OF CABLE REQUIRED IS DETERMINED BY ADDING LENGTH A FOR EACH TERMINATION TO LENGTH L DETAILED IN FIG 18

Fig 19 - Stripping details - cables DEF STAN types J and H



OPERATION 1

a ASSEMBLE ITEMS 1 TO 6 TO CABLE IN THIS ORDER
b PREPARE CABLE TO DIMENSIONS SHOWN. TRIM FILLER CORE(S) AND IDENTIFICATION THREADS FLUSH WITH OUTER PVC SHEATH
c COMB OUT CORE BRAIDS (EXCEPT BLUE CORE)
d SEE OPERATION 1A BELOW FOR PREPARATION OF BLUE CORE
e TIN DIP EXPOSED CONDUCTORS AND BLUE CORE WHERE INDICATED



OPERATION 1A (PREPARATION OF BLUE CORE)

a COMB OUT BRAID AND UNTWIST CONDUCTOR AS SHOWN
b TWIST BRAID AND CONDUCTOR TOGETHER

DEF / STAN CABLE	OLD CABLE NOMENCLATURE	A		B	
		ST OUTLET	90° OUTLET	ST OUTLET	90° OUTLET
MIN CABLE No 2D	DUCOREVINSMALL No1	1 1/8 in	1 1/2 in	7/8 in	1 1/4 in
" " " 3D	TRICOREVINSMALL No1	1 1/8 in	1 1/2 in	7/8 in	1 1/4 in
" " " 4D	QUADRACOREVINSMALL No1	1 1/8 in	1 1/2 in	7/8 in	1 1/4 in
" " " 6D	SEXTOCOREVINSMALL No1	1 1/8 in	1 1/2 in	7/8 in	1 1/4 in
" " " 6E AND 6F	SEXTOCOREVINSMALL No2, 3 OR 4	2 1/8 in	2 1/2 in	1 7/8 in	2 1/4 in
" " " 12D	TWELVECOREVINSMALL No1	1 1/8 in	1 1/2 in	7/8 in	1 1/4 in
" " " 18F	EIGHTEENCOREVINSMALL No 2 AND 3	2 3/8 in	3 1/4 in	2 1/8 in	3 in
" " " 25D	TWENFIVECOREVINSMALL No1	1 3/8 in	1 7/8 in	1 1/8 in	1 5/8 in

NOTE:
ON 18 AND 25 CORE CABLES CORES WHICH ARE TO BE CONNECTED TO OUTER RING OF PINS MUST BE CUT 1/8 in LONGER THAN REMAINDER

NOTE:
DIMENSION 'A' IS TO BE ADDED TO THE NOMINAL LENGTH 'L' OF THE CABLE AT EACH END TO OBTAIN THE LENGTH OF CABLE TO BE CUT.
DIMENSION 'B' IS THE LENGTH OF OUTER SLEEVING REMOVED

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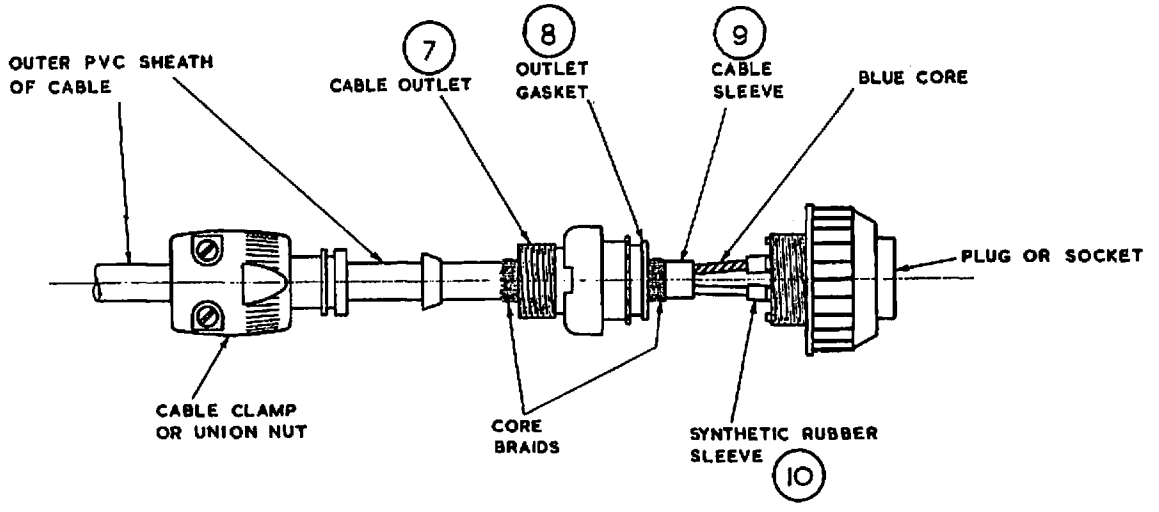
Fig 20 - Stripping details - cables DEF STAN types D, E and F - operations 1 and 1A



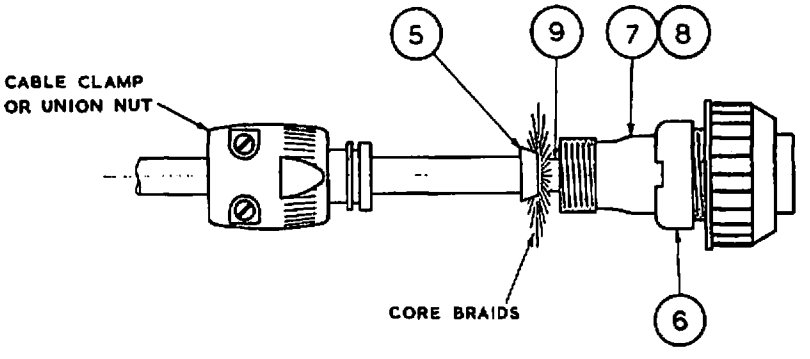
OPERATION 2

a PRESS ALL LOOSE BRAID BACK OVER OUTER PVC SHEATH OF CABLE AND TEMPORARILY BIND IN POSITION WITH A FEW TURNS OF TWINE OR FINE GAUGE COPPER WIRE

b ASSEMBLE ITEMS 7 TO 9 TO CABLE IN THIS ORDER

c FIT ITEM 10 TO EACH CORE SOLDER CONDUCTORS TO APPROPRIATE BUCKET ENDS

d SLIDE ITEM 10 FORWARD OVER SOLDERED JOINTS



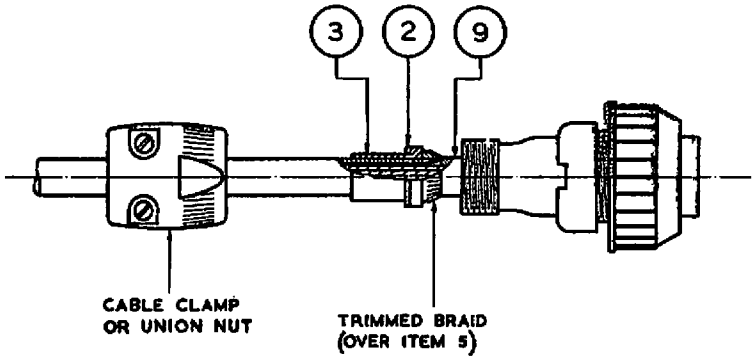
OPERATION 3

a FIT ITEMS 8 AND 7 IN THIS ORDER TO BODY OF PLUG OR SOCKET SCREW ITEM 6 INTO POSITION AND TIGHTEN WITH APPROPRIATE TOOL

b REMOVE TEMPORARY BRAID BINDING AND PULL ALL LOOSE ENDS OF BRAID OUT AT RIGHT ANGLES TO CABLE AS SHOWN

c SLIDE ITEM 5 INTO POSITION SHOWN (ALSO ITEM 4 IF REQUIRED SEE OPERATIONS 1 AND 4)

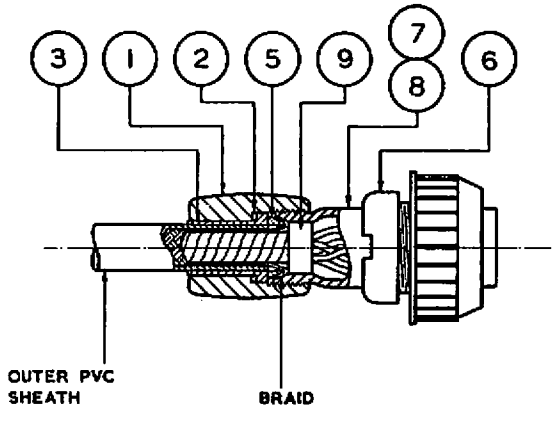
Fig 21 - Stripping details - cable DEF STAN types D, E and F - operations 2 and 3



OPERATION 4

a PRESS BRAID BACK OVER ITEM 5 AND TRIM OFF SURPLUS AS SHOWN

b SLIDE ITEMS 3 AND 2 INTO POSITION AS SHOWN

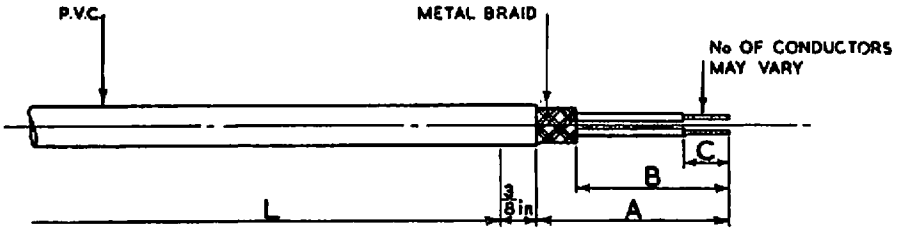


OPERATION 5

a COMPLETE ASSEMBLY BY PRESSING CABLE INTO ITEM 7 UNTIL ITEM 5 SEATS IN ITEM 7 (THE CONDUCTORS WILL BOW TO PERMIT THIS)

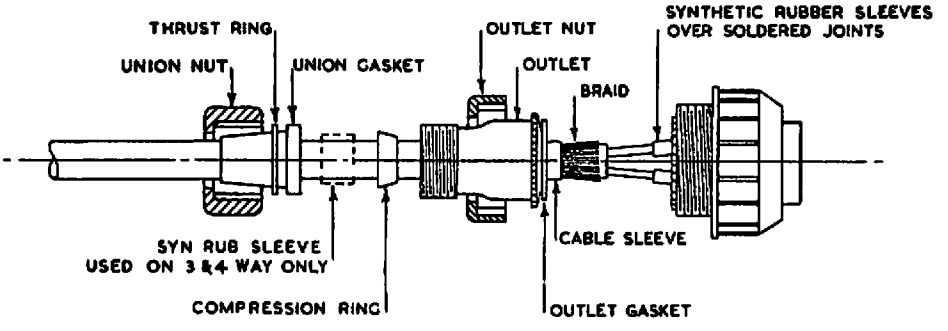
b COAT THREADS OF ITEM 7 WITH BAKELITE VARNISH SCREW ON ITEM 1 AND TIGHTEN BY HAND ONLY

Fig 22 - Stripping details - cable DEF STAN types D, E and F - operations 4 and 5



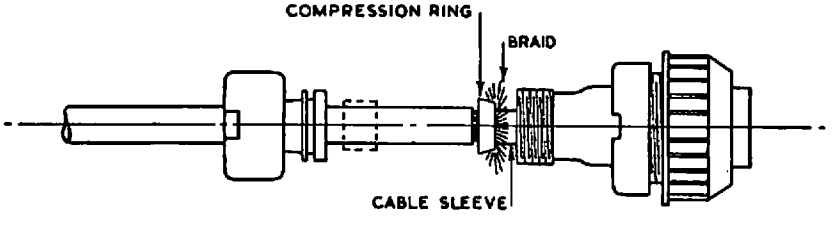
STRIP P.V.C., BRAID, TAPE AND CONDUCTORS TO DIMENSIONS GIVEN IN TABLE 3 ON 16 AND 25 CORE CABLES, CORES WHICH ARE TO BE CONNECTED TO OUTER RING OF PINS MUST BE CUT 1/8in LONGER THAN REMAINDER. TIN DIP CONDUCTORS FOR HALF LENGTH OF BARED WIRE

OPERATION 1



ASSEMBLE FITTINGS TO CABLE IN ORDER SHOWN COMB OUT METAL BRAID SLIDE RUBBER SLEEVES OVER CONDUCTORS SOLDER CONDUCTORS TO THE APPROPRIATE BUCKET ENDS AND ROLL SLEEVES OVER SOLDERED JOINTS

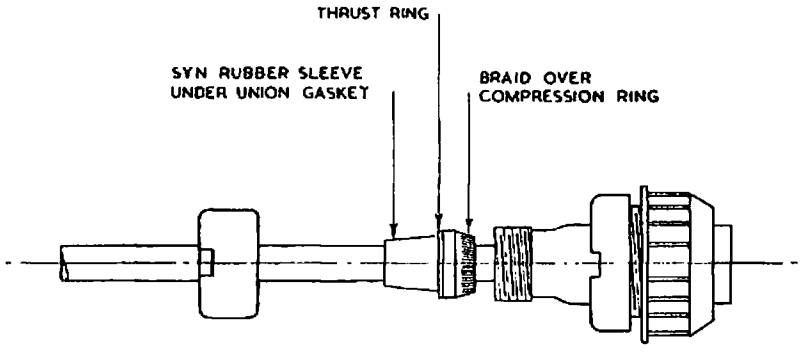
OPERATION 2



WITH OUTLET GASKET INSIDE OUTLET LOCK TO PLUG OR SOCKET ASSEMBLY WITH OUTLET NUT MOVE COMPRESSION RING ON BRAID JUST CLEAR OF PVC PULL ENDS OF BRAID OUT AT RIGHT ANGLES TO CABLE AND TRIM

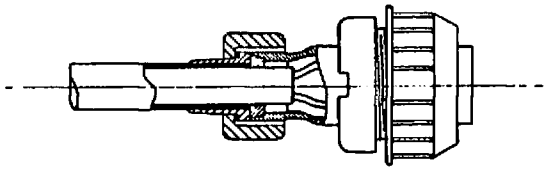
OPERATION 3

Fig 23a - Terminating cables DEF STAN types C and R - operations 1, 2 and 3



BEND BRAID BACK OVER COMPRESSION RING ENDS MUST NOT PROJECT OVER REAR FACE OF RING SLIDE UNION GASKET AND THRUST RING TO REAR FACE OF COMPRESSION RING AS SHOWN

OPERATION 4



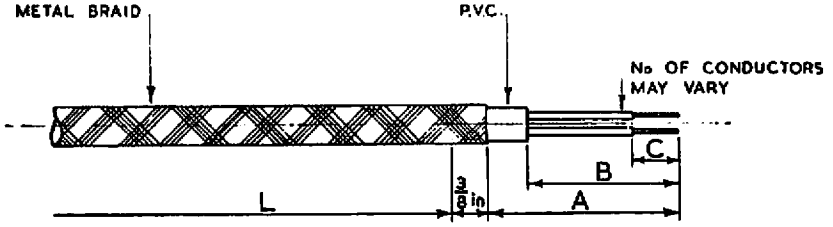
FORCE CABLE INTO OUTLET UNTIL BRAID SEATS IN OUTLET (THE CONDUCTORS WILL BOW TO PERMIT THIS) BRING UP THE UNION GASKET AND THRUST RING. LOCK WITH UNION NUT

OPERATION 5

NOTES:

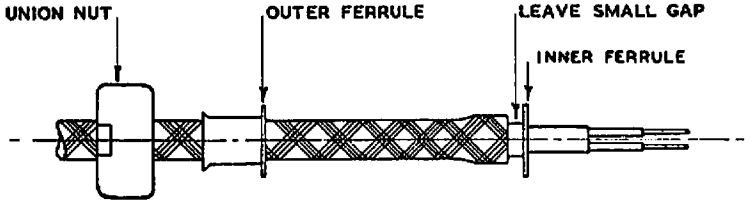
1. STRAIGHT OUTLETS ARE ILLUSTRATED — METHOD FOR 90° OUTLETS IS IDENTICAL
2. TOTAL LENGTH OF CABLE REQUIRED IS DETERMINED BY ADDING (A+ 3/8 in) FOR EACH TERMINATION TO LENGTH L DETAILED IN FIG 18

Fig 23b – Terminating cables DEF STAN types C and R – operations 4 and 5



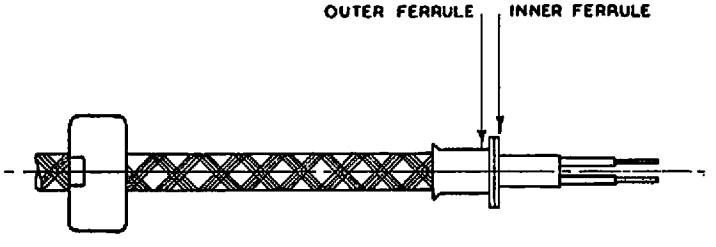
STRIP BRAID, P.V.C, TAPE AND CONDUCTORS TO DIMENSIONS GIVEN IN TABLE 3. ON 18 AND 25 CORE CABLES, CORES WHICH ARE TO BE CONNECTED TO OUTER RING OF PINS MUST BE CUT 1/8in LONGER THAN REMAINDER. TIN DIP CONDUCTORS FOR HALF LENGTH OF BARED WIRE

OPERATION 1



THREAD ON UNION NUT AND OUTER FERRULE SLIDE INNER FERRULE UNDER BRAID

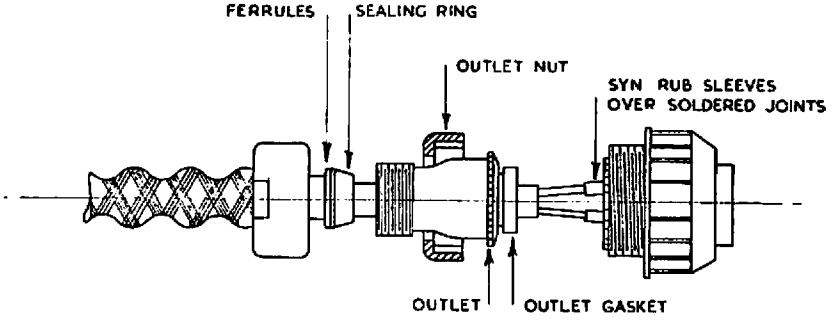
OPERATION 2



FORCE OUTER FERRULE OVER INNER FERRULE AND BRAID

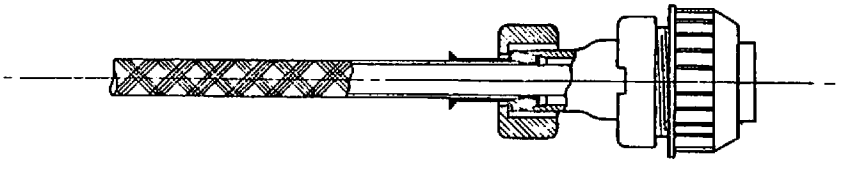
OPERATION 3

Fig 24a - Terminating cables DEF STAN types B and Q - operations 1, 2 and 3



COMPRESS BRAID WELL BACK FIT SEALING RING OUTLET NUT OUTLET AND GASKET SLIDE RUBBER SLEEVES OVER CONDUCTORS SOLDER CONDUCTORS TO APPROPRIATE BUCKET ENDS AND ROLL SLEEVES OVER SOLDERED JOINTS

OPERATION 4



WITH GASKET IN OUTLET LOCK TO SHELL WITH OUTLET NUT
FIT SEALING RING IN END OF OUTLET
PULL FERRULES UP TO RING LOCK TIGHT WITH UNION NUT

OPERATION 5

NOTES:

1. STRAIGHT OUTLETS ARE ILLUSTRATED METHOD FOR 90° OUTLETS IS IDENTICAL
2. TOTAL LENGTH OF CABLE REQUIRED IS DETERMINED BY ADDING $(A+\frac{3}{8}in)$ FOR EACH TERMINATION TO LENGTH L DETAILED IN FIG19

Fig 24b - Terminating cables DEF STAN types B and Q - operations 4 and 5

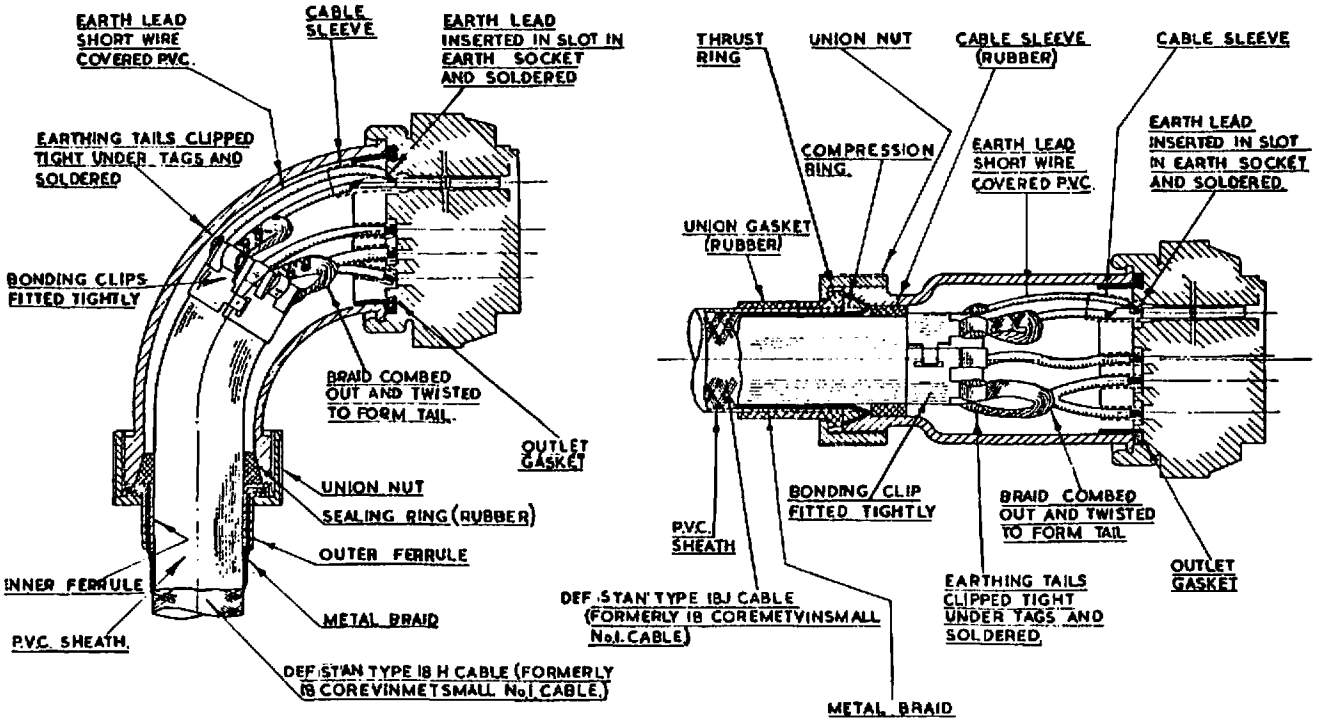
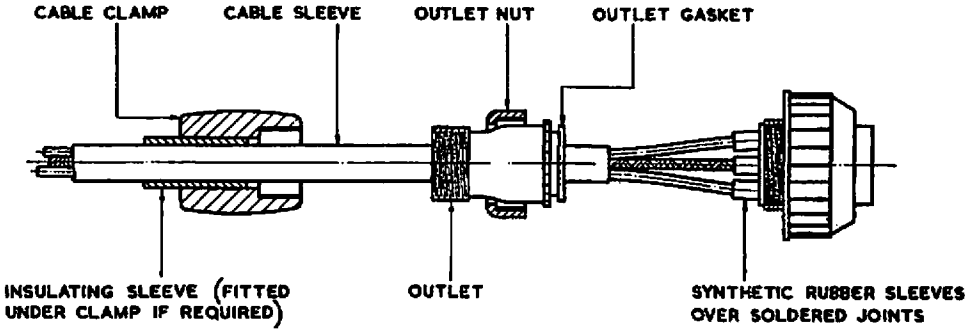
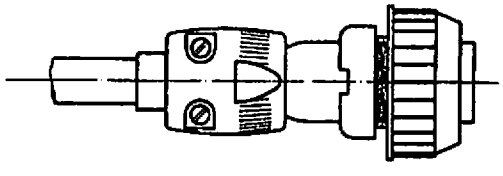


Fig 25 - Method of earthing metal braid screening on cables
DEF STAN types 18H and 18J



OPERATION 1

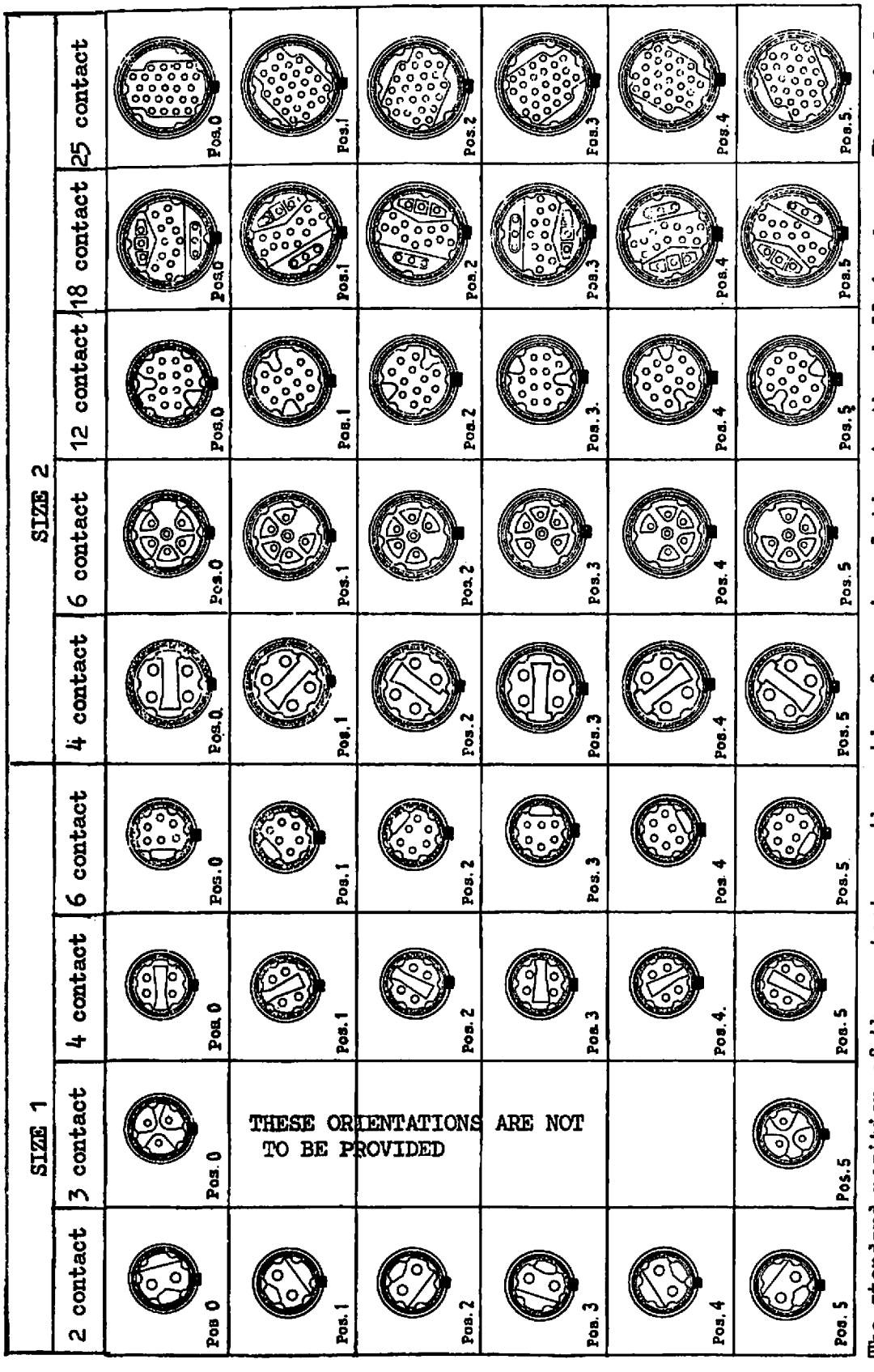
a THREAD COMPONENTS OVER CABLES IN ORDER SHOWN
b COMB OUT BRAIDING OF SCREENED CABLES AND TWIST INTO PIGTAILS
c PREPARE CABLE ENDS FOR SOLDERING
d SLIDE SYNTHETIC RUBBER SLEEVES OVER CABLE ENDS
e SOLDER CABLES TO APPROPRIATE BUCKET ENDS
f SOLDER PIGTAILS OF SCREENED CABLES TO EARTH PIN
g SLIDE SLEEVES OVER SOLDERED JOINTS



OPERATION 2

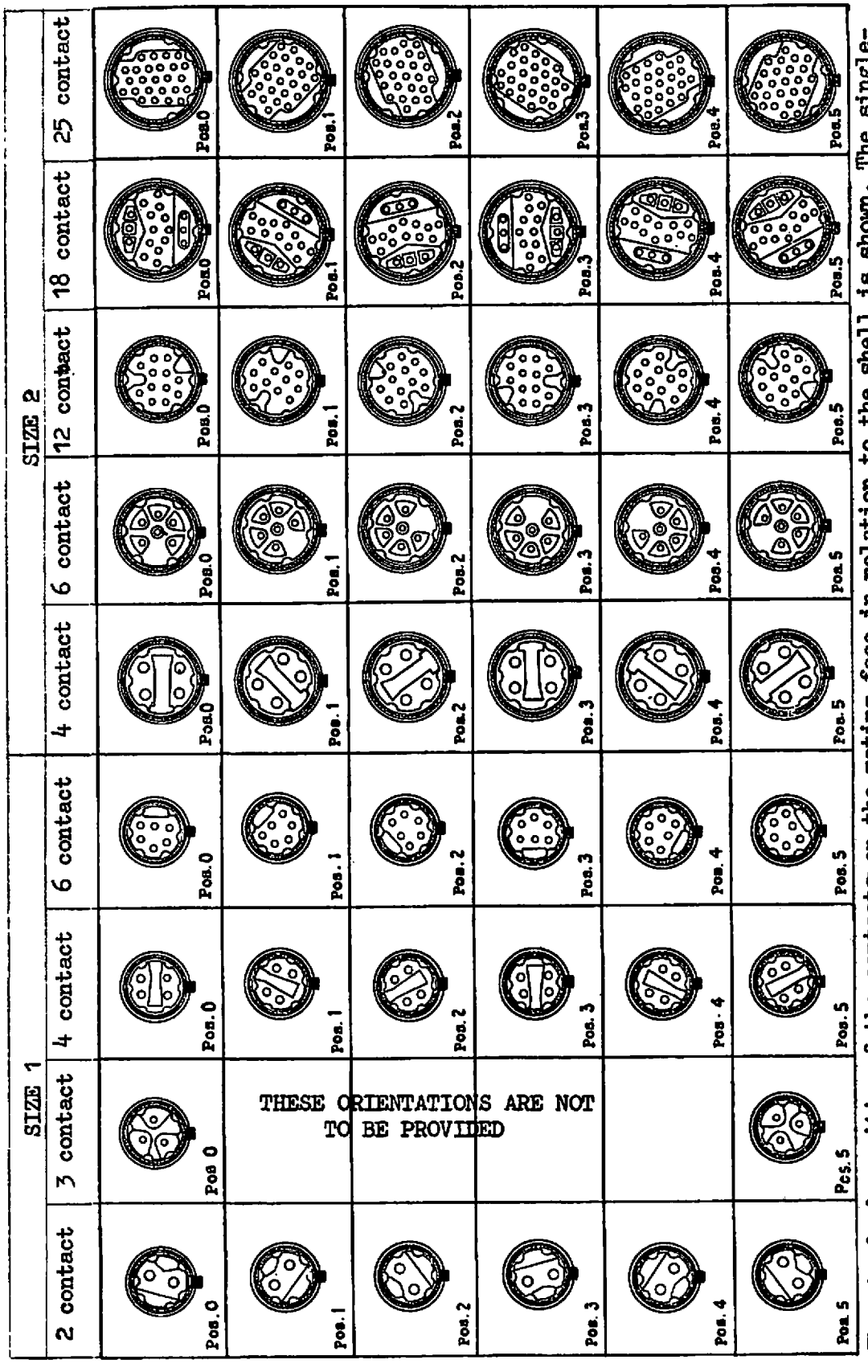
a ASSEMBLE COMPONENTS AS SHOWN

Fig 26 - Terminating open wiring



The standard position of the contacts on the mating face, in relation to the shell is shown. The single-key or single-keyway of the shell is represented by the black square at the base of each diagram and the settings are referred to as positions 0,1,2, 3,4,5.

Fig 27 - Mk 4 Plug orientation



The standard position of the contacts on the mating face in relation to the shell is shown. The single-key or single-keyway of the shell is represented by the black square at the base of each diagram and the settings are referred to as positions 0,1,2,3,4,5.

Fig 28 - Mk 4 Socket orientation

PATTERN 104 PLUGS AND SOCKETS

General

79. The Mk 4 series of plugs and sockets at present in service is being replaced by pattern 104 plugs and sockets. The pattern 104A (aluminium) and pattern 104B (brass) include those that are interchangeable, and mateable with, the Mk 4A and Mk 4B plugs and sockets respectively. They are similiar in appearance and manufactured in the same three sizes, small, size 1; medium, size 2 and large, size 3. They have soldered contacts, threaded couplings, and the contact ranges have been extended in all 3 shell sizes.

80. The main differences between the two types are:-

a. the shape of the coupling ring, which is square on both faces of the pattern 104 but the Mk 4 has one face bevelled.

b. the inserts, which are black phenolic material in the Mk 4 range, are now available in three types in the pattern 104 series.

(1) A4 Aluminium shells with a fine thread having blue/grey neoprene inserts suitable for temperature severity T4 (-55/+100°C)

(2) B4 Brass shells having a coarse thread and blue/grey neoprene inserts suitable for temperature severity T4 (-55/+100°C)

(3) C4 Aluminium shells with a coarse thread having bright green fluorinated silicone inserts suitable for temperature severity T4 (-55/+190°C).

c. The pattern 104 shells are passivated and have an olive drab finish. The A4 and B4 shells have a darker shade than the C4 type. The Mk 4 range is passivated only.

d. The NSN, usually followed by the manufacturers code will be inscribed on the pattern 104 assemblies. The manufacturers code may be omitted in some cases.

e. Six grooves are moulded into the insert on the Mk 4 series one of which is located by a projection on the inside of the shell to provide the required orientation. These grooves are omitted in the pattern 104 inserts and the inside periphery of the shell is continuous.

f. Pattern 104 socket contacts are of the restricted entry type.

g. When terminating cables into pattern 104 plugs and sockets there are certain variations in the cable outlet sets as shown in Fig 31 to 35 inclusive.

Orientation

81. Orientation of the insert to positions other than that set by the manufacturers is not possible with pattern 104. The orientation is set during assembly in production and no attempt should be made to alter this setting. There are six modes of orientation 0 to 5 inclusive in all types of plugs/sockets manufactured in the pattern 104 series with the exception of the 3 contact shell size 1. This is limited to orientation 0and 5 only following the practice in the Mk 4 range.

82. The mode of orientation can be identified by reference to Figs 29 and 30. One of each type of plug and socket is illustrated along with the various orientation positions. The views shown are of the mating faces in both cases which is the normal view of a plug/socket.

83. A marker is moulded on the mating face of each insert and may take the form of a small raised circular dot or a tringular arrow head. From this, the orientation can be ascertained by noting the position of this marker relative to the main key/keyway. The angular displacement of the insert is a multiple of 60° from the main key/keyway in order to satisfy the six orientation positions. It should be noted that with each increase of the orientation number the insert is rotated CLOCKWISE for the plugs and ANTI-CLOCKWISE for the sockets.

Style references

84. The style references are abbreviations used to identify plug and socket variants. A typical reference is:-

Function	Pattern number	Type	Temperature severity	Shell Style	Shell Size	Number of contacts	Orientation
P	04	A	4	X	2	6	0

where

Function, is denoted as P-plug; S-socket

Pattern 04, indicates Pattern 104

Type, *indicated shell material* A-*aluminium fine thread*, B-*brass coarse thread*, C aluminium coarse thread

Temperature severity, is designated by 4 which indicates the range (-55/+100°C)

Shell style, X-fixed female shell, F-free male shell or C-free female shell (coupler)

Shell size 1, 2 or 3

No of contacts 2, 4, etc as applicable

Orientation 0 to 5 as applicable

The typical reference sample indicates a Plug, fixed female shell pattern 104 aluminium size 2 shell, 6 contacts, 0 orientation, temperature range -55°C to +100°C.

Shell styles

85. The range of Pattern 104 plugs and sockets consist of eighteen basic types accommodated in three shell sizes. Each shell size is available in three shell thread styles:

A4. ALUMINIUM, FINE THREAD

FIXED FEMALE SHELL
SHELL SIZE 1: 2, 3, 4, 6, 12 Contacts
SHELL SIZE 2: 2, 4, 6, 12, 26 Contacts
SHELL SIZE 3: 18, 25, 37, 62 Contacts

FREE MALE SHELL
SHELL SIZE 1: 2, 3, 4, 6, 12 Contacts
SHELL SIZE 2: 2, 4, 6, 12, 26 Contacts
SHELL SIZE 3: 18, 25, 37, 62 Contacts

FREE FEMALE SHELL (COUPLER)
SHELL SIZE 1: 2, 3, 4, 6, 12 Contacts
SHELL SIZE 2: 2, 4, 6, 12, 26 Contacts
SHELL SIZE 3: 18, 25, 37, 62 Contacts

B4. BRASS, COARSE THREAD

FIXED FEMALE SHELL
SHELL SIZE 1: 2, 3, 4, 6, 12 Contacts
SHELL SIZE 2: 2, 4, 6, 12, 26 Contacts
SHELL SIZE 3: 4, 5, 6, 9, 18, 25, 37, 62 Contacts

FREE MALE SHELL
SHELL SIZE 1: 2, 3, 4, 6, 12 Contacts
SHELL SIZE 2: 2, 4, 6, 12, 26 Contacts
SHELL SIZE 3: 4, 5, 6, 9, 18, 25, 37, 62 Contacts

FREE FEMALE SHELL (COUPLER)
SHELL SIZE 1: 2, 3, 4, 6, 12 Contacts
SHELL SIZE 2: 2, 4, 6, 12, 26 Contacts
SHELL SIZE 3: 4, 5, 6, 9, 18, 25, 37, 62 Contacts

C4. ALUMINIUM, COARSE THREAD

FIXED FEMALE SHELL
SHELL SIZE 1: 2, 3, 4, 6, 12 Contacts
SHELL SIZE 2: 2, 4, 6, 12, 26 Contacts
SHELL SIZE 3: 4, 5, 6, 9, 18, 25, 37, 62 Contacts

Contact ratings

86. The recommended working voltage and current is given in Table 5.

Table 5 – Pattern 104 contact ratings

Size	Number of contacts	Recommended working volts	Recommended working amps
No 1 Small	2	500	16
	3	500	2.5
	4	500	2.5
	6	500	2.5
	12	500	2.5

Table 5 - (cont)

Size	Number of contacts	Recommended working volts	Recommended working amps
No 2 Medium	2	500	-
	4	500	16
	6	1500	2.5
	12	500	2.5
	26	500	-
No 3 Large	4	500	-
	5	500	-
	6	2500	-
	9	500	-
	18	500/1500	2.5
	25	500	2.5
	37	500	-
	62	500	-

Notes on Table 5

1. - Indicates that the column heading does not apply.

2. The Shell Size 3, 18 contact items have d.c. voltages of:

Contacts ADC	1500 V to any other contacts or to the shell
Contacts D to P	500 V to any other of these contacts or to the shell
Contacts QRS	500 V between these contacts
Contacts QRS	1500 V to any other contacts or to the shell.

NOTES APPLICABLE TO PERMISSIBLE ORIENTATIONS SHELL SIZES 1, 2 AND 3 (Figs 29 and 30)

1. The diagrams are of the mating faces and show the standard orientations of the insert in relation to the shell. The single key/keyway of the shell is represented by the black square at the base of each diagram.

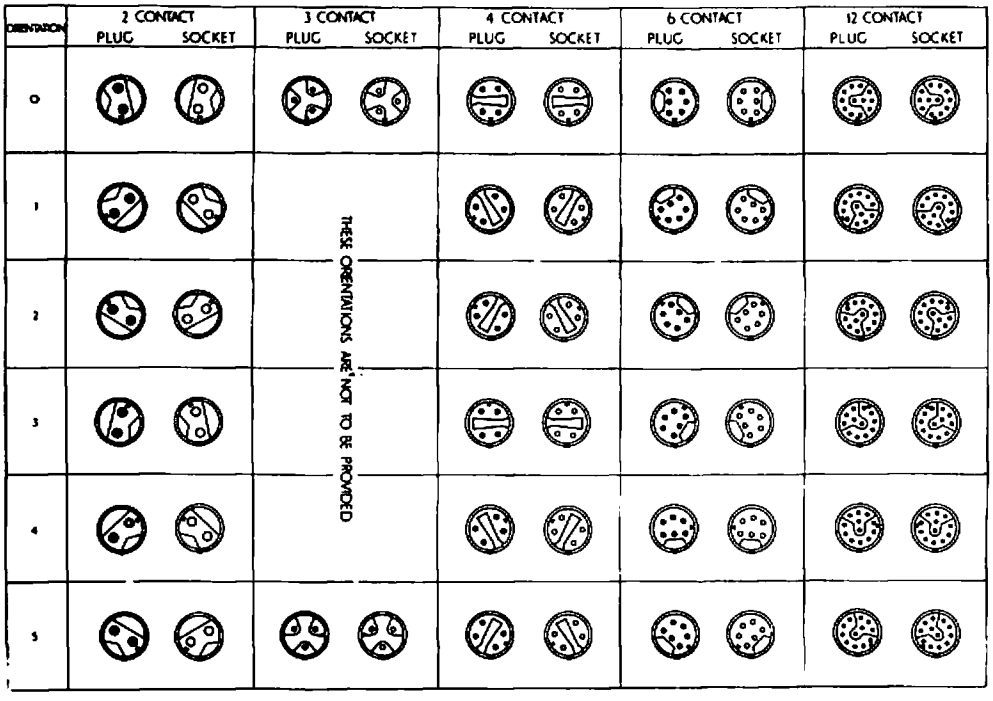
2. The contact location plan of High Density Styles is as follows:

   a. The arrow indicates the starting point.

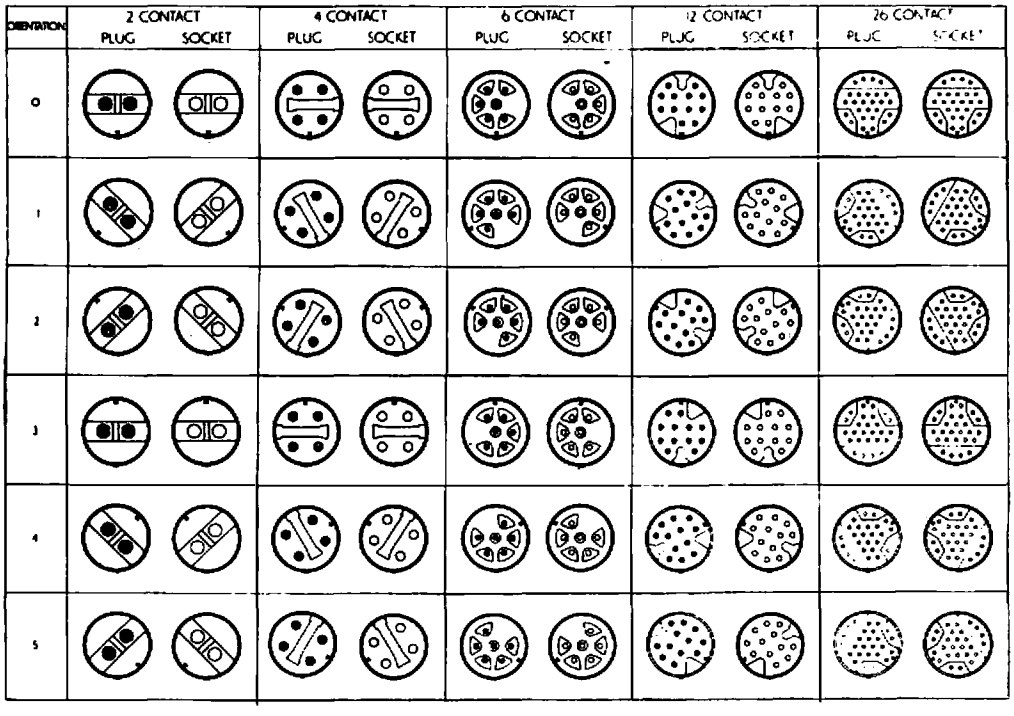
   b. Every subsequent tenth contact is ringed.

   c. The rectangular markers indicate the direction to be followed when sequential contacts are not in line, see Fig 30.

3. In other styles each contact is indexed, (not shown on Figures).

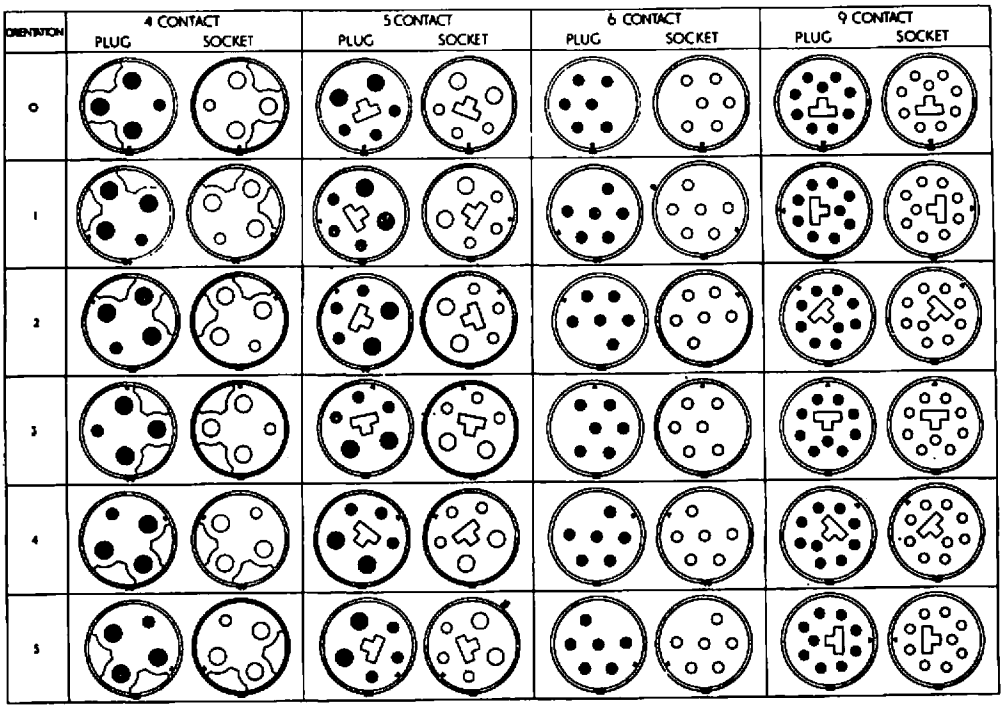


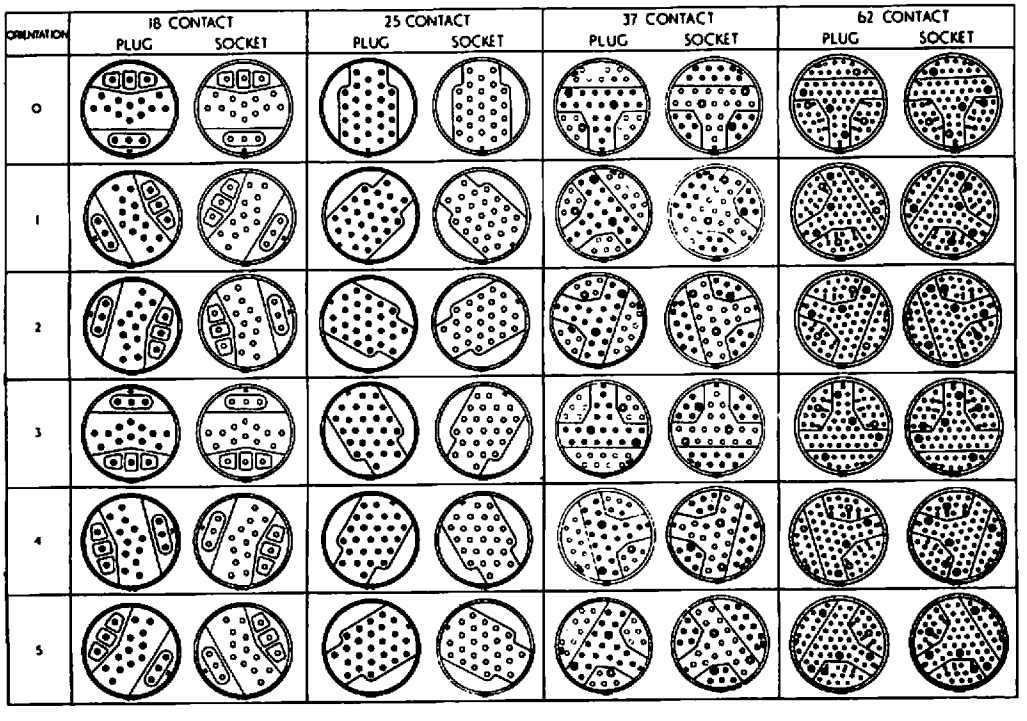
SHELL SIZE 1



SHELL SIZE 2

Looking at the mating face
Fig 29 - Pattern 104 Permissible orientations



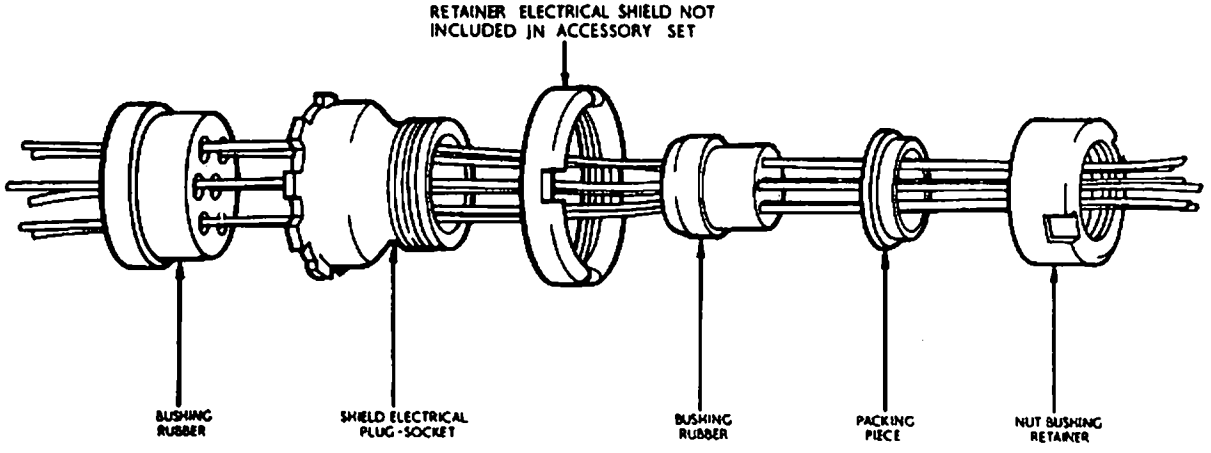


SHELL SIZE 3

Looking at the mating face

Fig 30 – Pattern 104 Permissible orientations

ACCESSORY SETS WITH STRAIGHT OUTLET OPEN WIRING



ACCESSORY SETS WITH ANGLED OUTLET OPEN WIRING

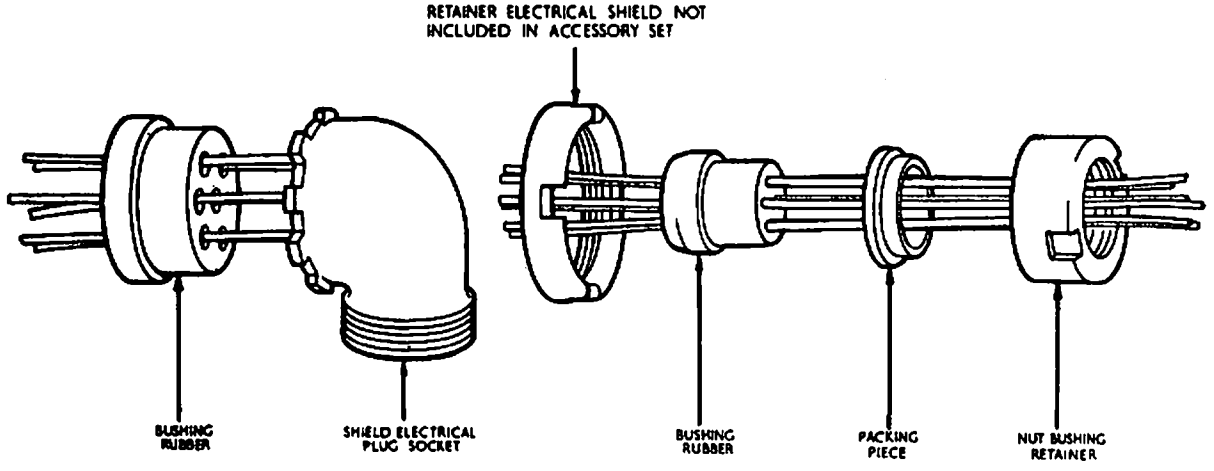


Fig 31 - Pattern 104 - Opening wiring accessory sets

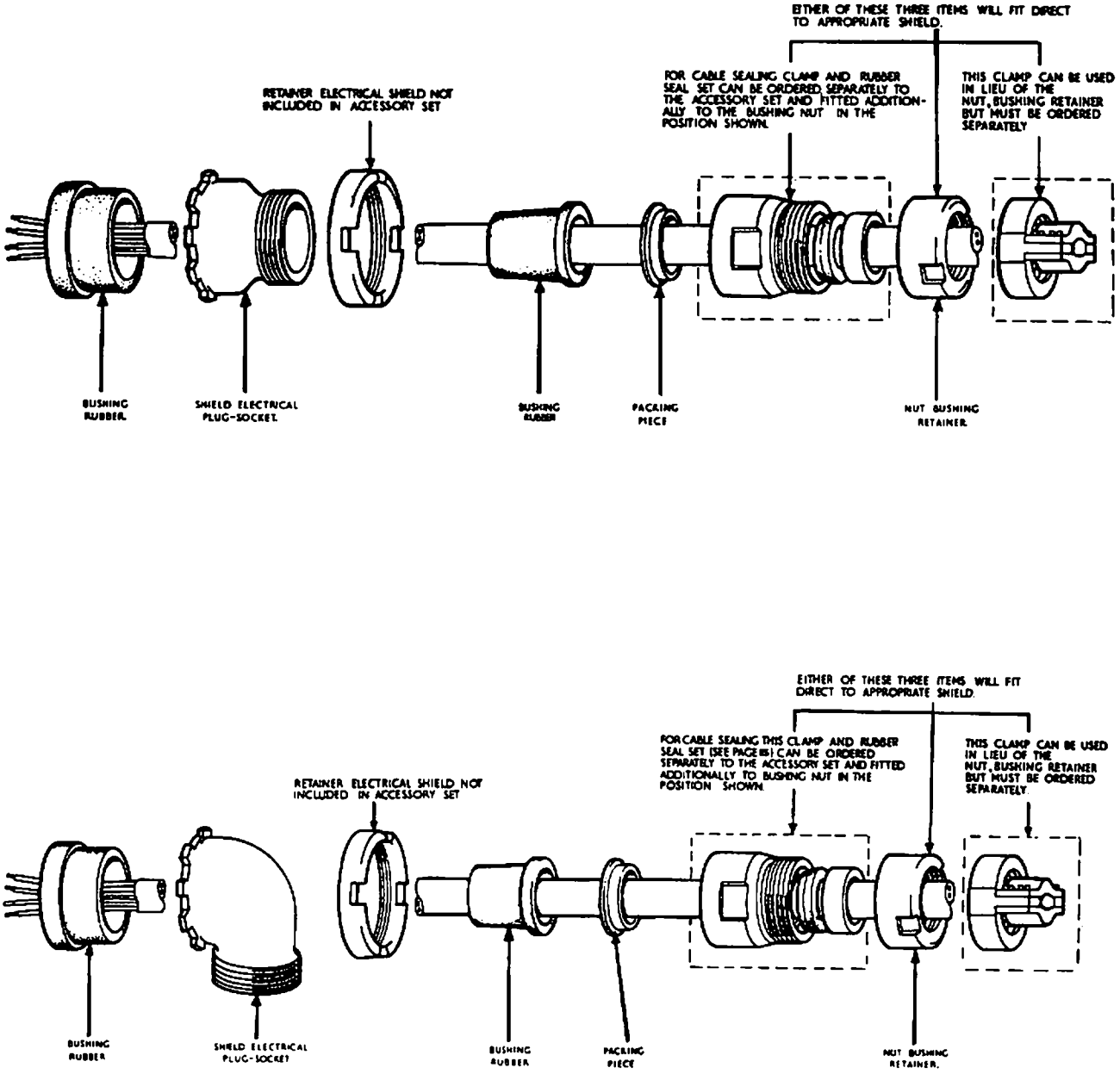
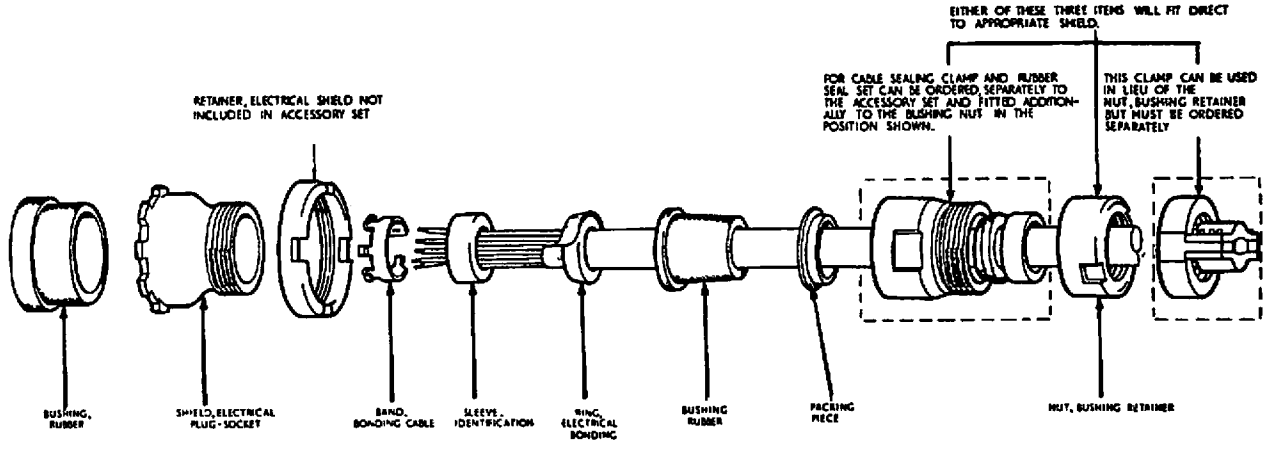


Fig 32 – Pattern 104 – Terminating cables DEF STAN types A and P



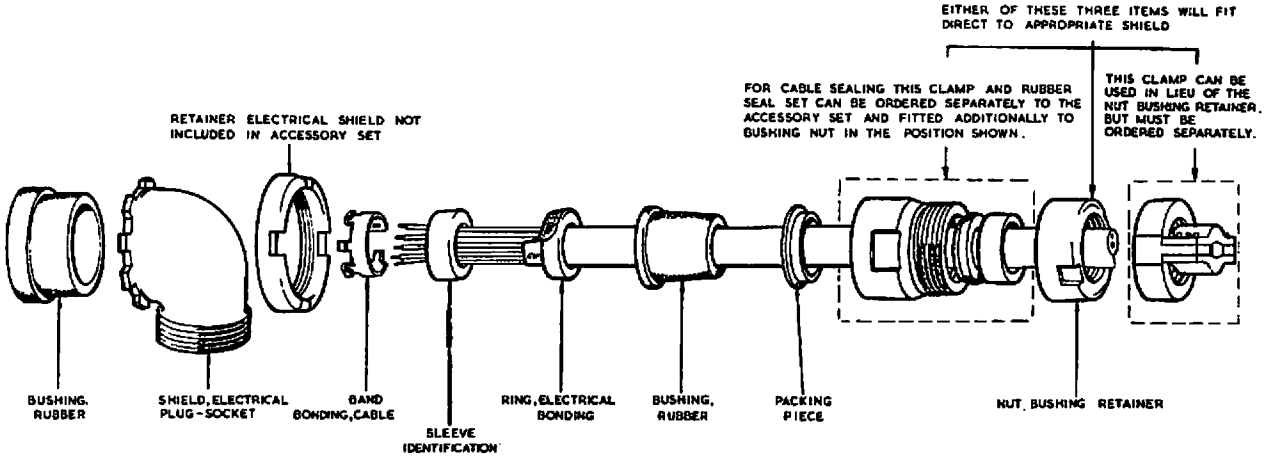


Fig 33 - Pattern 104 - Terminating cables DEF STAN types C, J and R

ACCESSORY SETS WITH STRAIGHT OUTLET.

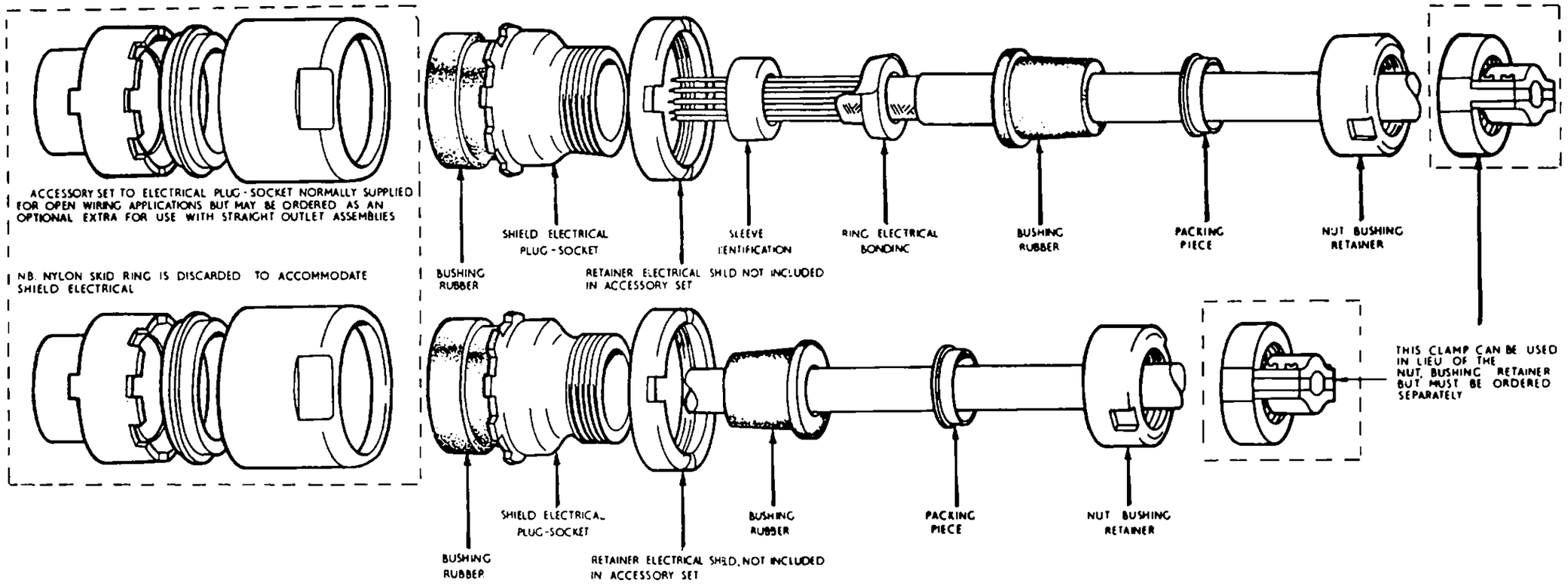
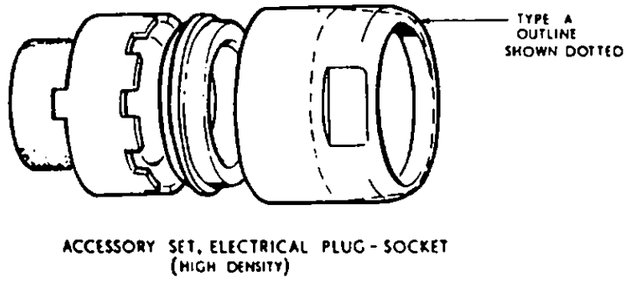


Fig 34 - Pattern 104 - Terminating cables DEF STAN types A and C



Type A
For use with Aluminium Free male shell and all brass connector styles

Type B
For use with all female aluminium connector styles.

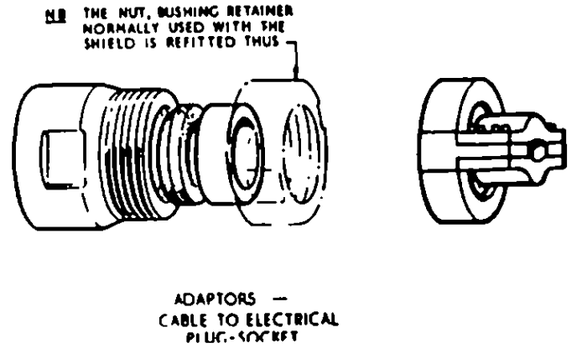


Fig 35 - Pattern 104 - Additional accessories available

PATTERN 105 PLUGS AND SOCKETS

General

87. This range of plugs and sockets is manufactured with metal shells enclosing resilient monobloc sealed inserts having soldered contacts. Mating of the male and female shells is by means of a 3 pin bayonet coupling the mating pins being part of the female shells.

Shells

88. The shell sizes are indicated by code numbers eg 8, 10, 12 etc which represent the approximate outer diameter of the female shell in sixteenths of an inch. From this a No 8 shell is 1/2 in, and a No 12 shell is 3/4 in. diameter etc.

Inserts

89. The inserts are available having between 2 and 61 contacts with various contact arrangements. The insert arrangement, when given, appears to indicate that a 14-12 contact arrangement means a shell size 14 and 12 contacts. This may be taken as a guide only but not as a general rule with all connectors. (see table 6).

Orientation

90. Orientation is possible by two different methods, preferred and permissible

a. (Preferred) Normal, B, C, E and F obtained by the use of shells with alternative positions for the four minor keys/keyways relative to the main key/keyway as shown in Fig 36.

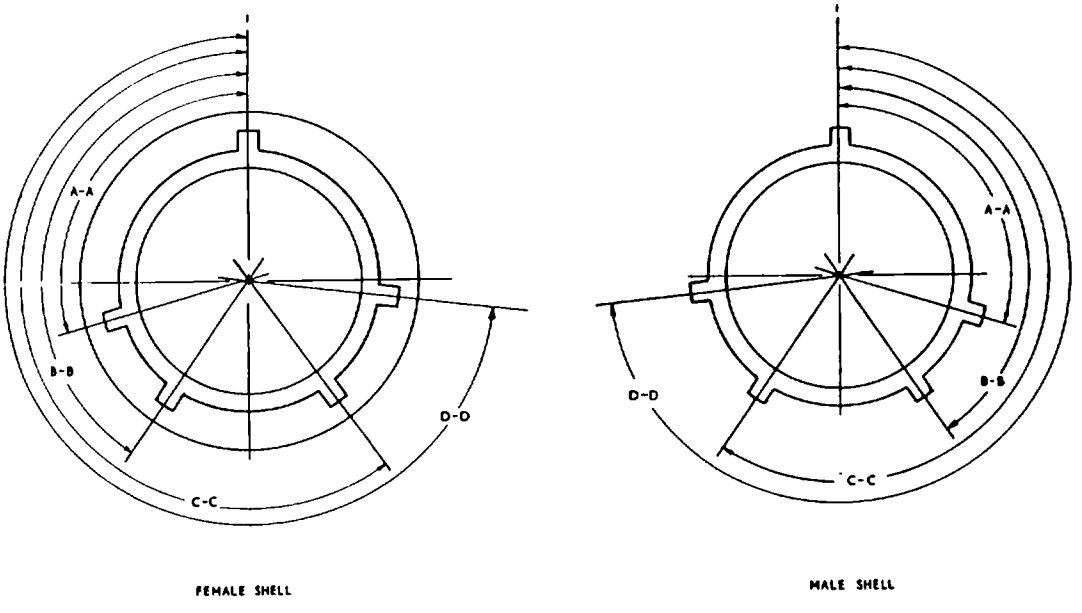


Fig 36 - Pattern 105 - Shell orientation

b. (Permissible) Normal W, X, Y and Z which are provided by the rotation (during manufacture) of the insert within the shell relative to the main key/keyway. Pin inserts are rotated clockwise through the angle ϕ in both male and female shells. Socket inserts are rotated counter-clockwise through the corresponding angle in both the male and female shells, looking at the mating face see Fig 37.

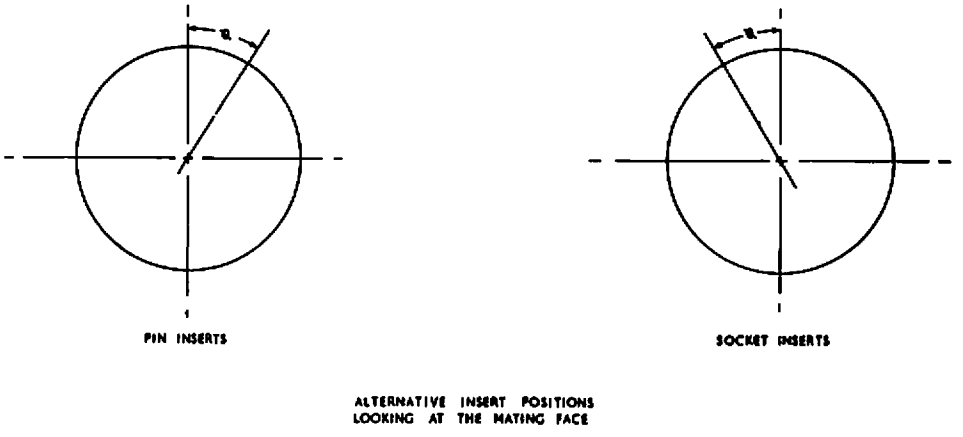


Fig 37 - Pattern 105 - Insert orientation

91. Tables 7 and 8 show the positions of keys/keyways and inserts for the various shell sizes and contact arrangements. The contact arrangements and shell sizes are given in Table 6 and shown in Fig 41.

Temperature range and altitude

92. This type of plug and socket is suitable for operation at a temperature range of between -55°C and +125°C. The operational altitude is a maximum of 66,000 ft.

Style references

93. The style references are abbreviations used to identify plug and socket variants. A typical style reference is CC/C1300-10-2PN

Control Drawing Number	Shell size	Contact arrangement	Contact	Orientation
CC/C 1300	10	10-2	P	N

Coding CC/C indicates the Control drawing number

Shell size	8, 10, 12, etc
Contact arrangements	10-2, 14-19, etc
Contact	P-pin S-socket
Orientation (preferred)	N, B, C, E and F
Orientation (permissible)	N, W, X, Y, and Z

Table 6 - Pattern 105 - Contact arrangements and shell sizes

Shell size	Contact arrangement	Number of contacts	Contact size
8	33	3	20
10	2	2	16
10	6	6	20
10	7	7	20
12	3	3	16
12	10	10	20
14	2	2	12
14	5	5	16
14	12	8	20
		4	16
14	19	19	20
14	22	1	20
		4	12
16	8	8	16
16	26	26	20
18	8	4	20
		4	12
18	11	11	16
18	32	32	20
20	16	16	16
20	41	41	20
22	21	21	16
22	55	55	20
24	61	61	20

Table 7 - Pattern 105 - Shell key/keyway position

Shell size	Keyway position	Number of degrees				
		Normal	B	C	E	F
8	A-A	105			118	82
	B-B	140			148	132
	C-C	215			248	207
	D-D	265			278	252

Where no figure is given these positions are not used

Table 7 - (cont)

Shell size	Keyway position	Number of degrees				
		Normal	B	C	E	F
10	A-A	105	85	125	115	85
	B-B	140	120	160	145	135
	C-C	215	195	235	245	210
	D-D	265	245	285	275	255
12	A-A	105	89	121	115	85
	B-B	140	124	156	145	135
	C-C	215	199	231	245	210
	D-D	265	249	281	275	255
14	A-A	105	91	119	75	120
	B-B	140	126	154	105	170
	C-C	215	201	229	205	245
	D-D	265	251	279	235	280
16	A-A	105	93	117	75	120
	B-B	140	128	152	105	170
	C-C	215	203	227	205	245
	D-D	265	253	277	235	280
18	A-A	105	95	115	75	120
	B-B	140	130	150	105	170
	C-C	215	205	225	205	245
	D-D	265	255	275	235	280
20	A-A	105	95	115	75	120
	B-B	140	130	150	105	170
	C-C	215	205	225	205	245
	D-D	265	255	275	235	280
22	A-A	105	97	113	75	120
	B-B	140	132	148	105	170
	C-C	215	207	223	205	245
	D-D	265	257	273	235	280
24	A-A	105	97	113	75	120
	B-B	140	132	148	105	170
	C-C	215	207	223	205	245
	D-D	265	257	273	235	280

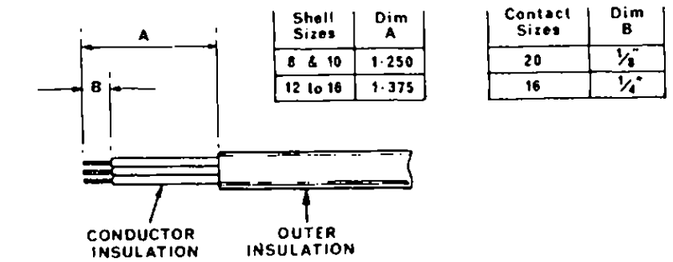
Table 8 - Pattern 105 - Insert orientation positions

Contact Arrangement	Orientation angle in degrees				
	Normal	W	X	Y	Z
8-33	0	90			
10-2	0				
10-6	0	90			
10-7	0				
12-3	0			180	
12-10	0	60	155	270	295
14-2	0	58	122		
14-5	0	40	92	184	273
14-12	0	43	90		
14-19	0	30	165	315	
14-22	0	45			
16-8	0	54	152	180	331
16-26	0	60		275	338
18-8	0				
18-11	0	62	119	241	340
18-32	0	85	138	222	265
20-16	0	238	318	333	347
20-41	0	45	126	225	
22-21	0	16	135	175	349
22-55	0	30	142	226	314
24-61	0	90	180	270	324

Where no figure is given these positions are not used

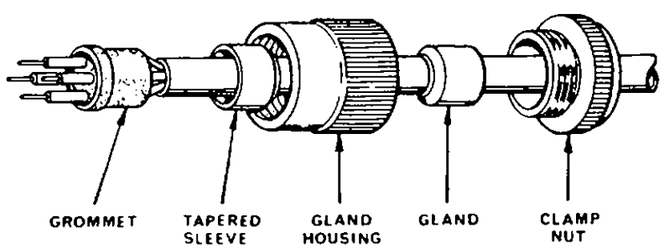
Wiring and assembly

94. The instructions for connecting the cables into the rear of the contacts are given in Fig 38, 39 and 40 for DEF STAN A, B and C cables. It could be that some improvements have been incorporated in the plugs and sockets and instructions may be included with the item concerned.



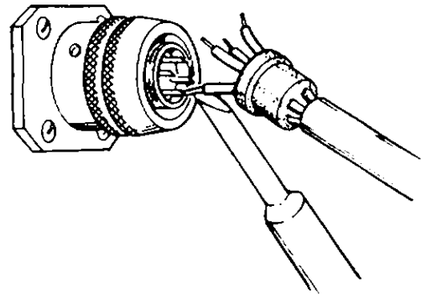
Shell Sizes	Dim A
8 & 10	1·250
12 to 16	1·375

Contact Sizes	Dim B
20	1/8"
16	1/4"

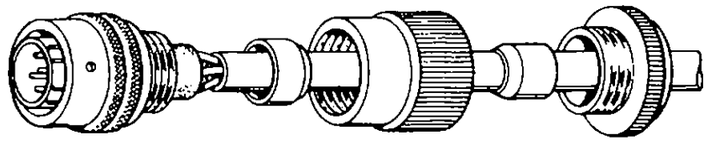


Strip back outer and conductor insulation to dimensions shown. After ascertaining that the conductors are clean, tin half of the stripped length using a good grade of resin cored solder. Tinning should be confined to the ends of the conductors to keep them flexible.

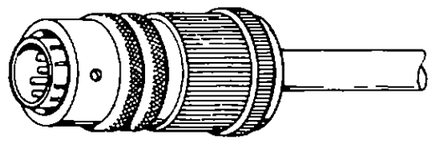
Slide the clamp nut, gland, gland housing and tapered sleeve over the outer insulation. Push the individual cores through the appropriate holes in the rear of the grommet as far as possible.



The plug or socket should be placed in some form of holding device so that the contact wire wells are towards the operator with the cut-away portions uppermost. The holding device may be a mating shell but if it is a vice the vice jaws should be suitably covered to protect the shell being operated on. If the solder buckets are not filled with solder this should be carried out. Insert the conductors into the solder buckets singly and apply heat and solder as required.

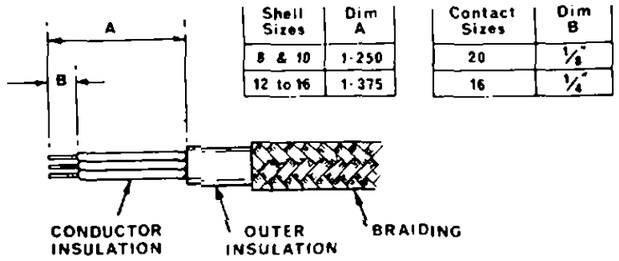


Slide the grommet over the soldered contacts pressing it firmly into the shell against the back face of the insert.



Slide the tapered sleeve over the grommet and screw the gland housing firmly into the shell. Push the gland into the housing and screw the clamp nut up finger tight only.

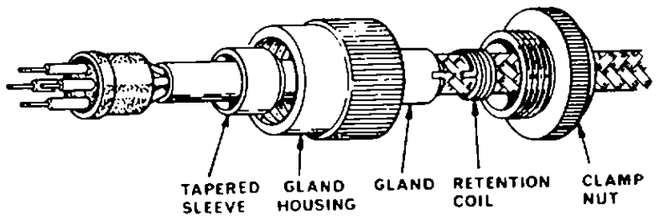
Fig 38 – DEF STAN type A cable assembly instructions



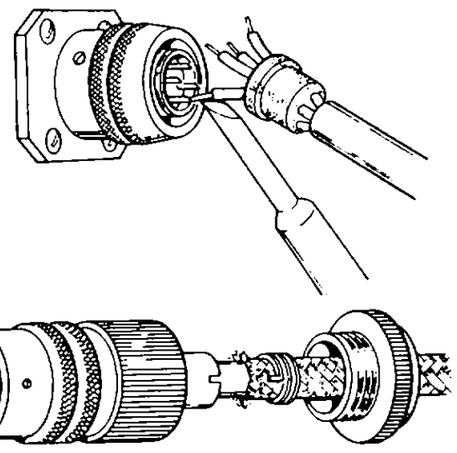
Shell Sizes	Dim A
8 & 10	1·250
12 to 16	1·375

Contact Sizes	Dim B
20	1/8"
16	1/4"

Strip back braiding, outer and conductor insulation to dimensions shown. After ascertaining that the conductors are clean, tin half of the stripped length using a good grade of resin cored solder. Tinning should be confined to the ends of the conductors to keep them flexible.

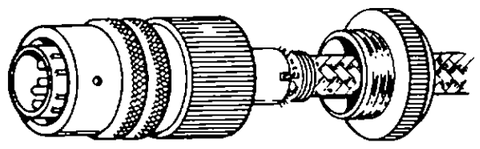


Slide the clamp nut and braid retention coil over the braiding. Ease the braiding along the outer insulation a sufficient distance to allow the gland, gland housing and tapered sleeve to be slid over the outer insulation. Push the individual cores through the appropriate holes in the rear of the grommet as far as possible.



The plug or socket should be placed in some form of holding device so that the contact wire wells are towards the operator with the cut-away portions uppermost. The holding device may be a mating shell but if it is a vice the vice jaws should be suitably covered to protect the shell being operated on. If the solder buckets are not filled with solder this should be carried out. Insert the conductor into the solder buckets singly applying heat and solder as required.

Slide the grommet over the soldered contacts pressing it firmly into the shell against the rear face of the insert. Slide up tapered sleeve and gland housing and screw latter tightly into the shell. Push gland into gland housing. Fray out the braiding easing it along the cable to within a short distance of the gland. Thrust the out-turned end of the braid retention coil along the frayed out braiding and rotate it counter clockwise until the out-turned end fits into a slot in the gland. Trim off surplus braiding.



Bring up clamp nut over gland and braid retention coil and screw the clamp nut up finger tight only.

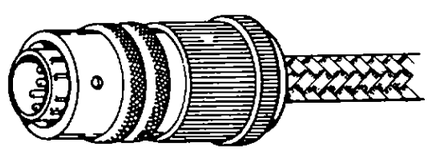
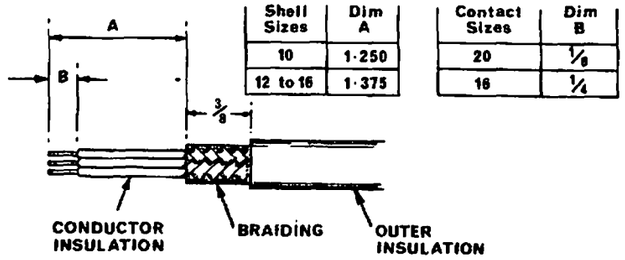
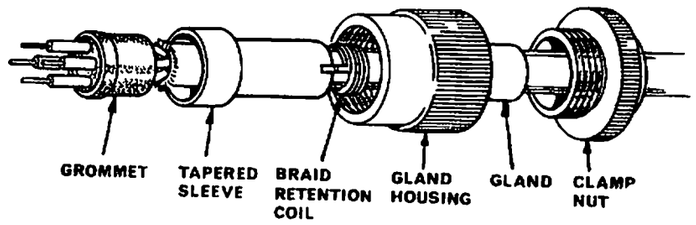


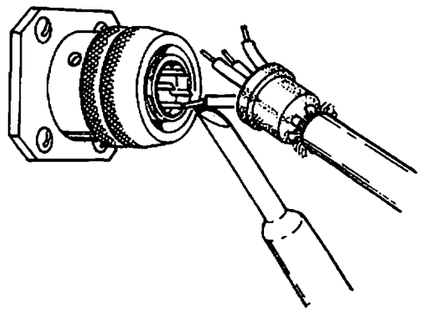
Fig 39 – DEF STAN type B cable assembly instructions

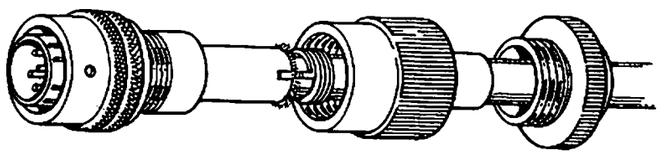


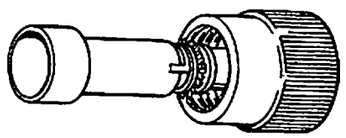
Shell Sizes	Dim A
10	1·250
12 to 16	1·375

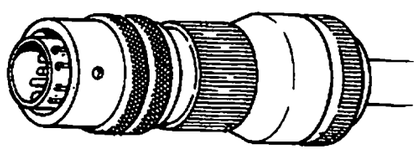
Contact Sizes	Dim B
20	1/8
16	1/4











Strip back outer insulation braiding and conductor insulation to dimensions shown. After ascertaining that the conductors are clean, tin half the stripped length using a good grade of resin cored solder. Tinning should be confined to the ends of the conductors to keep them flexible.

Slide the clamp nut, gland, gland housing, braid retention coil and tapered sleeve over the outer insulation. Fray out the braiding back to the outer insulation. Push the individual cores through the appropriate holes in the rear of the grommet as far as possible.

The plug or socket should be placed in some form of holding device so that the contact wire wells are towards the operator with the cut-away portions uppermost. The holding device may be a mating shell, but if it is a vice, the vice jaws should be suitably covered to protect the shell being operated on. If the solder buckets are not filled with solder this should be carried out. Insert the conductors into the solder buckets singly and apply heat and solder as required.

Push grommet over the soldered contacts pressing it firmly against the back face of the insert. Comb out the exposed braiding and slide the tapered sleeve over the braiding until it presses against the grommet. Hook the braiding out from within the tapered sleeve and form it into a 'collar'. Slide the braid retention coil along the braid and thrust the turned out end through the 'collar'. Rotate the braid retention coil counter-clockwise and fit the turned out end into the slot in the gland. Trim off surplus braiding.

Bring up the gland housing screwing it firmly into the shell. Slide the gland into the gland housing. Push forward and screw up the clamp nut finger tight.

Fig 40 - DEF STAN type C cable assembly instructions

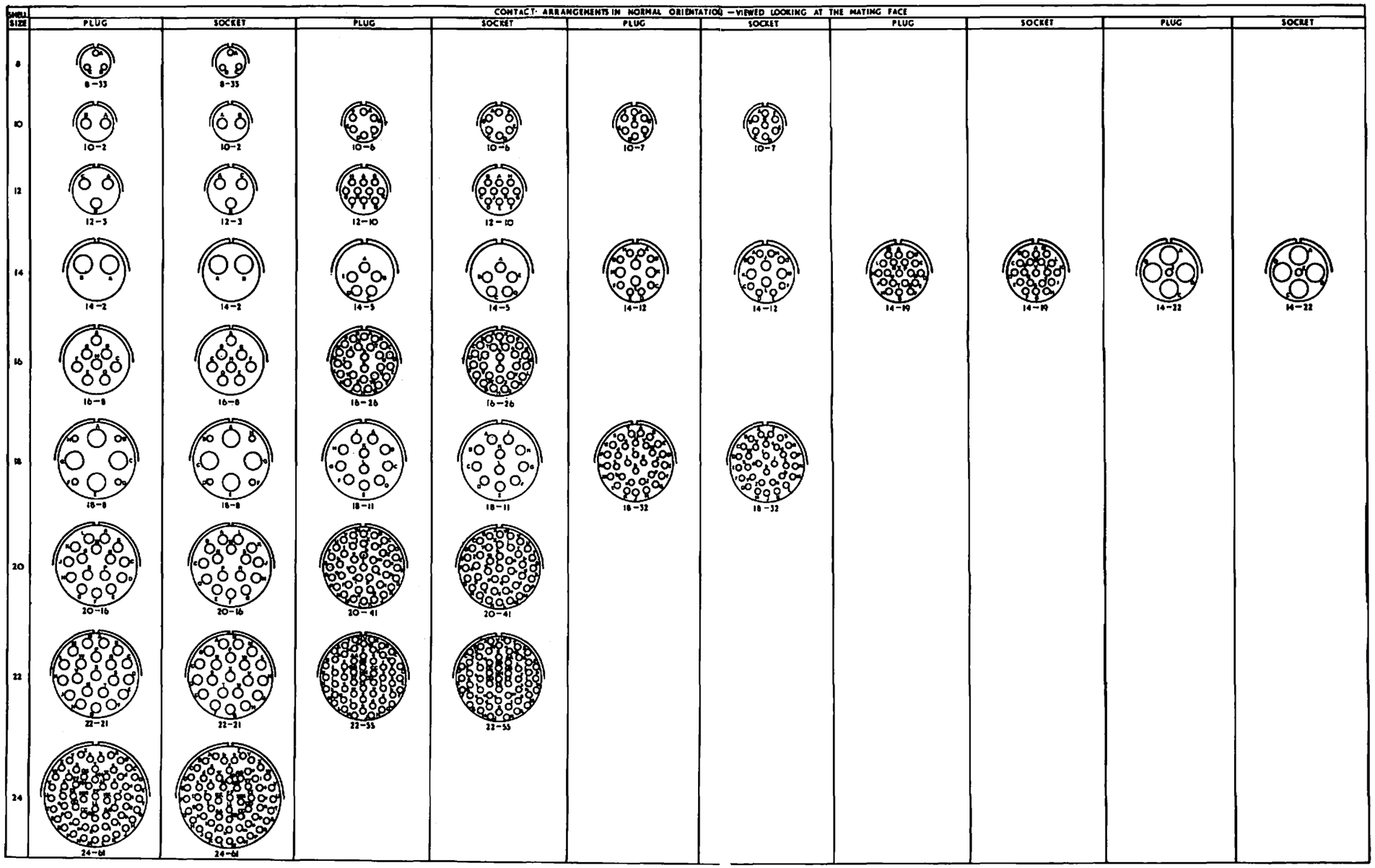


Fig 41 – Pattern 105 – Contact arrangements

PATTERN 106, 107 AND 108 PLUGS, SOCKETS AND JACKS

General

95. These plugs, sockets and jacks are unsealed, have soldered terminations and are designed for telephone and headset applications.

96. Pattern 106 consist of two contact plugs and sockets and are intended for headset use. They are capable of operating up to 150V d.c. and will carry a current of 2A at 70°C.

97. Pattern 107, are 3 and 4 contact plugs and jacks for audio-frequency application or inter-communication circuits and switch board operators head-sets. They will function satisfactorily with a current of up to 2A at 70°C and an applied voltage of 150V d.c.

98. Pattern 108 plugs and jacks are intended mainly for switchboards. The jacks are available with 3, 5 and 8 contacts, and are obtainable in single units or in strips of 10 or 20. They are suitable to carry 2A at 70°C and an applied voltage of 250V d.c.

Style references

99. The style references are abbreviations to identify individual plugs, jacks and sockets. A typical style reference is:

Function	Pattern number	Type	Number of contacts
P	106	A	3

where

Function letter - P = plug: J = plug: S = socket:

Pattern number - 106, 107 or 108 as applicable.

Type - indicates a variation within the range see Figs 42, 43 and 44

Number of contacts - indicates the number of contacts as appropriate.

Shell material colours

100. Where a letter follows the contact figure, this denotes the colour of the shell material, ie:

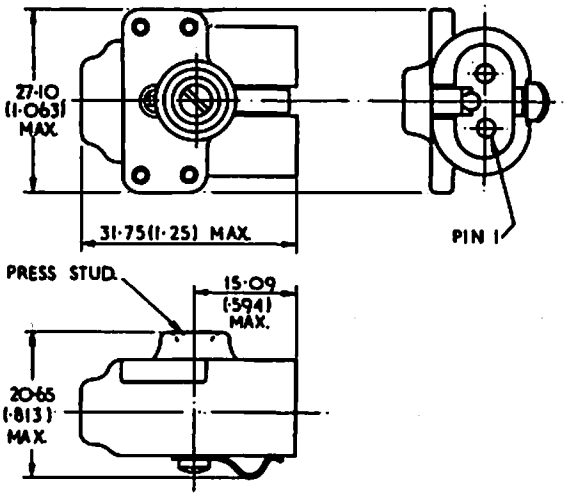
B - Black; R - Red; G - Grey.

Mating

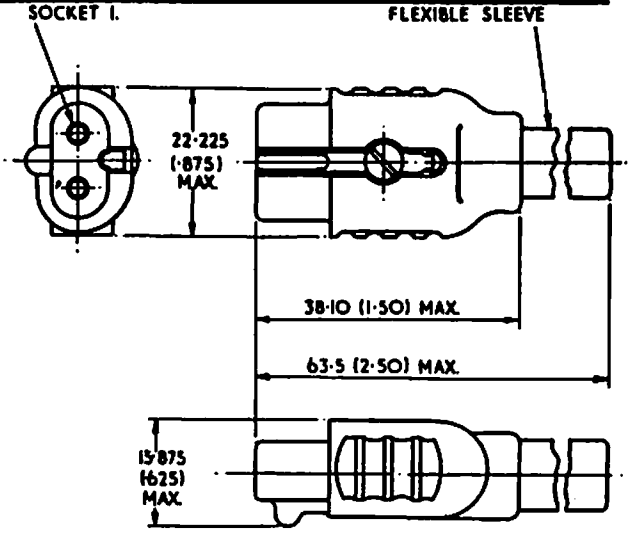
101. A list of mating items is given in Table 9

Table 9 - Pattern 106, 107, 108 - Plugs and mating items

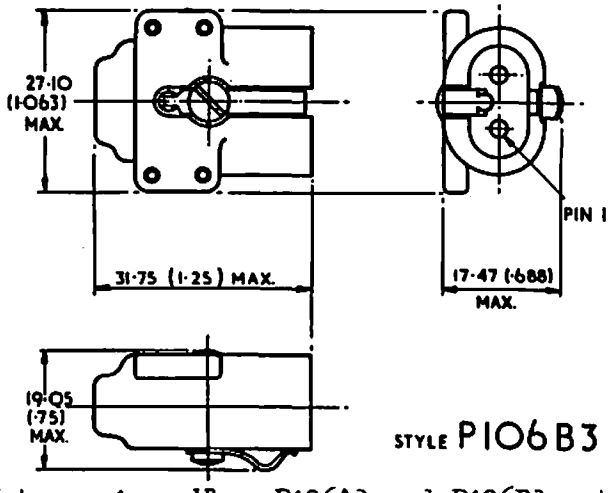
Pattern 106		Pattern 107		Pattern 108	
Style	(Mating item)	Style	(Mating item)	Style	(Mating item)
P106A3 P106B3	S106C3 S106C3	P107A4 P107C4 P107E4	J107B4 J107D4 J107F4	P108A3	J108B3 J108B5 J108B8 J108C3 J108C5 J108C8 J108D3 J108D5



STYLE P106A3



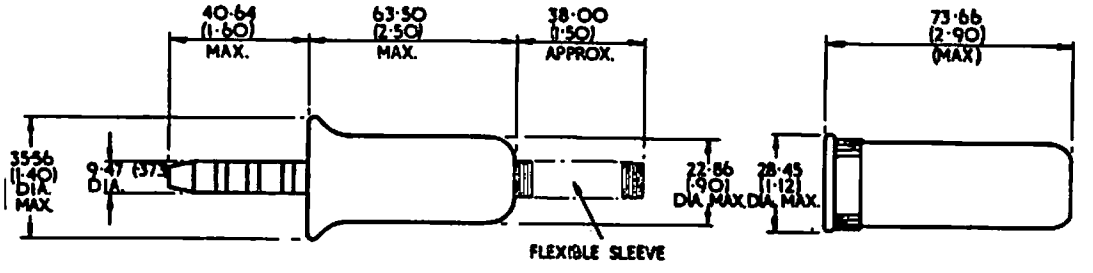
STYLE S106C3



STYLE P106B3

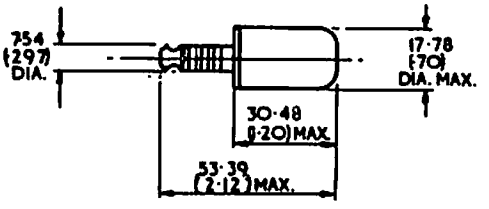
Notes: 1. When P106A3 and P106B3 mate with S106C3 pin 1 mates with socket 2.
2. Dimensions are in millimetres with the original inch dimensions shown in brackets.

Fig 42 - Pattern 106 - Plugs and sockets

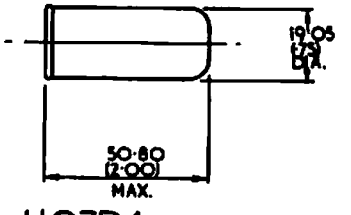


STYLE P107A4

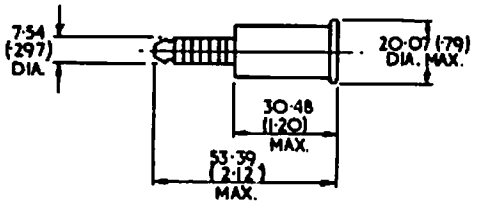
STYLE J107B4



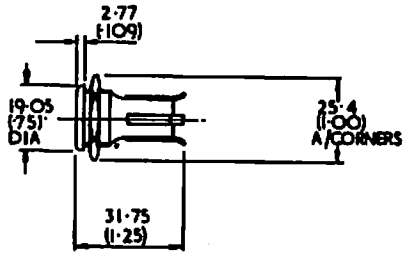
STYLE P107C4



STYLE J107D4



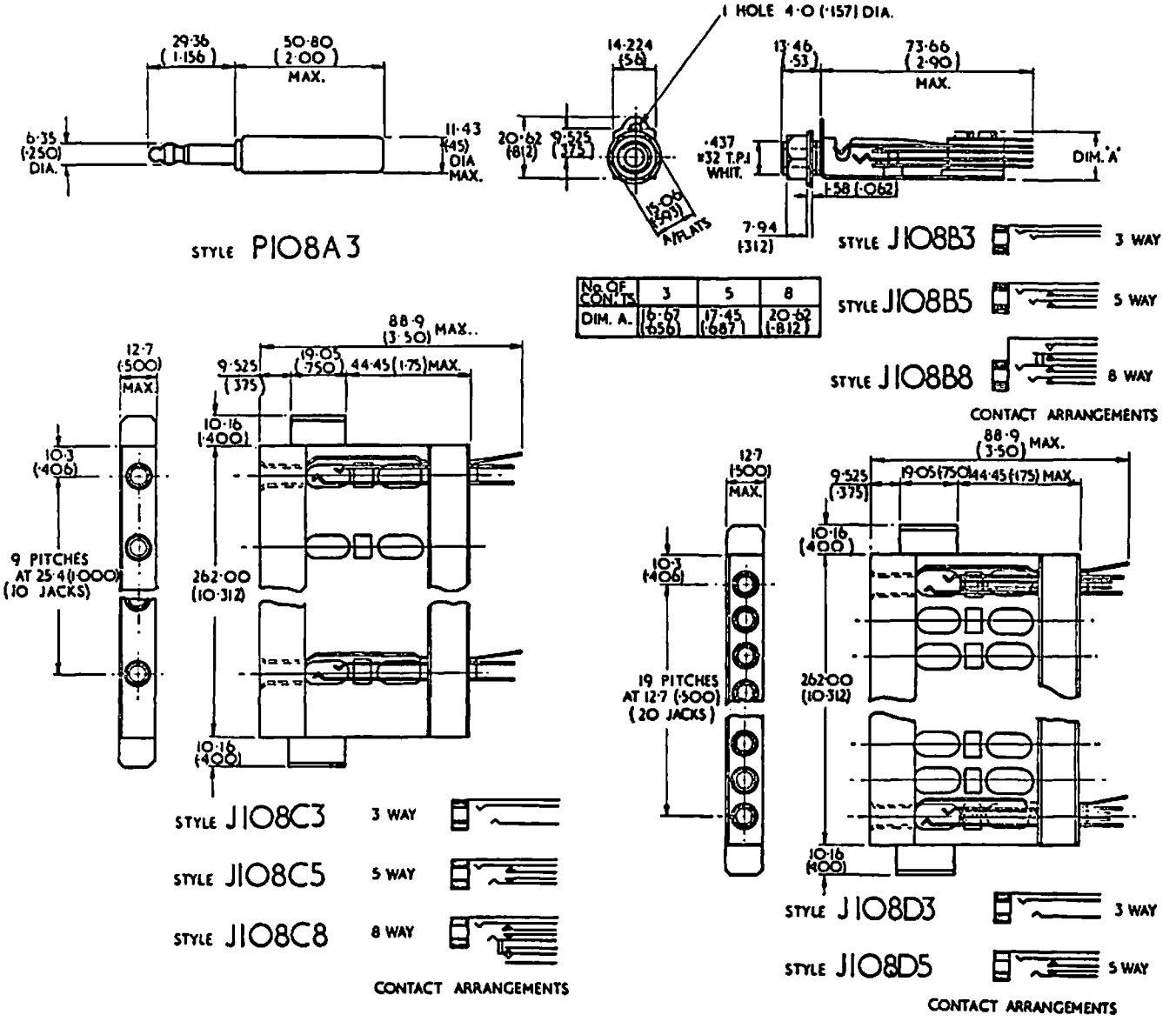
STYLE P107E4



STYLE J107F4

Notes: 1. P107E4 and J107F4 are suitable for use on switchboard operator's headsets only.
2. Dimensions are in millimetres with original inch dimensions shown in brackets

Fig 43 - Pattern 107 - Plugs and jacks



Note: Dimensions are in millimetres with original inch dimensions shown in brackets.

Fig 44 - Pattern 108 - Plugs and jacks

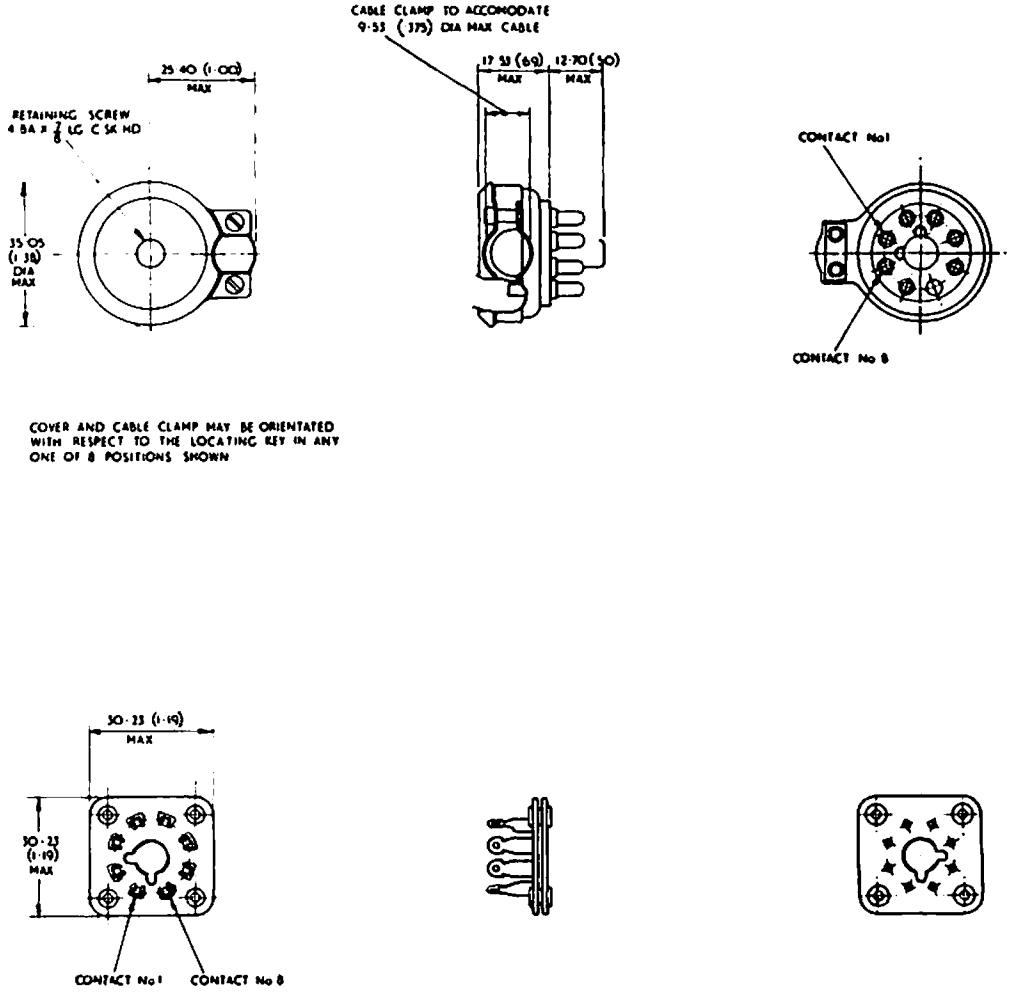
PATTERN 112 PLUGS AND SOCKETS

General

102. This range is provided for use with primary batteries, they are unsealed and have eight soldered connections. Two types are available pattern 112A and 112B. They are not interchangeable as the keyways are dissimilar in shape which may prevent cross-plugging where two sockets are mounted in close proximity. The differences are shown in Figs 45 and 46.

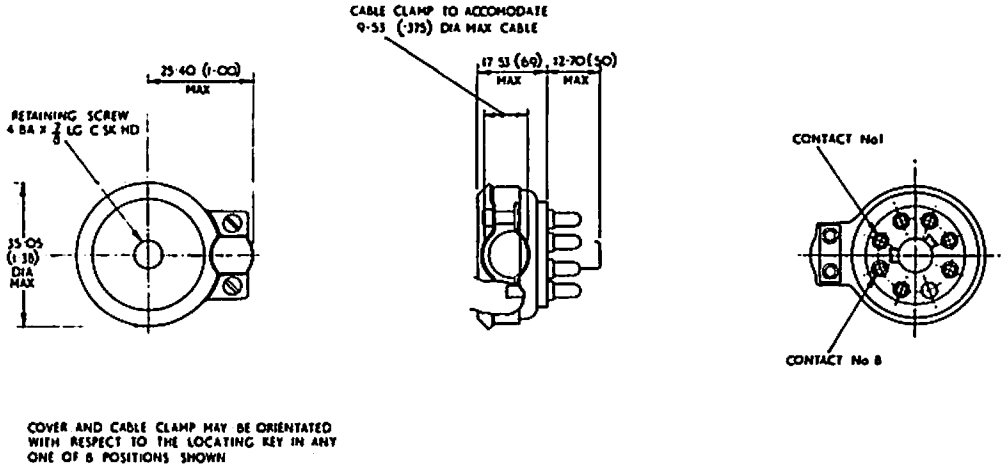
Working conditions

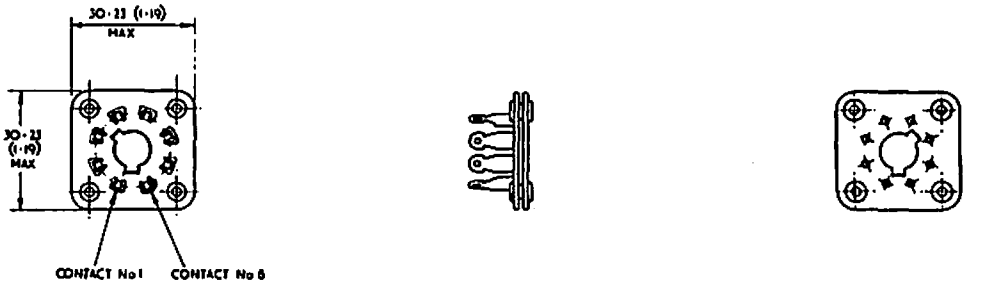
103. The working voltage at sea level is 500 volts each contact capable of carrying 5 amps at 85°C with a maximum of 12 amps per plug or socket. They can be operated over the temperature range of -55°C to +85°C.



NOTE DIMENSIONS ARE IN MILLIMETRES WITH ORIGINAL INCH DIMENSIONS SHOWN IN BRACKETS

Fig 45 - Pattern 112A, plugs and sockets





NOTE DIMENSIONS ARE IN MILLIMETRES WITH ORIGINAL INCH DIMENSIONS SHOWN IN BRACKETS

Fig 46 – Pattern 112B plugs and sockets

PATTERN 121 PLUGS AND SOCKETS

General

104. This range of plugs and sockets has threaded coupling aluminium shells with solder type contacts bonded into resilient inserts, Coupling nuts are captive but may be removed from the front. This feature obviates disturbance of the conductors when replacing a damaged coupling nut.

Shells

105. Shell sizes range from size No 10 SL to 36. The shell number is the size of the coupling nut threads in sixteenths of an inch ie a No 12 shell has a coupling thread of 3/4 in. diameter. The other thread on the shell(if provided) is termed the fitting thread and is used for accommodating cable outlet ancillaries.

106. Shells below size 18 are provided in more than one version, certain sizes have the letters S or SL following the shell size number. The letter S following the shell number indicates a shortened design, where among other changes, the coupling thread and shell lengths are shorter eg,

> a size 16 shell thread length is 0.625 in. and the total length is 1.843 in. and a size 16S shell thread length is 0.450 in. and the total length is 1.468 in.

107. The letters SL following a shell size number denotes a limited availability ie only NORMAL orientation is provided. In the 5MS series of plugs and sockets pin contacts are available only in the fixed unit and socket contacts only in the free unit if the shell size 10SL.

Inserts

108. Inserts have between 1 and 47 contacts with differing contact arrangements as shown in Fig 47 and listed in table 10. The contact arrangement may appear to indicate the shell size followed by the number of contacts but this must not be taken as a general rule.

Orientation

109. Orientation is effected by setting the insert relative to the shell. Five orientations are possible but are not all provided in all shells. The angular position of the insert relative to the shell is fixed during manufacture. No attempt shall be made to alter these settings as this would destroy the sealing between the shell and insert.

110. When looking at the mating face the plug inserts are rotated clockwise to provide the orientation W, X, Y and Z. Socket inserts are rotated counter-clockwise through the corresponding angles. Insert orientation for the various shell sizes is given in table 10.

Style references

111. The style references are abbreviations used to identify plug and socket variants. A typical style reference for this type of plug and socket is CC 1331 - 14S - 2PX which denotes

Control Drawing No	Shell Size	Contact Arrangement	Contact	Orientation
CC/C1331	14S	2	P	X

Coding

Shell size	10SL; 12S; 14 etc
Contact arrangement	1, 2, 3, 4 etc
Contact	P denotes pin. S denotes socket.
Orientation	W, X, Y, Z (where orientation is NORMAL the suffix letter is omitted)

Table 10 - Pattern 121, insert orientation, contact arrangements and sizes

Shell Size	Contact Arrangements	Number of Contacts	Contact Size	Insert Orientation
10SL	4	2	16	N
10SL	3	3	16	N
12S	3	2	16	N,W,X,Y,Z
14S	4	1	16	N
14S	9	2	16	N,W,X,Y,Z
14S	7	3	16	N,W,X,Y
14S	2	4	16	N,X,Y
14S	5	5	16	N,X
14S	6	6	16	N
16S	1	7	16	N,W,Z
16	10	3	12	N,W,X,Y
16	9	2	12	N,W,X,Y,Z
		2	16	
18	11	5	12	N,X,Y
18	1	10	16	N
20	14	2	8	N,W,X,Y,X
		3	12	
20	22	3	8	N,W,X,Y,Z
		3	16	
20	15	7	12	N,W,Z
20	18	3	12	N,W,X,Y,Z
		6	16	
20	29	17	16	N,W,Z
22	22	4	8	N,X,Y
22	23	8	12	N,W,Y
22	18	8	16	N,W,X,Y,Z
22	19	14	14	N,W,X,Y,Z
22	14	19	16	N,W,Z
24	12	2	4	N,W,X,Y,Z
		3	12	
24	11	3	8	N,W,X,Y,Z
		6	12	
24	7	2	12	N,W,X,Y,Z
		14	16	
24	28	24	16	N,W,X,Y,Z

Table 10 - (cont)

Shell Size	Contact Arrangement	Number of Contacts	Contact Size	Insert Orientation
28	22	3 3	4 16	N,W,X,Y,Z
28	10	2 2 3	4 8 12	N,W,X,Y,Z
28	20	10 4	12 16	N,W,X,Y,Z
28	11	4 18	12 16	N,W,X,Y,Z
28	21	37	16	N,W,X,Y,Z
32	6	2 3 2 16	4 8 12 16	N,W,X,Y,Z
32	7	7 28	12 16	N,W,X,Y,Z
36	7	7 40	12 16	N,W,X,Y,Z

PATTERN 123 PLUGS AND SOCKETS

General

112. A range of plugs and sockets provided mainly for power application on mobile, portable and transportable equipments. They are multicontact, circular barrier sealed with resilent inserts and have bonded-in solder type contacts. They conform to IEE regulations in that the earth contact makes before and breaks after all other contacts.

113. The outer nylon casings reduce weight and help to eliminate electric shock hazard. They may be either a male threaded member or a female threaded member each of which may have either a pin contact insert or a socket contact insert fitted.

Shell sizes and markings

114. The shell sizes do not conform to the normal shell size numbers. The nominal outside diameters of the coupling threads on the male threaded numbers are as follows:

Shell size	Thread diameter
36	2.3/4 ins.
28	2.1/8 ins.
22	1.3/4 ins.
18	1.1/2 ins.

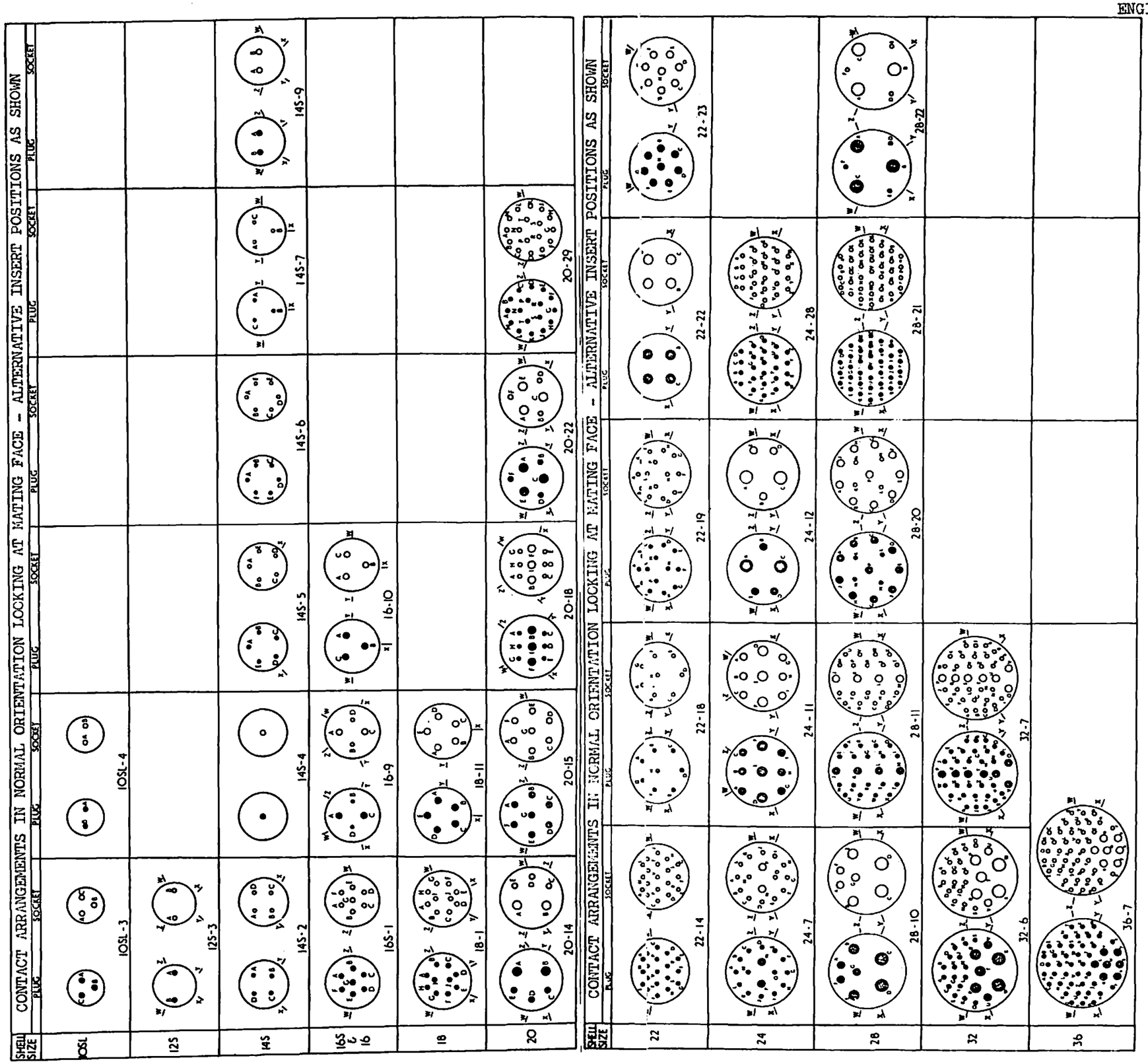


Fig 47 – Pattern 121 plug and socket contact arrangements

115. The identification letters of the contacts on the inserts follow the normal practice ie the plug or socket is the mirror image of the other. The master key M is accommodated in the female threaded member, and the master keyway M is provided on the male threaded member. In addition to the main key, four slots are housed in the inner shell of the female threaded member and four corresponding slots are furnished in the outer shell of the male threaded member for orientation purposes. It should be noted that the numbering sequence of the slots in both cases are identical, see Fig 48.

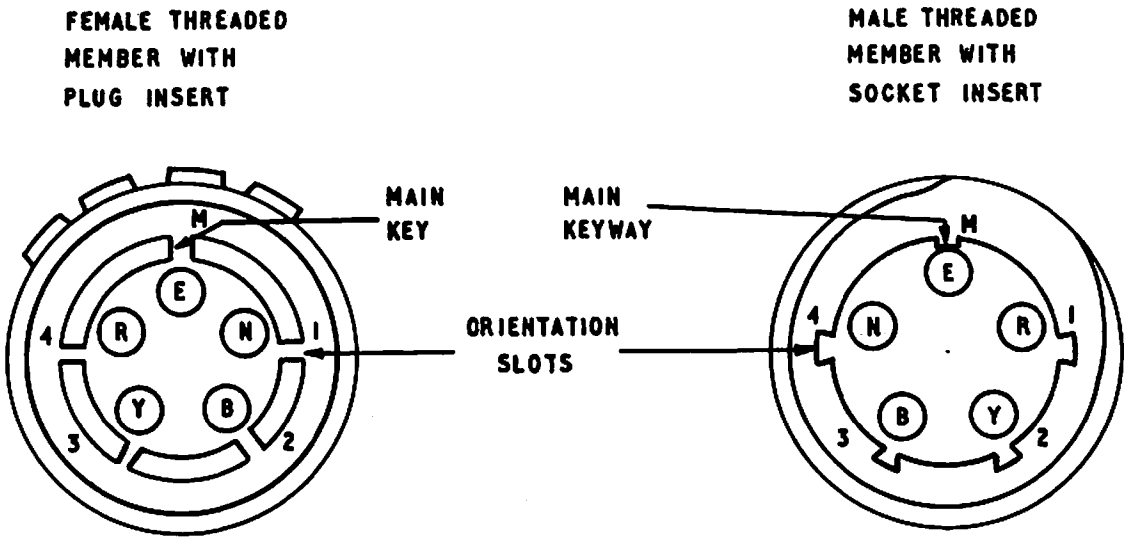


Fig 48 - Pattern 123 - Shell outlines, inserts and orientation slots

Polarizing keys and stops

116. Two polarising keys are fitted to the inner shell of the female threaded member (plug or socket) and two stops are fitted in the slots not accepting a corresponding key in the outer shell of the male threaded member (plug or socket). It is important that both keys and stops are fitted before any attempt is made to mate the shells. The six shell orientations available are:-

1/2, 1/3, 1/4, 2/3, 2/4 and 3/4 and are identified with the power supplies.

CONTACT ALLOCATIONS

117. 5 and 6 contact plugs and sockets

Orientation	Voltage	Supply	Frequency
1/2	415	3 phase	50 Hz
1/3	200	3 phase	50 Hz
1/4	SPARE POSITION		
2/3	200	3 phase	400 Hz ø
2/4	200	3 phase	400 Hz øø
3/4	SPARE POSITION		

Note: ø Normal position for use on 3 phase 400 Hz supply.
øø Only to be used for special requirement when for safety purposes one piece of equipment is to be operated through another.

118. 3 contact plugs and sockets

Orientation	Voltage	Supply	Frequency
1/2	240	Single phase	50 Hz
1/3	110	Single phase	50 Hz
1/4	50	Single phase	50 Hz
2/3	120	Single phase	400 Hz
2/4	SPARE POSITION		
3/4	-	d.c.	-

Orientation and contact allocations

119. Arrangement of orientation keys and stops in the shells relative to the supplies are shown in Fig 49. The orientation numbers indicate that these slots are clear in the male threaded members at the supply output and equipment input ends. Remaining contact allocations shall be generally in accordance with the mandatory requirements of Chapter 105 of this EMER.

Shell sizes and contact arrangements

120. The contact sizes and arrangements against the various shell size numbers are listed in Table 11 and shown in Fig 50.

Style references

121. The style references are abbreviations to identify individual plug and socket variants. A typical style reference is CC/C 1540-28-10P this indicates

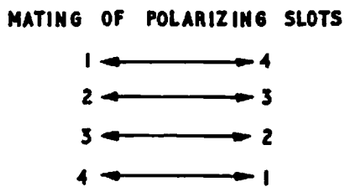
Control drawing number	Shell size	Contact arrangement	Contact
CC/C 1540	28	10	P

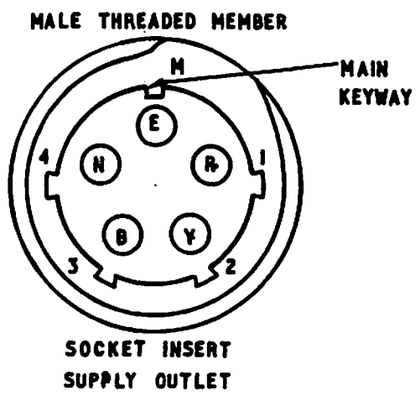
Coding:

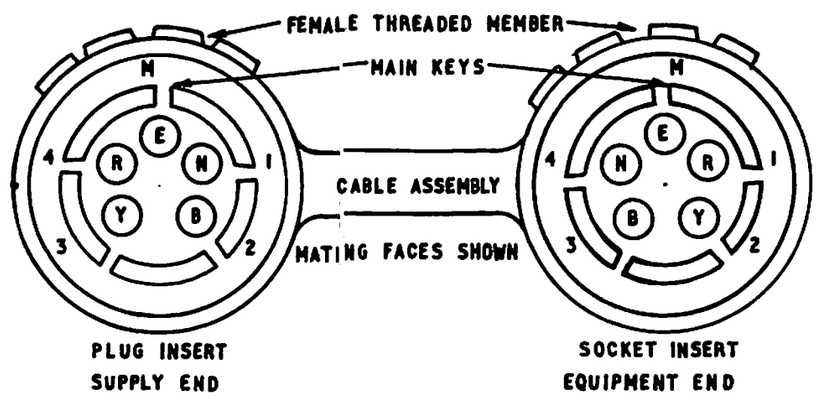
CC/C	Control drawing number
Shell size	18, 22, 28, 36
Contact arrangements	1, 2, 4 or PD 1 etc as in Fig 50
Contact	P = pin, S = socket.

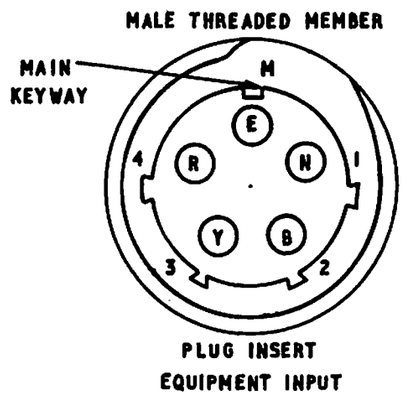
Table 11 - Pattern 123 Contact arrangements sizes

Shell Size	Contact Arrangement	Number of Contacts	Contact Size	Voltage d.c. or a.c.	Rating Peak
18	21	3	12	750	
18	12	6	16	750	
18	11	5	12	750	
18	1	10	16	500	
22	2	3	8	750	
22	22	4	8	750	
22	PD1	5	12	750	
22	18	8	16	750	
22	23	8	12	750	
22	19	14	16	500	
22	14	19	16	500	
28	6	3	4	750	
28	PD2	5	8	750	
28	22	3	4	750	
		3	16		
28	10	2	4	750	
		2	8		
		3	12		
28	20	10	12	750	
		4	16		
28	11	4	12	500	
		18	16		
28	12	26	16	500	
28	21	37	16	500	
36	4	3	0	750	
36	PD3	5	4	750	
36	PD4	4	4	750	
		2	12		
36	7	7	12	500	
		40	16		









5 PIN PLUGS AND SOCKETS Power supply			ORIENTATION	SUPPLY SOCKET SLOTS	CABLE PLUG SLOTS	CABLE SOCKET SLOTS	EQUIPMENT PLUG SLOTS
415V	3 Phase	50 Hz	1/2	1/2 clear 3/4 stopped	1/2 clear 3/4 keyed	1/2 clear 3/4 keyed	1/2 clear 3/4 stopped
200V	3 Phase	50 Hz	1/3	1/3 clear 2/4 stopped	1/3 clear 2/4 keyed	1/3 clear 2/4 keyed	1/3 clear 2/4 stopped
	SPARE		1/4	1/4 clear 2/3 stopped	1/4 keyed 2/3 clear	1/4 keyed 2/3 clear	1/4 clear 2/3 stopped
200V	3 Phase	400 Hz	2/3 ø	2/3 clear 1/4 stopped	2/3 keyed 1/4 clear	2/3 keyed 1/4 clear	2/3 clear 1/4 stopped
200V	3 Phase	400 Hz	2/4 øø	2/4 clear 1/3 stopped	2/4 clear 1/3 keyed	2/4 clear 1/3 keyed	2/4 clear 1/3 stopped
	SPARE		3/4	3/4 clear 1/2 stopped	3/4 clear 1/2 keyed	3/4 clear 1/2 keyed	3/4 clear 1/2 stopped
3 PIN PLUGS AND SOCKETS Power supply							
240V	1 Phase	50 Hz	1/2	1/2 clear 3/4 stopped	1/2 clear 3/4 keyed	1/2 clear 3/4 keyed	1/2 clear 3/4 stopped
110V	1 Phase	50 Hz	1/3	1/3 clear 2/4 stopped	1/3 clear 2/4 keyed	1/3 clear 2/4 keyed	1/3 clear 2/4 stopped
50V	1 Phase	50 Hz	1/4	1/4 clear 2/3 stopped	1/4 keyed 2/3 clear	1/4 keyed 2/3 clear	1/4 clear 2/3 stopped
120V	1 Phase	400 Hz	2/3	2/3 clear 1/4 stopped	2/3 keyed 1/4 clear	2/3 keyed 1/4 clear	2/3 clear 1/4 stopped
	SPARE		2/4	2/4 clear 1/3 stopped	2/4 clear 1/3 keyed	2/4 clear 1/3 keyed	2/4 clear 1/3 stopped
	d.c.		3/4	3/4 clear 1/2 stopped	3/4 clear 1/2 keyed	3/4 clear 1/2 keyed	3/4 clear 1/2 stopped

Note: ø Normal position for use on 3 phase 400 Hz supply. øø Only to be used for special requirement when for safety purposes one piece of equipment is to be operated through another.

Fig 49 - Pattern 123 PLUGS AND SOCKETS - Orientation relative to supplies

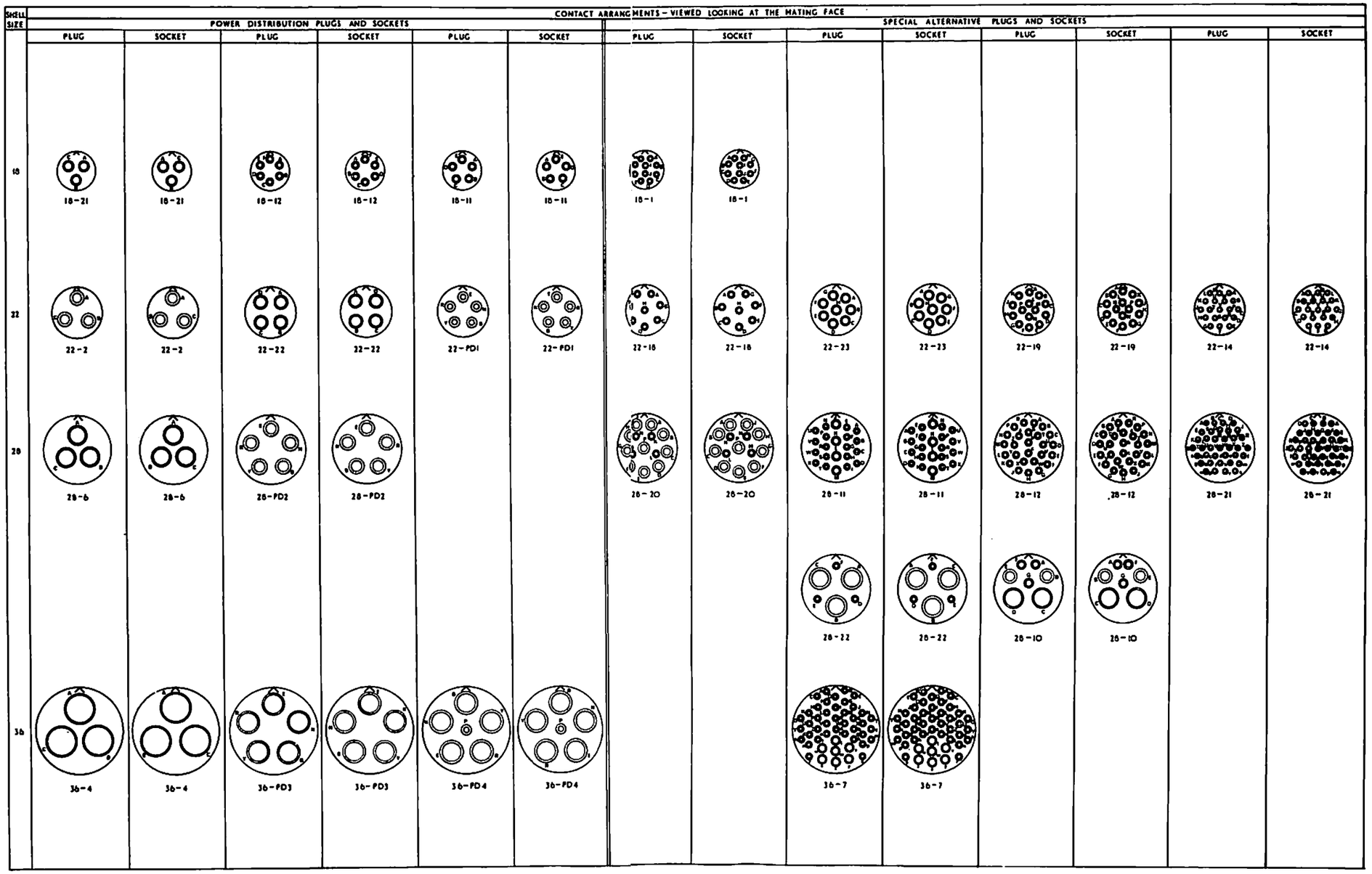


Fig 50 – Patten 123 contact arrangements

PATTERN 602 PLUGS AND SOCKETS

General

122. This is a range of general purpose miniature bayonet coupling plugs and sockets introduced to improve plug and socket reliability and to reduce logistic and maintenance problems. The range is intermateable with patterns 105 and 603 plugs and sockets. In addition they can be used as replacements for the proprietary (Hellerman Deutsch) 460 series which is being fitted as the interim MOD standard pending the availability of pattern 602.

Styles and contacts

123. Six styles are available, three having soldered contacts bonded into the insert, the others having removable crimped contacts. The contacts are of three types:-

1. Type A, removable, crimped.

2. Type B, fixed, soldered, copper alloy.

3. Type C, fixed, soldered, ferrous alloy.

124. The styles available in the pattern 602 range are:-

6020 Fixed, square flange, type A, crimped contacts.
6021H Fixed, solder mount, type C, soldered contacts.
6022 Fixed, square flange, type B, soldered contacts.
6026 Free, type A, crimped contacts.
6027 Fixed, jam nut mounted, type C, soldered contacts.
6027H Fixed, jam nut mounted, type C, soldered contacts.

H denotes hermetic sealing.

Shells

125. Shells are provided in 9 sizes consisting of the even numbers between 8 and 24 inclusive and in two ranges

a. Standard range.

b. Maintenance range.

126. In the latter range only 7 sizes are available as sizes 18 and 22 are omitted. Both ranges along with the contacts and contact arrangements are listed in Tables 12 and 13 and shown in Fig 52.

Orientation

127. Two methods of orientation are used as laid down for Pattern 105 plugs and sockets and given in Tables 7 and 8:

1. "Preferred" - for all new designs this is the shell orientation. The keys/keyways are identified by the letters N,B,C, E or F. Additionally early UK keying denoted by A and D will be required.

2. "Permissible" - for maintenance purposes and is achieved by the insert being set to positions N, W, X, Y or Z during manufacture.

Note: The 'Normals' of the UK and US systems are identical and account for some 85% of all types used.

Contact position identification

128. An alternative system of contact position identification is shown in Fig 51. Contact positions are identified by numbers but NO numbers are marked upon the inserts. Instead, both front and rear faces of inserts shall be marked by the system shown. In this system an arrow indicates clearly No 1 contact and the direction of count. When the count proceeds from one ring of contacts to an inner ring, a short line joins the last contact of the outer ring to the first contact of the next ring. Additionally, a circle is marked around each 10th contact to facilitate the count. Thus to identify the 53rd contact in the Figure, the count would be 10, 20, 30, 40, 50, 51, 52, 53. The sequence of numbers shall follow exactly the sequence shown in the drawing.

Table 12 - Pattern 602 Contact sizes and arrangements (Standard range)

Shell Size	Contact Arrangement	Number of contacts	Contact Size
8	8-33	3	16
10	10-2*	2	16
10	10-6	6	20
12	12-3	3	16
12	12-10	10	20
14	14-5	5	16
14	14-12	4	16
		8	20
14	14-19	19	20
16	16-8	8	16
16	16-26	26	20
18	18-11	11	16
18	18-32	32	20
20	20-16	16	16
20	20-41	41	20
22	22-21	21	16
22	22-55	55	20
24	24-61	61	20

* This is a UK replacement only and is included as a replacement for the equivalent in patterns 105 and 603

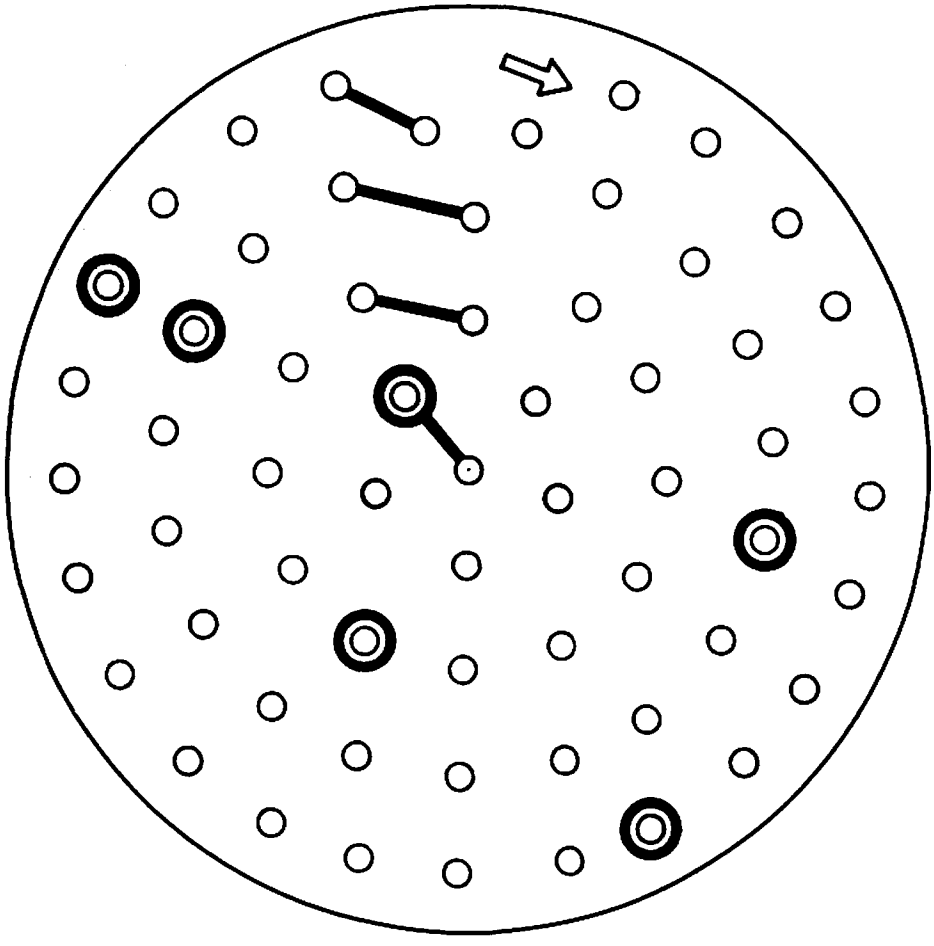


Fig 51 - Pattern 602 Contact position identification

Table 13 - Pattern 602 Contact sizes and arrangements (Maintenance range)

Shell Size	Contact Arrangement	Number of Contacts	Contact Size
8	8-3A	3	20
8	8-98	3	20
10	10-6A	6	20
10	10-98	6	20
12	12-8	8	20
12	12-10	10	20
14	14-15	1	16
		14	20
14	14-18	18	20
14	14-19	19	20
16	16-23	1	16
		22	20
20	20-39	2	16
		37	20
22	22-36	36	20
22	22-41	14	16
		27	20

PATTERN 603 PLUGS AND SOCKETS

General

129. This is a solderless contact version of the pattern 105 plugs and sockets with which it is mateable. Contacts are provided as loose items and the conductors are crimped into crimp barrels at the rear of the contacts by means of a crimping tool. The contacts are lodged into the pockets in the insert by means of an Insertion tool.

Shells and accessories

130. The shells are made from aluminium and the plug and socket is mated by means of a 3 pin bayonet coupling in common with the pattern 105. The accessories obtainable are the same as these available for the pattern 105.

Crimping

131. Crimping procedure details are to be found in Chap 121 of this EMER. A Crimping tool and an Insertion tool are shown in Fig 3. The contacts of pattern 602 plugs and sockets are closely defined and are interchangeable between manufacturers.

IDENTIFICATION OF PLUGS AND SOCKETS

Introduction

132. Difficulty may be experienced in identification of the wide range of plugs and sockets fitted in service equipment. A common coding system is used on plugs and sockets meeting U.S. military specifications such as MIL-C-5015D and MIL-C-26482 although most manufacturers have their own but similiar system of coding.

Coding examples

133. Two examples of this are laid out in Fig 53, a MS type is shown along with a manufacturers type of coding. It is emphasised that the contact arrangement does not always indicate the number of contacts employed and reference must be made to the relevant table for the plug and socket concerned.

Orientation coding

134. The orientation of a plug or socket may be given in either of two methods. The shell keyway orientation is indicated using the leading letters of the alphabet and the insert orientation is represented by the terminal letters of the alphabet. This is evident from the examples of manufacturers coding in Fig 53.

Connector Identification

135. Detailed information on connectors and their components is contained in:-

Register of Class Code 5935 - Plugs, sockets etc.

Chap 100 refers

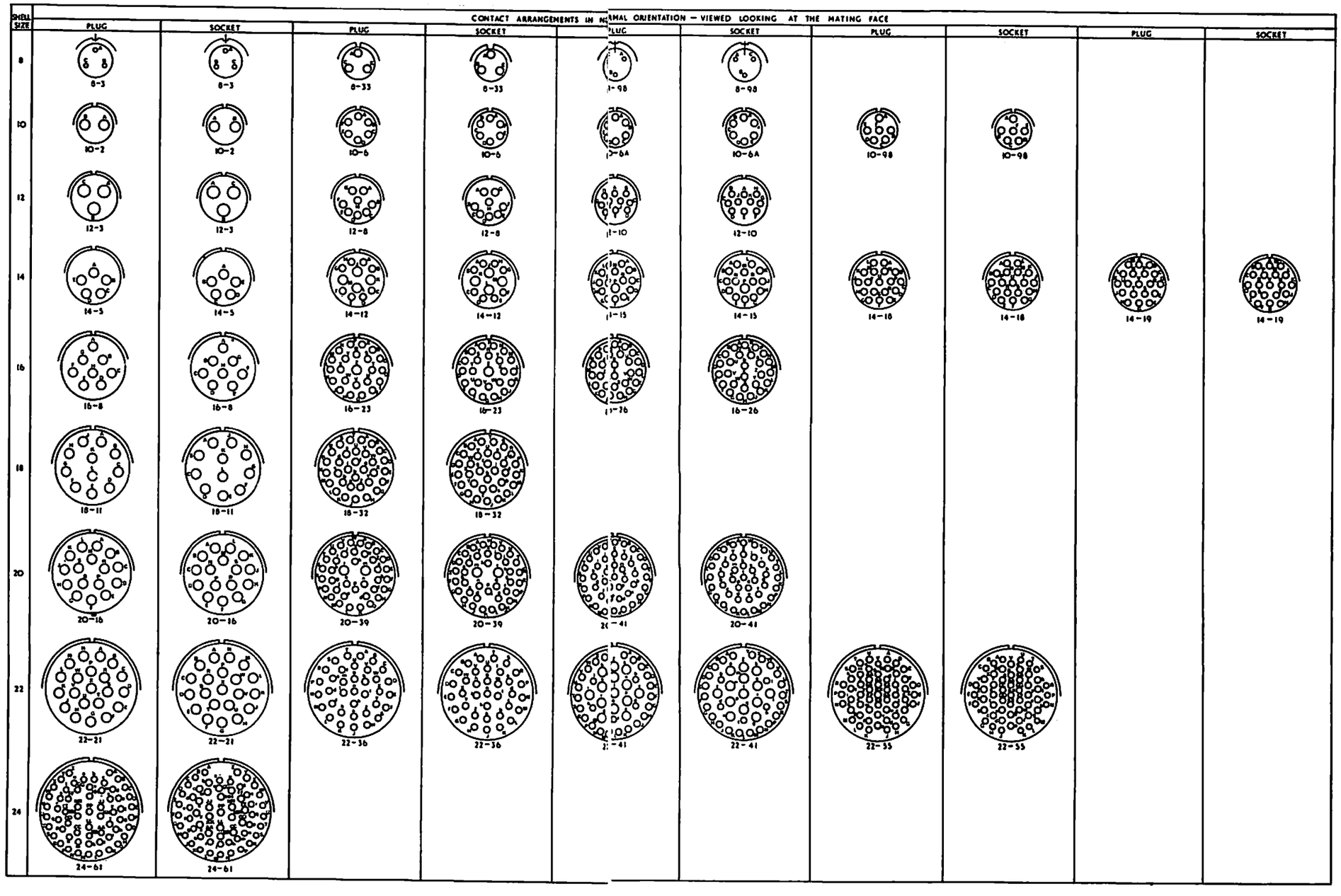
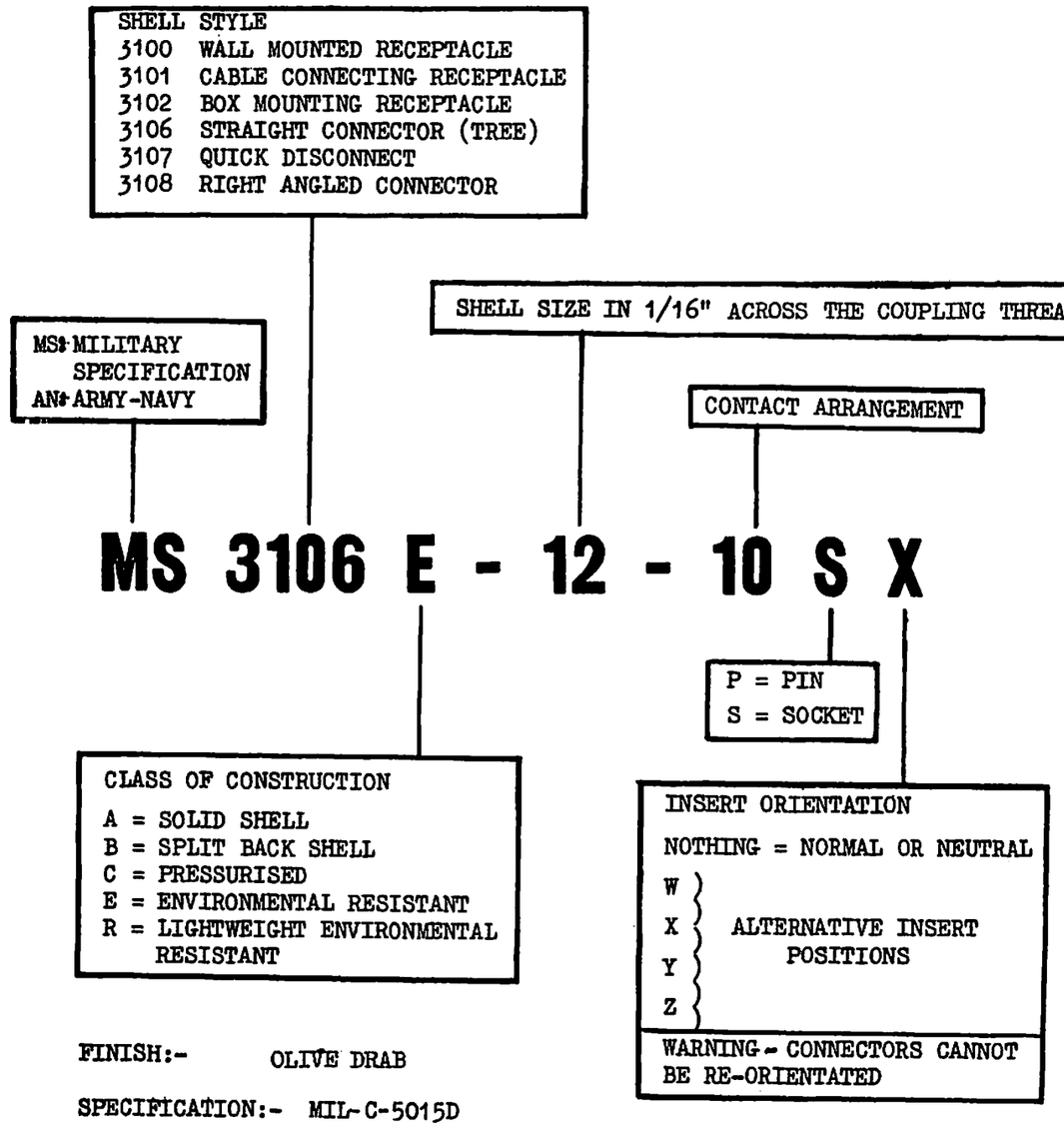
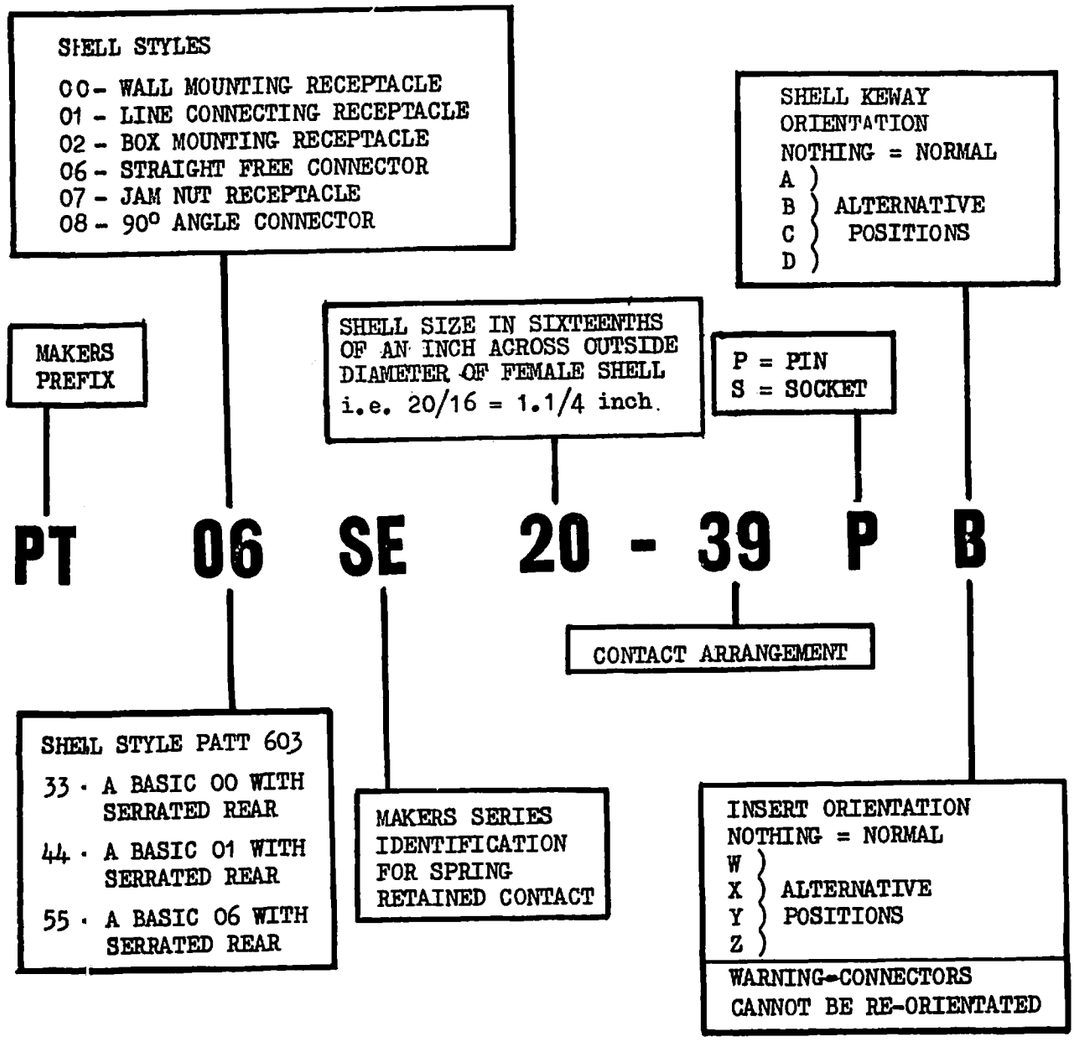


Fig 52 – Pattern 602 Contact arrangements and shell sizes



SCREW COUPLING SHELL
Service Coding



BAYONET COUPLING SHELL
Manufacturers coding

Fig 53 - Examples of coding plugs and sockets

END