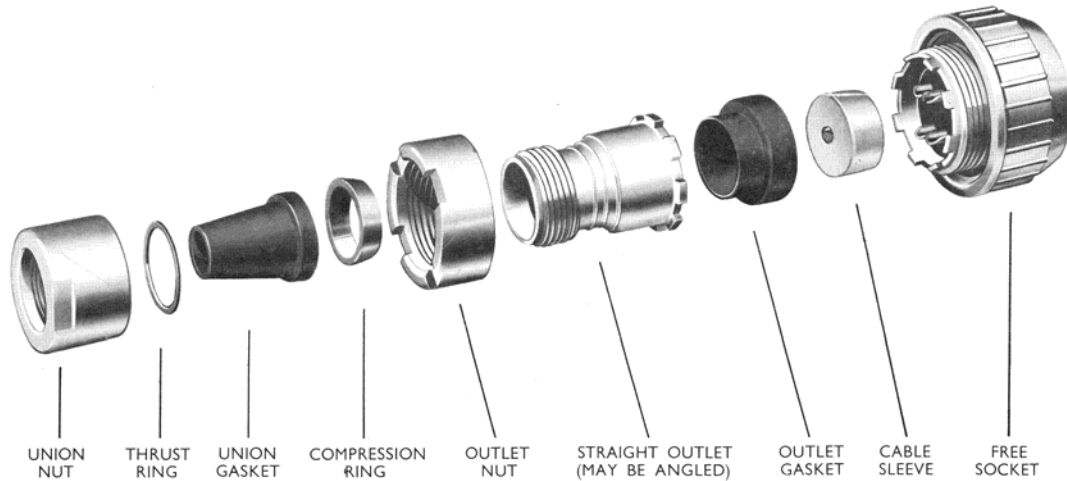


# Repurposing Plessey Mk 4 Connectors a Practical Guide



MARK 4 CONNECTORS  
COMPONENTS, COMPRISING THE FREE SOCKET TERMINATION  
IN THE ORDER IN WHICH THEY ARE PLACED ON THE CABLE

## Terminology

Throughout these notes, a connector that has pins is referred to as a plug and a connector that has receptacles to accept pins is referred to as a socket. A connector fitted to a cable is termed 'free' and a connector fitted to a piece of equipment is termed 'fixed'.

## Introduction

There are two basic types of Plessey Mk 4 connector:

**Mk 4A, fine thread**, these are manufactured in aluminium and are typically found on a variety of aircraft, Admiralty and 'Common Test' equipment.

**Mk 4B, course thread**, these are manufactured in brass and are the type used on British Army Larkspur era equipment.

Both of these two basic types have three shell sizes options:

Shell size one Up to 6 ways. Internal diameter of fixed connector 16 mm.  
Shell size two Up to 12 ways. Internal diameter of fixed connector 22 mm.  
Shell size three Up to 25 ways. Internal diameter of fixed connector 32 mm.



01) A selection of free connectors, showing examples of the three shell sizes in fine thread and a shell size one course thread connector.

## Rating

Current ratings of up to 60A are possible depending on pin size, but the most common connectors are rated at 5A with a pin size of 1.6 mm diameter and 19A with a pin size of 2.6 mm diameter.

For most connector configurations, the official voltage rating is now 250V DC or AC peak. In the past, the limit was set at 350V, although even this figure was often exceeded without untoward consequences.

The eighteen way connector is very useful for valve PSU applications. Pins A B C have a voltage rating of 1500V, pins Q R S are rated at 250V between each other but 1500V in respect to all other pins and the shell. The remaining twelve pins are rated at the standard 250V. All pins have a current rating of 5A, but could of course be paralleled for higher current loads.

## Orientation

The connector shells will only mate in one orientation. However the black plastic insert in which the pins are disposed may be rotated to slide into the shell in one of six positions. This feature enables connectors to be 'preset' to prevent incorrect connection when equipment has multiple connectors which would otherwise be identical.

### **Notes on disassembling and repurposing**

Special tools exist for disassembling the Mk 4. These are available from time to time second hand, but as the connectors are still in production (now called LMF connectors) they are also available new from the manufacturer. The double ended spanner for undoing the outlet nut and panel locking ring is undoubtedly the best tool for the job. However, it is possible to improvise a jig using an empty fixed connector shell that is of more use than the official 'bodyholder' tool. It will add stability when undoing the various fittings of a free connector and prove invaluable when unsoldering or wiring up.



02) An empty size three fixed shell clamped in an old lathe chuck and an empty size one fixed shell mounted on a steel plate are examples of improvised 'bodyholder' tools. Both will be found of more use than the official tool shown in the foreground.



**03) A Weald Electronics double-ended spanner undoing the outlet nut of a free connector held in the home brew jig.**

It will be appreciated from the forgoing that the inserts containing the pin clusters can be withdrawn from the shells of both fixed and free connectors. It is therefore possible to 'build' a Mk 4 of any required number of ways and gender, given a reasonable stock of surplus donor connectors.

The locking ring that retains the insert also serves to compress a neoprene component within the insert assembly, causing it to balloon out and form a watertight seal with the shell. Removal and replacement of the inserts will almost certainly compromise this seal. It must therefore be assumed that the connector will no longer remain waterproof following disassembly.

A pair of circlip pliers or similar, can be used to unscrew the locking ring. If it will not release, a kettle full of boiling water poured over the connector is pretty well guaranteed to free it up. Once the retaining ring is undone, the insert can be pushed out. It may be found that the neoprene seal is stuck to the inside of the shell and requires working free before the insert is finally ejected. Thoroughly dry any parts that got a soaking.



**04) Undoing the insert locking ring using a pair of narrow jaw pliers.**

### **Notes on assembly**

The connector must be assembled with the insert correctly orientated in the shell for it to mate with an existing connector. A projecting square lug on the inside of the shell engages with one of six slots moulded into the side of the insert. The standard orientation is termed position zero and is not marked on the insert, but the alternatives are marked 1 2 3 4 5. As these figures are on the mating face of the insert, they may be difficult to discern on a worn socket. Just to complicate matters, some are not marked at all. These inserts are of an earlier pattern with half round rather than square registration slots. If these inserts are to be used in later type shells, some careful work with a needle file is required to re-profile the registration lug.



05) Two 12 pin fixed sockets orientated in position one. The left hand connector shows the square locating lug visible at 10 o'clock corresponding to the figure 1 on the insert. The right hand connector is of the earlier pattern with a semicircular lug. This connector also features a panel locking ring that incorporates a threaded collar converting it from fine to course thread specification.

Rather than trying to orientate the insert by reference to the correct indexing number, perhaps the easiest method is to fit the empty shell into the mating connector, then rotate the insert until it slides neatly in.

Some of these connectors may date back to the 1940s. When doing up the insert retaining ring, it should be born in mind that the neoprene sandwich has already been compressed for a considerable time. The locking ring should therefore only be nipped up enough to prevent it from loosening off.

### **Cable restraint**

The majority of surplus Mk 4 connectors have a plain union nut that has no flex grip. Originally intended for use with shielded cable, mechanical restraint was provided by folding the braided screen back over the compression ring on assembly. If the new application uses a flex without a screen, it is possible to leave out the compression ring and substitute a small cable tie tightened around the cable sheath. This will provide adequate mechanical restraint. Care is needed not to allow the flex to twist as

the union nut is tightened.



06) An improvised flex grip using a cable tie.

### **Use as a mains connector**

Three pin Mk 4 free sockets were often used as mains connectors on a variety of equipment: Racal's RA17 receiver, Common Test Equipment such as the CT160 valve tester and CT212 signal generator to name but a few. The Mk 4 is no longer approved as a mains connector as the earth connection is not guaranteed to be the last to remain in contact as the connector is withdrawn. With this in mind, unplug the other end first.

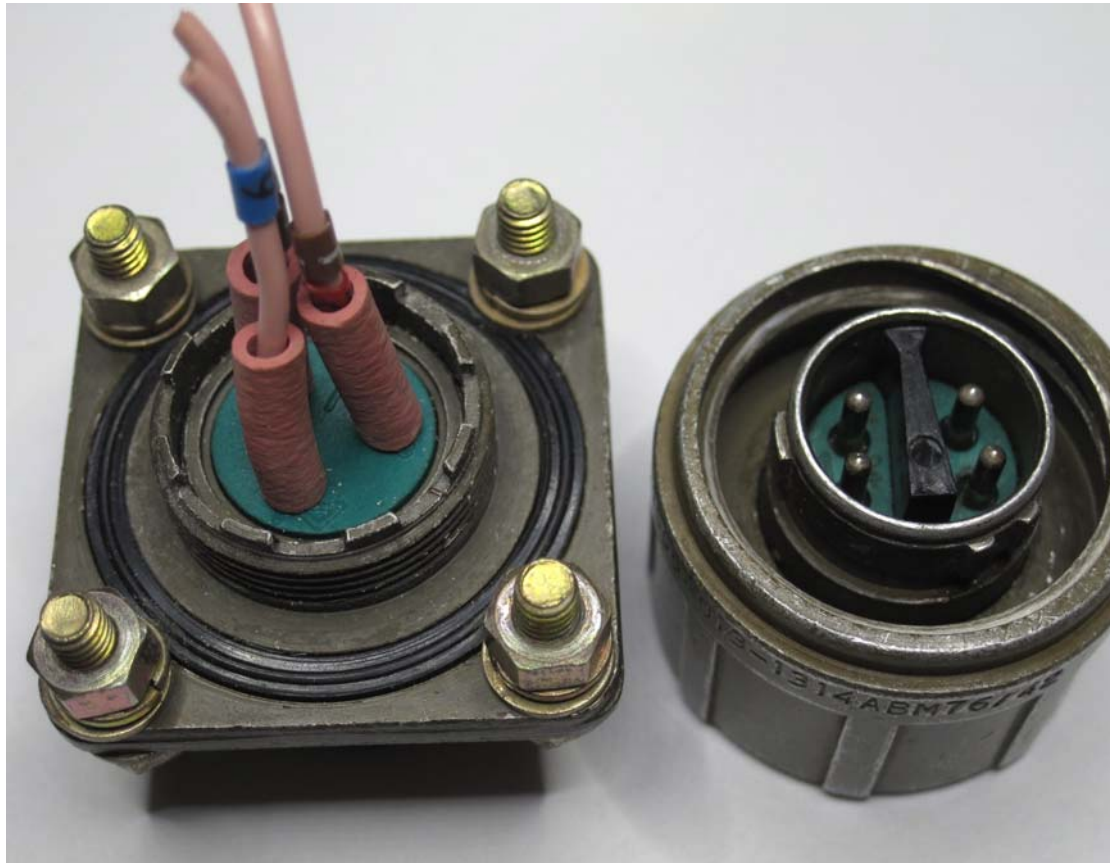
The situation can be mitigated by soldering a 'tail' to the earth contact and bring it out to connect to one of the flex grip clamp screws (if present). However it's still no substitute for isolating first before withdrawing the socket.

With all Common Test Equipment encountered to date, the Mk 4 insert is orientated in the zero position with contact A = line, B = neutral and C = earth. Equipment has been discovered that does not follow this convention, including military spec Eddystone receivers and Ferrograph tape recorders, so it's always worth checking before initial use.

### **Later versions**

Less common than the Mk 4 is the Mk 5 which is similar in most respects but has an increased voltage rating. They are identifiable by having a red insert.

The Mk 7 or 104 connector is a further upgraded of the Mk 4. It is used on more modern equipment such as Clansman. Although many Mk 7 connectors will mate with Mk 4 version, they cannot be repurposed as detailed above. The inserts are moulded into the shells at manufacture and cannot be reorientated or removed. Mk 7s can be identified by a blue/grey or bright green element to the insert.



**07) Some Mk 7 connectors identifiable by their green inserts and absence of insert locking rings.**

Mk 4 connectors should be used with caution in association with Mk 7 fitted equipment. It's possible that in these circumstances, the voltage rating of the Mk 4 connector could be greatly exceeded.

## Supplier

Mk 4 and 7 connectors (now designated LMF and LMG respectively) are manufactured by Weald Electronics. A full range including accessories and tools is available through Lane Electronics.

Link to their LMF page with downloadable catalogues:



[www.felane.com/product-group/range-lmf](http://www.felane.com/product-group/range-lmf)