

# Belling-Lee

Subminiature coaxial connectors  
Miniature coaxial connectors  
Miniature coaxial units  
Standard coaxial connectors  
BNC connectors

## Dimensions (unless otherwise stated)

Panel cut-outs minima, normal tolerance  $\pm 0.005$  inch  $0.13$  mm.

Overall sizes and fixing centres nominal.

First dimension is design dimension.

Second is the nearest imperial or metric equivalent.

## Current ratings / Temperature rise

Where stated, the temperature rise figure given  
is above ambient ( $20^{\circ}\text{C}$ ).

All photographs are shown  
actual size unless  
otherwise stated.

## IMPORTANT NOTE

European Community Council Directive on low  
voltage electrical equipment.

Health & Safety at Work Act October 1974.

Consumer Protection Act (The Electrical  
Equipment Safety Regulation 1975 effective  
1st April 1976).

If you have reason to believe your products are  
covered by the above legislation please contact  
our Technical Advisory Service who will be pleased  
to advise you concerning the suitability of our  
products in your applications.

Telephone 01-363 5393 and ask for Components  
Division Technical Sales.



**L1403 Series, coaxial, sub-miniature**

**L1403/BS/Au Fixed adaptor, plug-to-plug**

**L1403/FP/Ag or Au Free connector**

**L1403/CS/Ag or Au Fixed connector**

**L1403/PCS/Au Fixed connector, printed circuit**

**L1403/RFP/Ag or Au Free connector, right angle entry**

The L1403 series incorporates a positive locking feature which is achieved by means of the hexagonal clamping nut in co-operation with a silicone elastomer washer to obviate loosening under vibration.

In the free connectors the braid connection is made by soldering it to the body. PTFE is employed for the insulant on account of its excellent r.f. and thermal characteristics.

These connectors are compatible with the American Microdot series, and their field of application is international.

**Impedance:** 50 ohms nominal  
**V.S.W.R.:**  $< 1.1 : 1$  at 200 and 500 MHz  
**Breakdown voltage(d.c.):** At sea level  $> 1$  kV  
At 100,000 feet 30,000 m 300 V  
 $\geq 10 \times 10^3$  megohms  
**Insulation resistance:** Creepage distance: 0.020 inch 0,5 mm

**Contact resistance and screen continuity:**  $\leq 5$  milliohms (mated pair)  
**Capacitance:**  $\leq 4$  pF  
**Temperature range:**  $-55^\circ\text{C}$  to  $+85^\circ\text{C}$  (Ambient)  
Will withstand short term exposure at  $125^\circ\text{C}$

**Humidity:** H5 (DEF - 5011)  
**Low air density:** Severity D2 (100 000 feet, DEF - 5011)

**Acceleration:** Severity A2 (50 g DEF - 5011)  
**Shock:** Severity S1 (50 g DEF - 5011)  
**Vibration:** Severity V3 (5 - 5000 Hz, DEF - 5011)

**Panel thickness:** BS 0.046 - 0.062 inch 1,2 - 1,6 mm  
CS 0.015 - 0.150 inch 0,4 - 3,4 mm  
PCS 0.063 inch 1,6 mm

**Fixing and locking torque:** 6 lbf in 0,67 N m maximum

**Cables, dimensions and suitable types:** Maximum diameter:  
Screen 0.071 inch 1,8 mm  
Inner conductor 0.023 inch 0,6 mm  
UR 94, UR 95, UR 110

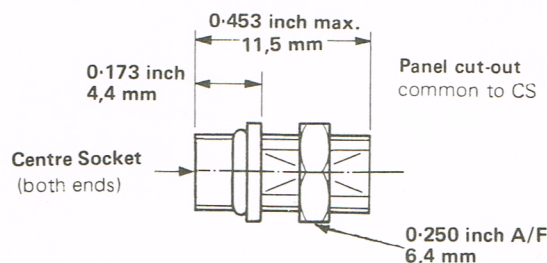
**Materials:** Brass pins and Hidurel 5 sockets, all gold-plated; brass bodies gold or silver-plated, except L1403/BS and L1403/PCS. PTFE dielectric. Silicone rubber washer and sleeve.

**Weights (average):**  
BS 1,3 g 0.05 oz  
CS 1,5 g 0.05 oz  
FP 1,5 g 0.05 oz  
PCS 1,6 g 0.06 oz  
RFP 2,7 g 0.09 oz

**American equivalents:**  
BS Microdot 33 - 53  
CS Microdot 31 - 50  
FP Microdot 32 - 21 or 32 - 23

**Belling-Lee reference numbers:** Examples:  
L1403/FP/Au Free connector - Gold-plated pins and bodies  
L1403/FP/Ag Free connector - Gold-plated pins, silver-plated bodies

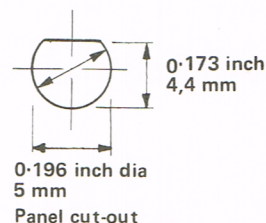
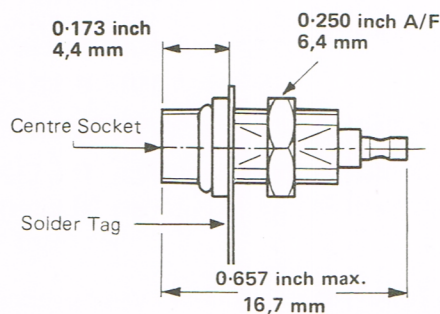
## L1403/BS/Au



For panel cut-out see L1403/CS below

Bulkhead adaptor  
plug-to-plug

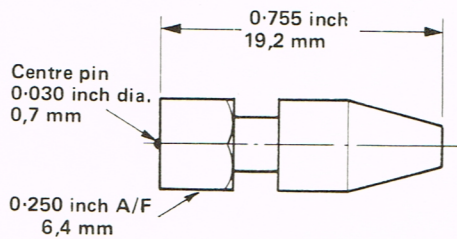
## L1403/CS/Ag or Au



Bulkhead socket

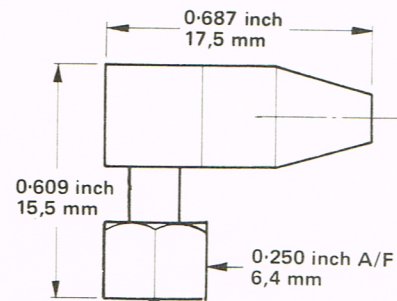


L 1403/FP/Ag or Au



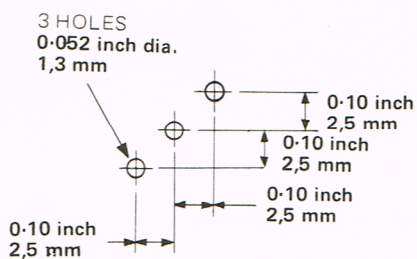
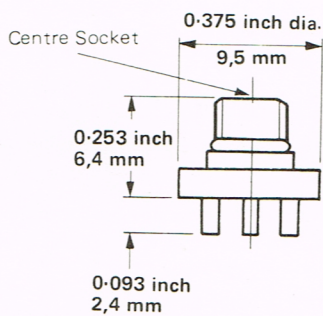
Free plug

L 1403/RFP/Ag or Au



Right angle free plug

L 1403/PCS/Au



Panel cut-out

Printed circuit socket



**L1465 Series coaxial miniature**  
**L1465B/FP Free connector**  
**L1465B/FS Free connector**  
**L1465/RPCS Fixed connector**  
**L1465/PCS Fixed connector**  
**L1465C/CS Fixed connector**

These miniature coaxial connectors for cable of overall diameter up to 4,5 mm 0.18 inch incorporate all the best features of the Belling-Lee larger series, on which the R.E.C.M.F. standard and BS 3041 were based. These include an external circlip on the sockets, giving great strength at the mouth combined with maximum resilience. The free members employ the famous 'tulip' cable grip together with a centre pole which is removable from the polyethylene insulator for soldering, obviating all difficulties. The insulant in the panel socket is methylpentene polymer.

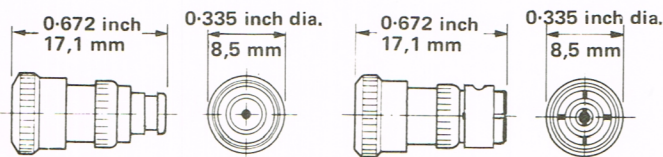
The plug and socket bodies are normally made of brass, nickel-plated and the contacts are silver-plated.

Despite their small size, these connectors are extremely robust, and are ideal for use in modern electronic instruments, tape recorders and car radios.

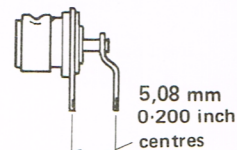
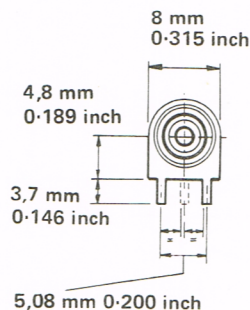
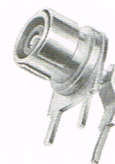
<b>Impedance:</b>	50 ohms nominal
<b>Breakdown voltage (d.c.):</b>	At sea-level > 2 kV At 100 000 feet > 500 V 30 000 m ≥ 10 <sup>3</sup> megohms
<b>Insulation resistance:</b>	≤ 5 milliohms
<b>Contact resistance and screen continuity:</b>	– 25 °C to + 70 °C (Ambient)
<b>Temperature range:</b>	A4 (BS 2011)
<b>Humidity:</b>	Inner 1 mm 0.039 inch
<b>Cable size:</b>	Overall 4,5 mm 0.177 inch 35 N 8 lbf, depending on cable
<b>Cable retention:</b>	20 N 4.5 lbf maximum
<b>Insertion/withdrawal force:</b>	Body, brass nickel-plated Insulant for RPCS, PCS and CS methylpentene polymer FP and FS polyethylene Centre pole FP and FS brass, silver-plated. RPCS, PCS and CS Beryllium- copper, silver plated.
<b>Materials:</b>	
<b>Weights (average):</b>	L1465B/FP 2,60 g 0.09 oz L1465B/FS 2,60 g 0.09 oz L1465/RPCS 1,27 g 0.04 oz L1465/PCS 1,24 g 0.04 oz L1465C/CS 1,33 g 0.05 oz

## L1465B/FP

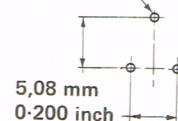
## L1465B/FS



## L1465/RPCS

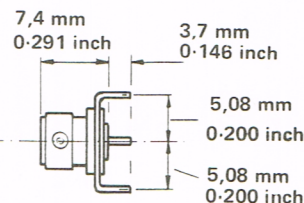


3 holes, 1.3 mm dia. 0.052 inch



Panel cut-out

## L1465/PCS



3 holes, 1.3 mm dia. 0.052 inch

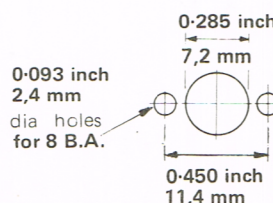
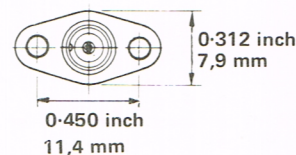
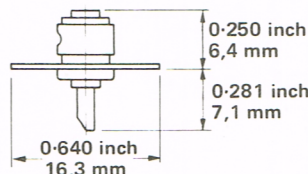
To suit panel thickness up to 2.38 mm 0.094 inch



5.08 mm 0.200 inch

Panel cut-out

## L1465C/CS



Panel cut-out



## L1465/K Coaxial miniature, for crimped connections

L1465A/K/FP Free connector

L1465A/K/FS Free connector

L1465A/K/BS Fixed connector

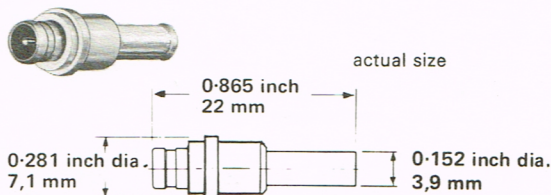
These additions to the L1465 pattern connectors have been developed specifically for crimped connection to RG 174/U cable.

The L1465K range completely intermates with the L1465 range.

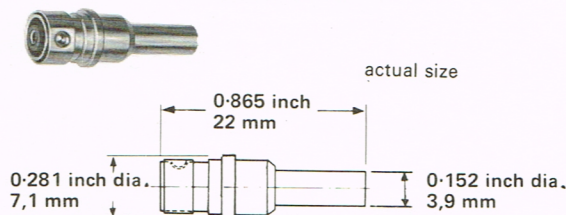
Impedance:	50 ohms nominal
V.S.W.R:	$\leq 1.2$ : 1 up to 1500 MHz
Breakdown voltage (d.c.):	$\geq 2$ kV
Insulation resistance:	$\geq 10^3$ megohms
Contact resistance and screen continuity:	$\leq 5$ milliohms
Capacitance:	$\leq 5$ pF
Temperature range:	-25 °C to +70 °C (Ambient)
Humidity:	H5 (DEF - 5011)
Insertion/withdrawal force:	18 N 4 lbf maximum
Cable retention:	44.5 N 10 lbf
Materials:	Body and plug contact brass, silver-plated. Socket contact beryllium-copper, silver-plated. L1465A/K/BS flange nickel-plated. Insulant polyethylene.

Weights (average):	L1465A/K/BS	2,2 g	0.08 oz
	L1465A/K/FP	2,04 g	0.07 oz
	L1465A/K/FS	1,9 g	0.07 oz

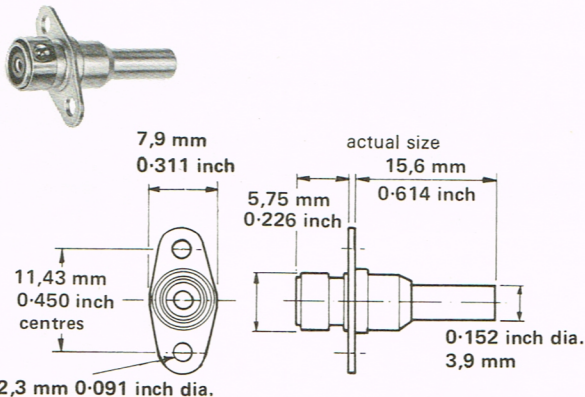
### L1465A/K/FP



### L1465A/K/FS



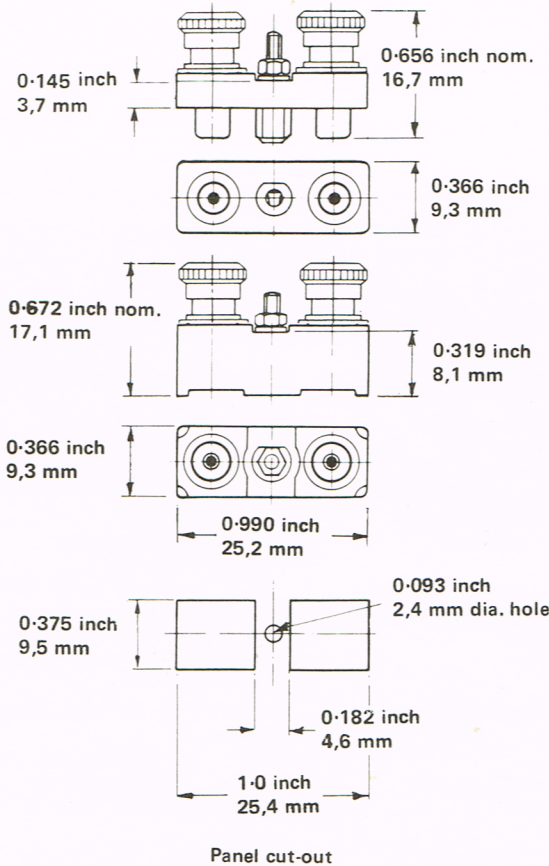
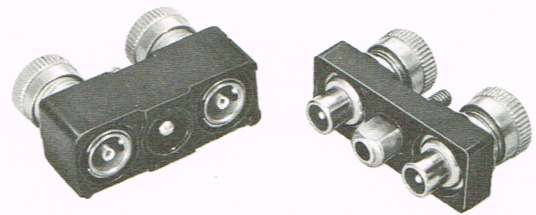
### L1465A/K/BS



## Miniature unitor, twin coaxial

L1580/P/Ag Twin connector, male contacts

L1580/S/Ag Twin connector, female contacts



Panel cut-out

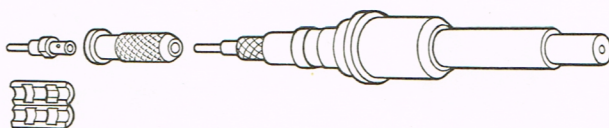
(Ag= silver-plated)

Based on the same standard module as the general purpose miniature unitors (ORANGE SECTION), these coaxial connectors may be combined with them to provide individually shielded inter-connections when required. Alternatively, they may be used singly in conjunction with the cable outlet and retainer, L1588. For general characteristics see the L1465 series opposite.

Weight (average):  
mated pair:

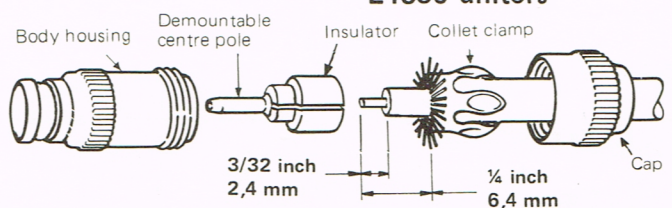
15,66 g 0.55 oz

## Crimping Instructions – L1465A/K series



Crimped connections are made with Erma Buchanan tool number 612118 (inner) and 29010 (outer).

## Loading Instructions – L1465 series, and L1580 unitors





## Standard coaxial plugs

### L734/P/Al or Ni

Free connector with polished aluminium, or nickel-plated brass body, soldered centre connection.

### L1556

Insulated free connector with black or white polypropylene body, soldered centre connections.

### L1956

Insulated free connector with white polypropylene body, solderless pressure connections.

### L2156

Right angle insulated connector with white polypropylene body, solderless pressure connections.

Originally developed for the television industry, these connectors, due to the technical excellence of their design, were quickly adopted by instrumentation engineers, and several of them have also received approval for use by H.M. Services. Such qualities were achieved at very low cost by mass manufacturing methods.

A selection of sockets is provided in which the mouth is reinforced by a powerful circlip; this imparts great mechanical strength while maintaining a high degree of resilience. A special collet clamp makes an efficient braid connection and anchorage in cable mounting members.

The centre conductor is generally solder connected except in types L1956 and L2156, where it is clamped.

Various wall-mounting sockets are available in the range of Belling-Lee television accessories.



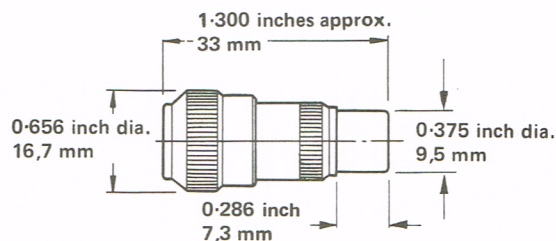
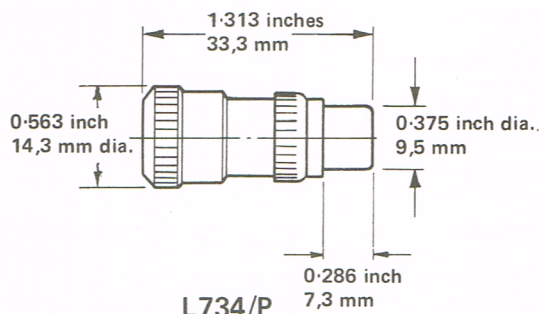
L734/P/AL  
L734/P/Ni



L1556/Black  
L1556/White



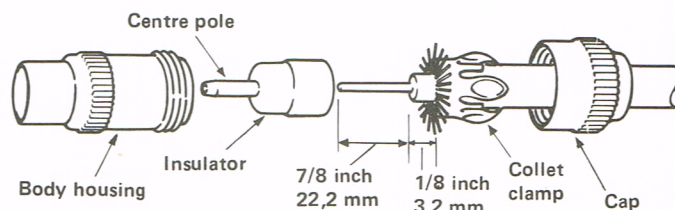
L1956/White



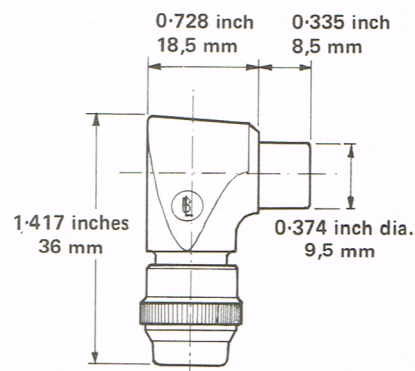
Mating specifications: BS 3041 : 1958, IEC 169-2 and DIN 45325

<b>Impedance:</b>	60 – 75 ohms		
<b>Capacitance:</b>	≤ 5 pF		
<b>Breakdown voltage (d.c.):</b>	≥ 4 kV		
<b>Insulation resistance:</b>	≥ 10 <sup>3</sup> megohms		
<b>Contact resistance:</b>	Inner ≤ 10 milliohms Outer ≤ 5 milliohms		
<b>Temperature range:</b>	– 40 °C to + 70 °C (Ambient)		
<b>Insertion/withdrawal force:</b>	≤ 25 lbf 111 N		
<b>Cable size:</b>	Inner 0.048 inch max. 1,2 mm Overall 0.125 inch – 0.312 inch 3,2 mm – 7,9 mm		
<b>Insulants – internal:</b>	L604/S, L616, L617, L734/J, L1421 L734/S – Polyethylene, L603, L734/P, L1366, L1556, L1666A – Polypropylene L1956, L2156 – Acetal and polypropylene.		
<b>– external:</b>	L603, L1556, L1956, L2156 – Polypropylene.		
<b>Centre contact:</b>	Silver-plated		
<b>Weights (average):</b>	L603	5,1 g	0.18 oz
	L604/S	5,3 g	0.19 oz
	L616	5,3 g	0.19 oz
	L617	9,4 g	0.33 oz
	L734/J/Al	7,1 g	0.25 oz
	L734/P/Al	5,1 g	0.18 oz
	L734/P/Ni	11,8 g	0.42 oz
	L734/S	3,2 g	0.11 oz
	L1366	3,4 g	0.12 oz
	L1421	7,1 g	0.25 oz
	L1556	4,8 g	0.17 oz
	L1666A	1,9 g	0.07 oz
	L1956	4,9 g	0.17 oz
	L2156	6,8 g	0.24 oz

### Assembly L734/P/– and L1556/–



### L2156

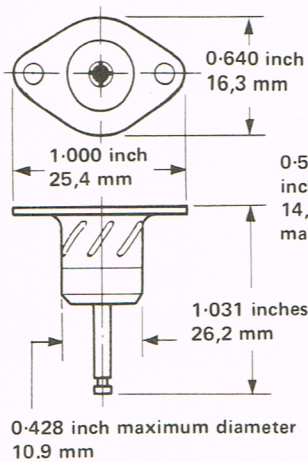
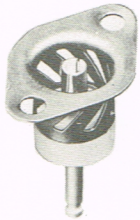




## Fixed socket

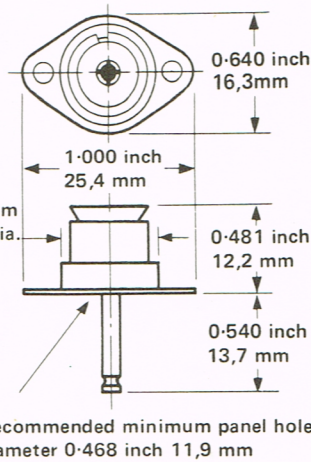
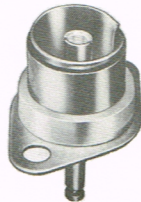
### L734/S

flush mounting with zinc-plated brass body



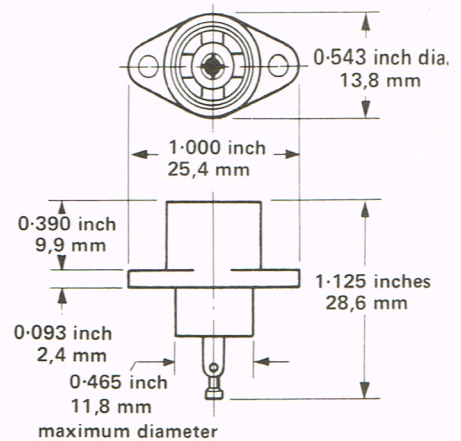
### L604/S/Zn or Ni

surface mounting with zinc or nickel-plated brass body



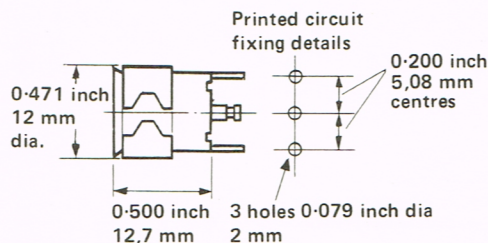
## L603 coaxial socket, surface mounting, insulated

Colours: Black, white

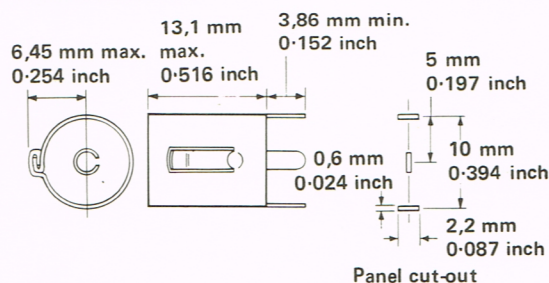


## L1366 printed circuit socket, with cadmium-plated brass body

A printed circuit version of L604/S, for 0.062 inch 1.6 mm thick panels. It is recommended that the two outer tags be bent over the rear of the panel before soldering in place as this will assist anchoring during withdrawal of the plug.



## L1666A P.C. coaxial socket

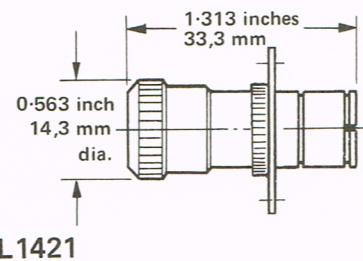
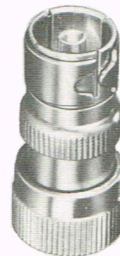


A low cost, dual standard \* coaxial socket for printed circuit board mounting.

\* It accepts free plugs of 9 and 9.5 mm dia.

Panel thickness: Up to 2.38 mm 0.094 inch thick board

## L734/J/Al free socket with polished aluminium body



### L1421

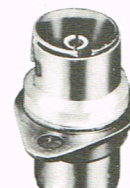
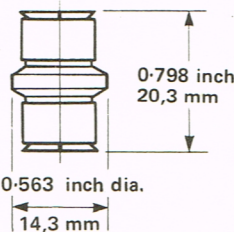
bulkhead socket, with a polished aluminium body and integral flange for panel mounting.

## Adaptors

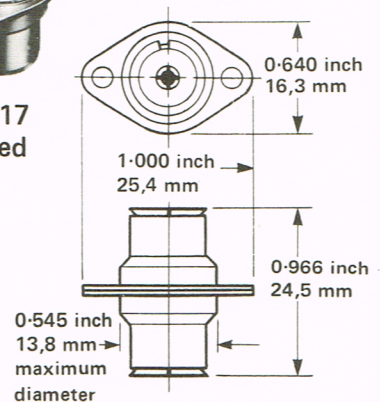
These adaptors provide convenient means of joining two leads which are already terminated in standard coaxial plugs.



### L616 free



### L617 fixed



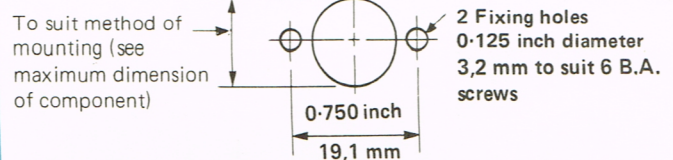
## L616/Zn or Ni

Adaptor, plug-to-plug, with zinc or nickel-plated brass body.

## L617/Zn or Ni

Adaptor, plug-to-plug, with zinc or nickel-plated brass body.

## Panel cut-out — for L603, L604/S, L617, L734/S & L1421





## BNC pattern 15

### L1637 Series pattern 15 connectors (BNC unsealed)

L1637/FP Free connector

L1637/FS Free connector

L1637/CS Fixed connector

L1637/CSS Fixed connector

L1637/JS Fixed connector

L1637/A Locking tool

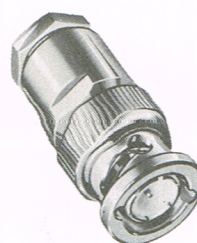
Pattern 15 connectors are variations of the international range of BNC coaxial plugs and sockets, incorporating an improved method of clamping the cable.

In the Belling-Lee L1637 Series, first the braid is clamped between two metallic ferrules. Next, the cable is gripped by a waterproof compression gland made of silicone rubber, which is controlled by an internal threaded ring. Finally the cable is gripped again by a split-tapered collet which is tightened by the hexagonal nut. The strength of the resulting termination approaches the breaking strain of the cable.

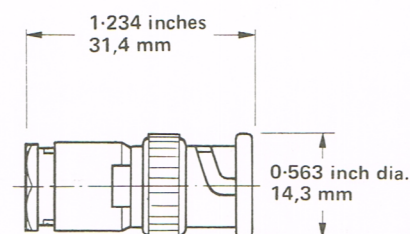
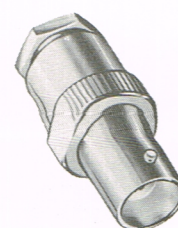
The centre contact is silver-plated, and captive after assembly. The insulant is PTFE, permitting a higher working temperature.

<b>Impedance:</b>	50 ohms nominal
<b>V.S.W.R.:</b>	Better than 1.2 : 1 from 200 to 3 000 MHz
<b>Breakdown voltage (d.c.):</b>	≥ 3 kV
<b>Insulation resistance:</b>	≥ 5 x 10 <sup>3</sup> megohms
<b>Contact resistance and screen continuity:</b>	≤ 2 milliohms
<b>Capacitance:</b>	≤ 5 pF
<b>Dielectric loss:</b>	≥ 5 megohms
<b>Temperature range:</b>	-55 °C to + 150 °C (Ambient)
<b>Humidity:</b>	Class H6 (DEF - 5011)
<b>Acceleration:</b>	Severity A1 (13 g, DEF - 5011)
<b>Vibration:</b>	Severity V2 (5-500 Hz, DEF - 5011)
<b>Shock:</b>	Severity S2 (75 g, DEF - 5011)
<b>Cables:</b>	Uniradio 43, 72, 76 or equivalent, Maximum diameters, Screen 0.212 inch 5,4 mm Centre conductor 0.045 inch 1,1 mm
<b>Cable retention:</b>	≥ 40 lbf 178 N
<b>Panel thickness:</b>	/CS 0.056 inch - 0.133 inch 1,4 mm - 3,4 mm /CSS 0.122 inch 3,1 mm maximum /J 0.056 inch - 0.164 inch 1,4 mm - 4,2 mm /JS 0.0625 inch 1,6 mm maximum (flange at rear of panel)
<b>Materials:</b>	Body and centre pin — brass Socket insert — beryllium-copper Finish — silver-plated Insulant — PTFE Seals — silicone rubber
<b>Weights (average):</b>	/CS 8,8 g 0.31 oz /CSS 9,3 g 0.33 oz /FP 19,7 g 0.7 oz /FS 16,8 g 0.6 oz /J 22,4 g 0.78 oz /JS 17,5 g 0.62 oz

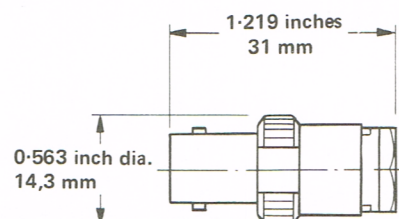
## L1637/FP



## L1637/FS



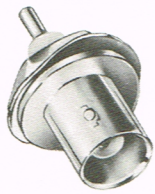
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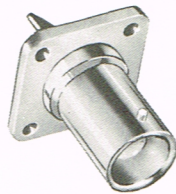
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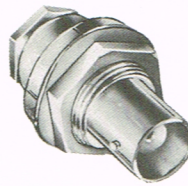
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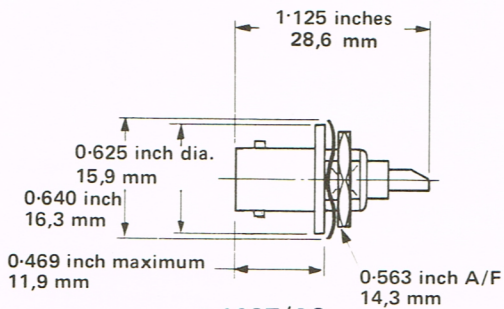
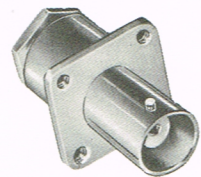
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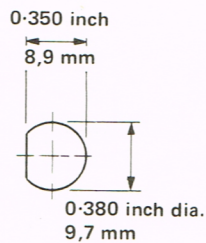
L1637/J



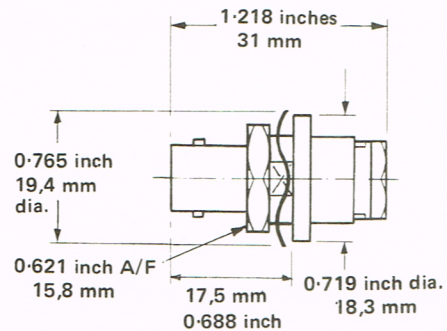
L1637/JS



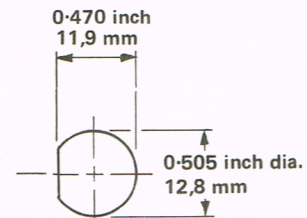
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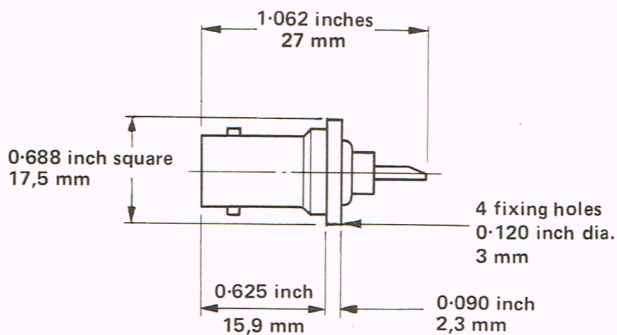
Panel cut-out  
L1637/CS



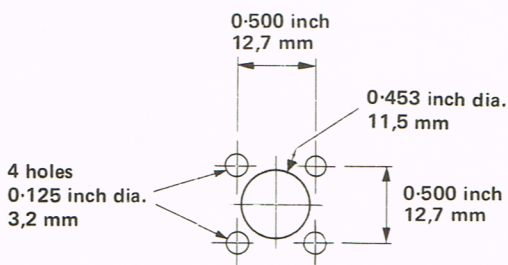
L1637/J



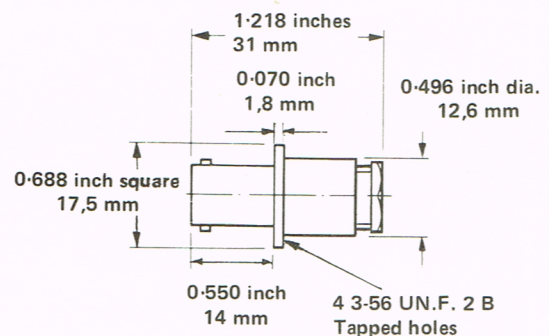
Panel cut-out  
L1637/J



L1637/CSS

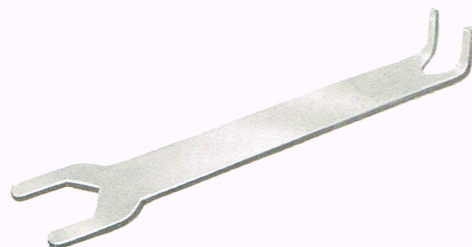


Panel cut-out for  
L1637/CSS and L1637/JS



L1637/JS

L1637/A Locking tool



This combination tool comprises a claw spanner for tightening the internal clamping ring, and an open-ended spanner for tightening the hexagonal clamping nut.



## L 1647 Series pattern 22 connectors (BNT)

L 1647/CS	L 1647/50/JS
L 1647/CSS	L 1647/FP
L 1647/50/J	L 1647/FS

A range of quick connect/disconnect (bayonet lock) connectors, with two independent screens concentrically disposed around an inner conductor. Will mate with series L1637 BNC connectors (Pattern 15).

For use with Uniradio cable UR54 (0.325 inch 8.3 mm nominal overall diameter). Corresponding types for other Uniradio cables made to order.

The centre conductor carries the line current, and the outer screen is the true screen.

## Applications

### 1. Separate direct current return path

In sensitive apparatus where a direct current return path, separate from the screen, is necessary in order to avoid random circulating currents and common earth returns, the inner 'screen' forms the return current path. Connection of this and the true screen (outer) to earth should be made at one point only.

### 2. Low effective shunt capacitance

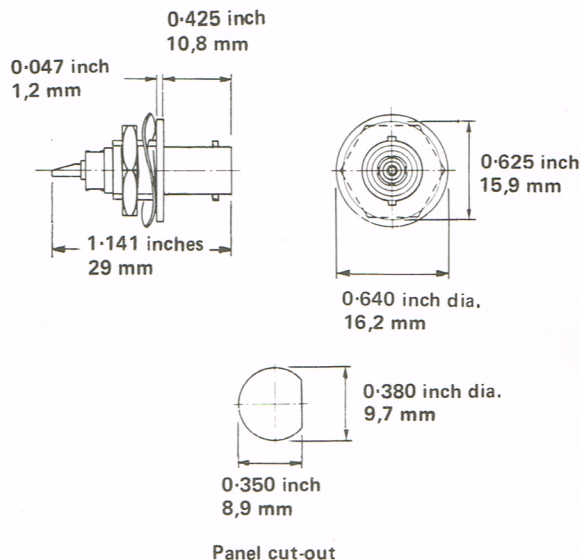
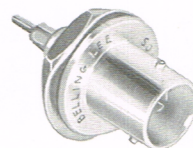
In circuits that require low values of shunt capacitance, out-of-phase feed back of the signal (1 : 1) is effected over the inner 'screen', thus virtually nullifying the capacitance of the cable. One end of the inner 'screen' is left floating - this can conveniently be done by terminating the appropriate end of the cable in a standard BNC connector. The true screen (outer) also forms the return current path.

<b>Characteristic impedance:</b>	50 ohms nominal
<b>Contact resistance:</b>	≤ 5 milliohms
<b>Screen continuity:</b>	≤ 2 milliohms
<b>Insulation resistance:</b>	≥ 5 x 10 <sup>3</sup> megohms
<b>Breakdown voltage (d.c.):</b>	Centre pole to screens > 3 kV
at sea level	Between screens > 2 kV
<b>Temperature range:</b>	-55 °C to + 70 °C (+ 150 °C without boot) (Ambient)
<b>Humidity:</b>	Class H5
<b>Cable retention:</b>	80 lbf 356 N
<b>Panel thickness:</b>	/CS 0.056 inch — 0.133 inch 1.4 mm — 3.4 mm
	/CSS 0.125 inch 3.17 mm max.
	/J 0.056 inch — 0.164 inch 1.4 mm — 4.3 mm
	/JS 0.063 inch 1.58 mm (flange at rear of panel)

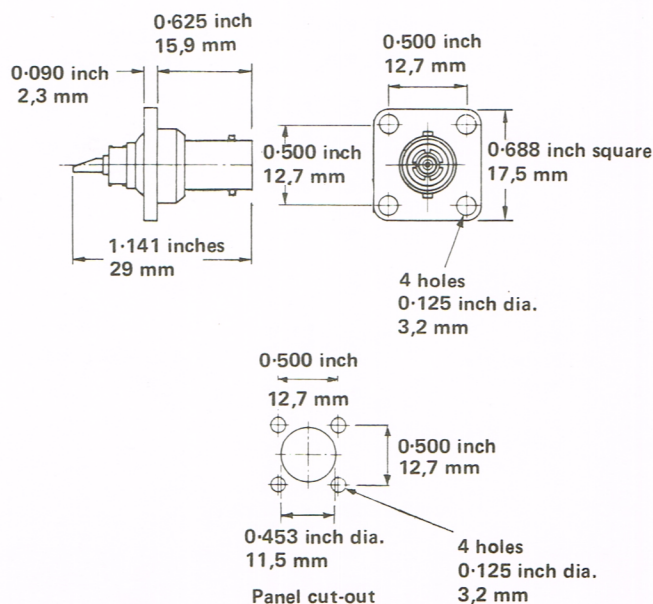
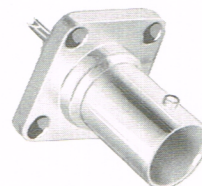
<b>Materials:</b>	Body — brass, silver-plated
	Inner Screen and Centre pole — FP brass, silver-plated, remainder beryllium copper, silver-plated.
	Insulant — PTFE
	Boot — PVC

<b>Weights (average):</b>	CS 9.0 g 0.32 oz
	CSS 9.8 g 0.35 oz
	FP 18.4 g 0.65 oz
	FS 15.1 g 0.53 oz
	J 20.2 g 0.71 oz
	JS 15.8 g 0.56 oz

## L 1647/CS

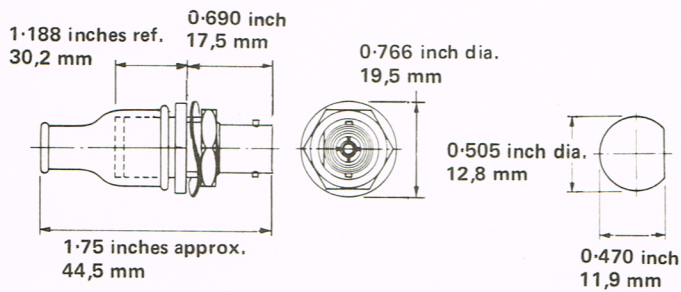
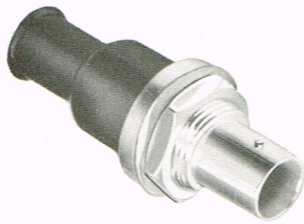


## L 1647/CSS



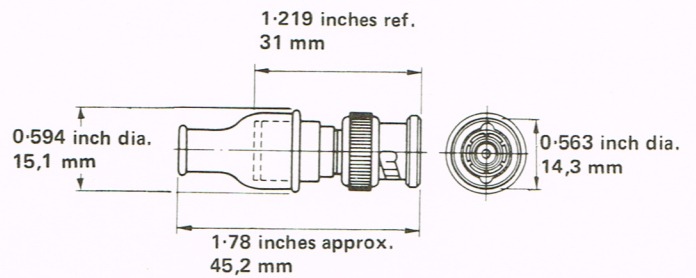


L 1647/50/J

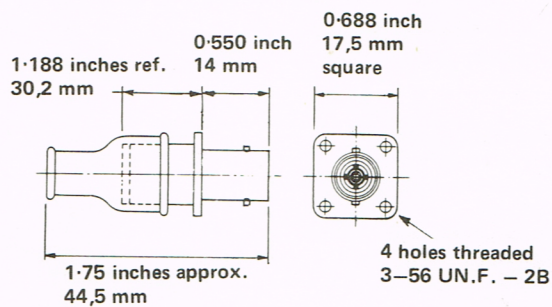
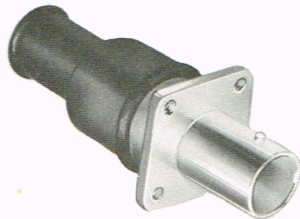


Panel cut-out

L 1647/50/FP

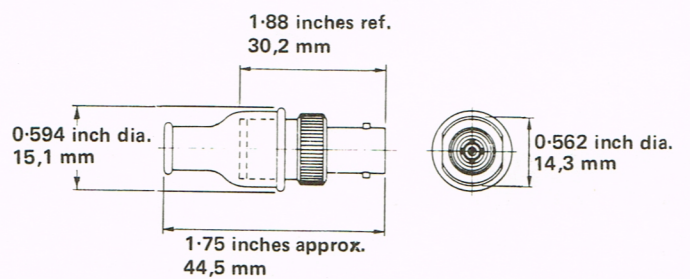


L 1647/50/JS

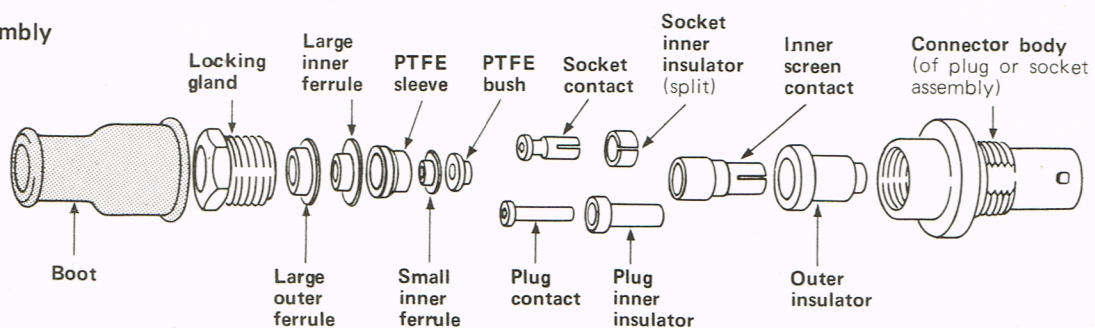


For Panel cut-out see L 1647/CSS

L 1647/50/FS



## Assembly

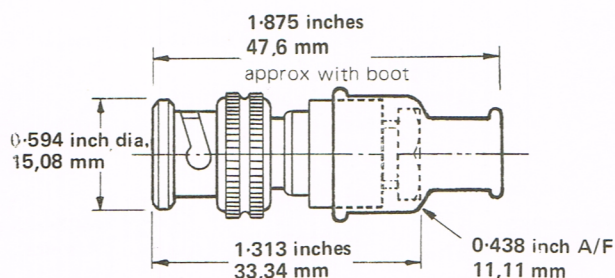




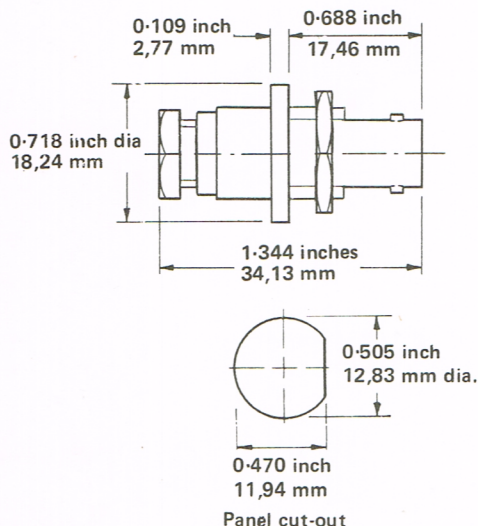
## L1752/FP and J 2-pole shielded connectors



L1752/FP Free plug



L1752/J Panel Jack

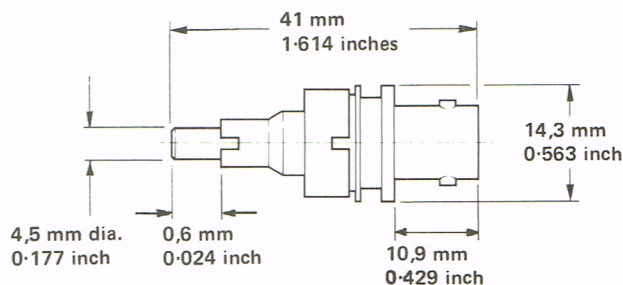
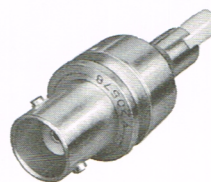


These polarized, two-pole, shielded connectors are housed in silver-plated brass BNC shells and are available for standard Duradio 68 and DRM 68 cable. Fittings for other miniature, twin, shielded cables can be made available on request.

<b>Current rating:</b>	2 A per pole (temperature rise internal, 10 °C above ambient).
<b>Contact resistance:</b>	≤ 3 milliohms per pole
<b>Screen continuity:</b>	≤ 2 milliohms
<b>Voltage breakdown (d.c.):</b>	Between poles > 3 kV Poles to screen > 2 kV
<b>Insulation resistance:</b>	> 60 x 10 <sup>3</sup> megohms
<b>Temperature range:</b>	-55 °C to +85 °C (Ambient)
<b>Humidity:</b>	21 days (BS 2011)
<b>Cable clamping torque:</b>	2,28 N m 20 lbf inch
<b>Cable retention:</b>	200 N 45 lbf
<b>Panel thickness:</b>	0-056 inch to 0-149 inch 1,42 mm - 3,78 mm
<b>Materials:</b>	Body and contact pin — Brass Socket — Beryllium-copper Finish — Silver-plated Insulant — Polypropylene
<b>Weight (average):</b>	FP 18,5 g 0-65 oz J 19,2 g 0-68 oz

## Y20578 Sealed BNC connector

(P.O. end sealing No. 4C)



Designed for the Post Office and approved for use on terminal units for coaxial cables where a low pressure gas-sealed junction is essential. This connector may also be used in similar applications where easy connection/disconnection is required without tools, e.g., in repeaters and outdoor instrumentation.

The connections to the cable are made by soldering, and the cover is also soldered in position, after which the assembly may be encapsulated if necessary.

<b>Nominal impedance:</b>	75 ohms
<b>Insulation resistance:</b>	≥ 100 x 10 <sup>3</sup> megohms
<b>Voltage proof:</b>	1500 Vd.c.
<b>Leakage:</b>	≤ 1 cc/h at 62 kpascals 9 lbf/in <sup>2</sup>
<b>Temperature range:</b>	-55 °C to +150 °C (Ambient)
<b>Humidity:</b>	Class H5 (DEF - 5011)
<b>Cable:</b>	Post office 1-2/4-4 A
<b>Weight (average):</b>	10,7 g 0-38 oz