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# RF COAXIAL CONNECTORS

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February 1996

**ITT Cannon**



## RF Coaxial Connectors

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ITT Cannon is a company with the in-depth experience of an 80-plus year history and the innovative spirit of a dynamic enterprise. As a key part of this enterprise ITT Cannon RF Products has been providing highly reliable coaxial connectors for over 25 years to customers worldwide.

We are part of ITT Industries, a multi-disciplined, multinational company engaged in the design and manufacture of electronic components, automotive products and fluid handling controls/instrumentation.

ITT Cannon operates globally and is active in many diverse markets including telecoms, medical electronics, instruments, military, microwave components, information systems and radar.



# A global range of connectors and cable



The ITT Cannon RF Products complementary manufacturing sites in the UK and the USA have extensive manufacturing facilities which include precision machining, molding, pressing, finishing and assembly plant. Assembly of connectors is maintained by use of MRP II production control techniques and dedicated assembly equipment. In house plating facilities allow a wide range of plating finishes to be offered.

The company has its own independent environmental test laboratory which enables analysis and testing of raw materials, components and finished products. ITT Cannon is an approved manufacturer to ISO9001, BS9000, CECC, AQAP1 and CAA in the UK and MIL-C-39012 in the USA.

We recognise the importance of reduced time to market. Our market driven R & D teams use state-of-the-art Computer Aided Design (CAD) systems to ensure rapid product development. Test equipment includes network analysers with frequency capability to 40 GHz.

In addition to the manufacture of precision connectors the company also offers cable assembly facilities to customer specifications. Capability includes the manufacture of semi-rigid, flexible and high performance flexible cable assemblies.

The designs shown in this publication are not the entire range. Should you require styles not shown please contact our nearest Sales Department listed on the back cover.

# assemblies

For high volume requirements we offer a design engineering service to develop products specific to a particular application.

Please contact ITT Cannon Product Management Group to discuss your current or planned project or to request samples, prices and delivery information.

In addition to its coaxial connectors ITT Cannon also offers a full selection of products that include a comprehensive range of industrial, military and aerospace connectors, switches, test accessories and network systems, services and components.

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ITT Cannon manufactures the highest quality products available in the marketplace; however these products are intended to be used in accordance with the specifications in this publication. Any use or application that deviates from the stated operating specifications is not recommended and may be unsafe. No information and data contained in this publication shall be construed to create any liability on the part of ITT Cannon. Any new issue of this publication shall automatically invalidate and supersede any and all previous issues. **A limited warranty applies to ITT Cannon products. Except for obligations assumed by ITT Cannon under this warranty, ITT Cannon shall not be liable for any loss, damage, cost of repairs, incidental or consequential damages of any kind, whether or not based on express or implied warranty, contract, negligence or strict liability arising in connection with the design, manufacture, sale, use or repair of the products.** Product availability, prices and delivery dates are exclusively subject to our respective order confirmation form; the same applies to orders based on development samples delivered. This publication is not to be construed as an offer. It is intended merely as an invitation to make an offer. By this publication, ITT Cannon does not assume responsibility or any liability for any patent infringements or other rights of third parties which may result from its use. Reprinting this publication is generally permitted, indicating the source. However, ITT Cannon's prior consent must be obtained in all cases.

*Choose the connector series that fits your needs.*

On pages 6 and 7 you will find a quick overview of each of the connector series in the ITT Cannon coaxial connector range. The chart on page 5 will assist you in selecting suitable cables for your application.

*Use the color tabs on the publication edge to locate the section you want.*

Each connector series has color tabs at a different position on the outside edge of the right hand pages in that section. This will help you get straight to the section you want.

*Each series section has all the information needed to specify the connectors for your requirement.*

On the first page of each section is an introduction to the product followed by full technical specifications and mating interface details as appropriate. The connector styles are grouped by connector type and are illustrated with dimensioned drawings.

*Choose your part numbers.*

Part numbers appear alongside the connector drawings and a part number explanation guide appears on page 5.

*Refer to the Assembly Instructions*

Detailed Assembly Instructions for most cable mounting connectors are included at the rear of the publication and the appropriate Assembly Instruction Number and the page on which it will be found are indicated by the connector drawing. Other Assembly Instructions may be obtained by contacting your nearest Sales Office.

*Refer to the mounting hole dimensions*

For those connectors requiring mounting holes in panel, bulkhead or printed circuit board, reference to the indicated Mounting Plan on pages 108 - 109 will provide recommended mounting hole dimensions. Mounting Plan references will be found under the connector drawing where appropriate.

*Choose the appropriate tooling*

Details of a range of Crimp Tools, Torque Wrenches and other tools to assist in the assembly and use of the ITT Cannon coaxial connector range can be found on page 140.

*For your reference*

#### **Part Number Index**

A full part number to page number index appears on page 144.

#### **Cross Reference Lists**

QPL part number and old to new part number cross reference lists will be found on page 143.

#### **Product Safety Information**

Essential information on the safe use and handling of ITT Cannon electrical connectors is given on page 148.

#### **Glossary of Terms**

Explanations of over 130 terms used in this publication and in RF and microwave technology can be found on pages 141 and 142.

*Further information*

In the event that you do not find everything you need in this publication and require further information or assistance please photocopy, complete and fax to us the form on page 146.

## Connector/Cable Selection Guide

Given here are details of all popular cables with which the connectors in this publication may be used.

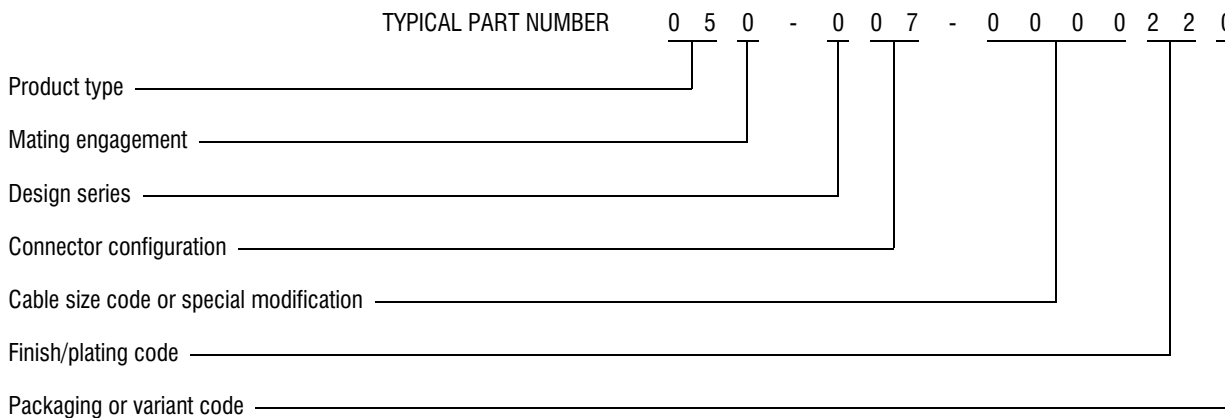
Cable numbers suitable for use with all cable mounting connectors are given opposite the connector part numbers in the series chosen.

Cable Number	Impedance (ohms)	Diameter of Jacket	Diameter of Outer Conductor (Max)	Diameter of Dielectric (Max)	Diameter of Center Conductor (Nom)
BT2001	75	4,60 (.181)	3,13 (.123)	2,45 (.096)	0,60 (.024)
BT2002*	75	5,30 (.209)	3,81 (.150)	2,45 (.096)	0,60 (.024)
BT2003*	75	6,90 (.272)	5,06 (.199)	3,70 (.146)	0,61 (.024)
BT3002	75	3,55 (.140)	2,85 (.112)	1,95 (.077)	0,31 (.012)
MIL-C-17/151	50	—	1,22 (.048)	0,97 (.038)	0,29 (.013)
M17/29-RG59	75	6,27 (.247)	4,85 (.191)	3,81 (.150)	0,56 (.022)
RD179*	75	3,07 (.121)	2,69 (.106)	1,68 (.066)	0,30 (.012)
RD316*	50	3,00 (.118)	2,79 (.101)	1,60 (.063)	0,51 (.020)
RG59/U	75	6,25 (.246)	4,85 (.191)	3,81 (.150)	0,58 (.023)
RG62/U	93	6,32 (.249)	4,85 (.191)	3,84 (.151)	0,64 (.025)
RG140/U	75	6,12 (.241)	4,47 (.176)	3,84 (.151)	0,64 (.025)
RG174/U	50	2,92 (.115)	2,24 (.088)	1,60 (.063)	0,48 (.019)
RG178/U	50	1,91 (.075)	1,37 (.054)	0,91 (.036)	0,30 (.012)
RG179/U	75	2,67 (.105)	2,13 (.084)	1,68 (.066)	0,30 (.012)
RG180/U	95	3,68 (.145)	3,15 (.124)	2,67 (.105)	0,30 (.012)
RG187/U	75	2,80 (.110)	2,13 (.084)	1,68 (.066)	0,30 (.012)
RG188/U	50	2,80 (.110)	2,06 (.081)	1,60 (.063)	0,51 (.020)
RG195/U	95	3,94 (.155)	3,15 (.124)	2,67 (.105)	0,30 (.012)
RG196/U	50	2,04 (.080)	1,37 (.054)	0,91 (.036)	0,30 (.012)
RG316/U	50	2,60 (.102)	2,06 (.081)	1,60 (.063)	0,51 (.020)
RG402/U	50	—	3,61 (.142)	3,05 (.120)	0,91 (.036)
RG405/U	50	—	2,18 (.086)	1,70 (.067)	0,51 (.020)
TZC75024	75	3,55 (.140)	3,01 (.119)	1,95 (.077)	0,31 (.012)
1694A	75	6,99 (.275)	5,44 (.214)	4,57 (.180)	1,02 (.040)
734	75	6,10 (.240)	5,21 (.205)	3,89 (.153)	0,79 (.031)
735A	75	3,51 (.138)	2,79 (.110)	2,01 (.079)	0,41 (.016)

\* Double shielded

## Part Number Guide

The table shows how the part numbers for coaxial connectors are constructed.



## Quick Reference Selection Guide

	Frequency	Impedance	Cable Type	Coupling	Body Material	Body Finish
<b>SMA - Precision</b> Coaxial connectors for rugged environments.	DC - 18 GHz	50Ω	Flexible/Semi-rigid	Screw	Stainless steel or beryllium copper	Gold or passivated
<b>SMA - Commercial</b> Economic, brass bodied coaxial connectors	DC - 12.4 GHz	50Ω	Flexible	Screw	Brass and stainless steel	Gold or nickel
<b>SMB</b> Rapid connect/disconnect coaxial connectors	DC - 4 GHz	50Ω	Flexible	Snap-on	Brass	Gold or nickel
<b>SMC</b> Vibration resistant coaxial connectors	DC - 12.4 GHz	50Ω	Flexible	Screw	Brass	Gold or nickel
<b>SSMB</b> Microminiature rapid connect/disconnect coaxial connectors	DC - 4 GHz	50Ω	Flexible	Snap-on	Brass	Gold or nickel
<b>SSMC</b> Microminiature vibration resistant coaxial connectors	DC - 12.4 GHz	50Ω	Flexible	Screw	Brass	Gold or nickel
<b>SMZ (Type 43)</b> Rapid connect/disconnect coaxial connectors for telecommunications applications	DC - 4 GHz	75Ω	Flexible	Snap-on with latch	Copper or zinc alloy	Gold, nickel, tin/lead or zinc
<b>1.0/2.3</b> Rapid connect/disconnect coaxial connectors for telecommunications applications	DC - 10 GHz	50Ω/75Ω	Flexible	Screw, snap-on, slide-on (with latch)	Brass	Gold or nickel
<b>1.6/5.6</b> Coaxial connectors with optional coupling for telecommunications applications	DC - 1 GHz	75Ω	Flexible	Screw, snap-on, slide-on	Brass	Gold, nickel or silver
<b>MCX</b> Microminiature coaxial connector for RF screening applications	DC - 6 GHz	50Ω	Flexible/Semi-rigid	Snap-on	Brass	Gold or nickel
<b>MPC - Coax</b> Microminiature coaxial connectors for mobile telephone applications	DC - 2 GHz	50Ω	Flexible	Slide-on	Brass and beryllium copper	Gold and tin
<b>Coaxial Terminators</b> Provide permanent coaxial connections to printed circuit boards	DC - 4 GHz	N/A	Flexible	N/A	Copper alloy	Electro-plated tin
<b>SMA Slide-On Plug</b> For reliable and fast testing of systems fitted with SMA jack connectors	DC - 18 GHz	50Ω	N/A	Slide-on	Stainless steel	Gold or passivated
<b>SMS (BMB)</b> Blind mate coaxial connectors for rack and panel applications	DC - 18 GHz	50Ω	Flexible/Semi-rigid	Slide-on	Stainless steel and beryllium copper	Gold or passivated

## Quick Reference Selection Guide

	Frequency	Impedance	Cable Type	Coupling	Body Material	Body Finish
<b>SIS</b> Blind mate coaxial connectors for multiple module to module connections	DC - 18 GHz	50Ω	N/A	Slide-on	Stainless steel and beryllium copper	Gold
<b>SSIS</b> Microminiature blind mate connectors for multiple module to module connections	DC - 18 GHz	50Ω	N/A	Slide-on	Stainless steel and beryllium copper	Gold
<b>CMM</b> Self aligning microminiature blind mate connectors with non-butting interface	DC - 26.5 GHz	50Ω	Semi-rigid	Slide-on	Stainless steel and beryllium copper	Gold
<b>QT BNC</b> Quick termination version of standard BNC series coaxial connector	DC - 2 GHz	75Ω	Flexible	Bayonet latch	Phosphor bronze	Nickel
<b>Between Series Adaptors</b> High efficiency transitions between various coaxial connector series	DC - 18 GHz	50Ω/75Ω	N/A	Various	Stainless steel or brass	Gold or passivated
<b>Sealflex 2</b> High performance flexible microwave cable assemblies	DC - 18 GHz	50Ω	Flexible	Various	Stainless steel (connectors)	Passivated (connectors)

## Cable Assembly Service

A precision cable assembly facility is available from ITT Cannon for the manufacture and testing of a wide range of cable/connector assemblies to customer drawings and specifications.

By using ITT Cannon's considerable expertise in this field the customer is relieved of expensive training, tooling and reject problems. This invariably offers economic and logistical advantages when compared to user assembly.

Flexible, semi-rigid and Sealflex 2 RF and microwave coaxial cable assemblies for DC to 40 GHz are manufactured to the most complex customer designs and exacting mechanical and electrical tolerances. A full range of MIL-C-17G and proprietary flexible and semi-rigid cables are used as well as the Sealflex 2 fully flexible, low loss microwave cable. With computerised semi-rigid cable forming and Vector Network Analyser test equipment cable assemblies are manufactured for quality conscious customers the world over. Our skills, experience and 100% electrical testing allows us to build quality products and ship direct to line.

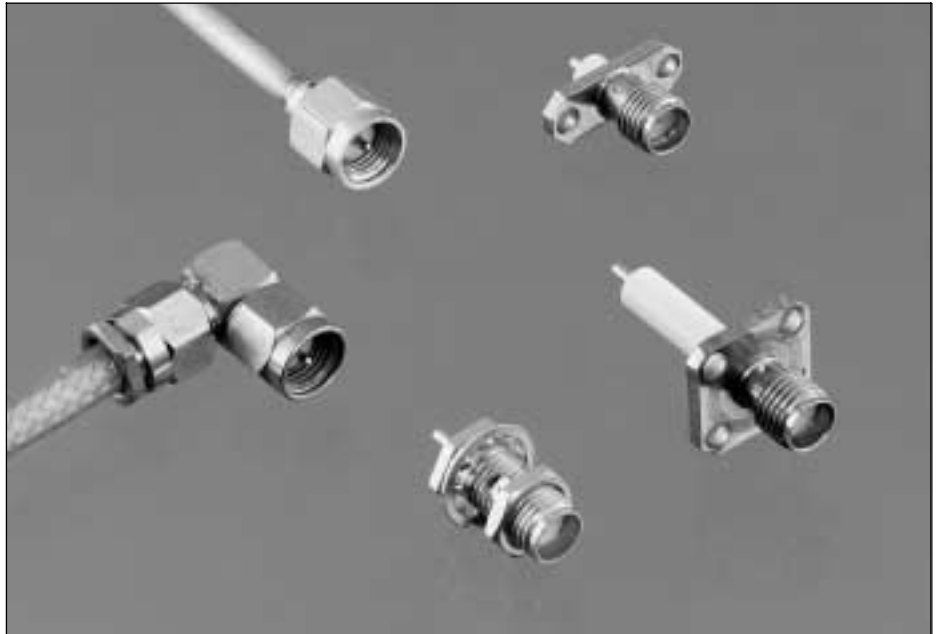
Our staff will be pleased to assist in the selection of the components and optimization of assembly performance. Contact our Sales Department for details.



## Introduction

ITT Cannon Precision SMA connectors feature the MIL-C-39012 Series SMA interface and envelope configuration. They can be mated with all connectors meeting the MIL specification dimensions. Designed for use with a variety of subminiature coaxial cables, superior results are obtained from DC to 18 GHz when used with semi-rigid cables and from DC to 12.4 GHz with flexible cable. These connectors are manufactured with beryllium copper bodies which are gold plated or stainless steel bodies which can be supplied with either a gold plated or passivated finish.

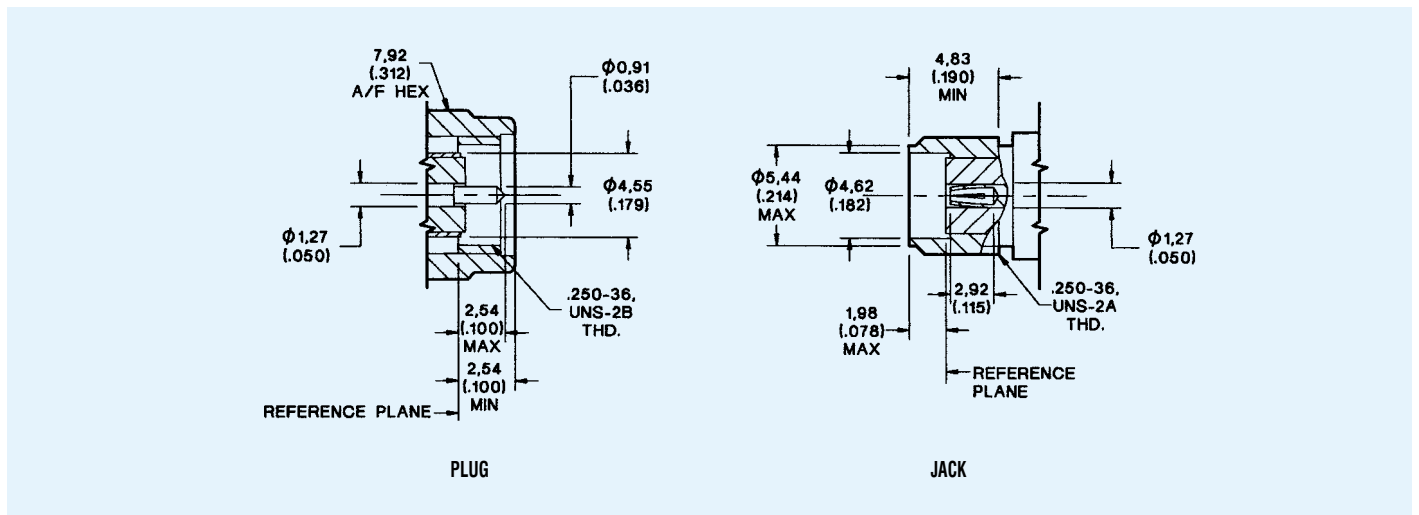
ITT Cannon also offers a range of Commercial SMA, brass bodied connectors with stainless steel coupling nuts. These offer a more economic product for a slightly reduced performance. They are supplied with either gold or nickel plating. Coupling nuts are gold plated or passivated finish.



## Features / Benefits

- Standoffs on PCB mounts of Commercial SMA series for cleaning and inspection
- Stainless steel coupling nuts with gold or passivated finish on cable plugs
- SMA plugs are environmentally sealed using a gasket
- Intermateable with all SMA connectors currently available
- Crimp/solder contact on straight plug for performance and speed of assembly on Commercial SMA series

## Mating Interfaces



## Specifications

<b>ELECTRICAL</b>	Impedance	50 $\Omega$ nominal		
	Frequency Range	0 to 18.0 GHz		
	Voltage Rating	Connectors for RG178/U series cable: At Sea Level = 170 Vrms. At 21 km (70k feet) = 45 Vrms Connectors for RG316/U series cable: At Sea Level = 250 Vrms. At 21 km (70k feet) = 65 Vrms Connectors for RG142/U series cable: At Sea Level = 335 Vrms. At 21 km (70k feet) = 85 Vrms		
	Insulation Resistance	5000 M $\Omega$ minimum		
	Contact Resistance	Center Contact = 3.0 m $\Omega$ maximum initial. 4.0 m $\Omega$ maximum after environment Outer Contact = 2.0 m $\Omega$ maximum initial. 2.0 m $\Omega$ maximum after environment Braid to Body = 0.5 m $\Omega$ maximum		
	Contact Current Rating	2.0 A dc maximum		
	Insertion Loss	0.06 x $\sqrt{\text{freq. GHz}}$ tested at 6 GHz		
	RF Leakage	-60 dB minimum @ 2 - 3 GHz		
	Voltage Standing Wave Ratio (VSWR) To 18 GHz or 80% of upper cut-off frequency of the cable, whichever is lower. Applicable to 50 $\Omega$ cables only. (F = GHz)	Connector configuration		
		Cable group	Straight	Right Angle
		RG178/U braided	1.20 + .025F	1.20 + .03F
		RG316/U braided	1.15 + .02F	1.15 + .03F
		RG142/U braided	1.15 + .01F	1.15 + .02F
	Dielectric Withstanding Voltage (DWV)	Connectors used with RG316/U series cable = 750 Vrms @ Sea Level		
	Corona Level	Connectors used with RG316/U series cable = 190 V @ 21 km (70k feet) minimum		
<b>MECHANICAL</b>	Engagement Design	SMA per MIL-C-39012, Series SMA		
	Engagement Forces	Torque: 0.23 Nm (2 in. lbs.) maximum		
	Contact Torque	0.03 Nm (4 in. ozs.) minimum. (For captivated contacts)		
	Mating Torque	0.8 Nm to 1.1 Nm (7 to 10 in. lbs.)		
	Locknut Torque	1.4 Nm to 1.7 Nm (12 to 15 in. lbs.) minimum		
	Coupling Nut Retention	267 N (60 lbs.) minimum		
	Materials	Body & body Components: Non-magnetic stainless steel or beryllium copper. Female Contacts: Beryllium copper. Insulators: PTFE. Crimp Ferrule: Annealed copper alloy. Gaskets: Silicone rubber		
	Finish/Plating	Center Contacts: Gold Plated. Other Metal Parts: Gold plated or passivated (as specified) to meet the finish and corrosion requirements of MIL-C-39012		
	<b>ENVIRONMENTAL</b>	Temperature Rating	-65° C to 165° C	
		Corrosion (salt spray)	MIL-STD-202, Method 101, test condition B, 5% salt solution	
Vibration, High Frequency		MIL-STD-202, Method 204, test condition D (20 G's)		
Shock		MIL-STD-202, Method 213, test condition I, (100 G's)		
Thermal Shock		MIL-STD-202, Method 107, test condition B.		
Moisture Resistance		MIL-STD-202. Method 106. No measurements at high humidity. Insulation resistance shall be 200 M $\Omega$ minimum within five minutes after removal from humidity.		
<b>GENERAL</b>		Connector Durability	500 matings minimum	
	Contact Captivation	Unless otherwise specified, all connectors feature captivated contacts. When captivated the contacts will withstand 26.7 N (6 lbs.) minimum axial force.		
	Cable Retention	When properly assembled to the compatible single braided coaxial cable, the retention is equal to the breaking strength of the cable.		

SMA

**Body Plating Options**

The following part number suffices can be specified for Precision SMA Connectors.

...310 gold body, gold coupling nut

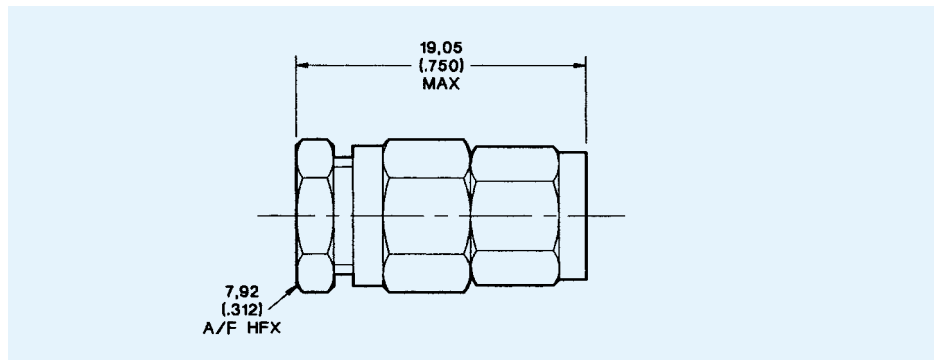
...890 passivated body &amp; coupling nut

except Direct Solder Types; gold body, passivated coupling nut

Clamp Type Cable Connectors For Flexible Cable

**Straight Plug, Captive Contact**

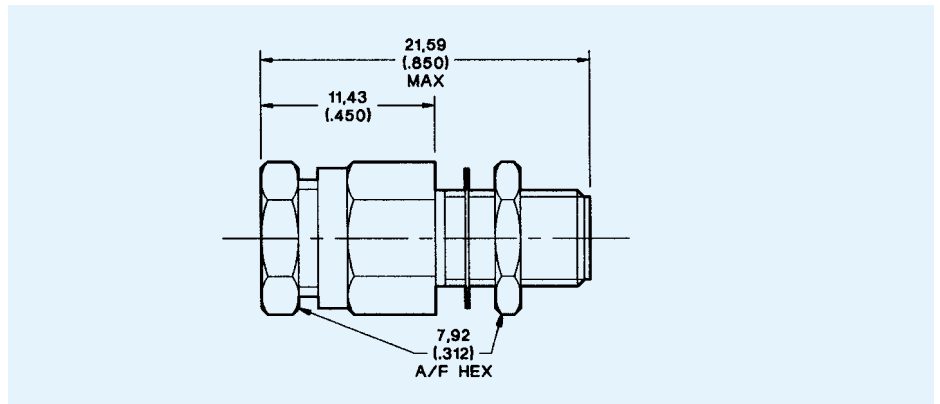
Part Number	Cable Numbers
050-607-3188890	RG174/U, 316/U



Assembly Instruction AI-106 (Page 113)

**Bulkhead Jack, Captive Contact**

Part Number	Cable Numbers
050-610-3188890	RG174/U, 316/U

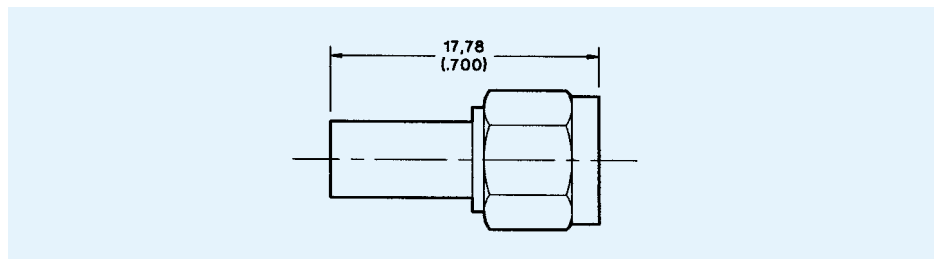


Mounting Plan W (Page 109). Assembly Instruction AI-106 (Page 113)

Crimp Type Cable Connectors For Flexible Cable

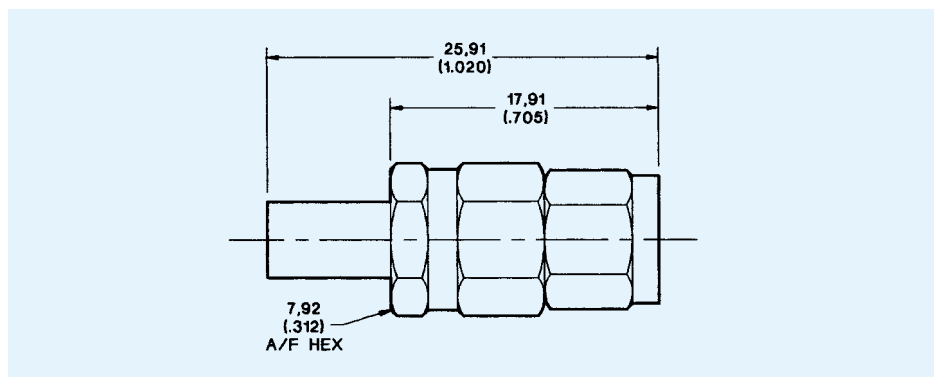
**Straight Plug, Non-Captive Contact**

Part Number	Cable Numbers	Assembly Instruction
050-622-9188890	RG174/U, 316/U	AI-102 (Page 112)
050-622-9875890	RD316	AI-236 (Page 112)



**Straight Plug Captive Contact**

Part Number	Cable Numbers
A50-624-9188890	RG174/U, 316/U
A50-624-9875890	RD316
A50-624-9142890	RG142/U, 400/U

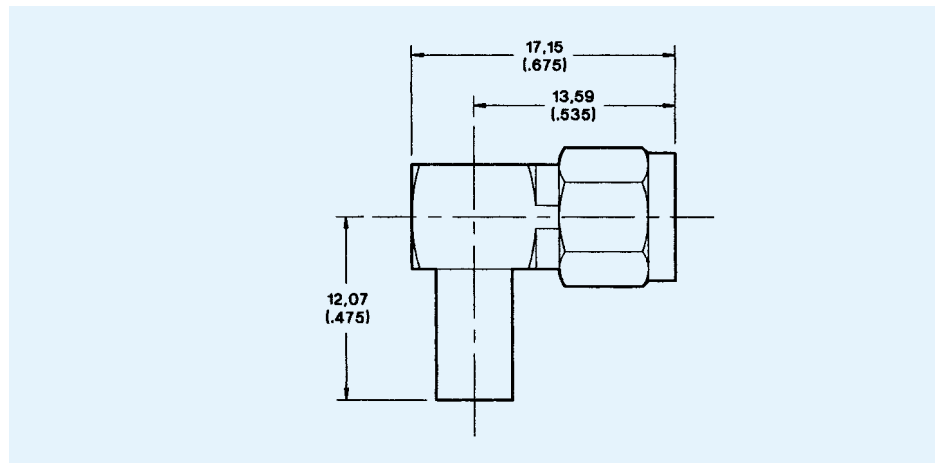


Assembly Instruction AI-703 (Page 125)

Crimp Type Cable Connectors for Flexible Cable

Right Angle Plug, Captive Contact

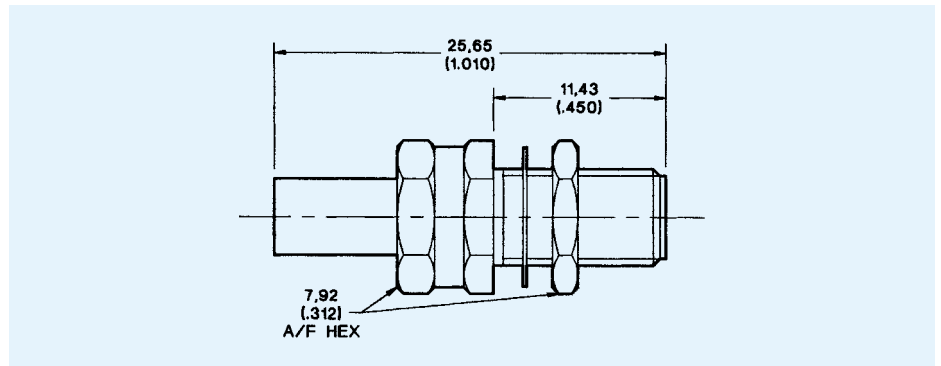
Part Number	Cable Numbers
050-628-9142890	RG142/U, 400/U
050-628-9188890	RG174/U, 316/U
050-628-9196890	RG178/U, 196/U
050-628-9875890	RD316



Assembly Instruction AI-90 (Page 110)

Bulkhead Jack, Captive Contact

Part Number	Cable Numbers
050-627-9142890	RG142/U, 400/U
050-627-9188890	RG174/U, 316/U
050-627-9875890	RD316

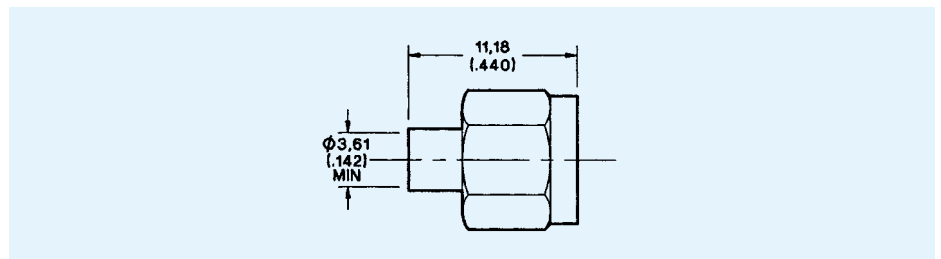


Mounting Plan W (Page 109). Assembly Instruction AI-227 (Page 116)

Direct Solder Type Cable Connectors for Semi-Rigid Cable

Straight Plug Without Center Contact\*

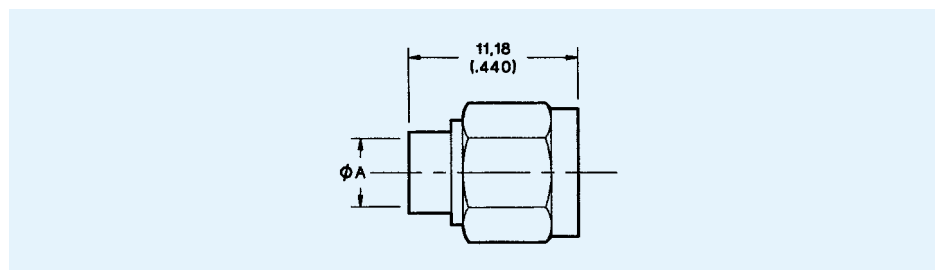
Part Number	Cable Number
055-607-2003890	RG402/U



Assembly Instruction AI-302 (Page 118)

Straight Plug With Center Contact

Part Number	Cable Number	A
055-607-9172890	RG405/U	2,20 (.088)
055-607-9173890	RG402/U	3,60 (.142)



Assembly Instruction AI-252 (Page 117)

\* Center conductor of cable is used as contact.

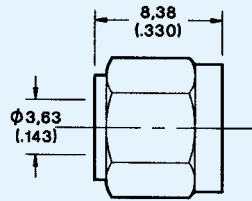


Direct Solder Type Cable Connectors for Semi-Rigid Cable

**Straight Plug, Solderless Version, Without Center Contact\***

Part Number	Cable Number
055-624-6703890	RG402/U

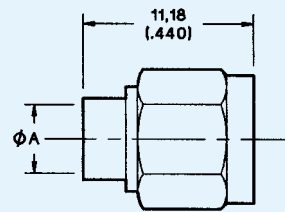
\* Center conductor of cable is used as contact.



Assembly Instruction AI-507 (Page 123)

**Straight Plug, Solderless Version, With Center Contact**

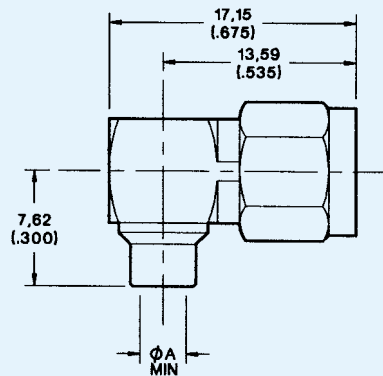
Part Number	Cable Number	A
055-607-6702890	RG405/U	2,20 (.088)
055-607-6203890	RG402/U	3,60 (.142)



Assembly Instruction AI-521 (Page 123)

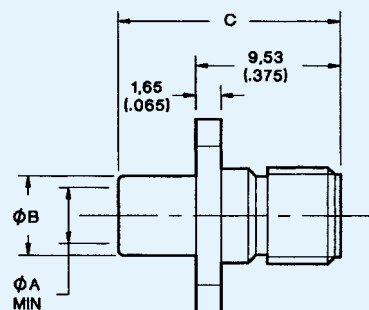
**Right Angle Plug**

Part Number	Cable Number	A
055-611-3702890	RG405/U	2,20 (.088)
055-611-3703890	RG402/U	3,60 (.142)



Assembly Instruction AI-98 (Page 111)

**Flange Mount Panel Jack**



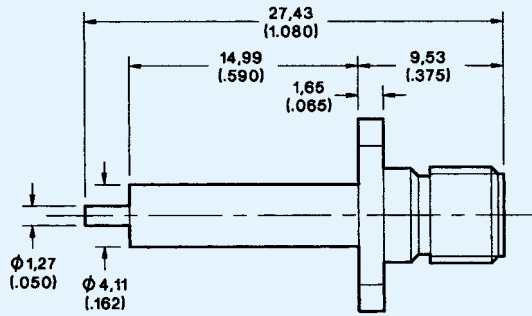
Assembly Instruction AI-278 (Page 117)

Part Numbers		Cable Number	Dimensions		
Square Flange	Narrow Flange		A	B	C
055-604-9172310	055-604-9272310	RG405/U	2,20 (.088)	3,05 (.120)	12,70 (.500)
055-604-9173310	055-604-9273310	RG402/U	3,60 (.142)	4,68 (.184)	14,28 (.560)

Flange Mount Receptacles

**Straight Jack, Stub Contact, Extended Dielectric**

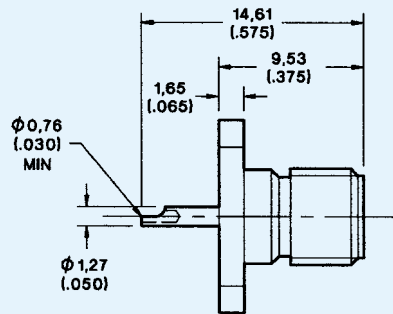
Part Numbers	
Square Flange	Narrow Flange
A50-645-4520890	A50-645-4540890



SMA

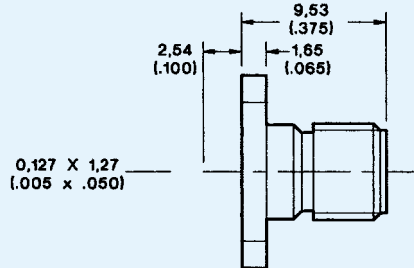
**Straight Jack, Solder Pot Contact, Flush Dielectric**

Part Numbers	
Square Flange	Narrow Flange
A50-645-4504890	A50-645-4526890

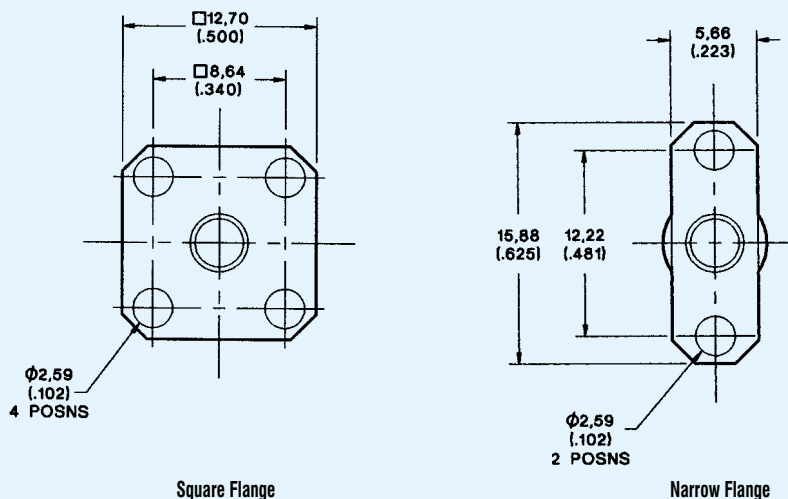


**Straight Jack, Tab Contact, Flush Dielectric**

Part Numbers	
Square Flange	Narrow Flange
A50-645-4575890	A50-645-4528890



**Flange Dimensions for Flange Mount Receptacles and Panel Jacks.**

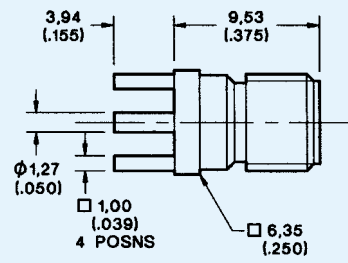


ALL FLANGE MOUNT RECEPTACLES HAVE CAPTIVATED CONTACTS

Printed Circuit Receptacles

**Straight Jack**

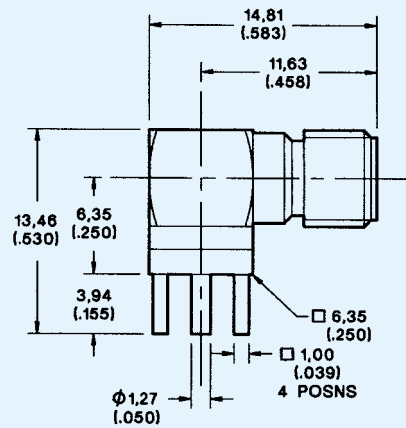
Part Number  
050-651-0000310



Mounting Plan D (Page 108)

**Right Angle Jack**

Part Number  
050-653-0000310

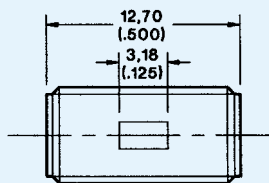


Mounting Plan D (Page 108)

In-Series Adaptors

Jack to Jack Adaptor, Straight

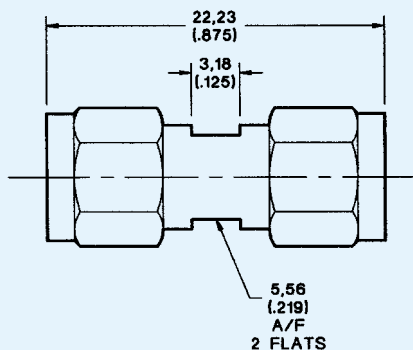
Part Number  
050-672-0000890



SMA

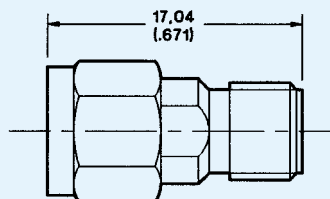
Plug to Plug Adaptor, Straight

Part Number  
050-673-0000890



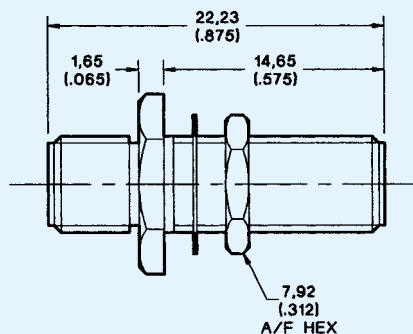
Plug to Jack Adaptor, Straight

Part Number  
050-674-0000890



Jack to Jack Adaptor, Bulkhead Mount, Straight

Part Number  
050-675-0000890



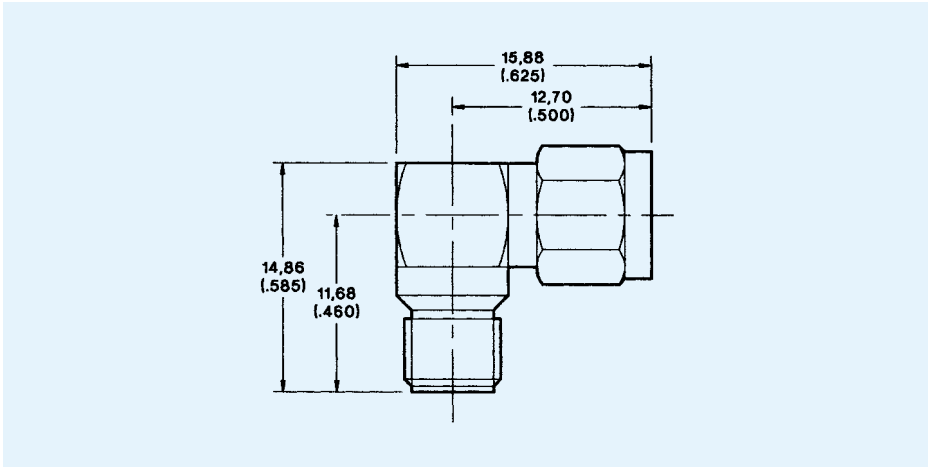
Mounting Plan W (Page 109)



In-Series Adaptors

Plug to Jack Adaptor, Right Angle

Part Number  
050-678-0000890



## Specifications

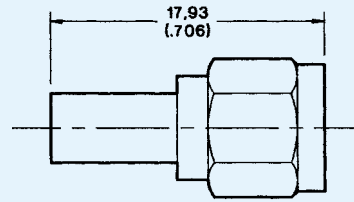
<b>ELECTRICAL</b>	Impedance	50 Ω nominal		
	Frequency Range	0 to 12.4 GHz		
	Voltage Rating	Connectors for RG316/U series cable . . . . At Sea Level = 250 Vrms. At 21 km (70k feet) = 65 Vrms Uncabled receptacles . . . . . At Sea Level = 335 Vrms. At 21 km (70k feet) = 85 Vrms		
	Insulation Resistance	5000 MΩ minimum		
	Contact Resistance	Straight cable connectors = 3.0 mΩ maximum initial. 4.0 mΩ maximum after environment R/A cable connectors = 3.0 mΩ maximum initial. 2.0 mΩ maximum after environment Outer contact = 2.0 mΩ maximum Braid to body (gold plated) = 0.5 mΩ maximum Braid to body (nickel or passivated) = 5.0 mΩ maximum		
	Insertion Loss	Straight cable connectors = $0.06 \times \sqrt{\text{freq. GHz}}$ tested at 6 GHz Right angle cable connectors = $0.15 \times \sqrt{\text{freq. GHz}}$ tested at 6 GHz		
	RF Leakage	-60 dB minimum @ 2.5 GHz		
	Voltage Standing Wave Ratio (VSWR) To 12.4 GHz or 80% of upper cut-off frequency of the cable, whichever is lower. Applicable to 50 Ω cables only. (F = GHz)	Connector configuration		
	Dielectric Withstanding Voltage (DWV)	Cable group	Straight	Right Angle
		RG316/U braided	1.15 + .02F	1.15 + .03F
	Corona Level	Connectors used with RG316/U series cable = 190 V @ 21 km (70k feet) minimum Uncoupled receptacles = 250 V @ 21 km (70k feet) minimum		
<b>MECHANICAL</b>	Engagement Design	SMA per MIL-C-39012, Series SMA		
	Engagement Forces	Torque: 0.23 Nm (2 in. lbs.) maximum		
	Contact Torque	0.03 Nm (4 in. ozs.) minimum. (Captivated contacts)		
	Mating Torque	0.8 Nm to 1.1 Nm (7 to 10 in. lbs.)		
	Coupling Nut Retention	267 N (60 lbs.) minimum		
	Materials	Body, body components: Brass. Coupling nut: Non-magnetic stainless steel. Female Contacts: Beryllium copper. Male contacts: Brass. Insulators: PTFE or Tefzel Crimp ferrule: Copper alloy. Gaskets: Silicone rubber		
	Finish/Plating	Center Contacts: Gold Plated. Other Metal Parts: Gold or nickel plated (as specified) to meet the finish and corrosion requirements of MIL-C-39012		
<b>ENVIRONMENTAL</b>	Temperature Rating	-65° C to 165° C		
	Corrosion (salt spray)	MIL-STD-202, Method 101, test condition B, 5% salt solution		
	Vibration, High Frequency	MIL-STD-202, Method 204, test condition D (20 G's)		
	Shock	MIL-STD-202, Method 213, test condition I, (100 G's)		
	Thermal Shock	MIL-STD-202, Method 107, test condition B.		
	Moisture Resistance	MIL-STD-202. Method 106.		
<b>GENERAL</b>	Connector Durability	500 matings minimum		
	Contact Captivation	Unless otherwise specified, all connectors feature captivated contacts. When captivated the contacts will withstand 22.2 N (5 lbs.) minimum axial force.		
	Cable Retention	When properly assembled to the compatible single braided coaxial cable, the retention is equal to the breaking strength of the cable.		

SMA

Plugs and Jacks

**Straight Cable Plug**

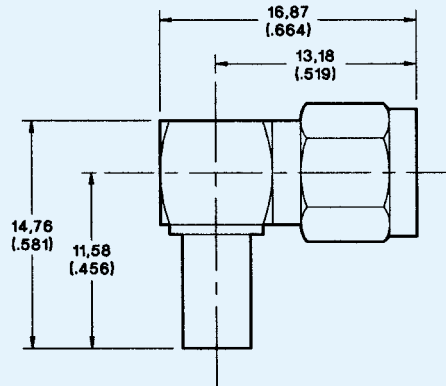
Part Number	Cable Numbers
050-E22-9188210	RG174/U, 316/U
050-E22-9141210	RG58/U, 141/U
050-E22-9142210	RG142/U, 400/U
050-E22-9875210	RD316



Assembly Instruction AI-771 (Page 112)

**Right Angle Cable Plug**

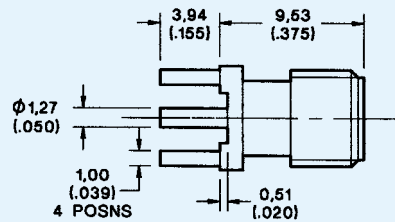
Part Number	Cable Numbers
A50-E28-9188210	RG174/U, 316/U
050-E28-9141210	RG58/U, 141/U
050-E28-9142210	RG142/U, 400/U
050-E28-9196210	RG178/U, 196/U
A50-E28-9875210	RD316



Assembly Instruction AI-773 (Page 110)

**Straight PCB Jack**

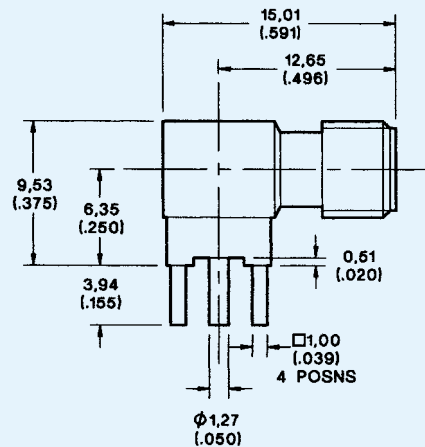
Part Number  
050-E51-0000210



Mounting Plan D (Page 108)

**Right Angle PCB Jack**

Part Number  
A50-E53-0000210

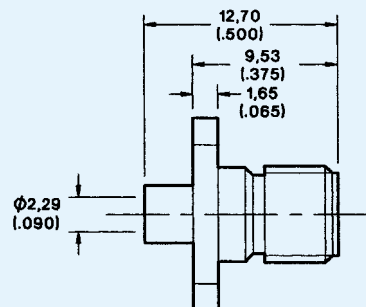


Mounting Plan D (Page 108)

Flange Mount Connectors

**Flange Mount Jack, Non-Captive Contact**

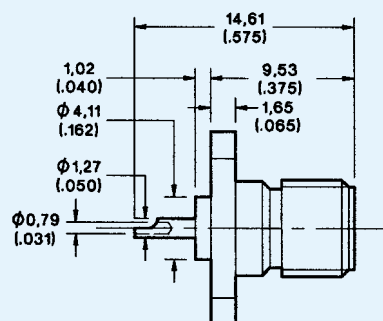
Part Number	Cable Number
<b>Narrow Flange</b>	
050-E04-9702210	RG405/U



Assembly Instruction AI-770 (Page 128)

**Flange Mount Jack Receptacle**

Part Number  
Narrow Flange  
050-E45-0000210



Flange mounting details are shown on page 13.

SMA

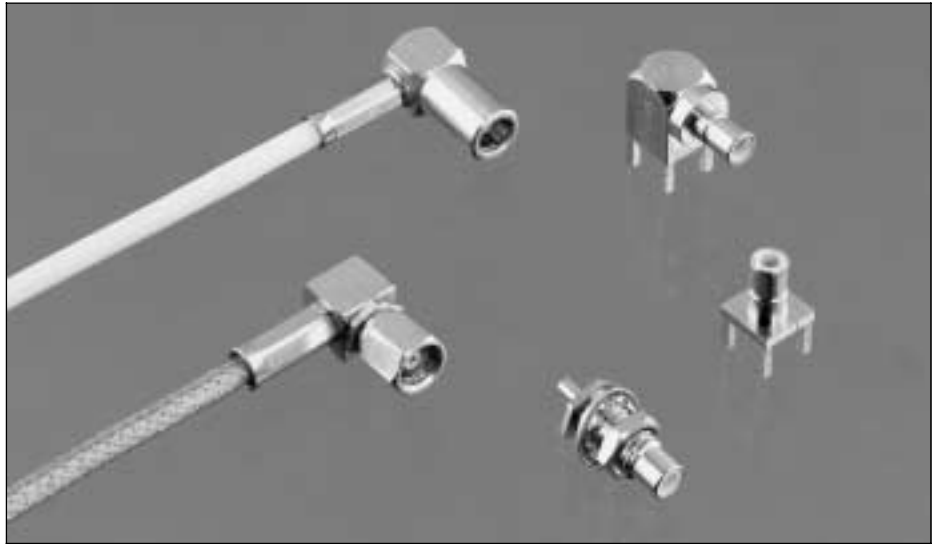


## Introduction

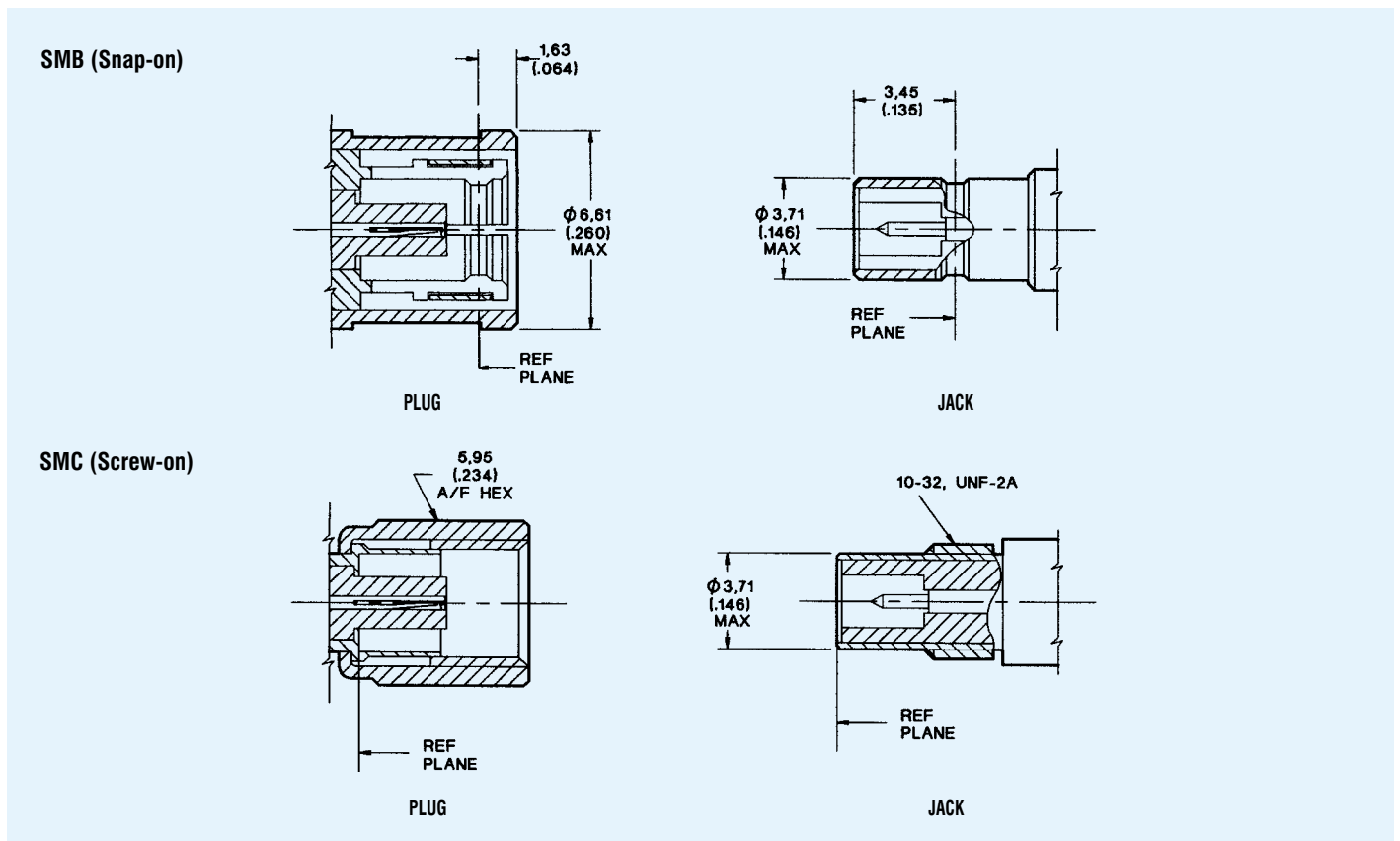
ITT Cannon's SMB Snap-on and SMC Screw-on subminiature coaxial connectors have been specifically engineered for high performance and high reliability applications in both military and commercial equipments operating at frequencies up to 4 GHz (SMB) and 12.4 GHz (SMC).

The Snap-on mating engagement allows a rapid connect/disconnect facility. The Screw-on mating engagement allows a low VSWR under vibration conditions and a matched impedance of 50ohms.

ITT Cannon SMB/SMC connectors are compatible with all SMB/SMC type connectors conforming with MIL-C-39012, BS9210, UTE C93 561, UTE C93 562, CCEC 22130 and CCEC 22140.



## Mating Interfaces



### NOTES

1) Inside diameter of female contact to meet VSWR mating characteristics and connector durability when mated with a 0.48 – 0.53 (.019 – .021) diameter male contact.

2) All undimensioned pictorial representations are for reference purposes only.

3) Slide-on versions of most SMB female styles, prefix 052, are available. For slide-on male interconnection use male SMB (snap-on) type.

## Specifications

ELECTRICAL		Impedance	50 $\Omega$																						
		Frequency Range	SMB = 0 to 4.0 GHz. SMC = 0 to 12.4 GHz																						
		Voltage Rating	Connectors for RG196/U series cable: At Sea Level = 300 Vrms. At 21 km (70k feet) = 75 Vrms Connectors for RG188/U series cable: At Sea Level = 400 Vrms. At 21 km (70k feet) = 100 Vrms																						
		Insulation Resistance	1000 M $\Omega$ minimum																						
		Contact Resistance	Center Contact = 6.0 m $\Omega$ maximum initial. 8.0 m $\Omega$ maximum after environment Outer Contact = 1.0 m $\Omega$ maximum initial. 1.5 m $\Omega$ maximum after environment Braid to Body = 1.0 m $\Omega$ maximum																						
		Contact Current Rating	1.5 A dc maximum																						
		Insertion Loss	0.25 dB maximum @ 4 GHz																						
		RF Leakage	SMB = -55 dB minimum @ 2 - 3 GHz SMC = -60 dB minimum @ 2 - 3 GHz																						
		Voltage Standing Wave Ratio (VSWR) To 10 GHz or 80% of upper cut-off frequency of the cable, whichever is lower. Applicable to 50 $\Omega$ cables only. (F = GHz)	<table border="1"> <thead> <tr> <th rowspan="2">Cable</th> <th colspan="2">SMB</th> <th colspan="2">SMC</th> </tr> <tr> <th>Straight</th> <th>Rt. Angle</th> <th>Straight</th> <th>Rt. Angle</th> </tr> </thead> <tbody> <tr> <td>RG196/U Series</td> <td>1.30 + .04F</td> <td>1.45 + .06F</td> <td>1.25 + .04F</td> <td>1.40 + .06F</td> </tr> <tr> <td>RG188/U Series</td> <td>1.25 + .04F</td> <td>1.35 + .04F</td> <td>1.20 + .04F</td> <td>1.30 + .04F</td> </tr> </tbody> </table>				Cable	SMB		SMC		Straight	Rt. Angle	Straight	Rt. Angle	RG196/U Series	1.30 + .04F	1.45 + .06F	1.25 + .04F	1.40 + .06F	RG188/U Series	1.25 + .04F	1.35 + .04F	1.20 + .04F	1.30 + .04F
Cable	SMB		SMC																						
	Straight	Rt. Angle	Straight	Rt. Angle																					
RG196/U Series	1.30 + .04F	1.45 + .06F	1.25 + .04F	1.40 + .06F																					
RG188/U Series	1.25 + .04F	1.35 + .04F	1.20 + .04F	1.30 + .04F																					
MECHANICAL		Engagement Design	SMB per MIL-C-39012, Series SMB. SMC per MIL-C-39012, Series SMC																						
		Engagement Forces	SMB: Initial = 62 N (14 lbs.) max. engagement. After 500 matings = 62 N (14lbs.) max. engagement and disengagement = 8.9 N (2 lbs.) min. disengagement. SMC: 0.11 Nm (16 in. oz.) torque max.																						
		Mating Torque	SMB: N/A. SMC: 0.42 to 0.50 Nm (60 to 70 in. oz.)																						
		Locknut Torque	0.56 to 0.64 Nm (80 to 90 in. oz.)																						
		Coupling Nut Retention	SMB: N/A. SMC: 155 N (35 lbs.) minimum																						
		Materials	Body, Body Components and Male Contacts: Brass, half hard. Female Contacts: Beryllium copper, heat treated. Insulators: PTFE. Lockwashers: Phosphor bronze. Crimp Ferrule: Annealed copper alloy. Gaskets: Silicone rubber																						
		Finish/Plating	Center Contacts: Gold Plated Other Metal Parts: Gold or nickel plated to meet the finish and corrosion requirements of MIL-C-39012																						
ENVIRONMENTAL		Temperature Rating	-65°C to 165°C																						
		Corrosion (salt spray)	MIL-STD-202, Method 101, test condition B, 5% salt solution																						
		Vibration, High Frequency	MIL-STD-202, Method 204. SMB, test condition B (15 G's). SMC, test condition D (20 G's)																						
		Shock	MIL-STD-202, Method 213. SMB: test condition B, 75 G's @ 6 milliseconds, 1/2 sine. SMC: test condition C, 100 G's @ 6 milliseconds 1/2 sine.																						
		Thermal Shock	MIL-STD-202, Method 107, test condition B, except high temperature shall be 85°C. High temperature shall be 200°C for connectors using 200°C cables.																						
		Moisture Resistance	MIL-STD-202. Method 106, when interface gasket is used. No measurement at high humidity. Insulation resistance shall be 200 M $\Omega$ minimum within five minutes after removal from humidity.																						
GENERAL		Connector Durability	500 matings minimum																						
		Contact Captivation	Unless otherwise specified, all connectors feature captivated contacts. When captivated the contacts will withstand 17,8 N (4.0 lbs.) minimum axial force. CECC 22130 = 10 N (2.25 lb.)																						
		Cable Retention	When properly assembled to the compatible braided coaxial cable, the retention is equal to the breaking strength of the cable.																						

SMB/C

**Body Plating Options**

The following part number suffices can be specified for SMB/SMC Connectors.

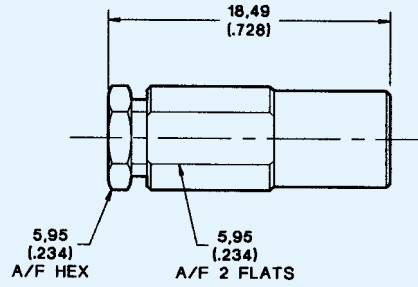
...220 gold body  
 ...910 nickel body  
 ...C90 nickel body

Straight Plugs and Jacks

SMB CONNECTORS HAVE SOLDER CENTER CONTACTS

**Straight Clamp Plug**

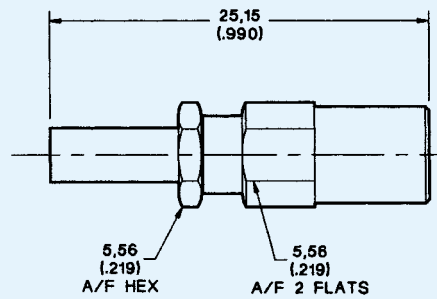
Part Number	Cable Numbers
B51-007-0000220	RG174/U, 316/U
B51-007-3196220	RG178/U, 196/U



Assembly Instruction BBAI-1213 (Page 135)

**Straight Crimp Plug**

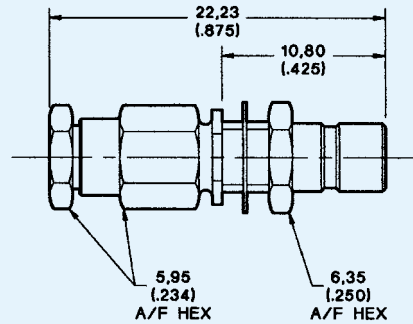
Part Number	Cable Numbers
B51-024-0000220	RG174/U, 316/U
B51-024-3196220	RG178/U, 196/U
B51-024-9399220	RD316, 179



Assembly Instruction BAI-003 (Page 122)

**Straight Clamp Bulkhead Jack**

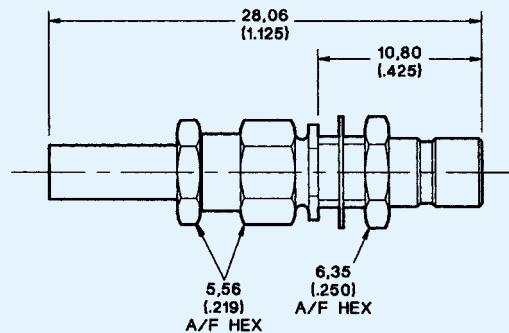
Part Number	Cable Numbers
051-010-0000220	RG174/U, 316/U
051-010-3196220	RG178/U, 196/U



Mounting Plan V (Page 109). Assembly Instruction BAI-001 (Page 130)

**Straight Crimp Bulkhead Jack**

Part Number	Cable Numbers
051-027-0000220	RG174/U, 316/U
051-027-3196220	RG178/U, 196/U
051-027-9399220	RD316, 179



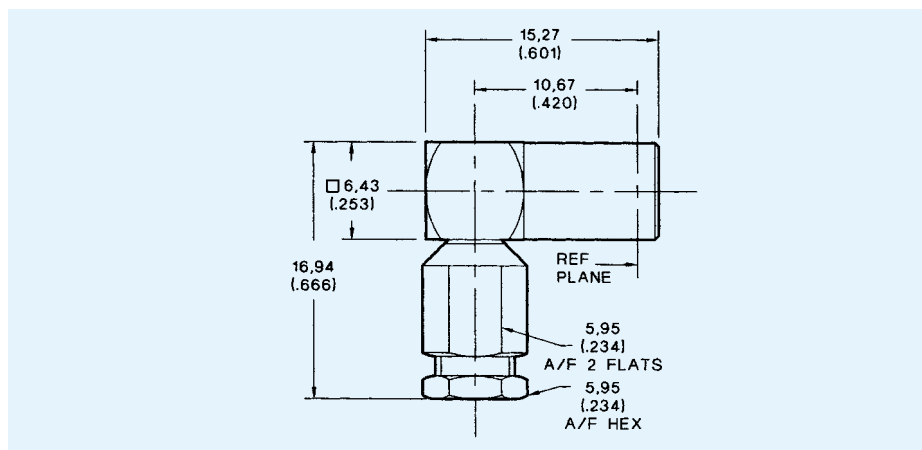
Mounting Plan V (Page 109). Assembly Instruction BAI-003 (Page 122)

## Right Angle Plugs

SMB CONNECTORS HAVE SOLDER CENTER CONTACTS

### Right Angle Clamp Plug

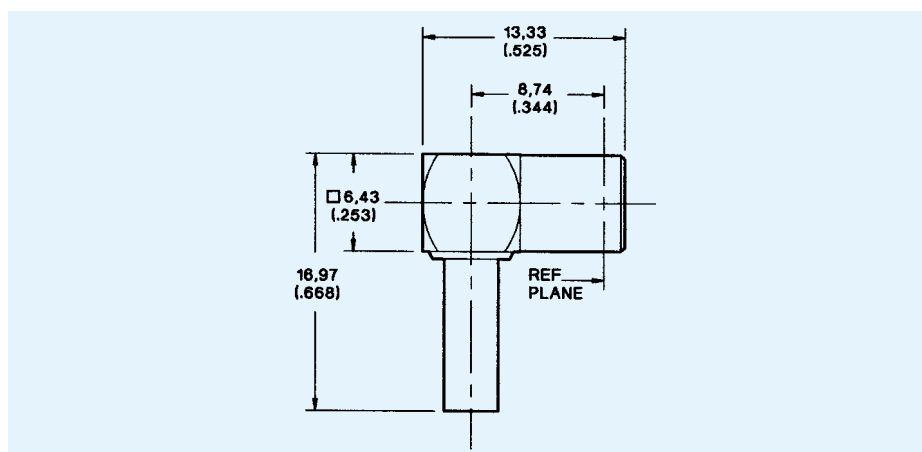
Part Number	Cable Numbers
B51-011-0000220	RG174/U, 316/U
B51-011-3196220	RG178/U, 196/U



Assembly Instruction BBAI-1221 (Page 136)

### Right Angle Crimp Plug

Part Number	Cable Numbers
B51-328-3188220	RG174/U, 316/U
B51-328-3196220	RG178/U, 196/U
B51-328-9399220	RD316, 179



Assembly Instruction BAI-015 (Page 120)

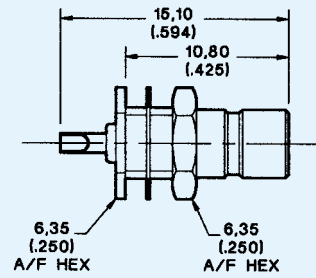
SMB/C



Bulkhead Jacks

**Straight Bulkhead Jack, Solder Pot,  
Mounting Nut Outside Panel**

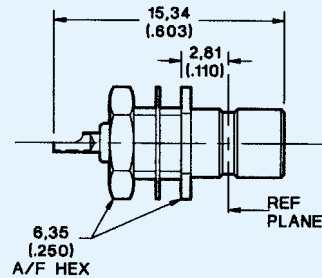
Part Number  
051-043-0000220



Mounting Plan V (Page 109)

**Straight Bulkhead Jack, Solder Pot,  
Mounting Nut Inside Panel**

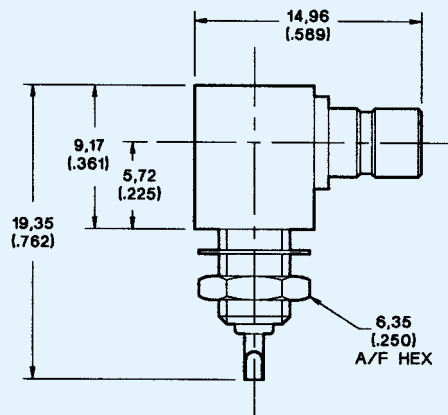
Part Number  
051-045-0000220



Mounting Plan V (Page 109)

**Right Angle Bulkhead Jack, Solder Pot,  
Mounting Nut Inside Panel**

Part Number  
051-047-0000220



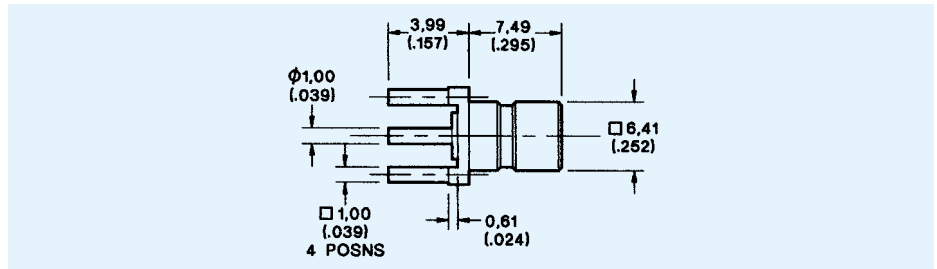
Mounting Plan V (Page 109)

Printed Circuit Board Jacks

SMB PCB preferred styles feature stepped legs. This allows the jacks to be raised from the surface of the PCB, thereby preventing the accumulation of soldering fluids and foreign bodies. A single piece conductor overcomes the problem of internal joint separation during continuous wave/flow soldering operations.

**Straight PCB Jack, 1,00 (.039) sq Legs**

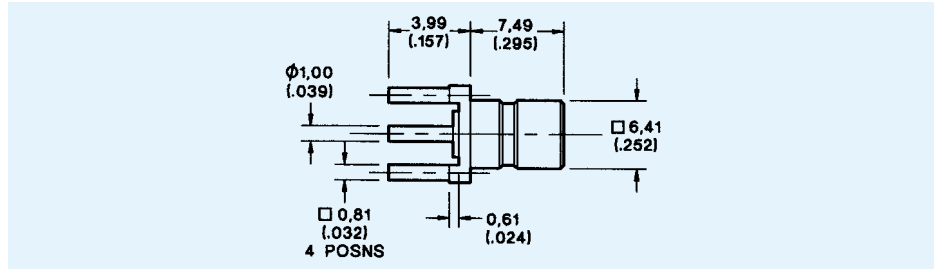
Part Number  
B51-351-0000220



Mounting Plan A (Page 108)

**Straight PCB Jack, 0,81 (.032) sq Legs**

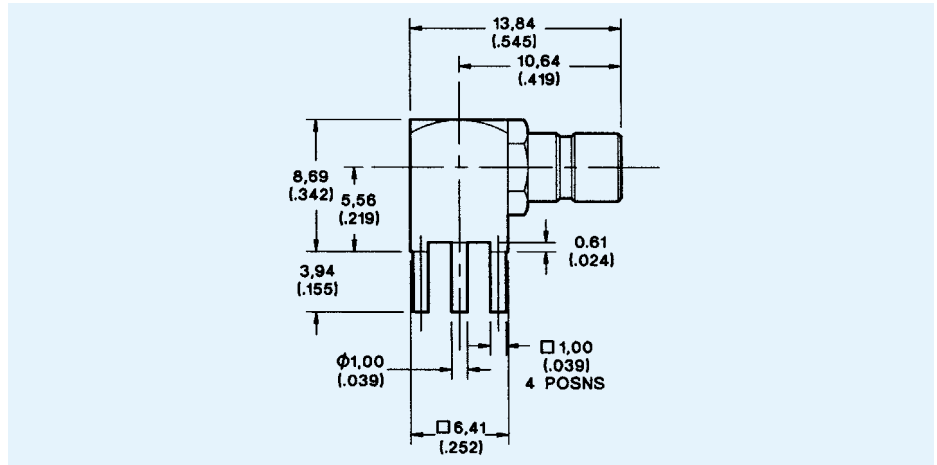
Part Number  
B51-051-9029220



Mounting Plan B (Page 108)

**Right Angle PCB Jack, 1,00 (.039) sq Legs**

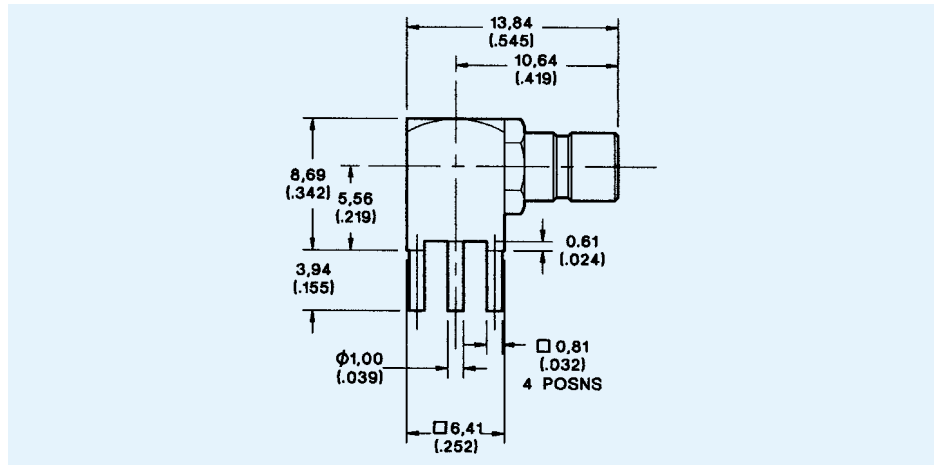
Part Number  
B51-053-0000220



Mounting Plan A (Page 108)

**Right Angle PCB Jack, 0,81 (.032) sq Legs**

Part Number  
B51-053-9029220



Mounting Plan B (Page 108)

SMB/C