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# MAURY

## VNA Calibration Kits, Microwave Components & Adapters

*IN THIS CATALOG:*

- VNA Calibration Kits
- Calibration Standards
- Coaxial & Waveguide Adapters
- Connector Gage Kits
- Air Lines
- Torque Wrenches
- Manual Tuners



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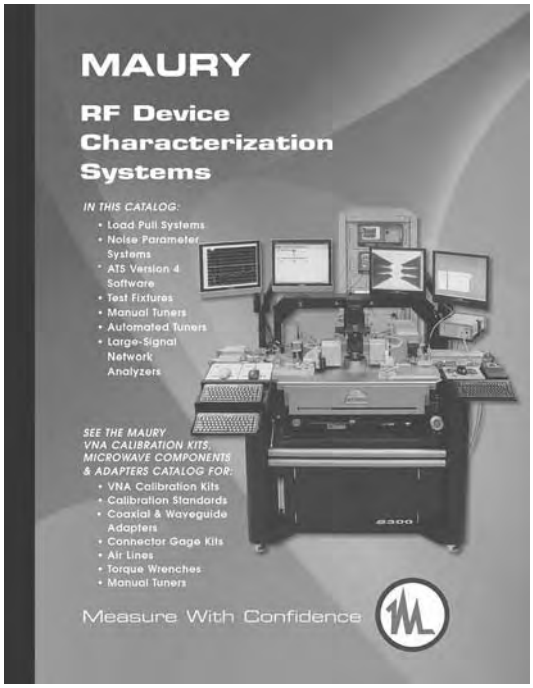
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# Maury Precision Calibration Standards & Components

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## *In This Volume:*



### *Calibration Kits for Network Analyzers (VNAs, PNAs and ENAs)*

For accurate and precise calibration of all popular Agilent VNAs, PNAs and ENAs; Anritsu, Rohde & Schwarz, and other network analyzers, from DC to 110 GHz. Maury cal kits are offered in a wide range of connector types, and are available in standard (sliding load), expanded (sliding load plus connector gages), fixed termination, TRM/TRL/LRL, and economy models.

### *Coaxial and Waveguide Microwave Components*

All of the components that make up our calibration kits are available for separate purchase as spares or replacement parts. Whether you buy them as part of a kit or separately, you can always count on Maury components to perform with the same high quality and dependability. Maury makes the world's finest precision and reference air lines, directional couplers, fixed and sliding loads, shorts, opens and precision mismatches.

Maury also offers a line of analog and digital connector gage kits. Using these gages to check all of your connector interface dimensions *before* mating ensures the best possible electrical performance and most accurate measurements from your test equipment. Maury connector gage kits come in over 30 gage types with more than 20 kit configurations providing everything you need to verify the pin depth and center conductor position of each connector. Proper use of these gage kits enables you to avoid expensive damage to test set ports and DUT connectors.



### *Coaxial and Waveguide Precision Adapters*

Maury produces the widest variety of precision coaxial and waveguide adapters of any supplier, world-wide. Our adapters are known for their quality, durability and repeatability. From 1.85mm to 7-16, and from WR650 to WR10, we have the adapter you need, no matter what test setup or application you use.

### *Coaxial and Waveguide Manual Tuners*

Manual tuners are used both in the laboratory and as system components to either establish or transform impedances for a number of applications. Maury produces several types of manual tuners in two categories; stub tuners and slide screw tuners.



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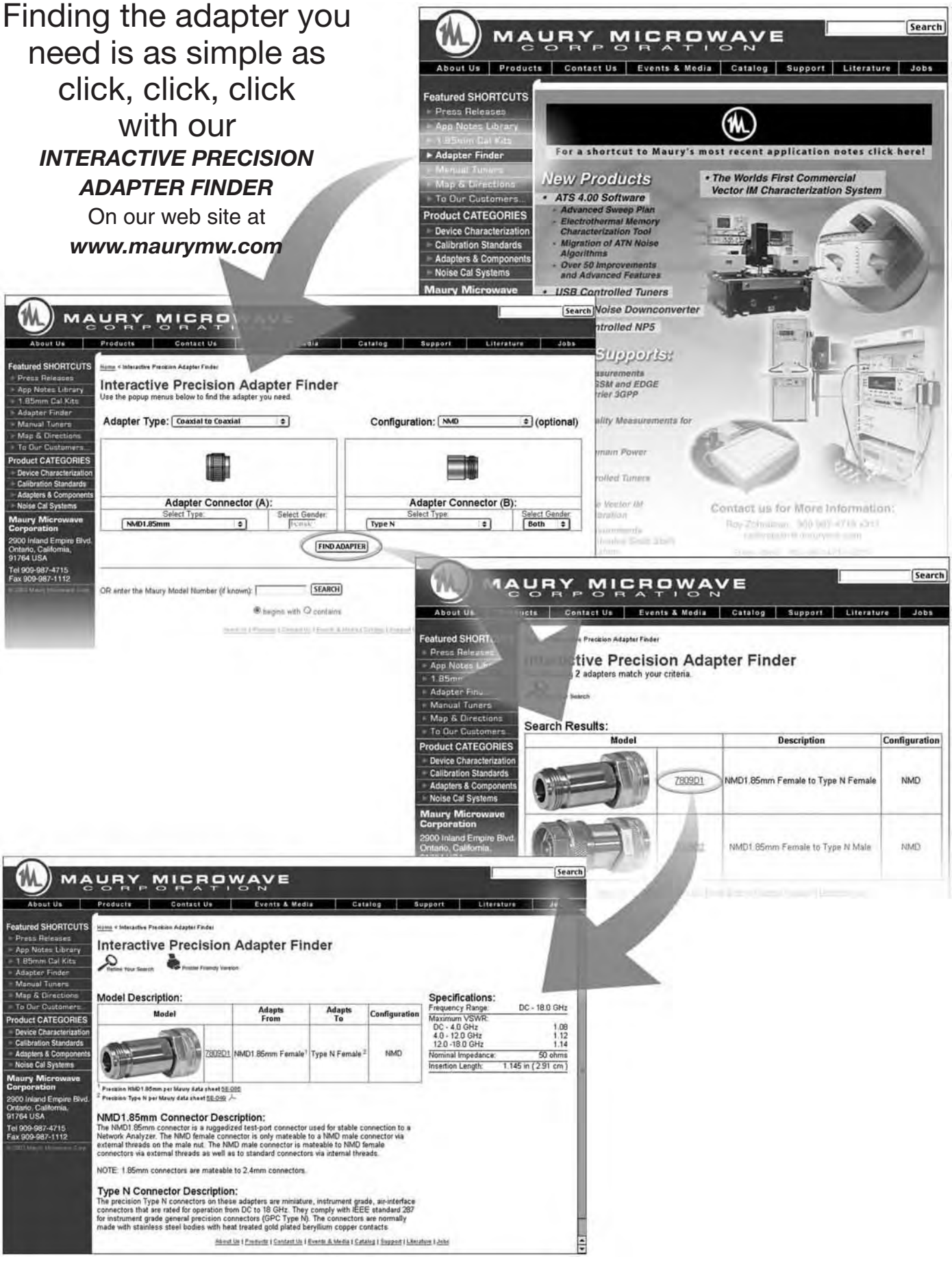
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# General Information

## How To Order Maury Products

Orders may be placed directly with the factory or in care of your nearest Maury sales representative. For orders originating outside the United States, we recommend placing the order with your local Maury sales representative. Maury maintains an extensive network of sales representatives throughout the world. A list of Maury sales representatives can be found on our web site at **maurymw.com**.

## Pricing and Quotations

Prices for Maury products are those prevailing when an order is placed except in those instances where the price is established by a formal quotation. Maury Microwave reserves the right to change prices at any time without notice. Price and availability of products with custom or special features must be verified by a valid, formal factory quotation. Maury quotations are valid for a maximum of 30 days. Extensions of quotation validity beyond 30 days can be granted only by the factory.

## Terms of Sale

***Domestic*** terms are net 30 days from the date of invoice for customers with established credit F.O.B. Ontario, California. Please refer to Maury Form 228 for complete terms and conditions.

For ***International*** sales, please refer to Maury Form 250. Sales to Canada are covered by Maury Form 251.

These forms are available on request, or may be found on our web site in PDF format.

## Shipment

All shipments are at the buyer's expense. Shipments are normally made using methods and carriers specified by the customer. In the absence of specific instructions, Maury will ship at our discretion by the most advantageous method. All shipments are F.O.B. the Maury Microwave factory in Ontario, California (U.S.A.) and, unless otherwise specified, will be insured at full value at the customer's expense. Shipments are packed to provide ample safety margin against transit damage, and there is no charge for regular packing requirements. Additional charges apply to MIL-SPEC preservation, packaging, packing and marking.

## Product and Specifications Changes

The information, illustrations and specifications contained in this catalog were current at the time of publication. Maury Microwave is continually striving to upgrade and improve our product offering and therefore, reserves the right to change specifications, designs and models without notice and without incurring any obligation to incorporate new features on products previously sold.

Because products are changed or improved with time, please consult your local Maury representative, or our Sales Department, for current pricing and product information before placing orders.

## Product Selection

Maury representatives and sales office personnel are well qualified to provide assistance in product selection, and current pricing and availability. Our factory applications engineers are ready to assist you with any technical or applications questions you may have.

## Service and Support

### *Warranty*

Maury Microwave is highly confident that our products will perform to the high levels that our customers have come to expect. As an expression of that confidence, our products are warranted as noted in the abbreviated warranty statements below. (For a complete statement of the hardware warranty, please see Form 228, *Terms and Conditions of Sales*. For a complete statement of the software warranty, please see Form 273, *Maury License Agreement*.)

Maury Microwave hardware products are warranted against defects in material and workmanship for a period of one year after delivery to the original purchaser. If a Maury manufactured hardware product is returned to the factory with transportation prepaid and it is determined by Maury that the product is defective and under warranty, Maury will service the product, including repair or replacement of any defective parts thereof. This constitutes Maury's entire obligation under this warranty.

Maury warrants that, for a period of ninety (90) days following purchase, software products, including firmware for use with and properly installed on a Maury designated hardware product, will operate substantially in accordance with published specifications, and that the media on which the product is supplied is free from defects in material and workmanship. Maury's sole obligation under this warranty is to repair or replace a nonconforming product and/or media, provided Maury is notified of nonconformance during the warranty period. Maury does not warrant that the operation of the product shall be uninterrupted or error-free, nor that the product will meet the needs of your specific application.

The warranty does not apply to defects arising from unauthorized modifications, misuse or improper maintenance of the product. Warranty service is available at our facility in Ontario, California.

### *Service Returns*

Repair and calibration services are available for Maury products for as long as replacement parts are available. On some instruments, support services may be available for up to ten years.

## Quality Profile

Maury Microwave Corporation enjoys a well-earned reputation for excellent, technically advanced products that are reliable, meet specifications, and provide a quality appearance. Maintaining and improving this reputation requires adherence to strict quality standards that are set forth in a formal Quality Department Manual. This manual is distributed to all Maury managers, inspectors, and technicians. The Quality Manual can be reviewed by our customers at our facility in Ontario, California.

Our inspection and calibration systems are in accord with MIL-I-45208A and MIL-STD-45662A, respectively. Our overall quality system has been approved through in-house surveys by many of our customers including the U.S. Government. Our laboratory is ANSI/NCSL Z540-1 compliant with traceability to NIST.



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# About Maury Microwave

## Corporate Profile

Maury and Associates was founded by Mario A. Maury, in Montclair, California on October 15, 1957. With the help of his sons, Mario A. Maury, Jr. and Marc A. Maury, the company earned a solid reputation in the microwave test and calibration industry, while developing a comprehensive line of precision instruments, coaxial and waveguide components, and support products. Today, after more than 48 years we serve our customers as Maury Microwave Corporation. We are proud of our company and the products we make, we are dedicated to the pursuit of quality, and we are committed to providing the very best in customer service.

### Markets Served

Maury Microwave serves all areas of the RF and microwave industry, producing a comprehensive line of automated tuners, microwave components and accessories that operate from DC to 110 GHz. Our offering includes a wide range of test and measurement products that are used extensively by the wireless communication industry for power and noise characterization of transistors and amplifiers. Our precision calibration standards are used for test and measurement applications and production testing. Maury also produces system components for ground based and airborne applications such as communications, EW/ECM systems, and radar.

### Manufacturing Technologies

Our factory is equipped with the latest CNC machines and can handle high volume production as well as high precision small-quantity manufacturing. We maintain a state-of-the-art microwave laboratory using the latest test equipment and vector network analyzers to support our test and calibration operations. Our in-house manufacturing and testing capabilities allow us to provide custom products tailored to our customers' specific requirements.

### Business Alliances

As a leader in the RF and microwave calibration and measurement field, Maury has long been recognized for the accuracy, repeatability, and stability of our products. Agilent Technologies acknowledged this in September, 2001 by inviting Maury Microwave to become a Channel Partner for device characterization solutions. We also enjoy close business ties with Cascade Microtech of Beaverton, Oregon and Inter-Continental Microwave of Santa Clara, California.

### Technical Services

Our extensive knowledge and experience with calibration and measurement requirements provides the expertise necessary for producing high quality products. Maury Calibration and Repair Services are available for every product we make, and are performed in a temperature-controlled environment with the latest in measurement and verification equipment.



### New Products & Technologies

In May of 2003, Maury Microwave and Agilent Technologies signed an agreement under which Maury is licensed to utilize Agilent's large signal network analysis (LSNA) technology for commercialization, manufacture, sales and support. The resulting new product, Maury's MT4463A Large-Signal Network Analyzer is an essential design tool that complements our electro-mechanical and solid state tuner-based device characterization product line.

Maury makes RF and microwave devices that cover a range from DC to 110 GHz, primarily addressing test and measurement applications. Coaxial components are available to 67 GHz in most popular line sizes and we also manufacture waveguide components from WR650 to WR10.

Maury's extensive line of VNA calibration kits also supports Agilent's PNA and ENA series, as well as Rohde and Schwarz ZV series and Anritsu 37000 series network analyzers. Also, new digital connector gage kits are now available in 3.5mm/2/92mm and 2.4mm/1.85mm combination models.

### Facilities

Located in the City of Ontario, California, about 40 miles due east of Los Angeles and just north of the San Bernardino Freeway (Interstate 10), our 96,000 square foot facility is within minutes of the Ontario International Airport (ONT). Here, we make the best microwave products in the market.





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# Calibration and Repair Services





## *Calibration Services*

At Maury Microwave, our commitment to quality doesn't end with the sale of a product. In our state-of-the-art microwave laboratory, we offer both ANSI/NCSL Z540-1 (MIL-STD-45662A) calibration and commercial level calibration services for every product we produce. Our laboratory is ANSI/NCSL Z540-1 ISO 10012-1 compliant with traceability to NIST (National Institute of Standards and Technology).

Each Maury Microwave product is shipped with a certificate of conformance which assures that it has been tested and found to be within operational tolerances. As these products are used, changes can occur which may result in an out of tolerance condition. Periodic calibrations are therefore recommended to maintain functional integrity. We are happy to perform the calibrations you need at a reasonable cost.

Please contact our Calibration and Repair – Measurement Services Department to obtain quotations for the specific calibration services you require. Quoted prices will cover the cost of all applicable measurements and include written calibration reports documenting the mechanical and electrical data. If parts are out of tolerance, the cost of repair or replacement will be quoted for your approval prior to the start of any additional work.

It is recommended that the following items be placed on a 12-month re-calibration cycle:

- Calibration Kits
- Verification Kits
- Coaxial Components for Laboratory Use
- Waveguide Components for Laboratory Use
- Automated Tuner Systems
- Noise Calibration Systems (Cryogenic, Thermal and Ambient Terminations)Mechanical Products
- Torque Wrenches
- Connector Gages

## *Repair Services*

We recommend annual re-calibration and refurbishment of your Maury products to ensure continuous measurement accuracy. Because we are the original equipment manufacturer and users of Maury products, we understand the critical performance criteria of your measurement equipment. Therefore, we will always give you an honest evaluation of each and every Maury part when repairs are required. We will also provide you with options and our best recommendation for optimum performance.

Annual recalibration and servicing guarantees:

- Accuracy and Confidence in your Network Analyzer Measurements
- Precision Connector Mating
- Verification of Critical Mechanical and Electrical Specifications
- All Interfaces meet “As New” Mechanical Specifications to Ensure Predictable S-Parameter Performance
- Prolonged Life of Both Maury Measurement Standards and Your Network Analyzers
- Confidence That Your Maury Product Will Be As Precise As When First Delivered
- Refurbishment Done Right and Done Here In Our Factory
- Guaranteed Genuine Maury Parts and Quality
- We Design It, We Build It, We Calibrate It, We Repair It.

Benefits of Maury Calibration and Repair:

- Calibration and Repairs Performed Directly By The OEM (No Middleman Delays or Mark-Ups!)
- Complete Confidence In Your Measurements
- Protects Your Costly Network Analyzer Investment
- Maintains Your ANSI/ISO Compliance and NIST Traceability



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# VNA Calibration Kit Finder

## Use the chart below to find the page(s) in this catalog which have information about Maury VNA/PNA Calibration Kits

### Cal Kit Information Finder

Locate the right catalog page(s) for the kit you need

| DUT CONNECTOR | SOLT Kits: •Standard Coaxial (Sliding Load) Kits | •Expanded Coaxial (Connector Gages) Kits | •Fixed Termination Coaxial Kits | •Fixed Single-Sex Coaxial Kits | •Economy Coaxial Kits | •Standard Waveguide Kits | •Economy Waveguide Kits | •Optimized Waveguide Kits | SSLT Kits: •Coaxial Kits | •Coaxial Economy Kits | TRL/LRL Kits: •Waveguide Kits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 1.85mm | 4 | | 5 | 5 | | | | | 6 | | |
| • 2.4mm | 8 | | 9 | 9 | | | | | 10 | | |
| • 2.92mm (K) | 12 | | 13 | | | | | | 14 | | |
| • 3.5mm | 16 | 16 | 17 | | 39 | | | | 18 | | |
| • 7mm | | 20 | 20 | | | | | | 21 | 39 | |
| • Type N (50 ohm) | 22 | | 23 | | 39 | | | | 24 | | |
| • Type N (75 ohm) | | | 26-27 | | | | | | | | |
| • TNC | 28 | | 29 | | 39 | | | | | | |
| • AFTNC | 30 | | 30 | | | | | | | | |
| • TNCA | 32 | | 32 | | | | | | | | |
| • BNC (50 ohm) | | | 34 | | 39 | | | | | | |
| • BNC (75 ohm) | | | 35 | 35 | | | | | | | |
| • OSP™ | 36 | | 36 | 37 | | | | | | | |
| • 14mm | | 38 | | | | | | | | | |
| • 7-16 | | | 40 | 41 | | | | | 42 | | |
| • Rectangular Waveguide | | | | | | 44 | 47 | 48 | | | 48 |
| • Millimeter Waveguide | | | | | | | 46 | 45 | | | 48 |

Other, less common connector types, such as BZ, ZMA, C, HN, SC, Multiport and EIA 1-5/8 are also available as Special Calibration Kits (see page 3).

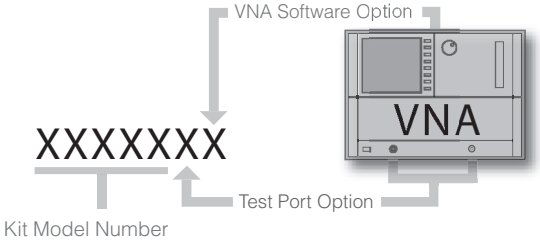
To order any of these Special Calibration Kits, please contact our Sales Department.

## *Ordering Maury Cal Kits by Model Numbers*

### *Ordering Options*

To order a kit configured to match your VNA model and specific application, go to the page(s) indicated in the matrix chart above. There you will find a diagram like the one below which explains how to order options by adding additional numbers and/or letters to the kit model number.

1. Find the row in the first column on the left in the chart above for your DUT connector type.
2. Follow that row across to the column for the type or method of calibration you want to do. (See the detailed methodology information on the reverse of this page.) The number indicates the catalog page with the proper Maury kit for your needs.
3. In the Option Finder chart on the page for your kit, locate the column for your VNA model and follow it down to the row for your VNA test port connector type.
4. Add the numbers shown to the end of the kit model number to specify the adapter and software options you desire.






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# Network Analyzer Calibration Methodologies

## Why do we need to calibrate?

Imperfections exist in even the finest test equipment and, if uncorrected, these imperfections will cause the equipment to yield less than ideal measurements. The basis of network analyzer error correction is the measurement of known electrical standards, such as a thru, open, short, and precision load impedance. By calibrating your network analyzer with these standards, you can compensate for its inherent imperfections. The information below addresses some of the most critical factors in VNA calibration, ending with a brief survey of the more widely used calibration methodologies that can be performed with Maury Precision VNA Calibration Kits.

## Calibration Procedures

Calibration procedures include the popular Short-Open-Load (SOL) or Short-Open-Load-Thru (SOLT) calibration technique, Short-Short-Load-Thru (SSLT ) for waveguide, and Thru-Reflect-Line (TRL).

## Sources and Types of Errors

All measurement systems, including those employing network analyzers, have three types of inherent measurement errors:

- Systematic errors
- Random errors
- Drift errors

Systematic errors are caused by imperfections in the test equipment and test setup. If these errors do not vary over time, they can be characterized through calibration and mathematically removed during the measurement process.

## Error Correction

Vector error correction is the more thorough method of removing systematic errors. This type of error correction requires a network analyzer capable of measuring (but not necessarily displaying) phase as well as magnitude, and a set of calibration standards with known, precise electrical characteristics.

The vector-correction process requires the open, short, load, and sometimes thru calibration standards. The two main types of vector error correction are one-port and two-port calibrations.

## One-Port Calibration

A one-port calibration can measure and minimize three systematic error terms (directivity, source match, and reflection tracking) from reflection measurements. Three known calibration standards must be measured, such as a short, open, and a load (the load value is usually the same as the characteristic impedance of the test system, generally either 50 or 75 ohm). One-port calibration makes it possible to derive the actual reflection S-parameters of the device-under-test (DUT).

## Two-Port Error Correction

Two-port error correction yields the most complete calibration because it accounts for the three major sources of systematic error addressed by one-port calibration at both ports of a two-port DUT. Traditional full two-port calibrations utilize three impedance standards and one transmission standard to define the calibrated reference plane. These standards, typically a short, open, load, and thru, make up the SOLT calibration kit. The most common thru used is the test ports connected directly together.

## TRL Calibration

Following SOLT in popularity, the next most common form of two-port calibration is called a Thru-Reflect-Line (TRL) calibration. TRL corrects the same error terms as a SOLT calibration, although it uses different calibration standards.

Other variations of TRL are Line-Reflect-Line (LRL), (LRM) based on Line-Reflect-Match (load) calibration standards or Thru-Reflect-Match (TRM) calibration standards.

In non-coaxial applications such as waveguide, TRL usually achieves better source match and load match corrections than SOLT. While not as commonly used, coaxial TRL can also provide more accuracy than SOLT, but only if very-high quality coaxial transmission lines (such as beadless airlines) are used.

Maury Microwave includes precision beadless air lines in our coaxial TRL calibration kits providing the capability to perform the most accurate calibration possible.

## Why use Sliding Loads?

When performing SOL, SOLT, or SSLT (waveguide) calibrations the impedance standard is the load. At frequencies above 2 GHz (4 GHz for 2.4mm) sliding loads are more accurate impedance standards. Therefore sliding loads will provide a better calibration at higher frequencies, in terms of reduced directivity error).

A summary of these calibrations is shown below:

## One-port calibration methods

**(SOL)** **S**hort-**O**pen-**L**oad calibration
- Calibration for measuring VSWR/Return Loss.

**(SSL)** **S**hort-**S**hort-**L**oad calibration
- Calibration for measuring VSWR/Return Loss in waveguide applications.

## Two-Port full calibration methods

(**SOLT**) **S**hort-**O**pen-**L**oad-**T**hru
- Full two-port calibration for performing forward and reverse transmission and reflections measurements.

(**SSLT**) **S**hort-**S**hort-**L**oad-**T**hru
- Full two-port calibration for performing forward and reverse transmission and reflections measurements.

(**TRL**) **T**hru-**R**eflect-**L**ine
- Full two-port calibration for performing forward and reverse transmission and reflections measurements.



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# Maury VNA Calibration Kits

## General Information

### *Features*

- *Broad VNA Coverage (Including PNA)*
- *Accurate VNA Calibration*
- *DC to 110 GHz*
- *All Popular Coaxial Connector Types and Waveguide Flange Sizes*
- *Standard Kits, Fixed Termination Kits, Expanded Kits, and Economy Kits are Offered for most DUT connector types*

### *General*

When properly calibrated against known standards, vector network analyzers (VNAs), provide the most accurate means of determining the one-port and two-port network characteristics of RF and microwave devices. Calibration effectiveness (a VNA's ability to reduce error terms to negligible values) critically and ultimately depends on the quality and integrity of the calibration standards used.

To help maximize calibration effectiveness, Maury produces a comprehensive line of coaxial and waveguide VNA calibration kits which incorporate accurate, stable, and precise calibration standards for a broad range of VNA models. When properly used, these kits ensure a true evaluation of VNA performance.

Maury kits offer a range of performance and cost options which provide users with choices that are both technically and economically suitable for a variety of intended application.

Coaxial kits are available for testing VNAs fitted with any of the modern, popular connectors, including: 1.85mm, 2.4mm, 2.92mm (K), 3.5mm (also used for SMA testing), Type N, TNC (and AFTNC) , BNC, 7mm, 14mm (formerly GR900), and 7-16.

Other, less common connector types, such as BZ and ZMA are also available as **Special Calibration Kits**.

Maury also produces kits for OSP™[1], C, SC, and HN connectors. Please contact our Sales Department if you have a requirement in any of these connector types.

Waveguide kits are available in all common, standard rectangular sizes from WR430 (1.7 to 2.6 GHz) through WR10 (75 to 110 GHz). Maury also produces kits in less common rectangular size such as WR102 (7 to 11 GHz) and in half-height waveguide. If you require a calibration kit in a nonstandard or rarely used waveguide type – including circular guide – please contact our Sales Department.



### *Special Calibration Kits*

Maury frequently configures unique or highly specialized calibration kits based on customer-specified component lists. Whether in coax or waveguide, Maury can provide custom calibration kits to meet your exact needs. Customizing may include special packaging; addition, deletion or substitution of components; single sex coaxial kit configurations; or special waveguide flanges. Maury also offers several coaxial and waveguide kits that are configured in economy versions, made up of the minimum number of components necessary to provide an accurate calibration of specified VNA. If your calibration needs are not covered by our standard or expanded kits, our sales department can assist you in defining a special configuration.

#### *Special Packaging*

Most of our calibration kits are housed in foam-lined wood instrument cases. In some applications, more rugged or specialized packaging may be required. Maury offers special packaging options which include a molded plastic case for “assembly line” use, extremely small cases for single sex coaxial kits, and briefcase or wheeled suitcase configurations for field use.

#### *Component Changes*

Calibration kits can be configured to include the exact components needed for your VNA calibration. Coax-to-coax and waveguide-to-coax adapters can be changed to meet your interface needs. Reference air lines, sliding loads, gage kits, etc., can also be added or deleted.

#### *Single Sex Coaxial Kits*

Most of Maury's standard or expanded calibration kits include male and female components. Maury also offers single sex kits which are very economical alternatives for production line calibrations that require only a single sex version of a particular connector.

#### *Special Waveguide Flanges*

European designation, half-height or special index pin/bolt pattern waveguide flanges can be incorporated into a special kit. Please provide a flange drawing that describes your special flange when requesting a price quote.

If you do not find a kit to meet your calibration needs, please contact our Sales Department or your local Maury representative for assistance.

[1] "OSP™" is the M/A-Com Omni-Spectra designation. See Maury data sheet 5E-065 for interface details.



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# 1.85mm VNA Calibration Kits

## 7850A Standard Kits




### *Features*

- *1.85mm Connectors*
- *DC to 67 GHz (Operates DC to 70 GHz)*
- *High Performance*
- *Broad VNA Coverage*
- *Fixed Offset Short Calibration*

### *Description*

These precision 1.85mm connector calibration kits are designed for use with a broad range of vector network analyzers (VNA). With these kits, you can make error-corrected measurements of devices equipped with 1.85mm connectors from DC to 67 GHz.

Each kit includes a full complement of calibration standards (multiple offset shorts, opens, and fixed loads) and can be configured for use with any combination of VNA or test set/cable connectors. User-specified VNA software and a set of adapters are included. All kit components come housed in an attractive, foam-lined, wood instrument case.

### *Connector Description*

The precision 1.85mm connectors on the components in this kit are miniature, instrument grade, air-interface connectors that operate mode free up to 67 GHz, and comply with IEEE standard 287 general precision connector, instrument grade GPC1.85. For interface specifications please refer to Maury data sheet 5E-059.

### *Recommended Accessories*

A048A Digital connector gage kit (thread-on type)
See page 92.

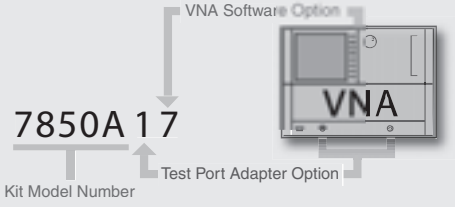
### *Components Included in 7850A Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 1.85mm female fixed offset short (0.5cm) | 7846A |
| 1 | 1.85mm female fixed offset short (0.606cm) | 7846B |
| 1 | 1.85mm female fixed offset short (0.683cm) | 7846C |
| 1 | 1.85mm female fixed offset short (0.794cm) | 7846D |
| 1 | 1.85mm male fixed offset short (0.5cm) | 7847A |
| 1 | 1.85mm male fixed offset short (0.606cm) | 7847B |
| 1 | 1.85mm male fixed offset short (0.683cm) | 7847C |
| 1 | 1.85mm male fixed offset short (0.794cm) | 7847D |
| 1 | 1.85mm female open | 7848A |
| 1 | 1.85mm male open | 7848B |
| 1 | 1.85mm female low band fixed termination | 7831A1 |
| 1 | 1.85mm male low band fixed termination | 7831B1 |
| 1 | Torque wrench (8 in. lbs) | 8799A1 |
| 1 | 5/16-inch double end wrench | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 7 for details.)

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 7850A kit configured with the adapters and software for use with an Agilent PNA that has 1.85mm or 2.4mm test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 7) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 1.85mm or 2.4mm [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.92mm or 3.5mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. Resulting junctions are calibrated out and are not critical.

Key Literature: Maury data sheets 2Z-054 and 2Z-056.



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# 1.85mm VNA Calibration Kits

## 7850B/F/M Fixed Termination Kits



7850B

### Features

- *1.85mm Connectors*
- *DC to 67 GHz (Operates DC to 70 GHz)*
- *High Performance*
- *Broad VNA Coverage*
- *Fixed Load Calibration*

### Description

These precision 1.85mm connector calibration kits are designed for use with a broad range of vector network analyzers (VNA). With these kits, you can make error-corrected measurements of devices equipped with 1.85mm connectors from DC to 67 GHz.

Each kit includes a full complement of calibration standards (shorts, opens, and fixed loads) and can be configured for use with any combination of VNA or test set/cable connectors. User-specified VNA software and a set of adapters are included. All kit components come housed in an attractive, foam-lined, wood instrument case.

### Connector Description

The precision 1.85mm connectors on the components in this kit are miniature, instrument grade, air-interface connectors that operate mode free up to 67 GHz, and comply with IEEE standard 287 general precision connector, instrument grade GPC1.85. For interface specifications please refer to Maury data sheet 5E-059.

### Recommended Accessories

A048A Digital connector gage kit (thread-on type) See page 92.

### Components Included in 7850B Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 1.85mm female fixed offset short (0.5cm) | 7846A* |
| 1 | 1.85mm male fixed offset short (0.5cm) | 7847A** |
| 1 | 1.85mm female open | 7848A* |
| 1 | 1.85mm male open | 7848B** |
| 1 | 1.85mm female low band fixed termination | 7831A1* |
| 1 | 1.85mm male low band fixed termination | 7831B1** |
| 1 | 1.85mm female high band fixed termination | 7832A* |
| 1 | 1.85mm male high band fixed termination | 7832B** |
| 1 | Torque wrench (8 in. lbs) | 8799A1 |
| 1 | 5/16-inch double end wrench | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 7 for details.)

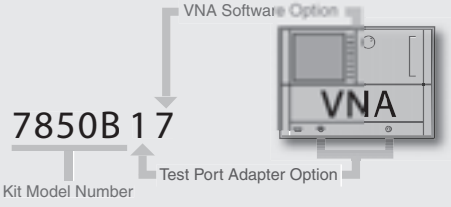
*Included in 7850F single sex kits but not in 7850M single sex kits.
**Included in 7850M single sex kits but not in 7850F single sex kits.

### Components Included in 7850F/M Kits

7850F and 7850M are single sex kits which include only the female (7850F) or male (7850M) components listed above.

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 7850B kit configured with the adapters and software for use with an Agilent PNA that has 1.85mm or 2.4mm test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 7) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 1.85mm or 2.4mm [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.92mm or 3.5mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. Resulting junctions are calibrated out and are not critical.

Key Literature: Maury data sheets 2Z-055 and 2Z-056.



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# 1.85mm TRL/LRL VNA Calibration Kits

## 7860A Series

### *Features*

- *1.85mm Connectors*
- *TRL/LRL Calibrations*
- *DC to 67 GHz (Operates DC to 70 GHz)*
- *Agilent VNAs*

### *Description*

These precision 1.85mm calibration kits are designed for use with a broad range of vector network analyzers (VNAs). The components in the kits are configured for use in making error-corrected TRM/TRL/LRL measurements of devices supplied with 1.85mm connectors, from DC to 67 GHz.

Each kit includes a full complement of calibration standards (shorts, air lines, and fixed loads) and can be configured for use with any combination of VNA or test set/cable connectors. User-specified VNA software and a set of adapters are included. All kit components come housed in an attractive, foam-lined, wood instrument case.

### *TRM/TRL/LRL Calibration*

The 7860A series kits are configured for three calibration methods (TRM/TRL/LRL). Source match can also be measured using the 3.00cm air line with the short. The table below shows the frequency ranges, calibration methods, and the standards used to perform a complete 2-port calibration to 67 GHz.

| FREQUENCY RANGE | CALIBRATION METHOD | CALIBRATION STANDARDS |
|---|---|---|
| DC – 800 MHz | TRM | Fixed Termination |
| 800 MHz – 4.0 GHz | TRL | 3.00cm air line |
| 4.0 GHz – 13.0 GHz | TRL | 0.96cm air line |
| 13.0 GHz – 67.0 GHz | LRL | 0.96cm & 1.15cm air lines |



7860A

### *Components Included in 7860A Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 1.85mm female to male air line (0.96cm) | 7843S0.96 |
| 1 | 1.85mm female to male air line (1.15cm) | 7843S1.15 |
| 1 | 1.85mm female to male air line (3.00cm) | 7843S3.00 |
| 1 | 1.85mm female fixed offset short | 7846A |
| 1 | 1.85mm male fixed offset short | 7847A |
| 1 | 1.85mm female fixed termination | 7831A1 |
| 1 | 1.85mm male fixed termination | 7831B1 |
| 1 | Torque wrench (8 in. lbs) | 8799A1 |
| 1 | 5/16-inch double end wrench | — |
| 1 | 3/16-inch double end wrench | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

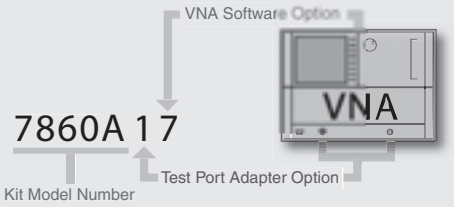
Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 7 for details.)

### *Recommended Accessories*

A048A Digital connector gage kit (thread-on type) See page 92.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 7860A kit configured with the adapters and software for use with an Agilent PNA that has 1.85mm or 2.4mm test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 7) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 1.85mm or 2.4mm [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.92mm or 3.5mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. Resulting junctions are calibrated out and are not critical.

Key Literature: Maury data sheet 2Z-053.



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# 1.85mm VNA Calibration Kit Adapter Options

## 7850Z1, 7850Z2, & 7850Z3 Sets

### Features

- *NMD1.85mm to 1.85mm, 1.85mm In-Series and 1.85mm to 2.92mm Adapters*
- *DC to 67 GHz (Operates DC to 70 GHz)*
- *High Performance*
- *Phase Matched Within Model Series*

### Description

The NMD1.85mm test port adapters in these sets are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets. The precision 1.85mm adapters are of minimum length and feature low VSWR with low insertion loss. The sets described on this page are configured to provide users with the ability to tailor their Maury calibration kit for use with specific VNAs. These adapters may be ordered in separately boxed sets, as options shipped with their corresponding VNA calibration kits, or as individual adapters (by model number) to serve as replacement parts or spares.

### Adapters Included in 7850Z1 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 1 | NMD1.85mm female to 1.85mm female | 7809A1 |
| | 1 | NMD1.85mm female to 1.85mm male | 7809A2 |
| | 1 | 1.85mm female to 1.85mm female | 7821A |
| | 1 | 1.85mm male to 1.85mm male | 7821B |
| | 1 | 1.85mm female to 1.85mm male | 7821C |

### Adapters Included in 7850Z2 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | 1.85mm female to 1.85mm female | 7821A |
| | 1 | 1.85mm male to 1.85mm male | 7821B |
| | 1 | 1.85mm female to 1.85mm male | 7821C |

### Adapters Included in 7850Z3 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 1 | 1.85mm female to 2.92mm female | 7826A |
| | 1 | 1.85mm female to 2.92mm male | 7826B |
| | 1 | 1.85mm male to 2.92mm female | 7826C |
| | 1 | 1.85mm male to 2.92mm male | 7826D |

Note: Adapter options for single sex kits (7850F and 7850M) contain only the appropriate female or male adapters.

### Adapter Specifications

The Maury precision 1.85mm in-series adapters and the NMD1.85mm test port adapters included in these sets have the following specifications:

### Ruggedized Test Port Adapters

***Models 7809A1 and 7809A2*** *(for more detail see page 98)*

Frequency Range . . . . . DC to 67.0 GHz

Maximum VSWR:

- DC to 26.5 GHz . . . . . 1.10
- 26.5 to 40.0 GHz . . . . . 1.15
- 40.0 to 67.0 GHz . . . . . 1.20

Nominal Impedance . . . . . 50 ohm

### Precision 1.85mm Adapters

***Models 7821A/B/C*** *(for more detail see page 99)*

Frequency Range . . . . . DC to 67.0 GHz

Maximum VSWR:

- DC to 4.0 GHz . . . . . 1.06
- 4.0 to 40.0 GHz . . . . . 1.10
- 40.0 to 67.0 GHz . . . . . 1.15

Nominal Impedance . . . . . 50 ohm

***Models 7826A/B/C/D*** *(for more detail see page 99)*

Frequency Range . . . . . DC to 40.0 GHz

Maximum VSWR:

- DC to 4.0 GHz . . . . . 1.05
- 4.0 to 20.0 GHz . . . . . 1.08
- 20.0 to 40.0 GHz . . . . . 1.12

Nominal Impedance . . . . . 50 ohm



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# 2.4mm VNA Calibration Kits

## 7950A Series Standard Kits




### Features

- *2.4mm Connectors*
- *DC to 50 GHz*
- *High Performance*
- *Broad VNA Coverage*
- *Fixed and Sliding Load Calibration*

### Description

These 2.4mm calibration kits are designed for use with a broad range of Vector Network Analyzers (VNAs). The components in the kits are configured for use in making error-corrected measurements of devices supplied with 2.4mm connectors, from DC to 50 GHz. Each kit includes a full complement of calibration standards (as listed at right) and can be configured for use with any combination of VNA or test set/cable connectors. All kit components come housed in an attractive, foam-lined, wood instrument case.

### Connector Description

The precision 2.4mm connectors are miniature, instrument grade, air-interface connectors that operate mode free up to 50 GHz, and comply with IEEE standard 287 general precision connector, instrument grade—GPC2.4. For interface specifications please refer to Maury data sheet 5E-064.

### Recommended Accessories

A048A Digital connector gage kit (thread-on type) See page 92.

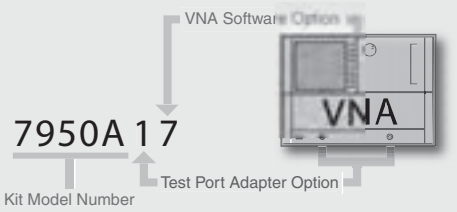
### Components Included in 7950A Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 2.4mm female fixed offset short | 7946A |
| 1 | 2.4mm male fixed offset short | 7946B |
| 1 | 2.4mm female open | 7948A |
| 1 | 2.4mm male open | 7948B |
| 1 | 2.4mm female fixed termination | 7931A1 |
| 1 | 2.4mm male fixed termination | 7931B1 |
| 1 | 2.4mm female sliding termination | 7935A |
| 1 | 2.4mm male sliding termination | 7935B |
| 1 | Torque wrench (8 in. lbs) | 8799A1 |
| 1 | 5/16-inch double end wrench | — |
| 1 | 7/16-inch double end wrench | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 11 for details.)

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 7950A kit configured with the adapters and software for use with an Agilent PNA that has 1.85mm or 2.4mm test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 11) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 1.85mm or 2.4mm [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.92mm or 3.5mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. Resulting junctions are calibrated out and are not critical.

Key Literature: Maury data sheet 2Z-050.



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# 2.4mm VNA Calibration Kits

## 7950B/F/M Fixed Termination Kits



7950B

### *Features*

- *2.4mm Connectors*
- *DC to 50 GHz*
- *High Performance*
- *Broad VNA Coverage*
- *Fixed Load Calibration*

### *Description*

These precision 2.4mm connector calibration kits are designed for use with a broad range of vector network analyzers (VNA). With these kits, you can make error-corrected measurements of devices equipped with 2.4mm connectors from DC to 50 GHz.

Each kit includes a full complement of calibration standards (shorts, opens, and fixed loads) and can be configured for use with any combination of VNA or test set/cable connectors. User-specified VNA software and a set of adapters are included. All kit components come housed in an attractive, foam-lined, wood instrument case.

### *Connector Description*

The precision 2.4mm connectors on the components in this kit are miniature, instrument grade, air-interface connectors that operate mode free up to 50 GHz, and comply with IEEE standard 287 general precision connector, instrument grade GPC2.4. For interface specifications please refer to Maury data sheet 5E-064.

### *Recommended Accessories*

A048A Digital connector gage kit (thread-on type) See page 92.

### *Components Included in 7950B Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 2.4mm female fixed offset short | 7946A* |
| 1 | 2.4mm male fixed offset short | 7946B** |
| 1 | 2.4mm female open | 7948A* |
| 1 | 2.4mm male open | 7948B** |
| 1 | 2.4mm female fixed termination | 7931A1* |
| 1 | 2.4mm male fixed termination | 7931B1** |
| 1 | Torque wrench (8 in. lbs) | 8799A1 |
| 1 | 5/16-inch double end wrench | — |
| 1 | 7/16-inch double end wrench | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 11 for details.)

*Included in 7950F single sex kits but not in 7950M single sex kits.

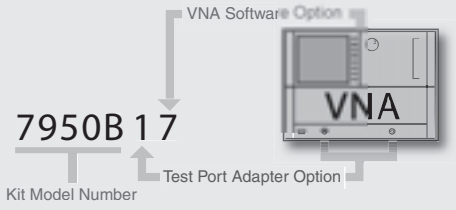
**Included in 7950M single sex kits but not in 7950F single sex kits.

### *Components Included in 7950F and M Kits*

7950F and 7950M are single sex kits which include the components listed above, but only female (7950F) or male (7950M) connectors respectively. Torque wrenches and open end wrenches are not included.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 7950B kit configured with the adapters and software for use with an Agilent PNA that has 1.85mm or 2.4mm test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 11) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 1.85mm or 2.4mm [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.92mm or 3.5mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. Resulting junctions are calibrated out and are not critical.

Key Literature: Maury data sheet 2Z-050.



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# 2.4mm TRL/LRL VNA Calibration Kits

## 7960A Series Tri-Kits

### *Features*

- *2.4mm Connectors*
- *TRM/TRL/LRL, SOLT and Gated Air Line Calibrations*
- *DC to 50 GHz*



7960A

### *Description*

These 2.4mm calibration kits are designed for use with a range of vector network analyzers (VNA). With these kits, you can make error-corrected measurements of devices equipped with 2.4mm connectors from DC to 50.0 GHz.

### *TRM/TRL/LRL Calibration*

Maury TRL/LRL calibration kits are tri-kits that contain the components needed to perform three types of calibrations (TRM/TRL/LRL, SOLT, and short-open-(air line + load). Source match can also be measured using the 6.25cm air line and provided short. The table below shows the frequency ranges, calibration methods, and the standards used to perform a complete 2-port calibration to 50 GHz.

| FREQUENCY RANGE | CALIBRATION METHOD | CALIBRATION STANDARDS |
|---|---|---|
| DC – 400 MHz | TRM | Fixed Termination |
| 400 MHz – 2.0 GHz | TRL | 6.25cm air line |
| 2.0 GHz – 10.0 GHz | TRL | 1.25cm air line |
| 10.0 GHz – 50.0 GHz | LRL | 1.25cm & 1.50cm air lines |

### *Components Included in 7960A Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 2.4mm female to male air line (1.25cm) | 7943S1.25 |
| 1 | 2.4mm female to male air line (1.50cm) | 7943S1.50 |
| 1 | 2.4mm female to male air line (6.25cm) | 7943S6.25 |
| 1 | 2.4mm female open | 7948A |
| 1 | 2.4mm male open | 7948B |
| 1 | 2.4mm female fixed offset short | 7946A |
| 1 | 2.4mm male fixed offset short | 7946B |
| 1 | 2.4mm female fixed termination | 7931A1 |
| 1 | 2.4mm male fixed termination | 7931B1 |
| 2 | 5/16-inch double end wrenches | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 11 for details.)

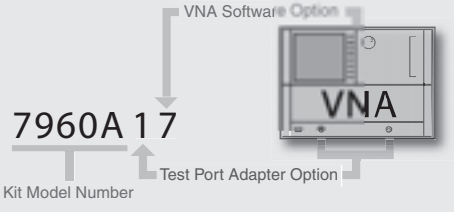
### *Recommended Accessories*

A048A Connector gage kit (thread-on type). See page 92.

8799A1 Torque wrench, 5/16-inch (8 in. lbs). See page 94.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 7960A kit configured with the adapters and software for use with an Agilent PNA that has 1.85mm or 2.4mm test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 11) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 1.85mm or 2.4mm [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.92mm or 3.5mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-051.



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# 2.4mm VNA Calibration Kit Adapter Options

## 7950Z3, 7950Z4, & 7950Z8 Sets

### *Features*

- *NMD2.4mm to 2.4mm, 2.4mm In-Series, and 2.4mm to 2.92mm Adapters*
- *DC to 50 GHz*
- *High Performance*
- *Phase Matched Within Model Series*

### *Description*

The NMD2.4mm test port adapters in these sets are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets. The precision 2.4mm adapters feature low VSWR and low insertion loss and are of minimum length. The sets described on this page are configured to provide users with the ability to tailor their Maury calibration kit for use with specific VNAs. These adapters may be ordered in separately boxed sets, as options shipped with their corresponding VNA calibration kits, or as individual adapters (by model number) to serve as replacement parts or spares.

### *Adapters Included in 7950Z3 Sets*

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 1 | NMD2.4mm female to 2.4mm female | 7909A1 |
| | 1 | NMD2.4mm female to 2.4mm male | 7909A2 |
| | 1 | 2.4mm female to 2.4mm female | 7921A |
| | 1 | 2.4mm male to 2.4mm male | 7921B |
| | 1 | 2.4mm female to 2.4mm male | 7921C |

### *Adapters Included in 7950Z4 Sets*

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | 2.4mm female to 2.4mm female | 7921A |
| | 1 | 2.4mm male to 2.4mm male | 7921B |
| | 1 | 2.4mm female to 2.4mm male | 7921C |

### *Adapters Included in 7950Z8 Sets*

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 1 | 2.4mm female to 2.92mm female | 7926A |
| | 1 | 2.4mm female to 2.92mm male | 7926B |
| | 1 | 2.4mm male to 2.92mm female | 7926C |
| | 1 | 2.4mm male to 2.92mm male | 7926D |

Note: Adapter options for single sex kits (7950F and 7950M) contain only the appropriate female or male adapters.

### *Adapter Specifications*

The Maury precision 2.4mm in-series adapters and the NMD2.4mm test port adapters included in these sets have the following specifications:

### *Ruggedized Test Port Adapters*

***Models 7909A1 and 7909A2*** *(for more detail see page 102)*

Frequency Range . . . . . DC to 50.0 GHz

Maximum VSWR:

- DC to 26.5 GHz . . . . . 1.10
- 26.5 to 40.0 GHz . . . . . 1.15
- 40.0 to 50.0 GHz . . . . . 1.20

Nominal Impedance . . . . . 50 ohm

### *Precision 2.4mm Adapters*

***Models 7921A/B/C*** *(for more detail see page 103)*

Frequency Range . . . . . DC to 50.0 GHz

Maximum VSWR:

- DC to 26.5 GHz . . . . . 1.06
- 26.5 to 40.0 GHz . . . . . 1.10
- 40.0 to 50.0 GHz . . . . . 1.15

Nominal Impedance . . . . . 50 ohm

***Models 7926A/B/C/D*** *(for more detail see page 104)*

Frequency Range . . . . . DC to 40.0 GHz

Maximum VSWR:

- DC to 4.0 GHz . . . . . 1.05
- 4.0 to 20.0 GHz . . . . . 1.08
- 20.0 to 40.0 GHz . . . . . 1.12

Nominal Impedance . . . . . 50 ohm



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# 2.92mm (K) VNA Calibration Kits

## 8770C Standard Kits

### *Features*

- *2.92mm (K) Connectors*
- *DC to 40 GHz*
- *High Performance Sliding Terminations*
- *Verified Kit Performance*



8770C

### *Description*

These precision calibration kits are used to calibrate network analyzers and to make error-corrected measurements of 2.92mm (K) devices from DC to 40 GHz. Each kit includes a full complement of calibration standards (listed at right) and can be configured for a number of VNA or test set/cable connector combinations. All kit components are housed in an attractive foam-lined wood instrument case. Each kit is tested for 100% compliance to the specifications listed below and ships with a performance verification report.

### *Specifications for 8770C Series Kits*

Frequency Range . . . . . DC to 40.0 GHz
Minimum Directivity:
DC to 20.0 GHz . . . . . 42 dB
20.0 to 40.0 GHz . . . . . 40 dB
Minimum Source Match:
DC to 20.0 GHz . . . . . 40 dB
20.0 to 40.0 GHz . . . . . 35 dB
Nominal Impedance . . . . . 50 ohm

### *2.92mm (K) Connector Description*

These precision miniature 2.92mm air line interface connectors operate mode free to 40 GHz. They are fully compliant with IEEE 287 (GPC 2.92) and are fully mateable with SMA and 3.5mm connectors. Introduced by Maury in 1974 as the MPC3 connector, the design was reintroduced as the K connector by Wiltron in 1984. For interface specifications please refer to Maury data sheet 5E-063.

### *Components Included in 8770C Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 2.92mm (K) female fixed offset short | 8771F1 |
| 1 | 2.92mm (K) male fixed offset short | 8772F1 |
| 1 | 2.92mm (K) female open | 8773A1 |
| 1 | 2.92mm (K) male open | 8773B1 |
| 1 | 2.92mm (K) female fixed termination | 8775A2 |
| 1 | 2.92mm (K) male fixed termination | 8775B2 |
| 1 | 2.92mm (K) female sliding termination | 8777A1 |
| 1 | 2.92mm (K) male sliding termination | 8777B1 |
| 1 | 5/16-inch torque wrench (8 in. lbs) | 8799A1 |
| 1 | 5/16-inch double end wrench | — |
| 1 | 7/16-inch double end wrench | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

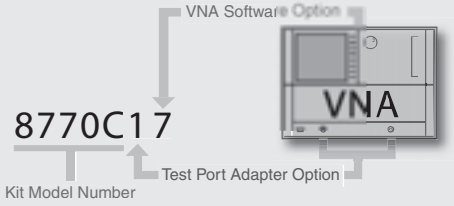
Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 15 for details.)

### *Recommended Accessories*

A050A Digital connector gage kit (thread-on type) See page 92.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8770C kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 15) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 3.5mm or 2.92mm (K) [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| 7mm | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.4mm or 1.85mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-034C.



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# 2.92mm (K) VNA Calibration Kits

## 8770D Fixed Termination Kits


8770D04

### *Features*

- *2.92mm (K) Connectors*
- *DC to 40 GHz*
- *Broad VNA Coverage*
- *Fixed Load Calibration*

### *Description*

These 2.92mm (K) calibration kits are designed for use with a range of vector network analyzers (VNA). With these kits you can make error-corrected measurements of devices equipped with 2.92mm (K) connectors from DC to 40 GHz.

Each kit includes a full complement of calibration standards (shorts, opens and fixed loads) and can be configured for a number of VNA or test set/cable connector combinations. All kit components, including the VNA software and operating instructions, are housed in an attractive foam-lined wood instrument case.

### *2.92mm (K) Connector Description*

These precision miniature 2.92mm air line interface connectors operate mode free to 40 GHz. They are fully compliant with IEEE 287 (GPC 2.92) and are fully mateable with SMA and 3.5mm connectors. Introduced by Maury in 1974 as the MPC3 connector, the design was reintroduced as the K connector by Wiltron in 1984. For interface specifications please refer to Maury data sheet 5E-063.

### *Recommended Accessories*

A050A Digital connector gage kit (thread-on type) See page 92.

8799A1 Torque wrench, 5/16-inch (8 in. lbs). See page 94.

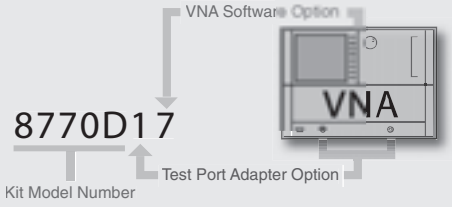
### *Components Included in 8770D Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 2.92mm (K) female fixed offset short | 8771F1 |
| 1 | 2.92mm (K) male fixed offset short | 8772F1 |
| 1 | 2.92mm (K) female open | 8773A1 |
| 1 | 2.92mm (K) male open | 8773B1 |
| 1 | 2.92mm (K) female fixed termination | 8775A2 |
| 1 | 2.92mm (K) male fixed termination | 8775B2 |
| 2 | 5/16-inch double end wrenches | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 15 for details.)

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8770D kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 15) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 2.92mm (K) [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| 7mm | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.4mm or 1.85mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-034D.



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# 2.92mm (K) TRL/LRL VNA Calibration Kits

## 8760A Series Tri-Kits




### Features

- *TRL/LRL Calibrations*
- *SOLT (Short-Open-Load-Thru)*
- *Gated Air Line*
- *DC to 40 GHz*

### Description

These 2.92mm (K) calibration kits are designed for use with a range of vector network analyzers (VNAs). With these kits you can make error-corrected measurements of devices equipped with 2.92mm (K) connectors from DC to 40 GHz.

### TRM/TRL/LRL Calibration

Maury TRL/LRL calibration kits are tri-kits that contain the components needed to perform three types of calibrations (TRM/TRL/LRL, SOLT, and short-open-(air line + load). Source match can also be measured using the 15cm air line and provided short. The following table shows the frequency ranges, calibration methods, and the standards used to perform a complete 2-port calibration to 40 GHz.

| FREQUENCY RANGE | CALIBRATION METHOD | CALIBRATION STANDARDS |
|---|---|---|
| DC – 800 MHz | TRM | Fixed Termination |
| 160 – 800 MHz | TRL | 15cm air line |
| 800 MHz – 2.5 GHz | TRL | 5cm air line |
| 2.5 GHz – 12.5 GHz | TRL | 5cm & 6cm air lines |
| 12.5 GHz – 40 GHz | LRL | 5cm & 5.25cm air lines |

### Components Included in 8760A Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 2.92mm (K) female to male air line (15cm) | 8774C15 |
| 1 | 2.92mm (K) female to male air line (5cm) | 8774C5 |
| 1 | 2.92mm (K) female to male air line (6cm) | 8774C6 |
| 1 | 2.92mm (K) female to male air line (5.25cm) | 8774C5.25 |
| 1 | 2.92mm (K) female fixed offset short | 8771F1 |
| 1 | 2.92mm (K) male fixed offset short | 8772F1 |
| 1 | 2.92mm (K) female open | 8773A1 |
| 1 | 2.92mm (K) male open | 8773B1 |
| 1 | 2.92mm (K) female fixed termination | 8775A2 |
| 1 | 2.92mm (K) male fixed termination | 8775B2 |
| 2 | 5/16-inch double end wrenches | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

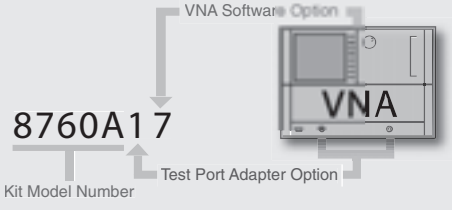
Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 15 for details.)

### Recommended Accessories

A050A Digital connector gage kit (thread-on type). See page 92.
8799A1 Torque wrench, 5/16-inch (8 in. lbs). See page 94.

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8760A kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 15) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 3.5mm or 2.92mm (K) [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| 7mm | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.4mm or 1.85mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-052.



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# 2.92mm (K) VNA Calibration Kit Adapter Options

## 8770Z1, 8770Z2, & 8770Z3 Sets

### Features

- *NMD2.92mm to 2.92mm (K), NMD2.4mm to 2.92mm (K), 2.92mm (K) In-Series, and 7mm to 2.92mm (K) Adapters*
- *DC to 40 GHz*
- *High Performance*
- *Phase Matched Within Model Series*

### Description

The NMD2.92mm test port adapters in these sets are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets. The precision 2.92mm adapters are feature low VSWR and low insertion loss and are of minimum length. The sets described on this page are configured to provide users with the ability to tailor their Maury calibration kit for use with specific VNAs. These adapters may be ordered in separately boxed sets, as options shipped with their corresponding VNA calibration kits, or as individual adapters (by model number) to serve as replacement parts or spares.

### Adapters Included in 8770Z1 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 1 | NMD2.92mm female to 2.92mm (K) female | 8719A |
| | 1 | NMD2.92mm female to 2.92mm (K) male | 8719B |
| | 1 | 2.92mm (K) female to 2.92mm (K) female | 8714A2 |
| | 1 | 2.92mm (K) male to 2.92mm (K) male | 8714B2 |
| | 1 | 2.92mm (K) female to 2.92mm (K) male | 8714C2 |

### Adapters Included in 8770Z2 (7mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 2 | 2.92mm (K) female to 7mm | 8725A |
| | 2 | 2.92mm (K) male to 7mm | 8725B |

### Adapters Included in 8770Z3 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 1 | NMD2.4mm female to 2.92mm (K) female | 7909F1 |
| | 1 | NMD2.4mm female to 2.92mm (K) male | 7909F2 |
| | 1 | 2.4mm female to 2.92mm (K) female | 7926A |
| | 1 | 2.4mm male to 2.92mm (K) male | 7926B |
| | 1 | 2.4mm male to 2.92mm (K) female | 7926C |
| | 1 | 2.4mm male to 2.92mm (K) male | 7926D |

### Adapter Specifications

The Maury precision 2.92mm in-series adapters and the NMD2.92mm test port adapters included in these sets have the following specifications:

### Ruggedized Test Port Adapters

***Models 8719A and 8719B*** *(for more detail see page 105)*

Frequency Range . . . . . DC to 40.0 GHz
Maximum VSWR:
- DC to 20.0 GHz . . . . . 1.10
- 20.0 to 40.0 GHz . . . . . 1.16

Nominal Impedance . . . . . 50 ohm

***Models 7909F1 and 7909F2*** *(for more detail see page 102)*

Frequency Range . . . . . DC to 40.0 GHz
Maximum VSWR:
- DC to 20.0 GHz . . . . . 1.10
- 20.0 to 40.0 GHz . . . . . 1.16

Nominal Impedance . . . . . 50 ohm

### Precision 2.92mm (K) Adapters

***Models 8714A2/B2/C2*** *(for more detail see page 106)*

Frequency Range . . . . . DC to 40.0 GHz
Maximum VSWR:
- DC to 4.0 GHz . . . . . 1.05
- 4.0 to 20.0 GHz . . . . . 1.08
- 20.0 to 40.0 GHz . . . . . 1.12

Nominal Impedance . . . . . 50 ohm

***Models 7926A/B/C/D*** *(for more detail see page 104)*

Frequency Range . . . . . DC to 40.0 GHz
Maximum VSWR:
- DC to 4.0 GHz . . . . . 1.05
- 4.0 to 20.0 GHz . . . . . 1.08
- 20.0 to 40.0 GHz . . . . . 1.12

Nominal Impedance . . . . . 50 ohm

***Models 8725A/B*** *(for more detail see page 107)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
- DC to 4.0 GHz . . . . . 1.05
- 4.0 to 12.0 GHz . . . . . 1.07
- 12.0 to 18.0 GHz . . . . . 1.10

Nominal Impedance . . . . . 50 ohm



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# 3.5mm VNA Calibration Kits

## 8050A Standard Kits & 8050Y Expanded Kits

### *Features*

- *Broad VNA Coverage*
- *Improved Opens*
- *Sliding Load Calibration*
- *In-Series Phase Matched Adapters are Available*

### *Description*

The 8050A standard and the 8050Y expanded kits are 3.5mm calibration kits designed for use with vector network analyzers (VNAs) equipped with 3.5mm, 2.92mm (K), 2.4mm,or 1.85mm test set connectors and cables. With these kits, you can make error-corrected measurements of devices supplied with either 3.5mm or SMA connectors from DC to 34.0 GHz.

Each kit includes a full complement of calibration standards (shorts, opens, sliding and fixed loads). All required calibration standards, adapters and accessories; the VNA software and operating instructions, come housed in an attractive foam-lined wood instrument case. The expanded kits also include female and male connector gages and standards for checking contact pin location prior to connecting these instruments, and a torque wrench for accurate tightening of connector junctions.

### *Connector Description*

3.5mm connectors are air interface connectors that are fully compliant with IEEE 257 (GPC 3.5) specifications, and are mating compatible with SMA and 2.92mm (K) connectors. They have an air line size of 0.0598 (inner conductor diameter) and 0.1378 (outer conductor diameter). For interface specifications see Maury data sheet 5E-062.



8050Y17

### *Components Included in 8050A & Y Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 3.5mm female fixed offset short | 8046F |
| 1 | 3.5mm male fixed offset short | 8047F |
| 1 | 3.5mm female open | 8048A1 |
| 1 | 3.5mm male open | 8048B1 |
| 1 | 3.5mm female fixed termination | 8031A4 |
| 1 | 3.5mm male fixed termination | 8031B4 |
| 1 | 3.5mm female sliding termination | 8037A |
| 1 | 3.5mm male sliding termination | 8037B |
| 1 | 5/16-inch torque wrench (8 in. lbs) | 8799A1* |
| 1 | 2.92mm/3.5mm female connector gage | A050A1* |
| 1 | 2.92mm/3.5mm male connector gage | A050A2* |
| 1 | 2.92mm/3.5mm female master gage | A050A3* |
| 1 | 2.92mm/3.5mm male master gage | A050A4* |
| 1 | 5/16-inch double end wrench** | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 19 for details.)

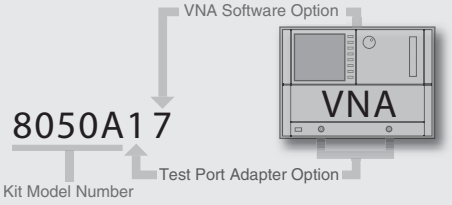
* Included in 8050Y expanded kits. Not included in 8050A standard kits.
** Two (2) double-end wrenches are included in 8050A standard kits.

### *Recommended Accessories (for 8050A)*

8799A1 5/16-inch torque wrench (8 in. lbs) See page 94.
A050A Digital connector gage kit (thread-on type) See page 92.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8050A kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 19) | VNA SOFTWARE OPTIONS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT ENA OPTION 2 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 3.5mm | 0 | — | 01 | 02 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 12 | 14 | 15 | 17 | 19 |
| 1.85mm or 2.4mm [1] | 2 | 20 | 21 | 22 | 24 | 25 | 27 | 29 |
| Type N | 3 | 30 | 32 | 32 | 34 | 35 | 37 | 39 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-059.



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# 3.5mm VNA Calibration Kits

## 8050B Fixed Termination Kits



8050B07

### *Features*

- *3.5mm Connectors*
- *DC to 26.5 GHz*
- *Broad VNA Coverage*
- *In-Series Phase Matched Adapters are Available*
- *Fixed Load Calibration*

### *Description*

These 3.5mm calibration kits are designed for use with a range of vector network analyzers (VNA). With these kits, you can make error-corrected measurements of devices equipped with 3.5mm connectors from DC to 26.5 GHz.

Each kit includes a full complement of fixed load calibration standards (shorts, opens and fixed loads) and can be configured for a number of VNA or test set/cable connector combinations. All kit components, including the VNA software and operating instructions, are housed in an attractive foam-lined wood instrument case.

### *Connector Description*

3.5mm connectors are air interface connectors that are fully compliant with IEEE 257 (GPC 3.5) specifications, and are mating compatible with SMA and 2.92mm (K) connectors. They have an air line size of 0.0598 (inner conductor diameter) and 0.1378 (outer conductor diameter). For interface specifications see Maury data sheet 5E-062.

### *Components Included in 8050B Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 3.5mm female fixed offset short | 8046F |
| 1 | 3.5mm male fixed offset short | 8047F |
| 1 | 3.5mm female open | 8048A1 |
| 1 | 3.5mm male open | 8048B1 |
| 1 | 3.5mm female fixed termination | 8031A5 |
| 1 | 3.5mm male fixed termination | 8031B5 |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 19 for details.)

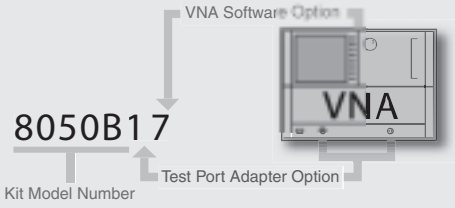
### *Recommended Accessories*

A050A Digital connector gage kit (thread-on type). See page 92.

8799A1 Torque wrench, 5/16-inch (8 in. lbs). See page 94.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8050B kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 19) | VNA SOFTWARE OPTIONS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT ENA OPTION 2 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 3.5mm | 0 | — | 01 | 02 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 12 | 14 | 15 | 17 | 19 |
| 1.85mm or 2.4mm [1] | 2 | 20 | 21 | 22 | 24 | 25 | 27 | 29 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-059.



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# 3.5mm TRL/LRL VNA Calibration Kits

## 8060A Tri-Kits


8060A

### *Features*

- *TRL/LRL Calibrations*
- *SOLT (Short-Open-Load-Thru)*
- *Gated Air Line*
- *DC to 34 GHz*

### *Description*

These 3.5mm Vector Network Analyzer (VNA) calibration kits are designed for use with a range of Agilent VNAs. The components in the kits are configured for use in making error-corrected TRL/LRL measurements of devices supplied with 3.5mm connectors, from DC to 34 GHz.

### *TRM/TRL/LRL Calibration*

Maury TRL/LRL calibration kits are tri-kits that contain the components needed to perform three types of calibrations (TRM/TRL/LRL, SOLT, and short-open-(air line + load). Source match can also be measured using the 15cm air line and provided short. The following table shows the frequency ranges, calibration methods, and the standards used to perform a complete 2-port calibration to 34 GHz.

| FREQUENCY RANGE | CALIBRATION METHOD | CALIBRATION STANDARDS |
|---|---|---|
| DC – 800 MHz | TRM | Fixed Termination |
| 160 – 800 MHz | TRL | 15cm air line |
| 800 MHz – 2.5 GHz | TRL | 5cm air line |
| 2.5 GHz – 12.5 GHz | TRL | 5cm & 6cm air lines |
| 12.5 GHz – 34 GHz | LRL | 5cm & 5.3cm air lines |

### *Components Included in 8060A Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 3.5mm female to male air line (15cm) | 8043S15 |
| 1 | 3.5mm female to male air line (5cm) | 8043S5 |
| 1 | 3.5mm female to male air line (6cm) | 8043S6 |
| 1 | 3.5mm female to male air line (5.3cm) | 8043S5.3 |
| 1 | 3.5mm female fixed offset short | 8046F |
| 1 | 3.5mm male fixed offset short | 8047F |
| 1 | 3.5mm female open | 8048A1 |
| 1 | 3.5mm male open | 8048B1 |
| 1 | 3.5mm female fixed termination | 8031A5 |
| 1 | 3.5mm male fixed termination | 8031B5 |
| 2 | 5/16-inch double end wrenches | — |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

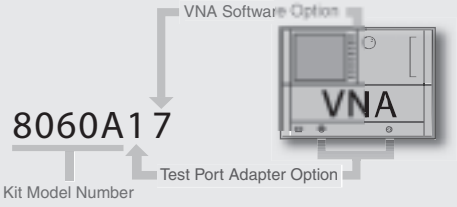
Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 19 for details.)

### *Recommended Accessories*

A050A Digital connector gage kit (thread-on type). See page 92.
8799A1 Torque wrench, 5/16-inch (8 in. lbs). See page 94.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8060A kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 19) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 3.5mm | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| 1.85mm or 2.4mm [1] | 2 | 20 | 21 | 24 | 25 | 27 | 29 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-045.



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# 3.5mm VNA Calibration Kit Adapter Options

## 8050Z1, & 8050Z2 Sets

### Features

- *3.5mm In-Series Adapters and 2.4mm to 3.5mm Between Series Adapters*
- *DC to 34 GHz*
- *High Performance*
- *Phase Matched Within Model Series*

### Description

The precision 3.5mm adapters in these sets feature low VSWR and low insertion loss and are of minimum length. The sets described on this page are configured to provide users with the ability to tailor their Maury calibration kit for use with specific VNAs. These adapters may be ordered in separately boxed sets, as options shipped with their corresponding VNA calibration kits, or as individual adapters (by model number) to serve as replacement parts or spares.

### Adapters Included in 8050Z1 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 1 | 3.5mm female to 3.5mm female | 8021A2 |
| | 1 | 3.5mm male to 3.5mm male | 8021B2 |
| | 1 | 3.5mm female to 3.5mm male | 8021C2 |

### Adapters Included in 8050Z2 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | 2.4mm female to 3.5mm female | 7927A |
| | 1 | 2.4mm female to 3.5mm male | 7927B |
| | 1 | 2.4mm male to 3.5mm female | 7927C |
| | 1 | 2.4mm male to 3.5mm male | 7927D |

### Adapters Included in 8050Z3 Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 1 | 3.5mm female to Type N female | 8023A |
| | 1 | 3.5mm female to Type N male | 8023B1 |
| | 1 | 3.5mm male to Type N female | 8023C |
| | 1 | 3.5mm male to Type N male | 8023D1 |

### Adapter Specifications

The Maury precision 3.5mm in-series adapters and 2.4mm to 3.5mm adapters included in these sets have the following specifications:

### Precision 3.5mm In-Series Adapters

***Models 8021A2/B2/C2*** *(for more detail see page109)*

Frequency Range . . . . . DC to 34.0 GHz

Maximum VSWR:

DC to 18.0 GHz . . . . . 1.05

18.0 to 26.5 GHz . . . . . 1.08

26.5 to 34.0 GHz . . . . . 1.12

Nominal Impedance . . . . . 50 ohm

### Precision 2.4mm to 3mm Adapters

***Models 7927A/B/C/D*** *(for more detail see page 104)*

Frequency Range . . . . . DC to 34.0 GHz

Maximum VSWR:

DC to 18.0 GHz . . . . . 1.06

18.0 to 26.5 GHz . . . . . 1.08

26.5 to 34.0 GHz . . . . . 1.12

Nominal Impedance . . . . . 50 ohm



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# 7mm VNA Calibration Kits

## 2650 Expanded Kits & Fixed Termination Kits



2650M01

### Features

- *Sliding Termination (in Expanded Kits)*
- *Broad VNA Coverage*
- *DC to 18 GHz*

### Description

These calibration kits are designed for use with vector network analyzers equipped with 7mm, 3.5mm or 2.92mm test set connectors and cables. With these kits, you can make error-corrected measurements of devices supplied with 7mm connectors from DC to 18 GHz.

Each kit includes the full complement of calibration standards needed to support sliding load and/or fixed load calibrations, and can be configured for any combination of supported VNA or test set/cable connectors. All calibration standards, adapters and optional accessories (if ordered), plus the operating Instructions, are shipped in an attractive, foam-lined, wood instrument case. All 2650 series kits include VNA software constants on a 3.5-inch disk.

### Connector Description

7mm connectors are precision air interface hermaphroditic connectors that are rated from DC to 18 GHz. They have an air line size of 0.1197 inner conductor diameter and a 0.2756 outer conductor diameter. There are basically two configurations; 1) GPC7 (commonly referred to as APC7) which incorporates a bead support and, 2) LPC7A which is a beadless connector. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC7). See Maury data sheet 5E-060 for interface dimensions.

### Available Kits

| VNA MODEL | MAURY CAL KIT (EXPANDED) * | MAURY CAL KIT (FIXED TERMINATION) ** |
|---|---|---|
| Rohde & Schwarz ZV Series | 2650R | 2650P11 |
| Agilent ENA Series | — | 2650P12 |
| Agilent 8510C | 2650J | 2650P14 |
| Agilent 8719/20/22 | 2650M | 2650P15 |
| Agilent PNA series | 2650J07 | 2650P17 |
| Anritsu 37000 | 2650X | 2650P19 |

* Expanded kits are configured with adapters for 3.5mm or 2.92mm (K) test ports.

** Fixed termination kits **DO NOT** include adapters. Adapters must be ordered separately.

### Options

These kits may be expand by adding option numbers, from the list below, to the end of the kit model number:

***Option 01:*** adds air line 2653S30 to the 2650J, M, R and X kits.

***Option 17:*** adds air line 2653S30 to the 2650J07 kit. (To order a 7mm PNA kit with air line, ask for model 2650J17.)

Key Literature: Maury data sheet 2Z-022H.

### Components Included in 2650 Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 7mm reference fixed flush short | 2615D3 |
| 1 | 7mm open | 2616D3 |
| 1 | 7mm sliding termination | 2517H† |
| 2 | 7mm fixed terminations | 2610F |
| 2 | NMD3.5mm female to 7mm adapters | 2633C† |
| 1 | 3.5mm female to 7mm test port adapter | 8022A2† |
| 1 | 3.5mm male to 7mm test port adapter | 8022B2† |
| 1 | 7mm connector gage (push-on type) | A028† |
| 1 | 7mm master gage (push-on type) | A028D2† |
| 1 | 3/4-inch hex torque wrench (12 in. lbs) | 2698C2† |
| 1 | Collet extractor | 2697S5† |
| 1 | 7mm six-slot collets (spare parts) | 2680S2† |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

† Included in all 2650 standard kits, and excluded from 2650P fixed termination kits. All adapters shown here (except 2633C) are a phase matched set.

### Recommended Accessories

***Offset Shorts*** – 2649 Series *(See page 69)*

***Precision Mismatches*** – 2611 Series in values up to 2:1 VSWR *(See page 87)*

***Precision Two-Port Standards Set*** – Model 2654A and 2654B *(See page 91)*

***Precision Test Port Cable and Adapter Kit*** – 8948 series *(See page 134)*

### Adapters Specifications

***Models 2633C*** *Ruggedized Test Port Adapters* *(See page 108)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR . . . . . 1.08 + 0.003$f$ (GHz)
Nominal Impedance . . . . . 50 ohm

***Models 8022A2/B2*** *(See page 111)*

Frequency Range . . . . . DC to 34.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 18.0 GHz . . . . . 1.08
Nominal Impedance . . . . . 50 ohm



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# 7mm TRL VNA Calibration Kits

## 2660B Tri-Kits

### *Features*

- *TRL Calibrations*
- *SOLT (Short-Open-Load-Thru)*
- *Gated Air Line*
- *DC to 18 GHz*




### *Description*

This Maury tri-kit is capable of performing three types of calibrations: 1) TRL/TRM 2-port from DC to 18 GHz; 2) SOLT (short-open-load-thru) 1-port or 2-port; and 3) Short-open-(air line + load) 1-port calibration for gated measurements.

### *TRL Calibration*

Maury TRL calibration kits contain the components needed to perform TRL calibrations. Source match can also be measured using the 15cm air line and provided short.

### *Test Port Adapter Options*

| OPTION | DESCRIPTION | QUANTITY | MODEL* |
|---|---|---|---|
| 0 | No Adapters | | — |
| 1 | NMD3.5mm female to 7mm | 2 | 2633C |
| 2 | 3.5mm female to 7mm | 1 | 8022A2 |
| | 3.5mm male to 7mm | 1 | 8022B2 |
| 3 | NMD2.4mm female to 7mm | 2 | 7909C |
| 4 | 2.4mm female to 7mm | 1 | 7922A |
| | 2.4mm male to 7mm | 1 | 7922B |

* Specification for 7909C are on page 102; 7922A/B on page 104; for all others see page 20.

### *Components Included in 2660B Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 7mm air line (3.12cm) | 2653S3.12 |
| 1 | 7mm air line (0.6cm) | 2653L |
| 1 | 7mm air line (15cm) | 2653S15 |
| 1 | 7mm reference fixed flush short | 2615B3 |
| 1 | 7mm open | 2616D3 |
| 1 | 7mm fixed termination | 2610F |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

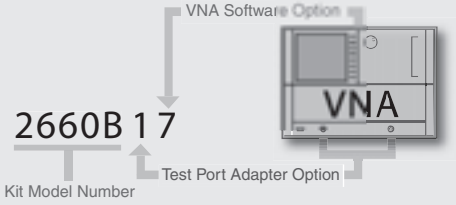
Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See ***Test Port Adapter Options*** for details.)

### *Recommended Accessories*

A028 Connector gage kit (push-on type). See page 92.
A028D Connector gage kit (thread-on type). See page 92.
8799A1 Torque wrench, 5/16-inch (8 in. lbs). See page 94.
2698C2 Torque wrench, 3/4-inch (12 in. lbs). See page 94.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 2660B kit configured with the adapters and software for use with an Agilent PNA that has NMD3.5mm test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see above) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 7mm | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.4mm or 1.85mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |
| | 4 | 40 | 41 | 44 | 45 | 47 | 49 |

[1] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-042.



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# Type N VNA Calibration Kits

## 8850C Standard Kits




### *Features*

- *Broad VNA Coverage*
- *Precision Opens*
- *DC to 18 GHz*

### *Description*

These precision type N calibration kits are designed for use with a broad range of vector network analyzers (VNA). With these kits, you can make error-corrected measurements of devices equipped with type N connectors from DC to 18.0 GHz. Each kit includes a full complement of calibration standards (as listed at right) and can be configured for any combination of VNA or test set/cable connectors. Each kit include a 3-1/2" disk containing the VNA software constants. All kit components come housed in an attractive, foam-lined, wood instrument case.

### *Type N Connector Description*

The precision type N connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N). The connectors are normally made with stainless steel bodies with heat treated gold-plated beryllium copper contacts. For interface specifications see Maury data sheet 5E-049.

### *Components Included in 8850C Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | Type N female fixed offset short | 8806C |
| 1 | Type N male fixed offset short | 8807C |
| 1 | Type N female open | 8809B1 |
| 1 | Type N male open | 8810B1 |
| 1 | Type N female fixed termination | 2510A7 |
| 1 | Type N male fixed termination | 2510B7 |
| 1 | Type N female sliding termination which converts between type N female and male | 2517A |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |
| 1 | Double ended flat wrench (1/2-inch & 9/16-inch) | — |

Note: 8850C kits also include a set of adapters that is user specified per the Option Finder below. (See page 25 for details.)

### *Recommended Accessories*

***Torque wrench*** (See page 94)

2698C2 3/4-inch torque wrench (12 in. lbs)

***Connector Gage Kits*** (See page 92)

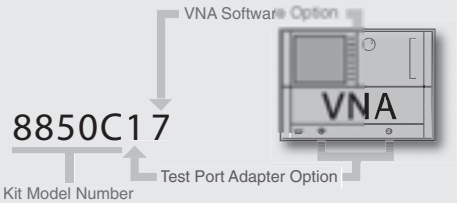
A020A Connector gage kit (push-on type)
A020D Connector gage kit (thread-on type)

***Adapters***

8828A/B/C Type N In-series phase matched adapters (See page 114)
7909D1/D2 Type N to NMD2.4mm test port adapters (See page 102)
7923A/B/C/D Type N to 2.4mm phase matched adapters (See page 104)

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8850C kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 25) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| Type N | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [1] | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| 7mm | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 2.4mm or 1.85mm [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

Key Literature: Maury data sheet 2Z-025C.



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# Type N VNA Calibration Kits

## 8850P Fixed Termination Kits


8850P14

### *Features*

- *Broad VNA Coverage*
- *Precision Opens*
- *DC to 18 GHz*

### *Description*

These precision type N calibration kits are designed for use with a broad range of vector network analyzers (VNA). With these kits, you can make error-corrected measurements of devices equipped with type N connectors from DC to 18.0 GHz. Each kit includes a full complement of calibration standards (as listed at right) and can be configured for any combination of VNA or test set/cable connectors. Each kit include a 3-1/2″ disk containing the VNA software constants. All kit components come housed in an attractive, foam-lined, wood instrument case.

### *Type N Connector Description*

The precision type N connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N). The connectors are normally made with stainless steel bodies with heat treated gold-plated beryllium copper contacts. For interface specifications see Maury data sheet 5E-049.

### *Components Included in 8850P Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | Type N female fixed offset short | 8806C |
| 1 | Type N male fixed offset short | 8807C |
| 1 | Type N female open | 8809B1 |
| 1 | Type N male open | 8810B1 |
| 1 | Type N female fixed termination | 2510A7 |
| 1 | Type N male fixed termination | 2510B7 |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: These fixed termination kits **DO NOT** include adapters. Adapters must be ordered separately (see ***Recommended Accessories*** below).

### *Available Kits*

| VNA MAKE AND MODEL | MAURY CAL KIT MODEL* |
|---|---|
| Rohde & Schwarz ZV Series | 8850P11 |
| Agilent ENA Series | 8850P12 |
| Agilent 8510C | 8850P14 |
| Agilent 8719/20/22 | 8850P15 |
| Agilent PNA series | 8850P17 |
| Anritsu 37000 | 8850P19 |

* These fixed termination kits **DO NOT** include adapters. Adapters must be ordered separately.

### *Recommended Accessories*

***Torque wrench*** (See page 94)

2698C2 3/4-inch torque wrench (12 in. lbs)

***Connector Gage Kits*** (See page 92)

A020A Connector gage kit (push-on type)

A020D Connector gage kit (thread-on type)

***Adapters***

8828A/B/C Type N In-series phase matched adapters (See page 114)

7909D1/D2 NMD2.4mm to Type N test port adapters (See page 102)

7923A/B/C/D 2.4mm to Type N phase matched adapters (See page 104)

Key Literature: Maury data sheet 2Z-025P.



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# Type N TRL/LRL VNA Calibration Kits

## 8860A Tri-Kits




### *Features*

- *TRL/LRL Calibrations*
- *SOLT (Short-Open-Load-Thru)*
- *Gated Air Line*
- *DC to 18 GHz*

### *Description*

These type N vector network analyzer (VNA) calibration kits are designed for use with a range of popular VNAs. The components in the kits are configured for use in making error-corrected TRL/LRL measurements of devices supplied with type N connectors, from DC to 18.0 GHz.

### *TRM/TRL/LRL Calibration*

Maury TRL/LRL calibration kits are tri-kits that contain the components needed to perform three types of calibrations (TRM/TRL/LRL, SOLT, and short-open-(air line + load). Source match can also be measured using the 15cm air line and provided short. The following table shows the frequency ranges, calibration methods, and the standards used to perform a complete 2-port calibration to 18 GHz.

| FREQUENCY RANGE | CALIBRATION METHOD | CALIBRATION STANDARDS |
|---|---|---|
| DC – 800 MHz | TRM | Fixed Termination |
| 160 – 800 MHz | TRL | 15cm air line |
| 800 MHz – 4.0 GHz | TRL | 3.12cm air line |
| 4.0 GHz – 18.0 GHz | LRL | 3.12cm & 3.82cm air lines |

### *Components Included in 8860A Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | Type N female to male air line (3.12cm) | 2553T3.12 |
| 1 | Type N female to male air line (3.82cm) | 2553T3.82 |
| 1 | Type N female to male air line (15cm) | 2553T15 |
| 1 | Type N female fixed offset short (SOLT) | 8806C |
| 1 | Type N female fixed offset short (TRL) | 8806G |
| 1 | Type N male fixed offset short | 8807C |
| 1 | Type N female open | 8809B1 |
| 1 | Type N male open | 8810B1 |
| 1 | Type N female fixed termination | 2510A6 |
| 1 | Type N male fixed termination | 2510B6 |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

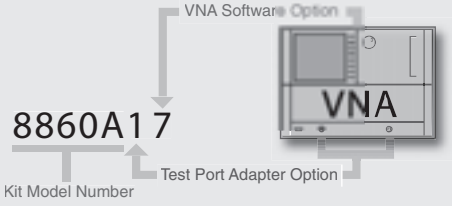
Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 25 for details.)

### *Recommended Accessories*

A020A Connector gage kit (push-on type). See page 92.
A020D Connector gage kit (thread-on type). See page 92.
2698C2 Torque wrench, 3/4-inch (12 in. lbs). See page 94.

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8860A kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm or 2.92mm (K) test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 25) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| Type N [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 3.5mm or 2.92mm (K) [2] | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| 2.4mm or 1.85mm [2] | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 7mm | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] Adapters are not included with these type N test port options, but may be ordered separately, if needed. See ***Recommended Accessories*** on page 23.
[2] 1.85mm and 2.4mm connectors are fully mateable, as are 2.92mm (K) and 3.5mm connectors. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-043.



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# Type N VNA Calibration Kit Adapter Options

## 8850Z8/Z9/Z10 and 8860 (3.5mm, 2.4mm and 7mm) Sets

### Features

- *NMD3.5mm to Type N, NMD2.4mm to Type N, and Type N Between-Series Adapters*
- *DC to 18 GHz*
- *High Performance*
- *Phase Matched Within Each Set*

### Description

The NMD3.5mm, and NMD2.4mm test port adapters in these sets are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets. The precision 3.5mm, 7mm, and 2.4mm adapters feature low VSWR, low insertion loss and are of minimum length. The sets described on this page are configured to provide users with the ability to tailor their Maury calibration kit for use with specific VNAs. These adapters may be ordered in separately boxed sets, as options shipped with their corresponding VNA calibration kits, or as individual adapters (by model number) to serve as replacement parts or spares.

### Adapter Specifications:

***Models 8829A and 8829B*** *(for more detail see page 108)*
Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 6.0 GHz . . . . . 1.04
6.0 to 18.0 GHz . . . . . 1.08
Nominal Impedance . . . . . 50 ohm

***Models 7909D1 and 7909D2*** *(for more detail see page 102)*
Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 6.0 GHz . . . . . 1.06
6.0 to 18.0 GHz . . . . . 1.10
Nominal Impedance . . . . . 50 ohm

***Models 8023A/B1/C/D1*** *(for more detail see page 111)*
Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.065
4.0 to 18.0 GHz . . . . . 1.13
Nominal Impedance . . . . . 50 ohm

***Models 2606C/D*** *(for more detail see page 113)*
Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.03
4.0 to 9.0 GHz . . . . . 1.04
9.0 to 18.0 GHz . . . . . 1.07
Nominal Impedance . . . . . 50 ohm

***Models 7923A/B/C/D*** *(for more detail see page 104)*
Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.07
4.0 to 18.0 GHz . . . . . 1.14
Nominal Impedance . . . . . 50 ohm

### For 8850 Series Calibration Kits:

#### Adapters Included in 8850Z8 (3.5mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 1 | NMD3.5mm female to type N female | 8829A |
| | 1 | NMD3.5mm female to type N male | 8829B |
| | 1 | 3.5mm female to type N female | 8023A |
| | 1 | 3.5mm female to type N male | 8023B1 |
| | 1 | 3.5mm male to type N female | 8023C |
| | 1 | 3.5mm male to type N male | 8023D1 |

#### Adapters Included in 8850Z9 (7mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 2 | 7mm to type N female | 2606C |
| | 2 | 7mm to type N male | 2606D |

#### Adapters Included in 8850Z10 (2.4mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 1 | NMD2.4mm female to type N female | 7909D1 |
| | 1 | NMD2.4mm female to type N male | 7909D2 |
| | 1 | 2.4mm female to type N female | 7923A |
| | 1 | 2.4mm male to type N male | 7923B |
| | 1 | 2.4mm male to type N female | 7923C |
| | 1 | 2.4mm male to type N male | 7923D |

### For 8860 Series Calibration Kits:

#### Adapters Included in 8860 (3.5mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 1 | 3.5mm female to type N female | 8023A |
| | 1 | 3.5mm female to type N male | 8023B1 |
| | 1 | 3.5mm male to type N female | 8023C |
| | 1 | 3.5mm male to type N male | 8023D1 |

#### Adapters Included in 8860 (2.4mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | 2.4mm female to type N female | 7923A |
| | 1 | 2.4mm male to type N male | 7923B |
| | 1 | 2.4mm male to type N female | 7923C |
| | 1 | 2.4mm male to type N male | 7923D |

#### Adapters Included in 8860 (7mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 2 | 7mm to type N female | 2606C |
| | 2 | 7mm to type N male | 2606D |



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# Type N VNA Calibration Kits

## 8880A/B 75 ohm Fixed Termination Kits



8880B

### Features

- *75 ohm Kits*
- *Simple Fixed Load Calibration*
- *Broad VNA Coverage*

### Description

Maury's 8880 series calibration kits are designed for calibrating vector network analyzers (VNAs) from DC to 2.0 GHz that will be used to make 75 ohm type N connector measurements.

A full complement of calibration standards (opens, shorts and fixed terminations, female and male) are included in the 8880A and 8880B kits. In addition, the 8880B kit includes three (3) in-series adapters that are phase matched for accurate measurements of non-insertable devices.

All kit components (as listed at right) are housed in a foam-lined wood instrument case. Operating instructions are included with the calibration standard constants so that they can be keyed in from the VNA's front panel. (Calibration standard constants in the form of software on a 3-1/2 inch diskette may be ordered separately.)

### Connector Description

The type N 75 ohm connectors on the components in these kits are a precision version of type N 75 ohm connectors, developed by Maury, which meets all applicable requirements of IEC169-16. They exhibit extremely low VSWR, and although specified to 2.0 GHz, they can be used at much higher frequencies. The male connectors are provided with a 3/4" hex coupling nut so the junctions can be properly torqued to 12 in. lbs. For interface specifications see Maury data sheet 5E-054.

### Supported VNAs

Maury's 8880 series calibration kits are ideal for use in calibrating Agilent's 75 ohm VNAs (ie., 8752B or 8753C with 85046B, 85044B test sets or 11850D splitters). With the appropriate adapters (listed at right) these kits can also be used with 50 ohm VNAs (eg., Agilent 8510C, 8719/20/22, and PNA series; Anritsu 37000 series; and Rohde & Schwarz ZV series) to make 75 ohm measurements.

### Recommended Accessories

***Torque wrench*** See page 94.

2698C2 3/4-inch torque wrench (12 in. lbs)

***Connector Gage Kits*** See page 92.

A020A Connector gage kit (push-on type)
A020D Connector gage kit (thread-on type)
A020G 75 ohm type N Connector gage kit (push-on type)

***Utility Boxes***

8880X2 Foam-lined utility box (houses up to 12 adapters)

Key Literature: Maury data sheet 2Z-035.

### Components Included in 8880A/B Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | Type N 75 ohm female fixed offset short | 8884A |
| 1 | Type N 75 ohm male fixed offset short | 8884B |
| 1 | Type N 75 ohm female open | 8885A |
| 1 | Type N 75 ohm male open | 8885B |
| 1 | Type N 75 ohm female fixed termination | 8883A |
| 1 | Type N 75 ohm male fixed termination | 8883B |
| 1 | Type N 75 ohm female to female adapter | 8882A* |
| 1 | Type N 75 ohm male to male adapter | 8882B* |
| 1 | Type N 75 ohm female to male adapter | 8882C* |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |
| 1 | Double ended flat wrench (1/2-inch & 9/16-inch) | — |

* In-series, phase matched adapters included in 8880B kits, but not in 8880A kits.

### Recommended Adapters

***In-Series Phase Matched Adapters*** See page 117.

8882A Type N 75 ohm female to type N 75 ohm female
8882B Type N 75 ohm male to type N 75 ohm male
8882C Type N 75 ohm female to type N 75 ohm male

***Between-Series Adapters (75 ohm to 50 ohm)*** See page 117.

8882D1 Type N 75 ohm female to 7mm 50 ohm
8882D2 Type N 75 ohm male to 7mm 50 ohm
8882E1 Type N 75 ohm female to NMD3.5mm 50 ohm female
8882E2 Type N 75 ohm male to NMD3.5mm 50 ohm female
8882F11 Type N 75 ohm female to type N 50 ohm female
8882F12 Type N 75 ohm female to type N 50 ohm male
8882F21 Type N 75 ohm male to type N 50 ohm female
8882F22 Type N 75 ohm male to type N 50 ohm male
8882G11 Type N 75 ohm female to 3.5mm 50 ohm female
8882G12 Type N 75 ohm female to 3.5mm 50 ohm male
8882G21 Type N 75 ohm male to 3.5mm 50 ohm female
8882G22 Type N 75 ohm male to 3.5mm 50 ohm male

***Warning: Do not mate a 75 ohm type N connector to a 50 ohm type N connector.***



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# Type N VNA Calibration Kits

## 8880A/B 75 ohm Fixed Termination Kits

### *Kit Component Specifications*

#### *Fixed Terminations*

***Models 8883A and 8883B*** *(see also page 55)*

Frequency Range . . . . . DC to 2.0 GHz
Maximum VSWR . . . . . 1.01 (46 dB minimum R.L.)
Nominal Impedance . . . . . 75 ohm
Power Handling . . . . . 1 watt CW

#### *Fixed Shorts*

***Models 8884A and 8884B*** *(see also page 73)*

Frequency Range . . . . . DC to 2.0 GHz
Reflection Coefficient . . . . . 0.98 minimum
Nominal Impedance . . . . . 75 ohm

#### *Open Circuits*

***Models 8885A and 8885B*** *(see also page 79)*

Frequency Range . . . . . DC to 2.0 GHz
Reflection Coefficient . . . . . 0.98 minimum
Phase Accuracy . . . . . ± 2.0 degrees
Nominal Impedance . . . . . 75 ohm

#### *Type N 75 ohm Phase Matched In-Series Adapters*
#### *(Included in 8880B Kits; Not Included in 8880A Kits)*

***Models 8882A/B/C*** *(see also page 117)*

Frequency Range . . . . . DC to 2.0 GHz
Maximum VSWR . . . . . 1.03
Nominal Impedance . . . . . 75 ohm

### *Specifications for Accessories*

#### *Type N 75 ohm Between-Series Adapters*
#### *(Adapting to various 50 ohm connector types)*

***Models 8882E1/E2*** *(see also page 117)*

Frequency Range . . . . . DC to 2.0 GHz
Typical VSWR . . . . . 1.05
Nominal Impedance . . . . . 75 ohm

***Models 8882G11/G12/G21/G22*** *(see also page 117)*

Frequency Range . . . . . DC to 2.0 GHz
Typical VSWR . . . . . 1.05
Nominal Impedance . . . . . 75 ohm

***Models 8882D1/D2*** *(see also page 117)*

Frequency Range . . . . . DC to 2.0 GHz
Typical VSWR . . . . . 1.05
Nominal Impedance . . . . . 75 ohm

***Models 8882F11/F12/F21/F22*** *(see also page 117)*

Frequency Range . . . . . DC to 2.0 GHz
Typical VSWR . . . . . 1.05
Nominal Impedance . . . . . 75 ohm

#### *Other Recommended Accessories*

***Model 2698C2 Torque wrench*** (see also page 94)

Wrench Size . . . . . 3/4-inch Hex
Reset Torque . . . . . 12 (± 0.4) in. lbs
Handle Color . . . . . Blue

***Model A020A Connector Gage Kit*** (see also page 92)

Connector Type(s) . . . . . Type N (50 ohm) female and male
Dial Resolution (Inches) . . . . . 0.00025
Gages in Kit . . . . . One
Interface . . . . . Hand-held Push-on

***Model A020D Connector Gage Kit*** (see also page 92)

Connector Type(s) . . . . . Type N (50 ohm) female and male
Dial Resolution (Inches) . . . . . 0.0001
Gages in Kit . . . . . Two
Interface . . . . . Metrology Grade Thread-on

***Model A020G Connector Gage Kit*** (see also page 92)

Connector Type(s) . . . . . Type N (75 ohm) female and male
Dial Resolution (Inches) . . . . . 0.0001
Gages in Kit . . . . . One
Interface . . . . . Hand-held Push-on



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# TNC VNA Calibration Kits

## 8650E Standard Kits

### Features

- *Precision TNC Connectors*
- *Sliding Load Calibration*
- *Broad VNA Coverage*
- *DC to 18 GHz*



8650E

### Description

These precision TNC calibration kits are designed for use with a broad range of vector network analyzers (VNAs) and are used to make error-corrected measurements of devices supplied with TNC connectors from DC to 18 GHz.

Each kit is supplied with a full complement of calibration standards (shorts, opens, sliding and fixed loads) and can be configured for any combination of VNA or test set/cable connectors. All required calibration standards, applicable adapters and accessories, along with a 3-1/2" disk (containing the VNA software) and operating instructions, come in an attractive foam-lined wood instrument case.

### Connector Description

The TNC connectors (MPC/TNC) on the components in this kit are precision stainless steel connectors that mate with MIL-C-39012 and MIL-T-81490 connectors. They are low VSWR connectors rated from DC to 18 GHz. For interface specifications see Maury data sheet 5E-053.

### Adapters Included in 7mm Sets (See page 113)

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 2 | 7mm to TNC female | 2622A1 |
| | 2 | 7mm to TNC male | 2622B |

### Recommended Adapters

***In-Series Adapters*** See page 119

232A11 TNC female to female
232B11 TNC male to male
232C11 TNC female to male

### Components Included in 8650E Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | TNC female fixed offset short | 8615A |
| 1 | TNC male fixed offset short | 8615B |
| 1 | TNC female open | 8609B |
| 1 | TNC male open | 8610B |
| 1 | TNC female sliding termination | 452A1 |
| 1 | TNC male sliding termination | 452B1 |
| 1 | TNC female fixed termination | 332E |
| 1 | TNC male fixed termination | 332F |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

All kits also include a set of user-specified adapters per the Option Finder below.

### Adapters Included in 3.5mm Sets (Pages 108, 111)

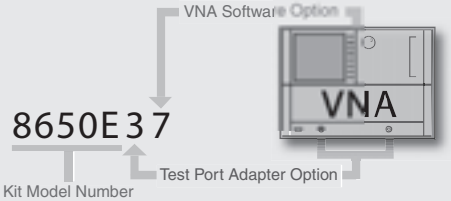
| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 1 | NMD3.5mm female to TNC female | 8619A |
| | 1 | NMD3.5mm female to TNC male | 8619B |
| | 1 | 3.5mm female to TNC female | 8025A1 |
| | 1 | 3.5mm female to TNC male | 8025B1 |
| | 1 | 3.5mm male to TNC female | 8025C1 |
| | 1 | 3.5mm male to TNC male | 8025D1 |

### Recommended Accessories

2698G1 9/16-in. hex torque wrench (12 in. lbs) See page 94
A012A Connector gage kit (push-on type) See page 92

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8650E kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see above) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 7mm | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| 3.5mm or 2.92mm (K) [1] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] 2.92mm (K) and 3.5mm connectors are fully mateable. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheets 2Z-023H.



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# TNC VNA Calibration Kits

## 8650P Fixed Termination Kits



8650P14

### *Features*

- *Fixed Load Calibration*
- *Precision TNC Connectors*

### *Description*

Maury's 8650P calibration kits are designed for calibrating vector network analyzers (VNAs) for measuring devices equipped with TNC connectors from DC to 18 GHz. Each kit is supplied with a full complement of calibration standards (shorts, opens, sliding and fixed loads) and can be configured for any VNA version. All required calibration standards, along with a 3-1/2" disk (containing the VNA software) and operating instructions, come in an attractive foam-lined wood instrument case.

### *Connector Description*

The TNC connectors (MPC/TNC) on the components in this kit are precision stainless steel connectors that mate with MIL-C-39012 and MIL-T-81490 connectors. They are low VSWR connectors rated from DC to 18 GHz. For interface specifications see Maury data sheet 5E-053.

### *Available Kits*

| VNA MAKE AND MODEL | MAURY CAL KIT MODEL* |
|---|---|
| Rohde & Schwarz ZV Series | 8650P11 |
| Agilent ENA Series | 8650P12 |
| Agilent 8510C | 8650P14 |
| Agilent 8719/20/22 | 8650P15 |
| Agilent PNA series | 8650P17 |
| Anritsu 37000 | 8650P19 |

*These fixed termination kits **DO NOT** include adapters. Adapters must be ordered separately.

### *Recommended Accessories*

***Torque wrench*** (See page 94)

2698G1 9/16-inch torque wrench (12 in. lbs)

***Connector Gage Kits*** (See page 92)

A012A Connector gage kit (push-on type)

### *Components Included in 8650P Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | TNC female fixed offset short | 8615A |
| 1 | TNC male fixed offset short | 8615B |
| 1 | TNC female open | 8609B |
| 1 | TNC male open | 8610B |
| 1 | TNC female fixed termination | 332E |
| 1 | TNC male fixed termination | 332F |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: These fixed termination kits **DO NOT** include adapters. Adapters must be ordered separately (see ***Recommended Adapters*** below).

### *Recommended Adapters*

***In-Series Adapters*** (See page 119)

232A11 TNC female to TNC female adapter
232B11 TNC male to TNC male adapter
232C11 TNC female to TNC male adapter

***Between-Series Adapters – 7mm to TNC*** (See page 113)

2622A1 7mm to TNC female adapter
2622B 7mm to TNC male adapter

***Between-Series Adapters – Type N to TNC*** (See page 116)

8817A Type N female to TNC female adapter
8817B Type N female to TNC male adapter
8817C Type N female to TNC female adapter
8817D Type N male to TNC male adapter

***Between-Series Adapters – 3.5mm to TNC*** (See page 111)

8025A1 3.5mm female to TNC female adapter
8025B1 3.5mm female to TNC male adapter
8025C1 3.5mm male to TNC female adapter
8025D1 3.5mm male to TNC male adapter

***Ruggedized Test Port Adapters – NMD3.5mm to TNC*** (Page 108)

8619A NMD3.5mm female to TNC female adapter
8619B NMD3.5mm female to TNC male adapter

Key Literature: Maury data sheet 2Z-068.



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# AFTNC VNA Calibration Kits

## 8680A Standard Kits & 8680B Fixed Termination Kits

### Features

- *MIL-C-87104/2 AFTNC Interface*
- *Rated to 20 GHz*
- *Sliding Load and Fixed Load Kits*
- *Multiple VNA Support*



8680A

### Description

Maury 8680 calibration kits provide the necessary standards and accessories required to accurately calibrate network analyzers up to 20 GHz for error-corrected measurements of devices equipped with AFTNC connectors. Each kit includes a full complement of calibration standards (as listed at right) and can be configured for any combination of VNA or test set/cable connectors. The "A" model kits include both sliding and fixed terminations; the "B" model economy kits include only fixed terminations. All kit components are supplied in an attractive foam-lined wood instrument case.

### Connector Description

The Maury AFTNC connectors supplied in this kit fully comply with the interface requirements of MIL-C-87104/2. The male connector utilizes a solid outer conductor configuration to provide consistent measurement results. All connector bodies are fabricated from stainless steel for strength and wear resistance. These connectors were developed using optimized HFSS simulation to provide extremely low VSWR, and they are rated to 20 GHz. For interface specifications on these connectors, please refer to Maury data sheet 5E-056.

### Recommended Accessories

2698G1 0.562 hex torque wrench (12 in. lbs) See page 94.

A012E Connector gage kit (push-on type) See page 92.

### Components Included in 8680A/B Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | AFTNC female fixed offset short | 8686A |
| 1 | AFTNC male fixed offset short | 8687A |
| 1 | AFTNC female open | 8685A |
| 1 | AFTNC male open | 8685B |
| 1 | AFTNC female sliding termination | 8683A* |
| 1 | AFTNC male sliding termination | 8683B* |
| 1 | AFTNC female fixed termination | 8684A |
| 1 | AFTNC male fixed termination | 8684B |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

* Included in the 8680A standard kits and not included in the 8680B fixed termination kits.

### Recommended Adapters

***In-Series, Phase Matched Adapters*** *(see page 119)*

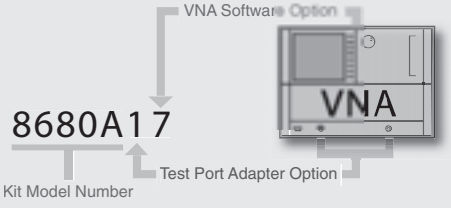
8688A AFTNC female to female

8688B AFTNC male to male

8688C AFTNC female to male

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8680A kit configured with the adapters and software for use with an Agilent PNA that has 7mm test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 29) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| AFTNC [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 7mm | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| Type N | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 3.5mm or 2.92mm (K) [2] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] Adapters are not included with these AFTNC test port options, but may be ordered separately, if needed. See pages 31 and 119.

[2] 3.5mm and 2.92mm (K) connectors are fully mateable. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-038.



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# AFTNC VNA Calibration Kit Adapter Options

## 7mm, Type N, & 3.5mm Sets

### Features

- *AFTNC to 7mm, AFTNC to Type N, and AFTNC to 3.5mm Adapters*
- *DC to 20 GHz*
- *High Performance*
- *Phase Matched Within Model Series*

### Description

The NMD3.5mm test port adapters in these sets are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets. The precision 7mm, Type N, and 3.5mm adapters feature low VSWR, low insertion loss and are of minimum length. The sets described on this page are configured to provide users with the ability to tailor their Maury calibration kit for use with specific VNAs. These adapters may be ordered as options shipped with their corresponding VNA calibration kits, or as individual adapters (by model number) to serve as replacement parts or spares.

### Adapters Included in 7mm Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 2 | 7mm to AFTNC female | 8692A |
| | 2 | 7mm to AFTNC male | 8692B |

### Adapters Included in Type N Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | Type N female to AFTNC female | 8694A |
| | 1 | Type N female to AFTNC male | 8694B |
| | 1 | Type N male to AFTNC female | 8694C |
| | 1 | Type N male to AFTNC male | 8694D |

### Adapters Included in 3.5mm Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 3 | 1 | NMD3.5mm female to AFTNC female | 8691A |
| | 1 | NMD3.5mm female to AFTNC male | 8691B |
| | 1 | 3.5mm female to AFTNC female | 8682A |
| | 1 | 3.5mm female to AFTNC male | 8682B |
| | 1 | 3.5mm male to AFTNC female | 8682C |
| | 1 | 3.5mm male to AFTNC male | 8682D |

### Adapter Specifications

The Maury precision AFTNC adapters and the NMD3.5mm test port adapters included in these sets conform to the following:

### Ruggedized Test Port Adapters

***Models 8691A and 8691B*** *(for more detail see page 108)*

Frequency Range . . . . . DC to 20.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 20.0 GHz . . . . . 1.10
Nominal Impedance . . . . . 50 ohm

### Precision 3.5mm to AFTNC Adapters

***Models 8682A/B/C/D*** *(for more detail see page 111)*

Frequency Range . . . . . DC to 20.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 12.0 GHz . . . . . 1.06
12.0 to 20.0 GHz . . . . . 1.08
Nominal Impedance . . . . . 50 ohm

### Precision Type N to AFTNC Adapters

***Models 8694A/B/C/D*** *(for more detail see page 116)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 8.0 GHz . . . . . 1.06
8.0 to 18.0 GHz . . . . . 1.08
Nominal Impedance . . . . . 50 ohm

### Precision 7mm to AFTNC Adapters

***Models 8692A/B*** *(for more detail see page 113)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 18.0 GHz . . . . . 1.06
Nominal Impedance . . . . . 50 ohm

### Precision AFTNC In-Series Adapters

***Models 8688A/B/C*** *(for more detail see page 119)*

Frequency Range . . . . . DC to 20.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 8.0 GHz . . . . . 1.08
8.0 to 18.0 GHz . . . . . 1.12
Nominal Impedance . . . . . 50 ohm



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# TNCA VNA Calibration Kits

## 8670A Standard Kits & 8670B Fixed Termination Kits




### Features

- *MIL-STD 348A TNCA Interface*
- *Rated to 20 GHz*
- *Sliding Load and Fixed Load Kits*
- *Multiple VNA Support*

### Description

Maury 8670 calibration kits provide the necessary standards and accessories required to accurately calibrate network analyzers up to 20 GHz for error-corrected measurements of devices equipped with TNC connectors. Each kit includes a full complement of calibration standards (as listed at right) and can be configured for any combination of VNA or test set/cable connectors. The "A" model kits include both sliding and fixed terminations; the "B" model economy kits include only fixed terminations. All kit components are supplied in an attractive foam-lined wood instrument case.

### Connector Description

The Maury TNCA connectors supplied in this kit fully comply with the interface requirements of MIL-STD 328A. The male connector utilizes a solid outer conductor configuration to provide consistent measurement results. All connector bodies are fabricated from stainless steel for strength and wear resistance. These connectors are rated to 20 GHz. For interface specifications on these connectors, please refer to Maury data sheet 5E-058.

### Components Included in 8670A/B Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | TNCA female fixed offset short | 8676A |
| 1 | TNCA male fixed offset short | 8677A |
| 1 | TNCA female open | 8675A |
| 1 | TNCA male open | 8675B |
| 1 | TNCA female sliding termination | 8673A* |
| 1 | TNCA male sliding termination | 8673B* |
| 1 | TNCA female fixed termination | 8674A |
| 1 | TNCA male fixed termination | 8674B |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

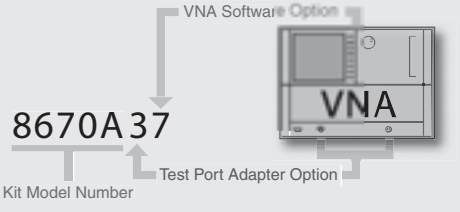
* Included in the 8670A standard kits and not included in the 8670B fixed termination kits.

### Recommended Accessories

2698G1 9/16-inch hex torque wrench (12 in. lbs) See page 94.
A012E Connector gage kit (push-on type) See page 92.

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8670A kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 29) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| TNCA [1] | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 7mm | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| Type N | 2 | 20 | 21 | 24 | 25 | 27 | 29 |
| 3.5mm or 2.92mm (K) [2] | 3 | 30 | 31 | 34 | 35 | 37 | 39 |

[1] Adapters are not included with these TNCA test port options, but may be ordered separately, if needed. See page 33.
[2] 3.5mm and 2.92mm (K) connectors are fully mateable. The resulting junction is calibrated out and is not critical.

Key Literature: Maury data sheet 2Z-038.



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# TNCA VNA Calibration Kit Adapter Options

## 7mm, Type N, & 3.5mm Sets

### Features

- *TNCA to 7mm, TNCA to Type N, and TNCA to 3.5mm Adapters*
- *DC to 20 GHz*
- *High Performance*
- *Phase Matched Within Model Series*

### Description

The NMD3.5mm test port adapters in these sets are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets. The precision 7mm, Type N, and 3.5mm adapters feature low VSWR, low insertion loss and are of minimum length. The sets described on this page are configured to provide users with the ability to tailor their Maury calibration kit for use with specific VNAs. These adapters may be ordered as options shipped with their corresponding VNA calibration kits, or as individual adapters (by model number) to serve as replacement parts or spares.

### Adapters Included in 7mm Sets

| TEST PORT ADAPTER OPTION 1 | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| | 2 | 7mm to TNCA female | 8696A |
| | 2 | 7mm to TNCA male | 8696B |

### Adapters Included in Type N Sets

| TEST PORT ADAPTER OPTION 2 | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| | 1 | Type N female to TNCA female | 8697A |
| | 1 | Type N female to TNCA male | 8697B |
| | 1 | Type N male to TNCA female | 8697C |
| | 1 | Type N male to TNCA male | 8697D |

### Adapters Included in 3.5mm Sets

| TEST PORT ADAPTER OPTION 3 | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| | 1 | NMD3.5mm female to TNCA female | 8679A |
| | 1 | NMD3.5mm female to TNCA male | 8679B |
| | 1 | 3.5mm female to TNCA female | 8672A |
| | 1 | 3.5mm female to TNCA male | 8672B |
| | 1 | 3.5mm male to TNCA female | 8672C |
| | 1 | 3.5mm male to TNCA male | 8672D |

### Adapter Specifications

The Maury precision TNCA adapters and the NMD3.5mm test port adapters included in these sets conform to the following:

### Test Port Adapters

***Models 8679A and 8679B*** *(for more detail see page 108)*

Frequency Range . . . . . DC to 20.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 20.0 GHz . . . . . 1.10
Nominal Impedance . . . . . 50 ohm

### Precision 3.5mm to TNCA Adapters

***Models 8672A/B/D/C*** *(for more detail see page 111)*

Frequency Range . . . . . DC to 20.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 12.0 GHz . . . . . 1.06
12.0 to 20.0 GHz . . . . . 1.20
Nominal Impedance . . . . . 50 ohm

### Precision Type N to TNCA Adapters

***Models 8697A/B/C/D*** *(for more detail see page 116)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 8.0 GHz . . . . . 1.06
8.0 to 18.0 GHz . . . . . 1.08
Nominal Impedance . . . . . 50 ohm

### Precision 7mm to TNCA Adapters

***Models 8696A/B*** *(for more detail see page 113)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 18.0 GHz . . . . . 1.06
Nominal Impedance . . . . . 50 ohm

### Recommended Adapters (not included in adapter option sets)

### Precision TNCA In-Series Adapters

***Models 8678A/B/C*** *(for more detail see page 119)*

Frequency Range . . . . . DC to 20.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 8.0 GHz . . . . . 1.08
8.0 to 20.0 GHz . . . . . 1.12
Nominal Impedance . . . . . 50 ohm



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# BNC VNA Calibration Kits

## 8550E/F/G 50 ohm Fixed Termination Kits



8550E14

### *Features*

- *Precision BNC Connectors*
- *DC to 10 GHz*
- *Fixed Load Calibration*
- *Multiple VNA Support*

### *Description*

These BNC calibration kits provide a convenient, accurate means of calibrating vector network analyzers (VNAs) for measuring devices with BNC connectors at 50 ohm reference impedance. These kits are provided with fixed terminations and are generally used at frequencies up to 10 GHz.

Each kit in the 8550 series includes all the basic standards necessary for calibrating your VNA. All the included calibration standards (listed at right) are provided in a foam-lined wood instrument case, along with the Operating Instructions. The VNA software for supported VNA models are provided on 3-1/2" data disks for simplified loading into your analyzer.

### *Supported VNAs*

Maury's 8550 series calibration kits are ideal for use in calibrating many popular VNAs (ie., Agilent 8510C, 8719/20/22, ENA and PNA series; Anritsu 37000; and Rohde & Schwarz ZV series).The table below lists the supported VNA makes and models with their corresponding software option numbers. To order an 8850 series kit configured with the VNA software you need, simply add the appropriate two digit number to the end of the kit model number.

Example: To order a cal kit configured for use with an Agilent PNA equipped with 3.5mm test ports, add the software option number (17) to the end of the kit model number from the Available Kits table at left (8550F). The complete model number to show on your order for this configuration is 8550F17.

### *Software Options for 8550 Kits*

| VNA MAKE AND MODEL | SOFTWARE OPTION NUMBER |
|---|---|
| Rohde & Schwarz ZV Series | 11 |
| Agilent ENA Series | 12 |
| Agilent 8510C | 14 |
| Agilent 8719/20/22 | 15 |
| Agilent PNA series | 17 |
| Anritsu 37000 | 19 |

Key Literature: Maury data sheet 2Z-029B.

### *Components Included in 8550 Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | BNC female fixed offset short | 361N2 |
| 1 | BNC male fixed offset short | 361P2 |
| 1 | BNC female open | 371N2 |
| 1 | BNC male open | 371P2 |
| 1 | BNC female fixed termination | 351A2 |
| 1 | BNC male fixed termination | 351B2 |
| 1 | Operating Instructions (manual) | — |
| 1 | VNA software disk | — |
| 1 | Instrument case | — |

Each kit also include the adapters shown in the ***Available Kits*** table below.

### *Available Kits*

| VNA TEST PORT TYPES | MAURY KIT MODEL NO. | ADAPTERS INCLUDED IN KITS* | | |
|---|---|---|---|---|
| | | QTY | MODELS | DESCRIPTION |
| 7mm | 8550E | 2 | 2621A1 | 7mm to BNC female |
| | | 2 | 2621B1 | 7mm to BNC male |
| 3.5mm or 2.92mm (K) [1] | 8550F | 1 | 8028A | 3.5mm fem to BNC fem |
| | | 1 | 8028B | 3.5mm fem to BNC male |
| | | 1 | 8028C | 3.5mm male to BNC fem |
| | | 1 | 8028D | 3.5mm male to BNC male |
| Type N | 8550G | 1 | 8821A1 | Type N fem to BNC fem |
| | | 1 | 8821B1 | Type N fem to BNC male |
| | | 1 | 8821C1 | Type N male to BNC female |
| | | 1 | 8821D1 | Type N male to BNC male |

[1] 3.5mm and 2.92mm (K) connectors are fully mateable. The resulting junction is calibrated out and is not critical.

* For detail information about these adapters see page 113 (for 2621 series), page 111 (for 8028 series) or page 116 (for 8821 series models).



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# BNC VNA Calibration Kits

## 8580A 75 ohm Fixed Termination Kits

### *Features*

- *Precision BNC Connectors*
- *DC to 2 GHz*
- *Fixed Load Calibration*
- *Multiple VNA Support*

### *Description*

These BNC calibration kits provide a convenient, accurate means of calibrating vector network analyzers (VNAs) for measuring devices with BNC connectors at 75 ohm reference impedance. These kits are provided with fixed terminations and are generally used at frequencies up to 2 GHz.

The 8580A kit includes all the basic standards (both female and male) necessary for calibrating your VNA. The 8580A01 and the 8580A02 are single-sex kits which include only female or male standards, respectively.

Each kit is provided with all the included calibration standards (listed below and at right) housed in a foam-lined wood instrument case, along with the Operating Instructions. The VNA software for supported VNA models are included in the Operating Instructions and may be easily keyed in through the front panel.

### *Components Included in 8580A Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 75 ohm BNC female fixed offset short | 8584A |
| 1 | 75 ohm BNC male fixed offset short | 8584B |
| 1 | 75 ohm BNC female open | 8585A |
| 1 | 75 ohm BNC male open | 8585B |
| 1 | 75 ohm BNC female fixed termination | 8583A |
| 1 | 75 ohm BNC male fixed termination | 8583B |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

### *Recommended Adapters* (See page 113)

8582D1 7mm to BNC 75 ohm female adapter

8582D2 7mm to BNC 75 ohm male adapter

Key Literature: Maury data sheet 2Z-036.



8580A01

## 8580A01/02 75 ohm Single Sex Fixed Termination Kits

### *Components Included in 8580A01 Female Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 75 ohm BNC female fixed offset short | 8584A |
| 1 | 75 ohm BNC female open | 8585A |
| 1 | 75 ohm BNC female fixed termination | 8583A |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

### *Components Included in 8580A02 Male Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 75 ohm BNC male fixed offset short | 8584B |
| 1 | 75 ohm BNC male open | 8585B |
| 1 | 75 ohm BNC male fixed termination | 8583B |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

***Warning: Do not mate 75 ohm BNC connectors to a 50 ohm BNC connectors. Serious damage may result.***



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# OSP™ VNA Calibration Kits

## 8780A Standard Kits & 8780B Fixed Termination Kits

### Features

- *OSP™ Connectors*
- *Precision Coupling*
- *Sliding Load and Fixed Load Calibration*
- *DC to 18 GHz*



8780A17

### Description

These calibration kits are designed for use in calibrating vector network analyzers (VNAs) for making error-corrected measurements of devices with OSP™ blind-mate connectors from DC to 18 GHz. The positive coupling system featured in these connectors permits standards to be mated using a calibrated torque wrench. This provides precise repeatability of each calibration interface and significantly improves accuracy compared to non-captivated, blind-mate interfaces.

The 8780A standard kits include fixed shorts, opens, fixed and sliding loads, a torque wrench, an open-end wrench, and a 3-1/2 inch data disk that provides the VNA software for your specific VNA. The 8780B fixed termination kits have the same components but lack the sliding loads. Each kit comes in a foam-lined wood instrument case with operating instructions.

### Connector Description

The connectors on these components are Maury precision LCP/OSP™ connectors that are mating compatible with standard OSP™ and Dynawave/Dynamate™ series blind-mate connectors. They are low VSWR connectors rated from DC to 18 GHz. For interface specifications see Maury data sheet 5E-065.

### Recommended Accessories

***Connector Gage Kits*** See page 92.

A039C Connector gage kit (push-on type)

### Components Included in 8780A/B Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | OSP™ female fixed offset short | 8781A |
| 1 | OSP™ male fixed offset short | 8781B |
| 1 | OSP™ female open | 8782A |
| 1 | OSP™ male open | 8782B |
| 1 | OSP™ female fixed termination | 8783A |
| 1 | OSP™ male fixed termination | 8783B |
| 1 | OSP™ sliding termination (with interchangeable female and male connectors) | 8784E* |
| 1 | 9/16-inch hex torque wrench (8 in. lbs) | 2698H1 |
| 1 | 5/16-inch open-end wrench | 8770Z6 |
| 1 | 7/16-inch open-end wrench | 8770Z7 |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: These kits can also include a set of phase matched 3.5mm or 7mm user- specified adapters per the Option Finder below. (See page 37.)

* Included in 8780A standard kits. Not included in 8780B fixed termination kits.

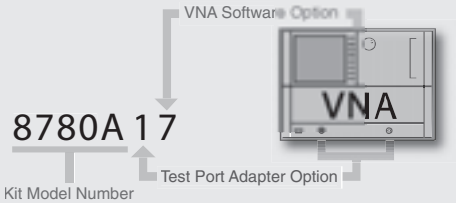
### Recommended Adapters

***Phase Matched Adapters*** See page 118.

8787J Type N female to OSP™ female
8787K Type N male to OSP™ male

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 8780A kit configured with the adapters and software for use with an Agilent PNA that has 3.5mm test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 33) | VNA SOFTWARE OPTIONS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT ENA SERIES OPTION 2 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| OSP™ | 0 | — | 01 | 02 | 04 | 05 | 07 | 09 |
| 7mm | 1 | 10 | 11 | 12 | 14 | 15 | 17 | 19 |
| 3.5mm | 1 | 20 | 21 | 22 | 24 | 25 | 27 | 29 |

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Key Literature: Maury data sheet 2Z-037.



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# OSP™ VNA Calibration Kits

## 8780F/M Single-Sex Fixed Termination Kits

### Description

These kits are offered as a lower-cost single-sex alternative for users who don't need all of the components in the 8780A/B kits. The 8780F kits include only female standards and the 8780M kits include only male standards. (See the list at right.) Each kit comes in a foam-lined wood instrument case with operating instructions. The VNA software for specific VNAs are included in the operating instructions and can be keyed in from the front panel of the VNA.

### Components Included in 8780F/M Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | OSP™ female fixed offset short | 8781A* |
| 1 | OSP™ male fixed offset short | 8781B** |
| 1 | OSP™ female open | 8782A* |
| 1 | OSP™ male open | 8782B** |
| 1 | OSP™ female fixed termination | 8783A* |
| 1 | OSP™ male fixed termination | 8783B** |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

* Included in 8780F kits; not included in 8780M kits.
** Included in 8780M kits; not included in 8780F kits.

### Adapter Set Options for 8780F/M Kits

To order a set of phase matched adapters for the 8780F or M kits add one of the two-digit option numbers in the table below to the basic kit model number.

| NETWORK ANALYZER TEST PORT TYPE | TEST PORT ADAPTER SET OPTIONS | Adapters Included in each Set | | | |
|---|---|---|---|---|---|
| | | For 8780F Kits | | For 8780M Kits | |
| 7mm | 10 | 2 ea. 7mm to OSP™ male adapters | 8787H | 2 ea. 7mm to OSP™ female adapters | 8787G |
| | | 1 ea. 7mm to OSP™ female adapter | 8787G | 1 ea. 7mm to OSP™ male adapter | 8787H |
| 7mm | 11 | 1 ea. 7mm to OSP™ male adapter | 8787H | 1 ea. 7mm to OSP™ female adapter | 8787G |
| 3.5mm | 20 | 2 ea. 3.5mm female to OSP™ male adapters | 8787S | 2 ea. 3.5mm female to OSP™ female adapters | 8787Q |
| | | 1 ea. 3.5mm female to OSP™ female adapter | 8787Q | 1 ea. 3.5mm female to OSP™ male adapter | 8787S |
| 3.5mm | 21 | 1 ea. 3.5mm female to OSP™ male adapter | 8787S | 1 ea. 3.5mm female to OSP™ female adapter | 8787Q |
| Type N | 30 | 2 ea. Type N male to OSP™ male adapters | 8787K | 2 ea. Type N male to OSP™ female adapters | 8787J |
| | | 1 ea. Type N male to OSP™ female adapter | 8787J | 1 ea. Type N male to OSP™ male adapter | 8787K |
| Type N | 31 | 1 ea. Type N male to OSP™ male adapter | 8787K | 1 ea. Type N male to OSP™ female adapter | 8787J |

### Adapter Set Options for 8780A/B Kits

### Adapters Included in 8780Z5 (7mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 2 | 7mm to OSP™ female | 8787G |
| | 2 | 7mm to OSP™ male | 8787H |

### Adapters Included in 8780Z6 (3.5mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | 3.5mm female to OSP™ female | 8787Q |
| | 1 | 3.5mm male to OSP™ female | 8787R |
| | 1 | 3.5mm female to OSP™ male | 8787S |
| | 1 | 3.5mm male to OSP™ male | 8787T |

Note: All of the adapters within each set are phase matched (same electrical length) so they may be interchanged for measurement of non-insertable devices.

### Adapter Specifications

The Maury precision adapters included in these sets conform to the following:

### Precision 7mm to OSP™ Adapters

***Models 8787G/H*** *(for more detail see page 118)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 18.0 GHz . . . . . 1.08
Nominal Impedance . . . . . 50 ohm

### Precision 3.5mm to OSP™ Adapters

***Models 8787Q/R/S/T*** *(for more detail see page 118)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.04
4.0 to 18.0 GHz . . . . . 1.08
Nominal Impedance . . . . . 50 ohm

### Precision Type N to OSP™ Adapters

***Models 8787J/K*** *(for more detail see page 118)*

Frequency Range . . . . . DC to 18.0 GHz
Maximum VSWR:
DC to 4.0 GHz . . . . . 1.065
4.0 to 18.0 GHz . . . . . 1.13
Nominal Impedance . . . . . 50 ohm

Key Literature: Maury data sheet 2Z-037.

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# 14mm VNA Calibration Kits

## 2450 Series Expanded Kits

### *Features*

- *Sliding Load Calibration*
- *MPC14 (GR900) Connectors*
- *Includes Connector Gage Kit*
- *Includes Test Port Adapters*
- *DC to 8.5 GHz*



2450F14

### *Description*

These calibration kits are expanded kits designed for calibrating vector network analyzers (VNAs) equipped with 3.5mm, 2.92mm or 7mm test set connectors and cables, which will be used in making error-corrected measurements of devices with 14mm connectors from DC to 8.5 GHz.

Each kit includes a full complement of calibration standards and accessories (shorts, opens, sliding and fixed loads, torque wrench, connector gages, 3.5mm to 14mm adapters, and a 14mm contact installation/extraction tool with spare contacts). The software (3-1/2" disk) needed to easily load the VNA software into your VNA is also included.

### *Connector Description*

The MPC14 precision 14mm connector is essentially equivalent to, and mating compatible with, GR900 type connectors. It features an improved hex knurl coupling nut and an improved center conductor inner contact (model 2481A). The coupling nut has a 1.00 inch hex for accurate tightening with a torque wrench, and the knurled knob provides a positive grip for finger tightening.

### *Components Included in 2450 Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 14mm fixed offset short | 2415D1 |
| 1 | 14mm open | 2416D1 |
| 1 | 14mm sliding termination | 2408A1 |
| 2 | 14mm fixed termination | 2410A |
| 1 | 14mm to NMD3.5mm female adapter | 2433A1 |
| 1 | 14mm to 3.5mm female adapter | 2407A1 |
| 1 | 14mm to 3.5mm male adapter | 2407B1 |
| 1 | 14mm Connector Gage Kit (push-on type) | A024 |
| 1 | 1-inch hex torque wrench (12 in. lbs) | 2498T1 |
| 1 | Contact installation/extraction tool | 2481S3 |
| 2 | 14mm contacts (spare parts) | 2481A |
| 1 | VNA software disk | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

### *Available Kits*

| NETWORK ANALYZER TEST PORT TYPE | VNA MANUFACTURER AND MODEL | MAURY KIT MODEL |
|---|---|---|
| 3.5mm or 2.92mm (K) [1] | Rohde & Schwarz ZV series | 2450F11 |
| 3.5mm or 2.92mm (K) [1] | Agilent ENA series | 2450F12 |
| 3.5mm or 2.92mm (K) [1] | Agilent 8510C | 2450F14 |
| 3.5mm or 2.92mm (K) [1] | Agilent PNA series | 2450F17 |
| 3.5mm or 2.92mm (K) [1] | Anritsu 37000 | 2450F19 |

[1] 3.5mm and 2.92mm (K) connectors are fully mateable. The resulting junction is calibrated out and is not critical.

### *Recommended Accessories*

2453A 30cm beadless air line. See page 85.

2607A1 14mm to 7mm adapters. See page 113.

7909H NMD2.4mm female to NMD3.5mm male adapter. See page 102.

Key Literature: Maury data sheet 2Z-021C.



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# Economy VNA Calibration Kits

## Single-Sex or Dual-Sex Fixed Termination Kits

### *Features*

- *Fixed Load Calibration*
- *3.5mm, Type N, TNC and BNC Connectors*
- *Rugged Plastic Instrument Case*
- *DC to 26.5 GHz*[1]



8550Q02



8550Q03

### *Description*

This series of low cost fixed load calibration kits covers frequencies from DC to 26.5 GHz[1]. The kits contain the standards needed to calibrate scalar or vector network analyzers and are housed in rugged, molded plastic cases. The increased durability of the cases makes these kits ideal for field service use. The VNA software provided in the operating instructions manual can be keyed in from the front panel of the analyzer. The kits are available in female/male dual-sex configurations or in single-sex female or male configurations.

### *Available Kits*

Select the calibration kit number for the appropriate network analyzer test port connector type.

| NETWORK ANALYZER TEST PORT TYPE | MAURY KIT MODEL | | |
|---|---|---|---|
| | Female Only | Male Only | Female and Male |
| 3.5mm | 8050Q01 | 8050Q02 | 8050Q03 |
| Type N | 8850Q01 | 8850Q02 | 8850Q03 |
| BNC | 8550Q01 | 8550Q02 | 8550Q03 |
| TNC | 8650Q01 | 8650Q02 | 8650Q03 |

### *Recommended Adapters for these Kits*

***Phase Matched Adapters*** See pages 111, 114 and 116.

| | |
|---|---|
| 8023B1 | 3.5mm female to type N male |
| 8023D1 | 3.5mm male to type N male |
| 8022A2 | 3.5mm female to 7mm |
| 8022B2 | 3.5mm male to 7mm |
| 8828A | Type N female to type N female |
| 8828B | Type N male to type N male |
| 8828C | Type N female to type N male |
| 8821C1 | Type N male to BNC female |
| 8821D1 | Type N male to BNC male |

***In-Series Adapters*** See page 119.

| | |
|---|---|
| 232A11 | TNC female to TNC female |
| 232B11 | TNC male to TNC male |
| 232C11 | TNC female to TNC male |

### *Components Included in Economy Kits*

| QUANTITY | DESCRIPTION |
|---|---|
| 1 | Female fixed offset short* |
| 1 | Male fixed offset short** |
| 1 | Female open* |
| 1 | Male open** |
| 1 | Female fixed termination* |
| 1 | Male fixed termination** |
| 1 | Instrument case |

* Included in female single-sex kits and dual-sex kits; excluded from male single-sex kits.

** Included in male single-sex kits and dual-sex kits; excluded from female single-sex kits.

### *Recommended Accessories for these Kits*

***Connector Gage Kits*** See page 92.

| | |
|---|---|
| A034B | 3.5mm Connector gage kit (push-on type) |
| A050A | 3.5mm Digital Connector gage kit (thread-on type) |
| A020A | Type N Connector gage kit (push-on type) |
| A020D | Type N Connector gage kit (thread-on type) |
| A012A | BNC Connector gage kit (push-on type) |

***Torque Wrenches*** See page 94.

| | |
|---|---|
| 8799A1 | 3.5mm, 5/16-inch (8 in. lbs) |
| 2698C2 | Type N, 3/4-inch hex (12 in. lbs) |

## Economy TRL Calibration Kits - 7mm

Need a 7mm Economy TRL Kit? Maury offers the following:

| FREQUENCY RANGE (GHz) | VNA MAKE & MODEL — MAURY KIT MODEL | | | | |
|---|---|---|---|---|---|
| | NO SOFTWARE | R&S ZV ZV SERIES | AGILENT 8510C | AGILENT 8719/20/22 | AGILENT PNA SERIES |
| 0.8 – 18.0 | 2660Q10 | 2660Q11 | 2660Q14 | 2660Q15 | 2660Q17 |
| 0.8 – 4.0 | 2660Q20 | 2660Q21 | 2660Q24 | 2660Q25 | 2660Q27 |

This series of low cost TRL calibration kits covers frequencies from 800 MHz to 18 GHz, or 800 MHz to 4 GHz, and contain the shorts and air lines needed to perform TRL calibration of vector network analyzers and devices equipped with 7mm connectors. Kit components are provided in foam-lined wood instrument cases. For more information please contact the Maury Sales Department. See also Maury data sheet 2Z-042.

[1] 3.5mm operates to 26.5 GHz, type N/TNC to 18 GHz and BNC to 10 GHz.



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# 7-16 VNA Calibration Kits

## 2750B Fixed Termination Kits

### *Features*

- *Precision 7-16 Connectors*
- *Rated DC to 7.5 GHz; Usable to 8 GHz*
- *Fixed Load Calibration*
- *Low Torque Coupling*



2750B10

### *Description*

The 2750 series calibration kits operate up to 7.5 GHz for making error-corrected measurements of devices with 7-16 connectors. The 2750B kits consist of the male and female 7-16 fixed load calibration standards needed to calibrate supported vector network analyzers (VNAs), and the VNA software on 3-1/2" data disk, supplied with the operating instructions (manual) in a foam-lined wood instrument case.

### *Connector Description*

The 7-16 connectors found on the components in these kits are rugged, calibration grade connectors that exceed the requirements for IEC169-4 reference grade and BSEN122190 grade 0 specifications. They feature a thicker dielectric bead to eliminate deflection, retracted threads on the female connector to eliminate the need to apply excessive torque during calibration and test, and tighter tolerance control than called for in the IEC and BSEN specifications to reduce uncertainties. For interface specifications on these connectors, please refer to Maury data sheet 5E-066.

### *Supported VNAs*

Maury's 2750B calibration kits are ideal for use in calibrating many popular VNAs (ie., Agilent 8510C, 8719/20/22 and PNA series; Anritsu 37000; and Rohde & Schwarz ZV series).

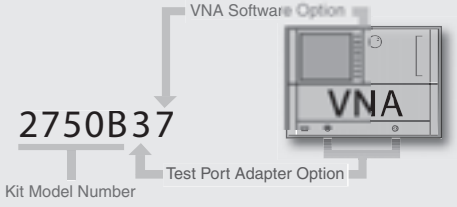
### *Components Included in 2750B Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 7-16 female fixed offset short | 2714A |
| 1 | 7-16 male fixed offset short | 2714B |
| 1 | 7-16 female open | 2716A |
| 1 | 7-16 male open | 2716B |
| 1 | 7-16 female fixed termination | 2710A |
| 1 | 7-16 male fixed termination | 2710B |
| 1 | 1-1/16 inch torque wrench (20 in. lbs) | 2698K1 |
| 1 | 15/16 inch open-end wrench | 2750Z3 |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 43 for details.)

### *Ordering Options*

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 2750B kit configured with the adapters and software for use with an Agilent PNA that has type N test ports.




### *Option Finder*

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 43) | VNA SOFTWARE OPTIONS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT ENA SERIES OPTION 2 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 7-16 | 0 | — | 01 | 02 | 04 | 05 | 07 | 09 |
| 7mm | 1 | 10 | 11 | 12 | 14 | 15 | 17 | 19 |
| Type N | 2 | 20 | 21 | 22 | 24 | 25 | 27 | 29 |

Key Literature: Maury data sheet 2Z-041.



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# 7-16 VNA Calibration Kits

## 2750F/M Single-Sex Fixed Termination Kits



2750F30

### Features

- *Precision 7-16 Connectors*
- *Rated DC to 7.5 GHz; Usable to 8 GHz*
- *Fixed Load Calibration*
- *Low Torque Coupling*

### Description

The 2750F/M calibration kits are an economical alternative to the 2750B fixed termination kit, designed for the user who only needs calibration standards in one sex. The kits consist of the female (2750F) or male (2750M) 7-16 fixed load calibration standards needed to calibrate supported vector network analyzers (VNAs) for making error-corrected measurement of devices with 7-16 connectors. The VNA software is supplied on a 3-1/2" data disk. All of the components including software disk and operating instructions (manual) are provided in a foam-lined wood instrument case.

### Connector Description

See the Connector Description for these connectors on page 40.

### Supported VNAs

Maury's 2750F/M calibration kits are ideal for use in calibrating many popular VNAs (ie., Agilent 8510C, 8719/20/22, and PNA series; Anritsu 37000; and Rohde & Schwarz ZV series).

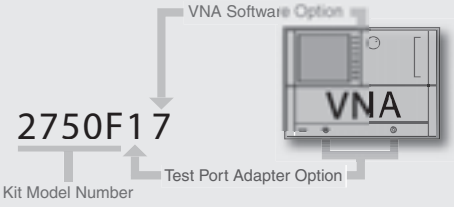
### Components Included in 2750F/M Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 7-16 female fixed offset short | 2714A* |
| 1 | 7-16 male fixed offset short | 2714B** |
| 1 | 7-16 female open | 2716A* |
| 1 | 7-16 male open | 2716B** |
| 1 | 7-16 female fixed termination | 2710A* |
| 1 | 7-16 male fixed termination | 2710B** |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 43 for details.)

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 2750F kit configured with the adapters and software for use with an Agilent PNA that has type N female test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 43) | VNA SOFTWARE OPTIONS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT ENA SERIES OPTION 2 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 7-16 | 0 | — | 01 | 02 | 04 | 05 | 07 | 09 |
| Type N Female | 1 | 10 | 11 | 12 | 14 | 15 | 17 | 19 |
| Type N Male | 2 | 20 | 21 | 22 | 24 | 25 | 27 | 29 |
| 7mm | 3 | 30 | 31 | 32 | 34 | 35 | 37 | 39 |
| Type N Female | 4 | 40 | 41 | 42 | 44 | 45 | 47 | 49 |
| Type N Male | 5 | 50 | 51 | 52 | 54 | 55 | 57 | 59 |
| 7mm | 6 | 60 | 61 | 62 | 64 | 65 | 67 | 69 |

Key Literature: Maury data sheet 2Z-041.



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# 7-16 TRL/LRL VNA Calibration Kits

## 2760B Tri-Kits


2760B14

### Features

- *SOLT (Short-Open-Load-Thru)*
- *Rated to 7.5 GHz, Usable to 8 GHz*
- *Gated Air Line*
- *TRL/LRL Calibrations*
- *Low Torque Coupling*

### Description

These kits feature both female and male standards, a torque wrench and an open-end wrench for precise, repeatable connections, and adapter sets and VNA software on computer media. The each kit contains the components listed at the right, shipped together in a foam-lined wood instrument case. See page 85 for air line specifications.

### Connector Description

The 7-16 connectors found on the components in these kits are rugged, calibration grade connectors that exceed the requirements for IEC169-4 reference grade and BSEN122190 grade 0 specifications. They feature a thicker dielectric bead to eliminate deflection, retracted threads on the female connector to eliminate the need to apply excessive torque during calibration and test, and tighter tolerance control than called for in the IEC and BSEN specifications to reduce uncertainties. For interface specifications on these connectors, please refer to Maury data sheet 5E-066.

### Components Included in 2760B Kits

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | 7-16 female to male air line (6cm) | 2735A6 |
| 1 | 7-16 female to male air line (7.5cm) | 2735A7.5 |
| 1 | 7-16 female to male air line (30cm) | 2735A30 |
| 1 | 7-16 female fixed offset short | 2714A |
| 1 | 7-16 male fixed offset short | 2714B |
| 1 | 7-16 female open | 2716A |
| 1 | 7-16 male open | 2716B |
| 1 | 7-16 female fixed termination | 2710A |
| 1 | 7-16 male fixed termination | 2710B |
| 1 | 1-1/16-inch torque wrench (12 in. lbs) | 2698K1 |
| 1 | 15/15-inch open end wrench | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit also includes a set of adapters that is user specified per the Option Finder below. (See page 43 for details.)

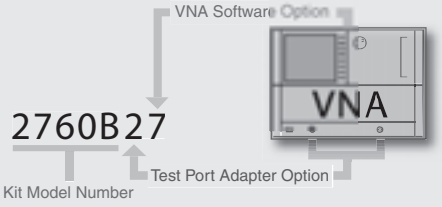
### TRM/TRL/LRL Calibration

Maury TRL/LRL calibration kits are tri-kits containing the components needed to perform three types of calibrations (TRM/TRL/LRL, SOLT, and short-open-(air line + load). Source match can also be measured using the 6cm air line and provided short.

The reference air lines listed above are also sold as the model 2735K 7-16 air line kit (see page 85), which includes all three air lines housed in a foam-lined wood instrument case. This kit adds full 2-port TRL/LRL (Through-Reflect-Line, Line-Reference-Line) calibration capability to the 2750B standard kits.

### Ordering Options

To specify the test port adapter and VNA software options you need, simply add two digits to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (as found in the ***Option Finder*** below). The example in the diagram shows the combination of digits needed to order a 2760B kit configured with the adapters and software for use with an Agilent PNA that has type N test ports.




### Option Finder

| VNA TEST PORT TYPE | TEST PORT ADAPTER OPTIONS (see page 43) | VNA SOFTWARE OPTIONS | | | | | |
|---|---|---|---|---|---|---|---|
| | | KITS W/O SOFTWARE OPTION 0 | ROHDE & SCHWARZ ZV SERIES OPTION 1 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| 7-16 | 0 | — | 01 | 04 | 05 | 07 | 09 |
| 7mm | 1 | 10 | 11 | 14 | 15 | 17 | 19 |
| Type N | 2 | 20 | 21 | 24 | 25 | 27 | 29 |

Key Literature: Maury data sheet 2Z-044, and 2Z-041A.



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# 7-16 VNA Calibration Kit Adapter Options

## 7-16 In-Series and 3.5mm, 7mm, and Type N Between-Series Sets

### Features

- *7mm to 7-16, and Type N to 7-16 Between-Series Adapters*
- *7-16 to 7-16 In-Series Adapters*
- *Phase Matched within Each Series*
- *DC to 7.5 GHz (Usable to 8 GHz)*

### Description

The precision 7-16 adapters in these sets feature low VSWR, low insertion loss and are of minimum length. Test port adapters are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets. All of these adapters may be ordered in separately boxed sets (as described below), as options shipped with Maury VNA calibration kits, or as individual adapters (by model number).

### Recommended Accessories for 7-16 Kits

***Connector Gage Kits*** See page 92.

A041A 7-16 Connector gage kit (push-on type)

***Torque Wrench*** See page 94.

2698K1 7-16, 1-1/16 inch (20 in. lbs)

### Adapter Specifications

The precision in-series and between-series adapters in these sets have a 50 ohm nominal impedance and a frequency range of DC to 7.5 GHz. Within each series they are phase matched (have the same electrical length), making them interchangeable for measurement of non-insertable devices. VSWR for each model is as follows:

### Precision 7-16 In-Series Adapters

***Models 2712A/B/C*** *(for more detail see page 121)*

Maximum VSWR . . . . . 1.025

### Precision 7-16 Adapters

***Models 2706A/B/C/D*** *(for more detail see page 121)*

Maximum VSWR . . . . . 1.03

***Models 2707A/B*** *(for more detail see page 121)*

Maximum VSWR . . . . . 1.03

### Special Short-Faced Test Port Adapters[1]

***Models 2706E/F & Models 2707C*** *(for more detail see page 121)*

Maximum VSWR . . . . . 1.03

### 3.5mm to 7-16 Adapters (sold separately)

***Models 2705A/B/C/D*** *(for more detail see page 121)*

Maximum VSWR . . . . . 1.04

## Adapter Options for 2750B Cal Kits

### Adapters Included in 2750Z4 (7mm) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 2 | 7mm to 7-16 female | 2707A |
| | 2 | 7mm to 7-16 male | 2707B |

### Adapters Included in 2750Z5 (Type N) Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | Type N female to 7-16 female | 2706A |
| | 1 | Type N male to 7-16 female | 2706B |
| | 1 | Type N female to 7-16 male | 2706C |
| | 1 | Type N male to 7-16 male | 2706D |

## Adapter Options for 2760B Cal Kits

### Adapters Included in 7mm Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 2 | 7mm to 7-16 female test port adapters | 2707A |
| | 2 | 7mm to 7-16 male test port adapters | 2707C[1] |

### Adapters Included in Type N Sets

| TEST PORT ADAPTER OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 2 | 1 | Type N female to 7-16 female | 2706A |
| | 1 | Type N male to 7-16 female | 2706B |
| | 1 | Type N fem to 7-16 male test port adapter | 2706E[1] |
| | 1 | Type N male to 7-16 male test port adapter | 2706F[1] |

## Adapter Options for 2750F and 2750M Single-Sex Cal Kits

### Adapters Included in 2750F Options 1 – 6

| OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 2 | Type N male to 7-16 male | 2706D |
| | 1 | Type N male to 7-16 female | 2706B |
| 2 | 2 | Type N female to 7-16 male | 2706C |
| | 1 | Type N female to 7-16 female | 2706A |
| 3 | 2 | 7mm to 7-16 male | 2707B |
| | 1 | 7mm to 7-16 female | 2707A |
| 4 | 1 | Type N male to 7-16 male | 2706D |
| 5 | 1 | Type N female to 7-16 male | 2706C |
| 6 | 1 | 7mm to 7-16 male | 2707B |

### Adapters Included in 2750M Options 1 – 6

| OPTION | QUANTITY | DESCRIPTION | MODEL |
|---|---|---|---|
| 1 | 2 | Type N male to 7-16 female | 2706B |
| | 1 | Type N male to 7-16 male | 2706D |
| 2 | 2 | Type N female to 7-16 female | 2706A |
| | 1 | Type N female to 7-16 male | 2706C |
| 3 | 2 | 7mm to 7-16 female | 2707A |
| | 1 | 7mm to 7-16 male | 2707B |
| 4 | 1 | Type N male to 7-16 female | 2706B |
| 5 | 1 | Type N female to 7-16 female | 2706A |
| 6 | 1 | 7mm to 7-16 female | 2707A |

[1] These special short-faced test port adapters are required when using precision beadless air lines.



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# Waveguide VNA Calibration Kits

## 7005E Standard Kits

### *Features*

- *1.7 to 50 GHz*
- *WR430 Through WR22*
- *Fixed and Sliding Load Calibration*
- *Agilent and Anritsu VNAs Supported*



K7005E34

### *Description*

The 7005E series standard kits are designed to provide accurate calibration of vector network analyzers (VNAs) for measurements in standard rectangular waveguide from 1.7 to 50 GHz (WR430 through WR22). Each kit includes all the components needed for accurate calibration of most VNAs with a user-specified set of adapters and a high precision sliding termination (in a machined housing) to ensure high effective directivity after calibration. Precision straight sections and a fixed (reference plane) short are also provided as verification standards. All component flanges have precision indexing holes and indexing pins for excellent measurement repeatability.

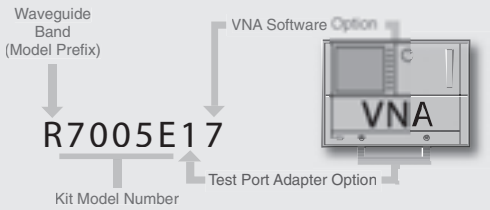
### *Components Included in7005E Kits*

| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | Fixed flush (reference plane) short | 344 series |
| 1 | 1/8-λ fixed offset short | 340 series |
| 1 | 3/8-λ fixed offset short | 340 series |
| 1 | Precision fixed termination | 301 series |
| 1 | High precision sliding termination | 314 series |
| 1 | Straight section (rectangular) | 101/2 series |
| 1 | Flange hardware (including the indexing pin set) | — |
| 1 | 3.5-inch data disk with VNA software | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Each kit includes a set of adapters that is user specified per the chart below.

### *Ordering Options*

To specify the waveguide band, test port adapter and VNA software options you need, add a letter (designating the desired bandwidth) to the front of the kit model number and add a two digit number to the end of the kit model number (as shown in the diagram at right). The first digit is the test port adapter option number, and the second is the VNA software option number (from the ***Option Finder*** below). The example in the diagram shows the waveguide band prefix, kit model number, adapter option and VNA software option numbers to order an "R" band 7005E kit for use with an Agilent PNA.




### *Option Finder*

| WAVEGUIDE BAND (Model Prefix) | FREQUENCY RANGE (GHz) | WAVEGUIDE DESIGNATION EIA WR NO. | TEST PORT ADAPTER SET OPTIONS (See below) | VNA SOFTWARE OPTIONS | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | KITS W/O SOFTWARE OPTION 0 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| R | 1.70 – 2.60 | WR430 | 1 or 2 | 0 | 4 | 5 | 7 | 9 |
| S | 2.60 – 3.95 | WR284 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| E | 3.30 – 4.90 | WR229 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| G | 3.95 – 5.85 | WR187 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| F | 4.90 – 7.05 | WR159 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| C | 5.85 – 8.20 | WR137 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| H | 7.05 – 10.0 | WR112 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| X | 8.20 – 12.4 | WR90 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| M | 10.0 – 15.0 | WR75 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| P | 12.4 – 18.0 | WR62 | 1, 2 or 3 | 0 | 4 | 5 | 7 | 9 |
| N | 15.0 – 22.0 | WR51 | 3 or 5 | 0 | 4 | 5 | 7 | 9 |
| K | 18.0 – 26.5 | WR42 | 3 or 5 | 0 | 4 | 5 | 7 | 9 |
| U | 26.5 – 40.0 | WR28 | 4 or 5 | 0 | 4 | 5 | 7 | 9 |
| J | 33.0 – 50.0 | WR22 | 5 | 0 | 4 | 5 | 7 | 9 |

| | |
|---|---|
| TEST PORT ADAPTER SET OPTIONS* (One of these sets is Included in each kit) | OPTION 1: 2 ea., waveguide (WG) to 7mm right angle launch (RAL); 1 ea., WG to 7mm end launch (EL) adapters<br>OPTION 2: 1 ea., WG to 7mm RAL; 2 ea., WG to 7mm EL adapters<br>OPTION 3: 1 ea., WG to 3.5mm female RAL; 1 ea. WG to 3.5mm male RAL; 1 ea., WG to 3.5mm female EL adapters (NMD F – K bands)<br>OPTION 4: 1 ea. WG to 2.92mm female RAL; 1 ea. WG to 2.92mm male RAL; 1 ea. WG to 2.92mm female EL adapters<br>OPTION 5: 1 ea. WG to 2.4mm female RAL; 1 ea. WG to 2.4mm male RAL; 1 ea. WG to 2.4mm female EL adapters (not included for N band) |

* The specifications of the waveguide test port adapters included in these adapter set options are provided on page 136 .

Key Literature: Maury data sheet 3H-056.



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# Optimized Millimeter Waveguide VNA Calibration Kits

## 7005G Optimized Kits

### *Features*

- *26.5 to 110 GHz*
- *WR28 Through WR10*
- *Fixed and Sliding Load Calibration*
- *Optimized Directivity & Source Match*




### *Description*

The 7005G kits are high precision kits featuring optimized standards and VNA software, which provide highly accurate calibration (for measurements in rectangular waveguide) of Agilent 8510C, 8719/20/22, and PNA series or Anritsu 37000 vector network analyzers (VNAs) equipped with external millimeter waveguide test heads or modules. Kits are available for these Agilent VNAs (and for the Anritsu 37000) from 26.5 to 110 GHz. Each kit includes all the components needed for accurate calibration of these VNAs. The high precision sliding termination features a machined housing to ensure high effective directivity after calibration. For kits in WR22 and smaller sizes, these sliding terminations are equipped with a micrometer drive so that load positions can be easily and smoothly set. The precision straight section and fixed (reference plane) short in these kits can be used as verification standards. All component flanges have precision indexing holes and removable indexing pins for excellent measurement repeatability. The millimeter waveguide flanges in the WR22 and smaller sizes are of a unique Maury-pioneered design featuring a raised outer rim to prevent the flanges from cocking during connection. These flanges will mate with corresponding UG ***/U flanges.

### *Optimized Directivity and Source Match*

All 7005G kits are configured for the Short-Short-Load-Thru (SSLT) calibration method using offset shorts and a sliding termination. The sliding termination housings are calibrated for return loss and selected for compliance with the directivity specification. The offset shorts are calibrated and the calibration coefficients are optimized for compliance with the source match specification. Each kit comes with a calibration report which includes the unique calibration data for that individual kit.

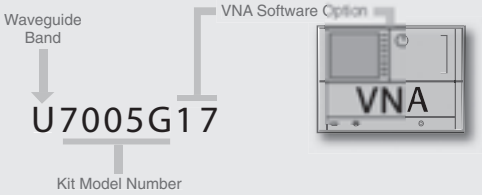
### *Components Included in 7005G Kits*

| QUANTITY | DESCRIPTION |
|---|---|
| 2 | Test port adapters (see the Option Finder below) |
| 1 | Fixed flush (reference plane) short (verification standard) |
| 1 | 1/8-λ high precision fixed offset short |
| 1 | 3/8-λ high precision fixed offset short |
| 1 | Precision fixed termination |
| 1 | High precision sliding termination |
| 1 | Precision straight section (verification standard) |
| 1 | Flange hardware (including the indexing pin set) |
| 1 | Flange tool set |
| 1 | 3.5-inch data disk with optimized VNA software |
| 1 | Operating Instructions (manual) |
| 1 | Instrument case |

Note: Additional adapters may be ordered separately.

### *Ordering Options*

To specify the waveguide band and VNA software options you need, add a letter (designating the desired bandwidth) to the front of the kit model number and add a two digit number, from the ***Option Finder*** (below), to the end of the kit model number, as shown in the diagram at right. The example in the diagram shows the waveguide band prefix, kit model number, and VNA software option number needed to order a "U" band 7006G kit configured for use with an Agilent PNA.




### *Option Finder*

| WAVEGUIDE BAND (Model Prefix) | FREQUENCY RANGE (GHz) | WAVEGUIDE DESIGNATION EIA WR NO. | TEST PORT ADAPTERS PROVIDED [1] | MINIMUM DIRECTIVITY (dB) | MINIMUM SOURCE MATCH (dB) | VNA SOFTWARE OPTIONS | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| U | 26.5 – 40.0 | WR28 | 2 U103A1.375 | 54 | 48 | 14 | 15 | 17 | 19 |
| J | 33.0 – 50.0 | WR22 | 2 J115B1 | 54 | 48 | 14 | 15 | 17 | 19 |
| T | 40.0 – 60.0 | WR19 | 2 T115B | 54 | 44 | 14 | 15 | 17 | 19 |
| V | 50.0 – 75.0 | WR15 | 2 V115C | 54 | 42 | 14 | 15 | 17 | 19 |
| Y | 60.0 – 90.0 | WR12 | 2 Y115B | 50 | 40 | 14 | 15 | 17 | 19 |
| Z | 75.0 – 110.0 | WR10 | 2 Z115A | 50 | 40 | 14 | 15 | 17 | 19 |

[1] See page 123 for Overall lengths.

Key Literature: Maury data sheet 3H-068.



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# Millimeter Waveguide VNA Calibration Kits

## 7005M Economy Kits

### *Features*

- *26.5 to 110 GHz*
- *WR28 Through WR10*
- *Fixed or Sliding Load Calibration*
- *SSLLT Configured*




### *Description*

The 7005M series kits are economical, cost effective kits designed to provide accurate calibration (for measurements in rectangular waveguide) of Agilent 8510C, 8719/20/22 and PNA series or Anritsu 37000 vector network analyzers (VNAs) equipped with external millimeter waveguide test heads or modules. Kits are available for these Agilent VNAs (and for the Anritsu 37000) from 26.5 to 110 GHz.

Each kit includes all the components needed for accurate calibration of these VNAs as listed at the right. The 7005M kits come with a precision fixed termination. The precision straight section and fixed (reference plane) short in these kits can be used as verification standards.

All component flanges have precision indexing holes and removable indexing pins for excellent measurement repeatability. The Millimeter waveguide flanges in the WR22 and smaller sizes are of a unique Maury-pioneered design featuring a raised outer rim to prevent the flanges from cocking during connection. These flanges will mate with corresponding UG ***/U flanges.

### *Components Included in 7005M Kits*

| QTY | DESCRIPTION |
|---|---|
| 1 | Fixed flush (reference plane) short (calibration and verification standard) |
| 1 | Precision straight section (verification standard) |
| 1 | 1/4-λ waveguide straight section (shim) |
| 1 | Precision fixed termination |
| 1 | Flange hardware (including the indexing pin set) |
| 1 | Flange tool set |
| 1 | 3-1/2 inch data disk with optimized VNA software |
| 1 | Operating Instructions (manual) |
| 1 | Instrument case |

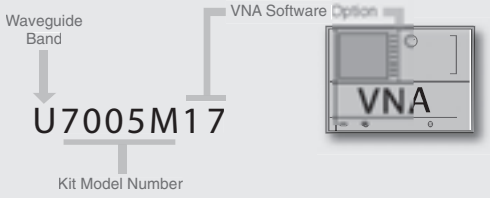
Note: Additional adapters may be ordered separately.

### *Calibration Method*

The 7005M series kits are configured for the Short-Short-Load-Load-Thru (SSLLT) calibration method using a fixed flush short, a fixed precision termination, and a 1/4-λ shim.

### *Ordering Options*

To specify the waveguide band and VNA software options you need, add a letter (designating the desired bandwidth) to the front of the kit model number and add a letter and/or two digit number to the end of the kit model number from the ***Option Finder*** (as shown in the diagram at right). The example in the diagram shows the waveguide band prefix, kit model number, and VNA software option number to order an "U" band 7005 kit configured for use with an Agilent PNA.




### *Option Finder*

| WAVEGUIDE BAND (Model Prefix) | FREQUENCY RANGE (GHz) | TEST PORT ADAPTERS PROVIDED[1] | WAVEGUIDE DESIGNATION EIA WR NO. | VNA SOFTWARE OPTIONS | | |
|---|---|---|---|---|---|---|
| | | | | AGILENT 8510C OPTION 14 | AGILENT PNA SERIES OPTION 17 | ANRITSU 37000 OPTION 19 |
| U | 26.5 – 40.0 | 2 U103A1.375 | WR28 | 14 | 17 | — |
| J | 33.0 – 50.0 | 2 J115B1 | WR22 | 14 | 17 | 19 |
| T | 40.0 – 60.0 | 2 T115B | WR19 | 14 | 17 | 19 |
| V | 50.0 – 75.0 | 2 V115C | WR15 | 14 | 17 | 19 |
| Y | 60.0 – 90.0 | 2 Y115B | WR12 | 14 | 17 | 19 |
| Z | 75.0 – 110.0 | 2 Z115A | WR10 | 14 | 17 | 19 |

[1] See page 123 for Overall lengths.

Key Literature: Maury data sheet 3H-071.



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# Waveguide VNA Calibration Kits

## 7006A Economy Kits


P7006A

### *Features*

- *2.6 to 40 GHz*
- *WR284 Through WR28*
- *Sliding Load Calibration*
- *Agilent and Anritsu VNAs Supported*

### *Description*

The 7006A kits are economical, cost effective kits designed to provide accurate calibration of vector network analyzers (VNAs) that are equipped with 3.5mm or 2.4mm connectors. They are used for making measurements in standard rectangular waveguide from 2.6 to 40 GHz (WR284 through WR28). Each kit includes all the components needed for accurate calibration of most VNAs with a user-specified set of adapters and a precision sliding termination. In addition to these components, kits for Anritsu 37000 VNAs also include two (2) fixed shorts. All component flanges have precision indexing holes and indexing pins for excellent measurement repeatability.

### *Components Included in 7006A Kits*

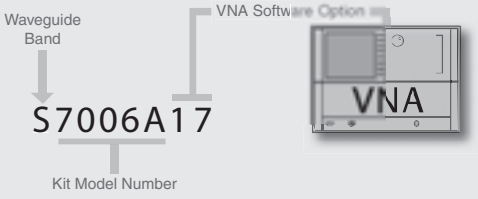
| QUANTITY | DESCRIPTION | MODEL |
|---|---|---|
| 1 | Fixed (reference plane) short** | 344 series |
| 1 | 1/4-λ straight section (shim) | 322A series |
| 1 | Precision sliding termination | 313/4 series |
| 1 | WG to NMD 3.5mm female end launch adapter* | 230/3 series |
| 1 | WG to 3.5mm male right angle launch adapter* | 200/10 series |
| 1 | Flange hardware (including the indexing pin set) | — |
| 1 | 3.5-inch data disk with VNA software | — |
| 1 | Operating Instructions (manual) | — |
| 1 | Instrument case | — |

Note: Additional adapters may be ordered separately.

*WR34 and WR28 kits replace these adapters with two 2.4mm female right angle launch adapters.

### *Ordering Options*

To specify the waveguide band and VNA software options you need, add a letter (designating the desired bandwidth) to the front of the kit model number and add a two digit number to the end of the kit model number (as shown in the diagram at right) from the ***Option Finder*** (below). The example in the diagram shows the waveguide band prefix, kit model number, and VNA software option number to order an "S" band 7006A kit configured for use with an Agilent PNA.




### *Option Finder*

| WAVEGUIDE BAND (Model Prefix) | FREQUENCY RANGE (GHz) | WAVEGUIDE DESIGNATION EIA WR NO. | TEST PORT ADAPTERS PROVIDED IN THESE KITS | VNA SOFTWARE OPTIONS | | | |
|---|---|---|---|---|---|---|---|
| | | | | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000** OPTION 9 |
| S | 2.60 – 3.95 | WR284 | 1 S230K1 and 1 S200B1 | 14 | 15 | 17 | 19 |
| E | 3.30 – 4.90 | WR229 | 1 E230K1 and 1 E200B1 | 14 | 15 | 17 | 19 |
| G | 3.95 – 5.85 | WR187 | 1 G230K1 and 1 G200B1 | 14 | 15 | 17 | 19 |
| F | 4.90 – 7.05 | WR159 | 1 F230K1 and 1 F200B1 | 14 | 15 | 17 | 19 |
| C | 5.85 – 8.20 | WR137 | 1 C230K1 and 1 C200B1 | 14 | 15 | 17 | 19 |
| H | 7.05 – 10.0 | WR112 | 1 H230K1 and 1 H200B1 | 14 | 15 | 17 | 19 |
| X | 8.20 – 12.4 | WR90 | 1 X230K1 and 1 X200B2 | 14 | 15 | 17 | 19 |
| M | 10.0 – 15.0 | WR75 | 1 M230K1 and 1 M200B2 | 14 | 15 | 17 | 19 |
| P | 12.4 – 18.0 | WR62 | 1 P230K1 and 1 P200B2 | 14 | 15 | 17 | 19 |
| N | 15.0 – 22.0 | WR51 | 1 N230K3 and 1 N200B2 | 14 | 15 | 17 | 19 |
| K | 18.0 – 26.5 | WR42 | 1 K230K6 and 1 K200B8 | 14 | 15 | 17 | 19 |
| Q | 22.0 – 33.0 | WR34 | 2 Q236A1 | 14 | 15 | 17 | 19 |
| U | 26.5 – 40.0 | WR28 | 2 U236A6 | 14 | 15 | 17 | 19 |

** All kits for Anritsu 37000 VNAs include two fixed shorts.

Key Literature: Maury data sheet 3H-057.



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# Waveguide TRL VNA Calibration Kits

## 7007H Kits


N7007H15

### *Features*

- *1.7 to 50 GHz*
- *WR430 Through WR10*
- *Fixed Load Calibration*
- *TRL and SSLT Configured*

### *Description*

Maury 7007H series calibration kits are designed to provide accurate Thru-Reflect-Line (TRL) calibrations of vector network analyzers (VNAs), for measurements in rectangular waveguide from 1.7 to 110.0 GHz (WR430 through WR10).

They include all the components needed for accurate TRL calibration of supported VNA (listed at right). They can also be used for Short-Short-Load-Thru (SSLT) and offset load calibrations.

All component flanges have precision indexing holes for excellent measurement repeatability (indexing pins are provided).

### *Test Port and Cable Connectors*

These kits are configured for use with VNA test sets or test cables utilizing 7mm, 3.5mm and 2.4mm connectors. Other adapter or test port configurations are available upon request.

### *Components Included in 7007H Kits*

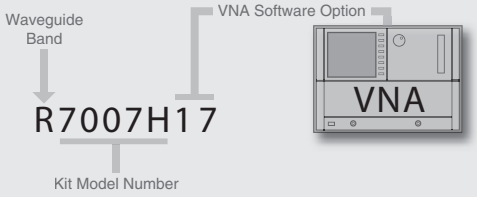
| QTY | DESCRIPTION |
|---|---|
| 2 | Test port adapters (see the Option Finder below) |
| 1 | Fixed (reference plane) short (calibration and verification standard)* |
| 2 | Precision fixed terminations |
| 1 | 1/4-λ high precision straight section (shim) |
| 1 | Flange hardware (including the indexing pin set) |
| 1 | 3-1/2 inch data disk with optimized VNA software |
| 1 | Operating Instructions (manual) |
| 1 | Instrument case |

Note: Additional adapters may be ordered separately.

*Kits for the Anritsu 37000 include two (2) fixed (reference plane) shorts.

### *Ordering Options*

To specify the waveguide band and VNA software options you need, add a letter from the ***Option Finder*** (designating the desired bandwidth) to the front of the kit model number, and add a two digit number to the end of the kit model number (designating the VNA software needed) as shown in the diagram at right. The example in the diagram shows the waveguide band prefix, kit model number, and VNA software option number to order an "R" band 7007H kit for use with an Agilent PNA.




### *Option Finder*

| WAVEGUIDE BAND (Model Prefix) | FREQUENCY RANGE (GHz) | WAVEGUIDE DESIGNATION EIA WR NO. | TEST PORT ADAPTERS PROVIDED IN THESE KITS* | VNA SOFTWARE OPTIONS | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | AGILENT ENA SERIES OPTION 2 | AGILENT 8510C OPTION 4 | AGILENT 8719/20/22 OPTION 5 | AGILENT PNA SERIES OPTION 7 | ANRITSU 37000 OPTION 9 |
| R | 1.70 – 2.60 | WR430 | 2 R209A2 (W/G to 7mm) | 12 | 14 | 15 | 17 | 19 |
| S | 2.60 – 3.95 | WR284 | 2 S209D2 (W/G to 7mm) | 12 | 14 | 15 | 17 | 19 |
| E | 3.30 – 4.90 | WR229 | 2 E209A2 (W/G to 7mm) | 12 | 14 | 15 | 17 | 19 |
| G | 3.95 – 5.85 | WR187 | 2 G209D2 (W/G to 7mm) | 12 | 14 | 15 | 17 | 19 |
| F | 4.90 – 7.05 | WR159 | 2 F209A2 (W/G to 7mm) | 12 | 14 | 15 | 17 | 19 |
| C | 5.85 – 8.20 | WR137 | 2 C209D2 (W/G to 7mm) | 12 | 14 | 15 | 17 | 19 |
| H | 7.05 – 10.0 | WR112 | 2 H209D2 (W/G to 7mm) | 12 | 14 | 15 | 17 | 19 |
| X | 8.20 – 12.4 | WR90 | 2 X209D2 (W/G to 7mm) | — | 14 | 15 | 17 | 19 |
| M | 10.0 – 15.0 | WR75 | 2 M209D2 (W/G to 7mm) | — | 14 | 15 | 17 | 19 |
| P | 12.4 – 18.0 | WR62 | 2 P209D2 (W/G to 7mm) | — | 14 | 15 | 17 | 19 |
| N | 15.0 – 22.0 | WR51 | 1 N200A2 and 1 N200B2 | — | 14 | 15 | 17 | 19 |
| K | 18.0 – 26.5 | WR42 | 1 K200A1 and 1 K200B1 | — | 14 | 15 | 17 | 19 |
| Q | 22.0 – 33.0 | WR34 | 1 Q236A1 and 1 Q236B1 | — | 14 | 15 | 17 | 19 |
| U | 26.5 – 40.0 | WR28 | 1 U236A6 and 1 U236B6 | — | 14 | 15 | 17 | 19 |
| T | 40.0 – 60.0 | WR19 | 2 T115B (Test Port Adapt.) | — | 14 | 15 | 17 | 19 |
| V | 33.0 – 50.0 | WR15 | 2 V115C (Test Port Adapt.) | — | 14 | 15 | 17 | 19 |
| Y | 33.0 – 50.0 | WR12 | 2 Y115B (Test Port Adapt.) | — | 14 | 15 | 17 | 19 |
| Z | 33.0 – 50.0 | WR10 | 2 Z115A (Test Port Adapt.) | — | 14 | 15 | 17 | 19 |

Key Literature: Maury data sheet 3H-058. *To order kits without adapters substitute zero (0) for the numberal "1" in the VNA software option numbers.



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# VNA Calibration Kit Components Finder

## Use the chart below to find the page(s) in this catalog which have information about Maury VNA Calibration Kit Components

| Cal Kit Components Information Finder<br>Connector Type | Fixed Terminations | Sliding Terminations | Fixed Flush & Fixed Offset Shorts | Sliding Shorts | Opens | Air Lines (Beadless) | Air Lines (Bead Supported) | Precision Mismatches | Precision Mismatch Sets | Two-Port Mismatch Standards | Two Port Standards Set | Connector Gage Kits * | Directional Couplers | Torque Wrenches |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| • 1.85mm | 52 | 62 | 66 | | 79 | 80 | | | | | | 92 | | 94 |
| • 2.4mm | 52 | 62 | 667 | | 79 | 81 | | 86 | 88 | | | 92 | | 94 |
| • 2.92mm | 53 | 62 | 67 | 76 | 79 | 81 | | 86 | 88 | | | 92 | | 94 |
| • 3.5mm | 53 | 62, 64 | 68 | 76 | 79 | 82 | 82 | 86 | 88 | | 90 | 92 | | 94 |
| • 7mm | 54 | 63, 64 | 69 | 76, 77 | 79 | 83 | 83 | 87 | 88 | | 91 | 92 | 93 | 94 |
| • Type N (50 ohm) | 54 | 63, 64 | 70 | 76, 77 | 79 | 84 | 84 | 87 | 88 | | | 92 | | 94 |
| • Type N (75 ohm) | 55 | | 73 | | 74 | | | | | | | 92 | | 94 |
| • C | 56 | | 73 | | | | | | | | | 92 | | |
| • HN | 56 | | 73 | | | | | | | | | | | |
| • SC | 56 | | 73 | | | | | | | | | 92 | | 94 |
| • BNC (50 ohm) | 56 | | 73 | | 79 | | | | | | | 92 | | |
| • BNC (75 ohm) | 55 | | 73 | | 79 | | | | | | | 92 | | |
| • TNC | 57 | 63 | 70 | | 79 | | | 87 | 88 | | | 92 | | 94 |
| • AFTNC | 57 | 63 | 71 | | 79 | | | | | | | 92 | | 94 |
| • TNCA | 57 | 63 | 71 | | 79 | | | | | | | 92 | | 94 |
| • SMA | | 63 | | 77 | | | | | | | | 92 | | 94 |
| • OSP™ | 58 | | 72 | | 79 | | | | | | | 92 | | 94 |
| • 14mm (GR 900 Equiv) | 59 | 63 | 72 | | | 85 | | 87 | | | | 92 | 93 | 94 |
| • 7-16 | 59 | | 72 | | 79 | 85 | | | | | | 92 | | 94 |
| • Waveguide Components | 60 | 65 | 74, 75 | 78 | | | | | | 89 | | | | |

* Maury also offers connector gages and gage kits for ZMA/BZ and Multiport connectors. See their listings on page 92.
Digital gages and gage kits are available for 1.85mm/2.4mm and 2.92mm (K)/3.5mm connectors.



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# Maury Cal Kit Components

## General Information

### Fixed Terminations

Maury fixed terminations are precision "fixed" loads that are used to introduce known VSWR into 50 ohm transmission systems. They are available in various frequency ranges with specific VSWR maximums, and are designed for general laboratory use, or as calibration standards for performing $Z_0$ calibrations (especially at low frequencies) on network analyzers (VNAs, PNAs and SNAs).

### Sliding Terminations

Maury sliding terminations ("sliding loads") consist of a precision, movable, tapered termination in a highly accurate, air dielectric transmission line. They are basic tools for making precision microwave measurements, such as "load separation", in which the reflection from the terminating element can be separated from that of the test device. Load separation using sliding loads is a key element in the calibration of VNAs and PNAs. The technique is also used to measure the reflection from two-port devices (particularly "non-insertable" devices like waveguide-to-coax adapters) and to measure the directivity of directional couplers.

Maury's sliding terminations are available in metrology grade and high precision units with integral, dedicated connectors; precision units which permit changing the sex of the connector within the same connector series; and modular instruments which permit changing the connector type.

### Fixed Flush and Fixed Offset Shorts

Fixed flush and fixed offset shorts are used to establish reference planes in transmission systems and as calibration standards for VNAs, PNAs and SNAs. Shorts with an offset of 2.498cm are often used to evaluate the calibration effectiveness of a VNA.

The shorting plane of fixed flush shorts is at the connector reference plane or at some offset established by another component, (typically an open). The shorting plane of some fixed offset shorts can also be relative to that established by another short with a nominal zero offset.

### Sliding Shorts

A sliding short is a movable short circuited termination in a precision air line which is used in laboratory measurement applications, such as establishing a reference plane in a transmission system, as tuning elements in the development of microwave components (mixers, amplifiers, etc.), and in tuning high precision CW reflectometer systems. They are also important as calibration standards for calibrating VNAs, PNAs, and SNAs, when they are to be used for measuring highly reflective devices.

Maury coaxial sliding shorts feature a precision transmission structure (air line), consistent low noise contacts on the inner and outer conductors, and a precision connector. Maury sliding shorts are available as modular units with interchangeable connectors, high precision devices with dedicated connectors, and rugged general purpose units.

### Opens

Shielded, coaxial open circuit terminations (opens) are used in calibrating VNAs, PNAs and SNAs. Their function is to provide a nominal 180° phase offset from a compatible reference short circuit over a broad range of frequencies.

Shielding the open essentially eliminates radiation losses; but creates a residual frequency-sensitive capacitance. An accurate knowledge of the open circuit effective capacitance is essential to an accurate calibration of the analyzer.

Maury opens are characterized for effective capacitance versus frequency by means of a fourth order polynomial curve fit, and the nominal capacitance coefficients are provided with each unit. We offer several innovative designs that improve the consistency and repeatability of the capacitance coefficients, resulting in improved effective source match of calibrated VNAs.

### Air Lines (Beaded and Beadless)

Precision or reference air lines are air-dielectric transmission lines with highly accurate dimensions that can be used as fundamental impedance standards and to establish reference positions in measurement and calibration applications.

Maury air lines are available with both bead supported and beadless connectors. Beadless lines offer better impedance and electrical length accuracies and lower VSWR, while beaded lines offer greater convenience.

### Precision Mismatches and Mismatch Air Line Sets

Maury precision standard mismatches are fixed terminations that can be used to calibrate swept reflectometers, verify network analyzer calibration, establish impedance references in TDR measurements, and have other general laboratory uses. They are made with thin film resistors and a unique grounding method that ensures stable operation. Calibration data is provided for all units at 1 GHz intervals from 2 GHz to the applicable upper frequency limit.

Maury mismatch air line sets are two-port, 1/4λ VSWR standards consisting of coaxial air lines with precision outer conductors, beadless connectors, and a set of inner conductors with increasing diameters. They produce accurately known reflection coefficents which are directly calculable from, and traceable to, air line dimensions. These sets are extremely stable and easy to use in many applications. Their simple geometry allows direct calculation of reflection, loss, transfer and group delay characteristics, making them ideally suited for checking the performance and accuracy of VNAs.

### Connector Gage Kits

Maury's connector gage kits provide an easy to use, direct reading, self-checking, and accurate way to measure the critical linear interface dimensions of most coaxial connectors. Their use helps ensure the best electrical performance and accuracy of your test instruments and DUTs, and allows you to avoid serious damage to their connectors.



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# Precision Fixed Terminations

## General Information



**Fixed Terminations –**

A precision fixed termination (or load) consists of an immovable, (fixed) termination which, when mated to the end of a transmission line or cable, absorbs nearly all of the signal energy traveling toward it. An ideal "matched" condition exists when a termination with an impedance value of $Z_0$, is connected to the end of a transmission line or cable that also has a characteristic impedance of $Z_0$. Such an ideal "matched" condition (one with no mismatch between the termination and its mated line or cable) is critical if a voltage standing wave ratio (VSWR) of 1.0:1 is to be achieved in a system with a 50 or 75 ohm impedance value. Simply put, the more closely the 1.0:1 ratio is approached, the more accurate the measurements that can be made from a system.

Maury precision fixed terminations are designed to exacting specifications and are as close to the ideal impedance as it is mechanically possible to make them. The following pages (pages 50 through 58) provide detailed information about the various types of precision fixed terminations offered by Maury. Most are normally sold as components of Maury VNA calibration kits, but may also be purchased separately as replacement parts or spares.



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# Precision Fixed Terminations

## 1.85mm (7831/32 series) and 2.4mm (7931 series)

### *Features*

- *Low VSWR*
- *DC to 67 GHz (1.85mm)*
- *DC to 50 GHz (2.4mm)*
- *Mating Compatible to Each Other*

### *Description*

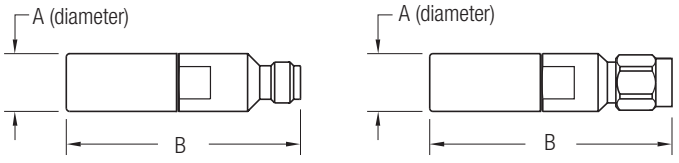
The 7831/32 and 7931 model series fixed terminations, which have 1.85mm and 2.4mm connectors respectively, are precision low VSWR terminations suited to a wide variety of general purpose and precision laboratory applications. Depending on the frequency range and required calibration effectiveness of your network analyzer (VNA or SNA), specific models can be used for full or lowband one-port $Z_0$ calibration and full two-port isolation calibration. The 1.85mm and 2.4mm mini-connectors used on these terminations are mating compatible with each other.

### *Connector Descriptions*

The precision 1.85mm connectors on the 7831A/B and the 7832A/B are miniature, instrument grade, air-interface connectors that operate mode free up to 67 GHz, and comply with IEEE standard 287 general precision connector, instrument grade GPC1.85.

The precision 2.4mm connectors on the 7931A1/B1 are miniature, instrument grade, air-interface connectors that operate mode free up to 50 GHz, and comply with IEEE standard 287 general precision connector, instrument grade GPC2.4.

### *Dimensions – Inches (cm)*




Unless otherwise noted, all dimensions are in inches and centimeters (cm).

| TYPE | MODEL | A | B | MODEL | A | B |
|---|---|---|---|---|---|---|
| 1.85mm | 7831A1 | 0.36 (0.91) | 1.46 (3.71) | 7831B1 | 0.36 (0.91) | 1.50 (3.81) |
| 1.85mm | 7832A | 0.28 (0.71) | 2.39 (6.07) | 7832B | 0.28 (0.71) | 2.29 (5.82) |
| 2.4mm | 7931A1 | 0.36 (0.91) | 1.46 (3.71) | 7931B1 | 0.36 (0.91) | 1.50 (3.81) |

[1] Precision 1.85mm per Maury data sheet 5E-089.

[2] Precision 2.4mm per Maury data sheet 5E-064.




### *Available Models*

| MODEL FEMALE | MODEL MALE | FREQUENCY RANGE (GHz) | MAXIMUM VSWR | CONNECTOR TYPE |
|---|---|---|---|---|
| 7831A1 | 7831B1 | DC – 1.0 | 1.02 | 1.85mm |
| | | 1.0 – 10.0 | 1.07 | |
| | | 10.0 – 26.5 | 1.10 | |
| | | 26.5 – 50.0 | 1.20 | |
| 7832A | 7832B | 10.0 – 67.0 | 1.10 | |
| 7931A1 | 7931B1 | DC – 4.0 | 1.016 | 2.4mm |
| | | 4.0 – 50.0 | 1.15 | |

### *Specifications*

Frequency Range, VSWR . . . . . (See Available Models chart)
Power Rating . . . . . 0.5 watt CW, 0.25 kW peak
Nominal Impedance . . . . . 50 ohm
Connectors:
7831 series. . . . . 1.85mm [1]
7832 series. . . . . 1.85mm [1]
7931 series. . . . . 2.4mm [2]
Size . . . . . (See Dimensions)



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# Precision Fixed Terminations

## 2.92mm (K) (8775 series) and 3.5mm (8031 series)

### *Features*

- *Low VSWR*
- *DC to 40 GHz (2.92mm)*
- *DC to 34 GHz (3.5mm)*
- *Mates with SMA & Each Other*

### *Description*

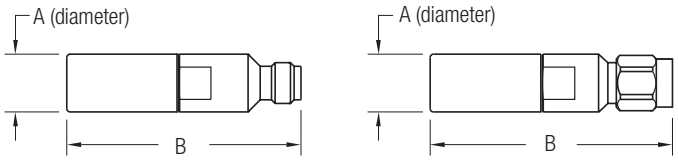
The 8775 and 8031 model series fixed terminations, which have 2.92mm and 3.5mm connectors respectively, are precision low VSWR terminations suited to a wide variety of general purpose and precision laboratory applications. Depending on the frequency range and required calibration effectiveness of your network analyzer (VNA or SNA), specific models can be used for full or lowband one-port $Z_0$ calibration and full two-port isolation calibration. The 2.92mm (K) and 3.5mm connectors used on these terminations are mating compatible with each other, and with SMA connectors.

### *Connector Descriptions*

The precision 2.92mm (or K) connectors on the 8775 model series are precision miniature 2.92mm air line interface connectors that operate mode free to 40 GHz. They have a mechanically compatible interface that mates with SMA and 3.5mm connectors. This interface was originally introduced by Maury in 1974 as the MPC3 connector and was reintroduced as the K connector by Wiltron in 1984.

The 3.5mm connectors on the 8031model series are air interface connectors that are mating compatible with SMA and K (2.92mm) connectors. They have an air line size of 0.0598 (inner diameter) and 0.1378 (outer diameter).

### *Dimensions – Inches (cm)*




Unless otherwise noted, all dimensions are in inches and centimeters (cm).

| TYPE | MODEL | A | B | MODEL | A | B |
|---|---|---|---|---|---|---|
| 2.92mm | 8775A2 | 0.36 (0.91) | 1.46 (3.71) | 8775B2 | 0.36 (0.91) | 1.50 (3.81) |
| 3.5mm | 8031A( ) | 0.36 (0.91) | 1.46 (3.71) | 8031B( ) | 0.36 (0.91) | 1.50 (3.81) |

[1] Precision 2.92mm (K) per Maury data sheet 5E-063.

[2] Precision 3.5mm per Maury data sheet 5E-062.




### *Available Models*

| MODEL FEMALE | MODEL MALE | FREQUENCY RANGE (GHz) | MAXIMUM VSWR | CONNECTOR TYPE |
|---|---|---|---|---|
| 8775A2 | 8775B2 | DC – 4.0 | 1.016 | 2.92mm [1] |
| | | 4.0 – 40.0 | 1.15 | |
| 8031A2 | 8031B2 | DC – 4.0 | 1.05 | 3.5mm [2] |
| | | 4.0 – 12.0 | 1.10 | |
| | | 12.0 – 18.0 | 1.15 | |
| | | 18.0 – 26.5 | 1.20 | |
| | | 26.5 – 34.0 | 1.25 | |
| 8031A4 | 8031B4 | DC – 2.0 | 1.03 | 3.5mm [2] |
| | | 2.0 – 4.0 | 1.05 | |
| | | 4.0 – 18.0 | 1.10 | |
| | | 18.0 – 26.5 | 1.15 | |
| 8031A5 | 8031B5 | DC – 3.0 | 1.02 | 3.5mm [2] |
| | | 3.0 – 6.0 | 1.032 | |
| | | 6.0 – 20.0 | 1.052 | |
| | | 20.0 – 26.5 | 1.083 | |

### *Specifications*

Frequency Range, VSWR . . . . . (See Available Models chart)

Power Rating . . . . . 0.5 watt CW, 0.25 kW peak

Nominal Impedance . . . . . 50 ohm

Connectors:

8775 series . . . . . 2.925mm (K) [1]

8031 series. . . . . 3.5mm [2]

Size . . . . . (See Dimensions)



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# Precision Fixed Terminations

## 7mm (2610 series) and Type N (2510 series)



2610C



2510A6



2510B6

### *Features*

- *Low VSWR*
- *DC to 18 GHz*

### *Description*

The 2610 and 2510 series fixed terminations (utilizing 7mm and type N connectors respectively) are precision, broadband, low VSWR terminations suited to a wide variety of general purpose and precision laboratory applications. Depending upon the frequency range and required calibration effectiveness of a vector or scalar network analyzer (VNA or SNA, respectively), specific models can be used for full or lowband one-port $Z_0$ calibration and full two-port isolation calibration.

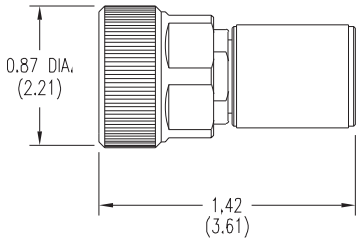
### *Connector Descriptions*

The 7mm connectors on the 2610 series terminations are precision air interface hermaphroditic connectors that are rated from DC to 18 GHz. They have an air line size of 0.1197 inner diameter and a 0.2756 outer diameter.

The connectors on the 2510 series terminations are Maury precision stainless steel type N connectors that mate with most of the precision type N connectors commonly used today, including those complying with MIL-C-39012 and MIL-T-81490. They are low VSWR connectors rated from DC to 18 GHz.

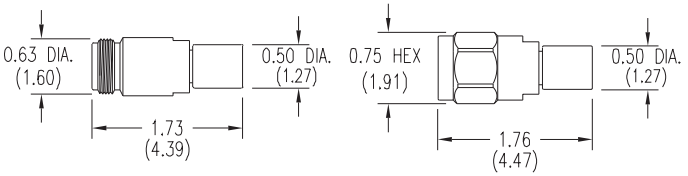
### *Dimensions – Inches (cm)*

***7mm***




2610

***Type N***




2510 Female

2510 Male

### *Available Models*

| MODEL FEMALE | MODEL MALE | FREQUENCY RANGE (GHz) | MAXIMUM VSWR | CONNECTOR TYPE |
|---|---|---|---|---|
| 2610C | | DC – 4.0<br>4.0 – 18.0 | 1.04<br>1.08 | 7mm [1] |
| 2610D | | DC – 18.0 | 1.04 | 7mm [1] |
| 2610F | | DC – 1.0<br>1.0 – 2.0<br>2.0 – 8.0<br>8.0 – 18.0 | 1.005<br>1.01<br>1.03<br>1.06 | 7mm [1] |
| 2510A4 | 2510B4 | DC – 4.0<br>4.0 – 12.0<br>12.0 – 18.0 | 1.04<br>1.10<br>1.15 | Type N [2] |
| 2510A5 | 2510B5 | DC – 4.0<br>4.0 – 18.0 | 1.04<br>1.10 | Type N [2] |
| 2510A6 | 2510B6 | DC – 2.0<br>2.0 – 4.0<br>4.0 – 18.0 | 1.02<br>1.04<br>1.06 | Type N [2] |
| 2510A7 | 2510B7 | DC – 2.0<br>2.0 – 4.0<br>4.0 – 18.0 | 1.01<br>1.04<br>1.12 | Type N [2] |
| 2510A8 | 2510B8 | DC – 3.0<br>3.0 – 6.0 | 1.01<br>1.02 | Type N [2] |

### *Specifications*

Frequency Range, VSWR . . . . . (See Available Models chart)

Power Rating . . . . . 1 watt CW, 1 kW peak

Nominal Impedance . . . . . 50 ohm

Connectors:

2610 series . . . . . 7mm [1]

2510 series . . . . . Type N [2]

Size . . . . . (See Dimensions)

[1] Precision 7mm per Maury data sheet 5E-060.

[2] Precision stainless steel type N per Maury data sheet 5E-049.

Key Literature: Maury data sheet 2C-003, 2C-005, 5E-049, and 5E-060.



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# Precision Fixed Terminations

## Type N 75 ohm (8883 series)
## BNC 75 ohm (8583 series)

### *Features*

- *Low VSWR*
- *DC to 2 GHz*

### *Description*

The 8883 series and 8583 series fixed terminations are precision, , low VSWR, 75 ohm terminations equipped with type N and BNC connectors, respectively. These terminations are suited to a wide variety of general purpose and precision laboratory applications; however, their primary usage is for 75 ohm reference $Z_0$ calibration of network analyzers at frequencies up to 2 GHz. All Maury 75 ohm components are identifiable by a black ring encircling the body of the component. 75 ohm connectors should never be mated to their 50 ohm counterparts as doing so could result in damage to the 75 ohm female connector and/or poor, or erratic electrical performance.

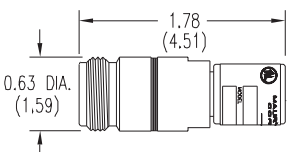
### *Connector Description*

The type N 75 ohm connectors on the components in the 8883 series are a precision version of type N 75 ohm connectors, developed by Maury, which meets all applicable requirements of IEC169-16. They exhibit extremely low VSWR, and although specified to 2.0 GHz, they can be used at much higher frequencies. The male connectors are provided with a 3/4" hex coupling nut so the junctions can be properly torqued to 12 in. lbs.

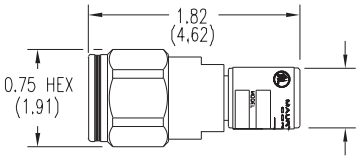
The BNC connectors on the 8583 series terminations are precision miniature coaxial connectors featuring a quick disconnect bayonet locking coupling mechanism. The connector body is fabricated from solid brass finished with nickle plating. The center conductor is beryllium-plated copper, supported by teflon beads. They are rugged, lightweight connectors that are negligably affected by temperature and humidity.

### *Dimensions – Inches (cm)*

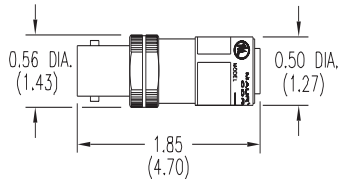
8883A Female



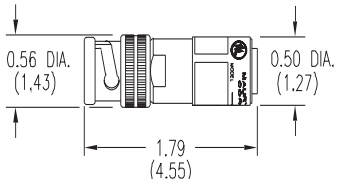

8883B Male




8583A Female




8583B Male




Key Literature: Maury data sheet 2Z-036



8883A



8883B



8583A



8583B

### *Specifications*

Model 8883A – Female type N 75 ohm fixed termination
Model 8883B – Male type N 75 ohm fixed termination
Frequency Range . . . . . DC – 2.0 GHz
Maximum VSWR . . . . . 1.01
Power Rating . . . . . 1 watt CW
Nominal Impedance . . . . . 75 ohm
Connectors:
8883A . . . . . Precision 75 ohm type N female [1]
8883B . . . . . Precision 75 ohm type N male [1]
Size . . . . . (see Dimensions)

Model 8583A – Female BNC 75 ohm fixed termination
Model 8583B – Male BNC 75 ohm fixed termination
Frequency Range . . . . . DC – 2.0 GHz
Maximum VSWR . . . . . 1.02
Power Rating . . . . . 1 watt CW
Nominal Impedance . . . . . 75 ohm
Connectors:
8583A . . . . . Precision 75 ohm BNC female
8583B . . . . . Precision 75 ohm BNC male
Size . . . . . (see Dimensions)


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# Precision Fixed Terminations

## HN, SC, BNC and C (335, 336, 351, and 354 series)

### Features

- *Low VSWR*
- *DC to 10 GHz*

### Description

Maury produces these four series of low power, general purpose terminations which are designed to operate from DC to 8 or DC to 10 GHz. They are useful in a variety of airborne systems and laboratory applications where low VSWR broadband termination is required.

These compact, lightweight, rugged terminations are available with HN, SC, BNC, and C connectors. Most are sufficiently well matched for low frequency VNA $Z_0$ calibrations and all can be used for isolation calibrations within the appropriate frequency range.

### Connector Descriptions

The HN connectors on the 335 series terminations are medium size high voltage connectors with a screw type coupling mechanism and overlapping dialectrics for longer breakdown paths.

The SC connectors on the 336 series terminations are threaded versions of the C connector and are designed for use in severe environments, where vibration and shock are present.

The C connectors on the 354 series terminations are medium size, 50 ohm impedance connectors with bayonet couplings. Maury MPC C connectors mate with most C versions in use today, specifically with MIL-C-39012/35/36 and test connectors with MIL-C-3989 interfaces. They are normally made with stainless steel bodies and have heat treated, gold-plated beryllium copper contacts.

The BNC connectors on the 351 series terminations are 50 ohm impedance connectors with two-stud bayonet coupling. They conform to MIL-C-39012 and are normally made with stainless steel bodies with heat treated, gold-plated beryllium copper contacts.


351A2


351B2


354A


354B

### Available Models

| MODEL FEMALE | MODEL MALE | FREQUENCY RANGE (GHz) | MAXIMUM VSWR | CONNECTOR TYPE |
|---|---|---|---|---|
| 335A | 335B1 | DC – 1.0<br>1.0 – 4.0<br>4.0 – 8.0 | 1.05<br>1.10<br>1.20 | HN [1] |
| 336A | 336B1 | DC – 1.0<br>1.0 – 4.0<br>4.0 – 10.0 | 1.03<br>1.07<br>1.12 | SC [1] |
| 351A2 | 351B2 | DC – 2.0<br>2.0 – 4.0<br>4.0 – 10.0 | 1.04<br>1.10<br>1.20 | BNC |
| 354A | 354B | DC – 1.0<br>1.0 – 4.0<br>4.0 – 10.0 | 1.05<br>1.15<br>1.30 | C |

### Dimensions – Inches (cm)

| TYPE | MODEL | DIAMETER INCHES | DIAMETER (CM) | LENGTH INCHES | LENGTH (CM) |
|---|---|---|---|---|---|
| HN Female | 335A | 0.750 | (1.905) | 1.770 | (4.496) |
| HN Male | 335B1 | 0.875 | (2.223) | 1.955 | (4.966) |
| SC Female | 336A | 0.760 | (1.930) | 1.925 | (4.889) |
| SC Male | 336B1 | 0.790 | (2.007) | 1.835 | (4.661) |
| BNC Female | 351A2 | 0.570 | (1.448) | 1.520 | (3.861) |
| BNC Male | 351B2 | 0.570 | (1.448) | 1.435 | (3.645) |
| C Female | 354A | 0.760 | (1.930) | 1.925 | (4.889) |
| C Male | 354B | 0.790 | (2.007) | 1.835 | (4.661) |

Key Literature: Maury data sheet 2C-004, 2C-005.

### Specifications

Frequency Range, VSWR . . . . . (See Available Models chart)

Power Rating:

HN and SC . . . . . 1 watt CW, 1 kW peak

BNC and C . . . . . 2 watt CW, 1 kW peak

Nominal Impedance . . . . . 50 ohm

Size . . . . . (See Dimensions)

[1] Precision stainless steel connector per Maury data sheet 5E-051.

[2] Precision stainless steel SC per Maury data sheet 5E-050.



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# Precision Fixed Terminations

## TNC (332 series), AFTNC (8684 series) and TNCA (8674 series)







### *Features*

- *Low VSWR*
- *DC to 20 GHz*

### *Description*

These TNC, AFTNC, and TNCA units are precision, broadband, low VSWR fixed terminations suited to a variety of general purpose and precision laboratory applications. Depending upon the frequency range and required calibration effectiveness of a vector network analyzer (VNA) specific models can be used for full or low-band one-port $Z_0$ calibration and full two-port, isolation calibration.

### *Connector Description*

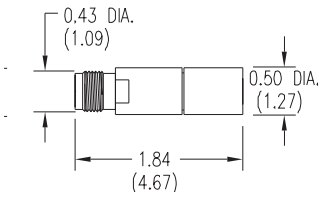
Maury TNC connectors (MPC/TNC) on the are precision stainless steel connectors that mate with MIL-C-39012 and MIL-T-81490 connectors. These low VSWR connectors rated from DC to 18.0 GHz.

Maury AFTNC connectors fully comply with the requirements of MIL-C-87104/2. The male connector utilizes a solid outer conductor configuration to provide consistent measurement results. Connector bodies are fabricated from stainless steel for strength and durability. These connectors were developed using optimized HFSS simulation to provide extremely low VSWR, and they are rated to 20 GHz.

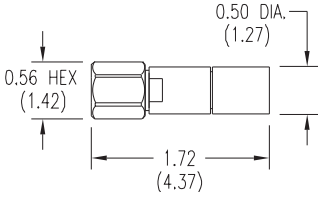
Maury TNCA connectors fully comply with the requirements of MIL-STD 348A. The male connector utilizes a solid outer conductor configuration to provide consistent measurement results. Connector bodies are fabricated from stainless steel for strength and durability.

### *Dimensions – Inches (cm)*

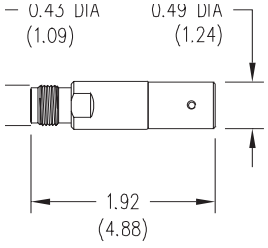
332A Female



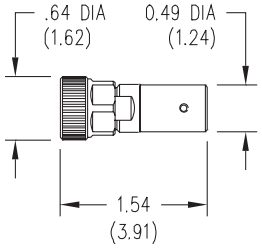

332B Male




8684A & 8674A Female




8684B & 8674B Male




### *Available Models*

| MODEL FEMALE | MODEL MALE | FREQUENCY RANGE (GHz) | MAXIMUM VSWR | CONNECTOR TYPE |
|---|---|---|---|---|
| 332A | 332B | DC – 4.0<br>4.0 – 12.0<br>12.0 – 18.0 | 1.10<br>1.15<br>1.20 | TNC [1] |
| 332E | 332F | DC – 4.0<br>4.0 – 12.0<br>12.0 – 18.0 | 1.06<br>1.10<br>1.15 | TNC [1] |
| 332G | 332H | DC – 2.0<br>2.0 – 4.0 | 1.02<br>1.05 | TNC [1] |
| 332A3 | 332B3 | DC – 3.0<br>3.0 – 6.0 | 1.02<br>1.04 | TNC [1] |
| 332A8 | 332B8 | DC – 3.0<br>3.0 – 13.5 | 1.03<br>1.06 | TNC [1] |
| 332A9 | 332B9 | DC – 3.0<br>3.0 – 18.0 | 1.03<br>1.10 | TNC [1] |
| 332A5 | 332B5 | DC – 12.0<br>12.0 – 18.0 | 1.25<br>1.10 | TNC [1] |
| 8684A | 8684B | DC – 4.0<br>4.0 – 12.0<br>12.0 – 20.0 | 1.04<br>1.08<br>1.10 | AFTNC [2] |
| 8674A | 8674B | DC – 4.0<br>4.0 – 12.0<br>12.0 – 20.0 | 1.04<br>1.08<br>1.10 | TNCA [3] |

### *Specifications*

Frequency Range, VSWR . . . . . See chart
Power Rating . . . . . 1 watt CW, 1 kW peak
Impedance . . . . . 50 ohm (nominal)
Connectors:
332 series . . . . . TNC [1]
8684 series . . . . . AFTNC [2]
8674 series . . . . . TNCA [3]
Size . . . . . (see Dimensions)

[1] Precision TNC per Maury data sheet 5E-053.
[2] Precision TNC MIL-C-87104/2 per Maury data sheet 5E-056.
[3] Precision TNC MIL-STD 348A per Maury data sheet 5E-058.



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# Precision Fixed Terminations

## LCP/OSP™ (8783 series)

### *Features*

- *Low VSWR*
- *DC to 18 GHz*

### *Description*

The 8783 series fixed terminations are equipped with Maury LCP/OSP™ connectors, which are precision, broadband, low VSWR terminations suited to a wide variety of general purpose and precision laboratory applications. Their unique coupling mechanism is an improvement on the original OSP™ design that significantly enhances the performance of these connectors (see Connector Description below). Depending upon the frequency range and required calibration effectiveness of your VNA, PNA, or SNA, specific models can be used for full or lowband one-port $Z_0$ calibration and full two-port, isolation calibration.

### *Connector Description*

The connectors on these components are Maury precision LCP/OSP™ connectors that are mating compatible with standard OSP™ and Dynawave/Dynamate™ series blind-mate connectors. They are low VSWR connectors rated from DC to 18 GHz. A unique feature of these connectors is their use of a positive (thread-on) coupling system which permits mating with the use of a calibrated torque wrench to enhance the repeatability and electrical performance of the connection. For interface specifications on these connectors, please refer to Maury data sheet 5E-065.



8783A 8783B

### *Specifications*

Model 8783A female LCP/OSP™ fixed termination

Model 8783B male LCP/OSP™ fixed termination

Frequency Range . . . . . DC to 18.0 GHz

Maximum VSWR:

DC to 1.0 GHz . . . . . 1.03

1.0 to 6.0 GHz . . . . . 1.05

6.0 to 18.0 GHz . . . . . 1.08

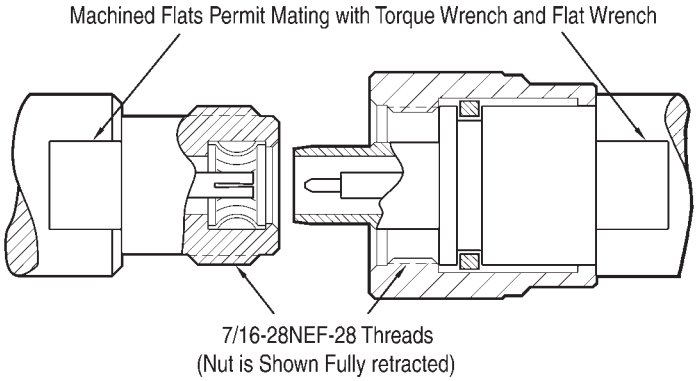
Power Rating . . . . . 1 watt CW, 0.5 kW peak

Reference Impedance . . . . . 50 ohm (nominal)

Connectors . . . . . LCP/OSP™

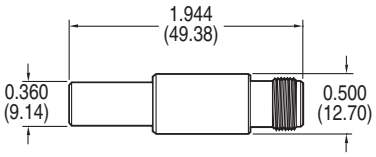
Size . . . . . (see Dimensions)

### *Maury OSP™ Improvements*

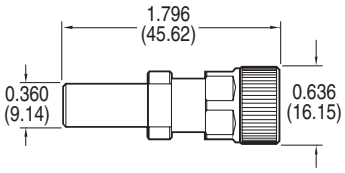



### *Dimensions – Inches (cm)*

8783A Female




8783B Male






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# Precision Fixed Terminations

## 14mm – GR900 Equivalent (2410A)




### *Features*

- *Low VSWR*
- *DC to 8.5 GHz*

### *Description*

The 2410A fixed termination is equipped with the Maury MPC14 connector, a precision 14mm connector. The 2410A is a broadband, low VSWR termination suited to a wide variety of general purpose and precision laboratory applications. Within its frequency range this termination can be used for full or lowband one-port $Z_0$ calibration and full two-port, isolation calibration.

### *Connector Description*

The MPC14 precision 14mm connector is essentially equivalent to, and mating compatible with, GR900 type connectors. It features an improved hex knurl coupling nut and an improved center conductor inner contact (model 2481A). The coupling nut has a 1.00 inch hex for accurate tightening with a torque wrench, and the knurled knob provides a positive grip for finger tightening.

### *Dimensions – Inches (cm)*

See the diagram at right.

### *Specifications*

Model 2410A Precision 14mm Fixed Termination

Frequency Range . . . . . DC to 8.5 GHz

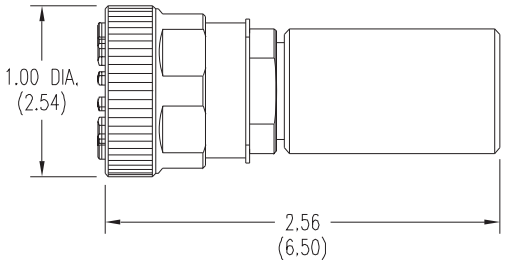
Maximum VSWR: . . . . . 1.005 + 0.004 GHz

Power Rating . . . . . 3 watts CW, 1 kW peak

Reference Impedance . . . . . 50 ohm (nominal)

Connector . . . . . 14mm (MPC14)

Size . . . . . (see diagram below)




# Precision Fixed Terminations

## 7-16 (2710 Series)







### *Features*

- *Low VSWR*
- *DC to 7.5 GHz*

### *Description*

The 2710 series fixed terminations are precision, broadband, low VSWR terminations suited to a wide variety of general purpose and precision laboratory applications. Within their frequency range they can be used for full band one-port $Z_0$ calibration and full two-port isolation calibration.

### *Connector Description*

The 7-16 connectors found on the components in these kits are rugged, calibration grade connectors that exceed the requirements for IEC169-4 reference grade and BSEN122190 grade 0 specifications. They feature a thicker dielectric bead to eliminate deflection, retracted threads on the female connector to eliminate the need to apply excessive torque during calibration and test, and tighter tolerance control than called for in the IEC and BSEN specifications to reduce uncertainties.

### *Specifications*

Model 2710A Female Precision 7-16 Fixed Termination

Model 2710B Male Precision 7-16 Fixed Termination

Frequency Range . . . . . DC to 7.5 GHz

Maximum VSWR:

DC to 4.0 GHz . . . . . 1.02

4.0 to 7.5 GHz . . . . . 1.03

Power Rating . . . . . 3 watts CW, 1 kW peak

Reference Impedance . . . . . 50 ohm (nominal)

Connector . . . . . Precision 7-16

Size in inches (cm):

2710A . . . . . 1.142 (2.901) max dia., 2.758 (7.005) length

2710B . . . . . 1.311 (3.330) max. dia. 3.068 (7.793) length



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# Precision Fixed Terminations

## Waveguide (301 series)

### *Features*

- *Low VSWR*
- *1.12 to 110 GHz*
- *Moderate Power Handling*




### *Description*

The 301 series low power waveguide fixed terminations are precision, low VSWR terminations suited to a wide variety of general purpose and precision laboratory applications. They can be used for full band one-port calibration and full two-port, isolation calibration.

### *Waveguide Flange Description*

The waveguide flanges used on these terminations are Maury Precision Flanges (MPF) in rectangular, or round configurations. MPF flanges have precision indexing holes and removable indexing pins for excellent measurement repeatability. The millimeter waveguide flanges in the WR22 and smaller sizes are of a unique Maury-pioneered design featuring a raised outer rim to prevent the flanges from cocking during connection. These flanges will mate with corresponding UG ( )/U flanges. (See page 128 for flange details.)







### *Available Models*

| MODEL | FREQUENCY RANGE (GHz) | VSWR (Maximum) | EIA WR NUMBER | EQUIVALENT FLANGE | POWER RATING | | LENGTH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | AVE. (W) | PEAK (kW) | inches | (cm) |
| L301A | 1.12 — 1.20<br>1.20 — 1.70 | 1.040<br>1.025 | 650 | CPR-650F | 25.0 | 10.0 | 19.5 | (49.53) |
| R301A | 1.70 — 1.90<br>1.90 — 2.60 | 1.025<br>1.020 | 430 | UG435/U | 12.0 | 5.0 | 14.8 | (37.6) |
| D301A | 2.20 — 3.30 | 1.025 | 340 | CPR340F | 5.0 | 2.0 | 9.8 | (24.9) |
| S301A | 2.60 — 3.95 | 1.025 | 284 | UG584/U | 5.0 | 2.0 | 10.4 | (26.4) |
| E301F | 3.30 — 4.90 | 1.020 | 229 | CPR229F | 5.0 | 2.0 | 7.4 | (18.8) |
| G301 | 3.95 — 5.85 | 1.020 | 187 | UG149A/U | 5.0 | 2.0 | 6.4 | (16.3) |
| F301C | 4.90 — 7.05 | 1.020 | 159 | CPR159F | 3.0 | 1.0 | 5.8 | (14.7) |
| C301 | 5.85 — 8.20 | 1.020 | 137 | UG344/U | 2.5 | 1.0 | 5.2 | (13.2) |
| H301A | 7.05 — 10.00 | 1.015 | 112 | UG51/U | 2.0 | 1.0 | 5.0 | (12.7) |
| X301A | 8.20 — 12.40 | 1.015 | 90 | UG39/U | 1.0 | 1.0 | 5.0 | (12.7) |
| M301A | 10.00 — 15.00 | 1.020 | 75 | MPF75 | 1.0 | 1.0 | 5.0 | (12.7) |
| P301A | 12.40 — 18.00 | 1.020 | 62 | UG419/U | 1.0 | 1.0 | 4.0 | (10.2) |
| N301 | 15.00 — 22.00 | 1.025 | 51 | MPF51 | 0.5 | 0.2 | 3.1 | (07.9) |
| K301 | 18.00 — 26.50 | 1.025 | 42 | UG595/U | 0.5 | 0.2 | 2.8 | (07.1) |
| U301 | 26.50 — 40.00 | 1.025 | 28 | UG599/U | 0.5 | 0.2 | 2.2 | (05.6) |
| J301A | 33.00 — 50.00 | 1.040 | 22 | UG383[1] | 0.5 | 0.1 | 1.6 | (04.1) |
| V301B | 50.00 — 75.00 | 1.025 | 15 | UG385[1] | 0.3 | 0.05 | 1.5 | (03.8) |
| Y301 | 60.00 — 90.00 | 1.030 | 12 | UG387/U | 0.2 | 0.03 | 1.5 | (03.8) |
| Z301B | 75.00 — 110.00 | 1.030 | 10 | UG387[1] | 0.2 | 0.03 | 1.5 | (03.8) |

[1] Units are supplied with Maury precision flanges (MPF) which mate with the UG flanges shown.



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# Sliding Terminations

## General Information



A sliding termination (or sliding load) consists of a precision, movable, tapered termination in a highly accurate, air dielectric transmission line. These instruments are basic tools for making precision microwave measurements, and are particularly useful in the following applications:

**Load Separation:** A general application measurement in which the reflection from the terminating element can be separated from that of the test device. Load separation using sliding loads is a key element in the calibration of vector network analyzers (VNAs). The technique is also used in the measurement of the reflection from two-port devices, particularly "non-insertable", (e.g., waveguide-to-coax adapters, and the directivity of directional couplers). Maury sliding terminations make it possible to measure test device reflection in extremely small increments that would normally be masked by the reflections from the termination.

**50 ohm Fixed Termination:** The low VSWR inherent in Maury sliding terminations make them excellent for use as fixed terminations in 50 ohm systems.

---

Maury manufactures sliding terminations which offer a range of performance and convenience features. These include metrology grade, high precision units with integral, dedicated connectors; precision units which permit the sex of the connector to be changed within the same connector series; and true, modular instruments which permit changing the connector type or sex.

**Metrology grade sliding terminations** provide the highest level of accuracy, stability and repeatability when used as impedance standards for calibrating vector network analyzers. They feature integral connectors, flush set adjustment, and thermal isolation.

**Dedicated connector sliding terminations** are capable of handling higher power than is typical of metrology grade sliding terminations. Their defining characteristic is that they feature connectors of a single type, and (in sexed connectors) of a single, non-interchangable, sex.

**Modular sliding terminations** are provided with a range of interchangable connectors, permitting the user to change the connector type and sex of the sliding termination as needed.

Most Maury sliding termination VNA calibration kits include metrology grade sliding terminations. These sliding terminations are also available individually as replacement parts for the calibration kits. Dedicated connector and Modular models are likewise available as individual instruments, and in some cases as boxed sets. The following pages provide detailed descriptions and specifications for all of the coaxial and waveguide sliding terminations offered by Maury.



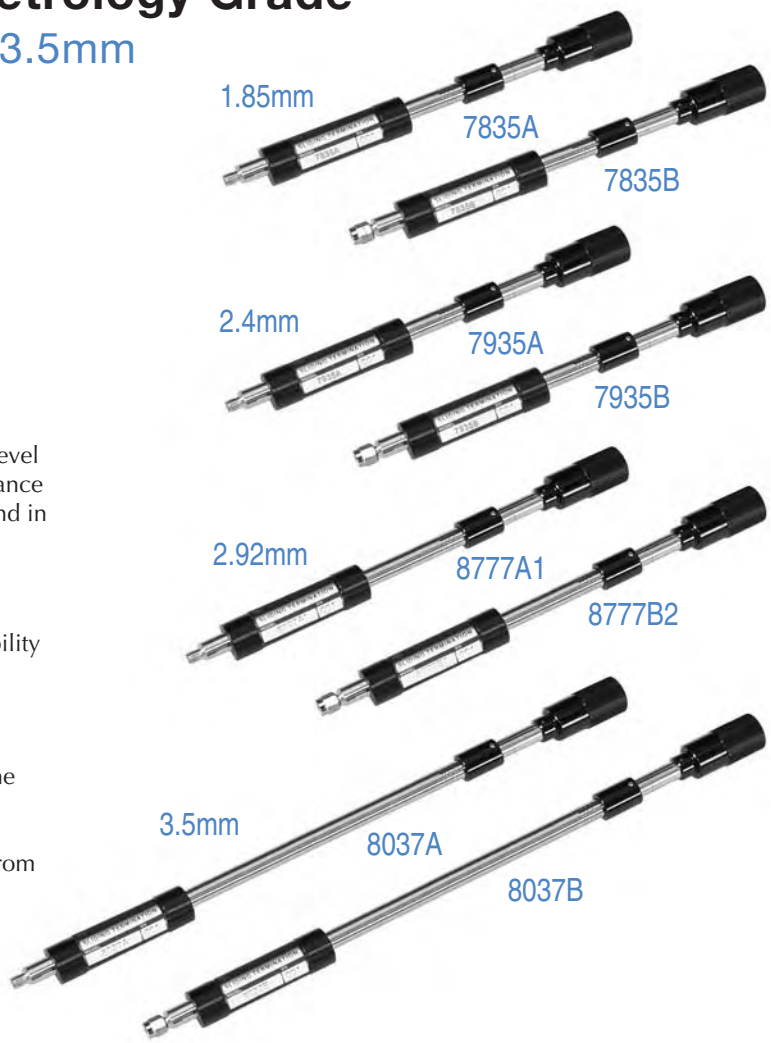
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# Sliding Terminations — Metrology Grade

## 1.85mm, 2.4mm, 2.92mm and 3.5mm

### *Features*

- *Integral Connectors*
- *"Flush Set" Adjustment*
- *"Pull Back" Mechanism & Lock*
- *Thermal Isolation*
- *Enhanced Air Line Accuracy*




### *Description*

These metrology grade sliding terminations achieve a high level of accuracy, stability and repeatability when used as impedance standards for calibrating vector network analyzers (VNAs) and in other critical, precision measurement applications.

They feature seamless, integral, beadless (air dielectric) connectors that provide an extremely accurate impedance reference, and an external jacket that enhances thermal stability by insulating the transmission line.

When used with "thread-on" connector gages, a "flush set" mechanism allows users to adjust the center conductor to acheive a coplanar inner and outer conductor interface at the connector mating plane. A "pull back" mechanism automatically locks the center conductor to a previously set flush condition, making it easy to return to flush condition from any other position.

These terminations are available individually, with female or male connectors, or in boxed sets with one each of both sexes, per the ***Specifications*** chart (below).

### *Specifications*

| MODEL | CONNECTOR TYPE | FREQUENCY RANGE & MAXIMUM VSWR [1] | AIR LINE ACCURACY [2] | POWER HANDLING |
|---|---|---|---|---|
| 7835A | 1.85mm female | 8.0 GHz — 67.0 GHz, 1.05 | 42 dB (4.0 — 67.0 GHz) | 0.5 watts CW, 0.5 kW peak |
| 7835B | 1.85mm male | | | |
| 7835C | 1.85mm boxed set (1 ea. 7835A female and 7835B male) [3] | | | |
| 7935A | 2.4mm female | 4.0 GHz — 10.0 GHz, 1.10 | 42 dB (4.0 — 50.0 GHz) | 0.5 watts CW, 0.5 kW peak |
| 7935B | 2.4mm male | 10.0 GHz — 50.0 GHz, 1.05 | | |
| 7935C | 2.4mm boxed set (1 ea. 7935A female and 7935B male) [3] | | | |
| 8777A1 | 2.92mm (K) female | 4.0 GHz — 10.0 GHz, 1.10 | 46 dB (4.0 — 40.0 GHz) | 0.5 watts CW, 0.5 kW peak |
| 8777B1 | 2.92mm (K) male | 10.0 GHz — 40.0 GHz, 1.05 | | |
| 8777C1 | 2.92mm (K) boxed set (1 ea. 8777A1 female and 8777B1 male) [3] | | | |
| 8037A | 3.5mm female | 2.0 GHz — 4.0 GHz, 1.09 | 50 dB (4.0 — 34.0 GHz) | 1.0 watts CW, 1.0 kW peak |
| 8037B | 3.5mm male | 4.0 GHz — 34.0 GHz, 1.05 | | |
| 8037C | 3.5mm boxed set (1 ea. 8037A female and 8037B male) [3] | | | |
| 2608C | 7mm (LPC7) | 1.8 GHz — 18.0 GHz, 1.035 | 62 dB | 1.0 watt CW, 1.0 kW peak |
| 8834A | Type N female | 2.0 GHz — 18.0 GHz, 1.04 | 54 dB | |
| 8834B | Type N male | | | |
| 8834C | Type N boxed set (1 ea. 8834A female and 8834B male) [3] | | | |

[1] Maximum VSWR (50 ohm reference) of the terminating element alone.

[2] Equivalent return loss of the air line impedance (50 ohm reference).

[3] Supplied in a foam-lined wood instrument case.



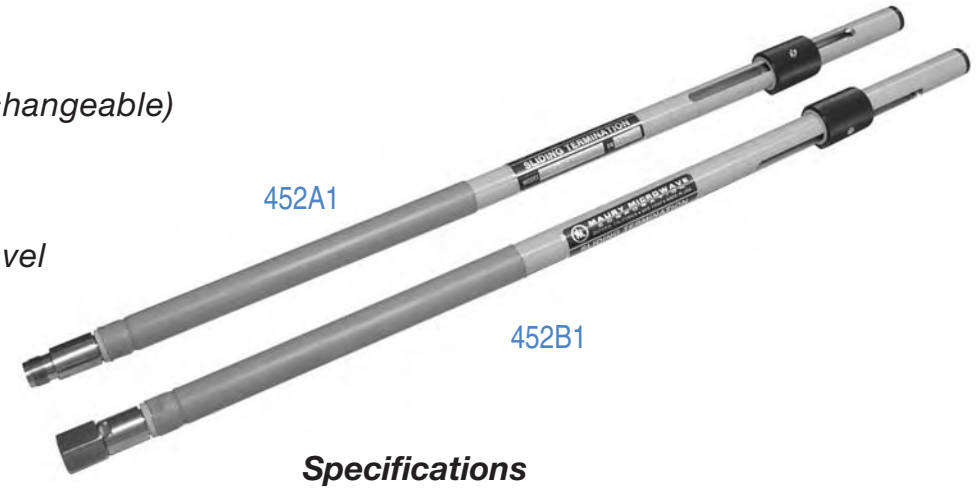
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# Sliding Terminations — Precision Dedicated Connectors

## 7mm (LPC7A), Type N, TNC, AFTNC, TNCA, SMA and 14mm (LPC14)

### Features

- *Dedicated (Non-Interchangeable) Precision Connectors*
- *Low Reflection*
- *Greater than 1/2-λ Travel at Lowest Frequency*




### Description

These sliding terminations feature dedicated connectors.Those with sexed connectors (e.g., type N), are available in two models; one each with female and male connectors. Except as noted, the terminating elements are capable of handling higher power than typical laboratory sliding loads.

TNC and SMA terminations are precision air lines with low-reflection transformers to the dielectrically loaded connectors. Their air dielectric connectors and movable center conductors permit precision setting of the connector interface condition, using an appropriate connector gage.

### Specifications

Frequency Range . . . . . .See chart
VSWR (terminating element) . . . . . .See chart
Power Rating . . . . . .See chart
Nominal Impedance . . . . . .50 ohm
Air Line Accuracy . . . . . .See chart
Travel . . . . . >1/2 wavelength at lowest rated frequency
Connectors . . . . . .See chart

Note: Wood instrument cases are provided with many of these units or are available as optional accessories.

### Available Models

| MODEL | CONNECTOR TYPE | FREQUENCY RANGE & MAXIMUM VSWR [1] | AIR LINE ACCURACY [2] | POWER HANDLING |
|---|---|---|---|---|
| 2517H | LPC7A [3] | 2.0 GHz — 18.0 GHz, 1.04 | 52 dB | 1.0 watt CW, 5.0 kW peak |
| 453A1 | Type N female [4] | 1.8 GHz — 18.0 GHz, 1.05 | 56 dB | 5.0 watt CW, 1.0 kW peak |
| 453B1 | Type N male [4] | | | |
| 493A | Type N female [4] | 0.9 GHz — 18.0 GHz, 1.10 | | |
| 493B | Type N male [4] | 1.8 GHz — 18.0 GHz, 1.05 | | |
| 452A1 | TNC female [5] | 1.8 GHz — 18.0 GHz, 1.05 | | |
| 452B1 | TNC male [5] | | | |
| 487A | SMA female [6] | 0.9 GHz — 1.8GHz, 1.10 | | |
| 487B | SMA male [6] | 1.8 GHz — 18.0 GHz, 1.05 | | |
| 8683A | AFTNC female [7] | 2.0 GHz — 4.0 GHz, 1.04 | | |
| 8683B | AFTNC male [7] | 4.0 GHz — 20.0 GHz, 1.05 | | |
| 8673A | TNCA female [8] | 2.0 GHz — 4.0 GHz, 1.04 | | |
| 8673B | TNCA male [8] | 4.0 GHz — 20.0 GHz, 1.05 | | |
| 2408A1 | LPC14 [9] | 0.9 GHz — 1.5 GHz, 1.08<br>1.5 GHz — 2.0 GHz, 1.04<br>2.0 GHz — 8.5 GHz, 1.03 | 64 dB | 2.0 watts CW, 2.0 kW peak |

[1] Maximum VSWR (50 ohm reference) of the terminating element alone.

[2] Equivalent return loss of the air line impedance (50 ohm reference).

[3] Air interface connector per Maury data sheet 5E-061 with a spring-loaded, self-centering, center pin that mates with standard 7mm connectors.

[4] Precision stainless steel type N per Maury data sheet 5E-049.

[5] Precision stainless steel TNC per ES-2047.

[6] Precision stainless steel SMA per MIL-C-39012.

[7] Precision TNC MIL-C-87104/2 per Maury data sheet 5E-056.

[8] Precision TNCA MIL-STD 348A per Maury data sheet 5E-058.

[9] Movable center conductor permits setting of connector interface conditions.



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# Sliding Terminations — Modular Connectors

## 3.5mm, 7mm (LPC7) and Type N

### *Features*

- *Interchangeable Precision Connectors*
- *Greater than 1/2-λ Travel at Lowest Frequency*
- *Broadband, Low-Reflection*




### *Description*

These precision sliding terminations have interchangeable precision, beadless connectors, eliminating the need for separate loads for different connector sexes or types as noted in the chart below. The 8035A has a single center conductor and interchangeable female and male center contacts and connector bodies. The 2507 and 2517A are true modular instruments provided with interchangeable LPC7 and type N (female and male) connectors. Precision adapters for other connectors (including SC, HN, BNC and C) are also available as options.

The 8035A is characterized by highly accurate, 50 ohm air line impedance and low terminating element VSWR. The 2507 and 2517A are high precision, movable, low-reflection, broadband terminations .

In all of the models listed below, the travel of the movable loads is at least 1/2 wavelength (at the lowest rated frequency) so that frequencies within the rated phase range of the load reflection can be reversed and separated from other in-system reflections. The connectors are beadless (air dielectric), and the movable center conductors can be set to the correct connector interface conditions with the aid of an appropriate connector gage.

All three models are provided in foam-lined wooden instrument cases.

### *Specifications*

Frequency Range . . . . . See chart
VSWR (terminating element) . . . . . See chart
Power Rating . . . . . See chart
Nominal Impedance . . . . . 50 ohm
Air Line Accuracy . . . . . See chart
Travel . . . . . >1/2 wavelength at lowest rated frequency
Connectors . . . . . See chart
Center Conductor . . . . . Silver plated stainless steel
Accessories (provided) . . . . . Wood Instrument case and operating instructions

### *Available Models*

| MODEL | CONNECTOR TYPE(S) | FREQUENCY RANGE & MAXIMUM VSWR [1] | AIR LINE ACCURACY [2] | POWER HANDLING |
|---|---|---|---|---|
| 8035A | 3.5mm [3] | 2.0 GHz — 4.0 GHz, 1.09 (<1.06 typ)<br>4.0 GHz — 34.0 GHz, 1.05 (<1.03 typ) | 44 dB | 1.0 watt CW, 1.0 kW peak |
| 8784E | LCP/OSP [4] | 2.0 GHz — 4.0 GHz, 1.09 (<1.06 typ)<br>4.0 GHz — 18.0 GHz, 1.05 (<1.03 typ) | 44 dB | 1.0 watt CW, 1.0 kW peak |
| 2507 | Beadless LPC7 [5]<br>Type N female [6]<br>Type N male [6] | 0.9 GHz — 1.5 GHz, 1.08<br>1.5 GHz — 2.0 GHz, 1.05<br>2.0 GHz — 18.0 GHz, 1.03 | 56 dB | 1.0 watt CW, 5.0 kW peak |
| 2517A | Beadless LPC7 [5]<br>Type N female [6]<br>Type N male [6] | 1.8 GHz — 18.0 GHz, 1.05 | 54 dB | 1.0 watt CW, 1.0 kW peak |

[1] Maximum VSWR (50 ohm reference) of the terminating element alone.

[2] Equivalent return loss of the air line impedance (50 ohm reference).

[3] See Maury data sheet 5E-062 for interface specifications.

[4] Precision LCP/OPS™ per Maury data sheet 5E-065.

[5] Air interface connector per Maury data sheet 5E-061 with a spring-loaded, self-centering, center pin that mates with standard 7mm connectors.

[6] Precision stainless steel type N per Maury data sheet 5E-049.



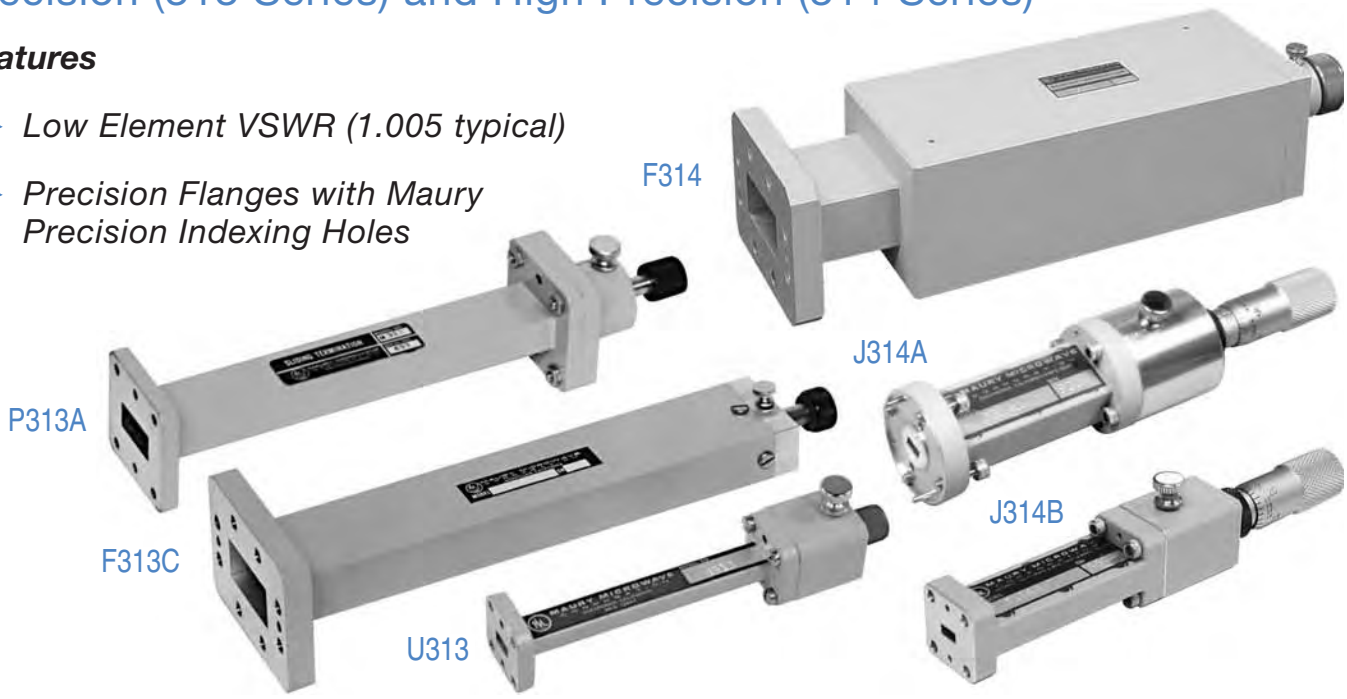
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# Sliding Terminations — Waveguide

## Precision (313 Series) and High Precision (314 Series)

### *Features*

- *Low Element VSWR (1.005 typical)*
- *Precision Flanges with Maury Precision Indexing Holes*




### *Description*

These precision sliding terminations are ideal for use as impedance standards for VNA calibration, and are included in many of the VNA calibration kits offered by Maury. They feature a typical effective return loss greater than 45 dB (313 series) or greater than 50 dB (314 series). Element travel in both series is greater than 1/2 waveguide wavelength (at the lowest rated frequency) so that effective frequencies within the rated phase range of the load reflection can be reversed and separated from other in-system reflections.

### *Available Models*

| FREQUENCY RANGE (GHz) | EIA WR NUMBER | EQUIVALENT FLANGE | MAXIMUM ELEMENT VSWR | POWER HANDLING WATTS (w) | PRECISION MODEL & MAX. HOUSING VSWR | | HIGH PRECISION MODEL & MAX. HOUSING VSWR [1] | |
|---|---|---|---|---|---|---|---|---|
| 1.7 — 2.6 | 430 | UG435/U | 1.01 [2] | 8.0 | R313A | 1.01 | R314 | 1.005 |
| 2.2 — 3.3 | 340 | CPR340F | 1.01 | 7.0 | D313A | 1.01 | — | — |
| 2.6 — 3.95 | 284 | UG584/U | 1.01 | 6.0 | S313A | 1.01 | S314 | 1.005 |
| 3.3 — 4.9 | 229 | CPR229F | 1.01 | 5.0 | E313F | 1.01 | E314 | 1.005 |
| 3.95 — 5.85 | 187 | UG149A/U | 1.01 | 5.0 | G313 | 1.01 | G314 | 1.005 |
| 4.90 — 7.05 | 159 | CPR159F | 1.01 | 4.0 | F313C | 1.01 | F314 | 1.005 |
| 5.85 — 8.2 | 137 | UG344/U | 1.01 | 3.0 | C313 | 1.01 | C314 | 1.005 |
| 7.05 — 10.0 | 112 | UG51/U | 1.01 | 2.0 | H313 | 1.01 | H314 | 1.005 |
| 8.2 — 12.4 | 90 | UG39/U | 1.01 | 2.0 | X313 | 1.012 | X314 | 1.005 |
| 10.0 — 15.0 | 75 | MPF75 | 1.01 | 1.5 | M313 | 1.013 | M314 | 1.006 |
| 12.4 — 18.0 | 62 | UG419/U | 1.01 | 1.0 | P313A | 1.015 | P314 | 1.006 |
| 15.0 — 22.0 | 51 | MPF51 | 1.01 | 0.5 | N313 | 1.025 | N314 | 1.008 |
| 18.0 — 26.5 | 42 | UG595/U | 1.01 | 0.5 | K313 | 1.02 | K314 | 1.01 |
| 22.0 — 33.0 | 34 | UG1530/U [3] | 1.015 | 0.5 | — | — | Q314A | 1.01 |
| 26.5 — 40.0 | 28 | UG599/U | 1.015 | 0.5 | U313 | 1.025 | U314 | 1.015 |
| 33.0 — 50.0 | 22 | UG383 [3] | 1.02 | 0.5 | — | — | J314A | 1.015 |
| 50.0 — 75.0 | 15 | UG385/U [3] | 1.02 | 0.5 | — | — | V314B | 1.015 |
| 60.0 — 90.0 | 12 | UG387/U [3] | 1.025 | 0.5 | — | — | Y314B | 1.015 |
| 75.0 — 110.0 | 10 | UG387/U [3] | 1.025 | 0.5 | — | — | Z314B | 1.015 |

[1] Housings are machined.

[2] 1.02 maximum at 1.7 to 2.1 GHz.

[3] Units are provided with Maury MPF series flanges with index holes which mate with the UG flanges shown.



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# Fixed Flush and Fixed Offset Shorts

## General Information

Fixed flush and fixed offset short circuit terminations (shorts) are used to establish reference planes in transmission systems and as key elements in the calibration of vector network analyzers (VNA) and scalar network analyzers (SNA). Offset shorts can be used for banded calibrations of VNA. Those with the longest offset are often used to evaluate the calibration effectiveness of a VNA by measuring the effective source match after calibration.

In general, the shorting plane of fixed flush shorts is at the connector reference plane, and at some predetermined offset in offset shorts. The shorting plane of some fixed offset shorts can also be relative to a reference offset established by another short. (e.g.: the 8046 and 8047 series shown on page 68).

Many of the shorts listed in this section are components of the Maury VNA calibration kits described on pages 1 through 48 of this catalog. Others are available as supplements to the components in these kits. In all cases, the specification "Phase Accuracy" is defined in this section as phase deviation from a nominal unit.



# 1.85mm Precision Fixed Offset Shorts

## Model Series 7846 (female) and 7847 (male)

### *Description*

These fixed offset shorts are designed to perform short, short, short (SSS) calibrations on VNAs equipped with 1.85mm test port connectors, including the Agilent PNA series. The 7846A and 7647A are sold as primary components of Maury's 7850 and 7860 series VNA calibration kits; the other models are also included in the 7850A calibration kits as offset shorts which are offset relative to the 7846A and 7847A. All series 7846 and 7847 models may also be purchased separately as replacement parts or spares.

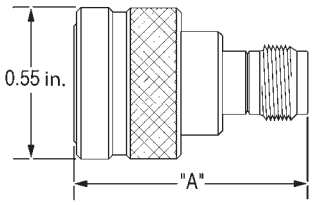


7846A 7847A

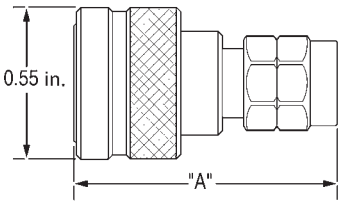
### *Specifications*

Frequency Range . . . . . DC to 67.0 GHz [1]
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy [2] . . . . . ± 4.0°

### *Reference Dimensions*




7846A/B/C/D




7847A/B/C/D

[1] Operates to 70 GHz.

[2] Phase accuracy is phase deviation from a nominal unit.

### *Available Models*

| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) |
| 7846A [3] | female | 0.980 | (2.4384) | 0.1968 [3] | (0.4999) |
| 7846B | female | 1.022 | (2.5451) | 0.2386 | (0.6060) |
| 7846C | female | 1.052 | (2.6213) | 0.2690 | (0.6833) |
| 7846D | female | 1.096 | (2.7330) | 0.3125 | (0.7938) |
| 7847A [3] | male | 0.945 | (2.4003) | 0.1968 [3] | (0.4999) |
| 7847B | male | 0.987 | (2.5070) | 0.2386 | (0.6060) |
| 7847C | male | 1.017 | (2.5832) | 0.2690 | (0.6833) |
| 7847D | male | 1.061 | (2.6949) | 0.3125 | (0.7938) |

[3] Reference shorts and reference offset lengths for these two model series. The relative offset length of other models in each series is derived by subtracting their offset lengths (shown in this table) from the offset length of their appropriate reference short (i.e., 7846A or 7846B).



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# 2.4mm Precision Fixed Offset Shorts

## Models 7946A (female) and 7946B (male)

### *Description*

These fixed offset shorts are used to establish the reference plane of calibration for vector network analyzers with 2.4mm test port connectors, including the Agilent PNA series. They are sold as part of Maury's 7950 and 7960 series VNA calibration kits, or may be purchased separately as replacement parts or spares.



7946A



7946B

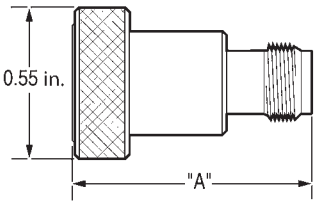
### *Specifications*

Frequency Range . . . . . DC to 50.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

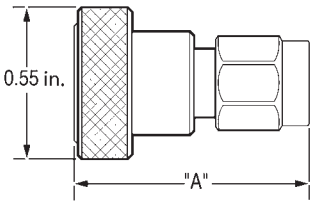
### *Available Models*

| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) |
| 7946A | female | 0.830 | (2.1082) | 0.2 | (0.508) |
| 7946B | male | 0.797 | (2.0244) | 0.2 | (0.508) |

### *Reference Dimensions*




7946A




7946B

# 2.92mm Precision Fixed Shorts

## Model Series 8771 (female) and 8772 (male)

### *Description*

These fixed offset shorts mate with the 2.92mm (K) test port connectors on various vector network analyzers, including the Agilent PNA series. The 8771F1 and 8772F1are reference shorts which are sold as part of Maury's 8770 and 8760 series VNA calibration kits, but may also be purchased separately as replacement parts or spares. The other models in these series are also sold separately as calibration kit accessories.



8771F1

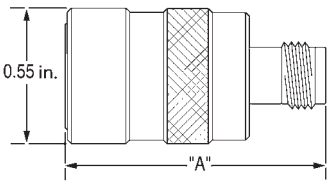


8772F1

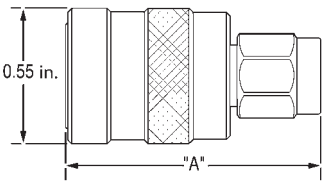
### *Specifications*

Frequency Range . . . . . DC to 40.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### *Reference Dimensions*




8771F1




8772F1

### *Available Models*

| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | | 1/4- λ FREQ (GHz) |
|---|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) | |
| 8771A1 | female | 1.856 | (4.7142) | 1.1803 | (2.9980) | 3.0 |
| 8771B1 | female | 1.364 | (3.4646) | 0.6885 | (1.7488) | 6.0 |
| 8771C1 | female | 1.162 | (2.9515) | 0.4862 | (1.2349) | 10.2 |
| 8771D1 | female | 1.080 | (2.7432) | 0.4040 | (1.0262) | 14.24 |
| 8771E1 | female | 1.005 | (2.5527) | 0.3295 | (0.8369) | 22.24 |
| 8771F1[1] | female | 0.873 | (2.2174) | 0.1970 [1] | (0.5004) | REF |
| 8772A1 | male | 1.897 | (4.8184) | 1.1803 | (2.9980) | 3.0 |
| 8772B1 | male | 1.405 | (3.5687) | 0.6885 | (1.7488) | 6.0 |
| 8772C1 | male | 1.203 | (3.0556) | 0.4862 | (1.2349) | 10.2 |
| 8772D1 | male | 1.121 | (2.8473) | 0.4040 | (1.0262) | 14.24 |
| 8772E1 | male | 1.046 | (2.6568) | 0.3295 | (0.8369) | 22.24 |
| 8772F1[1] | male | 0.914 | (2.3216) | 0.1970 [1] | (0.5004) | REF |

[1] Reference shorts and reference offset lengths for these two model series. The relative offset length of other models in each series is derived by subtracting their offset lengths (show in this table) from the offset length of their appropriate reference short (i.e., 8771F1 or8772F1).



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# 3.5mm Precision Fixed Offset Shorts

## Model Series 8046 (female) and 8047 (male)



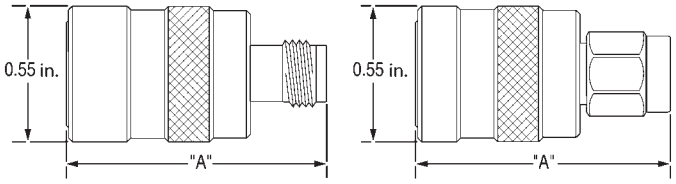

### *Description*

These shorts mate with the 3.5mm test port connectors on various VNAs, including the Agilent PNA series. The "F" models are reference shorts and are sold as part of Maury's 8050 and 8060 series VNA calibration kits; the other models are offset relative to the 8046F and 8047F, and are sold separately as suplemental parts for those VNA calibration kits.

### *Specifications*

Frequency Range . . . . . DC to 34.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### *Reference Dimensions*




8046 8047

### *Available Models*

| MODEL | SEX | "A" DIMENSION INCHES | "A" DIMENSION (CM) | OFFSET LENGTH INCHES | OFFSET LENGTH (CM) | 1/4- λ FREQ (GHz) |
|---|---|---|---|---|---|---|
| 8046A | female | 1.856 | (4.7142) | 1.1803 | (2.9980) | 3.0 |
| 8046B | female | 1.364 | (3.4646) | 0.6885 | (1.7488) | 6.0 |
| 8046C | female | 1.162 | (2.9515) | 0.4862 | (1.2349) | 10.2 |
| 8046D | female | 1.080 | (2.7432) | 0.4040 | (1.0262) | 14.24 |
| 8046E | female | 1.005 | (2.5527) | 0.3295 | (0.8369) | 22.24 |
| 8046F [1] | female | 0.873 | (2.2174) | 0.1970 [1] | (0.5004) | REF |
| 8047A | male | 1.897 | (4.8184) | 1.1803 | (2.9980) | 3.0 |
| 8047B | male | 1.405 | (3.5687) | 0.6885 | (1.7488) | 6.0 |
| 8047C | male | 1.203 | (3.0556) | 0.4862 | (1.2349) | 10.2 |
| 8047D | male | 1.121 | (2.8473) | 0.4040 | (1.0262) | 14.24 |
| 8047E | male | 1.046 | (2.6568) | 0.3295 | (0.8369) | 22.24 |
| 8047F [1] | male | 0.914 | (2.3216) | 0.1970 [1] | (0.5004) | REF |

[1] Reference shorts and reference offset lengths for these two model series. The relative offset length of other models in each series is derived by subtracting their offset lengths (shown in this table) from the offset length of their appropriate reference short (i.e., 8046F or 8047F).

# 3.5mm/SMA Reference Fixed Flush Shorts

## Models 360D (female) and 360B (male)




### *Description*

These true coplanar, reference plane shorts mate with the 3.5mm, SMA and 2.92mm (K) test port connectors on various VNAs, including the Agilent PNA series. The 360D has a return loss of less than 0.2 dB with a phase offset of less than 2 degrees. The 360D and 360B are sold as suplemental parts for use with Maury's 8050 and 8060 series VNA calibration kits.

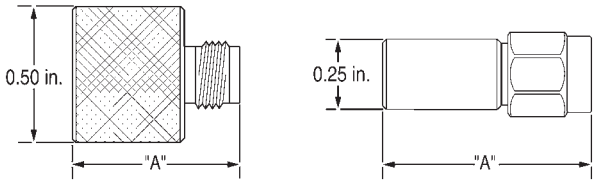
### *Specifications*

Frequency Range . . . . . DC to 26.5 GHz (useable to 40 GHz)
Minimum Reflection Coefficient . . . . . 0.99
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### *Available Models*

| MODEL | SEX | "A" DIMENSION INCHES | "A" DIMENSION (CM) |
|---|---|---|---|
| 360D | female | 0 | (0) |
| 360B | male | 0 | (0) |

### *Reference Dimensions*




360D 360B



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# 7mm Precision Reference Fixed Flush Shorts

## Model Series 2615

### Description

These true coplannar, reference fixed shorts are designed to terminate an APC7 connector at its mating plane, and are used to establish a reference plane in systems as well as in loss measurments. 2615A3 is a flat face/flat plane short, 2615B3 includes a collet contact to support the inner conductor of series 2653 reference air lines, and 2615D3 has a precision hole (for the same purpose) in place of the collet contact. Two of these shorts are included in Maury 7mm VNA calibration kits; 2615D3 is a component of 2650 series kits , and 2515B3 is a component of 2660 series kits. All of the models shown here are also sold separately as replacement parts or spares.

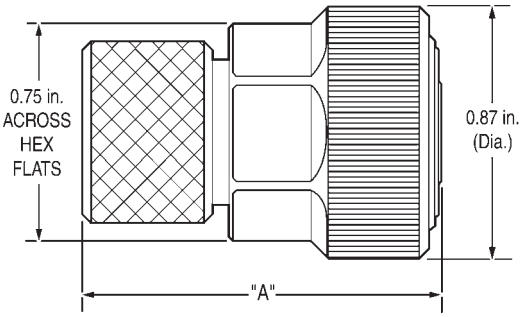


2615A3 2615B3 2615D3

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
Minimum Reflection Coefficient . . . . . 0.995
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 0.3°

### Reference Dimensions




2615A3

### Available Models

| MODEL | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|
| | INCHES | (CM) | INCHES | (CM) |
| 2615A3 | 1.250 | (3.1750) | 0 | (0) |
| 2615B3 | 1.250 | (3.1750) | 0 | (0) |
| 2615D3 | 1.250 | (3.1750) | 0 | (0) |

# 7mm Precision Fixed Offset Shorts

## Model Series 2649

### Description

These very low loss fixed offset shorts are offset electically from the reference plane of the APC7 connector established by 2615 series flush shorts. The offset length is held to ±0.0025cm. A set of four (2649A/B/C/D) in a foam-lined wood instrument case can be ordered as model 2649R.

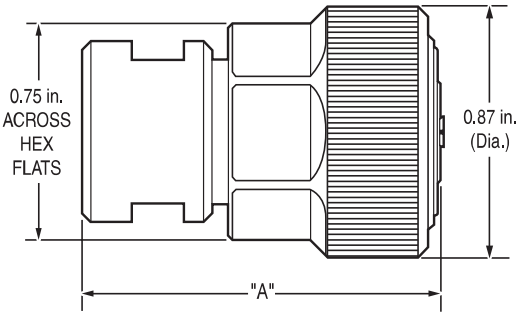


2649C

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### Reference Dimensions




2649C

### Available Models

| MODEL FREQ | "A" DIMENSION | | RELATIVE OFFSET LENGTH [1] | | 1/4- λ |
|---|---|---|---|---|---|
| | INCHES | (CM) | INCHES | (CM) | (GHz) |
| 2649A | 1.583 | (4.0208) | 0.9833 | (2.4976) | 3.00 |
| 2649B | 1.091 | (2.7711) | 0.4915 | (1.2484) | 6.00 |
| 2649C | 1.250 | (3.1750) | 0.2892 | (0.7346) | 10.20 |
| 2649D | 1.250 | (3.1750) | 0.2070 | (0.5258) | 14.24 |

[1] Relative to the 0 (zero) offset of the 2615 series.



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# Type N Precision Fixed Offset Shorts

## Model Series 8806 (female) and 8807 (male)

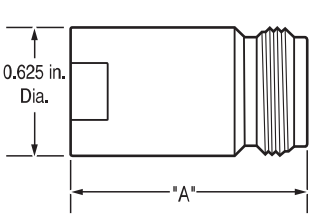
### *Description*

These very low loss fixed offset shorts are offset electically from the reference plane of the type N connector. The 8806C and 8807C are included as components of Maury's 8850 and 8860 VNA calibration kits. The 8806G is also included in the 8860 kit for use in TRL calibrations. The other models in these series may be purchased separately to complement those included in the kits.

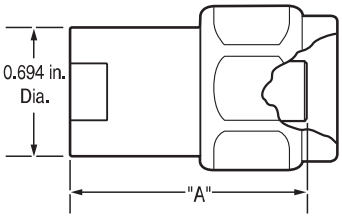
### *Specifications*

Frequency Range . . . . . DC to 18.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### *Reference Dimensions*




8806C




8807C



8806C



8807C

### *Available Models*

| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) |
| 8806A | female | 1.942 | (4.9327) | 0.9833 | (2.498) |
| 8806B | female | 1.451 | (3.6855) | 0.4915 | (1.248) |
| 8806C | female | 1.248 | (3.1699) | 0.2892 | (0.735) |
| 8806D | female | 1.166 | (2.9616) | 0.2070 | (0.526) |
| 8806G [1] | female | 1.456 | (3.6982) | 0.4972 | (1.263) |
| 8807A | male | 1.791 | (4.5491) | 1.1913 | (3.026) |
| 8807B | male | 1.300 | (3.3020) | 0.6995 | (1.777) |
| 8807C [1] | male | 1.097 | (2.7864) | 0.4972 | (1.263) |
| 8807D | male | 1.015 | (2.5781) | 0.4150 | (1.054) |

[1] 8806G and 8807C are matched (have the same electrical length) for use in TRL calibrations.

# TNC [1] Precision Fixed Offset Shorts

## 8606, 8607, and 8615 Series

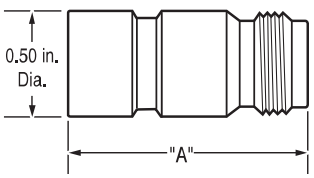
### *Description*

These very low loss fixed offset shorts are offset electrically from the reference plane of the TNC connector. The offset length is held to ±0.005cm.

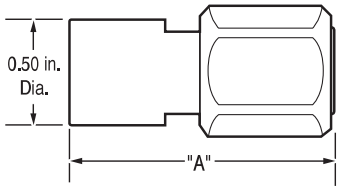
### *Specifications*

Frequency Range . . . . . DC to 18.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 5.0°

### *Reference Dimensions*




8606A




8607A

[1] Precision TNC per Maury Data Sheet 5E-053.

8615A





8615B

### *Available Models*

| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | | 1/4- λ FREQ (GHz) |
|---|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) | |
| 8615A [2] | female | 1.431 | (3.6347) | 0.5000 [2] | (1.2700) | REF |
| 8606A | female | 2.123 | (5.3824) | 1.1920 | (3.0277) | 3.00 |
| 8606B | female | 1.777 | (4.5136) | 0.8460 | (2.1488) | 6.00 |
| 8606C | female | 1.635 | (4.1529) | 0.7035 | (1.7869) | 10.20 |
| 8606D | female | 1.577 | (4.0056) | 0.6455 | (1.6396) | 14.25 |
| 8615B [2] | male | 1.300 | (3.3020) | 0.7000 [2] | (1.7780) | REF |
| 8607A | male | 1.992 | (5.0597) | 1.1820 | (3.0023) | 3.00 |
| 8607B | male | 1.646 | (4.1808) | 0.8360 | (2.1234) | 6.00 |
| 8607C | male | 1.504 | (3.8202) | 0.6935 | (1.7615) | 10.20 |
| 8607D | male | 1.446 | (3.6728) | 0.6355 | (1.6142) | 14.25 |

[2] Reference shorts and reference offset lengths for these two model series. The relative offset length of other models in each series is derived by subtracting their offset lengths (show in this table) from the offset length of their appropriate reference short (i.e., 8615A or 8615B).



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# AFTNC[1] Precision Fixed Offset Shorts

## Models 8686A (female) and 8687A (male)

### Description

These fixed offset shorts are reference plane shorts that are used to establish reference planes in transmission systems and as key elements in the calibration of vector network analyzers (VNA), including the Agilent PNA series. They are sold as part of Maury's 8680A and 8680B series VNA calibration kits, or may be purchased separately as replacement parts or spares.

### Specifications

Frequency Range . . . . . DC to 20.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### Available Models

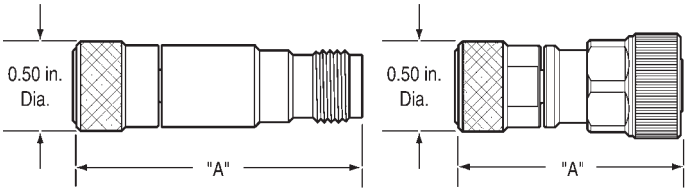
| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) |
| 8686A | female | 1.744 | (4.4298) | 0.9833 | (2.498) |
| 8687A | male | 1.366 | (3.4964) | 0.4915 | (1.248) |

[1] Precision AFTNC per MIL-C-87104/2 per Maury data sheet 5E-056.



8686A 8687A

### Reference Dimensions




8686A 8687A

# TNCA[2] Precision Fixed Offset Shorts

## Models 8676A (female) and 8677A (male)

### Description

These fixed offset shorts are reference plane shorts that are used to establish reference planes in transmission systems and as key elements in the calibration of vector network analyzers (VNA), including the Agilent PNA series. They are sold as part of Maury's 8670A and 8670B series VNA calibration kits, or may be purchased separately as replacement parts or spares.

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### Available Models

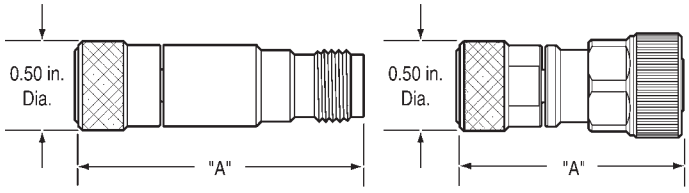
| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) |
| 8676A | female | 1.744 | (4.4298) | 0.9833 | (2.498) |
| 8677A | male | 1.366 | (3.4964) | 0.4915 | (1.248) |

[2] Precision TNCA per MIL-STD 328A per Maury data sheet 5E-058.



8676A 8677A

### Reference Dimensions




8676A 8677A



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# 14mm Precision Reference Fixed Flush Shorts

## Model Series 2415

### *Description*

These true coplanar, reference fixed flush shorts are designed to terminate an 14mm connector at its mating plane, and are used to establish a reference plane in systems as well as in loss measurments. 2415A1 is a flat face/flat plane short, 2415B1 includes a collet contact to support the inner conductor of series 2453 reference air lines, and 2415D1 has a precision hole (for the same purpose) in place of the collet contact. The 2415D1 is included as a component of Maury's 2450 VNA calibration kits. The other models in these series may be purchased separately to complement those included in the kits.



2415A1 2415B1 2415D1

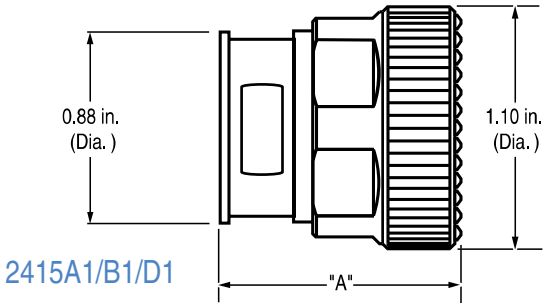
### *Specifications*

Frequency Range . . . . . DC to 8.5 GHz
Minimum Reflection Coefficient . . . . . 0.995
Nominal Impedance . . . . . 50 ohm
Connector . . . . . 14mm (mating compatible with GR900)
Phase Accuracy . . . . . ± 0.2°

### *Available Models*

| MODEL | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|
| | INCHES | (CM) | INCHES | (CM) |
| 2415A1 | 1.00 | (2.45) | 0.00 | (0.00) |
| 2415B1 | 1.00 | (2.45) | 0.00 | (0.00) |
| 2415D1 | 1.00 | (2.45) | 0.00 | (0.00) |

### *Reference Dimensions*




2415A1/B1/D1

# LCP/OSP™ Fixed Offset Shorts

## Model Series 8781

### *Description*

These fixed offset shorts are used to establish reference planes in transmission systems and as key elements in the calibration of vector network analyzers (VNA), including the Agilent PNA series. They are sold as part of Maury's 8780 series VNA calibration kits, or may be purchased separately as replacement parts or spares.



8781A 8781B

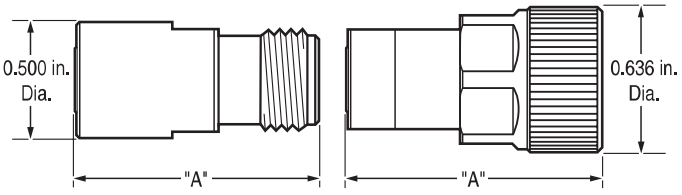
### *Specifications*

Frequency Range . . . . . DC to 18.0 GHz
Minimum Reflection Coefficient . . . . . 0.98
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . ± 2.0°

### *Available Models*

| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) |
| 8781A | female | 1.050 | (2.6670) | 0.3270 | (0.8306) |
| 8781B | male | 1.103 | (2.8016) | 0.3270 | (0.8306) |

### *Reference Dimensions*




8781A 8781B



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# 7-16 Precision Fixed Offset Shorts

## Model Series 2714

### Description

The 2714A and 2714B are precision 7-16 fixed offset shorts designed to operate from DC to 7.5 GHz. These shorts establish a measurement plane of 2.00cm offset from the connector reference plane for compatibility with the companion 2716 series open circuits. See page 79.

### Specifications

Frequency Range . . . . . DC to 7.5 GHz
Minimum Reflection Coefficient . . . . . 0.99
Nominal Impedance . . . . . 50 ohm
Phase Accuracy . . . . . DC to 4.0 GHz = ± 0.60°
4.0 to 7.5 GHz = ± 0.85°

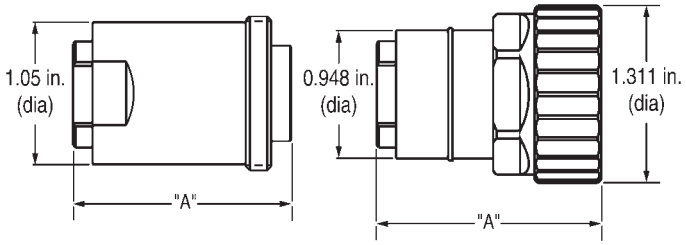
### Available Models

| MODEL | SEX | "A" DIMENSION | | OFFSET LENGTH | |
|---|---|---|---|---|---|
| | | INCHES | (CM) | INCHES | (CM) |
| 2714A | female | 1.707 | (4.3358) | 0.7897 | (2.006) |
| 2714B | male | 1.777 | (4.5136) | 0.7897 | (2.006) |
| 2714C | female | 2.886 | (7.3304) | 1.9680 | (4.999) |
| 2714D | male | 2.955 | (7.5057) | 1.9680 | (4.999) |



2714A 2714B

### Reference Dimensions




2714A 2714B

# General Purpose Fixed Offset Shorts

### Description

The defining characteristic of this class of fixed offset shorts is their suitability for general purpose vector network analyzer (VNA) calibration, where the reference plane (or an offset established by another component) has a wider range of tolerance than would be desireable for high precision, metrology grade calibrations.



361P2



364C

### Specifications

| MODEL | CONNECTOR TYPE | FREQUENCY RANGE (GHz) | | |
|---|---|---|---|---|
| 8884A | Type N 75 ohm female | DC | — | 2.0 |
| 8884B | Type N 75 ohm male | | | |
| 364C | C female | DC | — | 10.0 |
| 364D | C male | | | |
| 8445A | HN female | DC | — | 8.0 |
| 8445B1 | HN male | | | |
| 8455A | SC female | DC | — | 10.0 |
| 8455B1 | SC male | | | |
| 361N2 | BNC female | DC | — | 12.4 |
| 361P2 | BNC male | | | |
| 8584A | BNC 75 ohm female | DC | — | 2.0 |
| 8584B | BNC 75 ohm male | | | |



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# Waveguide Fixed Flush Shorts

## Model Series 344

### *Description*

These machined fixed shorts are designed to terminate round or rectangular waveguide connectors at the mating plane. They are used to establish a reference plane in systems and in making loss measurments. They are flat face/flat plane shorts that cover frequencies from 1.12 to 110.0 GHz. They may be ordered with user-specified flanges; with or without Maury precision indexing holes. These shorts are included as components of Maury's 7005/6/7 series VNA calibration kits as listed on pages 44–48. They may also be purchased separately as spare or replacement parts for these kits.

### *Available Models*

| MODEL | MATES WITH EQUIVALENT FLANGE | EIA WR NUMBER | FREQUENCY RANGE (GHz) |
|---|---|---|---|
| L344B | CPR650F | 650 | 1.12 — 1.7 |
| R344B | CPR430F / UG435A/U | 430 | 1.7 — 2.6 |
| D344B | CPR340F | 340 | 2.2 — 3.3 |
| S344A | UG53/U | 284 | 2.6 — 3.95 |
| S344B | CPR284F | | |
| S344C | CMR284 | | |
| E344B | CPR229F | 229 | 3.3 — 4.9 |
| E344C | CMR229 | | |
| G344A | UG149A/U | 187 | 3.95 — 5.85 |
| G344B | CPR187F | | |
| G344C | CMR187 | | |
| F344B | CPR159F | 159 | 4.9 — 7.05 |
| F344C | CMR159 | | |
| C344A | UG344/U | 137 | 5.85 — 8.2 |
| C344B | CPR137F | | |
| C344C | CMR137 | | |
| H344A | UG51/U | 112 | 7.05 — 10.0 |
| H344B | CPR112F | | |
| H344C | CMR112 | | |
| X344A | UG39/U | 90 | 8.2 — 12.4 |
| X344B | CPR90F | | |
| X344C | CMR90 | | |
| M344A | MPF75 | 75 | 10.0 — 15.0 |
| P344A | UG419U | 62 | 12.4 — 18.0 |
| N344A | MPF51 | 51 | 15.0 — 22.0 |
| K344A | UG595/U | 42 | 18.0 — 26.5 |
| K344D | UG425/U | | |
| K344E | UG595/U [1] | 42 | 18.0 — 26.5 |
| [3] | — | 34 | 22.0 — 33.0 |
| U344A | UG599/U | 28 | 26.5 — 40.0 |
| [3] | UG381/U | | |
| [3] | UG383/U | 22 | 33.0 — 50.0 |
| [3] | — | 19 | 40.0 — 60.0 |
| V344D | UG385/U | 15 | 50.0 — 75.0 |
| V344E | UG385/U [2] | 15 | 50.0 — 75.0 |
| [4] | UG387U | 12 | 60.0 — 90.0 |
| [4] | — | 10 | 75.0 — 110.0 |


F344B


C344A


X344A


P344A


U344A


V344D

[1] Same as K344D with index holes.
[2] Same as V344D with index holes.
[3] Use K344D.
[4] Use V344D.



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# Waveguide Fixed Offset Shorts

## Model Series 340



### *Description*

Offset shorts with 1/8 and 3/8 wavelength offsets are considered one of the more accurate means of obtaining a 180° phase difference in waveguide. Using these single-piece devices will reduce the number of flange interfaces during calibration. This helps to maintain an essentially constant magnitude of current flow across the calibration plane.
The chart below lists the offset shorts available from Maury. Those in rectangular guide are nominally 1/8 and 3/8 wavelength offset at a frequency near the waveguide band center. These will not be the exact band center as the frequency is chosen to equalize the phase differences at the band edges.

### *Available Models*

| BAND | EIA WR NUMBER | FREQUENCY RANGE (GHz) | MODEL | OFFSET (cm) | DELAY (ps) [1] |
|---|---|---|---|---|---|
| L | WR650 | 1.12 — 1.7 | L340A1 | 3.581 | 119.488 |
| | | | L340A3 | 10.744 | 358.497 |
| R | WR430 | 1.7 — 2.6 | R340F1 | 2.336 | 77.946 |
| | | | R340F3 | 7.010 | 233.904 |
| S | WR284 | 2.6 — 3.95 | S340B1 | 1.524 | 50.852 |
| | | | S340B2 | 4.572 | 152.555 |
| E | WR229 | 3.3 — 4.9 | E340B3 | 1.359 | 45.346 |
| | | | E340B4 | 4.077 | 136.038 |
| G | WR187 | 3.95 — 5.85 | G340B1 | 1.026 | 34.235 |
| | | | G340B3 | 3.078 | 102.704 |
| F | WR159 | 4.9 — 7.05 | F340C1 | 0.815 | 27.194 |
| | | | F340C3 | 2.446 | 81.616 |
| C | WR137 | 5.85 — 8.2 | C340F1 | 0.686 | 22.890 |
| | | | C340F3 | 2.058 | 68.670 |
| H | WR112 | 7.05 — 10.0 | H340B1 | 0.571 | 19.067 |
| | | | H340B3 | 1.714 | 57.191 |
| HS | WR102 | 7.0 — 11.0 | HS340A | 0.558 | 16.684 |
| | | | HS340B | 1.676 | 55.923 |
| X | WR90 | 8.2 — 12.4 | X340B1 | 0.483 | 16.116 |
| | | | X340B3 | 1.448 | 48.316 |
| M | WR75 | 10.0 — 15.0 | M340C1 | 0.396 | 13.213 |
| | | | M340C3 | 1.189 | 39.674 |
| P | WR62 | 12.4 — 18.0 | P340A1 | 0.352 | 11.745 |
| | | | P340A2 | 1.055 | 35.202 |
| N | WR51 | 15.0 — 22.0 | N340A | 0.267 | 8.909 |
| | | | N340B | 0.800 | 26.694 |
| K | WR42 | 18.0 — 26.5 | K340A1 | 0.251 | 8.365 |
| | | | K340A2 | 0.752 | 25.095 |
| U | WR28 | 26.5 — 40.0 | U340B | 0.150 | 5.005 |
| | | | U340C | 0.450 | 15.015 |
| J | WR22 | 33.0 — 50.0 | J340A1 | 0.120 | 4.007 |
| | | | J340B1 | 0.360 | 12.022 |
| V | WR15 | 50.0 — 75.0 | V340A1 | 0.080 | 2.669 |
| | | | V340A3 | 0.240 | 8.008 |
| Z | WR10 | 75.0 — 110.0 | Z340A1 | 0.054 | 1.802 |
| | | | Z340A3 | 0.162 | 5.405 |

[1] Offset delay is calculated without consideration for the dispersive effect of waveguide, that is, assuming the short is in air dielectric coaxial line. This conforms to the convention established for Agilent network analyzers. Anritsu analyzers use the actual mechanical offset in centimeters.



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# Sliding Shorts

## General Information

A sliding short is a movable short circuited termination in a precision air line which is used in a variety of laboratory measurement applications. These devices are used to establish a reference plane in a transmission system, as tuning elements in the development of microwave components (mixers, amplifiers, etc.), and tuning high precision CW reflectometer systems. An important application is the calibration of vector network analyzers (VNA). The use of a sliding short for such a calibration is particularly effective when the VNA is to be used for the measurement of highly reflective devices.

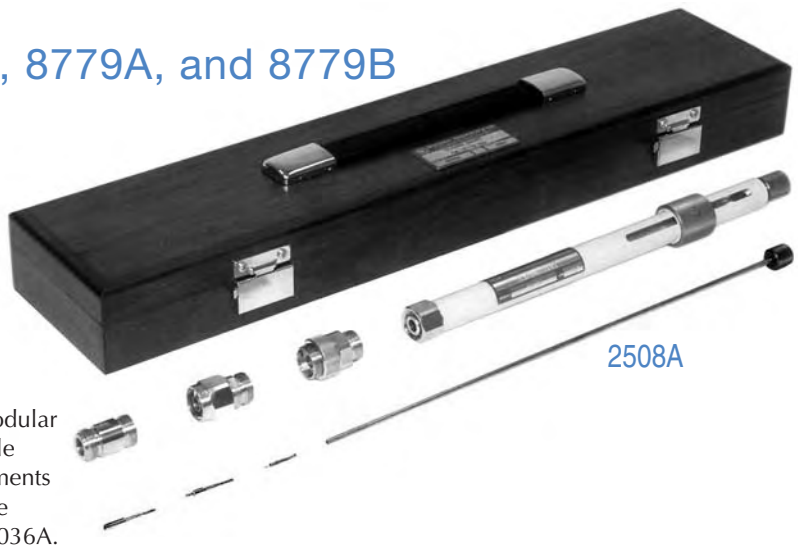
The primary criteria for a quality coaxial sliding short are a) a precision transmission structure (air line), b) consistent low noise contacts on the inner and outer conductors and c) a precision connector. Maury manufactures coaxial sliding shorts with a range of performance and operational convenience features. Among the classes available are modular units with interchangeable connectors, high precision devices with dedicated connectors, and rugged general purpose units.

# Modular Sliding Shorts

## Models 2508A, 2518A, 8036A, 8779A, and 8779B

### *Features*

- *Broad Frequency Range*
- *Precision Air Lines*
- *Interchangeable Connectors*




### *Description*

The 2508A, 2518A, and 8036A sliding shorts are true modular instruments. These units are provided with interchangeable connector bodies and center conductors so that measurements may be made in type N (female or male), or 7mm with the 2508A and 2518A, or 3.5mm (female or male) with the 8036A.

The connectors used on these units are air-dielectric (beadless) and the center conductor is movable; therefore, with the aid of an appropriate connector gage, the center pin of the connector can be set to the desired interface condition.

### *Specifications*

Frequency Range . . . . . See Available Models Chart

VSWR (excluding transmission line loss):

2.92mm . . . . . 4.0 to 18.0 GHz, 100:1
18 to 26.5 GHz, 75:1
26.5 to 40.0 GHz, 50:1

3.5mm . . . . . 2.0 to 18.0 GHz, 100:1
18 to 26.5 GHz, 75:1
26.5 to 34.0 GHz, 50:1

7mm . . . . . 2.0 to 18 GHz, 100:1

Type N . . . . . 2.0 to 18 GHz, 100:1

Impedance . . . . . 50 ohm ±0.3%

Travel . . . . . > 1/2-λ at the lowest rated frequency

### *Available Models*

| MODEL | FREQUENCY RANGE (GHz) | CONNECTOR | AIR LINE ACCURACY [1] |
|---|---|---|---|
| 2508A | 0.9 – 18.0 | LPC7 [2], Type N female and male | 56 dB |
| 2518A | 1.8 – 18.0 | | |
| 8036A | 2.0 – 34.0 | 3.5mm female and male | 44 dB |
| 8779A1 | 4.0 – 20.0 | 2.92mm female | 42 dB |
| | 20.0 – 40.0 | | 40 dB |
| 8779B1 | 4.0 – 20.0 | 2.92mm male | 42 dB |
| | 20.0 – 40.0 | | 40 dB |

[1] Equivalent return loss of the air line impedance (50 ohm ref.)

[2] Air interface connector with a spring loaded, self-centering center pin that mates with standard 7mm connectors.



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# Sliding Shorts

## High Precision



2604A

### *Features*

- *0.9 to 18.0 GHz*
- *Precision Air Lines*
- *Dedicated Connectors*

### *Description*

These models are movable shorts with dedicated connectors in precision air lines. The inherent low reflection and accurate transmission line of these instruments, coupled with efficient beryllium copper inner and outer conductor contacting fingers, provide an excellent short circuit. The travel of the shorting plane of these instruments is at least 1/2 wavelength at the lowest rated frequency to permit reversal of the reflection phase.

### *Specifications*

Frequency Range . . . . . See Available Models Chart
VSWR (excluding transmission line loss) . . . . . 100:1 minimum
Impedance . . . . . 50 ohm ±0.3%
Travel . . . . . > 1/2 wavelength at the lowest rated frequency

### *Available Models*

| MODEL | FREQUENCY RANGE (GHz) | CONNECTOR | AIR LINE ACCURACY [1] |
|---|---|---|---|
| 1959A | 1.8 – 18.0 | SMA female | 56 dB |
| 1959B | 1.8 – 18.0 | SMA male | |
| 2604A | 0.9 – 18.0 | 7mm | |

[1] Equivalent return loss of the air line impedance (50 ohm ref.)

# General Purpose Sliding Shorts

## Model Series 1909 and 1978

### *Specifications*

Frequency Range . . . . . See Available Models Chart
Impedance . . . . . 50 ohm
Travel . . . . . 1/2 wavelength at the lowest rated frequency
Connectors . . . . . See Available Models Chart



1978D1

### *Available Models*

| MODEL | FREQUENCY RANGE (GHz) | CONNECTOR | SHORT TRAVEL (in.) | LENGTH CLOSED (lin.) |
|---|---|---|---|---|
| 1909A1 | 0.2 – 0.5 | SMA female | 30.0 | 32.6 |
| 1909A2 | 0.2 – 0.5 | SMA male | 30.0 | 32.6 |
| 1909B1 | 0.4 – 1.0 | SMA female | 15.0 | 17.6 |
| 1909B2 | 0.4 – 1.0 | SMA male | 15.0 | 17.6 |
| 1909C1 | 0.8 – 4.0 | SMA female | 7.5 | 10.1 |
| 1909C2 | 0.8 – 4.0 | SMA male | 7.5 | 10.1 |
| 1909D1 | 2.0 – 12.0 | SMA female | 3.0 | 5.6 |
| 1909D2 | 2.0 – 12.0 | SMA male | 3.0 | 5.6 |
| 1978A1 | 0.2 – 0.5 | Precision N female | 30.0 | 32.6 |
| 1978A2 | 0.2 – 0.5 | Precision N male | 30.0 | 32.6 |
| 1978B1 | 0.4 – 1.0 | Precision N female | 15.0 | 17.6 |
| 1978B2 | 0.4 – 1.0 | Precision N male | 15.0 | 17.6 |
| 1978C1 | 0.8 – 4.0 | Precision N female | 7.5 | 10.1 |
| 1978C2 | 0.8 – 4.0 | Precision N male | 7.5 | 10.1 |
| 1978D1 | 2.0 – 12.0 | Precision N female | 3.0 | 5.6 |
| 1978D2 | 2.0 – 12.0 | Precision N male | 3.0 | 5.6 |

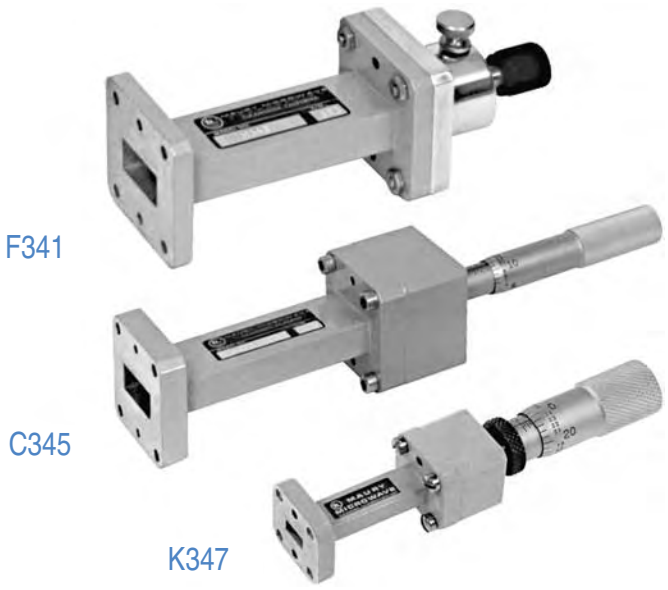

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# Waveguide Sliding Shorts

## Series 341, 345 and 347

### *Description*

Maury waveguide sliding shorts are convenient, low loss, movable shorts for use in a variety of microwave techniques. They can be used with waveguide tees as a variable shunt for tuning or impedance matching applications and they are a necessary device for tuning high performance tuned reflectometer systems. They are valuable for establishing a reference impedance for the calibration and error analysis of waveguide measurement systems. Maury offers three grades of waveguide sliding shorts; series 341, featuring an uncalibrated sliding shaft with a position lock (called an "uncalibrated drive"; series 345, featuring a 0.001-inch resolution micrometer drive (or "calibrated drive"); and series 347 high precision drive, featuring a sliding shaft with a position lock for rapid adjustment, plus a 0.001-inch resolution micrometer for fine adjustment.




### *Available Models*

| MODEL | DRIVE TYPE | EIA WR NUMBER | FREQUENCY RANGE (GHz) | | | EQUIVALENT FLANGE |
|---|---|---|---|---|---|---|
| R341B | Uncalibrated | 430 | 1.7 | — | 2.6 | CPR430F |
| S341 | Uncalibrated | 284 | 2.6 | — | 3.95 | UG53/U |
| E341B | Uncalibrated | 229 | 3.3 | — | 4.9 | CPR229F |
| G341 | Uncalibrated | 187 | 3.95 | — | 5.85 | UG149A/U |
| F341B | Uncalibrated | 159 | 4.90 | — | 7.05 | CPR159F |
| C345 | Calibrated | 137 | 5.85 | — | 8.2 | UG344/U |
| H345 | Calibrated | 112 | 7.05 | — | 10.0 | UG51/U |
| X345 | Calibrated | 90 | 8.2 | — | 12.4 | UG39/U |
| M345 | Calibrated | 75 | 10.0 | — | 15.0 | MPF75 |
| P345 | Calibrated | 62 | 12.4 | — | 18.0 | UG419/U |
| K345 | Calibrated | 42 | 18.0 | — | 26.5 | UG595/U |
| U345 | Calibrated | 28 | 26.5 | — | 40.0 | UG599/U |
| S347 | High Precision | 284 | 2.6 | — | 3.95 | UG53/U |
| C347 | High Precision | 137 | 5.85 | — | 8.2 | UG344/U |
| H345 | High Precision | 112 | 7.05 | — | 10.0 | UG51/U |
| X347A | High Precision | 90 | 8.2 | — | 12.4 | UG39/U |
| M347 | High Precision | 75 | 10.0 | — | 15.0 | MPF75 |
| P347 | High Precision | 62 | 12.4 | — | 18.0 | UG419/U |
| K347 | High Precision | 42 | 18.0 | — | 26.5 | UG595/U |
| U347 | High Precision | 28 | 26.5 | — | 40.0 | UG599/U |
| J347A | High Precision | 22 | 33.0 | — | 50.0 | UG383/U |



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# Opens

## General Information

Shielded, coaxial open circuit terminations (opens) are used in the calibration of vector network analyzers (VNAs) to provide a nominal 180 degree phase offset from a compatible reference short circuit over a broad range of microwave frequencies.

At these frequencies, open circuit terminations are inherently imperfect. Shielding the open essentially eliminates radiation loss, but creates a residual frequency-sensitive capacitance. An accurate knowledge of the open's effective capacitance is essential to an accurate calibration of the analyzer.

Maury opens are characterized for effective capacitance versus frequency by means of a fourth order polynomial curve fit, and the nominal capacitance coefficients are provided with each unit. We offer several innovative designs that improve the consistency and repeatability of the open's capacitance coefficients resulting in improved effective source match of the calibrated VNA [1].

One design (seen in the 14mm and 7mm models shown below) uses a beadless captivated dielectric rod in place of the center conductor contact. This rod depresses the spring-loaded contact of the test port connector so that it is flush with the outer conductor mating plane. This creates highly accurate, precisely repeatable open circuit conditions which improve the calibration effectiveness and measurement accuracy of the open.



Another design (seen in most of the sexed models listed below) uses a center contact that is captivated and set at the factory to be essentially flush with the outer conductor mating plane, thereby eliminating dependence on test port connector tolerances and adding a high degree of performance consistency to the open.

The 371N1/P1, 8585A/B, and 8885A/B models are designed for limited frequency ranges as determined by their connector types. Models 8885A and 8885B have shielded shells without center conductors or supporting dielectric rods.

In all cases, the specification "Phase Accuracy" is defined as phase deviation from a nominal unit.

### *Specifications and Available Models*

| MODEL | SEX | CONNECTOR TYPE | FREQUENCY RANGE (GHz) | NOMINAL IMPEDANCE | PHASE ACCURACY | MINIMUM REFLECTION COEFFICIENT |
|---|---|---|---|---|---|---|
| 7848A | female | 1.85mm | DC – 70.0 | 50 ohm | ± 5.0 degrees | 0.98 |
| 7848B | male | 1.85mm | DC – 70.0 | 50 ohm | ± 5.0 degrees | 0.98 |
| 7948A | female | 2.4mm | DC – 50.0 | 50 ohm | ± 2.0 degrees | 0.98 |
| 7948B | male | 2.4mm | DC – 50.0 | 50 ohm | ± 2.0 degrees | 0.98 |
| 8773A1 | female | 2.92mm (K) | DC – 40.0 | 50 ohm | ± 1.5 degrees | 0.98 |
| 8773B1 | male | 2.92mm (K) | DC – 40.0 | 50 ohm | ± 1.5 degrees | 0.98 |
| 8048A1 | female | 3.5mm | DC – 26.5 | 50 ohm | ± 1.4 degrees | 0.98 |
| 8048B1 | male | 3.5mm | DC – 26.5 | 50 ohm | ± 1.4 degrees | 0.98 |
| 2616D3 | — | 7mm | DC – 18.0 | 50 ohm | ± 0.3 degrees | 0.995 |
| 8809B1 | female | Type N | DC – 18.0 | 50 ohm | ± 2.0 degrees | 0.99 |
| 8810B1 | male | Type N | DC – 18.0 | 50 ohm | ± 2.0 degrees | 0.99 |
| 8609B | female | TNC | DC – 18.0 | 50 ohm | ± 5.0 degrees | 0.98 |
| 8610B | male | TNC | DC – 18.0 | 50 ohm | ± 5.0 degrees | 0.98 |
| 8685A | female | AFTNC | DC – 20.0 | 50 ohm | ± 2.0 degrees | 0.98 |
| 8685B | male | AFTNC | DC – 20.0 | 50 ohm | ± 2.0 degrees | 0.98 |
| 8675A | female | TNCA | DC – 20.0 | 50 ohm | ± 2.0 degrees | 0.98 |
| 8675B | male | TNCA | DC – 20.0 | 50 ohm | ± 2.0 degrees | 0.98 |
| 8782A | female | OSP™ | DC – 18.0 | 50 ohm | ± 2.0 degrees | 0.99 |
| 8782B | male | OSP™ | DC – 18.0 | 50 ohm | ± 2.0 degrees | 0.99 |
| 371N1 | female | BNC | DC – 12.4 | 50 ohm | ± 5.0 degrees | 0.98 |
| 371P1 | male | BNC | DC – 12.4 | 50 ohm | ± 5.0 degrees | 0.98 |
| 2416D1 | — | 14mm (GR900) | DC – 8.5 | 50 ohm | ± 0.2 degrees | 0.997 |
| 2716A | female | 7-16 | DC – 7.5 | 50 ohm | ± 1.00 degrees | 0.99 |
| 2716B | male | 7-16 | DC – 7.5 | 50 ohm | ± 1.25 degrees | 0.99 |
| 8585A | female | BNC | DC – 2.0 | 75 ohm [2] | ± 1.0 degrees | 0.98 |
| 8585B | male | BNC | DC – 2.0 | 75 ohm [2] | ± 1.0 degrees | 0.98 |
| 8885A | female | Type N | DC – 4.0 | 75 ohm [2] | ± 1.0 degrees | 0.98 |
| 8885B | male | Type N | DC – 4.0 | 75 ohm [2] | ± 1.0 degrees | 0.98 |

[1] See Maury data sheet 5C-027.

[2] The 8585 and 8885 series opens are for use in 75 ohm calibrations only. These units should never be mated to 50 ohm connectors, as this could result in damage to the 75 ohm female center conductor contact, and would produce an unreliable, unstable electrical connection.



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# Precision Air Lines

## General Information

Coaxial air lines are air-dielectric transmission lines with highly accurate dimensions that can be used as fundamental impedance standards in measurement and calibration applications, and may also be used to establish reference positions for measurements.

Maury offers air lines with bead supported and/or beadless connectors in a variety of popular types including, 1.85mm, 2.4mm, 2.92mm (K), 3.5mm, 7mm, type N, 14mm, and 7-16.

Bead supported air lines offer greater convenience and easier connections (the center conductor is automatically aligned by the dielectric bead for easy connection); beadless air lines offer better impedance and electrical length accuracies, as well as lower VSWR (the center conductor floats free in the air line body, and the male connector nut is retractable to facilitate insertion of the center conductor contact before the thread- on connection tightened.

The photos at the right (above) show end views of two type N air lines. On the left is a model 2503F (representing Maury's bead supported design) and on the right is a model 2553T5 (representing Maury's beadless design). The low-loss dielectric bead in the 2503F keeps the center conductor precisely centered in the body of the air line. The photo on the right shows how the unsupported center conductor of the 2553T5 has shifted to the left, and floats freely in the air line body until it is connected at both ends. The beadless design is a true "air" line in that it does not include any discontinuities coause by having the center conductor supported by dielectric beads.



2503F



2553T5

Beadless air lines are often used as "sample holders" where samples of various materials can be inserted in the air line and measured to determine the material's dielectric properties.

Specifications given for the air line models in this section include the odd 1/4-λ frequency rating. This rating indicates the frequencies at which the electrical length is an odd multiple of a 1/4 wavelength where n = zero or an integer.

# 1.85mm Beadless Air Lines

## Model Series 7843

### *Features*

- *DC to 67.0 GHz (Operates to 70.0 GHz)*
- *Virtually Reflectionless*
- *1.85mm Connectors*

### *Description*

These reference air lines are beadless 1.85mm coaxial transmission lines which are held to extremely tight tolerances to provide a highly accurate 50 ohm impedance standard. They are rated for a frequency range from DC to 67 GHz and are virtually reflectionless. Fabricated from beryllium copper, they are gold-plated to prevent tarnishing.

### *Specifications*

Frequency Range . . . . . DC to 67.0 GHz
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . 0.0025cm
Minimum Return Loss (excluding connector interface) . . . 48 dB
Nominal Impedance . . . . . 50 ohm



7843S3.00

7843S1.15

7843S0.96

### *Available Models*

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 7843S0.96 | 1.85mm female to male | 0.96 | (2n + 1) | 7.8 |
| 7843S1.15 | 1.85mm female to male | 1.15 | (2n + 1) | 6.5 |
| 7843S3.00 | 1.85mm female to male | 3.00 | (2n + 1) | 2.5 |



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# 2.4mm Beadless Air Lines

## Model Series 7943

### *Features*

- *DC to 50.0 GHz*
- *Virtually Reflectionless*
- *2.4mm Connectors*

### *Description*

The Maury 7943 series reference air lines are beadless 2.4mm coaxial transmission lines which are held to extremely tight tolerances to provide a highly accurate 50 ohm impedance standard utilizing precision 2.4mm connectors These air lines are fabricated from beryllium copper and are gold plated for low loss and to prevent tarnishing.

### *Specifications*

Frequency Range . . . . . DC to 50 GHz (usable to 54 GHz)
Minimum Return Loss (excluding connector interfaces) . . . 48 dB
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . .±0.0025cm
Nominal Impedance . . . . . 50 ohm



7943S6.25

7943S1.25

### *Available Models*

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 7943G | 2.4mm female to male | 4.997 | (2n + 1) | 1.5 |
| 7943H | 2.4mm female to male | 2.997 | (2n + 1) | 2.5 |
| 7943S1.25 | 2.4mm female to male | 1.25 | (2n + 1) | 6.0 |
| 7943S1.50 | 2.4mm female to male | 1.50 | (2n + 1) | 5.0 |
| 7943S6.25 | 2.4mm female to male | 6.25 | (2n + 1) | 1.2 |

# 2.92mm Beadless Air Lines

## Model Series 8774

### *Features*

- *DC to 40.0 GHz*
- *Virtually Reflectionless*
- *2.92mm Connectors*

### *Description*

The 8774C series female to male and 8774B series male to male reference air lines are beadless precision 2.92mm coaxial transmission lines which are held to extremely tight tolerances to provide a highly accurate 50 ohm impedance standard, utilizing precision 2.92mm connectors. Fabricated from beryllium copper, these air lines are gold plated for low loss and to prevent tarnishing.

### *Specifications*

Frequency Range . . . . . DC to 40 GHz
Minimum Return Loss (excluding connector interfaces) . . . 48 dB
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . .±0.0025cm
Nominal Impedance . . . . . 50 ohm




8774C3

### *Available Models*

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 8774C15 | 2.92mm female to male | 14.990 | (2n + 1) | 0.50 |
| 8774C7.5 | 2.92mm female to male | 7.495 | (2n + 1) | 1.00 |
| 8774C6 | 2.92mm female to male | 6.000 | (2n + 1) | 1.25 |
| 8774C5.25 | 2.92mm female to male | 5.250 | (2n + 1) | 1.43 |
| 8774C5 | 2.92mm female to male | 4.997 | (2n + 1) | 1.50 |
| 8774C3 | 2.92mm female to male | 2.998 | (2n + 1) | 2.50 |
| 8774B15 | 2.92mm male to male | 14.990 | (2n + 1) | 0.50 |
| 8774B7.5 | 2.92mm male to male | 7.495 | (2n + 1) | 1.00 |
| 8774B6.8 | 2.92mm male to male | 6.795 | (2n + 1) | 1.10 |


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# 3.5mm Beadless Air Lines

## Model Series 8043

### Features

- *DC to 26.5 GHz*
- *Virtually Reflectionless*
- *Precision 3.5mm Connectors*




8043S15

### Description

The 8043S series female to male and 8043M series male to male reference air lines are beadless, precision, coaxial 3.5mm transmission lines which are held to extremely tight tolerances to provide a highly accurate 50 ohm impedance standard. Fabricated from beryllium copper, they are gold-plated to prevent tarnishing, with a special stainless steel coupling nut on the male connectors that can be retracted for ease of assembly. All units are equipped with machined flats to permit the use of torque wrenches for proper mating.

### Specifications

Frequency Range . . . . . DC to 26.5 GHz
Minimum Return Loss (excluding connector interfaces) . . . 48 dB
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . .±0.0025cm
Nominal Impedance . . . . . 50 ohm

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) |
|---|---|---|---|
| 8043S15 | 3.5mm female to male | 14.990 | (2n+1) 0.50 |
| 8043S10 | 3.5mm female to male | 9.993 | (2n+1) 0.75 |
| 8043S7.5 | 3.5mm female to male | 7.495 | (2n+1) 1.00 |
| 8043S6 | 3.5mm female to male | 6.000 | (2n+1) 1.25 |
| 8043S5.3 | 3.5mm female to male | 5.298 | (2n+1) 1.41 |
| 8043S5 | 3.5mm female to male | 4.997 | (2n+1) 1.50 |
| 8043M10 | 3.5mm male to male | 9.993 | (2n+1) 0.75 |
| 8043M7.2 | 3.5mm male to male | 7.195 | (2n+1) 1.04 |
| 8043M6.8 | 3.5mm male to male | 6.795 | (2n+1) 1.10 |

# 3.5mm Bead Supported Air Lines

## Model Series 8042

### Features

- *DC to 18.0 GHz*
- *Virtually Reflectionless*
- *Precision 3.5mm Connectors*




8042E

### Description

The 8042 series precision air lines utilize 3.5mm connectors in which the center conductor is supported by a low-loss dielectric bead. The air lines are fabricated from gold-plated, copper alloys to prevent tarnishing.

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
VSWR (typical) . . . . . <1.004 + 0.0035$f$(GHz)
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . .±0.02cm
Nominal Impedance . . . . . 50 ohm

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) |
|---|---|---|---|
| 8042C | 3.5mm female to male | 14.990 | (2n+1) 0.50 |
| 8042D | 3.5mm female to male | 9.993 | (2n+1) 0.75 |
| 8042E | 3.5mm female to male | 7.495 | (2n+1) 1.00 |
| 8042G | 3.5mm female to male | 4.997 | (2n+1) 1.50 |



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# 7mm Beadless Air Lines

## Model Series 2653

### Features

- *DC to 18.0 GHz*
- *Virtually Reflectionless*
- *LPC7 Connectors*

### Description

The 2653 series reference air lines are beadless, virtually reflectionless, coaxial 7mm air lines. Spring-loaded tips on the ends of the center conductors mate with standard 7mm connectors.

### Specifications

Frequency Range . . . . . DC to 18.0 GHz

VSWR:

DC to 3.0 GHz . . . . . <1.002 + 0.001$f$ (GHz)

3.0 to 18.0 GHz . . . . . <1.005 maximum

Electrical Length . . . . . See Available Models Chart

Electrical Length Accuracy . . . . . .±0.005cm

Characteristic Impedance
(where skin depth is negligible) . . . . . 50 + 0.1 ohm [1]

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 2653S30 | 7mm (LPC7) [2] | 29.969 | (2n + 1) | 0.25 |
| 2653S20 | 7mm (LPC7) [2] | 19.980 | (2n + 1) | 0.375 |
| 2653S15 | 7mm (LPC7) [2] | 14.983 | (2n + 1) | 0.50 |
| 2653S10 | 7mm (LPC7) [2] | 9.988 | (2n + 1) | 0.75 |
| 2653S9.2 | 7mm (LPC7) [2] | 9.239 | (2n + 1) | 0.81 |
| 2653S7.5 | 7mm (LPC7) [2] | 7.493 | (2n + 1) | 1.00 |
| 2653S6 | 7mm (LPC7) [2] | 5.993 | (2n + 1) | 1.25 |
| 2653S5 | 7mm (LPC7) [2] | 4.994 | (2n + 1) | 1.50 |
| 2653S4 | 7mm (LPC7) [2] | 3.994 | (2n + 1) | 1.875 |
| 2653S3.12 | 7mm (LPC7) [2] | 3.121 | (2n + 1) | 2.40 |
| 2653S3 | 7mm (LPC7) [2] | 2.9969 | (2n + 1) | 2.50 |
| 2653L | 7mm (LPC7) [2] | 0.693 | (2n + 1) | 10.81 |

### 7mm Beadless Air Line Kits

The 2653K is a kit consisting of six reference air lines from the chart above supplied in an attractive foam-lined wood instrument case.

# 7mm Bead Supported Air Lines

## Model Series 2603

### Features

- *DC to 18.0 GHz*
- *Virtually Reflectionless*
- *Precision 7mm Connectors*

### Description

The 2603 precision air lines are 7mm coaxial line sections with 7mm connectors [3] in which the center conductor is supported by a low-loss dielectric bead. The air lines are held to extremely close tolerances to provide an accurate 50 ohm impedance standard, and are fabricated from copper alloys with a gold-flash protective coating (except those over 15cm which have a silver-layered stainless steel center conductor to eliminate sag).

### Specifications

Frequency Range . . . . . DC to 18.0 GHz

VSWR . . . . . <1.004 + 0.003$f$ (GHz)

Electrical Length . . . . . See Available Models Chart

Electrical Length Accuracy . . . . . .±0.015cm

Characteristic Impedance
(where skin depth is negligible) . . . . . 50 + 0.12 ohm

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 2603A | Precision 7mm [4] | 29.979 | (2n + 1) | 0.25 |
| 2603B | Precision 7mm [4] | 19.986 | (2n + 1) | 0.375 |
| 2603C | Precision 7mm [4] | 14.990 | (2n + 1) | 0.50 |
| 2603D | Precision 7mm [4] | 9.993 | (2n + 1) | 0.75 |
| 2603E | Precision 7mm [4] | 7.495 | (2n + 1) | 1.00 |
| 2603F | Precision 7mm [4] | 5.996 | (2n + 1) | 1.25 |
| 2603G | Precision 7mm [4] | 4.997 | (2n + 1) | 1.50 |

### 7mm Bead Supported Air Line Kits

Air lines kits, model 2603K (consisting of one each 2603A, C, D, E, G) and model 2603L (consisting of one each 2603A, B, C, D, E, F, G) are available and are supplied in an attractive foam-lined wood instrument case.

1 Impedance = 49.987 ohms based on nominal dimensions and tolerances of the conductors, and the equation: $Z = 59.939 \log_e D/d$, D = I.D. inner conductor, d = O.D. outer conductor.

2 Beadless 7mm connector that mates with standard precision 7mm.

3 Precision 7mm connector per Maury data sheet 5E-060.



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# Type N Beadless Air Lines

## Model Series 2553

### Features

- DC to 18.0 GHz
- Virtually Reflectionless
- Beadless Type N Connectors

### Description

The 2553T series reference air lines utilize beadless type N connectors which are integral to the air lines, thereby producing extremely low reflection transmission lines. The complete air lines (inner and outer conductor) are fabricated from gold-plated, low-loss copper alloys.

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
VSWR . . . . . $<1.02 + 0.002f$ (GHz)
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . ±0.01cm
Characteristic Impedance
(where skin depth is negligible) . . . . . 50 + 0.2 ohm [1]

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 2553T30 | Type N female to male [2] | 29.969 | (2n + 1) | 0.25 |
| 2553T15 | Type N female to male [2] | 14.983 | (2n + 1) | 0.50 |
| 2553T10 | Type N female to male [2] | 9.988 | (2n + 1) | 0.75 |
| 2553T7.5 | Type N female to male [2] | 7.493 | (2n + 1) | 1.00 |
| 2553T6 | Type N female to male [2] | 5.993 | (2n + 1) | 1.25 |
| 2553T5 | Type N female to male [2] | 4.994 | (2n + 1) | 1.50 |
| 2553T3.82 | Type N female to male [2] | 3.816 | (2n + 1) | 1.96 |
| 2353T3.12 | Type N female to male [2] | 3.123 | (2n + 1) | 2.40 |
| 2553T3 | Type N female to male [2] | 2.9969 | (2n + 1) | 2.50 |

### Type N Beadless Air Line Kits

The 2553K is a kit consisting of six reference air lines from the chart above supplied in an attractive foam-lined wood instrument case.

# Type N Bead Supported Air Lines

## Model Series 2503

### Features

- DC to 18.0 GHz
- Virtually Reflectionless
- Precision Type N Connectors

### Description

The 2503 series precision air lines utilize stainless steel type N connectors in which the center conductor is supported by a low-loss dielectric bead. The air lines (inner and outer conductor) are fabricated from gold-plated, low-loss copper alloys.

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
VSWR . . . . . $<1.03 + 0.003f$ (GHz)
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . ±0.02cm
Characteristic Impedance
(where skin depth is negligible) . . . . . 50 + 0.2 ohm

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 2503A | Type N female to male [3] | 29.979 | (2n + 1) | 0.25 |
| 2503B | Type N female to male [3] | 19.986 | (2n + 1) | 0.375 |
| 2503C | Type N female to male [3] | 14.990 | (2n + 1) | 0.50 |
| 2503D | Type N female to male [3] | 9.993 | (2n + 1) | 0.75 |
| 2503E | Type N female to male [3] | 7.495 | (2n + 1) | 1.00 |
| 2503F | Type N female to male [3] | 5.996 | (2n + 1) | 1.25 |
| 2503G | Type N female to male [3] | 4.997 | (2n + 1) | 1.50 |

### Type N Bead Supported Air Line Kits

Air lines kits, model 2503K (consisting of one each 2503A, C, D, E, G) and model 2503L (consisting of one each 2503A, B, C, D, E, F, G) are available and are supplied in an attractive foam-lined wood instrument case.

[1] Impedance = 49.987 ohms based on nominal dimensions and tolerances of the conductors, and the equation: $Z = 59.939 \log_e D/d$, D = I.D. inner conductor, d = O.D. outer conductor.

[2] Beadless precision type N connectors, one female and one male.

[3] Precision stainless steal type N per Maury data sheet 5E-049.



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# 14mm Beadless Air Lines

## Model Series 2453

### Features

- *DC to 8.5 GHz*
- *Virtually Reflectionless*
- *LPC14 Connectors* [1]

### Description

The 2453 series are beadless, virtually reflectionless, coaxial 14mm reference air lines with spring-loaded tips on the ends of the inner conductor to mate with 14mm connectors [2]. VSWR is <1.006 at 8.5 GHz. The lines are fabricated from beryllium copper and are gold-plated to prevent tarnishing.

### Specifications

Frequency Range . . . . . DC to 8.5 GHz
VSWR . . . . . <1.001 + 0.0005$f$ (GHz)
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . .±0.005cm
Characteristic Impedance
(where skin depth is negligible) . . . . . 50 + 0.05 ohm [2]

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 2453A | Precision 14mm [2] | 29.979 | (2n + 1) | 0.25 |
| 2453B | Precision 14mm [2] | 19.986 | (2n + 1) | 0.375 |
| 2453C | Precision 14mm [2] | 14.990 | (2n + 1) | 0.50 |
| 2453D | Precision 14mm [2] | 9.993 | (2n + 1) | 0.75 |
| 2453E | Precision 14mm [2] | 7.495 | (2n + 1) | 1.00 |
| 2453F | Precision 14mm [2] | 5.996 | (2n + 1) | 1.25 |
| 2453G | Precision 14mm [2] | 4.997 | (2n + 1) | 1.50 |
| 2453H | Precision 14mm [2] | 2.998 | (2n + 1) | 2.50 |

### 14mm Beadless Air Line Kits

The 2453K is a kit consisting of one (each) of 2453C, D, E, F, G and H, from the chart above, supplied in an attractive foam-lined wood instrument case.

# 7-16 Beadless Air Lines

## Model Series 2735A

### Features

- *DC to 7.5 GHz*
- *Virtually Reflectionless*
- *Precision 7-16 Connectors*

### Description

The 2735A series are beadless, virtually reflectionless, coaxial 7-16 reference air lines. The lines are fabricated from beryllium copper and are gold-plated to prevent tarnishing.

### Specifications

Frequency Range . . . . . DC to 7.5 GHz
VSWR . . . . . <1.004 + 0.0035$f$ (GHz)
Electrical Length . . . . . See Available Models Chart
Electrical Length Accuracy . . . . . .±0.005cm
Characteristic Impedance . . . . . 50 + 0.05 ohm

### Available Models

| MODEL | CONNECTORS | ELECTRICAL LENGTH (cm) | ODD 1/4-WAVELENGTH FREQUENCY (GHz) | |
|---|---|---|---|---|
| 2735A30 | 7-16 female to male | 29.979 | (2n + 1) | 0.25 |
| 2735A7.5 | 7-16 female to male | 7.495 | (2n + 1) | 1.00 |
| 2735A6.0 | 7-16 female to male | 3.996 | (2n + 1) | 1.25 |

### 7-16 Precision Air Line Kits

The 2735K kits consist of the reference air lines listed in the chart above provided in an attractive foam-lined wood instrument case. (See Maury data sheet 2Z-041A for test port adapter options.)



2735K

[1] A precision beadless 14mm connector that mates with GR900 connectors.

[2] Impedance = 49.987 ohms based on nominal dimensions and tolerances of the conductors, and the equation: $Z = 59.939 \log_e D/d$, D = I.D. inner conductor, d = O.D. outer conductor.



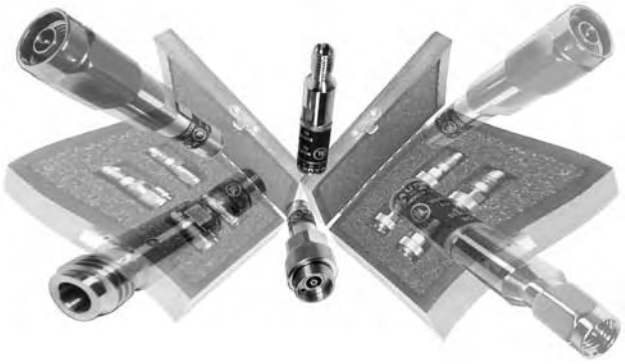
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# Precision Mismatches

## General Information

Precision standard mismatches are fixed coaxial terminations which are used to introduce a known VSWR into a 50 ohm transmission system. These mismatches are extremely useful in a wide variety of applications and are quick and easy to use. They can be used to calibrate swept reflectometers, verify network analyzer calibration, establish impedance references in TDR measurements, etc.

Maury standard mismatches are quality constructed using thin film resistors and a unique grounding method that ensures stable operation. For ease of identification, the VSWR value of the mismatch is engraved on the end cap. Calibration data is provided for all units.



The standard units shown in this section are fitted with 2.4mm, 2.92mm, 3.5mm, 7mm, type N, TNC, and 14mm connectors. Please consult with our sales staff for application assistance. The units are also available as sets or kits packaged in foam-lined wood instrument cases. (See page 88.)

# Precision Mismatches

## 2.4mm, 2.92mm & 3.5mm Connectors

### *2.4mm Standard Mismatches*

***Models 7933A1/A2 and 7933B1/B2***

### *Specifications*

Frequency Range . . . . . DC to 50.0 GHz
Nominal VSWR . . . . . See Available Models Chart
VSWR Accuracy . . . . . See Available Models Chart
Calibration Data Provided . . . . . VNA data 2.0 to 50.0 GHz
Nominal Calibration Impedance Reference . . . . . 50 ohm
Power Handling . . . . . 0.5 W average, 0.5 kW peak

### *2.92mm Standard Mismatches*

***Models 8778A1/A2 and 8778B1/B2***

### *Specifications*

Frequency Range . . . . . DC to 40.0 GHz
Nominal VSWR . . . . . See Available Models Chart
VSWR Accuracy . . . . . See Available Models Chart
Calibration Data Provided . . . . . VNA data 2.0 to 40.0 GHz
Nominal Calibration Impedance Reference . . . . . 50 ohm
Power Handling . . . . . 0.5 W average, 0.5 kW peak

### *3.5mm Standard Mismatches*

***Models 8033A1/A2/A3 and 8033B1/B2/B3***

### *Specifications*

Frequency Range . . . . . DC to 26.5 GHz
Nominal VSWR . . . . . See Available Models Chart
VSWR Accuracy . . . . . See Available Models Chart
Calibration Data Provided . . . . . VNA data 2.0 to 26.5 GHz
Nominal Calibration Impedance Reference . . . . . 50 ohm
Power Handling . . . . . 0.5 W average, 0.5 kW peak

### *2.4mm Available Models*

| MODEL | | NOMINAL VSWR | ACCURACY (GHz) | |
|---|---|---|---|---|
| FEMALE | MALE | | DC – 12.0 | 12.0 – 50.0 |
| 7933A1.10 | 7933B1.10 | 1.10 | ±0.08 | +0.13 –0.10 |
| 7933A1.20 | 7933B1.20 | 1.20 | ±0.09 | ±0.13 |
| 7933A1.30 | 7933B1.30 | 1.30 | ±0.09 | ±0.17 |
| 7933A1.50 | 7933B1.50 | 1.50 | ±0.10 | ±0.20 |
| 7933A1.75 | 7933B1.75 | 1.75 | ±0.12 | ±0.22 |
| 7933A2.00 | 7933B2.00 | 2.00 | ±0.14 | ±0.25 |

### *2.92mm Available Models*

| MODEL | | NOMINAL VSWR | ACCURACY (GHz) | |
|---|---|---|---|---|
| FEMALE | MALE | | DC – 12.0 | 12.0 – 40.0 |
| 8778A1.10 | 8778B1.10 | 1.10 | ±0.08 | +0.13 –0.10 |
| 8778A1.15 | 8778B1.15 | 1.15 | ±0.08 | ±0.13 |
| 8778A1.20 | 8778B1.20 | 1.20 | ±0.08 | ±0.13 |
| 8778A1.25 | 8778B1.25 | 1.25 | ±0.08 | ±0.13 |
| 8778A1.30 | 8778B1.30 | 1.30 | ±0.09 | ±0.17 |
| 8778A1.50 | 8778B1.50 | 1.50 | ±0.10 | ±0.20 |
| 8778A1.75 | 8778B1.75 | 1.75 | ±0.12 | ±0.22 |
| 8778A2.00 | 8778B2.00 | 2.00 | ±0.14 | ±0.25 |

### *3.5mm Available Models*

| MODEL | | NOMINAL VSWR | ACCURACY (GHz) | |
|---|---|---|---|---|
| FEMALE | MALE | | DC – 12.0 | 12.0 – 26.5 |
| 8033A1.10 | 8033B1.10 | 1.10 | ±0.06 | ±0.08 |
| 8033A1.20 | 8033B1.20 | 1.20 | ±0.07 | ±0.10 |
| 8033A1.30 | 8033B1.30 | 1.30 | ±0.08 | ±0.12 |
| 8033A1.50 | 8033B1.50 | 1.50 | ±0.09 | ±0.17 |
| 8033A1.75 | 8033B1.75 | 1.75 | ±0.11 | ±0.19 |
| 8033A2.00 | 8033B2.00 | 2.00 | ±0.12 | ±0.22 |
| 8033A2.50 | 8033B2.50 | 2.50 | ±0.13 | ±0.23 |
| 8033A3.00 | 8033B3.00 | 3.00 | ±0.15 | ±0.25 |



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# Precision Mismatches

## 7mm, Type N, TNC and 14mm Connectors




### 7mm Standard Mismatches

***Models 2611A/B/C/D/E/F/G***

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
Nominal VSWR . . . . . See Available Models Chart
VSWR Accuracy . . . . . See Available Models Chart
Calibration Data Provided . . . . . 2.0 to 18.0 GHz
Nominal Calibration Impedance Reference . . . . . 50 ohm
Power Handling . . . . . 1 W average, 1 kW peak

### 7mm Available Models

| MODEL | NOMINAL VSWR | ACCURACY (GHz) | | | RESISTANCE (OHMS) |
|---|---|---|---|---|---|
| | | DC – 8.0 | 8.0 – 12.4 | 12.4 – 18.0 | |
| 2611A | 1.05 | ±0.05 | ±0.05 | +0.07 –0.05 | 47.6 |
| 2611B | 1.10 | ±0.05 | ±0.05 | ±0.07 | 45.5 |
| 2611C | 1.20 | ±0.05 | ±0.06 | ±0.09 | 41.7 |
| 2611D | 1.30 | ±0.05 | ±0.07 | ±0.10 | 38.5 |
| 2611E | 1.50 | ±0.06 | ±0.08 | ±0.15 | 33.3 |
| 2611F | 1.75 | ±0.08 | ±0.10 | ±0.17 | 28.6 |
| 2611G | 2.00 | ±0.10 | ±0.12 | ±0.20 | 25.0 |

### Type N Standard Mismatches

***Models 2561A/B/C/D/E/F/G and 2562A/B/C/D/E/F***

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
Nominal VSWR . . . . . See Available Models Chart
VSWR Accuracy . . . . . See Available Models Chart
Calibration Data Provided . . . . . 2.0 to 18.0 GHz
Nominal Calibration Impedance Reference . . . . . 50 ohm
Power Handling . . . . . 1 W average, 1 kW peak

### Type N Available Models

| MODEL | | NOMINAL VSWR | ACCURACY (GHz) | | | RESISTANCE (OHMS) |
|---|---|---|---|---|---|---|
| FEMALE | MALE | | DC – 8.0 | 8.0 – 12.4 | 12.4 – 18.0 | |
| 2561A | 2562A | 1.05 | ±0.05 | ±0.05 | +0.08 –0.05 | 47.6 |
| 2561B | 2562B | 1.10 | ±0.06 | ±0.06 | ±0.08 | 45.5 |
| 2561C | 2562C | 1.20 | ±0.06 | ±0.07 | ±0.10 | 41.7 |
| 2561D | 2562D | 1.30 | ±0.06 | ±0.08 | ±0.12 | 38.5 |
| 2561E | 2562E | 1.50 | ±0.08 | ±0.09 | ±0.17 | 33.3 |
| 2561F | 2562F | 1.75 | ±0.10 | ±0.11 | ±0.19 | 28.6 |
| 2561G | 2562G | 2.00 | ±0.12 | ±0.12 | ±0.22 | 25.0 |

### TNC [1] Standard Mismatches

***Models 8611C/D/E/G and 8612G***

### Specifications

Frequency Range . . . . . DC to 18.0 GHz
Nominal VSWR . . . . . See Available Models Chart
VSWR Accuracy . . . . . See Available Models Chart
Calibration Data Provided . . . . . 2.0 to 18.0 GHz
Nominal Calibration Impedance Reference . . . . . 50 ohm
Power Handling . . . . . 1 W average, 1 kW peak

### TNC [1] Available Models

| MODEL | | NOMINAL VSWR | ACCURACY (GHz) | | RESISTANCE (OHMS) |
|---|---|---|---|---|---|
| FEMALE | MALE | | DC – 10.0 | 10.0 – 18.0 | |
| 8611C | 8612C | 1.20 | ±0.08 | ±0.15 | 41.7 |
| 8611D | 8612D | 1.30 | ±0.09 | ±0.15 | 38.5 |
| 8611E | 8612E | 1.50 | ±0.10 | ±0.18 | 33.3 |
| 8611F | 8612F | 1.75 | ±0.13 | ±0.20 | 28.6 |
| 8611G | 8612G | 2.00 | ±0.15 | ±0.25 | 25.0 |

### 14mm Standard Mismatches

***Model 2411E***

### Specifications

Frequency Range . . . . . DC to 8.5 GHz
Nominal VSWR . . . . . See Available Models Chart
VSWR Accuracy . . . . . See Available Models Chart
Calibration Data Provided . . . . . 2.0 to 8.5 GHz
Nominal Calibration Impedance Reference . . . . . 50 ohm
Power Handling . . . . . 1 W average, 1 kW peak

### 14mm Available Model

| MODEL | NOMINAL VSWR | ACCURACY (GHz) | | | RESISTANCE (OHMS) |
|---|---|---|---|---|---|
| | | DC – 1.0 | 1.0 – 4.0 | 4.0 – 8.5 | |
| 2411B | 1.10 | ±0.02 | ±0.03 | ±0.04 | 55 |
| 2411C | 1.20 | ±0.03 | ±0.04 | ±0.05 | 60 |
| 2411D | 1.30 | ±0.04 | ±0.05 | ±0.06 | 65 |
| 2411E | 1.50 | ±0.05 | ±0.06 | ±0.07 | 75 |

[1] Precision TNC per Maury Data Sheet 5E-053.



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# Precision Mismatches

## Mismatch Sets

Maury offers standard mismatches in sets containing a selection of mismatch values including the nominal matched load (typically, 1.05 VSWR). These sets, available with 7mm, type N female or male, 3.5mm, 2.92mm, 2.4mm, and TNC connectors, are packaged in foam-lined wooden instrument cases. Each mismatch is provided with an individual calibration report.



2611L

### *2.4mm, 2.92mm, and TNC Mismatch Sets*

Please consult our Sales Department for availability of mismatch sets with TNC, 2.92mm and 2.4mm connectors.

### *3.5mm Mismatch Sets*

The 8033K mismatch set is made up of all six each female and male of the 3.5mm mismatches from 1.10 through 2.00 VSWR shown on page 86. The set is packaged in a foam-lined wooden instrument case, and each mismatch value is provided with an individual calibration report.

### *7mm and Type N Mismatch Sets*

Two types of sets are offered in these connector styles: sets with model suffix "L" contain one each of four mismatch values – a nominally matched load, 1.20, 1.50 and 2.00 VSWR. Sets with the model suffix "M" contain one each of all mismatch values indicated on page 86. The basic model follows those noted on page 87, i.e.: 2611L/M, 7mm; 2561L/M, type N female; 2562L/M, type N male. For example: 2562L describes a mismatch set with type N male connectors containing the four mismatches noted above.



2562L

### *Special Kits*

Custom mismatch kits, combining different connector types and values, can be configured. Please consult our Sales Department and reference model 9476(x).

### *Instrument Cases*

Standard mismatches in the various connector styles and mismatch values are available as individual units. Should you wish to purchase individual units and configure a custom set, Maury can offer the following foam-lined wood instrument cases to provide suitable laboratory storage.

| | |
|---|---|
| 2611S1 | houses 4 units |
| 2611S2 | houses 8 units |
| 2611S3 | houses 12 units |
| 8650Z1 | houses 24 units |



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# Waveguide Two-Port Mismatch Standard Sets

## 322A Series

### Features

- *Two-Port Calculable Standards*
- *Reduced Height 1.00, 1.10, 1.25, 1.50, 2.00 VSWR Spacers*
- *1/4 λ at Midband*



J322A X322A

### Description

These 322 series models are two-port calculable waveguide standard sets. The sets consist of five reduced height spacers which provide an accurately known VSWR which is directly calculable from the mechanical dimensions. The spacers are fabricated from aluminum and are provided with precision indexing holes for excellent flange alignment. Indexing pins and mounting hardware are also provided. The sets are packaged in foam-lined wood instrument cases.

The standards in these sets are extremely stable and easy to use for a variety of calibration applications. Their simple geometry allows direct calculation of reflection, loss, transfer and group delay characteristics and makes them ideally suited for quickly checking the performance and accuracy of automated network analyzers.

To order the 1.00 VSWR shim by itself, please add "1.00" to the model number. (Example: X322A1.00)

### Available Models

| MODEL | FREQUENCY RANGE (GHz) | EIA WR NUMBER | EQUIVALENT FLANGE | 1/4-λ FREQUENCY (GHZ) | LENGTH INCHES | (CM) | WAVEGUIDE TOLERANCE | PS DELAY WITH AIR DIELECTRIC |
|---|---|---|---|---|---|---|---|---|
| R322A | 1.7 — 2.6 | 430 | CPR430F | 2.112 | 1.840 | (4.6736) | ±0.005 | 155.9444 |
| S322A | 2.6 — 3.95 | 284 | UG584/U | 3.221 | 1.198 | (3.0429) | ±0.004 | 101.5334 |
| E322A | 3.3 — 4.9 | 229 | CPR229F | 4.042 | 0.948 | (2.4079) | ±0.003 | 80.34527 |
| G322A | 3.95 — 5.85 | 187 | UG149A/U | 4.826 | 0.807 | (2.0498) | ±0.002 | 68.39518 |
| F322A | 4.90 — 7.05 | 159 | CPR159F | 5.906 | 0.642 | (1.6307) | ±0.002 | 54.41104 |
| C322A | 5.85 — 8.2 | 137 | UG344/U | 6.960 | 0.539 | (1.3691) | ±0.0015 | 45.68154 |
| H322A | 7.05 — 10.0 | 112 | UG51/U | 8.438 | 0.447 | (1.1354) | ±0.0010 | 37.88432 |
| X322A | 8.2 — 12.4 | 90 | UG39/U | 10.129 | 0.382 | (0.9703) | ±0.0010 | 32.37541 |
| M322A | 10.0 — 15.0 | 75 | MPF75 [1] | 12.322 | 0.311 | (0.7899) | ±0.0010 | 26.35799 |
| P322A | 12.4 — 18.0 | 62 | UG419/U | 15.030 | 0.253 | (0.6426) | ±0.0008 | 21.44236 |
| N322A | 15.0 — 22.0 | 51 | MPD51 | 18.249 | 0.209 | (0.5309) | ±0.0008 | 17.71325 |
| K322A | 18.0 — 26.5 | 42 | UG595/U | 21.941 | 0.175 | (0.4445) | ±0.0005 | 14.83167 |
| U322A | 26.5 — 40.0 | 28 | UG599/U | 32.693 | 0.118 | (0.2997) | ±0.0005 | 10.00078 |
| J322A | 33.0 — 50.0 | 22 | MPF22 [1] | 40.824 | 0.0946 | (0.2403) | ±0.0005 | 8.017576 |
| T322A | 40.0 — 60.0 | 19 | MPF19 [1] | 49.261 | 0.0777 | (0.1974) | ±0.00025 | 6.585261 |
| V322A | 50.0 — 75.0 | 15 | MPF15 [1] | 61.518 | 0.0630 | (0.1600) | ±0.00025 | 5.339401 |
| Y322A | 60.0 — 90.0 | 12 | MPF12 1 | 73.772 | 0.0529 | (0.1344) | ±0.00025 | 4.483402 |
| Z322A | 75.0 — 110.0 | 10 | MPF10 1 | 91.221 | 0.0424 | (0.1077) | ±0.00025 | 3.593501 |

[1] Provided with Maury "MPF" precision type flanges with indexing holes.



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# Two-Port Mismatch Air Line Standards (Individual Units and Sets)

## General Information

Mismatch air line sets are two-port, 1/4-λ VSWR standards consisting of coaxial air lines employing a design that features a precision outer conductor with beadless connectors and a set of inner conductors with increasing diameters. The inner conductors produce accurately known reflection coefficents which are directly calculable from and traceable to the air line dimensions[1].

Air line standard sets are extremely stable and easy to use for a variety of applications. Their simple geometry allows direct calculation of reflection, loss, transfer and group delay characteristics, making them ideally suited for checking the performance and accuracy of network analyzers. The sets described here utilize beadless connectors and rely on the mating connectors for center conductor support.



# 3.5mm Two-Port Mismatch Air Line Standards

## Model 8044S15 & 8044S60

### *Features*

- *DC to 26.5 GHz*
- *Separated Step Discontinuity*
- *Beadless 3.5mm Connectors*




8044S60

### *Description*

Maury offers the 8044S15 and the 8044S60 as individual two-port mismatch standards in 3.5mm line size and connector type. A key design feature of these units is that the step discontinuity is separated from the connector interface for better accuracy[2].

Both models also feature a precision outer conductor with beadless 3.5mm connectors, and a stepped center conductor. The center conductors are designed to produce an accurately known VSWR which is directly calculable from the mechanical dimension.

### *Specifications*

Frequency Range . . . . . DC to 26.5 GHz

VSWR:

Γ = 0.15 . . . . . 1.350 ± 0.025

Γ = 0.60 . . . . . 4.00 ± 0.25

Reference Impedance . . . . . 50 ohm

Nominal Overall Electrical Length . . . . . 10cm

Nominal Mismatch Section Electrical Length . . . . . 7.5cm

Odd 1/4-λ Frequencies . . . . . 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 GHz

1 Beatty, R.W., "Calculated and Measured S11, S21, and Group Delay for Simple Types of Coaxial and Rectangular Waveguide 2-port Standards", NBS Technical Note No. 657, Dec. 1974.

2 Maury, M.A. Jr., and Simpson, G.R., "Two-Port Verification Standards in 3.5mm and 7mm for Vector Automatic Network Analyzers", Microwave Journal, June, 1984; pp. 101-110.



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# 7mm Two-Port Mismatch Air Line Standard Set

## Model 2654A

### *Features*

- *DC to 18.0 GHz*
- *Beadless LPC7 Connectors*

### *Description*

The 2654A Beadless Mismatch Air Line Set was designed for use in coaxial systems employing 7mm connectors. The air line connectors are beadless LPC7 connectors that mate with standard 7mm connectors, and rely on the mating connector for center conductor support.

Each set consists of:

A) One (1) outer conductor.

B) Five (5) inner conductors (see specification for corresponding VSWR values).

C) A foam-lined, wood instrument case for protection and storage.

2654A



### *Specifications*

Frequency Range . . . . . DC to 18.0 GHz

Nominal Impedance . . . . . 49.987 for 1.00 VSWR

Mismatch Values (VSWR) . . . . . 1.00, 1.10, 1.25, 1.50, 2.00 (based on nominal impedance)

Electrical Length . . . . . .7.495cm

Odd 1/4-λ Frequencies . . . . . .1, 3, 5, 7, 9, 11, 13, 15, 17 GHz

# 7mm Two-Port Mismatch Air Line Standard Sets

## Model 2654B

### *Features*

- *DC to 18.0 GHz*
- *Beadless LPC7(F) Connectors*

### *Description*

The Maury 2654B precision air line standard set contains calculable two-port 7mm coaxial air lines[1]. These standards are provided with the step discontinuity separated from the connector interface for better accuracy[2].

The set consists of a precision outer conductor with beadless 7mm connectors and three center conductors. Each center conductor has a different diameter to produce an accurately known VSWR which is directly calculable from the mechanical dimension. They employ self-centering, spring-loaded pins to allow connection easily without tools.

Also available are the Maury 2654S15 and 2654S60 which are individual two-port standards with Γ = 0.15 and 0.60, respectively.

2654B



### *Specifications*

Frequency Range . . . . . DC to 18.0 GHz

VSWR:

Γ = 0 . . . . . .1.005 maximum

Γ = 0.15 . . . . . .1.350 ± 0.025

Γ = 0.60 . . . . . .4.00 ± 0.25

Reference Impedance . . . . . 50 ohm

Nominal Overall Electrical Length . . . . . 10cm

Nominal Mismatch Section Electrical Length . . . . . .7.5cm

Odd 1/4-λ Frequencies . . . . . .1, 3, 5, 7, 9, 11, 13, 15, 17 GHz

[1] Beatty, R.W., "Calculated and Measured S11, S21, and Group Delay for Simple Types of Coaxial and Rectangular Waveguide 2-port Standards", NBS Technical Note No. 657, Dec. 1974.

[2] Maury, M.A. Jr., and Simpson, G.R., "Two-Port Verification Standards in 3.5mm and 7mm for Vector Automatic Network Analyzers", Microwave Journal, June, 1984; pp. 101-110.



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# Connector Gages and Connector Gage Kits

## General Information

### Features

- *Direct Reading, Self-Checking*
- *Accurate, Easy to Use*
- *Digital and/or Dial Indicator Styles*



### Description

These connector gage kits provide an easy and accurate way to measure critical linear interface dimensions of most coaxial connectors. Each kit consist of gages with specially adapted indicators, and the bushings and pins needed to mate with specified connectors. Master setting gages are used to adjust the dial indicators (or digital indicators) to zero, before push-on or thread-on gages are mated with connectors to measure the distance from a given interface (male shoulder, etc.) to the outer conductor mating plane. The table below lists available models. Additional information is found in the referenced data sheets.

### Available Models - Digital Indicator Style

| CONNECTOR TYPE | DIAL RESOLUTION (INCHES) | MODEL | DESCRIPTION | DATA SHEET |
|---|---|---|---|---|
| 1.85mm/2.4mm | 0.001mm/ 0.00004 in. | A048A | Two “thread-on” metrology grade digital gages measure female and male contact pin locations. | 2Y-049 |
| 2.92mm (K) or 3.5mm | 0.001mm/ 0.00004 in. | A050A | Two “thread-on” metrology grade digital gages measure female and male contact pin locations. | 2Y-048 |

### Available Models - Dial Indicator Style

| | | | | |
|---|---|---|---|---|
| 2.92mm (K) or 3.5mm | 0.00025 | A034B | Two “push-on” gages measure female and male contact pin interface locations. | 2Y-020 |
| 2.92mm (K) or 3.5mm | 0.0001 | A034E | Two metrology grade “thread-on” gages measure female and male contact pin interface locations. | 2Y-020A |
| 2.4mm | 0.0001 | A035E | Two metrology grade “thread-on” gages measure female and male contact pin interface locations. | 2Y-022A |
| 7mm | 0.0001 | A028 | One “push-on” gage measures planar contact location. | 2Y-005 |
| 7mm | 0.0001 | A028D | One “thread-on” metrology grade gage measures planar contact location. | 2Y-005A |
| N | 0.001 | A007A | One “push-on” gage measures female and male contact pin location. | 2Y-002 |
| N | 0.00025 | A020A | One “push-on” gage measures female and male contact pin location. | 2Y-003 |
| N | 0.0001 | A020D | Two metrology grade “thread-on” gages measure female and male contact pin interface locations. | 2Y-003A |
| N (75 ohms) | 0.0001 | A020G | One “push-on” gage measures female and male contact pin location of 75ohm type N connectors. | 2Y-003G |
| N, BNC, TNC, C or SC | 0.00025 | A025A | One “push-on” gage measures female and male contact pin location. | 2Y-016 |
| BNC or TNC | 0.0005 | A012A | Two “push-on” gages measure female and male contact pin and dielectric interface locations. | 2Y-009 |
| AFTNC, TNC or TNCA | 0.0001 | A012E | Six “push-on” “universal” gages measure all contact pin and dielectric interface locations of all MIL-STD, IEC and commercial TNC connectors. | 2Y-028 |
| SMA | 0.0005 | A027 | Two “push-on” gages measure female and male contact pin interface locations. | 2Y-004 |
| SMA | 0.0005 | A027A | Four “push-on” gages measure female and male contact pin and dielectric interface locations. | 2Y-004 |
| SMA | 0.0005 | A027G | Two “push-on” gages measure female and male contact pin and dielectric interface locations. | 2Y-004 |
| SMA | 0.0005 | A027M | Three “push-on” gages measure standard male contact pin and dielectric interface locations, and the stepless 0.085-inch male pin dimension. | 2Y-004 |
| OSP™ [1] | 0.00025 | A039C | One “push-on” gage measures female and male contact pin location. | 2Y-026 |
| 14mm (GR900) | 0.0001 | A024 | One “push-on” gage measures planar contact location of 14mm and 7mm connectors. | 2Y-006 |
| 7-16 | 0.0001 | A041A | One “push-on” gage measures female and male contact pin location. | 2Y-027 |
| SMP/GPO™ [2] | 0.0005 | A042A | Three “push-on” gages measures SMP connectors’ contact pin and dielectric interface locations. | 2Y-031 |
| Multiport | 0.0001 | A045A | Six “push-on” gages measures multiport connectors’ contact pin and dielectric locations. | 2Y-029 |
| ZMA/BZ | 0.0001 | A046A | Six “push-on” gages measures ZMA and BZ connectors’ contact pin and dielectric locations. | 2Y-030 |

[1] OSP™ (the Omni-Spectra designation) is a trademark of M/A-Com.

[2] GPO™ is a trademark of the Gilbert Engineering Co., Inc.



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# Coaxial Directional Couplers

## Model Series 4030 and 4090




### *Features*

- *High Directivity*
- *Broadband Operation*
- *Precision Connectors*
- *Low VSWR*
- *High Tracking Accuracy*

### *Description*

The 4030 and 4090 series of precision directional couplers are designed to provide high directivity and an accurate sample of forward or reflected power over octave bandwidths or greater. They are primarily intended for laboratory type applications where an extremely stable and rugged device is required.

The couplers, when used singly or in pairs, are ideally suited for high accuracy swept frequency measurements or reflection coefficient and insertion loss. The use of precision couplers has numerous advantages and applications such as when used with network analyzer systems and in power level measurements.

Units, as provided, are calibrated at five frequencies and are available with either 7mm[1] or 14mm[2] connectors on the mainline with a precision stainless steel type N female connector on the secondary (coupled) line input.

### *Specifications*

Frequency Range . . . . . Octave bands or greater, see charts
Nominal Coupling . . . . . 10 dB
Tracking (unit to unit, when paired) . . . . . 0.03 dB
Directivity . . . . . Generally >40 dB, see charts
VSWR . . . . . see charts
Nominal Impedance . . . . . 50 ohm
Power Handling . . . . . 30 watts
Connectors:
Main Line . . . . . 7mm (series 4030); 14mm (series 4090)
Coupled Line . . . . . Type N (female)

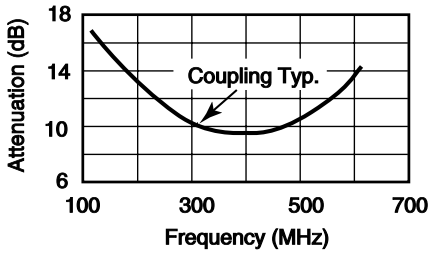



Figure A. Coupling Curve for 0.1 to 0.6 GHz Couplers

### *Available Models - 7mm (Series 4030)*

| FREQUENCY RANGE (GHz) | MODEL | DIRECTIVITY (DB) | COUPLING FREQ SENSITIVITY (dB) | VSWR | | OVERALL LENGTH (INCHES) |
|---|---|---|---|---|---|---|
| | | | | MAIN | SECONDARY | |
| 0.95 – 2.2 | 4031 | 40 (typical >45) | ±1.0 | 1.10 6 | 1.15 7 | 10.70 |
| 1.7 – 4.2 | 4032 | 40 (typical >43) | ±1.2 | 1.15 | 1.20 | 3.70 |
| 3.7 – 8.3 | 4033 | 35 (typical >38) | ±1.2 | 1.20 | 1.25 | 6.35 |

### *Available Models - 14mm (Series 4090)*

| FREQUENCY RANGE (GHz) | MODEL | DIRECTIVITY (DB) | COUPLING FREQ SENSITIVITY (dB) | VSWR | | OVERALL LENGTH (INCHES) |
|---|---|---|---|---|---|---|
| | | | | MAIN | SECONDARY | |
| 0.10 – 0.6 | 4096A | 46 (typical >50) | See Figure A | 1.05 | 1.08 | 13.15 |
| 0.50 – 1.0 | 4097 | 46 (typical >50) | ±1.0 | 1.05 | 1.10 | 9.14 |
| 0.75 – 1.5 | 4094 | 45 | ±1.0 | 1.05 | 1.10 | 7.88 |
| 1.50 – 3.0 | 4095 | 42 | ±1.0 | 1.07 | 1.10 | 6.51 |

1 Precision 7mm connector per Maury data sheet 5E-060.

2 Precision 14mm connector, mating compatible with GR900.



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# Torque Wrenches

## All Models



2698G1 8799A1 2698C2

### *Description*

Maury's torque wrenches are recommended for tightening coaxial connectors in order to obtain optimum repeatability and prolong connector life. They employ a "break" design so it is impossible to over-torque a coupled junction, and torque can be applied in either direction. Each Maury torque wrench is factory preset to the proper in. lbs for tightening its coaxial connector type, and the color coded handles make it easy to select the correct wrench from your toolbox at a glance.

Maury torque wrenches are included in many of our VNA calibration kits, and can be ordered separately by the model numbers listed in the chart below. If the wrench you need isn't shown in this chart, please contact our Sales Department or your local Maury representative for assistance.

Note: The models shown are delivered in a non-calibrated state unless calibration is requested at the time they are ordered. Maury highly recommends annual recalibration of these torque wrenches to ensure their continued ability to properly tighten connections. Torque wrenches that are subject to heavy use should have their calibration checked more frequent.

### *Available Models*

| MODEL | FOR USE WITH CONNECTOR TYPE | WRENCH SIZE | PRESET TORQUE (INCH LBS) | HANDLE COLOR [1] |
|---|---|---|---|---|
| 8799A1 [2] | 1.85mm, 2.4mm, 2.92mm (K), and 3.5mm | 5/16-in. hex | 8 ± 0.3 | Red |
| 8799D1 | SMA, OSM | 5/16-in. hex | 5 ± 0.3 | Black |
| 8799E1 | OSSM, MPC8 | 1/4-in. hex | 5 ± 0.3 | Black |
| 2698C2 | 7mm, LPC7, Precision Type N (with 3/4-inch hex nuts), NMD3.5, NMD2.92, NMD2.4 | 3/4-in. hex | 12 ± 0.4 | Blue |
| 2698G1 | Precision TNC (with 9/16 hex nuts), MPC6 | 9/16-in. hex | 12 ± 0.4 | Blue |
| 2698H1 | LPC/OSP™ (Precision LCP/OSP™ per Maury data sheet 5E-065) | 9/16-in. hex | 8 ± 0.3 | Red |
| 2698J1 | SC | 13/16-in. hex | 12 ± 0.4 | Blue |
| 2498T1 | MPC14, LPC14 (Precision 14mm connectors that are essentially the same as GR900) | 1-in. hex | 12 ± 0.4 | Blue |
| 2698K1 | 7-16 | 1-1/16 hex | 20 ± 0.5 | Green |

[1] Handle color represents torque value: blue = 12 in. lbs; red = 8 in. lbs; black = 5 in. lbs; green = 20 in. lbs (unless otherwise marked on the nameplate).

[2] Do not use on SMA connectors. Significant damage may result.



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# Coaxial to Coaxial & Waveguide to Coaxial Adapter Finder

## The chart below shows the page(s) in this catalog which describe Maury's Coaxial to Coaxial and Waveguide to Coaxial Adapters

| Coaxial-to-Coaxial Connectors<br>Side A / Side B | • NMD1.85mm | • 1.85mm | • NMD2.4mm | • 2.4mm | • NMD2.92mm (K) | • 2.92mm (K) | • NMD3.5mm | • 3.5mm | • QT3.5mm™ | • 3.5mm Panel Mount | • SMA | • 7mm | • Type N (50 ohm) | • Type N (75 ohm) | • LCP/OSP™ | • TNC | • TNCA | • AFTNC | • BNC (50 ohm) | • HN, SC, C | • 14mm (GR 900) | • 7-16 | • EIA 7/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| • NMD1.85mm | 98 | 98 | 98 | | 98 | 98 | | 98 | | | | 98 | 98 | | | | | | | | | | |
| • 1.85mm | 98 | 99 | | 99 | | 99 | | 99 | | | | | | | | | | | | | | | |
| • NMD2.4mm | 98 | | 102 | 102 | | 102 | | 102 | 110 | | | 102 | 102 | | | | | | | | | | |
| • 2.4mm | | 99 | 102 | 103 | | 103 | | 103 | | | | 103 | 103 | | | | | | | | | | |
| • NMD2.92mm (K) | 98 | | | | 105 | 105 | | | | | | | | | | | | | | | | | |
| • 2.92mm (K) | 98 | 99 | 102 | 103 | 105 | 106 | | | | | | 107 | 107 | | | | | | | | | | |
| • NMD3.5mm | | | | | | | 108 | 108 | 110 | 112 | | 108 | 108 | 117 | | 108 | | 108 | | | | | |
| • 3.5mm | 98 | 99 | 102 | 103 | | | 108 | 109 | | | | 111 | 111 | 117 | 118 | 111 | 111 | 111 | 111 | | | 121 | |
| • QT3.5mm™ | | | 110 | | | | 110 | | | | | 110 | 110 | | | | | | | | | | |
| • 3.5mm Panel Mount | | | | | | | 112 | | | | | 112 | 112 | | | | | | | | | | |
| • SMA | | | | | | | | | | | | 113 | 116 | | | | | | | | | | |
| • 7mm | 98 | | 102 | 103 | | 107 | 108 | 111 | 110 | 112 | 113 | 113 | 113 | 117 | 118 | 113 | 113 | | 113 | 113 | 113 | 121 | 113 |
| • Type N (50 ohm) | 98 | | 102 | 103 | | 107 | 108 | 111 | 110 | 112 | 116 | 113 | 114 | 117 | 118 | 116 | | 116 | 116 | 116 | | 121 | |
| • Type N (75 ohm) | | | | | | | 117 | 117 | | | | 117 | 117 | 117 | | | | | | | | | |
| • LCP/OSP™ | | | | | | | | 118 | | | | 118 | 118 | | | | | | | | | | |
| • TNC | | | | | | | 108 | 111 | | | | 113 | 116 | | | 119 | | | | | | | |
| • TNCA | | | | | | | | 111 | | | | 113 | | | | | 119 | | | | | | |
| • AFTNC | | | | | | | 108 | 111 | | | | | 116 | | | | | | | | | | |
| • BNC (50 ohm) | | | | | | | | 111 | | | | 113 | 116 | | | | | | | | | | |
| • HN, SC, C | | | | | | | | | | | | 113 | 116 | | | | | | | | | | |
| • 14mm (GR 900) | | | | | | | | 120 | | | | 113 | 120 | | | | | | | | | 120 | 120 |
| • 7-16 | | | | | | | | 121 | | | | 121 | 121 | | | | | | | | 120 | 121 | |
| • EIA 7/8 | | | | | | | | | | | | 113 | | | | | | | | | 120 | | |

### *Also in this Section*

- Waveguide-to-Coaxial Adapters are listed on pages 122-123 (Right Angle Launch models) and pages 124-125 (End Launch models).
- Waveguide Flange Adapters (see page 126).
- Waveguide Transmission Lines & Test Port Adapters (see page 127).
- Waveguide Flange Information, Specifications and Hole Patterns (see pages 128-131).
- Coaxial Cable Assemblies – Flexible and Semi-Rigid (see page 132).
- Coaxial Semi-Rigid Right Angle Assemblies (see page 133).
- Coaxial Precision Right Angle Test Port Adapters – NMD3.5mm Female to NMD3.5mm Male (see page 133).
- Test Port Cable and Adapter Sets (see page 134-136).
- Coaxial rigid and Semi-Rigid Air Line Connectors (see pages 137-140).
- Manual Tuners (see pages 141-146).



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# Precision Adapters, Cables, Connectors, Waveguide Components and Manual Tuners General Information

## *Coaxial Adapters*

Maury Microwave produces a comprehensive line of both in-series and between-series coaxial to coaxial adapters which includes all precision laboratory measurement connector types – 1.85mm, 2.4mm, 2.92mm (K), 3.5mm, 7mm, 14mm, etc., and all common systems connectors – type N, TNC, etc. Maury also manufactures adapters in other less common connector series that are not shown in this catalog. If you have a specific need, and do not see it in these pages, please contact our Sales Department for assistance.

## *Waveguide to Coaxial Adapters*

Maury's comprehensive line of precision end launch and right-angle launch waveguide to coaxial adapters provide a convenient and reliable transistion between most popular EIA waveguide sizes and a wide range of precision coaxial connector types. In most cases the waveguide flanges used are Maury Precision Flanges (MPF) that incorporate a pattern of precision index holes and matching pins to ensure proper mating alignment and connection repeatability.

## *Waveguide to Waveguide Adapters*

Maury produces waveguide to waveguide adapters, transitions, and straight transmission line sections in all popular EIA waveguide sizes. Units from R through P bands are normally aluminum construction with irridite finish; K band and above are copper alloy with a plated finish. All units are painted with highly durable paint.

Maury also produces waveguide devices in millimeter sizes from 26.5 through 110 GHz (WR28 to WR10), large waveguides (WR430), and in many less common configurations such as: flatguide, reduced height, round, etc. Maury can provide waveguide to waveguide adapters with any flange type, material or finish you require. Consult us on your specific requirement.

## *Test Port Adapters*

Maury Test port adapters are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets, such as those used on Agilent PNA series VNAs and Anritsu 37000 series VNAs. Maury's test port adapters can convert those connectors to other coaxial connector or waveguide types. Using Maury test port adapters as connector savers can yield significant cost savings in terms of reduced VNA down time and lower repair costs.

## *Cables and Cable and Adapter Sets*

For your convenience, Maury produces an extensive line of flexible or semi-rigid cable assemblies that feature improved cable to connector transition designs in standard lengths/sizes/connector types, or in user-specified configurations. Maury also offers a line of test port cable and adapter kits which are ideal for use in VNA-based test setups. Please consult our Sales Department for application assistance.

## *Precision Connectors*

All of the industry standard connectors used on Maury adapters are mating compatible with connectors conforming to the applicable MIL-C or MIL-T specifications. However, because of the need for precision in many applications, most Maury connectors are manufactured to even more exacting requirements. Maury precision connectors are available for sale as spare or replacement parts.

Maury also offers a limited selection of precision connectors with integral or removable panel mount flanges, a series of micro-strip connectors designed for mounting on minature micro-strip packages, a line of rigid or semi-rigid cable connectors, and tool kits for use in performing precision assembly or disassembly of Maury precision connectors.

## *MANUAL TUNERS*

## *Stub Tuners*

Maury's stub tuners are basic laboratory tools used for matching load impedances to provide for mazimum power transfer between a generator and a load. Typical applications include power and attenuation measurements, tuned reflectometer systems and providing a DC return for single-ended mixers and detectors. Maury produces a comprehensive line of bradband stub tuners designed to satisfy the majority of these applications. These tuners are availabble in double-stub and triple-stub configurations with frequency ranges from 0.2 to 18.0 GHz.

## *Slide Screw Tuners*

Maury precision slide screw tuners are manual tuners that are designed for use in laboratory environments and as system components for establishing or transforming impedances for a number of applications. These micrometer driven manual tuners can be used to establish optimum source or load terminations for device characterization, normalizing source or load for precision laboratory measurements and/or calibrations, and as a matching transformer between mismatched source and load. Maury produces both coaxial and waveguide slide screw screw tuners, covering a wide range of RF frequencies and bandwidths.



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# Precision Coaxial Adapters

## General Information



### *Connecting With Confidence*

Test and measurement data is only as good as the system used to generate it. Good test and measurement systems rely on high-performance precision adapters to ensure proper connection between system components – connections that ensure the accuracy, repeatability, and reliability of component performance. Over the last four-and-a-half decades, Maury has earned a reputation as a leading producer of high quality, precision adapters. Today, Maury offers adapters with a wider variety of connector types and combinations than any other manufacturer.

Maury adapters feature low reflection at the interface and dielectric suport, negligible electromagnetic interference, excellent connection repeatability,rugged durability, and are guaranteed to perform reliably within their specifications even after multiple connection/disconnection cycles.

When you consider the relative ease of incorporation into system designs and applications, and the value versus life-cycle cost inherent in every Maury adapter, it is easy to understand their popularity. Engineers, designers and technicians alike know that with Maury adapters they can have the highest confidence in their component connections.

The following paragraphs discribe the major categories of Maury's precision adapter line.

### *In-Series and Between-Series Adapters*

Maury Microwave's comprehensive line of in-series and between-series coaxial adapters are available for all precision laboratory measurement connectors – 1.85mm, 2.4mm, 2.92mm (K), 3.5mm, 7mm, 14mm, 7-16, etc.; all common systems connectors – type N, TNC, etc.; and several special purpose connector series such as EIA 7/8 rigid line connectors. Most of these are available as components of Maury's VNA calibration kits or as kit options, and are also sold separately, as auxilliary components, spares, or replacement parts.

Maury also manufactures adapters in other less common connector series not shown in this catalog. If you have a specific need and don't find a solution in these pages, please contact our Sales Department for assistance.

### *Phase Matched Adapters*

Phase matched adapters are used in two-port VNA calibrations when the devices have same sex input and output connectors that must be tested. Through connection for calibration is made using adapters with female and male connectors. One adapter is then replaced to permit mating to the test device. With phase matched adapters, this can be done without significantly degrading the VNA error correction capability. Phase matched in-series and between-series adapters are noted as such in the following pages.

### *Ruggedized Test Port Adapters*

Maury Test port adapters are specifically designed to mate with the special ruggedized connectors used on commercial VNA test sets, such as those used on Agilent PNA series VNAs and Anritsu 37000 series VNAs. Maury's test port adapters can convert those connectors to other coaxial or waveguide connector types. Using Maury test port adapters as connector savers can yield significant cost savings in terms of less VNA down time and repair costs.



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# NMD1.85mm Test Port Adapters

## 7809 Series

### Features

- *Low VSWR*
- *DC to 67 GHz (Usable to 70 GHz)*
- *Protects VNA Test Ports*
- *Ruggedized for Long Life*

### Description

Maury's 7809 series NMD1.85mm adapters are precision, low VSWR adapters designed to connect directly to the male 1.85mm NMD-style test ports on certain Agilent test sets and VNA models (including those in the PNA series). They are fully compatible with the VNA test ports, and adapt to precision 1.85mm, 2.4mm, 2.92mm, 3.5mm, 7mm, and type N connectors. Maury test port adapters provide the best possible connection between the VNA and other precision cables and devices. Their rugged construction provides for long life and highly stable, highly repeatable connections. The 7809A1/A2 and 7809K models also act as test port savers, by absorbing the wear and tear that would otherwise affect the test port; preventing costly repairs and eliminating downtime.

### Connector Description

The NMD1.85mm female connectors on Maury 7809 series adapters are miniature, instrument grade, air-interface connectors. Rated for operate up to 67 GHz, they are useable up to 70 GHz. They comply with IEEE standard 287 general precision connector, instrument grade GPC1.85. For interface specifications please refer to Maury data sheet 5E-089.




### Available Models

| MODEL | CONNECTORS SIDE A | CONNECTORS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 7809A1 | NMD1.85mm female [1] | 1.85mm female [3] | DC — 26.5 ≤ 1.10 | 50 ohm | 0.993 | (2.52) |
| 7809A2 | NMD1.85mm female [1] | 1.85mm male [3] | 26.5 — 40.0 ≤ 1.15 | 50 ohm | 0.993 | (2.52) |
| 7809K | NMD1.85mm female [1] | NMD1.85mm male [1] | 40.0 — 67.0 ≤ 1.20 | 50 ohm | 1.133 | (2.88) |
| 7809G | NMD1.85mm female [1] | NMD2.4mm male [2] | DC — 26.5 ≤ 1.10 | 50 ohm | 1.142 | (2.90) |
| 7809H | NMD2.4mm female [2] | NMD1.85mm male [1] | 26.5 — 40.0 ≤ 1.15<br>40.0 — 50.0 ≤ 1.20 | 50 ohm | 1.317 | (3.35) |
| 7809F1 | NMD1.85mm female [1] | 2.92mm female [5] | DC — 20.0 ≤ 1.10 | 50 ohm | 1.072 | (2.72) |
| 7809F2 | NMD1.85mm female [1] | 2.92mm male [5] | 20.0 — 40.0 ≤ 1.16 | 50 ohm | 1.072 | (2.72) |
| 7809B1 | NMD1.85mm female [1] | 3.5mm female [6] | DC — 10.0 ≤ 1.06 | 50 ohm | 1.085 | (2.76) |
| 7809B2 | NMD1.85mm female [1] | 3.5mm male [6] | 10.0 — 20.0 ≤ 1.10<br>20.0 — 34.0 ≤ 1.12 | 50 ohm | 1.085 | (2.76) |
| 7809C | NMD1.85mm female [1] | 7mm [7] | DC — 4.0 ≤ 1.05<br>4.0 — 12.0 ≤ 1.07<br>12.0 — 18.0 ≤ 1.10 | 50 ohm | 1.206 | (0.47) |
| 7809D1 | NMD1.85mm female [1] | Type N female [8] | DC — 4.0 ≤ 1.08 | 50 ohm | 1.145 | (2.91) |
| 7809D2 | NMD1.85mm female [1] | Type N male [8] | 4.0 — 12.0 ≤ 1.12<br>12.0 — 18.0 ≤ 1.14 | 50 ohm | 1.504 | (3.82) |

[1] NMD1.85mm per Maury data sheet 5E-085.
[2] NMD2.4mm per Maury data sheet 5E-083.
[3] Precision 1.85mm per Maury data sheet 5E-089.
[4] Precision 2.4mm per Maury data sheet 5E-064.
[5] Precision 2.92mm (K) per Maury data sheet 5E-063.
[6] Precision 3.5mm per Maury data sheet 5E-062.
[7] Precision 7mm per Maury data sheet 5E-060.
[8] Precision type N per Maury data sheet 5E-049.

Key Literature: Maury data sheet 2B-074..



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# 1.85mm Between-Series Adapters

## Models 7824A/B/C/D, 7826A/B/C/D and 7827A/B/C/D

### *Description*

The precision adapters in these model series are designed to allow devices with 1.85mm connectors to mate with devices and cables bearing 2.4mm, 2.92mm, or 3.5mm connectors. When properly mated, they provide a low VSWR connection with low insertion loss and high repeatability. Made of highly durable materials, these adapters are ideal for use in laboratory and production environments where frequent connect/disconnect cycles occur.

These adapters are **phase matched within each model series**, so that they may be easily interchanged for VNA measurement of non-insertable devices. Outline dimensions are shown on pages 100 and 101.

*2.4mm*



7824A 7824B 7824C 7824D

*2.92mm*



7826A 7826B 7826C 7826D

*3.5mm*



7827A 7827B 7827C 7827D

### *1.85mm Connector Description*

The precision 1.85mm connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 67 GHz, but may be used up to 70 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC1.85).

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 7824A | 1.85mm female [1] | 2.4mm female [2] | DC — 26.5 ≤ 1.06 | 50 ohm | 0.75 | (1.905) |
| 7824B | 1.85mm female [1] | 2.4mm male [2] | 26.5 — 40.0 ≤ 1.10 | 50 ohm | 0.75 | (1.905) |
| 7824C | 1.85mm male [1] | 2.4mm female [2] | 40.0 — 50.0 ≤ 1.15 | 50 ohm | 0.75 | (1.905) |
| 7824D | 1.85mm male [1] | 2.4mm male [2] | | 50 ohm | 0.75 | (1.905) |
| 7826A | 1.85mm female [1] | 2.92mm female [3] | DC — 4.0 ≤ 1.05 | 50 ohm | 0.657 | (1.669) |
| 7826B | 1.85mm female [1] | 2.92mm male [3] | 4.0 — 20.0 ≤ 1.08 | 50 ohm | 0.657 | (1.669) |
| 7826C | 1.85mm male [1] | 2.92mm female [3] | 20.0 — 40.0 ≤ 1.12 | 50 ohm | 0.657 | (1.669) |
| 7826D | 1.85mm male [1] | 2.92mm male [3] | | 50 ohm | 0.657 | (1.669) |
| 7827A | 1.85mm female [1] | 3.5mm female [4] | DC — 4.0 ≤ 1.05 | 50 ohm | 0.657 | (1.669)) |
| 7827B | 1.85mm female [1] | 3.5mm male [4] | 4.0 — 26.5 ≤ 1.08 | 50 ohm | 0.657 | (1.669) |
| 7827C | 1.85mm male [1] | 3.5mm female [4] | 26.5 — 34.0 ≤ 1.12 | 50 ohm | 0.657 | (1.669) |
| 7827D | 1.85mm male [1] | 3.5mm male [4] | | 50 ohm | 0.657 | (1.669) |

# 1.85mm In-Series Adapters

## Models 7821A/B/C



7821A 7821B 7821C

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 7821A | 1.85mm female [1] | 1.85mm female [1] | DC — 26.5 ≤ 1.06 | 50 ohm | 0.75 | (1.905) |
| 7821B | 1.85mm male [1] | 1.85mm male [1] | 26.5 — 40.0 ≤ 1.10 | 50 ohm | 0.75 | (1.905) |
| 7821C | 1.85mm female [1] | 1.85mm male [1] | 40.0 — 67.0 ≤ 1.15 | 50 ohm | 0.75 | (1.905) |

[1] Precision 1.85mm per Maury data sheet 5E-089.
[2] Precision 2.4mm per Maury data sheet 5E-064.
[3] Precision 2.92mm per Maury data sheet 5E-063.
[4] Precision 3.5mm per Maury data sheet 5E-062.

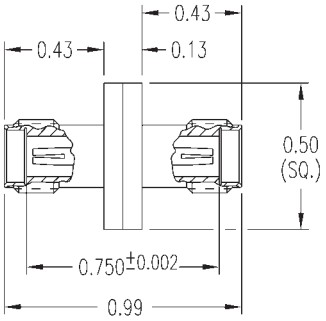
Key Literature: Maury data sheet 2B-070, 2B-071, 2B-072, 2B-073.



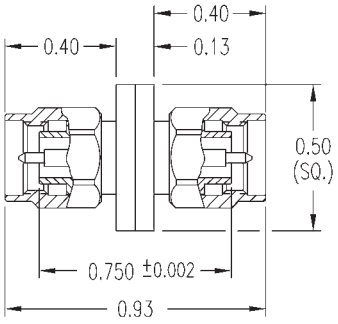
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# 1.85mm Adapter Dimensions (Inches)

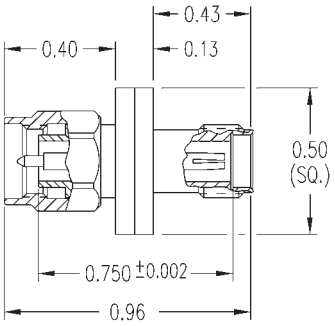
### *Models 7821A/B/C and 7802A*




7821A

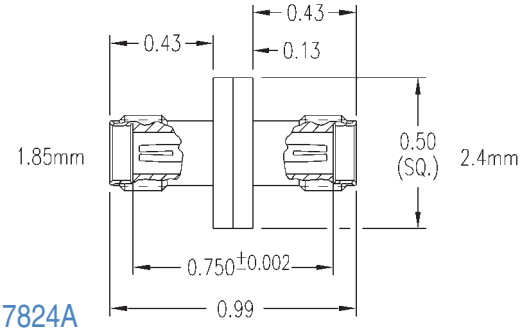



7821B

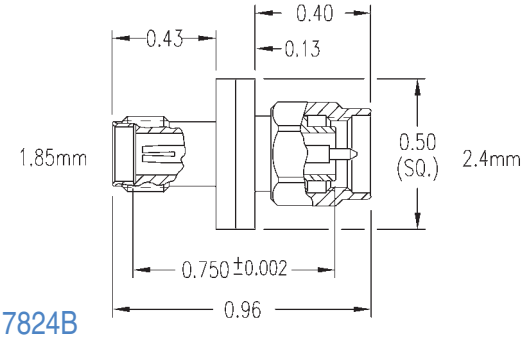



7821C

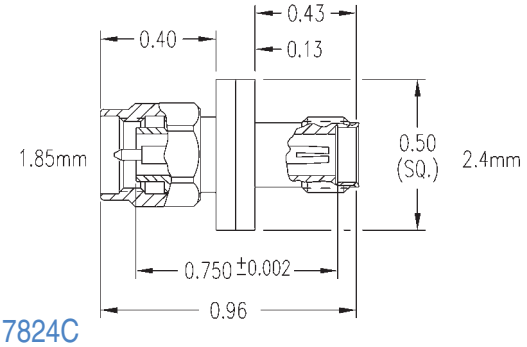
### *Models 7824A/B/C/D*



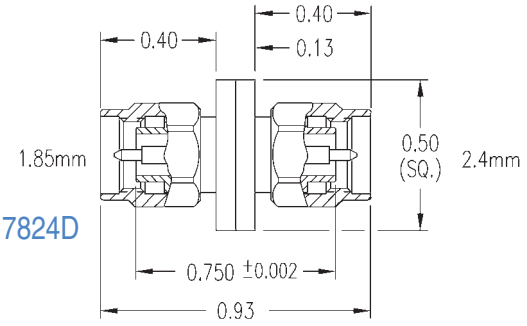

7824A




7824B




7824C

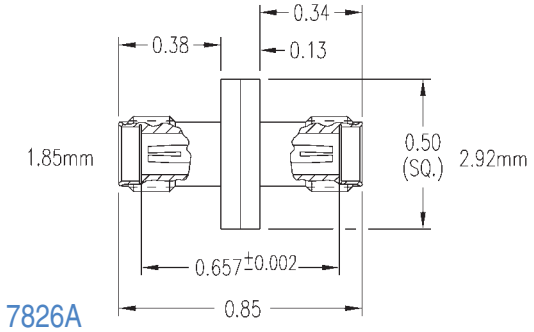



7824D

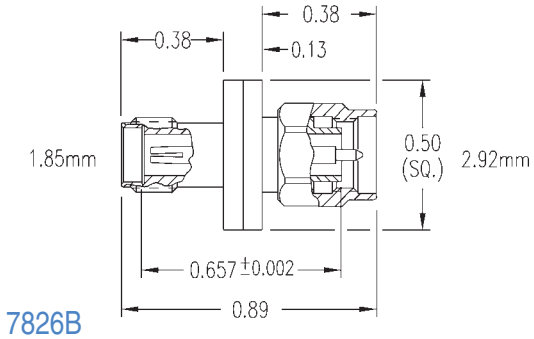


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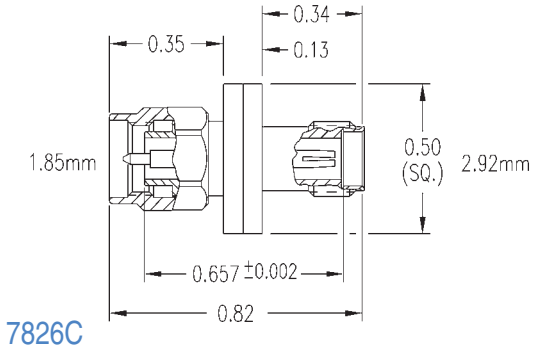
## *Models 7826A/B/C/D*



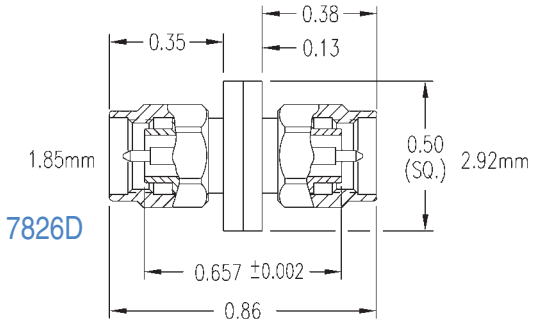

7826A




7826B

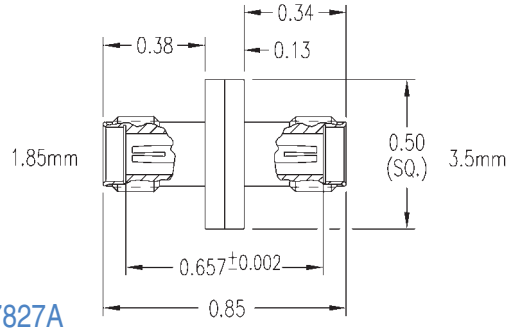



7826C

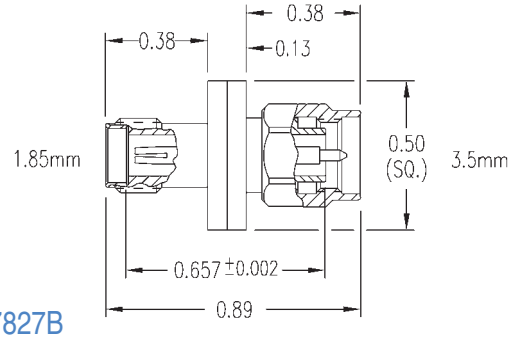



7826D

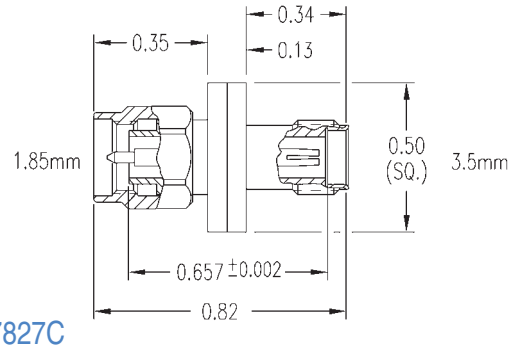
## *Models 7827A/B/C/D*



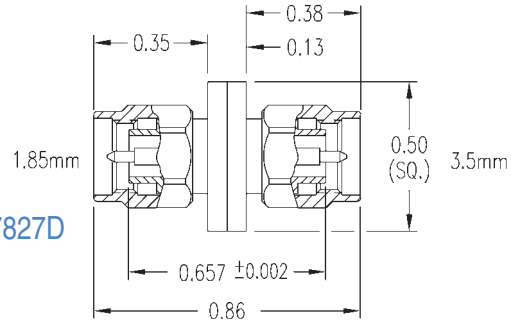

7827A




7827B




7827C




7827D



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# NMD2.4mm Test Port Adapters

## 7809H and 7909 Series

### *Features*

- *Low VSWR*
- *DC to 50 GHz*
- *Protects VNA Test Ports*
- *Ruggedized for Long Life*

### *Description*

Maury's 7909 series NMD2.4mm adapters are precision, low VSWR adapters designed to connect directly to the NMD-style 2.4mm male test ports on certain Agilent test sets and VNA models (including those in the PNA series). They are fully compatible with the VNA test ports, and adapt to precision 2.4mm 2.92mm, 3.5mm, 7mm or type N connectors. Maury test port adapters provide the best possible connection between the VNA and other precision cables and devices. Their rugged construction provides for long life and highly stable, highly repeatable connections. The 7909A1/A2 and 7909K models also act as test port savers, by absorbing the wear and tear that would otherwise affect the test port; preventing costly repairs and eliminating downtime.

### *Connector Description*

The NMD2.4mm female connectors on Maury 7909 series adapters are miniature, instrument grade, air-interface connectors., rated for operate up to 50 GHz. They comply with IEEE standard 287 general precision connector, instrument grade GPC2.4.) For interface specifications please refer to Maury data sheet 5E-082. The NMD male connectors are mateable to NMD female connetors via external threads, and can also mate to non-NMD connectors via internal threads.




### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 7809H | NMD2.4mm female [1] | NMD1.85mm male [2] | DC — 26.5 ≤ 1.10<br>26.5 — 40.0 ≤ 1.15<br>40.0 — 50.0 ≤ 1.20 | 50 ohm | 1.317 | (3.35) |
| 7909A1 | NMD2.4mm female [1] | 2.4mm female [3] | | 50 ohm | 1.24 | (3.15) |
| 7909A2 | NMD2.4mm female [1] | 2.4mm male [3] | | 50 ohm | 1.27 | (3.23) |
| 7909K | NMD2.4mm female [1] | NMD2.4mm male [1] | | 50 ohm | 1.317 | (3.35) |
| 7909H | NMD2.4mm female [1] | NMD3.5mm male [4] | DC — 10.0 ≤ 1.06<br>10.0 — 20.0 ≤ 1.10<br>20.0 — 34.0 ≤ 1.14 | 50 ohm | 1.317 | (3.35) |
| 7909F1 | NMD2.4mm female [1] | 2.92mm female [5] | DC — 20.0 ≤ 1.10<br>20.0 — 40.0 ≤ 1.16 | 50 ohm | 1.291 | (3.279) |
| 7909F2 | NMD2.4mm female [1] | 2.92mm male [5] | | 50 ohm | 1.291 | (3.279) |
| 7909B1 | NMD2.4mm female [1] | 3.5mm female [6] | DC — 10.0 ≤ 1.06<br>10.0 — 20.0 ≤ 1.10<br>20.0 — 34.0 ≤ 1.12 | 50 ohm | 1.06 | (2.70) |
| 7909B2 | NMD2.4mm female [1] | 3.5mm male [6] | | 50 ohm | 1.02 | (2.60) |
| 7909C | NMD2.4mm female [1] | 7mm [7] | DC — 4.0 ≤ 1.05<br>4.0 — 12.0 ≤ 1.07<br>12.0 — 18.0 ≤ 1.10 | 50 ohm | 2.04 | (5.18) |
| 7909D1 | NMD2.4mm female [1] | Type N female [8] | DC — 4.0 ≤ 1.08<br>4.0 — 12.0 ≤ 1.12<br>12.0 — 18.0 ≤ 1.14 | 50 ohm | 1.28 | (3.25) |
| 7909D2 | NMD2.4mm female [1] | Type N male [8] | | 50 ohm | 1.64 | (4.17) |

[1] NMD2.4mm per Maury data sheet 5E-082.
[2] NMD1.85mm per Maury data sheet 5E-085.
[3] Precision 2.4mm per Maury data sheet 5E-064.
[4] NMD3.5mm per Maury data sheet 5E-083.
[5] Precision 2.92mm (K) per Maury data sheet 5E-063.
[6] Precision 3.5mm per Maury data sheet 5E-062.
[7] Precision 7mm per Maury data sheet 5E-060.
[8] Precision type N per Maury data sheet 5E-049.

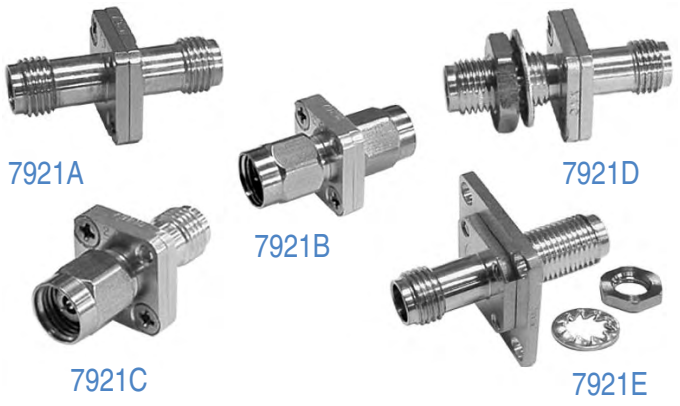
Key Literature: Maury data sheet 2B-049, 2B-049A, 2B-050, 2B-051, 2B-052, 2B-053.



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# 2.4mm In-Series Adapters

## Models 7921A/B/C/D/E




### *Description*

Maury precision 2.4mm in-series adapters are low VSWR and low loss devices that operate from DC to 50 GHz. The models 7921A, B and C offer combinations for in-series adapting and are phase matched, making them ideal for use in precision measurement applications. These adapers are minimum length and feature a square-flanged body for ease of connecting that also prevents them from rolling off flat surfaces. They are useful as "test port savers" when used with automated network analyzers such as the Agilent 8510, etc. The models 7921D and E are bulk-head and panel mount feedthru adapters respectivley, and are designed for instrumentation applications.

### *Specifications*

Frequency Range . . . . . DC – 50 GHz

Maximum VSWR . . . . . DC – 26.5 GHz, 1.06

26.5 – 40.0 GHz, 1.10

40.0 – 50.0 GHz, 1.15

Impedance . . . . . 50 ohm

Connectors . . . . . 2.4mm per Maury data sheet 5E-064

### *Available Models*

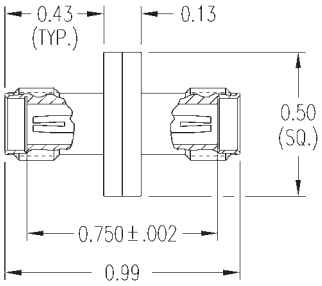
| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|
| 7921A | 2.4mm female [1] | 2.4mm female [1] | 0.75 | (1.905) |
| 7921B | 2.4mm male [1] | 2.4mm male [1] | 0.75 | (1.905) |
| 7921C | 2.4mm female [1] | 2.4mm male [1] | 0.75 | (1.905) |
| 7921D | 2.4mm female [1] | 2.4mm female [1] | 0.86 | (2.18) |
| 7921E | 2.4mm female [1] | 2.4mm female [1] | 0.86 | (2.18) |

[1] Precision 2.4mm per Maury data sheet 5E-064.

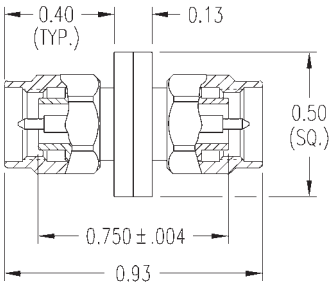
Key Literature: Maury data sheet 2B-001.

### *Dimensions – Inches (cm)*

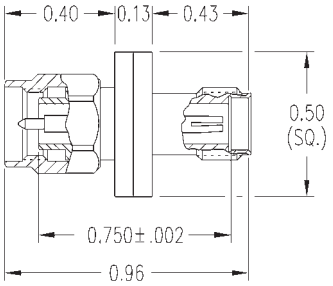
7921A



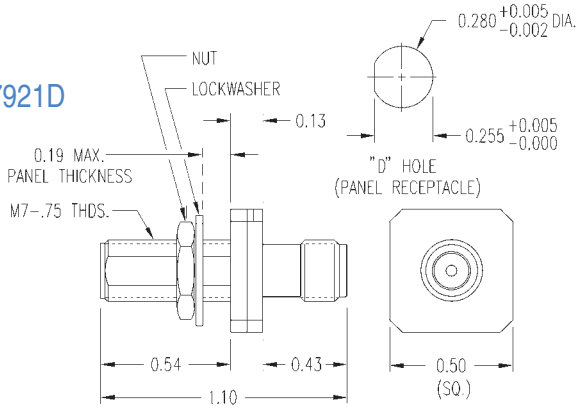

7921B



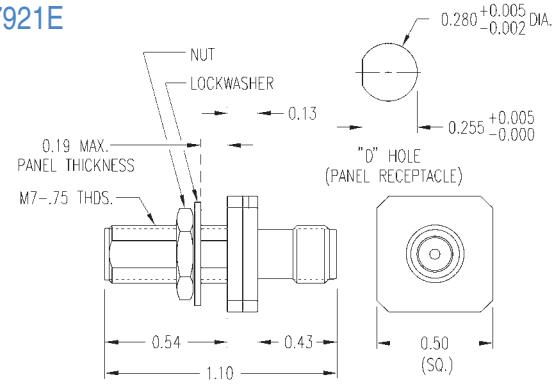

7921C




7921D




7921E






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# 2.4mm Between-Series Adapters

## Models 7926A/B/C/D, 7927A/B/C/D, 7922A/B and 7923A/B/C/D

### *Description*

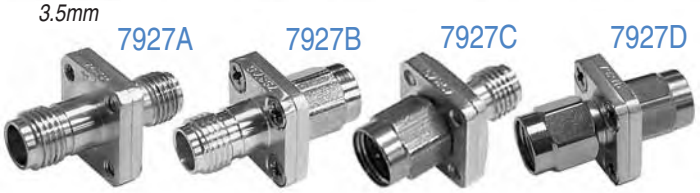
The precision adapters in these model series are designed to allow devices with 2.4mm connectors to mate with devices and cables bearing 2.92mm, 3.5mm, 7mm or Type N connectors. When properly mated, they provide a low VSWR connection with low insertion loss and high repeatability. Made of highly durable materials, these adapters are ideal for use in laboratory and production environments where frequent connect/ disconnect cycles occur.

Except for the 7923 series, these adapters are phase matched within each model series, so that they may be easily interchanged for VNA measurement of non-insertable devices.

*2.92mm*




*3.5mm*




*7mm*




### *2.4mm Connector Description*

The precision 2.4mm connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 50 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC2.4).

*Type N*




### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 7926A | 2.4mm female [1] | 2.92mm female [2] | DC — 4.0 ≤ 1.05 | 50 ohm | 0.65 | (1.65) |
| 7926B | 2.4mm female [1] | 2.92mm male [2] | 4.0 — 20.0 ≤ 1.08 | 50 ohm | 0.65 | (1.65) |
| 7926C | 2.4mm male [1] | 2.92mm female [2] | 20.0 — 40.0 ≤ 1.12 | 50 ohm | 0.65 | (1.65) |
| 7926D | 2.4mm male [1] | 2.92mm male [2] | | 50 ohm | 0.65 | (1.65) |
| 7927A | 2.4mm female [1] | 3.5mm female [3] | | 50 ohm | 0.657 | (1.669) |
| 7927B | 2.4mm female [1] | 3.5mm male [3] | DC — 18.0 ≤ 1.06 | 50 ohm | 0.657 | (1.669) |
| 7927C | 2.4mm male [1] | 3.5mm female [3] | 18.0 — 26.5 ≤ 1.08 | 50 ohm | 0.657 | (1.669) |
| 7927D | 2.4mm male [1] | 3.5mm male [3] | 26.5 – 34.0 ≤ 1.12 | 50 ohm | 0.657 | (1.669) |
| 7922A | 2.4mm female [1] | 7mm [4] | DC — 4.0 ≤ 1.03 | 50 ohm | 1.28 | (3.25) |
| 7922B | 2.4mm male [1] | 7mm [4] | 4.0 — 12.0 ≤ 1.07<br>12.0 — 18.0 ≤ 1.08 | 50 ohm | 1.28 | (3.25) |
| 7923A | 2.4mm female [1] | Type N female [5] | | 50 ohm | 1.22 | (3.10) |
| 7923B | 2.4mm female [1] | Type N male [5] | DC — 4.0 ≤ 1.07 | 50 ohm | 1.58 | (4.02) |
| 7923C | 2.4mm male [1] | Type N female [5] | 4.0 — 18.0 ≤ 1.12 | 50 ohm | 1.20 | (3.05) |
| 7923D | 2.4mm male [1] | Type N male [5] | | 50 ohm | 1.56 | (3.96) |

[1] Precision 2.4mm per Maury data sheet 5E-064.
[2] Precision 2.92mm per Maury data sheet 5E-063.
[3] Precision 3.5mm per Maury data sheet 5E-062.
[4] Precision 7mm per Maury data sheet 5E-060.
[5] Precision type N per Maury data sheet 5E-049.

Key Literature: Maury data sheet 2B-008.



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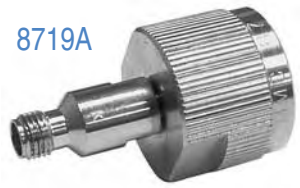
# NMD2.92mm Test Port Adapters

## 8719 Series

### Features

- *Low VSWR*
- *DC to 40 GHz*
- *Protects VNA Test Ports*
- *Ruggedized for Long Life*

8719A



8719B



8719E



8719F



### Description

Maury's 8719 series NMD2.92mm adapters are precision, low VSWR adapters designed to connect directly to the NMD-style 2.92mm male test ports on certain Agilent test sets and VNA models (including those in the PNA series). They are fully compatible with the VNA test ports, and adapt to precision 2.4mm or 2.92mm (K) connectors. Maury test port adapters provide the best possible connection between the VNA and other precision cables and devices. Their rugged construction provides for long life and highly stable, highly repeatable connections. The 8719A/B and 8719F models also act as test port savers, by absorbing the wear and tear that would otherwise affect the test port; preventing costly repairs and eliminating downtime.

### Connector Description – NMD2.92mm

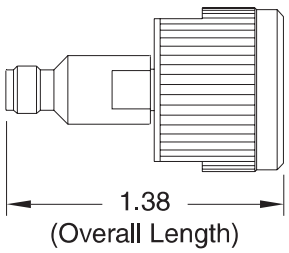
The NMD2.92mm connectors on Maury 8719 series adapters are ruggedized test-port connectors used for stable connection to a network analyzer. The female connector is only mateable to NMD male connectors via external threads on the male nut. The NMD male connectors are mateable to NMD female connectors via external threads, and can also mate to non-NMD connectors (2.92mm, SMA, or 3.5mm) via internal threads.

### Connector Description – 2.92mm (K)

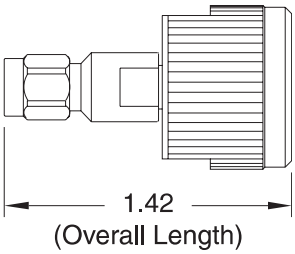
The K connectors on 8719A/B adapters are precision miniature 2.92mm air-interface connectors that are rated for operation from DC to 40 GHz. They have a mechanically compatible interface that mates with SMA and 3.5mm connectors. The K connector was originally introduced by Maury in 1974 as the MPC3 connector and re-introduced by Wiltron in 1984 as the K connector. They comply with IEEE standard 287 general precision connector, instrument grade (GPC2.92).

### Dimensions – Inches (cm)

8719A




8719B




### Available Models

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8719A | NMD2.92mm female [1] | 2.92mm (K) female [2] | DC — 4.0 ≤ 1.05 | 50 ohm | 1.23 | (3.12) |
| 8719B | NMD2.92mm female [1] | 2.92mm (K) male [2] | 4.0 — 20.0 ≤ 1.08 | 50 ohm | 1.23 | (3.12) |
| 8719F | NMD2.92mm female [1] | NMD2.92mm male [1] | 20.0 — 40.0 ≤ 1.12 | 50 ohm | 1.28 | (3.25) |
| 8719E | NMD2.92mm female [1] | NMD2.4mm male [3] | DC — 20.0 ≤ 1.08<br>20.0 — 40.0 ≤ 1.12 | 50 ohm | 1.44 | (3.66) |

Note: See 7809F on page 98 for NMD1.85mm female to 2.92mm (K) test port adapters or 7909F on page 102 for NMD2.4mm to 2.92mm (K) test port adapters.

[1] NMD2.92mm per Maury data sheet 5E-083. [2] Precision 2.92mm (K) per Maury data sheet 5E-063. [3] NMD2.4mm per Maury data sheet 5E-082.

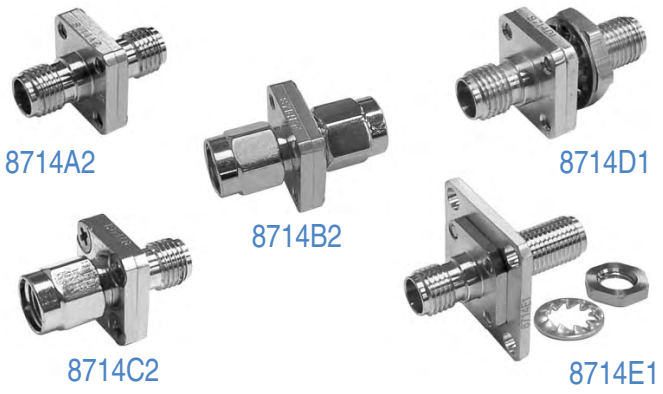
Key Literature: Maury data sheet 2B-004.



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# 2.92mm (K) In-Series Adapters

## Models 8714A2/B2/C2/D1/E1




### *Description*

Maury precision 2.92mm (K) in-series adapters are low VSWR and low loss devices that operate from DC to 40 GHz. The models 8714A2, B2 and C2 offer all combinations for adapting and are ideal for using with precision measurement applications. These adapters are minimum length, phase matched and feature a square-flange body for ease of connecting and prevents rolling off tables. They are useful as "test port savers" when used with vector network analyzers such as the Agilent 8510, etc. The 8714D1 and 8714E1 are bulkhead and panel mount feedthru adapters respectively, designed for instrumentation applications.

### *Specifications*

Frequency Range . . . . . DC – 40 GHz

Maximum VSWR . . . . . DC - 4.0 GHz, 1.05

4.0 - 20.0 GHz, 1.08

20.0 - 40.0 GHz, 1.12

Impedance . . . . . 50 ohm

Connectors . . . . . 2.92mm (K) per Maury data sheet 5E-063

### *Available Models*

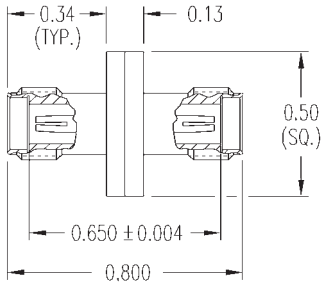
| MODEL | ADAPTS FROM | ADAPTS TO | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|
| 8714A2 | 2.92mm female [1] | 2.92mm female [1] | 0.65 | (1.65) |
| 8714B2 | 2.92mm male [1] | 2.92mm male [1] | 0.65 | (1.65) |
| 8714C2 | 2.92mm female [1] | 2.92mm male [1] | 0.65 | (1.65) |
| 8714D1 | 2.92mm female [1] | 2.92mm female [1] | 0.85 | (2.15) |
| 8714E1 | 2.92mm female [1] | 2.92mm female [1] | 0.85 | (2.15) |

[1] Precision 2.92mm per Maury data sheet 5E-063

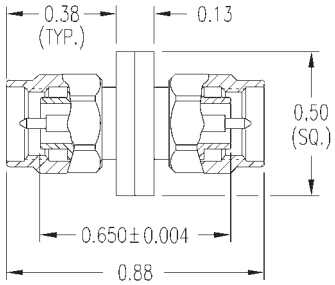
Key Literature: Maury data sheet 2B-003

### *Dimensions – Inches (cm)*

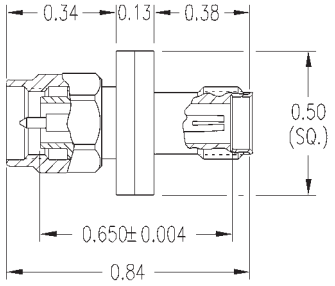
8714A2



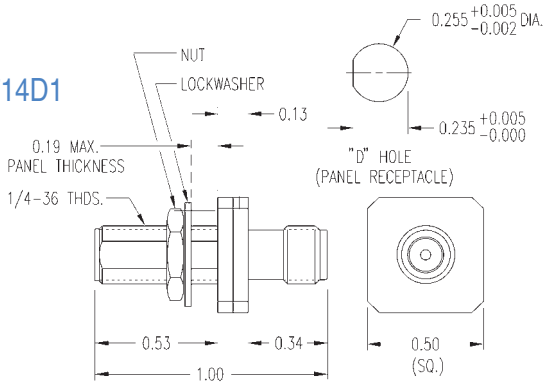

8714B2



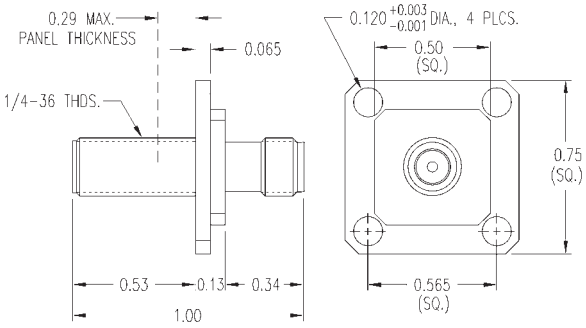

8714C2




8714D1




8714E1






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# 2.92mm Between-Series Adapters

## Models 8723A/B/C/D and 8725A/B

8723A 8723B



8723C 8723D



8725A 8725B



### *Description*

The precision adapters in these model series are designed to allow devices with 2.92mm connectors to mate with devices and cables bearing 7mm or Type N connectors. When properly mated, they provide a low VSWR connection with low insertion loss and high repeatability. Made of highly durable materials, these adapters are ideal for use in laboratory and production environments where frequent connect/ disconnect cycles occur.

The 8725A and 8725B adapters are phase matched to each other so that they may be easily interchanged for network analyzer measurement of non-insertable devices.

### *Connector Description – 2.92mm (K)*

The K connectors on 8719A/B adapters are precision miniature 2.92mm air-interface connectors that are rated for operation from DC to 40 GHz. They have a mechanically compatible interface that mates with SMA and 3.5mm connectors. The K connector was originally introduced by Maury in 1974 as the MPC3 connector and re-introduced by Wiltron in 1984 as the K connector. They comply with IEEE standard 287 general precision connector, instrument grade (GPC2.92).

### *Type N Connector Description*

The precision type N connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N). The connectors are normally made with stainless steel bodies with heat treated gold-plated beryllium copper contacts.

### *7mm Connector Description*

Maury precision 7mm connectors are miniature, instrument grade, air-interface connectors rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC7). They are normally made with gold-plated beryllim copper bodies and have a six-slot heat treated gold-plated beryllium copper center conductor contact for improved repeatability and durability. See Maury data sheet 5E-060 for interface dimensions.

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8723A | 2.92mm female [1] | Type N female [3] | DC — 4.0 ≤ 1.07 | 50 ohm | 1.614 | (4.099) |
| 8723B | 2.92mm female [1] | Type N male [3] | 4.0 — 12.0 ≤ 1.10 | 50 ohm | 1.914 | (5.014) |
| 8723C | 2.92mm male [1] | Type N female [3] | 12.0 – 18.0 ≤ 1.15 | 50 ohm | 1.614 | (4.099) |
| 8723D | 2.92mm male [1] | Type N male [3] | | 50 ohm | 1.914 | (5.014) |
| 8725A | 2.92mm female [1] | 7mm [4] | DC — 4.0 ≤ 1.05 | 50 ohm | 1.67 | (4.24) |
| 8725B | 2.92mm male [1] | 7mm [4] | 4.0 — 12.0 ≤ 1.07<br>12.0 — 18.0 ≤ 1.10 | 50 ohm | 1.67 | (4.24) |

[1] Precision 2.92mm per Maury data sheet 5E-063.

[2] MPC8 is mating compatible with SSMA connectors.

[3] Precision type N per Maury data sheet 5E-049.

[4] Precision 7mm per Maury data sheet 5E-060.

Key Literature: Maury data sheet 2B-042, 2B-043.



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# NMD3.5mm Test Port Adapters

## 2433A1, 2633C, 8009, 8619, 8679, 8691 and 8829 Series

### *Features*

- *Low VSWR*
- *DC to 18, 20 or 26.5 GHz*
- *Protects VNA Test Ports*
- *Ruggedized for Long Life*













### *Description*

Maury's NMD3.5mm adapters are precision, low VSWR adapters designed to connect directly to the NMD-style 3.5mm male test ports on certain Agilent test sets and VNA models (including those in the PNA series). They are fully compatible with the VNA test ports, and adapt to precision 3.5mm 7mm TYPE N, TNC, AFTNC, or 14mm connectors. Maury test port adapters provide the best possible connection between the VNA and other precision cables and devices. Their rugged construction provides for long life and highly stable, highly repeatable connections. The 8009A/B and 8009F models also act as test port savers, by absorbing the wear and tear that would otherwise affect the test port; preventing costly repairs and eliminating downtime.

### *Connector Description*

The NMD3.5mm female connectors on Maury test port adapters are miniature, instrument grade, air-interface connectors., rated for operate up to 18, 20 or 26.5 GHz, according to the range of the adapted connector type. For interface specifications please refer to Maury data sheet 5E-084. The NMD male connectors on 8009F units are mateable to NMD female connetors via external threads, and can also mate to non-NMD connectors via internal threads.

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8009A | NMD3.5mm female [1] | 3.5mm female [2] | DC — 18.0 ≤ 1.08<br>18.0 — 26.5 ≤ 1.12 | 50 ohm | 1.45 | (3.68) |
| 8009B | NMD3.5mm female [1] | 3.5mm male [2] | | 50 ohm | 1.49 | (3.79) |
| 8009F | NMD3.5mm female [1] | NMD3.5mm male [1] | | 50 ohm | 1.49 | (3.79) |
| 2633C | NMD3.5mm female [1] | 7mm [3] | DC — 18.0 ≤ $1.018 + 0.003f$ | 50 ohm | 1.78 | (4.53) |
| 8829A | NMD3.5mm female [1] | Type N female [4] | DC — 6.0 ≤ 1.04<br>6.0 — 18.0 ≤ 1.08 | 50 ohm | 2.04 | (5.18) |
| 8829B | NMD3.5mm female [1] | Type N male [4] | | 50 ohm | 2.20 | (5.59) |
| 8619A | NMD3.5mm female [1] | TNC female [5] | DC — 3.5 ≤ 1.06<br>3.5 — 7.0 ≤ 1.10<br>7.0 — 18.0 ≤ 1.16 | 50 ohm | 2.05 | (5.21) |
| 8619B | NMD3.5mm female [1] | TNC male [5] | | 50 ohm | 2.00 | (5.08) |
| 8691A | NMD3.5mm female [1] | AFTNC female [6] | DC — 4.0 ≤ 1.04<br>4.0 — 20.0 ≤ 1.10 | 50 ohm | 1.92 | (4.88) |
| 8691B | NMD3.5mm female [1] | AFTNC male [6] | | 50 ohm | 1.54 | (3.91) |
| 8679A | NMD3.5mm female [1] | TNCA female [7] | DC — 4.0 ≤ 1.04<br>4.0 — 20.0 ≤ 1.10 | 50 ohm | 1.92 | (4.88) |
| 8679B | NMD3.5mm female [1] | TNCA male [7] | | 50 ohm | 1.54 | (3.91) |
| 2433A1 | NMD3.5mm female [1] | 14mm [8] | DC — 8.5 ≤ $1.01 + 0.008f$ | 50 ohm | 2.32 | (5.89) |

[1] NMD3.5mm per Maury data sheet 5E-084.
[2] Precision 3.5mm per Maury data sheet 5E-062.
[3] Precision 7mm per Maury data sheet 5E-060.
[4] Precision type N per Maury data sheet 5E-049.
[5] Precision TNC per Maury data sheet 5E-053.
[6] Precision AFTNC per Maury data sheet 5E-056.
[7] Precision TNC MIL-STD 348A per Maury data sheet 5E-068.
[8] Precision 14mm per Maury data sheet 5E-068.

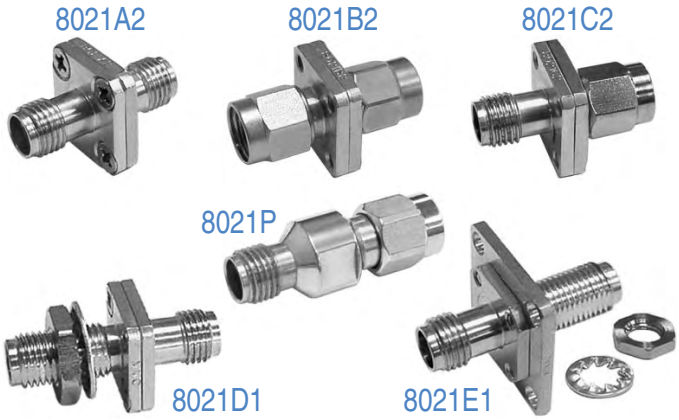
Key Literature: Maury data sheet 2B-049, 2B-049A, 2B-050, 2B-051, 2B-052, 2B-053.



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# 3.5mm In-Series Adapters

## Models 8021A/B/C/D/E/P/K/L




### Description

These precision 3.5mm adapters are low VSWR, low loss devices that operate from DC to 34 GHz. Models 8021A2, B2 and C2 offer combinations for in-series adapting and are phase matched, making them ideal for use in precision measurement applications. These adapers are minimum length and feature a square-flanged body for ease of connecting that also prevents them from rolling off flat surfaces. They are useful as “test port savers” when used with network analyzers such as the Agilent 8510, etc. Several designs are available for instrumentation applications: 8021D1 is a bulkhead feedthru models, 8021E1 is a panel mount model, and 8021K1/L1 are bull-nose panel mount adapters. 8021P is a slim-line 3.5mm female to male adapter that is designed for use in tight spaces where minimal clearance exists around the test port.

### Specifications

Frequency Range . . . . . DC – 34 GHz

| Maximum VSWR: | 8021A2/B2/C2/P | 8021D1/E1/K1/L1 |
|---|---|---|
| DC – 18 GHz | 1.05 | 1.07 |
| 18 – 26.5 GHz | 1.08 | 1.10 |
| 26.5 – 34.0 GHz | 1.12 | 1.15 |

Impedance . . . . . 50 ohm

Connectors . . . . . 3.5mm per Maury data sheet 5E-062

### Available Models

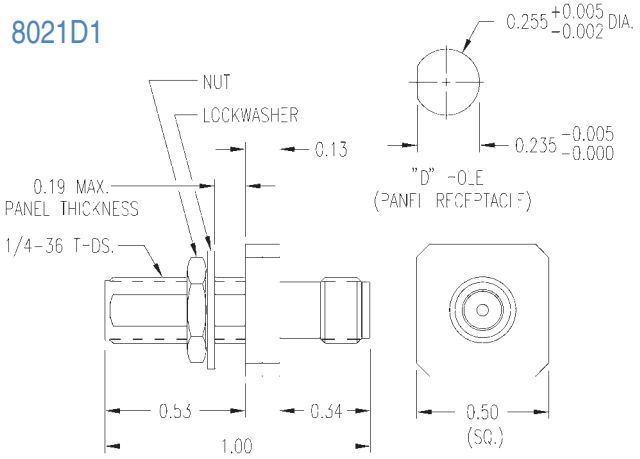
| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|
| 8021A2 | 3.5mm female [1] | 3.5mm female [1] | 0.65 | (1.65) |
| 8021B2 | 3.5mm male [1] | 3.5mm male [1] | 0.65 | (1.65) |
| 8021C2 | 3.5mm female [1] | 3.5mm male [1] | 0.65 | (1.65) |
| 8021D1 | 3.5mm female [1] | 3.5mm female [1] | 0.85 | (2.15) |
| 8021E1 | 3.5mm female [1] | 3.5mm female [1] | 0.85 | (2.15) |
| 8021P | 3.5mm female [1] | 3.5mm male [1] | 0.95 | (2.41) |
| 8021K1 | 3.5mm male [1] | 3.5mm female [1] | 1.455 | (3.69) |
| 8021L1 | 3.5mm female [1] | 3.5mm female [1] | 1.304 | (3.31) |

[1] Precision 3.5mm per Maury data sheet 5E-062.

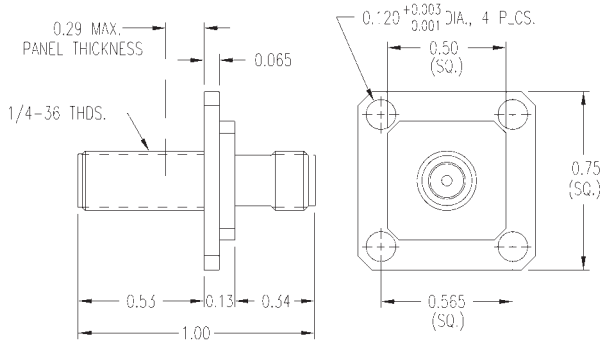
Key Literature: Maury data sheet 2B-021.

### *Dimensions – Inches (CM)*

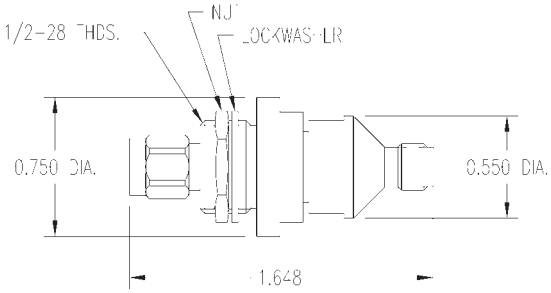
8021D1



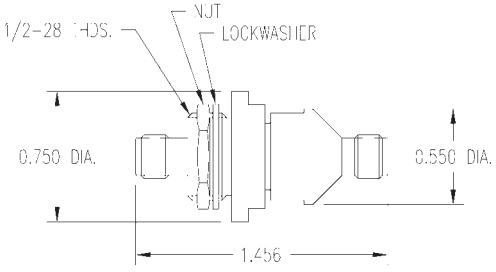

8021E1




8021K1




8021L1






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# 3.5mm (QT3.5mm™) Quick Test Adapters

## 8006 Series (U.S. Patent No. 6,21,221)

### *Features*

- *Quick, Easy Push-On/Pull-Off Design*
- *Designed for Durability and Long Life (3,000 Connect/Disconnect Cycles)*
- *Excellent Repeatability/Low VSWR*
- *Guide Sleeve Design for Automated applications*



8006E1 No Nut | 8006E11 3/8" Nut | 8006E21 9/16" Nut | 8006Q1 Guide Sleeve

### *Description*

The QT3.5mm™ male connector incorporates a quick connect design that provides for a push-on/pull-off capability that mates with any commercially available SMA, 3.5mm, and 2.92mm female connectors. The optional quick 1-1/2 turn twist nut combines the best of both worlds allowing quick connect or disconnect with the increased accuracy of a thread-on connector. In addition to the no nut and quick turn nut designs, a guide sleeve configuration is available to provide a self-aligning capability required in automated test stations.

The push-on connector offers excellent repeatability and long life making these adapters ideal for use in a production environment. The nut can also be torqued to 8 in. lbs making them suitable for test port applications where a calibration is required. The connectors come in four configurations: no nut, a 3/8" diameter nut, a 9/16" diameter nut, and a guide sleeve configuration.

### *Repeatability**

| MODE | DC — 18 GHz | 18 — 26.5 GHz |
|---|---|---|
| Push-On | > 40 dB | > 40 DB |
| Torqued to 8 in. lbs | > 50 dB | > 50 dB |
| Hand Torqued | > 50 dB | > 50 dB |

*Repeatability is based on a minimum of 3,000 connect/disconnect cycles.

### *Available Models*

| MODEL | ADAPTS SIDE A | SIDE B | FREQUENCY RANGE (GHz) | MAXIMUM VSWR (GHz) |
|---|---|---|---|---|
| 8006B1<br>8006B11<br>8006B21 | QT3.5mm™ (m) with no nut<br>QT3.5mm™ (m) with 3/8" diameter nut<br>QT3.5mm™ (m) with 9/16" diameter nut | 7mm | DC — 18.0 | DC — 4.0 ≤ 1.04<br>4.0 — 18.0 ≤ 1.08 |
| 8006C1<br>8006C11<br>8006C21 | QT3.5mm™ (m) with no nut<br>QT3.5mm™ (m) with 3/8" diameter nut<br>QT3.5mm™ (m) with 9/16" diameter nut | NMD3.5mm (f) | DC — 26.5 [1] | DC — 16.0 ≤ 1.08<br>16.0 — 26.5 ≤ 1.12 |
| 8006E1<br>8006E11<br>8006E21 | QT3.5mm™ (m) with no nut<br>QT3.5mm™ (m) with 3/8" diameter nut<br>QT3.5mm™ (m) with 9/16" diameter nut | 3.5mm (f) | DC — 26.5[1] | DC — 16.0 ≤ 1.05<br>16.0 — 26.5 ≤ 1.08 |
| 8006F1<br>8006F11<br>8006F21 | QT3.5mm™ (m) with no nut<br>QT3.5mm™ (m) with 3/8" diameter nut<br>QT3.5mm™ (m) with 9/16" diameter nut | 3.5mm (m) | DC — 26.5[1] | DC — 16.0 ≤ 1.05<br>16.0 — 26.5 ≤ 1.08 |
| 8006G1<br>8006G11<br>8006G21 | QT3.5mm™ (m) with no nut<br>QT3.5mm™ (m) with 3/8" diameter nut<br>QT3.5mm™ (m) with 9/16" diameter nut | Type N (f) | DC — 18.0 | DC — 4.0 ≤ 1.05<br>4.0 — 18.0 ≤ 1.08 |
| 8006H1<br>8006H11<br>8006H21 | QT3.5mm™ (m) with no nut<br>QT3.5mm™ (m) with 3/8" diameter nut<br>QT3.5mm™ (m) with 9/16" diameter nut | Type N (m) | DC — 18.0 | DC — 14.0 ≤ 1.05<br>4.0 — 18.0 ≤ 1.08 |
| 8006K1<br>8006K11<br>8006K21 | QT3.5mm™ (m) with no nut<br>QT3.5mm™ (m) with 3/8" diameter nut<br>QT3.5mm™ (m) with 9/16" diameter nut | NMD2.4mm (f) | DC — 26.5[1] | DC — 16.0 ≤ 1.08<br>16.0 — 26.5 ≤ 1.12 |
| 8006Q1 | QT3.5mm™ (m) guide sleeve | 3.5mm (f) | DC — 26.5[1] | DC — 16.0 ≤ 1.05<br>16.0 — 26.5 ≤ 1.08 |

[1] Slightly reduced VSWR specifications to 34 GHz.



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# 3.5mm Between-Series Adapters

## 8022, 8023, 8025, 8682, 8672 & 8028 Series




### Description

These precision adapters are used to connect 3.5mm devices to cables or devices with 7mm, type N, TNC, AFTNC, TNCA or BNC connectors. Low VSWR, low insertion loss and high repeatability, make these rugged, highly durable adapters ideal for use wherever frequent connect/disconnect cycles occur. Adapters in each model series are phase matched for VNA applications.

### 3.5mm Connector Description

Rated from DC to 34 GHz, the precision 3.5mm miniature, air-interface connectors on these adapters comply with IEEE standard 287 for instrument grade general precision connectors (GPC3.5). See Maury data sheet 5E-062 for interface dimensions.

### 7mm Connector Description

Rated from DC to 18 GHz, these precision miniature, air-interface connectors comply with IEEE standard 287 for instrument grade general precision connectors (GPC7). See page 113 for details. See Maury data sheet 5E-060 for interface dimensions.

### Type N Connector Description

Rated from DC to 18 GHz, these precision miniature, air-interface connectors comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N). See page 115 for details. Maury data sheet 5E-049 for interface dimensions.

### BNC Connector Description

Rated from DC to 10 GHz, Maury BNC series connectors conform to MIL-C-39012. The two-stud bayonet coupling connectors are normally made with stainless steel bodies with heat treated gold plated beryllium copper contacts.

### TNC Connector Descriptions

Maury offers three precision TNC connector designs:

***MPC/TNC*** **-** Precision TNC connectors that mate with most TNC connectors; specifically with MIL-C-39012/26/27 test connectors or MIL-T-81490 connectors. See page 119 for details. See also Maury data sheet 5E-053 for interface dimensions.

***AFTNC*** **-** Fully compliant with MIL-C-87104/2 "AFTNC". Tightly controlled mating dimensions ensure that mated connectors exhibit low VSWR from DC to 19 GHz. See page 119 for details. See also Maury data sheet 5E-056 for interface dimensions.

***TNCA*** **-** Fully compliant with MIL-STD 348A with low VSWR from DC to 20 GHz. See page 119 for details. See also Maury data sheet 5E-058 for interface dimensions.

### Available Models

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8022A1 | 3.5mm female [1] | 7mm | | 50 ohm | 1.67 | (4.24) |
| 8022B1 | 3.5mm male [1] | 7mm | DC — 4.0 ≤ 1.04 | 50 ohm | 1.67 | (4.24) |
| 8022A2 | 3.5mm female [1] | 7mm [2] | 4.0 — 18.0 ≤ 1.08 | 50 ohm | 1.67 | (4.24) |
| 8022B2 | 3.5mm male [1] | 7mm [2] | | 50 ohm | 1.67 | (4.24) |
| 8023A | 3.5mm female [1] | Type N female | | 50 ohm | 1.62 | (4.11) |
| 8023B1 | 3.5mm female [1] | Type N male | DC — 4.0 ≤ 1.065 | 50 ohm | 1.97 | (5.00) |
| 8023C | 3.5mm male [1] | Type N female | 4.0 — 18.0 ≤ 1.13 | 50 ohm | 1.62 | (4.11) |
| 8023D1 | 3.5mm male [1] | Type N male | | 50 ohm | 1.97 | (5.00) |
| 8025A1 | 3.5mm female [1] | TNC female | DC — 4.0 ≤ 1.06 (<1.03 typ) | 50 ohm | 1.61 | (4.10) |
| 8025B1 | 3.5mm female [1] | TNC male | 4.0 — 8.0 ≤ 1.14 (<1.07 typ) | 50 ohm | 1.61 | (4.10) |
| 8025C1 | 3.5mm male [1] | TNC female | 8.0 — 18.0 ≤ 1.20 (<1.15 typ) | 50 ohm | 1.61 | (4.10) |
| 8025D1 | 3.5mm male [1] | TNC male | | 50 ohm | 1.61 | (4.10) |
| 8682A | 3.5mm female [1] | AFTNC female | DC — 4.0 ≤ 1.04 | 50 ohm | 1.34 | (3.40) |
| 8682B | 3.5mm female [1] | AFTNC male | 4.0 — 12.0 ≤ 1.06 | 50 ohm | 1.29 | (3.28) |
| 8682C | 3.5mm male [1] | AFTNC female | 12.0 — 20.0 ≤ 1.20 | 50 ohm | 1.34 | (3.40) |
| 8682D | 3.5mm male [1] | AFTNC male | | 50 ohm | 1.29 | (3.28) |
| 8672A | 3.5mm female [1] | TNCA female | DC — 4.0 ≤ 1.04 | 50 ohm | 1.34 | (3.40) |
| 8672B | 3.5mm female [1] | TNCA male | 4.0 — 12.0 ≤ 1.06 | 50 ohm | 1.29 | (3.28) |
| 8672C | 3.5mm male [1] | TNCA female | 12.0 — 20.0 ≤ 1.20 | 50 ohm | 1.34 | (3.40) |
| 8672D | 3.5mm male [1] | TNCA male | | 50 ohm | 1.29 | (3.28) |
| 8028A | 3.5mm female [1] | BNC female | | 50 ohm | 2.00 | (5.08) |
| 8028B | 3.5mm female [1] | BNC male | DC — 4.0 ≤ 1.10 | 50 ohm | 1.91 | (4.85) |
| 8028C | 3.5mm male [1] | BNC female | 4.0 — 10.0 ≤ 1.20 | 50 ohm | 2.00 | (5.08) |
| 8028D | 3.5mm male [1] | BNC male | | 50 ohm | 1.91 | (4.85) |

[1] Precision 3.5mm per Maury data sheet 5E-062. These 3.5mm connectors are mating compatible with SMA or 2.92mm (K) connectors.
[2] High Precision 7mm test port interface with enhanced performance in VNA applications.

Key Literature: Maury data sheets 2B-022, 2B-022D, 2B-017, 2B-017A, 2B-025, and 2B-028.



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# 3.5mm Between-Series Panel Mount Adapters

## Models 8022N/P, 8023P1/P2, 8023T1/T2, 8009D/E/E1

### *Description*

The 8022N/P and 8023P/T models are precision panel mount adapters designed for use in OEM applications, special test fixturing, and custom instrumentation designs. These models adapt 3.5mm female or male connectors to 7mm or type N female or male connectors. When properly mated, they provide a low VSWR connection with low insertion loss and high repeatability. Made of highly durable materials, these adapters are ideal for use in laboratory and production environments where frequent connect/ disconnect cycles occur.

The 8009D/E/E1 are NMD3.5mm panel mount adapters designed for use in applications where the highest repeatability is critical. They adapt precision 3.5mm connectors to NMD3.5mm male connectors, and are mateable to non-NMD SMA, 2.92mm (K) and 3.5mm connectors via internal threads. The center conductors are supported by two dialectric beads for exceptional stability and long life. These models are rated for operation from DC to 26.5 GHz.

### *3.5mm Connector Description*

Maury precision 3.5mm connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 34 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC3.5).

### *7mm Connector Description*

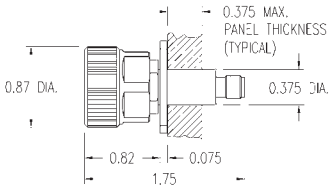
Maury precision 7mm connectors are miniature, instrument grade, air-interface connectors rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC7). They are normally made with gold-plated beryllim copper bodies and have a six-slot heat treated gold-plated beryllium copper center conductor contact for improved repeatability and durability. See Maury data sheet 5E-060 for interface dimensions.

### *Type N Connector Description*

The precision type N connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N). The connectors have stainless steel bodies with heat treated gold-plated beryllium copper contacts.

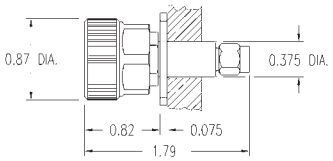


8022N



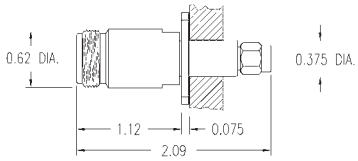



8022P

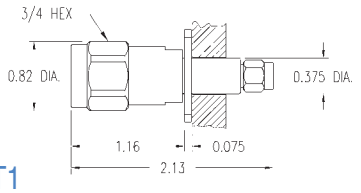





8023P1

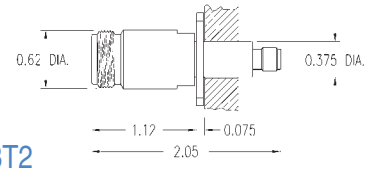


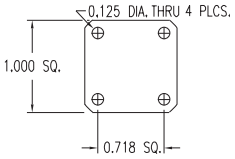

8023P2





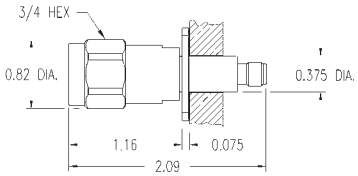

8023T1



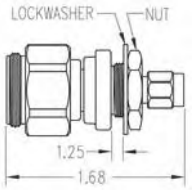

Flange Layout (8022/23)

8023T2

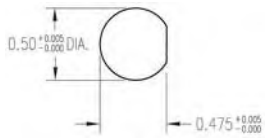



8009D






Recommended Mounting Hole (8009D)




### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8022N | 3.5mm female | 7mm | DC — 4.0 ≤ 1.04 | 50 ohm | 1.670 | (4.24) |
| 8022P | 3.5mm male | 7mm | 4.0 — 18.0 ≤ 1.08 | 50 ohm | 1.670 | (4.24) |
| 8023P1 | 3.5mm male | Type N female | DC — 4.0 ≤ 1.065 | 50 ohm | 1.611 | (4.09) |
| 8023P2 | 3.5mm male | Type N male | 4.0 — 18.0 ≤ 1.13 | 50 ohm | 1.972 | (5.01) |
| 8023T1 | 3.5mm female | Type N female | DC — 4.0 ≤ 1.065 | 50 ohm | 1.615 | (4.10) |
| 8023T2 | 3.5mm female | Type N male | 4.0 — 18.0 ≤ 1.13 | 50 ohm | 1.976 | (5.02) |
| 8009D | 3.5mm male | NMD3.5mm male | DC — 18.0 ≤ 1.06 | 50 ohm | 1.455 | (3.69) |
| 8009E | 3.5mm male | NMD3.5mm male | 18.0 — 26.5 ≤ 1.10 | 50 ohm | 1.455 | (3.69) |
| 8009E1 | 3.5mm male | NMD3.5mm male | | 50 ohm | 1.455 | (3.69) |

Key Literature: Maury data sheets 2B-022C, 2B-017A and 2B-034B.



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# 7mm Between-Series Adapters

## Series 2633, 2606, 2607, 2617, 2621, 2622, 2623, 2624, 2625, 2657, 8692 and 8696




### *Description*

Maury offers an extensive line of precision 7mm adapters in all common laboratory and systems connector types. 7mm adapters are also available for special purpose connections such as EIA rigid line connectors. Female and male adapters in the same connector series are phase matched for VNA applications. See pages 104 –112 for 7mm to 2.4mm, 2.92mm, and 3.5mm adapters.

### *7mm Connector Description*

Maury precision 7mm connectors are miniature, instrument grade, air-interface connectors rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC7). They are normally made with gold-plated beryllim copper bodies and have a six-slot heat treated gold-plated beryllium copper center conductor contact for improved repeatability and durability. See Maury data sheet 5E-060 for interface dimensions.

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 2633A | 7mm "female" [1] | 7mm [1] | DC — 18.0 ≤ 1.004 + 0.003*f* | 50 ohm | 1.62 | (4.24) |
| 2606C | 7mm [1] | Type N female [2] | DC — 4.0 ≤ 1.03<br>4.0 — 9.0 ≤ 1.04<br>9.0 – 18.0 ≤ 1.07 | 50 ohm | 1.51 | (3.84) |
| 2606D | 7mm [1] | Type N male [2] | | 50 ohm | 1.51 | (3.84) |
| 2622A1 | 7mm [1] | TNC female [3] | DC — 4.0 ≤ 1.05<br>4.0 — 18.0 ≤ 1.15 | 50 ohm | 1.68 | (4.26) |
| 2622B | 7mm [1] | TNC male [3] | | 50 ohm | 1.55 | (3.94) |
| 8692A | 7mm [1] | AFTNC female [4] | DC — 4.0 ≤ 1.04<br>4.0 — 18.0 ≤ 1.06 | 50 ohm | 1.88 | (4.78) |
| 8692B | 7mm [1] | AFTNC male [4] | | 50 ohm | 1.82 | (4.62) |
| 8696A | 7mm [1] | TNCA female [5] | DC — 4.0 ≤ 1.04<br>4.0 — 18.0 ≤ 1.06 | 50 ohm | 1.88 | (4.78) |
| 8696B | 7mm [1] | TNCA male [5] | | 50 ohm | 1.82 | (4.62) |
| 2625A | 7mm [1] | SMA female [6] | DC — 4.0 ≤ 1.05<br>4.0 — 10.0 ≤ 1.08<br>10.0 – 18.0 ≤ 1.15 | 50 ohm | 1.67 | (4.24) |
| 2625B | 7mm [1] | SMA male [6] | | 50 ohm | 1.67 | (4.24) |
| 2621A1 | 7mm [1] | BNC female | DC — 4.0 ≤ 1.06<br>4.0 — 10.0 ≤ 1.15 | 50 ohm | 2.16 | (5.48) |
| 2621B1 | 7mm [1] | BNC male | | 50 ohm | 2.07 | (5.25) |
| 8582D1 | 7mm [1] | BNC 75 ohm female | DC — 2.0 ≤ 1.05 (Typ.) | 50/75 ohm | 2.06 | (5.23) |
| 8582D2 | 7mm [1] | BNC 75 ohm male | | 50/75 ohm | 2.06 | (5.23) |
| 2623A | 7mm [1] | C female | DC — 8.0 ≤ 1.10<br>8.0 — 10.0 ≤ 1.20 | 50 ohm | 2.37 | (6.02) |
| 2623B | 7mm [1] | C male | | 50 ohm | 2.22 | (5.64) |
| 2657A | 7mm [1] | HN female [7] | DC — 4.0 ≤ 1.05<br>4.0 — 8.5 ≤ 1.12 | 50 ohm | 3.00 | (7.62) |
| 2657B | 7mm [1] | HN male [7] | | 50 ohm | 2.70 | (6.86) |
| 2624A | 7mm [1] | SC female [8] | DC — 4.0 ≤ 1.06<br>4.0 — 8.0 ≤ 1.09<br>8.0 — 10.0 ≤ 1.12 | 50 ohm | 2.36 | (5.99) |
| 2624B1 | 7mm [1] | SC male [8] | | 50 ohm | 2.22 | (5.64) |
| 2607A1 | 7mm [1] | 14mm (GR900) | DC — 8.5 ≤ 1.004 + 0.004*f* | 50 ohm | 2.01 | (5.10) |
| 2617 | 7mm [1] | 7/8 EIA | DC — 1.0 ≤ 1.02<br>1.0 — 2.0 ≤ 1.05<br>2.0 — 3.0 ≤ 1.10<br>3.0 — 4.0 ≤ 1.15 | 50 ohm | 2.68 | (6.81) |

1 7mm per Maury data sheet 5E-060.
2 Precision type N per Maury data sheet 5E-049.
3 Precision TNC per Maury data sheet 5E-053
4 Precision TNC MIL-C-87104/2 per Maury data sheet 5E-056.
5 Precision TNC MIL-STD 348A per Maury data sheet 5E-058.
6 Precision stainless steel per MIL-C-39012.
7 Precision stainless steel HN per Maury data sheet 5E-051.
8 Precision stainless steel SC per Maury data sheet 5E-050.

Key Literature: Maury data sheets 2B-022, 2B-022D, 2B-017, 2B-017A, 2B-025, 2B-028, and 2B-030.



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# Type N In-Series Adapters (50 ohm) – Phase Matched

## 8828 Series

### Description

The 8828 precision type N in-series adapters feature extremely low VSWR with low insertion loss, and are phase matched (having the same electrical insertion length) so they may be readily interchanged in network analyzer measurement applications. They are constructed with aluminum bodies. Connector bodies are made from stainless steel, and the center conductors are made from gold plated, heat treated beryllium

### Connector Description

The Maury type N connectors on these adapters are precision, miniature, instrument grade, air-interface connectors, rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N), and meet most applicable interface requirements of MIL-C-39012/1 (see footnote 2, in Figure 1 below) and they meet all applicable interface requirements of MIL-C-39012/2. The connectors will mate properly with MIL-C-71, MIL-C-39012, MIL-T-81490 and most other semi-precision type N connectors. The male connectors are provided with a 3/4-inch hex coupling nut so they can be properly torqued to 12 in. lbs. The connectors have stainless steel bodies with heat treated gold-plated beryllium copper contacts.

### Specifications

Frequency Range . . . . . DC – 18 GHz

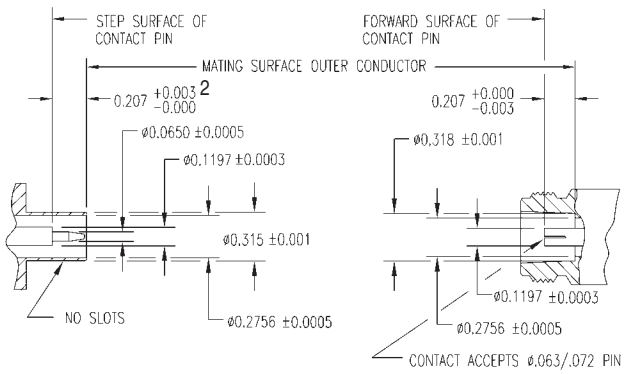
Maximum VSWR . . . . . DC – 4.0 GHz, 1.03 (<1.02 typical)
4.0 – 10.0 GHz, 1.05 (<1.03 typical)
10.0 – 18.0 GHz, 1.09 (<1.06 typical)

Impedance . . . . . 50 ohm

Insertion Loss . . . . . 0.08 dB + 0.01 dB$\sqrt{f}$ (GHz)

### Interface Dimensions – Inches

Figure 1 – Contact Pin Location




2 This dimension is .210 minimum on MIL-C-39012/1.




### Available Models

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|
| 8828A | Type N female [1] | Type N female [1] | 2.50 | (6.35) |
| 8828B | Type N male [1] | Type N male [1] | 2.50 | (6.35) |
| 8828C | Type N female [1] | Type N male [1] | 2.50 | (6.35) |

1 Precision type N per Maury data sheet 5E-049.

### Dimensions – Inches

Figure 2 – 8828A

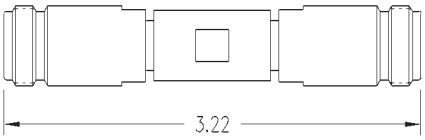



Figure 3 – 8828B

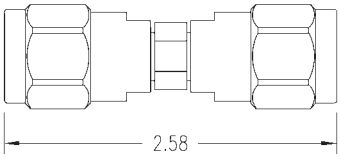
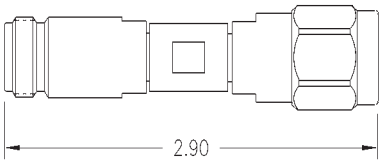



Figure 4 – 8828C




Key Literature: Maury data sheet 2B-029.



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# Type N In-Series Adapters (50 ohm)

## 8801 and 8803 Series

### Description

The 8801 beadless (air dielectric) adapters, and the 8803 bead-supported adapters both have precision type N connectors that exhibit low VSWR and low insertion loss from DC to 18 GHz. They are useful in a variety of VNA measurement applications or in general laboratory use. Two kits are available; the 8801K and 8801L; each including a selection of these adapters in a wood instrument case. (See "Available Models" below for kit contents.)



8801K
Type N
Adapter Kit

### Connector Description

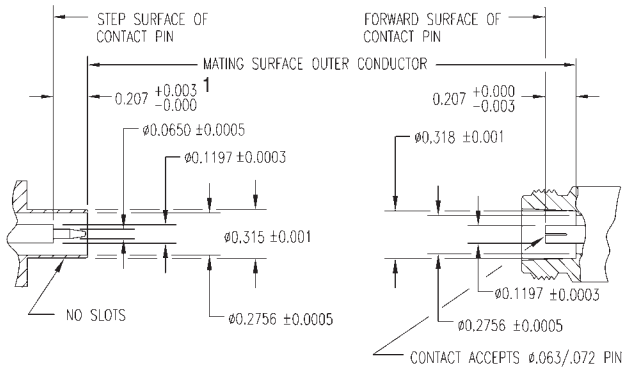
The Maury type N connectors on these adapters are precision, miniature, instrument grade, air-interface connectors, rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N), and most applicable interface requirements of MIL-C-39012/1 (see footnote 1, in Figure 1 below). They also meet all applicable interface requirements of MIL-C-39012/2, and will mate properly with MIL-C-71, MIL-C-39012, MIL-T-81490 and most other semi-precision type N connectors. The male connectors are provided with a 3/4-inch hex coupling nut so they can be properly torqued to 12 in. lbs. The connectors have stainless steel bodies with heat treated gold-plated beryllium copper contacts.

### Specifications

Frequency Range . . . . . DC – 18 GHz
Maximum Insertion Loss:
DC – 4.0 GHz . . . . . 8801 ≤ 0.07 dB; 8803 ≤ 0.1 dB
4.0 – 10.0 GHz . . . . . 8801 ≤ 0.10 dB; 8803 ≤ 0.15 dB
10.0 – 18.0 GHz . . . . . 8801 ≤ 0.15 dB; 8803 ≤ 0.25 dB
Dielectric . . . . . 8801 – Beadless; 8803 – Teflon Bead

### Dimensions – Inches

Figure 1 – Contact Pin Location




1 This dimension is .210 minimum on MIL-C-39012/1.

### Dimensions – Inches

Figure 2 – 8801A/8803A

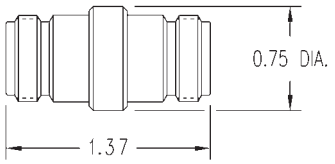



Figure 3 – 8801B/8803B

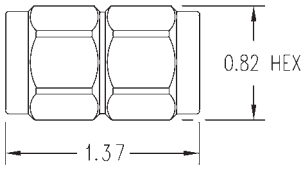
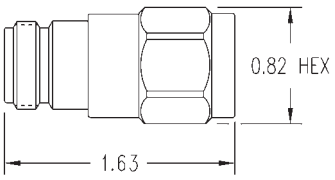



Figure 4 – 8801C/8803C




### Available Models

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8801A | Type N female [2] | Type N female [2] | DC — 4.0 ≤ 1.03 | 50 ohm | 0.657 | (1.67) |
| 8801B | Type N male [2] | Type N male [2] | 4.0 — 10.0 ≤ 1.08 | 50 ohm | 1.302 | (3.31) |
| 8801C | Type N female [2] | Type N male [2] | 10.0 — 18.0 ≤ 1.10 | 50 ohm | 1.237 | (3.14) |
| 8803A | Type N female [2] | Type N female [2] | DC — 4.0 ≤ 1.05 (<1.03 typ) | 50 ohm | 0.836 | (2.12) |
| 8803B | Type N male [2] | Type N male [2] | 4.0 — 10.0 ≤ 1.08 (<1.05 typ) | 50 ohm | 1.729 | (4.39) |
| 8803C | Type N female [2] | Type N male [2] | 10.0 — 18.0 ≤ 1.12 (<1.08 typ) | 50 ohm | 1.282 | (3.25) |
| 8803D [3] | Type N female [2] | Type N female [2] | | 50 ohm | 0.836 | (2.12) |
| 8801K | Kit consisting of one each 8801A, 8801B, 8803A and 8803B. | | | | | |
| 8801L | Kit consisting of one each of all models listed above, except the 8803D. | | | | | |

2 Precision type N per Maury data sheet 5E-049.
3 This is a precision pressurized bulkhead feedthru adapter similar to UG30/U. Outline drawing available on request.

Key Literature: Maury data sheet 2B-010.



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# Type N Between-Series Adapters (50 ohm)

## Model Series 8694, 8697, 8816, 8817, 8820, 8821 and 8822

### *Description*

Maury precision type N between-series adapters are designed for general purpose laboratory use and high precision measurement applications. They exhibit low VSWR and low insertion loss across the frequency range of the adapted connector, and are built to the same ridgid quality standards as the type N in-series adapters listed on the preceeding pages.



8816A 8816C 8817B 8816D

### *Type N Connector Description*

See pages 114-115 for a description of Maury type N connectors. See also Maury data sheet 5E-049 for interface dimensions.

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8816A | Type N female [2] | SMA female [3] | DC — 4.0 ≤ 1.05 | 50 ohm | 1.59 | (4.04) |
| 8816B | Type N female [2] | SMA male [3] | 4.0 — 10.0 ≤ 1.10 | 50 ohm | 1.59 | (4.04) |
| 8816C | Type N male [2] | SMA female [3] | 10.0 – 18.0 ≤ 1.16 | 50 ohm | 1.95 | (4.95) |
| 8816D | Type N male [2] | SMA male [3] | | 50 ohm | 1.95 | (4.95) |
| 8817A | Type N female [2] | TNC female [4] | DC — 4.0 ≤ 1.065 | 50 ohm | 1.17 | (2.97) |
| 8817B | Type N female [2] | TNC male [4] | 4.0 — 8.0 ≤ 1.10 | 50 ohm | 1.50 | (3.81) |
| 8817C | Type N male [2] | TNC female [4] | 8.0 – 12.0 ≤ 1.12 | 50 ohm | 1.53 | (3.89) |
| 8817D | Type N male [2] | TNC male [4] | 12.0 – 18.0 ≤ 1.14 | 50 ohm | 1.86 | (4.72) |
| 8694A | Type N female [2] | AFTNC female [5] | DC — 4.0 ≤ 1.04 | 50 ohm | 1.82 | (4.63) |
| 8694B | Type N female [2] | AFTNC male [5] | 4.0 — 8.0 ≤ 1.06 | 50 ohm | 1.77 | (4.48) |
| 8694C | Type N male [2] | AFTNC female [5] | 8.0 — 18.0 ≤ 1.08 | 50 ohm | 2.18 | (5.54) |
| 8694D | Type N male [2] | AFTNC male [5] | | 50 ohm | 2.13 | (5.90) |
| 8697A | Type N female [2] | TNCA female [6] | DC — 4.0 ≤ 1.04 | 50 ohm | 1.82 | (4.63) |
| 8697B | Type N female [2] | TNCA male [6] | 4.0 — 8.0 ≤ 1.06 | 50 ohm | 1.77 | (4.48) |
| 8697C | Type N male [2] | TNCA female [6] | 8.0 — 18.0 ≤ 1.08 | 50 ohm | 2.18 | (5.54) |
| 8697D | Type N male [2] | TNCA male [6] | | 50 ohm | 2.13 | (5.90) |
| 8821A1 [1] | Type N female [2] | BNC female | DC — 4.0 ≤ 1.10 | 50 ohm | 2.10 | (5.33) |
| 8821B1 [1] | Type N female [2] | BNC male | 4.0 — 10.0 ≤ 1.20 | 50 ohm | 2.01 | (5.11) |
| 8821C1 [1] | Type N male [2] | BNC female | | 50 ohm | 2.46 | (6.25) |
| 8821D1 [1] | Type N male [2] | BNC male | | 50 ohm | 2.37 | (6.02) |
| 8820A | Type N female [2] | HN female [7] | DC — 4.0 ≤ 1.08 | 50 ohm | 1.93 | (4.90) |
| 8820B1 | Type N female [2] | HN male [7] | 4.0 — 8.5 ≤ 1.20 | 50 ohm | 2.64 | (6.71) |
| 8820C | Type N male [2] | HN female [7] | | 50 ohm | 2.39 | (6.07) |
| 8820D1 | Type N male [2] | HN male [7] | | 50 ohm | 2.00 | (5.08) |
| 8822A | Type N female [2] | C female | DC — 4.0 ≤ 1.10 | 50 ohm | 1.77 | (4.50) |
| 8822B | Type N female [2] | C male | 4.0 — 10.0 ≤ 1.20 | 50 ohm | 2.13 | (5.41) |
| 8822C | Type N male [2] | C female | | 50 ohm | 2.13 | (5.41) |
| 8822D | Type N male [2] | C male | | 50 ohm | 2.49 | (6.32) |

[1] 8821A1/B1 and 8821C1/D1 are phase matched pairs.
[2] Precision type N per Maury data sheet 5E-049.
[3] Precision stainless steel SMA per MIL-C-39012.
[4] Precision stainless steel TNC per Maury data sheet 5E-053.
[5] Precision TNC per MIL-C-87104/2 per Maury data sheet 5E-056.
[6] Precision TNC per MIL-STD 348A per Maury data sheet 5E-058.
[7] Precision stainless steel HN per Maury data sheet 5E-051.

Key Literature: Maury data sheets 2B-006B, 2B-016, 2B-011, 2B-045, 2B-056, 2B-057 and 2B-058.



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# Type N Adapters (75 ohm) – Phase Matched

## 8882 Series

### Description

The 8882 type N 75 ohm adapters are manufactured with a precision version of the Maury type N interface. To help prevent the inadvertent mating of these 75 ohm adapters to 50 ohm type N connectors, a black band is incised into these adapters on the male coupling nut, or just behind the female coupling threads. 75 ohm N center conductors are smaller than 50 ohm versions, so mating a 50 ohm male to a 75 ohm female will destroy the female contact. Mating a 75 ohm male to a 50 ohm female will result in a poor electrical connection.

These adapters are phase matched (having the same electrical insertion length) within their series so they may be readily interchanged in network analyzer measurement applications, and for accurate measurement of non-insertable devices.



8882E1 8882E2 8882G12 8882G22

### Connector Description

Maury type N, 75 ohm connectors are a precision version of the Maury type N interface which meets all applicable requirements of IEC169-16. They exhibit extremely low VSWR and although rated to 2.0 GHz, they can be used at much higher frequencies. The male connectors are provided with a 3/4-inch hex coupling nut so they can be properly torqued to 12 in. lbs. See Maury data sheet 5E-054 for interface dimensions.

### Specifications

Frequency Range . . . . . DC – 2.0 GHz

Maximum VSWR:

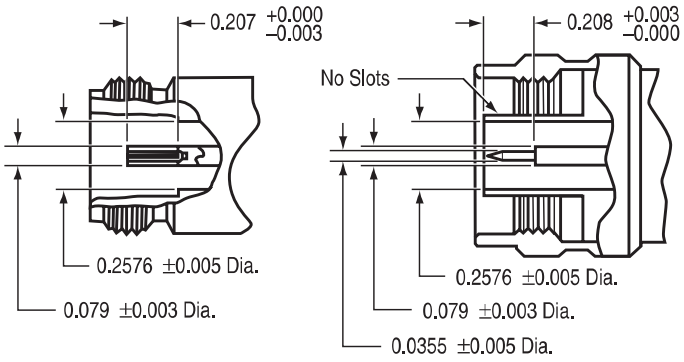
8882A/B/C . . . . . 1.03

All 75 ohm to 50 ohm models . . . . . 1.5 (75/50 ohm) typical
(calibrated out during the measurement calibration process)

Nominal Impedance . . . . . 75 ohm

### Interface Dimensions

Contact Pin Location




### Available Models (In-Series)

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|
| 8882A | Type N (F) 75 Ω [1] | Type N (F) 75 Ω [1] | 2.768 | (7.0307) |
| 8882B | Type N (M) 75 Ω [1] | Type N (M) 75 Ω [1] | 2.768 | (7.0307) |
| 8882C | Type N (F) 75 Ω [1] | Type N (M) 75 Ω [1] | 2.768 | (7.0307) |

### Available Models (Between-Series)

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|
| 8882E1 | NMD3.5mm (F) 50 Ω [2] | Type N (F) 75 Ω [1] | 1.003 | (2.5476) |
| 8882E2 | NMD3.5mm (F) 50 Ω [2] | Type N (M) 75 Ω [1] | 1.603 | (4.0716) |
| 8882G11 | Type N (F) 75 Ω [1] | 3.5mm (F) 50 Ω [3] | 1.748 | (4.4399) |
| 8882G12 | Type N (F) 75 Ω [1] | 3.5mm (M) 50 Ω [3] | 1.748 | (4.4399) |
| 8882G21 | Type N (M) 75 Ω [1] | 3.5mm (F) 50 Ω [3] | 1.748 | (4.4399) |
| 8882G22 | Type N (M) 75 Ω [1] | 3.5mm (M) 50 Ω [3] | 1.748 | (4.4399) |
| 8882D1 | Type N (F) 75 Ω [1] | 7mm 50 Ω [4] | 2.277 | (5.7836) |
| 8882D2 | Type N (M) 75 Ω [1] | 7mm 50 Ω [4] | 2.277 | (5.7836) |
| 8882F11 | Type N (F) 75 Ω [1] | Type N (F) 50 Ω [5] | 2.634 | (6.6904) |
| 8882F12 | Type N (F) 75 Ω [1] | Type N (M) 50 Ω [5] | 2.634 | (6.6904) |
| 8882F21 | Type N (M) 75 Ω [1] | Type N (F) 50 Ω [5] | 2.634 | (6.6904) |
| 8882F22 | Type N (M) 75 Ω [1] | Type N (M) 50 Ω [5] | 2.634 | (6.6904) |

[1] Precision Type N - 75 ohm per Maury data sheet 5E-054.
[2] NMD3.5mm per Maury data sheet 5E-084.
[3] Precision 3.5mm per Maury data sheet 5E-062.
[4] Precision 7mm per Maury data sheet 5E-060.
[5] Precision type N per Maury data sheet 5E-049.

Key Literature: Maury data sheet 2B-031.



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# LPC/OSP™ Between-Series Adapters

## 8787 Series




### Description

The LPC/OSP™ [1] adapters are designed to provide a precisely repeatable mated interface for calibration purposes and for test of production components which use the standard OSP™ [2] series blind-mate connectors.

Interface dimensions of the connectors are tightly controlled. A hexagonal coupling nut on the male connector, allows torquing to 8 in/lb with a calibrated torque wrench to further improve the repeatability of a mated pair. Both the female and male connectors are fully mating compatible with the standard OSP™ series and with Dynawave's Dynamate™ series [3] blind-mate connectors.

Most adapters in the same series are phase matched and may be interchanged for VNA measurement of non-insertable devices.

### 3.5mm Connector Description

The Maury precision 3.5mm connectors on these adapters are miniature, instrument grade, air-interface connectors that are rated for operation from DC to 34 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC3.5).

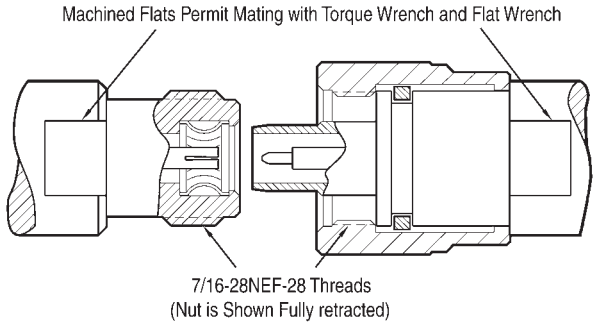
### 7mm Connector Description

Maury precision 7mm connectors are miniature, instrument grade, air-interface connectors rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC7). They are normally made with gold-plated beryllim copper bodies and have a six- slot heat treated gold-plated beryllium copper center conductor contact for improved repeatability and durability. See Maury data sheet 5E-060 for interface dimensions.

### Type N Connector Description

The Maury type N connectors on these adapters are precision, miniature, instrument grade, air-interface connectors, rated for operation from DC to 18 GHz. They comply with IEEE standard 287 for instrument grade general precision connectors (GPC Type N), and meet most applicable interface requirements of MIL-C-39012/1 (see Note 7, below) and they meet all applicable interface requirements of MIL-C-39012/2. The connectors will mate properly with MIL-C-71, MIL-C-39012, MIL-T-81490 and most other semi-precision type N connectors. The male connectors are provided with a 3/4-inch hex coupling nut so they can be properly torqued to 12 in. lbs. The connectors have stainless steel bodies with heat treated gold-plated beryllium copper contacts.

### Maury Improved LCP/OSP™ Interface




### Available Models

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 8787Q | LPC/OSP™ female [1] | 3.5mm female [4] | | 50 ohm | 1.50 | (3.81) |
| 8787R | LPC/OSP™ female [1] | 3.5mm male [4] | DC — 4.0 ≤ 1.04 | 50 ohm | 1.50 | (3.81) |
| 8787S | LPC/OSP™ male [1] | 3.5mm female [4] | 4.0 — 18.0 ≤ 1.08 | 50 ohm | 1.50 | (3.81) |
| 8787T | LPC/OSP™ male [1] | 3.5mm male [4] | | 50 ohm | 1.50 | (3.81) |
| 8787G | LPC/OSP™ female [1] | 7mm [5] | DC — 4.0 ≤ 1.04 | 50 ohm | 2.10 | (5.32) |
| 8787H | LPC/OSP™ male [1] | 7mm [5] | 4.0 — 18.0 ≤ 1.08 | 50 ohm | 2.10 | (5.32) |
| 8787J | LPC/OSP™ female [1] | Type N male [6] | DC — 4.0 ≤ 1.065 | 50 ohm | 2.40 | (6.08) |
| 8787K | LPC/OSP™ male [1] | Type N male [6] | 4.0 — 18.0 ≤ 1.13 | 50 ohm | 2.40 | (6.08) |

[1] Precision LCP/OSP™ per Maury data sheet 5E-065.
[2] OSP™ is a tradmark of M/A-Com, Inc.
[3] Dynamate™ is a trademark of Dynawave, Inc.
[4] Precision 3.5mm per Maury data sheet 5E-062.
[5] Precision 7mm per Maury data sheet 5E-060.
[6] Precision type N per Maury data sheet 5E-049.
[7] This dimension is .210 minimum on MIL-C-39012/1.

Key Literature: Maury data sheets 2B-022C, 2B-017A and 2B-034B.



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# TNC In-Series Adapters

## 232, 8688 & 8678 Series

### *Description*

Because TNC interfaces vary from maker to maker, compatibility must be verified before connectors of different specification types are mated. Mating different specification types degrades electrical performance and risks damage to connector interfaces. Maury application note 5A-031 dis- cusses the most common TNC con-nectors and compatibility issues that arise if specification types are mixed. See also Maury data sheet 5E-057A to check the compatibility of your TNC connectors.

### *TNC Connector Descriptions*

***Maury offers three precision TNC connector designs:***

***MPC/TNC -*** Precision TNC connectors that mate with most commercially available TNC connectors and specifically with MIL-C-39012/26/27 test connectors or MIL-T-81490 connectors. This design is used in the 232A11/B11/C11 models and – with some modifications – in the 232A2/B2/C2 models.

Models 232A11/B11/C11 are designed per the Maury 5E-053 interface standard and are intended for general purpose precision test applications. These adapters are recommended for use with dialectrically loaded TNC interfaces. Because they are ideal for use in VNA application these adapters are provided in Maury 8650E series VNA calibration kits (see page 28).

Models 232A2/B2/C2 are designed per the Maury 5E-053A interface standard; an improved MPC/TNC version that is mating compatible with all common military and IEC specification TNC connectors. This includes MIL-STD-348A standard and test connectors (which replace MIL-C-39012 connectors), MIL-T-81490, and IEC 169-17 G0 and G2 connectors.

All 232 series adapters exhibit low VSWR when properly mated and are usable to 18 GHz.

***AFTNC -*** Fully compliant with MIL-C-87104/2 "AFTNC" design standards. Mating dimensions are tightly controlled to ensure low VSWR from DC to 20 GHz. In this design, the male connector utilizes a solid outer conductor configuration to provide consistent measurement results. For long life and reliability, connector bodies are fabricated from solid stainless steel, with gold-plated, heat treated beryllium copper contacts. See Maury data sheet 5E-056 for interface dimensions.




This design is used in the 8688A/B/C in-series adapters (listed below). For optimum perfomance, models 8688A/B/C should only be used with other MIL-C-87104/2 connectors.

***TNCA -*** Fully compliant with MIL-STD 348A with tightly controlled interface dimensions to ensure low VSWR from DC to 20 GHz. This design is used in the 8678A/B/C in-series adapters listed below. In the 8678A/B/C models, the male connector utilizes a solid outer conductor configuration to provide consistent measurement results. When properly mated, these adapters exhibit low VSWR from DC to 20 GHz. When mated to TNC connectors governed by other specifications, reduced performance can be expected. Connector bodies are made from stainless steel, and contacts are made from gold-plated, heat treated beryllium copper to ensure long life and reliability. See Maury data sheet 5E-058 for interface dimensions.

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 232A11 | TNC female [1] | TNC female [1] | DC — 4.0 ≤ 1.06 | 50 ohm | 1.35 | (3.43) |
| 232B11 | TNC male [1] | TNC male [1] | 4.0 — 7.0 ≤ 1.10 | 50 ohm | 1.35 | (3.43) |
| 232C11 | TNC female [1] | TNC male [1] | 7.0 — 18.0 ≤ 1.14 | 50 ohm | 1.35 | (3.43) |
| 232A2 | TNC female [2] | TNC female [2] | DC — 4.0 ≤ 1.06 | 50 ohm | 1.35 | (3.43) |
| 232B2 | TNC male [2] | TNC male [2] | 4.0 — 7.0 ≤ 1.10 | 50 ohm | 1.35 | (3.43) |
| 232C2 | TNC female [2] | TNC male [2] | 7.0 — 18.0 ≤ 1.14 | 50 ohm | 1.35 | (3.43) |
| 8688A | AFTNC female [3] | AFTNC female [3] | DC — 4.0 ≤ 1.04 | 50 ohm | 2.10 | (5.33) |
| 8688B | AFTNC male [3] | AFTNC male [3] | 4.0 — 8.0 ≤ 1.08 | 50 ohm | 1.95 | (4.95) |
| 8688C | AFTNC female [3] | AFTNC male [3] | 8.0 — 20.0 ≤ 1.12 | 50 ohm | 2.00 | (5.08) |
| 8678A | TNCA female [4] | TNCA female [4] | DC — 4.0 ≤ 1.04 | 50 ohm | 2.10 | (5.33) |
| 8678B | TNCA male [4] | TNCA male [4] | 4.0 — 8.0 ≤ 1.08 | 50 ohm | 1.95 | (4.95) |
| 8678C | TNCA female [4] | TNCA male [4] | 8.0 — 20.0 ≤ 1.12 | 50 ohm | 2.00 | (5.08) |

[1] Precision TNC per Maury data sheet 5E-053.
[2] Precision TNC per Maury data sheet 5E-053A.
[3] Precision TNC per Maury data sheet 5E-056.
[4] Precision TNCA per Maury data sheet 5E-058.

Key Literature: Maury data sheets 2B-007, 2B-046.



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# 14mm Between-Series Adapters

## 2406, 2407 and 2709 Series; EIA Model 2417B

### *Description*

Maury 14mm coaxial adapters utilize precision air dielectric connectors that are fully mating compatible with, and equivalent to, the GR900BT connector. These connectors are often used in highly critical laboratory applications at frequencies up to 8.5 GHz. They feature improved center conductor inner contacts (model 2481A) and outer connector bodies with a one-inch Hex/Knurl coupling nut for accurate tightening with a calibrated torque wrench. Coupled junctions that are properly tightened with a calibrated torque wrench offer greatly enhanced measurement repeatability and accuracy.

14mm Adapters are offered for precision3.5mm, type N, 7-16, and 7/8 EIA rigid line connectors. The 3.5mm adapters can also be used for connection to SMA and 2.92mm (the frequency range is limited to 8.5 GHz by the 14mm connector). To adapt from 14mm to 7mm, please see model 2607A1(see page 113).

In addition to coaxial adapters, Maury also offers a full line of components utilizing the 14mm precision interface. Many of these are direct replacements for the original GR models. Please contact our Sales Department for a cross reference to the original GR model numbers. Maury 14mm products also include VNA calibration kits, directional couplers and noise terminations.

### *14mm Connector Description*

The precision 14mm connectors are instrument grade, air-interface connectors that are rated for operation from DC to 8.5 GHz. The connectors are normally made with stainless steel bodies with heat treated gold plated beryllium copper contacts. They are also known as GR900 (General Radio) connectors.




### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 2407A1 [1] | 14mm (GR900) [3] | 3.5mm female [4] | DC — 8.5 ≤ 1.020 + 0.008$f$ | 50 ohm | 2.01 | (5.11) |
| 2407B1 [1] | 14mm (GR900) [3] | 3.5mm male [4] | DC — 8.5 ≤ 1.020 + 0.008$f$ | 50 ohm | 2.01 | (5.11) |
| 2406C1 | 14mm (GR900) [3] | Type N female [5] | DC — 8.5 ≤ 1.006 + 0.006$f$ | 50 ohm | 1.95 | (4.95) |
| 2406D1 | 14mm (GR900) [3] | Type N male [5] | DC — 8.5 ≤ 1.006 + 0.006$f$ | 50 ohm | 2.03 | (5.16) |
| 2709A [2] | 14mm (GR900) [3] | 7-16 female [6] | DC — 7.5 ≤ 1.006 + 0.006$f$ | 50 ohm | 1.81 | (4.60) |
| 2709B [2] | 14mm (GR900) [3] | 7-16 male [6] | DC — 7.5 ≤ 1.006 + 0.006$f$ | 50 ohm | 1.81 | (4.60) |
| 2417B | 14mm (GR900) [3] | 7/8 EIA | DC — 5.0 ≤ 1.012 + 0.008$f$ | 50 ohm | 3.04 | (7.72) |

[1] 2407A1 and 2407B1 are phase matched for VNA applications.
[2] 2709A and 2709B are phase matched for VNA applications.
[3] Precision 14mm (GR900) per Maury data sheet 5E-068.
[4] Precision 3.5mm per Maury data sheet 5E-062.
[5] Precision type N per Maury data sheet 5E-049.
[6] Precision 7-16 per Maury data sheet 5E-066.

Key Literature: Maury data sheet 2B-020.



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# 7-16 In-Series and Between-Series Adapters

## 2705, 2706, 2707 and 2712 Series

### *Description*

These adapters are precision 7-16 to 3.5mm, 7mm, type N or 7mm connectors which cover the frequency ranges from DC to 7.5 GHz. They are fabricated from stainless steel and beryllium copper alloy to provide a rugged, long-wearing and highly repeatable interface with very low VSWR. These characteristics make them ideal for use in laboratory measurement enviornments and in wireless applications.

Adapters in the same model series are phase matched so that they can be readily interchanged for VNA measurement of non-insertable devices. Maury also supplies these adapters in sets, and together with a full complement of calibration standards in the 2750 series VNA calibration kits (see page 40–41).




### *7-16 Connector Description*

The Maury 7-16 interface is designed to provide a standard test interface that is tighter controlled than the grade "0" standard test connectors specified by European Standard EN 122190 and British Standard BSEN 122190. This interface also complies with the requirements of the "Reference Connector" specified in IEC standard publication 169-4 and is designed to be used as a test connector for all devices which use the general purpose 7-16 connector described in all three standards. Recommended torque value when mating these connectors to themselves or to general purpose 7-16 connectors is 20.0 in/lb. (See Maury data sheet 5E-066 for interface dimensions.)

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | NOMINAL IMPEDANCE | INSERTION LENGTH INCHES | INSERTION LENGTH (CM) |
|---|---|---|---|---|---|---|
| 2705A | 7-16 female [1] | 3.5mm female [2] | DC — 7.5 ≤ 1.04 | 50 ohm | 2.45 | (6.21) |
| 2705B | 7-16 female [1] | 3.5mm male [2] | | | | |
| 2705C | 7-16 male [1] | 3.5mm female [2] | | | | |
| 2705D | 7-16 male [1] | 3.5mm male [2] | | | | |
| 2707A | 7-16 female [1] | 7mm [3] | DC — 7.5 ≤ 1.03 | 50 ohm | 2.56 | (6.50) |
| 2707B | 7-16 male [1] | 7mm [3] | | | | |
| 2707C * | 7-16 male [1, 5] | 7mm [3] | | | | |
| 2706A | 7-16 female [1] | Type N female [4] | DC — 7.5 ≤ 1.03 | 50 ohm | 2.86 | (7.26) |
| 2706B | 7-16 female [1] | Type N male [4] | | | | |
| 2706C | 7-16 male [1] | Type N female [4] | | | | |
| 2706D | 7-16 male [1] | Type N male [4] | | | | |
| 2706E * | 7-16 male [1, 5] | Type N female [4] | | | | |
| 2706F * | 7-16 male [1, 5] | Type N male [4] | | | | |
| 2712A | 7-16 female [1] | 7-16 female [1] | DC — 7.5 ≤ 1.025 | 50 ohm | 1.83 | (4.65) |
| 2712B | 7-16 male [1] | 7-16 male [1] | | | | |
| 2712C | 7-16 female [1] | 7-16 male [1] | | | | |

* Special short-face design made to facilitate a proper connect with air lines.

[1] Precision 7-16 per Maury data sheet 5E-066.
[2] Precision 3.5mm per Maury data sheet 5E-062.
[3] Precision 7mm per Maury data sheet 5E-060.
[4] Precision type N per Maury data sheet 5E-049.
[5] Test port adapter for use with precision 7-16 beadless air lines.

Key Literature: Maury data sheet 2B-080, 2B-081, 2B-082 and 2B-083.



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# Waveguide To Coaxial Adapters — Right Angle Launch

## WR650–WR22 to 2.4mm, 2.92mm, 3.5mm, SMA, 7mm, Type N, and TNC

### *General Information*

Maury produces a comprehensive lines of waveguide to coaxial adapters. Our adapters set the standards for high precision laboratory test and measurement applications, and for systems applications where accuracy and durability are important. These adapters feature precision index holes and lapped flanges to facilitate proper mating; ensuring that your system will deliver the critical performance demanded by the most exacting measurement tasks.

Maury waveguide to coaxial adapters include right angle and end launch configurations. They are available in all common waveguide sizes, covering frequencies from DC to 50 GHz. They adapt to 2.4mm, 2.92mm, 3.5mm, 7mm, type N, TNC and SMA coaxial connector types.

If you require an adapter not listed in this catalog, please contact our Sales Department or your local Maury representative. Special adapters in large waveguide sizes such as WR975 (0.76 to 1.15 GHz), in uncommon sizes (e.g.: WR102), and in half-height waveguide can also be provided. We can also provide units with less common connectors such as SC, 14mm (GR900) and EIA rigid line (7/8, 1-5/8, etc.). Other special adapters have been built for space flight environments.

### *Description*

Maury right angle launch adapters feature low VSWR and low insertion loss. Except where noted, flanges are in accordance with the listing on page 128. Most of the adapters shown incorporate precision index holes in the flange for precise mating alignment and connection repeatability. Please consult the factory for detailed flange interface information.

### *Specifications*

Frequency Range . . . . . 1.12 – 40.0 GHz (in waveguide bands)

Maximum VSWR. . . . . 1.25 (<1.15 typical)

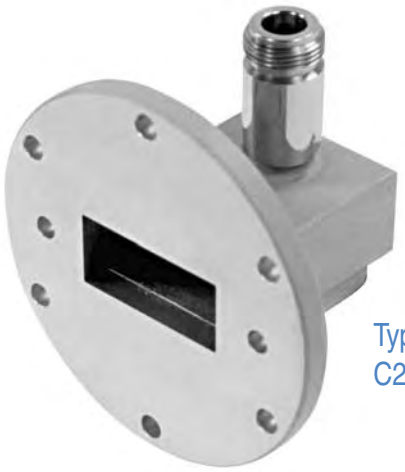
Flanges . . . . . Cover Type, see page 128

### *VSWR Options*

Improved VSWR is provided on adapters with a numeric suffix to the model number (e.g., X200A2).

| Model Suffix | Maximum VSWR |
|---|---|
| 2 | 1.05 |
| 8 | 1.07 |
| 1 | 1.10 |
| 6 | 1.15 |
| 3 | 1.20 |
| 7 | 1.25 |

Many adapters can be provided with improved VSWR over their full or partial waveguide bands. Our Sales Department will gladly assist you with this and other application specific requirements. Information on specific models such as loss, power handling and dimensions will be provided on request.



Type N
C213D2



7mm
X209D2



SMA
P211D



2.92mm
K210C1



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# Waveguide To Coaxial Adapters — Right Angle Launch

## Available Models

### *Right Angle Launch EIA WR to 2.4mm, 2.92mm and 3.5mm Connectors*

| FREQUENCY RANGE (GHz) | EIA WR NUMBER | MODEL (BY COAXIAL CONNECTOR TYPE) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2.4mm female | 2.4mm male | 2.92mm female | 2.92mm male | 3.5mm female | 3.5mm male |
| 1.70 – 2.60 | 430 | — | — | — | — | R200A1 | R200B1 |
| 2.20 – 3.30 | 340 | — | — | — | — | — | — |
| 2.60 – 3.95 | 284 | — | — | — | — | S200A1 | S200B1 |
| 3.30 – 4.90 | 229 | — | — | — | — | E200A1 | E200B1 |
| 3.95 – 5.85 | 187 | — | — | — | — | G200A1 | G200B1 |
| 4.90 – 7.05 | 159 | — | — | — | — | F200A1 | F200B1 |
| 5.85 – 8.20 | 137 | — | — | — | — | C200A1 | C200B1 |
| 7.05 – 10.00 | 112 | — | — | — | — | H200A1 | H200B1 |
| 8.20 – 12.40 | 90 | X236A1 | X236B1 | — | — | X200A2 | X200B2 |
| 10.00 – 15.00 | 75 | — | — | — | — | M200A2 | M200B2 |
| 12.40 – 18.00 | 62 | P236A1 | P236B1 | — | — | P200A2 | P200B2 |
| 15.00 – 22.00 | 51 | N236A1 | N236B1 | — | — | N200A2 | N200B2 |
| 18.00 – 26.50 | 42 | K236A1 | K236B1 | K210C1 | K211C1 | K200A1 | K200B1 |
| 22.00 – 33.00 | 34 | Q236A1 | Q236B1 | — | — | Q200A3 | Q200B3 |
| 26.50 – 40.00 | 28 | U236A6 | U236B6 | U210C6 | U211C6 | U200A1 [1] | U200B1 [1] |
| 33.00 – 50.00 | 22 | J236A3 | J236B3 | — | — | — | — |

### *Right Angle Launch EIA WR to SMA, 7mm, Type N and TNC Connectors*

| FREQUENCY RANGE (GHz) | EIA WR NUMBER | MODEL (BY COAXIAL CONNECTOR TYPE) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | SMA female [2] | SMA male [2] | 7mm | Type N female | Type N male | TNC female | TNC male |
| 1.12 – 1.70 | 650 | — | — | L209A1 | L213A1 | L214A1 | — | — |
| 1.70 – 2.60 | 430 | — | — | R209A2 | R213A2 | R214A2 | — | — |
| 2.20 – 3.30 | 340 | — | — | D209A2 | D213A1 | D214A1 | — | — |
| 2.60 – 3.95 | 284 | — | — | S209D2 | S213D2 | S214D2 | — | — |
| 3.30 – 4.90 | 229 | — | — | E209A2 | E213A2 | E214A2 | — | — |
| 3.95 – 5.85 | 187 | — | — | G209D2 | G213D2 | G214D2 | — | — |
| 4.90 – 7.05 | 159 | — | — | F209A2 | F213A2 | F214A2 | — | — |
| 5.85 – 8.20 | 137 | C210D | C211D | C209D2 | C213D2 | C214D2 | — | — |
| 7.05 – 10.00 | 112 | H210D | H211D | H209D2 | H213D2 | H214D2 | — | — |
| 8.20 – 12.40 | 90 | X210D | X211D | X209D2 | X213D2 | X214D2 | — | — |
| 10.00 – 15.00 | 75 | M210D1 | M211D1 | M209D2 | M213D2 | M214D2 | M215D1 | M216D1 |
| 12.40 – 18.00 | 62 | P210D | P211D | P209D2 | P213D2 | P214D2 | — | — |
| 15.00 – 22.00 | 51 | N210D | N211D | — | — | — | — | — |
| 18.00 – 26.50 | 42 | — | — | — | — | — | — | — |
| 26.50 – 40.00 | 28 | — | — | — | — | — | — | — |

[1] 3.5mm WR28 models are rated to 34 GHz. Use 2.92mm adapters, which are mating compatible, for full band coverage.

[2] Use 3.5mm adapters in bands not covered.



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# Waveguide To Coaxial Adapters — End Launch

## WR430–WR22 to 2.4mm, 2.92mm, 3.5mm, SMA, 7mm, and Type N

### *General Information*

Maury produces a comprehensive lines of waveguide to coaxial adapters. Our adapters set the standards for high precision laboratory test and measurement applications, and for systems applications where accuracy and durability are important. These adapters feature precision index holes and lapped flanges to facilitate proper mating; ensuring that your system will deliver the critical performance demanded by the most exacting measurement tasks.

Maury waveguide to coaxial adapters include right angle and end launch configurations. They are available in all common rectangular waveguide sizes, covering frequencies from DC to 50 GHz. They adapt to 2.4mm, 2.92mm, 3.5mm, 7mm, type N and SMA coaxial connector types.

If you require an adapter not listed in this catalog, please contact our Sales Department or your local Maury representative. Special adapters in large waveguide sizes such as WR975 (0.76 to 1.15 GHz), in uncommon sizes (e.g.: WR102), and in half-height waveguide can also be provided. We can also provide units with less common connectors such as SC, 14mm (GR900) and EIA rigid line (7/8, 1-5/8, etc.). Other special adapters have been built for space flight environments.



Type N
E221A1

### *Description*

Maury end launch adapters feature low VSWR and low insertion loss. Except where noted, flanges are in accordance with the listing on page 128. Most of the adapters shown incorporate precision index holes in the flange for precise mating alignment and connection repeatability. Please contact us for detailed flange interface information.



7mm
X229A2

### *Specifications*

Frequency Range . . . . . 1.7 – 40.0 GHz
(in waveguide bands)

Maximum VSWR . . . . . 1.25 (<1.15 typical) to 18.0 GHz
1.30 (< 1.20 typical) to 50.0 GHz

Flanges . . . . . Cover Type, see page 128



3.5mm
K230B6

### *VSWR Options*

Improved VSWR is provided on adapters with a numeric suffix to the model number (e.g.,X230A1).

| Model Suffix | Maximum VSWR |
|---|---|
| 2 | 1.05 |
| 8 | 1.07 |
| 1 | 1.10 |
| 6 | 1.15 |
| 3 | 1.20 |
| 7 | 1.25 |



2.4mm
U237A1

Many adapters can be provided with improved VSWR over their full or partial waveguide bands. Our Sales Department will gladly assist you with this and other application specific requirements. Information on specific models such as loss, power handling and dimensions will be provided on request.



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# Waveguide To Coaxial Adapters — End Launch

## Available Models

### *End Launch EIA WR to 2.4mm, 2.92mm, and 3.5mm Connectors*

| FREQUENCY RANGE (GHz) | EIA WR NUMBER | MODEL (BY COAXIAL CONNECTOR TYPE) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2.4mm female | 2.4mm male | 2.92mm female | 2.92mm male | 3.5mm female | 3.5mm male |
| 1.70 – 2.60 | 430 | — | — | — | — | — | — |
| 2.60 – 3.95 | 284 | — | — | — | — | — | — |
| 3.30 – 4.90 | 229 | — | — | — | — | E230A1 | E230B1 |
| 3.95 – 5.85 | 187 | — | — | — | — | G230A1 | G230B1 |
| 4.90 – 7.05 | 159 | — | — | — | — | — | — |
| 5.85 – 8.20 | 137 | — | — | — | — | C230A1 | C230B1 |
| 7.05 – 10.00 | 112 | — | — | — | — | H230A1 | H230B1 |
| 8.20 – 12.40 | 90 | — | — | — | — | X230A1 | X230B1 |
| 10.00 – 15.00 | 75 | — | — | — | — | M230A1 | M230B1 |
| 12.40 – 18.00 | 62 | — | — | — | — | P230A2 | P230B2 |
| 15.00 – 22.00 | 51 | — | — | — | — | N230A3 | N230B3 |
| 18.00 – 26.50 | 42 | K237A2 | K237B2 | K233A8 | K233B8 | K230A6 | K230B6 |
| 22.00 – 33.00 | 34 | Q237A2 | Q237B2 | — | — | — | — |
| 26.50 – 40.00 | 28 | U237A1 | U237B1 | U233A1 | U233B1 | U230A7 [1] | U230B7 [1] |
| 33.00 – 50.00 | 22 | J237A6 | J237B6 | — | — | — | — |

### *End Launch EIA WR to SMA, 7mm, and Type N Connectors*

| FREQUENCY RANGE (GHz) | EIA WR NUMBER | MODEL (BY COAXIAL CONNECTOR TYPE) | | | | |
|---|---|---|---|---|---|---|
| | | SMA female [2] | SMA male [2] | 7mm | Type N female | Type N male |
| 1.70 – 2.60 | 430 | — | — | R229A1 | R221A | R221B |
| 2.60 – 3.95 | 284 | — | — | S229A1 | S221A1 | S221B1 |
| 3.30 – 4.90 | 229 | — | — | E229A1 | E221A1 | E221B1 |
| 3.95 – 5.85 | 187 | — | — | G229C1 | G221A1 | G221B1 |
| 4.90 – 7.05 | 159 | — | — | F229C1 | F221A1 | F221B1 |
| 5.85 – 8.20 | 137 | — | — | C229A1 | C221A1 | C221B1 |
| 7.05 – 10.00 | 112 | — | — | H229A2 | H221A | H221B |
| 8.20 – 12.40 | 90 | — | — | X229A2 | X221A2 | X221B2 |
| 10.00 – 15.00 | 75 | — | — | M229A2 | M221A2 | M221B2 |
| 12.40 – 18.00 | 62 | P223A | P223B | P229A2 | P221A2 | P221B2 |
| 15.00 – 22.00 | 51 | — | — | — | — | — |
| 22.00 – 33.00 | 34 | — | — | — | — | — |
| 18.00 – 26.50 | 42 | — | — | — | — | — |
| 26.50 – 40.00 | 28 | — | — | — | — | — |

[1] 3.5mm WR28 models are rated to 34 GHz. Use 2.92mm adapters, which are mating compatible, for full band coverage.

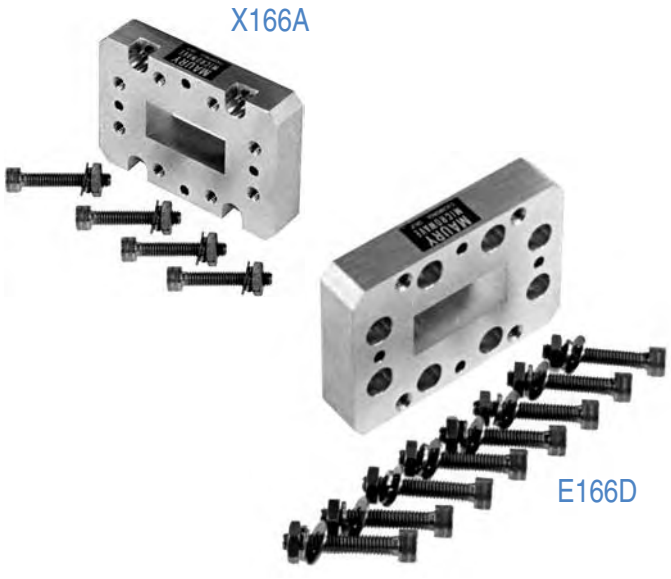
[2] Use 3.5mm adapters in bands not covered.



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# Waveguide Flange Adapters

## In-Band – Minimum Length




### *Description*

Maury series 166 are unique precision waveguide flange adapters for converting flanges from one type to another type in the same waveguide band and introducing a minimum of insertion length. A summary of the basic model types of adapters available in this series may be found in Maury data sheet 3A-166. This data sheet also lists the contents of the specific hardware kit that is supplied with each model type (except K and U bands).

These flange adapters are designed for both laboratory and system applications. They provide a convenient and precise method for converting equipment from one type flange to another for either temporary or permanent installations. Due to the precision manufacturing techniques utilized, the reflection introduced by these adapters is 1.01. Each adapter is provided with special mounting hardware and installation instructions, (except models in K and U bands).

### *Available Models*

| MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE (GHz) | | | TYPICAL VSWR | EIA WR NUMBER | OVERALL LENGTH INCHES | OVERALL LENGTH (CM) |
|---|---|---|---|---|---|---|---|---|---|
| S166B | CPR284F | UG53/U | 2.60 | — | 3.95 | 1.01 | 284 | 0.50 | (1.3) |
| E166C | CPR229F | CMR229 | 3.30 | — | 4.90 | 1.01 | 229 | 0.50 | (1.3) |
| E166D | CMR229 | CPR229 | 3.30 | — | 4.90 | 1.01 | 229 | 0.50 | (1.3) |
| G166A | UG149A/U | CPR187F | 3.95 | — | 5.85 | 1.01 | 187 | 0.50 | (1.3) |
| F166C | CPR159 | CPR159 | 4.90 | — | 7.05 | 1.01 | 159 | 0.75 | (1.9) |
| F166D | CMR159 | CPR159F | 4.90 | — | 7.05 | 1.01 | 159 | 0.75 | (1.9) |
| C166A | UG344/U | CPR137F | 5.85 | — | 8.20 | 1.01 | 137 | 0.50 | (1.3) |
| C166B | CPR137F | UG344/U | 5.85 | — | 8.20 | 1.01 | 137 | 0.50 | (1.3) |
| C166D | CMR137 | CPR137F | 5.85 | — | 8.20 | 1.01 | 137 | 0.75 | (1.9) |
| C166E | UG344/U | CMR137 | 5.85 | — | 8.20 | 1.01 | 137 | 0.50 | (1.3) |
| H166A | UG51/U | CPR112F | 7.05 | — | 10.00 | 1.01 | 112 | 0.50 | (1.3) |
| H166B | CPR112F | UG51/U | 7.05 | — | 10.00 | 1.01 | 112 | 0.50 | (1.3) |
| H166C | CPR112F | CMR112 | 7.05 | — | 10.00 | 1.01 | 112 | 0.75 | (1.9) |
| H166D | CMR112 | CPR112F | 7.05 | — | 10.00 | 1.01 | 112 | 0.75 | (1.9) |
| H166E | UG51/U | CMR112 | 7.05 | — | 10.00 | 1.01 | 112 | 0.50 | (1.3) |
| H166F | CMR112 | UG51/U | 7.05 | — | 10.00 | 1.01 | 112 | 0.50 | (1.3) |
| X166A | UG39/U | CPR90F | 8.20 | — | 12.40 | 1.01 | 90 | 0.50 | (1.3) |
| X166B | CPR90F | UG39/U | 8.20 | — | 12.40 | 1.01 | 90 | 0.50 | (1.3) |
| X166D | CMR90 | CPR90F | 8.20 | — | 12.40 | 1.01 | 90 | 0.75 | (1.9) |
| X166E | UG39/U | CMR90 | 8.20 | — | 12.40 | 1.01 | 90 | 0.50 | (1.3) |
| X166F | CMR90 | UG39/U | 8.20 | — | 12.40 | 1.01 | 90 | 0.50 | (1.3) |
| K166G | UG595U | UG425U | 18.00 | — | 26.50 | 1.01 | 42 | 0.50 | (1.3) |
| U166G | UG599/U | UG381/U | 26.50 | — | 40.00 | 1.01 | 28 | 0.50 | (1.3) |

Key Literature: Maury data sheet 3A-166.



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# Waveguide Transmission Lines and Test Port Adapters

## Straight Sections and Transitions

### *Description*

Maury produces waveguide components in many EIA WR sizes. A comprehensive line of standard rectangular products is available in the sizes shown below. They are generally supplied with cover flanges. Units from R through P bands are normally aluminum construction with irridite finish; K band and above are copper alloy with a plated finish. All units are painted with highly durable paint, or other special order finishes. Maury can provide waveguide devices with any flange type, material or finish you require. Special waveguide devices in millimeter sizes from 18 to 110 GHz (WR62 to WR10), large waveguides (WR430), and many special configurations such as: flatguide, reduced height, round, etc. can also be provided.

H103C5

U101A4

V106B

### *Rectangular Transmission Lines*

| MODEL | FREQUENCY RANGE (GHz) | | | LENGTH [1] INCHES | (CM) |
|---|---|---|---|---|---|
| S102A12 [2] | 2.60 | — | 3.95 | 12.00 | (30.5) |
| G102A8 [2] | 3.95 | — | 5.85 | 8.00 | (20.3) |
| C101A8 [3] | 5.85 | — | 8.20 | 8.00 | (20.3) |
| H101A6 [3] | 7.05 | — | 10.00 | 6.00 | (15.2) |
| X101A6 [3] | 8.20 | — | 12.40 | 6.00 | (15.2) |
| M102A6 [2] | 10.00 | — | 15.00 | 6.00 | (15.2) |
| P101A6 [3] | 12.40 | — | 18.00 | 6.00 | (15.2) |
| N102A4 [2] | 15.00 | — | 22.00 | 4.00 | (10.2) |
| K101A4 [3] | 18.00 | — | 26.50 | 4.00 | (10.2) |
| U101A4 [3] | 26.50 | — | 40.00 | 4.00 | (10.2) |
| Q102A4 [2] | 22.00 | — | 33.00 | 4.00 | (10.2) |

### *Millimeter Waveguide Transmission Lines*

| MODEL | FREQUENCY RANGE (GHz) | | | LENGTH [1] INCHES | (CM) |
|---|---|---|---|---|---|
| J103A3 [3] | 33.0 | — | 50.0 | 3.00 | (7.6) |
| V103A2 [3] | 50.0 | — | 75.0 | 2.00 | (5.1) |
| Z103A2 [3] | 75.0 | — | 110.0 | 2.00 | (5.1) |

### *Millimeter Wave Test Port Adapters (Straight Sections)*

| MODEL | FREQUENCY RANGE (GHz) | | | LENGTH [1] INCHES | (CM) |
|---|---|---|---|---|---|
| U103A1.375 | 26.5 | — | 40.0 | 1.375 | (3.51) |
| J115B1 | 33.0 | — | 50.0 | 1.97 | (5.00) |
| T115B | 40.0 | — | 60.0 | 1.97 | (5.00) |
| V115C | 50.0 | — | 75.0 | 1.50 | (3.81) |
| Y115B | 60.0 | — | 90.0 | 1.97 | (5.00) |
| Z115A | 75.0 | — | 110.0 | 1.375 | (3.51) |

### *Millimeter Waveguide Transmission Lines*

| MODEL | FREQUENCY RANGE (GHz) | | | LENGTH [1] INCHES | (CM) |
|---|---|---|---|---|---|
| J106B [4] | 33.0 | — | 50.0 | 1.96 | (5.0) |
| V106B [4] | 50.0 | — | 75.0 | 1.96 | (5.0) |
| T106B [5] | 40.0 | — | 60.0 | 1.96 | (5.0) |
| Y106B [5] | 60.0 | — | 90.0 | 1.96 | (5.0) |
| Z106B [5] | 75.0 | — | 110.0 | 1.96 | (5.0) |

### *Rectangular to Rectangular Waveguide Stepped Transitions – Overlapping Bands*

| MODEL | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | | | | EIA WAVEGUIDE SIZES SIDE A | SIDE B | EQUIVALENT FLANGES SIDE A | SIDE B | LENGTH [1] INCHES | (CM) |
|---|---|---|---|---|---|---|---|---|---|---|
| H161C | 8.20 | — | 10.00 | ≤ 1.05 | 112 | 90 | CPR112F | UG39/U | 1.5 | (3.8) |
| X161 | 10.00 | — | 12.40 | ≤ 1.05 | 90 | 75 | UG39/U | MPF75 | 2.4 | (6.1) |
| M161 | 12.40 | — | 15.00 | ≤ 1.05 | 75 | 62 | MPF75 | UG419/U | 2.4 | (6.1) |

[1] Other lengths can be provided. Please specify when ordering.
[2] Aluminum construction.
[3] Brass plated construction.
[4] Precision aluminum straight sections.
[5] To request straight sections made out of solid aluminum, specify band, length, and 104 series.



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# Waveguide Flange Information

## Maury Precision Flanges (MPF)

### *Description*

Maury MPF flanges are designed to provide precise mating of flanges when repeated connections are required or in systems where optimum waveguide alignment is critical. Some MPF series flanges also allow mating to more than one type of flange interface, which amplifies their versatility and economy when mating different flange types within a band. Please refer to the "mates with" column in the chart below to see the possible combinations.

MPF flanges are provided on components used in Maury calibration kits or on low VSWR components such as waveguide to coax adapters with VSWR of 1.10 or better.

MPF flanges in WR22 and smaller waveguide (millimeter wave sizes) provide dramatic improvements in connection consistency, repeatability and serviceability versus standard UG flanges, while still maintaining mating compatibility with these older designs (see Maury data sheet 5E-030). As in larger waveguide sizes, these flanges have two precision index holes and slip-fit alignment pins. (Threaded pins may also be installed in the standard four-pin pattern when mating to standard UG flanges. Both types of pins are removable, making the flange face available for servicing.)



MPF flanges also have a raised outer ring which prevents the mating surfaces from cocking due to uneven torque applied to the flange bolts. To obtain complete technical descriptions, please request the data sheets shown in the Maury Data Sheet column.

NOTE: All Maury MPF flanges have precision index holes. Corresponding slip-fit alignment pins are also available. Together, these ensure precise alignment and repeatable mating in waveguide connections. All Maury waveguide VNA calibration kit components come with MPF flanges. Alignment pins are available separately. See Maury data sheet 3A-996 for details.

### *Maury Precision Flange Reference Chart*

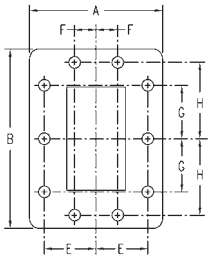
| BAND | EIA WR NUMBER | MPF DESIGNATION | MATES WITH | MAURY DATA SHEET |
|---|---|---|---|---|
| L | 650 | MPF650 | UG417A/U (without groove) | |
| R | 430 | MPF430 | UG435/U (without groove) | 5E-016 |
| D | 340 | MPF340 | CPR340F | |
| S | 284 | MPF284 | UG53/U, UG54A/U, CPR284 | 5E-002 |
| S | 284 | MPF284B | UG53/U, UG54A/U, CPR284, CMR284 | 5E-002A |
| S | 284 | MPF284C | UG53/U, UG54A/U | 5E-002B |
| E | 229 | MPF229 | CPR229, CMR229 | 5E-003 |
| E | 229 | MPF229B | CPR229 | 5E-003A |
| G | 187 | MPF187 | UG149A/U, UG148B/U, CPR187 | 5E-004 |
| G | 187 | MPF187C | UG149A/U, UG148B/U | 5E-004A |
| F | 159 | MPF159 | CPR159, CMR159 | 5E-011 |
| F | 159 | MPF159B | CPR159 | 5E-011A |
| C | 137 | MPF137 | UG344/U, UG343A/U, CPR137 | 5E-005 |
| C | 137 | MPF137C | UG344/U, UG343A/U | 5E-005A |
| H | 112 | MPF112 | UG51/U, UG138/U, CPR112F & G | 5E-001 |
| H | 112 | MPF112B | UG51/U, UG52/U | 5E-001A |
| H | 112 | MPF112C | UG51/U, UG52/U, CMR112 | 5E-001C |
| HS | 102 | MPF102 | UG1493 | 5E-014 |
| X | 90 | MPF90 | UG39/U, UG40A/U, CPR90 | 5E-006 |
| X | 90 | MPF90A | UG39/U, UG40A/U, CMR90 | 5E-006 |
| X | 90 | MPF90B | UG39/U, UG40A/U | 5E-006A |
| M | 75 | MPF75A & B | M3922/70-004 & -005 | 5E-007 |
| P | 62 | MPF62 | UG419/U, UG541A/U | 5E-008 |
| N | 51 | MPF51A & B | M3922/70-010, -011, -012, -022, -023, -024 | 5E-012 |
| N | 51 | MPF51C | Agilent Type, UBR180 | 5E-013 |
| K | 42 | MPF42 | UG595/U, UG596/U | 5E-009 |
| Q | 34 | MPF34 | UG595U, UG596/U, UG1530/U | 5E-019 |
| U | 28 | MPF28 | UG599/U, UG600/U | 5E-010 |
| J | 22 | MPF22 | UG383/U | 5E-030 |
| T | 19 | MPF19 | UG383/U | 5E-030 |
| V | 15 | MPF15 | UG385 | 5E-031 |
| Y | 12 | MPF12 | UG385 | 5E-031 |
| Z | 10 | MPF10 | UG385 | 5E-031 |



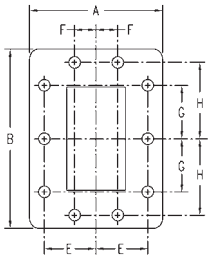
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# Standard Waveguide Flange Specifications

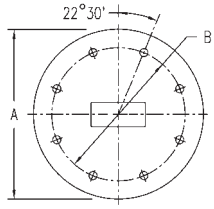
| WR650 | WG6 | R14 |
|---|---|---|
| UG417A/U (without groove) | | |
| Dimensions | inches | mm |
| A | 5.44 | 138.18 |
| B | 8.69 | 220.73 |
| E | 2.31 | 58.69 |
| F | 1.25 | 31.73 |
| G | 2.37 | 60.30 |
| H | 3.94 | 100.00 |
| Hole Dia. | 0.330 [1] | 8.20 |



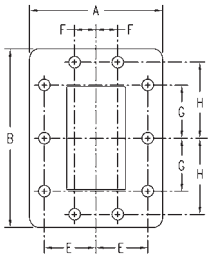

| WR430 | WG8 | R22 |
|---|---|---|
| UG435B/U (without groove) | | |
| Dimensions | inches | mm |
| A | 4.19 | 106.38 |
| B | 6.34 | 161.04 |
| E | 1.72 | 43.69 |
| F | 0.94 | 23.83 |
| G | 1.79 | 45.39 |
| H | 2.79 | 70.99 |
| Hole Dia. | 0.257 [1] | 6.71 |



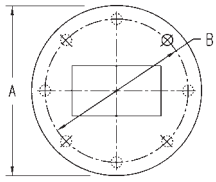

| WR284 | WG10 | R32 |
|---|---|---|
| UG53/U | | |
| Dimensions | inches | mm |
| A | 5.31 | 134.87 |
| B | 4.75 | 120.65 |
| Hole Dia. | 0.257 [1] | 6.50 |



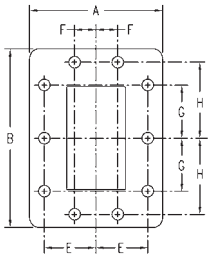

| WR229 | WG11A | R40 |
|---|---|---|
| CPR229F | UDR40 | |
| Dimensions | inches | mm |
| A | 2.76 | 70.20 |
| B | 3.89 | 98.73 |
| E | 1.05 | 26.67 |
| F | 0.50 | 12.70 |
| G | 1.07 | 27.18 |
| H | 1.62 | 41.15 |
| Hole Dia. | 0.257 [1] | 6.50 |



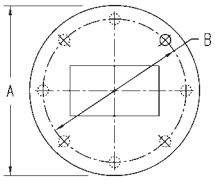

| WR187 | WG12 | R48 |
|---|---|---|
| UG149/U | UAR48 | |
| Dimensions | inches | mm |
| A | 3.64 | 92.33 |
| B | 3.25 | 82.55 |
| Hole Dia. | 0.330 [1] | 5.13 |




| WR159 | WG13 | R58 |
|---|---|---|
| CPR159 | UDR58 | |
| Dimensions | inches | mm |
| A | 2.44 | 61.98 |
| B | 3.18 | 80.77 |
| E | 0.88 | 22.35 |
| F | 0.38 | 9.53 |
| G | 0.50 | 12.70 |
| H | 1.27 | 32.26 |
| Hole Dia. | 0.257 [1] | 6.50 |




| WR137 | WG14 | R70 |
|---|---|---|
| UG344/U | UAR70 | |
| Dimensions | inches | mm |
| A | 3.13 | 79.50 |
| B | 2.75 | 69.85 |
| Hole Dia. | 0.199 [1] | 5.16 |



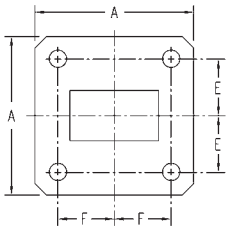

[1] English and metric hole sizes may differ slightly.



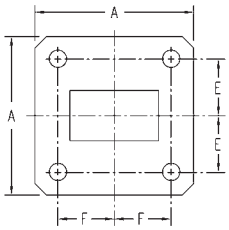
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# Standard Waveguide Flange Specifications

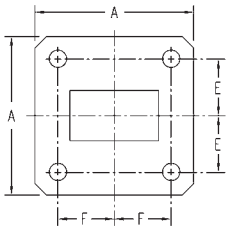
| WR112 | WG15 | R84 |
|---|---|---|
| UG51/U | UBR84 | |
| Dimensions | inches | mm |
| A | 1.875 [1] | 47.90 |
| E | 0.737 | 18.72 |
| F | 0.676 | 17.17 |
| Hole Dia. | 0.169 [2] | 4.255 |



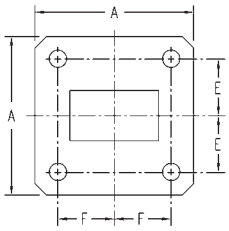

| WR90 | WG16 | R100 |
|---|---|---|
| UG39/U | UBR100 | |
| Dimensions | inches | mm |
| A | 1.625 [1] | 41.40 |
| E | 0.640 | 16.26 |
| F | 0.610 | 15.49 |
| Hole Dia. | 0.169 [2] | 4.255 |



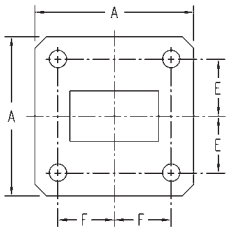

| WR75 | WG17 | R120 |
|---|---|---|
| COM'L | UBR120 | |
| Dimensions | inches | mm |
| A | 1.50 [1] | 38.83 |
| E | 0.561 | 14.25 |
| F | 0.520 | 13.21 |
| Hole Dia. | 0.144 [2] | 4.085 |



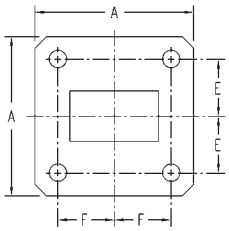

| WR62 | WG18 | R140 |
|---|---|---|
| UG419/U | UBR140 | |
| Dimensions | inches | mm |
| A | 1.31 [1] | 33.30 |
| E | 0.478 | 12.14 |
| F | 0.497 | 12.63 |
| Hole Dia. | 0.144 [2] | 4.085 |



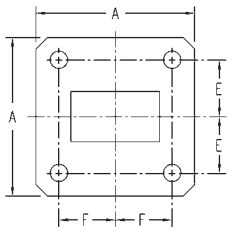

| WR51 | WG19 | R180 |
|---|---|---|
| COM'L | | |
| Dimensions | inches | mm |
| A | 1.31 [1] | 33.27 |
| E | 0.497 [1] | 12.62 |
| F | 0.478 [1] | 12.14 |
| Hole Dia. | 0.144 [2] | 3.658 |




| WR42 | WG20 | R220 |
|---|---|---|
| UG595/U | UBR220 | |
| Dimensions | inches | mm |
| A | 0.875 [1] | 22.41 |
| E | 0.335 | 8.51 |
| F | 0.320 | 8.13 |
| Hole Dia. | 0.116 [2] | 3.07 |




| WR34 | WG21 | R260 |
|---|---|---|
| UG1530 | | |
| Dimensions | inches | mm |
| A | 0.875 [1] | 22.41 |
| E | 0.335 [1] | 8.51 |
| F | 0.320 [1] | 8.13 |
| Hole Dia. | 0.116 [2] | 3.07 |

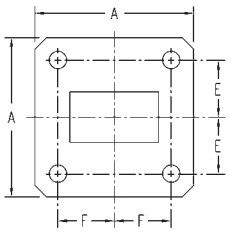



[1] CAUTION: U.S. MIL and commercial flange dimensions differ from IEC flanges.
[2] English and metric hole sizes may differ slightly.

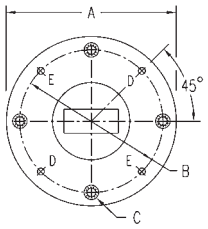

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# Standard Waveguide Flange Specifications

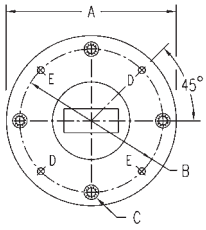
| WR28 | WG22 | R320 |
|---|---|---|
| UG599/U | | |
| Dimensions | inches | mm |
| A | 0.75 | 19.05 |
| E | 0.265 | 6.73 |
| F | 0.250 | 6.35 |
| Hole Dia. | 0.116 | 2.98 |



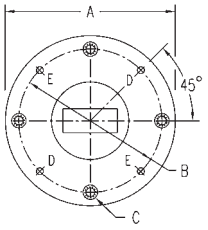

| WR22 | WG23 | R400 |
|---|---|---|
| UG383/U | | |
| Dimensions | inches | mm |
| A | 1.13 | 28.85 |
| B | 0.94 | 23.81 |
| C Holes | 4-40 UNC-2B | |
| D Holes | 0.063 | 1.613 |
| E Dowels | 0.061 | 1.555 |



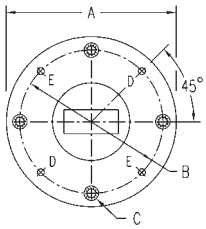

| WR19 | WG24 | R500 |
|---|---|---|
| UG383/U | | |
| Dimensions | inches | mm |
| A | 1.13 | 28.85 |
| C Holes | 4-40 UNC-2B | |
| D Holes | 0.063 | 1.613 |
| E Dowels | 0.061 | 1.555 |
| All Holes | 0.938 | 23.81 |



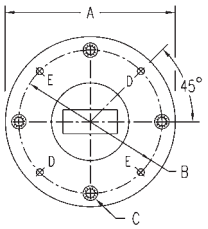

| WR15 | WG25 | R620 |
|---|---|---|
| UG385/U | | |
| Dimensions | inches | mm |
| A | 0.750 | 19.05 |
| B | 0.563 | 14.29 |
| C Holes | 4-40 UNC-2B | |
| D Holes | 0.063 | 1.613 |
| E Dowels | 0.061 | 1.555 |




| WR12 | WG26 | R740 |
|---|---|---|
| UG387/U | | |
| Dimensions | inches | mm |
| A | 0.750 | 19.05 |
| B | 0.563 | 14.29 |
| C Holes | 4-40 UNC-2B | |
| D Holes | 0.063 | 1.613 |
| E Dowels | 0.061 | 1.555 |
| All Holes | 0.563 | 14.29 |




| WR10 | WG27 | R900 |
|---|---|---|
| UG387/U | | |
| Dimensions | inches | mm |
| A | 0.750 | 19.05 |
| B | 0.563 | 14.29 |
| C Holes | 4-40 UNC-2B | |
| D Holes | 0.063 | 1.613 |
| E Dowels | 0.061 | 1.555 |
| All Holes | 0.563 | 14.29 |






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# Coaxial Cable Assemblies

## Flexible and Semi-Rigid Cable

### *Description*

Maury 8015 series flexible cable assemblies feature improved cable to connector transitions. Nominal loss and power handling characteristics of the cable used in these assemblies is show in the "Available Models" chart below.

Maury 8921 series semi-rigid cable assemblies are supplied as straight sections and are used in general purpose laboratory or systems applications where high stability and durability is critical.

Maury coaxial cable assemblies are available in the following standard lengths. Cable assemblies can also be fabricated to any length required. For non-standard length assemblies, please contact our Sales Department to place a special order. Both flexible and semi-rigid cable assemblies are available in four connector arrangements (see the Connector Configuration table below).

### *Available Models – Flexible Cable*

| MODEL | FREQ. RANGE (GHz) & MAX. VSWR | TYPE | JACKET O.D. INCHES (CM) | MIN. BEND (r) INCHES (CM) | LOSS (dB) AT $F_{MAX}$ |
|---|---|---|---|---|---|
| 7915(X)(L) | DC – 50.0 ≤ 1.45 | 2.4mm | 0.40 (1.02) | 1.0 (2.54) | 0.65+1.43 dB/FT |
| 8015(X)(L) | DG – 26.5 ≤ 1.45 | 3.5mm | 0.20 (0.508) | 1.0 (2.54) | 0.40+0.50 dB/FT |
| 8926(X)(L) | DC – 12.4 ≤ 1.50<br>12.4 – 18.0 ≤ 1.75 | SMA | 0.19 (0.483) | 1.0 (2.54) | 0.85 dB/FT |

Note: When ordering, indicate the desired connector arrangement where (X) is shown (using "A" for female to female, "B" for male to male, or "C" for female to male configurations). Where (L) is shown indicate the desired standard line length from the chart below.



### *Available Models – Semi-Rigid Cable*

| MODEL | FREQ. RANGE (GHz) & MAX. VSWR | TYPE | JACKET O.D. INCHES (CM) | MIN. BEND (r) INCHES (CM) | LOSS (dB) AT $F_{MAX}$ |
|---|---|---|---|---|---|
| 8921A(L) | DC – 18.0 ≤ 1.30 | SMA F-F | 0.141 (0.356) | 0.25 (0.635) | 0.75 |
| 8921B(L) | DC – 26.5 ≤ 1.40 | SMA M-M | 0.141 (0.356) | 0.25 (0.635) | 0.75 |
| 8921C(L) | DC – 18.0 ≤ 1.30 | SMA F-M | 0.141 (0.356) | 0.25 (0.635) | 0.75 |

Note: When ordering, indicate the desired length (from the chart below) where (L) is shown.



### *Standard Line Lengths*

| MODEL SUFFIX | LENGTH INCHES | (CM) | MODEL SUFFIX | LENGTH INCHES | (CM) | MODEL SUFFIX | LENGTH INCHES | (CM) |
|---|---|---|---|---|---|---|---|---|
| 12 | 12.0 | (30.48) | 30 | 30.0 | (76.20) | 48 | 48.0 | (121.92) |
| 18 | 18.0 | (45.00) | 36 | 36.0 | (91.44) | 54 | 54.0 | (137.16) |
| 24 | 24.0 | (60.96) | 42 | 42.0 | (106.68) | 60 | 60.0 | (152.40) |



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# Precision Semi-Rigid Assemblies

## Phase Matched 90° Bends




### Available Models

| MODEL | FREQUENCY RANGE (GHz) AND MAXIMUM VSWR | CONNECTOR ARRANGEMENT | "A" DIMENSION INCHES (CM) |
|---|---|---|---|
| 8011A1 | DC – 26.5 ≤ 1.25 | 3.5mm F – F | 2.00 (5.08) |
| 8011B1 | DC – 26.5 ≤ 1.25 | 3.5mm M – M | 2.00 (5.08) |
| 8011C1 | DC – 26.5 ≤ 1.25 | 3.5mm F – M | 2.00 (5.08) |
| 9526C | DC – 8.0 ≤ 1.10<br>8.0 – 18.0 ≤ 1.25 | 7mm | 1.75 (4.45) |
| 7911A | DC – 50.0 ≤ 1.5 | 2.4mm F – F | 1.90 (4.83) |
| 7911B | DC – 50.0 ≤ 1.5 | 2.4mm M – M | 1.90 (4.83) |
| 7911C | DC – 50.0 ≤ 1.5 | 2.4mm F – M | 1.90 (4.83) |

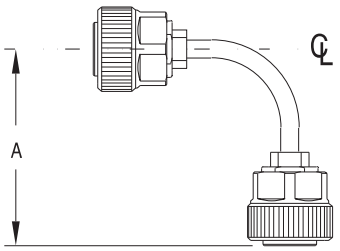
### Description - Phase Matched 90° Bends

The Maury 7911A/B/C and 8011A1/B1/C1 series, and model 9526C are precision semi-rigid cable assemblies configured in a 90° bend. They provide a highly stable, extremely durable, low-loss, low VSWR right angle connection for 50 ohm test bench setups or other measurement applications. Each assembly consists of two Maury coaxitube connectors [1] joined by a standard length of copper-jacketed coaxitube that is formed to provide a precise right angle bend.

Three cable size/connector combinations are offered: 2.4mm with 0.0865-inch (O.D.) coaxitube; 3.5mm with 0.141-inch (O.D.) coaxitube; and 7mm with 0.250-inch (jacket O.D.) coaxitube.

Sexed connectors are offered in A (female to female), B (male to male) , or C (female to male) connector arrangements.

### Dimensions




# Precision Right Angle Test Port Adapters

## Phase Matched 90° Bends

### Description - Right Angle Test Port Adapters

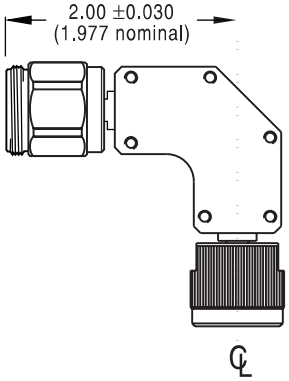
The Maury 8011E1, 8011F1/F2 precision right angle test port adapters are designed to mate with the ruggedized test ports of Agilent and Anritsu network analyzers. They effectively extend the network analyzer test port at a right angle with the same ruggedized connector found on the test port, or with a standard 3.5mm female or male connector. They allow users to maintain the high reliability and stability of the network analyzer test port, with flexibility for unique measurement requirements.

Three connector combinations/types are offered: NMD 3.5mm (female) to NMD 3.5mm (male), NMD 3.5mm (female) to 3.5mm (female) and NMD 3.5mm (female) to 3.5mm (male).
These right angle test port adapters are ideal for use with the 8946 series of VNA test port cable/adapter kits available from Maury (see page 134–136).



8011E1

### Dimensions




### Available Models

| MODEL | FREQUENCY RANGE AND MAXIMUM VSWR | CONNECTOR ARRANGEMENT | DIMENSIONS INCHES (CM) |
|---|---|---|---|
| 8011E1 | DC – 34.0 GHz ≤1.25 | NMD3.5mm F – NMD3.5mm M | 2.00 (5.08) |
| 8011F1 | DC – 34.0 GHz ≤1.25 | NMD3.5mm F – 3.5mm F | 2.00 (5.08) |
| 8011F2 | DC – 34.0 GHz ≤1.25 | NMD3.5mm F – 3.5mm M | 2.00 (5.08) |

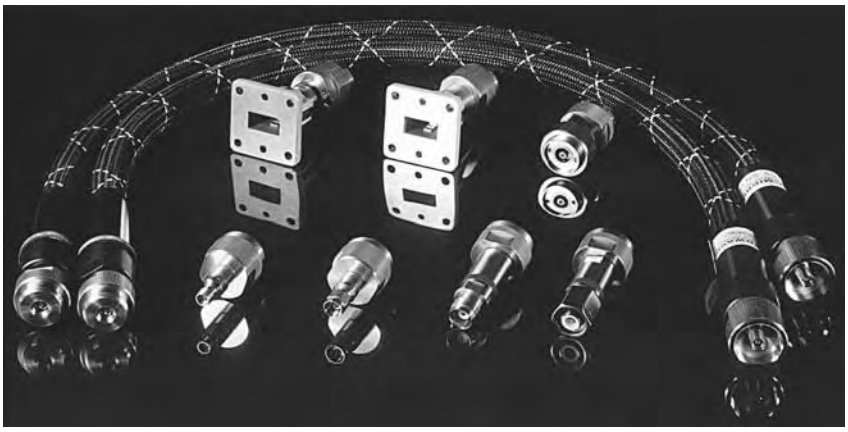
[1] Maury coaxitube connectors are designed for use with 50 ohm copper-jacketed coaxitube, and are configured to allow the outer and center conductors to be soldered at assembly for maximum reliability.



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# Test Port Cable and Adapter Kits

## Coaxial-To-Coaxial and Waveguide-To-Coaxial Test Port Adapters



### *Features*

- *For VNA Applications*
- *Ruggedized Test Port Connectors*
- *For Use with 2.4mm, 2.92mm, 3.5mm, and 7mm Test Ports*
- *Coaxial Test Port to Waveguide Adapters Available*

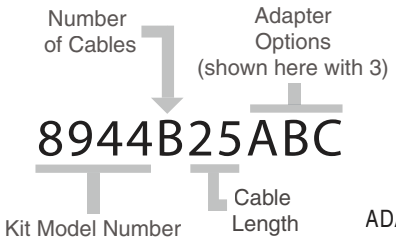
### *Description*

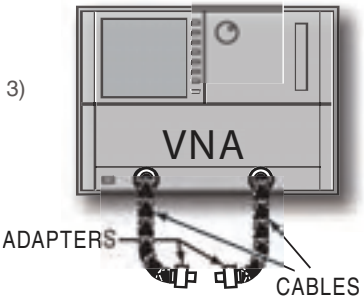
Maury 8944, 8946 and 8948 series test port cable and adapter kits replace multiple cables in various connector types with a versitile and cost effective alternative. The cable assemblies extend the test ports of network analyzers, and have a rugged female and male test port connector at each end. They come in standard lengths of 25 or 38 inches and are extremely flexible while maintaining excellent phase and amplitude stability.

The adapters also have a rugged test port connector on one side with a precision 2.4mm, 2.92mm, 3.5mm, 7mm, N, TNC or waveguide connector (EIA WR229 to WR28) on the other side. Some options include NMD to NMD adapters. Each kit includes up to three user-specified adapter sets (see pages 135-136). Kits with more than three adapter sets can be configured as special orders. Individual adapters can also be purchased separately.

### *Ordering Options*

To specify the test port cable and adapter options you need, add the appropriate letters and numbers to the end of the kit model number (as shown in the diagram at right). The first letter indicates the number of cables desired (A = one cable; B = 2 cables). After it, add the desired cable length (25-inch or 38-inch). Next add the appropriate letters to indicate the desired adapter options (from the tables on pages 135-136). One, two, or three adapter options may be ordered with standard kits. Additional adapters are available in custom configured kits.




### *Available Models – Kits*

| KIT MODEL | TYPE | CABLE LENGTH INCHES | (CM) | CABLES PER KIT | FREQUENCY RANGE (GHz) | CABLE O.D. (NOMINAL) INCHES | (CM) | BEND RADIUS (MINIMUM) INCHES | (CM) | NOMINAL IMPEDANCE |
|---|---|---|---|---|---|---|---|---|---|---|
| 8946A25 (*) (*) (*) | NMD2.4mm | 25.0 | (63.5) | 1 | DC — 50.0 | 0.6 | (1.524) | 2.5 | (6.35) | 50 ohm |
| 8946B25 (*) (*) (*) | NMD2.4mm | 25.0 | (96.5) | 2 | | | | | | |
| 8946A38 (*) (*) (*) | NMD2.4mm | 38.0 | (63.5) | 1 | | | | | | |
| 8946B38 (*) (*) (*) | NMD2.4mm | 38.0 | (96.5) | 2 | | | | | | |
| 8946C25 | NMD2.4mm | 25.0 | (63.5) | 1 | | | | | | |
| 8946C38 | NMD2.4mm | 38.0 | (96.5) | 1 | | | | | | |
| 8944A25 (*) (*) (*) | NMD3.5mm | 25.0 | (63.5) | 1 | DC — 26.5 | 0.6 | (1.524) | 2.5 | (6.35) | 50 ohm |
| 8944B25 (*) (*) (*) | NMD3.5mm | 25.0 | (63.5) | 2 | | | | | | |
| 8944A38 (*) (*) (*) | NMD3.5mm | 38.0 | (63.5) | 1 | | | | | | |
| 8944B38 (*) (*) (*) | NMD3.5mm | 38.0 | (63.5) | 2 | | | | | | |
| 8944C25 | NMD3.5mm | 25.0 | (63.5) | 1 | | | | | | |
| 8944C38 | NMD3.5mm | 38.0 | (96.5) | 1 | | | | | | |
| 8948A25 (*) (*) (*) | 7mm | 25.0 | (63.5) | 1 | DC — 18.0 | 0.6 | (1.524) | 2.5 | (6.35) | 50 ohm |
| 8948B25 (*) (*) (*) | 7mm | 25.0 | (63.5) | 2 | | | | | | |
| 8948A38 (*) (*) (*) | 7mm | 38.0 | (63.5) | 1 | | | | | | |
| 8948B38 (*) (*) (*) | 7mm | 38.0 | (63.5) | 2 | | | | | | |
| 8948C25 | 7mm | 25.0 | (63.5) | 1 | | | | | | |
| 8948C38 | 7mm | 38.0 | (63.5) | 1 | | | | | | |

(*) Insert adapter option letters from the Adapter Options table on page 135.

NOTE: 8946C, 8944C and 8948C models are cables only without adapters.

Key Literature: Maury data sheet 2Z-001, 2Z-001A and 2Z-003.



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# Test Port Cable and Adapter Kits

## Cable Specifications

### *Specifications (25-inch Length Cables)*

Standard 25-inch cables in Maury 8944, 8946 and 8948 series test port cable and adapter kits have the following specifications:

Frequency Range:

8946 series . . . . . DC – 50.0 GHz
8944 series . . . . . DC – 26.5 GHz
8948 series . . . . . DC – 18.0 GHz

Insertion Loss (dB):

8946 series . . . . . Typical = $0.05 + 0.30(f) + 0.010(f)$
Guaranteed = $0.25 + 0.35(f) + 0.015(f)$
8944 & 8948 series . . . . . Typical = $0.05 + 0.30(f) + 0.010(f)$
Guaranteed = $0.25 + 0.35(f) + 0.015(f)$

Return Loss (dB):

8946 series . . . . . 15
8944 & 8948 series . . . . . 18

Overall Phase Stability (degrees): . . . . . Typical = $0.05(f)$
Guaranteed = $0.5 + 0.08(f)$

Overall Amplitude Stability (dB): . . . . . Typical = ≤0.03
Guaranteed = ≤0.08

Return Loss Stability (dB): . . . . . ≥40

### *Specifications (38-inch Length Cables)*

Standard 38-inch cables in Maury 8944, 8946 and 8948 series test port cable and adapter kits have the following specifications:

Frequency Range:

8946 series . . . . . DC – 50.0 GHz
8944 series . . . . . DC – 26.5 GHz
8948 series . . . . . DC – 18.0 GHz

Insertion Loss (dB): . . . . . Typical = $0.044 + 0.47(f) + 0.014(f)$
Guaranteed = $0.290 + 0.51(f) + 0.017(f)$

Return Loss (dB):

8946 series . . . . . 15
8944 & 8948 series . . . . . 18

Overall Phase Stability (degrees): . . . . . Typical = $0.10(f)$
Guaranteed = $0.5 + 0.17(f)$

Overall Amplitude Stability (dB): . . . . . Typical = ≤0.05
Guaranteed = ≤0.15

Return Loss Stability (dB): . . . . . ≥40

## Adapter Options

### *NMD2.4mm Adapter Models and Set Options*

| ADAPTER MODEL | ADAPTS SIDE A | ADAPTS SIDE B | QUANTITY PER SET | OPTION CODE |
|---|---|---|---|---|
| 7909A1 | NMD2.4mm (f) | 2.4mm (f) | 1 | A |
| 7909A2 | NMD2.4mm (f) | 2.4mm (m) | 1 | |
| 7909B1 | NMD2.4mm (f) | 3.5mm (f) | 1 | B |
| 7909B2 | NMD2.4mm (f) | 3.5mm (m) | 1 | |
| 7909C | NMD2.4mm (f) | APC7 | 2 | C |
| 7909D1 | NMD2.4mm (f) | Type N (f) | 1 | D |
| 7909D2 | NMD2.4mm (f) | Type N (m) | 1 | |
| 7909F1 | NMD2.4mm (f) | 2.92mm ( f) | 1 | E |
| 7909F2 | NMD2.4mm (f) | 2.92mm (m) | 1 | |

### *NMD3.5mm Adapter Models and Set Options*

| ADAPTER MODEL | ADAPTS SIDE A | ADAPTS SIDE B | QUANTITY PER SET | OPTION CODE |
|---|---|---|---|---|
| 8009A | NMD3.5mm (f) | 3.5mm (f) | 1 | A |
| 8009B | NMD3.5mm (f) | 3.5mm (m) | 1 | |
| 2633C | NMD3.5mm (f) | 7mm | 2 | B |
| 8829A | NMD3.5mm (f) | Type N (f) | 1 | C |
| 8829B | NMD3.5mm (f) | Type N (m) | 1 | |
| 8619A | NMD3.5mm (f) | TNC (f) | 1 | D |
| 8619B | NMD3.5mm (f) | TNC (m) | 1 | |
| 2433A1 | NMD3.5mm (f) | 14mm | 2 | E |
| H230K1 | NMD3.5mm (f) | WR112 | 2 | F |
| X230K1 | NMD3.5mm (f) | WR90 | 2 | G |
| M230K1 | NMD3.5mm (f) | WR75 | 2 | H |
| P230K1 | NMD3.5mm (f) | WR62 | 2 | J |
| N230K3 | NMD3.5mm (f) | WR51 | 2 | K |
| K230K6 | NMD3.5mm (f) | WR42 | 2 | L |

### *7mm Adapter Models and Set Options*

| ADAPTER MODEL | ADAPTS SIDE A | ADAPTS SIDE B | QUANTITY PER SET | OPTION CODE |
|---|---|---|---|---|
| 8022A1 | 7mm | 3.5mm (f) | 1 | A |
| 8022B1 | 7mm | 3.5mm (m) | 1 | |
| 2633A | 7mm | 7mm (f) | 2 | B |
| 2606C | 7mm | Type N (f) | 1 | C |
| 2606D | 7mm | Type N (m) | 1 | |
| 2622A1 | 7mm | TNC (f) | 1 | D |
| 2622B | 7mm | TNC (m) | 1 | |
| 2607A1 | 7mm | 14mm | 2 | E |


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# Test Port Cable and Adapter Kits

## Adapter Specifications

### *Coaxial to Coaxial Test Port Adapter Specifications*

| ADAPTER MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE AND MAXIMUM VSWR (GHZ) | NOMINAL IMPEDANCE | OVERALL LENGTH INCHES | OVERALL LENGTH (CM) |
|---|---|---|---|---|---|---|
| 7909A1 [1] | NMD2.4mm female | 2.4mm female | DC — 26.5 ≤ 1.10<br>26.5 — 40.0 ≤ 1.15<br>40.0 — 50.0 ≤ 1.20 | 50 ohm | 1.48 | (3.76) |
| 7909A2 [1] | NMD2.4mm female | 2.4mm male | | 50 ohm | 1.51 | (3.84) |
| 7909B1 | NMD2.4mm female | 3.5mm female | DC — 10.0 ≤ 1.06<br>10.0 — 20.0 ≤ 1.10<br>20.0 — 34.0 ≤ 1.12 | 50 ohm | 1.26 | (3.20) |
| 7909B2 | NMD2.4mm female | 3.5mm male | | 50 ohm | 1.26 | (3.20) |
| 7909C | NMD2.4mm female | 7mm | DC — 10.0 ≤ 1.05<br>10.0 — 20.0 ≤ 1.07<br>20.0 — 34.0 ≤ 1.10 | 50 ohm | 2.16 | (5.49) |
| 7909D1 | NMD2.4mm female | Type N female | DC — 10.0 ≤ 1.08<br>10.0 — 20.0 ≤ 1.12<br>20.0 — 34.0 ≤ 1.14 | 50 ohm | 1.80 | (4.57) |
| 7909D2 | NMD2.4mm female | Type N female | | 50 ohm | 1.84 | (4.67) |
| 7909F1 | NMD 2.4mm female | 2.92mm (K) female | DC — 20.0 ≤ 1.10<br>20.0 — 40.0 ≤ 1.16 | 50 ohm | 1.44 | (3.66) |
| 7909F2 | NMD 2.4mm female | 2.92mm (K) male | | 50 ohm | 1.48 | (3.76) |
| 7909H | NMD 2.4mm female | NMD 3.5mm male | DC — 10.0 ≤ 1.06<br>10.0 — 20.0 ≤ 1.10<br>20.0 – 34.0 ≤ 1.14 | 50 ohm | 1.49 | (3.79) |
| 8009A | NMD 3.5mm female | 3.5mm female | DC — 18.0 ≤ 1.08<br>18.0 — 26.5 ≤ 1.12 | 50 ohm | 1.45 | (3.68) |
| 8009B | NMD 3.5mm female | 3.5mm male | | 50 ohm | 1.49 | (3.79) |
| 2633C | NMD 3.5mm female | 7mm | DC — 18.0 ≤ $1.018 + 0.003f$ | 50 ohm | 1.86 | (4.72) |
| 8829A | NMD 3.5mm female | Type N female | DC — 6.0 ≤ 1.04<br>6.0 — 18.0 ≤ 1.08 | 50 ohm | 2.04 | (5.18) |
| 8829B | NMD 3.5mm female | Type N male | | 50 ohm | 2.20 | (5.59) |
| 2433A1 | NMD 3.5mm female | 14mm (GR900 equiv) | DC — 8.5 ≤ $1.01 + 0.008f$ | 50 ohm | 2.32 | (5.89) |
| 8022A1 | 3.5mm female | 7mm | DC — 4.0 ≤ 1.04<br>4.0 — 18.0 ≤ 1.08 | 50 ohm | 1.67 | (4.24) |
| 8022B1 | 3.5mm male | 7mm | | 50 ohm | 1.67 | (4.24) |
| 2633A | 7mm | 7mm “female” | DC — 18.0 ≤ $1.004 + 0.003f$ | 50 ohm | 1.62 | (4.12) |
| 2606C | 7mm | Type N female | DC — 4.0 ≤ 1.03<br>4.0 — 9.0 ≤ 1.04<br>9.0 – 18.0 ≤ 1.07 | 50 ohm | 1.51 | (3.84) |
| 2606D | 7mm | Type N male | | 50 ohm | 1.51 | (3.84) |
| 2622A1 | 7mm | TNC female | DC — 4.0 ≤ 1.05<br>4.0 — 18.0 ≤ 1.15 | 50 ohm | 1.68 | (4.26) |
| 2622B | 7mm | TNC male | | 50 ohm | 1.55 | (3.94) |
| 2607A1 | 7mm | 14mm (GR900 equiv) | DC — 8.5 ≤ $1.004 + 0.004f$ | 50 ohm | 2.01 | (5.10) |

### *Waveguide to Coaxial Test Port Adapter Specifications*

| ADAPTER MODEL | ADAPTS SIDE A | ADAPTS SIDE B | FREQUENCY RANGE AND MAXIMUM VSWR (GHZ) | EQUIVALENT FLANGE | OVERALL LENGTH INCHES | OVERALL LENGTH (CM) |
|---|---|---|---|---|---|---|
| E230K1 [2] | NMD3.5mm female | EIA WR229 | 3.3 — 4.9 ≤ 1.10 | CPR229F | 3.88 | (9.86) |
| G230K1 [2] | NMD3.5mm female | EIA WR187 | 3.95 — 5.85 ≤ 1.10 | UG149/U | 3.88 | (9.86) |
| F230K1 | NMD3.5mm female | EIA WR159 | 4.9 — 7.05 ≤ 1.10 | CPR159F | 3.40 | (8.64) |
| C230K1 | NMD3.5mm female | EIA WR137 | 8.85 — 8.20 ≤ 1.10 | UG344/U | 3.13 | (7.95) |
| H230K1 | NMD3.5mm female | EIA WR112 | 7.05 — 10.0 ≤ 1.10 | UG51/U | 2.98 | (7.57) |
| X230K1 | NMD3.5mm female | EIA WR90 | 8.2 — 12.4 ≤ 1.10 | UG39/U | 2.73 | (6.93) |
| M230K1 | NMD3.5mm female | EIA WR75 | 10.0 — 15.0 ≤ 1.10 | MPF75 | 2.63 | (6.68) |
| P230K1 | NMD3.5mm female | EIA WR62 | 12.4 — 18.0 ≤ 1.10 | UG419/U | 2.38 | (6.05) |
| N230K3 | NMD3.5mm female | EIA WR51 | 15.0 — 22.0 ≤ 1.20 | MPF51 | 2.00 | (5.08) |
| K230K6 | NMD3.5mm female | EIA WR42 | 18.0 — 26.5 ≤ 1.15 | UG595/U | 1.80 | (4.57) |
| U233E [3] | NMD2.92mm female | EIA WR28 | 26.5 — 40.0 ≤ 1.30 | UG599/U | 1.80 | (4.57) |

[1] 7909A1 and 7909A2 are phase matched for VNA applications.

[2] These Larger waveguide adapters should not be directly connected to test sets without support.

[3] Mates with the special (K) connector provided on Anritsu 360 VNA.



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# 3.5mm Rigid and Semi-Rigid Air Line Connectors

## 8001 and 8003 Series

### Description

Maury 3.5mm 8001 series rigid air line connectors are designed for use with air dielectric coaxial line with 0.0598-inch (1.52mm) inner conductor diameter and 0.1378-inch (3.5mm) outer conductor inner diameter. The 8003 series are used with a 0.141 semirigid cable. Materials and instructions for fabricating the air line and cable can be provided as well as a connector tool kit.

These connectors have a high performance 50 ohm, air dielectric interface that operates mode-free through 34 GHz with low VSWR and low insertion loss. They comply with proposed USNC/IEC/SC46D standards: general precision connector, instrument grade – GPC3.5 per Maury data sheet 5E-062, and are mating compatible with SMA and 2.92mm (K) connectors. They are designed for durability and good connection repeatability. Tool kits, torque wrenches and other accessories are available.

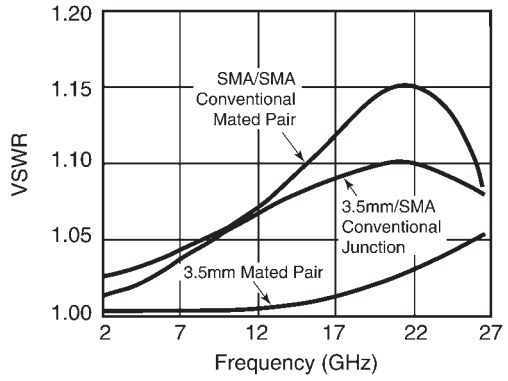
### Electrical Specifications[1]

Frequency Range . . . . . DC to 34 GHz
Nominal Impedance . . . . . 50 ohm
VSWR. . . . . 1.01 + 0.004$f$ (GHz)
Insertion Loss (dB) . . . . . 0.015 – $f$ (GHz)
R. F. Leakage . . . . . <-100 dB at 26.5 GHz
Contact Resistance:
  Inner Conductor. . . . . <2.0 milliohm
  Outer Conductor . . . . . <0.4 milliohm
Voltage Rating . . . . . 500 volts RMS
Dielectric Insulation Rating . . . . . 1500 volts RMS
Power Handling . . . . . 2.5 kW$\sqrt{f}$ (MHz) above 16 Hz

### Environmental Specifications

Thermal Limits . . . . . -65° to +85° C
Humidity . . . . . 20% to 80% RH
Pressure . . . . . 590mm to 780mm Hg

### Typical Performance



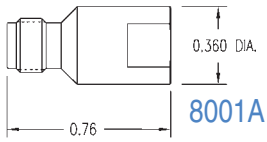

[1] These specifications are for a mated pair (models 8001A and 8001B) and may not apply to when used with mating-compatible connectors.

[2] 8001K is provided in a foam-lined wood instrument case; 8003K is provided in a foam-lined molded plastic case.

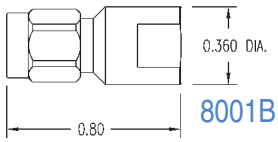

8001A


8001B

### Dimensions – Inches

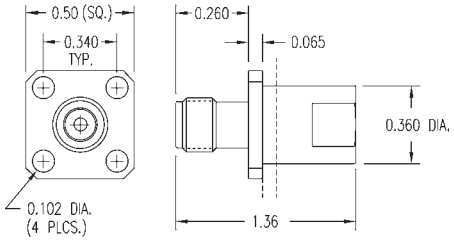


8001A

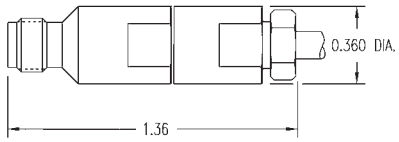


8001B

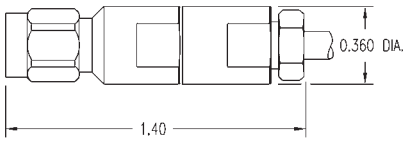
### 8001C Female Panel Mount Connector



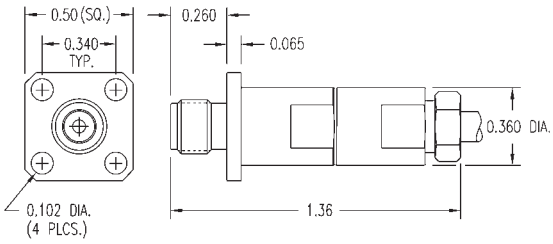

### 8003A Female Connector for 0.141-inch Semi-Rigid Cable




### 8003B Male Connector for 0.141-inch Semi-Rigid Cable




### 8003C Female Panel Mount Connector for 0.141-inch Semi-Rigid Cable




### Materials and Tool Kits

| MODEL | DESCRIPTION |
|---|---|
| 8001G | Inner conductor rod: unfinished beryllium copper; 0.0589 ± 0.0003-inch dia. 6.00-inch length. |
| 8001H | Outer conductor rod: unfinished gun-drilled, honed aluminum tubing; 0.1378 ± 0.0003-inch I.D.; 0.375-in. O.D.; 6.00-inch length. |
| 8001K[2] | Rigid air line connector tool kit: center conductor pin vice & torque pin vice; 3/16-in. open end wrench; 5/16-in. torque wrench |
| 8003K1[2] | Semi-rigid cable connector tool kit: tools and instructions for assembling 0.141-in. semi-rigid cable connectors. |


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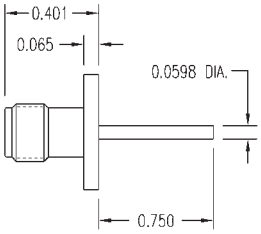
# 3.5mm Panel Mount, Suspended Stripline, and Micro-Strip Launch Connectors

## 8002 and 8004 Series

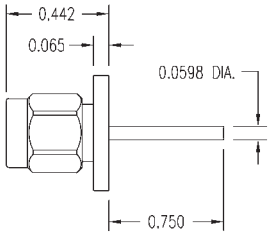
### *Panel Mount Connectors*

The 8002A and 8002B are 3.5mm panel mount connectors in a four-hole mounting configuration. Ordering Option 1 converts these to two-hole mounting. The rear part of the center conductor can be removed for machining and a set of five spare center conductors, 8002C, is available.

8002A Female



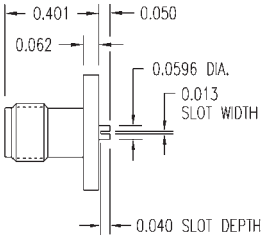

8002B Male



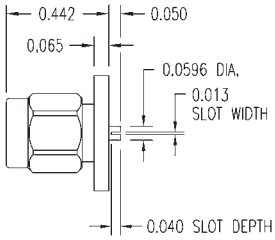

### *Suspended Stripline Connectors*

The 8002D and 8002E are designed for use with suspended stripline circuits utilizing 0.010 thick dielectric with 1/2 ounce copper on both sides (0.012 inch nominal thickness). 8002D and 8002E are provided with the 4-Hole flange configuration only.

8002D Female




8002E Male

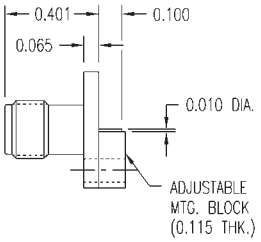



### *Suspended Stripline Connectors*

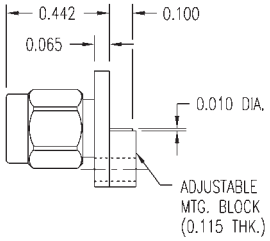
The 8004 series connectors are designed for use with micro-strip circuits and include a transformer from 3.5mm to a 0.01-inch pin diameter launch. Three basic panel mount configurations are available: Mounting Block, Dialectric Feed Thru, and Bushing Feed Thru. Mounting Block and Dielectric Feed Thru versions (8004A, 8004B, 8004C and 8004D) are available in both 4-Hole flange and 2-Hole flange configurations. 8004E and 8004F Bushing Feed Thru versions are only available with the 4-Hole flange.

Mounting Block Configuration

8004A Female

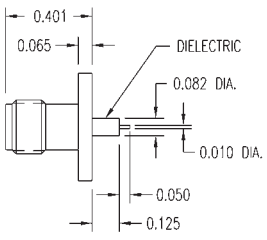



8004B Male

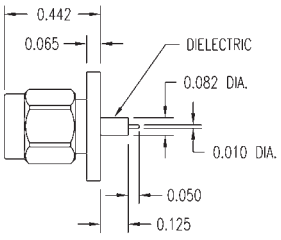



Dialectric Feed Thru Configuration

8004C Female

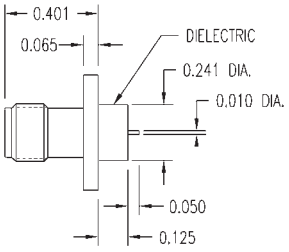



8004D Male

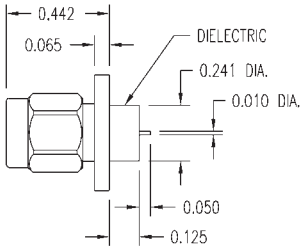



Bushing Feed Thru Configuration

8004E Female




8004F Male

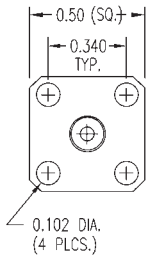



### *Ordering Flange Configurations*

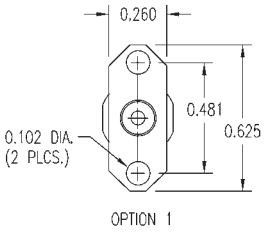
When placing your order be sure to indicate which flange configuration you need. The default configuration is the 4-hole flange, which is standard for all 8002 and 8004 models.

A 2-Hole flange option is available for 8002 and 8004 models except 8002D, 8002E, 8004A, 8004B, 8004E and 8004F. To order connectors with the 2-Hole flange, indicate that you are ordering Option 1 by adding a numeral 1 after the model number.

4-Hole Flange




2-Hole Flange (Option 1)






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# 7mm Precision Connectors

## 2680A1 – Rigid Line Connectors




### *Description*

The 2680A1 is a precision 7mm coaxial connector designed primarily for use with rigid air dielectric transmission lines (principal dimensions: 0.2756/0.01197 in.) and is equivalent to 7mm. These connectors provide superior electrical and mechanical performance for precision laboratory instruments. The sexless coupling mechanism permits any two 7mm connectors to be mated directly. The outer coupling nut can be removed and other coupling mechanisms substituted without disturbing the air line assembly.

The connector barrel configuration complies with IEEE requirements for 7mm general precision connectors. Because electrical and mechanical mating are accomplished in the same plane, the reference plane is clearly defined and permits accurate determination of electrical lengths.

All movable components of the connector are captivated. Assembly instructions with air line preparation dimensions are provided with each connector. The coupling unit is a 3/4" hex fabricated from stainless steel. (See Maury data sheet 5E-060.)

### *Specifications*

Frequency Range . . . . . DC to 18 GHz

Characteristic Impedance . . . . . 50 ohm ±0.2%

VSWR. . . . . 1.003 +0.002 (F GHz)

Insertion Loss (dB) . . . . . < 1.007 $\sqrt{f\,(\mathrm{GHz})}$ per pair

Leakage (up to 6 GHz). . . . . Better than 120 dB below signal

DC Contact Resistance . . . . . Inner: <1.0 milliohm; Outer: <0.1 milliohm

| MODEL | DESCRIPTION |
|---|---|
| 2680A1 | 7mm Sexless |

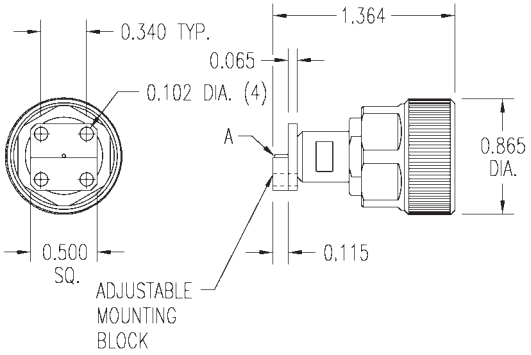
# 7mm Precision Micro-Strip Connectors

## 2683 Series

### *Description*

These connectors are designed for mounting on miniature micro-strip packages. They provide a well matched transition from DC to 18 GHz with a typical VSWR of 1.10, with a 50 ohm nominal impedance.

| MODEL | DIMENSION "A" (INCHES) |
|---|---|
| 2683A1 | 0.010 diameter pin |
| 2683B1 | 0.006 thick x 0.020 wide tab |




### *Accessories*

Precision connectors require precision assembly and proper gaging of the connector pin depth and location in order to produce optimum performance. The following accessories are the best tools available for doing the job correctly. We highly recommended their use for assembly or disassembly of the Maury precision 7mm connectors on this page.

| MODEL | DISCRIPTION |
|---|---|
| A028 | Push-on style 7mm connector gage kit (see page 92) |
| 2697A | Tool kit |
| 2698C2 | Torque wrench; 3/4-inch hex; 12 in. lbs (see page 94) |



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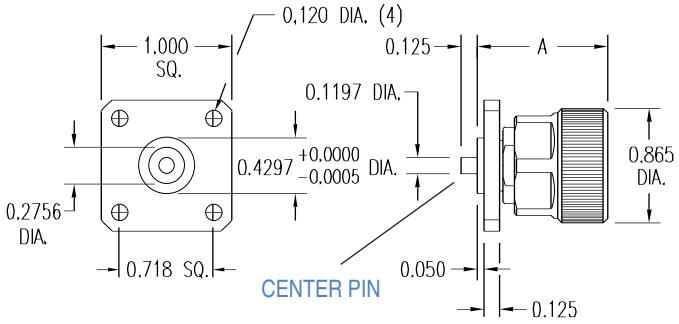
# 7mm Precision Connectors

## 2680B1/C1 – Panel Mount Connectors

### *Description*

Two flanged connectors are available. Model 2680C1 has a removable flange and center pin with a 0.093 hole solder pot. Model 2680B1 is essentially a rigid line type connector with an integral flanged body that receives an air line like model 2680A1. Both models exhibit the same basic electrical characteristics as model 2680A1.

| MODEL | DESCRIPTION | DIMENSION "A" INCHES | (CM) |
|---|---|---|---|
| 2680B1 | 7mm Sexless with integral flange | 1.200 | (3.048) |
| 2680C1 | 7mm Sexless with removable contact pin | 0.950 | (2.413) |




Note: Dimensions shown are for 2680C1 only.

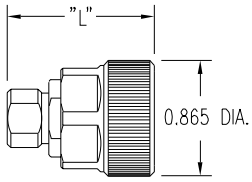
# 7mm Precision Semi-Rigid Cable Connectors

## 2681 Series

### *Description*

These connectors are designed for easy assembly with semi-rigid coaxitube cables. The design includes a threaded female bushing that attaches to the cable. This bushing is soldered in place, then threaded into the back of the 7mm connector body.

The 7mm connectors exhibit the same basic electrical characteristics as model 2680A1, and the finished assembly provides a highly stable, highly repeatable connection that is rated for a frequency range from DC to 12.4 GHz, but is usable to 18 GHz.




| MODEL | FOR USE WITH | MAX. VSWR (DC-12.4 GHZ) | LENGTH ("L") INCHES | (CM) |
|---|---|---|---|---|
| 2681C1 | 0.141 dia. copper coaxitube | 1.15 | 1.5 | (3.81) |
| 2681D1 | 0.250 dia. copper coaxitube | 1.12 | 1.5 | (3.81) |
| 2681E1 | 0.325 dia. copper coaxitube | 1.10 | 1.5 | (3.81) |

### *Proper Connector Care*

***To insure the best electrical performance, prevent serious damage and obtain the most accurate measurements, you must always check the critical interface dimensions of your connectors before mating.***

Destructive interference will result if contacts protrude beyond the conductor mating planes. This can cause buckling of the female contact fingers or damage to associated equipment. Excessive gaps between mated contacts or dielectrics can produce undesirable high reflections and reduced power handling. Such out-of-tolerance conditions may result in impared electrical performance and damage to mated connectors. See page 92 for a complete list of Maury connector gages and gage kits.



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# Manual Tuners



## General Information

Manual tuners are used both in the laboratory and as system components to either establish or transform impedances for a number of applications. They can be used to establish optimum source or load terminations for device characterization, normalize a source or load for precision laboratory measurements or calibrations (noise, power, etc.), and can act as a matching transformer between a mismatched source and a mismatched load. Maury produces several types of coaxial manual tuners in two categories; slide screw tuners and stub tuners. Waveguide slide screw tuners are available in standard matching ranges only.

**Coaxial Slide Screw Tuners –** Maury coaxial slide screw tuners are particularly well suited for use in establishing impedances for device characterization, or for any other application requiring a precisely repeatable mismatch condition. Calibrated position indicators on these tuners make it possible to repeat a specific matching condition with a high degree of accuracy. Their design allows the reflection magnitude and phase to be set independently. Slide screw tuners are also easy to use due to the almost independent electrical results of the mechanical motions.

These tuners employ a slab-line transmission structure which defines their frequency range, with dual probes for enhanced matching characteristics. The probes are micrometer driven and work with a vernier readout of carriage position (except for the 3.5mm and 2.4mm units which have micrometer driven carriages). Position locks are provided on both the probe micrometers and the carriage mechanism. Units with sexed connectors have a female connector on one end and a male on the other.

**Coaxial Stub Tuners –** Maury stub tuners are basic laboratory tools used for matching load impedances to provide for maximum power transfer between a generator and a load, and for introducing a mismatch into an otherwise matched system. Typical applications include power and attenuation measurements, tuned reflectometer systems and providing a DC return for single-ended mixers and detectors. Maury stub tuners are available in double- and triple-stub configurations with frequency ranges extending from 0.2 to 18.0 GHz.

The inter-stub spacing determines the range of impedances that can be matched and the ease of tuning. Triple-stub tuners are more convenient to use since tuning sensitivity is relatively independent of stub spacing.

**Waveguide Slide Screw Tuners –** Maury also offers manual tuners designed with slotted waveguide sections and movable carriages supporting micrometer driven probes that extend down into the waveguide. They are valuable tools for optimizing a mismatched load and/or source for maximum power transfer, or for establishing a specific source or load termination condition for device characterization.

They differ from coaxial slide screw tuners in that reflection phase is set by the position of a single probe along the waveguide, instead of the dual probes and slab line/center conductor assembly of coaxial models. Magnitude is still set by the probe penetration depth, which is controlable to 0.001-inch resolution and can be locked down to prevent movement after adjustment. The carriage is held in constant tension to provide smooth movement and to eliminate the need for a position lock.

Key Literature: Maury data sheet 2G-008, 2G-030, 2G-035, 2G-035A, 2G-035B, 2G-035C and 3A-353.

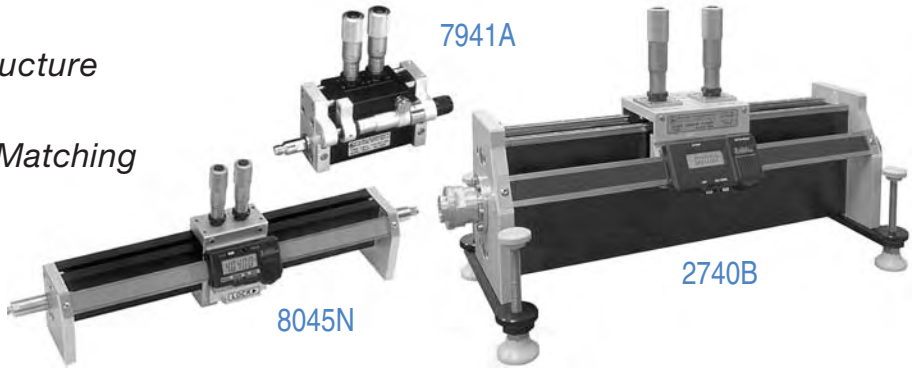


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# Coaxial Slide Screw Tuners – Wide Matching Range

## Features

- *Slab-line Transmission Structure*
- *Dual Probes for Improved Matching*
- *LCD Readout for Carriage Position*




## Description

Maury wide matching range slide screw tuners feature a slab-line transmission structure with dual micrometer-driven probes that provide precise control of the mismatch magnitude. Models operating up to 18 GHz are equipped with a digital LCD readout to indicate carriage position (phase). Higher frequency models are equipped with a micrometer driven carriage mechanism which is also employed in the standard matching range models (see page 144).

The positional repeatability and high matching range of these tuners make them ideally suited for use in device characterization applications where there is a critical need to establish impedances near the outer edge of the Smith chart and to reproduce electrical characteristics as a function of mechanical position. They are designed to serve as a matching network for reducing relections caused by mismatches present in a transmission line, or to introduce a controlled mismatch into an otherwise matched transmission line.

The models listed below are optimized for operation over wider matching ranges than the standard matching range models.

## Available Models

| MODEL | FREQUENCY RANGE (GHz) | CONNECTOR TYPE | VSWR MATCHING RANGE | MAXIMUM LOSS (PROBES RETRACTED) | PROBE CROSSOVER FREQUENCY | POWER [1] HANDLING (AVE./PK. WATTS) | DIMENSION "A" INCHES (CM) | DIMENSION "B" INCHES (CM) |
|---|---|---|---|---|---|---|---|---|
| 7941A | 12.0 — 50.0 | 2.4mm [2] | 10:1 | 1.0 dB | 21.5 GHz | 15/150 | 0.417 (1.059) | 4.62 (11.735) |
| 8041C | 12.0 — 34.0 | 3.5mm [3] | 10:1 | 0.7 dB | 16.0 GHz | 15/150 | 0.417 (1.059) | 4.95 (12.573) |
| 8045D1 | 1.8 — 18.0 | 3.5mm [3] | 12:1 | 0.4 dB | 5.5 GHz | 25/250 | 3.4 (8.636) | 8.94 (22.708) |
| 2640D1 | | 7mm [4] | | | | 50/500 | 3.4 (8.636) | 8.88 (22.555) |
| 1643D1 | | Type N [5] | | | | 50/500 | 3.4 (8.636) | 8.92 (22.657) |
| 8045P | 0.8 — 18.0 | 3.5mm [3] | 10:1 | 0.6 dB | 4.6 GHz | 25/250 | 7.8 (19.812) | 13.34 (33.884) |
| 2640P | | 7mm [4] | | | | 50/500 | 7.8 (19.812) | 13.28 (33.731) |
| 1643P | | Type N [5] | | | | 50/500 | 7.8 (19.812) | 13.32 (33.833) |
| 1643N | 0.8 — 2.5<br>2.5 — 8.0 | Type N [5] | 25:1<br>18:1 | 0.5 dB | 2.8 GHz | 50/500 | 7.8 (19.812) | 13.32 (33.833) |
| 2640N | 0.8 — 2.5<br>2.5 — 8.0 | 7mm [4] | 25:1<br>18:1 | 0.5 dB | 2.8 GHz | 50/500 | 7.8 (19.812) | 13.28 (33.731) |
| 8045N | 0.8 — 2.5<br>2.5 — 8.0 | 3.5mm [3] | 25:1<br>18:1 | 0.5 dB | 2.8 GHz | 25/250 | 7.8 (19.812) | 13.34 (33.884) |
| 2740B | 0.8 — 8.0 | 7-16 [6] | 35:1 | 0.1 dB | 2.8 GHz | 100/1000 | 7.88 (20.015) | 14.48 (36.779) |
| 2440B | | 14mm [7] | | | | | 7.88 (20.015) | 13.07 (33.198) |
| 2740C | 0.4 — 4.0 | 7-16 [6] | 25:1 | 0.1 dB | 1.4 GHz | 100/1000 | 14.95 (37.973) | 22.76 (57.810) |
| 2440C | | 14mm [7] | | | | | 14.95 (37.973) | 21.35 (54.229) |

[1] Within rated matching range.
[2] Precision 2.4mm per Maury data sheet 5E-064.
[3] Precision 3.5mm per Maury data sheet 5E-062.
[4] Precision 7mm per Maury data sheet 5E-060.
[5] Precision type N per Maury data sheet 5E-049.
[6] Precision 7-16 per Maury data sheet 5E-066.
[7] Precision 14mm (GR900) per Maury data sheet 5E-068.



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# Coaxial Slide Screw Tuners – Wide Matching Range

## *Functional Description*

The dual probe structure in Maury coaxial slide screw tuners is designed so that one probe (the low frequency probe) covers the range from the lowest frequency to the crossover frequency listed in the **Available Models** table on page 142. The second probe (the high frequency probe) covers the range from the crossover frequency to the tuner's maximum rated frequency. The optimum crossover frequency varys from tuner to tuner.

As each micrometer-driven probe is introduced into the slab-line transmission structure it induces a mismatch in its frequency range. The magnitude of this impedance mismatch is determined by the probe position (depth); the closer the probe approaches the center conductor, the greater the magnitude. The phase of the impedance mismatch is determined by the carriage position. The probes operate independently of each other with little or no interaction. Each probe will meet its specifications over its rated frequency range, and typically has considerably higher matching capability in the middle of its band. Figure 1 shows responses that are typical of those seen in a low frequency /high frequency pair of probes.

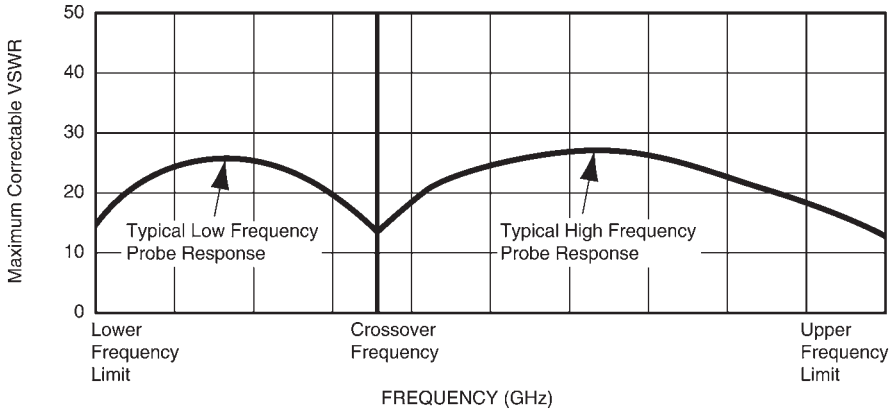
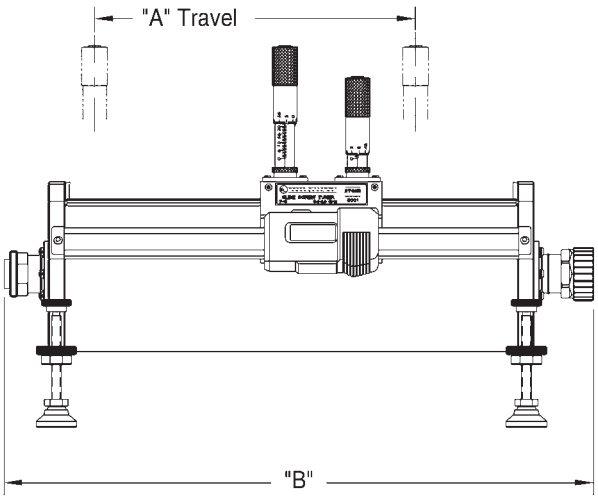
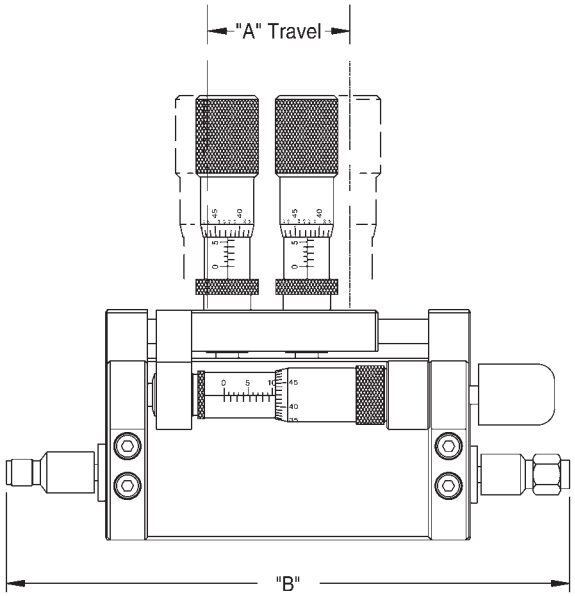



Figure 1. Typical responses seen in low frequency and high frequency probes as they are used in Maury coaxial slide screw tuners.

## *Typical Dimensions*




Models with LCD readouts for carriage position




Models with micrometer-driven carriage blocks

Figure 2. Typical dimensions for Maury coaxial slide screw tuners. See the ***Available Models*** table on page 138 for model-specific dimensions at the "A" and "B" references.



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# Coaxial Slide Screw Tuners – Standard Matching Range

## Description

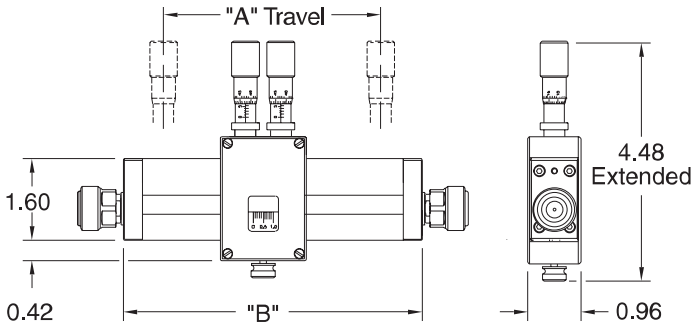
Maury slide screw tuners are particularly well suited for use in establishing impedances for device characterization, or for any other application requiring a precisely repeatable mismatch condition The calibrated position indicators on these tuners make it possible to repeat a specific matching condition with a high degree of accuracy. These tuners are also designed to allow the reflection magnitude and phase to be set independently. Slide screw tuners are also easy to use due to the almost independent electrical results of the mechanical motions.

Maury produces two categories of coaxial slide screw tuners; standard matching range (minimum 6:1 equivalent VSWR) and wide matching range (up to 25:1 nominal VSWR). Both types employ a slab-line transmission structure which defines their frequency range, with probes designed to be very close to 1/4λ in the linear dimension at the mid-band of each range. Each tuner has two probes for enhanced matching characteristics. Units with sexed connectors have a female connector on one end and a male on the other.

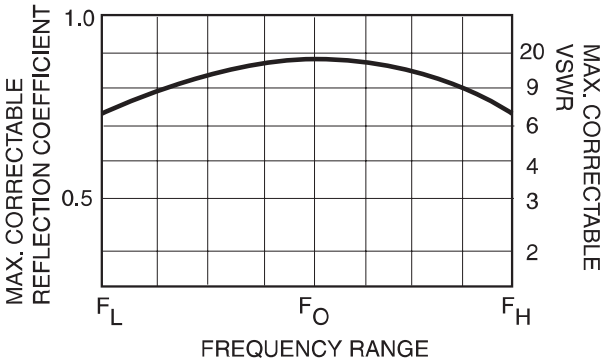



Maury standard matching range tuners are provided with micrometer driven probes and vernier readout of carriage position (except for the 3.5mm units which have micrometer driven carriages). Position locks are provided on both the probe micrometers and the carriage mechanism.

## Typical Dimensions




## Typical Performance




## Available Models

| MODEL | FREQUENCY RANGE (GHz) | CONNECTOR TYPE | VSWR MATCHING RANGE | MAXIMUM LOSS (PROBES RETRACTED) | PROBE CROSSOVER FREQUENCY | POWER [1] HANDLING (AVE./PK. WATTS) | DIMENSION "A" INCHES (CM) | DIMENSION "B" INCHES (CM) |
|---|---|---|---|---|---|---|---|---|
| 8041B | 12.0 — 26.5 | 3.5mm [2] | ≥ 10:1 | 0.7 dB | 16.0 GHz | 25/250 | 0.52 (1.321) | 2.90 (7.400) |
| 8045D | 1.8 — 18.0 | 3.5mm [2] | ≥ 6:1 | 0.4 dB | 5.5 GHz | 25/250 | 3.40 (8.636) | 7.50 (19.100) |
| 2640D | | 7mm [3] | | | | 50/500 | | |
| 1643D | | Type N [4] | | | | 50/500 | | |
| 8045C | 0.9 — 12.4 | 3.5mm [2] | ≥ 6:1 | 0.6 dB | 4.6 GHz | 25/250 | 7.80 (19.812) | 10.50 (26.700) |
| 2640C | | 7mm [3] | | | | 50/500 | | |
| 1643C | | Type N [4] | | | | 50/500 | | |

[1] Within rated matching range.
[2] Precision 3.5mm per Maury data sheet 5E-062.
[3] Precision 7mm per Maury data sheet 5E-060.
[4] Precision type N per Maury data sheet 5E-049.



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# Coaxial Stub Tuners

## *Description*

Maury stub tuners are basic laboratory tools used for matching load impedances to provide for maximum power transfer between a generator and a load, and for introducing a mismatch into an otherwise matched system. Typical applications include power and attenuation measurements, tuned reflectometer systems and providing a DC return for single-ended mixers and detectors. Maury stub tuners are available in double- and triple-stub configurations with frequency ranges extending from 0.2 to 18.0 GHz.

Stub tuners work as impedance transformers to introduce a variable shunt susceptance into a coaxial transmission line. They consist of one or more short-circuited, variable length lines (stubs) connected at right angles to the primary transmission line. To provide all possible shunt susceptances, each stub must be movable over 1/2 wavelength at the lowest frequency of operation; therefore, the lower frequency limit of a tuner is determined by the frequency at which the maximum stub travel equals 1/2 wavelength. The upper frequency limit for a stub tuner is established by its connectors.

The inter-stub spacing of multiple-stub tuners determines the range of impedances that can be matched and the ease of tuning. Triple-stub tuners are more convenient to use since tuning sensitivity is relatively independent of stub spacing.



2612C2



1819A



1719A

## *Available Models*

| STUB CONFIGURATION | FREQUENCY RANGE (GHz) | MODEL (BY CONNECTOR TYPE) TYPE N | 7mm | SMA | STUB TRAVEL INCHES | (cm) | STUB SPACING INCHES | (cm) |
|---|---|---|---|---|---|---|---|---|
| DOUBLE-STUB | 0.2 — 0.5 | 1778G | 2612B7 | — | 30.0 | (76.2) | 4.6 | (11.7) |
| | 0.4 — 1.0 | 1778A | 2612B1 | 1719A | 15.0 | (38.1) | 4.6 | (11.7) |
| | 0.8 — 4.0 | 1778B | 2612B2 | 1719B | 7.5 | (19.1) | 2.0 | ( 5.1) |
| | 2.0 — 12.0 | 1778C | 2612B3 | 1719C | 3.0 | ( 7.6) | 0.75 | ( 1.9) |
| | 2.0 — 18.0 | 1778E | — | — | 3.0 | ( 7.6) | 0.5 | ( 1.3) |
| | 4.0 — 18.0 | 1778D | 2612B4 | 1719D | 1.75 | ( 4.4) | 0.5 | ( 1.3) |
| TRIPLE-STUB | 0.2 — 0.5 | 1878G | 2612C7 | — | 30.0 | (76.2) | 4.6 (11.7) / | 2.0 ( 5.1) |
| | 0.4 — 1.0 | 1878A | 2612C1 | 1819A | 15.0 | (38.1) | 4.6 (11.7) / | 2.0 ( 5.1) |
| | 0.8 — 4.0 | 1878B | 2612C2 | 1819B | 7.5 | (19.1) | 1.0 ( 2.5) / | 0.75 ( 1.9) |
| | 2.0 — 18.0 | 1878C | 2612C3 | 1819C | 3.0 | ( 7.6) | 0.75 ( 1.9) / | 0.5 ( 1.3) |
| | 4.0 — 18.0 | 1878D | 2612C4 | 1819D | 1.75 | ( 4.4) | 0.75 ( 1.9) / | 0.5 ( 1.3) |



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# Waveguide Slide Screw Tuners – Standard Matching Range

## Features

- *Slotted Waveguide Transmission Structure*
- *Single Micrometer-Driven Probe*
- *Can Be Locked Down To Prevent Movement After Adjustment*




J353A

## Description

Maury offers manual tuners that feature slotted waveguide sections and movable carriages supporting micrometer driven probes that extend down into the waveguide. They are valuable tools for optimizing a mismatched load and/or source for maximum power transfer, or for establishing a specific source or lad termination condition for device characterization.

They differ from coaxial slide screw tuners in that the reflection phase is set by th position of a single probe along the waveguide, instead of dual probes and slabline/center conductor assembly of coaxial models.

As is the case with the coaxial slide screw tuners, in these waveguide models magnitude is set by the probe penetration depth, which is controllable to 0.001-inch resolution and can be locked down to prevent movement after adjustment. The carriage is held in constant tension to provide smooth movement and to eliminate the need for a position lock.

## Available Models

| FREQUENCY RANGE (GHz) | | | MATCHING RANGE (CORRECTABLE TO < 1.02) | MODEL | EIA WR NUMBER | EQUIVALENT FLANGE | OVERALL BODY LENGTH I NCHES | (cm) |
|---|---|---|---|---|---|---|---|---|
| 8.2 | — | 12.4 | VSWR ≤ 20:1 | X353 | 90 | UG39/U | 6.0 | (15.2) |
| 12.5 | — | 18.0 | VSWR ≤ 20:1 | P353 | 62 | UG419/U | 6.0 | (15.2) |
| 18.0 | — | 26.5 | VSWR ≤ 20:1 | K353 | 42 | UG595/U | 4.38 | (11.1) |
| 26.5 | — | 40.0 | VSWR ≤ 20:1 | U353 | 28 | UG599/U | 4.38 | (11.1) |
| 33.0 | — | 50.0 | VSWR ≤ 20:1 | J353A | 22 | UG383/U | 4.75 | (12.1) |

Key Literature: Maury data sheet and 3A-353.



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# Notes



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# Thank You!

We want to take the opportunity to thank you for your interest in Maury Microwave products. We realize that we must earn your business on each and every requirement by providing the highest quality products at a fair price with delivery per committment.

This is what you expect and this is what Maury Microwave strives to provide.



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