Maury Microwave

User Guide

TNCA
Coaxial Calibration Kit

DC to 20 GHz

Models: 8670CK10/11
8670CK20/21

8670-511 (A) 2/15

User Guide

TNCA
Coaxial Calibration Kit

DC to 20 GHz

Models: 8670CK10/11
8670CK20/21

Maury Microwave
2900 Inland Empire Boulevard
Ontario, California 91764-4804 USA
Telephone: (909) 987-4715
Facsimile: (909) 987-1112

maurymw.com

Warranty

Maury Microwave hardware products are warranted against defects in materials and workmanship for a period of one year from date of shipment. During the warranty period, Maury Microwave will, at its option, either repair or replace products which prove to be defective.

Maury Microwave software products are warranted against defects in material and workmanship of the media on which the product is supplied for a period of ninety (90) days from date of shipment. Maury also warrants that the product shall operate substantially in accordance with published specifications during the same warranty period. During the warranty period, Maury Microwave will, at its option, either repair or replace products which prove to be defective. Maury does not warrant that the operation of the product shall be uninterrupted or error-free.

For warranty service or repair, all products must be returned to Maury Microwave and must be issued a return authorization number by Maury prior to shipment. Buyer shall prepay shipping charges to Maury. Obligation is limited to the original Buyer.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or wear resulting from normal use. No other warranty is expressed or implied. Maury Microwave specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

The remedies provided herein are the Buyer's sole and exclusive remedies. Maury Microwave shall not be liable for any direct, indirect, special, incidental, or consequential damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or any other financial loss) arising out of the Buyer's use of or inability to use the product, even if Maury or an authorized Maury dealer has been advised of the possibility of such damages.

Contents

Tables

Figures

General Information

Calibration Kit Description

This series of **TNCA** coaxial calibration kits is designed to provide accurate calibrations of network analyzers in the **DC to 20.0 GHz** range. Each of these kits includes all the necessary calibration standards and associated hardware needed for the accurate calibration of most network analyzers.

Refer to the ***Calibration Kits*** *Contents* section (see Appendix, Date Sheet Resources) for information on included components and available kit options.

NOTE: This document, calibration constants software, and data sheet can be downloaded from our website: ***maurymw.com***

NOTE: Legacy analyzer software is not on our website but is available for purchase.

Maintenance

This calibration kit is relatively maintenance free if the components are handled with the same care that is appropriate to all precision equipment. As with any precision component, proper care should be taken to assure clean mating surfaces, correct alignment when mating, and proper torquing of connectors or waveguide coupling screws. To help maintain the integrity of the components in this kit, routine visual inspection and cleaning of mating surfaces is recommended. Failure to do so may result in degraded repeatability and accuracy, as well as damage any mated devices.

Calibration

To maintain verification that a calibration kit is performing to traceable specifications, we recommend that all kits be periodically returned to Maury Microwave for calibration. The typical calibration cycle is one year, although actual need may vary depending on usage.

Supporting Test Port Adapters

When configuring a test setup, be sure that damaging stresses are not applied to the connectors on the test set. This is particularly critical when the attached components are heavy or long. Always properly support the test port adapters being used.

Electrostatic Discharge Precautions

Protection against electrostatic discharge (ESD) is essential while inspecting, cleaning, or making connections to connectors attached to a static-sensitive circuit, such as those found inside test sets.

When handling the connectors on the test set, be aware that you are coming in contact with exposed center conductors that are connected directly to the static-sensitive internal circuits of the network analyzer. Make sure that you and your equipment are well-grounded before inspecting, cleaning, or making connections to test set ports. Standard ESD precautions, such as the use of grounded wrist straps and grounded antistatic mats, are recommended.

Connector Description

The Maury **TNCA** connectors supplied in this kit fully comply with the interface requirements of MIL-STD-348A. All connector bodies are fabricated from stainless steel for strength and wear resistance. For interface specifications on these connectors, see Maury data sheet ***5E-058***.

Connector Care

Precision connectors must be handled carefully if accurate calibrations and measurements are to be obtained. All connectors should be inspected prior to each use. For optimum measurement results, all interfaces should be visually inspected under magnification and cleaned on a regular basis. Proper connector contact pin depths should also be verified through regular inspections using a connector gage, such as the Maury Microwave A012E connector gage kit, to insure that the connectors on both calibration devices and devices under test (DUTs) have contact pin depths within recommended tolerances. Refer to Maury data sheet ***5E-058*** (available on our website) for proper pin depth specifications.

Care should be used whenever aligning connectors. Tighten connector coupling nuts using an appropriate torque wrench while holding the opposing connector with an open-end wrench.

When disconnecting devices, take care not to rock or bend any of the connections. Disconnect devices by disengaging the coupling nuts and gently pulling the connectors apart in a straight line.

Always use protective covers on all connectors when devices are not in use.

Should a connector become damaged, it should be repaired before it is used any further or replaced immediately. A damaged connector can damage other mated connectors.

Connector Tightening

Damage to a calibration device or attaching connector can occur if the device is turned instead of the connector nut. ALWAYS turn the nut when making connections. Never turn the device itself.

Always use a torque wrench (Maury model **2698G1**) to final-tighten all connections. This will insure calibration accuracy and measurement repeatability.

When making connections, a **7/16 inch** open-end wrench may be required to hold the body of one device stationary while torquing the nut on the other device or cable. This open-end wrench is supplied with this calibration kit for this purpose.

Using the torque wrench, hand-tighten the connection to be torqued by holding the calibration device steady and turning only the nut.

- Hold the torque wrench with your thumb and index finger, behind the groove in the handle (see **Figure 1**).
- Tighten the connection until the ball in the handle crests on the cam (as the handle begins to break). Do not "fully break" the handle of the torque wrench to reach the specified torque.
- Reverse the previous procedure to disconnect the connection.

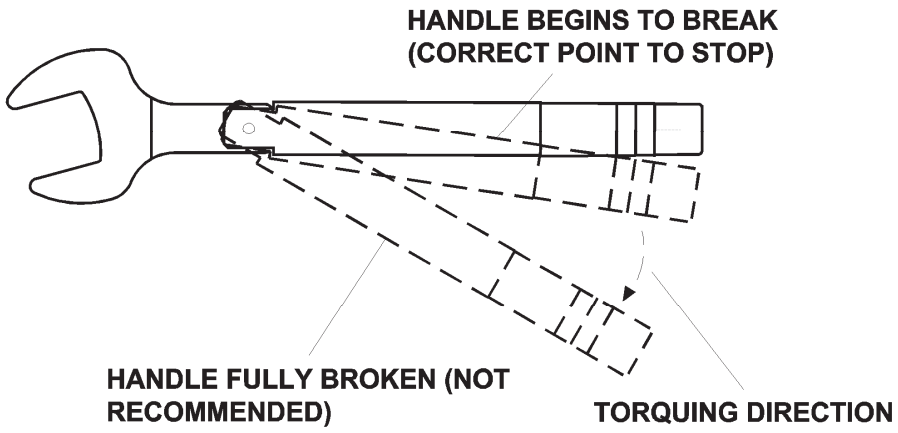

Figure 1. Using the Torque Wrench

Calibration Kit Contents

Standard Components – 8670CK10

1 ea	Short, female	8676A
1 ea	Short, male	8677A
1 ea	Open, female	8675A
1 ea	Open, male	8675B
1 ea	Fixed Termination, female	8674A
1 ea	Fixed Termination, male	8674B
1 ea	Case Assembly	

Standard Components – 8670CK11

1 ea	Short, female	8676A
1 ea	Short, male	8677A
1 ea	Open, female	8675A
1 ea	Open, male	8675B
1 ea	Fixed Termination, female	8674A
1 ea	Fixed Termination, male	8674B
1 ea	Adapter, male to male	8678B
1 ea	Adapter, female to male	8678C
1 ea	Adapter, female to female	8678A
1 ea	Case Assembly	

Standard Components – 8670CK20

1 ea	Short, female	8676A
1 ea	Short, male	8677A
1 ea	Open, female	8675A
1 ea	Open, male	8675B
1 ea	Fixed Termination, female	8674A
1 ea	Fixed Termination, male	8674B
1 ea	Sliding Termination, female	8673A
1 ea	Sliding Termination, male	8673B
1 ea	9/16 Torque Wrench, 12in.lbs	2698G1
1 ea	Wrench, 7/16	8770Z7
1 ea	Case Assembly	

Standard Components – 8670CK21

1 ea	Short, female	8676A
1 ea	Short, male	8677A
1 ea	Open, female	8675A
1 ea	Open, male	8675B
1 ea	Fixed Termination, female	8674A
1 ea	Fixed Termination, male	8674B
1 ea	Adapter, male to male	8678B
1 ea	Adapter, female to male	8678C
1 ea	Adapter, female to female	8678A
1 ea	Sliding Termination, female	8673A
1 ea	Sliding Termination, male	8673B
1 ea	9/16 Torque Wrench, 12in.lbs	2698G1
1 ea	Wrench, 7/16	8770Z7
1 ea	Case Assembly	

Standard Definitions

Anritsu Network Analyzers

Table 1. Male Standard Definitions for Anritsu

Male Open Device	
C0	60.000 e-15
C1	-200.000 e-27
C2	6.000 e-36
C3	0.000 e-45
Offset Length	1.2565 cm
Serial Number	00000
Male Short Device	
Offset Length	1.3190 cm
Serial Number	00000

Table 2. Female Standard Definitions for Anritsu

Female Open Device	
C0	58.000 e-15
C1	-90.000 e-27
C2	-55.000 e-36
C3	3.100 e-45
Offset Length	1.2326 cm
Serial Number	00000
Female Short Device	
Offset Length	1.3190 cm
Serial Number	00000

For specific loading instructions, see ***Anritsu loading instructions,*** which can be downloaded from our website: ***maurymw.com***.

Keysight Network Analyzers

Table 3. Standard Definitions for Keysight

Standard (1)			C0 x10^{-15} F	C1 x10^{-27} F/Hz	C2 x10^{-36} F/Hz^2	C3 x10^{-45} F/Hz^3	Fixed or Sliding (2)	Offset			Frequency GHz		Coax or W/G	Standard Label
	Type	Description	L0 x10^{-12} H	L1 x10^{-24} H/Hz	L2 x10^{-33} H/Hz^2	L3 x10^{-42} H/Hz^3		Delay ps	Z_0 (3) Ω	Loss (4) GΩ/s	Min	Max		
	Short	Female Short	0.0	0.0	0.0	0.0		43.997	50	0.7	0.0	999.0	Coax	8676A
	Open	Female Open	58.0	-90.0	-55.0	3.10		41.115	50	0.7	0.0	999.0	Coax	8675A
	Load	Broadband Female Load					Fixed	0.0	50	0.0	0.0	999.0	Coax	8674A BB
	Thru	Thru						0.0	50	0.0	0.0	999.0	Coax	Thru (5)
	Load	Sliding Female Load					Sliding	0.0	50	0.0	1.999	999.0	Coax	8673A
	Load	Lowband Female Load					Fixed	0.0	50	0.0	0.0	2.001	Coax	8674A LB
	Short	Male Short	0.0	0.0	0.0	0.0		43.997	50	0.7	0.0	999.0	Coax	8677A
	Open	Male Open	60.0	-200.0	6.0	0.0		41.912	50	0.7	0.0	999.0	Coax	8675B
	Load	Broadband Male Load					Fixed	0.0	50	0.0	0.0	999.0	Coax	8674B BB
	Load	Sliding Male Load					Sliding	0.0	50	0.0	1.999	999.0	Coax	8673B
	Load	Lowband Male Load					Fixed	0.0	50	0.0	0.0	2.001	Coax	8674B LB

(1) Open, short, load, delay/thru, or arbitrary impedance.
(2) Load or arbitrary impedance only.
(3) Z_0 normalized.
(4) Skin loss factor, normalized at 1 GHz.
(5) Test ports connected directly.

For specific loading instructions, see ***Keysight loading instructions***, which can be downloaded from our website: ***maurymw.com***

Rohde & Schwarz Network Analyzers

Table 4. Standard Definitions for Rohde & Schwarz

Short (M) Min Freq = 0 Hz Max Freq = 20 GHz Length = 13.19 mm Loss = 0.0054 dB/$\sqrt{GHz}$	Match (M) Min Freq = 0 Hz Max Freq = 20 GHz
Short (F) Min Freq = 0 Hz Max Freq = 20 GHz Length = 13.19 mm Loss = 0.0054 dB/$\sqrt{GHz}$	Match (F) Min Freq = 0 Hz Max Freq = 20 GHz
Open (M) Min Freq = 0 Hz Max Freq = 20 GHz Length = 12.565 mm Loss = 0.0051 dB/$\sqrt{GHz}$ C0 = 60 fF C1 = -0.2 fF/GHz C2 = 0.006 fF/GHz^2 C3 = 0 fF/GHz^3	Sliding Match (M) Min Freq = 2 GHz Max Freq = 20 GHz Sliding Match (F) Min Freq = 2 GHz Max Freq = 20 GHz
Open (F) Min Freq = 0 Hz Max Freq = 20 GHz Length = 12.326 mm Loss = 0.0050 dB/$\sqrt{GHz}$ C0 = 58 fF C1 = -0.09 fF/GHz C2 = -0.055 fF/GHz^2 C3 = 0.0031 fF/GHz^3	

For specific loading instructions, see ***Rohde & Schwarz loading instructions***, which can be downloaded from our website: ***maurymw.com***.

(This page intentionally left blank)

Appendix

Data Sheet Resources

2Z-067 – TNCA Calibration Kits
http://maurymw.com/pdf/datasheets/2Z-067.pdf

5E-058 – Engineering Data, TNCA Connectors
http://maurymw.com/pdf/datasheets/5E-058.pdf

5E-057A – TNC Compatibility Chart
http://maurymw.com/pdf/datasheets/5E-057A.pdf

2Y-028 – TNC MIL-SPEC and IEC Connector Gage Kit
http://maurymw.com/pdf/datasheets/2Y-028.pdf

2Y-001 – Connector Gages and Connector Gage Kits
http://maurymw.com/pdf/datasheets/2Y-001.pdf

2Y-050A – Torque Wrenches
http://maurymw.com/pdf/datasheets/2Y-050A.pdf

Contacts

Corporate

Maury Microwave Corporation
2900 Inland Empire Boulevard
Ontario, California 91764-4804
United States of America

Tel. 909-987-4715
Fax 909-987-5855
Email maury@maurymw.com

Sales

Tel. 909-204-3224
Fax 909-987-1112
Email maury@maurymw.com

Customer Support

Tel. 909-204-3283
Fax 909-987-1112
Email support@maurymw.com

Website

maurymw.com

Web Resources

Maury Calibration Kits
http://maurymw.com/Precision/VNA_Cal_Kits.php

Maury Precision Coaxial and Waveguide-to-Coaxial Adapters
http://maurymw.com/Finder/Adapter_Finder.php

Maury Applications Notes Library & Technical Articles Archive
http://maurymw.com/Support/tech-support.php

Maury Sales Representative Finder
http://maurymw.com/Support/find-sales-rep.php

Visit our website for additional product information and literature.