Maury Microwave

User Guide

Precision N 75 Ohm Coaxial Calibration Kit

Models: 8880CK40/41

8880-501 (A) 12/19

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Models: 8880CK40/41

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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.

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General Information

Calibration Kit Description

This series of Precision N 75 Ohm coaxial calibration kits is designed to provide accurate calibrations of network analyzers in the DC to 18.0 GHz range. However, these kits can be used at higher frequencies. Each of these kits includes all the necessary calibration standards and associated hardware needed for the accurate calibration of most network analyzers.

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

All calibration standards and adapters in this series of kits utilize the Maury Microwave Precision N 75 Ohm Connector, which is compliant with IEEE 287.1 Rev D.

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 A020G 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 ***2Z-061A*** (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.

CAUTION: Do not mate Type N 75 ohm connectors to Type N 50 ohm connectors. Mating a Type N 75 ohm female connector to a Type N 50 ohm male connector will destroy the contact on the Type N 75 ohm female connector. Mating a Type N 75 ohm male connector to a Type N 50 ohm female connector will not provide proper electrical contact for the center conductors.

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 **2698C2**) to final-tighten all connections. This will insure calibration accuracy and measurement repeatability.

When making connections, a **3/4 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.

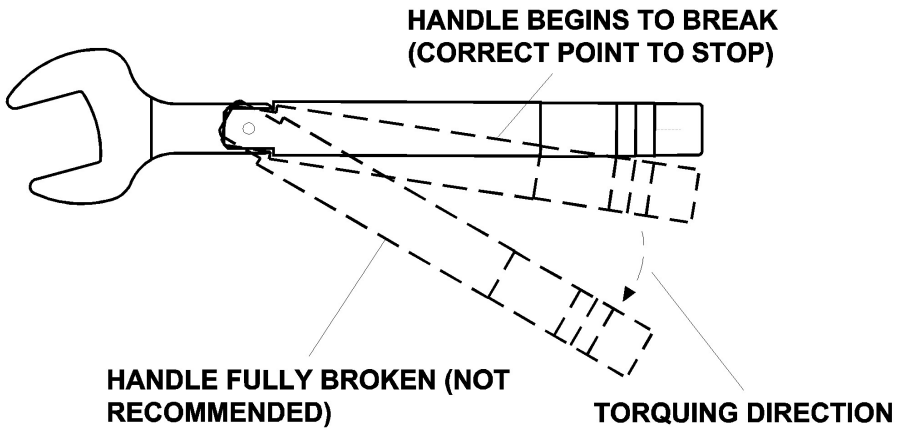

Figure 1. Using the Torque Wrench

Calibration Kit Contents

Standard Components – 8880CK40

1 ea	Short, female	8884A1
1 ea	Short, male	8884B1
1 ea	Open, female	8885A1
1 ea	Open, male	8885B1
1 ea	Fixed Termination, female	8883A1
1 ea	Fixed Termination, male	8883B1
1 ea	Case Assembly	

Standard Components – 8880CK41

1 ea	Short, female	8884A1
1 ea	Short, male	8884B1
1 ea	Open, female	8885A1
1 ea	Open, male	8885B1
1 ea	Fixed Termination, female	8883A1
1 ea	Fixed Termination, male	8883B1
1 ea	Adapter, male to male	8882B1
1 ea	Adapter, female to male	8882C1
1 ea	Adapter, female to female	8882A1
1 ea	Case Assembly	

Anritsu Network Analyzers

Table 1. Male Standard Definitions for Anritsu

Type N (75) Male Open Device	
C0	55.544374 e-15
C1	46.769425 e-27
C2	70.281761 e-36
C3	-1.833202 e-45
Offset Length	11.100505 mm
Serial Number	00000

Type N (75) Male Short Device	
L0	7.175754 e-12
L1	37.624275 e-24
L2	-100.946068 e-33
L3	5.707350 e-42
Offset Length	12.632655 mm
Serial Number	00000

Table 2. Female Standard Definitions for Anritsu

Type N (75) Female Open Device	
C0	1.283217 e-15
C1	-2132.613502 e-27
C2	252.893465 e-36
C3	-7.951035 e-45
Offset Length	12.500750 mm
Serial Number	00000

Type N (75) Female Short Device	
L0	-7.959313 e-12
L1	5412.578574 e-24
L2	-610.788859 e-33
L3	20..288745 e-42
Offset Length	12.632655 mm
Serial Number	00000

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

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	-7.959313	5412.578574	-610.788859	20.288745		42.138	75	1.451476	0.0	999.0	Coax	8884A1
	Open	Female Open	1.283217	-2132.61350	252.893465	-7.951035		41.698	75	1.428661	0.0	999.0	Coax	8885A1
	Load	Broadband Female Load					Fixed	21.568	75	25.34225	0.0	999.0	Coax	8883A1 BB
	Thru	Thru						0.0	75	1.13	0.0	999.0	Coax	Thru [5]
	Short	Male Short	7.175754	37.624275	-100.946068	5.707350		42.138	75	1.375180	0.0	999.0	Coax	8884B1
	Open	Male Open	55.544374	46.769425	70.281761	-1.833202		37.0273	75	1.165687	0.0	999.0	Coax	8885B1
	Load	Broadband Male Load					Fixed	56.5584	75	23.00120	0.0	999.0	Coax	8883B1 BB

[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 = 18 GHz Length = 0.012633 mm Loss = 0.006711 dB/√GHz L0 = 7.175754 pH L1 = 0.037624 pH/GHz L2 = -0.100946 pH/GHz^2 L3 = 0.005707 pH/GHz^3	Match (M) Min Freq = 0 Hz Max Freq = 18 GHz Length = 0.016956 mm Loss = 0.150661 dB/√GHz
Short (F) Min Freq = 0 Hz Max Freq = 18 GHz Length = .012633 mm Loss = 0.007083 dB/√GHz L0 = -7.959313 pH L1 = 5.412579 pH/GHz L2 = -0.610789 pH/GHz^2 L3 = 0.020289 pH/GHz^3	Match (F) Min Freq = 0 Hz Max Freq = 18 GHz Length = 0.006466 mm Loss = 0.063301 dB/√GHz
Open (M) Min Freq = 0 Hz Max Freq = 18 GHz Length = 0.011101 mm Loss = 0.004999 dB/√GHz C0 = 55.544374 fF C1 = 0.046769 fF/GHz C2 = 0.070282 fF/GHz^2 C3 = -0.001833 fF/GHz^3	
Open (F) Min Freq = 0 Hz Max Freq = 18 GHz Length = 0.012501 mm Loss = 0.006899 dB/√GHz C0 = 1.283217 fF C1 = -2.132614 fF/GHz C2 = 0.252893 fF/GHz^2 C3 = -0.007951 fF/GHz^3	

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

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Appendix

Data Sheet Resources

2Z-061A – Type N 75 ohm Calibration Kit
http://maurymw.com/pdf/datasheets/2Z-061A.pdf

2Y-051 – Connector Gage Summary
http://maurymw.com/pdf/datasheets/2Y-051.pdf

Contacts

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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
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