# VectorStar<sup>™</sup> MN469xC Series Multiport Test Set

VectorStar MN4694C, K Connectors, for the MS4642A/B or MS4644A/B VNA VectorStar MN4697C, V Connectors, for the MS4645A/B or MS4647A/B VNA





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# **Chapter 1 — General Information**

# 1-1 Introduction

This manual provides general information, installation, operating, and maintenance information for the VectorStar MN469xC Series Multiport Test Sets. The following model Multiport Test Sets are discussed in this manual:

- MN4694C, K Connectors, for the VectorStar MS4642A/B or MS4644A/B VNAs
- MN4697C, V Connectors, for the VectorStar MS4645A/B or MS4647A/B VNAs

Throughout this manual, the term **test set** is used to refer to the MN469xC Series Multiport Test Set, the term **VNA** is used to refer to the VectorStar MS464xA/B Series Vector Network Analyzer, and the term **DUT** is used to refer to the device under test.

This chapter contains general information about the Multiport Test Sets shown in Figure 1-1 on the following page. It includes a general description and functional details of the instrument, and provides technical specifications for each test set model.

# **1-2** Test Set Description

The Multiport Test Set provides multiple test port capabilities for the Anritsu VectorStar MS464xA/B Series Vector Network Analyzers. The test set contains a switch matrix and switch matrix controller that facilitates multiple test port connections to the device under test. The test set is controlled by the connected VectorStar VNA (except for power on/off) via the IEEE-488 General Purpose Interface Bus (GPIB).

Below, Figure 1-1 shows the front and rear panels for the MN469xC Series Multiport Test Set.



Figure 1-1. MN469xC Series Multiport Test Set Front (top) and Rear (bottom) Panels

# **1-3** Test Set Components

The MN469xC Series Multiport Test Set comes with the following components.

Table 1-1.	MN469xC Multiport	Test Set Components and Ca	bles
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Part Numbers	Description	Connection From	Connection To
		VNA port labeled: <b>b1</b> (In)	MN469xC port labeled: <b>b1</b> (ln)
		VNA port labeled: <b>b1</b> (Out)	MN469xC port labeled: <b>b1</b> (Out)
3-62109-42 V (m-m)		VNA port labeled: <b>Port 1 Source</b> (In)	MN469xC port labeled: <b>Port 1 Source</b> (In)
(MN4697C)	V or K male-male semi-rigid	VNA port labeled: Port 1 Source (Out)	MN469xC port labeled: Port 1 Source (Out)
3-67357-38	Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	VNA port labeled: <b>Port 2 Source</b> (In)	MN469xC port labeled: <b>Port 2 Source</b> (In)
(MN4694C)		VNA port labeled: Port 2 Source (Out)	MN469xC port labeled: <b>Port 2 Source</b> (Out)
		VNA port labeled: <b>b2</b> (In)	MN469xC port labeled: <b>b2</b> (ln)
		VNA port labeled: <b>b2</b> (Out)	MN469xC port labeled: <b>b2</b> (Out)
3-62112-81	Rear Panel SMA male-male	MS464xB port labeled:	MN469xC port labeled:
	semi-rigid	b2 loop out	TO VNA b2 OUTPUT
3-62112-80	Rear Panel SMA male-male semi-rigid	MS464xB port labeled:	MN469xC port labeled:
		b2 loop in	TO VNA b2 INPUT
3-62112-81	Rear Panel SMA male-male semi-rigid	MS464xB port labeled:	MN469xC port labeled:
		P2 source loop out	TO VNA Port 2 Src OUTPUT
3-62112-80	Rear Panel SMA male-male semi-rigid	MS464xB port labeled:	MN469xC port labeled:
		P2 source loop in	TO VNA Port 2 Src INPUT
3-62112-81	Rear Panel SMA male-male semi-rigid	MS464xB port labeled:	MN469xC port labeled:
5-02112-01		b1 loop out	TO VNA b1 OUTPUT
2 62112 90	Rear Panel SMA male-male semi-rigid	MS464xB port labeled:	MN469xC port labeled:
3-02112-00		b1 loop in	TO VNA b1 INPUT
2 62112 01	Rear Panel SMA male-male semi-rigid	MS464xB port labeled:	MN469xC port labeled:
3-02112-01		P1 source loop out	TO VNA Port 1 Src OUTPUT
3-62112-80	Rear Panel SMA male-male	MS464xB port labeled:	MN469xC port labeled:
5-02112-00	semi-rigid	P1 source loop in	TO VNA Port 1 Src INPUT
2100-1	Rear Panel GPIB Cable 1 meter (39.3") long	IEEE 488.2 GPIB	Dedicated GPIB
_	Rear Panel Power Cord	Line Input o	connects to AC Mains
MS464xA/B	VNA with Option 051, 061, or 062		
MN469xC	Multiport Test Set		

# **1-4** Functional Description

The functional description is based on the functional block diagram of the MN469xC Series Test Set shown below (Figure 1-2).

The VectorStar VNA sends switch control commands via the GPIB bus to the GPIB to Parallel Digital Interface PCB in the test set. The logic in this PCB is translated by the switch driver board to the appropriate levels to control each of the RF switches designated SW1 through SW4. Any one or two test ports may be selected for forward and/or reverse measurements. This enables any one of a variety of connections to be selected.

An LED below each test port (Ports 1 to 4) and an LED above the AC Power switch indicate an active status. When AC power is first applied, the Power LED will light. This is the default state where all test ports are terminated into a nominal 50 Ohm termination and none of the test ports are selected for a measurement. When the connection paths are set via GPIB commands, the Test Port LEDs light according to the connections. A lit LED under a test port indicates that it is selected as an active test port.



Figure 1-2. VectorStar MN469xC Series Multiport Test Set Functional Block Diagram

# 1-5 Technical Specifications

For complete technical specifications, refer to the VectorStar MN469xC Series Multiport Technical Data Sheet – 11410-00777.

# 1-6 Related Documentation

All documents listed in this section are available on the VectorStar <sup>™</sup> User Documentation USB Memory Device 10920-00067, except for the Calibration, Verification, and System Performance Verification documents, which are included on a separate USB memory device included in each kit.

### Product Information, Compliance, and Safety

• VectorStar Product Information, Compliance, and Safety (PICS) - 10100-00063

### VectorStar™ MS464xB Series Vector Network Analyzers

- MS464xB Series VNA Technical Data Sheet 11410-00611
- MS464xB Series VNA Operation Manual 10410-00317
- MS464xB Series VNA Measurement Guide 10410-00318
- MS464xB Series VNA User Interface Reference Manual 10410-00319
- MS464xB Series VNA Maintenance Manual 10410-00320
- MS464xB Series VNA Programming Manual 10410-00322
- MS464xB Series VNA Programming Manual Supplement 10410-00323
- MS464xB Series VNA User Help System 10450-00040
- MS464xB Series VNA User Documentation USB Memory Device 2300-564-R or CD 10920-00067

### VectorStar ME7838 Series 2-Port BB/mmW VNA Measurement System

- ME7838A Modular BB/mm-Wave Technical Data Sheet (TDS) 11410-00593
- ME7838D Modular BB/mm-Wave Technical Data Sheet (TDS) -11410-00778
- ME7838E Modular BB/mm-Wave Technical Data Sheet (TDS) -11410-00767
- ME7838A Modular BB/mm-Wave Quick Start Guide (QSG) -10410-00292
- ME7838D Modular BB/mm-Wave Quick Start Guide (QSG) -10410-00732
- ME7838E Modular BB/mm-Wave Quick Start Guide (QSG) –10410-00729
- ME7838 Series Modular BB/mm-Wave Installation Guide (IG) -10410-00293
- VectorStar Broadband/Banded Millimeter-Wave Modules (RM) -10410-00311
- ME7838 Series Modular BB/mm-Wave Maintenance Manual (MM) -10410-000306

### VectorStar™ ME7838A4 Multiport BB/mm-Wave VNA Measurement System

- ME7838A4 4-Port Broadband VNA Technical Data Sheet (TDS) 11410-00704
- ME7838A4 4-Port Broadband VNA Quick Start Guide (QSG) 10410-00735
- ME7838A4 4-Port Broadband VNA Installation Guide (IG) 10410-00734
- ME7838A4 4-Port Broadband VNA Maintenance Manual (MM) 10410-00736
- Broadband/Banded Millimeter-Wave Module Reference Manual (RM) 10410-00311

### VectorStar MN469xC Series Multiport VNA Measurement System

- MN469xC Series Multiport VNA Measurement System Technical Data Sheet 11410-00777
- MN469xC Series Multiport Test Set Installation Guide 10410-00737
- MN469xC Series Multiport Test Set Quick Start Guide 10410-00738
- MN469xC Series Multiport Test Set Maintenance Manual 10410-00730

### Calibration, Verification, and System Performance Verification

- MN4765B O/E Calibration Module Technical Data Sheet (TDS) 11410-00843
- MN4765B O/E Calibration Module Operation Manual (OM) 10410-00742
- 36585K and 36585V Precision Auto Calibrator (AutoCal) Module Reference Manual 10410-00279
- 365xx-x Mechanical Calibration Kit Reference Manual 10410-00278
- 366X-1 Verification Kits (3666-1 3.5mm Connectors, 3668-1 K Connectors, 3669B-1 V Connectors) and 2300-579 Performance Verification Software (PVS) User Guide – 10410-00270
- 366X-1 Verification Kit and 2300-579 PVS Quick Start Guide 10410-00285
- 3656B W1 (1 mm) Calibration/Verification Kit and 2300-584 System Performance Verification Software User Guide for the VectorStar<sup>™</sup> ME7838A/ME7828A and Lightning ME7808A/B/C BB/mm-Wave VNA Systems 10410-00286
- 3659 Calibration/Verification Kit and 2300-580 Performance Verification Software (PVS) User Guide for BB-mmW ME7838D with 0.8 mm Connectors – 10410-00327

# 1-7 Contacting Anritsu

To contact Anritsu, please visit:

https://www.anritsu.com/en-US/contact-us

From here, you can select the latest sales, service and support contact information in your country or region, provide online feedback, complete a "Talk to Anritsu" form to get your questions answered, or obtain other services offered by Anritsu.

Updated product information can be found on your product page:

http://www.anritsu.com/en-us/products-solutions/products/ms4640b-series.aspx

On this web page, you can select various tabs for more information about your instrument. Included is a "Library" tab which contains links to all the latest technical documentation related to this instrument.

# **Chapter 2 — Hardware Installation**

# 2-1 Introduction

This chapter provides installation instructions for the Multiport Test Set. It includes information on initial inspection, preparation for use, front and rear panel connections, and General Purpose Interface Bus (GPIB) setup and interconnections.

# 2-2 Initial Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, retain until the contents of the shipment have been checked against the packing list and the test set has been checked for mechanical and electrical operation.

If the shipment is incomplete or if the test set is damaged mechanically or electrically, notify your local sales representative or Anritsu Customer Service. If either the shipping container is damaged or the cushioning material shows signs of stress, notify the carrier as well as Anritsu. Keep the shipping materials for the carrier's inspection.

# 2-3 **Power Requirements**

The test set accepts 85 to 240 VAC, 47 to 63 Hz, single-phase power. Power consumption is 255 VA maximum. The test set is intended for Installation Category (Over Voltage Category) II.

When supplying power to this test set, always use a three-wire power cable connected to aCaution three-wire power line outlet. If power is supplied without grounding the equipment in this manner, there is a risk of receiving a severe or fatal electric shock.

# 2-4 Preparation for Use

Preparation for use consists of placing the VNA on top of the test set, cabling the test set to the VNA with front and rear panel connections, and connecting both units to AC power. The test set comes factory configured for GPIB address 16, which is set by the rear panel DIP switches.



# 2-5 System Connections

The figure below shows the front panel connections between the Test Set and VNA. Make the semi-rigid cable connections as shown in Figure 2-1, Figure 2-2, and in Table 2-1.

**Note** Before installing the test set in its operating environment, ensure that the airflow hole pattern at the right side of the instrument is clear. This is necessary to provide adequate ventilation for the test set.

### **Front Panel Connections**

- **1.** Place the VNA on top of the Test Set as shown in Figure 2-1.
- **2.** Disconnect the front panel RF cable loops from ports that will be connected to the test set.

When front panel loops on a VectorStar MS464xA/B are removed and then reinstalled for any reason, ensure they are returned to their original locations. If they are reconnected to locations other than their original, this can affect the VNA factory calibration. If the loop locations are forgotten and the calibration has been compromised, refer to the VectorStar Maintenance Manual for instructions on performing a new factory RF calibration.

**3.** Use the eight provided RF (K or V) male-to-male cables, or other semi-rigid or phase stable male-to-male RF cables to make the connections as shown in Figure 2-1 and in Table 2-1.



Figure 2-1. Front Panel Connections

### **Rear Panel Connections**

- 1. Connect the GPIB cable between the VNA Rear Panel **Dedicated GPIB** connector and the Test Set **IEEE** 488.2 GPIB connector as shown in Figure 2-2.
- **2.** On the VNA rear panel, remove and set aside the eight SMA (m-m) loops.
- **3.** Install the eight semi-rigid cables provided as shown in Figure 2-2 and Table 2-1.
- **4.** Connect the **AC Power Cords** to the VNA and the Test Set and then to the AC Mains.



Figure 2-2. MS464xA/B VNA and MN469xC Test Set Rear Panel Connections (MS464xB shown)

Index	Part Numbers	Description/Torque	Connection From	Connection To		
	Front Panel Connections					
	3-62109-42		VNA port labeled: <b>b1</b> (In)	MN469xC port labeled: <b>b1</b> (In)		
			VNA port labeled: <b>b1</b> (Out)	MN469xC port labeled: <b>b1</b> (Out)		
			VNA port labeled: <b>Port 1 Source</b> (In)	MN469xC port labeled: <b>Port 1 Source</b> (In)		
1	(MN4697C)	V or K male-male semi-rigid	VNA port labeled: <b>Port 1 Source</b> (Out)	MN469xC port labeled: Port 1 Source (Out)		
I	3-67357-38	Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m	VNA port labeled: <b>Port 2 Source</b> (In)	MN469xC port labeled: <b>Port 2 Source</b> (In)		
	(MN4694C)		VNA port labeled: Port 2 Source (Out)	MN469xC port labeled: Port 2 Source (Out)		
			VNA port labeled: <b>b2</b> (In)	MN469xC port labeled: <b>b2</b> (In)		
_			VNA port labeled: <b>b2</b> (Out)	MN469xC port labeled: <b>b2</b> (Out)		
		Rear Panel Conr	nections			
2	3-62112-81	SMA male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	MS464xB port labeled: <b>b2 loop out</b>	MN469xC port labeled: TO VNA b2 OUTPUT		
3	3-62112-80	SMA male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	MS464xB port labeled: <b>b2 loop in</b>	MN469xC port labeled: TO VNA b2 INPUT		
4	3-62112-81	SMA male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	MS464xB port labeled: P2 Source loop out	MN469xC port labeled: TO VNA Port 2 Src OUTPUT		
		SMA male-male semi-rigid	MS464xB port labeled:	MN469xC port labeled:		
5	3-62112-80	torque end wrench set to 0.9 N·m (8 lbf·in).	P2 Source loop in	TO VNA Port 2 Src INPUT		
		SMA male-male semi-rigid		MNI400xQ part labaladi		
6	3-62112-81	Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	b1 loop out	TO VNA b1 OUTPUT		
7	3-62112-80	SMA male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	MS464xB port labeled: <b>b1 loop in</b>	MN469xC port labeled: <b>TO VNA b1 INPUT</b>		

 Table 2-1.
 MN469xC Multiport semi-rigid Cable Interconnect Part Numbers and Locations

Index	Part Numbers	Description/Torque	Connection From	Connection To
8	3-62112-81	SMA male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	MS464xB port labeled: P1 Source loop out	MN469xC port labeled: TO VNA Port 1 Src OUTPUT
9	3-62112-80	SMA male-male semi-rigid Tighten using an 8 mm (5/16 in) torque end wrench set to 0.9 N·m (8 lbf·in).	MS464xB port labeled: P1 Source loop in	MN469xC port labeled: TO VNA Port 1 Src INPUT
10	2100-1	Rear Panel GPIB Cable 1 meter (39.3") long	IEEE 488.2 GPIB	Dedicated GPIB
11		Rear Panel Power Cord Varies with country	Line Input connects to AC Mains	
12	MS464xA VNA v	vith Option 051, 061, or 062	·	
	MS464xB VNA with Option 051, 061, or 062			
13	MN469xC Test S	Set		

 Table 2-1.
 MN469xC Multiport semi-rigid Cable Interconnect Part Numbers and Locations

# 2-6 Rear Panel DIP Switch GPIB Address Setting

The MN469xC Series Test Set GPIB address must match the GPIB address set on the VNA and is set on the Test Set by rear panel DIP switches. The factory default GPIB address is 16 (Switch 1 ON and all other switches OFF). Note that the VNA GPIB connection must be made to the VNA **Dedicated GPIB** connector and not to the VNA **IEEE-488.2 GPIB** connector.



Figure 2-3. MN469xC DIP Switches (factory setting)

### **Changing the Test Set Addresses**

In general, there should be no reason to change the address setting. If a change of test set address is required, match the Test Set DIP switch settings to the VNA address setting. To change the Test Set address, make sure the Test Set is disconnected from power, and then selectively turn switches **1** through **5** ON where the sum of the ON switch values equals the required GPIB address. All switch values are labeled on the rear panel as:

- Switch 1 = 16
- Switch 2 = 8
- Switch 3 = 4
- Switch 4 = 2
- Switch 5 = 1
- Switch 6 = T
- Switch 7 = L
- Switch 8 = S

For example, to set GPIB 28:

- Set switch 1 ON = 16
- Set switch 2 ON = 8
- Set switch 3 ON = 4

The resultant GPIB address is 16 + 8 + 4 or 28.

The **T**, **L**, and **S** switches at positions **6**, **7**, and **8** stand for talker-only, listener-only, and system controller. These switches are not used in the VectorStar MS464xA/B VNA application and must be left in the down or OFF position.

### **Changing VNA Addresses for the Test Set**

The default VNA GPIB address for the MN469xC Series Test Set is GPIB 16 and must match the address set on the Test Set through the rear panel DIP switches. To change the GPIB address on the VNA, navigate to the REMOTE INTER menu.

• Navigation: MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Multiport Test Set

On the REMOTE INTER. (REMOTE INTERFACE) menu (shown below), select the Multiport Test Set button and set the same GPIB address as set at the Test Set rear panel.

Remote Inter. X
Language Selection 🕨
Native
GPIB Addresses
IEEE 488.2 Interface
6
Ext. Sources 🕨
Power Meter
Ext. Freq Counter
7
Multiport Test Set
16
Config Multiport Test Set
NOTE Reboot is required for Multiport test set GPIB address to take effect.

Figure 2-4. VectorStar REMOTE INTER. (REMOTE INTERFACE) Menu

If setting the GPIB Address for the MN469xC Test Set to a value **OTHER** than 16, select the Config Multiport Test Set button and follow the instructions. Note that this will require a reboot for both the Test Set and VNA for the new address to take effect.

## 2-7 Power Up Sequence

Note

The VNA application must be started after the Test Set is connected and powered up. If the VNA application is started before the Test Set, the VNA will remain in 2-port mode and the 4-port functions will not be available. If this happens, exit the VNA application, make sure the Test Set is powered up, and launch the VNA application.

### Procedure

- **1.** Make sure all of the cables are properly installed as illustrated in the previous sections.
- **2.** Turn on the Test Set prior to launching the VNA application on the VNA. The VNA can be powered on, but the application must be off.
- **3.** Once the Test Set is on, launch the VNA application. During the launch sequence, the VNA application recognizes the Test Set on the GPIB bus and is configured for 4-port mode. If the VNA application is powered up and launched before the test set, the VNA application will stay in 2-port mode and only 2-port mode features and functions will be available.
- **4.** If the 4-port functions fail to appear, exit the VNA application by selecting File | Exit from the VectorStar Menu Bar and then clicking Yes in the confirmation dialog box.
  - Navigation: MENU BAR | File | FILE Drop-Down Menu | Exit Command
- 5. After the Windows desktop appears, launch the VNA application by doing one of the following:
  - **a.** On the desktop, click the VectorStar icon. If the VNA was running in 100,000 point mode, the icon is annotated with "100K".
  - b. If running in 25,000 point mode, select Start | All Programs | VectorStar | VectorStar.
  - c. If running in 100,000 point mode, select Start | All Programs | VectorStar\_100K | VectorStar.

# **Chapter 3 — Initial System Checkout**

# 3-1 Introduction

This chapter provides the general initial system checkout for a completely assembled multiport system. Once this procedure is complete, the system is ready for calibration and available to make measurements up to a 4-port configuration.

# 3-2 Power Up

- 1. Ensure the AC main line supply to both the MN469xC Test Set and MS464xA/B VNA is turned ON.
- **2.** Turn on the Test Set prior to launching the VNA application on the VNA. The VNA can be powered on, but the VNA application must be off.
- **3.** Once the Test Set is on, launch the VNA application. During the launch sequence, the VNA application recognizes the Test Set on the GPIB bus and is configured for 4-port mode. If the VNA application is powered up and launched before the test set, the VNA application will stay in 2-port mode and only 2-port mode features and functions will be available.
- **4.** Connect a USB mouse to the VNA.

### 3-3 MN469xC Multiport Test Set Configuration Verification

- **1.** On the VNA, push the front panel **Preset** key.
  - **a.** Ensure the system is sweeping from 70 kHz to 40 GHz (for MN4694C) or 70 kHz to 70 GHz (for MN4697C).
  - **b.** Ensure that Trace 1 is set to S11, Trace 2 set to S12, Trace 3 set to S21, and Trace 4 set to S22.

	If Option 70 is not installed on the VNA, the start frequency will be 10 MHz. If the MN4694C is
Note	connected to an MS4642A/B, the Stop Frequency will be 20 GHz. If the MN4697C is connected to an
	MS4645A/B, the Stop Frequency will be 50 GHz.

- 2. At the top of the display, select MENU BAR | Utilities | System.
  - The right side SYSTEM menu appears.
- **3.** On the right-side, select SYSTEM | Utility | UTILITY | Factory Receiver Cal and toggle the Factory Receiver Cal button to OFF.
- 4. Select Trace 1 and then from Main Menu select Display | DISPLAY | Trace Format, and set to Log Mag.
- 5. From Main Menu select Response | RESPONSE | User-defined. The USER-DEFINED menu appears.
  - a. Set USER-DEFINED | Numerator to A1.
  - **b.** Set USER-DEFINED | Denominator to **1**.
  - c. On the USER-DEFINED menu, select Port 1 as the Driver Port.
  - **d.** Using a mouse, move the Reference Line as shown below (Figure 3-1 on page 3-2) to Reference Position = **5**.

**Note** The Reference Line position can also be set from the SCALE menu in the Reference Position field.

6. Select Trace 2 and repeat Step 3, setting Numerator = B2, Denominator = 1, Driver Port = 2.

- 7. Select Trace 3 and repeat Step 3 setting Numerator = **B1**, Denominator = **1**, Driver Port = **1**.
- 8. Select Trace 4 and repeat Step 3, setting Numerator = A2, Denominator = 1, Driver Port = 2.
- **9.** Connect **shorts** to **Ports 1** and **2** on the MS464xB VNA, and ensure the resultant display looks similar to Figure 3-1 on page 3-2 (70 GHz shown).



Non-Ratioed Parameters for Initial Checkout



- **10.** Select Trace 1 and then from Main Menu select Response | RESPONSE | User-defined. The USER-DEFINED menu appears.
  - a. Set USER-DEFINED | Numerator to A3.
  - **b.** Set USER-DEFINED | Denominator to **1**.
  - c. On the USER-DEFINED menu, select  ${\it Port}~{\it 3}$  as the Driver Port.
  - **d.** Using a mouse, move the Reference Line as shown below (Figure 3-2 on page 3-3) to Reference Position = **5**.
- 11. Select Trace 2 and repeat Step 8, setting Numerator = **B4**, Denominator = 1, Driver Port = 4, Reference Position = 9.
- **12.** Select Trace 3 and repeat Step 8, setting Numerator = **B3**, Denominator = **1**, Driver Port = **3**, Reference Position = **9**.

- **13.** Select Trace 4 and repeat Step 8,, setting Numerator = **A4**, Denominator = **1**, Driver Port = **4**, Reference Position = **8**.
- **14.** Connect **shorts** to **Ports 3** and **4** on the MN469xC Test Set, and ensure the resultant display looks similar to Figure 3-2 on page 3-3 (70 GHz shown).



Non-Ratioed Parameters for Initial Checkout



# Chapter 4 — Troubleshooting and Maintenance

# 4-1 Introduction

This section provides the information necessary for maintenance of the Multiport Test Set. Operator maintenance is limited to troubleshooting and repairs that can be made without removing the instrument covers. All other maintenance should be performed by qualified Anritsu service technicians.

Caution There are no operator serviceable components inside the Test Set. Refer servicing of the instrument to qualified Anritsu service technicians. To prevent the risk of electrical shock or damage to precision components, do not remove the equipment covers.

# 4-2 Verifying VNA 4-Port Mode

To verify the VNA is in 4-Port mode, do one of the following:

- 1. Check the SINGLE-MODE menu display.
  - **a.** Navigate to the RESPONSE | More Single-Mode | SINGLE-MODE menu.
  - **b.** S-Parameter selections should be available for S13, S14, S23, S24, S31, S32, S33, S34, S41, S42, S43, and S44.
- 2. Check the MANUAL CAL menu display.
  - a. Navigate to the CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL menu.
  - **b.** Calibration mode selections should be available for 4-Port Cal, 3-Port Cal, 2-Port Cal, and 1-Port Cal.

# 4-3 Troubleshooting GPIB Addresses

In the event the VNA system does not come up in 4-Port mode, perform the procedure below.

- **1.** Ensure that the GPIB cable is properly connected between the MN469xC Series Test Set and the **Dedicated GPIB** connector on the MS464xA/B Series VNA.
- 2. Ensure that the MN469xC Series Test Set Rear Panel DIP Switch is set to 16.
  - Refer to the section on "Rear Panel DIP Switch GPIB Address Setting" on page 2-6.
- **3.** Ensure that power is applied to the MN469xC Test Set before the MS464xA/B VNA application is launched (the VNA may be powered on, but the application must be launched after power is applied to the Test Set).
- **4.** Verify the Multiport Test Set GPIB address is set to 16 in the REMOTE INTERFACE menu (Figure 4-1 on page 4-2):
  - Navigation: MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
- **5.** Select the Config Multiport Test Set button, follow the Multiport Test Set Configuration instructions, and then re-boot both the MN469xC Test Set and MS464xA/B VNA.

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16
Config Multiport
NOTE Reboot is required for Multiport test set GPIB address to take effect.
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# 4-4 Troubleshooting Power Up Failure

Troubleshooting by the operator consists of determining the cause of test set power up failure. The procedure below provides the necessary troubleshooting steps.

1. Test Set will not turn on.

Normal operation for the test set is to connect the set to the power source, and then push in the front panel **POWER** button. The LED above the switch should illuminate and the instrument should power up.

- **2.** If the test set does not turn on, disconnect the test set from the power source, then check the line fuse on the rear panel as described in the "Checking/Changing the Rear Panel Fuse" section below.
- **3.** If the fuse is defective, replace the fuse.
- **4.** If the fuse is good, go to the next step.
- 5. Check to see if power is available at the power receptacle.
- 6. If not, move to a working receptacle.
- 7. If power is available, go to the next step.
- 8. Check the power cable.
- **9.** If defective, replace the power cable.
- **10.** If Test Set still will not turn on, call service technician.

## 4-5 Checking/Changing the Rear Panel Fuse

The value of the line fuse used in the Test Set is printed on the rear panel next to the line voltage module.

Caution Before changing the fuse, always remove the power cord from the power outlet. There is the risk of receiving a fatal electric shock if the fuse is replaced with the power cord connected. Always use a new fuse of the type and rating specified by the fuse markings on the rear panel of the instrument.

### Procedure

Replace the defective line fuse as follows:

- **1.** Remove the power cord from the rear panel line voltage module.
- 2. Pull out the fuse holder assembly as shown in Figure 4-2.





- 3. Remove the fuse.
- **4.** Change the fuse and install the fuse holder assembly.
- **5.** Reconnect the power cord.
- 6. Reconnect the test set to the power source.

## 4-6 **Preparation for Storage**

Preparing the test set for storage consists of cleaning the unit, packing the inside with moisture-absorbing desiccant crystals, and storing the unit in a temperature environment that is maintained between  $-40^{\circ}$  C and  $+75^{\circ}$  C ( $-40^{\circ}$  F to  $+167^{\circ}$  F).

## 4-7 **Preparation for Shipment**

To provide maximum protection against damage in transit, the test set should be repackaged in the original shipping container. If this container is no longer available and the unit is being returned to Anritsu for repair, advise Anritsu Customer Service; they will send a new shipping container free of charge. In the event neither of these two options is possible, instructions for packaging and shipment are given below.

### Use a Suitable Container

Obtain a corrugated cardboard carton with a 125 kg (275 pound) test strength. This carton should have inside dimensions of no less than 15 cm (6.0") larger than the unit dimensions to allow for cushioning.

### Dimensions

The MN4640C Multiport Test Set dimensions are 108 mm H x 487 mm W x 590 mm D (4.25 in H x 19.1 in W x 23.2 in D)

### **Protect the Instrument**

Surround the unit with polyethylene sheeting to protect the finish.

### **Cushion the Instrument**

Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the unit. Provide at least three inches of dunnage on all sides.

### Seal the Container

Seal the carton by using either shipping tape or an industrial stapler.

### Address the Container

If the instrument is being returned to Anritsu for service, mark the address of the appropriate Anritsu service center and your return address on the carton in one or more prominent locations.

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"S" Rear Panel DIP Switch	
"T" Rear Panel DIP Switch	

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