

Installation Guide

VectorStar[®] MN4690B Series Multiport Test Set

VectorStar MN4694B, K Connectors, for the MS4642A or MS4644A VNA
VectorStar MN4697B, V Connectors, for the MS4645A or MS4647A VNA



Anritsu

WARRANTY

The Anritsu product(s) listed on the title page is (are) warranted against defects in materials and workmanship for one year from the date of shipment.

Anritsu's obligation covers repairing or replacing products which prove to be defective during the warranty period. Buyers shall prepay transportation charges for equipment returned to Anritsu for warranty repairs. Obligation is limited to the original purchaser. Anritsu is not liable for consequential damages.

LIMITATION OF WARRANTY

The foregoing warranty does not apply to Anritsu connectors that have failed due to normal wear. Also, the warranty does not apply to defects resulting from improper or inadequate maintenance by the Buyer, unauthorized modification or misuse, or operation outside of the environmental specifications of the product. No other warranty is expressed or implied, and the remedies provided herein are the Buyer's sole and exclusive remedies.

DISCLAIMER OF WARRANTY

DISCLAIMER OF WARRANTIES. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, ANRITSU COMPANY AND ITS SUPPLIERS DISCLAIM ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH REGARD TO THE SOFTWARE PRODUCT. THE USER ASSUMES THE ENTIRE RISK OF USING THE PROGRAM. ANY LIABILITY OF PROVIDER OR MANUFACTURER WILL BE LIMITED EXCLUSIVELY TO PRODUCT REPLACEMENT.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL ANRITSU COMPANY OR ITS SUPPLIERS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR ANY OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR INABILITY TO USE THE SOFTWARE PRODUCTS, EVEN IF ANRITSU COMPANY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME STATES AND JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

TRADEMARK ACKNOWLEDGMENTS

Windows, Windows XP, Microsoft Paint, Microsoft Word, Microsoft Access, Microsoft Excel, Microsoft PowerPoint, and Visual Studio are all registered trademarks of Microsoft Corporation.

Acrobat Reader is a registered trademark of Adobe Corporation.

NI is a trademark of the National Instruments Corporation.

NOTICE

Anritsu Company has prepared this manual for use by Anritsu Company personnel and customers as a guide for the proper installation, operation and maintenance of Anritsu Company equipment and computer programs. The drawings, specifications, and information contained herein are the property of Anritsu Company, and any unauthorized use or disclosure of these drawings, specifications, and information is prohibited; they shall not be reproduced, copied, or used in whole or in part as the basis for manufacture or sale of the equipment or software programs without the prior written consent of Anritsu Company.

UPDATES

Updates, if any, can be downloaded from the Documents area of the Anritsu web site at:

<http://www.us.anritsu.com>

For the latest service and sales contact information in your area, please visit:

<http://www.anritsu.com/contact.asp>

Notes On Export Management

This product and its manuals may require an Export License or approval by the government of the product country of origin for re-export from your country.

Before you export this product or any of its manuals, please contact Anritsu Company to confirm whether or not these items are export-controlled.

When disposing of export-controlled items, the products and manuals need to be broken or shredded to such a degree that they cannot be unlawfully used for military purposes.

CE Conformity Marking

Anritsu affixes the CE Conformity marking onto its conforming products in accordance with Council Directives of The Council Of The European Communities in order to indicate that these products conform to the EMC and LVD directive of the European Union (EU).



C-tick Conformity Marking

Anritsu affixes the C-tick marking onto its conforming products in accordance with the electromagnetic compliance regulations of Australia and New Zealand in order to indicate that these products conform to the EMC regulations of Australia and New Zealand.



Mercury Notification

This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance (www.eiae.org) for disposal or recycling information.

European Parliament and Council Directive 2002/96/EC




Chinese RoHS Compliance Statement

产品中有毒有害物质或元素的名称及含量

For Chinese Customers Only NLNB

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 [Cr(VI)]	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
其他(电缆、风扇、 连接器等) (Appended goods)	×	○	×	×	○	○
○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。 ×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。						

环保使用期限

	这个标记是根据 2006/2/28 公布的「电子信息产品污染控制管理办法」以及 SJ/T 11364-2006「电子信息产品污染控制标识要求」的规定，适用于在中国销售的电子信息产品的环保使用期限。仅限于在遵守该产品的安全规范及使用注意事项的基础上，从生产日起算的该年限内，不会因产品所含有害物质的泄漏或突发性变异，而对环境污染，人身及财产产生深刻地影响。 注) 生产日期标于产品序号的前四码(如 S/N 0728XXXX 为 07 年第 28 周生产)。
---	--

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

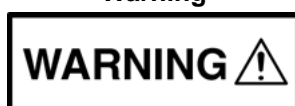
Symbols Used in Manuals

Danger



This indicates a very dangerous procedure that could result in serious injury or death, and possible loss related to equipment malfunction, if not performed properly.

Warning



This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

Caution



This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

For Safety

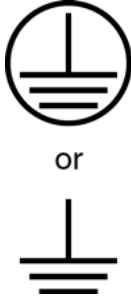
Warning



Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Warning



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Warning



This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Warning



Use two or more people to lift and move this equipment, or use an equipment cart. There is a risk of back injury if this equipment is lifted by one person.

Caution



Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Table of Contents

Chapter 1—General Information

1-1	Introduction	1-1
1-2	Test Set Description	1-2
1-3	Test Set Components	1-3
1-4	Functional Description	1-4
1-5	Technical Summary	1-5
1-6	Related Documentation	1-6

Chapter 2—Hardware Installation

2-1	Introduction	2-1
2-2	Initial Inspection	2-1
2-3	Power Requirements	2-1
2-4	Preparation for Use.	2-1
2-5	Front Panel Connections	2-2
2-6	Rear Panel Connections.	2-4
2-7	Rear Panel DIP Switches	2-6
	Changing the Test Set Addresses.	2-6
	Changing VNA Addresses for the Test Set	2-7
2-8	Power Up Sequence.	2-8

Chapter 3—Initial System Checkout

3-1	Introduction	3-1
3-2	Power Up	3-1
3-3	MN4690B Multiport Test Set Configuration Verification	3-1

Chapter 4—Troubleshooting and Maintenance

4-1	Introduction	4-1
4-2	Verifying VNA 4-Port Mode.	4-1
4-3	Troubleshooting GPIB Addresses	4-1
4-4	Troubleshooting Power Up Failure	4-3
4-5	Checking/Changing the Rear Panel Fuse	4-4
4-6	Preparation for Storage	4-5
4-7	Preparation for Shipment	4-5
	Use a Suitable Container.	4-5
	Dimensions	4-5
	Protect the Instrument	4-5
	Cushion the Instrument	4-5
	Seal the Container.	4-5
	Address the Container.	4-5

Index

Chapter 1 — General Information

1-1 Introduction

This manual provides general information, installation, operating, and maintenance information for the VectorStar MN4690B Series Multiport Test Sets. The following model Multiport Test Sets are discussed in this manual:

- MN4694B, K Connectors, for the VectorStar MS4642A or MS4644A VNAs
- MN4697B, V Connectors, for the VectorStar MS4645A or MS4647A VNAs

Throughout this manual, the term **test set** is used to refer to the MN4690B Series Multiport Test Set, the term **VNA** is used to refer to the VectorStar MS4640A 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.

Refer to following documentation for additional information:

- **VectorStar MN4690B Series Technical Data Sheet – 11410-00528** for VNA performance specifications.
- **VectorStar MS4640A Series VNA Operation Manual – 10410-00266** for VNA operation procedures.
- **VectorStar MS4640A Programming Manual – 10410-00267** for VNA GPIB and other programming information.

1-2 Test Set Description

The Multiport Test Set provides multiple test port capabilities for the Anritsu VectorStar MS4640A 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 MN4690B Series Multiport Test Set models.

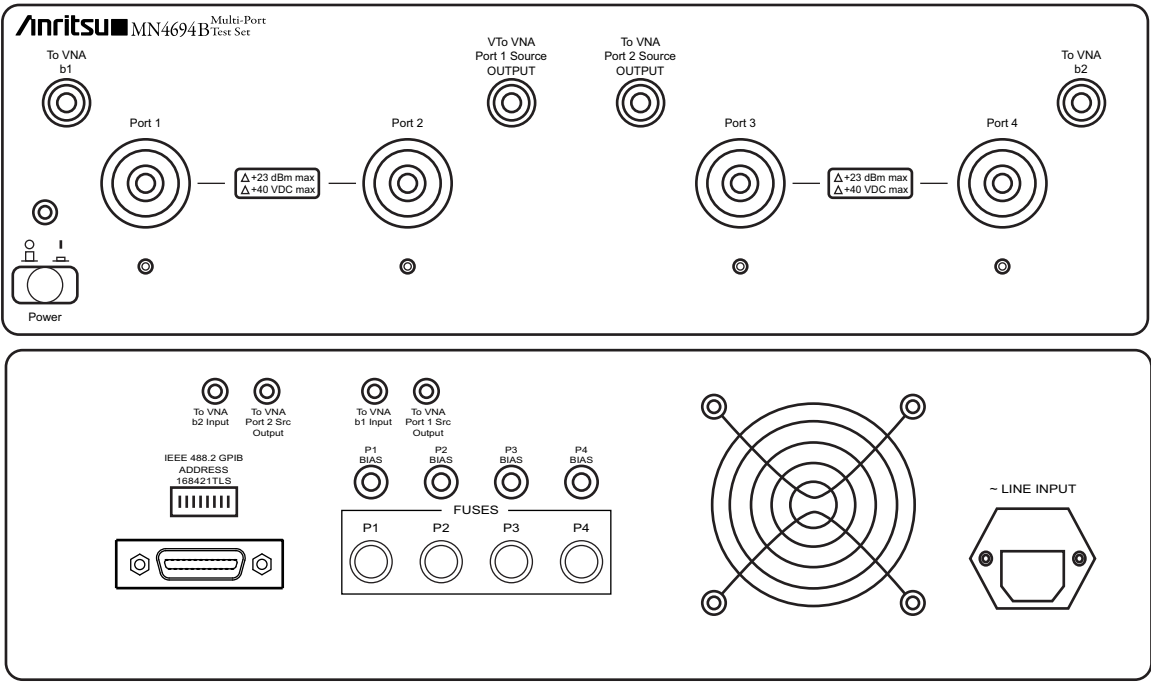


Figure 1-1. MN4690B Series Multiport Test Set Front (top) and Rear (bottom) Panels

1-3 Test Set Components

The MN4690B Series Multiport Test Set comes with the following components. The components depend on the model selected.

Table 1-1. MN4690B Series Multiport Test Set Components

Name and Description	Anritsu Part Numbers		Cable Port Connections	
	MN4694B	MN4697B	From Test Set Connector Label	To VNA Connector Label
Test Set Chassis	MN4694B K Connectors 10 MHz to 40 GHz	MN4697B V Connectors 10 MHz to 70 GHz	—	—
Rear Panel RF Cables (2 each)	62112-140 SMA (m-m)	62112-140 SMA (m-m)	To VNA b1 Input	b1 Input
			To VNA b2 Input	b2 Input
Rear Panel RF Cables (2 each)	62112-141 SMA (m-m)	62112-141 SMA (m-m)	To VNA Port 1 Src OUTPUT	Port 1 Src Output
			To VNA Port 2 Src OUTPUT	Port 2 Src Output
Rear Panel GPIB Cable	2100-1 1 meter (39.3") long	2100-1 1 meter (39.3") long	IEEE 488.2 GPIB	Dedicated GPIB
Rear Panel Power Cord	Varies with country		Line Input connects to AC Mains	
Front Panel RF Cables (4 each)	67357-146 K (m-m)	62109-142 V (m-m)	To VNA b1	b1 Input
			To VNA b2	b2 Input
			To VNA Port 1 Source OUTPUT	Port 1 Source Output
			To VNA Port 2 Source OUTPUT	Port 2 Source Output

1-4 Functional Description

The functional description is based on the functional block diagram of the MN4690B Series Test Set shown below (Figure 1-2 on page 1-4).

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.

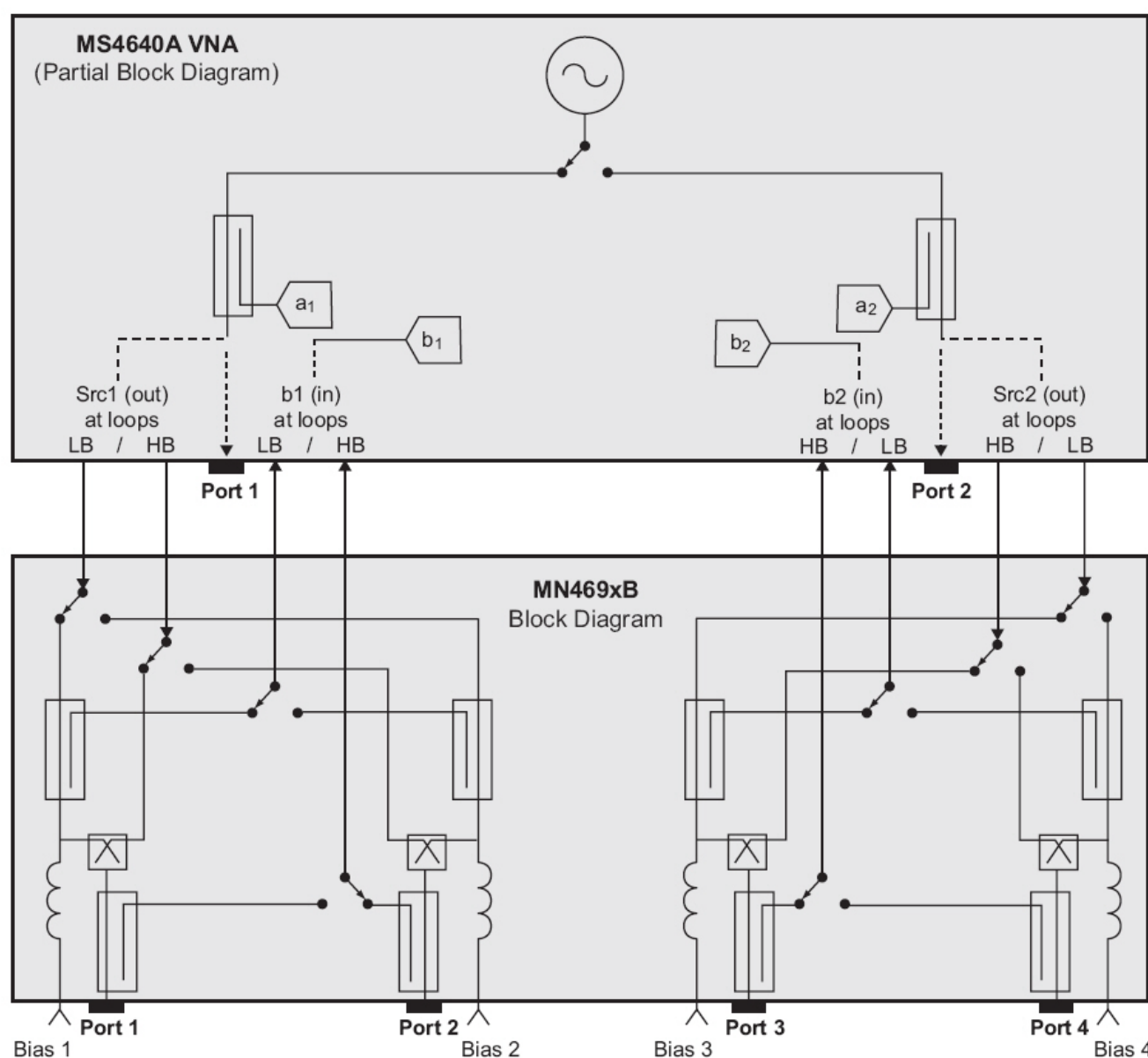


Figure 1-2. VectorStar MN4690B Series Multiport Test Set Functional Block Diagram

1-5 Technical Summary

For complete technical specifications, refer to the **VectorStar MN4690B Series Multiport Technical Data Sheet – 11410-00528**. A summary of the Multiport Test Set models is contained below ([Table 1-2](#)).

Table 1-2. Technical Summary of the MN4690B Series Multiport Test Sets

Parameter		MN4694B K Connector Test Set	MN4697B V Connector Test Set
Frequency Range		10 MHz to 20 GHz (MS4642A) 10 MHz to 40 GHz (MS4644A)	10 MHz to 50 GHz (MS4645A) 10 MHz to 70 GHz (MS4647A)
Front Panel Test Port Connectors	Connector Types	K male: Port 1, Port 2, Port 3, Port 4 K female: To VNA Port 1 Source OUTPUT, To VNA Port 2 Source OUTPUT, To VNA b1, To VNA b2	V male: Port 1, Port 2, Port 3, Port 4 V female: To VNA Port 1 Source OUTPUT, To VNA Port 2 Source OUTPUT, To VNA b1, To VNA b2
	Maximum Input	All ports +20 dBm, 40 VDC max	
	Impedance	50 Ohms	
Rear Panel Signal Connectors	Bias Tee Supply	30 VDC, 500 mA maximum for Ports J1 through J4	40 VDC, 500 mA maximum for Ports J1 through J4
	Connector Type	SMA female: To VNA Port 1 Src OUTPUT, To VNA Port 2 Src OUTPUT, To VNA b1 Input, To VNA b2 Input	
	Maximum Input	+20 dBm max, 0 VDC max	
Connectivity	GPIB IEEE 488.2	Connects to Dedicated GPIB rear panel connector on MS4640A VNA	
Temperature Range	Storage	–40° C to 75° C (–40° F to 167° F)	
	Operating	0° C to 50° C (32° F to 122° F) Specifications apply at 23° C ± 3° C (73.4° F ± 9.5° F)	
Power Supply		85 to 240 VAC, 47 to 63 Hz, 255 VA Maximum	
Dimensions		158 mm H x 487 mm W x 540 mm D (6.2" H x 19.1" D x 21.2" W)	
Weight		8.0 kg (17.6 pounds)	

1-6 Related Documentation

This section lists other documents that are available for the VectorStar instrument line.

MS4640A Series Vector Network Analyzer

- VectorStar MS4640A Series VNA Technical Data Sheet – 11410-00432
- VectorStar MS4640A Series VNA Operation Manual – 10410-00266
- VectorStar MS4640A Series VNA Measurement Guide – 10410-00269
- VectorStar MS4640A Series VNA Programming Manual – 10410-00267

MN4690B Series Multiport Vector Network Analyzer Measurement System

- MN4690B Series Multiport VNA Measurement System Technical Data Sheet – 11410-00528
- MN4690B Series Multiport Test Set Quick Start Guide – 10410-00290
- MN4690B Series Multiport Test Set Installation Guide – 10410-00288

ME7828A Series Broadband/Millimeter Wave Vector Network Analyzer Measurement System

- VectorStar ME7828A Series Broadband/Millimeter Wave Technical Data Sheet – 11410-00452
- VectorStar ME7828A Series Broadband/Millimeter Wave Quick Start Guide – 10410-00289
- VectorStar ME7828A Series Broadband/Millimeter Wave Installation Guide – 10410-00287

Calibration, Verification, and System Performance Verification

- For MS4640A Series VNA:
 - 36585K and 36585V Precision Auto Calibrator (AutoCal) Module Reference Manual – 10410-00279
 - M3650A, 3652A, and 3654D Mechanical Calibration Kit Reference Manual – 10410-00278
 - 3666-1, 3668-1, and 3669-1 Verification Kit Reference Manual – 10410-00285
 - 2300-527 Performance Verification Software (PVS) User Guide – 10410-00270
- For ME7828A Series Broadband/Millimeter Wave VNA System:
 - 3656B W1 Calibration/Verification Kit and 3-2300-496 Performance Verification Software User Guide – 10410-00286

For additional literature related to the Anritsu VectorStar family of products, refer to:

<http://www.us.anritsu.com/VectorStar>

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.

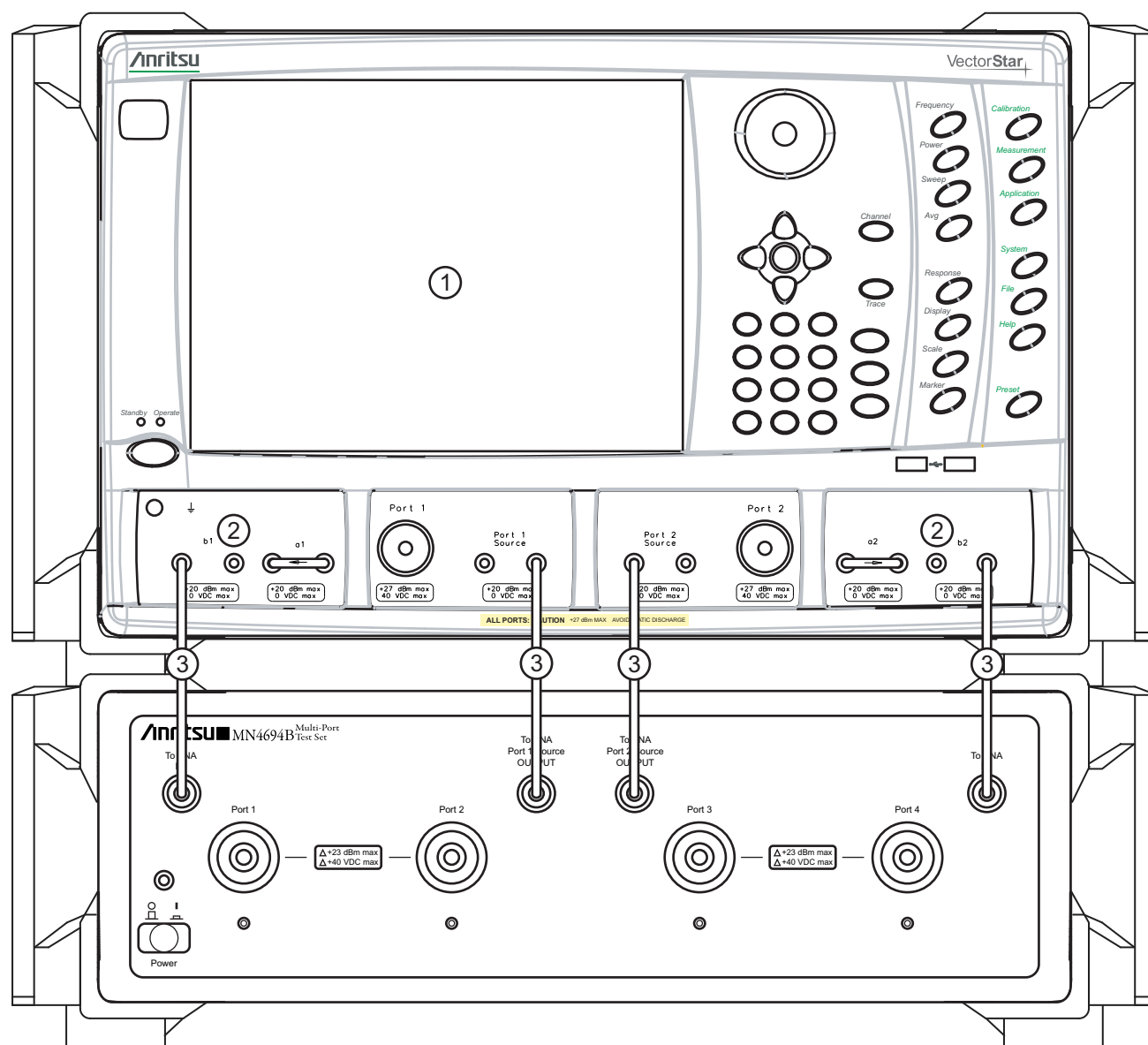
Caution	When supplying power to this test set, always use a three-wire power cable connected to a three-wire power line outlet. If power is supplied without grounding the equipment in this manner, there is a risk of receiving a severe or fatal electric shock.
----------------	---

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 Front Panel Connections

The figure below shows the front panel connections between the Test Set and VNA.



The figure callouts are linked to the procedure steps below.

Figure 2-1. Front Panel Connections

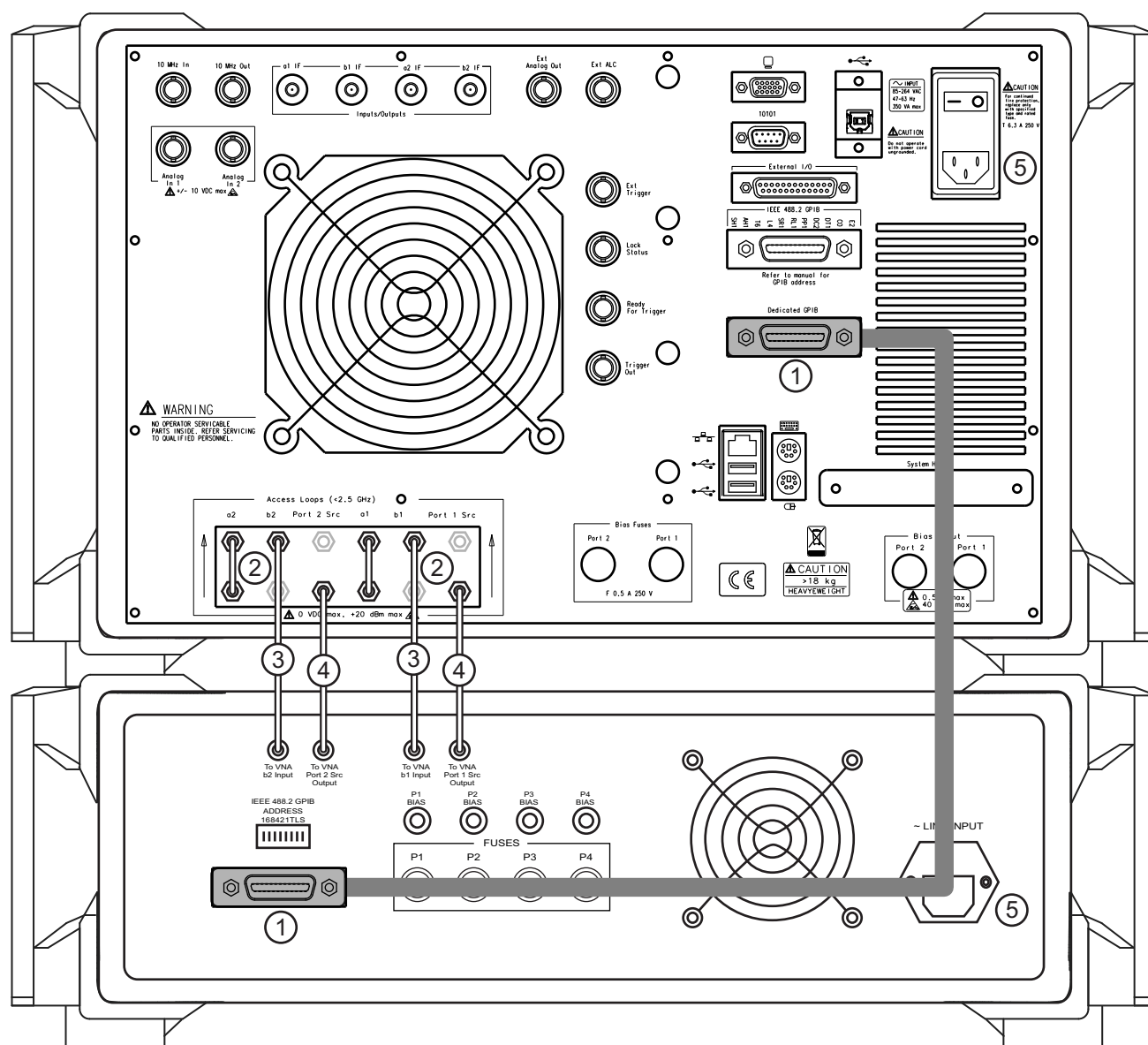
Procedure

1. Place the VNA on top of the Test Set as shown above.
2. Disconnect the front panel RF cable loops from ports **b1**, **b2**, **Port 1 Source**, and **Port 2 Source** and any cables that are connected from VNA **Port 1** and **Port 2**.
3. Use the four provided RF (K or V) male-to-male cables, or other semi-rigid or phase stable male-to-male RF cables to make the following connections:
 - a. Connect the Test Set **To VNA b1** output port to the VNA far left **b1** input port.

- b. Connect the Test Set **To VNA b2** output port of the VNA far right **b2** input port.
- c. Connect the Test Set **To VNA Port 1 Source OUTPUT** port to the VNA **Port 1 Source** output connector. The VNA output port is to the right of the **<-- arrow**.
- d. Connect the Test Set **To VNA Port 2 Source OUTPUT** port of the right center VNA **Port 2 Source** output connector. The VNA output port is to the left of the **--> arrow**.

2-6 Rear Panel Connections

The figure below shows the rear panel connections between the Test Set and VNA.



The figure callouts are linked to the procedure steps below.

Figure 2-2. MS4640A VNA and MN4690A Test Set Rear Panel Connections

Procedure

1. A standard one meter (37") GPIB Cable 2100-1 is shipped with Test Set. Connect the GPIB cable between the VNA Rear Panel **Dedicated GPIB** connector and the Test Set **IEEE 488.2 GPIB** connector as shown above.
2. On the VNA rear panel, disconnect and set aside the four SMA (m-m) loops from ports **Port 1 Src**, **b1**, **Port 2 Src**, and **b2**.

3. Using the two longer RF (SMA m-m) cables, or other semi-rigid or phase-stable male-to-male RF cables, make connections to the upper row of VNA input ports:
 - a. Connect the Test Set **To VNA b1 INPUT** output port to the VNA **b1** input port.
 - b. Connect the Test Set **To VNA b2 INPUT** output port to the VNA **b2** input port.
4. Using the two shorter RF (SMA m-m) cables, or other semi-rigid or phase-stable male-to-male RF cables, make connections to the lower row of VNA output ports:
 - a. Connect the Test Set **To VNA Port 1 Src OUTPUT** output port to the VNA **Port 1 Src** output port.
The lower row are VNA output ports.
 - b. Connect the Test Set **To VNA Port 2 Src OUTPUT** output port to the VNA **Port 2 Src** output port.
5. Connect the **AC Power Cords** to the VNA and the Test Set and then to the AC Mains.

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.

2-7 Rear Panel DIP Switches

The MN4690B 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.

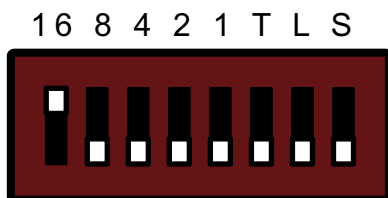


Figure 2-3. MN4690B DIP Switches (factory setting)

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 MS4640A 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 MN4690B 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.

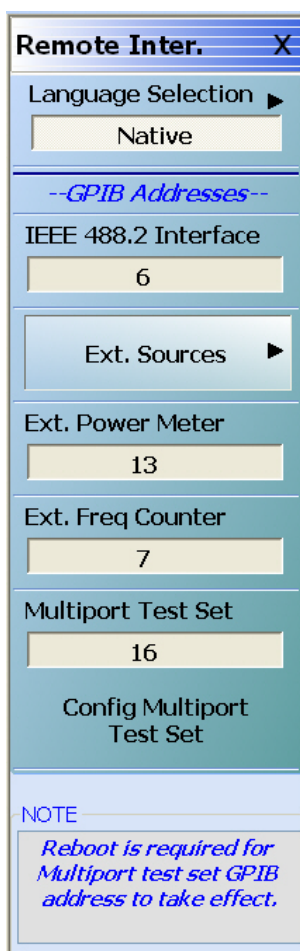


Figure 2-4. VectorStar REMOTE INTER. (REMOTE INTERFACE) Menu

If setting the GPIB Address for the MN4690B 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.

2-8 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 MN4690B Test Set and MS4640A 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.

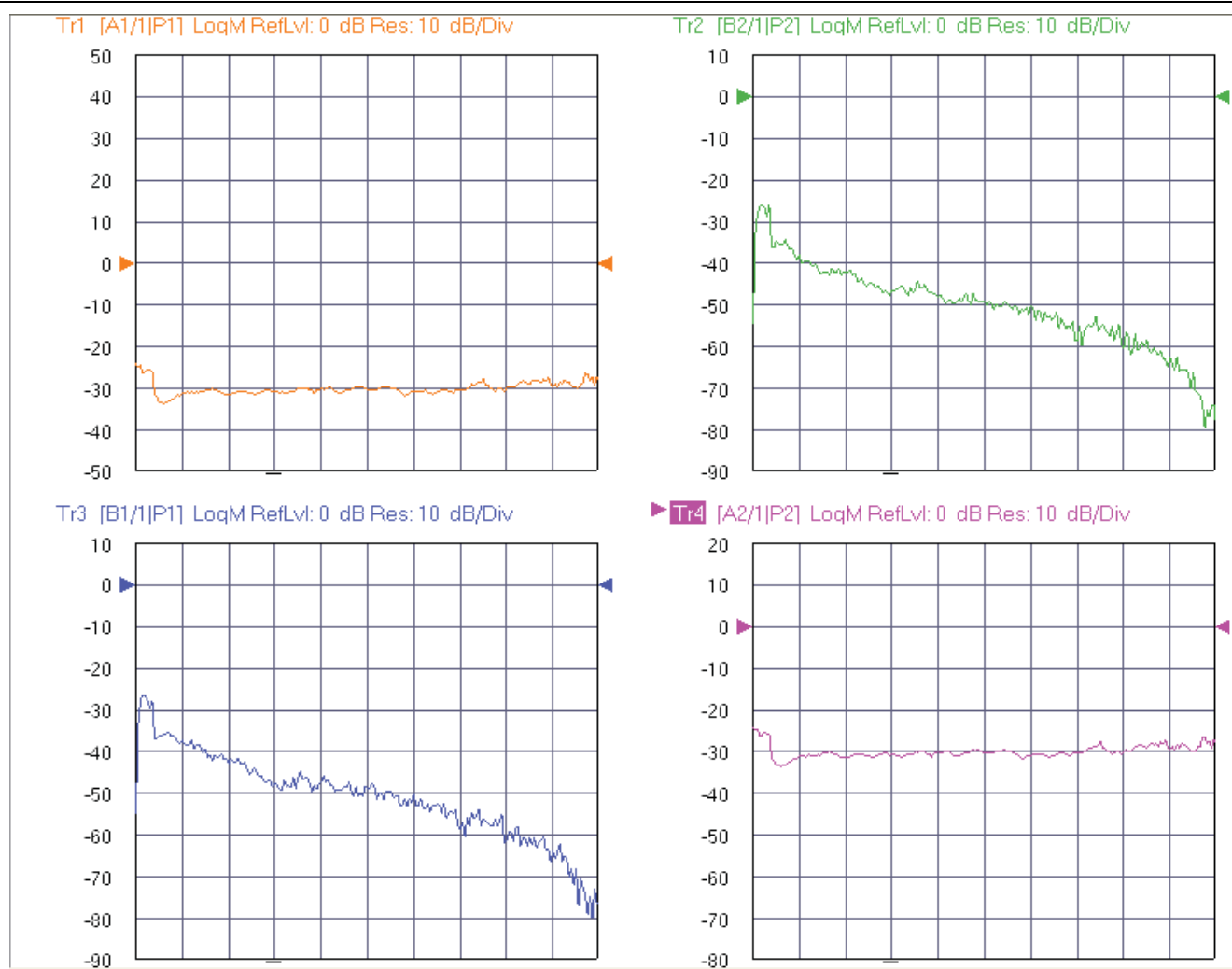
3-3 MN4690B Multiport Test Set Configuration Verification

1. On the VNA, push the front panel **Preset** key.
 - a. Ensure the system is sweeping from 70 kHz to 40 GHz (for MN4694B) or 70 kHz to 70 GHz (for MN4697B) GHz.
 - 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.
2. Select Trace 1 and then select Display | DISPLAY | Trace Format, and set to **Log Mag**.
3. 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](#)) to Reference Position = **5**.

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

4. For Trace 2, repeat Steps #2 through #4, setting Numerator = **b2**, Denominator = **1**, Driver Port = **2**.
5. For Trace 3, repeat Steps #2 through #4, setting Numerator = **b1**, Denominator = **1**, Driver Port = **1**.
6. For Trace 4, repeat Steps #2 through #4, setting Numerator = **a2**, Denominator = **1**, Driver Port = **2**.

7. Connect **shorts** to **Ports 1** and **2** on the MN469xB Test Set, and ensure the resultant display looks similar to the [Figure 3-1](#) below (70 GHz shown).

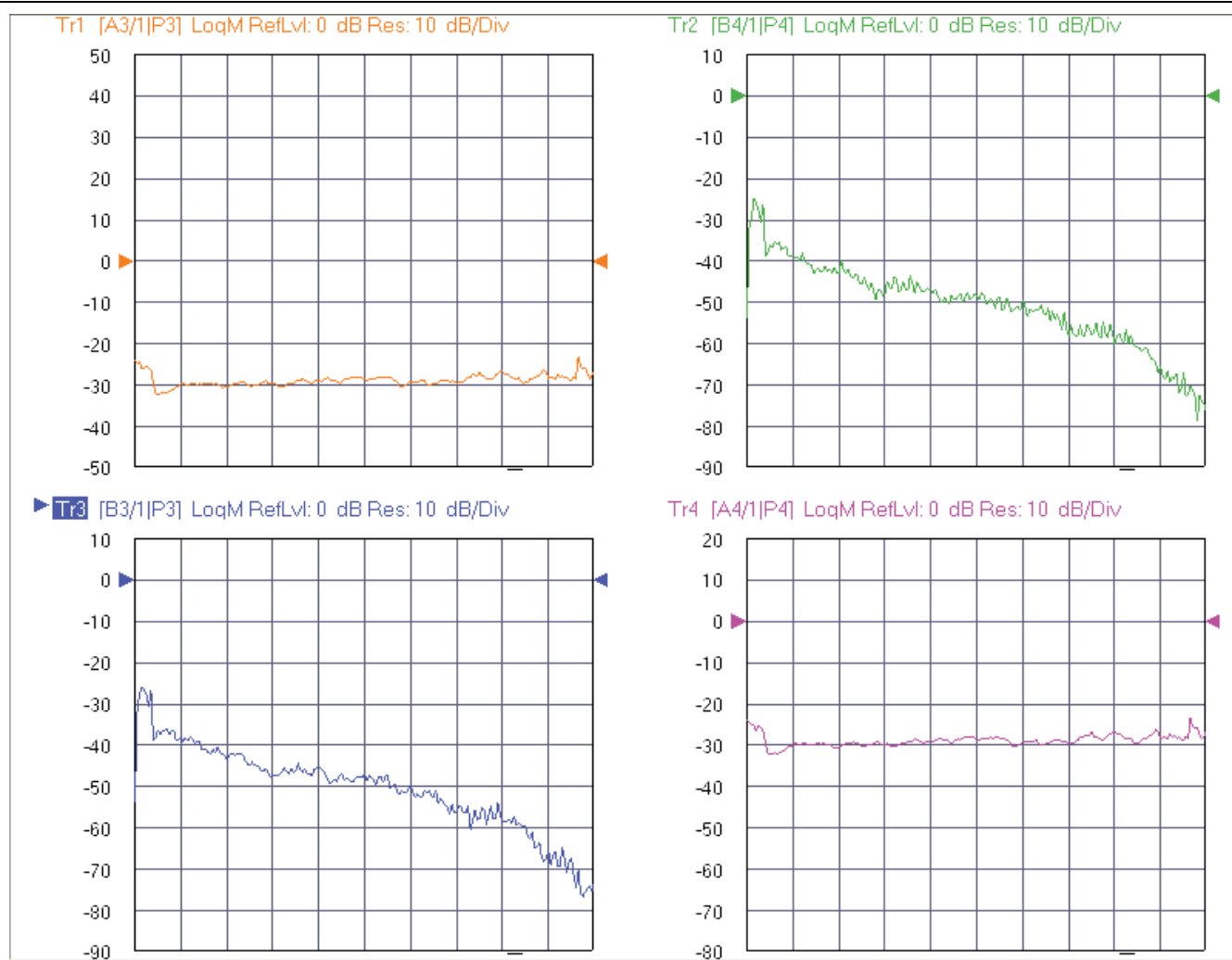


Non-Ratioed Parameters for Initial Checkout

Figure 3-1. Typical Four-Trace Display for 70 GHz VNAs - Shorts on Test Set Port 1 and Port 2

8. Select Trace 1 and then 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 **Port 3** as the Driver Port.
 - d. Using a mouse, move the Reference Line as shown below ([Figure 3-2](#)) below to Reference Position = **5**.
9. For Trace 2, repeat Steps #9 through #10, setting Numerator = **b4**, Denominator = **1**, Driver Port = **4**, Reference Position = **9**.
10. For Trace 3, repeat Steps #9 through #10, setting Numerator = **b3**, Denominator = **1**, Driver Port = **3**, Reference Position = **9**.
11. For Trace 4, repeat Steps #9 through #10, setting Numerator = **a4**, Denominator = **1**, Driver Port = **4**, Reference Position = **8**.

12. Connect shorts to Ports 3 and 4 on the MN469xB Test Set, and ensure the resultant display looks similar to the figure below (Figure 3-2) (70 GHz shown).



Non-Ratioed Parameters for Initial Checkout

Figure 3-2. Typical Four-Trace Display for 70 GHz VNAs - Shorts on Test Set Port 3 and Port 4

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:

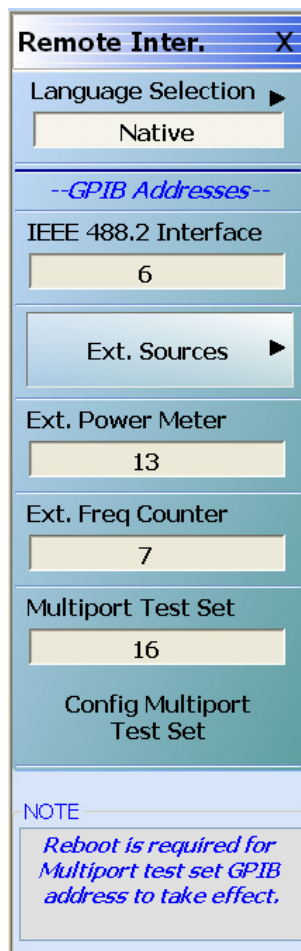
1. Check the SINGLE-MODE menu display.
 - a. Navigate to the RESPONSE | More Single-Mode | SINGLE-MODE menu.
 - b. S-Parameter selections should be available for S13, S14, S23, S24, S31, S32, S33, S34, S41, S42, S43, and S44.
2. Check the MANUAL CAL menu display.
 - a. Navigate to the CALIBRATION | Calibrate | 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 MN4690B Series Test Set and the **Dedicated GPIB** connector on the MS4640A Series VNA.
2. Ensure that the MN4690B Series Test Set **Rear Panel DIP Switch** is set to 16.
 - Refer to the section on [“Rear Panel DIP Switches” on page 2-6](#).
3. Ensure that power is applied to the MN4690B Test Set before the MS4640A 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 (shown below):

- Navigation: MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.



Remote Inter. X

Language Selection ►
Native

--GPIB Addresses--

IEEE 488.2 Interface
6

Ext. Sources ►

Ext. Power Meter
13

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 4-1. REMOTE INTER. (REMOTE INTERFACE) Menu for GPIB Addresses

5. Select the Config Multiport Test Set button, and then re-boot both the MN469xB Test Set and MS4640A VNA.

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.

Note

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 good, call a 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 the figure below.



Figure 4-2. Replacing the Line Fuse

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°C and $+75^{\circ}\text{C}$ (-40°F to $+167^{\circ}\text{F}$).

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 MN4640B Multiport Test Set dimensions are 158 mm H x 487 mm W x 540 mm D (6.2" H x 19.1" D x 21.2" W)

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.

Subject Index

Symbols

"L" Rear Panel DIP Switch	2-6
"S" Rear Panel DIP Switch	2-6
"T" Rear Panel DIP Switch	2-6

Numerics

100,000 point mode	2-8
25,000 point mode	2-8
4-Trace Display	3-2

A

AC Power	
Power Cords	2-5
Power Up Sequence	3-1
Requirements	1-5
Airflow Clearance	2-5
Anritsu	
Email	Front Matter-2
Web site	Front Matter-2
Anritsu Documents	
10410-00266 - VNA OM	1-1, 1-6
10410-00267 - VNA PM	1-1, 1-6
10410-00269 - VNA MG	1-6
10410-00270 - SPVS UG	1-6
10410-00278 - Cal Kit RM	1-6
10410-00279 - AutoCal RM	1-6
10410-00285 - Ver Kit RM	1-6
10410-00287 - BBmm IG	1-6
10410-00288 - Multiport IG	1-6
10410-00289 - BBmm QSG	1-6
10410-00290 - Multiport QSG	1-6
11410-00432 - VNA TDS	1-6
11410-00452 - BBmm TDS	1-6
11410-00528 - Multiport TDS	1-1, 1-5, 1-6
Anritsu Part Numbers	
2100-1 GPIB cable	1-3
62109-142 V (m-m) cable	1-3
62112-140 SMA (m-m) cable	1-3
62112-141 SMA (m-m) cable	1-3
67357-146 K (m-m) cable	1-3
MN4694B Test Set - K connectors	1-1
MN4697B Test Set - V connectors	1-1
MS4642A VNA - K connectors	1-1
MS4644A VNA - K connectors	1-1
MS4645A VNA - V connectors	1-1
MS4647A VNA - V connectors	1-1

B

Bias Tee Supply	1-5
Block diagrams	1-4
Broadband/Millimeter Wave System (BBmm) ..	1-6

C

Cables	1-3
Caution Symbol	Safety-1
CE Conformity	Front Matter-3
Changing the Test Set Addresses	2-6
Changing VNA Addresses	2-7
Chinese RoHS Compliance	Front Matter-4
Components	1-3
Configure Multiport Test Set button	2-7
Connections	
Front Panel	2-2
Rear Panel	2-4
Connectivity	1-5
Connectors	
Connector types	1-5
Front Panel	1-2
Rear Panel connectors	1-2
Container Requirements	4-5
Cooling Airflow	2-5
C-tick Conformity	Front Matter-3

D

Danger Symbol	Safety-1
Description	1-2, 1-4
Dimensions	1-5
DIP Switch	
"L" Switch	2-6
"S" Switch	2-6
"T" switch	2-6
DIP Switches	2-6
Document Types	
Installation Guide (IG)	1-6
Measurement Guide (MG)	1-6
Operation Manual (OM)	1-6
Programming Manual (PM)	1-6
Quick Start Guide (QSG)	1-6
Reference Manual (RM)	1-6
Technical Data Sheet (TDS)	1-1, 1-6
User Guide (UG)	1-6
Documentation	1-6
Driver Port	3-1
Dual-Inline-Package (DIP) Switches	2-6

E

Electrostatic Discharge (ESD) Warning ...	Safety-2
EPCD 2002/96/EC	Front Matter-4
ESD Warning	Safety-2
Exit VNA Application	2-8
Export Management	Front Matter-3

F

Four Trace Display	3-2
Frequency Range	1-3, 1-5

Front Panel

Connections	2-2
Connectors and ports	1-2
Overview	1-2
RF Cables	1-3
Test Port Connectors	1-5
Functional Block Diagram	1-4
Functional Description	1-4
Fuse	4-4

G

General Purpose Interface Bus (GPIB)	1-2
GPIB Networking	
Addressing Switches	2-6
GPIB Addressing	2-6, 4-1
IEEE 488.2 GPIB Port	2-4
IEEE-488-2 Rear Port	1-2
Overview	1-2
Test Set Default Address 16	2-1

H

Heavy Weight Warning	Safety-2
----------------------	----------

I

IEEE-488-2 General Purpose Interface Bus	1-2
Impedance	1-5
Initial Inspection	2-1
Installation Guide (IG)	1-6

K

K Connectors	1-5
MN4694B Test Set	1-1
MS4642A VNA	1-1
MS4644A VNA	1-1

M

Maintenance	4-1
Maximum Input	1-5
Measurement Guide (MG)	1-6
Mercury Notification	Front Matter-3
MN4694B Test Set - K connectors	1-1
MN4697B Test Set - V connectors	1-1
MS4642A VNA - K connectors	1-1
MS4644A VNA - K connectors	1-1
MS4645A VNA - V connectors	1-1
MS4647A VNA - V connectors	1-1

N

NLNM Compliance	Front Matter-4
Non-Ratioed Parameters	3-2, 3-3

O

Operating Temperature Specifications	1-5
Operation Manual (OM)	1-6

P

Power	
Power Cord	1-3
Power Requirements	2-1
Power Supply	1-5
Power Up Sequence	2-8, 3-1
Preparation for Use	2-1
Preset key (VNA)	3-1

Q

Quick Start Guide (QSG)	1-6
-------------------------	-----

R

Rear Panel	
Cable Connections	2-4
Connectors and Ports	1-2
Power Cord	1-3
RF Cables	1-3
Signal Connectors	1-5
Reference Manual (RM)	1-6
Reference Position	3-1
Related Documents	
MS4640A VNA Operation Manual (OM)	1-6
MS4640A VNA Programming Manual (PM)	1-1
REMOTE INTER Menu	2-7
Restart VNA Application	2-8
RF (SMA) m-m cables (longer)	2-4
RF (SMA) m-m cables (shorter)	2-5
RoHS Compliance	Front Matter-4

S

Safety Symbols	Safety-1, Safety-2
Shipment	4-5
Software Updates	Front Matter-2
Static Warning	Safety-2
Storage	4-5

T

Technical Data Sheet (TDS)	1-1, 1-6
Technical Documentation	1-6
Temperature Range	1-5
Test Set	
Components	1-3
Default GPIB Address 16	2-1
Frequency Range	1-3, 1-5
General Description	1-2
Port Connectors	1-5
Weight	1-5
Test Set Front Panel Ports	
To VNA b1	1-3, 2-2
To VNA b2	1-3, 2-2
To VNA Port 1 Source OUTPUT	1-3, 2-3
To VNA Port 2 Source OUTPUT	1-3, 2-3

Test Set Rear Panel Ports	
AC Line Fuse	4-4
DIP Switches	2-6
GPIO Addressing DIP Switches	4-1
IEEE 488.2 GPIO	1-3, 2-4
To VNA b1 INPUT	2-4
To VNA b1 Input	1-3
To VNA b2 INPUT	2-4
To VNA b2 Input	1-3
To VNA Port 1 Src OUTPUT	1-3, 2-5
To VNA Port 2 Src OUTPUT	1-3, 2-5
Trace Display	3-1, 3-2, 3-3
Trace Settings	3-1, 3-2
Trademarks	Front Matter-2
Troubleshooting	
GPIO Addresses	4-1
Power Up Failure	4-3
Power-up sequence	4-1

U

Updates	Front Matter-2
USB mouse	3-1
User Guide (UG)	1-6

V

V Connectors	1-5
MN4697B Test Set	1-1
MS4645A VNA	1-1
MS4647A VNA	1-1
VectorStar Models	
MN4694B Test Set - K connectors	1-1
MN4697B Test Set - V connectors	1-1
MS4642A VNA - K connectors	1-1
MS4644A VNA - K connectors	1-1
MS4645A VNA - V connectors	1-1
MS4647A VNA - V connectors	1-1
VectorStar Web Site	1-6
VNA Application Stop/Start	2-8

VNA Front Panel Ports	
b1 cable loop	2-2
b1 Input	1-3
b2 cable loop	2-2
b2 Input	1-3
Port 1	2-2
Port 1 Source	2-3
Port 1 Source cable loop	2-2
Port 1 Source Output	1-3
Port 2	2-2
Port 2 Source	2-3
Port 2 Source cable loop	2-2
Port 2 Source Output	1-3

VNA Keys

Preset key	3-1
------------------	-----

VNA Menus

Config Multiport Test Set button	4-2
DENOMINATOR menu	3-2
MANUAL CAL menu	4-1
NUMERATOR menu	3-2
REMOTE INTERFACE menu	4-1
RESPONSE menu	3-1, 4-1
SINGLE-MODE menu	4-1
USER-DEFINED menu	3-1, 3-2

VNA Rear Panel Ports

b1	2-4
b1 Input	1-3
b2	2-4
b2 Input	1-3
Dedicated GPIO	1-3, 2-4
Port 1 Src	2-4, 2-5
Port 1 Src Output	1-3
Port 2 Src	2-4, 2-5
Port 2 Src Output	1-3
SMA cable loops	2-4

VNA Settings

Sweeping Range	3-1
Trace Reference Position	3-1
Trace Settings	3-1, 3-2

W

Warning Symbol	Safety-1
Warranty	Front Matter-2
Web Site	1-6
Weight	1-5



Printed on Recycled Paper with Vegetable Soybean Oil Ink

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA
<http://www.anritsu.com>