Maintenance Manual

VectorStar™ 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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Safety Symbols

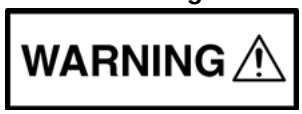
To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

Symbols Used in Manuals

Danger

This indicates a risk from a very dangerous condition or procedure that could result in serious injury or death and possible loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

Warning



This indicates a risk from a hazardous condition or procedure that could result in light-to-severe injury or loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

Caution

This indicates a risk from a hazardous procedure that could result in loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

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

or

When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. 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 5—Component Replacement

Chapter 1 — General Information

1-1 Introduction

This manual provides general service and maintenance instructions for Anritsu MN469xC Series Multiport Test Set. It contains procedures for:

- Testing the system for proper operation
- Verifying System Performance in conjunction with a 2-port MS4640A or MS4640B VectorStar VNA
- Troubleshooting tests and techniques
- Locating and replacing failed parts in the MN469xC Series Test Set

Models

The MN469xC Series family includes two models:

- MN4694C – 70 kHz to 40 GHz, K Connectors, for MS4642A or MS4642B, and MS4644A or MS4644B VNA
  - MS4642A/B, K Connectors, 10 MHz to 20 GHz, 70 kHz with low frequency option
  - MS4644A/B, K Connectors, 10 MHz to 40 GHz, 70 kHz with low frequency option
- MN4697C – 70 kHz to 70 GHz, V Connectors, for MS4645A or MS4645B, and MS4647A or MS4647B VNA
  - MS4645A/B, V Connectors, 10 MHz to 50 GHz, 70 kHz with low frequency option
  - MS4647A/B, V Connectors, 10 MHz to 70 GHz, 70 kHz with low frequency option

Naming Conventions

Throughout this manual, the term “Test Set” is used interchangeably to refer to the MN469xC Series Multiport Test Set, the term “VNA” is used interchangeably to refer to MS464xA or MS464xB VectorStar® Vector Network Analyzer, and the term “Multiport VNA System” is used interchangeably to refer to MS464xA/B VectorStar Vector Network Analyzer / MN469xC Test Set Multiport VNA System.

1-2 Identification Number

All Anritsu instruments are assigned an unique identification number (up to seven-digit), such as “090201” or “1010222”. This number appears on a decal affixed to the rear panel. Please use this identification number during any correspondence with Anritsu Customer Service about Anritsu instruments.

1-3 Related Manuals and Documentation

Manuals and Documentation related to the operation and maintenance of the MN469xC Series Multiport Test Sets are listed below.

MS464xA Series Vector Network Analyzer

- MS464xA Series VNA Technical Data Sheet – 11410-00432
- MS464xA Series VNA Operation Manual (OM) – 10410-00266
- MS464xA Series VNA Measurement Guide (MG) – 10410-00269
- MS464xA Series VNA Programming Manual (PM) – 10410-00267
- MS464xA Series VNA Help System (OM, PM, and MG) – 10450-00008
- MS464xA Series VNA Maintenance Manual (MM) – 10410-00268
- MS464xA Series VNA User Documentation CD – 10920-00049

MS464xB Series Vector Network Analyzer

- 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

MN469xC Series Multiport Vector Network Analyzer Measurement System

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

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

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

Calibration, Verification, and System Performance Verification

- For MS464xA/B Series VNA:
  - 36585K and 36585V Precision Auto Calibrator (AutoCal) Module Reference Manual –10410-00279
  - 3650A, 3652A, and 3654D Mechanical Calibration Kit Reference Manual –10410-00278
  - 366xX-1 Verification Kits and 2300-527 Performance Verification Software (PVS) for VectorStar™ MS464xA/B Series VNA Quick Start Guide –10410-00285
  - 3666-1, 3668-1, 3669B-1 Verification Kits and 3-2300-527 Performance Verification Software (PVS) User Guide –10410-00270

For additional literature related to the Anritsu VectorStar family of products, refer to:
http://www.us.anritsu.com/VectorStar

1-4 VectorStar Multiport VNA System Overview

An overall block diagram of the VectorStar Multiport VNA system is shown in Figure 1-1.

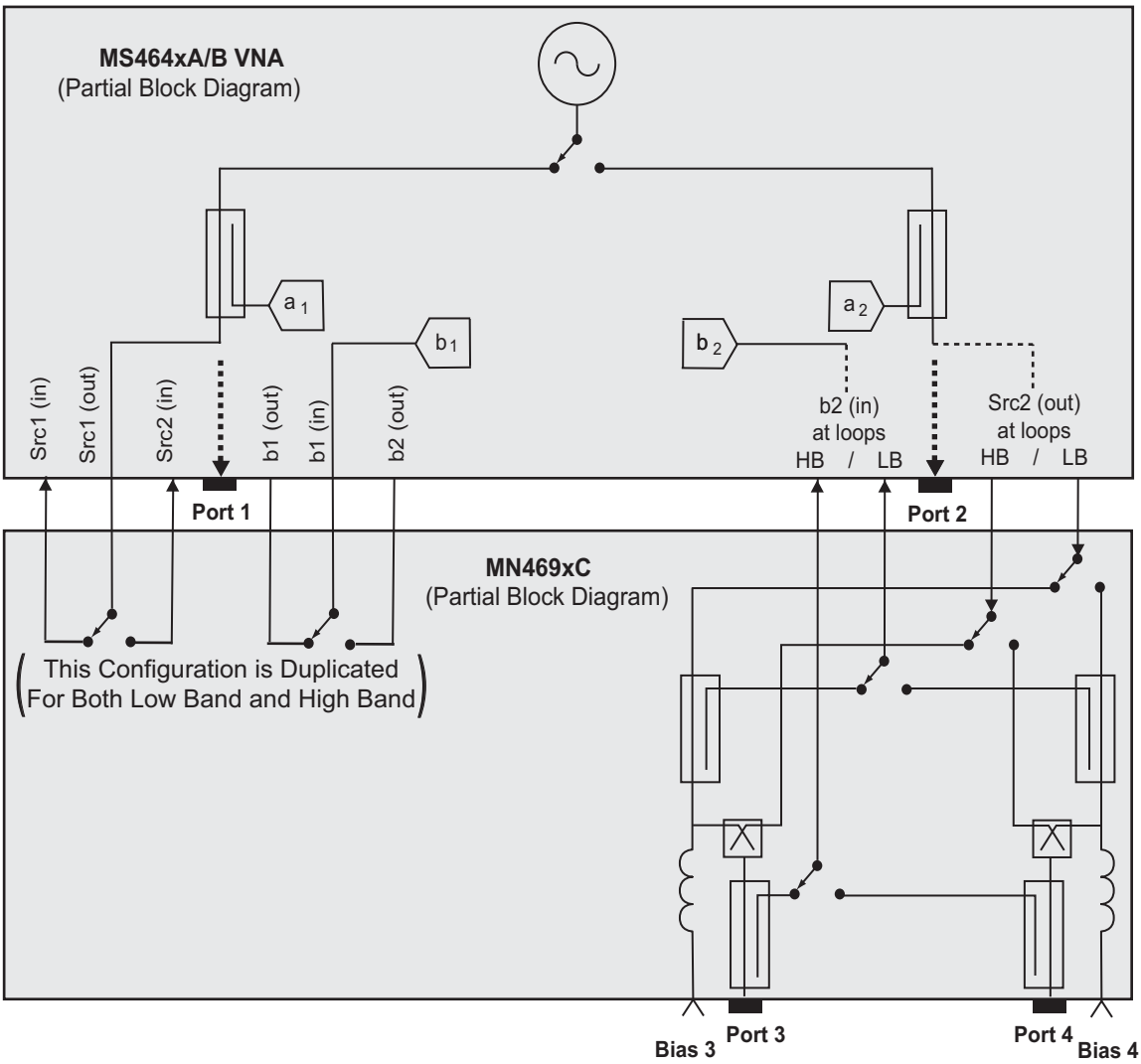


Figure 1-1. Overall Block Diagram of the VectorStar Multiport VNA System

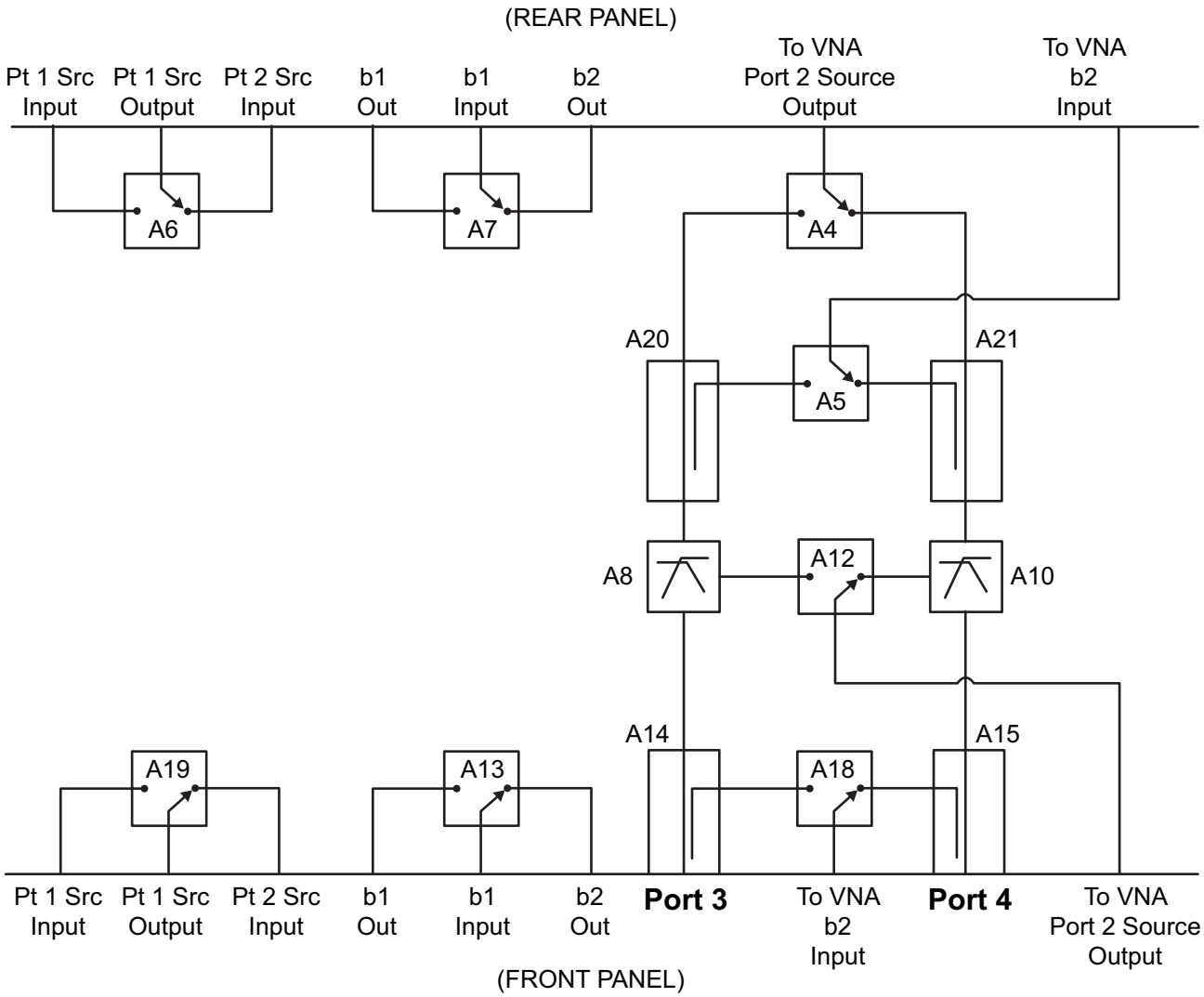
The Anritsu MN469xC Series Multiport Test Set provides multiple test port capabilities for the Anritsu VectorStar MS464xB/MS464xA Series Vector Network Analyzer.

The MN469xC Series 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).

The MN469xC Series Test Sets only contribute loss to the source and test paths, and uncorrected (raw) port directivity and match. Therefore, system performance is specified when connected to a base 2-port VectorStar VNA with option 051 (Direct Access Loops). If additional options are added to the base VectorStar VNA that affect its port performance, those effects must also be added to these system specifications. Specifically, adding option 06x, Active Measurement Suites will affect available test port power and dynamic range.

1-5 MN469xC Multiport Test Set Functional Description

A block diagram of the MN469xC Series Multiport Test Set is shown in Figure 1-2.



Module	Description	Module	Description
A4	Low Band Switch	A13	High Band SPDT Switch
A5	Low Band Switch	A14	Port Coupler
A6	Low Band Switch	A15	Port Coupler
A7	Low Band Switch	A18	High Band SPDT Switch
A8	Diplexer/Bias-Tee	A19	High Band SPDT Switch
A10	Diplexer/Bias-Tee	A20	Low Band Bridge
A12	High Band SPDT Switch	A21	Low Band Bridge

Figure 1-2. MN469xC Functional Block Diagram

The VectorStar VNA sends switch control commands via the GPIB bus to the GPIB to Parallel Digital Interface PCB Assembly in the test set. The logic in this PCB is translated by the 4-Port Test Set Control PCB to the appropriate levels at any given time to control each one of the SPDT RF switches in the test set.

The MN469xC test set contains eight SPDT RF switches. Four switches, A4, A5, A6 and A7, operate in low band frequencies below 2.5 GHz. Four switches, A12, A13, A18 and A19, operate in high band frequencies from 2.5 GHz and beyond.

Any one or two test ports may be selected for forward and/or reverse measurements. There is an LED above each test port (Ports 3 and 4). When the connection paths are set via GPIB commands, the test port LEDs will light according to the connections. A lit LED under a test port indicates that it is selected as an active test port.

There is an LED next to the Power switch. When AC power is first applied, the Power LED will light.

Low Band Operation – 70 kHz to 2.5 GHz

The A4 Low Band Switch routes the stimulus signal from the VectorStar VNA Low Band Source 2 Output to either Port 3 through the A20 Port 3 Low Band Bridge, A8 Diplexer/Bias Tee Assembly and then A14 Port 3 Coupler or to Port 4 through the A21 Port 4 Low Band Bridge, A10 Diplexer/Bias Tee Assembly and then A15 Port 4 Coupler.

The A6 Low Band Switch routes the stimulus signal from the VectorStar VNA Low Band Source 1 to either Port 1 or Port 2 back on the host VNA. It does this by routing back into the source loops so the VNA bridges/couplers are employed.

The reflected or transmitted signal measured at Port 3 passes directly through the A14 Port 3 Coupler and A8 Diplexer/Bias Tee Assembly, and then is coupled via the A20 Low Band Bridge to the A5 Low Band Switch.

The reflected or transmitted signal measured at Port 4 passes directly through the A15 Port 4 Coupler and A10 Diplexer/Bias Tee Assembly, and then is coupled via the A21 Low Band Bridge to the A5 Low Band Switch.

The A5 Low Band Switch routes the measured reflected or transmitted signal from either Port 3 or Port 4 to the VectorStar VNA Low Band b2 Input.

Reflected or transmitted signals arriving at ports 1 or 2 are coupled within the host VNA and the b1 or b2 signals are routed to the A7 Low Band Switch where they are multiplexed onto the VNA's b1 input.

High Band Operation – 2.5 GHz and beyond

The A12 High Band Switch routes the stimulus signal from the VectorStar VNA Low Band Source 2 Output to either Port 3 through the A8 Diplexer/Bias Tee Assembly and then A14 Port 3 Coupler or to Port 4 through the A10 Diplexer/Bias Tee Assembly and then A15 Port 4 Coupler.

The A19 High Band Switch routes the stimulus signal from the VectorStar VNA High Band Source 1 to either Port 1 or Port 2 back on the host VNA. It does this by routing back into the source loops so the VNA bridges/couplers are employed.

The reflected or transmitted signal measured at Port 3 is coupled via the A14 Port 3 Coupler to the A13 High Band Switch.

The reflected or transmitted signal measured at Port 4 is coupled via the A15 Port 4 Coupler to the A13 High Band Switch.

Reflected or transmitted signals arriving at Ports 1 or 2 are coupled within the host VNA and the b1 or b2 signals are routed to the A13 High Band Switch where they are multiplexed onto the VNA's b1 input..

The A18 High Band Switch routes the measured reflected or transmitted signal from either Port 3 or Port 4 to the VectorStar VNA High Band b2 Input.

1-6 Contacting Anritsu

To contact Anritsu, please visit:

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

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.

1-7 Electrostatic Discharge (ESD) Prevention

All electronic devices, components, and instruments can be damaged by electrostatic discharge. It is important to take preventive measures to protect the instrument and its internal subassemblies from electrostatic discharge.

An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the MN469xC Series test sets.

Take steps to eliminate the static charges built-up on coaxial cables prior to connecting them to the VNA System test ports. This can be done by terminating one end of the cable with the short from the calibration kit and then grounding the outer conductor of the connector of the cables.

1-8 Recommended Test Equipment

Below, Table 1-1 provides a list of recommended test equipment needed for the performance verification and troubleshooting procedures presented in this manuals.

Table 1-1. Recommended Test Equipment List (1 of 2)

Instrument	Critical Specification	Recommended Manufacturer and Model	Use
Calibration Kit	Connector Type: K	Anritsu Model 3652A	MN4694C
Extension Cable	Frequency: DC to 40 GHz Connector Type: K male to K female	Anritsu Model 3670K50-2 (Qty 2)	MN4694C
Adapter	Type: K male to K female	Anritsu Model 33KKF50B (Qty 2)	MN4694C
Air Line	Connector Type: K female	Anritsu Model T2023-2	MN4694C
Offset Termination	Return Loss: 20 dB Connector Type: V female	Anritsu Model SC4808	MN4694C
Calibration Kit	Connector Type: V	Anritsu Model 3654D	MN4697C
Extension Cable	Frequency: DC to 70 GHz Connector Type: V male to V female	Anritsu Model 3670V50B-2 (Qty 2)	MN4697C
Adapter	Type: V male to V female	Anritsu Model 33VVF50C (Qty 2)	MN4697C
Air Line	Connector Type: V female	Anritsu Model T2025-2	MN4697C
Offset Termination	Return Loss: 20 dB Connector Type: V female	Anritsu Model SC5727	MN4697C
Power Meter	Power Range: –70 to +20 dBm	Anritsu Model ML2437A or ML2438A	All Models
Power Sensor	Frequency: 70 kHz to 70 GHz Connector Type: V male	Anritsu Model SC7770	All Models
Adapter	Type: N male to V female	Pasternack Model PE9720	All Models
PC Controller	**Configuration:** – 1 gigahertz (GHz) or faster 32-bit (x86) or 64-bit (x64) processor – At least 2 GB RAM – Windows 7 (32-bit or 64-bit) – 20 MB Hard-disk free space – 1024x768 Display Resolution – CD-ROM Drive – USB 2.0 Type A Port – National Instruments GPIB Controller and Driver – National Instruments NI-VISA Version	Any	All Models
Test Software	–	Anritsu 2300-531-R	All Models
Torque Wrench	5/16” (8 mm) Torque End Wrench, set to 8 lbf · in (0.9 N · m)	Anritsu 01-201, use with 01-204 below.	All Models

Table 1-1. Recommended Test Equipment List (2 of 2)

Instrument	Critical Specification	Recommended Manufacturer and Model	Use
Torque Wrench	1/2” (12.7 mm) Torque End Wrench, set to 36 lbf · in (4.063 N · m)	Mountz MTBN10 or equivalent with 1/2” socket.	All Models
Torque Wrench	13/16” (20.6 mm) Torque Socket Wrench, set to 15 lbf · ft (20.34 N · m)	Craftsman 009-44594 or equivalent with 13/16” deep socket on 3/8” (9.525 mm) drive	All Models
End Wrench	5/16” (8 mm) End Wrench	Anritsu 01-204, use with 01-201 above	All Models

Chapter 2 — Replaceable Parts

2-1 Introduction

This chapter provides replaceable parts information for MN469xC Series Multiport Test Sets.

2-2 Exchange Assembly Program

Anritsu maintains a module exchange program for selected subassemblies. If a malfunction occurs in one of these sub-assemblies, the defective item can be exchanged. Upon receiving your request, Anritsu will ship the exchange subassembly to you. You then have 45 days in which to return the defective item. All exchange subassemblies or RF assemblies are warranted for 90 days from the date of shipment, or for the balance of the original equipment warranty, whichever is longer.

Please have the exact model number and serial number of your equipment available when requesting this service, as the information about your equipment is filed according to the instrument model and serial number. For more information about this program, contact your local Anritsu Service Center.

2-3 Replaceable Parts

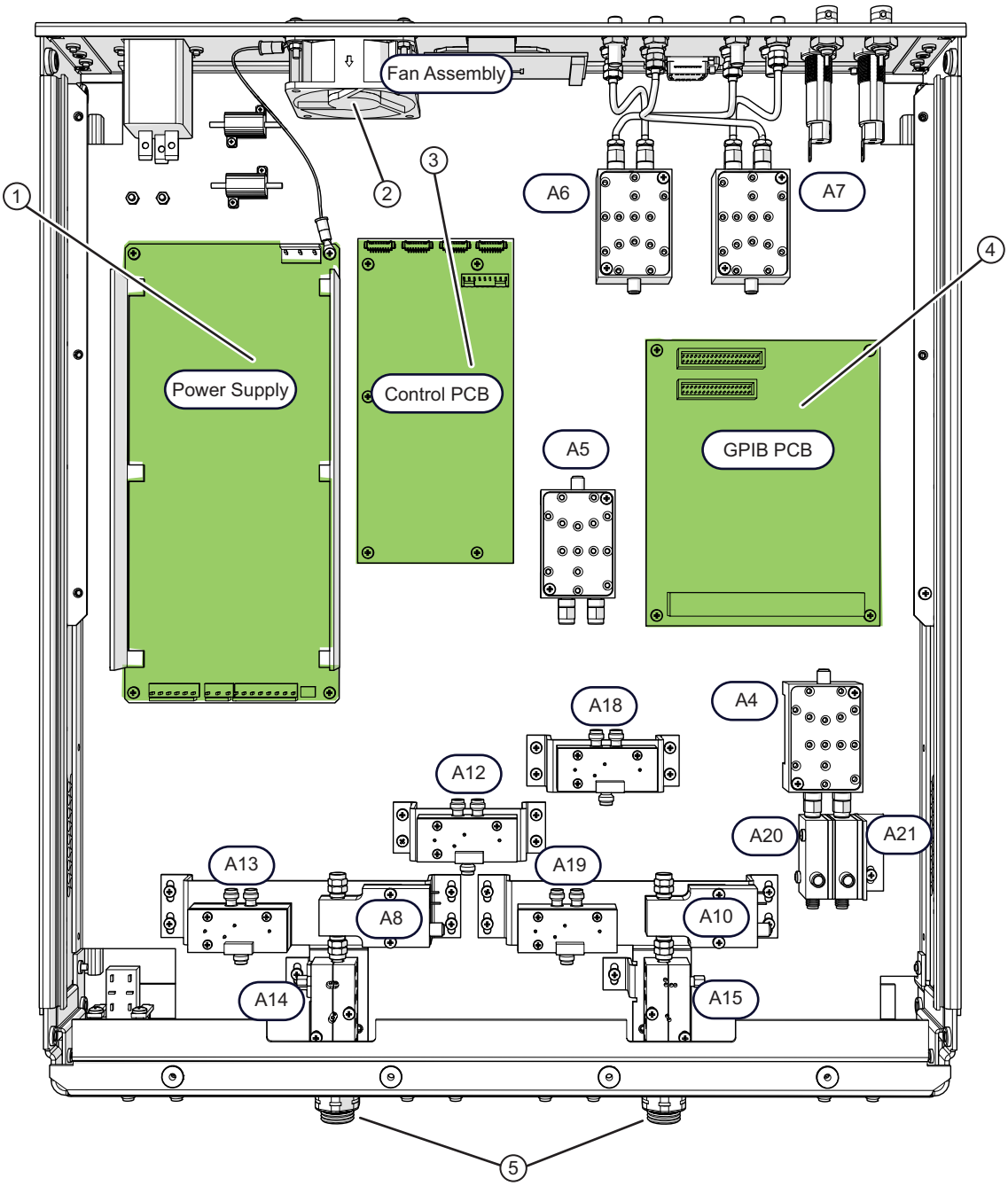
Table 2-1 lists the replaceable parts found in the MN469xC Series Test Set. See Figure 2-1 for locations.

Table 2-1. Replaceable Parts List (1 of 2)

Part Number	Part Description – Drawing "A" Number	Use
2000-989	GPIB-Parallel Interface PCB Assembly	All Models
ND70926	High Band SPDT Switch Control PCB Assembly – Mounts on top of A12, A13, A18, A19	All Models
ND70927	Control PCB Assembly	All Models
3-40-183	Power Supply	All Models
ND70078	Low Band Bridge – A20, A21	All Models
ND70079	Low Band Switch – A4, A5, A6, A7	All Models
70241	High Band SPDT Switch Assembly, V Connector, 70 GHz – A12, A13, A18, A19	MN4697C
70242	High Band SPDT Switch Assembly, K Connector, 40 GHz – A12, A13, A18, A19	MN4694C
74278	Diplexer Assembly, V Connector, 70 GHz – A8, A10	MN4697C
74277	Diplexer Assembly, K Connector, 40 GHz – A8, A10	MN4694C
66245	Port Coupler, V Connector, 70 GHz – A14, A15	MN4697C
66480	Port Coupler, K Connector, 40 GHz – A14, A15	MN4694C
34YK50C	K Test Port Connector – Mounts on A14, A15	MN4694C
34YV50C	V Test Port Connector – Mounts on A14, A15	MN4697C
3-62109-42	RF Cable, V Connector, VNA to Test Set, Front Panel	MN4697C

Table 2-1. Replaceable Parts List (2 of 2)

Part Number	Part Description – Drawing "A" Number	Use
3-67357-38	RF Cable, K Connector, VNA to Test Set, Front Panel	MN4694C
62112-80	RF Cable, SMA Connector, VNA Bx to Test Set Bx, Rear Panel	All Models
62112-81	RF Cable, SMA Connector, VNA Src to Test Set Src, Rear Panel	All Models
ND71327	Fan Assembly, Rear Panel	All Models



See Table 2-1, "Replaceable Parts List" on page 2-1 for identification of Replacement Part Numbers.

Figure 2-1. Location of Major Components and Subassemblies (1 of 2)

Item	Description	Item	Description
1	Power Supply	A10	Diplexer/Bias-Tee
2	Cooling Fan Assembly	A12	High Band SPDT Switch
3	Control PCB Assembly	A13	High Band SPDT Switch
4	GPIB–Parallel Interface Board	A14	Port Coupler
5	Test Port Connectors	A15	Port Coupler
A4	Low Band Switch	A18	High Band SPDT Switch
A5	Low Band Switch	A19	High Band SPDT Switch
A6	Low Band Switch	A20	Low Band Bridge
A7	Low Band Switch	A21	Low Band Bridge
A8	Diplexer/Bias-Tee		

Figure 2-1. Location of Major Components and Subassemblies (2 of 2)

Chapter 3 — Performance Verification

3-1 Introduction

This chapter contains procedures that can be used to verify the performance of the VectorStar Multiport Vector Network Analyzer System which is comprised of MS464xA/B VNA and MN469xC Test Set.

Note	As the MN469xC Series Test Set provides multiple test port capabilities for the Anritsu VectorStar MS464xA or MS464xB Series Vector Network Analyzer, they do not have any performance specifications separate from the VectorStar VNA. Therefore, MN469xC Test Set must be verified with a 2-port VectorStar VNA as a system. The frequency range that can be verified will be limited by the 2-port VectorStar VNA.

The procedures include the following tests:

- "Directivity and Test Port Match Verification" on page 3-2
- "Test Port Power Verification" on page 3-12
- "Noise Floor Verification" on page 3-14

Note	The 2-port VectorStar VNA should be verified as a stand-alone unit. Consult the **VectorStar MS4640A Series VNA Maintenance Manual – 10410-00268**, or the **VectorStar MS4640B Series VNA Maintenance Manual - 10410-00320** prior to performing these system tests.

3-2 Directivity and Test Port Match Verification

The following test can be used to verify the corrected directivity and port match of each test port of the VectorStar Multiport VNA System.

Equipment Required for VNA System with MN4694C

- Calibration Kit, K Connector, Anritsu Model 3652A
- Phase Equal Adapter, K(m) to K(f) Anritsu Model 33KKF50B (Qty 2)
- Air Line, K Connector, Anritsu Model T2023-2
- 20 dB Offset Termination, K(f) Connector, Anritsu Model SC4808

Equipment Required for VNA System with MN4697C

- Calibration Kit, V Connector, Anritsu Model 3654D
- Phase Equal Adapter, V(m) to V(f) Anritsu Model 33VVF50C (Qty 2)
- Air Line, V Connector, Anritsu Model T2025-2
- 20 dB Offset Termination, V(f) Connector, Anritsu Model SC5727

Procedure

1. Install the MS464xA/B VNA on the MN469xC Test Set per the **VectorStar MN469xC Multiport Test Set Installation Guide – 10410-00737**. Power on the MN469xC Test Set first.
2. Install four Phase Equal Adapters on the two MN469xC test ports and on the two VNA test ports.

Note	Use the Anritsu 01-204 Torque Wrench to tighten the adapters to the MN469xC test ports so they will not loosen during the calibration steps and adversely affect the calibration quality.

3. Power on the MN469xC Test Set.

Note	If the VNA is powered up 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. Power on the MS464xA/B VNA and allow it to complete self test.
5. Allow both VNA and Test Set to warm up for at least one hour.
6. Preset the VNA.
   a. Ensure that Trace 1 is set to S11, Trace 2 set to S12, Trace 3 set to S21, and Trace 4 set to S22.
7. Select Sweep Setup | Freq-based Seg. Sweep Setup
8. When the Freq-based Seg. Sweep Setup Table appears on the bottom of the display, do the following:
   a. Enter the information into the Setup Table on the bottom of the VNA display per Table 3-1 on page 3-3 below for MN4694C or Table 3-2 on page 3-3 below for MN4697C.
   b. Omit the frequency bands that are outside of the frequency coverage of the 2-port VectorStar VNA.
   c. Select Add to add a new segment.

Table 3-1. VectorStar VNA Segmented Sweep Setup for VNA System with MN4694C Test Set

F1	F2	# of Pts	IFBW	P1 Src Pwr	P2 Src Pwr
70 kHz	**200 kHz**	11	10 Hz	+5 dBm	+5 dBm
300 kHz	**1 MHz**	21	10 Hz	+5 dBm	+5 dBm
2 MHz	**9 MHz**	21	10 Hz	+5 dBm	+5 dBm
10 MHz	**998 MHz**	51	10 Hz	+5 dBm	+5 dBm
1000 MHz	**2499 MHz**	51	1 kHz	+5 dBm	+5 dBm
2500 MHz	**5000 MHz**	51	1 kHz	+5 dBm	+5 dBm
5001 MHz	**20000 MHz**	401	1 kHz	+5 dBm	+5 dBm
20001 MHz	**38000 MHz**	601	1 kHz	+5 dBm	+5 dBm
38001 MHz	**40000 MHz**	51	1 kHz	+5 dBm	+5 dBm

Table 3-2. VectorStar VNA Segmented Sweep Setup for VNA System with MN4697C Test Set

F1	F2	# of Pts	IFBW	P1 Src Pwr	P2 Src Pwr
70 kHz	**200 kHz**	11	10 Hz	–8 dBm	–8 dBm
300 kHz	**1 MHz**	21	10 Hz	–8 dBm	–8 dBm
2 MHz	**9 MHz**	21	10 Hz	–8 dBm	–8 dBm
10 MHz	**998 MHz**	51	10 Hz	–8 dBm	–8 dBm
1000 MHz	**2499 MHz**	51	1 kHz	–8 dBm	–8 dBm
2500 MHz	**5000 MHz**	51	1 kHz	–8 dBm	–8 dBm
5001 MHz	**20000 MHz**	401	1 kHz	–8 dBm	–8 dBm
20001 MHz	**38000 MHz**	601	1 kHz	–8 dBm	–8 dBm
38001 MHz	**40000 MHz**	51	1 kHz	–8 dBm	–8 dBm
40001 MHz	**50000 MHz**	201	1 kHz	–8 dBm	–8 dBm
50001 MHz	**65000 MHz**	151	1 kHz	–8 dBm	–8 dBm
65001 MHz	**67000 MHz**	51	1 kHz	–8 dBm	–8 dBm
67001 MHz	**70000 MHz**	51	1 kHz	–8 dBm	–8 dBm

9. Select Save Table to File

a. Enter the file name and click OK to save the Table.

10. Select Back | Sweep Type | Segmented Sweep (Freq-based)

11. Ensure that **Tr1** is highlighted. If not, move the mouse pointer over Tr1 and click to select.

12. Select Display | Trace Format | Log Mag

13. Change Display Trace Format of Tr2, Tr3, Tr4 to Log Mag.

14. Select Response | Tr2 | S22

15. Select Tr3 | More Single Mode | S33

16. Select Tr4 | More Single Mode | S44

17. Insert the Calibration Kit Components Coefficients USB Memory Stick into one of the front panel USB ports.

18. Select Calibration | Cal Kit/AutoCal Characterization | Install Kit/Charac.

19. Select Cal Kit file type and then click the Browse button. See Figure 3-1 below.

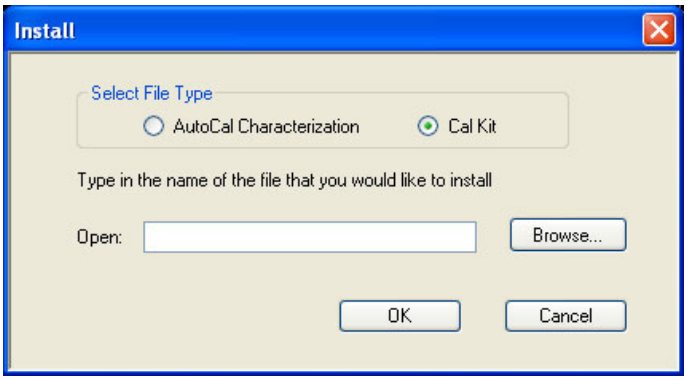


Figure 3-1. Install Dialog Box

20. Select the file with ".ccf" file extension and then click the Open button. See Figure 3-2 below.

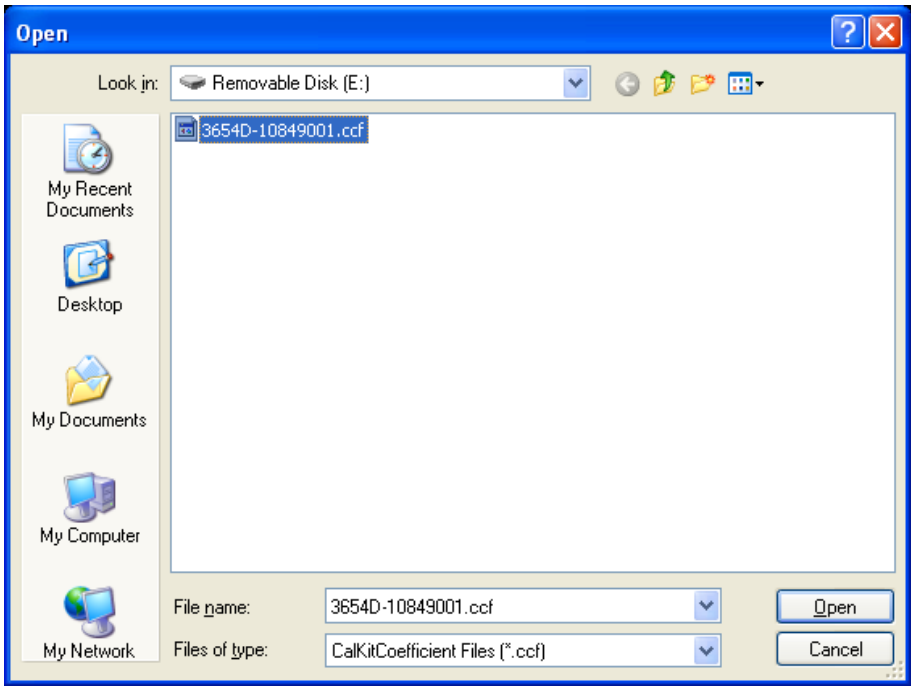


Figure 3-2. Open Dialog Box

21. Click on the OK button and then the Install button to install the Calibration Kit Components Coefficients.

22. Select Calibration | Calibrate | Manual Cal | 1-Port Cal | Modify Cal Setup | Edit Cal Params

23. Change all DUT Connector settings to K-Conn(F) for MN4694C or V-Conn(F) for MN4697C in the One Port Cal Setup dialog box. Click the OK button when done. See Figure 3-3 below.

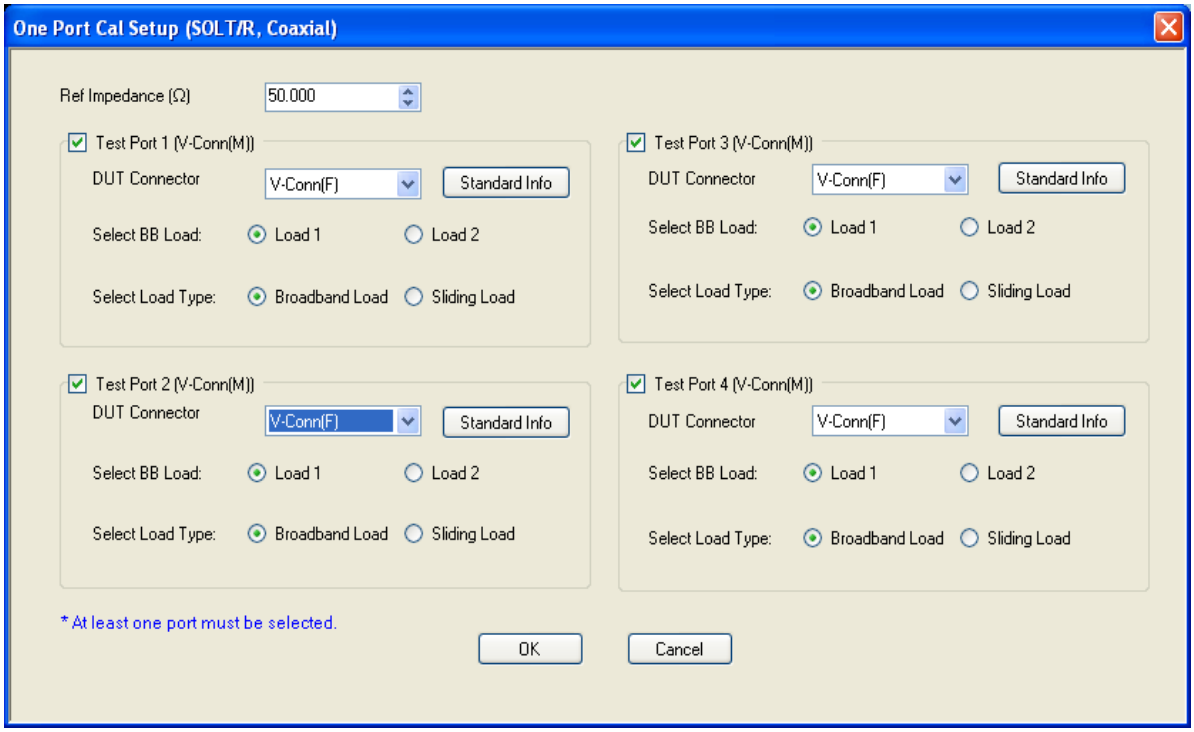


Figure 3-3. One Port Cal Setup Dialog Box

24. Select Back to return to the One Port Cal/s Menu. See Figure 3-4 below.

Figure 3-4. One Port Cal/s Menu

25. Select Port 1 Reflective Device to display the Refl. Device(s) Menu. See Figure 3-5 below.

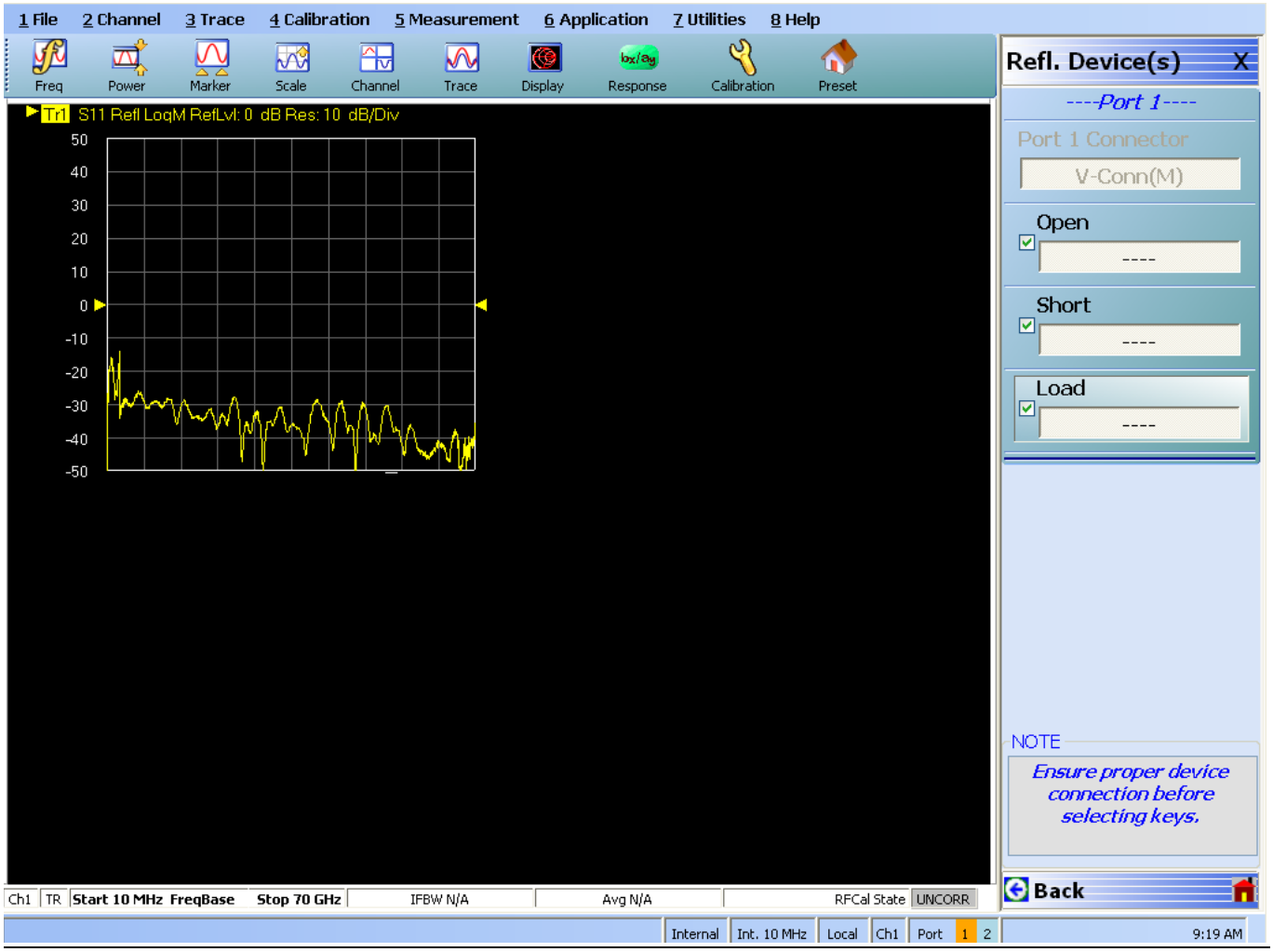


Figure 3-5. Refl. Device(s) Menu

26. Connect the Open from the Calibration Kit to Port 1 of the VNA.

Note	Use the Anritsu 01-201 torque wrench from the Anritsu 365xx Calibration Kit to tighten the connection to improve the quality of the calibration. Do the same for other calibration standards (e.g. Short and Load) in subsequent steps.

27. Select Open.

Note	A check mark will appear on the button when the measurement or process is complete. See examples on right side of Figure 3-5 above.

28. Disconnect the Open from Port 1 and connect the Short.

29. Select Short

30. Disconnect the Short from Port 1 and connect the termination.

31. Select Load

32. Select Back to return to previous menu.

33. Select Port 2 Reflective Device

34. Connect the Open from the Calibration Kit to Port 2 of the VNA.

35. Select Open.

36. Disconnect the Open from Port 2 and connect the Short.

37. Select Short

38. Disconnect the Short from Port 2 and connect the termination.

39. Select Load

40. Select Back to return to previous menu.

41. Select Port 3 Reflective Device

42. Connect the Open from the Calibration Kit to Port 3 of MN469xC.

43. Select Open.

44. Disconnect the Open from Port 3 and connect the Short.

45. Select Short

46. Disconnect the Short from Port 3 and connect the termination.

47. Select Load

48. Select Back to return to previous menu.

49. Select Port 4 Reflective Device

50. Connect the Open from the Calibration Kit to Port 4 of MN469xC.

51. Select Open.

52. Disconnect the Open from Port 4 and connect the Short.

53. Select Short

54. Disconnect the Short from Port 4 and connect the termination.

55. Select Load

56. Select Back to return to previous menu.

57. Select Done

58. Select Tr1 | Trace | Trace Max

59. Connect the Air Line to Port 1 and then terminate the Air Line with the Offset Termination.

Caution	Finger tighten only. Do not use torque wrench to tighten the connector connection for this step.

60. Select Scale | Auto Scale Active Trace

61. Select Marker

62. Click Mkr 1, Mkr 2 and Mkr 3 to turn these markers On.

63. Using the mouse to move Mkr 1 and Mkr 3 to adjacent peaks of the ripple with the greatest negative trough (or adjacent troughs if the ripple has the greatest positive peak) in the frequency band of interest as shown in Figure 3-6 on page 3-9 below. For frequency band information, in Appendix A, "Test Records", refer to either:

- Table A-1, "Directivity Record for MN4694C Multiport VNA System" on page A-2 for MN4694C
- Table A-4, "Directivity Record for MN4697C Multiport VNA System" on page A-4 for MN4697C

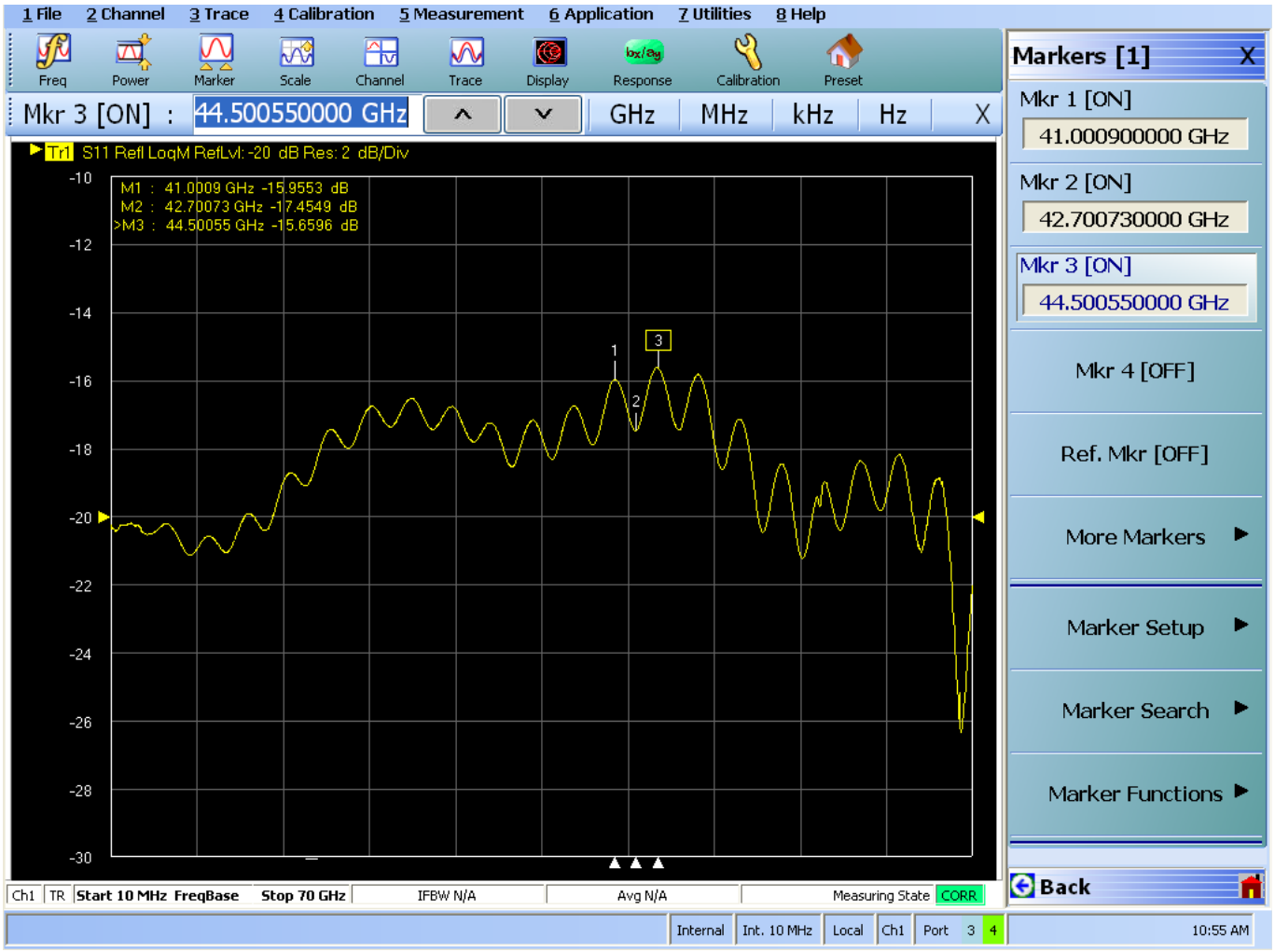


Figure 3-6. Log Mag Display

64. Position Mkr 2 to the bottom of the trough (or to the top of the peak if the ripple has the greatest position peak.)

65. Sum the magnitude values of Mkr 1 and Mkr 3 at the peaks (or troughs) and divide the result by two. This is the average value of the two peaks (or troughs) Refer to the example formula below:

Average Value = (Mkr 1 + Mkr 2)/2 = (–15.9634 dB) + (–15.641 dB)/2 = –15.8022 dB

66. Calculate the peak-to-peak ripple value (absolute difference of the Mkr 2 value and the Average Value) as follows:

dB_{p-p} = |Mkr 2 value| – |Average Value| = 17.452 dB – 15.8022 dB = 1.6498 dB

67. Use a RF measurement chart in Figure 3-7 on page 3-10 to find the corresponding return loss value of the peak-to-peak ripple value.

- Example: The corresponding Return Loss value of 1.6498 dB_{p-p} is approximately 20 dB

68. Also find the corresponding Ref + X or Ref – X value from the RF measurement chart.

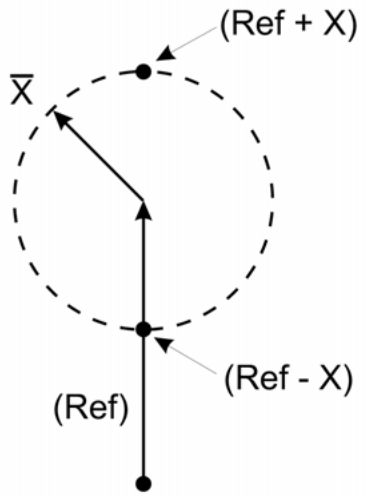
The first three columns are conversion tables for return loss, reflection coefficient, and SWR.

The last four columns are values for interactions of a small phasor X with a large phasor (unity reference) expressed in dB related to the reference.

The RF Measurement Chart can be used to determine the uncertainty due to bridge/autotester VNA directivity. The "X dB Below Reference" column represents the difference between the directivity and the measured reflection (return loss). The "Ref + X dB" and "Ref – X dB" values are 360°. Therefore, the peak-to-peak ripple (1 ± X) is the total measurement uncertainty caused by the error signal.

For example, if a 30 dB return loss is measured with a 40 dB directivity autotester, the X dB Below Reference value is 10 dB. The Ref + X dB value is 2.3866 dB and the Ref – X dB value is 3.3018 dB.

The actual return loss is between 27.6134 dB (– 30 + 2.3866) and 33.3018 dB (– 30 – 3.3018). The peak-to-peak ripple on a swept measurement will be 5.6884 dB. If the error and directivity signals are equal, the Ref + X dB value equals 6 dB (voltage doubling causes a 6 dB change) and the Ref – X dB value becomes infinite, since the two signals are equal in amplitude and 180° out of phase (zero voltage).



Phasor Interaction

SWR	Reflection Coefficient	Return Loss (dB)	Relative to Unity Reference			
			X dB Below Reference	Ref + X (dB)	Ref - X (dB)	Ref ± X Pk to Pk Ripple (dB)
17.3910	0.8913	1	1	5.5350	-19.2715	24.8065
8.7242	0.7943	2	2	5.0780	-13.7365	18.8145
5.8480	0.7079	3	3	4.6495	-10.6907	15.3402
4.4194	0.6310	4	4	4.2489	-8.6585	12.9073
3.5698	0.5623	5	5	3.8755	-7.1773	11.0528
3.0095	0.5012	6	6	3.5287	-6.0412	9.5699
2.6146	0.4467	7	7	3.2075	-5.1405	8.3480
2.3229	0.3981	8	8	2.9108	-4.4096	7.3204
2.0999	0.3548	9	9	2.6376	-3.8063	6.4439
1.9250	0.3162	10	10	2.3866	-3.3018	5.6884
1.7849	0.2818	11	11	2.1567	-2.8756	5.0322
1.6709	0.2512	12	12	1.9465	-2.5126	4.4590
1.5769	0.2239	13	13	1.7547	-2.2013	3.9561
1.4985	0.1995	14	14	1.5802	-1.9331	3.5133
1.4326	0.1778	15	15	1.4216	-1.7007	3.1224
1.3767	0.1585	16	16	1.2778	-1.4988	2.7766
1.3290	0.1413	17	17	1.1476	-1.3227	2.4703
1.2880	0.1259	18	18	1.0299	-1.1687	2.1986
1.2528	0.1122	19	19	0.9237	-1.0337	1.9574
1.2222	0.1000	20	20	0.8279	-0.9151	1.7430
1.1957	0.0891	21	21	0.7416	-0.8108	1.5524
1.1726	0.0794	22	22	0.6639	-0.7189	1.3828
1.1524	0.0708	23	23	0.5941	-0.6378	1.2319
1.1347	0.0631	24	24	0.5314	-0.5661	1.0975
1.1192	0.0562	25	25	0.4752	-0.5027	0.9779
1.1055	0.0501	26	26	0.4248	-0.4466	0.8714
1.0935	0.0447	27	27	0.3796	-0.3969	0.7765
1.0829	0.0398	28	28	0.3391	-0.3529	0.6919
1.0736	0.0355	29	29	0.3028	-0.3138	0.6166
1.0653	0.0316	30	30	0.2704	-0.2791	0.5495
1.0580	0.0282	31	31	0.2414	-0.2483	0.4897
1.0515	0.0251	32	32	0.2155	-0.2210	0.4365
1.0458	0.0224	33	33	0.1923	-0.1967	0.3890
1.0407	0.0200	34	34	0.1716	-0.1751	0.3467
1.0362	0.0178	35	35	0.1531	-0.1558	0.3090
1.0322	0.0158	36	36	0.1366	-0.1388	0.2753
1.0287	0.0141	37	37	0.1218	-0.1236	0.2454
1.0255	0.0126	38	38	0.1087	-0.1100	0.2187
1.0227	0.0112	39	39	0.0969	-0.0980	0.1949
1.0202	0.0100	40	40	0.0864	-0.0873	0.1737
1.0180	0.0089	41	41	0.0771	-0.0778	0.1548
1.0160	0.0079	42	42	0.0687	-0.0693	0.1380
1.0143	0.0071	43	43	0.0613	-0.0617	0.1230
1.0127	0.0063	44	44	0.0546	-0.0550	0.1096
1.0113	0.0056	45	45	0.0487	-0.0490	0.0977
1.0101	0.0050	46	46	0.0434	-0.0436	0.0871
1.0090	0.0045	47	47	0.0387	-0.0389	0.0776
1.0080	0.0040	48	48	0.0345	-0.0346	0.0692
1.0071	0.0035	49	49	0.0308	-0.0309	0.0616
1.0063	0.0032	50	50	0.0274	-0.0275	0.0549
1.0057	0.0028	51	51	0.0244	-0.0245	0.0490
1.0050	0.0025	52	52	0.0218	-0.0218	0.0436
1.0045	0.0022	53	53	0.0194	-0.0195	0.0389
1.0040	0.0020	54	54	0.0173	-0.0173	0.0347
1.0036	0.0018	55	55	0.0154	-0.0155	0.0309
1.0032	0.0016	56	56	0.0138	-0.0138	0.0275
1.0028	0.0014	57	57	0.0123	-0.0123	0.0245
1.0025	0.0013	58	58	0.0109	-0.0109	0.0219
1.0022	0.0011	59	59	0.0097	-0.0098	0.0195
1.0020	0.0010	60	60	0.0087	-0.0087	0.0174

Figure 3-7. RF Measurement Chart

69. Use the following formula to calculate the directivity:

- For ripple with a negative trough:

  Directivity = Return Loss value + |Mkr 2 value| – |Ref – X value|

- For ripple with a positive peak:

  Directivity = Return Loss value + |Mkr 2 value| + |Ref + X value|

- Example:

  Directivity = 20 dB + 17.452 dB - 0.9151 dB = 36.5369 dB

70. Record the directivity value into the Port 1 Measured column of the following applicable table in Appendix A:

- Table A-1, "Directivity Record for MN4694C Multiport VNA System" on page A-2 for MN4694C
- Table A-4, "Directivity Record for MN4697C Multiport VNA System" on page A-4 for MN4697C.

71. Repeat Step 63 to Step 70 for other frequency bands listed in Table A-1 for MN4694C or Table A-4 for MN4697C in Appendix A.

72. Disconnect the Offset Termination from the Air Line and connect a short.

73. Select Scale | Auto Scale Active Trace

74. Repeat Step 63 to Step 67. Record the Return Loss value into the appropriate table and the Port 1 Measured column in Appendix A:

- Table A-2, "Test Port Match Record for MN4694C Multiport VNA System" on page A-2 for MN4694C
- Table A-5, "Test Port Match Record for MN4697C Multiport VNA System" on page A-4 for MN4697C.

75. Repeat Step 74 for other frequency bands listed in Table A-2 for MN4694C or Table A-5 for MN4697C in Appendix A.

76. Disconnect the Short from the Air Line and then disconnect the Air Line from the Test Port.

77. Select Trace | Trace Next

78. Connect the Air Line to the next Test Port (e.g. Port 2 for S22, Port 3 for S33 or Port 4 for S44) on MN469xC and then terminate the Air Line with the Offset Termination.

79. Repeat Step 60 to Step 76 to verify the Directivity and Port Match of the Test Port being tested.

80. Repeat Step 77 to Step 79 for the rest of the Test Ports on MN469xC.

3-3 Test Port Power Verification

The following test can be used to verify the test port power of each test port of the VectorStar Multiport VNA System meets specification.

Note	Perform this test only when the 2-Port VectorStar VNA has Option 051 installed.

Equipment Required

- Power Meter, Anritsu Model ML2437A or ML2438A
- Power Sensor, Anritsu Model SC7770
- Adapter, N male to V female, Pasternack Model PE9720
- Calibration Kit, K Connector, Anritsu Model 3652A
- Calibration Kit, V Connector, Anritsu Model 3654D

Procedure

1. Power on the power meter allow to warm up for at least 15 minutes.
2. Connect the N male to V female adapter to the power meter calibrator port.
3. Connect the sensor to the power meter calibrator port. Zero and calibrate the power sensor.
4. Disconnect the power sensor from the calibrator port and install a female to female Phase Equal adapter (such as 33KFKF50B) from the calibration kit to convert the power sensor input to a female connector.
5. Place the MS464xA/B VNA on top of the MN469xC Test Set and connect the font and rear panel cables per the **VectorStar MN469xC Multiport Test Set Installation Guide – 10410-00288.**
6. Power on the MN469xC Test Set first.

Note	If the VNA is powered up before the test set, the VNA application will stay in 2-port mode and only 2-port mode features and functions will be available.

7. Power on the MS464xA/B VNA and allow it to complete self test.
8. Allow both VNA and Test Set to warm up for at least one hour.
9. Preset the VNA.
10. Select Trace | # of Traces | 1 | Enter
11. Select Trace Max
12. Select Frequency | CW Mode

Note	This turns CW Mode On.

13. Select CW Frequency
14. Enter the first frequency value from Table A-3, “Test Port Power Record for MN4694C Multiport VNA System” on page A-3 for MN4694C or Table A-6, “Test Port Power Record for MN4697C Multiport VNA System” on page A-5 for MN4697C in Appendix A.
15. On the power meter, set the Cal factor to match the frequency entered in the previous step.
16. Connect the power sensor to Port 1 of the VNA.
17. Select Power | Port 1 Power

18. Set Port 1 Power to the corresponding value in the VNA Port 1 Power Setting column of Table A-3 on page A-3 for MN4694C or Table A-6 on page A-5 for MN4697C.

- For example, set Port 1 Power to +9 dBm for 70 kHz

19. Record the power meter reading into the Port 1 Power Measured column of Table A-3 for MN4694C or Table A-6 for MN4697C.

20. Select Response | S22

21. Disconnect the power sensor from Port 1 of the VNA and connect it to Port 2 of the VNA.

22. Record the power meter reading into the Port 2 Power Measured column of Table A-3 for MN4694C or Table A-6 for MN4697C.

23. Select Response | More Single-Mode | S33

24. Disconnect the power sensor from Port 2 of the VNA and connect it to Port 3 of the MN4694C or MN4697C.

25. Record the power meter reading into the Port 3 Power Measured column of Table A-3 for MN4694C or Table A-6 for MN4697C.

26. Select Response | More Single-Mode | S44

27. Disconnect the power sensor from Port 3 of MN469xC and connect it to Port 4.

28. Record the power meter reading into the Port 4 Power Measured column of Table A-3 for MN4694C or Table A-6 for MN4697C.

29. Select Power | Port 1 Power | –10 dBm

30. Repeat Step 13 through Step 29 for other frequencies listed in Table A-3 for MN4694C or Table A-6 for MN4697C.

3-4 Noise Floor Verification

This test verifies the noise floor performance of the VectorStar Multiport VNA system at the test port of the MN469xC.

The Noise Floor test procedures are automated by using the VectorStar MS4640A/B Instrument Test Software, CDROM part number 2300-531-R.

The software guides you through the calibration process and the measurement of the noise floor. The software then computes the test results which are expressed in RMS values.

Refer to the **VectorStar MS4640A/B Series VNA 2300-531-R System Verification Software Quick Start Guide – 10410-00291**, for information about required equipment and details about running the software.

After the automated test is complete, print the test result and attached it the Test Records in Appendix A.

Chapter 4 — Troubleshooting

4-1 Introduction

This chapter provides information about troubleshooting tests that can be used to check the MN469xC Multiport Test Set for proper operation. These tests are intended to be used as a troubleshooting tool for checking the functionality of the components and sub-assemblies in the test set.

4-2 General Safety Warnings

Many of the troubleshooting procedures presented in this chapter require the removal of instrument covers to gain access to subassemblies and modules. When using these procedures, please observe the warning and caution notices.

Warning	Hazardous voltages are present inside the instrument when AC line power is connected. Before removing any covers, turn off the instrument via the Main power switch on the front panel and unplug the AC power cord.

Caution	Many assemblies and modules in the MN469xC contain static-sensitive components. Improper handling of these assemblies and modules may result in damage to the assembly and modules. Always observe the static-sensitive component handling precautions.

4-3 Troubleshooting Strategy

The VectorStar Multiport VNA System consists of two instruments:

- The 2-Port VectorStar MS4640A/B Series VNA
- The VectorStar Multiport MN469xC Test Set

A good understanding of the VectorStar Multiport VNA System operation is an important aid to troubleshooting system failures. Refer to the descriptions of system operation, and block diagrams located in Section 1-4 “VectorStar Multiport VNA System Overview” on page 1-4 and Section 1-5 “MN469xC Multiport Test Set Functional Description” on page 1-5.

It is also imperative to isolate whether the system fault is in the VectorStar VNA or the MN469xC Test Set.

Suggested Troubleshooting Steps

The suggested troubleshooting steps for MN469xC Test Set are as follows:

- Identify whether the fault is unique to the MN469xC Test Set (e.g. Unable to power on, etc.).
- Verify whether the fault is related to system setup and installation (e.g. GPIB cable, GPIB Address, inter-connect RF cable condition and connection and etc). Refer to **VectorStar MN469xC Series Multiport Test Set Installation Guide – 10410-00288.**
- Verify whether the 2-Port VectorStar VNA is in good condition by itself. Refer to the **MS4640A Series VNA Maintenance Manual – 10410-00268, or the MS4640B Series VNA Maintenance Manual – 10410-00320**.
- Perform the troubleshooting tests in this chapter.
- If possible, swap the suspected faulty component or PCB with the component or PCB from the known working switching signal path.
    - For example, if you suspect that Port 1/Port 2 Low Band Switch is faulty, swap it with the Port 3/Port 4 Low Band Switch.

4-4 Troubleshooting – Test Set Fails to Power Up

If the MN469xC test set fails to power up when connected to an AC power source and the **Power** key is pressed, perform the power supply checks described below.

Warning	Hazardous voltages are present inside the instrument when AC line power is connected. Turn off the instrument and disconnect the AC line cord before removing any covers. Troubleshooting or repair procedures should only be performed by qualified service personnel who are fully aware of the potential hazards.

Line Source and Interface Checks

1. Verify that the AC power source is providing stable power at the correct line voltage.

Note	The MN469xC is designed to automatically sense and operate with AC line voltage in the range of 85 to 264 Volt AC, with a frequency range of 47 to 63 Hz.

2. Verify the AC power cord is in good condition.
3. Verify the power line fuse is installed and that is not blown (open).

Power Supply Voltage Check

1. Turn off the test set and disconnect the AC power cord from the instrument. Ensure that all external front and rear panel cable connections to the test set are also disconnected.
2. Remove the top cover.
   - Refer to Section 5-3 “Removing the Covers” on page 5-2.
3. Re-connect the power cord to the test set and turn it on.
4. Using a digital multi-meter or oscilloscope, measure the expected DC power supply voltages on the 4-Port Test Set Control PCB at the P4 connector pins or test points listed in Table 4-1 below.
   - See Figure 4-1, “4-Port Test Set Control PCB P4 Connector Location” on page 4-3 below for test point locations.
5. If any of the DC voltage is much lower than the expected value, replace the power supply (part number 3-40-183).
   - Refer to Section 5-8 “Power Supply Replacement – 3-40-183” on page 5-11.

Table 4-1. Power Supply Voltages

Measured Pin	Common Pin	Expected DC Voltage
P4 pin 1 (or TP7)	P4 pin 2	–15 V
P4 pin 4 (or TP6)	P4 pin 2	+15 V
P4 pin 5 (or TP5)	P4 pin 2	–5.5 V
P4 pin 8 (or TP2)	P4 pin 2	+5.5 V

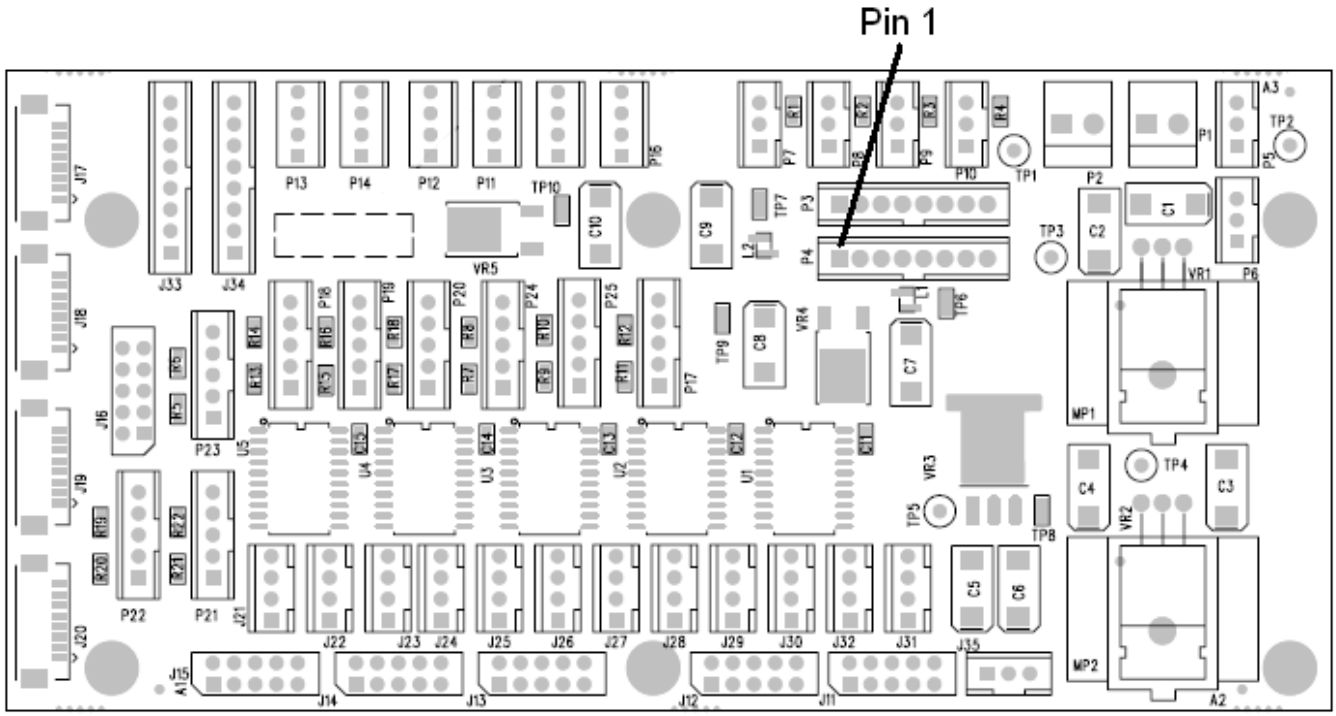


Figure 4-1. 4-Port Test Set Control PCB P4 Connector Location

4-5 Troubleshooting – RF Switch Functional Check

This section provides the procedures to check if the respective RF switches of each test port are working properly.

Note	Port 1 and Port 2 share the same set of RF switches. Port 3 and Port 4 share a separate set of RF switches.

Equipment Required for VNA System with MN4694C

- Anritsu Model 3652A K Connector Calibration Kit (For MN4694C)
- Anritsu Model 3670K50-2 K Connector Through Cable (For MN4694C)

Equipment Required for VNA System with MN4697C

- Anritsu Model 3654D V Connector Calibration Kit (For MN4697C)
- Anritsu Model 3670V50B-2 V Connector Through Cable (For MN4697C)

Procedure

1. Set up the VNA for S11 Log Mag graph type Single Display.
2. Connect a short to Port 1 of the VNA.
3. Observe if there is any abnormality in the S11 trace (e.g. power roll off in the low frequency band, power drop off in the entire low band or high band, and etc.).
4. If no abnormalities are observed, then the switches are working properly for Port 1.
5. Change the VNA display for S22.
6. Disconnect the Short from Port 1 and connect it to Port 2 of the VNA.
7. Observe if there is any abnormality in the S22 trace (e.g. power roll off in the low frequency band, power drop off in the entire low band or high band, and etc.).
8. If no abnormalities are observed, then the switches are working properly for Port 2.
9. If abnormalities are observed, determine if the fault is in the Source Channel RF switch or b Channel RF switch by do the following:
    a. Change the VNA display for S31.
    b. Connect a through cable between Port 1 and Port 3.
    c. Observe if the same abnormality appears on S31 trace.
    d. If yes, check the control cable connection to the respective b Channel RF Switch, replace the High Band SPDT Switch Control PCB (if applicable), and then replace the respective b Channel RF Switch.
        - For example, if abnormality is shown below 2.5 GHz, replace the b Channel Low Band Switch.
    e. If no, check the control cable connection to the respective Source Channel RF Switch, replace the High Band SPDT Switch Control PCB (if applicable), and then replace the respective Source Channel RF Switch.
10. Repeat Step 1 through Step 9 for Port 3 and Port 4 of the test set. Set the VNA display for S33, S44 and then S13 for the tests.

4-6 Troubleshooting – Directivity and Test Port Match Failure

This section provides the test procedures to isolate the cause of failure when the test set fails either the directivity and test port match tests. Refer to Section 3-2 “Directivity and Test Port Match Verification” on page 3-2 above for VNA setup information.

Equipment Required for VNA System with MN4694C

- Calibration Kit, K Connector, Anritsu Model 3652A
- Phase Equal Adapter, K(m) to K(f) Anritsu Model 33KKF50B (Qty 2)
- Air Line, K Connector, Anritsu Model T2023-2
- 20 dB Offset Termination, K(f) Connector, Anritsu Model SC4808

Equipment Required for VNA System with MN4697C

- Calibration Kit, V Connector, Anritsu Model 3654D
- Phase Equal Adapter, V(m) to V(f) Anritsu Model 33VVF50C (Qty 2)
- Air Line, V Connector, Anritsu Model T2025-2
- 20 dB Offset Termination, V(f) Connector, Anritsu Model SC5727

Directivity Failure Troubleshooting Procedure

1. Use a different Termination from the Calibration Kit to perform an One Port Cal on Port 1 of the VectorStar Multiport VNA System.
2. Verify if the system passes the directivity test.
3. If the system passes, the cause of the failure is caused by a defective termination in the Calibration Kit.
4. If the system fails, do the following:
    a. Separate the test set from the 2-port VectorStar VNA.
    b. Re-install the front panel and rear panel loop cables to the VectorStar VNA.
    c. Perform an One Port Cal on Port 1 of the VectorStar VNA.
    d. Verify that directivity of 2-port VNA configuration are the same as those of 4-port VNA configuration.
    e. If yes, the failure is caused by the termination in the calibration kit.
    f. If no, replace the respective b Channel RF Switch (Low Band Switch or High Band SPDT Switch, depending on frequencies that the failure occurs).

Test Port Match Failure Troubleshooting Procedure

1. Separate the test set from the 2-Port VectorStar VNA.
2. Re-install the front panel and rear panel loop cables to the VectorStar VNA.
3. Perform an One Port Cal on Port 1 of the VectorStar VNA.
4. Verify that test port match of 2-port VNA configuration are the same as those of 4-port VNA configuration.
5. If yes, the failure is caused by the Open and Short in calibration kit.
6. If no, do the following:
    a. Replace the Diplexer.
    b. Replace the respective Source Channel RF Switch.

Chapter 5 — Component Replacement

5-1 Introduction

This chapter provides procedures for removing and installing replaceable components and sub-assemblies in the MN469xC Series Multiport Test Set.

5-2 Equipment Required

All procedures require the use of the following tools:

- Either a #1 or #2 size Phillips screwdriver
- 5/16 inch open end wrench
- Anritsu 01-201 (8 lbf·in) 5/16 inch torque wrench.

Caution	Always use a torque wrench calibrated to 8 lbf·in when tightening the RF connectors on semi-rigid RF cables. Over-torquing will cause damage to the RF connectors.

Some procedures require the use of the following tools:

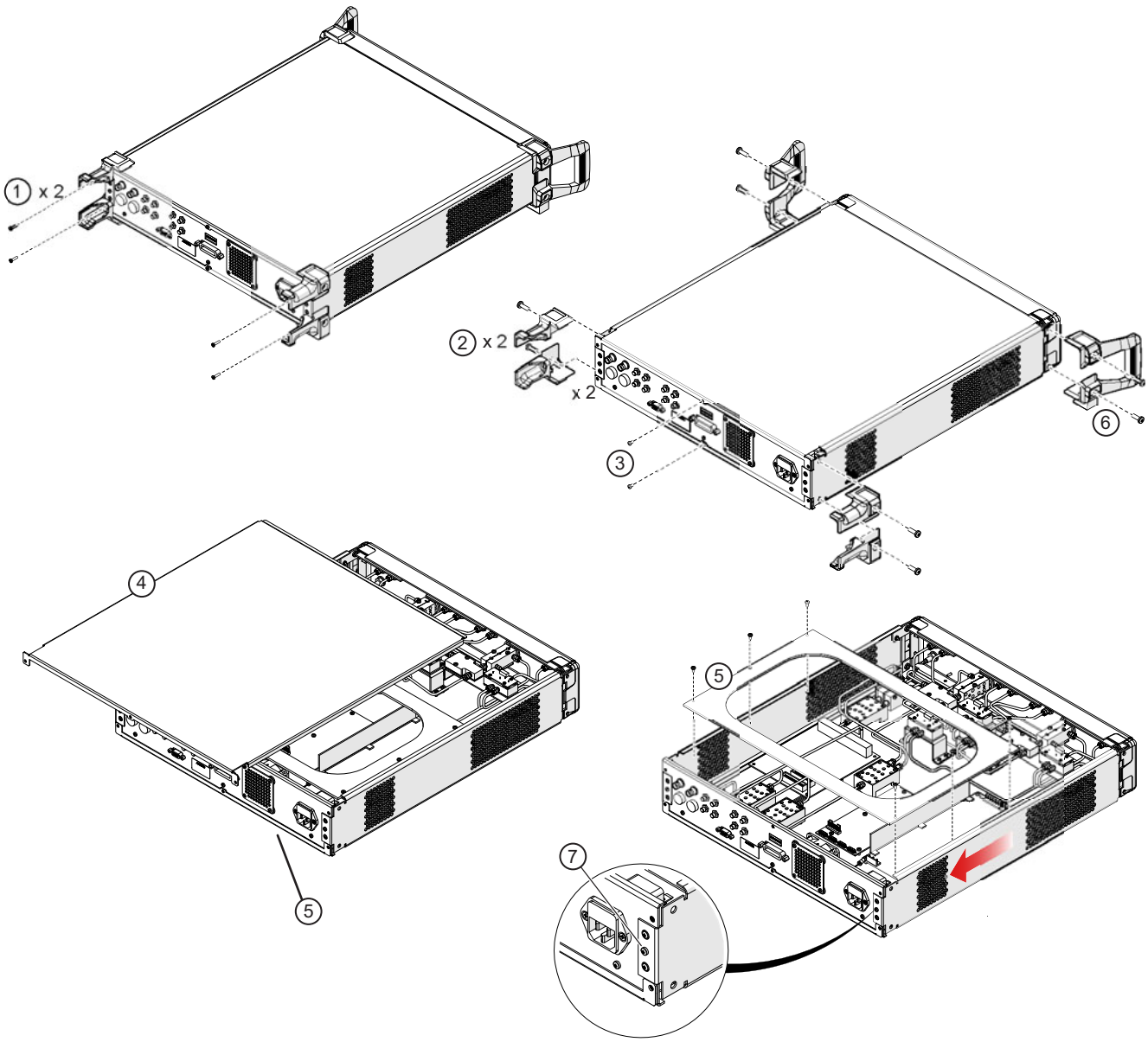
- Small jewelers Phillips screwdriver
- Right angle (offset) #1 size Phillips screwdriver
- Right angle (offset) 5/16 inch open end wrench (for loosening RF connectors inside the front panel)
- Adjustable wrench, 4 inch length, 9/16 inch Jaw Opening
- 36 lbf·in Torque Wrench with 1/2" Open End Head – Mountz MTBN10 with 1/2" Open End Head or equivalent.
- 15 lbf·in Torque Wrench with 13/16" Socket – Craftsman 009-44594 with 13/16" deep socket on 3/8" drive or equivalent

5-3 Removing the Covers

1. Switch the VectorStar VNA and the MN469xC Test Set power off and remove the power cords.
2. Remove the MN469xC Test Set from the VectorStar VNA by disconnecting all cable connections and separating the test set from the VectorStar VNA.
3. Remove covers as shown in Figure 5-1 on page 5-2.

Caution	Green-headed screws have metric threads. Be sure to retain all of the screws and reinstall them in their original location.

4. Installation is reverse of removal.



Removal Steps – Top, Bottom, or Side Covers

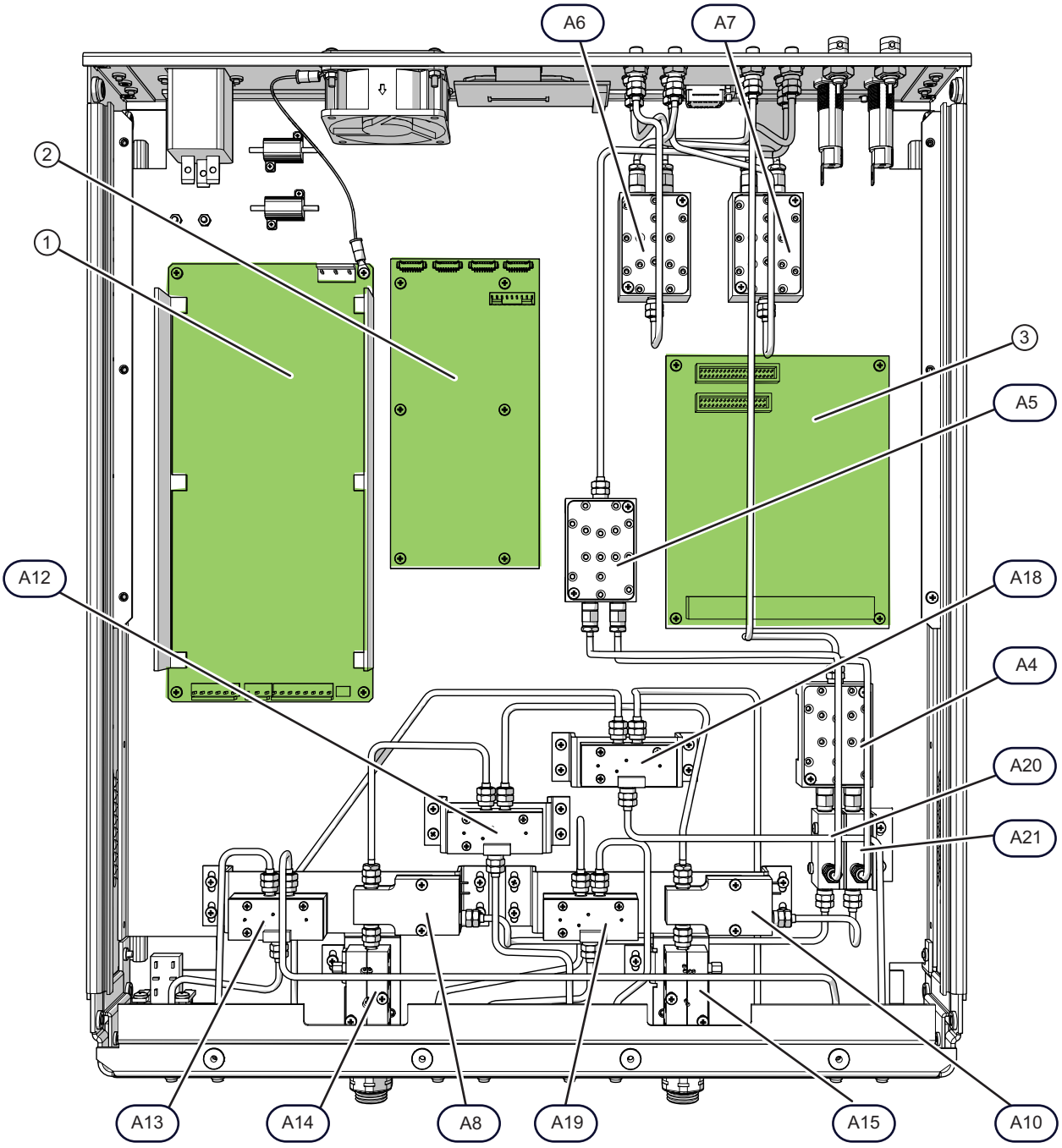
Figure 5-1. MN469xC Test Set Cover Removal (1 of 2)

1. Remove foot end screws – Upper for top cover removal – Lower for bottom cover removal 2. Remove foot side screws then left and right feet – Upper feet for top cover removal – Lower feet for bottom cover removal 3. Remove upper center screw for top cover removal. Remove lower center screw for bottom cover removal.	4. Lift and slide top (or bottom) cover toward rear of chassis 5. Remove stiffener plate. 6. Front handles are removed only if the front panel or side panels require removal. 7. To remove side a panel, remove the center screw from rear side panel flange then slide the side panel toward the rear and out.

Figure 5-1. MN469xC Test Set Cover Removal (2 of 2)

5-4 Location of Major Components and Sub-assemblies

Figure 5-2 below shows the location of major components and sub-assemblies in the MN469xC Series Multiport Test Set.



See Table 2-1, “Replaceable Parts List” on page 2-1 for identification of Engineering “A” Numbers.

Item	Description	Item	Description
1	Power Supply	A12	.04-70GHz SPDT SWITCH
2	Control Board	A13	.04-70GHz SPDT SWITCH
3	GPIB–Parallel Interface Board	A14	70GHz TEST COUPLER

Figure 5-2. Location of Major Components and Subassemblies (1 of 2)

A4	Low Band Switch	A15	70GHz TEST COUPLER
A5	Low Band Switch	A18	.04-70GHz SPDT SWITCH
A6	Low Band Switch	A19	.04-70GHz SPDT SWITCH
A7	Low Band Switch	A20	Low Band Bridge
A8	Diplexer/Bias-Tee, V Conn	A21	Low Band Bridge
A10	Diplexer/Bias-Tee, V Conn		

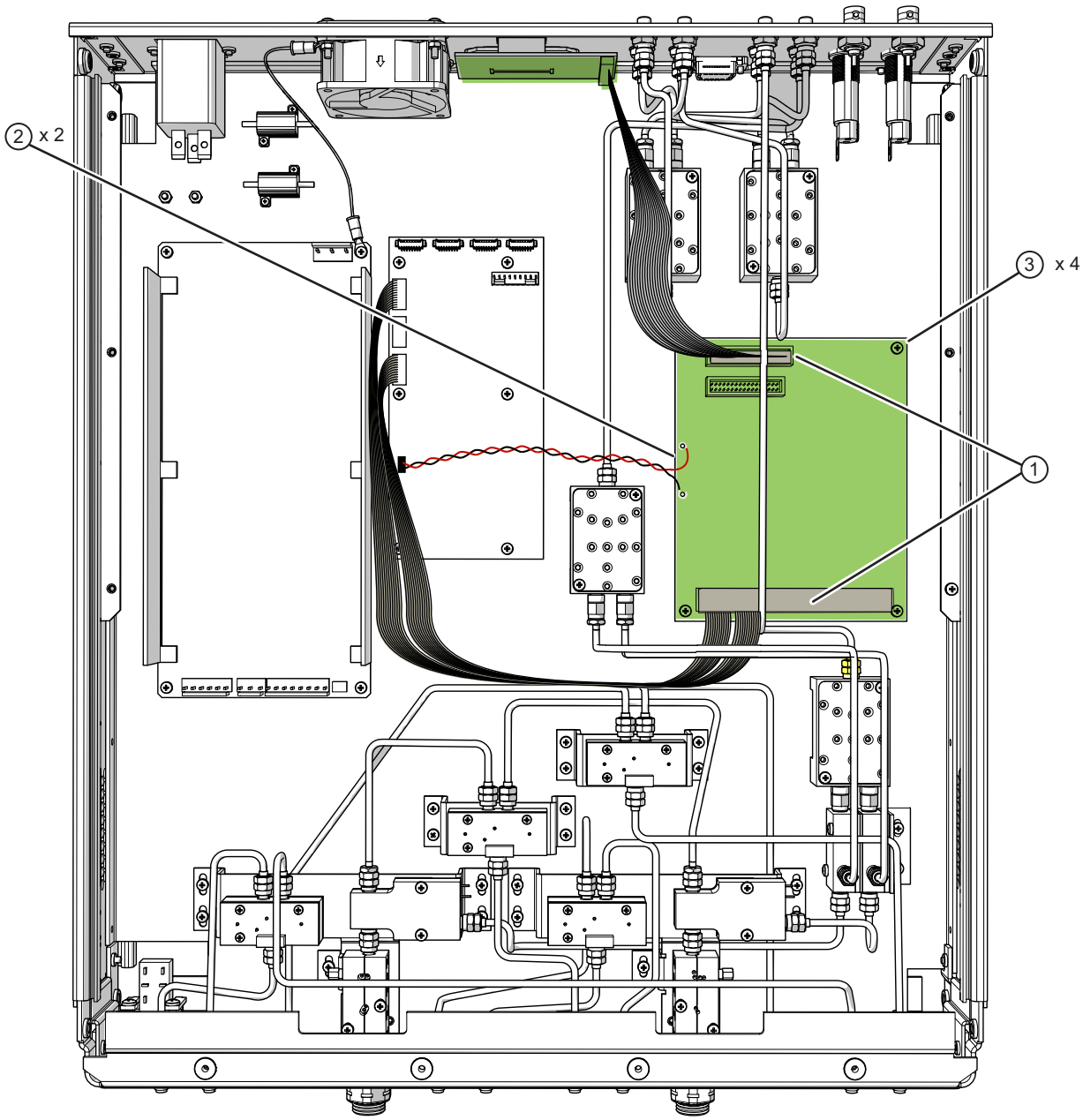
Figure 5-2. Location of Major Components and Subassemblies (2 of 2)

5-5 GPIB-Parallel Interface PCB Replacement – 2000-989

This section provides a procedure for removing and replacing the GPIB-Parallel Interface PCB Assembly in the test set.

1. Remove the top cover from the test set. Refer to Section 5-3 “Removing the Covers” on page 5-2.

2. Remove the board as illustrated Figure 5-3.



1. Disconnect the two cables from the connectors as shown in the illustration.
2. Un-solder (de-solder) the black and red power wires on the left side of the PCB.
3. Remove the four mounting screws.
4. Slightly lift and slide the PCB board toward chassis center and then lift it away from the chassis.
5. Installation is reverse of the removal procedure.

Figure 5-3. GPIB-Parallel Interface PCB Removal Steps

5-6 Rear GPIB Connector PCB Replacement – 2000-989

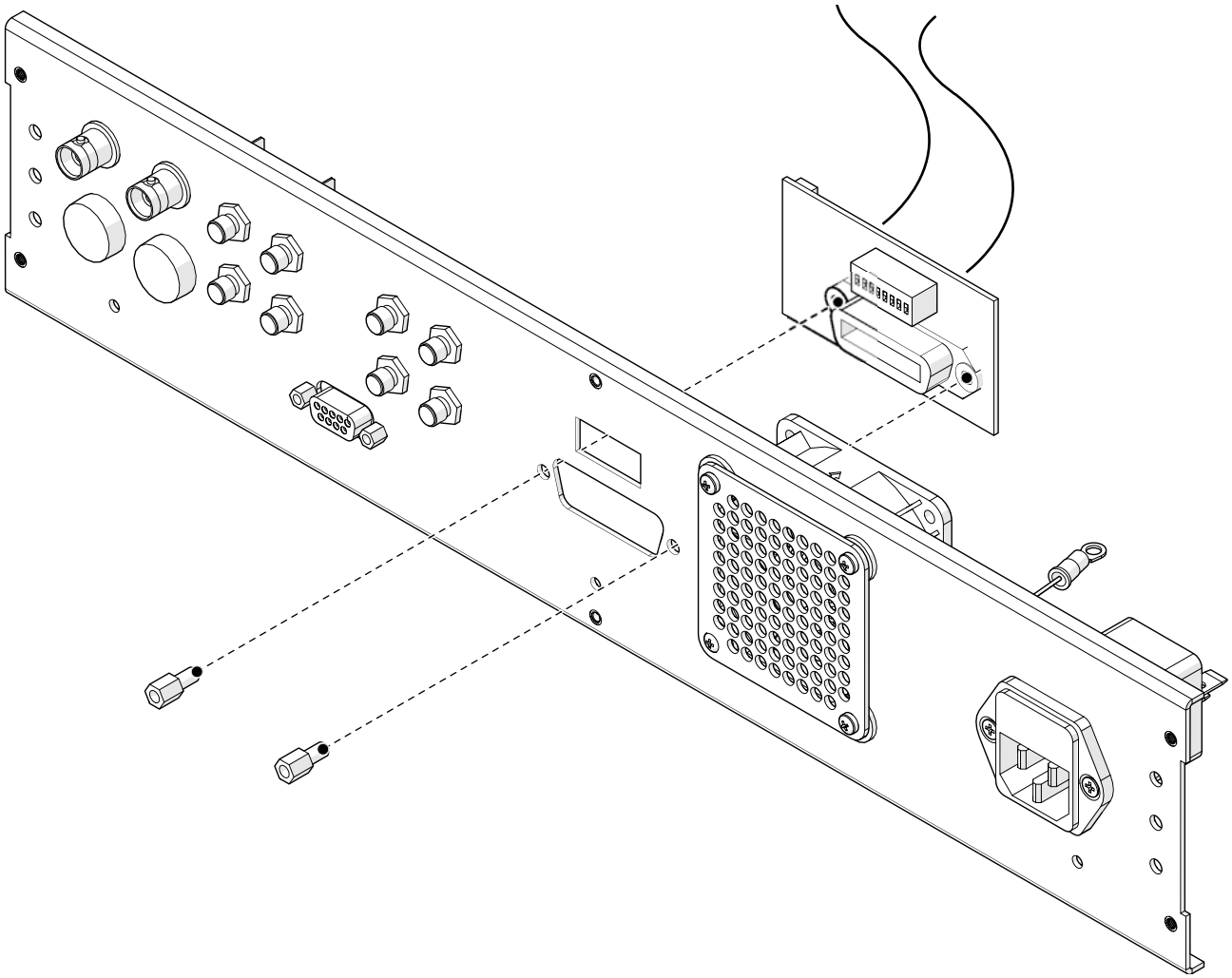
This section provides a procedure for removing and replacing the Rear Panel GPIB Connector PCB in the test set.

Note	The Rear Panel GPIB Connector PCB Assembly is a part of the GPIB-Parallel Interface PCB Assembly Replacement Kit, part number 2000-989.

1. Remove the top cover from the test set. Refer to Section 5-3 “Removing the Covers” on page 5-2.

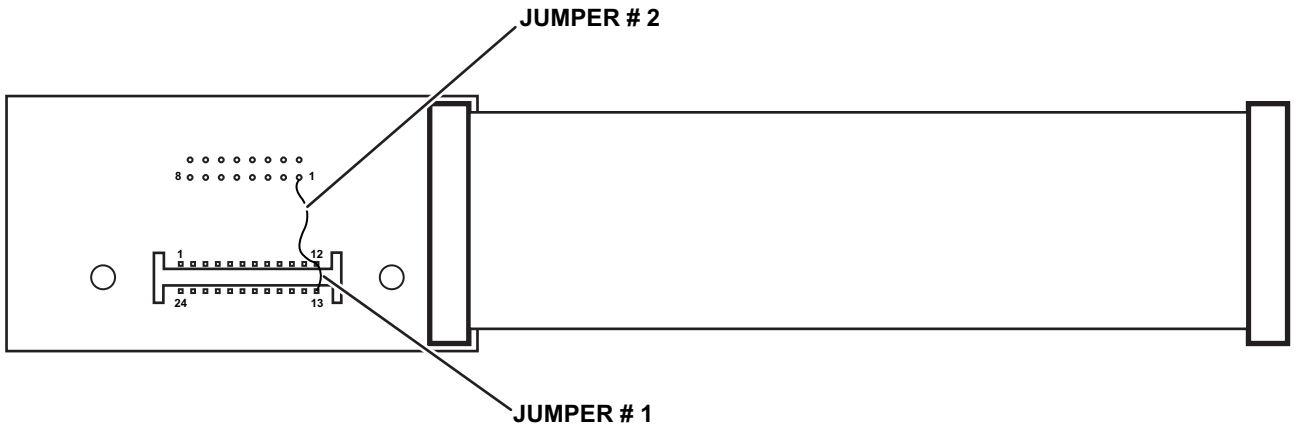
2. Remove the board as illustrated in Figure 5-4.

Note	Ensure that the two jumper wires are installed as shown in Figure 5-5 on page 5-8.



1. Disconnect the ribbon cable from the GPIB-Parallel Interface PCB Assembly. Refer to Figure 5-3.
2. Use an adjustable spanner wrench to un-screw the two hex nuts from the rear panel.
3. Remove the GPIB Connector PCB Assembly from the rear panel. Refer to Figure 5-4.
4. To replace the GPIB Connector PCB Assembly, reverse the order of the removal procedure.

Figure 5-4. GPIB Connector PCB Assembly Removal



1. Jumper # 1 goes from pin 12 of the GPIB connector to pin 13 of the GPIB connector.
2. Jumper # 2 goes from pin 12 of the GPIB connector to pin 1 of the Dip Switch connector

Figure 5-5. Back side of GPIB Connector PCB Assembly

5-7 Control PCB Assembly Replacement – ND70927

This section provides a procedure for removing and replacing the 4-Port Test Set Control PCB in the test set.

1. Remove the top cover from the test set. Refer to Section 5-3 “Removing the Covers” on page 5-2.

2. Remove the board as illustrated in Figure 5-6.

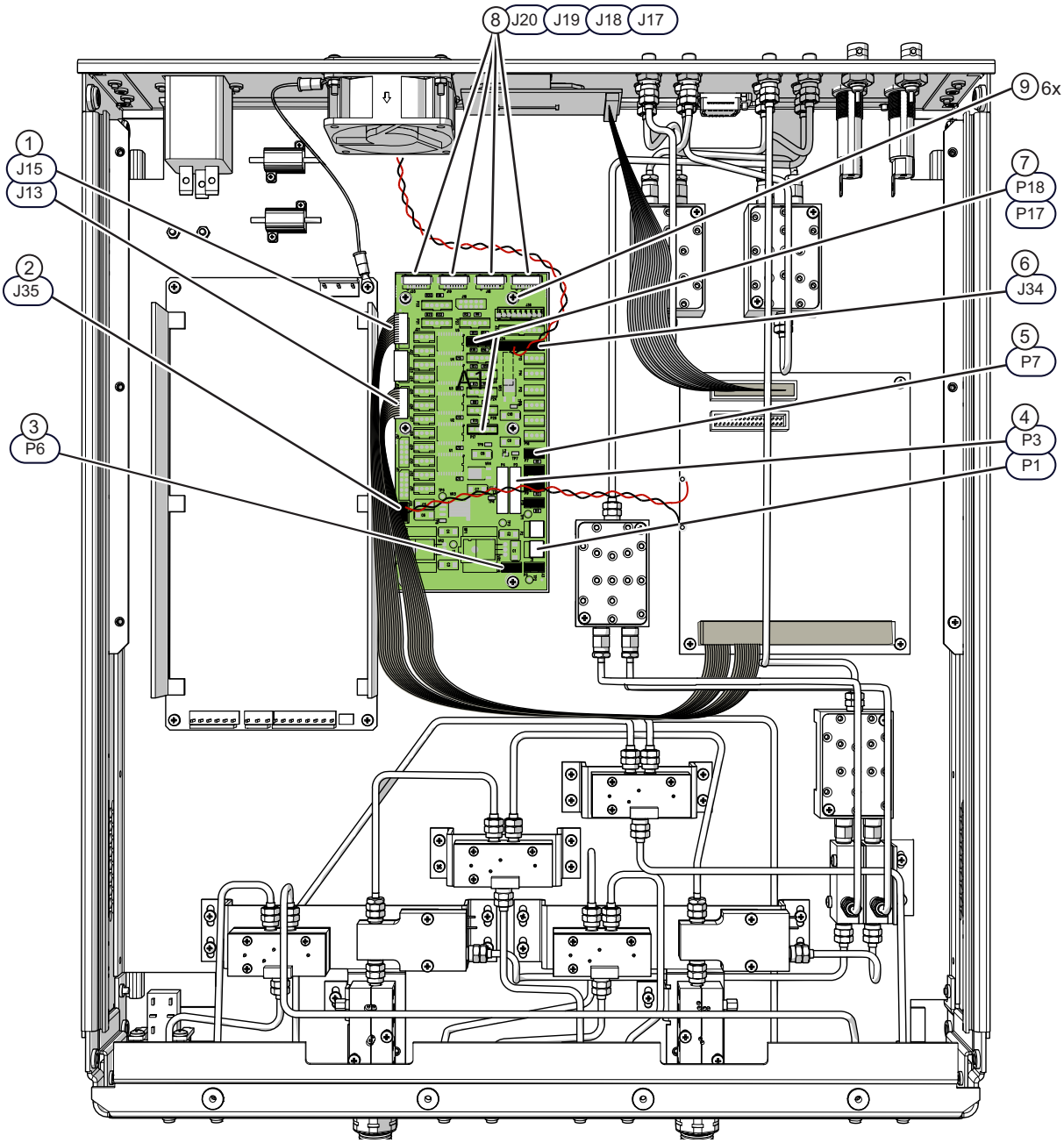


Figure 5-6. Test Set Control PCB Assembly Replacement (1 of 2)

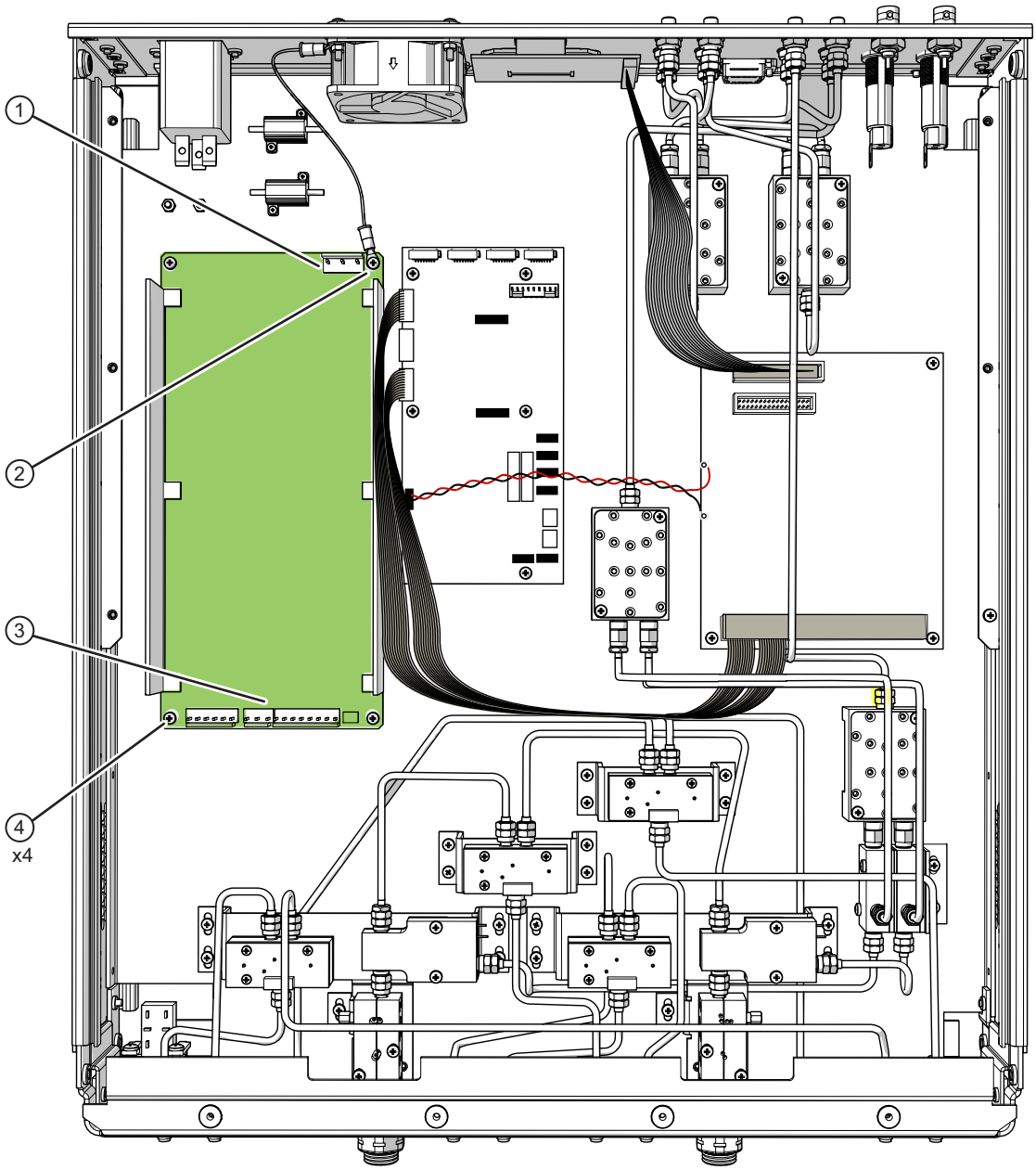
1. Disconnect the two GPIB PCB ribbon cables from J13 and J15.
2. Disconnect the GPIB PCB power cable from J35.
3. Disconnect the Power Supply Load cable from P6.
4. Disconnect the Power Supply cables from P1 and P3.
5. Disconnect the Front Panel Power Indicator LED cable from P7.
6. Disconnect the Fan Power cable from J34.
7. Disconnect the Front Panel Port Indicator LED cables from P17 and P18.
8. Disconnect the four switch control cables from J17, J18, J19 and J20.
9. Remove the six mounting screws from the PCB.
10. Lift the Control PCB away from the test set chassis.
11. Assembly is reverse of the removal procedure.

Figure 5-6. Test Set Control PCB Assembly Replacement (2 of 2)

5-8 Power Supply Replacement – 3-40-183

1. Remove the top cover and left cover from the test set. Refer to Section 5-3.

2. Remove the board as illustrated in Figure 5-7.



1. At the rear of the power supply, disconnect the 3 Pin Connector which connects to the rear panel AC input module.
2. Disconnect the ground wire from the power supply.
3. At the front of the power supply, disconnect the Power Supply Output Cable Harness – ND73168 – 71918.
4. Remove the four mounting screws from the power supply.
5. Lift the power supply from the chassis.
6. Assembly is reverse of the removal procedure.

Figure 5-7. Power Supply Replacement

5-9 Low Band Switch – ND70079 – A4, A5, A6, A7

This section provides procedures for removing and replacing each Low Band Switch in the test set. There are four Low Band Switches, A4, A5, A6 and A7. In Figure 5-2 on page 5-4 above, refer to the A4, A5, A6, and A7 engineering references. The replacement procedures for each module vary slightly.

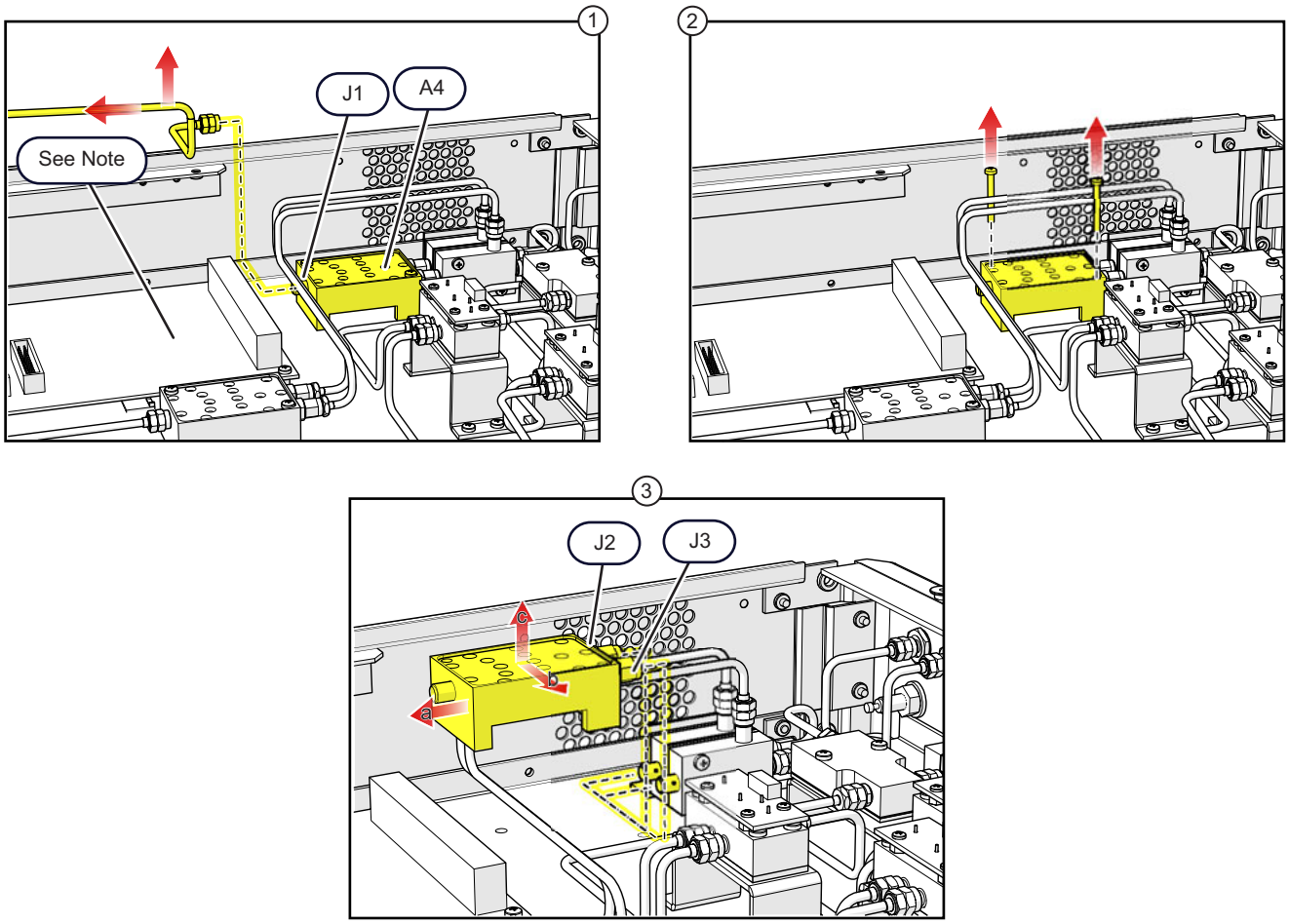
A4 Replacement

1. Remove the top cover from the test set.

- Refer to Section 5-3.

2. Replace the A4 module as illustrated in Figure 5-8.

Note	Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.



1. Disconnect the RF cable from the J1 connector of the A4 module and the Rear Panel.

   Note: The GPIB–Parallel Interface Board may have to be removed in order to remove the A4 RF cable. See Section 5-5 for GPIB board removal.

2. Remove the two phillips mounting screws from the module.
3. Disconnect the two connectors from J2 and J3 connectors, then disconnect the control cable from the module side and remove the module.
4. Installation is the reverse of removal.

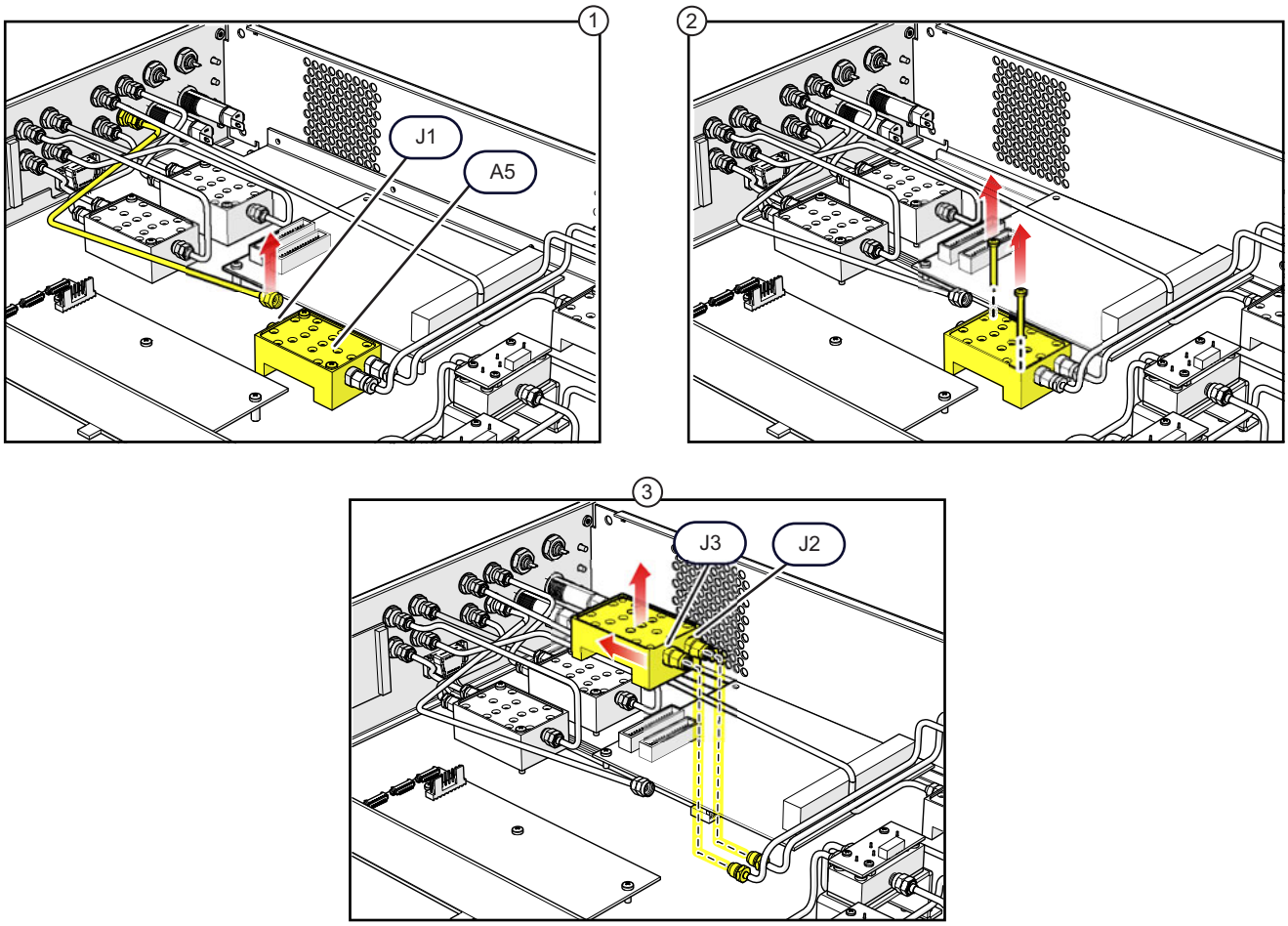
Figure 5-8. A4 Low Band Switch Replacement

A5 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the A5 module as illustrated in Figure 5-9.

Note	Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.



1. Disconnect the RF cable from the J1 connector of the A5 module and carefully lift it out of the way. 2. Remove the two phillips mounting screws from the module.	3. Disconnect the two connectors from J2 and J3 connectors, then disconnect the control cable from the module side and remove the module. 4. Installation is the reverse of removal.

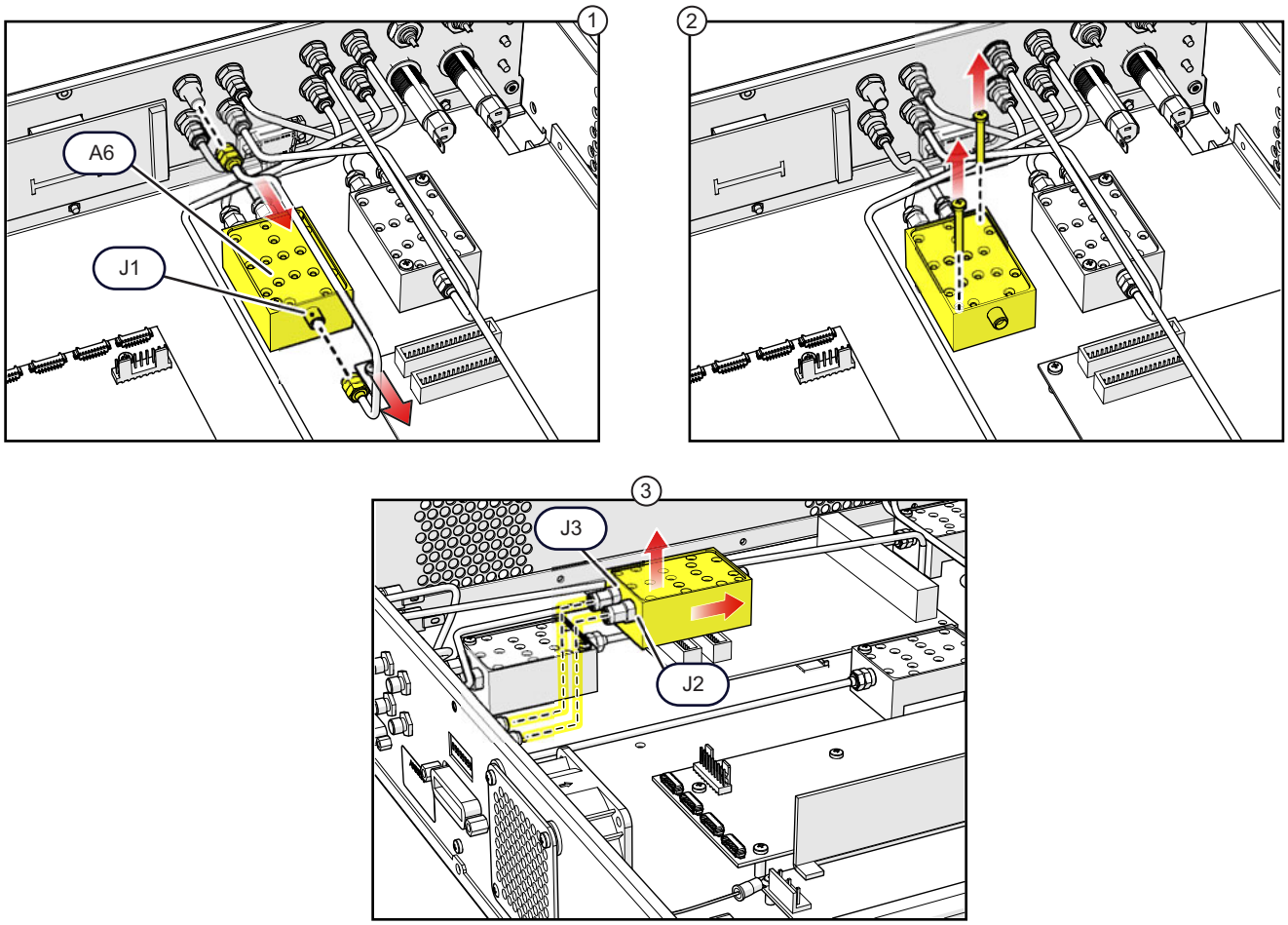
Figure 5-9. A5 Low Band Switch Replacement

A6 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the A6 module as illustrated in Figure 5-10.

Note	Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.



1. Disconnect the RF cable from the J1 connector of the A6 module and the Rear Panel.
2. Remove the two phillips mounting screws from the Module.
3. Disconnect the two RF cables from J2 and J3 connectors, then disconnect the control cable from the module side and remove the module.
4. Installation is the reverse of removal.

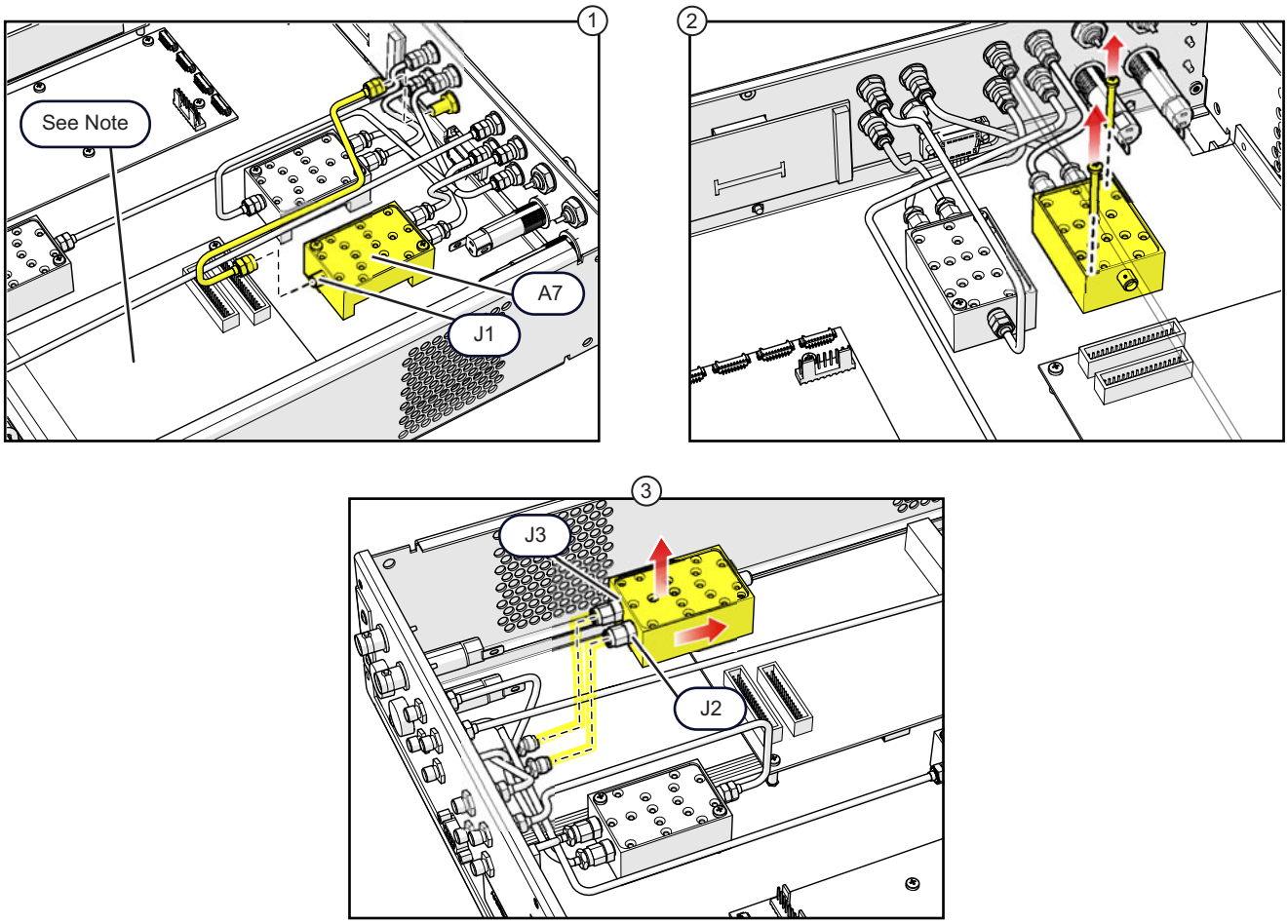
Figure 5-10. A6 Low Band Switch Replacement

A7 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the A7 module as illustrated in Figure 5-11.

Note	Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.



1. Disconnect the RF cable from the J1 connector of the A7 module and the Rear Panel.

   Note: The GPIB–Parallel Interface Board may have to be removed in order to remove the A7 RF cable. See Section 5-5 for GPIB board removal.

2. Remove the two phillips mounting screws from the module.
3. Disconnect the two RF cables from J2 and J3 connectors, then disconnect the control cable from the module side and remove the module.
4. Installation is the reverse of removal.

Figure 5-11. A7 Low Band Switch Replacement

5-10 Low Band Bridge – ND70078 – A20, A21

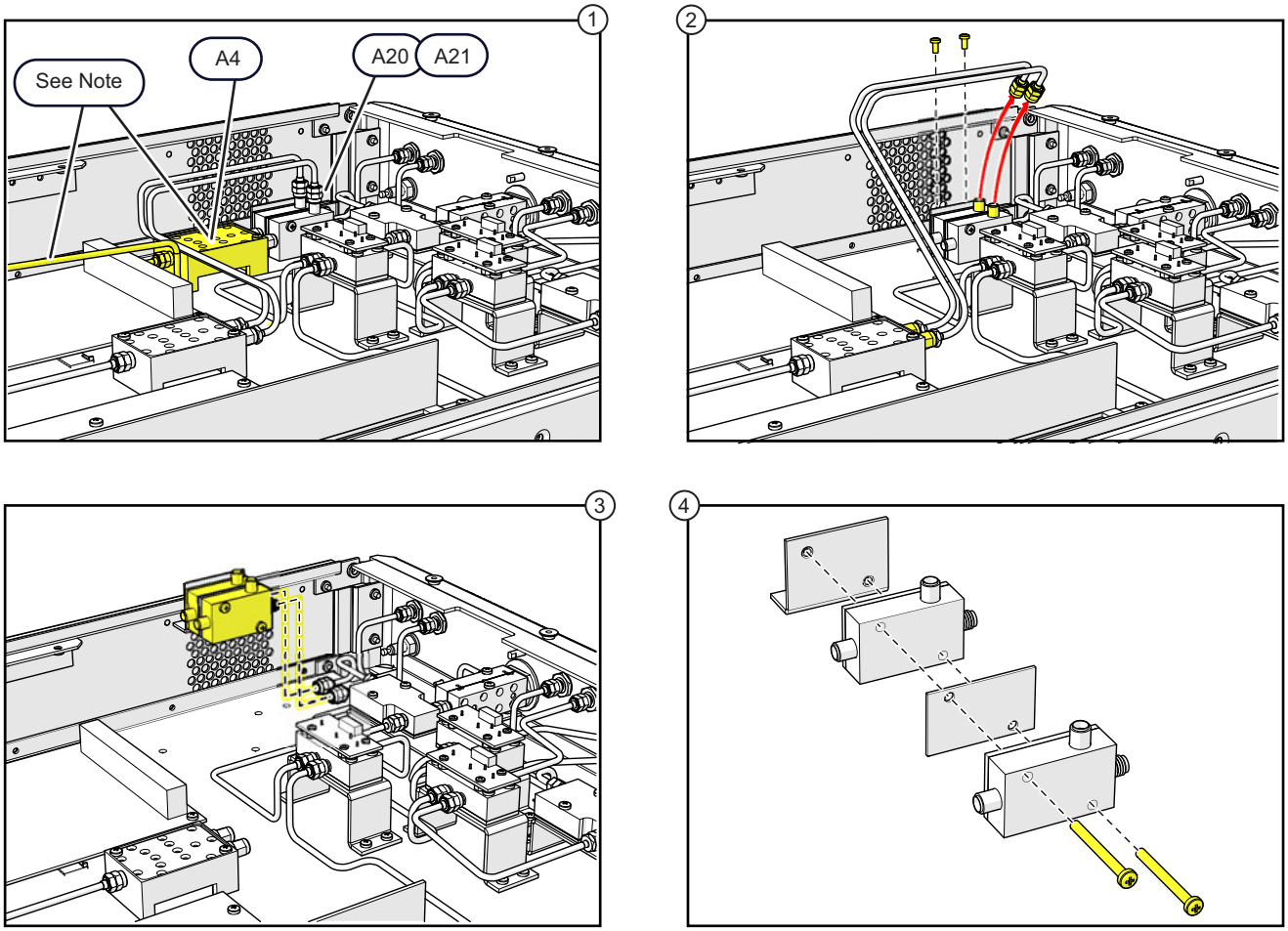
This section provides a procedure for removing and replacing the Low Band Bridges in the test set. There are two Low Band Bridges, A20 and A21. Refer to Figure 5-2 on page 5-4 for physical location on the chassis.

A20, A21 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the A20 or A21 module as illustrated in Figure 5-12.

Note	Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.



1. Remove the A4 low band switch. See "A4 Replacement" on page 5-12. See Section 5-5 for GPIB board removal.
2. Disconnect the two RF cables from the JB connector on each bridge and rotate them out of the way, then remove the two bracket mounting screws. (The JB connector is the one facing upward).
3. Remove the A20/A21 assembly
4. Remove and replace the A20 or A21 module as shown.
5. Installation is the reverse of removal.

Figure 5-12. A20/A21 Low Band Bridge Replacement

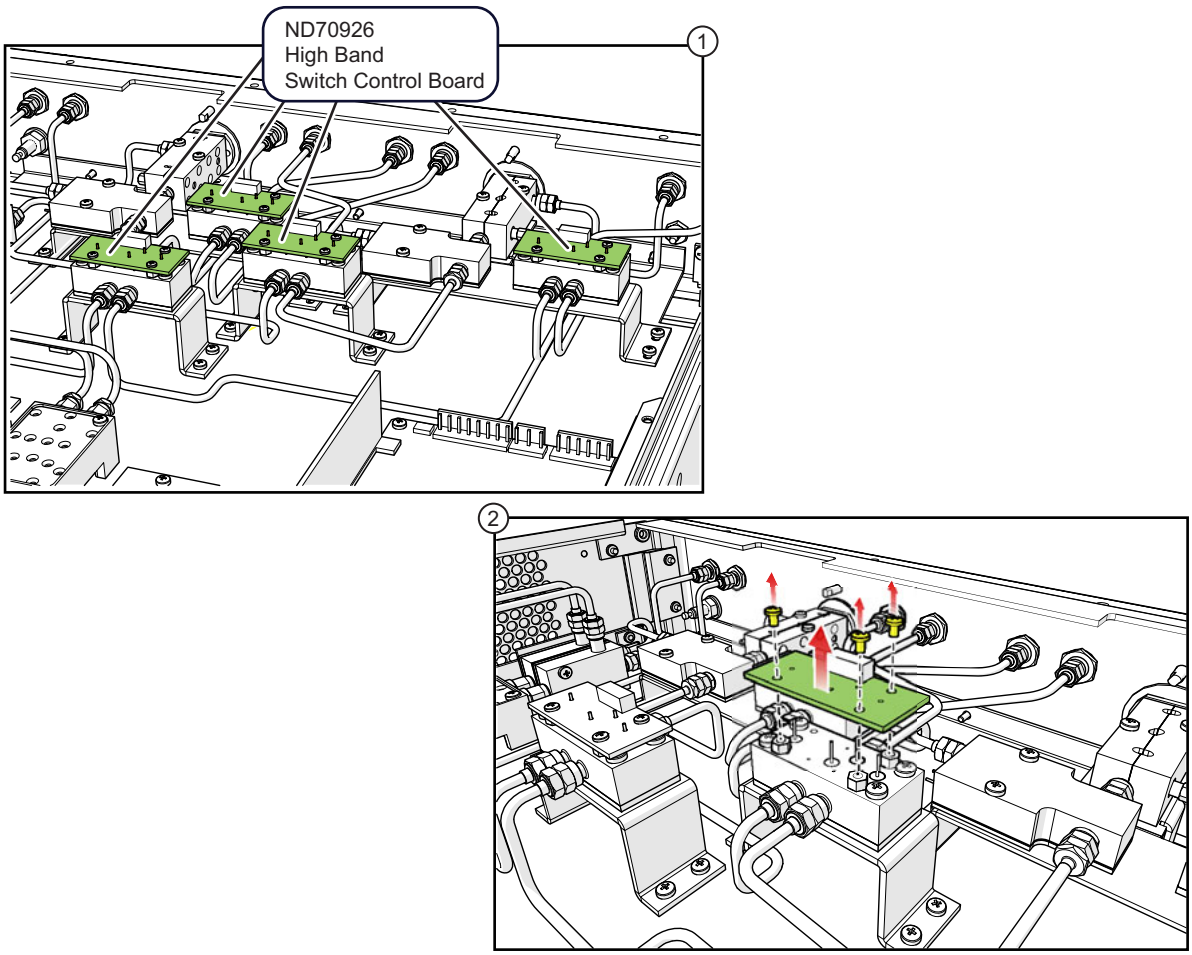
5-11 High Band SPDT Switch Control PCB Assembly – ND70926

This section provides a procedure for removing and replacing the High Band SPDT Switch Control PCB Assembly. The Switch Control PCB Assembly is mounted on top of the High Band SPDT Switch Assemblies A12, A13, A18, and A19; Parts 70241 or 70242.

A12, A13, A18 or A19 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.
2. Replace the Switch Control PCB as illustrated in Figure 5-13.

Caution	Do not force the Control PCB onto the Switch Assembly. The Control PCB must be in good alignment with the Switch contact pins.



1. High Band Switch Control Board locations
2. Control Board Removal:

   Disconnect the switch control cable from the High Band SPDT Switch Control PCB Assembly.

   Remove the three mounting screws from the Switch Control PCB. (Save the screws and washers).

   Unplug the Switch Control PCB from the High Band SPDT Switch.
3. Installation is the reverse of removal.

Figure 5-13. High Band SPDT Switch Control PCB Assembly,

5-12 High Band SPDT Switch Assembly – 70241/ 70242

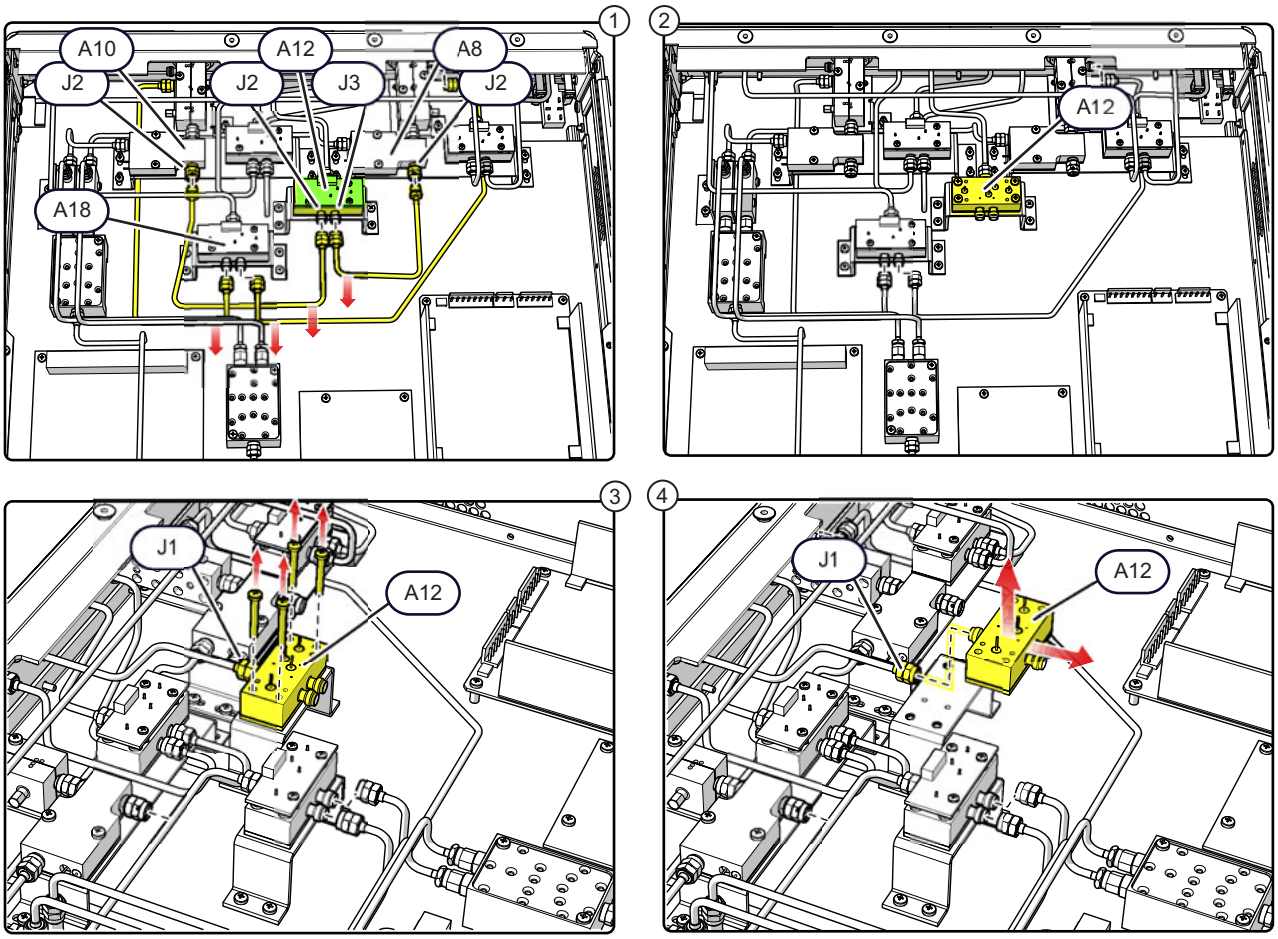
This section provides a procedure for removing and replacing the High Band SPDT Switch Assembly, A12, A13, A18 and A19. Refer to Figure 5-2 on page 5-4 for module locations.

A12 Replacement

Note	Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the Switch Assembly as illustrated in Figure 5-14.



1. Disconnect the RF cables connected at J2 and J3 of the A18 assembly to provide clearance and then perform the following:

   Disconnect and remove the RF cable between J2 of A12 and J2 of A10.

   Disconnect and remove the RF cable between J3 of A12 and J2 of A8.

2. Remove the Switch Control Board from A12 per the procedure in Section 5-11, and then remove the three (3) support standoffs.
3. Remove the four A12 switch mounting screws from the bracket.
4. Disconnect the semirigid cable from J1 of the switch and remove the switch from the chassis.
5. Installation is the reverse of removal.

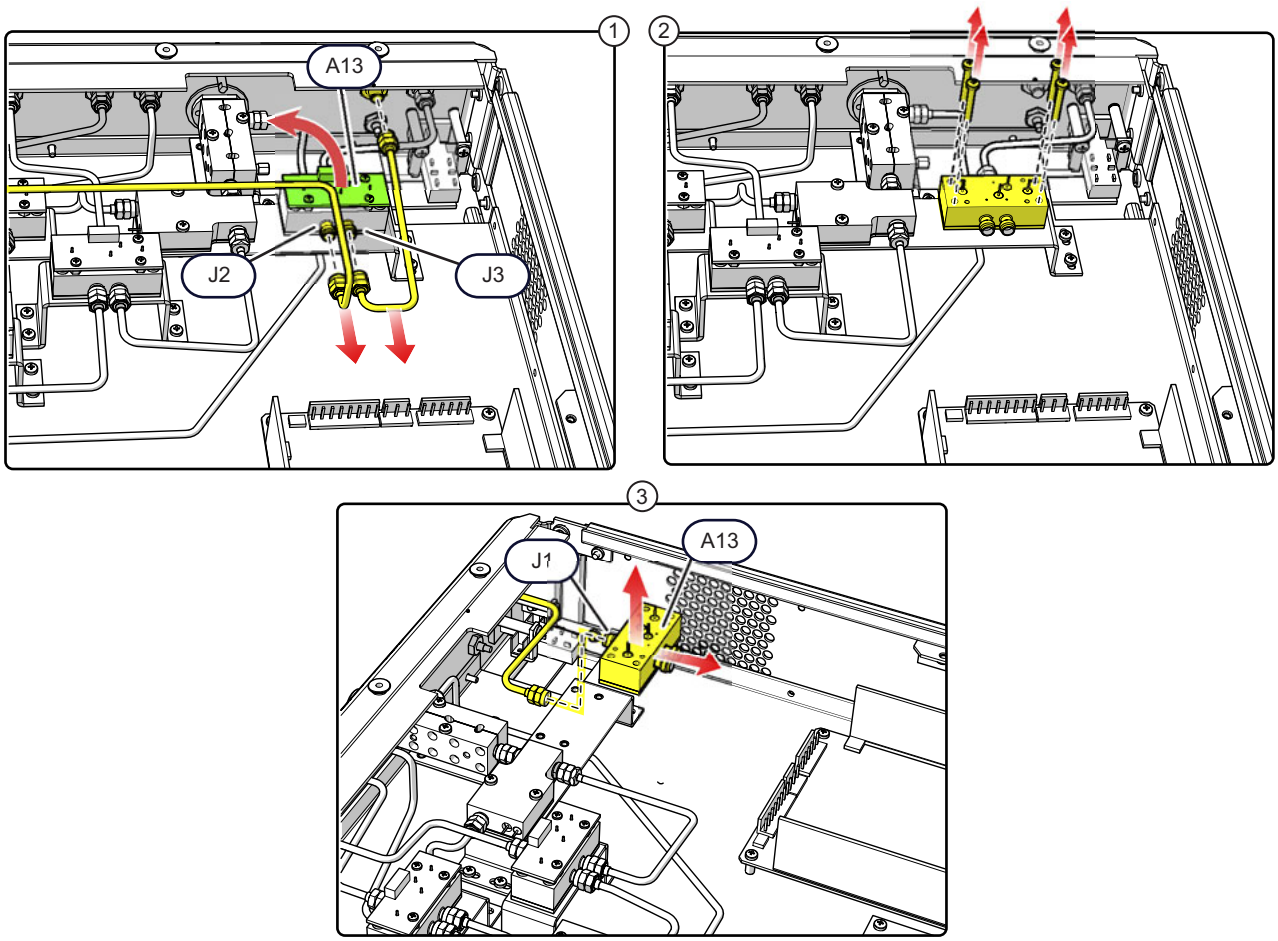
Figure 5-14. A12 High Band SPDT Switch Assembly

A13 Replacement

Note	For this procedure, a right angle wrench is required to loosen the RF cable connectors attached at the front panel. Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the A13 Switch Assembly as illustrated in Figure 5-15.



1. Remove the Switch Control Board and the 3 standoffs from the A12 switch per the procedure in Section 5-11, then disconnect and remove the RF cables between J2 and J3 of A13 and the front panel connector. Use a right angle wrench to loosen the connector attached at the front panel.
2. Remove the four A13 switch mounting screws from the bracket.
3. Disconnect the RF cable from J1 of A13 and lift the module out of the chassis.
4. Installation is the reverse of removal.

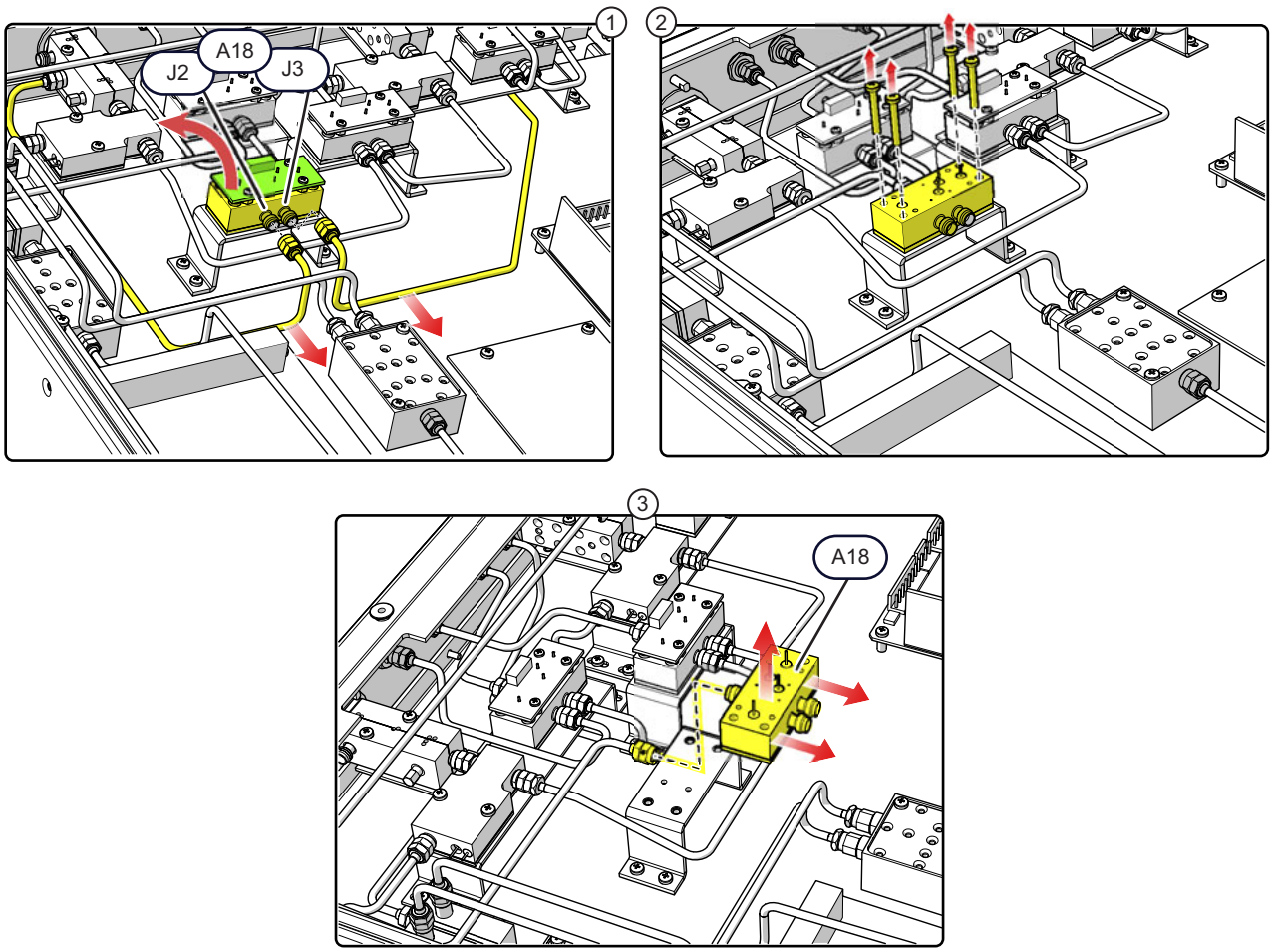
Figure 5-15. A13 High Band SPDT Switch Assembly

A18 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the Switch Assembly as illustrated in Figure 5-16 .

Note	Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.



1. Remove Switch Control Board and the 3 standoffs from the switch per the procedure in Section 5-11, then disconnect the cables from J2 and J3 of the switch and gently move them clear of the connectors.
2. Remove the four (4) switch mounting screws from the bracket.
3. Disconnect the semirigid cable from J1 of the switch and remove the switch from the chassis.
4. Installation is the reverse of removal.

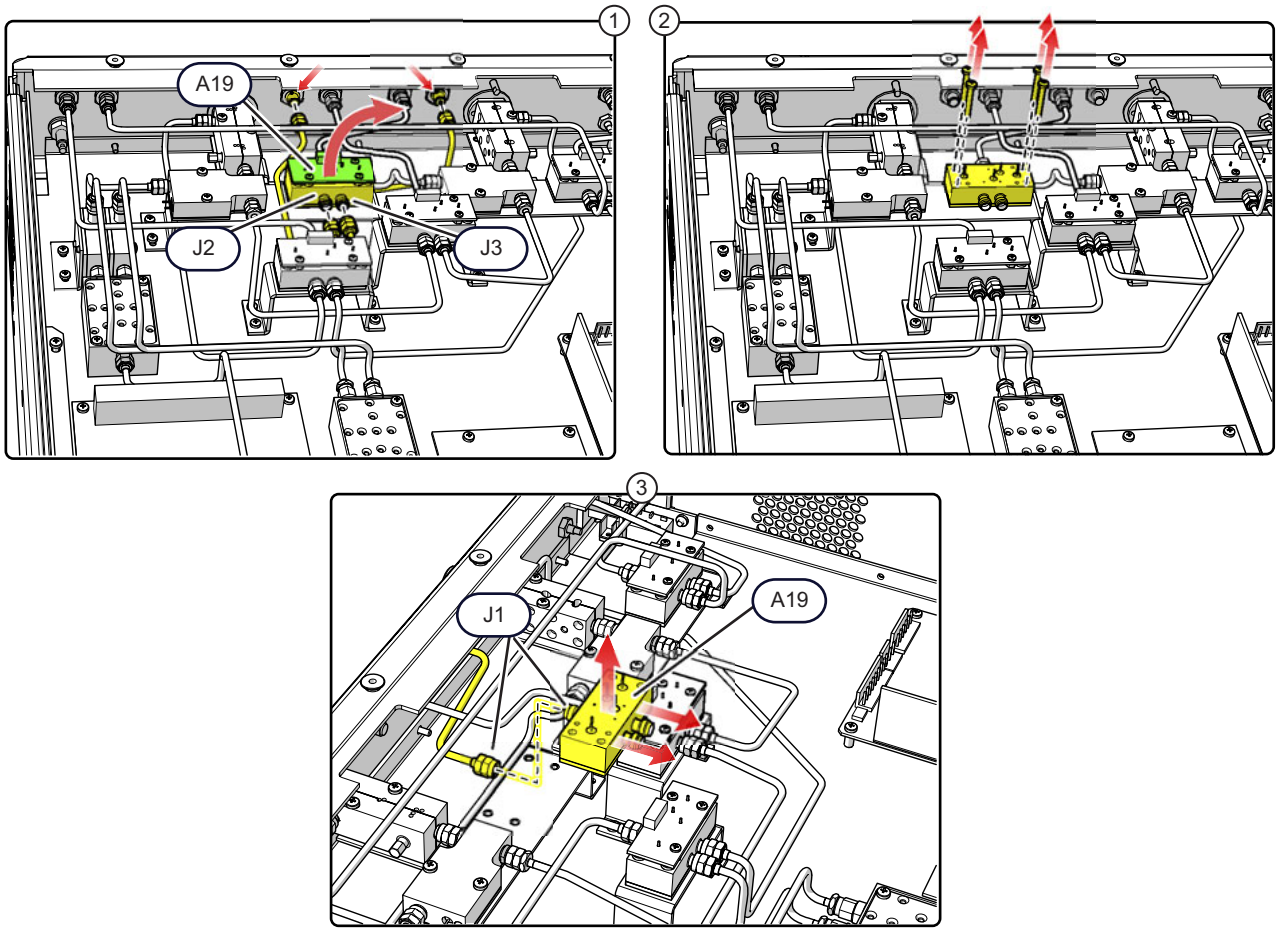
Figure 5-16. A18 High Band SPDT Switch Assembly

A19 Replacement

Note	For this procedure, a right angle wrench is required to loosen the RF cable connectors attached at the front panel. Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the Switch Assembly as illustrated in Figure 5-17.



1. Remove the Switch Control Board and the 3 standoffs from the A19 switch per the procedure in Section 5-11, then disconnect the RF cables from J2 and J3 of A19 and their respective front panel connectors. If needed, use a right angle wrench to loosen the connectors attached at the front panel.
2. Remove the four A13 switch mounting screws from the bracket.
3. Disconnect the RF cable at A13-J1 to remove the module.
4. Installation is the reverse of removal.

Figure 5-17. A19 High Band SPDT Switch Assembly

5-13 Diplexer Assembly – 74277 or 74278 – A8, A10

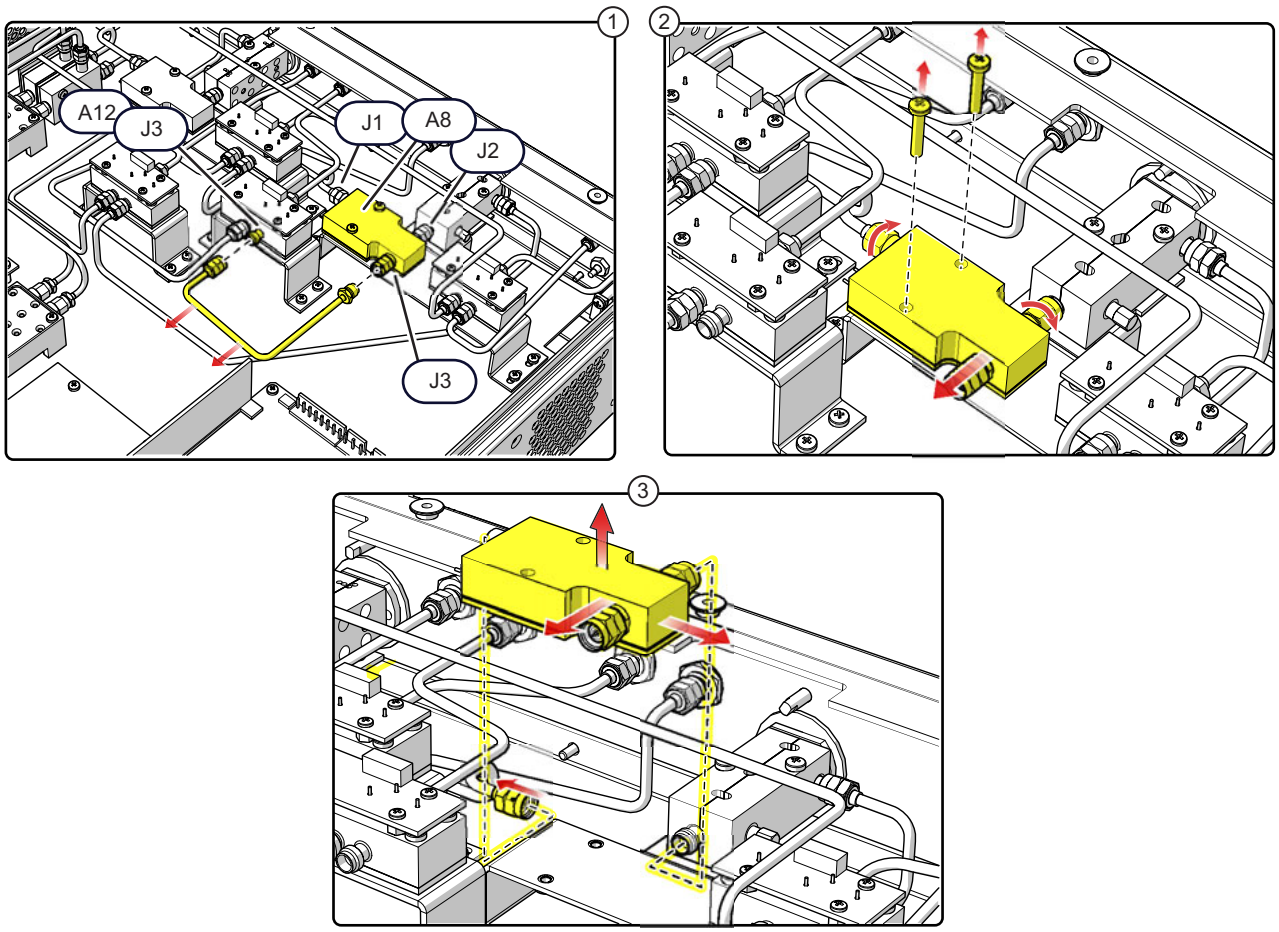
This section provides a procedure for removing and replacing the two Diplexer Assemblies A8, and A10. Refer to Figure 5-2, “Location of Major Components and Subassemblies” on page 5-4.

Note	The DC bias leads must be desoldered from the module prior to removal. Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.

A8 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the Diplexer Assembly as illustrated in Figure 5-19.



1. Remove the RF cable that connects between J3 of the Diplexer A8 and J3 of Switch A12.
2. Remove the four (4) A8 mounting screws, loo os en the J2 RF connector nut between A8 and A14, then gently pry the module away from A14 while loosening the RF cable nut at J1.
3. Desolder the DC Bias wires from A8 and then remove it from the chassis.
4. Installation is the reverse of removal.

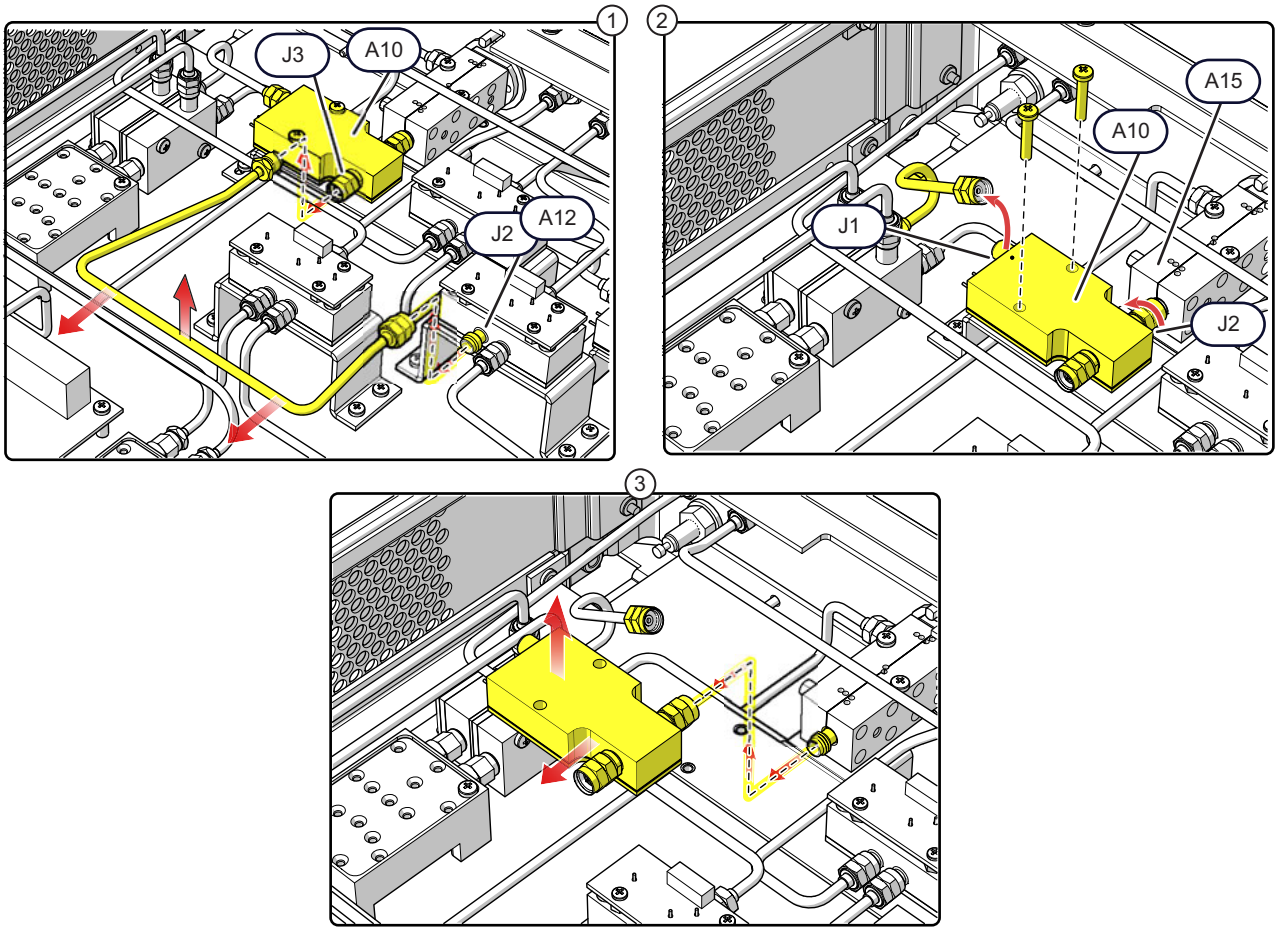
Figure 5-18. A8 Diplexer Assembly

A10 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

Note	The DC bias leads must be desoldered from the module prior to removal. Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.

2. Replace the Diplexer Assembly as illustrated in Figure 5-19.

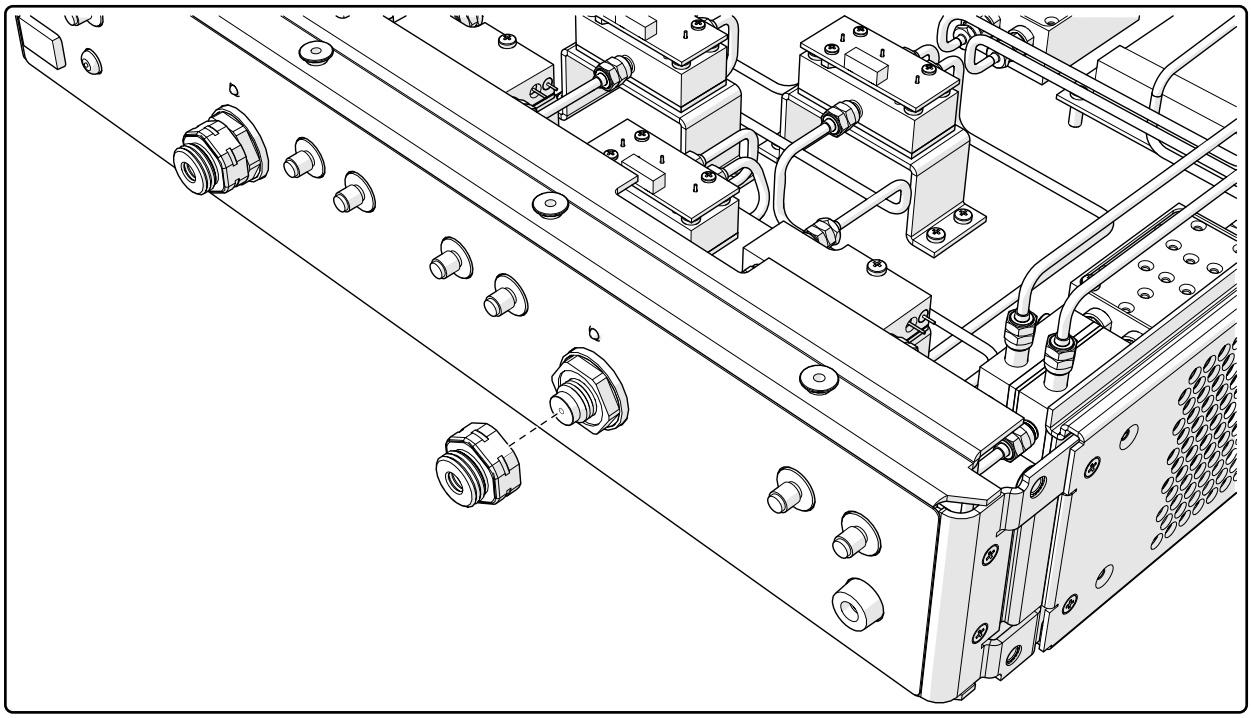


1. Disconnect and remove the RF cable that connects between J3 of the A10 Diplexer and J2 of A12 Switch.
2. Remove the four (4) A10 mounting screws. Disconnect J2 from the A15 module and, while applying lateral pressure to the module, disconnect the RF cable at A10-J1.
3. Desolder the DC Bias wires from the module and then remove it from the chassis.
4. Installation is the reverse of removal.

Figure 5-19. A10 Diplexer Assembly

5-14 Test Port Connector Replacement – 34YK50C or 34YV50C

This section provides instructions for removing and replacing the Test Port Connectors.



1. Loosen and remove the Test Port Connector using a 1/2” torque wrench.
2. Carefully screw the new Test Port Connector onto the threaded coupler shaft, making sure that the connector center pin is correctly aligned.
3. After tightening to finger tight, Torque the Test Port Connector using a 1/2” torque wrench set to 36 lbf·in.

Figure 5-20. A15 Port Coupler Assembly

5-15 Port Coupler – 66245 or 66480 – A14, A15

This section provides instructions for replacing the Port Coupler in the test set. There are two Port Couplers, A14 and A15, installed in the test set. Refer to Figure 5-2 on page 5-4 for physical locations.

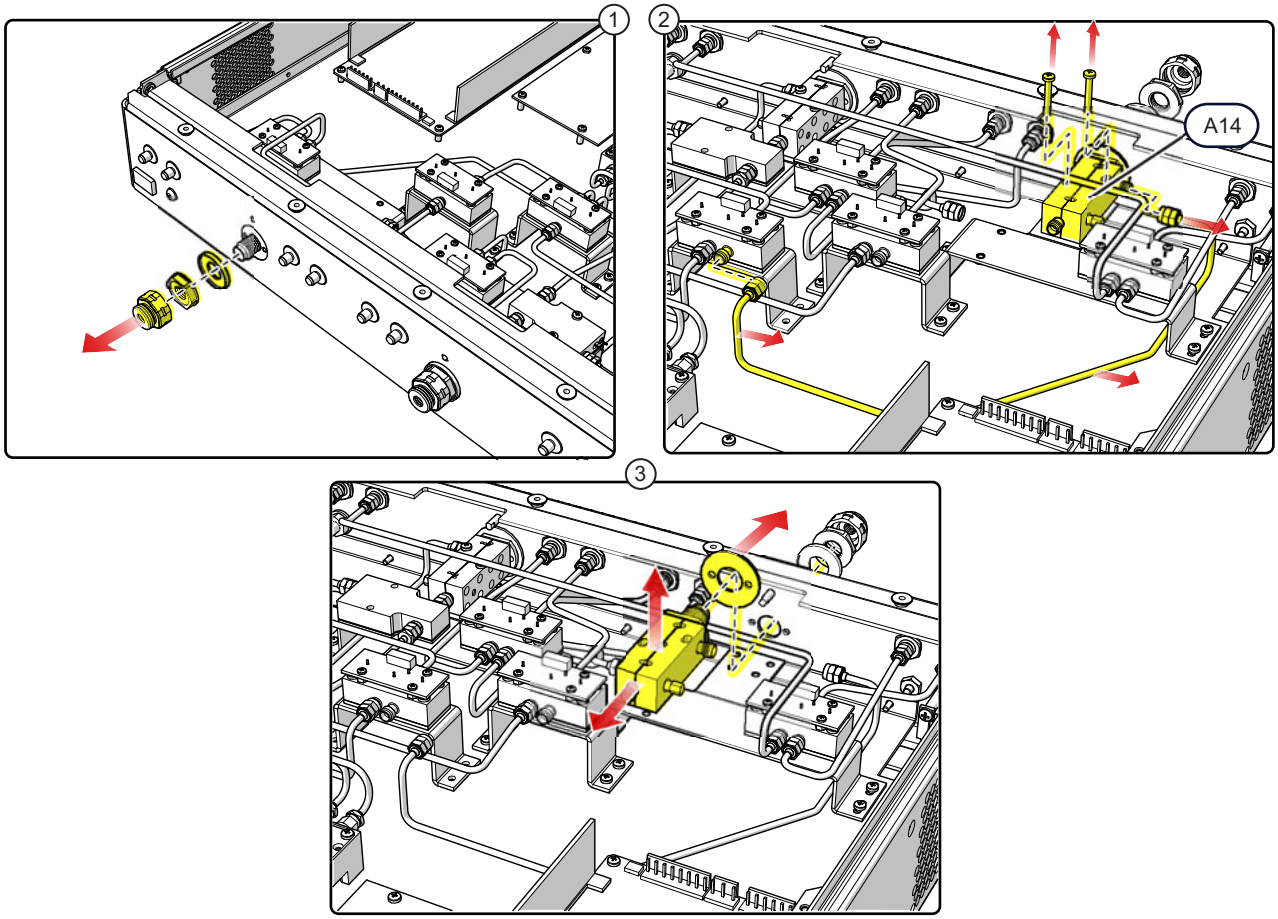
A14 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Remove the A8 Diplexer Assembly as instructed in Section 5-13.

Note	De-soldering of the DC Bias wires from the A8 Diplexer Assembly is *not* required. Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.

3. Replace the A14 Port Coupler Assembly as illustrated in Figure 5-21.



1. Remove the Test Port Connector, the Port Connector Nut, and the Thrust Washer from the front panel.
2. Disconnect the RF cable from the A14 coupled port. Remove the coupler mounting screws using a right angle Phillips screwdriver. (If a right angle driver is not available the front panel must be removed to gain access to forward screw on the coupler.)
3. Remove the A14 Coupler from the chassis and separate the spacer from the front of the coupler.
4. Installation is the reverse of removal. When installing the test port connector, torque to 15 lbf·in using a torque wrench.

Figure 5-21. A14 Port Coupler Assembly

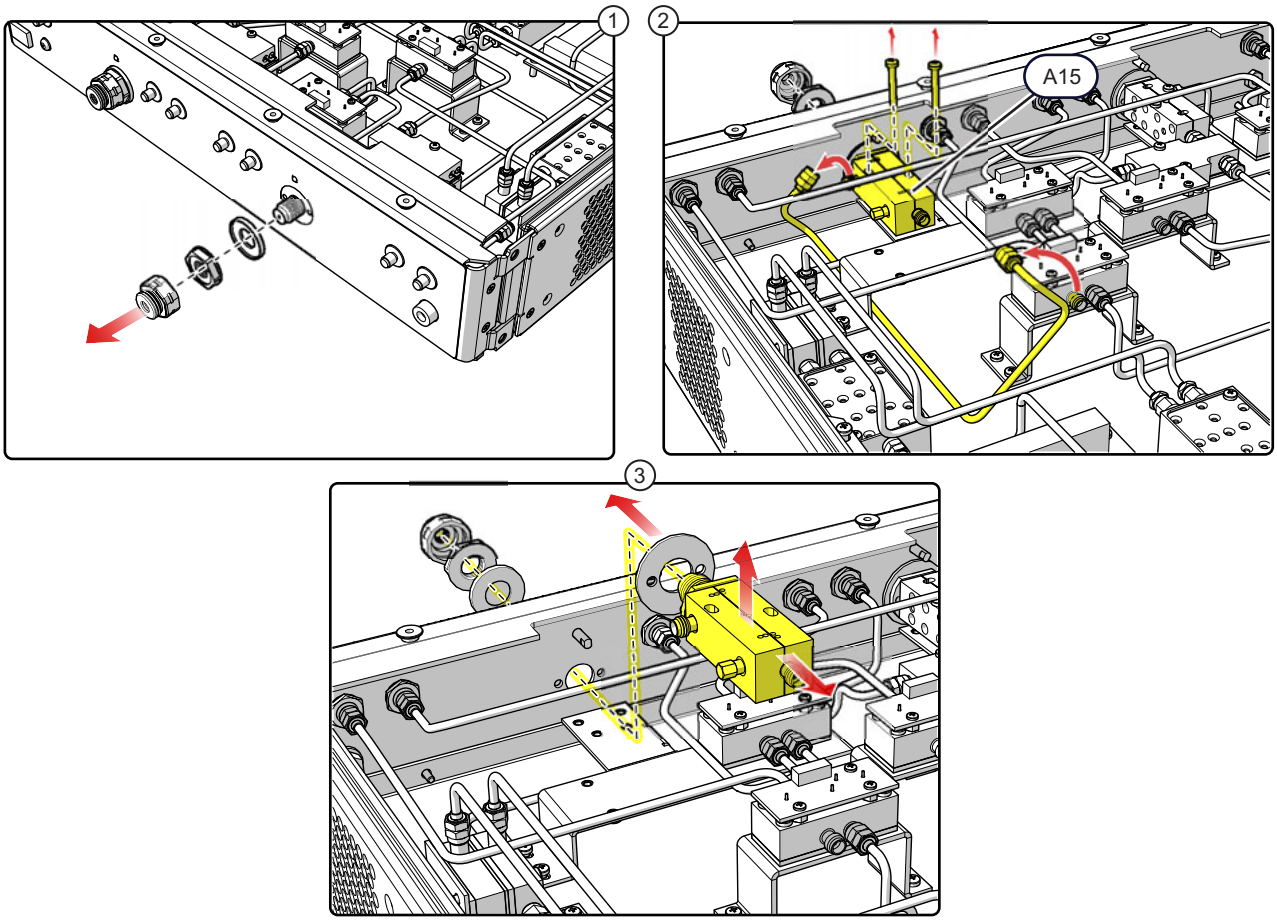
A15 Replacement

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Remove the A10 Diplexer Assembly as instructed in Section 5-13.

Note	De-soldering of the DC Bias wires from the A10 Diplexer Assembly is *not* required. Use Anritsu 01-201 Torque Wrench to tighten all RF connectors when installing the module.

3. Replace the A15 Port Coupler Assembly as illustrated in Figure 5-22.



1. Remove the Test Port Connector, the Port Connector Nut, and the Thrust Washer from the front panel.
2. Disconnect the RF cable from the A15 coupled port. Use a right angle Phillips screwdriver to remove the two mounting screws that secure the Port Coupler to the bracket. (If a right angle driver is not available the front panel must be removed to gain access to forward screw on the coupler.)
3. Remove the A15 Coupler from the chassis and separate the spacer from the front of the coupler.
4. Installation is the reverse of removal. When installing the test port connector, torque to 15 lbf·in using a torque wrench.

Figure 5-22. A15 Port Coupler Assembly

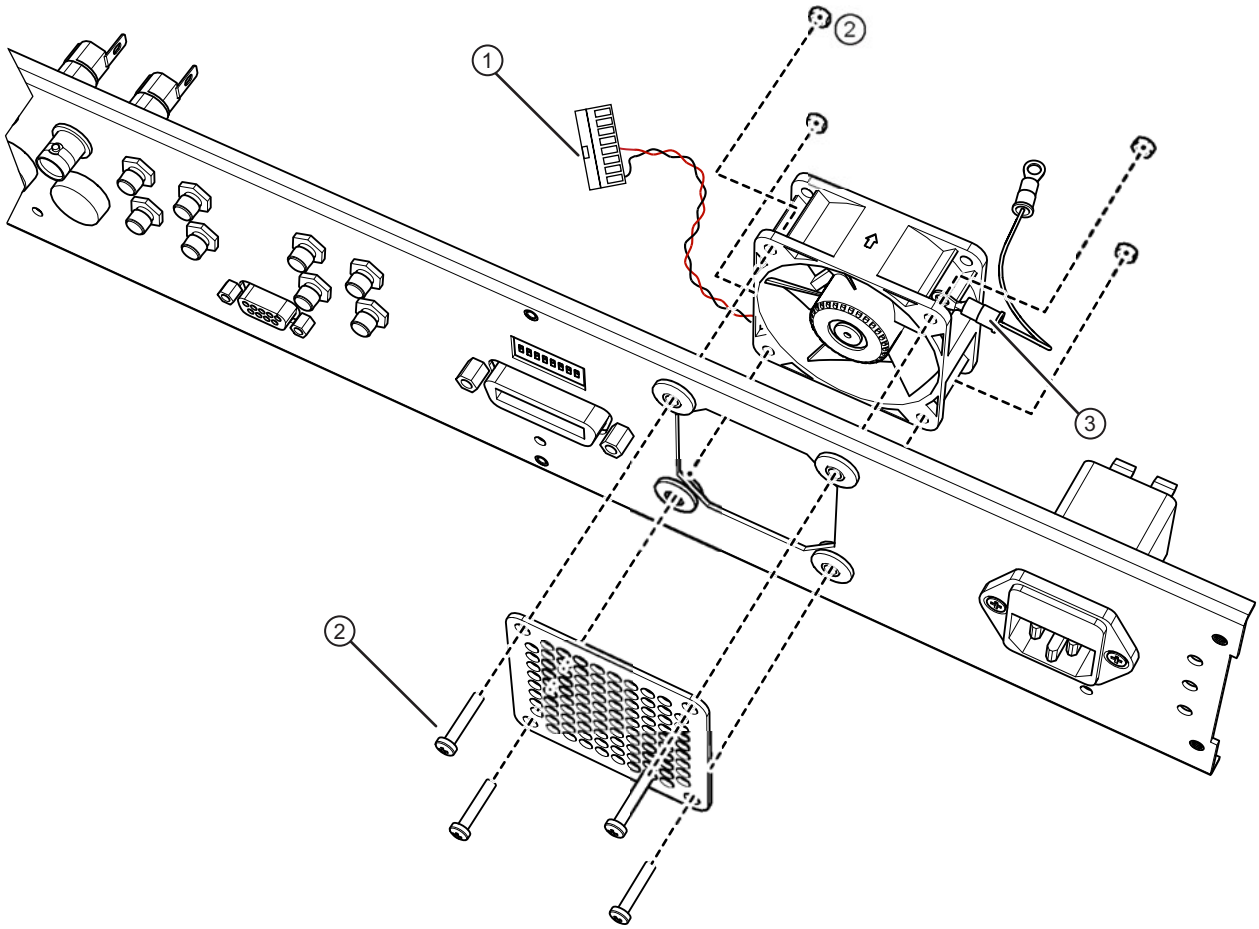
5-16 Fan Assembly Replacement – ND71327

This section provides a procedure for removing and replacing the rear panel fan assembly in the test set.

1. Remove the top cover from the test set as instructed in Section 5-3.

2. Replace the Fan Assembly as illustrated in Figure 5-23.

Note	When installing the fan, make sure the arrow mark on the fan is pointing away from the rear panel to ensure proper airflow direction.



1. Disconnect the fan power cable from the J34 connector of the Test Set Control PCB Assembly
2. Remove the 4 fan guard mounting screws from the rear panel. Hold the fan mounting nuts with an open end wrench.
3. Remove the grounding wire.
4. Installation is the reverse of removal. Make sure the arrow mark on the fan is pointing away from the rear panel to ensure proper airflow direction. Ensure the grounding wire is reattached.

Figure 5-23. Cooling Fan Assembly

Appendix A — Test Records

A-1 Introduction

This appendix provides test records that can be used to record the performance of MN469xC in conjunction with a 2-Port VectorStar VNA.

Note	As the MN469xC Series Test Set provides multiple test port capabilities for the Anritsu VectorStar MS464xA/B Series Vector Network Analyzer, they do not have any performance specifications separate from the VectorStar VNA. Therefore, MN469xC Test Set must be verified with a 2-port VectorStar VNA as a system. The frequency range that can be verified will be limited by the 2-port VectorStar VNA.

Make a copy of the following Test Record pages and document the measured values each time performance verification is performed. Continuing to document this process each performance verification session provides a detailed history of the instrument's performance.

The following test record forms are available:

A-2 MN4694C Multiport VNA System Test Record

Instrument Information for MN4694C

MN4694C Serial Number:	Operator:	Date:
VectorStar VNA Model: MS4642A [ ] MS4644A [ ] MS4642B [ ] MS4644B [ ]	VectorStar VNA Serial Number:	VectorStar VNA Options:

Directivity for MN4694C VNA System

Table A-1. Directivity Record for MN4694C Multiport VNA System

Freq (GHz)	Port 1 (VNA) Measured (dB)	Port 2 (VNA) Measured (dB)	Port 3 (Test Set) Measured (dB)	Port 4 (Test Set) Measured (dB)	Specification
<0.01					>38 dB
0.01 to 2.5					>37 dB
2.5 to 20					>34 dB
20 to 40					>32 dB

Test Port Match for MN4694C VNA System

Table A-2. Test Port Match Record for MN4694C Multiport VNA System

Freq (GHz)	Port 1 (VNA) Measured (dB)	Port 2 (VNA) Measured (dB)	Port 3 (Test Set) Measured (dB)	Port 4 (Test Set) Measured (dB)	Specification
<0.01					>36 dB
0.01 to 2.5					>41 dB
2.5 to 20					>39 dB
20 to 40					>34 dB

Test Port Power for MN4694C

Note	This section applies to MN4694C Multiport VNA Systems with MS4642A/B or MS4644A/B VNAs equipped with Option 051 – Front Panel Loops.

Table A-3. Test Port Power Record for MN4694C Multiport VNA System

CW Freq	VNA Port Power Setting	Port 1 (VNA) Measured (dBm)	Port 2 (VNA) Measured (dBm)	Port 3 (Test Set) Measured (dBm)	Port 4 (Test Set) Measured (dBm)	Specification
70 kHz	**+9 dBm**					≥ +4 dBm
10 MHz	**+11 dBm**					≥ +6 dBm
500 MHz	**+11 dBm**					≥ +6 dBm
1 GHz	**+8 dBm**					≥ +6 dBm
2 GHz	**+8 dBm**					≥ +6 dBm
3 GHz	**+8 dBm**					≥ +2 dBm
5 GHz	**+8 dBm**					≥ +2 dBm
10 GHz	**+8 dBm**					≥ +2 dBm
15 GHz	**+8 dBm**					≥ +2 dBm
20 GHz	**+8 dBm**					≥ +2 dBm
25 GHz	**+8 dBm**					≥ +2 dBm
30 GHz	**+8 dBm**					≥ +2 dBm
35 GHz	**+8 dBm**					≥ +2 dBm
40 GHz	**+8 dBm**					≥ +2 dBm

Noise Floor for MN4694C

_____ Refer to Attached Test Data Report

A-3 MN4697C Multiport VNA System Test Record

Instrument Information for MN4697C

MN4697C Serial Number:	Operator:	Date:
VectorStar VNA Model: MS4645A [ ] MS4647A [ ] MS4645B [ ] MS4647B [ ]	VectorStar VNA Serial Number:	VectorStar VNA Options:

Directivity for MN4697C

Table A-4. Directivity Record for MN4697C Multiport VNA System

Freq (GHz)	Port 1 (VNA) Measured (dB)	Port 2 (VNA) Measured (dB)	Port 3 (Test Set) Measured (dB)	Port 4 (Test Set) Measured (dB)	Specification
<0.01					>38 dB
0.01 to 20					>40 dB
20 to 40					>35 dB
40 to 67					>32 dB
67 to 70					>28 dB

Test Port Match for MN4697C

Table A-5. Test Port Match Record for MN4697C Multiport VNA System

Freq (GHz)	Port 1 (VNA) Measured (dB)	Port 2 (VNA) Measured (dB)	Port 3 (Test Set) Measured (dB)	Port 4 (Test Set) Measured (dB)	Specification
<0.01					>36 dB
0.01 to 2.5					>39 dB
2.5 to 20					>37 dB
20 to 40					>32 dB
40 to 67					>28 dB
67 to 70					>26 dB

Test Port Power for MN4697C

Note	This section applies to MN4697C Multiport VNA Systems with MS4645A/B or MS46447A/B VNAs equipped with Option 051 – Front Panel Loops.

Table A-6. Test Port Power Record for MN4697C Multiport VNA System

CW Freq	VNA Port Power Setting	Port 1 (VNA) Measured (dBm)	Port 2 (VNA) Measured (dBm)	Port 3 (Test Set) Measured (dBm)	Port 4 (Test Set) Measured (dBm)	Specification
70 kHz	**+9 dBm**					≥ +4 dBm
10 MHz	**+11 dBm**					≥ +6 dBm
500 MHz	**+11 dBm**					≥ +6 dBm
1 GHz	**+5 dBm**					≥ +6 dBm
2 GHz	**+5 dBm**					≥ +6 dBm
3 GHz	**+4 dBm**					≥ –3 dBm
5 GHz	**+4 dBm**					≥ –3 dBm
10 GHz	**+4 dBm**					≥ –3 dBm
15 GHz	**+4 dBm**					≥ –3 dBm
20 GHz	**+4 dBm**					≥ –3 dBm
25 GHz	**+4 dBm**					≥ –3 dBm
30 GHz	**+4 dBm**					≥ –3 dBm
35 GHz	**+4 dBm**					≥ –3 dBm
38 GHz	**+4 dBm**					≥ –3 dBm
40 GHz	**+3 dBm**					≥ –3 dBm
45 GHz	**+3 dBm**					≥ –7 dBm
50 GHz	**+3 dBm**					≥ –7 dBm
55 GHz	**–2 dBm**					≥ –13 dBm
60 GHz	**–2 dBm**					≥ –13 dBm
65 GHz	**–2 dBm**					≥ –13 dBm
67 GHz	**–3 dBm**					≥ –20 dBm
70 GHz	**–6 dBm**					≥ –20 dBm

Noise Floor for MN4697C

_____ Refer to Attached Test Data Report

Appendix B — Specifications

B-1 Technical Data Sheet

Use this tab to store the latest version of the VectorStar technical data sheets:

- **VectorStar MS4640A Series VNA Technical Data Sheet – 11410-00435**
- **VectorStar MS4640B Series VNA Technical Data Sheet – 11410-00611**
- **VectorStar MN469xC Series Multiport Test Set Technical Data Sheet – 11410-00777**

Updated product information can be found on your product page:

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

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