

Installation and User Guide

N4419B, N4420B, N4421B Multiport Test Sets

This manual provides information for installing Multiport Test Sets for use with PNA Option 550.

Note: If this Test Set is to be used with PLTS software, please

DO NOT USE THIS MANUAL.

Use the PLTS Installation Guide (N1930-90005) that was shipped with PLTS, and is also available at www.Agilent.com/find/plts



Agilent Technologies

Manufacturing Part Number: N4421-90002

Printed in USA

Print Date: September 2011

Supersedes: April 2010

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N4421-90002

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You can also purchase accessories or documentation items on the Internet at: <http://www.Agilent.com/find/>

If you do not have access to the Internet, contact your field engineer.

NOTE In any correspondence or telephone conversation, refer to the product by its model number and full serial number. With this information, the Agilent representative can determine whether your unit is still within its warranty period.

Safety and Regulatory Information

The safety and regulatory information pertaining to this product is located in Chapter 3, "Safety and Regulatory Information."

Safety Notes

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument. All pertinent safety notes for using this product are located in Chapter 3, "Safety and Regulatory Information."

WARNING **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

CAUTION Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

Documentation Map



PNA Help, embedded in the PNA, offers quick reference to user documentation, including the capabilities and limitations of Option 550. Click **Help** on the PNA menu bar or press the **Help** key on the PNA front panel.



This **Installation Guide** helps you to connect the Test Set to the PNA.



The **N4419B, N4420B, N4421B Service Guide**, which includes an Operators Check, is available **ONLY** at www.na.tm.agilent.com/multiport

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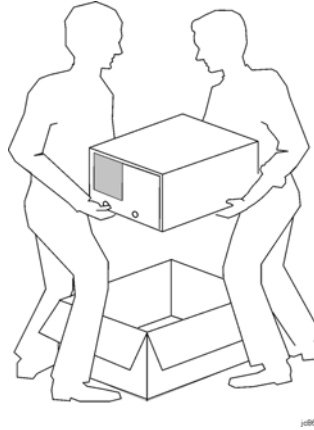
1 Installing the Test Set

This installation includes the following steps:

1. Verify your Shipment
2. Set Up the PNA
3. Attach the Test Set to the Network Analyzer (N4420B or N4421B Test Set Only)
4. Install the Test Set on a Bench Top or in an Equipment Rack
5. Make the Interconnections between the Test Set and the PNA
6. Set Up the General Purpose Interface Bus (GPIB)
7. Power up the System
8. Perform Quick Check

Step 1. Verify your Shipment

1. Unpack your system from the containers in which it was shipped.



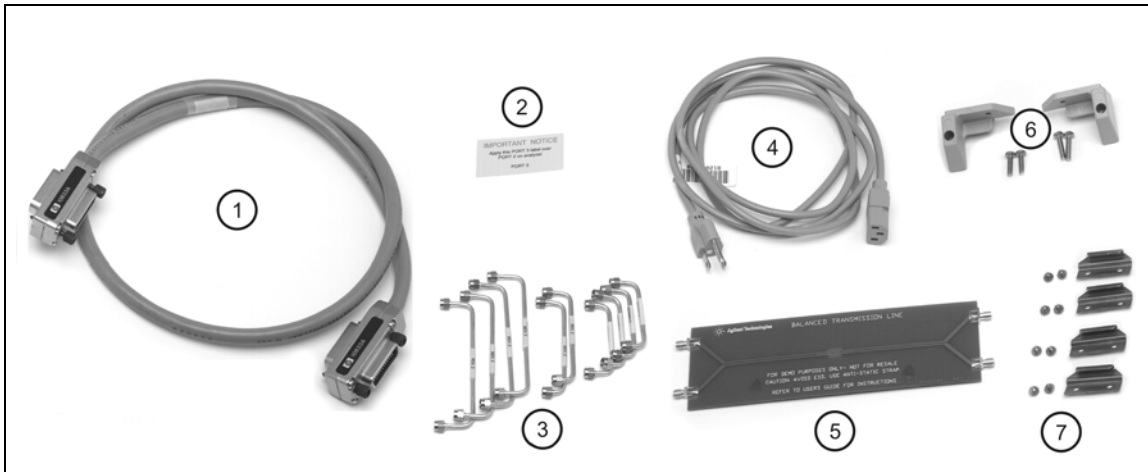
WARNING **The test set hardware may be heavy. Use proper lifting techniques.**

2. Carefully inspect the test set hardware to make sure that it was not damaged during shipment.

NOTE If your test set was damaged during shipment, contact Agilent Technologies.

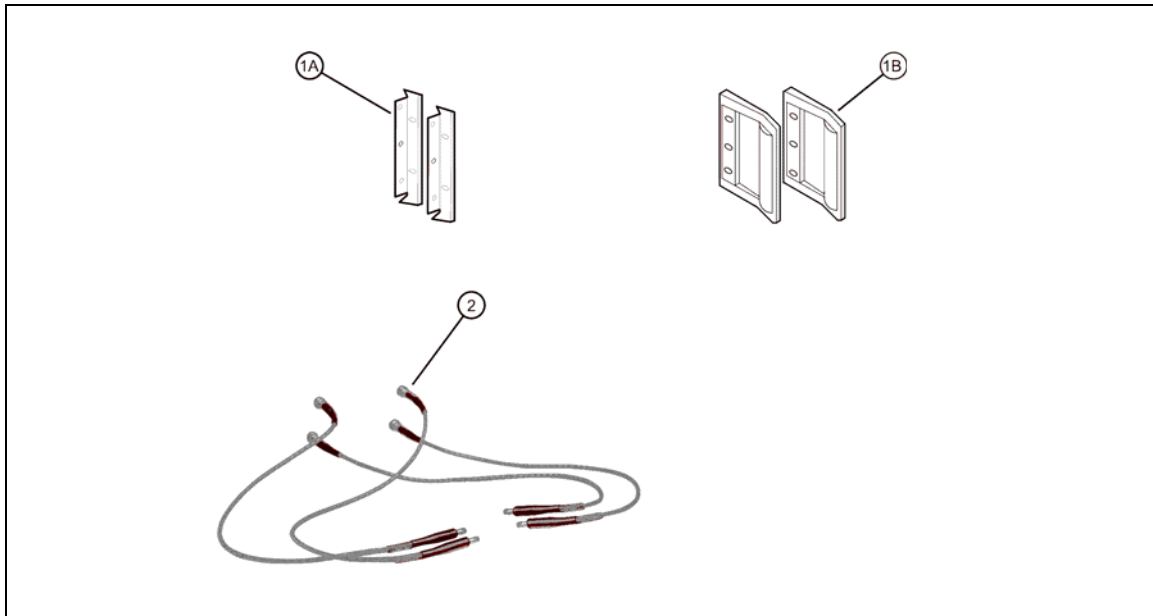
Step 1. Verify your Shipment

3. Check the accessories that were shipped with your system. Your network analyzer accessories will be checked during the network analyzer setup.



Item Nr	Part Number	Part Description
1	8120-3445	GPIB Cable (3 feet)
2	N/A	“Port 3” Label
3	Varies by Test Set Model and Option	Semirigid interconnect cables (refer to Step 5. Make the Interconnections between the Test Set and the PNA.)
4	Unique to country	AC Power Cord (for the test set)
5	AD00658	Balanced Transmission Line PC Board Device (Sample DUT). Included ONLY when purchased with PLTS system.
6	5023-0132	Rear Locking Feet (for the PNA)
-- (not shown)	5063-9253	Kit Including Rear Locking Feet (for the Test Set)
7	1600-1423	4 Lock Links (N4420B, N4421B only) with 8 screws (0515-1499)

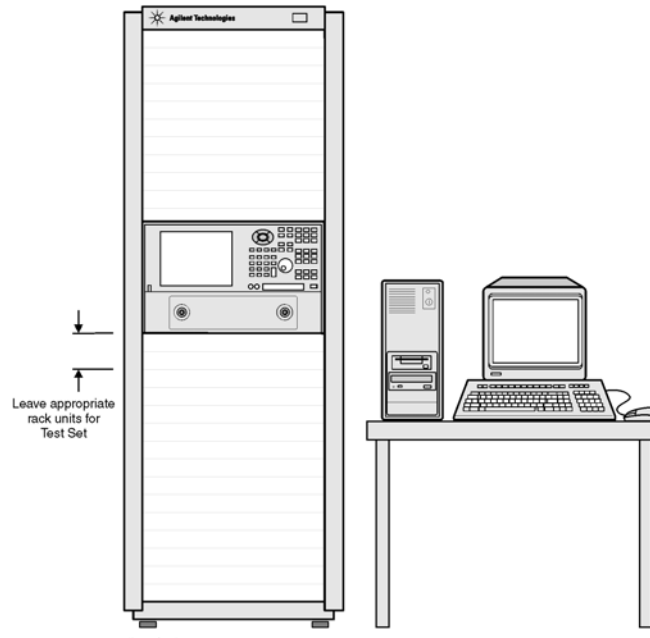
4. If you ordered any of the following options, check the parts. Option 1CP is shipped in a separate container.



Option Number	Item Number	Part Description
1CP	1A 1B	Rack mount flange kit (For use with handles) Handles (set of 2)
B20	2	Precision 50-ohm cables (4)

Step 2. Set Up the PNA

1. Using the PNA Installation and Quick Start Guide, set up the network analyzer.
2. If you are installing your PNA in an equipment rack, be sure to leave at least 2 rack units of space *below* the analyzer.



NOTE For the N4420B or N4421A/B test set, connect the PNA to the test set before placing in the rack as a single unit on one set of rails. Refer to [“Step 3. Attach the PNA to the Test Set”](#) on page 1-7 for instructions.

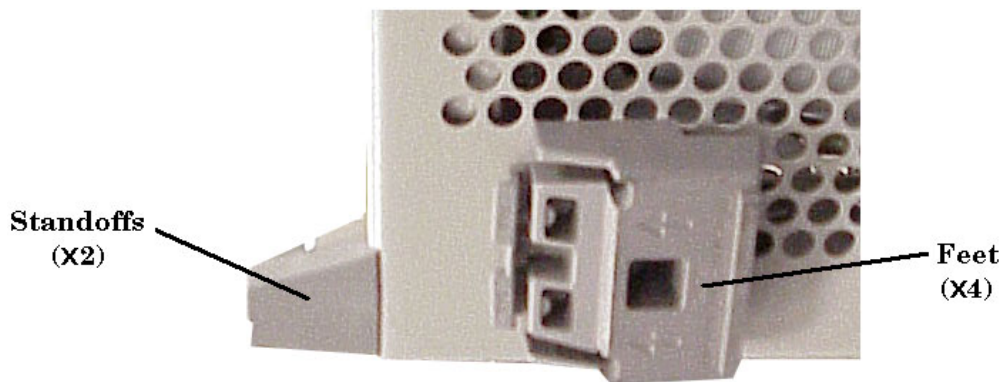
Step 3. Attach the PNA to the Test Set (N4420B or N4421B Test Set Only)

If your test set is an N4419B, continue with “[Step 4. Install the System on a Bench Top or in an Equipment Rack](#)” on page 1-11.

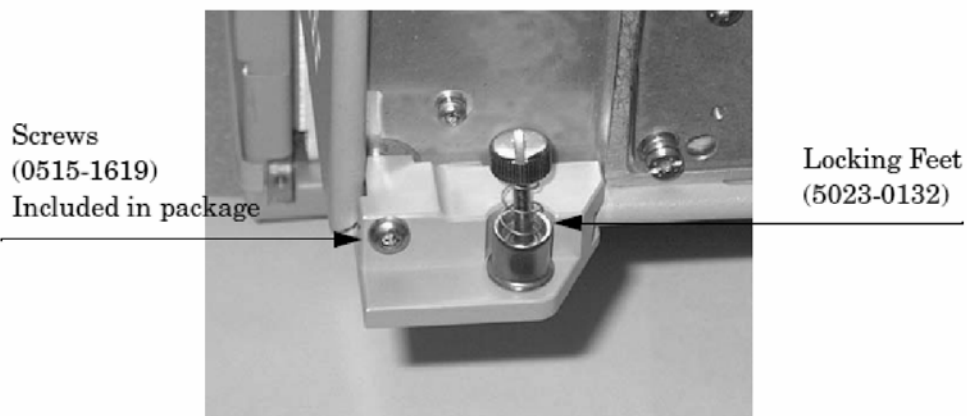
The PNA is attached to the N4420B and N4421B test sets using lock links at the front and locking feet at the rear.

Preparing the PNA

1. Remove the four feet from the bottom of the PNA.



2. Remove the screws from the two lower rear panel standoffs.
3. Install the two rear locking feet (5023-0132) where the standoffs were removed. The locking feet may require GENTLE tapping with a hammer to seat properly. Use the screws (part number 0515-1619) that are included to secure the feet to the PNA.



N4421_002_02

Preparing the Test Set

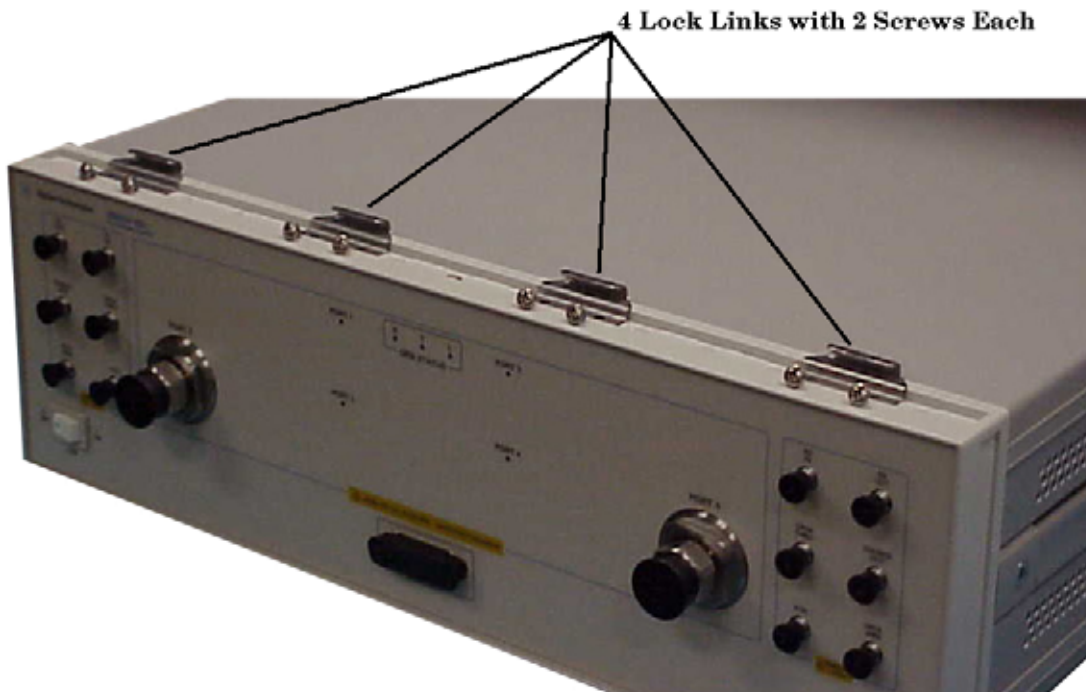
4. Remove the two standoffs and screws (0515-1619) from the rear panel on the test set.
5. Install the top left and right rear locking feet from the kit (5063-9253) using screws (0515-1244).



N4421_002_01

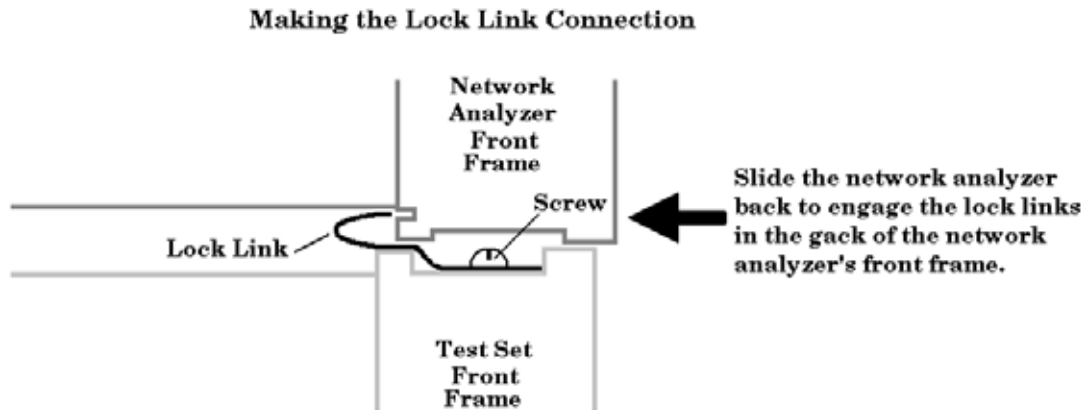
6. Remove the trim strip from the top of the front frame.
7. Install the four lock links from the kit (5063-9253) to the top of the front frame using eight screws. Refer to the graphic below.

Lock Link Installation



Attaching the PNA to the Test Set

- Place the PNA on top of the test set ensuring that the front frame of the PNA is positioned slightly forward of the lock links that are attached to the test set. Then slide the PNA back so the lock links engage the front frame of the analyzer.



Step 3. Attach the PNA to the Test Set

9. Secure the PNA lower locking feet to the test set's upper locking feet, using the spring-loaded screws.



N4421_002_03

NOTE If the screw holes are not aligned, loosen the screws that secure the feet to both the PNA and the test set to align the screw holes.

10. Tighten all screws.

Step 4. Install the System on a Bench Top or in an Equipment Rack

The test system can be installed on a bench top or in an equipment rack.

In all installations, consider the following ventilation requirements when deciding where to set up your test system.

CAUTION**Ventilation Requirements:**

When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

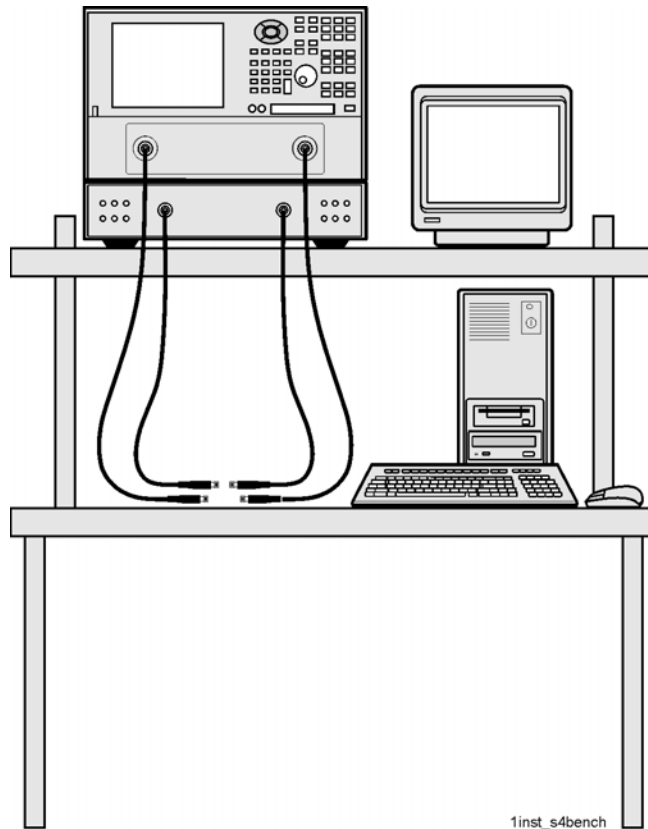
Refer to the section that applies to your installation.

- **For bench top installation**, continue on page 12.
- **For equipment rack installation**, continue on page 13.

To Install on a Bench Top

1. Place the test set and PNA on a bench top. In the example illustration shown below, the system is placed on a riser as an alternative to the bench top. Make sure that there is at least four inches of clearance on the sides and back of the system for adequate ventilation.

The front panel test cables are shown only as a reminder to make sure they can easily reach the test surface of the bench.



CAUTION Consider the ventilation requirement described on page 11 when selecting the location of your system.

2. Continue with [“Step 5. Make the Interconnections between the Test Set and the PNA” on page 1-17.](#)

To Install in an Equipment Rack

You may install the system in an equipment rack in one of following two ways:

Removing Feet from PNA	Leaving Feet attached to PNA
<ol style="list-style-type: none"> 1. Install one set of rails into the equipment rack 2. Remove feet from Test Set and PNA 3. Attach mount flanges and the handles to Test Set 4. Attach mount flanges and the handles to PNA 5. Insert test set on rails in equipment rack and screw to rack 6. Place PNA on top of test set and screw PNA into rack 7. Bend Semi-rigid interconnect cables to fit between the test set connector and the PNA connector 8. Connect semirigid between test set and PNA 	<ol style="list-style-type: none"> 1. Install one set of rails into the equipment rack 2. Remove feet from Test Set only 3. Attach mount flanges and the handles to Test Set 4. Attach mount flanges and the handles to PNA 5. Insert test set on rails in equipment rack and screw to rack 6. Place PNA on top of test set 7. Connect semirigid between test set and PNA

When you install the test set in an equipment rack, you will install rails in the rack to support the weight of the test set, attach the handles and the rack mount flanges to the test set, and secure the test set to the equipment rack.

1. Ensure that the front handle kit, the rack mount flange kit, and the rack mount rail set are complete.

Handle Kit Contents	Flange Kit Contents
<ul style="list-style-type: none"> • 4 Screws • 2 Side Trim Strip • 2 Handles • Installation Instructions 	<ul style="list-style-type: none"> • 4 Screws (Long) • 4 Screws with Washers • 4 Nuts with Metal Clips • 2 Flanges • Installation Instructions

NOTE If any items are damaged or missing from a kit, contact us to order a replacement kit. Items within these kits are not individually available.

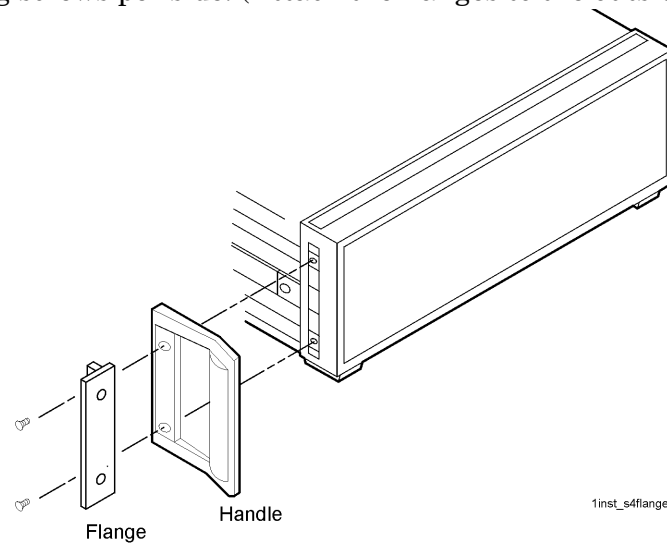
2. Install the rails into the equipment rack using the instructions provided. Consider that the test set is two rack units high (3.5 inches). Mount the test set immediately below the PNA.

NOTE For the N4420B or N4421B test set, connect the network analyzer to the test set before placing in the rack as a single unit on one set of rails.

3. Attach the cabinet mount flanges and the handles to the sides of the front panel,

Step 4. Install the System on a Bench Top or in an Equipment Rack

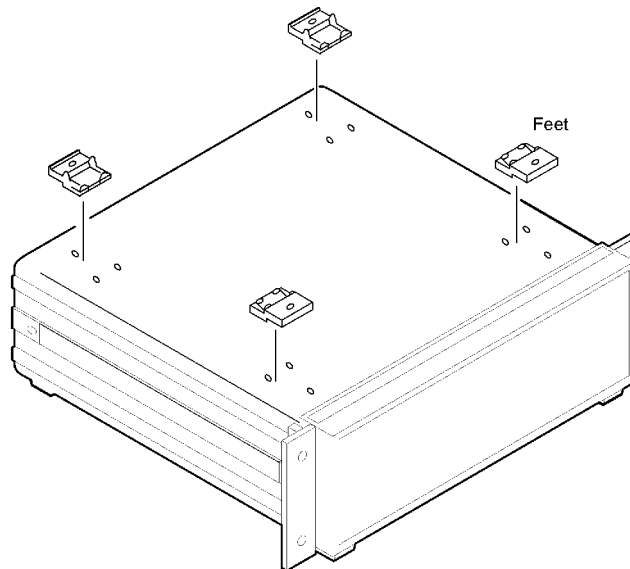
using two long screws per side. (Attach the flanges to the outside of the handles.)



WARNING **If an instrument handle is damaged, you should replace it immediately. Damaged handles can break while you are moving or lifting the instrument and cause personal injury or damage to the instrument.**

Step 4. Install the System on a Bench Top or in an Equipment Rack

4. Remove the feet before cabinet mounting the analyzer using the directions imprinted on the feet.



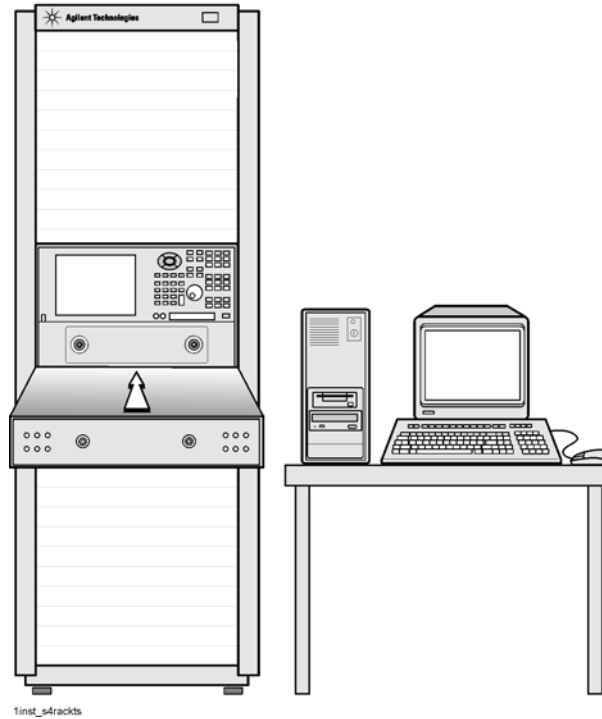
jc814a

5. Ensure there is adequate clearance between the system cabinet and the sides and back of the test system for adequate ventilation.

CAUTION Consider the ventilation requirements described in “Step 4. Install the System on a Bench Top or in an Equipment Rack” on page 11 when selecting the location of your system.

Step 4. Install the System on a Bench Top or in an Equipment Rack

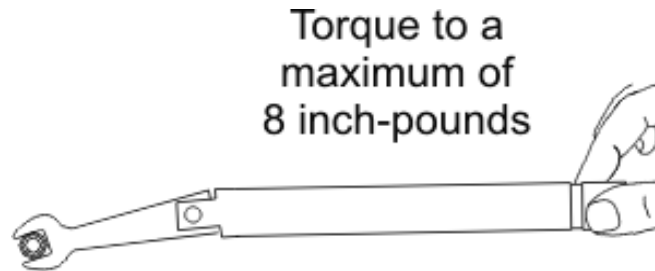
6. Lift the test set and slide it onto the rails that you installed earlier from the front of the equipment rack. Secure the test set to the equipment rack using the screws with washers and metal-clipped nuts provided in the flange kit.



7. Continue with “Step 5. Make the Interconnections between the Test Set and the PNA” on page 17.

Step 5. Make the Interconnections between the Test Set and the PNA

1. Locate your test set and PNA model on the following pages for information describing the interconnections between the test set and the network analyzer.
2. Connect the provided interconnect cables between the test set and the PNA. Torque the semirigid cable connectors to 8 inch-pounds.



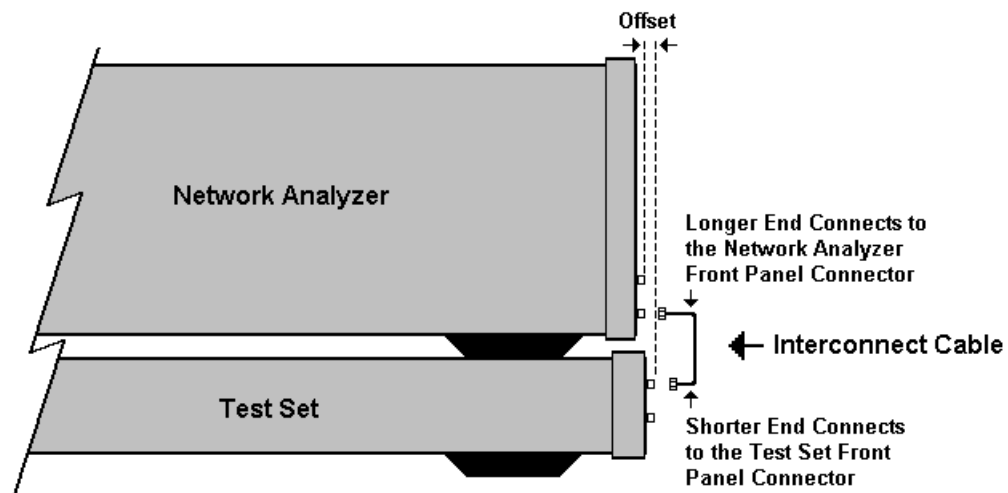
NOTE The Reference channel path through the test set is used to compensate for electrically long DUTs. This also results in added loss in the Reference channel and higher trace noise.

Therefore, do NOT use the Reference channel interconnect cables unless making high speed measurements of electrically long devices.

For more information, see 'Electrically long devices' in the PNA Help system.

CAUTION Be careful to install the interconnect cables correctly. The longer end of the interconnect cable connects to the PNA front panel connector as shown in the following image.

Figure 1-1 Interconnect Cable Orientation



Step 5. Make the Interconnections between the Test Set and the PNA

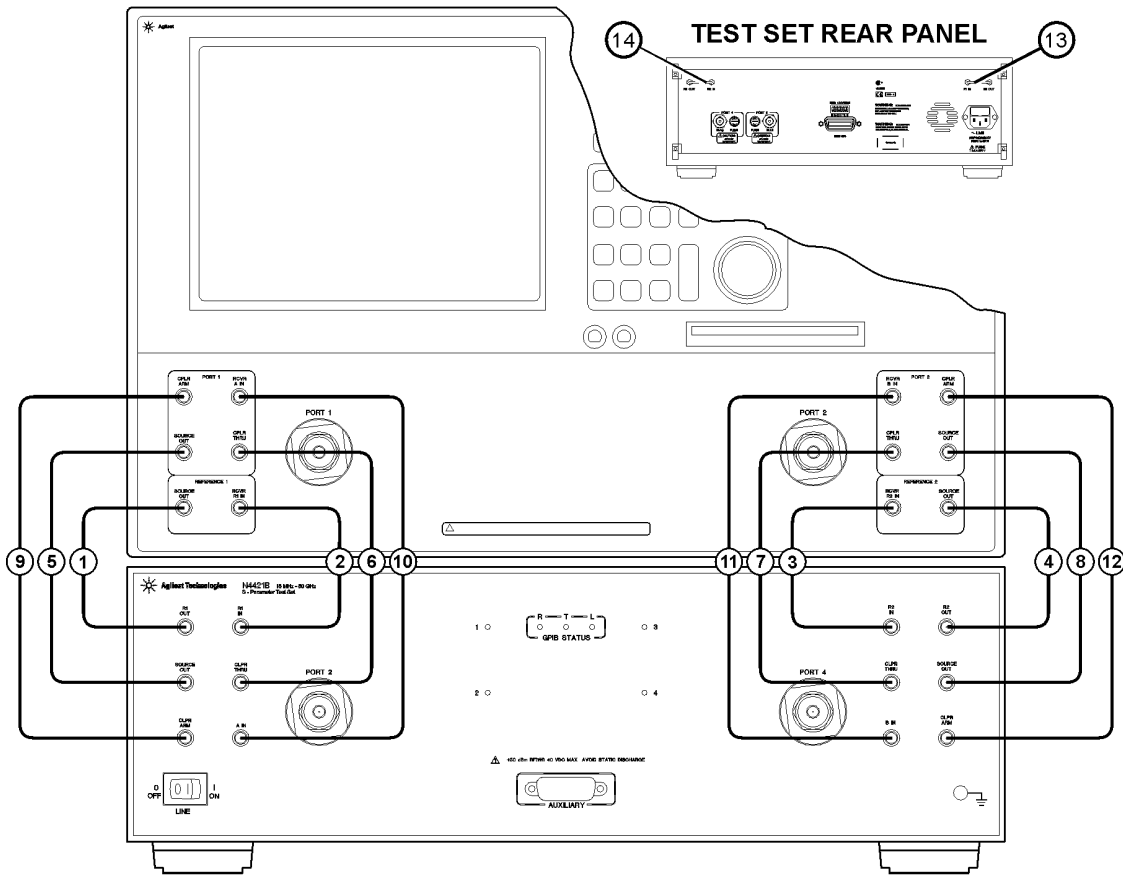
Damage to the interconnect cable can result from improper connection of the cable.

TIP If the test set and the PNA are rack mounted, the screws securing the rack mount flanges to the instrument rack may be loosened slightly to allow for minor repositioning of the instruments. Don't forget to retighten the screws when you are done.

3. Continue with [“Step 6. Set Up the General Purpose Interface Bus \(GPIB\)” on page 1-23.](#)

Step 5. Make the Interconnections between the Test Set and the PNA

N4420B Test Set with E8363B and N4421B Test Set with E8364B



4421_connections

CAUTION Damage to the interconnect cable can result from improper orientation of the cable. Refer to page 1-16 for detailed information regarding the correct cable orientation.

Step 5. Make the Interconnections between the Test Set and the PNA

Call Out Sequence	Cable Part Number	From Network Analyzer	To Test Set
1*	Z5623-20215	REF 1 SOURCE OUT	REF 1 R1 OUT
2*	Z5623-20215	REF 1 RCVR R1 IN	REF 1 RCVR R1 IN
3*	Z5623-20215	REF 2 RCVR R2 IN	REF 2 RCVR R2 IN
4*	Z5623-20215	REF 2 SOURCE OUT	REF 2 R2 OUT
5	Z5623-20216	PORT 1 SOURCE OUT	PORT 1 SOURCE OUT
6	Z5623-20216	PORT 1 CPLR THRU	PORT 1 CPLR THRU
7	Z5623-20216	PORT 2 CPLR THRU	PORT 2 CPLR THRU
8	Z5623-20216	PORT 2 SOURCE OUT	PORT 2 SOURCE OUT
9	Z5623-20217	PORT 1 CPLR ARM	PORT 1 CPLR ARM
10	Z5623-20217	PORT 1 RCVR A IN	PORT 1 RCVR A IN
11	Z5623-20217	PORT 2 RCVR B IN	PORT 2 RCVR B IN
12	Z5623-20217	PORT 2 CPLR ARM	PORT 2 CPLR ARM
13*	E8364-20059	REF 1 on rear panel of the test set	
14*	E8364-20059	REF 2 on rear panel of the test set	

NOTE

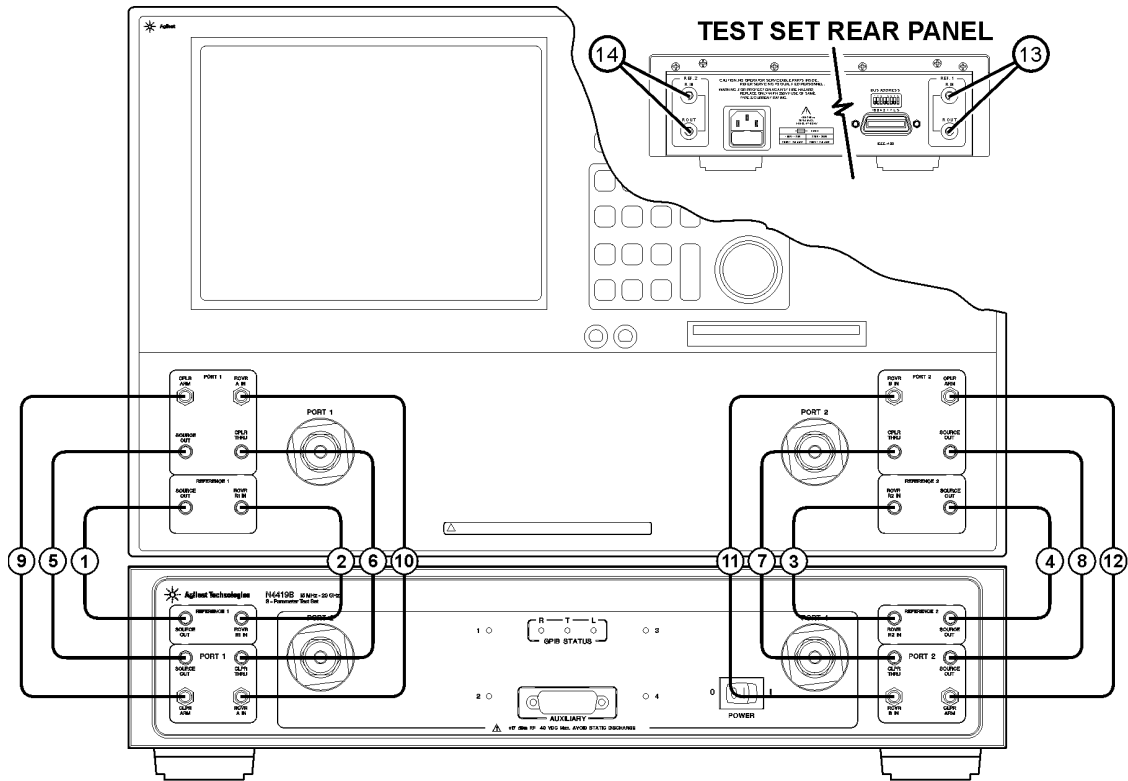
* The Reference channel path through the test set is used to compensate for electrically long DUTs. This also results in added loss in the Reference channel and higher trace noise.

Therefore, unless making high speed measurements of electrically long devices, do NOT remove the PNA **REFERENCE 1** and **REFERENCE 2** front-panel loops, and do NOT use the Reference channel interconnect cables (items 1, 2, 3, 4, 13, and 14).

For more information, see 'Electrically long devices' in the PNA Help system.

Step 5. Make the Interconnections between the Test Set and the PNA

N4419B Test Set with E8362B or N5230A Option 225



4419_connections

CAUTION Damage to the interconnect cable can result from improper orientation of the cable. Refer to page 1-16 for detailed information regarding the correct cable orientation.

Step 5. Make the Interconnections between the Test Set and the PNA

NOTE: Cables are orderable only as cable set AD00756.			
Call Out Sequence	Cable Part Number	From Network Analyzer	To Test Set
1*	AD00756-1	REF 1 SOURCE OUT	REF 1 SOURCE OUT
2*	AD00756-1	REF 1 RCVR R1 IN	REF 1 RCVR R1 IN
3*	AD00756-1	REF 2 RCVR R2 IN	REF 2 RCVR R2 IN
4*	AD00756-1	REF 2 SOURCE OUT	REF 2 SOURCE OUT
5	AD00756-2	PORT 1 SOURCE OUT	PORT 1 SOURCE OUT
6	AD00756-2	PORT 1 CPLR THRU	PORT 1 CPLR THRU
7	AD00756-2	PORT 2 CPLR THRU	PORT 2 CPLR THRU
8	AD00756-2	PORT 2 SOURCE OUT	PORT 2 SOURCE OUT
9	AD00756-3	PORT 1 CPLR ARM	PORT 1 CPLR ARM
10	AD00756-3	PORT 1 RCVR A IN	PORT 1 RCVR A IN
11	AD00756-3	PORT 2 RCVR B IN	PORT 2 RCVR B IN
12	AD00756-3	PORT 2 CPLR ARM	PORT 2 CPLR ARM
13*	AD00756-4	REF 1 on rear panel of the test set	
14*	AD00756-4	REF 2 on rear panel of the test set	

NOTE

* The Reference channel path through the test set is used to compensate for electrically long DUTs. This also results in added loss in the Reference channel and higher trace noise.

Therefore, unless making high speed measurements of electrically long devices, do NOT remove the PNA **REFERENCE 1** and **REFERENCE 2** front-panel loops, and do NOT use the Reference channel interconnect cables (items 1, 2, 3, 4, 13, and 14).

For more information, see 'Electrically long devices' in the PNA Help system.

Step 6. Set Up the General Purpose Interface Bus (GPIB)

The PNA uses the General Purpose Interface Bus (GPIB) to communicate with the test set.

NOTE There are 31 GPIB addresses, numbered 0 to 30. However, there may be the occasion that you need to change the GPIB address for test equipment. GPIB addresses are set either using rear panel switches or using the equipment firmware. Refer to the PNA or PLTS online help for more information.

1. Connect a GPIB cable from the rear panel GPIB connector on the PNA to the rear panel GPIB connector on the test set.

If the PNA has two GPIB ports, connect the test set to the CONTROLLER GPIB port.

Step 7. Power up the System

1. Ensure the available ac power supply meets the Power Source Requirements and the operating environment meets the Operating Environment Requirements listed below.

Power Source Requirements	
Input Voltage Range	100 – 120 Vac - or - 220 – 250 Vac
Frequency Range	47 – 62 Hz / 400 Hz
Power	40 VA maximum.
Operating Environment Requirements	
Operating Environment	Indoor use
Altitude	Operating: 0 to 2.0 km (6,560 ft.) Storage: 0 to 15.24 km (50,000 ft.)
Temperature	0 °C to 40 °C
Maximum Relative Humidity	80% for temperatures up to 31 °C; decreasing linearly to 50% for a temperature of 40 °C

2. Verify that the ac power cable is not damaged, and that the power-source outlet provides a protective earth contact.

CAUTION Always use the three-prong ac power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

3. Turn off the PNA.
4. Connect the ac power cable from the power-source outlet to the ac input on the rear panel of the test set.
5. Turn on the PNA and the test set by pressing the ON/OFF button on the front panel of each instrument.

NOTE Perform Step 6 ONLY when both of the following are true. Otherwise, skip to Step 7.

- Using the Reference channel paths through the test set. See page 1-16 for more information
- Using a PNA model E8362A/B, E8363A/B, or E8364A/B.

6. The **Phase-Lock IF Gain Adjustment** adjusts the R Channel receivers ALC gain to ensure phase lock over the entire frequency range. Refer to **Phase-Lock IF Gain Adjustment** in the PNA Help system for details.
 - a. Ensure the PNA is NOT already in 4-port mode (Step 7).
 - b. On the PNA, from the **System** menu, click **Service**, then **Adjustments**, then **IF**

Gain Adjustment.

- c. In Select Specials, select **None**.
- d. No connections to the test ports are required.
- e. Click **Begin Adj**. The adjustment takes about a minute to complete.

The advanced screen is for factory personnel only.

NOTE To start the PNA in 4-port mode (Step 7), Option 550 must already be enabled on the PNA. See PNA Help to learn more about Option 550. In addition, the PNA must have firmware version A.06.03.05 or later. To check both of these on the PNA, click Help, then About Network Analyzer.

7. When the PNA application has completely powered up, and the default trace is present, then:
 - a. Click **System**, point to **Configure**, then click **Multiport Capability**
 - b. On the Multiport Restart dialog, select Testset: **N44xx**, then click **Restart as a Multiport PNA with this testset**.
 - c. **Click OK**

The PNA should shut down and restart as a 4-port PNA. To learn more about the Option 550 capabilities and limitations, see PNA Help. In the Help file index, type “Option 550”.
8. If you intend to always use the default port mapping, attach the “Port 3” label (included with accessories) over the “Port 2” label on the PNA front panel. This will help to eliminate confusion when referring to the system “logical” ports. To learn more about port mapping, see the PNA Help, option 550 topic.

Step 8. Perform Quick Check

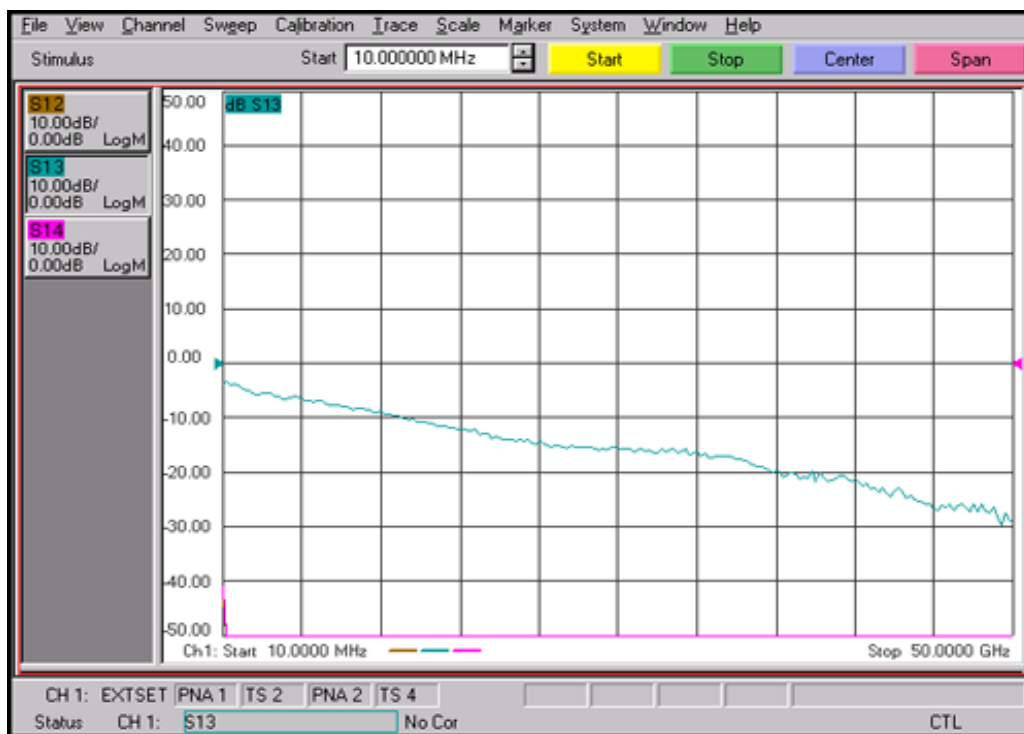
This Quick Check procedure helps to ensure that the system is properly configured. Perform this check after the PNA has rebooted as a 4-port PNA (previous step).

NOTE An Operator's Check, used to confirm that the 4-port system is fully functional, is contained in the **N4419B, N4420B, N4421B Service Guide**. Download the Service Guide at www.na.tm.agilent.com/multiport

All four test ports should be open and in the default port mapping configuration.

1. Preset the PNA.
2. Set the stop frequency on the PNA channel to the maximum frequency of either the test set or the PNA, which ever is lower. This is probably the default setting.
3. On the PNA, click Trace, then Delete Trace to delete the S11 trace.
4. On the PNA, click Trace, then New Trace, then check S12, S13, and S14. Click OK. This creates three new traces in the same channel and window. All of the new traces should appear at the bottom, or below, the window.
5. Connect a Thru cable between logical ports 1-2, then between ports 1-3, then between ports 1-4. This assumes that you have NOT changed port mapping. Port 3 is the PNA "physical" port 2. Port 2 and port 4 is on the test set.

Each trace should look similar to the uncorrected trace in the following figure.



2 Specifications and Characteristics

Definitions

All specifications and characteristics apply over a 25 °C ±5 °C range (unless otherwise stated) and 90 minutes after the instrument has been turned on.

Specification (spec.)	Warranted performance. Specifications include guard bands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions.
Characteristic (char.)	A performance parameter that the product is expected to meet before it leaves the factory, but that is not verified in the field and is not covered by the product warranty. A characteristic includes the same guard bands as a specification.
Typical (typ.)	Expected performance of an average unit which does not include guard bands. It is not covered by the product warranty.
Nominal (nom.)	A general, descriptive term that does not imply a level of performance. It is not covered by the product warranty.

NOTE There are NO specifications for multiport test set performance; only Characteristics and Typical.

 The Characteristic and Typical performance information is contained in the **N4419B, N4420B, N4421B Service Guide**, which is available at www.na.tm.agilent.com/multiport

General Characteristics

The frequency range, environmental operating conditions, and physical characteristics are displayed on the following pages.

Frequency Range

Table 2-1 Test Set Frequency Range and PNA Model

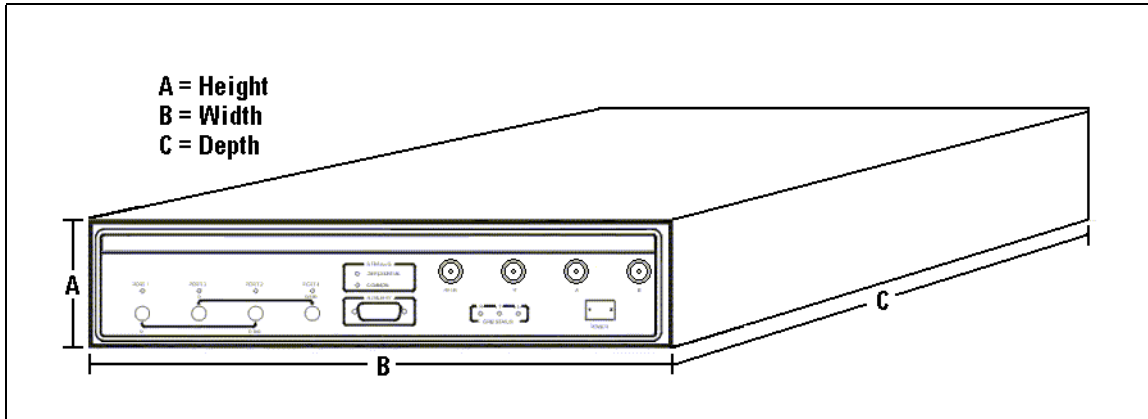
Test Set Model	Frequency Range	Recommended PNA Model
N4419B	10 MHz to 20 GHz	E8362B or N5230A Opt 225
N4420B	10 MHz to 40 GHz	E8363B or N5230A Opt 425
N4421B	10 MHz to 50 GHz	E8364B or N5230A Opt 525

Physical Characteristics

The weight and dimensions for the test sets are listed below.

Weight and Dimensions

Table 2-2 Test Set Weight and Dimensions



Model Number	Weight	Dimensions		
		Height (A)	Width (B)	Depth (C)
N4419B	9.0 kilograms (19.9 pounds)	3.0 in (7.62 cm)	16.75 in (42.55 cm)	19.25 in (48.90 cm)
N4420B and N4421B	9.0 kilograms (19.9 pounds)	5.5 in (13.97 cm)	16.75 in (42.55 cm)	16.75 in (42.55 cm)

3 Safety and Regulatory Information

Safety Information

Review to the safety information in this section before operating your physical layer test system.

Safety Symbols

The following safety symbols are used throughout this manual. Familiarize yourself with each of the symbols and its meaning before operating the physical layer test system.

CAUTION Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the instrument. Do not proceed beyond a caution note until the indicated conditions are fully understood and met.

WARNING **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

Instrument Markings

Familiarize yourself with each of the markings and its meaning before operating the physical layer test system.



The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.



This symbol indicates that the instrument requires alternating current (ac) input.



This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).



This symbol indicates that the power line switch is ON.



This symbol indicates that the power line switch is in the STANDBY position.



This symbol indicates that the power line switch is in the OFF position.



This symbol is used to identify a terminal which is internally connected to the product frame or chassis.



The CE mark is a registered trademark of the European Community. (If accompanied by a year, it is when the design was proven.)



The CSA mark is a registered trademark of the CSA International. This instrument complies with Canada: CSA 22.2 No. 61010-1-04.

ISM1-A

This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.

ICES/NMB-001

This is a marking to indicate product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001).



Direct Current.



This is a required mark signifying compliance with an EMC requirement. The C-Tick mark is a registered trademark of the Australian Spectrum Management Agency.



China RoHS regulations include requirements related to packaging, and require compliance to China standard GB18455-2001.



This symbol indicates compliance with the China RoHS regulations for paper/fiberboard packaging.

Safety Considerations

Familiarize yourself with each of the safety considerations before operating the physical layer test system.

NOTE Positioning the Test System for Use

When setting up the test set for use, position the equipment so that the front panel power switch is easy to reach.

NOTE This instrument has been designed and tested in accordance with the standards listed on the Manufacturer's Declaration of Conformity and has been supplied in a safe condition. This instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

Safety Earth Ground

WARNING **This is a Safety Class 1 product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.**

CAUTION Always use the three-prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

Before Applying Power

CAUTION Install the instrument so that the ON/OFF switch is readily identifiable and is easily reached by the operator. The ON/OFF switch or the detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. Alternately, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

CAUTION Before switching on this instrument, make sure that the correct fuse is installed and the supply voltage is in the specified range.

Servicing

WARNING **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.**

WARNING **These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.**

WARNING **The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.**

WARNING **The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply.**

WARNING **For continued protection against fire hazard replace line fuse only with same type and rating (115V and 230V operation: T2.5A 250V). The use of other fuses or material is prohibited.**

General

WARNING To prevent electrical shock, disconnect the Agilent Technologies (N4419B, N4420B, and N4421B) S-parameter test set from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

WARNING If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

CAUTION This product is designed for use in Installation Category II and Pollution Degree 2.

CAUTION VENTILATION REQUIREMENTS: When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4° C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

Regulatory Information

The Agilent Technologies S-Parameter test set complies with the regulatory requirements listed in this section.

EMC

Complies with European EMC Directive 2004/108/EC.

- IEC/EN 61326-2-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11

SAFETY

Complies with European Low Voltage Directive 2006/95/EC.

- IEC/EN 61010-1, 2nd edition
- Canada: CSA C22.2 No. 61010-01-04
- USA: UL std no 61010-1, 2nd edition

Compliance with Canadian EMC Requirements

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme a la norme NMB du Canada.

Compliance with German Noise Requirements

This is to declare that this instrument is in conformance with the German Regulation on Noise Declaration for Machines (Laermangabe nach der Maschinenlaermrrerordnung –3. GSGV Deutschland).

Acoustic Noise Emission/Geraeuschemission	
LpA <70 dB	LpA <70 dB
Operator position	am Arbeitsplatz
Normal position	normaler Betrieb
per ISO 7779	nach DIN 45635 t. 19

Declaration of Conformity

A copy of the Declaration of Conformity is available upon request, or a copy is available on the Agilent Technologies web site at <http://regulations.corporate.agilent.com/DoC/search.htm>.

