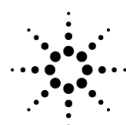


Agilent Technologies U3020AS62

User's and Service Guide



Agilent Technologies

Manufacturing Part Number: U3020-90011

Printed in USA: October 2013

© Copyright Agilent Technologies, Inc. 2013

Warranty Statement

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED "AS IS," AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, AGILENT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. AGILENT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR ANY INFORMATION CONTAINED HEREIN. SHOULD AGILENT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT WILL CONTROL.

DFARS/Restricted Rights Notice

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notes

The following safety notes are used throughout this document. Familiarize yourself with each of these notes and its meaning before performing any of the procedures in this document.

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 product. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

Definitions

- *Specifications* describe the performance of parameters covered by the product warranty (temperature –0 to 50 °C, unless otherwise noted.)
- *Typical* describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.
- *Nominal* values indicate expected performance or describe product performance that is useful in the application of the product, but is not covered by the product warranty.
- *Characteristic Performance* describes performance parameter that the product is expected to meet before it leaves the factory, but is not verified in the field and is not covered by the product warranty. A characteristic includes the same guard bands as a specification.

Contents

U3020AS62

Description	2
Verifying the Shipment	2
General Performance	3
Power Requirements	3
Environmental Tests	3
Dimensions and Space Requirements	4
General RF Switch Specifications	4
RF Channel Performance	5
Front and Rear Panel Features	6
Controlling the Test Set	9
Controlling the Test Set and Making Measurements	9
LAN Connection using Your Companies Intranet	9
Test Set Control Commands	10
Adding Instruments to the LAN Interface	11
Configuring the LAN Interface	11
Locating the Instrument	11
Configuring the GPIB Interface	12
Adding Instruments to the GPIB Configuration	13
Changing the GPIB Address	13
LAN Configuration Commands	13
IP Address Command	13
Auto IP Address Command	14
DHCP Command	14
DNS Command	15
Domain Name Command	15
Gateway Address Command	16
Host Name Command	16
GPIB Address Command	17
Performance Verification	18
Equipment Required	18
Equipment Setup	18
Measurement Setup	19
Service Information	20
Electrostatic Discharge Protection	20
Theory of Operation	21
Test Set System Operation	21
Controller Module and Power Supply	22
39495EXT Module	22
Distribution Board	22
I/O Distribution Board	22
LED Indicator Board	22
Troubleshooting	23
Front Panel Instrument State LEDs	23
Front Panel Input Port LEDs	24
RF Switch is Not Switching	24
Safety and Information	26
Introduction	26
Safety Earth Ground	26
Declaration of Conformity	26
Statement of Compliance	26
Before Applying Power	27
Connector Care and Cleaning Precautions	28

Contents

Regulatory Information	29
Instrument Markings	29
EMC Information	30
Acoustic Noise Emission	30
Safety	30
Agilent Support, Services, and Assistance	31
Service and Support Options	31
Contacting Agilent	31
Shipping Your Product to Agilent for Service or Repair	31

U3020AS62

Description

The Agilent U3020AS62 Test Set is a DC to 26.5 GHz Signal Distribution instrument. The Test Set functionally is a Dual SP6T 6-Port Latching, Terminated switch in which both switches are functionally ganged together. The Test Set mainframe is a rack mountable 2 EIA units high. Switch control is only processed via the LAN or GPIB rear panel interfaces.

Figure 1 **U3020AS62**



Verifying the Shipment

To verify the contents shipped with your product, refer to the “Box Content List” included with the shipment.

Inspect the shipping container. If the container or packing material is damaged, it should be kept until the contents of the shipment have been checked mechanically and electrically. If there is physical damage refer to [“Contacting Agilent” on page 31](#). Keep the damaged shipping materials (if any) for inspection by the carrier and an Agilent Technologies representative.

General Performance

The Test Set performance is specified for a standalone instrument.

CAUTION This product has an autoranging line voltage input. Be sure the supply voltage is within the specified range.

Power Requirements

- 100/120/220/240 VAC (50/60 Hz)
- The instruments can operate with mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage.
- Air conditioning equipment (or other motor-operated equipment) should not be placed on the same ac line that powers the Test Set.
- U3022AS62 maximum power is 50 W.

Environmental Tests

The U3020AS62 complies with all applicable safety and regulatory requirements for the intended location of use.

- Operating Environment (Indoor Use)
- Operating Temperature 0 to 55 °C
- Storage Temperature: -40 to +70 °C
- Operating Altitude: 0 to 2000 meters (~ 6,562 feet)
- The instrument can safely operate in a relative humidity of 80% for temperatures to 31 degrees C, decreasing linearly to 50% relative humidity at 40 degrees C.

Dimensions and Space Requirements

Standard installation of the U3020AS62 includes configuration and installation on a customer provided lab bench, or table top of adequate size and strength.

Table 1 Test Set Dimensions

Item	Length/Weight
Width	42.5 cm (16.73 in)
Depth	58 cm (22.83 in)
Weight	8 kg (17.64 lb)

General RF Switch Specifications

Table 2 Internal RF Switch and Key Parameters

Maximum Input Power Rating	1 Watt (+30 dBm) average into 50 Ohm internal loads.
Switch Life	5 million cycles minimum
Switch Speed	15 ms

RF Channel Performance

Table 3 Typical Performance Characteristics

Amplitude & Phase Response (Port IN to OUT)		
Frequency Range	Insertion Loss (-dB)	Phase Delay (k Deg)
DC to 1.0 GHz	0.5	0.9
1.0 to 6.0 GHz	1.2	5.7
6.0 to 12 GHz	2.0	11.3
12 to 20 GHz	2.5	19.0
20 to 26.5 GHz	3.0	25.0
Amplitude & Phase Tracking, Channel A to B		
Frequency Range	Amplitude Tracking (dB)	Phase Tracking (Deg)
DC to 1.0 GHz	± 0.05	± 0.7
1.0 to 6.0 GHz	± 0.1	± 4.0
6.0 to 12 GHz	± 0.2	± 8.0
12 to 20 GHz	± 0.3	± 13.0
20 to 26.5 GHz	± 0.8	± 18.0
Propagation Delay, Channel A to B		
Frequency Range	Skew (ps)	
0.1 to 6.0 GHz	± 5	
6.0 to 12 GHz	± 6	
12 to 20 GHz	± 8	
20 to 26.5 GHz	± 20	
26.0 to 26.5 GHz	± 40	

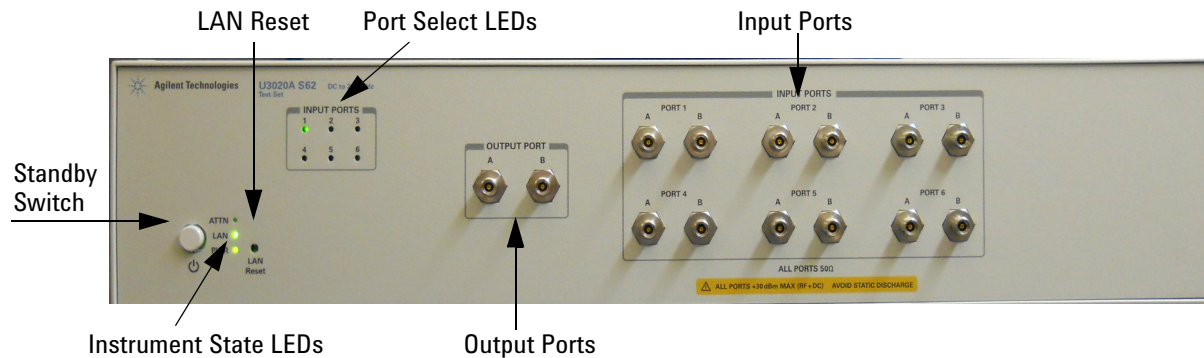
Table 4 Typical Port Match (Return Loss -dB)

Frequency Range	Output Ports A & B	Input Ports 1 to 6	Input Ports 1 to 6 (internal termination)
DC to 1.0 GHz	30	30	32
1.0 to 6.0 GHz	18	18	20
6.0 to 12 GHz	10	10	12
12 to 20 GHz	10	10	11
20 to 26.5 GHz	7	7	8

Front and Rear Panel Features

CAUTION Refer to the standard instrument documentation for damage limits to the ports. Verify that your test setup will not cause those limits to be exceeded.

Figure 2 Front Panel



LAN Reset

The LAN reset button restores the instrument's default LAN configuration.

Port Select LEDs

The LED's indicate the RF Port path that is presently operational, all other port inputs are terminated by an internal 50 Ohm load.

Input/Output Ports

There are two separate signal channels, A and B. Each channel has one output port and six input ports. All connectors are 3.5 mm female.

Instrument State LEDs

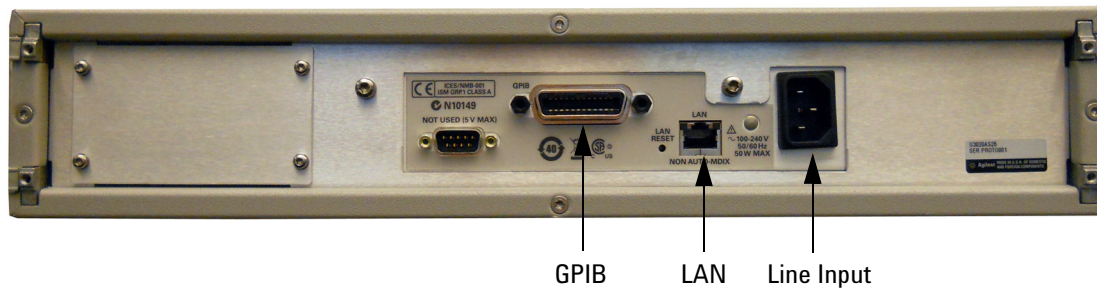
When the power is applied to the U3020AS62, the instrument enters its power-on sequence which requires several seconds to complete. The LEDs provide information on the state of the instrument during power-on and during upgrades of the instrument firmware. [Table 5 on page 7](#) identifies the instrument states based on the color and functioning of the LEDs.

Standby Switch

Note that this switch is Standby only, not a line switch. The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.

Table 5 Instrument State LED Definitions

LED	Color	Instrument State
ATTN LAN PWR	Off Green Green	Instrument in "ready" state LAN connection established - instrument has an IP address firmware download complete
ATTN LAN PWR	flashing flashing Green	Power-on/boot-up. ATTN and LAN will flash red and then green during the power-on self-test.
ATTN LAN PWR	Off Red Green	No LAN connection due to: - disconnected LAN cable - failure to acquire and IP address - waiting for DHCP-assigned address
ATTN LAN PWR	Green (flashing) Green Green	Instrument Busy State - firmware download (LAN LED red if download over GPIB) - lengthy instrument operation in progress
ATTN LAN PWR	Red (flashing) Green Green	Instrument programming error or self-test error. Error queue is read using SYSTem:ERRor?
ATTN LAN PWR	Off Green (flashing) Green	Instrument identification. Activated from instrument Web interface: ON: Turn on Front Panel Interface Indicator OFF: Turn off Front Panel Interface Indicator

Figure 3 Rear Panel**GPIB Connector**

This connector allows the Test Set to be connected directly to a controller.

LAN

The instrument is controlled over Local Area Network (LAN).

Line Input

The line input contains the power cord receptacle.

Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch. Alternatively, 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 Always use the three-prong ac power cord supplied with this product. Failure to ensure adequate grounding by not using this cord may cause damage to the product.

Controlling the Test Set

Controlling the Test Set and Making Measurements

Agilent U3020A is a “slave” instruments. A controller must be used to control the Test Set. There are two methods that can be used to control the Test Set.

- Using LAN connection
- Using GPIB connection

Once the connection between the Controller and the Test Set has been established (LAN or GPIB), the Test Set can be controlled using SCPI commands.

LAN Connection using Your Companies Intranet

Connect the Test Set and your controlling computer to an active instrument LAN line. Open the internet browser application on the computer. Enter this default web address on your browser application:

<http://U3020aS62-xxxx>

The Welcome screen for the instrument should be viewable if the LAN connection is working. Select the following screen control buttons to access the SCPI command control window.

1. Browser Web Connect (control button on the left side of the screen)
2. Allow Full control
3. Commands

NOTE The last four digits in the web address (xxxx) are the last four digits of the instruments serial number.

Once the connection between the controller and the Test Set has been established (LAN or GPIB), the test set can be controlled using SCPI commands. Refer to [Table 6 on page 10](#).

Test Set Control Commands

The Test Set has predefine sequence command sets defined at the factory and stored in the non-volatile memory of the controller module. If the specified sequence name is not currently stored in the memory, due to corrupted program or accidentally deleted, an error will be generated. Refer to the Service section of this manual for instructions to remedy this issue.

Syntax

ROUT:SEQ:TRIGger <command>

Parameters

Refer to [Table 6](#) for commands use to control the Test Set's programmable switches.

Example

The following executed sequence command, "SEL_PORT1", will position the RF switches to create a signal path through Port 1, Input to Output for Channels A and B. All other remaining Port Inputs will be terminated by an internal 50 Ohm load.

ROUT:SEQ:TRIG SEL_PORT1

Table 6 Test Set Control Commands

Commands	Description	comments
SEL_PORT1	Select Port 1 Input of Chan A and B	All unselected Port Inputs are terminated
SEL_PORT2	Select Port 2 Input of Chan A and B	All unselected Port Inputs are terminated
SEL_PORT3	Select Port 3 Input of Chan A and B	All unselected Port Inputs are terminated
SEL_PORT4	Select Port 4 Input of Chan A and B	All unselected Port Inputs are terminated
SEL_PORT5	Select Port 5 Input of Chan A and B	All unselected Port Inputs are terminated
SEL_PORT6	Select Port 6 Input of Chan A and B	All unselected Port Inputs are terminated
TERM_ALL_INPUTS	Terminate all Input Ports (50 Ohm)	Output Ports are not terminated
LED_ALL	All LEDs ON	Diagnostic Check
LED_OFF	All LEDs OFF	Diagnostic Check

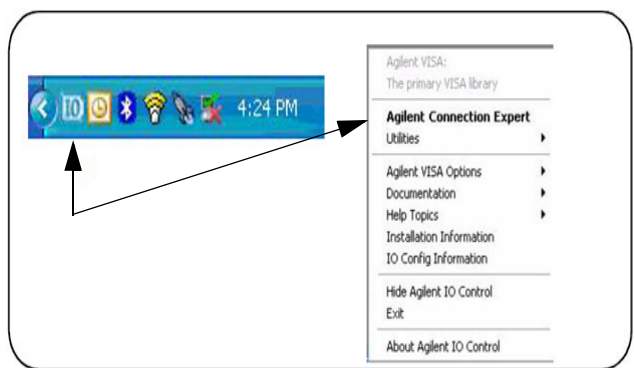
Adding Instruments to the LAN Interface

This section contains information to configure the U3020A LAN and using Agilent IO Libraries “Connection Expert Utility.”

Configuring the LAN Interface

1. Connect the Test Set to the PC.
2. Turn On the Test Set.
3. Select **IO Control** icon > **Agilent Connection Expert** from the application window.

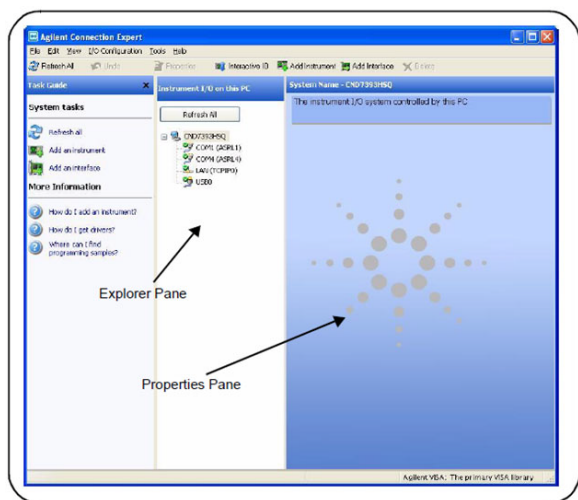
Figure 4 Agilent Connection Expert



Locating the Instrument

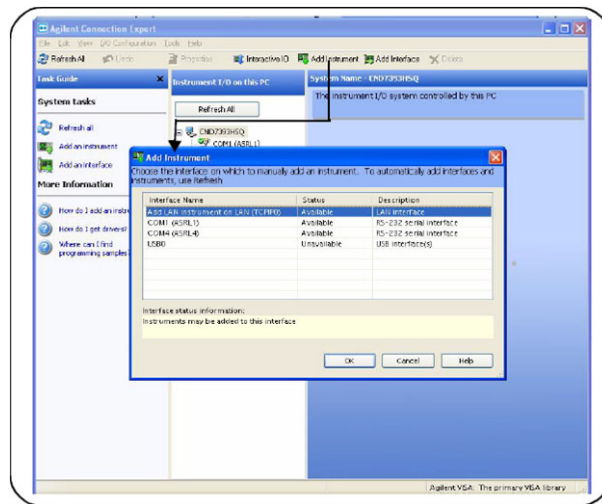
Agilent Connection Expert opens with a “Welcome Screen,” and a window similar to that shown in Figure 4. The available computer interfaces are configured during installation of the Agilent IO Libraries and are displayed in the left column (Explorer Pane). The properties of the configured interface are displayed in the right column (Properties Pane).

Figure 5 Explorer and Properties Pane



1. Click **Add Instrument** on the tool bar to search the network for instruments.
2. Select **Add LAN Instrument on LAN (TCPIP0) > OK**. Agilent Connection Expert performs an automatic find of all instruments on the same subnet as the computer.
3. Select the desired instruments from the list and click **OK**. Communication paths to the instruments are verified and the instruments are added to the configured interface.

Figure 6 Adding Instruments

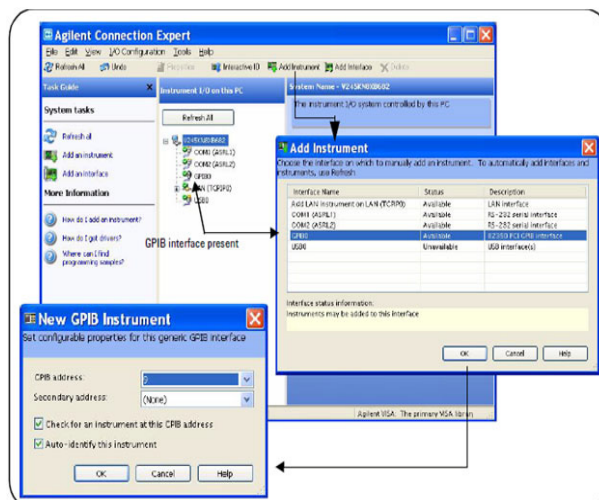


Configuring the GPIB Interface

Programming access to the Test Set is also available through the instrument's GPIB interface. The GPIB connector is located on the rear panel of the instrument.

1. Select the **Agilent Control** icon > **Agilent Connection Expert**. If a GPIB card is installed in your computer, the GPIB interface was configured during installation of the IO libraries and is displayed in the Explorer Pane of the "Welcome" Screen.

Figure 7 Agilent Connection Expert



Adding Instruments to the GPIB Configuration

1. Select **Add Instrument** on the tool bar.
2. Select **GPIB Interface > OK**.
3. Select **U3020A's Address** in the GPIB address drop-down list > **OK**.
(Factory set address = 26)

Changing the GPIB Address

The U3020A GPIB address can only be changed programmatically. The GPIB address command is:

```
SYSTem:COMMunicate:GPIB:ADDRes <address>
```

When the address is changed, the new GPIB address is *not* updated in the Agilent Connection Expert if the instrument was previously configured.

1. From the Agilent Connection Expert application window, highlight the instrument that's address was changed and click **Change Properties** in the Configurable Properties application window, change the address to the new address setting and select **OK**.

LAN Configuration Commands

IP Address Command

This command assigns a static Internet Protocol (IP) address for the U3020A. Contact your network administrator for the valid IP address to use for your instrument.

NOTE If you change the IP address, you must cycle power on the U3020A to activate the new address.

Syntax

```
SYSTem:COMMunicate:LAN:IPADdress <address>
```

```
SYSTem:COMMunicate:LAN:IPADdress?
```

You can also queries the U3020A for the IP address it was assigned to.

Example

The following command sets the IP address:

```
SYST:COMM:IPAD 169.254.149.35
```

The following query returns the IP address currently being used by the instrument (quotes are also returned).

```
SYST:COMM:LAN:IPAD?
```

Typical Response: "169.254.149.35"

Auto IP Address Command

This command disable or enable the use of Auto-IP standard to automatically assign an IP address to the U3020A when on a network that does not have DHCP servers.

Syntax

```
SYSTem:COMMunicate:LAN:AUTOip {OFF|0|ON|1}
```

```
SYSTem:COMMunicate:LAN:AUTOip?
```

Example

The following command disable the Auto-IP:

```
SYST:COMM:LAN:AUTOIP OFF
```

The following query returns the current Auto-IP setting:

```
SYST:COMM:LAN:AUTOIP?
```

Typical Response: 0

DHCP Command

This command disables or enables the use of the Dynamic Host Configuration Protocol (DHCP).

Syntax

```
SYSTem:COMMunicate:LAN:DHCP {OFF|0|ON|1}
```

```
SYSTem:COMMunicate:LAN:DHCP?
```

When DHCP is enable (factory setting), the instrument will try to obtain an IP address from the DHCP server. If a DHCP server is found, it will assign a Dynamic IP address, Subnet Mask, and Default Gateway to the instrument.

When the DHCP is disable or unavailable, the instrument will use the Static IP address, Subnet Mask, and Default Gateway during power-on.

NOTE If you change the DHCP setting, you must cycle power on the U3020A to activate the new setting.

Example

The following command disables DHCP:

```
SYST:COMM:LAN:DHCP OFF
```

The following query returns the current DHCP setting:

```
SYST:COMM:LAN:DHCP?
```

Typical Response: 0

DNS Command

This command assigns the IP address of the Domain Name System (DNS) server. Contact your network administrator to determine if DNS is being used and for the correct address.

Syntax

```
SYSTem:COMMunicate:LAN:DNS <address>
```

```
SYSTem:COMMunicate:LAN:DNS?
```

NOTE If you change the DNS address, you must cycle power on the U3020A to activate the new address.

Example

The following command sets the DNS address:

```
SYST:COMM:LAN:DNS 198.105.232.4
```

The following query returns the DNS address currently being used by the instrument (the quotes are also returned).

```
SYST:COMM:LAN:DNS?
```

Typical Response: "198.105.232.4"

Domain Name Command

This command assigns a Domain Name to the U3020A. The Domain Name is translated into an IP address.

Syntax

```
SYSTem:COMMunicate:LAN:DOMain "<name>"
```

```
SYSTem:COMMunicate:LAN:DOMain?
```

NOTE If you change the Domain Name, you must cycle power on the U3020A to activate the new address.

Example

The following command defines the Domain Name:

```
SYST:COMM:LAN:DOM www.agilent.com
```

The following query returns the Domain Name currently being used by the instrument:

```
SYST:COMM:LAN:DOM?
```

Typical response: www.agilent.com

Gateway Address Command

This command assigns a Default Gateway for the U3020A. The specified IP Address sets the Default Gateway which allows the instrument to communicate with systems that are not on the local subnet. Thus, this is the Default Gateway where packets are sent which are destined for a device not on the local subnet, as determined by the Subnet Mask setting. Contact your network administrator to determine if a gateway is being used and for the correct address.

Syntax

```
SYSTem:COMMunicate:LAN:GATEway <address>
```

```
SYSTem:COMMunicate:LAN:GATEway?
```

Example

The following command sets the Default Gateway address:

```
SYST:COMM:LAN:GATEWAY 255.255.20.11
```

The following query returns the Default Gateway address currently being used by the instrument (the quotes are also returned).

```
SYST:COMM:LAN:GATEWAY?
```

Typical Response: "255.255.20.11"

Host Name Command

This command assigns a Host Name to the U3020A. The Host Name is the host portion of the domain name, which is translated into an IP address.

Syntax

```
SYSTem:COMMunicate:LAN:HOSTname "<name>"
```

```
SYSTem:COMMunicate:LAN:HOSTname?
```

NOTE If you change the Domain Name, you must cycle power on the U3020A to activate the new address.

Example

The following command defines a Host Name:

```
SYST:COMM:LAN:HOST "U3020AS62-0001"
```

The following query returns the Host Name currently being used by the instrument (the quotes are also returned):

```
SYST:COMM:LAN:HOST?
```

Typical Response: "U3020AS62-0001"

GPIB Address Command

GPIB Address Command Description

This command assigns a GPIB address to the U3020A.

Syntax

```
SYSTem:COMMunicate:GPIB:ADDRess <address>
```

```
SYSTem:COMMunicate:GPIB:ADDRess?
```

NOTE If you change the GPIB address, you must cycle power on the U3020A to activate the new address.

Example

The following command sets the GPIB address to 10:

```
SYST:COMM:GPIB:ADDR 10
```

The following query returns the current GPIB address:

```
SYST:COMM:GPIB:ADDR?
```

Typical Response: 10

NOTE For a complete list of SCPI commands, refer to the Agilent L449xA RF Switch Platform User's Guide (L4490-90001).

Performance Verification

The following procedure will confirm that the Test Set is functional.

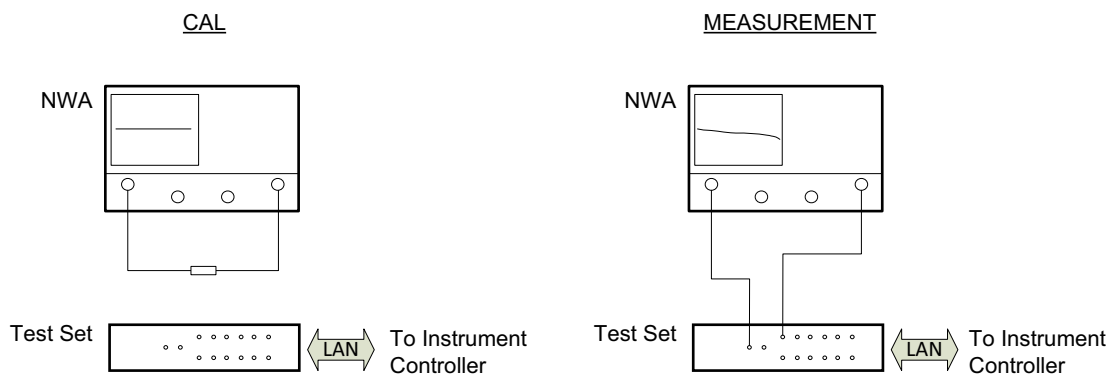
Equipment Required

- Working LAN System
- PNA Network Analyzer with up to 26.5 GHz frequency range
- RF coaxial cables with 3.5 mm connectors

Equipment Setup

1. Configure PNA and Test Set as shown in Figure 7
2. Turn On the PNA and Test Set.
 - The Test Set LED Indicators should indicate the following after 1 minute:
 - ATTN - OFF
 - LAN - ON
 - PWR - ON
3. Preset the PNA.
4. PNA frequency range: 10 MHz to 26.5 GHz.
5. Set the PNA to Measure S21, Scale to 5 dB/Div.

Figure 8 **Equipment Setup**



Measurement Setup

1. Cal S21 as shown above by connecting the two RF cable using a 3.5 mm female to female adapter.
2. Normalize the displayed response trace on the PNA.
3. Remove the 3.5 mm adapter from the setup.
4. Connect the PNA Port 1 cable to the Test Set Output Port A.
5. Connect the PNA Port 2 cable to the Test Set Input Port 1 A.
6. Establish control of the Test Set with the controller via the LAN connection.
7. Execute the sequence command <ROUT:SEQ:TRIG SEL_PORT1> to select Port 1.
 Figure 9 is representation of the S21 response trace. Markers shown are not provided in the procedure above. Refer to Table 3 on page 5 for typical Insertion Loss values.
8. To verify each Input A Port to 2A through 6A, move the PNA Port 2 cable to each Input A port, and execute the corresponding sequence command <ROUT:SEQ:TRIG SEL_PORTx> to select Port x.
9. To verify each Input B Port to 1B through 6B, connect the PNA Port 1 cable to test set Output Port B connector.
10. Connect the PNA Port 2 cable to each Input B port, and execute the corresponding sequence command <ROUT:SEQ:TRIG SEL_PORTx> to select Port x.

Figure 9 Typical S21 Response Plot



Service Information

There are many other repair and calibration options available from the Agilent Technologies support organization. The options cover a range of service agreements with varying response times. Contact Agilent for additional information on available service agreements for this product.

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.

Electrostatic Discharge Protection

Electrostatic discharge (ESD) can damage or destroy electronic components. The instrument is shipped in materials that prevent damage from static, and should only be removed from the packaging in an anti-static area ensuring that the correct anti-static precautions are taken.

Two types of ESD protection are listed below. Purchase acceptable ESD accessories from your local supplier.

- Conductive table-mat and wrist-strap combination
- Conductive floor-mat and heel-strap combination

Both types, when used together, provide a significant level of ESD protection. To ensure user safety, static-safe accessories must provide at least 1 MW of isolation from ground.

Theory of Operation

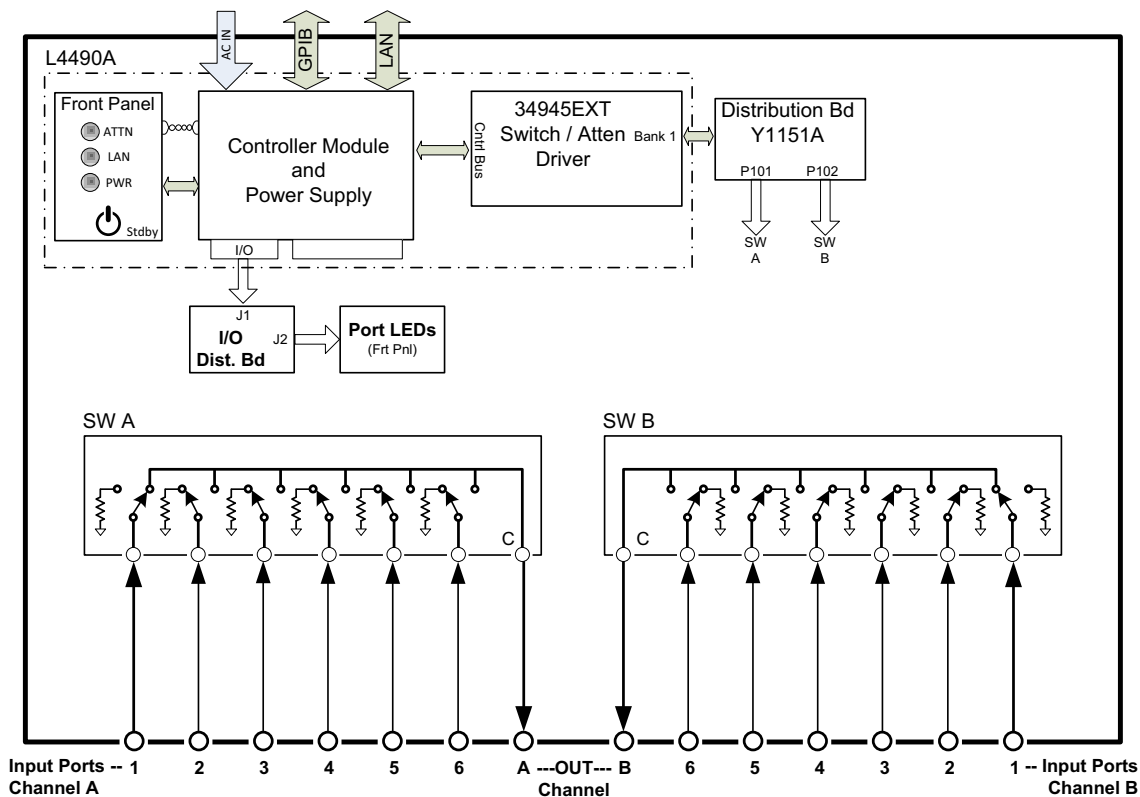
This section provides a general description of the U3020AS62 Test Set, followed by a more detailed operating theory. The operation of each component group is briefly described to the assembly level only.

NOTE If you need to disassemble the instrument, be sure to work at an antistatic workstation and use a grounded wrist strap to prevent damage from electrostatic discharge (ESD). See [“Electrostatic Discharge Protection”](#) on page 20.

Test Set System Operation

Figure 10 illustrates the components and interconnects of the Test Set. The main function of this Test Set is Dual Channel Signal Distribution. The Test Set consists of six main components: a controller module, a 39495EXT module, distribution board for RF switches, two SP6T RF switches and a front panel LED indicator. There are no adjustments required for the Agilent U3020AS62 Test Set.

Figure 10 Test Set Block Diagram



Controller Module and Power Supply

Inside the controller module there are two main components, the AC-DC power supply and controller board. The AC-DC power supply is a 12V/65W power supply that is converted to various voltages by means of DC-DC converter inside the module. It provides regulated voltages to all assemblies in the Test Set. The internal DC voltage has the following nominal specification:

- +24 V
- +12 V
- +5 V

The controller board is the “brain” of the Test Set, it handles all the communication between the Controller and the Test Set via LAN or GPIB connectivity.

39495EXT Module

This module provides the bias and control signals for the RF Switches.

Distribution Board

The Distribution board (Y1151A) provides a passive control signal interface between the 34945EXT module and the RF Switches.

I/O Distribution Board

The I/O Distribution board provides a passive control signal interface between the controller module I/O port and the front panel Port LED board.

LED Indicator Board

This board provides an LED indication of the Port setting in the Test Set. The LED indicator board is driven by the digital IO of the Test Set.

Troubleshooting

This section contains information for troubleshooting the Test Set to the assembly level only. By following these procedures, you may determine if the power supply, front panel, or main switch board needs replacing. Refer to [Figure 10 on page 21](#) as an aid in troubleshooting.

NOTE If you need to disassemble the instrument, be sure to work at an antistatic workstation and use a grounded wrist strap to prevent damage from electrostatic discharge (ESD).

Front Panel Instrument State LEDs

If you suspect a problem with the Instrument State or Input Port LEDs, first refer to the status definitions in [Table 5 on page 7](#) before proceeding. Note that with only a power cable connected to the rear panel of the Test Set, the PWR LED = Green and LAN LED = Red.

1. If the green PWR LED is OFF after depressing the front panel button continue with the following procedure:
 - a. Remove the top cover of the instrument.
 - b. Ensure that the ribbon cable and 2-wire connector are properly in place.
 - c. Measure the DC voltage between the red and black wires. The red wire should measure approximately +12 Vdc.
 - d. If the +12 Vdc is not present on the red wire, measure the three labeled output power supply voltages on the controller module at the green connector.
 - e. If any voltages are not present, the controller module power supply will need to be replaced.
2. If the green PWR LED is 'ON' after depressing the front panel button and the LAN LED is OFF continue with the following procedure:
 - a. Remove the top cover of the instrument.
 - b. Ensure that the ribbon cable and 2-wire connector are properly in place.
 - c. Measure the DC voltage between the red and black wires. The red wire should measure approximately +12 Vdc.
 - d. If any voltages are not present, the controller module power supply will need to be replaced.

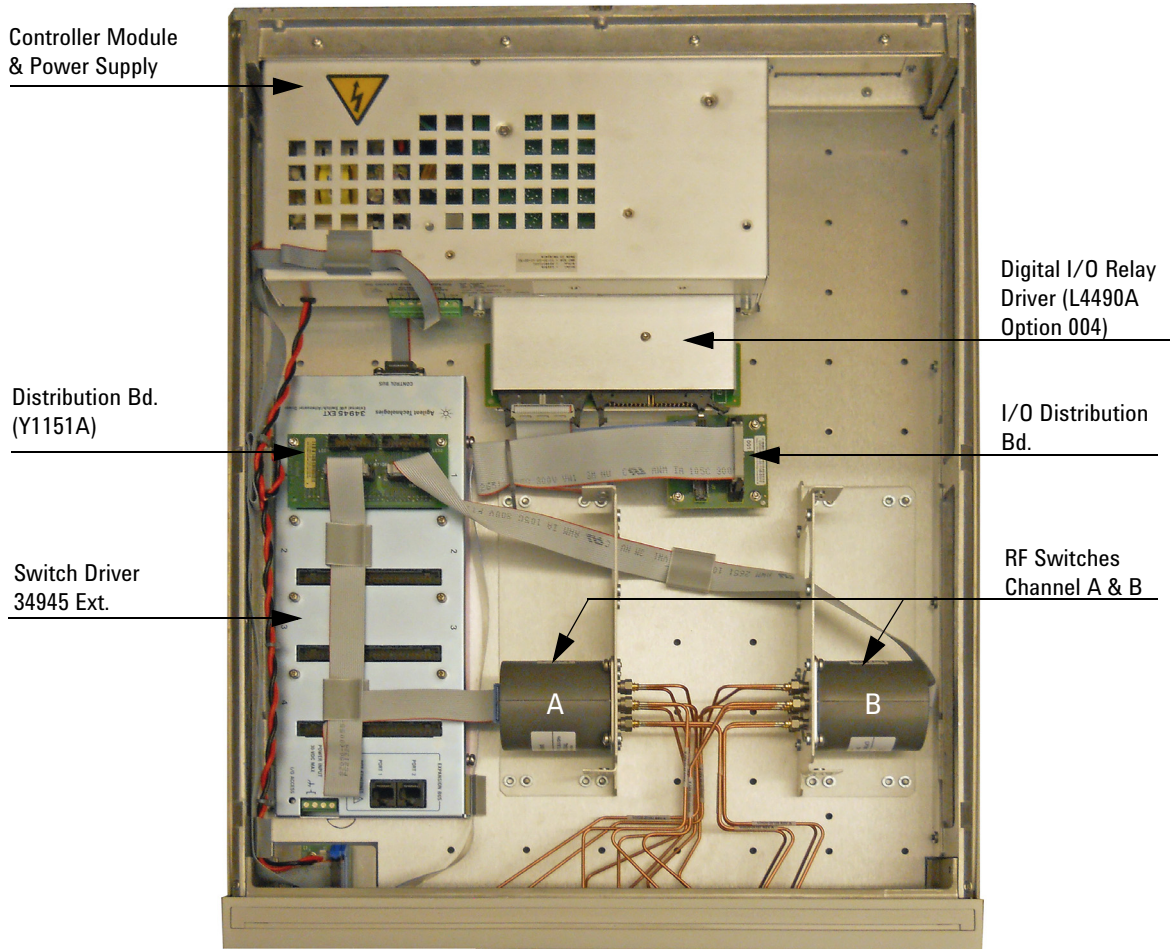
Front Panel Input Port LEDs

1. If the Input Port LEDs do not operate when you have executed a Port Selection command on the Test Set continue with the following procedure:
 - a. If you have determined that the RF switch is operating, either by an audible sound or by an RF Input to Output port measurement, remove the top cover of the instrument.
 - b. Ensure that the two ribbon cables going from the Controller Module I/O port to the front panel LED board are properly in place.
 - c. Measure the three labeled output power supply voltages on the Controller Module at the green connector.
 - d. If any voltages are not present, the Controller Module Power Supply will need to be replaced.
 - e. If the Power Supply voltage are all present, suspect the front panel Input Port LED board or the Controller Module I/O section.

RF Switch is Not Switching

1. If the RF Switches are not operating continue with the following procedure:
 - a. Determine if you can hear an audible switching sound.
 - b. If an audible sound is heard, but the switch is not being properly control in order for the correct Port to be selected, it is possible that the instrument Power On preset set has been corrupted.
 - c. Contact Agilent Technologies for support in recovering this preset set.
 - d. If no audible sound is heard, remove the top cover of the instrument.
 - e. Insure that the ribbon cable connections at the distribution board and switch are properly in place.
 - f. Measure the three labeled output power supply voltages on the Controller Module at the green connector.
 - g. If any voltages are not present, the Controller Module Power Supply will need to be replaced.

Figure 11 **Top View**



Safety and Information

Introduction

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the instrument.

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Safety Earth Ground

WARNING This is a Safety Class I Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall be only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product 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 and the risk of electrical shock.

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>

Statement of Compliance

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Before Applying Power

Verify that the premises electrical supply is within the range of the instrument. The instrument has an autoranging power supply.

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 The Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure, to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.

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

CAUTION Before switching on this instrument, make sure the supply voltage is in the specified range.

CAUTION Verify that the premise electrical voltage supply is within the range specified on the instrument.

CAUTION Ventilation Requirements: When installing the instrument in a cabinet, the convection into and out of the instrument 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, forced convection must be used.

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 Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to manufacturer's instructions.

WARNING For continued protection against fire hazard replace line fuse only with same type and rating. The use of other fuses or material is prohibited.

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 the user to dangerous voltages. Disconnect the instrument from all voltage sources before opening.

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

WARNING The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device).

Connector Care and Cleaning Precautions

Remove the power cord to the instrument. To clean the connectors use alcohol in a well ventilated area. Allow all residual alcohol moisture to evaporate, and fumes to dissipate prior to energizing the instrument.

WARNING To prevent electrical shock, disconnect the [Agilent Technologies U3020AS62](#) from mains electrical supply 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 flammable cleaning materials are used, the material shall not be stored, or left open in the area of the equipment. Adequate ventilation shall be assured to prevent the combustion of fumes, or vapors.

Regulatory Information

This section contains information that is required by various government regulatory agencies.

Instrument Markings



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 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 in the STANDBY 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 (CISPR 11, Clause 54)

ICES/NMB-001

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

IP 2 0

The instrument has been designed to meet the requirements of IP 2 0 for ingress and operational environment.



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.



Indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.



This symbol on all primary and secondary packaging indicates compliance to China standard GB 18455-2001.



Korean Certification (KC) mark. Must include the marking's identifier code (Agilent product specific) as follows: KCC-REM-ATi-WNANALYZERF01

EMC Information

Complies with European EMC Directive 2004/108/EC

- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- This ISM device complies with Canadian ICES-001
Cet appareil ISM est conforme a la norme NMB du Canada

Acoustic Noise Emission

- LpA<70 dB
- Operator Position
- Normal Operation
- Acoustic Per ISO 7779

Safety

Complies with European Low Voltage Directive 2006/95/EC

- IEC/EN 61010-1, 2nd Edition
- Canada: CSA C22.2 No. 61010-1-04
- USA: UL std no. 61010-1, 2nd Edition
- Acoustic statement (European Machinery Directive 2022/42/EC, 1.7.4.2U)

Agilent Support, Services, and Assistance

Service and Support Options

There are many other repair and calibration options available from the Agilent Technologies support organization. These options cover a range of service agreements with varying response times. Contact Agilent for additional information on available service agreements for this product.

Contacting Agilent

Assistance with test and measurements needs and information or finding a local Agilent office are available on the Web at:

<http://www.agilent.com/find/assist>

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

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

Shipping Your Product to Agilent for Service or Repair

IMPORTANT Agilent Technologies reserves the right to reformat or replace the internal hard disk drive in your analyzer as part of its repair. This will erase all user information stored on the hard disk. It is imperative, therefore, that you make a backup copy of your critical test data located on the analyzer's hard disk before shipping it to Agilent for repair.

If you wish to send your instrument to Agilent Technologies for service or repair:

- Include a complete description of the service requested or of the failure and a description of any failed test and any error message.
- Remove and retain the front handles and all rack mount hardware. The analyzer should be sent to Agilent in the same configuration as it was originally shipped.
- Ship the analyzer using the original or comparable antistatic packaging materials.
- Contact Agilent for instructions on where to ship your analyzer.

