

Keysight N1900 Series Physical Layer Test Systems

N1930B Physical Layer Test System Software
which supports VNA-Based and TDR-Based
Physical Layer Test System Hardware

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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 [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.
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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.
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Documentation Map



The online Help files are in the PLTS software, offering quick reference to user documentation. Click **Help** on the menu bar.



This *Installation Guide* helps you to with PLTS software and hardware installation.

PLTS Documentation Online

All PLTS documentation, including the very latest online version of the PLTS Help file, can be found at: <http://na.support.keysight.com/plts/help>

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1 Installing the VNA-Based Physical Layer Test System Hardware

The Physical Layer Test System (PLTS) consists of the following items:

- Personal computer (PC)
- VNA-based system (Network analyzer and S-parameter test set)
- PLTS software

The installation procedure in this chapter will lead you through setting up the hardware (the PC and the VNA-based system). After that is complete, you will refer to [Installing the PLTS Software](#) to install the software.

NOTE If you have the TDR-based PLTS system, refer to [Installing the TDR-Based Physical Layer Test System Hardware](#) for instructions on setting up that system.

This installation procedure will lead you through a series of steps to set up your PLTS hardware. The following is a list of the installation steps:

- Step 1. Set Up the Personal Computer
- Step 2. Verify your System Shipment
- Step 3. Set Up the Network Analyzer
- Step 4. Attach the Test Set to the Network Analyzer (N4420B or N4464A/B Test Set Only)
- Step 5. Install the S-Parameter Test Set on a Bench Top or in an Equipment Rack
- Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer
- Step 7. Set Up the General Purpose Interface Bus (GPIB)
- Step 8. Power up the Physical Layer Test System

NOTE These installation instructions were written specifically for customers who have just received their PLTS. If you have already been using our S-parameter test set and its corresponding network analyzer, you have probably completed most of these installation steps. Review these installation steps to ensure that your system is currently set up as recommended. Then, begin the software installation process by starting at [Installing the PLTS Software](#).

Step 1. Set Up the Personal Computer

Step 1. Set Up the Personal Computer

1. Make sure that your PC meets the following minimum system controller requirements:

Table 1-1 Minimum PC Requirements by PLTS Modes of Operation

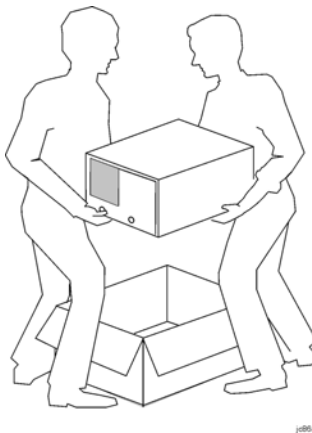
PC Requirement	Measurement Mode ONLY	Off-Line Analysis Mode
	In the lab, controlling test equipment and making quick analysis of the results.	In your office, performing “What if...” analysis, characterization, cross-domain analysis, filtering, waveform math, and eye diagram simulation
CPU	1.5 GHz Quad-core	1.5 GHz Quad-core
Main Memory	4 GB	4 GB+
Virtual Memory ^a	6 GB+	6 GB+
GPIO Interface	Keysight 82357A USB/GPIB Interface for Windows or supported GPIB card (any National Instruments or Keysight 82340/41 or 82350 GPIB card)	No GPIB connection is required to utilize PLTS in the off-line mode. Saved (stored) measurement files can be recalled at any time for analysis.
Operating Systems	Windows 7 (64 bit with service pack 1), Windows 10 (64 bit)	Windows 7 (64 bit with service pack 1), Windows 10 (64 bit)
Screen Resolution	1280 x 1024 or greater required	
Display Colors	High Color (16 Bit) or greater	

a. As a general rule for optimum PC performance when using PLTS, virtual memory should be 1.5 to 2 times the size of the main memory.

2. Using the PC documentation, make sure that the PC is operating properly.
3. Make sure the GPIB card is installed in the PC and that it is operating properly.
4. Make sure the PC is located near where you will position the Physical Layer Test System (PLTS). Later in this process, you will connect the GPIB card to the PLTS using a GPIB cable.

Step 2. Verify your System Shipment

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



WARNING The test system hardware is heavy. Use proper lifting techniques. The network analyzer can weigh between 53 lb. (24 kg) and 64 lb. (29 kg). The test set can weigh as much as 20 lb. (9 kg).

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

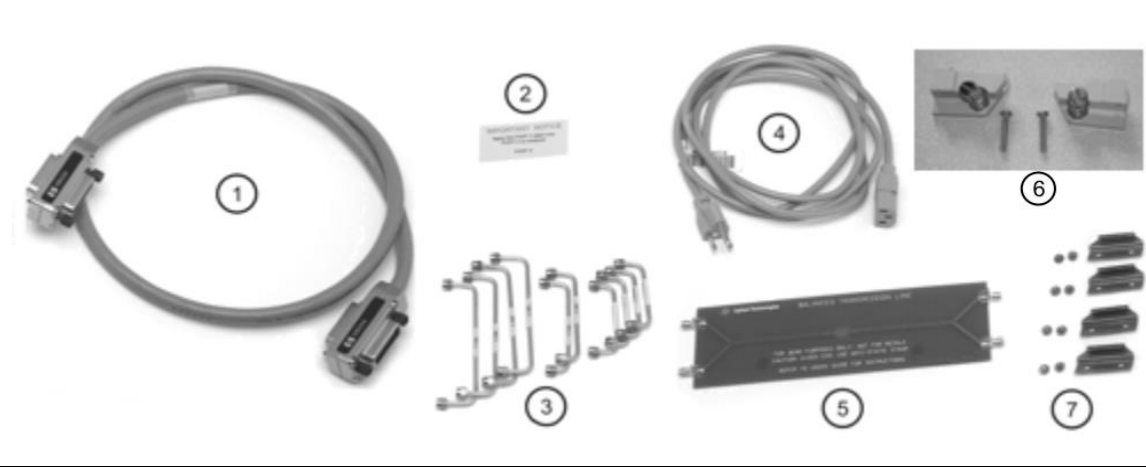
NOTE If your test system was damaged during shipment, contact Keysight Technologies. Refer to [Contacting Keysight](#).

3. Verify that your test set is compatible with your network analyzer and its installed options. To see supported test sets and network analyzers, visit www.keysight.com/find/plts. If the installed options are not compatible, contact us before proceeding. Refer to [Contacting Keysight](#).

Note: Support for most ECal modules requires PNA firmware revision 4.83. Type “ECal” in the PLTS online help index for more information.

Step 2. Verify your System Shipment

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



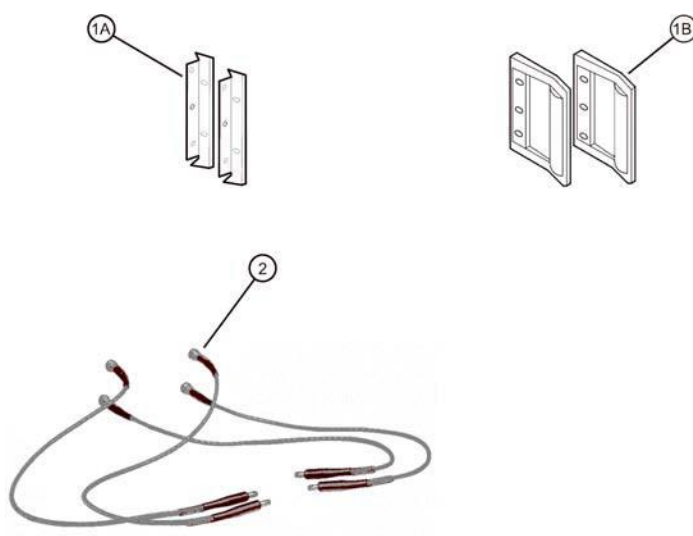
Item Nr	Part Number	Part Description
1	8120-3445	GPIB Cable (3 feet)
2	N/A	"Port 3" Label
3	Varies by Test Set Model and Option	Semirigid interconnect cables (refer to Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer for the appropriate number of cables)
4	Unique to country	AC Power Cord (for the test set)
5	AD00658	Balanced Transmission Line PC Board Device (Sample DUT)
6	5023-0132	2 Rear Locking Feet with captive screws (N4420B, N4421A/B only) (With 2 Screws)
7	5063-9253	4 Lock Links (N4420B, N4421A/B only) with 8 screws (0515-1499)

To order a kit that contains items 6 and 7, use part number N4421-60001.

Installing the VNA-Based Physical Layer Test System Hardware

Step 2. Verify your System Shipment

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

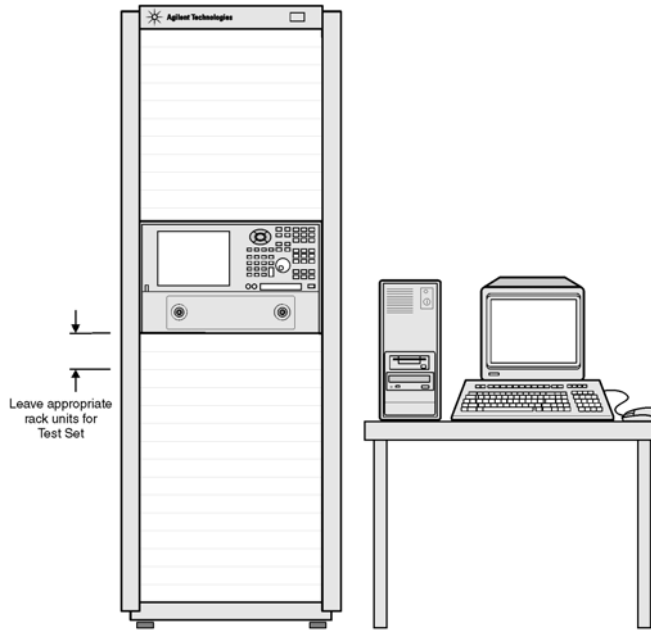
		
Option Number	Item Number	Part Description
1CP	1A 1B	Rack mount flange kit (For use with handles) Handles (set of 2)
B20	2	Precision 50-ohm cables (4)
Other Calibration Kits		
N/A	Not Shown	85033E 3.5mm Calibration Kit (0 Hz (dc) - 9 GHz) ¹ 85052D 3.5mm Economy Calibration Kit (0 Hz (dc) - 26.5 GHz) ¹ 85056A 2.4mm Precision Calibration Kit (0 Hz (dc) - 50 GHz) ¹ 85050C 7 mm Precision Calibration Kit (0 Hz (dc) - 18 GHz) ²

¹ Kit for SOLT Calibration; ² Kit for TRL Calibration

Step 3. Set Up the Network Analyzer

Step 3. Set Up the Network Analyzer

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



NOTE

For the N4420B or N4421A/B test set, connect the network analyzer to the test set before placing in the rack as a single unit on one set of rails. Refer to [Step 4. Attach the Network Analyzer to the Test Set](#) for instructions.

Step 4. Attach the Network Analyzer to the Test Set (N4420B or N4421A/B Test Set Only)

If your test set is *not* an N4420B, an N4421A, or an N4421B, continue with **Step 5. Install the Test System on a Bench Top or in an Equipment Rack**.

The compatible network analyzers are attached to the N4420B and N4421A/B test sets using lock links at the front and locking feet at the rear. This hardware is supplied with the test set. Other network analyzers are **not** attached to test sets (N4415A, N4416A, N4417A, N4418A, and N4419A/B) using this hardware.

Preparing the Network Analyzer

1. Remove the four feet from the bottom of the network analyzer.



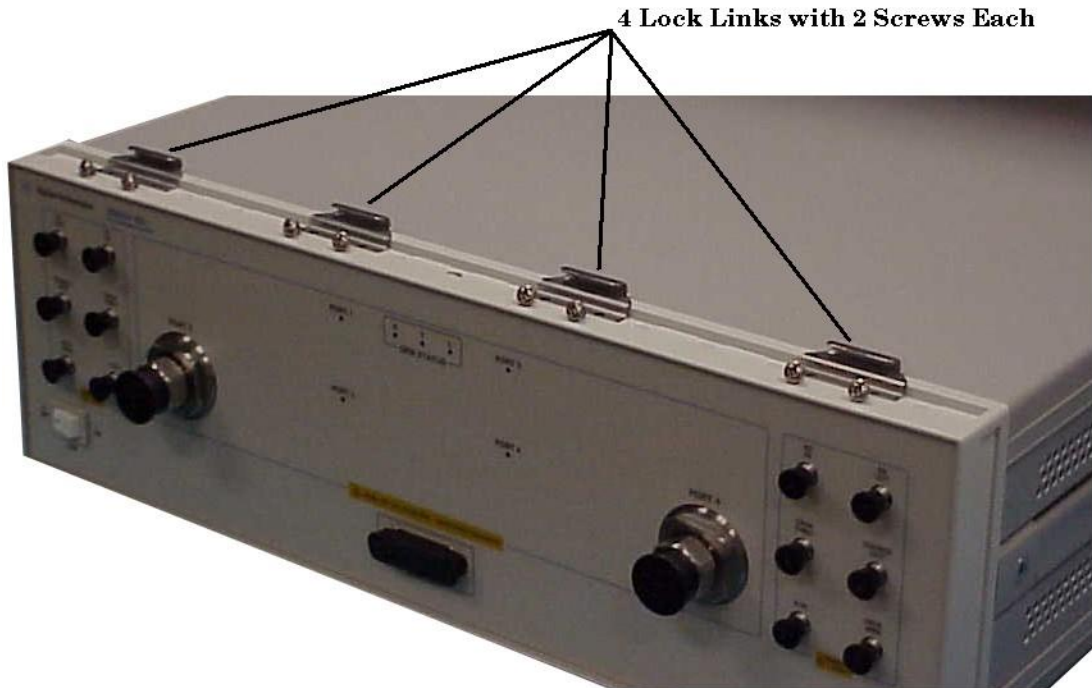
2. Remove the screws from the two lower rear panel standoffs.
3. Install the two rear locking feet where the standoffs were removed. Part number 5023-0132 includes two pieces which are NOT interchangeable.. One piece is for the right side and the other for the left side. The locking feet may require GENTLE tapping with a hammer to seat properly. Use the two longer screws to secure the feet to the analyzer. Do NOT tighten the screws.

Step 4. Attach the Network Analyzer to the Test Set

Preparing the Test Set

4. Remove the trim strip from the top of the front frame.
5. Install the four lock links to the top of the front frame using eight screws.

Lock Link Installation

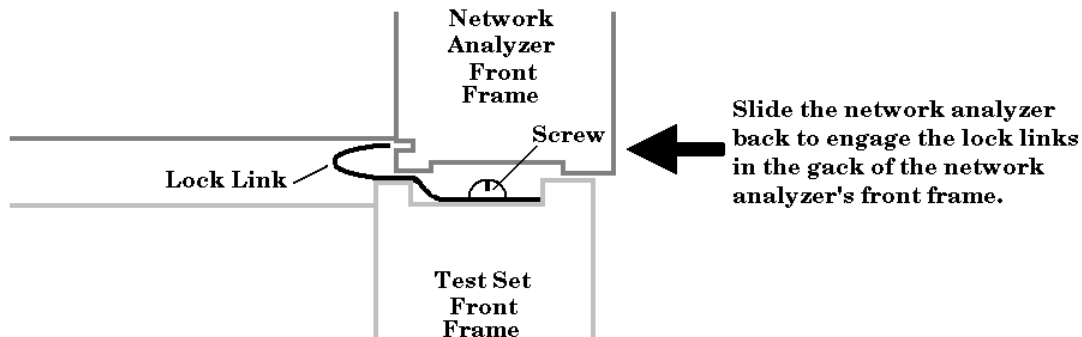


Attaching the Network Analyzer to the Test Set

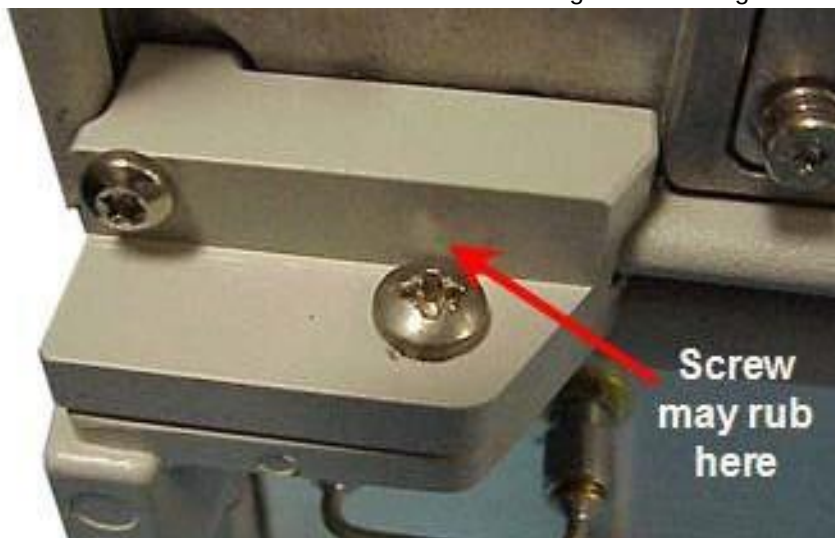
6. Place the network analyzer on top of the test set ensuring that the front frame of the network analyzer is positioned slightly forward of the lock links that are attached to the the test set. Then slide the network analyzer back so the lock links engage the front frame of the analyzer.

Step 4. Attach the Network Analyzer to the Test Set

Making the Lock Link Connection



7. Secure the network analyzer's lower locking feet to the test set's upper locking feet by inserting the shorter two screws between the two pairs of locking feet, one on each side of the instrument as shown below. **NOTE:** The screw may rub against the locking feet attached to the analyzer. This is normal and does not detract from the strength of the fitting.



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

8. Tighten all screws.

Step 5. Install the Test System on a Bench Top or in an Equipment Rack

Step 5. Install the Test 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 [21](#).
- **For equipment rack installation**, continue on page [22](#).

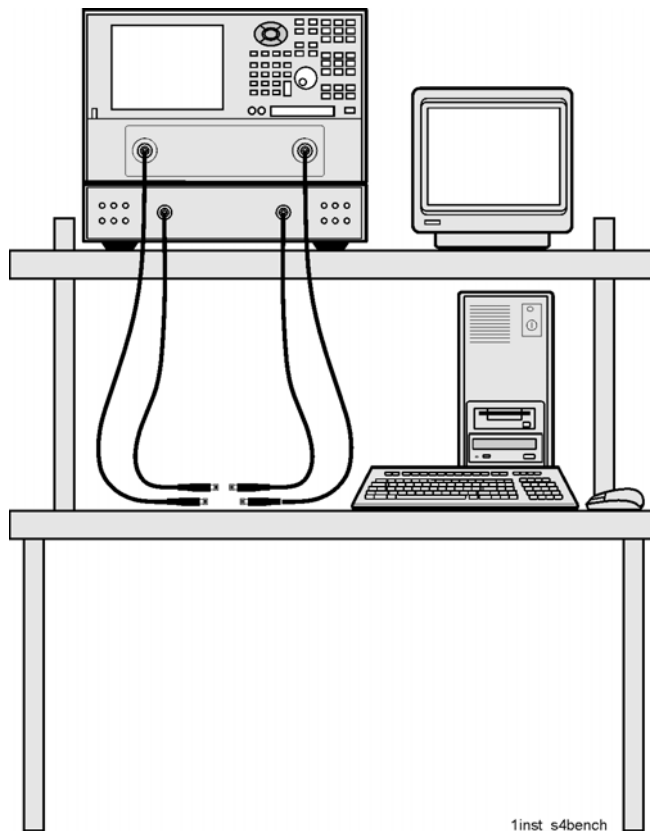
Installing the VNA-Based Physical Layer Test System Hardware

Step 5. Install the Test System on a Bench Top or in an Equipment Rack

To Install on a Bench Top

1. Place the test set and the network analyzer 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 20 when selecting the location of your system.

2. Continue with **Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer.**

Step 5. Install the Test System on a Bench Top or in an Equipment Rack

To Install in an Equipment Rack

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

Removing Feet from VNA	Leaving Feet attached to VNA
1. Install one set of rails into the equipment rack 2. Remove feet from Test Set and VNA 3. Attach mount flanges and the handles to Test Set 4. Attach mount flanges and the handles to VNA 5. Insert test set on rails in equipment rack and screw to rack 6. Place VNA on top of test set and screw VNA into rack 7. Bend Semi rigid interconnect cables to fit between the test set connector and the VNA connector 8. Connect semirigid between test set and VNA	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 VNA 5. Insert test set on rails in equipment rack and screw to rack 6. Place VNA on top of test set 7. Connect semirigid between test set and VNA

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
• 4 Screws • 2 Side Trim Strip • 2 Handles • Installation Instructions	• 4 Screws (Long) • 4 Screws with Washers • 4 Nuts with Metal Clips • 2 Flanges • Installation Instructions

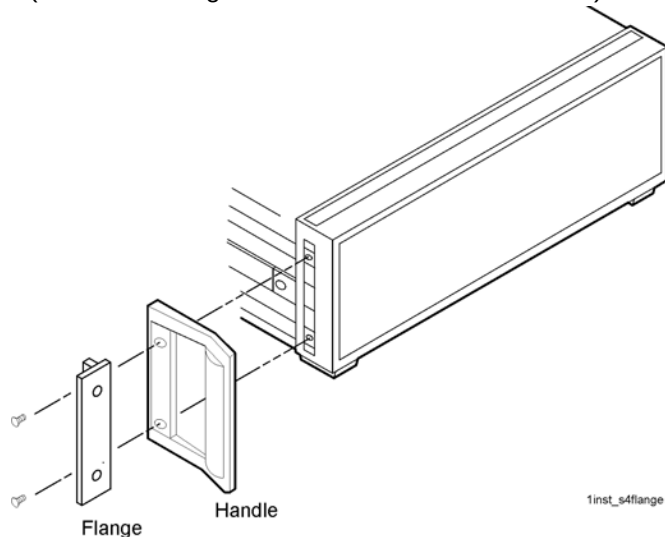
NOTE If any items are damaged or missing from a kit, contact us (refer to **Contacting Keysight**) to order a replacement kit. Items within these kits are not individually available.

Step 5. Install the Test System on a Bench Top or in an Equipment Rack

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 network analyzer.

NOTE For the N4420B, N4421A, 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.

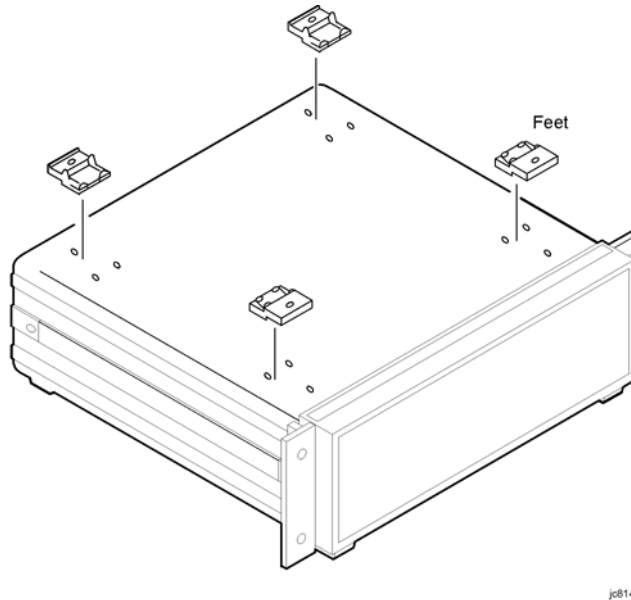
3. Attach the cabinet mount flanges and the handles to the sides of the front panel, using two long screws per side. (Attach the flanges to the outside of the handles.)



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 5. Install the Test 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.

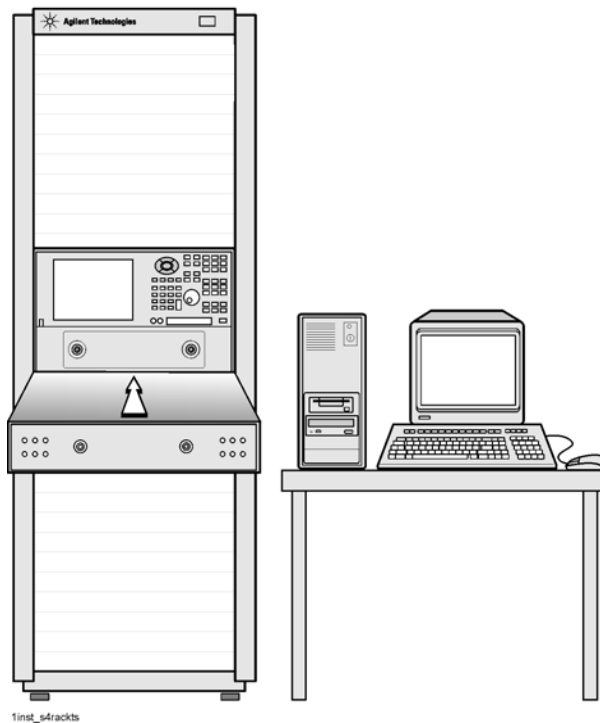


5. Ensure there is adequate clearance between the system cabinet and the sides and back of the test system for adequate ventilation.

CAUTION Consider the ventilation requirements described in **Step 5. Install the Test System on a Bench Top or in an Equipment Rack** when selecting the location of your system.

Step 5. Install the Test 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 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer.**

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

1. Locate your system or test set and network analyzer on the following pages for information describing the interconnections between the test set and the network analyzer.

For interconnection information for the discontinued hardware models listed below, refer to PLTS online Help.

PLTS Systems: N1947A, N1948A, N1951A, N1953A, N1957A

PLTS Test Sets: N4415A, N4416A, N4417A, N4418A, N4419A, N4421A

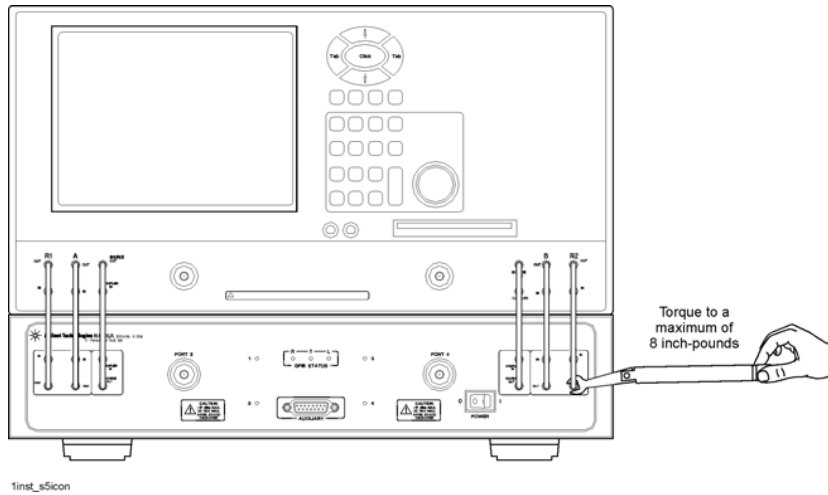
PLTS Network Analyzers: 8753ES, 8720ES/8722ES, E8356A/E8357A/E8358A, E8362A/E8363A/E8364A, E8801A/E8802A/E8803A

2. Using the illustration and table located on the page referenced above in step 1, connect the interconnect cables between the test set and the network analyzer. 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, 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).

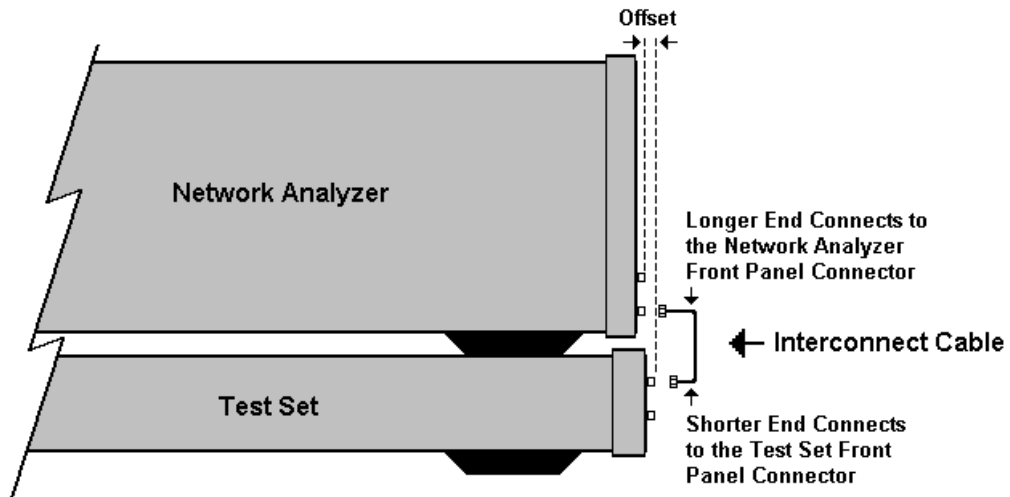
Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer



Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

CAUTION When connecting the interconnect cables described in the remaining pages of this section, be careful to install the interconnect cables correctly. The longer end of the interconnect cable connects to the network analyzer front panel connector. Refer to Figure 1-1 for the correct orientation.

Figure 1-1 Interconnect Cable Orientation



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

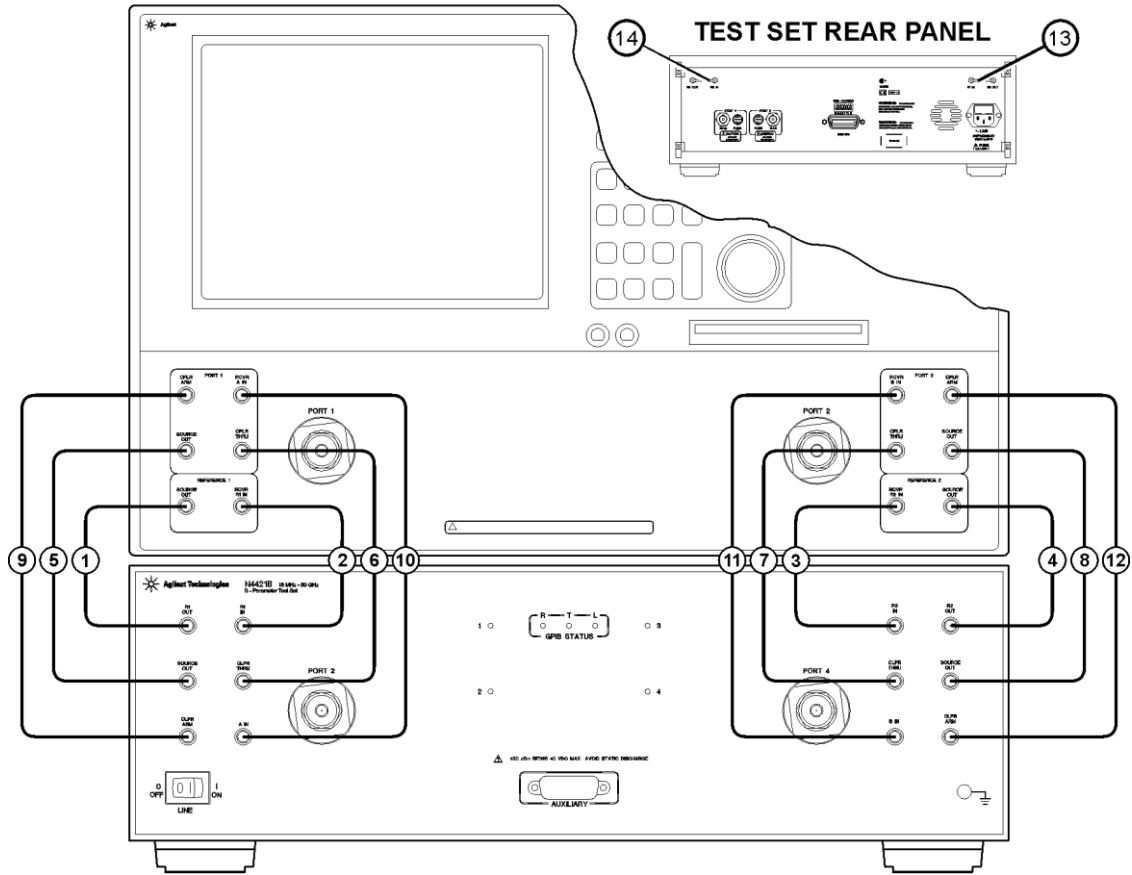
TIP If the test set and the network analyzer are rack mounted, the screws securing the rack mount flanges to the instrument rack may be loosened slightly to allow for minor repositioning of the instruments. Don't forget to retighten the screws when you are done.

3. Continue with **Step 7. Set up PC to PLTS Communication.**

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

N1957B Test System Interconnections

(N4421B Test Set with E8364B/C)



4421_connections

CAUTION Damage to the interconnect cable can result from improper orientation of the cable. Refer to page 28 for detailed information regarding the correct cable orientation.

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

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	

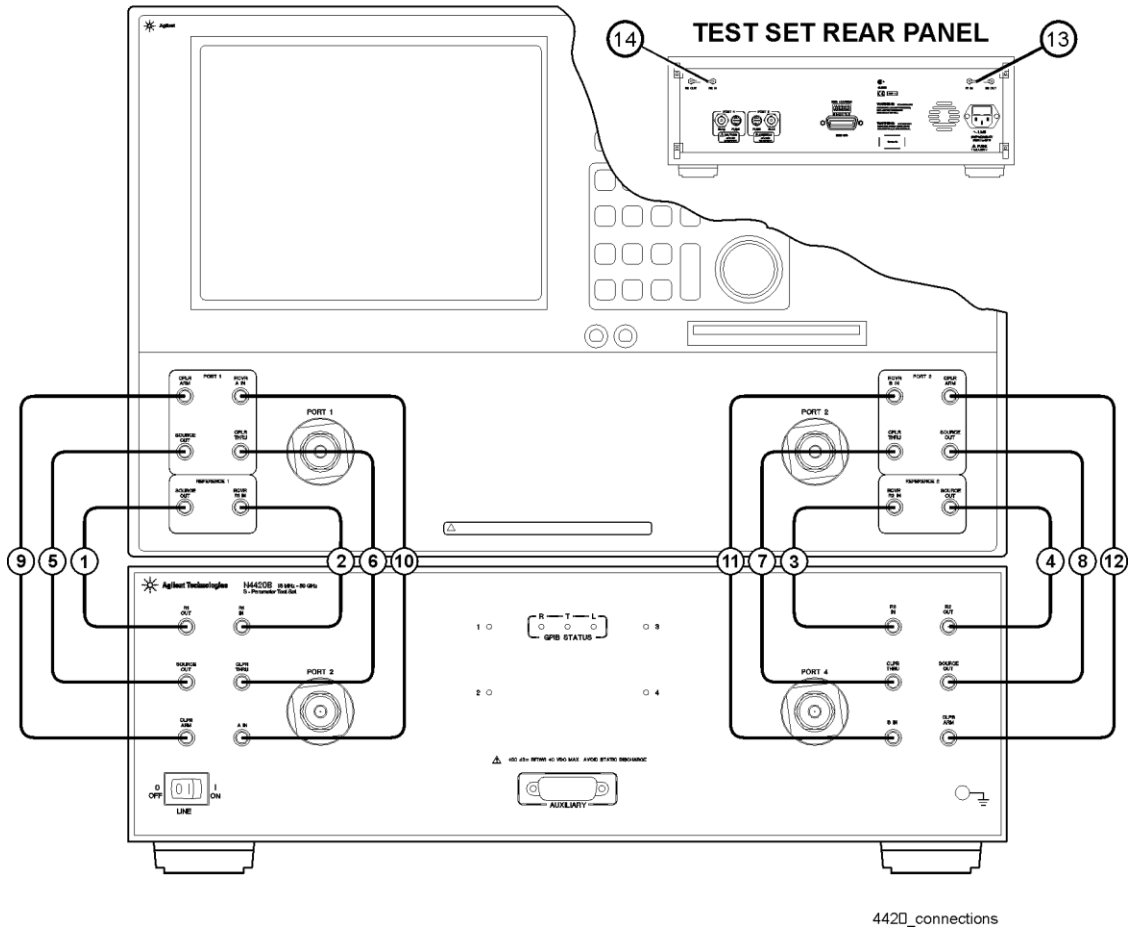
NOTE The Reference channel path through the test set is used to compensate for electrically long DUTs. This also results in added loss in the Reference channel and higher trace noise. Therefore, unless making high-speed measurements of electrically-long devices, do NOT remove the PNA **REFERENCE 1** and **REFERENCE 2** front-panel loops, and do NOT use the Reference channel interconnect cables (items 1, 2, 3, 4, 13, and 14).

Installing the VNA-Based Physical Layer Test System Hardware

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

N1955B Test System Interconnections

(or N4420B Test Set with E8363B/C Network Analyzer)



CAUTION Damage to the interconnect cable can result from improper orientation of the cable. Refer to page 28 for detailed information regarding the correct cable orientation.

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

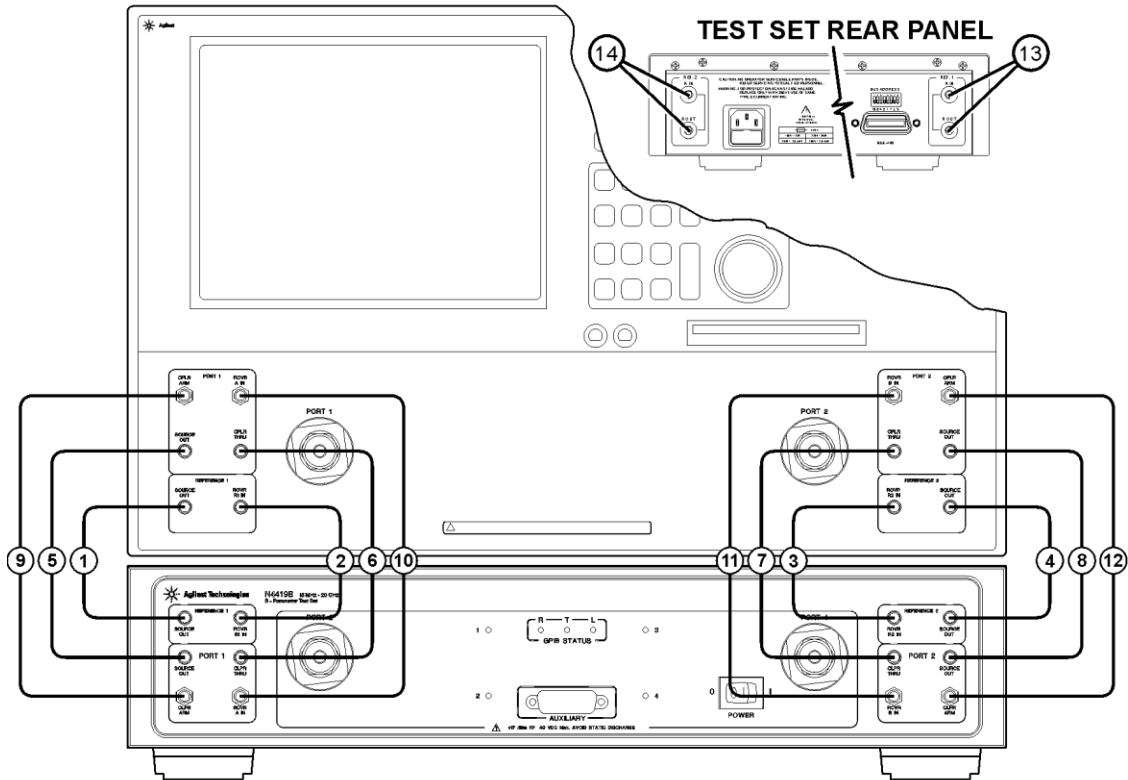
Call Out Sequence	Cable Part Number	From Network Analyzer	To Test Set
1	Z5623-20215	REF 1 SOURCE OUT	REF 1 R1 OUT
2	Z5623-20215	REF 1 RCVR R1 IN	REF 1 RCVR R1 IN
3	Z5623-20215	REF 2 RCVR R2 IN	REF 2 RCVR R2 IN
4	Z5623-20215	REF 2 SOURCE OUT	REF 2 R2 OUT
5	Z5623-20216	PORT 1 SOURCE OUT	PORT 1 SOURCE OUT
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).

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

N1935A and N1953B Test System Interconnections

(or N4419B Test Set with E8362B/C or N5230A/C Option 225 Network Analyzer)



4419_connections

CAUTION Damage to the interconnect cable can result from improper orientation of the cable. Refer to page 28 for detailed information regarding the correct cable orientation.

Step 6. Make the Interconnections between the S-Parameter Test Set and the Network Analyzer

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).

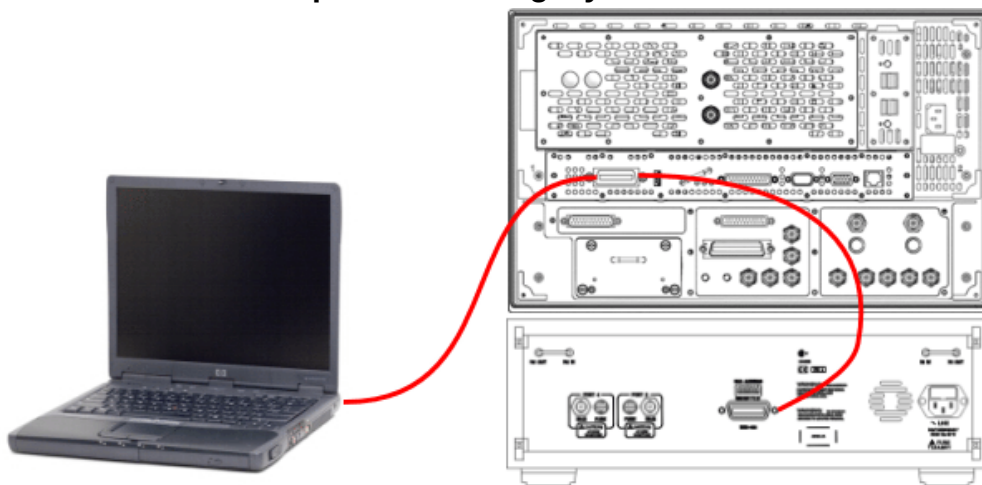
Step 7. Set up PC to PLTS Communication

Below are several different configurations depending on the following:

- Whether the PNA has a 1.1 GHz CPU (2 GPIB ports)
- Whether the PNA has either Opt 550 or 551 installed or NOT. With Opt 550 or 551, which allows the PNA to automatically control the test set, calibrations are performed in the PNA, taking full advantage of the latest calibration features. See PLTS Help for more information on 'Full Cal Mode'.

When communication is established, the PLTS software will locate and identify your test system equipment automatically.

500 MHz CPU WITHOUT Opt 550/551 - Legacy Mode



1. Using a GPIB cable, connect the PNA GPIB port to the test set GPIB port.
2. Using a second GPIB cable, connect the PC to the same PNA GPIB port.
3. In the PNA SICL / GPIB / SCPI dialog, leave the GPIB in **Talker/Listener** mode.

LAN can **NOT** be used in this configuration to control the PLTS system.

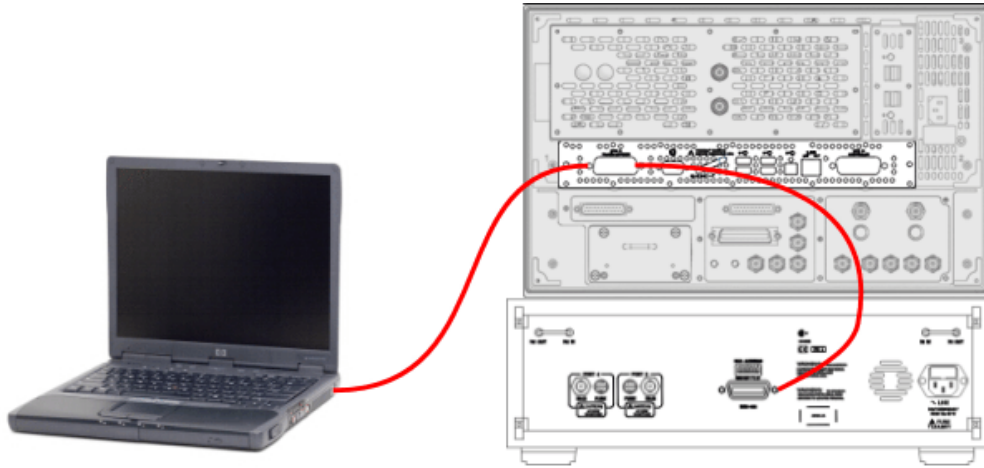
In this mode:

- Calibration is performed in PLTS software - NOT in the PNA - which limits the features which can be used.

Step 7. Set up PC to PLTS Communication

- ONLY 4 ports allowed.

1.1 GHz CPU WITHOUT Opt 550/551 - Legacy Mode



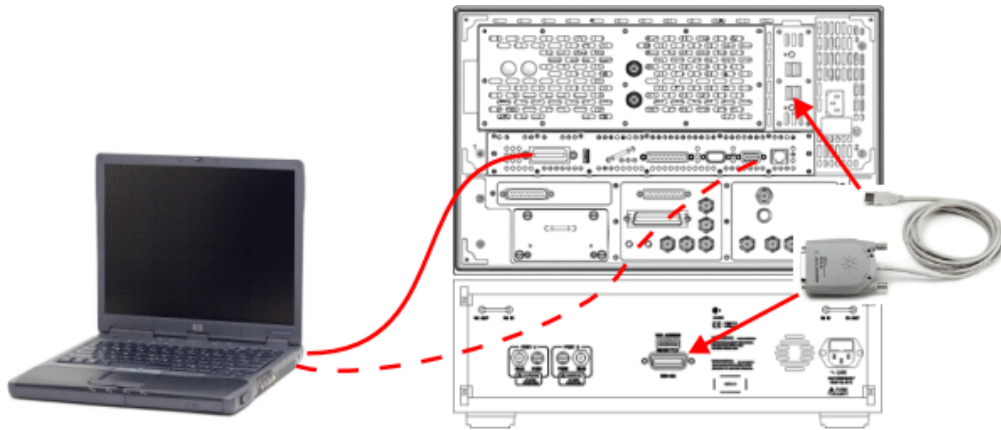
1. Using a GPIB cable, connect the PNA GPIB **Talker/Listener** port to the test set GPIB port.
 2. Using a second GPIB cable, connect the PC to the same PNA GPIB **Talker/Listener** port.
- LAN can **NOT** be used in this configuration to control the PLTS system.

In this mode:

- Calibration is performed in PLTS software - NOT in the PNA - which limits the features which can be used.
- ONLY 4 ports allowed.

Installing the VNA-Based Physical Layer Test System Hardware
Step 7. Set up PC to PLTS Communication

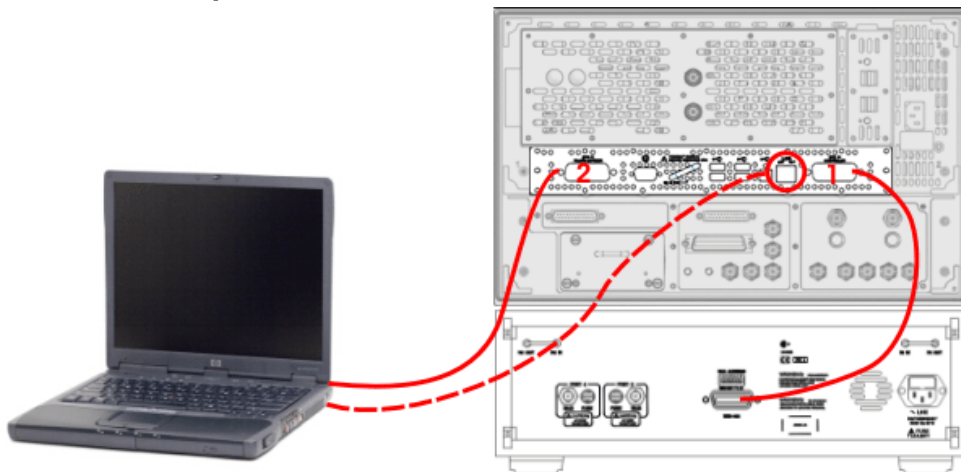
500 MHz CPU with Opt 550/551



1. Connect a 82357A/B to the PNA USB and to the test set GPIB port.
2. Using a GPIB cable, connect the PNA GPIB port to the PC for control of the system.

Or a LAN cable (dashed line) can be used in this configuration to control the PLTS system in either SICL-LAN, COM, or DCOM.

1.1 GHz CPU with Opt 550/551



1. Using a GPIB cable, connect the PNA System Controller GPIB port to the test set GPIB port.

Step 7. Set up PC to PLTS Communication

2. Using a second GPIB cable, connect the PNA Talker/Listener GPIB port to the PC for control of the system.

Or a LAN cable (dashed line) can be used in this configuration to control the PLTS system in either SICL-LAN, COM, or DCOM.

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 “Setting Up the General Purpose Interface Bus Manually” in the PLTS online help for more information.

Step 8. Power up the S-Parameter Test Set

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 PC and the network analyzer.
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 PC, the network analyzer, and the test set by pressing the ON/OFF button on the front panel of each device.

Step 8. Power up the S-Parameter Test Set

NOTE	Perform Step 6 ONLY when both of the following are true. Otherwise, skip to Step 7. * When using the Reference channel paths through the test set. See page 1-17 for more information. * When using a PNA model E8362A/B/C, E8363A/B/C, E8364A/B/C.
-------------	--

6. If your network analyzer is an E8362A/B, E8363A/B, or E8364A/B, you will need to perform the Phase-Lock IF Gain Adjustment after it has been connected to the test set. This routine 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 network analyzer's online help system for details. Use the following steps to perform this adjustment:

- a. On the PNA, from the **System** menu, click **Service**, then **Adjustments**, then **IF Gain Adjustment**.

If you are unable to find these selections on your E836XA PNA, your analyzer firmware is a revision prior to 3.0. Refer to the "IF Gain Adjustment" topic in the "Procedures" section of the PLTS online help for the adjustment procedure.

- b. Select any special test set options installed.
- c. No connections to the test ports are required.
- d. Click **Begin Adj.** The adjustment takes about a minute to complete.

The advanced screen is for factory personnel only.

NOTE	This adjustment must be performed before using the network analyzer each time the system is assembled or disassembled.
-------------	---

7. The PLTS hardware installation is complete. Continue with the PLTS software installation by referring to **Installing the PLTS Software**.

2 Installing the TDR-Based Physical Layer Test System Hardware

Installing the TDR-Based Physical Layer Test System Hardware

To make time domain measurements using the Physical Layer Test System (PLTS) software and a TDR system, you need the following equipment:

- Personal computer (PC)
- PLTS software
- TDR-based PLTS hardware (one of the following systems)
 - Keysight 86100A/B/C Infiniium DCA Wide-Bandwidth Oscilloscope equipped with one or two 54754A Differential 18 GHz TDR/TDT Plug-in Modules using the following firmware revisions:
 - Keysight 86100A/B: Firmware Revision 03.06 or greater
 - Keysight 86100C: Firmware Revision 04.00 or greater
 - Keysight 86100D: Firmware Revision A.10.00 or greater
 - Tektronix CSA8000 Communications Signal Analyzer equipped with one or two 80E04 Dual Channel, 20 GHz TDR Sampling Modules using Firmware Revision 1.3.3 or greater
 - Tektronix TDS8000 Digital Sampling Oscilloscope equipped with one or two 80E04 Dual Channel, 20 GHz TDR Sampling Modules using Firmware Revision 1.3.3 or greater

Figure 2-1 TDR-based Physical Layer Test System Hardware:
Tektronix CSA8000 (left) and Keysight 86100A/B/C DCA (right)



This installation procedure leads you through setting up the hardware (the PC and the TDR-based Physical Layer Test System). After you complete this installation, you will refer to **Installing the PLTS Software** to install the software.

NOTE If you have the VNA-based Physical Layer Test System, refer to [1 Installing the VNA-Based Physical Layer Test System Hardware](#) for instructions on setting up that system.

The following is a list of the installation steps to set up your TDR system hardware:

- Step 1. Set Up the Personal Computer
- Step 2. Set Up the TDR System
- Step 3. Set Up the GPIB
- Step 4. Power up the TDR System

NOTE These installation instructions were written specifically for customers who have just received their TDR system with their PLTS software. If you have already been using your TDR system, you have probably completed most of these installation steps. Briefly review installation these steps to ensure that your system is currently set up as recommended. Then, begin the software installation process by starting at [Installing the PLTS Software](#).

Step 1. Set Up the Personal Computer

Step 1. Set Up the Personal Computer

1. Make sure that your PC meets the following minimum system controller requirements:

Table 2-1 Minimum PC Requirements by PLTS Modes of Operation

PC Requirement	Measurement Mode ONLY	Off-Line Analysis Mode
	In the lab, controlling test equipment and making quick analysis of the results.	In your office, performing “What if...” analysis, characterization, cross-domain analysis, filtering, waveform math, and eye diagram simulation
CPU	1.5 GHz Quad-core	1.5 GHz Quad-core
Main Memory	4 GB	4 GB+
Virtual Memory ^a	6 GB+	6 GB+
GPIO Interface	Keysight 82357A USB/GPIO Interface for Windows or supported GPIO card (any National Instruments or Keysight 82340/41 or 82350 GPIO card)	No GPIO connection is required to utilize PLTS in the off-line mode. Saved (stored) measurement files can be recalled at any time for analysis.
Operating Systems	Windows 7 (64 bit with service pack 1), 8.1, and 10 (64 bit)	Windows 7 (64 bit with service pack 1), 8.1, and 10 (64 bit)
Screen Resolution	1280 x 1024 or greater required	
Display Colors	High Color (16 Bit) or greater	

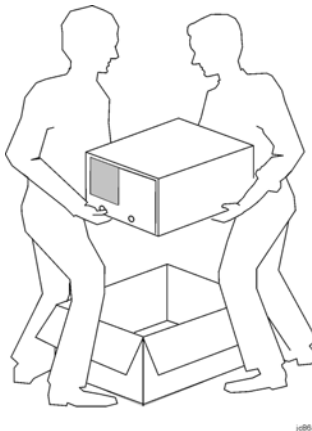
a. As a general rule for optimum PC performance when using PLTS, virtual memory should be 1.5 to 2 times the size of the main memory.

NOTE Memory, both main and virtual, is critical to using PLTS effectively. As more applications are added to the PC, more memory is used. If your PC needs more memory, we suggest you take the time to remove unused programs.

- Using the PC documentation, make sure that the PC is operating properly.
- Make sure the GPIO card is installed in the PC and that it is operating properly.
- Make sure the PC is located near where you will position the oscilloscope-based TDR system. Later in this process, you will connect the GPIO card to the TDR system using a GPIO cable.

Step 2. Set up the TDR System

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



WARNING The TDR system hardware can be heavy. Use proper lifting techniques. Refer to the TDR system's documentation for information regarding the equipment weight.

2. Carefully inspect the system to make sure that it was not damaged during shipment.

If your TDR system was damaged during shipment, refer to the system's documentation to contact the manufacturer. If the manufacturer is Keysight, refer to [Contacting Keysight](#).

3. Using the TDR system's documentation, set up the system as instructed, ensuring that the system's permanent location is near the PC that was set up in [Step 1. Set Up the Personal Computer](#).

CAUTION Both the Keysight and Tektronix TDR systems, although not required, may be connected to a computer network. Connecting to a computer network may present security risks to your TDR system.

Step 2. Set up the TDR System

4. Ensure that your TDR system is one of the following:

- Keysight 86100A/B/C Infiniium Digital Communications Analysis Wide-Bandwidth Oscilloscope with:
 - Firmware: 86100A/B revision 03.06 or later / 86100C: revision 04.00 or later
 - 1 or 2 Keysight 54754A 18 GHz Differential TDR/TDT Plug-In Modules installed
- Tektronix CSA8000 Communications Signal Analyzer Oscilloscope with:
 - Firmware revision 1.3.3 (check with your Tektronix representative for firmware)
 - 1 or 2 Tektronix 80E04 Dual Channel, 20 GHz TDR Sampling Modules installed in slot 1/2 and/or slot 3/4 only (no support for channels 5, 6, 7, or 8)
- Tektronix TDS8000 Digital Sampling Oscilloscope with:
 - Firmware revision 1.3.3 (check with your Tektronix representative for firmware)
 - 1 or 2 Tektronix 80E04 Dual Channel, 20 GHz TDR Sampling Modules installed in slot 1/2 and/or slot 3/4 only (no support for channels 5, 6, 7, or 8)

CAUTION Avoiding ESD Damage to TDR Plug-In Modules

The input connectors are very sensitive to electrostatic discharge (ESD). When you connect a device or cable that is not fully discharged to the input connector, you risk damage to the module and expensive instrument repairs. Refer to your TDR documentation for detailed information regarding ESD susceptibility.

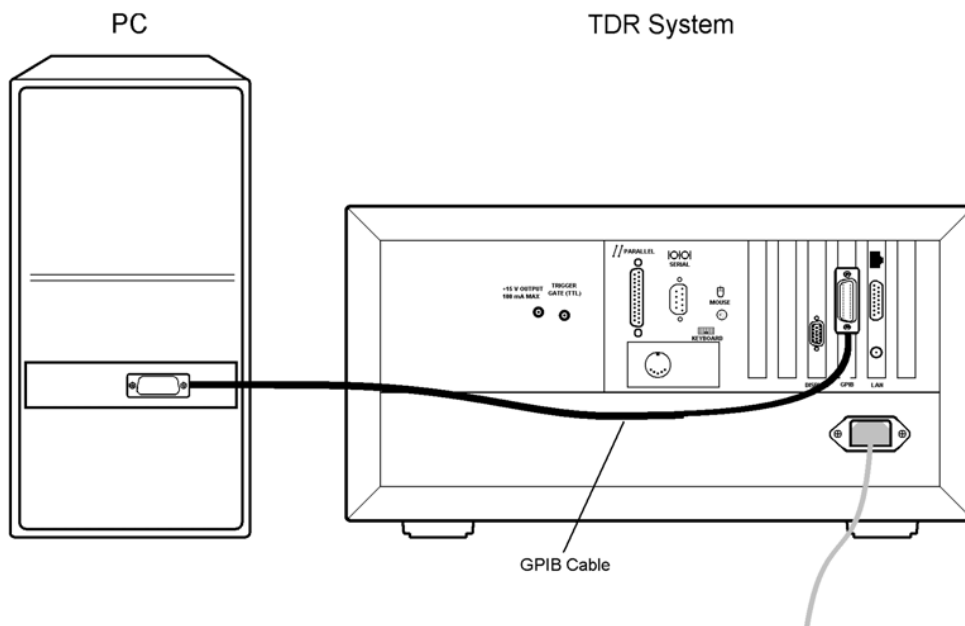
Step 3. Set Up the General Purpose Interface Bus (GPIB)**Step 3. Set Up the General Purpose Interface Bus (GPIB)**

The PC uses the General Purpose Interface Bus (GPIB) to communicate with the test system hardware. The PLTS software will locate and identify your test system equipment automatically. Each test system device must have a unique GPIB address.

Check the GPIB address of your Keysight TDR system by selecting **Remote Interface** from the **Utilities** menu on the TDR display. To check the GPIB address of your Tektronix TDR system, refer to the programming manual for information.

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 using the equipment firmware. Refer to “Setting Up the General Purpose Interface Bus Manually” in the *PLTS User’s Guide* for more information.

1. Connect a GPIB cable from the PC GPIB card's connector to the rear-panel GPIB connector on the TDR system.



Step 4. Power up the TDR System

Step 4. Power up the TDR System

If you have not previously powered on your TDR system, start with step 1. If you have already powered on your TDR system, just review steps 1, 2, and 3 before continuing with step 4.

1. Ensure the available ac power supply meets the power source requirements and the operating environment meets the operating environment requirements for the TDR system. Refer to the TDR system documentation for the environmental specifications.
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. Connect the ac power cable from the power-source outlet to the ac input on the rear panel of the test set.
4. Turn on the PC and the TDR system.
5. The TDR system hardware installation is complete. Continue with the PLTS software installation by referring to [Installing the PLTS Software](#).

3 Installing the PLTS Software

This chapter leads you through the following steps to install and run the PLTS software:

- Step 1. Install or Upgrade PLTS Software
- Step 2. License the PLTS Software
- Step 3. Start the PLTS Software

Important PLTS Installation Notes

- If you have modified or custom cal kits, they are automatically saved at the start of the PLTS installation process. To learn how to restore them, type “restore” in the index of PLTS online Help.
- For optimum performance, PLTS should be installed on a computer with a 1.5 GHz CPU and 1 GB of RAM. Measurement accuracy is not affected by a slower computer.
- Close all other applications that are running on your computer.
- Ensure that PC communication with instruments is working BEFORE installing PLTS. **Note:** Beginning with Rev. 4.00, you can make a LAN connection to PNA hardware from the remote computer running PLTS. This is possible ONLY if the PNA has opt 550 or 551 installed and enabled. To learn more, type ‘LAN’ in the index of the PLTS Help file.
- To learn ALL about configuring Opt 550 and Opt 551, type ‘option 550’ in the index of the PNA Help file file.
- When installing PLTS on Microsoft Vista or Windows 7 operating systems, the User Account Control (UAC) feature will prompt you to authorize PLTS with higher privileges.

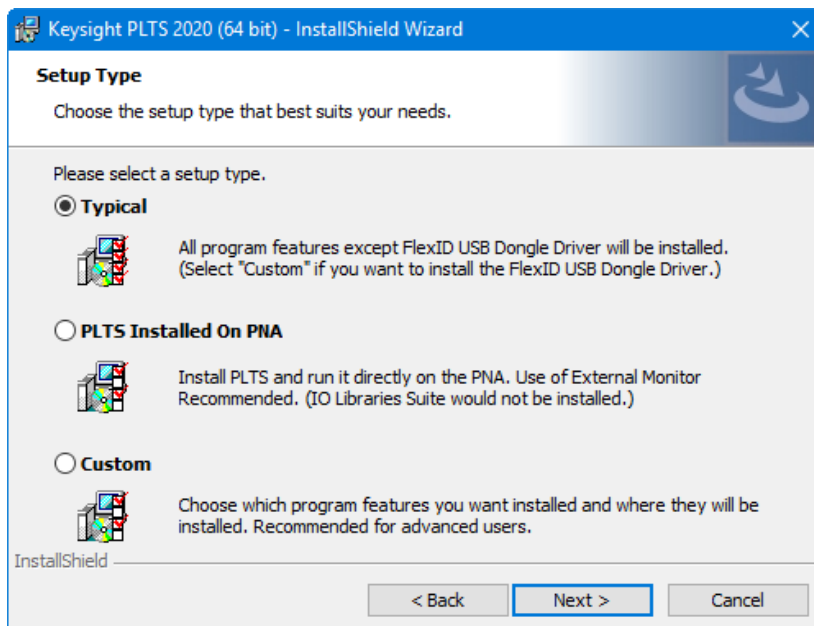
The PLTS installation also installs the following software programs or components. If you already have any of these software packages installed on your computer, you may be prompted to Modify, Repair, or Remove the application. Please select **Repair**.

- Microsoft .NET Framework
- Keysight IO Libraries & VisaCom

See [Troubleshooting](#) if you encounter problems with PLTS Installation.

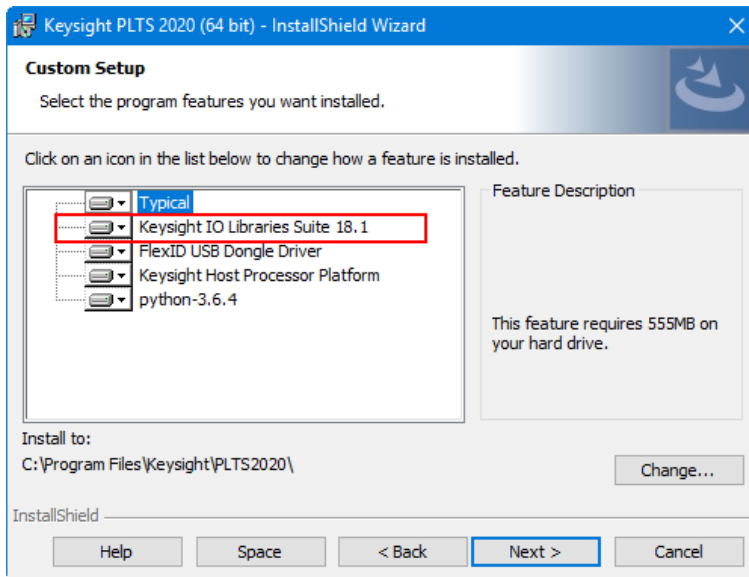
Step 1. Install or Upgrade PLTS Software

1. You can download the PLTS software from the Keysight Software Management System (KSM) at <http://www.keysight.com/find/softwaremanager>. For instructions on downloading the software, refer to your entitlement certificate that you received via email.
2. Download the PLTS install bits zip file **Keysight_PLTS20xx_64bit.zip** and PLTS installation note PDF file.
3. Unzip the PLTS install bits zip file to a directory and run the Setup.exe.
4. Follow the InstallShield Wizard prompts to Install or Upgrade the PLTS software and other software products.



- **Typical:** Select for all program features to be installed.
- **PLTS Installed on PNA:** Select to run the program directly on a PNA. Use of an external monitor is highly recommended. IO Libraries Suite would not be installed.
- **Custom:** Select to choose the program features you want installed. Click on an icon to the left of the feature name to change how the feature is installed.

Installing the PLTS Software



5. At the Custom Setup dialog click Keysight IO Libraries Suite <current rev> and select:
This feature will not be available
6. Click **Next** and continue with the installation process.
7. When the installation has completed, click **Finish**.

Step 2. License the Physical Layer Test System Software

NOTE For complete instructions on registering your PLTS (Physical Layer Test System Software) purchase with SUS (Software Update Service), requesting a PLTS update, and renewing your SUS subscription, refer to the **PLTS User Manual**. This can be viewed in the PLTS software on your PC (typically C:\Program Files\Keysight\PLTS_Revxx\Help) with or without an active product license. Also, it can be viewed online at <http://na.support.keysight.com/plts/help>.

This procedure instructs you on how to license your PLTS software, which is required before it can be used.

PLTS is available with three types of licenses: fixed (node-locked), networkable (floating), and transportable (USB key). The type of license that you have was determined at the time of purchase.

- A fixed (node-locked) license (Ex: N1930xB-xFP) entitles you to use the software on only one personal computer and the software enforces that restriction.
- A networkable (floating) license (Ex: N1930xB-xNP) entitles you to install the software license on one server and issue the license to any personal computer on the server network that has PLTS installed. The software enforces the restriction that a license can be checked out to one user at a time unless multiple PLTS networkable (floating) licenses are owned.
- A transportable (USB key) license (Ex: N1930xB-xUP) entitles you to share a single license that is copied on multiple personal computers. When a USB key is connected to one of these computers, the PLTS software is enabled to run.

Stop! Do not proceed until you have determined the type of license you own.

- If you own a fixed (node-locked) license, continue with **Setting Up the Fixed (Node-locked) License**.
- If you own a networkable (floating) license, continue with **Setting Up the Networkable (Floating) License**.
- If you own a transportable (USB key) license, continue with **Setting Up the Transportable (USB Key) License**.

To see a complete description of PLTS Licensing, see the PLTS Help file. In PLTS, click **Help**, then Licensing.

Step 2. License the Physical Layer Test System Software

Setting Up the Fixed (Node-locked) License

CAUTION The license is fixed (node-locked) which means that you are entitled to use the software on only one personal computer and the software enforces that restriction. Make sure that you license the software to the correct PC.

During this procedure, you will identify the host ID of one PC in order to license the software to that PC. Therefore, it is very important to confirm that you have loaded and are licensing the software to the correct PC.

1. In Windows, select **Start, Programs, Accessories**, then **Command Prompt** (for Windows 10, select **Start, Windows System**, then **Command Prompt**).
2. In the **Command Prompt** window, change the directory to the **License** subdirectory in the PLTS subdirectory using the following command:

cd x:\dddd\ssss\PLTS\License

where, x is the letter of the drive the software was installed on.
 dddd is the directory name the software was installed on.
 ssss is any subdirectories the software was installed on.

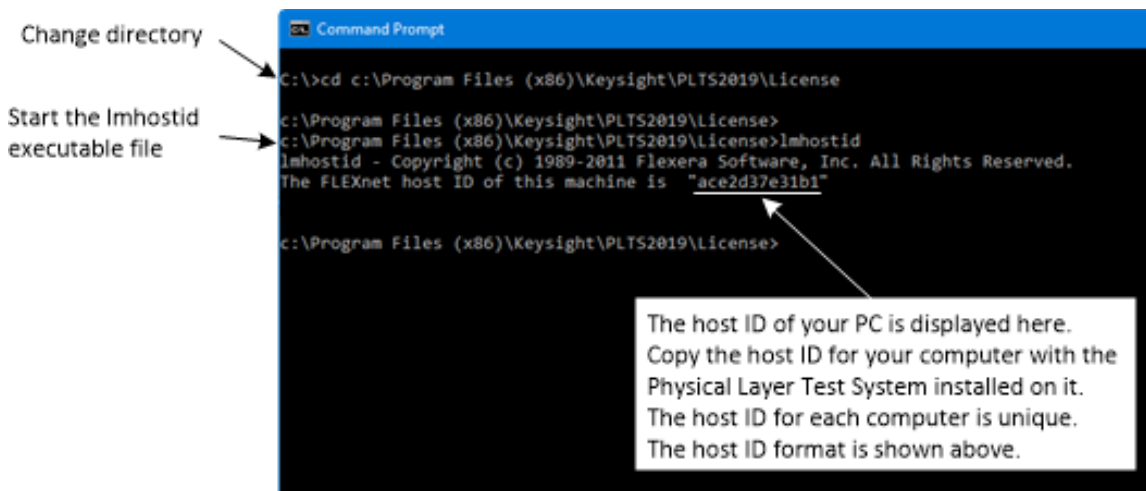
The default directory that the software is loaded on is: C:\Program Files (x86)\Keysight.
Therefore, enter the following command to change to the default directory:

cd c:\Program Files (x86)\Keysight\PLTS_<software rev #>\License

3. Enter the following command as shown:
Imhostid
4. The host ID of the computer is displayed in window opened by the **Imhostid.exe** file. Write the host ID for your computer in the space provided below. You will need the host ID to request a license for the software.

If more than one Host ID is listed, see the procedure, **Finding the correct Host ID when more than one are listed**.

Step 2. License the Physical Layer Test System Software



Record the host ID for your computer here.	
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5. Locate the single certificate, titled "**Software License and Software Update Service Subscription Entitlement Certificate**" that was mailed to you from Keysight.

The certificate lists the **Order Number** and the **Certificate Number** for your software. These two numbers will also be used to request a license for your software.

6. Go to the Keysight KSM (Keysight Software Management) Web site listed on the "**Software License and Software Update Service Subscription Entitlement Certificate**." Follow the instructions at the Web site to receive your license file for the software. While in the KSM system, you are automatically registered for a 1-year SUS (Software Update Service) subscription. You will need to provide the following information:

- **Order Number**
- **Certificate Number**
- **Host ID for your computer that will run the PLTS Software**

The Web site will also ask you to provide your e-mail address. The license file will promptly be sent to you via e-mail.

7. Once you receive the e-mail with the attached license file, save the file to the "License" directory (the same directory that you used earlier to identify the host ID).
8. Make a back up of the license file and store in a safe location.

This back up file is very important! You may need this back up file if you encounter problems with your computer or if the license file is lost or erased.

9. Continue with **Step 3. Start the Physical Layer Test System Software.**

Step 2. License the Physical Layer Test System Software

Finding the correct Host ID when more than one are listed

Sometimes several Host IDs are returned from the lmhostid program, as in the following image. In the case of this laptop computer there are three IDs listed: an Ethernet connection, a Wireless connection, and Ethernet Adapter. Some of these connections may not show up if they are not currently enabled, such as a Wireless connection.

```
c:\Program Files (x86)\Keysight\PLTS2019\License>lmhostid
lmhostid - Copyright (c) 1989-2011 Flexera Software, Inc. All Rights Reserved.
The FLEXnet host ID of this machine is ""ace2d37e31b1 48ba4e1b9e16 f85971bfd236""
Only use ONE from the list of hostids.
```

You can choose only ONE host ID to license. Once a host ID is selected, it can not be changed.

To determine which ID belongs to which device, at a command prompt, type **ipconfig/all**. From the resulting display, like the one following, you can determine the physical address to which you can choose to license PLTS. The format shown is the MAC (physical) address format (nn-nn-nn-nn-nn-nn). However, you will use the host ID format from the above image (12 digits without hyphens) . The Host ID is the MAC (physical) address without the hyphens.

Step 2. License the Physical Layer Test System Software

```

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : srs.is.keysight.com
    Description . . . . . : Intel(R) Ethernet Connection (2) I219-LM
    Physical Address. . . . . : AC-E2-D3-7E-31-B1
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet 3:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : hsd1.ca.comcast.net
    Description . . . . . : Broadcom NetXtreme Gigabit Ethernet
    Physical Address. . . . . : 48-BA-4E-1B-9E-16
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :
    Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
    Physical Address. . . . . : F8-59-71-BF-D2-37
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix . : hsd1.ca.comcast.net
    Description . . . . . : Intel(R) Dual Band Wireless-AC 8265
    Physical Address. . . . . : F8-59-71-BF-D2-36
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    IPv6 Address. . . . . : 2601:200:4201:9b2f::fdf6(Preferred)
    Lease Obtained. . . . . : Tuesday, October 22, 2019 5:28:13 AM
    Lease Expires . . . . . : Monday, October 28, 2019 5:26:59 AM
    IPv6 Address. . . . . : 2601:200:4201:9b2f:90e2:4d97:a8e4:daf(Preferred)
    Temporary IPv6 Address. . . . : 2601:200:4201:9b2f:e998:67cd:356e:aec3(Preferred)
    Link-local IPv6 Address . . . . : fe80::90e2:4d97:a8e4:daf%11(Preferred)
    IPv4 Address. . . . . : 10.0.0.97(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : Tuesday, October 22, 2019 5:28:11 AM
    Lease Expires . . . . . : Tuesday, October 29, 2019 6:42:31 AM
    Default Gateway . . . . . : fe80::5eb0:66ff:feed:c5e1%11
                                10.0.0.1
    DHCP Server . . . . . : 10.0.0.1
    DHCPv6 IAID . . . . . : 100161905
    DHCPv6 Client DUID. . . . . : 00-01-00-01-22-39-D3-7A-AC-E2-D3-7E-31-B1
    DNS Servers . . . . . : 2001:558:feed::1
                                2001:558:feed::2
                                75.75.75.75
                                75.75.76.76
    NetBIOS over Tcpip. . . . . : Enabled
  
```

Setting Up the Networkable (Floating) License

The *Networkable (Floating)* license allows you to use PLTS on one of many PCs (or clients), utilizing a single license on a common server. The server issues the license to any of the clients that attempt to run PLTS. If the license is already being used by another client, notification is provided that the license is in use. The number of licenses installed dictates the number of clients that can use the software at the same time.

Step 2. License the Physical Layer Test System Software

Important - When upgrading to PLTS version 4.5 and higher:

Previous versions use FlexLm version 8.2. With PLTS 4.5, your license server must be upgraded to FlexLm 11.4. The necessary files are included with your PLTS software on the installation CD. Here is how to upgrade:

1. Copy the files listed below (in **Preparing the License Server**) to your server and restart the new version on the server.
2. If already using FlexLm 11.4, then replace the Keysight daemon file and use the new license file.

Notes:

- It is very important to license the software to the correct server.
- To use PLTS, the client PC must be on the same network as the license server.
- With this type of license, a PC can be both a server and a client. This allows the PC to use the PLTS software or issue the license for other PCs on the network.
- PLTS supports servers that use Windows Vista, Windows 7, Windows 10, Windows XP, Solaris 9, Solaris 10, Red Hat Linux, and HP-UX 11 operating systems.

Preparing the License Server

1. After you have installed PLTS on your PC (one of the client machines), navigate to one of the following directories:

If installing on a Solaris server, navigate to C:/Program Files (x86)/Keysight/PLTS/License/Sun4

If installing on a HP-UX server, navigate to C:/Program Files (x86)/Keysight/PLTS/License/hp700

If installing on a PC server, navigate to C:/Program Files (x86)/Keysight/PLTS/License/

Copy all of the files in the directory from your PC to the server. While you could save these files to any directory on your server, we recommend that you create a similar directory structure on your server.

Obtaining the License

2. From a *Command Prompt* window, run the Imhostid executable file to display the host ID for the license server by typing: Imhostid
3. The host ID of the server is displayed in the *Command Prompt* window.

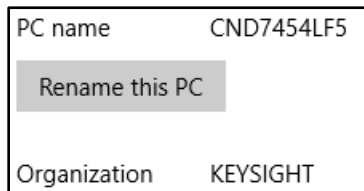
Step 2. License the Physical Layer Test System Software

The Host ID is the MAC (physical) address without the hyphens. When you request a Networkable license in the Keysight Software Management System (KSM), you are prompted to provide the server MAC (physical) address. For a Windows system, enter the 12 character host ID as the MAC address (do not insert hyphens). For a Solaris system, enter the eight character host ID as the MAC (physical) address (do not insert hyphens).

Customers using a triple redundant server system must provide three MAC (physical) addresses - one for each server.

CAUTION This software license is locked to a specific server that you provide information for when obtaining the license. Make sure that you obtain and provide the MAC (physical) address for the correct server when requesting your license.

4. You also need the network server name to request a license file in KSM. To locate the server name of your network, from Windows **Control Panel**, click the **System** icon (for Windows 10, right-click **Start** then select **System**) to open the *System Properties* dialog box. On the **Network Identification** tab (**About** tab for Windows 10), locate the **Full Computer Name** or **PC name** entry. For example:



Step 2. License the Physical Layer Test System Software

When requesting a Networkable license in the Keysight Software Management System (KSM), customers using a triple redundant server system must provide three server names - one for each server.

Write the server name and MAC (physical) address for your server in the space provided below. Remember, the Host ID is the MAC (physical) address without the hyphens. Do not use hyphens when entering the MAC (physical) address in KSM.

Record the server name and MAC (physical) address for your server here: * For a one server system, use the format: SERVERNAME space MACADDRESS * For a triple redundant server system, use the format: SERVERNAME1 space MACADDRESS1 space SERVERNAME2 space MACADDRESS2 space SERVERNAME3 space MACADDRESS3	
--	--

5. Locate the “**Software License and Software Update Service Subscription Entitlement Certificate**” that was mailed to you from Keysight. The certificate lists the **Order Number** and the **Certificate Number** for your software. These two numbers will also be needed to request a license for your software.
6. Go to the Keysight KSM (Keysight Software Management) Web site listed on the “**Software License and Software Update Service Subscription Entitlement Certificate**.” Follow the instructions at the Web site to receive your license file for the software. While in the KSM system, you are automatically registered for a 1-year SUS (Software Update Service) subscription. You will need to provide the following information:
 - **Order Number**
 - **Certificate Number**
 - **MAC (physical) address for your PLTS license server**
 - **Server Name for your PLTS license server**

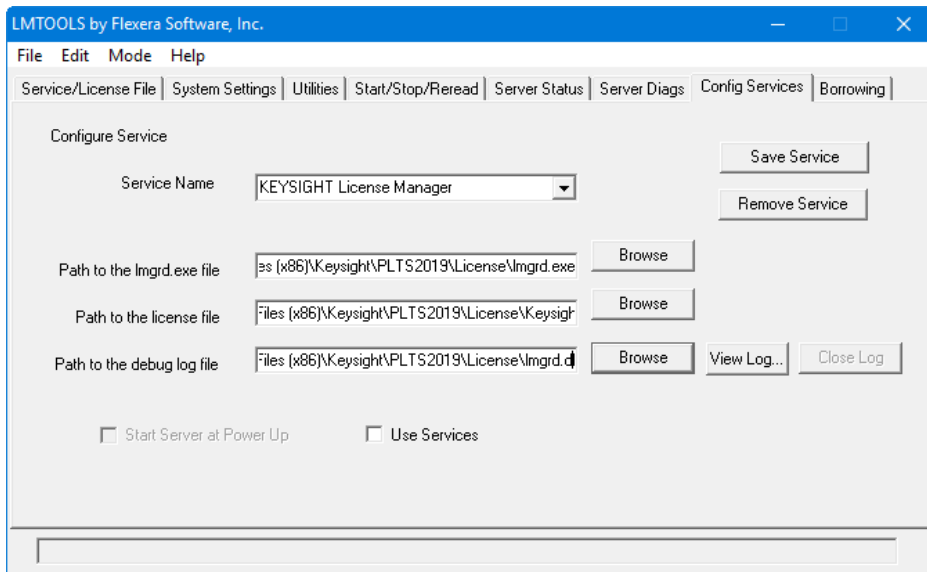
The Web site will also ask you to provide your e-mail address. The license file will promptly be sent to you via e-mail.

Setting Up the License Server

7. Once you receive the e-mail with the attached license file, save the license file to the server's PLTS License directory (the same directory that you created on your server earlier).
8. Make a back up of the license file and store in a safe location. **This back up file is very important!** You may need this back up file if you encounter problems with your computer or if the license file is lost or erased.

Step 2. License the Physical Layer Test System Software

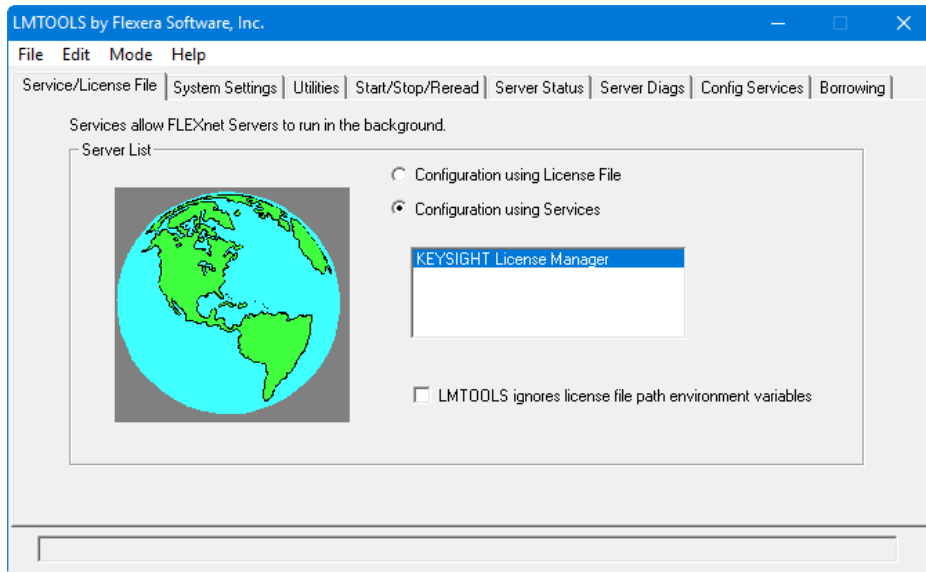
9. In the server's PLTS License directory (or sub directory), double click the **Imtools.exe** file to open the *LMTools* dialog box. Select the **Config Services** tab. On this tab:
 - a. In the **Service Name** list, select or enter **KEYSIGHT License Manager**.
 - b. In the **Path to the LMgrd.exe file** text box, enter the path to the server's PLTS license directory followed by the **lmgrd.exe** file name.
 - c. In the **Path to the license file** text box, enter the path to the server's PLTS license directory followed by the file name of the license that you copied to the directory.
 - d. In the **Path to the debug log file** text box, enter the path to the server's PLTS license directory followed by the **lmgrd.dl** file name.
 - e. Click the **Use Services** check box and then click the **Start Server at Power Up** check box to make the PLTS license available for PLTS on restart of the server.
 - f. Click the **Save Service** button to save the changes.



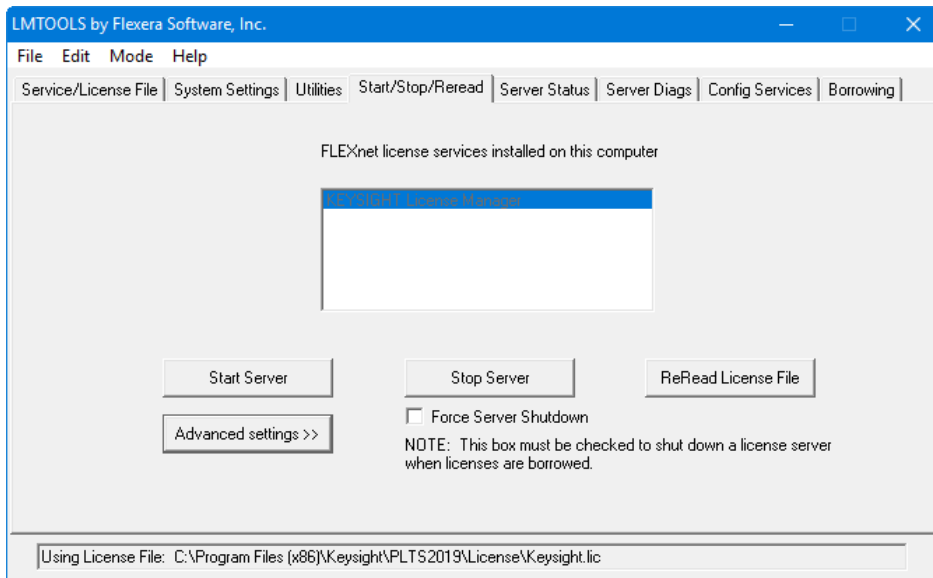
10. Select the **Service/License File** tab. Select **KEYSIGHT License Manager**, then click **Configuration using Services**.

Installing the PLTS Software

Step 2. License the Physical Layer Test System Software



11. Select the **Start/Stop/Reread** tab. Select **KEYSIGHT License Manager** . Then click **Start Server**. This step must be repeated each time the server is powered up if you did not click the **Start Server at Power Up** check box earlier in this procedure.



Step 2. License the Physical Layer Test System Software**Setting Up the Transportable (USB Key) License**

CAUTION Keep the USB key (dongle) in a safe location when it is not connected to a computer. Without it, you cannot run the PLTS software.

1. Locate the serial number - also called the FLEXid - of the USB key (dongle) that was included in your PLTS shipment. As shown in the following graphic, this number is located on the label of the bag that holds the USB key (dongle). It is also stamped on the USB key (dongle). This number is formatted as: one hexadecimal character, a dash, and eight hexadecimal characters (x-xxxxxxx).



Record the serial number, or FLEXid, of your USB key (dongle) here:	
---	--

2. Locate the “**Software License and Software Update Service Subscription Entitlement Certificate**” that was mailed to you from Keysight.

The certificate lists the **Order Number** and the **Certificate Number** for your software. These two numbers will also be used to request a license for your software.

Step 2. License the Physical Layer Test System Software

3. Go to the Keysight KSM (Keysight Software Management) Web site listed on the “**Software License and Software Update Service Subscription Entitlement Certificate**.” Follow the instructions at the Web site to receive your license file for the software. While in the KSM system, you are automatically registered for a 1-year SUS (Software Update Service) subscription. You will need to provide the following information:

- a. **Order Number**
- b. **Certificate Number**
- c. **USB Key (dongle) Serial Number (also called the FLEXid)**

The Web site will also ask you to provide your e-mail address. The license file will promptly be sent to you via e-mail.

4. With a Transportable license, every computer you intend to use to run the PLTS software with the USB key (dongle) must contain a copy of the license file and the PLTS software file. Once you receive the e-mail with the attached license file, save the file to the default directory that the software is loaded on: C:\Program Files (x86)\PLTS\License.
5. Make a back up of the license file and store in a safe location.

This back up file is very important! You may need this back up file if you encounter problems with your computer or if the license file is lost or erased.

6. Continue with **Step 3. Start the Physical Layer Test System Software.**

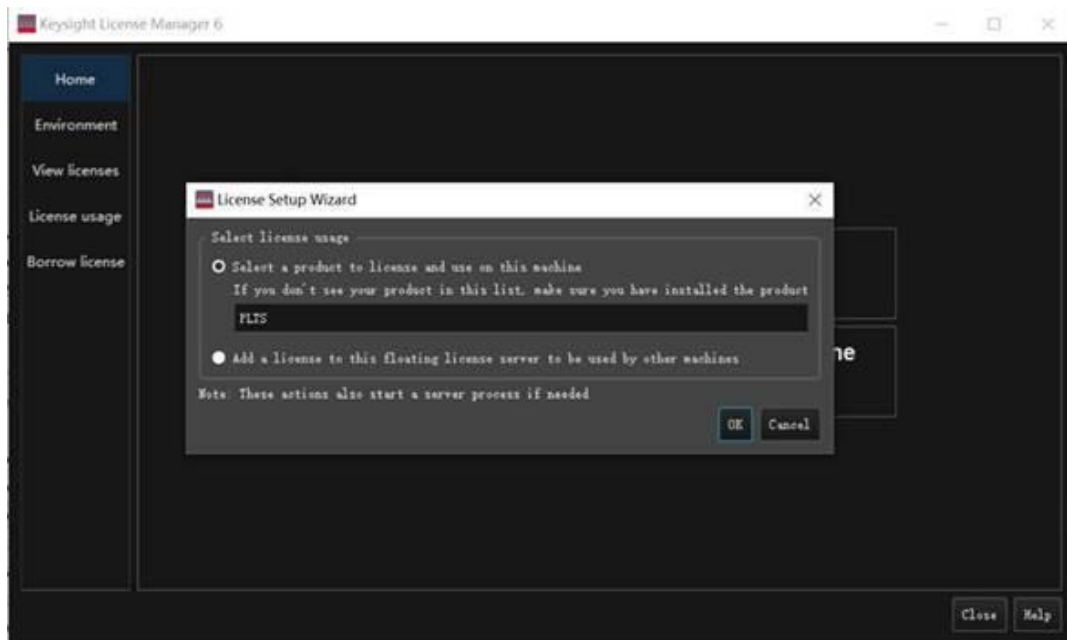
Step 3. Start the Physical Layer Test System Software

Important PLTS License Notes:

From July 1, 2020, PLTS2020 update1 release (PLTS2020U1), we implemented Keysight Advanced License (KAL). For PLTS orders after July 1, 2020, PLTS uses the KAL license.

For the existing PLTS users before July 1, 2020, you can continue to use the legacy Flexlm license or contact Keysight to upgrade to KAL license. The “PLTS License Management” and “PLTS License Reset” names have been changed to “PLTS Legacy License Management” and “PLTS Legacy License Reset”.

For the KAL license, users need to use Keysight License Manager 6 to add and manage the licenses.



PLTS software will automatically install “Keysight License Manager 6”, “PLTS Legacy License Management” and “PLTS Legacy Reset” to your PC.

Step 3. Start the Physical Layer Test System Software

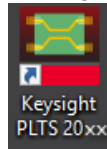
Step 3. Start the Physical Layer Test System Software

Important Note:

Before the first start of the PLTS software, we recommend you add KAL license in “Keysight License Manager 6” or add legacy FlexIm license in “PLTS Legacy License Management”. See 3.2 and 3.3 below for the steps.

3.1 Start the PLTS software:

Start the PLTS software by double-clicking the **Keysight PLTS** icon on the PC desktop.

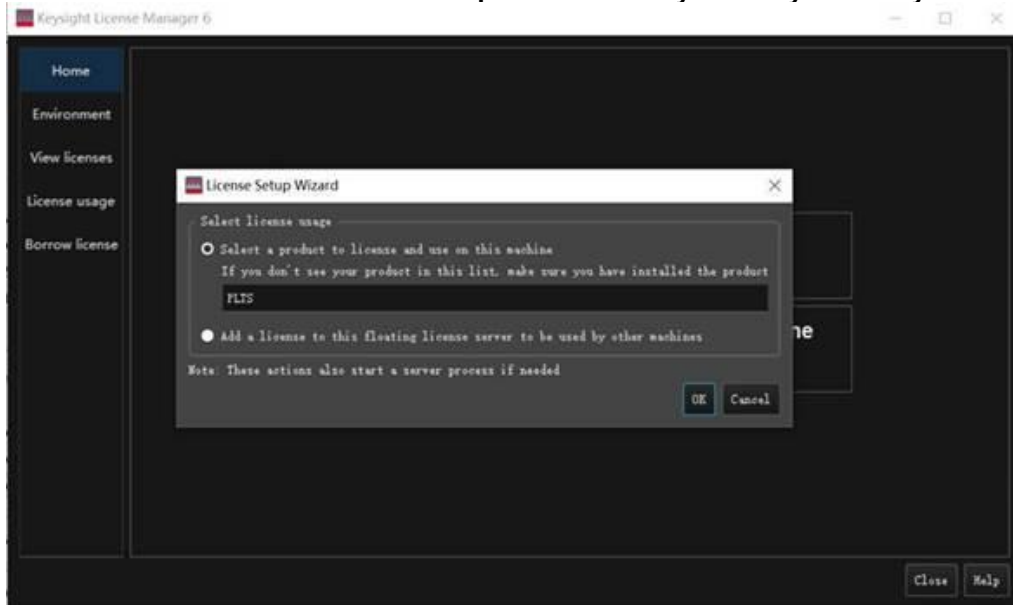


You may also run PLTS by selecting **Start**, then **Programs**, then **Keysight Technologies**, then **PLTS <version>**, then **PLTS <version>**. For Windows 10 users, select **Start**, then **Keysight PLTS <version>**, then **Keysight PLTS <version>**.

NOTE To learn about other PLTS tools which are available from this menu, on the PLTS Help file Home page, click **Tools and Utilities**.

3.2 Procedure Using Keysight Advanced Licensing (KAL)

1. The first time you start the software, you will need to open Keysight License Manager 6 in your Windows start menu to add your KAL licenses:

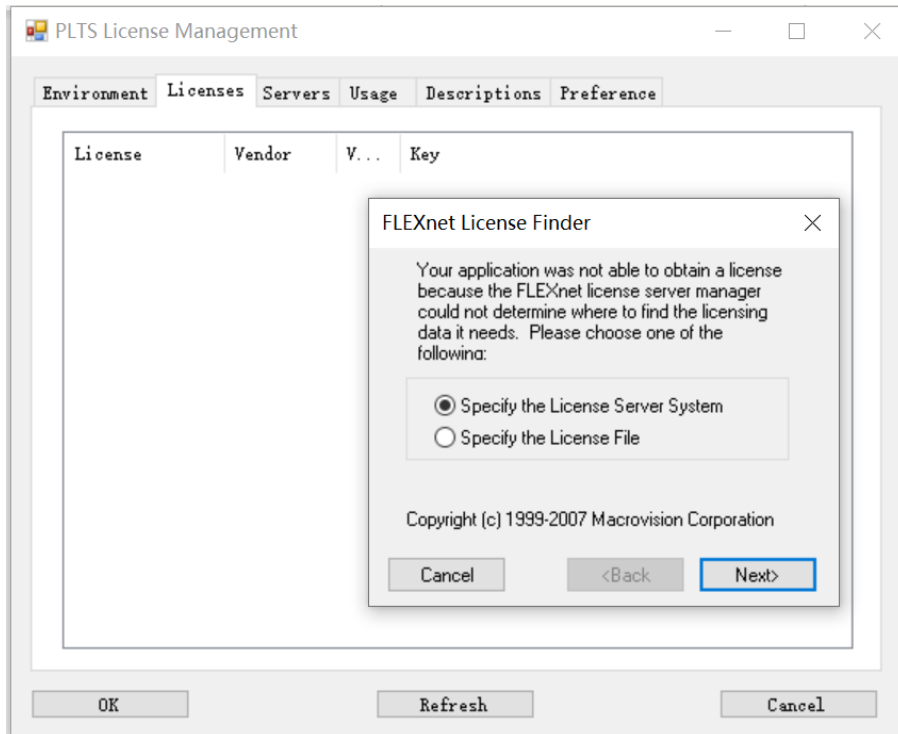
Step 3. Start the Physical Layer Test System Software

2. Make a selection based on license usage.
3. Select **PLTS** then click **OK**.

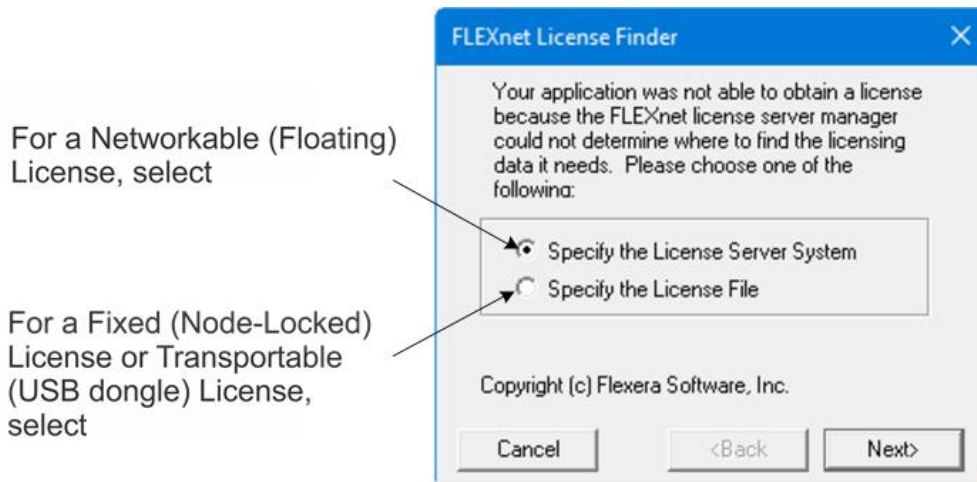
Step 3. Start the Physical Layer Test System Software

3.3 Procedure Using Legacy Flexlm Licensing

1. The first time you start the software, you will need to open PLTS legacy License Management in your Windows start menu to add your legacy Flexlm licenses:

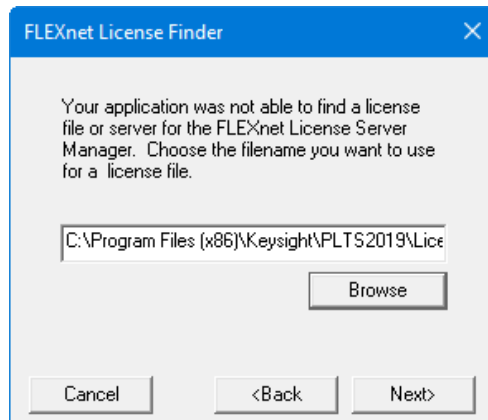


2. You will be asked to identify the license type of the software. Select your type of license file, then click **Next>**.

Step 3. Start the Physical Layer Test System Software

3. Then, one of the following dialog boxes are shown depending on your type of license:

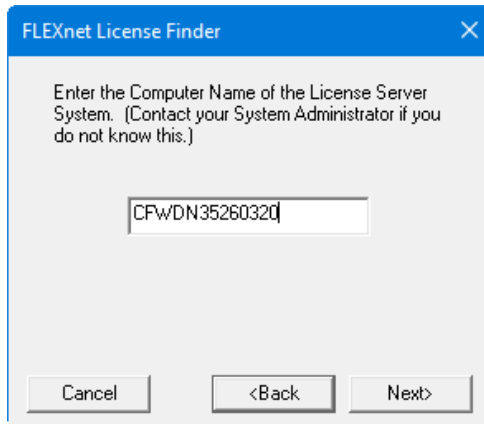
- **If you own a fixed (node-locked) license:** Click **Browse** and select the license file in the License directory. Then click **Next>**.



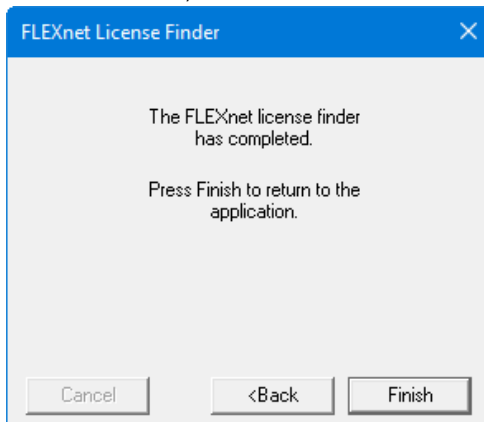
Installing the PLTS Software

Step 3. Start the Physical Layer Test System Software

- **If you own a networkable (floating) license:** Enter the network computer server name that you recorded earlier.



- When the license is found and identified, click **Finish**.



3.4 If you didn't add the license before the first start of PLTS

When PLTS starts and can't find qualified license, PLTS will display a dialog with instructions. Follow the steps in the dialog to add the licenses.

NOTE Make a back-up copy of the license file if you have not already done so.

4 Troubleshooting

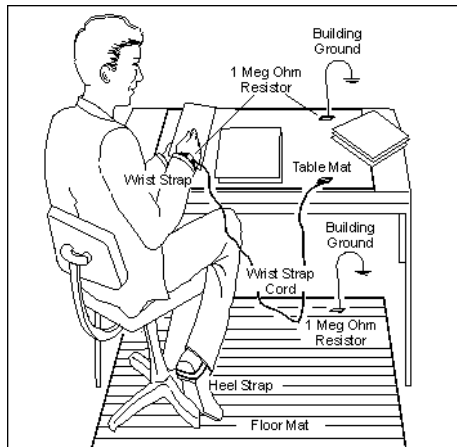
Electrostatic Discharge

Although protected internally, test systems are sensitive to electrostatic discharge (ESD). Static discharges too small to feel can damage or degrade the test equipment or your devices.

Use standard precautions to protect against ESD before using the test system for calibration or measurement.

Use the following illustration and list of equipment to set up a static-safe workstation.

Figure 4-1 Static-Safe Workstation



10 m at 46

- static-control table mat and earth ground wire: part number 9300-0797
- wrist-strap cord: part number 9300-0980
- wrist-strap: part number 9300-1367
- heel-straps: part number 9300-1308
- floor mat: not available through Keysight Technologies

PLTS Installation Troubleshooting

This section provides some background and gives solutions for correcting PLTS installation problems. The following issues are covered in this section:

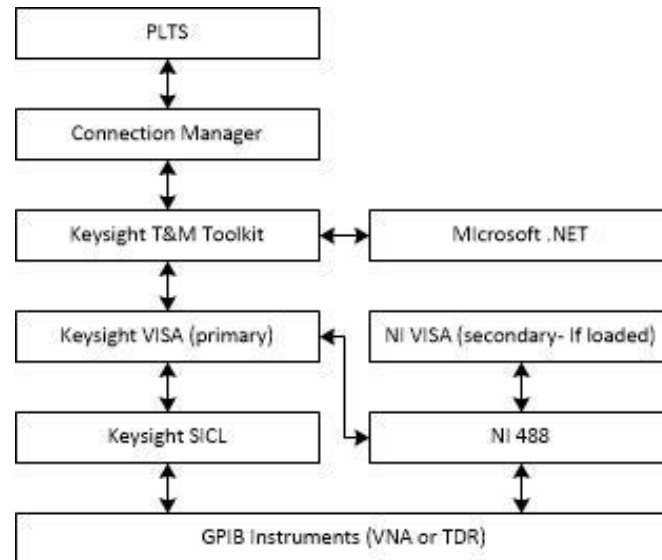
- [Connection Manager working with .NET and the T&M Toolkit](#)
- [PLTS does not recognize the Keysight USB to GPIB adapter.](#)
- [Problems with the VISA Layer](#)
- [Problems with VISA COM \(SOAP Error\)](#)
- [Problems with using National Instruments I/O Devices](#)
- [I/O Troubleshooting Steps](#)
- [Missing Microsoft Component](#)
- [PLTS Hardware Troubleshooting](#)
- [Contacting Keysight](#)

Connection Manager working with .NET and the T&M Toolkit

PLTS Connection Manager communicates with instruments and scans for instruments connected to the bus. The PLTS Connection Manager is built on Keysight's Test and Measurement Programmers Tool Kit (T&M Toolkit), which requires Microsoft's .NET package. Figure 4-2 shows PLTS and its dependencies on other software products and how it communicates with instruments.

Figure 4-2

PLTS Instrument Communication Hierarchy



Note: The German version of .NET does not work with PLTS

PLTS does not recognize the Keysight USB to GPIB adapter.

Restart PLTS after performing one of these procedures.

For Keysight IO Libraries M.01.04

1. In Windows, select **Start, Programs, Keysight IO Libraries**, then **IO Config**.
2. In the Configured Interfaces List, click the "GPIBx" that corresponds to the GPIB card that you are using.
3. Click **Edit**.
4. Change the SICL Interface Name to be identical to the VISA Name.
5. Click **OK**, then click OK to confirm the change.

For Keysight IO Libraries Suite 14

1. In Windows, select **Start, Programs, Keysight IO Libraries Suite**, then **Keysight Connection Expert**.
2. In the Configured Interfaces List, click the "GPIBx" that corresponds to the GPIB card that you are using.
3. Click **Change Properties**.
4. Change the SICL Interface ID to be identical to the VISA ID.
5. Click **OK**, then close the Keysight Connection Expert to confirm the change.

For Keysight IO Libraries Suite 2019

1. In Windows, select **Start**, then **Keysight Connection Expert**.
2. In the My Instruments list, right-click the "GPIBx" that corresponds to the GPIB card that you are using.
3. Click **Edit**.
4. Change the SICL Interface ID to be identical to the VISA ID.
5. Click Test Connection to verify the connection is made. If verification is returned, click **OK**. Otherwise, check the connection or Hostname / IP address and try again.

Other Keysight USB to GPIB Adapter Problems

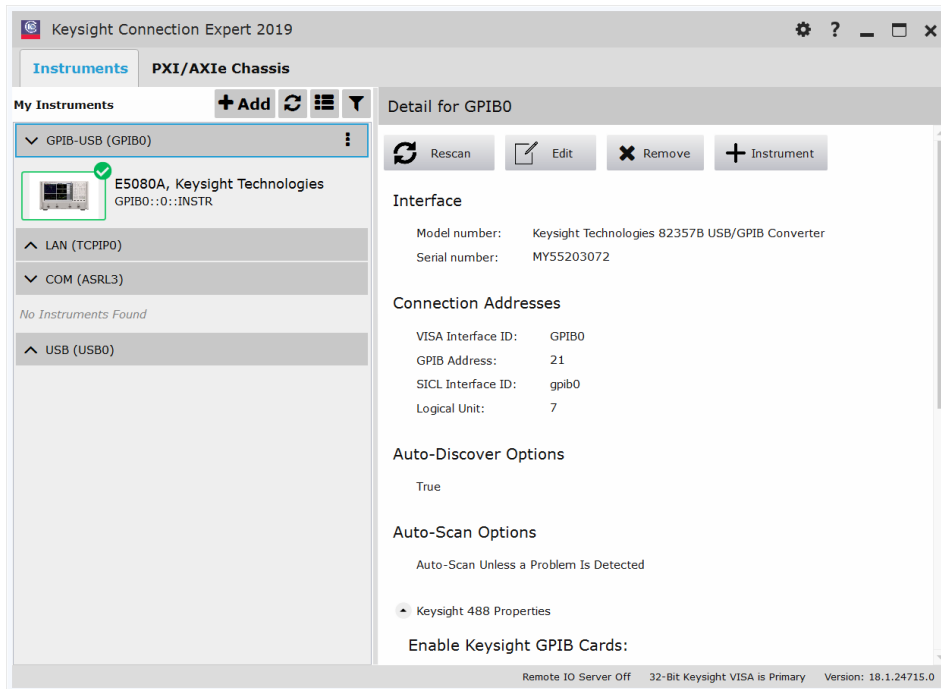
1. If the computer goes into hibernation with the adapter connected, the adapter will not work when the computer comes out of hibernation.
2. If the adapter is connected to a docking station and the laptop is powered up (or rebooted), sometimes the adapter will not work.

To get the adapter to work for either case, make sure the PC is fully powered up and Windows is functional, then unplug the USB connection and reconnect the adapter. The Microsoft Operating System will find the new hardware and the details will be displayed in the Keysight Connection Expert dialog box similar to Figure 4-3.

Troubleshooting

PLTS Installation Troubleshooting

Figure 4-3 Keysight 82357B USB/GPIB Interface Detected Dialog Box



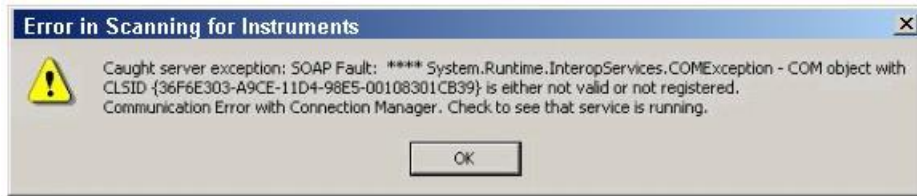
Problems with the VISA Layer

For PLTS Connection Manager to operate correctly and consistently, the Keysight VISA needs to be the primary (or the only) VISA installed. If the NI VISA is installed first, it usually assumes the primary position. When loading the Keysight I/O libraries second (as with PLTS), the Keysight VISA should be set as the primary VISA. Problems may occur leaving the Keysight VISA as secondary VISA. Refer to Figure 4-4 through Figure 4-8 for more details. To quickly check the VISA status, see [I/O Troubleshooting Steps](#) for directions.

Problems with VISA COM (SOAP Error)

The error message shown in Figure 4-4 may be displayed when running PLTS. This error is generated because the VISA COM was not loaded with the Keysight IO libraries.

Figure 4-4 Scanning for Instruments Error Message

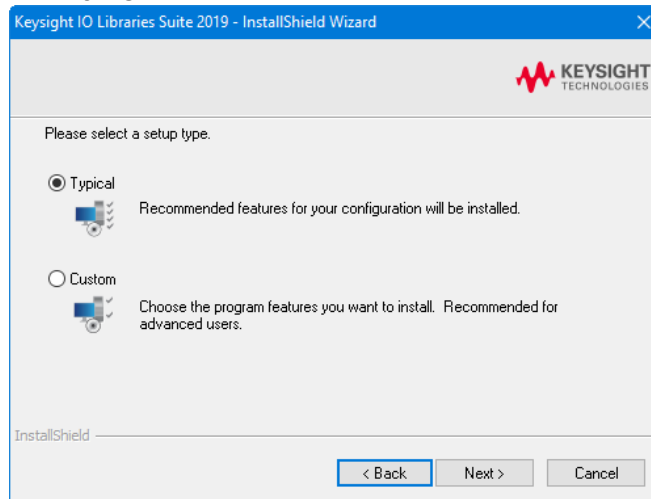


The VISA COM must be loaded for PLTS Connection Manager to work. If the IO libraries are already installed, uninstall then re-install the IO libraries. This can be done by re-installing PLTS or by downloading the IO libraries from the Keysight IO Libraries Suite web page:

<http://www.keysight.com/find/iolib>

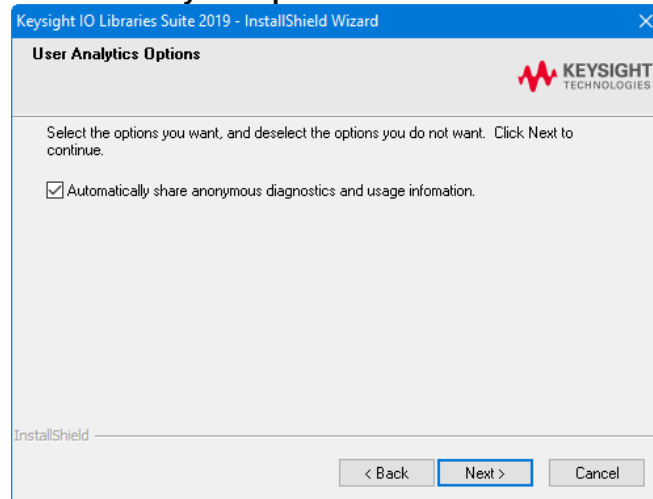
Choose the **Typical** selection during the PLTS installation. See Figure 4-5.

Figure 4-5 Keysight IO Libraries Suite 2019 Select Installation Option Screen



Click **Next**, select the options you want, then click **Next**. See Figure 4-6.

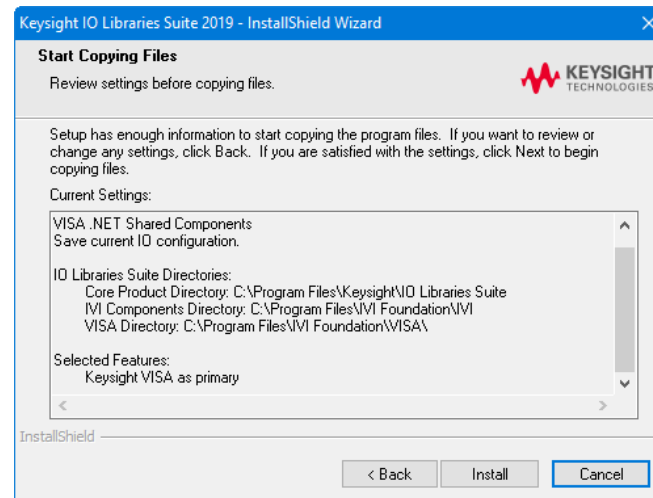
User Analytics Options



Click **Install**. The **Typical** selection automatically loads the Keysight VISA COM and sets it as the primary VISA. See Figure 4-7.

Figure 4-7

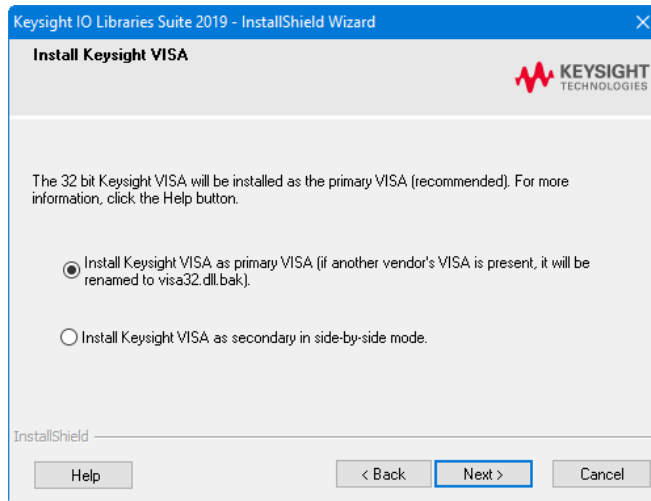
Keysight IO Libraries Suite 2019 Start Copying Files Screen



If you chose the **Custom** selection, you must now choose how to install the VISA. Choose Option **Install Keysight VISA as primary VISA** (this method is used when loaded with PLTS) or Option **Install Keysight VISA as secondary in side-by-side mode**. See Figure 4-8.

Figure 4-8

Keysight IO Libraries Custom Installation Screen



Problems with using National Instruments I/O Devices

If you are using a PCMCIA or PCI NI GPIB, card, the NI software drivers should be loaded first before loading PLTS. There have been occasions where loading the NI software has been problematic. The installation may complete without any apparent errors. However, when running the National Instruments/NI488.2/Getting Started, an error is displayed indicating that the software was not loaded correctly and must be reloaded. Occasionally, getting past this problem has been difficult. Reloading does not seem to help. Sometimes there is a problem identifying the I/O card and getting it to work. In all cases, contact National Instruments technical support representative.

With the NI GPIB-USB-B adapter shown in Figure 4-9, use the latest NI drivers.

Figure 4-9 National Instruments GPIB-USB Adapter



The latest NI drivers can be downloaded from:

<ftp://ftp.ni.com/support/gpib/ni488221/ni488221.exe> (104 MB)

The NI VISA code can be downloaded from:

<ftp://ftp.ni.com/support/visa/drivers/win32/3.0.1/visa301full.exe> (68 MB)

If problems occur when trying to use the NI GPIB-USB-B interface, it may be necessary to force a clean installation by performing the following steps:

1. Uninstall PLTS.
2. Uninstall "all" NI products using **Start, Settings, Control Panel (Apps for Windows 10), and Add/Remove Programs (Uninstall for Windows 10)**.
3. Reboot your computer.
4. Uninstall Keysight IO Libraries using **Start, Settings, Control Panel (Apps for Windows 10), and Add/Remove Programs (Uninstall for Windows 10)**.
5. Uninstall Keysight VISA Com using **Start, Settings, Control Panel (Apps for Windows 10), and Add/Remove Programs (Uninstall for Windows 10)**.
6. Uninstall the Keysight T&M Toolkit using **Start, Settings, Control Panel (Apps for Windows 10), and Add/Remove Programs (Uninstall for Windows 10)**.
7. Reboot your computer.

8. Install the new NI driver. Reboot your computer if prompted.
9. Install NI VISA. Reboot your computer if prompted.
10. Install PLTS. Ensure that the Keysight VISA Layer is the primary VISA. See Figure 4-17.
11. For NI Labview code to run properly, you will need to enable **TULIP Passport** in NI Labview.

I/O Troubleshooting Steps

This section provides some steps to troubleshooting the I/O section of the PLTS system. The steps include:

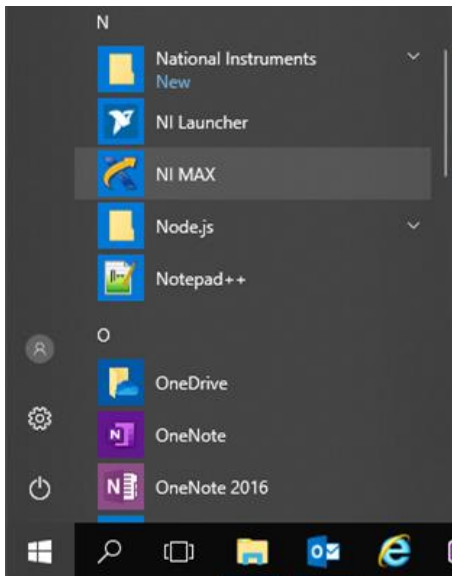
1. Troubleshooting the National Instruments (NI) software, hardware, and connections.
2. Troubleshooting the Keysight I/O libraries.

Troubleshooting the NI Software, Hardware, and Connections

If you are using a National Instruments (NI) GPIB card, troubleshoot the NI software, hardware, and connection by doing the following:

1. Click **Start, NI MAX** to run the Measurement & Automation Explorer. See Figure 4-10.

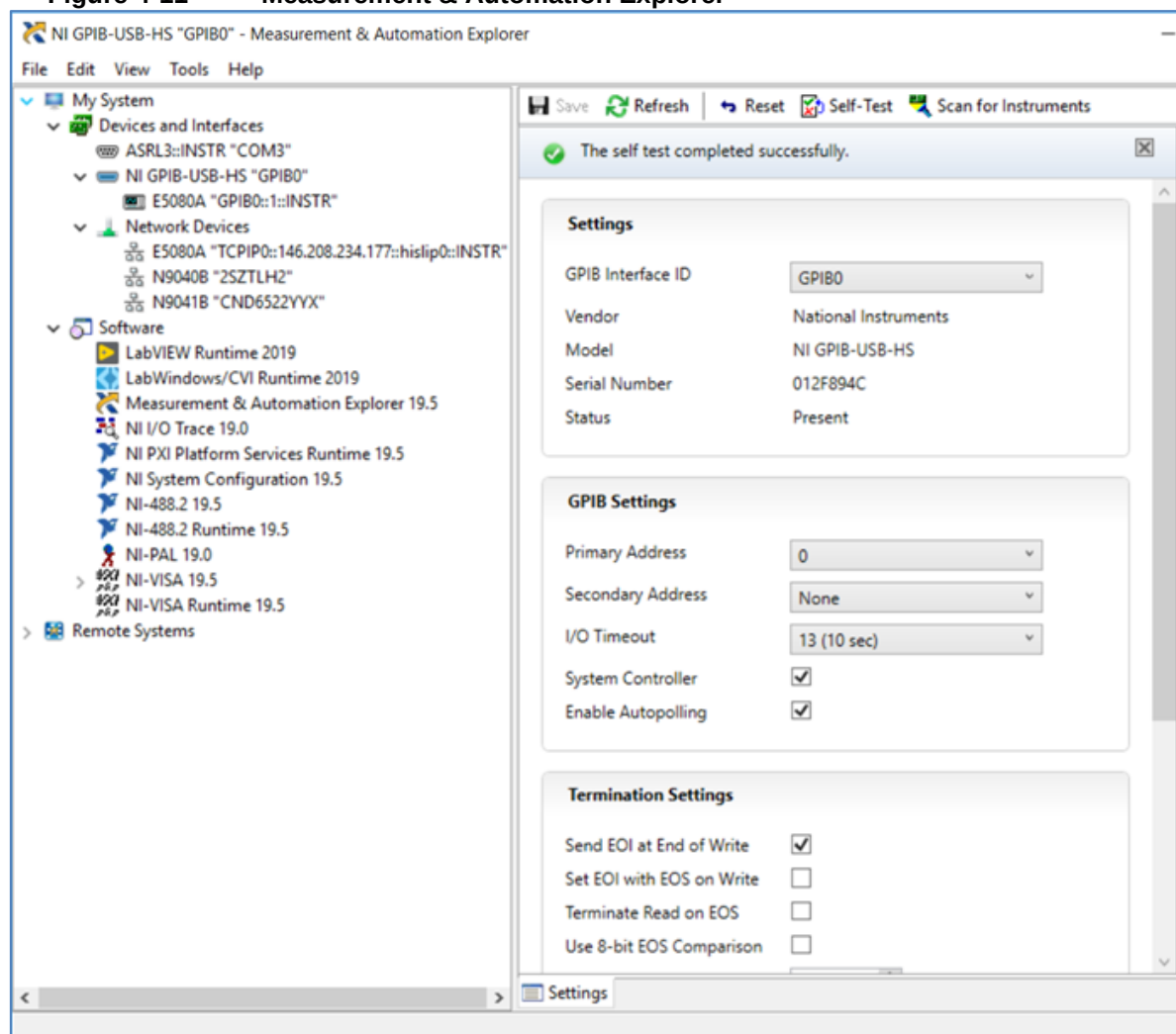
Figure 4-10 National Instrument Getting Started Menu Selection



PLTS Installation Troubleshooting

2. Use the Self-Test function in the Measurement & Automation Explorer to help troubleshoot any problems you encounter while using your GPIB hardware and the NI-488.2 software. Self-Test verifies that your GPIB hardware and the NI-488.2 software are installed correctly and able to perform basic I/O functions. See Figure 4-11.

Figure 4-11 Measurement & Automation Explorer

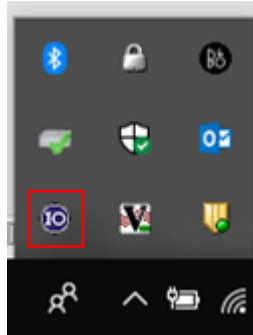


Troubleshooting the Keysight I/O Libraries

Troubleshoot the Keysight I/O libraries by doing the following:

1. When the **Keysight IO Control** is running, an **IO** icon is displayed in the task bar as shown in Figure 4-12.

Figure 4-12 Keysight IO Control Icon

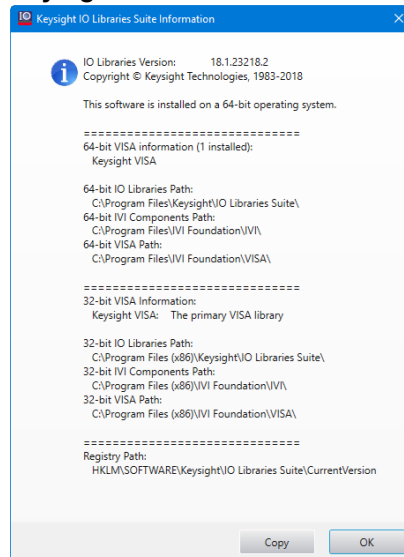


If the **Keysight IO Control** is not already running, click **Start, Keysight Connection Expert**.

2. Select **About Keysight IO Libraries Suite** to verify that the Keysight libraries are installed and Keysight VISA is set as the primary VISA.

This is required for PLTS to work correctly. If this is not correct, reload the Keysight IO libraries.

Figure 4-13 Keysight IO Libraries Suite Information Dialog Box



PLTS Installation Troubleshooting

- To configure an interface, right-click the name of the interface and choose **Edit**.

Figure 4-14 Edit settings for an 82357 USB/GPIB interface Dialog Box

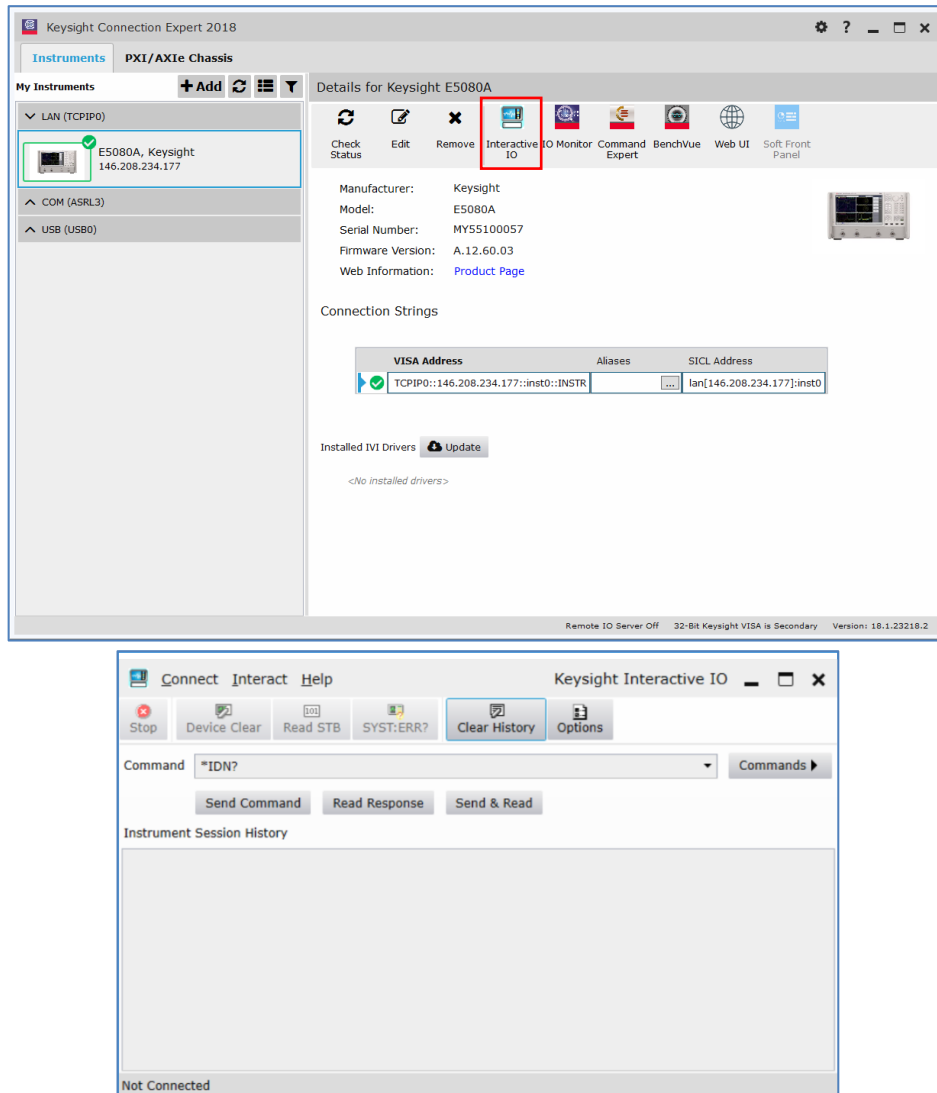
The dialog box is titled "Edit settings for an 82357 USB/GPIB interface". It contains the following sections:

- Interface**
 - Model number: Keysight Technologies 82357B USB/GPIB Converter
 - Serial number: MY55203072
- Specify Connection Addresses:**
 - VISA Interface ID: GPIB0
 - GPIB Address: 21
 - SICL Interface ID: gpib0
 - Logical Unit: 7
- Auto-Discover Options**
 - ☒ Auto-Discover Instruments Connected to This Interface
- Auto-Scan Options**
 - ☐ Do Not Auto-Scan For Instruments On This Interface
 - ☐ Always Auto-Scan For Instruments On This Interface
 - ☒ Auto-Scan Unless a Problem Is Detected
 - Auto-Scan is enabled by default*
- Keysight 488 Properties** (collapsed)

At the bottom right are "OK" and "Cancel" buttons.

- For all GPIB interfaces used with PLTS, the **VISA Interface Name** and **SICL Interface Name** MUST BE THE SAME (including the case). For NI GPIB interfaces, the **NI GPIB Board** name must also be the same. Click **OK**.
- To send a SCPI command to an instrument, click **Interactive IO**. See Figure 4-15.

Figure 4-15 **Interactive IO**



Missing Microsoft Component

When installing PLTS, if the following error is displayed, comctl32.ocx has to be installed and registered.

'Component 'comctl32' or one of its dependencies not correctly registered: a file is missing or invalid'

PLTS Hardware Troubleshooting

Use Table 4-1 to help troubleshoot your Physical Layer Test System VNA-based hardware.

Table 4-1 **Troubleshooting the PLTS VNA-Based Hardware**

Symptom	Cause	Cure
One or more biases not applied.	Bias fuse blown.	Check bias fuses. Replace blow fuse with fuse of the same type and rating.
Control computer can't communicate with the test set.	Accidental change to GPIB switch settings.	Set the GPIB address as needed. Restart the test system. See Step 7. Set up PC to PLTS Communication .
The test set does not come on the first time you use it.	Line fuse not installed, or incorrect line fuse installed.	Install the line fuse.
Excessive ripple in data.	Load termination damaged by excessive RF power.	Contact Keysight Technologies. See Contacting Keysight for more information.
	Loose connections between VNA and test set and/or between test set and DUT.	Check and torque the connectors.
	Poor test cable repeatability.	Replace test cables as needed. You can replace a single cable, without replacing the entire set.
High loss on one path with poor raw data match (as seen during analyzer sweep) or inability to make a good calibration.	Possible signal channel damage.	Contact Keysight Technologies. See Contacting Keysight for more information.

Troubleshooting PLTS Using a Tektronix CSA8000 or TDS8000

PLTS is designed to use the following Tektronix equipment.

- Tektronix CSA8000 Communications Signal Analyzer equipped with one or two 80E04 Dual Channel, 20 GHz TDR Sampling Modules using Firmware Revision 1.3.3 or greater
- Tektronix TDS8000 Digital Sampling Oscilloscope equipped with one or two 80E04 Dual Channel, 20 GHz TDR Sampling Modules using Firmware Revision 1.3.3 or greater

If you are having problems getting PLTS to work with this equipment, the following is a basic troubleshooting procedure that should help you isolate the problem.

1. First, this procedure instructs you how to make sure the Tektronix equipment has basic operational functions.
2. Then, this procedure instructs you how to make sure your PC has basic communication functions with the Tektronix equipment.
3. Finally, this procedure instructs you how to make sure PLTS is communicating with the Tektronix equipment.

Verifying the Tektronix System is Operational

The first step is verifying that the Tektronix instrument is operational. The first part of this step is to check that the instrument's stimulus and receiver for each channel is operating. Then, the next part of this step is performing the compensation utility on the instrument and verifying the main frame and both channels of each 80E04 TDR sampling module pass.

Check each Channel's Stimulus and Receivers are Operational

Perform this procedure with nothing (no cables, connectors, or standards) connected to the TDR sampling module channel connectors.

1. Using the mouse, from the **Setup** menu, click **Display** for the *Disp* tab on the *Setups* window. With **Normal** selected, click the **Show Vectors** check box.
2. Select the **TDR** tab on the *Setups* window.
3. On **TDR** tab, for **C1**:
 - a. In the **TDR Step** area:
 - Click the **On** check box
 - Make sure the waveform is positive going 
 - b. In the **ACQ** area:
 - Click the **On** check box

PLTS Hardware Troubleshooting

- Set the **Units** to volts (V)
- c. In the **Preset** area:
 - Click the **C1** button
- 4. On the TDR sampling module, verify that the red **TDR** LED and the yellow **SELECT ON/OFF** LED for channel 1 (CH 1) is lit.
- 5. Verify that the display shows Channel 1 with an initial step 250 mV and a subsequent step of 250 mV because of the open circuit response.
- 6. Repeat for steps 3, 4, and 5 for each of the other channels to verify that each channel is operational.
- 7. If the instrument does not match these results, contact your Tektronix representative.

Perform the Compensation

Perform this procedure to verify that the instrument is operating with the instrument's Compensation utility. The firmware will only allow you to start this utility after the instrument is sufficiently warmed. Typically, the longer the instrument has been powered on; the stability of the instrument is increased and results in better performance.

1. Under **Utilities** menu, select **Compensation**^o
2. Make sure that **Compensate** in the **Select Action** area is selected. Then, select **All** from the list below. Choose **Execute** button to start the compensation utility on the mainframe and of all the TDR sampling module channels.
3. When the Compensation utility has finished (after approximately five minutes), make sure that the mainframe and each of the four module channels has passed.
4. Save the compensation data by selecting **Save** in the **Select Action** area and then choosing the **Execute** button.
5. Click the **Close** button to exit the Compensation utility.
6. If the Compensation utility fails, contact your Tektronix representative.

Verifying the GPIB Communication between the PC and the Tektronix System

The next step is verifying that the PC and the Tektronix instrument have two-way communication over the GPIB. To check the GPIB communication:

1. Check the GPIB address of the Tektronix instrument:
 - a. Select **User Preferences** on the **Utilities** menu.
 - b. Select the **GPIB Configuration** tab on the *User Preferences* window.

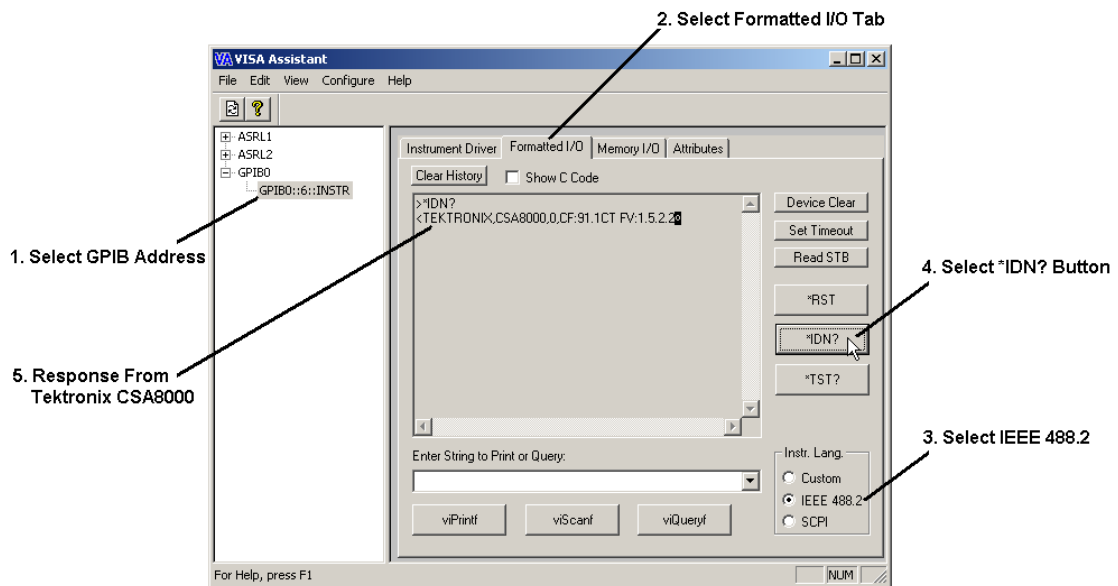
- c. Locate the address in the **GPIB Address** box.
- d. Make sure that **GPIB Talk/Listen** is selected in the **GPIB Mode** area.
2. Click the **Start** button in the lower left corner of the PC. Then select **Programs, Keysight IO Libraries**, then **VISA Assistant** to open the *Visa Assistant* dialog box.
3. In *Visa Assistant* dialog box, make sure the Tektronix instrument's GPIB address found in step 1 is listed the window. See Figure 4-16.

Figure 4-16 Instrument GPIB Address Displayed in VISA Assistant



4. Verify the PC and the Tektronix instrument have two-way communication over the GPIB:
 - a. Select the GPIB address listed in step 3, and then select the **Formatted I/O** tab. See Figure 4-17.

Figure 4-17 Tektronix CSA8000 Response to *IDN? Button



- b. Select **IEEE 488.2** in the **Inst. Lang.** area.
- c. Click the ***IDN?** button.

The PC queries the instrument at the address requesting instrument information. The Tektronix instrument should reply with a response that lists the manufacturer, the model number, and some additional information that includes the firmware version (FV).

If this response is received, two-way communication over the GPIB between the PC and the instrument is occurring.

5. If communication is not occurring, investigate your GPIB for problems.

Verifying PLTS is Operating with the Tektronix System

The first step is verifying that PLTS recognizes the Tektronix instrument. The next part is performing a basic PLTS calibration and measurement with the Tektronix instrument.

Verify PLTS Recognizes the Tektronix Instrument

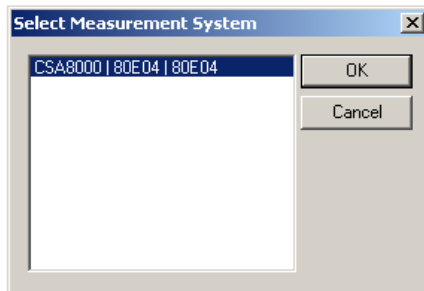
Start PLTS to ensure that PLTS finds and identifies the Tektronix instrument. This section does not go into detail with each PLTS step. Locate specific PLTS information in the PLTS User's Guide.

1. Start the PLTS software. PLTS scans for possible PLTS hardware on the GPIB.
 - If the Tektronix instrument is found and displayed in the *Select Measurement System* dialog

box (Figure 4-18) upon PLTS startup, skip the remaining steps and continue with **Verify the Tektronix Instrument Makes a PLTS Measurement**.

- If the Tektronix instrument is not found and displayed in the *Select Measurement System* dialog box upon PLTS startup:
 - a. From the PLTS **Tools** menu, select **Acquisition Hardware**, and then choose **Choose Data Acquisition Device**^o to display the *Select Measurement System* dialog box manually.
 - b. If the Tektronix instrument is found and displayed in the *Select Measurement System* dialog box, skip the remaining steps and continue with **Verify the Tektronix Instrument Makes a PLTS Measurement**.

Figure 4-18 **Select Measurement System Dialog Box**



2. If the Tektronix instrument is not displayed in step 1:
 - a. From the PLTS **Tools** menu, select **Acquisition Hardware**, and then choose **Scan for New Hardware** to force PLTS to re-scan for PLTS hardware on the GPIB.
 - b. After the scan is complete, from the PLTS **Tools** menu, select **Acquisition Hardware**, and then choose **Choose Data Acquisition Device**^o to display the *Select Measurement System* dialog box manually.
 - c. Check for the Tektronix instrument in the *Select Measurement System* dialog box.
If it is found, continue with **Verify the Tektronix Instrument Makes a PLTS Measurement**. If it is not found, contact Keysight for assistance.

Verify the Tektronix Instrument Makes a PLTS Measurement

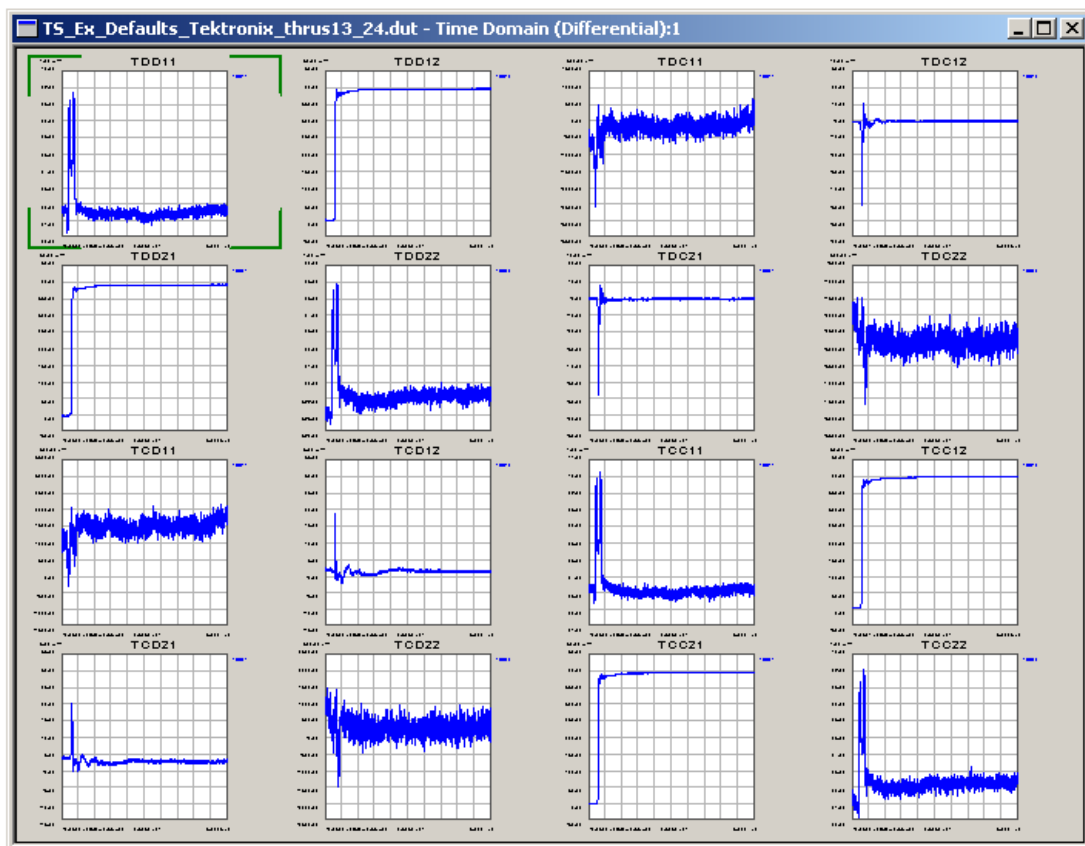
After PLTS has found and identified the Tektronix instrument, make a basic measurement using the following instructions. This section does not go into detail with each PLTS step. Locate specific PLTS information in the PLTS User's Guide.

1. Select the Tektronix instrument in the *Select Measurement System* dialog box.

PLTS Hardware Troubleshooting

2. Start the PLTS measurement process. Use the default parameters for the **TDR Setup** and **Calibration and Measurement Parameters** wizard windows. Use the **Generic 3.5mm** calibration kit for the calibration.
3. For the measurement, connect a thru device between channel 1 and channel 3 and another thru device between channel 2 and channel 4.
4. Compare the Time Domain Differential results with the measurement plots shown in Figure 4-19. Each measurement plot has been autoscaled.

Figure 4-19 PLTS-Tektronix Measurement Example Plots



5. If your measurement results are similar to the measurement results shown above, your Tektronix instrument operates with the PLTS software. If it is not found, contact Keysight for assistance.

Contacting Keysight

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

[*http://www.keysight.com/find/assist*](http://www.keysight.com/find/assist)

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

Make sure have the following information readily available:

- the serial number of the test set
- a list of any options or accessories installed in or in use with the test set
- the type of GPIB board in your computer
- any information you can supply about the DUT
- the nature of the problem
- the version number of software

5 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.
----------------	---

Safety Information

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.



The AC symbol indicates the required nature of the line module input power.



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.



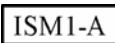
This symbol is used to identify a terminal which is internally connected to the product frame or chassis.



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 mark designates the product is an Industrial Scientific and Medical Group 1 Class A product (reference CISPR 11, Clause 5).



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



Direct Current.



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



The RCM mark is a registered trademark of the Australian Communications and Media Authority.



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 or secondary packaging indicates compliance to China standard GB 18455-2001.



South Korean Certification (KC) mark; includes the marking's identifier code which follows the format: MSIP-REM-YYY-ZZZZZZZZZZZZZZ or KCC-REM-YYY-ZZZZZZZZZZZZZZ.

Safety Information

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 physical layer test system 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.

Safety Information

General

WARNING To prevent electrical shock, disconnect the Keysight Technologies (N4415A, N4416A, N4417A, N4418A, N4419A/B, N4420B, and N4421A/B) 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 per IEC 1010 and 664 respectively.

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 Keysight Technologies S-Parameter test system complies with the regulatory requirements listed in this section.

Compliance with Canadian EMC Requirements

This ISM device complies with Canadian ICES-001.

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

South Korean Class A EMC Declaration

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으로 합니다 .

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 Maschinenlaermrerordnung –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 Declaration of Conformity is on file for the N1900 Series models, and a copy is available upon request.

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