

Agilent E6474A

Wireless Network Optimization Platform

User's Guide



Agilent Technologies

Notices

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A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Welcome to Agilent E6474A Wireless Network Optimization Platform

Thank you for choosing Agilent Technologies. In this User's Guide, you will find the instructions you need to setup the hardware and begin using the software to take measurements.

About this guide

This guide contains installation and operating instructions for the Agilent E6474A Wireless Network Optimization Platform software, as well as instructions for using the Agilent E6473B High Speed Direct Connect Hub.

See this chapter	For this information
1 Get Ready	A list of tasks to perform before you get started.
2 Install the Software	Instructions for installing the E6474A software.
3 Set Up Your System	Setup instructions and cable connections for each component of your systems.
4 Use Your System	<ul style="list-style-type: none">• Powering up systems.• Starting the software.
5 Get Results Fast	<ul style="list-style-type: none">• Using the Quick Basics to get started learning to use the E6474A.• Accessing and using online help.
6 Get Assistance, If You Need It	<ul style="list-style-type: none">• Getting telephone support.• Frequently asked questions.• Returning systems for service.• Solving problems.• Contacting customer support.• Updating E645xx receiver firmware.
Appendix A, "Safety and Regulatory Information"	Information to help you to use your system safely
Appendix B, "Connection Panels and LED Indicators"	A quick reference for the panel connectors and LED indicators of the E6473B High Speed Direct Connect Hub, E645x receiver, the GPS/DR Navigation unit, and the Trimble Placer 455DR.

See this chapter	For this information
Appendix C, "System Information"	System specifications, including software and hardware options, and part numbers.
Appendix D, "Permanent In-Vehicle Hardware Installation"	Recommendations for installing components connected to your vehicle.
"Index"	Key word index helps you find information quickly

Information you need

This guide is one member of a comprehensive documentation set for the Agilent E6474A. It is designed to provide you with a smooth, successful installation and set-up. In addition to this guide, the documentation set includes:

- **E6474A Quick Basics**—online tutorial that provides interactive training on how to use the system.
- **Getting Started Poster**—helps you quickly set up the hardware. You'll find that the steps on the poster correspond directly to the chapters in this book, making it easy to know where to go for more information.
- **Online help**—provides context-sensitive information for entries in each of the views within the software, as well as in-depth information about the use of the E6474A software.

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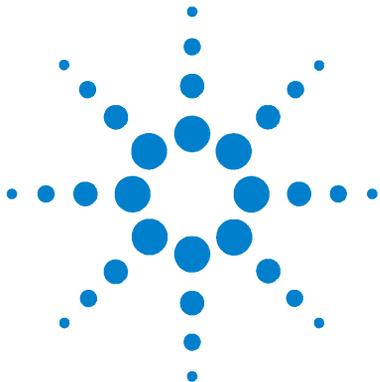
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1 Get Ready

Unpacking your boxes

The Agilent E6474A system is a modular system so your delivery may arrive as a collection of boxes. Carefully unpack each box and locate the following items:

- License key(s).
- Installation CD.
- License documents.
- Order details (order number, packing list).
- Getting Started Poster.

NOTE

Do not connect any hardware at this stage.

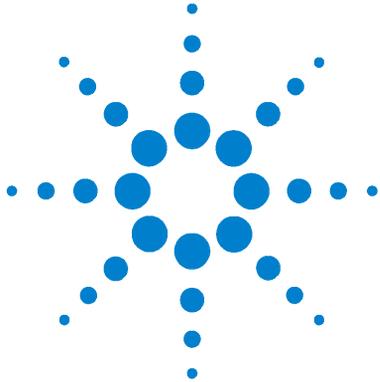


Before installing the software

Once you have identified your delivered items and before connecting any hardware or installing any software, check you have these items:

- A PC that meets the minimum requirements (refer to [“Computer Hardware and Software Requirements”](#) on page 142)
- Agilent E6474A installation CD
- A valid license key
- A valid SIM phone card
- Fully charged phone batteries

If you are unclear about any items you have received, please contact us as soon as possible. Refer to [“Contacting Customer Support”](#) on page 123.



2 Installing the Software

What you'll find in this chapter

To do this	See this
Find out what's on the CD	"What is on the CD" on page 16
Install the E6474A system software.	"Install the E6474A software." on page 17.
Install the E6474A Option 758 Analysis Reporter software.	"Install Analysis Reporter software" on page 18.
Install the Adobe Reader software.	"Install Adobe Reader software" on page 19.
Uninstalling Walkabout or VoicePrint software.	"Uninstalling the Walkabout or VoicePrint software" on page 21.
Verify your installation.	"Verifying your software installation" on page 22.

NOTE

Do not connect any hardware at this stage.

Refer to ["Set Up Your System"](#) on page 25 for more information on hardware configuration.

NOTE

If you have **Walkabout** or **VoicePrint** software on your PC, it must be removed before installing Agilent E6474A software.

Refer to ["Uninstalling the Walkabout or VoicePrint software"](#) on page 21.



What is on the CD

The Agilent E6474A software CD includes:

- Release Notes
- The main E6474A measurement software
- Analysis Reporter - post-processing software (option 758)
- Adobe Reader software
- E6473B, Socket I/O, and phone hardware drivers
- Default plan and demo files for most technologies

After installation of the main Agilent E6474A software the following items are added to your PC:

- The main E6474A measurement software
- Folders containing hardware drivers
- Default plan and demo files (only if the custom install has been used)
- All documentation, including help files and a quick start tutorial

NOTE

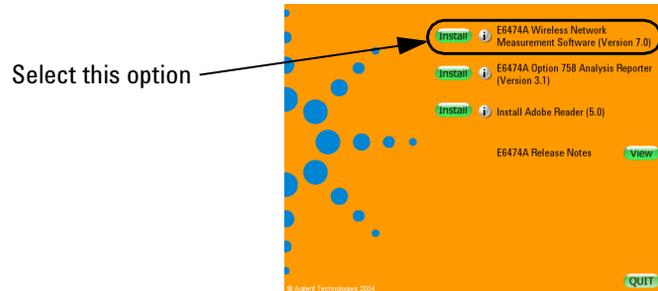
It is recommended that you read the **Release Notes** before you install the software.

The **Release Notes** include information that may not appear in this guide. It also lists all the new features and enhancements made since the last released version.

Install the E6474A software.

Follow these steps.

Do This	Notes
1 Insert the Agilent E6474A CD.	This CD contains the required software device drivers.
2 Your system may have autostart or go to the Start button, click Run and type D:\setup (where D is your CD drive).	The installation dialog box appears (see below).



3 Select View and read the E6474A Release Notes before installing.	These notes provide additional information that may not be covered in this guide.
4 Select Install next to the E6474A Wireless Network Measurement Software option.	Before selecting this option you can find out more by clicking the  information button.
5 Follow the installation instructions	Select the Custom Install option if you wish to install sample default plan and demo files.

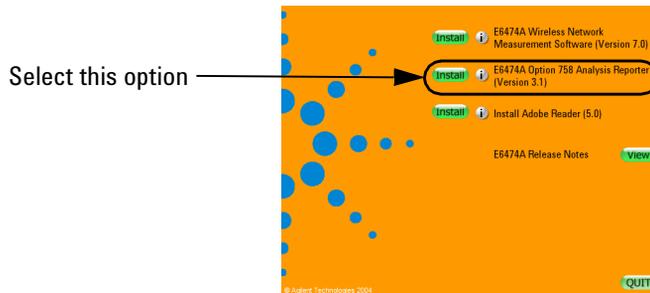
Once the installation has completed you are returned to the installation dialog box.

Install Analysis Reporter software

The Analysis Reporter (Agilent E6474A-758) option is a simple-to-use post-processing report tool. It quickly generates network performance overview and detailed network analysis reports.

Follow these steps.

Do This	Notes
1 Insert the Agilent E6474A CD.	This CD contains the required software device drivers.
2 Your system may have autostart or go to the Start button, click Run and type D:\setup (where D is your CD drive).	The installation dialog box appears (see below).



3 Select Install next to the E6474A Option 758 Analysis Reporter option.	Before selecting this option you can find out more by clicking the  information button.
4 Follow the installation instructions	If you have a previous version of Analysis Reporter installed on your PC you will be prompted to over-write with the newer version.

Once the installation has completed you are returned to the installation dialog box.

Install Adobe Reader software

NOTE

If you already have this software installed on your PC, you **do not need to install the Adobe Reader software.**

All the documentation supplied with your system is also available in PDF (Portable Document Format) for online viewing. All these documents can be viewed once the main E6474A software has been installed.

To view documents:

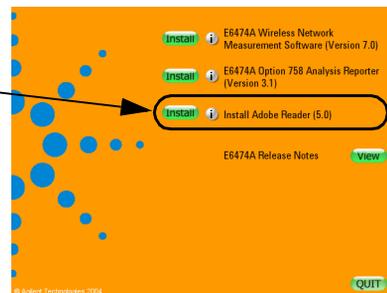
- 1 Start the E6474A software.
- 2 Select **Help > Library**.

To read the supplied documents you need to have the Adobe Reader software installed on your PC.

To install the Adobe Reader software.

Do This	Notes
1 Insert the Agilent E6474A CD.	This CD contains the required software device drivers.
2 Your system may have autostart or go to the Start button, click Run and type D:\setup (where D is your CD drive).	The installation dialog box appears (see below).

Select this option



2 Installing the Software

Do This	Notes
3 Select Install next to the Adobe Reader software option.	Before selecting this option you can find out more by clicking the  information button.
4 Follow the installation instructions	You may need to restart your PC once the installation has completed.

Once the installation has completed you are returned to the installation dialog box.

If you have installed the options you require, select **QUIT** (Quit) to close the installation screen.

Uninstalling the Walkabout or VoicePrint software

It is recommended that you uninstall existing Walkabout, or VoicePrint software prior to installing E6474A software.

Uninstalling Existing Software

Follow these steps:

Do this	Notes
1 Select Start button.	
2 Select Settings > Control Panel .	
3 Double-click Add/Remove Programs .	
4 Select Walkabout or VoicePrint .	
5 Click Yes to begin the uninstallation process.	
6 When the uninstallation is completed, restart your PC.	

Verifying your software installation

Once you have installed the E6474A software you can verify the installation using the following methods.

An option will appear in your program listing.

Select Start > Programs > Agilent Wireless Solutions >E6474A and you should see a new program group and items added to your program listing. Refer to [Figure 1](#).



Figure 1 Menu item options after installation

Start the software and check you license options

Do the following.

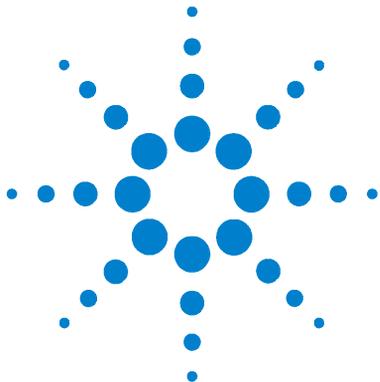
Do this	Notes
1 Attach your USB license dongle to your PC.	This also applies to parallel license dongles. Your PC should automatically detect the USB license dongle.
2 Select Start > Programs > Agilent Wireless Solutions > E6474A > E6474A .	The E6474A software starts.
3 Select Help > About E6474A...	The About E6474A dialog box appears.
4 Confirm you have the version of software you ordered.	
5 Select the License Info button	The License Information dialog box appears.

Do this	Notes
6 Confirm the license descriptions match your ordered license options.	If no license descriptions appear in this dialog box, check that you have properly connected a valid license dongle.

Ordered license options can provide a range of measurement features. When you view the license descriptions, you will see more features listed than the options you ordered.

If you are having problems with installing the software or verifying its operation, refer to [“Get Assistance, if You Need It”](#) on page 101.

2 Installing the Software



3 Set Up Your System

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Overview

This chapter explains how to configure and set up each type of hardware that forms part of your E6474A system.

NOTE

Do not connect hardware until you installed the Agilent E6474A software. Refer to "[Installing the Software](#)" on page 15.



E6473B High Speed Direct Connect Hub

The E6473B High Speed Direct Connect Hub expands the serial communication capabilities of your computer. The computer and hub communicate via the Universal Serial Bus (USB). The hub converts the USB to six serial (COM) ports, which are in turn connected to the devices.

Up to two phones and two Agilent digital receivers can be connected to the hub. It also provides power to all devices, phone battery charging, phone audio monitoring, and a serial port for a GPS receiver or GPS/DR navigator.

In this section you can find:

To do this	Refer to
How to connect your E6473B hub.	page 27
How to power your E6473B hub.	page 28
How to connect a License key dongle.	page 31
How to connect other devices to the E6473B hub.	page 31
How to connect two E6473B hubs together	page 32
Verifying E6473B hub installation	page 32

NOTE

Windows 2000 and XP

Windows 2000 and Windows XP requires that anyone installing hardware drivers must have System Administrator rights. If you do not have System Administrator rights for the computer on which the E6473B drivers need to be installed, contact your site's IT Support for assistance.

How to connect the E6473B hub

NOTE

Do not connect the E6473B High Speed Direct Connect Hub until you have installed the E6474A software. Refer to [“Install the E6474A software.”](#) on page 17.

Follow these instructions.

Do this	Notes
1 Connect the E6473B hub to a suitable power source.	Refer to “How to power your E6473B hub” on page 28.
2 Connect the E6473B hub to the USB port of your PC.	Refer to Figure 2 .

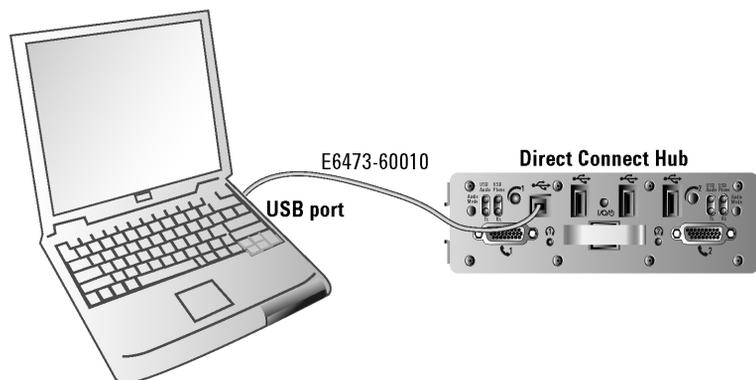


Figure 2 USB connection between the E6473B hub and your PC.

- 3 Follow the hardware installation wizard that starts automatically when you connected the E6473B hub.
- 4 Select 'Search for a suitable driver'.
- 5 Select 'Specify location'.
- 6 Follow the installation instructions.

Do this	Notes
<p>7 Select the drivers that were added to your PC when you installed the E6474A software. These can be found in: C:\Program Files\Agilent Technologies\Shared\Drivers\Edgeport\E6473B</p>	Do not use any other drivers.
<p>8 Accept all the installation options listed by the installation wizard.</p>	Select 'yes' for any digital signature dialogs.
<p>9 The installation process is repeated for each added port.</p>	
<p>10 Restart your PC.</p>	

How to power your E6473B hub

The E6473B hub can be powered from any of these sources.

Powering the E6473B hub	Refer to
Power from the in-vehicle lighter socket using the in-vehicle lighter cable (E6473-90004) (option 015).	page 28
Power from the in-vehicle chassis (E6473-60224) connected directly to the vehicle ignition system (option 021).	page 29
Power from a battery (E6473-60008) connection using the in-building chassis (E6473-60225) (option 022).	page 30

Power the E6473B hub from the in-vehicle lighter socket

The E6473B hub (option 015) is supplied with a lighter power cable. The E6473B hub is connected directly to the in-vehicle lighter socket. Refer to [Figure 3](#) on page 29.

CAUTION

Using the in-vehicle lighter socket to power the E6473B hub may cause problems if more than one device is attached to the hub.

It is recommended that the E6473B hub is powered using the in-vehicle ignition system. Refer to [“Permanent In-Vehicle Hardware Installation”](#) on page 171.

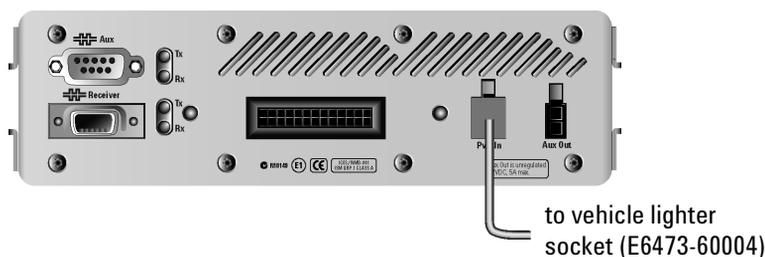


Figure 3 Power E6473B hub directly from lighter socket

Power the E6473B hub using the in-vehicle chassis

The E6473B in-vehicle chassis has a built-in power socket which the E6473B hub plugs into. The chassis allows connection to your car ignition system. Refer to [“Direct Connect Hub Installation”](#) on page 174 for more information about connecting the E6473B hub to your vehicle ignition system. [Figure 4](#) below shows the E6473B hub fitted into the in-vehicle chassis (shown with the E6473B GPS/DR unit) and the in-vehicle power connections.

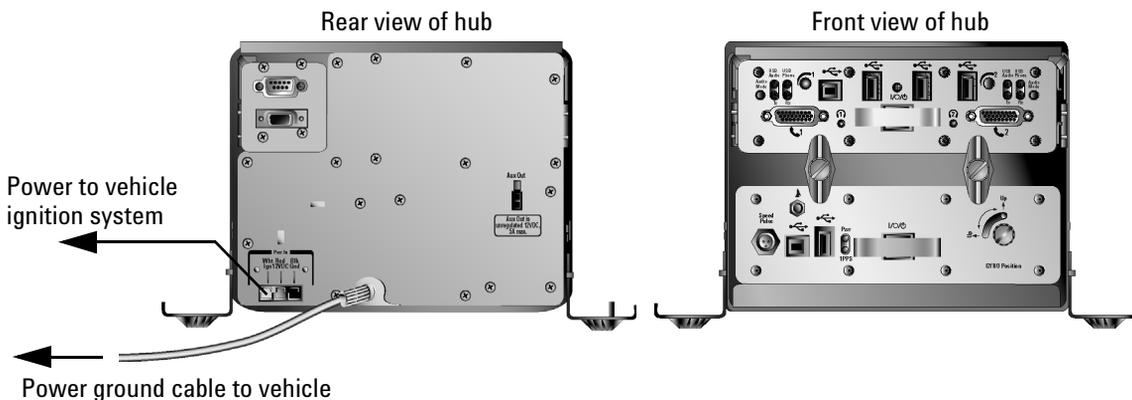


Figure 4 E6473B hub inside in-vehicle chassis

Power the E6473B hub from a battery

The E6473B hub can be used for indoor measurement systems and is powered using an Agilent battery (E6473-60008). Refer to [Figure 5](#).

Locking knobs:

After inserting the battery and hub, the knobs should be turned vertical and the screws tightened to lock in place.

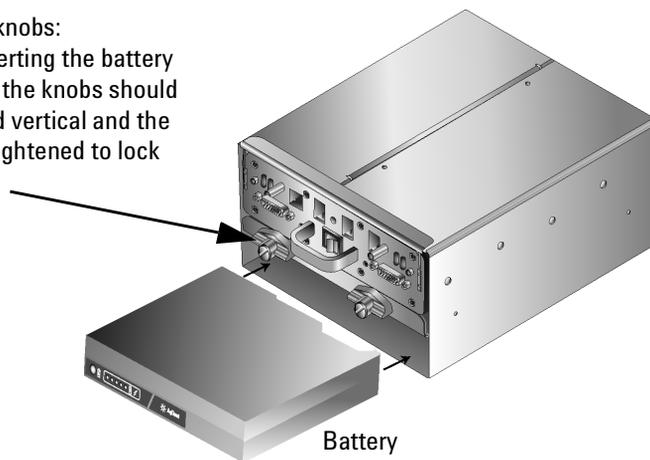


Figure 5 Inserting the battery into the chassis with the E6473B hub.

Refer to “Batteries” on page 55 for more information about the battery and how to use it.

How to connect a license key dongle to the E6473B hub

Once the E6473B hub has been configured and an adequate power supply has been provided, it is possible to attach devices, such as the USB license dongle.

The USB license dongle can be plugged into any of the three USB ports  on the front of the hub. Refer to [Figure 6](#).

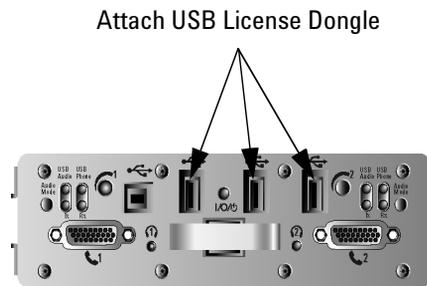


Figure 6 Fit the USB dongle to any of three USB ports.

How to connect other devices to the E6473B hub

The E6473B hub is part of the E6474A measurement system. Other parts of the system that the hub supports, include:

System component	Refer to
Phones	page 36
Agilent digital receivers	page 40
GPS and GPS/DR	page 47
Batteries	page 55
Indoor setup	page 58

To find out more about connecting these devices to the E6473B hub and how the hub is configured, refer to the relevant section in this chapter.

Connecting two direct connect hub systems

If your system includes two Direct Connect Hub units, connect them together as follows:

Do this	Notes
1 Connect the USB cable (E6473-60005) to the  (USB Downstream) port on the front panel of the Direct Connect Hub connected to the computer.	
2 Connect the opposite end of the cable to the  (USB Upstream) port on the front panel of the second Direct Connect Hub.	
3 If programmed, insert the software license key into the  (USB Downstream) port on the front panel of any available USB Downstream. Otherwise, plug the DB25 key into the parallel port of the computer	

Direct connect hub connections

CAUTION

To prevent damage to the direct connect hub or phone, always power the direct connect hub **off** before connecting or disconnecting a phone.

Verifying E6473B hub installation

To verify driver installation and that your PC can see the E6473B hub you should use the configuration utility and device manager to confirm port identification.

Once the E6473B hub drivers have been installed, a COM port utility is added to your PC. With this utility you can see what COM ports have been assigned to which part of the hub and lets you change COM port labelling.

Verifying installation using the Configuration Utility

To verify the driver installation:

Do this	Notes
1 Connect and switch on the E6473B hub.	
2 Select Start > Programs > Agilent Technologies > Configuration Utility .	
3 Select the General tab.	
4 Expand the device tree so that you can see all six ports. Refer to Figure 7 .	

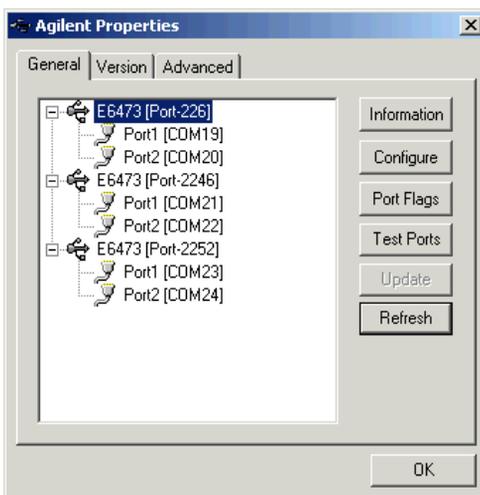


Figure 7 Configuration Utility

Test the ports using the **Test Ports** button:

NOTE

This test uses an internal loopback to test the ports. Devices that generate data without being polled (for example a GPS receiver or certain phones) can cause this test to fail. You must unplug all devices before testing the ports.

- 1 Select the USB port to test.
- 2 Select the **Test Ports** button.
- 3 Select the ports to test.
- 4 Enable **Use Digital Loopback** option.
- 5 Select **Begin Test**.

Once the test is completed and successful (refer to [Figure 8](#) on page 34), the selected ports are flagged as Passed. If the ports Fail, check the power connections and driver installation using the Device Manager.

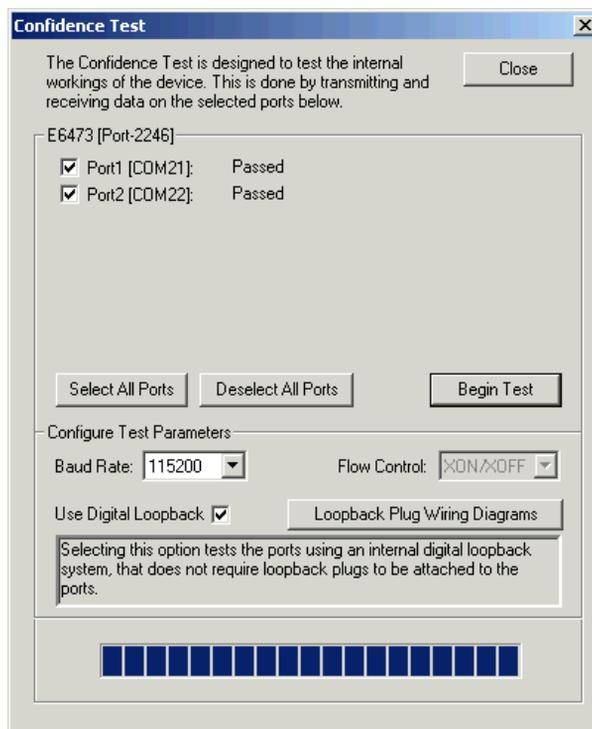


Figure 8 Confidence Test dialog box

Verifying Installation using the Device Manager

To verify the driver installation:

- 1 Connect and switch on the E6473B hub.
- 2 Select **Start > Settings > Control Panel**.
- 3 Select **System**.
- 4 Select the **Hardware** tab.
- 5 Select the **Device Manager** button.
- 6 Expand the device tree to see the active ports. Refer to [Figure 9](#) on page 35.

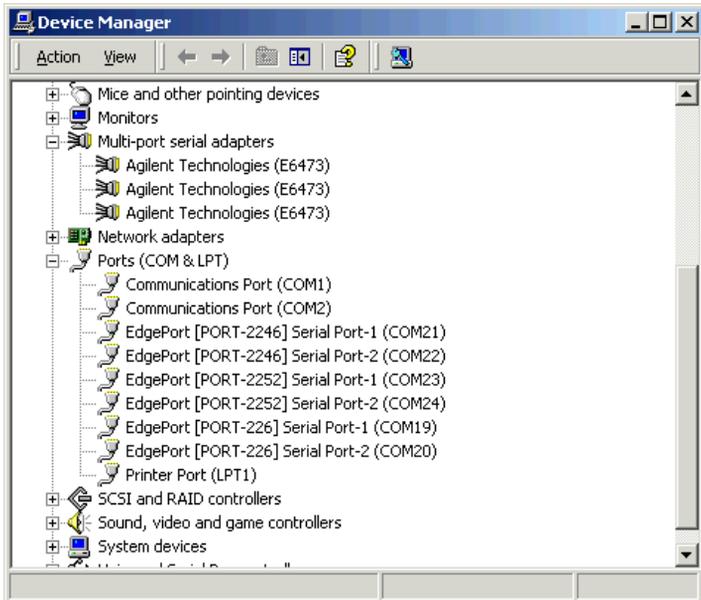


Figure 9 Device Manager showing E6473B ports

Phones

Overview

The Agilent E6474A system supports a wide range of phones and data communication devices. A list of the currently supported phones can be found in the Library. To access this list open the E6474A software and select **Help > Library** or **Start > Programs > Agilent Wireless Solutions > E6474A > Reference > Library**.

Phones can be connected to your system using the following methods:

Phone connection using	Refer to
Direct serial port	page 36
PCMCIA (PC Card)	page 37
E6473B hub	page 37
USB port	page 39

NOTE

Phone battery charging and audio monitoring are not supported with direct connect phones.

Phone connection using direct serial port

Depending on the type of phone you wish to connect to your laptop, it may be possible to connect the phone directly to your laptop serial port.

Refer to the phone manufacturers instructions before connecting a phone.

Phone connection using PCMCIA (PC Card)

To extend your laptop serial port capability you can use a dual-port serial PCMCIA (PC-card) I/O card. Refer to [Figure 10](#) on page 37.

Refer to the PCMCIA manufacturer instructions before installing this device.



Figure 10 Connecting a phone using a PCMCIA card

Phone connection using the E6473B hub

The E6473B hub provides two ports for connecting phones. Each port provides a voice and data capability while charging the attached phone.

NOTE

To use the two phone ports on the front of the E6473B hub you have to use a special cable. Refer to the list of supported phones to see if a cable exists for your phone.

To access this list open the E6474A software and select **Help > Library**.

Figure 11 on page 38 shows the two phone connection ports. These ports are labelled 1 and 2. Refer to Port A and Port B in Figure 11 on page 38.

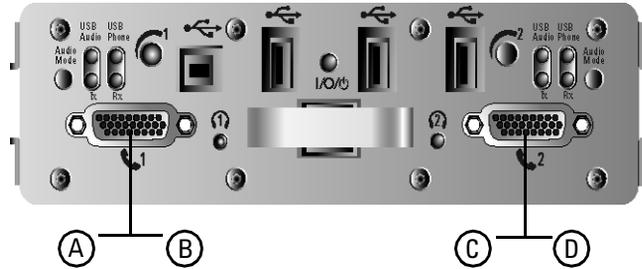


Figure 11 COM port allocation for phone ports

When certain types of phones are connected to the E6473B hub their sound output is disabled. To hear the attached phone sound output, you can use headset sockets marked 1 or 2. Refer to the online help in the E6474A software for information on directing phone sound through your laptop. Refer to Figure 12 on page 38.

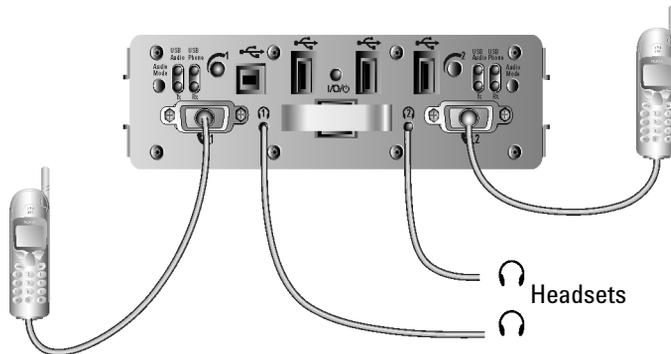


Figure 12 Connecting two phones to the E6473B hub

Phone connection using a USB port

Some phones can be connected to your system using USB interface cables. When these types of phones are connected to your system, your PC should automatically detect the new USB device.

The USB drivers used by these phones may require custom installation processes. Follow the phone manufacturers instructions for configuring USB phone connections.

External antennas

The following phone interface kits include antenna adapters. If your system includes one of the phone interface kits listed in [Table 1](#), follow these steps:

- 1 Connect the antenna adapter to the phone.
- 2 Connect the antenna extender cable (E6473-60105) to the appropriate adapter, if necessary. (Two adapters are included with the antenna kit). The antenna extender cable connectors are both FME female type.
- 3 Connect the antenna to the extender cable.
- 4 Mount the antennas on the roof of the vehicle, with at least 18" (approx. 46 cm) between antennas.

Table 1 Adapters used in kits

Phone interface kit part number	Use with phone(s)	Adapter part number	Adapter type
E6473-803	QCP 860, 1960, and 2760	E7483-60002	TNC female
E6473-830	Nokia 61xx	E7484-60023	FME male

Phone antenna kit part number	Use with frequency bands	TNC male to FME male adapter part number	FME male to FME male Adapter part number
E6473-898	900/1800 MHz	E6473-60101	E6473-60102
E6473-899	800/1900 MHz	E6473-60101	E6473-60102

Agilent Digital Receivers

Overview

Agilent manufactures a range of digital RF receivers that cover most technologies. All receivers are supplied with an internal GPS systems. For technical details of the available receivers, refer to [“Receiver Specifications”](#) on page 146.

Receivers can be connected and configured using the following methods:

Receiver configuration	Refer to
Connect directly to your laptop	page 41
Connect to your in-vehicle E6473B hub	page 42
Connect two receivers to your in-vehicle E6473B hub	page 42
Connect multiple receivers	page 44
Pulse trigger the receivers	page 45

NOTE

For details on how to upgrade the Agilent receiver firmware, refer to [“Updating E645xx Receiver Firmware”](#) on page 120.

Connect directly to your laptop

The Agilent digital receiver can be connected directly to the serial port of your laptop. The direct serial port connection provides RF measurement information and GPS coordinate results.

Refer to [Figure 13](#) on page 41 for typical serial port connection (this diagram does not include a GPS antenna).

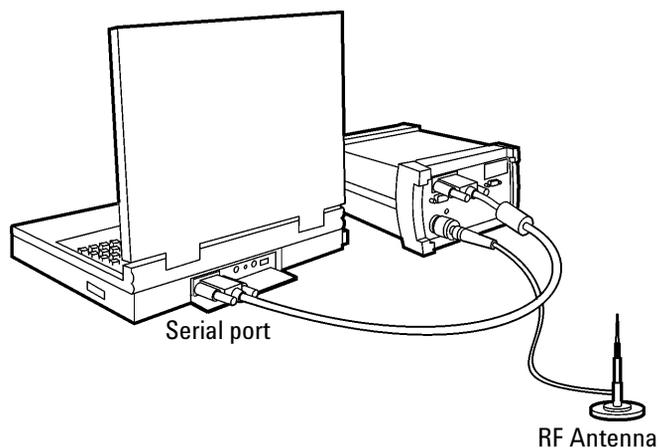


Figure 13 Serial port connection for Agilent digital receiver

Connect to the E6473B hub

An Agilent digital receiver can be connected to the E6473B hub using the receiver port (marked with  Receiver) on the back of the hub. The receiver cable (E6473-60006) splits into a data cable and power cable. Refer to [Figure 14](#).

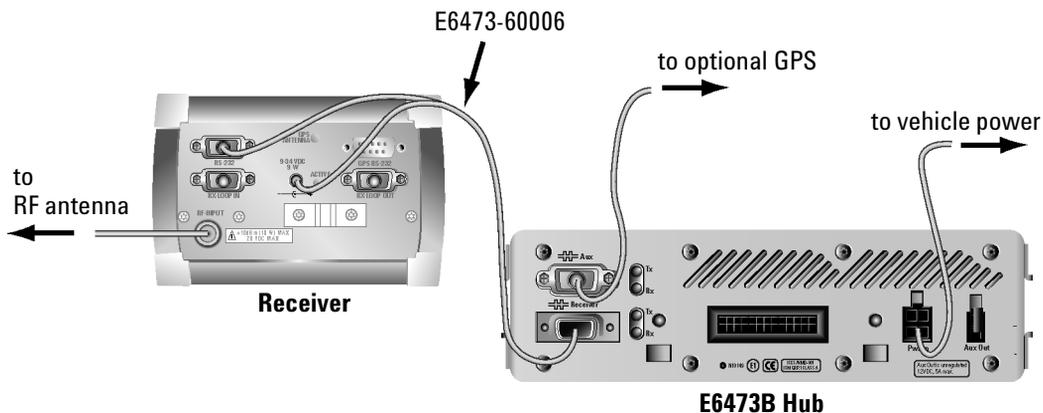


Figure 14 Data and power connection for one receiver

Connect two receivers to your in-vehicle E6473B hub

The E6473B hub provides an additional power socket for powering a second Agilent digital receiver.

Connections for receiver 1

- 1 Connect the RS-232 port on the receiver 1 to the receiver port on the hub ( Receiver) using the cable E6473-60106.
- 2 Connect the power lead part of the E6473-60106 cable to receiver 1 power socket.

Connections for receiver 2

- 1 Connect RX LOOP IN on receiver 1 to RX LOOP OUT on receiver 2 using cable E6450-60002.
- 2 Connect RX LOOP OUT on receiver 1 to RX LOOP IN on receiver 2 using cable E6450-90001.
- 3 Connect power on receiver 2 to Aux Out socket on the E6473B hub using cable E6473-60091.

Refer to [Figure 15](#) on page 43.

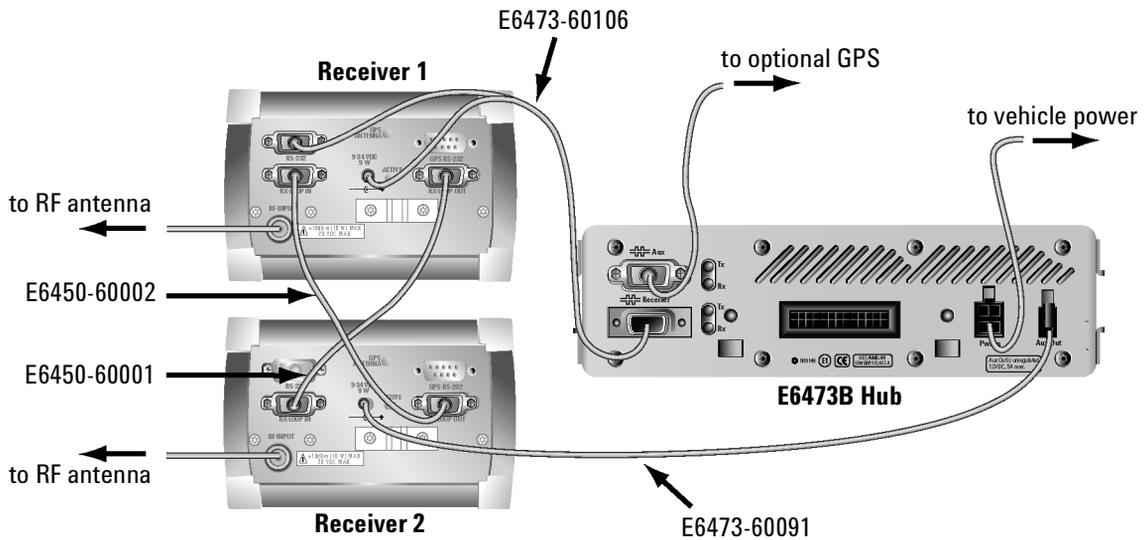


Figure 15 Data and power connection for two receivers

Connect multiple receivers

When you configure multiple receivers, only one receiver (the **master receiver**) is physically connected to the computer and is able to supply input from the GPS. You attach an external GPS system (unless it has internal GPS) to the master receiver only. The other receiver(s) receive their GPS signal from the master receiver. If other receivers contain internal GPS systems, their GPS is ignored.

To connect multiple receivers:

- 1** Attach one end of a short cable to the RX LOOP IN connector on the master receiver. Attach the other end of the short cable to the RX LOOP OUT of the second receiver.
- 2** Continue to attach receivers (up to a total of four receivers) as in step 1.
- 3** When all receivers are connected with short cables, connect one end of a long cable to the RX LOOP OUT connector on the master receiver to the RX LOOP IN on the last receiver in the series.
- 4** Connect the serial port of your laptop to the RS-232 port of the master receiver with an RS-232 cable.
- 5** Connect the RF antenna to the RF input of each of the receivers.

Refer to [Figure 16](#) on page 45.

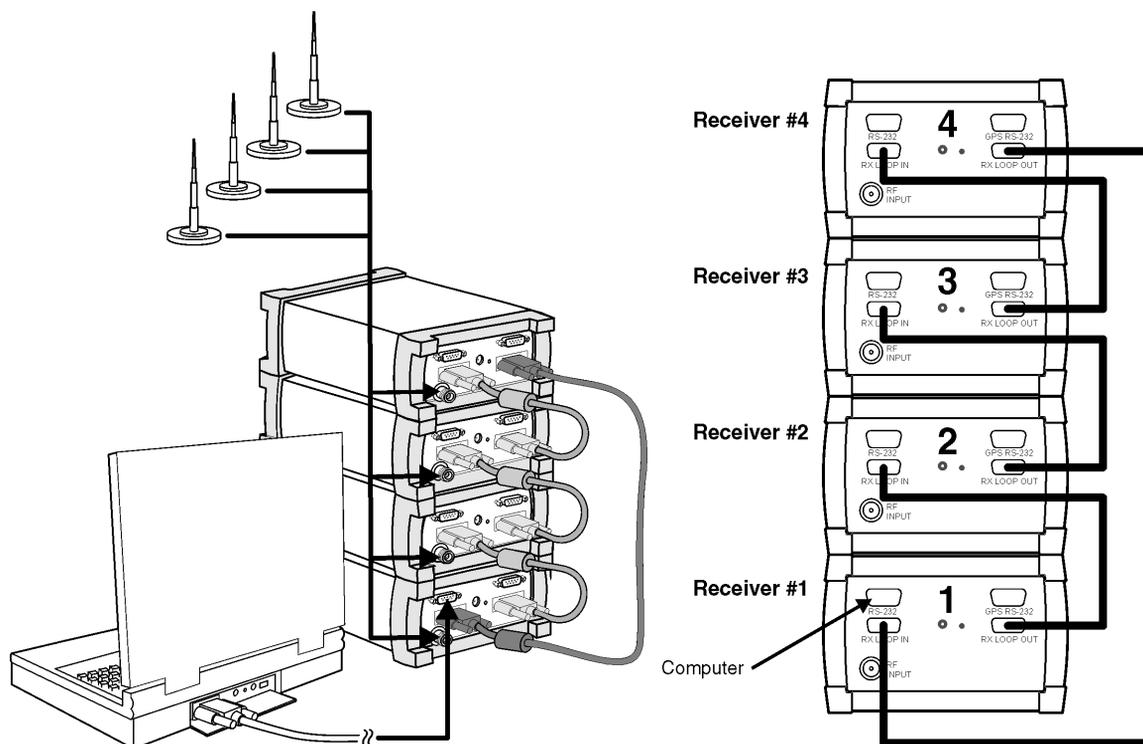


Figure 16 Connecting more than one receiver to your laptop

Pulse trigger the receiver

The E645xC receivers accommodate a pulse trigger device. The triggering device requirements are:

- Cable with BNC male connector (the Agilent pulse trigger cable input is female BNC)
- Falling-edge trigger
- TTL threshold
- 15 volt maximum pulse level
- 100 nanosecond minimum pulse width of period

- 300 microsecond minimum pulse

Follow the manufacturer's instructions for installing the pulse trigger device. Connections to the receiver are shown in [Figure 17](#).

- If you have two receivers, connect the pulse trigger cable (E7450-60015) to the RX LOOP IN and RX LOOP OUT ports as shown in [Figure 17](#).
- Or, if you have one receiver, connect the pulse trigger cable to the RX LOOP IN and RX LOOP OUT ports of the same receiver.
- Connect the cable from the pulse trigger device to the BNC connector of the pulse trigger cable. For software configuration and calibration instructions, refer to the online help. Search for "wheel pulse unit setup" to locate the information.

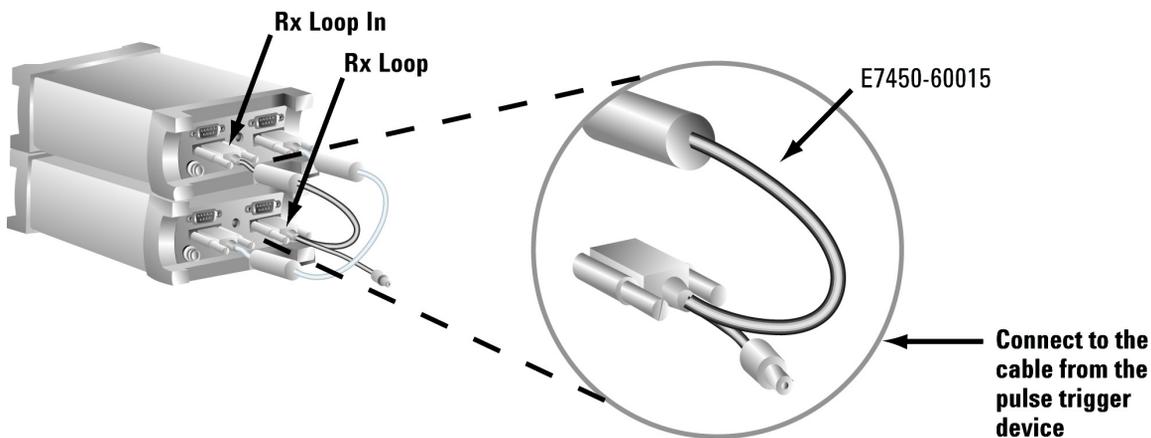


Figure 17 Connecting the pulse trigger cable

GPS and GPS/DR

Overview

To provide accurate measurement analysis and signal synchronization, the Agilent E6474A system provides comprehensive methods of support for Global Positioning Systems (GPS).

The Agilent E6474A system obtains its GPS signal from a variety of sources. GPS systems can be connected and configured using the following methods:

GPS and GPS/DR configuration	Refer to
Agilent digital receiver internal GPS	page 47
Agilent digital receiver external GPS	page 47
External GPS using the E6473B hub	page 51
Agilent GPS/DR navigator	page 51
Indoor positioning	page 54

Agilent digital receiver internal GPS

All Agilent digital receivers are supplied with an internal GPS system. When an Agilent digital receiver is connected to your system, this GPS device is automatically detected. GPS signals are passed to your system through the serial connection.

Agilent digital receiver external GPS

The following examples show a complete system with various external GPS systems attached through an Agilent digital receiver. These examples show the external GPS and receiver connected to a PC, however the same connection can be made to the AUX port on the E6473B hub. Refer to [Figure 18](#) on page 48.

Example 1 - Using the internal GPS with a differential GPS antenna.

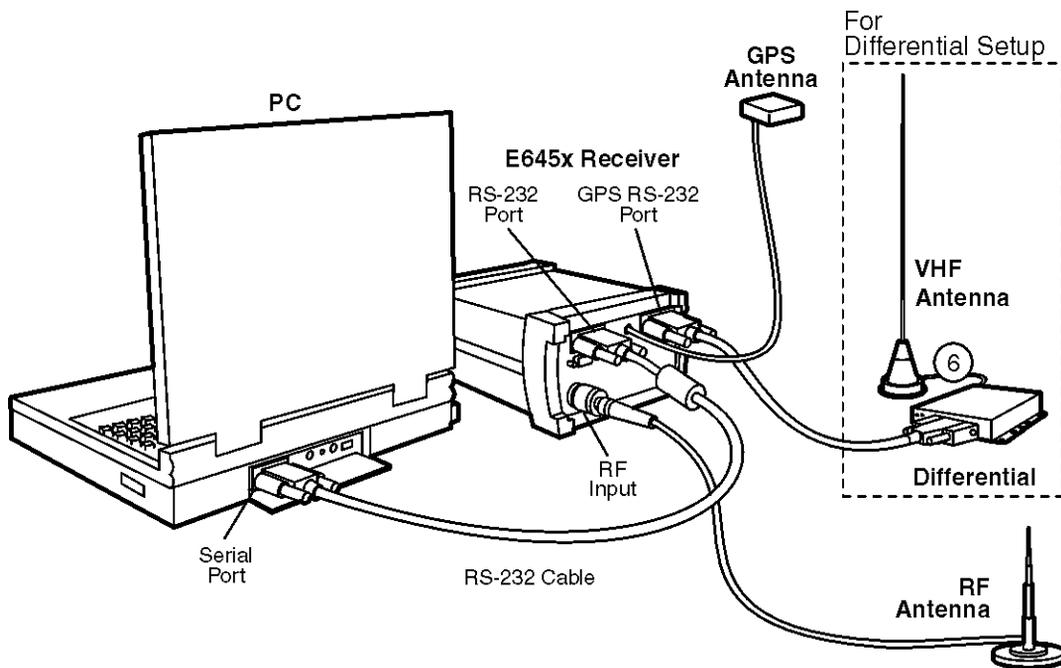


Figure 18 Internal GPS with optional differential GPS

Example 2 - Using Placer GPS 455

In this example the external GPS unit is connected using an adapter box. The adapter box is connected to the GPS RS-232 port on the receiver.

Refer to [Figure 19](#) on page 49.

The adapter box is connected to the MDT/RTCM and Digital IO ports.

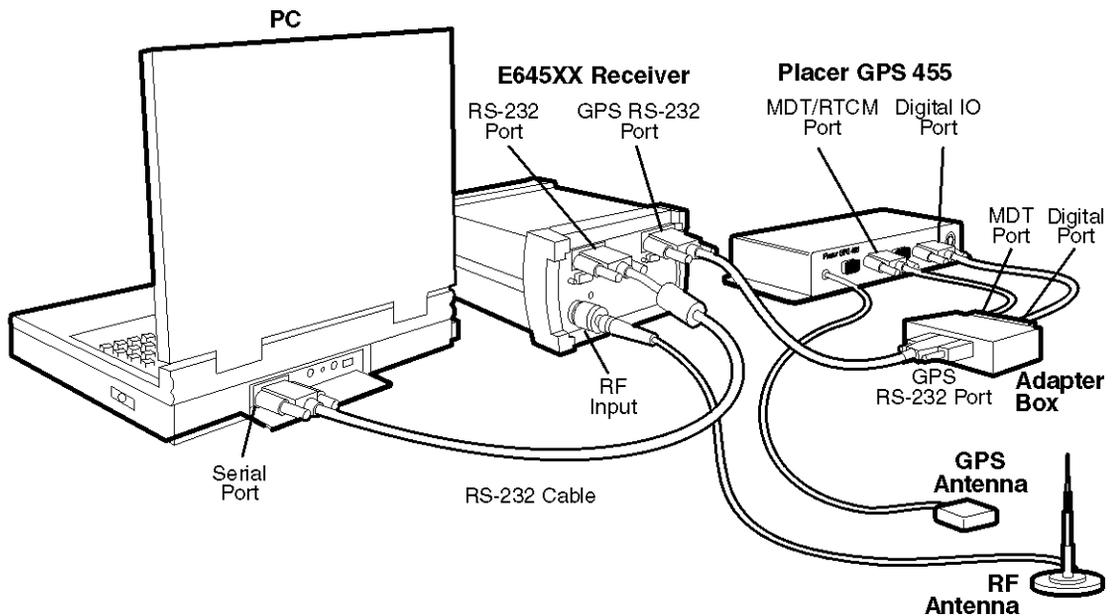


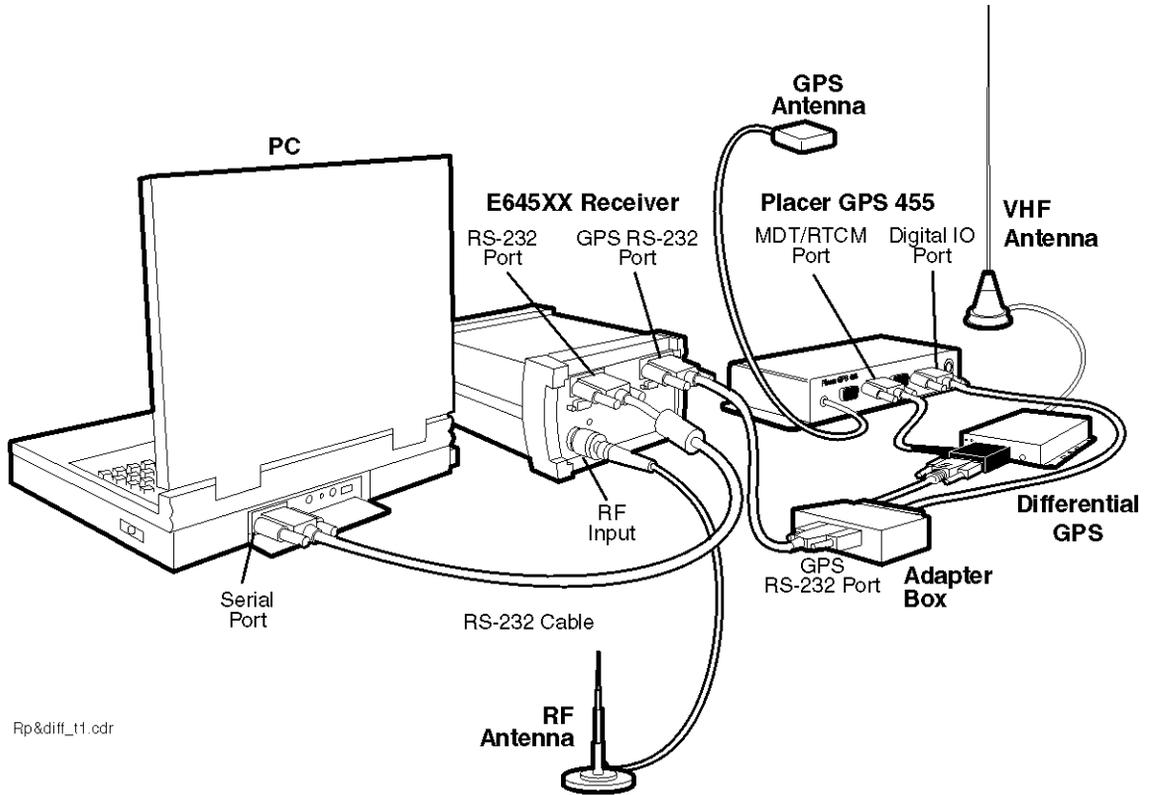
Figure 19 External GPS - Placer 455

Example 3 - Placer 455 with differential GPS

Refer to [Figure 20](#) on page 50.

- 1 Connect the RTCM port of the Trimble-supplied communications cable to the differential GPS receiver, using the RS-232 cable included with the system. Connect the remaining port of the Trimble-supplied communications cable to the MDT/RTCM port of the Trimble Placer GPS 455 unit.
- 2 Connect the digital port of the adapter box to the Digital IO port of the Trimble Placer GPS 455 unit, using the RS-232 cable.
- 3 Connect the MDT/RTCM port of the adapter box to the MDT port of the Trimble-supplied communications "T" cable, connected to the Differential, using the RS-232 cable.

- 4 Connect the GPS antenna to the GPS ANT port of the Trimble Placer GPS 455 unit. Agilent Technologies recommends that a “bulkhead mount” GPS antenna be used whenever possible for improved performance.



Rp&diff_t1.cdr

Figure 20 Placer 455 GPS with differential GPS

External GPS using the E6473B hub

Other types of external GPS systems can be connected to the E6473B hub. This example shows the Garmin II Plus GPS Receiver connected to the E6473B hub.

- 1 Connect the interface cable to the GPS receiver. See [Figure 21](#).

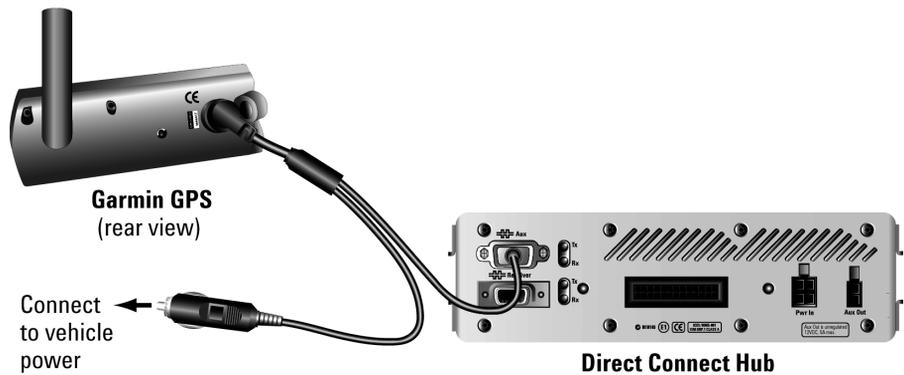


Figure 21 Connect the GPS to the AUX connector

- 2 Connect the D-shell connector of the cable to the  AUX port on the rear panel of the Direct Connect Hub. See [Figure 21](#).
- 3 Connect the power plug to the lighter socket.

Agilent GPS/DR navigator

The Agilent GPS/DR navigation option (Option 30 and 31) is a GPS Dead-Reckoning unit that can be connected to your system using one of the following three methods:

Method 1 - In-vehicle chassis

Connect using the in-vehicle chassis. Data and GPS information is passed to your PC through the E6473B hub. See [Figure 22](#) on page 52.



Figure 22 GPS/DR system fitted into the in-vehicle chassis (shown with the E6473B hub)

Method 2 - USB connection

If the GPS/DR unit can not be fitted to the in-vehicle chassis it is possible to use the downstream USB port. Power is provided from the power socket at the back of the unit (power cable E6473-60004).

Method 3 - Serial connection

You can use the serial port on the back of the GPS/DR unit (refer to [Figure 23](#)). Connect this port to the serial port on your PC. The GPS/DR serial port overrides the USB port.



Figure 23 Serial port on GPS/DR unit

Gyro positioning

To avoid inaccuracies in dead reckoning, the Gyro in the Agilent Direct Connect GPS/DR must be positioned so that it is within 10 degrees of vertical or horizontal. The Gyro must be set to indicate the Up position on the unit as follows:

- 1 Position the unit either horizontally or on its right edge (vertically).
- 2 Turn the **Gyro Position** knob counter-clockwise to loosen it.
- 3 Slide the pin so that it indicates the applicable **Up** position.
- 4 Turn the **Gyro Position** knob clockwise to tighten it.



Figure 24 Setting the Gyro pin. If the unit is set on its right side, the pin is set at the alternate position.

Connecting the Speed Pulse

CAUTION

The dead reckoning system is comprised of the Gyro and the Speed Pulse (odometer) connection. The connection of the Speed Pulse cable is vehicle-specific and should be performed by persons trained to do such installations.

When connecting the Speed Pulse cable, the following wiring scheme is used:

Color	Connection
Red	Speed Pulse (odometer)
Black	Ground
White	Backup (seldom used; not necessary for proper operation)
Shield	

Indoor positioning

The Agilent E6474A system supports indoor measurements. Mapping and recording data for indoor environments requires the following items:

- Detailed floor and building plan (BMP format).
- Pen tablet laptop (preferred).
- (optional) 1 PPS signal for CDMA measurements synchronization.

Full details on how to perform indoor measurements and configure the indoor positioning and tracking, refer to the online help and quick basics tutorial.

Batteries

Checking the remaining charge

Press the test button shown in [Figure 25](#) to check the remaining charge capacity. The battery charge level can be checked while the Direct Connect Hub power switch is on or off; however checking it with the power on may provide a more accurate indication.

LEDs Lit	Capacity Remaining
5	81% to 100%
4	61% to 80%
3	41% to 60%
2	21% to 40%
1	1% to 20%

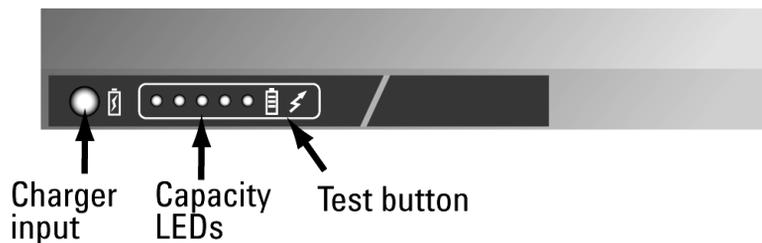


Figure 25 Lithium-ion battery

Charging the battery

The battery (E6473-60008) can be charged within the carry bag. Disconnect the charger (E6473-60009) from the battery before checking the charge. The battery is fully charged when all five LEDs are lit.

WARNING

Never charge the battery when the E6473B Hub is powered on. Use only the approved charger, part no. E6473-60009.

- 1 Connect the battery charger cable to the battery.
- 2 Plug the battery charger's AC power cord into a 100-240V AC 50-60 Hz power source.
- 3 Allow approximately three hours to fully charge the battery.

Safe handling and disposal

For the safe use of lithium-ion batteries, always follow the instructions provided below. Improper handling of lithium-ion batteries may result in injury or damage from electrolyte leakage, heating, ignition, or explosion. Batteries must be recycled or disposed of properly.

WARNING

Always use the battery charger provided with the battery.

Never heat or incinerate the battery.

Never impact, pierce, or crush the battery.

Never disassemble or modify the battery. The battery contains a circuit designed to enhance safety. Damaging this circuit may cause overheating, fire or bursting.

Never charge a battery under high temperature conditions, such as near a fire or in the direct sunlight. If the ambient temperature is too high, the protection circuit may be actuated, preventing further charging, or damage.

Never short-circuit the battery by connecting the positive and negative terminals with a metal material.

Do not store or carry the battery where it could come into contact with metal objects such as a key chain or necklace.

Never allow the battery to get wet or be immersed in water.

Do not place the battery in a microwave oven or high-pressure container.

Stop charging if the battery is not charged after the prescribed charge time.

If leakage of the electrolyte occurs, or if there is an offensive odor, keep the battery away from any source of fire or spark.

If you become aware of any abnormal phenomena, such as odor, discoloration, or deformation, during use, while charging, or when storing the battery, remove the battery from the device or charger and stop using.

In the event the electrolyte comes into contact with the eyes, flush thoroughly with clean water, without rubbing. Consult with a physician immediately.

Indoor Setup

Overview

This section contains instructions for setting up a portable or indoor system. A single lithium-ion battery powers the portable system. Always charge all batteries before beginning a survey.

Portable system cable connections

Cable connections to the rear panels should be made before the E6473B hub and the battery pack are loaded into the carry bag. Cable connections to the front panels can be made after the components are inserted into the carry bag. If the system is not equipped with a receiver, no cable connections are made to the rear panel of the E6473B hub.

Carry pack final assembly

- 1 Route the antenna, phone, and computer cables through the openings provided.
- 2 Close all open panels.
- 3 Attach the clip-on receiver antenna to the pocket of pack. See [Figure 28](#) on page 60 for an example.

Using carry pack assembly with the shoulder strap

See [Figure 26](#) on page 59 for an example.

- 1 Attach the shoulder strap to the D-rings.
- 2 Slip the shoulder strap around your neck.

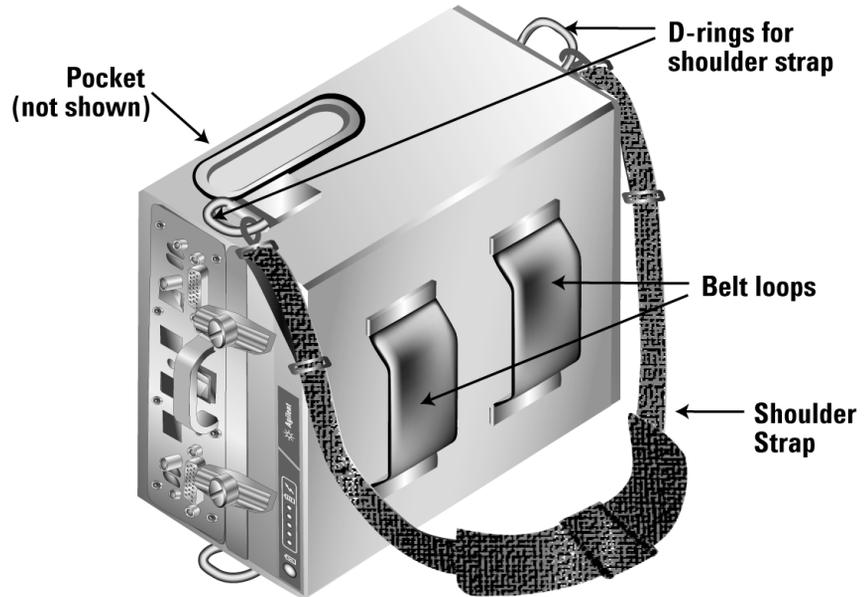


Figure 26 Side view of the carry pack showing the shoulder strap

Using the carry pack as a backpack

- 1 Adjust the waist belt for a snug fit around your waist, then remove it.
- 2 Feed the waist belt through the belt loops of the pack, as shown in [Figure 27](#) on page 60. The black mesh should be on the outside.

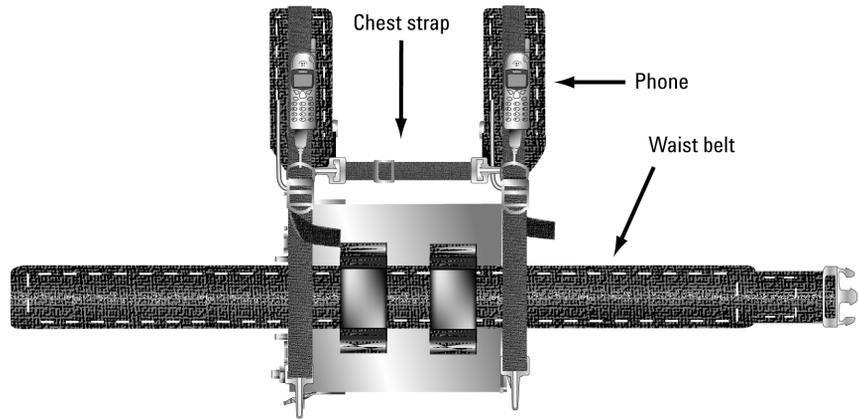


Figure 27 Carry pack inside view

- 3 Connect the two shoulder straps to the D-rings of the pack as shown in Figure 28.

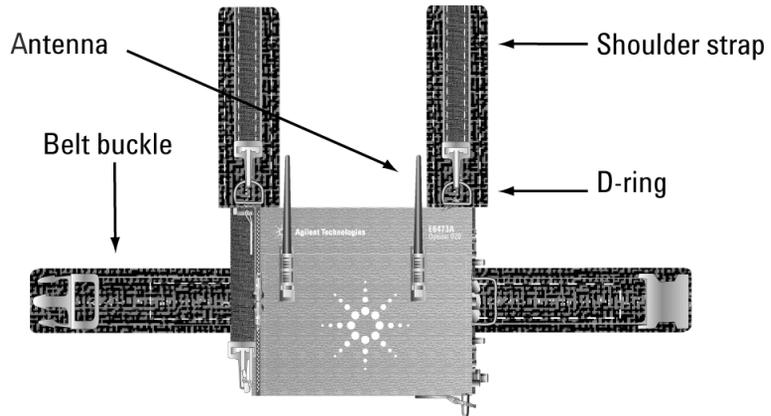


Figure 28 Carry pack outside view

- 4 Mount the pack to your body, then connect the buckle of the waist strap. See Figure 29 on page 61.

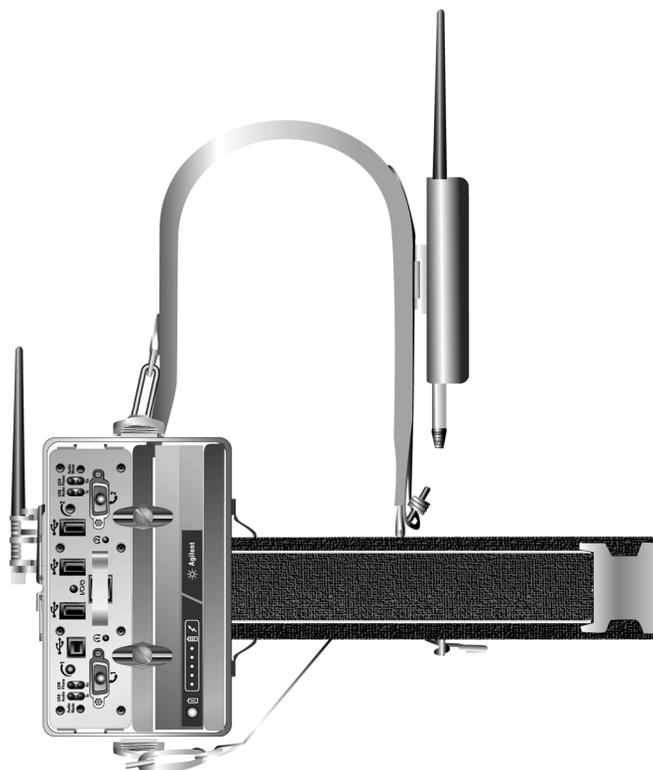


Figure 29 Carry pack side view

- 5 Adjust the shoulder straps.
- 6 Connect the chest strap to the D-rings of the shoulder straps as shown in [Figure 27](#) on page 60.
- 7 Adjust all straps for a comfortable fit.

Portable digital receiver system

This section describes the cable connections for a system equipped with one Agilent digital receiver. This configuration is housed in a single receiver backpack hub kit,

E6473B option 023. The carry bag contains a bracket that secures the Direct Connect Hub and the battery, and provides the power connection between them.

NOTE

Refer to [Appendix C](#), "System Information", for antenna and phone interface cable part numbers.

Chassis and backpack assembly

Use the straps provided to secure all components within the single receiver backpack.

- 1 Insert the battery into the chassis, and then push until it locks in place, as shown in [Figure 5](#) on page 30.

NOTE

The battery is keyed, and can only be properly inserted into the chassis when the connectors are aligned.

- 2 Align the tabs of the Direct Connect Hub with the slots in the chassis, then attach it to the chassis by pushing it rearward until it locks in place.
- 3 Secure the chassis assembly within the right side of the backpack.
- 4 Secure the Agilent digital receiver within the left side of the backpack.

Final assembly

- 1 Route the USB, antenna, and phone cables through the openings provided. See [Figure 30](#).

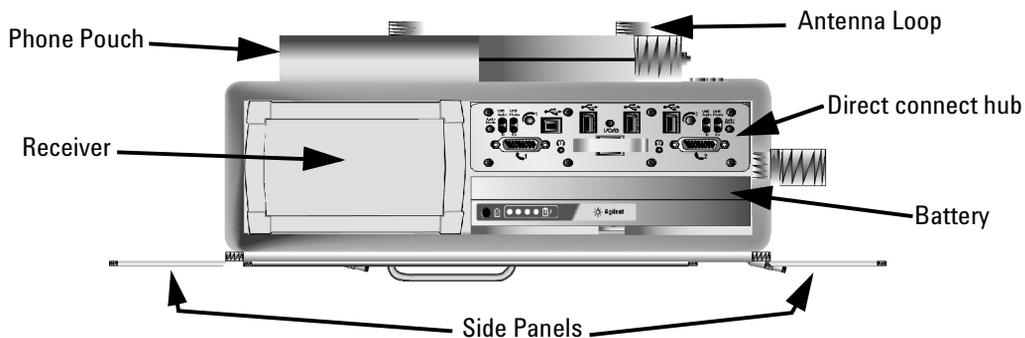


Figure 30 Single receiver backpack (right side view)

- 2 Close all open panels.
- 3 Attach the clip-on receiver antenna to the antenna loop of the pack.
- 4 Attach the shoulder strap to the D-rings of the pack. See [Figure 31](#).

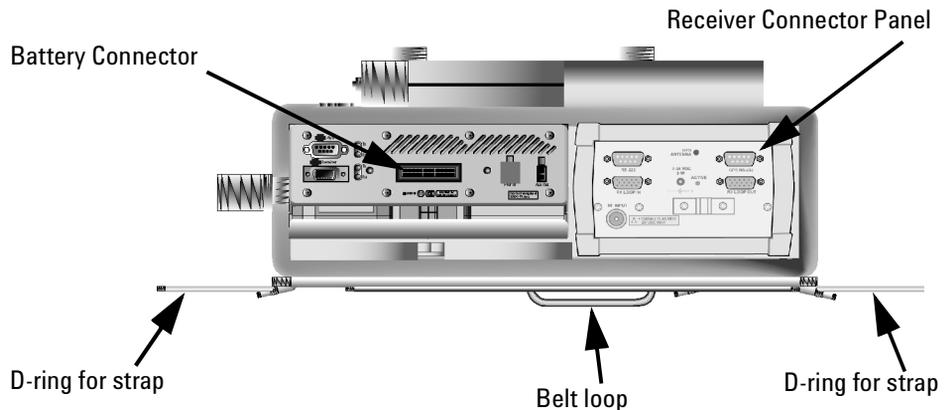


Figure 31 Single receiver backpack (left side view)

Using the single-receiver backpack

- 1 Adjust the waist belt for a snug fit around your waist, then remove it.
- 2 Feed the waist belt through the belt loops of the pack. The black mesh should be on the outside.
- 3 Connect the two shoulder straps to the D-rings of the pack.
- 4 Mount the pack to your body, then connect the buckle of the waist strap.
- 5 Adjust the shoulder straps.
- 6 Connect the chest strap to the D-rings of the shoulder straps.
- 7 Adjust all straps for a comfortable fit.

Portable dual E645xx receiver system

This section describes the cable connections for a system equipped with two receivers. This configuration is housed in the dual receiver back pack hub kit, E6473B option 024. The backpack contains a removable mounting platform to which the receivers and hub are attached.

The dual receiver backpack hub kit also supports a two-direct connect hub (no receivers) configuration. To achieve this configuration, you must purchase two Agilent hubs (E6473B option 015), one dual receiver backpack hub kit (E6473B-024), and one carry pack hub kit (E6473B option 022).

The carry pack hub kit is required for the portable chassis and the battery kit, which would be used for the second direct connect hub. Please note that the carry pack, itself, can be strapped into the backpack.

NOTE

Please refer to [Appendix C](#), "System Information", for antenna and phone interface cable part numbers.

- 1 Rotate the locking knobs horizontally to allow devices to slide into the slots of the chassis.
- 2 Insert the battery into the bottom slot of the chassis.
- 3 Rotate the locking knobs to a vertical position, and tighten the screws.

NOTE

The battery is keyed, and can only be properly inserted into the chassis when the connectors are aligned.

Cable routing within the backpack

Refer to [Figure 32](#) for cable routing details. Refer to "[System Information](#)" on page 141, for antenna, phone, and headset cable part numbers.

- 1 Route the receiver and GPS antenna cables through the two openings in the cover.
- 2 Route the phone cables through the appropriate opening, depending on where the phones will be attached.
- 3 Route the USB cable (E6473-60005) and headset cables through the top opening.

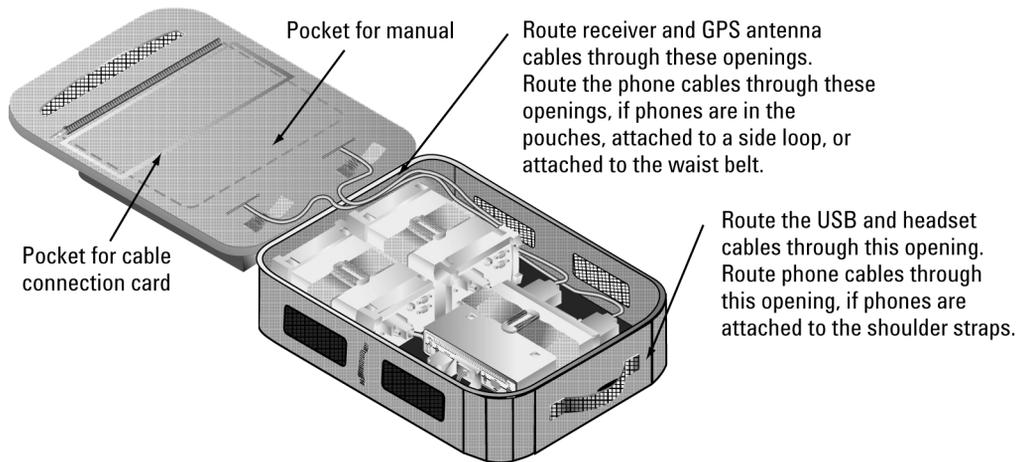


Figure 32 Inside the backpack

Cable routing through the shoulder straps

Refer to [Figure 33](#) for a cable routing example.

- 1** Route the USB cable (E6473-60005) through either shoulder strap.
- 2** If the phones will be attached to the shoulder straps, route the phone interface cables through either shoulder strap.

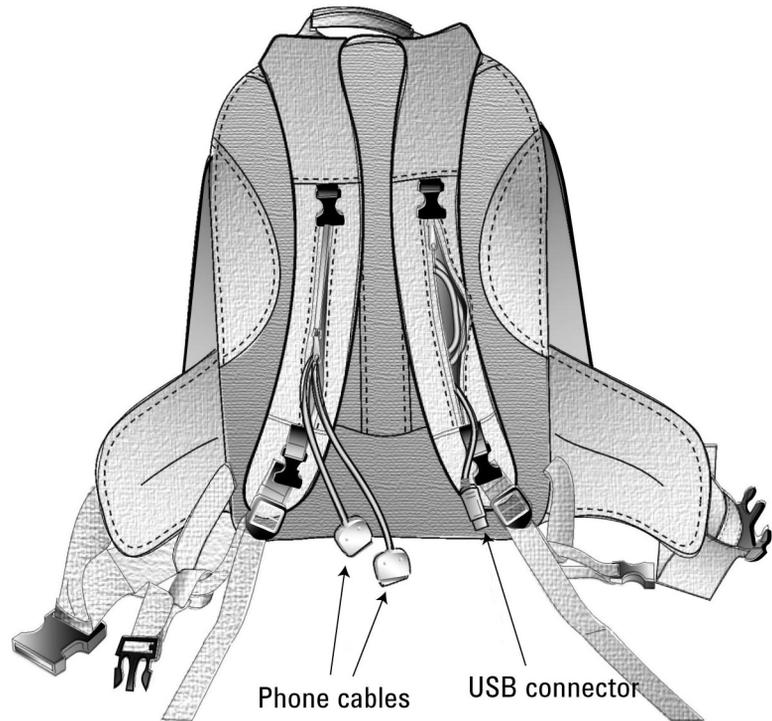


Figure 33 Routing cables through the shoulder straps

Receiver and hub mounting

Refer to [Figure 34](#) on page 68 for receiver and Direct Connect Hub mounting positions. Use the straps provided to secure the components to the platform.

- 1 Remove the inner component platform from the backpack.
- 2 Attach the receivers to the platform.
- 3 Attach the hub, battery and chassis assembly to the platform.

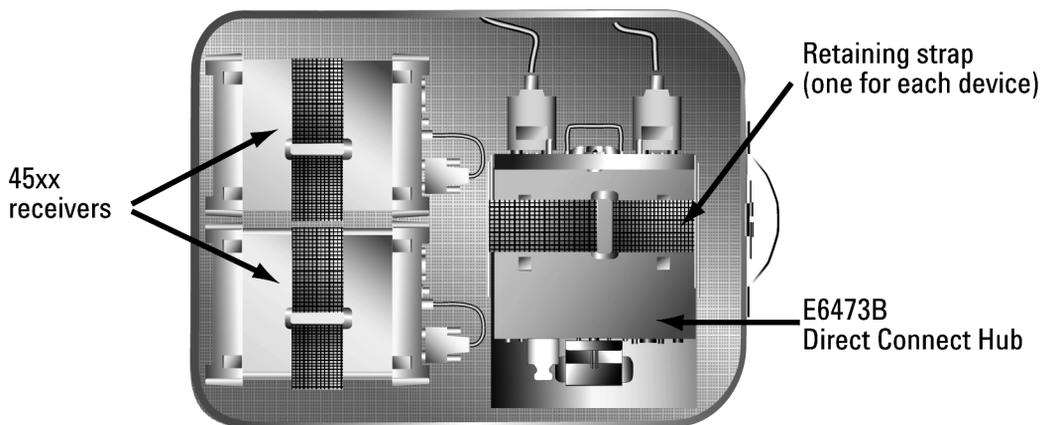


Figure 34 Two receivers and Direct Connect Hub mounted to the platform

Cable connections to the E6473B hub

- 1 Connect the receiver data/power cable (E6473-60106) to the  Receiver port on the rear panel.
- 2 Connect the second receiver power cable (E6473-60107) to the AUX PWR OUT connector.
- 3 If programmed, insert the software license key into the  (USB Downstream) port on the front panel. Otherwise, plug the DB25 key into the parallel port of the computer.
- 4 Connect the USB cable (E6473-60005) to the  (USB Upstream) port on the front panel.

Cable connections to the receiver

- 1 Connect the D-shell connector end of the receiver data/power cable (E6473-60106) to the RS-232 port of Receiver 1.
- 2 Connect the power plug of the receiver data/power cable to the 9-34 VDC connector of Receiver 1.
- 3 Connect the power plug of the second receiver power cable (E6473-60107) to the 9-34 VDC connector of Receiver 2.

- 4 Connect the short RX Loop cable (E7450-60001) to the RX LOOP IN port of Receiver 1.
- 5 Connect the opposite end of the cable to the RX LOOP OUT port of Receiver 2.
- 6 Connect the long RX Loop cable (E7450-60002) to the RX LOOP IN port of Receiver 2.
- 7 Connect the opposite end of the cable to the RX LOOP OUT port of Receiver 1.
- 8 Connect the receiver antennas to the RF INPUT connectors of the receivers.
- 9 If equipped, connect the GPS antennas to the GPS ANTENNA connectors of the receivers.

Dual receiver backpack final assembly

- 1 Place the component platform inside the backpack, as shown in [Figure 34](#) on page 68. It attaches to the backpack with Velcro fasteners.
- 2 Connect one phone interface cable to the  1 (Phone 1) port of the Direct Connect Hub.
- 3 Connect the second phone interface cable to the  2 (Phone 2) port of the Direct Connect Hub.
- 4 Connect the headset cables (E6473-60017) to the connectors of the Direct Connect Hub.
- 5 Attach the clip-on receiver antennas to the antenna loops on the sides of the backpack. See [Figure 35](#).

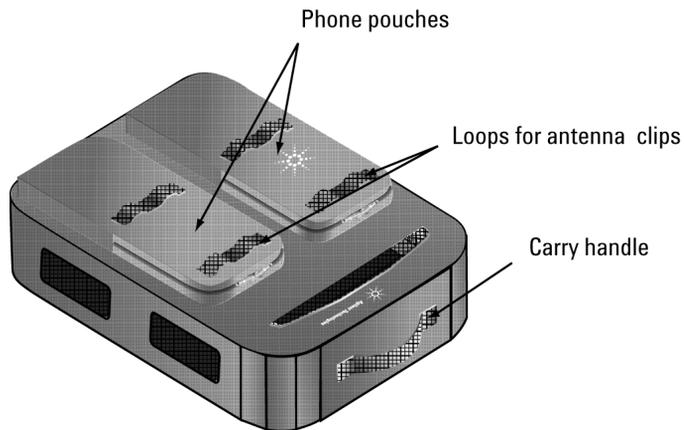


Figure 35 Backpack exterior features

6 Close all zips.

CAUTION

To prevent damage to the Direct Connect Hub or phone, always power the Direct Connect Hub **off** before connecting or disconnecting a phone.

7 With the Direct Connect Hub powered off, connect each phone to its interface cable.

8 Attach the phones to the shoulder straps, antenna loops on the side of the backpack, or in the phone pouches.

9 Connect the free end of the USB cable to the USB port of the computer.

Adjusting the backpack harness

- 1 Loosen all straps and place the pack on your back as shown in [Figure 36](#).



Figure 36 Tightening the shoulder straps on the backpack

- 2 Fasten the waist belt and tighten it so that it rests on your hips. The waist belt should always remain on your hips, even after the harness is adjusted.
- 3 Tighten up the shoulder straps until the pack feels comfortable. The weight of the pack should be carried on your hips for maximum comfort. The shoulder straps help stabilize the pack on your body.
- 4 Connect the chest strap. You can change the vertical position so that the strap fits comfortably across your chest. The sternum strap reduces shoulder fatigue and increases mobility by pulling the shoulder straps inward.

License Manager

Introduction

Software options are enabled via software license keys (also called “Dongles”) that are attached to either the USB or parallel port on your computer. The software license key included with the E6474A software contains the licenses for the software options you have purchased. When started, the E6474A software queries the key to determine which options to enable.

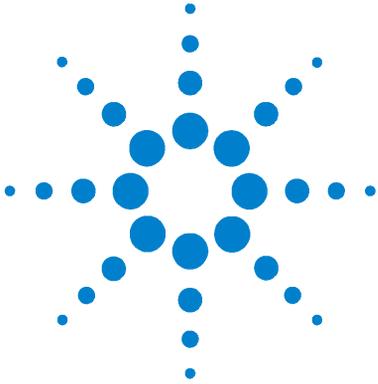
License Manager software is automatically installed when you install the E6474A software. This software allows you to:

- Transfer licenses between keys included (for example, between the DB25 key and USB key)
- Add software options to your license key
- Transfer licenses between keys on different computer systems
- Transfer licensed product options between license keys
- View online help on the use of License Manager features

For more information

For complete instructions on using the License Manager, please refer to the Welcome topic in the License Manager software’s online help.

- 1 To start the License Manager, click **Start > Programs > Agilent Wireless Solutions > Utilities > License Manager**.
- 2 Click **Help > Contents** to open the Welcome topic.



4 Use Your System

- Turning the power on [74](#)
- Starting the software [77](#)
- Creating a new project [79](#)
- Identifying devices [81](#)
- Configuring devices and views [84](#)
- File types and locations [87](#)
- Configuring and creating a data project [88](#)
- Configuring and creating a WAMS project (Option 740) [92](#)

Overview

This chapter tells you how to start configuring and using your system.

Before you begin to collect or monitor data, you must:

Do this	Refer to
Turn the power on	page 74
Start the application	page 77
Create a plan file	page 79
Identify and enable the devices	page 81
Configure the devices and the display	page 84



Turning the power on

CAUTION

Before switching on any system component, ensure that the supply voltages are in the specified ranges. Refer to “System Information” on page 141.

Battery charging

- For a portable system, verify that the Direct Connect Hub, phone, and computer batteries are fully charged before beginning a survey. Refer to “Batteries” on page 55 for more information.
- For an in-vehicle system, verify that the phone batteries are fully charged before beginning a survey.

E6473B high speed direct connect hub

The hub has a three-position power switch (refer to [Figure 37](#) on page 75). It controls the power to the hub, the phones, and the scanner or receivers. The blue LED above the power switch will glow after the Direct Connect Hub has initialized.

- Place the switch in the left position to power the unit on. For in-vehicle systems, if the hub is powered on and off by an GPS/DR navigator unit, the switch should be in the left position.
- Place the switch in the center position to power the unit off.
- For in-vehicle systems without GPS/DR navigator, placing the switch in the right position allows the unit to power on and off via the vehicle’s ignition switch.

NOTE

To allow the receiver to lock onto the GPS signal, allow the system to be powered on at least 3 minutes before starting a data collection test.

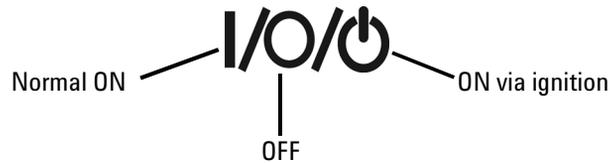


Figure 37 E6473B hub power switch positions

Agilent direct connect GPS/DR

If the ignition sense lead of the main power cable has been connected to a +12 volt source, the navigator powers up when the vehicle's ignition is switched on and the power switch is in either the Ignition (right) or Power (left) position. (For installation instructions, [Appendix D](#), "Permanent In-Vehicle Hardware Installation," starting on page 171.)

LEDs and display during power-up

The upper front panel LED indicates Power, and the lower LED indicates 1PPS (Pulse Per Second). The information shown on these two LEDs comes from the GPS Receiver. One use of the 1PPS would be to indicate that the GPS receiver is active. 1PPS is also available at pin 9 of the rear panel RS-232 DB9 connector and is enabled by software.

The Agilent direct connect GPS/DR status LCD displays power-up and navigation status messages. The front panel LEDs indicate CPU status, speed pulse status, and serial port activity.

Determining GPS receiver status

You can determine whether the GPS Receiver is ready to navigate by using the E6474A software as follows:

- 1** Start the E6474A software, and select **Tools > Navigation** to display the Navigation dialog box.
- 2** Click the **Live Mode** button.
- 3** When the GPS Navigator is ready to track, the **Satellites** box shows the number of satellites tracked, and the **Navigation**

display shows either 2D or 3D, with the GPS Status displaying “Tracking.” Both speed and direction are also displayed. If the Nav Mode shows 3D, the altitude readings in the display are also valid.

Before starting a data collection test, allow three minutes for the unit to acquire GPS position data. During a data collection test, navigation data is also combined and collected.

Calibration of dead reckoning

The Dead Reckoning calibration system is virtually self-calibrating and requires minimal user intervention. Once the Agilent direct connect GPS/DR is properly connected and the unit is powered on for the first time, it is not yet calibrated and operates as a normal GPS receiver.

Once navigation begins using GPS signals, the receiver automatically calibrates the sensors. During this calibration process, the vehicle must be maneuvered in a specific manner in order for the unit to calibrate, as follows:

- 1 Stop the vehicle for at least three seconds in order to determine the gyro bias.
- 2 Drive in a straight line for a distance of approximately one kilometer (0.62 mile).
- 3 Turn the vehicle, and proceed in another straight line for approximately one kilometer (0.62 mile).

The period of time and distance traveled that are required for the system to calibrate the Dead Reckoning sensors vary depending on the GPS signal quality and receiver temperature stability. The calibration continuously refines itself as you drive.

NOTE

Toshiba JCDMA phones have special power-up procedures. Refer to [“Toshiba phone power-up issues”](#) on page 104 for more information.

Starting the software

Detailed information about the software is available from the online help. It is assumed that the software has already been installed. If not, refer to “Install the E6474A software.” on page 17 for installation instructions.

To start the software

- 1 To start the software, click **Start > Programs > Agilent Wireless Solutions > E6474A > E6474A**. Refer to [Figure 38](#).



Figure 38 Starting E6474A software

- 2 When the software starts, a copyright screen (Refer to [Figure 39](#)) is briefly displayed. If you have used the software before, the last used project will automatically open.



Figure 39 Copyright screen

Confirm you license options

Once the software has started, check your license options.

To check your license options.

- 1** With the application open, select **Help > About E6474A...**
- 2** Select the **License Info...** button.

A dialog box appears listing the detected license options. If you do not see any license options in this dialog box, check that you have a valid license key attached to your system.

Creating a new project

Once the software has started and you have confirmed you have valid license options, you can then create a project. For a list of the files that are created and required for your project, refer to [“File types and locations”](#) on page 87.

The first step is to create a plan file. The plan file contains the system device configuration, the properties settings for all of the devices, and the views, as they have been configured and arranged in the main window. Its name appears in the title bar of the main window. You can create different plan files with unique characteristics for specific test routes.

You can also open and modify an existing plan file, saving it with a different name.

If a plan file is not open when you start the E6474A software, you need to create one. You must also create a new one if you have used the system, disconnected devices, and then reconnected them to different COM ports than those to which they were originally connected.

NOTE

The E6474A software comes with a set of default and demo plan files for each technology. These files can help you to see how plan files are set up and used. For information on how to locate these files and what each file contains, refer to the online help, where you can use the help index to locate **Default Plan Files** or **Demo Plan Files**.

To create a new plan

- 1 With the software open, select **File > New...**
- 2 A System Setup View opens showing available COM ports and navigation options. Refer to [Figure 40](#).

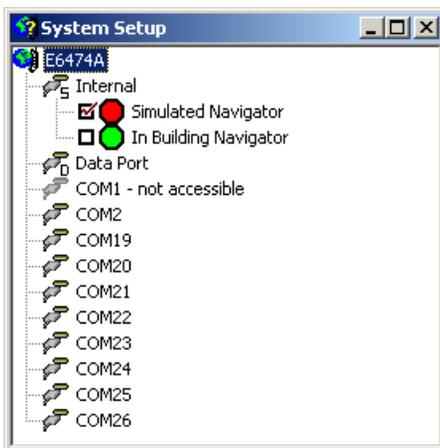


Figure 40 System Setup view

- 3 Save the plan file. Plan files are saved with **.spf** file extension. Refer to "[File types and locations](#)" on page 87 for more information.

System Setup view

The System Setup view is used for identifying the devices. After identifying the devices, the System Setup view displays a tree diagram of the system configuration, showing the COM ports and the devices connected to them.

Identifying devices

The software must identify the attached devices before it can communicate with them. Devices include phones, Agilent digital receivers, and the navigator (if equipped). This process is also referred to as “configuring the system.”

NOTE

Generic data devices are configured differently than phones used in conversation mode. See [“Generic data devices”](#) on page 88 for setup information.

NOTE

If you are using the E6473B hub and are uncertain about which COM ports are assigned and need assistance in determining which COM port is assigned to each specific device, refer to [“Verifying E6473B hub installation”](#) on page 32.

More information on identifying devices and system configuration can be found in the online help and quick basics. Refer to [“Get results fast”](#) on page 93.

Identify devices

To identify the devices, perform the following procedure (this example uses a phone attached to COM port 1). All system components should be connected and powered on.

- 1 Right-click on **COM1** in the System Setup view. A popup menu appears, as shown in [Figure 41](#).

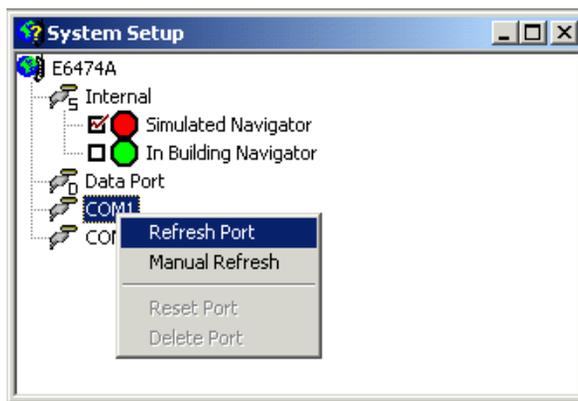


Figure 41 System setup view showing pop-up menu

- 2 Select the **Refresh Port** option.
- 3 Once the device is identified a message dialog box appears.
- 4 Click:
 - **Yes** if you want to update the COM port.
 - **No** if you do not want to update the COM port.
 - **Details>>** to view the devices found on the COM port.

NOTE

If you are sure which device is connected to the selected port, you can reduce refresh time by using the **Manual Refresh** option. A second menu is displayed showing the devices you are currently licensed to use. You can then select the device that is connected to the selected port.

When the device has been identified it will be added to the System Setup View tree. See [Figure 42](#).

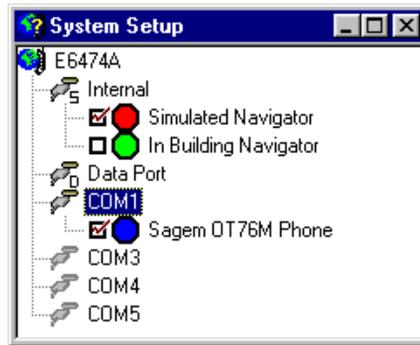


Figure 42 System Setup View with a phone identified on COM 1

Enabling the devices

Note that the check box next to each device is checked, indicating that the device is enabled for data collection. Phones and receivers are automatically enabled after you identify these devices. The navigator, however is not automatically enabled. Before you begin logging data or Live Mode, verify the following:

- Verify that each phone or receiver is enabled. Click the check box to enable the NMEA Navigator. The navigator supplies data to plot your position on the Route Map.
- Click the check box to enable the In-Building Navigator if you have E6474A, option 030, indoor mapping. This allows you to use the In-Building Route Map for manually plotting your test route.
- Click the check box to enable the Simulated Navigator when you need to isolate a problem, and do not require real navigation data.

Configuring devices and views

Once a device has been identified by the system it needs to be configured for measurement and data recording.

Each device has its own properties dialog box. This dialog box allows you to set various measurement and test parameters for that particular device.

Further test configuration can be done in the measurement views associated with the relevant device.

To configure a device

- 1 Select the device.
- 2 Right-click on the device.
- 3 Select **Properties** from the pop-up menu. The properties dialog box for that device will appear.
- 4 Step through the tabbed areas of the properties dialog box and configure the device as required. For more information on device properties, select **F1** or click the **Help** button. Refer to [Figure 43](#) on page 85 for an example of a typical properties dialog box.
- 5 Once the device properties have been configured, close the dialog box (Select **OK**).
- 6 Select **File > Save** to save your plan file.

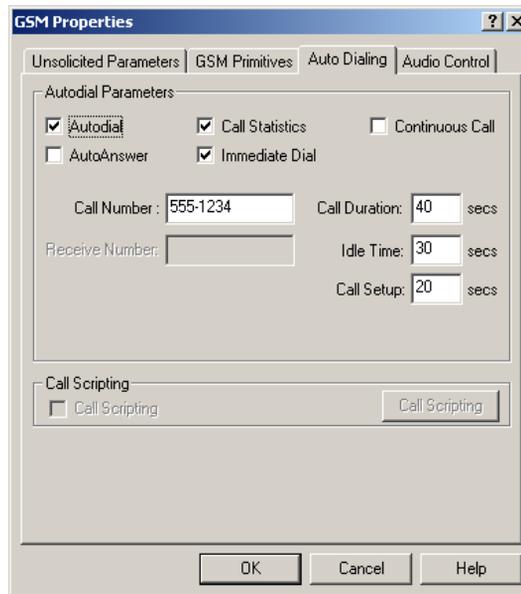


Figure 43 An example of a device properties dialog box

Once a device has been identified and configured, you can then open various measurement views for displaying data and test results.

The views available depend on the license options you have attached to your laptop, the devices configured, and what properties you have configured.

To configure measurement views

- 1 Select the **View** menu option.
- 2 Select the view you wish to display.
- 3 Repeat this process until you have all the information you require.
- 4 Use the **Window** menu option to help you organize your views.

Some views require further configuration once they have been opened before they can display measurement data.

For example, the Chart View can display charts for up to four devices. Open the view and select the properties button to start configuring which device to chart and what data needs plotted.

Once a view has been opened, you can find out more by selecting **F1** to display the online help topic for the selected view.

NOTE

It is recommended that you also use the **Edit Label** command on the pop-up menu, to give the device a meaningful name. For Data Devices, it is helpful if the label includes the COM port that the device is connected to. The label will appear in the title bar of the views associated with the device.

File types and locations

The Agilent E6474A system generates and uses different files. The following list describes these files in terms of their function and location.

File type	File extension	Description
Plan File	.spf	Created when you save a project. You can select any location for this file.
Environment File	.sef	Contains information about view settings in the above plan file. This file is generated automatically in the same location as the plan file.
Object Control File	.ocf	Contains information about each view that makes up the plan file you created in the system setup view and in the E6474A software. This file is generated automatically in the same location as the plan file.
Data file	.sd5	Contains the recorded measurement data. This file can be stored in any location. It is recommended that the data file is saved in the same location as the plan file.
Export plan file	.epf	Contains the Export Wizard settings. Refer to the online help for more information on using the Export Wizard. This file can be stored in any location. It is recommended this file is saved in the same location as the plan file.

NOTE

If you need to transfer a project to another laptop, it is recommended that you copy the plan (.spf), environment (.sef), and object control files (.ocf) at the new laptop.

Configuring and creating a data project

Generic data devices

Before using the Agilent E6474A software to make data measurements, it is important that you configure the external software and hardware. This software and hardware is used to establish a data connection through your phone, with the phone acting as a wireless modem. The following sections outline the tasks you need to perform before you start the Agilent E6474A software.

For more information, refer to:

- Phone supplier's documentation or software
- Windows Dial Up Networking installation wizard help
- Agilent E6474A online help and tutorial

Configure the phone

Each phone is supplied with manufacturer's documentation that explains how to configure a phone for use as a modem (data device). Using this documentation set up the phone's modem settings by navigating through the phone menu options and entering the modem interface settings.

Add a modem connection to the computer

Instructions for adding a modem connection to the computer and configuring it are included with the phone's documentation. Follow the instructions explicitly.

NOTE

In the dialog box that prompts "Do you want Windows to detect your modem?" be sure to check the "Don't detect my modem; I will select it from a list" check box option. You will also be prompted to select a COM port on which to install the modem. For this prompt, select the COM port to which the data device is connected.

Configure the network and dial-up connection

Instructions for configuring the network and dial-up Connection are included with the phone's documentation. Follow the instructions explicitly. There are two parts to this procedure:

- **Setting up the Internet Connection:** In this part of the procedure, you set up the dial-up connection to your service provider. You need your service provider's phone number.
- **Advanced Connection Properties:** In this part of the procedure, you set up the **Dial Up Networking (DUN)** properties, including the DNS and APN settings for your ISP. This information is available from your service provider.

NOTE

It is recommended that you use a logical (and meaningful) name for the DUN connection name. You will select this as the Dial-up Name when you configure the Data Port Properties in the E6474A software. For example, include the phone type, service provider name, and Data Port connection number: Sagem-MyProvider-COM3.

Testing the phone/modem configuration

The following test verifies that all phone and modem settings are correct:

- 1 Using the dial-up connection you have set up, establish a connection with the Internet.

NOTE

Not all phones have integrated data and power supply connections. Ensure the phone is fully charged before proceeding. Connect the phone to a serial port of the computer, using the recommended connections given to you by the phone supplier.

- 2 Open the browser on the computer.
- 3 Attempt to browse the web.
- 4 If this test is successful, then start the E6474A software, and proceed to ["Adding a data device"](#) on page 90.

Adding a data device

Use the data port in the System Setup view to set up the device and data properties. In the System Setup view, up to four devices can be added to the data port. Properties for the data device can then be configured, in a manner similar to a phone.

To add a device to the data port:

- 1 Right-click on the Data Port. A pop-up menu appears, as shown in [Figure 44](#).

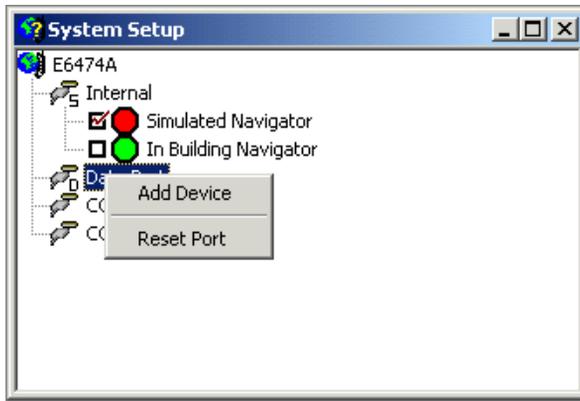


Figure 44 Adding a data device

- 2 Choose **Add Device** from the pop-up menu. After you add the data device, it is enabled, as indicated by the check mark next to Data Device in [Figure 45](#) on page 91.

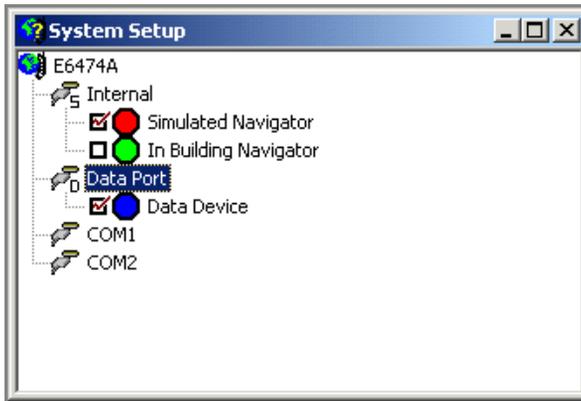


Figure 45 Data device added

Configuring data device properties

To perform throughput and timing calculations, you should use Agilent Data Server Software. For more information on this software and how it works, refer to the Agilent Data Server software installation guide (E7475-90012).

Before you can perform a test with the data server, you must configure the properties of the data device added to the data port. The properties dialog box for the data device allows you to configure the test conditions and parameters. See [“Configuring devices and views”](#) on page 84 for instructions on opening this dialog box.

NOTE

Although the Agilent E6474A software shows the COM port in the System Setup view that the data device is connected to, that COM port cannot be used for configuring the device’s properties. Data Device properties can only be configured by right-clicking on the **Data Device**, then choosing **Properties** from the pop-up menu.

Configuring and creating a WAMS project (Option 740)

Wireless Application Measurement Software (WAMS) is a software application that measures user experience of wireless data networks. It can be used in a drive test environment, as well as in a stationary environment. The following are some of the key features in WAMS:

- Shell application that allows easy creation, scheduling, and running of tests.
- Allows simultaneous measuring of multiple wireless networks.
- Allows integration of GPS for accurate time and location stamps.
- Easily exports measured data to an Excel like CSV files.
- Integrates with QoS DMS and Report engine, which allows near real time performance monitoring of multiple probes.
- Allows easy creation and integration of custom made and third party tests.

To start the WAMS interface

- 1 Open the E6474A application.
- 2 Select **Tools > WAMS Sequencer**.

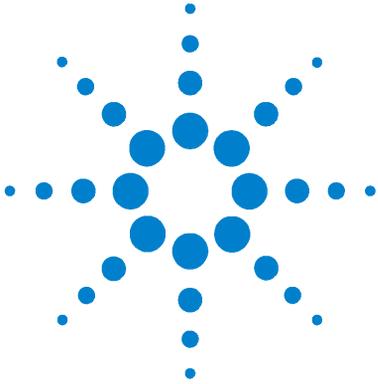
The WAMS sequencer view opens with a default sequence tree.

To configure a WAMS sequence

A WAMS sequence is made up from test nodes and tests designed to measure typical user experience of wireless data networks.

Full details on configuration and the tests are provided in the Wireless Application Measurement Software (WAMS) User's Guide (E6474-90058).

An online version (PDF format) can be found in the **Help > Library**.



5 Get results fast

What you'll find in this chapter

To do this	See this
Learn to use the software	"Using Quick Basics — the Online Tutorial" on page 94
Get information about taking measurements	"Online Help" on page 96

WARNING

Drivers should not operate the Agilent E6474A system while the vehicle is in motion.



Using Quick Basics — the Online Tutorial

As part of the product, the Agilent E6474A includes Quick Basics, an online tutorial. The opening screen is shown in [Figure 46](#). It is recommended that you complete Quick Basics before you use the Agilent E6474A system.

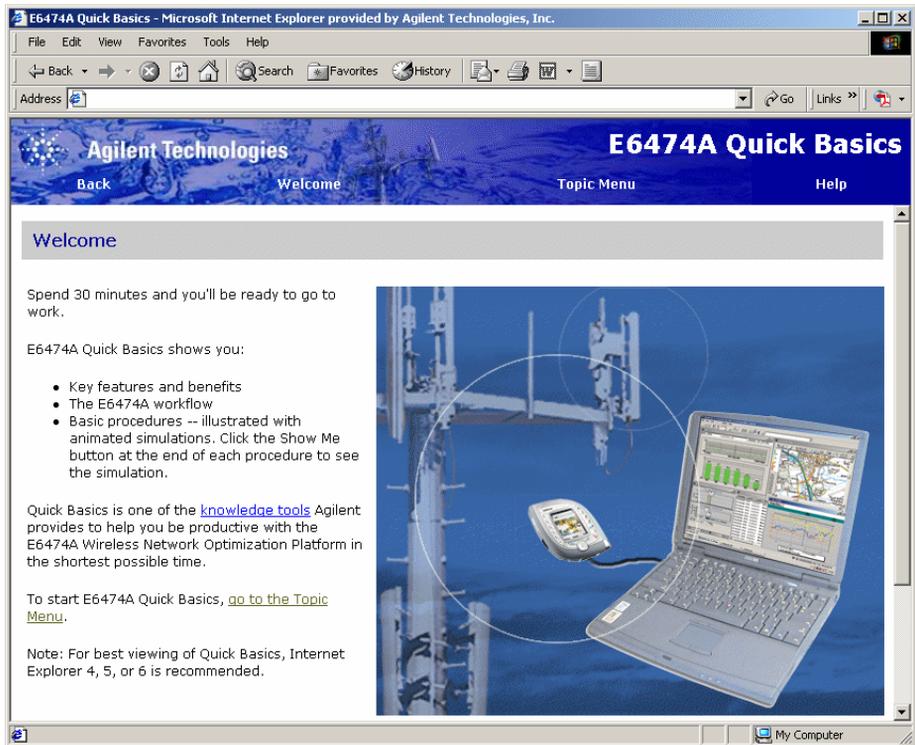


Figure 46 The E6474A Quick Basics tutorial

Quick Basics provides an overview of the capabilities of the Agilent E6474A. It also demonstrates the most common tasks you'll perform, and then guides you through those tasks in a simulation of the program.

To run the tutorial

Do this	See this
1 Click Start > Programs > Agilent Wireless Solutions > E6474A > Reference > Tutorial.	The tutorial opens in your browser window.
2 Read the Welcome page and then click Topic Menu.	The Topic menu lists the Key Features and Quick Tour, as well as the available procedures.
3 To see an overview of the Agilent E6474A, click Quick Tour.	View the Quick Tour and then choose the procedures that interest you or view them in order to get a good introduction to the software.
4 When you have completed Quick Basics, or want to exit, close the browser windows.	The Quick Basics is closed. Run it again any time for a brush up.

After the Tutorial

When you have finished running the tutorial, you can continue learning about the system by reviewing these and other online help topics:

- **What's New** to familiarize yourself with changes from the latest release
- **Getting started** for basic information on using the software and getting help
- **How do I...** for valuable how-to information on using the software
- And, of course, the online help provides details about every aspect of the software, as well

Online Help

The software includes context-sensitive, HTML-based online help. In the help, you'll find all the information you need to make measurements with the Agilent E6474A software, including procedures, measurement parameters, and tips. The help opens in a browser window, separate from the E6474A application window.

Accessing Online Help

- 1 Press the **F1** key or click the **Help** button, when shown, to display the help topic with detailed information about the options, check boxes, and text boxes.
- 2 For help on configuring a view, open the view, then press **F1**.

Figure 47 shows the Contents tab on the left, and a typical help topic on the right.

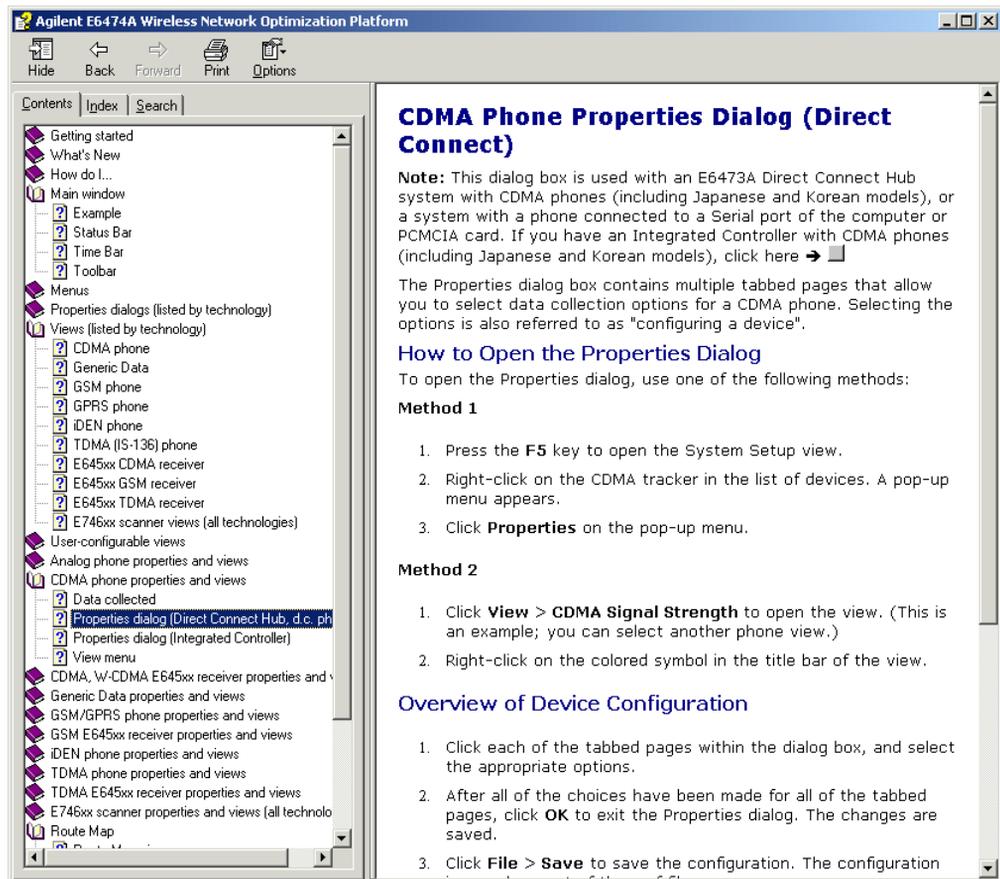


Figure 47 A typical online help browser display

The online help can also be accessed in the following ways:

- Click **Start > Programs > Agilent Wireless Solutions > E6474A > Help > E6474A Help**.
- With the E6474A software running, click **Help > Help Topics** to open the Help menu and a list of items that are new for the current software release.

Using Online Help

Following are some tips for using the software's online help system.

Getting familiar with new features

When you display the online help from the Help menu, a list of new software features automatically appears in your browser as shown in [Figure 48](#).

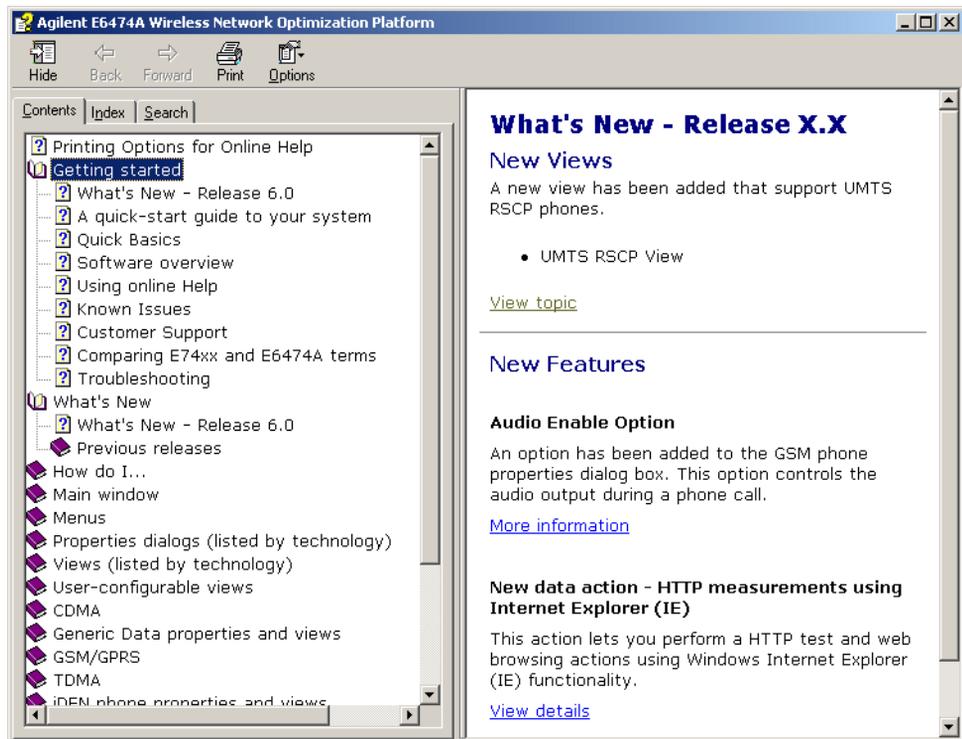


Figure 48 The What's New topic

This topic lists and briefly describes each new feature for the current release of the software. You can display detailed information for any new feature by clicking the **View topic** link.

Using the contents tab

The Contents tab lists all the topics in the online help.

- 1 Click the **Contents** tab to look at the topics by category.
- 2 Click a plus (+) sign or double-click a book icon to view its contents. It may include more Book icons or topics.
- 3 Click a topic to open that topic in the Help window.

Using the index tab

The Index tab lets you search through an alphabetical list of topics to find those relating to the text you type in the text field.

- 1 Click the **Index** tab to look at the list of index entries.
- 2 Type your subject in the **Type Keywords** box.
Or, scroll through the list in the list of entries, and double-click the term to list topics.
- 3 If more than one topic is available for the keywords you selected, a **Topics found** box appears from which you can select the topic of interest.
- 4 Double-click a topic to view it in the Help window.

Using the search tab

The Find tab lets you search the online help to find topics that include the words or phrases you type in the text box.

- 1 Click the **Search** tab to search for words or phrases used in the help topics.
- 2 Type the word or Phrase you are looking for in the text box.
- 3 Click the **List Topics** button to display topics that contain the word or phrase you enter in the bottom list box.
- 4 Double-click a topic to open the help window for that topic.

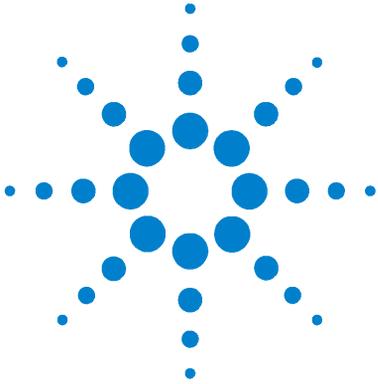
Getting Information about Views

To learn about the views available for a device, follow these steps:

- 1 Start the online help.
- 2 Click the **Contents** tab.

5 Get results fast

- 3** Open the book for the phone or receiver.
- 4** Open the View Menu topic.
- 5** Click the links for the views listed.



6 Get Assistance, if You Need It

What you'll find in this chapter

To do this	See this
Solve problems with your system.	"Troubleshooting your E6474A system" on page 102
Verifying your system	"Verifying your System" on page 106
Online frequently asked questions.	"Online Frequently Asked Questions" on page 119
Update E645xx receiver firmware.	"Updating E645xx Receiver Firmware" on page 120
Contact Customer Support.	"Contacting Customer Support" on page 123
Return the system for service.	"Returning the System for Service" on page 124



Troubleshooting your E6474A system

Device communication problems

Occasionally, when you probe a COM port, the error message in [Figure 49](#) may be displayed

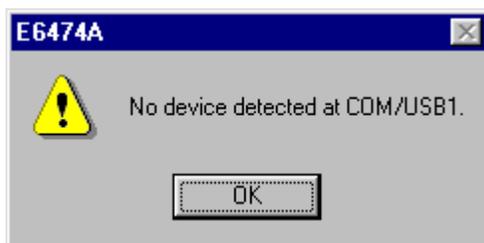


Figure 49 No device error message

Causes

This message is displayed for the following reasons:

- The Direct Connect Hub or a device connected to a serial port is not powered on.
- The device has a defective interface cable.
- The serial port has no device connected to it.
- A phone is communicating at the wrong baud rate.
- The device itself is defective.

Remedies

- Before using the Refresh Port command to probe the COM port to identify the devices, verify that all devices are connected and powered on. Devices include the Direct Connect Hub (if equipped), phones, scanner, receivers, and navigator. Refer to Chapter 3 for cable connection details.
- If you have an iDEN phone, perform the procedure under [“Setting an iDEN phone’s baud rate”](#) on page 103.

- If you have a Sagem phone that is capable of operating in Data mode, refer to “[Changing a Sagem phone’s operating mode](#)” on page 103.
- In the System Setup view, right-click another COM port, then select the Refresh Port command.
- Use a systematic approach to isolate a hardware problem. If available, replace a suspected defective device or cable with a known working device or cable. Replace only one component at a time, then retest.

Setting an iDEN phone’s baud rate

The baud rate for any iDEN phone must be set to 19200 baud, otherwise the phone may not be identified. The following is the procedure for the i1000 Plus phone.

- 1 Power up the phone. Wait for “Phone Ready” to be displayed.
- 2 Press the **Menu** key 3 times.
- 3 Press the key under **Prgm** shown in the display. The Programming Menu is displayed.
- 4 Press the key under **OK** in the display.
- 5 Press the right arrow key until Set Baud Rate: <value> is displayed.
- 6 Press the key under **OK** in the display.
- 7 Press the right arrow key until **19200** is displayed.
- 8 Press the key under **OK** in the display.
- 9 Press the key under **Exit** in the display.

Changing a Sagem phone’s operating mode

The Sagem OT-55P phone can operate in either of two modes, Trace or Data. A communication error may occur if the wrong mode is selected. If you are making parameter measurements, it must be set to Trace mode.

Refer to the phone manufacturers instructions for details on how to change the phone mode settings.

Toshiba phone power-up issues

Toshiba direct-connect phone power-up

Toshiba JCDMA phones have special power-up procedures. Each time you power up the system, you must perform the following procedure to enable communication between the phone and the data collection software. Begin all of the following procedures with the phone and computer powered off.

Toshiba 10-CT

- 1 Unplug the phone interface cable from the phone.
- 2 Power the computer on.
- 3 Power the phone on.
- 4 Plug the interface cable into the phone.

Toshiba C-103T

- 1 Unplug the interface cable from the phone.
- 2 Plug the phone interface cable into the phone. The phone will power up.
- 3 Within the next 5 seconds, press the following keys on the handset: # 3 2 5 7 4 7 * (Numbers will appear on the display.)
- 4 Press the # key.
- 5 Press the following keys: F 9 6 (The F key is to the right of the toggle button.)
- 6 Press the F key.
- 7 Choose the **DIAGE** option.
- 8 Press the F key.
- 9 Power the computer on.

Toshiba 301T

- 1 Unplug the interface cable from the phone.
- 2 Plug the phone interface cable into the phone. The phone will power up.

- 3 Press the following keys: **F 9 0** (The F key is to the right of the toggle button.)
- 4 Press the **F** key.
- 5 Choose the upper **DIAGE** option. (Do not choose the DIAGE AUX option)
- 6 Press the **F** key.
- 7 Power the computer on.

Verifying your System

Overview

There are five tests you can use to verify your system, as listed in [Table 2](#) on page 106.

Table 2 Methods to verify your system

Test Description and Page
"Test 1 - Receiver testing using a signal generator" on page 106
"Test 2 - Receiver testing by measuring a known channel" on page 112
"Test 3 - Receiver testing by measuring the noise floor" on page 114
"Test 4 - GPS receiver testing" on page 116
"Test 5 - Phone testing using a test call" on page 117

- If your system includes an Agilent digital receiver, perform tests 1, 2, or 3 and test 4.
- Tests 1 and 2 provide the highest level of confidence.
- Test 3 should only be used for testing the receiver if you do not have a signal generator and there is no known channel in the system.
- If your system includes a phone, perform test 5.

NOTE

The verification tests are only used to alert you to possible non-operating conditions. To measure actual receiver specifications, the unit must be measured in a controlled environment, using Agilent Technologies' prescribed measurement techniques.

Test 1 - Receiver testing using a signal generator

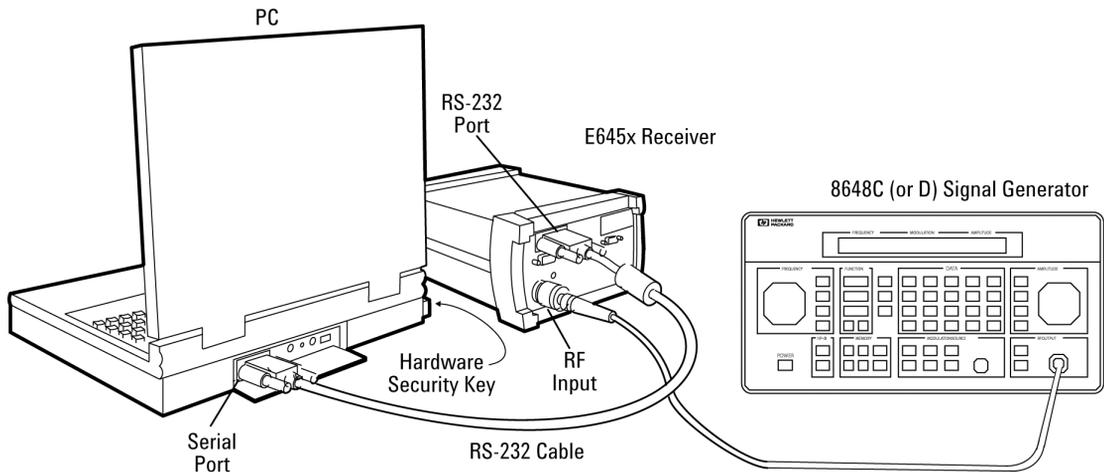
Preparing the hardware

- 1 Connect the system as shown in [Figure 50](#) on page 107, but do not connect the signal generator output. The Agilent

receiver requires a 30-minute warm-up period to meet the guaranteed specifications.

NOTE

There is a three-minute delay after power-up or re-configuration, before the internal temperature sensor is activated and measurements are nominally correct.



Ver8648.cdr

Figure 50 System measurement verification setup using a signal generator

- 2 Depending on your system type, set the frequency/power levels using "[Signal Generator Uplink Settings](#)" on page 108.
- 3 Verify that the correct values are set on the signal generator.

NOTE

Do not connect the signal generator at this stage.

Table 3 Signal Generator Uplink Settings

Model	Frequency and Power Setting
GSM1900, TDMA, cdma2000 and CDMA PCS band systems	1879 MHz at -60 dBm
GSM DCS1800 band systems	1748 MHz at -60 dBm
GSM900 band systems	898 MHz at -60 dBm
Cellular CDMA and TDMA band systems	837 MHz at -60 dBm
UMTS E6455C receivers	1950 MHz at -60 dBm

Preparing the software

- 1 Start the E6474A software.
- 2 Refer to “[Identifying devices](#)” on page 81, and perform the procedure, if you have not already done so.
- 3 Click **Log > Start Live Mode**.
- 4 Open the Spectrum Analyzer view and maximize the view.
- 5 Connect the signal generator output to the RF input of the receiver.
- 6 Turn on the signal generator.
- 7 Set the measurement software as follows:

Band: Uplink

Frequency: Refer to [Table 3](#) on page 108.

Span: 1 MHz

Averaging: Running

Averages: 32

You should see a signal trace showing a single spectral peak in the middle of the display, as shown in [Figure 51](#) on page 109.

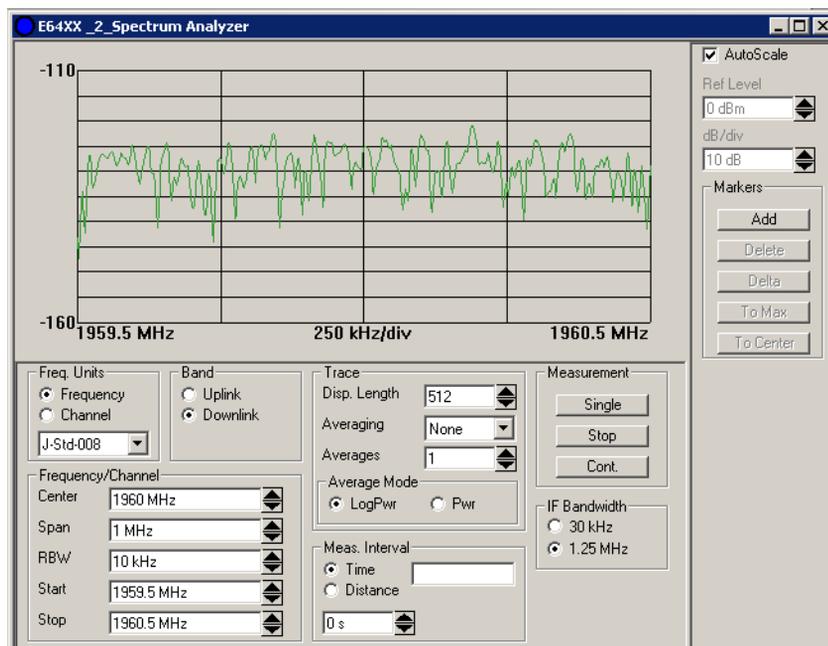


Figure 51 Spectrum Display with Marker Set to a Center Frequency of 1960MHz(CDMA 1900 band system)

Testing the signal

- 1 In the Markers group, click **Add** and **To Max**. The level and frequency are displayed at the top-left corner of the Spectrum Analyzer display.
- 2 In the Band group, select Downlink.
- 3 In the Freq/Channel group, change the Center frequency according to [Table 4](#) on page 110.
- 4 On the signal generator, set the frequency according to [Table 4](#) on page 110.

You should see a signal trace showing a single spectral peak in the middle of the display. [Figure 52](#) on page 110 shows an example trace.

Table 4 Signal Generator Downlink Settings

Model	Frequency and Power Setting
GSM1900, TDMA, cdma2000, and CDMA PCS band systems	1959 MHz at -60 dBm
GSM DCS1800 band systems	1843 MHz at -60 dBm
GSM900 band systems	943 MHz at -60 dBm
Cellular CDMA and TDMA band systems	882 MHz at -60 dBm
UMTS E645C receivers	2140 MHz at -60 dBm

NOTE

Wait for at least one minute before using the displayed marker value. The default trace display is set to display a running average of 32. With time, the marker value will approach the value of the signal generator output.

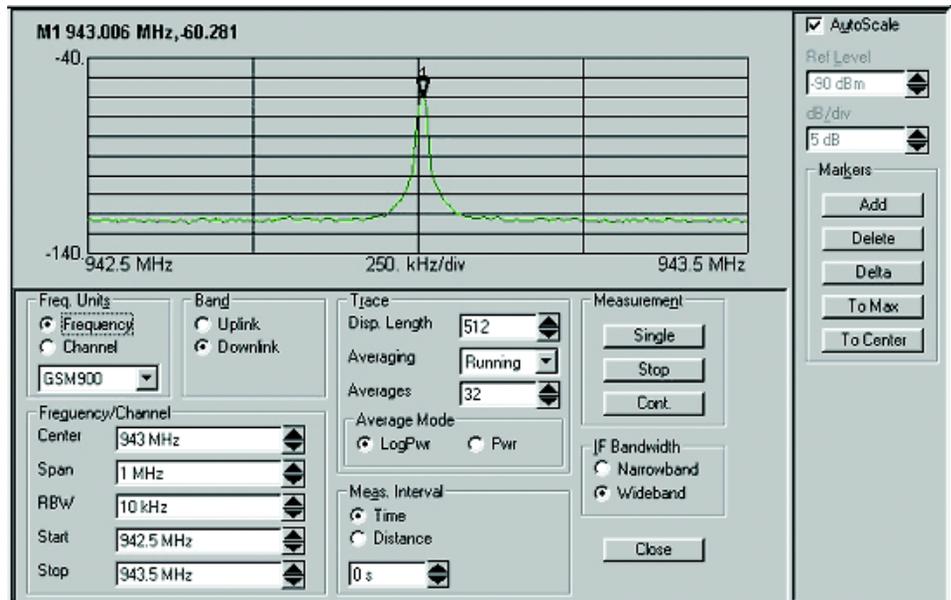


Figure 52 Spectrum Display with Marker Set to a Center Frequency of 943 MHz (GSM 900 band system)

Accuracy

The accuracy is calculated as:

Frequency accuracy = signal generator accuracy + 1 ppm.

Amplitude accuracy = \pm (0.5 dB + signal generator accuracy + mismatch error + cable loss).

Assuming the Agilent receiver and Agilent 8648B signal generator specifications, with nominal values of mismatch and cable losses of approximately 1 dB, you can expect:

- Frequency reading, approximately: Frequency selected \pm 450 kHz
- Amplitude reading, approximately: Amplitude selected \pm 2.5 dB

NOTE

You can save the settings of the project (.spf file) at any time. If you experience measurement or configuration problems, you can refer to the settings shown in the corresponding verification test.

Passing the test

If the display shows a single spectral peak, and reports frequency and power levels that match the output of the signal generator, the system has passed the test.

If your system is equipped with a navigator, perform the tests in [“Test 4 - GPS receiver testing”](#) on page 116. If you experience problems in setting up the tests, refer to [“Troubleshooting your E6474A system”](#) on page 102.

Test 2 - Receiver testing by measuring a known channel

Preparing the hardware

- 1 Connect the system as shown in [Figure 53](#).

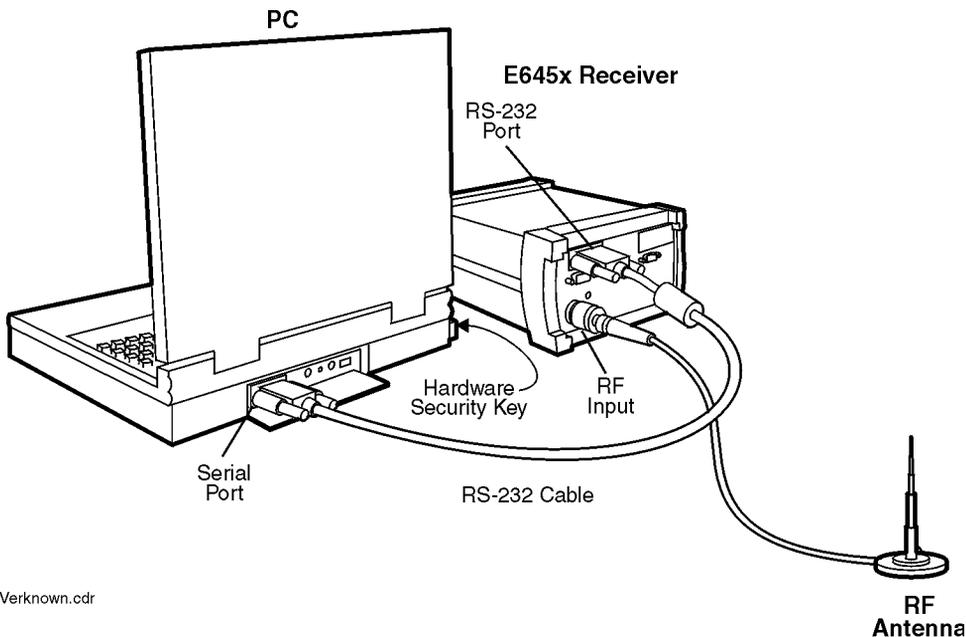


Figure 53 System configuration for measuring a known channel in the system

- 2 Turn on the Agilent receiver.

NOTE

The Agilent receiver requires a 30-minute warm-up period to meet the guaranteed specifications. There is a three-minute delay after power-up or re-configuration, before the internal temperature sensor is activated and measurements are nominally correct.

Preparing the software

- 1 Start the E6474A software.
- 2 Refer to “[Identifying devices](#)” on page 81, and perform the procedure if you have not already done so.
- 3 Click **Log > Start Live Mode**.
- 4 Open the Spectrum Analyzer view and maximize the view.
- 5 Select either Frequency or Channel in the Frequency Units. Frequency is displayed on the Spectrum Analyzer view.
- 6 Set the measurement controls as follows:

Band: Downlink

Frequency: User-specified. The frequency you specify and enter in the Center field should be a known communication frequency or channel.

Span: 2 MHz or 1 MHz, depending on the channel used

Averaging: Running

Averages: 32

Testing the signal

- In the Markers group, click **Add** and **To Max**. The level and frequency are displayed at the top-left corner of the Spectrum Analyzer view.

NOTE

Wait for at least one minute before using the displayed marker value. The system is set to display a running average of 32. With time, the marker value will approach the value of the measured signal.

Passing the test

If the signal trace is of acceptable amplitude above the noise floor, depending on the distance from transmitters and antenna placement, at the appropriate frequency for the channel measured, the system passed the test.

If your system is equipped with a navigator, perform the tests in [Table 5](#) on page 116 next. If you experience problems in setting up the tests, refer to “[Troubleshooting your E6474A system](#)” on page 102.

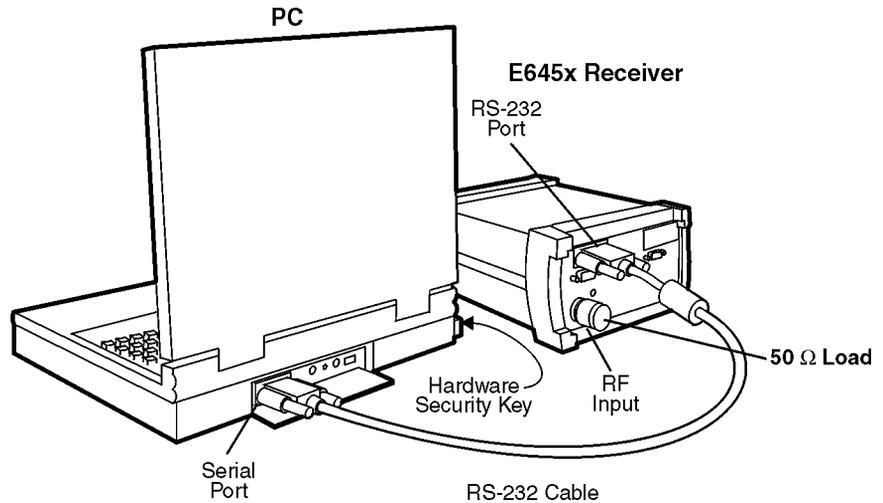
Test 3 - Receiver testing by measuring the noise floor

NOTE

Use this procedure only if you do not have a signal generator and there is no known channel in the system. Connect a 50-ohm load (customer supplied) to the input of the receiver.

Preparing the hardware

- 1 Connect the system as shown in [Figure 54](#).



Verload.cdr

Figure 54 System Configuration for Measuring the Noise Floor

- 2 Turn on the Agilent receiver.

NOTE

The Agilent receiver requires a 30-minute warm-up period to meet the guaranteed specifications. There is a three-minute delay after power-up or re-configuration, before the internal temperature sensor is activated and measurements are nominally correct.

Preparing the software

- 1 Start the E6474A software.
- 2 Refer to “[Identifying devices](#)” on page 81, and perform the procedure if you have not already done so.
- 3 Click **Log > Start Live Mode**.
- 4 Open the Spectrum Analyzer view and maximize the view.
- 5 Set the measurement controls as follows:
 - Band:** Downlink
 - Frequency:** See the tables on the next page.
 - Span:** 300 kHz
 - Averaging:** Running
 - Averages:** 100
- 6 In the Markers group, click **Add** button then **To Max** and note the Marker 1 frequency and level. The level and frequency are displayed at the top-left corner of the Spectrum Analyzer view.
- 7 In the Markers group, click **Add** to place a second marker on the display.
- 8 Use the mouse to drag Marker 2 to the minimum level of the trace. Note the Marker 2 frequency and level.
- 9 Calculate the average noise level of the downlink. Average noise level = (Marker 1 level + Marker 2 level) / 2
- 10 Select Uplink in the Band group. Frequency is displayed on the Spectrum VFP.
- 11 Perform steps 7 through step 10 to determine the average noise level of the uplink. Substitute the frequencies from [Table 6](#) on page 116 in step 6. Average noise level = (Marker 1 level + Marker 2 level) / 2

Table 5 Noise Floor Frequency Settings for Step 5

Model	Marker 1 Frequency (step 6)
PCS CDMA and TDMA band systems	1959 MHz
GSM DCS1800 band systems	1843 MHz
GSM900 band systems	943 MHz
Cellular CDMA and TDMA band systems	882 MHz

Table 6 Noise Floor Frequency Settings for Step 11

Model	Marker 1 Frequency (step 6)
PCS CDMA and TDMA band systems	1879 MHz
GSM DCS1800 band systems	1745 MHz
GSM900 band systems	898 MHz
Cellular CDMA and TDMA band systems	837 MHz

The measurement is making 100 averages, which requires approximately three minutes to stabilize the noise level. After completion, stop the measurement and note the levels.

Passing the test

You have passed the test if the average noise level is below -122 dBm. If your system is equipped with a navigator, perform the tests in “[Test 4 - GPS receiver testing](#)” on page 116. If you experience problems in setting up the test, refer to “[Troubleshooting your E6474A system](#)” on page 102.

Test 4 - GPS receiver testing

If you have an Agilent digital receiver, make sure that you have tested the receiver using either method 1 ([page 106](#)), method 2 ([page 112](#)), or method 3 ([page 114](#)) described earlier in this chapter. It is recommended that you know the GPS position, the longitude and latitude, of where you do the test.

Setting up the hardware

- 1 Connect the system components per the instructions in Chapter 3.
- 2 Power the system on. Allow 30 minutes for the system to stabilize before testing.
- 3 If the system is equipped with a GPS/DR Navigation unit, move the vehicle approximately 10 feet.

Testing the signal

- 1 Start the E6474A software.
- 2 Refer to [“Identifying devices”](#) on page 81, and perform the procedure if you have not already done so.
- 3 Verify that the navigator is enabled in the System Setup view.
- 4 Click **Log > Start Logging**.
- 5 Open the Route Map view.

Passing the test

If the status area of the Route Map view reports the same longitude and latitude of your current location, the GPS is ready for use. If the navigator is not communicating, a dialog box with an error message appears.

If you experience problems in setting up the test, refer to [“Troubleshooting your E6474A system”](#) on page 102.

Test 5 - Phone testing using a test call

Setting Up the hardware

- 1 Connect the system components per the instructions in [Chapter 3](#).
- 2 Power the system on.

Testing the phone

- 1 Start the E6474A software.
- 2 Refer to “Identifying devices” on page 81, and perform the procedure if you have not already done so.
- 3 Configure the Autodialing options in the Properties dialog box. Click **Help** in the dialog box for instructions.
- 4 Open the view that shows signal parameters:
- 5 For CDMA, click **View > CDMA Phone Status**.
- 6 For GSM, click **View > GSM Signal**.
- 7 For iDEN, click **View > iDEN Signal Parameters**.
- 8 For TDMA, click **View > IS 136 Phone**.
- 9 Click **View > Call Stats** to open the call statistics view.
- 10 Click **Log > Start Logging**.

Passing the test

In the signal parameters view, you should see an indication of signal strength and other air interface parameters. The Call Stats view indicates the call progress and call termination results. If all calls are logged as “blocked,” verify that service for the phone has been activated, and that the phone’s battery is fully charged. Also recheck all cable connections.

- Click **Log > Stop** to end the test.

Online Frequently Asked Questions

If you need installation or application assistance, refer to the web site at:

<http://www.agilent.com/find/E6474A>

To access the frequently asked questions section:

- 1 Scroll to the **Library** section of the web page.
- 2 Scroll to the **FAQ** link.
- 3 Navigate up or down the FAQ links to find the appropriate FAQ topic.

If you do not have access to the web, contact your local Agilent Technologies representative for information.

Updating E645xx Receiver Firmware

NOTE

If your hardware configuration includes daisy-chained E645xx receivers, you must first disconnect the receivers, then connect one receiver at a time, and upgrade the firmware on each receiver. When you are finished updating the firmware, reconnect the daisy-chain, and reconfigure the daisy-chained receivers.

- 1 In the System Setup view, configure a receiver measurement view. Once data logging starts, the E6474A software determines if the Agilent E645xx digital receiver has the correct firmware. If not, the message box in [Figure 2](#) appears.

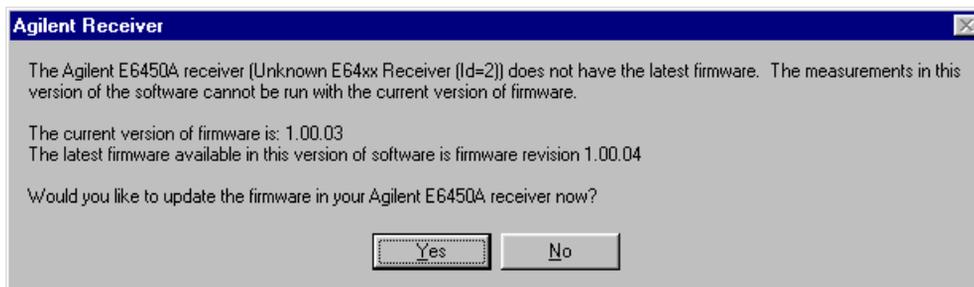


Figure 55 Firmware upgrade required, first dialog box

- 2 Click **Yes**. The message box in [Figure 56](#) appears.



Figure 56 Firmware upgrade required, second dialog box

- 3** Insert the firmware programming dongle into the Rx Loop Out port of the receiver, as shown in [Figure 57](#).

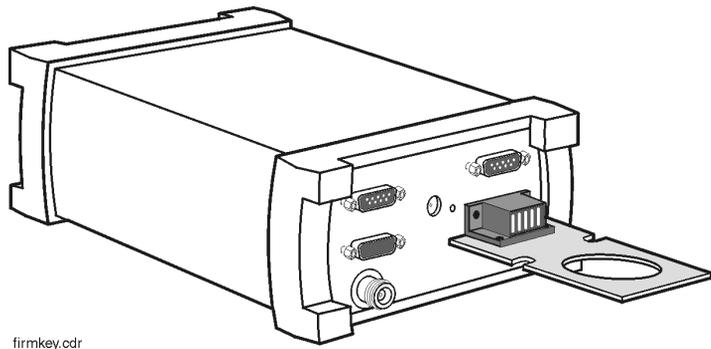


Figure 57 Receiver with dongle attached

- 4** Click **OK**. When the update is complete, the dialog box shown in [Figure 58](#) appears. This indicates that the update is complete.

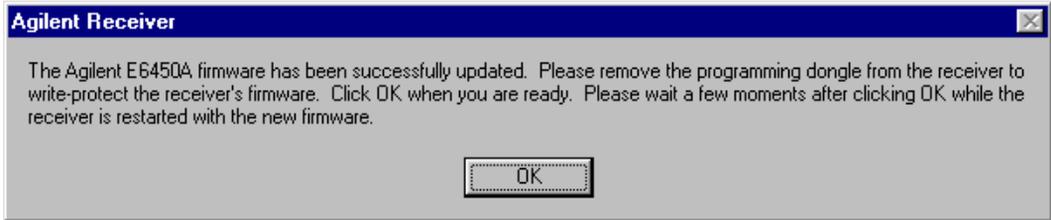


Figure 58 Firmware update successful dialog box

- 5 Remove the dongle from the receiver. Stop and restart data logging.

Replacement firmware security key

If you have misplaced your firmware write enable key, you can order a new one (order from your Agilent Technologies representative, E6450-60007), or you can substitute a piece of wire that shorts pins 8 to 10 on the RX LOOP OUT connector (see Figure 59). Remember to follow on screen instructions, and remove the wire when you are prompted by the software.

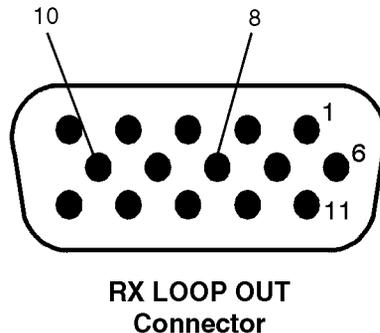


Figure 59 Short these pins to update the firmware

Contacting Customer Support

Technical telephone assistance

Before you make a call to technical support, you can save yourself time by ensuring that you have the following information at hand:

- Software revision (found by selecting **Help > About E6474A** while running the E6474A software).
- Phone brand and model.
- Error message received (text).
- Configuration (how the phones are connected).
- Operating system used (Windows 2000 or XP).
- The brand and model number of the computer being used.
- How much RAM is available on the computer, and the amount of free hard disk space.

Your E6474A Wireless Network Optimization Platform software includes 12 months of Response Center Support. To use the telephone assistance:

- 1 Install the software.
- 2 The Customer Business Center will provide you with a packet of information, which includes your system handle number. Please refer to that number when you call for support. To establish a Support Contact, please call the Customer Business Center.
- 3 Ask the Agilent Technologies engineer your question.

Numbers to call

For technical support, contact your local country-specific office and they will quickly forward your enquiry to the person who can best help you solve your problem.

For up-to-date, country-specific contact information, go to <http://www.agilent.com/comms/contactus>.

Returning the System for Service

The instructions in this section explain how to properly package the system for return to Agilent Technologies.

NOTE

Please notify Agilent Technologies before returning your system for service. Any special arrangements for the system can be discussed at this time. This will help Agilent Technologies repair and return your system as quickly as possible.

Warranty repair

If the system is still under warranty or is covered by an Agilent Technologies maintenance contract, it will be repaired under the terms of the warranty or contract. If the system is no longer under warranty or is not covered by an Agilent Technologies maintenance plan, Agilent Technologies will notify you of the cost of the repair after examining the unit.

When a system is returned to Agilent Technologies for servicing, it must be adequately packaged (see [“Preparing the system for shipping”](#) on page 125) and have a complete description of the failure symptoms attached.

When describing the failure, please be as specific as possible about the nature of the problem. Include copies of additional failure information (such as receiver or computer failure settings, data related to system failure, and error messages) along with the system being returned.

Preparing the system for shipping

Do This	Additional Information
<p>1 Write a complete description of the failure and attach it to the system.</p>	<p>Include any specific performance details related to the problem. The following information should be returned with the system:</p> <ul style="list-style-type: none"> • Type of service required • Date system was returned for repair • Description of the problem: <ul style="list-style-type: none"> • Whether problem is constant or intermittent • Whether system is temperature-sensitive • Whether system is vibration sensitive • System settings required to reproduce the problem • Error Code • Performance data • Company Name and return address • Name and phone number of technical contact person • Model number of returned system • Full serial number of returned system • List of any accessories returned with the system
<p>2 Cover all front and rear panel connectors that were originally covered when you first received the system.</p>	
<p>3 Pack the system in the original shipping containers. Original materials are available through Agilent Technologies office. See step 4 for more information.</p>	
<p>4 Wrap the system in anti-static plastic to reduce the possibility of damage caused by electrostatic discharge.</p>	<p>For systems weighing less than 54 kg (120 lbs.), use a double-walled, corrugated cardboard carton of 159 kg (350 lbs.) test strength. The carton must be large enough to allow 3 to 4 inches on all sides of the system for packing material, and strong enough to accommodate the weight of the system.</p> <p>Surround the equipment with 3 to 4 inches of packing material, to protect the system and prevent it from moving in the carton. If packing foam is not available, the best alternative is S.D-240 Air Cap™ from Sealed Air Corporation (Commerce, California 90001). Air Cap looks like a plastic sheet filled with air bubbles. Use the pink (anti-static) Air Cap to reduce static electrical damage. Wrapping the system several times in this material will protect the system and prevent it from moving in the carton.</p>

6 Get Assistance, if You Need It

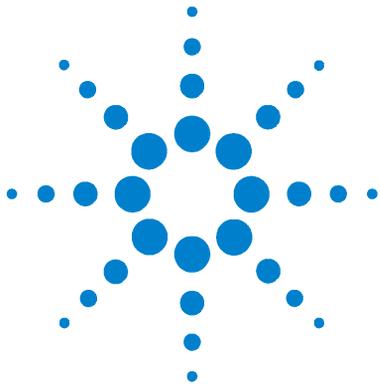
Do This**Additional Information**

5 Seal the carton with strong nylon adhesive tape and mark it "FRAGILE, HANDLE WITH CARE".

6 Retain copies of all shipping papers.

CAUTION

Cover electrical connectors to protect sensitive components from electrostatic damage. Instrument damage can result from using packaging materials other than the original materials. Never use styrene pellets as packaging material. They do not adequately cushion the system or prevent it from shifting in the carton. They may also cause system damage by generating static electricity.



A Safety and Regulatory Information

Overview

This appendix contains important warnings and cautions for hardware products used in conjunction with the Agilent E6474A software.

Warning and caution notices

WARNING

The **WARNING!** notice denotes a hazard. It calls attention to a procedure, practice, or the like, that, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING!** notice until the indicated conditions are fully understood and met.

CAUTION

The **CAUTION!** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION!** notice until the indicated conditions are fully understood and met.

General safety considerations

The Agilent digital receiver and Agilent E6473B hub have been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.



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.

No operator serviceable parts are inside this system. Refer servicing to a qualified Agilent Technologies, Inc. service center. To prevent electrical shock, do not remove the covers.

To prevent electrical shock, disconnect the equipment 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 the receiver internally.

Installation, Use, and Storage

CAUTION

The Agilent 645xx digital receiver and Agilent E6473B are designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2, per IEC 61010-1 and 664 respectively.

Enclosure protection IP40 according to IEC 529.

Install the system according to the enclosure protection provided. This system does not protect against the ingress of water. This instrument protects against entry of solid foreign objects greater than, or equal to, one millimeter.

Signal and input power

CAUTION

The input power to the Agilent 645xx digital receiver should not exceed -15 dBm. Power levels greater than $+10$ dBm will damage the instrument.

For continued protection against fire hazard, replace the line fuse (cigarette lighter/2 amp 32 V FB fuse) only with the same type of rating (type nA/nV). The use of other fuses or materials is prohibited.

If you use external power, install the instrument so the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuit from the mains supply before other parts of the instrument.

If you do not use external power, position the product so you can easily operate the disconnecting device.

Always use the power cords supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

Symbols

Table 7 lists standard symbols that appear on equipment panels.

Table 7 Equipment panel symbols

Symbol	Description
	AC power input
	DC power input
	Power switch ON position
	Power switch STANDBY or IGNITION SENSE position

A Safety and Regulatory Information

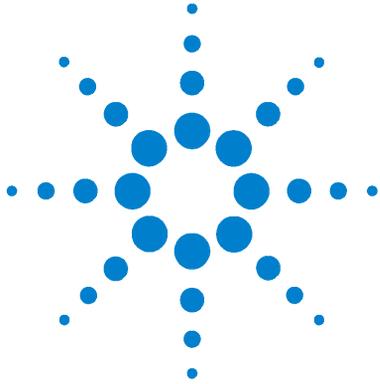
Symbol	Description
	Power switch OFF position
	Registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
	The CSA mark is a registered trademark of the Canadian Standards Association
ISM 1-A	This text indicates that the instrument is an Industrial Scientific and Medical Group Class A product (CISPER 11, Clause 4).
 N10149	The C-Tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework Regulations under the terms of the Radio Communications Act of 1992.
ICES-001	This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norma NMB du Canada.
ICES / NMB-001	This is a marking to indicate product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001).

Declaration of Conformity - Analog and Digital Cellular RF Receivers

According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014	
Manufacturer's Name:	Agilent Technologies, Inc.
Manufacturer's Address:	1400 Fountaingrove Parkway Santa Rosa, CA 95403-1799 USA
Declares that the products	
Product Name:	Analog and Digital Cellular RF Receivers
Model Numbers:	E6450B, E6450C, E6451A, E6451C, E6452A, E6452C, E6453A, E6453C, E6454A, E6454C, E6455C, E6456C, E6457C, E6458C
Product Options:	This declaration covers all options of the above products.
Conforms to the following product specifications:	
IEC 61326:1997+A1:1998+A2:2000 / EN 61326:1997+A1:1998+A2:2001	
EMC: Standard	Limit
CISPR 11:1990 / EN 55011-1991	Group 1, Class A
IEC 61000-4-2:1995+A1998 / EN 61000-4-2:1995	4 kV CD, 8 kV AD 3 V/m, 80 - 1000 MHz
IEC 61000-4-3:1995 / EN 61000-4-3:1995	0.5 kV sig., 1 kV power
IEC 61000-4-4:1995 / EN 61000-4-4:1995	0.5 kV L-L, 1 kV L-G
IEC 61000-4-5:1995 / EN 61000-4-5:1996	3 V, 0.15 - 80 MHz
IEC 61000-4-6:1996 / EN 61000-4-6:1998	1 cycle, 100%
IEC 61000-4-11:1994 / EN 61000-4-11:1998	
Safety:	IEC 61010-1:1990 + A1:1992 + A2:1995 / EN 61010-1:1993 +A2:1995, CAN/CSA-C22.2 No. 1010.1-92
Supplementary Information:	
The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carry the CE-marking accordingly.	
Santa Rosa, CA, USA	11 October, 2002
	
Greg Pfeiffer/Quality Engineering Manager	
For further information, please contact your local Agilent Technologies sales office, agent or distributor	

Declaration of Conformity - Agilent Direct Connect Hub

The Manufacturer's Declaration of Conformity document is available upon request. Please contact your Agilent Technologies sales representative or the Agilent Technologies Customer Support Center for your country.



B Connection Panels and LED Indicators

Overview

This appendix contains information about the panel connectors and LED indicators of the E6473B High Speed Direct Connect Hub, E645xx receiver, the Agilent High Speed direct connect GPS/DR Navigation unit, and the Trimble Placer 455DR.

For this information	See this
E6473B Direct Connect Hub connections	"E6473B High Speed Direct Connect Hub" on page 134
E645xx receiver	"E645xx Receiver" on page 136
Agilent High Speed Direct Connect GPS/DR	"Agilent High Speed Direct Connect GPS/DR Navigation" on page 137
Trimble Placer GPS 455DR	"Trimble Placer GPS 455DR" on page 139



E6473B High Speed Direct Connect Hub

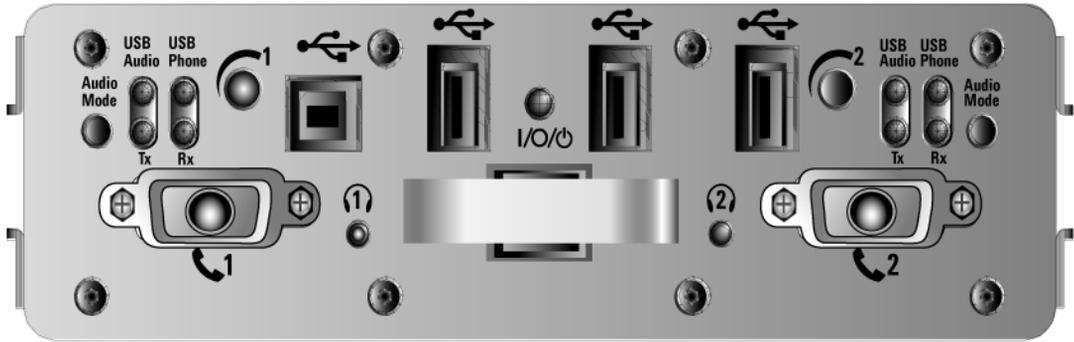


Figure 60 E6473B High Speed Direct Connect Hub front panel

Table 8 Direct Connect Hub front panel descriptions (see [Figure 60](#))

Reference	Name	Description or Cable Connection
Rx	Receive Data LED (Phone 1, 2)	Flashes when phone data is received
Tx	Transmit Data LED (Phone 1, 2)	Flashes when phone data is transmitted
	Phone 1 audio level	Controls headset 1 audio volume
	USB Computer port	Connect to USB Data Cable
	USB Out port	Plug in the software license key, or connect cable to next E6473B
	Phone 2 audio level	Controls headset 2 audio volume
	Phone 1 port	Connect to phone interface cable
	Headset for Phone 1	Connect to headset

Reference	Name	Description or Cable Connection
I/O/⏻	Power switch	Left position = On Center position = Off Right position = Ignition Sense
📞	Headset for Phone 2	Connect to headset
📞	Phone 2 port	Connect to phone interface cable



Figure 61 E6473B High Speed Direct Connect Hub rear panel

Table 9 E6473B hub rear panel descriptions (see [Figure 61](#))

Reference	Name	Description or Cable Connection
Aux Out	Power out connection	Connect to power cable for second E645xx Receiver (if equipped)
Rx	Receive Data LED (Receiver or Aux ports)	Flashes when data is received
Tx	Transmit Data LED (Receiver or Aux ports)	Flashes when data is transmitted
Receiver	Receiver or Scanner Data port	Connect to Receiver or scanner Data/Power cable
Aux	Auxiliary Data Port	Connect to GPS receiver or GPS/DR Navigation
Pwr In	Power Input connection	Connect to main power cable

E645xx Receiver

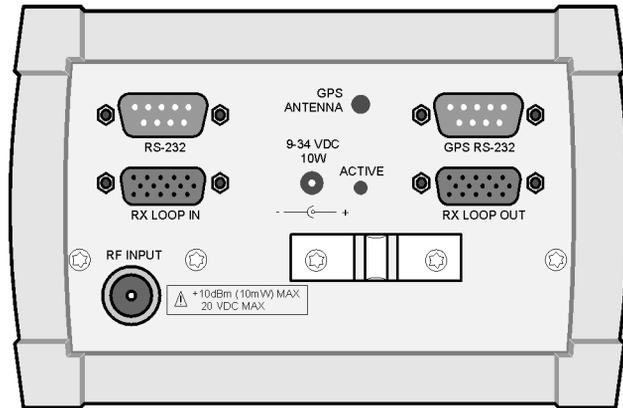


Figure 62 E645xx Receiver connector panel

Table 10 E645xx Receiver connector panel descriptions (see [Figure 62](#))

Reference	Name	Description or Cable Connection
RS-232	Receiver data port	Connect to receiver data/power cable
GPS Antenna	GPS antenna connector	Connect to GPS antenna, if equipped (included with E6455C; and E6450B, E6452A, E6453A, and E6454A with GPS option)
GPS RS-232	External GPS data port	For CDMA receivers, an optional 1 PPS cable may be connected to this port, if the external navigator provides a 1 pulse per second signal. For E6455A, E6456A, and E645xC receivers, the cable for a wheel pulse trigger may be connected to this port.
Rx Loop In	Receive data loop input	Connect to Rx Loop Out of second receiver (if equipped)
Rx Loop Out	Receive data loop output	Connect to Rx Loop In of second receiver (if equipped)
9-34 VDC	Power input	Connect to Receiver Data/Power cable
Active	Active LED	Glows when unit is powered on
RF Input	RF antenna connector	Connect to receiver's RF antenna

Agilent High Speed Direct Connect GPS/DR Navigation

This navigator is Agilent part number E6473B Options 030 (Magnetic Mount Antenna) and 031 (Permanent Mount Antenna).

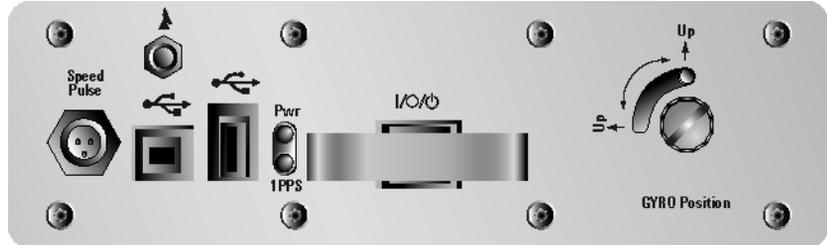


Figure 63 Agilent High Speed Direct Connect GPS/DR front panel

Table 11 Agilent High Speed Direct connect GPS/DR front panel descriptions (see [Figure 63](#))

Reference	Name	Description or Cable Connection
I/O/⏻	Power switch	Left-most position powers the unit on manually. The middle position turns it off manually. The right-most position powers the unit on and off by the ignition switch)
	USB Connector	The connector on the left is the USB Upstream port, which can connect to the PC. The connector on the right is the USB Downstream port, which can connect to another USB device.
Pwr / 1PPS	Power / 1 Pulse Per Second	The upper LED indicates that the power is on. The lower LED indicates one pulse per second from the GPS receiver.
Up ↑	GYRO Position	Allows unit to be positioned either vertically or horizontally without affecting dead reckoning. The user indicates the position by moving the Up pin to the appropriate position. Refer to " Gyro positioning " on page 53.

B Connection Panels and LED Indicators



Figure 64 Agilent High Speed Direct connect GPS/DR rear panel

Table 12 Agilent High Speed Direct Connect GPS/DR rear panel descriptions (see [Figure 64](#))

Reference	Name	Description or Cable Connection
RS232/1PPS	Serial Port and GPS 1PPS	Connects to the PC serial port for GPS data. Overrides the USB port on the front panel.
Pwr In	Power Input	Used to connects to power supply when the unit is in the rack.

Trimble Placer GPS 455DR

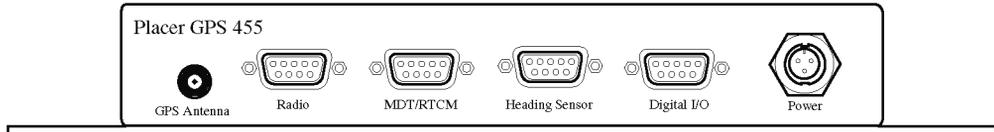


Figure 65 Trimble Placer connector panel

Table 13 Trimble Placer connector panel descriptions (see [Figure 65](#))

Connector Name	Cable Part Number	Opposite End of Cable Connects To
GPS Antenna	E6450-80002	GPS antenna
Radio	8120-8650	GPS RS-232 port of the E645xx receiver or Serial port of the computer (this option requires a Dual Serial Port PCMCIA card)
MDT/RTCM		If you have a Differential GPS, connect its data cable to this port. This port is also used for sensor calibration. When calibrating, remove the cable from the Radio port, then connect it to the MDT/RTCM port. When calibration is complete, reconnect the cable to the Radio port.
Heading Sensor	Trimble p/n 30513	Heading Sensor lead: Connect to the heading sensor ODO 0 Red lead: Connect to the odometer pulse signal ODO 0 Black lead: Connect to ground.
Digital I/O	(none)	(not used)
Power	5182-1290	4-to-1 lighter socket adapter

B Connection Panels and LED Indicators



C System Information

Overview

This appendix provides you with hardware specifications, options, and part numbers for the following.

For this	See this
PC Specifications	"Computer Hardware and Software Requirements" on page 142
Battery and charger specifications and battery disposal and power cable information	"Battery Specifications (part of E6473B, options 022, 023, and 024)" on page 143
E6473B Direct Connect Hub Specifications	"E6473B High Speed Direct Connect Hub Specifications" on page 145
Receiver specifications	"Receiver Specifications" on page 146
Cable part numbers	"Cable part numbers" on page 167
Phone interface cable options	"E6473B phone interface cable options" on page 167
Antenna kit part numbers	"Antenna kit part numbers" on page 168
Agilent E645xx receivers	"Agilent receivers" on page 169
Hardware included with the E6474A software licenses	"Hardware included with E6474A software licenses" on page 169



Computer Hardware and Software Requirements

The following are the recommended computer requirements:

- 600 MHz Pentium III processor or higher
- 256 MB of RAM or higher
- 2 USB ports
- 1 RS-232 DB9 serial port
- 2 PCMCIA slots
- 10 Gigabyte hard drive or higher
- 1024 x 768 display resolution
- CD-ROM drive (for software installation)

Item	Information/Requirements
E6474A software	<p>Compatible with Windows 2000 and XP. Windows 98 can only be used for direct connect phones making trace measurements.</p> <p>Persons using this software should be familiar with the Windows user interface. These recommendations are subject to change as new functionality is provided in the product.</p>
Dual serial port PCMCIA (Socket I/O) card	<p>Required for a system equipped with multiple phones, each of which is connected to a computer serial port. The Socket I/O card is included with the phone, and combination phone and receiver software licenses.</p>
E6473B High Speed Direct Connect Hub	<p>Enables communication with the software via the computer's USB port. Two phones or up to two Agilent receivers, and a GPS navigator can be connected to the Direct Connect Hub.</p>

Battery Specifications (part of E6473B, options 022, 023, and 024)

Item Description	Specifications
Part Number	E6473-60008
Typical Capacity	9000 mAh
Nominal Voltage	14.4V
Discharge Cut-off voltage	12.0V
Allowable Temperature Range	-20° C to +60° C at discharge 0° C to 40° C at charge
Storage Temperature Range	-20° C to 50° C 3-month -20° C to 35° C 6-month -20° C to 20° C 12-month
Humidity	0 to 85%
Weight	2.33 lbs. / 1.057 kg
Terminals	Discharge - Molex 15-24-6047
Overcharge Protection	Charging turned off $\geq 17.4V \pm 0.2V$
Short Circuit Protection:	Off at short circuit

Charger specifications (part of E6473B Options 022, 023, and 024)

Item Description	Specification
Part Number	E6473-60009
Charger Input Voltage	100-230 VAC 1.5A 50-60 Hz
Charger Output Voltage	nominal 18Vdc, 3.35A max

Battery disposal

When the battery is exhausted and/or ready for disposal, dispose of it according to your country's requirements. Within the US, you may contact Rechargeable Battery Recycling Corporation (RBRC) for disposal.

The RBRC seal on the nickel metal hydride battery pack indicates that Agilent Technologies is voluntarily participating in an industry program to collect and recycle these battery packs at the end of their useful life, when taken out of service within the United States. The RBRC program provides a convenient alternative to placing spent nickel metal hydride battery packs into the trash or municipal waste stream, which is illegal in some areas.

For information on recycling the battery outside the US, please check with your local Agilent sales office.

Power cable

The battery pack charger is equipped with a three-wire power cable, in accordance with international safety standards. When connected to an appropriate power line outlet, this cable grounds the charger power supply case. Various power cables are available to connect the charger power supply to the types of AC power outlets unique to specific geographic areas.

E6473B High Speed Direct Connect Hub Specifications

This section contains detailed specifications on the E6473B hub.

Description	Specification
Operating temperature range	0 to 40 deg C
Storage temperature	-40 to 85 deg C
Case dimensions (approx)	7.6" width x 6.78" depth x 1.56" height (19.3 cm x 17.22 cm x 3.96 cm) Add approximately 2" (5.13 cm) for handle, connectors, and software license key
Weight (without phone)	1.7 lbs./ .77 kg
Power consumption	<ul style="list-style-type: none"> • 2.75 amps with two phones and a single receiver • 3.2 amps with two phones and a dual-band receiver
Battery voltage	14.8 volts
Battery voltage charging	17.0 volts DC
Input voltage (in-vehicle system)	10-16 volts DC, 13.7 volts DC nominal

Receiver Specifications

This section contains detailed specifications on the Agilent receivers.

E6450C CDMA/TDMA PCS 1.9 GHz receiver specifications

Item	Description	Specification
Frequency	Frequency range	1850 to 1910 MHz 1930 to 1990 MHz
	Frequency accuracy	±1 ppm
	With GPS time synchronization	±0.05 ppm, characteristic
	IF bandwidth (wideband mode)	1.25 MHz, characteristic
	IF bandwidth (narrowband mode)	30 kHz, characteristic
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy 1.25 MHz IF	±0.5 typical (-25 dBm to -100dBm) ±1 dB from -40 dBm to -100 dBm (20° to 30°C) ±2 dB from -40 dBm to -100 dBm (0° to 55°C)
	Accuracy, 30 kHz IF	±0.5 typical (-25 dBm to -100dBm) ±1.5 dB from -40 dBm to -100 dBm (20° to 30°C) ± 2.5 dB from -40 dBm to -100 dBm (0° to 55°C)
	Accuracy, 200 kHz IF	
	Noise figure	8.0 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point *	-15 dBm, characteristic
	Adjacent channel desensitization † Adjacent channel rejection Internally generated spurious, input referred	-25 dBm typical 45 dB typical -120 dBm
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male

Item	Description	Specification
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	– 40°C to +70°C
	Dimensions	6 in x 3-5/8 in x 8 in 15.24 cm x 9.21 cm x 20.32 cm
	Weight	4.6 lbs (2.1 kg)
	Power	9 to 34 V DC, 9W
	Power (internal GPS option 200)	9 to 34 V DC, 10W
	AC Power	100 - 240 Volts AC 50 - 60 Hz
Internal GPS[†] (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning Note: Internal GPS is standard on all “C” receivers. It can be disabled if you wish to use an external GPS system.	

* It is recommended the input signal level not exceed – 40 dBm.

† Adjacent channel desensitization applies to wideband mode (1.25 MHz IF filter) and is defined as: 1 dB compression of tuned signal with interfering signal 1.25 MHz from tuned signal.

‡ Receivers (with the exception of “C” receivers) fitted with an internal GPS do not support connection to external GPS receivers.

E6451A/E6451C GSM900 receiver specifications

Item	Description	Specification
Frequency	Frequency range	E6451A range: 880 to 915 MHz 925 to 960 MHz E6451C range: 876 to 915 MHz 921 to 960 MHz
	Frequency accuracy	±1 ppm
	IF bandwidth	1.25 MHz, characteristic (wideband mode) 200 kHz, characteristic (narrowband mode)
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy, 1.25 MHz IF bandwidth	± 0.5 typical (-25 dBm to -100 dBm)
	Accuracy, 200 kHz IF bandwidth	± 0.5 typical (-25 dBm to -100 dBm)
	Noise figure	8 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point *	-15 dBm, characteristic
	Adjacent channel desensitization †	-25 dBm typical
	Adjacent channel rejection †	45 dB typical
Internally generated spurious, input referred	-120 dBm	
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	-40°C to +70°C
	Dimensions	6 in x 3-5/8 in x 8 in 15.24 cm x 9.21 cm x 20.32 cm
	Weight	2.1 kg (4.6 lbs)

Item	Description	Specification
	Power (options 300, 320, 340)	9 to 34 V DC, 9W
	Power (internal GPS, Option 310, 330, 350)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
Internal GPS** (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning	

* It is recommended the input signal level not exceed -25 dBm.

† Adjacent channel desensitization applies to the wideband mode (1.25 MHz IF Filter) and is defined as: 1 dB compression of tuned signal with interfering signal ± 1.25 MHz from tuned signal.

‡ Adjacent channel rejection applies to the narrowband mode (200 kHz IF filter) and is defined as: Suppression of interfering signal ± 200 kHz from tuned signal.

** Systems fitted with an internal GPS do not support connection to external GPS receivers.

E6452C CDMA/TDMA cellular band receiver specifications

Item	Description	Specification
Frequency	Frequency range	824 to 849 MHz 869 to 894 MHz
	Frequency accuracy With GPS time synchronization	±1 ppm ±0.05 ppm, characteristic
	IF bandwidth	1.25 MHz, characteristic 30 kHz, characteristic
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy, 1.25 MHz IF	±0.5 typical ±1 dB from – 40 dBm to – 100 dBm (20° to 30°C) ±2 dB from – 40 dBm to – 100 dBm (0° to 55°C)
	Accuracy, 200 kHz IF	±0.5 typical ±1.5 dB from – 40 dBm to – 100 dBm (20° to 30°C) ±2.5 dB from – 40 dBm to – 100 dBm (0° to 55°C)
	Noise figure	8.0 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point *	– 15 dBm, characteristic
	Adjacent channel desensitization †	– 25 dBm typical
	Adjacent channel rejection ‡ Internally generated spurious, input referred	45 dB typical – 120 dBm
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C

Item	Description	Specification
	Storage temperature range	– 40°C to +70°C
	Dimensions	6 in × 3-5/8 in × 8 in 15.24 cm × 9.21 cm × 20.32 cm
	Weight	4.6 lbs (2.1 kg)
	Power	9 to 34 V DC, 9W
	Power (internal GPS, option 200)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
Internal GPS** (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning	
	Note: Internal GPS is standard on all “C” receivers. It can be disabled if you wish to use an external GPS system.	

* It is recommended the input signal level not exceed – 40 dBm.

† Adjacent channel desensitization: 1 dB compression of tuned signal with interfering signal 1.25 MHz from tuned signal.

‡ Adjacent channel rejection applies to the narrowband mode (30 kHz IF filter) and is defined as: Suppression of interfering signal ± 30 kHz from tuned signal for 30 kHz.

** Receivers (with the exception of “C” receivers) fitted with an internal GPS do not support connection to external GPS receivers.

E6452A Option 002/E6457C Japan cellular band receiver specifications

Item	Description	Specification
Frequency	Frequency range	832 to 870 MHz 887 to 925 MHz
	Frequency accuracy <i>With GPS time synchronization</i>	±1 ppm ±0.05 ppm, characteristic
	IF bandwidth	1.25 MHz, characteristic 30 kHz, characteristic
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy, 1.25 MHz IF	±1 dB from – 40 dBm to – 100 dBm (20° to 30°C) ±2 dB from – 50 dBm to – 100 dBm (0° to 55°C) ±3 dB from – 40 dBm to – 50 dBm (0° to 55°C)
	Accuracy, 30 kHz IF	±1.5 dB from – 40 dBm to – 100 dBm (20° to 30°C) ±2.5 dB from – 40 dBm to – 100 dBm (0° to 55°C)
	Noise figure	8.0 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point *	– 15 dBm, characteristic
	Adjacent channel desensitization † Adjacent channel rejection ‡ Internally generated spurious, input referred	– 25 dBm typical 45 dB typical – 120 dBm
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	– 40°C to +70°C

Item	Description	Specification
	Dimensions	6 in × 3-5/8 in × 8 in 15.24 cm × 9.21 cm × 20.32 cm
	Weight	4.6 lbs (2.1 kg)
	Power	9 to 34 V DC, 9W
	Power (internal GPS, option 200)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
Internal GPS** (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning	
	Note: Internal GPS is standard on all "C" receivers. It can be disabled if you wish to use an external GPS system.	

* It is recommended the input signal level not exceed – 40 dBm.

† Adjacent channel desensitization: 1 dB compression of tuned signal with interfering signal 1.25 MHz from tuned signal.

‡ Adjacent channel rejection applies to the narrowband mode (30 kHz IF filter) and is defined as: Suppression of interfering signal \pm 30 kHz from tuned signal for 30 kHz.

** Receivers (with the exception of "C" receivers) fitted with an internal GPS do not support connection to external GPS receivers.

E6453C GSM1800 and Korean CDMA band receiver specifications

Item	Description	Specification
Frequency	Frequency range	1710 to 1785 MHz 1805 to 1880 MHz
	Frequency accuracy	±1 ppm
	With GPS time synchronization	±.05 ppm characteristic
	IF bandwidth	1.25 MHz, characteristic (wideband mode) 200 kHz, characteristic (narrowband mode)
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy, 1.25 MHz IF bandwidth	±0.5 typical (-25 dBm to -100dBm)
	Accuracy, 200 kHz IF bandwidth	±0.5 typical (-25 dBm to -100 dBm)
	Noise figure	8 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point *	- 15 dBm, characteristic
	Adjacent channel desensitization †	- 25 dBm typical
	Adjacent channel rejection Internally generated spurious, input referred	45 dB typical - 120 dBm
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	- 40°C to +70°C
	Dimensions	6 in x 3-5/8 in x 8 in 15.24 cm x 9.21 cm x 20.32 cm

Item	Description	Specification
	Weight	2.1 kg (4.6 lbs)
	Power	9 to 34 V DC, 9W
	Power (internal GPS, Option 200)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
Internal GPS[†] (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning Note: Internal GPS is standard on all "C" receivers. It can be disabled if you wish to use an external GPS system.	

* It is recommended the input signal level not exceed – 25 dBm.

† Adjacent channel desensitization applies to the wideband mode (1.25 MHz IF Filter) and is defined as: 1 dB compression of tuned signal with interfering signal ± 1.25 MHz from tuned signal.

‡ Receivers (with the exception of "C" receivers) fitted with an internal GPS do not support connection to external GPS receivers.

E6454C 1.9 GHz CDMA/GSM1900 receiver specifications

Item	Description	Specification
Frequency	Frequency range	1850 to 1910 MHz 1930 to 1990 MHz
	Frequency accuracy	±1 ppm
	With GPS time synchronization	±.05 ppm characteristic
	IF bandwidth	1.25 MHz, characteristic (wideband mode) 200 kHz, characteristic (narrowband mode)
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy, 1.25 MHz IF bandwidth	±0.5 typical (-25 dBm to -100dBm)
	Accuracy, 200 kHz IF bandwidth	±0.5 typical (-25 dBm to -100 dBm)
	Noise figure	8 dB typical
	<i>Maximum safe input level</i>	<i>+10 dBm, 20V DC, characteristic</i>
	<i>1 dB compression point</i> *	<i>- 15 dBm, characteristic</i>
	Adjacent channel desensitization [†]	- 25 dBm typical
Adjacent channel rejection	45 dB typical	
Internally generated spurious, input referred	- 120 dBm	
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	- 40°C to +70°C
	Dimensions	6 in x 3-5/8 in x 8 in 15.24 cm x 9.21 cm x 20.32 cm
	Weight	2.1 kg (4.6 lbs)

Item	Description	Specification
	Power	9 to 34 V DC, 9W
	Power (internal GPS, Option 200)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
Internal GPS[†] (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning	
	Note: Internal GPS is standard on all "C" receivers. It can be disabled if you wish to use an external GPS system.	

* It is recommended the input signal level not exceed – 25 dBm.

† Adjacent channel desensitization applies to the wideband mode (1.25 MHz IF Filter) and is defined as: 1 dB compression of tuned signal with interfering signal ± 1.25 MHz from tuned signal.

‡ Receivers (with the exception of "C" receivers) fitted with an internal GPS do not support connection to external GPS receivers.

E6455C 2.1 GHz W-CDMA/UMTS/cdma2000 receiver specifications

Item	Description	Specification
Frequency	Frequency range	1920 to 1980 MHz [1895-1990] 2110 to 2170 MHz [2100-2180]
	Frequency accuracy With GPS time synchronization	±1 ppm ±0.05 ppm, characteristic
	IF bandwidth	1.25 MHz, characteristic 5 MHz, characteristic
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy 1.25 MHz IF	± 0.5 dB typical from – 25 dBm to – 110 dBm (20° to 30°C)
	Accuracy, 5 MHz IF	±0.5 dB typical from – 25 dBm to – 100 dBm (20° to 30°C)
	Noise figure	8.0 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point [*]	– 15 dBm, characteristic
	Adjacent channel desensitization [†] Adjacent channel rejection [‡] Internally generated spurious, input referred	– 20 dBm typical 25 dB typical – 120 dBm for 1.25 MHz -115 dBm for 5 MHz
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	– 40°C to +70°C
	Dimensions	6 in x 3-5/8 in x 8 in 15.24 cm x 9.21 cm x 20.32 cm

Item	Description	Specification
	Weight	4.6 lbs (2.1 kg)
	Power	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
	Support for Pulse triggering measurements	
Internal GPS	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning	
	Note: The internal GPS can be disabled if you wish to connect an external GPS system.	

* It is recommended the input signal level not exceed – 40 dBm.

† Adjacent channel desensitization applies to wideband mode (5 MHz IF filter) and is defined as: 1 dB compression of tuned signal with interfering signal 5 MHz from tuned signal.

‡ Adjacent channel rejection applies to the narrowband mode (1.25 MHz IF filter) and is defined as: Suppression of interfering signal \pm 1.25 MHz from tuned signal.

E6456C 1.9 GHz W-CDMA/UMTS/cdma2000 receiver specifications

Item	Description	Specification
Frequency	Frequency range	1850 to 1910 MHz 1930 to 1990 MHz
	Frequency accuracy With GPS time synchronization	±1 ppm ±0.05 ppm, characteristic
	IF bandwidth	1.25 MHz, characteristic 5 MHz, characteristic
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy 1.25 MHz IF	± 0.5 dB typical from – 25 dBm to – 110 dBm (20° to 30°C)
	Accuracy, 5 MHz IF	±0.5 dB typical from – 25 dBm to – 100 dBm (20° to 30°C)
	Noise figure	8.0 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point *	– 15 dBm, characteristic
	Adjacent channel desensitization † Adjacent channel rejection ‡ Internally generated spurious, input referred	– 20 dBm typical 25 dB typical – 120 dBm for 1.25 MHz -115 dBm for 5 MHz
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	– 40°C to +70°C
	Dimensions	6 in x 3-5/8 in x 8 in 15.24 cm x 9.21 cm x 20.32 cm
	Weight	4.6 lbs (2.1 kg)

Item	Description	Specification
	Power	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
	Support for Pulse triggering measurements	
Internal GPS	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning	
	Note: The internal GPS can be disabled if you wish to connect an external GPS system.	

* ¹It is recommended the input signal level not exceed – 40 dBm.

† Adjacent channel desensitization applies to wideband mode (5 MHz IF filter) and is defined as: 1 dB compression of tuned signal with interfering signal 5 MHz from tuned signal.

‡ Adjacent channel rejection applies to the narrowband mode (1.25 MHz IF filter) and is defined as: Suppression of interfering signal ± 1.25 MHz from tuned signal.

E6458C GSM 850 receiver specifications

Item	Description	Specification
Frequency	Frequency range	824 to 849MHz 869to 894MHz
	Frequency accuracy With GPS time synchronization	±1 ppm ±0.05 ppm, characteristic
	IF bandwidth	1.25 MHz, characteristic 200 kHz, characteristic
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy, 1.25 MHz IF	±0.5 typical ±1 dB from – 40 dBm to – 100 dBm (20° to 30°C) ±2 dB from – 40 dBm to – 100 dBm (0° to 55°C)
	Accuracy, 200 kHz IF	±0.5 typical ±1.5 dB from – 40 dBm to – 100 dBm (20° to 30°C) ±2.5 dB from – 40 dBm to – 100 dBm (0° to 55°C)
	Noise figure	8.0 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point *	– 15 dBm, characteristic
	Adjacent channel desensitization † Adjacent channel rejection ‡ Internally generated spurious, input referred	– 25 dBm typical 45 dB typical – 120 dBm
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C

Item	Description	Specification
	Storage temperature range	– 40°C to +70°C
	Dimensions	6 in × 3-5/8 in × 8 in 15.24 cm × 9.21 cm × 20.32 cm
	Weight	4.6 lbs (2.1 kg)
	Power	9 to 34 V DC, 9W
	Power (internal GPS, option 200)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
Internal GPS** (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning	
	Note: Internal GPS is standard on all “C” receivers. It can be disabled if you wish to use an external GPS system.	

* It is recommended the input signal level not exceed – 40 dBm.

† Adjacent channel desensitization: 1 dB compression of tuned signal with interfering signal 1.25 MHz from tuned signal.

‡ Adjacent channel rejection applies to the narrowband mode (200 kHz IF filter) and is defined as: Suppression of interfering signal ± 200 kHz from tuned signal for 200 kHz.

** Receivers (with the exception of “C” receivers) fitted with an internal GPS do not support connection to external GPS receivers.

E7456C iDEN/CDMA RF receiver specifications

Item	Description	Specification
Frequency	Forward Channel frequency range	851 to 870 MHz 935 to 940 MHz
	Frequency accuracy With GPS time synchronization	±1 ppm ±0.05 ppm, characteristic
	IF bandwidth	30 kHz, characteristic 1.25 MHz, characteristic
	Aging of TCXO	±1 ppm/year
Amplitude	Accuracy, 30 kHz IF	±1dB from -40 dBm to -100 dBm (20° to 30°C) ±2 dB from -50 dBm to - 100 dBm (0° to 55°C) ±3 dB from -40 dBm to - 100 dBm (0° to 55°C)
	Noise figure	8.0 dB typical
	1 dB compression point *	- 15 dBm, characteristic
	Adjacent channel desensitization †	- 25 dBm typical
	Adjacent channel rejection ‡ Internally generated spurious, input referred	45 dB typical - 120 dBm
Input/Output	RF input	50Ω Type-N
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Internal GPS receiver	8 channel
	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	- 40°C to +70°C
	Dimensions	6 in × 3-5/8 in × 8 in 15.24 cm x 9.21 cm x 20.32 cm

Item	Description	Specification
	Weight	4.6 lbs (2.1 kg)
	Power	9 to 34 V DC, 9W
	Power (internal GPS, option 200)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
Internal GPS** (Option 200)	GPS Receiver	8 Channel internal GPS receiver
	Connector type	SMA
	Differential compatible without dead reckoning Note: Internal GPS is standard on all "C" receivers. It can be disabled if you wish to use an external GPS system.	

* It is recommended the input signal level not exceed – 40 dBm.

† Adjacent channel desensitization: 1 dB compression of tuned signal with interfering signal 1.25 MHz from tuned signal.

‡ Adjacent channel rejection applies to the narrowband mode (200 kHz IF filter) and is defined as: Suppression of interfering signal \pm 200 kHz from tuned signal for 200 kHz.

** Receivers (with the exception of "C" receivers) fitted with an internal GPS do not support connection to external GPS receivers.

Phone Support

A list of supported phones is supplied with the Agilent E6474A software. This list can be found in the library.

To view a list of supported phones:

- 1 Open the Agilent E6474A application software.
- 2 Select **Help > Library** or **Start > Programs > Agilent Wireless Solutions > E6474A > Reference > Library**.
- 3 Select the “Supported phones and cables list” link.

Options and Part Numbers

Cable part numbers

Part Number	Description
E6473-60206	Direct Connect Hub power cable, permanent mount
E6473-60004	Direct Connect Hub power cable with lighter plug
E6473-60005	Direct Connect Hub to computer USB data cable, 3 feet (.914 m)
E6473-60006	Direct Connect Hub to E645xx Receiver data/power cable
E6473-60010	Direct Connect Hub to computer USB data cable, 15 feet (4.57 m)
E6473-60015	9 to 26 pin converter - adapts standard phone cable to computer Serial port
E6473-60042	Phone extender cable, 15 feet (4.57 m)

E6473B phone interface cable options

Option	Description
E6473B #801	CDMA - Qualcomm QCP 820/1920/2700 CDMA IS-95 Phone Cable Kit
E6473B #802	CDMA - Qualcomm QCP860/1960/2760 CDMA IS-95 Phone Cable Kit
E6473B #803	CDMA - QCP860/1960/2760 cable kit with RF
E6473B #805	CDMA/cdma2000 - Kyocera Voice-Only Phones Int. Cable (Kyocera 2035/2135/3035/2235/2255/2325/2345/5472)
E6473B #810	cdma2000 - Kyocera 2235 data and trace phone cable kit with RF
E6473B #811	cdma2000 - Kyocera 2255 data and trace phone cable kit with RF

E6473B #812	cdma2000 - Kyocera 2235/2255/2325/2345 data and trace phone cable kit
E6473B #816	cdma2000 - Samsung A500 phone cable kit
E6473B #817	cdma2000 - Samsung N181/N370 phone cable kit
E6473B #825	GSM/GPRS - OT-96M/OT 190/OT 199 Voice & data phone cable
E6473B #827	GSM - Sagem OT-76M/OT-96M/OT-160/OT-169 voice only phone cable
E6473B #830	TDMA - Nokia 6120(i)/6160(i) Phone Interface Cable
E6473B #840	CDMA - Sanyo SCP-4500 phone interface cable
E6473B #850	GAIT - Nokia 6340(i) phone interface cable
E6473B #860	iDEN - Motorola i1000+ /i2000+ phone interface cable kit
E6473B #865	iDEN - Motorola i85s and i90c voice and data phone cable kit
E6473B #871	KCDMA - Samsung SCH-X120/SPH-X1200 phone phone cable kit

Antenna kit part numbers

These kits include an antenna clip.

Part Number	Description
E7484-60029	800 MHz for CDMA, iDEN
E7484-60027	1800 MHz GSM
E7484-60028	1900 MHz for CDMA, GSM
E7484-60026	900 MHz GSM

All cables are labeled to indicate whether the cable is for voice only or for voice and data. The labels also reflect both part number and Agilent option number.

Agilent receivers

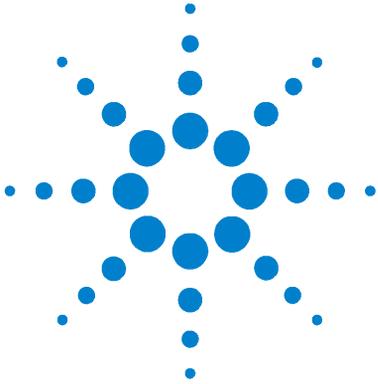
Part Number	Description	Available Options
E6450C	PCS CDMA/TDMA receiver, 1.9GHz	
E6451C	GSM receiver, 900 MHz	
E6452C	Cellular CDMA/TDMA receiver, 850 MHz	
E6457C	Cellular CDMA/TDMA receiver, 800 MHz, Japan cellular band	
E6453C	GSM/Korean band CDMA receiver, 1.8GHz	
E6454C	PCS CDMA/GSM receiver, 1.9GHz	
E6455C	IMT-2000 band W-CDMA (UMTS) / CDMA receiver, 2.1 GHz (with GPS)	
E6456C	W-CDMA/UMTS/cdma2000, 1.9 GHz (with GPS)	
E6458C	GSM850 Receiver (with GPS)	

Hardware included with E6474A software licenses

E6473B hardware options are typically ordered with Agilent E6474A system. E6474A software option licenses include the following hardware items:

Component	Part Number	Description
Software license key for Parallel port	E6474-10002	Can be programmed with the E6474A software options that you have ordered using the License Manager software. Plugs into the computer's Parallel port.
Software license key for USB port	E6474-10003	Contains the E6474A software options that you have ordered. Plugs into the computer's USB port.
Dual serial port PCMCIA card	1150-2067	Plugs into the computer's PCMCIA card slot. Used if a device is connected directly to the computer.

C System Information



D Permanent In-Vehicle Hardware Installation

WARNING

Before installing this product, check your vehicle warranty for any special instructions regarding the installation of third party products. Agilent assumes no responsibility for any vehicle warranty issues arising out of the installation or use of this product.

It is recommended that any vehicle installation should be done by a qualified vehicle mechanic and electrician.

To install this	See this
Direct connect hub	"Direct Connect Hub Installation" on page 174
Antenna	"Antenna Installation" on page 175
Computer mount	"Computer mount installation" on page 176
Cables	"Cable Installation" on page 177



Installation Guidelines

Use the following guidelines for installing the system hardware.

- The dimensions of the in-vehicle rack with the navigator installed are approximately:
 - Width: 11 inches / 280 mm
 - Depth: 10.5 inches / 265 mm (allow an additional 3 inches / 76 mm for handles)
 - Height (with E746xx): 6.5 inches / 164 mm
- Because every installation has different requirements, the installer must select the appropriate mounting hardware.
- If you are using a permanently installed antenna, follow the antenna manufacturer's installation instructions. Antennas should be spaced at least 18" apart to avoid interference.

WARNING

Choose suitable locations for the navigator and E6473B, the phones, the speakers, and the computer, that will not interfere with the operation of the vehicle, but will allow access to the cable connectors. If the system includes an E645xx receiver, allow room for its mounting plate.

Observe local regulations and restrictions when installing the equipment and making electrical connections to the vehicle.

Use caution when drilling holes and working around critical areas, such as the fuel tank, fuel lines, battery, engine compartment, electrical harnesses, fuse block, and the exhaust system.

Disconnect the battery before making permanent connections to the electrical system.

CAUTION

Secure all components to prevent movement while the vehicle is in motion.

When routing cables leave sufficient length on both ends for making connections. Avoid sharp metal edges, sharp bends, and crushing the cables. Use a rubber grommet if the cable is routed through a hole in a metal panel. Do not route a cable near the catalytic converter. Use wiring troughs when they are available.

Direct Connect Hub Installation

Use the following guidelines for installing the E6473B hub in your vehicle:

Choose a suitable location for the in-vehicle chassis - you must have access to the front and back of the unit.

The location must be flat and capable of taking the four locating screws/bolts (refer to [Figure 66](#)).

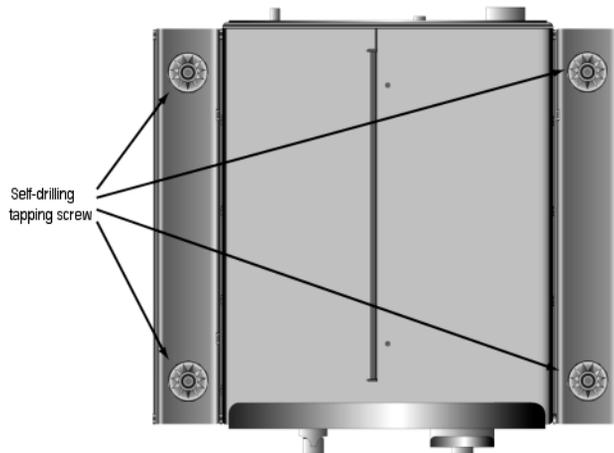


Figure 66 In-Vehicle rack for direct connect hub

Mounting the E645x receiver

Use the following guidelines for installing the Agilent E645x receiver:

- Locate a flat surface of the vehicle to which the base plate can be securely attached.
- Attach the base plate to the vehicle using the hardware provided.

Antenna Installation

Installation guidelines

- All antennas must be spaced at least 18 inches (45.7 cm) apart. Plan the layout before drilling any holes.
- A magnetic-mount antenna may be mounted on any suitable metallic surface, paying attention to the routing of the cable. However, avoid areas of high vibration. Also avoid mounting the antenna near a roof luggage rack. (The rack could block the signal.)
- For permanent-mount antennas, choose a location with access both above and below the antenna-mounting surface; this is required for installing fasteners and for routing the antenna cable.
- For permanent-mount antennas, use silicone sealant to prevent water leakage between the antenna base and the mounting surface.
- The GPS antenna must be located outside of the vehicle with a clear view of the sky.
- Choose a horizontal mounting position for the GPS antenna.

GPS antenna

You can choose between a magnetic-mount GPS antenna (E6473B option 30) or a permanent mount antenna (E6473B option 31) with the Agilent direct connect GPS/DR.

- 1** Choose a position for the antenna that is at least 18 inches (45.7 cm) away from any other antenna.
- 2** Route the antenna cable through the vehicle to the GPS unit.
- 3** Secure the permanent-mount antenna to the surface with the TNC connector of the antenna cable.

Cellular antennas

Your system may include magnetic-mount or permanent mount antennas, depending on the order.

- 1 Identify the antennas.
- 2 Install permanent-mount antennas according to the antenna manufacturer's instructions.
- 3 Route the antenna cables through the vehicle to the area where the system is installed.
- 4 If equipped, attach the antenna adapters to the antenna cable, then connect the adapter to the phone. See [Table 1](#) on page 39 for adapter part numbers.

Computer mount installation

If your system includes a computer mounting kit, follow the installation instructions packaged with it. Refer to the computer manufacturer's documentation to identify the computer connectors.

- 1 Install the computer mounting kit.
- 2 Attach the computer to the mounting bracket.
- 3 Connect the USB data cable to the USB port of the computer.
- 4 Connect the power cable to the computer.
- 5 Connect the opposite end of the power cable to the lighter socket.

Cable Installation

Phone extender cables

Route the extender cables (E6473-60042) from the vehicle interior to the location where the Direct Connect Hub is installed, then follow the phone cable connection instructions in [Chapter 3](#).

USB data cable

Route the USB data cable (E6473-60010) from the vehicle interior to the location where the Direct Connect Hub is installed, then follow the USB cable connection instructions in [Chapter 3](#). If your system includes two Direct Connect Hub units, see [Chapter 3](#).

Main power cable

A permanent install cable (E6473-60206) is included. The following installation instructions are for the permanent install power cable.

WARNING

It is recommended that you disconnect the vehicle's battery before making any connections to the vehicle power.

This task should be done by a qualified vehicle electrician.

The leads for this cable are color-coded as follows:

- The red lead is power (+)
- The black lead is ground (-)
- The white lead is ignition sense

Power cable connections to the vehicle

- 1 Attach the ring terminal of the black lead to chassis ground using the appropriate hardware.
- 2 Ensure that a good mechanical and electrical connection has been made to the chassis, then coat the connection with anti-corrosive spray.
- 3 Connect the red lead to the battery positive (+) terminal.
- 4 Connect the ignition sense lead as described below.
- 5 When installation is complete, secure any loose wires.
- 6 Route the cable through the vehicle to where the E6473B is installed.

Ignition sense lead

Connect the ignition sense lead of the power cable to a source that measures +12 volts only when the ignition switch is on, using one of the following methods:

- Connect it to the radio side of the radio fuse.
- Connect it to a 12 volt power lead that is switched on and off by the ignition switch.

NOTE

Direct Connect Hub: If you do not connect the ignition sense lead of the power cable for the hub, the unit can only be powered on and off via its front panel switch.

The ignition sense wire color code is specified under "[Main power cable](#)" on page 177.

Connecting the ignition sense lead to the fuse block

Because each vehicle is different, you must determine the best method for attaching the lead to the fuse block. Agilent recommends that you crimp a quick-disconnect terminal onto the lead, then plug the terminal into the fuse block.

Connecting the ignition sense lead to a switched 12 Volt lead

Locate a switched 12 Volt connection. Refer to the vehicle wiring diagrams to find the appropriate location.

Speed Pulse Cable

This cable is only included if you have ordered the Agilent direct connect GPS DR with mag mount antenna (E6473B option 030) or with permanent mount antenna (E6473B option 031). The GPS DR requires the Speed Pulse cable (E6473-60207), which is connected to the vehicle's digital odometer or speed pulse lead.

NOTE

The odometer pulse lead typically originates from the computer module (PCM) in the engine compartment. Contact your vehicle supplier for assistance in locating the correct lead in your vehicle.

D Permanent In-Vehicle Hardware Installation

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