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Getting Started Guide



Agilent Technologies
E6473A Network Optimization Solution - Options

Agilent Technologies

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Table of Contents

1 — Getting Started 1

Overview 1
E6473A Direct Connect Hub 1
E6473A System Description 1
About This Guide 2
If You Need Help 2
Computer Requirements 3
Recommended Computers 3
Dual Serial Port PCMCIA Card 3
Installing the Edgeport USB Software 4
Installing the Edgeport Drivers 4
Creating an Edgeport Shortcut 4
Testing the USB Configuration 4
Additional Edgeport Information 4
Installing the Data Collection Software 5
License Manager 5
The Next Step 5

2 — Upgrading an E747xx System 7

Overview 7
Software License Key 7
Removing the Old Components 8
Portable System 8
In-vehicle System 8
Installing the New Components 10
Portable Single Receiver System 10
Portable Dual Receiver System 12
In-vehicle Single Receiver System 14
In-vehicle Dual Receiver System 16
Cascaded Systems 18
Phone Connections 18
The Next Step 18

3 — Upgrading a Walkabout System 19

Overview 19
Removing the Old Components 19
Portable System 19
In-vehicle System 19
Retrofitting the Scanner 20
Scanner Pre-assembly 20
Final Assembly 21
Software License Key 21
Installing the New Components 22
Portable System 22
In-vehicle System 24

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In-vehicle System with Navigator Plus 26
Cascaded Systems 28
Phone Connections 28
The Next Step 28

4 — New Portable System Setup 29

Overview 29
Phone and Receiver Options 29
Software License Key 29
Dual Serial Port PCMCIA Card 29
Single E746xx Scanner or Phone Only System 30
Single E645xx Receiver System 33
Dual E645xx Receiver System 36
Using the Dual Receiver Backpack 40
Phone Connections 44
The Next Step 44

5 — New In-vehicle System Installation 45

Overview 45
Phone and Receiver Options 45
Navigation Options 45
Software License Key 45
Dual Serial Port PCMCIA Card 45
Installation Guidelines 46
Recommended Tools 46
Direct Connect Hub Installation 47
Base Plate Installation 47
Mounting the Hub and E746xx Scanner 47
Mounting the E645xx Receiver 48
86156A GPS/DR Navigator Installation 49
Base Plate Installation 50
Attaching the Navigator Side Brackets 51
Mounting the Navigator 51
Mounting the Hub and Scanner or Receiver 52
Antenna Installation 53
Installation Guidelines 53
GPS Antenna 53
Cellular Antennas 53
Computer Mount Installation 54
Cable Installation 55
Phone Extender Cables 55
USB Data Cable 55
Main Power Cable 55
Speed Pulse Cable 58
Cable Connections 59
Direct Connect Hub with Scanner 59
Direct Connect Hub with Scanner and GPS/DR Navigator 61
Direct Connect Hub with Receivers 63
Direct Connect Hub with Receivers and GPS/DR Navigator 65
Cascaded Systems 67
Phone Connections 67

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The Next Step 67

6 — Operation 69

Overview 69
Battery Charging 69
Portable System Power-up 69
In-vehicle System Power-up 69
E6473A Direct Connect Hub 69
86156A GPS/DR Navigator 70
Toshiba Phone Power-up 70
Toshiba 10-CT 70
Toshiba C-103T 70
Toshiba 301T 71
iDEN® i1000 Plus Baud Rate 71
86156A GPS/DR Navigator 72
LEDs and Display During Power-up 72
LEDs and Display During Normal Operation 72
Error Indications 73
Sensor Calibration 74
Cable Connections for Calibration 74
Starting PLCRINIT 74
The Next Step 74

7 — Battery Use and Care 75

Checking the Remaining Charge 75
Charging the Battery 75
Safe Handling and Disposal 76
Battery Specifications 77
Charger Specifications 77

8 — Support, Warranty and Returns 79

Technical Telephone Assistance 79
Numbers to Call 79
Returning the System for Service 79
Warranty 79
Preparing the System for Shipping 80

9 — Safety and Regulatory Information 83

Warning and Caution Notices 83
General Safety Considerations 83
Installation, Use, and Storage 83
Signal and Input Power 84
Symbols 84
Declaration of Conformity 85

10 — Specifications 87

E6473 Direct Connect Hub 87

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

E645xx Receiver 87
Specifications 87
Product Numbers 87
E746xx Scanner 88
Specifications 88
Product Numbers 88
86156A GPS/DR Navigator 88

11 — Quick Reference Guide 89

Connector Panels 89
E6473A Direct Connect Hub 89
E645xx Receiver 91
E746xx Scanner 92
86156A GPS/DR Navigation 93
Cable Part Numbers 94
Receivers and Scanners 94
Hardware Included with Software Licenses 95
Option Descriptions 95
Option 010: In-vehicle (Drive Test) Direct Connect Hub 95
Option 020: Portable Direct Connect Hub Kit 96
Option 040: Single Receiver Carry Case 96
Option 041: Dual Receiver Carry Case 96
Option 090: CDMA Walkabout Conversion Kit 96
Option 091: GSM Walkabout Conversion Kit 97
Option 094: iDEN® Walkabout Conversion Kit 97
Option 801: CDMA 820/1920/2700 Phone Interface Cable Kit 97
Option 802: CDMA 860/1960/2760 Phone Interface Cable Kit 97
Option 820: GSM Phone Interface Cable Kit 98
Option 821: GSM Phone Interface Cable Kit 98
Option 860: iDEN® i1000 Phone Interface Cable Kit 98
Option 899: Phone Antenna Cable Kit 98

Index 99

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1 — Getting Started

Overview

This chapter contains the following:

- E6473A Direct Connect Hub
- System Description
- About this Guide (chapter summaries)
- If You Need Help
- Computer Requirements
- Identifying the components
- Installing the Edgeport USB software
- Installing the data collection software

E6473A Direct Connect Hub

The E6473A Direct Connect Hub expands the serial communication capabilities of the computer. The computer and Hub communicate via the Universal Serial Bus. The Hub converts the USB to four serial (COM) ports, that are in turn connected to the devices. To the E6474A data collection software, the devices appear to be directly connected to four serial (COM) ports of the computer.

Up to two phones and two E645xx receivers, or two phones and one E746xx scanner 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.

The Hub is technology independent. The combination of a software license key and phone interface cable determine what E6474A software features are available.

E6473A System Description

Agilent's Network Optimization Drive Test system enables service providers and equipment manufacturers to turn-up new networks and optimize and maintain existing networks faster while minimizing the time required to do so by providing key contributions such as:

- A network-independent receiver that provides network independent measurements.
- Software alarms to detect real time problems.
- Scalable architecture to add more receivers, phones and features to protect the customer's investment.
- Integration of phone and receiver to tell what the problem is and why it happened
- Cross-technology capability allows current 2G operators to migrate to 3G technology without having to purchase entirely new optimization tools

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About This Guide

This guide contains installation and operating instructions for the E6473A Direct Connect Hub and the 86156A GPS/DR Navigation unit. The software is compatible with Windows 95 (for direct connect phones only), 98, 2000, and NT 4.0. It is Year 2000 Compliant. Persons using this product should be familiar with the Windows user interface.

See this chapter	for this information
1 — Getting Started	Software installation instructions
2 — Upgrading an E747xx System	Instructions for connecting the E6473A to existing E7473A, E7474A, E7475A, E7476A, E7477A or E7490A system components
3 — Upgrading a Walkabout	Instructions for connecting the E6473A to existing WALKABOUT system components
4 — New Portable System Setup	Cable connections for the backpack version
5 — New In-vehicle System Installation	Installation instructions and cable connections for the in-vehicle (drive test) version
6 — Operation	Power up procedures, the meaning of LED indicators and messages shown on the navigator's LCD display
7 — Battery Use and Care	How to check, charge, and dispose of the battery
8 — Support, Warranty and Returns	How to contact Agilent Technologies for technical support, warranty information, and how to return a unit for servicing
9 — Safety and Regulatory Information	Explanations of Caution and Warning notices, information on equipment safety
10 — Specifications	Specifications for the system components
11 — Quick Reference Guide	Panel symbols, names, and general cable connections

If You Need Help

To Do This...	See This
Get training	Go to http://agilent.com/find/networks. Check the web site for information about training registration, software updates, phone support, FAQs, and more.
Get Online Help	After you start the software, press the F1 key in any view or dialog box to get context-sensitive Help.
Get additional information about an E645xx Receiver (for customers upgrading an E747xx system only)	Refer to the Getting Started Guide and System Information Guide that was included with your original system. These guides are also available on the CD-ROM included with your system.

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Computer Requirements

The following are the minimum computer requirements for a system equipped with the E6473A Direct Connect Hub option.

- 400 MHz Pentium processor
- 128 Megabytes of RAM
- 1 USB port (for systems equipped with the E6473A Direct Connect hub)
- 1 serial port per test mobile (for a phone connected directly to a serial port)
- 1 parallel port (for a system with a phone connected directly to a serial port, if the computer is not equipped with a USB port)
- 1 Gigabyte hard drive
- 800 x 600 display resolution

Recommended Computers

- IBM ThinkPad® T20 laptop
- Fujitsu Stylistic 3400 pen tablet

Dual Serial Port PCMCIA Card

Your system may include a Dual Serial Port PCMCIA card. It is only required for the following system configurations:

- A system with two or more phones that does not include an E6473A Direct Connect Hub. In this case, connect each phone to a Serial port of the card.
- A system equipped with a Direct Connect Hub that has more than three phones. (The Direct Connect Hub has two Phone ports, and your computer may have a Serial port that can be utilized.) In this case, connect each additional phone to a Serial port of the card.

Refer to the manufacturer's instructions if you need to install the Dual Serial Port PCMCIA card.

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Installing the Edgeport USB Software

The E6473A contains an Edgeport/4 serial converter that provides four serial ports. In order for your computer to communicate with the device, the Edgeport drivers must be installed.

Installing the Edgeport Drivers

Your computer must be running Windows 98, 2000, or NT 4.0 to use the following procedure.

1. Power up the computer. Wait for the Add New Hardware Wizard to appear.
2. Insert the Edgeport Driver disk into the floppy drive.
3. Follow the recommended on-screen instructions. The driver files will be copied into your Windows System.
4. Click the **Finish** button to complete the installation of the COM ports. When the Add New Hardware Wizard initiates its second search, it will create the new COM ports.
5. Follow the instructions on the screen. Installation is complete when no more dialogs appear.

Creating an Edgeport Shortcut

1. Open Windows Explorer, then navigate to **Windows\System**.
2. Right-click on **edgeport.exe**, then click **Create Shortcut**.
3. Drag the shortcut you have just created to the Windows desktop. Any time the system is powered on, you can double-click the Edgeport shortcut to verify the communication between the computer and the USB Serial Hub.

Testing the USB Configuration

To verify that the USB Serial Hub is working correctly, double-click on the Edgeport icon on the Windows desktop. The Edgeport Properties Dialog box should show one Edgeport/4 serial hub. If the Edgeport/4 entry is not present, disconnect the USB cable from the computer, wait two seconds, reconnect it, then display the Edgeport Properties, as described previously.

Additional Edgeport Information

- The latest drivers and software can be found at: http://www.ionetworks.com/support/epdrivers.html
- The latest Edgeport documentation can be found at: http://www.ionetworks.com/support/epdocs.html
- The latest Edgeport FAQs can be found at: http://www.ionetworks.com/support/epfaq9x.html

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Installing the Data Collection Software

If you have purchased a computer and E6474A software with your system, then the software has already been installed and tested with the system.

- If you are installing the E6474A software, refer to the Software Getting Started Guide included with the software for the for the installation procedure.
- If you are installing the software for an E74xx system, refer to the Getting Started Guide included on the software installation CD-ROM for the installation procedure.

License Manager

If you have purchased E6474A or E74xx software, a DB25 software license key is included. It contains the licenses for the software options you have purchased. When started, the software queries the key to determine which options to enable.

License Manager software is also installed when you install the software. This software allows you to perform the following functions:

- Add product options to a License Key
- Transfer licensed product options between license keys
- Transfer licenses between keys on different computer systems

For example, an initialized USB port software license key (with no options) is also included with the software. You can transfer the licensed options from the DB25 key to the USB key.

For More Information

For complete License Manager instructions, please refer to the *Welcome* topic in the online Help for the License Manager software.

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

The Next Step

- Turn to *2 — Upgrading an E747xx System* if you are upgrading an existing E747xx system with the E6473A Direct Connect Hub.
- Turn to *3 — Upgrading a Walkabout System* if you are upgrading a Walkabout system with the E6473A Direct Connect Hub.
- Turn to *4 — New Portable System Setup* if you have ordered option 020.
- Turn to *5 — New In-vehicle System Installation* if you have ordered option 010.

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2 — Upgrading an E747xx System

Overview

This chapter contains instructions for upgrading your E747xx system, which may include an E645xx receiver and a USB Converter.

The following are the highlights of the upgrade:

- The USB Converter is replaced with the E6473A Direct Connect Hub.
- The original USB data cable is replaced with a new USB data cable.
- For portable systems, the original batteries are replaced with a new lithium ion battery. The original battery charger is also replaced.
- For a phone-only portable system, a new carry-around bag replaces the original backpack. The bag contains the battery-to-Direct Connect Hub power connections.
- If option 040 has been ordered for a single receiver system, a new backpack replaces the original backpack .
- For a dual receiver system, the original backpack is reused.
- The receiver power and data cables are replaced with new cables.
- For an in-vehicle system, a mounting plate for the Direct Connect Hub and receivers is included, and the original power cable is replaced.
- Phone battery charging and audio monitoring are only available for supported phones using the new phone interface cable.
- Phones not supported by the E6473A require an adapter cable to be connected between the original phone interface cable and the Direct Connect Hub. Phone battery charging and audio monitoring are not available for unsupported phones.

Software License Key

If you have purchased E6474A or E74xx software, a DB25 software license key is included. It determines which software options are enabled. Connect it to the PARALLEL port of the computer. You can transfer the license information from it to the USB key using the License Manager software that is included with the E6474A or E74xx software. Refer to the License Manager's online Help for instructions.

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Removing the Old Components

Before disconnecting the antenna, Rx Loop and GPS cables, make a note of their current connections. Temporarily removing these cables may ease the installation of the new components.

Portable System

1. Disconnect all of the cables from the USB Converter.
2. Remove and discard the receiver power cable(s).
3. Remove and discard the cable connected to the RS-232 port of Receiver 1.
4. Remove the USB Converter from the backpack.
5. Remove and discard the original USB data cable.

In-vehicle System

1. Disconnect all of the cables from the USB Converter.
2. Remove the USB Converter.
3. Remove and discard the original USB data cable.
4. Remove and discard the receiver power cable(s).
5. If equipped, remove and discard the original in-vehicle power cable.

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Installing the New Components

See page 94 for cable part numbers.

Portable Single Receiver System

This section describes the cable connections for a system equipped with one receiver. This configuration is housed in the single receiver carry bag option 040. The carry bag contains a bracket that secures the Direct Connect Hub and the battery, and provides the power connection between them. See page 94 for cable part numbers.

Figure 1
Data and Power Connections

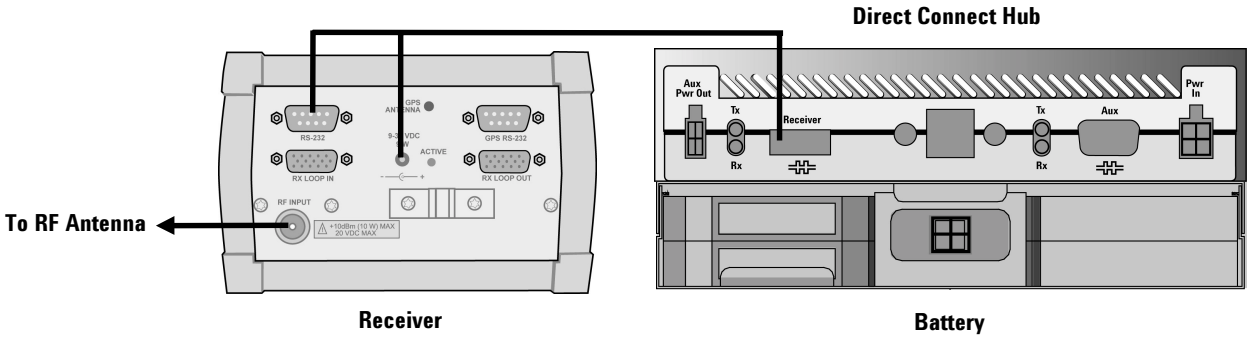
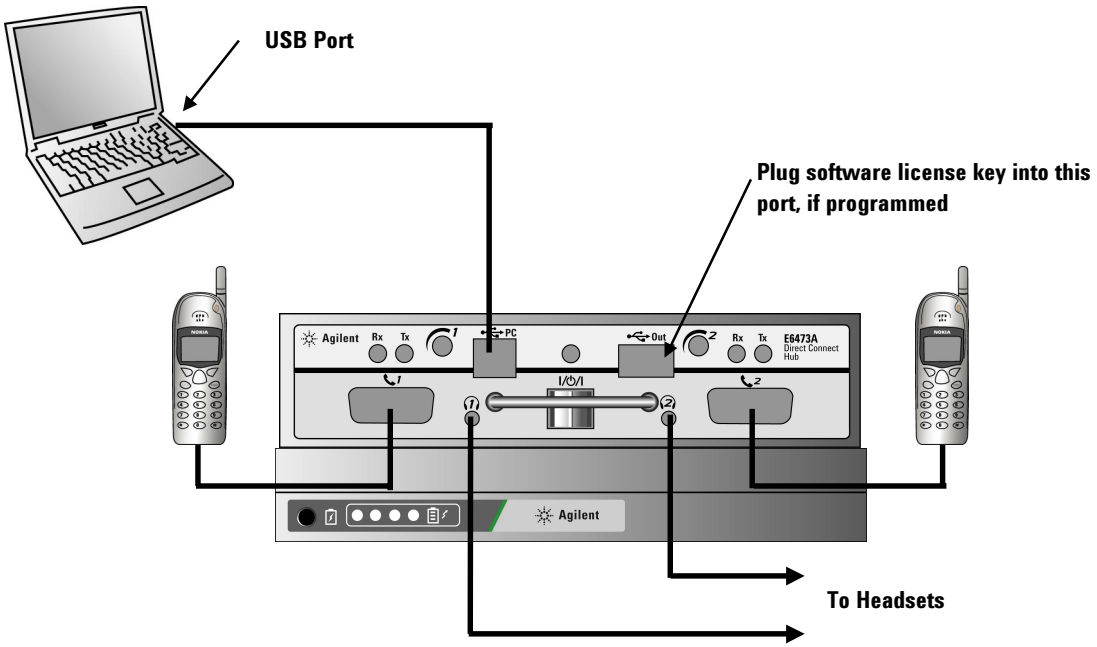


Figure 2
Peripheral Connections



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Chassis and Backpack Assembly

If you have ordered option 040, the portable system equipped with one receiver is packaged in a new style backpack. See page 34 for an illustration. Use the straps provided to secure all components within the backpack.

1. Insert the battery into the chassis, then push it rearward until it locks in place.
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 E645xx Receiver within the left side of the backpack.

E6473A Direct Connect Hub Connections

1. Open the rear cover of the pack, then connect the receiver data/power cable to the RECEIVER port on the rear panel.
2. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
3. Connect the USB data cable to the PC (USB PC) port on the front panel.
4. Connect the opposite end of the USB data cable to the USB port of the computer.
5. If equipped, connect the phones and headsets as described on page 18.

E645xx Receiver Connections

1. Connect the D-shell connector end of the receiver data/power cable to the RS-232 port.
2. Connect the power plug of the receiver data/power cable to the 9-34 VDC connector.
3. Connect the receiver antenna cable to the RF INPUT connector of the receiver.

Final Assembly

1. Route the antenna, phone, and computer cables through the openings provided.
2. Zip up all open panels.

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Portable Dual Receiver System

The following are the power and data connections for a system equipped with a second receiver. The components are housed in the original backpack. See page 38 for backpack details. See page 94 for cable part numbers.

Figure 3
Data and Power Connections

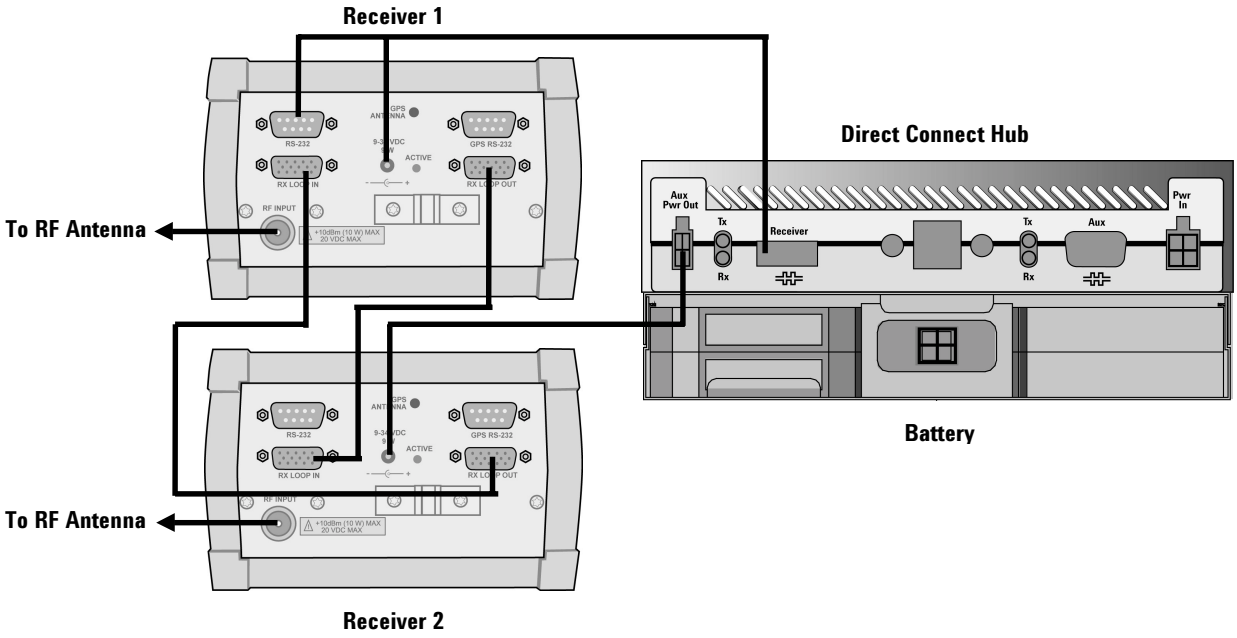
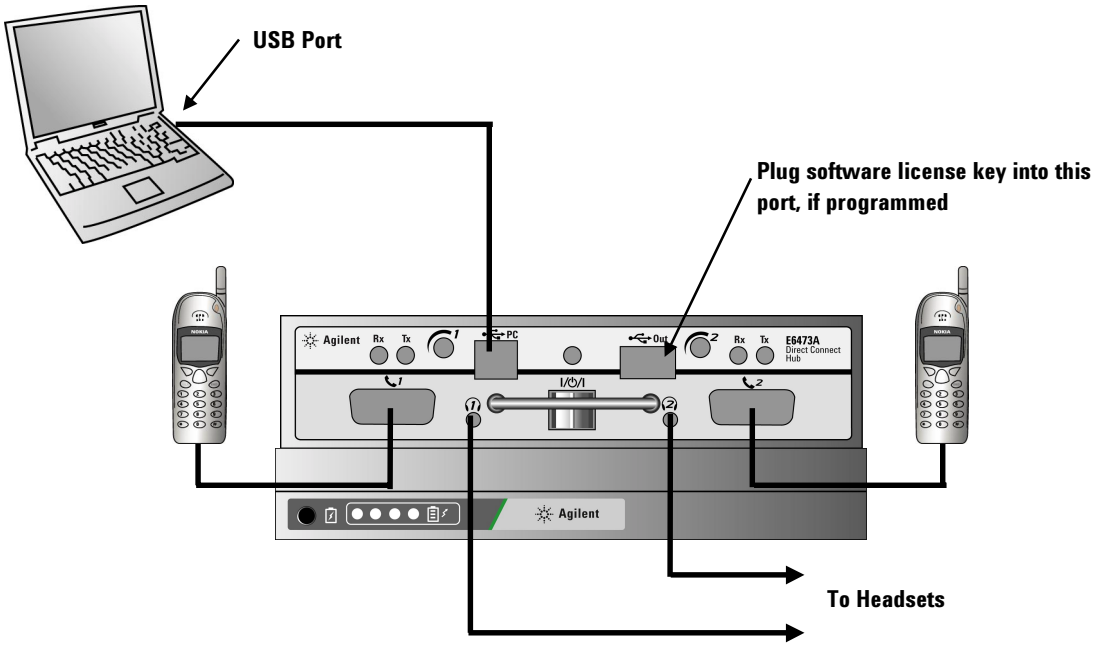


Figure 4
Peripheral Connections



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Chassis Assembly

1. Insert the battery into the chassis, then push it rearward until it locks in place.
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.

E6473A Direct Connect Hub Connections

1. Connect the data/power cable to the RECEIVER port on the rear panel.
2. Connect the power cable for the second receiver to the AUX PWR OUT connector.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
4. Connect the USB data cable to the PC (USB PC) port on the front panel.
5. Connect the opposite end of the USB data cable to the USB port of the computer.
6. If equipped, connect the phones and headsets as described on page 18.

E645xx Receiver 1 Connections

1. Connect the D-shell connector end of the receiver data/power cable 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 Receiver 1 antenna to the RF INPUT connector.

E645xx Receiver 2 and Loop Connections

1. Connect the power plug of the second receiver power cable to the 9-34 VDC connector of Receiver 2.
2. Connect one RX Loop cable to the RX LOOP IN port of Receiver 1.
3. Connect the opposite end of the cable to the RX LOOP OUT port of Receiver 2.
4. Connect the second RX Loop cable to the RX LOOP OUT port of Receiver 1.
5. Connect the opposite end of the cable to the RX LOOP IN port of Receiver 2.
6. Connect the Receiver 2 antenna to the RF INPUT connector of Receiver 2.

Dual Receiver Backpack Assembly

A portable system equipped with two receivers is packaged in the original backpack. Use the straps provided to secure the receivers within the backpack.

1. Secure the receivers and antennas inside the backpack in their original positions, if they have been removed.
2. Insert the Direct Connect Hub/battery/chassis assembly into the pocket.
3. Route the antenna, phone, receiver interconnect, and computer cables through the zipper openings.
4. Zip up all open zippers.

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In-vehicle Single Receiver System

Figure 5
Data and Power Connections

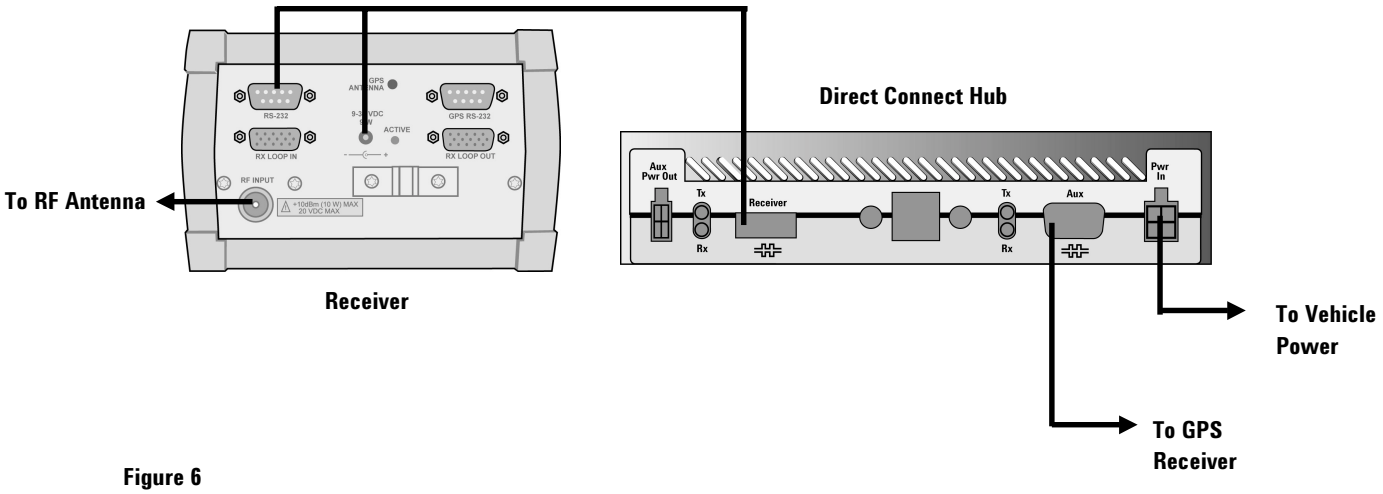
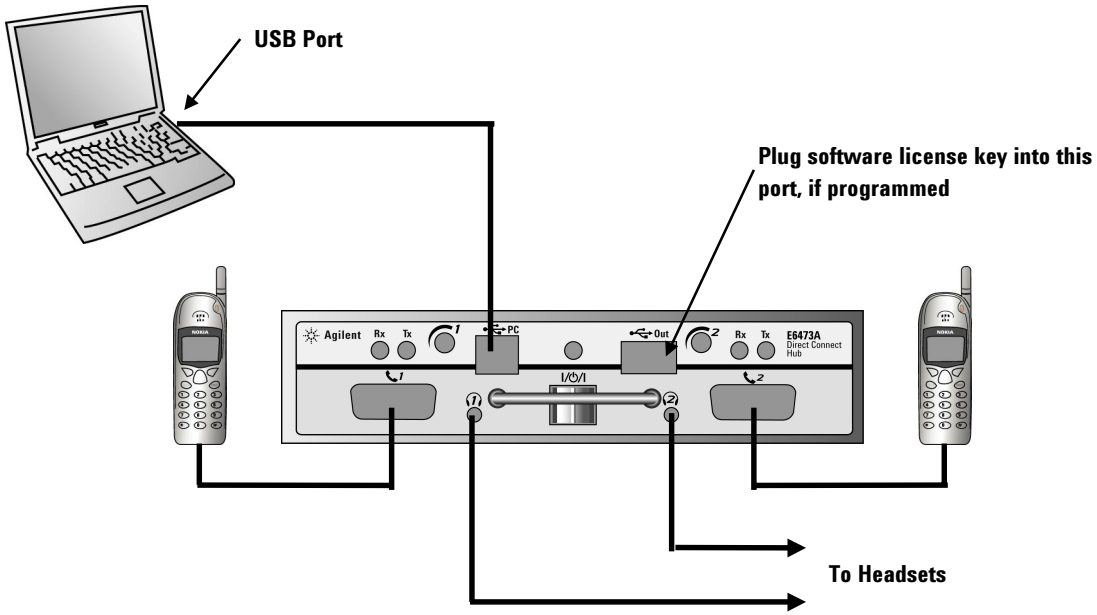


Figure 6
Peripheral Connections



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Component Installation

If you have ordered option 010, the in-vehicle mounting kit, follow the instructions in *5 — New In-vehicle System Installation* for installing the base plate (see page 47) and permanent mount power cable (see page 55). Next, attach the Direct Connect Hub and the receiver(s) to their base plates.

E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 18.

1. Connect the data/power cable to the RECEIVER port on the rear panel.
2. Connect the main power cable to the PWR IN connector on the rear panel.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
4. Connect the USB data cable to the PC (USB PC) port on the front panel.
5. If equipped, connect the phones and headsets as described on page 18.
6. If equipped, connect the GPS receiver to the AUX port on the rear panel.

E645xx Receiver Connections

1. Connect the D-shell connector end of the receiver data/power cable to the RS-232 port.
2. Connect the power plug of the receiver data/power cable to the 9-34 VDC connector.
3. Connect the receiver antenna cable to the RF INPUT connector of the receiver.
4. If equipped, reconnect the GPS antenna to the GPS ANTENNA connector.

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the vehicle's lighter socket.

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In-vehicle Dual Receiver System

See page 94 for cable part numbers.

Figure 7
Data and Power Connections

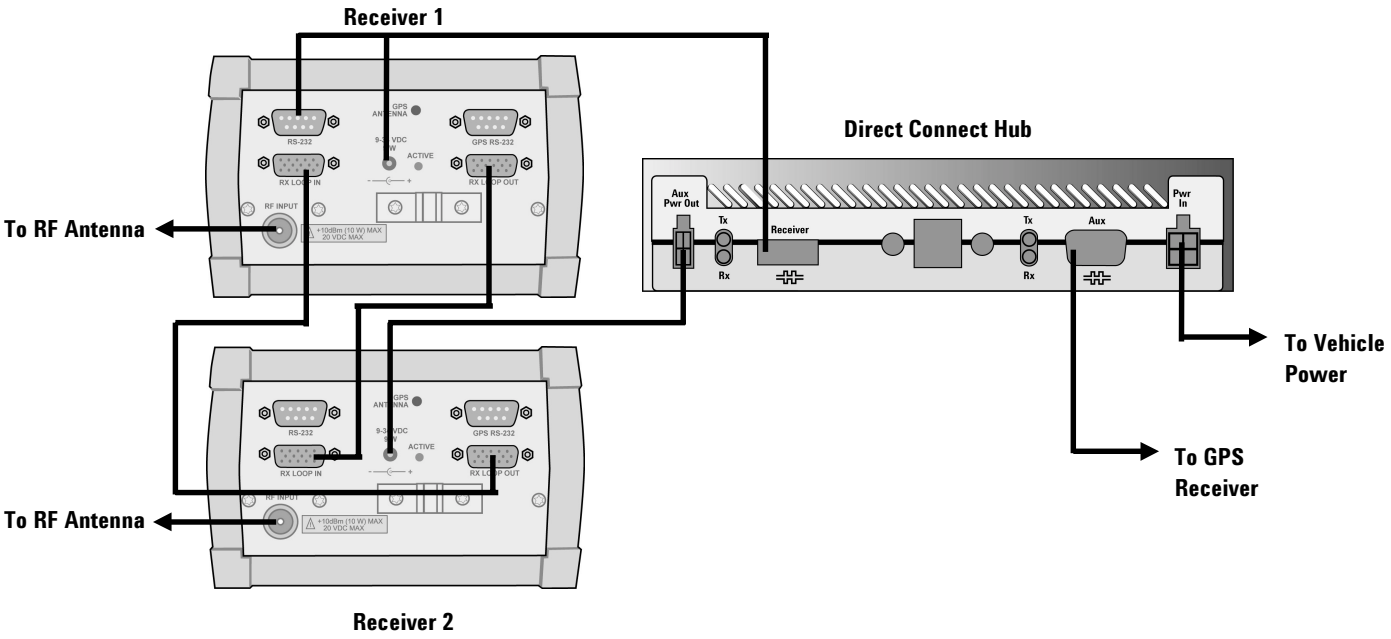
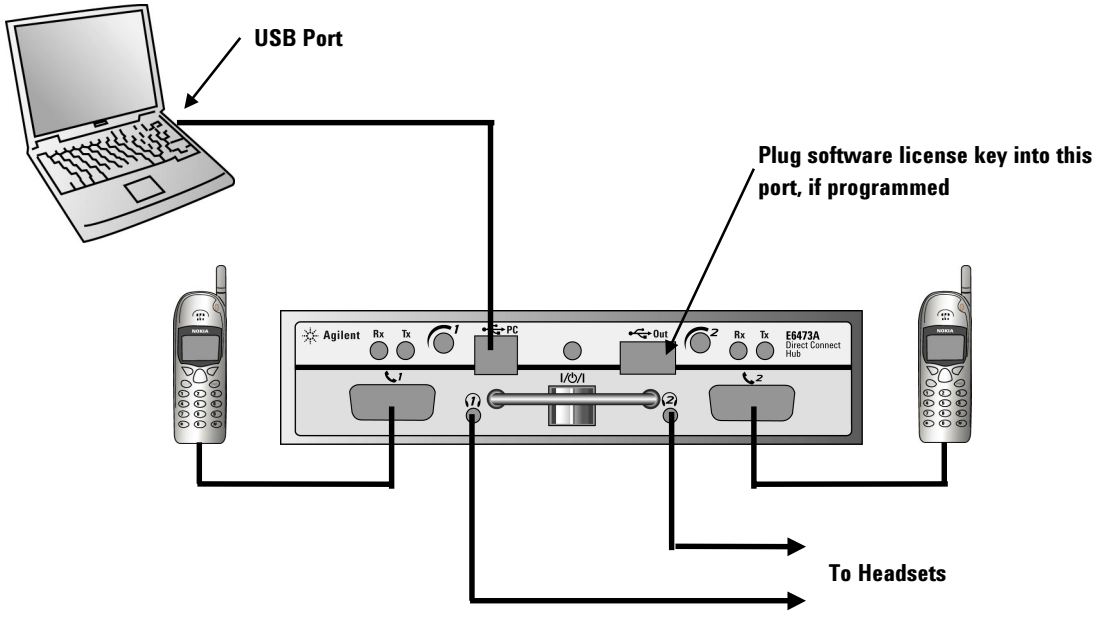


Figure 8
Peripheral Connections



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Component Installation

If you have ordered the in-vehicle mounting kit (option 010), follow the instructions in *5 – New In-vehicle System Installation* for installing the base plate (see page 47) and permanent mount power cable (see page 55). Next, attach the E6473A and the receiver(s) to their base plate.

E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 18.

1. Connect the data/power cable to the RECEIVER port on the rear panel.
2. Connect the main power cable to the PWR IN connector on the rear panel.
3. Connect the power cable for the second receiver to the AUX PWR OUT connector on the rear panel.
4. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
5. Connect the USB data cable to the PC (USB PC) port on the front panel.
6. If equipped, connect the phones and headsets as described on page 18.
7. If equipped, connect the GPS receiver to the AUX port on the rear panel.

E645xx Receiver 1 Connections

1. Connect the D-shell connector end of the receiver data/power cable to the RS-232 port.
2. Connect the power plug of the receiver data/power cable to the 9-34 VDC connector.
3. Connect the Receiver 1 antenna cable to the RF INPUT connector of receiver 1.
4. If equipped, reconnect the GPS antenna to the GPS ANTENNA connector.

E645xx Receiver 2 and Loop Connections

1. Connect the second receiver power cable from the E6473A to the 9-34 VDC connector.
2. Connect one Rx Loop cable to the RX LOOP IN port of Receiver 1.
3. Connect the opposite end of the cable to the RX LOOP OUT port of Receiver 2.
4. Connect the second Rx Loop cable to the RX LOOP OUT port of Receiver 1.
5. Connect the opposite end of the cable to the RX LOOP IN port of Receiver 2.
6. Connect the Receiver 2 antenna cable to the RF INPUT connector of Receiver 2.
7. If equipped, reconnect the GPS antenna to the GPS ANTENNA connector.

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the vehicle's lighter socket.

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Cascaded Systems

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

1. Connect the cascade USB cable to the Out (USB Out) port on the front panel of the Direct Connect Hub connected to the computer.
2. Connect the opposite end of the cable to the PC (USB PC) port on the front panel of the second Direct Connect Hub.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel of the second Direct Connect Hub. Otherwise, plug the DB25 key into the PARALLEL port of the computer.

Phone Connections

To a Direct Connect Hub

The phone cable set includes a 3 foot (.914 meter) phone interface cable, a 15 foot (4.57 meter) extender cable, and a 9-to-26 pin adapter, that allows the phone cable to be plugged into a Serial port of the computer for a "direct connect" configuration (see *To a Computer Serial Port* below). ,

1. Connect the phone interface cable(s) to the phone(s).
2. If you are using the extender cables, connect a phone extender cable to each phone interface cable.
3. Connect the opposite end of the phone interface cable (or extender) to the 1 (Phone 1) port of the Direct Connect Hub.
4. Connect the opposite end of the second phone interface cable (or extender) to the 2 (Phone 2) port of the Direct Connect Hub.
5. Connect headsets to the headset connectors 1 and 2 of the Direct Connect Hub.

To a Computer Serial Port

If your system is equipped with two or more phones and does not include an E6473A Direct Connect Hub, install the Dual Serial Port PCMCIA card per the manufacturer's instructions.

1. Connect the phone interface cable to the phone.
2. If you are using the extender cable, connect it to the phone interface cable.
3. Connect the 26 pin end of the adapter to the phone interface cable (or extender).
4. Connect the 9 pin end of the adapter to the Serial port of the computer.

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

The Next Step

Refer to *6 — Operation* for information on powering up the system.

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3 — Upgrading a Walkabout System

Overview

This chapter contains instructions for upgrading your Walkabout system.

The following are the highlights of the upgrade:

- The Walkabout controller unit is replaced with the E6473A Direct Connect Hub.
- The scanner is installed in a new housing that attaches to the Direct Connect Hub.
- The serial data cable is replaced with a new USB data cable.
- The scanner power/data cable is replaced with a new cable.
- For a portable system, the original battery is replaced with a new lithium-ion battery. The original battery charger is also replaced.
- For a portable system, a new carry-around bag replaces the original blue bag. The bag contains the battery-to-Direct Connect Hub power connections.
- For an in-vehicle system, a mounting plate for the E6473A Direct Connect Hub is included, and the original power cable is replaced.
- Phone battery charging and audio monitoring are only available for supported phones using the new phone interface cable.
- Phones not supported by the E6473A require an adapter cable to be connected between the original phone interface cable and the Direct Connect Hub. Phone battery charging and audio monitoring are not available for unsupported phones.
- A software license key determines which software options are enabled. Connect it to the PARALLEL port of the computer. You can transfer the key information to the USB key using the Agilent License Manager that is included with the software.

Removing the Old Components

Portable System

1. Disconnect the antenna cable from the scanner.
2. Disconnect all of the cables from the controller unit.
3. Remove the scanner and controller unit from the pack.

Remove and discard the data/power cable from the scanner.

In-vehicle System

1. Disconnect the antenna cable(s) from the scanner.
2. Disconnect all of the cables from the controller unit.
3. Remove the scanner and controller from the bag, if included.
4. Remove and discard the data/power cable from the scanner.
5. If equipped, remove and discard the existing permanent power cable from the vehicle.

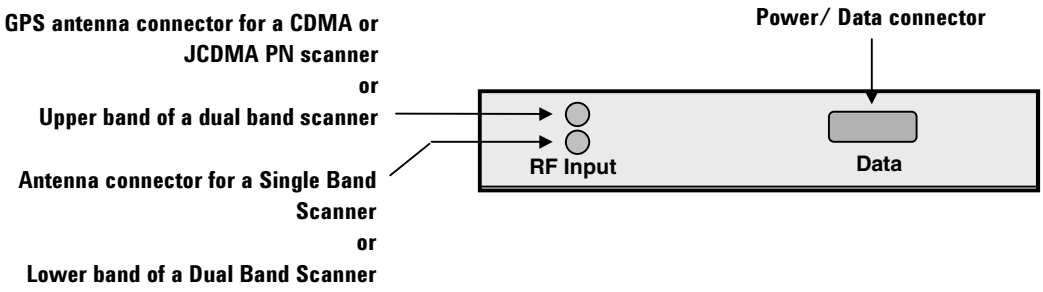
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Retrofitting the Scanner

The scanner retrofit kit consists of a chassis, cover, left bracket, and a rear bracket with the power/data cable. Also included are the bulkhead antenna connectors with cables.

Scanner Pre-assembly

Figure 9
Original Scanner

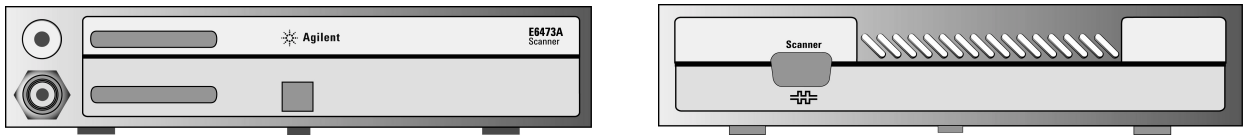


1. Attach the left bracket to the side of the scanner that has the DATA and RF INPUT connectors using the screws provided.
2. Attach the rear bracket to the rear edge of the scanner using the screws provided.
3. Attach the power/data cable to the DATA connector of the scanner.
4. Connect an antenna cable to the RF INPUT connector of the single band scanner.
5. For a dual band scanner, connect an antenna cable to each RF INPUT connector.
6. For a CDMA or JCDMA PN scanner, connect the GPS antenna cable to the upper RF INPUT connector as shown above.

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Final Assembly

Figure 10
New Scanner Front and Rear Panels



1. Attach the antenna connectors to the front panel of the housing. For a dual band scanner, orient the connectors so that you can identify the upper and lower band antenna inputs. For a PN scanner, orient the connectors so that you can identify the RF and GPS antenna inputs.
2. Slide the scanner and bracket assembly into the chassis. Line up the holes of the side bracket and the opposite side of the scanner with the chassis.
3. Attach the cover to the chassis, mating the retaining piece on the cover with the inside front edge of the chassis.
4. Secure the assemblies with two screws on each side.

Software License Key

If you have purchased E6474A or E74xx software, a DB25 software license key is included. It determines which software options are enabled. Connect it to the PARALLEL port of the computer. You can transfer the license information from it to the USB key using the License Manager software that is included with the E6474A or E74xx software. Refer to the License Manager's online Help for instructions.

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Installing the New Components

See page 94 for cable part numbers.

Portable System

This section describes the cable connections for a portable system equipped with a scanner. This configuration is housed in the small carry bag, option 020. The connector plate inside the carry bag provides the power connection between the battery and the Direct Connect Hub. The scanner is powered by its Data/Power cable. See page 94 for cable part numbers.

Figure 11
Data / Power Connection

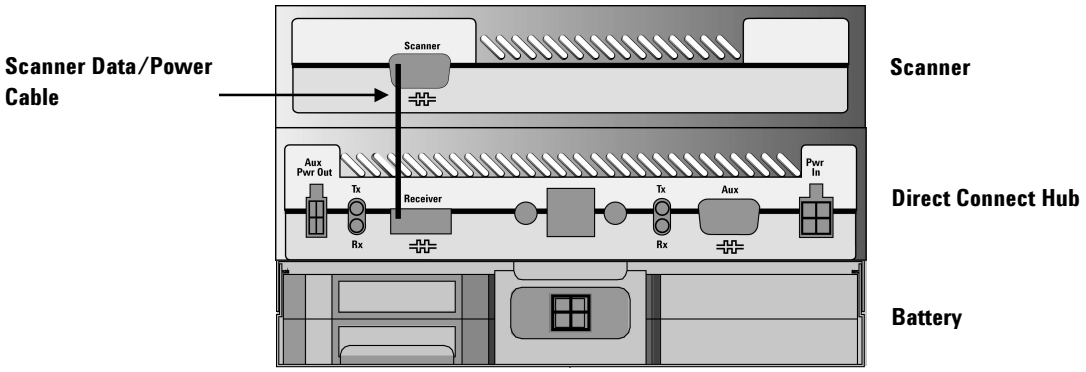
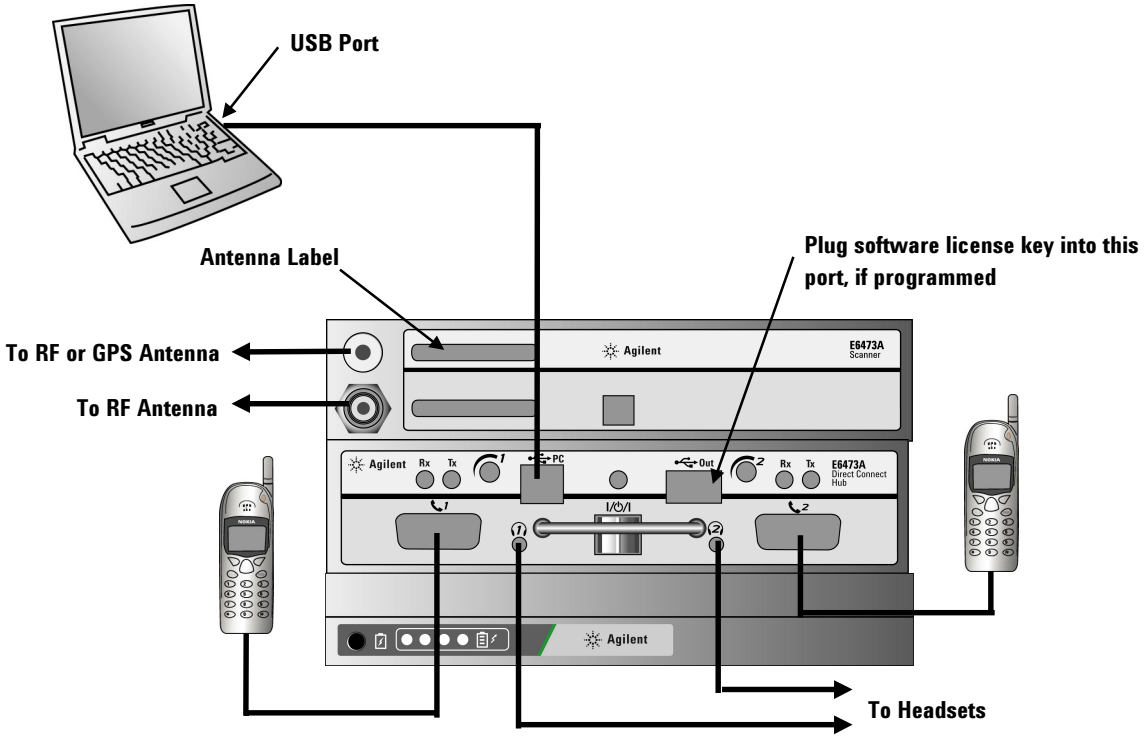


Figure 12
Peripheral Connections



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Chassis Assembly

1. Insert the battery into the chassis, then push it rearward until it locks in place.
2. Attach the scanner to the Direct Connect Hub by inserting its tabs into the slots in the Direct Connect Hub, then push the scanner rearward until it locks in place.
3. Align the tabs of the Direct Connect Hub with the slots in the chassis, then attach the Hub/scanner assembly to the chassis by pushing it rearward until it locks in place.
4. Insert the chassis assembly into the carry pack.

E6473A Direct Connect Hub and E746xx Scanner Connections

1. Open the rear cover of the pack, then connect the data/power cable to the RECEIVER port on the Direct Connect Hub rear panel.
2. Connect the opposite end of the data/power cable to the SCANNER port of the scanner.
3. Connect the USB data cable to the PC (USB PC) port on the Direct Connect Hub front panel.
4. Connect the opposite end of the USB data cable to the USB port of the computer.
5. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
6. Connect the phones and headsets as described on the next page.

E746xx Scanner Antenna Connections

1. For a single band scanner, connect the antenna cable to the antenna connector on the front panel.
2. For a dual band or PN scanner, connect the lower band RF antenna cable to the lower antenna connector on the front panel.
3. For a dual band or PN scanner, connect the upper band RF or GPS antenna cable to the upper antenna connector on the front panel.

E645xx Receiver Connections

If you are replacing the original scanner with an E645xx Receiver, see *2 — Upgrading an E747xx System* for cable connection instructions.

Carry Pack Assembly

See page 32 for an illustration of the carry pack.

1. Route the antenna, phone, and computer cables through the openings provided.
2. Zip up all open panels.
3. Attach the clip-on scanner antenna to the pocket of the pack.
4. Attach the pack to your belt using the belt loops, or attach the shoulder strap to the d-rings.

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In-vehicle System

Figure 13
Data and Power Connections

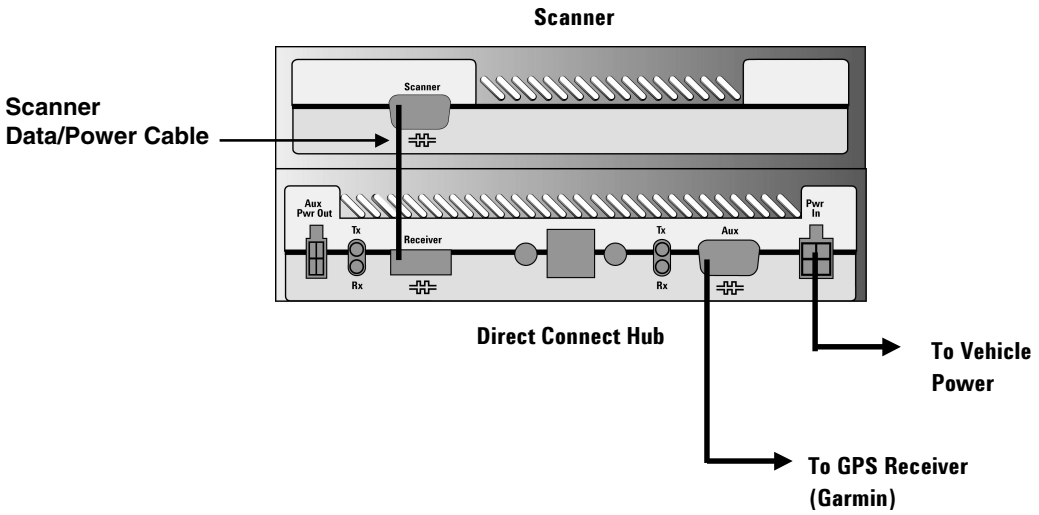
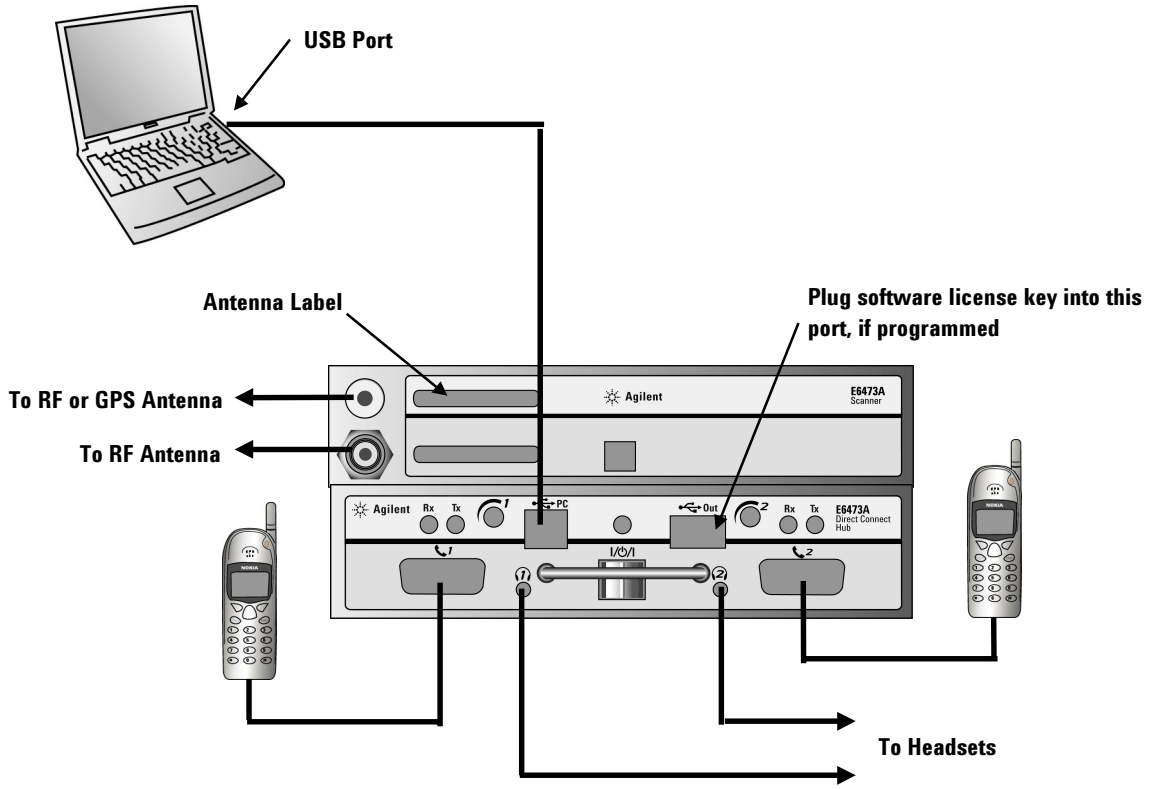


Figure 14
Peripheral Connections



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Component Installation

If you have ordered the in-vehicle mounting kit (option 010), follow the instructions in for installing the mounting plate (see page 47) and the permanent install power cable (see page 55).

1. Insert the tabs of the scanner housing into the slots in the Direct Connect Hub, then push the scanner rearward to lock it in place.
2. Place the Scanner/Hub assembly over the tabs of the mounting plate, then pull the assembly forward to lock it in place.
3. If you are replacing the scanner with an E645xx receiver, secure it to the mounting plate with the straps provided.
4. If you are replacing the scanner with an E645xx receiver, mount its antenna at least 18 inches / 45.7 cm away from any other antenna.

E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 28.

1. Connect the scanner data/power cable to the RECEIVER port on the rear panel.
2. Connect the main power cable to the PWR IN connector on the rear panel.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
4. Connect the USB data cable to the PC (USB PC) port on the front panel.
5. Connect the phones and headsets as described on page 28.

E746xx (Retrofitted) Scanner Connections

1. Connect the opposite end of the scanner data/power cable to the SCANNER port on the rear panel.
2. For a single band scanner, connect the antenna cable to the antenna connector on the front panel.
3. For a dual band or PN scanner, connect the lower band RF antenna cable to the lower antenna connector on the front panel.
4. For a dual band or PN scanner, connect the upper band RF or GPS antenna cable to the upper antenna connector on the front panel.

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the vehicle's lighter socket.

E645xx Receiver Connections

If you are replacing the original scanner with an E645xx Receiver, see *2 — Upgrading an E747xx System* for cable connection instructions.

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In-vehicle System with Navigator Plus

If your system is equipped with a Navigator Plus, connect the data and power cables as shown below. See page 94 for new cable part numbers. The original Navigator Plus input power and speed pulse cables are reused.

Figure 15
Data and Power Connections

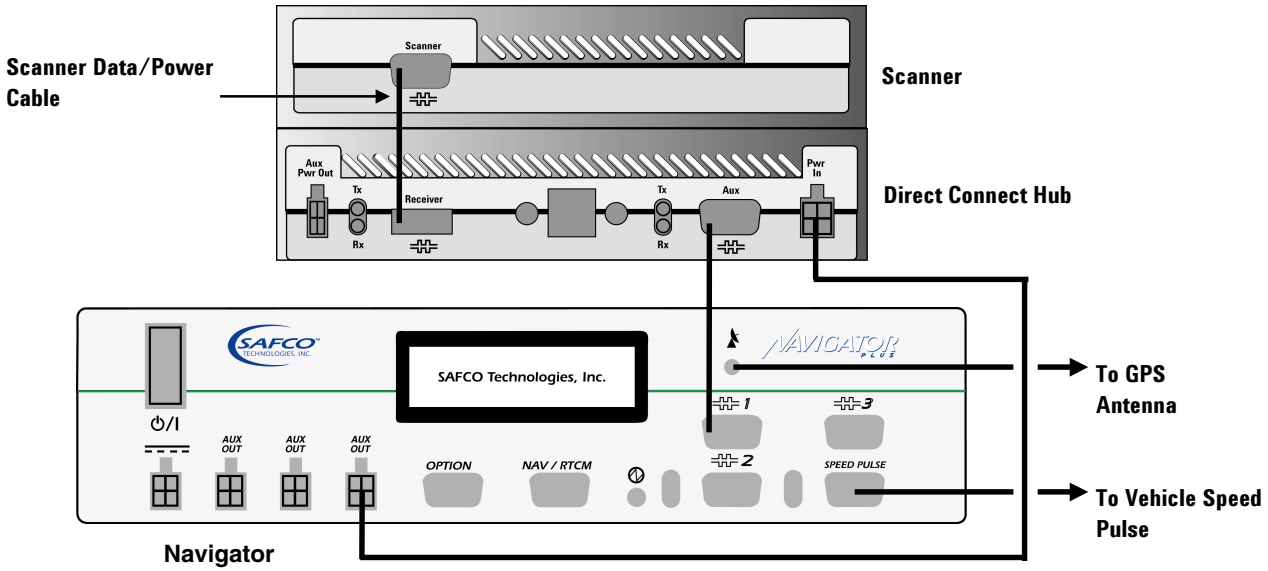
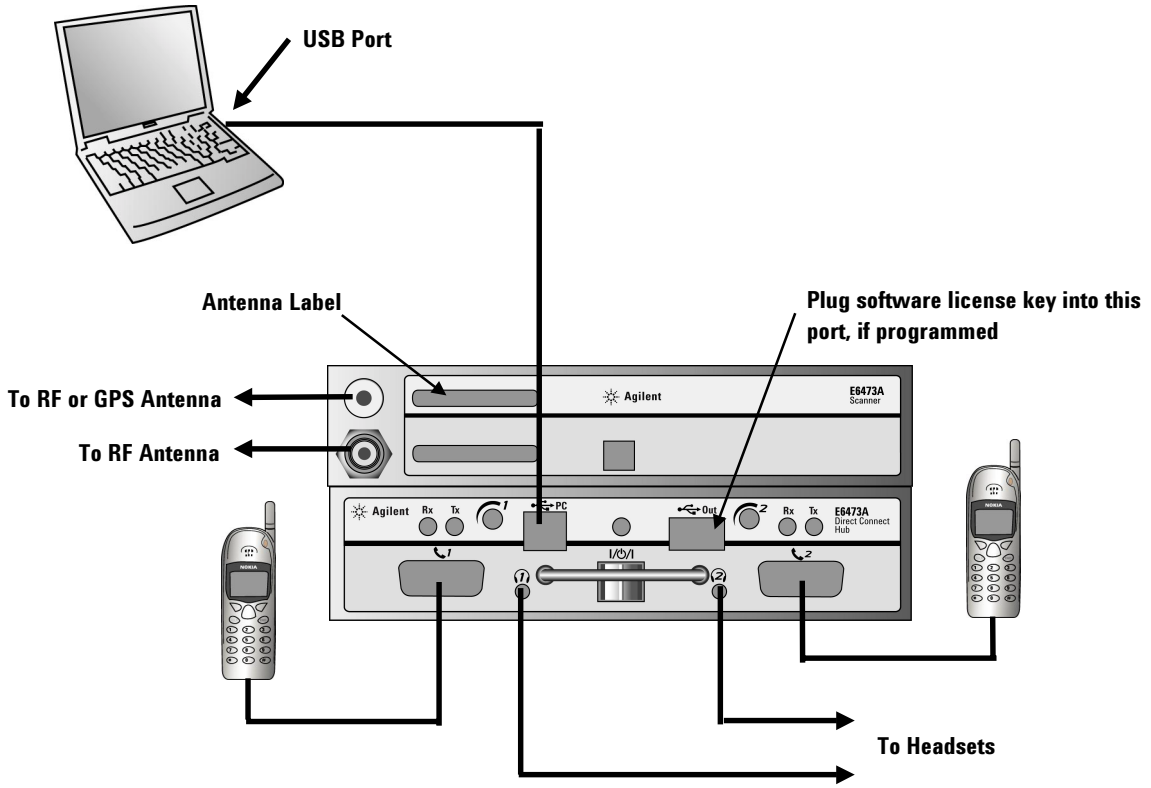


Figure 16
Peripheral Connections



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Component Installation

1. Attach the Direct Connect Hub and Scanner to the mounting plate as described on page 25.
2. Insert the tabs of the mounting plate into the slots of the Navigator Plus side brackets, then pull the plate towards you to lock it in place.

E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 28.

1. Connect the scanner data/power cable to the RECEIVER port on the rear panel.
2. Connect the Direct Connect Hub power cable to the PWR IN connector on the rear panel.
3. Connect the Navigator Data cable to the AUX port on the rear panel.
4. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
5. Connect the USB data cable to the PC (USB PC) port on the front panel.
6. Connect the phones and headsets as described on page 28.

E746xx Scanner Connections

1. Connect the opposite end of the scanner data/power cable to the SCANNER port on the rear panel.
2. For a single band scanner, connect the antenna cable to the antenna connector on the front panel.
3. For a dual band or PN scanner, connect the lower band RF antenna cable to the lower antenna connector on the front panel.
4. For a dual band or PN scanner, connect the upper band RF or GPS antenna cable to the upper antenna connector on the front panel.

Navigator Plus Connections

The following are the new connections. It is assumed that the GPS antenna and main power input cable are still connected.

1. Connect the opposite end of the Navigator Data cable to the 1 Serial Data 1 port.
2. Connect the opposite end of the Direct Connect Hub power cable to an AUX OUT power connector.

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the vehicle's lighter socket.

E645xx Receiver Connections

If you are replacing the original scanner with an E645xx Receiver, see *2 — Upgrading an E747xx System* for Receiver cable connection instructions.

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Cascaded Systems

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

1. Connect the cascade USB cable to the Out (USB Out) port on the front panel of the Direct Connect Hub connected to the computer.
2. Connect the opposite end of the cable to the PC (USB PC) port on the front panel of the second Direct Connect Hub.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel of the second Direct Connect Hub. Otherwise, plug the DB25 key into the PARALLEL port of the computer.

Phone Connections

To a Direct Connect Hub

The phone cable set includes a 3 foot (.914 meter) phone interface cable, a 15 foot (4.57 meter) extender cable, and a 9-to-26 pin adapter, that allows the phone cable to be plugged into a Serial port of the computer for a "direct connect" configuration (see *To a Computer Serial Port* below). ,

1. Connect the phone interface cable(s) to the phone(s).
2. If you are using the extender cables, connect a phone extender cable to each phone interface cable.
3. Connect the opposite end of the phone interface cable (or extender) to the 1 (Phone 1) port of the Direct Connect Hub.
4. Connect the opposite end of the second phone interface cable (or extender) to the 2 (Phone 2) port of the Direct Connect Hub.
5. Connect headsets to the headset connectors 1 and 2 of the Direct Connect Hub.

To a Computer Serial Port

If your system is equipped with two or more phones and does not include an E6473A Direct Connect Hub, install the Dual Serial Port PCMCIA card per the manufacturer's instructions.

1. Connect the phone interface cable to the phone.
2. If you are using the extender cable, connect it to the phone interface cable.
3. Connect the 26 pin end of the adapter to the phone interface cable (or extender).
4. Connect the 9 pin end of the adapter to the Serial port of the computer.

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

The Next Step

Refer to *6 — Operation* for information on powering up the system.

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4 — New Portable System Setup

Overview

This chapter contains instructions for setting up a new portable system. If you plan to install the system in a vehicle, refer to *5 — New In-vehicle System Installation*. The portable system is powered by a single lithium-ion battery.

Phone and Receiver Options

A system equipped with the E6473A Direct Connect Hub option is available in a variety of configurations, however you cannot combine an E746xx Scanner and an E645xx Receiver with the same E6473A Direct Connect Hub.

A system can be equipped with:

- With one, two, or no tracking phones
- With or without an E746xx Scanner
- With one, two, or no E645xx Receivers

Cable connections to the rear panels should be made before the E6473A Direct Connect Hub, the battery pack, and the optional Scanner 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 scanner or receiver, no cable connections are made to the rear panel of the E6473A Direct Connect Hub.

- An E746xx Dual Band Scanner has two RF antenna connectors. Labels on the front panel identify the bands.
- An E746xx CDMA or JCDMA PN Scanner has one RF antenna connector and one GPS antenna connector. Labels on the front panel identify the connectors.

Software License Key

A DB25 software license key determines which software options are enabled. Connect it to the PARALLEL port of the computer. You can transfer the license information from it to the USB key using the License Manager software that is included with the E6474A or E74xx software. Refer to the License Manager's online Help for instructions.

Dual Serial Port PCMCIA Card

If your system is equipped with two or more phones and does not include an E6473A Direct Connect Hub, install the Dual Serial Port PCMCIA card per the manufacturer's instructions. Connect the phones to the card with the cables provided.

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Single E746xx Scanner or Phone Only System

This section describes the cable connections for a portable system equipped with a scanner. This configuration is housed in the small carry bag, option 020. If your system does not include a scanner, disregard the scanner connection steps in the following procedures. See page 94 for cable part numbers.

Figure 17
Data and Power Connections

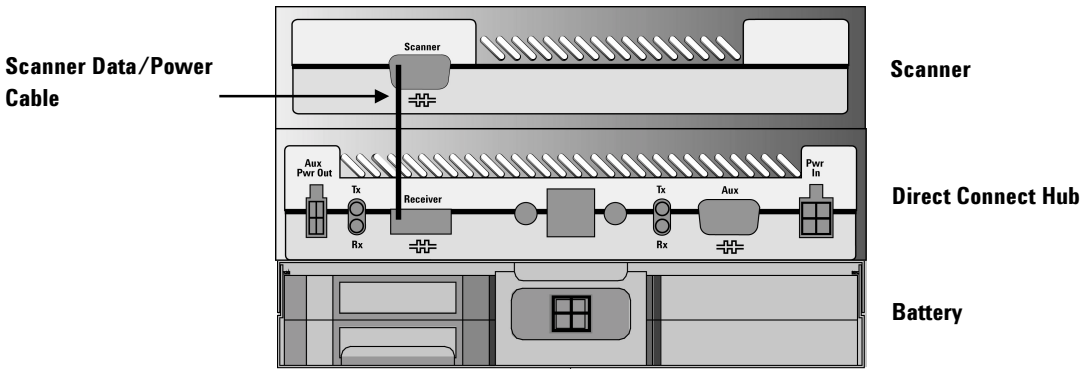
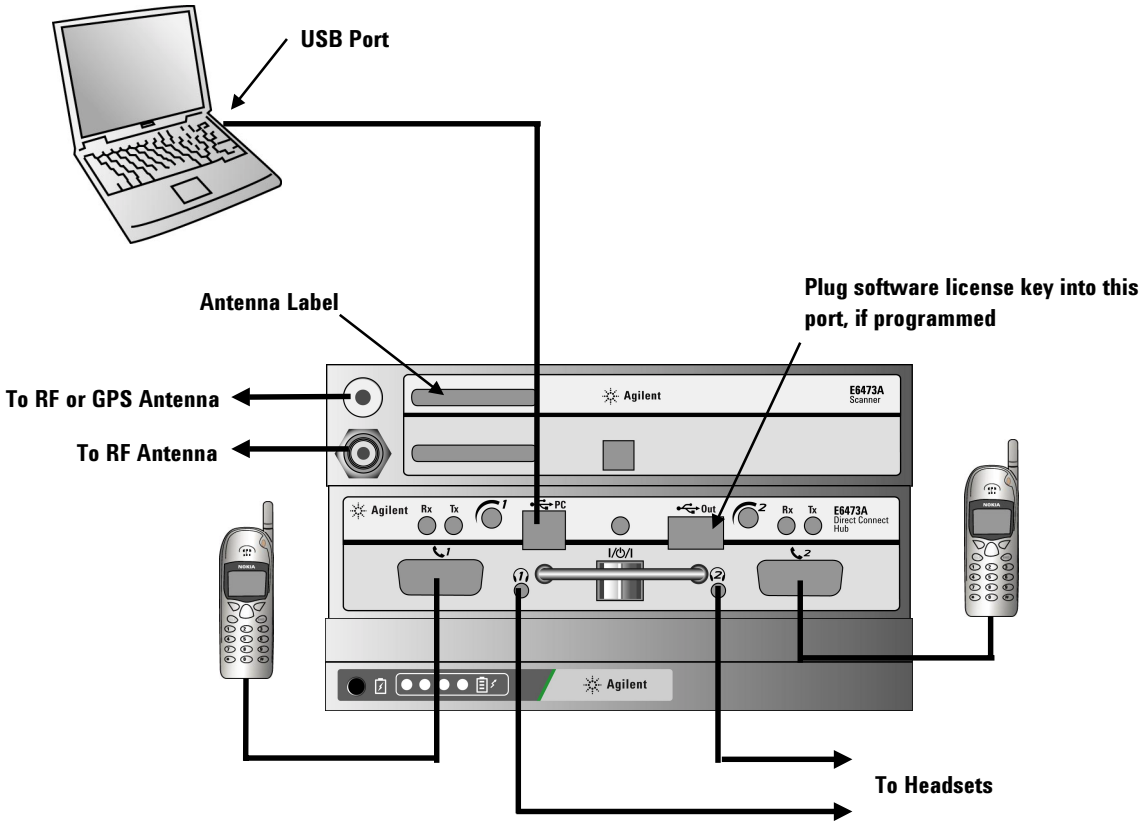


Figure 18
Peripheral Connections



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Chassis Assembly

1. Insert the battery into the chassis, then push it rearward until it locks in place.
2. If equipped, attach the scanner to the Direct Connect Hub by inserting its tabs into the slots in the Direct Connect Hub, then push the scanner rearward until it locks in place.
3. Align the tabs of the Direct Connect Hub with the slots in the chassis, then attach the Hub/scanner assembly to the chassis by pushing it rearward until it locks in place.
4. Insert the chassis assembly into the carry pack.

E6473A Direct Connect Hub and E746xx Scanner Connections

1. Open the rear cover of the pack, then connect the data/power cable to the RECEIVER port of the Direct Connect Hub.
2. Connect the opposite end of the cable to the SCANNER port of the Scanner.
3. Connect the USB data cable to the PC (USB PC) port on the Direct Connect Hub front panel.
4. Connect the opposite end of the USB data cable to the USB port of the computer.
5. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
6. Connect the phones and headsets as described on page 38.

E746xx Scanner Antenna Connections

1. For a single band scanner, connect the antenna cable to the antenna connector on the front panel.
2. For a dual band or PN scanner, connect the lower band RF antenna cable to the lower antenna connector on the front panel.
3. For a dual band or PN scanner, connect the upper band RF or GPS antenna cable to the upper antenna connector on the front panel.

Carry Pack Assembly

See the next page for illustrations.

1. Route the antenna, phone, and computer cables through the openings provided.
2. Zip up all open panels.
3. Attach the clip-on scanner antenna to the pocket of pack.
4. Attach the pack to your belt using the belt loops, or attach the shoulder strap to the d-rings.

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Figure 19
Carry Pack, Side View

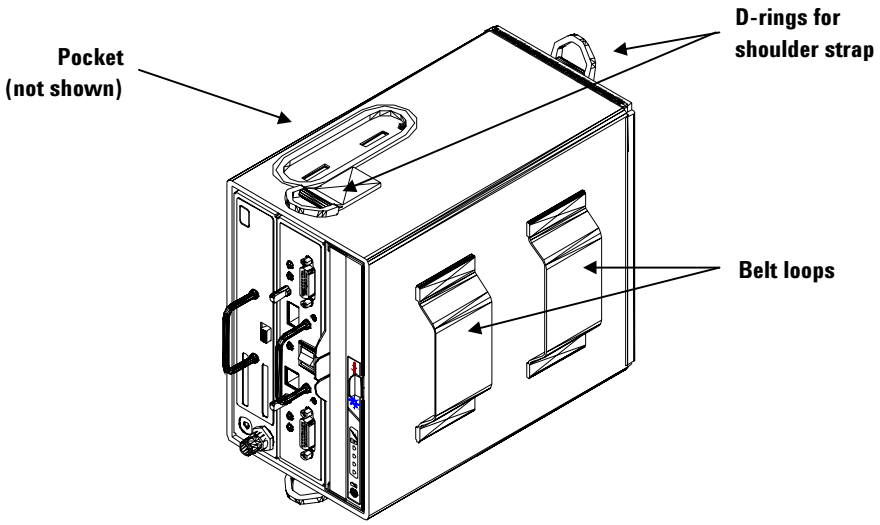
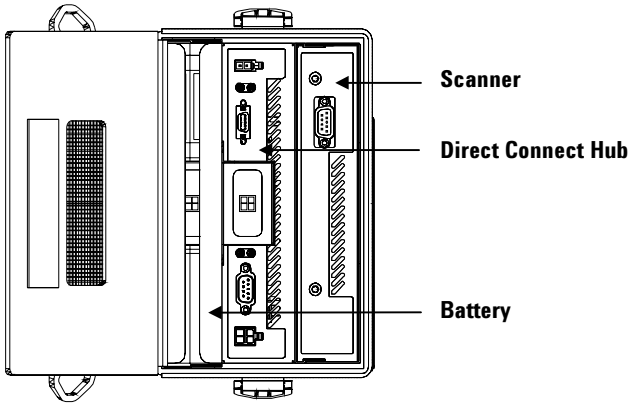


Figure 20
Carry Pack, Showing Rear Panels of Modules



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Single E645xx Receiver System

This section describes the cable connections for a system equipped with one E645xx receiver. This configuration is housed in the single receiver carry bag, option 040. The carry bag contains a bracket that secures the Direct Connect Hub and the battery, and provides the power connection between them. See page 94 for cable part numbers.

Figure 21
Data and Power Connections

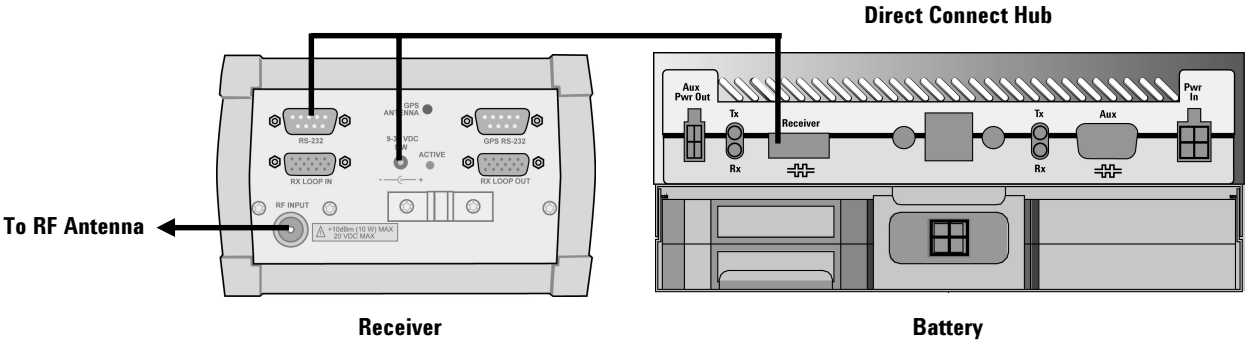
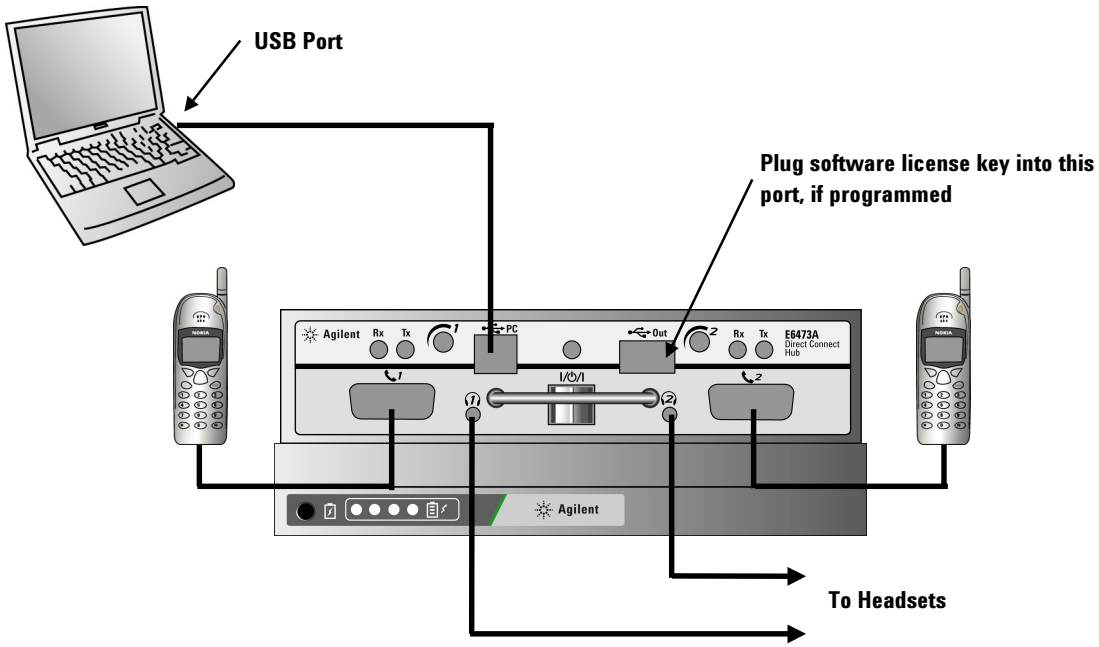


Figure 22
Peripheral Connections



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Chassis and Backpack Assembly

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

1. Insert the battery into the chassis, then push it rearward until it locks in place.
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 E645xx Receiver within the left side of the backpack.

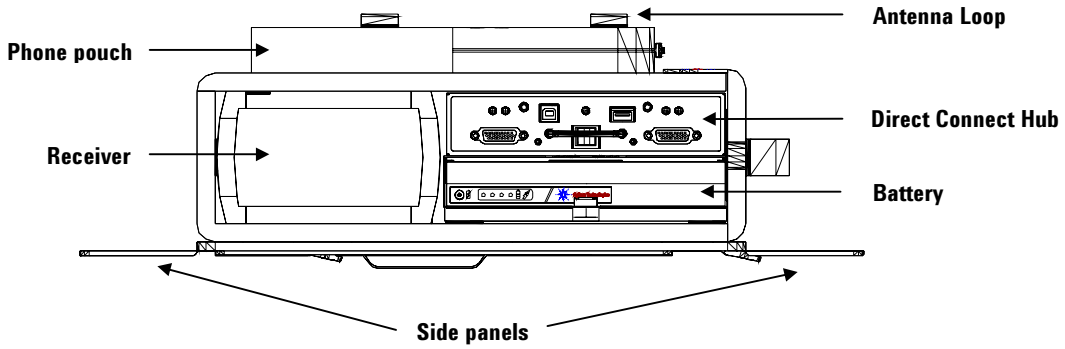
E6473A Direct Connect Hub Connections

1. Open the rear cover of the pack, then connect the data/power cable to the RECEIVER port on the rear panel.
2. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
3. Connect the USB data cable to the PC (USB PC) port on the front panel.
4. Connect the opposite end of the USB data cable to the USB port of the computer.
5. If equipped, connect the phones and headsets as described on page 38.

E645xx Receiver Connections

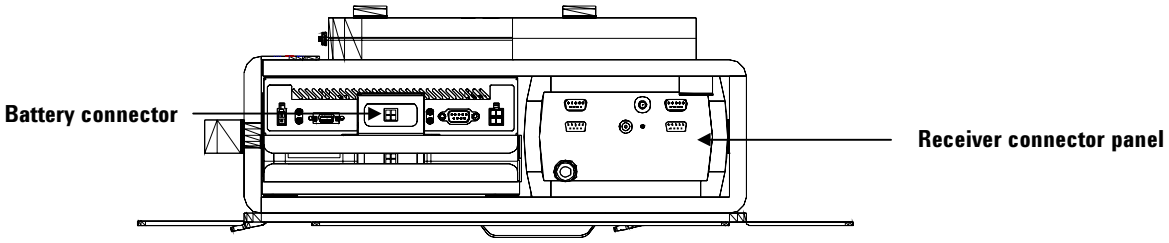
1. Connect the D-shell connector end of the receiver data/power cable to the RS-232 port.
2. Connect the power plug of the receiver data/power cable to the 9-34 VDC connector.
3. Connect the receiver antenna cable to the RF INPUT connector of the receiver.

Figure 23
Single Receiver Backpack (Front View)



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Figure 24
Single Receiver Backpack (Rear View)



Final Assembly

1. Route the antenna, phone, and computer cables through the openings provided.
2. Zip up 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.

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Dual E645xx Receiver System

This section describes the cable connections for a system equipped with two E645xx receivers. This configuration is housed in the dual receiver back pack, option 041. The Direct Connect Hub and its battery are contained in a carry bag that fits inside of the backpack. See page 94 for cable part numbers.

Figure 25
Data and Power Connections

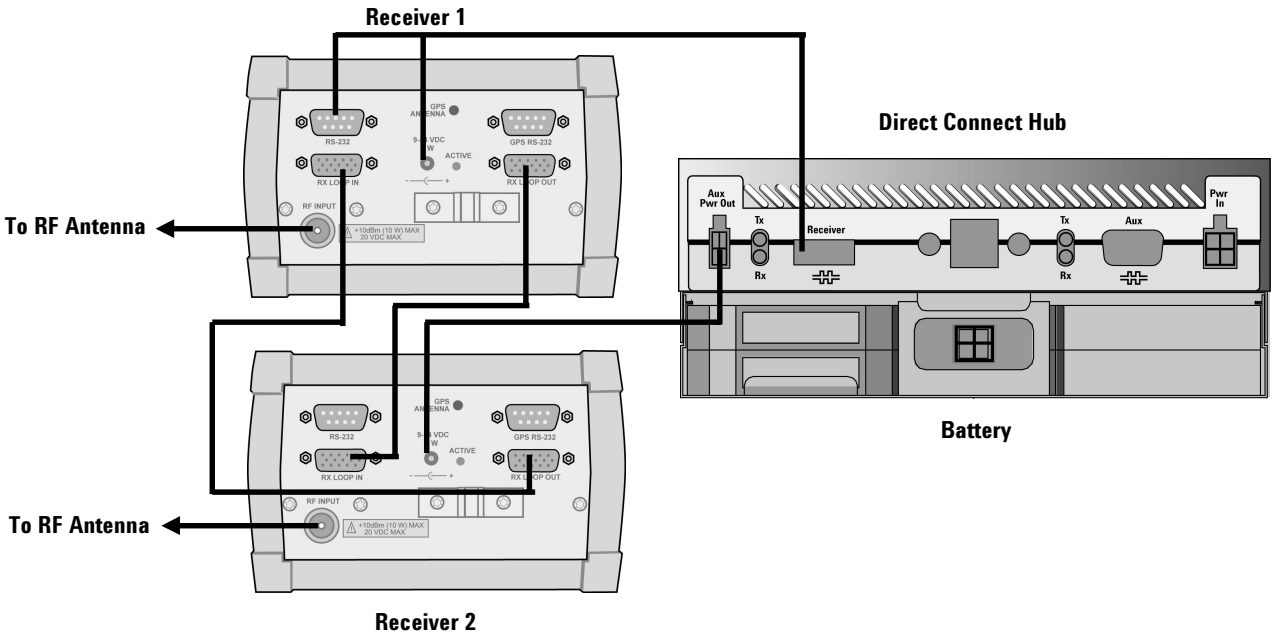
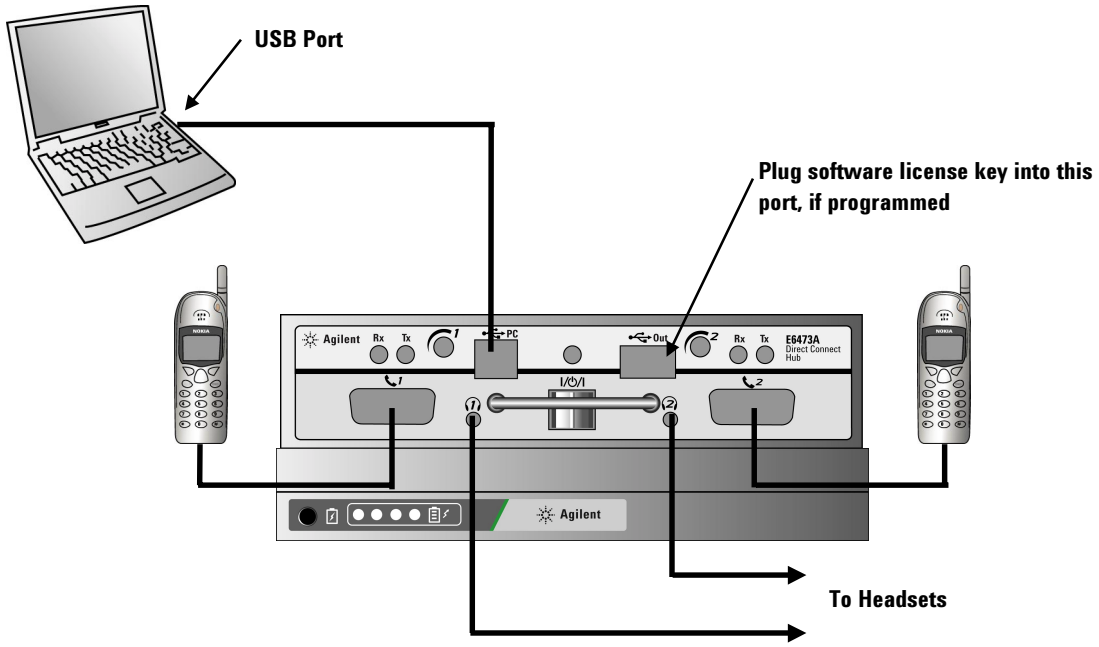


Figure 26
Peripheral Connections



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Chassis Assembly

The Direct Connect Hub and the battery are packaged in a separate chassis that is placed inside of the backpack.

1. Insert the battery into the chassis, then push it rearward until it locks in place.
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.

E6473A Direct Connect Hub Connections

1. Connect the data/power cable to the RECEIVER port on the rear panel.
2. Connect the power cable for the second receiver to the AUX PWR OUT connector.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
4. Connect the USB data cable to the PC (USB PC) port on the front panel.
5. Connect the opposite end of the USB data cable to the USB port of the computer.
6. If equipped, connect the phones and headsets as described on page 38.

E645xx Receiver Connections

1. Connect the D-shell connector end of the receiver data/power cable 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 to the 9-34 VDC connector of Receiver 2.
4. Connect one RX Loop cable 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 second RX Loop cable 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.

Dual Receiver Backpack Assembly (Option 041)

The following information applies to option 041 only, ordered with a portable system equipped with two E645xx receivers. Use the straps provided to secure the receivers within the backpack. Refer to the figures that follow for details.

1. Attach the E645xx Receivers to the lower sections of the pack.
2. Insert the Direct Connect Hub/battery/chassis assembly into the pocket.
3. Route the antenna, phone, receiver interconnect and computer cables through the zipper openings.
4. Attach the clip-on receiver antennas to a convenient place.
5. Zip up all open zippers.

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Figure 27
Backpack Features

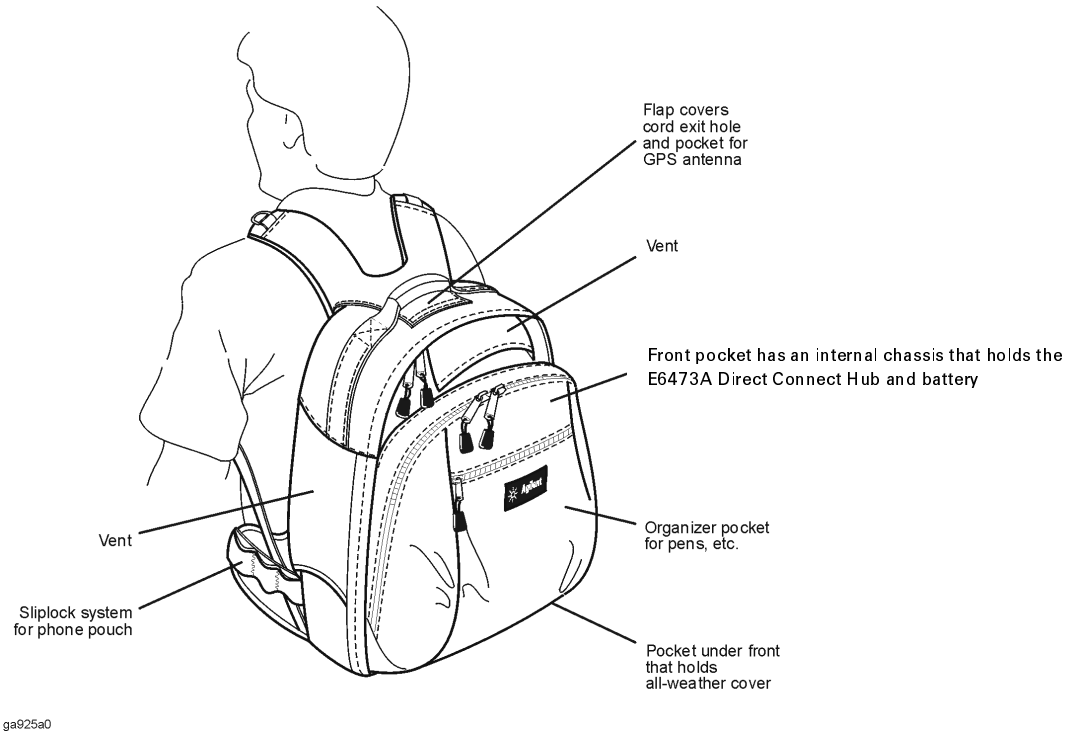
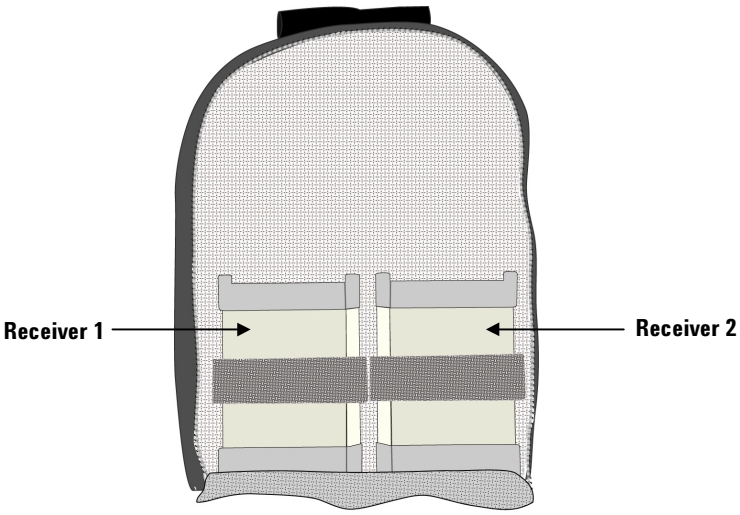
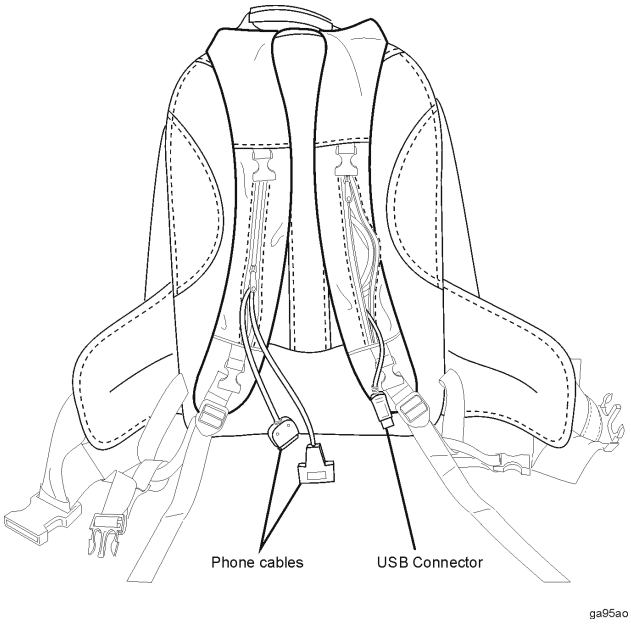


Figure 28
Inside of the Two-Receiver Backpack



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Figure 29
Running cables through the backpack straps



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Using the Dual Receiver Backpack

1. Loosen all straps and place the pack on your back.
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 Sternum 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.
5. Attach the phone pouch to the left side of the belt as shown in. Figure 31

Figure 30
Tightening the shoulder straps on the backpack



Figure 31
Attaching the phone pouch to the backpack



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Attaching the Pen Tablet

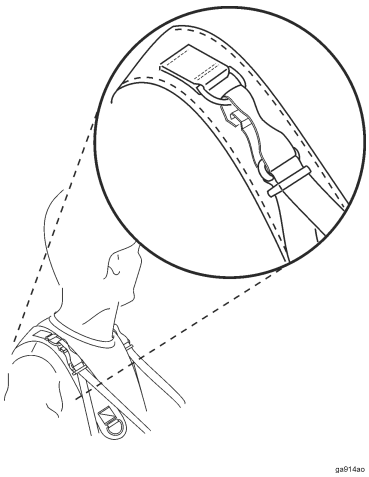
The hands-free platform attaches directly to the pen tablet case.

1. Lay the pen tablet in its case face, down on a table or counter.
2. Press the hands-free platform onto the pen tablet case, placing it so that the Velcro tabs align.
3. Fasten the tabs down.
4. Turn the tablet over, and check that the strap lengths are approximately equal. Spread the straps to the sides.
5. Attach the platform to the D-rings on the harness, selecting the set that best accommodates your height. Make sure the connectors snap completely in place.

Figure 32
Attaching the pen tablet to the hands-free platform



Figure 33
Attaching the pen tablet straps to the backpack harness



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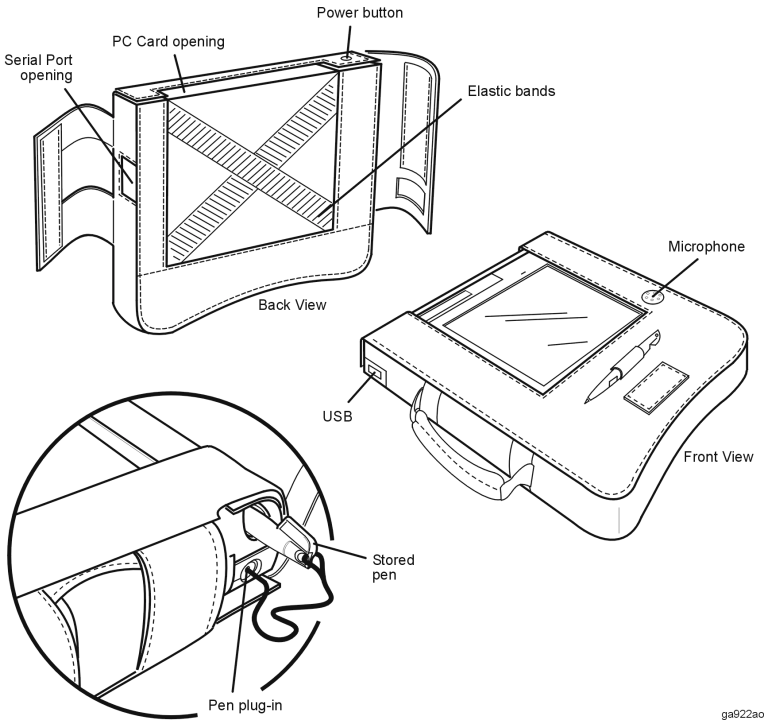
Tilting the Pen Tablet

When you navigate stairs, escalators, or elevators, be sure to tilt the pen tablet for visibility You can tilt it and hold it in place with one hand.

Figure 34
Tilt the pen tablet for safety on stairways



Pen Tablet Case Features

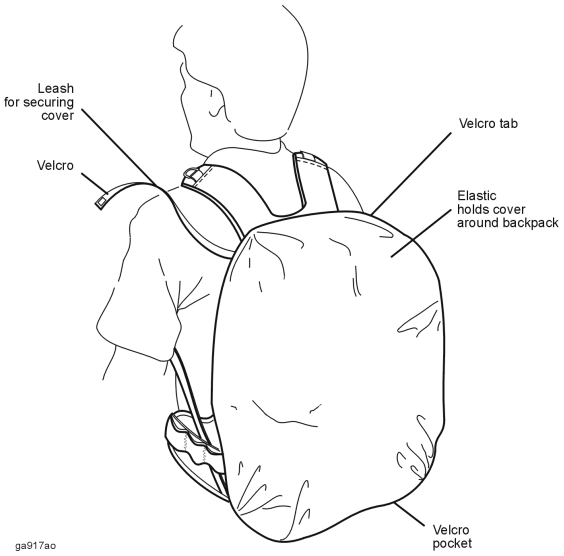


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Using the All-Weather Cover

1. Remove the cover from the bottom Velcro storage compartment.
2. Drape it over the front and top of the pack. The elastic should enable the cover to snugly surround the whole backpack with no gaps.
3. Fasten the leash behind the shoulder straps to secure the cover in place.

Figure 35
All-weather cover



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Phone Connections

To a Direct Connect Hub

The phone cable set includes a 3 foot (.914 meter) phone interface cable, a 15 foot (4.57 meter) extender cable, and a 9-to-26 pin adapter, that allows the phone cable to be plugged into a Serial port of the computer for a "direct connect" configuration (see *To a Computer Serial Port* below).

1. Connect the phone interface cable(s) to the phone(s).
2. Connect the opposite end of the phone interface cable to the 1 (Phone 1) port of the Direct Connect Hub.
3. Connect the opposite end of the second phone interface cable to the 2 (Phone 2) port of the Direct Connect Hub.
4. Connect headsets to the headset connectors 1 and 2 of the Direct Connect Hub.

To a Computer Serial Port

If your system is equipped with two or more phones and does not include an E6473A Direct Connect Hub, install the Dual Serial Port PCMCIA card per the manufacturer's instructions.

1. Connect the phone interface cable to the phone.
2. If you are using the extender cable, connect it to the phone interface cable.
3. Connect the 26 pin end of the adapter to the phone interface cable (or extender).
4. Connect the 9 pin end of the adapter to the Serial port of the computer.

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

The Next Step

Refer to *6 — Operation* for information on powering up the system

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5 — New In-vehicle System Installation

Overview

This chapter contains instructions for installing the system in a vehicle. Before you begin the installation, identify the cables and components. If you plan to use the system for an in-building survey, refer to *4 — New Portable System Setup*.

Phone and Receiver Options

A system equipped with the E6473A Direct Connect Hub option is available in a variety of configurations, however you cannot combine an E746xx Scanner and an E645xx Receiver with the same E6473A Direct Connect Hub.

- With one, two, or no tracking phones
- With or without an E746xx Scanner
- With one, two, or no E645xx Receivers (with or without the GPS option)

An E746xx Dual Band Scanner has two RF antenna connectors. Labels on the front panel identify the bands.

An E746xx CDMA or JCDMA PN Scanner has one RF antenna connector and one GPS antenna connector. Labels on the front panel identify the connectors.

Navigation Options

The E6474A software supports many navigators. Two navigation options are available for in-vehicle installations:

- 86156A GPS/DR Navigator. Installation instructions for the 86156A GPS/DR Navigation unit begin on page 49. Operating instructions begin on page 72
- Garmin II Plus GPS receiver. An operator's manual and interface cable is supplied with the receiver. Connect the interface cable per the instructions on page 60. The receiver can be powered by internal batteries or by vehicle power.

Software License Key

A DB25 software license key determines which software options are enabled. Connect it to the PARALLEL port of the computer. You can transfer the license information from it to the USB key using the License Manager software that is included with the E6474A or E74xx software. Refer to the License Manager's online Help for instructions.

Dual Serial Port PCMCIA Card

If your system is equipped with two or more phones and does not include an E6473A Direct Connect Hub, install the Dual Serial Port PCMCIA card per the manufacturer's instructions. Connect the phones to the card with the cables provided.

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Installation Guidelines

Use the following guidelines for installing the system.

- The dimensions of the base plate with the navigator installed are approximately:
  - Width: 12.25 inches / 31.12 cm
  - Depth: 13.75 inches / 34.93 cm (allow an additional 1.5 inches / 3.81 cm for handles)
  - Height (with E746xx): 6.75 inches / 17.15 cm
- Choose suitable locations for the navigator and E6473A, the tracking 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.
- Secure all components to prevent movement while the vehicle is in motion.
- 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.
- 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.
- Because every installation has different requirements, the installer must select the appropriate mounting hardware.
- If you are using a permanently installed cellular antenna, follow the antenna manufacturer's installation instructions. Antennas should be spaced at least 18" apart to avoid interference.

Recommended Tools

- Electric drill and bits
- Screwdriver
- Phillips screwdriver
- Wire cutter and stripper
- Voltmeter
- Terminal crimping tool or equivalent
- Pliers
- Utility knife
- Panel removing tool (optional)

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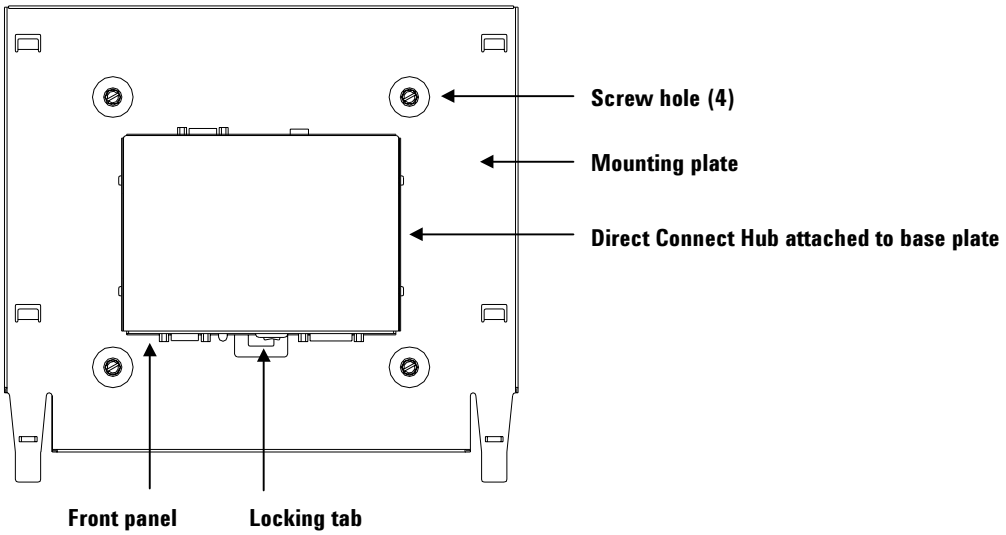
Direct Connect Hub Installation

Follow the instructions in this section if your system does not include the 86156A GPS/DR Navigator.

Base Plate Installation

1. Place the base plate in the desired location as shown.
2. Mark the holes for the #10 mounting screws on the mounting surface according to the hole pattern of the plate.
3. Drill the holes, using a 3/32" (or metric equivalent) drill bit that accommodates the screw.
4. Attach the base plate to the vehicle, using the hardware provided.

Figure 36
Base plate for Direct Connect Hub



Mounting the Hub and E746xx Scanner

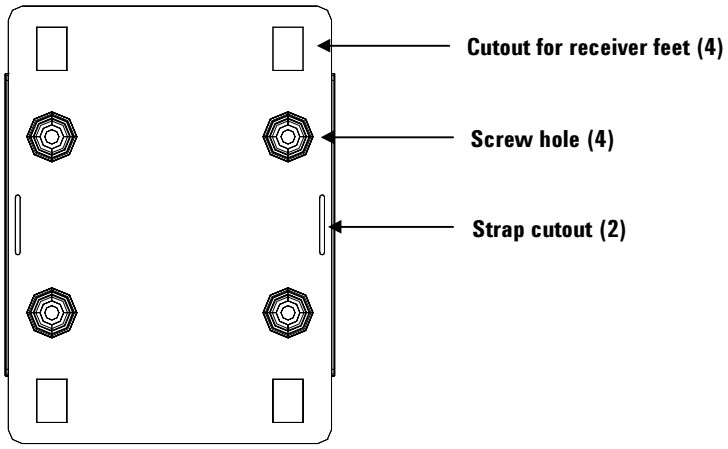
1. If equipped, attach the scanner to the Direct Connect Hub by inserting its tabs into the slots in the Direct Connect Hub.
2. Push the scanner rearward until it locks in place.
3. Place the E6473A assembly over the mounting plate tabs, then pull it towards you until the locking tab snaps into place.

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Mounting the E645xx Receiver

1. If equipped, install the receiver's mounting plate as described on the previous page.
2. Attach the receiver(s) to the plate with the straps provided.

Figure 37
E645xx Receiver Mounting Plate

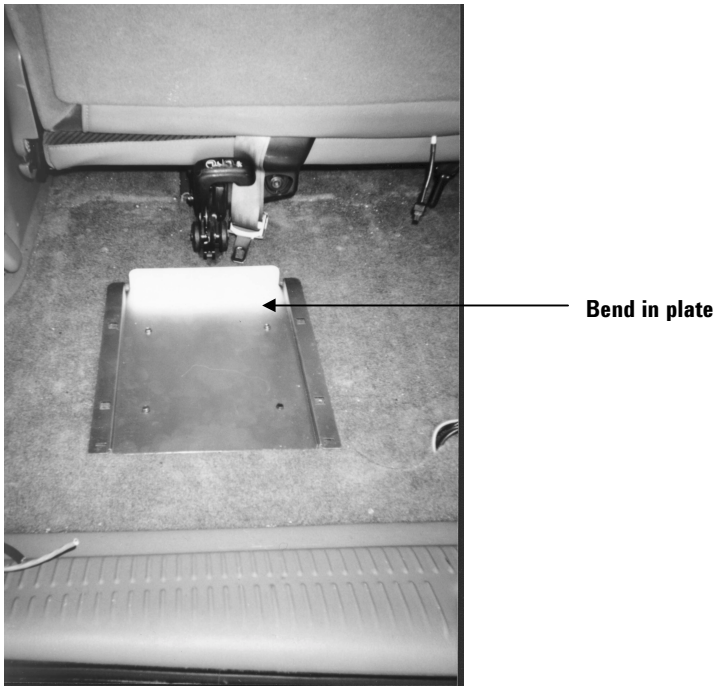


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86156A GPS/DR Navigator Installation

The figure below shows a typical navigator base plate installed. The base plate for a E6473A is similar, except it is slightly smaller.

Figure 38
Navigator Base Plate in Position



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Base Plate Installation

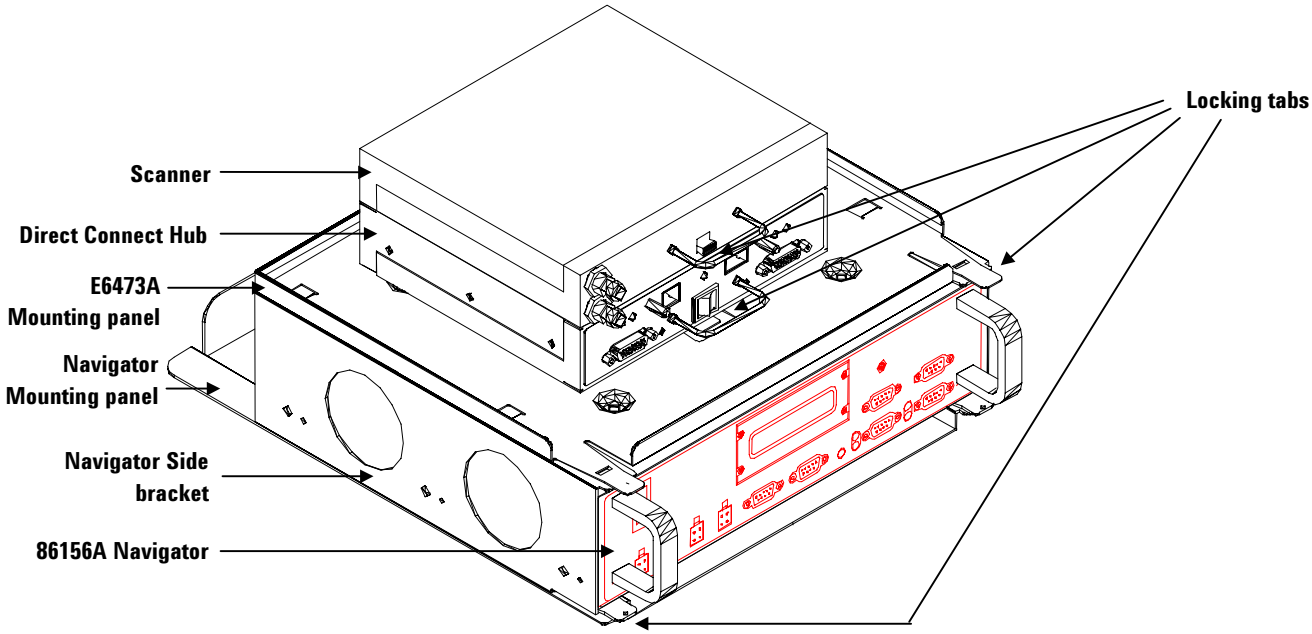
The base plate must be attached securely to a flat surface of the vehicle. The navigator attaches to the base plate via tabs on the side brackets. A locking tab on each side bracket holds the navigator in place.

Important! Choose a mounting location for mounting the navigator according to the guidelines mentioned previously. The base plate must be mounted horizontally, within 5 degrees of being level.

1. Place the base plate in the desired location. The upward-curved edge will be on the opposite side of the connector panel when the navigator is installed.
2. Mark the holes for the # 10 mounting screws on the mounting surface according to the hole pattern of the plate.
3. Drill the holes, using a 3/32" drill bit, or the metric equivalent that accommodates the screw.
4. Attach the base plate to the vehicle, using the hardware provided.
5. Follow the instructions in the next section.

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Figure 39
Direct Connect Hub, Scanner, and Navigator, Installed



Attaching the Navigator Side Brackets

Note: If your system includes the 86156A GPS/DR Navigation option, then the side brackets are already attached to the navigator. If the navigator was ordered separately, use the following instructions for attaching the brackets.

1. Identify the left and right side brackets. (See Figure 39 above.)
2. Attach the brackets to the navigator with the 6-32 screws provided. The navigator fits within the bends, with the locking tabs towards the connector panel.

Mounting the Navigator

The bottom edges of the side brackets have tabs that mate with the square holes in the base plate. They also have locking tabs to secure the navigator in place.

1. Lower the navigator onto the base plate, while inserting the tabs into the slots.
2. Push the navigator away from you, and secure the unit in place with the locking tabs.
3. To remove the navigator, lift each locking tab up, then pull the unit towards you while lifting it upwards.

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Mounting the Hub and Scanner or Receiver

1. If equipped, insert the tabs of the Scanner into the slots in the Direct Connect Hub.
2. Push the scanner rearward until it locks in place.
3. Place the E6473A assembly over the mounting plate tabs, then pull it towards you until it locks in place.
4. If equipped, attach the E645xx Receiver(s) to the receiver mounting plate with the straps provided.
5. Attach the Direct Connect Hub mounting plate to the navigator side panels by inserting the tabs of the mounting plate into the slots of the side panels. Next, slide the plate away from you until it locks in place.

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Antenna Installation

Installation Guidelines

- All antennas must be spaced at least 18 inches 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, such as the engine hood. 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

A magnetic-mount GPS antenna is included with the 86156A GPS/DR Navigator, and with each CDMA or JCDMA PN scanner.

1. Choose a position for the antenna that is at least 18 inches away from any other antenna.
2. Route the antenna cable through the vehicle to the navigator or PN scanner.
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.

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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.

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Cable Installation

Phone Extender Cables

Route the extender cables from the vehicle interior to the location where the Direct Connect Hub is installed, then follow the phone cable connection instructions on page 67.

USB Data Cable

Route the USB data cable from the vehicle interior to the location where the Direct Connect Hub is installed, then follow the USB cable connection instructions starting on page 60. If your system includes two Direct Connect Hub units, see *Cascaded Systems* on page 67.

Main Power Cable

Two main power cables are included: removable and non-removable. The removable power cable plugs into the 4-to-1 lighter socket adapter. The following installation instructions are for the non-removable power cable.

WARNING We recommend that you disconnect the battery before making any connections to the vehicle power.

Two different non-removable input power cables may be included, depending on the options ordered:

- Option 010 includes the permanent install power cable for the Direct Connect Hub. Install this cable if you are not using the removable power cable, or have not ordered the 86156A GPS/DR Navigator.

  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.

- The 86156A GPS/DR Navigator option also includes the 86156A Navigator main power cable. The Direct Connect Hub is powered by a separate cable connected to the Navigator's AUX OUT connector.

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

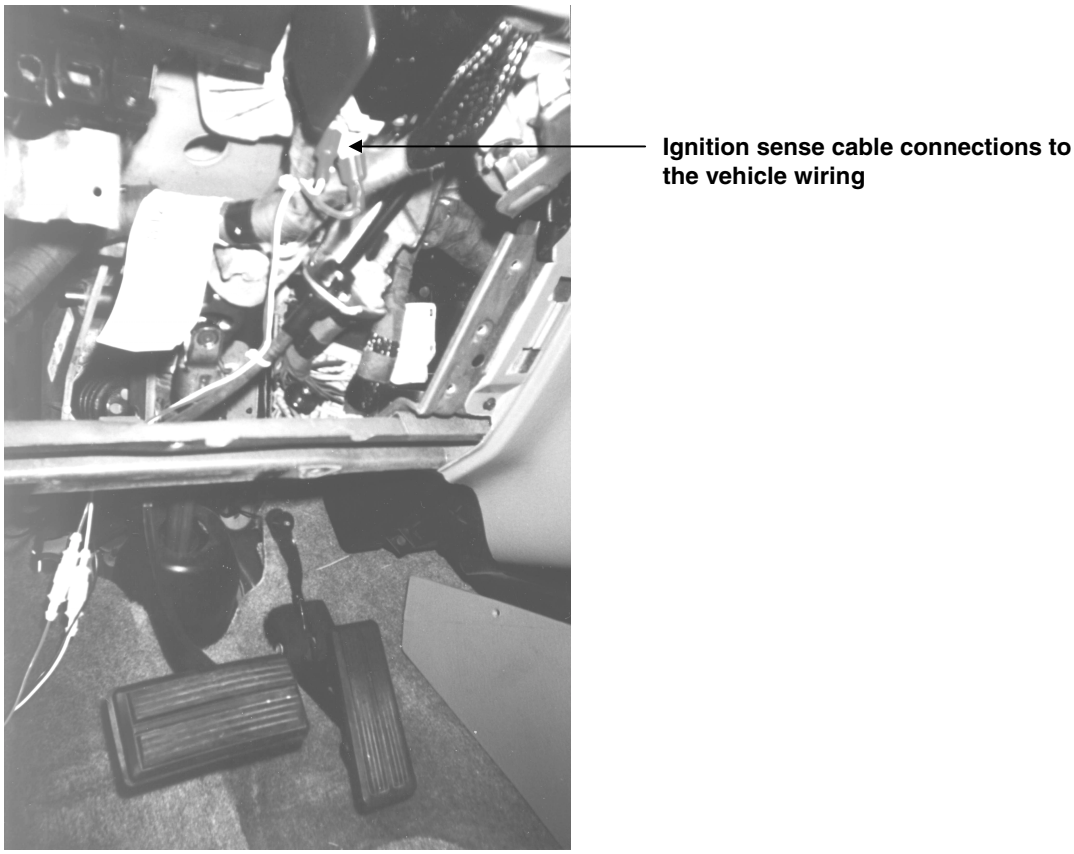
  - The red lead is power (+)
  - The black lead is ground (-)
  - The blue lead is ignition sense

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Power Cable Connections to the Vehicle

1. Attach the ring terminal of the black lead to chassis ground using the appropriate hardware. Ensure that a good mechanical and electrical connection has been made to the chassis, then coat the connection with anti-corrosive spray.
2. Connect the red lead to the battery positive (+) terminal.
3. Connect the ignition sense lead as described on page 57.
4. When installation is complete, secure any loose wires with wire ties.
5. Route the cable through the vehicle to where the E6473A is installed.

Figure 40
Ignition Sense Lead Connected to the Vehicle



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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 Direct Connect Hub, the unit can only be powered on and off via its front panel switch.

86156A GPS/DR Navigator: If the ignition sense lead of the power cable for the navigator is not connected to a source that measures +12 volts only when the ignition switch is on, it must be connected to a constant +12 volt power source. Note that if you connect the ignition sense lead to a constant +12 volt source, the navigator will always be powered on; it can only be powered off by removing the cable.

Note: The ignition sense wire color code is specified on page 55.

Connecting the Ignition Sense Lead to the Fuse Block

Because each vehicle is different, the installer must determine the best method for attaching the lead to the fuse block. We recommend 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

Locating the 12 Volt Power Leads

1. Remove the steering column panel or the lower dashboard panel. (See to the figure on the next page.)
2. Locate the two 12 or 10 AWG wires under or near the steering column.
3. Using a voltmeter, identify the lead that always measures 12 volts.
4. Using a voltmeter, identify the lead that measures 12 volts when the ignition is switched on.

Connecting the Ignition Sense Lead to the Vehicle Wiring

1. Cut approx. 12” (30.4 cm) off of the ignition sense lead of the cable assembly.
2. Crimp an inline fuse holder onto the 12” (30.4 m) lead.
3. Crimp the other side of the inline fuse holder onto the ignition sense lead of the cable assembly.
4. Connect the free end of the 12” (30.4 cm) lead to the switched 12 volt lead using a wire tap.

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Speed Pulse Cable

This cable is only included if you have ordered the 86156A GPS/DR Navigator. The navigator requires the Speed Pulse cable, which is connected to the vehicle's digital odometer pulse lead.

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

For vehicles not equipped with a digital speed pulse signal, a speedometer pickup utilizing a Hunter Universal Transducer is available. Contact Customer Support for details.

---

1. Locate the emergency brake cable grommet, at the point where the cable passes through the firewall.
2. Cut a slot in the grommet to allow the Speed Pulse cable to pass through it.
3. Feed the cable through the grommet into the engine compartment.
4. Crimp a ring terminal to the lead marked GND.
5. Attach the ring terminal to chassis ground using a self-tapping screw.
6. Connect the lead marked PULSE to the speed pulse lead using a wire tap.
7. Route the cable through the vehicle to where the navigator is installed.
8. Refer to page 62 for 86156A GPS/DR cable connections.

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Cable Connections

Direct Connect Hub with Scanner

Before you connect the cables, install the power, USB data, phone extender, and antenna cables, then route them through the vehicle. See page 94 for cable part numbers.

Figure 41
Data and Power Connections

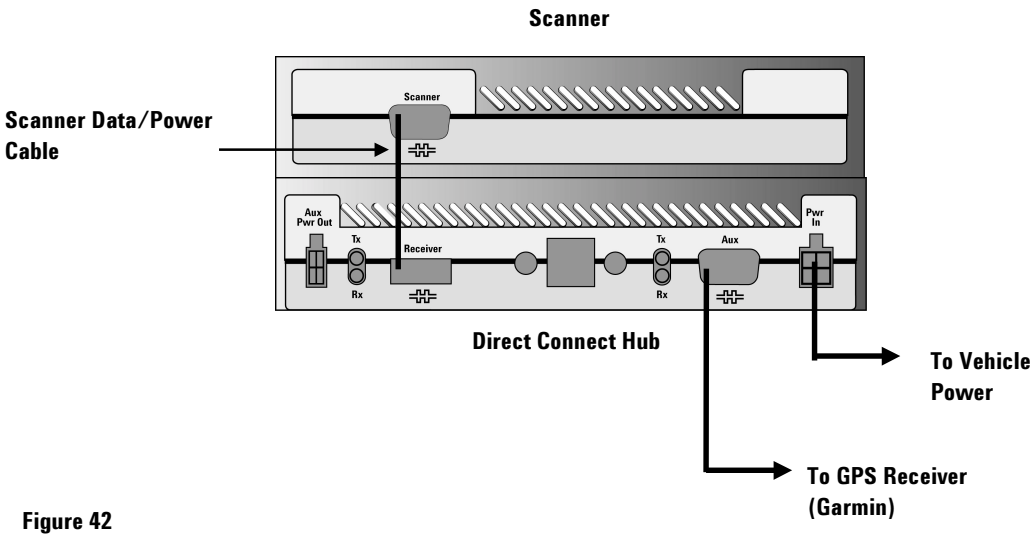
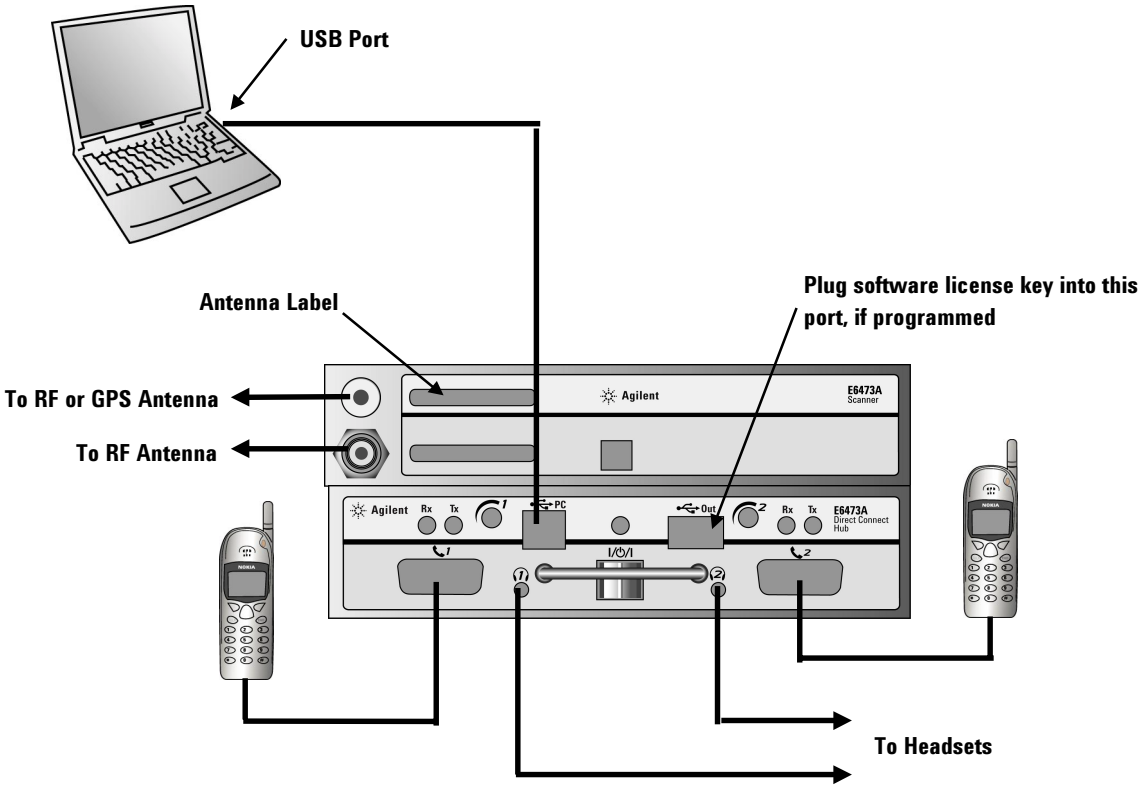


Figure 42
Peripheral Connections



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E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 67.

1. Connect the scanner data/power cable to the RECEIVER port on the rear panel.
2. Connect the main power cable to the PWR IN connector on the rear panel.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
4. Connect the USB data cable to the PC (USB PC) port on the front panel.
5. Connect the phones and headsets as described on page 65.

E746xx Scanner Connections

1. Connect the opposite end of the scanner data/power cable to the SCANNER port on the rear panel.
2. For a single band scanner, connect the antenna cable to the antenna connector on the front panel.
3. For a dual band or PN scanner, connect the lower band RF antenna cable to the lower antenna connector on the front panel.
4. For a dual band or PN scanner, connect the upper band RF or GPS antenna cable to the upper antenna connector on the front panel.

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the 4-to-1 lighter socket adapter.

Garmin GPS Receiver Connections

If your system is equipped with a Garmin GPS receiver, follow these steps:

1. Connect the interface cable to the receiver.
2. Connect the D-shell connector of the cable to the AUX port on the rear panel of the Direct Connect Hub.
3. Connect the power plug to the 4-to-1 lighter socket adapter.

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Direct Connect Hub with Scanner and GPS/DR Navigator

Before you connect the cables, install the power, USB data, handset extender, headset extender, antenna, and speed pulse cables, and route them through the vehicle. See page 94 for cable part numbers.

Figure 43
Data and Power Connections

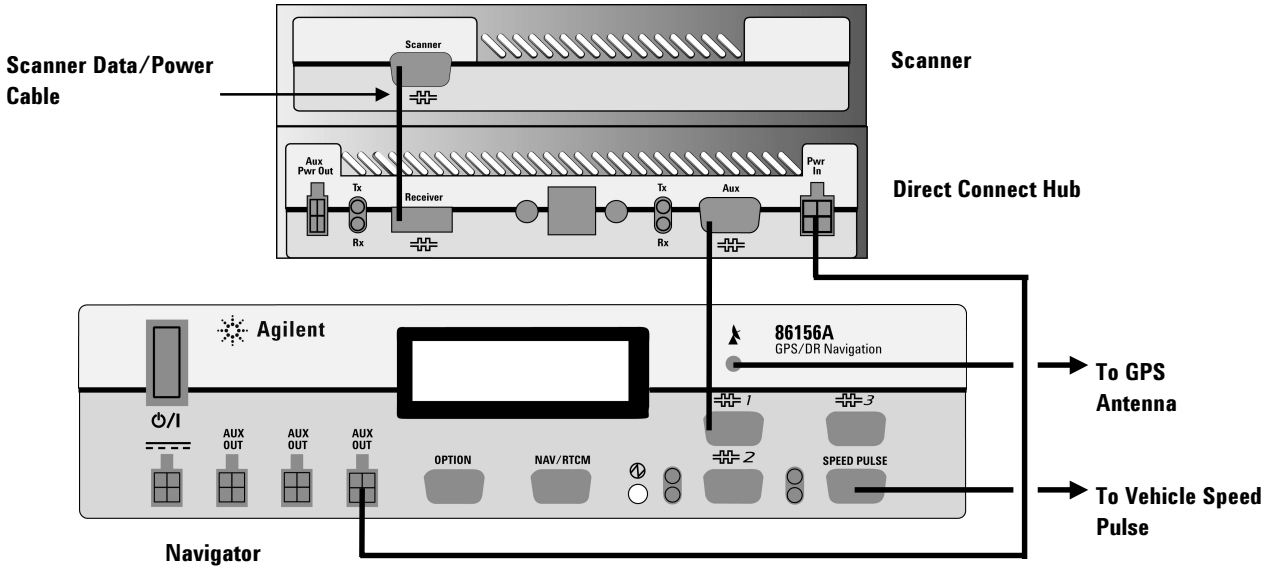
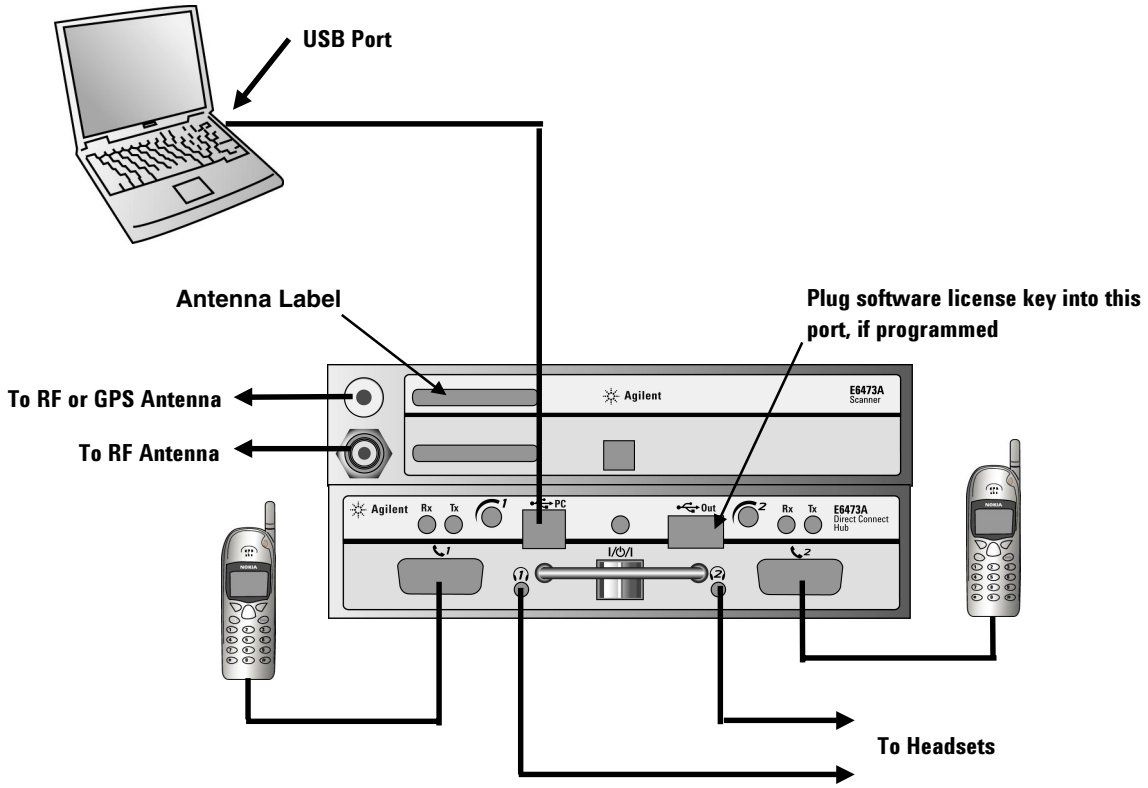


Figure 44
Peripheral Connections



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E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 67.

1. Connect the scanner data/power cable to the RECEIVER port on the rear panel.
2. Connect the Direct Connect Hub power cable to the PWR IN connector on the rear panel.
3. Connect the Navigator Data cable to the AUX port on the rear panel.
4. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
5. Connect the USB data cable to the PC (USB PC) port on the front panel.
6. Connect the phones and headsets as described on page 65.

E746xx Scanner Connections

1. Connect the opposite end of the scanner data/power cable to the SCANNER port on the rear panel.
2. For a single band scanner, connect the antenna cable to the antenna connector on the front panel.
3. For a dual band or PN scanner, connect the lower band RF antenna cable to the lower antenna connector on the front panel.
4. For a dual band or PN scanner, connect the upper band RF or GPS antenna cable to the upper antenna connector on the front panel.

86156A Navigator Connections

1. Connect the opposite end of the Navigator Data cable to the 1 Serial Data 1 port.
2. Connect the opposite end of the Direct Connect Hub power cable to an AUX OUT power connector.
3. Connect the GPS antenna cable to the GPS Antenna connector.
4. Connect the Speed Pulse cable to the SPEED PULSE port.
5. Connect the main power cable to the center connector on the rear panel of the navigator. (See page 65.)

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the 4-to-1 lighter socket adapter.

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Direct Connect Hub with Receivers

A system with two receivers is shown below. If your system has only one receiver, disregard all connections shown to receiver 2. See page 94 for cable part numbers.

Figure 45
Data and Power Connections

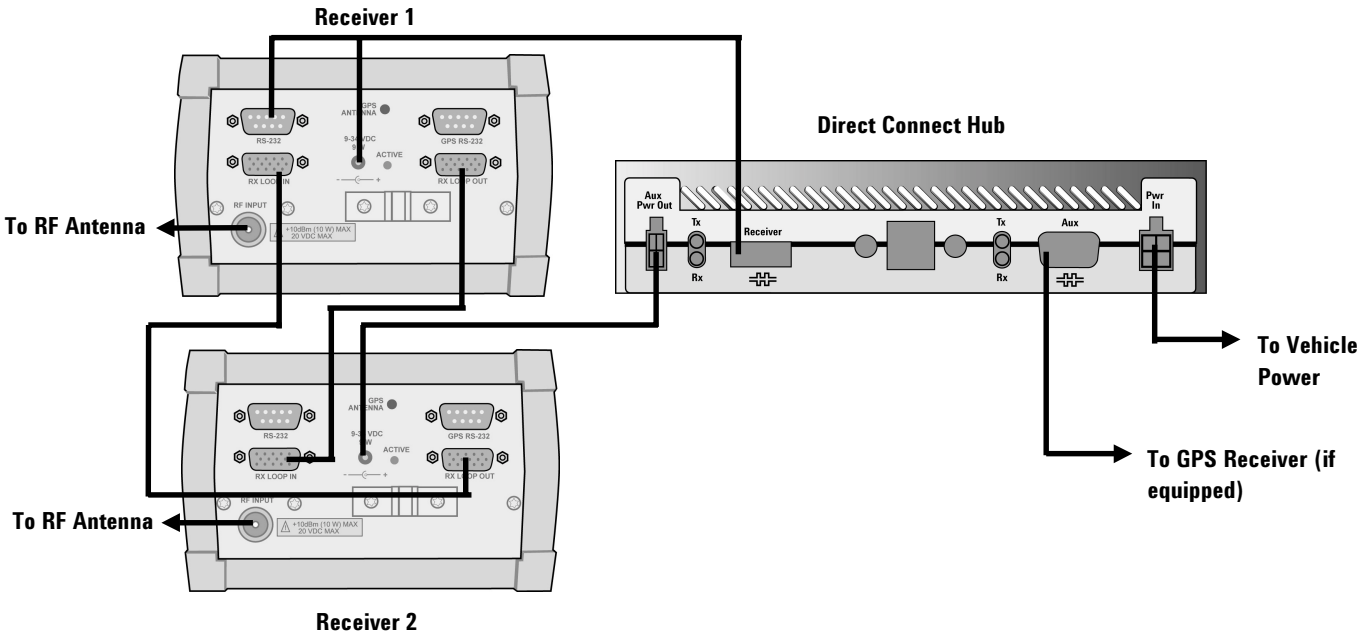
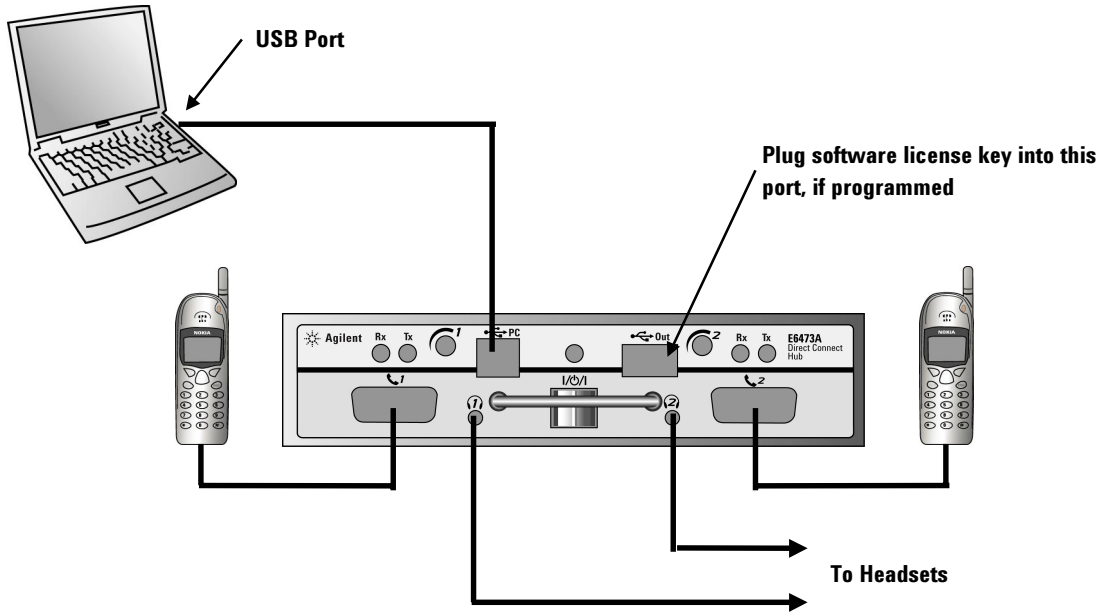


Figure 46
Peripheral Connections



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E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 67.

1. Connect the data/power cable to the RECEIVER port on the rear panel.
2. Connect the main power cable to the PWR IN connector on the rear panel.
3. If equipped, connect the second receiver power cable to the AUX PWR OUT connector on the rear panel.
4. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
5. Connect the USB data cable to the PC (USB PC) port on the front panel.
6. If equipped, connect the phones and headsets as described on page 65.

Single E645xx Receiver Connections

1. Connect the D-shell connector end of the data/power cable to the RS-232 port of the receiver.
2. Connect the power plug of the data/power cable to the 9-34 VDC connector of the receiver.
3. Connect the antenna cable for the receiver the RF INPUT connector.
4. If the receiver is equipped with the GPS option, connect the GPS antenna to the GPS antenna connector of the receiver.

Second E645xx Receiver Connections

1. Connect the power plug of the second receiver power cable to the 9-34 VDC connector.
2. Connect one Rx Loop cable to the RX LOOP IN port of Receiver # 1.
3. Connect the opposite end of the cable to the RX LOOP OUT port of Receiver # 2.
4. Connect the second Rx Loop cable to the RX LOOP OUT port of Receiver # 1.
5. Connect the opposite end of the cable to the RX LOOP IN port of Receiver # 2.
6. Connect the antenna cable for the receiver the RF INPUT connector.
7. If the receiver is equipped with the GPS option, connect the GPS antenna to the GPS antenna connector of the receiver

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the 4-to-1 lighter socket adapter.

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Direct Connect Hub with Receivers and GPS/DR Navigator

A system with two E645xx receivers is shown below. If your system has only one receiver, disregard all connections shown to Receiver 2. See page 94 for cable part numbers.

Figure 47
Data and Power Connections

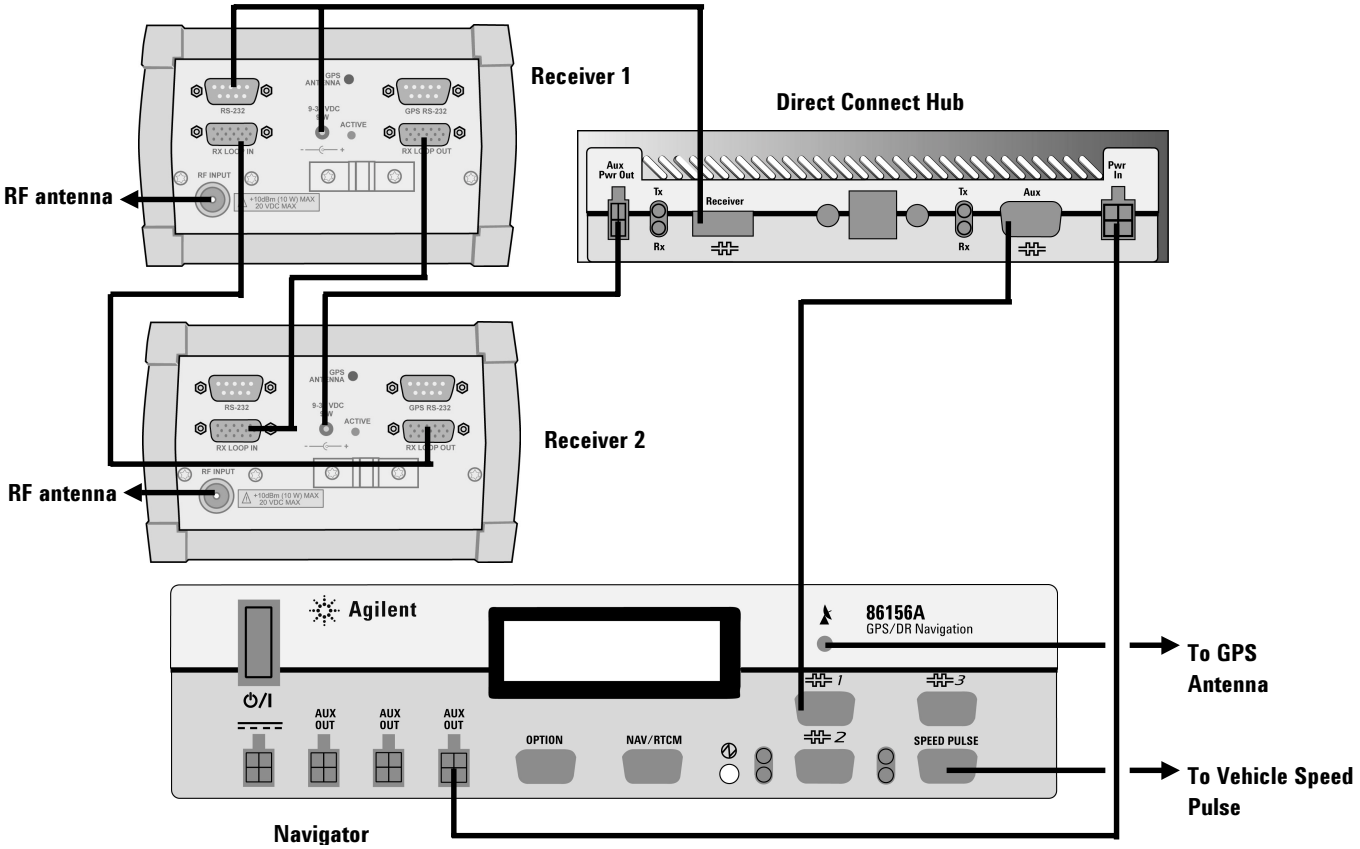
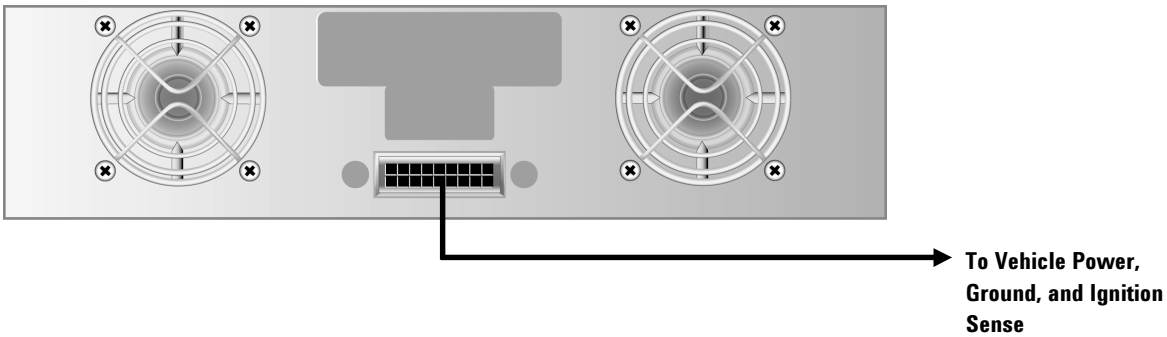


Figure 48
Navigator Rear Panel



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E6473A Direct Connect Hub Connections

If your system includes two Direct Connect Hub units, see page 67.

1. Connect the data/power cable to the RECEIVER port on the rear panel.
2. Connect the Direct Connect Hub power cable to the PWR IN connector on the rear panel.
3. If equipped, connect the second receiver power cable to the AUX PWR OUT connector on the rear panel.
4. If programmed, insert the software license key into the Out (USB Out) port on the front panel. Otherwise, plug the DB25 key into the PARALLEL port of the computer.
5. Connect the USB data cable to the PC (USB PC) port on the front panel.
6. If equipped, connect the phones and headsets as described on page 65.

Single E645xx Receiver Connections

1. Connect the D-shell connector end of the data/power cable to the RS-232 port of the receiver.
2. Connect the power plug of the data/power cable to the 9-34 VDC connector of the receiver.
3. Connect the antenna cable for the receiver the RF INPUT connector.

Second E645xx Receiver Connections

1. Connect the power plug of the second receiver power cable to the 9-34 VDC connector.
2. Connect one Rx Loop cable to the RX LOOP IN port of Receiver # 1.
3. Connect the opposite end of the cable to the RX LOOP OUT port of Receiver # 2.
4. Connect the second Rx Loop cable to the RX LOOP OUT port of Receiver # 1.
5. Connect the opposite end of the cable to the RX LOOP IN port of Receiver # 2.
6. Connect the antenna cable for the receiver the RF INPUT connector.

86156A Navigator Connections

1. Connect the opposite end of the Navigator Data cable to the 1 Serial Data 1 port.
2. Connect the opposite end of the Direct Connect Hub power cable to an AUX OUT power connector.
3. Connect the GPS antenna cable to the GPS Antenna connector.
4. Connect the main power cable to the center connector on the rear panel of the navigator.

Computer Connections

1. Connect the opposite end of the USB data cable to the USB port of the computer.
2. If equipped, connect the power cable from the computer to the 4-to-1 lighter socket adapter.

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Cascaded Systems

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

1. Connect the cascade USB cable to the Out (USB Out) port on the front panel of the Direct Connect Hub connected to the computer.
2. Connect the opposite end of the cable to the PC (USB PC) port on the front panel of the second Direct Connect Hub.
3. If programmed, insert the software license key into the Out (USB Out) port on the front panel of the second Direct Connect Hub. Otherwise, plug the DB25 key into the PARALLEL port of the computer.

Phone Connections

To a Direct Connect Hub

The phone cable set includes a 3 foot (.914 meter) phone interface cable, a 15 foot (4.57 meter) extender cable, and a 9-to-26 pin adapter, that allows the phone cable to be plugged into a Serial port of the computer for a "direct connect" configuration (see *To a Computer Serial Port* below). ,

1. Connect the phone interface cable(s) to the phone(s).
2. If you are using the extender cables, connect a phone extender cable to each phone interface cable.
3. Connect the opposite end of the phone interface cable (or extender) to the 1 (Phone 1) port of the Direct Connect Hub.
4. Connect the opposite end of the second phone interface cable (or extender) to the 2 (Phone 2) port of the Direct Connect Hub.
5. Connect headsets to the headset connectors 1 and 2 of the Direct Connect Hub.

To a Computer Serial Port

If your system is equipped with two or more phones and does not include an E6473A Direct Connect Hub, install the Dual Serial Port PCMCIA card per the manufacturer's instructions.

1. Connect the phone interface cable to the phone.
2. If you are using the extender cable, connect it to the phone interface cable.
3. Connect the 26 pin end of the adapter to the phone interface cable (or extender).
4. Connect the 9-pin end of the adapter to the Serial port of the computer.

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

The Next Step

Refer to *6 — Operation* for information on powering up the system.

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6 — Operation

Overview

This chapter contains information on system power-up and operation. The software license key and all cables should be connected at this time, as described in the previous chapters. After powering up the system, power up the computer.

Note that Toshiba phones have special power-up requirements, as described on page 70.

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 *7 — Battery Use and Care* for more information. For an in-vehicle system, verify that the phone batteries are fully charged before beginning a survey.

Portable System Power-up

The Direct Connect Hub has a three-position power switch. 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 E6473A has initialized.

- Place the switch the left position to power the unit on.
- Place the switch the center position to power the unit off.

In-vehicle System Power-up

If your system is not equipped with an 86156A GPS/DR Navigator, power up the E6473A Direct Connect Hub as described below. If your system is equipped with an 86156A GPS/DR Navigator, place the Direct Connect Hub's power switch the left position. It is powered on and off by the navigator.

E6473A Direct Connect Hub

The Direct Connect Hub has a three-position power switch. 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 E6473A has initialized.

- Place the switch the left position to power the unit on.
- Place the switch the center position to power the unit off.
- Placing the switch the right position allows the unit to power on and off via the vehicle's ignition switch. (In-vehicle system without 86156 navigator only.)

Important! If the system is equipped with a CDMA or JCDMA PN receiver, allow the system to be powered on at least 3 minutes before starting a data collection test, to allow the receiver to lock onto the GPS signal. (Only the GPS time parameter is required by the receiver.)

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86156A GPS/DR Navigator

The navigator will power up when the vehicle's ignition is switched on, if the Ignition Sense lead of its main power cable has been connected to a +12 volt source that is switched on and off by the ignition switch.

WARNING If the Ignition Sense lead of the power cable has been connected to a constant 12 volt source, you must remove the power cable from the navigator to power it off.

CAUTION The vehicle must be moved while the navigator is powered on before you start a data collection test. To avoid getting a navigation error, power up the system (including the navigator), move the vehicle a short distance, stop the vehicle, then start the test as described in the online Help.

Toshiba 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 with the phone and the system powered off.

Toshiba 10-CT

1. Unplug the phone interface cable from the phone.
2. Power the E6473A system on. Wait for the LED above the power switch to glow blue.
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 E6473A system on.

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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 E6473A system on.

iDEN® i1000 Plus Baud Rate

The following procedure sets the phone to communicate at 19200 baud:

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.

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86156A GPS/DR Navigator

LEDs and Display During Power-up

The 86156A GPS/DR navigator status LCD displays power-up and navigation status messages. The front panel LEDs indicate CPU status, speed pulse status and serial port activity.

After the navigator is powered on, the CPU LED is solid orange for approximately 20 seconds, indicating that the system is booting up. During this time, the LCD is blank.

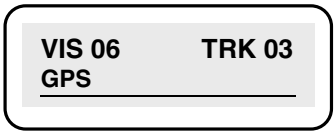
For the next, (approximately) 60 seconds, the unit initializes the GPS and serial ports. During this time the CPU LED flashes red, and the LCD displays the following messages:

- Agilent Technologies
- Navigation Unit / Version 1.41
- System Initializing

LEDs and Display During Normal Operation

After the system has successfully initialized, the CPU LED flashes green. The LCD Displays the number of satellites visible, the number of satellites tracked, and the type of GPS fix. In the example below, 6 satellites are visible, 3 are tracked, and the GPS has a 2-Dimension fix.

Figure 49
Navigator Plus LCD



The table below summarizes the LCD display for the various types of fixes.

LCD indicates	For this type of fix:
None	None
2D	2-Dimension
3D	3-Dimension
D2D	Differential 2-Dimension
D3D	Differential 3-Dimension
DR	Dead Reckoning

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Note: The GPS fix type reported by the receiver changes from 3D to 2D whenever there is a change in the number of satellites that are visible or tracked. This information is reported once per second, and is captured by the data collection software. Because the LCD display is updated only once every two seconds, you may experience the display regularly alternating between GPS fixes of 2D and 3D. This indication is normal, and does not affect the accuracy of the navigator.

During a drive test, the Serial Port LEDs will blink to indicate communication activity, and the Speed Pulse LED will blink to indicate that the unit is receiving pulses from the vehicle.

Before starting a data collection test, allow 10 minutes for the unit to acquire GPS position data. During a data collection test, navigation data will automatically be combined with the cellular data by the data collection software.

Error Indications

If a system error condition occurs, the CPU LED will flash red. The LCD will display will display one of the following System Error messages:

Error Number	Type of failure
01	COM Port 1
02	COM Port 2
03	COM Port 3
04	COM Port 4
05	COM Port 5
06	COM Port 6
07	GPS Initialization
08	Invalid Comm Spec message (future availability)
09	Buffer overflow
10	Invalid system flashload attempted from secondary Comm Spec port

If a GPS error condition occurs, the CPU LED will flash orange. The LCD will display will display one of the following GPS Error messages:

Error Number	Type of failure
01	GPS antenna (future availability)
02	GPS message timeout
03	GPS valid fix timeout
04	GPS heading sensor
05	GPS heading sensor calibration (future availability)
06	GPS wheel sensor
07	GPS wheel sensor calibration (future availability)

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Sensor Calibration

The 86156A Navigation unit contains a Trimble Placer GPS 455DR. Before the navigator can be used for a survey, the heading sensor and speed pulse must be calibrated. Refer to Chapter 6 of the *Placer GPS Installation and Operator's Manual* available from the Trimble Navigation web site for the calibration procedure. The manual can be downloaded from: http://www.trimble.com/mpc/placer/download/index.htm.

The Trimble Placer calibration program files named PINIT140.EXE and PINIT140.INI are on a diskette supplied with the navigator. Copy the two files onto your computer's hard disk. PLCRINIT is the name of the calibration program shown in the opening screen.

Note: The speed sensor calibration procedure requires the vehicle to be driven a measured mile. The heading sensor calibration procedure requires the vehicle to be driven in continuous circles. Choose a location, such as a parking lot where this can be done.

Cable Connections for Calibration

1. With the power off, connect the calibration cable to the NAV/RTCM connector of the 86156A Navigation unit.
2. Connect the opposite end of the cable to the Serial port (COM 1) of the computer.

Starting PLCRINIT

1. Start the computer in DOS mode. (PLCRINIT does not run properly if it is started from the MS DOS Command Prompt in Windows.)
2. Type in pinit140.exe to start the PLCRINIT calibration program. PLCRINIT is a DOS program, set up to run at 9600 baud using the computer's COM1 serial port. (If necessary, first use the DOS CD command to change the path to the directory that contains PINIT140.EXE.)

The Next Step

Refer to the Getting Started topic in the software's online Help for information on configuring the software to perform a data collection test.

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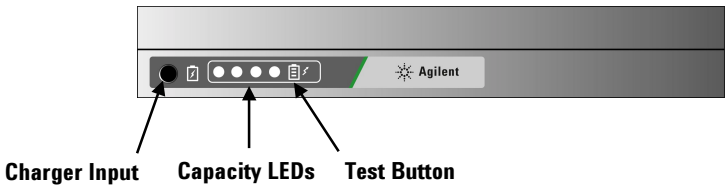
7 — Battery Use and Care

Checking the Remaining Charge

Press the test button shown below 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
4	76% to 100%
3	51% to 75%
2	26% to 50%
1	1% to 25%
0	Totally discharged

Figure 50
Lithium-Ion Battery



Charging the Battery

The battery can be charged within the carry bag. Disconnect the charger from the battery before checking the charge. The battery is fully charged when all four LEDs are lit.

WARNING Never charge the battery when the E6473A Direct Connect Hub is powered On. Use only the approved charger, part no. 1892-119.

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 3 hours to fully charge the battery.

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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

- Never use the batteries with anything other than specifically designed equipment.
- 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.

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Battery Specifications

Part Number	1890-027
Typical Capacity	8000 mAh
Nominal Voltage	14.8V
Discharge Cut-off voltage	12.0V
Cell Configuration	five in parallel and four series
Allowable Temperature Range	0º C to 60º C at discharge 0º C to 45º C at charge
Storage Temperature Range	-20º C to 50º C 3-month -20º C to 35º C 6-month -20º C to 20º C 12-month
Humidity	0 to 85%
Weight	2.32 lbs. / 1.050 kg
Terminals	Discharge – Molex 15-24-6047 Charge – HCH No.IDJ-D22-6T
Overcharge Protection	Charging turned off at and over 4.35 +\- .05V / Cell Charging re-enabled at and under 4.1 +\- .05V / Cell Charging off at nominal >= 16.8V
Over Discharge Protection	Discharge off at and lower 2.4 +\- .1V / Cell Discharge re-enabled at and higher 3.2 +\- .1V / Cell Shut Down at nominal 12 +\- .4V Wake at recharge
Short Circuit Protection:	Off at short circuit
Cycle Life:	>= 4800 mAh after 300 cycles

Charger Specifications

Part Number	1892-119
Charger Input Voltage	100-240 volts AC, 50-60 Hz
Charger Output Voltage	17 volts DC

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8 — Support, Warranty and Returns

Technical Telephone Assistance

Your network test solution comes with 12 months of technical telephone assistance and a 12 month hardware warranty period. 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 calling 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, call the appropriate number below, or contact your local Agilent Technologies Sales and Service Office. Before calling, ensure that you have all the information described above.

Before calling, ensure you have all the information described above.

Region	Phone Number
Americas	+1-800-698-0061, press 3
Asia, Australia	+65 271 0915
Europe, Africa, Middle East	+31 20 547 9900

Returning the System for Service

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

Warranty

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 (the warranty is at the front of this manual). 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 80) 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.

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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.

Preparing the System for Shipping

Do This	Additional Information

1 Write a complete description of the failure and attach it to the system.	Include any specific performance details related to the problem. The following information should be returned with the system:
	▪ Type of service required
	▪ Date system was returned for repair
	▪ Description of the problem:
	  ▪ 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

2 Cover all front and rear panel connectors that were originally covered when you first received the system.	
3 Pack the system in the original shipping containers. Original materials are available through Agilent Technologies office. See step 4 for more information.	
4 Wrap the system in anti-static plastic to reduce the possibility of damage caused by electrostatic discharge.	▪ 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. ▪ 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.

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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.

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9 — Safety and Regulatory Information

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 has 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 is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2, per IEC 1010 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.

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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.

Symbols

The following are standard symbols that appear on equipment panels. For a complete list of panel symbols, see *11 — Quick Reference Guide*.

	AC power input
	DC power input
	Power switch ON position
	Power switch STANDBY or IGNITION SENSE position
	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).
	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.

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Declaration of Conformity

Agilent Technologies	**DECLARATION OF CONFORMITY** According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014	CE

Manufacturer's Name: Agilent Technologies, Incorporated
Manufacturer's Address:

6060 Northwest Highway
Chicago, Illinois, 60631
USA

Declares, that the product

Product Name: Network Optimization Solution Hardware
Agilent Direct Connect Hub
Model Number: E6473A
Product Options: This declaration covers all options of the above product(s).

Conforms with the following European Directives:
EN 55011:1991, Amendments A1:1997& A2:1996 (C.I.S.P.R. 11, 1990-09, 2nd edition)
Group 1, Class A ISM Equipment for Industrial, Scientific, and Medical Equipment

EMC Requirements Part 1: General Requirements (IEC 61326-1, April 1997)
IEC Publication 1000 Electromagnetic Compatibility (EMC)
IEC 1000-4-2 (1995-01); IEC 1000-4-3 (1995-02); IEC 1000-4-4 (1995-01); IEC 1000-4-5 (1995-02); IEC 1000-4-6 (1995-03-03)
IEC 1000-4-8 (1993) ; & IEC 1000-4-11 (1994)

Conforms with the following product standards:

EMC	Standard	Limit
	CISPR 11:1990 / EN 55011:1991	*Group 1 Class A*
	IEC801,1000-4, 61000-4-2:1995	*4kV CD, 8kV AD*
	IEC 801,1000-4, 61000-4-3:1995	*3 V/m, 80-1000 MHz*
	IEC 801,1000-4, 61000-4-4:1995	*0.5kV signal lines, 1kV power lines*
	IEC 801,1000-4, 1000-4-5:1995	*0.5 kV line-line, 1 kV line-ground*
	IEC 801,1000-4, 61000-4-6:1996	*3V, 0.15-80 MHz I cycle, 100%*
	IEC801,1000-4, 61000-4-11:1994	

Revision: A.03 Issue Date: 02 APR 2001 Document No. 1503-760

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Agilent Technologies	**DECLARATION OF CONFORMITY** According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014	CE

Supplemental Information:

The product was tested in a typical configuration with Agilent Technologies test systems

April 02,2001
Date

Name JEFFREY A MILLER

Title Functional Manager, Optimization Products

For further information, please contact your local Agilent Technologies sales office, agent or distributor.
Authorized EU representative: Agilent Technologies Deutschland GmbH, Herrenberger Straße 130, D-71034 Böblingen, Germany

Revision: A.03 Issue Date: 02 APR 2001 Document No. 1503-760

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10 — Specifications

E6473 Direct Connect Hub

Operating Temperature Range	0° to +40° C
Storage Temperature Range	-40° to +85° C
Case Dimensions (approx.) Add approximately 2" (5.13 cm) for handle, connectors, and software license key	7.60" (width) x 6.78" (depth) x 1.56" (height) 19.3 cm x 17.22 cm x 3.96 cm
Weight (without phone)	1.7 lbs. / .77 kg
Power Consumption	2.75 amps, with two-phones and a single receiver 3.20 amps, with two phones and a dual band scanner
Battery Voltage (nominal)	14.8 volts
Battery Voltage, Charging	17.0 volts DC
Battery life	2.6 hours, with two-phones and a single receiver 2.2 hours, with two phones and a dual band scanner
Input voltage (in-vehicle system)	10 – 16 volts DC, 13.7 volts DC nominal

E645xx Receiver

Specifications

Operating Temperature Range	0° to +55° C
Storage Temperature Range	-40° to +70° C
Dimensions (approx.)	6.0" x 3.625" x 8.75" 15.24 cm x 9.21 cm x 22.23 cm
Weight	4.5 lbs. / 2.04 kg
Input power range (receiver only)	9 to 34 volts DC **Warning!** This range does not apply to the Direct Connect Hub. Refer to the nominal input voltage specified above.

Product Numbers

Product Number	Description
E6450B	PCS CDMA/TDMA at 1.9 GHz
E6452A	CDMA/TDMA at 850 MHz
E6453A	GSM / Korean Band CDMA at 1.8 GHz
E6454A	PCS CDMA/GSM at 1.9 GHz
E6455C	IMT-2000 Band W-CDMA (UMTS) / CDMA at 2.1 GHz (w/ GPS)

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E746xx Scanner

Specifications

Operating Temperature Range	0°C to +50° C
Case Dimensions (approx.)	7.60″ (width) x 6.78″ (depth) x 1.56″ (height)
Add approximately 1″ for handles and connectors	19.3 cm (width) x 17.22 cm (depth) x 3.96 cm (height)
Weight	1.6 lbs. / .726 kg
Power Requirements	8 to 16 volts DC; 1.2 amps maximum

Product Numbers

Product Number	Description
E7462A	CDMA at 850MHz
E7463A	CDMA at 1.9 GHz
E7464A	Japan CDMA (JCDMA) at 850 MHz
E7465A	GSM at 850 MHz
E7466A	GSM at 1800 MHz
E7467A	GSM at 1900 MHz
E7468A	GSM Dual Band at 850/1800 MHz
E7469A	iDEN®

86156A GPS/DR Navigator

Operating Temperature Range	-40°C to +60° C
Storage Temperature Range	-55°C to +85° C
Dimensions (approx.)	12.0″ (width) x 10.5″ (depth) x 3.0″ (height) 30.48 cm (width) x 26.67 cm (depth) x 7.62 cm (height)
Weight	6 lbs. / 2.72 kg
Power Requirements	10 to 16 volts DC; 5 amps maximum
Odometer Pulse Input	100 mV to 28 V P-P square wave, analog or digital. Proportional to distance traversed Minimum: 2000 pulses per mile (1.613 km) Recommended: greater than 8000 pulses per mile (1.613 km)

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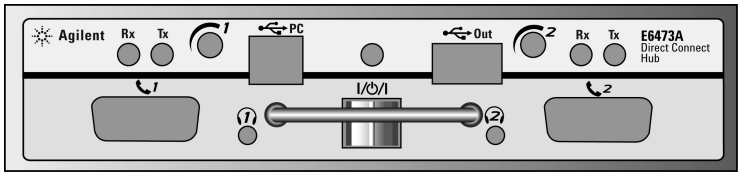
11 — Quick Reference Guide

This chapter is provided as a quick reference for the LEDs and cable connections to the panels of the E6473A Direct Connect Hub, E645xx receiver, E746xx scanner, and the 86156A GPS/DR Navigation unit. Detailed cable connection and installation information is provided in the chapters 2 through 5. A cable part number list is on page 94.

Connector Panels

E6473A Direct Connect Hub

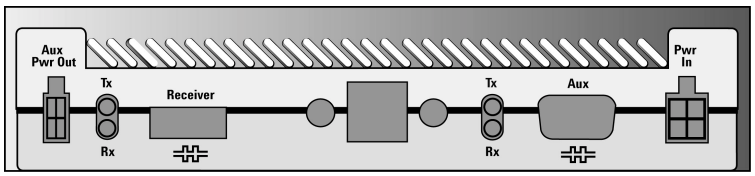
Figure 51
E6473A Direct Connect Hub Front Panel



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
1	Phone 1 audio level	Controls headset 1 audio volume
PC	USB Computer port	Connect to USB Data Cable
Out	USB Out port	Plug in the software license key, or connect cable to next E6473A
2	Phone 2 audio level	Controls headset 2 audio volume
1	Phone 1 port	Connect to phone interface cable
1	Headset for Phone 1	Connect to headset
I/O/⏻	Power switch	Left position = On Center position = Off Right position = Ignition Sense
2	Headset for Phone 2	Connect to headset
2	Phone 2 port	Connect to phone interface cable

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Figure 52
E6473A Direct Connect Hub Rear Panel

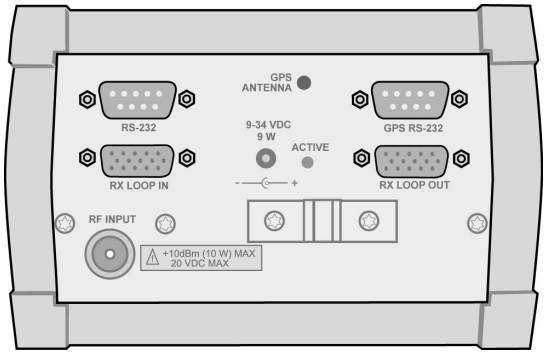


Reference	Name	Description or Cable Connection
Aux Pwr Out	Power out connection	Connect to power cable for second E645xx Receiver (if equipped)
Rx	Receive Data LED (Receiver or Aux ports)	Flashes when data is received
Tx	Transmit Data LED (Receiver or Aux ports)	Flashes when data is transmitted
Receiver	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

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E645xx Receiver

Figure 53
E645xx Receiver Connector Panel

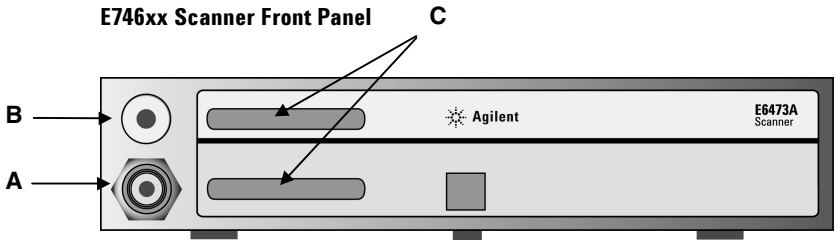


Reference	Name	Description or Cable Connection
RS-232	Receiver data port	Connect to Receiver Data/Power cable
GPS Antenna	GPS antenna connector	Connect to GPS antenna, if equipped (included with E6455C; and E6450B, E6452A, E6453A, and E6454A with option 200)
GPS RS-232	External GPS data port	(No connection)
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

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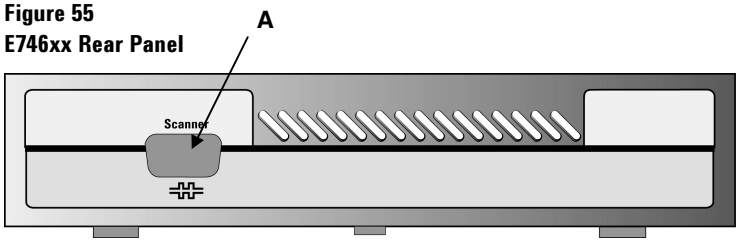
E746xx Scanner

Figure 54
E746xx Scanner Front Panel



Reference	Name	Description or Cable Connection
A	RF Antenna	Connect to antenna cable (for E7468A, match antenna with label)
B	GPS antenna connector	Connect to GPS antenna (E7462A, E7463A, E7464A only) Or Connect to second RF antenna (E7468A only)
C	Label	Indicates antenna to be connected

Figure 55
E746xx Rear Panel

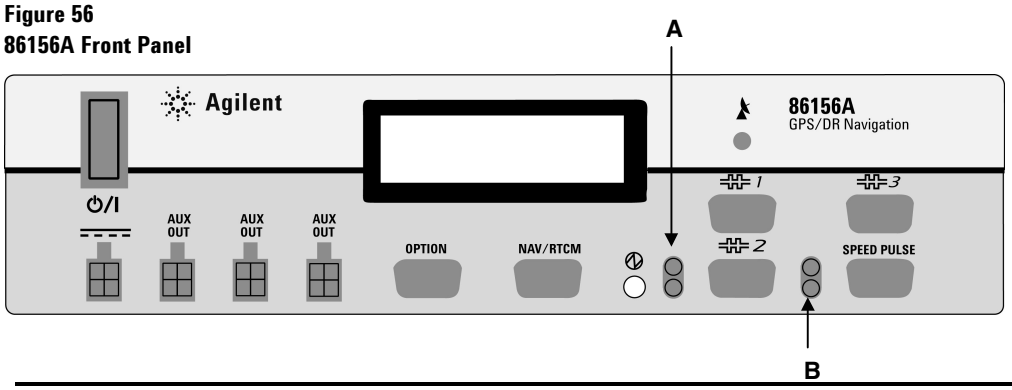


Reference	Name	Description or Cable Connection
A	Scanner	Connect to Scanner/Data cable

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86156A GPS/DR Navigation

Figure 56
86156A Front Panel



Reference	Name	Description or Cable Connection
⏻/I	Power switch	(Not used – power is switched On/Off by the ignition switch)
	GPS antenna	Connect to the GPS antenna cable
⎓	Power input	(Not used – power cable is connected to a connector on the rear panel)
AUX OUT	Power output connections	(Not used)
OPTION	Option port	(Not used)
NAV/RTCM	Calibration port	Connect the calibration cable to this port when calibrating speed pulse and heading sensors
	CPU LED	(See page 72)
1	Serial port 1	Connect to GPS Data cable
2	Serial port 2	(Not used)
3	Serial port 3	(Not used)
SPEED PULSE	Speed Pulse input	Connect to Speed Pulse cable
A	Serial port 1 LED	Flashes when data is sent or received
B	Speed Pulse LED	Flashes when speed pulses are received

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Cable Part Numbers

Part Number	Description
E6473-60003	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)
E6473-60011	4-to-1 lighter socket adapter for Direct Connect Hub, GPS receiver, phone
E6473-60014	Phone interface cable w/o RF, QCP860/1960/2760
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)
E6473-60017	Phone interface cable with ext. RF antenna, QCP860/1960/2760

Receivers and Scanners

Part Number	Description	Available Options
E6450B	PCS CDMA/TDMA receiver, 1.9GHz	GPS (option 200)
E6452A	Cellular CDMA/TDMA receiver, 850 MHz	GPS (option 200) Japan cellular band (option H02)
E6453A	GSM/Korean band CDMA receiver, 1.8GHz	GPS (option 200)
E6454A	PCS CDMA/GSM receiver, 1.9GHz	GPS (option 200)
E6455C	IMT-2000 band W-CDMA (UMTS) / CDMA receiver, 2.1 GHz (with GPS)	
E7462A	CDMA scanner, 850 MHz	
E7463A	CDMA scanner, 1900 MHz	
E7464A	Japan CDMA scanner, 850 MHz	
E7465A	GSM scanner, 850 MHz	
E7466A	GSM scanner, 1800 MHz	
E7467A	GSM scanner, 1900 MHz	
E7468A	GSM dual band scanner, 850/1800 MHz	
E7469A	iDEN® scanner	

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Hardware Included with Software Licenses

E6474A Software option licenses include the following hardware items:

Component	Part Number	Description
Software license key for Parallel port	E6474-10002	Contains the E6474A software options that you have ordered. Plugs into the computer's Parallel port.
Software license key for USB port	E6474-10003	Can be programmed with the E6474A or E74xx software options that you have ordered using the License Manager software. 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.

Option Descriptions

Option 010: In-vehicle (Drive Test) Direct Connect Hub

Option 010 contains the following core components for an in-vehicle system.

Component	Part Number	Description
Direct Connect Hub	E6473-60001	Controller unit and central connection point for the phones, receiver, navigator, and computer.
Mounting plate	E6473-60002	Attaches to the vehicle. Can also be attached to a CarPack mount for a 86156A GPS/DR Navigator.
Power cable, permanent install	E6473-60003	Power cable permanently connected to the vehicle's electrical system.
Power cable, removable	E6473-60004	Power cable connected to the vehicle's lighter socket.
Direct Connect Hub to computer USB cable, 3 feet (.914 m)	E6473-60005	Connects the USB ports of the E6473A and the computer.
Direct Connect Hub to receiver cable kit	E6473-60006	Connects the E645xx receiver to the E6473A. Supplies power and data.
Direct Connect Hub to computer USB cable 15 feet (4.57 m)	E6473-60010	Connects the USB ports of the E6473A and the computer.

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Option 020: Portable Direct Connect Hub Kit

Option 020 contains the following core components for a portable system.

Component	Part Number	Description
Direct Connect Hub	E6473-60001	Controller unit and central connection point for the phones, receiver, and computer
Power cable	E6473-60004	Connects the Direct Connect Hub to a vehicle's lighter socket
Direct Connect Hub to computer USB cable, 3 feet (.914 m)	E6473-60005	Connects the USB ports of the Direct Connect Hub and the computer
Direct Connect Hub to receiver cable kit	E6473-60006	Connects the E645xx receiver to the E6473A. Supplies power and data
Carrying case	E6473-60007	Houses the USB Hub and the battery for portable operation
Lithium-Ion battery (main power)	E6473-60008	Powers the E6473A, phone, and receiver
Battery charger and cable	E6473-60009	Charges the battery outside of the backpack
Power adapter	E6473-60011	4-to-1 lighter socket adapter that the Direct Connect Hub and the GPS receiver power cables plug into

Option 040: Single Receiver Carry Case

Component	Part Number	Description
Carrying bag	E6473-60013	Houses the Direct Connect Hub, battery, and one E645xx receiver for portable operation.
Indoor antenna	E6473-60016	Indoor antenna for an E645xx receiver.

Option 041: Dual Receiver Carry Case

Component	Part Number	Description
Dual receiver carrying bag	E6473-60020	Houses the Direct Connect Hub, battery, and two E645xx receivers for portable operation.
(2) Indoor antennas	E6473-60016	Indoor antennas for two E645xx receivers.

Option 090: CDMA Walkabout Conversion Kit

Component	Description
E6473A option 020	Portable Direct Connect Hub kit
E6474A option 120	Network Optimization Software CDMA combo license
Scanner housing	Hardware to retrofit a DTI scanner with the new package

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Option 091: GSM Walkabout Conversion Kit

Component	Description
E6473A option 020	Portable Direct Connect Hub kit
E6474A option 220	Network Optimization Software GSM combo license
Scanner housing	Hardware to retrofit a DTI scanner with the new package

Option 094: iDEN® Walkabout Conversion Kit

Component	Description
E6473A option 020	Portable Direct Connect Hub kit
E6474A option 420	Network Optimization Software iDEN combo license
Scanner housing	Hardware to retrofit a DTI scanner with the new package

Option 801: CDMA 820/1920/2700 Phone Interface Cable Kit

Component	Description
CDMA QCP 820, 1920, 2700 phone interface cable, 3 feet (.914 m)	Connects the phone to the Direct Connect Hub
Phone extender cable, 15 feet (4.57 m)	Connected between the phone interface cable and the Direct Connect Hub
DB9 converter (9 to 26 pin)	Used to adapt the 26 pin phone interface cable to the Serial port of a computer.
Headset	Connects to the Headset jack of the Direct Connect Hub

Option 802: CDMA 860/1960/2760 Phone Interface Cable Kit

Component	Description
CDMA QCP 860, 1960, 2760 phone interface cable, 3 feet (.914 m)	Connects the phone to the Direct Connect Hub
Phone extender cable, 15 feet (4.57 m)	Connected between the phone interface cable and the Direct Connect Hub
DB9 converter (9 to 26 pin)	Used to adapt the 26 pin phone interface cable to the Serial port of a computer.
Headset	Connects to the Headset jack of the Direct Connect Hub.

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Option 820: GSM Phone Interface Cable Kit

Component	Description
GSM OT55P, OT55G, OT55D, OT75M, OT95 phone interface cable, 3 feet (.914 m)	Connects the phone to the Direct Connect Hub (without external RF antenna connection)
Phone extender cable, 15 feet (4.57 m)	Connected between the phone interface cable and the Direct Connect Hub
DB9 converter (9 to 26 pin)	Used to adapt the 26 pin phone interface cable to the Serial port of a computer.
Headset	Connects to the Headset jack of the Direct Connect Hub.

Option 821: GSM Phone Interface Cable Kit

Component	Description
GSM OT55P, OT55G, OT55D, OT75M, OT95 phone interface cable, 3 feet (.914 m)	Connects the phone to the Direct Connect Hub (with external RF antenna connection)
Phone extender cable, 15 feet (4.57 m)	Connected between the phone interface cable and the Direct Connect Hub
DB9 converter (9 to 26 pin)	Used to adapt the 26 pin phone interface cable to the Serial port of a computer.
Headset	Connects to the Headset jack of the Direct Connect Hub.
External dual band antenna	Connects to phone interface cable

Option 860: iDEN® i1000 Phone Interface Cable Kit

Component	Description
iDEN i1000 Plus phone interface cable, 3 feet (.914 m)	Connects the phone to the Direct Connect Hub
Phone extender cable, 15 feet (4.57 m)	Connected between the phone interface cable and the Direct Connect Hub
DB9 converter (9 to 26 pin)	Used to adapt the 26 pin phone interface cable to the Serial port of a computer.
Headset	Connects to the Headset jack of the Direct Connect Hub.

Option 899: Phone Antenna Cable Kit

Component	Description
Antenna kit	Antenna, magnetic mount, and cable
Phone adapter cable	Connected between the phone and the antenna cable

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Index

Battery
  Charging, 75
  Handling and Disposal, 76
  Specifications, 76
Cascading two Direct Connect Hubs, 18, 28, 67
Dual receiver backpack
  All-weather cover, 43
  Cable routing, 38
  Features, 37
  Pen tablet, 41
  Strapping on, 40
Dual Serial PCMCIA card, 3, 29, 45
E747xx system upgrade
  In-vehicle dual receiver, 16
  In-vehicle single receiver, 14
  Overview, 7
  Phone connections, 18, 28, 44, 67
  Portable dual receiver, 12
  Portable single receiver, 10
Edgeport USB drivers, installing, 4
Garmin GPS connections, 60
GPS/DR Navigator
  Display and LEDs, 72
  Error indications, 73
  Sensor calibration, 74
Installation
  Direct Connect Hub base plate, 47
  Navigator base plate, 50
In-vehicle system cable connections
  Direct Connect Hub and Scanner, 59
  Hub, Scanner, and GPS/DR Navigator, 61
  One receiver, 64
  Two receivers, 63
  Two receivers and GPS/DR Navigator, 65
In-vehicle system installation
  Antennas, 53
  Baseplate, 47, 50
  Computer mount, 54
  Direct Connect Hub, 47, 51
  GPS/DR navigator, 49
  Guidelines, 46
  Main power cable, 55
  Overview, 45
  Receiver, 47, 51
  Speed Pulse cable, 58
License manager, 5
Panel connectors
  86156A GPS/DR Navigation, 93
  E645xx Receiver, 91
  E6473A Direct Connect Hub front, 89
  E6473A Direct Connect Hub rear, 90
  E746xx Scanner, 92
Phone connections, 18, 28, 44, 67
PLCRINIT, 74
Portable system setup
  Dual receiver system, 36
  Overview, 29
  Single receiver system, 33
  Single scanner system, 30
Power-up
  Direct Connect Hub, 69
  GPS/DR Navigator, 70
  Toshiba phone, 70
Returning for service, 79
Safety and regulatory information, 83
Shipping preparation, 80
Software installation
  Data collection, 5
  Edgeport USB drivers, 4
Software license key, 5, 7, 21, 29, 45
Specifications
  86156A GPS/DR Navigation, 88
  E645xx Receiver, 87
  E6473A Direct Connect Hub, 87
  E746xx Scanner, 88
Speed Pulse cable installation, 58
Technical Suppport, 79
Walkabout system upgrade
  In-vehicle system, 24
  In-vehicle system with Nav Plus, 26
  Overview, 19
  Portable system, 22
  Scanner retrofit, 20
Warning and Caution, defined, 83
Warranty, 79

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