Agilent Technologies
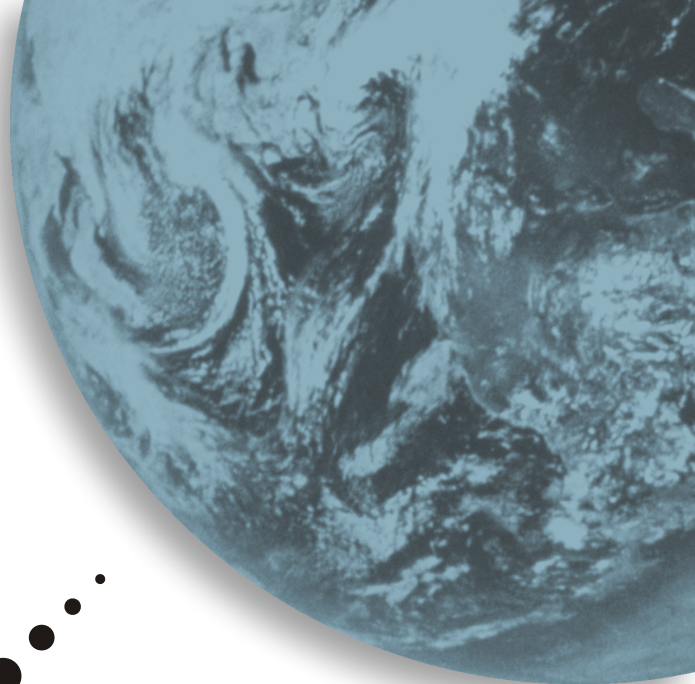# E7473A, E7474A, E7475A, E7476A, E7477A, E7490A

Drive Test Wireless Solutions

Getting Started Guide

Agilent Technologies

Getting Started Guide

Agilent Technologies E7473A, E7474A,
E7475A, E7476A, E7477A, E7490A
Drive Test Wireless Solutions

Safety and Regulatory Information

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the system. This product has been designed and tested in accordance with appropriate international standards.

For more details on Safety and Regulatory Information, refer to "Safety and Regulatory Information" on page 177

MUST READ FIRST

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.

Welcome to Your Agilent Wireless Solutions

Thank you for choosing Agilent Technologies, Inc. In this getting started guide, you'll find the setup instructions you need to begin taking measurements.

Follow These Steps

To Do This	See This	And Check This
Install the software.	Chapter 1, "Installing the Software"	If you have purchased a computer from Agilent with your system, the software came pre-installed. Go to step 2.
Set up your system.	Chapter 2, "Setting Up Your System"	You'll find all system configuration information, including **GPS** (Global Positioning System) setup here.
Verify the system.	Chapter 4, "Verifying the System"	Perform these tests to ensure that your system is ready to make measurements.
Start the software.	Chapter 3, "Starting and Learning to Use the Software"	An online tutorial and online help instruct you how to use your system.

If You Need Help...

To Do This...	See This
Get training	**http://agilent.com/find/networks** Check the web site for information about training registration, software updates, phone support, FAQs, and more.
Get help	Chapter 5, "Solving Problems and Updating Your System" Find GPS installation tips and more. Once you start the software, press **F1** to use the extensive help system.
Check specification or confirm the contents of your system.	*Agilent System Information Guide* for your specific system number.

Online Getting Started Guide

If you would like an additional copy of this Guide, check the following web site for the latest PDF[1] version:

http://agilent.com/find/manuals and then search for your system type

This PDF version has also been loaded with your application software, if you chose the typical installation. For more information on accessing this and other online documentation, refer to "Additional Documentation" on page 131.

Systems Covered by this Guide

The following table outlines the wireless solutions covered by this guide. For more detailed lists of system options and accessories, refer to the *Agilent System Information Guide*. This guide has been loaded with your application, if you chose the typical installation. For more information on accessing this guide and other online documentation, refer to "Additional Documentation" on page 131.

System Part Number	Description
Agilent E7473A	CDMA Cellular and PCS Network Test System
Agilent E7474A	TDMA Cellular and PCS Network Test System
Agilent E7475A	GSM900, DCS1800 and GSM1900 Network Test Systems
Agilent E7476A	W-CDMA (UMTS) Network Test Systems
Agilent E7477A	CDMA 2000 Network Test Systems
Agilent E7490A	CDMA Base Station Over Air Maintenance Test System

1. Portable Document Format - online version that can be viewed using Adobe ® Acrobat reader.
    For more information about this reader, refer to http://www.adobe.com

Contents

1

Installing the Software

What You'll Find in This Chapter

To Do This	See This
Install the system software	"Installing the Software" on page 13
Install the License Manager software	"Agilent Technologies License Manager" on page 15
Install Adobe Reader	"Installing Adobe Reader" on page 16
Install Socket I/O card software	"Installing Socket PCMCIA I/O Card Software" on page 17

Read This First

If you purchased your laptop computer as part of Agilent 86154A option 010 or option 030, the software came factory-installed. Skip this procedure and go to "Setting Up Your System" on page 19.

The factory-installed software does not include Adobe Reader.

Install
Software

Installing the Software

Before you begin installing the software, ensure that your computer system is configured with the minimum requirements. Check "Personal Computer Recommendations, Minimum" on page 68 for information.

Follow These Steps

Do This	See This
1 Insert the CD-ROM into the CD-ROM drive, choose **Start>Run**, and type **d:\setup** where d: is the drive containing the software CD-ROM. Click **OK**.	A Welcome dialog box appears instructing you to close any currently running Windows applications before you begin installation.
2 Click **Next** when you are ready to continue the installation. Type your name and the name of the company you work for, then click **Next**.	The "Choose Destination Location" dialog box appears. The default folder for installation is C:\Program Files\Agilent Technologies\E74xx (depending on the system you're installing).
3 If you wish to install the program in a folder other than the default, click **Browse** to display text. When the correct destination folder appears in the field, click **Next**.	The Setup Type box appears.
4 Select the language in which you would like to see the online help and tutorial displayed , and click **Next.**	For more information see "Online Help and Tutorial Language Options" on page 14
5 Select the type of installation you want: typical, compact, or custom, and click **Next**. •Typical: Includes Agilent E74xx application, online help files, tutorial and documentation. •Compact: Includes Agilent E74xx application and online help files •Custom: Lets you select individual components.	The Destination Folder box appears. Agilent Technologies recommends using the Typical installation. Refer to page 68 to see if you have enough disk space available to perform the Typical installation before proceeding.

Do This	See This
6 Select the destination folder for the program. The default folder is "C:\Program Files\Agilent Technologies\ E74xx" or you can select a different folder that can be found on your system. Click **Next**.	The list of folders found on your system is displayed. Agilent Technologies recommends using the default folder
7 Read the list of software installation options and check that Setup Type, Target Folder, and User Information are correct, and click **Next**.	The software installs from CD to PC.
8 Click **Finish** to complete the installation.	Depending on the files installed or updated you may be prompted to reboot your system.

NOTES

- It is recommended that new users go through the online tutorial before using the software. Refer to "Starting and Learning to Use the Software" on page 117 for instructions on running the online tutorial.

- When you run the software, disable the Windows 95 Advanced Power Management Support capabilities to significantly improve the performance of the system.

Online Help and Tutorial Language Options

During the software installation, you can select the language for the online help and tutorial (English is always the most up-to-date). The measurement software does not change. The currently supported languages are:

- Simplified Chinese
- English (default)
- Japanese

- Korean
- Brazilian Portuguese
- Latin American Spanish

To change the language, once the installation is complete, you must re-install the software.

Agilent Technologies License Manager

The hardware key that came with your Agilent Technologies system enables and secures the functionality you purchased from Agilent. The Agilent License Manager, automatically installed when you install the Agilent Wireless Solutions Software, enables you to manage licensing security information. You can use the software to:

- Add product options to license keys. You can add licenses (temporary or permanent) to the license key by entering a string obtained from an Agilent representative.
- Transfer licensed product options between license keys in order to consolidate licenses onto one key.
- Transfer a license from one key to another.
- Transfer licenses between keys on different computers. You can move license options to license keys on another computer that is located anywhere from the same room to another country.

For more information on learning and using the license manager refer to "Learning the License Manager" on page 129. Details on the operation of the license manager can be found in the online help.

Installing Adobe Reader

NOTE

Before starting the installation process, ensure that you have removed previous versions of Adobe reader. This version is Adobe Reader 4.05.

Do This	See This
1 Insert the CD-ROM into the CD-ROM drive, choose **Start>Run**, and type **d:\Acrobat\rs405eng.exe** where d: is the drive containing the software CD-ROM. Click **OK**.	A Welcome dialog box appears detailing copyright information.
2 Click **Next** when you are ready to continue the installation.	The "Choose Destination Location" dialog box appears. The default folder for installation is C:\Program Files\Adobe\Acrobat4.0
3 If you wish to install the program in a folder other than the default, click **Browse** to display text. When the correct destination folder appears in the field, click **Next**.	The software will install from CD to PC.
4 Once the installation is complete, click **OK**.	A user guide for the Adobe Reader has been provided on the CD in PDF format.
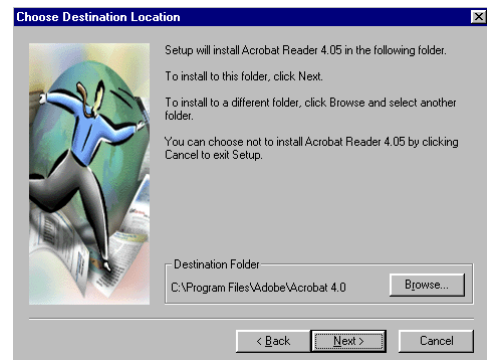
Installing Socket PCMCIA I/O Card Software

If you have a phone or phone/receiver-based system, a serial I/O card (such as the Socket Ruggedized Serial I/O card) must be installed in the **PCMCIA** slot (Personal Computer Memory Card International Association) to configure the system properly. See "Setting Up Your System" on page 19 for instructions on installing the I/O card. The software that is provided with the serial I/O card must be installed at the time the I/O card is installed.

NOTE

See Chapter 3, "Software Setup" of the *Serial I/O ™ and Ruggedized Serial I/O Card ™ User's Guide* for instructions on installing the software for that specific card.

If you are using the USB 4-Port adapter, Agilent 86154A option 036, refer to the *Agilent Technologies Indoor Test System Setup Guide* for more information.

2

Setting Up Your System

What You'll Find in This Chapter

To Do This	See This
Connect the hardware	"Hardware Installation Tips" on page 21 covers important setup information.
	"Connecting the Hardware" on page 25 covers setup of all types of systems. Refer to this page for the pages that cover your particular system.
Configure hardware automatically.	"Automatic Configuration" on page 23
Configure internal GPS.	"Internal GPS & Internal GPS with Differential Setup" on page 44
Configure multiple receivers and/or multiple phones.	"Configuring Multiple Receivers and Phones" on page 92
Review receiver connection panels and connectors.	"Universal Serial Bus (USB), 4-port Adapter Configuration" on page 105
Set pin-out specifications for serial port connection.	"Receiver to PC Serial Port Cable Configuration" on page 109
Configure other GPS units.	"RS-232 to GPS Unit Cable Configuration" on page 110
Set pin-out specifications for connecting differential GPS receiver to a receiver with an internal GPS.	"RS-232 to Differential Unit Cable Configuration" on page 111

NOTE

Trimble provides downloadable documentation on the Web. At the time of this printing, you can find the files (Microsoft Word and PDF formats) at http://www.trimble.com/mpc/placer/download/manuals.htm. If the URL has changed, use the search facility provided at the Web site (www.trimble.com). For further information about support and training, you can contact Trimble at a phone number on their Web site.

Hardware Installation Tips

<div style="text-align: right">**Setting up Hardware**</div>

Item	Information
Hardware security key	The hardware security key must be connected to the parallel port of the PC. The application runs with a limited feature set without the key. You cannot configure projects or collect data without the key.
Power supply connections	Make sure that power supply connections to the GPS, the receiver, the PC, and the phones (if applicable) are correct.
PC turn on	After all cables are connected, turn on the PC. **The PC should be the last device you turn on.**
Create a project	Make sure your hardware is properly configured.
	1 Verify hardware type and COM port settings.
	2 Open application and choose a project from the **Project** drop-down list that best represents your hardware configuration.
	3 Click **Configuration** and go to **Hardware** tab. Verify or add descriptions to complete hardware configuration or use the **Automatic Configuration** wizard (refer to "Automatic Configuration" on page 23).
	4 Click **Collection** to verify that there are no COM errors. If errors appear, repeat previous steps or refer to "Solving Problems and Updating Your System" on page 157.
	5 Click **Save As** and name current project.
	6. Set project as default project under Tools > Options >New Project and click **OK**.

Item	Information
Configuring hardware	The Wireless Solutions system assigns the serial port of the receiver to COM1 by default. If you want to use a different port, modify the serial port setting for the receiver in the application software as follows.
	1 After starting the Wireless Solutions application software, click the **Configuration** button.
	2 Select the **Hardware** tab and highlight the Agilent E645x receiver. Click the **Modify** button.
	3 Set the desired COM port. It is recommended that you accept the program defaults for other settings.
	4 If the system includes a GPS receiver, you must also change its COM port.
Cable handling	Verify all cable connections against the illustrations in the following sections of this chapter. Cables can be damaged. Please handle them carefully.
GPS verification	Can be done two ways:
	• Use the appropriate Trimble or GPS software, if applicable.
	• Use your Agilent system software.
GPS software selection	See "Selecting GPS Hardware" on page 120 for information on selecting GPS hardware in the GPS software.
Socket Serial I/O card installation	Refer to the User's Guide supplied by Socket Communications for instructions on installing the Socket Serial I/O card and driver software.
Universal Serial Bus, 4-port adapter (Agilent 86154A, option 036)	See "Universal Serial Bus (USB), 4-port Adapter Configuration" on page 105 for information on installing and using this piece of hardware.
Troubleshooting	See "Solving Problems and Updating Your System" on page 157 for troubleshooting information.

NOTE

For continued protection against fire hazard, replace the line fuse (cigarette lighter/2 amp 32 V FB fuse, Agilent part number 2110-0002) only with the same type of rating (type nA/nV). The use of other fuses or materials is prohibited.

Automatic Configuration

The Agilent Wireless Solutions Software can automatically configure hardware that has been connected to your laptop. By clicking the **Auto Config** button, you begin the automatic configuration wizard (see Figure 2-1). This wizard checks a defined list of COM ports for recognized hardware. Once all ports have been checked, the attached hardware is automatically set up with the correct settings.

The automatic configuration wizard can be used for setting up new hardware and projects, or for updating previously saved configurations.

You can speed up the configuration process by selecting the types of hardware to be attached to your system and the COM ports used. This limits the list of hardware types and COM ports searched during configuration. To enable this feature select **Tools > Options > Other >"Enable auto-config COM and device customization"**. See Figure 2-2, and Figure 2-3 on page 24.

Automatic Configuration button
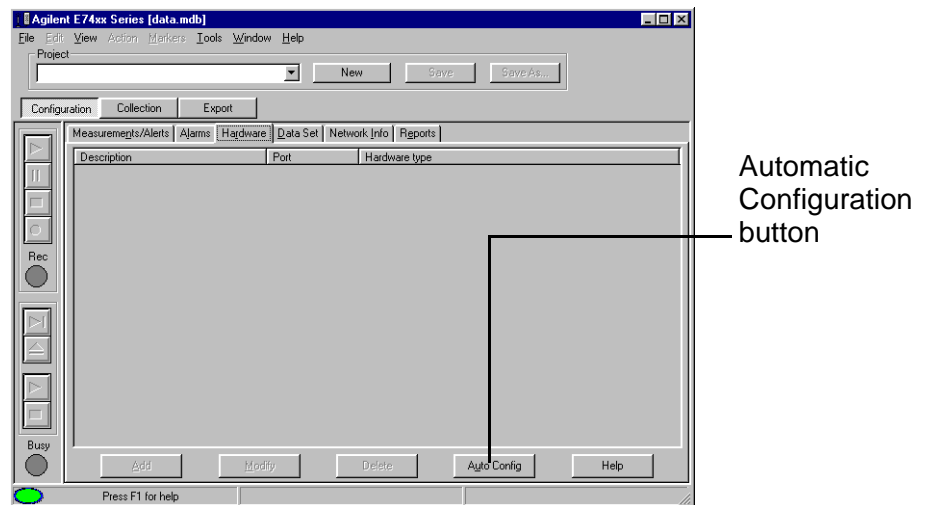
Figure 2-1 Accessing the Automatic Configuration Wizard
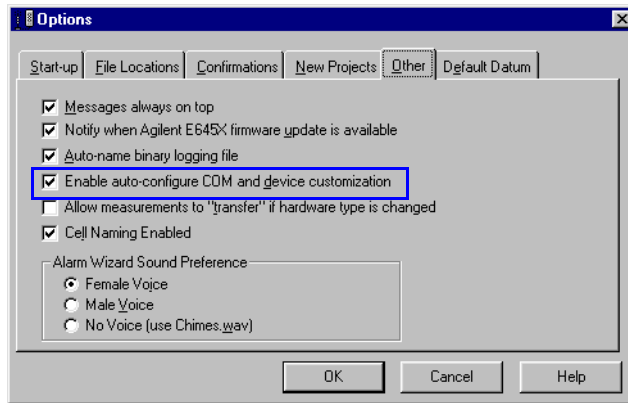
Figure 2-2 Enabling the auto-configuration customization features
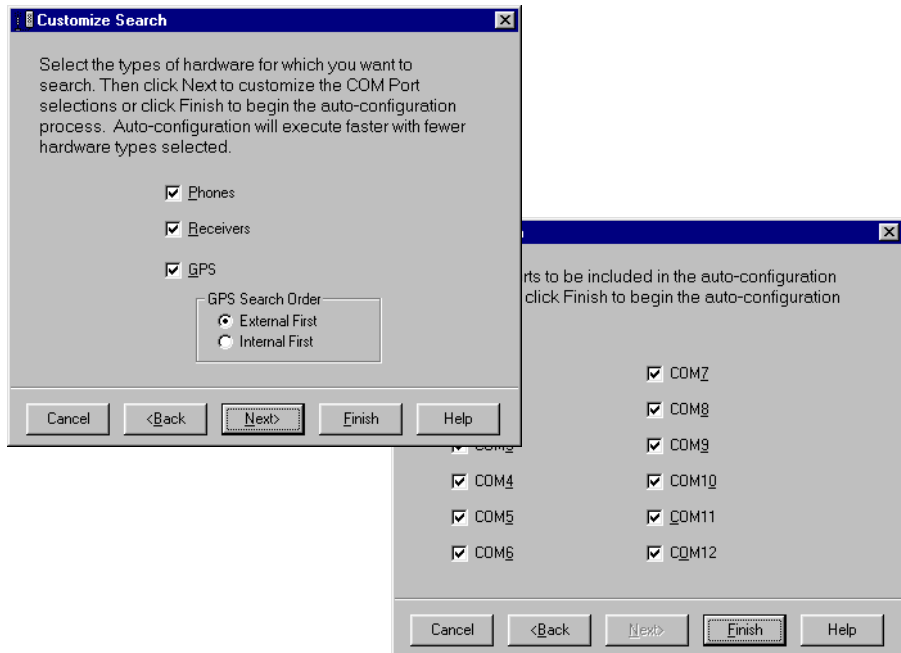
Figure 2-3 Defining COM ports and device types to be searched during the
configuration process

Connecting the Hardware

The software *must* be installed before you install the hardware. If your system includes 86154A option 010, a laptop computer, or 86154A option 030, a pen tablet computer, the software was factory-installed. Otherwise, refer to "Installing the Software" on page 11 for instructions.

Table 2-1 directs you to the configuration instructions for receiver, phone, and combination systems with most types of GPS. If you have a GPS that is not listed, use Table 2-1 to find the one that most resembles your own. Also refer to the pin-out illustration "RS-232 to GPS Unit Cable Configuration" on page 110.

Setting up Hardware

Table 2-1 *GPS System Configurations*

If You Have This	with Receiver Only	with Phone Only	with Receiver and Phone
Trimble Placer GPS/DR	page 28	page 72	page 50
Trimble Placer GPS 455	page 36	page 80	page 58
Trimble Placer 455 & Differential	page 40	page 84	page 62
Trimble Placer GPS 455 with Dead Reckoning	page 46	page 88	page 68
Internal GPS & Differential	page 44		page 66
Trimble Placer GPS 400 or SVeeSix	page 32	page 76	page 54

NOTE   Your system can be configured using either Agilent Technologies supplied options or customer-supplied components.

CAUTIONS

- The input power to the Agilent digital receiver should not exceed -10 dBm. Receiver measurements are not warranted for power levels between -10 dBm and 10 dBm. Power levels greater than 10 dBm damage the instrument.

- For optimum performance, it is recommended that no more than -40 dBm be applied to the input of all other types of receivers.

- Never test the vehicle's battery when your GPS is connected to it. First, disconnect the GPS receiver, and then test your battery. Never "jumpstart" your vehicle's battery with the GPS connected. It may cause severe damage to the GPS receiver.

NOTES
- Agilent Technologies suggests that you verify that the GPS is working properly before you connect it to the Agilent Wireless Solutions system.

- The Trimble Placer DR, Trimble Placer GPS 400, and SVeeSix Plus DO NOT have battery backup. If the DC power supply is removed (without external lithium battery backup), these GPS receivers will lose their settings after 15 minutes, which causes them to re-set to their default values.

- If the Trimble GPS has no battery backup connected, when the Trimble GPS receiver is turned on again, it will be set to the defaults. You will have to wait some time until the Trimble GPS receiver is locked and tracking the satellites before the correct coordinates are shown. Otherwise, the Trimble GPS receiver will see (by design) the Santa Clara, CA, coordinates. If this happens, allow some time (up to 30 minutes) before doing the actual network test, to ensure the correct coordinates are acquired.

Setting up
Hardware

Receiver-Based System Setup

Trimble Placer GPS/DR

The setup for the Trimble Placer GPS/DR receiver is shown in Figure 2-4.
When connecting your system with a Trimble Placer GPS/DR receiver, the
86154A option 211 (adapter cable) is required.

Before you begin the hardware installation procedure, please review
"Hardware Installation Tips" on page 21.
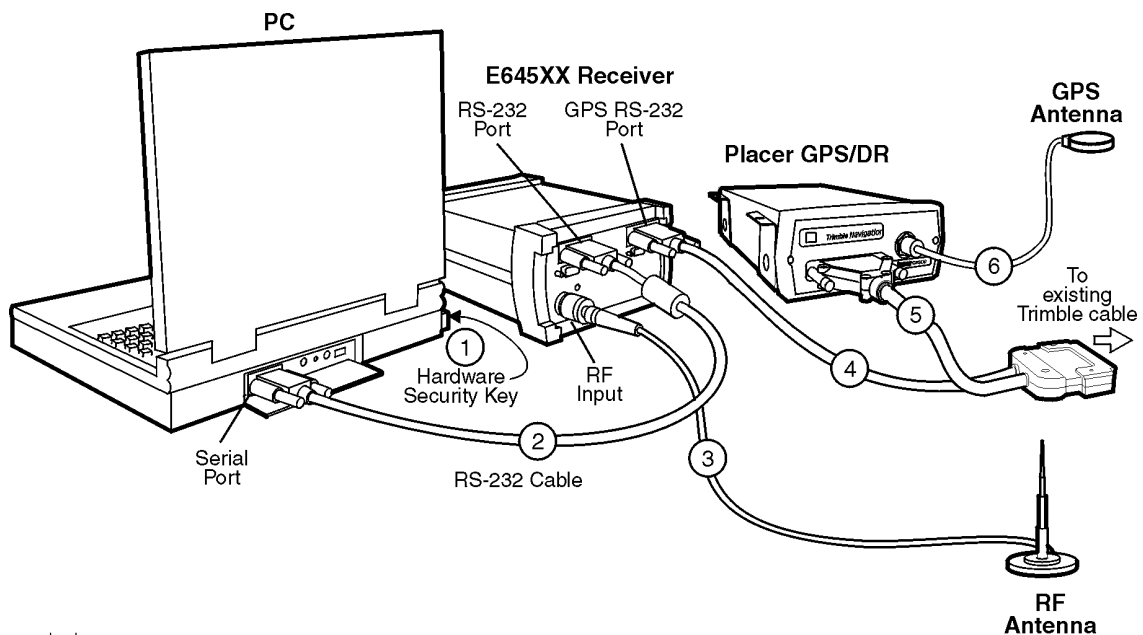
sgpsdr.cdr

Figure 2-4 Trimble Placer GPS/DR

Configuring with a Trimble Placer GPS/DR

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the
    Agilent E645x receiver using an RS-232 straight-through cable. The
    default serial port used by the application is multiplexed serial, COM1. If
    your PC uses a different COM port, you can specify a different serial port
    number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver.
    Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the end of Agilent cable 86154A option 211, labeled GPS RS-
    232, to the GPS RS-232 port of the receiver.

5. Connect the 37-pin connector of the Agilent cable 86154A option 211 to
    the existing Trimble Placer GPS/DR connector. Connect the remaining
    end of the Agilent cable 86154A option 211 to the Trimble Placer GPS/
    DR cable.

6. Connect the GPS antenna to the GPS ANT port of the Trimble Placer
    GPS/DR antenna. Agilent Technologies recommends that a "bulkhead
    mount" GPS antenna be used whenever possible for improved
    performance.

7. Connect power to the Trimble Placer GPS/DR and the PC.

8. Turn on the Trimble Placer GPS/DR and the Agilent E645x receiver.

9. Turn on the PC and run the application.

10. Select or create the project you are going to use.

11. Configure the GPS unit for the Trimble Placer GPS/DR with **TAIP**
    (Trimble ASCII Interface Protocol) protocol:

    a. Select the **Configuration** mode.
    b. Select the **Hardware** tab.
    c. Double-click the GPS icon, or select GPS, then click the **Modify** button.
    d. In the Hardware Type box, select the GPS (Placer DR, 400, SV6;
        TAIP), and click **OK**.

Setting up
Hardware

Accept the default settings for baud rate, parity, and so forth. See "Selecting GPS Hardware" on page 120 for more information.

NOTE

If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Trimble Placer GPS 400 or SVeeSix

The setup for the receiver with a Trimble Placer GPS 400 or SVeeSix receiver is shown in Figure 2-5. When using the Trimble Placer GPS 400 or SVeeSix receiver, a standard, straight-through, RS-232 9-pin cable is required.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.
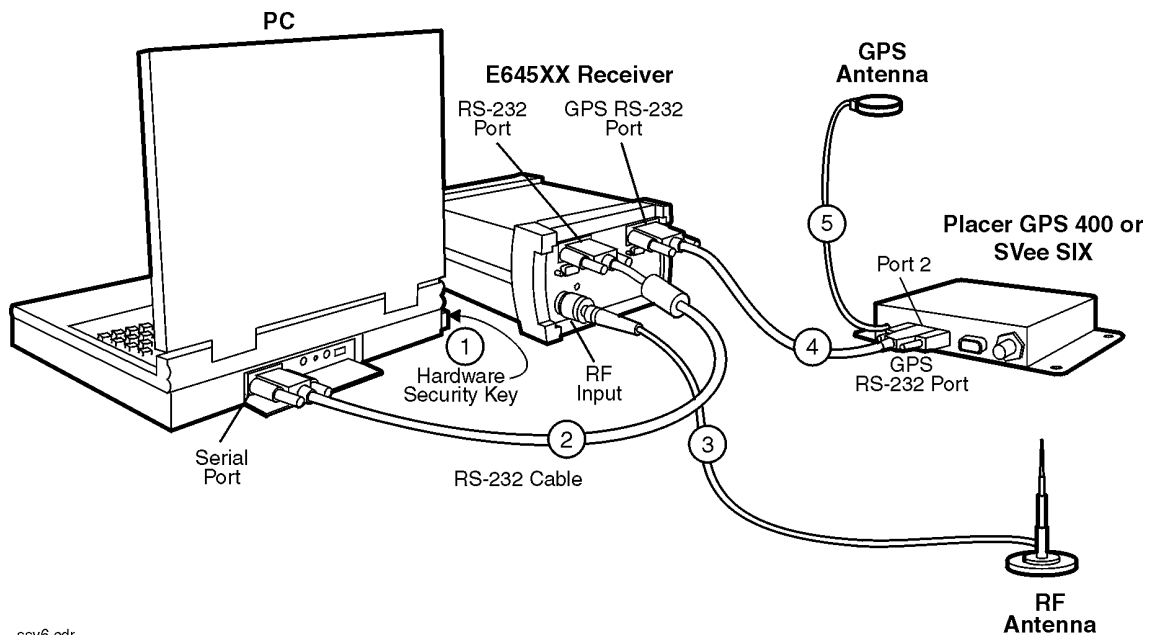
Figure 2-5 Trimble Placer GPS 400 or SVeeSix

NOTE   The Trimble Placer SVeeSix Plus operates from 9 to 32 VDC (NO internal battery backup). The red wire must be tied to the positive side of the power supply. The black wire must be tied to the negative side of the power supply. Optionally, the yellow wire may be tied to a backup power source, such as a lithium battery (operates from 3.5 to 14 VDC).

Configuring a Trimble Placer GPS 400 or SVeeSix

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using an RS-232 cable. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different com port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect one end of a standard, straight-through, RS-232 9-pin cable to the GPS RS-232 port of the Agilent E645x receiver. Connect the other end of the RS-232 cable to the Trimble Placer GPS 400 or SVeeSix connector.

5. Connect the GPS antenna to the GPS ANT port of the Trimble Placer GPS 400 or SVeeSix unit.

6. Connect power to the Trimble Placer GPS 400 or SVeeSix and the PC.

7. Turn on the Trimble Placer GPS 400 or SVeeSix, and the PC, and run the application.

8. Select or create the project you are going to use.

9. Select Configuration mode.
   a. Select the Hardware tab.
   b. Double-click the GPS icon, or select GPS then click **Modify.**
   c. In the Hardware Type box, select GPS (Placer DR, 400, SV6; TAIP) if the Trimble Placer SVeeSix has TAIP.
      See part number XXXXX-63.
   d. In the Hardware Type box, select GPS (SV6, SK8; TSIP) if the Trimble Placer SVeeSix has TSIP (Trimble Standard Interface Protocol). See part number XXXXX-61.
   e. In the Hardware Type box, select GPS (NMEA) if the Trimble Placer SVeeSix has NMEA. See part number XXXXX-62.
   f. Click **OK.**

Setting up
Hardware

Accept the default settings for baud rate, parity, and so forth. See "Selecting GPS Hardware" on page 120 for more information.

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Trimble Placer GPS 455

The setup for the receiver with a Trimble Placer GPS 455 receiver is shown in Figure 2-6.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

If the Trimble Placer GPS 455 receiver is supplied by Agilent as option 210, all necessary cables are included. If the Trimble Placer GPS 455 receiver is customer supplied, 86154A option 212 is required.
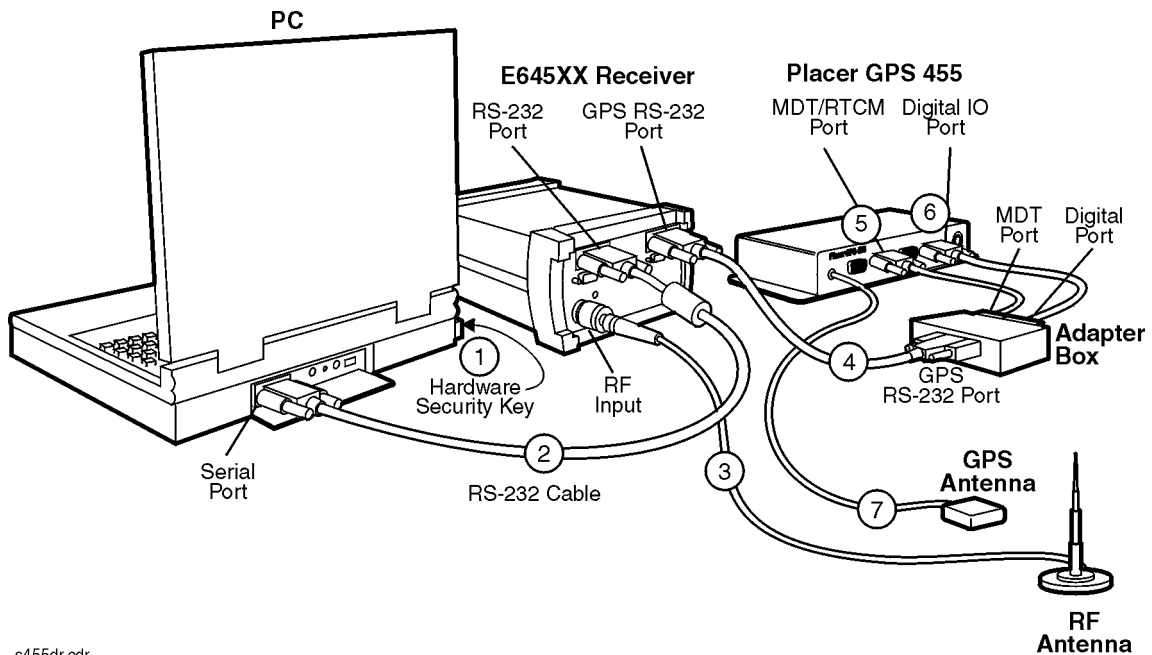
Figure 2-6 Trimble Placer GPS 455

NOTE   The Trimble Placer GPS 455 operates on 10 to 32 VDC (internal battery backup keeps the last GPS settings). The red and white wires must be tied to the positive side of the power supply. The black wire must be tied to the negative side of the power supply. To turn on the GPS receiver when starting the vehicle, the white wire must be tied to the ignition switch.

Setting up
Hardware

Configuring a Trimble Placer GPS 455

NOTE   Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x Receiver using the RS-232 cable included with the system. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS RS-232 port of the Agilent E645x receiver to the GPS RS-232 port of the adapter box, using the RS-232 straight-through cable.

5. Connect the MDT port of the adapter box to the MDT/RTCM port of the Trimble Placer GPS 455 unit, using the RS-232 straight through cable.

6. Connect the digital port of the adapter box to the Digital IO port of the Trimble Placer GPS 455 unit, using the RS-232 straight-through cable.

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

8.   Turn on the Trimble Placer GPS 455 unit and the PC.

9.   Configure the Trimble Placer GPS 455 unit for the correct settings. See "Selecting GPS Hardware" on page 120 for more information.

Trimble Placer GPS 455 & Differential

The setup for the receiver with a Trimble Placer GPS 455 and Differential receiver is shown in Figure 2-7.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

86154A option 230 provides a differential GPS, with all necessary cables included. A differential GPS may also be customer supplied.

If the Trimble Placer GPS 455 receiver is supplied by Agilent as option 210, all necessary cables are included. If the Trimble Placer GPS 455 receiver is customer supplied, 86154A option 212 is required.

Figure 2-7 Trimble Placer GPS 455 and Differential GPS

Configuring a Trimble Placer GPS 455 and Differential

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using the RS-232 cable included with the system. The default serial port used by application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS RS-232 port of the Agilent E645x receiver to the GPS RS-232 port of the adapter box, using the RS-232 cable.

5. Connect the RTCM port of the Trimble-supplied communications cable to the differential GPS receiver, using the RS-232 cable included with the system. Connect the remaining port of the Trimble-supplied communications cable to the MDT/RTCM port of the Trimble Placer GPS 455 unit.

6. Connect the digital port of the adapter box to the Digital IO port of the Trimble Placer GPS 455 unit, using the RS-232 cable.

7. Connect the MDT/RTCM port of the adapter box to the MDT port of the Trimble-supplied communications "T" cable, connected to the Differential, using the RS-232 cable.

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

9. Connect the VHF Differential GPS antenna to the Differential GPS unit.

10. Connect power to the differential GPS unit, the Trimble Placer GPS 455 unit, and the PC.

11. Turn the differential GPS unit, the Trimble Placer GPS 455 unit, and the PC on. Refer to "Selecting GPS Hardware" on page 120 to configure the Agilent Wireless Solutions Software.

Setting up
Hardware

NOTE

Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

Configuring the Differential GPS Communications Port When Using a Differential GPS

1. If your system includes an Agilent E645x receiver 86154A option 230 differential GPS receiver, the baud rate of the Differential Corrections Inc., (DCI) Differential GPS model RDS 3000, and the baud rate of the Trimble GPS receiver unit must be the same.

    Please refer to the manuals supplied by Differential Corrections, Inc. and Trimble Navigation, Limited.

2. Connect the differential GPS to the serial port of the PC.

3. Run the software supplied by DCI with the differential GPS (*rtcmon.exe*). (The file is contained on the disk that comes with 86154A option 230.)

4. Press F1 to set the correct baud rate for the differential GPS. Use the following table to set the baud rate for the Trimble model you are using.

Table 2-2 Trimble Baud Rate Settings

Differential GPS	Use F1 to set the baud rate of the DCI model RDS 3000 differential GPS	Then use F2 to set the baud rate of the PC serial port
Placer GPS/DR	9600	9600
Trimble Placer GPS 455	9600	9600
Agilent E645x with internal GPS (Trimble model SK-8)	4800	4800

When the differential GPS is correctly configured, it will start to send legible information to the PC. If the subscription is active, this information will be correction data, otherwise it will be scanned frequencies.

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of
                  GPS hardware configuration box. The default datum can be set using the
                  Tools > **Options** and selecting the Default Datum tab.

Please contact DCI for information about getting a subscription to activate
your differential GPS. When it is activated, it will be ready to work with the
Agilent Technologies system.

Setting up
Hardware

Internal GPS & Internal GPS with Differential Setup

The setup for the internal GPS, including 86154A option 230, Differential GPS, is shown in Figure 2-8. Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

The internal GPS can not be used with Dead Reckoning. The internal GPS can, and most often will, be used *without* the differential GPS.
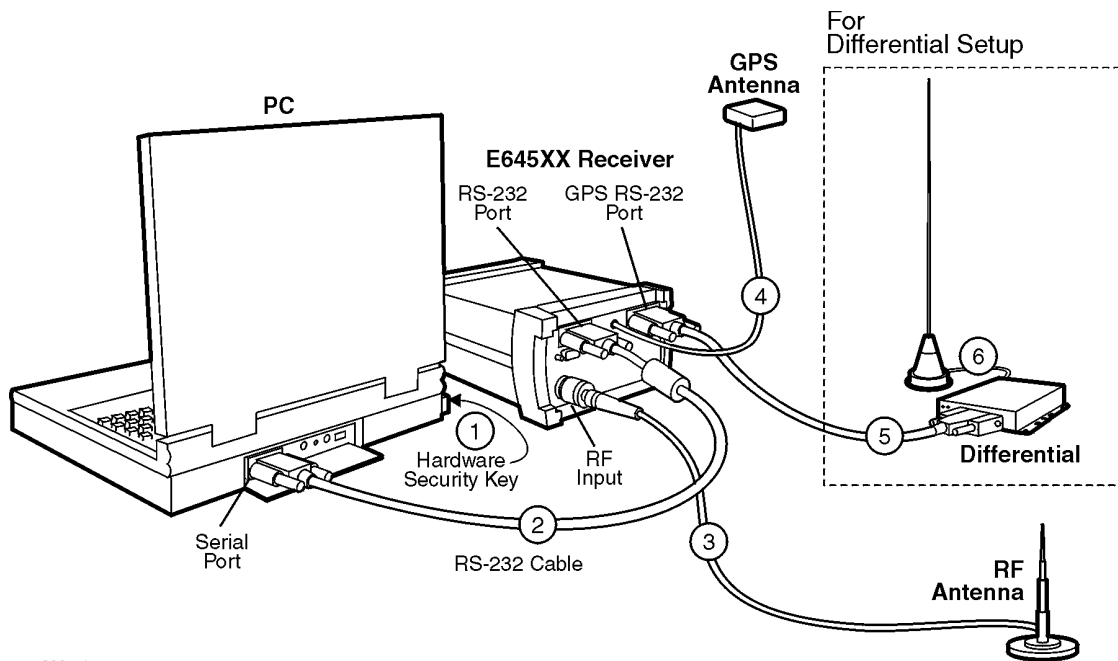
s200.cdr

Figure 2-8 Internal GPS and Internal GPS with Differential

Setting up Hardware

Configuring an Internal GPS

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using the RS-232 cable included with the system. The default serial port used by the application is multiplexed serial COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS antenna to the GPS ANT port of the Agilent E645x receiver. Agilent Technologies recommends that a "bulkhead mount" GPS antenna be used whenever possible for improved performance.

   If the system includes a differential GPS receiver, continue. If it does not, skip to step 7.

5. Connect the GPS RS-232 port of the Agilent E645x receiver to the differential GPS. The cable is included with the differential GPS receiver, 86154A option 230.

6. Connect the differential GPS VHF antenna to the differential GPS unit.

7. Connect power to the Agilent E645x receiver, the PC, and the differential GPS unit, if used.

8. Turn the differential GPS unit, and the PC, on.

9. Refer to "Selecting GPS Hardware" on page 120 to configure the Agilent Wireless Solutions Software.

10. Refer to "Configuring the Differential GPS Communications Port When Using a Differential GPS" on page 42 for instructions on setting the COM ports.

NOTE   If you have a Differential GPS other than the 86154A option 230, refer to that suppliers manual for configuration instructions.

Trimble Placer GPS 455 with Dead Reckoning

The setup for the Trimble Placer GPS 455 receiver and GPS antenna is shown in Figure 2-9.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

86154A option 210 provides a Trimble Placer GPS 455 receiver and two GPS antennas. All necessary cables and adapters are included. The speedometer interface is *not* included. If the Trimble Placer GPS 455 receiver and GPS antennas are customer supplied, 86154A option 212 (adapter and cables) is required.
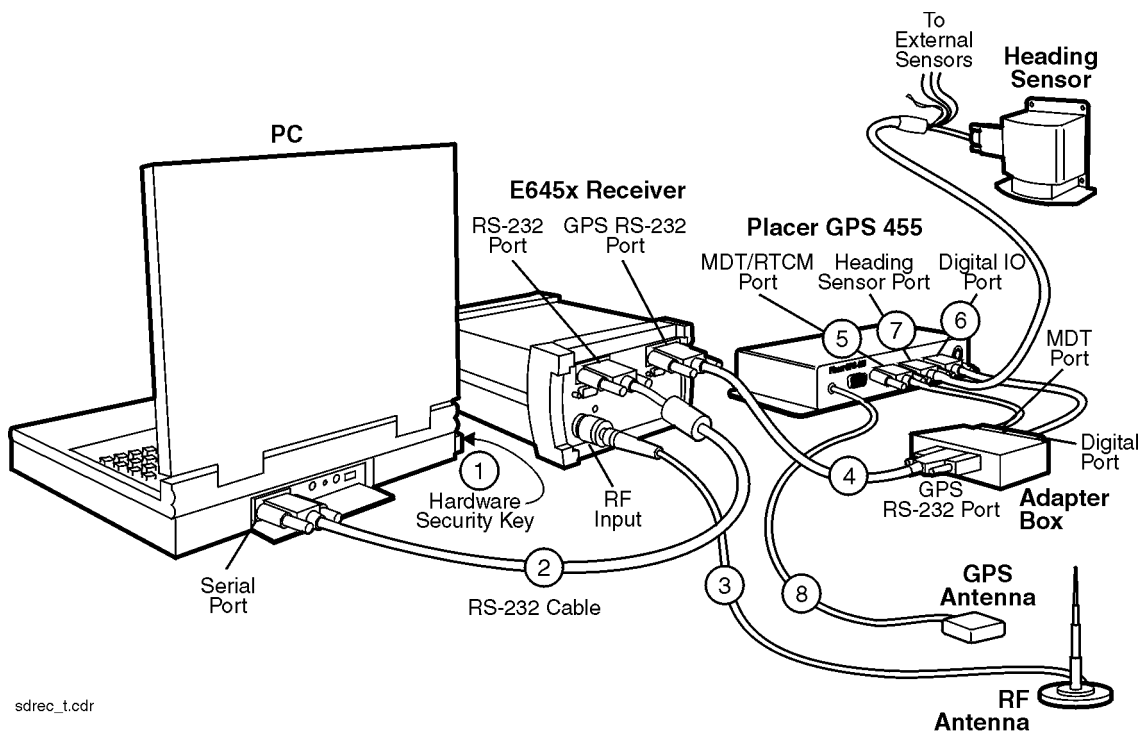
Figure 2-9 Trimble Placer GPS 455 with Dead Reckoning

Configuring a Trimble Placer GPS 455 with Dead Reckoning

NOTE   When the heading sensor is connected to the GPS 455 receiver, Dead
Reckoning must be calibrated before the software will provide correct GPS
information.

Setting up
Hardware

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x
    receiver using the RS-232 cable included with the system. The default
    serial port used by the application is multiplexed serial COM1. If your PC
    uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver.
    Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS RS-232 port of the Agilent E645x receiver to the GPS
    RS-232 port of the adapter box, using the RS-232 cable.

5. Connect the MDT port of the adapter box to the MDT/RTCM port of the
    Trimble Placer GPS 455 unit, using the RS-232 straight-through cable.

6. Connect the digital port of the adapter box to the Digital IO port of the
    Trimble Placer GPS 455 unit, using the RS-232 cable.

7. Connect the Heading Sensor to the Heading Sensor port of the Trimble
    Placer GPS 455 through the female 9-pin connector on the DR sensor
    cable supplied by Trimble. See Figure 2-9. The connector labeled
    Heading Sensor connects to the heading sensor; the connector labeled
    Sensors connects to the Placer GPS 455. See Figure 2-10.

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

9. Connect power to the Trimble Placer GPS 455, the
    Agilent E645x receiver, and the PC and turn them on.

10. Calibrate the DR unit using Trimble supplied software *Plcrinit.exe* or *GPSSK*. If you do not have this software, it is available on the Trimble web page. For more details and the URL, refer to page 20.

11. Start the Agilent Technologies application software. Verify that both the software and the Trimble Placer GPS 455 are configured for the same communication protocol. Refer to "Selecting GPS Hardware" on page 120 to configure the Agilent Wireless Solutions Software.

NOTE   Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools > Options** and selecting the Default Datum tab.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Odometer 0 (red) } ODO "0"
GND (blk)
Odometer 1 (red) } ODO "1"
GND (blk)
GND (blk)
+5V (red) } 2 conductor zip cable
Backup (wht)

To Placer GPS 455
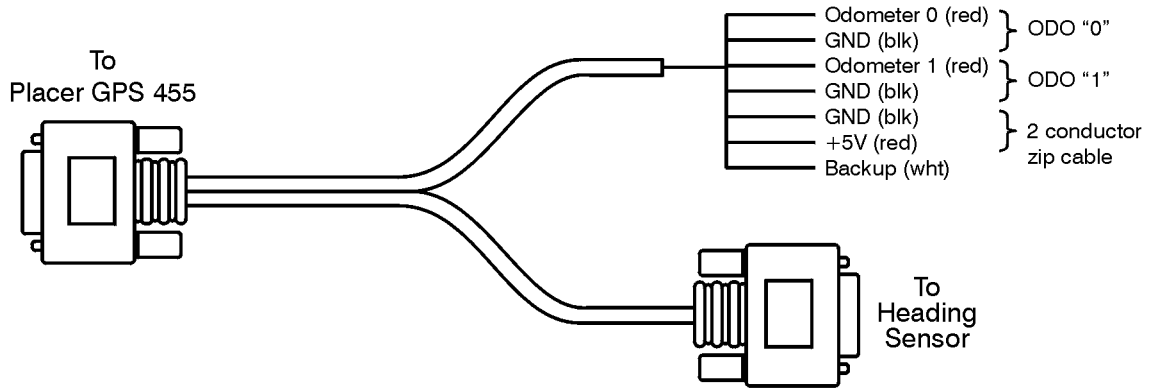
To Heading Sensor

headsens.cdr

Figure 2-10 Heading Sensor Cable

Receiver and Phone-Based System Setup

Trimble Placer GPS/DR

The setup for the Trimble Placer GPS/DR receiver and GPS antenna is shown in Figure 2-11.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.
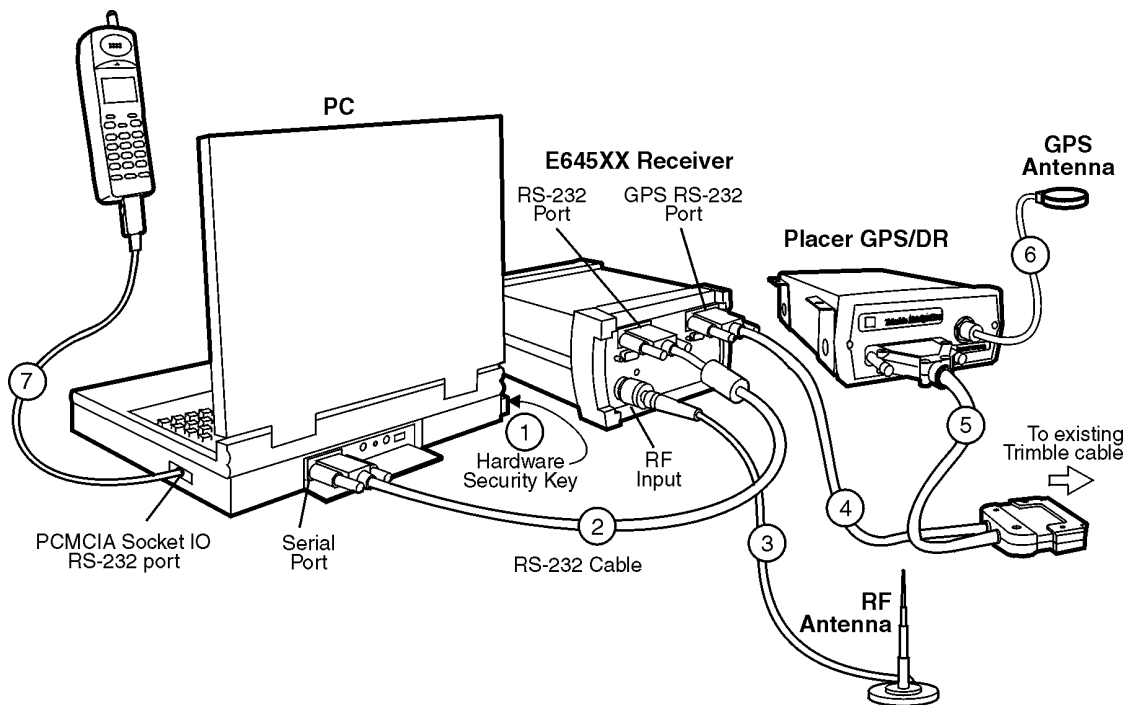
rpgpsdr.cdr

Figure 2-11 Trimble Placer GPS/DR Receiver and Phone

Configuring a Trimble Placer GPS/DR

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using an RS-232 straight-through cable. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the end of Agilent cable 86154A option 211, labeled GPS RS-232, to the GPS RS-232 port of the receiver.

5. Connect the 37-pin connector of the Agilent cable 86154A option 211 to the existing Trimble Placer GPS/DR connector. Connect the remaining end of the Agilent cable 86154A option 211 to the Trimble Placer GPS/DR cable.

6. Connect the GPS antenna to the GPS ANT port of the Trimble Placer GPS/DR antenna. Agilent Technologies recommends that a "bulkhead mount" GPS antenna be used whenever possible for improved performance.

7. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

8. Connect power to the Trimble Placer GPS/DR and the PC.

9. Turn on the Trimble Placer GPS/DR, the Agilent E645x receiver and the phone.

10. Turn on the PC and run the application.

11. Select or create the project you are going to use.

12. Configure the GPS unit for the TAIP protocol:

    a. Select Configuration mode.

    b. Select the Hardware tab.

    c.   Double-click the GPS icon, or select GPS, then click **Modify.**

    d.   In the Hardware Type box, select the GPS (Placer DR, 400, SV6; TAIP)

    e.   Click **OK** when you are satisfied with the settings.

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

13. Configure the phone:

    a.   Select Configuration mode.

    b.   Select the Hardware tab.

    c.   Double-click the phone icon or select the phone icon and click **Modify.**

    d.   In the Hardware Type box, select the phone used.

    e.   Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial. Select the Com port you are using.

    f.   Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

    g.   Click **OK** when you are satisfied with the settings.

    h.   Select Collection mode to start the measurements.

Accept the default settings for baud rate, parity, and others.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Trimble Placer GPS 400 or SVeeSix

The setup for the Trimble Placer SVeeSix/Placer GPS 400 is shown in Figure 2-12.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.
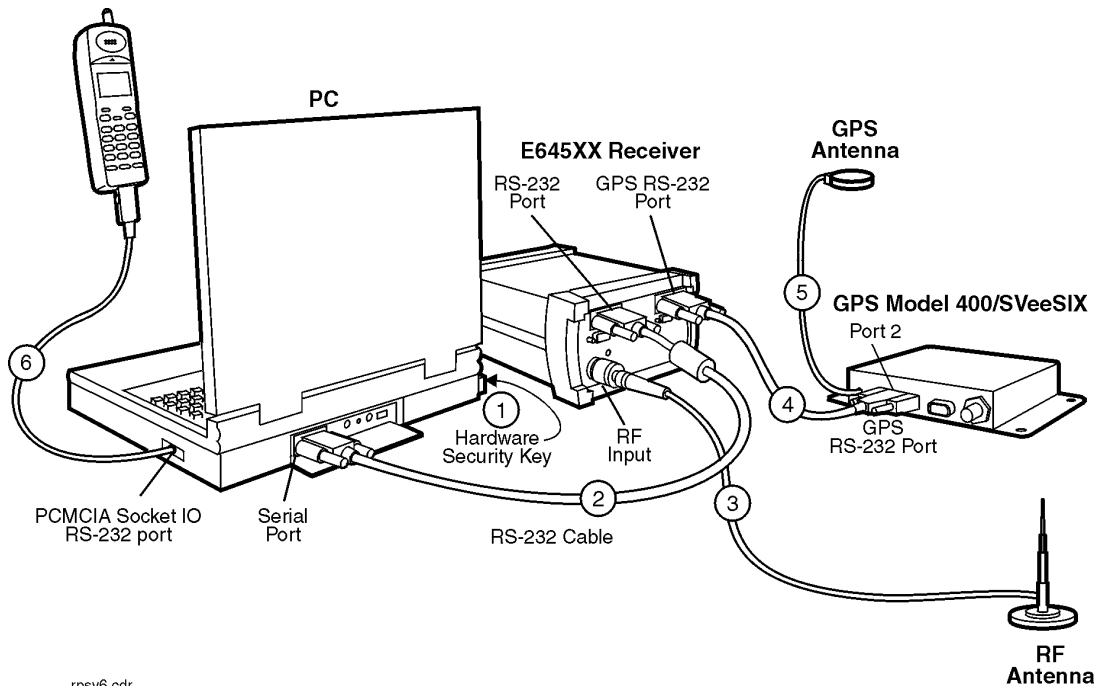
rpsv6.cdr

Figure 2-12 Trimble Placer GPS 400 or SVeeSix Receiver and Phone

NOTE   The Trimble Placer SVeeSix Plus operates from 9 to 32 VDC (NO internal battery backup). The red wire must be tied to the positive side of the power supply. The black wire must be tied to the negative side of the power supply. Optionally, the yellow wire may be tied to a backup power source, such as a lithium battery (operates from 3.5 to 14 VDC).

Configuring a Trimble Placer GPS 400 or SVeeSix

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using the RS-232 cable included with the system. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect one end of a standard, straight-through, RS-232 9-pin cable to the GPS RS-232 port of the Agilent E645x receiver. Connect the other end of the RS-232 cable to the Trimble Placer GPS 400 or SVeeSix connector.

5. Connect the GPS antenna to the GPS ANT port of the Trimble Placer SVeeSix/Placer GPS 400 unit.

6. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

7. Connect power to the Trimble Placer GPS 400 or SVeeSix and the PC.

8. Turn on the Trimble Placer GPS 400 or SVeeSix, the PC, and the phone and run the application.

9. Select or create the project you are going to use.

10. Select Configuration mode.

    a. Select the Hardware tab.
    b. Double-click the GPS icon, or select GPS and click **Modify**.
    c. In the Hardware Type box, select GPS (Placer DR, 400, SV6; TAIP) if the Trimble Placer GPS 400 or SVeeSix has TAIP. See part number XXXXX-63.
    d. In the Hardware Type box, select GPS (SV6, SK8; TSIP) if the Trimble Placer SVeeSix has TSIP. See part number XXXXX-61.

Setting up Hardware

  e. In the Hardware Type box, select GPS (NMEA) if the Trimble Placer SVeeSix has NMEA (National Marine Electronics Association: a GPS protocol). See part number XXXXX-62.

  f. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the GPS.

  g. Click **OK** when you are satisfied with the settings.

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

 11. Configure the phone:

  a. Select Configuration mode.

  b. Select the Hardware tab.

  c. Double-click the phone icon or select the phone icon and click the **Modify** button.

  d. In the Hardware Type box, select the phone used.

  e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial and select the Com port you are using.

  f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

  g. Click **OK** when you are satisfied with the settings.

  h. Select Collection mode to start the measurements.

Accept the default settings for baud rate, parity, and others.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Trimble Placer GPS 455

The setup for the Trimble Placer GPS 455 is shown in Figure 2-13.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

If the Trimble Placer GPS 455 receiver is supplied by Agilent as option 210, all necessary cables are included. If the Trimble Placer GPS 455 receiver is customer supplied, 86154A option 212 is required.
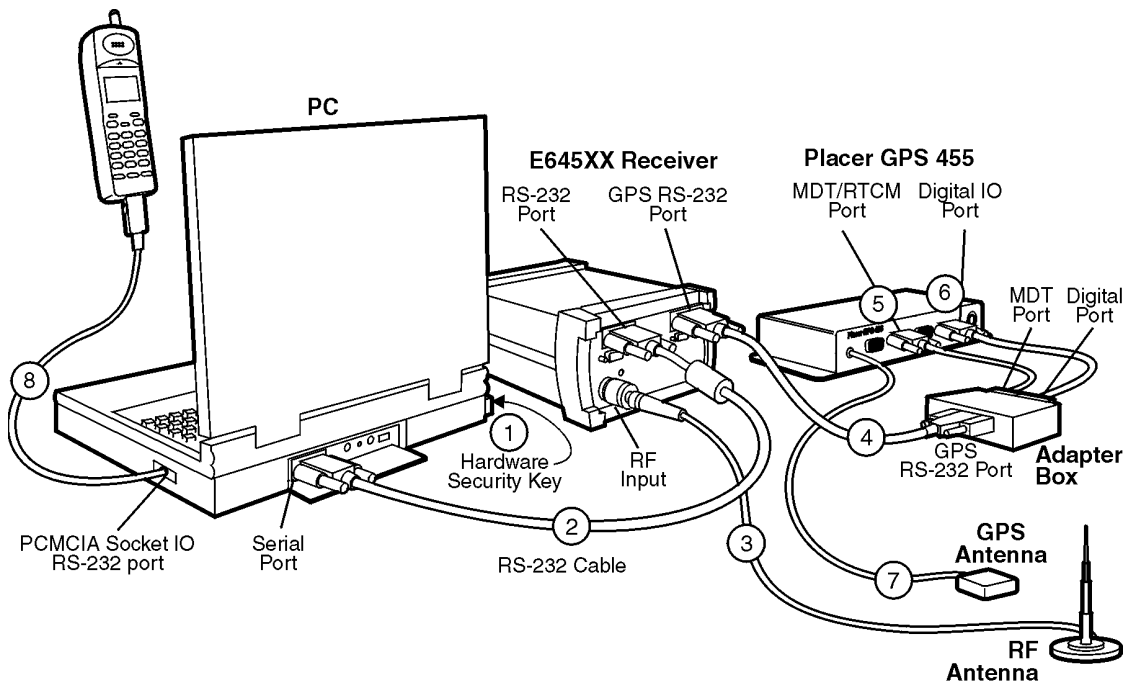
rp455dr.cdr

Figure 2-13 Trimble Placer GPS 455 Receiver and Phone

NOTE The Trimble Placer GPS 455 operates on 10 to 32 VDC (internal battery backup keeps the last GPS settings). The red and white wires must be tied to the positive side of the power supply. The black wire must be tied to the negative side of the power supply. To turn on the GPS receiver when starting the vehicle, the white wire must be tied to the ignition switch.

Configuring a Trimble Placer GPS 455

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using the RS-232 cable included with the system. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x Receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS RS-232 port of the Agilent E645x receiver to the GPS RS-232 port of the adapter box, using the RS-232 straight-through cable.

5. Connect the MDT port of the adapter box to the MDT/RTCM port of the Trimble Placer GPS 455 unit, using the RS-232 straight-through cable.

6. Connect the digital port of the adapter box to the Digital IO port of the Trimble Placer GPS 455 unit, using the RS-232 straight-through cable.

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

8. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

9. Turn on the Trimble Placer GPS 455 unit, the PC, and the phone.

Setting up
Hardware

10. Configure the Trimble Placer GPS 455 unit for the correct settings. See "Selecting GPS Hardware" on page 120 for more information.

11. Configure the phone:

   a. Select Configuration mode.

   b. Select the Hardware tab.

   c. Double-click the phone icon or select the phone icon and click **Modify**.

   d. In the Hardware Type box, select the phone used.

   e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial and select the COM port you are using.

   f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

   g. Click **OK** when you are satisfied with the settings.

   h. Select Collection mode to start the measurements.

NOTE   Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

Trimble Placer GPS 455 & Differential

The setup for the Trimble Placer GPS 455 and Differential is shown in Figure 2-14.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

86154A option 230 provides a differential GPS, with all necessary cables included. A differential GPS may also be customer supplied.

If the Trimble Placer GPS 455 receiver is supplied by Agilent as option 210, all necessary cables are included. If the Trimble Placer GPS 455 receiver is customer supplied, 86154A option 212 is required.
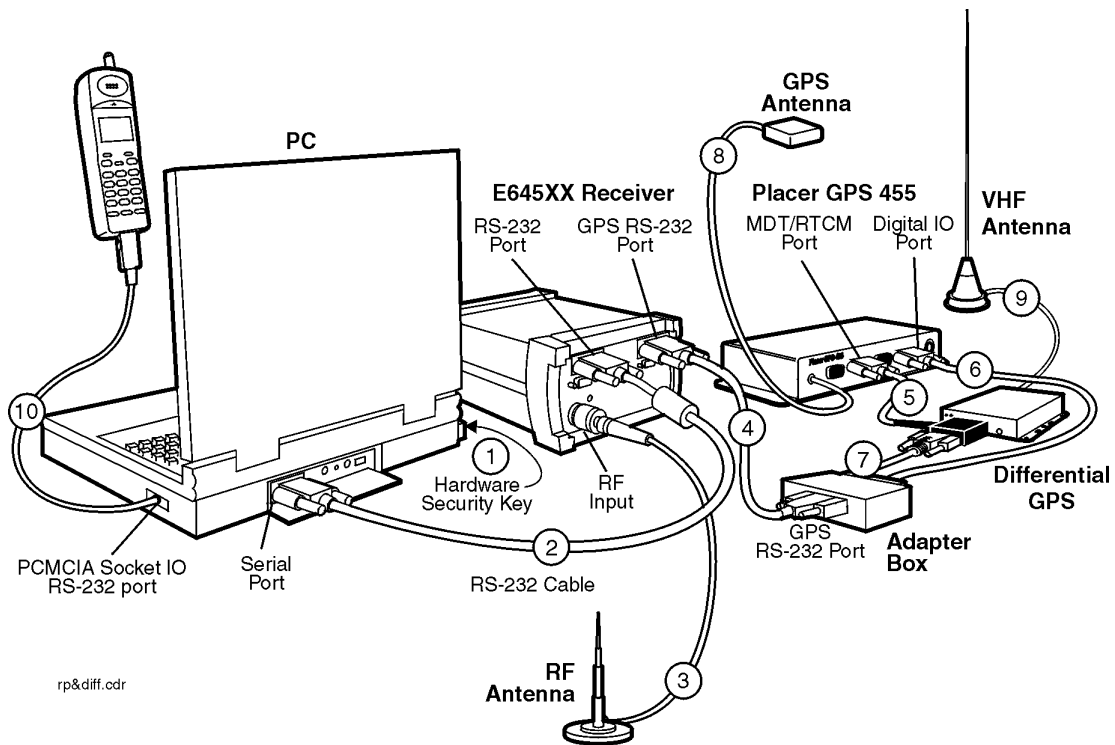

Figure 2-14 Trimble Placer GPS 455 and Differential Receiver and Phone

Configuring a Trimble Placer GPS 455 and Differential

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using the RS-232 cable included with the system. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS RS-232 port of the Agilent E645x receiver to the GPS RS-232 port of the adapter box, using the RS-232 cable.

5. Connect the RTCM port of the Trimble-supplied communications cable to the differential GPS receiver, using the RS-232 cable included with the system. Connect the remaining port of the Trimble-supplied communications cable to the MDT/RTCM port of the Trimble Placer GPS 455 unit.

6. Connect the digital port of the adapter box to the Digital IO port of the Trimble Placer GPS 455 unit, using the RS-232 cable.

7. Connect the MDT/RTCM port of the adapter box to the MDT port of the Trimble-supplied communications "T" cable, connected to the Differential, using the RS-232 cable.

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

9. Connect the VHF Differential GPS antenna to the Differential GPS unit.

10. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

11. Connect power to the differential GPS unit, the Trimble Placer GPS 455 unit, and the PC.

Setting up
Hardware

12. Turn on the differential GPS unit, the Trimble Placer GPS 455 unit, the PC, and the phone. Refer to "Selecting GPS Hardware" on page 120 to configure the Agilent Wireless Solutions Software.

13. Configure the Trimble Placer GPS 455 unit for the correct settings. See "Selecting GPS Hardware" on page 3-4 for more information.

14. Configure the phone:

    a. Select Configuration mode.

    b. Select the Hardware tab.

    c. Double-click the phone icon or select the phone icon and click **Modify**.

    d. In the Hardware Type box, select the phone used.

    e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial and select the Com port you are using.

    f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

    g. Click **OK** when you are satisfied with the settings.

    h. Select Collection mode to start the measurements.

NOTE

Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

Configuring the Differential GPS Communications Port When Using a Differential GPS

1. If your system includes an Agilent E645x receiver 86154A option 230 differential GPS receiver, the baud rate of the **DCI** (Differential Corrections Inc.) Differential GPS model RDS 3000, and the baud rate of the Trimble GPS receiver unit must be the same.

    Please refer to the manuals supplied by Differential Corrections, Inc. and Trimble Navigation, Limited.

2. Connect the differential GPS to the serial port of the PC.

3. Run the software supplied by DCI with the differential GPS (*rtcmon.exe*). (The file is contained on the disk that comes with 86154A option 230.)

4. Press **F1** to set the correct baud rate for the differential GPS. Use the following table to set the baud rate for the Trimble model you are using.

Table 2-3 Trimble Baud Rate Settings

Differential GPS	Use F1 to set the baud rate of the DCI model RDS 3000 differential GPS	Then use F2 to set the baud rate of the PC serial port
Placer GPS/DR	9600	9600
Trimble Placer GPS 455	9600	9600
Agilent E645x with internal GPS (Trimble model SK-8)	4800	4800

When the differential GPS is correctly configured, it will start to send legible information to the PC. If the subscription is active, this information will be correction data, otherwise it will be scanned frequencies.

**NOTE**   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools > Options** and selecting the Default Datum tab.

Please contact DCI for information about getting a subscription to activate your differential GPS. Once activated, it is ready to work with the Agilent Technologies system.

Setting up Hardware

Internal GPS & Internal GPS with Differential

The setup for the internal GPS, including 86154A option 230, Differential GPS, is shown in Figure 2-15. Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

The internal GPS can not be used with Dead Reckoning. The internal GPS can, and most often will, be used *without* the differential GPS.
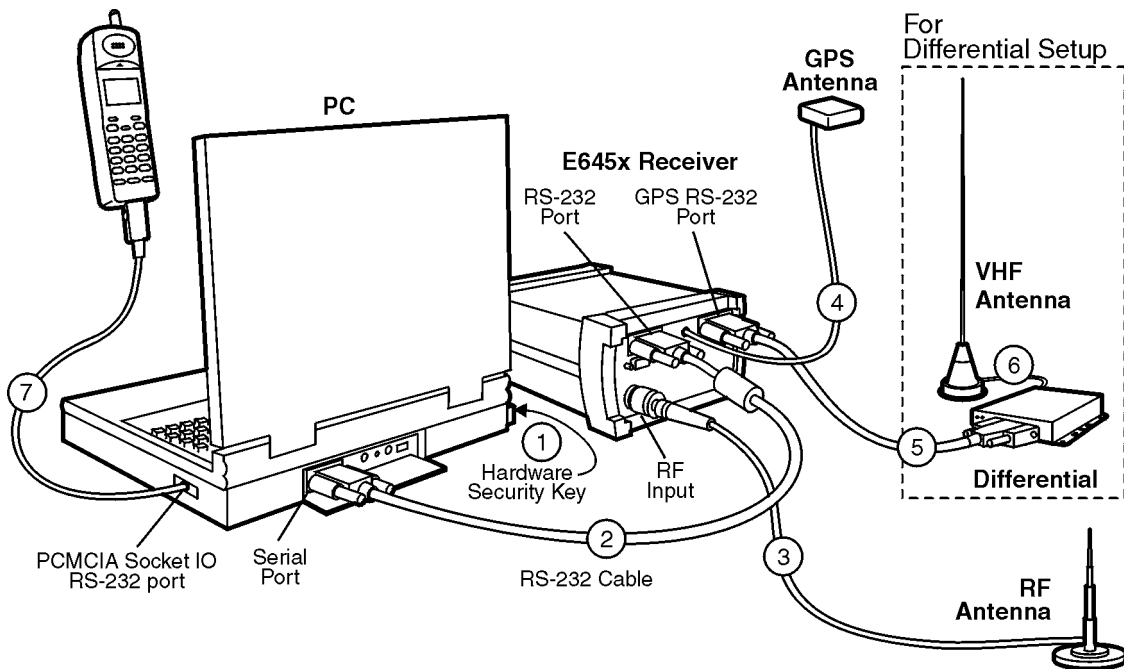
Figure 2-15 Internal GPS and Internal GPS with Differential Receiver and Phone

Configuring an Internal GPS and Differential

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using the RS-232 cable included with the system. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS antenna to the GPS ANT port of the Agilent E645x receiver. Agilent Technologies recommends that a "bulkhead mount" GPS antenna be used whenever possible for improved performance.

   If the system includes a differential GPS receiver, continue. If it does not, skip to step 7.

5. Connect the GPS RS-232 port of the Agilent E645x receiver to the differential GPS. The cable is included with the differential GPS receiver, 86154A option 230.

6. Connect the differential GPS VHF antenna to the differential GPS unit.

7. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

8. Connect power to the Agilent E645x receiver, the PC, and the differential GPS unit, if used.

9. Turn on the differential GPS unit, the PC, and the phone.

10. Refer to "Selecting GPS Hardware" on page 120 to configure the Agilent Wireless Solutions Software.

11. Refer to "Configuring the Differential GPS Communications Port When Using a Differential GPS" on page 64 for instructions on setting the COM ports.

Trimble Placer GPS 455 with Dead Reckoning

The setup for the Trimble Placer GPS 455 with Dead Reckoning is shown in Figure 2-16.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

If the Trimble Placer GPS 455 receiver is supplied by Agilent as option 210, all necessary cables are included. If the Trimble Placer GPS 455 receiver is customer supplied, 86154A option 212 is required.
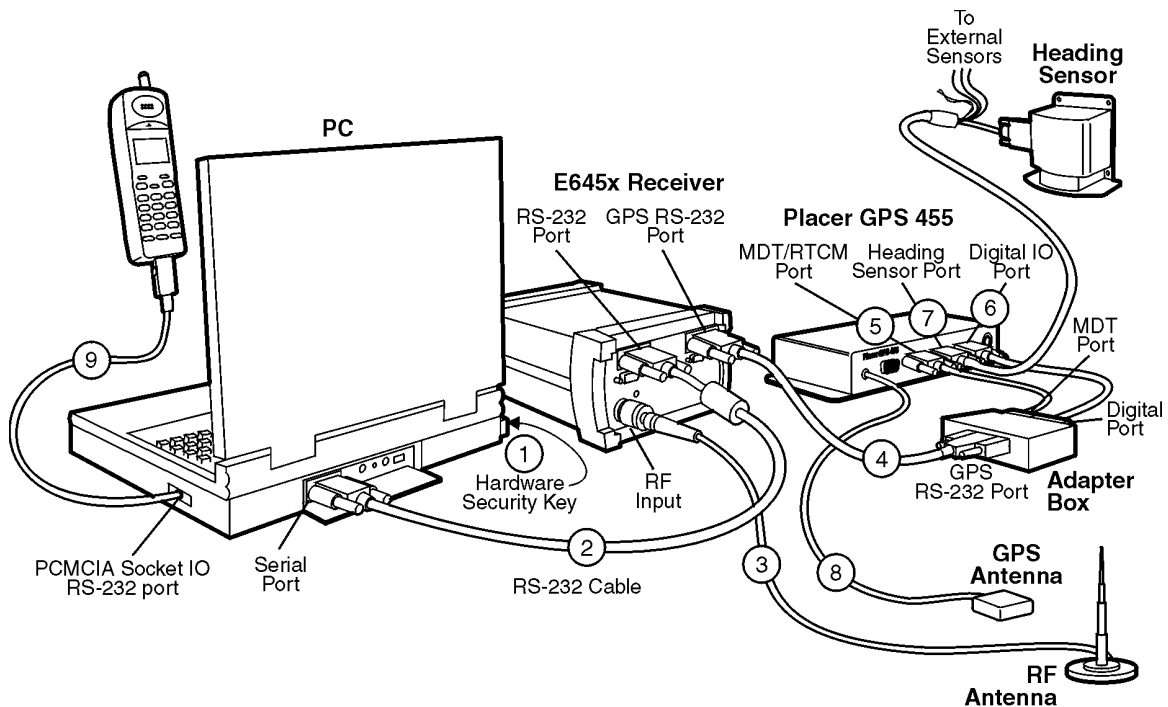
rpdrec.cdr

Figure 2-16 Trimble Placer GPS 455 with Dead Reckoning Receiver and Phone

Configuring a Trimble Placer GPS 455 with Dead Reckoning

NOTE   When the heading sensor is connected to the GPS 455 receiver, Dead Reckoning must be calibrated before the software will provide correct GPS information.

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Agilent E645x receiver using the RS-232 cable included with the system. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RF antenna to the RF input of the Agilent E645x receiver. Use the supplied Type-N to TNC adapter, if necessary.

4. Connect the GPS RS-232 port of the Agilent E645x receiver to the GPS RS-232 port of the adapter box, using the RS-232 cable.

5. Connect the MDT port of the adapter box to the MDT/RTCM port of the Trimble Placer GPS 455 unit, using the RS-232 straight through cable.

6. Connect the digital port of the adapter box to the Digital IO port of the Trimble Placer GPS 455 unit, using the RS-232 cable.

7. Connect the Heading Sensor to the HS port of the Trimble Placer GPS 455 through the female 9-pin connector on the DR sensor cable supplied by Trimble. See Figure 2-16. The connector labeled Heading Sensor connects to the heading sensor; the connector labeled Sensors connects to the Placer GPS 455. See Figure 2-17.

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

Setting up
Hardware

9. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

10. Turn on the Trimble Placer GPS 455, the Agilent E645x receiver, the PC, and phone.

11. Calibrate the DR unit using Trimble supplied software *Plcrinit.exe* or GPSSK. If you do not have this software, it is available on the Trimble web page. For more details and the URL, refer to page 20.

12. Start the Agilent Technologies application software. Verify that both the software and the Trimble Placer GPS 455 are configured for the same communication protocol.

13. Configure the Trimble Placer GPS 455 unit for the correct settings. See "Selecting GPS Hardware" on page 3-4 for more information.

14. Configure the phone:

    a. Select Configuration mode.
    b. Select the Hardware tab.
    c. Double-click the phone icon or select the phone icon and click **Modify**.
    d. In the Hardware Type box, select the phone used.
    e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial and select the Com port you are using.
    f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.
    g. Click **OK** when you are satisfied with the settings.
    h. Select Collection mode to start the measurements.
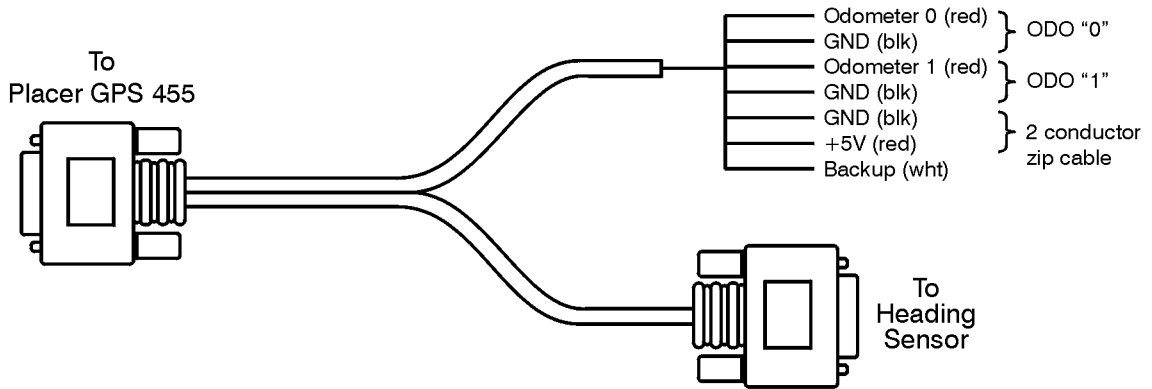
NOTE   Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Setting up
Hardware

To
Placer GPS 455

Odometer 0 (red)
GND (blk)   } ODO "0"
Odometer 1 (red)
GND (blk)   } ODO "1"
GND (blk)
+5V (red)   } 2 conductor
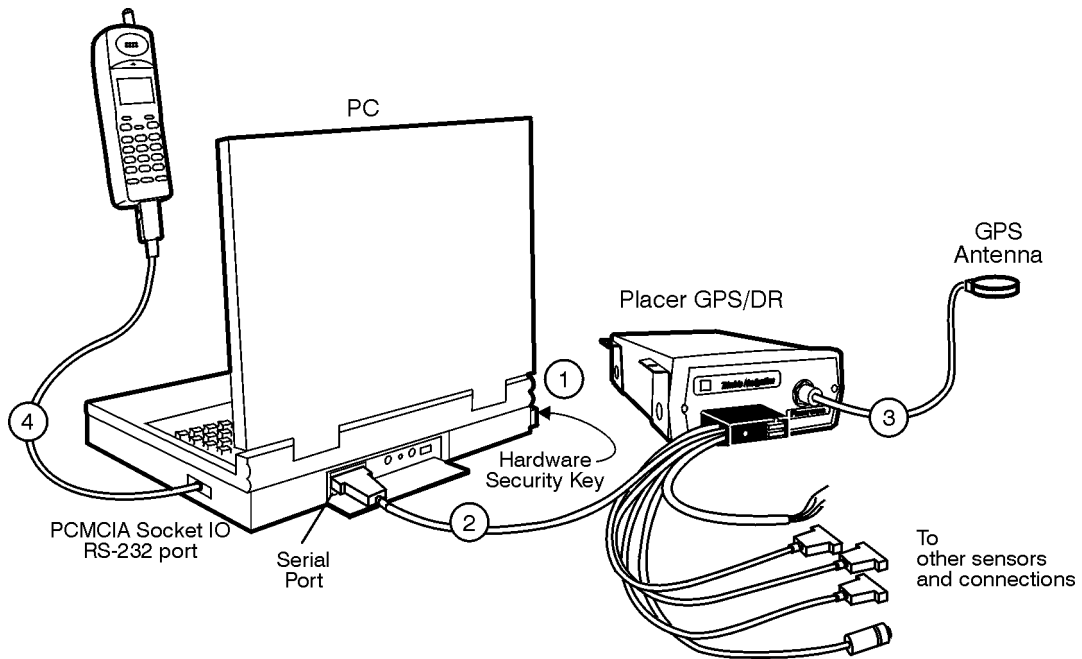Backup (wht)   zip cable

To
Heading
Sensor

headsens.cdr

Figure 2-17   Heading Sensor Cable

Phone-Based System Setup

Trimble Placer GPS/DR

The setup for the Trimble Placer GPS/DR is shown in Figure 2-18.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

pgpsdr.cdr

Figure 2-18 Trimble Placer GPS/DR with Phone

Configuring with a Trimble Placer GPS/DR

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the Placer GPS/DR using an RS-232 cable from the Trimble connector. The default serial port used by the application is serial, COM1. If your PC uses a different com port, you can specify a different serial port number.

3. Connect the GPS antenna to the GPS ANT port of the Trimble Placer GPS/DR. Agilent Technologies recommends that a "bulkhead mount" GPS antenna be used whenever possible for improved performance.

4. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

5. Connect power to the Trimble Placer GPS/DR and the PC.

6. Turn on the Trimble Placer GPS/DR, the phone, and the PC. Run the application.

7. Select or create the project you are going to use.

8. Configure the GPS unit for the TAIP protocol:

    a. Select Configuration mode.
    b. Select the Hardware tab.
    c. Double-click the GPS icon, or select GPS, then click **Modify.**
    d. In the Hardware Type box, select the GPS (Placer DR, 400, SV6; TAIP)
    e. Click **OK.**

NOTE   If you need to change the GPS coordinate datum, select the **Advanced** tab of GPS hardware configuration box. The default datum can be set using the **Tools > Options** and selecting the Default Datum tab.

9. Configure the phone:

    a. Select Configuration mode.

    b. Select the Hardware tab.

    c. Double-click the phone icon or select the phone icon and click **Modify**.

    d. In the Hardware Type box, select the phone used.

    e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial. Select the Com port you are using.

    f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

    g. Click **OK** when you are satisfied with the settings.

    h. Select Collection mode to start the measurements.

Accept the default settings for baud rate, parity, and others. Verify that the software is also configured for the TAIP protocol. Refer to the GPS selection procedure.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Trimble Placer GPS 400 or SVeeSix

The setup for the Trimble Placer GPS 400/Placer SVeeSix is shown in Figure 2-19.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.
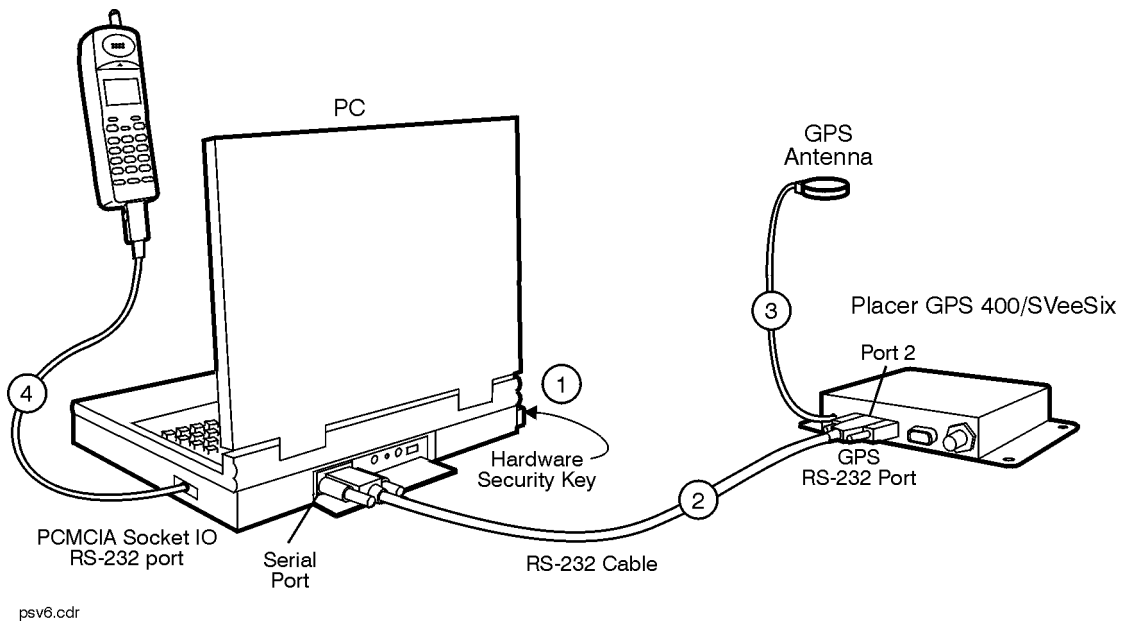

psv6.cdr

Figure 2-19   Trimble Placer GPS 400 or SVeeSix with Phone

NOTE   The Trimble Placer SVeeSix Plus operates from 9 to 32 VDC (NO internal battery backup). The red wire must be tied to the positive side of the power supply. The black wire must be tied to the negative side of the power supply. Optionally, the yellow wire may be tied to a backup power source, such as a lithium battery (operates from 3.5 to 14 VDC).

Configuring a Trimble Placer GPS 400 or SVeeSix

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the
   Placer GPS 400 or SVeeSix receiver using an RS-232 straight-through
   cable. The default serial port used by the application is multiplexed serial,
   COM1. If your PC uses a different com port, you can specify a different
   serial port number.

3. Connect the GPS antenna to the GPS ANT port of the Trimble Placer
   GPS 400 or SVeeSix unit.

4. Connect the phone cable to a second COM port (different than used in
   step 1). On most laptop PCs this will require the use of a Socket Serial I/O
   RS-232 card that is installed into the PCMCIA slot on your PC.

5. Connect power to the Trimble Placer GPS 400 or SVeeSix and the PC.

6. Turn on the Trimble Placer GPS 400 or SVeeSix, the PC, and the phone.
   Run the application.

7. Select or create the project you are going to use.

8. Select Configuration mode.

   a. Select the Hardware tab.
   b. Double-click the GPS icon, or select GPS then click **Modify**.
   c. In the Hardware Type box, select GPS (Placer DR, 400, SV6; TAIP)
      if the Trimble Placer SVeeSix has TAIP. See part number XXXXX-
      63.
   d. In the Hardware Type box, select GPS (SV6, SK8; TSIP) if the
      Trimble Placer SVeeSix has TSIP. See part number XXXXX-61.
   e. In the Hardware Type box, select GPS (NMEA) if the Trimble Placer
      SVeeSix uses NMEA. See part number XXXXX-62.
   f. Click **OK**.

Setting up
Hardware

NOTE   If you need to change the GPS coordinate datum, select the Advanced tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

9. Configure the phone:

    a. Select Configuration mode.

    b. Select the Hardware tab.

    c. Double-click the phone icon or select the phone icon and click **Modify**.

    d. In the Hardware Type box, select the phone used.

    e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial. Select the Com port you are using.

    f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

    g. Click **OK** when you are satisfied with the settings.

    h. Select Collection mode to start the measurements.

Accept the default settings for baud rate, parity, and others. Verify that the system software is also configured for the correct GPS protocol.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Trimble Placer GPS 455

The setup for the Trimble Placer GPS 455 is shown in Figure 2-20.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

If the Trimble Placer GPS 455 receiver is supplied by Agilent as option 210, all necessary cables are included. If the Trimble Placer GPS 455 receiver is customer supplied, 86154A option 212 is required.
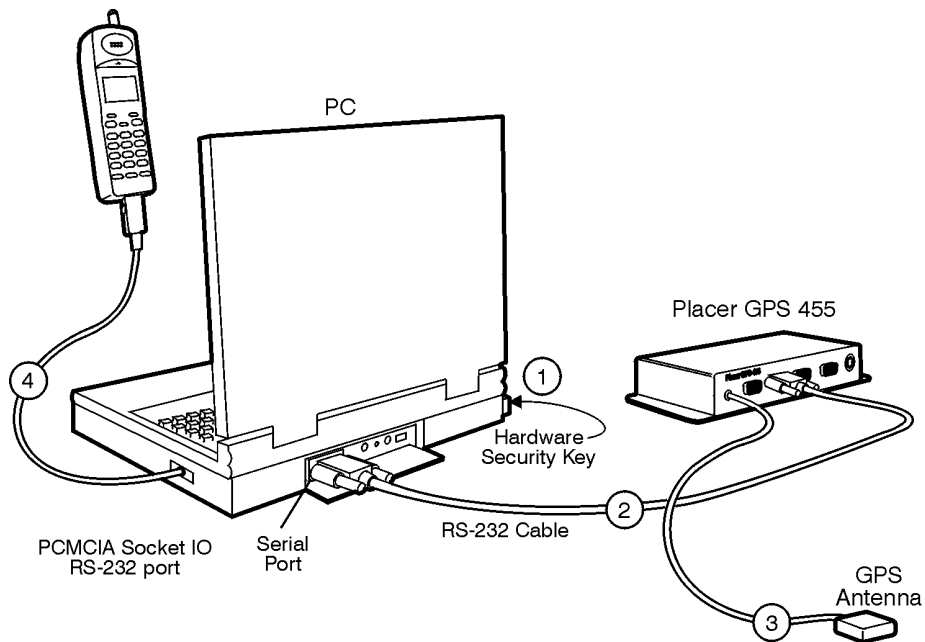
p455dr.cdr

Figure 2-20 Trimble Placer GPS 455 with Phone

NOTE   The Trimble Placer 455 operates on 10 to 32 VDC (internal battery backup keeps the last GPS settings). The red and white wires must be tied to the positive side of the power supply. The black wire must be tied to the negative side of the power supply. To turn on the GPS receiver when starting the vehicle, the white wire must be tied to the ignition switch.

Setting up Hardware

Configuring a Trimble Placer GPS 455

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the MDT port of the Placer GPS 455 Receiver using an RS-232 straight-through cable. The default serial port used by the application is serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

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

4. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

5. Turn on the Trimble Placer GPS 455 unit, the PC, and the phone.

6. Configure the Trimble Placer GPS 455 unit for the correct settings. See "Selecting GPS Hardware" on page 120 for more information.

7. Configure the phone:

   a. Select Configuration mode.
   b. Select the Hardware tab.
   c. Double-click the phone icon or select the phone icon and click **Modify**.
   d. In the Hardware Type box, select the phone used.
   e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial. Select the Com port you are using.

  f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

  g. Click **OK** when you are satisfied with the settings.

  h. Select Collection mode to start the measurements.

NOTE   Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

NOTE   If you need to change the GPS coordinate datum, select the Advanced tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.
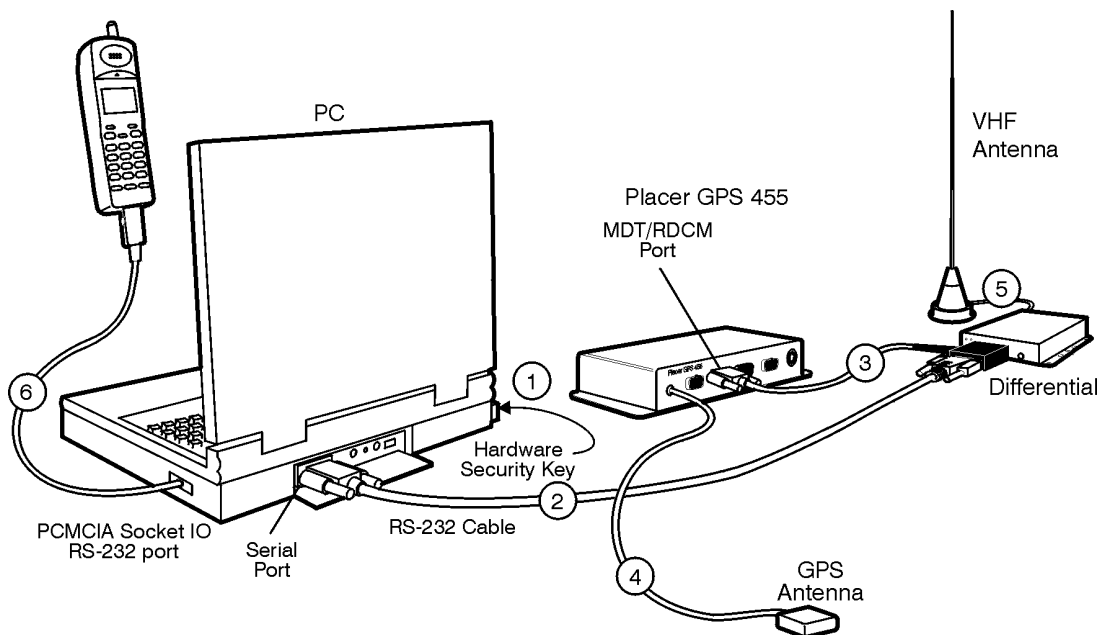
Trimble Placer GPS 455 & Differential

The setup for the Trimble Placer GPS 455 and differential is shown in Figure 2-21.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

86154A option 230 provides a differential GPS, with all necessary cables included. A differential GPS may also be customer supplied.

If the Trimble Placer GPS 455 DR receiver is supplied by Agilent as option 210, all necessary cables are included. If the Trimble Placer GPS 455 receiver is customer supplied, 86154A option 212 is required.

P&diff_t.cdr

Figure 2-21 Trimble Placer GPS 455 and Differential with Phone

Configuring a Trimble Placer GPS 455 and Differential

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the RS-232 port of the differential receiver using the RS-232 straight-through cable, connected to the RS-232 "T" cable. The default serial port used by the application is serial, COM1. If your PC uses a different COM port, you can specify a different serial port number.

3. Connect the RTCM port of the Trimble-supplied communications cable to the differential GPS receiver, using the RS-232 "T" cable included with the system. Connect the remaining port of the Trimble-supplied communications cable to the MDT/RTCM port of the Trimble Placer GPS 455 unit.

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

5. Connect the VHF Differential GPS antenna to the Differential GPS unit.

6. Connect the phone cable to a second COM port (different than used in step 1). On most laptop PCs this will require the use of a Socket Serial I/O RS-232 card that is installed into the PCMCIA slot on your PC.

7. Connect power to the differential GPS unit, the Trimble Placer GPS 455 unit, and the PC.

8. Turn on the differential GPS unit, the Trimble Placer GPS 455 unit, the PC, and the phone. Refer to "Selecting GPS Hardware" on page 120 to configure the Agilent Wireless Solutions Software.

9. Configure the phone:

    a. Select Configuration mode.
    b. Select the Hardware tab.
    c. Double-click the phone icon or select the phone icon and click **Modify**.
    d. In the Hardware Type box, select the phone used.

Setting up Hardware

e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial. Select the Com port you are using.

f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

g. Click **OK** when you are satisfied with the settings.

h. Go to **Collection** to start the measurements.

NOTE

Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

Configuring the Differential GPS Communications Port When Using a Differential GPS

1. If your system includes an Agilent E645x receiver 86154A option 230 differential GPS receiver, the baud rate of the Differential Corrections Inc., (DCI) Differential GPS model RDS 3000, and the baud rate of the Trimble GPS receiver unit must be the same.

   Please refer to the manuals supplied by Differential Corrections, Inc. and Trimble Navigation, Limited.

2. Connect the differential GPS to the serial port of the PC.

3. Run the software supplied by DCI with the differential GPS (*rtcmon.exe*). (The file is contained on the disk that comes with 86154A option 230).

4. Press F1 to set the correct baud rate for the differential GPS. Use the
    following table to set the baud rate for the Trimble model you are using.

Table 2-4 Trimble Baud Rate Settings

Differential GPS	Use F1 to set the baud rate of the DCI model RDS 3000 differential GPS	Then use F2 to set the baud rate of the PC serial port
Placer GPS/DR	9600	9600
Trimble Placer GPS 455	9600	9600
Agilent E645x with internal GPS (Trimble model SK-8)	4800	4800

When the differential GPS is correctly configured, it will start to send legible
information to the PC. If the subscription is active, this information will be
correction data, otherwise it will be scanned frequencies.

NOTE

If you need to change the GPS coordinate datum, select the Advanced tab of
GPS hardware configuration box. The default datum can be set using the
**Tools > Options** and selecting the default datum tab.

Please contact DCI for information about getting a subscription to activate
your differential GPS. Once activated, it is ready to work with the
Agilent Technologies system.

Setting up
Hardware

Trimble Placer GPS 455 with Dead Reckoning

The setup for the Trimble Placer GPS 455 with Dead Reckoning is shown in Figure 2-22.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

86154A option 210 provides a Trimble Placer GPS 455 receiver and two GPS antennas. All necessary cables and adapters are included. The speedometer interface is *not* included. If the Trimble Placer GPS 455 receiver and GPS antennas are customer supplied, 86154A option 212 (adapter and cables) is required.
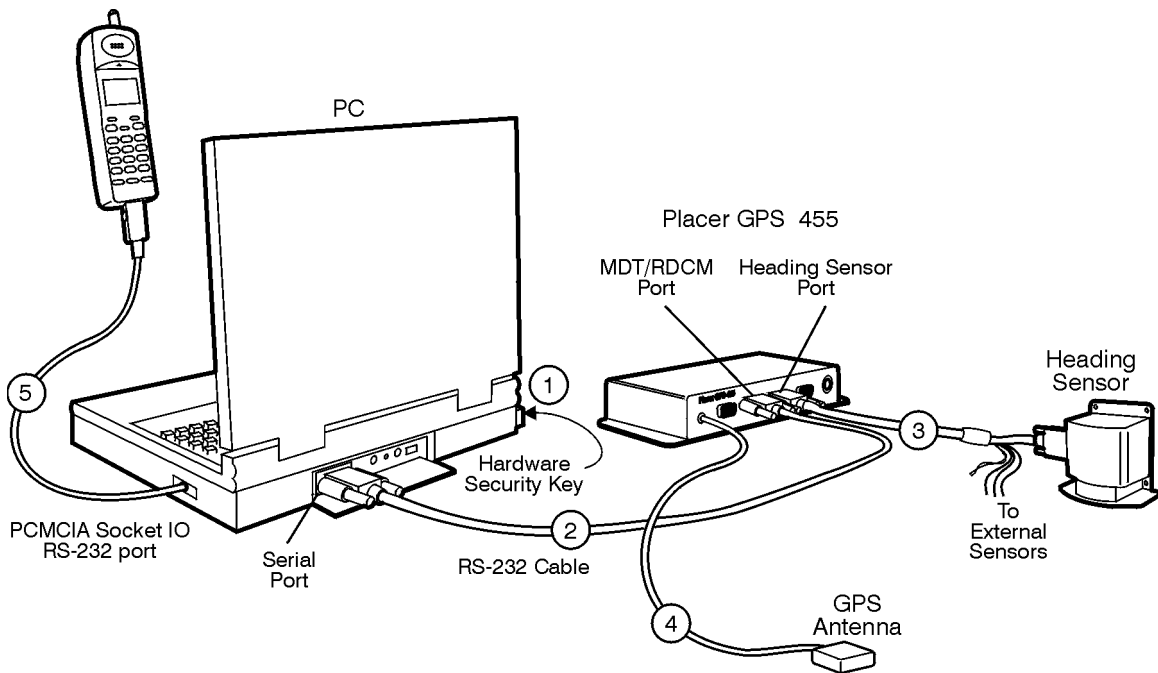
pdrec.cdr

Figure 2-22 Trimble Placer GPS 455 with Dead Reckoning and Phone

Configuring a Trimble Placer GPS 455 with Dead Reckoning

NOTE   When the heading sensor is connected to the GPS 455 receiver, Dead
Reckoning must be calibrated before the software will provide correct GPS
information.

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the serial port of the PC to the MDT port of the Trimble Placer
    GPS 455 using an RS-232 straight-through cable. The default serial port
    used by the application is serial, COM1. If your PC uses a different COM
    port, you can specify a different serial port number.

3. Connect the Heading Sensor to the HS port of the Trimble Placer GPS
    455 through the female 9-pin connector on the DR sensor cable supplied
    by Trimble. See Figure 2-10. The connector labeled Heading Sensor
    connects to the heading sensor; the connector labeled Sensors connects to
    the Placer GPS 455.

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

5. Connect the phone cable to a second COM port (different than used in
    step 1). On most laptop PCs this will require the use of a Socket Serial I/O
    RS-232 card that is installed into the PCMCIA slot on your PC.

6. Turn on the Trimble Placer GPS 455, the phone, and the PC.

7. Calibrate the DR unit using Trimble supplied software *Plcrinit.exe* or
    GPSSK. If you do not have this software, it is available on the Trimble
    web page.

8. Start the Agilent Technologies application software. Verify that both the
    software and the Trimble Placer GPS 455 are configured for the same
   communication protocol.

Setting up
Hardware

9. Configure the phone:

    a. Select Configuration mode.

    b. Select the Hardware tab.

    c. Double-click the phone icon or select the phone icon and click **Modify**.

    d. In the Hardware Type box, select the phone used.

    e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial and select the Com port you are using.

    f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

    g. Click **OK** when you are satisfied with the settings.

    h. Select Collection mode to start the measurements.

NOTE
Never set your GPS receiver protocol as TAIP and TSIP together. The Agilent Wireless Solutions Software is designed to work with one protocol at a time. Having both protocols active may confuse the system.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.
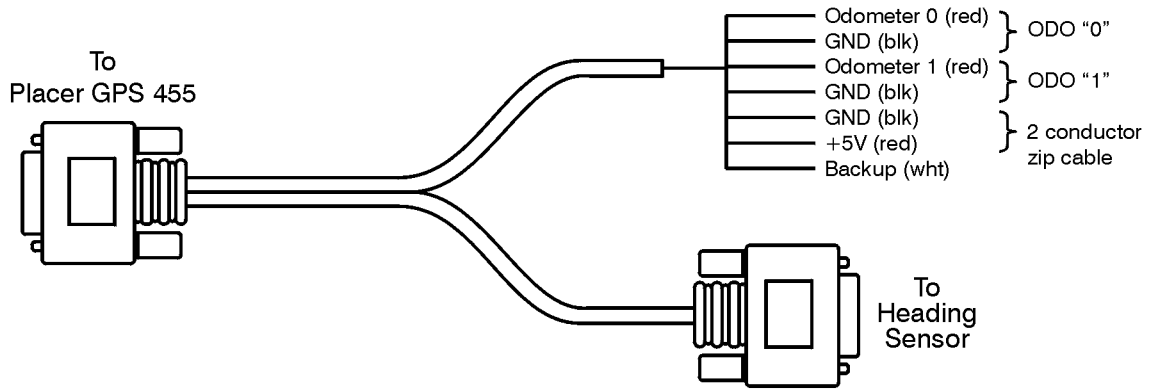
Figure 2-23 Heading Sensor Cable

Configuring Multiple Receivers and Phones

The Agilent Wireless Solutions support up to four receivers (all options) and/ or four phones (option 150 only).

Multiple Receivers

NOTE   When connecting multiple receivers, it is recommend that you use the automatic configuration wizard. For more information refer "Automatic Configuration" on page 23.

When you configure multiple receivers, only one receiver (the **master receiver**) is physically connected to the computer and is able to supply input from the GPS. You attach an external GPS system (unless it has internal GPS) to the master receiver only. The other receiver(s) receive their GPS signal from the master receiver via the cabling shown in Figure 2-24. If other receivers contain internal GPS systems, their GPS is ignored. When you configure the receivers in the software, do not attempt to configure more than one GPS receiver (the one provided by the master receiver).

If you are using an external GPS, refer to the appropriate section (see Table 2-1 on page 2-25) for instructions on how to connect it to your master receiver. The setup for multiple receivers is shown in Figure 2-24.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

NOTE

- Each receiver you purchase comes with one short cable. Configuring multiple receivers requires a short cable for each receiver, but only one long cable, so you may end up with some extra cables. Cables can be ordered using Agilent 86154A option 099.
- The Agilent E6450A receiver is not capable of multiple-receiver functionality. However, it can be upgraded to an Agilent E7473A Options 320 or 330. This upgrade is covered by ordering Agilent 86150A special upgrade (see your Agilent Technologies representative for more information).
- To operate multiple receivers, you must be running version A.03.01, or later, of the software, and version 3.00.00, or later, of the firmware.
- To operate multiple phones, you must be running software that supports multiple phone measurement and be using the correct hardware security key.

Setting up Hardware
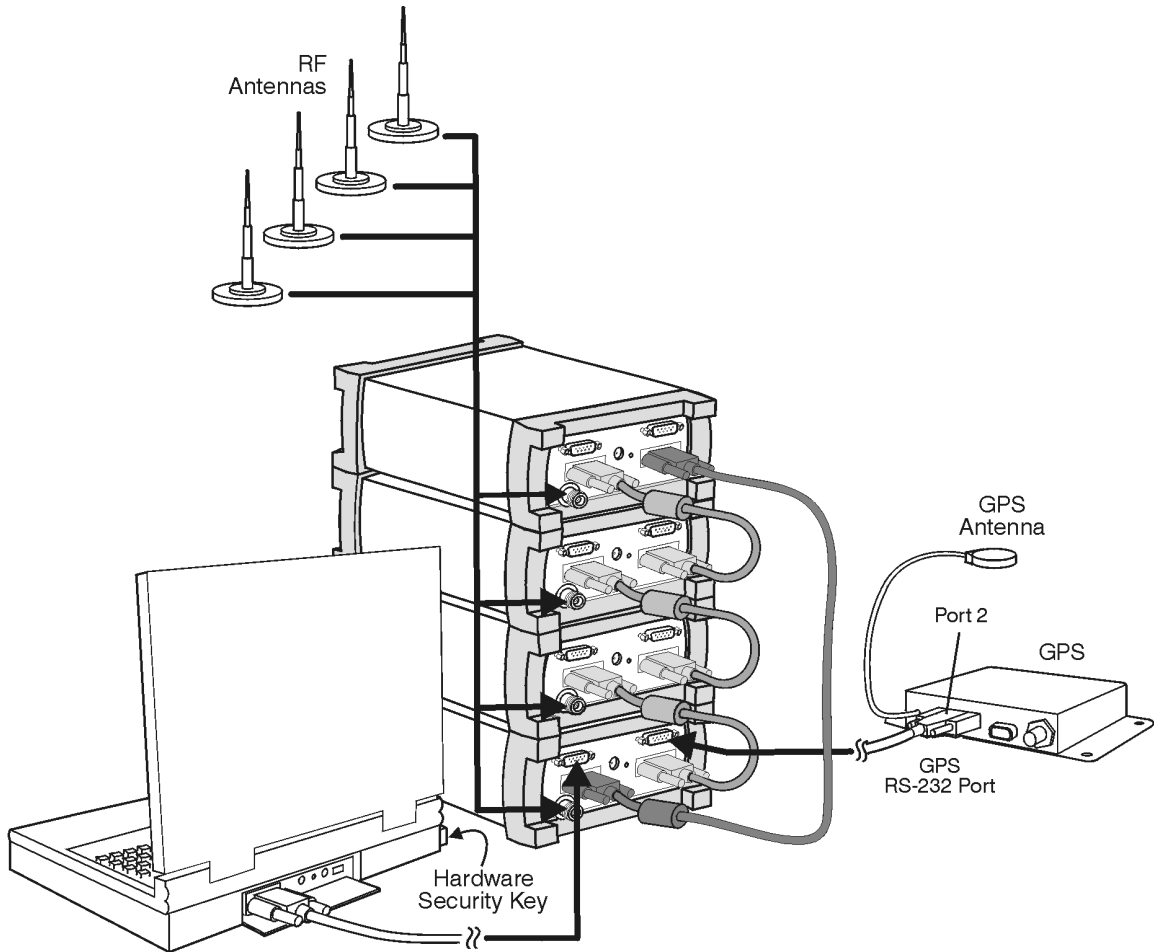
4rcvrs_t.cdr

Figure 2-24 Multiple Receiver Configuration

Configuring a multiple receiver system

1. Begin by connecting the receivers to each other using the illustrations shown in Figure 2-24 on page 94 and Figure 2-25 on page 98 to guide you. Decide which receiver will act as the master receiver, the receiver to

which you connect the computer and the GPS (or one that has internal GPS).

NOTE   You should not connect GPS antennas to other, non-master receivers, which may have internal GPS. Only connect a GPS antenna to the master receiver or GPS system.

   a. Attach one end of a short cable to the RX LOOP IN connector on the master receiver. Attach the other end of the short cable to the RX LOOP OUT of the second receiver. The receivers are designed to stack one on top of the other.

   b. Continue to attach receivers (up to a total of four receivers) as in step a.

   c. When all receivers are connected with short cables, connect one end of a long cable to the RX LOOP OUT connector on the master receiver to the RX LOOP IN on the last receiver in the series.

2. Connect the hardware security key to the parallel port of the PC.

3. Connect the serial port of the PC to the RS-232 port of the master receiver with an RS-232 cable. The default serial port used by the application is multiplexed serial, COM1. If your PC uses a different com port, you can specify a different serial port number in the software when you configure the project.

4. Connect the RF antenna to the RF input of each of the Agilent E645x receivers. Use the supplied Type-N to TNC adapter, if necessary.

5. When applicable, connect the GPS system and antenna as instructed earlier in this guide. See Table 2-1, "GPS System Configurations," on page 25 for the page to which to refer for your specific GPS and receiver.

6. Turn on the GPS system and the PC, and run the application.

7. Select or create the project you are going to use.

8. To configure each individual receiver:

   a. Select Configuration mode.

   b. Choose the Hardware tab, and click **Add**. The Hardware Editor opens. (Alternatively, you can click the right mouse button to display the Edit menu, and then choose **Add**.)

   c. Enter a description of the receiver in the Description field. It is important with multiple receivers that you are very specific in your descriptions to help you identify a particular receiver in a measurement setup.

   d. Select the type of hardware you want to use from the Hardware Type drop-down list.

   e. Select the COM Port you want from the Port Selection drop-down list.

   f. Click the Port Settings tab to configure the COM port you selected.

   g. Click the Advanced tab, and indicate in the RX Loop Position box the position in which the receiver is located ("Determining Where in the Chain a Receiver Is Positioned" on page 97). If all receivers are unique, you can select Auto to accept the default settings which are based on the receivers' physical position.

9. Select Configuration mode.

   a. Select the **Hardware** tab.

   b. Double-click the GPS icon, or select GPS then click **Modify**.

   c. In the Hardware Type box, select the appropriate GPS system.

   d. Click **OK**.

NOTES

- If the receivers are not different models or are in unique situations (such as one receiver with the antenna on the roof and the other receiver with the antenna in an isolation box), you can set the RX loop positions yourself to ensure that you can differentiate between them for measurements and the resulting data.

- When receiver position is assigned by the system (when you select Auto), an effort is made to match as closely as possible the physical order of the receivers.

- The receiver in position 1 has a higher data rate than receiver 2, which is higher than receiver 3, etc.

Accept the default settings for baud rate, parity, and others. See "Selecting GPS Hardware" on page 120 for more information.

NOTE If you need to change the GPS coordinate datum, select the Advanced tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

For additional information and vehicle connections for Trimble Placer units, refer to Trimble Navigation Limited documentation.

Determining Where in the Chain a Receiver Is Positioned

The position of a particular receiver in a chain of receivers is determined by its proximity in the chain to the master receiver (the receiver connected directly to the computer). The connection is made from RX LOOP OUT on one receiver to RX LOOP IN on the next in the chain. Therefore, the receiver that is connected to the master receiver's RX LOOP OUT becomes the second module in the chain. The third module is the one connected to the second one's RX LOOP OUT, and so on. Figure 2-25 on page 98 illustrates how the receivers are configured and numbered by the system.
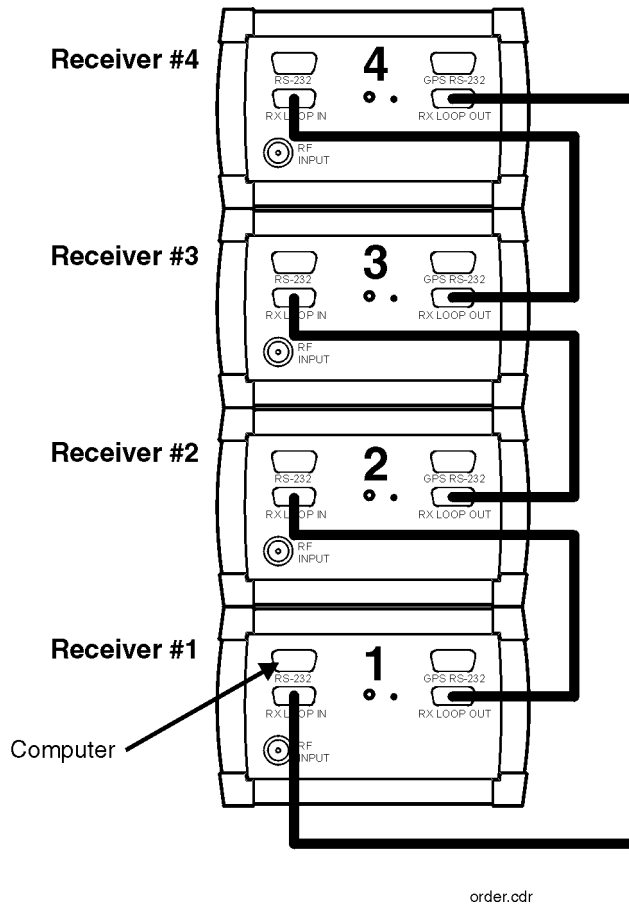
Setting up
Hardware

order.cdr

Figure 2-25 Positioning a Series of Receivers

Multiple Phones (Option 150)

The Wireless Solutions system supports up to four phones. The phones attach to the computer via a PCMCIA card (see Figure 2-26). Agilent Technologies recommends and supports the Socket™ I/O[1] card (86154A option 020) which provides two phone connectors. Refer to the User's Guide that comes with the card for installation instructions. To attach four phones, you will need two Socket™ Port Ruggedized Serial I/O cards and your computer must have two PCMCIA slots.

NOTE   NT 4.0 does not support two serial I/O cards.

Agilent 86154A option 036 can also provide four RS-232 Serial ports through a Universal Serial Bus (USB) adapter.

NOTES   Be advised that when you add two cards, more resources are required than many laptops have. It is possible that you will experience slowdowns or even crashes. Please refer to "Troubleshooting Resource, GPS, or, COM Errors Problems" on page 159 for recommendations on how to avoid this situation and "General Hardware Specifications and Minimum System Requirements" on page 68 for minimum PC requirements.

To operate multiple phones and receivers, you must be running version A.03.01 of the software or later and have the appropriate multiple resource license security key.

Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

1. The Socket™ Port Ruggedized Serial I/O card is produced by Socket Communications, Inc.

Setting up
Hardware

Checking for a Free Interrupt

Each dual port serial I/O card you insert requires one free interrupt request (IRQ) to operate. Check the following entries in the Windows 95 help index for more information:

- Resources for hardware
- Freeing resource settings used by disabled hardware
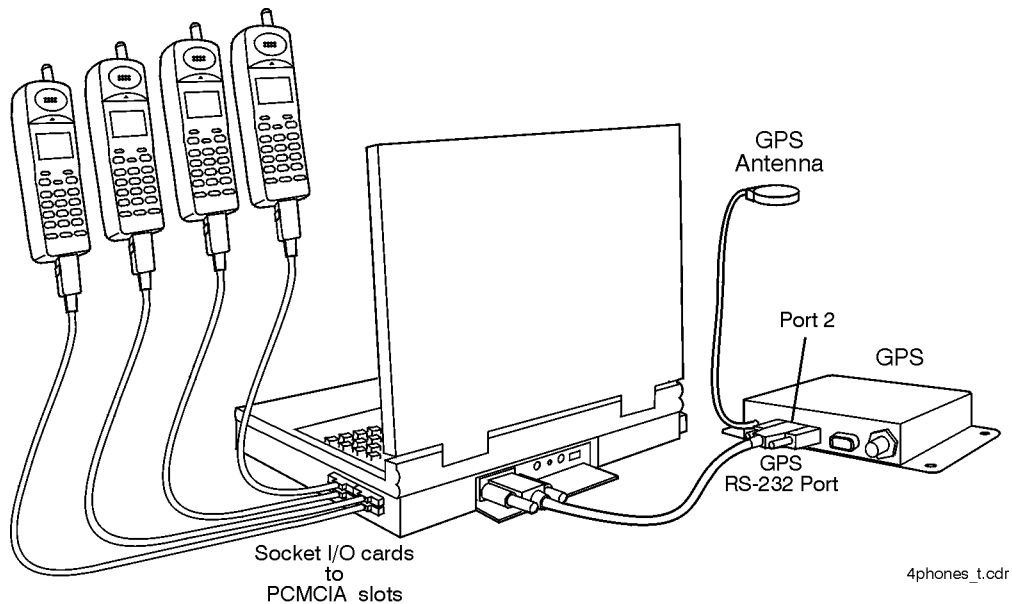- Troubleshooting conflicts

Figure 2-26 Multiple Phone Configuration

Configuring a Multiple Phone System

1. Connect the hardware security key to the parallel port of the PC.

2. Connect the GPS system and antenna as instructed earlier in this guide. See Table 2-1, "GPS System Configurations," on page 25 for the page that covers your specific GPS.

3. Connect the phone cable to a second COM port (different than you use in step 2). On most laptop PCs this will require the use of a Socket Dual I/O card, installed into the PCMCIA slot on your PC. If you are installing

three or four phones, you'll need to insert a second I/O card and then connect the additional phone cable. To verify COM port allocation:

a. On your Windows desktop, open the Start menu and choose **Settings** > **Control Panel** and double-click the System icon to open the System Properties window.

b. Select the Device Manager tab.

c. Open Ports (COM and LPT) and check that the COM ports you need are defined and available. Make a note of the COM numbers that are assigned.

Setting up Hardware

NOTE Some I/O cards provide their own icon on the Control Panel. Select it to expedite configuration.

4. Turn on the GPS, the PC, and the phone(s), then start the application.

5. Select or create the project you are going to use.

6. Select Configuration mode.

a. Select the Hardware tab.

b. Double-click the GPS icon, or select GPS then click **Modify**.

c. In the Hardware Type box, select the appropriate GPS.

d. On the Port Selection tab, select the appropriate COM port (typically COM1). If the GPS is connected to a receiver (or is built into that receiver), connect the receiver to the main COM port.

e. If the GPS is connected to a PC, select **Serial**. If the GPS is connected to an Agilent receiver, select **Multiplex Serial**.

f. Click **OK**.

NOTE If you need to change the GPS coordinate datum, select the Advanced tab of GPS hardware configuration box. The default datum can be set using the **Tools** > **Options** and selecting the Default Datum tab.

7. Configure each phone individually as follows:

    a. In Configuration mode, select the Hardware tab.

    b. Double-click the phone icon or select the phone icon and click **Modify** to display the Hardware editor. Or, click **Add** to add a new phone.

    c. Enter a description for the phone.

NOTE   When you describe (name) a project, the more descriptive you are, the easier it will be later to distinguish among resources when you are creating measurements that use similar or multiple resources.

    d. In the Hardware Type box, select the phone type.

    e. Click the Port Selections and Port Settings tabs to modify and confirm the correct COM port setting for the phone. The port selection should be serial. Select the Com port you are using.

    f. Use the default port settings or use the values according to the PCMCIA Socket I/O card you are using.

    g. Click **OK** when you are satisfied with the settings.

8. Select Collection mode to start the measurements.

Multiple Receivers and Phones

Refer to "Multiple Receivers" on page 92 and "Multiple Phones (Option 150)" on page 99 for information about installing multiple receivers and multiple phones. There are no special considerations for installing both multiple phones and multiple receivers. Figure 2-27 on page 104 illustrates a sample setup.

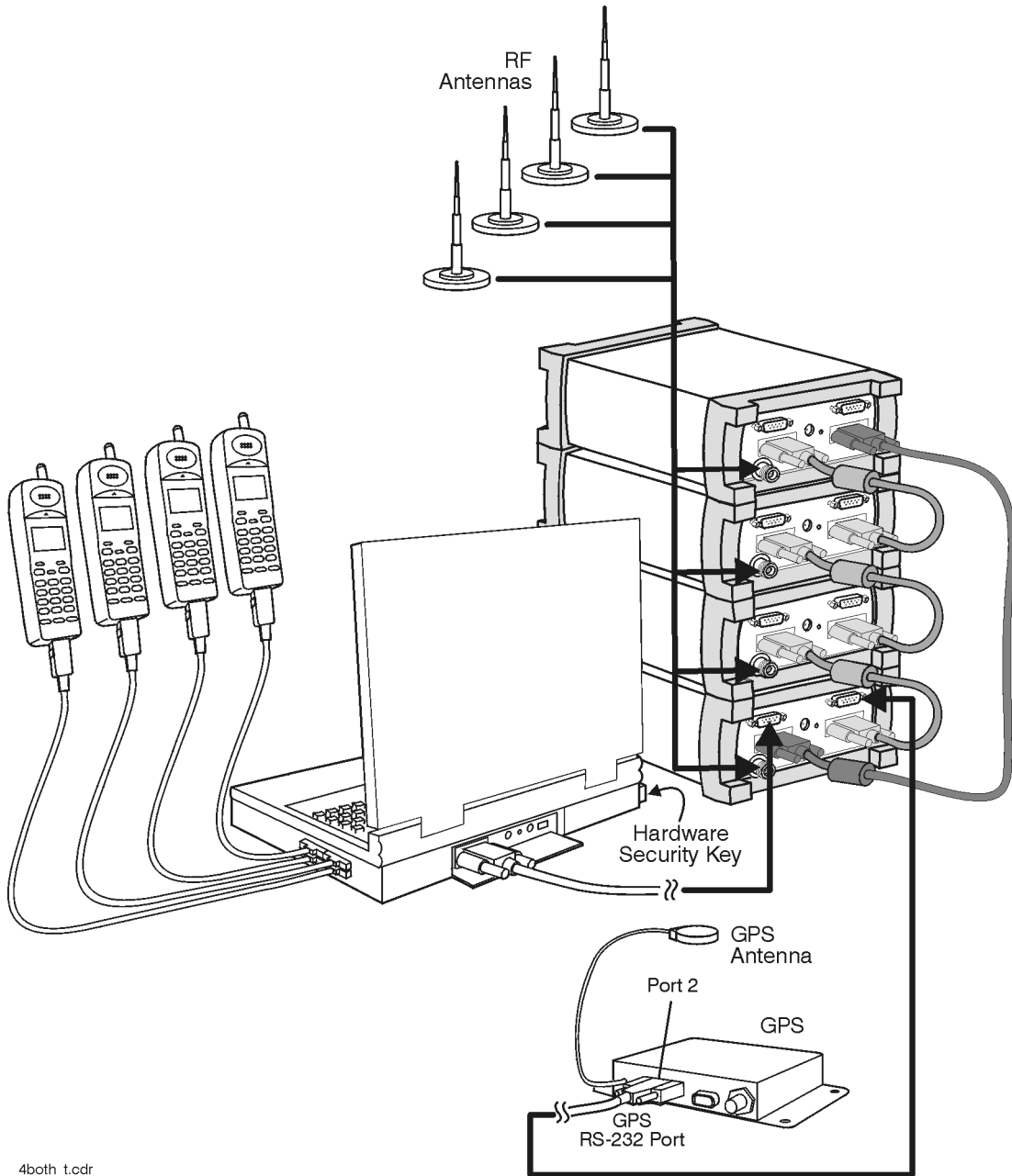Before you begin the hardware installation procedure, please review "Hardware Installation Tips" on page 21.

NOTE   The GPS must be physically connected through the Agilent receiver and designated in the software as Multiplex Serial.

Setting up
Hardware

RF
Antennas

Hardware
Security Key

GPS
Antenna

Port 2

GPS

GPS
RS-232 Port

4both_t.cdr

Figure 2-27 Multiple Receiver and Phone Configuration

Universal Serial Bus (USB), 4-port Adapter Configuration

The USB-to-Serial Converter, EdgePort/4, from Inside Out Networks™ is a true plug-and-play compatible device. It reduces the number of cables required by multiplexing up to four serial ports onto one USB cable.

Setting up Hardware

NOTES

- Currently only Windows 98 provides true USB and plug-and-play capability. These instructions only apply to Windows 98. In the near future, Windows NT (2000) will have plug-n-play USB support.

- The USB serial converter has an optional +5V input which in NOT required for use. The USB connection provides sufficient power to the converter to support four serial devices.

WARNING **Do not connect power to the EdgePort/4 USB. It does not require external power, even though there is a power connector on the back. Any power source that is of an incorrect voltage, such as the receiver battery, can damage the Acceleport 4.**

To Connect the USB Serial Converter for Use with a Laptop or a Non-Agilent Provided Pen Tablet

This procedure is for customers wishing to use the device on laptop systems in a drive test environment, or, indoor customers installing on their own computing device.

1. Plug in the EdgePort/4 to the USB port. The device is recognized by Windows as new hardware.

2. Insert the Windows 98 Inside Out Networks Acceleport 4 driver diskette in the device's floppy drive.

   (For the Fujitsu pen tablet computer, the floppy drive is connected via a connector exposed by removing the battery. This must be done with external power connected.)

3. Follow the directions in the New Hardware wizard to select the floppy drive as the source for the drivers.

4. The drivers load and are configured automatically. The converter is now ready to use.

To Connect the USB Serial Converter for Backpack Usage

1. Unzip the left shoulder strap pocket.

2. Feed the USB connector through the strap, out through the top, then down through the hole in the top of the backpack.

3. Pull the cable in and plug it into the USB serial converter.

4. Fasten the USB hub into the case.

CAUTION   The USB connector attaches to the pen tablet on the outside of the case. As you collect data, watch that you don't bump the USB connector against your surroundings. Also, be aware of backpack dimensions and weight. Dropping or bumping the system may cause the measurement system to fail.

Receiver Connector Panel

Make all connections *before* applying power. The default serial port used by the application is COM1. If desired, you can specify a different serial port in the application.

When the Agilent E645x receiver is turned on, the ACTIVE indicator is lighted. The light will turn off for 1-2 seconds during the software start up and configuration process.
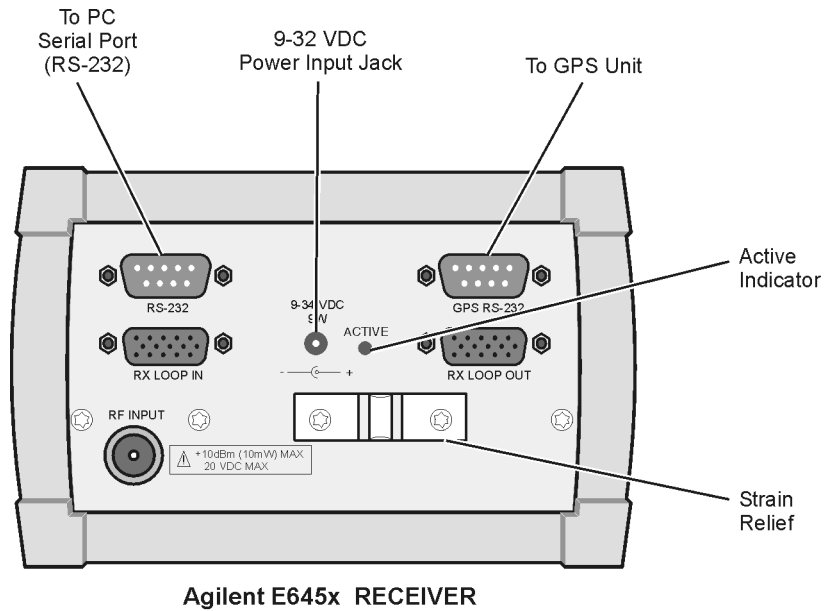
Setting up
Hardware

Figure 2-28 The Agilent Receiver Connector Panel

Internal GPS Receiver Connector Panel

The receiver provides an internal GPS as identified in the application.

Make all connections *before* applying power. The default serial port used by the application is COM1. If desired, you can specify a different serial port in the application.

When the receiver is turned on, the ACTIVE indicator is lighted. The light will turn off for 1-2 seconds during the software start up and configuration process.

Once the receiver is turned on and the GPS antenna is properly placed, the GPS is functional; however it may take several minutes to acquire GPS lock.
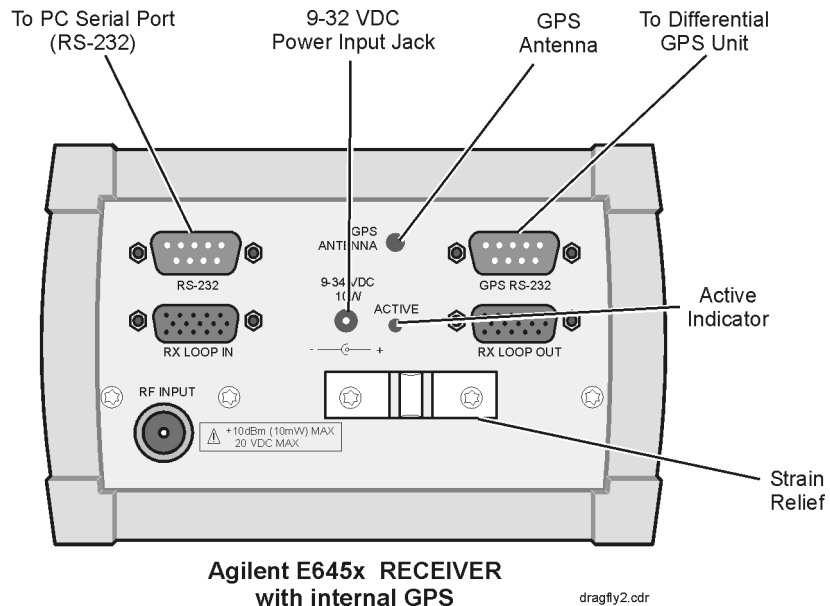
Figure 2-29 The Agilent Digital Receiver with Internal GPS, Connector Panel

Receiver to PC Serial Port Cable Configuration

Figure 2-30 shows the pin-out specifications for the connection between the Receiver and the PC. The cable provided with the system is a "Null Modem" cable.
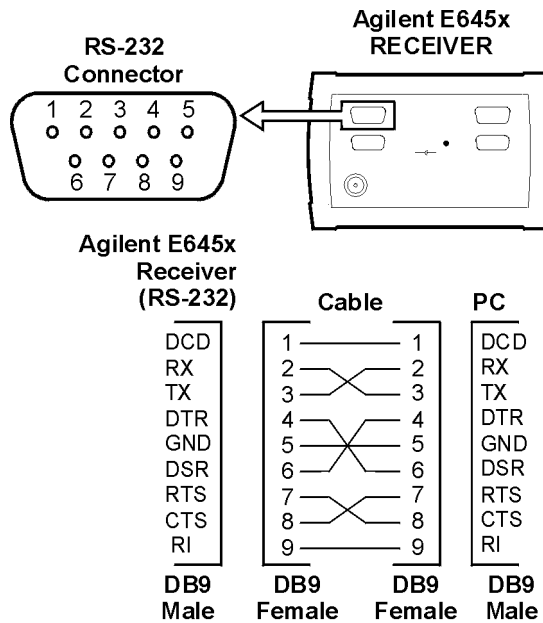
Figure 2-30 Agilent E645x Receiver Connections to PC Serial Port

RS-232 to GPS Unit Cable Configuration

Figure 2-31 is supplied in case the GPS unit you are using is different from those described in this guide. The Agilent Wireless Solutions Software can usually operate any GPS unit employing the TAIP, TSIP, or NMEA protocols.

NOTE   1PPS must be provided on Pin 9 for CDMA Pilot and Code-Domain Power measurements, to be accurate and stable.

**Agilent E645x
RECEIVER**

GPS RS-232 Connector

```
1  2  3  4  5
o  o  o  o  o
  o  o  o  o
  6  7  8  9
```
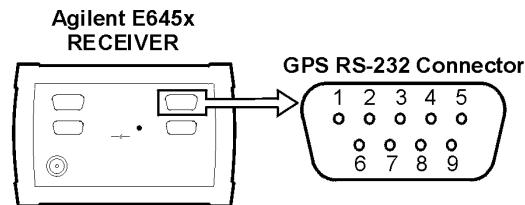
pin#   Connections used

1   DCD
2   RX ⟵   Input to Agilent E645x Receiver from the GPS unit
3   TX ⟶ Output to GPS Unit
4   DTR
5   GND ⟶ Ground
6   DSR
7   RTS
8   CTS
9   1PPS*⟵1 Pulse per second

  * 1PPS (one pulse per second, TTL level or open collector) is supplied by the GPS
    unit and used as a reference in the Agilent E645x receiver.

The configuration shown is used in the following GPS Protocols:
    - TSIP (Trimble Standard Interface Protocol)
    - TAIP (Trimble ASCII Interface Protocol)
    - NMEA (National Marine Electronics Association)

connb.cdr

Figure 2-31 RS-232 Cable Connecting the Agilent E645x Receiver to a GPS Unit

RS-232 to Differential Unit Cable Configuration

Figure 2-32 shows the pin-out specifications for connection of the differential GPS receiver to an Agilent E645x receiver (with internal GPS).
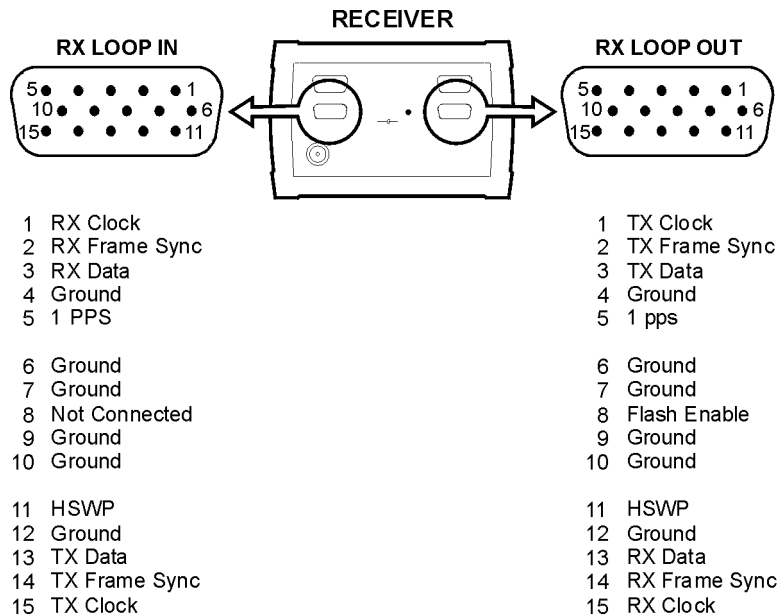
Internal GPS
Differential GPS
RS-232 Connector

Agilent E645x RECEIVER
Internal GPS

1 2 3 4 5
6 7 8 9

pin#   Connections used
1   DCD
2   RX ←——   Input to Agilent E645x Receiver from the Differential GPS unit
3   TX ——→ Output to Differential GPS Unit
4   DTR
5   GND ——→ Ground
6   DSR
7   RTS
8   CTS
9   not used
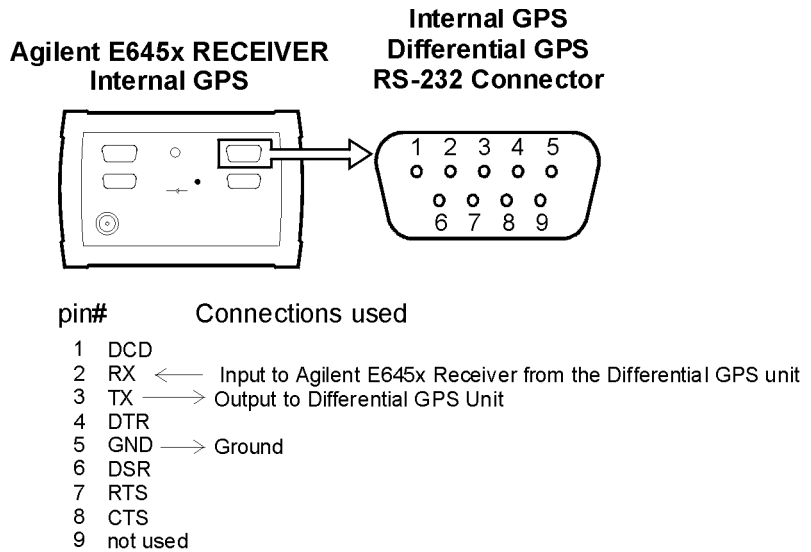
connc.cdr

Figure 2-32 RS-232 Cable Connecting the Agilent E645x Receiver to a Differential Unit

RX Loop In/Out Cable Configuration

Figure 2-32 shows the pin-out numbers for the cable used to connect receivers, in a multiple receiver setup. Connections are made between the Rx Loop in and Rx Loop out of the Agilent E645x receivers. The pin-out numbers apply to both the short and long cables.

RECEIVER

RX LOOP IN   **RX LOOP OUT**

1	RX Clock		1	TX Clock
2	RX Frame Sync		2	TX Frame Sync
3	RX Data		3	TX Data
4	Ground		4	Ground
5	1 PPS		5	1 pps
6	Ground		6	Ground
7	Ground		7	Ground
8	Not Connected		8	Flash Enable
9	Ground		9	Ground
10	Ground		10	Ground
11	HSWP		11	HSWP
12	Ground		12	Ground
13	TX Data		13	RX Data
14	TX Frame Sync		14	RX Frame Sync
15	TX Clock		15	RX Clock

rxconn.cdr

Figure 2-33 Cable Connecting the Agilent E645x Receiver to Another Agilent E645x Receiver

Pulse Trigger Device Configuration

The E6455A receiver accommodates a pulse trigger device. The device you use must meet the following input requirements:

- BNC connector (our input is female BNC)
- Falling-Edge triggered
- TTL threshold
- 15 Volt Maximum Pulse Level
- 100 nsec minimum pulse width of period
- 300 usec minimum pulse

Connections are illustrated in Figure 2-34. For software configuration instructions, refer to the online help. Search for **pulse trigger** to locate the information.

pulse_trigger_cable.cdr
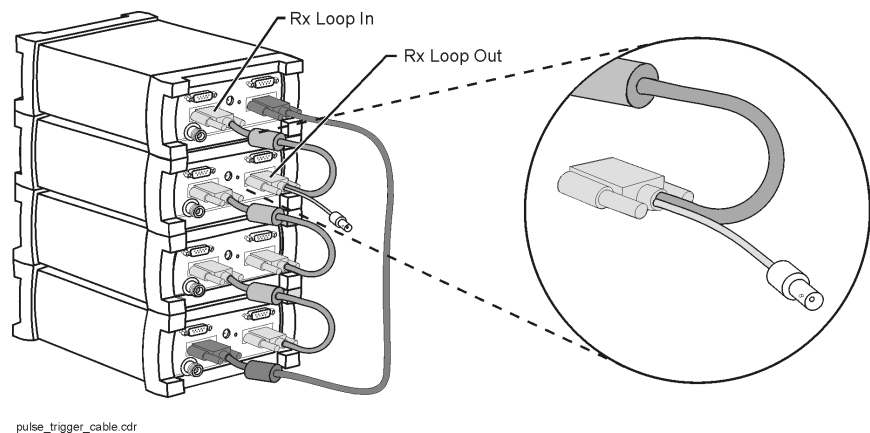
Figure 2-34 Pulse Trigger Cable Connected to Receivers and the Pulse Trigger Unit

Mounting the Receiver

The vehicle mounting kit is used to mount the Agilent digital receiver in a vehicle or rack. These parts are supplied with an Agilent digital receiver or can be ordered separately as 86154A Option 510.
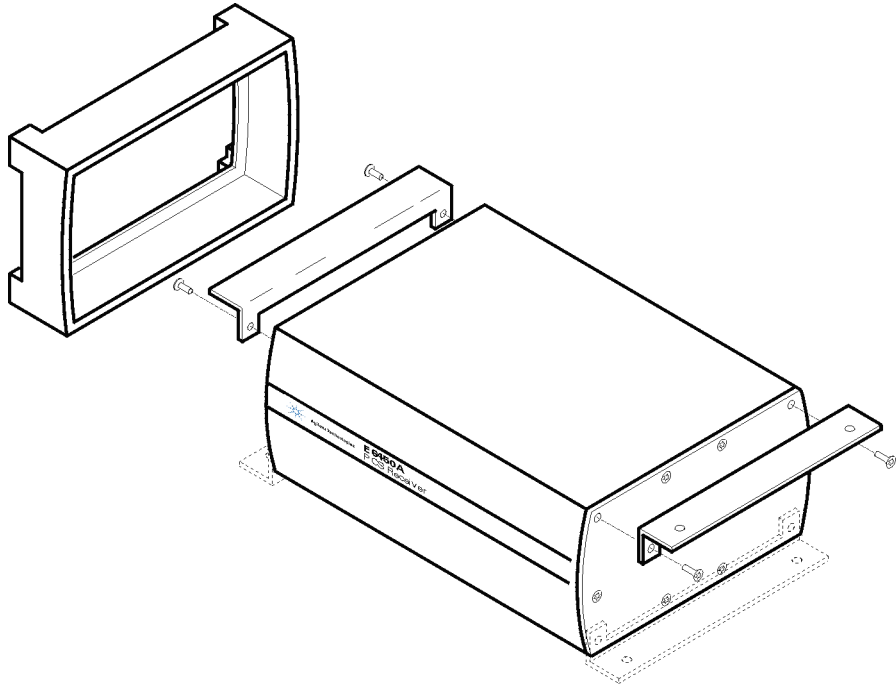
mountb.cdr

Figure 2-35 Vehicle Mounting Kit (Agilent 86154A Option 510)

Mounting a Receiver

1. Remove the rubber bumpers from each end of the receiver.

2. To attach the brackets to the top of the receiver, remove the top two screws from the front and rear panels of the receiver.

3. To attach the brackets to the bottom of the receiver, remove the bottom two screws from the front and rear panels of the receiver.

4. Attach the brackets using the two screws you removed in step 2 (for top attachment) or step 3 (for bottom attachment).

Setting up Hardware

3

Starting and Learning to Use the Software

What You'll Find in This Chapter

To Do This	See This
Start the software.	"Starting the Agilent Wireless Solutions Software" on page 119
Select GPS Hardware.	"Selecting GPS Hardware" on page 120
Learn to use the software.	"Using the Online Tutorial" on page 123
Get information about taking measurements.	"Using Online Help" on page 125
Start and use the License Manager.	"Using the License Manager" on page 128
Get an online version of this guide and other documentation (**PDF format**).	"Additional Documentation" on page 131

Starting the Agilent Wireless Solutions Software

Be sure that you have installed the software. Refer to "Installing the Software" on page 11for instructions.

Do This	See This
1 Choose the **Start** menu and click **Programs**	
2 Click **Agilent E74xx** (the name of your Agilent Wireless Solutions)	A sub-menu should appear, listing the components of the Wireless software.
3 Click **Agilent E74xx Series** to start the software.	The copyright screen appears for a few seconds, then the software appears on your screen, ready to use.
	Note: The first time you start the software you have the opportunity to run the online tutorial, a tool that is designed to help you get the most from the software.

Start & Learn Software

CAUTION   It is possible to exceed Windows 95/98 allocated resource levels by opening too many windows while running your system. This causes erratic behavior of the application and requires the operator to reboot the operating system in order to recover. This will also corrupt an open Wireless Solutions database, with potential loss of data. Windows 95 does not display any warning or feedback when this occurs. Refer to "Troubleshooting Resource, GPS, or, COM Errors Problems" on page 159 for more information.

Selecting GPS Hardware

The Agilent Wireless Solutions Software is designed to support several types of GPS hardware. The application must be configured for your system in order to operate correctly. The following procedure describes how to select the appropriate GPS hardware.

NOTE

If you are unsure of your GPS communication protocols and configuration, use the automatic configuration wizard to set up your GPS. Refer to "Automatic Configuration" on page 23.

Do This	See This
1 Set up the hardware.	"Setting Up Your System" on page 19 for your hardware configuration.
2 Turn on the hardware.	"Setting Up Your System" on page 19 for your hardware configuration.
3 Turn on the PC and run the Agilent Wireless Solutions Software.	See "Starting the Agilent Wireless Solutions Software" on page 119.
4 Create or select a Project.	Project name appears in the field.
5 Select Configuration mode.	You switch to Configuration mode.
6 Select the Hardware tab.	See Figure 3-1.
7 Select **GPS**, then click **Modify**, or double-click the **GPS** icon.	You can now select the appropriate GPS protocol. See Figure 3-2.

Do This	See This
8 In the Hardware Type box, select the appropriate GPS hardware. Click the Port Selections and Port Settings tabs to set the communications protocol for your system.	Refer to Table 4-5 on page 153 for a listing of the GPS protocols
9 Click **OK** when you are satisfied with the settings.	
10 Select Collection mode to start measurements.	
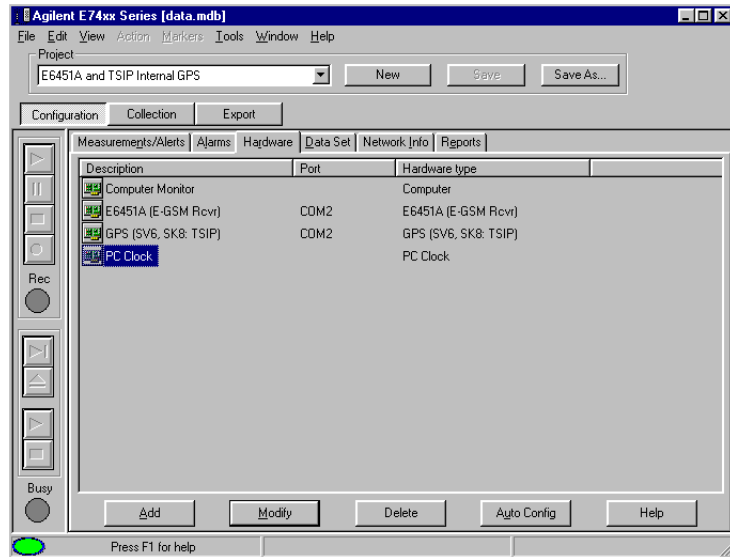
Figure 3-1 A List of Hardware in Configuration Mode
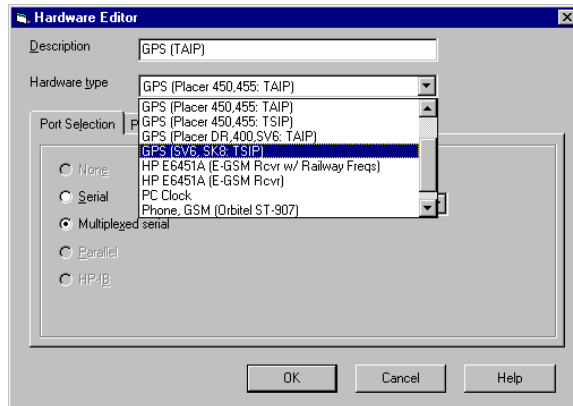
Figure 3-2 Hardware Editor Where You Select Your GPS Protocol

Using the Online Tutorial

As part of the product, the Agilent Wireless Solutions Software includes an online tutorial. The opening screen is shown in Figure 3-3. *It is strongly recommended that you complete the online tutorial before you perform any measurements.*
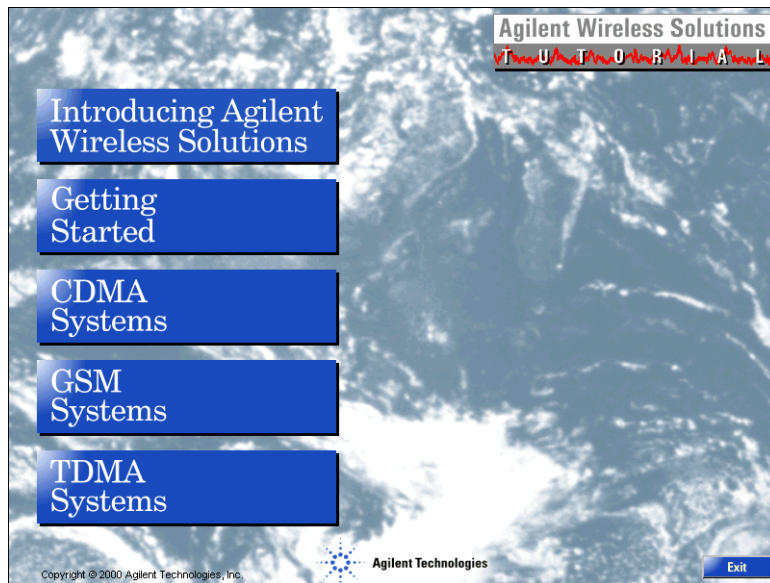
Figure 3-3 The Opening Screen of the Agilent Wireless Solutions Online Tutorial

The tutorial provides an overview of the capabilities of the Agilent Wireless Solutions. It also demonstrates the most important tasks you'll perform, and then guides you through practicing those tasks in the program.

Agilent Technologies supplies Wireless Solutions for GSM, CDMA, TDMA, and W-CDMA (UMTS) systems. This tutorial includes training for all types of systems, but it is not necessary to view all parts of the tutorial if you are only going to be analyzing your particular system.

Run the Tutorial

Do This	See This
1 Choose the **Start** menu and click **Programs**.	
2 Click **Agilent E74xx** (the name of your Agilent Wireless Solutions)	A sub-menu should appear, listing the components of the Wireless software.
3 Click ◈ **Agilent E74xx Tutorial** to start the software.	The tutorial begins as shown in Figure 3-3 page 123. **Note:** The first time you start the software you have the opportunity to run the online tutorial, a tool that is designed to help you get the most from the software.

After the Tutorial

When you have finished running the tutorial, you can continue learning about the system by looking at these online help topics.

- Introducing the system

- Getting started

- Receiver Based Procedures

- Phone Based Procedures

- Importing, exporting, and mapping data

See "Using Online Help" on page 125 for more information.

Using Online Help

As part of the product, the software also includes context-sensitive online help and *How Do I?* help, designed to answer many commonly asked operation and application questions. You can also select *Support Help* from the Help menu to see a description of available support resources, including phone numbers. Figure 3-4 shows sample lists of help topics.

.
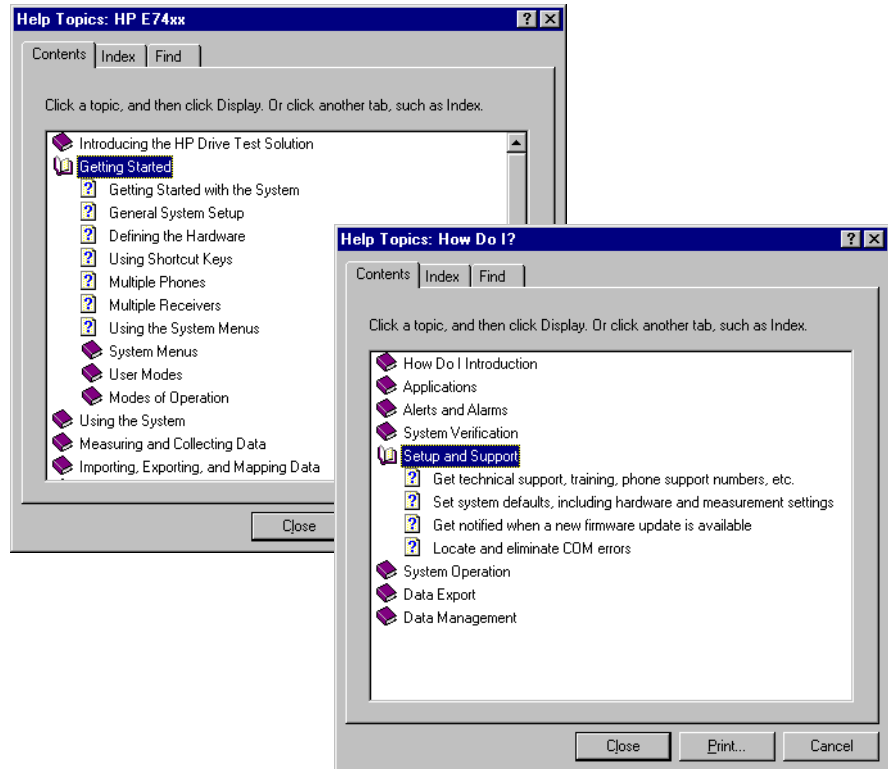
Figure 3-4   Online Help and How Do I Help Contents

Run the Online Help

You can press **F1** when running the application software to open help for the displayed screen. If **F1** is not active, you can click the Help button.

Do This	See This
1 Choose the **Start** menu and click **Programs**.	
2 Click **Agilent E74xx** (the name of your Agilent Wireless Solutions)	A sub-menu should appear, listing the components of the Wireless software.
3 Click ![icon] **Agilent E74xx Help** to start the software. Or, You can choose **Topics** from the Help menu in the Agilent E74xx software. Or, You can choose **How Do I?** from the Help menu in the Agilent E74xx software. Or, You can choose **Support** from the Help menu in the Agilent E74xx software.	The help opens, a sample of which is shown in Figure 3-4 page 125.
4 Click the **Contents** tab to view all the topics in the online help. • Double-click a book icon to view its contents. • Double-click to display the topic you want.	The topic you've selected opens in the help window. Procedures can be left on the screen to guide you as you work in the software.

Do This	See This
5 Click the **Index** tab to search through an alphabetical list of topics.	The topic you've selected opens in the help window. Procedures can be left on the screen to guide you as you work in the software.
• Scroll through the list or type in the text box to locate the subject you want.	
• Double-click the index term when you find it.	
6 Use the **Find** tab to search the online help to find topics that include the words or phrases you type in the text box.	The topic you've selected opens in the help window. Procedures can be left on the screen to guide you as you work in the software.
• Double-click the topic to open the help window for that topic.	
7 Click **Close** to exit help.	The help window closes.

Start & Learn Software

Using the License Manager

The hardware key that came with your Agilent Technologies system enables and secures the functionality you purchased from Agilent Technologies. In addition to the parallel port hardware key, the License Manager also supports the Sentinal SuperPro USB port hardware key.

Starting the License Manager

Make sure to plug your hardware key into the parallel or USB port (depending on the key you're using) before you begin this process.

Do This	See This
1 Choose the **Start** menu and click **Programs**.	
2 Click **Agilent E74xx** (the name of your Agilent Wireless Solutions)	A sub-menu should appear, listing the components of the Wireless software.
3 Click **License Manager** to start the software.	The License Manager begins showing the enabled software options, Figure 3-5 page 129.

Figure 3-5 License Manager

Learning the License Manager

For further information about the Agilent Technologies License Manager, refer to the following resources:

Resource	Description
Online Help	Available from the software's Help menu or by pressing **F1**, covers all functionality. It is the program's reference and includes step-by-step instructions for basic operations.
Support	Available from the Help menu, directs you to the support provided by Agilent Technologies.

Transferring Licenses

Your software license key contains the code necessary to enable your measurement and control features.

Using the License Manager software, you can transfer license options between software license keys. To limit the number of software license keys you have attached to your PC, you can consolidate the license codes onto one key. Figure 3-6 on page 130 shows the principle of software license management.
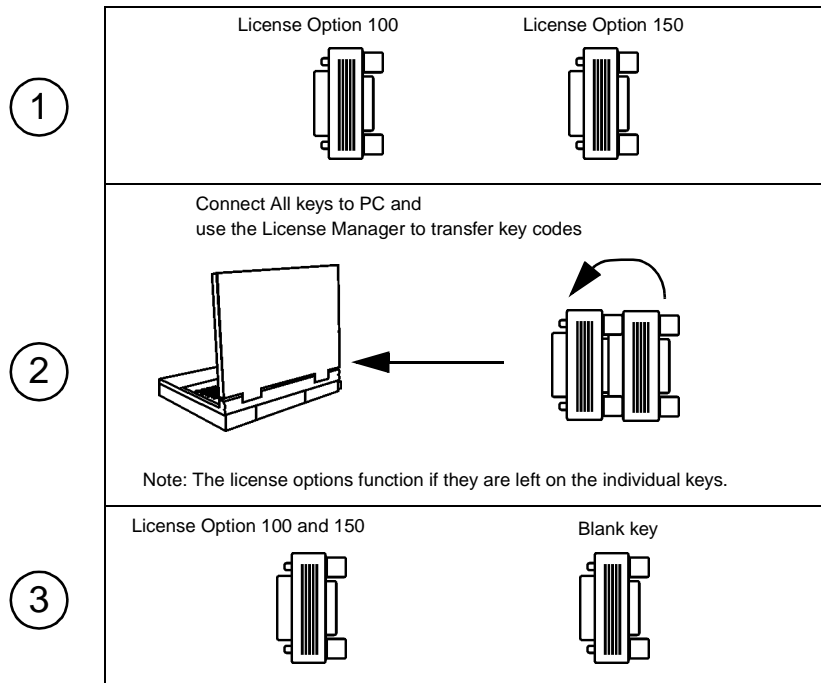
Figure 3-6   Example showing license key transfer process

Additional Documentation

Additional documents are supplied with your system. These include:

- This Getting Started Guide (PDF format)

- *Agilent Technologies Indoor Test System Setup Guide*: a guide that describes how to use the elements of the indoor solution, such as the backpack, the hands-free platform, and the receiver batteries (PDF format).

- *Agilent E74xx System Information Guide*: a guide containing system software and hardware specifications, options and accessories, including part numbers (PDF format).

- Various background technical-papers and application notes. *Note*: These documents were valid at time of shipping. However, since that time there may have been some updates or additional documents created. To ensure that you have the lastest information, please look at the Agilent web site.

These documents can be viewed online or printed.

Location of Online Documents

The documents were installed with your software application, if you used the typical installation option. The documents were installed in the following location:

C:\Program Files\Agilent Technologies\E74xx\Documents

If you chose not to install the documents during software installation, you can copy them from the CD. The documents can be found in the following location on the CD:

D:\documents *(D: represents the drive letter of your CD-ROM reader.)*

Viewing and Printing Online Documents

Before you can view and print these documents, you must have the Adobe Reader installed on your system. For more information about PDF files and the Adobe Reader, refer to the Adobe Web site (**http://www.adobe.com**).

The Adobe Reader is supplied on your CD. Refer to "Installing Adobe Reader" on page 16 for more information.

NOTE   The latest version of the Adobe Reader can also be downloaded from the Adobe Web site (**http://www.adobe.com**).

To View a PDF Document Installed with Your System:

Do This	Additional Information
1 From the program task bar, select **Start>Programs> Adobe> Adobe Reader**	The Reader software is displayed.
2 From the File menu of the Reader, select Open.	A dialog box appears listing the available drives you can read.
3 Select the C: drive and then select the documents folder. *C:\Program Files\Agilent Technologies\E74xx\Documents*	The dialog box displays the PDFs contained on your CD.
4 Choose the document you wish to view.	• **Getting Started Guide.PDF** - a PDF file of this Guide. • **Support Information.PDF** - a guide containing system and accessory options and part numbers. • **Indoor Getting Started Guide.PDF** - a guide that helps you set up your system for indoor measurements (Option 180).
5 Search for the information you require.	This can be done using: • Hypertext links (blue text) • The Adobe Reader search tool, found on the Tools menu.

To Print a PDF document or sections from It:

Do This	Additional Information
1 With the document opened, search for the information you require to be printed.	
2 Note the page number(s) displayed at the bottom of the Reader.	**Note**: The page numbers shown in the document may not correspond to the page numbers displayed by the reader.
3 Select **File > Print** and configure the print options for your printer.	**CAUTION**: when printing sections from the Getting Started Guide, ensure that a page or page range is specified. The Getting Started Guide is approximately 180 pages.

Start & Learn Software

4

Verifying the System

What You Will Find In This Chapter

There are four methods you can use to verify your system. These methods are:

Method	Additional Information
1	"Method 1: Using a Signal Generator" on page 137
2	"Method 2: Measuring a Known Channel in the System" on page 144
3	"Method 3: Measuring the Noise Floor" on page 147
4	"Method 4: GPS Measurement Verification Procedure" on page 152

If you have a phone-only system, use method 4 to verify your system. If you have an Agilent digital receiver as part of your system, you need to use at least 2 methods. These are method 4 and either method 1, or 2, or 3. Method 1 and 2 provide the highest level of confidence. Method 3 should only be used if you do not have a signal generator *and* there is no known channel in the system.

NOTE

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

- Before you start the verification procedures, familiarize yourself with the system, by completing the online tutorial. See "Using the Online Tutorial" on page 123.

Method 1: Using a Signal Generator

This procedure requires the Agilent 8648B signal generator. A similar signal generator can be used, providing it meets or exceeds the frequency ranges of your Agilent digital receiver and can produce an amplitude in the range of -70 dBm to -50 dBm.

CAUTIONS   The input power to the Agilent digital receiver should not exceed -10 dBm. Receiver measurements are not warranted for power levels between -10 dBm and 10 dBm. Power levels greater than 10 dBm damage the instrument.

For optimum performance, it is recommended that no more than -25 dBm be applied to the input of the Agilent digital receiver.

Do *not* connect the signal generator until you have checked the output power level is below -10 dBm.

Verifying Your System
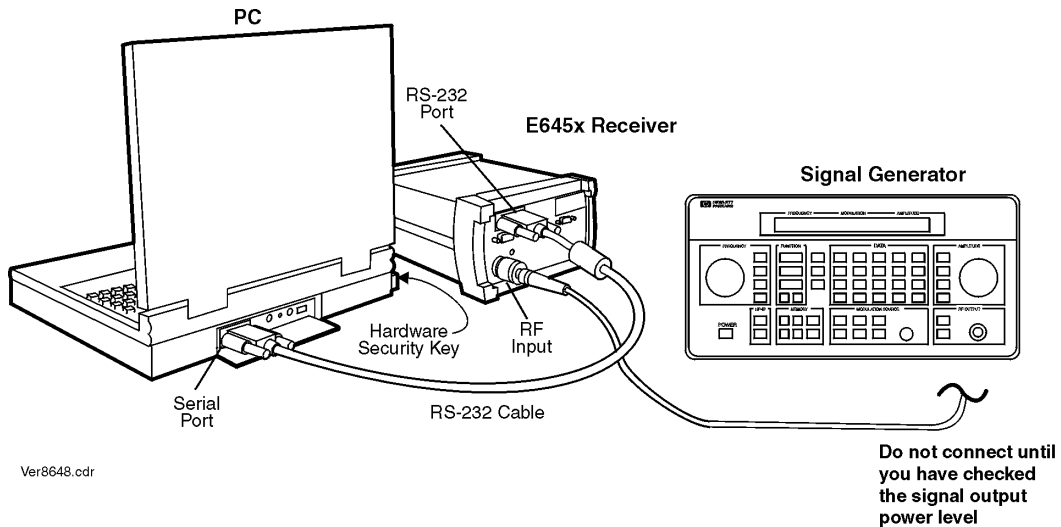
Figure 4-1 System Measurement Verification Setup Using a Signal Generator

Preparing the Hardware

Do This	Additional Information
1 Connect the system as shown in Figure 4-1, but do **not** connect the signal generator output.	There is a three minute delay after power-up or re-configuration, before the internal temperature sensor is activated and measurements are nominally correct.
The Agilent receiver requires a 30 minute warm-up period to meet the guaranteed specifications.	For more information on how to connect the receiver and laptop, refer to step 1 and step 2 of any of the procedures listed in "Receiver-Based System Setup" on page 28
2 Depending on your system type, set the frequency/power levels using Table 4-1 on page 140.	
3 Check that the correct values are set on the signal generator.	Do **not** connect the signal generator at this stage.

Preparing the Software

Do This	Additional Information
1 Start the application program by going to the Start menu, selecting Programs, Agilent E74xx.	The software starts.
2 Create a new project called *Verification Test 1 (External generator)*.	We recommend you use the automatic configuration wizard for this process. Refer to "Automatic Configuration" on page 23.
3 Click **Configuration** and then add the receiver hardware.	Refer to "Hardware Installation Tips" on page 21
4 Click **Collection** and select the Spectrum VFP (Virtual Front Panel)	
5 Click **Maximize** button in the upper-right corner of the main window.	The display size increases to fill the available space.
6 Connect the signal generator output to the RF input of the receiver.	
7 Turn on the signal generator.	
8 Set the measurement software as follows: **Band:** Uplink **Frequency:** See Table 4-1 on page 140 **Span:** 1 MHz **Averaging:** Running **Averages:** 32	You should see a signal trace showing a single spectral peak in the middle of the display. Figure 4-2 page 140 shows a example trace.

Verifying Your System

Table 4-1 Signal Generator Uplink Settings

Model	Frequency and Power Setting
GSM1900, TDMA and CDMA PCS band systems	1879 MHz at –60 dBm
GSM DCS1800 band systems	1748 MHz at –60 dBm
GSM900 band systems	898 MHz at –60 dBm
Cellular CDMA and TDMA band systems	837 MHz at -60 dBm
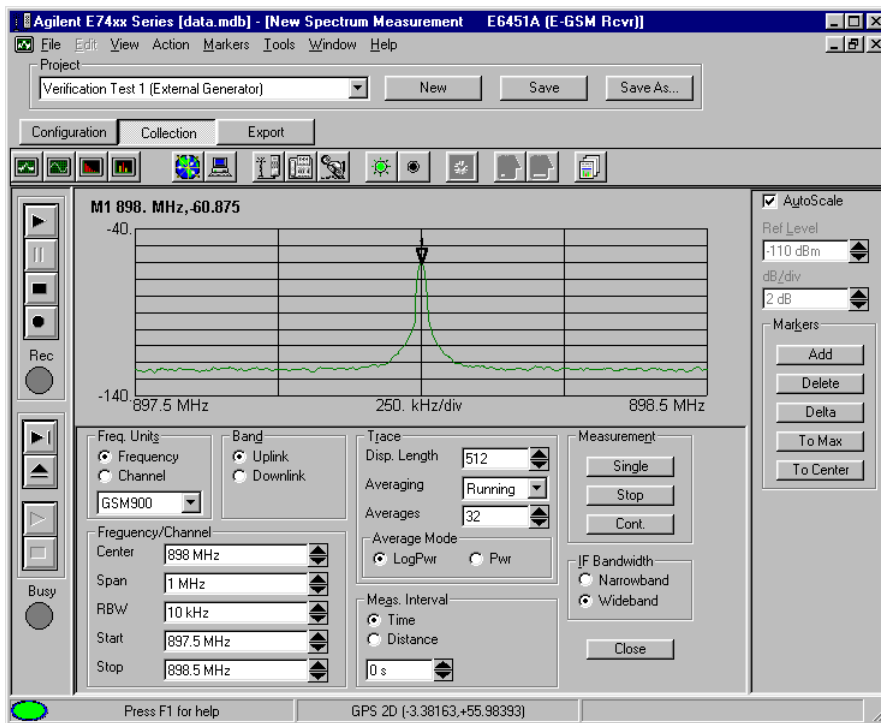
*Figure 4-2 Spectrum Display with Marker Set to a Center Frequency of 898 MHz
(GSM900 band system)*

Testing the Signal

Do This	Additional Information
1 In the Markers group, click **Add** and **To Max**.	The level and frequency are displayed at the top-left corner of the Spectrum display.
2 In the Band group, select Downlink.	
3 In the Freq/Channel group, change the Center frequency according to the Table 4-2.	
4 On the signal generator, set the frequency according to the Table 4-2.	You should see a signal trace showing a single spectral peak in the middle of the display. Figure 4-3 page 143 shows a example trace.

Table 4-2 Signal Generator Downlink Settings

Model	Frequency and Power Settings
GSM1900, TDMA and CDMA PCS band systems	1959 MHz at -60 dBm
GSM DCS1800 band systems	1843 MHz at -60 dBm
GSM900 band systems	943 MHz at –60 dBm
Cellular CDMA and TDMA band systems	882 MHz at -60 dBm

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

Accuracy

The accuracy is calculated as:

Frequency accuracy = signal generator accuracy + 1 ppm.

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

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

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

NOTE   You can save the settings of the project at any time. If you experience measurement or configuration problems, you can refer to the settings shown in the corresponding verification test.
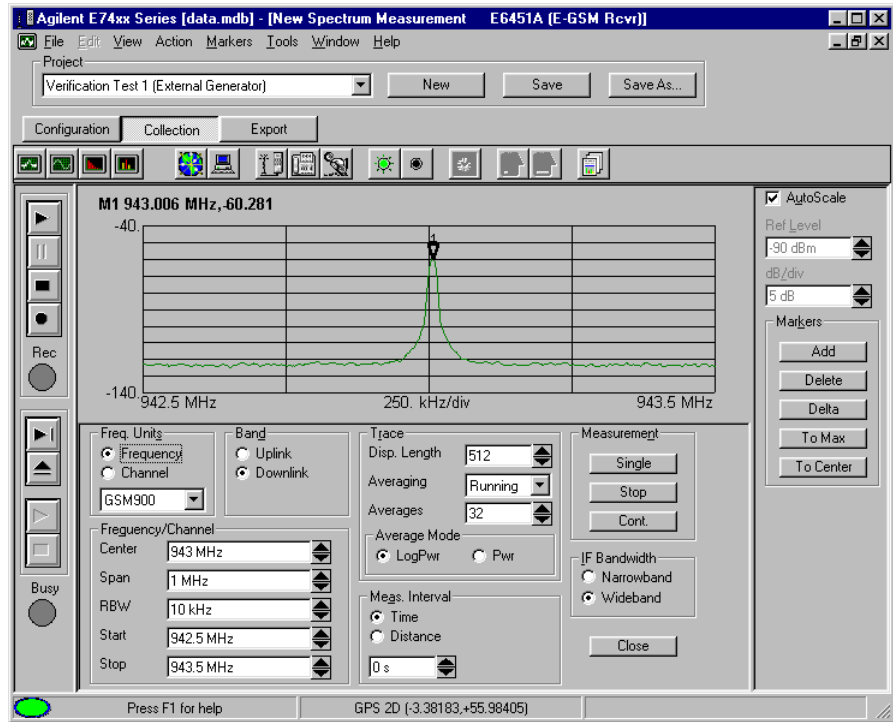
Figure 4-3 Spectrum Display with Marker Set to a Center Frequency of 943 MHz (GSM900 band system)

Passing the Test

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

Now continue with the "Method 4: GPS Measurement Verification Procedure" on page 152. If you are having problems with setting up these tests, refer to "Solving Problems and Updating Your System" on page 157 for additional information.

Method 2: Measuring a Known Channel in the System

Preparing the Hardware

Do This	Additional Information
1 Connect the system as shown in Figure 4-4. The Agilent receiver requires a 30 minute warm-up period to meet the guaranteed specifications.	There is a three minute delay after power-up or re-configuration, before the internal temperature sensor is activated and measurements are nominally correct. To connect the receiver and laptop, refer to step 1 and step 2 of any of the procedures listed in "Receiver-Based System Setup" on page 28
2 Turn on the Agilent receiver.	
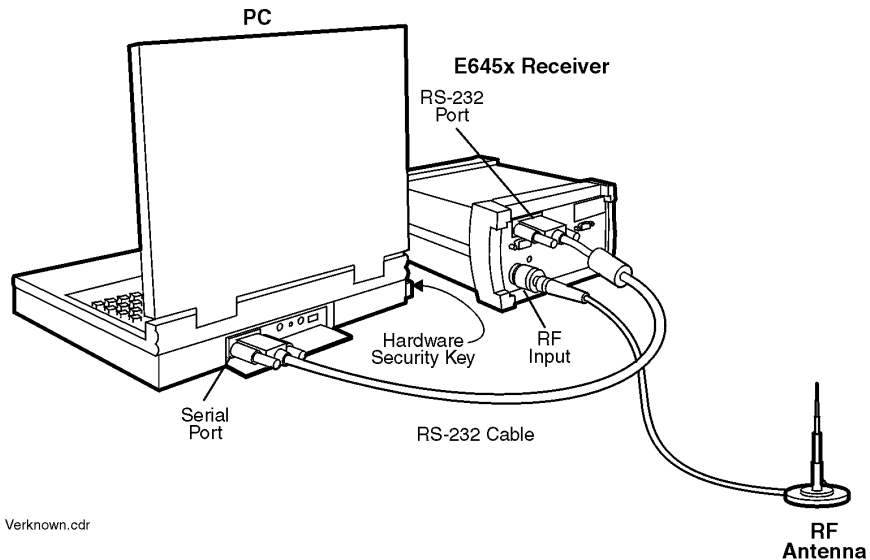
Figure 4-4 System Configuration for Measuring a Known Channel in the System

Preparing the Software

Do This	Additional Information
1 Start the application program by going to the Start menu. Select Programs, Agilent E74xx.	The software starts.
2 Create a new project called: *Verification Test 2 (Using the Antenna)*.	It is recommended that you use the automatic configuration wizard for this process. Refer to Chapter 2, "Automatic Configuration".
3 Click **Configuration** and then add the receiver hardware.	Refer to Chapter 2, "Hardware Installation Tips"
4 Click **Collection** and select the Spectrum VFP (Virtual Front Panel)	
5 Click **Maximize** button in the upper-right corner of the main window.	The display size increases to fill the available space.
6 Select either Frequency or Channel in the Frequency Units.	Frequency is displayed on the Spectrum VFP.
7 Set the measurement software as follows: **Band:** Downlink **Frequency**: User specified **Span**: 2 MHz or 1 MHz depending on the channel used **Averaging**: Running **Averages**: 32	The frequency you specify and enter in the **Center** field, should be known communication frequency or channel.

Verifying Your
System

Testing the Signal

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

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

Passing the Test

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

Now continue with the "Method 4: GPS Measurement Verification Procedure" on page 152. If you are having problems with setting up these tests, refer to "Solving Problems and Updating Your System" on page 157 for additional information.

Method 3: Measuring the Noise Floor

NOTE   Use this procedure *only* if you do not have a signal generator *and* there is no known channel in the system. Connect a 50 ohm load (customer supplied) to the input of the receiver.
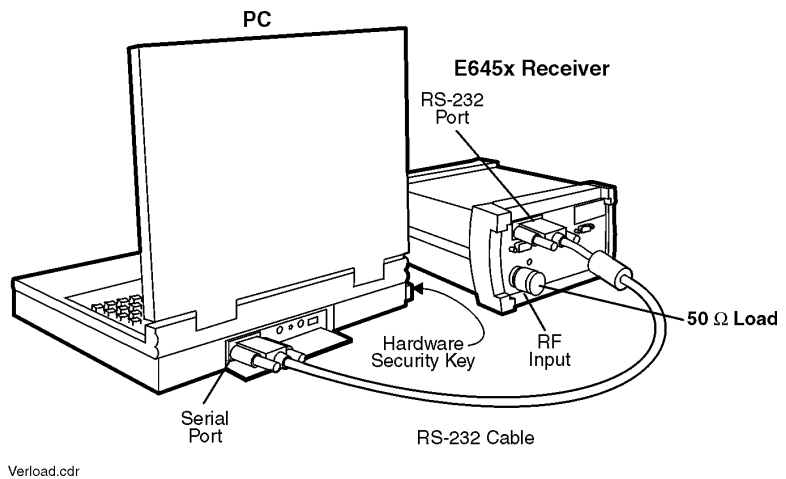
Figure 4-5   System Configuration for Measuring the Noise Floor

Preparing the Hardware

Do This	Additional Information
1 Connect the system as shown in Figure 4-5 page 147, using a calibrated 50Ω load fitted to the RF input. The Agilent receiver requires a 30 minute warm-up period to meet the guaranteed specifications.	There is a three minute delay after power-up or re-configuration, before the internal temperature sensor is activated and measurements are nominally correct. For more information on how to connect the receiver and laptop, refer to step 1 and step 2 of any of the procedures listed in "Receiver-Based System Setup" on page 28
2 Turn on the Agilent receiver.	

Preparing the Software

Do This	Additional Information
1 Run the application program by going to the Start menu, selecting Programs, Agilent E74xx.	The software starts.
2 Create a new project called: *Verification Test 3 (Noise Floor)*.	It is recommended that you use the automatic configuration wizard for this process. Refer to "Automatic Configuration" on page 23.
3 Click **Collection** and select the Spectrum VFP (Virtual Front Panel)	
4 Click **Maximize** button in the upper-right corner of the main window.	The display size increases to fill the available space.
5 Set the measurement software as follows: **Band**: Downlink **Frequency**: See Table 4-3 on page 150 for values to use. **Span**: 300 kHz **Averaging**: Running **Averages**: 100	
6 In the Markers group, click **Add** button then **To Max** and note the Marker 1 frequency and level.	The level and frequency are displayed at the top-left corner of the Spectrum VFP.
7 In the Markers group, click **Add** to place a second marker on the display.	
8 Use the mouse to drag Marker 2 to the minimum level of the trace. Note the Marker 2 frequency and level.	

Verifying Your System

Do This	Additional Information
9 Calculate the average noise level of the downlink.	Average noise level = (Marker 1 level + Marker 2 level) / 2
10 Select Uplink in the Band group.	Frequency is displayed on the Spectrum VFP.
11 Perform step 6 through step 9 to determine the average noise level of the uplink. Substitute the frequencies from Table 4-4 on page 150 in step 5.	Average noise level = (Marker 1 level + Marker 2 level) / 2

Table 4-3 *Noise Floor Frequency Settings for Step 5*

Model	Marker 1 Frequency (step 5)
PCS CDMA and TDMA band systems	1959 MHz
GSM DCS1800 band systems	1843 MHz
GSM900 band systems	943 MHz
Cellular CDMA and TDMA band systems	882 MHz

Table 4-4 *Noise Floor Frequency Settings for Step 11*

Model	Marker 1 Frequency (step 11)
PCS CDMA and TDMA band systems	1879 MHz
GSM DCS1800 band systems	1745 MHz
GSM900 band systems	898 MHz
Cellular CDMA and TDMA band systems	837 MHz

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

Passing the Test

You have passed the if the average noise level is below –122 dBm.

Now continue with the . If you are having problems with setting up these tests, refer to for additional information.

Verifying Your System

Method 4: GPS Measurement Verification Procedure

If you have an Agilent digital receiver, make sure that you have tested the receiver using either method 1 (page 137), method 2 (page 144), or method 3 (page 147) described earlier in this chapter.

It is recommended that you know the GPS position, the longitude and latitude, of where you do the test.

Setting Up the Hardware

Do This	Additional Information
1 Connect the GPS receiver as shown in Chapter 2, "Setting Up Your System".	Refer to the section specific to the GPS you own.
2 Click **Configuration** to review or modify the existing GPS hardware settings.	You switch to Configuration mode.
3 Select the Hardware tab.	You can use the Automatic Configuration wizard to help set up the GPS attached to your system. For more information refer to "Automatic Configuration" on page 23
4 Highlight the appropriate GPS unit and click **Modify**.	You can now set the appropriate GPS protocol.
5 Use the information in Table 4-5 on page 153 to establish the GPS protocol and serial port settings for your particular GPS unit.	The serial port settings are Trimble factory defaults. If you have difficulty determining your serial port configuration, contact Trimble Navigation.

In order to configure any GPS unit, you have to know the settings of that unit. The default settings of the Trimble GPS units supported by Agilent have been included in the Agilent Wireless Solutions Software. New settings can be selected using Port Settings Tab of the Hardware Editor in Configuration Mode. See Table 4-5 on page 153 for the default settings.

Table 4-5 *GPS Settings*

	Trimble Placer GPS/DR	Trimble Placer GPS 400/ SVeeSix Plus[a]	Trimble Placer GPS 455	Internal GPS (Trimble Placer Model SK-8) or SVeeSix Plus
Protocol	TAIP	TAIP	TAIP[b]	TSIP
Bits per Second	4800	4800	9600	9600
Data Bits	8	8	8	8
Parity	None	None	None	Odd
Stop Bits	1	1	1	1
Flow Control	None	None	None	None

a. The SVeeSix Plus GPS Unit is built by TRIMBLE to work only as TSIP, NMEA, or TAIP according to the last 2 digits of the part number:XXXXX-61 is TSIP only; XXXXX-62 is NMEA only; XXXXX-63 is TAIP only. Verify first what protocol is used, to find out the default settings of that unit.

b. The GPS 455 unit can work as TAIP or TSIP. By default it is configured as TAIP. If you want the unit to work as TSIP, you must set the GPS 455 to TSIP.

Verifying Your System

Selecting the Test

Do This	Additional Information
1 Start the application program by going to the Start menu, select Programs, Agilent E74xx.	The software starts.
2 Create a new project called: *Verification Test 4 (GPS)*.	The Measurement or Hardware configuration is shown.
	You can use the Automatic Configuration wizard to help set up the GPS receiver. For more information, refer to "Automatic Configuration" on page 23
3 Click **Collection** and select the GPS VFP (Virtual front Panel).	
4 Select measurement types: Satellites or Statistics	Assuming the GPS antenna is properly located and the GPS receiver has a fix, the current location parameters, such as latitude, longitude, velocity, and altitude are displayed as shown in Figure 4-6.

NOTE   If the GPS receiver is configured for TAIP or NMEA, you can not see the satellite bar chart.
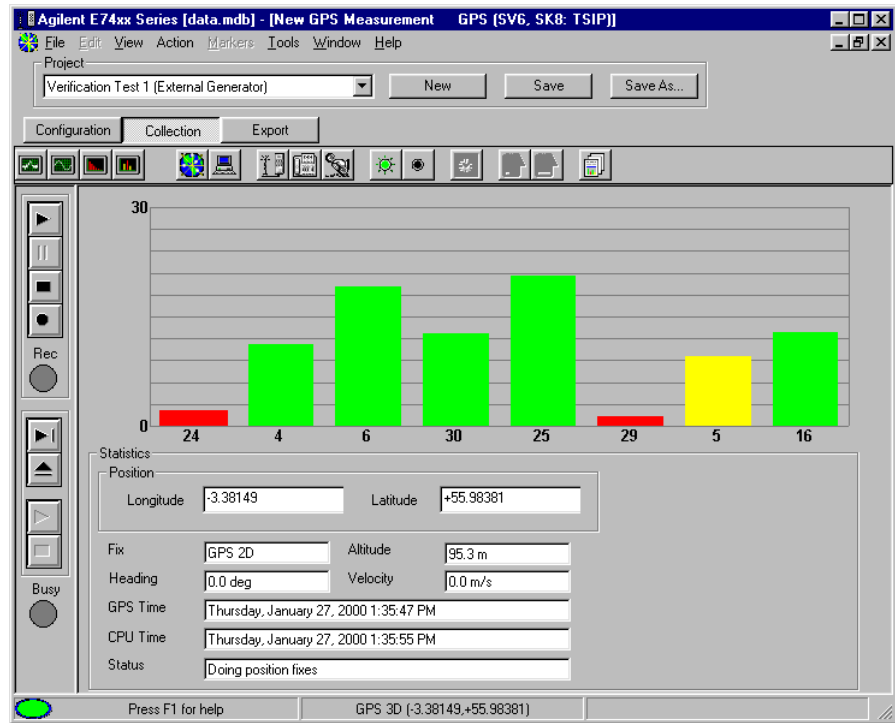
Figure 4-6 GPS Virtual Front Panel Display

NOTE

The units used for displaying the GPS statistics can be changed using the Display controls on the GPS virtual front panel.

If you need to change the GPS coordinate datum, select the Advanced tab of GPS hardware configuration box. The default datum can be set using the **Tools > Options** and selecting the Default Datum tab.

Passing the Test

If the display shows a clear set of satellite signals and reports the same longitude and latitude of your current location, the system passed the GPS test and is ready to be used.

Figure 4-6 on page 155 shows an example of what a typical GPS display should look like.

If you are having problems with setting up these tests, refer to "Solving Problems and Updating Your System" on page 157 for additional information.

5

Solving Problems and Updating Your System

What You'll Find in This Chapter

To Do This	See This
Troubleshoot resource problems.	"Resource Problems" on page 159.
Troubleshoot COM errors.	"COM Errors" on page 160. For more information refer to "Setting Up Your System" on page 19.
Troubleshoot GPS problems.	"Locating and Eliminating GPS Errors" on page 164. For more information refer to "Setting Up Your System" on page 19.
Update the software.	"Updating the Software" on page 167.
Update the firmware.	"Updating the Firmware" on page 168.
Get telephone assistance.	"Calling for Assistance" on page 170.
Return an Agilent Technologies instrument for service.	"Returning the Instrument for Service" on page 173.

Troubleshooting Resource, GPS, or, COM Errors Problems

Resource Problems

CAUTION
It is possible to exceed Windows 95/98 allocated resource levels by opening too many windows while running your Wireless Solutions system. This will cause erratic behavior of the application and require the operator to reboot the operating system in order to recover. This will also corrupt an open Wireless Solutions database, with potential loss of data. Windows 95/98 will not display any warning or feedback when this occurs.

The number of allowable open windows is dependent on the types you choose, as different windows require varying amounts of Windows 95/98 resources. The maximum number of windows is approximately 12, although up to 14 can be opened in certain configurations.

To provide the maximum amount of available Windows 95/98 resources to the measurement application, it is strongly recommended that you close all other applications before running the Wireless Solutions software. This includes all applications found in the Startup folder. It is also recommended that you run the Windows 95/98 resource meter in a minimized configuration in order to monitor available remaining resources.

To start the Windows 95/98 resource meter

1. Choose **Start** > **Programs** > **Accessories** > **System Tools** > **Resource Meter**. The Resource Meter dialog box appears.

2. Click **OK**.

Troubleshoot
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While this application utilizes system resources, it provides a way of determining when the system is running low on available resources. Opening new windows with less than 20% remaining resources in any of the three categories could cause Windows 95/98 to overrun its resources.

One solution for increasing the potential number of measurements made in a given project without exceeding Windows 95/98 resources is to configure the measurement with the associated virtual front panel turned off. You will be able to record the data but not display it. This can be done in Configuration mode, under the Display/Logging tab found under the Measurement tab.

The only solution for increasing the number of windows available during a measurement is to use Windows NT. It does not have the same systems resource limitations as Windows 95/98.

NOTE   While using option 160, real time mapping, operating with a 256-color display setting may cause erratic behavior or memory problems. Adjust your color display to High Color (16 bit) or higher.

COM Errors

The following procedure is suggested for locating and eliminating COM errors when using the Agilent Wireless Solutions system.

NOTES
- To ensure that hardware is configured correctly, it is highly recommended that you use the **Automatic Configuration Wizard** for setting up your projects. for more information on the auto-configure process, refer to "Automatic Configuration" on page 23

- You must create the verification tests in chapter 4 as projects prior to troubleshooting COM errors.

Table 5-1

Do This	Additional Information
1 Check the project and configuration being used by the application.	• Does the hardware configuration for the project selected match the actual system hardware?
	• Are the correct GPS receiver model number, protocol, COM port selection, and port settings shown in Configuration mode on the Hardware tab?
	• Is the correct coordinate datum being used?
	• Is the correct Agilent receiver model number and COM port selection shown in Configuration mode on the Hardware tab?
	• Are the correct phone model number and COM port selection shown in Configuration mode on the Hardware tab?
2 Check system hardware components.	• Is DC power provided to the Agilent digital receiver?
	• Is the null modem cable connected between the PC and the Agilent digital receiver?

NOTE   COM Errors may occur if the SAGEM phone is not set in the correct operating mode. The correct mode is **TRACE**.

When the SAGEM phone is in DATA mode, the interface connection is used for transmitting fax and other data transmission types. When the SAGEM phone is in TRACE mode, the interface connection is used for transmitting measurement reports.

To change the mode, switch on the phone and use the following phone keystrokes:

- **[Menu], [44]**, Down Arrow, **[#], [8]**
- Use the up and down arrows to select TRACE mode, then select OK.

Troubleshoot
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Do This	Additional Information
2 (Continued) Check system hardware components.	• Is DC power provided to the GPS receiver (external GPS)?
	• Is the proper RS-232 cable, or cable assembly, connected between the GPS receiver and Agilent E645x receiver (external GPS)?
	• Is the GPS receiver functioning with the correct GPS antenna connected, and providing a 3-D fix?
	• Is the correct cable connected between the GPS receiver and the PC (phone-based system)?
	• Is the phone turned on and does the battery show sufficient power (phone-based system)?
	• Is the interface cable connected between the phone and the PC (phone-based system)?
	• Is the second COM port defined and functioning (phone-based system)?
3 Troubleshoot COM errors.	• Verify steps 1 and 2 are true.
	• Check the Agilent E645x receiver by selecting **Verification Test 1, 2, or 3** project and confirm no COM errors by going to Collection mode and viewing the Spectrum virtual front panel.
	• Check the GPS receiver by selecting **Verification Test 4 project**, choosing the correct GPS receiver model number, protocol, COM port settings and confirm no COM errors by going to Collection mode and viewing the GPS virtual front pane**l.**
	• Check the phone by defining a new project with only the correct phone model number and COM port selection, then going to Collection mode and viewing the Phone Measurements virtual front panel (phone-based system).

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Do This	Additional Information
3 (Continued) Troubleshoot COM errors.	• If the previous steps are not successful, refer to the GPS Problems section, "Locating and Eliminating GPS Errors" on page 164, or refer to Trimble utilities for more information.
	• Check the RS-232 interface cable between the PC and Receiver.
	• If the RS-232 connection between the Receiver and PC is bad (broken or damaged cable or connectors) or communication is broken, then the error displayed will indicate that the Receiver may be in fault. Check the RS-232 cable or replace it. If the fault persists, contact Agilent Technologies.

Do This	Additional Information
4 If all else fails.	• Define a new project, checking on all items listed in steps 1 and 2.
	• Use a different database by selecting **File > Open Database**, or creating a new database by selecting **File > New Database**, then defining a new project, checking on all items listed in steps 1 and 2.
	• Repair the existing database by creating a new database, then using **Tools** >**Database Utilities** > **Repair** to open the original database (usually *data.mdb*). Once repaired, return to the original database by selecting **File** >**Open Database** with the original file name. Select the original project, checking on all items listed in steps 1 and 2.
	• Use a brand new database. Using Windows Explorer, copy the file *Design.mdb* found in the working directory for the application (usually *\Program Files \Agilent Technologies \E74xx*), to a new file name then repeat step 4.
	• When nothing else works, re-install the application. Copy the database in question to another location. Uninstall the current installation of the application by using the Add/Remove Program application, found in the Control Panel under **Start > Settings**. Once the application has been uninstalled, re-install the application.

Locating and Eliminating GPS Errors

There is no way to communicate with the GPS receivers if the port settings are unknown. It is strongly recommended that you write down **ALL** GPS receiver

settings and tape the list to the unit. The primary cause of COM errors between the PC and the GPS receiver is usually incorrect port settings.

The following procedure is suggested for locating and eliminating GPS errors and problems when using the Agilent Wireless Solutions system.

Do This	Additional Information
1 Check hardware connections (verify cabling and power supply).	If you have hardware configuration errors and/or communications errors, exit the Agilent Wireless Solutions Software. Cycle the power on the GPS receiver and the Agilent E645x receiver, then check both RS-232 connections and DC connections. Run the Agilent Wireless Solutions Software again.
2 Start the Agilent Wireless Solutions Software, select your project, select **Collection** mode, and note what error messages occur.	If there are no error messages, the hardware connections are **OK**. Skip to step 3.
	If there are error messages, write them down and review the entire Troubleshooting section. If you are unable to resolve the error messages, refer to "Calling for Assistance" on page 170.
	There are three main messages when something is wrong:
	• Hardware Error
	• Application Error
	• Communications Error
	If there is an application error, it is likely that the GPS receiver configuration in the **Hardware Editor** of the configuration is different than the actual settings of the Trimble GPS receiver.
	A common error is **"Application Error: Failed to read serial device. Please make sure the hardware configuration is correct and the hardware is connected and turned on. Device = COM 1"**.

Do This	Additional Information
4 (Continued) Verify the GPS configuration.	• Verify that the Hardware Type (for example, GPS Placer 450, 455: TAIP) is selected. If not, select the correct model and protocol in the Hardware Type field.
	• Review the settings specific to the GPS receiver used. If the settings are wrong, correct them.
	• For port selection, if the GPS receiver is connected to the Agilent E645x receiver through the GPS RS-232 port, select Multiplexed Serial. If the GPS receiver is connected directly to the computer (and the Agilent E645x receiver is not used) select Serial.
	• COM 1 is the default serial port, but if a different serial port is used with the Agilent E645x receiver, select the correct COM port.
	• For port settings, if the protocol of your GPS receiver is known and the default settings are used, nothing needs to change. But if the GPS receiver has been configured to work with Qualcomm's Mobile Diagnostic Monitor (MDM), it is very likely that it is set as: TAIP and 4800 bps. Change the bps to the correct speed (usually, other parameters will not need to change, but be sure to verify them against the known hardware settings).
	• When all port selections and port settings have been configured to the settings of the GPS receiver, click **OK** in the Hardware Editor. The Agilent Wireless Solutions Software should be ready to successfully communicate with the GPS receiver. Select Collection mode and repeat step 3.

Updating the Software

Software updates are available to download from the web. Your computer must be web-enabled to perform this process: you must have a modem or LAN access to the web, a service provider, and a web browser. If you are set up to access the web, go to the following web site and follow the links to your particular system:

http://agilent.com/find/networks

Once you have found your system, click on the **Support** link for information on software updates.

NOTE   If you are unable to access the web, contact your Agilent Technologies representative for information about updating the software.

Troubleshoot & Upgrade

Updating the Firmware

Sometimes a software update (see "Updating the Software" on page 167) also requires a firmware update. With the software update installed, when you run the updated software and select Collection mode, you will be notified if a firmware update is required. A series of messages will walk you through the firmware update process. Before you update the firmware, you must first insert a firmware write enable key (E6450-60007) into the RX LOOP OUT connector, as shown in Figure 5-1, then follow the instructions on the screen. Remember to remove and safely store the firmware write enable key when you are prompted to do so by the software.

firmkey.cdr
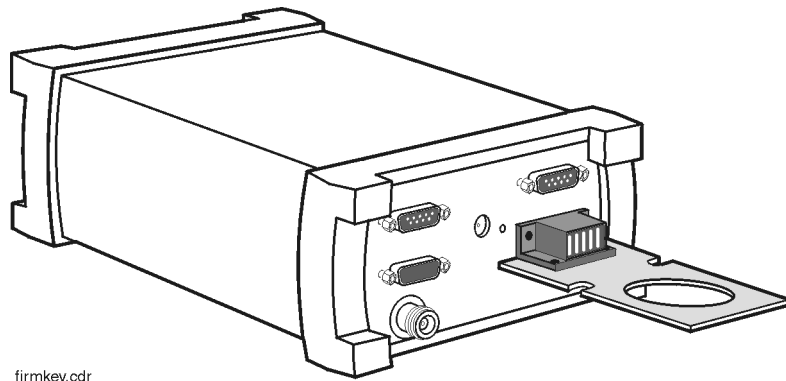
Figure 5-1 Firmware Write Enable Key

Replacement Firmware Security Key

If you have misplaced your firmware write enable key, you can order a new one (order from your Agilent Technologies representative, E6450-60007), or you can substitute a piece of wire that shorts pins 8 to 10 on the RX LOOP OUT connector (see Figure 5-2). Remember to follow on screen instructions, and remove the wire when you are prompted by the software.

RX LOOP OUT
Connector
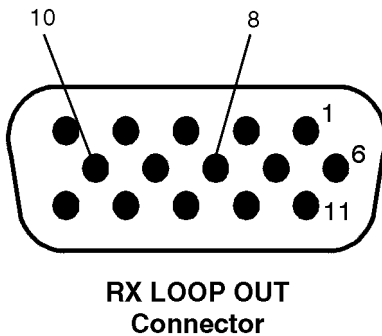
rxloop.cdr

Figure 5-2 Short These Pins to Update the Firmware

If you are set up to access the web, go to the following web site and follow the links to your particular system:

http://agilent.com/find/networks

Once you have found your system, click on the **Support** link for information on software updates.

Troubleshoot
& Upgrade

Calling for Assistance

Your Agilent Wireless Solutions are designed to provide dependable service. It is unlikely that you will experience a problem. However, Agilent Technologies sales and service organization is ready to provide the support you need.

The Agilent Technologies web site provides very detailed lists of frequently asked questions, which address the most commonly encountered problems. It is highly recommended that you search these questions before contacting Agilent Technologies.

If You Have a Problem

If you have a problem, refer to the following for possible help:

- This guide
- Online help
- Online tutorial

If you are unable to resolve your problem, refer to the information in the following section.

NOTE   For continued protection against fire hazard, replace the line fuse (cigarette lighter/2 amp 32 V FB fuse, Agilent part number 2110-0002) only with the same type of rating (type nA/nV). The use of other fuses or materials is prohibited.

Frequently Asked Questions

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

http://www.tm.agilent.com/

To access the frequently asked questions section:

1. Click on the Technical Support link.

2. Type **drive test** in the dialog box under the title Enter a Search Word or Phrase: on the right of the screen.

3. In the Search Only For Document Type(s): list, select Frequently Asked Questions as your search item.

4. In the Specify Your Search Criteria Matches box, select exact phrase.

5. Click the Search button.

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

Technical Telephone Assistance

Your Agilent Wireless Solutions come 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.

Troubleshoot & Upgrade

Numbers to call

For a more detailed list of contact numbers, please refer to the Agilent web site, or contact your local Agilent Technologies Sales and Service Office.

Before calling, ensure you have all the information described in step 2, above.

Table 5-2

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

Returning the Instrument for Service

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

Warranty

If the instrument 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 instrument 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 an instrument is returned to Agilent Technologies for servicing, it must be adequately packaged (see "Preparing the Instrument for Shipping" on page 174) 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 instrument failure settings, data related to instrument failure, and error messages) along with the instrument being returned.

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

Troubleshoot
& Upgrade

Preparing the Instrument for Shipping

Do This	Additional Information
1 Write a complete description of the failure and attach it to the instrument.	Include any specific performance details related to the problem. The following information should be returned with the instrument:
	• Type of service required
	• Date instrument was returned for repair
	• Description of the problem:
	• Whether problem is constant or intermittent
	• Whether instrument is temperature-sensitive
	• Whether instrument is vibration sensitive
	• Instrument 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 instrument
	• Full serial number of returned instrument
	• List of any accessories returned with the instrument
2 Cover all front and rear panel connectors that were originally covered when you first received the instrument.	
3 Pack the instrument in the original shipping containers. Original materials are available through Agilent Technologies office. See step 4 for more information.	

Do This	Additional Information
4 Wrap the instrument in antistatic plastic to reduce the possibility of damage caused by electrostatic discharge.	• For instruments 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 instrument for packing material, and strong enough to accommodate the weight of the instrument.
	• Surround the equipment with 3 to 4 inches of packing material, to protect the instrument 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 (antistatic) Air Cap to reduce static electrical damage. Wrapping the instrument several times in this material will protect the instrument and prevent it from moving in the carton.
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 instrument or prevent it from shifting in the carton. They may also cause instrument damage by generating static electricity.

Troubleshoot & Upgrade

6

Safety and Regulatory Information

Warning and Caution Notices

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the system. This product has been designed and tested in accordance with appropriate international standards.

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.

Instrument Markings

⚠	When you see this symbol on your instrument, you should refer to the instrument's instruction manual for important information.
⚡	This symbol indicates hazardous voltages.
☀	The laser radiation symbol is marked on products that have a laser output.
∼	This symbol indicates that the instrument requires alternating current (ac) input.
⎓	This symbol indicates that the instrument requires direct current (dc) input.
CE	The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
CSA	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 1 Class A product (CISPER 11, Clause 4).
I	This symbol indicates that the power line switch is ON.
⏻	This symbol indicates that the power line switch is in STANDBY position.
N279	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
O	This symbol indicates that the power line switch is in OFF position.

Safety
Information

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 Agilent receiver 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.**

Product Installation, Use, and Storage

CAUTIONS
- This Agilent 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.

Product Power

CAUTIONS
- The input power to the Agilent 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.

Safety
Information
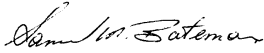
Declarations of Conformity

<table>
<tr><td colspan="2" align="center">**Declaration of Conformity**
according to ISO/IEC Guide 22 and EN45014</td></tr>
<tr><td>**Manufacturer's Name:**</td><td>Agilent Technologies, Inc.</td></tr>
<tr><td>**Manufacturer's Address:**</td><td>1400 Fountaingrove Parkway
Santa Rosa, CA 95403-1799
USA</td></tr>
<tr><td colspan="2">Declares that the product</td></tr>
<tr><td>**Product Name:**</td><td>**Drive Test System**</td></tr>
<tr><td>**Model Numbers:**</td><td>Agilent E7473A, Agilent E7474A, Agilent E7476A, Agilent E7477A</td></tr>
<tr><td>**Product Options:**</td><td>This declaration covers all options of the above products.</td></tr>
<tr><td colspan="2">Conforms to the following product specifications:</td></tr>
<tr><td>EMC:</td><td>CISPR 11:1990/EN 55011:1991 Group 1, Class A
IEC 801-2:1984/EN 50082-1:1992 4 kV CD, 8 kV AD
IEC 801-3:1984/EN 50082-1:1992 3 V/m, 27-500 MHz
IEC 801-4:1988/EN 50082-1:1992 0.5 kV sig. lines, 1 kV power lines</td></tr>
<tr><td>Safety:</td><td>IEC 61010-1:1990 + A1:1992 + A2:1995 / EN 61010-1:1993 +A2:1995
CAN/CSA-C22.2 No. 1010.1-92</td></tr>
<tr><td colspan="2">**Supplementary Information:**</td></tr>
<tr><td colspan="2">The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC, and carries the CE-marking accordingly.</td></tr>
<tr><td>**Santa Rosa, CA, USA**
Location</td><td>**25 April 2000**
Date

Greg Pfeiffer
Quality Engineering Manager</td></tr>
<tr><td colspan="2">For further information, please contact your local Agilent Technologies sales Office, agent, or distributor</td></tr>
</table>

<div style="border:1px solid black">

Declaration of Conformity
according to ISO/IEC Guide 22 and EN45014

Manufacturer's Name:	Agilent Technologies, Inc.
Manufacturer's Address:	1400 Fountaingrove Parkway Santa Rosa, CA 95403-1799 USA

Declares that the product

Product Name:	**Over Air Maintenance Tool**
Model Numbers:	Agilent E7490A
Product Options:	This declaration covers all options of the above products.

Conforms to the following product specifications:

EMC:	CISPR 11:1990/EN 55011:1991 Group 1, Class A IEC 801-2:1984/EN 50082-1:1992 4 kV CD, 8 kV AD IEC 801-3:1984/EN 50082-1:1992 3 V/m, 27-500 MHz IEC 801-4:1988/EN 50082-1:1992 0.5 kV sig. lines, 1 kV power lines
Safety:	IEC 61010-1:1990 + A1:1992 + A2:1995 / EN 61010-1:1993 +A2:1995 CAN/CSA-C22.2 No. 1010.1-92

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC, and carries the CE-marking accordingly.

Santa Rosa, CA, USA	**25 April 2000**	
Location	**Date**	**Greg Pfeiffer** **Quality Engineering Manager**

For further information, please contact your local Agilent Technologies sales Office, agent, or distributor

</div>

Safety Information

<div style="border:1px solid black;">

Declaration of Conformity

according to ISO/IEC Guide 22 and CEN/CENELEC EN45014

Manufacturer's Name:	**Agilent Technologies**
Manufacturer's Address:	South Queensferry West Lothian, EH30 9TG Scotland, United Kingdom

Declares that the product

Product Name:	**GSM Drive Test System**
Model Numbers:	Agilent E7475A
Product Options:	This declaration covers all options of the above product as detailed in TCF A-5951-9852-09.

Conforms with the protection requirements of European Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic compatibility, against EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992 .

As Detailed in:	Electromagnetic Compatibility (EMC) Technical Construction File (TCF) No. A-5951-9852-02
Assessed by:	DTI Appointed Competent Body EMC Test Centre, GEC-Marconi Avionics Ltd., Maxwell Building, Donibristle Industrial Park, Hillend, Dunfermline, KY11 9LB Scotland, United Kingdom
Technical Report Number:	605/CBR, dated 09 April 1999

Supplementary Information:

The individual components of the product meet relevant international safety standards.

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC.

South Queensferry, Scotland   **14 July 2000**

S.Bateman/Order Fulfilment Manager

For further information, please contact your local Agilent Technologies sales office, agent, or distributor.

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