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3100 Mobile Fault Finder

boosting wireless efficiency

Ordering information This guide is issued as part of the **3100 Mobile Fault Finder**. The ordering number for a published guide is M 295 111. The ordering number for the product is M 101 110.

Table of Contents

About This Guide

This section contains the following basic information:

Purpose and scope

The purpose of this guide is to help you successfully use the 3100 Mobile Fault Finder's features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the 3100 Mobile Fault Finder. Additionally, this guide provides a description of Willtek's warranty, services, and repair information, including terms and conditions of the licensing agreement.

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the 3100 Mobile Fault Finder effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience, and are familiar with basic telecommunication concepts and terminology.

Related information

Use this guide in conjunction with the following information:

– Willtek 3100 Mobile Fault Finder: user's guide, M 290 111

– Willtek 3100 Mobile Fault Finder: SCPI command reference, M 293 111

– Willtek 7311 Lector Basic, 7312 Lector Enhanced, 7315 Scriptor: user's guide, M 294 309

– Bluetooth Connectivity Test Products: user's guide, M 292 018

Technical assistance

If you need assistance or have questions related to the use of this product call Willtek's technical support. You can also contact Willtek by e-mail at customer.support@willtek.com.

Table 1   Technical support contacts

Region	Phone number	Fax number
Europe, Middle East, Asia, Africa	+49 (0) 89 996 41 311	+49 (0) 89 996 41 440
Americas	+1 973 386 9696	+1 973 386 9191
China	+86 21 5836 6669	+86 21 5835 5238

Conventions

This guide uses naming conventions and symbols, as described in the following tables.

Table 2 Typographical conventions

Description	Example
User interface actions appear in this **typeface**.	On the Status bar, click **Start**.
Buttons or switches that you press on a unit appear in this **TYPEFACE**.	Press the **ON** switch.
Code and output messages appear in this `typeface`.	`All results okay`
Text you must type exactly as shown appears in this **`typeface`**.	Type: **`a:\set.exe`** in the dialog box.
Variables appear in this **<typeface>**.	Type the new **<hostname>**.
Book references appear in this **typeface**.	Refer to **Newton's Telecom Dictionary**
A vertical bar | means "or": only one option can appear in a single command.	`platform [a|b|e]`
Square brackets [ ] indicate an optional argument.	`login [platform name]`
Slanted brackets < > group required arguments.	`<password>`

Table 3   Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**
A comma indicates consecutive keystrokes.	Press **Alt+f,s**
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click **Start > Program Files**.

Table 4   Symbol conventions

This symbol represents a general hazard.

This symbol represents a risk of electrical shock.

NOTE

This symbol represents a note indicating related information or tip.

Table 5   Safety definitions

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Safety Notes

This chapter provides the safety notes for the 3100 Mobile Fault Finder. Topics discussed in this chapter include the following:

Safety class

The 3100 is designed and tested in line with DIN 57411 part 1 (protective measures for electronic test equipment). The instrument complies with safety class I. It left the works in a perfectly safe condition for operation. To make sure it stays this way and can be operated without any risk, please observe the following notes carefully, which are based on section 17 of DIN 57411 part 1 a.

Before startup

Ensure proper supply voltage

Before powering on, ensure that the operating voltage which is permitted for the 3100 (94 to 132 V_{AC}, 187 to 264 V_{AC}) is identical with your line voltage. You do not need to set the voltage range; the 3100 automatically adjusts to the applied (permissible) line voltage.
The power plug of the 3100 may only be inserted in outlets with a ground contact.
Never use extension cables without grounding conductor.

Apply proper grounding

The grounding conductor must under no circumstances ever be interrupted, neither inside nor outside the test set. If there is no grounding through the grounding conductor, the cabinet of the 3100 could become live as the result of a defect. This can make the test set a potential risk.

During test

Apply proper grounding

Always plug in the power socket of the 3100 before connecting a test circuit in order to use the protective effect of the 3100 grounding.

During maintenance and repair

Live parts can be exposed when you open covers or remove components. Connecting parts can also be live.

Live parts with and without supply voltage connected

Before any adjustment, maintenance repair or replacement of parts, the test set must be separated from all voltage sources if it will be necessary to open it. If any jobs have to be performed on the 3100 while voltage is applied, they should only be undertaken by a specialist who is aware of the dangers that are involved. Capacitors in the power supply can still be charged, even though the instrument has been separated from all voltage sources.

Use proper fuses

Defective fuses must be replaced with fuses of identical specifications.
Never patch fuses or short the fuse holder.

Shutdown when defective

In the following cases, safe operation is very likely to be no longer possible:

– if the test set exhibits visible damage,

– if the test set will no longer work,

– after a extendend period of storage under the wrong conditions (see data sheet),

– following transport under adverse conditions.

If you suspect that it is unsafe to continue operating the 3100, shut it down immediately and unplug all power connectors.
Secure the test set in such way that nobody else can start it up again, in order to protect any third party.
Get in touch with your nearest Willtek service center.

Overview

1

This chapter provides a general description of the 3100 Mobile Fault Finder. Topics discussed in this chapter include the following:

About the 3100 Mobile Fault Finder

The 3100 Mobile Fault Finder was designed to meet the requirements of point of sale/point-of-return and service center functional testing. It is the ideal tool to analyze GSM/WCDMA dual-mode phones or CDMA2000 phones in a service or point-of-sale environment. An option for EDGE testing is also available. The 3100 Mobile Fault Finder provides a user-friendly and cost-effective way to identify "No Fault Found" devices being returned from the market. Additionally, the 3100 provides a quick functional verification of mobile devices as they leave the service center, ensuring proper operation when returned to the customer.

The 3100 has no display and is therefore remote-controlled from a PC via a simple serial or USB connection by the 7310 Lector and Scriptor product family of wireless test automation software. This intuitive PC application provides a simple Pass or Fail verdict, and a detailed report can be printed or stored in file.

Features and capabilities

Enables accurate and no-fault identification of WCDMA, GSM and CDMA2000 mobile devices.

Separates faulty and non-fault-found (NFF) mobile phones to maximise revenues.

Provides intuitive operation and Autotest features to minimise training requirements.

Simulates real-life networks for complete testing.

Supports GSM, EDGE, WCDMA and CDMA2000 testing.

Option for Bluetooth testing available.

Scope of delivery

3100 base unit (instrument)

Manual Pack including a user documentation CD

7311 Lector Basic (CD)

USB stick 256 Mb

This getting started manual

Power cord

USB cable

Options

The following options and accessories are available:

Table 6 Options

Order number	Description
M 248 750	3150 GSM Call Mode Option
M 897 257	3151 GSM Non-Call Mode Option
M 897 290	3158 GPRS Option
M 897 269	3152 EDGE Option
M 897 258	3153 EDGE Non-Call Mode Option
M 248 752	3154 WCDMA (UMTS) Option
M 897 254	3155 WCDMA (UMTS) Non-Call Mode Option
M 248 760	3156 CDMA2000 Option
M 897 283	3157 CDMA2000 Non-Call Mode Option
M 248 753	3160 1xEV-DO Call Mode Option
M 897 318	3161 1xEV-DO Non-Call Mode Option
M 897 278	3175 ACPM Option
M 248 512	3189 Bluetooth Connectivity Test Package
M 897 271	3180 GPIB - IEEE 488.2 Option
M 897 295	3181 AM Signal Generator Option
M 897 315	3192 Speed Option for 3100 Mobile Fault Finder
M 248 978	1209 Downconverter
M 378 320	19" Rack Mount Set 3100

Table 7 General options and accessories

Order number	Description
M 248 642	4916 Antenna Coupler Package
M 248 346	4921 RF Shield (N)
M 248 348	RF Shield & 4916 Antenna Coupler Package (N)
M 860 164	1103 USIM and GSM Test SIM card
M 897 310	7312 Lector Enhanced
M 897 311	7315 Scriptor
M 897 312	7360 Coupling Factor Update License

Installation

2

This chapter describes how to setup the 3100 Mobile Fault Finder. The topics discussed in this chapter are as follows:

Scope of delivery

When unpacking the 3100 Mobile Fault Finder, ensure that you do not miss any of the following items:

– 3100 Mobile Fault Finder
– AC power cord
– Manual pack containing this getting started manual and a Documentation CD containing the user's guide
– CD containing the 7311 Lector Basic application as well as the USB driver necessary for using the USB interface to establish a connection between the 3100 and your PC.
– USB cable

Software requirements

7311 Lector Basic is designed to run on 32-bit Microsoft Windows operating systems (Windows NT, Windows 2000 and Windows XP). You will need to log in with administrator rights to install the software.

Hardware requirements

Following are hardware requirements as well as hardware recommendations for achieving the most reliable test results.

PC specifications
Willtek recommends the following mininum PC specifications:

– Pentium-compatible processor, 200 MHz mininum

– 64 MB RAM

– Dedicated USB or serial port for the 3100 interface

– Sufficient hard disk size. The hard disk size depends on the volume of test results which you intend to store.

– A pointing device, e.g. a mouse, connected to the PC

RF connection and shielding
An antenna coupler or cable connection to the device under test is required. For further information on off-air and cable connections refer to "Connecting the RF" on page 18. Willtek recommends the use of the 4916 Antenna Coupler. For proper shielding and more reliable results, the Willtek 4921 RF Shield is recommended. When using the last two items, an RF cable for connecting the Antenna Coupler or the RF Shield is required.

NOTE

For testing UMTS (WCDMA) and CDMA phones the RF Shield is required for obtaining reliable test results. Testing without an RF Shield only makes sense whithin the GSM and EDGE options.

Setting up the hardware

The following steps need to be taken to set up the hardware of the test system:

1   Place the 3100 instrument close to the PC that controls the 3100.

2   Connect the 3100 to mains using a power cord.

3   Use the USB cable to connect the USB 3 port of the 3100 to the PC. (Alternatively, you can instead connect the 3100 to the PC using a GPIB or a LAN connection).

4   Connect the RF port on the front panel of the 3100 instrument with the 4921 RF Shield using a double-shielded RF cable. Alternatively, if you do not intend to use the 4921, connect it to the coupling device of your choice.

5   If you have bought the 3189 Bluetooth Connectivity Test Package:

   a   Plug the Bluetooth dongle into the serial interface inside the 4921 RF Shield and screw it tight.

   b   Plug the connector with two cables into the RS-232 socket at the back of the 4921 RF Shield.

   c   Plug the other D-type connector into the COM 1 port of the 3100.

   d   Connect the AC/DC power converter to mains and to the remaining end of the RS-232 cable.

Installing the software

In these directions we assume that you are installing the software from the Lector and Scriptor installation CD delivered with the instrument.

1   Insert the CD into the CD drive of the PC.

2 If the installation does not start automatically, use Microsoft Explorer to start the AUTORUN.EXE program from the CD.

3 Click on "Install Lector or Scriptor"
The Lector and Scriptor Setup Assistant appears.

4 Follow the instructions on the screen. In particular:

   – Select a language for the setup assistant

   – Read and accept the license agreement

   – Select a folder to install the program files of 3100 Mobile Fault Finder (e.g. "C:\Program files\Willtek\731X Lector-Scriptor")

   – Choose a program group name that will appear under **Start > Programs** (e.g. Willtek)

   – Select if you want to have a 3100 Mobile Fault Finder icon on the Windows desktop

   – Start the installation process

   The 3100 Mobile Fault Finder program will be installed.

5 After completion of the 3100 Mobile Fault Finder installation, the setup program asks if you wish to install the USB drivers. If you want to run 7312 Lector Enhanced or 7315 Scriptor, enable HASP HL USB dongle driver installation. If you are likely to use the USB connection to the 3100, have the setup program install the USB to serial driver.
If selected, the HASP device driver is started.

6 Confirm the Welcome menu and the license agreement.
The HASP device driver is installed. Depending on the dongle installed, you may now be able to use the 7311 Lector or 7315 Scriptor features.

7 The Wizard for CP210X USB to UART Bridge Controller Driver appears. Follow the instructions on the screen.
The USB driver will be installed, typically in C:\SiLabs. After completion, you will be able to control the instrument via USB.

If you want to control the 3100 instrument via USB, please follow the steps below. Alternatively, if you want to control it via LAN or GPIB, please refer to section Configuring the software" in the 7310 Lector and Scriptor user's guide, which can be found on the User Documentation CD delivered with your system.

1   Install the USB-To-Serial driver; follow the onscreen instructions. You may have to restart the computer.

2   Connect the USB cable between the PC and the 3100.
    The Found New Hardware Wizard will start automatically.
    Follow the instructions to install the CP2101 USB Bridge Controller until it says, "Ready to use".

3   Look up the COM port number in the Windows environment at **Start > Settings > Control Panel > System > Hardware > Device Manager > Ports (COM & LPT) > CP210x USB to UART Bridge Controller**. The COM port number (e.g. COM5) should be noted down.

4   Call up the 7310 Lector software on your PC by selecting **Start > Programs > Willtek > 731x Lector-Scriptor > 731x Lector-Scriptor**.

5   In Lector, select **Connection > Define Interface**.
    The Connection box appears.
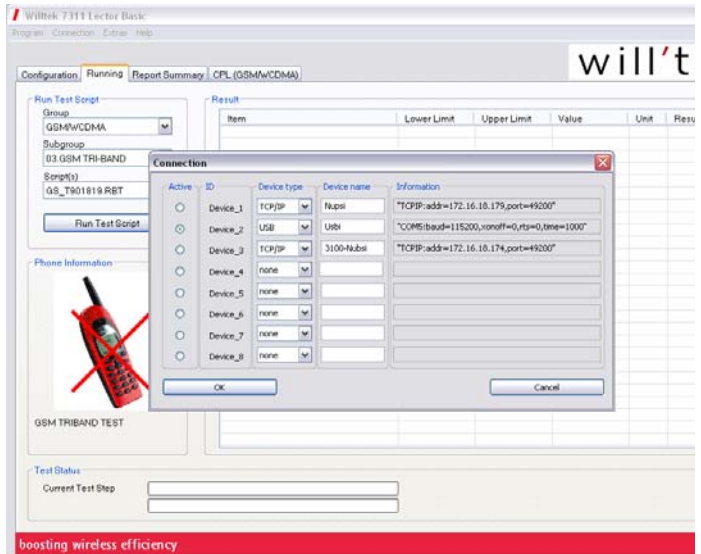
6 Select a device by clicking on the appropriate radio button in the first column (Active).

7 In the second column (Device type) of the same row, select USB.
   A new window "Settings for RS-232" appears.

8 In the COM field, enter the number previously noted down in step 3.

9 Leave the Baud entry at 115200 and the Handshake entry at None, and confirm your changes with **OK**.
   The window disappears and the entries appear in the Information field.

10 In the third row, enter a device name (e.g. "3100").

11 Confirm your changes by selecting OK.

12 If the 3189 Bluetooth Connectivity Test functionality is not already enabled in the 3100, enter the key code you received with the 3189 Bluetooth Connectivity Test Package using the 7200 Update Utility.

Software drivers and application software for the 3189 Blue-
tooth Connectivity Test Package are integrated into 7311
Lector Basic.

Your 3100 is now ready to start a test. Please refer to the 7310
Lector and Scriptor user's guide (on the User Documentation CD)
on how to configure and carry out tests.

Configuring the software

For a detailed description of the Software installation and config-
uration please refer to the 3100 Mobile Fault Finder user's guide
which is included on the User Documentation CD delivered with
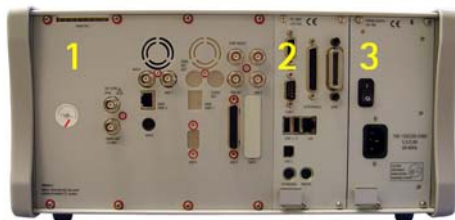your system.

Operation

<div style="border:1px solid black; display:inline-block; padding:20px;">

3

</div>

This chapter describes the functionality of the instrument. Topics discussed in this chapter are as follows:

3100 rear panel connectors

The 3100's rear panel is divided into three main sections.

Section 1 – The RF/IF/AF section

The RF/IF/AF section provides several interfaces that may support your tests. Most of these interfaces are related to synchronization and triggering.

Section 2 – The PC unit

In this section you will find all the standard PC interfaces.

Section 3 – The power supply

In this section, the power switch and the power connector are located.

NOTE

The power switch has to be **on** before you will be able to start the 3100 using the **STANDBY** button.

HAZARD

Before connecting the 3100 to the power line, please check that the power available on your supply line is within the operating range of the 3100's power supply as indicated on the back of the unit and "Power connector" on page 17.

For a detailed description of all rear panel connectors refer to the user's guide.

Power connector

⚠️ **Supply voltage**

Before powering on, ensure that the operating voltage at your location is permitted for the 3100 (94 to 132 V_{AC}, 187 to 264 V_{AC}).
The 3100 adjusts itself automatically to the applied (permissible) line voltage.

Connect the supplied power cable to the line socket of the power supply module (rear of 3100, see "3100 rear panel connectors" on page 16) and then to a power outlet with a ground contact.

Switch on the 3100. The power switch is located on the rear of the 3100, above the socket of the power cable. The 3100 is in stand-by mode now.

Powering the unit

Ensure that the 3100 is switched on as described above. The power switch is located on the rear of the 3100, above the socket of the power cable. When switched on, the 3100 is in stand-by mode. The light below the stand-by button on the front panel lights yellow.

Push the stand-by button to put the 3100 into operation mode. The stand-by light turns green.

Connecting the RF

The 3100's RF connector is located on its front panel.

There are two ways of connecting a mobile to a tester:

– Cable connection
– Off-air connection

Both have their advantages and disadvantages.

Cable connection The cable connection between a mobile under test and the 3100 requires a mobile-specific RF adapter cable. With a cable connection, the RF socket of the tester is connected to the RF socket of the mobile (typically an antenna connector, e.g. for car-mount adapters). A shielded cable contributes to very accurate measurements.

However, if you need to test many different types of mobile phones, you will need many different cables or adapters, which increases test costs. Also, many new types of mobile phones do not have an RF socket anymore.

Off–air With an off–air connection, the RF socket of the tester is connected
connection to Willtek's Antenna Coupler. This makes testing easy and fast. The
mobile transmits via the antenna. No further test adapters are
needed. The coupling loss depends on factors such as orientation,
distance and frequency. To a certain extent, this can be compen-
sated with a coupling loss table.

Test setup

To set up the hardware (for hardware requirements and recom-
mendations see section s) for tests proceed as follows:

1 If you intend to use the RF Shield and the Antenna Coupler,
   place the Antenna Coupler in the RF Shield and connect the
   cable between the RF Shield (internal) and the coupler.

2 If you are using the Antenna Coupler, connect it to the tester
   using a double-shielded RF cable.
   If you are also using the RF Shield, connect the box to the
   tester instead.

3 Connect the PC's serial port to the serial (COM1) interface of
   the tester or the PC's USB port to the tester's USB interface
   (USB3). If you intend to use a USB connection you need to

install the USB driver delivered with your 3100 first. For information in installing the driver refer to your 3100 Mobile Fault Finder user's guide.

4 Connect the power supply connector of the tester to a power outlet using the mains power cable or the power supply provided with the tester.

5 Switch on the PC.

6 Switch on the tester and wait for the double-tone beep which indicates that the boot process of the tester is completed.

7 Start Lector on the host PC.

The following picture shows a typical test setup for performing measurements utilizing an off-air connection via the Willtek 4916 Antenna Coupler.

Performing radio frequency (RF) measurements

RF measurements can be divided into measurements on the transmitter and on the receiver.

Transmitter measurements A transmitter test is carried out to evaluate the performance of the mobile's transmitter. These measurements can be divided into two main groups:

–   **Power measurements:** Here the focus is on transmit power levels and level changes. In GSM, for example, the peak power measurement and the power/time template check are common examples.
–   **Modulation quality checks:** In these measurements, the focus lies on the modulator. In GSM, phase and frequency error are measured.
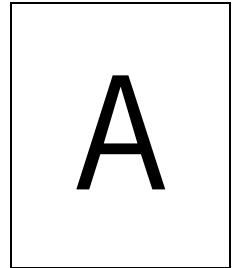
Receiver measurements Receiver measurements are also referred to as RX tests. In order to transfer speech and data correctly, the received bits must be detected properly. The common method in radio communication systems to test the receiver performance is the bit error rate measurement, often based on a signal loopback.

An additional method is to look at the mobile's internally generated evaluation of its received signal strength and quality. In many systems, the mobile reports this data to the network and hence can be displayed by the 3100 when it simulates a network to the mobile phone.

Warranty and Repair

A

This chapter describes the customer services available through Willtek. Topics discussed in this chapter include the following:

Warranty information

Willtek warrants that all of its products conform to Willtek's published specifications and are free from defects in materials and workmanship for a period of one year from the date of delivery to the original buyer, when used under normal operating conditions and within the service conditions for which they were designed. This warranty is not transferable and does not apply to used or demonstration products.

In case of a warranty claim, Willtek's obligation shall be limited to repairing, or at its option, replacing without charge, any assembly or component (except batteries) which in Willtek's sole opinion proves to be defective within the scope of the warranty. In the event Willtek is not able to modify, repair or replace nonconforming defective parts or components to a condition as warranted within a reasonable time after receipt thereof, the buyer shall receive credit in the amount of the original invoiced price of the product.

It is the buyer's responsibility to notify Willtek in writing of the defect or nonconformity within the warranty period and to return the affected product to Willtek's factory, designated service provider, or authorized service center within thirty (30) days after discovery of such defect or nonconformity. The buyer shall prepay shipping charges and insurance for products returned to Willtek or its designated service provider for warranty service. Willtek or its designated service provider shall pay costs for return of products to the buyer.

Willtek's obligation and the customer's sole remedy under this hardware warranty is limited to the repair or replacement, at Willtek's option, of the defective product. Willtek shall have no obligation to remedy any such defect if it can be shown: (a) that the product was altered, repaired, or reworked by any party other than Willtek without Willtek's written consent; (b) that such defects were the result of customer's improper storage, mishandling, abuse, or misuse of the product; (c) that such defects were the result of customer's use of the product in conjunction with equipment electronically or mechanically incompatible or of an inferior quality; or (d) that the defect was the result of damage by fire, explosion, power failure, or any act of nature.

The warranty described above is the buyer's sole and exclusive remedy and no other warranty, whether written or oral, expressed or implied by statute or course of dealing shall apply. Willtek specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. No statement, representation, agreement, or understanding, oral or written, made by an agent, distributor, or employee of Willtek, which is not contained in the foregoing warranty will be binding upon Willtek, unless made in writing and executed by an authorized representative of Willtek. Under no circumstances shall Willtek be liable for any direct, indirect, special, incidental, or conse-quential damages, expenses, or losses, including loss of profits, based on contract, tort, or any other legal theory.

Equipment return instructions

Please contact your local service center for Willtek products via tele-phone or web site for return or reference authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

– Owner's name, address, and telephone number.

– Serial number, product type, and model.

– Warranty status. (If you are unsure of the warranty status of your instrument, include a copy of the invoice or delivery note.)

– Detailed description of the problem or service requested.

– Name and telephone number of the person to contact regarding questions about the repair.

– Return authorization (RA) number (US customers), or reference number (European customers).

If possible, return the equipment using the original shipping container and material. Additional Willtek shipping containers are available from Willtek on request. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit. Willtek is not liable for any damage that may occur during shipping. The customer should clearly mark the Willtek-issued RA or reference number on the outside of the package and ship it prepaid and insured to Willtek.

End-User License Agreement

B

This appendix describes the conditions for using the 7310 Lector software and the 3100 operating software.

All copyrights in and to the software product are owned by Willtek Communications or its licensors. The software is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties.

This end-user license agreement grants you the right to use the software contained in this product subject to the following restrictions. You may not:

(i) use the software and/or any copy of the software in different computers concurrently, unless the software is an update that has been downloaded from the Internet at www.willtek.com;

(ii) copy the software, except for archive purposes consistent with your standard archive procedures;

(iii) transfer the software to a third party apart from the entire product;

(iv) modify, decompile, disassemble, reverse engineer or otherwise attempt to derive the source code of the software;

(v) export the software in contravention of applicable export laws and regulations of the country of purchase;

(vi) use the software other than in connection with operation of the product.

The licensor's suppliers do not make or pass on to end users or any other third party, any express, implied or statutory warranty or representation on behalf of such suppliers, including but not limited to the implied warranties of noninfringement, title, merchantability or fitness for a particular purpose.

Willtek Communications shall not be held liable for any damages suffered or incurred by you or any other third party (including, but not limited to, general, special, consequential or incidental damages including damages for loss of business profits, business interruption, loss of business information and the like), arising out of or in connection with the delivery, use or performance of the software.

Room for your notes

Publication History

Revision	Changes
0505-100-A	First version.
0507-500-A	Options information updated. Information on shielding for UMTS (WCDMA) measurement added.
0510-500-A	Options information updated. Pictures updated. Scope of delivery information updated.
0605-590-A	New series; introduction of Lector.
0607-590-A	More detailed installation instructions including the 3189 Bluetooth Connectivity Test Package.
0707-590-A	Replaced 7310 Lector by 7311 Lector Basic, including modified installation procedure.

Note: Specifications, terms and
conditions are subject to change
without prior notice.

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