User's Guide

will'tek

3100 Mobile Fault Finder

User's guide
Version 12.00

boosting wireless efficiency

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Ordering information This guide is issued as part of the **3100 Mobile Fault Finder**. The ordering number for a published guide is M 290 111. The ordering number for the product is M 101 110.

Table of Contents

About This Guide

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: getting started manual, M 295 111

Willtek 3100 Mobile Fault Finder: SCPI Command Reference, M 293 111

Willtek 7310 Lector: user's guide, M 294 289

Technical assistance

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

Table 1 Technical assistance centers

Region	Phone number	Fax number
Europe, Middle East, Asia, Africa	+49 (0) 89 996 41 386 +49 (0) 89 996 41 227	+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.

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 carefully the following notes, 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.

High voltages after power disconnect

High and dangerous voltages can still be present in the instrument even when it is being powered from a battery.

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 longish 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 pull out 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.

1

Overview

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 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. The PC application is very simple to use and provides easy management of mobile characterisation values.

Features and capabilities

Supports GSM, EDGE and WCDMA testing

CDMA2000 upgradeable

GPRS available as a software option

Separates faulty and no-fault-found (NFF) mobile phones to maximize revenues

Provides complete solution for Go/NoGo testing when used with the 4920 RF Shield Box, 4921 RF Shield and 4916 Antenna Coupler

Simple, easy-to-use interface, minimizing training time

Pre-attenuation values online available

Bluetooth option for Go/NoGo testing available

Options

The following options, test packages and accessories are available:

Table 1 Options

Order number	Description
M 248 750	3150 GSM Option
M 897 257	3151 GSM Non-Call Mode 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 897 290	3158 GPRS Option (call mode and non-call mode)
M 897 278	3175 ACPM Option (for EDGE and GSM)
M 897 271	3180 GPIB - IEEE 488.2 Option
M 248 512	3189 Bluetooth Connectivity Test Package

Table 2 General Options/Accessories

Order number	Description
M 248 642	4916 Antenna Coupler Package
M 248 346	4921 RF Shield (N)
M 248 348	4921 RF Shield & 4916 Antenna Coupler Package (N)
M 860 164	1103 USIM and GSM Test SIM card

Installation

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This chapter describes how to the set up the 3100 Mobile Fault Finder and the 7310 Lector software. 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:

- AC power cord
- CD containing the 7310 Lector application as well as the USB driver necessary for using the USB interface to establish a connection between the 3100 and your PC.
- Manual pack containing the getting started manual and CD with all the manuals (3100 user's guide, 3100 SCPI command reference guide, 7310 Lector user's guide)
- USB cable

Software requirements

Your PC needs to be running one of the Microsoft operating systems Windows NT, Windows 2000 or Windows XP.

To control a 4400 Series Mobile Phone Tester, the instrument will need firmware version 6.20 or higher.

To make use of the Bluetooth and the Intersystem Handover capabilities, firmware version 12.00 or higher of the 4400 is required.

Hardware requirements

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

PC specifications

Before installing 3100 Mobile Fault Finder on a PC, make sure that the PC has

- at least 60 Mb of free hard disk space
- a CD drive
- a free RS-232 or USB port (for initial setup of the 3100 Mobile Fault Finder)
- a screen size of at least 1024 x 768 pixels

In addition, the PC needs an interface to the instrument to be controlled. Ensure that both the PC and the instrument can be connected using one of the following interfaces supported by 3100 Mobile Fault Finder:

- TCP/IP
- GPIB
- USB
- RS-232

RF connection

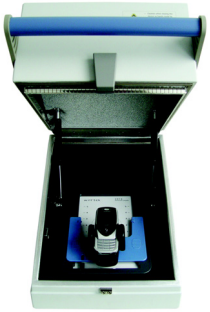
An antenna coupler or cable connection to the device under test is required. Willtek recommends the use of the 4916 Antenna Coupler as testing via an off-air antenna coupler connection is fast and easy. The mobile transmits via the antenna and no further test adapters are needed.

Shielding

For proper shielding and more reliable test results, the Willtek 4921 RF Shield is recommended.

NOTE

For testing UMTS (WCDMA) or CDMA2000 phones, the RF Shield is required in order to obtain reliable test results. Testing without an RF Shield only makes sense within the GSM and EDGE options. In this case a previous scan of occupied channels is highly recommended.



If you use an antenna coupler and an RF shield, an RF cable for connecting them is required.

Test SIM cards

A test SIM card is a Subscriber Identification Module programmed with a specific mobile phone number, the so-called test IMSI (International Mobile Subscriber Identity). Test SIM cards are available from Willtek, with the IMSI set to 001-01-0123456789. The 3100 knows this IMSI and uses it to page the mobile under test.

Willtek offers a test SIM card with two profiles – one for GSM operation and one for WCDMA (UMTS) operation. This card combines a GSM test SIM with a WCDMA test USIM. This combined card enables fast testing of dual-mode phones for GSM, GPRS, EGPRS and WCDMA. It also relieves you of the burden of keeping different test SIM cards for different types of phones.

NOTE

When a GSM, EDGE or WCDMA mobile phone is tested without a SIM card only emergency calls are possible.

The following test SIM cards are available from Willtek:

- 1100 Test SIM Card (GSM)
- 1102 USIM Test SIM Card (UMTS/WCDMA)
- 1103 USIM and GSM Test SIM card

For ordering information refer to "Options" on page 3.

Installing the software

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 following program from the CD: INSTALL.BAT.
The 7310 Lector Setup Assistant appears.

3 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\7310Lector)
- Choose a program group name that will appear under **Start > Programs**
- 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.

4 After completion of the 3100 Mobile Fault Finder installation, the InstallShield Wizard for CP2101 USB to UART Bridge Controller Driver appears. Again, follow the instructions on the screen.
The USB driver will be installed.

Setting up the hardware

To set up the hardware for tests proceed as follows:

1 If you intend to use the 4921 RF Shield and the 4916 Antenna Coupler, place the antenna coupler in the RF shield and connect the cable between the RF shield (internal) and the coupler.

NOTE

For performing tests within the UMTS System Option the RF shield should be used in order to obtain reliable test results.

2 If you are only 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.

NOTE

For establishing a USB connection between the 3100 and your PC a USB driver has to be installed on your PC. You can find this driver on the software CD delivered with your 3100. For information on installing the USB driver refer to "Installing the software" on page 9.

3 If you intend to establish a serial connection between PC and tester, connect the PC's serial port to the serial (COM1) interface of the tester.
If you intend to use a USB connection, connect the PC's USB port to the tester's USB interface (USB3).

4 Connect the power supply connector of the 3100 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 3100 Mobile Fault Finder by pressing the **on** button on the front panel and wait for the tester to boot. You can recognize completion of the booting process by the 3100's two-tone beep.

NOTE

In order to be able to switch on the 3100 Mobile Fault Finder by pressing the **on** button the power switch on the rear panel of the tester has to be switched on (see also "Using the rear panel" on page 12.

7 Start 7310 Lector on the host PC via
Start > Programs > Willtek > 7310 Lector > 7310 Lector or by double-clicking on the desktop shortcut.
Information about how to use the 3100 Mobile Fault Finder with 7310 Lector can be found in the 7310 Lector user's guide.

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

Operation

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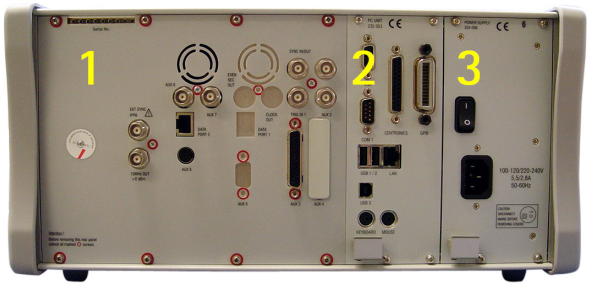
This chapter describes the functionality of the 3100 Mobile Fault Finder and the 7310 Lector software. The software functions are described as they are available with their default settings. The settings can be changed by experienced personnel. This is explained in more detail in the 7310 Lector user's guide. Topics discussed in this chapter are as follows:

Using the rear panel

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.

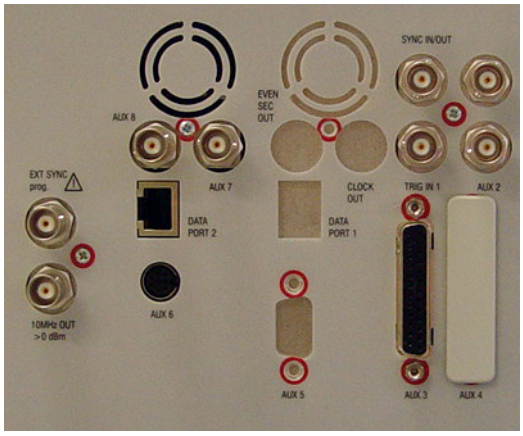
NOTE

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 in your getting started manual.

Connectors on the RF/IF/ AF section



Not all of the connectors may be fitted on your 3100. The connectors actually available depend on your system configuration, in particular the installed system options.

EXT SYNC — BNC socket. Input for external reference signal. If a high-precision reference signal of 5 MHz, 10 MHz or 13 MHz is connected here, the internal 10 MHz reference signal of the 4400 will not be used.
Input level: approx. 0 dBm
Frequency tuning range: approx. 1 ppm (10E-6) (equals 10 Hz at 10 MHz)
Input resistance: approx. 50 Ω

10 MHz OUT — BNC socket. Output of the 3100's internal 10 MHz reference signal. With the help of this output, the internal time base of the 3100 can be used to synchronize external equipment.
Output power: approx. +5 dBm
Output resistance: approx. 50 Ω

SYNC IN/OUT — BNC socket, providing a CMOS-TTL signal.
The signal on this connector allows the GSM-specific synchronization with external units. The connector is currently configured as **Sync out**. The 3100 outputs its internally generated frame synchronization signal. This signal is TTL-low for (downlink) time slots 0 to 2 and TTL-high for time slots 3 to 7.

TRIG IN — BNC socket, expecting a CMOS-TTL signal.
A trigger signal applied on this connector triggers all GSM-related RF measurements. The 3100 allows you to select between triggering on the rising or falling edge of the signal connected here.
The main application for this connector will be measurements in non-call mode at very low power levels, e.g. asynchronous measurements.

AUX connectors — These connectors are reserved for later use.

Connectors on the PC unit

COM 1 — Standard 9-pin D-sub connector for serial interface 1.

CENTRONICS — Standard parallel port to connect a PC printer (LPT 1).

GPIB — **G**eneral **P**urpose **I**nterface **B**us according to specification IEEE-488.2.

USB3 — Standard USB interface.

KEYBOARD — This connector is not in use.

MOUSE — This connector is not in use.

Connector on the power supply

Power in — Standard IEC 320 power connector (3 pins). Please make sure that the power cable is properly grounded.

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 in your getting started manual.

Starting the 7310 Lector software

In order to start the 7310 Lector software, proceed as follows:

Start 7310 Lector on the host PC via
Start > Programs > Willtek > 7310 Lector > 7310 Lector or by doubleclicking on the desktop shortcut.
Information about how to configure and use the 3100 Mobile Fault Finder with 7310 Lector can be found in the 7310 Lector user's guide.

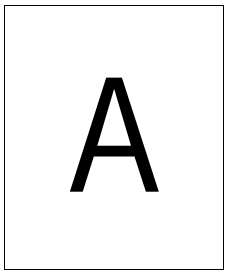
Using the 3189 Bluetooth Connectivity Test Package

Detailed instructions about how to connect and work with the 3189 Bluetooth Connectivity Test Package can be found in the Bluetooth Connectivity Test Products user's guide.

Updating the 3100 firmware

The 3100 firmware can be updated and changed through the 7310 Lector software. Please refer to the Lector user's guide for more information.

Warranty and Repair



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 consequential 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 telephone 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 or reference number.

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 firmware and 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.

Publication History

Revision	Comment
0507-200-A	First version
0510-310-A	Added new chapter describing the 3100 Upgrade Utility. Updated operation description. Updated Option information.
0608-120-A	Phone Checker and Upgrade Utility replaced by 7310 Lector.

Manual ident no.
M 290 111

Manual version
0608-120-A

English

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