



Getting Started Manual

# 3110 *Mobile Service Tester*



For serial numbers 3111001 and higher

***boosting wireless efficiency***



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# About This Guide

This section contains the following basic information:

- “Purpose and scope” on page viii
- “Assumptions” on page viii
- “Related information” on page viii
- “Technical assistance” on page ix
- “Conventions” on page x

## Purpose and scope

The purpose of this guide is to help you successfully use the 3110 features and capabilities. This guide includes task-based instructions that describe how to install, configure and use the 3110. Additionally, this guide provides a description of Willtek's warranty, services and repair information.

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## Assumptions

This guide is intended for novice users who want to use the 3110 effectively and efficiently. We are assuming that you have basic computer experience and are familiar with basic telecommunication concepts and terminology.

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## Related information

Use this guide in conjunction with the following information:

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

M 294 001: 7201 Update Utility



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## 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](mailto:customer.support@willtek.com).

**Table 1**      **Technical support contacts**

Region	Phone number	Fax number
Europe, Middle East, Asia, Africa	+49 (0)89 99641 311	+49 (0)89 99641 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 <b>typeface</b> .	On the Status bar, click <b>Start</b> .
Buttons or switches that you press on a unit appear in this <b>TYPEFACE</b> .	Press the <b>ON</b> switch.
Code and output messages appear in this <code>typeface</code> .	All <code>results</code> okay
Text you must type exactly as shown appears in this <b>type-face</b> .	Type: <code>a:\set.exe</code> in the dialog box.
Variables appear in this <b>&lt;type-face&gt;</b> .	Type the new <b>&lt;hostname&gt;</b> .
Book references appear in this <b>typeface</b> .	Refer to <b>Newton's Telecom Dictionary</b>
A vertical bar   means "or": only one option can appear in a single command.	<code>platform [a b e]</code>
Square brackets [ ] indicate an optional argument.	<code>login [platform name]</code>
Slanted brackets < > group required arguments.	<code>&lt;password&gt;</code>

**Table 3      *Keyboard and menu conventions***

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

**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 3110. Topics discussed in this chapter include the following:

- “Safety class” on page xiv
- “Taking into account before startup” on page xiv
- “Operating the 3110” on page xiv
- “During maintenance and repair” on page xv
- “Shutdown when defective” on page xv

## Safety class

The 3110 is built 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 factory in a perfectly safe condition for operation. To make sure it stays this way and can be operated without any risk, please note the following instructions, which are based on section 17 of DIN 57411 part 1 a.

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## Taking into account before startup

Before powering on, ensure that the operating voltage which is permitted for 3110 (90 to 140 V AC, 200 to 250 V AC) is the same as your power source. 3110 adjusts itself automatically to the applied (permissible) line voltage.

The power plug must only be inserted in an outlet with a ground contact. Do not endanger the unit by using an extension cable without a protective conductor.

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## Operating the 3110



**Do not interrupt protective conductor!**  
**Risk of electric shock**

Any interruption of the protective conductor inside or outside the instrument may result in electric shock.



**Do not attempt to service this product yourself!**  
**Risk of electric shock**

Opening or removing covers may expose you to dangerous, high voltage points and other hazards. Refer all servicing to qualified service personnel.

## During maintenance and repair

Maintenance and repair is only allowed to specially trained service technicians. Opening a unit without permission causes loss of warranty.

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

Capacitors in the power supply can still be charged, even though the instrument has been separated from all voltage sources.

Only use fuses with identical specifications to the replaced ones. You should never patch fuses or short the fuse holder.

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## Shutdown when defective

If you think that it is unsafe to continue operating the 3110, shut it down immediately and contact your nearest Willtek service center.

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

- if the instrument exhibits visible damage
- if the instrument will no longer work
- if stored under the wrong conditions
- following transport under adverse conditions

Safety Notes  
*Shutdown when defective*



# 3110 Overview

# 1

This chapter provides a general description of the 3110. Topics discussed in this chapter include the following:

- [“About the 3110” on page 2](#)
- [“Features and capabilities” on page 2](#)
- [“Options” on page 2](#)
- [“Physical description” on page 3](#)

## About the 3110

The 3110 Mobile Service Tester is the ideal choice for incoming inspection and final testing in large service centers and repair factories. Functional tests at each mobile phone and wireless data card require a high throughput, and the 3110 is designed to support this task at an affordable price.

The 3110 can be used as part of a complete test system also integrating the 4916 Antenna Coupler and the 4921 RF Shield. In addition, the 7310 Lector product family including the 7360 Coupling Factor Upgrade License helps you to set up an automated test system that is easily installed and maintained, further decreasing the cost of ownership.

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## Features and capabilities

The 3110 is a modular test set for GSM, EDGE and WCDMA phones and wireless devices. Typical features include:

- Transmitter measurements of the RF power and modulation characteristics
- ACPM (ORFS) for GSM and EDGE
- Receiver tests based upon bit error rate measurements
- Spectrum measurements
- Remote control via USB or TCP/IP, based on SCPI commands

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## Options

With additional hardware and software options you can extend your 3110's application range to provide audio signals and measurements or measure the current consumption of the mobile. Available options include, but are not restricted to, the following items:

- Options for GPRS and HSDPA
- Bluetooth Connectivity Test Package
- Audio/Codec Package
- MS Power Supply Option, Current Measurement Option

Additional accessories and software products support your tests and can increase your productivity, such as SIM cards, an RF coupler, a complete RF shielding solution and the Lector and Scriptor family of wireless testing products.

Also, there is a free software tool available, easing the software update and installation of new software options. Please search Willtek's website at [www.willtek.com](http://www.willtek.com) or the accompanying CD for the 7201 Update Utility.

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## Physical description

When unpacking the 3110, ensure that you do not miss any of the items listed in section ["Standard delivery" on page 10](#).



The user-accessible parts of the 3110 can be broken down into several sections:

- Front panel with screen, softkeys, numerical, cursor and function keys; RF, audio, MS power and USB connectors
- Rear panel with connectors for mains power, synchronization, external monitor and control (USB, TCP/IP, RS-232)

**Chapter 1** 3110 Overview  
*Physical description*

# Installation

## 2

This chapter describes how to set up the 3110. The topics discussed in this chapter are as follows:

- [“Scope of delivery” on page 6](#)
- [“Power connector” on page 6](#)

## Scope of delivery

When unpacking the 3110, ensure that you do not miss any of the following items:

- the instrument (3110 Mobile Service Tester)
- the manual pack including this getting started manual
- 7311 Lector Basic (software on CD)
- a USB cable for remote control
- a USB flash drive
- a power cable

### **Options**

If you ordered the 3110 together with options, these options are already installed and ready for use when you switch on the instrument.

### **Cardboard box**

Keep the cardboard box for shipping the 3110 back to Willtek e.g. for factory calibration or a model upgrade.

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## Power connector



### **Supply voltage**

Before powering on, ensure that the operating voltage at your location is permitted for the 3110 (90 to 140 V AV or 200 to 250 V AC).

The 3110 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 3110) and then to a power outlet with a ground contact.

Switch on the 3110. The power switch is located on the rear of the 3110, above the socket of the power cable. The 3110 is in standby mode now.

# Operation

# 3

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

- [“Connecting the RF” on page 8](#)
- [“Connecting the audio parts” on page 9](#)
- [“Powering the unit” on page 10](#)
- [“Navigating the user interface” on page 11](#)
- [“Performing radio frequency \(RF\) measurements” on page 14](#)

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## Connecting the RF

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

- Cable connection
- Off-air connection

Both have their advantages and disadvantages.

**Cable connection** 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 connection** With an off-air connection, the RF socket of the tester is connected to the mobile phone through an RF coupling device such as the Willtek 4916 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 device orientation, distance and frequency. This can be compensated with a coupling loss table.





## Connecting the audio parts

### **Requires Audio Option**

Any audio tests with the Willtek 3110 require the 3170 Audio/Codec Package to be installed.

The audio connection is used for testing the mobile's audio quality. The signal follows the path shown below: the analog audio signal from the mobile phone is fed to the AF in connector of the 3110; the analog audio signal from the AF out connector of the 3110 can be fed to the microphone input of the mobile phone. For best performance you will want to use shielded coax cables.

One example of an audio signal path is a sine wave generated by the 3110 which is fed to the headset connector of the phone, passes through both the encoder and decoder of the mobile and leaves the earphone.

The speech quality can be evaluated by comparing the two signals, either by ear, or in a more quantitative approach by the audio analyzer.



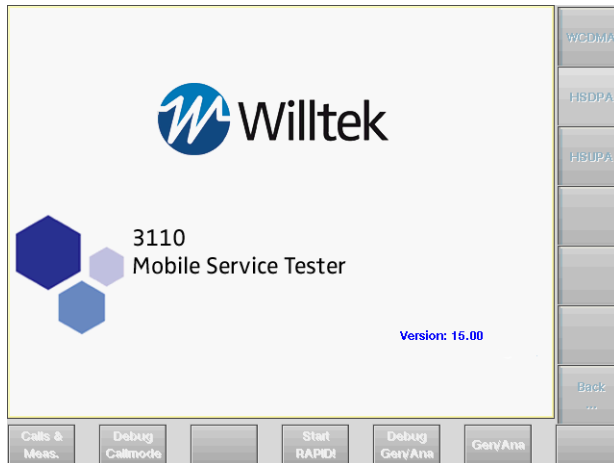
## Powering the unit

Ensure that the 3110 is switched on. The power switch is located on the rear of the 3110, above the socket of the power cable. When switched on, the 3110 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 3110 into operation mode. The stand-by light turns green.

At the end of the startup sequence, the start or Welcome menu appears.

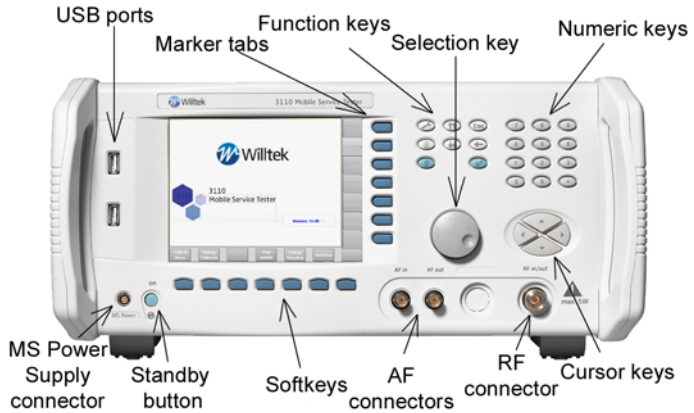


In the Welcome menu, you can immediately start testing GSM mobiles in call mode by pressing the **Calls & Meas.** softkey below the TFT display.

Other systems can be selected using the marker tabs on the right side of the TFT display, provided the options are installed.

## Navigating the user interface

This is a short description of the front panel of the 3110.











**Standby button** This button switches the 3110 from stand-by mode to operating mode. The light below the button lights yellow in stand-by mode and green in operating mode.

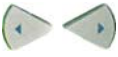

**MS Power connector** This connector can be used to feed the supply voltage to a mobile under test. It requires the MS Power Supply Option to be installed.

**Numeric keys** Used for entering numerical values into entry fields.

**Function keys** With these important keys you get general control of the 3110.

	Shows the 3110 tools menu. Here you can start any 3110 tool such as the spectrum analyzer.
 	Selects the first entry field of the previous/next group.
	This key brings you one menu level up.
	Deletes the value left of the cursor in an entry field.
	Accepts a newly entered value in an entry field.
	Displays contact information for support issues.
	Prints the screen contents on paper or stores it in a bmp file on the hard disk, depending on the printer setting under <b>Tools &gt; Config &gt; I/O</b> .

**Cursor keys**

	To get from one entry field to the previous or next one.
	To change the value of a numeric field or the setting of a selection field (scroll variable).

**Selection key** Turning the selection key changes values in entry fields.

**Softkeys** The softkeys are the keys below the screen. Their individual functions depend on the state of the software and are described by the text at the lower end of the screen.

From the Welcome menu, use the softkeys to select one of the available test modes (e.g. Calls & Measurements) or to start a test.

**Marker tabs** Press a marker tab to select the communication system (e.g. GSM or GSM/GPRS) or to jump from one test menu to another. The function of the marker tab is shown on the TFT display next to the buttons. It will change on every new entered level.

**RF socket (RF in/out)** Connect your mobile to this N-type socket.

## 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 these data to the network and hence can be displayed by the 3110 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” on page 16](#)
- [“Equipment return instructions” on page 17](#)

## 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.

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## 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 (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.

**Appendix A** Warranty and Repair  
*Equipment return instructions*

# Publication History

Revision	Changes
0907-310-A	Initial revision.

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