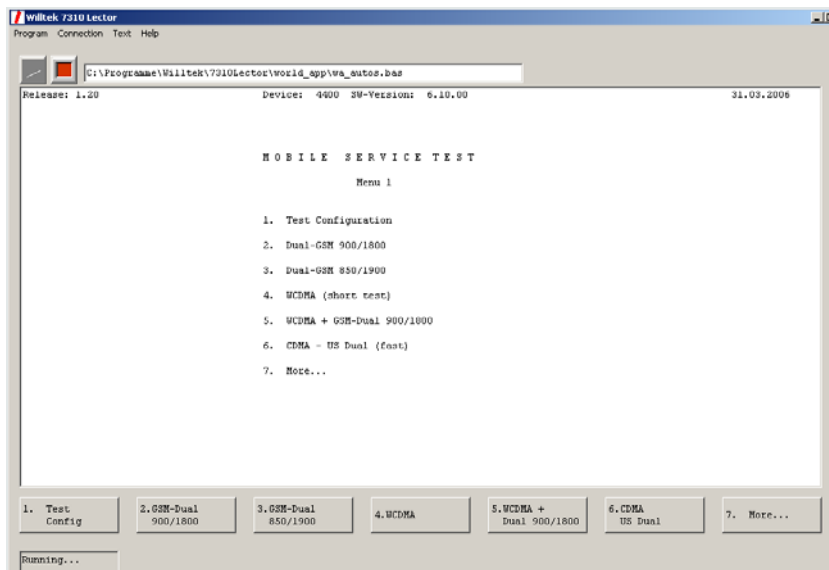


7310 Lector



User's guide
Version 1.30

boosting wireless efficiency

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About This Guide

- ["Purpose and scope" on page viii](#)
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Purpose and scope

The purpose of this guide is to help you successfully use the 7310 Lector features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the 7310 Lector. 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 users who want to use the 7310 Lector effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience.

Related information

Use this guide in conjunction with the following information:

3100 Mobile Fault Finder getting started manual, ordering number M 295 111

3100 Mobile Fault Finder user's guide, ordering number M 290 111

4400 Mobile Phone Tester getting started manual, ordering number M 295 011

4400 Mobile Phone Tester Series user's guides

Bluetooth Connectivity Test Products user's guide, ordering number M 292 018

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.

Overview

1

This chapter provides a general description of the 7310 Lector. Topics discussed in this chapter include the following:

- ["About 7310 Lector" on page 2](#)
- ["What's new in version 1.30" on page 2](#)
- ["Changes from version 1.00 to version 1.20" on page 3](#)
- ["Features and capabilities" on page 3](#)

About 7310 Lector

Willtek's 7310 Lector is an economical solution for service centres and repair shops testing returned mobile phones. Running on a PC, Lector provides an easy-to-use interface to the 3100 Mobile Fault Finder and the 4400 Series Mobile Phone Testers.

Using one of these instruments and Lector on a PC, service and repair centres easily can check the performance of returned mobile phones. The system automatically recognises the phone type, and it can test single, dual, triple and quad band models. All major RF parameters are measured against specifications, and audio tests check microphone and speaker functionality. Results can be stored in a database for analysis or printed for reports.

The operator doesn't have to learn the complexities of WCDMA or CDMA2000 testing: The Pass/Fail indication is good enough to filter bad from good phones. The accompanying detailed results can be printed or stored, and forwarded to the repair technician for fault diagnosis.

The test scripts running in Lector can easily be adapted and extended to individual needs. Support for GSM, GPRS, WCDMA/UMTS, CDMA2000 and EDGE mobile phones is already built in.

Lector is a standard accessory to the 3100 Mobile Fault Finder and an option to the 4400 Mobile Phone Tester Series.

What's new in version 1.30

Lector is now supporting the Intersystem Handover from WCDMA to GSM. For performing an Intersystem Handover, firmware version 12.00 or higher must be installed on the 3100 or 4400.

New application for CDMA2000 phone testing available (wa_mobcar.bas).

Support of Willtek's Bluetooth adapter (4941 Bluetooth Connectivity Hardware): By including the BLUETOOTH command in the test scripts, a Bluetooth test can be performed.

The phone's serial number (TAC within IMEI) may decide which test script to run. The number can be entered either manually or through a barcode reader.

Progress bar indicates the overall test progress.

A progress bar is also displayed for CDMA2000 test scripts.

Extended information in the test log:
The test log now includes the Lector version number and a headline for the tested bands.

CDMA2000 now also supports reference coupling.

Changes from version 1.00 to version 1.20

In GSM and WCDMA, a new TAC is easily assigned to phones which have already been characterized under a different TAC.

Lector now includes a software update utility for the 3100 Mobile Fault Finder.

Functions can now also be invoked with the numerical keys in addition to the mouse.

Version 1.20 supports CDMA2000 tests.

Features and capabilities

- Lector automatically recognizes the phone type and loads RF coupling factors for the 4916 Antenna Coupler (and 4921 RF Shield if available).
- Guided test sequence makes it easy for new users to follow, and special tests can be user programmed. Provides simple Pass/Fail verdict at the end of the test sequence.
- Comprehensive checks include signalling, call set-up and call release, all major RF parameters against specification, audio loopback tests and keypad tests.
- Results can be stored in a database for record keeping, sent to manufacturer for warranty claims or printed for customer invoicing.

Installation

2

This chapter describes how to install the 7310 Lector. The topics discussed in this chapter are as follows:

- "Scope of delivery" on page 6
- "Software requirements" on page 6
- "Hardware requirements" on page 6
- "Installing the software" on page 6
- "Setting up the hardware" on page 7
- "Configuring the software" on page 8

Scope of delivery

7310 Lector comes on a CD with an installation program. The installation includes the driver software necessary to control a 3100 Mobile Fault Finder or a 4400 Series Mobile Phone Tester via USB.

Software requirements

7310 Lector can be installed and run on every PC with Microsoft Windows NT, Windows 2000 or Windows XP. You will need to log in with administrator rights to install the software.

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

To control a 3100 Mobile Fault Finder, the instrument will need software version 11.20 or higher.

To make use of the Bluetooth and the Intersystem Handover capabilities, software version 12.00 or higher of the 4400 or 3100 is required.

Hardware requirements

Before installing 7310 Lector 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 7310 Lector:

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

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 7310 Lector (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 7310 Lector icon on the Windows desktop
 - Start the installation processThe 7310 Lector program will be installed.
- 4 After completion of the 7310 Lector 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

Before starting a test, the PC should be connected to the instrument. Please note the following particularities:

3100 Mobile Fault Finder

The 3100 Mobile Fault Finder supports remote control via TCP/IP, GPIB, USB and RS-232.

If the 3100 shall be controlled via TCP/IP, a connection via USB or RS-232 must be established at first-time use because the 3100 must be programmed with a valid IP address. [Chapter 5 "Setting Up the 3100 Software"](#) explains how to change the 3100's IP address.

If the 3100 shall be controlled via GPIB, a connection via USB or RS-232 must be established at first-time use because the 3100 must be programmed with a valid GPIB address. [Chapter 5 "Setting Up the 3100 Software"](#) explains how to change the 3100's GPIB address.

4400 Mobile Phone Tester Series

Instruments from the 4400 Mobile Phone Tester Series support remote control via GPIB and, depending on the status of the instrument and the installed options, via TCP/IP and USB.

TCP/IP

The LAN connector of your instrument can be connected with the PC in two different ways:

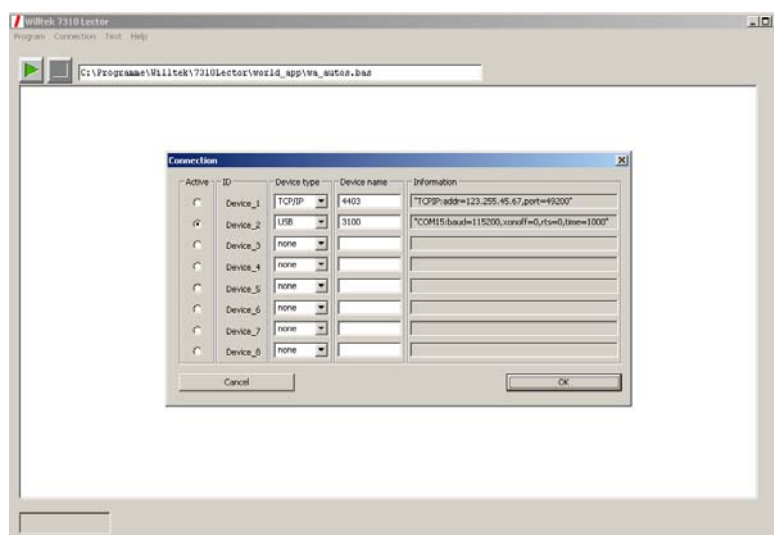
- Existing TCP/IP network with router or hub: Use a CAT5 or CAT6 LAN cable to connect the instrument to the LAN. Similarly, also connect the PC to the LAN.
- Point-to-point connection: Use a crossed-line LAN cable to directly connect the instrument to the PC.

Configuring the software

7310 Lector can be set up to communicate with several different instruments over different connections. Only one instrument, however, can be used at any time while Lector is running.

The connections need to be defined and the active instrument must be selected as follows:

- 1 In 7310 Lector, select **Connection > Define Interface**.
The Connection box appears.
- 2 In the first column, select the instrument (device) to be used with 7310 Lector for the next test. If no device has been defined as yet, select the first one and fill out the device information according to the table below.
The Device name field can be used to note any instrument or connection information.
- 3 Confirm your changes by selecting **OK**.



Each device can be defined as follows by selecting the appropriate Device type:

Table 1 Device type input fields in the Connection menu

Device type	Parameters	Remarks
RS-232	COM port (range 1 – 99) Baud rate (in kbps) Handshake protocol (Xon/Xoff, RTS, None)	Use the physical COM port number (usually 1). The default baud rate of the 3100 is 115200. The default handshake protocol selection is None.

Table 1 Device type input fields in the Connection menu

Device type	Parameters	Remarks
TCP/IP	IP Address Port	<p>The IP address must be selected in line with the local area network policies. This must be the same address as selected on the 3100 or 4400. Each address must exist only once within the network.</p> <p>You can look up the IP address of your 3100 using the 3100 Update Tool. The IP address of your 4400 is displayed in the Tools > Configuration > I/O menu.</p> <p>The port number indicates the logical port for the software; the default in the 3100 and 4400 is 49200.</p>
USB	COM port (range 1 – 99) Baud rate (in kbps) Handshake protocol (Xon/Xoff, RTS, None)	<p>The physical USB port is rerouted to a logical RS-232 port number. Once a 3100 or 4400 is connected to the PC via USB, the port number is automatically assigned and can be looked up in the Windows environment at Start > Control Panel > System > Hardware > Device Manager > Ports. It should then be copied to the Com port input field.</p> <p>The default baud rate is 115200.</p> <p>By default, no handshake protocol is applied (None setting).</p>
GPIB	GPIB Address (range 1 – 31)	<p>This should be identical with the GPIB address of the instrument. The default address of the 3100 and the 4400 is 4.</p>

Running Lector Applications

3

This chapter describes how to run a Lector application and provides a brief explanation of the applications delivered with your Lector version. These topics are covered in the following chapters:

- ["Starting a Lector application" on page 12](#)
- ["Understanding and running Mobile Service Test" on page 15](#)
- ["Understanding and running 3100 Update Tool" on page 16](#)
- ["Troubleshooting" on page 16](#)

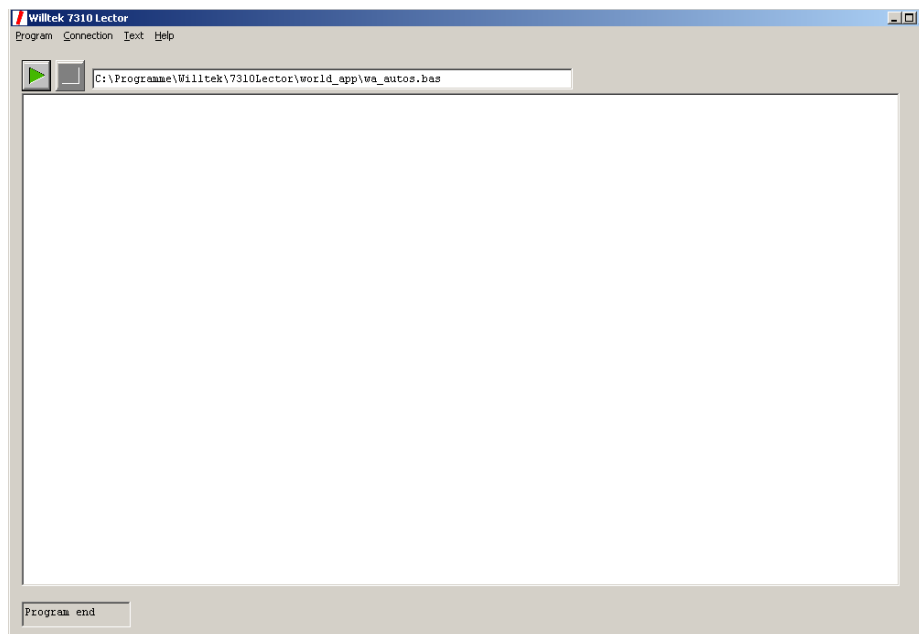
Starting a Lector application

Applications delivered with Lector

Lector comes with two applications that can be run from Lector.

- **Mobile Service Test:** This is a comprehensive application allowing you to test GSM and WCDMA mobile phones. Tests can be run upon a keypress, providing a pass/fail verdict at the end and offering more detailed test results. There are many parameters that can be configured, such as the frequency bands to be tested and whether results should be displayed on the screen or printed on paper. The test application actually comes in two different versions; the first one is stored in file `wa_AUTOS.BAS` and the second one in `wa_mobcar.BAS` (for use with the 3100 Mobile Fault Finder only). The difference is that `wa_mobcar.BAS` supports a different set of CDMA tests (mobile/carrier test software). The Mobile Service Test configuration is detailed in [Chapter 4 "Configuring Mobile Service Test"](#). Basic principles of Mobile Service Test are explained in section "[Understanding and running Mobile Service Test](#)" on page 15.
- **3100 Update Utility:** This application allows you to load and install a new software version on your 3100 Mobile Fault Finder. It also supports you in switching back to an older 3100 software version should you want to do this. The application can be started by loading and running the file `3100UpdateTool.bas`; the update tool is explained in more detail in [Chapter 5 "Setting Up the 3100 Software"](#).

Screen elements of Lector



The program window consists of the following main elements:

- Menu bar allowing to load Lector applications and to configure Lector.
- Two square elements allowing to either start or stop execution of an application.

- A bar displaying the Lector application currently loaded.
- An input/output section showing the progress of the application and test results, and offering input fields from within the Lector application.
- At the bottom, a field displays the application execution status (e.g. if an application program is running or terminated).

Starting and stopping a Lector application

When you want to run a Lector application, you need to load and run an executable program file that can be run by Lector. Lector will first search for files in the `world_app` folder within the Lector installation folder (e.g. `C:\Program files\Willtek\7310Lector`). Lector programs carry the file name extension `BAS`. If you want to use your own programs, these may be stored in other folders and loaded from there within Lector.

Lector applications can be loaded and started as follows:

- 1 Start Lector: On your Windows PC, select **Start > Programs > Willtek > 7310 Lector > 7310 Lector**. Alternatively, double-click the Lector icon on your desktop.
- 2 To run an application that is already loaded, select **Program > Run**. Alternatively, simply click on the green triangle in the program window.
- 3 To run an application within Lector that is not already loaded, select **Program > Load/Run**. Select the application file and click on the **Open** button.
The Lector application file is loaded and execution is started.

Note

In the line above the input/output section, Lector indicates which application file is currently loaded.

- 4 To terminate a running application, select **Program > Break**. Alternatively, simply click on the red square in the program window.

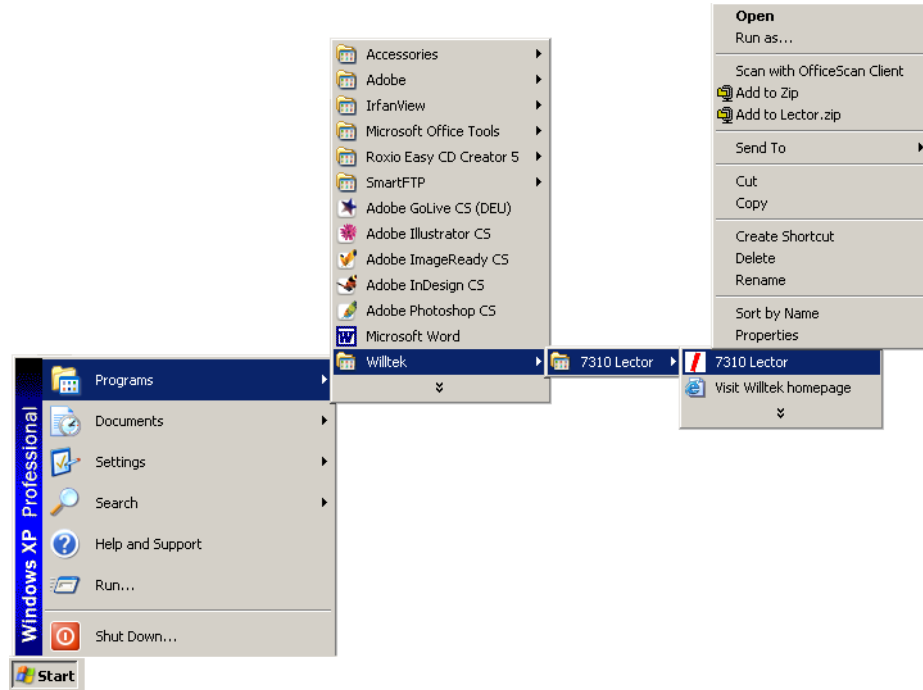
Starting Lector and loading an application

During installation, the 7310 Lector Setup Assistant installed one or two links to the Lector program; one can be found in the `Start > Programs > Willtek > 7310 Lector` menu and the other one on the Windows desktop.

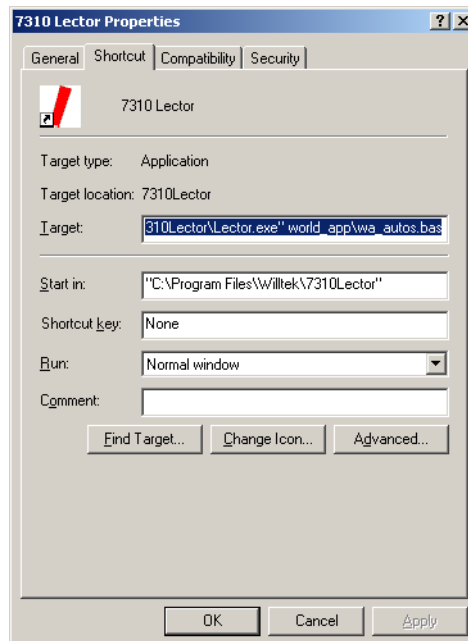
These links are configured such that they start Lector and have Lector immediately load an application. The default application is `wa_autos.bas` (Mobile Service Test). The application, including the folder in which it can be found, is provided to the Lector software as a command line element.

The application to be loaded can be changed by editing the properties of the Windows link:

- 1 Right-click on the Lector icon.
The context menu opens.



- 2 Select Properties from the context menu.
The Properties menu opens.



- 3 In the Target input field, change the argument (behind the program location and file) according to your needs. Note that the file location must be given as well. The file location can be either absolute (e.g. C:\Program Files\Lector\test.bas) or relative to the folder containing the Lector program file (e.g. world_app\test.bas).
- 4 Confirm the changes and close the Properties menu by clicking **OK**. The Properties menu disappears and Lector accepts the changes.

Note

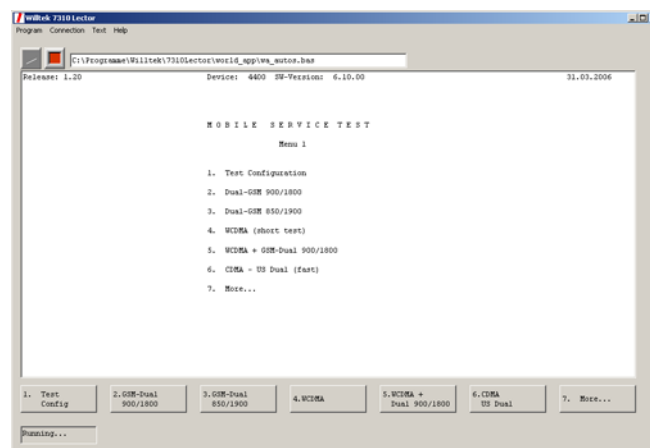
On your Windows desktop, you can also add multiple icons, each with a shortcut to Lector with a different application file. This can be convenient if you have different tests to run.

Understanding and running Mobile Service Test

Mobile Service Test is a Lector application for the testing of wireless devices following the GSM, GPRS, EDGE, CDMA2000 and/or WCDMA standards. It allows starting a comprehensive test program upon the click of a mouse button or upon a keypress.

Operating Mobile Service Test

This application provides a number of tests to check the quality of a mobile phone and to configure some test parameters.



Most of the menus within the application use up to seven buttons to offer the user a selection between different options. These options or buttons can be selected either by clicking on them with the mouse, or by pressing a numerical key (**1** to **7**) depending on the selection. If more than seven options are available, one button (**More**) can be used to toggle between several menu lists.

The top line of the input/output section displays (from left to right) the Lector version number, the instrument with its software version, and the current date when the application was started.

The configurable parameters are explained in more detail in [Chapter 4 "Configuring Mobile Service Test"](#).

See [Appendix A](#) on how the main menu can be adapted to individual needs.

The executable tests in the standard delivery are:

- Dual-GSM 900/1800 (dual-band GSM test in the 900 and 1800 MHz bands)
- Dual-GSM 850/1900 (dual-band GSM test in the U.S. frequency bands)
- WCDMA (quick test of a WCDMA phone)
- WCDMA + GSM-Dual 900/1800 (test of mobile phone in WCDMA mode and in GSM mode at 900 and 1800 MHz)
- CDMA US Dual (quick test of a CDMA2000 phone in the U.S. cellular and PCS bands)
- EDGE + GSM-Dual 900/1800 (test of a GSM and EDGE phone at 900 and 1800 MHz)
- EDGE + GSM-Dual 850/1900 (test of a GSM and EDGE phone at 850 and 1900 MHz)
- WCDMA + EDGE + GSM-Dual 900/1800 (test of a WCDMA phone that also supports GSM and EDGE in the 900 and 1800 MHz bands)
- WCDMA (long test) (comprehensive test of a WCDMA phone)
- WCDMA + GSM-Dual 900/1800 (long test) (comprehensive test of mobile phone in WCDMA mode and in GSM mode at 900 and 1800 MHz)
- WCDMA + EDGE + GSM-Dual 900/1800 (long test) (comprehensive test of a WCDMA phone that also supports GSM and EDGE in the 900 and 1800 MHz bands)
- GSM 900 (single-band test of a GSM 900 phone)
- GSM 1800 (single-band test of a GSM 1800 phone)
- GPRS 900/1800 (dual-band test of the GPRS functionality)
- GPRS 850/1900 (dual-band test of the GPRS functionality in the U.S. frequency bands)
- CDMA US PCS (short test of a CDMA2000 phone in the 1900 MHz band)
- CDMA Cellular (short test of a CDMA2000 phone in the 850 MHz band)

Understanding and running 3100 Update Tool

This application can be used to load new software into the 3100 Mobile Fault Finder, to switch between different installed software versions and to delete installed software. More information can be found in [Chapter 5 "Setting Up the 3100 Software"](#).

Troubleshooting

If you experience problems with Lector, please refer to one of the Technical Assistance Centers (TAC) (see [page viii](#)). Keep the following information at hand:

- Problem description
- Version number of Lector

- Application program started within Lector
- Type and serial number of instrument
- Installed options on the tester
- Lector logfile

Lector logs the SCPI commands executed during the last application run into file `world_app\log.txt`, so the logfile is useful only if the problem at hand occurred when a Lector application was started last.

Configuring Mobile Service Test

4

This chapter describes how the Mobile Service Test applications for Lector (wa_AUTOS.BAS and wa_mobcar.BAS) can be configured to optimally fit the test needs. Topics discussed in this chapter are as follows:

- ["Introduction" on page 20](#)
- ["Adapting the WCDMA configuration" on page 20](#)
- ["Adapting the GSM configuration" on page 21](#)
- ["Adapting the CDMA2000 configuration in wa_AUTOS.BAS" on page 21](#)
- ["Adapting the CDMA2000 configuration in wa_mobcar.BAS" on page 25](#)
- ["Configuring the antenna coupling for GSM and WCDMA" on page 29](#)
- ["Testing Bluetooth devices" on page 30](#)
- ["Changing general settings" on page 31](#)

Introduction

The Mobile Service Test configuration is split into five sections: test parameters for GSM (including GPRS and EDGE), CDMA2000 and WCDMA, the coupling parameters, and general settings (such as IMSI, result storage/printing and password protection).

This chapter explains the configuration for both Mobile Service Test programs, wa_AUTOS.BAS and wa_mobcar.BAS. Differences between the two are indicated.

Note

wa_mobcar.BAS is for use with the 3100 Mobile Fault Finder only.

Adapting the WCDMA configuration

The WCDMA setup menus allow you to configure the frequency channels on which the measurements shall be performed. Tests are typically performed on three channel pairs: at the band edges and in the middle of the band.

WCDMA uses different channel numbers for the uplink (mobile transmit) and downlink (base station transmit) directions. There are different frequency bands in use with their respective channel numbers.

The following table provides some help in configuring the WCDMA channel numbers.

Table 2 WCDMA frequency bands

Frequency band	Uplink channels	Downlink channels	Region
Band I	9612–9888 (1920–1980 MHz)	10562–10838 (2110–2170 MHz)	Europe, China, Japan, Korea
Band II	9262–9538 (1850–1910 MHz)	9662–9938 (1930–1990 MHz)	North America (PCS band)
Band III	8562–8913 (1710–1785 MHz)	9037–9388 (1805–1880 MHz)	Europe/Asia (GSM 1800 band)
Band IV	1162, 1187, 1212, 1237, 1262, 1287, 1312, 1337, 1362 (1710–1770 MHz)	1462, 1487, 1512, 1537, 1562, 1587, 1612, 1637, 1662 (2110–2170 MHz)	
Band V	782, 787, 807, 812, 837, 862 (824–849 MHz)	1007, 1012, 1035, 1037, 1062, 1087 (869–894 MHz)	North America (US cellular band)
Band VI	812–837 (830–840 MHz)	1037–1062 (875–885 MHz)	

Adapting the GSM configuration

The GSM setup menus allow you to configure the frequency channels on which the measurements shall be performed. Tests are typically performed on three channel pairs: at the band edges and in the middle of the band.

Typical GSM phones support more than one frequency band. Mobile Service Test allows you to define frequencies for testing in each band.

Note that there are three subtypes for the GSM 900 band. The E-GSM 900 band is the most popular one and is supported by most GSM phones.

A frequency for the BCCH (Broadcast Control Channel or base channel) must be defined separately for each band because the mobile phone will drop a test call if the BCCH is not present. The BCCH may be located on one of the other test frequencies in the same band.

For your convenience, the following table shows the different frequency bands and their respective channel number ranges.

Table 3 GSM frequency bands

Frequency band	Channel numbers	Uplink frequencies	Downlink frequencies
GSM 850	128–251	824–849 MHz	869–894 MHz
P-GSM 900	1–124	890–915 MHz	935–960 MHz
E-GSM 900	975–1023, 0–124	880–915 MHz	925–960 MHz
R-GSM 900	955–1023, 0–124	876–915 MHz	921–960 MHz
GSM 1800	512–885	1710–1785 MHz	1805–1880 MHz
GSM 1900	512–810	1850–1910 MHz	1930–1990 MHz

Adapting the CDMA2000 configuration in wa_AUTOS.BAS

Various test parameters should be set up before testing CDMA2000 phones. These are explained below.

Frequency bands

CDMA2000 is supported in a number of frequency bands. For each band, typical settings such as channel numbers and SID can be defined.

For your convenience, the following table shows the different frequency bands and their respective channel number ranges.

Table 4 CDMA2000 frequency bands

Frequency band	Channel numbers	Uplink frequencies	Downlink frequencies
US 800	1–799, 991–1023	824–849 MHz	869–894 MHz
US PCS	0–1199	1850–1910 MHz	1930–1990 MHz
Korean PCS	0–599	1750–1780 MHz	1840–1870 MHz
CDMA 450	1–300, 539–871, 1039–1473, 1792–2016	411–484 MHz	421–494 MHz

Mobile Service Test also supports dual-band phone testing in the US 800 and US PCS bands.

Control channel

The base station uses the control channel to broadcast its presence with information about the network. The mobile phone uses the control channel to register with the network and to initiate a call. A separate control channel must be defined for each frequency band.

SID

The System Identity (SID) is a number which identifies the subscriber's home system. Using a home SID allows operation with phones that are programmed for home-only operation. A separate SID must be defined for each frequency band, typically the SID of the network that the phone is subscribed to. Valid entries are in the range from 0 to 32767.

Radio Config

The radio configuration (RC) determines the supported traffic channel data rates and modulation types on the forward and reverse link.

Table 5 CDMA2000 reverse link radio configuration

Radio configuration	IS-95 compatible	Data rates (kbs)	Base rate (kbps)	Modulation type
RC 1	x	1.2, 2.4, 4.8, 9.6	9.6	OQPSK
RC 2	x	1.8, 3.6, 7.2, 14.4	14.4	OQPSK
RC 3		1.2, 1.35, 1.5, 2.4, 2.7, 4.8, 9.6, 19.2, 38.4, 76.8, 153.6, 307.2	14.4	HPSK
RC 4		1.8, 3.6, 7.2, 14.4, 28.8, 57.6, 115.2, 230.4	14.4	HPSK

Table 6 CDMA2000 forward link radio configuration

Radio configuration	IS-95 compatible	Data rates (kbs)	Base rate (kpbs)	Modulation type (traffic channel)
RC 1	x	1.2, 2.4, 4.8, 9.6	9.6	BPSK
RC 2	x	1.8, 3.6, 7.2, 14.4	14.4	BPSK
RC 3		1.2, 1.35, 1.5, 2.4, 2.7, 4.8, 9.6, 19.2, 38.4, 76.8, 153.6	9.6	QPSK
RC 4		1.2, 1.35, 1.5, 2.4, 2.7, 4.8, 9.6, 19.2, 38.4, 76.8, 153.6, 307.2	9.6	QPSK
RC 5		1.8, 3.6, 7.2, 14.4, 28.8, 57.6, 115.2, 230.4	14.4	QPSK

Service Option

The service option determines the mode in which the traffic channel will operate: voice, data or loopback.

Table 7 Service options

Service option	Type	Applicable radio configurations
1	Basic variable rate voice service (9.6 kbps)	F1-R1, F3-R3, F4-R3
2	Mobile station loopback (9.6 kbps)	F1-R1, F3-R3, F4-R3
3	EVRC (enhanced variable-rate voice service) (9.6 kbps)	F1-R1, F3-R3, F4-R3
9	Mobile station loopback (14.4 kbps)	F2-R2, F3-R4
17	High rate voice service (14.4 kbps)	F2-R2, F5-R4
32	TDSO (test data service option) (9.6, 14.4 kbps)	F3-R3, F4-R3
55	RC1/2/3/4/5 loopback (9.6, 14.4 kbps)	F1-R1, F2-R2, F3-R3, F4-R3, F5-R4
32768	Basic variable rate voice service (14.4 kbps)	F2-R2, F5-R4

Minimum Base Power This is the lowest power level of the instrument at which tests such as receiver measurements are performed. The minimum base power is expressed in dBm.

Traffic Channel This is the channel number for the traffic channel (voice or data) in case of a quick test. The channel number must be supported in the respective frequency band; for valid channel numbers, see [Table 4 on page 22](#).

Low Channel, Mid Channel, High Channel These entry fields allow you to configure the frequency channels on which comprehensive measurements shall be performed. Tests are typically performed on three channels: at the band edges and in the middle of the band. For valid channel numbers in the respective frequency band, see [Table 4 on page 22](#)

Traffic Level This entry field defines the receive power level (in dBm) at the mobile phone during receiver tests (FER test). Allowable values are in the range from -32.0 to -5.0.

Configuring the antenna coupling for CDMA2000 The coupling factors or coupling data allow Mobile Service Test to take the attenuation between the mobile phone and the tester into account. The signals between the two are attenuated both when the phone is connected via a cable (attenuation typically in the range 0 to 3 dB) or when it is connected via an antenna coupler (attenuation typically in the range 5 to 30 dB).

By specifying the coupling factor, Mobile Service Test can take the raw power measurement values or settings and add or subtract the factor. The coupling factor or attenuation depends on the type of coupling (cable or antenna), the cables and coupler being used, the phone model and the frequency. The more exact the coupling factor is given, the more exact the test results are. You can, however, work with typical values, at the expense of measurement accuracy.

In CDMA, there are three ways for defining the coupling loss in Mobile Service Test. The application can either apply some typical values that are stored in the application program (script file), or the values that are entered by the user. Separate values can be defined for each frequency band, for the three channels (low, middle, high) and for the two directions (RX attenuation for the reverse link from the phone to the tester and TX attenuation for the forward link from the tester to the phone). The attenuation or coupling factor can be entered in the range from 0 to 40 dB.

Coupling Data The Coupling Data menu allows you to select which set of coupling values shall be applied: the user-defined values from the User Coupling Data menu or the predefined values from the application (script file).

CDMA User Coupling Data The user-defined coupling factors can be entered in the CDMA User Coupling Data menu after selecting the respective frequency band.

Adapting the CDMA2000 configuration in wa_mobcar.BAS

File wa_mobcar.BAS comes with more comprehensive CDMA testing features. In the default configuration, the CDMA functionality and setup can be found in the main menu under "Mobile Carrier".

Note

wa_mobcar.BAS is for use with the 3100 Mobile Fault Finder only.

Setting up the software for the phone and coupler

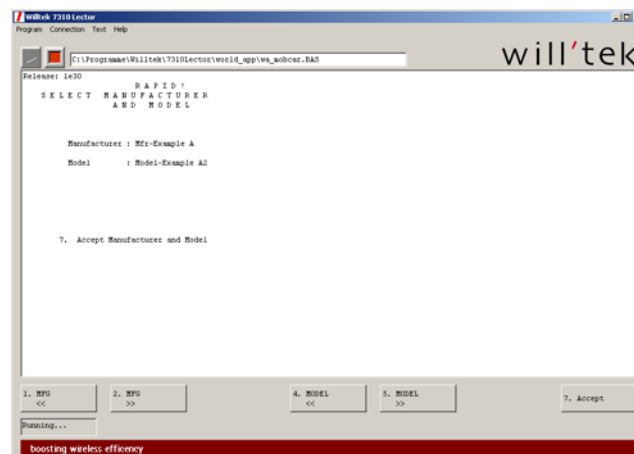
There are different types of connections possible between the mobile phone and the instrument: a cable connection ("direct connect") or different types of radio frequency couplers such as the 4916 Antenna Coupler. Each phone model and coupling device have their own coupling characteristics, in particular with respect to attenuation (or coupling loss). Usually each phone model is used with a specific connection device.

Different types of mobiles require individual test channels to support transmitter and receiver tests. These parameters must be taken into account when testing a phone.

7310 Lector caters for all these variations by allowing you to select the phone under test and associate it with a coupling device. This will set up the channel and the predefined coupling loss in the software and take the loss into account when setting up power levels and presenting measurement results.

To select the phone and coupling device, proceed as follows:

- 1 In the Mobile and Carrier Tests main menu, select **Change Mobile**. The "Select Manufacturer and Model" menu appears.



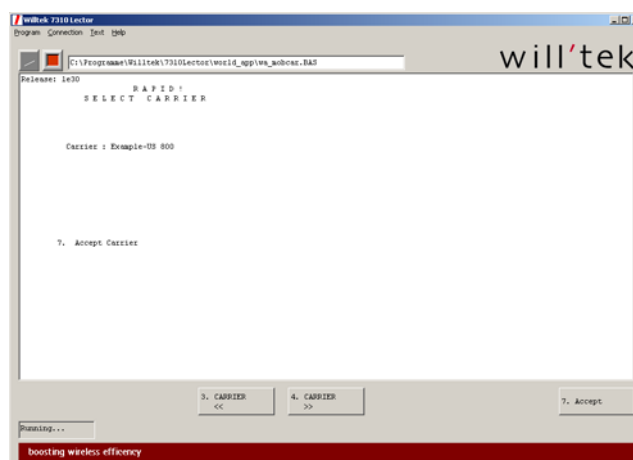
- 2 Click on **MFG <<** or **MFG >>** several times until the desired manufacturer is displayed on the screen.
- 3 Click on **MODEL <<** or **MODEL >>** several times until the connection type is shown. The selection of models depends on the chosen manufacturer.
- 4 Click on **Accept** to return to the main menu.

Section ["Adding a new manufacturer and phone model"](#) on page 46 shows experienced users how to change or add new mobile phones and manufacturers to the lists.

Selecting the carrier and frequency band

Each network has their own frequency band and preferred channel numbers. CDMA phones are optimized to look for a carrier on specific frequency channels. Therefore 7310 Lector allows the user to select a particular frequency band or even a mobile network.

- 1 To set up the instrument for a specific network or frequency, click on **Change Carrier** in the Mobile and Carrier Tests main menu. The "Select Carrier" menu appears.



- 2 Click on **CARRIER <<** or **CARRIER >>** several times until the desired band or carrier name appears.
- 3 Select **Accept** to apply the changes. The 4400 is set up for the appropriate predefined carrier frequency. The main menu appears.

Section ["Adding or modifying carrier-specific parameters"](#) on page 49 shows experienced users how to change or add new carriers and frequency band parameters to the lists.

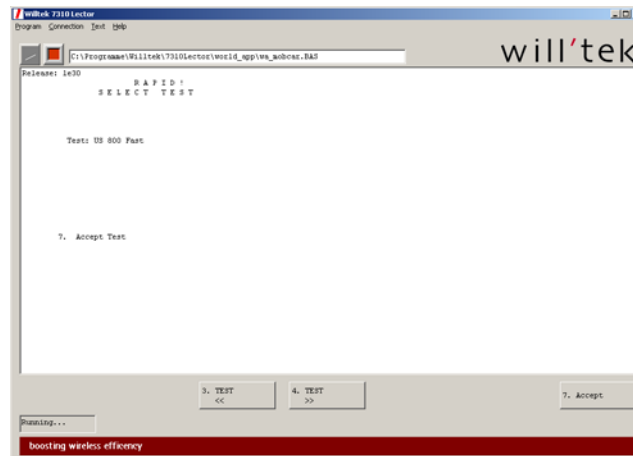
Setting up a test type

The 7310 Lector provides several test sequences to accommodate different testing requirements. Predefined test sequences include:

- US Dual Band Fast
- US Dual Band Long
- US PCS Fast
- US PCS Long
- US 800 Fast
- US 800 Long

To select a test sequence, proceed as follows:

- 1 Select **Change Test** in the Mobile and Carrier Tests main menu.
The "Select Test" menu appears.



- 2 Click on **Test <<<** or **Test >>>** several times to change the type of test.
The test type currently selected will be shown on the display.
- 3 Select **Accept** to confirm your choice and to return to the main menu.

Note

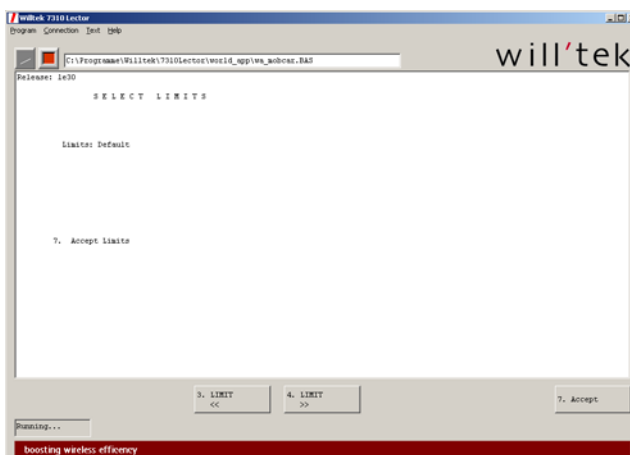
The 7310 Lector only offers those test types that fit with the type of mobile, e.g. if the mobile is defined as US800 only, only the US 800 Fast and US 800 Long tests will be displayed for the user to select.

Setting up the test limits

7310 Lector tests the mobile phone against predefined limits and, at the end of the test, provides a Pass or Fail verdict. Each network operator or mobile manufacturer may have their own test limits, so the software can be set up to apply certain limits. A set of limits can be stored under a name and called up from within the software.

To change the set of limits, proceed as follows:

- 1 In the Mobile and Carrier Tests main menu, select **Change Limits**. The "Select Limits" menu appears.



- 2 Click on **LIMIT <<<** or **LIMIT >>>** several times until the name of the desired limits profile appears.
- 3 Select **Accept** to apply the new limits and to return to the main menu.

Section ["Adding or modifying test limits" on page 50](#) shows experienced users how to change the limits or add new mobile or carrier-specific limit profiles to the list.

Carrying out a test

To start a test, click on **Start Test** in the Mobile and Carrier Tests main menu. The test will start, the instrument will set up a connection with the mobile phone and the test will take a few minutes, depending on the selected test. 7310 Lector will keep you informed about the progress.

At the end of the test, the software will show an overview of the results, together with a Pass or Fail statement. Depending on the selections made in the Result Destination menu (see section ["Setting up the output devices" on page 28](#)), the results can be printed and/or stored on a media device.

Setting up the output devices

7310 Lector allows you to select from multiple interfaces where the results are sent. These can be a printer, the internal hard disk, a floppy disk or a hard disk on the network. Depending on which interfaces have been selected and how, the software may ask you after a completed test if you want to print or store the results. In case of a failed test, the results may help an experienced technician to identify the source of the problem for subsequent repair. In any case, it may be useful to document that a test has been performed on a particular mobile and what the result was.

To learn how the output device and printing conditions can be selected, please refer to ["Result destination" on page 32](#).

7310 Lector shares the output device selection with the Evaluation Tests for CDMA. This is why the selection can only be made outside 7310 Lector:

Configuring the antenna coupling for GSM and WCDMA

There are several ways to connect the mobile phone to the tester: An RF cable, an antenna coupler like Willtek's 4916, and the 4916 Antenna Coupler in the 4921 RF Shield. Each coupling involves some attenuation of the RF signal which has to be taken into account in the RF measurements (transmit power, sensitivity).

The coupling factors or coupling data allow Mobile Service Test to take the attenuation between the mobile phone and the tester into account. The signals between the two are attenuated both when the phone is connected via a cable (attenuation typically in the range 0 to 3 dB) or when it is connected via an antenna coupler (attenuation typically in the range 5 to 35 dB).

By specifying the coupling factor, Mobile Service Test can take the raw power measurement values or settings and add or subtract the factor. The coupling factor or attenuation depends on the type of coupling (cable or antenna), the cables and coupler being used, the phone model and the frequency. The more exact the coupling factor is given, the more exact the test results are. You can, however, work with typical values, at the expense of measurement accuracy.

Mobile Service Test includes a large database of past and present popular mobile phones. The application usually identifies the phone by its electronic serial number, the IMEI (International Mobile Equipment Identity) and looks up the respective coupling factors in its database.

RF Connection Type

Use this menu to define which type of coupling you are applying during the test. Supported coupling types are: Willtek 4916 Antenna Coupler, Willtek 4916 Antenna Coupler with Willtek 4921 RF Shield, and cable connection.

Configure Auto-CPL Factors

If the mobile phone is not detected, Mobile Service Test will inform you and offer the possibility to determine the coupling factors using a "golden phone"; this should be a no-fault mobile phone with normal characteristics. The phone is then used to automatically determine the attenuation factors for each of the typical test frequencies. This process can also be started in the **Test Config > Coupling Menu > Auto Coupling** menu. The application will guide you through the process and save the results so that a phone of the same type can be tested in the future.

Coupling Files Path

Large organizations with several test operators can place the coupling files in central location on a file server so that an update of the coupling factor files is automatically used by all the test stations.

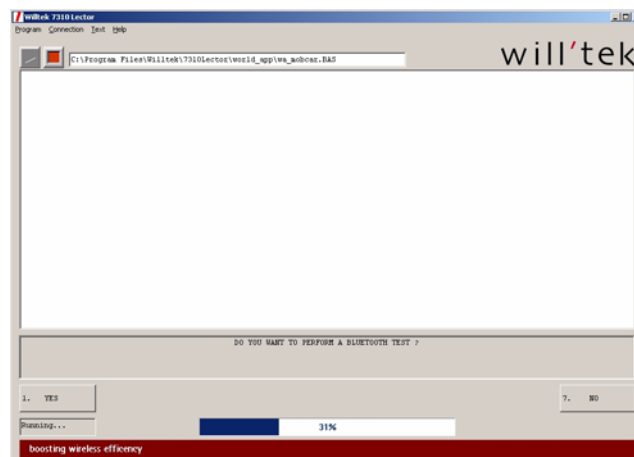
Use this menu to define the drive and folder where Mobile Service Test should look for coupling factor information.

Testing Bluetooth devices

Performing Bluetooth tests with Lector

This section explains how to carry out connectivity tests on the Bluetooth device integrated in wireless devices. See section ["Enabling and disabling Bluetooth tests" on page 45](#) on how to enable and disable this feature.

The Bluetooth test can be an integral part of the mobile phone test procedure. Typically after a connection (a call) between the phone and the tester has been established, Lector will ask if you want to perform a Bluetooth test (see picture below).



Follow the onscreen instructions. In particular, make sure that

- the Willtek Bluetooth dongle is switched on
- the Bluetooth function in the mobile phone is enabled
- the Bluetooth visibility in the phone is enabled

After completing the mobile phone tests, Lector shows or prints a test protocol that includes the RF measurements as well as the results of the Bluetooth connectivity test.

If successful, the Bluetooth test result consists of the MAC address of the Bluetooth device and the device name. The device name should be identical to the one that is set up in the phone.

Example:

```

Date: 28.06.2006                                TIME: 14:01:32

Willtek Service for Dual 900/1800 MHz
LECTOR-Release: 1e30
Test Equipment : "WILLTEK 3100, SM: 5811213, FW: 12a00.018"

Mobile      : Nokia 6260                        IMEI: 004400481623013
RF Connection : Willtek 4916 Antenna Coupler + 4921 RF Shield
Position    : 5

Coupling loss values (RX,TX) :
GSM 900   :    22.0, 20.8 / 22.0, 21.0 / 20.7, 20.4
GSM 1800  :    14.3, 19.5 / 14.3, 17.5 / 13.0, 14.0

GSM 900/1800
Speech Test .....:                               Pass
Bluetooth connect.....: 0002eefef1d4 : nokia 7610
-----
TV  PS...20 04Pw MS.E TCU.3      II      III      MV

```

Troubleshooting Bluetooth tests with Lector

If a Bluetooth test fails, this is indicated by asterisks on the right-hand side of the results printout.

```

GSM 900   :    14.3, 19.5 / 14.3, 17.5 / 13.0, 14.0

GSM 900/1800
Speech Test .....:                               Pass
Bluetooth connect.....: ----- **
-----
TV  PS...20 04Pw MS.E TCU.3      II      III      MV

```

Test failure may occur for different reasons. It may be either because the test setup is not suitable or because the Bluetooth device in the mobile phone is defective. Here are a few possibilities:

- The Bluetooth testing device is switched off.
Switch on the device in the 4921 RF Shield.
- The phone under test does not have a Bluetooth device.
Repeat the test, but do not request a Bluetooth connectivity test.
- The Bluetooth function in the phone is disabled.
Turn on the Bluetooth feature in the phone.
- The Bluetooth function is enabled, but the visibility is disabled.
Enable the Bluetooth visibility in the phone.
- There are other Bluetooth devices around that make communication difficult.
Close the RF Shield before starting the Bluetooth test.

If none of these conditions are met, the Bluetooth device in the phone may indeed be defective!

Changing general settings

IMSI number

The International Mobile Subscriber Identity (IMSI) is the individual identity number of the subscriber in the GSM or UMTS network. The mobile reads the IMSI from the SIM card. This parameter defines which SIMs may register with the test instrument; the 3100 or 4400 rejects registration attempts and calls from phones with a different IMSI.

The Mobile Service Test application needs to know this number to page the phone. Tests are typically performed with a so-called Test SIM containing a specific IMSI: 001-01-0123456789. If you want to use a SIM card with a different IMSI, enter that IMSI in the General Settings section of the application software.

The IMSI consists of up to 15 digits. The first three digits are called the MCC and give the code of the country in which the mobile subscriber is registered; the next two digits (the so-called MNC) are the code of the national network the mobile subscriber is registered in. Please note that there are three digits being used for the MNC in North America. The remaining ten digits (nine in North America) are the registration number of the subscriber within the network.

Result destination

The Mobile Service Test application conveniently supports output of results into different media. The measurement results, along with the limits, can be printed and/or stored in a file. The Configure Result Destination menu allows you to define your options for this.

Print Settings

This menu allows you to select the conditions under which detailed measurement results are printed.

- Never Print
- Always Print
- Print on Request (at the end of the test, Mobile Service Test asks you if you want the results to be sent to a printer)
- Print if Fail (automatically prints the complete measurement results with the limit values if any of the results is outside these limits)
- Print if Pass (automatically prints the complete measurement results with the limit values if all the results is inside these limits)

Storage Settings

This menu allows you to select the conditions under which detailed measurement results are saved to a file on a local or network drive.

- Never Save
- Always Save
- Save on Request (at the end of the test, Mobile Service Test asks you if you want the results to be saved in a file)
- Save if Fail (automatically saves the complete measurement results with the limit values to a file if any of the results is outside these limits)
- Save if Pass (automatically saves the complete measurement results with the limit values to a file if all the results is inside these limits)

Note

Before storing results for the first time, make sure that a valid folder for the results files is defined (see previous section).

Folder Path for results storage Results can be saved to a file in a user-defined folder a local or network disk drive. The Folder Path input field allows you to define the drive and folder where results shall be stored.

Note

The Mobile Service Test application does not save the results file in this folder but in a subfolder, depending on the selected file name format. See section below.

Store Format (File Name Format) After a few hundred tests, there will be a lot of results file stored in the results folder. Mobile Service Test keeps some order in the results folder by providing two different ways for systematically saving the results in subfolders.

Note

Before storing results for the first time, make sure that a valid folder for the results files is defined (see previous section).

\Date\IMEI.txt

Select this format if you want to keep the results saved by date. Mobile Service Test creates a subfolder to the results folder; the subfolder name corresponds to the date when the test is being carried out. The result files are saved with the IMEI number as a file name.

Example:

Let us assume that the mobile phone with IMEI 358368001135614 has been tested on April 5, 2006. The result file folder has been set to V:\ag. The limit values and measurement results will be stored in file V:\ag\RESULTS\05.04.2006\358368001135614.txt.

\TAC\SN.txt

This format allows you to easily access the results by phone model and serial number. For each new phone model being tested, Mobile Service Test creates a new subfolder within the results folder. The subfolder name corresponds to the type approval code (TAC) that is part of the full serial number (International Mobile Equipment Identity, IMEI). The TAC is unique for a specific phone model (although the same phone model may be produced under different TACs). The file name corresponds to the last digits of the IMEI which make up the unique number within the series.

Example:

Let us assume that the mobile phone with IMEI 358368001135614 has been tested. The result file folder has been set to V:\ag. The limit values and measurement results will be stored in file V:\ag\RESULTS\358368\001135614.txt.

Password Administrators can protect unauthorized access to and change of the test configuration by operators. Once a password is set, the configuration cannot be viewed nor modified under Mobile Service Test unless the password is entered again.

Set Password A password of arbitrary length can be set. The password may only consist of Latin characters and Arabic numerals.

If no password had been set before, you will be prompted to enter the password. The password becomes effective immediately.

If a password had previously been configured, you will be prompted to first enter the old password. If that has been entered correctly, Mobile Service Test will ask for the new password.

Notes

Choose a password that cannot easily be guessed by colleagues.

Note down the password and store it in a place that is not accessible to others because if you forget the password, you will not be able to modify the configuration via Lector anymore.

Disable Password To unlock the test configuration section within Mobile Service Test, select the **Disable Password** button in the General Settings. You will have to enter the password once more.

Setting Up the 3100 Software

5

This chapter provides task-based instructions for using the 3100UpdateTool.bas application. Topics discussed in this chapter are as follows:

- ["Introduction" on page 36](#)
- ["Loading a new firmware version" on page 36](#)
- ["Changing to a previous firmware version" on page 37](#)
- ["Deleting a previous firmware version" on page 38](#)
- ["Changing the TCP/IP settings" on page 38](#)
- ["Changing the GPIB address" on page 39](#)
- ["Installing new options in the 3100 Mobile Fault Finder" on page 40](#)

Introduction

The 3100UpdateTool.bas application allows you to load, install, and delete firm-ware versions on the 3100. It is also a helpful tool for changing the TCP/IP settings and the GPIB address of your 3100. New software options can be added as well.

Loading a new firmware version

Willtek keeps adding new and improving existing functions for the 3100 Mobile Fault Finder. New instrument firmware is published on the Willtek website. To install new firmware on your 3100, proceed as follows:

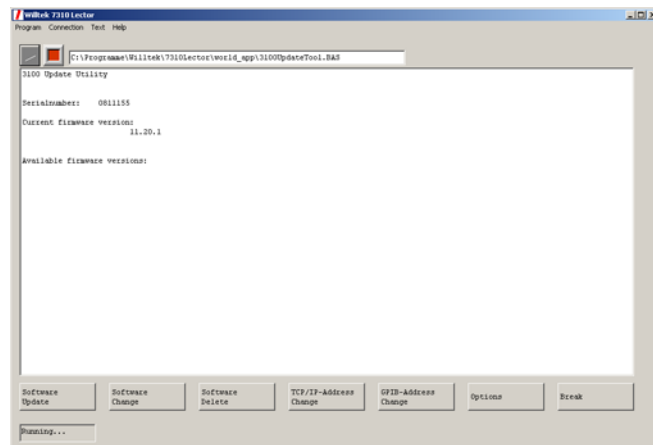
- 1 Insert a Willtek USB memory stick into a free USB connector of your PC.
- 2 Visit Willtek's website at www.willtek.com, and open the web page for the 3100 software download (this is **Download Quick Access > 3100** at present).

Note

In order to download software from Willtek's website, you will have to enter your username and password for this site and sign in. If you do not have a password for this site already, you can define one by clicking on **Register** and filling out the form.

The screenshot shows a Microsoft Internet Explorer browser window displaying the Willtek website. The address bar shows the URL: <http://www.willtek.com/english/products/tt/3100/download/sw>. The website header includes navigation links: [Contact Us](#), [Sitemap](#), [Home](#), and [Sales Partner W](#). The main navigation menu includes: [Products](#), [Solutions](#), [Technologies](#), [Services](#), [E-Shop](#), [Company](#), [Press](#), and [New](#). The breadcrumb trail reads: [Products](#) > [Terminal Test Products](#) > [3100 Mobile Fault Finder](#) > [Downloads](#) > [3100 Sof](#). A left sidebar contains a dropdown menu with the text "Please select..." and a list of categories: [Literature](#), [Downloads](#) (highlighted), [Options](#), [Specifications](#), [Applications](#), [Accessories](#), and [Manuals](#). The main content area features a "Customer Login" section with the text: "Sign in for a Willtek.com account for quick access to download software updates, user manuals and more." Below this, it states: "Access to software updates and user manuals is restricted to registered users. If you are a user of Willtek test equipment and do not yet have a password, take a minute to register. Willtek wants to learn more about its customers; you only need to register once and you will receive a username and password instantly." There are two sections for user registration: "For registered users:" with fields for "Username:" and "Password*:" and a "Sign in" button; and "For non-registered users:" with a "Register" button. A link for "Forgot your password? Click here." is also present.

- 3 Click on the ZIP file containing the 3100 firmware (e.g. 3100_1200.zip).
- 4 When asked by the web browser if you want to open or save the file, click on Save and select a folder on the hard disk of your PC or local network. The ZIP file is downloaded.
- 5 When the download is completed, decompress the ZIP file using WinZIP or a similar tool (e.g. FilZip which is available at www.filzip.com).
- 6 Use Windows Explorer to copy the decompressed file image.tar.gz to the root directory of the USB memory stick.
- 7 Once the file is completely stored on the USB stick, remove the stick from the PC and insert it into one of the USB ports of the 3100.
- 8 Switch on the 3100.
- 9 Start Lector on your PC (see section "[Starting and stopping a Lector application](#)" on page 13 for more detailed instructions).
- 10 Select **Program > Load/Run** and double-click on 3100UpdateTool.BAS. The main menu of the 3100 Update Utility appears.



- 11 Click on **Software Update** and confirm by selecting **Yes**. Follow the instructions on the screen. The firmware will be copied to the internal hard disk of the 3100 and, after rebooting the instrument twice, will be activated. The previous version will be kept on the hard disk of the 3100 so that you can go back to an older version if you desire.

Note

The 3100 can only hold a limited number of different firmware versions on its hard disk. It may be necessary to delete an older version first before installing yet another new version.

Changing to a previous firmware version

The 3100 can store multiple versions on its hard disk so that you can easily switch between different versions if required.



Do not change from version 12 or higher to version 11!

If you have a firmware revision 12.00 or higher, only go back to 12.00 or higher. Trying to go back to a 11.xx revision will make your 3100 unusable and it must be returned to a Willtek service centre for repair!

The start menu of the 3100 Update Utility displays the firmware version currently installed and the versions that are available on the hard disk.

Press the **Software Change** softkey to activate a version that is available on the 3100 hard disk but not currently installed.

Deleting a previous firmware version

The 3100 can hold multiple firmware versions on its hard disk. Only one of them can be active (installed) at any one time. However the number of different versions is limited so that you may need to delete an older version at some point in order to load a new one.

The main menu of the 3100 Update Utility shows the active (installed) and the available (stored) versions.

Press the Software Delete softkey to delete a previous older version.

Note

You cannot delete a currently active firmware version. Change to a different version first before deleting it.

Changing the TCP/IP settings

This section is important if you want to control the 3100 via a local area network (LAN).

Note

The TCP/IP settings cannot be changed while controlling the 3100 via LAN or TCP/IP. Change the connection to either GPIB, USB or RS-232 first; please refer to section ["Configuring the software" on page 8](#) for details.

Changing the IP address

Each device on a local area network or a TCP/IP connection needs its own individual IP address. Valid IP addresses are in the format **a.b.c.d**; **a** through **d** are numbers in the range 0 to 255. The address must not already be in use by another device. Refer to the administrator of your local area network for the assignment of a valid and accessible IP address within your local area network. If DHCP is enabled, the IP address of the 4400 is automatically derived from a DHCP server and the IP address does not need to be entered manually.

To change the IP address of the 3100, proceed as follows:

- 1 Select **TCP/IP Settings Change > IP address** in the 3100 Update Tool.
An input box opens.
- 2 Enter the valid IP address for the 3100 and confirm with **OK**.
The input box closes.
- 3 Select **Finish | End**.
The new IP address data are sent to the 3100 and the instrument is rebooted for the changes to take effect.

Changing the subnet mask

The subnet mask defines the device address range directly addressable on the local area network.

- 1 Select **TCP/IP Settings Change > Subnet mask** in the 3100 Update Tool.
An input box opens.
- 2 Enter the valid IP subnet mask in the format **a.b.c.d** and confirm with **OK**.
The input box closes, the new subnet mask data are sent to the 3100 and the instrument is rebooted for the changes to take effect.
- 3 Select **Finish | End**.
The new IP data are sent to the 3100 and the instrument is rebooted for the changes to take effect.

Enabling and disabling DHCP

The Dynamic Host Configuration Protocol (DHCP) allows dynamic allocation of IP addresses and other configuration parameters within the TCP/IP subnet. This requires an appropriate DHCP server to be available within the network.

- 1 To enable DHCP usage, select **TCP/IP Settings Change > DHCP ON** in the 3100 Update Tool.
- 2 To disable DHCP usage, select **TCP/IP Settings Change > DHCP OFF** in the 3100 Update Tool.
- 3 Select **Finish | End**.
The new IP data are sent to the 3100 and the instrument is rebooted for the changes to take effect.

Changing the GPIB address

This section is important if you want to control the 3100 via the General Purpose Interface Bus (GPIB) or IEEE-488 bus.

Note

The General Purpose Interface Bus (GPIB or IEEE 488) is an option to the 3100.

Note

The GPIB address cannot be changed while controlling the 3100 via GPIB. Change the connection to either TCP/IP, USB or RS-232 first; please refer to section "Configuring the software" on page 8 for details.

Installing new options in the 3100 Mobile Fault Finder

You can extend the capabilities of your 3100 Mobile Fault Finder by installing additional options. Willtek currently offers options for GSM, GPRS, EDGE and WCDMA testing in call mode and in non-call mode. An ACPM option for adjacent channel power measurements and a GPIB option for remote control via the General Purpose Interface Bus (IEEE standard 488) are also available. Please refer to your local Willtek sales representative for more information, or visit Willtek at www.willtek.com.

Installing the GPIB option

The 3100 Mobile Fault Finder hardware is already prepared for remote control over GPIB. If not already enabled on your instrument, you will have to enable the driver software before first-time use.

To install the GPIB option, select **Options > GPIB option setting** and enter the option key that you received with the purchase of the GPIB option. Follow the instructions on the screen.

Installing other software options

For any other software option purchased for the 3100 Mobile Fault Finder, select **Options > Option setting**, enter the option key you received with the purchase of the respective option, and follow the instructions on the screen.

Modifying Mobile Service Test

A large, bold, black letter 'A' is centered within a thin black rectangular border.

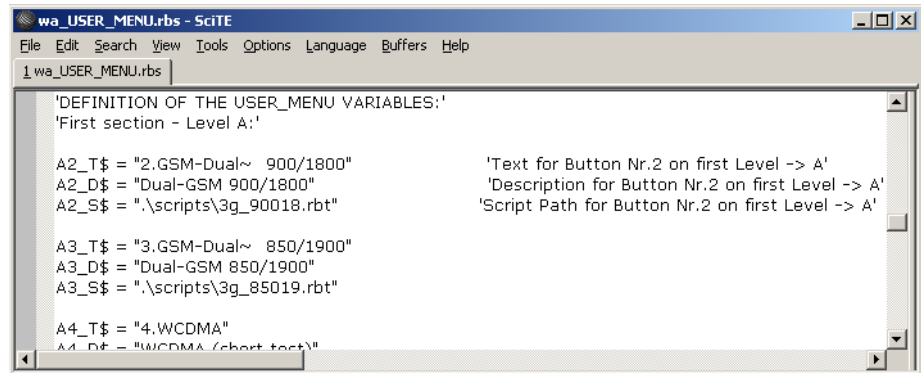
This appendix is intended for advanced users and administrators, and describes how to tweak some more parameters of the Mobile Service Test applications (wa_AUTOS.BAS and wa_mobcar.BAS). The topics discussed in this appendix are as follows:

- ["Modifying the top-level menu" on page 42](#)
- ["Modifying test limits" on page 43](#)
- ["Depending the test on the serial number entered" on page 43](#)
- ["Enabling and disabling Bluetooth tests" on page 45](#)
- ["Modifying CDMA2000 test parameters for wa_mobcar.bas" on page 46](#)

Modifying the top-level menu

The top-level menu is distributed over three sections. The menu items can be modified or their sequence can be changed to display those menu items on the first level that are relevant to your service center.

The menu entries are defined in file world_app\wa_USER_MENU.rbs which is located in the folder where Lector is installed. Here is an excerpt from the file:



```
'DEFINITION OF THE USER_MENU VARIABLES:'  
'First section - Level A:'  
  
A2_T$ = "2.GSM-Dual~ 900/1800"           'Text for Button Nr.2 on first Level -> A'  
A2_D$ = "Dual-GSM 900/1800"           'Description for Button Nr.2 on first Level -> A'  
A2_S$ = ".\scripts\3g_90018.rbt"       'Script Path for Button Nr.2 on first Level -> A'  
  
A3_T$ = "3.GSM-Dual~ 850/1900"  
A3_D$ = "Dual-GSM 850/1900"  
A3_S$ = ".\scripts\3g_85019.rbt"  
  
A4_T$ = "4.WCDMA"  
A4_D$ = "WCDMA (short test)"
```

Figure 1 Application and user interface definitions in wa_USER_MENU.rbs

There are a number of variable definitions with a certain structure in the variable names:

xn_T\$
xn_D\$
xn_S\$

x stands for the capital letters A, B or C. The capital letter indicates the first, second or third level of buttons in the top-level menu. The levels can be changed by the "More..." or "Back to Menu 1" button, respectively.

n stands for the number of the button on a level, with n ranging from 1 to 6.

Note

Some menu entries are predefined and cannot be changed, e.g. A1 leads to the Test Configuration menu. A7, B7 and C7 will lead to the next level. In wa_mobcar.BAS, button 6 is also reserved (for the Mobile Carrier software).

The variable with _T in the name defines the text on the button in the horizontal menu.

Note

Use the "~" character to specify a line break within the text to be displayed.

The variable with _D in the name defines the text in the vertical menu on the display.

The variable with `_S` in the name defines the script that will be invoked when the button is selected.

Note

Section ["Understanding and running Mobile Service Test" on page 15](#) lists the executable test scripts that are available in the default configuration. Many more test scripts are readily available in the `world_app` folder and can easily be integrated into Mobile Service Test by modifying the `wa_USER_MENU.rbs` file as described above.

Comment lines start with an apostrophe. Example:

```
'This is a comment line.
```

The apostrophe can also be used to eliminate commands without deleting them completely from the file. For example, in order to not display a softkey, the three lines that define the softkey (`xn_T$`, `xn_D$`, `xn_S$`) can be commented out.

Modifying test limits

The test limits are usually fixed and under normal conditions should not be changed. This section shows how to modify the limits if you really need to change them.

Test limits for GSM and WCDMA

The test limits for GSM (including GPRS and EDGE) and WCDMA are defined in file `world_app\wa_limits.rbl` within the Lector program folder.

All the variable names start with `Li_`. Most of the test parameters have an upper and a lower limit; this is indicated by the letters `_L` (for lower limit) and `_H` (for upper limit).

Test limits for CDMA2000

The test limits for CDMA2000 in the Mobile/Carrier Software are defined in file `world_app\ini\` within the Lector program folder. Example:

```
US800 Power Class 1: 31.0, 38.0
```

defines the lower limit for power class 1 mobile phones in the US cellular band as 31 dBm and the upper limit as 38 dBm.

Note

The limits for CMDA2000 tests other than the Mobile/Carrier Software cannot be modified.

Depending the test on the serial number entered

An alternative method of depending the test sequence and limits on the phone under test is by only using the serial number. In this case, the serial number can be entered either manually or with a barcode reader.

Most of the mobile phones have a serial number containing a code for the whole series, usually the first six or eight digits. Lector can use this code to determine which test shall be carried out. The operator only needs to enter the serial number or scan it using a barcode reader; Lector then uses a user-defined table to find out the right test script.

The test starts with the serial number query. Once the test is completed, a new test will automatically be started by requesting the next serial number entry.

To enable this feature, the xn_S\$ element in file wa_USER_MENU.rbs (see section "Modifying test limits" on page 43) must carry the keyword "TAC2TEST". The table in file world_app\TAC2TEST.DAT will be used and can be modified accordingly.

Changes in wa_USER_MENU.rbs

The following example illustrates the necessary changes in file wa_USER_MENU.rbs.

Assume that the third menu entry in the main menu should be changed to start tests depending on the serial number entered. The change should look as follows:

Table 8 Necessary changes to enable automated decisions

replace ...	by ...
A3_T\$ = "3.GSM-Dual~ 850/1900"	A3_T\$ = "3.Auto"
A3_D\$ = "Dual-GSM 850/1900"	A3_D\$ = "Automatic mode with Barcode-Reader"
A3_S\$ = ".\scripts\3g_85019.rbt"	A3_S\$ = "TAC2TEST"

File contents structure for TAC2TEST.DAT

In each line, the file should contain the relevant digits from the serial number that denote the whole series, and the file (including location) of the respective test script. Serial number and file name should be separated by a comma. The file location should be given relative to the world_app folder.

This way, Lector can decide which test is suitable for a particular phone (e.g. a dual-band GSM test or a dual-mode GSM and WCDMA test, etc).

Example of a world_app\tac2test.dat file:

```

TAC2TEST.DAT
35538600,.\scripts\3g_90018.rbt
357092,.\scripts\3g_900.rbt
357933,.\scripts\wbdu_short.rbt
35088010,.\scripts\wcdma_short.rbt
00440036,.\scripts\wcdma_short.rbt
    
```


Enabling and disabling Bluetooth tests

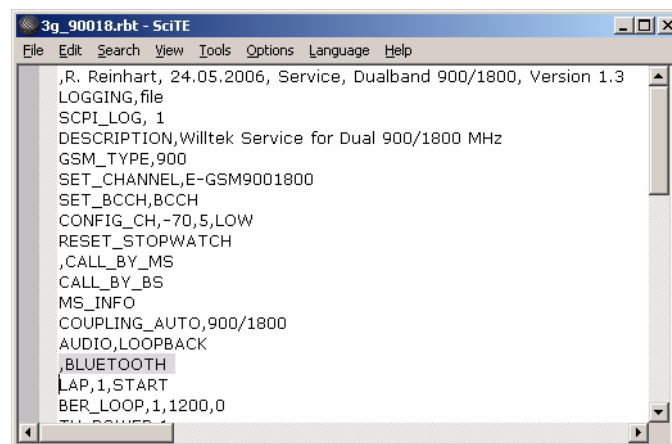
Lector supports Bluetooth tests with Willtek's Bluetooth Connectivity Test products. However, the built-in test scripts have this feature disabled by default because not every user wants to perform Bluetooth tests on mobile phones.

Bluetooth testing can be enabled or disabled separately for each test script. In order to change the current setting for a test script, the respective test script file must be edited. Willtek already prepared the standard test scripts for Bluetooth testing, so enabling or disabling the feature is very easy.

Before changing the test script, you will have to find out the file name and location for that test script.

To enable or disable Bluetooth testing in the standard test scripts, proceed as follows:

- 1 Open file world_app\wa_USER_MENU.rbs using WordPad or another advanced text editor. This file defines the top-level menu structure by softkey.
- 2 Look up the menu item that refers to the test you want to change, and note the file name and location.
Example: If wa_USER_MENU.rbs is located in C:\Program Files\Willtek\7310Lector\world_app and the script path is .\scripts\3g_85019.rbt, the file with the test script will be C:\Program Files\Willtek\7310Lector\world_app\scripts\3g_85019.rbt.
- 3 Open the file containing the test script with the text editor.
- 4 Find the line with the word "Bluetooth" as marked in the example below.



- 5 To enable Bluetooth testing, delete the comma before the word Bluetooth. To disable Bluetooth testing, ensure there is a comma in front of the word.
- 6 Save the file and close it.
A new test can now be started with Bluetooth testing included.

For more information about Willtek's Bluetooth Connectivity Test products, please refer to the user's guide for these products. Section ["Testing Bluetooth devices" on page 30](#) shows how to use this feature.

Modifying CDMA2000 test parameters for wa_mobcar.bas

Adding a new manufacturer and phone model

7310 Lector comes pre-installed with a number of combinations for the manufacturer and phone model. These are at the time of this writing:

- Default
 - Dual Band Coupler
 - Dual Band Direct Connect
 - US800 Coupler
 - US800 Direct Connect
 - USPCS Coupler
 - USPCS Direct Connect
- Mfr-Example A
 - Model-Example A1
 - Model-Example A2

Section ["Setting up the software for the phone and coupler" on page 25](#) explains how the model can be selected from the list before a test is carried out.

Manufacturers and models appearing in the menus of 7310 Lector are defined in file word_app\ini\cdma_mob.ini as accessible from the Lector installation folder (e.g. C:\Program Files\Willtek\7310Lector). You can edit the file directly using an advanced text editor (e.g. WordPad from the Microsoft Windows accessories).

Here is an example of how a proper description of a manufacturer and phone model is set up:

[Default]	The manufacturer definition must begin in the first column. Replace 'Default' with the manufacturer's name.
[A59 with Dual Band Coupler]	The model name must begin at least 6 spaces from the first column (use the space key, do NOT use the Tab key). It is a good idea to define the coupling device as this text is displayed onscreen.
Test Band: DUAL	Valid entries are 'US800' or 'USPCS' or 'KPCS' or 'NMT450' or 'TACS' or 'JTAC' or 'IMT2000' or 'MHZ900' or 'MHZ1800' or 'DUAL' (US800 and USPCS)
Band: US800	'USPCS' or 'US800'. If Test Band is DUAL, both must be defined, each with the parameters ranging from Radio Configuration to Long Test Channel High.

Radio Configuration: 2	Valid entries: 1 or 2 or 3 or 4 or 5						
Service Option: 9	Valid entries for Service Option depend on the Radio Configuration as follows: <table border="0"> <tr> <td>Radio Configuration</td> <td>Service Opt.</td> </tr> <tr> <td>1 or 3 or 4</td> <td>1 or 2 or 3 or 55</td> </tr> <tr> <td>2 or 5</td> <td>9 or 17 or 55 or 32768</td> </tr> </table>	Radio Configuration	Service Opt.	1 or 3 or 4	1 or 2 or 3 or 55	2 or 5	9 or 17 or 55 or 32768
Radio Configuration	Service Opt.						
1 or 3 or 4	1 or 2 or 3 or 55						
2 or 5	9 or 17 or 55 or 32768						
Minimum Base Power: -100	Minimum signal power at the mobile's input, in dBm						
FER Traffic Level: -12.3	Signal power level for FER measurements, in dBm						
Fast Test Channel: 385	Fast Test Channel must be one of the Long Test Channels						
Long Test Channel Low: 100	Channel numbers for the frequency band						
Long Test Channel Mid: 385							
Long Test Channel High: 777							
Band: USPCS	Definition for the other band (as Test Band is DUAL)						
Radio Configuration: 2							
Service Option: 9							
Minimum Base Power: -100							
FER Traffic Level: -12.3							
Fast Test Channel: 575							
Long Test Channel Low: 150							
Long Test Channel Mid: 575							
Long Test Channel High: 1075							
Coupling: User-CPL	'User-CPL' or 'Script file' or 'RAPID! file'.						

```
User-CPL: US800   RX, TX
Low-Channel: 16.3, 11.2
Mid-Channel: 15.5, 11.1
High-Channel: 13.0, 10.6
```

'US800' or 'USPCS' or 'KPCS' or 'NMT450'. Do not include bands without specifying losses. Losses are with respect to the 4400.

TX is the loss from the mobile to the 4400 (mobile TX).

RX is the loss from the 4400 to the mobile (mobile RX).

Alternatively, if Coupling is 'Script file', replace User-CPL and the subsequent definitions by the keyword 'Script file'. The coupling loss values are then taken from the test script defining the measurements.

Else if Coupling is 'RAPID! file', replace User-CPL and the subsequent definitions by the keyword 'RAPID! file' and a file definition. See section ["Predefined coupling loss files" on page 55](#) for valid file definitions.

Note: If 'Script file' is entered then the User-CPL fields must be omitted, otherwise the script file entry will be ignored.

```
User-CPL: USPCS   RX, TX
Low-Channel: 21.5, 20.4
Mid-Channel: 22.0, 19.9
High-Channel: 22.2, 20.0
```

Definition for the second band (see also note above)

Mobile Defined Tests:

Mobile Defined Tests do not have to be defined. The number of tests that can be defined is not limited.

The tests that are defined here will appear in the Select Tests menu, together with the carrier-specific tests.

To define a test use the following line:

```
(label): filename
```

The label will appear on the screen. filename is the name of the script file. This file must be in the world_app\scripts folder.

Example:

```
Mobile Defined Tests:
(Motorola Test):
mototest.rbt
```

Next phone definition

```
[Dual Band Direct Connect]
(...)
```

To define a test that should appear for each model from a manufacturer, include the test in the Mobile Defined Test field for each model.

Note on editing: Copy one of the existing Default Mobile sections in the cdma_mob.ini file and paste it where the new Mobile section belongs in the menu. Edit the label and the parameters.

Notes on parameters:

- Always leave at least one space between the ':' and the value.
- Always leave at least one space between the ';' and the TX loss value when specifying 'USER-CPL' coupling loss values.

Not all the fields in the definition of a manufacturer and mobile phone type are required. The following fields, however, are mandatory:

- [Manufacturer] label
- [Model] label
- Test Band:
- Band: when Test Band:
- Radio Configuration:
- Service Option:
- Minimum Base Power:
- FER Traffic Level:
- Fast Test Channel:
- Long Test Channel Low:
- Long Test Channel Mid:
- Long Test Channel High:
- Coupling:
- When Coupling is User-CPL, the following fields are required:
 - User-CPL:
 - Low-Channel:
 - Mid-Channel:
 - High-Channel:

The Mobile Defined Tests field is optional.

Adding or modifying carrier-specific parameters

The fastest way for a CDMA phone to register with a network is with its home system. For a test system like the 4400 Series Mobile Phone Tester, this means that the tester needs to know the relevant home system parameters like frequency band, channel number and SID.

The 7310 Lector allows you to easily call up predefined carrier settings in the Select Carrier menu (see section ["Selecting the carrier and frequency band" on page 26](#)).

The predefined network parameters are defined in file world_app\ini\cdma_car.ini. You can edit the file using an advanced text editor (e.g. WordPad from the Microsoft Windows accessories).

The following table shows an example of how a carrier may be defined:

[Example-US 800]	The label is mandatory and must begin in the first column
BAND: US800	Mandatory parameter, allowable entries are 'US800' or 'USPCS' or 'KPCS' or 'NMT450' or 'TACS' or 'JTAC' or 'IMT2000' or 'MHZ900' or 'MHZ1800'
CHANNEL: 384	Channel number in the above band; mandatory parameter
SID: 80	System identification code; mandatory parameter
MNC:	Optional parameter (mobile network code)
MCC:	Optional parameter (mobile country code)
NID:	Optional Parameter (network identification code)
Carrier Defined Tests:	Carrier defined tests do not have to be defined. The number of tests that can be defined is not limited. To define a test, use the following parameters: (label): filename The label will appear on the screen. 'filename' is the name of the script file. This file must be in the world_app/scripts folder. Example: Carrier Defined Tests: (Carrier Test): catest.rbt

Notes on editing:

- Copy one of the existing carrier sections and paste it where the new carrier belongs in the menu. Edit the label and the parameters.
- Always leave at least one space between the ':' and the parameter value.

Adding or modifying test limits

7310 Lector provides versatile means to adapt test parameters to individual needs. Should a network operator or manufacturer require test limits that deviate from standard settings, these can be defined in a file on the 4400 and called up before starting a test.

Section "Setting up the test limits" on page 27 explains how a limit profile is selected from the list before carrying out a test.

General limits and deviating profiles appearing in the menus of 7310 Lector are defined in file world_app\ini\cdma_lim.ini. You can edit the file using an advanced text editor (e.g. WordPad from the Microsoft Windows accessories)

The file may consist of multiple sections, one containing a table with default (or standard) limits and additional sections with individual limit tables for a specific manufacturer and phone or operator. In the section with individual limits, only those parameters need to be defined that deviate from the default limits.

Default limits

Here is an example of how the default or standard limits profile is set up:

Limits: Lower Limit, Upper Limit

(Default) 'Label

The label is used to provide a name to a set of default limits. These limits may apply to all mobiles and all carriers. The user can select from a number of different sets of default limits or from the mobile and carrier-specific limits; the number of default limits that can be defined is not limited.

Maximum Power: dBm

US800 Power Class 1: 31.0, 38.0
US800 Power Class 2: 27.0, 34.0
US800 Power Class 3: 23.0, 30.0

USPCS Power Class 1: 28.0, 33.0
USPCS Power Class 2: 23.0, 30.0
USPCS Power Class 3: 18.0, 27.0
USPCS Power Class 4: 13.0, 24.0
USPCS Power Class 5: 8.0, 21.0

KPCS Power Class 1: 28.0, 33.0
KPCS Power Class 2: 23.0, 30.0
KPCS Power Class 3: 18.0, 27.0
KPCS Power Class 4: 13.0, 24.0
KPCS Power Class 5: 8.0, 21.0

NMT-450 Power Class 1: 33.0, 40.0
NMT-450 Power Class 2: 28.0, 35.0
NMT-450 Power Class 3: 23.0, 30.0
NMT-450 Power Class 4: 18.0, 25.0

-TACS Power Class 2: 31.0, 38.0
-TACS Power Class 3: 27.0, 34.0
-TACS Power Class 4: 23.0, 30.0

Appendix A Modifying Mobile Service Test
 Modifying CDMA2000 test parameters for wa_mobcar.bas

JTACS Power Class 1:	31.0, 38.0
JTACS Power Class 2:	27.0, 34.0
JTACS Power Class 3:	23.0, 30.0
IMT-2000 Power Class 1:	28.0, 33.0
IMT-2000 Power Class 2:	23.0, 30.0
IMT-2000 Power Class 3:	18.0, 27.0
IMT-2000 Power Class 4:	13.0, 24.0
IMT-2000 Power Class 5:	8.0, 21.0
M-1800 Power Class 1:	28.0, 33.0
M-1800 Power Class 2:	23.0, 30.0
M-1800 Power Class 3:	18.0, 27.0
M-1800 Power Class 4:	13.0, 24.0
M-1800 Power Class 5:	8.0, 21.0
M-900 Power Class 1:	31.0, 38.0
M-900 Power Class 2:	27.0, 34.0
M-900 Power Class 3:	23.0, 30.0
Open Loop Estimate: dB	-11.0, 9.5
Minimum Power: dBm	---, -50.0
Standby Power: dBm	---, -61.0
Access Power: dB	-9.5, 9.5
Closed Loop Range: dB	-24.0, 24.0
Freq. Error US800: Hz	-300, 300
Freq. Error USPCS: Hz	-150, 150
Freq. Error KPCS: Hz	-150, 150
Freq. Error NMT450: Hz	-300, 300
Freq. Error TACS: Hz	-300, 300
Freq. Error JTACS: Hz	-300, 300
Freq. Error IMT-2000: Hz	-150, 150
Freq. Error 1800: Hz	-150, 150
Freq. Error 900: Hz	-300, 300
Waveform Quality, Rho:	0.9440, ---
Time Error: uS	-1.000, 1.000
Carrier FeedThrough: dBc	---, -20.00
I/Q Imbalance: dBc	---, 0.00
Peak Phase Error: degrees	---, ---
RMS Phase Error: degrees	---, 14.00
Peak EVM: %	---, ---
RMS EVM: %	---, 24.4
Peak Mag. Error: %	---, ---
RMS Mag. Error: %	---, 24.4
FER Frame Error Rate: %	---, 0.5
FER Confidence Level: %	---, 100
FER Max. Frames:	---, 200


```

AMPS Power Level 0: dBm    32.0, 38.0
AMPS Power Level 1: dBm    28.0, 34.0
AMPS Power Level 2: dBm    24.0, 30.0
AMPS Power Level 3: dBm    20.0, 26.0
AMPS Power Level 4: dBm    16.0, 22.0
AMPS Power Level 5: dBm    12.0, 18.0
AMPS Power Level 6: dBm    8.0, 14.0
AMPS Power Level 7: dBm    4.0, 10.0

AMPS Freq. Error: Hz       -2060, 2060

AMPS SAT Freq. Error: Hz   -1, 1

AMPS SAT Deviation: Hz     1800, 2200

AMPS ST Freq. Error: Hz    -1, 1

AMPS ST Deviation: Hz      7200, 8800

AMPS RX SINAD: dB          12.0, ---

AMPS Peak Audio Deviation: Hz ---, 12000

AMPS BS Level Sensitivity: dBm ---, -116.0
    
```

These limits are always loaded first. It is only necessary to include changes to these limits in another limit table.

Mobile-specific limits

Mobile-defined limits apply only to a specific manufacturer and a specific model. In order for the software to automatically apply mobile-specific limits, the labels (both manufacturer and model) used in `cdma_mob.ini` must appear in this ini file. The labels from `cdma_mob.ini` may appear only once in the `cdma_lim.ini` file. For limits to apply to all models of a manufacturer the limit table must appear for each model.

This is how a model-specific limits table could look like:

[Mfr-Example A]

[Labels:] [Manufacturer] must begin in the first column

[Model-Example A1]

[Model] must begin at least 6 spaces from the first column (use the space key, DO NOT use the Tab key!)

```

Limits:      Lower Limit, Upper Limit
(Mobile: Model Example A1) 'Label
Maximum Power: dBm
    US800 Power Class 3:  22.0, 31.0
    USPCS Power Class 2:  22.0, 31.0
    
```

[Model-Example A2]

These are the limits for a second model from the same manufacturer

```

Limits:      Lower Limit, Upper Limit
(Mobile: Model Example A2) 'Label
Maximum Power: dBm
    US800 Power Class 3:  26.0, 35.3
    USPCS Power Class 2:  17.3, 28.2
Freq. Error US800: Hz    -250, 250
Freq. Error USPCS: Hz    -99, 99
Peak Phase Error: degrees 0, 20.00
RMS Phase Error: degrees ---, 9.99
    
```

Carrier-specific limits Carrier-specific limits may imply test thresholds that refer either to mobile phones of a certain network operator or to a frequency band. The carrier should be the same as defined in the Select Carrier menu and the associated limits are chosen automatically whenever the respective carrier is selected; see section [“Selecting the carrier and frequency band” on page 26](#) on how to set up the carrier.

Note

Carrier-defined limits apply only to a particular carrier. The label used in cdma_car.ini must appear in this file.

The table below shows how carrier-specific limits may look like:

[Example-US 800]

The carrier label must begin in the first column.

```
Limits:      Lower Limit, Upper Limit
(Carrier Example-US 800) 'Label
Maximum Power: dBm
US800 Power Class 1:  .5, 38.0
US800 Power Class 2: 25.5, 34.0
US800 Power Class 3: 23.0, 30.0
USPCS Power Class 1: 28.0, 33.0
USPCS Power Class 2: 21.0, 30.0
USPCS Power Class 3: 16.0, 27.0
USPCS Power Class 4: 11.0, 24.0
USPCS Power Class 5:  6.0, 21.0
Carrier FeedThrough: dBc  ---, 0.00
RMS Phase Error: degrees 0.0, 90.0
RMS Mag. Error: %       0.0, 100.0
```

Special considerations Notes on editing:

- Copy the Default limit table and paste it into the appropriate section (Standard, Carrier or Mobile Defined).
- Include the appropriate labels from the cdma_car.ini and or cdma_mob.ini above the limit table.
- Change the limit label.
- Limits in the new limit table that do not change or are not used should be deleted.
- Alter the limit parameters as required.

Notes on parameters:

- Always leave at least one space between the ':' and the Lower Limit value.
- Always leave at least one space between the ';' and the Upper Limit value.
- '---' is used to indicate that a limit does not apply.

Not all the fields in the definition of mobile or carrier-specific limits are required. The following fields, however, are mandatory:

- [Carrier Label] from the cdma_car.ini for carrier-defined limits.
- [Manufacturer] and [Model] labels from the cdma_mob.ini for mobile-defined limits.
- The Limit Table label, will appear on the screen. Example:
(Carrier Example-US 800) 'Label
- Parameters from the (Default) Limit table that require changes.

Predefined coupling loss files

The following files are available to the Mobile/Carrier test software for the coupling loss definition:

```
rapid/cpl/other/01db.cpl  
rapid/cpl/other/02db.cpl  
rapid/cpl/other/03db.cpl  
rapid/cpl/other/04db.cpl  
rapid/cpl/other/05db.cpl  
rapid/cpl/other/06db.cpl  
rapid/cpl/other/07db.cpl  
rapid/cpl/other/08db.cpl  
rapid/cpl/other/09db.cpl  
rapid/cpl/other/10db.cpl  
rapid/cpl/other/11db.cpl  
rapid/cpl/other/12db.cpl  
rapid/cpl/other/13db.cpl  
rapid/cpl/other/14db.cpl  
rapid/cpl/other/15db.cpl  
rapid/cpl/other/16db.cpl  
rapid/cpl/other/17db.cpl  
rapid/cpl/other/18db.cpl  
rapid/cpl/other/19db.cpl  
rapid/cpl/other/20db.cpl
```

Example:

```
RAPID! file: rapid/cpl/08db.cpl
```


Warranty and Repair



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

- ["Warranty information" on page 58](#)
- ["Equipment return instructions" on page 59](#)

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.

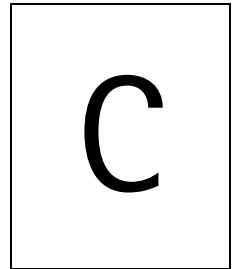
Equipment return instructions

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.

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Revision	Comment
0605-120-A	First revision.
0607-130-A	Mobile/Carrier software and Bluetooth connectivity tests integrated.

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