Willtek

Getting Started Manual

2201 ProLock

3G test set for service

For serial numbers 0003001 and higher

Boosting wireless efficiency

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Ordering information This guide is issued as part of the **2201 ProLock**. The ordering number for a published guide is M 295 003. The ordering number for the product is M 100 301.

Table of Contents

About This Guide

This section contains the following basic information:

Purpose and scope

The purpose of this guide is to help you successfully install and set up the 2201 ProLock. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the 2201 ProLock. 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 2201 ProLock effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication concepts and terminology.

Related information

Use this guide in conjunction with the following information:

2201 ProLock user's guide, ordering number M 290 003

Technical assistance

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

Table 1 ***Technical support contacts***

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

Conventions

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

Table 2 ***Typographical conventions***

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

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

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**

Table 3 ***Keyboard and menu conventions (Continued)***

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

Table 4 ***Symbol conventions***

This symbol represents a general hazard.

This symbol represents a risk of electrical shock.

NOTE

This symbol represents a Note indicating related information or tip.

Table 5 ***Safety definitions***

WARNING

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

CAUTION

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

Safety Notes

This chapter provides the safety notes for the 2201 ProLock. Topics discussed in this chapter include the following:

Safety class

The external power supply of the 2201 ProLock is a safety class I equipment as defined in EN 60950:2000.

Do not try to open the power supply. There are no serviceable parts inside. If the power supply is defective you can obtain a new one from Willtek Communications (order number M 860 224).

Safety warnings

This product is designed for indoor use. As exposure to water may damage the instrument it has to be protected against moisture when used outdoors.

WARNING

Only use a 50 Ω N-type connector to connect to the **RF IN/OUT** port of the 2201 ProLock. Use of any other connector may result in damage of the instrument.

WARNING

Do not cover the ventilation slits (on the left and right-hand side of the instrument). Covering them may result in serious damage and fire.

WARNING

The maximum input power level at the **RF IN/OUT** connector is 3.5 W (35 dBm) continuous or burst signal level. Higher input levels may result in serious damage of the instrument.

WARNING

Operate the instrument within the temperature range from 5°C (40°F) to 40°C (104°F) only. Operation outside this range will lead to invalid results.

Declaration of conformity

Wireless Telecom Group
Boonton Microlab Noisecom Willtek

Willtek Communications GmbH
Gutenbergstr . 2 – 4, 85737 Ismaning, Germany
Geschäftsführer: Matthias Weber, Paul Genova
Sitz und Registergericht: München HRB 46733

Declaration of EU Conformity

Manufacturer	Willtek Communications GmbH Gutenbergstr 2-4 D-85737 Ismaning Germany
Product designation	**2201 PROLOCK**
	The designated product conforms to the following European directive(s):
EMC Directive	**89/336/EEC**
	The conformity of these products of the above directive(s) is demonstrated by application of the following standard(s):
EMC	**EN 61326** (Class B)

Ismaning, August 26, 2008

i.V. [illegible]
W. Lenné, Manager Operations

This declaration is not a guarantee of features. Pay attention to the safety instructions in the product documentation.

www.wtcom.com T: +49 (0)89 99641 0

Overview

1

This chapter provides a general description of the 2201 ProLock. Topics discussed in this chapter include the following:

About the 2201 ProLock

Willtek's 2201 ProLock is a reasonably priced test instrument for 3G mobile phones and wireless data cards. Level 1 and level 2 service shops use ProLock to quickly test wireless devices, perform smaller repairs and bill manufacturers for warranty claims.

The 2201 ProLock is similar to the 4100 and 4200 series instruments because it is small, easy to use and affordable to large mobile phone retailers with a repair shop in the back office. ProLock, however, supports both GSM and WCDMA phones and wireless devices. Many mobile phones today include WCDMA functionality; manufacturers start to demand WCDMA testing in case of warranty claims from repair shops. ProLock fills the gap between the cheap GSM-only testers and sophisticated 3G test sets!

Features and capabilities

Affordable mobile phone test set for point-of-return and service tests

Separates defective from faultless phones

RF connector on the back for clear and tidy work bench

Select any or all of these systems: GSM, GPRS, WCDMA

Includes remote control software for easy-to-use Go/NoGo testing from a PC through 7311 Lector Basic

Lector test protocols prove which phone has been tested, with serial number, date and time, and results

Lector-generated test protocol equivalent to those generated with higher-level testers

Manual mode for fault finding

Standard transmitter and receiver measurements

Four GSM frequency bands supported: GSM 850, GSM 900, GSM 1800, GSM 1900

Ten WCDMA frequency bands supported (bands 1 thru 10)

Options

2231 GSM Option

The 2231 GSM Option performs the necessary GSM call processing and measurements on a voice channel or a test channel (loopback channel). Measurements include:

- Output power
- Power vs. time
- RMS and peak phase error
- Frequency error
- Burst length

- BER
- Reported RSSI

2232 GPRS Option

The 2232 GPRS Option is an extension of the 2231 GSM Option, adding the necessary protocol for the GPRS Attach and to set up a test channel. The measurements are the same as with the GSM Option, with BLER measurements in addition. Protocol and measurements support data traffic on one timeslot in either the uplink or the downlink.

2234 WCDMA Option

The 2234 WCDMA Option performs the necessary WCDMA call processing and measurements on a voice channel or a test channel (RMC). Measurements include:

- Minimum and maximum output power
- Open loop and inner loop power control
- RMS and peak error vector magnitude
- RMS and peak magnitude error
- RMS and peak phase error
- Frequency error
- Rho
- I/Q offset
- I/Q imbalance
- ACLR
- BER and BLER
- Reported RSCP

System architecture

2201 ProLock serves for testing mobile phones and wireless terminals such as WCDMA data cards. The unit under test can be connected either directly using an adapter cable (if the phone has an RF input/output connector) or through an RF coupler such as the Willtek 4916 Antenna Coupler.

In order to avoid the signals from the mobile phone, the tester and real networks to interfere with each other, the antenna coupler with the phone should be placed in a shielded chamber, e.g. Willtek's 4921 RF Shield. This device features very high attenuation between incoming and outgoing signal, fulfilling the requirement of 80 dB shielding for most state-of-the-art communication systems.

With 7311 Lector Basic (included in the 2201 ProLock delivery), ProLock can be controlled remotely from a PC. While ProLock's manual mode is ideal for fault finding, Lector Basic includes a large number of test sequences for automatic testing against defined limits, with a simple Pass/Fail verdict and a detailed measurement protocol for further fault analysis.

Installation

2

This chapter describes how to install 2201 ProLock. The topics discussed in this chapter are as follows:

Scope of delivery

When unpacking the 2201 ProLock, ensure that you do not miss any of the following items:

- 2201 ProLock
- Power supply
- Power cord
- Manual Pack, including
  - this Getting Started manual
  - Lector CD
- USB drive
- 1103 GSM and WCDMA Test SIM Card
- cross-patch LAN cable (length: 2 m)

Software requirements

7311 Lector Basic is a PC software that can optionally be used with ProLock. It is designed to run on 32-bit Microsoft Windows operating systems (Windows NT, Windows 2000, Windows XP and Vista). You will need to log in with administrator rights to install the software.

Hardware requirements

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

PC specifications

If you want to use the 2201 ProLock with one of the products of the Lector and Scriptor family of testing products, Willtek recommends the following mininum PC specifications:

- at least 60 MB of free hard disk space
- a CD drive
- a free RS-232 or USB port
- a pointing device, e.g. a mouse, connected to the PC
- 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 ProLock:

- TCP/IP
- USB
- RS-232

RF connection and shielding

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

NOTE

For testing WCDMA phones the RF Shield is required for obtaining reliable test results. Testing without an RF Shield only makes sense whithin the GSM option.

Setting up the hardware

In order to set up the test system, proceed as follows:

1 Connect the cable of the mains power supply with the **DC In** plug that is located on the rear panel of the 2201 ProLock.

2 Connect one end of the AC power cord to the mains power supply, and the other to a mains outlet.

3 Connect the **RF IN/OUT** plug on ProLock's rear panel with the 4921 RF Shield using a double-shielded RF cable. Alternatively, if you do not intend to use the 4921, connect it to the coupling device of your choice.

The following additional steps need to be taken to connect the instrument to a PC running Lector:

1 Place ProLock close to the PC that shall control the instrument.

2 Use a USB cable to connect ProLock's USB-B port (on the rear) to a free USB port on the PC.
Alternatively, you can connect ProLock to the PC using a LAN connection: Use a standard CAT-5 LAN cable to connect the LAN plug on ProLock's rear panel with a LAN wall outlet if you are using a local area network. Or use the cross-patch LAN cable that is included in the scope of delivery to connect the ProLock to a PC directly.

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 AUTORUN.EXE program from the CD.

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

4 Follow the instructions on the screen. In particular:

   a Select a language for the setup assistant

   b Read and accept the license agreement

   c Select a folder to install the program files of Lector and Scriptor (e.g. ''C:\Program files\Willtek\731X Lector-Scriptor'')

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

   e Select if you want to have a Lector and Scriptor icon on the Windows desktop

   f Start the installation process

   The Lector and Scriptor program will be installed.

5 After completion of the Lector and Scriptor installation, the setup program asks if you wish to install the HASP USB driver. If you want to run 7312 Lector Enhanced or 7315 Scriptor:

   a Confirm HASP HL USB dongle driver installation.
   If selected, the HASP device driver is started.

   b Confirm the Welcome menu and the license agreement.
   The HASP device driver is installed. Depending on the dongle installed, you may now be able to use the 7311 Lector Basic, 7312 Lector Enhanced or 7315 Scriptor features.

If you are using a Windows Vista PC, the operating system may ask you for USB driver software after connecting the 2201 ProLock over the USB for the first time. In this case, insert the Lector and Scriptor CD in your CD drive and indicate the following directory on the CD for the USB driver: ProLock-USB-Vista.
The driver software will then be installed on your Vista PC.

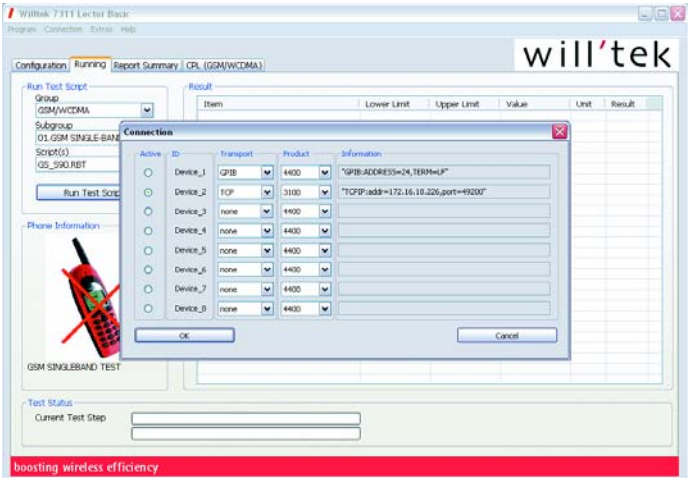
6 The setup program for the 2201 ProLock USB Driver appears. Follow the instructions on the screen.
The USB driver will be installed. After completion, you will be able to control the instrument via USB.

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

8 In 2201 ProLock, select **Connection > Define Interface**.
The Connection box appears.

9 In the first column, select the instrument (device) to be used with 2201 ProLock 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.

10 Confirm your changes by selecting **OK**.
The PC will try to set up a connection with the tester and inform you if the attempt was successful.



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

Table 6 ***Transport input fields in the Connection menu***

Transport type	Parameters	Remarks
USB/ RS-232	COM port (range 1 – 99) Baud rate (in kbps) Handshake protocol (Xon/ Xoff, RTS, None)	For RS-232 connections, use the physical COM port number. The RS-232 settings are irrelevant for ProLock if you use a USB connection.
TCP/IP	IP Address Port	The IP address must be selected in line with the local area network policies. This must be the same address as selected on ProLock. Each address must exist only once within the network. The port number indicates the logical port for the software. Default port is 49200.
GPIB	GPIB Address (range 1 – 31)	This should be identical with the GPIB address of the instrument. Default: 4.

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

Configuring the software

For a detailed description of the Software installation and configuration please refer to the 2201 ProLock user's guide which is included on the User Documentation CD delivered with your system.

Operation

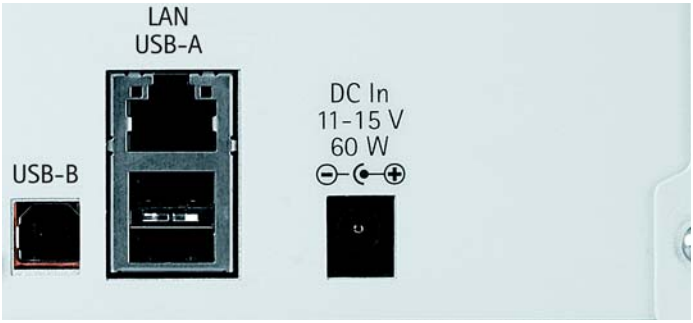
3

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

Connecting the 2201 ProLock

The 2201 ProLock offers different connectors for a variety of applications. The following section describes the connectors available and provides information on technical data and application purposes.

DC IN



The 2201 ProLock can be operated from an external DC source such as the power supply which is delivered with ProLock, or a car battery. The DC voltage must be in the range from 11 to 15 V. The power consumption may be up to 40 W.

The **DC IN** plug is located on the right-hand side at the back of the instrument. Read more in chapter ''Installation'', in particular in section ''Setting up the hardware'' on page 10.

RF IN/OUT

RF IN/OUT is a 50 Ω N-type connector (female) on the left-hand side of the rear panel.

Use a 50 Ω shielded RF cable with an N-type connector (male) to connect to the unit under test; simply screw the connector tight to the instrument.

If you have a 50 Ω shielded RF cable with a BNC connector (male), use an N to BNC adapter to connect the cable to ProLock. Willtek offers an appropriate adapter.

WARNING

The maximum input power level at the RF IN/OUT connector is 3 W continuous or burst level. Higher input levels may result in serious damage of the instrument.

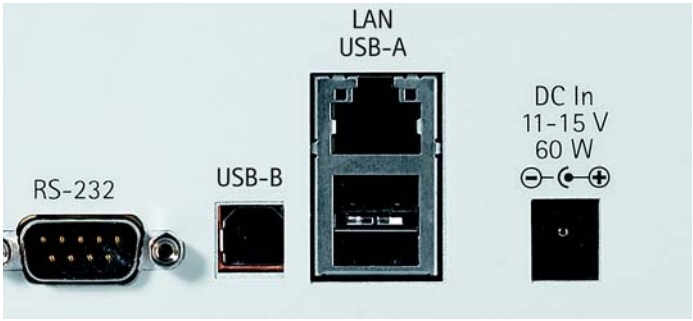
CAUTION

Only use a 50 Ω N-type connector to connect to the **RF IN** port of ProLock. Use of any other connector may result in damage of the instrument.

USB

There is a USB plug on the right-hand side of the front panel. It can be used to connect an external keyboard, a computer mouse, or a USB flash drive. More USB ports can be found on the rear panel.

LAN,USB-A



There is an RJ-45 LAN plug on the right-hand side of the rear panel. Additional USB plugs can be found below the LAN plug.

The 2201 ProLock can be controlled from an external computer via a local area network (LAN), using a TCP/IP connection at 10 or 100 Mbit/s. This high-speed connection can as well be used to transfer traces to a PC or to update the system software.

The IP address can be either obtained automatically from a DHCP server, or set up manually in the system configuration menu.

Setting up the IP address, the command set to control ProLock and the responses from the 2201 ProLock are explained in the full user's guide.

Connect the instrument to the LAN with a standard LAN cable with RJ-45 connectors. Alternatively, you can connect ProLock to a PC directly using a cross-patch cable.

USB-B This is a USB slave plug on the right-hand side of the front panel. It can be used to connect ProLock to a PC and control it from there. A typical application for this is an automated test using 7311 Lector Basic which is included in the scope of delivery of 2201 ProLock.

RS-232

This 9-pin sub-D connector on the rear panel of the 2201 ProLock can be used to control ProLock remotely via serial interface (RS-232). The command set and the responses conform to the SCPI standard and are explained in the user's guide.

The RS-232 connector can also be used to load and store results and settings and to update the operating software. See the user's guide for more details.

In order to connect the 2201 with a controlling PC over RS-232, use a null modem (PC to PC) cable.

REF IN

The **EXT. SYNC IN** plug can be found on the rear panel. It can be used as an input for an external time base (reference clock). If an external 10 MHz clock is connected, ProLock will automatically use this clock as a frequency reference, and display a symbol on the LCD screen. See the user's guide for more details.

WARNING

The input for the external trigger signal is designed for TTL input levels only. Higher levels at this port can damage the instrument!

Powering the unit

Switching the instrument on

Once the 2201 ProLock is connected to mains and the unit under test, the instrument can be powered on with the power switch on the front panel (left-hand side).

Once the instrument is switched on, it takes a couple of seconds for the instrument to load and start its firmware.

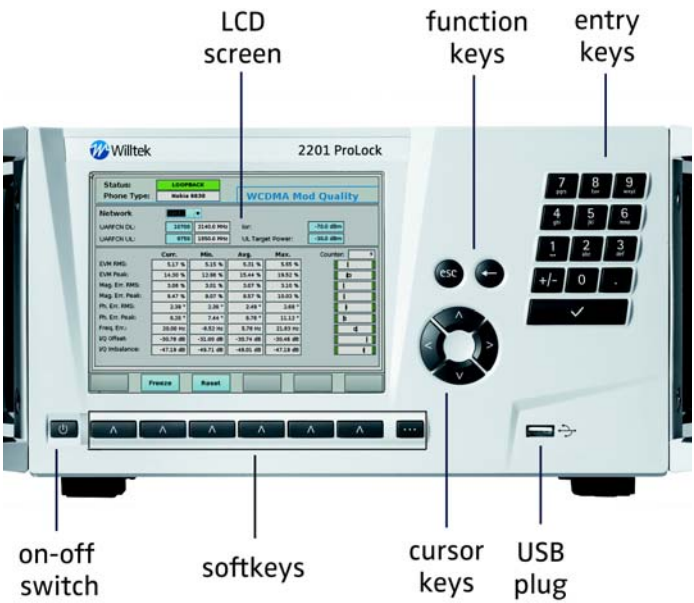
NOTE

The warm-up time for precision measurements is 30 minutes.

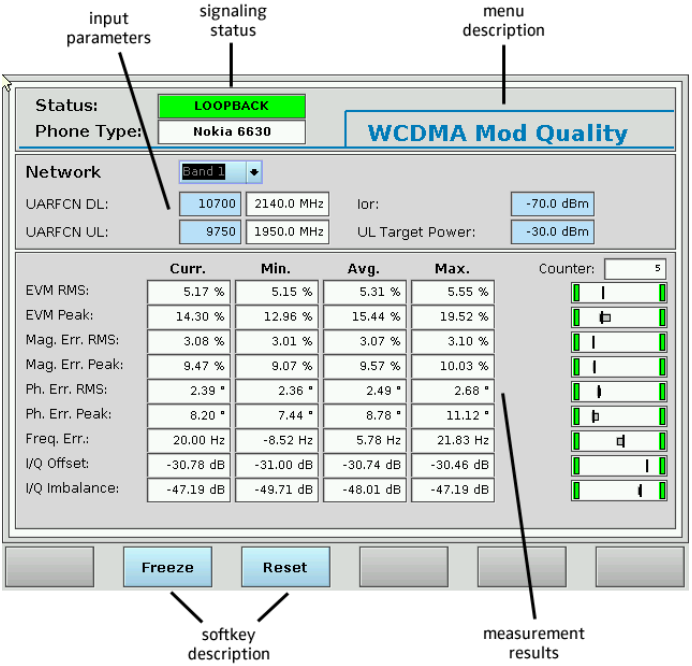
NOTE

In order to switch off the instrument, the power switch should be pressed for a few seconds.

Using the front panel



LCD The LCD screen shows the menus that guide you through configuration and measurements when the 2201 ProLock is switched on and the operating software is loaded. The menus consist of different sections as follows:



The top row shows the signaling and instrument status on the left.

On the right-hand side, the top row displays the current menu name.

The bottom row displays the meaning of the softkeys that are located beneath the LCD screen. If the description for the right-most softkey displays "1/2" or "2/2" on top, there is a second row of softkeys available. Press the **...** key to switch to the alternate softkey menu.

The rest of the display (in the middle) shows input and result fields. If there are input fields available in the menu, these start at the top-left. Graphical output, if available, is displayed on the right-hand side.

Keypad

The front panel of the 2201 ProLock has a number of keys that can be broken down into the following sections.

On-off switch

See "Switching the instrument on" on page 21.

Softkeys

The softkeys are the six keys below the LCD screen. The meaning depends on the currently active menu and is displayed on the screen, above the softkeys.

If the description for the right-most softkey displays "1/2" or "2/2" on top, there is a second row of softkeys available. Press the **...** key to switch to the alternate softkey menu.

Cursor keys

In menu mode (i.e. while not entering text or a new value in an input field), the Left and Right cursor keys allow you to move up and down, left and right between input fields.

In input mode (i.e. while entering text or values), you can move the cursor between the characters or digits with the help of the cursor keys.

Entry keys

You can open the currently highlighted input field and enter new values or text just by using the entry keys. The Enter key (marked with a tick) is used to accept the current value.

In input fields for numerical values, you can use the numeric keys to enter digits, the **+/-** key to toggle the sign, and the **.** key to separate the integer part from the decimal places of the input value or to enter the separator within IP addresses.

In input fields for text, the numeric keys can also be used to enter characters as shown on the key. Just press the respective key multiple times to change to the desired character.

Function keys

The Backspace function key can be used in input mode to erase the character in front of the current cursor position.

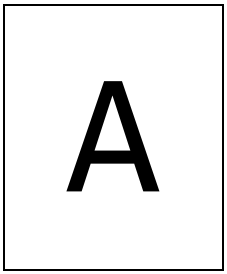
The Escape function key is used in menu mode to leave the current menu and move one menu level up.

In input mode, the Escape key is used to leave input mode without accepting the current input. The previous input is maintained.

Navigating the user interface

See the 2201 ProLock user's guide for operation details.

Warranty and Repair



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

Warranty information

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

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

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

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

The warranty described above is the buyer's sole and exclusive remedy and no other warranty, whether written or oral, expressed or implied by statute or course of dealing shall apply. Willtek specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. No statement, representation, agreement, or understanding,

oral or written, made by an agent, distributor, or employee of Willtek, which is not contained in the foregoing warranty will be binding upon Willtek, unless made in writing and executed by an authorized representative of Willtek. Under no circumstances shall Willtek be liable for any direct, indirect, special, incidental, or consequential damages, expenses, or losses, including loss of profits, based on contract, tort, or any other legal theory.

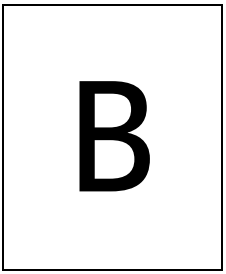
Equipment return instructions

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

- Owner's name, address, and telephone number.
- Serial number, product type, and model.
- Warranty status. (If you are unsure of the warranty status of your instrument, include a copy of the invoice or delivery note.)
- Detailed description of the problem or service requested.
- Name and telephone number of the person to contact regarding questions about the repair.
- Return authorization (RA) number (US customers), or reference number (European customers).

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

End-User License Agreement



This appendix describes the conditions for using the 2201 ProLock firmware and the 7310 Lector and Scriptor software.

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

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

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

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

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

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

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

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Publication History

Revision	Changes
0809-000-A	First version.

Wireless Telecom Group
c/o Willtek Communications GmbH
Ismaning
Germany
Tel: +49 (0)89 99641-0
Fax: +49 (0)89 99641-440
info@willtek.com
www.willtek.com

Wireless Telecom Group
Parsippany, NJ
USA
Tel: +1 973 386 9696
Fax: +1 973 386 9191

Wireless Telecom Group
Cheadle Hulme
United Kingdom
Tel: +44 (0)161 486 3353
Fax: +44 (0)161 486 3354

Wireless Telecom Group
Roissy
France
Tel: +33 (0)1 72 02 30 30
Fax: +33 (0)1 49 38 01 06

Wireless Telecom Group
Singapore
Asia Pacific
Tel: +65 6827 9670
Fax: +65 6827 9601

Wireless Telecom Group
Shanghai
China
Tel: +86 21 5835 8039
Fax: +86 21 5835 5238

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