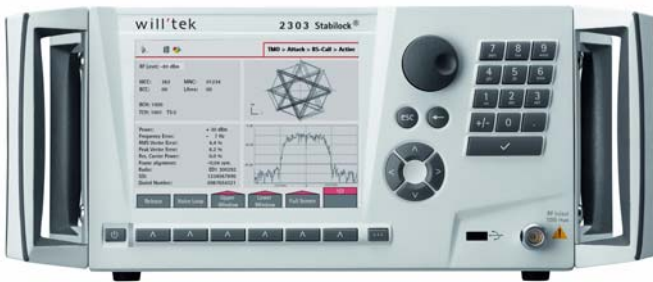


2303 Stabilock TETRA Mobile Station Tester



boosting wireless efficiency

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Ordering information This guide is issued as part of the **2303 Stabilock**. The ordering number for a published guide is M 295 002. The ordering number for the product is M 100 203.

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About This Guide

This section contains the following basic information:

- "Purpose and scope" on page vi
- "Assumptions" on page vi
- "Related information" on page vi
- "Technical assistance" on page vii
- "Conventions" on page viii

Purpose and scope

The purpose of this guide is to help you successfully use the 2303 Stabilock features and capabilities. This guide includes task-based instructions that describe how to install and use the 2303 Stabilock. 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 and intermediate users who want to use the 2303 Stabilock effectively and efficiently. We are assuming that you have basic computer experience and are familiar with basic telecommunication concepts and terminology.

Related information

Use this guide in conjunction with the following information:

2303 Stabilock TETRA Mobile Station Tester: User's Guide, ordering number M 290 002.

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 99641 311	+49 (0)89 99641 440
Americas	+1 973 386 9696	+1 973 386 9191
China	+86 21 5836 6669	+86 21 5835 5238

Conventions

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

Table 2 Typographical conventions

Description	Example
User interface actions appear in this 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 type-face .	Type: a:\set.exe in the dialog box.
Variables appear in this <type-face> .	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.

About This Guide
Conventions

Safety Notes

This chapter provides the safety notes for the 2303 Stabilock. Topics discussed in this chapter include the following:

- ["Safety class" on page xii](#)
- ["Safety warnings" on page xii](#)

Safety class

The external power supply of the 2303 Stabilock 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 2303 Stabilock. 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 10 W continuous level, or 20 W burst TETRA signal. 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 45°C (110°F) only. Operation outside this range will lead to invalid results.



Safety advice for the battery module

Do not crush. Do not heat or incinerate. Do not short-circuit. Do not dismantle. Do not immerse in any liquid, it may vent or rupture! Do not charge below 0°C (32°F) nor above 45°C (110°F).



Battery module usage

The battery module is for use with the 2303 Stabilock and the 9100 Handheld Spectrum Analyzer Series only. Willtek does not accept any liability for damage of the battery or other equipment if the battery module is used with other electric or electronic equipment.

Safety Notes
Safety warnings

Overview



1

This chapter provides a general description of the 2303 Stabilock. Topics discussed in this chapter include the following:

- ["About the 2303 Stabilock" on page 2](#)
- ["What's new in version 1.00" on page 2](#)
- ["Features and capabilities" on page 3](#)
- ["Options" on page 4](#)

About the 2303 Stabilock

Regular testing of TETRA phones ensures safe and reliable communication: In critical situations, users in the public safety and security sector fully rely on their communication devices. To help organisations such as police, fire brigades and paramedics provide maximum safety and reliability to their users, Willtek designed the 2303 Stabilock. It is the first TETRA mobile station tester which is specifically made for testing TETRA radios in a service environment. Service managers can now use the affordable instrument to ensure that the radios are fully operational; this is particularly important for the police, fire brigades and paramedics where lives may depend on proper communication tools!

The 2303 Stabilock delivers precise results the fast way. No matter if Trunked Mode or Direct Mode (optional), 400 or 800 MHz band: After setting up network parameters and frequency range the tester is ready for operation. The high contrast 6.5" TFT colour display is split into four sections for clear reading of test results in numeric or graphic format. All settings and commands are accessible via six softkeys or with one-hand operation using the turn-and-push dial. Reducing TETRA complexity to what is really needed in service – with this operational concept, users can operate the instrument easily with a few key presses on the Stabilock's high-quality click-type keyboard. Alternatively, a standard USB mouse provides access to all screen elements as on a PC.

What's new in version 1.00

This is the first version of the getting started manual.

Features and capabilities



General features

- Supports TETRA radio tests relevant for service
- Intuitive and failsafe user interface
- Made for the PMR service environment
- Bright screen and robust case
- Portable, lightweight and compact
- Optional battery operation
- Proven Stabilock® quality and precision with a 40-year tradition

Transmitter measurements

- Average burst power
- Carrier frequency offset
- Burst power profile over time
- Timing error
- Residual carrier power
- Error vector magnitude (RMS, peak)

I/Q modulation analysis

- Modulation spectrum
- Constellation diagram

Receiver measurements

- Bit error rate
- Paging sensitivity

Options

2330 DMO Option: Expand testing capabilities to TETRA Direct Mode Operation

With the 2330 DMO Option installed, the 2303 Stabilock also understands and analyzes the TETRA DMO protocol for direct communication between two TETRA radios. This enables the user to test the single-frequency operation.

2331 Autotest Option: Efficient and time-saving checks through automated tests

Willtek offers a set of automatic test capabilities for the 2303 Stabilock. The 2331 Autotest Option allows to run typical test sequences automatically on the instrument. So you can run tests with the mere push of a button!

2360 OCXO Option: Increasing frequency accuracy

TETRA radios are usually running a reliable AFC (Automatic Frequency Correction) to match frequency offset to the base station. For tests on mobile stations which do not have this feature, Willtek offers the 2360 OCXO Option to make the reference frequency of the 2303 Stabilock ten times more accurate.

2361 Battery Option: Becoming independent from mains power

No need to spend time dismounting radios installed into vehicles: Take the tester on the road with the 2361 Battery Option! Using the high-capacity Li-Ion type battery, the 2303 Stabilock becomes independent from other power sources for about two hours. And with accessories like the desk charger and extra batteries, engineers are always prepared for a quick emergency mission.

1500 Battery Charger

The desktop charger allows you to recharge a battery while operating the 2303 Stabilock with another battery. This way, your 2303 will always be ready for use in the field!

Installation

2

This chapter describes how to install the 2303 Stabilock. The topics discussed in this chapter are as follows:

- "Scope of delivery" on page 6
- "Before first-time use" on page 6
- "Setting up the hardware" on page 6
- "Installing and maintaining the battery" on page 7

Scope of delivery

When unpacking the 2303 Stabilock, ensure that you do not miss any of the following items:

- instrument (2303 Stabilock) with a dummy battery or (if ordered) a battery installed in the battery compartment
- power supply with inlet plug for non-heating apparatus
- power cable for your region
- USB flash drive
- manual pack including this getting started manual and CD containing the user's guide

Before first-time use

The 2303 is optionally delivered with a rechargeable battery module. This battery must be charged before first-time use. Please allow six hours to charge the battery while the instrument is connected to an external power supply and switched off. For more information, see section ["Installing and maintaining the battery" on page 7](#).

Setting up the hardware

The 2303 Stabilock can be operated either with an external power supply or with the built-in battery. For battery operation, refer to ["Installing and maintaining the battery" on page 7](#). Setting up the instrument to operate with an external power supply is explained here.

If you have a DC source with 11 to 15 V capable of providing 60 W power, you can connect it to the **DC IN** plug on the back panel. Ensure that the voltage polarity is as indicated on the back panel.

If you want to operate the 2303 Stabilock from a standard AC mains power source, connect the power supply provided with the instrument to the **DC IN** plug on the back panel, and to the AC source using the power cable delivered with the power supply.

Installing and maintaining the battery



The 2303 Stabilock can be equipped with a rechargeable battery module to enable operation in the field, without mains voltage. If you ordered your 2303 with a battery, that battery will already be installed. This battery must be charged before first-time use. Please allow six hours to charge while the instrument is connected to an external power supply and switched off.

The battery charge status is indicated with a symbol on the screen. See the user's guide for detailed information on this symbol.

On the front panel, an LED next to the on/off switch provides basic information about the power supply status. If the LED lights green, an external power source is connected. If the LED lights yellow, an external power source is connected and the battery is being charged.

If the instrument is switched on, the battery takes about three times as long to charge compared to when the instrument is switched off. After eight hours of continuous charging, the battery charger is automatically switched off to ensure that the battery is not damaged by too long charging periods. The battery may not be fully charged at the time. Therefore Willtek recommends to charge the battery only while the 2303 Stabilock is switched off.

NOTE

Disconnecting the mains cable from the power source resets the eight-hour maximum charging period. In order to make sure that the battery is fully charged when the instrument is switched off, unplug the mains cable first and plug it in again.

A completely discharged battery is not recharged, if the power supply is connected while the instrument is operating. Therefore it is advisable to switch off the instrument before connecting the power supply to the 2303 Stabilock.



Safety advice for the battery module

Do not crush. Do not heat or incinerate. Do not short-circuit. Do not dismantle. Do not immerse in any liquid, the battery may vent or rupture! Do not charge below 0°C (32°F) nor above 45°C (110°F).

Battery module replacement

To replace the battery module, use genuine Willtek spare parts only. Contact your local Willtek service center or sales representative for a quotation.

The battery module compartment is situated on the back panel of the instrument. You can replace the battery module as follows:

- 1 Switch off the 2303 Stabilock.
- 2 Remove the battery module by pushing the black rubber clasp to the right and pulling the battery module out of the compartment.
Do not try to open the battery module!
- 3 Line up the new battery module with the connectors to the bottom and pointing towards the compartment.
- 4 Gently slide the battery module into the compartment until it locks completely.
- 5 Fully charge the new battery.



For optimum performance and lifetime, please follow the advice below:

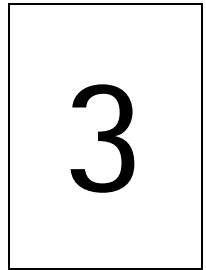
- Before first-time use, charge the battery completely while the 2303 Stabilock is switched off. This takes about six hours.
- If you do not use the battery module for months: Fully charge the battery and remove it from the instrument. Check the battery twice a year and recharge it if necessary – the battery must not be stored while completely discharged!
- Do not store the battery module above 45°C (110°F) or below 0°C (32°F).
- Do not touch the battery contacts with your fingers; keep them clean.
- Do not drop the battery module to the ground (risk of cracks).

Dispose of the battery module safely

Do not simply throw the battery module away. Dispose of the battery in line with national or regional regulations.

Chapter 2 Installation
Installing and maintaining the battery

Getting Started



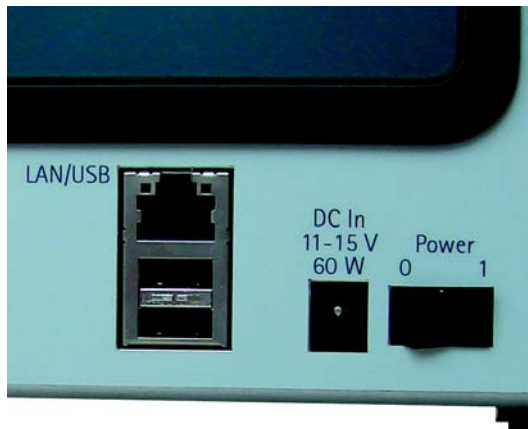
This chapter describes the functionality of the instrument. Topics discussed in this chapter are as follows:

- ["Connecting the 2303 Stabilock" on page 12](#)
- ["Powering the unit" on page 16](#)
- ["Using the front panel" on page 17](#)
- ["Navigating the user interface" on page 20](#)

Connecting the 2303 Stabilock

The 2303 Stabilock 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 2303 Stabilock can be operated either from the internal battery or from an external DC source such as the power supply which is delivered with the 2303, or a car battery. The DC voltage must be in the range from 11 to 15 V. In addition, the battery is loaded when an external DC source is connected.

The **DC IN** plug is located on the right-hand side at the back of the instrument. Read more about power supplies in chapter "[Installation](#)", in particular in section "[Setting up the hardware](#)" on page 6.

RF IN/OUT



RF IN/OUT is a 50 Ω N-type connector (female) on the right-hand side of the front 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 the 2303. Willtek offers an appropriate adapter.



WARNING

The maximum input power level at the **RF IN/OUT** connector is 10 W continuous level, or 20 W burst TETRA signal. Higher input levels may result in serious damage of the instrument.

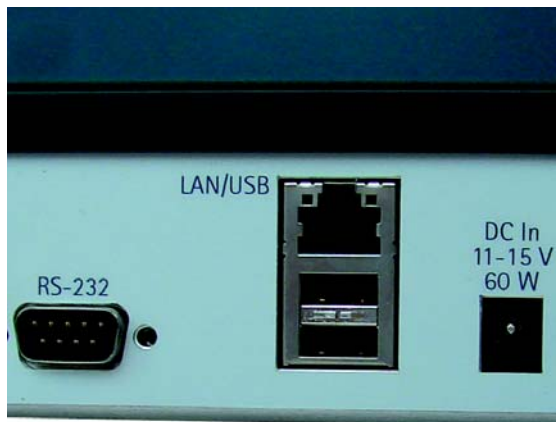


CAUTION

Only use a 50 Ω N-type connector to connect to the **RF IN** port of the 2303. 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



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 2303 Stabilock 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 or via RS-232.

Setting up the IP address, the command set to control the 2303 and the responses from the 2303 Stabilock 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 the 2303 to a PC directly using a cross patch cable.

RS-232



This 9-pin sub-D connector on the rear panel of the 2303 Stabilock can be used to control the 9100 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.

To connect the 2303 to a controlling PC over RS-232, use a null modem (PC to PC) cable.

EXT. SYNC 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 5, 10 or 13 MHz clock is connected, the 2303 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.



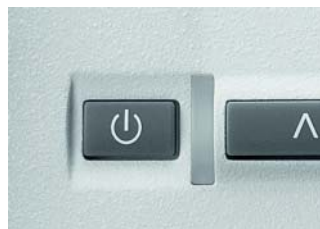
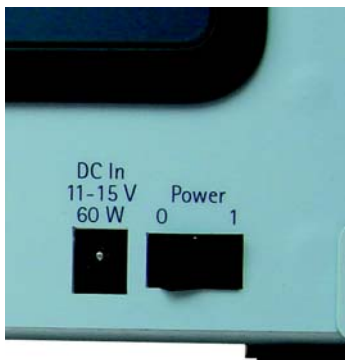
WARNING

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

TRIGGER OUT This BNC output plug can provide a TTL trigger signal for synchronization of external equipment with the active slot, frame or multiframe. The actual signal is set by the instrument software; see the user's guide for the 2303 Stabilock for more details.

Powering the unit

Switching on the instrument



The 2303 Stabilock has two independent power switches – one on the rear (right-hand side) and one on the front panel (left-hand side). Both must be switched on to operate the instrument.

The power switch on the rear disconnects the battery from the DC voltage supply and the instrument completely. Use this switch to avoid residual currents that may discharge the battery.

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

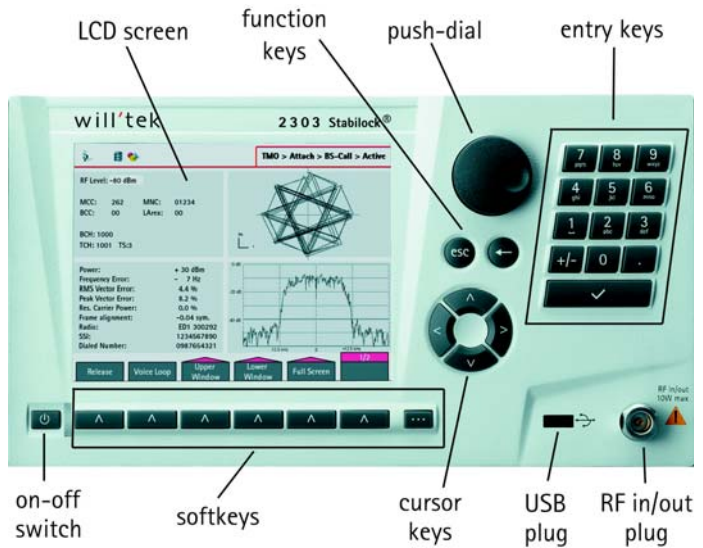
NOTE

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

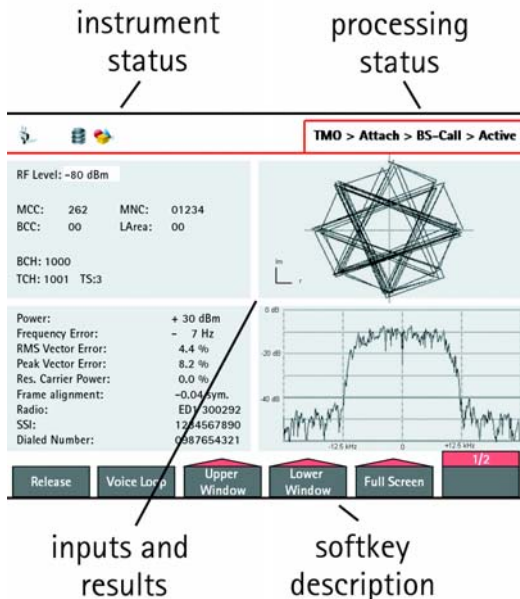
NOTE

Please wait a few seconds between switching the instrument off and on again. It will not start otherwise.

Using the front panel



LCD The LCD screen shows the menus that guide you through configuration and measurements when the 2303 Stabilock is switched on and the operating software is loaded. The menus consist of four different sections:



The top row shows the instrument status on the left. This includes the status of battery, network and USB connections.

On the right-hand side, the top row displays the processing status, e.g. the call processing.

The top 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 2303 Stabilock has a number of keys that can be broken down into the following sections.

On-off switch See ["Switching on the instrument"](#) on page 16.

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 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.

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.

Push-dial



In menu mode, the push-dial can be turned clockwise or anticlockwise to move to a different input field, just like you would do with the Up and Down cursor keys.

In input mode, you can increase or decrease the current value by turning the push-dial. The currently active value is accepted by pressing the push-dial.

Function keys



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

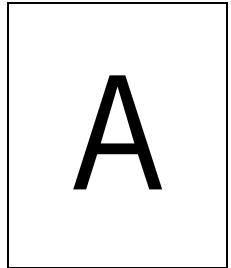
The Escape function key is used in menu mode to leave the current menu and move one menu level up.

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 2303 Stabilock 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" on page 22](#)
- ["Equipment return instructions" on page 23](#)

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

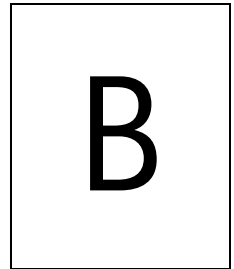
Please contact your local service center for Willtek products via telephone or web site for return or reference authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- 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.

Appendix A Warranty and Repair
Equipment return instructions

End-User License Agreement



This appendix describes the conditions for using the software, in particular firmware or software updates for the 2303 Stabilock.

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

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

- (i) use the software and/or any copy of the software in different computers concurrently, unless the software is an update that has been downloaded from the Internet at www.willtek.com;
- (ii) copy the software, except for archive purposes consistent with your standard archive procedures;
- (iii) transfer the software to a third party apart from the entire product;
- (iv) modify, decompile, disassemble, reverse engineer or otherwise attempt to derive the source code of the software;
- (v) export the software in contravention of applicable export laws and regulations of the country of purchase;
- (vi) use the software other than in connection with operation of the product.

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

Publication History

Revision	Changes
0710-100-A	First version.

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