Getting Started Manual

will'tek

8140 TETRA AirAnalyzer

boosting wireless efficiency

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Ordering information This guide is issued as part of the **8140 TETRA AirAnalyzer**. The ordering number for a published guide is M 295 099. The ordering number for the product is M 860 546.

EMC Directive Compliance This product was tested and conforms to the EMC Directive, 89/336/EEC as amended by 92/31/EEC and 93/68/EEC for electromagnetic compatibility. A copy of the Declaration of Conformity is provided with this manual.

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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 8140 TETRA AirAnalyzer features and capabilities. This guide includes task-based instructions that describe how to install and troubleshoot the 8140 TETRA AirAnalyzer. 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 8140 TETRA AirAnalyzer 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:

8140 TETRA AirAnalyzer: user's guide, ordering number M 292 546

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

Table 4 Symbol conventions

This symbol represents a general hazard.

This symbol represents a risk of electrical shock.

NOTE

This symbol represents a Note indicating related information or tip.

Safety Notes

This chapter provides the safety notes for the 8140 TETRA AirAnalyzer. Topics discussed in this chapter include the following:

- "Safety class" on page xii
- "General conditions of use" on page xii
- "Safety warnings" on page xiii
- "Declaration of conformity" on page xv

Safety class

The 8140 TETRA AirAnalyzer is a Safety Class I instrument.

General conditions of use

Read this product documentation before operation to familiarize yourself with safety markings and instructions.

This product is a Safety Class I instrument (provided with a protective earth terminal). Verify that the product is set to match the available line voltage and that the correct fuse is installed. An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set (except for the DC option).

Equipment should be protected from ingress of liquids and precipitation such as rain, snow, etc. When moving the equipment from a cold to a hot environment, it is important to allow the temperature of the equipment to stabilize before it is connected to the supply to avoid condensation forming.

This product is not approved for use in hazardous atmospheres or medical applications. If the equipment is to be used in a safety-related application, e.g. avionics or military applications, the suitability of the product must be assessed and approved for use by a competent person.

Safety warnings

WARNING

The TETRA AirAnalyzer is not designed or tested for usage inside of a moving vehicle (e.g. car, van, airplane, helicopter), so this usage must be avoided.
Contempt may cause failures and/or damages in the vehicle system and therefore may lead to disasters!

ELECTRICAL HAZARDS (AC supply voltage)

This equipment conforms with IEC Safety Class 1, i.e. it is provided with a protective grounding lead. To maintain this protection, the supply lead must always be connected to the source of supply via a socket with a grounded contact.

ELECTRICAL HAZARDS (AC supply voltage)

Be aware that the supply filter contains capacitors that may remain charged after the equipment is disconnected from the supply. Although the stored energy is within the approved safety requirements, a slight shock may be felt if the plug pins are touched immediately after removal.

ELECTRICAL HAZARDS

Do not remove covers, no user serviceable parts inside.

Note that there are supply fuses in both the live and neutral wires of the supply lead. If only one of these fuses should rupture, certain parts of the equipment could remain at supply potential.

FIRE HAZARD

Make sure that only fuses of the correct rating and type are used for replacement. If an integrally fused plug is used on the supply lead, ensure that the fuse rating is commensurate with the current requirements of this equipment.

TOXIC HAZARDS

Some of the components used in this equipment may include resins and other materials which give off toxic fumes if incinerated. Take appropriate precautions, therefore, in the disposal of these items.

WARNING

Beryllia (beryllium oxide) may be used in the construction of some of the components of this equipment. This material, when in the form of fine dust or vapor and inhaled into the lungs, can cause a respiratory disease. In its solid form, as used here, it can be handled quite safely although it is prudent to avoid handling conditions which promote dust formation by surface abrasion.

Because of this hazard, you are advised to be very careful in removing and disposing of these components. Do not put them in the general industrial or domestic waste or despatch them by post. They should be separately and securely packed and clearly identified to show the nature of the hazard and then disposed of in a safe manner by an authorized toxic waste contractor.

WARNING

Beryllium copper: Some mechanical components within this instrument may be manufactured from beryllium copper. This is an alloy with a beryllium content of approximately 5%. It represents no risk in normal use. The material should not be machined, welded or subjected to any process where heat is involved. It must be disposed of as "special waste".

It must NOT be disposed of by incineration.

WARNING

Tilt facility: When the instrument is in the tilt position, it is advisable, for stability reasons, not to stack other instruments on top of it.

WARNING

Input overload: The input power at the RF N-type connector should not exceed 0 dBm to guarantee the correct operation of the unit.

The input power level should not exceed 10 dBm to protect the device against damage.

At an input power above 17 dBm a protection circuit with diodes starts to protect the receiver. At any level above 17 dBm these diodes may burn out and the device may get seriously damaged.

WARNING

Static sensitive components: This equipment contains static sensitive components which may be damaged by handling.

Declaration of conformity

IP protection class: IP 20 (according to IEC529)

Degree of pollution: 2

Overvoltage category: II

fjord-e-design
mobile communication engineering

DECLARATION OF CONFORMITY
FOR
E1001 TETRA AirAnalyzer

With this document we:

fjord-e-design GmbH
Kanzleistraße 91-93
24943 Flensburg
Germany

declare as the manufacturer of the listed device, that the product:

E1001 TETRA AirAnalyzer (E1001-400-PFC),
including DC options (-DC12, -DC24, -DC48)

conforms with the protection requirements of Council Directive 89/336/EEC relating to electromagnetic compatibility and Council Directive 73/23/EEC relating to safety requirements.

The evidence of conformity is verified through meeting the following standards or other normative documents:

EN 61010-1: 1993 + A2: 1995
EN 50081-1: 1992
EN 50082-2: 1995

Signed .....
(Hauke Holm)
Managing Director

Flensburg, Germany
July 2003

Overview

1

This chapter provides a general description of the 8140 TETRA AirAnalyzer. Topics discussed in this chapter include the following:

- "About the 8140 TETRA AirAnalyzer" on page 2
- "Features and capabilities" on page 2
- "Options" on page 3
- "System architecture" on page 3
- "Physical description" on page 4

About the 8140 TETRA AirAnalyzer

The TETRA Quality of Service is of major concern for network operators and user groups in the public safety and security sector. Willtek's 8140 TETRA AirAnalyzer now helps to discover dead spots and handover problems. It monitors the radio communication and offers users comprehensive post-processing capabilities.

The TETRA AirAnalyzer enables you to test network performance and load to make safety-critical communication as reliable as possible. It records, displays and analyses the complex communication between one or several TETRA mobile stations and a TETRA base station.

The TETRA AirAnalyzer can also be used as a versatile protocol analyzer for the development of TETRA terminals, IOP tests, or monitoring and analysing signalling.

Features and capabilities

- Enables protocol analysis with message sequence charts (MSC) that display in detail the complex flow of communication in the signalling protocol between TETRA radio and base station.
- Optionally provides Quality of Service analyser to chart issues within a radio cell over a given time period, including statistical evaluation.
- Includes voice decoder, allowing users to monitor and record the ongoing voice communication in the network.
- Measures channel and modulation parameters with the TETRA physical data analyser
- Supports GPS-assisted radio coverage measurements
- Features TETRA scanner to survey spectrum utilisation
- Optionally decodes communication under static or dynamic air interface encryption

Options

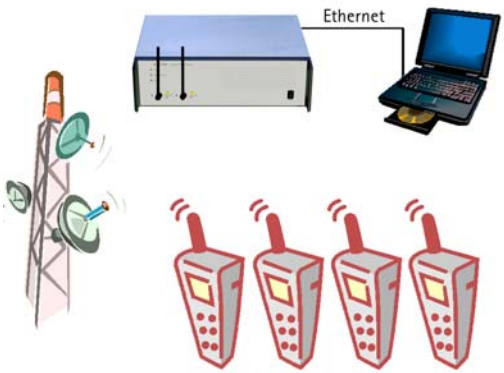
The following table lists the available options.

Table 5 Options to the 8140 TETRA AirAnalyzer

Option	Ordering number
8160 Static Air Interface Encryption	M 860 544
8161 Static/Dynamic Air Interface Encryption	M 860 561
8162 DMO Option	M 860 545
8164 AirAnalyzer Office Software	M 860 547
8165 TETRA QoS Analyzer	M 860 562
8171 DC Power Supply (12 – 18 V)	M 860 541
8172 DC Power Supply (18 – 36 V)	M 860 542
8172 DC Power Supply (36 – 72 V)	M 860 543

System architecture

The following drawing depicts a typical test setup.



Physical description

Front panel

The following table lists the input and output components on the front panel.

Table 6 Front panel elements

No.	Designation	Description
1	Power LED	green: The device is on.

Table 6 Front panel elements

No.	Designation	Description
2	Communication LED	green: Communication with PC is ok orange: Not used (contact Support) red: Communication with PC failed
3	Status LED	green: No error during self test orange: Not used (contact Support) red: Error occurred during self test
4	RF In A LED	green: TETRA signal found orange: Power at input, no TETRA signal found red: No power at input
5	RF In A connector	Input (downlink) max. 0 dBm, 0 V DC, 50 Ω
6	RF In B LED	green: TETRA signal found orange: Power at input, no TETRA signal found red: No power at input
7	RF In B connector	Input (uplink) max. 0 dBm, 0 V DC, 50 Ω
8	Power on/off switch	On the right-hand side 0: off 1: on

Rear panel

Important elements of the rear panel are described in the table below.

Table 7 Rear panel elements

No.	Component	Remarks
1	Fan	
2	AC power connector	
3	DC power connector	
4	Switch	DC power on/off (1/0)
5	Fuse	For AC input
6	Pushbutton	Resets IP configuration to default values

Installation

2

This chapter describes how to install the 8140 TETRA AirAnalyzer. The topics discussed in this chapter are as follows:

- "Scope of delivery" on page 8
- "Software requirements" on page 8
- "Hardware requirements" on page 9
- "Setting up the hardware" on page 9

Scope of delivery

Take the 8140 TETRA AirAnalyzer out of the shipping box and check whether all items listed below are included.

Carefully check the 8140 TETRA AirAnalyzer for mechanical damage. Should the instrument be damaged, immediately notify the forwarding agent responsible for shipping the instrument to you.

Please keep the original box and packing material because this should be used for further transport or shipment of the instrument.

When unpacking the 8140 TETRA AirAnalyzer, ensure that you do not miss any of the following items:

- TETRA AirAnalyzer
- Mains cable
- Cross-connect Ethernet cable, 2 m (ordering number M 860 393)
- 2 UHF Antennas for TETRA, TNC connector (ordering number M 860 264)
- 2 adapters N (male) to TNC (female) (ordering number M 886 098)
- DC plug Neutrik Powercon NAC3FCA (only with DC option)
- Manual pack including software CD, this printed getting started manual, and CD containing user's guide
- Dongle for TETRA AirAnalyzer software

Software requirements

For usage of the 8140 TETRA AirAnalyzer, the associated PC software is needed. This software is found on the included CD. For software installation instructions and operating system requirements, please refer to the user's guide for the 8140 TETRA AirAnalyzer.

Hardware requirements

In addition to the 8140 TETRA AirAnalyzer you will also need two antennas for the frequency range to be monitored.

Setting up the hardware

To use the device you have to connect it to the power supply, the PC and the RF signal source. This is described in the following chapter.

Operation

3

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

- "Connecting the instrument to a power source" on page 12
- "Connecting the instrument to the PC" on page 14
- "Connecting the RF" on page 15

Connecting the instrument to a power source

If you have an AC power supply, it should be connected at the back of the device, to the plug for non-heating apparatus. Power requirements regarding voltage, power and frequency are printed on the device. Make sure that your power supply meets the requirements.

If you want to operate the 8140 TETRA AirAnalyzer with a DC voltage supply (optional), install the Neutrik Powercon Connector (NAC3FCA) to your DC source. The Neutrik Powercon Connector is supplied with the instrument. Please ensure that the plug and cables are connected according to the following scheme:

Table 8 Pin assignment for the DC power connector

Plug description	Description
L	+ DC V
N	0 V
⏚	protective earth

To set up the DC power supply, proceed as follows:

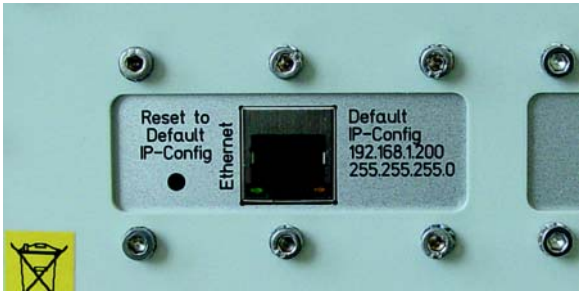
1. Due to the low voltages there are high currents on the cables. Choose cables with a diameter suitable for these high currents.
2. Connect the protective earth to ground. This must be done before you put the device into operation!
3. Make sure that your power supply meets the requirements. Power requirements due to voltage and power are printed on the device.
4. Connect the DC source to the plug at the back of the device to the Neutrik Powercon Connector.

NOTES

Please ensure that protective earth is connected.

Do not exceed the specified voltage range!

Connecting the instrument to the PC



For normal operation the 8140 TETRA AirAnalyzer has to communicate with the controlling application on a PC. This is done using the TCP/IP protocol over the Ethernet.

Connect the Ethernet port of the 8140 TETRA AirAnalyzer with the LAN port of the PC using a cross-connect cable for 100 Base-T (RJ-45 connectors).

Connecting the RF

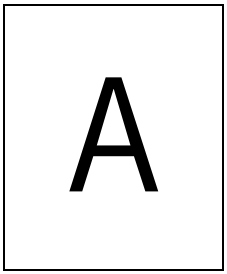
The TETRA AirAnalyzer has two connectors for radio frequency input. Normally you should use RF In A for the downlink (base station transmit) or DMO signal and RF In B for the uplink (mobile station transmit) signal. Both inputs are terminated with 50 Ω and are limited to a maximum input power of 0 dBm. Proper operation is warranted only without DC voltage.

You may connect signal sources directly with cables (e.g. from a monitor output), or you may use antennas for receiving real air interface data.

Operating the instrument through PC applications

Please refer to the user's guide for the 8140 TETRA AirAnalyzer.

Warranty and Repair



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

- "Warranty information" on page 18
- "Equipment return instructions" on page 19

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

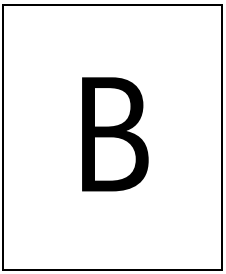
Please contact your local service center for Willtek products via telephone or web site for return or reference authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- 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 91xx Data Exchange Software.

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

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

(i) use the software and/or any copy of the software in different computers concurrently, unless the software is an update that has been downloaded from the Internet at www.willtek.com;

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

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

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

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

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

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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.

Room for your notes

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English

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