2201

ProLock

3G test set for service

Boosting wireless efficiency

Willtek 2201 ProLock – Service Testing for 2G and 3G Mobile Communications

Service centres for mobile phones perform repair on 2G and 3G phones for various manufacturers. Reverse logistics can be expensive, in particular in the no-fault-found case. On the other hand, customer satisfaction is guaranteed if they experience a competent service of defective mobile phones, with the phone being away for a short period only.

For these reasons, Level 1 and 2 service shops filter those phones that are within the specifications or can be repaired locally. This decreases the number of non-faulty phones which are processed in higher level service centres, meaning less cost for the service chain and higher customer satisfaction.

The Willtek 2201 ProLock is the most important part in Willtek's intelligent 3G test system for service. The system provides a competitive price-performance ratio for filter testing as well as final testing after repair.

Willtek's ProLock is capable of performing the measurements necessary for level 1 and 2 service on GSM and WCDMA. With its future proof RF concept, ProLock even supports WCDMA band VII (between 2.5 and 2.7 GHz).

Highlights

- Supports GSM and WCDMA

- Intuitive user interface

- Designed for level 1 and 2 service of mobile phones

- Reliable testing, due to longstanding experience in service

- Separates faulty from non-faulty phones

- 7310 Lector & Scriptor as remote control software

GSM measurements

- Output power

- RMS phase error

- Peak phase error

- Frequency error

- Burst length

- Power vs. time

- BER, BLER measurements

- Reported RSSI

WCDMA measurements

- Minimum output power

- Maximum output power

- Open loop power control

- Inner loop power control

- Error vector magnitude (RMS and peak)

- Magnitude error (RMS and peak)

- Phase error (RMS and peak)

- Frequency error

- Rho

- I/Q offset

- I/Q imbalance

- ACLR

- BER and BLER measurements

- Reported RSCP

Service made simple

The 2201 ProLock can be used either in manual mode or under remote control via 7310 Lector & Scriptor product family.

In **manual mode**, the large, high contrast colour display and the straightforward operating software ease manual measurements. With just a few clicks on the high quality, click-type keyboard measurements can be set up, started and switched. The 2201 equipped with the 7360 Coupling Factor Upgrade License can identify the type of phone and use the specific coupling factors, making manual operation of a communication test set easier than ever before!

Under **remote control**, the automated tests of the well known 7311 Lector Basic or 7212 Lector Enhanced can be performed with the 2201 ProLock. The convenient and user friendly PC software runs the same scripts as for other Willtek terminal test instruments; this indicates how flexible the 7310 Lector and Scriptor product family is. The test reports always have the same format, independent of the test instrument being used. This helps multi-level service organisations to easily and conveniently maintaining the whole service chain, as illustrated in Figure 1.

Universal interfaces

The 2201 comes with multiple USB connections to connect a mouse, a keyboard and a flash drive at the same time. The flash drive can be used for simple and fast firmware updates.

An integrated device USB port can be used to attach ProLock to a PC. – But this is not the only connection the 2201 ProLock supports. The instrument easily connects as well to the Ethernet, thanks to the built-in support of Dynamic Host Configuration Protocol (DHCP), which does not need any manual IP address handling.

The RF connector is located at the back of the instrument. This novel approach offers the most convenient connection to the 4921 RF Shield with its 4916 Antenna Coupler and keeps the repair bench clear and tidy, without RF cables lying around on the bench and being damaged.
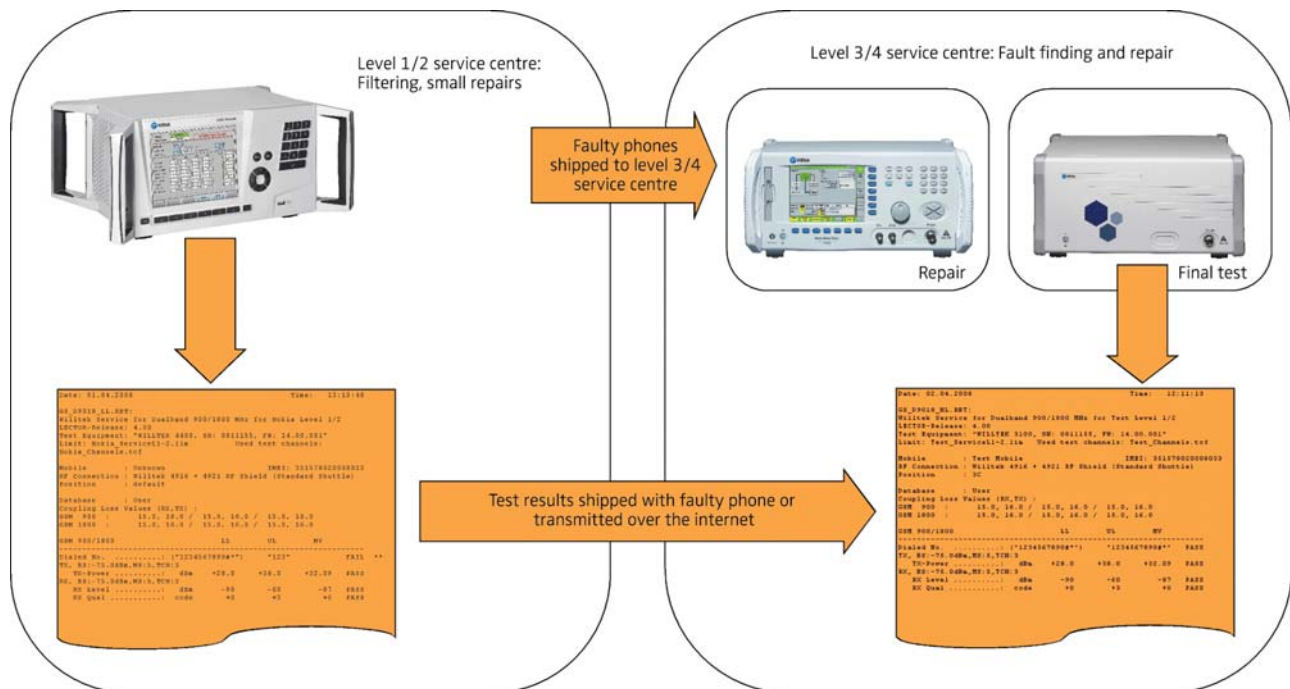


Figure 1: Multi-level repair process

Part of an intelligent 3G test system for service

Willtek's intelligent 3G test system for service does not need much user input for automated tests but determines the technologies, frequency bands and coupling factors independently. The system consists of:

- 2201 ProLock

- 7312 Lector Enhanced

- 4921 RF Shield and 4916 Antenna Coupler

- Coupling values (7360 Coupling Factor Update License)

The experience of phone manufacturers performing a filter test in level 1/2 service shows that about 30% of the returned phones in service are faultless. A filter test can at least identify 60% of those phones before they are shipped to a level 3/4 service centre. The strategy for service is more and more changing towards large service hubs which get the phones from small shops. If the intact phones are already filtered in those shops the total service costs for a faultless phone can be decreased. The following example calculation shows the impact of a filter test on the costs:

An average of about 10% of new phones come back to service for various reasons. 30% of these returned phones have no faults. In a country of 10 million new phones per year, these are 300,000 phones returned for nothing. If 60% of those faultless phones can be identified with a filter test locally it means that 180,000 phones will not cause the cost of being processed through the whole service chain – including shipment to and from the service hub.
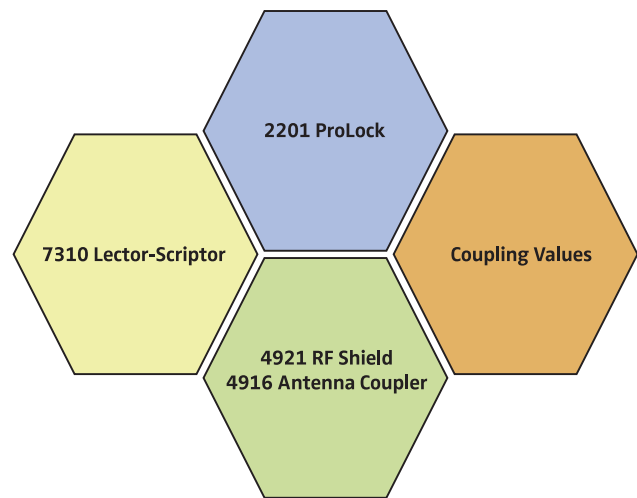
Assuming that each phone would cause 25 € in this service chain, this adds up to a cost saving of 4.5 million € per country per year if the phones were filtered locally.

Another important aspect of a proper filter test is customer satisfaction. Market experience shows that customers are pleased when they get a test protocol of their mobile phone after repair because they can be confident that the phone has been tested properly. This shows customers that they are facing a competent service – in particular outside the warranty period when they have to pay for the repair.

In conjunction with Lector, service shops can prove each mobile phone test with serial number, date and time, and results.

2201 ProLock

7310 Lector-Scriptor

Coupling Values

4921 RF Shield
4916 Antenna Coupler

Lector and Scriptor are both capable of controlling 2201 ProLock and all other Willtek terminal test instruments remotely and has been well accepted by customers for a long time. 7312 Lector Enhanced offers a large variety of features for service shops and service centres that need automated test scripts with defined limits and clear Go/NoGo verdict. In addition, 7315 Scriptor eases the administrator's work of distributing vendor-specific test scripts and mobile phone settings, and allows changing the test setup.

The **4916 Antenna Coupler** connects the mobile phone with the test instrument over the antenna, thus rendering an RF (radio frequency) cable connection unnecessary and including the antenna in the test. As a side effect, the RF radiation between the phone and the instrument can affect real networks, and vice versa. The **4921 RF Shield** is a high quality shielding chamber ensuring that the measurements are not impaired by interference from nearby base stations. The 4921 features a guaranteed attenuation of 80 dB for all GSM and WCMDA bands. Willtek tests each RF Shield and verifies its conformance to ensure that it's suitable for your measurement requirements. The results are documented in a detailed test report and are available on request.

With the **7360 Coupling Factor Update License** for 7312 Lector Enhanced and 7315 Scriptor, service shops and repair centres are always up to date with the coupling factor database because new mobile phone settings can be derived from Willtek over the Internet. The PC software checks if new updates are available, and downloads and installs them from the Internet. Do not worry about determining the coupling factors of new phones! With this automatic update, manual editing and file handling becomes unnecessary, hence avoids mistakes and saves time. – Supported manufacturers and phones are listed on Willtek's website in the Lector and Scriptor download area.
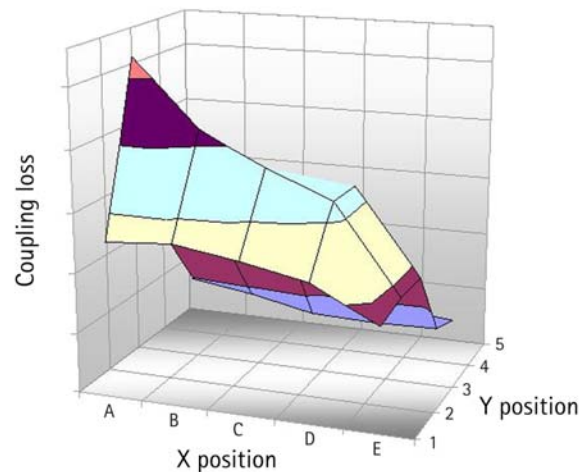
Preliminary specifications

Specifications valid after 60 minutes warm-up time at ambient temperature, specified environmental conditions and typical measurement range, within a period of one year after calibration.

The published accuracies are determined in accordance with GUM (Guide to the Expression of Uncertainty in Measurement) and EA (European Co-operation for Accreditation) application document EA4/02: "Expressions of the Uncertainty of Measurements in Calibration".

Basic RF data

Input/output impedance	50 Ω
VSWR	< 1.4
RF connector	N-type, female
Frequency resolution	100 kHz step
Signal bandwidth	6 MHz switchable 250 kHz narrow band
Maximum input level	+35 dBm (burst)

Internal time base

Reference frequency	10 MHz
Aging	10^{-6}/year

External time base	**input**
Sync input	BNC, 50 Ω
Frequency	10 MHz
Input level	0 to 17 dBm

Frequency range

GSM850, GSM900, GSM1800, GSM1900, WCDMA bands 1 – 10

RF output

Output level	−120 to −30 dBm
Resolution	0.1 dB
Absolute accuracy	
Level ≥ −60 dBm	±1.5 dB
Level < −60 dBm	±2.0 dB

WCDMA measurements

Power measurements

Input power level	−85 to +35 dBm
Absolute accuracy	
Transmit power ≥ −30 dBm	±1.0 dB
Transmit power < −30 dBm	±1.5 dB
Transmit power < −55 dBm	±2.5 dB
Relative accuracy (inner loop)	0.5 dB

EVM measurement

Accuracy	4% RMS (residual vector error)
Range	Up to 30%
Resolution	0.1%

Frequency error

Accuracy	20 Hz
Range	±5 kHz
Resolution	1 Hz

Supported procedures

Registration

Mobile originated call

Mobile terminated call

Loopback mode (RMC)

Speech loopback

Call clearing by UE

Call clearing by BS

Channel and band handover

Measurements

Min/Max output power

Modulation quality (EVM, freq. error)

Open loop power control

Inner loop power control

ACLR

BER, BLER measurements

Reported RSCP

GSM measurements

Power measurements

Range (in-burst meas.)	−30 to +35 dBm
Absolute accuracy	
Transmit power ≥ −30 dBm	±1.0 dB
Transmit power < −30 dBm	±1.5 dB

Phase error measurement

Accuracy (residual phase error)	1.5° RMS
Range	
Peak measurement	1.0° to 45°
RMS measurement	1.0° to 20°

Frequency error

Accuracy	20 Hz
Resolution	1 Hz
Range	±50 kHz

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Measurements

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RMS phase error

Peak phase error

Frequency error

Burst length

Power vs. time

BER, BLER measurements

Reported RSSI

General data

USB interface	USB 1.1 (Full Speed)
Serial interface	RS-232 (115,200 kbit/s)
Network interface	Ethernet, 100 Mbit/s, TCP/IP
DC supply voltage	11 to 15 V
Mains power supply	
Mains voltage range	100 to 250 V
Mains voltage frequency	50 to 60 Hz
Power consumption	< 40 W
Storage temperature	−20°C to +50°C
Operating temperature	+5°C to +40°C (40°F to 105°F)

Size (W x H x D)	310 x 170 x 250 mm
	(12.2 x 6.7 x 9.8 in)
Weight	5.5 kg
Standard delivery	
Mains power supply	
AC power cord	
7311 Lector Basic (CD)	
USB memory stick (256 Mb)	
1103 GSM & WCDMA Test SIM Card	

Ordering information

2201 ProLock	M 100 301

System software options (Select at least one)

2231 GSM Option	M 897 450
2234 WCDMA Option	M 897 451

Software options

2232 GPRS Option *)	M 897 453
2233 EDGE Option *)	M 897 454
1488 Bluetooth Connectivity Test Option	M 897 291
1489 Bluetooth Connectivity Test Package	M 248 510

*) Requires 2231 GSM Option

Accessories

1103 GSM and WCDMA Test SIM Card	M 860 164
Mains power supply	M 248 328

Coupling

4921 RF Shield & 4916 Antenna Coupler with XY Shuttle	M 248 721
4916 Antenna Coupler with XY Shuttle	M 248 720

Remote control software

Individual licenses

7312 Lector Enhanced	M 897 310
7315 Scriptor	M 897 311
7360 Coupling Factor Update License	M 897 312
Scriptor Upgrade from 7312 to 7315	M 897 314

Network licenses

USB Network Dongle for max 10 users	M 860 570
USB Network Dongle for max 50 users	M 860 571
USB Network Dongle for max 250 users	M 860 572

Wireless Telecom Group
Boonton   Microlab   Noisecom   Willtek