PhoneTest and the 2935
GSM 900/1800/1900 Radio Test Solution

The most flexible GSM service solution for repair, alignment and test

- Low cost test solution for GSM 900/1800/1900 mobiles
- Rapid transmitter and receiver alignment capability
- In-channel spectrum analyzer
- Bar graph alignment display
- Tri-band functionality
- Maximise output - through high speed test solution
- Custom program generation - simplified through script wizard
- Simple to use - through familiar windows interface
- Improved efficiency of repair process - Optional software embodies complete service task
- Available in five languages

PhoneTest is a complete service workshop solution. In it's basic form the 2935, running with PhoneTest software, provides the user with an easy to use flexible test instrument. With the optional PhoneTest Repair, Manager and Exchange software it becomes a test solution which is capable of handling the complete repair process. The choice is yours - a fast low cost test solution today, which can be enhanced with optional software, at any time, providing you with a complete logistics solution for the future.

The measurement system comprises a single desk top unit, the 2935 test head, which is controlled by a separate PC running a Windows 95, NT or 98 based application program. In situations where PC's are currently being used to run manufacturers phasing or alignment software they can also run PhoneTest, providing the user with a cost effective solution.

The great advantage of using the PC is to provide a familiar and easy to use man machine interface, minimizing the need for operator training. The incorporation of a sophisticated operating system into a GSM test product brings with it a sophisticated and flexible test solution.

GSM Measurements

The Test Head provides the necessary signaling protocols to simulate a base station which allows a GSM terminal to be put into conversation mode and parametric measurements performed on it. Standard transmitter and receiver measurements such as TX power, profile, frequency and phase error along with RX BER, RBER and FER are available. The E-GSM, GSM 1800 and GSM 1900 frequency and power levels are fully supported.

Test Head measurement capabilities are:-

Transmitter
- Power
- Power Profile to 50 dB (ramps, full, useful part)
- Frequency
- Phase, RMS and Peak
- Timing Advance.

Receiver
- BER I and II
- RBER Ib and II
- FER
- RX Lev
- RXQual

Protocol
- Registration
- Page Mobile
- Place Call
- Cleardown
- Handoff
- Dual Band Handoff

Additionally in Manual Mode there is the ability to provide an “unsynchronized“ Traffic Channel Test Mode. This provides Tx power measurement capability and an on Channel CW RF source for terminal alignment without protocol information.

Burst Profile

A burst profile can be measured in Manual Mode with display of either the full burst, the ramp up and down or the useful part of the burst containing the data bits.

Tri-Band Functionality

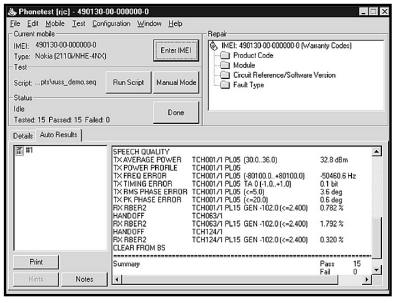
Multi-band capability has been added to the test functions of the 2935, allowing full testing of multi-band mobiles automatically under the control of PhoneTest software. Registration and calls to and from the mobile can be tested in the GSM 900 or 1800/1900 bands, with handoff carried out from band to band.

Auto Test

The Auto Test procedures are stored in the controlling PC as simple script files. PhoneTest is delivered with a number of generic test scripts for each of the three GSM systems available. Scripts can be written for Go/NoGo automated test sequences for fast and efficient mobile checks. Alternatively, more comprehensive

tests can be generated using the script wizard and stored for future use. For example registration, call placement and full parametric tests for transmission and receiver verification can be selected during script generation.

Running a script file or Auto sequence is similar to opening a file in Windows 95. Simply select the FILE pull-down and load or generate a test script as required. With the script loaded, select Run Script and observe the prompts on the PC screen. A results window is generated on the PC giving a PASS/FAIL indication on completion. The results can be viewed on the screen showing the tests performed and their results compared against the programmed limits.



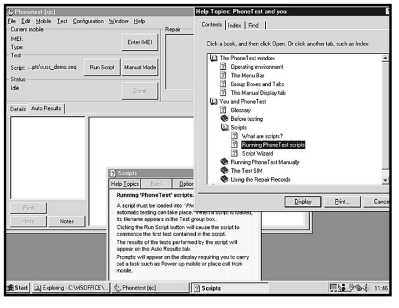
AutoTest

Results can be sent directly to a printer or to the optional PhoneTest-Manager software package.

Customized Test Routines

A Script Wizard is provided for rapid creation of fast customized automatic test sequences. On line error reporting is available and HELP facilities are provided to aid program creation. Commands are simple, logical and Scripts can be generated without any specialist software knowledge.

Once created any further editing that is required can be carried out manually using a DOS or Windows text editor. A number of generic test Scripts are provided as templates from which to generate Custom Scripts.



On line pull down help

Help is always at hand to guide the user. Simply select the Help pull-down and select the relevant topic in the familiar way

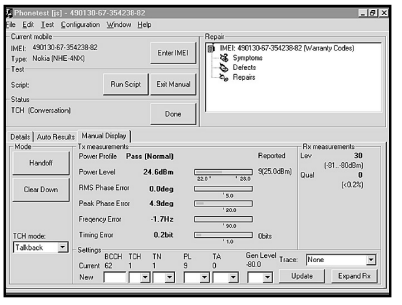
Printing Results

Detailed print out of test results are easily obtained from the unit in all configurations. The format of the test printout can also be selected to give Pass/Fail or parametric measurement test results, dependant upon requirement.

Manual Test

Manual mode offers the user the ability to perform individual measurements as required or intervene and investigate a particular parameter from an Auto Sequence failure. The operator can view both Tx and Rx measurements on the PC screen in bar chart and digital forms. Valid measurements are displayed on a green bar chart while measurements which are outside of limits are displayed in red with an accompanying yellow and black warning triangle. This gives the benefit of speedy visual decisions on measurement results. Control of call set up including call origination, termination and handoff selection is available.

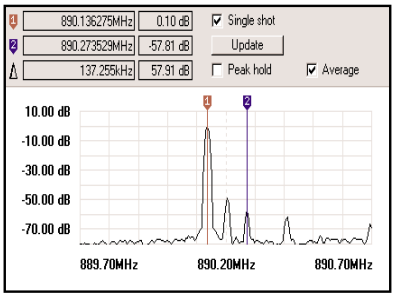
In situations where specific set ups are required for monitoring purposes, PhoneTest gives the operators the ability to store and recall an infinite number of user defined combinations of control parameters, in order to step a mobile through any permutation of conditions required to exercise functionality.



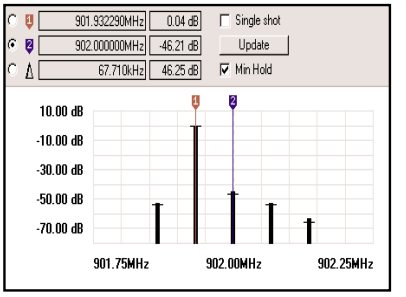
Manual Test

Spectrum Analyzer

Two additional traces are selectable with the FFT analyzer function in the manual test mode. An in-channel general purpose spectrum analyzer which covers the GSM900/1800 and 1900 bands, or an I/Q alignment bar graph display.



Spectrum Analyzer



I/Q Alignment

Both traces provide the user with a 70 dB dynamic range, two absolute and one relative marker function, as well as averaging. The combination of marker and min hold functions gives the user all the flexibility needed to make fast and very accurate mobile alignment possible.

Phase Profile

A peak phase profile display is available in manual mode, which through marker functions can be analyzed against timing or data bits

PhoneTest Application Software

The Test Head is designed to make terminal measurements according to ETS 300 607-1 Specification. These measurements are controlled from the PC interface by the PhoneTest Application software in the Windows environment. This software is supplied with the Test Head on disk.

Language Variants

A major advantage of the Windows Application software is the familiarity it offers to the user and the availability of language variants. PhoneTest is supplied with four selectable language variants, English, French, German and Chinese, both traditional and simplified. This enables the technician to work in his own language allowing lower labor costs to be employed.

Chinese language version

PC Requirements

The recommended minimum requirement for the PC to control the 2935 Test Head is a 66 MHz, 486 type PC with 16 MByte of RAM and running Windows 95 or Windows NT with a spare RS-232 connection. An RS-232 interconnecting lead is provided with the 2935 and the

PhoneTest application software; all you need to provide is the PC and the User. The application will run on PCs of a lower standard running Windows 95 but the speed of operation will be reduced accordingly. For users with a desktop PC which has a single RS-232 port used for mouse operation, an additional serial card can be purchased.

Low Cost of Ownership

With the PhoneTest application resident on the controlling PC, upgrades can be achieved quickly and easily at the user's premises. If the upgrade option (81504) is purchased any system enhancements will be automatically sent to the user.

A modular exchange program has been implemented with this product allowing fast fast repair turn around times.

Workshop Management Software

A range of "workshop management" software packages are available to use alongside PhoneTest.

PhoneTest-Repair

This software option provides the capability for quickly and efficiently generating repair and fault information to accompany the actual repair. Fault symptoms, defects, repair codes and parts used can be entered and added to warranty claims forms or saved to be recalled later from the optional PhoneTest-Manager.

PhoneTest-Manager

PhoneTest-Manager is a test area management software package that provides facilities for archiving and retrieval of test results, repair histories and workshop throughput and performance analysis. This software is invaluable for reducing tiresome paperwork tasks which divert skilled engineers from their primary functions. Increased efficiency, repair hints on-line, specific terminal type failure modes and more consistent reporting of failures are the major benefits of PhoneTest-Manager.

PhoneTest-Exchange

This option uses ODBC-32 (Open Database Communication) drivers for interfacing to an existing or new Management Information System with PhoneTest.

An example may be the reading in of job information e.g. customer's reported problem, name, etc. from the Goods-In entry procedure at the front desk through to the technician effecting the repair.

Many Service Centres will already be running their own database for accounting purposes and may want to link in the terminal test and repair data. PhoneTest-Exchange provides this link.

PhoneLib

PhoneLib provides a programming interface for customized Windows 95 and NT applications. A DLL interface is available for Visual C / BASIC programming and a VXI Plug and Play driver is available for development environments such as LabWindows.

Small Footprint, More Space

The measurement Test Head is housed in a small compact unit which can easily sit between the monitor and body of a desk mounted PC or concealed away under or above the workbench. By using the display and keyboard of a PC, the Test Head does not need to be regularly accessed freeing up valuable workspace in today's cluttered workshop environments.

System Configuration

For ordering purposes the 2935 comes complete with the PhoneTest software in all language variants and an RS-232 interconnect cable.

The Test Head requires minimum interfacing. The only facilities on its front panel are the power ON / OFF switch and the RF connection to the terminal under test, whilst on the rear are two RS-232 connections. One of the RS-232 connections provides the interface to the PC for control, the second provides a power-up diagnostic facility to test the integrity of the Test Head-PC link and cable connection.

RS-232 control eliminates the need for an expensive GPIB module for control whilst retaining high speed operation.

2935 Specification

Certain characteristics are shown as typical. These provide additional information for use in applying the instrument but they are unwarranted.

Digital Signal Generator

FREQUENCY

Range
GSM 900 Band 925 MHz to 960 MHz
GSM 1800 Band 1805 MHz to 1880 MHz
GSM 1900 Band 1930 MHz to 1990 MHz

Accuracy
As frequency standard

OUTPUT LEVEL

Range
–120 dBm to –40 dBm

Resolution
0.1 dB

Accuracy
Better than ±1.5 dB (Typically ±1 dB) for generator levels <-52 dBm and typically better than ±1.5 dB for generator levels ≥–52 dBm

OUTPUT IMPEDANCE
Nominally 50 Ω

VSWR
Better than 1.3:1

REVERSE POWER PROTECTION
10 W max

SPECTRAL PURITY

Harmonics
Typically better than –20 dBc

RF Carrier Leakage
Less than <1.0 µV PD generated at the carrier frequency across a 50 Ω load by a 2-turn 25 mm loop, 25 mm from the surface of the instrument with the output terminated in a 50 Ω sealed load

GMSK MODULATION - INTERNAL
GMSK, Bt 0.3

Phase Error
Typically <1.2° RMS
Typically <4° Peak

RF Receiver

FREQUENCY RANGE
GSM 900 Band 880 to 915 MHz
GSM 1800 Band 1710 to 1785 MHz
GSM 1900 Band 1850 to 1910 MHz

FREQUENCY ERROR METER

Burst type
Normal/Access

Frequency Error Range
±5 kHz

Resolution
0.5 Hz

Accuracy
As per frequency standard ±2 Hz ± resolution

TDMA POWER METER

Dynamic Range
–15 dBm to +40 dBm

VSWR
Better than 1.3:1

Power Reading
Average power over useful part of burst

Indication Units
dBm

Resolution
0.1 dB

Accuracy
Better than ±1.5 dB (typically ±1 dB) for P_{in} ≥–2 dBm and typically ±1.5 dB for P_{in} <-2 dBm

Input Power
10 W max

GMSK MODULATION METER

Burst Type
Normal/Access

Phase Error Range
10° RMS
±30° peak

Resolution
0.1°

Indication
2 digits and barchart

Phase Error Accuracy
Better than 1° RMS
Better than 4° peak

BURST TIMING METER

Burst type
Normal/Access

Range
–128 to +127 bits

Resolution
0.1 bits

Timing Accuracy
±0.1 bits

BER METER

Types
BER Class I
BER Class II
RBER Class Ib
RBER Class II
FER
Range 0 to 99%
Resolution 0.001%
Adjustable sample size.
Duration and % settled indication

Trace Displays

Following traces are available all with two marker operation

POWER PROFILE

Range
50 dB (40 dB for Access Bursts)

Burst Type
Normal/Access

Display
Full Burst or
Leading and Trailing ramp or

Useful Part

PHASE PROFILE
Range ±25°

Frequency Standard

Internal Frequency Standard
10 MHz

Temperature Stability
Better than 5 in 10^8, 0°C to 50°C

Ageing Rate
Better than 1 in 10^7 per year, after 1 month continuous use.

Warm Up Time
Less than 10 minutes to within 2 in 10^7

External Frequency Standard Input

Frequency
1, 2, 5 or 10 MHz

Input Level
Greater than 1 V peak to peak

Input Impedance
Nominally 1 kΩ

Supported Features

Controllable Parameters
BCCH ARFCN;
TCH ARFCN;TCH TN;
BCC; MCC; MNC; LAC;
TSC; IMSI-DETACH;
MIN LEVEL FOR ACCESS;
MS POWER; MS TIMING ADVANCE;
AUTHENTICATION CHALLENGE;
AUTHENTICATION RESPONSE;
RF GENERATOR LEVEL
MEASUREMENT AND PROTOCOL TIMEOUT PERIODS;
BER/RBER MEASUREMENT SAMPLES
POWER, FREQUENCY ERROR AND PHASE ERROR MEASUREMENT SAMPLES

TX MEASUREMENTS
POWER LEVEL
POWER PROFILE
RMS PHASE ERROR
PEAK PHASE ERROR
FREQUENCY ERROR
TIMING ADVANCE

RX MEASUREMENTS
BER I; BER II; BER Ib;
RBER II; FER,
RX LEV & RX QUAL

PROTOCOL FUNCTIONS
MS and BS Originated Call
MS and BS Originated Clear Down
Registration
Authentication
De-registration
Handoff
Dual Band handoff

RS-232 Interface

2 ports (one a test port)

Baud Rate
2,400 to 38,400 (autoranging)

Connector
9 way male “D” type

POWER REQUIREMENTS

AC supply

Voltage
90 V to 264 V

Supply frequency
45 Hz to 65 Hz

Max AC Power
80 VA

Electromagnetic Compatibility

Conforms with the protection requirements of the EEC Council directive 89/336/EEC.
Complies with the limits specified in the following standards:

EN55011 Class B	CISPR 11
EN50082-1	IEC 61000-4-2,3,4

Safety

Complies with IEC/EN61010-1 for class 1 portable equipment and is for use in a pollution degree 2 environment. The instrument is designed to operate from an installation category 2 supply.

Environmental

Rated Range Of Use
15 to 35°C and up to 95% relative humidity at 35°C.

Storage and Transport.
Temperature -40 to +70°C

Altitude
Up to 2500 m (pressurized freight at 27 kPa differential)

Dimensions and Weight

Height	Width	Depth
120 mm	415 mm	400 mm

Weight
Less than 12 kg (<25 lb)

Versions and Accessories

When ordering please quote the full ordering number information.

Ordering Numbers	***Versions***
2935	GSM 900/1800/1900 Radio Test Solution including 2935 Test Head
	PhoneTest Software and Getting Started Manual
	Serial RS-232 Cable Assembly
	Mains Supply Cord
	Supplied with the following language variants: English, French, German and Chinese. Also evaluation copies of 81501, 81502 & 81503.
	Software Options
81500	PhoneTest Bundle includes 81501/81502/81503
81501	PhoneTest-Repair
81502	PhoneTest-Manager
81503	PhoneTest-Exchange
81504	Software upgrade for 81501/2/3 (currently enabled options only)
81505	PhoneLib
	Optional Accessories
54212/001	GSM Phase 2 Plug-In Test SIM
54212/002	GSM Phase 2 Full Size Test SIM
46884/650	Serial Cable 9 way F to 9 way F

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