6104 Digital Radio Test Set

- Easy to use, fully integrated test set optimized for maintenance and servicing of GSM850, GSM900, GSM1800 and GSM1900 mobiles
- GPRS single slot receiver BLER
- Fast and accurate measurements taken at the touch of a button
- Modulation analyzer for alignment and diagnostics
- Supports Full Rate, Half Rate and Enhanced Full Rate speech and 3 digit MNC for North America
- Runs customer designed test sequences
- Supports dual-band handover
- "No button start" for ultimate simplicity of operation

GENERAL DESCRIPTION

The Racal Instruments Wireless Solutions (RIWS) 6104 Digital Radio Test Set, has been purposely designed for mobile test. It is a high performance, portable, fully integrated instrument designed for the service and repair of modern digital mobile telephones. Aimed at GSM850, GSM900, GSM1800 and GSM1900 the 6104 gives fast, accurate results. The user controls have been carefully designed to allow operators of any skill level to successfully test and fault find mobile phones. A 'no button start" feature allows them to be tested rapidly without even touching the instrument. Another mode provides all key measurements to be viewed simultaneously with any reading out of limits being highlighted, making adjustment simplicity itself. The 6104 offers six testing modes to suit any user and application.

SINGLE TESTS

- Single Tests Include - Call Set-up, Call Terminate, Handover, Transmitter, Receiver, Sensitivity, Voice Loopback, Speech, Power Level Steps and Timing Advance Tests.
- Easily modified parameters.
- Test results are viewed using clear numerical and graphical displays.
- Pass or fail indicator given.

GPRS

The following tests are provided for GPRS mobiles:

- Full GPRS attach and detach.
- Support for the four GPRS packet data coding schemes.
- GPRS BLER (Block Error Ratio) verifies the ability of the mobile to correctly determine the integrity of received data packets.

AUTOMATIC SEQUENCES

- Fully automatic Go/No-Go fault finding. Using the 6104 built in tests increases the speed of testing and increases throughput.
- Step by step fault finding to determine the exact nature of the fault.
- User defined sequences can be easily produced either from the front panel through a special learning mode or via a PC running a text editor. For the user's convenience the sequences can then be stored on a PCMCIA memory card and then run from one of the test set's 2 memory card slots.

MULTIMODE

- Provides continuously updated numeric and graphic displays of all key transmitter and receiver measurements. The results are compared to the normal GSM test limits and if a reading exceeds these limits it becomes highlighted.
- Parameters can be changed interactively and any protocol necessary to perform the changes is automatically generated making the 6104 very intuitive to operate.

UNSYNCHRONISED MODE

- Unsynchronized mode turns the 6104 into a signal generator and tuned receiver which provides the user with all the diagnostic facilities for testing RF modules and partially functioning phones, without using the Layer 2/ Layer 3 protocols.
- IQ modulation can be used for optimizing a mobile's modulator settings.
- Unsynchronized mode can be used to calibrate and realign the mobile; it should be noted that the 6104 unsynchronized mode is supported by all the leading manufacturers' service software.

REMOTE OPERATION

- 6104 offers full IEEE488 (GPIB) remote control of all tests and readings, including graph data.
- Remote control of 'Multimode' means that transmitter and receiver measurements can be performed concurrently and parameters and settings are quickly changed with simple commands. This vastly increases the speed of gathering the relevant test information.

The use of a large LCD display, coupled with intuitive streamlined soft keys, ensures that the user can select the required operation, change parameter values and read test results quickly and clearly without the need for an external PC or monitor. The use of soft keys and a spinwheel also allows the user to move quickly and logically through the menu structure and select the desired operation without any ambiguity.

THE FUTURE

RIWS has a policy of ongoing product enhancement. As a result, the instrument firmware is periodically updated to reflect changes in standards and new market requirements. A software support scheme enables customers' units to be automatically updated as soon as new facilities become available.

COMPREHENSIVE SIGNALING PROTOCOL

All signaling between the Test Set and the mobile-under-test is completely automatic so that the user does not need to have detailed knowledge of signaling standards. The 6104 even knows when to use phase 2 protocol. Individual signaling procedures can be invoked including:

- Location updating
- Call set-up, MO & MT
- Call termination, MO & MT
- Call lost
- Handover (inc. Dual-Band)
- Emergency calls
- Frequency hopping
- Timing advance
- Calling party identity

SUPPLEMENTARY FEATURES

- Dual Band Handover - With the introduction of dual-band mobiles and with networks operating on both bands, it is essential that the phones can Camp-on to the correct BCCH and be handed over from one band to another. The 6104 can simulate a BCCH on either band whilst handing over TCH in either direction.
- Auxiliary RF Port
- Synchronization Output - For synchronizing external equipment.
- Test SIM - Every 6104 is supplied with one Test SIM, additional Test SIMs may be purchased, see Option 70.
- Extended SMS 14.4k data.

SUPPORT

Not only is the 6104 good value for money, but it has also been designed to be simple and economic to maintain. The pre-calibrated modules and self diagnostic capabilities mean that repair times and costs are minimized. This is further backed up by a world-wide network of service centers offering a full range of repair, calibration and support facilities, RIWS has a growing library of pre-written test sequences and software modules available free to 6104 customers. Library sequences are a good way to see what is possible and a good point to start programming from.

Further information about the range of hardware and software support options can be found at www.aeroflex.com

OPTIONS

The 6104 in its basic form is a complete integrated test set capable of performing the full range of measurements on a GSM mobile. To complement this RIWS can supply a range of options and accessories which significantly enhance the applications of the 6104.

TECHNICAL SPECIFICATION

Test Capability

Functional Tests:	Call Set up - MO & MT Call Termination - MO, MT & Call lost Synchronized Handover
Transmitter Tests:	Tx Test – Power, Phase & Frequency Error, Power Profile Modulation Spectrum, Burst Timing Power Levels/Steps Timing Advance
Receiver Tests:	Rx Test – CII & CIb BER, FER, RXQUAL, RXLEV, GPRS BLER Sensitivity (Absolute)
Speech Tests:	Voice Loopback Send speech Receive speech
SMS/data & Fax:	SMS/E-SMS Data 2.4T – 14.4T & 2.4NT – 14.4NT Fax

Signal Source

Modulation:	GMSK & CW
Frequency	
Frequency Bands:	869-894 MHz (GSM 850) Channels 925-960MHz(E-GSM) Channels from 0 to 124,975 to 1023. 1.805 - 1.880GHz (GSM1800) Channels from 512 to 885. 1.930 - 1.990GHz (GSM1900) Channels from 512 to 810.
Resolution:	1Hz
Main RF Input/Output Level	
Range:	-40dBm to -120dBm ± 1.5 dB (E-GSM)[1,2] ± 2.0 dB (DCS1800)[1,2] ± 2.0 dB (GSM1900)[1,2]
Resolution:	0.1dB
Auxiliary RF Input/Output Level	
Range:	-25dBm to -105dBm

Measuring Receiver

Frequency Bands:	824 - 849MHz (GSM 850) Channels 880 - 915MHz (E-GSM) 1.710 - 1.785GHz (DCS1800) 1.850 - 1.910GHz (GSM1900)
Main RF Input/Output	
Impedance:	50 ohms, nominal
VSWR:	1.3:1
Connector:	N Type female
Input Level Range	+46dBm to -1dBm PEP
Max. Power	80W PEP; 10W continuous
Auxiliary RF Input/Output	
Connector type:	TNC female
Input Level Range:	±31dBm to -16dBm PEP
Max. power:	2.5W PEP; 0.3W continuous

Measurements

Phase Error	
Range:	10° RMS, ±30° peak
Accuracy RMS:	<±0.3° at 5°
Accuracy Peak:	<±7.2°
Frequency Error	
Range:	±2.5kHz
Accuracy:	±6.5Hz + freq. Std.
Power Level	
Range:	+46dBm to -1dBm PEP
Absolute Accuracy	<±1.0dB, (EGSM)[2] <±1.3dB, (DCS1800, GSM1900)[2]
Relative Accuracy:	<±0.4dB
Pulse Profile	
Dynamic Range:	>48dB
Time Arrival	
Accuracy:	0.05 bits
Modulation Spectrum	
Dynamic Range:	>52dB
Frequency Span:	1MHz (5 channels)

Interfaces

Memory Card:	2 sockets, PCMCIA V2.0
Card size:	Type 1,2 or 3
Card types supported:	SRAM, ATA flash EEPROM and hard disk
Synchronization Output:	For synchronizing external equipment such as a spectrum analyser
GPIB:	ANSI/IEEE 488.2 - 1987
Compatibility Subset:	SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT0, C0, E1
RS232 Interfaces:	2 configurable ports for printing and control 9 way male D-Type
Parallel Printer:	25 way female D-Type

General

Voltage ranges:	85 - 130V and 180 - 262V AC
Frequency range:	45 - 66Hz
Power consumption:	170VA maximum
Frequency Standard	
Internal:	±1 x 10^{-6}
(all sources of error)	±1.2 x 10^{-7} (Option 04E) ±3.5 x 10^{-8} (Option 04F)
External frequencies:	10MHz ± 2.5 ppm (13MHz, Option 04E/04F) -2dBm to +19dBm into 50 ohm
Output:	10MHz or 13MHz
(Option 04E/04F)	+9dBm nominal into 50 ohm
Dimensions and Environmental	
Height:	210mm
Width:	350mm
Depth:	420mm
Weight:	12kg approx.
Operating Temperature:	0 to 50° C
Calibration Period:	1 year
EMC:	Complies with EN61326-1:1997+A1:1998 Class B (emissions) EN61326-1:1997+A1:1998 Table 1 (immunity) BS EN50082-1 (immunity)
Safety:	Complies with BS EN61010-1

Notes: 1. For signals >-110dBm
2. Valid for 15°C to 35°C

ORDERING INFORMATION

6104 Digital Radio Test Set

Radio Systems

Option 01	GSM 900 operation
Option 02	GSM 1800 operation
Option 03	GSM 1900 operation
Option 06	GSM 1900, 1800 and 1900
Option 08	GSM 850 operation

Frequency Standards

Option 04T	Normal Frequency Standard
Option 04E	High Stability Frequency Standard
Option 04F	Very High Stability Frequency Standard

Encryption

Option 10R	Encryption, factory fit

Software Options

Option 313	GPRS single slot receiver testing software
Option 314	Voice Quality Analysis (VQA)
Option 320	Enhances Short Message Service and Cell Broadcast Software
Option 330	14.4 kbs Data Functionality
Option 340	Vodaphone Fixed Sequence
Option 341	Nokia Fixed Sequence
Option 342	Ericsson Fixed Sequence

ACCESSORIES

Option 61	Soft padded carrying case with shoulder strap and accessory pocket.
Option 62	Rigid transit case for heavy duty use (exceeds ATA 300 Category 1)
Option 64	Front Panel Protection Cover
Option 70	Test SIM GSM/DCS1800/GSM1900 (supplied and miniature SIM and full size adapter)
Option 77	2M byte SRAM memory card
Option 79	2G byte Hard disk drive
Option 90	Test Set / PC RS232 download cable, (9 way D-type)
Option 91	Test Set / Printer RS232 cable (25 way D-type)
Option 92	Test Set / Printer parallel cable

SUPPORT OPTIONS

Option S1	1 year Software support
Option S2	2 years Software support
Option S3	3 years Software support
Option C0	Calibration certificate
Option C1	1 annual Calibration
Option C2	2 annual Calibrations
Option C3	3 annual Calibrations
Option W1	1 year Extended warranty
Option W2	2 years Extended warranty
Option W3	3 years Extended warranty
Option Si0	Enhanced Silver service contract during initial warranty period
Option Si1	1 year Silver service contract
Option Si2	2 years Silver service contract
Option Si3	3 years Silver service contract
Option G0	Enhanced Gold service contract during initial warranty period
Option G1	1 year Gold service contract
Option G2	2 years Gold service contract
Option G3	3 years Gold service contract

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