will'tek

# Willtek 8100

## GPR General Purpose Receiver

- Wide frequency range 100 kHz to 1 GHz, 1.7 to 2.5 GHz
- High sensitivity and overload warnings
- 130 dB total dynamic range, over 80 dB instantaneous
- 0.5 dB level accuracy
- Light and truly portable
- Full working day's use on internal batteries

# True field instruments with laboratory accuracy

## Wide application range

– Transmitter Site Surveys
– Interference Tracing
– Voice Monitoring
– Direction Finding
– Tracing of "Rusty Bolt" effects
– Channel Occupancy
– Band Usage
– Remote Monitoring
– Field Checking of Modulation

In the increasingly crowded VHF/UHF frequency band the need for spectrum management has never been more important than today. The 8100 GPR series of receivers and associated software will allow sophisticated measurements and spectrum scanning to be conducted with ease and speed with no sacrifice in accuracy. The 8100 GPR series offers a portable solution to many measurement and monitoring problems.

The 8100 GPR series has gained acceptance throughout the world in many applications covering 100 kHz to 2.5 GHz. It is an ideal measuring tool for mobile communications network planning and maintenance. Together with Willtek integrated software packages they can form the basis of comprehensive measurement systems for:

– Signal monitoring
– Signal surveys – pedestrian and vehicular
– Broadcast coverage
– Cellular performance
– Personal communications networks

## Easy operation

The front panel display allows access to all parameters and features of the unit and it has variable contrast to facilitate use in all lighting conditions. A signal level can be displayed numerically in selected units. For trend indications a bar graph indicates the level over the 84 dB dynamic range of the receiver (130 dB using internal automatic RF and IF attenuator). All main parameters – tuned frequency, measurement bandwidth, RF detector and time constants – are displayed. The squelch threshold is indicated on the bar graph and can be conveniently set from the front panel.

The modulation level of speech transmissions can be measured dynamically under operational conditions. A direct reading of FM deviation or peak AM percentage is displayed. Two isolated, squelch operated change-over relays are provided to allow for simple remote monitoring, such as tape recorder switching, without the need of a controller.

For direct field strength readings in dBmV/m the antenna factors are automatically added to the signal strength reading when standard antennas are used.

For measurements on the move it is critical to have fast transfer of calibrated signal strength data. The 8100 GPR series can sample at a rate of 200 per second allowing signal strengths to be captured accurately. These measurements can be transferred over RS-232 allowing measurements to be made at speeds of up to 100 km/hour.

In their scanning mode the 8100 GPR receivers can scan sequentially from any selected start frequency to any stop frequency within their range. The scan is automatically stopped on any frequency with a signal level above a specified threshold. Variable "dwell" and "hold" times can also be selected. Up to 100 frequencies can be locked out during scanning.

Priority channels allow any two frequencies to be monitored on a regular basis as a "background" task of the receiver. Each priority channel has a variable sampling time. In priority mode, as soon as a selected signal is present, the receiver automatically holds on that frequency and indicates its measurement. This facility is ideal for tracing and monitoring intermittent or illegal signals whilst allowing normal measurement operations.

At the press of a button all receiver settings are captured and transferred immediately to memory for subsequent analysis. Up to 40 frequencies and settings can be stored and edited, each of which is displayed on a "Channel List".

An RS-232 interface is provided for the external control of all receiver functions and the transfer of all measurement data.

## Specifications

### Frequency

| | |
|---|---|
| Range | 100 kHz to 26 MHz* |
| | 26 to 1000 MHz |
| Accuracy | 2.5 kHz |
| Tuning increments | 0.5, 1, 5, 6.25, 10, |
| | 12.5, 20, 25, 50 kHz steps |
| Frequency offsets | 5, 6.25, 10, 12.5, 25 kHz steps |
| Frequency scanning | between user set limits |
| Lockout frequencies | Up to 100 |
| Hold time | adjustable 0 to 9.9 seconds |
| Dwell time | adjustable 0 to 9.9 seconds |
| Resume time | adjustable 0 to 9.9 seconds and off |

### Amplitude

| | |
|---|---|
| Level accuracy | ±1.5 dB max |
| | typically |
| | ±0.5 dB (26 to 1000 MHz) |
| 7.5 kHz bandwidth | ±3 dB (100 kHz to 26 MHz) |
| Measuring range | -10 dBµV to +110 dBµV |
| | (26 to 1000 MHz) |
| 7.5 kHz bandwidth | +5 dBµV to +110 dBµV |
| | (100 kHz to 1 MHz) |
| Average detection | 0 dBµV to +110 dBµV |
| | (1 to 26 MHz) |
| Level readout resolution | 0.1 dB |
| Displayed range | 84 dB bargraph display |
| Level detection | average, peak |
| Level detection time constants | |
| | average 5 ms, 0.1 s, 1 s |
| | peak hold time 1 s |
| Measuring units | dBµV, µV, dB relative, |
| | dBµV/m, dBm |

### Selectivity

| | |
|---|---|
| IF frequencies | 301.5 MHz, 21.4 MHz, 455 kHz |
| Bandwidth 3 dB | |
| 8101 | 7.5, 15 and 120 kHz |
| 8102 | 7.5, 15, 20 and 120 kHz |
| 8103 | 7.5, 15, 25, 120 kHz |

(*reduced specification)

| | |
|---|---|
| Adjacent channel | greater than 45 dB |
| | (12.5 kHz channel spacing) |
| Rejection | greater than 50 dB |
| | (25.0 kHz channel spacing) |
| Image rejection | 50 dB minimum |
| | typically 70 dB (level required |
| | to produce an indication of 0 dBµV) |
| IF rejection | 70 dB minimum |
| | (230-400 MHz, 50dB minimum) |
| | typically 80 dB (level required |
| | to produce an indication of 0 dBµV) |
| Spurious response rejection | typically 50 dB |
| | (level required to produce |
| | an indication of 0 dBµV) |
| Blocking | 75 dBµV minimum |
| | (1 dB level change, |
| | 0 dBµV signal, 2 MHz away) |
| Intermodulation | 55 dB minimum |
| (1 mV potential difference input, 50 kHz separation) | |

### Input

| | |
|---|---|
| LRF input impedance | nominally 50 Ω |
| Antenna input | "N" type connector |
| Input VSWR | less than 2 |
| | (1 without RF attenuation) |
| | less than 1.4 |
| | (1 with RF attenuation selected) |
| RF attenuation | 20 dB |
| IF attenuation | 10, 20 or 30 dB |
| Max. safe level | 3.5 V rms (250 mW) |
| | +23 dBm at max. sensitivity |
| Overload display | visual and audible |

### Audio

| | |
|---|---|
| Audio demodulation | AM, FM |
| Typical signal-to-noise ratio | |
| (S+N/N, audio filter selected): | |
| AM: | typically 10 dB (6 dB < 26 MHz) |
| | for 0 dBµV signal, 30 % modulation |
| | 1 kHz tone, audio filter in |
| FM: | typically 20 dB (14 dB < 26 MHz) |
| | for 0 dBµV signal, 1.5 kHz peak deviation |
| | 1 kHz tone, audio filter in. |
| Audio filter | 300 Hz ±50 Hz to 1 dB to 2.4 kHz |
| | ±300 Hz to 3 dB (switchable) |
| 600 Ω line output | adjustable from front panel |
| | nominally 0 dBm (600 Ω) |
| Audio output | 1.0 W to 3.0 W |
| | (dependent upon battery state) |

### Modulation Measurement (with 400 Hz Modulation)

| | |
|---|---|
| AM | |
| Range | 0 to 90% (0 to 126% indicated) |
| Accuracy | 5% |
| FM | (7.5 kHz bandwidth) |
| Range | 0 to 3.7 kHz peak deviation |
| | (0 to 4.2 kHz indicated) |
| Accuracy | 500 Hz |
| FM | (15 kHz bandwidth) |
| Range | 0 to 7.5 kHz peak deviation |
| | (0 to 8.4 kHz indicated) |
| Accuracy | 500 Hz |
| FM | (20 kHz bandwidth) |
| Range | 0 to 10 kHz peak deviation |
| | (0 to 16.8 kHz indicated) |
| Accuracy | 500 Hz |
| FM | (25 kHz bandwidth) |
| Range | 0 to 12.5 kHz peak deviation |
| | (0 to 16.8 kHz indicated) |
| Accuracy | 500 Hz |
| FM | (120 kHz bandwidth) |
| Range | 0 to 60 kHz peak deviation |
| | (0 to 84 kHz indicated) |
| Accuracy | 5 kHz |

### Auxiliary Outputs

| | |
|---|---|
| Serial data | RS-232 control of all functions |
| Loudspeaker | 1.0 W to 3.0 W into 8 Ω |
| | (dependent upon battery state) |
| Low level audio (line out) | variable using front panel |
| | control but nominally 0 dBm (600 Ω) |
| Signal level | full scale on bargraph 6 V |
| | noise level approx 2 V (typical) |
| Two squelch operated changeover relay contacts | |
| | maximum 0.5 A, 28 V DC |
| | contacts electrically isolated from receiver |
| Demodulation | unfiltered demodulator output |

### General

| | |
|---|---|
| Screening | 60 dB |
| Spurious emissions | 1 nW maximum |
| Battery state indicator | visual on display |
| | plus audible warning |
| Battery life | 8 hours, dependent upon volume level |
| Charging time | 16 hours |
| Weight | 6 kg (including case and batteries) |
| Dimensions | 330 x 115 x 240 mm (including case) |
| Operating temperature range | 0 to 40°C |
| Lock | front panel control lock |

## Ordering information

| | |
|---|---|
| 8101 GPR General Purpose Receiver<br>BW: 7.5, 15, 120 kHz | M 100 601 |
| 8102 GPR General Purpose Receiver<br>BW: 7.5, 15, 20, 120 kHz | M 100 602 |
| 8103 GPR General Purpose Receiver<br>BW: 7.5, 15, 25, 120 kHz | M 100 603 |
| 8010 Hindsite RF Propagation Test Software<br>MS Windows 95, 98, NT 4.0, 2000, XP | M 897 825 |
| 8181 GPR Down Converter<br>1700 MHz to 2500 MHz | M 248 618 |



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