Miniport Receiver EB200

Portable monitoring from 10 kHz to 3 GHz

- Ergonomic design for on-body operation
- Continuous frequency range 10 kHz to 3 GHz
- Detection of unlicensed transmitters

- Location of close-range to medium-range targets with the aid of Handheld Directional Antenna HE200
- Digital IF section with 12 bandwidths (150 Hz to 150 kHz)
- Fast, accurate level indication across 110 dB dynamic range

- Scanning modes
  - Frequency scanning
  - Memory scanning
- Frequency spectrum (option)
- IF panorama display (option)
- Remote-controllable via RS232 CPPP or LAN (Ethernet 10Base-T)
Brief description

Miniport Receiver EB200 with Active Directional Antenna HE200 is a portable unit for radiomonitoring in the wide frequency range from 10 kHz to 3 GHz. Whether used for monitoring emissions, detecting interference or locating mini-transmitters irrespective of their position, EB200 offers features unrivalled in its class. The favourably priced and compact receiver with LAN interface may also be used in computer-based stationary systems.

The EB200 is characterized by high input sensitivity and frequency setting accuracy throughout the frequency range from 10 kHz to 3 GHz.

Its small dimensions and low weight as well as a sturdy, pickup-proof die-cast aluminium housing with well-protected integrated operating elements make the EB200 ideal for use in places which cannot be reached with a vehicle. Its low power consumption permits battery operation typically of four hours. The EB200 battery pack is easily accessible and can be exchanged quickly.

In case of power supply interruption, all the data is stored. Operation can thus be resumed immediately after the power supply is restored.

EB200 fulfils the following tasks:

- Monitoring of given frequencies, eg storage of 1 to 1000 frequencies, squelch setting, constant monitoring of one frequency or cyclical scanning of several frequencies
- Searching in a frequency range with freely selectable start and stop frequency and step widths of 1 kHz to 9.999 MHz
- Location of close-range to medium-range targets with the aid of Handheld Directional Antenna HE200
- Detection of undesired emissions including pulsed emissions
- Detection of unlicensed transmitters communicating illegally or interfering with licensed transmission
- Protection against tapping by detecting miniature spy transmitters (bugs)
- Monitoring of one’s own radio exercises in a service band
- Monitoring of selected transmissions
- Remote-controlled operation via modem and PC in coverage measurement and monitoring systems
Digital IF section

The EB200 covers the wide frequency range from 10 kHz to 3 GHz. Processing all signals available with optimum signal-to-noise ratio requires a large number of IF bandwidths. This problem cannot be solved by means of analog filters as space is limited. The solution is a digital IF section in which a wide variety of different filters can be implemented in a relatively small space with the aid of DSP. The EB200 has 12 IF bandwidths between 150 Hz and 150 kHz. The following digital demodulators are available: AM, FM, LSB, USB and CW. If the receiver is fitted with the IF panorama option, the number of bandwidths is increased to 15 up to 1 MHz. Bandwidths over 150 kHz are for level and deviation measurement as demodulation is not possible.

Scanning modes

Frequency scanning
It is possible to define a frequency range to which a complete data set can be allocated. In addition to receiver settings, the following scan parameters may be included in the data set:

- Step width
- Signal threshold (dBuV)
- Dwell time (s)
- Hold time (s)
- Signal-controlled continuation
- Suppression (individual frequencies or search ranges)

Memory scanning
The EB200 uses 1000 definable memory locations. A complete data set, such as frequency, mode of demodulation, bandwidth, squelch level, etc, can be assigned to each memory location. The memory content can be edited or overwritten with the results of a scanning run. The content of any memory location can be transferred to the receiver manually using the RCL key, by turning the setting knob or automatically by activating the memory scanning process.

Frequency spectrum
Fitted with the frequency spectrum (DIGI-Scan) option, EB200 scans the frequency range of interest with digital control and displays the associated spectrum. Emissions detected can be seen at a glance. Aural monitoring of the information is possible by simply pressing a softkey. EB200 then goes to the DIGI-Scan listen mode. The stored spectrum is displayed in the background, and the emission of interest can be selected and monitored by marking it with the frequency cursor.

Location of miniature transmitters at close range is possible in the differential mode of the DIGI-Scan option. In this mode, the displayed spectrum is stored as a reference. Current spectra are superimposed on the reference spectrum, and any new signals or variations in signal strength are clearly discernible as peaks. If the measurement is made with the distance, the field strength of transmitters at close range varies to a greater extent than that of transmitters located far away. This differential display ensures fast and reliable location of miniature transmitters even in case of spread-spectrum transmission.
Miniport Receiver EB200

Function

The EB200 is a superhet receiver with a third intermediate frequency of 10.7 MHz. In spite of its compact size, it was possible to implement an advanced receiver concept. The receiver input is equipped with a high-pass/lowpass combination or tracking preselection, as required, to reduce the signal sum load. Intermodulation suppression equals that of many receivers used in stationary applications.

The low degree of oscillator reradia
tion is a result of large-scale filtering. A modern synthesizer concept featuring very low phase noise permits switching times of less than 3 ms. Effective frequency and memory scanning is thus possible.

Operation

The operational concept of the EB200 meets all the requirements of a modern radiomonitoring receiver, ie all the essential functions, such as modes of demodulation, bandwidths, etc, can be set via labelled keys directly.

Settings that are not used during current operation are available in sub menus. The hierarchy of menu control is implemented according to priorities for ease of use.

Serviceability

Modern design and the use of plug-in modules guarantee short repair times. All the modules may be exchanged without any recalibration or adjustments being required.

Remote control

All the receiver functions can be remote-controlled via the serial RS232C interface of a controller. For measurement tasks, the LAN option provides a hundred times faster speed as well as easy connection and control of multiple receivers from a PC. With these different versions the user can select the type of remote control to suit his tasks.

State-of-the-art design

The receiver is designed for both mobile and stationary operation. Careful screening and filters in all the input and output lines guarantee extremely low spurious as well as high interference rejection.

BITE

The receiver is permanently monitored by built-in test equipment. If deviations from the nominal are detected, an error message is output with a code informing on the type of fault.

Serviceability

Modern design and the use of plug-in modules guarantee short repair times. All the modules may be exchanged without any recalibration or adjustments being required.

Remote control

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Handheld Directional Antennas

Uses

The handy and highly broadband Active Directional Antenna HE200 in conjunction with portable receivers (eg EB200) is ideal for locating transmitting and interfering sources. The direction is found by pointing the antenna towards the direction of maximum signal voltage. The overall frequency range from 0.01 MHz to 3000 MHz is covered by 4 exchangeable broadband antenna modules each with a distinct directional pattern. A low-noise broadband amplifier may be added to increase sensitivity in the active mode. The amplifier is bypassed in the passive mode and in this case the antenna may also be used in the vicinity of strong transmitters.

Description

A broadband cardioid directional pattern is obtained in the frequency ranges 20 MHz to 200 MHz and 200 MHz to 500 MHz by using a loaded loop antenna in two different sizes. A log-periodic dipole antenna covers the range 500 MHz to 3000 MHz with a directional pattern. A loop antenna is available as an option for the lower frequency range of 0.01 MHz to 20 MHz.

The four RF modules can be exchanged by means of a quick-release catch provided at the supply and display unit. The supply and display unit comprises the following modules:

- Antenna electronics made up of low-noise amplifier as well as active/passive switchover circuit
- Active/passive switchover by means of relay

The low-noise amplifier is bypassed in passive mode and has no supply voltage. Passive mode is thus also possible without batteries and external voltage supply. The antenna should only be switched to active mode if there are no strong transmitters in close vicinity and if the sensitivity of the receiving system (antenna with receiver) in the passive mode is not sufficient to detect the signal. When the amplifier is activated, a yellow LED on the rear of the supply and display unit indicates whether the supply voltage from battery or external source has fallen below the permissible range.

*) For the unambiguous determination of the angle of incidence of a signal, at least two different sites are required. The transmitter is to be located at the intersection point of the DF beams.
Specifications

Frequency range
10 kHz to 3 GHz
- 1 kHz, 100 Hz, 1 kHz or in selectable increments
- ≤ 1.5 × 10^-11 to -10°C to +55°C
- ≤ 0.5 × 10^-11/year
- ≤ 100 dBc/Hz at 10 kHz offset

Antenna input
- Oscillator reradiation
- Synthesizer setting time
- Connectors: 10 MHz, BNC
- Bidirectional reference frequency
- Digital IF output serial data (clock, data, frame)
- Inputs/outputs
- Frequency scan START/STOP/STEP definition with automatic memory scan 1000 definable memory locations to scan characteristics
- Signal level indication graphical as level line or numerical
- AFC digital retuning for signals unstable in
- Gain control AGC, MGC
- Squelch signal-controlled, can be set from deviation indication 15 (150 Hz to 1 MHz) only with
- IF bandwidths for level and
- Demodulation
- AM, FM, USB, LSB, CW
- Squelch
- Gain control
- RF + IF control
- A/C
-国王控制信号在接收信号不稳定的频率
- Deviation indication
- Signal level indication
- graphical with tuning label
- graphical as level line or numerical
- internal module, ranges 25, 50, 100, 200, 500, 1000 kHz
- IF panorama display (option SU)

Scan characteristics
- Automatic memory scan
- 1000 defined memory locations to each of which a complete data set can be allocated
- Frequency scan
- 1 kHz, 100 Hz, 1 kHz or in selectable increments
- START/STOP/STEP definition with receiving data set

Inputs/outputs
- Digital IF output
- serial data (clock, data, frame)
- up to 256 kbps: 2 x 16 bit
- Bidirectional reference frequency connectors in
- out
- 10 MHz, BNC
- 0.1 V to 1 V: R = 500 Ω
- 0 dBm, R = 50 Ω
- AF signal, 2 x 16 bit
- ±5 MHz uncontrolled for external panoramic display
- AF output, balanced
- Loudspeaker output
- Headphones output
- Output level: signal level
- BITE
- monitoring of test signals by means of loop test

Data interface
- Option
- RS232 C PPP
- Option
- LAN (Ethernet 10Base-T)

General data
- Operating temperature range
- -10°C to +55°C
- 0°C to +50°C
- Storage temperature range
- -40°C to +70°C
- Humidity
- Shock
- Vibration (sinewave)
- Vibration (noise)
- Electromagnetic compatibility (EMC)
- Power supply
- Batteries: battery pack (typ. 6 h operation) or DC 10 V to 30 V (max. 22 W)
- Dimensions (W × H × D)
- 210 mm × 88 mm × 270 mm
- Weight (without battery pack)
- Battery pack
- 4 kg
- 1.5 kg

Directional antennas HE200/HE200HF
- Frequency range
- 0.01 MHz to 3000 MHz
- Antenna modules
- 20 MHz to 200 MHz, with 3 plug-in antennas
- 200 MHz to 500 MHz, loaded loop antenna
- 500 MHz to 3000 MHz, log-periodic antenna
- Option
- 0.01 MHz to 20 MHz
- 25 dB
- 25 dB
- 10 dB
- 10 dB
- 10 dB
- 70 dB, typ. 80 dB
- 70 dB, typ. 80 dB
- 1.9 g (rms)
- Weight
- 5 mA in passive mode
- 0 mA in passive mode
- 10 mA in active mode
- Circular vertical pattern of system
- Nominal impedance 50 Ω
- Nominal impedance
- SWR
- Gain
- Field strength sensitivity
- Linearity of amplifier
- Current drain
- 55 mA in active mode
- 0 mA in passive mode
- Power supply
- Dimensions (W × H × D)
- 470 mm × 360 mm × 180 mm
- (in transport case)

AF output, balanced
Loudspeaker output
Headphones output
Output level: signal level
BITE
monitoring of test signals by means of loop test
Data interface
Option
RS232 C PPP
LAN (Ethernet 10Base-T)
General data
Operating temperature range
- -10°C to +55°C
- 0°C to +50°C
Storage temperature range
- -40°C to +70°C
Humidity
Shock
Vibration (sinewave)
Vibration (noise)
Electromagnetic compatibility (EMC)
Power supply
Batteries: battery pack (typ. 6 h operation) or DC 10 V to 30 V (max. 22 W)
Dimensions (W × H × D)
210 mm × 88 mm × 270 mm
Weight (without battery pack)
Battery pack
4 kg
1.5 kg
Directional antennas HE200/HE200HF
Frequency range
0.01 MHz to 3000 MHz
Antenna modules
20 MHz to 200 MHz, with 3 plug-in antennas
200 MHz to 500 MHz, loaded loop antenna
500 MHz to 3000 MHz, log-periodic antenna
Option
0.01 MHz to 20 MHz
25 dB
25 dB
10 dB
10 dB
10 dB
70 dB, typ. 80 dB
70 dB, typ. 80 dB
1.9 g (rms)
Weight
5 mA in passive mode
0 mA in passive mode
10 mA in active mode
Circular vertical pattern of system
Nominal impedance 50 Ω
Nominal impedance
SWR
Gain
Field strength sensitivity
Linearity of amplifier
Current drain
55 mA in active mode
0 mA in passive mode
Power supply
Dimensions (W × H × D)
470 mm × 360 mm × 180 mm
(in transport case)
Ordering information

**EB200**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miniport Receiver</td>
<td>EB200 4052.2000.02</td>
<td></td>
</tr>
<tr>
<td>Accessory supplied:</td>
<td>power supply 110/230 V, 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td><strong>Recommended extras</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrying Case (telescopic antenna, headset, belt and space for EB200, battery pack)</td>
<td>EB200SC 4052.9304.02</td>
<td></td>
</tr>
<tr>
<td>Battery Pack</td>
<td>EB200BP 4052.4102.02</td>
<td></td>
</tr>
<tr>
<td>Internal IF Panoramic Unit</td>
<td>EB200SU 4052.3206.02</td>
<td></td>
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<tr>
<td>RF Spectrum DIGI-Scan</td>
<td>EB200DS 4052.9604.02</td>
<td></td>
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<tr>
<td>LAN Interface</td>
<td>EB20084 4052.9156.02</td>
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</tr>
<tr>
<td>Rack Adapter</td>
<td>EB200ZZ 4052.8250.02</td>
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</tr>
</tbody>
</table>

**Handheld directional antennas**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE200</td>
<td>20 MHz to 3 GHz</td>
<td>4050.3509.02</td>
</tr>
<tr>
<td>HE200 comprises:</td>
<td>Loaded loop antenna 20 MHz to 200 MHz</td>
<td>0701.5702.00</td>
</tr>
<tr>
<td>Loaded loop antenna</td>
<td>200 MHz to 500 MHz</td>
<td>0701.5354.00</td>
</tr>
<tr>
<td>Log periodic antenna</td>
<td>500 MHz to 3 GHz</td>
<td>4050.3609.02</td>
</tr>
<tr>
<td><strong>Accessory supplied: carrying case</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Option HE200HF</strong></td>
<td>Loop antenna 0.01 MHz to 20 MHz</td>
<td>4051.4009.02</td>
</tr>
<tr>
<td>Adapter and compass fitted to the supply and display unit when delivered.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>