

# **Panoramic signals recorder of VHF-UHF frequency band "Barvinok-PRS-WB"**

- ❖ Reception and panoramic recording of signals within 20 - 3000 MHz frequency band in standalone mode or simultaneously with "Barvinok" station
- ❖ Number of subbands of signal recording is 4 independent subbands by 10 MHz
- ❖ Total recording bandwidth is 40 MHz
- ❖ Time of continuous signal recording is not less than 24 hours with total storage capacity 24 TB
- ❖ Time delay to access of the last recorded files not more than 1 min
- ❖ Play back of recorded signals by preset frequency, time, filtering, primary technical analysis, demodulation and recording in \*wav format

## **GENERAL INFORMATION**

Group signals within frequency bandwidth are recorded and stored into file storage in the form of I/Q-samples.

Software of panoramic recorder of VHF-UHF frequency band "Barvinok-PRSSh" is developed implementing latest technologies and doesn't need high qualification of operator.

Multichannel receiver of panoramic recorder has four channels of analogue and digital processing implemented on receivers "Filin-VU/P" (interface LAN 1 Gbps). Group signal bandwidth recorded by single channel equals 10 MHz.

## **PURPOSE**

Panoramic recorder of VHF-UHF frequency band "Barvinok-PRSSh" is designed for reception, panoramic recording, storing and following processing of RES signals within specified frequency band. The product operates in standalone mode and by the commands of detector-direction finder "Barvinok".

Panoramic recorder of VHF-UHF frequency band "Barvinok-PRSSh" provides the following:

- Reception of emissions within 20–3000 MHz frequency band from external antennas ( $Z_i=50$  Ohm);
- Processing of emissions and recording of them into the storage in the form of I/Q- samples within preset recording bandwidth from 10 MHz to 40 MHz;
- Storing of files of recorded I/Q-samples of group signal in the file storage;
- File selection from file storage by frequency and time for play back;
- Selection of filtering parameters for waveform restore from panoramic recording;
- Viewing and analysis of frequency-time raster;
- Primary technical analysis, estimation of frequency, level, spectrum bandwidth;
- Signal demodulation, listening to and recording in WAV-format.

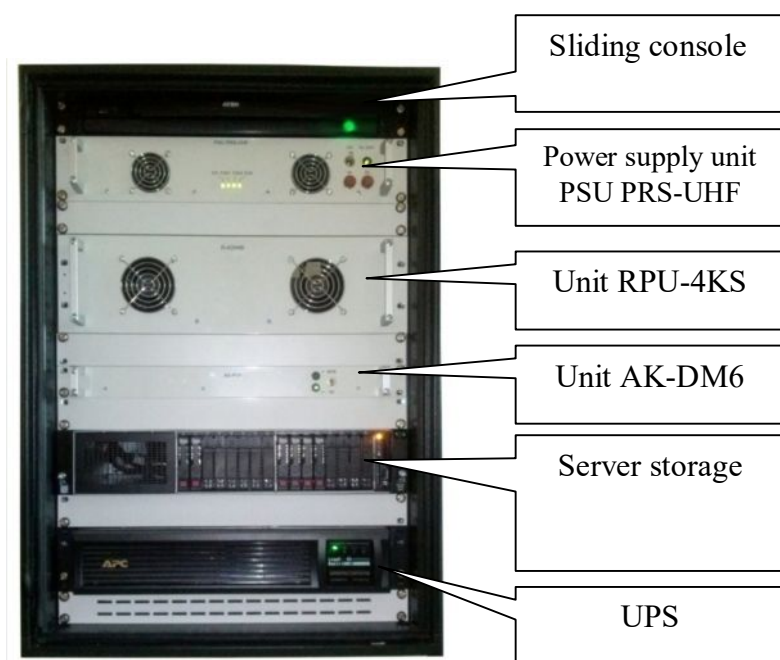
## COMPOSITION

### The Product consists of:

- Rack of panoramic recording;
- Operator's Workstation implemented on Note-Book;
- Complete set of HF-feeders, mounting parts and accessories;
- Operational and maintenance documentation.

### Rack of panoramic recording consists of the following parts:

- Unit of antenna switcher and power divider;
- Panoramic recording unit (4 pcs. of receiver "Filin-VU/P");
- Server HP with file storage (type and capacity is agreed with the Customer);
- LCD-console for sever control ATEN 17" with keyboard;
- Ventilation unit;
- Power supply unit from single-phase AC 220 V, 50 Hz;
- UPS 1500 VA.



Rack of panoramic recording provides signal reception within frequency band from 20 MHz to 3000 MHz, panoramic signal recording into server storage in the form of I/Q-components of group signals within preset bandwidth from 10 MHz to 40 MHz. It also transmits data for signals to be played back at specified frequencies and time to operator's WS computer. Rack contains LCD-console 17" with keyboard and mouse. File storage for signal recording is in the server of the rack.

Antenna switcher and power divider unit provides signal splitting and commutation from 4 antenna inputs to 6 outputs. Signal bandwidth is from 20 MHz to 3000 MHz.

UPS 1500 VA is mounted inside the rack to provide uninterruptible operation in case of power loss for 10 minutes period necessary for the data to be saved.

Operator's workstation is implemented on Notebook and is purposed for restoring of waveform from panoramic recording basing on specified frequency and time, it also provides play back of filtered signals and record in IFS and WAV-formats.

Navigation receiver is designed for precise time definition and recordings synchronization by this time.

The LAN equipment is designed for connecting Unit BU-PRSSh to the server, mounted inside the rack, for providing interaction of the component parts of the product and also for informational interaction with equipment of detector-direction finder "Barvinok" via LAN.



Rack in the composition of the "Barvinok" station

## TECHNICAL PARAMETERS

• Operating frequency band	<b>20-3000 MHz</b>
• Receiving and recording bandwidth of single channel	<b>10 MHz</b>
• Number of randomly set subbands for recording within 20-3000 MHz range	<b>1- 4</b>
• Total bandwidth for RES signals recording	<b>40 MHz</b>
• Sensitivity of radio receiving sections (SNR=10 dB, BW=12 kHz)	<b>&lt; 1.5 <math>\mu</math>V</b>
• Relative tuning frequency instability of receiver	<b><math>1.0 \times 10^{-7}</math></b>
• Dynamic range of third order intermodulation	<b>&gt; 70 dB</b>
• Dynamic range of received signals levels	<b>&gt; 100 dB</b>
• Spectral density of heterodyne noise (with 25 kHz detuning):	
within 20-1000 MHz frequency band	<b>- 95 dBc/Hz</b>
within 1-3 GHz frequency band	<b>- 85 dBc/Hz</b>
• Frequency step	<b>- 10 MHz</b>
• Time of recording with storage capacity <b>24 TB</b>	<b>&gt; 24 h</b>
• Signal bandwidth for play back	<b>3 – 1000 kHz</b>
• Time of delay to the files of latest recordings	<b>&lt; 1 min</b>
• Frequency resolution in Spectrum analyzer window	<b>10 -1500 Hz</b>
• Signal demodulation	<b>AM, CW, SSB, FM, PSK2, FSK2</b>
• Total power consumption from AC 220 V, 50 Hz	<b>&lt; 1000 VA</b>
• Operating temperature range	<b>+ 10° C ... + 40° C</b>



## MODES OF OPERATION

**Server tasking for recording:** functionality check after switching on, selection of subband or frequency, recording bandwidth, initiating of recording. Recorder control can be provided from operator workstation and from the post of detector-direction finder of station “Barvinok”.

**Signal recording** into file storage server in the form of I/Q-components of group signal level within specified frequency band.

**Request issuing to recorder server:** functionality check, request to server to find necessary file by necessary parameters:

- by file data containing REE provided by other stations;
- by results of records viewing recorded on Server PRS;
- by DBs of other stations;
- by known signal parameters.

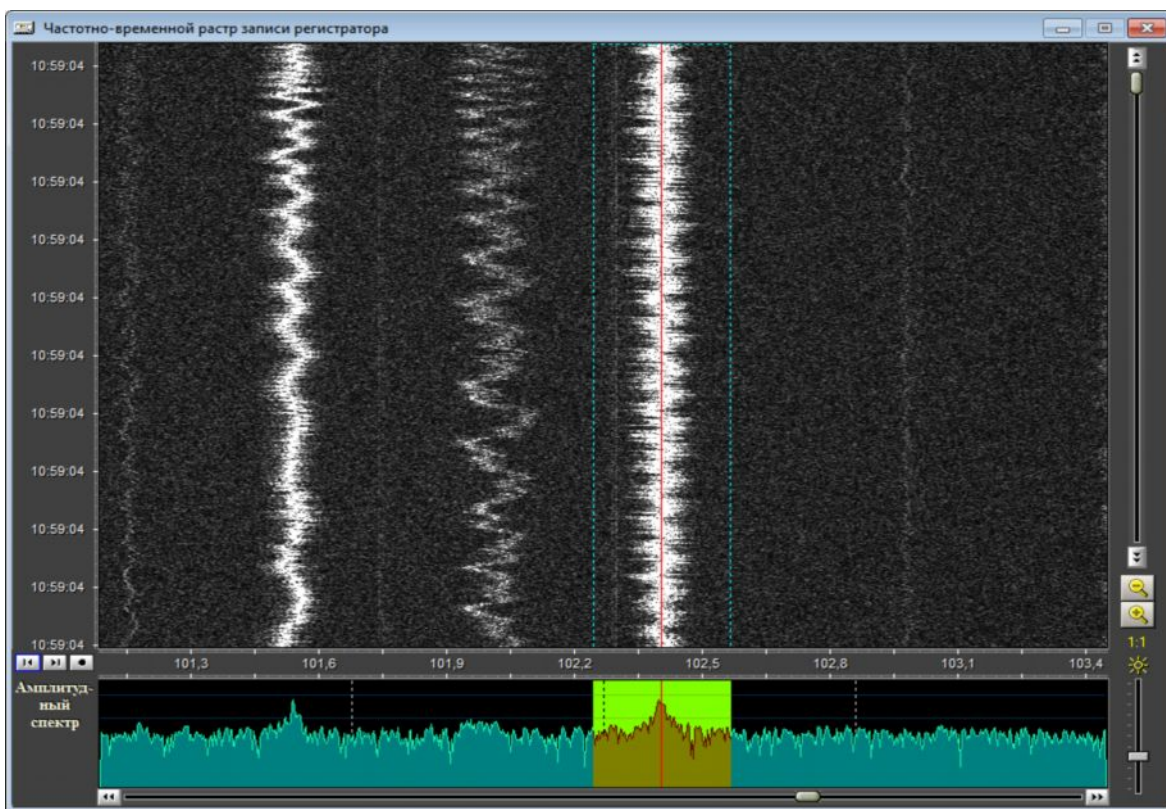
**Technical analysis:** selection of bandwidth for analysis, level assessment, carrier frequency, spectrum bandwidth, modulation type, signal demodulation, listening to and recording in wav-format.

## MAIN MODES OF INDICATION:

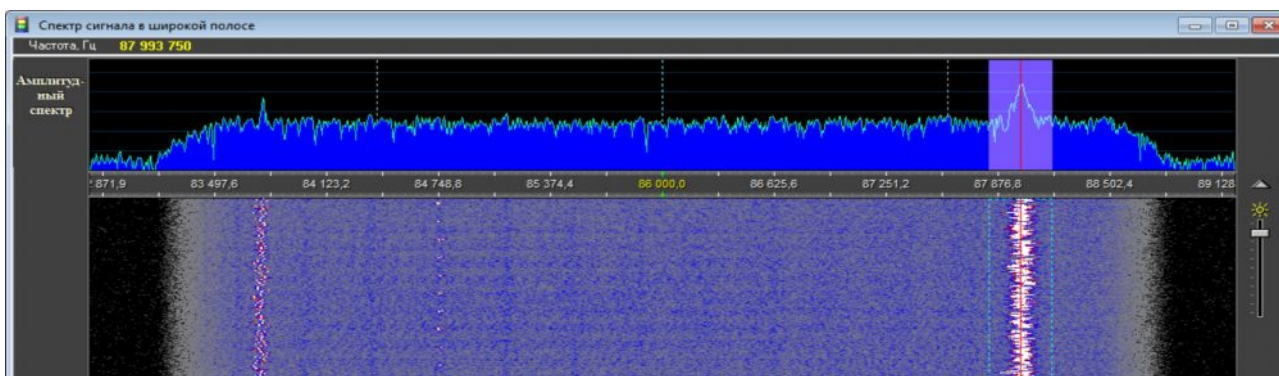
- ◆ Frequency-time raster (waterfall) and amplitude spectrum of played back group signal
- ◆ Window for viewing DB of signal recorder with a possibility to apply filters by time and signal frequency
- ◆ Window signal spectrum analyzer within wideband bandwidth filtered out from group signal
- ◆ Window of signal spectrum analyzer filtered out from group signal
- ◆ Window of signal Auto Correlation Function (ACF)
- ◆ Window of demodulator

№	Дата регистрации	100..110	09:25:28..09:25:29	№	Частота	Тнач - Ткон	Файлы	Канал
1.	2016 Сентябрь 26			1	100 000 000	9:25:28 .. 10:28:00	0 .. 90	0
				2	105 000 000	9:25:29 .. 10:28:00	0 .. 90	2
				3	110 000 000	9:25:30 .. 10:28:00	0 .. 90	3
				4	100 000 000	10:59:04 .. 14:44:51	91 .. 416	0
				5	105 000 000	10:59:05 .. 14:44:50	91 .. 416	2
				6	110 000 000	10:59:06 .. 14:44:49	91 .. 416	3
				7	100 000 000	14:46:07 .. 15:29:49	417 .. 479	0

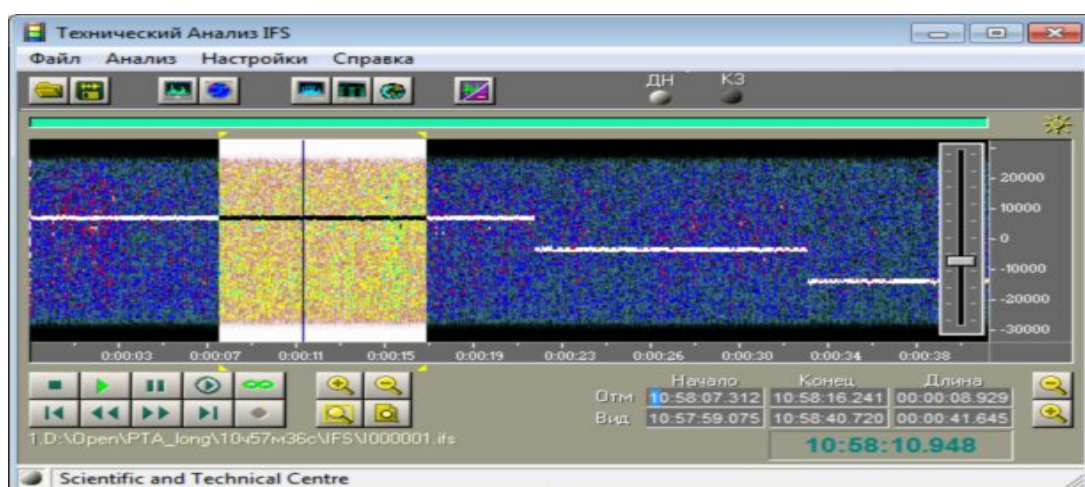
Panel for viewing DB of recorder



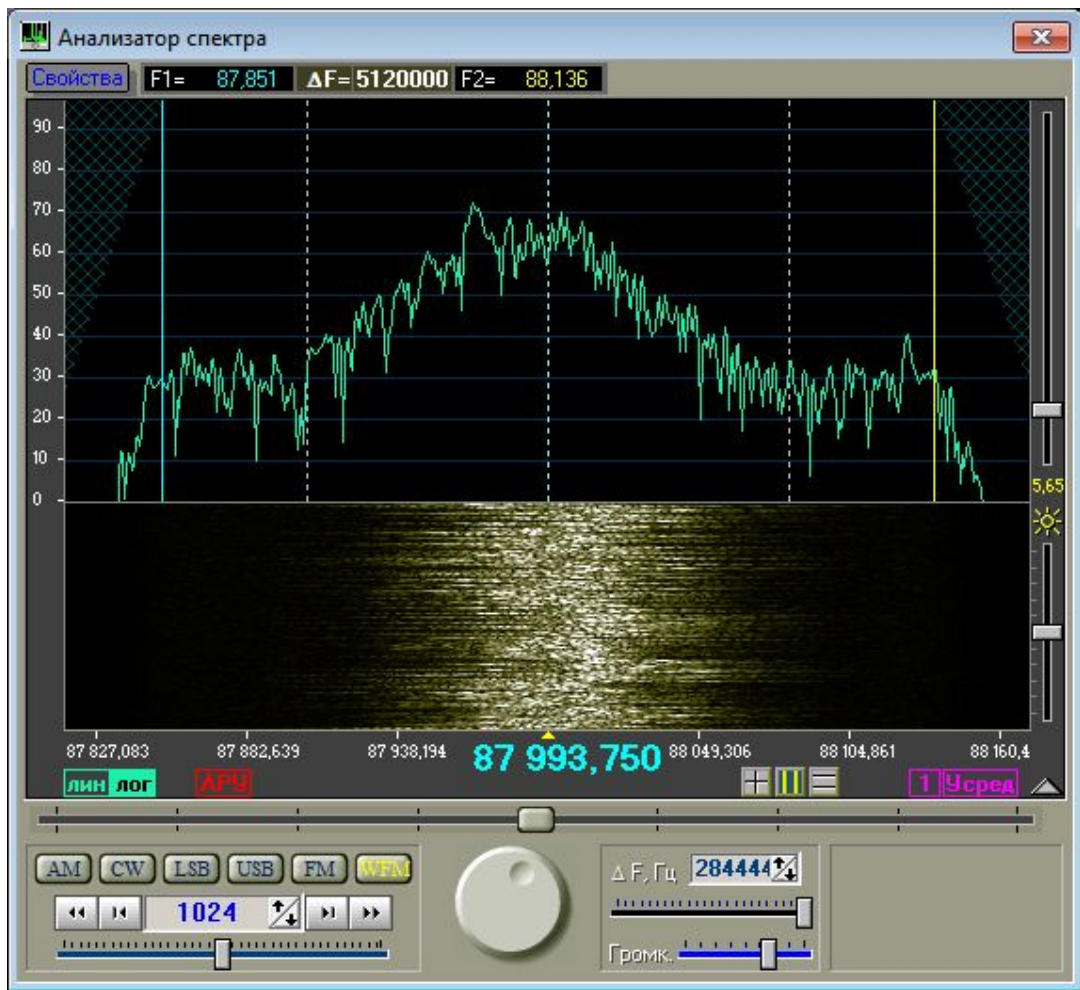
Frequency-time raster and amplitude spectrum of group signal that is being played back



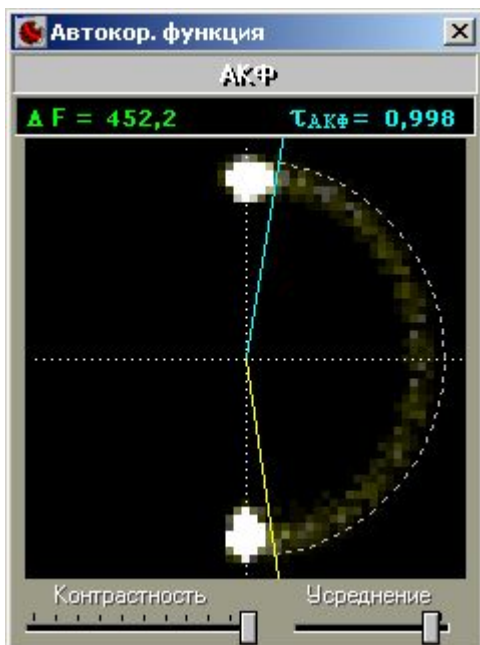
Signal spectrum in wideband



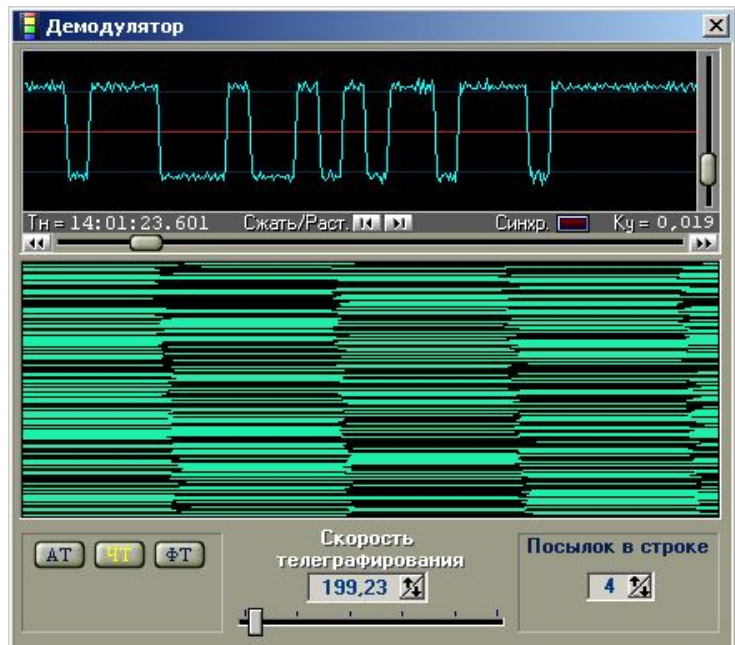
Window of technical analysis when signal is displayed as frequency-time raster



Window of spectrum analyzer



ACF of CW signal



Output signal and demodulator signal raster of CW