

Panoramic recorder of HF band signals "Vostok-PRSK"



- ❖ Receiving and panoramic registration of signals in the frequency band from 1 MHz to 30 MHz autonomously or synchronously operating within detection-direction finding station "Vostok-OPK"
- ❖ Number of frequency subbands for signal registration - 10
- ❖ Total registration bandwidth - 10 MHz
- ❖ Time of continuous signal record – not less than 24 hours
- ❖ Time of access delay to signal records – not more than 5 min
- ❖ Playback of recorded signals by preset frequencies and time, filtering, primary technical analysis, signal demodulation and registration in wav-format
- ❖ Pointing of continuous signal registration "Vostok-SP" posts after primary technical analysis of radio emitters

GENERAL INFORMATION

Recording and storing of group signals in the registration frequency band is provided in the filestore as I/Q samples.

Software of panoramic recorder of HF-band signals "Vostok-PRSK" is developed using state-of-art computer technologies and doesn't involve high qualification of operator.

Receiver of panoramic recorder of signals in the band from 1 MHz to 30 MHz has ten channels of analogue and digital processing. Group signal band registered by a single channel is 1 MHz.

PURPOSE

Panoramic recorder of HF band signals "Vostok-PRSK" is designed for reception, panoramic registration, storing and following processing of emission sources in HF frequency band. The product can operate autonomously or synchronously with and by commands of detection-direction finding equipment.

Panoramic recorder of HF band signals "Vostok-PRSK" provides the following:

- Reception of emissions in the frequency band of 1.0 MHz – 30 MHz;
- Emissions processing and recording to the filestore as I/Q samples of group signals within preset registration band;
- Storing of files of recorded I/Q samples of group signal to the filestore;
- Selection of file from out of filestore by frequency and registration time for its play back;
- Selection of filtering parameters for restoring signal shape out of panoramic record;
- Viewing and analysis of frequency and time raster;
- Conducting of primary technical analysis, estimation of frequency, level, spectrum;
- Signal demodulation, listening and registration in wav-format.

COMPOSITION

Into the composition of the product is included the following:

- Rack for panoramic emissions registration;
- Operator's workstations (up to 2 workstations) on the basis of personal computers for processing emission files.
- Complete set of HF-feeders, connecting cables, mounting parts and accessories;
- Operating instruction and User Guide.

To the complete set of the rack for panoramic emissions registration the following parts are included:

- Ten channels of receivers of the frequency band 1 MHz - 30 MHz with analogue and digital emissions processing;
- Server with filestore, LCD panel 19", keyboard and mouse manipulator with KVM switch;
- Power supply unit from one-phase AC network 220 V, 50 Hz;
- Uninterruptible power supply unit;
- Ventilation unit.

TECHNICAL PARAMETERS

• Operating frequency band	1-30 MHz
• Bandwidth of preset frequency subband of registered frequencies	1 MHz
• Number of arbitrary set in the frequency band 1 MHz - 30 MHz subbands for emissions registration	1- 10
• Width of every receiving and registration channel	1 MHz
• Total signal registration bandwidth	10 MHz
• Sensitivity of radio reception path (SNR=10 dB, BW=3 kHz)	< 1 µV
• Relative frequency instability	$2 \cdot 10^{-7}$
• Dynamic range by the third order intermodulation: within the frequency band 1 -3 MHz	> 85 dB
within the frequency band 3-30 MHz	> 90 dB
• Dynamic range of received signal levels	> 120 dB
• Filestore capacity (16 Tb - option)	8 - 16 Tb
• Time of continuous signal registration (depending on traffic and registration bandwidth)	> 24 (48) h
• Signal frequency bandwidth while play back	0.1-300 kHz
• Time of access delay to the files with recorded data depending on the bandwidth	0.5-5 min
• Frequency resolution in the window "Spectrum analyzer"	0.3-780 Hz
• Time of continuous registration of total bandwidth 8 Tb	24 hours
• Signal demodulation	AM, CW, SSB, FM, FM2, PM2, PM4
• Total power consumed by the station from AC network 220 V, 50 Hz (depending on the number of WS)	< 2000 VA
• Operating temperature range:	+ 10° C ... + 40° C

MODES OF OPERATION

Generating of the query to recorder server: functionality test after switching on, generating of the query to server for file search with necessary parameters:

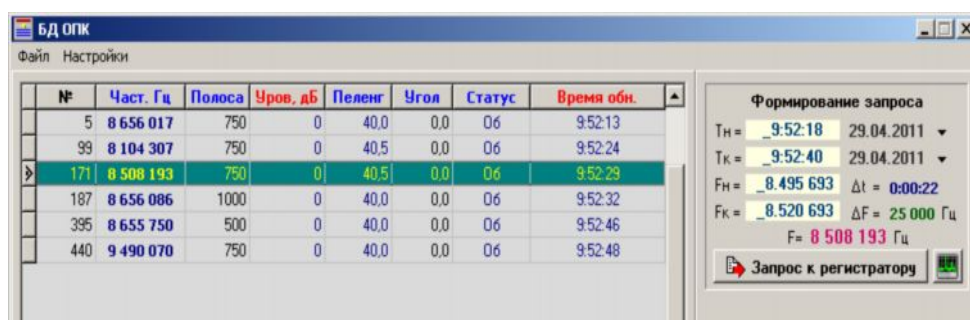
- by the data of radio electronic environment files;
- by database of other stations;
- by results of records viewing registered at PRSK post;
- by known signal parameters.

Technical analysis: analysis band selection, estimation of level, carrier frequency, spectrum width, signal modulation type, defining of modulation type, signal demodulation, listening to the signal and registration in wav-format.

Pointing of continuous signal registration posts “Vostok-ARM” to efficient frequencies by the results of technical analysis of emission sources.

MAIN INDICATION MODES

- ◆ Raster and histogram of radio electronic environment file of “Vostok-PRSK” station
- ◆ Panorama frequency-time-amplitude (waterfall) and amplitude spectrum of group signal that is played back
- ◆ Window of signal time samples during file play back
- ◆ Window of signal spectrum analyzer filtered out from group signal
- ◆ Window of signal autocorrelation function
- ◆ Window of demodulator



The screenshot shows a software window titled "БД ОПК" (OPK DB) with a menu bar containing "Файл" and "Настройки". The main area contains a table with the following data:

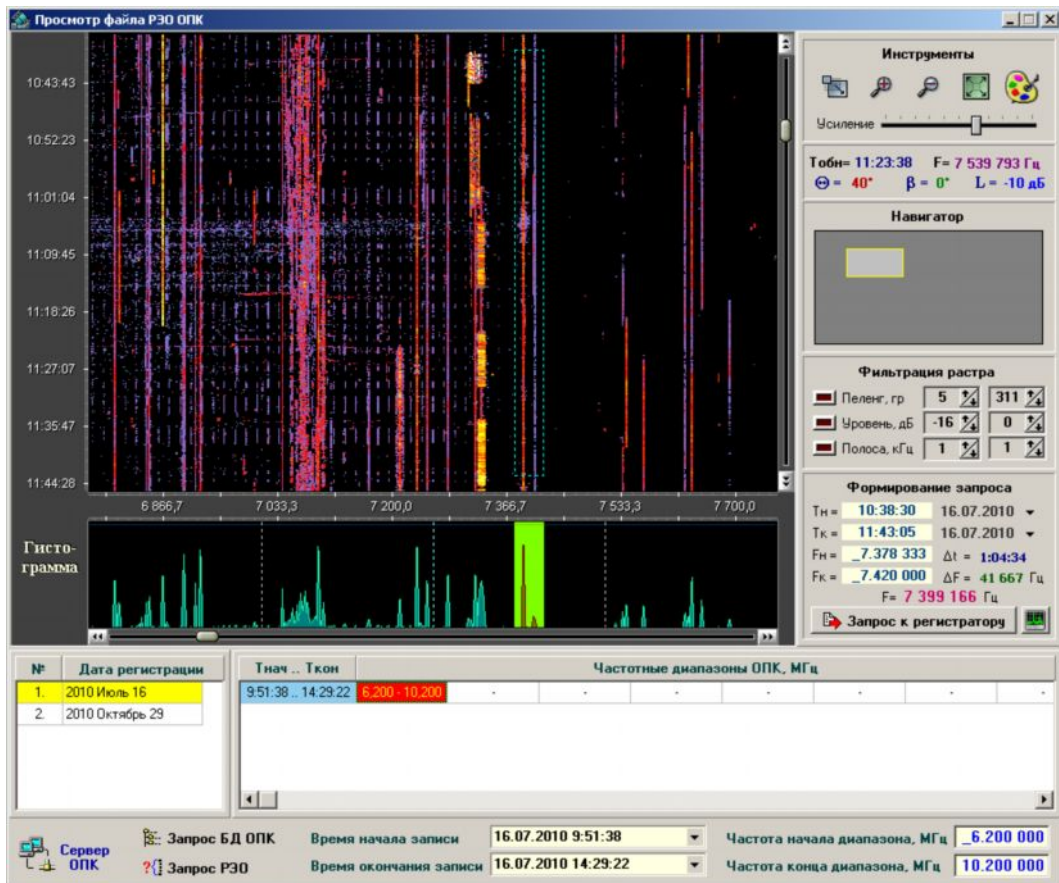
№	Част. Гц	Полоса	Уров. дБ	Пеленг	Угол	Статус	Время обн.
5	8 656 017	750	0	40,0	0,0	06	9:52:13
99	8 104 307	750	0	40,5	0,0	06	9:52:24
171	8 508 193	750	0	40,5	0,0	06	9:52:29
187	8 656 086	1000	0	40,0	0,0	06	9:52:32
395	8 655 750	500	0	40,0	0,0	06	9:52:46
440	9 490 070	750	0	40,0	0,0	06	9:52:48

To the right of the table is a "Формирование запроса" (Query Formation) panel with the following fields:

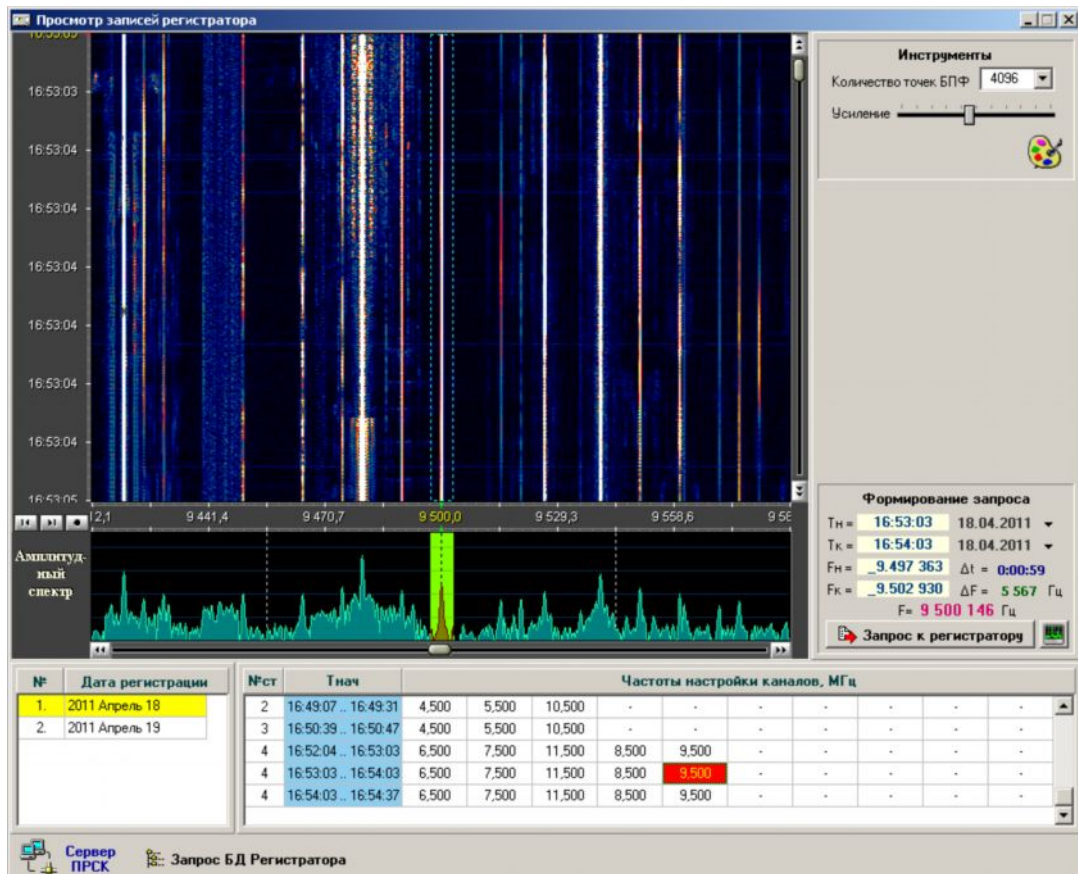
- ТН = 9:52:18 29.04.2011
- ТК = 9:52:40 29.04.2011
- FN = 8.495.693 Δt = 0:00:22
- FK = 8.520.693 ΔF = 25.000 Гц
- F = 8.508.193 Гц

At the bottom of the panel is a button labeled "Запрос к регистратору" (Request to recorder).

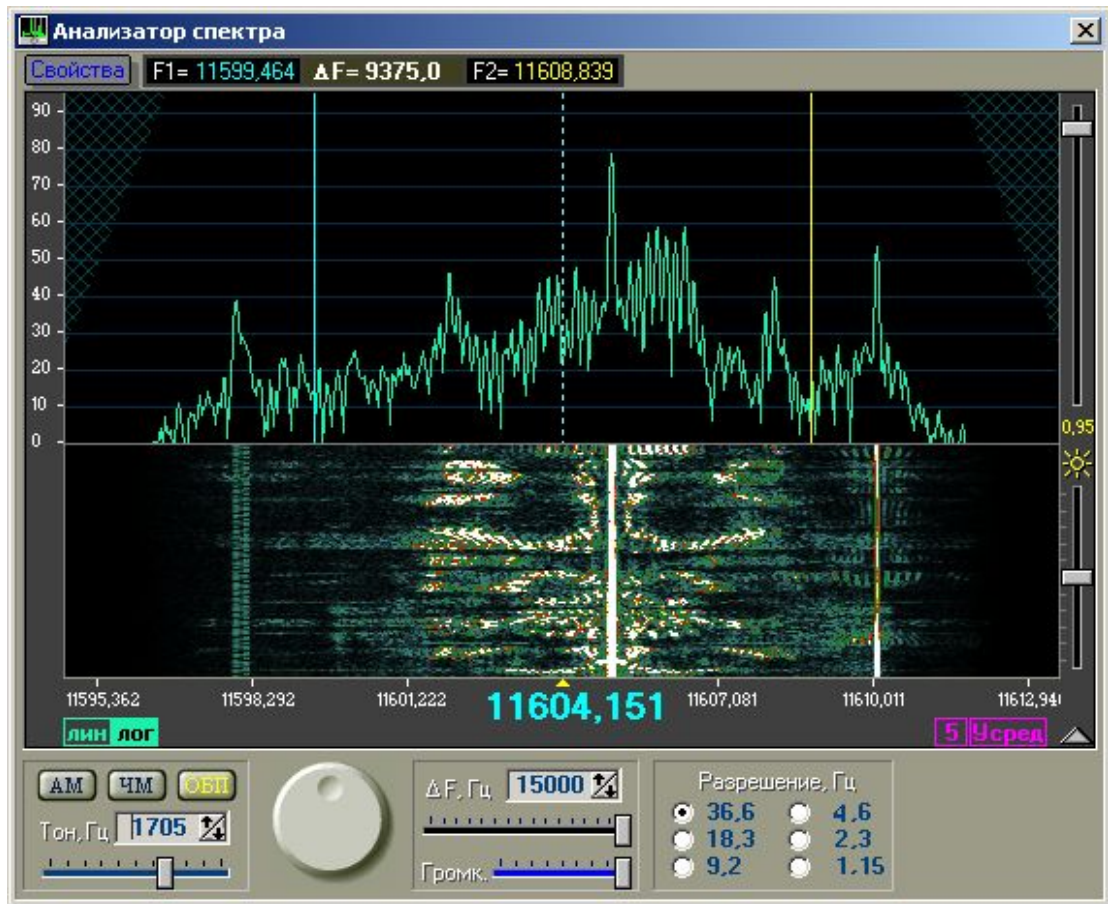
Tables of “Vostok-OPK” station in recorder WS window



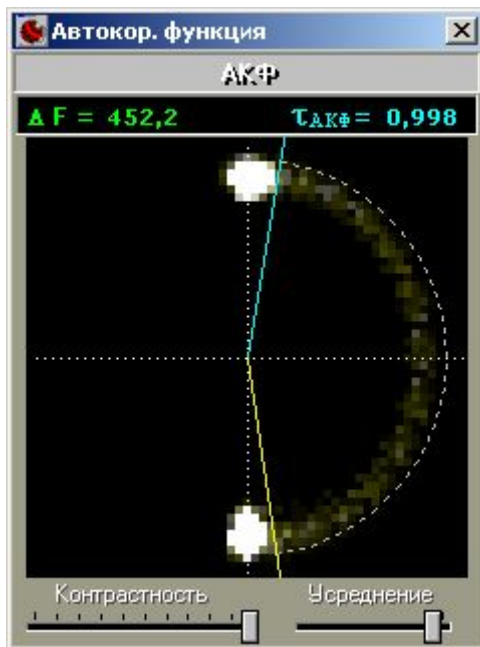
Raster and histogram of the file of radio electronic environment of "Vostok-OPK" station in WS window of recorder



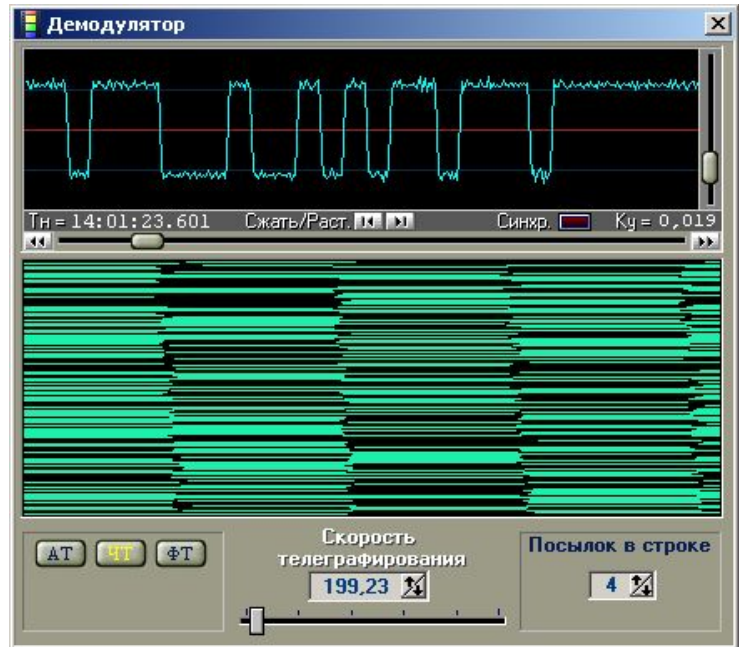
Panorama frequency-time-amplitude and amplitude spectrum of the group signal that is played back



Window of spectrum analyzer filtered out from group signal



Autocorrelation function frequency telegraphy signal



Output signal and raster of frequency telegraphy demodulator

“Scientific-Engineering Center of Radio Engineering System ARAS” Ltd.

✉ 7/8, sq. Vosstaniya, Kharkov City, Ukraine, 61001

☎ +38 (057) 732-25-53, +38 (057) 732-68-63 E-mail: ntcrts@kharkiv.com