

STATIONARY RADIO DIRECTION FINDING STATION OF HF FERQUENCY BAND R-700M

Stationary radio direction finder “R-700M” is based on antenna feeder system of product R-700 (code “Sosna”) and is purposed for direction estimation to sources of radio emissions operating within the band 1.5 – 30 MHz on the distance of up to 2000 km and more. Direction finder “R-700M” operates independently or in command-executive mode and provides measurement of azimuth and elevation angle of signal radio wave arrival, and also it can be used for position fixing of emission source implementing SSL method (Single Station Location) with ionosphere radio wave propagation.

COMPOSITION

- Direction finding antenna-feeder system (AFS) of the product “R-700”, consisting of two circular antenna arrays (CAA) with diameter 128 m and 48 m, provides signal reception within two subbands 1.5...10 MHz and 10...30 MHz. Every CAA contains 24 antenna elements (wideband monopoles) with height 14 m and 8 m;
 - Wideband signal amplifiers and splitters (6 outputs, switched-off) * – 24 pcs.;
 - Matrix switch for two bands, 24 inputs and 3 outputs each;
 - Four-channel receiver of HF band;
 - Unit of digital signal processing;
 - Panel of control and indication on the base of computer with DSP-module for interlink signal processing and interface boards;
 - Operational control panel;
 - Nondirectional antenna;
 - Equipment of data transeiving (selected under agreement with the Customer);
 - System of time synchronization on the base of navigation receiver GPS18;
 - Unit of field heterodyne with discrete frequency grid (0.5 and 1 MHz) of pilot signal;
 - Power supply system;
 - Complete set of HF-feeders, connecting cables and accessories;
 - Complete set of operational and maintenance documentation;
- Note. * - option, is supplied on special order.

MAIN PECULIARITIES



- Widebase antenna system of direction finder R-700 provides its high performance in conditions of interference signal fading;
- Simultaneous measurement of azimuth and elevation angle of radio wave arrival provides a possibility of position estimation of the source from a single point (method SSL);
- Interaction with receiving-transmitting channel of positioning system of the Customer;
- Easy learning process and maintenance;
- Modular structure of the station;
- Built-in failure control system self-check system;
- Computer control of the station
- Continuous registration of signals of spatial channels to HDD provides a possibility of scrolling and bearing taking in postponed mode in the case of receiving short term signals with low quality of reception

General view of “R-700M” RDF station layout



Workstation of operator



Operating frequency band	1.5–30 MHz
Polarization	vertical
Automatic bearing taking method	correlation interferometer
Methods of pattern (visual) direction finding:	automatic sector scan
Error of bearing measurement θ within $0^\circ \dots 360^\circ$ (RMS)	$< 1^\circ$
Error of measurement elevation angle α within $20^\circ \dots 85^\circ$ (RMS)	$< 5^\circ$
Error of position fixing by SSL method (when $K_v = \sigma$)	10-20% from
distance to RES	
Sensitivity (depending on frequency)	0.2 - 3 $\mu\text{V/m}$
Spatial selectivity of signals of interference stations	10...15 dB
Frequency resolution of signals	20 Hz
Minimal signal duration	50 ms
Dynamic range of signals	not less than 120 dB
Frequency bandwidth (set of 6 bands)	0.3...8.0 kHz
Accuracy of time binding of bearing sample	± 10 ms
Continuous signal recording in audio and direction finding channels	300 hours and more
Throughput	2...5 RES/min
Remote control channel	main communication
Consumed power	not more than 480 VA
Operating frequency range of:	
equipment	– 10 °C...+ 50 °C
operator’s board	+ 5 °C...+ 40 °C
antenna system	– 40 °C...+ 65 °C

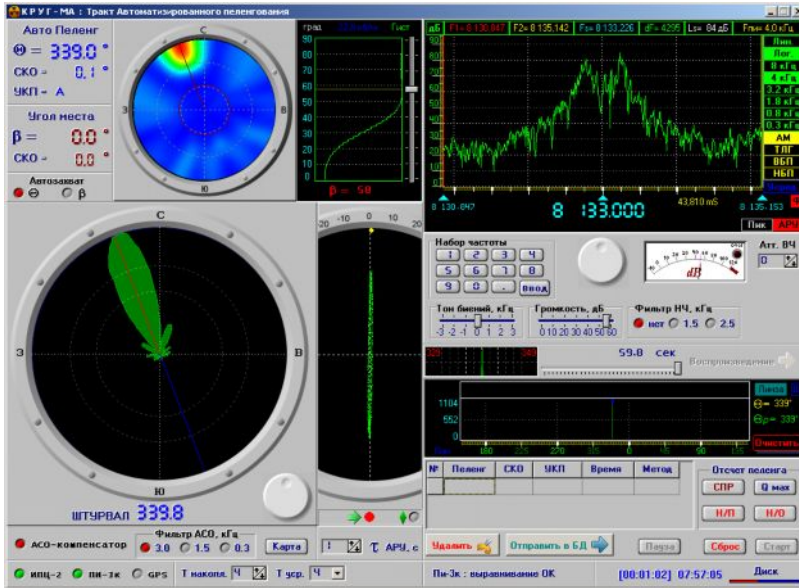
In the equipment of RDF station additional HF-paths for connecting additional receiving and measuring devices with a possibility of independent control of antenna feeder system are supported in order to increase throughput of command processing.

In radio direction finding station “R-700M” bearing samples done by operator are tagged with time markers coming from the channel of 1s-markers of precise time of GPS system that significantly increases validity of direction finding information and provides a possibility to automate coordinates computation of RES belonging to the same radionet.

RDF station “R-700M” in addition to the mode of automatic bearing sampling implementing spectral-correlation processing of spatial receiving channels has traditional mode of indication ASS (amplitude sector scan) pattern with the help of which bearing measurement were conducted at the stations of previous generations.

Implementation of different direction finding methods (amplitude, correlation-interferometer) and also combining of ways of data collecting (automatic with histogram accumulation, visual, audio) provides validity of bearing information about signal in complicated receiving conditions in HF band.

Desktop of operator's board of
RDF station "R-700M"



- Modes of indication:**
- Amplitude signal spectrum;
 - ASL-pattern;
 - H-histogram (directional pattern in elevation plane);
 - 3D-directional pattern;
 - Polivector raster of correlation interferometer

Panel of operational control board



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