



GROUND STATION OF AUTOMATIC DEPENDENT SURVEILLANCE SYSTEM “GRS-L ADS-B”

Ground receiving station (GRS) of automatic dependent surveillance with usage of extended squitter 1090 ES “GRS-L ADS-B” conforms to all requirements of ICAO (Annex 10) ED-129A, national standards and GOST R 51845-2001.

“GRS-L ADS-B” provides:

- surveillance aircraft available within the station visibility zone and equipped with facilities ensuring functions of automatic dependent surveillance ADS-B 1090 ES;

- transmission of surveillance data to ATC centers.

“GRS-L ADS-B” is designed basing on up-to-date element base with solid-state version of receivers and usage of digital signal processors and computers in systems of signals and data processing.

“GRS-L ADS-B” comprises antenna system, feeder section with monitoring signal divider, and the equipment cabinet.

Antenna device presents four stationary sections aligned (conventionally) in directions of four cardinal points. A section is designed as two antennas coupled mechanical way, and the each antenna is designed as vertical pole of 1.8m height, which shapes directional pattern of not less than 90° in azimuthal plane and of not less than 60° in elevation plane with coincidence as per a function, which is close to the one of cosec^2 .

On the each antenna the full-flow filter is installed as well as low-noise transistor amplifier, which takes power via microwave cable. This design allows eliminating losses in the cable line from antenna up to ADS signal receiving equipment, and getting maximal coverage (defined by ground curvature only).

Shaping of monitoring signal is effected within monitoring signal generator placed inside of the equipment cabinet. After being divided by 8 the said signal comes to the each antenna.



Equipment Cabinet of
“GRS-L ADS-B”

Receiving device of the each set of ADS-B equipment is designed basing on the principle of direct amplification of signal on the frequency of 1090 MHz, and it comprises 4 amplifiers, which do amplify a signal up to the level indispensable for sending directly to the input of fast-response analogue-to-digital converter.

Equipment for signal digital processing is multi-channel one as well (the number of processing channels does comply with the number of receiving channels), and is designed using the latest achievements of technique of digital signal processors and programmable logical integrated circuits.

Analogue-to-digital conversion of a signal received is effected on the carrier frequency with shaping of final amplitude-frequency response of a channel by means of digital filters, which do ensure high identity of channel characteristics as well as their phase stability at a dynamic range of not less than 84 dB. For an ADS-B station with four antennas positioned circularly with an angular increment of 90°, the value of capacity in comparison the one of non-directional antenna is increased approximately 2.5 times as much.



The entire equipment is 100% “hot-stand-by” redundant with automatic change-over to the stand-by semi-set.

The AMCS provides:

- monitoring of current status of equipment and operational modes with authenticity of not less than 0.98;
- faults isolation with accuracy down to a line replaceable unit (LRU);
- possibility of change-over to a standby set after fault detection;
- displaying of status of all systems with faults localization on a built-in monitoring display of

hardware cabinet;

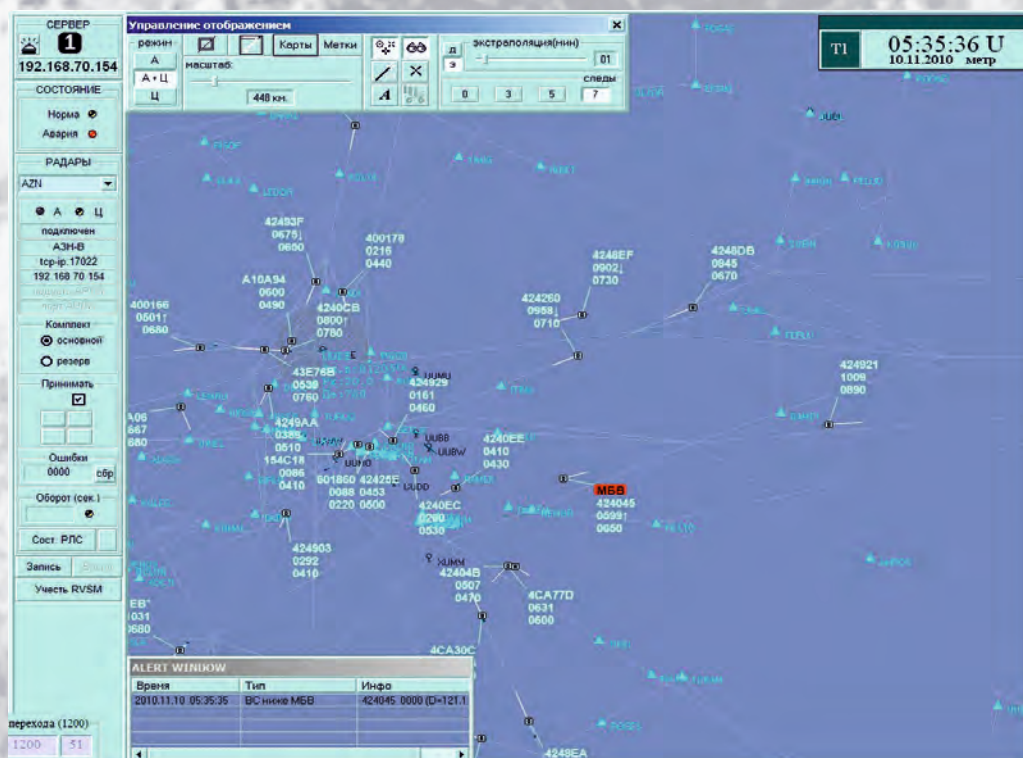
- transmission of equipment status data to consumer

For monitoring of serviceability of high-frequency section, the special input is available within the antenna for the purpose to introduce the monitoring signal directly at the input of low-noise amplifier.

Output data of “GRS-L ADS-B” containing coordinate data and supplementary data is transferred to the equipment of ATC systems via a LAN of the type of “Ethernet” or via a modem.



*Antenna section of
“GRS-L ADS-B”*



*Displaying of ADS-B data on a monitor of
TOPAZ ATM CAF*