



RadioAstron - the International Ground-Space Radio Interferometer

The Russian-Indian on-board 92 cm receiver

The 92 cm (327 MHz) receiver (marked as П-KPT-92, or P-SRT-92 device) is one of the four high frequency receivers of the RadioAstron Space Radio Telescope (SRT). This unit was designed & built under a collaborative project between the Astro Space Centre, Lebedev Physical Institute, Russian Academy of Science, from the one side, and the Giant Metrewave Radio Telescope (GMRT) Observatory of National Centre for Radio Astrophysics (NCRA), Tata Institute of Fundamental Research (TIFR), Pune, India, within the frame work of memorandum of understanding, MOU (1992) from the other side. The receiver is dedicated for the radio astronomy observations and consists of a pulse calibration device, which also serves other three SRT receivers. So P-SRT-92 is a part of the SRT payload complex.

The P-SRT-92 is a low noise receiver coupled to the feed at the focus of the parabolic dish. The unit receives the noise like radio signals from celestial sources in two circular orthogonal polarization channels with minimal losses. The channels have two following outputs:

- ✓ the interferometric one dedicated to operate with consecutive SRT device, and then with ground network in the VLBI mode;
- ✓ the radiometric one, with an output obtained from the square-law detector, transferred to the ground in digital and analogue form; this signal is exploring for the on-orbit SRT antenna positioning adjustments.

A basic part of P-SRT-92, which essentially determines SRT sensitivity, is a low-noise amplifier (LNA) having its own power supply unit (PSU). It was designed by the GMRT engineers, and three copies of it were manufactured by the Space Applications Center (SAC), Ahmedabad of the Indian Space Research Organization (ISRO). In accordance with the on-board device terms and specifications, space quality checks and standard tests were done successfully at SAC, Ahmedabad.

Then this LNA was integrated by Russian engineers into the P-SRT-92 receiver section. A high-level thermal stabilization of the LNA provides the expected stability of the receiver gain.

A comprehensive acceptance test of the LNA was performed, including verification of its mechanical, climatic and functional parameters.

The main LNA parameters

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|--------------------------------------|-----------------|
| Noise temperature | less than 35 K |
| Bandwidth (at the 0.2 dB level) | 8 МГц |
| Gain constant | more than 50 dB |
| Number of channels | two |
| The thermostat temperature stability | 30±2 C |

The on-board 92 cm receiver has already been integrated into the SRT electronic complex, and is currently undergoing the preflight tests.