Institute of Applied Astronomy Technology Development Center

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Abstract

The field of IAA TDC includes the development soft and hardware for Russian VLBI network QUASAR. This report describes IAA activities in this direction.

1. General

Technology Development Center is responsible for all parts of the Russian VLBI network and consists of separate laboratories which develop hardware and software for this project. Now the 32 m radio telescope in Svetloe is taking part in international VLBI network observations and in domestic radioastronomical and VLBI observations, radio telescope in Zelenchukskaya is taking part in domestic radioastronomical and VLBI observations and radio telescope in Badary is under construction.

2. Technical/Scientific

2.1. New Receiver for QUASAR Network

A radiometer at wavelength 7 mm for solar and VLBI observations and measuring of the quality of the Svetloe radio telescope surface has been developed. The receiving of two circular polarizations is available. This radiometer consists of a corrugated horn, input lines with transformation of circular polarization into linear and two selectors for two orthogonal linear polarizations, and receiver. Elements of the radiometer input line of 7 mm wave band have an inside diameter of 5.8 mm, and the section of rectangular waveguide is 5.2 by 2.6 mm. The input frequency band is 42.1 GHz – 43.6 GHz, RF bandwidth is 1000 MHz.

2.2. New System for Automatic Control of VLBI Receivers

A new control system for the receiver complex of the Russian VLBI network QUASAR was created in the laboratory of radio astronomical receivers. This system makes it possible to control all the receivers simultaneously from one computer, using only one interface block. The structure chart is represented in the figure.

The interface block has a modular design. It consists of five boards of the same type and its own power supply. Each board controls the receiver in one waveband. The control computer has one interface board LA-96D to provide the link with the interface block. LA-96D is the board for parallel input/output produced serially by Russian industry. This system is simple in operation from the hardware point of view. As the control is carried out by software, the system is sufficiently flexible in operation. The control program was written in the "C" language and it works under the MS-DOS operating system.

Now the three development prototypes were produced. One of them is placed at the Svetloe observatory and others are placed in the laboratory for testing. The next step in developing this system is the cooperation with Field System computer. For that the software will be modified

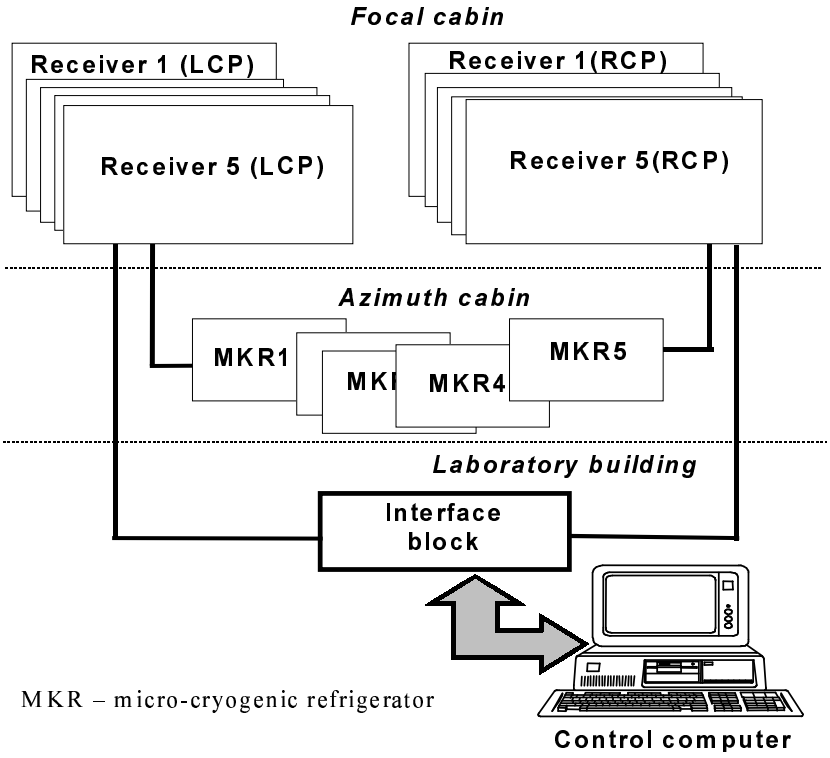

Figure 1. The new receiver control system

somewhat, but the hardware will not change.

2.3. VLBI Data Acquisition System for S2-RT Recorder Terminal

In 2002 the IAA Technology Development Center (TDC) continued preparing the new VLBI Data Acquisition System (DAS) for the S2-RT Recorder Terminal, which was described in our report 2001.

The first module of this DAS with two BBCs was tested and installed in Svetloe observatory. Manufacturing of two DAS was completed and the TDC began to test it. Each DAS consists of two modules (four BBCs with 2-bit digitizers). There are the clock 32 MHz and the 1PPS synchronizer for S2-RT too. After testing, these DASs will be sent to Svetloe and Zelenchukskaya observatories.

A new device was designed to connect the S2-RT recorder terminal to video outputs of the MarkIII DAS, which was installed in Svetloe observatory. It consists of two 2-bit digitizers and two 1-bit digitizers and clock 32 MHz and 1PPS synchronizer. It may convert 2 video signals to 2-bit streams or 4 video signals to 1-bit streams. Testing of this unit shows rather good results.

2.4. The Software

Both IAA radiotelescopes were equipped with a new antenna controller. Antenna control software integrated into the Field System was revised to allow operating with the new controller. This software has also some improvements mostly intended for single dish observations:

- new scanning algorithms;
- integrated support for observations of Solar System objects based on JPL ephemerides DE405 and USNO software NOVAS-C.

The software for the Field System for reading time interval counters was developed. It gives the possibility to use time counters produced in former USSR with old non-standard "KOP" interface. It makes possible the measurements of cable delay and GPS to formatter offsets with currently available equipment.

3. Technical Staff

For all the IAA address (8, Zhdanovskaya st., St. Petersburg, 197110, Institute of Applied Astronomy (IAA) RAS, Russia, Director Andrey Finkelstein, FAX +7-812-230-7413) is valid.

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4. Outlook

In the new IVS year we are planning:

- to include the VLBI site Svetloe into routine geodetic VLBI observations,
- to install receivers and cryogenic equipment at new dish in Badary,
- to adjust reflector and feeds systems to new dish,
- to measure parameters of new dish.