

## **MINUTES of the RadioAstron Teleconference on February 15, 2007**

N. Kardashev chaired the teleconference.

The agenda of the teleconference and the list of participants are attached to the Minutes.

The main intent of the teleconference was to review current status of mission development.

### **1. Andreyanov informed the participants about status and progress in technical developments achieved since the last teleconference which was in October 2006:**

1.1. Space segment of SVLBI consists of two parts: Science Payload (SRT, VIRK) and spacecraft bus (called service module "Navigator").

1.2. "Navigator" with SRT load-simulator has been tested on vibration, including VIRK system, which was placed on "Navigator body". Now, mass-dimension SRT model (full composition, including SHM mockup) is assembled and inspected; it is ready for mechanical tests.

1.3. Flight models fabrication continues. At present time, 12 FMs (from total 22) for payload have been delivered to the ASC and they were tested.

1.4. At last we have received new modification of the SRT feed with good mechanical quality.

1.5. FM of the 18-25 GHz 8-frequency receiver for MFS-mode of observations was delivered to the ASC and is being tested.

1.6. EM of the Space Hydrogen Maser (SHM), designed by the Russian firm "Vremya-Ch." (Nizhniy Novgorod), is tested on electrical parameters; required frequency stability was proved. Now this model is being prepared for mechanical tests.

1.7. Simulators of ground segments (TS, GRT, time-frequency equipment, registators and 2-station correlator) are being tested and assembled to be used in ZBT with flight device complex.

1.8. Flight SRT and VIRK have to be assembled and tested completely during this year and be ready to the integration with flight SC itself ("Navigator") in 2007.

1.9. K. Kellermann asked about the status of 6 and 18 cm receivers. Andreyanov explained that original Australian 18-cm receiver will be used for RadioAstron mission. Operational time of the receiver was prolonged after special tests. EM of the new Russian 6-cm receiver was delivered and tested; the FM is expected in March 2007. As for 92-cm receiver, the FM was delivered to the ASC two months ago, but it was sent back to Nizhniy Novgorod for modifications because of malfunction in the Generator of Pulse Calibration Signals, integrated with the 92-cm receiver. The ASC expects the modified device to be delivered in April 2007.

1.10. Answering the question from N. Bartel, V. Andreyanov made clarification that on-board scientific payload contains two sets of SHM for redundancy.

2. **N. Kardashev outlined the general time-line of mission development:** FM Science payload will be tested in the first half of 2007 at the ASC, then the equipment will be delivered to the Lavochkin Associations for assembling with the SRT and the spacecraft bus Navigator. The whole configuration will be completed to the end of 2007. The participants of RadioAstron meeting in November 2007 will have happy possibility to take pictures of the magnificent construction. Then, in the first half of 2008 the system will be subjected to the final numerous complex tests to be ready for launch in the end of 2008. The exact launch date depends on the results of complete integrated tests.

3. **A. Smirnov described achievements and plans in the development of Pushchino tracking stations:**

- 3.1. Feed system for 22-m radio telescope has been delivered. It is under testing and tuning in laboratory in order to prepare the system for the subsequent tests at radio telescope.
- 3.2. Some electronic equipment has been also delivered from the subcontractor to the ASC: 15 and 8 GHz receivers, power amplifiers for 7 GHz band. The rest of the electronics is expected to be delivered in March 2007.
- 3.3. According to general plan we will start assembling the system at the radio telescope in Pushchino in the middle of 2007 to be ready for complex tests in the end of 2007 year.
- 3.4. Necessary infrastructure at Pushchino observatory is being organized (including H-maser frequency standard) to match the tests.
- 3.5. Hard-disk "Mk5 compatible" recording system will be used at Pushchino tracking stations. The compatibility will be achieved through the usage of copying machine converting the RDR format to Mk5 format.
4. **G. Langston reported on the status of the problem concerning Green Bank Tracking Stations:**
  - 4.1. Present approach is to utilize for RadioAstron and VSOP-2 tracking station 20-m antenna.
  - 4.2. NRAO continues to work on the design documents.
5. **S. Likhachev and R. Booth informed the participants about negotiations with South Africa** on the possibility to construct tracking station for RadioAstron mission in South Africa. The corresponding item was included into the signed formal memorandum of understanding between Russian and South African space agencies. The matter will be subject to further negotiations in the course of visit of Russian delegation headed by prime minister of Russian Federation M.Fradkov to South Africa in March 2007. R.Booth clarified that Hartbeeshoek Observatory will not use the 30-m radio telescope for tracking station but as coobserving telescope only. There is 13-m dish, which can be used in principle for tracking both VSOP-2 and RadioAstron.
6. **S.Likhachev informed the participants on the status of idea to create tracking station for RadioAstron mission in Canada.** In the end of 2007 there were some preliminary negotiations with MDA-corporation in Toronto on the using of Algonquin radio telescope as a tracking station for RadioAstron. Unfortunately right now MDA-corporation is not ready to support Algonquin in such extent. Now we are thinking about issues to be included into interagency agreement between Russian Space Agency and Canadian Space Agency on the usage of Algonquin radio telescope for space communications. Then the MDA can consider its inclusion to the project once again.
7. **S. Likhachev informed the participants on the status of Putin-Bush letter.** In late December 2006 during the formal meeting in Washington Russian minister of Foreign Affairs S.Lavrov made personal request to the Secretary of State C.Rice on the matter and got the promise on proper investigations.
8. **Yu. Kovalev explained the situation with the preparation of the exploratory MFS experiment.** The proposal has been submitted to conduct VLBI observations in K band (18-26 GHz) using existing frequency performance at the DSN 70-m radio telescopes (Goldstone, and Robredo). These telescopes are already equipped with the receivers completely compatible with RadioAstron providing the possibility of frequency switching in the range 18.392-25.112 GHz with steps of 960 MHz. Requested observing time is 6 hours for single high declination source 00000+0000. Mk5A recording will be used with the correlation in Bonn, and postcorrelation processing is planned to be carried out at the ASC and in NRAO.
9. **Preliminary agreement was achieved on the date of the RadioAstron general meeting in Moscow on November 28-30 2007.**
10. **The reports on the fulfillment of action items**, formulated at the previous teleconference:
  - 10.1. N.Kardashev expressed gratitude to G.Langston who made presentation on the status and progress of RadioAstron project at the American Astronomical Society Meeting in Seattle Washington in January 2007.
  - 10.2. S. Likhachev agreed with J.Romney on the procedure of testing RDR-MK5 copy machine at VLBA correlator.
  - 10.3. N.Kardashev and Yu.Kovalev contacted relevant people at JPL concerning MFS proposal for DSN.
  - 10.4. S.Likhachev found it impossible to send to the participants the content of personal letter

from president Putin to president Bush.

- 10.5. A.Lobanov reported on prospects to modify Ku/K receiver system at the 100-m Effelsberg radio telescope to be compatible with RadioAstron MFS system in 2008.
11. **New action item** was to form Science Advisory Group to coordinate the development of RadioAstron science program and to provide link to ground radio telescopes, which will participate in RadioAstron mission. (K.Kellermann, W.Baan, N.Kardashev).
12. **The ASC team apologizes** for unsatisfactory communication conditions and will take care to improve the situation in future.

**Agenda of the RadioAstron teleconference  
February 15, 2007 (15:00 UT)**

1	Corrections to the Agenda	N.Kardashev
2	RadioAstron project status and progress	V. Andreyanov
3	Pushchino tracking station (TS)	A. Smirnov
4	Green Bank tracking station	G. Langston
5	Status of Putin-Bush letter	S. Likhachev
6	Status of TS in South Africa and in Canada	S. Likhachev
7	DSN proposal for GRT tests in MFS mode	Yu.Yu. Kovalev
8	RadioAstron meeting in Moscow in November 2007	N. Kardashev
9	Review of Action Items	M. Popov
10	New Action items	M. Popov
11	Proposed date for the next teleconference (May 12-16, 2007)	

**List of participants:**

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Andreyanov V.	ASC, Russia
Baan W.	Astron, the Netherlands
Bartel N.	York University, Canada
Fomalont E.	NRAO, USA (was not able to connect)
Kanevsky B.,	ASC, Russia
Kardashev N.S.,	ASC, Russia
Kellermann K.,	NRAO, USA
van 't Klooster K.	ESA, the Netherlands (was not able to connect)
Kogan L.	NRAO, USA
Kovalev Yu,Yu.	MPIfR/ASC
Lobanov A.,	MPIfR, Germany
Langston G.,	NRAO, USA
Likhachev S.,	ASC, Russia
Popov M.V.,	ASC, Russia
Preston R.	JPL, USA
Romney J.,	NRAO, USA (was not able to connect)
Smirnov A.	ASC, Russia

