

Noto Station Status Report

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Abstract

This brief report summarizes the main activities of the Observatory of Noto in 2007.

1. Antenna, Receivers and Microwave Technology

At present the main issue for the antenna functionality is still the azimuth rail, but news from INAF indicate that the rail and grout replacement could be realized in 2008. If confirmed, this job will probably stop the antenna activity during 2008 summer.

A new antenna driving software has been realized, which is able to support all the functionalities available with the TIW ACU and is able to control with better precision. The new software has also a Web interface.

The 43 GHz receiver is working with only one polarization and the replacement of a front-end amplifier will be done in the next months.

The 86 GHz is still an issue. Functionality measurements will be done in laboratory and a new campaign will be realized during the first months 2008.

2. Acquisition Terminal and Digital Technology

Terminals are in the process of being sent to the stations. On November 5, 2007 a geodetic version of DBBC arrived in Wettzell. The Wettzell DBBC system has 4 IFs and 14 equivalent base band converters. In the same month it was installed and integrated with the other VLBI equipment. Recording of its output is realized by a Mark 5B+ system. Europe90 observation has been done for testing the equipment. Fringes have been found on all channels and data analysis is underway.

The DBBC system for Irbene (Latvia) has been completed and in the first days of February it will be transferred by Latvian colleagues to their station. The Irbene DBBC is a reduced version having two IFs and 2 Core1 boards. As soon as Irbene funds are available to upgrade the system, a few Core2 boards will be added to achieve a complete architecture. At present the system will allow to perform the first observations and tests of the antenna and the 6 cm receiver.

A system similar to the Irbene one has been delivered to the Arcetri Observatory. Main purpose is to use it as a development system for FPGA configurations devoted to the realization of spectrometer, pulsar, total power, and polarimetry back-end. The Arcetri team is part of a FPGA team established to support firmware development on the DBBC platform.

Two additional DBBC systems are almost ready and equipped with 4 IF sections, but waiting for the production of the new Core2 boards. Such terminal for Tigo and O'Higgins will be equipped with four Core2 boards each and will achieve the functionality of 16 equivalent BBCs.

Other complete systems are under construction for Yebes, Noto, Medicina, and SRT. In particular the Medicina unit is expected to support the multibeam 22GHz receiver (7 feeds x 2 polarization x 2 GHz bwd/ea) for VLBI and single dish applications.

The first ADB2 board prototype has been completed and is available for the first test. The board offers several operation modes with demultiplexing in two or four bus. Maximum sampling

clock is 2.2 GHz, maximum signal frequency to be sampled is 3.5 GHz, 10-bit representation. A board ADB2 can feed as piggy-back element a FiLa10G, giving the possibility to place the sampling element in the receiver site, connecting the DBBC through optical fibres.

The new processing unit Core2 board, in V5 version, is expected by the end of January for the first tests. The board is compatible with ADB1 and ADB2 and support a minimal equivalent of four Core1 functionality. A piggy-back element can be adopted for additional functionality, like memory bank for pulsar de-dispersion, memory corner or other needs where a significant memory addition is to be adopted. The memory piggy-back is under development.

A multiband fixed tuning configuration is under development and expected in March 08, to be used as an alternative to the standard base band converter configurations.

The FiLa10G boards realization started and the first prototype of the board is expected in two-three months. It can be used as piggy-back board of any ADB2 sampler, giving the possibility to transmit and receive at the same time a high data rate of 20 Gbps + 20 Gbps. The bidirectional functionality can be required for instance when an RFI mitigation is needed to be realized in a remote location with respect to the sampling and processing site. With a typical sampling frequency of 2.048 MHz and the full 10-bit data representation, a double optical fibre set meets the full requirement. Two transceivers can be used, with the possibility to populate the board even with one transceiver only. One board can even support the data tx-rx of 2x2 VSI connections and in such case it can still be used as p-b element of an ADB2 or as stand-alone element. Indeed the configuration files can be also loaded by the on-board stand-alone flash memory. The entire triangle connectivity HSI/HSIR to VSI in/VSI out to Optical Fibres is supported.

3. Observation Test, Documentation and More

The Europe89 was observed for 12 hours in September using 8 BBC equivalent in X band and 3 BBC equivalent in S band: fringes have been detected in all the sub-bands. (See figure 1.) Euro90 observed 24 hours at Wettzell with all the standard number of subchannels. A technique to compensate for fractional frequency offset is under evaluation.

The digital system use requires to optimize or to equalize the IF flatness in band: a new version of Conditioning Module is under development to optimize this aspect, but a good equalized band is expected from the receiver. An additional observation test will be realized with the Wz unit and all the other terminals that will be available at that time.

Dedicated Web pages have been added to the Noto Internet server with information about the DBBC system. A document series is in preparation and it started to become available on these pages, so as a page with News.

The integration with the Field System is now under development and expected to be accomplished in the coming weeks. It is realized initially as a collection of station commands, as the software structure the DBBC is able to recognize. The gain information in the different parts of the instrument are recorded in a log that can be available under a specific FS command request for calibration purposes.

4. Geodetic Experiments in Noto during 2007

Noto station observed twelve geodetic experiments during 2007, namely 6 EUROPE, 3 IVS-CRF, 2 IVS-T2, 1 IVS-R&D.

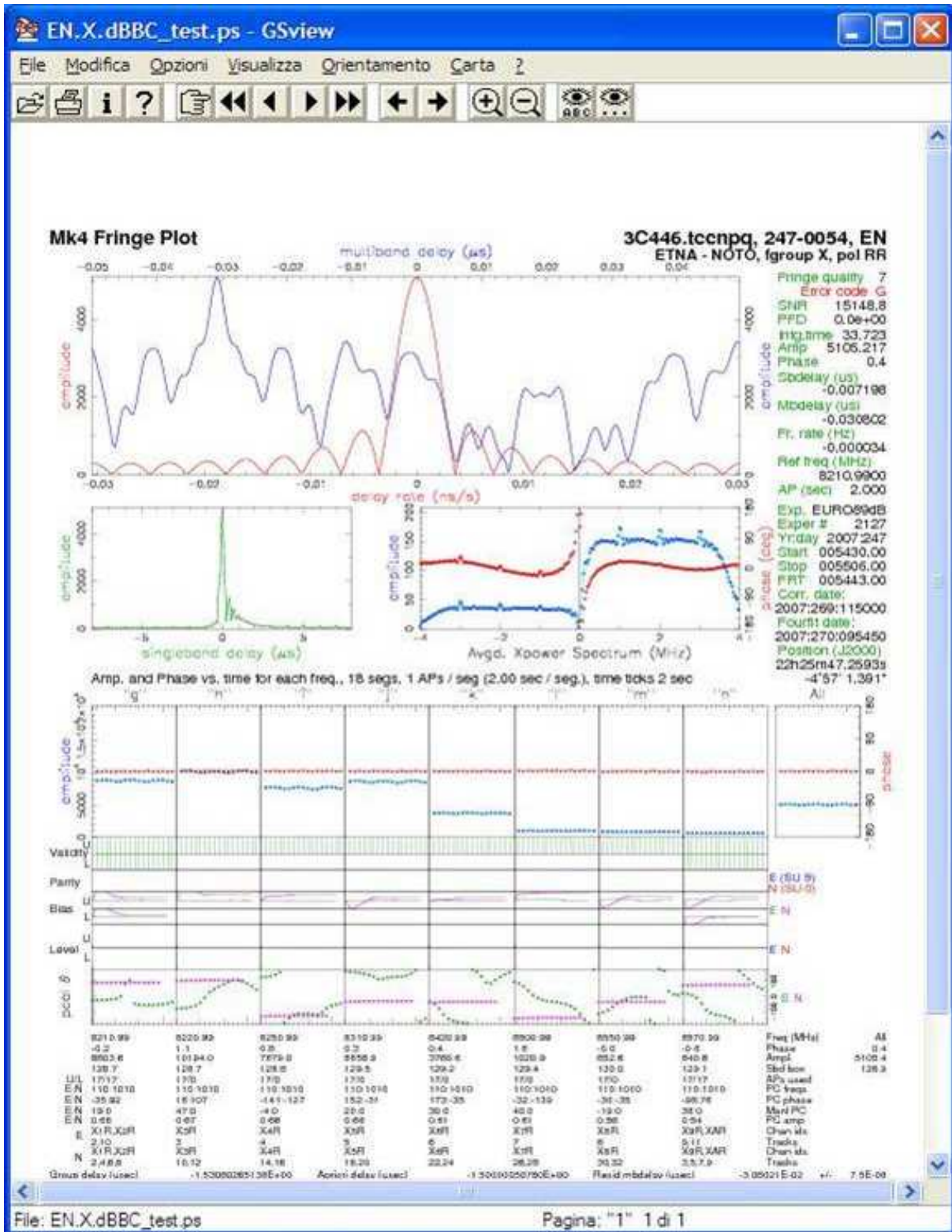


Figure 1. Fringes from Europe89.