ATNF ATUC Memorandum

To: ATUC
From: Jim Lovell
Date: 25 November 2004
Subject: Tidbinbilla Report

1. 70-m Time Allocation
    - Time allocated to radio astronomy continues at about the same level as 2003 with about 300h being allocated for VLBI and Service Spectroscopy per year. Service Spectroscopy observations have proceeded slowly however as the available LST ranges are generally outside the range requested by most proposals. This situation will improve into 2005 as Mars moves away from Galactic RAs. A summary of proposal status can be found at http://www.atnf.csiro.au/observers/tidbinbilla/
    - From July 2005 to January 2006 the 70m will have its antenna controller replaced and maintenance will be carried out on the hydrostatic bearing. During this time no observations will be possible.

2. Development Work
   Currently the 12mm system is restricted to a single polarisation with a maximum bandwidth of 64 MHz per IF (up to 2 IFs). The 18 to 26 GHz band is restricted by fixed 600 MHz filters at the input to the downconverter. There are three filters at present which cover 19.91-20.51 GHz, 21.78-22.38 GHz, and 23.61-24.21 GHz. Up to three more filters could be obtained and installed if requested by observers.

   Work is continuing to improve the efficiency of the observations by changing software to reduce the overheads between scans from ~50% to ~20%.

   A second downconverter has arrived, permitting dual polarisation observing. We are working to get this installed as soon as possible. More 600 MHz bandpass filters will be needed to for the second polarisation. A filter is currently available to permit dual polarisation observations in the 23.61-24.21 GHz band only.

   <u>Mapping/Scanning</u>
   ATNF has investigated the possibility of implementing a scanning mode on the 70-m for on-the-fly mapping.

   Chris Phillips and I spent a week at Tidbinbilla earlier this year working on observing software to implement and test a scanning mode. Unfortunately the DSN antenna control software (which our software has to interact with) cannot report antenna coordinates at the rate needed for on-the-fly mapping. While we can request changes to this software, it is generally beyond our control.

   I am still looking in to other possible ways of on-the-fly mapping, and will attempt a grid-based map a s a test but at this stage it is not possible to offer on-the-fly to the community.

   <u>e-VLBI</u>. Prior to the last LBA Session a disk-based recording system was

assembled, tested and installed at Tidbinbilla. This was used for near-real-time fringe checks and for an imaging test during the session and was successful. See the VLBI report for more details.

Mk-V. The upgrade from Mk-IV to Mk-V VLBI recording systems was recently completed and an initial test recording was carried out as part of the last LBA session with the VLBA also recording as part of a target of Opportunity observation. Mk-V recorders are capable of data rates of up to 1 Gb/s. During the ToO observations S2, MRO, Mk-IV and Mk-V recorders were being used simultaneously!

3. Resources
   ATNF allocate a budget of $6000 per year for support of Service Spectroscopy. This provides support for visiting observers, small hardware upgrades and some computing supplies.

4. Future Possibilities
   ATUC should be aware that the possibility exists to upgrade and install new equipment and obtain access to other antennas at Tidbinbilla.

   There is space on the 70-m antenna for additional receivers. For example a 6cm or 2cm (12 - 15 GHz) system. The present 18cm system is limited to 1.60 – 1.70 GHz and LCP only. An upgrade to dual polarisation and a wider bandwidth would make this system more useful.

   The 34-m beam-waveguide antenna is the newest large antenna to be built at Tidbinbilla. Currently we do not have access to it for radio astronomy but this could be negotiated with JPL. A 32 GHz system is soon to be installed on the antenna for spacecraft tracking (31.86 – 32.08 GHz, LCP, Tsys ~24K, 3 Jy/K). The antenna will also operate at wavelengths as short as 3mm. The possibility exists to use existing receivers or install new ones.

5. Comments for ATUC
   - ATUC may consider requesting that ATNF look in to an upgrade to the 12mm system at Tidbinbilla as a near duplicate of the proposed Parkes 12mm upgrade.