THE AUSTRALIA TELESCOPE LONG BASELINE ARRAY

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ABSTRACT

Progress on the Australia Telescope, due for commissioning in 1988, is on schedule. When complete, the Australia Telescope will consist of a 6-km compact array and a Long Baseline Array which will, in collaboration with the University of Tasmania and NASA, use baselines up to 1400 km. Here I focus on the novel features of the Long Baseline Array, which is planned to use satellite linked local oscillators and VLBA data acquisition terminals to provide a VLBI network capable of expansion both within Australia and overseas.

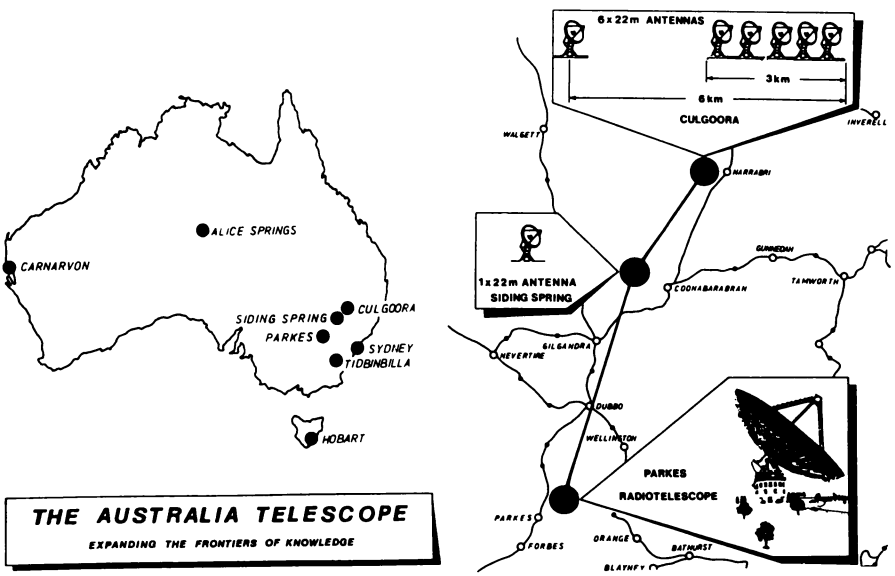

Figure 1: AT and Australian VLBI antennas

1. INTRODUCTION

The Australia Telescope (AT) will comprise a 6-km compact array (CA) at Culgoora, NSW, and a long baseline array (LBA) which will, in collaboration with the University of Tasmania and NASA, use baselines up to 1400 km, and be capable of further expansion in the future. The CA will use six movable 22-m antennas on a rail track to allow high dynamic range

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maps to be made at wavelengths extending eventually down to 3mm. The compact array is notable for its large bandwidth (up to 256 MHz with full polarisation information) and verstaile spectral-line capability (up to 2048 channels per Stokes parameter). The LBA will use the CA in a tied configuration together with the 64-m Parkes antenna, and a new 22-m antenna at Siding Spring. It will also be used in conjunction with the NASA DSN Tidbinbilla antennas and the 25-m antenna owned by the University of Tasmania.A recent review of the AT is given by Whiteoak (1986). Here I concentrate on the novel features of the LBA,the location of which is shown in Fig.1.

2. LOCAL OSCILLATOR DISTRIBUTION

Present plans are to use the AUSSAT geosynchronous satellites to distribute a master local oscillator from Culgoora. At each station of the LBA, a two-way AUSSAT link will be used to compare the phase of the local oscillator with that of the master at Culgoora, and the difference used to correct the phase of the data. The detailed design of this system is not yet complete, and a series of experiments using AUSSAT II will shortly be started to compare the performance of various configurations.

3. DATA TRANSMISSION AND PROCESSING

For various reasons, primarily the requirement for compatibility with the CA, fringe rotation for the LBA will be done at the antennas. This will be controlled by a local computer at each antenna which will communicate continuously with the central site computer, probably using a commercial packet-switched network. It is planned to record data at each antenna of the LBA using a standard Data Acquisition System purchased from the VLBA in the U.S. We also plan to purchase a number of Data Playback Systems which will then interface to our correlator at Culgoora.

The LBA data will be compatible with VLBA and other VLBI data, except for the provision of fringe tracking at the antennas. This will be overcome as follows: (i) For VLBI experiments to be processed overseas, fringe rotation at each antenna will be disabled. (ii) For VLBI experiments to be processed at the AT central site, our provisional plans are to implement a Hilbert Transform phase rotator at the correlator. As well as ensuring our ability to participate in international VLBI, this compatibility is intended to facilitate future expansion and use of QUASAT and RADIOASTRON.

REFERENCE

Whiteoak, J.B., 1986, Proc. Astr. Soc. Aust., **6**, 290.