AT NEWSLETTER
The Australia Telescope
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ALL SYSTEMS GO!

Extract from Hansard
House of Representatives
17 November 1983

CONSTRUCTION OF THE AUSTRALIA TELESCOPE, NEW SOUTH WALES

Approval of Work: Public Works Committee Act

Mr HURFORD (Adelaide - Minister for Housing and Construction) (4.16) - I move:

That in accordance with the provisions of the *Public Works Committee Act 1969*, it is expedient to carry out the following proposed work which was referred to the Parliamentary Standing Committee on Public Works and on which the Committee has duly reported to Parliament: Construction of the Australia Telescope, New South Wales.

The Australia telescope project will provide a multi-element synthesis array of reflector antennas for radio astronomy observation of celestial objects. It will comprise the following: a compact array of six antennas at Culgoora, New South Wales, a seventh antenna at Siding Spring, New South Wales, and the establishment of a long baseline array in combination with the 64 metre radio telescope at Parkes, New South Wales. The Committee has tabled its report on the proposed work d has concluded there is a need for the stralia telescope to maintain Australia's high standing in world astronomy, facilitate international cooperation and collaboration in astronomy and to develop further Australian industry associated with the science. The Committee also concluded that the design of the Australia telescope is satisfactory and the sites selected are suitable. The Committee recommends construction of the Australia telescope. The estimated cost of the work is $30.7m at March 1983 prices and if the House agrees to support the motion, planning can proceed in accordance with the Committee's recommendations. I commend the motion to the House.

Question resolved in the affirmative.

ATSOC

The AT Scientific Objectives Committee met on 3 November. Among their recommendations to the Advisory Committee meeting in December were:

* an extension of the interference survey currently in progress
* that the compact array should be a grating array with increments less than or about 15m
* that as far as possible, calibration using redundant spacings should be available, provided it is also possible to observe in a minimally redundant way

that if tunable bandwidths are limited to 15% at S-band and above, the preferred band limits (in GHz) are as follows;

S (2.2 - 2.5), C (4.45 - 5.10), X (8.0 - 9.20), K (20.5 - 24.0) and Q (42.0 - 50.0).

SITE DEVELOPMENTS

The drought in Australia has broken with a vengeance and no more so than in the Culgoora area - the site for the Compact Array of the AT. Consequently the topological survey of the site being carried out by the Australian Survey Office of the Department of Administrative Services (DAS) has been severely hampered with surveyors tramping round in ankle deep water in places. The purpose of the survey is to define the best route for the 3km track within a strip of land about 160m wide. Ground bore tests and a further survey for associated roadworks on site and to the remote 6km site will follow.

OVERSEAS VISITS AND VISITORS

Alec Little

In November Alec Little attended the 9th European Conference on Optical Communications held in Geneva and visited several centres for optical fibre research in England and Japan. It became clear from these visits that the use of optical fibres in the AT presents no technical difficulty but will raise some practical problems. Although the supply of fibres is assured, off-the-shelf transmitter and receiver units for high bit rate systems are in short supply.

Connectors for both monomode and multimode fibres are now available but this is an area of concern for the AT since connections have to be made and unmade in a rather harsh environment. There did not seem to be any really robust connectors available for the monomode fibres, but there were some for multimode fibres which can be used in harsh environments such as required in military applications. Thus multimode fibres will have to be considered as the more practical of the two types even though bandwidth limitations may force the use of monomode fibres.

Overall optical fibre technology is well advanced and should not present any major problem for the IF digital data. How well it will work for the LO systems will have to be evaluated.

Others

Jon Ables visited a range of institutions in the USA during September/October last year to familiarise himself with the latest developments there while Dennis Cooper made a rush visit to the States in January for consultations on aspects of antenna design. He was accompanied by Nicholas Guoth from MWP, the AT antenna consultant.

To reverse the outward flow, Ben Hooghoudt from the Netherlands is due to visit the project in late January for consultations on the antenna design.

Meanwhile Richard Lacasse from NRAO Greenbank has accepted an 18 months appointment to work with the AT Correlator group starting in March this year and Alan Young from Caltech will arrive early in the year for a six months consultancy with the AT Signal Distribution and Monitoring group.

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DEVELOPMENTS

Signal Distribution

In collaboration with the receiver group, an LO/IF configuration for the various receivers has been developed, allowing an initial definition of the overall LO system. Parts have been ordered so that a prototype can be put together. The group has now set up shop in the new hut, where initial tests of a phase stable L.O. distribution scheme are underway. An initial study of the phase rotators has also been made.

Digitizer/Correlator

In November, members of the Working Group (John O'Sullivan and Andrew Hunt) and the workers' group (David Brown, David Lecomte and Warwick Wilson) attended a VLSI course at CSIRO Adelaide. There followed much discussion on the XCELL chip (at the Correlator Workshop and elsewhere) with a view to updating the design to include 2-bit correlation and to improve the somewhat dismal (i.e. zero) yield obtained so far. Three XCELL structures, i.e. pieces of circuitry which are repeated many times over in the XCELL, were submitted to AUSMPC 12/83 (multi-project chip) and are due back in February. It is intended to use the remaining 3 AUSMPC runs this year to home in on a final design for the XCELL. Meanwhile the major effort in the group, following on from the correlator workshop, is aimed at further defining the hardware in each of the correlator sub-systems.

Computing

A study has commenced to determine the best way of implementing the communication links to carry control/monitor data between the antennas of the compact array and the central synchronous computer at Culgoora. These links must also provide a means whereby accurate clock information is available at each antenna. One method under consideration involves modifying a scheme currently being implemented at Parkes. As a means of becoming familar with the Parkes approach, some group members have provided assistance with developing the required hardware.

Available computing capacity at Epping is becoming saturated and plans are now well advanced for purchasing another computer to be used primarily for AT software development. This machine will be networked with the the two existing VAX computers. Eventually it will be moved to Culgoora and become the synchronous computer there.

Data Reduction

An image processing system - AIPS - has been adapted to the RP environment. The system is designed by NRAO for the VLA, and seems likely to become the astronomical industry standard. We expect that it will form the basis of the AT reduction package.

ADVISORY COMMITTEE MEETING

The next AT Advisory Committee meeting and brief sessions will be held at Epping from 19 to 21 Ma . Two of the overseas advisers, John Baldwin and Peter Napier, will be in attendance.

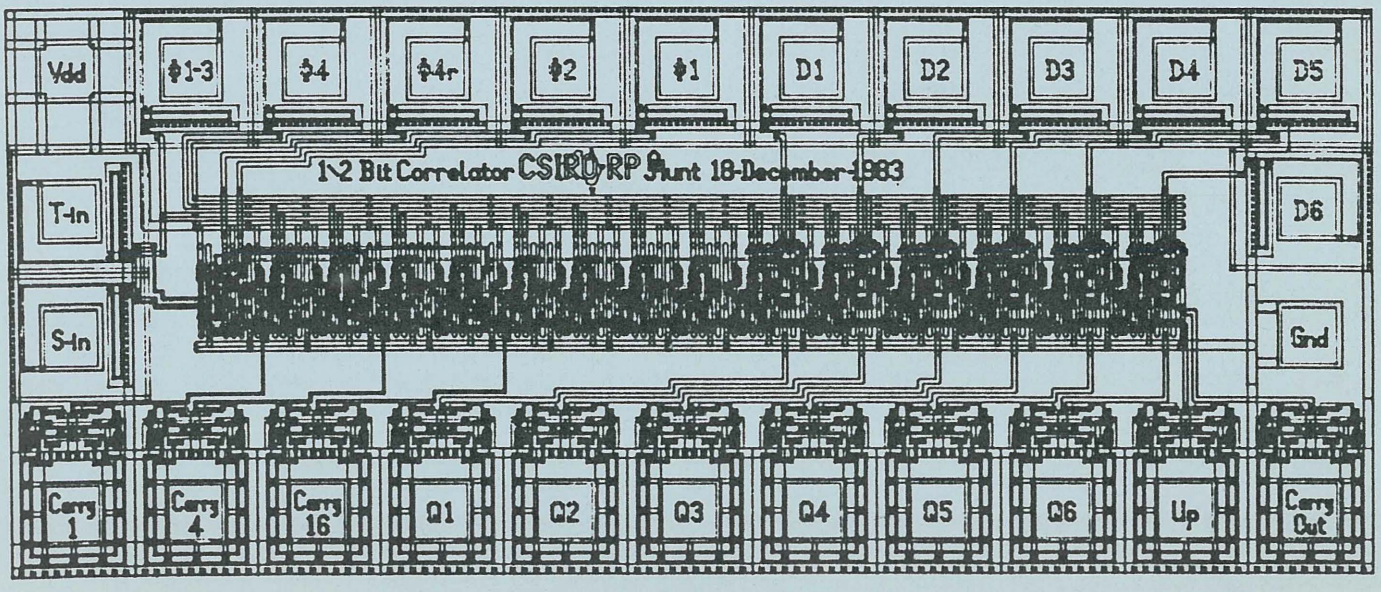
COUNTDOWN: A NEW SERIES

AT Countdown is a new series of publications produced by the AT Project Office. The first issue, January 1984, will be available early in February. Its aim is to inform key people in industry, research institutions and other interested parties about the design and construction of the Australia Telescope, the technology of its operation and the science for which it will be used.

The completion date for the AT is scheduled for December 1988 and it is expected that some ten issues of AT Countdown will be produced by that time. This series will thus provide a comprehensive picture of the Australia Telescope - a national project for Australia's bicentennial celebrations.

CORRELATOR WORKSHOP

Held at Parkes 21-23 Nov. 1983. Aims were to

- determine a reasonable specification for the AT correlator system
- provide conceptual designs for the various sub-systems
- identify problem areas requiring urgent attention

A major achievement of the workshop was the definition of a new overall structure of the correlator. The idea of producing one huge machine, capable of satisfying all the astronomical requirements, was abandoned. This was due to the complexity of the switching matrix required to reconfigure the correlator for various tasks. The structure finally adopted includes four distinct correlators, these being both line and continuum correlators for each of the compact and long baseline arrays. This conclusion was greeted by loud sighs of relief from members of the correlator group and other sympathetic parties. Much discussion also centred on the XCELL chip (see Digitizer/Correlator above). A report of the Workshop is available in the AT Memoranda Series (AT/10.4/003).