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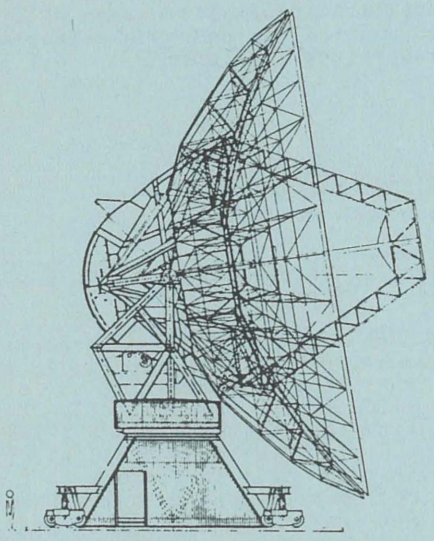
CIVIL WORKS

The earthworks for the Compact Array at Culgoora have been completed, except for the service roads and diversion channel. The base for the rail track has been levelled and stabilized and the foundation piers for all stations have been bored and concreted. The interconnecting beams (cross-ties) have been concreted for more than half the stations and the pedestals that support the antennas have been constructed at the first fourteen stations.

All of the rail and most of the prestressed concrete sleepers for the rail track have been delivered. Deliveries of the gravel for the rail bed have begun and the first section of track is about to be laid.

ANTENNA CONTRACT

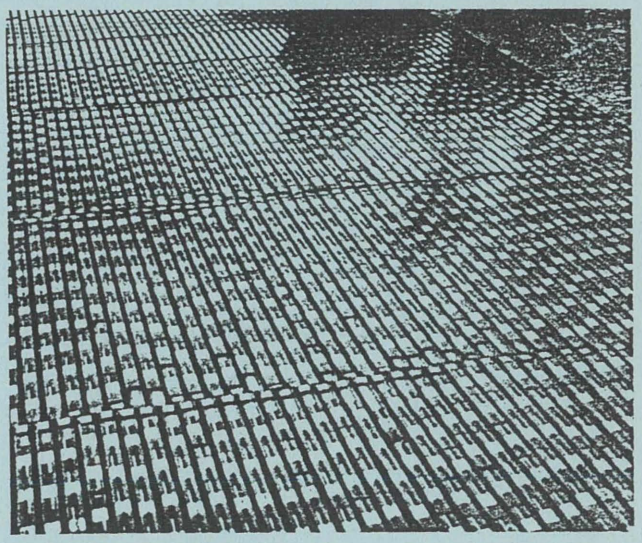
The contract for the construction of the seven 22 m antennas has been awarded to Evans Deakin Industries Ltd of Brisbane. The first antenna is to be completed by the end of 1986; the remainder to follow at intervals of two months. The 6 km antenna is due in September 1987 and the antenna at Siding Spring in November 1987.



The design of the antennas resulted from a collaboration between CSIRO Radiophysics and the consultants Macdonald Wagner Pty Ltd who will supervise the contract. Evans Deakin will take over techniques developed by CSIRO for the low-cost production of panels with accuracies down to 0.15 mm rms.

CORRELATOR CHIPS

4500 VLSI chips designed at CSIRO Radiophysics and supplied by Austek Microsystems of Adelaide were delivered in mid June. Tests have shown the majority of the chips operate at a 16 MHz clock rate, exceeding the design specification of 10 MHz. To capitalize on this it is likely that the correlator will be redesigned to allow 2 bit operation at the 128 MHz bandwidth. In principle the bandwidth could be increased to 256 MHz at 1 bit, but for continuum 2 bits at 128 MHz gives similar signal/noise, and for line observations the wider bandwidth will not be needed until operations commence at 115 GHz.



FEEDS

A prototype of the L/S (1.25 - 2.5 Ghz) feed horn - over 2 m long and over 1 m in diameter - has been built and tested on the antenna range. This corrugated conical horn was constructed from bands and rings of sheet aluminium. These were assembled on a polystyrene former, forced together to acieve electrical contact, and then mechanically joined with external fibreglass.

SYSTEMS CO-ORDINATOR

The death of Alec Little in March 1985 was a great loss to the Australia Telescope project. He is sorely missed. Some of his duties in the project have been assumed by Graham Nelson, who has been appointed Systems Co-ordinator.

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THE AUSTRALIA TELESCOPE IN SUMMARY

CONFIGURATION

Compact Array at CUlgoora

Six 22 m diameter antennas on an East-West rail track. Five antennas on a 3 km section with 35 stations, sixth antenna at 6 km on a 75 m section with 2 stations.

Pseudo-regular minimum redundancy coverage after 2, 4, 8, 12, 16 and 24 x 12hr observing periods. After 27 x 12hrs all baselines from 30 m to 3 km, at increments of 15m, available. Pseudo-zoom arrays available after 1, 2, 4 and 8 x 12hrs.

Long Baseline Array

One or more of the compact array antennas as a tied-array linked to a new 22 m antenna at Siding Spring and to the Parkes 64 m antenna.

Baselines PKS-CUL 321km; PKS-SS 207km; CUL-SS 115km. Provision to include antennas at Hobart, Tidbinbilla etc

ANTENNAS

Seven new 22 m fully-steerable alt-az antennas

Cassegrain optics with the feeds on axis
Aperture efficiency 0.5 at 44 Ghz
Central 11.7 m efficiency 0.3 at 115 Ghz

Six Culgoora antennas self-propelled
Siding Spring antenna stationary

SYSTEM

Compact Array

Two independent LO frequencies per antenna.
Four IF outputs per antenna, digitized at the antenna.
Fringe stopping at antennas.
Signal transmission via optical fibres, with separate fibre for each station.

IF stream (512 Mbaud capacity) either
256 MHz 1 bit sampled, or
128 MHz 2 bit sampled, or
64 Mhz 4 bit sampled, with D/A conversion at central site for narrow band filtering

Long Baseline Array

Two independent LO frequencies per antenna
At least two IF channels per antenna, digitized at the antenna
Fringe stopping at antennas
Signal data via (US VLBA) tape recorders
IF data rate >16Mbits/sec per IF channel

FEEDS AND RECEIVERS

For Cassegrain Antennas

Dual polarization, dual frequency systems with single wide-band horn and common cryogenic package, turret mounted

*	L/S	1.25-1.75 / 2.2-2.5	Ghz
*	C/X	4.4-6.1 / 8.0-9.2	Ghz
	K/Q	20-25.5 / 42-50	Ghz
	W/F	84-98.5 / 105-116	Ghz

Frequencies below 1 Ghz to be decided
* Within present budget

Simultaneous S/X operation with X-band (off-axis) via a dichroic reflector

Dual linear polarization

For Parkes 64 m Antenna

Prime focus designs still to be decided.

LOCAL OSCILLATORS

Compact Array

Via the optical fibres providng adequate reciprocity can be achieved

Long Baseline Array

Via satellite ('Aussat') unless cheaper frequency standards based on saphire-loaded cavities become available

CORRELATORS

The correlators use the XCELL chip which allows up to 32 parallel processes.

The compact Array correlator performs simultaneous 2 bit correlation for 15 baselines with up to 8 products/baseline (four Stokes parameters for two RF frequencies). For 8 products with bandwidths of 128 MHz there will be 16 channels. Bandwidths available range from 128 MHz downwards in factors of 2 to 0.5 MHz. The number of channels x the number of products per channel is limited to 16384 / bandwidth (MHz), up to a maximum of 4096 (or 8192 with recirculation).

The Long Baseline Array correlator is similar but provides for only 4 products from each of 10 baselines. The tape playback system interfaces to this correlator.

The numbers given assume that the correlator operates at 16 MHz.