CSIRO DIVISION OF RADIOPHYSICS
THE AUSTRALIA TELESCOPE
AT/20.1.1/022

System Drawings

(CA, LBA and Stand-alone operation)

The attached system drawings are intended to defined the CA system to the input to the correlator. The correlator and computer systems are not explicitly included, although many of the functions indicated here rely on interaction with them.

The LBA drawings define a system which will probably be installed at Parkes and Siding Spring and possibly also at Hobart.

Not shown on the drawings are the details of stand-alone operation which will be provided in L, S, C and X bands at Parkes including dual beam operation in Ca and X bands. At Siding Spring stand-alone operation will eventually be provided in all bands including dual beam operation in K, Q, W and F bands.

At each site line observations will be carried out using one correlator block as an autocorrelator. This system will also provide polarization measurements in bandwidths up to 2x128 MHz (2 bit digitization) or 2x256 MHz (1 bit). Wider band polarization and dual beam correlation observations will require the use of Bonn-type polarimeters. Two of these will be provided initially at Parkes and a further two (hopefully of wider bandwidth) will be required later at Siding Spring.

The implications of the stand-alone requirements for the attached system drawings are that full CA receivers will in fact be required at Parkes and Siding Spring. If autocorrelations (polarization or line) are required in 128 and 256 MHz bandwidths then 1 and 2 bit sampling will be required in addition to the 64 MHz, 4 bit sampling required for the LBA. This option will be essential for the higher frequencies at Siding Spring. In addition wide band polarization and dual beam correlation observations will require access to the broadband signals either at the RF or in the first IF.

Graham Nelson,
23rd April, 1986.
CSIRO DIVISION OF RADIOPHYSICS
THE AUSTRALIA TELESCOPE
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Graham Nelson,
23rd April, 1986.
BROADBAND CONTINUUM AND LINE CORRELATOR

SAMPLE STATISTICS
# USE NOTE 8

(15 SETS)

64 MHz CONTINUUM CORRELATOR

BROADBAND CONTINUUM AND LINE SWITCHED POLARIZATION CORRELATOR

500 MHz

(6 SETS)

64 MHz CONTINUUM SWITCHED POLARIZATION CORRELATOR

500 MHz

(6 SETS)

* NOTES:
1. DIGITIZER REFERENCE LEVELS ARE SET BY MONITORING SAMPLE STATISTICS.
2. POSITIVE AND NEGATIVE SAMPLE NUMBERS SHOULD BE EQUAL AND OUT OF
   SAMPLES SHOULD BE IN EACH OF THE HIGHEST AND LOWEST RANGES FOR
   2 BIT SAMPLING #7.
3. THE #1 FROM THE SWITCHED CORRELATORS ARE USED TO EQUALISE
   THE PHASES OF THE PAIRS OF LINEARLY POLARIZED CHANNELS.

AUSTRALIA TELESCOPE CA
RECEIVER CONTROL INFORMATION OBTAINED FROM CORRELATORS.
LINEARLY POLARIZED INPUTS

\( f_1 \) BANDWIDTHS 0.5, 1.2, 4.0, 8.0 MHz

\( f_2 \) BANDWIDTH 16 MHz

Phase offsetting at front end maintains XY phase difference equal to 90° ± 0.5°

Identical system for inputs from the other independent LO observing at \( f_2 \) (0.5-16 MHz bandwidths)

Identical system for inputs from the other independent LO observing at \( f_2 \) (1.2 MHz bandwidths)

*Notes:
- The switched analogue correlators on \( f_1 \) are used to control XY phase offsetting at front end. The \( f_2 \) inputs are used only when a 64 MHz bandwidth is required in a single polarization. The XY correlators on these inputs are used only to initially set-up equal delays on the \( f_1 \) and \( f_2 \) 16 MHz bands and then to monitor the stability of that setting.

AUSTRALIA TELESCOPE
TIED ARRAY

<table>
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<th>DESIGNER</th>
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BANDWIDTHS 0.5, 1, 4, 8, 16 MHz

TRANSFER SWITCH

SELECT 1-4 OF ABOVE OUTPUTS

CHANNEL GAIN + XY PHASE MONITORS
LEVEL CONTROL
SAMPLING AND DIGITIZING
0° / -180° PHASE SWITCHING

Y LNA
CIRCULAR
CIRCULAR
CIRCULAR
LINEAR
R L R L
R L R L
R L R L
R L R L

NOTES:

THE SWITCHED ANALOGUE CORRELATORS ON T1 ARE USED TO CONTROL XY PHASE OFFSETTING AT FRONT END. THE T12 INPUTS ARE USED ONLY WHEN A 64 MHz BANDWIDTH IS REQUIRED IN A SINGLE POLARIZATION. THE XY CORRELATORS ON THESE INPUTS ARE USED ONLY TO INITIALLY SET-UP EQUAL DELAYS ON THE T1 AND T12. IN MHz BANDS AND THEN TO MONITOR THE STABILITY OF THAT SETTING.

AUSTRALIA TELESCOPE LBA
POLARIZATION GENERATION AND SELECTION
The detail of the antenna alone and the cabling alone will be provided. An observer at each end will carry out using one channel. The observer will also provide a fibre optic measurement of 2 x 12.8 MHz (2.8 GHz) or 2 x 256 MHz (1 GHz). Other details of the antenna will be provided. The detail will be provided.
candidate with some frequency of occurrence will be carriers of that allele. In addition, one will find the allele in 128 individuals and 128 receivers. The attacks of the disorder in the group of 128 receivers is 128.
System Drawings (CA, LBA and Stand alone station)

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System Drawings

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Graham Nelson,
23rd April, 1986.
Receiver control information obtained from correlators.

AUSTRALIA TELESCOPE CA

Switched Polareization Correlator
64 MHz Continuum

Switched Polareization Correlator
Broadband Continuum and Line

Switched Polareization Correlator
64 MHz Continuum

Switched Polareization Correlator
Broadband Continuum and Line

Note:
1. The phase of the phase of the output polarized channels.
2. The output of the switched correlator is used to calibrate
3. The calibration signal is in phase with the reference and the output channel.
4. The reference and the output channel are equal to the output.
5. The output reference levels are set by monitoring signal statistics.
LINEARLY POLARIZED INPUTS

f_{11}  BANDWIDTHS 0.5, 1, 2, 4, 8, 16 MHz

f_{12}  BANDWIDTH 16 MHz

TRANSFER SWITCH

LAB INDEPENDENT ORTHOGONAL ENVELOPE

SELECT CHANNELS

IDENTICAL SYSTEM FOR INPUTS FROM THE OTHER INDEPENDENT LD OBSERVING AT f_{11} (0.5-16 MHz BANDWIDTHS)

PHASE OFFSETTING AT FRONT END MAINTAINS XY PHASE DIFFERENCE EQUAL TO 0° ± 0.5°

IDENTICAL SYSTEM FOR INPUTS FROM THE OTHER INDEPENDENT LD OBSERVING AT f_{12} (16 MHz BANDWIDTHS)

PHASE OFFSETTING AT FRONT END MAINTAINS XY PHASE DIFFERENCE EQUAL TO 0° ± 0.5°

SELECT 1-4 OF ABOVE OUTPUTS

d / 180° ANALOGUE PHASE SWITCHING
CHANNEL GAIN + XY PHASE MONITORS
LEVEL CONTROL
SAMPLING AND OBITIZING
6° / -180° PHASE SWITCHING

VLCB RECORDER

NOTES:

THE SWITCHED ANALOGUE CORRELATORS ON f_{11} ARE USED TO CONTROL XY PHASE OFFSETTING AT FRONT END. THE f_{12} INPUTS ARE USED ONLY WHEN A 16 MHz BANDWIDTH IS REQUIRED IN A SINGLE POLARIZATION. THE XY CORRELATORS ON THESE INPUTS ARE USED ONLY TO INITIALLY SET-UP EQUAL DELAYS ON THE f_{11} AND f_{12} 16 MHz BANDS AND THEN TO MONITOR THE STABILITY OF THAT SETTING.

AUSTRALIA TELESCOPE CA
TIED ARRAY

DRG. No.
AUSTRALIA TELESCOPE LBA
FRONT END CONVERSION SCHEME
THE SWITCHED ANALOGUE CORRELATORS ON f1 are used to control XY phase offsetting at front end. The f2 inputs are used only when a 64 MHz bandwidth is required in a single polarization. The XY correlators on these inputs are used only to initially set-up equal delays on the f1 and f2 16 MHz bands and then to monitor the stability of that setting.

AUSTRALIA TELESCOPE LBA
POLARIZATION GENERATION AND SELECTION