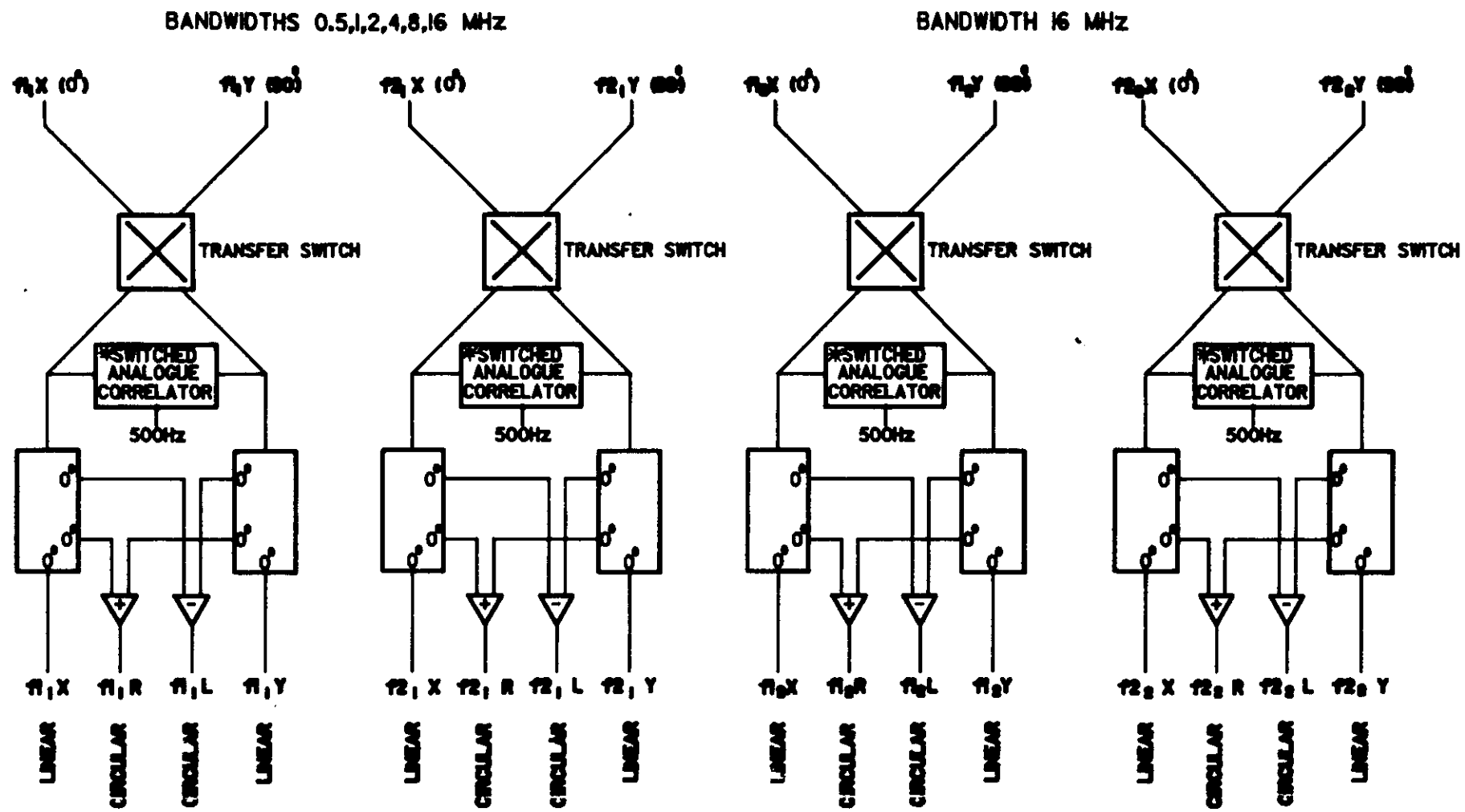


SELECT 1- 4 OF ABOVE OUTPUTS

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

VLBA RECORDER

* NOTES:

THE SWITCHED ANALOGUE CORRELATORS ON f_{1_1} ARE USED TO CONTROL XY PHASE OFFSETTING AT FRONT END. THE f_{1_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_1} AND f_{1_2} 16 MHz BANDS AND THEN TO MONITOR THE STABILITY OF THAT SETTING.

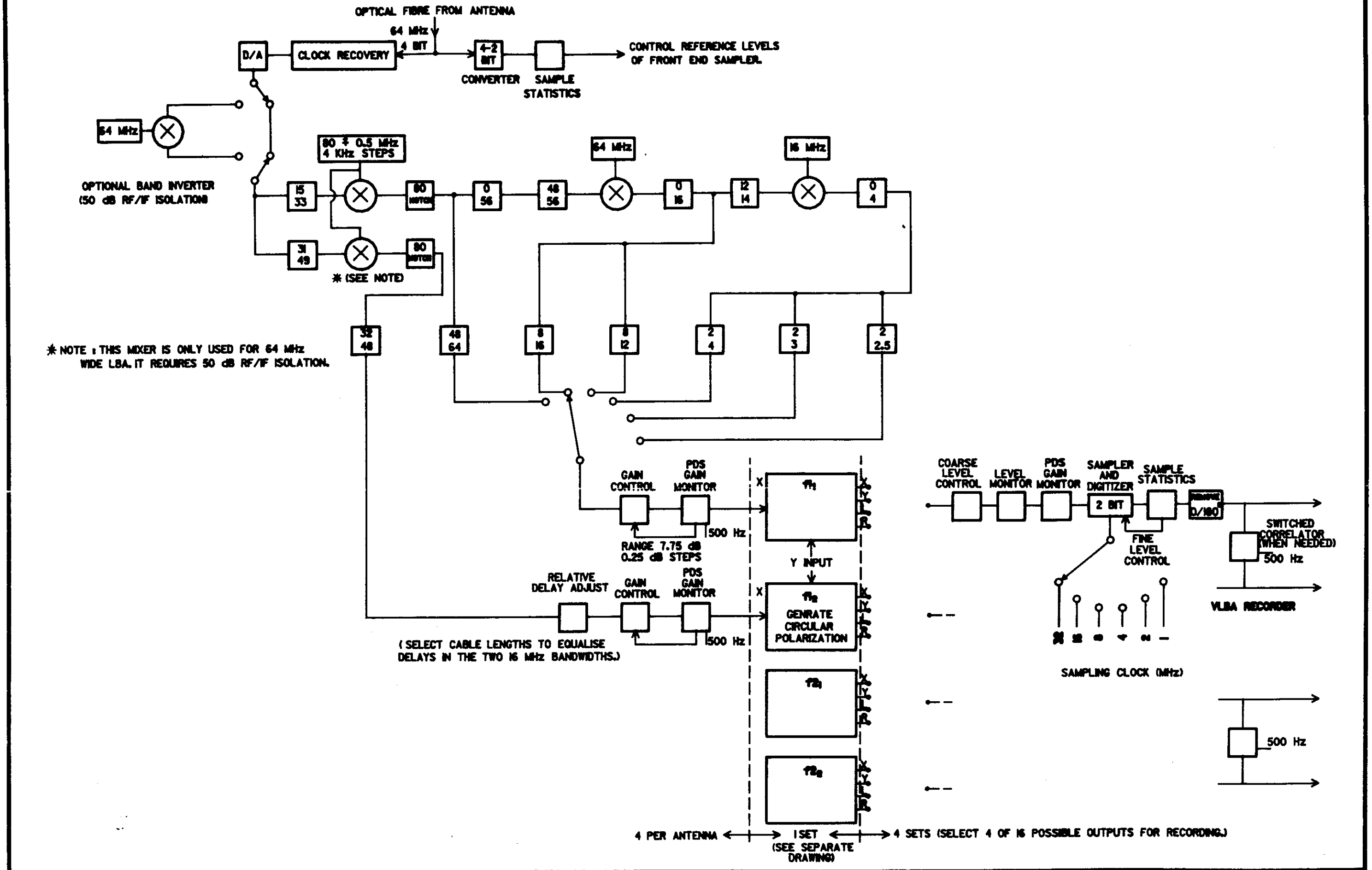
DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10.4.86						

AUSTRALIA TELESCOPE LBA

POLARIZATION GENERATION AND SELECTION

DRG. No.

SHEET OF



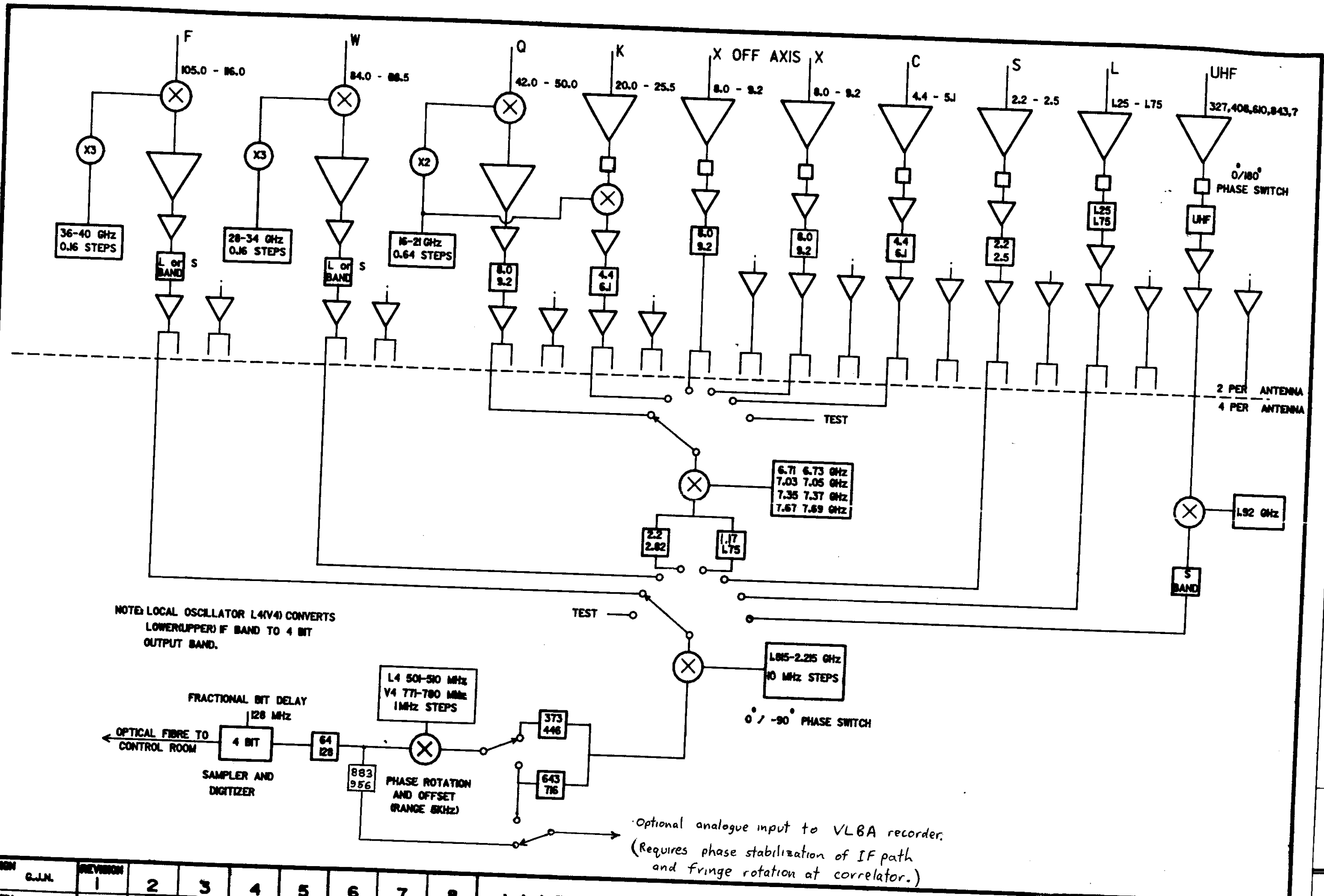
DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10.4.86						

AUSTRALIA TELESCOPE LBA

CONVERSION SCHEME NARROW BAND TUNING

DRG. No.

SHEET OF



NOTE: LOCAL OSCILLATOR L4(V4) CONVERTS LOWER(UPPER) IF BAND TO 4 BIT OUTPUT BAND.

DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-86	16-2-86	10.4.86						

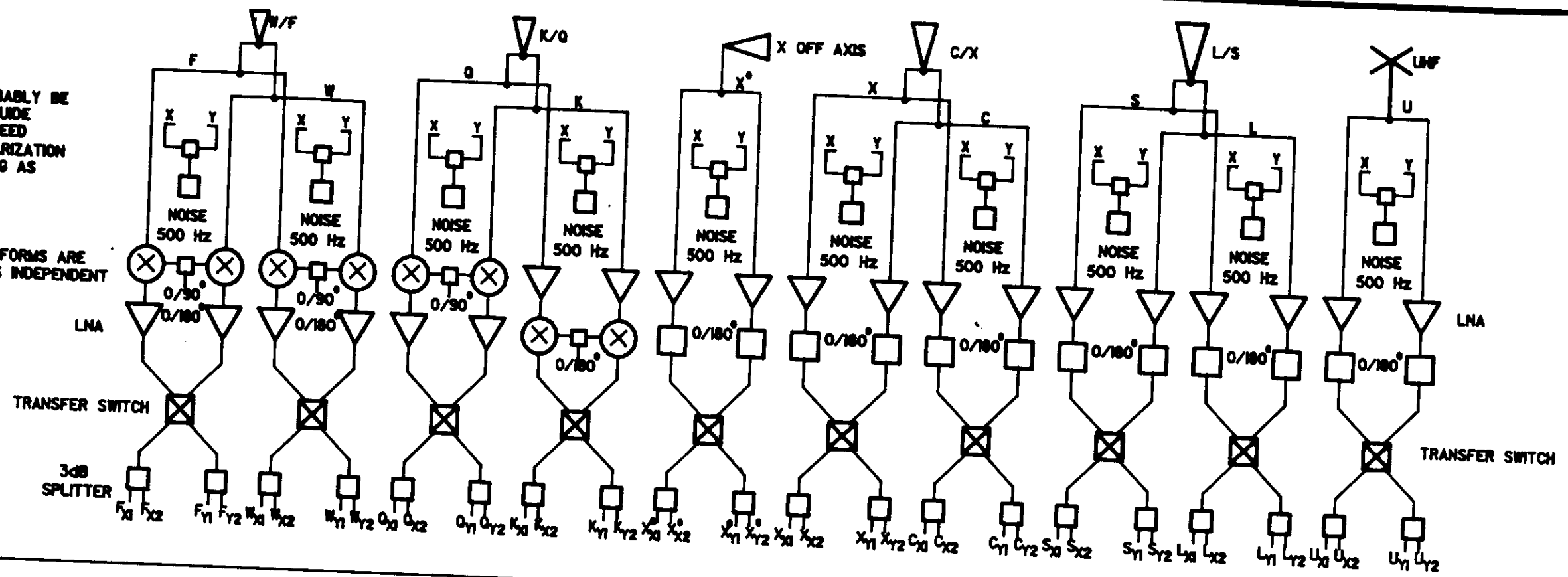
AUSTRALIA TELESCOPE LBA
FRONT END CONVERSION SCHEME

DRG. No.

SHEET OF

NOTE :
SWITCHED NOISE WILL PROBABLY BE INJECTED INTO THE WAVEGUIDE IMMEDIATELY AFTER THE FEED RATHER THAN AFTER POLARIZATION AND FREQUENTLY SPLITTING AS SHOWN ABOVE.

0° / 90° AND 0° / 180° WAVEFORMS ARE ORTHOGONAL BETWEEN AERIALS INDEPENDENT OF LAG.

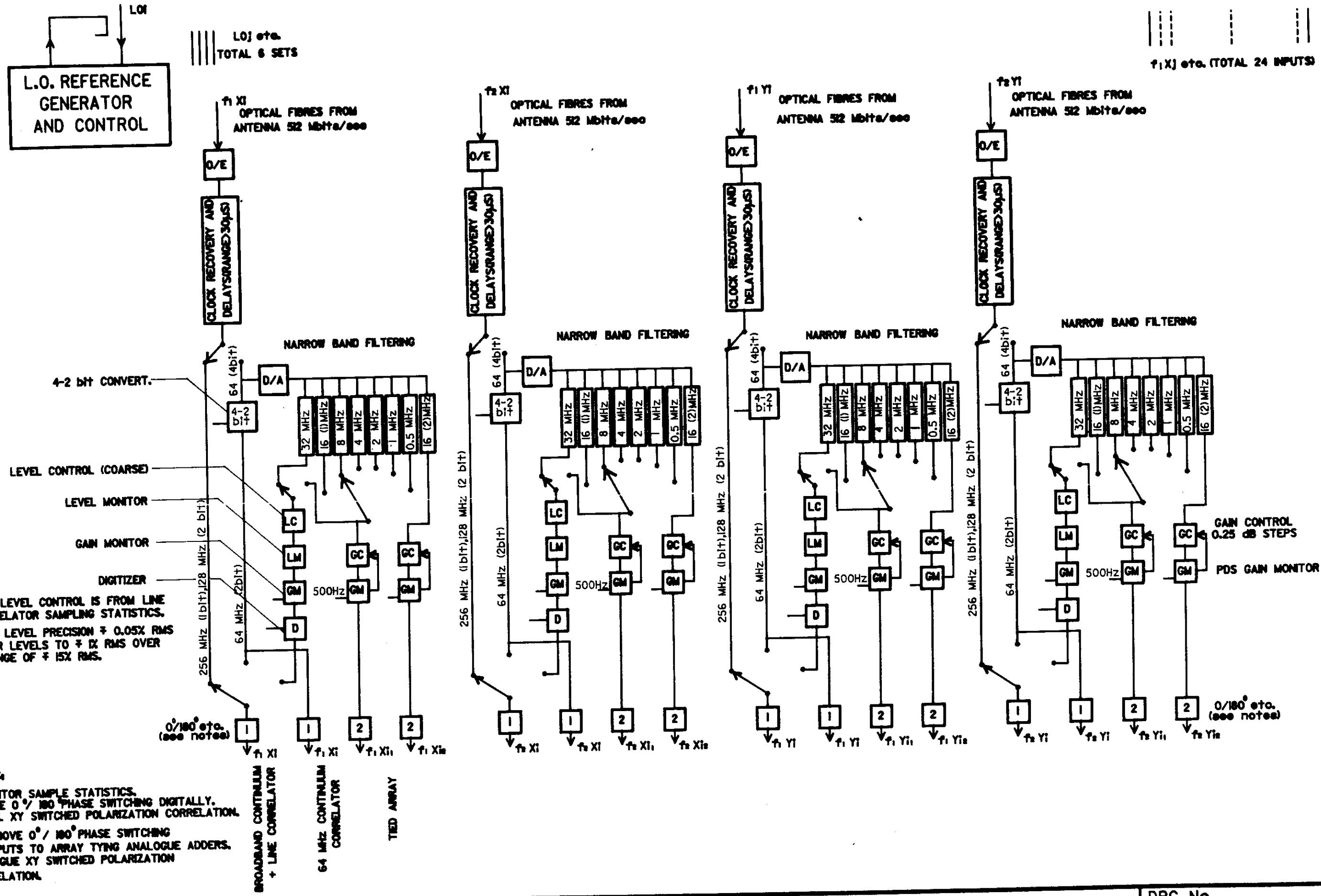


DESIGN G.J.N.	REVISION 1	2							
DRAWN G.J.N.	G.J.N.	K.C.							
DATE 1-10-85	18-2-86	10.4.86							

AUSTRALIA TELESCOPE CA
RECEIVER SCHEMATIC (AERIAL)

DRG. No.

SHEET OF



FINE LEVEL CONTROL IS FROM LINE CORRELATOR SAMPLING STATISTICS.

ZERO LEVEL PRECISION ± 0.05% RMS
OTHER LEVELS TO ± 1% RMS OVER A RANGE OF ± 15% RMS.

NOTES:

(1) MONITOR SAMPLE STATISTICS. REMOVE 0°/ 180° PHASE SWITCHING DIGITALLY. DIGITAL XY SWITCHED POLARIZATION CORRELATION.

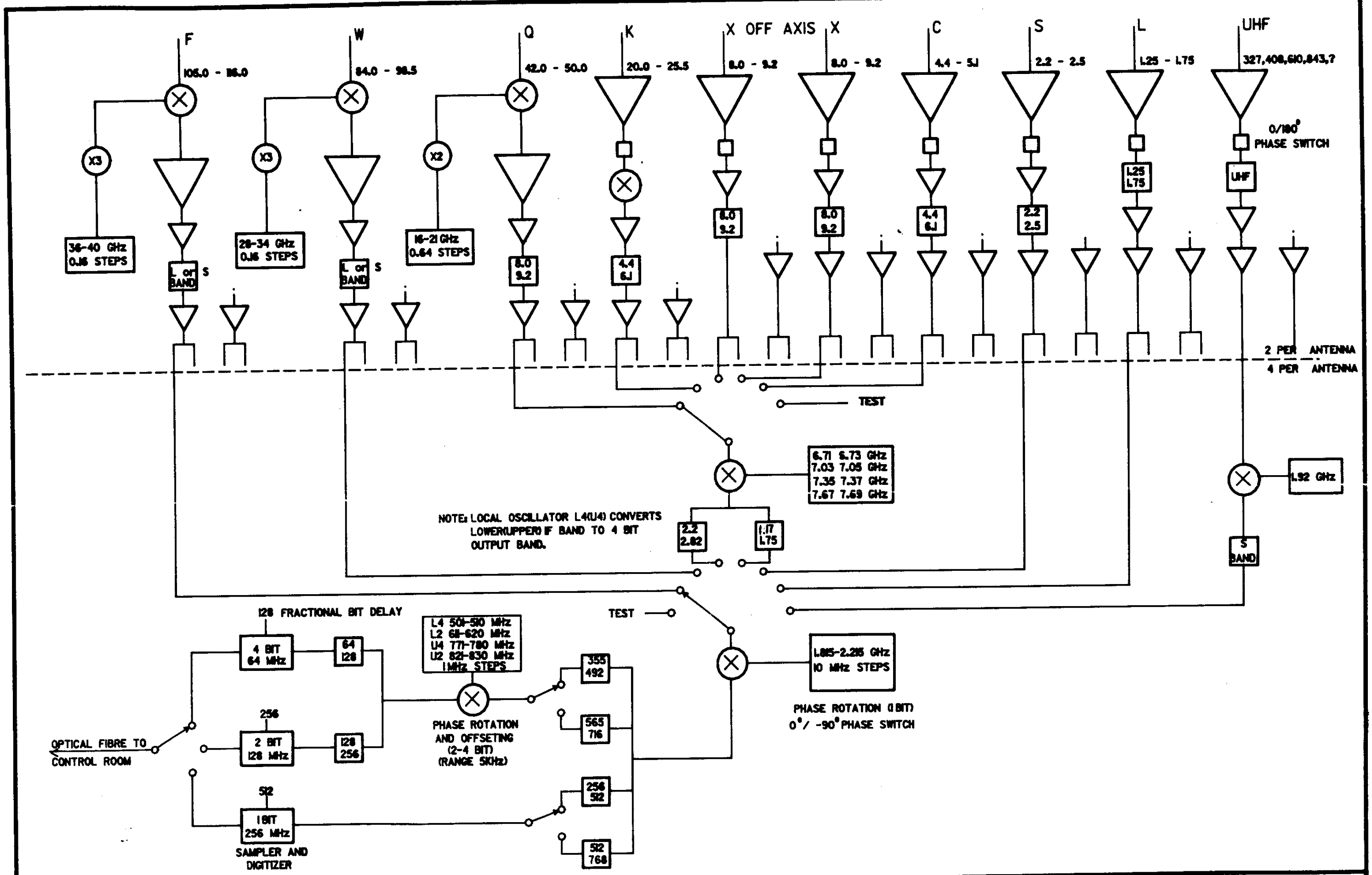
(2) REMOVE 0°/ 180° PHASE SWITCHING AT INPUTS TO ARRAY TYING ANALOGUE ADDERS. ANALOGUE XY SWITCHED POLARIZATION CORRELATION.

DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10.4.86						

AUSTRALIA TELESCOPE CA
RECEIVER SCHEMATIC (CENTRAL BUILDING)

DRG. No.

SHEET OF



DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10.4.86						

AUSTRALIA TELESCOPE CA

FRONT END CONVERSION SCHEME

DRG. No.

SHEET OF

OPTICAL FIBRE FROM ANTENNA

4 BIT (64 MHz)

D/A

64 MHz

OPTIONAL BAND INVERTER
(50 dB RF/IF ISOLATION)

80 ∓ 0.5 MHz
4 kHz STEPS

15
33

80
MHz

31
49

80
MHz

* (SEE NOTE)

0
56

48
56

64 MHz

0
16

12
14

16 MHz

0
4

0
32

32
48

48
64

8
16

8
12

2
4

2
3

2
2.5

* NOTE : THIS MIXER IS ONLY USED FOR 64 MHz WIDE LBA. IT REQUIRES 50 dB RF/IF ISOLATION.

SAMPLER AND DIGITIZER

2 BIT

64 MHz

LINE CORRELATOR

(OVERSAMPLING REMOVED IN CORRELATOR)

PDS GAIN MONITOR

LEVEL MONITOR

COARSE LEVEL CONTROL

500 Hz

RANGE 12 dB
2 dB STEPS

FINE LEVEL CONTROL

GAIN CONTROL

PDS GAIN MONITOR

500 Hz

RANGE 7.75 dB
0.25 dB STEPS

RELATIVE DELAY ADJUST

GAIN CONTROL

PDS GAIN MONITOR

500 Hz

(SELECT CABLE LENGTHS TO EQUALISE DELAYS IN THE TWO 16 MHz BANDWIDTHS.)

X

Y

$f1_1$ TIE ARRAY AND GENERATE CIRCULAR POLARIZATION

Y INPUTS

$f1_2$

$f2_1$

$f2_2$

4 PER ANTENNA

1 SET
(SEE SEPARATE DRAWING)

4 SETS (SELECT 4 OF 16 POSSIBLE OUTPUTS FOR RECORDING.)

0/180° LBA

COARSE LEVEL CONTROL

LEVEL MONITOR

PDS GAIN MONITOR

SAMPLER AND DIGITIZER

2 BIT

SAMPLE STATISTICS

0/180°

FINE LEVEL CONTROL

SWITCHED CORRELATOR (WHEN NEEDED)

500 Hz

VLBA RECORDER

32 16 8 4 2 1

SAMPLING CLOCK (MHz)

500 Hz

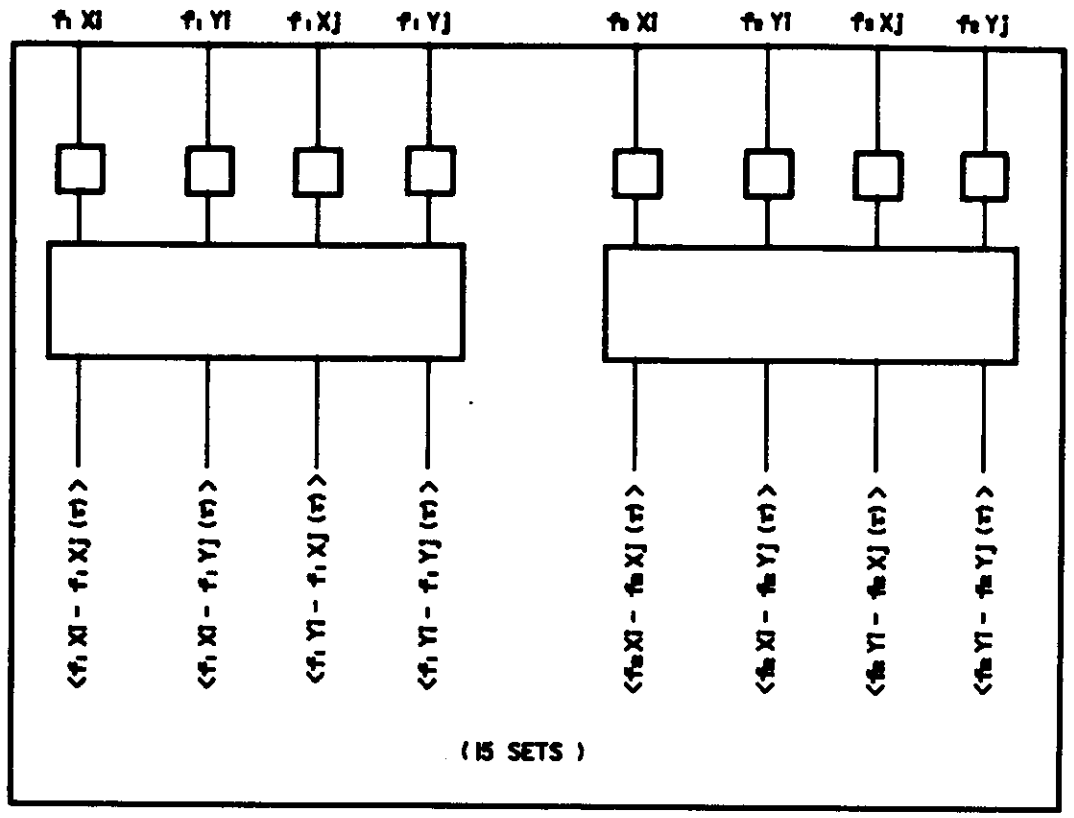
DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10-4-86						

AUSTRALIA TELESCOPE CA

CONVERSION SCHEME NARROW BAND TUNING

DRG. No.

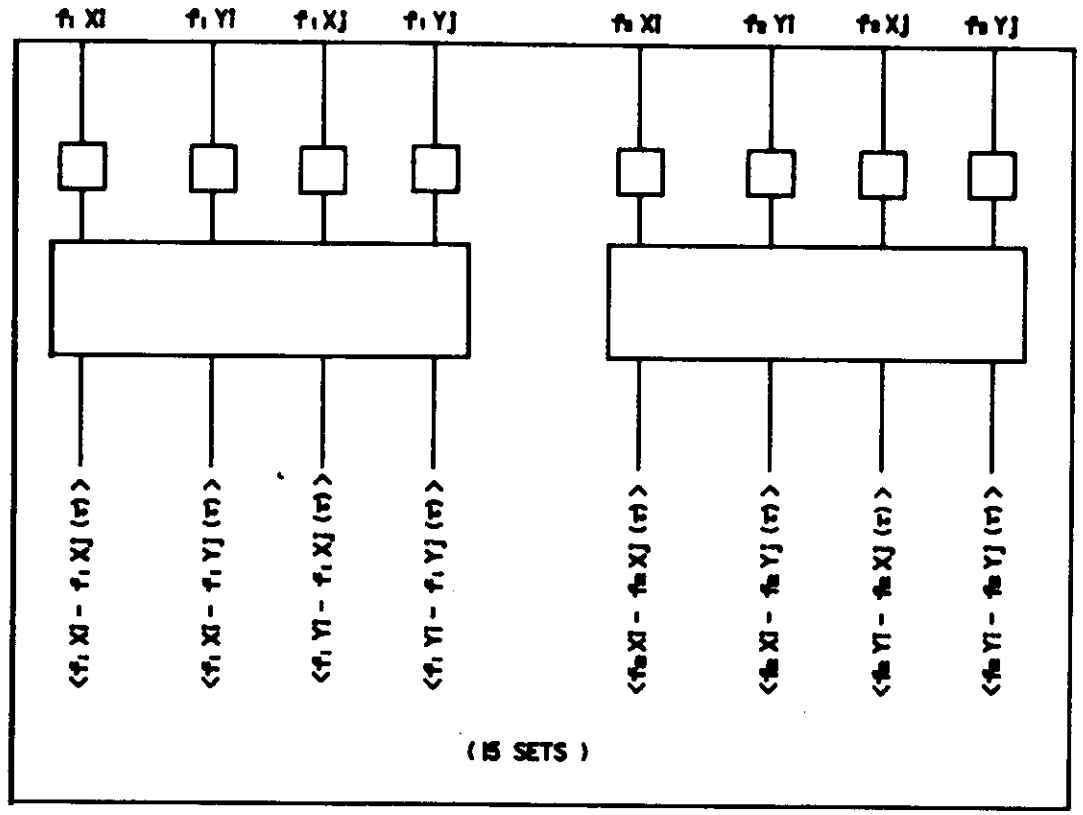
SHEET OF



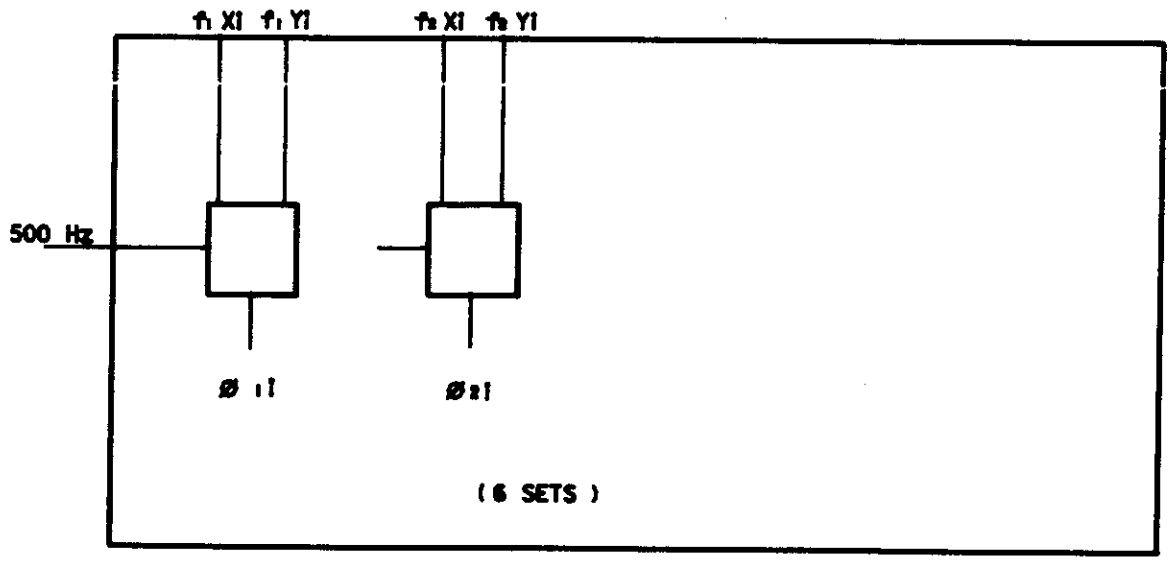
BROADBAND CONTINUUM AND LINE CORRELATOR

SAMPLE STATISTICS

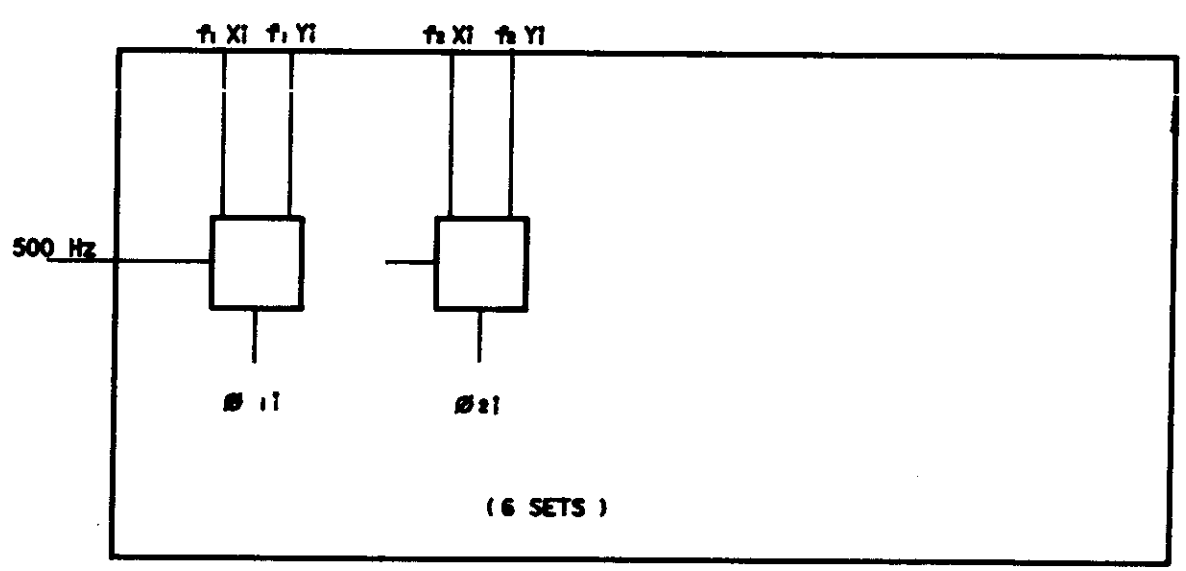
* (SEE NOTE 1)



64 MHz CONTINUUM CORRELATOR



BROADBAND CONTINUUM AND LINE
SWITCHED POLARIZATION CORRELATOR



64 MHz CONTINUUM
SWITCHED POLARIZATION CORRELATOR

* NOTES:

1. DIGITIZER REFERENCE LEVELS ARE SET BY MONITORING SAMPLE STATISTICS.
   ie. POSITIVE AND NEGATIVE SAMPLE NUMBERS SHOULD BE EQUAL AND 0.71 OF SAMPLES SHOULD BE IN EACH OF THE HIGHEST AND LOWEST RANGES FOR 2 BIT SAMPLING etc.
2. THE Ø1 FROM THE SWITCHED CORRELATORS ARE USED TO EQUALISE THE PHASES OF THE PAIRS OF LINEARLY POLARIZED CHANNELS.

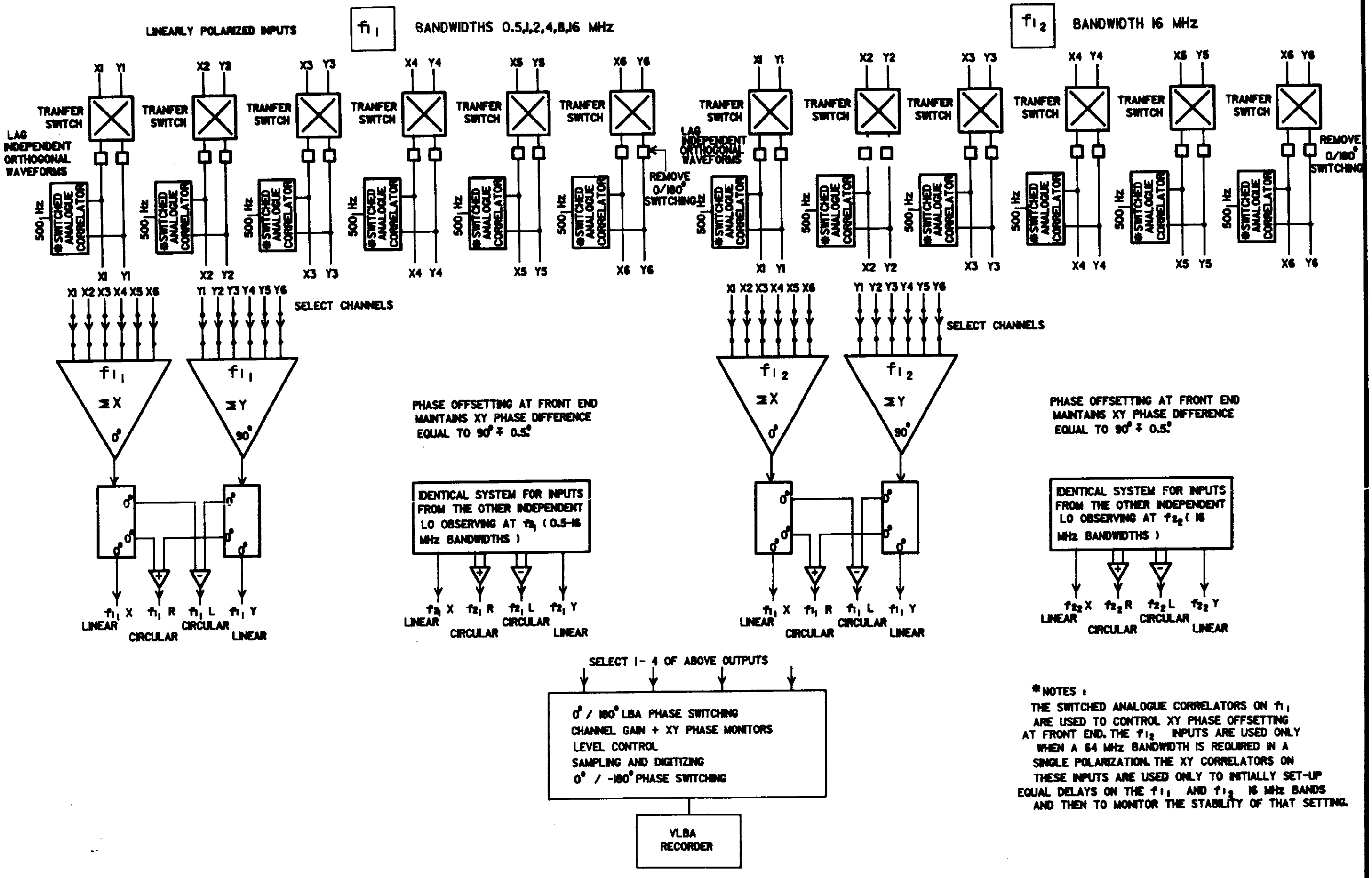
DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10.4.86						

AUSTRALIA TELESCOPE CA

RECEIVER CONTROL INFORMATION OBTAINED FROM CORRELATORS.

DRG. No.

SHEET OF



*NOTES :
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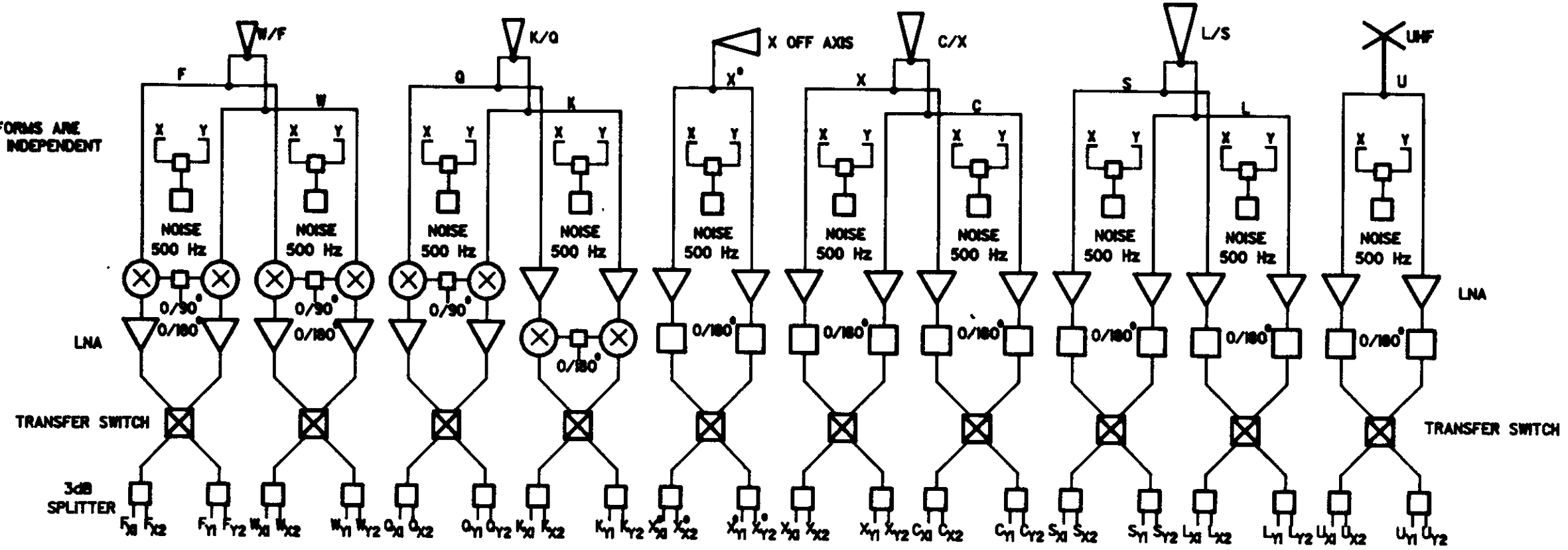
DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 8-10-85	18-2-86	10.4.86						

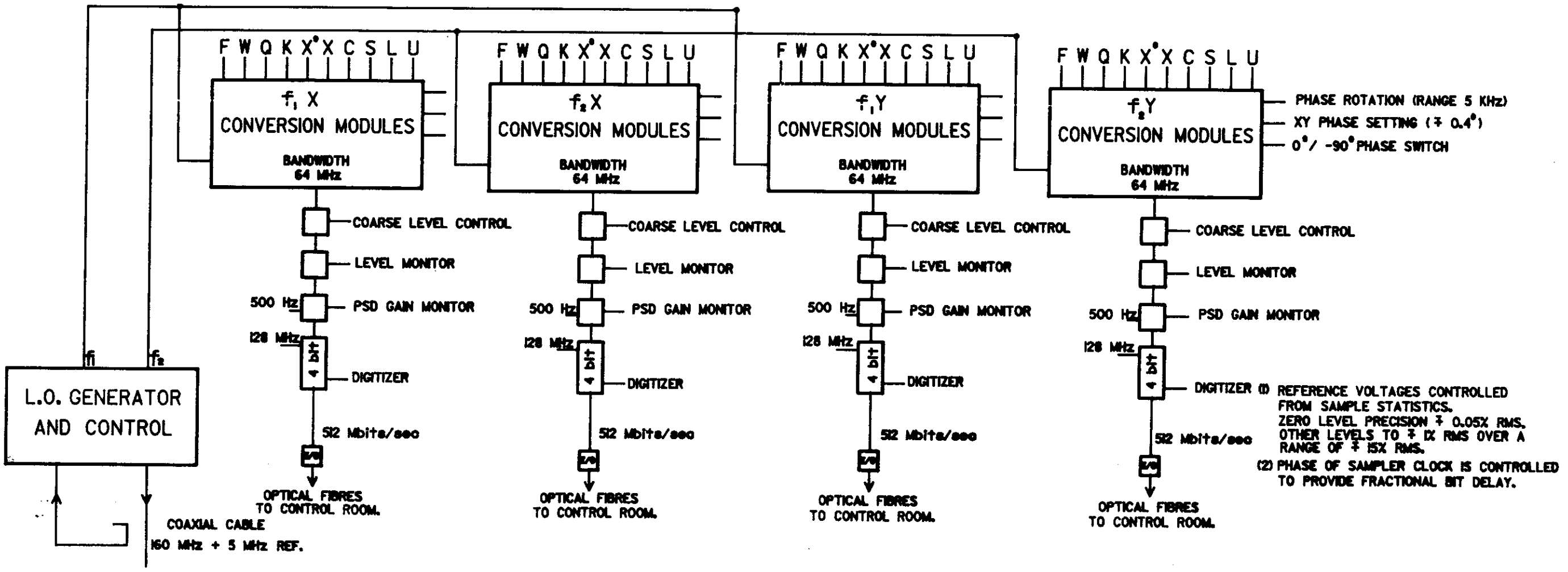
AUSTRALIA TELESCOPE CA
TIED ARRAY

DRG. No.

SHEET OF

0°/ 90° AND 0°/ 180° WAVEFORMS ARE ORTHOGONAL BETWEEN AERIALS INDEPENDENT OF LAG.





DESIGN G.J.N.	REVISION 1	2							AUSTRALIA TELESCOPE LBA RECEIVER SCHEMATIC (AERIAL)
DRAWN G.J.N.	G.J.N.	K.C.							DRG. No.
DATE 1-10-85	18-2-86	10.4.86							SHEET OF

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

AT/20.1.1/022

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(CA, LBA and Stand-alone operation)

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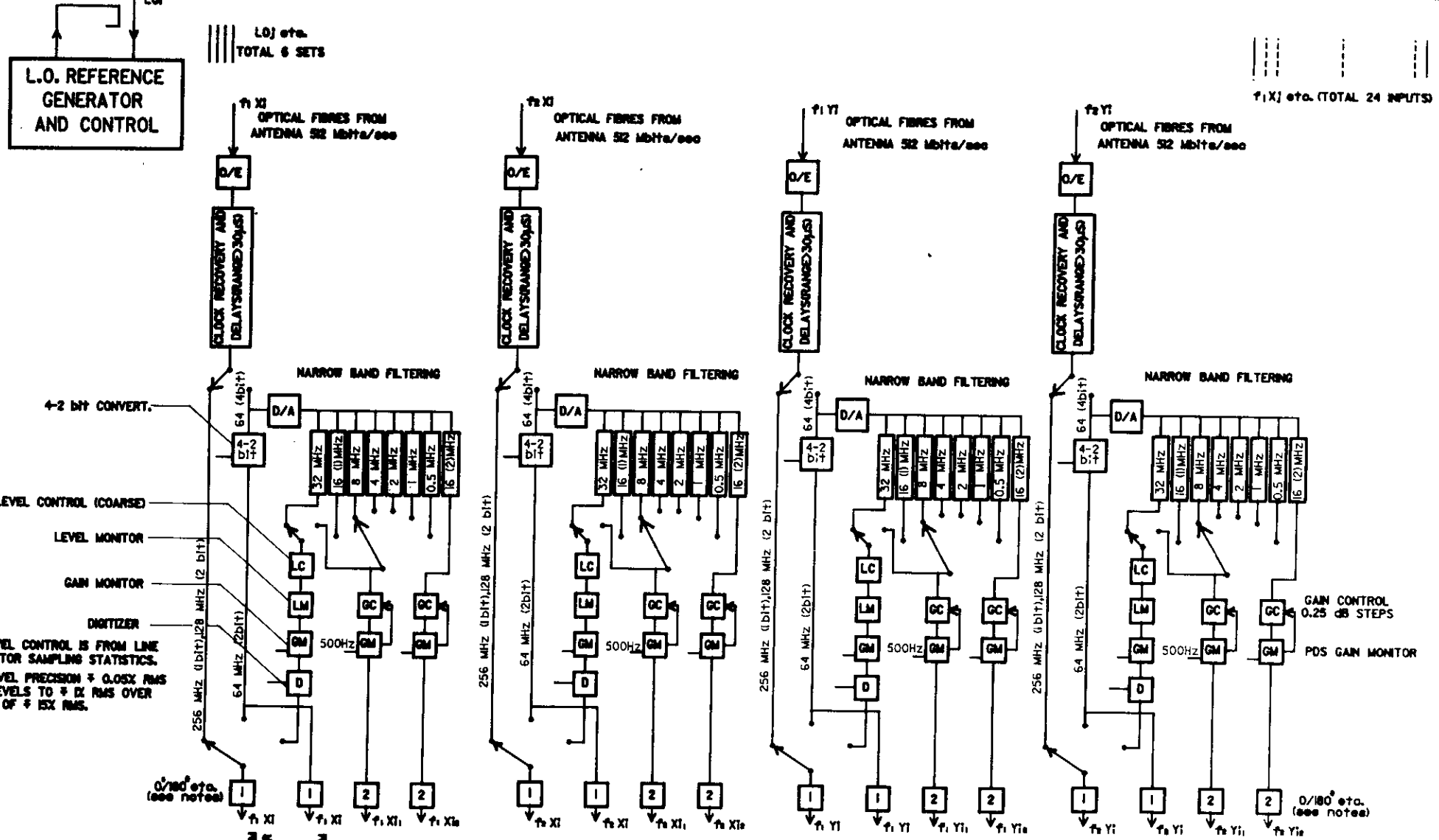
Graham Nelson,
23rd April, 1986.

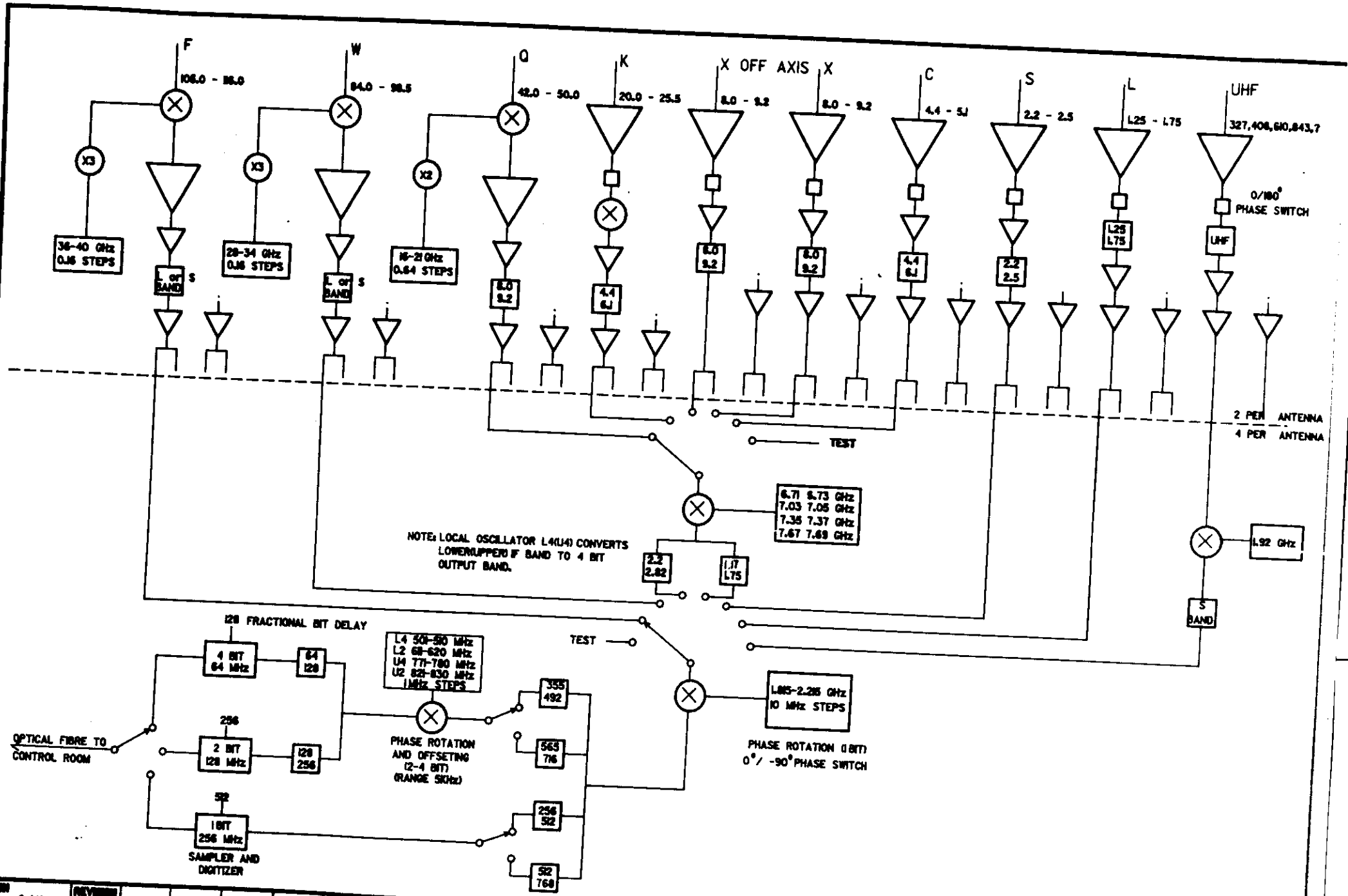


DESIGN	REVISION							
G.J.H.	1	2	3	4	5	6	7	8
DRAWN G.J.H.	G.J.H.	K.C.						
DATE 1-10-86	19-2-86	10.4.86						

AUSTRALIA TELESCOPE CA
RECEIVER SCHEMATIC (CENTRAL BUILDING)

DRG. No.

SHEET OF

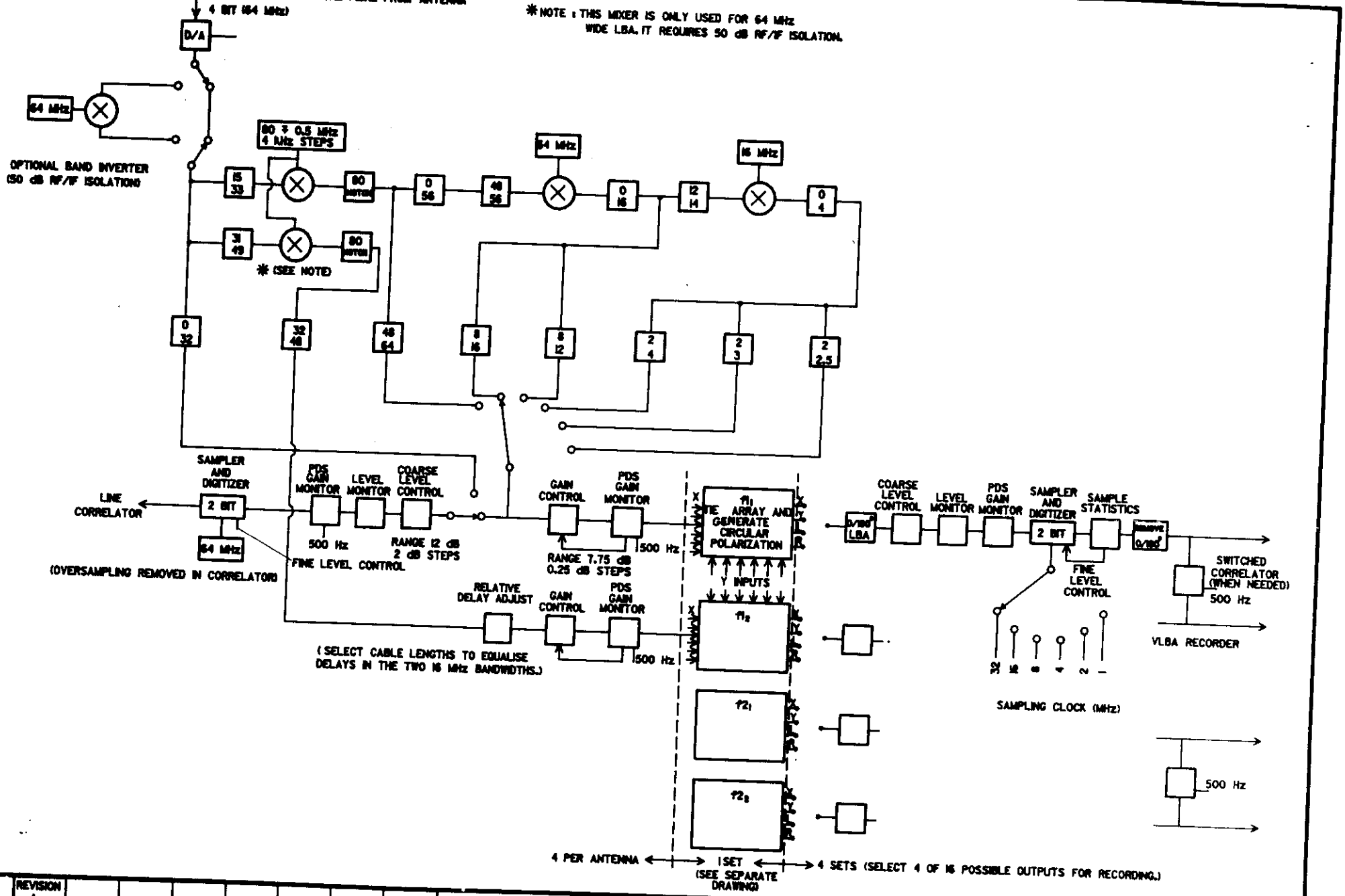


DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10.4.86						

AUSTRALIA TELESCOPE CA

FRONT END CONVERSION SCHEME

DRG. No.



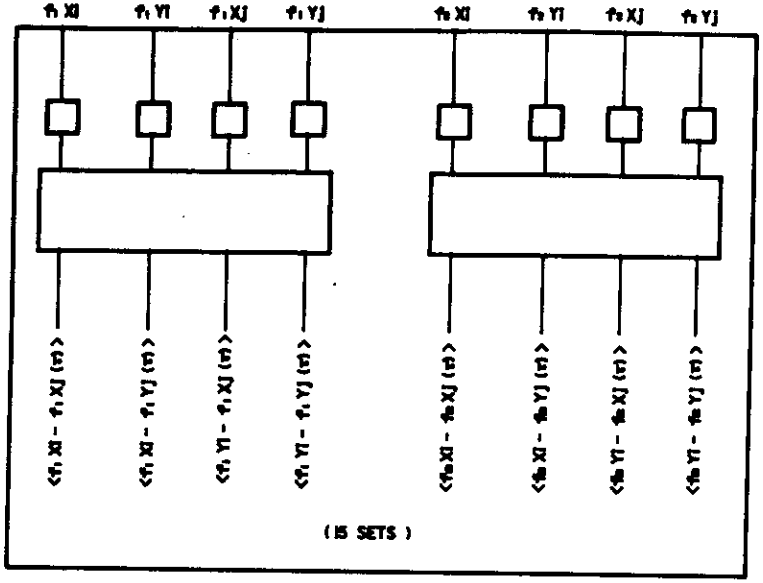
DESIGN	REVISION							
G.J.N.	1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-85	18-2-86	10-4-86						

AUSTRALIA TELESCOPE CA

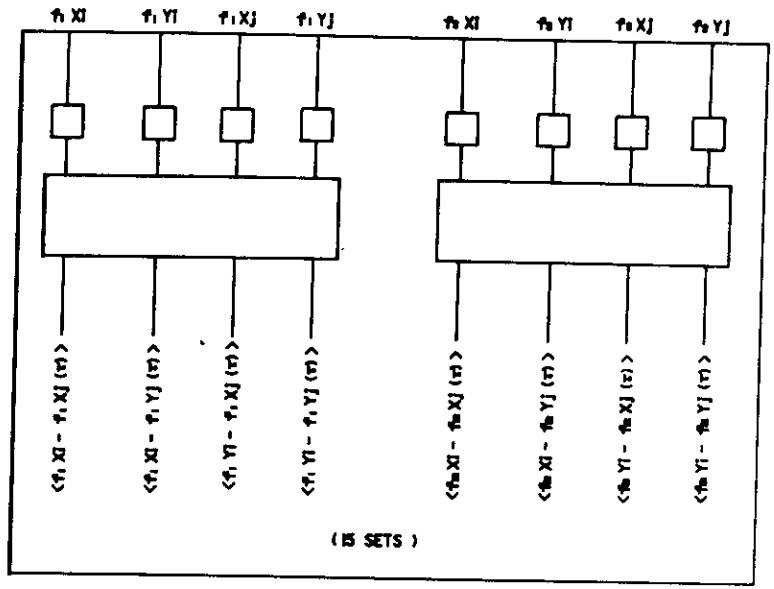
CONVERSION SCHEME NARROW BAND TUNING

DRG. No.

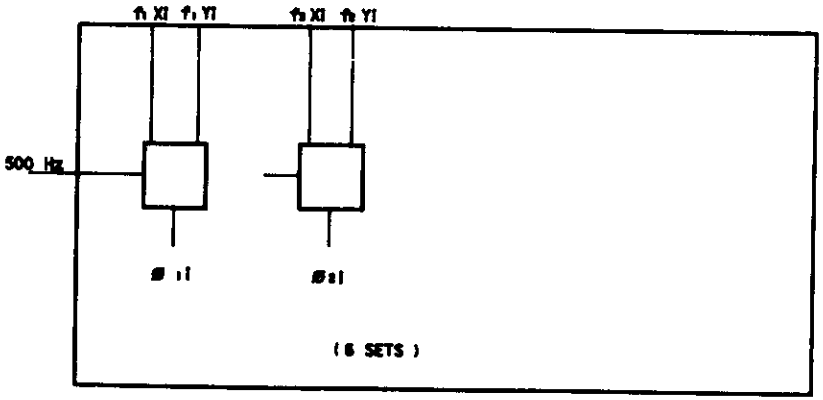
SHEET OF



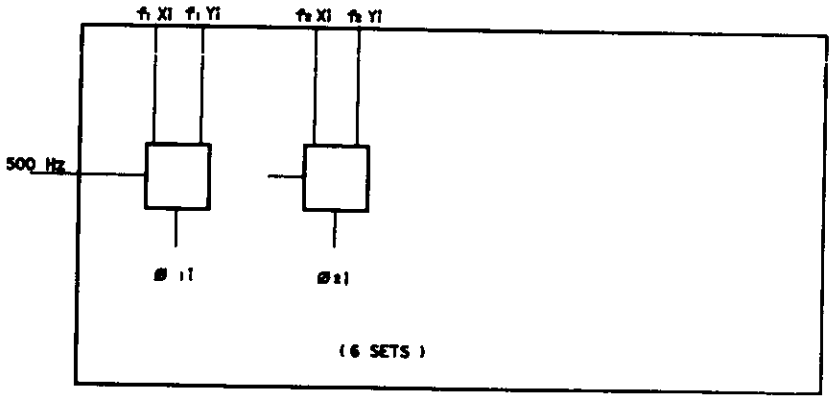
BROADBAND CONTINUUM AND LINE CORRELATOR



64 MHz CONTINUUM CORRELATOR



BROADBAND CONTINUUM AND LINE
SWITCHED POLARIZATION CORRELATOR



64 MHz CONTINUUM
SWITCHED POLARIZATION CORRELATOR

* NOTES:

1. DIGITIZER REFERENCE LEVELS ARE SET BY MONITORING SAMPLE STATISTICS.
   ie. POSITIVE AND NEGATIVE SAMPLE NUMBERS SHOULD BE EQUAL AND 0.1% OF SAMPLES SHOULD BE IN EACH OF THE HIGHEST AND LOWEST RANGES FOR 2 BIT SAMPLING etc.
2. THE ϕ1 FROM THE SWITCHED CORRELATORS ARE USED TO EQUALISE THE PHASES OF THE PAIRS OF LINEARLY POLARIZED CHANNELS.

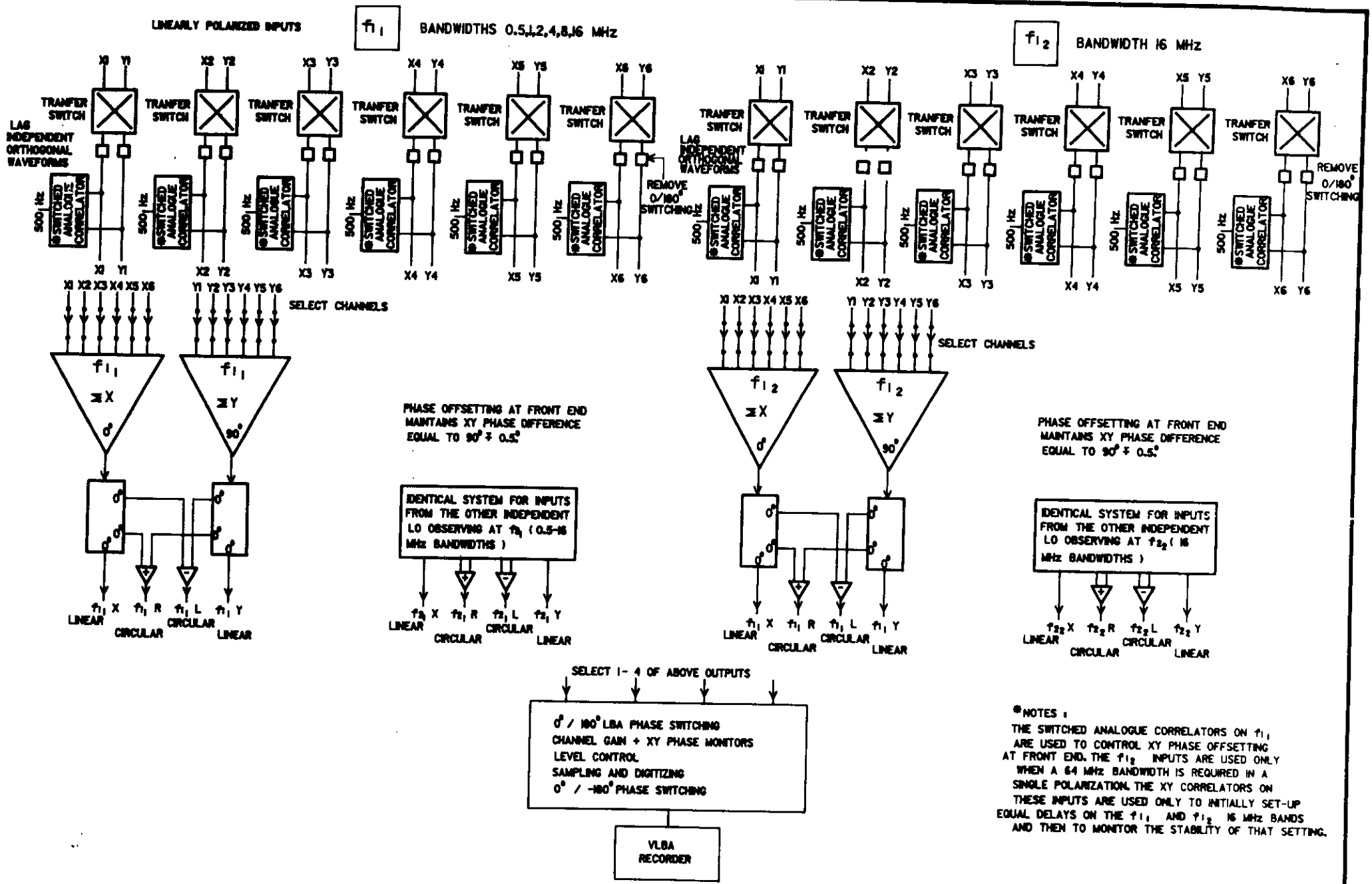
DESIGN G.J.H.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.H.	G.J.H.	K.C.						
DATE 1-10-86	13-2-86	10.4.86						

AUSTRALIA TELESCOPE CA

RECEIVER CONTROL INFORMATION OBTAINED FROM CORRELATORS.

DRG. No.

SHEET OF

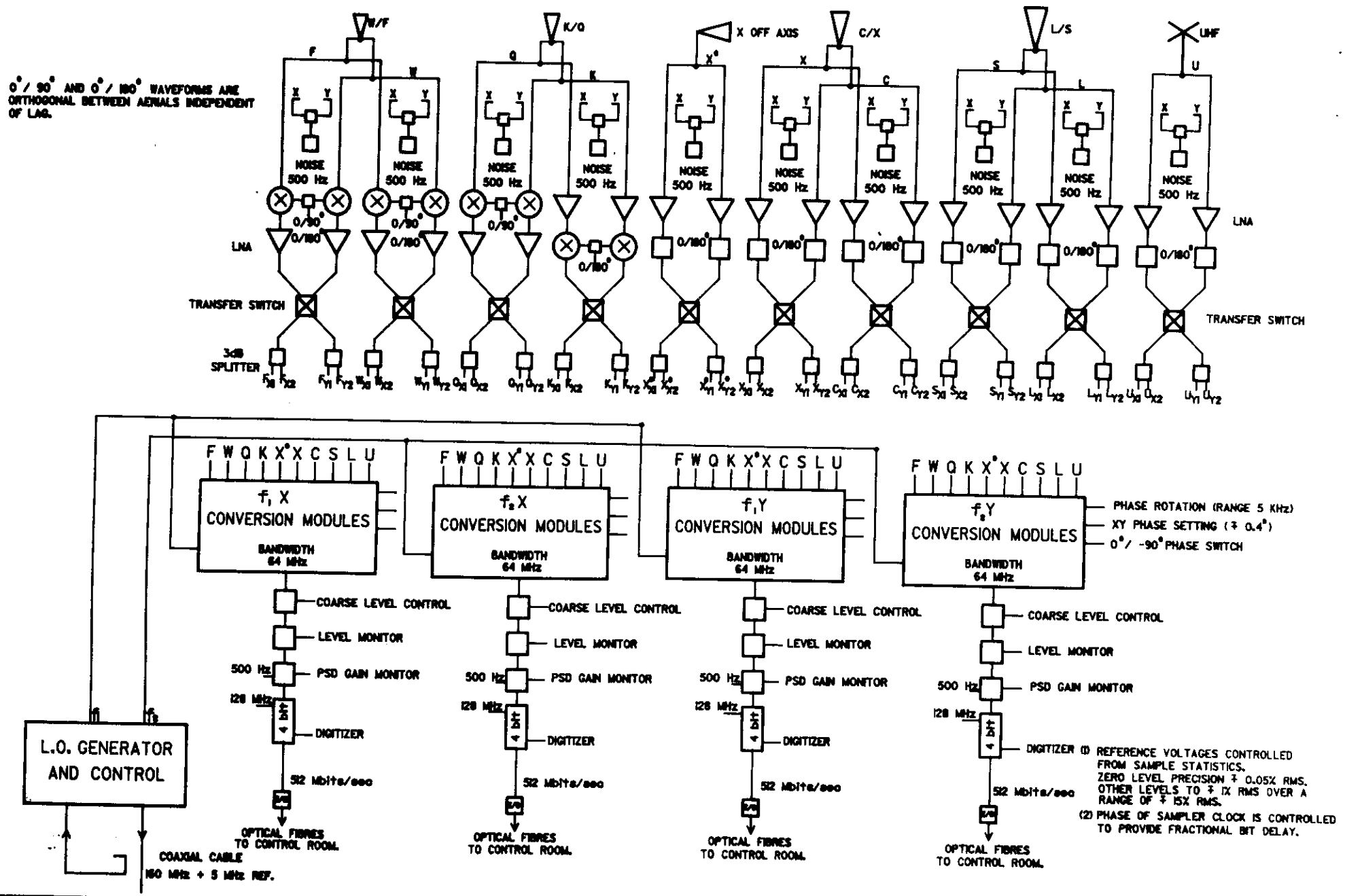


DESIGN G.I.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.I.N.	G.I.N.	K.C.						
DATE 9-10-86	19-2-86	10.4.84						

AUSTRALIA TELESCOPE CA
TIED ARRAY

DRG. No.

SHEET OF

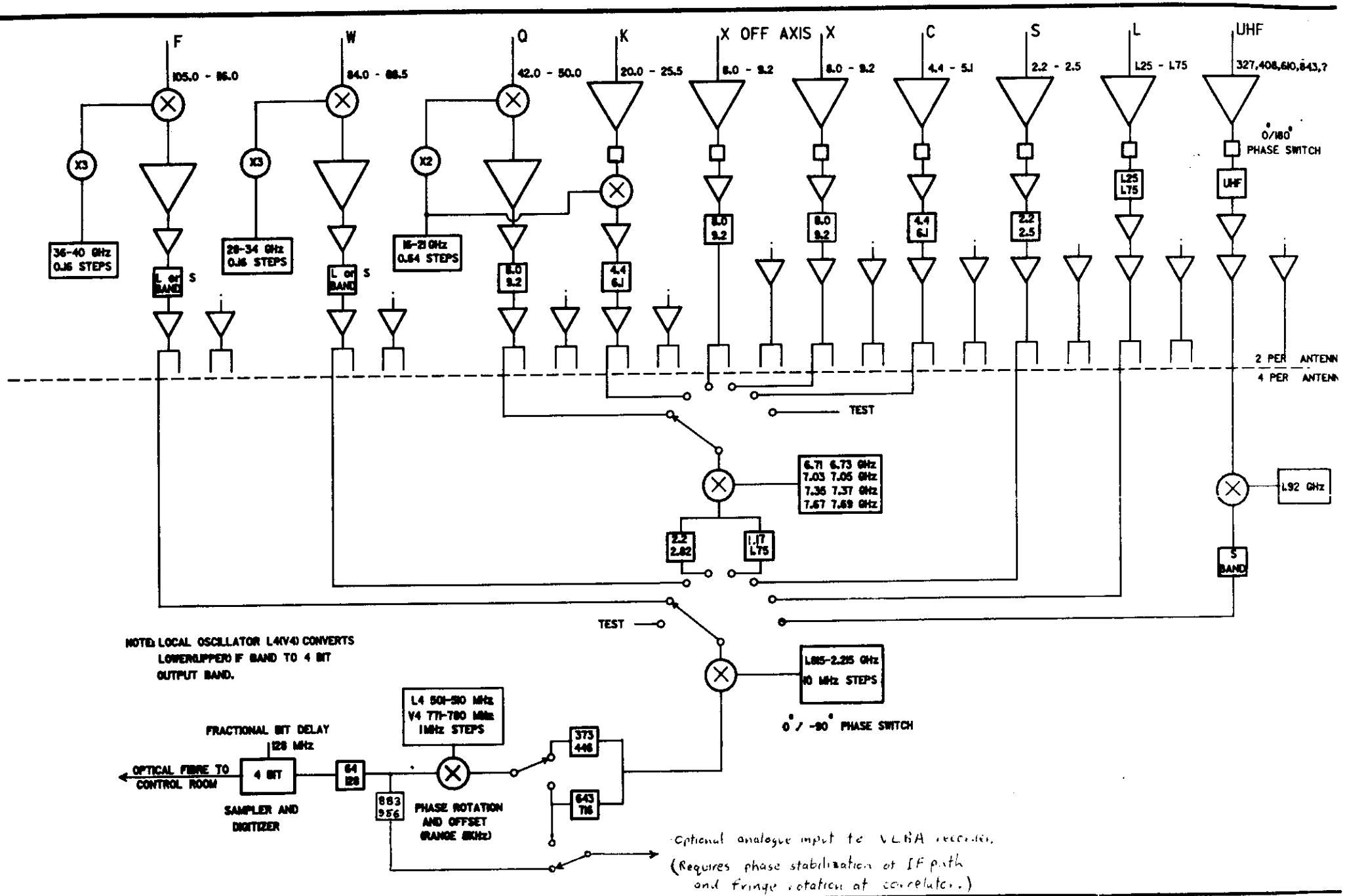


DESIGN G.J.N.	REVISIONS 1	2							
DRAWN G.J.N.	G.J.N.	K.C.							
DATE 1-10-86	15-2-86	10.4.86							

AUSTRALIA TELESCOPE LBA
RECEIVER SCHEMATIC (AERIAL)

DRG. No.

SHEET OF

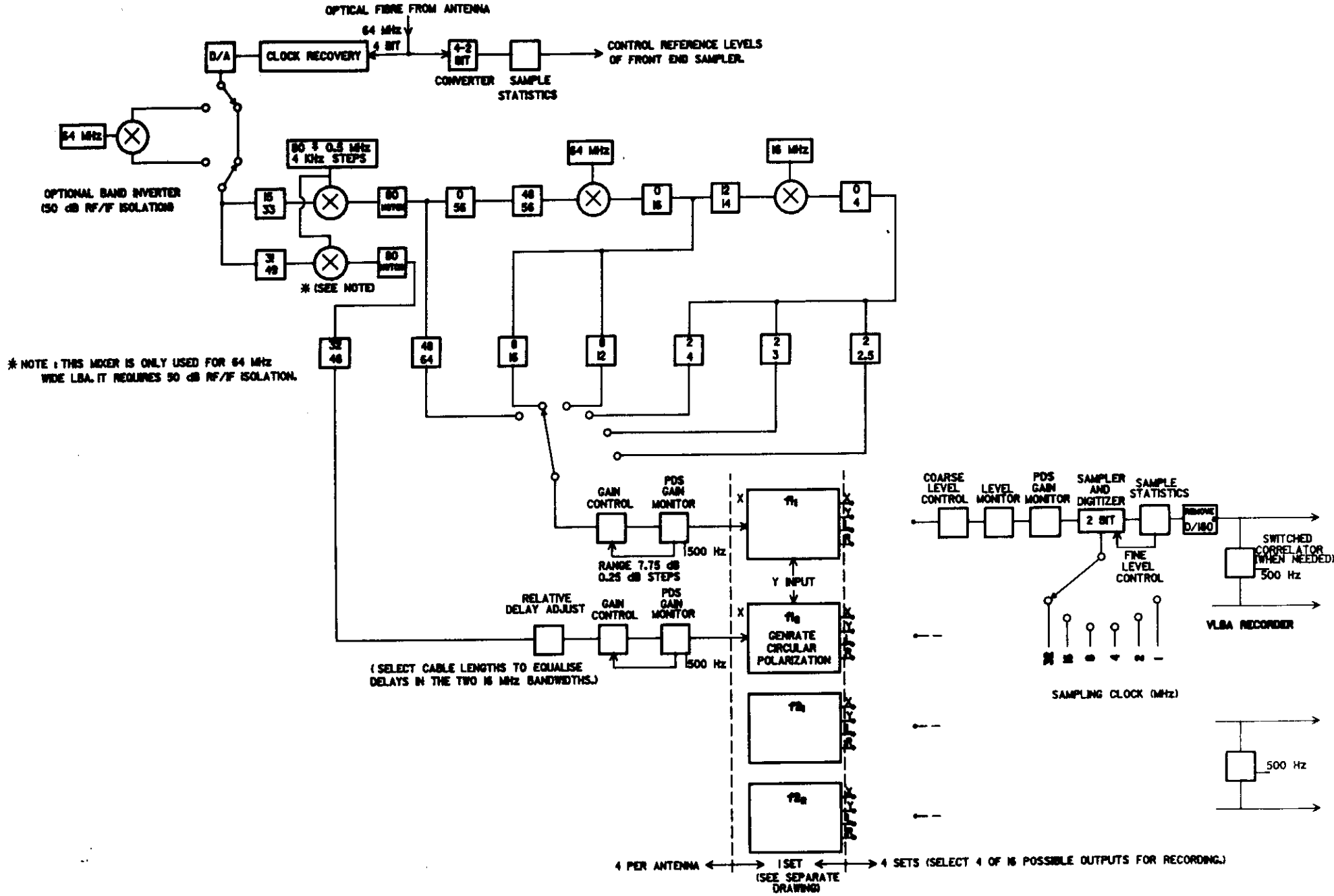


DESIGN G.J.N.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-86	15-2-86	10.4.86						

AUSTRALIA TELESCOPE LBA
FRONT END CONVERSION SCHEME

DRG. No.

SHEET OF



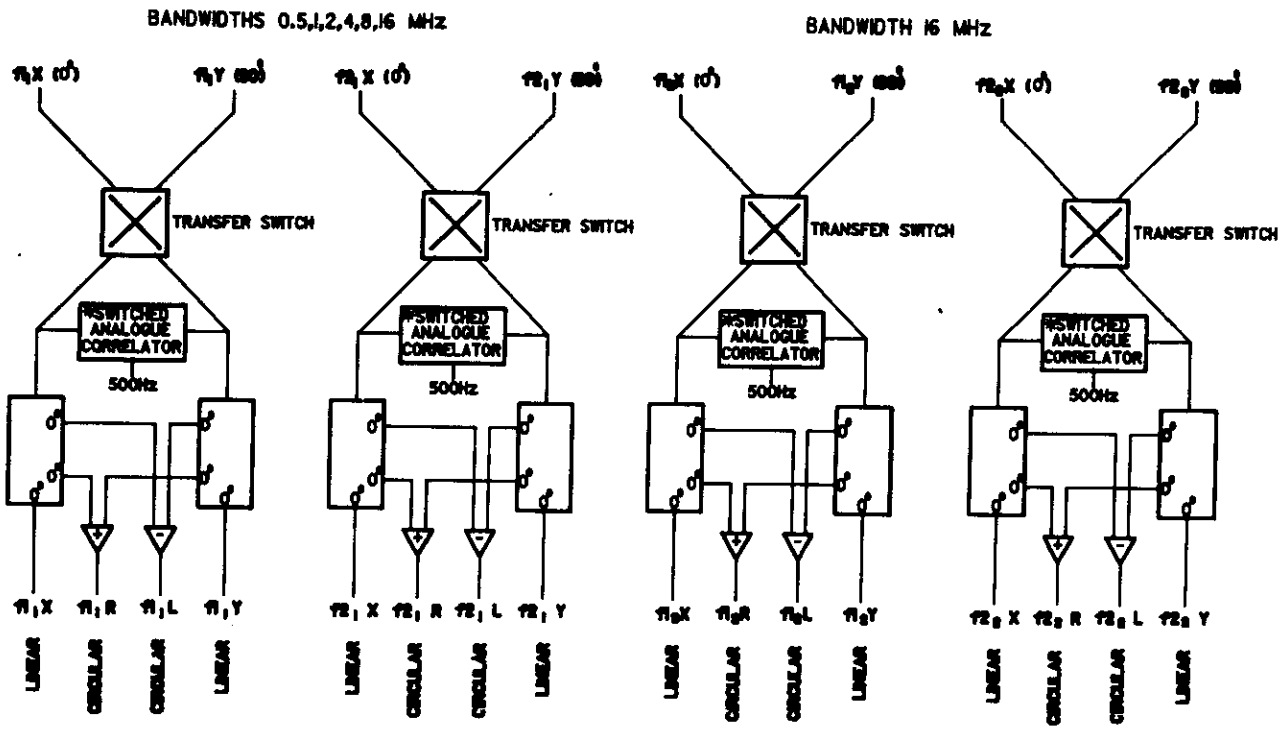
DESIGN G.J.H.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.H.	G.J.H.	K.C.						
DATE 1-10-86	16-2-88	10.4.86						

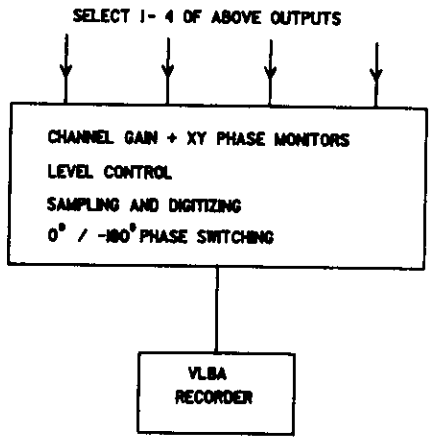
AUSTRALIA TELESCOPE LBA

CONVERSION SCHEME NARROW BAND TUNING

DRG. No.

SHEET OF





* NOTES:

THE SWITCHED ANALOGUE CORRELATORS ON f_{1_1} ARE USED TO CONTROL XY PHASE OFFSETTING AT FRONT END. THE f_{1_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_1} AND f_{1_2} 16 MHz BANDS AND THEN TO MONITOR THE STABILITY OF THAT SETTING.

DESIGN	REVISION							
G.J.N.	1	2	3	4	5	6	7	8
DRAWN G.J.N.	G.J.N.	K.C.						
DATE 1-10-86	16-2-86	10.4.86						

AUSTRALIA TELESCOPE LBA

POLARIZATION GENERATION AND SELECTION

DRG. No.

SHEET OF

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 C 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.

Initially 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 2 × 128 MHz (2 bit digitization) or 2 × 256 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 part 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 broadband signals either at the RF

CSIRO Div RP
The AT

AT/20.1.1/

System Drawings (CA, LBA and stand alone operation)

Graham J Nelson
21-6-86

The attached system drawings are intended to define 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 ~~both~~ with them.

The LBA drawings, which define a system will probably be installed at Parkes and Siding Spring and possibly, at Hobart. The problem of providing fringe rotation at Tidbinbilla has not yet been considered. ~~The inclusion of Tidbinbilla~~ If it proves to be an insurmountable problem then the inclusion of Tidbinbilla into the LBA would have to await the development of fringe rotation at the correlator.

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.

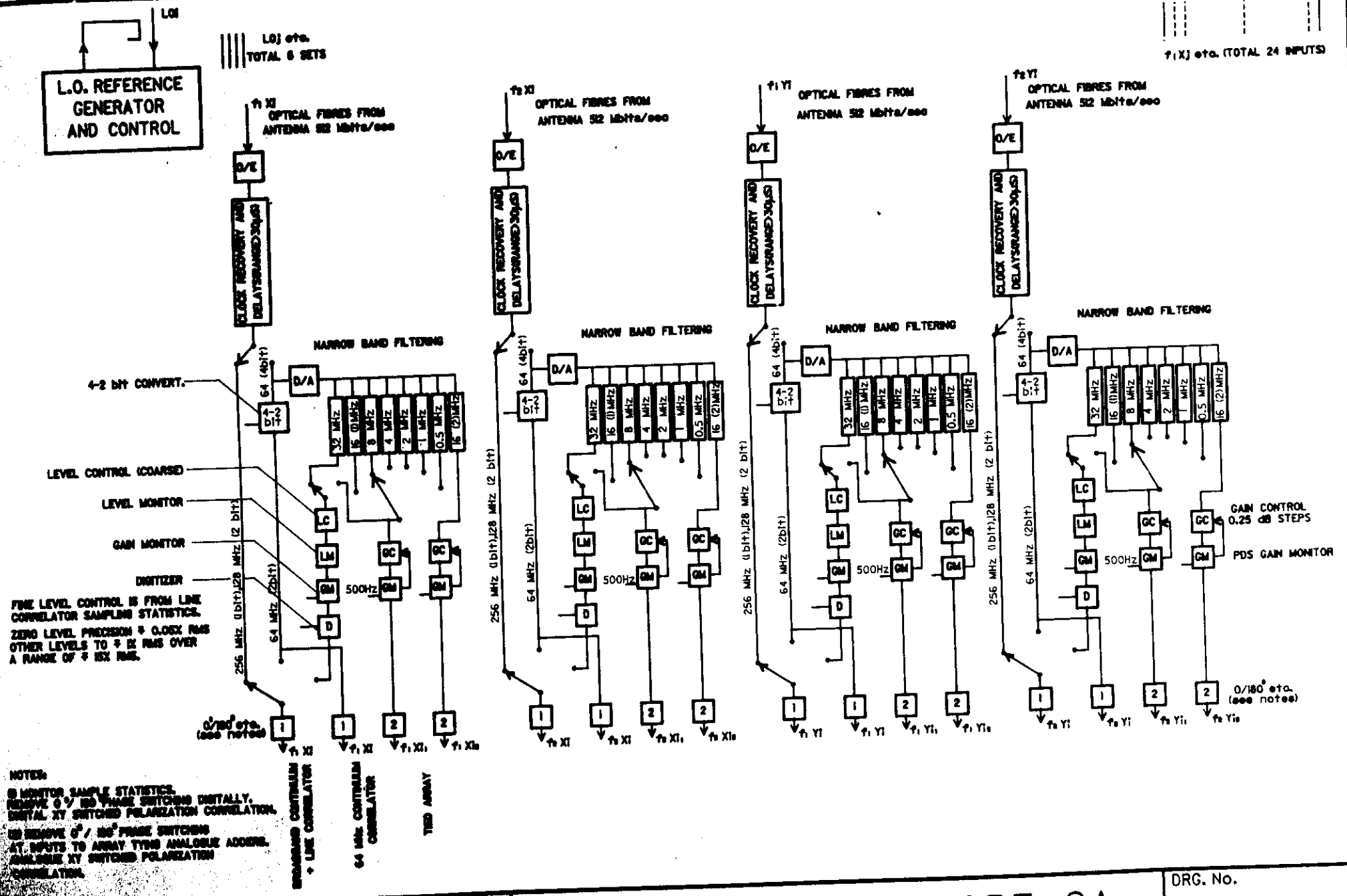
The LBA drawings define a system which will probably be installed at Parkes and Siding Spring and possibly also at Hobart.

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.



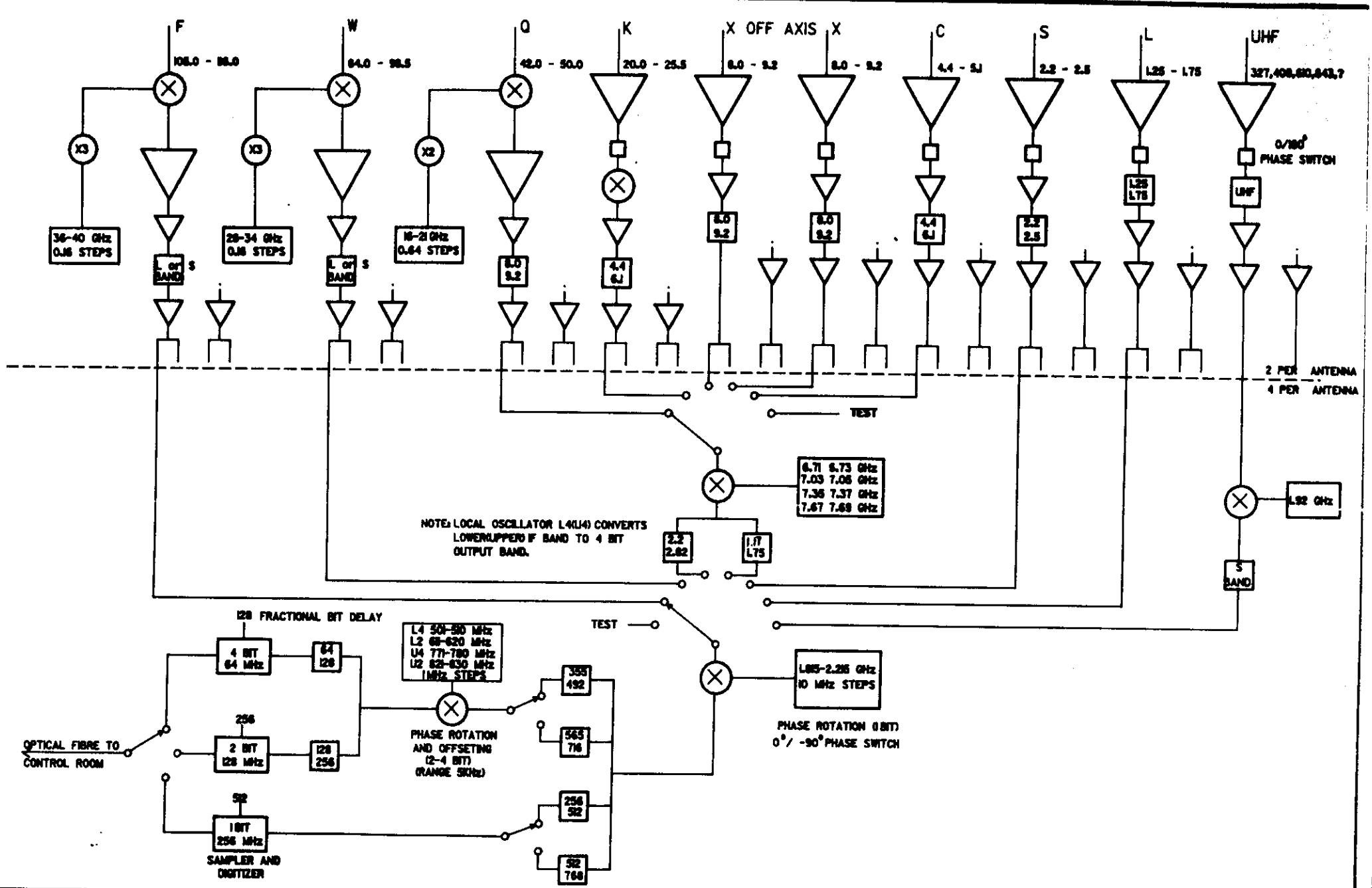
	1	2	3	4	5	6	7	8
		K.C.						

AUSTRALIA TELESCOPE CA

RECEIVER SCHEMATIC (CENTRAL BUILDING)

DRG. No.

SHEET OF

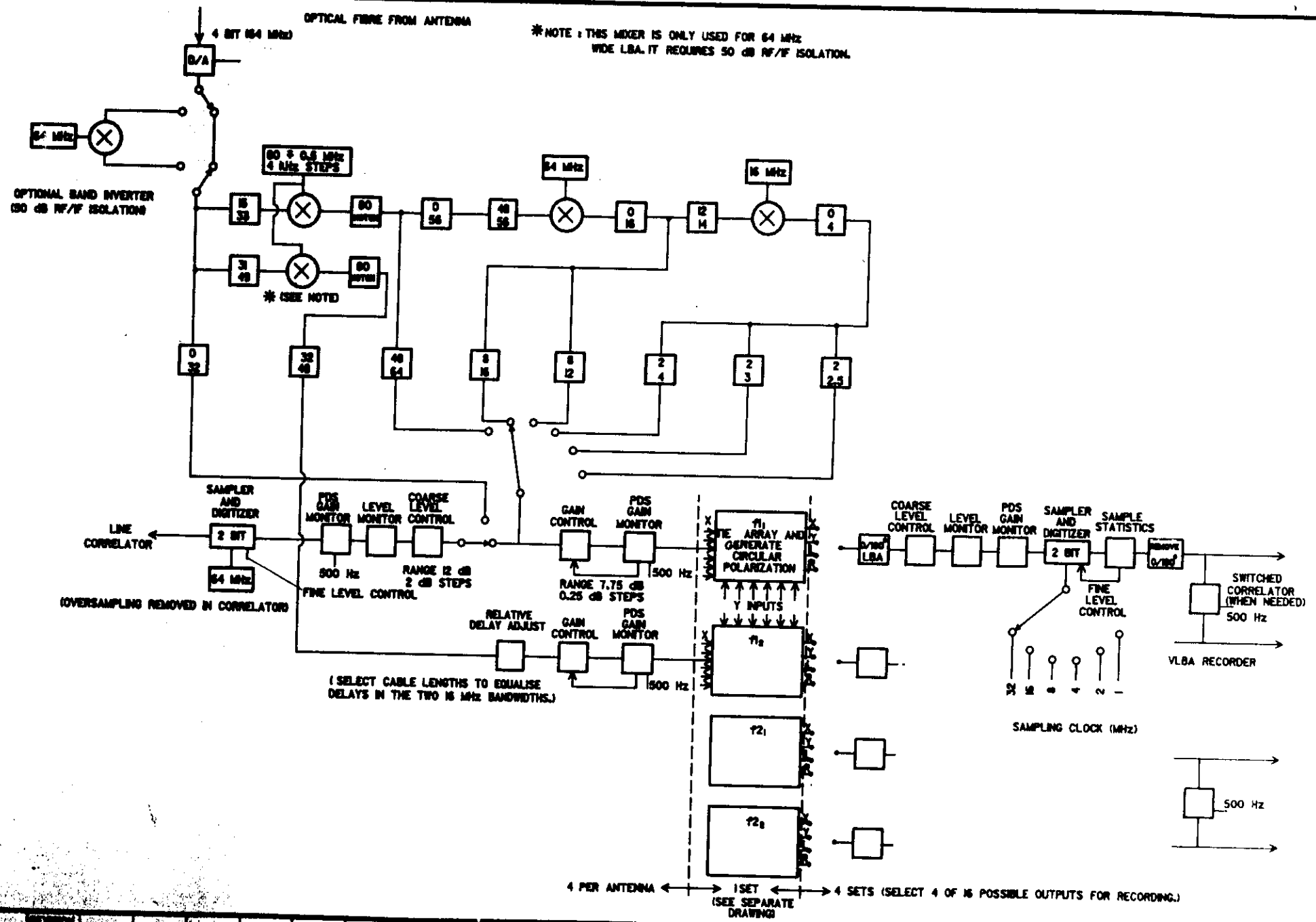


DESIGN G.J.H.	REVISION 1	2	3	4	5	6	7	8
DRAWN G.J.H.	G.J.H.	K.C.						
DATE 1-10-86	18-2-86	10.4.86						

AUSTRALIA TELESCOPE CA
FRONT END CONVERSION SCHEME

DRG. No.

SHEET OF



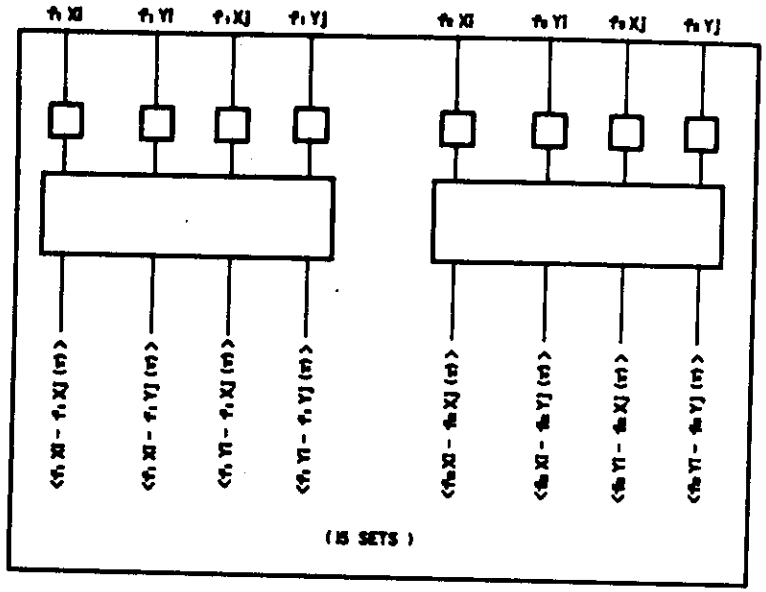
	REVISION 1	2	3	4	5	6	7	8
		M.C.						

AUSTRALIA TELESCOPE CA

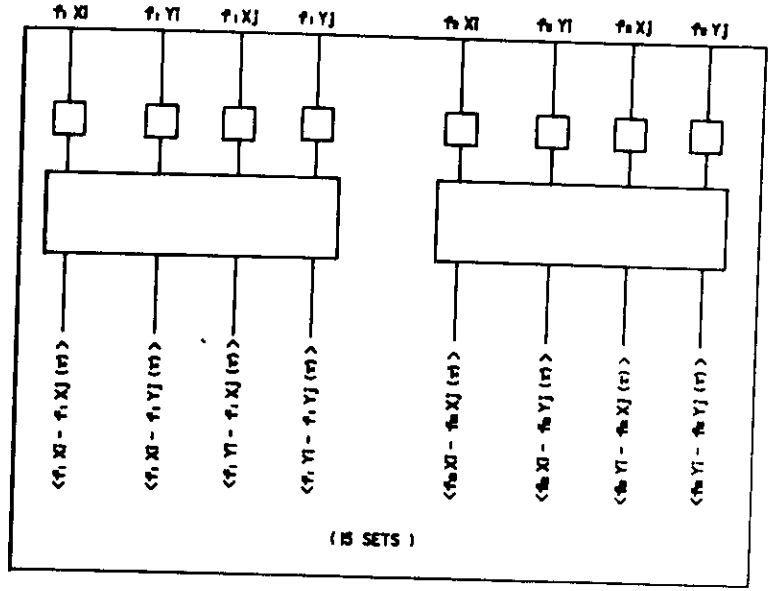
CONVERSION SCHEME NARROW BAND TUNING

DRG. No.

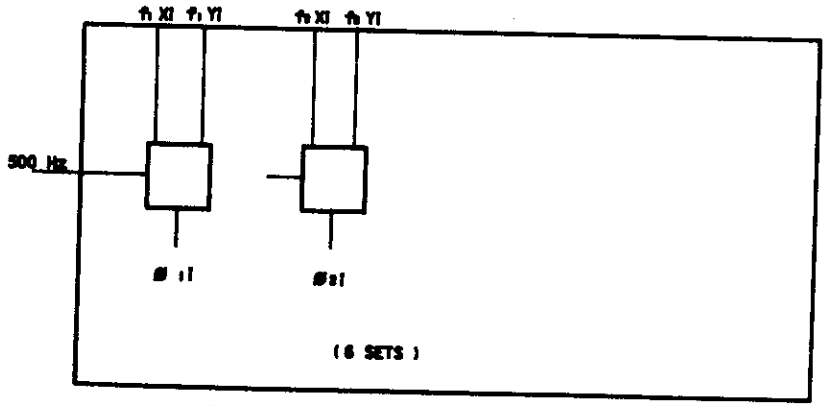
SHEET OF



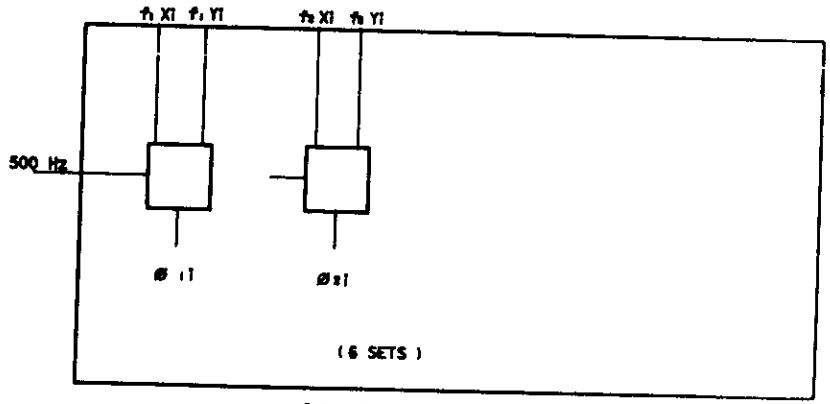
BROADBAND CONTINUUM AND LINE CORRELATOR



64 MHz CONTINUUM CORRELATOR



BROADBAND CONTINUUM AND LINE
SWITCHED POLARIZATION CORRELATOR



64 MHz CONTINUUM
SWITCHED POLARIZATION CORRELATOR

* NOTES:

1. DIGITIZER REFERENCE LEVELS ARE SET BY MONITORING SAMPLE STATISTICS.
   1a. POSITIVE AND NEGATIVE SAMPLE NUMBERS SHOULD BE EQUAL AND 0.1% OF SAMPLES SHOULD BE IN EACH OF THE HIGHEST AND LOWEST RANGES FOR 2 BIT SAMPLING etc.
2. THE Ø1 FROM THE SWITCHED CORRELATORS ARE USED TO EQUALISE THE PHASES OF THE PAIRS OF LINEARLY POLARIZED CHANNELS.

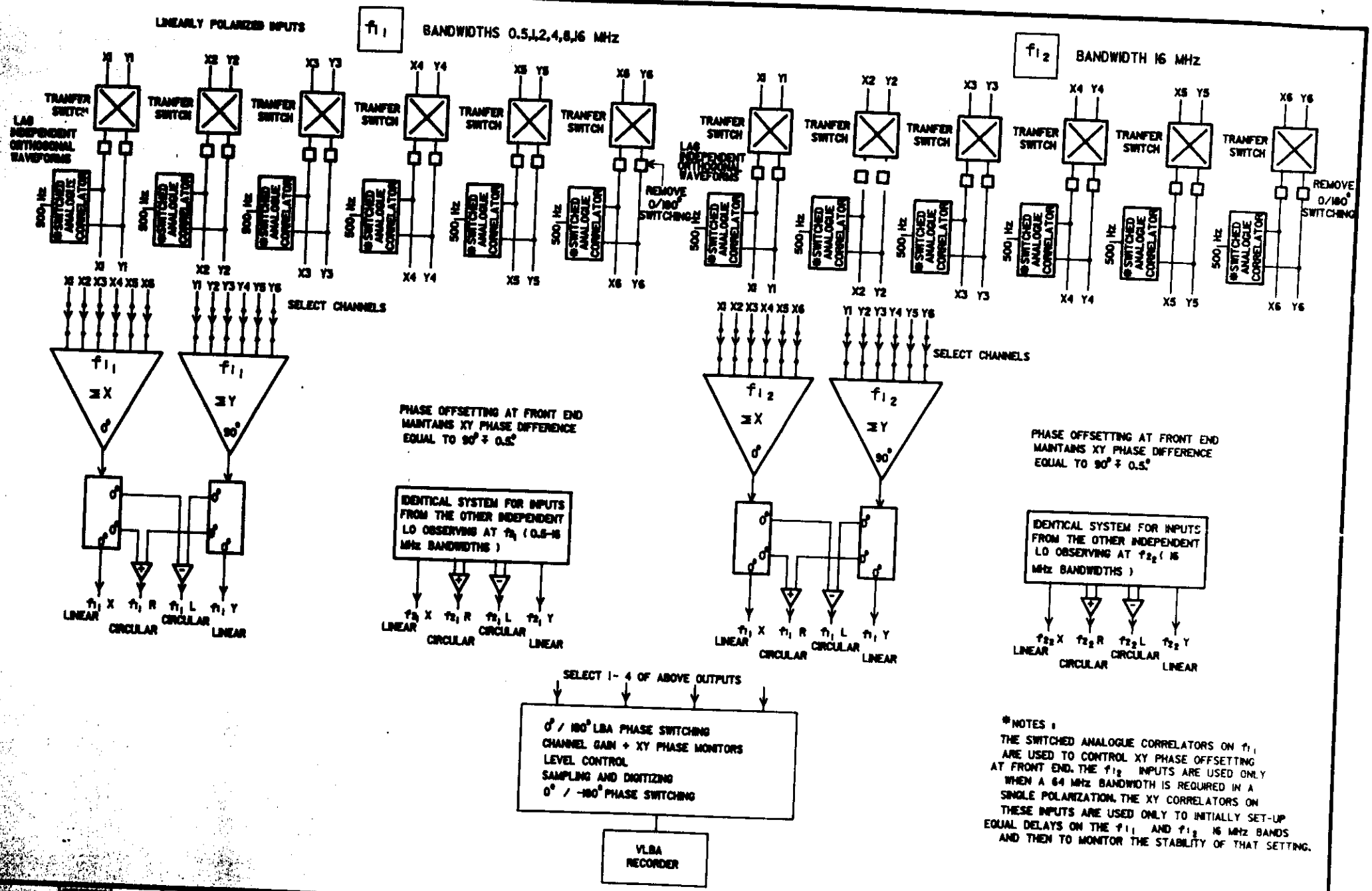
DESIGN	REVISIONS							
G.J.H.	1	2	3	4	5	6	7	8
DRAWN G.J.H.	G.J.H.	K.C.						
DATE 1-10-86	9-2-86	10.4.86						

AUSTRALIA TELESCOPE CA

RECEIVER CONTROL INFORMATION OBTAINED FROM CORRELATORS.

DRG. No.

SHEET OF

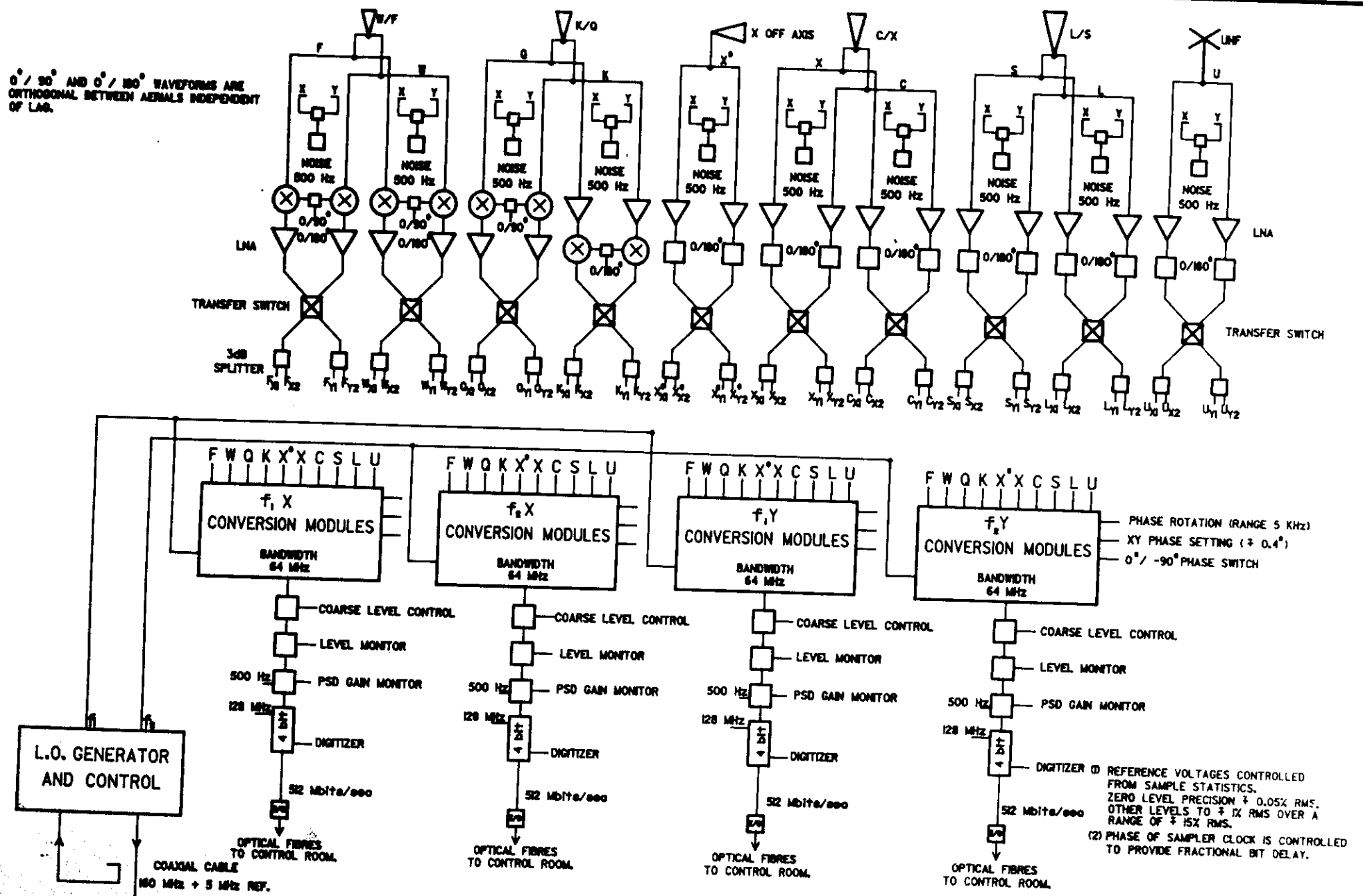


		1	2	3	4	5	6	7	8
			K.C.						

AUSTRALIA TELESCOPE CA
TIED ARRAY

DRG. No.

SHEET OF

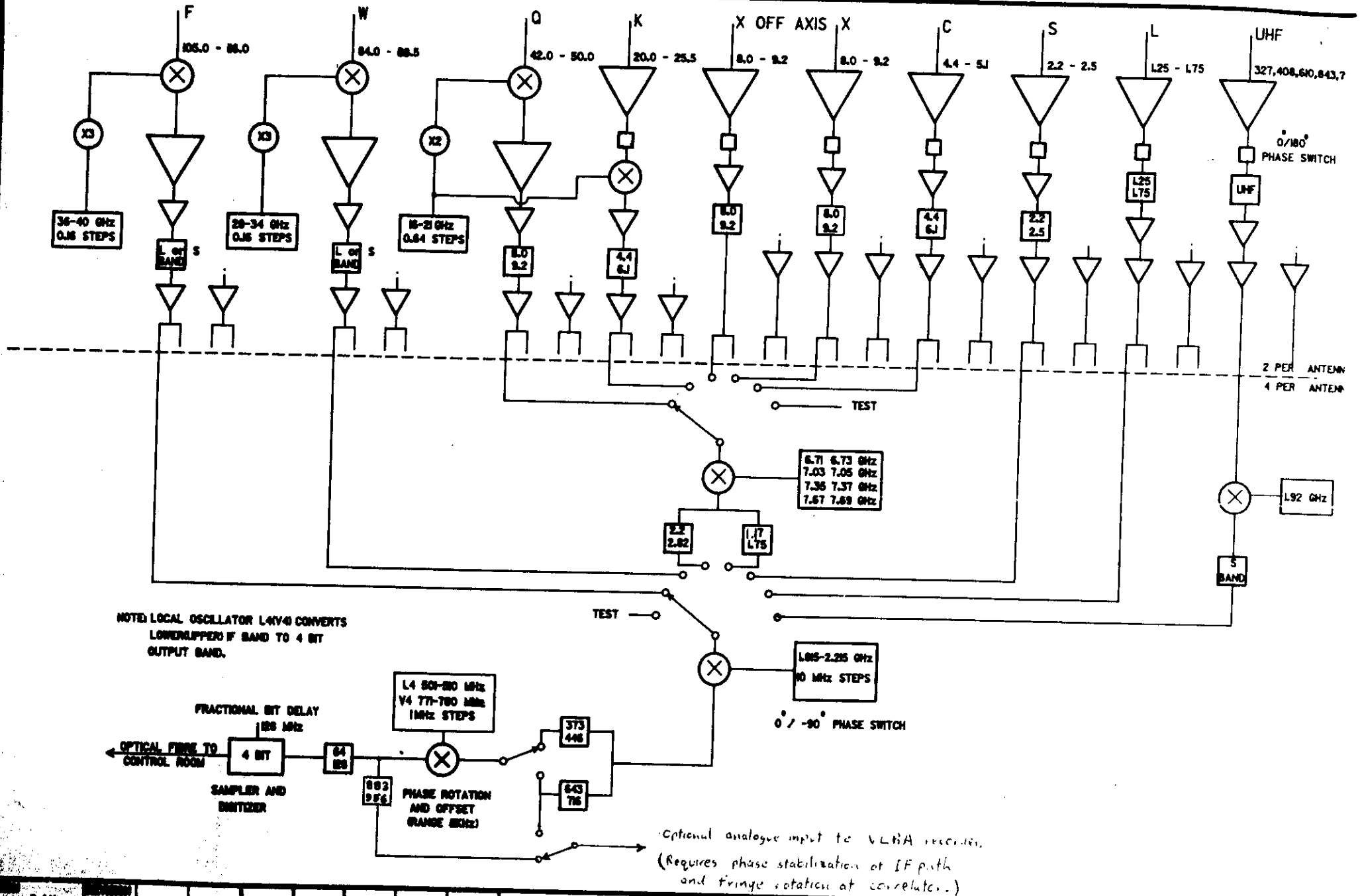


	G.J.H.	1	2						
	G.J.H.	G.J.H.	K.C.						
	1-10-86	16-2-86	10.4.86						

AUSTRALIA TELESCOPE LBA
RECEIVER SCHEMATIC (AERIAL)

DRG. No.

SHEET OF

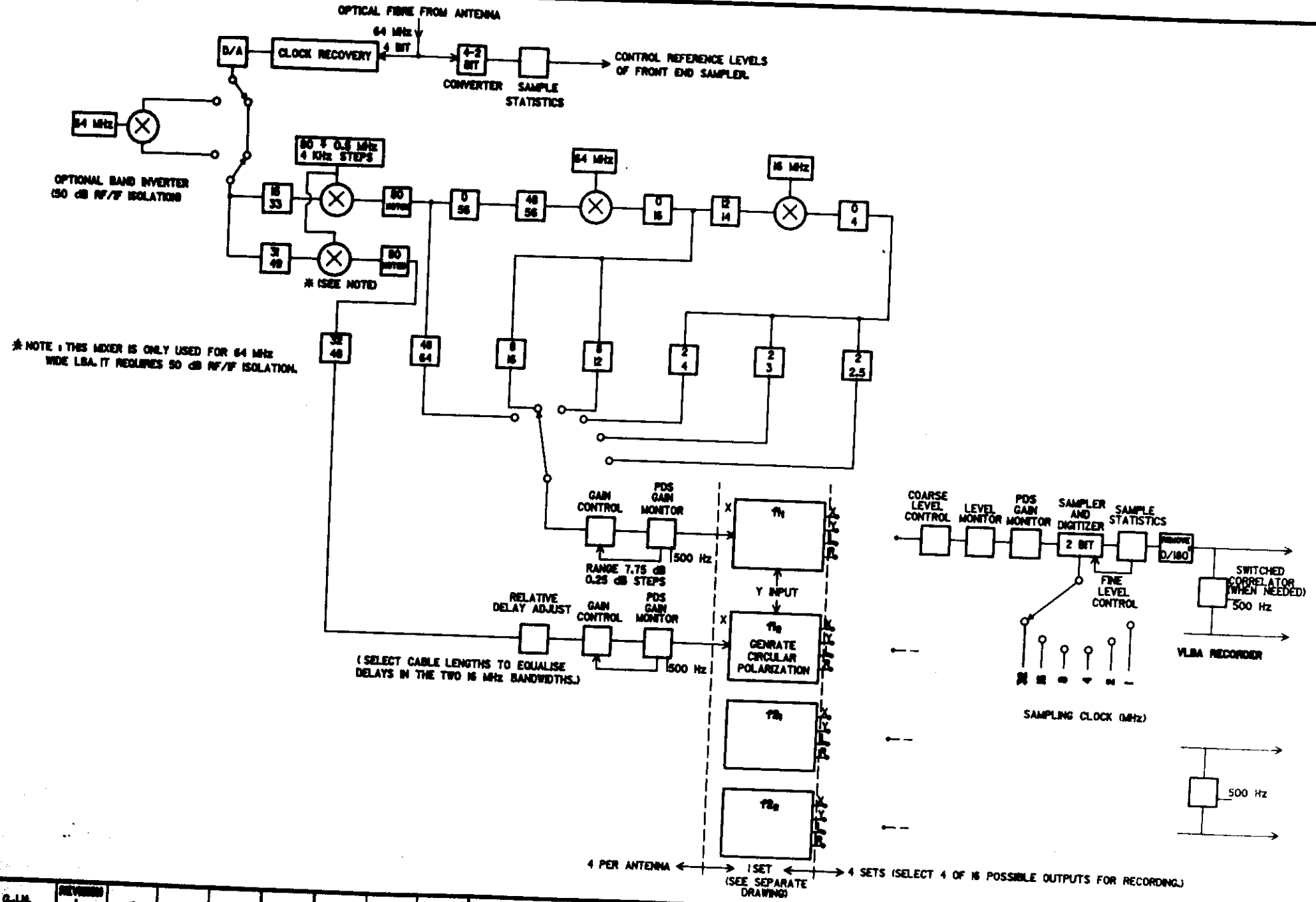


	1	2	3	4	5	6	7	8
		K.C.						
		10.4.84						

AUSTRALIA TELESCOPE LBA
FRONT END CONVERSION SCHEME

DRG. No.

SHEET OF



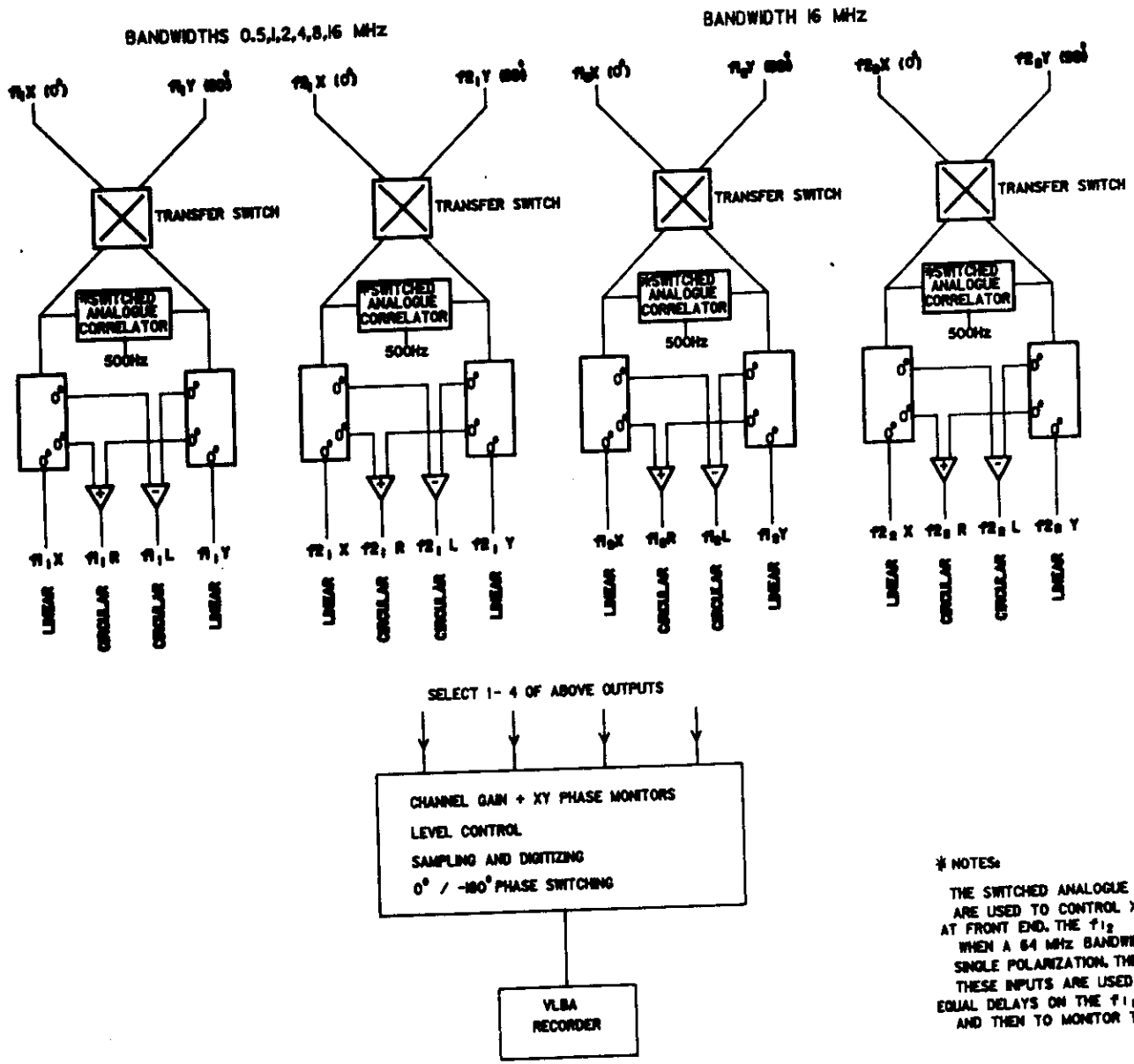
DESIGN G.J.H.	REVISIONS 1	2	3	4	5	6	7	8
DRAWN G.J.H.	G.J.H.	K.C.						
DATE 1-10-88	19-2-88	10.4.88						

AUSTRALIA TELESCOPE LBA

CONVERSION SCHEME NARROW BAND TUNING

DRG. No.

SHEET OF



* 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.

	1	2	3	4	5	6	7	8
		K.C.						
	10-4-86	10.4.86						

AUSTRALIA TELESCOPE LBA

POLARIZATION GENERATION AND SELECTION

DRG. No.

SHEET OF