

NATIONAL RADIO ASTRONOMY OBSERVATORY
Green Bank, West Virginia

MEMORANDUM

January 4, 1982

To: VLBA Working Group
From: C. Moore
Subj: Receiver Block Diagram and Test Equipment Budget

Attached are block diagrams of the RF/IF and LO portions of the array receiver as well as capital costs for test equipment to support/trouble-shoot this equipment at each array element and to repair same at a service center or operations center. I have included 1981 and 1982 H-P catalog prices as a check on the inflation factor prescribed.

Obviously, the GPS (Navstar Global Positioning Satellite) system for clock synchronization is too expensive for us at this time.

CRM/cjd

Enclosures

- Block Diagram - Receiver/LO
- Block Diagram - LO/IF
- Cost Estimates: A.8.a) Test Equipment
- B.6.a) Test Equipment
- A.8.c) Timing Equipment

NATIONAL RADIO ASTRONOMY OBSERVATORY
Green Bank, West Virginia

VLB ARRAY VI

Cost Estimates

A. Array Elements

8. Other Site Equipment

a) Test Equipment - Catalog Prices

	<u>1982</u>	<u>1981</u>
Vertical Scope Plug-In, HP 1805A	\$ 2.3 K	\$ 2.1 K
Time Base Plug-In, HP 1825A	2.0	1.3
Spectrum Analyzer Plug-In, HP 8559A	10.5	8.6
Main Frame, HP 182C	2.7	2.5
Power Meter, HP 436A	2.3	2.3
Power Meter Head, HP 8484A	0.7	0.7
Digital VOM, Fluke 8024A	_____	_____
	\$20.8 K	\$17.8 K

Additionally, specialized test equipment
for remote diagnostics:

Components ?
Man-hours ?

I think this specialized test equipment should
be included in item 6, Control and Monitor System.

NATIONAL RADIO ASTRONOMY OBSERVATORY
Green Bank, West Virginia

VLB ARRAY VI

Cost Estimates

B. Operations Center

6. Other Service Center and Operations Center Equipment

a) Test Equipment - Catalog Prices

	<u>1982</u>	<u>1981</u>
RF Sweep Generator, HP 8350A	\$ 4.3 K	\$ 4.3 K
0.01-26.5 GHz Plug-In, HP 83595A	27.0	N/A
Network Analyzer, PMI 1038-D14		3.5
Horizontal and Vertical Plug-In, 1038-N/O ..		6.2
Detectors		1.5
Miscellaneous Couplers, Attenuators, etc. ..		5.0
Power Meter, HP 432A	1.0	1.0
Thermistor Mounts:		
0.01-18, 40-60, 75-110 GHz		3.0
Frequency Counter, HP 5343A	6.4	5.2
Rb Traveling Clock, HP #21-5065A	22.0	18.6
Phase Comparator, HP K34-59991A	2.0	N/A
Frequency Stability Analyzer, HP 5390A	31.7	27.3

Digital Test Equipment ?

NATIONAL RADIO ASTRONOMY OBSERVATORY
Green Bank, West Virginia

VLB ARRAY VI

Cost Estimates

A. Array Elements

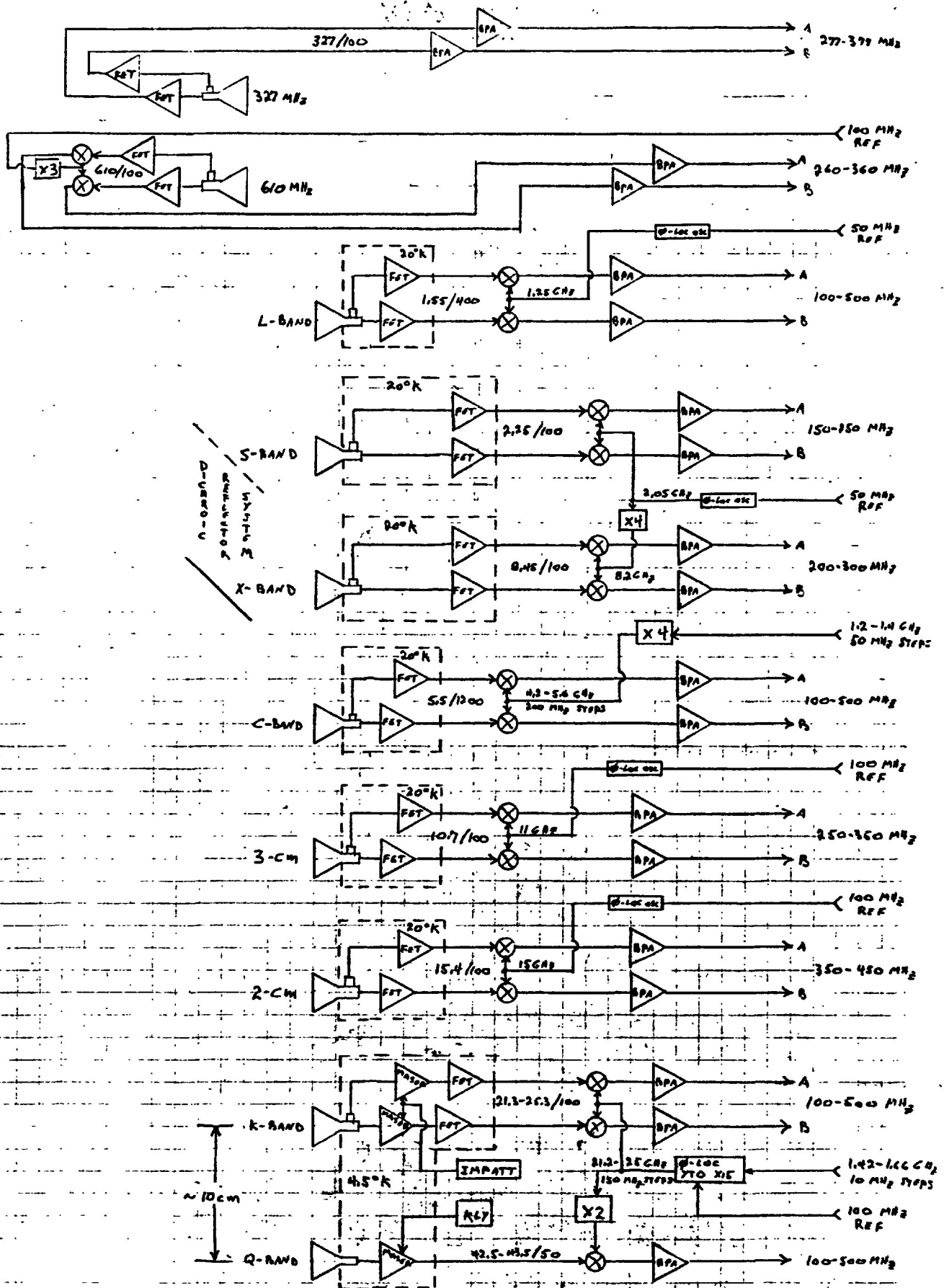
8. Other Site Equipment

c) Timing Equipment - Catalog Prices

	<u>1982</u>	<u>1981</u>
	\$16.9 K	\$13.5 K
	0.7	0.6
<i>one or</i> →	3.0	3.2
<i>other</i> →	5.3	4.5
		5.4
		3.0
		1.6
<i>one or</i> →		9.6
<i>other</i> →		80.0
		4.4

GPS receiver price will come down in future years.

I question the need for a crystal oscillator since the H-maser will have one.



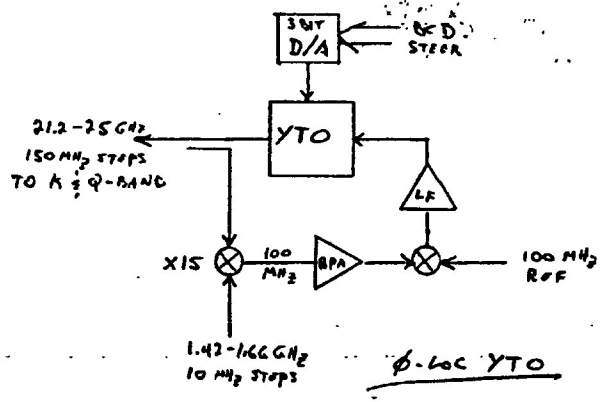
KEY: X/Y

X = CENTER FREQ. - MHz or GHz

Y = 3dB BW - MHz

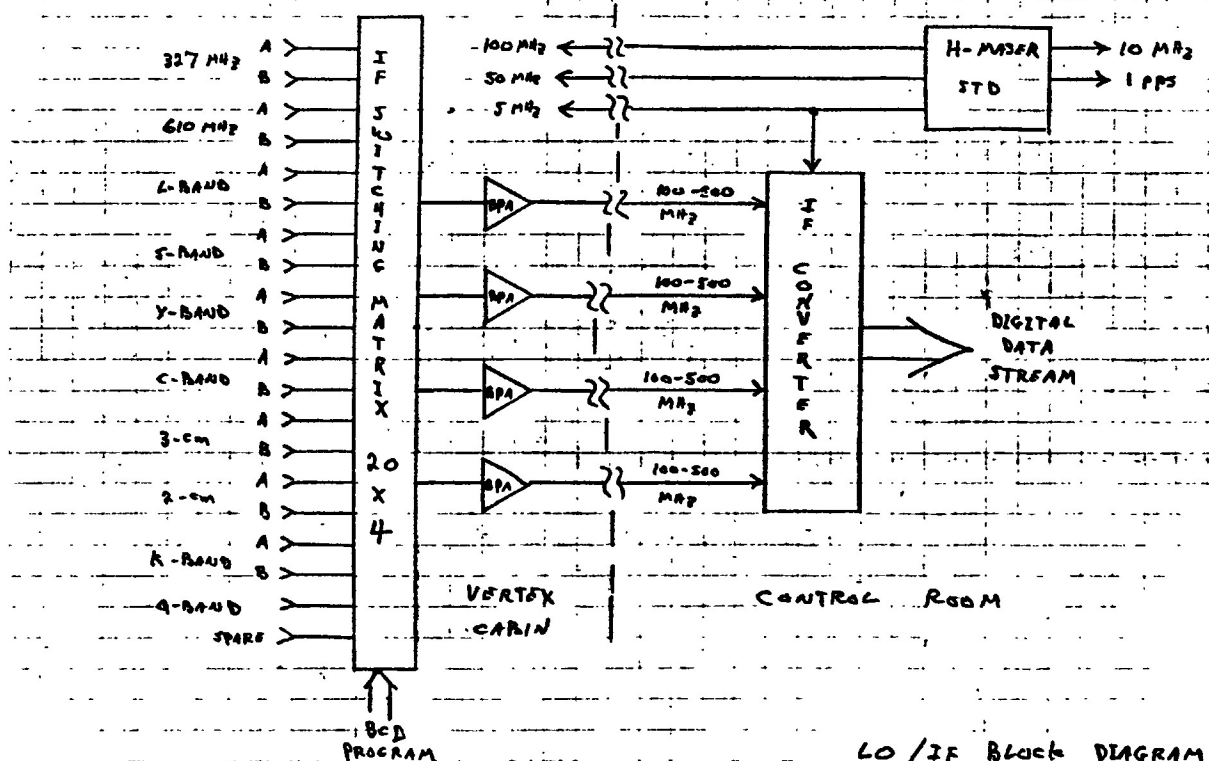
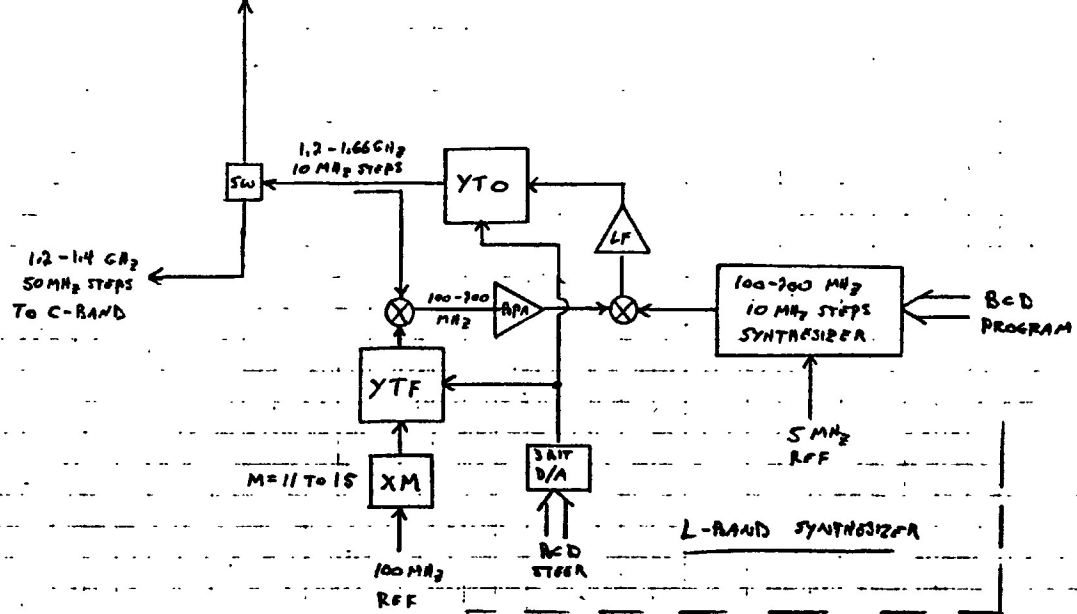
RECEIVER/LO BLOCK DIAGRAM
VLB ARRAY PROGRAM

BRM 12-21-81



Q-BAND FREQ. CHART

RF	LO	YTO	REF	100 MHz SIGN
42.5-42.9	42.4	21.2	1.42	-
42.7-43.3	42.8	21.4	1.42	+
42.8-43.2	42.7	21.35	1.43	-
43.2-43.6	43.1	21.55	1.43	+



LO/IF BLOCK DIAGRAM
 VEB ARRAY PROPOSAL
 BRM 12-21-81