Interoffice

National Radio Astronomy Observatory

Charlottesville, Virginia

I.

VLBI Mark III

To: Addressee

June 2, 1976

From: S. Weinreb S. Weinreb

Subject:

A status report on the VLBI Mark III System is attached. I would like to distribute this memo more widely after I get your comments.

Attachment

Addressees:
D. S. Heeschen
D. Hogg
H. Hvatum
W. Howard
K. Kellermann
D. Shaffer
J. Marymor
B. Rayhrer
R. Elcox
R. Fisher
R. Weimer
G. Patton
R. Mauzy

VLBI MARK III STATUS REPORT

S. Weinreb

June 2, 1976

A summary of the May 27, 1976, Haystack meeting* and some of my after thoughts are as follows:

1) The Haystack group has breadboards of all of record terminal equipment and will soon have a breadboard of the processor electronics. The processor computer is on hand and programming has begun. The system concept and components were discussed in detail at the meeting.

2) The Mark III System will provide 28 tracks of recording at approximately 4 Mbs/track at 120 IPS and, most likely, 8 Mbs/track at 240 IPS. Lesser bandwidths can be accommodated at slower speeds. Playback will be at a constant 120 IPS. Processing may be done time-reversed to minimize rewind time (which is 0.4 real time for 120 IPS recording). A tentative block diagram and component description for a Mark III record terminal is attached. All controls will be operable either manually or remotely thru IEEE Standard 488-1975 interface which also provides for remote monitoring.

3) A reasonable cooperative arrangement between NRAO and Haystack/NASA appears to be as follows:

a) NRAO will make extensive use of the Haystack equipment designs. In most cases these designs must be completed, packaged, and documented.

b) NRAO record terminals will be compatible with Haystack/NASA terminals; i.e. a tape recorded on an NRAO terminal can be processed on the Haystack processor (correlated with a tape made on a Haystack/NASA terminal) and vice versa. NRAO and Haystack/NASA terminals may be different in internal structure. This is due to differences in construction practices, purchasing procedure, and, to a small degree, system design philosophy.

c) The first goal is a trial experiment between NRAO and Haystack utilizing 6 tracks of a 28 track system (12 tracks were discussed at the meeting but I propose that 6 tracks is enough equipment to build for a first trial) by July 1977. NRAO will construct two record terminals for

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*Attended by A. Rogers, T. Clark, I. Shapiro, C. Counselman, B. Burke (morning only), C. Knight, H. Hinteregger, B. Rayhrer, and S. Weinreb.

this experiment; Haystack will construct the processor.

d) NRAO will buy two Honeywell 96 Recorders (without heads) and have one shipped to Haystack by September 1976. NRAO will buy and evaluate Spin-Physics 28-track heads; Haystack is evaluating Honeywell 28-track heads.

4) A cost estimate of a record terminal is attached; the total is $54.3K per terminal.

5) Tape capital cost is $250 per hour recording time at 120 IPS. Assuming 20% usage of a telescope at 120 IPS and a three-month tape turn-around time, an investment of $110K per telescope must be made unless surplus tape is available and of sufficient quality.

MARK III VLBI RECORD TERMINAL

COMPONENT DESCRIPTION

June 2, 1976

1. I.F. Distributor

This unit will allow 1, 2, or 4 I.F. inputs to be spread among 28, 14, or 4/3 tracks; this choice will be made by switch control or cable patching. The distributor will contain input attenuators, I.F. amplifiers, I.F. monitor output, and power dividers covering the 90-550 MHz range.

2. Dual I.F. Receiver

This unit accepts a -25 dBm/MHz I.F. input and converts this to upper sideband (USB) and lower sideband video outputs of an internal 90-550 MHz synthesizer tunable in .01 MHz steps. Bandwidth will be switch-selectable from approximately 4, 2, 1, 0.5, 0.25 MHz or external jacks. The video output will be clipped, formatted, and sampled.* A rear panel jumper cable will allow an external L.O. to be used. It has not been decided whether the I.F. Receiver will consist of 1, 2, or 3 modules.

3. Head Drivers

These will convert TTL signal levels (possible balanced-line receiver inputs) to proper currents for driving record heads. They will be located near the record heads and will probably consist of four septuple-driver boards.

4. Tape Transport

The Honeywell 96 transport will be utilized with 28-track ferrite heads either from Honeywell or Spin-Physics.

5. One-Track Readout

All tracks will have reproduce heads and preamps which can operate while writing. A multiplexer will allow any one channel to be read for testing purposes.

6. 5 MHz Distributor

This unit will provide all necessary buffered 5 MHz outputs and also a 36 MHz output needed for formatting.

* This may be performed in a combined format control chassis for all 28 tracks.

7. Format Controller/BCD Clock

Provides timing signals for all tracks. It may be one or two small modules or chassis.

8. Auxiliary Data Module

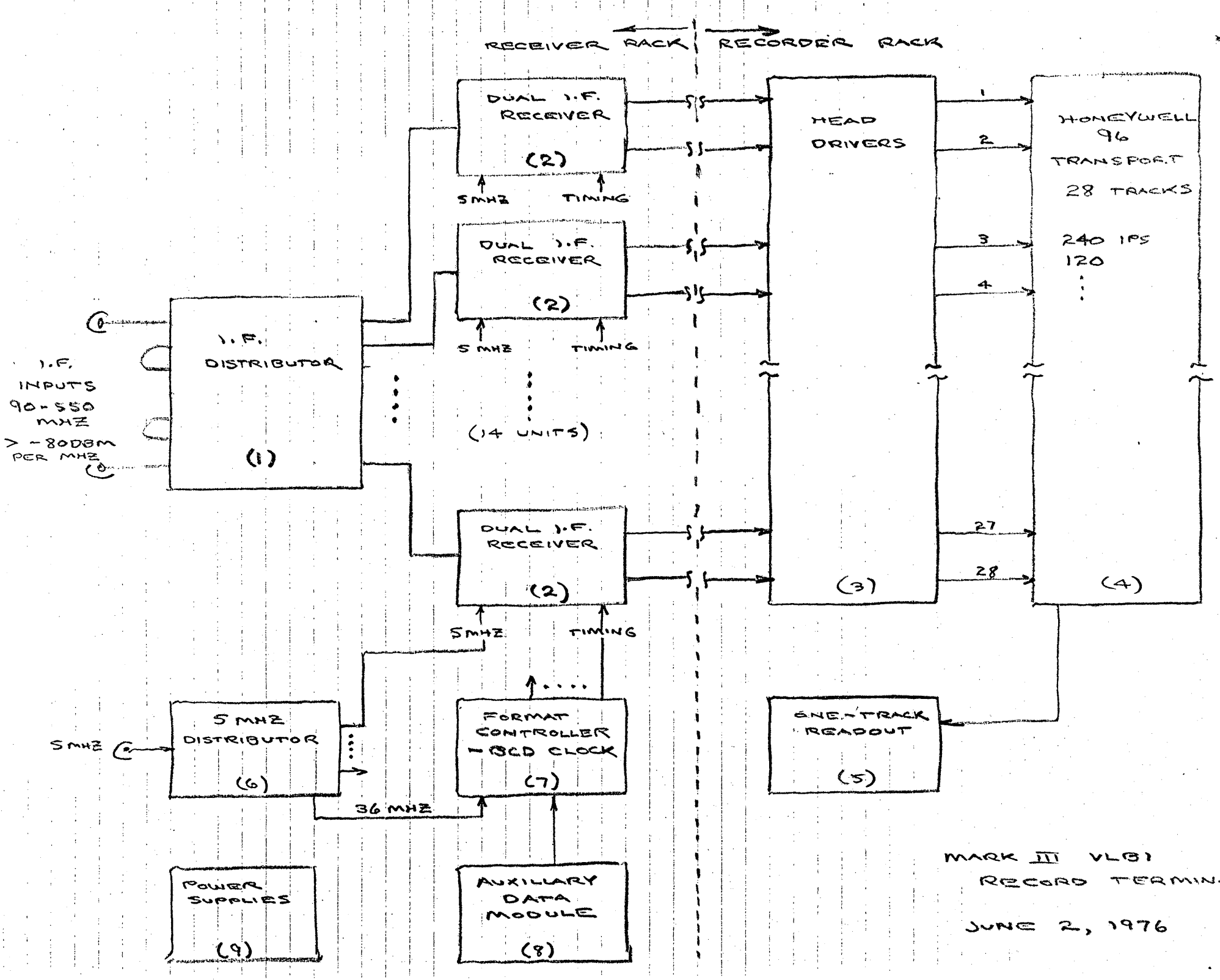
This has had little discussion so far but will be included in the final system.

MARK III VLBI RECORD TERMINAL

COST ESTIMATE - MATERIALS

June 2, 1976

ITEM NO.	QUANTITY QUANTITY	ITEM ITEM	UNIT COST	TOTAL COST
1	1	I.F. Distributor	2.0	2.0
2	14	Dual I.F. Receiver (includes Synthesizer and Formatter)	1.2	16.8
3	4	Septuple Head Drivers	0.2	0.8
4	1	Tape Transport (includes 28 Track Read/Write Heads)	28.0	28.0
5	1	One-Track Readout (includes 28 preamps)	1.4	1.4
6	1	5 MHz Distributor	0.8	0.8
7	1	Format Controller/BCD Clock	2.0	2.0
8	1	Auxiliary Data Module	1.0	1.0
9	1	Power Supplies, Cabinet	1.5	1.5
		TOTAL		$54.3K



MARK III VLBI
RECORD TERMINAL

JUNE 2, 1976