

National Radio Astronomy ObservatorySocorro, New Mexico
April 25, 1984

To: VLBA Electronics Group Members

From: A. R. Thompson

Subject: VLBA Electronics Meeting, April 19, 1984

Attendees: Balister, Brundage, D'Addario, Kellermann, Mauzy
Norrod, Thompson, Walker, Weinreb.Front_Ends

Sander Weinreb reported on cooldown tests of the new 8.4 GHz Dewar assembly. This appears to have a good cooldown margin. It cools to 11K, or to 22K with 1W of heat added. Cooldown takes six hours, and will be slightly longer when the amplifiers are installed. In the amplifier design Marion Pospieszalski has now obtained very good optimization of the noise temperature and gain flatness across the 8.0 to 8.8 GHz band. The plan for 8.4 GHz is to have the first front end completed and documented by June 30, 1984, and to have a second unit completed in December.

If front end development continues at its present pace, it is hoped to make one 10.7 GHz front end during the latter half of the year by scaling the 8.4 GHz amplifiers. This would go on the Pie Town antenna during the early installation, as requested by Ken Kellermann. There was some discussion as to whether this action would, in effect, preempt the choice between the 10.7 and 6.1 GHz bands if only one of them is implemented.

The order for polarizers from Atlantic Microwave is awaiting final approval. It will include 4.8 GHz (eight units), 8.4 GHz (two units) and one unit each for 10.7 GHz, 15 GHz and 23 GHz. The nominal bandwidth of the 23 GHz polarizer is 22.2 to 24.6 GHz. Craig Walker was concerned that the specification of the low end of this band may be a little too high to allow for observations of the red-shifted H₂O line. He will look into the frequency requirement, and if necessary discuss with Sander Weinreb the possibility of a modification of the specification. Twenty CTI model 22 refrigerators are on order.

22_and_43_GHz

AIL will lend us one of the 23 GHz paramps, and sell us a second one for \$50K. For a quantity of 22 (for 11

front ends) the price would be \$35K each. The price includes the 70 GHz pump which consists of an oscillator and doubler. The specifications include bandwidth 2 GHz; noise temperature 25K; and gain 9dB. The second stage (cooled FET) would add about 7K to the noise temperature. The overall system temperature would be about 60K, that is, only about 10K higher than a maser.

Local Oscillator

Bob Mauzy is working on the design of the 2-16 GHz synthesiser, and is investigating the possibility of a sampling-type harmonic mixer. The Watkins Johnson unit (see W.J. Tech Notes, Nov/Dec 1983) costs \$3700, and Bob has ordered a lower-cost H.P. sampler and will use a separate comb generator to drive it. He plans to have a working breadboard of the synthesiser completed by the end of 1984. This will allow completion of the module design by mid-1985.

Tentative Plan for Design of Front-Ends

<u>Band</u>	<u>FET Design</u>	<u>Front-End Design</u>	<u>Design Completion</u>
0.33 GHz	Exits	A.R.T.	June 1985
0.61	R.H.	A.R.T.	June 1985
1.5	R.N.	R.N.	June 1985
2.3	R.N.	R.N.	Feb. 1986
4.8	R.N.	R.N.	June 1985
6.1 *	R.N.	R.N.	July 1987
8.4	M.P.	S.W., H.D.	June 1984
10.7 *	M.P.	S.W., H.D.	Dec. 1984
15	Exists (M.P.)	H.D.	June 1985
22	Paramp?	?	Oct. 1985
43	Maser ?	?	Oct. 1985

* It is not yet clear if both of these bands will be implemented on all antennas.

The above plan shows persons and dates for the front-end design as they appear from my visit two weeks ago. The completion dates are either those that have been mentioned as reasonable goals, or they are one year ahead of the first installation on an antenna to allow time to start construction, whichever is the earlier. The dates for the 22 and 43 GHz front ends allow two years for testing and construction. We can discuss any corrections to this plan at the next meeting.

ART/bt