

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, Virginia

January 17, 1985

To: VLBA Electronics Group

From: Dick Thompson

Subj: VLBA Electronics Meeting, Jan 10, 1985

Attendees: Balister, Bradley, Brundage, D'Addario, Dill, Kellermann,
Mauzy, Napier, Norrod, Schlecht, Thompson, Walker.

Cryogenics

The model 22 refrigerators that were returned to CTI for rework have not yet been returned to NRAO, but are expected about the week of Jan 21. The status of the refrigerator test system at Green Bank as of the beginning of the year has been summarized by R. Norrod in VLBA Electronics Memo No. 34. The longest-running unit has been in operation for over 3600 hours. It's performance was improved by warming up and cooling again in mid-December, but it has more recently started to show emperature variations of 2-6 K amplitude on both stages.

Front Ends

The 8.4 GHz front end on the VLA appears to have been operating satisfactorily after some initial refrigerator problems were taken care of. An unsuccessful attempt was made to use it to detect the Voyager signal, but the failure to do so is believed to result from the difficulty in setting a spectrum analyser to follow the Doppler shifts.

Local Oscillator

A breadboard system for the 2-16 GHz synthesizer is under test at Green Bank. It is not yet working satisfactorily and does not lock at all required frequencies. Part of the problem may be that the 500 MHz reference signal being used is noisy, and Bob Mauzy will try to obtain a better test oscillator.

Interference

The effects of interference on the receiving-system design were discussed at some length. At this time the major problem in this area concerns the 1717 MHz signal at Los Alamos, for which the measured flux density is about $5 \times 10^{-8} \text{ Wm}^{-2}$ (-73 dBWm^{-2}). In +10 dB sidelobes the received power is -89 dBW. One-dB gain compression for a typical modular amplifier occurs at an output level of about +10 dBm (= -20 dBW). For the -89 dBm signal this would occur after about 69 dB of gain. It is not yet certain what the gain ahead of the baseband converter will be, and it could be as high as 69 dB. (VLBA Electronics Memo No. 30 suggests about 54 dB for the gain ahead of the baseband converter, but factors such as interference pickup in the cable could require a higher value.) Thus some special filtering may be needed. The level for gain compression of the Gasfet first amplifier is about -40 dBm (= -70 dBw) at the input, which is 19 dB higher than the 1717 GHz interference in +10 dB sidelobes. Thus the front end should not overload and the problem can be handled by a filter after the front-end amplifier. It was generally felt that this type of situation is acceptable so long as it does not occur on more than two or three bands at any particular site.