

NATIONAL RADIO ASTRONOMY OBSERVATORY

Charlottesville, Virginia

October 12, 1984

To: VLBA Electronics Group

From: Dick Thompson

Subj: VLBA Electronics Division Meeting, October 11, 1984

Attendees: Balister, Bradley, Brundage, Campbell, D'Addario, Latasa, Lillie, Mauzy, Moffet, Norrod, Schlecht, Thompson, Walker, Weinreb.

Cryogenics

H. Brown and R. Latasa visited CTI on September 6. to take part in a conference on reliability and other problems of the CTI refrigerators: see VLBA Electronics Memo No. 20. As a result a number of units that we have recently purchased will be returned to CTI for some replacement of parts and readjustment: see VLBA Electronics Memo No. 21. The squeaking produced by some units may result from rubbing of a micarta button, and thus may not indicate any serious problem. The model 22 refrigerator on the 8.4 GHz front end at the VLA site has twice required attention by R. Latasa who found bronze shavings of unknown origin within it. This front end has been running in the lab at the VLA for several weeks since its mounting on antenna no. 20 has been delayed by problems in the front end rack.

The test setup at Green Bank now has four model 22 refrigerators running, but two of these will be removed and returned to CTI for rework. So far none of the units has failed.

The latest cooldown results for the 1.5 GHz front end were reported by R. Norrod. The second stage cooled to 15 K in 18 hours without amplifiers attached. After the system had stabilized, a 1 watt thermal load increased the temperature to 21 K. The orthomode transition cooled to 90-100 K in 30 hours, and the first-stage head to 75-80 K. It is estimated that there is a 10 W load on the orthomode transition due to radiation through the waveguide window. R. Norrod is planning a test with a thermal reflector over the window to check this estimate. The problem could be solved by using a window material that reflects in the infrared but is transparent to radio waves. It seems clear that unless a substantial reduction in the heat load can be made, a model 350 refrigerator should be used for this frequency band. However, there was some disagreement on this point.

Front Ends

A second orthomode transition for the 1.5 GHz band has been ordered, and should be delivered about the end of November.

M. Balister summarized the current outlook for the 22 and 43 GHz bands. HEMT amplifiers seem promising for 22 GHz and SIS mixers for 43 GHz. If such systems are tentatively adopted when the matter is considered towards the end of this year, some work on prototype development will be started during 1985.

There was some discussion of the levels of the noise calibration signals, particularly those for solar observations. Provisionally values similar to those for the VLA can be adopted, but further study in this area is needed.

The location of the front end box for the 330/610 MHz bands was also briefly discussed. If this box can be mounted on the back of the subreflector, semi-rigid cables to the inputs can be used. It is desirable to avoid flexible cables between the dipoles and the hybrid junctions.

Vertex Room Mockup

A range of opinions was expressed on the need for a model of the vertex room and feed cone. It was decided to hold a separate meeting on the subject.

Report on the 8.4 GHz Front End

A detailed report has been prepared by S. Weinreb, H. Dill and R. Harris. Copies are being sent to most of the people concerned with VLBA front ends. Other copies can be obtained on request from C. Williams at Ivy Road.