

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, Virginia

May 6, 1985

To: VLBA Electronics Group

From: Dick Thompson

Subject: VLBA Electronics Meeting, May 2, 1985

Attendees: Bradley, Brundage, Dill, Mauzy, Napier, Narayana,
Norrod, Schlecht, Simon, Srikanth, Thompson.

The decision on the location of the monitor and control interface for the front ends, which is described in VLBA Electronics Memo No. 44, was briefly discussed.

Feeds

Peter Napier reviewed the status of the feed design. The design of the 330/610 MHz dipoles is well advanced, and a specification for the diplexers has been written by Dr. Narayana. It was agreed that Eric Schlecht would procure the diplexer as part of the front-end design. It may be possible to obtain the diplexers and the hybrids in a single package. The design for the 1.5 GHz horn has been completed. This is a compact design which will result in the front end being located within the feed cone, rather than near the floor of the vertex room. A scale model of the feed at 5 or 8 GHz will be made and tested. The prototype feed for 8.4 GHz has been completed by the Green Bank machine shop and is being tested at the VLA site. Over the 8.0 to 8.8 GHz range the return loss is better than 32 dB. Over a 40% bandwidth the return loss is better than 20 dB. This design will be scaled for all of the feeds for 4.8 GHz and above: it has not yet been decided whether the 2.3 GHz feed will be scaled from this design or the 1.5 GHz design. At the nominal 4.8 GHz band the feed should have good performance from 4.6 to 6.1 GHz. Design of the feed placement within the cone allows for three dichroic pairs as follows:

2.3 and 8.4 GHz
4.8 and 23 GHz
43 and 10.7 or 15 GHz

Front Ends

At Green Bank work on the prototype 1.5 GHz front end using the CTI model 350 refrigerator is progressing well, and the first cool-down test is expected to occur within the first half of this

month. A three-stage prototype of the 4.8 GHz FET amplifier is under test. Five model 22 refrigerators are currently running on the cryogenic test system. One of these is cooling to only 20K. It is concluded that the compressor is only marginally adequate for 5 model 22 units (or for one model 350 and three model 22 units). The compressor now in use does not incorporate some modifications used at the VLA, and it is planned to add these and see if there is any improvement. If neither the 6.1 nor the 10.7 GHz bands are implemented, there will be 7 cooled front ends (1.5, 2.3, 4.8, 8.4, 15, 23, and 43 GHz) using six model 22 refrigerators and one model 350. In any case, this should be within the capacity of two compressors.

At Charlottesville, most of the components for one 10.7 GHz front end that will be installed on the Pie Town antenna are in hand.

Local Oscillator

Development of the prototype 2-16 GHz synthesizer module is proceeding steadily. Power splitters for the 100 to 500 MHz multiplexer that were made in-house proved to be too narrow band, and commercial units are on order. The synthesizer is being built in a triple-width module. Performance tests will be made in June. A 100 MHz crystal oscillator for use in the testing is to be delivered next week.

330/610 MHz Front End

E. Schlecht briefly described temperature-stability testing of a 330 MHz front end of the type used on the VLA. A memorandum describing these results is being prepared.