

JEWELL

National Radio Astronomy Observatory
Tucson, Arizona

May 22, 1984

MEMORANDUM

TO: Bob Brown

FROM: John Payne

SUBJECT: Electronics Projects in Tucson

Here is a list of the major projects that we are working on right now.

JP/mt

c: M. Balister

SUMMARY OF CURRENT ELECTRONICS PROJECTS

1) CASSEGRAIN EFFICIENCY PROBLEM

The Cassegrain efficiency of the 12 m at $\lambda = 1.3$ mm is too low. The present value is $17\% \pm 2\%$ as compared with the prime focus value of $25\% \pm 2\%$. The beamwidths are wider at the Cassegrain focus, 33" compared with 28" at the prime focus. At $\lambda = 3.3$ mm the Cassegrain focus works ok.

I believe the problem is caused by

- 1) an inefficient feed system,
- 2) large scale subreflector errors.

Both these problems are being worked on.

2) NEW OPTICS FOR THE 12 M

The present optical system for the 12 m was intended to be a simple, temporary arrangement that enabled us to use the feed systems from the 36 ft telescope. The quasi optical devices that were available with the 36 ft (fast beam switcher, etc.) would not be useable with this first simple system. A new, more elaborate optical system has been conceptually designed and Buddy Martin is working on the detailed design.

3) NEW MIXER RECEIVER FOR 70-115 GHz

Our old 3 mm receiver covers the 70-115 GHz band with a single mixer. As a result the noise temp at 115 GHz is about 400K SSB. In the laboratory we have measured 200K SSB with an optimized mixer. We are well into building a new mixer receiver that splits the band into two bands; 70-90 GHz and 90-120 GHz. We will be able to achieve 200K SSB over the whole 70-115 GHz band with this receiver.

4) BOLOMETER PROBLEM

The sensitivity of the bolometer on the telescope is still a fair way off from that implied from lab measurements. A factor of between 2-4 seems to be about right, although bad weather and other factors have made even an accurate definition of the problem difficult.

5) NEW 2 mm RECEIVER

A dual channel 130-170 GHz cooled mixer receiver is planned. Using various salvaged components from the old 36 ft 2 mm receiver will minimize the effort required to build this receiver. A noise temperature of around 300K SSB across the 130-170 GHz band appears realistic. Work in the machine shop has started on this receiver.

6) 345 GHz RECEIVER

This will be a very simple single channel receiver. Work has started on it and the pacing items will be the mixer and tripler from CV.

7) INDUCTOSYN SYSTEM

The inductosyn electronic system is close to being completed and will be installed on the telescope this summer shut down.

8) SIS RECEIVER FOR 115 GHz

We have done nothing on this receiver here in Tucson. The SIS mixer is a copy of Tony Kerr's design and, as I understand, it doesn't work yet. The refrigerator has yet to be tested. I feel this is an important receiver that will require a lot of support and will be largely experimental for quite a while yet.

9) NEW CORRELATOR/FILTER BANK

Work has started on this project in Charlottesville. Andy Dowd, the engineer working on the project will move to Tucson at the completion of the project in about 2 years time.