

MEMORANDUM

To: Darrel Emerson
From: Thomas Folkers
Date: July 24, 2000
Subject: 12 Meter File server

Darrel,

I feel it is necessary to clear up a few misunderstandings about the file server *penguin*. As the person who specified and installed this computer, I feel I am best suited to explain it's function and it's absolute necessity to observing at the 12 Meter.

In it's present configuration, *penguin* is the file server. *Rtdata*, the actual data collection process for the *cactus control system*, runs on *penguin*. To think that *penguin* is only used for On-The-Fly (OTF) observing is a misunderstanding of the details of the architectural design of the system. All observing, be it simple continuum pointing, to the more sophisticated OTF observing rely on the file server *penguin*. Remove *penguin*, and you can not observe at the 12 Meter.

In early 1999, the first OTF observations using the new *Millimeter Auto Correlator* (MAC) were conducted. While it is correct, we were able to take 4096 channel/IF of data from the MAC using the old file server configuration, there was a problem, and it was a big one, that data rate was only achievable if the old file server, *locura*, was doing absolutely nothing else. I mean nothing. No one could be logged in, and no other processes could be running but the operating system and *rtdata*. If a process used up any memory or CPU time, the OTF map would self abort due to an overruns in the data streams. Coupled to this was the fact that the OTF map had to be taken in an inefficient manner to compensate for this limit. A calibrate and off scan would have to be done for each and every row to give *locura* the time necessary to receive, format and write the data to disk. Further, if the observer sitting at the analysis computer *modelo* tried to reduce their data, the act of NFS serving the data up to *modelo* by *locura* would also, on occasion, abort the map. Also, the process of backing up the data to tape caused the occasional aborted map. These restrictions in data throughput limited the useful data rate from the MAC to 2048 channels/IF in OTF mode. Small numbers for a instrument capable of 32,768 channels/IF. It is also necessary to note the total size of the old raw data disk drive farm, 64 GB, would have lasted less then one day utilizing the MAC's maximum data rates.

It was determined that these limits were not acceptable, and a solution was sought. I did the preliminary tests to determine what sorts of hardware were necessary to achieve the data rates desired and reported the results in the *12 Meter File Server Design Report*, which I have attached.

When *penguin* was installed at the 12 Meter, OTF data rates were raised to 16,384 channels/IF. The full 32,768 channel/IF rate is unobtainable do to software/hardware limit in the MAC processor itself and not the

data path. Test runs shows the file server *penguin* is fully capable of maintaining the higher 32,768 channel/IF rate even while simultaneously reducing and backing up the data.

I think it would be improper to turn over the 12 Meter to the University of Arizona Steward Observatory (UASO), and at the same time limit the potential of this fine instrument. If NRAO removes *penguin* the UASO will be required to replace it with a machine of similar capabilities. This will be necessary if we are to observe at the 12 Meter and to take advantage of the MAC, which we fully intend to do.

Thanks,

Thomas W. Folkers



Enclosures: *12 Meter File Server Design Report*

CC: Dale Webb
Jeff Mangum
Buddy Powell
Lucy Ziurys