Betty

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November 29, 1986

TO: D. T. Emerson

FROM: M. A. Gordon

SUBJECT: Observing experience, Program D149

In lieu of completing an observing form, I'm writing this memorandum to describe my experiences with the 12-m telescope and system from November 24 to 26.

We experienced both good and bad during this run.

Good:

The pointing at 1-mm appeared to be excellent, and the receivers were stable, requiring no retuning during this observing run. While we experienced 3 crashes with the PDP11/40 system during the 2 days, the VAX 11/750 never failed us.

The staff were always helpful, even during difficult periods. Phil called us often about our difficulties with sensitivity. Betty was always helpful, not only fixing bugs in the new system but resurrecting a POPS procedure essential to our analysis of data. John Payne also checked in with us.

The dormitories were clean, comfortable, warm, and quiet.

Bad:

We had difficulty with receiver changes. Although we acquired the system early from the departing observers, we were unable to begin observing for 3 additional hours because the operator was unable to tune the 1-mm receiver. One day later, a planned receiver change from the 1-mm to 3-mm receivers took 2 hours instead of the normal 15 minutes. The telescope operators claimed that these delays came because 1) the electronics staff had not anticipated our need for 230.1 GHz even though we gave this frequency several days before going on the telescope, and 2) there were no tuning sheets and documentation to allow the operators to change frequencies and receivers quickly.

We had difficulty with the software because of inadequate documentation and one problem extant for several years in spite

of observer complaints. We tried to find why the continuum sensitivity was between 2 and 4 times worse than we'd expected on the basis on the receiver temperatures and previously quoted system sensitivities. We discovered that a number produced by the program alleging to be RMS was in fact the standard error of the mean, an error causing us to follow a false lead for nearly 2 hours and to lose confidence in all calculations made by the new software release. We also found that access to the header parameters and data had changed without any adequate documentation. Furthermore, the new system makes its difficult to retrieve individual data within POPS procedures, compromising a powerful asset of the Tucson system. Collectively, these problems added a lot of anxiety during our short program.

Initially, the new software also had a couple of serious bugs. The departing observers warned us that we would not be able to look at plots of atmospheric extinction and of the modulation of the focus, so that we would have to trust the calculated outputs for extinction and proper focus without being able to assess the data from which they were calculated. Fortunately, Betty managed to fix most of these problems soon after we took over the telescope.

Recommendations:

1. I believe it unwise to release a new software system without adequate documentation and without adequate checkout by the resident staff in Tucson. What's the hurry? The inevitable bugs and the non-existent documentation can only undermine the astronomers' confidence in the new system, waste observing time, and generate a lot of frustration everywhere. Isn't the summer supposed to be used for this kind of testing? Why must the visiting astronomers be guinea pigs and pay penalties for what is supposed to be for their benefit? If you can't check it out early and document it first, don't install new software.

2. The astronomers should be able to examine the computer code used by the system to process data. We could have saved a lot of time if we'd been able to see how the computer was actually calculating what the documentation calls "RMS".

3. Please make certain that the telescope operators have the information necessary to carry out the observers' programs. Without exception, everyone on the mountain operations staff whom we encountered complained bitterly and loudly about their problems with documentation for electronics and software. Most disturbing to hear were their complaints about frequent undocumented changes to the computer programs. Frankly, the situation seemed reminiscent to what I encountered here in 1972 and 1973.

4. I strongly recommend that the NRAO find the money for a PC equipped with a printer, Vterm/4010, Turbo Pascal, WordPerfect, and Lotus for the mountain. George and I were able to use my Compaq to 1) verify calculations and find mistakes in the new programs, and 2) to reduce all of our hundreds of observations before leaving the mountain -- including statistical analyses of our results. Every other NRAO telescope has this facility.

c: G. A. Dulk
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