Interoffice

VLBA Electronics Memo No. //3

## **National Radio Astronomy Observatory**

New Mexico March 28, 1989

- To: VLBA Electronics Group
- From: Erich Schlecht

Subject: Notes on Electronics Meeting 3/2/89

Attendants:

R. Latasa, J. Oty, L. Beno, P. Napier, J. Campbell, C. Walker, R. Simmons, L. Beale, R. Norrod, W. Wireman, R. Treacy, R. Simon, S. Srikanth, K. Crady, G. Morris, E. Schlecht, M. Balister

Items discussed:

Which IF and converter to use with the 43 GHz Front end being built by R. Norrod.

Changing location of 43 GHz Front End to allow it to fit better with the slight package modifications.

Need for larger refrigerator for 2.3 GHz.

DAR production and retrofitting proceeding as needed.

The selection of an appropriate and convenient first IF frequency for 43 GHz was discussed. R. Norrod prefers an IF around 8.4 GHz to allow a reasonable LO and to keep losses in the IF line down. This would also not preclude the use of 15 GHz with the 43 GHz band, should this be necessary. J. Oty suggested that using a second 8.4/23 GHz converter would make a spare available, as well as not requiring additional development. E. Schlecht concurred that this would be preferable to trying to include a 43 GHz input into the same converter used for 8.4 and 23 GHz. He also noted that in the 23 GHz mode the 8.4/23 GHz converter will accept any RF input in the approximate range of 7 to 11 GHz. P. Napier and M. Balister were in general agreement, and no objections were forthcoming.

The LO source for 43 GHz was also discussed. R. Norrod proposed that using the existing third synthesizer and doubling its output would be preferable to using a single frequency phaselocked Gunn source, because the band covered would be so wide that image rejection would be a concern. E. Schlecht suggested the possibility of feeding 100 and 500 MHz up to the front end and synthesizing several LO frequencies, but R. Norrod felt this would be putting to much complexity into the front end. R. Norrod's concerns and suggestions are detailed in VLBA Electronics Memo 112.

A brief discussion of the packaging of the 43 GHz front end was held. It was generally agreed that there should be no real difficulty in modifying the standard front end dewar package slightly to allow for waveguide inputs and outputs and so on. It was also suggested that it would be a good idea to move the 43 GHz front end a few inches toward the 15 GHz front end to accommodate this change.

The 43 GHz feed is being worked on, and a decision was due shortly about whether it would require electroforming. (The consensus seemed to be yes).

R. Norrod and R. Latasa are of the opinion that the 2.3 GHz front end will require a model 350 refrigerator, rather than the present model 22. It appears that often when the front end warms up due to power failure, it cannot be cooled down again until it is roughed out with the vacuum pump. This problem occurs when attempting to cool down after warm up. The system cools down to about 150 K, and then hangs there. Apparently, the cryopumping is not effective enough to bring the total thermal conductivity down to where the system will cool the rest of the way. It was acknowledged that using a model 350 in the 2.3 GHz front end would put one 350 and 3 22's on each compressor, thus apparently leaving no spare capacity for 86 GHz. However, several people, including P. Napier felt that it would be better to make sure of a reliable 2.3 GHz capability. Also, 10.7 GHz will not be used throughout the array thus freeing some capacity, although there seemed to be some feeling that eventually the array might be outfitted for 10.7 GHz.