NATIONAL RADIO ASTRONOMY OBSERVATORY Charlottesville, Virginia

February 7, 1985

MEMORANDUM:

VLBA Electronics Memo No. 37

TO: VLBA

FROM: H. Dill

SUBJECT: Return of Reworked Model 22 Units

A meeting at Greeenbank was arranged January 28th between CTI, NRAO and Howard Brown. Four of our original ten units were returned from CTI's production group after evaluation and correction of some earlier production problems. The purpose of the meeting was to inspect some units and open up communication between the various parties.

Present at the meeting were:

Leon Audette	CTI	Quality Con	itrol
Jim Harrington	CTI	Production	Engineering
Howard Brown	Consultant	to NRAO	
Mike Balister	N RAO		
Dick Thompson	NRAO		
Fred Crews	N RAO		
Roger Norrod	N RAO		
Troy Henderson	NRAO		
Dave Williams	NRAO		
Fred Crews Roger Norrod Troy Henderson Dave Williams	N RAO N RAO N RAO N RAO		

The units that were returned to CTI were tested before and after their rework. The following is a summary of what CTI found with the returned units.

- 1. Units undercharged (40 lbs/sq in).
- 2. Intake and exhaust valves leaked.
- 3. Timing off 3-4 degrees.
- 4. To fine a surface finish on the first stage (the first stage has a slightly rougher finish than the second stage to seat the seal).
- 5. First stage displacer screws not tight enough.
- 6. Second stage seal required polishing.
- 7. Drive rod with sharp corners on end.
- 8. Displacer flows were out of spec.
- 9. Yoke rod and drive rod assembled backwards (a "B" marked on the block should face the displacers).

These items were not found on each unit, but summerize the problems found. CTI also checked the various components of the refrigerators against their prints. In some cases their prints were brought up to date or specified more clearly with geometric tolerancing.

One of the four units returned was disassembled and inspected. The other three were left intact. One disassembled unit and one intact unit will be installed in the life test. The remaining units will be used in prototype receivers. The intact units will ensure that no changes have been made by NRAO to the units. If these units do show signs of failure in the future, they will be inspected to determine the cause.

The unit that was disassembled showed vast improvment over earlier models inspected by Howard Brown. The bushings still need to be researched further to determine if a better material exists and if a better installation procedure can be developed. The reworked units still have carbon bushings, but they have a tighter tolerance (.1885/.1890 id). CTI is currently looking into new materials, and may use some of our units for field testing.

One area of concern still exists for the Model 22 units. This has to do with contamination. The smaller capacity of the 22 makes it sensitive to system contamination. Signs of this are present on our current life test and are being investigated further. CTI is also studying the problem and is currently investigating causes of contamination and its effect on the systems. With these systems it is important that any manifold lines be carefully cleaned, that the compressor systems be trapped prior to use, and that only known high quality helium be used in the systems. Wear dust found in the cylinders still needs to be explained and its effects on the system determined.

CTI is working toward improving the units performance and understanding its capabilities. New valves using an o-ring seal will be available in mid-1985. Technical data and tool kits should be available soon for setting the timing and overhauling the units. Communication is being established between field service and production to monitor the Model 22 service records. Over the next few weeks CTI and NRAO will be arranging a means of monitoring unit performance and determining what other areas may be of importance to guarantee a reliable 10000 hour refrigerator.