

# VLBA Electronics Memo No. 9

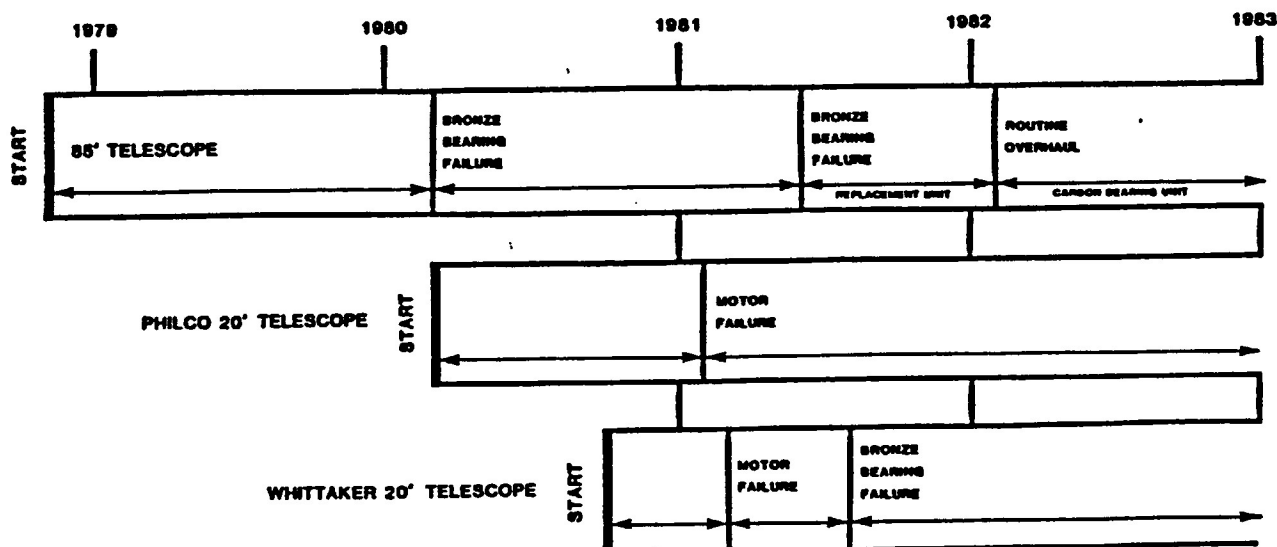
TO: VLBA Electronics Group  
FROM: D. Backer and T. Lum, U. C. Berkeley  
RE: Experience with CTI Model 21 Refrigerators at Hat Creek

In response to VLBA Electronics Memo No. 6, we can report the following experience with CTI Model 21 refrigerators:

CTI Model 21 refrigerators have been in continuous use at the Hat Creek Observatory on three telescopes: the 85 foot and two elements of the Millimeter Interferometer. On the 85 foot one refrigerator has been in near continuous use since late 1979 to cool the L-band FETs. Three other units are used intermittently to cool the S/X-, C- and X-band receivers; use amounts to 4-8 weeks per year. The history of the L-band refrigerator is shown below. The units on the elements of the Millimeter Interferometer have been in continuous use since 1981. Their history is shown below. Since the accompanying plot was made, three repairs have been made: (1) in July 1983 the Philco unit was replaced owing to wear on seals and bearings; (2) in January 1984 the Whittaker unit was replaced owing to heavy wear on seals and bearings; (3) in June 1983 the S/X unit which had received only intermittent use had a complete failure indicating that it was a defective unit.

Initially the mean time between failures (MTBF) was only 10 months; however, discussions with CTI led to the substitution of a carbon bearing for the bronze bearing that was causing most of the trouble. The two other failures, of the motor bearing, were exceptional and are not expected to recur. The MTBF is currently greater than 15 months; thus there should be no problems with the crossheads if routine maintenance is done every ~~twelve~~ months. The helium compressors appear to be very reliable, lasting about three years. All compressors at Hat Creek and at Berkeley are still running with only adsorber changes annually.

The Model 22 differs from the Model 21 in that the helium connectors are identical, rather than different for in and out lines, and the window which allows inspection of the moving parts is absent.



## SUMMARY OF FAILURES:

3 FAILURES DUE ALL CAUSES AFTER 10, 12, 11, 2, 5 MONTHS. MTBF = 10.4 MONTHS.

3 NON-FAILED CURRENT UNITS INCLUDING ONE CARBON BEARING. 10, 21, 12 MONTHS. AVERAGE 15.3 MONTHS.

Fig. 11 Service record for the CTI model 21 refrigerator