National Radio Astronomy Observatory *MEMORANDUM*

To: VLBA Project *Date:* September 29, 1987

From: Craig Walker

Subject: Summary of First VLBA Test Coordination Meeting, Sept. 15, 1987

The meeting was attended by Bagri, Clark, Crane, Goss, King, Napier, Rogers, Romney, Ruff, Thompson, and Walker.

Much of the meeting was spent on a review, to be completed next month, of the electronics tests that Bagri has done at the VLA and at Pie Town. A memo on the subject is being written so only a few points are mentioned here.

Tests have shown that phase variations with temperature changes are in the neighborhood of 1.5 deg C^{-1} GHz^{-1} with the 2-16 GHz synthesizer signal causing a large fraction. Thompson feels that this is satisfactorily close to the design goal of about 1 deg C^{-1} GHz^{-1} . These results appear to be several times better than what is achieved by the current geodetic systems.

Problems in some modules with image rejection, passbands, filtering of low frequency signals, L.O. lock range, phase jumps with ALC gain changes, and sensitivity of baseband converter (BBC) L.O. phase to temperature and power supply voltage have been identified and are being worked on.

Fairly long settling times have been found for the phase of the BBC L.O. after switching frequency. The times range from 10 sec. for a change of 1 MHz, 30 sec. for 250 MHz, to 70 sec for a change of 500 MHz. If the phase behavior is not the same for all modules, this, rather than subreflector motion, may set the minimum time for a frequency band change. It may also preclude rapid frequency switching within a band (eg 1 sec cycle) such as has been used in various Mark II experiments in the past. With eight baseband converters, frequency switching is probably not needed, but the slow band change times may be a problem.

Tests at Pie Town showed that 500 and 600 MHz L.O. signals are being fed into the signal path by the narrow band 610 MHz filter. The 500 MHz signal must be filtered out because it causes saturation problems. For now this is being done by filters about 50 MHz wide, centered near 610 MHz, that have been inserted after the 610 MHz IF converter but before the signal is combined with the output of the 327 MHz converter. This is probably ok for testing, but it would be good to eliminate these signals in the long run. The 600 MHz filters do a great deal to clean up the otherwise rather ratty passband when the narrow band filter is switched out.

The azimuth rail problem was discussed. The problem is that a level placed on the pedestal structure shows excessive variation as the antenna is rotated in azimuth. If the readings can be believed, the azimuth rail does not meet spec. The problem exists at Pie Town, Kitt Peak, and Los Alamos. At Los Alamos, extra care taken in leveling the track does not seem to have helped. There is concern that something is wrong with the measurements or that some sort of vibration or bending of the structure is being seen. Various tests will be made to try to understand what is happening. It is important to understand the problem soon in case there really is something wrong with the rail that should be corrected in future antennas.

There was some discussion of future tests at Pie Town. Napier would like to see more RFI tests. In particular, he is uneasy about the unshielded pedestal room. Bagri would like to repeat many of the tests done at the VLA as the system at Pie Town is more nearly the final system than was used for the tests at the VLA. Also, the RFI environment at Pie Town is much cleaner than at the VLA.