

National Radio Astronomy Observatory

VLA Test Memo # 181

Test and Repair of AOC PBD - Oct/Nov 93

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In mid October it was decided to test all of the AOC play back drives (PBD) located in the correlator area. In all, eighteen drives were tested, After some wheel-spinning, a procedure was devised that would test the 32 data tracks from each PBD. A VLBA test tape, 1:1, with no barrel roll, was made on the drive in the recorder area. System tracks were also recorded. The original test procedure could not check the system tracks. They will have to be checked during the next test phase. Also to be tested is the performance of the PBD's while varying the speed $\pm 5\%$. We did some of that, but a systematic test needs to be done on all units. We also want to test the clock recovery cards (CRC) with different setup settings of the DIP switch on the card. Of the 18 drives tested, 8 checked OK and 10 checked bad in one or more tracks. Two basic tests were done on each unit, the loopback tests and the tape test. The correlator generates a pseudo random (PR) data stream, sends it to the PBDs, along with a clock and control signal. Under control of the correlator, the PR data is input to the ATT chips on the CRC in place of track data from the tape. This test was marginal because of noise on the oscillator in the correlator. A new oscillator has been ordered that will improve the reliability of this test. The tape test consisted of playing the VLBA tape and monitoring performance on a screen from the correlator deformatter. The screen showed some of the Aux data field and a count of frames, invalid frames (IVF), sync errors, and parity errors. Early in the test we were looking for tracks that were completely dead. As the test progressed, we started watching for high IVF counts. Again I would like to make one more pass through the recorders and get a hard copy of the track performance for all 36 tracks.

The results of testing and repair effort is summarized in appendix A. Five problems were attributed to the clock recovery card (CRC). Eleven problems were attributed to the parallel reproduce module (PRM). Three were cable problems. One track recovery card, one head assembly, and one inchworm controller was changed. A major effort may be required to increase the reliability of the parallel reproduce module, depending on the results of further tests.

Three sets of PBD upgrades were completed during the same time. The inchworm controller were upgraded and a fan module added to cool the inchworm controller. The low voltage capacitors in the parallel reproduce modules were replaced. The reel servo amps were checked for high gain only operation and correct ground strapping. Any units not already modified were corrected.

Appendix A

- PBD #1 Added PBD loopback chip. Original symptom: Formatter tracks 2.5 and 3.5 (recorder tracks 12 and 28) looked bad in loop back - Tape test ok. Track recovery card bad - First spare worse - Second spare ok. Short between +6V & -12V blew resistor in read module. Short cleared, unit OK.
- PBD #2 Added PBD loopback chip. During trouble shooting swapped PRMs & CRC out. Spares put back in. During checkout IWC died - spare IWC & Fan Module put in. Checked out loopback and tape ok.
- PBD #3 Added PBD loopback chip. Loop back (1.3 to 1.7) problem. Not sure if this was repaired. Tape test OK.
- PBD #4 Added PBD loopback chip. Loopback & tape test OK. Ran some checks on CRC operation vs speed, OK \approx 255 ips to 330 ips.
- PBD #5 Added PBD loopback chip - loopback and tape test OK.
- PBD #6 Loopback OK - Tape 1.7 (33) bad. Odd Par Rep Mod bad. Changed H6, did not fix - U38, H22, U29 changed, test OK.
- PBD #7 Loopback and tape test OK. Later 1.4(27) bad, fixed itself? High IVF on 3.3 (24) - changed ATT chip and header. Tape test OK.
- PBD #8 Loopback - 2.0 (2) bad - Tape 0.1 (5) and 2.0 (2) bad. Cable pair for track 2 open. Repaired cable, 2.0 (2) loopback test ok. 0.1 (5) bad out of odd PRM. H1 replaced, looked ok. Later found 2.5 (12) bad. Problem followed PRM. Replaced H3 in PRM. Fixed. Test VLBA tape from 260 ips to 280 ips. Looked ok. Problem with 2.5 (12) returned. Probably thermal. All other chips and headers soldered in place. Put spare PRM in. VLBA tape test looked ok, except the tracking seemed unstable. Traced that to a loose screw in the head assembly. Tightened screw and recalibrated the head. Tape test ok. Odd PRM quit. Replaced with spare. Tape test ok again. System track 4.0 (0) bad. Will be checked later.
- PBD #9 Loopback test ok. Tape test - 0.1(5) bad. Bad crimp on Correlator input harness to TRC. Replaced. 0.1(5) still bad. Loopback should have picked up but didn't. Replaced head assembly. Tape test ok. Later 2.5 (12) bad. PRM (SN17A) bad. Changed header. Tape test ok.
- PBD #10 Added PBD loopback chip - Loopback test ok - 3.3 (24) & 3.6 (30) bad on tape test. 3.6 bad at PRM out. Change H6 header - fixed 3.6. 3.3 looked ok at 270 ips but quit at 265 ips. Changed ATT chip and header. Tape test ok. Later - 0.1 (5) and 1.3 (25) had high invalid frame count (IVF). Replaced odd PRM with spare. (Serial # 20 A out 41 A in). Looked ok. Put header in 20 A - Helped but didn't fix. Left spare (41A) in unit. Tape test ok. System track 4.3 (34) looked marginal. Speed sensitive. Check further later.

PBD #11 3.3 (24) bad on loopback. 1.5 (29) and 3.3 (24) bad on tape test. Tried swapping cables with PBD 12. Problem stayed in PBD 11. Put cables back. Changed ATT chip and header for 3.3 (24). Fixed loopback problem and tape problem for that track. Problem in track 1.5 (29) followed PRM. Changed header for 1.5. Tape test ok at 250, 270 and 280 ips.

PBD #12 Loopback and tape test ok.

PBD #13 Loopback test ok. Tape test all odd channels dead. Changed odd PRM. Tape test ok.

PBD #14 Loopback and tape test ok.

PBD #15 Loopback and tape test ok.

PBD #16 0.3 (9) and 0.4 (11) bad on loopback and on tape test. Most of even tracks looked marginal on tape test. Changed even PRM. Even tracks ok. Changed driver chip on CRC (no clock out of CRC). Tape test ok.

PBD #17 Loopback and tape test ok.

PBD #18 Added PBD loopback chips. Loopback and tape test no good. Swapped cables and found 1.0 (19) bad in cable. Ground wire crimped in with data wire. Fixed - cables tested ok. Changed CRC. Loopback and tape test ok.

