VLBA Electronics Memo No. 107

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
HAYSTACK OBSERVATORY
WESTFORD, MASSACHUSETTS 01886

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To: VLBA Electronics Group

From: Alan E.E. Rogers

Subject: VLBI Performance of VLBA Maser at Kitt Peak

The VLBA maser (Serial No. 4) was used at Kitt Peak for a 3mm (10 GHz) VLBI experiment. The phase tests done prior to the experiment showed the presence of 20 Hz sidebands on the L.O. when using the 5 MHz from the maser as a reference to the Fluke synthesizers in the L.O. chain. The Figure shows a spectrum in the 3mm receiver baseband test signal at 100 GHz derived from a crystal oscillator. The 20 Hz sidebands from the maser autotuning are seen to be only about 10 dB down from the carrier. Following the experiment the test was repeated and the 20 Hz sidebands were seen to vanish when the maser autotuner was put on "hold". Further confirmation of the reality of the 20 Hz sidebands was obtained by the detection of 3mm fringes at frequencies + and -20 Hz. The level of spurious fringes was about a factor of 3 below the main fringe - i.e., about 10 dB down in amplitude squared. Aside from the 20 Hz sidebands (which cost approximately 20% loss in sensitivity) the mazer performed well (3mm fringes were obtained to Japan and other U.S. sites) and ran with frequency offset of about 6×10^{-13} relative to UT (as derived from GPS measurements at Quabbin and transferred to Kitt Peak via 3mm fringe rates).

Xtal Test Tone: maser ref. 5 MHz