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VLBA Test Memorandum 60: VLBA Fringe-Finder Survey

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ABSTRACT

Visibility plots are presented for eight strong continuum sources observed with the VLBA at frequencies ranging from 1.7 to 43.2 GHz. These plots will be useful to VLBI observers seeking fringe finders and/or bandpass calibrators.

1. Motivation

VLBI correlators can validate their setup parameters with a brief observation of a continuum source strong enough to produce fringes to all antennas. Such "fringe finders" can also serve as complex bandpass calibrators for either line or continuum programs. This memorandum reports initial results from a VLBA test program to assemble visibility plots on strong sources at frequencies above 1 GHz. VLBI observers seeking sources for fringe finding and/or bandpass calibration are encouraged to consult these plots.

2. Observations and Data Reduction

Two segments of VLBA observations were obtaind under test program code TF015. The observing strategy for each segment was to acquire two 44-minute sets of scans per source. The two sets were scheduled to optimize coverage in the (u,v) plane, by selecting times when the source was rising at MK and later setting at SC and HN. Each 44-minute set consisted of eight 5.5-minutes scans at the following frequencies: 43.2, 1.7, 2.3, 5.0, 8.4, 15.4, 22.2, and 43.2 GHz. Standard observing setups requesting mode 128-4-2 and dual circular polarizations were used. Correlation parameters were also standard except that RR, LL, RL, and LR correlations were obtained. Standard *a priori* flagging, amplitude calibration, and fringe fitting was performed in AIPS. No opacity corrections were attempted. Further manual editing, imaging, deconvolution,

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and self-calibration steps were performed with DIFMAP. Only RR data were adjusted and displayed with DIFMAP.

Segment TF015A was observed 1997 November 24 at 20 UT to November 25 at 12 UT. Seven strong sources were targeted: 0234+285, 3C84, DA193, 4C39.25, 3C345, 2007+777, and 3C454.3. DA193 was also used as the segment's amplitude check source. Compressor problems at MK led to high system temperatures at 1.7 GHz throughout. No tape was written at FD for the first two hours, so FD was absent from the first set of scans on 3C345 and 2007+777. Some visibility data corrupted by RFI at 2.3 GHz at KP, LA, and NL were manually edited. The weather was fine at all antennas except HN, which experienced snow and, consquently, high system temperatures. These problems led to weak or no fringes to HN at the highest frequencies. Weak fringes were found at 15.4 GHz for HN on 0234+285, 2007+777, and 3C345. DIFMAP was used to correct the HN gains by constructing a model of the source without HN and then using that model to self-calibrate the data with HN. This procedure was usually successful but the HN data remained noisy because of high system temperatures. No fringes were found to HN at 22.2 GHz on 0234+285, 3C84, 3C345, 2007+777, and 3C454.3. No fringes were found to HN on any source at 43.2 GHz.

Segment TF015B was observed 1998 April 26 at 20 UT to April 27 at 08 UT. Five strong sources were targeted. However, due to a (human) communication problem, observations ended prematurely at MK at 24 UT after only two sources, 0528+134 and DA193, were observed. MK's absence for the remaining three sources seriously compromised the survey goals, so correlation of the eight hours lacking MK was not requested. DA193 again served as an amplitude check source. The only stations reporting weather or equipment failures were PT (rain) and LA (rain, 43.2 GHz not working). DIFMAP was used to correct for gain loss due to rain, by constructing a model of the source without the affected stations and then using that model for the complete data set. Data acquired during the rainy periods remained noisy due to the high system temperatures. No system temperature data were logged for the first 5.5-minute scan at 1.7 GHz at MK, so visibility data on baselines to MK are absent for that scan.

3. Results

DIFMAP was used to generate the attached visibility plots of RR amplitudes in Janskys as a function of $\sqrt{u^2 + v^2}$ in millions of wavelengths. For each of the eight sources there are seven plots, corresponding to frequencies of 1.7, 2.3, 5.0, 8.4, 15.4, 22.2, and 43.2 GHz. VLBI observers seeking fringe finders and/or bandpass calibrators at these frequencies are encouraged to consult these plots, all of which can be accessed from the VLBA home page. Visibility plots for other strong sources will be posted on the web as this fringe-finder survey continues.

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0234+285 at 2.271 GHz 1997 Nov 25