VLBA TEST MEMO NO. 23

POINTING HISTORIES

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The tables that are part of this memo show the pointing histories of the VLBA sites, including the first pointing results from Fort Davis.

The Pie Town data show evidence for:

1. A change in the azimuth encoder offset of about 0.5' in Nov. 1989. Between Nov. 14 and 17, 1989, the NPL unit and the encoders were exchanged at Pie Town. It would seem that, despite the use of proceedures that should have returned the encoder to its previous setting, the encoder offset changed. This emphasizes the importance of checking the pointing whenever anything is done that might disturb the encoders.

2. Something strange is going on with the sag and the elevation collimation offset in the latest data. The measured values of the sag in the most recent data are smaller than in any other data on any of our telescopes. Recall that the sag and the colimation offset, one a constant and the other a sin wave of which we can see at most 1/4 cycle, are highly correlated in the pointing solution. However, there are clear slopes of the elevation offset with elevation in the data so the effect is real.

3. A change in tilt by about 0.2' over the last year.

During the 86 GHz observations at Pie Town, we were tracking Venus through sunset and watched the pointing change by over 0.5' in an hour or so. If something like this happened during a normal pointing run, it could affect the solutions significantly.

At Kitt Peak, the main result from the measurements is that the azimuth encoder offset changed by about a minute of arc between the September and October observations. Between Oct. 2 and Oct 13, 1989, a new cable wrap and cable wrap tower were installed around the encoder support tube. The encoder should not have been affected, but the data suggest that something happened. Again it is clear that, whenever anything is done in the vicinity of the encoders, the pointing should be checked.

At Los Alamos, the pointing seems to have been reasonably stable. However, it is clear that there are effects on time scales of hours. Figure 1 is the pointing data from a 24 hour observation in which 3C84 and 3C273 were tracked for nearly the whole time that they were visible, and DR21 was tracked for for the period when neither of the others was visible. The point-to-point scatter is very small, indicating the measurement errors. The offsets in the postfit residuals of up to 0.4' indicate the degree to which effects are occuring that cannot be described by our simple pointing equation.

Finally, Fort Davis has had it's first pointing observations. Table 4 gives the results at 6 cm and Figure 2 shows the data. The postfit plots show systematic effects that are not taken out by the pointing equation, especially in azimuth. More measurements will be made soon to determine if these effects are persistent.

Table 1
Pointing Solutions for Pie Town

Day	Year	Band	W Tilt (')	N Tilt (')	Az Col. (')	Az Enc	Sag (')	El Col. (')
Aug 31, Sep 1	1988	1cm	0.14	0.19	0.48	180d40'19"	-1.49	-0.17
Oct 18	1988	1cm	0.26	0.07	0.68	180d40'08"	-1.57	-0.35
Nov 7	1988	1cm	0.21	0.02	0.72	180d40'04"	-1.52	-0.45
Nov 29	1988	1cm	0.26	0.11	0.73	180d40'16"	-1.59	-0.32
Dec 7	1988	1cm	0.30	0.10	0.72	180d40'23"	-1.32	-0.68
Dec 16	1988	1cm	0.43	-0.05	0.49	180d40'17"	-1.55	-0.56
Mar 20	1989	1cm	0.31	-0.05	0.47	180d40'01"	-1.48	-0.59
Sep. 11-12	1989	6cm	0.38	-0.02	0.26	180d40'17"	-1.74	-1.24
Sep. 13-18	1989	1cm	0.31	-0.05	0.69	180d40'10"	-1.56	-0.99
Nov. 14	1989	4cm	0.35	-0.10	0.67	180d39'59"	-1.65	-0.66
Nov 29, Dec 7	1989	1cm	0.42	0.01	0.77	180d40'42"	-0.77	-1.53
Dec. 11	1989	4cm	0.49	-0.14	0.45	180d40'53"	-0.94	-1.15

Notes:
1. All solutions are based on enough data to be "reasonably" realiable.
2. The colimation offsets are expected to be different between bands.

Table 2
Pointing Solutions for Kitt Peak

Day	Year	Band	W Tilt (')	N Tilt (')	Az Col. (')	Az Enc	Sag (')	El Col. (')
Sep 11-12	1989	6cm	0.23	0.22	0.45	179d59'23"	-1.35	1.68
Sep 13-18	1989	1cm	0.24	0.08	0.55	179d59'29"	-1.11	1.92
Oct 30, Nov 19	1989	4cm	0.14	0.14	1.12	179d58'08"	-1.50	2.25
Nov 30 Dec 1,7	1989	1cm	0.33	0.10	0.96	179d58'23"	-1.23	2.01
Dec. 6	1989	6cm	0.08	0.15	0.84	179d58'20"	-1.40	1.65
Dec. 11	1989	4cm	0.31	-0.10	0.95	179d58'31"	-1.22	2.00

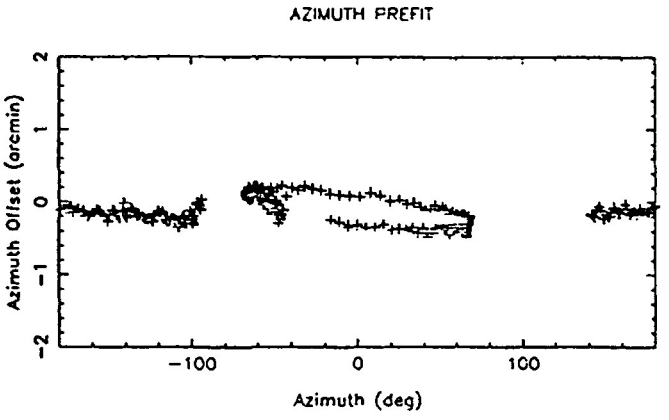
Table 3
Pointing Solutions for Los Alamos

Day	Year	Band	W Tilt (')	N Tilt (')	Az Col. (')	Az Enc	Sag (')	El Col. (')
Nov 7-8	1989	6cm	0.03	0.20	1.03	179d42'53"	-1.49	-3.96
Nov 14	1989	1cm	-0.10	0.03	0.54	179d42'50"	-1.64	-3.86
Nov 20	1989	1cm	0.12	0.12	0.35	179d42'54"	-1.83	-3.63
Dec 7 **	1989	1cm	-0.13	0.01	0.55	179d42'40"	-1.45	-3.83

** Very limited data but shows that significant changes have not happened.

Table 4
Pointing Solution for Fort Davis

Day	Year	Band	W Tilt (')	N Tilt (')	Az Col. (')	Az Enc	Sag (')	El Col. (')
Dec 20-21	1989	6cm	0.20	0.04	-1.88	179d54'37"	-1.42	-1.27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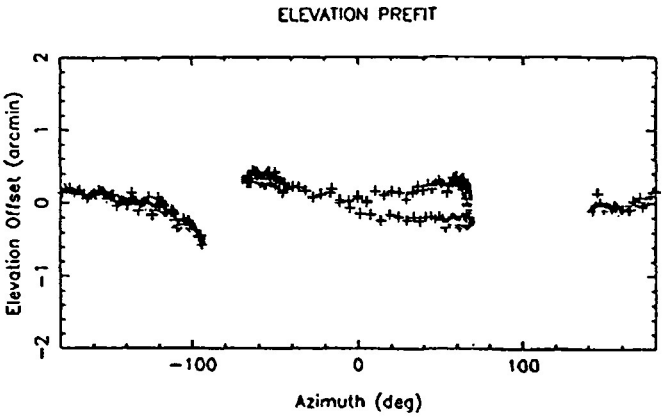
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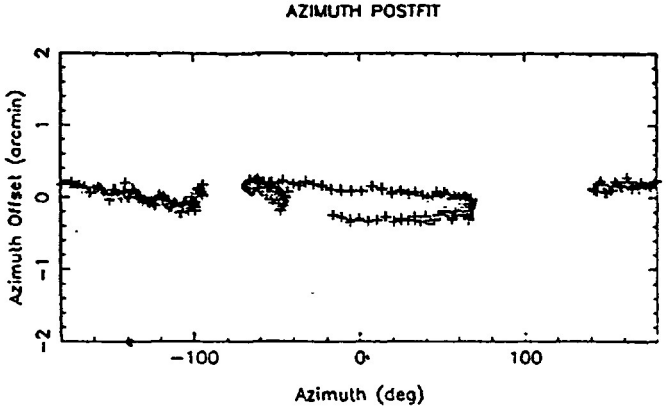
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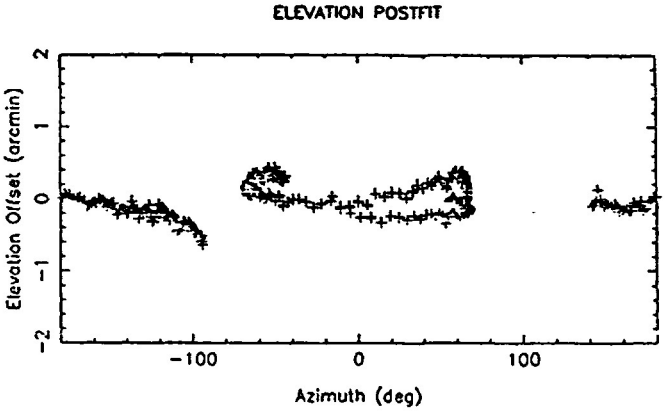
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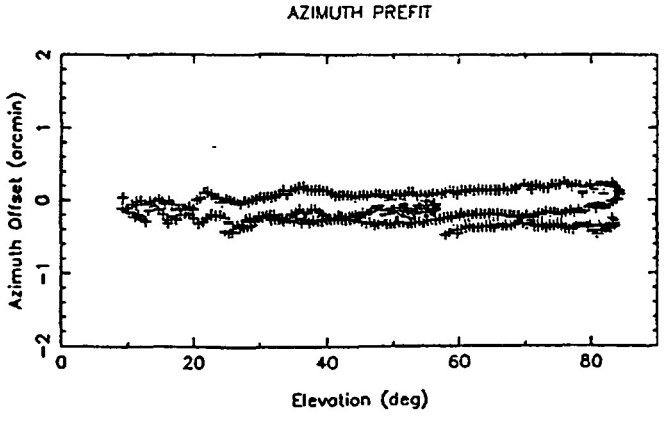
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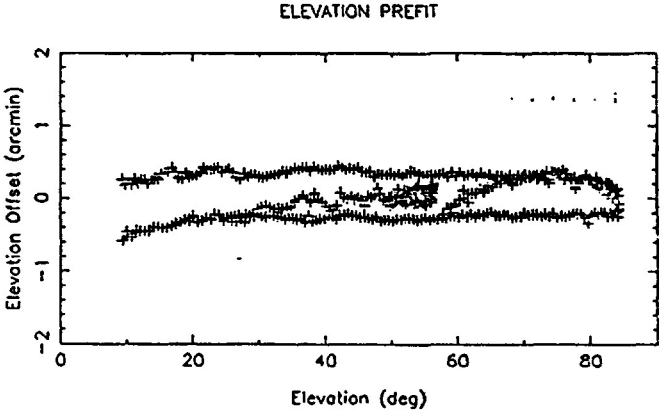
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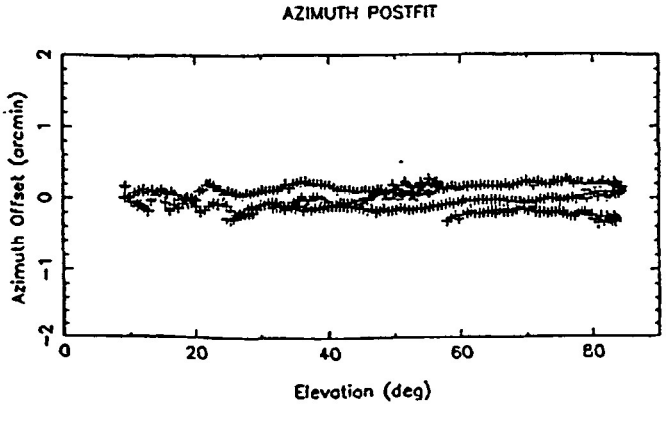
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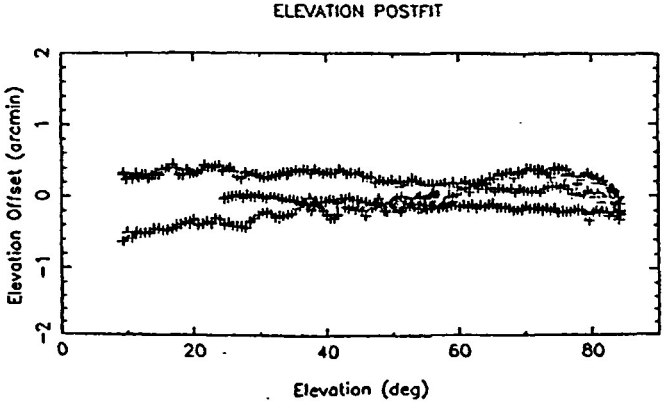
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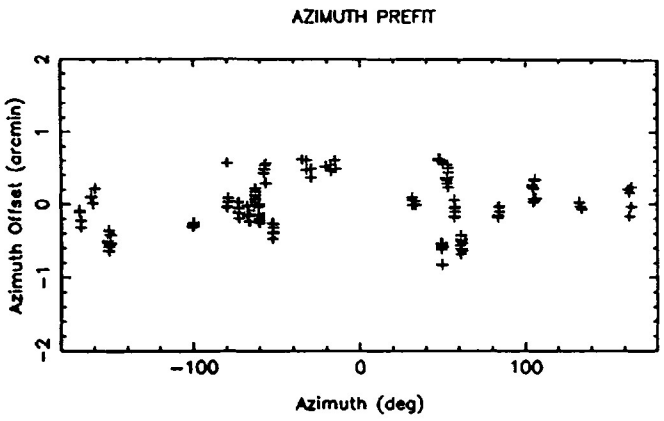
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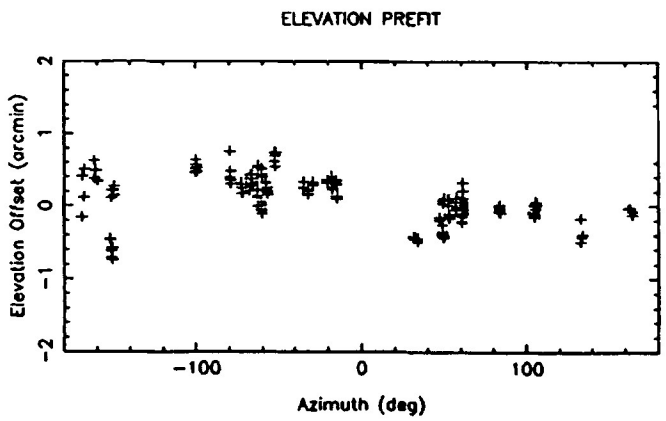
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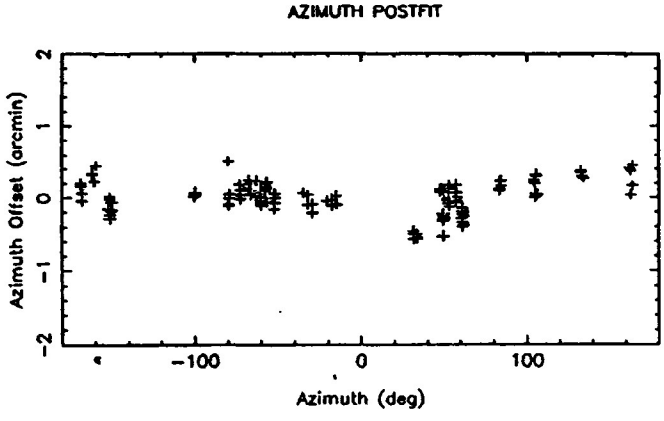
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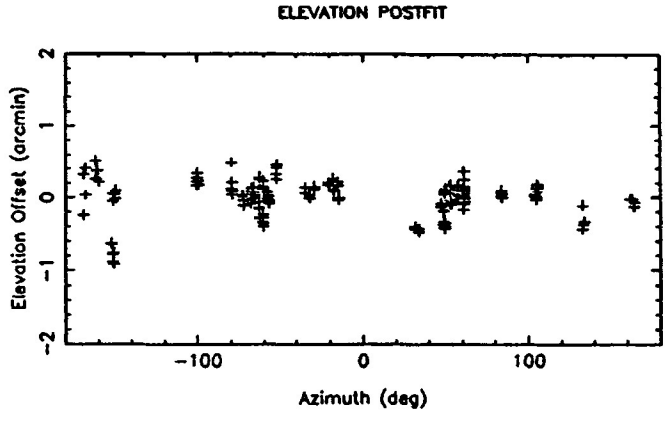
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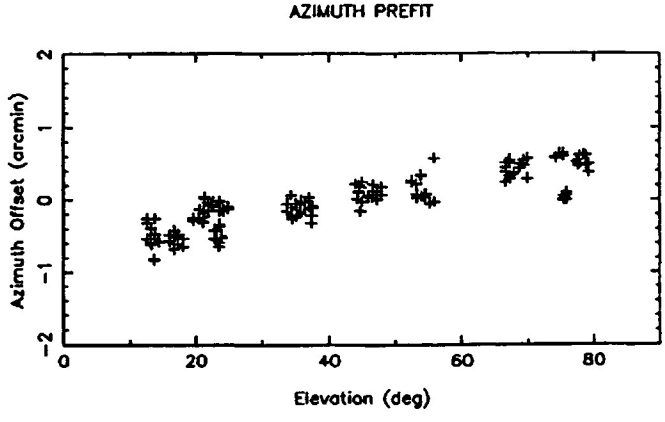
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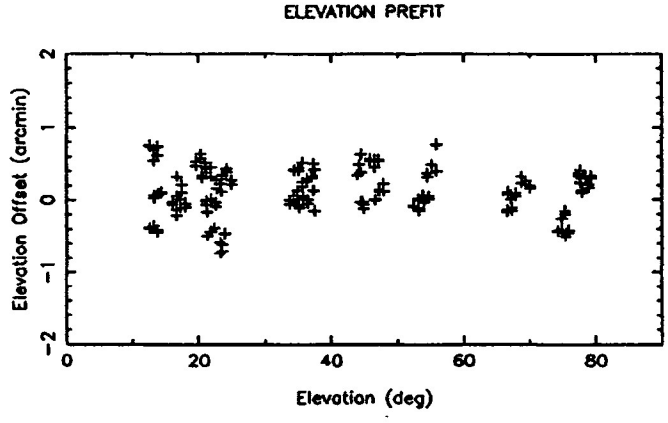
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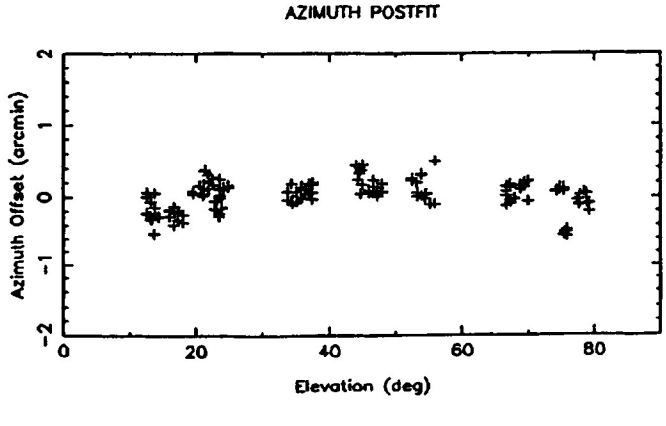
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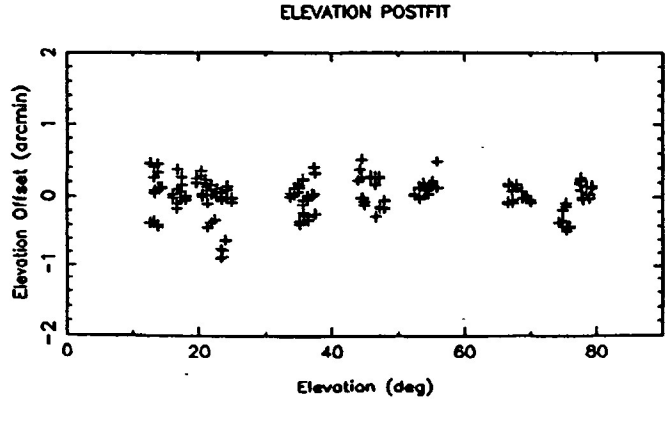
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