

25 METER MM-WAVE TELESCOPE MEMO #62

Telescope Measuring Tests -- Diary  
for Nov. 10 - Dec. 12, 1976

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1976

- Nov. 10 - Sample-Hold circuit incorporated into data recording system.
- Nov. 13 - Six test runs of electronics test with sample-hold. Not written onto computer--electrical noise.
- Nov. 14 - Fifteen test runs using the center wheel cart (CWC). All written into the 360. Runs 1-14 on disk. Of these, 1 through 3 have noise. The noise came from a fault in the towing mechanism. Runs 4-15 still appeared to have low-level noise or errors.
- Nov. 17-18 - A series of tests suggested an error in the digitizing system. Due either to a few millivolts of cross-talk or possibly a digitizing error.
- Shown as an occasional bit error of up to about 40 bits. (One bit = 0.015 microns.) The errors appeared to be usually positive, i.e., their mean value would not be zero.
- Nov. 19 - The electronics was returned to R. Weimer to search for the fault.
- Nov. 20 - Preliminary testing of the cart with a capacity depth transducer.
- Nov. 22 - Weimer found fault in A/D converter in electronics. J. Payne sent a replacement A/D converter by air from Tucson to Weimer (Payne to buy himself another on my electronics account.)
- Nov. 30 - New A/D installed and tested. Digital electronics now looks good.
- Between about 1500 EST on Saturday, Nov. 20 and 0900 on Nov. 30 the track of the measurement system had been scratched in a number of places. The damage has been shown to W. E. Howard, J. Ralston, and H. Hanes. It seems to have been done with some hard pointed instrument. I cannot estimate the effects of this on the measurements--it may not be serious--nor do I see yet how it might be repaired. I do not know who did it.

Dec. 1

- Four runs to test the digital electronics. A  $\pm 1.5$  volt cell was carried on the cart and its voltage encoded, written onto tape, then into the 360 and finally read by LOOKAT. The results (Run #176 of Dec. 2) are excellent. The recorded counts were:

Voltage Read by DVM at Interface Input	Counts Recorded*
-1.5243 volts	All -18272 except one of -18268
+1.5249 volts	All +18232
+1.5252 volts	All +18240 except about 50 of +18236

\* A one-bit change at the A/D writes as 4 bits, since we use a 14-bit A/D and write 16 bits on tape. Four bits on tape is equivalent to a probe movement of 0.06 microns.

Dec. 2

- A total of 11 runs were made (JWF/2) using the CWC. Of these only runs 1, 2, 4, 5, 7 and 11 had no record errors. (Errors arise when the cart moves too fast.)

The following table summarizes the results:

CWC Runs of Dec. 2, 1976

Run No.	Mean of Counts 1-125	Mean of All Counts	Y Value at X =	
			5171 mm	11299 mm
1	674.0	844.1	-0.910 mm	-4.639 mm
2	676.4	854.7	-0.901 mm	-4.615 mm
4	682.2	845.8	-0.865 mm	-4.395 mm
5	685.4	870.5	-0.917 mm	-4.799 mm
7	691.9	850.2	-0.751 mm	-3.849 mm
11	696.2	843.7	-0.857 mm	-3.782 mm

These suggest that there is still a difficulty with the center-wheel cart.

- Dec. 3 - The capacity depth sensor was tested.
- Dec. 4 - Six trial runs of the capacity sensor were made. The calibration and scale size were adjusted.
- Dec. 8 - Five runs of the capacity sensor were made (JWF/5). They are shorter than other runs, since the sensor will not work on the granite end slab. Four runs only were recorded on disk. The 12.7 mm capacity plate and guard ring were used. Although the results look consistent, the linearity was poor and the integrations were not made.
- Dec. 9 - The capacity sensor with a 25.4 mm plate was used for a total of 10 runs. The sensor was calibrated before and after the runs. A second order equation:

$$d = a_0 + a_1c + a_2c^2$$

relating sensor distance  $d$  to count  $c$  was fitted to the calibration. Nine of the 10 runs were written onto the 360 disk. (Tape JWF/4).

The following table summarizes the results.

Run No.	Mean of Counts 1-125	Mean of All Counts	Y Value at X =	
			5044 mm	10599 mm
1	12355	5705.8	-1.278 mm	-1.578 mm
2	12357	5694.3	-1.255 mm	-1.391 mm
3	12361	5743.7	-1.256 mm	-1.610 mm
4	12376	5746.5	-1.251 mm	-1.620 mm
5	12397	5745.9	-1.213 mm	-1.669 mm
6	12380	5731.5	-1.237 mm	-1.401 mm
7	12384	5734.2	-1.287 mm	-1.462 mm
8	12405	5772.9	-1.226 mm	-1.484 mm
9	12413	5774.4	-1.244 mm	-1.506 mm
Means and RMS			-1.256 ±0.018 mm	-1.525 ±0.094 mm

- Dec. 12 - Fourteen runs with the capacity sensor cart (JWF/3). Of these, 10 are useful as written onto the disk.