

VLA Test Memorandum 107

Observing Station Coordinates

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Table 1 lists the ground and geodetic coordinates for each observing station (see VLA Test Memorandum 102), together with the elevations above mean sea level (in meters) for a reference point approximately 6½ feet below the tops of the mounting piers.

Using these data, I have calculated the positions of the stations in a cartesian frame based on a point near the array center, as described in Section IV of VLA Test Memorandum 103. The sign of the y-axis has been reversed from the usage in Memorandum 103, in order to adhere to the convention now in use for the VLA. The rectangular coordinates are the components  $L_x$ ,  $L_y$ ,  $L_z$  of the vector  $\vec{L}$  from the origin to the observing station. They are tabulated in meters in Table 1, and in nanoseconds in Table 2. The conversion from meters to nanoseconds assumes that the speed of light is 0.2997925 meters/nanosecond.

Nominally, the array arms radiate from the center on geodetic azimuths of exactly 115° (southeast arm), 236° (southwest arm), and 355° (north arm). The actually surveyed azimuths, however, are respectively 114°59'42", 236°00'03", and 354°59'42".

The baseline vector joining two stations is  $\vec{B} = \vec{L}_2 - \vec{L}_1$ . The convention which probably will be used to fix the sense of the vector is that it runs from the lower-numbered antenna to the higher-numbered one (the antennas are numbered in order of construction). This applies without regard to which antenna is nearer to the center of the array. Thus, if Antenna 1 is at CW9 and Antenna 2 is at CW5, one has from Tables 1 and 2:

$$\begin{aligned} B_x &= -387.744 \text{ meters} = -1293.38 \text{ nanoseconds} \\ B_y &= 1024.873 \text{ " } = 3418.61 \text{ " } \\ B_z &= 572.222 \text{ " } = 1909.03 \text{ " } \end{aligned}$$

Baselines computed in this way are, of course, only initial estimates. Accurate values will be obtained from observations of radio sources.

Table 1

Station	X	Y	Latitude(N)	Longitude(W)	h(m)	L <sub>x</sub> (m)	L <sub>y</sub> (m)	L <sub>z</sub> (m)
DN1	565519.32	1120552.60	34° 04' 43"497	107° 37' 03"819	2123.639	0.705	0.000	0.478
DN2	565503.24	1120731.87	04 45.271	37 04.006	2123.505	-30.044	-4.792	45.691
DN3	565491.51	1120862.58	04 46.563	37 04.142	2123.426	-52.420	-8.282	78.632
DN4	565479.79	1120993.29	04 47.856	37 04.278	2123.347	-74.823	-11.772	111.595
DN5	565462.21	1121189.22	04 49.794	37 04.482	2123.225	-108.394	-17.007	161.002
DN6	565441.24	1121423.05	04 52.107	37 04.726	2123.081	-148.463	-23.257	219.971
DN7	565417.60	1121686.63	04 54.714	37 05.000	2122.920	-193.622	-30.293	286.434
DN8	565391.41	1121978.63	04 57.602	37 05.303	2122.743	-243.655	-38.057	360.058
DN9	565362.75	1122298.05	05 00.762	37 05.637	2122.548	-298.398	-46.624	440.618
CN5	565331.73	1122643.90	05 04.183	37 05.996	2122.335	-357.664	-55.828	527.831
CN6	565262.82	1123412.08	05 11.781	37 06.796	2121.865	-489.300	-76.341	721.525
CN7	565185.15	1124277.90	05 20.345	37 07.698	2121.542	-637.510	-99.474	939.954
CN8	565099.11	1125237.13	05 29.833	37 08.697	2121.542	-801.430	-125.089	1182.141
CN9	565004.99	1126286.37	05 40.211	37 09.789	2121.551	-980.724	-153.083	1447.047
BN5	564903.07	1127422.56	05 51.448	37 10.972	2122.182	-1174.361	-183.410	1734.216
BN6	564676.72	1129945.96	06 16.407	37 13.601	2123.432	-1604.647	-250.804	2371.937
BN7	564421.59	1132790.14	06 44.539	37 16.563	2122.609	-2091.568	-326.720	3089.421
BN8	564138.93	1135941.30	07 15.707	37 19.846	2124.102	-2629.167	-410.842	3885.604
BN9	563829.75	1139387.99	07 49.798	37 23.438	2125.419	-3217.584	-502.867	4756.186
AN5	563494.94	1143120.41	08 26.714	37 27.328	2127.044	-3854.758	-602.506	5698.919
AN6	562751.37	1151409.77	09 48.704	37 35.972	2129.750	-5271.292	-823.818	7791.797
AN7	561913.26	1160752.97	11 21.115	37 45.720	2130.275	-6870.961	-1073.257	10148.604
AN8	560984.71	1171104.55	13 03.500	37 56.525	2133.655	-8642.229	-1349.565	12760.531
AN9	559969.07	1182426.87	14 55.485	38 08.354	2141.494	-10577.667	-1651.843	15618.699

Table 1 (continued)

Station	X	Y	Latitude(N)	Longitude(W)	h(m)	L <sub>x</sub> (m)	L <sub>y</sub> (m)	L <sub>z</sub> (m)
DE1	565531.04	1120421.92	34° 04' 42"205	107° 37' 03"683	2123.645	23.026	3.490	-32.501
DE2	565652.82	1120490.70	04 42.882	37 02.235	2123.645	11.332	40.625	-15.220
DE3	565787.00	1120428.49	04 42.264	37 00.642	2123.645	22.006	81.483	-30.996
DE4	565957.85	1120349.28	04 41.477	36 58.613	2123.645	35.601	133.521	-51.086
DE5	566162.46	1120254.42	04 40.536	36 56.184	2123.645	51.848	195.817	-75.111
DE6	566398.67	1120144.91	04 39.447	36 53.380	2123.633	70.643	267.735	-102.918
DE7	566664.95	1120021.45	04 38.221	36 50.218	2123.252	91.491	348.840	-134.434
DE8	566959.94	1119884.68	04 36.862	36 46.716	2122.600	114.418	438.654	-169.494
DE9	567282.59	1119735.08	04 35.376	36 42.886	2122.054	139.617	536.889	-207.738
CE5	567632.01	1119573.08	04 33.766	36 38.738	2121.999	167.364	643.278	-248.873
CE6	568408.01	1119213.30	04 30.191	36 29.526	2122.469	229.458	879.561	-339.877
CE7	569282.64	1118807.79	04 26.162	36 19.142	2122.393	298.924	1145.914	-442.784
CE8	570251.70	1118358.49	04 21.697	36 07.639	2123.612	376.967	1440.976	-556.094
CE9	571311.65	1117867.06	04 16.814	35 55.056	2127.065	464.047	1763.741	-678.832
BE5	572459.45	1117334.90	04 11.525	35 41.432	2132.862	560.041	2113.235	-810.622
BE6	575008.63	1116153.01	03 59.777	35 11.174	2136.029	765.146	2889.467	-1108.804
BE7	577881.87	1114820.87	03 46.534	34 37.074	2142.436	998.543	3764.333	-1443.353
BE8	581065.22	1113344.95	03 31.857	33 59.296	2144.823	1253.107	4733.650	-1816.791
BE9	584547.09	1111730.63	03 15.801	33 17.979	2151.080	1534.374	5793.878	-2223.298
AE5	588317.67	1109982.45	02 58.410	32 33.242	2155.390	1836.719	6942.000	-2665.003
AE6	596691.70	1106099.94	02 19.769	30 53.903	2150.638	2495.587	9491.848	-3654.547
AE7	606130.29	1101723.86	01 36.188	29 01.965	2151.123	3241.849	12365.873	-4767.468
AE8	616587.62	1096875.47	34 00 47.872	26 57.984	2140.604	4057.921	15550.028	-6007.680
AE9	628214.54	1091980.38	33 59 59.011	24 40.159	2103.998	4858.292	19090.507	-7276.588

Table 1 (continued)

Station	X	Y	Latitude(N)	Longitude(W)	h(m)	L <sub>x</sub> (m)	L <sub>y</sub> (m)	L <sub>z</sub> (m)
DW1	565542.75	1120291.19	34° 04' 40" 912	107° 37' 03" 548	2123.645	45.355	6.953	-65.513
DW2	565397.51	1120470.06	04 42.684	37 05.269	2123.691	14.790	-37.191	-20.249
DW3	565275.07	1120387.10	04 41.866	37 06.726	2123.734	28.954	-74.557	-41.107
DW4	565119.16	1120281.47	04 40.824	37 08.582	2123.792	46.997	-122.163	-67.675
DW5	564932.45	1120154.96	04 39.577	37 10.804	2123.862	68.592	-179.151	-99.471
DW6	564716.91	1120008.91	04 38.137	37 13.369	2123.941	93.521	-244.938	-136.191
DW7	564473.93	1119844.28	04 36.514	37 16.260	2124.029	121.619	-319.083	-177.576
DW8	564204.74	1119661.89	04 34.716	37 19.464	2124.130	152.749	-401.261	-223.422
DW9	563910.31	1119462.39	04 32.479	37 22.967	2124.267	186.825	-491.114	-273.564
CW5	563591.47	1119246.36	04 30.619	37 26.762	2124.743	223.994	-588.456	-327.676
CW6	562883.35	1118766.57	04 25.889	37 35.188	2125.349	306.148	-804.577	-448.099
CW7	562085.24	1118225.80	04 20.557	37 44.685	2125.395	398.221	-1048.186	-584.204
CW8	561200.96	1117626.64	04 14.650	37 55.208	2124.986	499.817	-1318.114	-735.248
CW9	560233.73	1116971.29	04 08.187	38 06.716	2125.471	611.738	-1613.329	-899.989
BW5	559186.35	1116261.63	04 01.189	38 19.178	2126.580	733.381	-1933.031	-1078.043
BW6	556860.18	1114685.51	03 45.645	38 46.852	2131.381	1005.404	-2643.028	-1472.248
BW7	554238.31	1112909.03	03 28.124	39 18.041	2142.305	1316.456	-3443.297	-1913.528
BW8	551333.45	1110940.82	03 08.708	39 52.593	2129.183	1640.057	-4329.952	-2416.689
BW9	548156.20	1108788.04	02 47.468	40 30.380	2122.432	2000.136	-5299.751	-2962.901
AW5	544715.48	1106456.74	02 24.465	41 11.293	2121.420	2395.061	-6349.931	-3550.960
AW6	537074.06	1101279.22	01 33.362	42 42.136	2123.852	3275.305	-8682.311	-4854.921
AW7	528461.19	1095443.50	34 00 35.740	44 24.492	2118.202	4259.272	-11311.215	-6330.174
AW8	518918.73	1088977.90	33 59 31.871	46 17.850	2113.806	5349.454	-14223.831	-7964.638
AW9	508481.42	1081905.99	58 21.978	48 21.785	2104.970	6536.710	-17409.582	-9755.890

Table 2  
Coordinates in Nanoseconds

Station	$L_x$	$L_y$	$L_z$
DN1	2.35	0.00	1.59
DN2	-100.22	-15.98	152.41
DN3	-174.85	-27.63	262.29
DN4	-249.58	-39.27	372.24
DN5	-361.56	-56.73	537.04
DN6	-495.22	-77.58	733.74
DN7	-645.85	-101.05	955.44
DN8	-812.75	-126.94	1201.02
DN9	-955.35	-155.52	1469.74
CN5	-1193.04	-186.22	1760.65
CN6	-1632.13	-254.65	2406.75
CN7	-2126.50	-331.81	3135.35
CN8	-2673.28	-417.25	3943.20
CN9	-3271.34	-510.63	4826.83
BN5	-3917.25	-611.79	5784.72
BN6	-5352.53	-836.59	7911.93
BN7	-6976.72	-1089.82	10305.20
BN8	-8769.96	-1370.42	12960.98
BN9	-10732.70	-1677.38	15864.93
AN5	-12858.09	-2009.74	19009.54
AN6	-17583.14	-2747.96	25990.63
AN7	-22919.06	-3580.00	33852.09
AN8	-28827.37	-4501.66	42564.54
AN9	-35283.29	-5509.95	52098.36
DE1	76.81	11.64	-108.41
DE2	37.80	135.51	-50.77
DE3	73.40	271.80	-103.39
DE4	118.75	445.38	-170.40
DE5	172.95	653.18	-250.54
DE6	235.64	893.07	-343.30
DE7	305.18	1163.60	-448.42
DE8	381.66	1463.19	-565.37
DE9	465.71	1790.87	-692.94
CE5	558.27	2145.74	-830.15
CE6	765.39	2933.90	-1133.71
CE7	997.10	3822.36	-1476.97

Table 2 (continued)

Station	$L_x$	$L_y$	$L_z$
CE8	1257.43	4806.58	-1854.93
CE9	1547.89	5883.21	-2264.34
BE5	1868.10	7048.99	-2703.94
BE6	2552.25	9638.22	-3698.57
BE7	3330.78	12556.46	-4814.51
BE8	4179.91	15789.75	-6060.16
BE9	5118.12	19326.29	-7416.12
AE5	6126.63	23156.02	-8889.49
AE6	8324.38	31661.39	-12190.25
AE7	10813.64	41248.11	-15902.56
AE8	13535.77	51869.30	-20039.46
AE9	16205.52	63679.07	-24272.08
DW1	151.29	23.19	-218.53
DW2	49.33	-124.06	-67.54
DW3	96.58	-248.70	-137.12
DW4	156.77	-407.49	-225.74
DW5	228.80	-597.58	-331.80
DW6	311.95	-817.03	-454.28
DW7	405.68	-1064.35	-592.33
DW8	509.52	-1338.46	-745.26
DW9	623.18	-1638.18	-912.51
CW5	747.16	-1962.88	-1093.01
CW6	1021.20	-2683.78	-1494.70
CW7	1328.32	-3496.37	-1948.69
CW8	1667.21	-4396.75	-2452.52
CW9	2040.54	-5381.49	-3002.04
BW5	2446.30	-6447.90	-3595.96
BW6	3353.67	-8816.19	-4910.89
BW7	4391.22	-11485.60	-6382.84
BW8	5470.64	-14443.16	-8061.21
BW9	6671.73	-17678.06	-9883.17
AW5	7989.06	-21181.09	-11844.73
AW6	10925.24	-28961.07	-16194.27
AW7	14207.40	-37730.15	-21115.18
AW8	17843.86	-47445.59	-26567.17
AW9	21804.11	-58072.11	-32542.14