

NATIONAL RADIO ASTRONOMY OBSERVATORY
SOCORRO, NEW MEXICO
VERY LARGE ARRAY PROJECT

VLA Scientific Memorandum No. 126

THE DISTRIBUTION OF (U,V) POINTS AND THE
RECORDING OF DATA FOR AN OPTICAL PROCESSOR

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April 1977

The data recording system for an optical processor, as described in The VLA Spectral Line System: A Progress Report, requires data in a time-baseline (t-B) format for which it generates (u-v) ellipses for the deflection system. A time-consuming part of this approach is the initial sorting of the data from the baseline-time (B-t) format produced by the telescope to the (t-B) format.

Deflection systems for laser and electron-beam recording systems can write data along straight lines as well as along ellipses. Data in (B-t) format can be written along straight lines without the intermediate processing required for data in (t-B) format. For example, Figure 1 shows the (u,v) samples at some time t for a configuration with four antennas equally spaced along each of three arms (A,B,C) with no antenna at the center; the dots mark the sampled points. The six samples between the telescopes along arm A and their reflections through the origin (some redundant in this case), denoted collectively by AA, lie along the heavy line A. The sixteen samples and reflections (AB) between telescopes on arm A and those on B, lie between lines A and B. All samples involving telescopes on arm A lie along lines parallel to line A. Similar statements are true for telescopes on arms B and C.

The implication of this distribution for an optical processor is that the data can be recorded directly from the (B-t) format without sorting the data or generating ellipses. The data involving telescope pairs AA, AB, and AC can be recorded for each t along 37 parallel lines; those involving BB and BC, along 19 parallel lines; and those involving CC, along one straight line. Considerable savings in time are available with the elimination of the sort step and ellipse generation.

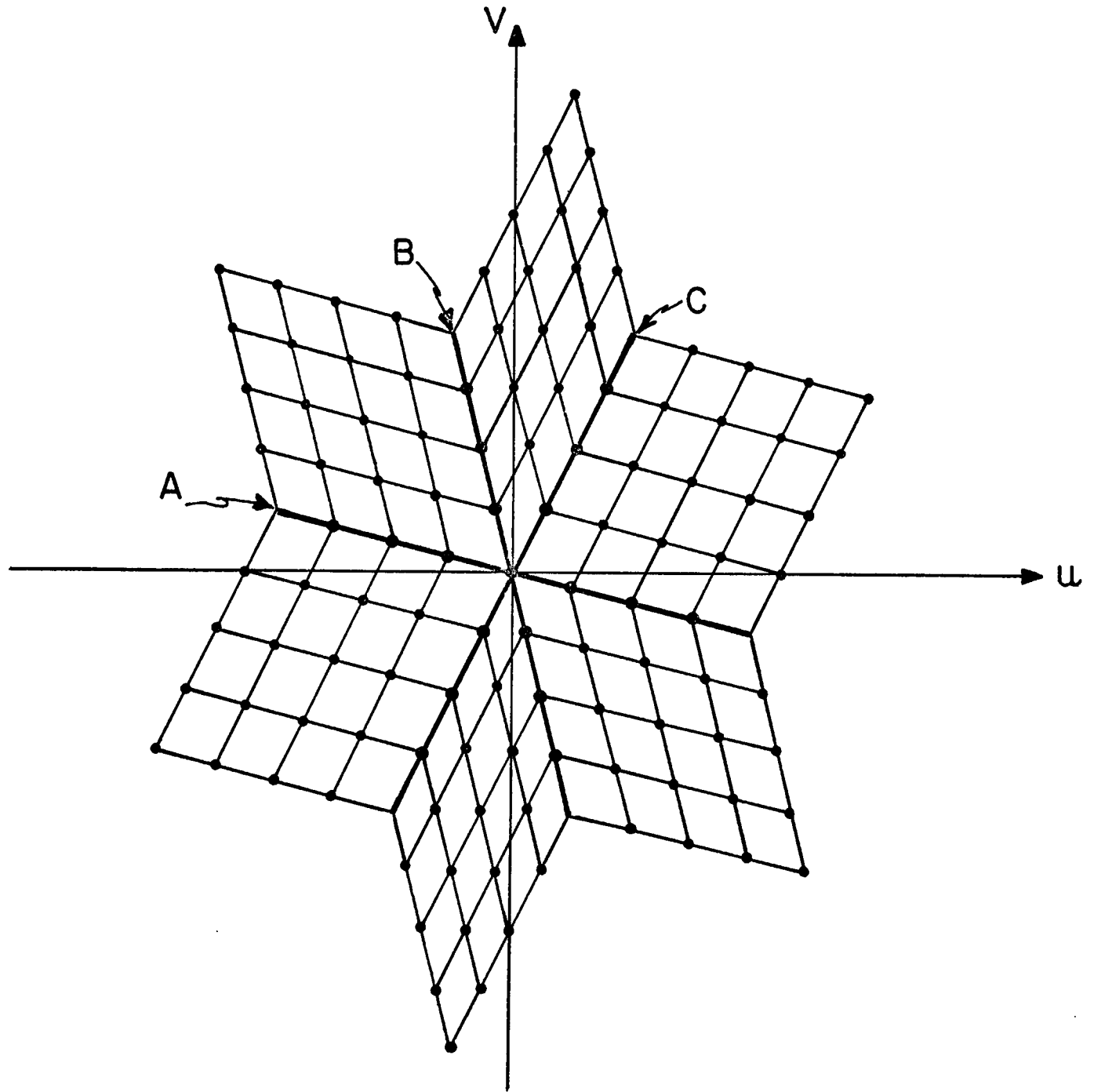


FIG. 1

6 cm Wavelength

All six antennas are operable at 6 cm and all have the new design 6 cm feed.

2 and 1.3 cm Wavelength

All antennas have feeds at these bands, but operation is limited by the performance of the module which provides the first local oscillator for both bands. This module is unreliable, and a design modification study has recently been started to rectify this problem. Performance on these bands will remain uncertain for several months.

A study to investigate whether feeds with corrugated inner surfaces would give better polarization characteristics on these bands is also still in progress.

3.0 ANTENNA STATIONS

The availability of antenna stations for observing is limited by the waveguide which is generally not installed until after the track and foundations are in. At the present time waveguide has been laid along the west arm out to station BW8. Most stations out to this point are currently available, but a few require the installation of a waveguide coupler and the short length of waveguide from the coupler manhole to the base of the antenna.

Track and foundations have been completed out to AW6 on the west arm and to CE9 and CN9 on the east and north arms. An extension of the 1976 contract should complete the rail and foundations on the west arm to AW8 by about September 1977. Laying of waveguide out to AW8 will follow and should be completed by late fall of 1977, providing a baseline of 17 km.

Attached is a list of the distances of antenna stations from the center of the wye and plans showing their positions.

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AVAILABILITY FOR OBSERVATIONS OF ANTENNAS,
FREQUENCY BANDS AND ANTENNA STATIONS

A. R. Thompson

February 1977

1.0 NUMBER OF ANTENNAS

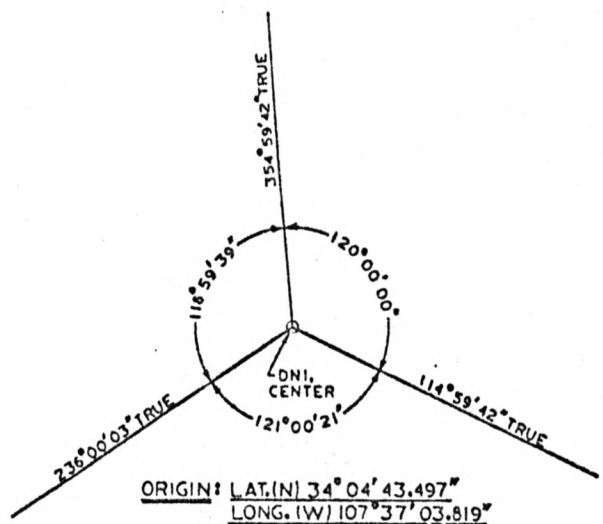
Six antennas are now operational, i.e. they have been outfitted to work in the array on at least the 6 cm band. During 1977 four more antennas will be put into operation, starting with No. 7 in late February.

Not all antennas will be available for astronomical observations. Two antennas (serial numbers 3 and 5) were withdrawn from the observing array on January 24 for installation of some improved electronic modules. These two antennas will remain as an electronics test array and one more antenna will be added to them during the year. The number of antennas available for astronomical programs during 1977 will, therefore, vary from four to seven. The electronics on these antennas will remain unmodified until near the end of 1977.

2.0 FREQUENCY BANDS

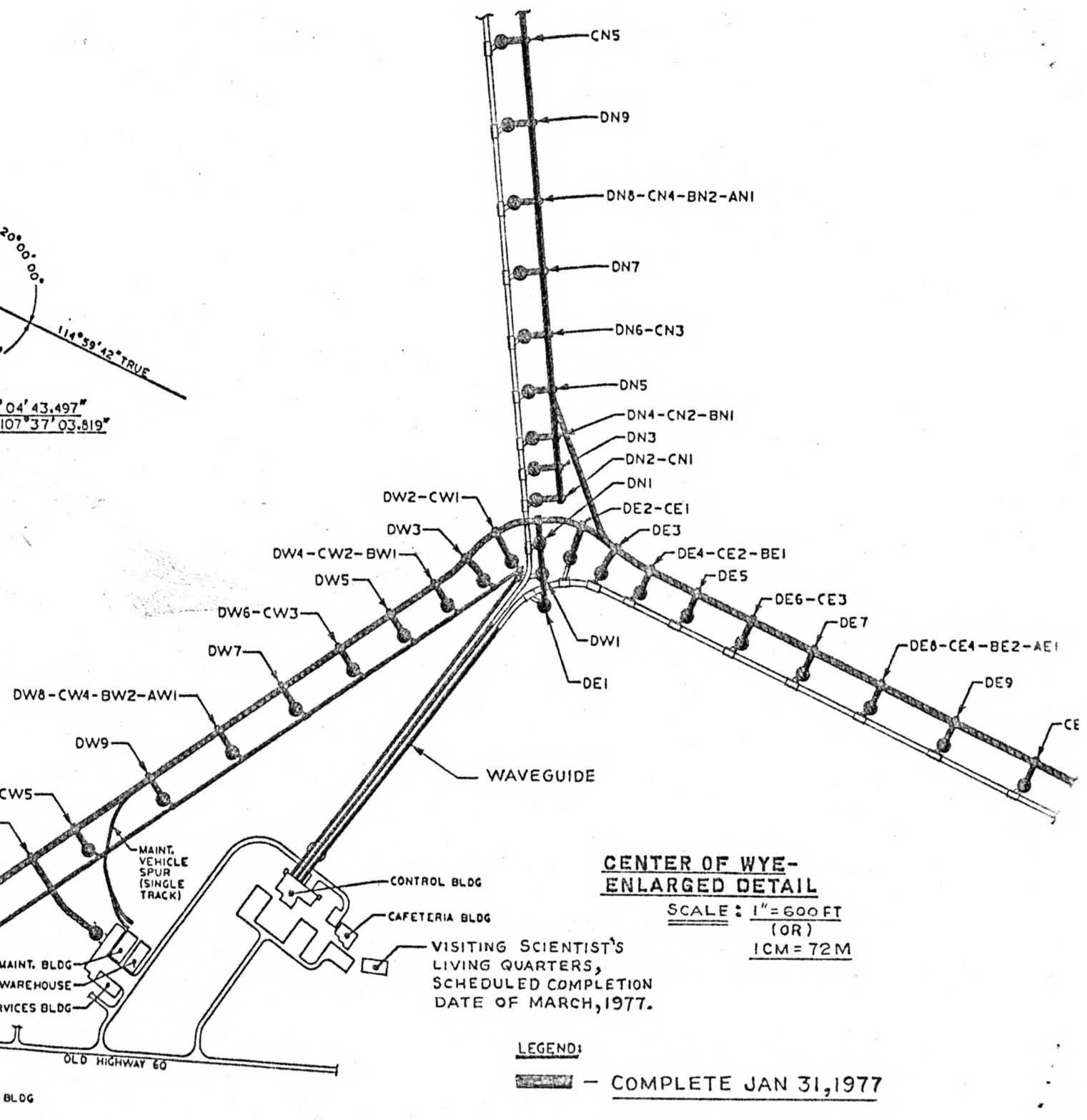
18-21 cm Wavelength

Operation is presently limited by the availability of feeds. Antenna No. 1 has the prototype feed and No. 2 has the new design. No other antennas have 18-21 cm feeds. Delivery of four more feeds is scheduled for early February, and procurement of others is in progress, so all antennas should be outfitted by about May.



ORIGIN: LAT.(N) 34° 04' 43.497"
 LONG. (W) 107° 37' 03.819"

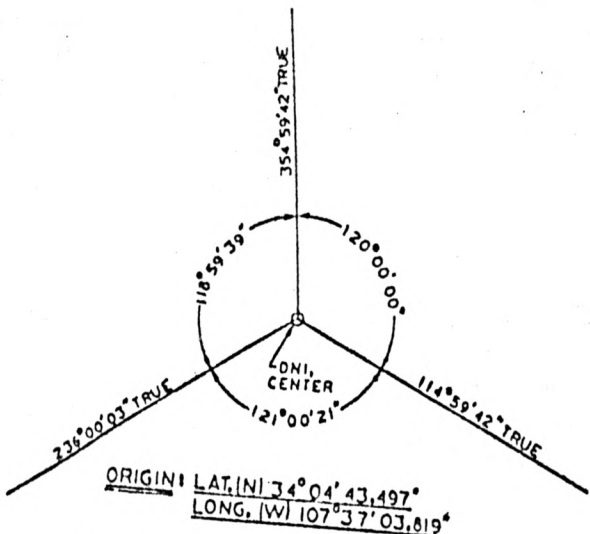
STATION	DISTANCE (FT)	STATION	DISTANCE (FT)	STATION	DISTANCE (FT)
DN1	0.00	DN1	0.00	DN1	0.00
DN2	10.00	DN2	10.00	DN2	10.00
DN3	20.00	DN3	20.00	DN3	20.00
DN4	30.00	DN4	30.00	DN4	30.00
DN5	40.00	DN5	40.00	DN5	40.00
DN6	50.00	DN6	50.00	DN6	50.00
DN7	60.00	DN7	60.00	DN7	60.00
DN8	70.00	DN8	70.00	DN8	70.00
DN9	80.00	DN9	80.00	DN9	80.00
DN10	90.00	DN10	90.00	DN10	90.00
DN11	100.00	DN11	100.00	DN11	100.00
DN12	110.00	DN12	110.00	DN12	110.00
DN13	120.00	DN13	120.00	DN13	120.00
DN14	130.00	DN14	130.00	DN14	130.00
DN15	140.00	DN15	140.00	DN15	140.00
DN16	150.00	DN16	150.00	DN16	150.00
DN17	160.00	DN17	160.00	DN17	160.00
DN18	170.00	DN18	170.00	DN18	170.00
DN19	180.00	DN19	180.00	DN19	180.00
DN20	190.00	DN20	190.00	DN20	190.00
DN21	200.00	DN21	200.00	DN21	200.00
DN22	210.00	DN22	210.00	DN22	210.00
DN23	220.00	DN23	220.00	DN23	220.00
DN24	230.00	DN24	230.00	DN24	230.00
DN25	240.00	DN25	240.00	DN25	240.00
DN26	250.00	DN26	250.00	DN26	250.00
DN27	260.00	DN27	260.00	DN27	260.00
DN28	270.00	DN28	270.00	DN28	270.00
DN29	280.00	DN29	280.00	DN29	280.00
DN30	290.00	DN30	290.00	DN30	290.00
DN31	300.00	DN31	300.00	DN31	300.00
DN32	310.00	DN32	310.00	DN32	310.00
DN33	320.00	DN33	320.00	DN33	320.00
DN34	330.00	DN34	330.00	DN34	330.00
DN35	340.00	DN35	340.00	DN35	340.00
DN36	350.00	DN36	350.00	DN36	350.00
DN37	360.00	DN37	360.00	DN37	360.00
DN38	370.00	DN38	370.00	DN38	370.00
DN39	380.00	DN39	380.00	DN39	380.00
DN40	390.00	DN40	390.00	DN40	390.00
DN41	400.00	DN41	400.00	DN41	400.00
DN42	410.00	DN42	410.00	DN42	410.00
DN43	420.00	DN43	420.00	DN43	420.00
DN44	430.00	DN44	430.00	DN44	430.00
DN45	440.00	DN45	440.00	DN45	440.00
DN46	450.00	DN46	450.00	DN46	450.00
DN47	460.00	DN47	460.00	DN47	460.00
DN48	470.00	DN48	470.00	DN48	470.00
DN49	480.00	DN49	480.00	DN49	480.00
DN50	490.00	DN50	490.00	DN50	490.00
DN51	500.00	DN51	500.00	DN51	500.00
DN52	510.00	DN52	510.00	DN52	510.00
DN53	520.00	DN53	520.00	DN53	520.00
DN54	530.00	DN54	530.00	DN54	530.00
DN55	540.00	DN55	540.00	DN55	540.00
DN56	550.00	DN56	550.00	DN56	550.00
DN57	560.00	DN57	560.00	DN57	560.00
DN58	570.00	DN58	570.00	DN58	570.00
DN59	580.00	DN59	580.00	DN59	580.00
DN60	590.00	DN60	590.00	DN60	590.00
DN61	600.00	DN61	600.00	DN61	600.00
DN62	610.00	DN62	610.00	DN62	610.00
DN63	620.00	DN63	620.00	DN63	620.00
DN64	630.00	DN64	630.00	DN64	630.00
DN65	640.00	DN65	640.00	DN65	640.00
DN66	650.00	DN66	650.00	DN66	650.00
DN67	660.00	DN67	660.00	DN67	660.00
DN68	670.00	DN68	670.00	DN68	670.00
DN69	680.00	DN69	680.00	DN69	680.00
DN70	690.00	DN70	690.00	DN70	690.00
DN71	700.00	DN71	700.00	DN71	700.00
DN72	710.00	DN72	710.00	DN72	710.00
DN73	720.00	DN73	720.00	DN73	720.00
DN74	730.00	DN74	730.00	DN74	730.00
DN75	740.00	DN75	740.00	DN75	740.00
DN76	750.00	DN76	750.00	DN76	750.00
DN77	760.00	DN77	760.00	DN77	760.00
DN78	770.00	DN78	770.00	DN78	770.00
DN79	780.00	DN79	780.00	DN79	780.00
DN80	790.00	DN80	790.00	DN80	790.00
DN81	800.00	DN81	800.00	DN81	800.00
DN82	810.00	DN82	810.00	DN82	810.00
DN83	820.00	DN83	820.00	DN83	820.00
DN84	830.00	DN84	830.00	DN84	830.00
DN85	840.00	DN85	840.00	DN85	840.00
DN86	850.00	DN86	850.00	DN86	850.00
DN87	860.00	DN87	860.00	DN87	860.00
DN88	870.00	DN88	870.00	DN88	870.00
DN89	880.00	DN89	880.00	DN89	880.00
DN90	890.00	DN90	890.00	DN90	890.00
DN91	900.00	DN91	900.00	DN91	900.00
DN92	910.00	DN92	910.00	DN92	910.00
DN93	920.00	DN93	920.00	DN93	920.00
DN94	930.00	DN94	930.00	DN94	930.00
DN95	940.00	DN95	940.00	DN95	940.00
DN96	950.00	DN96	950.00	DN96	950.00
DN97	960.00	DN97	960.00	DN97	960.00
DN98	970.00	DN98	970.00	DN98	970.00
DN99	980.00	DN99	980.00	DN99	980.00
DN100	990.00	DN100	990.00	DN100	990.00



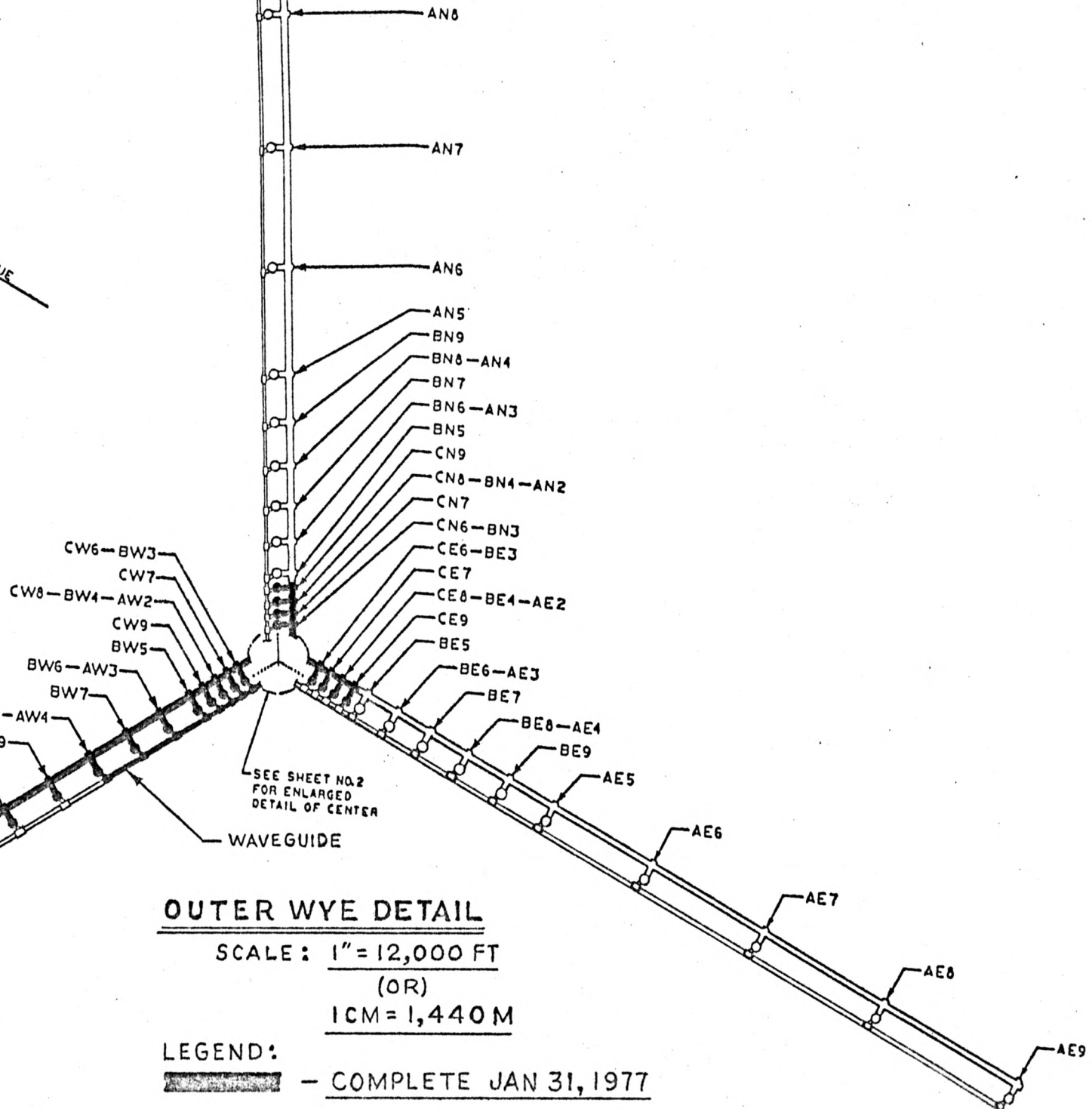
**CENTER OF WYE-
 ENLARGED DETAIL**
 SCALE: 1" = 600 FT
 (OR)
 1CM = 72M

LEGEND:
 [Symbol] - COMPLETE JAN 31, 1977

STATION	DISTANCE (M)	STATION	DISTANCE (M)	STATION	DISTANCE (M)
DW1	-40.00	DE1	-80.00	DN1	0.00
DW2-CW1	44.85	DE2-CE1	44.85	DN2-CN1	54.86
DW3	89.93	DE3	89.93	DN3	94.86
DW4-CW2-BW1	147.33	DE4-CE2-BE1	147.33	DN4-CN2-BN1	134.86
DW5	216.07	DE5	216.07	DN5	194.82
DW6-CW3	295.43	DE6-CE3	295.43	DN6-CN3	266.38
DW7	384.89	DE7	384.89	DN7	347.04
DW8-CW4-BW2-AW1	484.00	DE8-CE4-BE2-AE1	484.00	DN8-CN4-BN2-AN1	436.40
DW9	592.40	DE9	592.40	DN9	534.15
CW5	709.79	CE5	709.79	CN5	639.99
CW6-BW3	970.50	CE6-BE3	970.50	CN6-BN3	875.07
CW7	1,264.35	CE7	1,264.35	CN7	1,140.03
CW8-BW4-AW2	1,589.92	CE8-BE4-AE2	1,589.92	CN8-BN4-AN2	1,433.58
CW9	1,946.03	CE9	1,946.03	CN9	1,754.67
BW5	2,331.65	BE5	2,331.65	BN5	2,102.37
BW6-AW3	3,188.09	BE6-AE3	3,188.09	BN6-AN3	2,874.59
BW7	4,153.40	BE7	4,153.40	BN7	3,744.98
BW8-AW4	5,222.90	BE8-AE4	5,222.90	BN8-AN4	4,709.31
BW9	6,392.69	BE9	6,392.69	BN9	5,764.08
AW5	7,659.48	AE5	7,659.48	AN5	6,906.29
AW6	10,472.87	AE6	10,472.87	AN6	9,443.03
AW7	13,643.92	AE7	13,643.92	AN7	12,302.27
AW8	17,157.23	AE8	17,157.23	AN8	15,470.10
AW9	21,000.00	AE9	21,000.00	AN9	18,935.00



STATION	DISTANCE (FT)	STATION	DISTANCE (FT)	STATION	DISTANCE (FT)
00+00	00	00+00	00	00+00	00
01+00	100	01+00	100	01+00	100
02+00	200	02+00	200	02+00	200
03+00	300	03+00	300	03+00	300
04+00	400	04+00	400	04+00	400
05+00	500	05+00	500	05+00	500
06+00	600	06+00	600	06+00	600
07+00	700	07+00	700	07+00	700
08+00	800	08+00	800	08+00	800
09+00	900	09+00	900	09+00	900
10+00	1000	10+00	1000	10+00	1000
11+00	1100	11+00	1100	11+00	1100
12+00	1200	12+00	1200	12+00	1200
13+00	1300	13+00	1300	13+00	1300
14+00	1400	14+00	1400	14+00	1400
15+00	1500	15+00	1500	15+00	1500
16+00	1600	16+00	1600	16+00	1600
17+00	1700	17+00	1700	17+00	1700
18+00	1800	18+00	1800	18+00	1800
19+00	1900	19+00	1900	19+00	1900
20+00	2000	20+00	2000	20+00	2000
21+00	2100	21+00	2100	21+00	2100
22+00	2200	22+00	2200	22+00	2200
23+00	2300	23+00	2300	23+00	2300
24+00	2400	24+00	2400	24+00	2400
25+00	2500	25+00	2500	25+00	2500
26+00	2600	26+00	2600	26+00	2600
27+00	2700	27+00	2700	27+00	2700
28+00	2800	28+00	2800	28+00	2800
29+00	2900	29+00	2900	29+00	2900
30+00	3000	30+00	3000	30+00	3000
31+00	3100	31+00	3100	31+00	3100
32+00	3200	32+00	3200	32+00	3200
33+00	3300	33+00	3300	33+00	3300
34+00	3400	34+00	3400	34+00	3400
35+00	3500	35+00	3500	35+00	3500
36+00	3600	36+00	3600	36+00	3600
37+00	3700	37+00	3700	37+00	3700
38+00	3800	38+00	3800	38+00	3800
39+00	3900	39+00	3900	39+00	3900
40+00	4000	40+00	4000	40+00	4000
41+00	4100	41+00	4100	41+00	4100
42+00	4200	42+00	4200	42+00	4200
43+00	4300	43+00	4300	43+00	4300
44+00	4400	44+00	4400	44+00	4400
45+00	4500	45+00	4500	45+00	4500
46+00	4600	46+00	4600	46+00	4600
47+00	4700	47+00	4700	47+00	4700
48+00	4800	48+00	4800	48+00	4800
49+00	4900	49+00	4900	49+00	4900
50+00	5000	50+00	5000	50+00	5000



OUTER WYE DETAIL
 SCALE: 1" = 12,000 FT
 (OR)
 1CM = 1,440 M

LEGEND:
 - COMPLETE JAN 31, 1977