
FM DIRECTIONAL BROADCAST ANTENNA
PROOF-OF-PERFORMANCE

MODEL JADP-2-1(3)

SERIAL NUMBER 14027

WAPS

Akron, OH



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DATE: June 10, 2008

ANTENNA GAIN	H-pol	V-pol
relative	1.34	1.23
(dBd)	(1.27)	(0.92)

**RMS OF THE
AZIMUTH PATTERNS:**

FM ANTENNA FOR:

STATION: WAPS

LOCATION: Akron, OH

MODEL NUMBER: JADP-2-1(3)

FREQUENCY & ERP: 91.3 MHz, 2.00 kW

ANTENNA INPUT POWER: 1.49 kW

ANTENNA BOOM HEADING: See Dwgs

Composite	H-pol	V-pol
0.648	0.628	0.627

CERTIFICATION

This certification, along with the accompanying antenna specification sheet, antenna mounting sketches, and azimuth and elevation patterns, certifies the construction and measurement of the JAMPRO FM CP antenna to the station's requirements, as measured at the JAMPRO antenna site in Sacramento, California. The following is an outline of construction methods, pattern measurements, installation requirements, recommended maintenance and equipment used.

CONSTRUCTION

A standard CP FM cavity-style panel antenna model was used to create the required directional patterns. From experience and by repeated measurements, these elements were adjusted as to position until the final configuration was determined and the pattern requirements were met. Measurements to establish their exact location are shown on the antenna mounting sketches.

MEASUREMENT

The complete full scale antenna was mounted on an exact duplicate of its final support at the station. We were careful to duplicate conduits, cables and anything peculiar to this mounting. This was then placed on a turntable at the JAMPRO antenna range. This directional antenna was used for receiving the radiation from a transmitting antenna that is elevated 25 feet above ground and located at a distance of 4,500 feet. This transmitting antenna is capable of transmitting either horizontal or vertical polarization. The frequency of the signal generator was accurately set to station frequency by use of a frequency counter.

A spectrum analyzer was used to continuously measure field strength as the antenna under test was rotated. Field strength at each azimuth was then plotted.



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Station: **WAPS**

Model: **JADP-2-1(3)**

INSTALLATION

The antenna must be installed in exactly the manner in which it was measured at the factory. This is shown in detail on the antenna mounting sketch, including the azimuth bearing of the elements. This boom must be verified by a surveyor at the site when installation is being completed. Good engineering practices should be followed in any details not covered by specific instructions.

MAINTENANCE

Annual or regular inspection should be made on the antenna system. At this time, tightness of U-bolts, or other fastenings, should be routinely checked. Any deterioration of the antenna due to lightning, or other causes should be promptly repaired.

EQUIPMENT

MODEL: -3000 Wavetek Signal Generator, Serial #66479
-1580 Scientific Atlanta pattern Recorder, Serial # 471, Cal'd 11/01/07
-8591E H.P. Spectrum Analyzer, Serial #3308A01312, Cal'd 12/18/07
-TUNED CAVITY DIPOLE

CONCLUSION

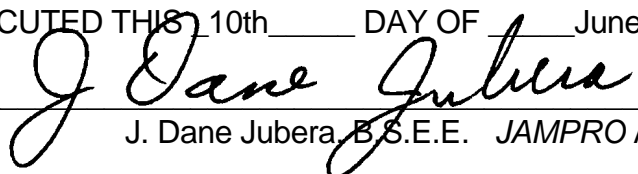
In the development of this pattern, JAMPRO antennas, Inc. observed known requirements of the FCC, as stated on the station construction permit.

Gain figures and required input power to achieve station ERP, as well as other details, are found on the first page.

This certification, with its calculations were performed by J. Dane Jubera, B.S.E.E., Electrical Engineer, JAMPRO Antennas, Inc.

EXECUTED THIS 10th DAY OF June, 2008

BY:

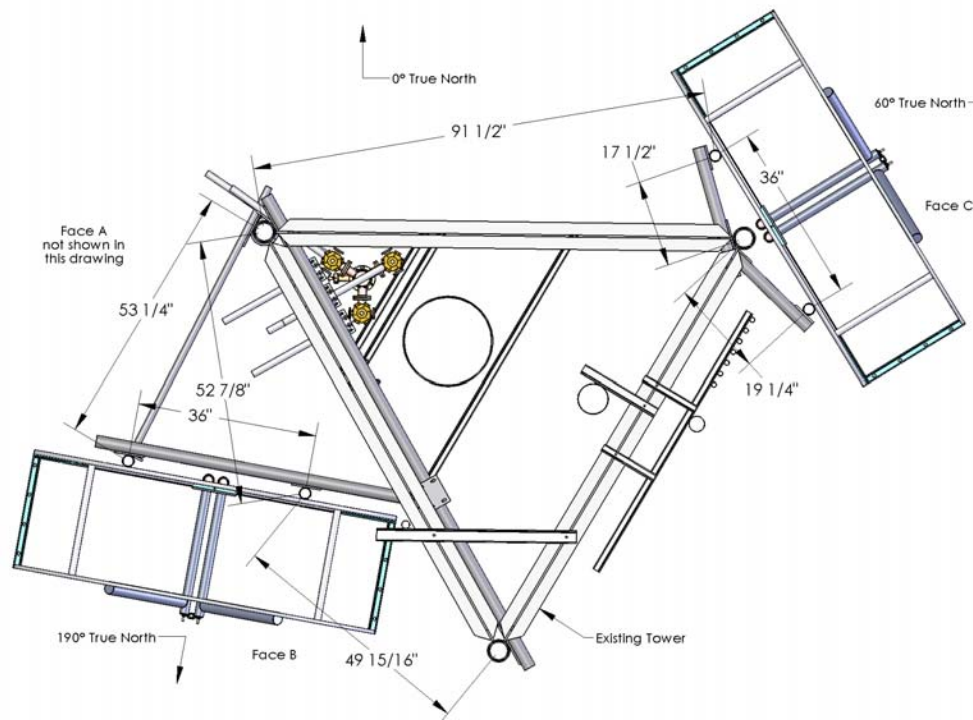

J. Dane Jubera, B.S.E.E. JAMPRO Antennas, Inc.



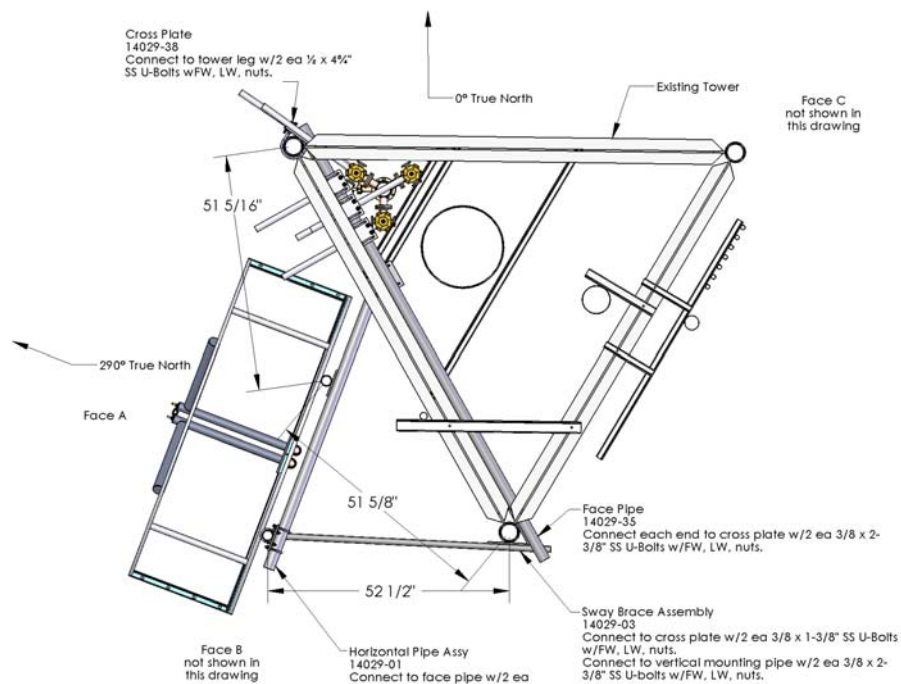
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TOP VIEW -- FACES B & C



TOP VIEW -- FACE A

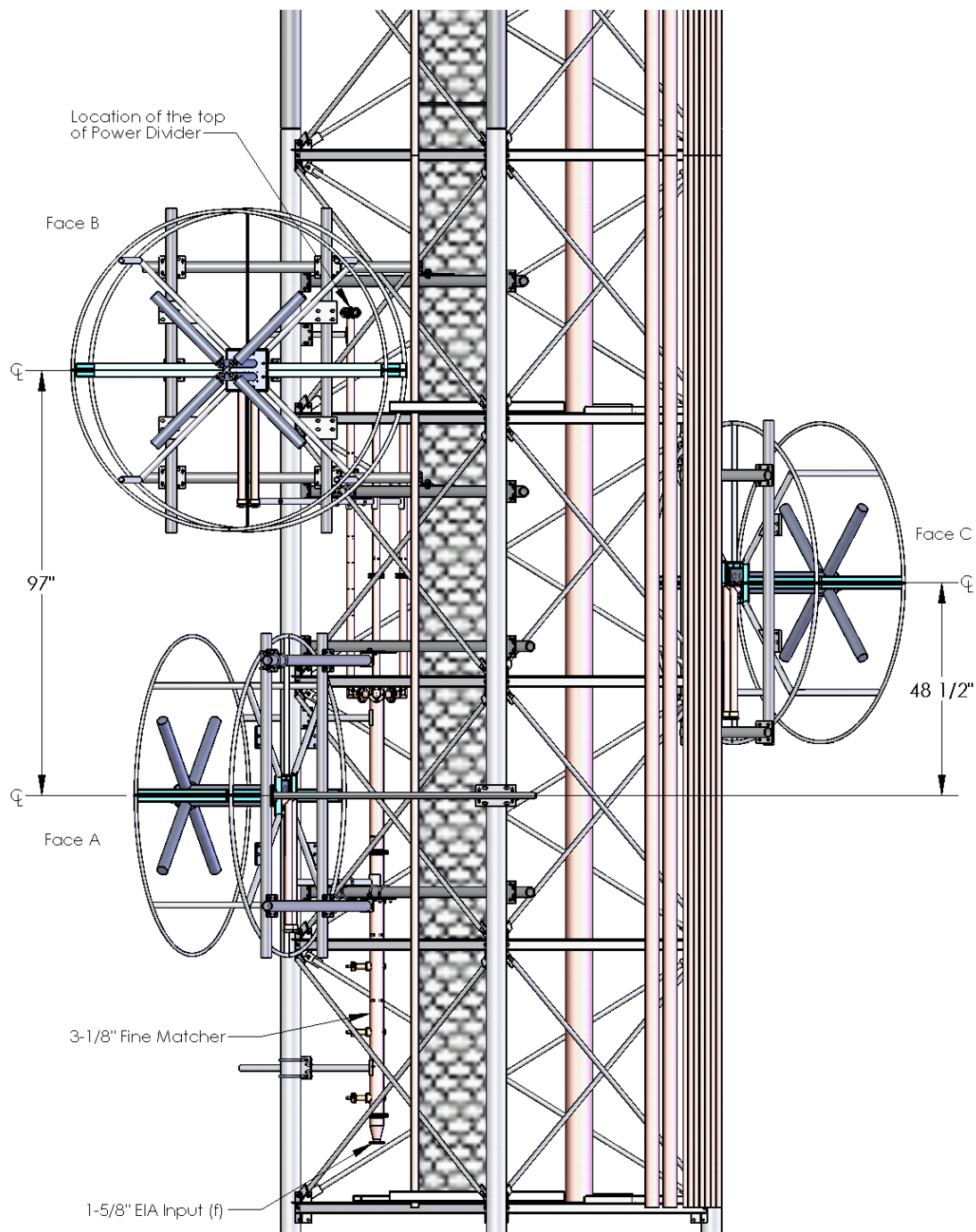


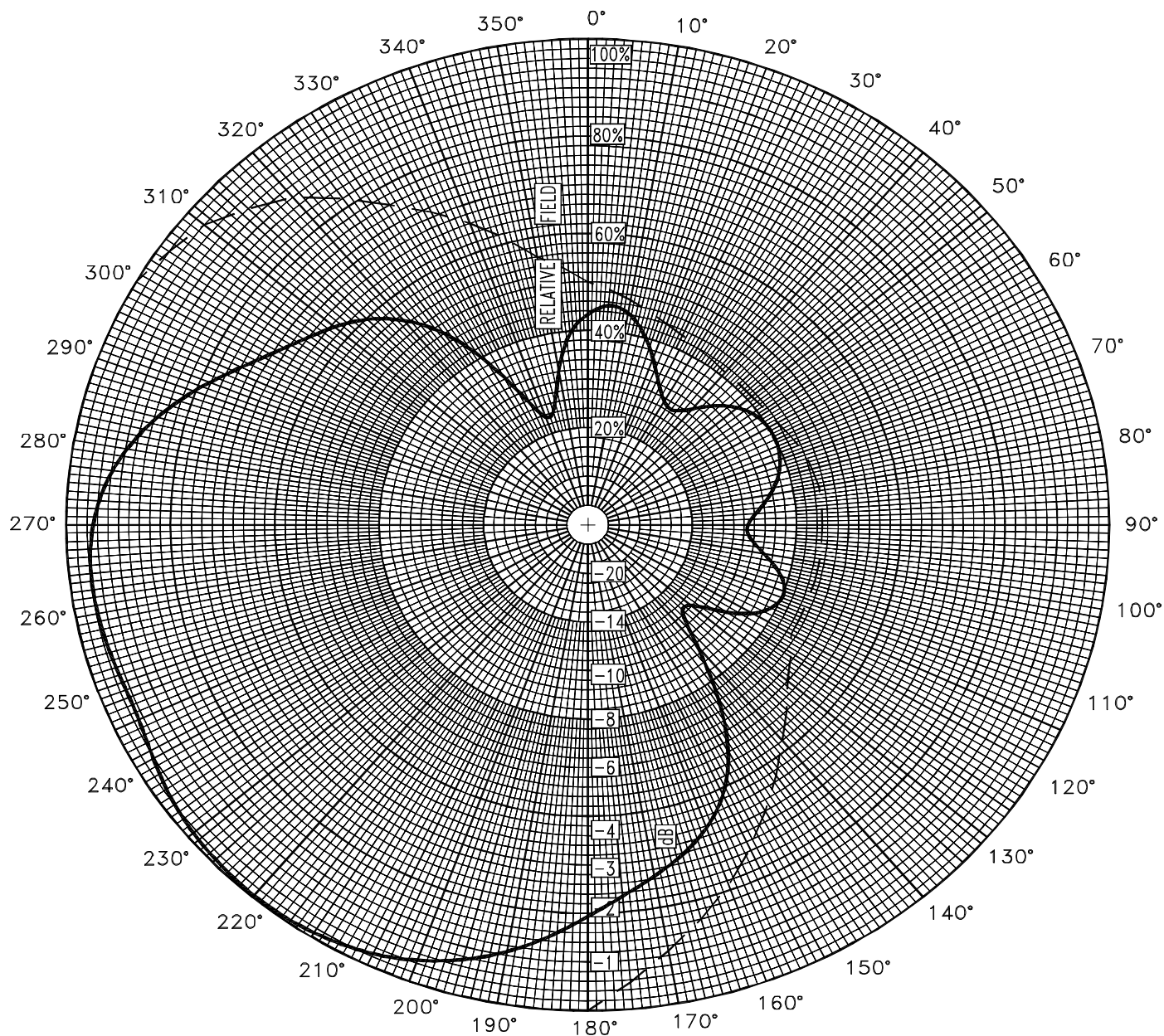


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SIDE VIEW





Azimuth Pattern

Customer: WAPS

Date: April 22, 2008

Frequency: 91.3 MHz

Type Number: JADP-2-1(3)

Notes:

COMPOSITE PATTERN ENVELOPE (H & V)



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WAPS

ERP = 2.00 kW

April 22, 2008

JADP-2-1(3)

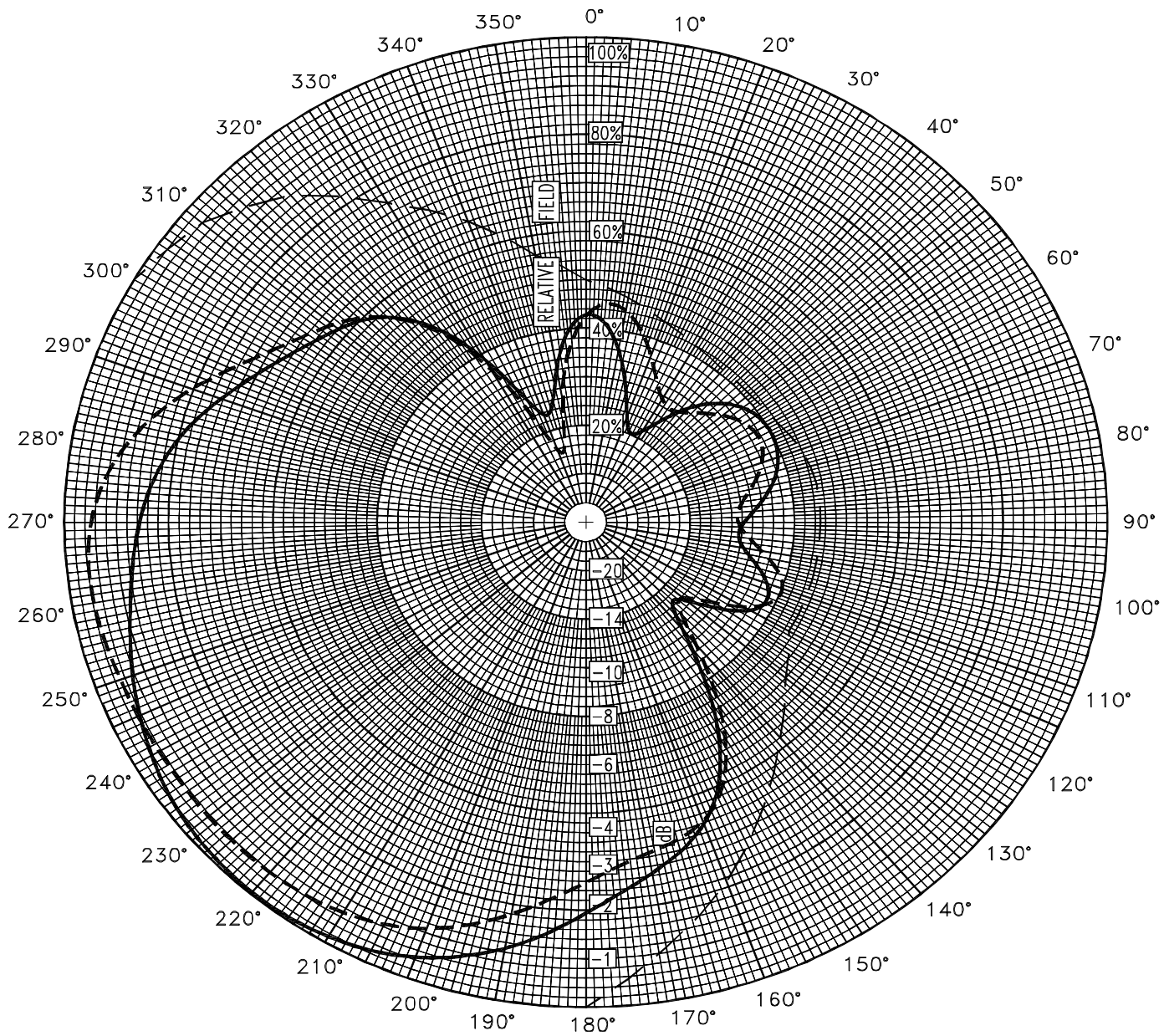
TABULATION OF RELATIVE FIELD

COMPOSITE MEASURED PATTERN (H & V)

<u>BEARING</u>	<u>FIELD</u>	<u>ERP</u> <u>(kW)</u>	<u>dBk</u>
0	0.436	0.38	-4.21
10	0.448	0.40	-3.96
20	0.368	0.27	-5.67
30	0.291	0.17	-7.71
40	0.311	0.19	-7.12
50	0.377	0.28	-5.47
60	0.401	0.32	-4.92
70	0.393	0.31	-5.09
80	0.356	0.25	-5.95
90	0.302	0.18	-7.38
100	0.344	0.24	-6.26
110	0.407	0.33	-4.80
120	0.372	0.28	-5.58
130	0.250	0.12	-9.04
140	0.332	0.22	-6.56
150	0.547	0.60	-2.23
160	0.667	0.89	-0.51
170	0.736	1.08	0.34
180	0.807	1.30	1.15
190	0.895	1.60	2.05
200	0.957	1.83	2.63
210	0.989	1.96	2.91
220	1.000	2.00	3.01
230	0.989	1.96	2.92
240	0.963	1.85	2.68
250	0.950	1.80	2.56
260	0.959	1.84	2.65
270	0.951	1.81	2.57
280	0.901	1.62	2.10
290	0.806	1.30	1.14
300	0.702	0.99	-0.06
310	0.635	0.81	-0.93
320	0.554	0.61	-2.12
330	0.399	0.32	-4.97
340	0.222	0.10	-10.05
350	0.331	0.22	-6.59

Relative fields at other azimuths:

45	0.350	225	0.994
135	0.246	315	0.601



Azimuth Pattern

Customer: WAPS

Date: April 22, 2008

Frequency: 91.3 MHz

Type Number: JADP-2-1(3)

Notes: MEASURED PATTERN IN FULL SCALE

— HPOL VPOL - - - LIMITS



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WAPS

ERP = 2.00 kW

April 22, 2008

JADP-2-1(3)

TABULATION OF MEASURED FIELDS

<u>BEARING</u>	<u>HORIZONTAL POLARIZATION</u>		<u>VERTICAL POLARIZATION</u>	
	<u>FIELD</u>	<u>ERP(kW)</u>	<u>FIELD</u>	<u>ERP(kW)</u>
0	0.436	0.38	0.433	0.38
10	0.367	0.27	0.448	0.40
20	0.229	0.11	0.368	0.27
30	0.215	0.09	0.291	0.17
40	0.311	0.19	0.295	0.17
50	0.377	0.28	0.344	0.24
60	0.401	0.32	0.376	0.28
70	0.393	0.31	0.361	0.26
80	0.356	0.25	0.312	0.19
90	0.302	0.18	0.289	0.17
100	0.305	0.19	0.344	0.24
110	0.374	0.28	0.407	0.33
120	0.372	0.28	0.356	0.25
130	0.250	0.12	0.232	0.11
140	0.292	0.17	0.332	0.22
150	0.521	0.54	0.547	0.60
160	0.667	0.89	0.661	0.87
170	0.736	1.08	0.692	0.96
180	0.807	1.30	0.744	1.11
190	0.895	1.60	0.823	1.36
200	0.957	1.83	0.895	1.60
210	0.989	1.96	0.932	1.74
220	1.000	2.00	0.944	1.78
230	0.989	1.96	0.946	1.79
240	0.963	1.85	0.945	1.79
250	0.926	1.71	0.950	1.80
260	0.887	1.57	0.959	1.84
270	0.857	1.47	0.951	1.81
280	0.816	1.33	0.901	1.62
290	0.745	1.11	0.806	1.30
300	0.673	0.91	0.702	0.99
310	0.620	0.77	0.635	0.81
320	0.554	0.61	0.551	0.61
330	0.399	0.32	0.380	0.29
340	0.222	0.10	0.148	0.04
350	0.331	0.22	0.279	0.16
MAXIMUM FIELDS:				
220	1.000	2.00		
265			0.960	1.84
MINIMUM FIELDS:				
25	0.194	0.07		
345			0.141	0.04

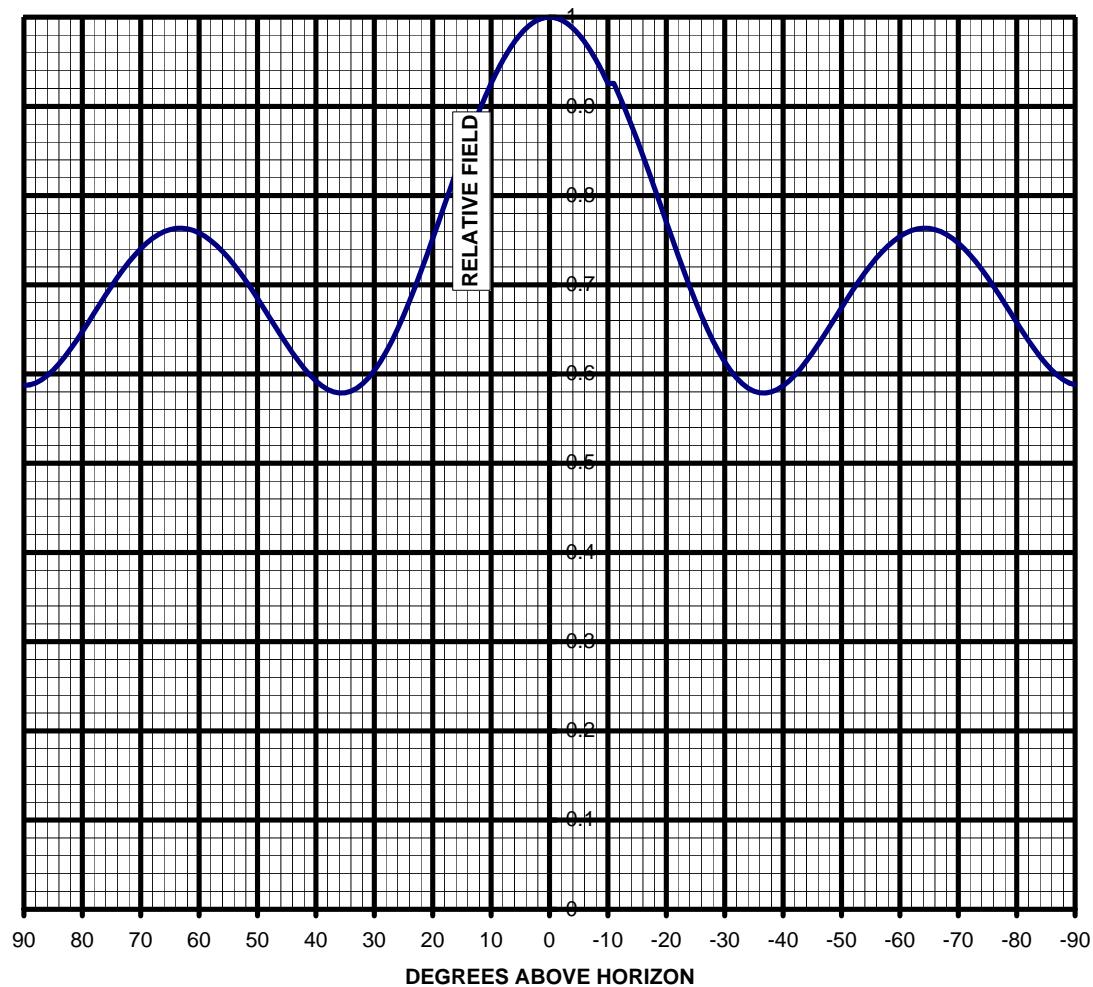


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PLOT OF ELEVATION PLANE PATTERN

STATION: WAPS 91.3 MHz JADP-2-1(3) .75 lambda spacing





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TABULATION OF ELEVATION PLANE PATTERN

STATION: WAPS 91.3 MHz JADP-2-1(3) .75 lambda spacing

<u>ELEVATION</u> <u>ANGLE</u>	<u>RELATIVE</u> <u>FIELD</u>	<u>ELEVATION</u> <u>ANGLE</u>	<u>RELATIVE</u> <u>FIELD</u>	<u>ELEVATION</u> <u>ANGLE</u>	<u>RELATIVE</u> <u>FIELD</u>
10	0.926	-25	0.681	-60	0.754
9	0.939	-26	0.666	-61	0.758
8	0.952	-27	0.651	-62	0.761
7	0.963	-28	0.637	-63	0.763
6	0.972	-29	0.625	-64	0.763
5	0.981	-30	0.614	-65	0.763
4	0.988	-31	0.604	-66	0.762
3	0.993	-32	0.596	-67	0.760
2	0.997	-33	0.589	-68	0.756
1	0.999	-34	0.584	-69	0.752
0	1.000	-35	0.581	-70	0.747
-1	0.999	-36	0.579	-71	0.741
-2	0.997	-37	0.579	-72	0.734
-3	0.993	-38	0.580	-73	0.726
-4	0.988	-39	0.583	-74	0.717
-5	0.981	-40	0.587	-75	0.708
-6	0.972	-41	0.592	-76	0.699
-7	0.963	-42	0.599	-77	0.689
-8	0.952	-43	0.606	-78	0.678
-9	0.939	-44	0.615	-79	0.668
-10	0.926	-45	0.624	-80	0.658
-11	0.926	-46	0.633	-81	0.648
-12	0.911	-47	0.643	-82	0.638
-13	0.896	-48	0.654	-83	0.628
-14	0.879	-49	0.664	-84	0.619
-15	0.862	-50	0.674	-85	0.611
-16	0.845	-51	0.685	-86	0.604
-17	0.826	-52	0.695	-87	0.598
-18	0.808	-53	0.704	-88	0.593
-19	0.789	-54	0.714	-89	0.590
-20	0.770	-55	0.722	-90	0.588
-21	0.752	-56	0.730		
-22	0.733	-57	0.737		
-23	0.715	-58	0.744		
-24	0.698	-59	0.750		