
FM DIRECTIONAL BROADCAST ANTENNA
PROOF-OF-PERFORMANCE

MODEL JMEP-4 DA

SERIAL NUMBER 15296

WQAI

Thomson, GA



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DATE: November 5, 2009

ANTENNA GAIN	H-pol	V-pol
relative	0.015	15.00
(dBd)	(-18.24)	(11.76)

FM ANTENNA FOR:

STATION: WQAI

LOCATION: Thomson, GA

MODEL NUMBER: JMEP-4 DA

FREQUENCY & ERP: 89.5 MHz, 49.00 kW

ANTENNA INPUT POWER: 3.267 k W

ANTENNA BOOM HEADING: 165° T.

**RMS OF THE
AZIMUTH PATTERNS:**

Composite	Hpol	V-pol
0.529	.050	0.529

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 vertically polarized FM antenna model was used and parasitic reflectors were added 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. These additional elements are steel, hot dipped galvanized and either bolted or welded in place. Measurements to establish their exact location are shown on the antenna mounting sketches.

MEASUREMENT

The 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. For this antenna, only the vertical polarization component of radiation is described. The cross polarization characteristics of the antenna range produce inaccurate results for highly suppressed Hpol radiation. The gain of the Hpol radiation was determined by state-of-the-art electromagnetics software to be less than a value that is 30 dB below the gain of the vertically polarization radiation. On that basis the gain of the Hpol is reported to be -30 dB compared to the Vpol. 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: **WQAI** Model: : **JMEP-4 DA**

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 5th DAY OF November, 2009

BY: J. Dane Jubera

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

12-22-94/RS

PAGE 2 OF 2

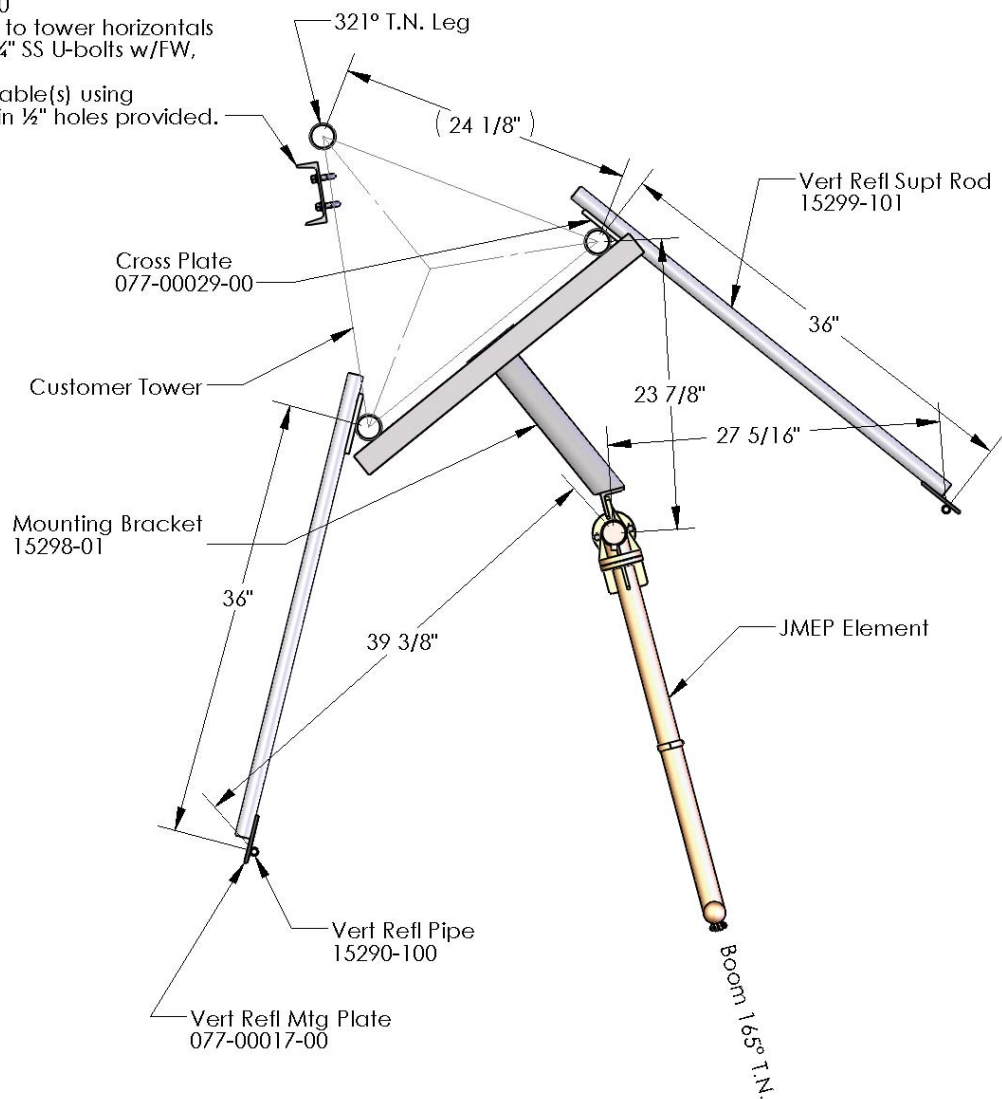


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TOP VIEW

Cable Tray
15296-100
Connect to tower horizontals
w/3/8 x 3/4" SS U-bolts w/FW,
LW, nuts.
Secure cable(s) using
hangers in 1/2" holes provided.

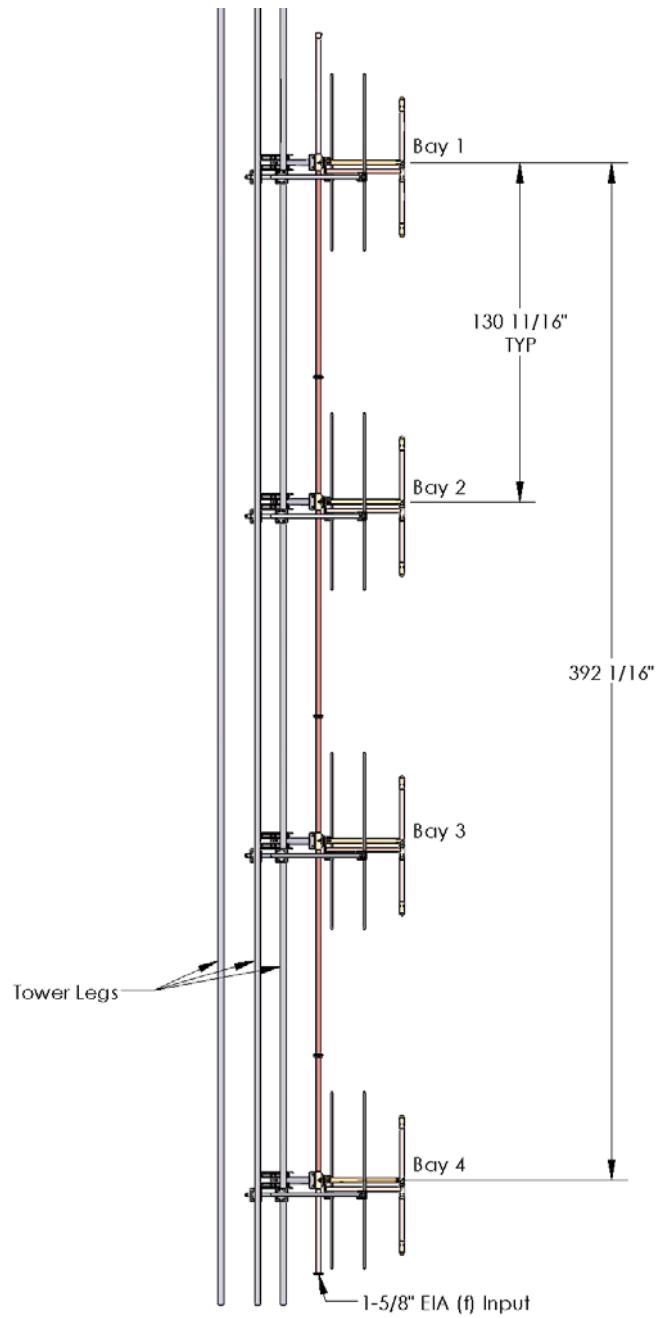


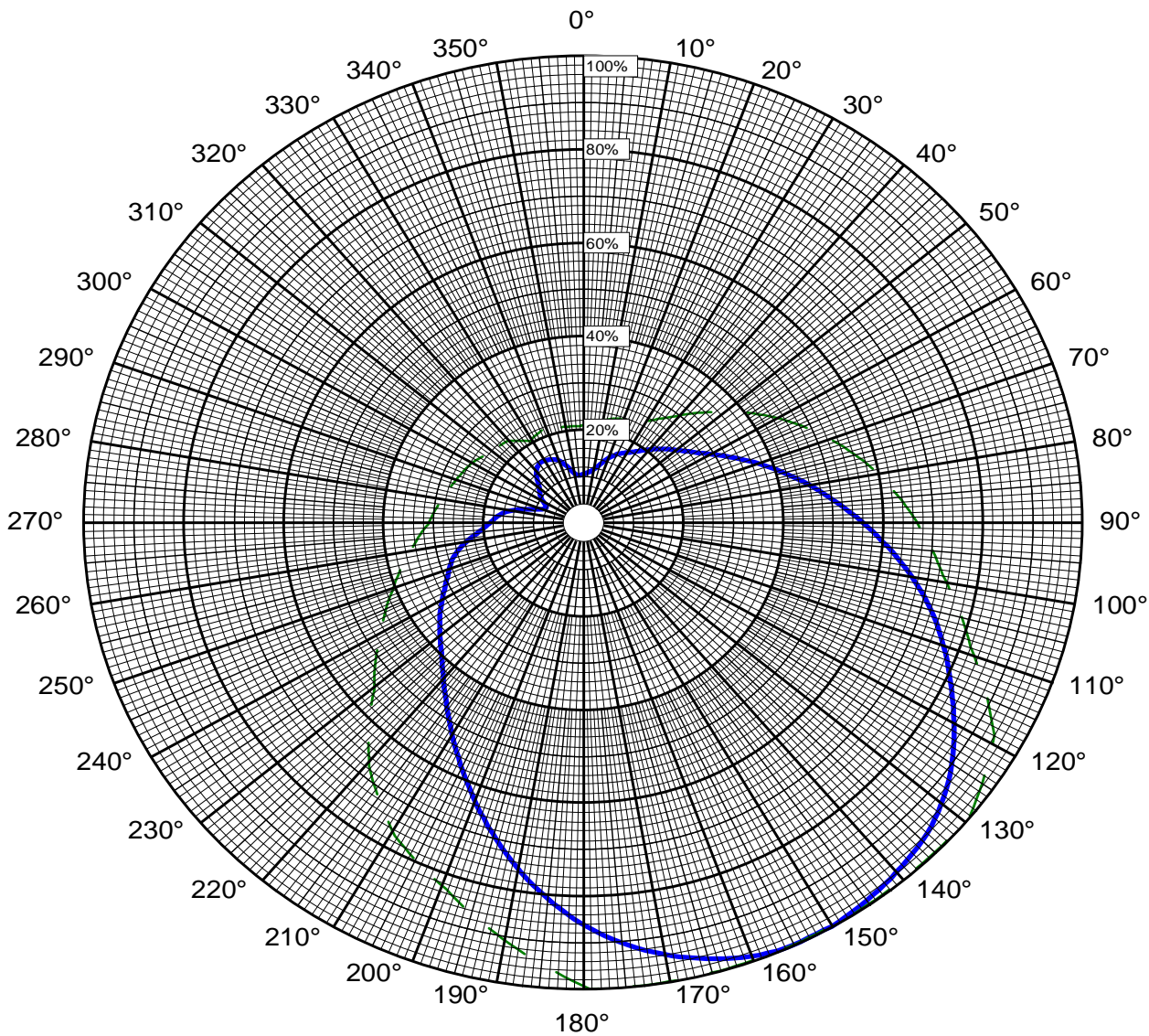


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SIDE VIEW





Azimuth Pattern

Customer: WQAI	Date: October 5, 2009
Frequency: 89.5 MHz	Type Number: JMEP-4 DA
Notes:	
COMPOSITE PATTERN ENVELOPE (H & V)	



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WQAI

ERP = 49.00 kW

October 5, 2009

JMEP-4 DA

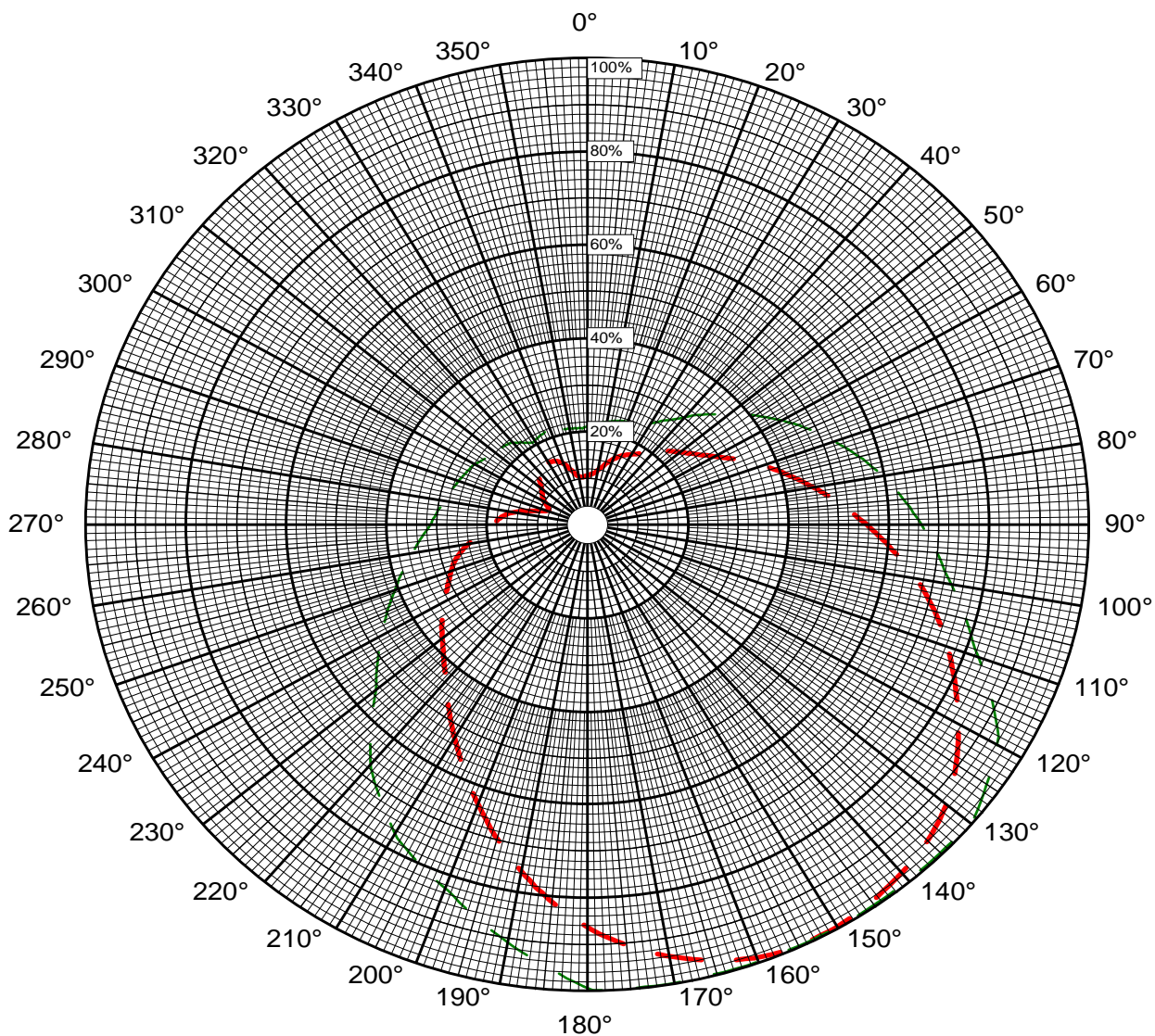
TABULATION OF RELATIVE FIELD

COMPOSITE MEASURED PATTERN (H & V)

<u>BEARING</u>	<u>FIELD</u>	<u>ERP</u> <u>(kW)</u>	<u>dBk</u>
0	0.100	0.49	-3.10
10	0.110	0.59	-2.27
20	0.140	0.96	-0.18
30	0.170	1.42	1.51
40	0.200	1.96	2.92
50	0.240	2.82	4.51
60	0.290	4.12	6.15
70	0.370	6.71	8.27
80	0.460	10.37	10.16
90	0.560	15.37	11.87
100	0.670	22.00	13.42
110	0.770	29.05	14.63
120	0.860	36.24	15.59
130	0.940	43.30	16.36
140	0.980	47.06	16.73
150	1.000	49.00	16.90
160	0.990	48.02	16.81
170	0.940	43.30	16.36
180	0.860	36.24	15.59
190	0.750	27.56	14.40
200	0.630	19.45	12.89
210	0.520	13.25	11.22
220	0.430	9.06	9.57
230	0.370	6.71	8.27
240	0.320	5.02	7.00
250	0.280	3.84	5.85
260	0.230	2.59	4.14
270	0.180	1.59	2.01
280	0.140	0.96	-0.18
290	0.080	0.31	-5.04
300	0.090	0.40	-4.01
310	0.110	0.59	-2.27
320	0.140	0.96	-0.18
330	0.150	1.10	0.42
340	0.140	0.96	-0.18
350	0.110	0.59	-2.27

Relative fields at other azimuths:

45	0.220	225	0.396
135	0.965	315	0.124



Azimuth Pattern

Customer: WQAI

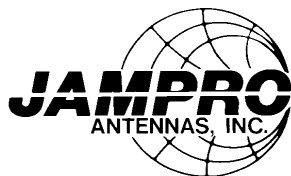
Date: October 5, 2009

Frequency: 89.5 MHz

Type Number: JMEP-4 DA

Notes: MEASURED PATTERN IN FULL SCALE

— HPOL VPOL - - - LIMITS



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WQAI

ERP = 49.00 kW

October 5, 2009

JMEP-4 DA

TABULATION OF MEASURED FIELDS

<u>BEARING</u>	<u>VERTICAL POLARIZATION</u>	
	<u>FIELD</u>	<u>ERP(kW)</u>
0	0.100	0.49
10	0.110	0.59
20	0.140	0.96
30	0.170	1.42
40	0.200	1.96
50	0.240	2.82
60	0.290	4.12
70	0.370	6.71
80	0.460	10.37
90	0.560	15.37
100	0.670	22.00
110	0.770	29.05
120	0.860	36.24
130	0.940	43.30
140	0.980	47.06
150	1.000	49.00
160	0.990	48.02
170	0.940	43.30
180	0.860	36.24
190	0.750	27.56
200	0.630	19.45
210	0.520	13.25
220	0.430	9.06
230	0.370	6.71
240	0.320	5.02
250	0.280	3.84
260	0.230	2.59
270	0.180	1.59
280	0.140	0.96
290	0.080	0.31
300	0.090	0.40
310	0.110	0.59
320	0.140	0.96
330	0.150	1.10
340	0.140	0.96
350	0.110	0.59

MAXIMUM FIELDS:

155	1.000	49.00
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MINIMUM FIELDS:

295	0.078	0.30
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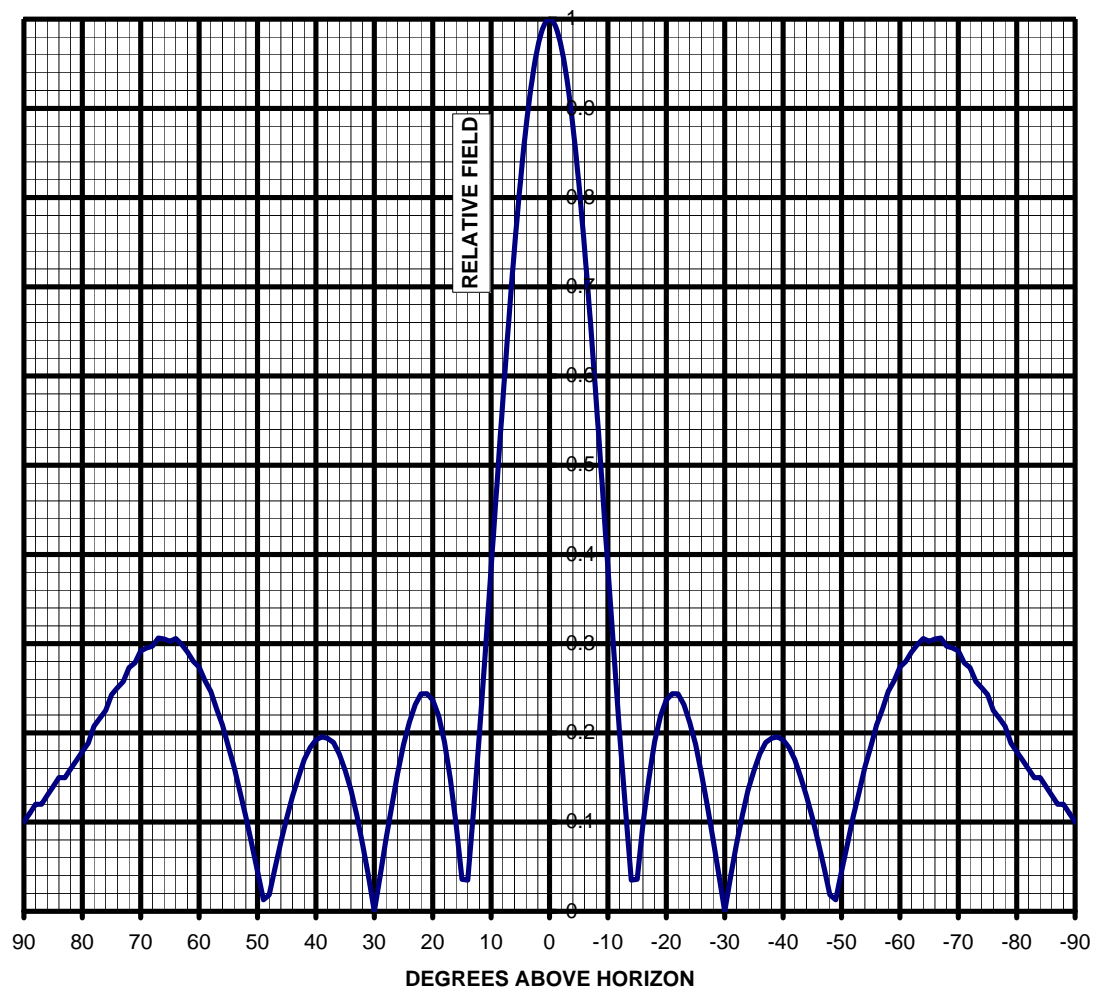


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PLOT OF ELEVATION PLANE PATTERN

STATION: WQAI 89.5 MHz JMEP-4 DA 1.00 lambda spacing





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TABULATION OF ELEVATION PLANE PATTERN

STATION: WQAI 89.5 MHz JMEP-4 DA 1.00 lambda spacing

ELEVATION RELATIVE		ELEVATION RELATIVE		ELEVATION RELATIVE	
<u>ANGLE</u>	<u>FIELD</u>	<u>ANGLE</u>	<u>FIELD</u>	<u>ANGLE</u>	<u>FIELD</u>
10	0.385	-25	0.187	-60	0.274
9	0.479	-26	0.155	-61	0.280
8	0.572	-27	0.119	-62	0.291
7	0.661	-28	0.081	-63	0.299
6	0.743	-29	0.040	-64	0.306
5	0.817	-30	0.000	-65	0.302
4	0.880	-31	0.039	-66	0.305
3	0.932	-32	0.075	-67	0.306
2	0.969	-33	0.107	-68	0.297
1	0.992	-34	0.136	-69	0.295
0	1.000	-35	0.158	-70	0.292
-1	0.992	-36	0.176	-71	0.278
-2	0.969	-37	0.189	-72	0.273
-3	0.932	-38	0.194	-73	0.257
-4	0.880	-39	0.196	-74	0.250
-5	0.817	-40	0.192	-75	0.243
-6	0.743	-41	0.183	-76	0.225
-7	0.661	-42	0.170	-77	0.216
-8	0.572	-43	0.150	-78	0.208
-9	0.479	-44	0.129	-79	0.188
-10	0.385	-45	0.105	-80	0.179
-11	0.291	-46	0.078	-81	0.169
-12	0.199	-47	0.049	-82	0.160
-13	0.114	-48	0.018	-83	0.150
-14	0.035	-49	0.013	-84	0.150
-15	0.036	-50	0.045	-85	0.140
-16	0.098	-51	0.075	-86	0.130
-17	0.149	-52	0.106	-87	0.120
-18	0.190	-53	0.134	-88	0.120
-19	0.219	-54	0.162	-89	0.110
-20	0.237	-55	0.185	-90	0.100
-21	0.244	-56	0.209		
-22	0.244	-57	0.227		
-23	0.232	-58	0.246		
-24	0.212	-59	0.259		