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**FM DIRECTIONAL BROADCAST ANTENNA**  
**PROOF-OF-PERFORMANCE**

**MODEL JMEP-4 DA-R**

**SERIAL NUMBER 11849**

**KTJC**

**Kelso, WA**



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**DATE:** March 1, 2004

<b>ANTENNA GAIN</b>	<u>H-pol</u>	<u>V-pol</u>
relative	<b>0.00</b>	<b>7.96</b>
(dBd)	( )	<b>(9.01)</b>

**RMS OF THE  
AZIMUTH PATTERNS:**

**FM ANTENNA FOR:**

**STATION: KTJC**

**LOCATION: Kelso, WA**

**MODEL NUMBER: JMEP-4 DA-R**

**FREQUENCY & ERP: 91.1 MHz, 8.00 kW**

**ANTENNA INPUT POWER: 1.00 kW**

**ANTENNA BOOM HEADING: 185° T.**

Composite	H-pol	V-pol
<b>0.726</b>	<b>0.000</b>	<b>0.726</b>

**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 vertical 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 7,000 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. NOTE: No horizontal polarization pattern is shown for this antenna, as cross-polarization characteristics of the measurement range are not sufficiently accurate to establish the horizontal polarization characteristics of this antenna. State-of-the-art computations show that the peak of the hpol radiation is not greater than -29 dB from the peak of the vertical polarization component.



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Station: **KTJC**

Model: **JMEP-4 DA-R**

### **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  
-8591E H.P. SPECTRUM ANALYZER, SERIAL #3308A01312, CAL'd 1/16/03  
-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 1st DAY OF March, 2004

BY:

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

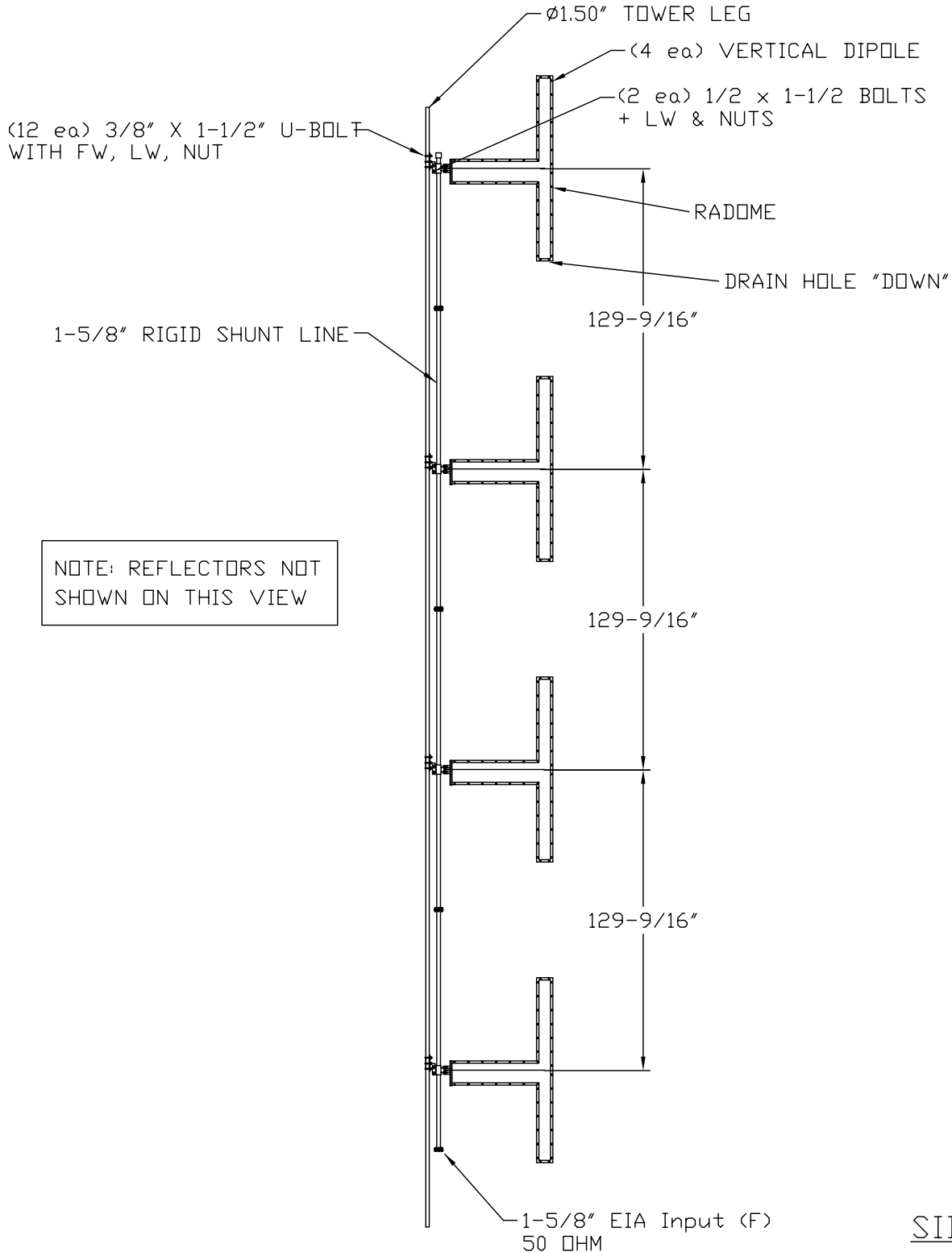
12-22-94/RS

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SIDE VIEW  
JMEP-4R, (11850)

REV "A" 1/29/04

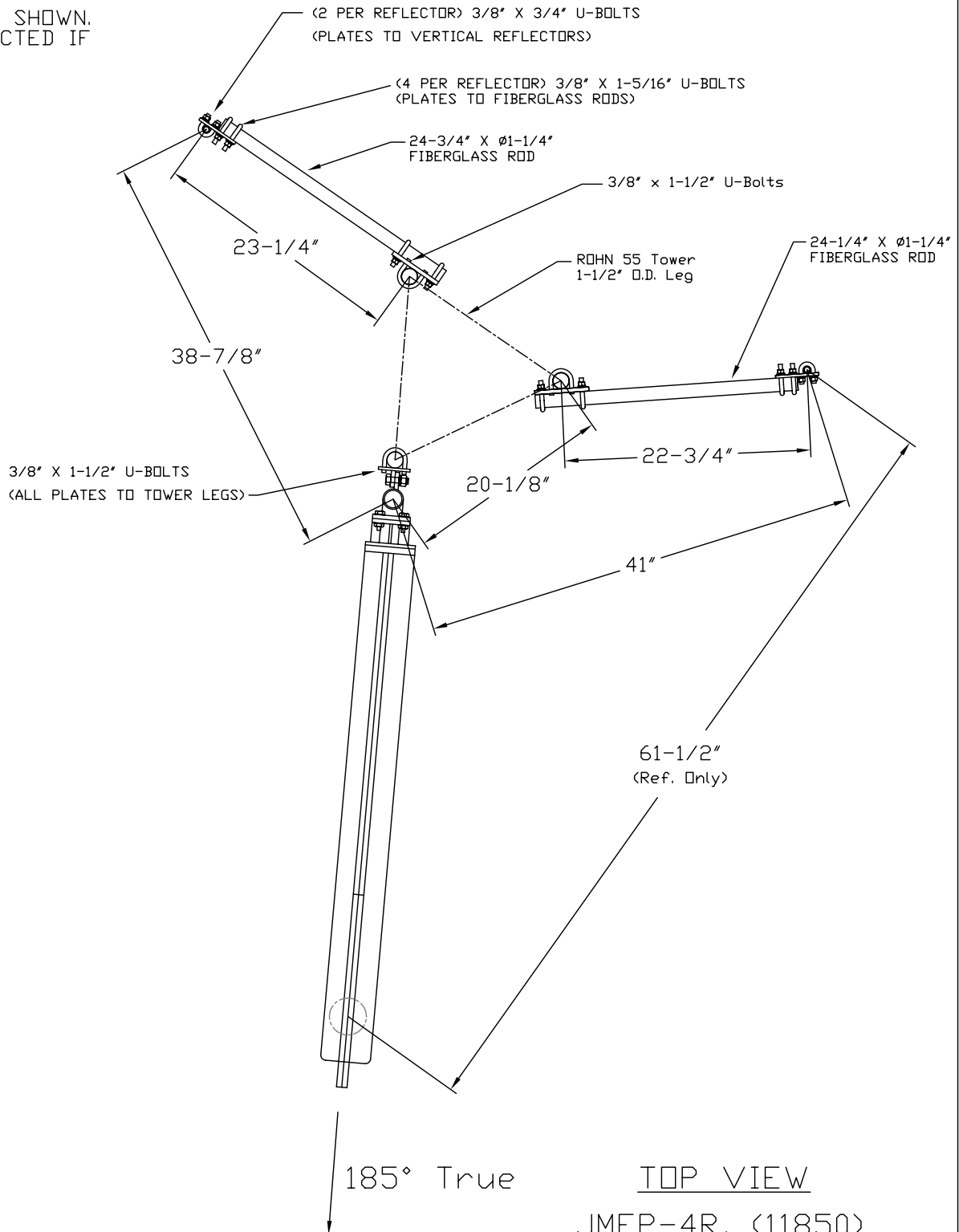


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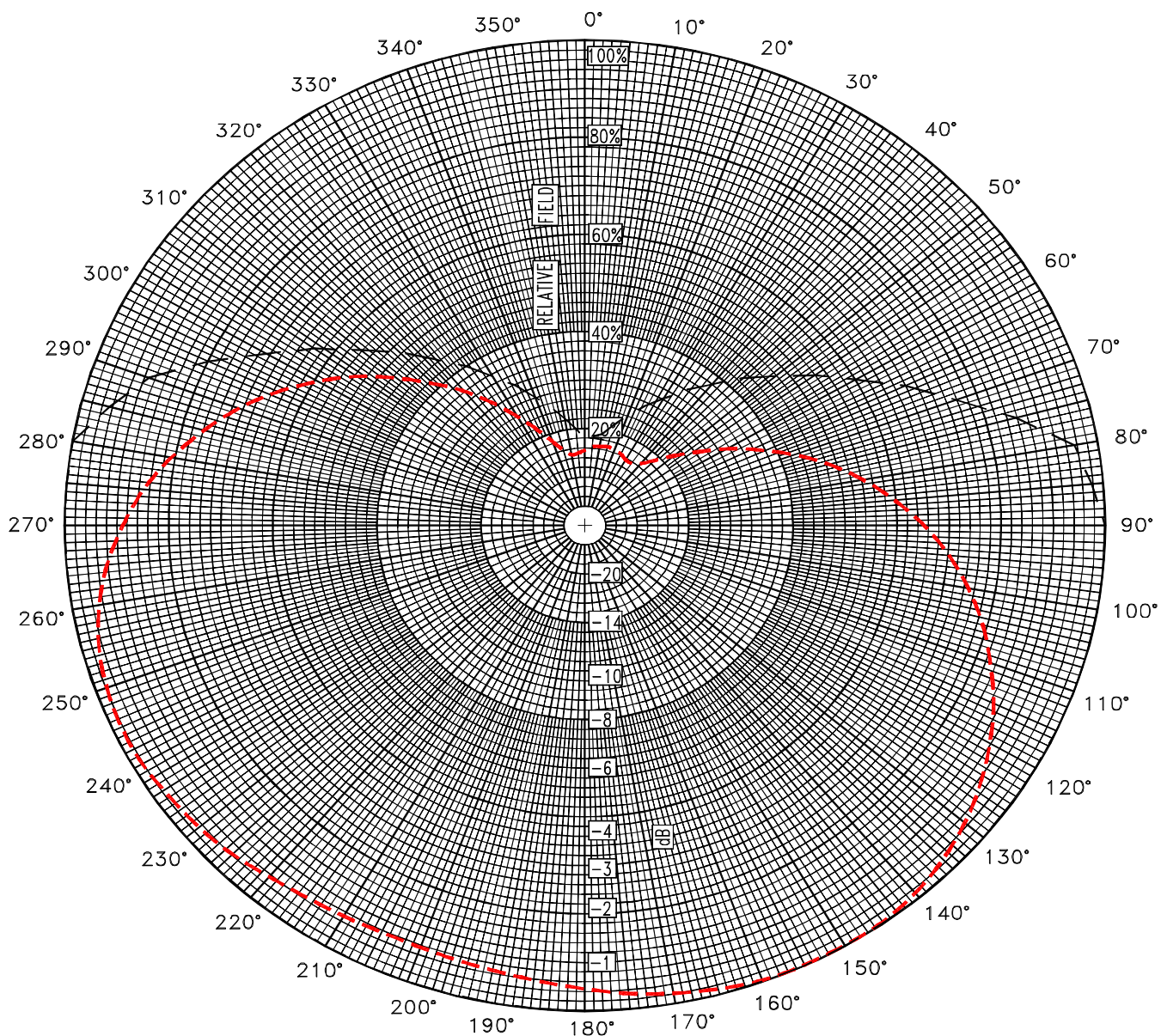
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STATION CHIEF ENGINEER  
TO ESTABLISH ON WHICH FACE  
ANTENNA IS TO BE MOUNTED.

INSTALL ANTENNAS AS SHOWN.  
VSWR COULD BE EFFECTED IF  
INSTALLED AT  
DIFFERENT HEADINGS.



TOP VIEW  
JMEP-4R, (11850)  
REV "A" 1/29/04



## Azimuth Pattern

Customer: KTJC

Date: January 14, 2004

Frequency: 91.1 MHz

Type Number: JMEP-4 DA-R

Notes: MEASURED PATTERN IN FULL SCALE

———— HPOL ..... VPOL - - - LIMITS



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KTJC

ERP = 8.00 kW

January 14, 2004

JMEP-4 DA-R

TABULATION OF MEASURED FIELDS

<u>BEARING</u>	HORIZONTAL POLARIZATION		VERTICAL POLARIZATION	
	<u>FIELD</u>	<u>ERP(KW)</u>	<u>FIELD</u>	<u>ERP(KW)</u>
0			0.155	0.19
10			0.165	0.22
20			0.165	0.22
30			0.155	0.19
40			0.165	0.22
50			0.225	0.41
60			0.320	0.82
70			0.430	1.48
80			0.545	2.38
90			0.655	3.43
100			0.750	4.50
110			0.830	5.51
120			0.900	6.48
130			0.955	7.30
140			0.990	7.84
150			1.000	8.00
160			1.000	8.00
170			0.980	7.68
180			0.955	7.30
190			0.935	6.99
200			0.925	6.85
210			0.930	6.92
220			0.945	7.14
230			0.970	7.53
240			0.985	7.76
250			0.980	7.68
260			0.950	7.22
270			0.890	6.34
280			0.810	5.25
290			0.710	4.03
300			0.595	2.83
310			0.475	1.81
320			0.365	1.07
330			0.260	0.54
340			0.185	0.27
350			0.145	0.17

**MAXIMUM FIELDS:**

355				
160			1	8.00

**MINIMUM FIELDS:**

355				
350			0.145	0.17

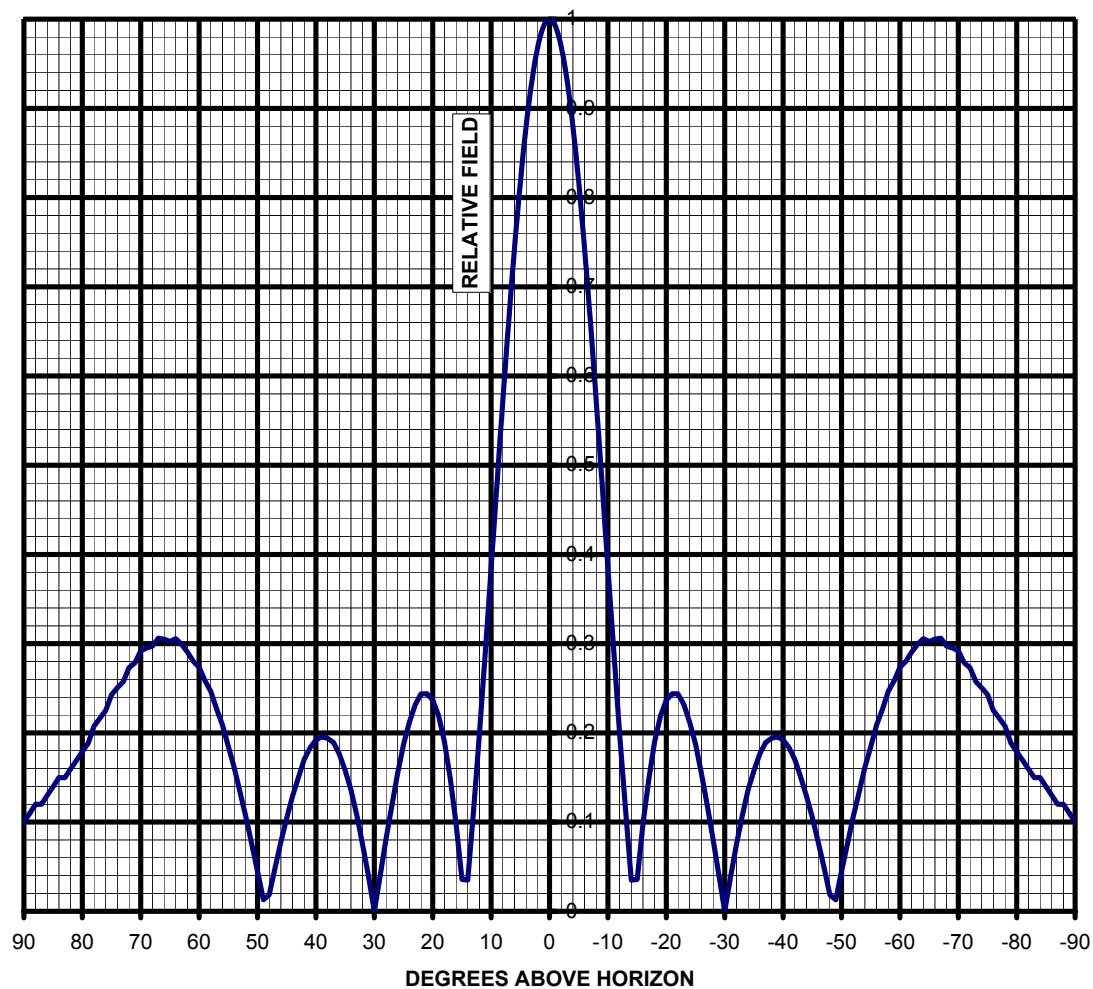


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## PLOT OF ELEVATION PLANE PATTERN

**STATION:** KTJC      91.1 MHz    JMEP-4 DA-R    1.00 lambda spacing





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## TABULATION OF ELEVATION PLANE PATTERN

**STATION:** KTJC 91.1 MHz JMEP-4 DA-R 1.00 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	0.385	-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	0.133	-88	0.120
-19	0.219	-54	0.161	-89	0.110
-20	0.237	-55	0.184	-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	0.258		