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

**MODEL JMPC-4D RFR .5 DA**

**SERIAL NUMBER 14200**

**KRRT**

**Arroyo Seco, NM**



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**DATE:** March 21, 2008

<b>ANTENNA GAIN</b>	<u>H-pol</u>	<u>V-pol</u>
relative	<b>2.86</b>	<b>2.86</b>
(dBd)	<b>(4.56)</b>	<b>(4.56)</b>

RMS OF THE  
AZIMUTH PATTERNS:

**FM ANTENNA FOR:**

STATION: **KRRT**

LOCATION: **Arroyo Seco, NM**

MODEL NUMBER: **JMPC-4R RFR .5 DA**

FREQUENCY & ERP: **90.9 MHz, 6.00 kW**

ANTENNA INPUT POWER: **2.10 kW**

ANTENNA BOOM HEADING: **30.3° T.**

Composite	H-pol	V-pol
<b>0.783</b>	<b>0.705</b>	<b>0.642</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 modified CP FM antenna (radome style) model was used and parasitic reflectors were added to create the required directional patterns. The elements were provided without radomes and were fitted with electrical deicer circuitry. 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**

Two bays of the full scale antenna were 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: **KRRT**

Model: **JMPC-4D RFR .5 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**

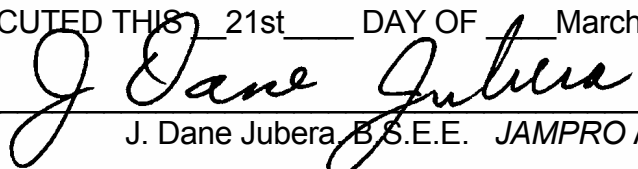
In the development of this pattern, *JAMPRO* antennas, Inc. observed known requirements of the FCC, as stated on the station construction permit. However, **the rms of the composite pattern is less than 85% of the rms of the currently authorized pattern.** Modifications to the authorized pattern should be made when application is made for station license.

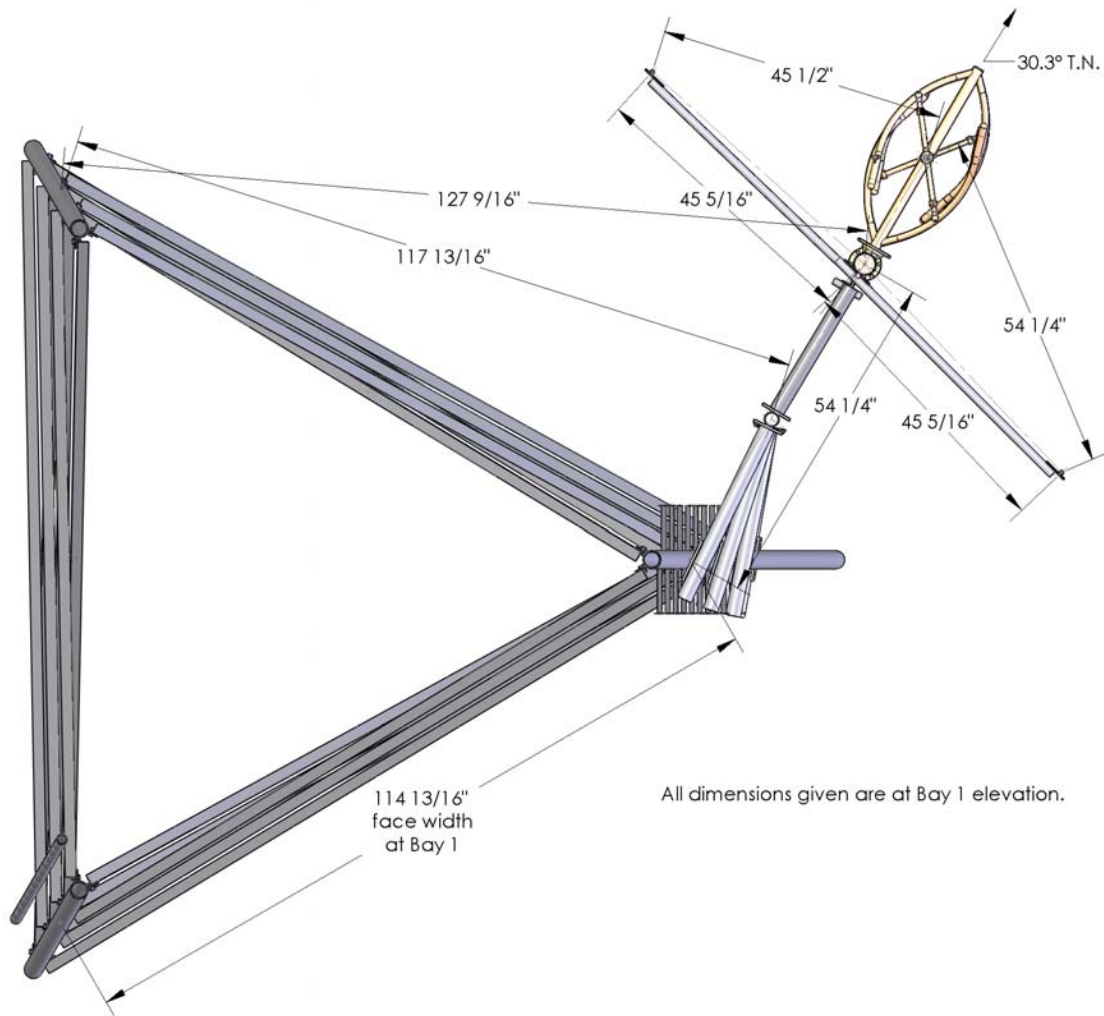
Gain figures and required input power to achieve station ERP, as well as other details, are found on the first page.

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

EXECUTED THIS 21st DAY OF March, 2008

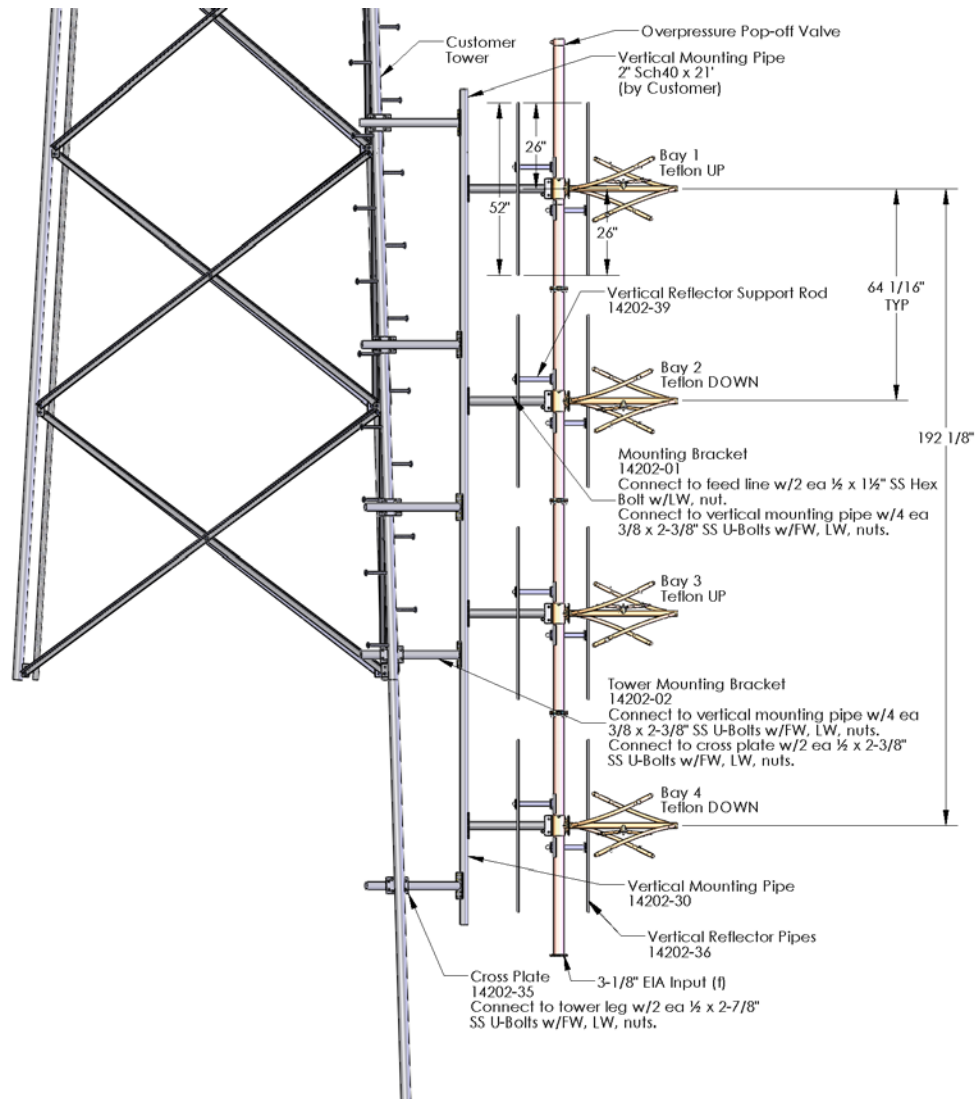
BY:

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



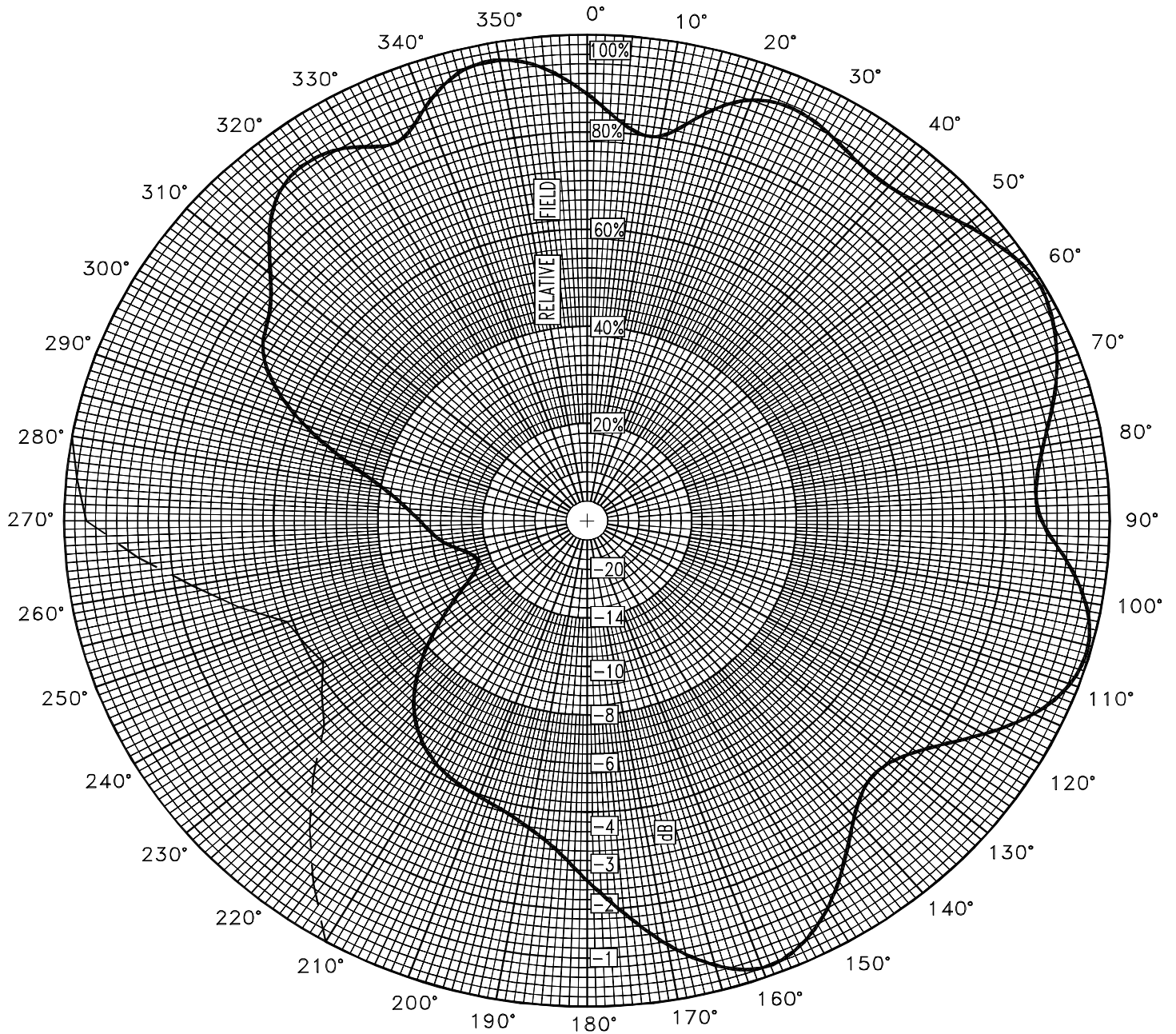
14200-00

**TOP VIEW**



14200-00

## SIDE VIEW



## Azimuth Pattern

Customer: KRRT

Date: March 18, 2008

Frequency: 90.9 MHz

Type Number: JMPC-4D RFR .5 DA

Notes:

COMPOSITE PATTERN ENVELOPE (H & V )



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KRRT

ERP = 6.00 kW

March 18, 2008

JMPC-4D RFR .5 DA

TABULATION OF RELATIVE FIELD

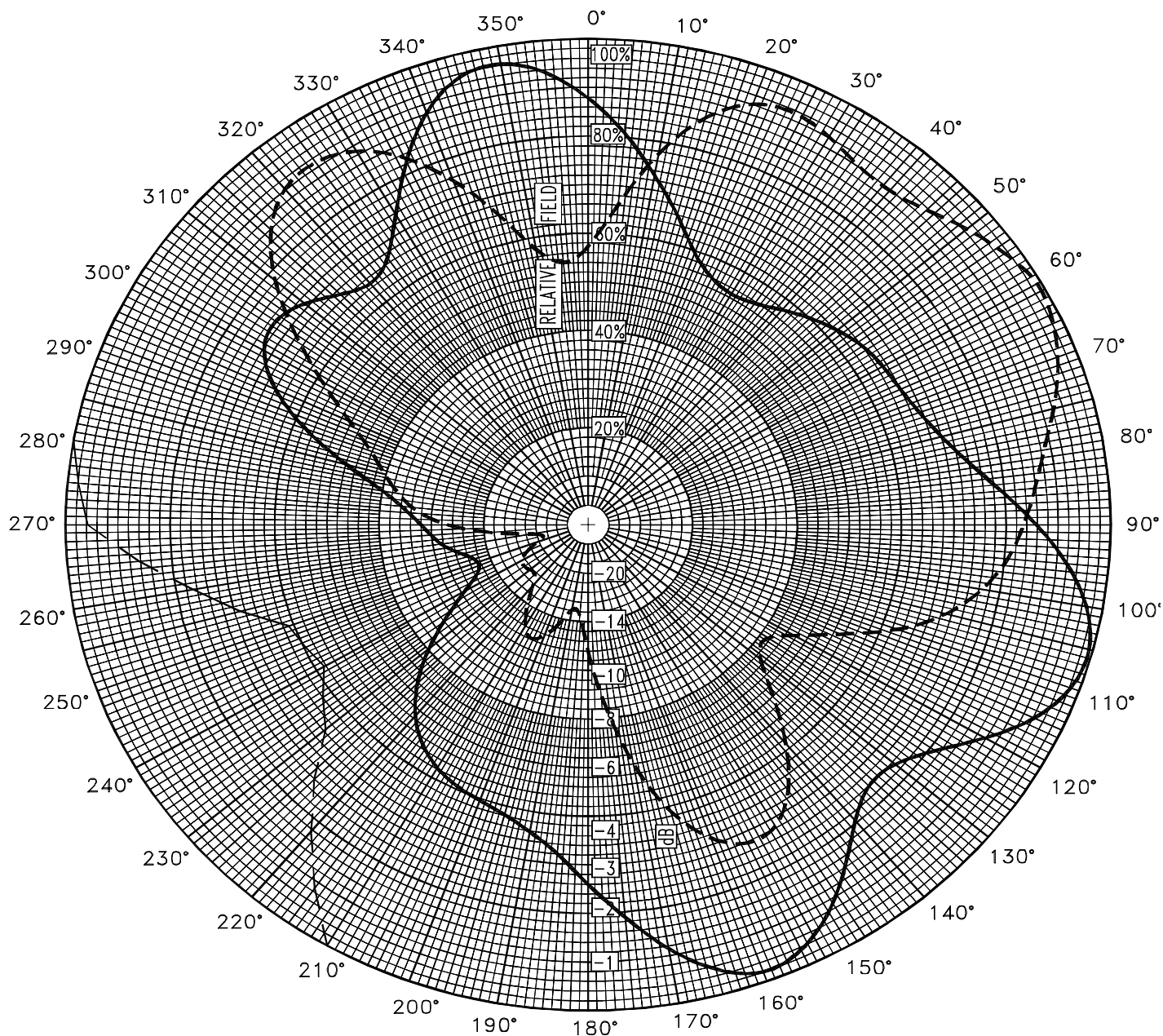
COMPOSITE MEASURED PATTERN (H & V)

<u>BEARING</u>	<u>FIELD</u>	<u>ERP</u> <u>(kW)</u>	<u>dBk</u>
0	0.882	4.67	6.69
10	0.785	3.70	5.68
20	0.930	5.19	7.15
30	0.925	5.13	7.10
40	0.895	4.81	6.82
50	0.950	5.42	7.34
60	1.000	6.00	7.78
70	0.960	5.53	7.43
80	0.885	4.70	6.72
90	0.861	4.45	6.48
100	0.974	5.69	7.55
110	0.989	5.87	7.69
120	0.881	4.66	6.68
130	0.763	3.49	5.43
140	0.793	3.78	5.77
150	0.926	5.15	7.12
160	0.990	5.88	7.69
170	0.892	4.77	6.78
180	0.743	3.31	5.20
190	0.641	2.47	3.92
200	0.605	2.19	3.41
210	0.580	2.02	3.05
220	0.518	1.61	2.07
230	0.403	0.98	-0.11
240	0.273	0.45	-3.51
250	0.222	0.29	-5.31
260	0.277	0.46	-3.36
270	0.319	0.61	-2.13
280	0.396	0.94	-0.26
290	0.583	2.04	3.09
300	0.725	3.15	4.99
310	0.790	3.74	5.73
320	0.910	4.97	6.96
330	0.895	4.81	6.82
340	0.910	4.97	6.97
350	0.970	5.65	7.52

Relative fields at other azimuths:

45	0.915	225	0.466
135	0.753	315	0.865





## Azimuth Pattern

Customer: KRRT

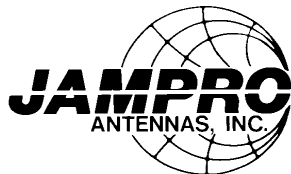
Date: March 18, 2008

Frequency: 90.9 MHz

Type Number: JMPC-4D RFR .5 DA

Notes: MEASURED PATTERN IN FULL SCALE

HPOL ..... VPOL - - - - LIMITS



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KRRT

ERP = 6.00 kW

March 18, 2008

JMPC-4D RFR .5 DA

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	0.882	4.67	0.565	1.92
10	0.732	3.22	0.785	3.70
20	0.592	2.10	0.930	5.19
30	0.546	1.79	0.925	5.13
40	0.578	2.00	0.895	4.81
50	0.624	2.34	0.950	5.42
60	0.653	2.56	1.000	6.00
70	0.675	2.73	0.960	5.53
80	0.739	3.27	0.885	4.70
90	0.861	4.45	0.835	4.18
100	0.974	5.69	0.770	3.56
110	0.989	5.87	0.640	2.46
120	0.881	4.66	0.455	1.24
130	0.763	3.49	0.425	1.08
140	0.793	3.78	0.595	2.12
150	0.926	5.15	0.725	3.15
160	0.990	5.88	0.695	2.90
170	0.892	4.77	0.515	1.59
180	0.743	3.31	0.275	0.45
190	0.641	2.47	0.170	0.17
200	0.605	2.19	0.245	0.36
210	0.580	2.02	0.245	0.36
220	0.518	1.61	0.165	0.16
230	0.403	0.98	0.145	0.13
240	0.273	0.45	0.150	0.14
250	0.222	0.29	0.105	0.07
260	0.277	0.46	0.110	0.07
270	0.319	0.61	0.280	0.47
280	0.396	0.94	0.370	0.82
290	0.583	2.04	0.440	1.16
300	0.725	3.15	0.590	2.09
310	0.712	3.04	0.790	3.74
320	0.641	2.46	0.910	4.97
330	0.737	3.26	0.895	4.81
340	0.910	4.97	0.760	3.47
350	0.970	5.65	0.570	1.95
<b>MAXIMUM FIELDS:</b>				
105	1.000	6.00		
60			1	6.00
<b>MINIMUM FIELDS:</b>				
250	0.222	0.29		
255			0.08	0.04

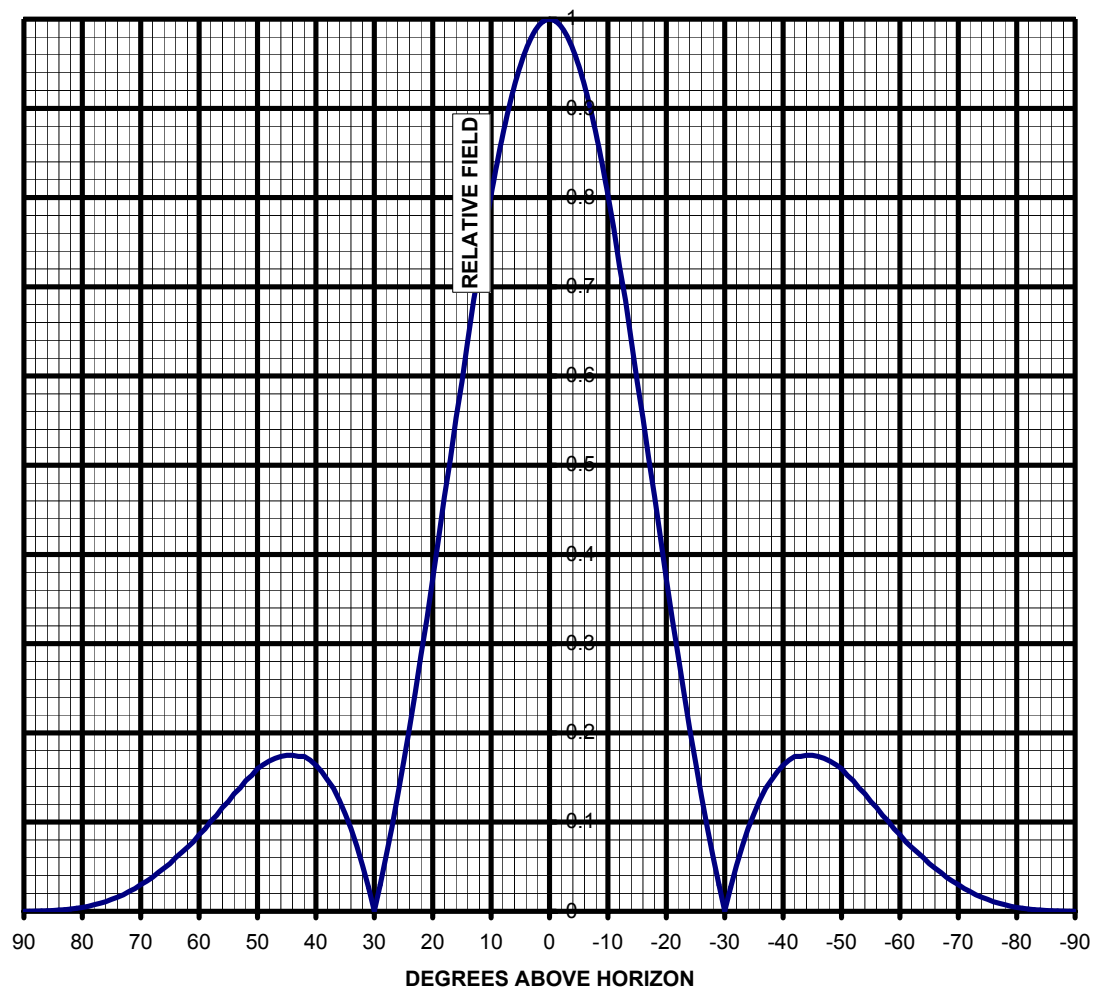


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## PLOT OF ELEVATION PLANE PATTERN

**STATION:** KRRT      90.9 MHz    JMPC-4D RFR .5 DA    .50 lambda spacing





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## TABULATION OF ELEVATION PLANE PATTERN

**STATION:** KRRT 90.9 MHz JMPC-4D RFR .5 DA .50 lambda spacing

<u>ELEVATION</u>	<u>RELATIVE</u>	<u>ELEVATION</u>	<u>RELATIVE</u>	<u>ELEVATION</u>	<u>RELATIVE</u>
<u>ANGLE</u>	<u>FIELD</u>	<u>ANGLE</u>	<u>FIELD</u>	<u>ANGLE</u>	<u>FIELD</u>
10	0.803	-25	0.167	-60	0.086
9	0.838	-26	0.130	-61	0.078
8	0.870	-27	0.094	-62	0.072
7	0.900	-28	0.061	-63	0.066
6	0.925	-29	0.030	-64	0.060
5	0.948	-30	0.000	-65	0.053
4	0.966	-31	0.027	-66	0.048
3	0.981	-32	0.051	-67	0.044
2	0.992	-33	0.073	-68	0.038
1	0.998	-34	0.093	-69	0.034
0	1.000	-35	0.109	-70	0.030
-1	0.998	-36	0.125	-71	0.025
-2	0.992	-37	0.138	-72	0.022
-3	0.981	-38	0.147	-73	0.018
-4	0.966	-39	0.156	-74	0.016
-5	0.948	-40	0.164	-75	0.013
-6	0.925	-41	0.169	-76	0.011
-7	0.900	-42	0.174	-77	0.009
-8	0.870	-43	0.174	-78	0.007
-9	0.838	-44	0.175	-79	0.006
-10	0.803	-45	0.175	-80	0.004
-11	0.765	-46	0.174	-81	0.003
-12	0.722	-47	0.171	-82	0.003
-13	0.685	-48	0.168	-83	0.002
-14	0.640	-49	0.165	-84	0.001
-15	0.594	-50	0.160	-85	0.001
-16	0.553	-51	0.152	-86	0.001
-17	0.506	-52	0.147	-87	0.000
-18	0.465	-53	0.138	-88	0.000
-19	0.418	-54	0.132	-89	0.000
-20	0.373	-55	0.123	-90	0.000
-21	0.328	-56	0.116		
-22	0.288	-57	0.108		
-23	0.245	-58	0.101		
-24	0.204	-59	0.092		