



6340 Sky Creek Drive, Sacramento, California 95828  
P.O. Box 292880, Sacramento, California 95829-2880

(916) 383-1177 FAX (916) 383-1182

**DATE:** December 1, 2003

**ANTENNA GAIN** H-pol V-pol  
relative            2.98 2.98  
(dBd)                (4.74) (4.74)

**RMS OF THE  
AZIMUTH PATTERNS:**  
**CERTIFICATION**

**FM ANTENNA FOR:**

**STATION:** KPMW

**LOCATION:** HALIMAILE, HI

**MODEL NUMBER:** JMPC-4 RFR DA

**FREQUENCY & ERP:** 105.5 MHz, 14.00 kW

**ANTENNA INPUT POWER:** 4.70 kW

**ANTENNA BOOM HEADING:** 305° T.

**Composite** H-pol V-pol  
0.731            0.648    0.675

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 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**

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 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.



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Station: **KPMW**

Model: **JMPC-4 RFR 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  
-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 18 1st DAY OF December, 2003

BY:

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

12-22-94/RS

PAGE 2 OF 2

**FM DIRECTIONAL BROADCAST ANTENNA**

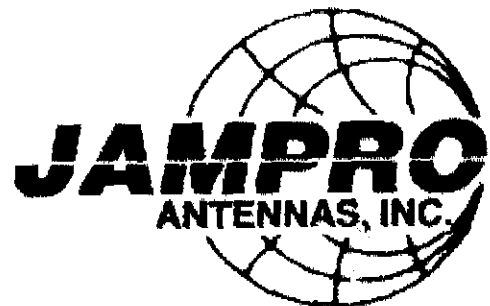
**PROOF-OF-PERFORMANCE**

**MODEL JMPC-4 RFR DA**

**SERIAL NUMBER 11700**

**KPMW**

**HALIIMAILE, HI**



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### TABULATION OF ELEVATION PLANE PATTERN

**STATION:** KPMW 105.5 MHz JMPC-4 RFR DA .50 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	0.802	-25	0.166	-60	0.085
9	0.838	-26	0.128	-61	0.077
8	0.870	-27	0.093	-62	0.071
7	0.899	-28	0.060	-63	0.065
6	0.925	-29	0.028	-64	0.060
5	0.948	-30	0.001	-65	0.053
4	0.966	-31	0.028	-66	0.048
3	0.981	-32	0.052	-67	0.043
2	0.991	-33	0.074	-68	0.037
1	0.998	-34	0.094	-69	0.033
0	1.000	-35	0.110	-70	0.029
-1	0.998	-36	0.126	-71	0.025
-2	0.991	-37	0.139	-72	0.022
-3	0.981	-38	0.148	-73	0.018
-4	0.966	-39	0.157	-74	0.016
-5	0.948	-40	0.164	-75	0.013
-6	0.925	-41	0.170	-76	0.010
-7	0.899	-42	0.174	-77	0.008
-8	0.870	-43	0.174	-78	0.007
-9	0.838	-44	0.175	-79	0.005
-10	0.802	-45	0.175	-80	0.004
-11	0.765	-46	0.174	-81	0.003
-12	0.722	-47	0.171	-82	0.002
-13	0.684	-48	0.168	-83	0.001
-14	0.639	-49	0.164	-84	0.001
-15	0.593	-50	0.160	-85	0.001
-16	0.552	-51	0.152	-86	0.000
-17	0.505	-52	0.146	-87	0.000
-18	0.464	-53	0.138	-88	0.000
-19	0.417	-54	0.131	-89	0.000
-20	0.371	-55	0.122	-90	0.000
-21	0.327	-56	0.116		
-22	0.286	-57	0.107		
-23	0.244	-58	0.100		
-24	0.203	-59	0.092		

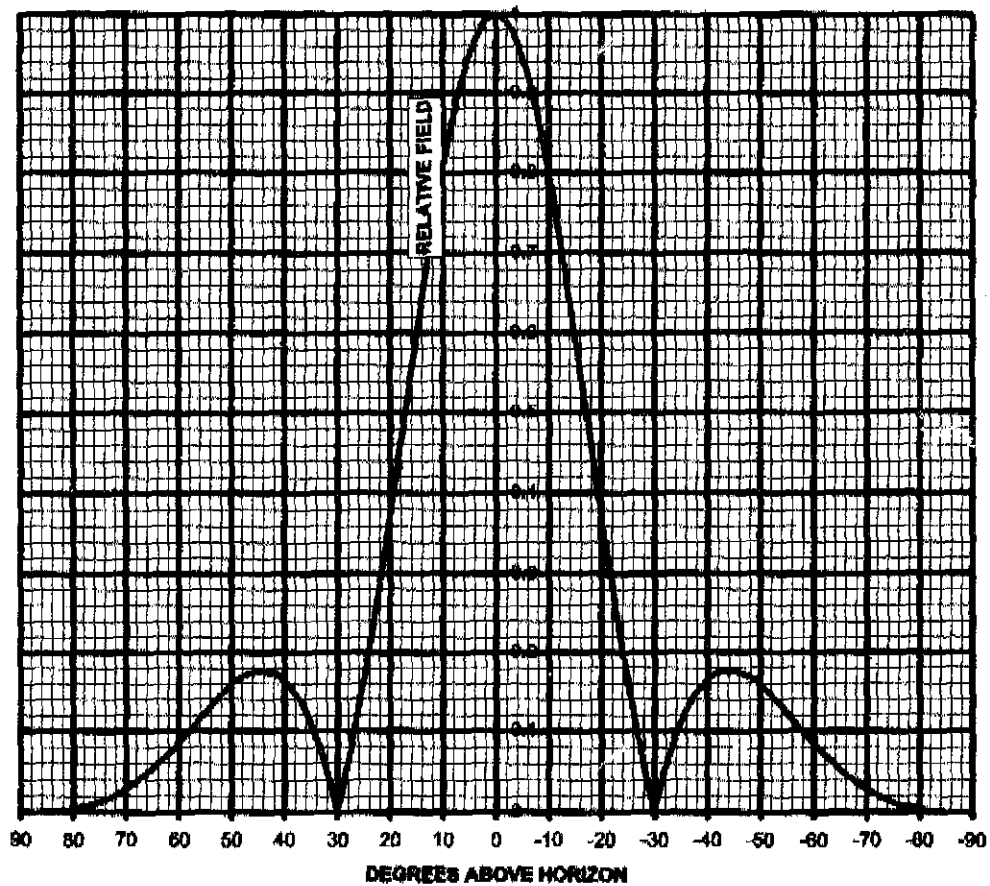


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## PLOT OF ELEVATION PLANE PATTERN

**STATION:** KPMW    105.5 MHz    JMPC-4 RFR DA    .50 lambda spacing





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KPMW

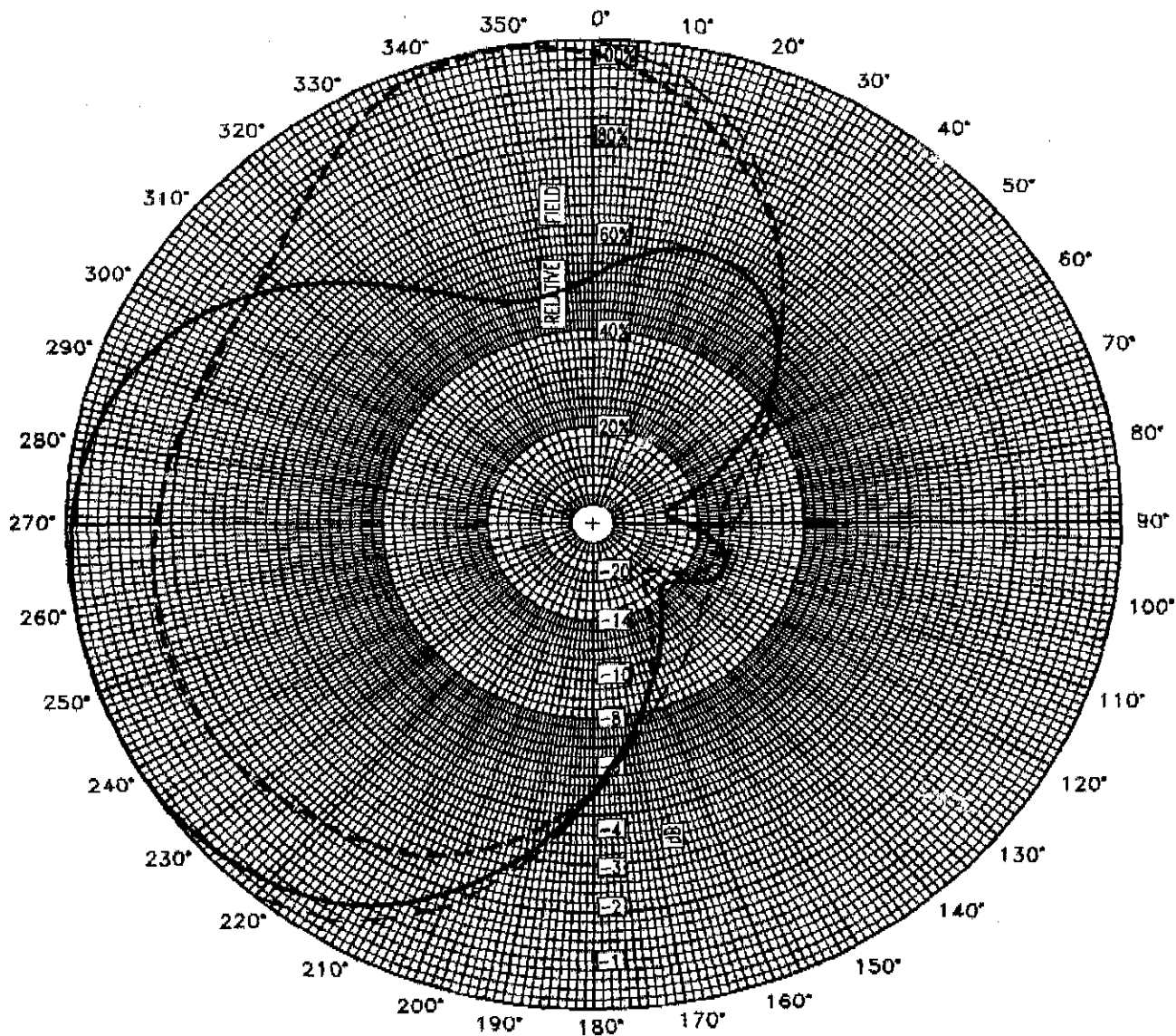
ERP = 14.00 kW

November 14, 2003

JMPC-4 RFR DA

TABULATION OF MEASURED FIELDS

BEARING	HORIZONTAL POLARIZATION		VERTICAL POLARIZATION	
	FIELD	ERP(KW)	FIELD	ERP(KW)
0	0.510	3.64	0.975	13.31
10	0.570	4.55	0.905	11.47
20	0.600	5.04	0.805	9.07
30	0.590	4.87	0.695	6.76
40	0.540	4.08	0.560	4.39
50	0.450	2.84	0.450	2.84
60	0.330	1.52	0.375	1.97
70	0.220	0.68	0.300	1.26
80	0.140	0.27	0.255	0.91
90	0.175	0.43	0.245	0.84
100	0.245	0.84	0.250	0.88
110	0.265	0.98	0.245	0.84
120	0.245	0.84	0.215	0.65
130	0.190	0.51	0.150	0.32
140	0.200	0.56	0.145	0.29
150	0.260	0.95	0.210	0.62
160	0.335	1.57	0.325	1.48
170	0.435	2.65	0.445	2.77
180	0.560	4.24	0.555	4.31
190	0.695	6.57	0.645	5.82
200	0.810	9.19	0.720	7.26
210	0.910	11.59	0.775	8.41
220	0.960	12.90	0.805	9.07
230	0.990	13.72	0.830	9.64
240	1.000	14.00	0.845	10.00
250	1.000	14.00	0.850	10.12
260	1.000	14.00	0.845	10.00
270	0.990	13.72	0.830	9.64
280	0.970	13.17	0.815	9.30
290	0.930	12.11	0.795	8.85
300	0.865	10.48	0.795	8.85
310	0.765	8.19	0.810	9.19
320	0.650	5.92	0.860	10.35
330	0.550	4.24	0.930	12.11
340	0.485	3.29	0.985	13.58
350	0.480	3.23	1.000	14.00
MAXIMUM FIELDS:				
260	1.000	14.00		
350			1	14.00
MINIMUM FIELDS:				
85	0.140	0.27		
135			0.135	0.26



## Azimuth Pattern

Customer: KPMW

Date: November 14, 2003

Frequency: 105.5 MHz

Type Number: JAMP-4 RFR DA

Notes:

MEASURED PATTERN IN FULL SCALE

HPOL

VPOL

--- LIMITS



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KPMW

ERP = 14.00 kW

November 14, 2003

JMPC-4 RFR DA

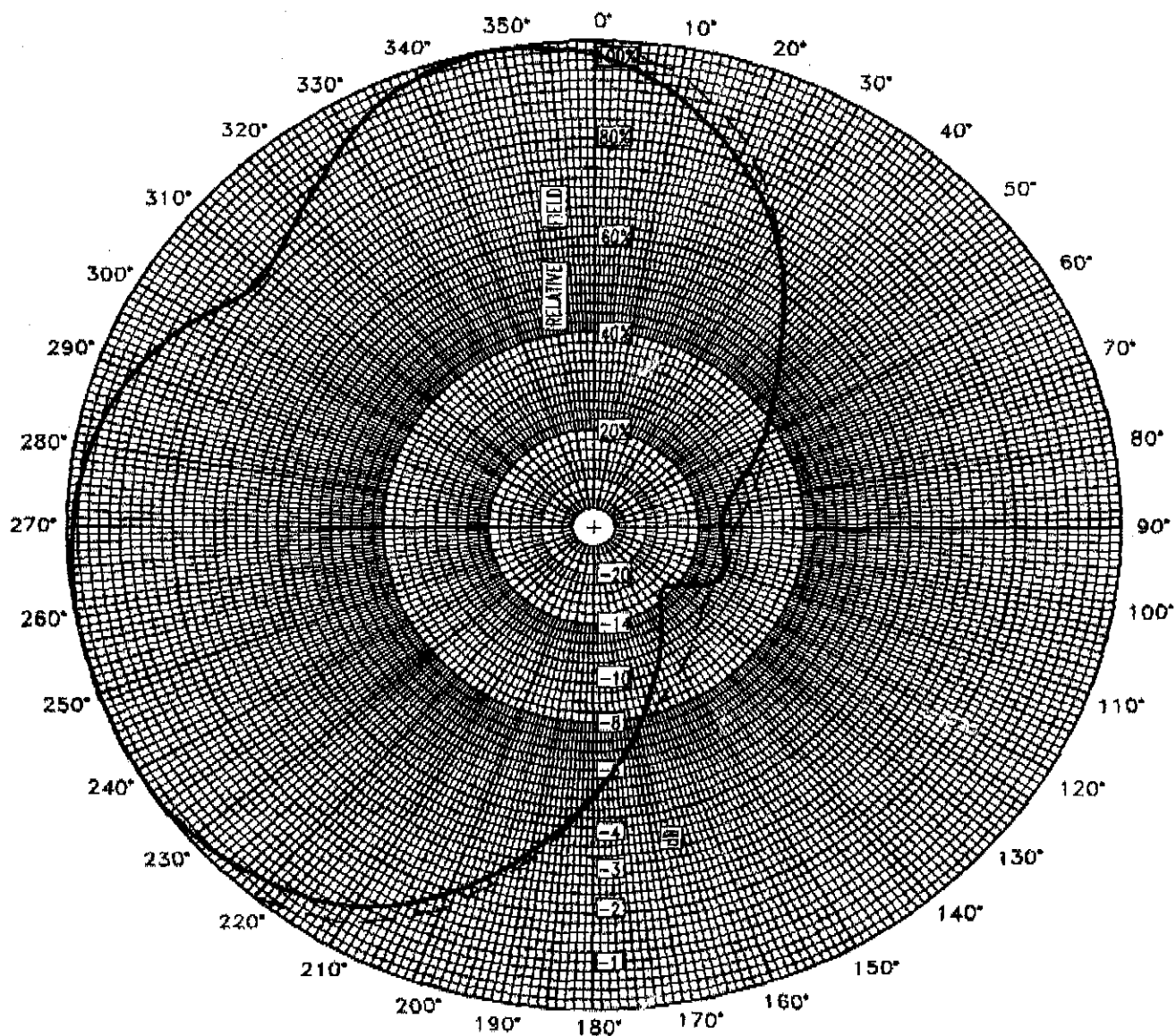
TABULATION OF RELATIVE FIELD

COMPOSITE MEASURED PATTERN (H & V)

BEARING	FIELD	ERP (kW)	dBk
0	0.975	13.31	11.24
10	0.905	11.47	10.58
20	0.805	9.07	9.58
30	0.695	6.76	8.30
40	0.580	4.39	6.43
50	0.450	2.84	4.53
60	0.375	1.97	2.94
70	0.300	1.28	1.00
80	0.255	0.91	-0.41
90	0.245	0.84	-0.76
100	0.250	0.88	-0.58
110	0.265	0.98	-0.07
120	0.245	0.84	-0.76
130	0.190	0.51	-2.96
140	0.200	0.56	-2.52
150	0.280	0.95	-0.24
160	0.335	1.57	1.96
170	0.445	2.77	4.43
180	0.555	4.31	6.35
190	0.685	6.57	8.18
200	0.810	9.19	9.63
210	0.910	11.59	10.64
220	0.980	12.90	11.11
230	0.990	13.72	11.37
240	1.000	14.00	11.46
250	1.000	14.00	11.46
260	1.000	14.00	11.46
270	0.990	13.72	11.37
280	0.970	13.17	11.20
290	0.930	12.11	10.83
300	0.865	10.48	10.20
310	0.810	9.19	9.63
320	0.860	10.35	10.15
330	0.930	12.11	10.83
340	0.985	13.58	11.33
350	1.000	14.00	11.46

Relative fields at other azimuths:

45	0.500	225	0.980
135	0.180	315	0.930



# **Azimuth Pattern**

Customer: KPMW

Date: November 14, 2003

Frequency: 105.5 MHz

Type Number: JMPC-4 RFR DA

Notes:

COMPOSITE PATTERN ENVELOPE (H & V)



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