
FM DIRECTIONAL BROADCAST ANTENNA
PROOF-OF-PERFORMANCE

MODEL JFVX 3/2/3(8)R DA

SERIAL NUMBER 16402

WZCO

Chadbourn, NC



6340 Sky Creek Drive • Sacramento, California USA 95828
(916) 383-1177 phone • (916) 383-1182 fax



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

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

TABLE OF CONTENTS

A.	Engineer's Statement	1,2
B.	Mechanical Drawings	3,4
C.	Composite Azimuth Pattern, Plot	5
D.	Composite Azimuth Pattern, Tabulation	6
E.	Azimuth Pattern, Horizontal & Vertical Polarizations, Plot	7
F.	Azimuth Pattern, Horizontal & Vertical Polarizations, Tabulation	8
G.	Elevation Plane Pattern, Plot	9
H.	Elevation Plane Pattern, Tabulation	10



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

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

DATE: February 21, 2012

ANTENNA GAIN H-pol V-pol
relative **3.11**
(dBd) **(4.92)**

RMS OF THE
AZIMUTH PATTERNS:

FM ANTENNA FOR:

STATION: **WZCO**

LOCATION: **Chadbourn, NC**

MODEL NUMBER: **JFVX 3/2/3(8)R DA**

FREQUENCY & ERP: **89.9 MHz, 25.00 kW**

ANTENNA INPUT POWER: **8.049 kW**

ANTENNA BOOM HEADING: **See Dwgs.**

Composite	H-pol	V-pol
0.567	0.000	0.567

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 single bay array of standard vertically-polarized FM panel antennas was used to create the required directional patterns. From experience and by repeated measurements, these elements were adjusted as to position and their feeds were adjusted in amplitude and phase 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 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.



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

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

Station: **WZCO** Model: **JFVX 3/2/3(8)R 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. *Guy wires in the aperture of the array, +/- ten feet of the array center, need to be non-conducting.*

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 21th DAY OF February, 2012

BY: J. Dane Jubera

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

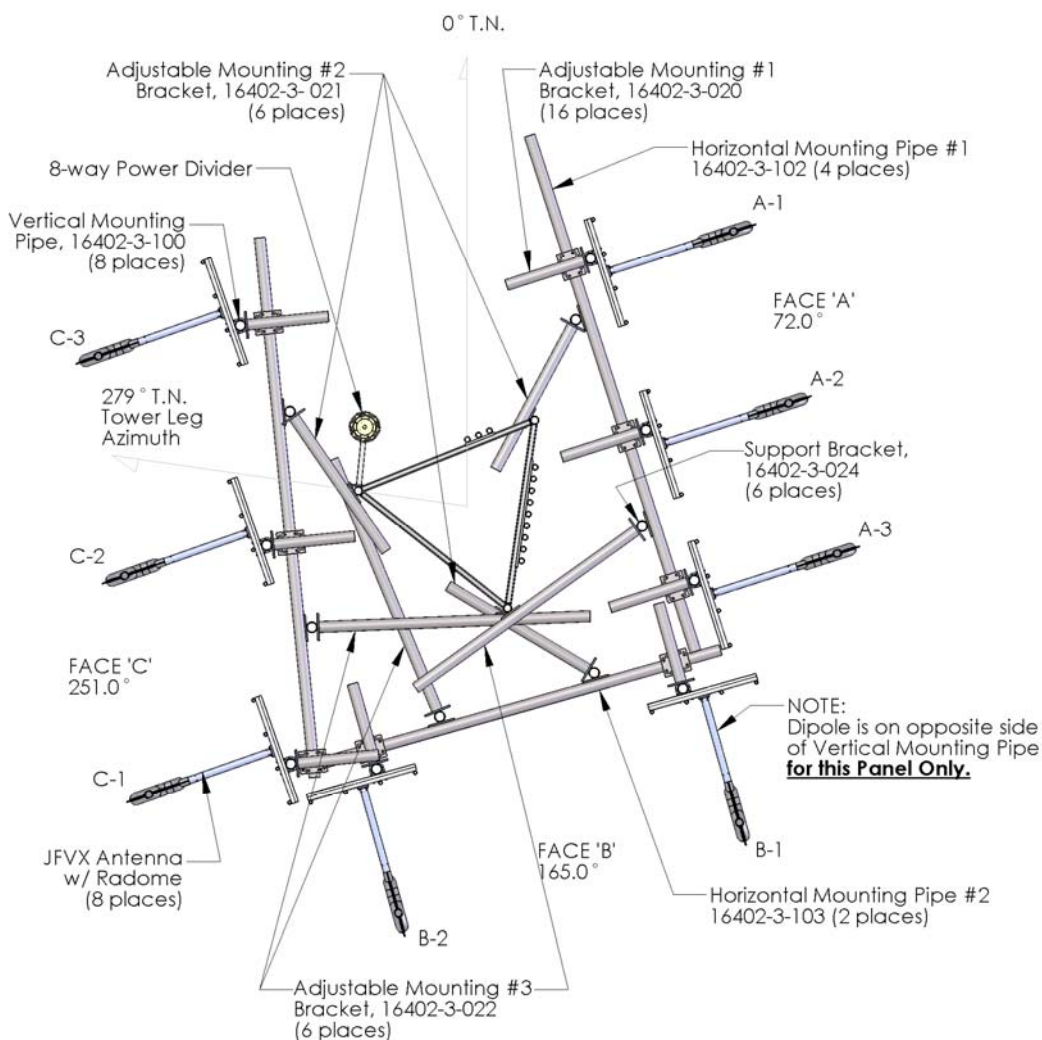


6340 Sky Creek Drive
Sacramento, California 95828 USA

Telephone (916) 383-1177
Fax (916) 383-1182

MECHANICAL DRAWINGS

Top View



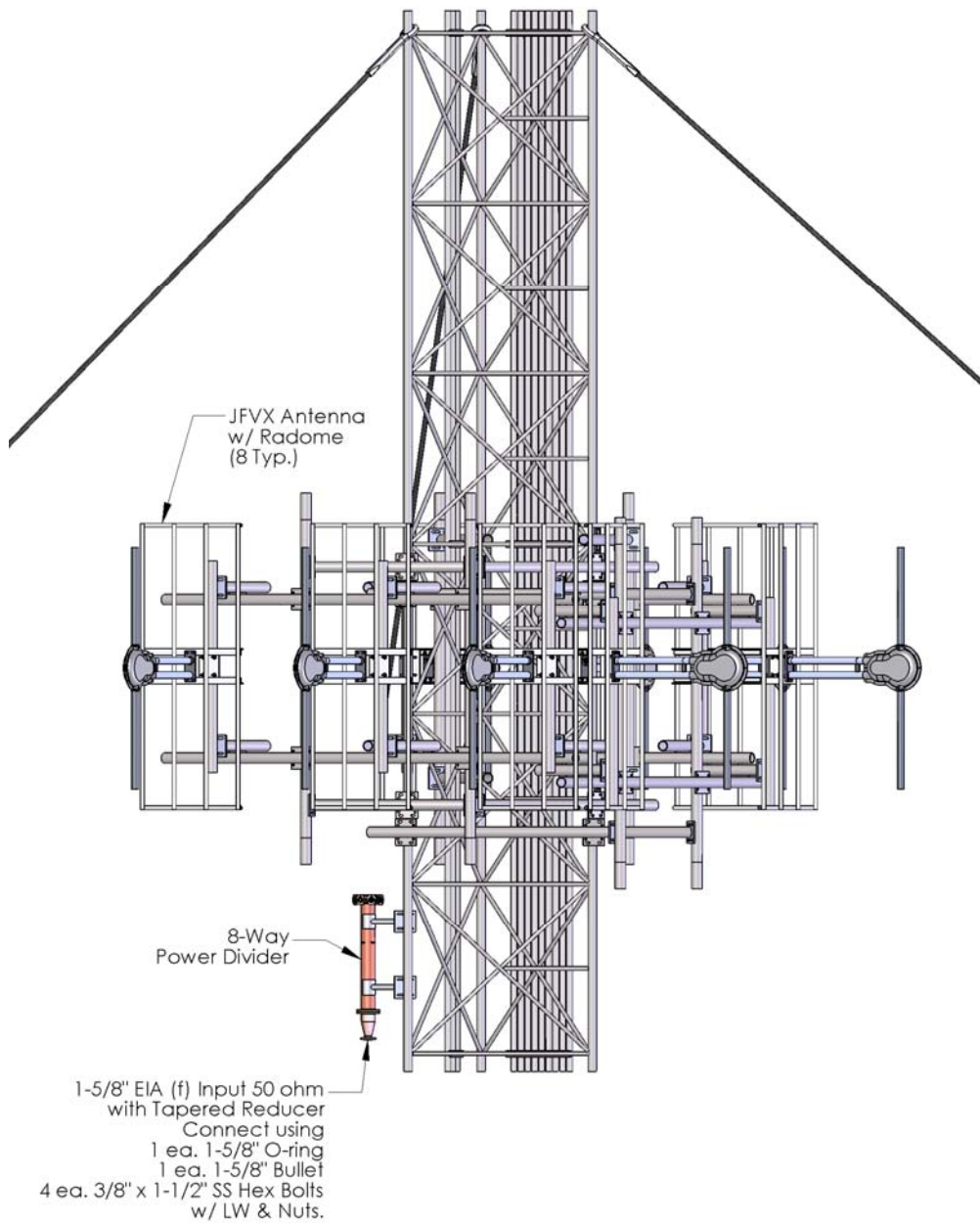


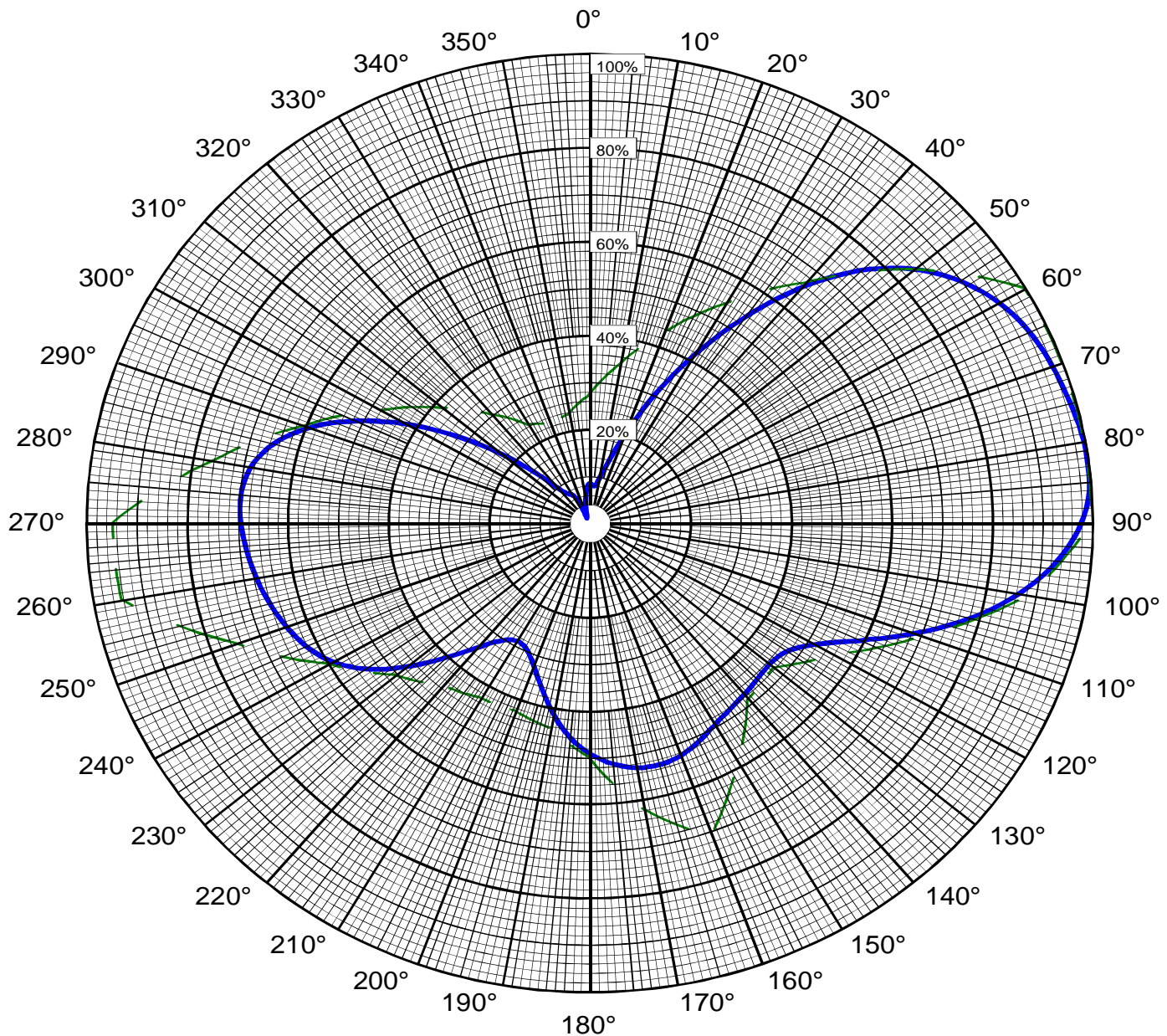
6340 Sky Creek Drive
Sacramento, California 95828 USA

Telephone (916) 383-1177
Fax (916) 383-1182

MECHANICAL DRAWINGS

Side View





Azimuth Pattern

Customer: WZCO

Date: November 16, 2011

Frequency: 89.9 MHz

Type Number: JFVX 3/2/3(8)R DA

Notes:

COMPOSITE PATTERN ENVELOPE (H & V)



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

(916) 383-1177 Fax: (916) 383-1182



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

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

WZCO

ERP = 25.00 kW

November 16, 2011

JFVX 3/2/3(8)R DA

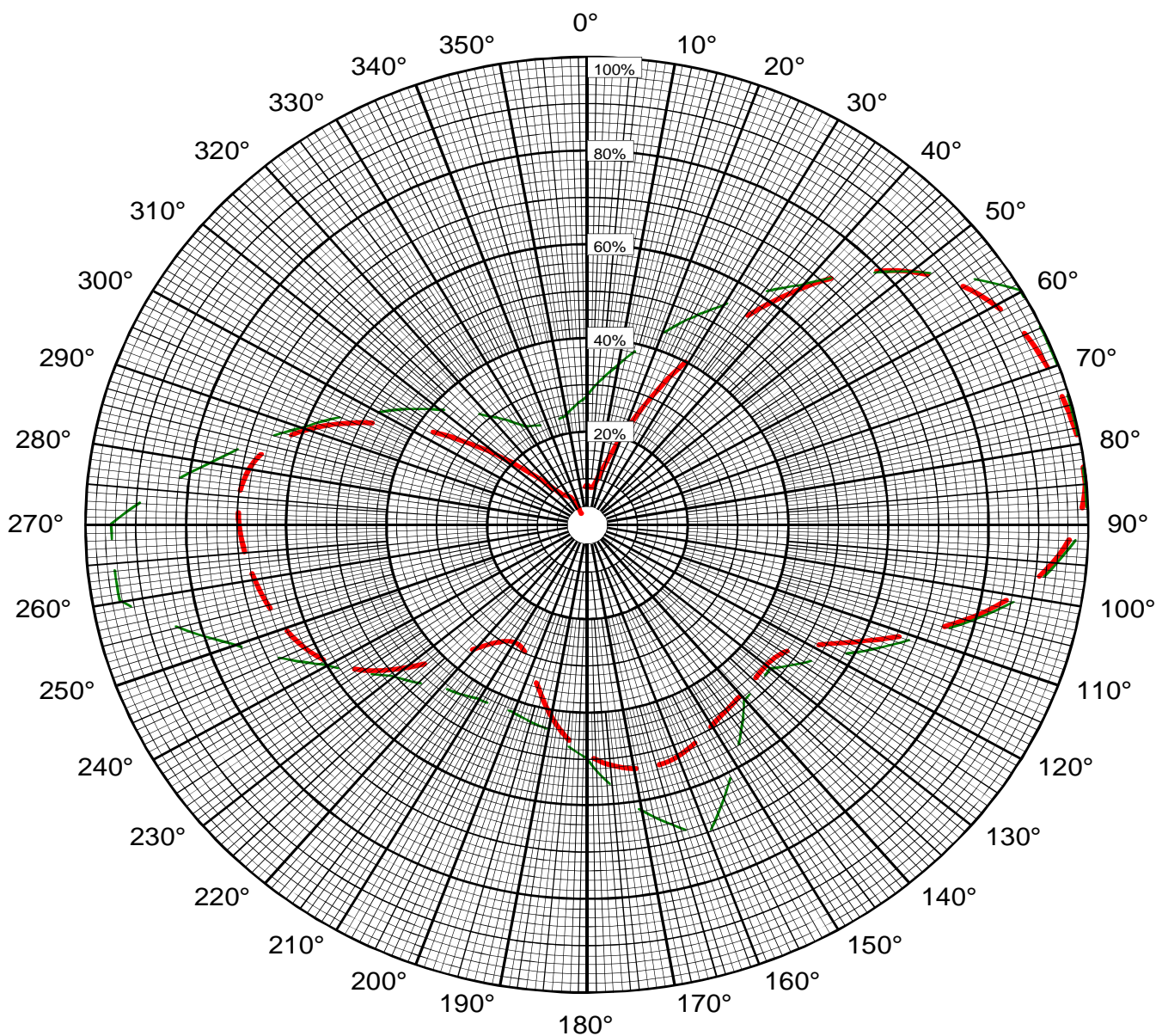
TABULATION OF RELATIVE FIELD

COMPOSITE MEASURED PATTERN (H & V)

<u>BEARING</u>	<u>FIELD</u>	<u>ERP</u> <u>(kW)</u>	<u>dBk</u>
0	0.080	0.16	-7.96
10	0.080	0.16	-7.96
20	0.180	0.81	-0.92
30	0.400	4.00	6.02
40	0.650	10.56	10.24
50	0.840	17.64	12.46
60	0.940	22.09	13.44
70	0.980	24.01	13.80
80	1.000	25.00	13.98
90	0.980	24.01	13.80
100	0.870	18.92	12.77
110	0.690	11.90	10.76
120	0.520	6.76	8.30
130	0.470	5.52	7.42
140	0.480	5.76	7.60
150	0.500	6.25	7.96
160	0.530	7.02	8.46
170	0.530	7.02	8.46
180	0.490	6.00	7.78
190	0.410	4.20	6.24
200	0.320	2.56	4.08
210	0.290	2.10	3.23
220	0.350	3.06	4.86
230	0.480	5.76	7.60
240	0.590	8.70	9.40
250	0.640	10.24	10.10
260	0.670	11.22	10.50
270	0.690	11.90	10.76
280	0.680	11.56	10.63
290	0.590	8.70	9.40
300	0.420	4.41	6.44
310	0.230	1.32	1.21
320	0.100	0.25	-6.02
330	0.070	0.12	-9.12
340	0.030	0.02	-16.48
350	0.020	0.01	-20.00

Relative fields at other azimuths:

45	0.758	225	0.411
135	0.474	315	0.152



Azimuth Pattern

Customer: WZCO

Date: November 16, 2011

Frequency: 89.9 MHz

Type Number: JFVX 3/2/3(8)R DA

Notes:

MEASURED PATTERN IN FULL SCALE

HPOL

VPOL

--- LIMITS



(916) 383-1177 Fax: (916) 383-1182

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



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

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

WZCO

ERP = 25.00 kW

November 16, 2011

JFVX 3/2/3(8)R 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	0.000	0.00	0.080	0.16
10	0.000	0.00	0.080	0.16
20	0.000	0.00	0.180	0.81
30	0.000	0.00	0.400	4.00
40	0.000	0.00	0.650	10.56
50	0.000	0.00	0.840	17.64
60	0.000	0.00	0.940	22.09
70	0.000	0.00	0.980	24.01
80	0.000	0.00	1.000	25.00
90	0.000	0.00	0.980	24.01
100	0.000	0.00	0.870	18.92
110	0.000	0.00	0.690	11.90
120	0.000	0.00	0.520	6.76
130	0.000	0.00	0.470	5.52
140	0.000	0.00	0.480	5.76
150	0.000	0.00	0.500	6.25
160	0.000	0.00	0.530	7.02
170	0.000	0.00	0.530	7.02
180	0.000	0.00	0.490	6.00
190	0.000	0.00	0.410	4.20
200	0.000	0.00	0.320	2.56
210	0.000	0.00	0.290	2.10
220	0.000	0.00	0.350	3.06
230	0.000	0.00	0.480	5.76
240	0.000	0.00	0.590	8.70
250	0.000	0.00	0.640	10.24
260	0.000	0.00	0.670	11.22
270	0.000	0.00	0.690	11.90
280	0.000	0.00	0.680	11.56
290	0.000	0.00	0.590	8.70
300	0.000	0.00	0.420	4.41
310	0.000	0.00	0.230	1.32
320	0.000	0.00	0.100	0.25
330	0.000	0.00	0.070	0.12
340	0.000	0.00	0.030	0.02
350	0.000	0.00	0.020	0.01
MAXIMUM FIELDS:				
355	0.000	0.00		
85			1.000	25.00
MINIMUM FIELDS:				
165	0.000	0.00		
345			0.010	0.00

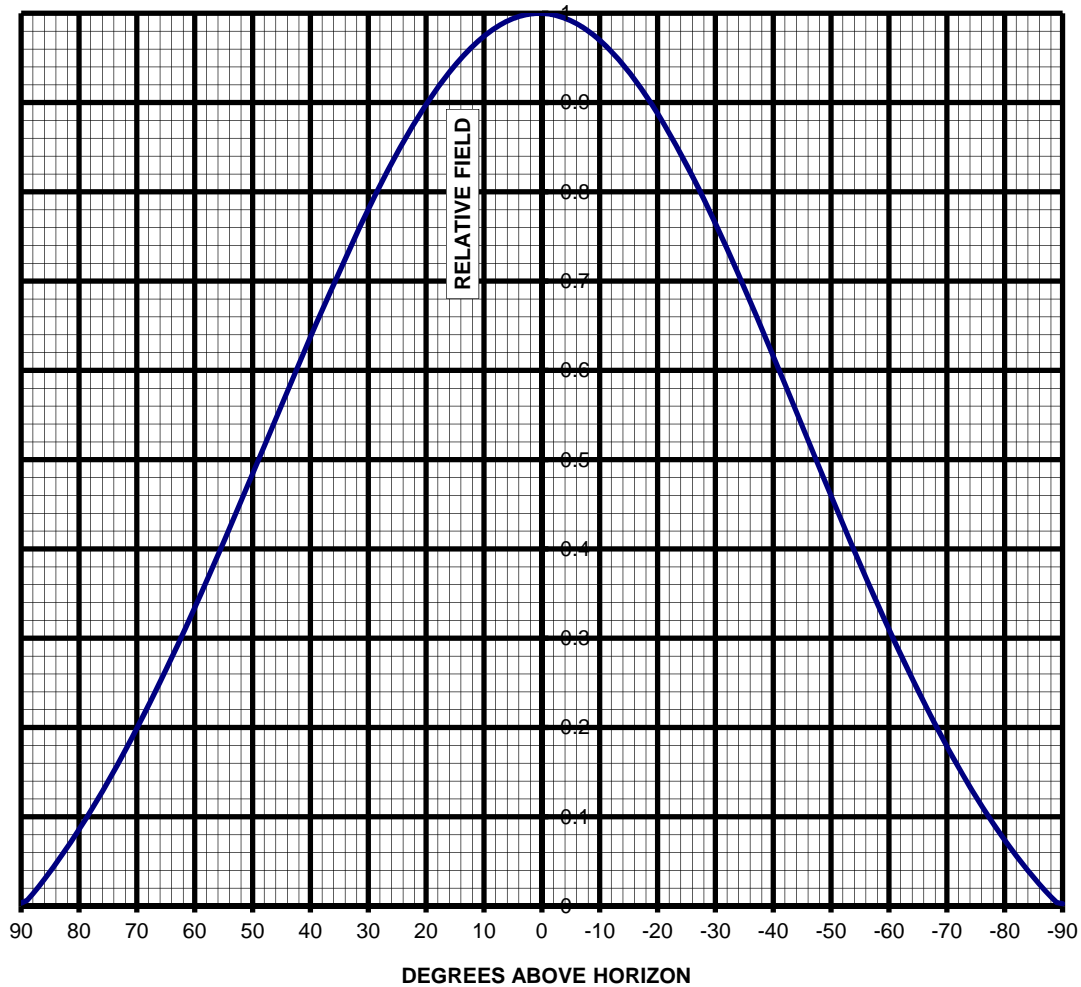


6340 Sky Creek Drive, Sacramento, California 95828
P.O. Box 292880, Sacramento, California 95829-2880

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

PLOT OF ELEVATION PLANE PATTERN

STATION: WZCO 89.9 MHz JFVX-3-2-3(8)R DA .00 lambda spacing





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

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

TABULATION OF ELEVATION PLANE PATTERN

STATION: WZCO 89.9 MHz JFVX-3-2-3(8)R DA .00 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	0.975	-25	0.830	-60	0.310
9	0.980	-26	0.818	-61	0.296
8	0.984	-27	0.805	-62	0.282
7	0.988	-28	0.792	-63	0.268
6	0.991	-29	0.778	-64	0.255
5	0.994	-30	0.765	-65	0.242
4	0.996	-31	0.751	-66	0.229
3	0.998	-32	0.736	-67	0.216
2	0.999	-33	0.722	-68	0.203
1	1.000	-34	0.707	-69	0.191
0	1.000	-35	0.692	-70	0.179
-1	0.999	-36	0.677	-71	0.167
-2	0.998	-37	0.662	-72	0.156
-3	0.997	-38	0.647	-73	0.145
-4	0.995	-39	0.631	-74	0.134
-5	0.992	-40	0.616	-75	0.123
-6	0.988	-41	0.600	-76	0.112
-7	0.985	-42	0.585	-77	0.102
-8	0.980	-43	0.569	-78	0.093
-9	0.975	-44	0.553	-79	0.083
-10	0.970	-45	0.538	-80	0.074
-11	0.964	-46	0.522	-81	0.065
-12	0.957	-47	0.506	-82	0.056
-13	0.950	-48	0.490	-83	0.048
-14	0.943	-49	0.475	-84	0.040
-15	0.935	-50	0.459	-85	0.032
-16	0.926	-51	0.444	-86	0.024
-17	0.917	-52	0.428	-87	0.017
-18	0.908	-53	0.413	-88	0.010
-19	0.898	-54	0.398	-89	0.004
-20	0.888	-55	0.383	-90	0.003
-21	0.877	-56	0.368		
-22	0.866	-57	0.353		
-23	0.854	-58	0.339		
-24	0.843	-59	0.324		