
FM DIRECTIONAL BROADCAST ANTENNA
PROOF-OF-PERFORMANCE

MODEL JMPC-3 RFR DA

SERIAL NUMBER 12365

KEXP-FM

Seattle, WA



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(916) 383-1177 phone • (916) 383-1182 fax



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DATE: January 5, 2005

ANTENNA GAIN	<u>H-pol</u>	<u>V-pol</u>
relative	2.01	2.01
(dBd)	(3.04)	(3.04)

RMS OF THE
AZIMUTH PATTERNS:

FM ANTENNA FOR:

STATION: **KEXP-FM**

LOCATION: **Seattle, WA**

MODEL NUMBER: **JMPC-3 RFR DA**

FREQUENCY & ERP: **90.3 MHz, 3.30 kW**

ANTENNA INPUT POWER: **1.64 kW**

ANTENNA BOOM HEADING: **22° T.**

Composite	<u>H-pol</u>	<u>V-pol</u>
0.783	0.658	0.748

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 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

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.



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Station: **KEXP-FM**

Model: **JMPC-3 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 5th DAY OF January, 2005

BY: J. Dane Jubera

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



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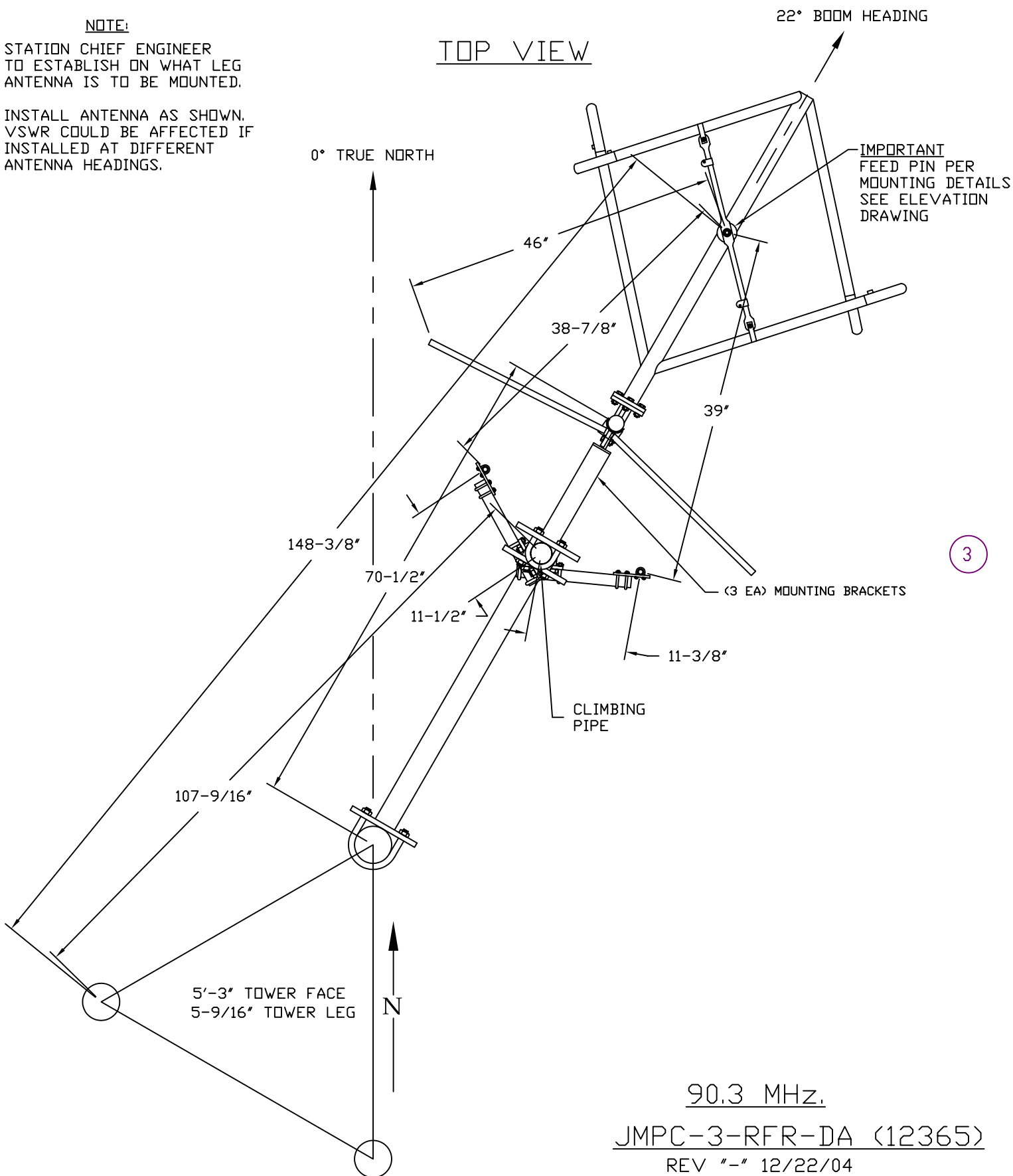
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NOTE:

STATION CHIEF ENGINEER
TO ESTABLISH ON WHAT LEG
ANTENNA IS TO BE MOUNTED.

INSTALL ANTENNA AS SHOWN.
VSWR COULD BE AFFECTED IF
INSTALLED AT DIFFERENT
ANTENNA HEADINGS.

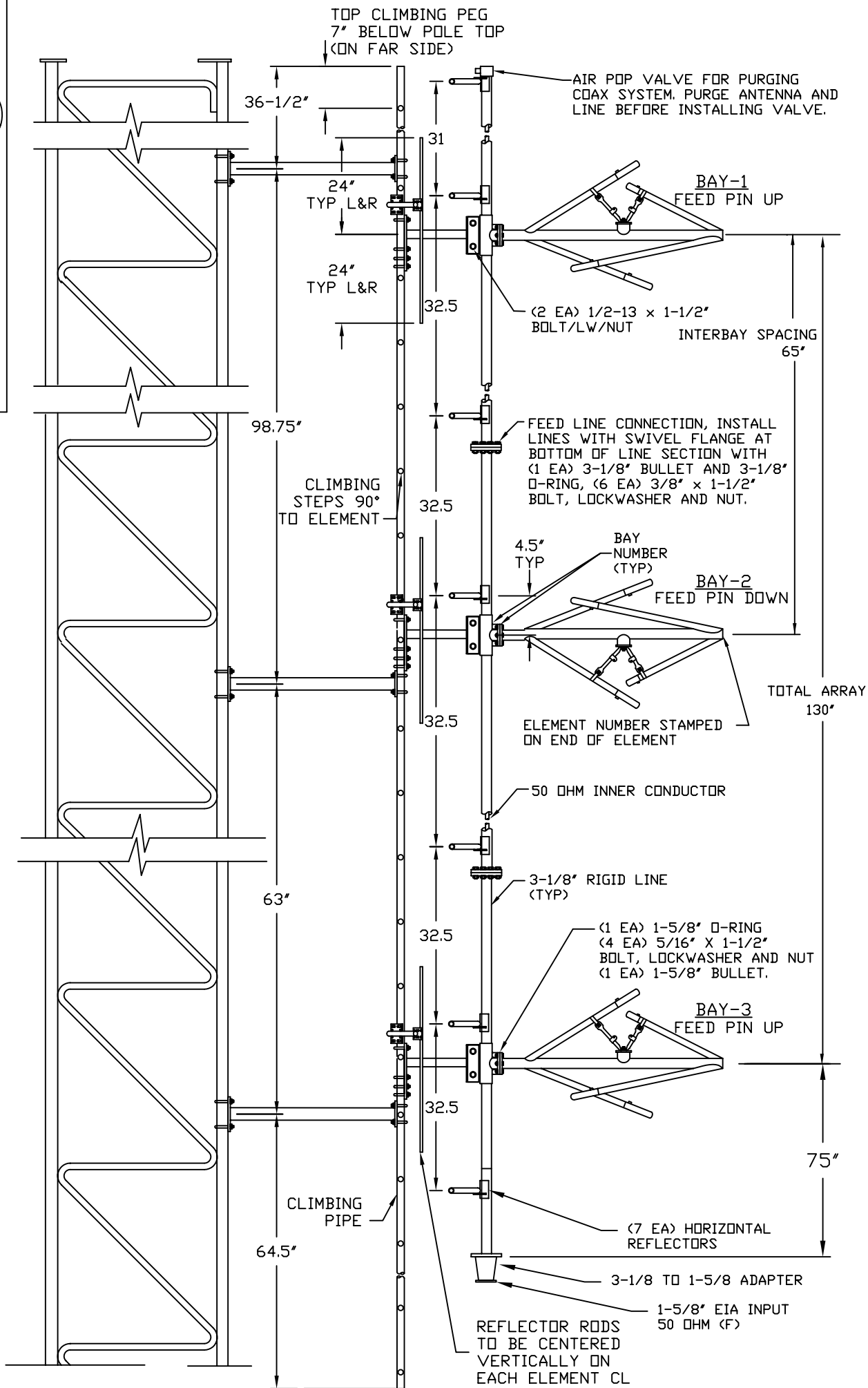
TOP VIEW

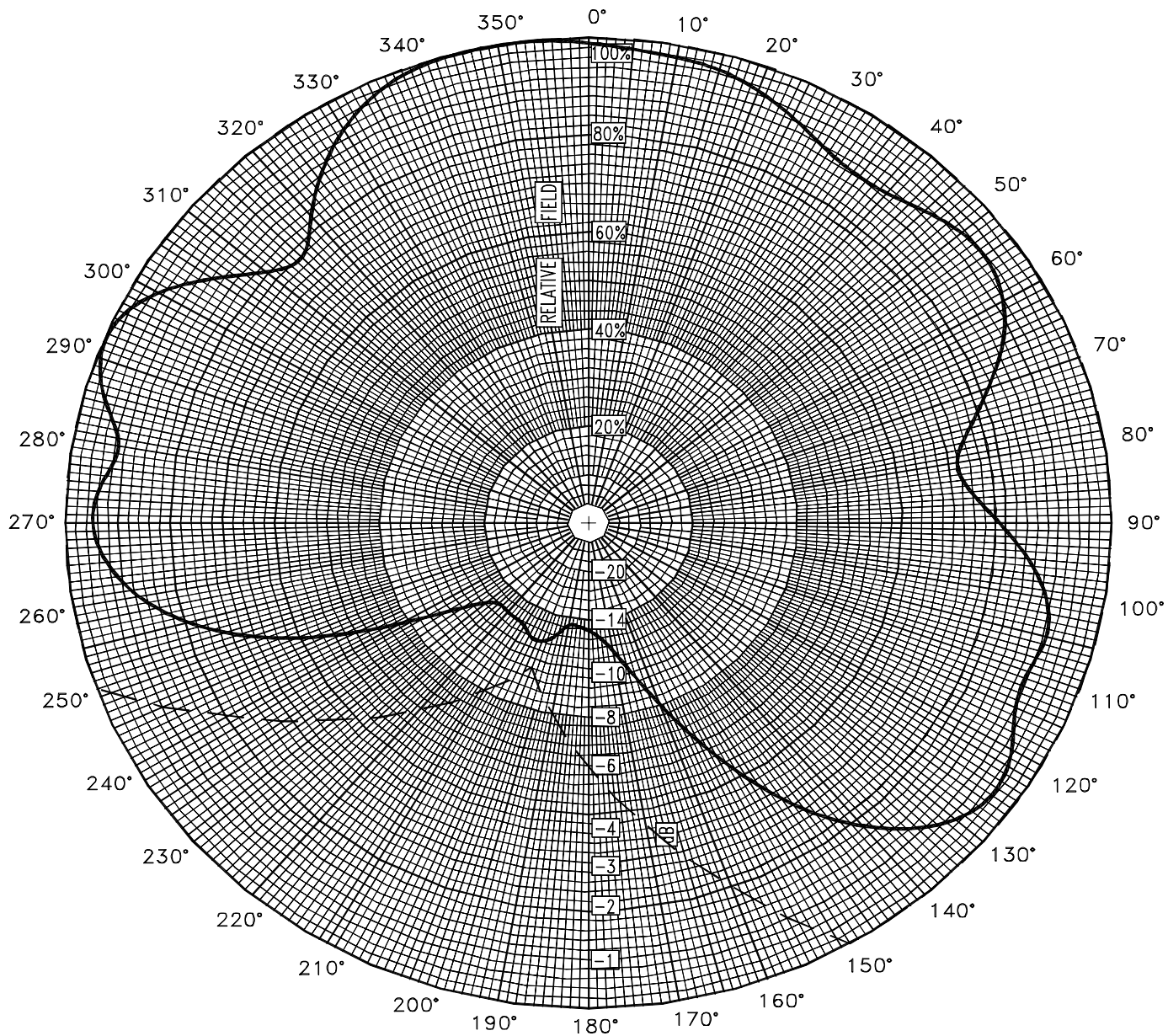


	
JAMPB O. Box 292880 6340 Sky Creek Dr Sacramento, Ca. 95828	
ANTENNA MOUNTING DRAWING JNPC-3 RFR DA	
CUSTOMER REF. SPEC. OF MIS.	FREQ: 90.3 MHZ
LOCATION: SEATTLE, WA	JOB #: 12365
SCALE: NONE	DATE: 12/22/04
DRAWN BY: S. MATHIAS	DRAWING NO: 12365MTG.DWG

NOTES:

1. ELEMENTS MAY BE SWUNG FROM DIRECTLY OFF TOWER LEG A MAXIMUM OF 15° TO AVOID CONFLICT WITH GUY WIRES.
2. USE OF GLASS RODS OR BREAK UP INSULATORS IN GUY WIRES IS OPTIONAL.
3. DELETE ALL REFERENCES TO DEICER HARDWARE ON THIS DRAWING IF DEICERS NOT SUPPLIED WITH ORDER.
4. PURGE ANTENNA SYSTEM AND COAX OF MOISTURE BEFORE APPLYING ANY R.F. POWER.
5. ALL METAL PARTS ARE AT D.C. GROUND THROUGH ELEMENT GROUNDING.
6. REMOVE PAINT AT TOWER LEG CONNECTIONS TO INSURE PROPER GROUNDING.





Azimuth Pattern

Customer: KEXP-FM

Date: December 9, 2004

Frequency: 90.3 MHz

Type Number: JMPC-3 RFR DA

Notes:

COMPOSITE PATTERN ENVELOPE (H & V)



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KEXP-FM

ERP = 3.30 kW

December 9, 2004

JMPC-3 RFR DA

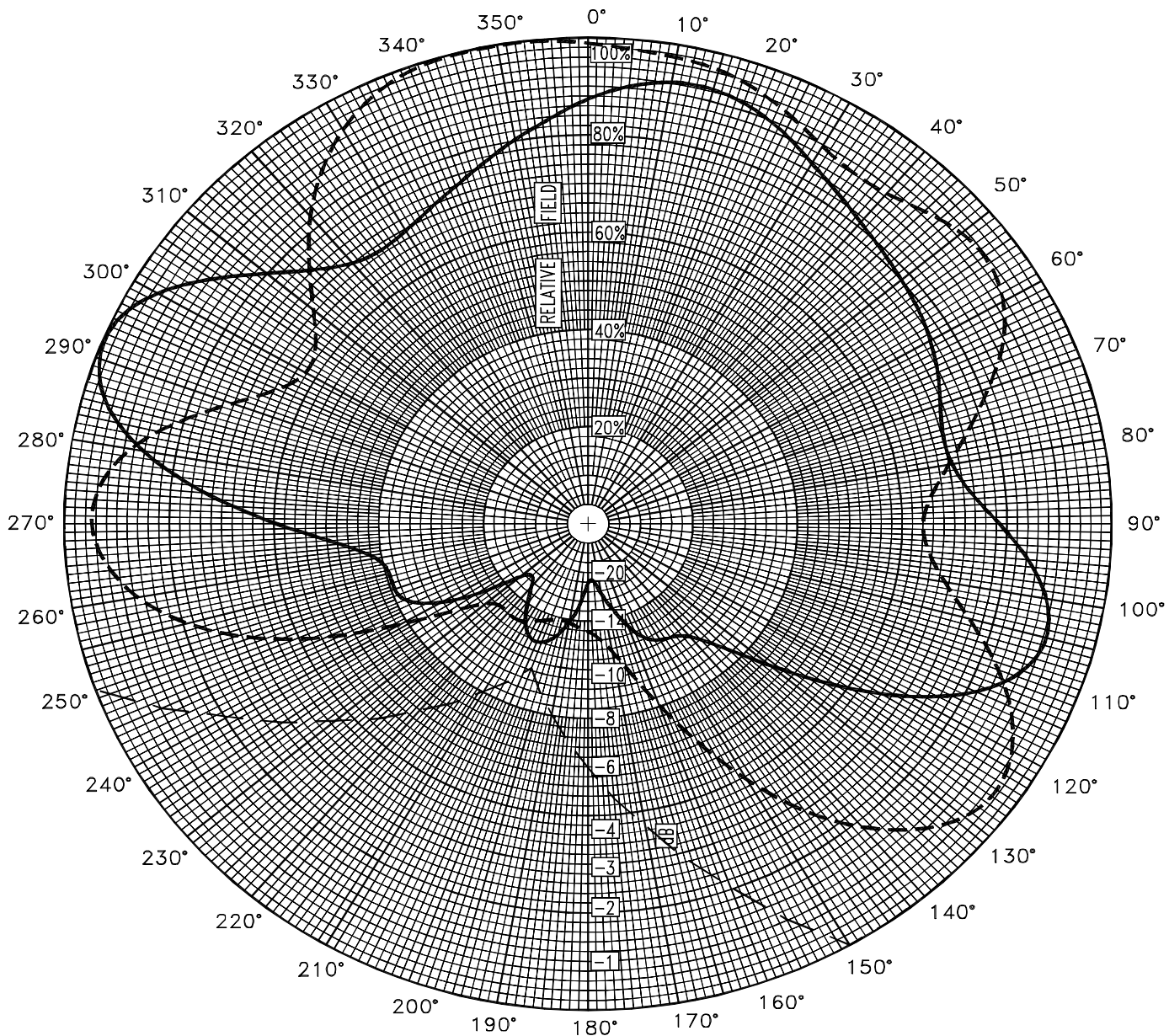
TABULATION OF RELATIVE FIELD

COMPOSITE MEASURED PATTERN (H & V)

<u>BEARING</u>	<u>FIELD</u>	<u>ERP</u> <u>(kW)</u>	<u>dBk</u>
0	0.990	3.23	5.10
10	0.975	3.14	4.97
20	0.950	2.98	4.74
30	0.895	2.64	4.22
40	0.885	2.58	4.12
50	0.935	2.88	4.60
60	0.920	2.79	4.46
70	0.815	2.19	3.41
80	0.703	1.63	2.13
90	0.787	2.04	3.11
100	0.894	2.64	4.21
110	0.892	2.62	4.19
120	0.940	2.92	4.65
130	0.945	2.95	4.69
140	0.820	2.22	3.46
150	0.615	1.25	0.96
160	0.400	0.53	-2.77
170	0.265	0.23	-6.35
180	0.220	0.16	-7.97
190	0.207	0.14	-8.51
200	0.262	0.23	-6.45
210	0.243	0.19	-7.12
220	0.240	0.19	-7.21
230	0.250	0.21	-6.86
240	0.420	0.58	-2.35
250	0.695	1.59	2.02
260	0.880	2.56	4.07
270	0.955	3.01	4.79
280	0.895	2.64	4.22
290	1.000	3.30	5.19
300	0.956	3.02	4.79
310	0.802	2.12	3.27
320	0.830	2.27	3.57
330	0.940	2.92	4.65
340	0.995	3.27	5.14
350	1.000	3.30	5.19

Relative fields at other azimuths:

45	0.910	225	0.235
135	0.895	315	0.755



Azimuth Pattern

Customer: KEXP-FM

Date: December 9, 2004

Frequency: 90.3 MHz

Type Number: JMPC-3 RFR DA

Notes: MEASURED PATTERN IN FULL SCALE

———— HPOL VPOL - - - - LIMITS



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KEXP-FM ERP = 3.30 kW December 9, 2004

JMPC-3 RFR 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	0.877	2.54	0.990	3.23
10	0.926	2.83	0.975	3.14
20	0.914	2.76	0.950	2.98
30	0.856	2.42	0.895	2.64
40	0.810	2.16	0.885	2.58
50	0.782	2.02	0.935	2.88
60	0.756	1.89	0.920	2.79
70	0.716	1.69	0.815	2.19
80	0.703	1.63	0.700	1.62
90	0.787	2.04	0.635	1.33
100	0.894	2.64	0.690	1.57
110	0.892	2.62	0.830	2.27
120	0.722	1.72	0.940	2.92
130	0.457	0.69	0.945	2.95
140	0.298	0.29	0.820	2.22
150	0.278	0.25	0.615	1.25
160	0.229	0.17	0.400	0.53
170	0.150	0.07	0.265	0.23
180	0.116	0.04	0.220	0.16
190	0.207	0.14	0.205	0.14
200	0.262	0.23	0.210	0.15
210	0.243	0.19	0.235	0.18
220	0.167	0.09	0.240	0.19
230	0.163	0.09	0.250	0.21
240	0.330	0.36	0.420	0.58
250	0.396	0.52	0.695	1.59
260	0.403	0.54	0.880	2.56
270	0.602	1.20	0.955	3.01
280	0.875	2.53	0.895	2.64
290	1.000	3.30	0.725	1.73
300	0.956	3.02	0.615	1.25
310	0.802	2.12	0.685	1.55
320	0.696	1.60	0.830	2.27
330	0.695	1.60	0.940	2.92
340	0.739	1.80	0.995	3.27
350	0.804	2.13	1.000	3.30
MAXIMUM FIELDS:				
295	1.000	3.30		
355			1	3.30
MINIMUM FIELDS:				
175	0.113	0.04		
195			0.205	0.14

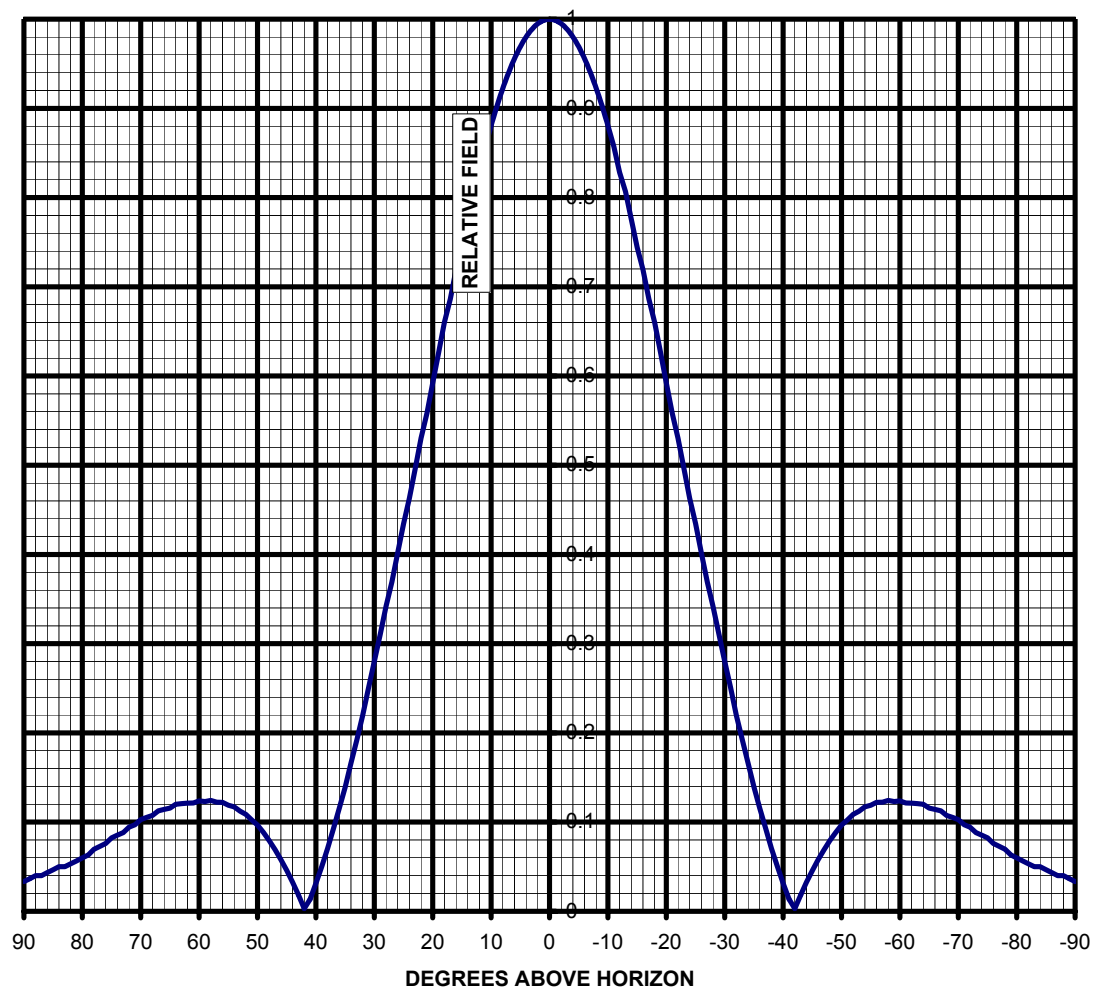


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PLOT OF ELEVATION PLANE PATTERN

STATION: KEXP-FM 90.3 MHz JMPC-3 RFR DA .50 lambda spacing





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TABULATION OF ELEVATION PLANE PATTERN

STATION: KEXP-FM 90.3 MHz JMPC-3 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	0.881	-25	0.435	-60	0.124
9	0.903	-26	0.402	-61	0.121
8	0.922	-27	0.369	-62	0.121
7	0.940	-28	0.342	-63	0.121
6	0.956	-29	0.310	-64	0.120
5	0.969	-30	0.280	-65	0.116
4	0.980	-31	0.251	-66	0.114
3	0.989	-32	0.219	-67	0.113
2	0.995	-33	0.192	-68	0.107
1	0.999	-34	0.166	-69	0.105
0	1.000	-35	0.139	-70	0.103
-1	0.999	-36	0.115	-71	0.097
-2	0.995	-37	0.093	-72	0.094
-3	0.989	-38	0.070	-73	0.088
-4	0.980	-39	0.050	-74	0.085
-5	0.969	-40	0.031	-75	0.082
-6	0.956	-41	0.014	-76	0.076
-7	0.940	-42	0.003	-77	0.073
-8	0.922	-43	0.018	-78	0.070
-9	0.903	-44	0.033	-79	0.063
-10	0.881	-45	0.046	-80	0.060
-11	0.857	-46	0.058	-81	0.057
-12	0.828	-47	0.069	-82	0.053
-13	0.807	-48	0.079	-83	0.050
-14	0.776	-49	0.088	-84	0.050
-15	0.744	-50	0.097	-85	0.047
-16	0.719	-51	0.102	-86	0.043
-17	0.686	-52	0.109	-87	0.040
-18	0.660	-53	0.112	-88	0.040
-19	0.626	-54	0.117	-89	0.037
-20	0.592	-55	0.119	-90	0.033
-21	0.558	-56	0.122		
-22	0.530	-57	0.122		
-23	0.496	-58	0.124		
-24	0.463	-59	0.123		