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

**MODEL JMPC-2D DA**

**SERIAL NUMBER 11935**

**WLAB**

**Ft. Wayne, IN**



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**DATE:** July 7, 2004

<b>ANTENNA GAIN</b>	<u>H-pol</u>	<u>V-pol</u>
relative	<b>2.49</b>	<b>2.49</b>
(dBd)	<b>(3.96)</b>	<b>(3.96)</b>

RMS OF THE  
AZIMUTH PATTERNS:

**FM ANTENNA FOR:**

STATION: **WLAB**

LOCATION: **Ft. Wayne, IN**

MODEL NUMBER: **JMPC-2D DA**

FREQUENCY & ERP: **88.3 MHz, 3.20 kW**

ANTENNA INPUT POWER: **1.28 kW**

ANTENNA BOOM HEADING: **186° T.**

Composite	H-pol	V-pol
<b>0.660</b>	<b>0.630</b>	<b>0.638</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 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 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: **WLAB** Model: **JMPC-2D 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**

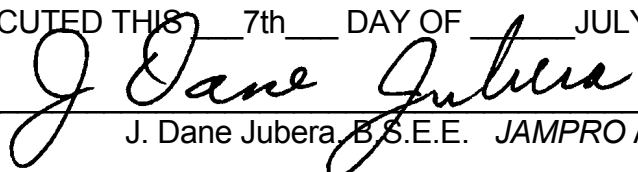
In the development of this pattern, *JAMPRO* antennas, Inc. observed known requirements of the FCC, as stated on the station construction permit.

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

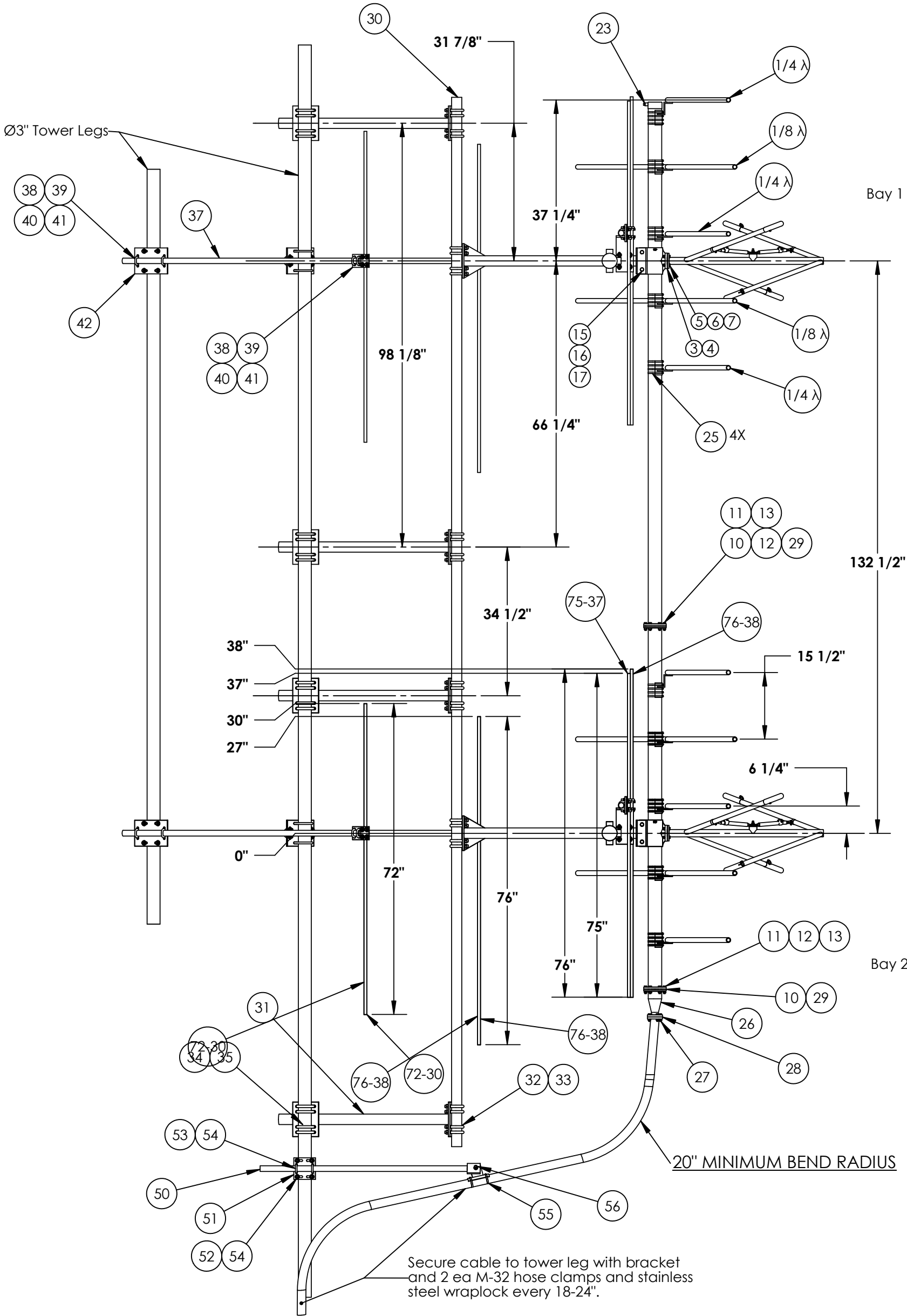
This certification, with its calculations were performed by J. Dane Jubera, B.S.E.E., Electrical Engineer, *JAMPRO* Antennas, Inc.

EXECUTED THIS 7th DAY OF JULY, 2004

BY:

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

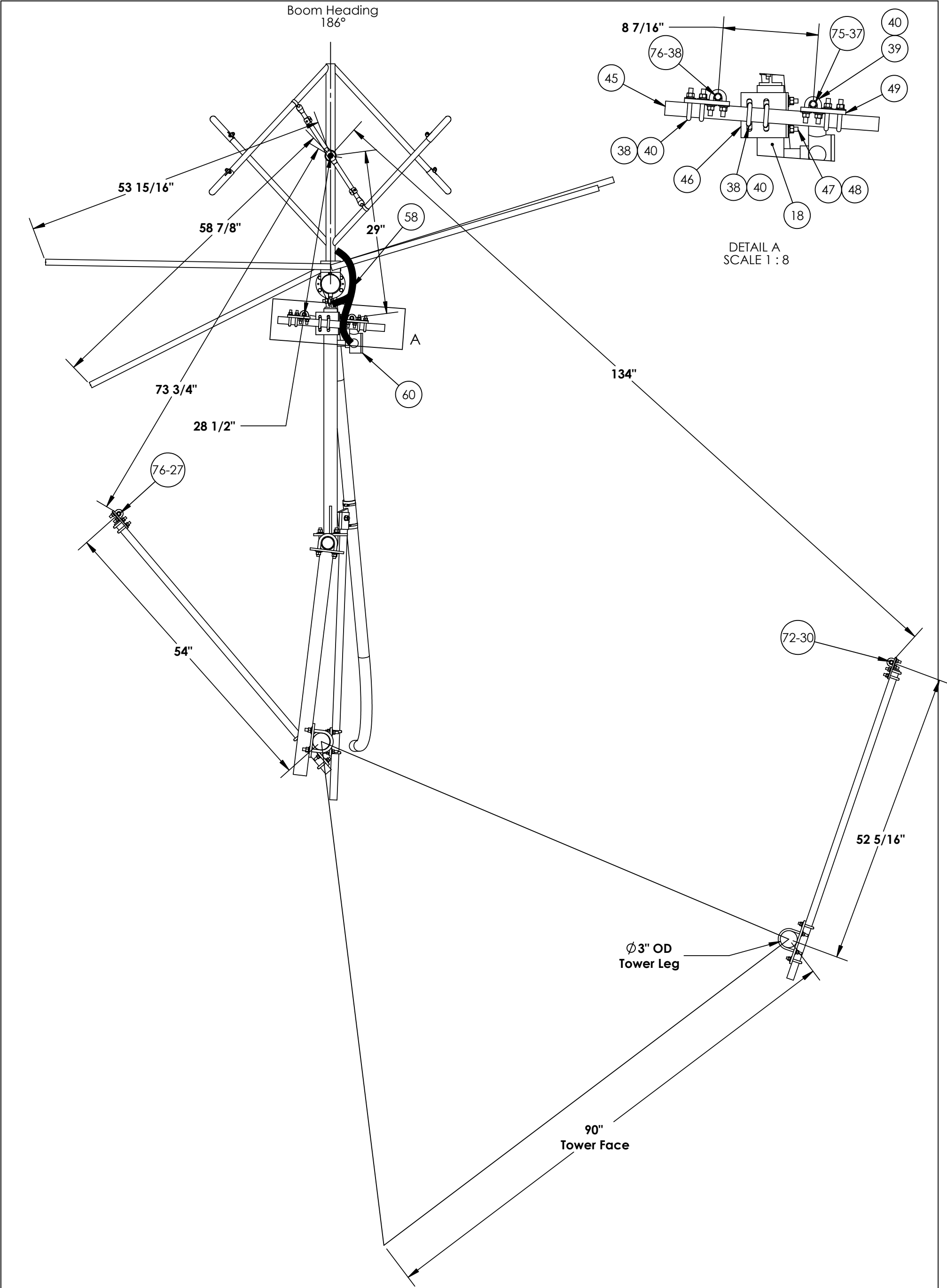
- Notes:
1. Vertical Reflector ID Format xx-yy Where xx Refers to Overall Length and yy Refers to Height of Reflector Top Above Element Centerline.
  2. Horizontal Reflectors Denoted by 1/4 or 1/8 Lamda.
  3. Top Reflector on Bay 1 is Unique.
  4. Elements may be swung from directly off tower leg a maximum 15° to avoid conflict with guy wires.
  5. Use of glass rods or break-up insulators in guy wires is optional.
  6. Using item 23, purge antenna system and coax of moisture before applying any RF power.
  7. All metal parts are at DC Ground through element grounding.
  8. Remove paint at tower leg connections to ensure proper grounding.



**PROPRIETARY AND CONFIDENTIAL**  
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF JAMPRO ANTENNAS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF JAMPRO ANTENNAS IS PROHIBITED.

		UNLESS OTHERWISE SPECIFIED:			NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN			
		TOLERANCES:	CHECKED			
		FRACTIONAL ±	ENG APPR.			
		ANGULAR: MACH ± BEND ±	MFG APPR.			
		TWO PLACE DECIMAL ±	Q.A.			
		THREE PLACE DECIMAL ±	COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:				
		MATERIAL				
		FINISH				
NEXT ASSY	USED ON					
APPLICATION		DO NOT SCALE DRAWING				

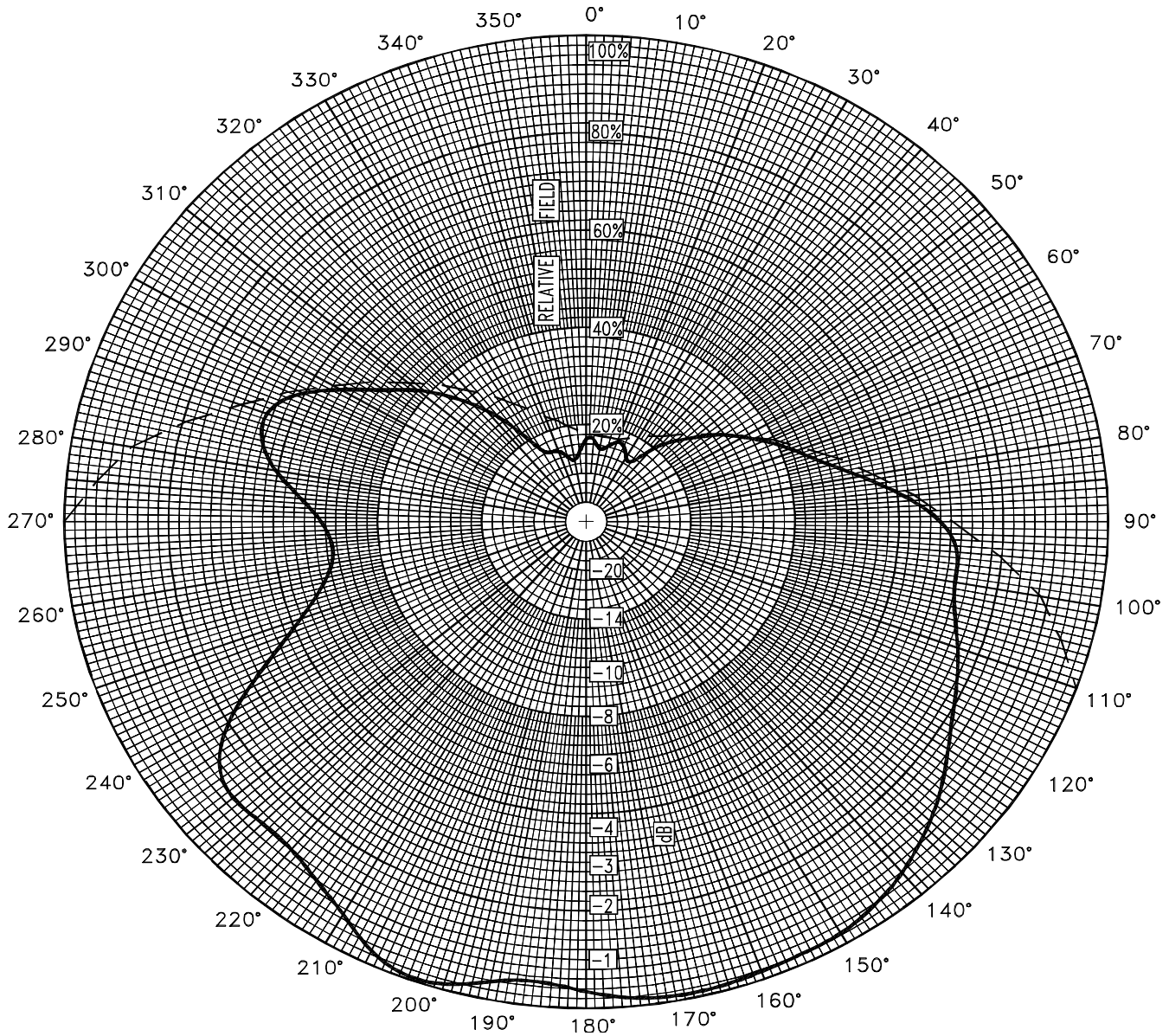
Jampro Antennas		
TITLE:		
System Layout		
JMPC-2D-DA		
WLAB - 88.3 MHz		
SIZE	DWG. NO.	REV
<b>B</b>	11935-00	
SCALE: 1:24	WEIGHT:	SHEET 1 OF 3



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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ±    BEND ± TWO PLACE DECIMAL    ± THREE PLACE DECIMAL    ±	DRAWN		
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
		FINISH			
NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DRAWING			

Jampro Antennas		
TITLE:		
System Layout		
JMPC-2D-DA		
WLAB - 88.3 MHz		
SIZE	DWG. NO.	REV
<b>B</b>	11935-00	
SCALE: 1:16	WEIGHT:	SHEET 2 OF 3



**Azimuth Pattern**

Customer: <u>WLAB</u>	Date: <u>June 22, 2004</u>
Frequency: <u>88.3 MHz</u>	Type Number: <u>JMPC-2D DA</u>
Notes: _____	
COMPOSITE PATTERN ENVELOPE (H & V )	



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WLAB

ERP = 3.20 kW

June 22, 2004

JMPC-2D DA

TABULATION OF RELATIVE FIELD

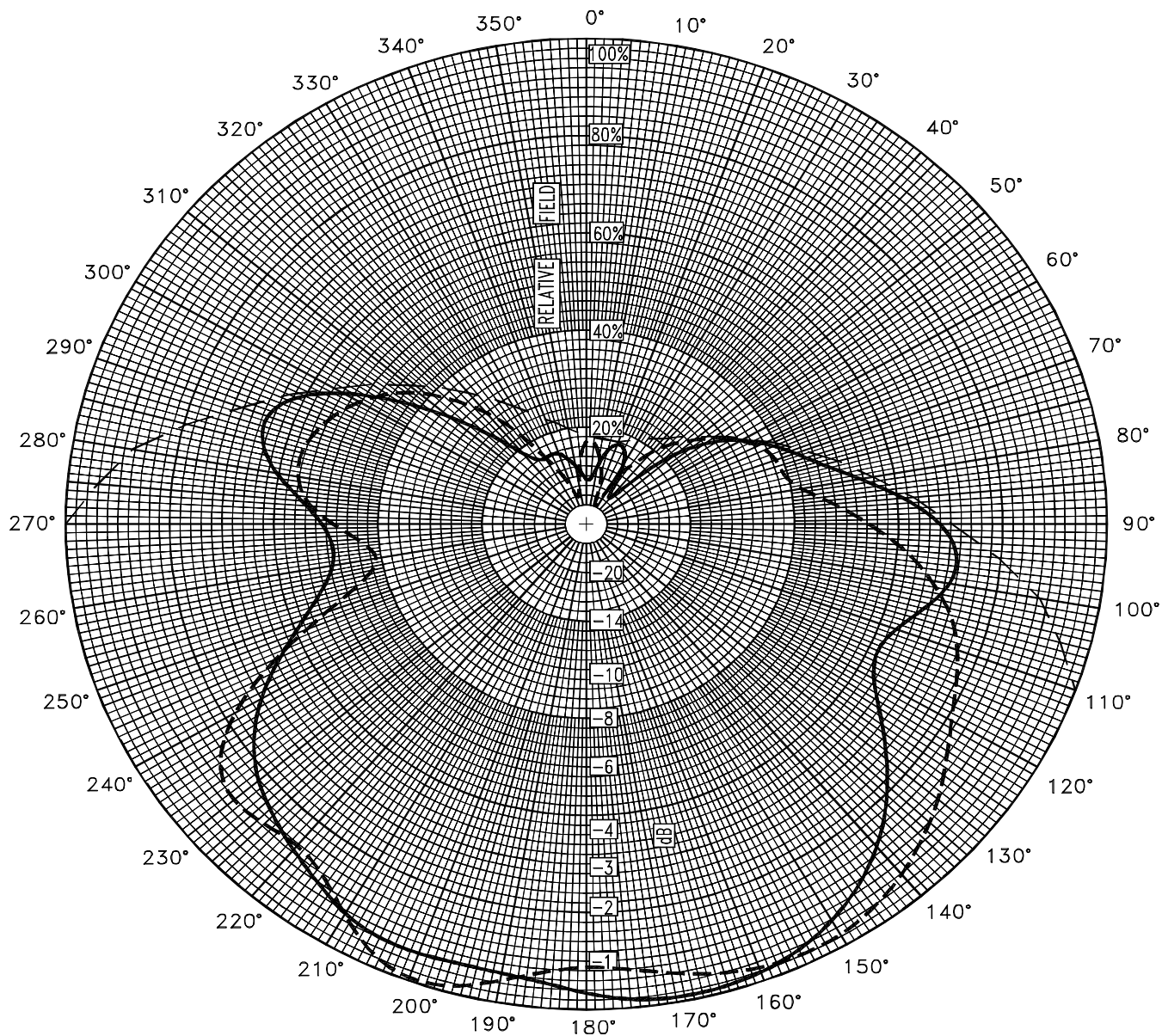
COMPOSITE MEASURED PATTERN (H & V)

<u>BEARING</u>	<u>FIELD</u>	<u>ERP</u> <u>(kW)</u>	<u>dBk</u>
0	0.175	0.10	-10.09
10	0.145	0.07	-11.72
20	0.177	0.10	-9.98
30	0.152	0.07	-11.31
40	0.200	0.13	-8.93
50	0.270	0.23	-6.32
60	0.349	0.39	-4.10
70	0.428	0.59	-2.31
80	0.537	0.92	-0.35
90	0.688	1.52	1.81
100	0.715	1.64	2.14
110	0.760	1.85	2.67
120	0.810	2.10	3.22
130	0.885	2.51	3.99
140	0.945	2.86	4.56
150	0.980	3.07	4.88
160	0.985	3.10	4.92
170	0.992	3.15	4.98
180	0.968	3.00	4.77
190	0.955	2.92	4.65
200	1.000	3.20	5.05
210	0.930	2.77	4.42
220	0.877	2.46	3.91
230	0.890	2.53	4.04
240	0.790	2.00	3.00
250	0.579	1.07	0.31
260	0.491	0.77	-1.12
270	0.505	0.82	-0.88
280	0.609	1.19	0.75
290	0.659	1.39	1.43
300	0.547	0.96	-0.18
310	0.425	0.58	-2.38
320	0.305	0.30	-5.26
330	0.160	0.08	-10.87
340	0.156	0.08	-11.07
350	0.123	0.05	-13.17

Relative fields at other azimuths:

45	0.235	225	0.875
135	0.915	315	0.365





## Azimuth Pattern

Customer: WLAB

Date: June 22, 2004

Frequency: 88.3 MHz

Type Number: JMPC-2D DA

Notes: MEASURED PATTERN IN FULL SCALE

HPOL VPOL LIMITS



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WLAB ERP = 3.20 kW June 22, 2004

JMPC-2D 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	0.092	0.03	0.175	0.10
10	0.123	0.05	0.145	0.07
20	0.177	0.10	0.080	0.02
30	0.152	0.07	0.120	0.05
40	0.046	0.01	0.200	0.13
50	0.236	0.18	0.270	0.23
60	0.349	0.39	0.345	0.38
70	0.428	0.59	0.390	0.49
80	0.537	0.92	0.415	0.55
90	0.688	1.52	0.545	0.95
100	0.715	1.64	0.675	1.46
110	0.631	1.27	0.760	1.85
120	0.633	1.28	0.810	2.10
130	0.756	1.83	0.885	2.51
140	0.871	2.43	0.945	2.86
150	0.945	2.86	0.980	3.07
160	0.985	3.10	0.975	3.04
170	0.992	3.15	0.940	2.83
180	0.968	3.00	0.910	2.65
190	0.940	2.82	0.955	2.92
200	0.943	2.85	1.000	3.20
210	0.930	2.77	0.930	2.77
220	0.877	2.46	0.860	2.37
230	0.825	2.18	0.890	2.53
240	0.727	1.69	0.790	2.00
250	0.579	1.07	0.535	0.92
260	0.491	0.77	0.400	0.51
270	0.505	0.82	0.490	0.77
280	0.609	1.19	0.565	1.02
290	0.659	1.39	0.555	0.99
300	0.547	0.96	0.505	0.82
310	0.350	0.39	0.425	0.58
320	0.189	0.11	0.305	0.30
330	0.156	0.08	0.160	0.08
340	0.156	0.08	0.080	0.02
350	0.123	0.05	0.085	0.02

**MAXIMUM FIELDS:**

170	0.992	3.15		
200			1	3.20

**MINIMUM FIELDS:**

40	0.046	0.01		
25			0.015	0.00

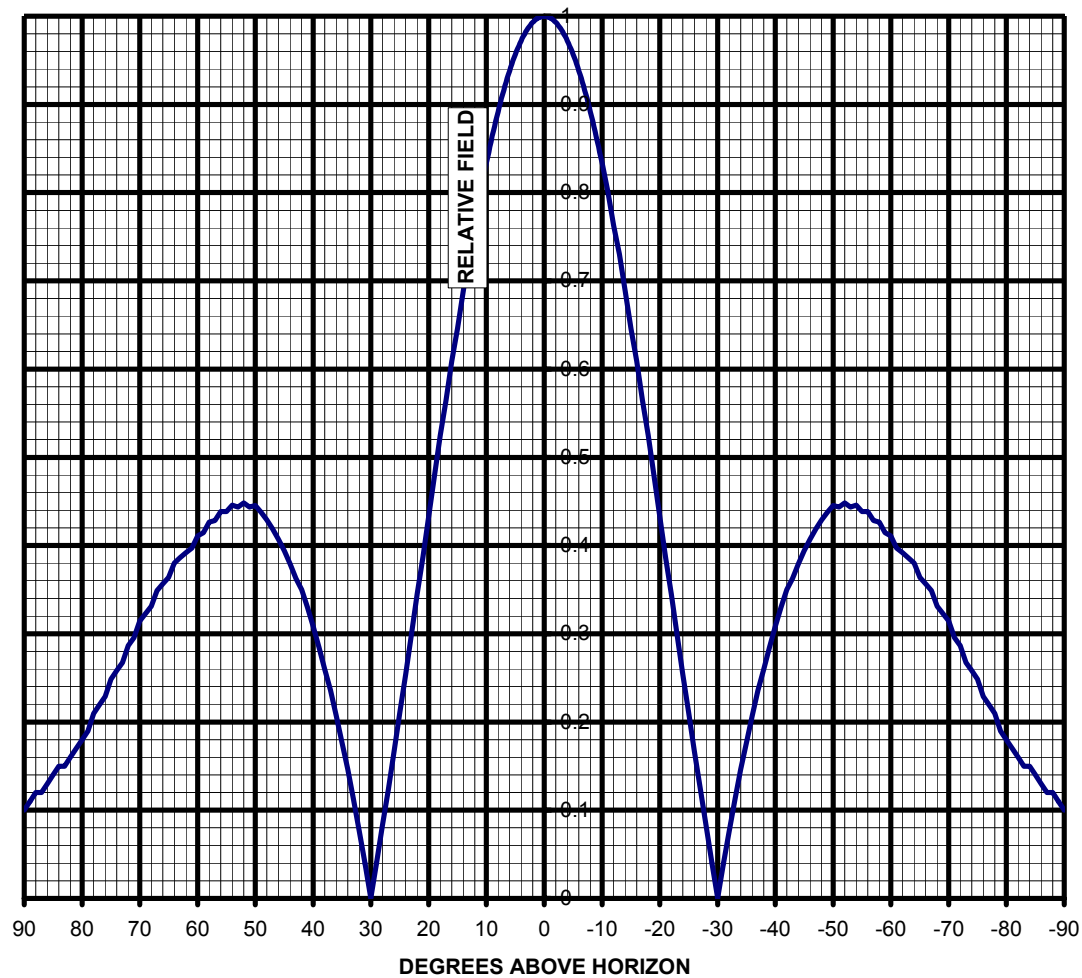


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## PLOT OF ELEVATION PLANE PATTERN

**STATION:** WLAB      88.3 MHz    JMPC-2D DA    1.00 lambda spacing





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### TABULATION OF ELEVATION PLANE PATTERN

**STATION:** WLAB    88.3 MHz    JMPC-2D DA    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	0.834	-25	0.212	-60	0.411
9	0.864	-26	0.167	-61	0.397
8	0.891	-27	0.124	-62	0.392
7	0.916	-28	0.082	-63	0.386
6	0.938	-29	0.040	-64	0.380
5	0.957	-30	0.000	-65	0.364
4	0.972	-31	0.040	-66	0.357
3	0.984	-32	0.076	-67	0.349
2	0.993	-33	0.112	-68	0.331
1	0.998	-34	0.146	-69	0.323
0	1.000	-35	0.177	-70	0.314
-1	0.998	-36	0.207	-71	0.296
-2	0.993	-37	0.236	-72	0.287
-3	0.984	-38	0.260	-73	0.267
-4	0.972	-39	0.285	-74	0.258
-5	0.957	-40	0.308	-75	0.249
-6	0.938	-41	0.330	-76	0.229
-7	0.916	-42	0.350	-77	0.219
-8	0.891	-43	0.363	-78	0.210
-9	0.864	-44	0.379	-79	0.190
-10	0.834	-45	0.394	-80	0.180
-11	0.801	-46	0.407	-81	0.170
-12	0.762	-47	0.419	-82	0.160
-13	0.730	-48	0.429	-83	0.150
-14	0.688	-49	0.438	-84	0.150
-15	0.646	-50	0.445	-85	0.140
-16	0.609	-51	0.444	-86	0.130
-17	0.564	-52	0.448	-87	0.120
-18	0.525	-53	0.444	-88	0.120
-19	0.479	-54	0.446	-89	0.110
-20	0.433	-55	0.438	-90	0.100
-21	0.387	-56	0.438		
-22	0.345	-57	0.429		
-23	0.299	-58	0.426		
-24	0.254	-59	0.415		