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S.O. 35137

Report of Test 6025-1-1/1/1(Slant 47°)-DA

for

EPIC LIGHT NETWORK, INC.

WSJQ 91.5 MHz PASCOAG, RI.

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6025-1-1/1/1(Slant 47°)-DA to meet the needs of WSJQ and to comply with the requirements of the FCC construction permit, file number BMPED-20171204ACH. This test characterizes only the radiation characteristics of the antenna when mounted on the tower as described. It does not represent or imply any guarantee of specific coverage which can be influenced by factors beyond the scope of this test.

RESULTS:

The following Figures are the results of the measurements from our pattern range:

Figure 1A - Measured Azimuth Pattern with the FCC Composite
Figure 1B - Measured Composite Azimuth Pattern with the FCC Composite
Figure 1C - Tabulation of the Horizontal Polarization for the Measured Azimuth Pattern
Figure 1D - Tabulation of the Vertical Polarization for the Measured Azimuth Pattern
Figure 1E - Tabulation of the Measured Composite Azimuth Pattern
Figure 1F - Tabulation of the FCC Composite

The calculated elevation pattern of the antenna is shown in Figure 3.

Construction permit file number BMPED-20171204ACH indicates that the Horizontal radiation component shall not exceed 10.5 kW at any azimuth and is restricted to the following values at the azimuths specified:

10 Degrees True: 3.2 kilowatts

70 Degrees True: 0.470 kilowatts

150 Degrees True through 180 Degrees True: 0.330 kilowatts

290 Degrees True: 9.1 kilowatts

340 Degrees True: 6.2 kilowatts

From Figure 1A, the maximum radiation of the Horizontal component occurs at 304 Degrees True to 312 Degrees True. At the restricted azimuth of 10 Degrees True the Vertical component is 6.80 dB down from the maximum of 10.5 kW, or 2.193 kW and at the restricted azimuth of 70 Degrees True the Vertical component is 14.24 dB down from the maximum of 10.5 kW, or 0.395 kW. At the restricted azimuth of 150 Degrees True through 180 Degrees True the Verticall component is 16.83 dB down from the maximum of 10.5 kW, or 0.218 kW and at the restricted azimuth of 290 Degrees True the Vertical component is 0.71 dB down from the maximum of 10.5 kW, or 8.926 kW. At the restricted azimuth of 340 Degrees True the Vertical component is 2.34 dB down from the maximum of 10.5 kW, or 6.129 kW.

The R.M.S. of the Horizontal component is 0.424. The total Horizontal power gain is 2.591. The R.M.S. of the Vertical component is 0.500. The total Vertical power gain is 2.513. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.587. The R.M.S. of the measured composite pattern is 0.504. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.499. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One level of the 6025-1-1/1/1(Slant 47°)-DA was mounted on a tower of precise scale to the American Tower Corporation Cellar tower at the WSJQ site. The spacing of the antenna to the tower was varied and with the additional of a 2-way unequal power split was used to achieve the horizontal and vertical pattern shown in Figure 1A. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20171204ACH, a single level of the 6025-1-1/1/1(Slant 47°)-DA was set up on the Shively Labs scale model antenna pattern measuring range. A scale of 4.5:1 was used.

EQUIPMENT:

The 4.5:1 scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator. The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 feet above ground level. The receiving corner reflector is spaced 50 feet away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable.

The control building is equipped with:

Hewlett Packard Model 4395-A Network Analyzer

PC Based Controller

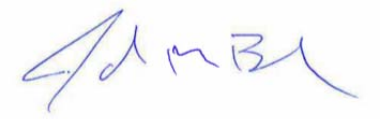
Output Standard Printer or 'pdf'

All testing is carried out in strict accordance with approved procedures under our ISO9001:2008.

TEST PROCEDURES:

The receiving antenna system is mounted so that the horizontal and vertical azimuth patterns are measured independently. The network analyzer was set to 411.75 MHz Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadded reading of 100 in voltage. From the recorded patterns, the R.M.S. values are calculated and recorded as shown in Figure 1A.

Respectfully submitted by:

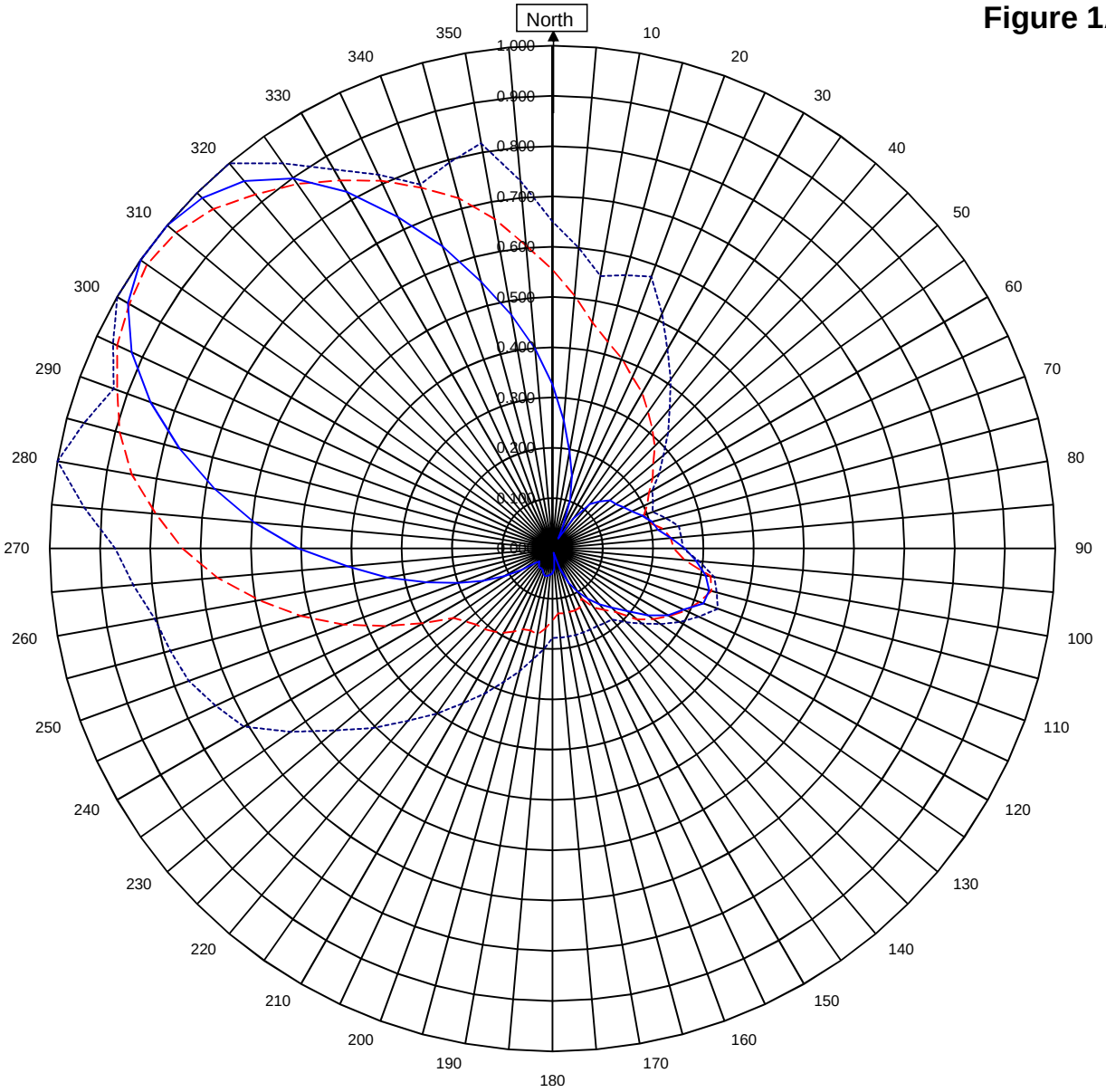


John M. Bliss
Vice President, Operations
S/O 35137
Date December 20, 2017

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc. Bridgton, ME (207)647-3327

Figure 1A



WSJQ PASCOAG, RI.

35137

December 20, 2017

Horizontal RMS	0.424
Vertical RMS	0.500
H/V Composite RMS	0.504
FCC Composite RMS	0.587

Frequency	91.5 / 411.75 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6025-1-1/1-DA
Pattern Type	Directional Azimuth

0

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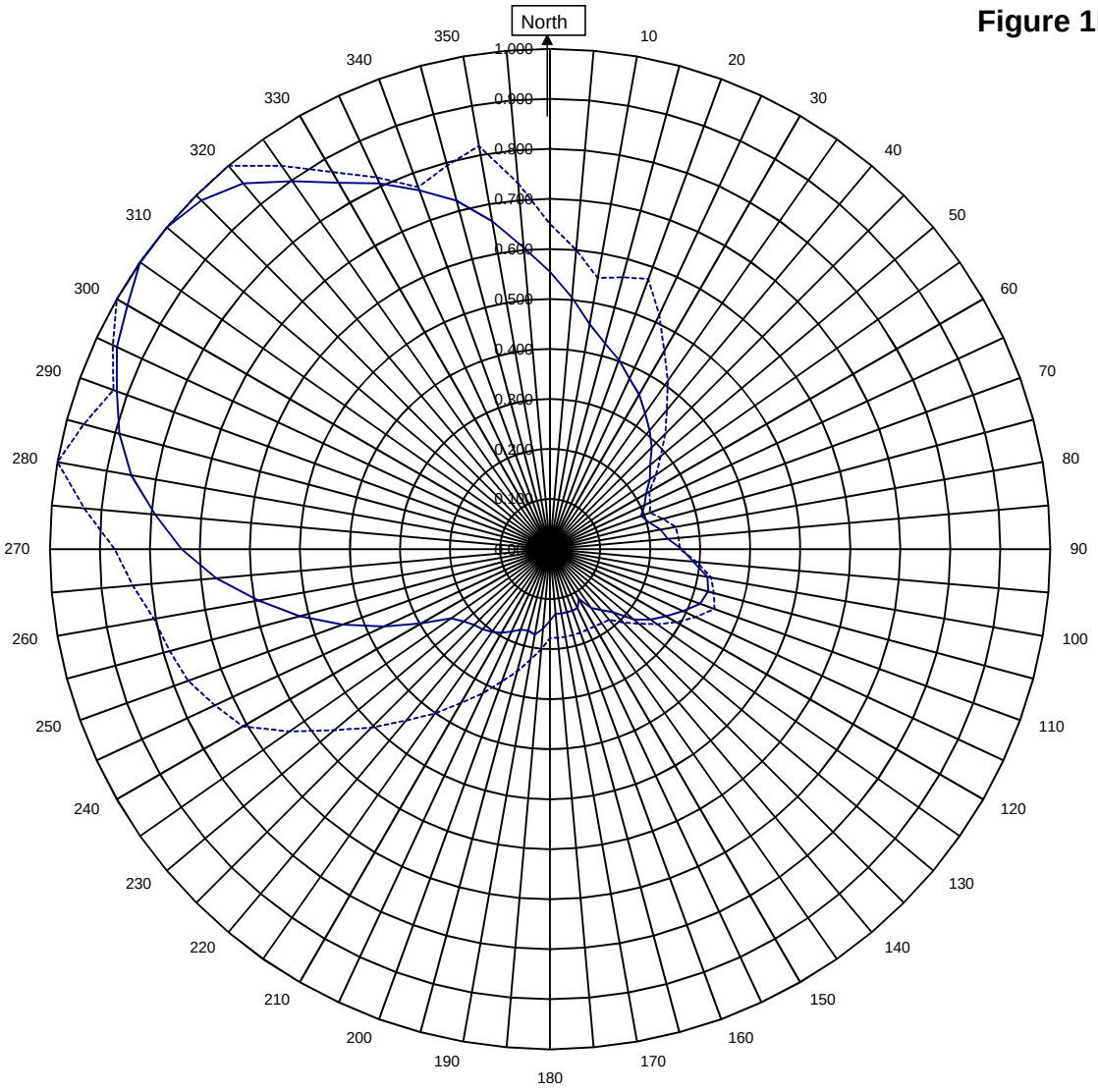
Figure 1B



WSJQ PASCOAG, RI.

35137

December 20, 2017

_____H/VComposite RMS	0.504
……FCC Composite RMS	0.587

Frequency	91.5 / 411.75 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6025-1-1/1-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
WSJQ PASCOAG, RI.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.326	180	0.049
10	0.195	190	0.055
20	0.103	200	0.052
30	0.023	210	0.045
40	0.115	220	0.042
45	0.132	225	0.037
50	0.149	230	0.044
60	0.164	240	0.109
70	0.190	250	0.200
80	0.213	260	0.333
90	0.264	270	0.505
100	0.310	280	0.683
110	0.320	290	0.851
120	0.266	300	0.975
130	0.194	310	1.000
135	0.166	315	0.986
140	0.145	320	0.954
150	0.099	330	0.819
160	0.042	340	0.639
170	0.019	350	0.472

Figure 1D

Tabulation of Vertical Azimuth Pattern
WSJQ PASCOAG, RI.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.555	180	0.144
10	0.457	190	0.174
20	0.403	200	0.171
30	0.357	210	0.194
40	0.310	220	0.210
45	0.288	225	0.215
50	0.262	230	0.225
60	0.222	240	0.297
70	0.194	250	0.442
80	0.224	260	0.592
90	0.241	270	0.736
100	0.320	280	0.850
110	0.311	290	0.922
120	0.269	300	0.972
130	0.220	310	0.977
135	0.179	315	0.955
140	0.160	320	0.919
150	0.115	330	0.845
160	0.131	340	0.764
170	0.131	350	0.666

Figure 1E

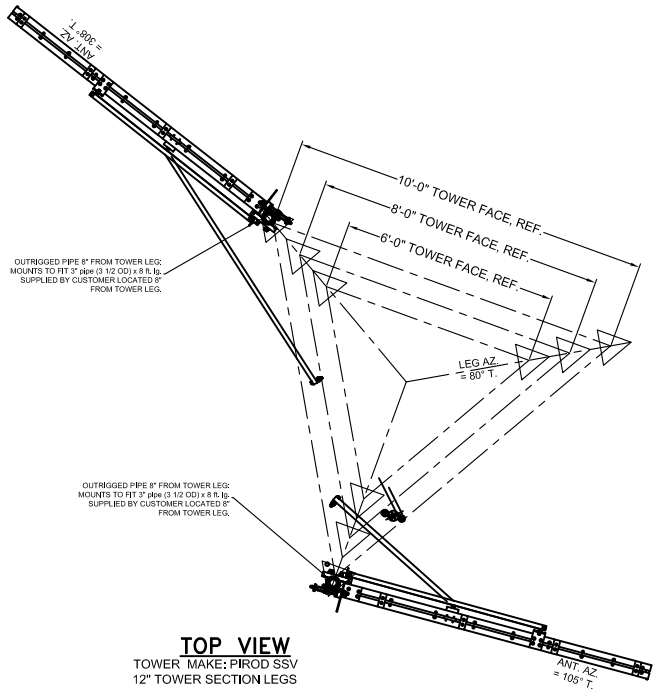
Tabulation of Composite Azimuth Pattern
WSJQ PASCOAG, RI.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.555	180	0.144
10	0.457	190	0.174
20	0.403	200	0.171
30	0.357	210	0.194
40	0.310	220	0.210
45	0.288	225	0.215
50	0.262	230	0.225
60	0.222	240	0.297
70	0.194	250	0.442
80	0.224	260	0.592
90	0.264	270	0.736
100	0.320	280	0.850
110	0.320	290	0.922
120	0.269	300	0.975
130	0.220	310	1.000
135	0.179	315	0.986
140	0.160	320	0.954
150	0.115	330	0.845
160	0.131	340	0.764
170	0.131	350	0.666

Figure 1F

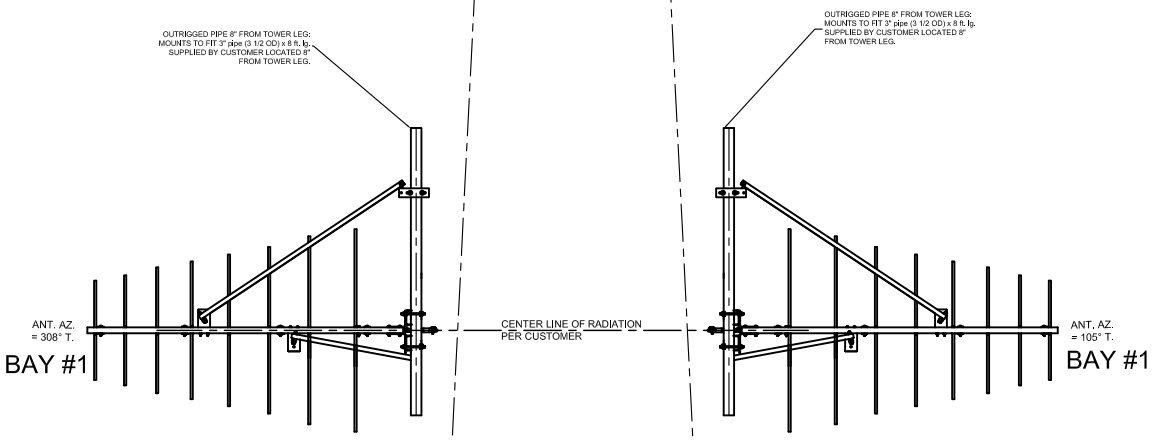
Tabulation of FCC Directional Composite
WSJQ PASCOAG, RI.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.650	180	0.178
10	0.550	190	0.224
20	0.575	200	0.282
30	0.457	210	0.355
40	0.363	220	0.447
50	0.288	230	0.563
60	0.229	240	0.709
70	0.212	250	0.770
80	0.255	260	0.804
90	0.260	270	0.870
100	0.327	280	1.000
110	0.350	290	0.929
120	0.292	300	1.000
130	0.232	310	1.000
140	0.184	320	1.000
150	0.178	330	0.870
160	0.178	340	0.770
170	0.178	350	0.818

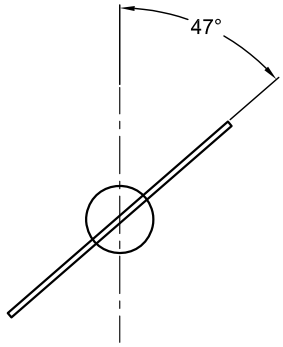


TOP VIEW
TOWER MAKE: PIROD SSV
12" TOWER SECTION LEGS

TRUE NORTH



ELEVATION VIEW
TOWER MAKE: PIROD SSV
12" TOWER SECTION LEGS



FRONT VIEW OF ALL BAYS

AZIMUTH	ATTENUATION	PHASE
105°	-10 db	0°
308°	0 db	0°

SHIVELY LABS®
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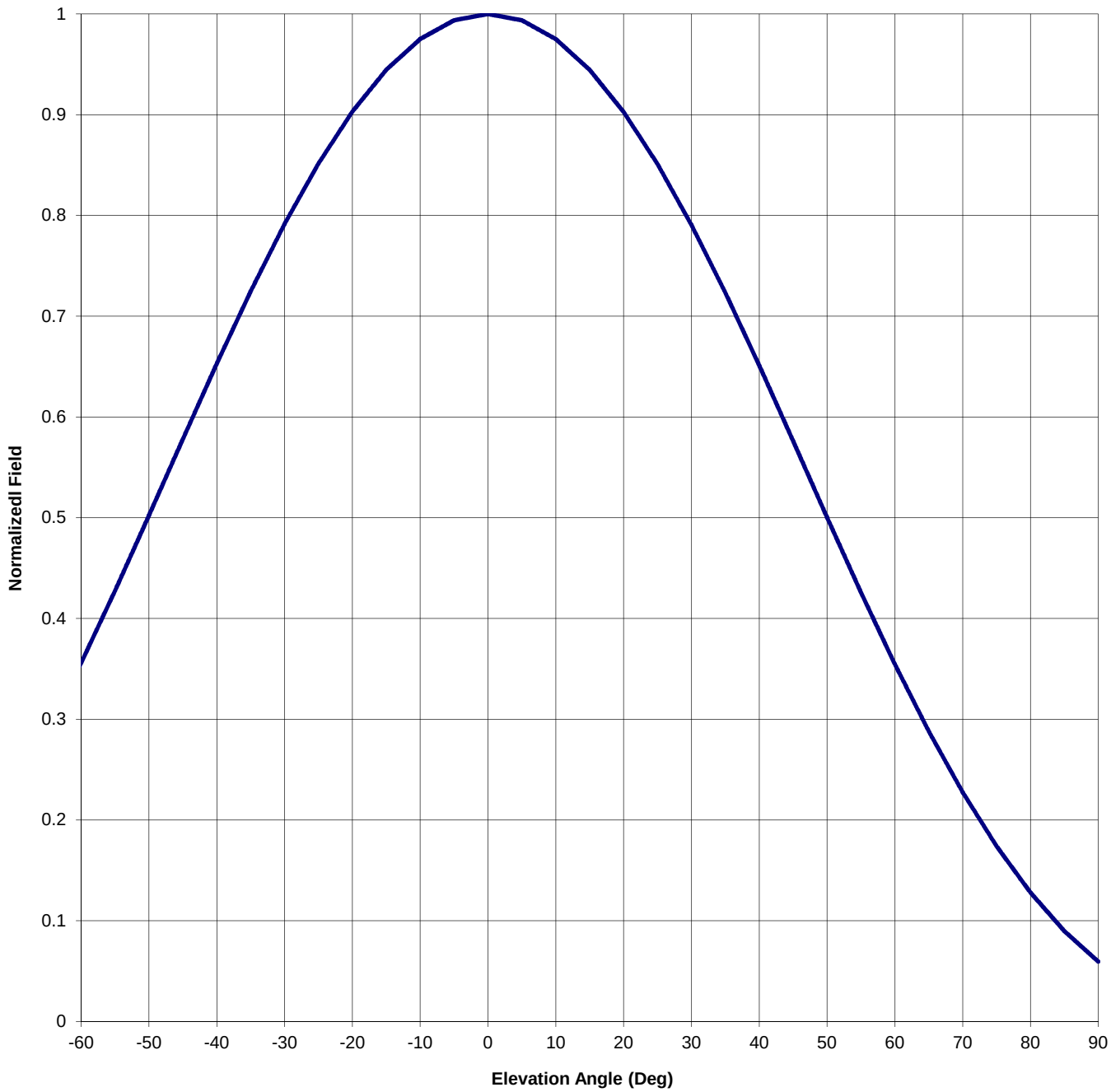
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY: ASP
35137	91.5	N.T.S.	APPROVED BY: DAB

TITLE:
FIGURE 2, WSJQ, 91.5 MHz
MODEL 6025-1-2, VERTICAL ELEMENTS

DATE: 12-19-17

FIGURE 2

Antenna Mfg.:	**Shively Labs**			**Date:**	**12/20/2017**
Antenna Type:	**6025-1-1/1/1(SLANT 47°)-DA**				
Station:	**WSJQ**	**Beam Tilt**	**0**		
Frequency:	**91.5**	**Gain (Max)**	**2.591**	**4.135**	**dB**
Channel #:	**218**	**Gain (Horizon)**	**2.591**	**4.135**	**dB**
Figure:	**Figure 3**				



Antenna Mfg.: Shively Labs **Date:** 12/20/2017

Antenna Type: 6025-1-1/1/1(SLANT 47°)-DA

Station: WSJQ **Beam Tilt** 0

Frequency: 91.5 **Gain (Max)** 2.591 4.135 dB

Channel #: 218 **Gain (Horizon)** 2.591 4.135 dB

Figure: Figure 3

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.059	-44	0.593	0	1.000	46	0.561
-89	0.066	-43	0.608	1	0.999	47	0.546
-88	0.072	-42	0.623	2	0.997	48	0.531
-87	0.078	-41	0.638	3	0.996	49	0.515
-86	0.084	-40	0.653	4	0.995	50	0.500
-85	0.090	-39	0.667	5	0.994	51	0.485
-84	0.097	-38	0.682	6	0.990	52	0.471
-83	0.105	-37	0.696	7	0.986	53	0.456
-82	0.113	-36	0.710	8	0.983	54	0.441
-81	0.120	-35	0.725	9	0.979	55	0.426
-80	0.128	-34	0.738	10	0.975	56	0.412
-79	0.137	-33	0.752	11	0.969	57	0.397
-78	0.146	-32	0.765	12	0.963	58	0.383
-77	0.156	-31	0.778	13	0.957	59	0.369
-76	0.165	-30	0.792	14	0.951	60	0.355
-75	0.174	-29	0.804	15	0.944	61	0.341
-74	0.185	-28	0.816	16	0.936	62	0.328
-73	0.196	-27	0.828	17	0.928	63	0.315
-72	0.206	-26	0.840	18	0.919	64	0.301
-71	0.217	-25	0.852	19	0.911	65	0.288
-70	0.228	-24	0.862	20	0.903	66	0.276
-69	0.240	-23	0.872	21	0.892	67	0.264
-68	0.252	-22	0.883	22	0.882	68	0.252
-67	0.265	-21	0.893	23	0.872	69	0.240
-66	0.277	-20	0.903	24	0.861	70	0.228
-65	0.289	-19	0.911	25	0.851	71	0.217
-64	0.302	-18	0.920	26	0.839	72	0.206
-63	0.316	-17	0.928	27	0.827	73	0.195
-62	0.329	-16	0.936	28	0.815	74	0.185
-61	0.343	-15	0.945	29	0.803	75	0.174
-60	0.356	-14	0.951	30	0.791	76	0.165
-59	0.370	-13	0.957	31	0.777	77	0.156
-58	0.385	-12	0.963	32	0.764	78	0.146
-57	0.399	-11	0.969	33	0.750	79	0.137
-56	0.413	-10	0.975	34	0.737	80	0.128
-55	0.428	-9	0.979	35	0.723	81	0.120
-54	0.443	-8	0.983	36	0.709	82	0.113
-53	0.458	-7	0.986	37	0.694	83	0.105
-52	0.473	-6	0.990	38	0.680	84	0.097
-51	0.487	-5	0.994	39	0.666	85	0.090
-50	0.502	-4	0.995	40	0.651	86	0.084
-49	0.518	-3	0.996	41	0.636	87	0.078
-48	0.533	-2	0.998	42	0.621	88	0.072
-47	0.548	-1	0.999	43	0.606	89	0.066
-46	0.563	0	1.000	44	0.591	90	0.059
-45	0.578			45	0.576		

S.O. 35137 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WSJQ PASCOAG, RI.

MODEL 6025-1-1/1-DA

Elevation Gain of Antenna 0.55

Horizontal RMS value divided by the Vertical RMS value equals the Horiz. - Vert. Ratio

H RMS 0.424448 V RMS 0.500189 H/V Ratio 0.849

Elevation Gain of Horizontal Component 0.467

Elevation Gain of Vertical Component 0.648

Horizontal Azimuth Gain equals $1/(RMS)^2$. 5.551

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 3.878

Max. Vertical 0.985

***Total Horizontal Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Horizontal Power Gain = **2.591**

***Total Vertical Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Vertical Power Gain = **2.513**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

10.5 kW ERP Divided by H Gain 2.591 equals 4.053 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

4.053 kW Times V Gain 2.513 equals 10.187 kW V ERP

Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP

(0.985)^2 Times 10.50 Equals 10.187 kW Vertical ERP

NOTE: Calculating the ERP of the Vertical Component by two methods validates the total power gain calculations