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S.O. 34514

Report of Test 6025-1(SLANT 52°)-DA

for

EDUCATIONAL MEDIA FOUNDATION

KARQ 91.3 MHz REDDING, CA.

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6025-1(Slant 52°)-DA to meet the needs of KARQ and to comply with the requirements of the FCC construction permit, file number BPED-20151221CJD. 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 BPED-20151221CJD indicates that the Horizontal radiation component shall not exceed 0.110 kW at any azimuth and is restricted to the following values at the azimuths specified:

0 to 10 Degrees True (clockwise): 0.0035 kilowatts

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40 Degrees True: 0.0035 kilowatts

280 Degrees True: 0.0035 kilowatts

310 to 320 Degrees True (clockwise): 0.0035 kilowatt

From Figure 1A, the maximum radiation of the Horizontal component occurs at 159 Degrees True to 161 Degrees True. At the restricted azimuth of 0 to 10 Degrees True(clockwise) the Vertical component is 21.01 dB down from the maximum of 0.110 kW, or 0.0009 kW. At the restricted azimuth of 40 Degrees True the Vertical component is 22.85 dB down from the maximum of 0.110 kW, or 0.0006 kW. At the restricted azimuth of 280 Degrees True the Vertical component is 21.11 dB down from the maximum of 0.110 kW, or 0.0009 kW. At the restricted azimuth of 310 to 320 Degrees True(clockwise) the horizontal component is 21.11 dB down from the maximum of 0.110 kW, or 0.0009 kW.

The R.M.S. of the Horizontal component is 0.411. The total Horizontal power gain is 3.257. The R.M.S. of the Vertical component is 0.411. The total Vertical power gain is 2.432. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.467. The R.M.S. of the measured composite pattern is 0.437. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.397. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One level of the 6025-1(slant 52°)-DA was mounted on a precise scale of a 3-inch pipe off set from the tapered 8.667 to 6.667 tower at the KARQ site. The spacing of the pole to the tower was varied 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 BPED-20151221CJD, a single level of the 6025-1(slant 52°)-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 410.85 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:

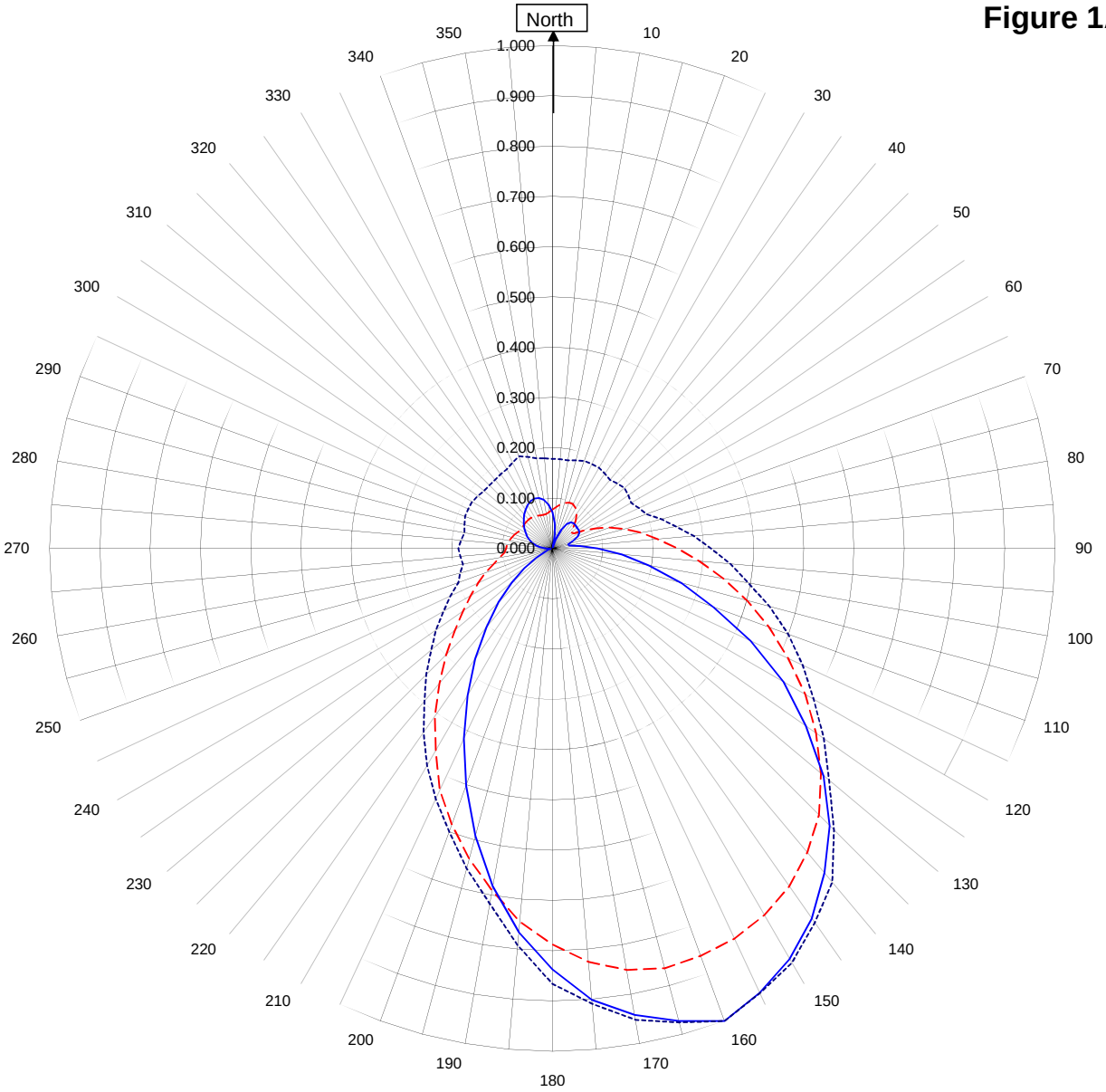
Martyn Gregory

Vice President, Shively Labs
S/O 34514
Date March 27, 2017

Shively Labs

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

Figure 1A



KARQ REDDING, CA.

34514

March 27, 2017

Horizontal RMS	0.411
Vertical RMS	0.411
H/V Composite RMS	0.437
FCC Composite RMS	0.467

Frequency	91.3 / 410.85 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6025-1-DA (SLANT 52-DGRS)
Pattern Type	Directional Azimuth

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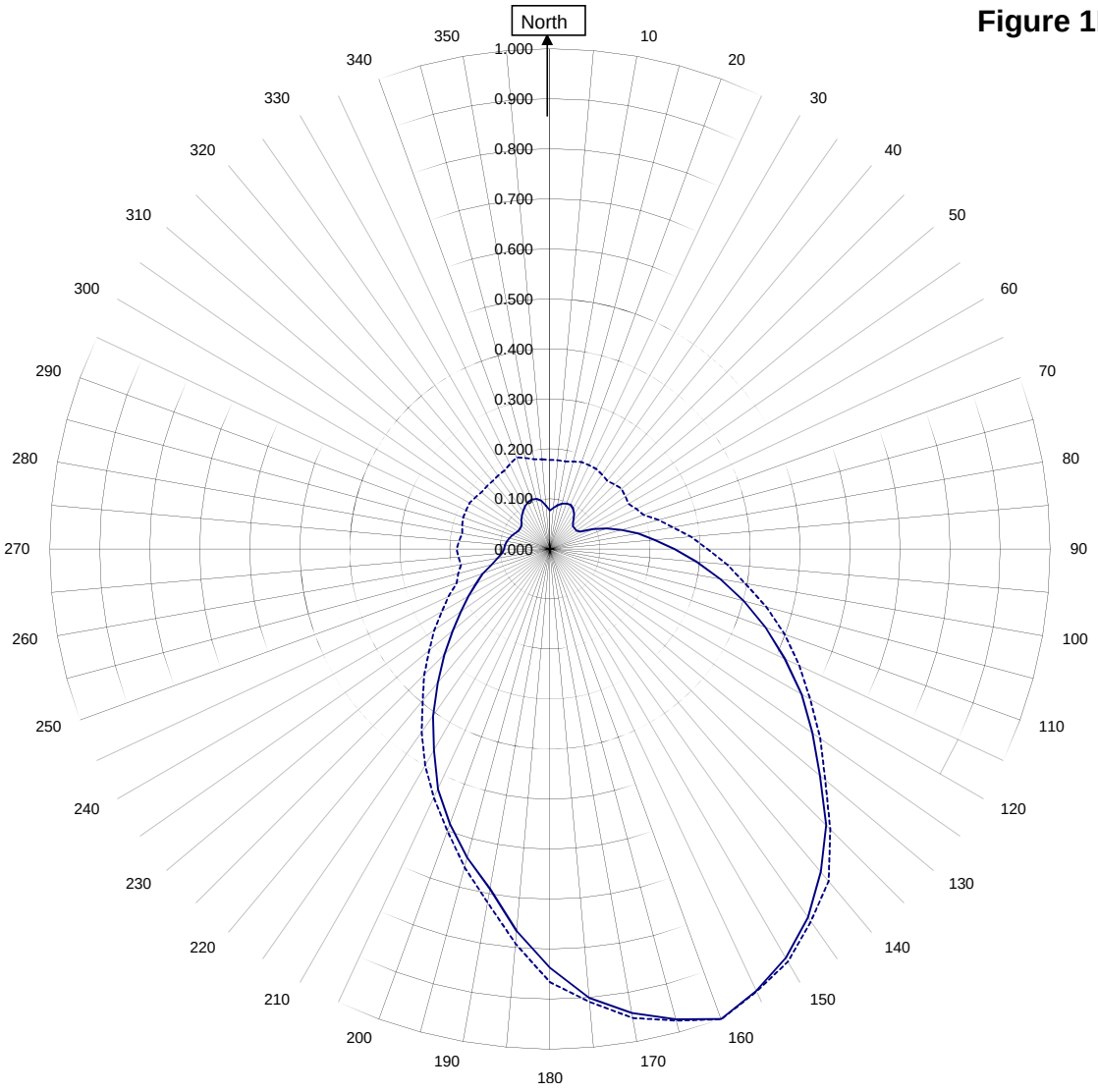
Figure 1B



KARQ REDDING, CA.

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March 27, 2017

_____H/VComposite RMS	0.437
……FCC Composite RMS	0.467

Frequency	91.3 / 410.85 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6025-1-DA (SLANT 52-DGRS)
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
KARQ REDDING, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.072	180	0.837
10	0.028	190	0.683
20	0.020	200	0.503
30	0.056	210	0.337
40	0.065	220	0.205
45	0.065	225	0.152
50	0.064	230	0.105
60	0.062	240	0.038
70	0.044	250	0.010
80	0.034	260	0.005
90	0.090	270	0.014
100	0.195	280	0.033
110	0.341	290	0.048
120	0.531	300	0.061
130	0.704	310	0.075
135	0.780	315	0.081
140	0.842	320	0.088
150	0.943	330	0.099
160	1.000	340	0.106
170	0.942	350	0.098

Figure 1D

Tabulation of Vertical Azimuth Pattern
KARQ REDDING, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.077	180	0.787
10	0.089	190	0.691
20	0.097	200	0.585
30	0.092	210	0.465
40	0.072	220	0.350
45	0.058	225	0.299
50	0.049	230	0.253
60	0.070	240	0.188
70	0.121	250	0.142
80	0.179	260	0.107
90	0.249	270	0.092
100	0.345	280	0.088
110	0.458	290	0.080
120	0.581	300	0.073
130	0.697	310	0.073
135	0.749	315	0.074
140	0.789	320	0.075
150	0.842	330	0.074
160	0.862	340	0.070
170	0.851	350	0.070

Figure 1E

Tabulation of Composite Azimuth Pattern
KARQ REDDING, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.077	180	0.837
10	0.089	190	0.691
20	0.097	200	0.585
30	0.092	210	0.465
40	0.072	220	0.350
45	0.065	225	0.299
50	0.064	230	0.253
60	0.070	240	0.188
70	0.121	250	0.142
80	0.179	260	0.107
90	0.249	270	0.092
100	0.345	280	0.088
110	0.458	290	0.080
120	0.581	300	0.073
130	0.704	310	0.075
135	0.780	315	0.081
140	0.842	320	0.088
150	0.943	330	0.099
160	1.000	340	0.106
170	0.942	350	0.098

Figure 1F

Tabulation of FCC Directional Composite
KARQ REDDING, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.178	180	0.866
10	0.178	190	0.718
20	0.185	200	0.600
30	0.185	210	0.499
40	0.178	220	0.396
50	0.187	230	0.315
60	0.181	240	0.250
70	0.199	250	0.199
80	0.250	260	0.181
90	0.315	270	0.187
100	0.396	280	0.178
110	0.499	290	0.185
120	0.600	300	0.185
130	0.718	310	0.178
140	0.866	320	0.178
150	0.952	330	0.182
160	1.000	340	0.195
170	0.952	350	0.182

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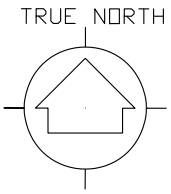
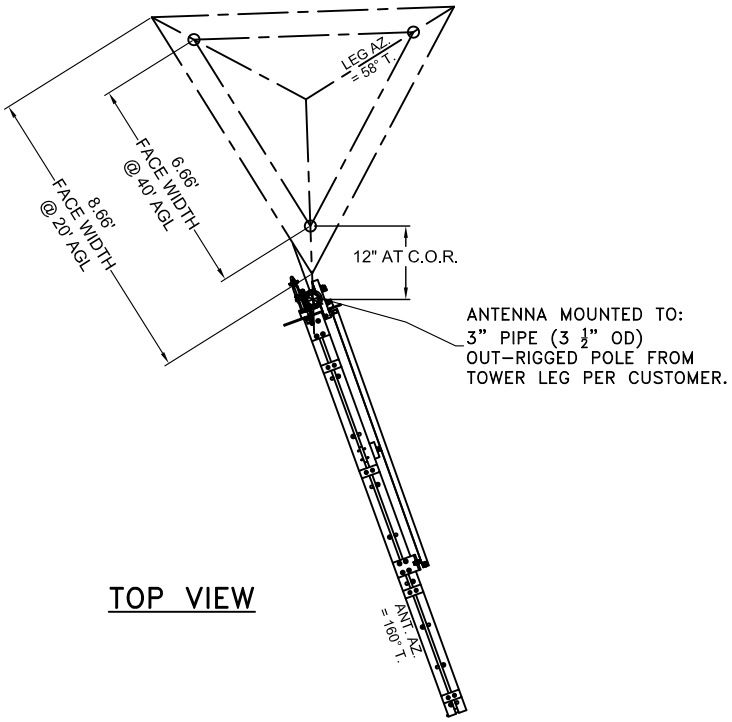
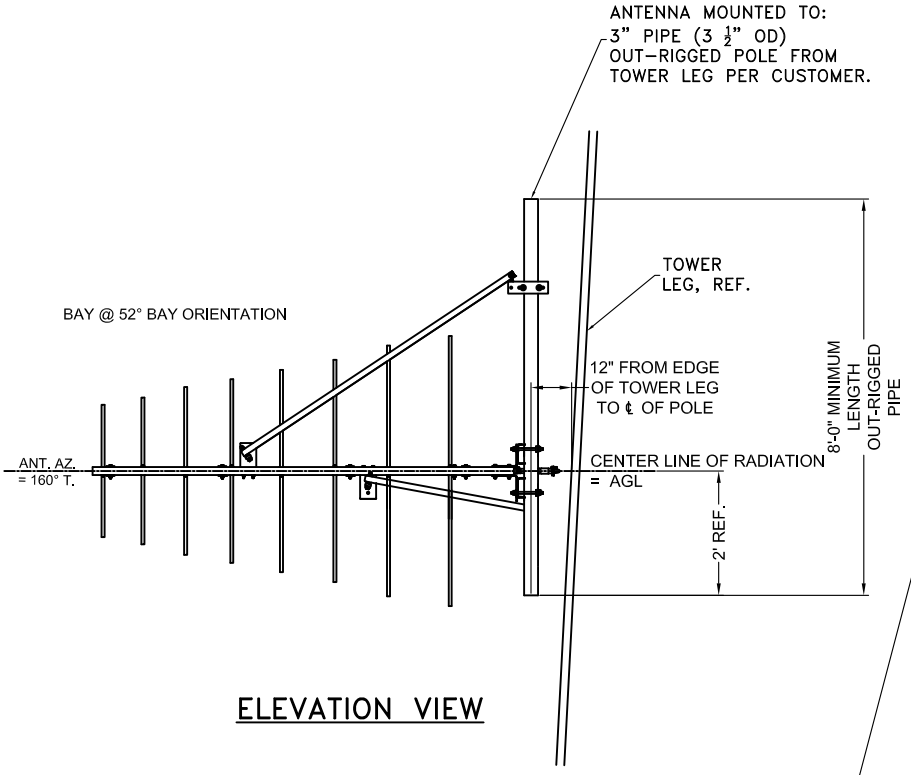
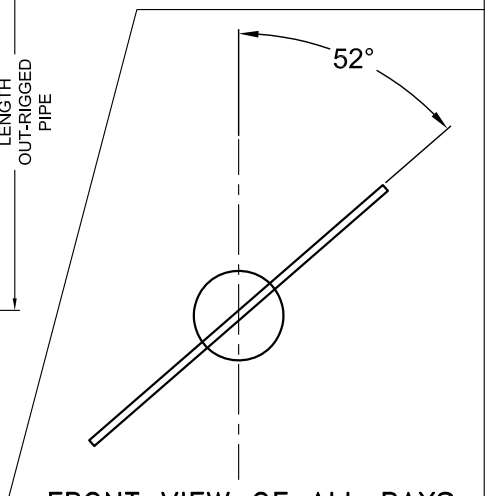




TOP VIEW



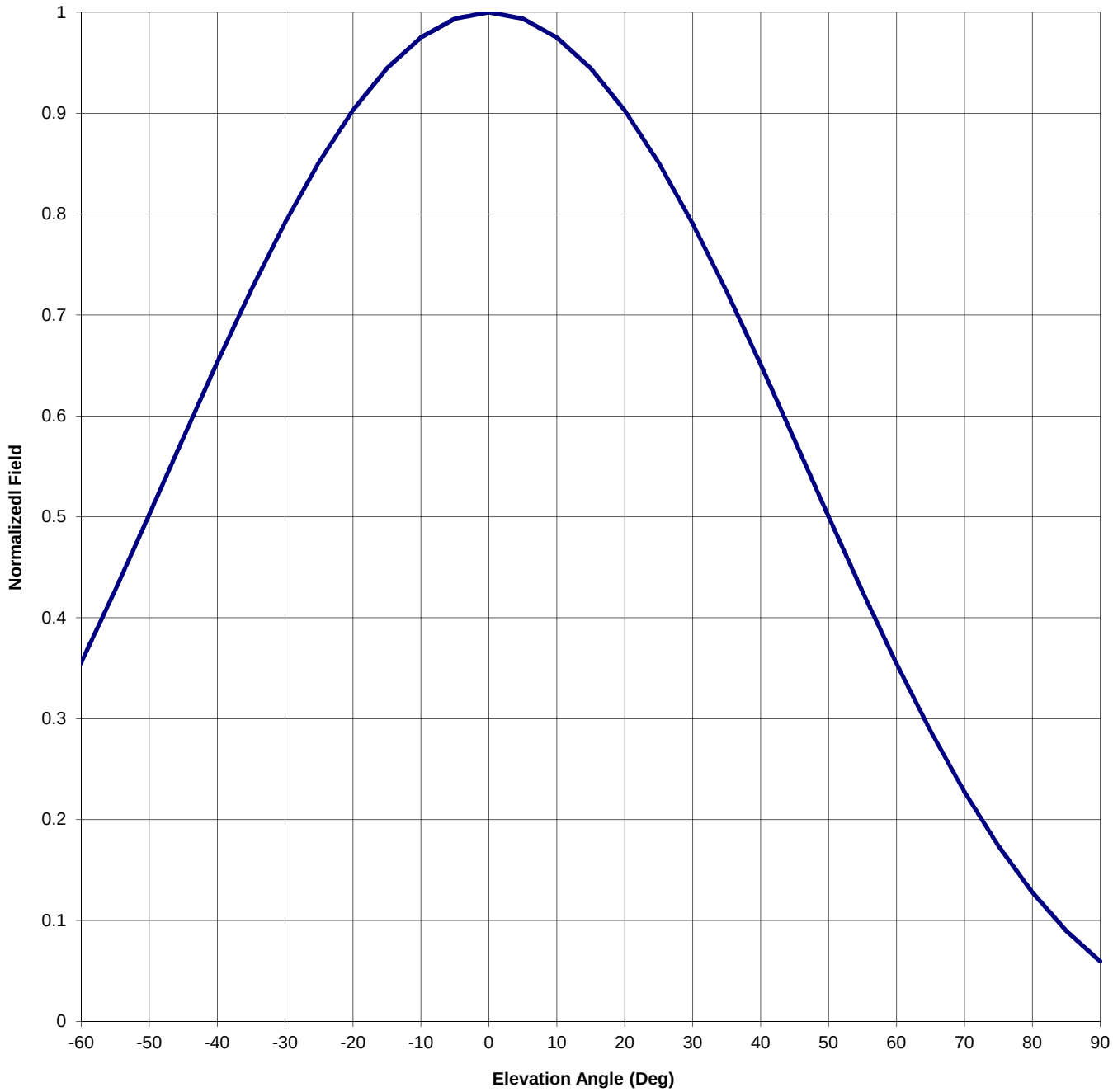
ELEVATION VIEW



FRONT VIEW OF ALL BAYS

SHIVELY LABS ® A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE			
SHOP ORDER: 34514	FREQUENCY: 91.3	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: FIGURE 2, KARQ, 91.3 MHz MODEL 6025-1-SLANT(52°)-DA			
DATE: 3-24-17	FIGURE 2		

Antenna Mfg.:	**Shively Labs**				**Date: 3/27/2017**
Antenna Type:	**6025-1(Slant 52°)-DA**				
Station:	**KARQ**	**Beam Tilt**	**0**		
Frequency:	**91.3**	**Gain (Max)**	**3.257**	**5.128**	**dB**
Channel #:	**217**	**Gain (Horizon)**	**3.257**	**5.128**	**dB**
Figure:	**Figure 3**				



Antenna Mfg.: Shively Labs **Date:** 3/27/2017

Antenna Type: 6025-1(Slant 52°)-DA

Station: KARQ **Beam Tilt** 0

Frequency: 91.3 **Gain (Max)** 3.257 5.128 dB

Channel #: 217 **Gain (Horizon)** 3.257 5.128 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. 34514 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KARQ REDDING, CA.

MODEL 6025-1-DA (SLANT 52-DGRS)

Elevation Gain of Antenna 0.55

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

H RMS 0.411011 V RMS 0.410821 H/V Ratio 1.000

Elevation Gain of Horizontal Component 0.550

Elevation Gain of Vertical Component 0.550

Horizontal Azimuth Gain equals $1/(RMS)^2$. 5.920

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 4.423

Max. Vertical 0.864

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

Total Horizontal Power Gain = **3.257**

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

Total Vertical Power Gain = **2.432**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

0.11 kW ERP Divided by H Gain 3.257 equals 0.034 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.034 kW Times V Gain 2.432 equals 0.082 kW V ERP

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

(0.864)^2 Times 0.11 Equals 0.082 kW Vertical ERP

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