

S.O. 38207
Report of Test 6025-2-SS-OFFSET
for
EDUCATIONAL MEDIA FOUNDATION
KJLV 97.7MHz Los Altos, CA

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6025-2-SS-OFFSET to meet the needs of KJLV and to comply with the requirements of the FCC construction permit, file number 0000159633. 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 0000159633 indicates that the Horizontal radiation component shall not exceed 0.750 kW at any azimuth and is restricted to the following values at the azimuths specified:

270 Degrees True: 0.00152 kilowatts

From Figure 1A, the maximum radiation of the Horizontal component occurs at 55 Degrees True. At the restricted azimuth of 270 Degrees True the Horizontal component is 31.057 dB down from the maximum of 0.750kW, or .00059kW.

The R.M.S. of the Horizontal component is 0.419. The total Horizontal power gain is 4.162. The R.M.S. of the Vertical component is 0.457. The total Vertical power gain is 4.150. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.535. The R.M.S. of the measured composite pattern is 0.458. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.455. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

Two bays of the 6025-2-SS-OFFSET were mounted on a Pole of precise scale with one bay horizontally offset from the other achieving the directionality of the pattern shown in Figure 1A. This configuration kept the pattern within the FCC Composite Pattern. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number 0000159633, two levels of the 6025-2-SS-OFFSET 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 parabolic dish 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 Hypercell Superflex and Cellflex ICF cabling respectively.

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.

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 439.65 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:

A handwritten signature in black ink, reading "Sean C. Edwards". The signature is fluid and cursive, with the first name "Sean" and last name "Edwards" clearly legible.

Sean C. Edwards
Director RF Engineering, Shively Labs

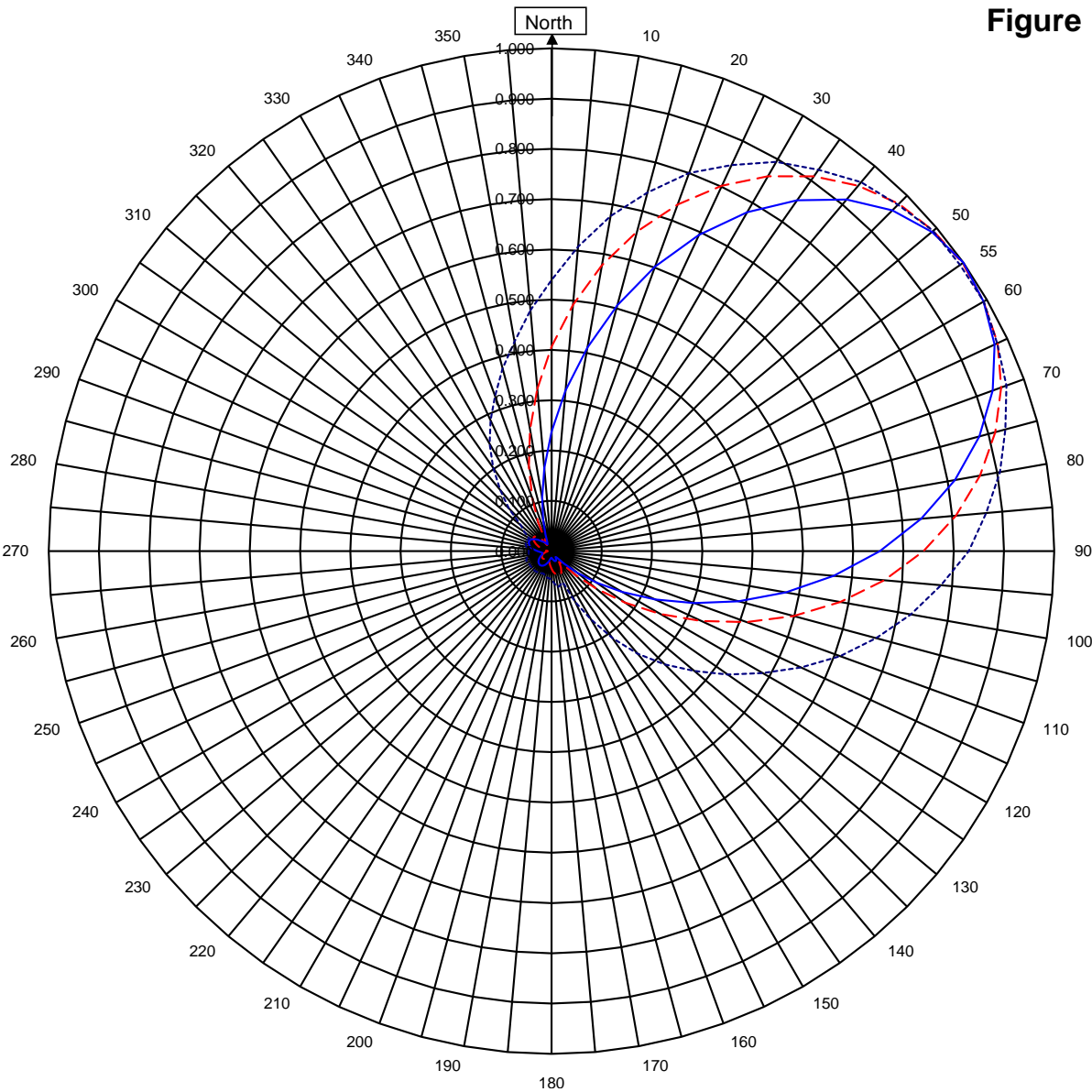
S/O: 38207

Date: March 15th, 2022

Shively Labs

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

Figure 1A



KJLV Los Altos, California

38207
December 21, 2021

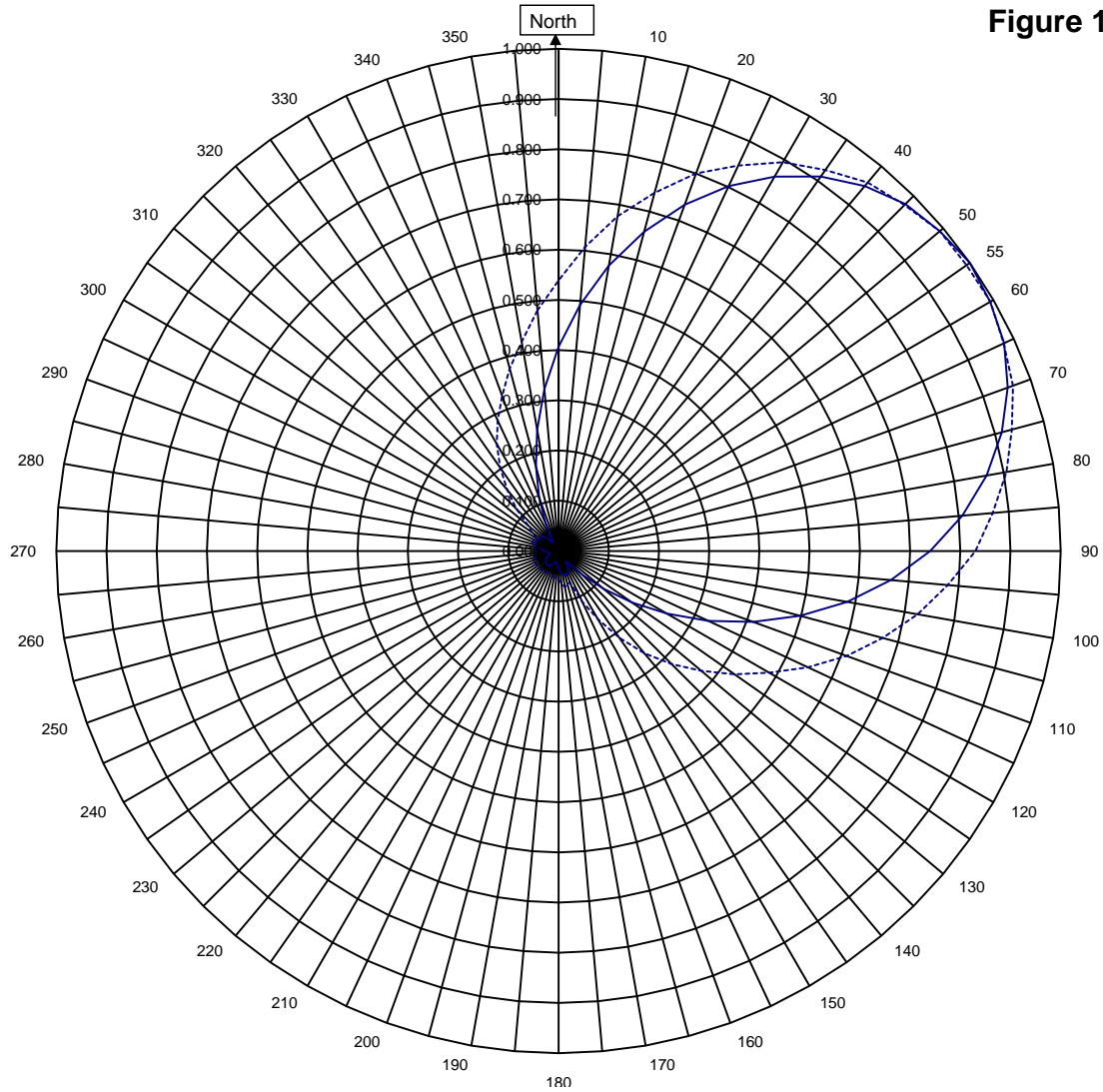
Horizontal RMS	0.419	Frequency	97.7 / 439.65 MHz
Vertical RMS	0.457	Plot	Relative Field
H/V Composite RMS	0.458	Scale	4.5 : 1
FCC Composite RMS	0.535	See Figure 2 for Mechanical Details	

Antenna Model	6025-2-SS-OFFSET
Pattern Type	Directional Azimuth

Shively Labs

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Figure 1B



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—————H/V Composite RMS	0.458
.....FCC Composite RMS	0.535

Frequency	97.7 / 439.65 MHz
Plot	Relative Field
Scale	4.5 : 1
See Figure 2 for Mechanical Details	

Antenna Model	6025-2-SS-OFFSET
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
KJLV Los Altos, California

Azimuth	Rel Field	Azimuth	Rel Field
0	0.237	180	0.013
10	0.411	190	0.017
20	0.602	200	0.026
30	0.778	210	0.033
40	0.913	220	0.036
45	0.959	225	0.035
50	0.988	230	0.034
55	1.000	240	0.028
60	0.992	250	0.020
70	0.934	260	0.019
80	0.815	270	0.028
90	0.653	280	0.042
100	0.473	290	0.048
110	0.302	300	0.047
120	0.162	310	0.035
130	0.067	315	0.028
135	0.036	320	0.024
140	0.017	330	0.015
150	0.018	340	0.035
160	0.021	350	0.107
170	0.017		

Figure 1D

Tabulation of Vertical Azimuth Pattern
KJLV Los Altos, California

Azimuth	Rel Field	Azimuth	Rel Field
0	0.407	180	0.035
10	0.577	190	0.023
20	0.734	200	0.016
30	0.861	210	0.017
40	0.949	220	0.021
45	0.977	225	0.022
50	0.991	230	0.023
55	0.999	240	0.022
60	0.992	250	0.018
70	0.952	260	0.012
80	0.866	270	0.007
90	0.740	280	0.015
100	0.583	290	0.027
110	0.413	300	0.040
120	0.250	310	0.045
130	0.116	315	0.041
135	0.067	320	0.031
140	0.033	330	0.023
150	0.037	340	0.112
160	0.051	350	0.245
170	0.047		

Figure 1E

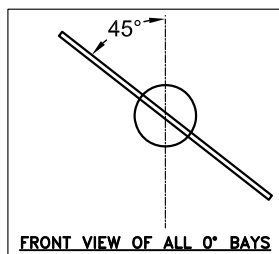
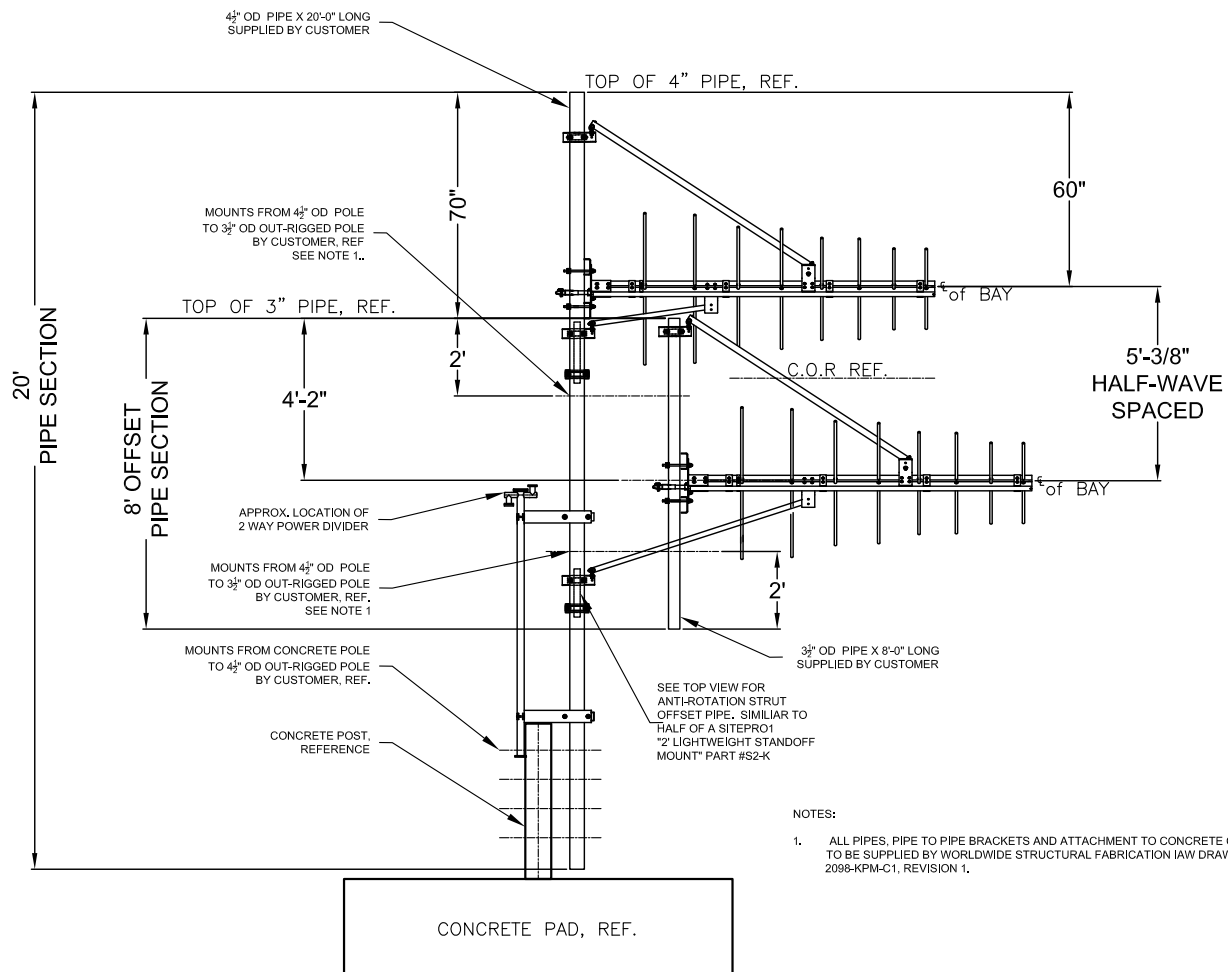
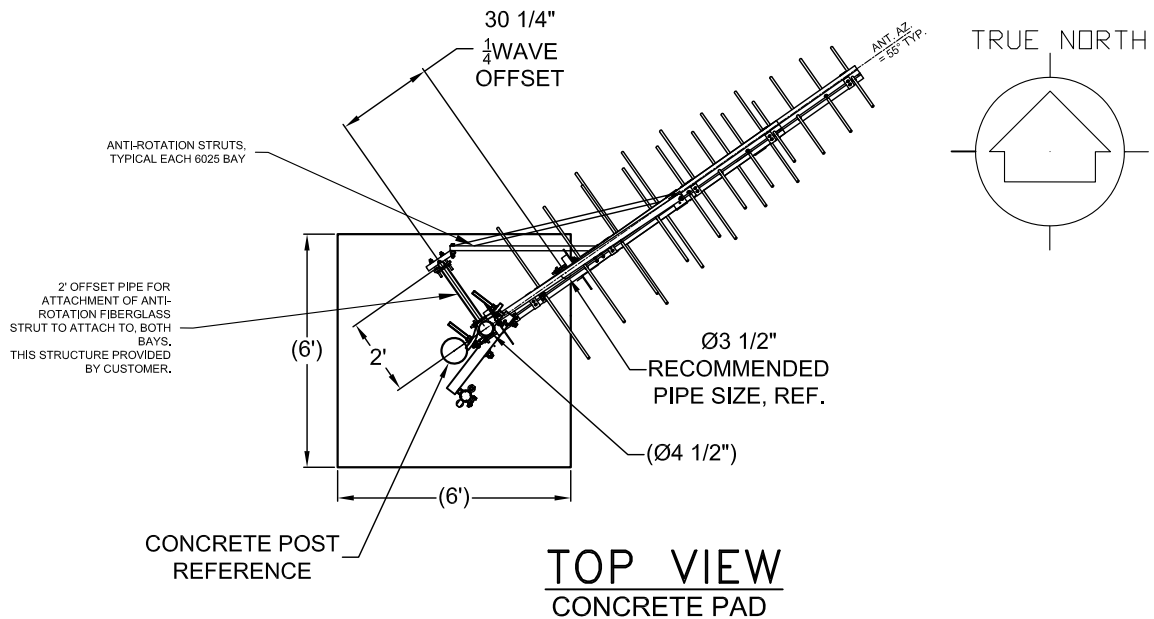
Tabulation of Composite Azimuth Pattern
KJLV Los Altos, California

Azimuth	Rel Field	Azimuth	Rel Field
0	0.407	180	0.035
10	0.577	190	0.023
20	0.734	200	0.026
30	0.861	210	0.033
40	0.949	220	0.036
45	0.977	225	0.035
50	0.991	230	0.034
55	1.000	240	0.028
60	0.992	250	0.020
70	0.952	260	0.019
80	0.866	270	0.028
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120	0.250	310	0.045
130	0.116	315	0.041
135	0.067	320	0.031
140	0.033	330	0.023
150	0.037	340	0.112
160	0.051	350	0.245
170	0.047		

Figure 1F

Tabulation of FCC Directional Composite
KJLV Los Altos, California

Azimuth	Rel Field	Azimuth	Rel Field
0	0.539	180	0.056
10	0.677	190	0.053
20	0.800	200	0.047
30	0.894	210	0.050
40	0.958	220	0.051
50	0.991	230	0.051
55	1.000	240	0.051
60	0.993	250	0.054
70	0.963	260	0.046
80	0.906	270	0.045
90	0.830	280	0.051
100	0.726	290	0.055
110	0.611	300	0.051
120	0.485	310	0.079
130	0.371	320	0.159
140	0.266	330	0.246
150	0.157	340	0.328
160	0.066	350	0.423
170	0.073		



AZIMUTH	ATTENUATION	PHASE
(BAY 1) 55°	0 db	0°
(BAY 2) 55°	0 db	-90°

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE			
SHOP ORDER: 38207	FREQUENCY: 97.7	SCALE: N.T.S.	DRAWN BY: ASP
			APPROVED BY: SE
TITLE: FIGURE 2, KJLV, 97.7MHz MODEL 6025-2-SS-OFFSET			
DATE: 1/11/22	FIGURE 2		REV —

Antenna Mfg.: Shively Labs
Antenna Type: 6025-2-SS-OFFSET

Date: 1/12/2022

Station: KJLV

Beam Tilt 0

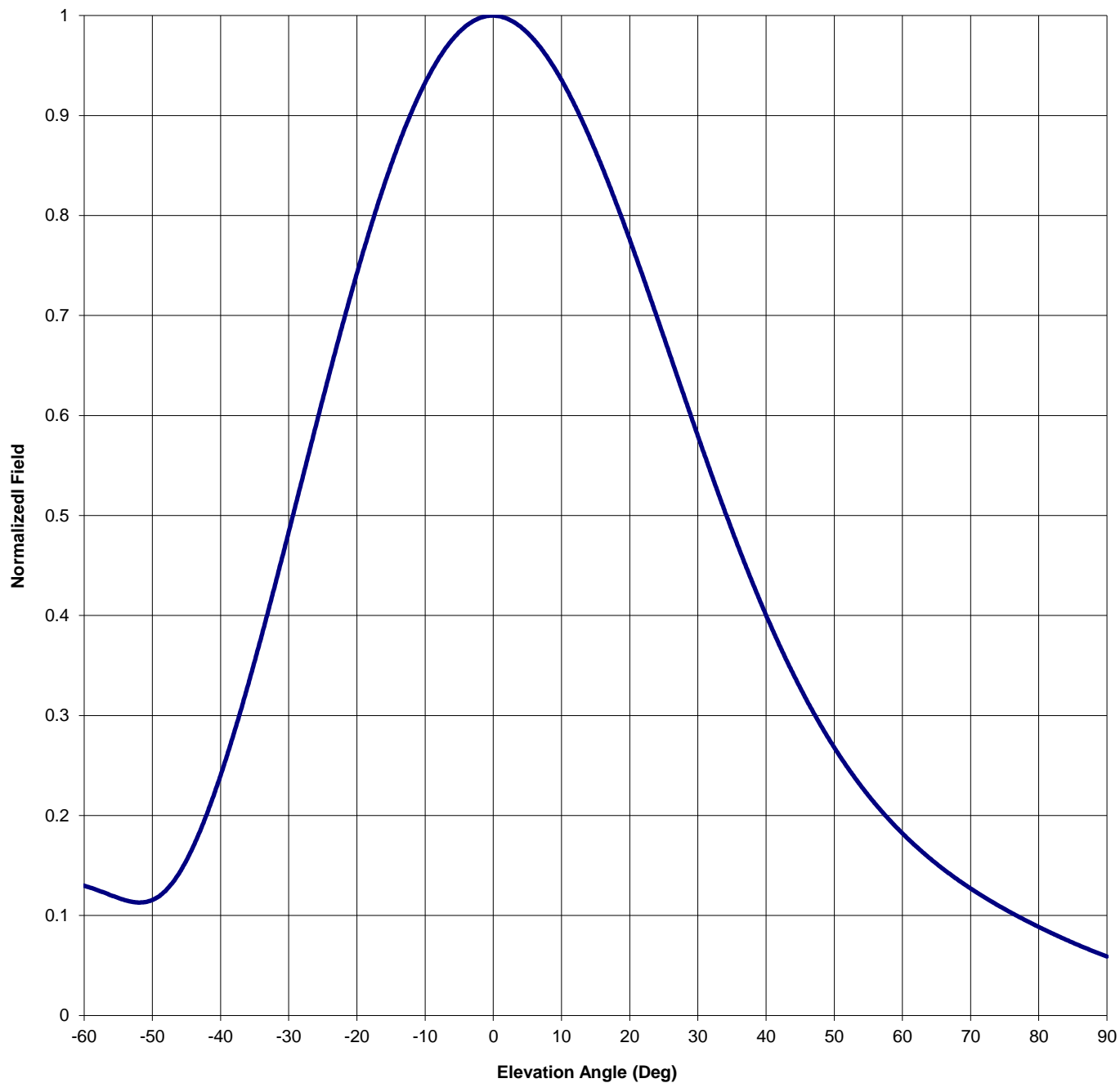
Frequency: 97.7

Gain (Max) 4.162 6.193 dB

Channel #: 249

Gain (Horizon) 4.162 6.193 dB

Figure: Figure 3



Antenna Mfg.: Shively Labs
Antenna Type: 6025-2-SS-OFFSET

Date: 1/12/2022

Station: KJLV

Beam Tilt 0

Frequency: 97.7

Gain (Max) 4.162

6.193 dB

Channel #: 249

Gain (Horizon) 4.162

6.193 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	0.058	-44	0.169	0	1.000	46	0.315
-89	0.061	-43	0.184	1	0.999	47	0.302
-88	0.064	-42	0.202	2	0.997	48	0.290
-87	0.067	-41	0.220	3	0.994	49	0.279
-86	0.071	-40	0.240	4	0.989	50	0.268
-85	0.075	-39	0.261	5	0.983	51	0.258
-84	0.078	-38	0.283	6	0.976	52	0.248
-83	0.082	-37	0.306	7	0.967	53	0.238
-82	0.086	-36	0.330	8	0.958	54	0.229
-81	0.090	-35	0.354	9	0.947	55	0.220
-80	0.094	-34	0.379	10	0.936	56	0.212
-79	0.098	-33	0.405	11	0.923	57	0.204
-78	0.101	-32	0.431	12	0.910	58	0.196
-77	0.105	-31	0.457	13	0.895	59	0.189
-76	0.109	-30	0.484	14	0.880	60	0.182
-75	0.113	-29	0.510	15	0.864	61	0.176
-74	0.116	-28	0.537	16	0.848	62	0.169
-73	0.119	-27	0.564	17	0.831	63	0.163
-72	0.122	-26	0.590	18	0.813	64	0.157
-71	0.125	-25	0.617	19	0.795	65	0.152
-70	0.127	-24	0.643	20	0.776	66	0.146
-69	0.129	-23	0.668	21	0.757	67	0.141
-68	0.131	-22	0.694	22	0.738	68	0.136
-67	0.132	-21	0.718	23	0.718	69	0.132
-66	0.133	-20	0.742	24	0.699	70	0.127
-65	0.134	-19	0.766	25	0.679	71	0.123
-64	0.134	-18	0.788	26	0.659	72	0.118
-63	0.134	-17	0.810	27	0.639	73	0.114
-62	0.133	-16	0.831	28	0.619	74	0.110
-61	0.131	-15	0.850	29	0.599	75	0.106
-60	0.130	-14	0.869	30	0.580	76	0.103
-59	0.128	-13	0.887	31	0.560	77	0.099
-58	0.125	-12	0.903	32	0.541	78	0.095
-57	0.123	-11	0.919	33	0.522	79	0.092
-56	0.120	-10	0.933	34	0.504	80	0.089
-55	0.118	-9	0.946	35	0.485	81	0.085
-54	0.115	-8	0.957	36	0.467	82	0.082
-53	0.114	-7	0.967	37	0.450	83	0.079
-52	0.113	-6	0.976	38	0.433	84	0.076
-51	0.113	-5	0.984	39	0.416	85	0.073
-50	0.115	-4	0.990	40	0.400	86	0.070
-49	0.119	-3	0.994	41	0.385	87	0.067
-48	0.125	-2	0.998	42	0.370	88	0.064
-47	0.133	-1	0.999	43	0.355	89	0.062
-46	0.143	0	1.000	44	0.341	90	0.059
-45	0.155			45	0.328		

S.O. 38207

Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KJLV Los Altos, California

MODEL 6025-2-SS-OFFSET

Elevation Gain of Antenna 0.798

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

H RMS 0.419272 V RMS 0.457313 H/V Ratio 0.917

Elevation Gain of Horizontal Component 0.732

Elevation Gain of Vertical Component 0.870

Horizontal Azimuth Gain equals $1/(\text{RMS})^2$. 5.689

Vertical Azimuth Gain equals $1/(\text{RMS}/\text{Max Vert})^2$. 4.768

Max. Vertical 0.998564

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

Total Horizontal Power Gain = 4.162

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

Total Vertical Power Gain = 4.150

=====

ERP divided by Horizontal Power Gain equals Antenna Input Power

0.75 kW ERP Divided by H Gain 4.162 equals 0.180 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.180 kW Times V Gain 4.150 equals 0.748 kW V ERP

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

(0.9985642 Times 0.75 Equals 0.748 kW Vertical ERP

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

