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S.O. 29318

Report of Test 6810-1-DA

for

LAZER LICENSES, LLC

KXZM 93.7 MHz FELTON, CA.

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-1-DA to meet the needs of KXZM and to comply with the requirements of the FCC construction permit, file number BMPH-20110927ADV. 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 BMPH-20110927ADV indicates that the Horizontal radiation component shall not exceed 0.41 kW at any azimuth and is restricted to the following values at the azimuths specified:

170 Degrees T: 0.065 kW

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From Figure 1A, the maximum radiation of the Horizontal component occurs at 235 Degrees T to 350 Degrees T. At the restricted azimuth of 170 Degrees T the Horizontal component is 8.336 dB down from the maximum of 0.410 kW, or 0.0601 kW.

The R.M.S. of the Horizontal component is 0.777. The total Horizontal power gain is 0.789. The R.M.S. of the Vertical component is 0.773. The total Vertical power gain is 0.771. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.905. The R.M.S. of the measured composite pattern is 0.781. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.769. Therefore this pattern complies with the FCC requirement of 73.316(c) (2) (ix) (A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-1-DA was mounted on a tower of precise scale to the ROHN-65 tower at the KXZM site. The spacing of the antenna to the tower was varied and with the addition of vertical parasitics the vertical pattern was achieved shown in Figure 1A. A horizontal parasitic element was placed directly under the bay. The position of this horizontal parasitic element was changed until the horizontal pattern shown in Figure 1A was achieved. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPH-20110927ADV, a single level of the 6810-1-DA was set up on the Howell Laboratories scale model antenna pattern measuring range. A scale of 4.5:1 was used.

SUPERVISION:

Mr. Surette was graduated from Lowell Technological Institute, Lowell, Massachusetts in 1973 with the degree of Bachelor of Science in Electrical Engineering. He has been directly involved with design and development of broadcast antennas, filter systems and RF transmission components since 1974, as an RF Engineer for six years with the original Shively Labs in Raymond, ME and for a short period of time with Dielectric Communications. He is Currently an Associate Member of the AFCCE and a Senior Member of IEEE. He has

authored a chapter on filters and combining systems for the latest edition of the CRC Electronics Handbook and for the 9th and 10th Editions of the NAB Handbook.

EQUIPMENT:

The 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 8753 Network Analyzer

PC Based Controller

Hewlett Packard 7550A Graphics Plotter

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 421.65 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:

Robert A. Surette
Director of Engineering
S/O 29318
Date October 14, 2011

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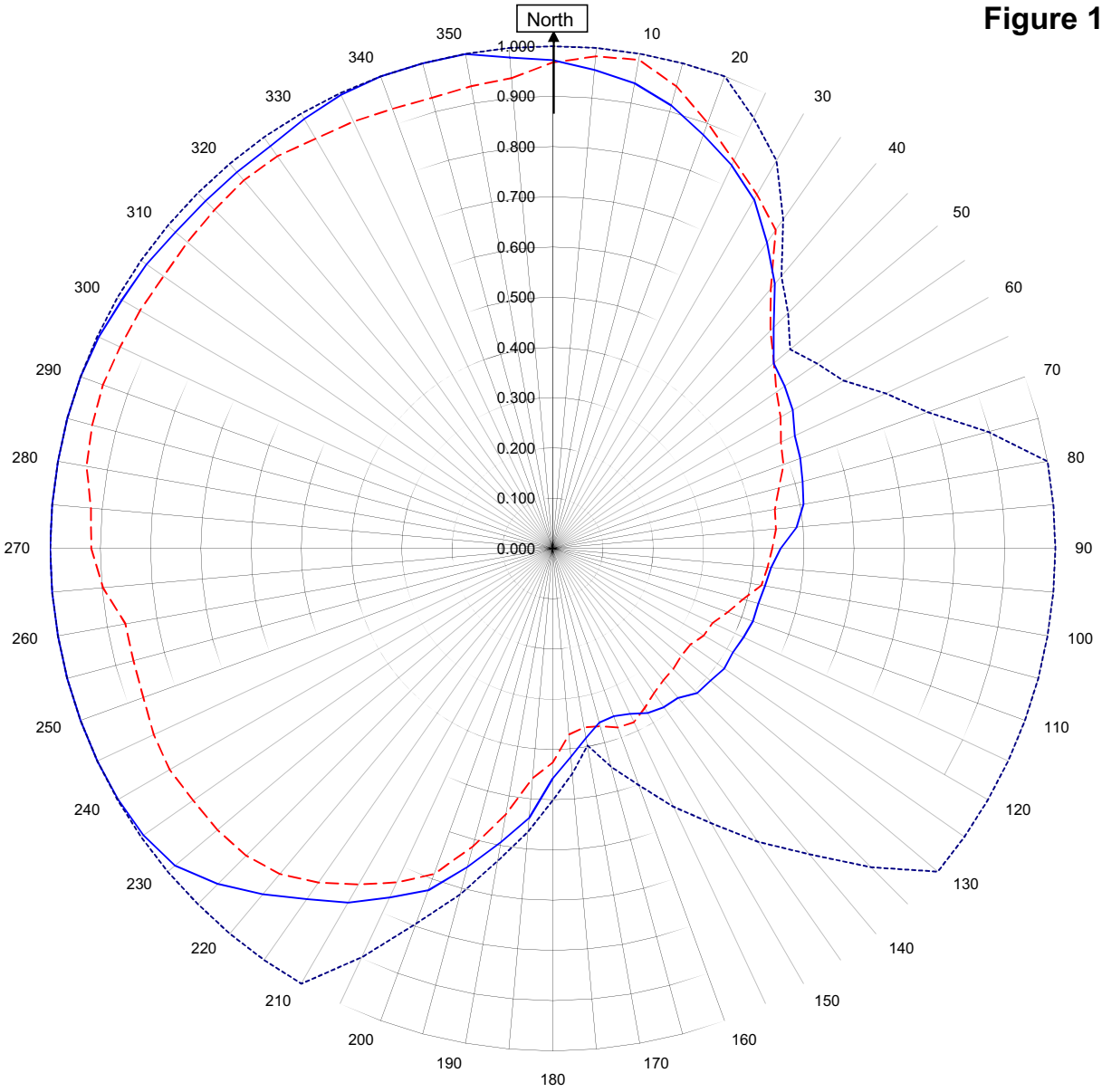
Figure 1A



KXZM FELTON, CA.

29318

October 14, 2011

Horizontal RMS	0.777
Vertical RMS	0.734
H/V Composite RMS	0.781
FCC Composite RMS	0.905

Frequency	93.7 / 421.65 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-1-DA
Pattern Type	Directional Azimuth

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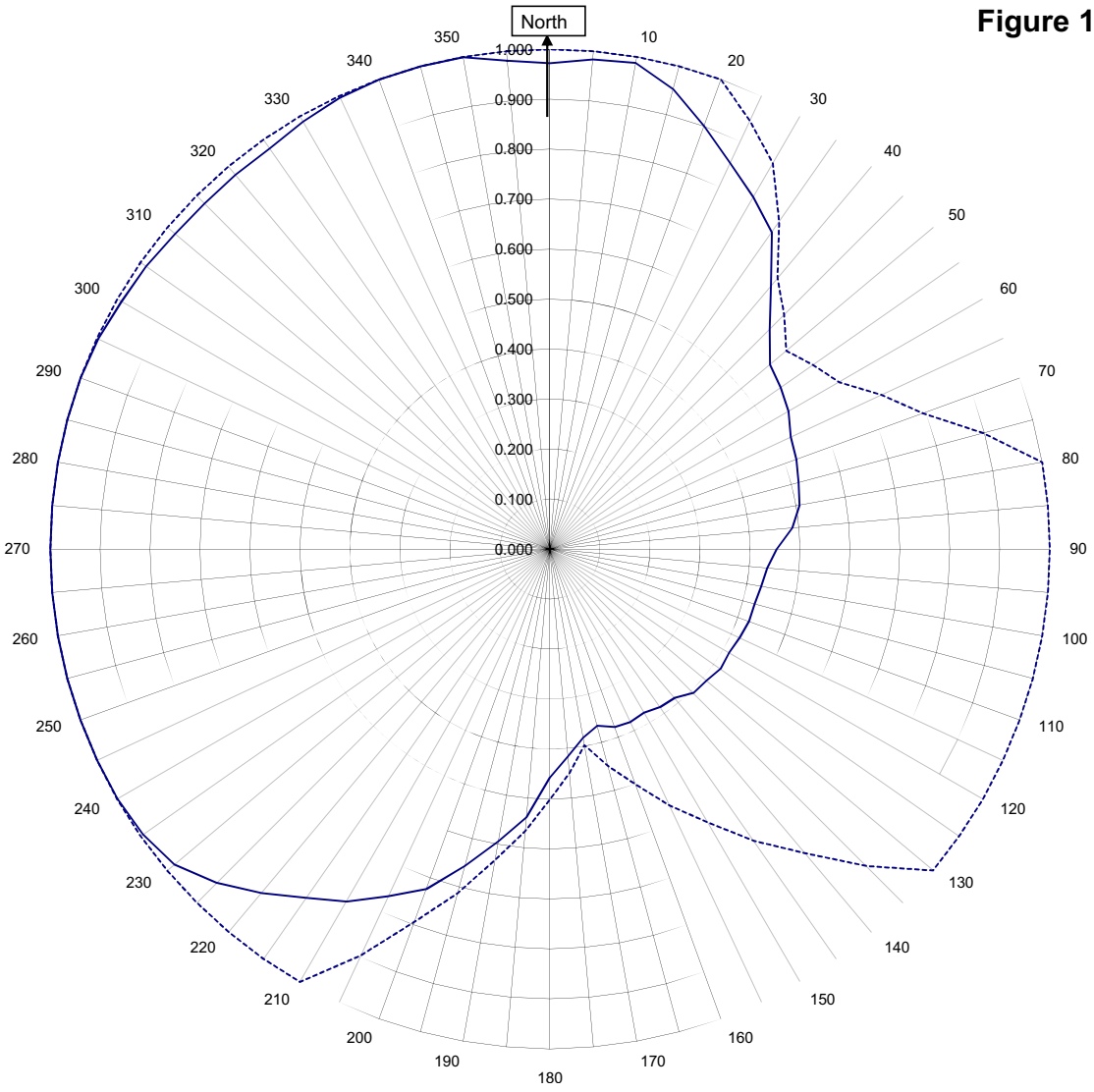
Figure 1B



KXZM FELTON, CA.

29318

October 14, 2011

_____H/VComposite RMS	0.781
.....FCC Composite RMS	0.905

Frequency	93.7 / 421.65 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-1-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
KXZM FELTON, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.972	180	0.457
10	0.940	190	0.593
20	0.877	200	0.724
30	0.802	210	0.814
40	0.688	220	0.898
45	0.622	225	0.944
50	0.574	230	0.981
60	0.551	240	0.999
70	0.524	250	1.000
80	0.507	260	1.000
90	0.454	270	1.000
100	0.429	280	1.000
110	0.424	290	1.000
120	0.414	300	0.990
130	0.409	310	0.980
135	0.407	315	0.978
140	0.388	320	0.978
150	0.378	330	0.988
160	0.355	340	1.000
170	0.383	350	1.000

Figure 1D

Tabulation of Vertical Azimuth Pattern
KXZM FELTON, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.968	180	0.426
10	0.988	190	0.537
20	0.901	200	0.689
30	0.813	210	0.772
40	0.675	220	0.846
45	0.612	225	0.864
50	0.575	230	0.871
60	0.524	240	0.880
70	0.489	250	0.867
80	0.449	260	0.864
90	0.437	270	0.918
100	0.422	280	0.942
110	0.370	290	0.953
120	0.347	300	0.948
130	0.333	310	0.949
135	0.339	315	0.952
140	0.342	320	0.957
150	0.366	330	0.942
160	0.379	340	0.931
170	0.362	350	0.935

Figure 1E

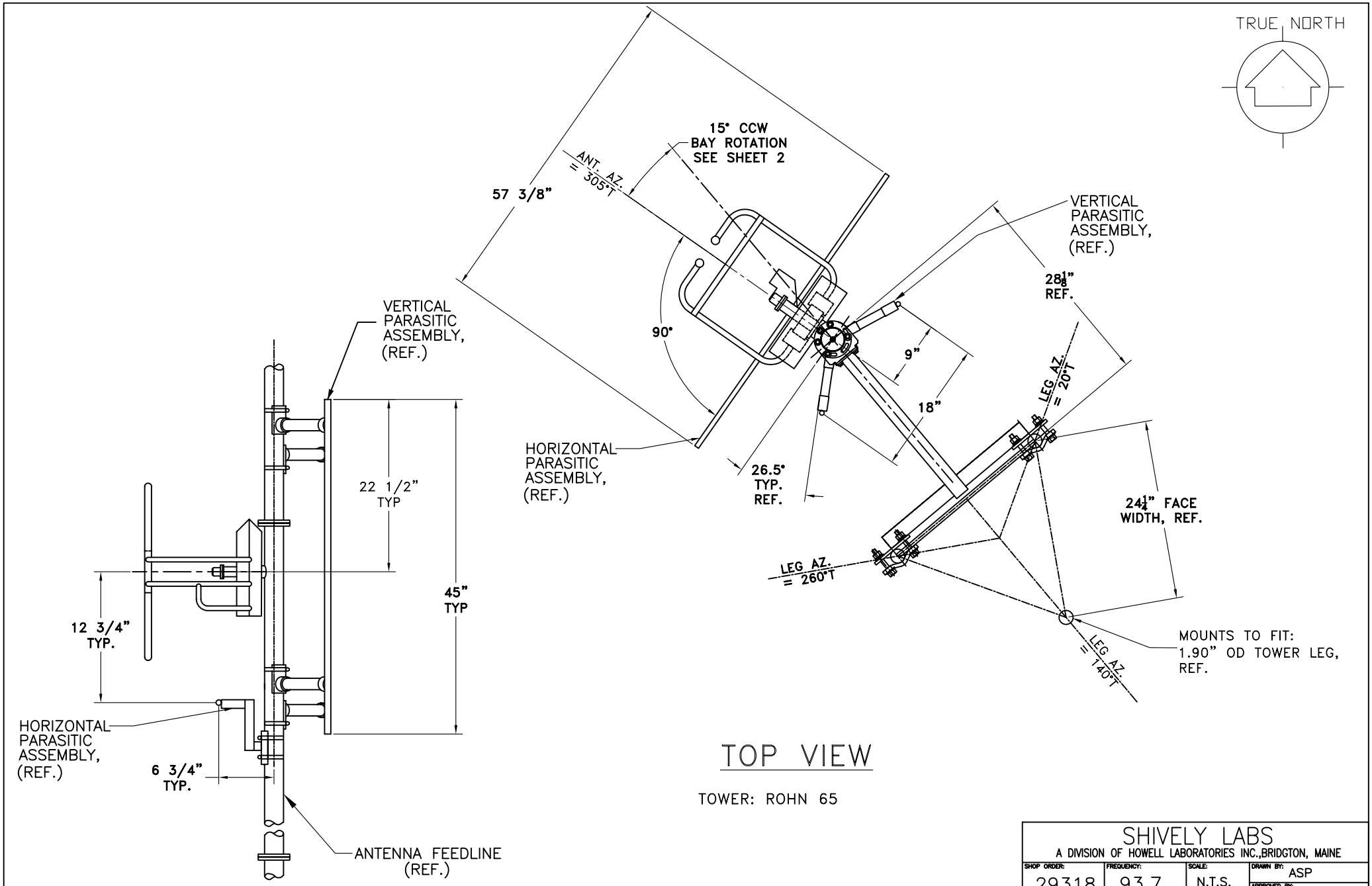
Tabulation of Composite Azimuth Pattern
KXZM FELTON, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.972	180	0.457
10	0.988	190	0.593
20	0.901	200	0.724
30	0.813	210	0.814
40	0.688	220	0.898
45	0.622	225	0.944
50	0.575	230	0.981
60	0.551	240	0.999
70	0.524	250	1.000
80	0.507	260	1.000
90	0.454	270	1.000
100	0.429	280	1.000
110	0.424	290	1.000
120	0.414	300	0.990
130	0.409	310	0.980
135	0.407	315	0.978
140	0.388	320	0.978
150	0.378	330	0.988
160	0.379	340	1.000
170	0.383	350	1.000

Figure 1F

Tabulation of FCC Directional Composite
KXZM FELTON, CA.

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	0.501
10	1.000	190	0.631
20	1.000	200	0.794
30	0.891	210	1.000
40	0.708	220	1.000
50	0.617	230	1.000
60	0.668	240	1.000
70	0.794	250	1.000
80	1.000	260	1.000
90	1.000	270	1.000
100	1.000	280	1.000
110	1.000	290	1.000
120	1.000	300	1.000
130	1.000	310	1.000
140	0.794	320	1.000
150	0.631	330	1.000
160	0.501	340	1.000
170	0.398	350	1.000



TOP VIEW

TOWER: ROHN 65

SIDE VIEW

ANTENNA HEADING 305° TRUE NORTH

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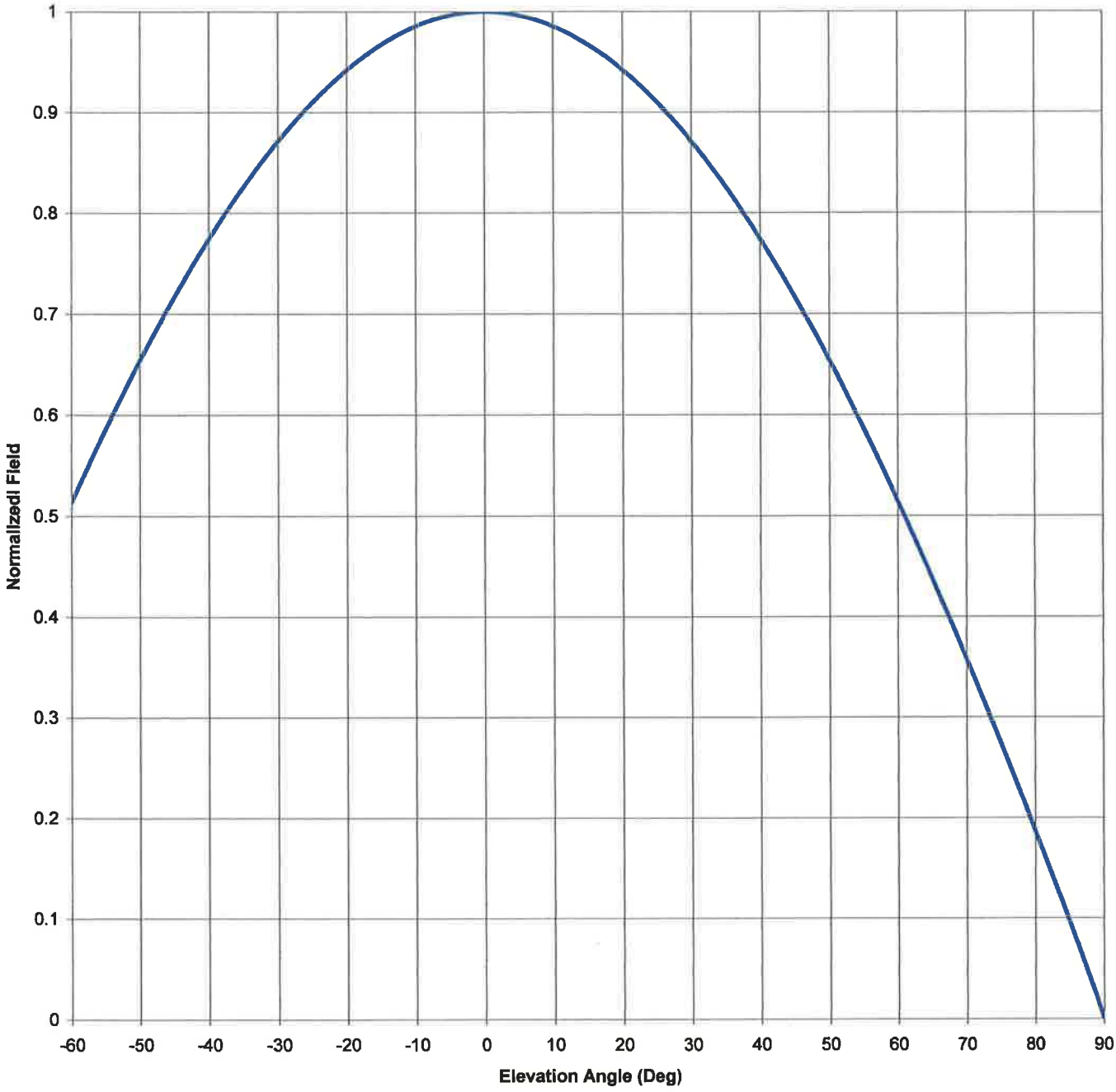
SHOP ORDER: 29318	FREQUENCY: 93.7	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: MODEL-6810-1-DIRECTIONAL ANTENNA			
DATE: 10/13/11	FIGURE 2		

Antenna Mfg.: Shively Labs
Antenna Type: 6810-1-DA
Station: KXZM
Frequency: 93.7
Channel #: 229
Figure: FIGURE-3

Date: 10/13/2011

Beam Tilt	0	
Gain (Max)	0.789	-1.029 dB
Gain (Horizon)	0.789	-1.029 dB



Antenna Mfg.: Shively Labs
Antenna Type: 6810-1-DA
Station: KXZM
Frequency: 93.7
Channel #: 229
Figure: FIGURE-3

Date: 10/13/2011

Beam Tilt	**0**	
Gain (Max)	**0.789**	**-1.029 dB**
Gain (Horizon)	**0.789**	**-1.029 dB**

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	0.000	-44	0.729	0	1.000	46	0.705
-89	0.021	-43	0.741	1	1.000	47	0.693
-88	0.040	-42	0.752	2	0.999	48	0.680
-87	0.059	-41	0.763	3	0.999	49	0.667
-86	0.078	-40	0.774	4	0.998	50	0.654
-85	0.096	-39	0.785	5	0.996	51	0.641
-84	0.114	-38	0.796	6	0.995	52	0.628
-83	0.133	-37	0.806	7	0.993	53	0.614
-82	0.151	-36	0.816	8	0.991	54	0.600
-81	0.168	-35	0.826	9	0.988	55	0.586
-80	0.186	-34	0.835	10	0.985	56	0.572
-79	0.204	-33	0.845	11	0.982	57	0.558
-78	0.221	-32	0.854	12	0.979	58	0.544
-77	0.239	-31	0.862	13	0.975	59	0.529
-76	0.256	-30	0.871	14	0.971	60	0.514
-75	0.273	-29	0.879	15	0.967	61	0.499
-74	0.290	-28	0.887	16	0.963	62	0.484
-73	0.307	-27	0.895	17	0.958	63	0.469
-72	0.324	-26	0.903	18	0.953	64	0.453
-71	0.341	-25	0.910	19	0.948	65	0.437
-70	0.357	-24	0.917	20	0.942	66	0.422
-69	0.373	-23	0.924	21	0.936	67	0.406
-68	0.390	-22	0.930	22	0.930	68	0.390
-67	0.406	-21	0.936	23	0.924	69	0.373
-66	0.422	-20	0.942	24	0.917	70	0.357
-65	0.437	-19	0.948	25	0.910	71	0.341
-64	0.453	-18	0.953	26	0.903	72	0.324
-63	0.469	-17	0.958	27	0.895	73	0.307
-62	0.484	-16	0.963	28	0.887	74	0.290
-61	0.499	-15	0.967	29	0.879	75	0.273
-60	0.514	-14	0.971	30	0.871	76	0.256
-59	0.529	-13	0.975	31	0.862	77	0.239
-58	0.544	-12	0.979	32	0.854	78	0.221
-57	0.558	-11	0.982	33	0.845	79	0.204
-56	0.572	-10	0.985	34	0.835	80	0.186
-55	0.586	-9	0.988	35	0.826	81	0.168
-54	0.600	-8	0.991	36	0.816	82	0.151
-53	0.614	-7	0.993	37	0.806	83	0.133
-52	0.628	-6	0.995	38	0.796	84	0.114
-51	0.641	-5	0.996	39	0.785	85	0.096
-50	0.654	-4	0.998	40	0.774	86	0.078
-49	0.667	-3	0.999	41	0.763	87	0.059
-48	0.680	-2	0.999	42	0.752	88	0.040
-47	0.693	-1	1.000	43	0.741	89	0.021
-46	0.705	0	1.000	44	0.729	90	0.000
-45	0.717			45	0.717		

S.O. 29318 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KXZM FELTON, CA.

MODEL 6810-1-DA

Elevation Gain of Antenna 0.45

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

H RMS 0.776791 V RMS 0.733882 H/V Ratio 1.058

Elevation Gain of Horizontal Component 0.476

Elevation Gain of Vertical Component 0.425

Horizontal Azimuth Gain equals $1/(RMS)^2$. 1.657

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 1.812

Max. Vertical 0.988

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

Total Horizontal Power Gain = **0.789**

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

Total Vertical Power Gain = **0.771**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

0.41 kW ERP Divided by H Gain 0.789 equals 0.519 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.519 kW Times V Gain 0.771 equals 0.400 kW V ERP

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

(0.988)^2 Times 0.41 Equals 0.400 kW Vertical ERP

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