

S.O. 28428

Report of Test 6018-1/4-DA

for

DOMESTIC CHURCH MEDIA FOUNDATION

WSFS 89.3 MHz Freehold, NJ

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6018-1/4-DA to meet the needs of WSFS and to comply with the requirements of the FCC construction permit, file number BMPED-20100318AKW.

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 Vertical Polarization for the Measured Azimuth Pattern

Figure 1D - Tabulation of the Measured Composite Azimuth Pattern

Figure 1E - Tabulation of the FCC Composite

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

Construction permit file number BMPED-20100318AKW indicates that the Vertical radiation component shall not exceed 3.8 kW at any azimuth and is restricted to the following values at the azimuths specified:

350 - 20 Degrees T: 0.77 kW

From Figure 1A, the maximum radiation of the Vertical component occurs at 089 Degrees T to 090 Degrees T. At the restricted azimuth of 350 - 20 Degrees T the Vertical component is 7.33 dB down from the maximum of 3.8 kW, or 0.70 kW.

The R.M.S. of the Vertical component is 0.798. The total Vertical power gain is 1.426. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.909. The R.M.S. of the measured composite pattern is 0.798. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.773. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6018-1/4-DA was mounted on a pole of precise scale to the outrigged pole mounted to the self-supported tower at the WSFS site. The spacing of the antenna to the pole was varied to achieve the vertical pattern shown in Figure 1A. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20100318AKW, a single level of the 6018-1/4-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

The test equipment is calibrated to ANSI/NCSL Z540-1-1994.

TEST PROCEDURES:

The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 401.85 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:



Robert A. Surette

Director of Sales Engineering

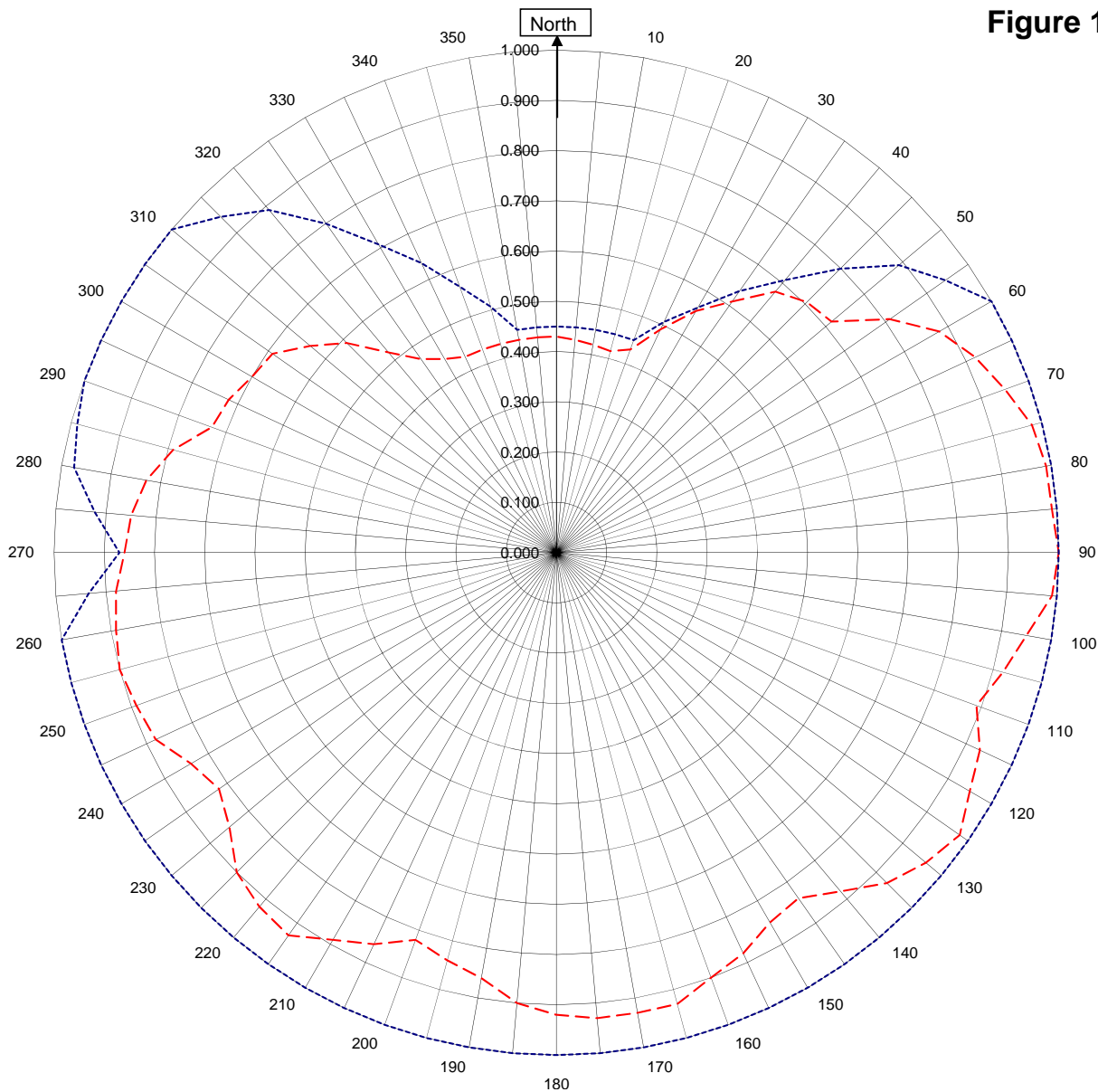
S/O 28428

December 6, 2010

Shively Labs

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

Figure 1A



WSFS Freehold, NJ

28428
December 6, 2010

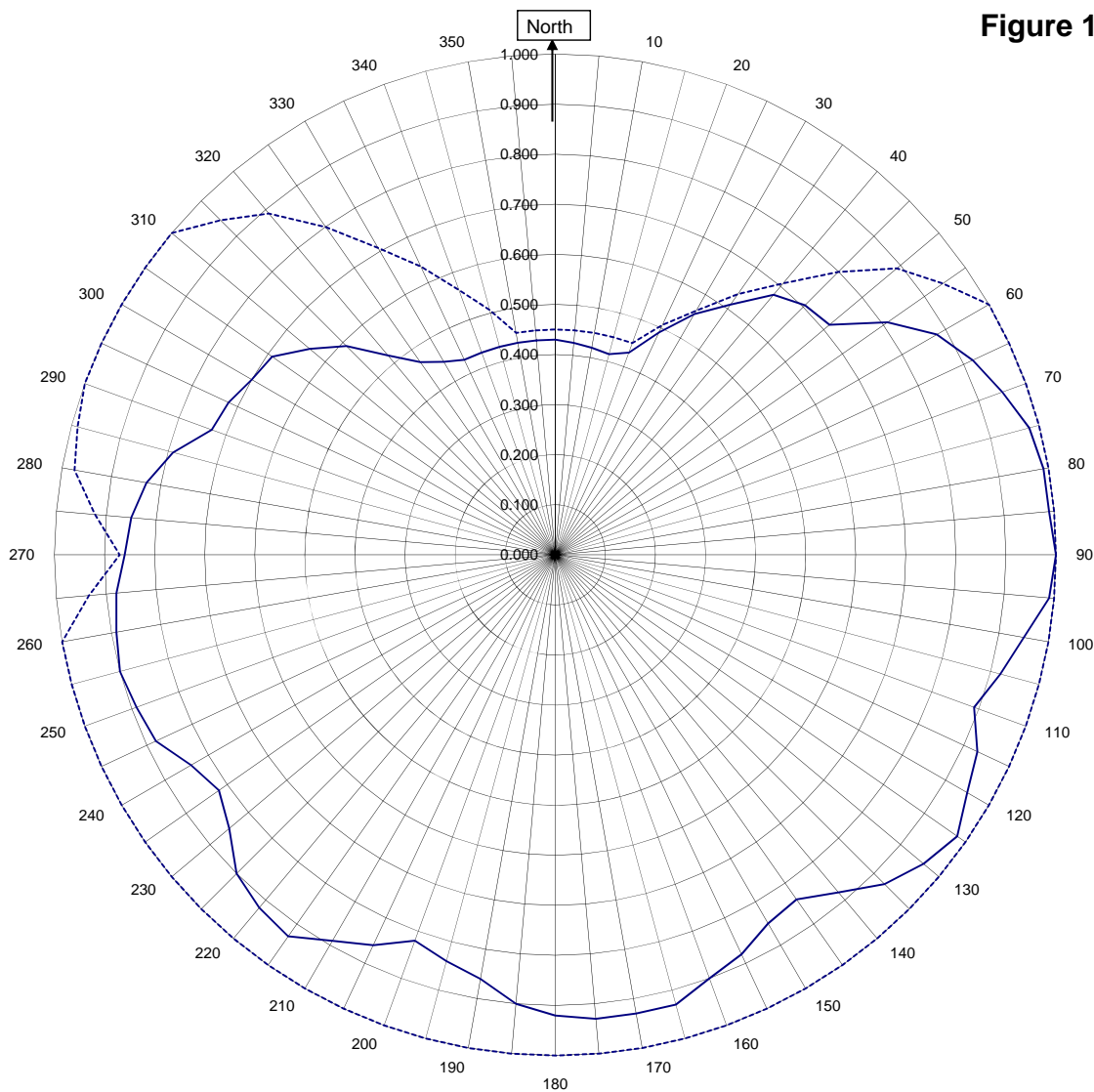
Horizontal RMS	0.000	Frequency	89.3 / 401.85 MHz
Vertical RMS	0.798	Plot	Relative Field
H/V Composite RMS	0.798	Scale	4.5 : 1
FCC Composite RMS	0.909	See Figure 2 for Mechanical Details	

Antenna Model	6018-1/4-DA
Pattern Type	Directional Azimuth

Shively Labs

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

Figure 1B



WSFS Freehold, NJ

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 H/V Composite RMS	0.798
 FCC Composite RMS	0.909

Frequency	89.3 / 401.85 MHz
Plot	Relative Field
Scale	4.5 : 1
See Figure 2 for Mechanical Details	

Antenna Model	6018-1/4-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Vertical Azimuth Pattern
WSFS Freehold, NJ

Azimuth	Rel Field	Azimuth	Rel Field
0	0.430	180	0.920
10	0.420	190	0.860
20	0.430	200	0.820
30	0.555	210	0.890
40	0.678	220	0.920
45	0.705	225	0.900
50	0.715	230	0.850
60	0.880	240	0.840
70	0.950	250	0.890
80	0.990	260	0.890
90	1.000	270	0.860
100	0.950	280	0.829
110	0.890	290	0.730
120	0.950	300	0.700
130	0.960	310	0.640
135	0.930	315	0.590
140	0.880	320	0.520
150	0.850	330	0.445
160	0.900	340	0.430
170	0.930	350	0.430

Figure 1D

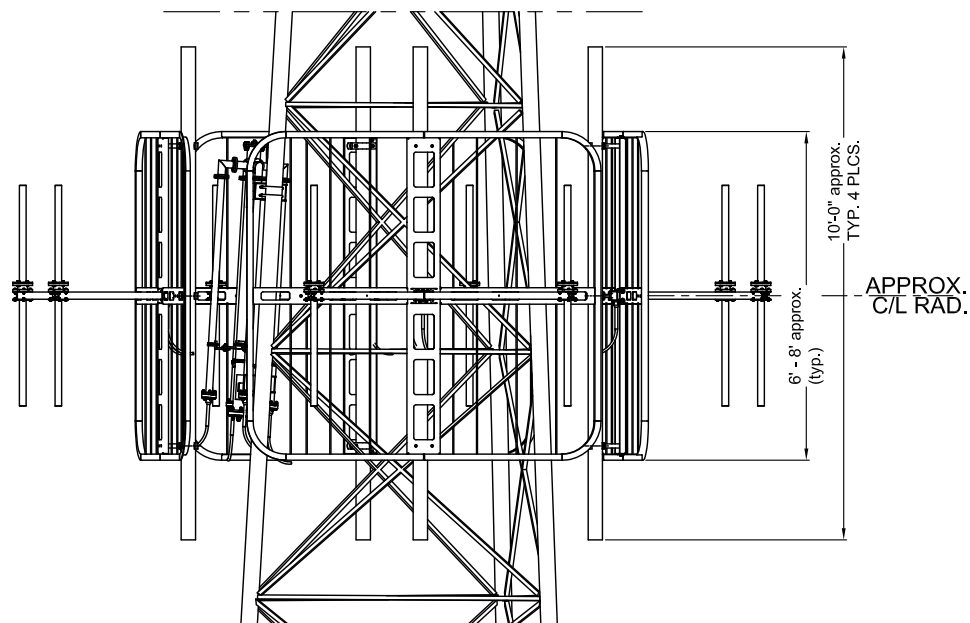
Tabulation of Composite Azimuth Pattern
WSFS Freehold, NJ

Azimuth	Rel Field	Azimuth	Rel Field
0	0.430	180	0.920
10	0.420	190	0.860
20	0.430	200	0.820
30	0.555	210	0.890
40	0.678	220	0.920
45	0.705	225	0.900
50	0.715	230	0.850
60	0.880	240	0.840
70	0.950	250	0.890
80	0.990	260	0.890
90	1.000	270	0.860
100	0.950	280	0.829
110	0.890	290	0.730
120	0.950	300	0.700
130	0.960	310	0.640
135	0.930	315	0.590
140	0.880	320	0.520
150	0.850	330	0.445
160	0.900	340	0.430
170	0.930	350	0.430

Figure 1E

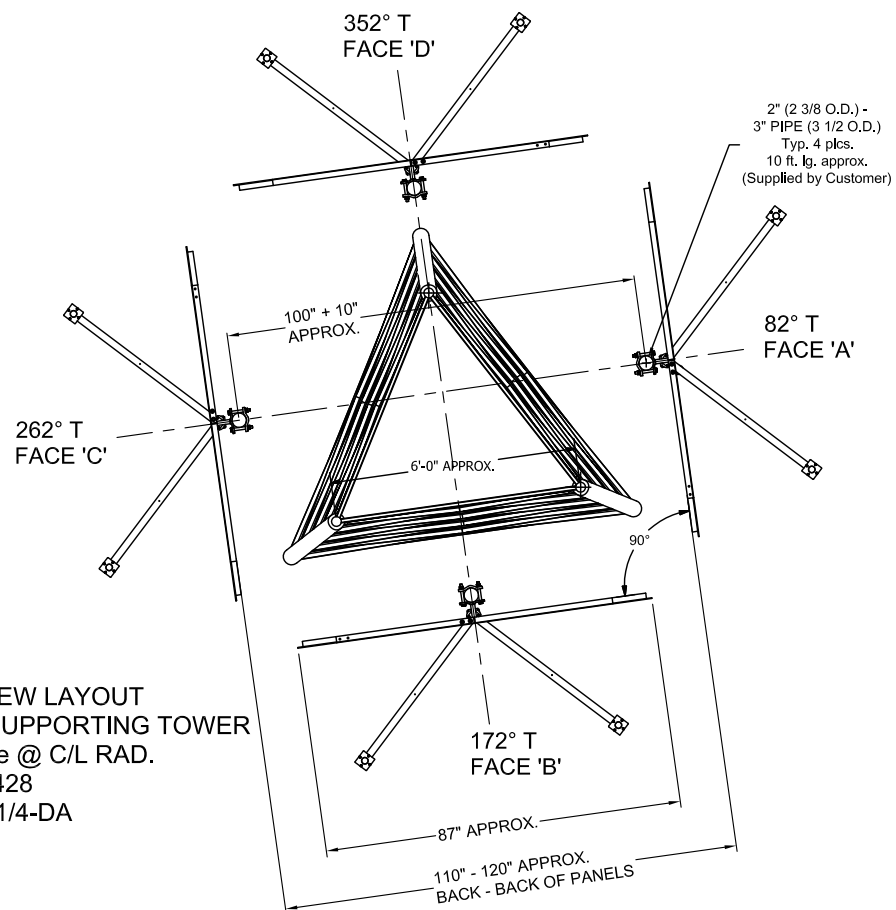
Tabulation of FCC Directional Composite
WSFS Freehold, NJ

Azimuth	Rel Field	Azimuth	Rel Field
0	0.450	180	1.000
10	0.450	190	1.000
20	0.450	200	1.000
30	0.563	210	1.000
40	0.708	220	1.000
50	0.890	230	1.000
60	1.000	240	1.000
70	1.000	250	1.000
80	1.000	260	1.000
90	1.000	270	0.870
100	1.000	280	0.975
110	1.000	290	1.000
120	1.000	300	1.000
130	1.000	310	1.000
140	1.000	320	0.890
150	1.000	330	0.708
160	1.000	340	0.563
170	1.000	350	0.450



SIDE VIEW LAYOUT

TOP VIEW LAYOUT
SELF-SUPPORTING TOWER
6 ft. face @ C/L RAD.
S/O 28428
6018V-1/4-DA



SHIVELY LABS			
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE			
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
28428	89.3 MHz	N.T.S.	DAB
TITLE:			APPROVED BY:
MODEL-6018V-1/4 DIRECTIONAL ANTENNA			ASP
DATE:			
10-31-10	FIGURE 2		

Antenna Mfg.: Shively Labs
Antenna Type: 6018-1/4-DA

Date: 12/6/2010

Station: WSFS

Frequency: 89.3

Channel #: 207

Figure: 3

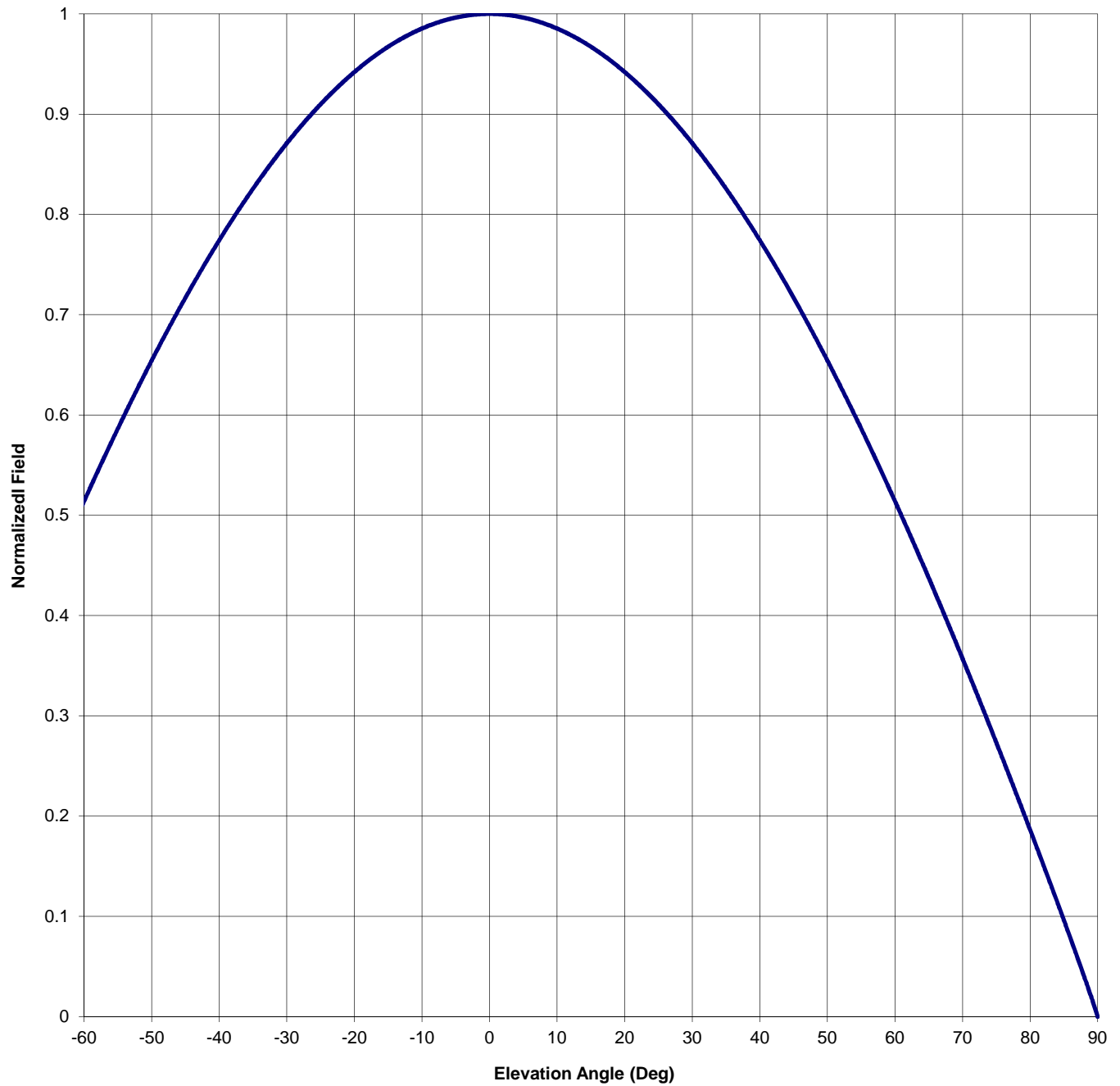
Beam Tilt 0

Gain (Max) 1.426

Gain (Horizon) 1.426

1.542 dB

1.542 dB



Antenna Mfg.: Shively Labs

Date: 12/6/2010

Antenna Type: 6018-1/4-DA

Station: WSFS

Beam Tilt 0

Frequency: 89.3

Gain (Max) 1.426

1.542 dB

Channel #: 207

Gain (Horizon) 1.426

1.542 dB

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	0.000	-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		