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INQ. F00065

Report of Test SCALA 4-CL-FM/VRM LOG PERIODIC ANTENNA

for

HOPE CHRISTIAN CHURCH OF MARLTON, INC.

WVBV 90.5 MHz MEDFORD LAKES, NJ

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a Scala 4-CL-FM/VRM Log Periodic Antenna to meet the needs of WVBV and to comply with the requirements of the FCC construction permit, file number BMPED-20041101AFA.

RESULTS:

The measured azimuth pattern for the Scala 4-CL-FM/VRM Log Periodic Antenna is shown in Figure 1. Figure 1A shows the Tabulation of the Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPED-20041101AFA indicates that the Vertical radiation component shall not exceed 21 kW at any azimuth and is restricted to the following values at the azimuths specified:

160 - 180 Degrees T: 0.008 kW

From Figure 1, the maximum radiation of the Vertical component occurs at 329 Degrees T to 332 Degrees T. At the restricted azimuth of 160 - 180 Degrees T the Vertical component is 33.979 dB down from the maximum of 21 kW, or 0.008 kW.

The R.M.S. of the Vertical component is 0.338. The total Vertical power gain is 15.800. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.356. The R.M.S. of the measured composite pattern is 0.338. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.302. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

The Scala 4-CL-FM/VRM Log Periodic Antenna was mounted on a tower of exact scale to the Rohn 90 tower at the Medford Lakes, NJ site. The Scala 4-CL-FM/VRM Log Periodic Antenna was placed on the tower per the Scala instructions. The spacing of the antenna system was optimized to produce the measured pattern shown in Figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20041101AFA, the Scala 4-CL-FM/VRM Log Periodic Antenna 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 Edition 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.

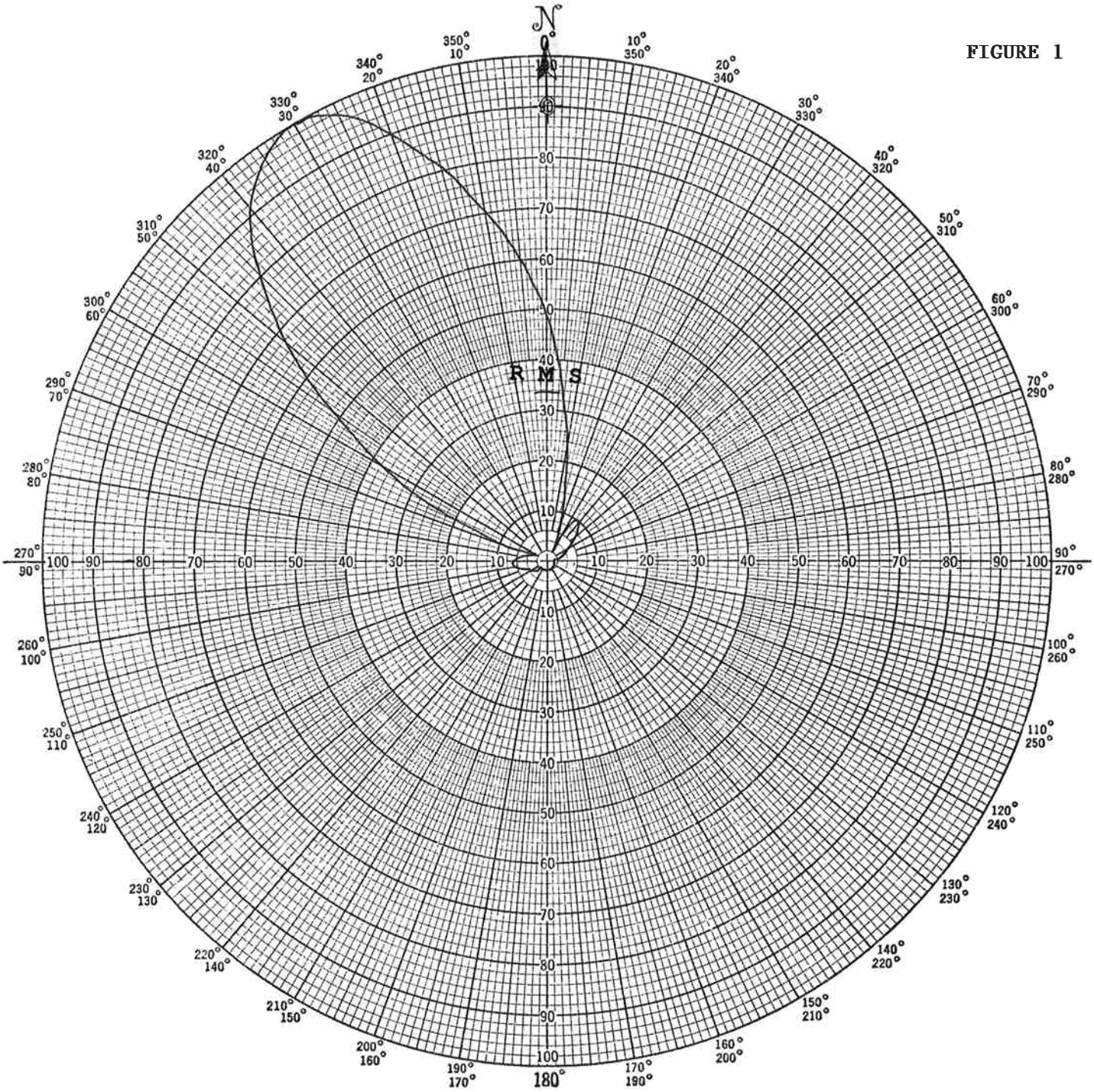
TEST PROCEDURES:

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 407.25 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 1.

Respectfully submitted by:

Robert A. Surette
Manager of RF Engineering
F00065
November 1, 2005

FIGURE 1



Shively Labs

PROJECT NAME WVBV MEDFORD LAKES, NJ

PROJECT NUMBER F00065 DATE 11/1/05

MODEL (X) FULL SCALE ( ) FREQUENCY 407.25/90.5 MHz

POLARIZATION VERTICAL

CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )

OBSERVER RAS

ANTENNA TYPE 4-CL-FM/VRM LOG PERIODIC ANTENNA

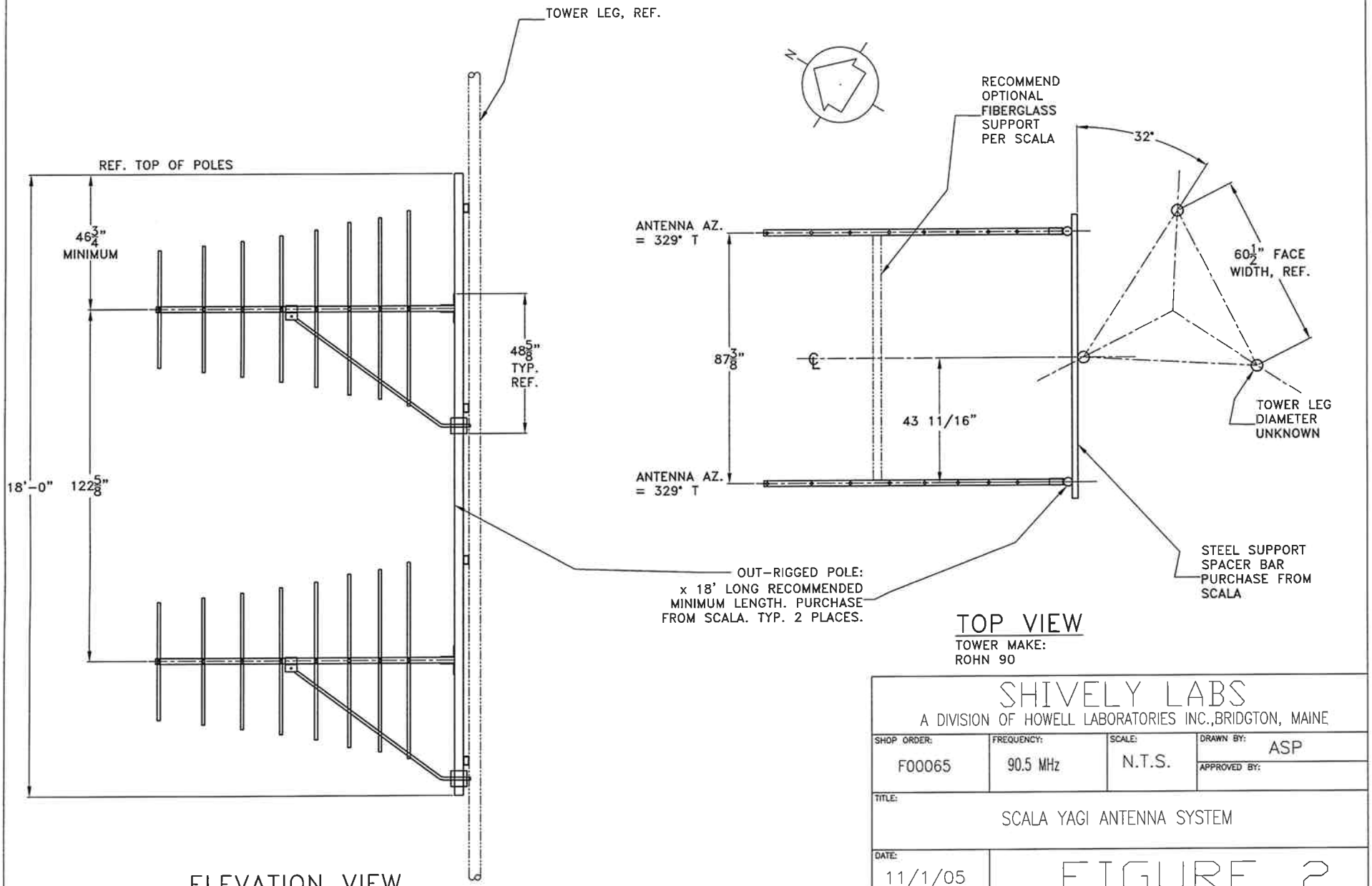
PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

Figure 1A

F00065
TABULATION OF VERTICAL POLARIZATION
WVBV MEDFORD LAKES, NJ

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.490	180	0.020
10	0.235	190	0.020
20	0.080	200	0.020
30	0.060	210	0.020
40	0.100	220	0.030
45	0.090	225	0.030
50	0.070	230	0.035
60	0.050	240	0.040
70	0.040	250	0.050
80	0.020	260	0.065
90	0.020	270	0.070
100	0.020	280	0.050
110	0.020	290	0.100
120	0.020	300	0.380
130	0.020	310	0.680
135	0.020	315	0.800
140	0.020	320	0.215
150	0.020	330	1.000
160	0.020	340	0.900
170	0.020	350	0.705



SHIVELY LABS
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE

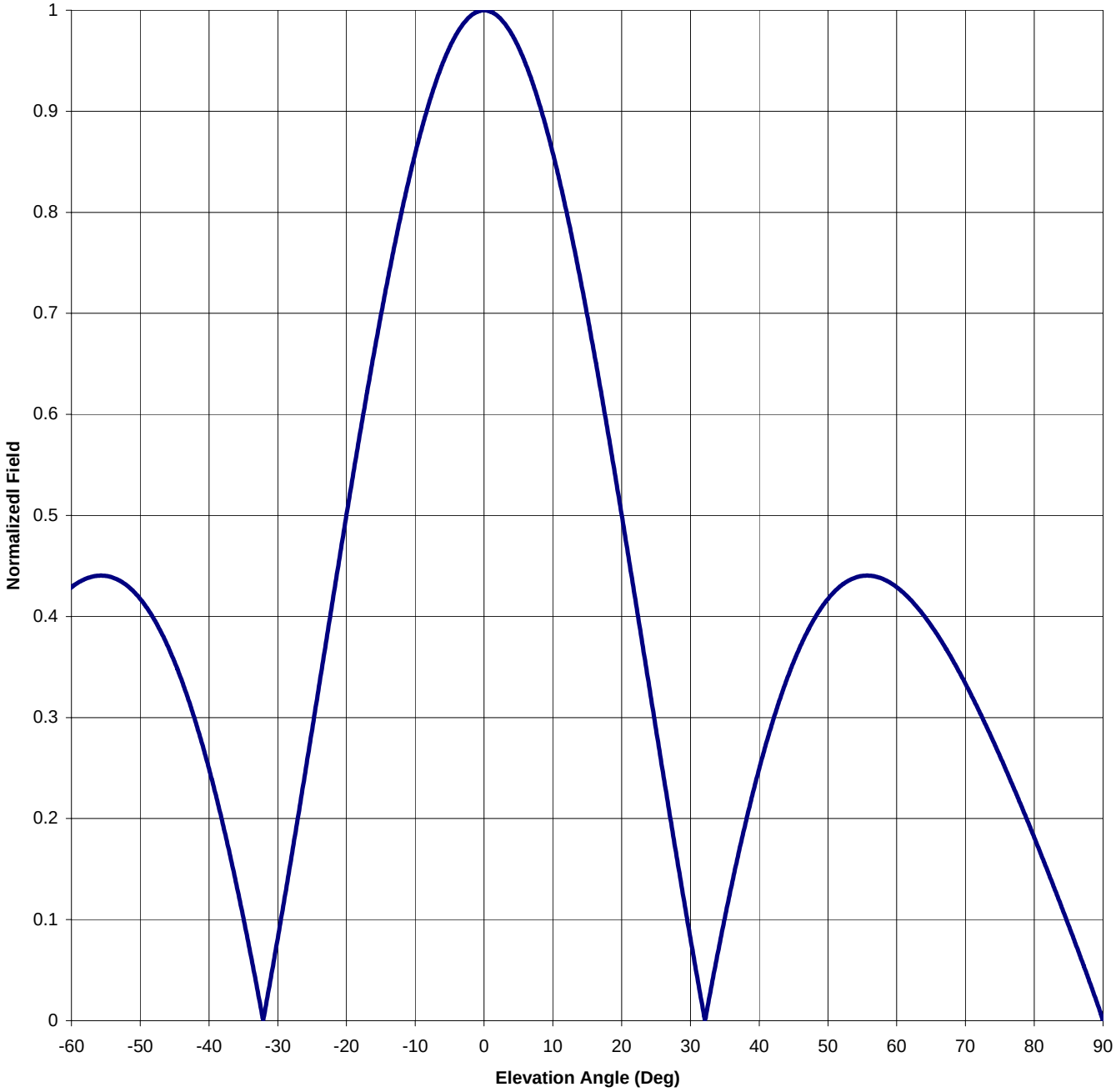
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
F00065	90.5 MHz	N.T.S.	ASP
			APPROVED BY:

TITLE: SCALA YAGI ANTENNA SYSTEM

DATE: 11/1/05

FIGURE 2

Antenna Mfg.:	**Shively Labs**			**Date:11/1/2005**
Antenna Type:	**Scala 4-CL-FM/VRM LPA**			
Station:	**WVBV**	**Beam Tilt**	**0**	
Frequency:	**90.5**	**Gain (Max)**	**15.800**	**11.986 dB**
Channel #:	**213**	**Gain (Horizon)**	**15.800**	**11.986 dB**
Figure:	**3**			



Antenna Mfg.: Shively Labs **Date:11/1/2005**

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Station: WVBV **Beam Tilt** 0

Frequency: 90.5 **Gain (Max)** 15.800 **11.986 dB**

Channel #: 213 **Gain (Horizon)** 15.800 **11.986 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	0.337	0	1.000	46	0.371
-89	0.020	-43	0.318	1	0.999	47	0.385
-88	0.039	-42	0.297	2	0.994	48	0.397
-87	0.058	-41	0.274	3	0.987	49	0.408
-86	0.076	-40	0.249	4	0.977	50	0.417
-85	0.094	-39	0.223	5	0.964	51	0.425
-84	0.112	-38	0.195	6	0.948	52	0.431
-83	0.130	-37	0.166	7	0.929	53	0.436
-82	0.147	-36	0.134	8	0.908	54	0.439
-81	0.164	-35	0.102	9	0.885	55	0.440
-80	0.181	-34	0.068	10	0.859	56	0.440
-79	0.198	-33	0.032	11	0.830	57	0.439
-78	0.214	-32	0.005	12	0.800	58	0.437
-77	0.231	-31	0.043	13	0.768	59	0.434
-76	0.246	-30	0.082	14	0.734	60	0.429
-75	0.262	-29	0.122	15	0.698	61	0.423
-74	0.277	-28	0.162	16	0.661	62	0.417
-73	0.292	-27	0.204	17	0.622	63	0.409
-72	0.306	-26	0.246	18	0.583	64	0.400
-71	0.320	-25	0.288	19	0.542	65	0.391
-70	0.333	-24	0.331	20	0.501	66	0.381
-69	0.346	-23	0.374	21	0.459	67	0.370
-68	0.358	-22	0.416	22	0.416	68	0.358
-67	0.370	-21	0.459	23	0.374	69	0.346
-66	0.381	-20	0.501	24	0.331	70	0.333
-65	0.391	-19	0.542	25	0.288	71	0.320
-64	0.400	-18	0.583	26	0.246	72	0.306
-63	0.409	-17	0.622	27	0.204	73	0.292
-62	0.417	-16	0.661	28	0.162	74	0.277
-61	0.423	-15	0.698	29	0.122	75	0.262
-60	0.429	-14	0.734	30	0.082	76	0.246
-59	0.434	-13	0.768	31	0.043	77	0.231
-58	0.437	-12	0.800	32	0.005	78	0.214
-57	0.439	-11	0.830	33	0.032	79	0.198
-56	0.440	-10	0.859	34	0.068	80	0.181
-55	0.440	-9	0.885	35	0.102	81	0.164
-54	0.439	-8	0.908	36	0.134	82	0.147
-53	0.436	-7	0.929	37	0.166	83	0.130
-52	0.431	-6	0.948	38	0.195	84	0.112
-51	0.425	-5	0.964	39	0.223	85	0.094
-50	0.417	-4	0.977	40	0.249	86	0.076
-49	0.408	-3	0.987	41	0.274	87	0.058
-48	0.397	-2	0.994	42	0.297	88	0.039
-47	0.385	-1	0.999	43	0.318	89	0.020
-46	0.371	0	1.000	44	0.337	90	0.000
-45	0.355			45	0.355		

FIGURE 4

INQ. F00065

VALIDATION OF GAIN CALCULATION

WVBV MEDFORD LAKES, NJ

SCALA 4-CL-FM/VRM LOG PERIODIC ANTENNA

Elevation Gain of Scala 4-CL-FM/VRM Log Periodic Antenna = 1.805

The RMS values are calculated utilizing the data of a planimeter.

Elevation Gain of Vertical Component equals 1.805

Vertical Azimuth Gain equals $1/(RMS)^2$
$1/(0.338)^2 = 8.753$

*** Total Vertical Gain is Elevation Gain times Azimuth Gain**
1.805 x 8.753 = 15.8