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S.O. 24030

Report of Test 6513-2-DA

for

FAMILY LIFE BROADCASTING, INC.

KFLT-FM 88.5 MHZ TUCSON, AZ

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6513-2-DA to meet the needs of KFLT-FM and to comply with the requirements of the FCC construction permit, file number BPED-19960517MF.

RESULTS:

The measured azimuth pattern for the 6513-2-DA 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 BPED-19960517MF indicates that the Vertical radiation component shall not exceed 1.50 kW at any azimuth and is restricted to the following values at the azimuths specified:

230 - 250 Degrees T: 0.048 kW

From Figure 1, the maximum radiation of the Vertical component occurs at 346 Degrees T to 011 Degrees T. At the restricted azimuth of 230 - 250 Degrees T the Vertical component is 15.65 dB down from the maximum of 1.50 kW, or 0.041 kW.

The R.M.S. of the Vertical component is 0.741. The total Vertical power gain is 3.609. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.8024. The R.M.S. of the measured composite pattern is 0.741. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.682. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6513-2-DA was mounted on a tower of exact scale to a Central 42″ face tower. The spacing of the antenna to the tower was varied to achieve the vertical pattern shown in Figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPED-19960517MF, a single level of the 6513-2-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 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.

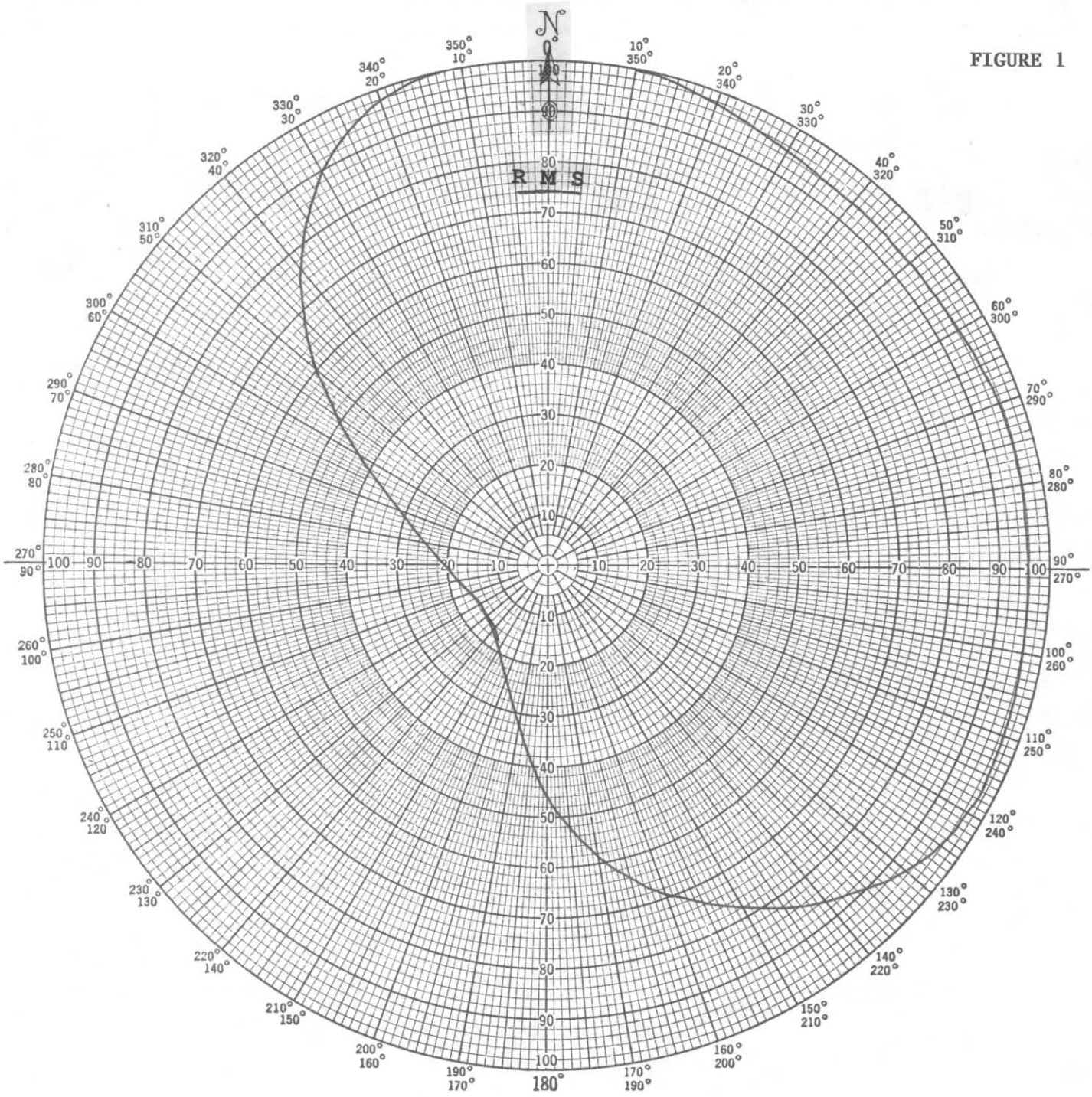
TEST PROCEDURES:

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 398.25 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
S/O 24030
July 8, 2005

FIGURE 1



Shively Labs

PROJECT NAME KFLT-FM TUCSON, AZ

PROJECT NUMBER 24030 DATE 6/29/05

MODEL (X) FULL SCALE ( ) FREQUENCY 398.25/88.5 MHz

POLARIZATION VERTICAL

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

OBSERVER RAS

ANTENNA TYPE 6513-2-DA

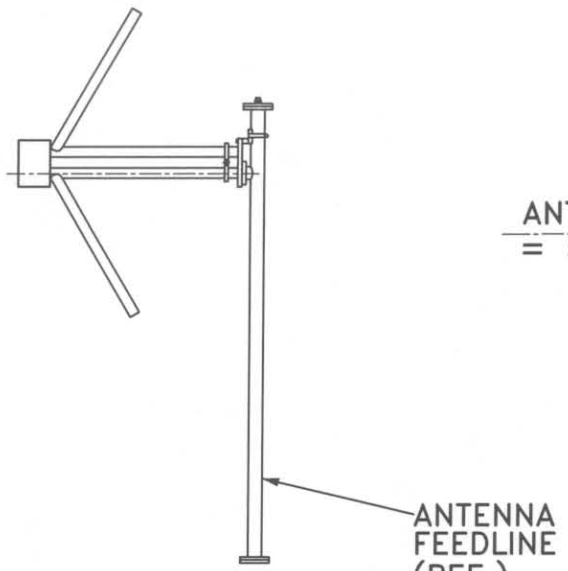
PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

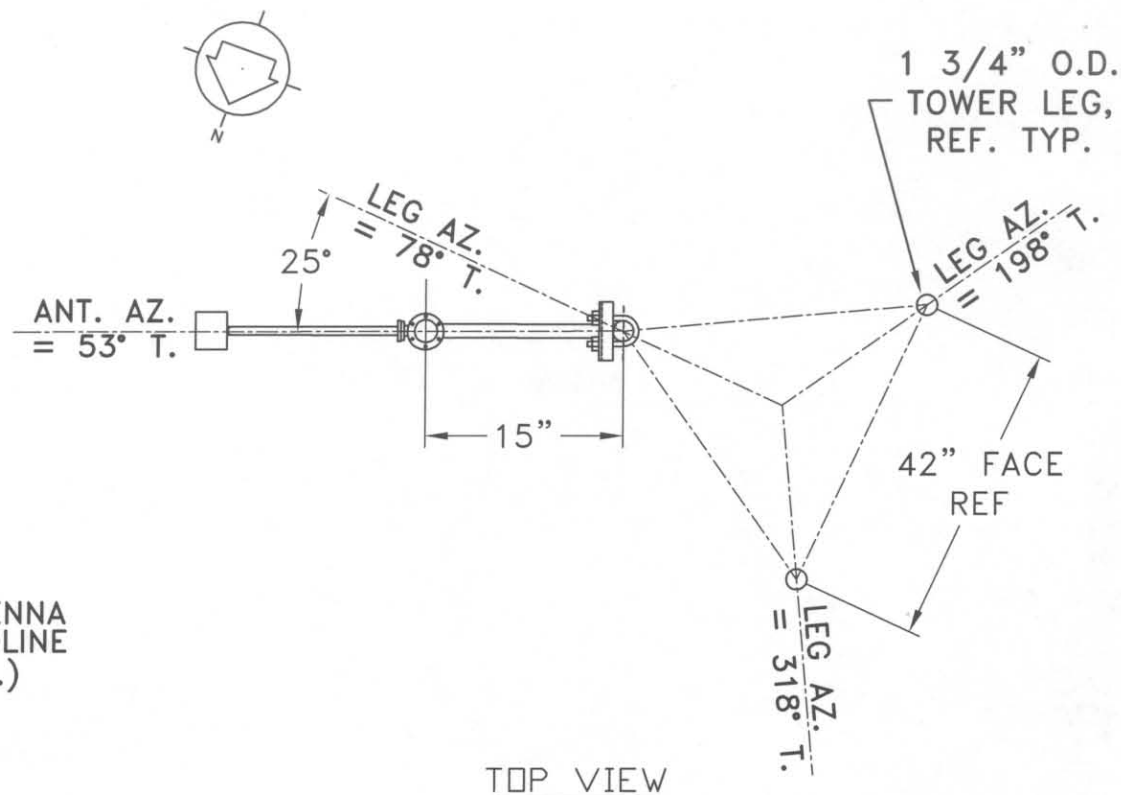
Figure 1A

S/O 24030
TABULATION OF VERTICAL POLARIZATION
KFLT-FM TUCSON AZ

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	1.000	180	0.450
10	1.000	190	0.325
20	0.975	200	0.240
30	0.950	210	0.195
40	0.940	220	0.170
45	0.940	225	0.170
50	0.940	230	0.160
60	0.940	240	0.160
70	0.955	250	0.165
80	0.960	260	0.180
90	0.960	270	0.210
100	0.960	280	0.245
110	0.970	290	0.310
120	0.965	300	0.430
130	0.935	310	0.600
135	0.900	315	0.685
140	0.865	320	0.765
150	0.780	330	0.900
160	0.695	340	0.980
170	0.585	350	1.000



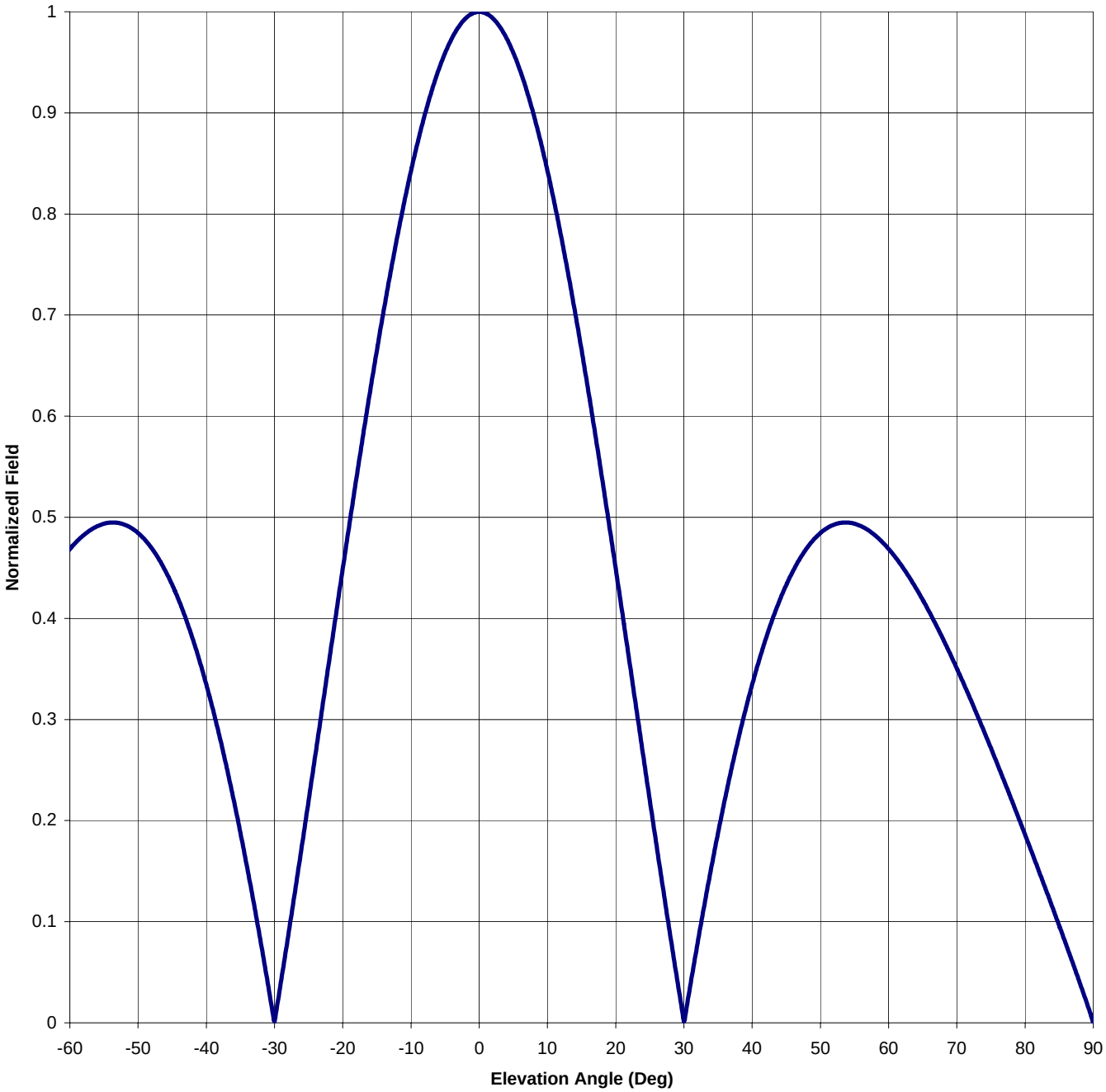
SIDE VIEW



TOP VIEW
CENTRAL TOWER
42" FACE

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE, USA			
SHOP ORDER 24030	FREQUENCY 88.5 MHz	SCALE N.T.S.	DRAWN BY: AMG APPROVED BY:
MODEL 6513-2-DIRECTIONAL ANTENNA			
DATE 6/24/05	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date: 7/8/2005**
Antenna Type:	**6513-2-DA**			
Station:	**KFLT-FM**	**Beam Tilt**	**0**	
Frequency:	**88.5**	**Gain (Max)**	**3.609**	**5.574 dB**
Channel #:	**203**	**Gain (Horizon)**	**3.609**	**5.574 dB**
Figure:	**3**			



Antenna Mfg.: Shively Labs **Date:** 7/8/2005

Antenna Type: 6513-2-DA

Station: KFLT-FM **Beam Tilt** 0

Frequency: 88.5 **Gain (Max)** 3.609 5.574 dB

Channel #: 203 **Gain (Horizon)** 3.609 5.574 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	0.417	0	1.000	46	0.447
-89	0.021	-43	0.400	1	0.998	47	0.459
-88	0.040	-42	0.380	2	0.993	48	0.469
-87	0.059	-41	0.358	3	0.985	49	0.478
-86	0.078	-40	0.335	4	0.974	50	0.484
-85	0.096	-39	0.309	5	0.959	51	0.489
-84	0.114	-38	0.282	6	0.942	52	0.493
-83	0.133	-37	0.252	7	0.921	53	0.495
-82	0.151	-36	0.221	8	0.898	54	0.495
-81	0.168	-35	0.188	9	0.871	55	0.494
-80	0.186	-34	0.153	10	0.843	56	0.491
-79	0.204	-33	0.117	11	0.811	57	0.487
-78	0.221	-32	0.079	12	0.778	58	0.482
-77	0.238	-31	0.040	13	0.742	59	0.476
-76	0.255	-30	0.001	14	0.705	60	0.469
-75	0.272	-29	0.043	15	0.665	61	0.460
-74	0.288	-28	0.086	16	0.624	62	0.451
-73	0.304	-27	0.130	17	0.582	63	0.441
-72	0.320	-26	0.175	18	0.539	64	0.430
-71	0.335	-25	0.220	19	0.494	65	0.418
-70	0.350	-24	0.266	20	0.449	66	0.406
-69	0.365	-23	0.312	21	0.404	67	0.393
-68	0.379	-22	0.358	22	0.358	68	0.379
-67	0.393	-21	0.404	23	0.312	69	0.365
-66	0.406	-20	0.449	24	0.266	70	0.350
-65	0.418	-19	0.494	25	0.220	71	0.335
-64	0.430	-18	0.539	26	0.175	72	0.320
-63	0.441	-17	0.582	27	0.130	73	0.304
-62	0.451	-16	0.624	28	0.086	74	0.288
-61	0.460	-15	0.665	29	0.043	75	0.272
-60	0.469	-14	0.705	30	0.001	76	0.255
-59	0.476	-13	0.742	31	0.040	77	0.238
-58	0.482	-12	0.778	32	0.079	78	0.221
-57	0.487	-11	0.811	33	0.117	79	0.204
-56	0.491	-10	0.843	34	0.153	80	0.186
-55	0.494	-9	0.871	35	0.188	81	0.168
-54	0.495	-8	0.898	36	0.221	82	0.151
-53	0.495	-7	0.921	37	0.252	83	0.133
-52	0.493	-6	0.942	38	0.282	84	0.114
-51	0.489	-5	0.959	39	0.309	85	0.096
-50	0.484	-4	0.974	40	0.335	86	0.078
-49	0.478	-3	0.985	41	0.358	87	0.059
-48	0.469	-2	0.993	42	0.380	88	0.040
-47	0.459	-1	0.998	43	0.400	89	0.021
-46	0.447	0	1.000	44	0.417	90	0.000
-45	0.433			45	0.433		

FIGURE 4

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VALIDATION OF GAIN CALCULATION

KFLT-FM TUCSON, AZ

MODEL 6513-2-DA

Elevation Gain of 6513-2-DA equals 1.982

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

Vertical Azimuth Gain equals $1/(RMS)^2$
$1/(0.741)^2 = 1.821$

*** Total Vertical Gain is Elevation Gain times Azimuth Gain**
1.821 x 1.982 = 3.609

ERP divided by Vertical Gain equals Antenna Input Power
1.50 kW ÷ 3.609 = 0.416