Shively Labs
a division of Howell Laboratories,Inc.

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S.O. 22494

Report of Test 6810-6-H/V-DA

for

THE UNIVERSITY OF LOUISIANA AT LAFAYETTE

KRVS 88.7 MHZ LAFAYETTE, LA

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-6-H/V-DA to meet the needs of KRVS and to comply with the requirements of the FCC construction permit, file number BPED-20010713ACG.

RESULTS:

The measured azimuth pattern for the 6810-6-H/V-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Vertical Polarization. The horizontal azimuth pattern of this antenna is omni-directional and therefore is not shown. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BPED-20010713ACG indicates that the Vertical radiation component shall not exceed 100 kW at any azimuth and is restricted to the following values at the azimuths specified:

270 Degrees T: 42 kW

280 Degrees T: 29.5 kW

290 Degrees T: 47 kW

From Figure 1, the maximum radiation of the Vertical component occurs at 124 Degrees T to 240 Degrees T. At the restricted azimuth of 270 Degrees T the Vertical component is 4.08 dB down from the maximum of 100 kW, or 39 kW. At the restricted azimuth of 280 Degrees T the Vertical component is 5.76 dB down from the

maximum of 100 kW, or 26.5 kW. At the restricted azimuth of 290 Degrees T the Vertical component is 6.94 dB down from the maximum of 100 kW, or 20 kW.

The R.M.S. of the Vertical component is 0.745. The total Vertical power gain is 7.903. The power gain of the Omnidirectional Horizontal component is 2.173. See Figure 4 for power gain calculations.

AMENDED FCC COMPOSITE PATTERN:

The R.M.S. of the measured pattern is 0.745. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.799. Therefore the measured pattern does not comply with the FCC requirement of 73.316(c)(ix)(A). In accordance with 73.1690(c)(2)(ii) an amended composite pattern is attached as Figure 5 which has an RMS value of 0.870 that will allow the above measured pattern to comply with the FCC requirement of 73.316(c)(ix)(A). Figure 5a shows the tabulations of the amended composite Figure 5. Eighty five percent (85%) of the amended FCC composite pattern is 0.740. Therefore the RMS of the measured pattern will comply with the requirement of 73.316(c)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-6-H/V-DA was mounted on a pole of exact scale to a Larouge pole as shown in Figure 2. The spacing of the antenna to the pole 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-20010713ACG, a single level of the 6810-6-H/V-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.

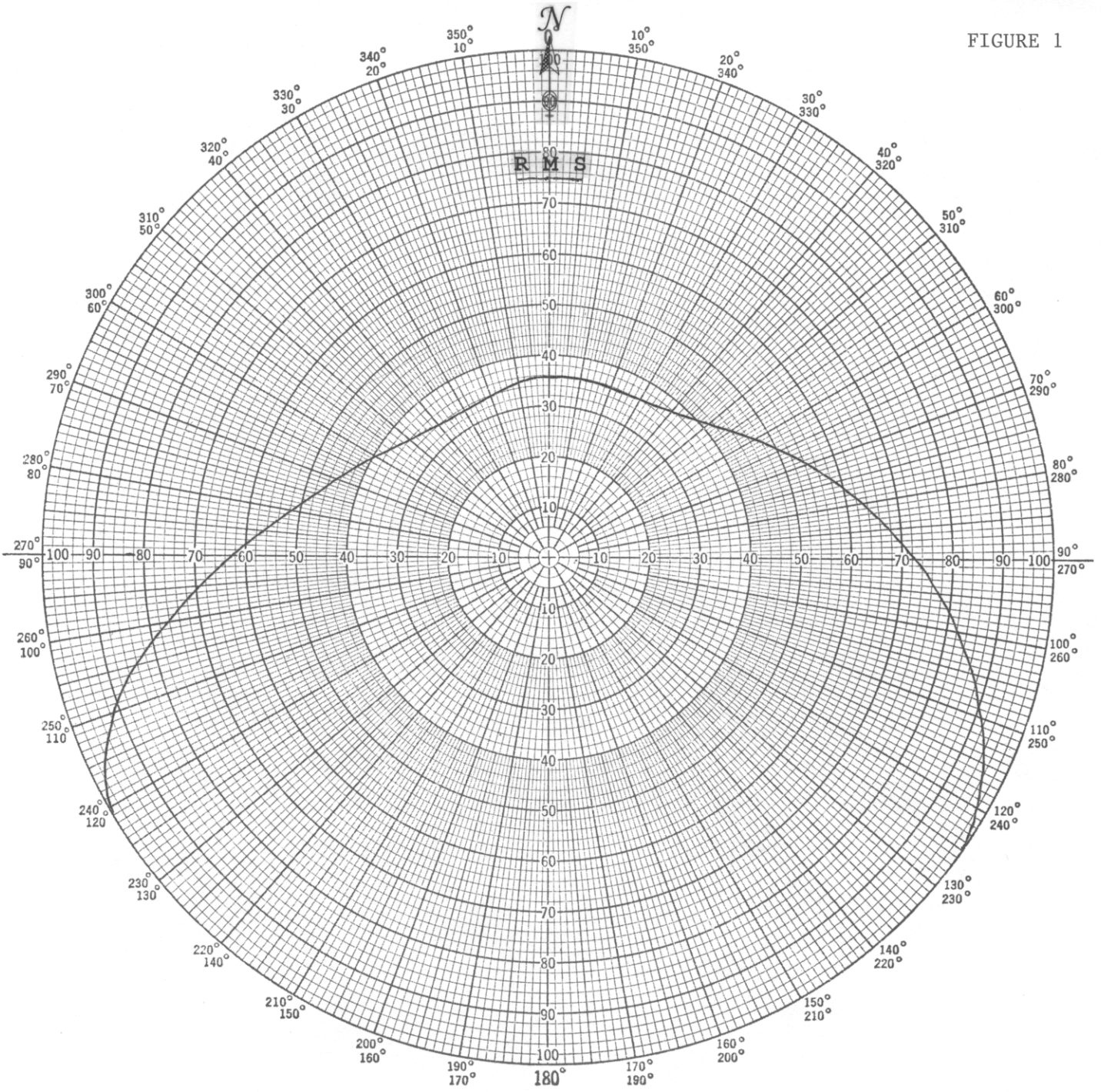
TEST PROCEDURES:

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 399.15 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 22494
August 9, 2002

FIGURE 1



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PROJECT NAME KRVS LAFAYETTE, LA

PROJECT NUMBER 22494 DATE 8/7/02

MODEL (X) FULL SCALE ( ) FREQUENCY 399.15/88.7 MHz

POLARIZATION VERTICAL

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

OBSERVER RAS

ANTENNA TYPE 6810-6-H/V-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

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Figure 1A

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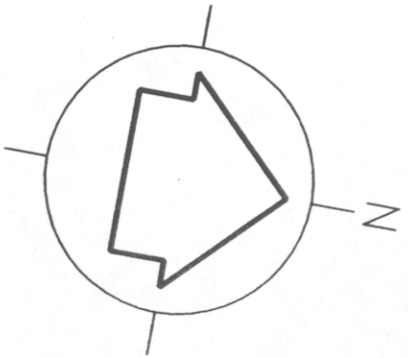
TABULATION OF VERTICAL POLARIZATION
KRVS LAFAYETTE, LA

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.360	180	1.000
10	0.360	190	1.000
20	0.360	200	1.000
30	0.360	210	1.000
40	0.375	220	1.000
45	0.390	225	1.000
50	0.410	230	1.000
60	0.470	240	0.995
70	0.545	250	0.910
80	0.630	260	0.760
90	0.725	270	0.630
100	0.820	280	0.520
110	0.910	290	0.450
120	0.980	300	0.400
130	1.000	310	0.360
135	1.000	315	0.350
140	1.000	320	0.340
150	1.000	330	0.335
160	1.000	340	0.340
170	1.000	350	0.350



STEP POLE: 12 3/4" DIA.
20" DIA.

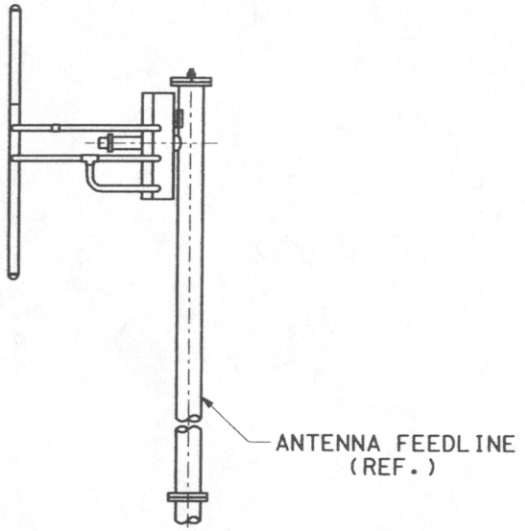
LADDER

ANTENNA AZIMUTH
= 170° TRUE

28 1/8"

TOP VIEW

ANTENNA MOUNTED TO
STEP POLE BY LAROUGE
ATOP A TOWER



SIDE VIEW

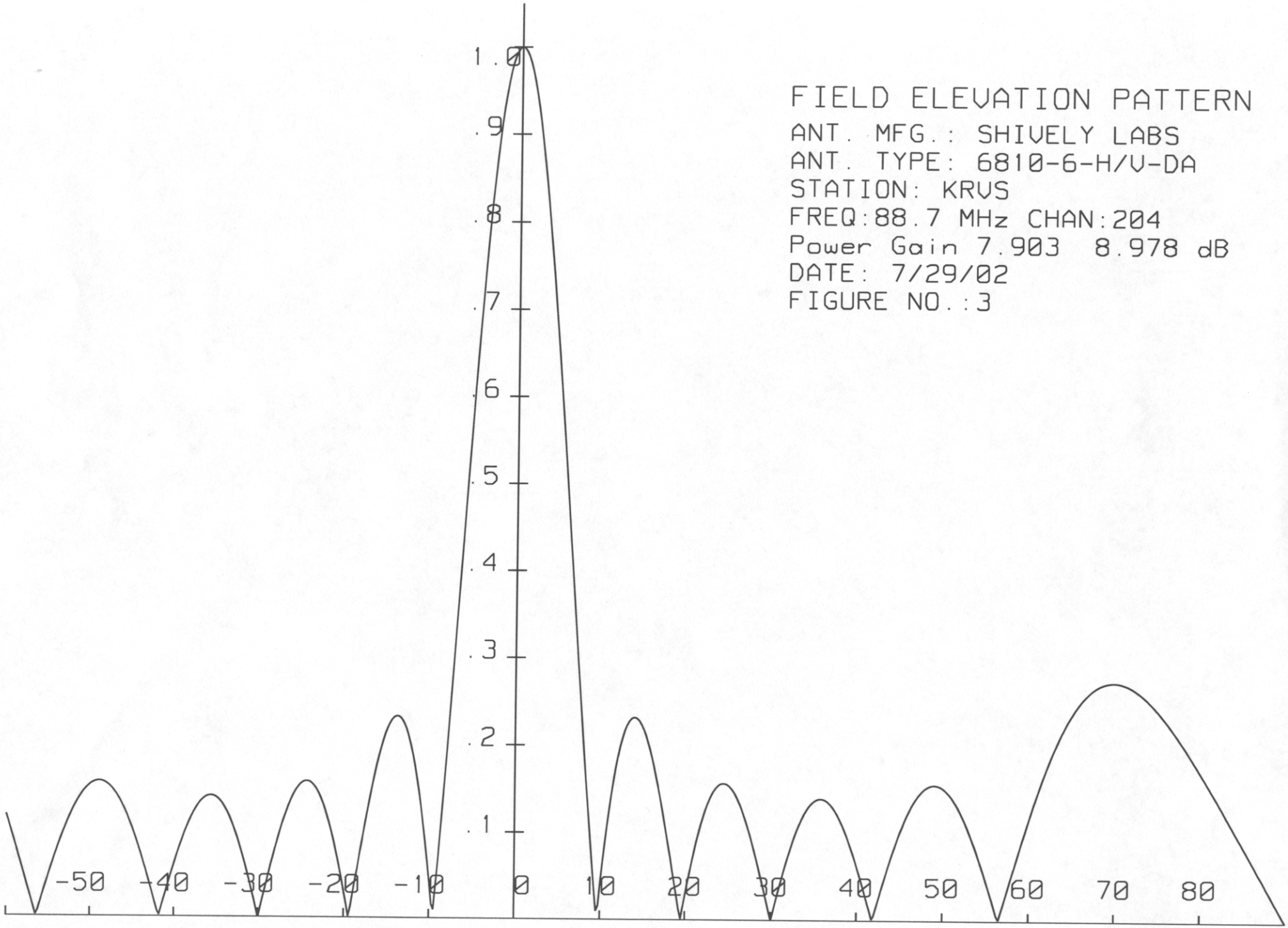
SHIVELY LABS
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE

SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
22,494	88.7 MHz.	N.T.S.	APL
			APPROVED BY:

TITLE: MODEL-6810-6-H/V-DIRECTIONAL ANTENNA

DATE: 07-30-02

FIGURE 2



FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6810-6-H/V-DA
STATION: KRVS
FREQ:88.7 MHz CHAN:204
Power Gain 7.903 8.978 dB
DATE: 7/29/02
FIGURE NO.:3

FIGURE 4

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VALIDATION OF GAIN CALCULATION

KRVS LAFAYETTE, LA

MODEL 6810-6-H/V-DA

H/V Ratio equals 33.1% Horizontal
66.9% Vertical

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

Elevation Gain of Omnidirectional Horizontal Component equals 2.173

Elevation Gain of Vertical Component equals 4.387

Vertical Azimuth Gain equals $1/(RMS)^2$
$1/(0.745)^2 = 1.802$

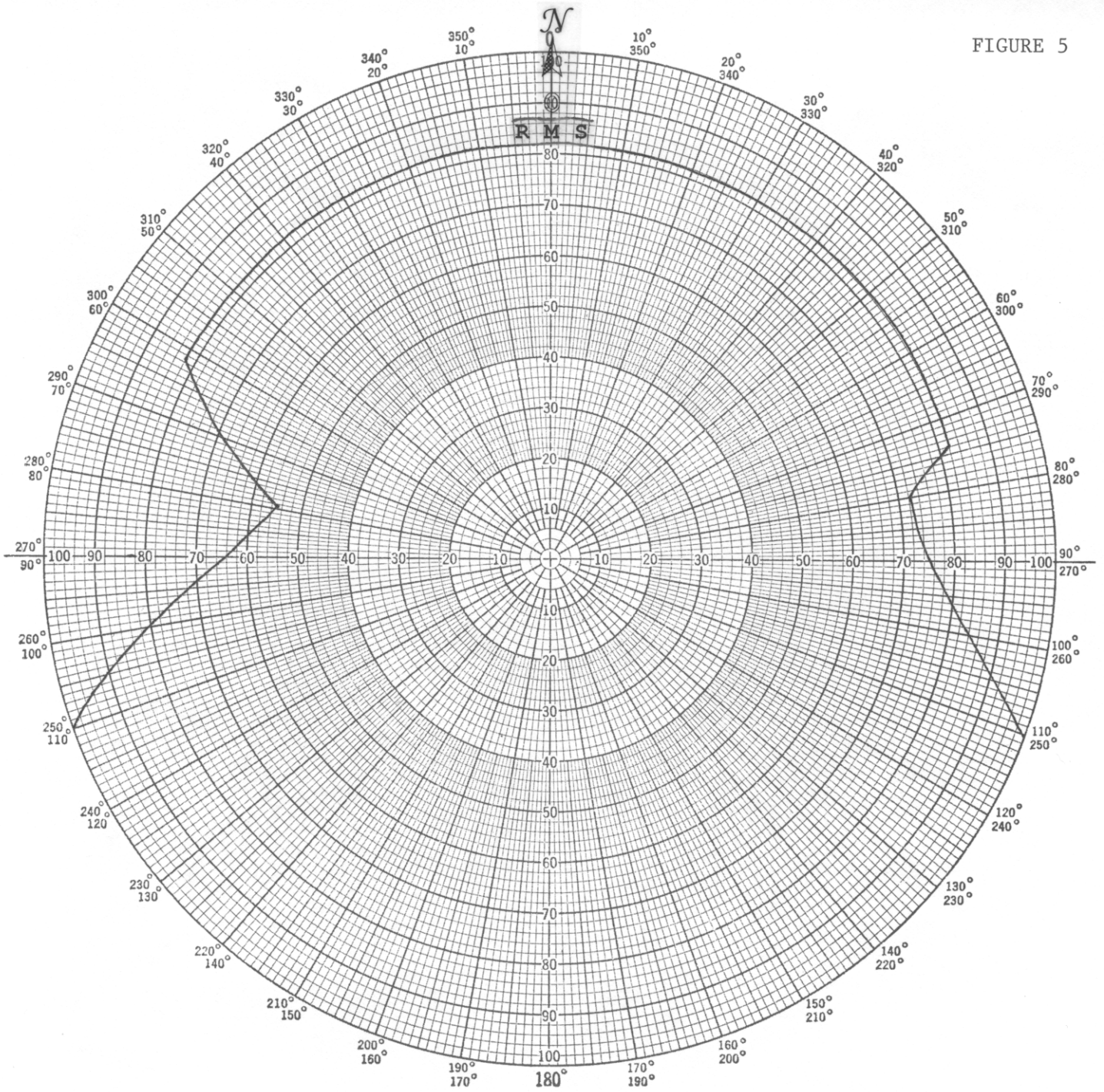
*** Total Horizontal Gain equals 2.173**

*** Total Vertical Gain is Elevation Gain times Azimuth Gain**
4.387 x 1.802 = 7.903

ERP divided by Vertical Gain equals Antenna Input Power
100 kW ÷ 7.903 = 12.653 kW

Antenna Input Power times Horizontal Gain equals Horizontal ERP
12.653 x 2.173 = 27.5 kW

FIGURE 5



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POLARIZATION COMPOSITE

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

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REMARKS:

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Figure 5A

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TABULATION OF COMPOSITE PATTERN
KRVS LAFAYETTE, LA

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.820	180	1.000
10	0.820	190	1.000
20	0.820	200	1.000
30	0.820	210	1.000
40	0.820	220	1.000
45	0.820	225	1.000
50	0.820	230	1.000
60	0.820	240	1.000
70	0.820	250	1.000
80	0.724	260	0.812
90	0.750	270	0.646
100	0.840	280	0.543
110	1.000	290	0.683
120	1.000	300	0.820
130	1.000	310	0.820
135	1.000	315	0.820
140	1.000	320	0.820
150	1.000	330	0.820
160	1.000	340	0.820
170	1.000	350	0.820