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S.O. 22757

Report of Test 6810-1R-DA

for

ENTERCOM PORTLAND LICENSE, LLC (DE)

KNRK 94.7 MHZ CAMAS, WA

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-1R-DA to meet the needs of KNRK and to comply with the requirements of the FCC construction permit, file number BPH-20020227ACY.

RESULTS:

The measured azimuth pattern for the 6810-1R-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of the Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BPH-20020227ACY indicates that the Horizontal radiation component shall not exceed 6.3 kW at any azimuth and is restricted to the following values at the azimuths specified:

340 to 345 Degrees T: 0.79 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 72 Degrees T to 104 Degrees T. At the restricted azimuth of 340 to 345 Degrees T the Horizontal component is 9.12 dB down from the maximum of 6.3 kW, or 0.77 kW.

The R.M.S. of the Horizontal component is 0.82. The total Horizontal power gain is 0.737. The R.M.S. of the Vertical component is 0.76. The total Vertical power gain is 0.723. See Figure Four for calculations. The R.M.S. of the FCC composite pattern is 0.92. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-1R-DA was mounted on a pole of exact scale to a 4 ½" OD pole. The spacing of the antenna to the pole was varied and vertical parasitic elements were attached to the interbay feedline to achieve the vertical pattern shown in Figure 1. 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 1 was achieved. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPH-20020227ACY, a single level of the 6810-1R-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.

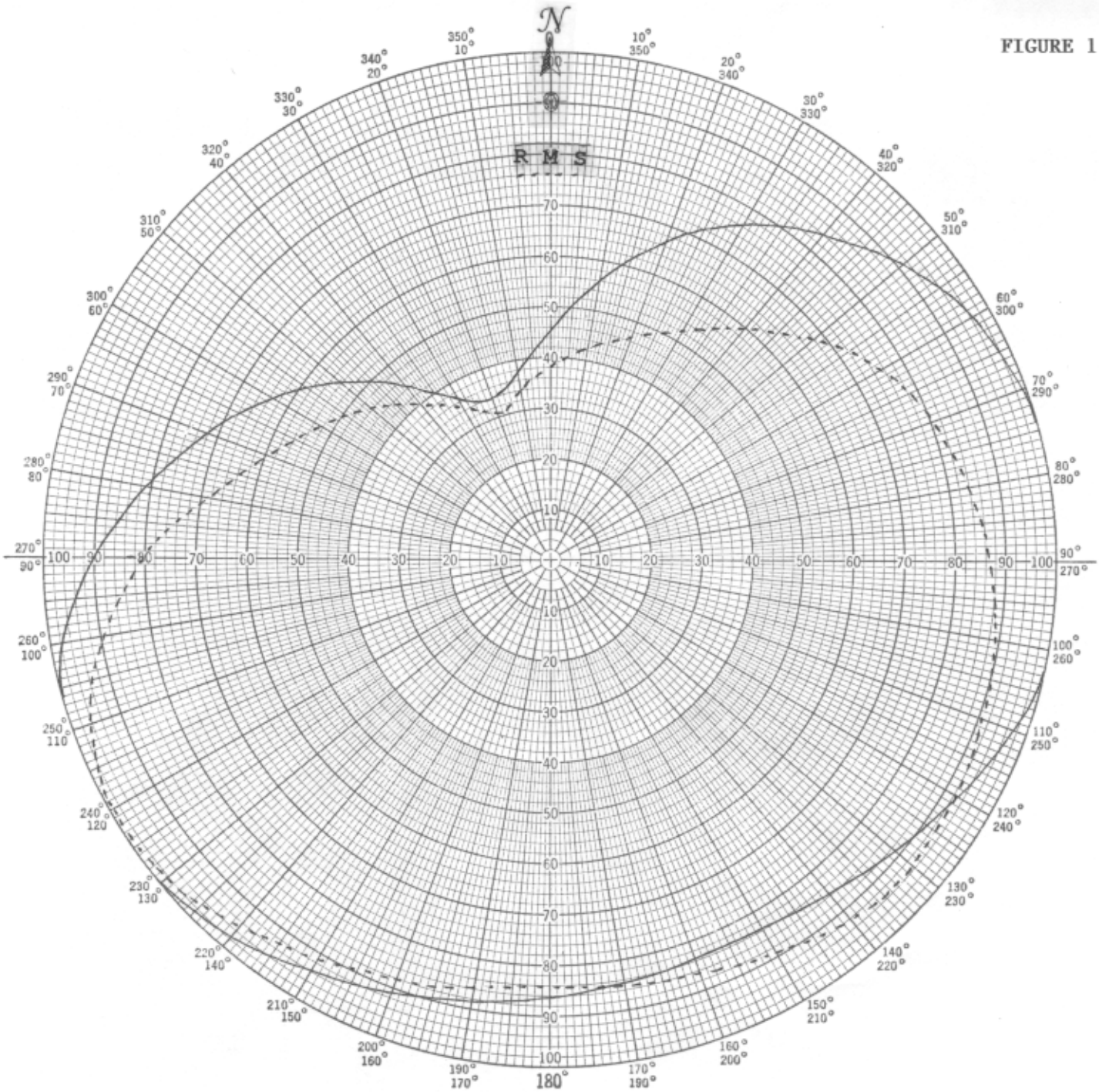
TEST PROCEDURES:

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 426.15 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 22757
December 11, 2002

FIGURE 1



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PROJECT NAME KNRK CAMAS, WA

PROJECT NUMBER 22757 DATE 12/10/02

MODEL (X) FULL SCALE ( ) FREQUENCY 426.15/94.7 MHz

POLARIZATION HORIZ (——); VERT (----)

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

OBSERVER RAS

ANTENNA TYPE 6810-1R-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

Figure 1A

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TABULATION OF HORIZONTAL POLARIZATION
KNRK CAMAS, WA

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.450	180	0.865
10	0.560	190	0.885
20	0.670	200	0.910
30	0.765	210	0.940
40	0.840	220	0.975
45	0.875	225	0.985
50	0.910	230	1.000
60	0.965	240	1.000
70	0.995	250	1.000
80	1.000	260	0.975
90	1.000	270	0.900
100	1.000	280	0.810
110	0.975	290	0.725
120	0.930	300	0.630
130	0.890	310	0.540
135	0.870	315	0.500
140	0.855	320	0.450
150	0.835	330	0.370
160	0.835	340	0.340
170	0.845	350	0.375

Figure 1B

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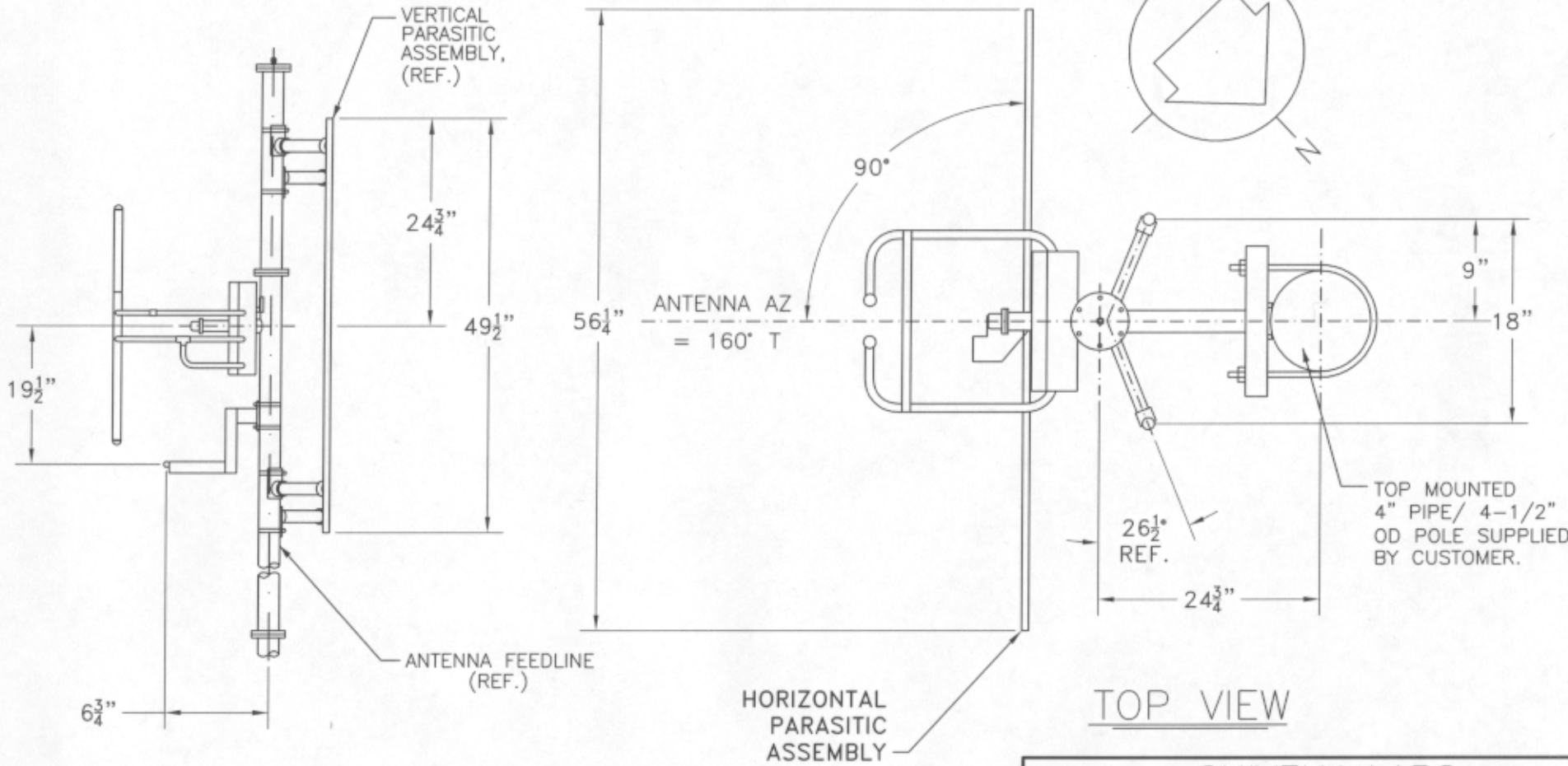
TABULATION OF VERTICAL POLARIZATION
KNRK CAMAS, WA

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.385	180	0.840
10	0.425	190	0.860
20	0.465	200	0.880
30	0.520	210	0.910
40	0.600	220	0.950
45	0.630	225	0.965
50	0.680	230	0.980
60	0.750	240	0.990
70	0.800	250	0.960
80	0.840	260	0.895
90	0.870	270	0.800
100	0.890	280	0.690
110	0.905	290	0.600
120	0.920	300	0.530
130	0.935	310	0.460
135	0.935	315	0.430
140	0.920	320	0.400
150	0.895	330	0.350
160	0.865	340	0.305
170	0.850	350	0.340



SHIVELY LABS

A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE

SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
22757 REF. 9847	94.7 MHz.	N.T.S.	WS
			APPROVED BY:

TITLE: MODEL-6810-1R-DIRECTIONAL ANTENNA

DATE: 12-10-02

FIGURE 2

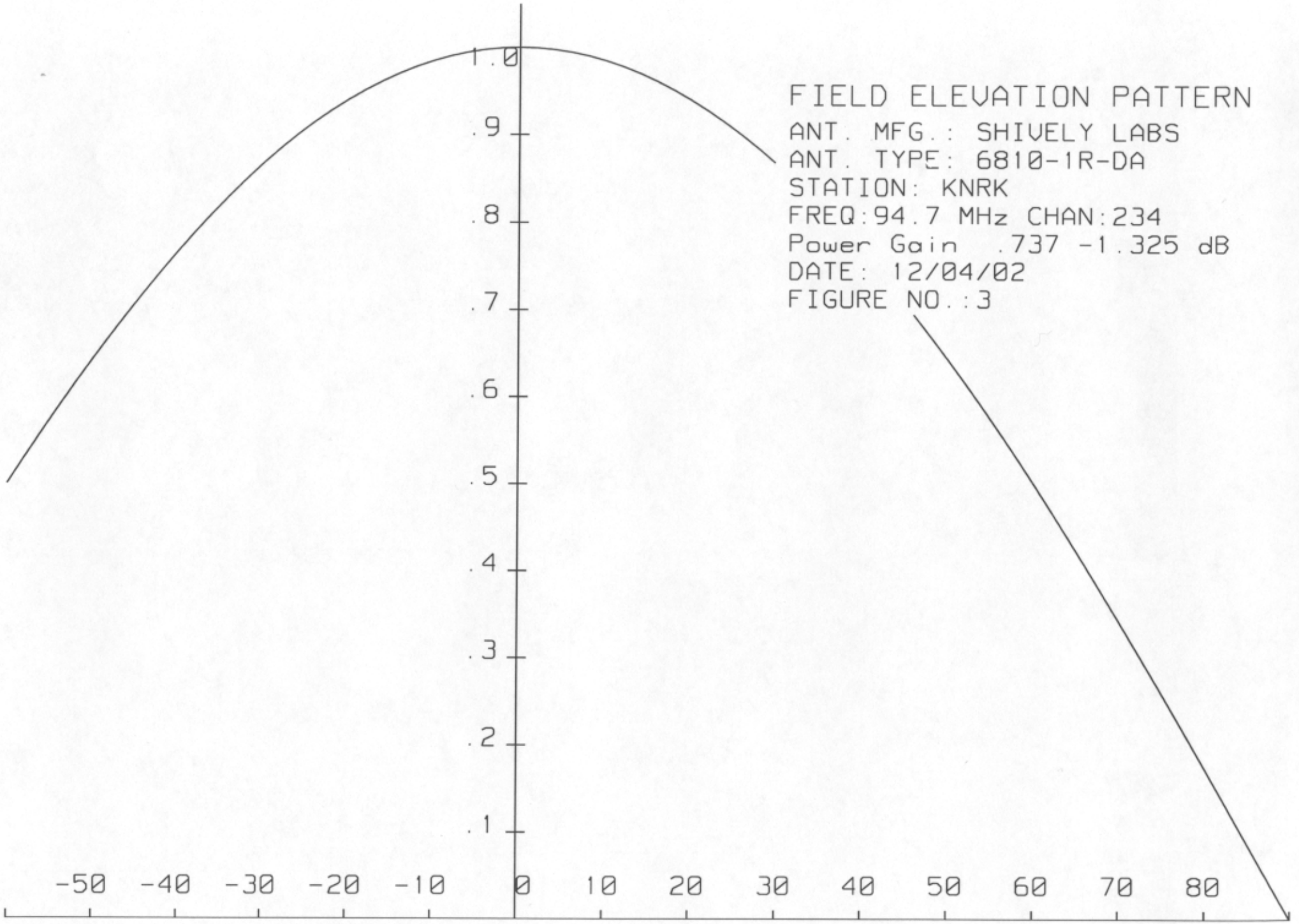

FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6810-1R-DA
STATION: KNRK
FREQ:94.7 MHz CHAN:234
Power Gain .737 -1.325 dB
DATE: 12/04/02
FIGURE NO.:3
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80

FIGURE 4

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VALIDATION OF GAIN CALCULATION

KNRK CAMAS, WA

MODEL 6810-1R-DA

Elevation Gain of 6810-1R-DA equals 0.46

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

Horizontal RMS divided by Vertical RMS equals
$0.82 \div 0.76 = 1.079$

Elevation Gain of Horizontal Component equals
$0.46 \times 1.079 = 0.496$

Elevation Gain of Vertical Component equals
$0.46 \times 0.927 = 0.426$

Horizontal Azimuth Gain equals $1/(RMS)^2$
$1/(0.82)^2 = 1.487$

Vertical Azimuth Gain equals $1/(RMS \div Max\ Vert)^2$
$1/(0.76 \div 0.99)^2 = 1.697$

*** Total Horizontal Gain is Elevation Gain times Azimuth Gain**
$0.496 \times 1.487 = 0.737$

*** Total Vertical Gain is Elevation Gain times Azimuth Gain**
$0.426 \times 1.697 = 0.723$

ERP divided by Horizontal Gain equals Antenna Input Power
$6.3\ kW \div 0.737 = 8.548\ kW$

Antenna Input Power times Vertical Gain equals Vertical ERP
$8.548 \times 0.723 = 6.18\ kW$

Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP
$(0.99)^2 \times 6.30\ kW = 6.18\ kW$

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