

Shively Labs, a division of Howell Laboratories, Inc.BRIDGTON, MAINE 04009
TWX 710-223-8910 SHIVELY BRGT(207) 647-3327
FAX (207) 647-8273Report of Test 6810-3R-DA
For
Music Broadcasting, Inc.
WPRR-FM, Altoona, PAOBJECTIVES:

The objectives of this test were to demonstrate the directional characteristics of a 6810-3R-DA antenna to meet the needs of WPRR-FM and to meet the requirements of the FCC construction permit, file number BPH-891211IE.

RESULTS:

The measured azimuth pattern for the 6810-3R-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-891211IE indicates that the horizontal radiation component shall not exceed 3.00 kW at any azimuth, the vertical radiation component shall not exceed the maximum horizontal radiation component, and each component shall be restricted to the following values at the azimuths specified:

1.25 kW @ 105 Degrees T
0.64 kW @ 150 Degrees T
0.36 kW @ 180 Degrees T

In addition, in accordance with the provisions of Section 73.316(b) of the FCC rules, neither radiation component shall increase at a rate exceeding 2.0 dB per 10 degrees from the azimuths of restricted radiation specified above nor exceed a maximum to minimum ratio of 15 dB. The R.M.S. of the vertically polarized radiation component.

From Figure 1, the maximum radiation of the horizontal component occurs at 000 Degrees T to 077 Degrees T and from 248 Degrees T to 360 Degrees T. At the restricted azimuth of 105 Degrees T the horizontal component is 3.88 dB down from the maximum of 3.00 kW, or 1.23 kW.

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At the restricted azimuth of 150 Degrees T, the horizontal component is 8.52 dB down from the maximum of 3.00 kW, or 0.42 kW. At the restricted azimuth of 180 Degrees T, the horizontal component is 9.63 dB down from the maximum of 3.00 kW, or 0.33 kW.

The R.M.S. value of the horizontal component is 0.840 and the R.M.S. value of the vertical component is 0.800. The total horizontal power gain is 2.300. The total vertical power gain is 2.214.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPH-8912111E, a single level of the 6810-3R-DA antenna was set up on the Howell Laboratories scale model antenna pattern measuring range. A scale of 4.5:1 was used.

SUPERVISION:

The tests were carried out under the direction of Robert A. Surette, Manager of RF Engineering. 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 both full size and scale model patterns measurements since 1974 as an RF Engineer with Shively Labs and with Dielectric Communications (a unit of General Signal) in Raymond, Maine. He is currently an Associate Member of the Association of Federal Communications Consulting Engineers and a Member of IEEE.

METHOD OF DIRECTIONALIZATION:

The 6810 bay was mounted on a pole of exact scale to a 8 5/8" diameter pole. Two vertical parasitic elements were attached to the interbay coax, and their position was varied 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.

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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:

Wavetek Synthesized Signal Generator
Model 3510

Hewlett Packard Network Analyzer
Model 8505

Heathkit Chart Recorder modified to a polar recorder

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 signal generator was set to 450.45 MHz. The network analyzer is tuned to that frequency. Calibrated pads were used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadding 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:



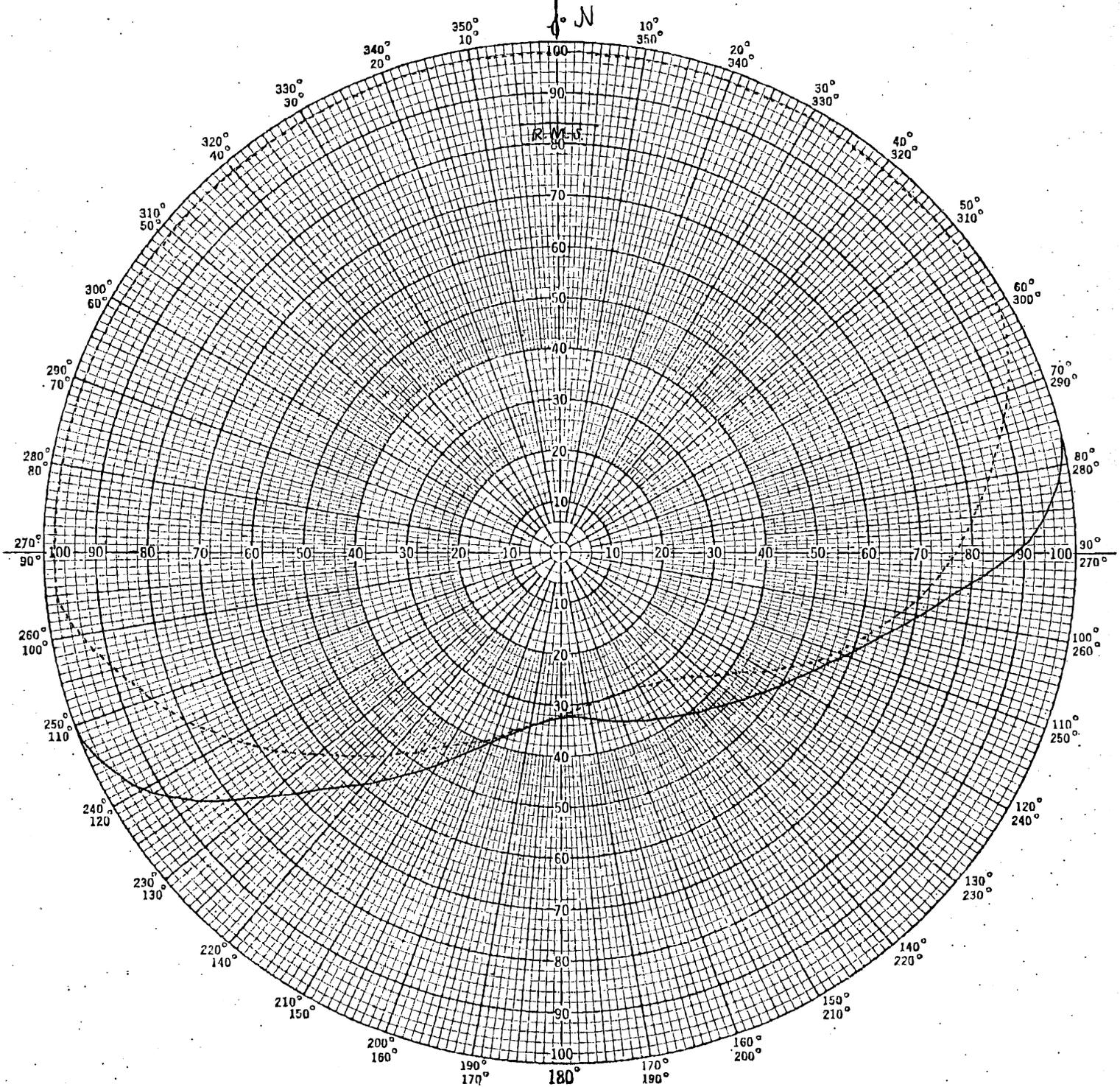
Robert A. Surette
Manager of RF Engineering
S/O 13,931
February 6, 1992

Shively Labs

Figure 1

PROJECT NAME WPRR-FM Altoona, PA
 PROJECT NUMBER 13,931 DATE 2/6/92

ANTENNA TYPE 6810-3R-DA
 PATTERN TYPE Directional Azimuth



MODEL (X) FULL SCALE () FREQUENCY 450.45/100.1 MHz
 POLARIZATION Horiz. (—); Vert (----)
 CURVE PLOTTED IN: VOLTAGE (X) POWER () DB ()
 OBSERVER RAS

REMARKS: See Figure 2
for Mechanical Details.

FIGURE 1A

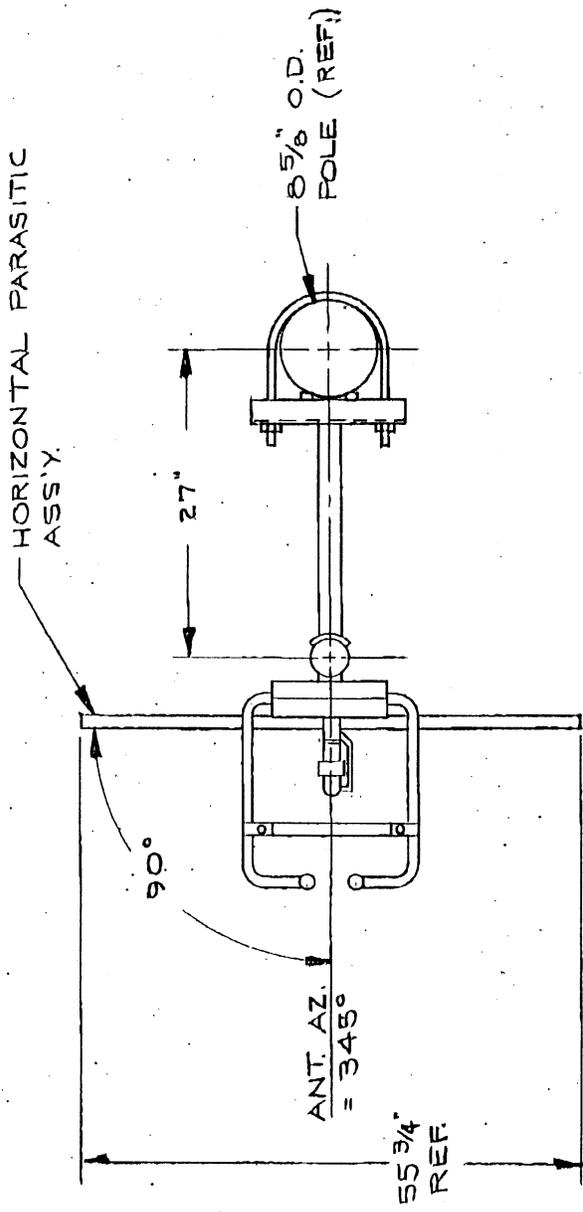
Tabulation of Horizontal Polarization
WPRR-FM Altoona, Pa.

Degrees	Relative Field	Degrees	Relative Field
0	1.000	180	0.330
10	1.000	190	0.350
20	1.000	200	0.395
30	1.000	210	0.480
40	1.000	220	0.600
45	1.000	225	0.660
50	1.000	230	0.750
60	1.000	240	0.935
70	1.000	250	1.000
80	0.985	260	1.000
90	0.890	270	1.000
100	0.710	280	1.000
110	0.590	290	1.000
120	0.510	300	1.000
130	0.450	310	1.000
135	0.430	315	1.000
140	0.410	320	1.000
150	0.375	330	1.000
160	0.350	340	1.000
170	0.330	350	1.000

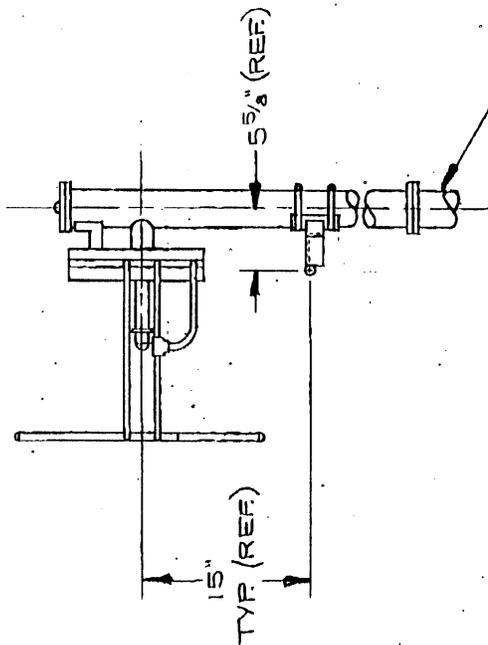
FIGURE 1B

Tabulation of Vertical Polarization
WPRR-FM Altoona, Pa.

Degrees	Relative Field	Degrees	Relative Field
0	0.980	180	0.325
10	0.980	190	0.345
20	0.980	200	0.390
30	0.980	210	0.440
40	0.980	220	0.520
45	0.980	225	0.565
50	0.980	230	0.620
60	0.980	240	0.735
70	0.925	250	0.845
80	0.845	260	0.945
90	0.765	270	0.980
100	0.670	280	0.980
110	0.570	290	0.980
120	0.465	300	0.980
130	0.380	310	0.980
135	0.345	315	0.980
140	0.330	320	0.980
150	0.305	330	0.980
160	0.300	340	0.980
170	0.305	350	0.980



TOP VIEW



SIDE VIEW

SHIVELY LABORATORIES		BRIDGTON, MAINE	
DIV. HOWELL LABS.		DRAWN BY: AL PLUMMER	
S.O.: 13, 751	FREQ. SCALE	100.1 MHz	N.T.S.
ALTOONA, PA.			APPROVED BY: DAB
TITLE: MODEL 6810-3R-DA DIRECTIONAL ANTENNA			
STATION: WPRR - FM			
DATE: 10-29-90	FIGURE 2		

10 X 10 TO THE INCH • 7 X 10 INCHES
KLEUFEL & ESSER CO. MADE IN U.S.A.

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