TECHNICAL EXHIBIT
APPLICATION FOR LICENSE
RADIO STATION WXQQ(FM)
WAUSEON, OHIO
CH 245A 5.0 KW (MAX-DA) 109 M

Technical Statement

This Technical Exhibit, of which this statement is part, was prepared on behalf of radio station WXQQ(FM) on Channel 245A at Wauseon, Ohio. WXQQ(FM) has authorization for a new facility at Wauseon, Ohio.[1] The maximum effective radiated power will be 5 kilowatts (kW) with an antenna height above average terrain of 109 meters. By this instant application, program test authority and station licensure is requested.

Special Conditions

As requested by the Commission, a complete proof-of-performance for the directional antenna is provided herein as Appendix A. The licensed surveyor affidavit establishing the orientation of the directional antenna is provided in Appendix B. Alan Colwell, the engineering supervisor during the WXQQ(FM) construction, provides his affidavit and certification in Appendix C.

Charles A. Cooper

December 19, 2002

du Treil, Lundin & Rackley, Inc.
201 Fletcher Avenue
Sarasota, Florida 34237
941.329.6000

[1] See FCC Construction Permit BMPH-20000724ABJ.

Figure 1

TECHNICAL EXHIBIT
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WXQQ(FM) RF Transmission System Specifications

Description	System
Transmitter Power Output (3.4 kW):	5.3 dBk
RFS Transmission Line Loss (1-5/8" Air Dielectric) 335 feet:	0.7 dB
Maximum *Shively 6810-2R/1RIAD-D* Antenna Gain (1.72 Power Gain):	2.4 dB
Maximum Effective Radiated Power (5.0 kW):	7.0 dBk

ATTACHMENT A

DIRECTIONAL ANTENNA
PROOF-OF-PERFORMANCE

Shively Labs
a division of Howell Laboratories,Inc.
- An Employee-Owned Company -

P. O. Box 389 Harrison Rd.,
Bridgton, Maine 04009 USA
(207) 647-3327
888-SHIVELY
Fax: (207) 647-8273
E-mail: sales@shively.com
Web site: www.shively.com

S.O. 22030

Report of Test 6810-2R/1RIAD-DA

for

CORNERSTONE CHURCH, INC.

WXQQ 96.9 MHZ WAUSEON, OH

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-2R/1RIAD-DA to meet the needs of WXQQ and to comply with the requirements of the FCC construction permit, file number BMPH-20000724ABJ, which authorizes a standard analog signal. This report also demonstrates that the interleaved digital antenna also complies with the requirements of this construction permit. The azimuth pattern of the digital antenna is exactly the same as that of the analog. The elevation pattern is different and is described in Section 3A and 4A.

RESULTS:

The measured azimuth pattern for the 6810-2R/1RIAD-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 BMPH-20000724ABJ indicates that the Horizontal radiation component shall not exceed 5.0 kW at any azimuth and is restricted to the following values at the azimuths specified:

140-150 Degrees T: 0.8 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 036 Degrees T to 069 Degrees T and at 291 Degrees T to 308 Degrees T. At the restricted azimuth of 150 Degrees T the Vertical component is 10.03 dB down from the maximum of 5.0 kW, or 0.5 kW.

THE ANALOG ANTENNA:

The R.M.S. of the Horizontal component is 0.780. The total Horizontal power gain is 1.715. The R.M.S. of the Vertical component is 0.740. The total Vertical power gain is 1.683. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.890. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

THE INTERLEAVED IBOC ANTENNA:

The R.M.S. of the Horizontal component is 0.780. The total Horizontal power gain is 0.80. The R.M.S. of the Vertical component is 0.740. The total Vertical power gain is 0.78. See Figure 4A for calculations. The R.M.S. of the FCC composite pattern is 0.890. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-2R/1RIAD-DA was mounted on a tower of exact scale to a Pirod 24. The spacing of the antenna to the tower was varied and vertical parasitic elements were used 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 BMPH-20000724ABJ, a single level of the 6810-2R/1RIAD-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.

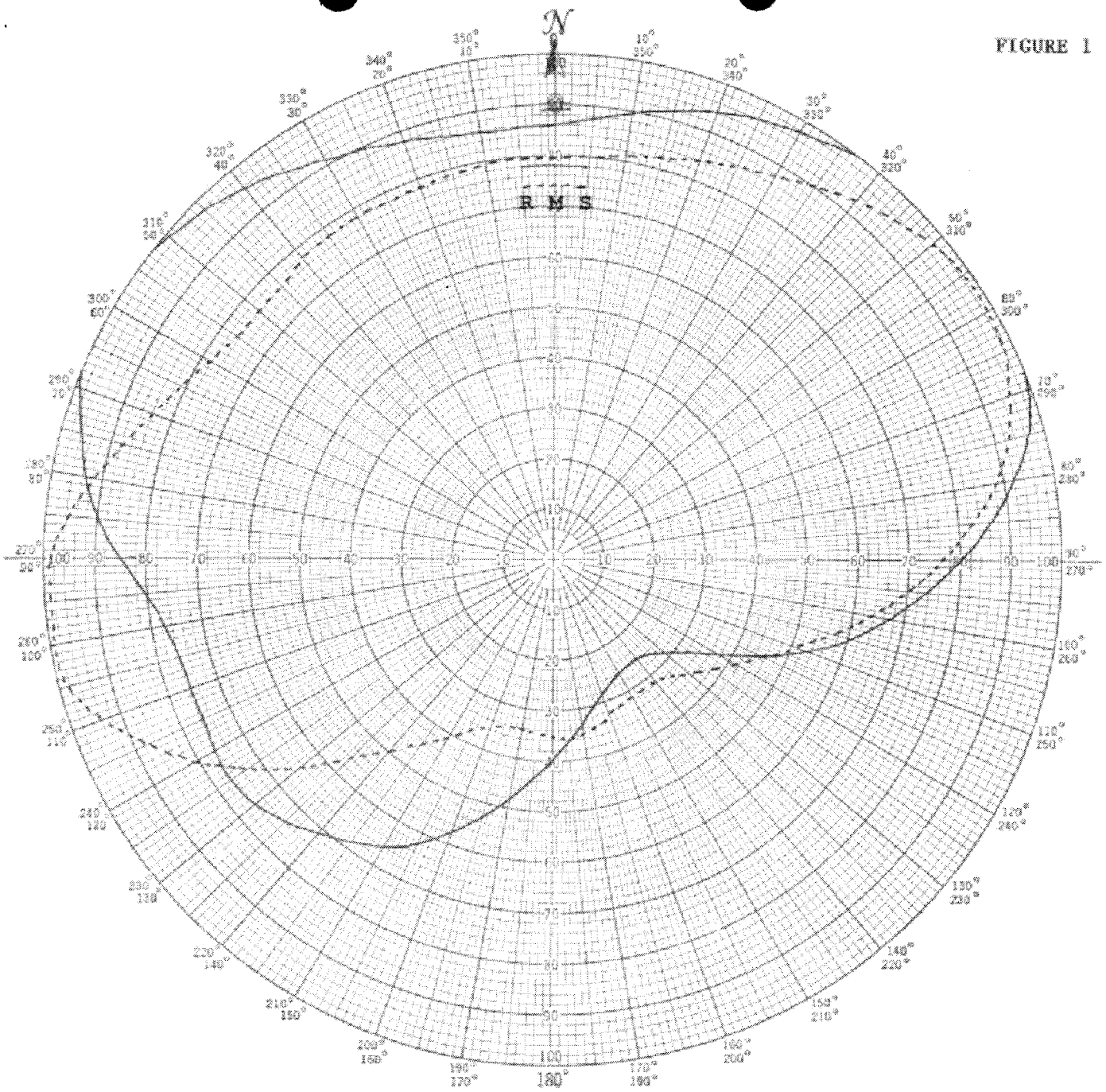
TEST PROCEDURES:

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 436.05 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 22030
November 18, 2002

FIGURE 1



Shively Labs

PROJECT NAME WXQQ WAUSEON, OH

PROJECT NUMBER 22030 DATE 11/13/02

MODEL (X) FULL SCALE ( ) FREQUENCY 436.05/96.9 MHz

POLARIZATION HORIZ (———); VERT (– – – –)

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

OBSERVER RAS

ANTENNA TYPE 6810-2R/1RIAD-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS SEE FIGURE 2 FOR MECHANICAL DETAILS

Figure 1A

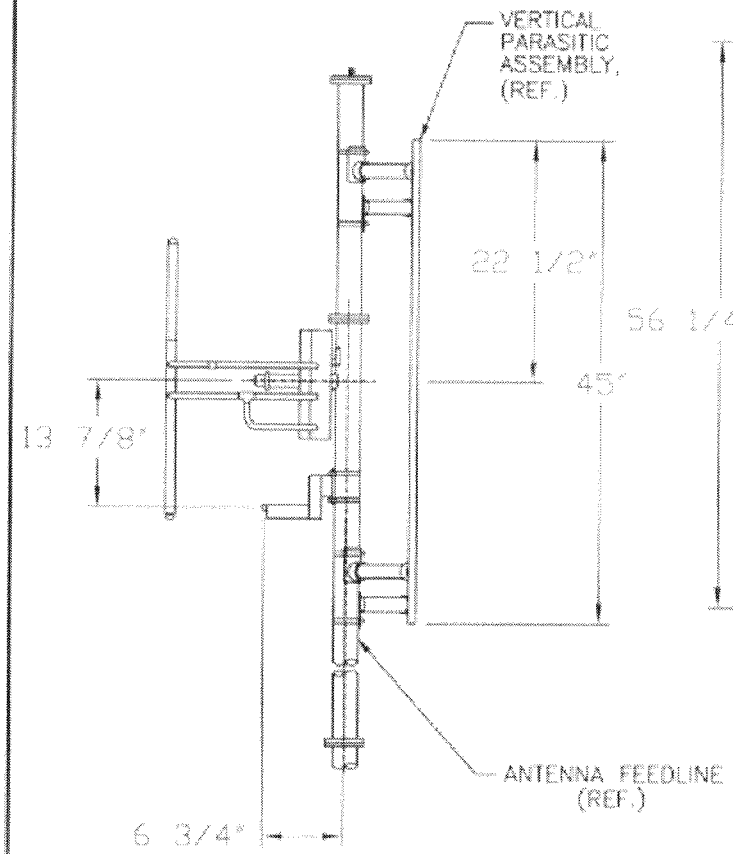
S/O 22030
TABULATION OF HORIZONTAL POLARIZATION
WXQQ WAUSEON, OH

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.860	180	0.400
10	0.895	190	0.480
20	0.940	200	0.575
30	0.975	210	0.660
40	1.000	220	0.710
45	1.000	225	0.740
50	1.000	230	0.760
60	1.000	240	0.765
70	0.995	250	0.755
80	0.920	260	0.775
90	0.800	270	0.850
100	0.670	280	0.935
110	0.530	290	0.990
120	0.375	300	1.000
130	0.290	310	0.995
135	0.270	315	0.975
140	0.260	320	0.955
150	0.260	330	0.910
160	0.285	340	0.880
170	0.330	350	0.855

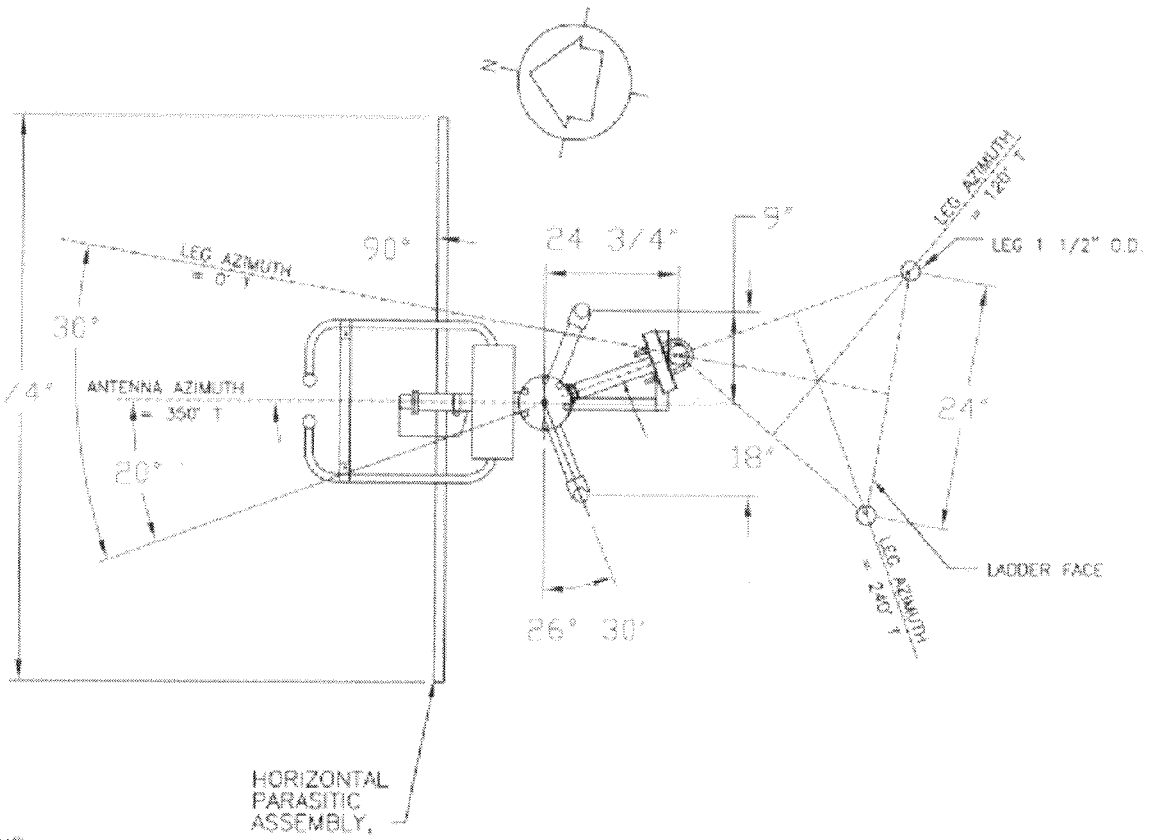
Figure 1B

S/O 22030
TABULATION OF VERTICAL POLARIZATION
WXQQ WAUSEON, OH

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.800	180	0.355
10	0.810	190	0.340
20	0.840	200	0.350
30	0.875	210	0.410
40	0.930	220	0.500
45	0.950	225	0.560
50	0.975	230	0.645
60	0.990	240	0.810
70	0.955	250	0.940
80	0.885	260	0.990
90	0.765	270	0.985
100	0.635	280	0.915
110	0.510	290	0.840
120	0.410	300	0.780
130	0.350	310	0.760
135	0.330	315	0.760
140	0.315	320	0.775
150	0.315	330	0.780
160	0.330	340	0.780
170	0.350	350	0.795



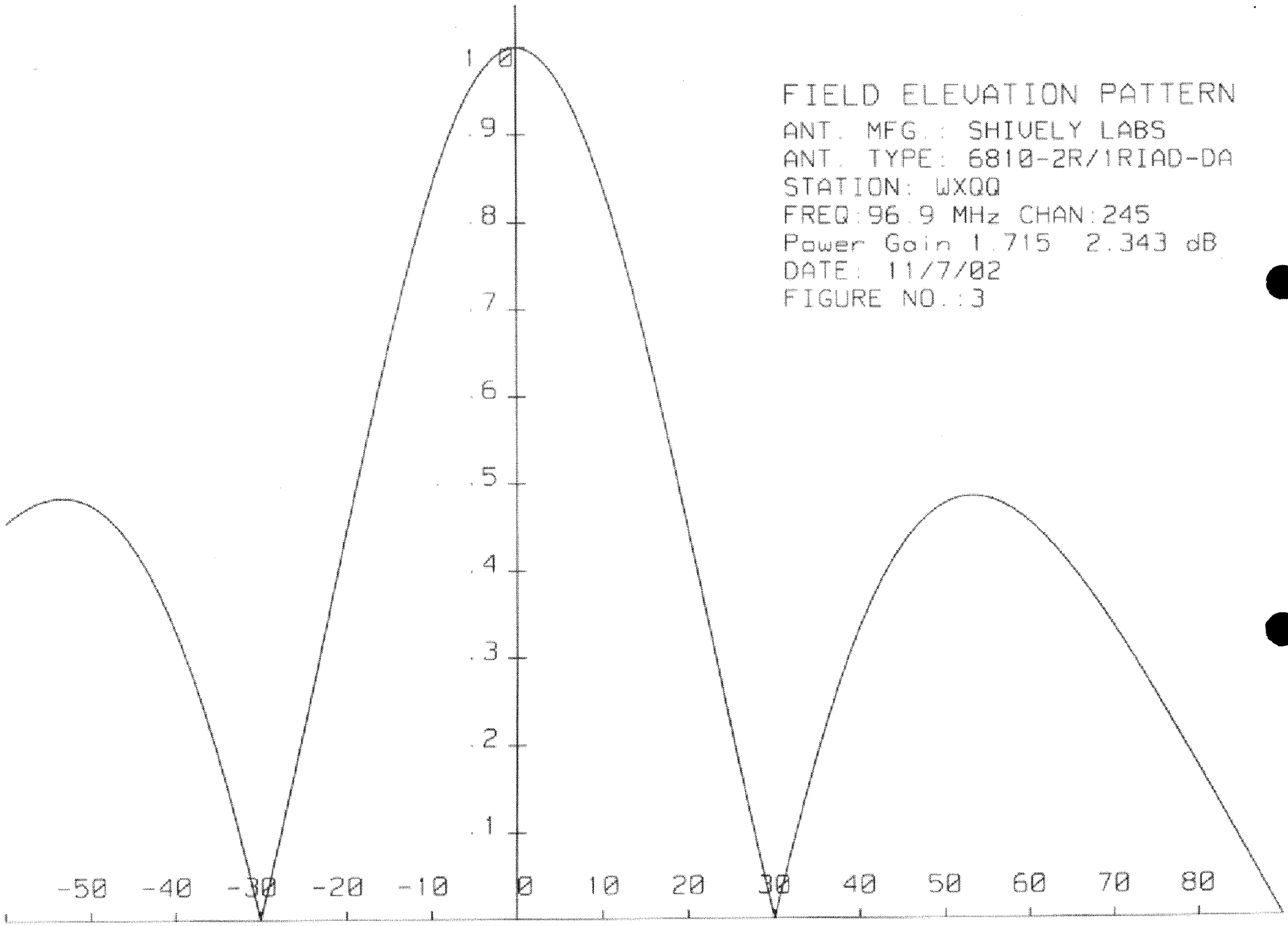
SIDE VIEW



TOP VIEW

TOWER: PIROD 24

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 22030-E	FREQUENCY: 96.9 MHz.	SCALE: N.T.S.	DRAWN BY: NMS APPROVED BY:
TITLE: MODEL-6810-2R-DIRECTIONAL ANTENNA			
DATE: 11-13-02	FIGURE 2		


FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6810-2R/1RIAD-DA
STATION: WXQQ
FREQ:96.9 MHz CHAN:245
Power Gain 1.715 2.343 dB
DATE: 11/7/02
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

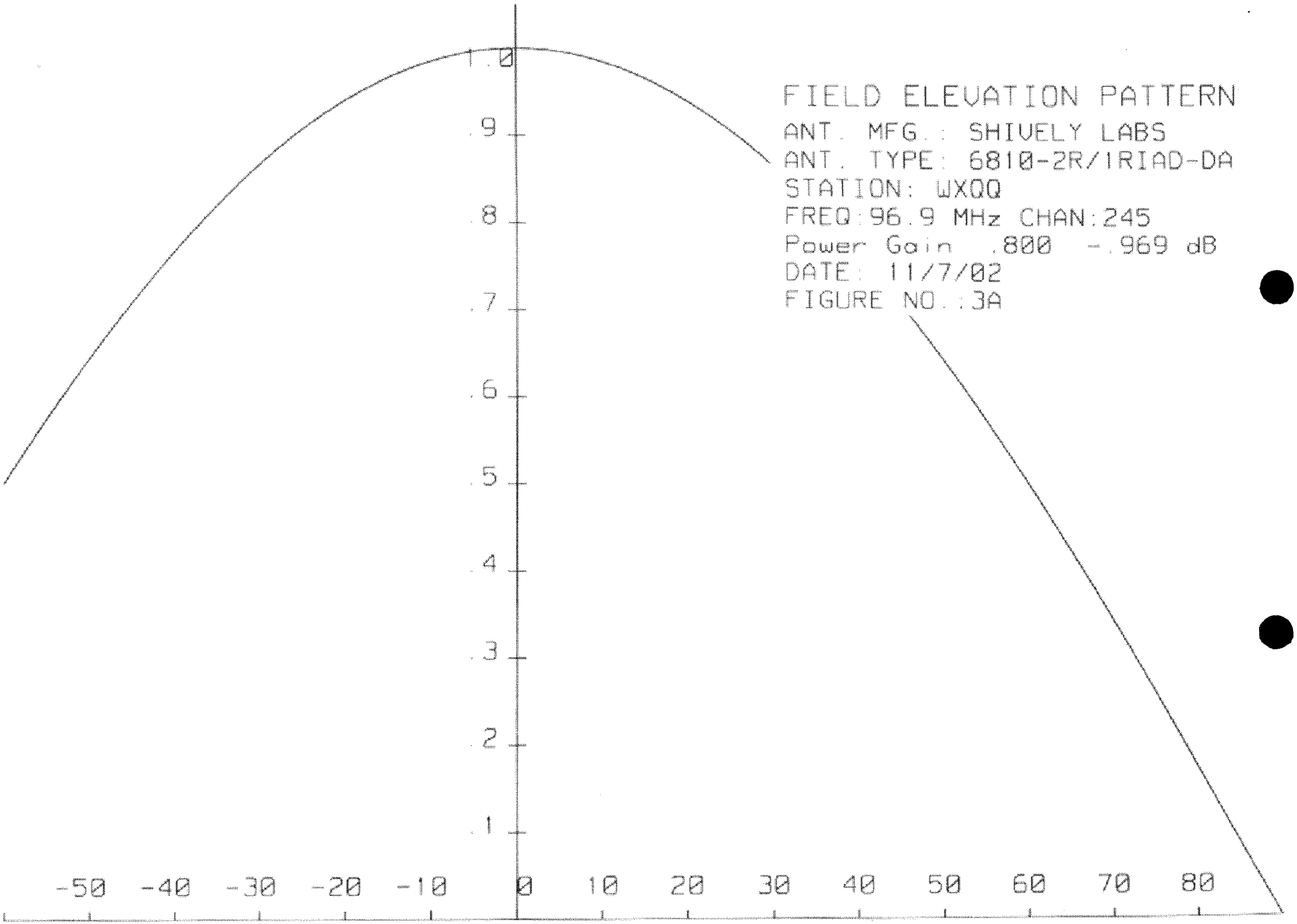

FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6810-2R/1RIAD-DA
STATION: WXQQ
FREQ:96.9 MHz CHAN:245
Power Gain .800 -.969 dB
DATE: 11/7/02
FIGURE NO.:3A
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80

FIGURE 4

S.O. 22030

VALIDATION OF ANALOG GAIN CALCULATION

WXQQ WAUSEON, OH

MODEL 6810-2R/1RIAD-DA

Elevation Gain of 6810-2R/1RIAD-DA equals 0.99

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

Horizontal RMS divided by Vertical RMS equals
$0.780 \div 0.740 = 1.054$

Elevation Gain of Horizontal Component equals
$0.99 \times 1.054 = 1.043$

Elevation Gain of Vertical Component equals
$0.99 \times 0.949 = 0.940$

Horizontal Azimuth Gain equals $1/(\text{RMS})^2$
$1/(0.780)^2 = 1.644$

Vertical Azimuth Gain equals $1/(\text{RMS} \div \text{Max Vert})^2$
$1/(0.740 \div 0.99)^2 = 1.790$

* **Total Horizontal Gain is Elevation Gain times Azimuth Gain**
  $1.043 \times 1.644 = 1.715$

* **Total Vertical Gain is Elevation Gain times Azimuth Gain**
  $0.940 \times 1.790 = 1.683$

ERP divided by Horizontal Gain equals Antenna Input Power
$5.0 \text{ kW} \div 1.715 = 2.915 \text{ kW}$

Antenna Input Power times Vertical Gain equals Vertical ERP
$2.915 \text{ kW} \times 1.683 = 4.906$

Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP
$(0.99)^2 \times 5.0 \text{ kW} = 4.901$

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

FIGURE 4A

S.O. 22030

VALIDATION OF DIGITAL GAIN CALCULATION

WXQQ WAUSEON, OH

MODEL 6810-2R/1RIAD-DA

Elevation Gain of 6810-2R/1RIAD-DA equals 0.46

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

Horizontal RMS divided by Vertical RMS equals
$0.780 \div 0.740 = 1.054$

Elevation Gain of Horizontal Component equals
$0.46 \times 1.054 = 0.485$

Elevation Gain of Vertical Component equals
$0.46 \times 0.949 = 0.436$

Horizontal Azimuth Gain equals $1/(RMS)^2$
$1/(0.780)^2 = 1.644$

Vertical Azimuth Gain equals $1/(RMS \div Max\ Vert)^2$
$1/(0.740 \div 0.99)^2 = 1.790$

* **Total Horizontal Gain is Elevation Gain times Azimuth Gain**
  $0.485 \times 1.644 = 0.80$

* **Total Vertical Gain is Elevation Gain times Azimuth Gain**
  $0.436 \times 1.790 = 0.78$

ERP divided by Horizontal Gain equals Antenna Input Power
$50\ W \div 0.80 = 62.5$ Watts

Antenna Input Power times Vertical Gain equals Vertical ERP
$62.5\ W \times 0.78 = 48.75$ Watts

Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP
$(0.99)^2 \times 50\ W = 49.01$ Watts

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

ATTACHMENT B

LICENSED SURVEYOR AFFIDAVIT

J. C. ANDRUS & ASSOCIATES, INC.

ENGINEERS – SURVEYORS – PLANNERS

445 - 10TH STREET TOLEDO, OHIO 43624
(419) 248-3737 • (419) 246-0201 • (734) 243-5877
FAX (419) 248-1099 • 1-800-669-5315
WEB: www.jcandrus.com

Corner Stone Church
Alan Colwell
1510 Reynolds Road
Toledo, Ohio 43615

December 13, 2002

RE: Verification of antenna orientation

Dear Alan,

On December 13, 2002 I visited the tower site previously designated as part of Aeronautical Study No: 01-AGL-4559-OE. I set my instrument on the previously placed Azimuth Stake and made observations on the three antenna bays attached to the top of the existing tower. To the best of the available survey techniques the observations indicate that the bays are orientated to a true azimuth of 350 degrees

Sincerely,

David A Andrus P.S. #7322

ATTACHMENT C

ENGINEERING AFFIDAVIT

DOMINION RADIO

Monday, December 23, 2002
Federal Communications Commission

As the engineering supervisor for the WXQQ (FM) new radio station installation project, I oversaw the installation of the tower and directional antenna. I worked closely with Joe Rorher at Shively during the design phase of our antenna and personally observed the proper orientation of the antenna. Further, I was present when the surveyor verified the correct azimuth and viewed the same through his instruments.

The installation followed all the manufacturer's instructions to guarantee the performance as shown in their proof of performance.

I have been in the broadcast engineering field for many years and recently certified the directional antenna installation for WYSA, Wauseon, Ohio.

Sincerely,

Alan Colwell

Alan Colwell
547 Apple Avenue
Toledo, Ohio 43609
419-385-8300
alan@alancolwell.com