

## **Engineering Exhibit**

### **APPLICATION TO MODIFY AN FM STATION LICENSE**

prepared for

#### **National Cable Satellite Corporation**

WCSP-FM Washington, D.C.

Facility ID: 68950

Ch. 211B 36 kW (MAX-DA) 173 m

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FCC Form 302-FM, Section III – Engineering

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*This material supplies a "hard copy" of the engineering portions of this application as entered February 21, 2013 for filing electronically. Since the FCC's electronic filing system may be accessed by anyone with the applicant's name and password, and electronic data may otherwise be altered in an unauthorized fashion, we cannot be responsible for changes made subsequent to our entry of this data and related attachments.*

**Cavell, Mertz & Associates, Inc.**

Federal Communications Commission Washington, D.C. 20554	Approved by OMB 3060-0506 (June 2002)	FOR FCC USE ONLY
<b>FCC 302-FM</b>		
<b>APPLICATION FOR FM BROADCAST STATION LICENSE</b>		FOR COMMISSION USE ONLY FILE NO. -
Read INSTRUCTIONS Before Filling Out Form		

**Section I - General Information**

1.	Legal Name of the Applicant NATIONAL CABLE SATELLITE CORPORATION		
	Mailing Address 400 NORTH CAPITOL STREET, N.W. SUITE 650		
	City WASHINGTON	State or Country (if foreign address) DC	ZIP Code 20001 -
	Telephone Number (include area code) 2026267993	E-Mail Address (if available) RFLEESON@C-SPAN.ORG	
	FCC Registration Number:	Call Sign WCSP-FM	Facility Identifier 68950
2.	Contact Representative (if other than Applicant) RICHARD H. MERTZ		Firm or Company Name CAVELL, MERTZ & ASSOCIATES, INC.
	Telephone Number (include area code) 7033929090	E-Mail Address (if available) RMERTZ@CAVELLMERTZ.COM	
3.	If this application has been submitted without a fee, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114): <input type="radio"/> Governmental Entity <input checked="" type="radio"/> Noncommercial Educational Licensee/Permittee <input type="radio"/> Other <input type="radio"/> N/A (Fee Required)		
4.	Facility Information:		
	a. <input type="radio"/> Commercial	<input checked="" type="radio"/> Noncommercial	
	b. <input checked="" type="radio"/> Directional	<input type="radio"/> Nondirectional	
	c. Community of License:		
	City: WASHINGTON	State: DC	
5.	<b>Program Test Authority:</b>		
	<input type="radio"/> Requesting program test authority.		
	<input checked="" type="radio"/> Station operating pursuant to automatic program test authority (47 C.F.R. Section 73.1620(a)(1)).		
6.	<b>Purpose of Application:</b>		
	<input type="radio"/> Cover construction permit (list most recent construction permit file number -- starts with the prefix BPH, BNPH, BMPH, BPED, BMPED, or BMPED):	-	
	<input checked="" type="radio"/> Modify an authorized license (list license file number -- starts with the prefix BLH, BMLH, BLED, or BMLED):	BLED-19980127KA	
	<input type="radio"/> Amend a pending application If an amendment, <b>submit as an Exhibit</b> a listing by Section and Question Number the portions of the pending application that are being revised.		[Exhibit 1]

**NOTE: In addition to the information called for in this section, an explanatory exhibit providing full particulars must be submitted for each question for which a "No" response is provided.**

**Section II - Legal and Financial**

1.	<b>Certification.</b> Applicant certifies that it has answered each question in this application based on its review of the application instructions and worksheets. Applicant further certifies that where it has made an affirmative certification below, this certification constitutes its representation that the application satisfies each of the pertinent standards and criteria set forth in the application instructions and worksheets.	<input checked="" type="radio"/> Yes <input type="radio"/> No
2.	Licensee/Permittee certifies that all terms, conditions, and obligations set forth in the underlying construction permit have been fully met.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 2]
3.	Licensee/Permittee certifies that, apart from changes already reported, no cause or circumstance has arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 3]
4.	<b>Character Issues.</b> Applicant certifies that neither licensee/permittee nor any party to the application has or has had any interest in, or connection with:  a. any broadcast application in any proceeding where character issues were left unresolved or were resolved adversely against the applicant or party to the application; or b. any pending broadcast application in which character issues have been raised.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 4]
5.	<b>Adverse Findings.</b> Applicant certifies that, with respect to the applicant and any party to the application, no adverse finding has been made, nor has an adverse final action been taken related to the following: any felony; mass media-related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 5]
6.	<b>Anti-Drug Abuse Act Certification.</b> Applicant certifies that neither licensee/permittee nor any party to the application is subject to denial of federal benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862.	<input checked="" type="radio"/> Yes <input type="radio"/> No

I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith. I acknowledge that all certifications and attached Exhibits are considered material representations. I hereby waive any claim to the use of any particular frequency as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and request an authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended.)

Typed or Printed Name of Person Signing BRUCE COLLINS	Typed or Printed Title of Person Signing VICE PRESIDENT & GENERAL COUNSEL
Signature	Date 02/21/2013

**SECTION III - PREPARER'S CERTIFICATION**

I certify that I have prepared Section III (Engineering data) on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name RICHARD H. MERTZ	Relationship to Applicant (e.g., Consulting Engineer) CONSULTANT	
Signature	Date 02/21/2013	
Mailing Address CAVELL, MERTZ & ASSOCIATES, INC. 7732 DONEGAN DRIVE		
City MANASSAS	State or Country (if foreign address) VA	Zip Code 20109 -
Telephone Number (include area code) 7033929090	E-Mail Address (if available) RMERTZ@CAVELLMERTZ.COM	

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(a)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

<b>Section III - Engineering</b>			
<b>TECHNICAL SPECIFICATIONS</b>			
Ensure that the specifications below are accurate. Contradicting data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.			
<b>TECH BOX</b>			
1.	Channel: 211		
2.	a. Effective Radiated Power: 36 kW(H) 36 kW(V) b. Maximum Effective Radiated Power: kW(H) kW(V) (Beam-Tilt Antenna ONLY) <input checked="" type="checkbox"/> Not Applicable		
3.	Transmitter Power Output: 9.7 kW		
4.	Antenna Data		
	Manufacturer	Model	Number of Sections
	SHI	6810-5D-DA	5
			Spacing Between Sections (wavelength)
			1
<b>NOTE: In addition to the information called for in this section, an explanatory exhibit providing full particulars must be submitted for each question for which a "No" response is provided.</b>			
<b>CERTIFICATION</b>			
<b>All applicants must complete this section.</b>			
5.	<b>Main Studio Location.</b> The main studio location complies with 47 C.F.R. Section 73.1125.		<input checked="" type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 6]
6.	<b>Transmitter Power Output.</b> The operating transmitter power output produces the authorized effective radiated power.		<input checked="" type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 7]
<b>APPLICATIONS FILED TO COVER A CONSTRUCTION PERMIT.</b>			
Only applicants filing this application to cover a construction permit must complete the following section.			
<b>NOTE: In addition to the information called for in this section, an explanatory exhibit providing full particulars must be submitted for each question for which a "No" response is provided.</b>			
7.	<b>Constructed Facility .</b> The facility was constructed as authorized in the underlying construction permit or complies with 47 C.F.R. Section 73.1690.		<input type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 8]
8.	<b>Special Operating Conditions.</b> The facility was constructed in compliance with all special operating conditions, terms, and obligations described in the construction permit.		<input type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 9]
	<b>An exhibit may be required.</b> Review the underlying construction permit.		[Exhibit 10]
<b>APPLICATIONS FILED PURSUANT TO 47 C.F.R. SECTIONS 73.1675(c) or 73.1690(c).</b>			
Only applicants filing this application pursuant to 47 C.F.R. Sections 73.1675(c) or 73.1690(c) must complete the following			

section.	
9.	<p><b>Changing transmitter power output.</b> Is this application being filed to authorize a change in transmitter power output caused by the replacement of omnidirectional antenna with another omnidirectional antenna or an alteration of the transmission line system? See 47 C.F.R. Sections 73.1690(c)(1) and (c)(10).</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No</p>
10.	<p><b>Increasing effective radiated power.</b> Is this application being filed to authorize an increase in ERP for a station operating in the nonreserved band (Channels 221-300)? See 47 C.F.R. Sections 73.1690(c)(4), (c)(5) and (c)(7).</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No</p> <p>If "Yes" to the above, the applicant certifies the following:</p> <p>a. <b>Spacing Requirements.</b> The increase in ERP was authorized pursuant to MM Docket 88-375 (Class A stations) OR the facility complies with the spacing requirements of 47 C.F.R. Section 73.207.</p> <p><input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 11]</p> <p>b. <b>International Coordination.</b> The transmitter site is greater than 320 km from the Canadian or Mexican borders OR coordination for the station's international class is complete.</p> <p><input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 12]</p> <p>c. <b>Interference.</b> The requirements of 47 C.F.R. Section 73.1030 regarding notification to radio astronomy installations, radio receiving installations and FCC monitoring stations have either been satisfied OR are not applicable.</p> <p><input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 13]</p> <p><b>Exhibit required.</b> If the proposed facility must be notified to the entities set forth in 47 C.F.R. Section 73.1030, the applicant must provide a copy of the written approval for the ERP increase from the affected entity.</p> <p>[Exhibit 14]</p> <p>d. <b>Multiple Ownership Showing.</b> The increase in ERP will not require the consideration of a multiple ownership showing pursuant to 47 C.F.R. Section 73.3555.</p> <p><input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 15]</p> <p>e. <b>Environmental Protection Act.</b> The proposed facility is excluded from environmental processing under 47 C.F.R. Section 1.1306 (i.e., the facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine compliance through the use of the RF worksheets in Appendix A, an <b>Exhibit is required.</b></p> <p><input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 16]</p> <p>By checking "Yes" above, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.</p>
11.	<p><b>Increasing vertically polarized effective radiated power.</b> Is this application being filed pursuant to 47 C.F.R. Section 73.1690(c)(4) to authorize an increase in the vertically polarized ERP for a station operating in the reserved band (Channels 200-220)?</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No</p> <p>If "Yes" to the above, the applicant certifies the following:</p> <p>a. <b>TV Channel 6 Protection Requirements.</b> The facility complies with the spacing requirements of 47 C.F.R. Section 73.525(a)(1).</p> <p><input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 17]</p> <p>b. <b>Environmental Protection Act.</b> The proposed facility is excluded from environmental processing under 47 C.F.R. Section 1.1306 (i.e., the facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine compliance through the use of the RF worksheets in Appendix A,</p> <p><input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 18]</p>

	an <b>Exhibit is required.</b>	
	By checking "Yes" above, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.	
12.	<b>Decreasing effective radiated power (non-reserved channel).</b> Is this application being filed pursuant to 47 C.F.R. Section 73.1690(c)(8) to authorize a decrease in the ERP for a station operating in the nonreserved band (Channels 221-300)?  If "Yes" to the above, the applicant certifies the following:	<input type="radio"/> Yes <input checked="" type="radio"/> No
	a. <b>Community Coverage .</b> The proposed facility complies with the community coverage requirements of 47 C.F.R. Section 73.315 where the distance to the 3.16 mV/m contour is predicted using the standard prediction method in 47 C.F.R. Section 73.313.	<input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 19]
	b. <b>Auxiliary Facilities.</b> The authorized or pending auxiliary facilities for this station comply with 47 C.F.R. Section 73.1675(a).	<input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 20]
	c. <b>Multiple Ownership Showing.</b> The decrease in ERP is not requested or required to establish compliance with 47 C.F.R. Section 73.3555.	<input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 21]
13.	<b>Decreasing effective radiated power (reserved channel).</b> Is this application being filed pursuant to 47 C.F.R. Section 73.1690(c)(8) to authorize a decrease in the ERP for a station operating in the reserved band (Channels 200-220)?  If "Yes" to the above, the applicant certifies the following:	<input type="radio"/> Yes <input checked="" type="radio"/> No
	a. <b>Community Coverage .</b> The proposed facility complies with the community coverage requirements of 47 C.F.R. Section 73.1690(c)(8)(i) where the distance to the 1 mV/m contour is predicted using the standard prediction method in 47 C.F.R. Section 73.313.	<input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 22]
	b. <b>Auxiliary Facilities.</b> The authorized or pending auxiliary facilities for this station comply with 47 C.F.R. Section 73.1675(a).	<input type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 23]
14.	<b>Replacing a directional antenna.</b> Is this application being filed pursuant to 47 C.F.R. Section 73.1690(c)(2) to replace a directional antenna with another directional antenna?  If "Yes" to the above, the applicant certifies the following:	<input checked="" type="radio"/> Yes <input type="radio"/> No
	a. <b>Measurement of Directional Antenna.</b> The composite measured pattern and measurement procedures comply with 47 C.F.R. Section 73.1690(c)(2). <b>Exhibit required.</b>	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 24] [Exhibit 25]
	b. <b>Installation of Directional Antenna.</b> The installation of the directional antenna complies with 47 C.F.R. Section 73.1690(c)(2). <b>Exhibit required.</b>	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 26] [Exhibit 27]
15.	<b>Deleting contour protection status.</b> Is this application being filed pursuant to 47 C.F.R. Section 73.1690(c)(6) to delete contour protection status (47 C.F.R. Section 73.215) for a station operating in the nonreserved band (Channels 221-300)?	<input type="radio"/> Yes <input checked="" type="radio"/> No

	If "Yes" to the above, the applicant certifies that the facility complies with the spacing requirements of 47 C.F.R. Section 73.207.	<input type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 28]
16.	<b>Use a formerly licensed main facility as an auxiliary facility.</b> Is this application being filed pursuant to 47 C.F.R. Section 73.1675(c)(1) to request authorization to use a formerly licensed main facility as an auxiliary facility and/or change the ERP of the proposed auxiliary facility?  If "Yes" to the above, the applicant certifies the following:	<input type="radio"/> Yes <input checked="" type="radio"/> No
	a. <b>Auxiliary antenna service area.</b> The proposed auxiliary facility complies with 47 C.F.R. Section 73.1675(a).	<input type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 29]
	b. <b>Environmental Protection Act.</b> The proposed facility is excluded from environmental processing under 47 C.F.R. Section 1.1 306 (i.e., the facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine compliance through the use of the RF worksheets in Appendix A, an <b>Exhibit is required.</b>	<input type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 30]
	By checking "Yes" above, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.	
17.	<b>Change the license status.</b> Is this application being filed pursuant to 47 C.F.R. Section 73.1690(c)(9) to change the license status from commercial to noncommercial or from noncommercial to commercial?	<input type="radio"/> Yes <input checked="" type="radio"/> No
	If "Yes" to the above, submit an exhibit providing full particulars. For applications changing license status from commercial to noncommercial, include Section II of FCC Form 340 as an exhibit to this application.	[Exhibit 31]
<b>PREPARERS CERIFICATION ON PAGE 3 MUST BE COMPLETED AND SIGNED.</b>		

## Exhibits

### Exhibit 24

**Description:** WCSP-FM EXHIBIT 24

PLEASE SEE EXHIBIT 26

### Attachment 24

### Exhibit 25

**Description:** WCSP-FM EXHIBIT 25

PLEASE SEE EXHIBIT 26

### Attachment 25

**Exhibit 26****Description:** WCSP-FM EXHIBIT 26

EXHIBIT 26 CONTAINS STATEMENT A, ANTENNA REPLACEMENT; TABLE 1, COMPLIANCE WITH SECTION 73.1690(C)(2)(II); FIGURE 1, ANTENNA HORIZONTAL PLANE RADIATION PATTERN COMPARISON; ATTACHMENT 1, ANTENNA MANUFACTURERS PROOF OF PERFORMANCE; ATTACHMENT 1, SURVEYORS STATEMENT; AND ATTACHMENT 3, SUPERVISING ENGINEERS STATEMENT.

**Attachment 26**

Description
<a href="#">WCSP-FM EXHIBIT 26</a>

**Exhibit 27****Description:** WCSP-FM EXHIBIT 27

PLEASE SEE EXHIBIT 26

**Attachment 27**

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Exhibit 26 - Statement A  
**ANTENNA REPLACEMENT**  
prepared for  
**National Cable Satellite Corporation**  
WCSP-FM Washington, D.C.  
Ch. 211B 36 kW (MAX-DA) 173 m

*National Cable Satellite Corporation* (“NCSC”), licensee of WCSP-FM, Washington, D.C. (BLED-19980127KA) has replaced its lightning damaged 5 bay FM antenna in accordance with Section 73.1690(c)(2) of the Commission’s rules and has commenced full power program tests with an exact replacement antenna in accordance with Section 73.1620(a)(3). The replacement antenna, a Shively Model 6810-5D-DA, employs 5 antenna bays spaced at 1 wavelength intervals and is identical to the damaged antenna. The antenna is mounted such that the antenna radiation center is identical to that of the damaged antenna.<sup>1</sup> The authorized maximum effective radiated power (“ERP”) of 36 kW remains unchanged. Coverage contours for WCSP-FM remain unchanged.

The original WCSP-FM antenna was purchased by the station’s previous owner in 1996.<sup>2</sup> Attached hereto, as **Exhibit 26-Attachment 1**, is a copy of the antenna’s pattern measurement proof of performance report dated April 11, 1996. Section 73.1690(c)(2)(i) of the Commission’s rules was amended on August 14, 1997 in MM Docket 96-58<sup>3</sup> to add the additional requirement for a manufacturer provided comparison of the measured horizontal and vertical relative field values with the authorized envelope pattern to demonstrate that neither measured value exceeds that authorized. As mentioned previously, the replacement WCSP-FM antenna is an *exact* replacement for the original damaged antenna. Thus, antenna measurements were not repeated. The original 1996 report does not contain such a pattern comparison. The proof report does, however, provide the manufacturer’s tabulation of the pattern measurement data results. Employing this data, the attached **Exhibit 26-Figure 1** has been prepared to demonstrate compliance with the current version of Section 73.1690(c)(2)(i). If a waiver of this rule section is required to permit acceptance of **Exhibit 26-Figure 1**, one is respectfully requested on behalf of the licensee.<sup>4</sup>

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<sup>1</sup> The licensee reported that the damaged antenna mounting brackets were not replaced and have been reused without any location adjustments.

<sup>2</sup> The station was formerly owned by the Trustees, University of the District of Columbia and was identified by the call sign WDCU.

<sup>3</sup> See FCC 97-290, In the Matters of Amendments to Parts 73 and 74 of the Commission’s Rules To Permit Certain Minor Changes in Broadcast Facilities Without a Construction Permit, Released August 22, 1997.

<sup>4</sup> **Exhibit 26-Table 1** provides a comparison of the authorized and measured relative field data.

Exhibit 26 - Statement A  
**ANTENNA REPLACEMENT**  
(Page 2 of 2)

**Exhibit 26-Table 1** has been prepared to demonstrate that the RMS of the composite antenna pattern is in excess of 85% of the RMS of the authorized composite antenna pattern. As demonstrated therein, the RMS of the measured composite pattern, as calculated using the method specified in Section 73.316(c)(2)(ix)(A) of the Commission's, is 91.1%. Thus, the WCSP-FM replacement antenna complies with Section 73.1690(c)(2)(ii) of the Commission's rules.

Attached hereto as **Exhibit 26-Attachment 1**, in compliance with Section 73.1690(c)(2)(iii) is a copy of the original WCSP-FM antenna manufacturer's proof of performance.

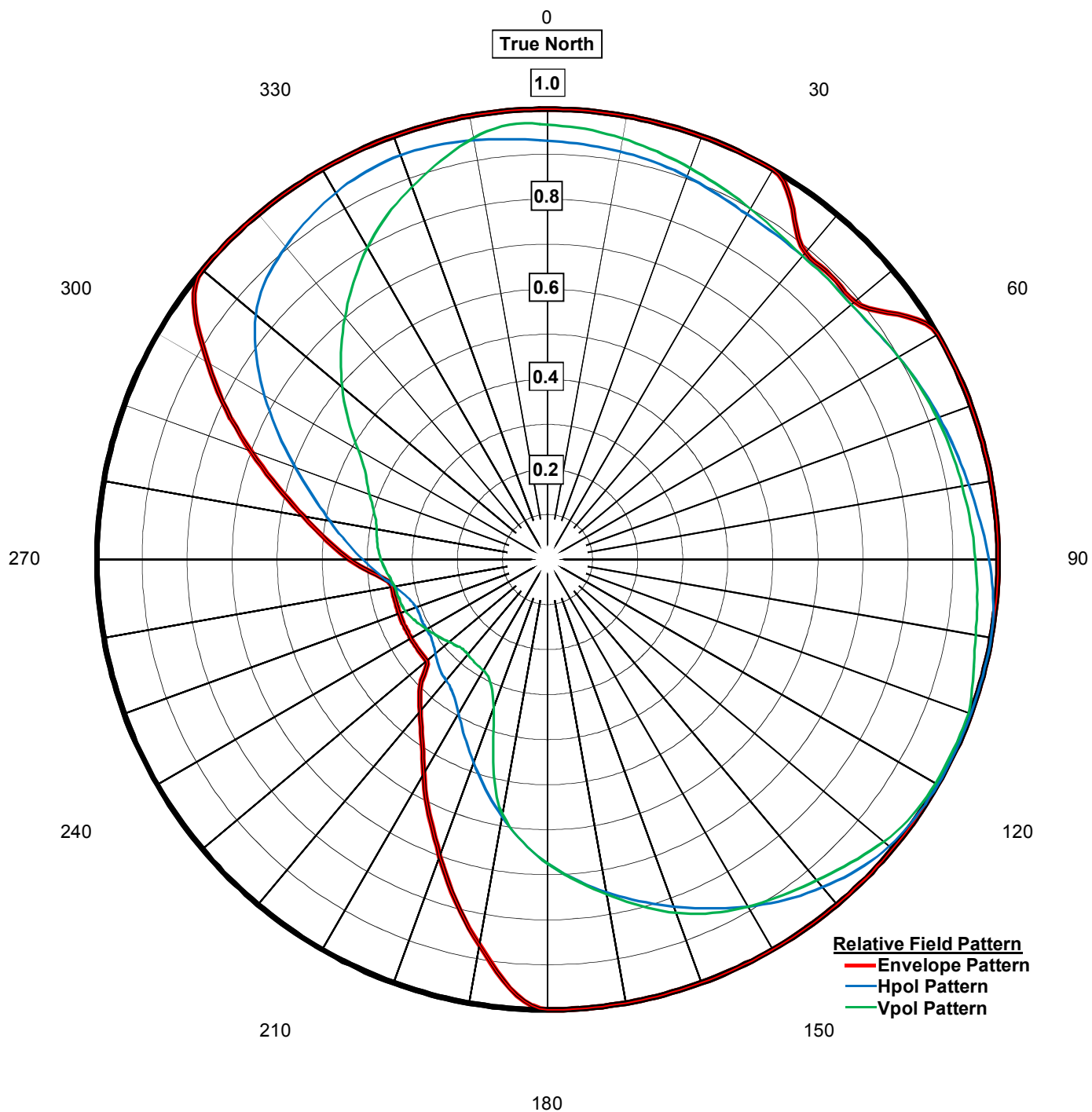
**Exhibit 26-Attachment 2** contains a statement from Mr. Ronald A. Skutch, a licensed surveyor registered in the state of Maryland, confirming the orientation of the antenna as specified in the manufacturer's instructions in compliance with Section 73.1690(c)(2)(iv) of the Commission's rules.

**Exhibit 26-Attachment 3** contains a statement from Mr. David Knighton, the engineer that supervised the installation of the replacement antenna, confirming the installation was in accordance with the manufacturer's instructions in compliance with Section 73.1690(c)(2)(v) of the Commission's rules.

Since the replacement WCSP-FM antenna is an exact replacement for the original antenna, it is believed that the RF contribution from WCSP-FM authorized in the station's license remains unchanged. Thus, an environmental statement has been omitted.

Exhibit 26 – Table 1  
**COMPLIANCE WITH SECTION 73.1690(c)(2)(ii)**  
 prepared for  
**National Cable Satellite Corporation**  
 WCSP-FM Washington, D.C.  
 Ch. 211B 36 kW (MAX-DA) 173 m

	Envelope	Envelope	Horizontal	Vertical	Composite	Composite
	Pattern	Pattern	Polarization	Polarization	Pattern	Pattern
	Relative	Relative	Relative	Relative	Relative	Relative
<u>Azimuth</u>	<u>Field</u>	<u>Field<sup>2</sup></u>	<u>Field</u>	<u>Field<sup>2</sup></u>	<u>Field</u>	<u>Field<sup>2</sup></u>
0	1.000	1.000	0.930	0.965	0.965	0.931
10	1.000	1.000	0.920	0.950	0.950	0.903
20	1.000	1.000	0.905	0.925	0.925	0.856
30	1.000	1.000	0.885	0.900	0.900	0.810
40	0.890	0.792	0.880	0.880	0.880	0.774
45	0.890	0.792	0.880	0.880	0.880	0.774
50	0.890	0.792	0.880	0.880	0.880	0.774
60	1.000	1.000	0.900	0.900	0.900	0.810
70	1.000	1.000	0.925	0.920	0.925	0.856
80	1.000	1.000	0.950	0.935	0.950	0.903
90	1.000	1.000	0.980	0.950	0.980	0.960
100	1.000	1.000	1.000	0.965	1.000	1.000
110	1.000	1.000	1.000	0.995	1.000	1.000
120	1.000	1.000	1.000	0.995	1.000	1.000
130	1.000	1.000	0.990	0.975	0.990	0.980
140	1.000	1.000	0.950	0.930	0.950	0.903
150	1.000	1.000	0.890	0.890	0.890	0.792
160	1.000	1.000	0.820	0.835	0.835	0.697
170	1.000	1.000	0.750	0.755	0.755	0.570
180	1.000	1.000	0.675	0.675	0.675	0.456
190	0.870	0.757	0.580	0.575	0.580	0.336
200	0.700	0.490	0.480	0.350	0.480	0.230
210	0.550	0.303	0.395	0.285	0.395	0.156
220	0.440	0.194	0.350	0.275	0.350	0.123
225	0.400	0.160	0.340	0.275	0.340	0.116
230	0.350	0.123	0.325	0.285	0.325	0.106
240	0.350	0.123	0.310	0.310	0.310	0.096
250	0.350	0.123	0.310	0.335	0.335	0.112
260	0.350	0.123	0.345	0.345	0.345	0.119
270	0.440	0.194	0.410	0.370	0.410	0.168
280	0.550	0.303	0.490	0.385	0.490	0.240
290	0.700	0.490	0.595	0.420	0.595	0.354
300	0.870	0.757	0.725	0.485	0.725	0.526
310	1.000	1.000	0.845	0.595	0.845	0.714
320	1.000	1.000	0.905	0.700	0.905	0.819
330	1.000	1.000	0.940	0.800	0.940	0.884
340	1.000	1.000	0.955	0.880	0.955	0.912
350	1.000	1.000	0.945	0.950	0.950	0.903
Envelope Pattern RMS		5.340	Composite Pattern RMS			4.864
			Envelope/Composite Comparison			91.1%



**EXHIBIT 26 - FIGURE 1**  
**ANTENNA HORIZONTAL PLANE**  
**RADIATION PATTERN COMPARISON**

prepared February 2013 for  
**National Cable Satellite Corporation**  
 WCSP-FM Washington, D.C.  
 Facility Id 68950  
 Ch. 211B 36 kW (MAX-DA) 173 m

Cavell, Mertz & Associates, Inc.  
 Manassas, Virginia

**Exhibit 26-Attachment 1**

**Shively Labs,** a division of Howell Laboratories, Inc.  
BRIDGTON, MAINE 04009 (207) 647-3327 FAX (207) 647-8273

**S.O. 13194**

**Report of Test 6810-5D-DA**

**for**

**TRUSTEES, UNIV. OF THE DISTRICT OF COLUMBIA**

**WDCU WASHINGTON, DC**

**OBJECTIVE:**

The objectives of this test was to demonstrate the directional characteristics of a 6810-5D-DA antenna to meet the needs of WDCU and to comply with the requirements of the FCC construction permit, file number BMPED-940429IA.

**RESULTS:**

The measured azimuth pattern for the 6810-5D-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPED-940429IA indicates that the horizontal radiation component shall not exceed 36.00 kW at any azimuth and each component shall be restricted to the following values at the azimuths specified:

040 Degrees T: 28.50 kW

050 Degrees T: 28.50 kW

250 Degrees T: 4.40 kW

From Figure 1, the maximum radiation of the horizontal component occurs at 096 Degrees T to 128 Degrees T. At the restricted azimuth of 040 Degrees T the horizontal component is 1.11 dB down from the maximum of 36.00 kW, or 27.88 kW maximum. At the restricted azimuth of 050 Degrees T, the horizontal component is 1.11 dB down from the maximum of 36.00 kW, or 27.88 kW. At the restricted azimuth of 250 Degrees T, the vertical component is 9.50 dB down from the maximum of 36.00 kW, or 4.04 kW.

The R.M.S. value of the horizontal component is 0.790 and the R.M.S. value of the vertical component is 0.760. The total horizontal power gain is 4.49. The total vertical power gain is 4.45. Therefore the input power into the antenna is 8.018 kW

**METHOD OF DIRECTIONALIZATION:**

The 6810 bay was mounted on a pole of exact scale to a 10 3/4" dia. pole. The spacing of the antenna to the tower was varied and vertical parasitic elements were added to achieve the vertical pattern shown in Figure 1. A horizontal parasitic element was placed directly under the bay. The position of the horizontal and vertical parasitic elements were changed until the horizontal and vertical patterns shown in Figure 1 was achieved. See Figure 2 for mechanical details.

No obstruction of any type is to be within a 50 foot horizontal radius of the directional antenna system.

**METHOD OF MEASUREMENT:**

As allowed by the construction permit, file number BMPED-940429IA, a single level of the 6810-5D-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 pattern measurements since 1974 as an RF Engineer with Shively Labs and with Dielectric Communications (a unit of General Signal). He is currently an Associate Member of the Association of Federal Communications Consulting Engineers and a Member of IEEE.

**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 8505 Network Analyzer  
Hewlett Packard Model 16 Series 200 Computer  
Hewlett Packard 9122 Dual Disc Drive  
Hewlett Packard 7475A Plotter

The test equipment is calibrated to a MIL-STD 45662 system

**TEST PROCEDURES:**

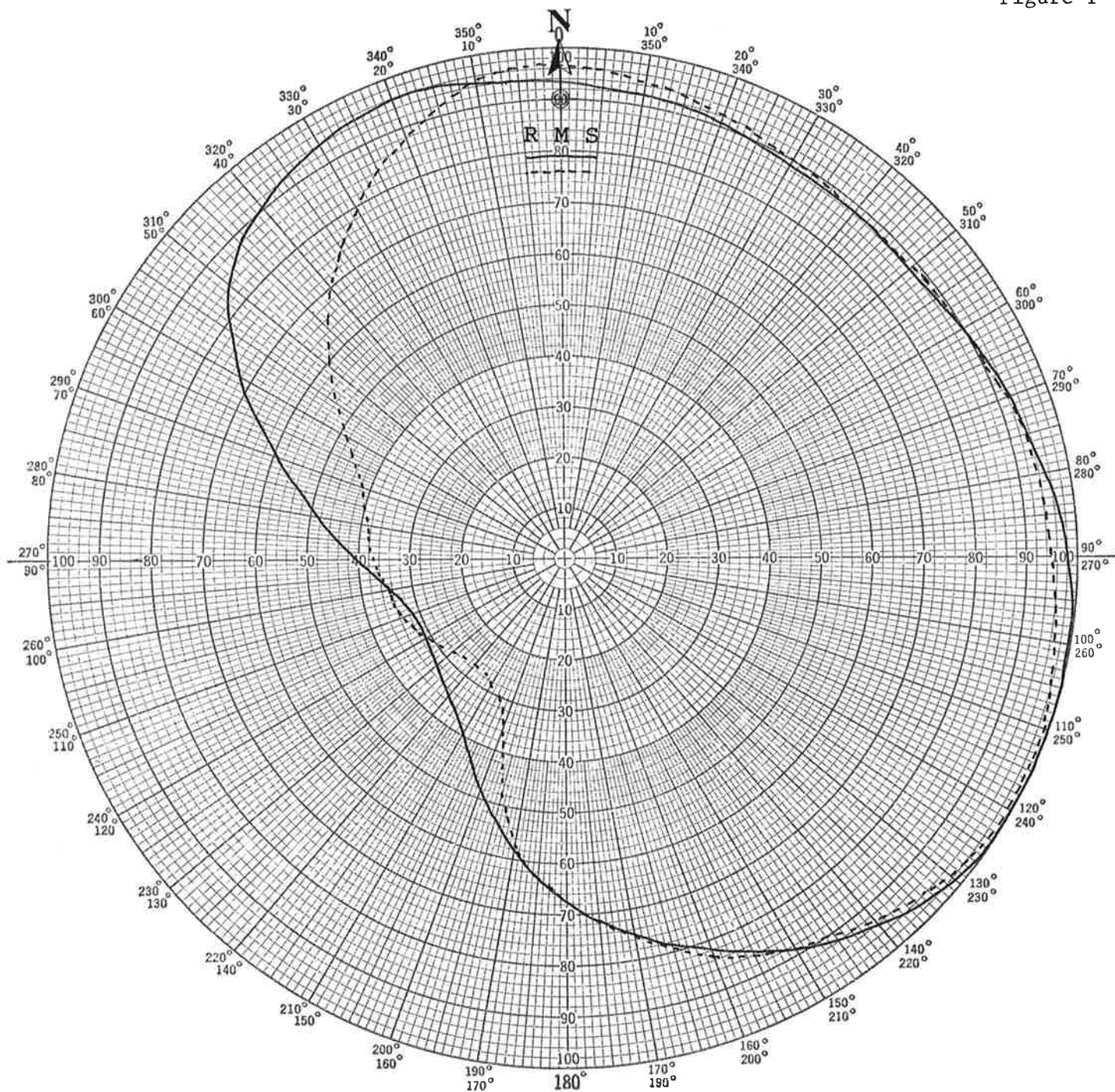
The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 405.45 MHz. Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding 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 13194  
April 11, 1996

Figure 1



## Shively Labs

PROJECT NAME WDCU Washington, DC  
 PROJECT NUMBER 13,194 DATE 4/11/96  
 MODEL (X) FULL SCALE ( ) FREQUENCY 405.45/90.1 MHz  
 POLARIZATION Horiz. (—); Vert. (----)  
 CURVE PLOTTED IN: VOLTAGE (X) POWER ( ) DB ( )  
 OBSERVER RAS

ANTENNA TYPE 6810-5D-DA  
 PATTERN TYPE Directional Azimuth  
 REMARKS: See Figure 2 for Mechanical  
Details



Figure 1A

TABULATION OF HORIZONTAL POLARIZATION  
WDCU WASHINGTON, DC

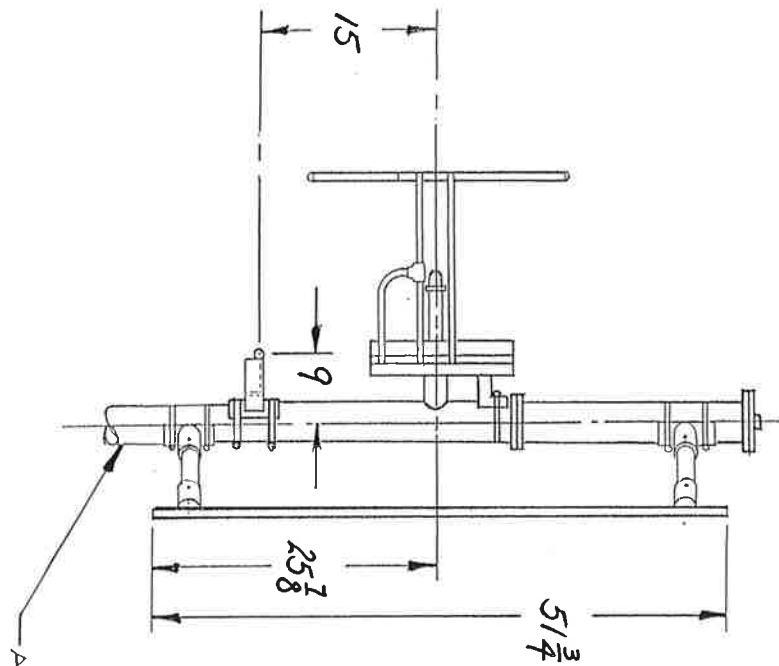
DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.930	180	0.675
10	0.920	190	0.580
20	0.905	200	0.480
30	0.885	210	0.395
40	0.880	220	0.350
45	0.880	225	0.340
50	0.880	230	0.325
60	0.900	240	0.310
70	0.925	250	0.310
80	0.950	260	0.345
90	0.980	270	0.410
100	1.000	280	0.490
110	1.000	290	0.595
120	1.000	300	0.725
130	0.990	310	0.845
135	0.970	315	0.880
140	0.950	320	0.905
150	0.890	330	0.940
160	0.820	340	0.955
170	0.750	350	0.945

Figure 1B

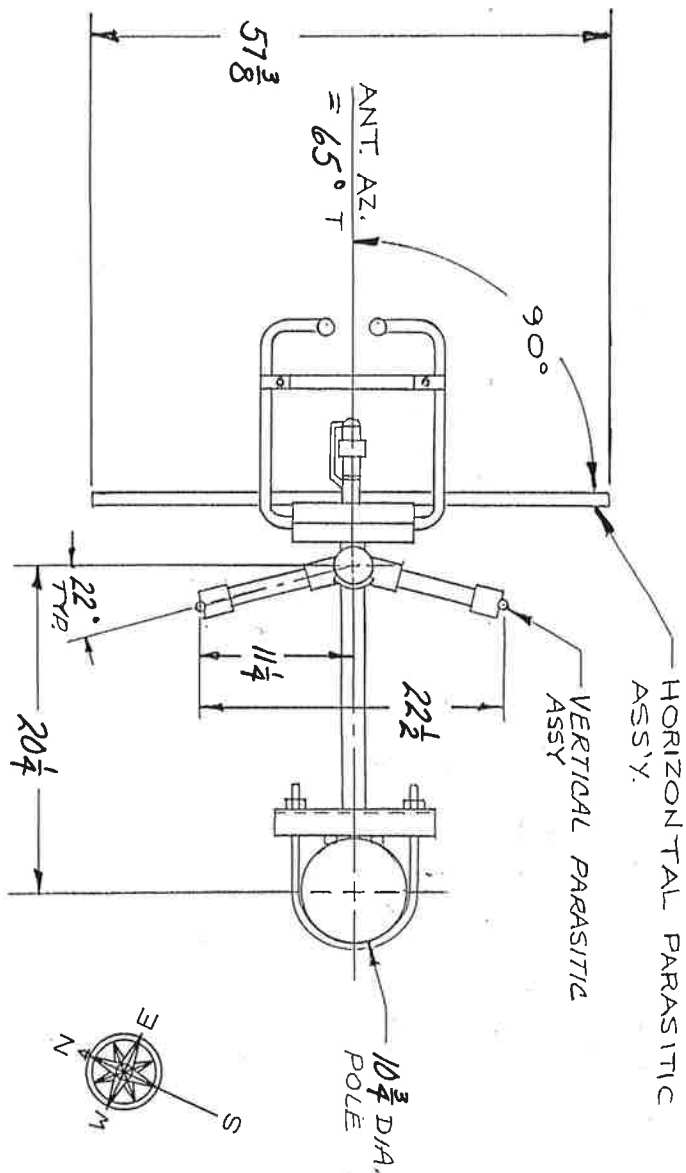
TABULATION OF VERTICAL POLARIZATION  
WDCU WASHINGTON, DC

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.965	180	0.675
10	0.950	190	0.575
20	0.925	200	0.350
30	0.900	210	0.285
40	0.880	220	0.275
45	0.880	225	0.275
50	0.880	230	0.285
60	0.900	240	0.310
70	0.920	250	0.335
80	0.935	260	0.345
90	0.950	270	0.370
100	0.965	280	0.385
110	0.995	290	0.420
120	0.995	300	0.485
130	0.975	310	0.595
135	0.955	315	0.650
140	0.930	320	0.700
150	0.890	330	0.800
160	0.835	340	0.880
170	0.755	350	0.950

# SIDE VIEW

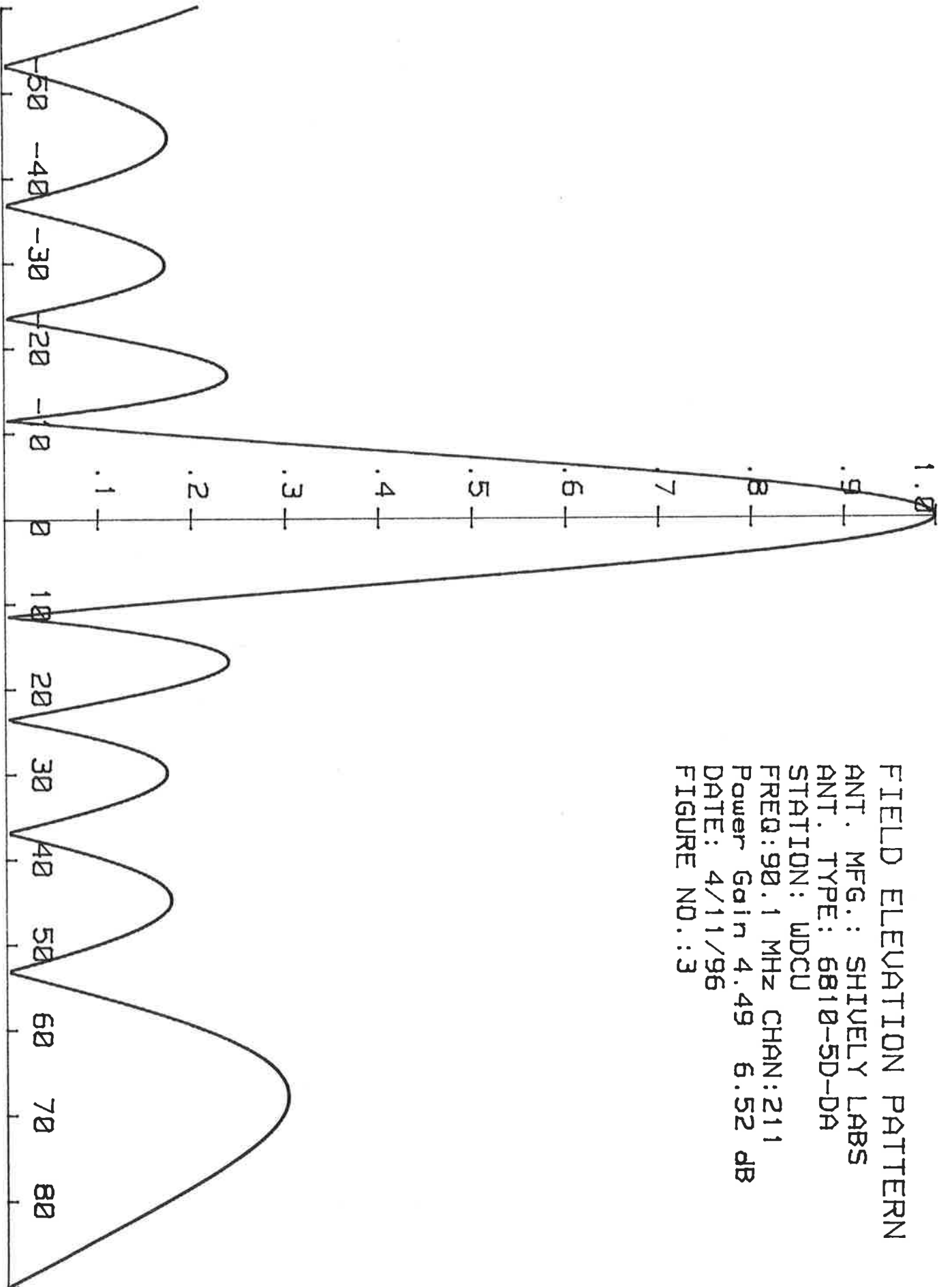


# TOP VIEW



<b>Shively Labs</b>			
DIV. HOWELL LABS.		BRIDGTON, MAINE	
S.O. # 13194	FREQ.:	SCALE	DRAWN BY
WASHAGTOO	90.1 MHz	N.T.S.	048
DC			APPROVED BY
TITLE			
MODEL	6810-5D	- DIRECTIONAL ANTENNA	
STATION		WDCU - FM	
DATE			
4-11-96	FIGURE 2		

FIELD ELEVATION PATTERN  
ANT. MFG.: SHIUELY LABS  
ANT. TYPE: 6810-5D-DA  
STATION: WDCU  
FREQ: 90.1 MHz CHAN: 211  
Power Gain 4.49 6.52 dB  
DATE: 4/11/96  
FIGURE NO.: 3





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**CIVIL ENGINEERS • SURVEYORS • LANDSCAPE ARCHITECTS • LAND PLANNERS**

February 15, 2013

To Whom It May Concern:

This letter confirms that the "WCSP" directional FM antenna system as installed is oriented at N 65° E in accordance with the antenna manufacturer's instructions.

This measurement was performed using differential GPS with respect to True North and has an accuracy of +/- 1° (or higher).

Questions regarding this measurement should be directed to the undersigned.

Sincerely,  
FREDERICK, SEIBERT AND ASSOCIATES, INC.

Ronald A. Skutch, RLS  
Chief of Surveyors



*Exp. 6-29-14*



February 15, 2013

To Whom It May Concern:

This letter confirms that the WCSP directional FM antenna system installed was supervised by the undersigned and was installed in accordance with the antenna manufacturer's instructions.

My qualifications are 22 years of operation, maintenance and design of microwave, FM, UHF and Satellite communication systems.

Questions regarding this statement should be directed to the undersigned.

Sincerely,

A handwritten signature in black ink, appearing to read "David P. Knight".

David Knighton

Broadcast Engineer – C-SPAN networks

202-737-3220