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May 18, 2018

Via E-mail Only

Marlene H. Dortch, Secretary
Federal Communications Commission
45 L. Street NE
Washington DC 20554

Re: Radio Station WBXR (AM), Hazel Green, Alabama (Fac ID No. 8999)
FCC Form 302-AM Direct Measurement- Moment of Method Proof Application

Dear Madam Secretary:

On behalf of New England Communications, Inc., the Licensee of Radio Station WBXR (AM), Hazel Green, Alabama, please find attached hereto an FCC Form 302-AM Direct Measurement-Moment of Method Proof Application. Please take note that this Application is FEE EXEMPT and as such is being filed thru the Office of the Secretary.

Should there be any questions regarding this submission, please contact this Office at (540) 459-7646.

Very truly yours,

John C. Trent

Enclosure
cc w/enc: Nazifa Sawez, Assistant Chief, FCC Audio Division

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY

FILE NO.

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)

New England Communications, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters)
P.O. Box 444

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Spartanburg	SC	29304

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
(864) 585-1885	WBXR	8999

2. A. Is a fee submitted with this application? ☐ Yes ☑ No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

☐ Governmental Entity ☐ Noncommercial educational licensee ☑ Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
	0001	$ N/A	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
	0001	$ N/A	

	TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.	$ N/A	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT New England Communications, Inc.		
MAILING ADDRESS P.O. Box 444		
CITY Spartanburg	STATE SC	ZIP CODE 29304

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
WBXR	Hazel Green, AL	N/A	N/A	N/A

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☐ No

If No, explain in an Exhibit.

Exhibit No. N/A

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No. N/A

5. Apart from the changes already reported, has any cause or circumstance 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?

☐ Yes ☐ No

If Yes, explain in an Exhibit.

Exhibit No. N/A

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☑ Does not apply

If No, explain in an Exhibit.

Exhibit No.

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☑ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☑ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☑ Yes ☐ No

2. 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.

Name	Signature	
Robert Wilkins		
Title: President	Date: 5.11.21	Telephone Number: 864-585-1885

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

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
New England Communications, Inc.

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☑ Station License ☐ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night / Critical Hrs	Day
WBXR	N/A	1140	Day and Critical Hours	7.5	15.0

2. Station location

State	City or Town
Alabama	Hazel Green

3. Transmitter location

State	County	City or Town	Street address (or other identification)
AL	Madison	Hazel Green	710 Butter and Egg Road

4. Main studio location

State	County	City or Town	Street address (or other identification)
GA	Richmond	Augusta	552 Laney Walker Blvd.

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
GA	Richmond	Augusta	552 Laney Walker Blvd.

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. ENG.

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system Critical Hours	RF common point or antenna current (in amperes) without modulation for day system
12.6	17.8
Measured antenna or common point resistance (in ohms) at operating frequency	**Measured antenna or common point reactance (in ohms) at operating frequency**
Night Critical Hours: 50.0 Day: 50.0	Night Critical Hours: -8.1 Day: -8.1

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night (CH)	Day	Night (CH)	Day	Night	Day
1(N)	0.0	0.0	1.000	1.000		
2(S)	-149.7	-149.7	.730	.730		

Manufacturer and type of antenna monitor: Potomac Instruments AM-19(204)

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
Guyed tower	59.8	60.7	60.7	Exhibit No. N/A

Excitation ☑ Series ☐ Shunt

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude	West Longitude
34 ° 57 ' 11 "	86 ° 38 ' 42 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. ENG.

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. ENG.

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

N/A

11. Give reasons for the change in antenna or common point resistance.

New Construction

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature (check appropriate box below)
Kurt Gorman	
Address (include ZIP Code) Phasetek Inc. 550 California Rd., Unit 11 Quakertown, PA 18951	Date October 31, 2020 Telephone No. (Include Area Code) 215-536-6648

☐ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☑ Technical Consultant

☐ Other (specify)

ENGINEERING STATEMENT CONCERNING

APPLICATION FOR LICENSE INFORMATION

EMPLOYING MOMENT METHOD MODELING

WBXR, 1140 KHZ, DA-D

HAZEL GREEN, ALABAMA

OCTOBER, 2020

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING APPLICATION FOR LICENSE INFORMATION EMPLOYING MOMENT METHOD MODELING WBXR, 1140 KHZ, DA-D HAZEL GREEN, ALABAMA OCTOBER, 2020

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PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WBXR, 1140 KHZ, DA-D
HAZEL GREEN, ALABAMA
OCTOBER, 2020

SUMMARY

Adjustment of the Antenna System and a Proof of Performance employing Moment Method Modeling were performed on Radio Station WBXR, 1140 KHz, Hazel Green, Alabama, after replacement of the ground system and other site modifications. This report was prepared on behalf of New England Communications, Inc. licensee of Radio Station WBXR.

SITE MODIFICATIONS

The WBXR Transmitter site is that as currently licensed under BL-20161122AFB. The Antenna Phasing and Branching equipment has been modified. Both Towers remain unchanged with the exception of the replacement of the tower feed assemblies. A new ground system has been installed for both towers. There are no changes to the presently licensed standard radiation pattern; therefore, a site survey is not included. A License Application employing Moment Method Modeling as set forth in Section 73.151(C) has been done to license Radio Station WBXR under the new rules.

REFERENCE POINTS

Reference Points were measured at pattern minima and maxima for the Directional Day mode of operation. These Points and their measured field intensity are shown in Figure 12.

CRITICAL HOURS DIRECTIONAL OPERATION

Critical hours directional operation utilizes the Day directional two (2) tower antenna system with the reduction in power to 7.5 kW.

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WBXR, 1140 KHZ, DA-D
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METHOD OF MOMENTS DETAIL

All Moment Method Modeling was done with Expert MININEC Broadcast Professional, Version 23. One wire was used to represent each Tower. Towers were driven individually to verify the Model compared to measured impedance data. Once the Model was verified, the Day Directional Antenna System was computed. For the Directional mode, the complex voltage values for sources located at ground level were computed. These sources produce current moment sums for each Tower that, when normalized, equate to the Theoretical Field Parameters for each respective Tower.

MEASURING EQUIPMENT AND PERSONNEL

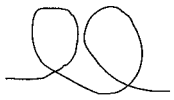
All Tower Resistance and Reactance measurements were made with a HP 8753ES network analyzer and Tunwall directional coupler. Before use, tests of known impedances were made to verify operation. All Field Intensity Measurements were made with a Potomac Instruments Field Intensity Meter, model PI 4100, Serial Number 249, calibrated on January 21, 2016. The meter was calibrated by Potomac Instruments, Frederick, Maryland. The meter was compared to a Potomac Instruments PI 4100, Serial Number 134, calibrated on June 19, 2019, and agreed. All measurements were taken by Phasetek Inc. personnel supervised by Kurt Gorman of Phasetek Inc.

CONCLUSION

It is believed that the WBXR Antenna System has been constructed and adjusted in accordance with all applicable Commission rules and regulations. The foregoing was prepared on behalf of New England Communications, Inc., under the immediate supervision of Kurt Gorman, Phasetek Inc., Quakertown, Pennsylvania, whose qualifications are a matter of record with the Federal Communications Commission. The statements herein are true and correct of his knowledge, except such statements made on information and belief, and as to these statements he believes them to be true and correct.

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING APPLICATION FOR LICENSE INFORMATION EMPLOYING MOMENT METHOD MODELING WBXR, 1140 KHZ, DA-D HAZEL GREEN, ALABAMA OCTOBER, 2020



Kurt Gorman, President
Phasetek Inc.
Quakertown, Pennsylvania

FIGURE 1

ANTENNA SYSTEM AS ADJUSTED

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WBXR, 1140 KHZ, DA-D
HAZEL GREEN, ALABAMA
OCTOBER, 2020

ANTENNA SYSTEM DESCRIPTION

1. The Antenna System consists of two (2), uniform cross section, guyed, vertical steel transmitting Towers. Both Towers stand 59.8M (81.8°) above their Base Insulators. The Towers are arranged with Tower 1 as a reference; Tower 2 is spaced 90.0° on a bearing of 170.0°T. Tower 1 supports a FM antenna for translator W267CG. The feed for this Antenna is isolated at the base with an isocoupler.

2. The Ground System for each Tower consists of (120) buried copper Radials, 65.7M in length, except where they intersect with copper transverse straps between Towers or property boundaries. Copper strap connects all Towers to the main Transmitter grounding point.

3. The Sampling System consists of two (2), Delta Electronics TCT-3, 1.0 V/A Toroidal Current Transformers. All TCT's are at the Output of each Antenna Tuning Unit. These TCT's are connected to a Potomac Instruments AM-19(204) Antenna Monitor via two (2) equal lengths of Andrew LDF4-50A, 1/2" phase stabilized foam coaxial cable.

4. Tower registration numbers:
   Tower 1: 1035775
   Tower 2: 1035776

FIGURE 1
ANTENNA SYSTEM AS ADJUSTED

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EMPLOYING MOMENT METHOD MODELING
CONTINUED
WBXR, 1140 KHZ, DA-D
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ANTENNA SYSTEM DESCRIPTION – Continued

DIRECTIONAL OPERATION (DAY)

COMMON POINT

Impedance = 50.0 – j 8.1 Ohms
Current = 17.8 Amperes
Power = 15,795 Watts

DIRECTIONAL OPERATION (CRITICAL HOURS)

COMMON POINT

Impedance = 50.0 - j 8.1 Ohms
Current = 12.6 Amperes
Power = 7,898 Watts

Directional Antenna Monitor indications are within ±5% and ±3° of the modeled TCT values.

FIGURE 2
WBXR SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WBXR, 1140 KHZ, DA-D
HAZEL GREEN, ALABAMA
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SAMPLING SYSTEM DESCRIPTION

The Sampling System consists of Delta Electronics TCT-3 Toroidal Sampling Transformers (1.0 volt/amp) mounted at the base of each Tower. The sampling devices are connected to the Antenna Monitor with equal lengths of Andrew LDF4-50A. The Antenna Monitor is a Potomac Instruments Model AM-19(204), Serial Number 1475.

SAMPLE LINE MEASUREMENTS

Impedance measurements were made of the Antenna Sampling Lines using a HP 8753ES network analyzer with a Tunwall directional coupler. Measurements were done with the lines open circuited and then connected to the TCT's.

The table below shows the frequencies above and below the carrier frequency where resonance, defined as zero reactance corresponding with low resistance, was found. Frequencies of resonance occur at odd multiples of 90 degrees electrical length, the Sample Line length at the resonant frequency below the carrier frequency, which is the closest one to the carrier frequency, was found to be 90 electrical degrees. The electrical length at carrier frequency appearing in the table below was calculated by ratioing the frequencies.

SAMPLE LINE MEASUREMENTS

	Resonant Frequency (KHz) below 1140 KHz	Resonant Frequency (KHz) above 1140 KHz	Calculated Electrical Length (deg) at 1140 KHz	Measured Impedance (ohms) Connected to TCT @ 1140 KHz
Tower 1	767.50	2315.75	133.7	48.3 –j 1.1
Tower 2	767.25	2316.25	133.7	48.4 –j 0.8

FIGURE 2
WBXR SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
CONTINUED
WBXR, 1140 KHZ, DA-D
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SAMPLE LINE MEASUREMENTS (CONTINUED)

To determine the characteristic impedance values of the Sample Lines, open-circuited measurements were made with frequencies offset to produce ± 45 degrees of electrical length from resonance. The characteristic impedance was calculated using the following formula, where R1 +j X1 and R2 +j X2 are the measured impedances at the +45 and -45 degree offset frequencies, respectively:

$$Z_0 = ((R_1^2 + X_1^2)^{1/2} \bullet (R_2^2 + X_2^2)^{1/2})^{1/2}$$

Tower	+ 45 Degree Offset Frequency (kHz)	+ 45 Degree Measured Impedance (Ohms)	- 45 Degree Offset Frequency (kHz)	- 45 Degree Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
1	1151.25	2.84 +j 49.6	383.75	0.65 –j 50.4	50.04
2	1150.88	2.84 +j 49.5	383.63	0.64 –j 50.3	49.94

SAMPLING TCT MEASUREMENTS

Measurements of the Delta Electronics Model TCT-3, 1.0 V/A Toroidal Current Transformers were performed by a Hewlett Packard 8753ES, Network Analyzer. Measurements are normalized to Tower #1 (reference) and are within the manufacturer's rating of ± 2.0% and ± 3.0°.

FIGURE 2
WBXR SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

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CONTINUED
WBXR, 1140 KHZ, DA-D
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SAMPLING TCT MEASUREMENTS CONT'D

TOWER	TCT SERIAL #	MAGNITUDE	PHASE
1	3261	1.000	0.0°
2	16214	1.000	-0.4°

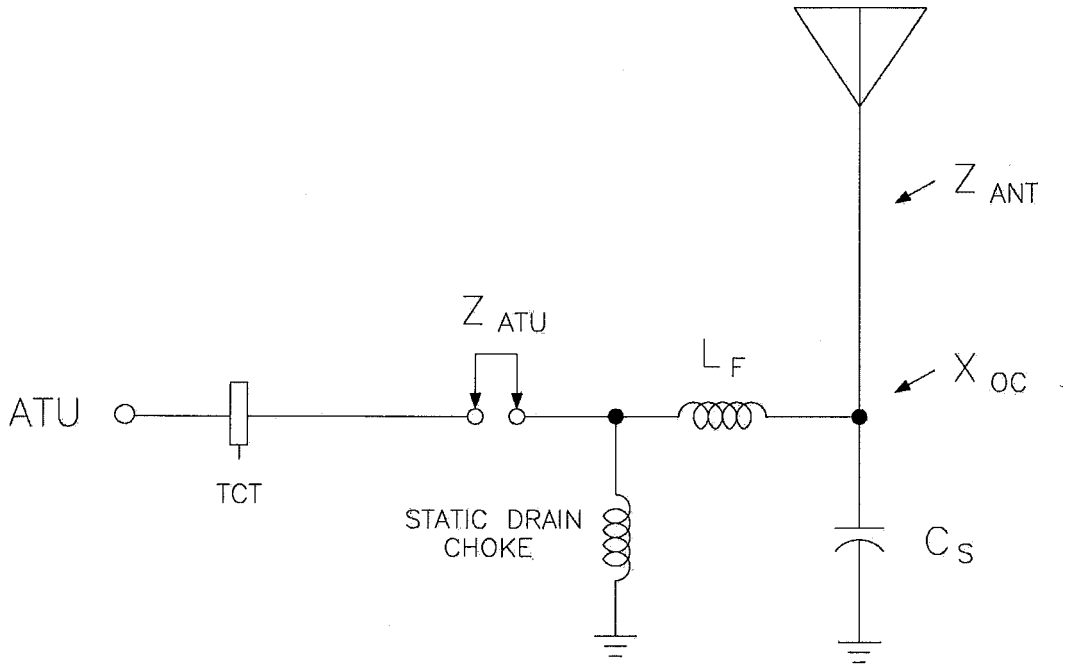
ANTENNA MONITOR MEASUREMENT

Measurement of the Potomac Instruments Model AM-19(204) Antenna Monitor was performed to verify calibration. A single RF Voltage was applied to the Reference Input (Tower #1) and each other Input by use of a "T" divider and equal electrical length coaxial cables. This yields the following:

Tower	Ratio	Phase
1	1.000	0.0^{0}
2	1.000	0.2^{0}

The above is within the manufacturer's rating of $\pm$ 1.5% and $\pm$ 1.0°.

FIGURE 3
WBXR TOWER IMPEDANCE MEASUREMENTS COMPARED TO METHOD OF MOMENTS MODEL



TOWER	Specified Cs (pf)	Measured L_F (μH)	Measured X_F (Ω)	Modeled Z_{ANT} (Ω)	Modeled Z_{ATU} (Ω)	Measured Z_{ATU} (Ω)
1	34	2.65	+j19.0	45.6 +j 38.7	46.6 +j 57.6	46.1 +j 57.9
2	15	4.75	+j34.0	42.7 +j 30.6	43.2 +j 64.5	43.5 +j 65.4

Tower	Calculated X_{OC} (Ω)
1	-j 3,611.6
2	-j 7,101.6

FIGURE 4
WBXR MOMENT MODEL PARAMETERS

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EMPLOYING MOMENT METHOD MODELING
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Tower #	Wire #	# of Segments	Base Node
1	1	12	1
2	2	12	13

Tower #	Physical Height Degrees	Modeled Height Degrees	Modeled Radius Meters	% of Equivalent Radius
1	81.8	93.5	.218	100.0
2	81.8	92.0	.206	100.0

Both Towers are uniform cross section, guyed with Base Insulator. All towers are three (3) sided. Tower #1 has a 18" face width and tower #2 has a 17" face width.

The Base Insulator for tower #1 was manufactured by Utility Towers, with an assumed capacity of 14pf (-j9,972.1 ohms @ 1140 kHz). Tower #2 base insulator was manufactured by Austin, part number A-4197-L, with an assumed capacity of 15pF (-j9,307.3 ohms @ 1140 kHz).

Tower #1 has a Phasetek Inc. P600-408 FM isocoupler across the base. This measures 20 pF and is in parallel with the base insulator.

Both Towers have Phasetek Inc. 4" diameter static drain choke. These measure –j30,000 ohms @ 1140 kHz.

FIGURE 5
WBXR MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WBXR TOWER 1 (OTHER OPEN)

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.218	12
		0	0	93.5		
2	none	90.	170.	0	.206	12
		90.	170.	92.		

Number of wires = 2
current nodes = 24

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	7.66667	1	7.79167
radius	2	.206	1	.218

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0212963	.0216435

Sources

source	node	sector	magnitude	phase	type
1	1	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	13	0	-7,101.6	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.14	45.563	38.721	59.794	40.4	2.2154	-8.4505	-.66956

FIGURE 5 CONTINUED
WBXR MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WBXR TOWER 2 (OTHER OPEN)

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.218	12
		0	0	93.5		
2	none	90.	170.	0	.206	12
		90.	170.	92.		

Number of wires = 2
current nodes = 24

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	7.66667	1	7.79167
radius	2	.206	1	.218

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0212963	.0216435

Sources

source	node	sector	magnitude	phase	type
1	13	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-3,611.6	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 13, sector 1							
1.14	42.697	30.546	52.498	35.6	1.949	-9.8484	-.47475

FIGURE 6
WBXR MOMENT MODEL ARRAY SYNTHESIS
(DIRECTIONAL – DAY)

WBXR DA

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.14 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	.75	-150.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	960.935	64.	19.337	2.4
13	1,095.41	279.4	14.0869	212.9

Sum of square of source currents = 1,144.72
Total power = 15,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00922244	-.00904717
Y(1, 2)	.00413399	.00636333
Y(2, 1)	.00413385	.00636345
Y(2, 2)	.011311	-.00935472

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	45.6988	38.7289
Z(1, 2)	22.5986	-21.1739
Z(2, 1)	22.598	-21.1743
Z(2, 2)	42.9645	30.5589

FIGURE 7
WBXR MOMENT MODEL SUMMARY FOR DIRECTIONAL DAY MODE

WBXR DA

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.218	12
		0	0	93.5		
2	none	90.	170.	0	.206	12
		90.	170.	92.		

Number of wires = 2
current nodes = 24

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	7.66667	1	7.79167
radius	2	.206	1	.218

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0212963	.0216435

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,358.97	64.	voltage
2	13	1	1,549.15	279.4	voltage

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.14	23.69	43.684	49.694	61.5	3.9418	-4.5054	-1.9002
source = 2; node 13, sector 1							
1.14	30.951	71.336	77.761	66.5	5.3354	-3.2949	-2.7432

CURRENT rms
Frequency = 1.14 MHz
Input power = 15,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	19.337	2.4	19.3195	.822153
2	0	0	7.79167	19.792	1.5	19.7854	.511665
3	0	0	15.5833	19.7071	.9	19.7047	.303692
4	0	0	23.375	19.2163	.4	19.2158	.134617
5	0	0	31.1667	18.3467	360.	18.3467	-2.72E-03
6	0	0	38.9583	17.12	359.6	17.1196	-.110272
7	0	0	46.75	15.5584	359.3	15.5573	-.188339
8	0	0	54.5417	13.6866	359.	13.6846	-.236727
9	0	0	62.3333	11.5304	358.7	11.5276	-.255112
10	0	0	70.125	9.1141	358.5	9.11086	-.243135
11	0	0	77.9167	6.45285	358.2	6.44975	-.200188
12	0	0	85.7083	3.53057	358.	3.52838	-.124464
END	0	0	93.5	0	0	0	0
GND	-88.6327	-15.6283	0	14.0869	212.9	-11.8296	-7.64863
14	-88.6327	-15.6283	7.66667	14.6787	211.7	-12.489	-7.71291
15	-88.6327	-15.6283	15.3333	14.7801	211.	-12.6716	-7.60804
16	-88.6327	-15.6283	23.	14.5413	210.4	-12.5393	-7.36296
17	-88.6327	-15.6283	30.6667	13.9881	210.	-12.119	-6.98549
18	-88.6327	-15.6283	38.3333	13.1387	209.6	-11.4279	-6.483
19	-88.6327	-15.6283	46.	12.0104	209.2	-10.4818	-5.86362
20	-88.6327	-15.6283	53.6667	10.6219	208.9	-9.29746	-5.13637
21	-88.6327	-15.6283	61.3333	8.99256	208.6	-7.89202	-4.3107
22	-88.6327	-15.6283	69.	7.14057	208.4	-6.28163	-3.39541
23	-88.6327	-15.6283	76.6667	5.07698	208.2	-4.47606	-2.39595
24	-88.6327	-15.6283	84.3333	2.78795	207.9	-2.46303	-1.30619
END	-88.6327	-15.6283	92.	0	0	0	0

FIGURE 8
DERIVED DIRECTIONAL PARAMETERS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WBXR, 1140 KHZ, DA-D
HAZEL GREEN, ALABAMA
OCTOBER, 2020

DAY:

	Theoretical		Base Network Input Current		Normalized TCT	
Tower	**Field**	**Phase**	**Amplitude**	**Phase**	**Amplitude**	**Phase**
1 (N)	1.000	0.0°	19.09	2.85°	1.000	0.0°
2 (S)	.750	-150.0°	13.93	-146.89°	.730	-149.7°

FIGURE 9
WBXR TOWER BASE CIRCUIT ANALYSIS DESCRIPTION

APPLICATION FOR LICENSE INFORMATION
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WBXR, 1140 KHZ, DA-D
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CIRCUIT ANALYSIS

Circuit Analysis was performed on each Tower of the WBXR model. "Phasetek" nodal Circuit Analysis program was used to compute base model Input/Output voltages and currents. For the Directional mode, the calculated Mininec Tower Base Drive Voltage was used to determine the Base Network Input Current. This point is the location of the Sampling TCT. "Z_1" represents the ATU Shunt impedance, "Z_2" represents the Tower Feed impedance, and "Z_3" represents the Tower Base Shunt impedance.

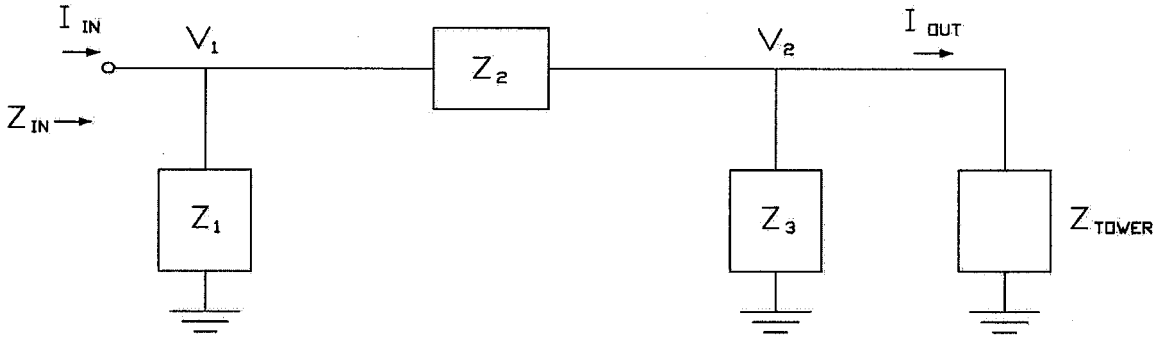

FIGURE 10
WBXR CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

CUSTOMER : WBXR
NETWORK ID : TOWER 1 (OTHER OPEN)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-30000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 19.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -4106.20 OHMS
TOWER IMPEDANCE (R,X) : 45.56, 38.72 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-30000.00
2		GROUND	46.43	38.57
1		2	0.00	19.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	81.61	-11.40

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	46.60	57.61	74.10	51.03
INPUT CURRENT (AMPS) :	0.85	-1.05	1.35	-51.03
OUTPUT CURRENT (AMPS) :	0.84	-1.07	1.36	-51.76

INPUT/OUTPUT CURRENT RATIO = 0.9887
INPUT/OUTPUT PHASE = 0.73 DEGREES

FIGURE 10
WBXR CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

CUSTOMER : WBXR
NETWORK ID : TOWER 1 (OTHER OPEN)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-30000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 19.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -4106.20 OHMS
TOWER IMPEDANCE (R,X) : 45.56, 38.72 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-30000.00
2		GROUND	46.43	38.57
1		2	0.00	19.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	81.61	-11.40

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	46.60	57.61	74.10	51.03
INPUT CURRENT (AMPS) :	0.85	-1.05	1.35	-51.03
OUTPUT CURRENT (AMPS) :	0.84	-1.07	1.36	-51.76

INPUT/OUTPUT CURRENT RATIO = 0.9887
INPUT/OUTPUT PHASE = 0.73 DEGREES

FIGURE 10 CONTINUED
WBXR CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

CUSTOMER : WBXR
NETWORK ID : TOWER 2 (OTHER OPEN)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-30000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 34.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9307.30 OHMS
TOWER IMPEDANCE (R,X) : 42.70, 30.55 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-30000.00
2	GROUND	42.98	30.45
1	2	0.00	34.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	68.00	-20.98

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	43.17	64.53	77.64	56.22
INPUT CURRENT (AMPS) :	0.72	-1.07	1.29	-56.22
OUTPUT CURRENT (AMPS) :	0.71	-1.08	1.30	-56.57

INPUT/OUTPUT CURRENT RATIO = 0.9946
INPUT/OUTPUT PHASE = 0.35 DEGREES

FIGURE 11
WBXR CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

CUSTOMER : WBXR
NETWORK ID : TOWER 1 DA

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-30000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 19.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -4106.20 OHMS
TOWER IMPEDANCE (R,X) : 23.69, 43.68 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-30000.00
2	GROUND	24.20	44.01
1	2	0.00	19.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	1291.42	71.80
2	960.94	64.00

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	24.30	63.12	67.64	68.94
INPUT CURRENT (AMPS) :	19.07	0.95	19.09	2.85
OUTPUT CURRENT (AMPS) :	19.32	0.83	19.34	2.47

INPUT/OUTPUT CURRENT RATIO = 0.9873
INPUT/OUTPUT PHASE = 0.38 DEGREES

FIGURE 11 CONTINUED
WBXR CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

CUSTOMER : WBXR
NETWORK ID : TOWER 2 DA

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-30000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 34.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9307.30 OHMS
TOWER IMPEDANCE (R,X) : 30.95, 71.34 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-30000.00
2	GROUND	31.43	71.79
1	2	0.00	34.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	1542.60	-73.50
2	1095.41	279.40

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	31.65	106.13	110.75	73.39
INPUT CURRENT (AMPS) :	-11.67	-7.61	13.93	-146.89
OUTPUT CURRENT (AMPS) :	-11.83	-7.64	14.09	-147.15

INPUT/OUTPUT CURRENT RATIO = 0.9888
INPUT/OUTPUT PHASE = 0.25 DEGREES

FIGURE 12
WBXR REFERENCE FIELD INTENSITY MEASUREMENTS
OCTOBER, 2020

WBXR DAY REFERENCE POINT MEASUREMENTS – OCTOBER 5, 2020

						CO-ORD NAD27			
Radial		**Dist km**	**mV/m**	**Time**		**Deg**	**Min**	**Sec**	**Description**
60.5°	1	1.26	161	1327	N	34	57	30.7	Mitchell Moore Rd., East side
					W	86	37	58.4	
	2	1.98	75.0	1331	N	34	57	42.7	Opposite #1621 Bobo Section Rd.
					W	86	37	34.0	
	3	2.48	56.0	1334	N	34	57	50.5	Larkin Sullivan Rd., South of sign
					W	86	37	16.8	
170°	1	2.31	600	1306	N	34	55	57.5	Ready Section Rd., opposite fire hydrant
					W	86	38	26.8	
	2	4.01	240	1311	N	34	55	03.6	Opp Reynolds Rd.
					W	86	38	13.4	
	3	4.68	230	1317	N	34	54	41.9	#470 Banyon Rd.
					W	86	38	08.9	
279.5°	1	3.02	44.0	1244	N	34	57	27.7	Opposite #1263 Scott Rd.
					W	86	40	39.4	
	2	4.63	20.0	1250	N	34	57	34.1	Carter Grove Rd.
					W	86	41	42.7	
	3	5.48	15.5	1255	N	34	57	42.6	Church parking lot
					W	86	42	14.6	Monroe Nunley Rd.

FIGURE 12
WBXR REFERENCE FIELD INTENSITY MEASUREMENTS
CONTINUED
OCTOBER, 2020

WBXR DAY REFERENCE POINT MEASUREMENTS – OCTOBER 5, 2020

					CO-ORD NAD27				
Radial		**Dist km**	**mV/m**	**Time**		**Deg**	**Min**	**Sec**	**Description**
350°	1	1.01	850	1145	N	34	57	43.2	Bobo Section Rd., South side
					W	86	38	49.1	
	2	2.77	152	1230	N	34	58	39.3	#559 Will Holt Rd.
					W	86	39	01.6	
	3	3.94	110	1235	N	34	59	16.5	Cothran Rd.
					W	86	39	08.7	