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. BMML-20180117ABT

SECTION I - APPLICANT FEE INFORMATION

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

Genesis Communications I, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters)
4300 West Cypress Street, Suite 1040

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Tampa	Florida	33607

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
8132811040	WHOO	54573

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
MMR	0001	$ 700.00	

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
MOR	0001	$ 805.00	

	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.	$ 1,505.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Genesis Communications I. Inc.		
MAILING ADDRESS 4300 West Cypress Street, Suite 1040		
CITY Tampa	STATE Florida	ZIP CODE 33607

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
WHOO	Winter Park	BP-20140721AAY	BMP-20170914ABA	03/27/2020

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.

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.

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.

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	
Bruce C. Maduri		
Title	Date	Telephone Number
President and CEO	July 13, 2018	8132811040

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
GENESIS COMMUNICATIONS I, 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	Day
WHOO	BMP-20170914ABA	1080	Unlimited	0.055	6.0

2. Station location

State	City or Town
Florida	Winter Park

3. Transmitter location

State	County	City or Town	Street address (or other identification)
FL	Orange	Pine Castle	6526 Dumont Street

4. Main studio location

State	County	City or Town	Street address (or other identification)
FL	Pinellas	Largo	800 8th Ave. SE

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

State	County	City or Town	Street address (or other identification)
FL	Pinellas	Largo	800 8th Ave. SE

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	RF common point or antenna current (in amperes) without modulation for day system
1.09	11.2

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50.0	50.0	-5.1	-5.1

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1(SW)	0.0	0.0	1.000	1.000		
2(NE)	-158.1	-170.6	.637	.389		

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

CLEAR ALL PAGES

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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	55.18	56.3	56.3	Exhibit No. ENG.

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
28 ° 28 ' 00 "	81 ° 22 ' 29 "

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?

Correction of ground system description

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)	Date
Phasetek Inc. 550 California Rd., Unit 11 Quakertown, PA 18951	June 30, 2018
	Telephone No. (Include Area Code) 215-536-6648

☐ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☑ Technical Consultant

☐ Other (specify)

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ENGINEERING STATEMENT CONCERNING

APPLICATION FOR LICENSE INFORMATION

EMPLOYING MOMENT METHOD MODELING

WHOO, 1080 KHZ, DA-2

WINTER PARK, FLORIDA

JUNE, 2018

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING APPLICATION FOR LICENSE INFORMATION EMPLOYING MOMENT METHOD MODELING WHOO, 1080 KHZ, DA-2 WINTER PARK, FLORIDA JUNE, 2018

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PHASETEK INC.

ENGINEERING STATEMENT CONCERNING APPLICATION FOR LICENSE INFORMATION EMPLOYING MOMENT METHOD MODELING WHOO, 1080 KHZ, DA-2 WINTER PARK, FLORIDA JUNE, 2018

SUMMARY

Adjustment of the Antenna System and a Proof of Performance employing Moment Method Modeling were performed on Radio Station WHOO, 1080 KHz, Winter Park, Florida, after installation of Antenna Phasing equipment, Transmission and Sampling Lines, and diplexing filtering. WHOO holds Construction Permit Number: BMP-20170914ABA to change Transmitter site and patterns. This report was prepared on behalf of Genesis Communications I, Inc., licensee of Radio Station WHOO.

SITE CONSTRUCTION

The WHOO Transmitter site is that as currently licensed for Radio Station WAMT, 1190 KHz. New Transmission Lines, Sampling Lines, and Antenna Phasing and Branching equipment have been installed. Both Towers remain unchanged. A License Application employing Moment Method Modeling as set forth in Section 73.151(C) has been done to cover the Radio Station WHOO Construction Permit and license under the new rules.

REFERENCE POINTS

Reference Points were measured at pattern minima and maxima for the Directional modes of operation. These Points and their measured field intensity are shown in Figure 15.

TOWER TOP LOADING

Top loading for both towers is modeled at 100% the physical length. The difference in diameter between the guy wire top loading and the tower yields a "warning" message for the model. A convergence test was performed on the tower 1 model to verify. This is shown in Figure 17. The other tower model is similar.

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
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EMPLOYING MOMENT METHOD MODELING
WHOO, 1080 KHZ, DA-2
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SPURIOUS EMISSIONS

Due to the common usage of the Transmitter site by both Radio Stations WHOO, 1080 KHz and WAMT, 1190 KHz, filtering has been installed and adjusted at both Towers to prevent interaction and spurious radiation products. Figure 18 shows measurement of any spurious radiation products. All filter circuits are located on the matching network side of the Sampling TCT's for both stations. The "reject" 1080 kHz Filters (located in the WAMT equipment) measure greater than 30,000 ohms, and are not included in the circuit model.

METHOD OF MOMENTS DETAIL

All Moment Method Modeling was done with Expert MININEC Broadcast Professional, Version 23. Four wires were used to represent each Tower and it's top-loading. Towers were driven individually to verify the Model compared to measured impedance data. Once the Model was verified, both the Day and Night Directional Antenna Systems were computed. For Directional modes, 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 Delta Electronics OIB-3 Operating Impedance Bridge and Array Solutions PowerAim 120 Network Analyzer. 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 4100, Serial Number 249, calibrated on January 21, 2016. The meter was calibrated by Potomac Instruments, Frederick, Maryland. All measurements were taken by Phasetek Inc. personnel supervised by Kurt Gorman of Phasetek Inc.

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
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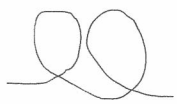
SPECIAL OPERATING CONDITIONS #6 AND #7

After installation and adjustment of the diplexing filtering circuitry, the WAMT (1190 kHz) Night directional antenna system was checked when operating with the current licensed parameters. Both monitoring points are within licensed limits and therefore there is no change to the current licensed operation. The WAMT non-directional Day operation has not been changed. However, the measurement location to determine operating power has been moved from the tower output to the transmitter output for the ND-Day operation. A new 302-AM "Direct Measurement of Power" has been done to revise the ND-Day operating impedance and current at this new location. With regard to condition #7, no interference from the second harmonic of WFLF, 540 kHz, was observed.

CONCLUSION

It is believed that the WHOO Antenna System has been constructed and adjusted in accordance with all applicable Commission rules and regulations. The foregoing was prepared on behalf of Genesis Communications I, 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.



Kurt Gorman, President
Phasetek Inc.
Quakertown, Pennsylvania

FIGURE 1

ANTENNA SYSTEM AS ADJUSTED

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ANTENNA SYSTEM DESCRIPTION

1. The Antenna System consists of two (2), uniform, guyed, vertical steel transmitting Towers. Both Towers stand 55.18M (71.5°) above their Base Insulators. The Towers are arranged with Tower 1 as a reference; Tower 2 is spaced 70.73° on a bearing of 32.0°T. Both towers employ guy wire top-loading. This remains as currently licensed for Radio Station WAMT, with no changes. Tower 2 supports a STL antenna and line that is terminated on the tower above the base insulator.

2. The Ground System for each Tower consists of (120) buried copper Radials, 63M 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. In addition, a 7.3M by 7.3M copper ground screen is installed at the base of each tower.

3. The Sampling System consists of two (2), Delta Electronics Inc. TCT-3, 1.0 V/A Toroidal Current Transformers. Both 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 RFS, LCF12-50J, 1/2" phase stabilized foam coaxial cable.

4. Tower registration numbers:
   Tower 1: 1257632
   Tower 2: 1257633

FIGURE 1
ANTENNA SYSTEM AS ADJUSTED

APPLICATION FOR LICENSE INFORMATION
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WHOO, 1080 KHZ, DA-2
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ANTENNA SYSTEM DESCRIPTION – Continued

DIRECTIONAL OPERATION (DAY)

COMMON POINT

Impedance = 50.0 – j 5.1 Ohms
Current = 11.2 Amperes
Power = 6,300 Watts

DIRECTIONAL OPERATION (NIGHT)

COMMON POINT

Impedance = 50.0 – j 5.1 Ohms
Current = 1.09 Amperes
Power = 59 Watts

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

FIGURE 2
WHOO SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

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SAMPLING SYSTEM DESCRIPTION

The Sampling System consists of Delta Electronics Inc. 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 RFS LCF12-50J. The Antenna Monitor is a Potomac Instruments Model AM-19(204), Serial Number 1637.

SAMPLE LINE MEASUREMENTS

Impedance measurements were made of the Antenna Sampling Lines using an Array Solutions PowerAim 120 Vector Network Analyzer (VNA). 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 closest to the carrier frequency was found to be 90 electrical degrees. All resonant frequencies are above the carrier frequency. The electrical length at carrier frequency appearing in the table below was calculated by ratioing the frequencies.

	1st Resonant Frequency (KHz) above 1080 KHz	2nd Resonant Frequency (KHz) above 1080 KHz	Calculated Electrical Length (deg) at 1080 KHz	Measured Impedance (ohms) Connected to TCT @ 1080 KHz
Tower 1	1245.84	3746.06	78.0	51.3 –j 2.1
Tower 2	1245.89	3745.58	78.0	51.3 –j 1.7

FIGURE 2
WHOO SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

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EMPLOYING MOMENT METHOD MODELING
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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	1868.8	1.75 +j 50.16	622.9	0.59 –j 50.39	50.29
2	1868.8	1.81 +j 50.76	622.9	0.44 –j 50.27	50.53

SAMPLING TCT MEASUREMENTS

Measurements of the Delta Electronics Inc. Model TCT-3, 1.0 V/A Toroidal Current Transformers were performed by a Hewlett Packard 8752A, Network Analyzer. Measurements are normalized to Tower #1 (reference) and are within the manufacturer's rating of ± 2.0% and ± 2.0°.

FIGURE 2
WHOO SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

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SAMPLING TCT MEASUREMENTS CONT'D

TOWER	TCT SERIAL #	MAGNITUDE	PHASE
1	235	1.000	0.0^{o}
2	1729	1.003	0.1^{o}

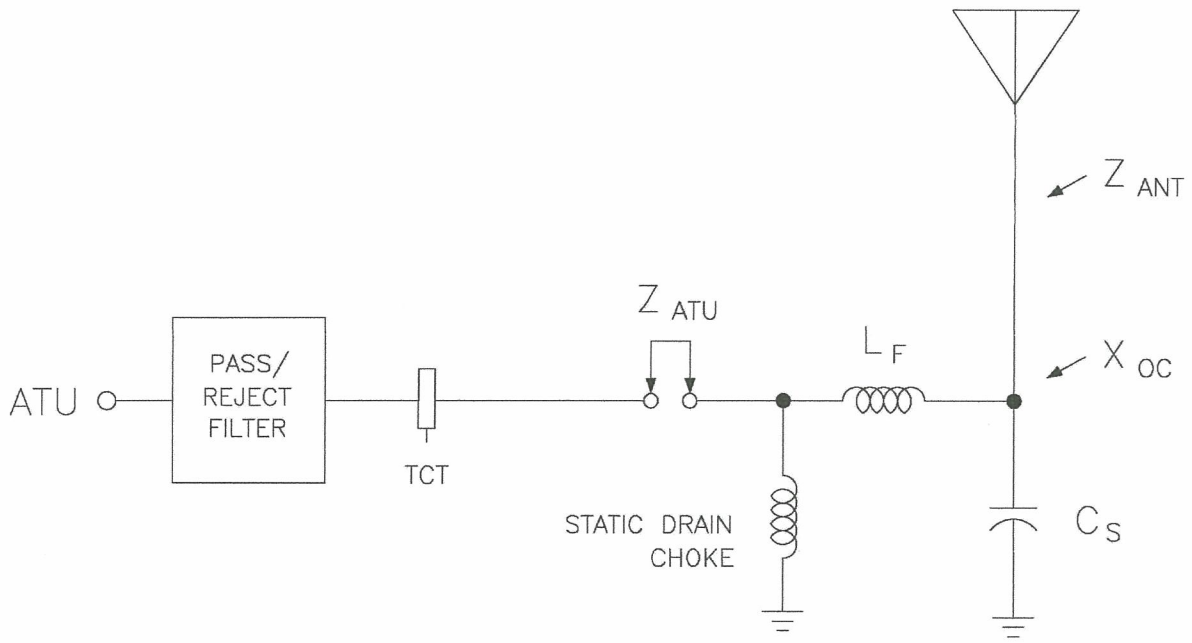
ANTENNA MONITOR MEASUREMENT

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 the 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	0.0^{0}

The above is within the manufacturer's rating of $\pm$ 1.0% and $\pm$ 1.0^{o}.

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



TOWER	Specified	Measured	Measured	Modeled	Modeled	Measured
	Cs (pf)	L_F (µH)	X_F (Ω)	Z_{ANT} (Ω)	Z_{ATU} (Ω)	Z_{ATU} (Ω)
1	15	4.86	+j33.0	31.9 +j 8.1	32.0 +j 41.0	31.6 +j 41.3
2	15	3.98	+j27.0	32.6 +j 10.5	32.7 +j 37.5	32.4 +j 37.2

Tower	Calculated X_{OC} (Ω)
1	-j 8,857.2
2	-j 8,857.3

FIGURE 4
WHOO MOMENT MODEL PARAMETERS

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Tower #	Wire #	# of Segments	Base Node
1	1-4	21	1
2	5-8	21	22

Tower #	Physical Height Degrees	Modeled Height Degrees	Modeled Radius Meters	% of Equivalent Radius
1	71.5 + TL	73.5 + TL	.3638	100.0
2	71.5 + TL	74.0 + TL	.3638	100.0

Both Towers are uniform cross section, guyed with Base Insulator. Both towers are three (3) sided, with a 30" face width. Guy wire top loading is incorporated on both towers. The physical length of "hot" guy wire for each tower is 55 ft. Top loading is modeled at 100% the physical length.

Both Base Insulators are manufactured by Austin Insulators, model #A-4197L with an assumed capacity of 15pf (-j9,824.4 ohms @ 1080 kHz).

Both Towers have Phasetek Inc. Model #P600-161-2 Static Drain Choke. These measure -j 90k ohms @ 1080 KHz.

FIGURE 5
WHOO MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WHOO 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	.3638	12
		0	0	73.5		
2	none	0	0	73.5	.01	3
		10.1	60.	54.2		
3	none	0	0	73.5	.01	3
		10.1	180.	54.2		
4	none	0	0	73.5	.01	3
		10.1	300.	54.2		
5	none	70.73	32.	0	.3638	12
		70.73	32.	74.		
6	none	70.73	32.	74.	.01	3
		79.79	35.41	54.7		
7	none	70.73	32.	74.	.01	3
		62.39	36.92	54.7		
8	none	70.73	32.	74.	.01	3
		71.1	23.84	54.7		

Number of wires = 8
current nodes = 42

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	6.125	7	7.2615
radius	2	.01	1	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.08	0	1	.0170139	.0201708

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	22	0	-8,857.3	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							
1.08	31.915	8.0696	32.919	14.2	1.6337	-12.374	-.25898

FIGURE 5 CONTINUED
WHOO MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WHOO 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	.3638	12
		0	0	73.5		
2	none	0	0	73.5	.01	3
		10.1	60.	54.2		
3	none	0	0	73.5	.01	3
		10.1	180.	54.2		
4	none	0	0	73.5	.01	3
		10.1	300.	54.2		
5	none	70.73	32.	0	.3638	12
		70.73	32.	74.		
6	none	70.73	32.	74.	.01	3
		79.79	35.41	54.7		
7	none	70.73	32.	74.	.01	3
		62.39	36.92	54.7		
8	none	70.73	32.	74.	.01	3
		71.1	23.84	54.7		

Number of wires = 8
current nodes = 42

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	6.125	7	7.2615
radius	2	.01	1	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.08	0	1	.0170139	.0201708

Sources

source	node	sector	magnitude	phase	type
1	22	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-8,857.2	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 22, sector 1							
1.08	32.622	10.543	34.283	17.9	1.6456	-12.251	-.26666

FIGURE 6
WHOO MOMENT MODEL ARRAY SYNTHESIS (DIRECTIONAL DAY)

WHOO DAY

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.08 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	.42	-166.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	440.464	29.1	17.4735	2.4
22	371.14	302.4	6.81956	192.1

Sum of square of source currents = 703.661
Total power = 6,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0188741	-.0185216
Y(1, 2)	.000288574	.0196852
Y(2, 1)	.000288628	.0196851
Y(2, 2)	.0169358	-.0189207

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	31.9766	8.10972
Z(1, 2)	22.4894	-12.1806
Z(2, 1)	22.4895	-12.1805
Z(2, 2)	32.6837	10.5815

FIGURE 7
WHOO MOMENT MODEL SUMMARY FOR DIRECTIONAL DAY MODE

WHOO DAY

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.3638	12
		0	0	73.5		
2	none	0	0	73.5	.01	3
		10.1	60.	54.2		
3	none	0	0	73.5	.01	3
		10.1	180.	54.2		
4	none	0	0	73.5	.01	3
		10.1	300.	54.2		
5	none	70.73	32.	0	.3638	12
		70.73	32.	74.		
6	none	70.73	32.	74.	.01	3
		79.79	35.41	54.7		
7	none	70.73	32.	74.	.01	3
		62.39	36.92	54.7		
8	none	70.73	32.	74.	.01	3
		71.1	23.84	54.7		

Number of wires = 8
current nodes = 42

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	6.125	7	7.2615
radius	2	.01	1	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.08	0	1	.0170139	.0201708

Sources

source	node	sector	magnitude	phase	type
1	1	1	622.911	29.1	voltage
2	22	1	524.871	302.4	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							
1.08	22.524	11.317	25.208	26.7	2.3604	-7.8545	-.77736
source = 2; node 22, sector 1							
1.08	-18.861	51.05	54.423	110.3	****	****	****

CURRENT rms
Frequency = 1.08 MHz
Input power = 6,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	17.4735	2.4	17.4583	.729225
2	0	0	6.125	17.5309	1.4	17.5254	.438669
3	0	0	12.25	17.3431	.9	17.3411	.26331
4	0	0	18.375	16.9543	.4	16.9538	.122341
5	0	0	24.5	16.3743	0.0	16.3743	7.84E-03
6	0	0	30.625	15.6142	359.7	15.614	-.083404
7	0	0	36.75	14.6888	359.4	14.688	-.152758
8	0	0	42.875	13.6208	359.2	13.6193	-.200958
9	0	0	49.	12.4521	358.9	12.45	-.228639
10	0	0	55.125	11.2633	358.8	11.2608	-.236819
11	0	0	61.25	10.1356	358.7	10.1331	-.227196
12	0	0	67.375	9.0482	358.7	9.04595	-.201591
J1	0	0	73.5	7.965	358.8	7.96338	-.161073
2J1	0	0	73.5	2.67614	358.9	2.67562	-.0528419
14	1.68333	-2.91562	67.0667	2.01841	359.1	2.01819	-.0300175
15	3.36667	-5.83124	60.6333	1.11713	359.5	1.11708	-.0102422
END	5.05	-8.74686	54.2	0	0	0	0
2J1	0	0	73.5	2.63596	358.8	2.6354	-.0542233
17	-3.36667	0	67.0667	1.98295	359.1	1.98271	-.0311887
18	-6.73333	0	60.6333	1.09431	359.4	1.09426	-.0108897
END	-10.1	0	54.2	0	0	0	0
2J1	0	0	73.5	2.6529	358.8	2.65235	-.0540081
20	1.68333	2.91562	67.0667	1.99774	359.1	1.9975	-.0310586
21	3.36667	5.83124	60.6333	1.10361	359.4	1.10355	-.0109009
END	5.05	8.74686	54.2	0	0	0	0
GND	59.9824	-37.4812	0	6.81957	192.1	-6.66837	-1.42804
23	59.9824	-37.4812	6.16667	7.04321	192.9	-6.86626	-1.56887
24	59.9824	-37.4812	12.3333	7.08186	193.3	-6.89151	-1.63091
25	59.9824	-37.4812	18.5	7.01017	193.7	-6.81169	-1.65629
26	59.9824	-37.4812	24.6667	6.83828	194.	-6.63629	-1.6498
27	59.9824	-37.4812	30.8333	6.57364	194.2	-6.37239	-1.61415
28	59.9824	-37.4812	37.	6.22416	194.4	-6.02767	-1.55156
29	59.9824	-37.4812	43.1667	5.80079	194.6	-5.61281	-1.46477
30	59.9824	-37.4812	49.3333	5.32238	194.8	-5.14611	-1.35839
31	59.9824	-37.4812	55.5	4.8244	194.9	-4.66203	-1.24111
32	59.9824	-37.4812	61.6667	4.34401	195.	-4.19655	-1.12226
33	59.9824	-37.4812	67.8333	3.87499	195.	-3.74353	-1.00076
J5	59.9824	-37.4812	74.	3.40274	194.9	-3.28876	-.873298
2J1	59.9824	-37.4812	74.	1.09236	196.	-1.0501	-.300907
35	61.6653	-40.3982	67.5667	.814191	196.	-.78281	-.223865
36	63.3481	-43.3152	61.1333	.444365	195.9	-.427315	-.121908
END	65.031	-46.2322	54.7	0	0	0	0
2J1	59.9824	-37.4812	74.	1.17816	193.8	-1.14399	-.281698
38	56.6147	-37.48	67.5667	.889983	193.4	-.865612	-.206847
39	53.247	-37.4788	61.1333	.493111	193.	-.48051	-.110763
END	49.8793	-37.4776	54.7	0	0	0	0
2J1	59.9824	-37.4812	74.	1.13262	194.9	-1.09468	-.290692
41	61.6662	-34.5666	67.5667	.849391	194.7	-.821772	-.21484
42	63.3499	-31.652	61.1333	.466512	194.4	-.451856	-.116014
END	65.0336	-28.7375	54.7	0	0	0	0

FIGURE 8
WHOO MOMENT MODEL ARRAY SYNTHESIS
(DIRECTIONAL – NIGHT)

WHOO NIGHT

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.08 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	.68	-157.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	31.9427	34.	1.71646	1.7
22	46.128	283.8	1.09769	203.7

Sum of square of source currents = 8.30232
Total power = 55. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0188741	-.0185216
Y(1, 2)	.000288574	.0196852
Y(2, 1)	.000288628	.0196851
Y(2, 2)	.0169358	-.0189207

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	31.9766	8.10972
Z(1, 2)	22.4894	-12.1806
Z(2, 1)	22.4895	-12.1805
Z(2, 2)	32.6837	10.5815

FIGURE 9
WHOO MOMENT MODEL SUMMARY FOR DIRECTIONAL NIGHT MODE

WHOO NIGHT

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.3638	12
		0	0	73.5		
2	none	0	0	73.5	.01	3
		10.1	60.	54.2		
3	none	0	0	73.5	.01	3
		10.1	180.	54.2		
4	none	0	0	73.5	.01	3
		10.1	300.	54.2		
5	none	70.73	32.	0	.3638	12
		70.73	32.	74.		
6	none	70.73	32.	74.	.01	3
		79.79	35.41	54.7		
7	none	70.73	32.	74.	.01	3
		62.39	36.92	54.7		
8	none	70.73	32.	74.	.01	3
		71.1	23.84	54.7		

Number of wires = 8
current nodes = 42

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	6.125	7	7.2615
radius	2	.01	1	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.08	0	1	.0170139	.0201708

Sources

source	node	sector	magnitude	phase	type
1	1	1	45.1738	34.	voltage
2	22	1	65.2349	283.8	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							
1.08	15.725	9.9527	18.61	32.3	3.3189	-5.4018	-1.4769
source = 2; node 22, sector 1							
1.08	7.1968	41.402	42.023	80.1	11.77	-1.4795	-5.3955

CURRENT rms
Frequency = 1.08 MHz
Input power = 55. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	1.71646	1.7	1.71571	.0508591
2	0	0	6.125	1.72022	1.	1.71994	.0308512
3	0	0	12.25	1.70052	.6	1.70042	.0187103
4	0	0	18.375	1.66128	.3	1.66126	8.89E-03
5	0	0	24.5	1.60345	0.0	1.60345	8.41E-04
6	0	0	30.625	1.52812	359.8	1.52811	-5.63E-03
7	0	0	36.75	1.43674	359.6	1.4367	-.0106058
8	0	0	42.875	1.33159	359.4	1.33151	-.0141165
9	0	0	49.	1.21677	359.2	1.21666	-.0161832
10	0	0	55.125	1.1002	359.1	1.10007	-.0168509
11	0	0	61.25	.989842	359.1	.98971	-.0162149
12	0	0	67.375	.883662	359.1	.883544	-.0143874
J1	0	0	73.5	.778125	359.2	.778041	-.0114276
2J1	0	0	73.5	.262653	359.3	.262634	-3.14E-03
14	1.68333	-2.91562	67.0667	.198405	359.6	.198399	-1.54E-03
15	3.36667	-5.83124	60.6333	.110002	359.8	.110001	-3.32E-04
END	5.05	-8.74686	54.2	0	0	0	0
2J1	0	0	73.5	.256418	359.	.256381	-4.38E-03
17	-3.36667	0	67.0667	.192899	359.2	.192881	-2.64E-03
18	-6.73333	0	60.6333	.106454	359.5	.106449	-1.02E-03
END	-10.1	0	54.2	0	0	0	0
2J1	0	0	73.5	.259056	359.1	.259026	-3.91E-03
20	1.68333	2.91562	67.0667	.195203	359.3	.19519	-2.24E-03
21	3.36667	5.83124	60.6333	.107907	359.6	.107904	-7.82E-04
END	5.05	8.74686	54.2	0	0	0	0
GND	59.9824	-37.4812	0	1.09769	203.7	-1.00536	-.440661
23	59.9824	-37.4812	6.16667	1.12576	203.4	-1.03341	-.446555
24	59.9824	-37.4812	12.3333	1.12756	203.2	-1.03634	-.444285
25	59.9824	-37.4812	18.5	1.1129	203.1	-1.02383	-.43626
26	59.9824	-37.4812	24.6667	1.08315	203.	-.997191	-.422874
27	59.9824	-37.4812	30.8333	1.03939	202.9	-.957465	-.404467
28	59.9824	-37.4812	37.	.9828	202.8	-.905755	-.38145
29	59.9824	-37.4812	43.1667	.915024	202.8	-.843593	-.354428
30	59.9824	-37.4812	49.3333	.838965	202.8	-.773674	-.324484
31	59.9824	-37.4812	55.5	.760149	202.7	-.701112	-.293716
32	59.9824	-37.4812	61.6667	.684346	202.7	-.631243	-.264313
33	59.9824	-37.4812	67.8333	.610479	202.7	-.563102	-.235799
J5	59.9824	-37.4812	74.	.536158	202.7	-.494505	-.207197
2J1	59.9824	-37.4812	74.	.174949	203.6	-.160319	-.0700352
35	61.6653	-40.3982	67.5667	.130837	203.8	-.119727	-.0527631
36	63.3481	-43.3152	61.1333	.0716961	204.	-.0654949	-.0291676
END	65.031	-46.2322	54.7	0	0	0	0
2J1	59.9824	-37.4812	74.	.182704	201.9	-.16952	-.0681457
38	56.6147	-37.48	67.5667	.137671	201.8	-.127841	-.0510886
39	53.247	-37.4788	61.1333	.0760757	201.7	-.0707076	-.0280703
END	49.8793	-37.4776	54.7	0	0	0	0
2J1	59.9824	-37.4812	74.	.178544	202.7	-.164666	-.0690157
41	61.6662	-34.5666	67.5667	.133975	202.8	-.123529	-.0518642
42	63.3499	-31.652	61.1333	.0736624	202.8	-.0678914	-.0285816
END	65.0336	-28.7375	54.7	0	0	0	0

FIGURE 10
DERIVED DIRECTIONAL PARAMETERS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WHOO, 1080 KHZ, DA-2
WINTER PARK, FLORIDA
JUNE, 2018

DAY:

	Theoretical		Base Network Input Current		Normalized TCT	
Tower	Field	Phase	Amplitude	Phase	Amplitude	Phase
1 (SW)	1.000	0.0°	17.45	+2.57°	1.000	0.0°
2 (NE)	.420	-166.0°	6.78	-168.00°	.389	-170.6°

NIGHT:

	Theoretical		Base Network Input Current		Normalized TCT	
Tower	Field	Phase	Amplitude	Phase	Amplitude	Phase
1 (SW)	1.000	0.0°	1.71	+1.77°	1.000	0.0°
2 (NE)	.680	-157.0°	1.09	-156.29°	.637	-158.1°

FIGURE 11
WHOO TOWER BASE CIRCUIT ANALYSIS DESCRIPTION

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WHOO, 1080 KHZ, DA-2
WINTER PARK, FLORIDA
JUNE, 2018

CIRCUIT ANALYSIS

Circuit Analysis was performed on each Tower of the WHOO model. "Phasetek" nodal Circuit Analysis program was used to compute base model Input/Output voltages and currents. For the Directional modes, 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.

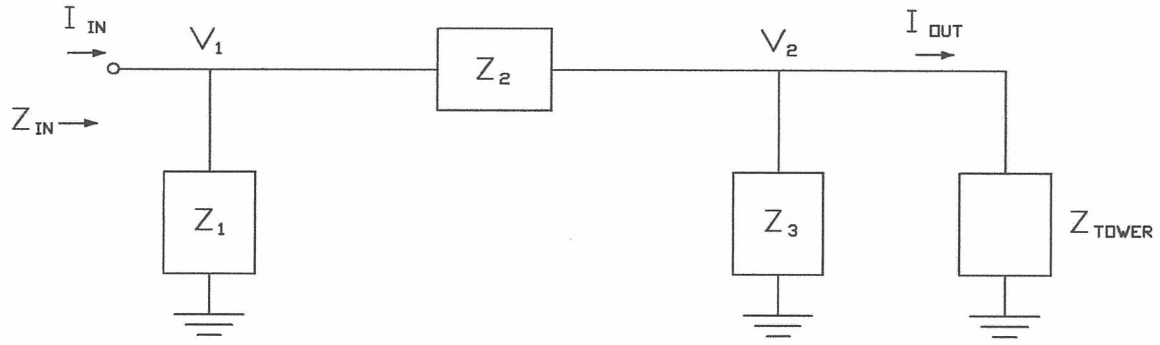

FIGURE 12
WHOO CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

NETWORK ID : TOWER 1 (OTHER OPEN)

FREQUENCY : 1080.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-90000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 33.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9824.40 OHMS
TOWER IMPEDANCE (R,X) : 31.92, 8.07 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-90000.00
2	GROUND	31.97	7.97
1	2	0.00	33.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	63.40	-38.03

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	32.00	40.98	51.99	52.01
INPUT CURRENT (AMPS) :	1.18	-1.52	1.92	-52.01
OUTPUT CURRENT (AMPS) :	1.18	-1.52	1.93	-52.22

INPUT/OUTPUT CURRENT RATIO = 0.9987
INPUT/OUTPUT PHASE = 0.21 DEGREES

FIGURE 12 CONTINUED
WHOO CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

NETWORK ID : TOWER 2 (OTHER OPEN)

FREQUENCY : 1080.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-90000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 27.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9824.40 OHMS
TOWER IMPEDANCE (R,X) : 32.62, 10.54 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-90000.00
2	GROUND	32.69	10.44
1	2	0.00	27.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	69.04	-31.16

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	32.72	37.45	49.73	48.86
INPUT CURRENT (AMPS) :	1.32	-1.51	2.01	-48.86
OUTPUT CURRENT (AMPS) :	1.32	-1.52	2.01	-49.07

INPUT/OUTPUT CURRENT RATIO = 0.9985
INPUT/OUTPUT PHASE = 0.21 DEGREES

FIGURE 13
WHOO CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

NETWORK ID : TOWER 1 DAY

FREQUENCY : 1080.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-90000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 33.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9824.40 OHMS
TOWER IMPEDANCE (R,X) : 22.52, 11.32 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-90000.00
2	GROUND	22.58	11.28
1	2	0.00	33.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	867.47	65.54
2	440.46	29.10

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	22.60	44.29	49.73	62.97
INPUT CURRENT (AMPS) :	17.43	0.78	17.45	2.57
OUTPUT CURRENT (AMPS) :	17.46	0.74	17.47	2.42

INPUT/OUTPUT CURRENT RATIO = 0.9984
INPUT/OUTPUT PHASE = 0.15 DEGREES

FIGURE 14
WHOO CIRCUIT ANALYSIS FOR DIRECTIONAL NIGHT MODE

NETWORK ID : TOWER 1 NIGHT

FREQUENCY : 1080.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-90000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 33.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9824.40 OHMS
TOWER IMPEDANCE (R,X) : 15.73, 9.95 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-90000.00
2	GROUND	15.76	9.94
1	2	0.00	33.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	78.43	71.61
2	31.94	34.00

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	15.77	42.96	45.76	69.84
INPUT CURRENT (AMPS) :	1.71	0.05	1.71	1.77
OUTPUT CURRENT (AMPS) :	1.72	0.05	1.72	1.67

INPUT/OUTPUT CURRENT RATIO = 0.9985
INPUT/OUTPUT PHASE = 0.10 DEGREES

FIGURE 14 CONTINUED
WHOO CIRCUIT ANALYSIS FOR DIRECTIONAL NIGHT MODE

NETWORK ID : TOWER 2 NIGHT

FREQUENCY : 1080.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-90000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 27.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9824.40 OHMS
TOWER IMPEDANCE (R,X) : 7.20, 41.40 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-90000.00
2		GROUND	7.26	41.57
1		2	0.00	27.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	75.37	-72.34
2	46.13	283.80

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	7.27	68.62	69.01	83.95
INPUT CURRENT (AMPS) :	-1.00	-0.44	1.09	-156.29
OUTPUT CURRENT (AMPS) :	-1.01	-0.44	1.10	-156.34

INPUT/OUTPUT CURRENT RATIO = 0.9950
INPUT/OUTPUT PHASE = 0.05 DEGREES

FIGURE 15
WHOO REFERENCE FIELD INTENSITY MEASUREMENTS
JUNE, 2018

WHOO DAY REFERENCE POINT MEASUREMENTS – JUNE 20, 2018

					CO-ORD NAD27				
Radial		**Dist km**	**mV/m**	**Time**		**Deg**	**Min**	**Sec**	**Description**
32°	1	0.97	990	1728	N W	28 81	28 22	26.5 10.2	Gate East of Wilks Ave./Orange Ave.
	2	3.66	135	1703	N W	28 81	29 21	40.5 17.5	#2004 Gatlin Ave.
	3	4.33	122	1713	N W	28 81	29 21	58.8 04.7	Timberlake Dr. East of Bumby @ 25MPH sign
133.5°	1	1.42	195	1618	N W	28 81	27 21	28.7 50.6	Opposite #1112 Perkins Rd.
	2	2.02	160	1626	N W	28 81	27 21	14.9 34.9	NW corner of intersection of Gondola Dr./ Sawyerwood Ave.
	3	2.63	125	1634	N W	28 81	27 21	01.6 18.5	Lindos Dr. at exit for McCoy Federal Union
212°	1	0.97	740	1606	N W	28 81	27 22	33.5 47.8	#499 Lear St.
	2	2.06	300	1551	N W	28 81	27 23	03.3 09.0	Parking lot for ALDI
	3	2.47	212	1556	N W	28 81	26 23	51.8 16.7	Drive behind building at door #170

FIGURE 15

WHOO REFERENCE FIELD INTENSITY MEASUREMENTS

CONTINUED

WHOO DAY REFERENCE POINT MEASUREMENTS – JUNE 20, 2018

					CO-ORD NAD27			
Radial	**Dist km**	**mV/m**	**Time**		**Deg**	**Min**	**Sec**	**Description**
290.5°	1	1.02	420	1510	N	28	28 11.1	Opposite #6021 Winegard Rd.
					W	81	23 04.3	
	2	1.61	250	1517	N	28	28 17.8	#5919 Luzon Dr.
					W	81	23 24.5	
	3	2.07	160	1522	N	28	28 22.9	#587 Tomoka Dr.
					W	81	23 40.3	

FIGURE 15

WHOO REFERENCE FIELD INTENSITY MEASUREMENTS

CONTINUED

WHOO NIGHT REFERENCE POINT MEASUREMENTS – JUNE 21, 2018

					CO-ORD NAD27				
Radial		**Dist km**	**mV/m**	**Time**		**Deg**	**Min**	**Sec**	**Description**
32°	1	0.97	151	1323	N	28	28	26.5	Gate East of Wilks Ave./Orange Ave.
					W	81	22	10.2	
	2	3.66	19.0	1309	N	28	29	40.5	#2004 Gatlin Ave.
					W	81	21	17.5	
	3	4.33	18.9	1311	N	28	29	58.8	Timberlake Dr. East of Bumby @ 25MPH
					W	81	21	04.7	sign
141°	1	0.63	72.0	1404	N	28	27	44.0	West end of Pinecastle Blvd.
					W	81	22	14.2	
	2	1.36	16.5	1413	N	28	27	25.8	Orange Ave. at building entrance
					W	81	21	57.2	
	3	2.34	13.9	1421	N	28	27	01.4	End of drive off McCoy Rd./Gondola Dr.
					W	81	21	34.5	
212°	1	0.97	80.0	1346	N	28	27	33.5	#499 Lear St.
					W	81	22	47.8	
	2	2.06	35.5	1350	N	28	27	03.3	Parking lot for ALDI
					W	81	23	09.0	
	3	2.47	26.5	1353	N	28	26	51.8	Drive behind building at door #170
					W	81	23	16.7	

FIGURE 15

WHOO REFERENCE FIELD INTENSITY MEASUREMENTS

CONTINUED

WHOO NIGHT REFERENCE POINT MEASUREMENTS – JUNE 21, 2018

					CO-ORD NAD27			
Radial		**Dist km**	**mV/m**	**Time**	**Deg**	**Min**	**Sec**	**Description**
283°	1	0.99	27.0	1332	N 28	28	07.4	Winegard Rd. at ball field
					W 81	23	04.2	
	2	1.60	18.0	1336	N 28	28	11.7	#6029 Luzon Dr.
					W 81	23	26.0	
	3	1.82	13.9	1340	N 28	28	13.3	#6020 Chipola Circle
					W 81	23	34.1	

FIGURE 16
WHOO CERTIFIED ARRAY GEOMETRY SURVEY
JUNE, 2018
CONTINUED

Station Tower Geometry Analysis

- Enter Requested Data in Yellow Blocks			
Callsign:	WHOO	*Reference Tower:*	1
Freq. (kHz):	1080 kHz	*Feet per wavelength:*	910.7139411

Tower Pair Studied	*Licensed Spacing (Electrical degrees)*	*Licensed Azimuth (Degrees True)*	*Measured Distance (feet)*	*Measured Azimuth (Degrees True)*	*Tower Location Error from Licensed (Result in Feet)*	*Tower Location Error from Licensed (Electrical Degrees)*	*Tower No. & (Loc)*
1 (ref)	0.0	0.0	0.0	0.0	0.00	0.00 °	#1(SW)
1 to 2	70.7	32.0	178.100	32.3000	1.25	0.49 °	#2(NE)
					--	--	
					--	--	
					--	--	
					--	--	
					--	--	
					--	--	
					--	--	

Law of Cosines Analysis

Tower Pair Studied	Licensed Specification (Side "a") of Triangle (Feet)	Licensed Azimuth Versus Measured Azimuth Difference	Included Angle A Converted to Radians	Tower Location Error from licensed position (Result in Feet)	Error in Feet Converted to Electrical Degrees	*Error Greater Greater Than 1.5° ? (3.79 ft)*
1 (ref)	--	--	--	0.00	0.00 °	N/A
1 to 2	178.93	0.3000 °	0.005235988	1.25	0.49 °	No - Therefore Okay
0	--	--	--	--	--	--
0	--	--	--	--	--	--
0	--	--	--	--	--	--
0	--	--	--	--	--	--
0	--	--	--	--	--	--
0	--	--	--	--	--	--
0	--	--	--	--	--	--

FIGURE 17
WHOO MODEL CONVERGENCE TEST
JUNE, 2018

WHOO TOWER 1

CONVERGENCE TEST

Frequency = 1.08 MHz

number of unknowns source 1 of sector 1	conductance (mhos)	susceptance (mhos)	resistance (ohms)	reactance (ohms)
21	.0283926	-7.65E-03	32.8395	8.84242
30	.0293718	-6.33E-03	32.5362	7.00933
42	.0303173	-4.75E-03	32.1929	5.04811
54	.0306352	-4.1E-03	32.0688	4.28826
63	.0306372	-4.07E-03	32.0754	4.25595
72	.0306042	-4.11E-03	32.0961	4.31134
84	.0305984	-4.1E-03	32.1041	4.30514
96	.0305851	-4.11E-03	32.1148	4.31919
105	.0304877	-4.3E-03	32.1616	4.53157
114	.0304411	-4.38E-03	32.1852	4.62668

FIGURE 18
WHOO SPURIOUS RADIATION MEASUREMENTS
JUNE, 2018
WHOO (1080 KHZ), 6.0 KW DAY MODE
WAMT (1190 KHZ), 4.7 KW DAY MODE

Frequency (kHz)	Field Intensity (mV/M)	Attenuation (dB) relative to WHOO	Attenuation (dB) relative to WAMT
1080	990	--	--
1190	520	--	--
860	.050	85.9	80.3
970	.050	85.9	80.3
1300	.030	90.4	84.8
1410	N.R.	--	--
2050	<.01	>99.9	>94.3
2160	<.01	>99.9	>94.3
2270	<.01	>99.9	>94.3
2380	<.01	>99.9	>94.3
2490	<.01	>99.9	>94.3
3240	<.01	>99.9	>94.3
3350	.016	95.8	90.2
3460	.015	96.4	90.8
3570	<.01	>99.9	>94.3
4430	<.01	>99.9	>94.3
4540	<.01	>99.9	>94.3
4650	<.01	>99.9	>94.3

Above taken with Potomac Instruments, FIM-41, 0.97 kM from the Antenna on a bearing of 32°T.

Above readings meet required attenuation of 80.0dB (WHOO Day) and 79.7dB (WAMT Day).

N.R. denotes not readable due to another station on that frequency.

FIGURE 18 CONTINUED
WHOO SPURIOUS RADIATION MEASUREMENTS
JUNE, 2018
WHOO (1080 KHZ), 0.055 KW NIGHT MODE
WAMT (1190 KHZ), 0.230 KW NIGHT MODE

Frequency (kHz)	Field Intensity (mV/M)	Attenuation (dB) relative to WHOO	Attenuation (dB) relative to WAMT
1080	151	--	--
1190	156	--	--
860	<.01	>83.6	>83.9
970	<.01	>83.6	>83.9
1300	.040	71.5	71.8
1410	N.R.	--	--
2050	<.01	>83.6	>83.9
2160	.017	79.0	79.3
2270	.012	82.0	82.3
2380	.015	80.1	80.3
2490	<.01	>83.6	>83.9
3240	<.01	>83.6	>83.9
3350	<.01	>83.6	>83.9
3460	.010	83.6	83.9
3570	<.01	>83.6	>83.9
4430	<.01	>83.6	>83.9
4540	<.01	>83.6	>83.9
4650	<.01	>83.6	>83.9

Above taken with Potomac Instruments, FIM-41, 0.97 kM from the Antenna on a bearing of 32°T.

Above readings meet required attenuation of 60.4dB (WHOO Night) and 66.6dB (WAMT Night).

N.R. denotes not readable due to another station on that frequency.