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March 19, 2021

FILED BY E-MAIL PURSUANT TO
Public Notice, *Audio Division Announces Procedures Related to Coronavirus,* DA 20-266, rel. March 13, 2020, addressed to Mr. James Bradshaw, Senior Deputy Chief (james.bradshaw@fcc.gov); and Nazifa Sawez, Esq. (nazifa.sawez@fcc.gov)

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
9050 Junction Drive
Annapolis Junction, MD 20701

Re: Pax Catholic Communications, Inc.
Application for License to Cover Construction Permit (BP-198901019AB)
WACC(AM), Hialeah, Florida (Facility ID No. 28874)

Dear Ms. Dortch:

Transmitted herewith, by the undersigned counsel to noncommercial educational licensee Pax Catholic Communications, Inc., is an application filed on FCC Form 302-AM for a license to cover construction permit File No. BP-19890109AB. Because Pax Catholic Communications, Inc. is a non-commercial educational licensee, no filing fee is required to accompany this application.

Please direct any questions regarding this matter to the undersigned.

Sincerely,

Mark B. Denbo
Counsel to Pax Catholic Communications, Inc.

cc: Joseph Szczesny/FCC

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)

PAX CATHOLIC COMMUNICATIONS, INC.

MAILING ADDRESS (Line 1) (Maximum 35 characters)

1779 NW 28TH STREET

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Miami	Florida	33142

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
305-638-9729	WACC	Facility No. 28874

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	$	

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	$	

ADD ALL AMOUNTS SHOWN IN COLUMN C,
AND ENTER THE TOTAL HERE.
THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
$	

CLEAR ALL PAGES

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT PAX CATHOLIC COMMUNICATIONS, INC.		
MAILING ADDRESS 1779 NW 28TH STREET		
CITY Miami	STATE Florida	ZIP CODE 33142

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
WACC	Hialeah	BP-19890109AB		5/17/2021

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.

CLEAR ALL PAGES

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	
Msgr. Roberto Garza	Msgr. Roberto Garza	
Title	Date	Telephone Number
Director	3/19/2021	305-638-9729

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

PAX CATHOLIC 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	Day
WACC	BP-19890109AB	830	Unlimited	1.0	4.1

2. Station location

State	City or Town
Florida	Hialeah

3. Transmitter location

State	County	City or Town	Street address (or other identification)
FL	Miami Dade	Miami	NW 137th Ave./NW 6th St.

4. Main studio location

State	County	City or Town	Street address (or other identification)
FL	Miami Dade	Miami	1779 NW 28th Street

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

State	County	City or Town	Street address (or other identification)
FL	Miami Dade	Miami	1779 NW 28th Street

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
4.65	9.41

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	-8.3	-8.3

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(NE)	-155.3	0.0	.274	1.000		
2(NW)	0.0	117.9	1.000	.438		
3(SW)	-112.0	104.5	.614	.742		
4(SE)	109.9	-22.8	.143	.259		

Manufacturer and type of antenna monitor: Gorman-Redlich CMR

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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	73.34 (#1/#2) 79.26 (#3/#4)	74.1 (#1/#2) 80.2 (#3/#4)	75.0 (#1/#2) 81.1 (#3/#4)	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
25 ° 46 ' 22 "	80 ° 25 ' 16 "

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?

None

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)
Charles Keiler	
Address (include ZIP Code) 6711 NW 26 Way Fort Lauderdale, FL 33309	Date 3/15/2021
	Telephone No. (Include Area Code) 954-804-4860

☐ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☑ Technical Consultant

☐ Other (specify)

ENGINEERING STATEMENT CONCERNING

APPLICATION FOR LICENSE INFORMATION

EMPLOYING MOMENT METHOD MODELING

WACC, 830 KHZ, DA-2

HIALEAH, FLORIDA

FEBRUARY, 2021

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
FEBRUARY. 2021

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PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
FEBRUARY. 2021

SUMMARY

Adjustment of the Antenna System and a Proof of Performance employing Moment Method Modeling was performed on Radio Station WACC, 830 KHz, Hialeah, Florida, after modification of Antenna Phasing equipment and Sampling Lines. WACC holds Construction Permit Number: BP-19890109AB to change the Day directional pattern. This report was prepared on behalf of PAX CATHOLIC COMMUNICATIONS, INC., licensee of Radio Station WACC.

SITE MODIFICATIONS

The WACC Transmitter site is that as currently licensed for both Radio Stations WACC, 830 KHz and WSUA, 1260 kHz. Sampling Line jumpers have been installed on the WACC lines to make them equal electrical lengths, and Antenna Phasing and Branching equipment has been modified. All 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 WACC 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.

SPURIOUS EMISSIONS

Due to the common usage of the Transmitter site by both Radio Stations WACC, 1280 KHz and WSUA, 1260 KHz, filtering is installed at all Towers to prevent interaction and spurious radiation products. No changes have been made to the existing filtering topology. Figure 17 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" 830 kHz Filters (located in the WSUA equipment) measure greater than 50,000 ohms, and are not included in the circuit model.

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
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EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
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ADDITIONAL TOWERS CO-LOCATED ON THE SITE

Located on the WACC/WSUA transmitter site property is a tall tower utilized for TV, STL, and various other communications. This tower is centered between towers 1 and 2, and in line with them. The tower stands 164.9 M. above ground with aviation obstruction lighting. It is uniform cross section, guyed, and grounded at the base. The tower has detuning skirts and circuits to detune at both 830 kHz and 1260 kHz and is not included in the WACC model. The ASRN for the tower is: 1030081.

In addition, there are two (2) other towers located on the WACC/WSUA transmitter site property that are used only for WSUA, 1260 kHz. These towers are identical in height to towers 1 and 2, and are located to the East and West of towers 1 and 2. The ASRN's for these towers are: 1030077 and 1030080. These towers were included in the measured/modeled open circuit impedance matrix to verify any influence on the model and are numbered as tower 5 (East) and tower 6 (West) in the model. Both of these towers are detuned for 830 kHz, and are not included in the calculations for the directional modes.

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, 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.

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
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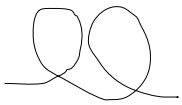
MEASURING EQUIPMENT AND PERSONNEL

All Tower Resistance and Reactance measurements were made with a HP 8753ES Network analyzer with a Tunwall directional coupler and a Delta Electronics OIB-3 Operating Impedance Bridge. 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 WACC Antenna System has been constructed and adjusted in accordance with all applicable Commission rules and regulations. The foregoing was prepared on behalf of PAX CATHOLIC 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.



Kurt Gorman, President
Phasetek Inc.
Quakertown, Pennsylvania

FIGURE 1

ANTENNA SYSTEM AS ADJUSTED

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
FEBRUARY. 2021

ANTENNA SYSTEM DESCRIPTION

1. The Antenna System consists of four (4) uniform, guyed, vertical steel transmitting Towers. Towers 1 and 2 stand 73.34M (73.1^{o}) above their Base Insulators. Towers 3 and 4 stand 79.26M (79.0^{o}) above their Base Insulators. The Towers are arranged with Tower 1 as a reference; Tower 2 is spaced 118.7^{o} on a bearing of 253.0^{o}T. Tower 3 is spaced 105.0^{o} on a bearing of 222.0^{o}T. Tower 4 is spaced 64.0^{o} on a bearing of 149.0°T. All Towers have a lighting choke at the base that is used as a static drain. Tower 4 supports an STL antenna. The line for the antenna is isolated at the base with a Phasetek Inc. isocoupler.

2. The Ground System for each Tower consists of (120) buried copper Radials, 55.0M in length for towers 1 and 2, 73.0M in length for towers 3 and 4, except where they intersect with copper transverse straps between Towers or property boundaries. In addition, a 7.3M by 7.3M copper ground screen is installed at the base of towers 1 and 2. Copper strap connects all Towers to the main Transmitter grounding point.

3. The Sampling System consists of four (4), Delta Electronics Inc. TCT-3, 1.0 V/A Toroidal Current Transformers. All TCT's are at the Output of each diplexing filter. These TCT's are connected to a Gorman-Redlich CMR Antenna Monitor via four (4) equal lengths of RFS, FCC-38-50J/LCF-12-50J, 3/8"/1/2" phase stabilized foam coaxial cable.

4. Tower registration numbers:
   Tower 1: 1030078
   Tower 2: 1030079
   Tower 3: 1030082
   Tower 4: 1030083

FIGURE 1
ANTENNA SYSTEM AS ADJUSTED

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
CONTINUED
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
FEBRUARY. 2021

ANTENNA SYSTEM DESCRIPTION – Continued

DIRECTIONAL OPERATION (DAY)

COMMON POINT

Impedance = 50.0 – j 8.3 Ohms
Current = 9.41 Amperes
Power = 4,428 Watts

DIRECTIONAL OPERATION (NIGHT)

COMMON POINT

Impedance = 50.0 – j 8.3 Ohms
Current = 4.65 Amperes
Power = 1,080 Watts

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

FIGURE 2
WACC SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
FEBRUARY. 2021

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 FCC-38-50J/LCF-12-50J. The Antenna Monitor is a Gorman-Redlich Model CMR, Serial Number 830.

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 above the carrier frequency, which is the closest one to the carrier frequency, was found to be 270 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 830 KHz	Resonant Frequency (KHz) above 830 KHz	Calculated Electrical Length (deg) at 830 KHz	Measured Impedance (ohms) Connected to TCT @ 830 KHz
Tower 1	318.54	951.87	235.4	50.3 –j 1.1
Tower 2	315.03	951.78	235.5	51.6 –j 1.4
Tower 3	318.53	951.68	235.5	51.6 –j 1.0
Tower 4	314.74	951.67	235.5	52.6 –j 1.4

FIGURE 2
WACC SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
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CONTINUED

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	1110.5	6.8 +j 47.6	793.2	4.5 –j 48.2	48.25
2	1110.4	8.3 +j 48.0	793.1	6.1 –j 48.6	48.85
3	1110.3	7.5 +j 47.3	793.0	5.8 –j 49.0	48.61
4	1110.3	6.9 +j 50.3	793.0	4.5 –j 49.3	50.13

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 (Day reference) and are within the manufacturer's rating of ± 2.0% and ± 3.0°.

FIGURE 2
WACC SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
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CONTINUED

SAMPLING TCT MEASUREMENTS CONT'D

TOWER	TCT SERIAL #	MAGNITUDE	PHASE
1	2309	1.000	0.0^{o}
2	2304	.998	-0.3^{o}
3	2311	.995	-0.2^{o}
4	2305	.999	-0.3^{o}

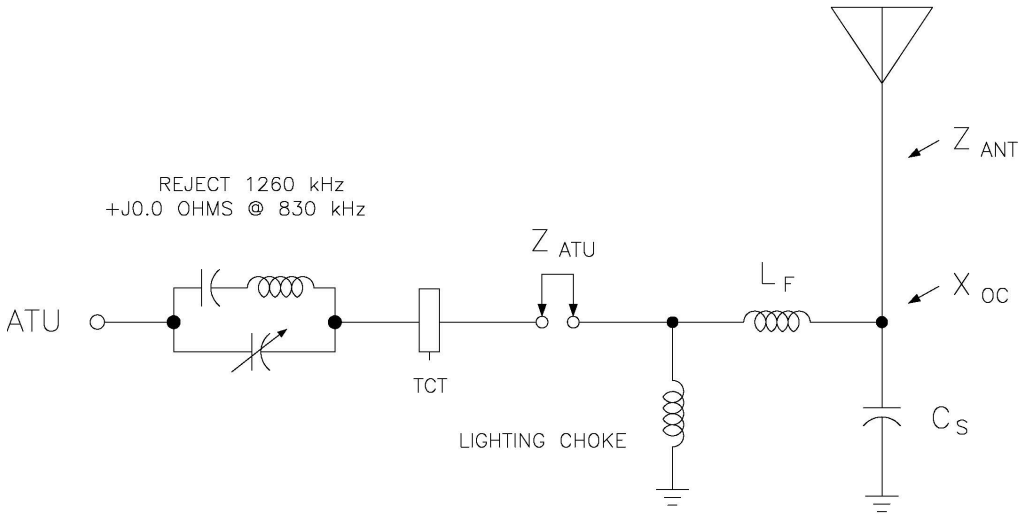
ANTENNA MONITOR MEASUREMENT

Measurement of the Gorman-Redlich Model CMR Antenna Monitor was performed to verify calibration. A single RF Voltage was applied to the Day 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	1.003	-0.3^{0}
3	1.002	-0.4^{0}
4	1.004	-0.1^{0}

The above is within the manufacturer's rating of $\pm$ 2.0% and $\pm$ 1.0^{o}.

FIGURE 3
WACC 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	20	3.07	+j16.0	24.61 –j 47.32	24.51 –j 31.18	24.2 –j 31.2
2	20	3.07	+j16.0	24.83 –j 49.75	24.73 –j 33.61	24.3 –j 33.8
3	20	3.93	+j20.5	33.72 +j 0.27	33.59 +j 20.72	33.5 +j 21.0
4	35	2.21	+j11.5	36.32 +j 7.89	36.29 +j 19.25	36.5 +j 19.1
5*	20	2.40	+j12.5	25.40 –j 47.21	25.31 –j 34.60	25.1 –j 34.8
6*	20	0.77	+j4.0	26.11 –j 45.41	26.06 –j 41.36	26.7 –j 41.5

Tower	Calculated X_{OC} (Ω)	
1	-j 90,334.3	
2	-j 90,334.3	
3	-j 90,016.4	
4	-j 11,203.9	
5*	-j 90,583.3	* Used for 1260 kHz only
6*	-j 91,194.6	* Used for 1260 kHz only

FIGURE 4
WACC MOMENT MODEL PARAMETERS

Tower #	Wire #	# of Segments	Base Node
1	1	12	1
2	2	12	13
3	3	12	25
4	4	12	37
5*	5	12	49
6*	6	12	61

Tower #	Physical Height Degrees	Modeled Height Degrees	Modeled Radius Meters	% of Equivalent Radius
1	73.1	78.0	.2304	100.0
2	73.1	77.5	.2304	100.0
3	79.0	86.5	.2304	100.0
4	79.0	88.0	.2304	100.0
5*	73.1	78.0	.2304	100.0
6*	73.1	78.5	.2100	91.2

* Used for 1260 kHz only

All Towers are uniform cross section, guyed with Base Insulator. Each tower is three (3) sided, 19” face width.

All base insulators were manufactured by Utility Tower with an assumed capacity of 20pF.

Tower #4 Isocoupler is Phasetek Inc. Model #P600-410-HV with a maximum capacity of 15pF.

All Towers have a Phasetek Inc./KTL lighting choke. These measure +j 10,710 ohms @ 830 kHz.

FIGURE 5
WACC MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WACC TOWER 1 (OTHERS 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	.2304	12
		0	0	78.		
2	none	118.7	253.	0	.2304	12
		118.7	253.	77.5		
3	none	105.	222.	0	.2304	12
		105.	222.	86.5		
4	none	64.	149.	0	.2304	12
		64.	149.	88.		
5	none	59.3	73.	0	.2304	12
		59.3	73.	78.		
6	none	177.9	253.	0	.21	12
		177.9	253.	78.5		

Number of wires = 6
current nodes = 72

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	6.45833	4	7.33333
radius	6	.21	1	.2304

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.83	0	1	.0179398	.0203704

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	-90,334.3	0	0	0
2	25	0	-90,016.4	0	0	0
3	37	0	-11,203.9	0	0	0
4	49	0	-90,583.3	0	0	0
5	61	0	-91,194.6	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							
.83	24.613	-47.318	53.336	297.5	4.0992	-4.3251	-2.0024

FIGURE 5
WACC MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WACC TOWER 2 (OTHERS 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	.2304	12
		0	0	78.		
2	none	118.7	253.	0	.2304	12
		118.7	253.	77.5		
3	none	105.	222.	0	.2304	12
		105.	222.	86.5		
4	none	64.	149.	0	.2304	12
		64.	149.	88.		
5	none	59.3	73.	0	.2304	12
		59.3	73.	78.		
6	none	177.9	253.	0	.21	12
		177.9	253.	78.5		

Number of wires = 6
current nodes = 72

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	6.45833	4	7.33333
radius	6	.21	1	.2304

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.83	0	1	.0179398	.0203704

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	-90,334.3	0	0	0
2	25	0	-90,016.4	0	0	0
3	37	0	-11,203.9	0	0	0
4	49	0	-90,583.3	0	0	0
5	61	0	-91,194.6	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							
.83	24.831	-49.747	55.599	296.5	4.2693	-4.1459	-2.1109

FIGURE 5
WACC MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WACC TOWER 3 (OTHERS 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	.2304	12
		0	0	78.		
2	none	118.7	253.	0	.2304	12
		118.7	253.	77.5		
3	none	105.	222.	0	.2304	12
		105.	222.	86.5		
4	none	64.	149.	0	.2304	12
		64.	149.	88.		
5	none	59.3	73.	0	.2304	12
		59.3	73.	78.		
6	none	177.9	253.	0	.21	12
		177.9	253.	78.5		

Number of wires = 6
current nodes = 72

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	6.45833	4	7.33333
radius	6	.21	1	.2304

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.83	0	1	.0179398	.0203704

Sources

source	node	sector	magnitude	phase	type
1	25	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-90,334.3	0	0	0
2	13	0	-90,334.3	0	0	0
3	37	0	-11,203.9	0	0	0
4	49	0	-90,583.3	0	0	0
5	61	0	-91,194.6	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 25, sector 1							
.83	33.723	.27041	33.724	.5	1.4828	-14.224	-.16738

FIGURE 5
WACC MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WACC TOWER 4 (OTHERS 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	.2304	12
		0	0	78.		
2	none	118.7	253.	0	.2304	12
		118.7	253.	77.5		
3	none	105.	222.	0	.2304	12
		105.	222.	86.5		
4	none	64.	149.	0	.2304	12
		64.	149.	88.		
5	none	59.3	73.	0	.2304	12
		59.3	73.	78.		
6	none	177.9	253.	0	.21	12
		177.9	253.	78.5		

Number of wires = 6
current nodes = 72

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	6.45833	4	7.33333
radius	6	.21	1	.2304

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.83	0	1	.0179398	.0203704

Sources

source	node	sector	magnitude	phase	type
1	37	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-90,334.3	0	0	0
2	13	0	-90,334.3	0	0	0
3	25	0	-90,016.4	0	0	0
4	49	0	-90,583.3	0	0	0
5	61	0	-91,194.6	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 37, sector 1							
.83	36.316	7.8867	37.162	12.3	1.4457	-14.788	-.14666

FIGURE 5
WACC MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WACC TOWER 5 (OTHERS 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	.2304	12
		0	0	78.		
2	none	118.7	253.	0	.2304	12
		118.7	253.	77.5		
3	none	105.	222.	0	.2304	12
		105.	222.	86.5		
4	none	64.	149.	0	.2304	12
		64.	149.	88.		
5	none	59.3	73.	0	.2304	12
		59.3	73.	78.		
6	none	177.9	253.	0	.21	12
		177.9	253.	78.5		

Number of wires = 6
current nodes = 72

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	6.45833	4	7.33333
radius	6	.21	1	.2304

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.83	0	1	.0179398	.0203704

Sources

source	node	sector	magnitude	phase	type
1	49	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-90,334.3	0	0	0
2	13	0	-90,334.3	0	0	0
3	25	0	-90,016.4	0	0	0
4	37	0	-11,203.9	0	0	0
5	61	0	-91,194.6	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 49, sector 1							
.83	25.4	-47.21	53.609	298.3	3.9802	-4.46	-1.9253

FIGURE 5
WACC MOMENT SUMMARY FOR INDIVIDUAL TOWERS

WACC TOWER 6 (OTHERS 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	.2304	12
		0	0	78.		
2	none	118.7	253.	0	.2304	12
		118.7	253.	77.5		
3	none	105.	222.	0	.2304	12
		105.	222.	86.5		
4	none	64.	149.	0	.2304	12
		64.	149.	88.		
5	none	59.3	73.	0	.2304	12
		59.3	73.	78.		
6	none	177.9	253.	0	.21	12
		177.9	253.	78.5		

Number of wires = 6
current nodes = 72

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	6.45833	4	7.33333
radius	6	.21	1	.2304

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.83	0	1	.0179398	.0203704

Sources

source	node	sector	magnitude	phase	type
1	61	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-90,334.3	0	0	0
2	13	0	-90,334.3	0	0	0
3	25	0	-90,016.4	0	0	0
4	37	0	-11,203.9	0	0	0
5	49	0	-90,583.3	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 61, sector 1							
.83	26.112	-45.406	52.379	299.9	3.7494	-4.748	-1.7726

FIGURE 6
WACC MOMENT MODEL ARRAY SYNTHESIS (DIRECTIONAL DAY)

WACC DAY

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = .83 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	.42	120.
3	.85	107.
4	.37	327.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	437.627	324.2	7.82576	4.
13	211.8	50.3	3.42697	122.
25	105.235	80.	5.80418	108.6
37	393.741	9.4	2.0452	340.4

Sum of square of source currents = 221.716
Total power = 4,100. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0101089	.0259481
Y(1, 2)	.00222832	-.0030043
Y(1, 3)	-.00535451	-.00226259
Y(1, 4)	-.0106757	-.0122121
Y(2, 1)	.00222778	-.00300458
Y(2, 2)	.00614514	.0233526
Y(2, 3)	-.0110312	-.0133003
Y(2, 4)	.000650707	.00445164
Y(3, 1)	-.00535498	-.00226268
Y(3, 2)	-.0110335	-.0132974
Y(3, 3)	.0349698	.000468708
Y(3, 4)	.000444094	.0125291
Y(4, 1)	-.0106776	-.0122086
Y(4, 2)	.000650188	.00445036
Y(4, 3)	.000444888	.0125287
Y(4, 4)	.0269566	-.00467296

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	24.7676	-46.7979
Z(1, 2)	5.59904	-13.8498
Z(1, 3)	10.2978	-15.8971
Z(1, 4)	22.5043	-8.53256
Z(2, 1)	5.59891	-13.85
Z(2, 2)	24.9236	-49.2563
Z(2, 3)	22.3949	-7.46874
Z(2, 4)	-1.24438	-16.378
Z(3, 1)	10.2997	-15.896
Z(3, 2)	22.3975	-7.46345
Z(3, 3)	34.1703	-.173867
Z(3, 4)	12.1422	-18.9231
Z(4, 1)	22.5074	-8.52701
Z(4, 2)	-1.24286	-16.378
Z(4, 3)	12.1426	-18.9227
Z(4, 4)	36.7393	8.45376

FIGURE 7
WACC MOMENT MODEL SUMMARY FOR DIRECTIONAL DAY MODE

WACC 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	.2304	12
		0	0	78.		
2	none	118.7	253.	0	.2304	12
		118.7	253.	77.5		
3	none	105.	222.	0	.2304	12
		105.	222.	86.5		
4	none	64.	149.	0	.2304	12
		64.	149.	88.		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	6.45833	4	7.33333
radius	1	.2304	1	.2304

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.83	0	1	.0179398	.0203704

Sources

source	node	sector	magnitude	phase	type
1	1	1	618.898	324.2	voltage
2	13	1	299.53	50.3	voltage
3	25	1	148.825	80.	voltage
4	37	1	556.835	9.4	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	0	26.25	-658.01	0	0	0
2	0	70.745	-657.8	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							
.83	42.954	-35.808	55.922	320.2	2.1564	-8.7217	-.62595
source = 2; node 13, sector 1							
.83	19.476	-58.655	61.804	288.4	6.3316	-2.7668	-3.2683
source = 3; node 25, sector 1							
.83	15.922	-8.6722	18.131	331.4	3.245	-5.5332	-1.4248
source = 4; node 37, sector 1							
.83	168.37	93.347	192.52	29.	4.4761	-3.9476	-2.2398

CURRENT rms
Frequency = .83 MHz
Input power = 4,100. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	7.82573	4.	7.80696	.54171
2	0	0	6.5	7.60635	2.5	7.59914	.331072
3	0	0	13.	7.33479	1.5	7.33227	.191895
4	0	0	19.5	6.97729	.7	6.97682	.0810161
5	0	0	26.	6.53165	359.9	6.53165	-7.24E-03
6	0	0	32.5	5.99955	359.3	5.99908	-.0749357
7	0	0	39.	5.38448	358.7	5.38308	-.122985
8	0	0	45.5	4.6909	358.1	4.68844	-.151858
9	0	0	52.	3.92338	357.6	3.92004	-.161836
10	0	0	58.5	3.08558	357.2	3.08178	-.153044
11	0	0	65.	2.17774	356.7	2.17413	-.125312
12	0	0	71.5	1.18914	356.3	1.18661	-.0775654
END	0	0	78.	0	0	0	0
GND	-34.7045	113.513	0	3.42698	122.	-1.81467	2.90709
14	-34.7045	113.513	6.45833	3.28534	121.3	-1.70653	2.80735
15	-34.7045	113.513	12.9167	3.13838	120.8	-1.60776	2.69528
16	-34.7045	113.513	19.375	2.96223	120.4	-1.49893	2.555
17	-34.7045	113.513	25.8333	2.75465	120.	-1.37806	2.38518
18	-34.7045	113.513	32.2917	2.51582	119.7	-1.245	2.18617
19	-34.7045	113.513	38.75	2.24684	119.3	-1.1003	1.95899
20	-34.7045	113.513	45.2083	1.94922	119.	-.944829	1.70492
21	-34.7045	113.513	51.6667	1.62451	118.7	-.779515	1.42527
22	-34.7045	113.513	58.125	1.27382	118.4	-.605126	1.12091
23	-34.7045	113.513	64.5833	.896864	118.1	-.421774	.7915
24	-34.7045	113.513	71.0417	.488802	117.7	-.227519	.432622
END	-34.7045	113.513	77.5	0	0	0	0
GND	-78.0302	70.2587	0	5.80421	108.6	-1.85101	5.50115
26	-78.0302	70.2587	7.20833	5.72822	108.	-1.77168	5.44735
27	-78.0302	70.2587	14.4167	5.57526	107.6	-1.68798	5.31359
28	-78.0302	70.2587	21.625	5.34053	107.3	-1.58751	5.09912
29	-78.0302	70.2587	28.8333	5.02578	107.	-1.46947	4.80616
30	-78.0302	70.2587	36.0417	4.63431	106.7	-1.33449	4.43801
31	-78.0302	70.2587	43.25	4.17035	106.5	-1.1838	3.9988
32	-78.0302	70.2587	50.4583	3.63882	106.3	-1.01889	3.49326
33	-78.0302	70.2587	57.6667	3.04485	106.	-.841422	2.92628
34	-78.0302	70.2587	64.875	2.39304	105.8	-.652866	2.30226
35	-78.0302	70.2587	72.0833	1.68557	105.6	-.454088	1.62326
36	-78.0302	70.2587	79.2917	.916519	105.4	-.243812	.883495
END	-78.0302	70.2587	86.5	0	0	0	0
GND	-54.8587	-32.9624	0	2.04521	340.4	1.92725	-.684534
38	-54.8587	-32.9624	7.33333	2.16187	334.7	1.95399	-.924995
39	-54.8587	-32.9624	14.6667	2.20928	331.3	1.93711	-1.06234
40	-54.8587	-32.9624	22.	2.20593	328.7	1.88505	-1.14573
41	-54.8587	-32.9624	29.3333	2.15303	326.7	1.79945	-1.18216
42	-54.8587	-32.9624	36.6667	2.05119	325.1	1.68149	-1.17473
43	-54.8587	-32.9624	44.	1.90124	323.7	1.53232	-1.1255
44	-54.8587	-32.9624	51.3333	1.70442	322.6	1.35322	-1.03627
45	-54.8587	-32.9624	58.6667	1.46222	321.6	1.14551	-.908795
46	-54.8587	-32.9624	66.	1.17611	320.7	.910344	-.744647
47	-54.8587	-32.9624	73.3333	.846482	320.	.648056	-.544569
48	-54.8587	-32.9624	80.6667	.469685	319.3	.355925	-.306465
END	-54.8587	-32.9624	88.	0	0	0	0

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

WACC NIGHT

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = .83 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	3.381	159.5
3	2.643	47.
4	.804	-85.8

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	105.134	353.3	1.6253	5.6
13	349.521	85.7	5.94938	161.
25	146.621	100.3	3.65371	49.
37	169.631	12.2	.867778	271.2

Sum of square of source currents = 104.279
Total power = 1,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0101089	.0259481
Y(1, 2)	.00222832	-.0030043
Y(1, 3)	-.00535451	-.00226259
Y(1, 4)	-.0106757	-.0122121
Y(2, 1)	.00222778	-.00300458
Y(2, 2)	.00614514	.0233526
Y(2, 3)	-.0110312	-.0133003
Y(2, 4)	.000650707	.00445164
Y(3, 1)	-.00535498	-.00226268
Y(3, 2)	-.0110335	-.0132974
Y(3, 3)	.0349698	.000468708
Y(3, 4)	.000444094	.0125291
Y(4, 1)	-.0106776	-.0122086
Y(4, 2)	.000650188	.00445036
Y(4, 3)	.000444888	.0125287
Y(4, 4)	.0269566	-.00467296

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	24.7676	-46.7979
Z(1, 2)	5.59904	-13.8498
Z(1, 3)	10.2978	-15.8971
Z(1, 4)	22.5043	-8.53256
Z(2, 1)	5.59891	-13.85
Z(2, 2)	24.9236	-49.2563
Z(2, 3)	22.3949	-7.46874
Z(2, 4)	-1.24438	-16.378
Z(3, 1)	10.2997	-15.896
Z(3, 2)	22.3975	-7.46345
Z(3, 3)	34.1703	-.173867
Z(3, 4)	12.1422	-18.9231
Z(4, 1)	22.5074	-8.52701
Z(4, 2)	-1.24286	-16.378
Z(4, 3)	12.1426	-18.9227
Z(4, 4)	36.7393	8.45376

FIGURE 9
WACC MOMENT MODEL SUMMARY FOR DIRECTIONAL NIGHT MODE

```
WACC 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            .2304        12
           0            0           78.
 2    none 118.7        253.        0            .2304        12
           118.7        253.        77.5
 3    none 105.         222.        0            .2304        12
           105.         222.        86.5
 4    none 64.          149.        0            .2304        12
           64.          149.        88.

Number of wires          =  4
          current nodes  =  48

                        minimum                   maximum
Individual wires      wire    value             wire  value
segment length         2      6.45833            4    7.33333
radius                 1      .2304              1    .2304


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   .83          0             1      .0179398       .0203704

Sources
source node    sector  magnitude      phase          type
 1      1       1      148.682        353.3          voltage
 2      13      1      494.298        85.7           voltage
 3      25      1      207.354        100.3          voltage
 4      37      1      239.895        12.2           voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     0     0             653.16        0           0            0
 2     0     0             695.31        0           0            0


IMPEDANCE
   normalization = 50.
freq     resist   react    imped    phase    VSWR    S11      S12
(MHz)    (ohms)   (ohms)   (ohms)   (deg)            dB       dB
source =  1; node 1, sector 1
.83      63.18    -13.876  64.686   347.6    1.4034  -15.502  -.1241

source =  2; node 13, sector 1
.83      14.86    -56.839  58.749   284.7    7.8829  -2.2157  -3.9837

source =  3; node 25, sector 1
.83      25.114   31.299   40.129   51.3     2.9323  -6.1713  -1.2003

source =  4; node 37, sector 1
.83      -37.373  191.87   195.48   101.     ****    ****     ****
```

CURRENT rms
Frequency = .83 MHz
Input power = 1,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	1.62529	5.6	1.61742	.159757
2	0	0	6.5	1.60104	3.5	1.59805	.0977524
3	0	0	13.	1.55825	2.1	1.55722	.0567632
4	0	0	19.5	1.49401	.9	1.49382	.024083
5	0	0	26.	1.40828	359.9	1.40828	-1.96E-03
6	0	0	32.5	1.30158	359.	1.30139	-.0219697
7	0	0	39.	1.17471	358.2	1.17415	-.0362138
8	0	0	45.5	1.02866	357.5	1.02768	-.0448214
9	0	0	52.	.864426	356.8	.8631	-.0478604
10	0	0	58.5	.682844	356.2	.681337	-.0453472
11	0	0	65.	.483942	355.6	.48251	-.0372033
12	0	0	71.5	.265304	355.	.264298	-.0230758
END	0	0	78.	0	0	0	0
GND	-34.7045	113.513	0	5.94937	161.	-5.62521	1.93702
14	-34.7045	113.513	6.45833	5.70884	160.5	-5.38078	1.90735
15	-34.7045	113.513	12.9167	5.45512	160.1	-5.12999	1.85514
16	-34.7045	113.513	19.375	5.14834	159.8	-4.83174	1.77756
17	-34.7045	113.513	25.8333	4.78517	159.5	-4.48251	1.67479
18	-34.7045	113.513	32.2917	4.36646	159.2	-4.08302	1.54755
19	-34.7045	113.513	38.75	3.89474	159.	-3.63566	1.39676
20	-34.7045	113.513	45.2083	3.37335	158.7	-3.14365	1.22349
21	-34.7045	113.513	51.6667	2.80579	158.5	-2.61037	1.02879
22	-34.7045	113.513	58.125	2.19492	158.2	-2.03863	.813419
23	-34.7045	113.513	64.5833	1.54119	158.	-1.42903	.577173
24	-34.7045	113.513	71.0417	.837369	157.8	-.775086	.316904
END	-34.7045	113.513	77.5	0	0	0	0
GND	-78.0302	70.2587	0	3.6537	49.	2.39637	2.75807
26	-78.0302	70.2587	7.20833	3.69698	48.1	2.46729	2.75321
27	-78.0302	70.2587	14.4167	3.65657	47.6	2.46588	2.69999
28	-78.0302	70.2587	21.625	3.54776	47.2	2.41117	2.60247
29	-78.0302	70.2587	28.8333	3.37431	46.9	2.30714	2.46233
30	-78.0302	70.2587	36.0417	3.13956	46.6	2.15681	2.28145
31	-78.0302	70.2587	43.25	2.84709	46.4	1.96318	2.062
32	-78.0302	70.2587	50.4583	2.50085	46.2	1.72948	1.80642
33	-78.0302	70.2587	57.6667	2.10488	46.1	1.45898	1.5172
34	-78.0302	70.2587	64.875	1.66286	46.	1.15466	1.1966
35	-78.0302	70.2587	72.0833	1.17671	45.9	.818241	.845648
36	-78.0302	70.2587	79.2917	.642572	45.9	.447341	.461286
END	-78.0302	70.2587	86.5	0	0	0	0
GND	-54.8587	-32.9624	0	.867776	271.2	.0183004	-.867583
38	-54.8587	-32.9624	7.33333	.966597	272.4	.0411086	-.965722
39	-54.8587	-32.9624	14.6667	1.01244	273.1	.0554704	-1.01092
40	-54.8587	-32.9624	22.	1.02645	273.7	.0658536	-1.02433
41	-54.8587	-32.9624	29.3333	1.01186	274.1	.0727753	-1.00924
42	-54.8587	-32.9624	36.6667	.970357	274.5	.0763511	-.967348
43	-54.8587	-32.9624	44.	.90329	274.9	.0765654	-.900039
44	-54.8587	-32.9624	51.3333	.811952	275.2	.0733601	-.808631
45	-54.8587	-32.9624	58.6667	.697653	275.5	.0666656	-.69446
46	-54.8587	-32.9624	66.	.561557	275.8	.0564052	-.558717
47	-54.8587	-32.9624	73.3333	.40425	276.	.0424643	-.402013
48	-54.8587	-32.9624	80.6667	.224272	276.3	.0245339	-.222926
END	-54.8587	-32.9624	88.	0	0	0	0

FIGURE 10
DERIVED DIRECTIONAL PARAMETERS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
FEBRUARY. 2021

DAY:

	Theoretical		Base Network Input Current		Normalized TCT	
Tower	**Field**	**Phase**	**Amplitude**	**Phase**	**Amplitude**	**Phase**
1 (NE)	1.000	0.0°	7.84	4.05°	1.000	0.0°
2 (NW)	.420	120.0°	3.43	121.94°	.438	117.9°
3 (SW)	.850	107.0°	5.82	108.58°	.742	104.5°
4 (SE)	.370	327.0°	2.03	-18.74°	.259	-22.8°

NIGHT:

	Theoretical		Base Network Input Current		Normalized TCT	
Tower	**Field**	**Phase**	**Amplitude**	**Phase**	**Amplitude**	**Phase**
1 (NE)	1.000	0.0°	1.63	5.73°	.274	-155.3°
2 (NW)	3.381	159.5°	5.96	161.06°	1.000	0.0°
3 (SW)	2.643	47.0°	3.66	49.05°	.614	-112.0°
4 (SE)	.804	-85.8°	0.85	-89.02°	.143	109.9°

FIGURE 11
WACC TOWER BASE CIRCUIT ANALYSIS DESCRIPTION

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WACC, 830 KHZ, DA-2
HIALEAH, FLORIDA
FEBRUARY. 2021

CIRCUIT ANALYSIS

Circuit Analysis was performed on each Tower of the WACC 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.

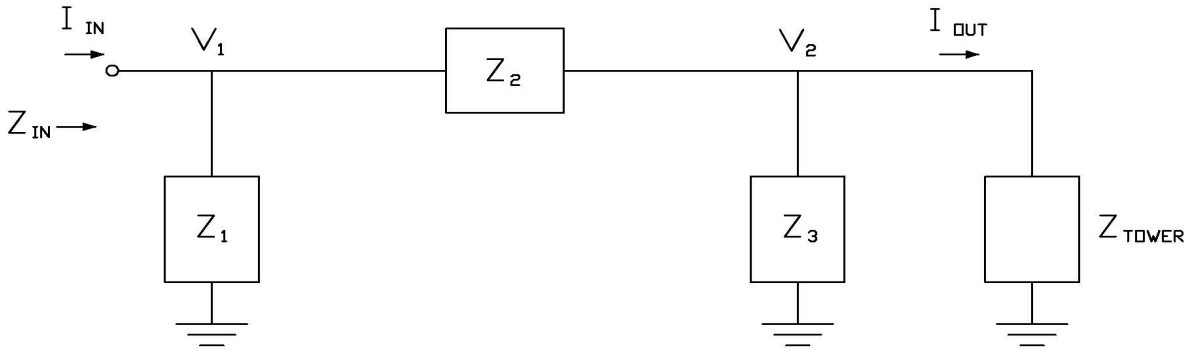


FIGURE 12
WACC CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

CUSTOMER : WACC
NETWORK ID : TOWER 1 (OTHERS OPEN)

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 16.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 24.61, -47.32 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	24.37	-47.15
1	2	0.00	16.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	134.20	-10.70

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	24.51	-31.18	39.66	-51.83
INPUT CURRENT (AMPS) :	1.56	1.98	2.52	51.83
OUTPUT CURRENT (AMPS) :	1.56	1.98	2.52	51.82

INPUT/OUTPUT CURRENT RATIO = 1.0020
INPUT/OUTPUT PHASE = 0.02 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 2 (OTHERS OPEN)

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 16.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 24.83, -49.75 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	10710.00
2		GROUND	24.57	-49.56
1		2	0.00	16.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	132.99	-9.84

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	24.73	-33.61	41.72	-53.65
INPUT CURRENT (AMPS) :	1.42	1.93	2.40	53.65
OUTPUT CURRENT (AMPS) :	1.42	1.93	2.39	53.64

INPUT/OUTPUT CURRENT RATIO = 1.0020
INPUT/OUTPUT PHASE = 0.02 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 3 (OTHERS OPEN)

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 20.50 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 33.72, 0.27 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	10710.00
2		GROUND	33.72	0.15
1		2	0.00	20.50

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	85.28	-31.23

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	33.59	20.72	39.47	31.66
INPUT CURRENT (AMPS) :	2.16	-1.33	2.53	-31.66
OUTPUT CURRENT (AMPS) :	2.15	-1.33	2.53	-31.69

INPUT/OUTPUT CURRENT RATIO = 1.0019
INPUT/OUTPUT PHASE = 0.02 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 4 (OTHERS OPEN)

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 11.50 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -5478.70 OHMS
TOWER IMPEDANCE (R,X) : 36.32, 7.89 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	10710.00
2		GROUND	36.42	7.66
1		2	0.00	11.50

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	90.44	-15.87

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	36.29	19.25	41.08	27.94
INPUT CURRENT (AMPS) :	2.15	-1.14	2.43	-27.94
OUTPUT CURRENT (AMPS) :	2.15	-1.15	2.43	-28.13

INPUT/OUTPUT CURRENT RATIO = 1.0004
INPUT/OUTPUT PHASE = 0.19 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 5 (OTHERS OPEN)

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 12.50 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 25.40, -47.21 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	25.15	-47.04
1	2	0.00	12.50

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	124.84	-7.93

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	25.31	-34.60	42.87	-53.81
INPUT CURRENT (AMPS) :	1.38	1.88	2.33	53.81
OUTPUT CURRENT (AMPS) :	1.38	1.88	2.33	53.79

INPUT/OUTPUT CURRENT RATIO = 1.0017
INPUT/OUTPUT PHASE = 0.02 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 6 (OTHERS OPEN)

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 4.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 26.11, -45.41 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	10710.00
2		GROUND	25.86	-45.27
1		2	0.00	4.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	107.05	-2.34

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	26.06	-41.36	48.89	-57.78
INPUT CURRENT (AMPS) :	1.09	1.73	2.05	57.78
OUTPUT CURRENT (AMPS) :	1.09	1.73	2.04	57.77

INPUT/OUTPUT CURRENT RATIO = 1.0009
INPUT/OUTPUT PHASE = 0.02 DEGREES

FIGURE 13
WACC CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

CUSTOMER : WACC
NETWORK ID : TOWER 1 DAY

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 16.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 42.95, -35.81 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	42.63	-35.87
1	2	0.00	16.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	369.45	-20.71
2	437.63	324.20

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	42.79	-19.73	47.12	-24.76
INPUT CURRENT (AMPS) :	7.82	0.55	7.84	4.05
OUTPUT CURRENT (AMPS) :	7.81	0.55	7.83	4.02

INPUT/OUTPUT CURRENT RATIO = 1.0019
INPUT/OUTPUT PHASE = 0.03 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 2 DAY

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 16.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 19.48, -58.66 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	19.24	-58.34
1	2	0.00	16.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	160.35	56.49
2	211.80	50.30

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	19.40	-42.48	46.69	-65.46
INPUT CURRENT (AMPS) :	-1.82	2.91	3.43	121.94
OUTPUT CURRENT (AMPS) :	-1.81	2.91	3.43	121.93

INPUT/OUTPUT CURRENT RATIO = 1.0021
INPUT/OUTPUT PHASE = 0.01 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 3 DAY

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 20.50 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 15.92, -8.67 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	15.89	-8.69
1	2	0.00	20.50

NODE	VOLTAGE MAGNITUDE	PHASE
1	115.05	145.29
2	105.24	80.00

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	15.86	11.82	19.78	36.71
INPUT CURRENT (AMPS) :	-1.85	5.51	5.82	108.58
OUTPUT CURRENT (AMPS) :	-1.85	5.50	5.81	108.57

INPUT/OUTPUT CURRENT RATIO = 1.0020
INPUT/OUTPUT PHASE = 0.01 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 4 DAY

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 11.50 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -5478.70 OHMS
TOWER IMPEDANCE (R,X) : 168.37, 93.35 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	174.09	89.53
1	2	0.00	11.50

NODE	VOLTAGE MAGNITUDE	PHASE
1	404.84	12.31
2	393.74	9.40

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	170.80	102.83	199.37	31.05
INPUT CURRENT (AMPS) :	1.92	-0.65	2.03	-18.74
OUTPUT CURRENT (AMPS) :	1.93	-0.69	2.05	-19.61

INPUT/OUTPUT CURRENT RATIO = 0.9928
INPUT/OUTPUT PHASE = 0.87 DEGREES

FIGURE 14
WACC CIRCUIT ANALYSIS FOR DIRECTIONAL NIGHT MODE

CUSTOMER : WACC
NETWORK ID : TOWER 1 NIGHT

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 16.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 63.18, -13.88 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	62.99	-14.27
1	2	0.00	16.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	102.57	7.64
2	105.13	353.30

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	62.97	2.10	63.01	1.91
INPUT CURRENT (AMPS) :	1.62	0.16	1.63	5.73
OUTPUT CURRENT (AMPS) :	1.62	0.16	1.63	5.69

INPUT/OUTPUT CURRENT RATIO = 1.0016
INPUT/OUTPUT PHASE = 0.04 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 2 NIGHT

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 16.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 14.86, -56.84 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	14.69	-56.53
1	2	0.00	16.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	257.97	91.06
2	349.52	85.70

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	14.80	-40.66	43.27	-70.00
INPUT CURRENT (AMPS) :	-5.64	1.94	5.96	161.06
OUTPUT CURRENT (AMPS) :	-5.63	1.93	5.95	161.05

INPUT/OUTPUT CURRENT RATIO = 1.0021
INPUT/OUTPUT PHASE = 0.01 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 3 NIGHT

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 20.50 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9587.60 OHMS
TOWER IMPEDANCE (R,X) : 25.11, 31.30 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	25.27	31.34
1	2	0.00	20.50

NODE	VOLTAGE MAGNITUDE	PHASE
1	210.03	113.20
2	146.62	100.30

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	25.03	51.65	57.39	64.14
INPUT CURRENT (AMPS) :	2.40	2.76	3.66	49.05
OUTPUT CURRENT (AMPS) :	2.40	2.76	3.65	49.04

INPUT/OUTPUT CURRENT RATIO = 1.0016
INPUT/OUTPUT PHASE = 0.02 DEGREES

CUSTOMER : WACC
NETWORK ID : TOWER 4 NIGHT

FREQUENCY : 830.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, 10710.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 11.50 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -5478.70 OHMS
TOWER IMPEDANCE (R,X) : -37.37, 191.87 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	10710.00
2	GROUND	-40.13	198.55
1	2	0.00	11.50

NODE	VOLTAGE MAGNITUDE	PHASE
1	179.08	11.59
2	169.63	12.20

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	-38.60	206.15	209.73	100.61
INPUT CURRENT (AMPS) :	0.01	-0.85	0.85	-89.02
OUTPUT CURRENT (AMPS) :	0.02	-0.87	0.87	-88.82

INPUT/OUTPUT CURRENT RATIO = 0.9839
INPUT/OUTPUT PHASE = -0.19 DEGREES

FIGURE 15
WACC REFERENCE FIELD INTENSITY MEASUREMENTS
FEBRUARY, 2021

WACC DAY REFERENCE POINT MEASUREMENTS – FEBRUARY 8, 2021

CO-ORD NAD27

Radial		Dist km	mV/m	Time		Deg	Min	Sec	Description
70°	1	0.42	1420	1728	N	25	46	26.6	#807 NW 137th Ave.
					W	80	25	01.6	
	2	1.40	503	1735	N	25	46	37.7	NW 132nd Ave./NW 8th Lane
					W	80	24	28.6	
	3	1.67	488	1738	N	25	46	39.8	#909 129th Ave.
					W	80	24	19.3	
187°	1	1.54	65.5	1711	N	25	45	30.1	#13981 SW 8th Terrace
					W	80	25	23.1	
	2	1.61	49.1	1713	N	25	45	30.1	SW 140th Ave./SW 9th St.
					W	80	25	23.0	
	3	1.71	48.9	1716	N	25	45	26.9	#14011 SW 10th St.
					W	80	25	24.0	
238.5°	1	2.71	73.5	1704	N	25	45	36.1	School Exit, SW 153rd Place
					W	80	26	38.8	
	2	3.09	66.1	1658	N	25	45	29.9	#927 SW 155th Court
					W	80	26	50.9	
	3	3.15	59.1	1656	N	25	45	28.9	#15564 SW 9th Terrace
					W	80	26	52.7	

FIGURE 15 CONTINUED
WACC REFERENCE FIELD INTENSITY MEASUREMENTS
FEBRUARY, 2021

WACC DAY REFERENCE POINT MEASUREMENTS – FEBRUARY 8, 2021

					CO-ORD NAD27				
Radial		**Dist km**	**mV/m**	**Time**		**Deg**	**Min**	**Sec**	**Description**
295°	1	6.82	5.9	1600	N	25	47	55.4	Krome Ave., East side
					W	80	28	58.3	
	2	6.83	6.0	1602	N	25	47	55.3	Krome Ave., Center divider
					W	80	28	58.6	
	3	6.86	5.8	1615	N	25	47	55.9	Krome Ave., West side
					W	80	28	59.4	

FIGURE 15 CONTINUED
WACC REFERENCE FIELD INTENSITY MEASUREMENTS
FEBRUARY, 2021

WACC NIGHT REFERENCE POINT MEASUREMENTS – FEBRUARY 10, 2021

CO-ORD NAD27

Radial		Dist km	mV/m	Time		Deg	Min	Sec	Description
104°	1	0.89	344	1305	N	25	46	15.1	NW 133rd Place/NW 4th Terrace
					W	80	24	44.9	
	2	1.43	241	1254	N	25	46	10.3	NW 130th Ave.
					W	80	24	25.9	
	3	1.81	125	1258	N	25	46	07.9	NW 2nd St., North side.
					W	80	24	13.1	
190.5°	1	3.50	63.3	1212	N	25	44	30.4	#14382 SW 27th St.
					W	80	25	38.4	
	2	3.80	57.0	1217	N	25	44	21.0	End of SW 30th St.
					W	80	25	40.0	
	3	4.77	55.2	1224	N	25	43	50.1	SW 38th Lane/SW 145th Ave.
					W	80	25	47.3	
214.5°	1	3.53	51.8	1158	N	25	44	47.3	SW 152nd Ave./SW 21st Lane
					W	80	26	26.9	
	2	3.74	66.1	1202	N	25	44	42.1	SW 23rd St./SW 153rd Ave.
					W	80	26	32.2	
	3	4.04	60.2	1205	N	25	44	34.4	SW 25th Terrace/SW 153rd Pass
					W	80	26	39.0	

FIGURE 15 CONTINUED
WACC REFERENCE FIELD INTENSITY MEASUREMENTS
FEBRUARY, 2021

WACC NIGHT REFERENCE POINT MEASUREMENTS – FEBRUARY 10, 2021

						CO-ORD NAD27			
Radial		**Dist km**	**mV/m**	**Time**		**Deg**	**Min**	**Sec**	**Description**
337.5°	1	15.05	3.17	1133	N	25	53	52.4	Krome Ave., East side, North MM32
					W	80	28	43.8	
	2	15.06	3.30	1135	N	25	53	52.5	Krome Ave., Center divider
					W	80	28	44.2	
	3	15.07	3.14	1140	N	25	53	52.9	Krome Ave., West side
					W	80	28	44.5	

FIGURE 16

WACC CERTIFIED ARRAY GEOMETRY SURVEY
FEBRUARY, 2021

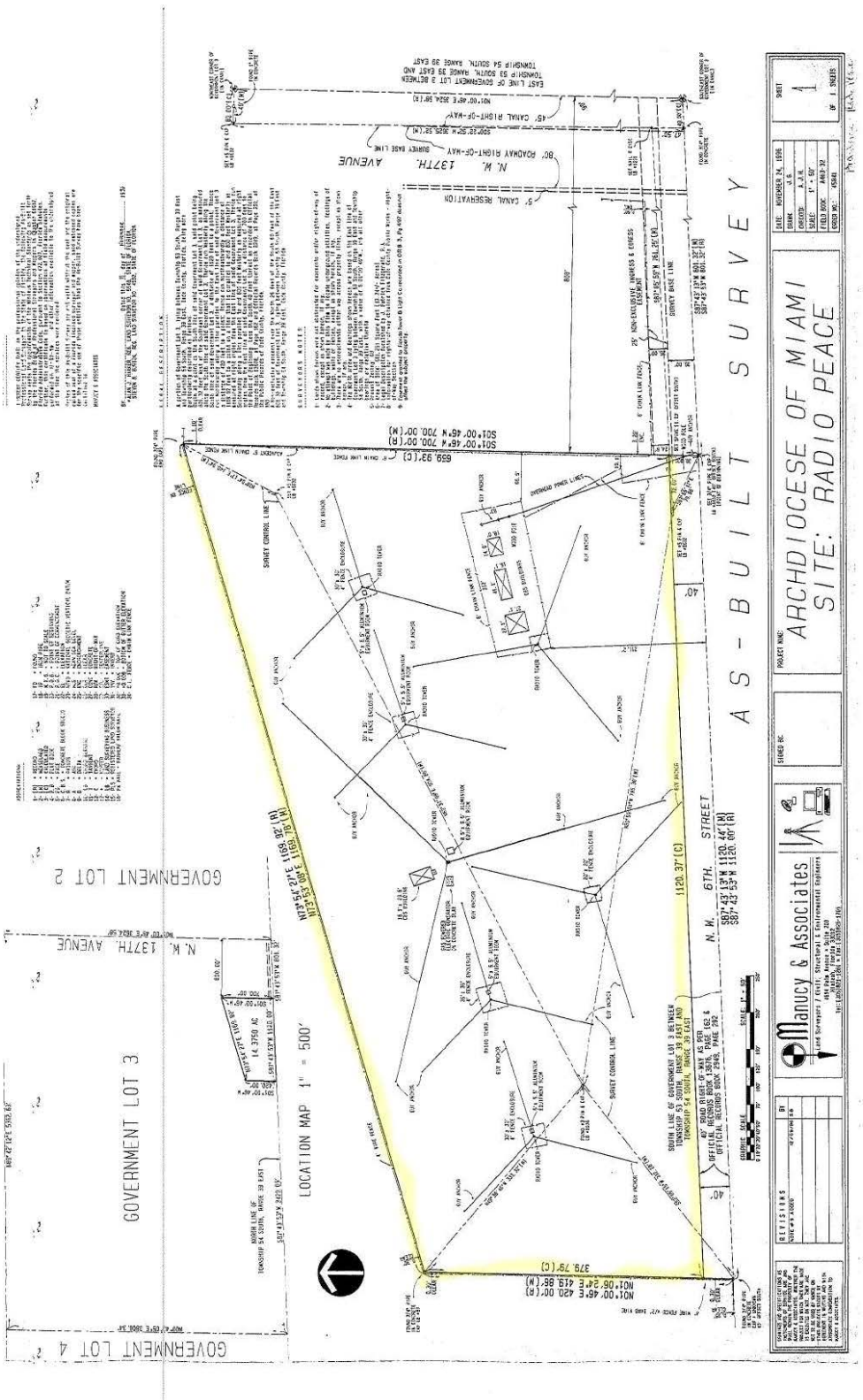


FIGURE 17
WACC SPURIOUS RADIATION MEASUREMENTS
FEBRUARY, 2021

WACC (830 kHz) DAY MODE
WSUA (1260 kHz) DAY MODE

Frequency (kHz)	Field Intensity (mV/M)	Attenuation (dB) relative to WACC	Attenuation (dB) relative to WSUA
830	686	---	---
1260	3330	---	---
400	.0208	90.4	104.1
430	.0174	91.9	105.6
860	.037	85.4	99.1
1230	.010	96.7	110.4
1290	.011	95.9	109.6
1660	.0108	96.1	109.8
1690	.031	86.9	100.6
2090	.0281	87.8	101.5
2120	.0093	97.4	111.1
2490	.0095	97.2	110.9
2520	.031	86.9	100.6
2920	.0165	92.4	106.1
3350	.049	82.9	96.6
3750	.020	90.7	104.4
3780	.023	89.5	103.2
4180	.0117	95.4	109.1
4610	.0098	96.9	110.6

Above taken with Potomac Instruments, PI 4100, 0.89 km from the array on a bearing of 104° T.
Point Coordinates (NAD27): N 25° 46’ 15.1”, W 80° 24’ 44.9”.

Above readings meet required attenuation of: 79.1 dB (WACC Day) and 80.0 dB (WSUA Day)

FIGURE 17 CONTINUED
WACC SPURIOUS RADIATION MEASUREMENTS
FEBRUARY, 2021

WACC (830 kHz) NIGHT MODE
WSUA (1260 kHz) NIGHT MODE

Frequency (kHz)	Field Intensity (mV/M)	Attenuation (dB) relative to WACC	Attenuation (dB) relative to WSUA
830	344	---	---
1260	1920	---	---
400	.013	88.5	103.4
430	.0175	85.9	100.8
860	.027	82.1	97.0
1230	.010	90.7	105.7
1290	.011	89.9	104.8
1660	.0109	90.0	104.9
1690	.016	86.6	101.6
2090	.0124	88.9	103.8
2120	.0095	91.2	106.1
2490	.0148	87.3	102.3
2520	.022	83.9	98.8
2920	.010	90.7	105.7
3350	.0214	84.1	99.1
3750	.019	85.2	100.1
3780	.018	85.6	100.6
4180	.0113	89.7	104.6
4610	.0098	90.9	105.8

Above taken with Potomac Instruments, PI 4100, 0.89 km from the array on a bearing of 104° T.
Point Coordinates (NAD27): N 25° 46’ 15.1”, W 80° 24’ 44.9”.

Above readings meet required attenuation of: 73.0 dB (WACC Night) and 80.0 dB (WSUA Night)