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-20150304ADE*

SECTION I - APPLICANT FEE INFORMATION

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

STAR OVER ORLANDO, INC.

Accepted / Filed

MAILING ADDRESS (Line 1) (Maximum 35 characters)
357 OCEAN SHORE BOULEVARD

MAR – 4 2015

MAILING ADDRESS (Line 2) (Maximum 35 characters)

Federal Communications Commission
Office of the Secretary

CITY ORMOND BEACH	STATE OR COUNTRY (if foreign address) FL	ZIP CODE 32176
TELEPHONE NUMBER (include area code) 3866722723	CALL LETTERS WRSO	OTHER FCC IDENTIFIER (If applicable) 129548

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

* See note below.

☐ 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
M M R	0 0 0 1	$ 690.00	

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
	0 0 0 1	$	

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 $ 690.00	FOR FCC USE ONLY

* The fee for this application has been submitted electronically through the Commission's Fee Filer service. The Form 159 filing receipt is attached hereto.

SECTION II - APPLICANT INFORMATION

1. NAME OF APPLICANT
STAR OVER ORLANDO, INC.

MAILING ADDRESS
357 OCEAN SHORE BOULEVARD

CITY	STATE	ZIP CODE
ORMOND BEACH	FL	32176

2. This application is for:

[X] Commercial   [ ] Noncommercial

[X] 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
WRSO	Orlando	BMP-20140211ACD		09/11/2016

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. A

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

[✓] Yes [ ] No

If No, state exceptions in an Exhibit.

Exhibit No.

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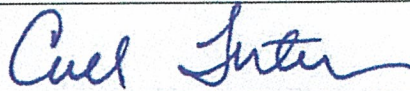
The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

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 CARL TUTERA	Signature
Title PRESIDENT	Date 02/25/2015	Telephone Number 3866722723

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.

EXHIBIT A
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO(AM), 810 KHZ, DA-2, ORLOVISTA, FLORIDA

Pursuant to the terms of the underlying construction permit, the station must request program test authority prior to beginning such tests. See Special Operating Conditions, No. 1, FCC File No. BMP-20140211ACD.

Name of Applicant

Star Over Orlando, 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
WRSO	BMP-20140211ACD	810	UNLIMITED	0.40	20.0

2. Station location

State	City or Town
FLORIDA	ORLOVISTA

3. Transmitter location

State	County	City or Town	Street address (or other identification)
FL	ORANGE	ORLANDO	2100 Mercy Drive

4. Main studio location

State	County	City or Town	Street address (or other identification)
FL	SEMINOLE	ALTAMONTE SPRINGS	999 Douglas Ave., Suite 3318

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

State	County	City or Town	Street address (or other identification)
FL	SEMINOLE	ALTAMONTE SPRINGS	999 Douglas Ave., Suite 3318

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
2.94	20.5

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	-8.1	-8.1

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (SW)	0.0	+95.9	1.000	1.114		
2 (SE)		0.0		1.000		
3 (NE)	-29.0	-1.1	.979	.823		
4 (NW)		+84.0		.773		

Manufacturer and type of antenna monitor: Potomac Instruments 1901-4

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	92.53	93.0	94.2	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 28 ° 34 ' 18 "	West Longitude 81 ° 26 ' 02 "

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?

No Change from Construction Permit

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

New Adjustment

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.	February 23, 2015
550 California Rd., Unit 11	
Quakertown, PA 18951	Telephone No. (Include Area Code)
	215-536-6648

☐ Technical Director   ☐ Registered Professional Engineer

☐ Chief Operator   ☑ Technical Consultant

☐ Other (specify)

ENGINEERING STATEMENT CONCERNING

APPLICATION FOR LICENSE INFORMATION

EMPLOYING MOMENT METHOD MODELING

WRSO, 810 KHZ, DA-2

ORLOVISTA, FLORIDA

FEBRUARY, 2015

PHASETEK INC.
ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

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WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

SUMMARY

Adjustment of the Antenna System and a Proof of Performance employing Moment Method Modeling were performed on Radio Station WRSO, 810 KHz, Orlovista, Florida, after modification of Antenna Phasing equipment. The existing transmission and sampling lines were utilized. WRSO holds Construction Permit Number: BMP-20140211ACD to increase Day power and change Day radiation pattern. The Night radiation pattern remains as licensed. This report was prepared on behalf of Star Over Orlando, Inc. licensee of Radio Station WRSO.

SITE MODIFICATIONS

The WRSO Transmitter site is that as currently licensed. The Day 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 WRSO 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.

SPECIAL OPERATING CONDITION #6

No new tower construction has been done at the WRSO transmitter site. All towers and grounding remain as previously licensed. Therefore, implementation of the WRSO construction permit has not adversely affected AM stations WDYZ, 990 kHz or WRLZ, 1270 kHz. WHOO, 1080 kHz operates from a licensed site that is more than 5 kM from the WRSO site. Verification of no spurious products from the above stations was performed.

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
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METHOD OF MOMENTS DETAIL

All Moment Method Modeling was done with Expert MININEC Broadcast Professional, Version 23. One wire was used to represent each Tower. Towers were driven individually to verify the Model compared to measured impedance data. Once the Model was verified, 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. Before use, tests of known impedances were made to verify operation. All Field Intensity Measurements were made with two Potomac Instruments Field Intensity Meters: An FIM-41, Serial Number 2181, calibrated on October 9, 2009 and another FIM-41, Serial Number 643, calibrated July 3, 2003. Both meters were calibrated by Potomac Instruments, Silver Spring, Maryland. Both meters were also compared to a Potomac Instruments FIM-21, serial number 901, calibrated August 29, 2012 by Potomac Instruments and agreed within tolerance. All measurements were taken by Phasetek Inc. personnel supervised by Kurt Gorman of Phasetek Inc.

CONCLUSION

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

PHASETEK INC.

ENGINEERING STATEMENT CONCERNING
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

Kurt Gorman, President
Phasetek Inc.
Quakertown, Pennsylvania

FIGURE 1

ANTENNA SYSTEM AS ADJUSTED

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

ANTENNA SYSTEM DESCRIPTION

1. The Antenna System consists of four (4), uniform, guyed, vertical steel transmitting Towers. All Towers stand 92.53M (90.0°) above their Base Insulators. The Towers are arranged with Tower 1 as a reference; Tower 2 is spaced 90.0° on a bearing of 81.6°T. Tower 3 is spaced 225.0° on a bearing of 7.0°T. Tower 4 is spaced 208.1° on a bearing of 343.4°T. Tower 2 supports an FM translator antenna and a STL antenna. Both feeds for these Antennas are isolated at the base with Isocouplers. All towers have aviation obstruction lighting. The lighting circuits are isolated at the base with a choke for each tower.

2. The Ground System for each Tower consists of (120) buried copper Radials, 92.5M in length, except where they intersect with copper transverse straps between Towers or property boundaries. Copper strap connects all Towers to the main Transmitter grounding point.

3. The Sampling System consists of four (4), Delta Electronics TCT-3, 1.0 V/A Toroidal Current Transformers. All TCT's are at the Output of each Antenna Tuning Unit. These TCT's are connected to a Potomac Instruments 1901-4 Antenna Monitor via four (4) equal lengths of Andrew, LDF2-50, 3/8" phase stabilized foam coaxial cable.

4. Tower registration numbers:
   Tower 1: 1247871
   Tower 2: 1247872
   Tower 3: 1247873
   Tower 4: 1247874

FIGURE 1
ANTENNA SYSTEM AS ADJUSTED

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
CONTINUED
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
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ANTENNA SYSTEM DESCRIPTION – Continued

DIRECTIONAL OPERATION (DAY)

COMMON POINT

Impedance   = 50.0 – j 8.1 Ohms
Current   = 20.5 Amperes
Power   = 21,060 Watts

DIRECTIONAL OPERATION (NIGHT)

COMMON POINT

Impedance   = 50.0 – j 8.1 Ohms
Current   = 2.94 Amperes
Power   = 432 Watts

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

FIGURE 2
WRSO SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

APPLICATION FOR LICENSE INFORMATION
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WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

SAMPLING SYSTEM DESCRIPTION

The Sampling System consists of Delta Electronics TCT-3 Toroidal Sampling Transformers (1.0 volt/amp) mounted at the base of each Tower. The sampling devices are connected to the Antenna Monitor with equal lengths of Andrew LDF2-50. The Antenna Monitor is a Potomac Instruments Model 1901-4, Serial Number 653.

SAMPLE LINE MEASUREMENTS

Impedance measurements were made of the Antenna Sampling Lines using an Array Solutions 2180 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 above the carrier frequency, which is the closest one to the carrier frequency, was found to be 450 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 810 KHz	Resonant Frequency (KHz) above 810 KHz	Calculated Electrical Length (deg) at 810 KHz	Measured Impedance (ohms) Connected to TCT @ 810 KHz
Tower 1	552.459	924.855	394.1	52.45 +j 0.25
Tower 2	552.443	924.877	394.1	52.07 +j 0.37
Tower 3	552.430	924.876	394.1	51.81 –j 0.71
Tower 4	552.428	924.777	394.1	51.48 –j 0.52

FIGURE 2
WSRF SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
CONTINUED
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
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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 $\pm$ 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	1017.3	9.9 +j 48.6	832.4	9.2 -j 48.4	49.43
2	1017.4	9.9 +j 48.5	832.4	9.1 -j 48.4	49.37
3	1017.4	9.8 +j 48.6	832.4	9.2 -j 48.5	49.47
4	1017.3	9.7 +j 48.7	832.3	9.0 -j 48.5	49.49

SAMPLING TCT MEASUREMENTS

Measurements of the Delta Electronics Model TCT-3, 1.0 V/A Toroidal Current Transformers were performed by a Hewlett Packard 8752A, Network Analyzer. Measurements are normalized to Tower #2 (reference) and are within the manufacturer's rating of $\pm$ 2.0% and $\pm$ 3.0°.

FIGURE 2
WSRF SAMPLING SYSTEM DESCRIPTION/MEASUREMENTS

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EMPLOYING MOMENT METHOD MODELING
CONTINUED
WRSO, 810 KHZ, DA-2
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SAMPLING TCT MEASUREMENTS CONT'D

TOWER	TCT SERIAL #	MAGNITUDE	PHASE
1	17304	1.000	$0.1°$
2	17307	1.000	$0.0°$
3	17308	1.001	$0.0°$
4	17309	1.002	$-0.1°$

ANTENNA MONITOR MEASUREMENT

Measurement of the Potomac Instruments Model 1901-4 Antenna Monitor was performed to verify calibration. A single RF Voltage was applied to the Reference Input (Tower #2) 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	$0.4°$
2	1.000	$0.0°$
3	1.000	$0.2°$
4	1.000	$0.3°$

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

FIGURE 3
WRSO TOWER IMPEDANCE MEASUREMENTS COMPARED TO METHOD OF MOMENTS MODEL
APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
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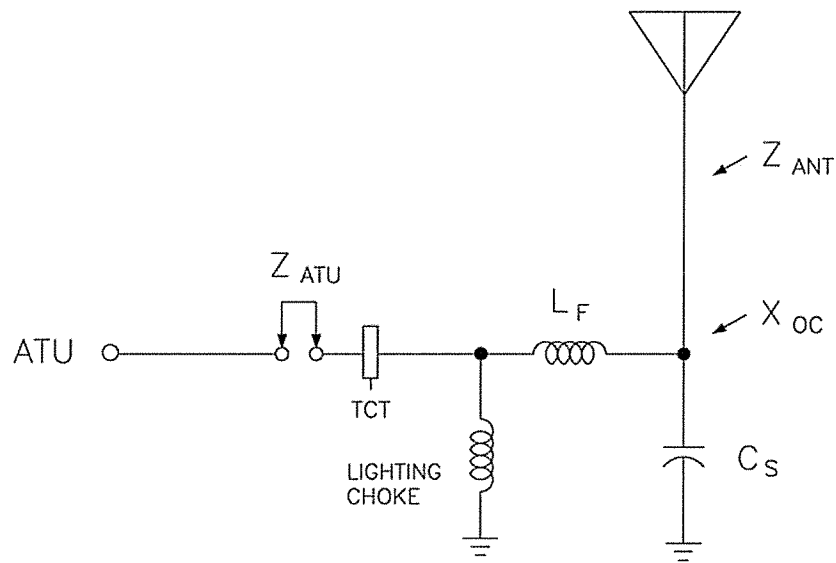
TOWER	Specified Cs (pf)	Measured L_F (µH)	Measured X_F (Ω)	Modeled Z_{ANT} (Ω)	Modeled Z_{ATU} (Ω)	Measured Z_{ATU} (Ω)
1	15	3.93	+j20.0	51.0 +j 55.4	49.2 +j 74.5	49.0 +j 76.0
2	45	5.11	+j26.0	49.9 +j 52.3	48.7 +j 77.3	48.0 +j 78.6
3	15	4.13	+j21.0	51.0 +j 55.2	49.2 +j 75.3	49.5 +j 76.8
4	15	3.93	+j20.0	50.9 +j 55.3	49.1 +j 74.5	49.9 +j 75.1

Tower	Calculated X_{OC} (Ω)
1	+j 4,537.3
2	+j 14,883.9
3	+j 4,539.1
4	+j 4,537.3

FIGURE 4
WRSO MOMENT MODEL PARAMETERS

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Tower #	Wire #	# of Segments	Base Node
1	1	10	1
2	2	10	11
3	3	10	21
4	4	10	31

Tower #	Physical Height Degrees	Modeled Height Degrees	Modeled Radius Meters	% of Equivalent Radius
1	90.0	96.5	.243	100.0
2	90.0	96.0	.243	100.0
3	90.0	96.5	.243	100.0
4	90.0	96.5	.243	100.0

All Towers are uniform cross section, guyed with Base Insulator. All towers are three (3) sided, 20" face width.

All Base Insulators are manufactured by Austin Insulators, part number A-4197L, with an assumed capacity of 15pf (-j13,099.2 ohms @ 810 kHz). Tower #2 FM Isocoupler is Phasetek Inc. Model #P600-407 with a capacity of 20pf (-j9,824.4 ohms @ 810 kHz). Tower #2 STL isocoupler is a Moseley Model #ICU-1D with a capacity of 10pF (-j19,648.8 ohms @ 810 kHz).

All Towers have Kintronic Labs 3 wire lighting choke. These measure +j3,350 ohms @ 810 kHz.

FIGURE 5
WRSO MOMENT SUMMARY FOR INDIVIDUAL TOWERS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

```
WRSO 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            .243         10
           0            0            96.5
 2    none 90.          81.6         0            .243         10
           90.          81.6         96.
 3    none 225.         7.           0            .243         10
           225.         7.           96.5
 4    none 208.1        343.4        0            .243         10
           208.1        343.4        96.5

Number of wires          =  4
         current nodes   =  40

                        minimum              maximum
Individual wires     wire    value        wire    value
segment length        2      9.6           1      9.65
radius                1      .243          1      .243


ELECTRICAL DESCRIPTION
Frequencies (MHz)
      frequency                 no. of  segment length (wavelengths)
no.  lowest        step         steps   minimum          maximum
1    .81           0            1       .0266667         .0268056

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

Lumped loads
            resistance      reactance       inductance  capacitance passive
load  node  (ohms)          (ohms)          (mH)        (uF)        circuit
1     11     0              14,883.9        0           0           0
2     21     0              4,539.1         0           0           0
3     31     0              4,537.3         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
.81       51.       55.39     75.294    47.4     2.8531  -6.3583  -1.1424
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FIGURE 5
WRSO MOMENT SUMMARY FOR INDIVIDUAL TOWERS

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WRSO 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	.243	10
		0	0	96.5		
2	none	90.	81.6	0	.243	10
		90.	81.6	96.		
3	none	225.	7.	0	.243	10
		225.	7.	96.5		
4	none	208.1	343.4	0	.243	10
		208.1	343.4	96.5		

```
Number of wires        =   4
        current nodes  =  40
```

		minimum			maximum	
Individual wires		wire	value		wire	value
segment length		2	9.6		1	9.65
radius		1	.243		1	.243

```
ELECTRICAL DESCRIPTION
Frequencies (MHz)
      frequency                  no. of  segment length (wavelengths)
no. lowest         step          steps   minimum       maximum
1   .81            0             1       .0266667      .0268056
```

Sources

source	node	sector	magnitude	phase	type
1	11	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	4,537.3	0	0	0
2	21	0	4,539.1	0	0	0
3	31	0	4,537.3	0	0	0

```
IMPEDANCE
   normalization = 50.
```

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 11, sector 1							
.81	49.848	52.312	72.259	46.4	2.7319	-6.6681	-1.0534

FIGURE 5
WRSO MOMENT SUMMARY FOR INDIVIDUAL TOWERS

```
WRSO 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            .243         10
           0            0              96.5
 2    none 90.          81.6           0            .243         10
           90.          81.6           96.
 3    none 225.         7.             0            .243         10
           225.         7.             96.5
 4    none 208.1        343.4          0            .243         10
           208.1        343.4          96.5


Number of wires        =   4
         current nodes  =  40


                       minimum                maximum
Individual wires       wire   value           wire   value
segment length          2     9.6              1     9.65
radius                  1      .243            1      .243


ELECTRICAL DESCRIPTION
Frequencies (MHz)
      frequency                 no. of  segment length (wavelengths)
no. lowest        step          steps   minimum        maximum
1   .81           0             1       .0266667       .0268056

Sources
source node     sector  magnitude      phase          type
1      21       1       1.             0              voltage

Lumped loads
              resistance     reactance      inductance  capacitance passive
load  node    (ohms)         (ohms)         (mH)        (uF)        circuit
1     1       0              4,537.3        0           0           0
2     11      0              14,883.9       0           0           0
3     31      0              4,537.3        0           0           0


IMPEDANCE
   normalization = 50.
freq       resist    react     imped     phase   VSWR     S11        S12
(MHz)      (ohms)    (ohms)    (ohms)    (deg)            dB         dB
source =  1; node 21, sector 1
.81        51.04     55.237    75.208    47.3    2.8444   -6.3794    -1.1361
```

FIGURE 5
WRSO MOMENT SUMMARY FOR INDIVIDUAL TOWERS

```
WRSO 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             .243         10
           0             0               96.5
 2    none 90.           81.6            0             .243         10
           90.           81.6            96.
 3    none 225.          7.              0             .243         10
           225.          7.              96.5
 4    none 208.1         343.4           0             .243         10
           208.1         343.4           96.5


Number of wires         =   4
          current nodes =   40

                        minimum                 maximum
Individual wires        wire    value           wire  value
segment length          2       9.6             1     9.65
radius                  1       .243            1     .243


ELECTRICAL DESCRIPTION
Frequencies (MHz)
       frequency                no. of  segment length (wavelengths)
no. lowest        step          steps   minimum         maximum
 1   .81          0              1       .0266667        .0268056

Sources
source node     sector  magnitude       phase           type
 1      31      1       1.              0               voltage

Lumped loads
                resistance      reactance       inductance  capacitance passive
load   node     (ohms)          (ohms)          (mH)        (uF)        circuit
 1     1        0               4,537.3         0           0           0
 2     11       0               14,883.9        0           0           0
 3     21       0               4,539.1         0           0           0


IMPEDANCE
   normalization = 50.
freq      resist    react     imped     phase     VSWR    S11       S12
(MHz)     (ohms)    (ohms)    (ohms)    (deg)             dB        dB
source =  1; node 31, sector 1
.81       50.943    55.333    75.213    47.4      2.8517  -6.3616   -1.1414
```

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

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

```
WRSO DAY

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency =  .81 MHz

        field ratio
tower   magnitude     phase (deg)
  1     1.            0
  2     .931          -99.8
  3     .744          -101.
  4     .68           -11.3

VOLTAGES AND CURRENTS - rms
source  voltage                          current
node    magnitude     phase (deg)        magnitude     phase (deg)
  1     666.332       74.8               14.3908       1.4
 11     1,131.51      314.2              12.9567       265.5
 21     828.243       301.5              10.6227       264.9
 31     313.52        69.4               10.012        349.3
Sum of square of source currents = 1,176.11
Total power = 20,000. watts

TOWER ADMITTANCE MATRIX
admittance     real (mhos)        imaginary (mhos)
Y(1, 1)        .00871243          -.00882986
Y(1, 2)        .00496811          .00269084
Y(1, 3)        .00272785          -.00149079
Y(1, 4)        .00332803          -.00202396
Y(2, 1)        .00496807          .00269091
Y(2, 2)        .00865981          -.00902374
Y(2, 3)        .00278277          -.00215183
Y(2, 4)        .0020943           -.00141139
Y(3, 1)        .00272784          -.00149078
Y(3, 2)        .00278277          -.00215185
Y(3, 3)        .00848884          -.00890128
Y(3, 4)        .00491857          .0025569
Y(4, 1)        .00332803          -.00202395
Y(4, 2)        .0020943           -.00141141
Y(4, 3)        .00491857          .0025569
Y(4, 4)        .00852187          -.00877838

TOWER IMPEDANCE MATRIX
impedance      real (ohms)        imaginary (ohms)
Z(1, 1)        51.0064            55.2755
Z(1, 2)        25.7748            -24.7706
Z(1, 3)        -18.1711           -3.06078
Z(1, 4)        -16.5232           -8.91811
Z(2, 1)        25.7744            -24.7709
Z(2, 2)        49.6066            52.1707
Z(2, 3)        -17.189            -5.32849
Z(2, 4)        -17.8057           1.08107
```

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

```
Z(3, 1)      -18.171           -3.06079
Z(3, 2)      -17.189           -5.32855
Z(3, 3)      50.7966           55.1332
Z(3, 4)      25.9233           -25.0164
Z(4, 1)      -16.5232          -8.91811
Z(4, 2)      -17.8056          1.081
Z(4, 3)      25.9233           -25.0164
Z(4, 4)      50.7251           55.2564
```

FIGURE 7
WRSO MOMENT MODEL SUMMARY FOR
DIRECTIONAL DAY MODE

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

```
WRSO 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            .243       10
           0             0              96.5
 2    none 90.           81.6           0            .243       10
           90.           81.6           96.
 3    none 225.          7.             0            .243       10
           225.          7.             96.5
 4    none 208.1         343.4          0            .243       10
           208.1         343.4          96.5


Number of wires       =   4
          current nodes  =  40

                      minimum                maximum
Individual wires    wire    value          wire   value
segment length       2      9.6             1     9.65
radius               1      .243            1     .243


ELECTRICAL DESCRIPTION
Frequencies (MHz)
      frequency                 no. of  segment length (wavelengths)
no. lowest        step          steps   minimum      maximum
1   .81           0             1       .0266667     .0268056

Sources
source node    sector   magnitude      phase         type
1    1         1        942.336        74.8          voltage
2    11        1        1,600.19       314.2         voltage
3    21        1        1,171.31       301.5         voltage
4    31        1        443.384        69.4          voltage


IMPEDANCE
   normalization = 50.
freq       resist    react    imped     phase   VSWR    S11      S12
(MHz)      (ohms)    (ohms)   (ohms)    (deg)           dB       dB
source =   1; node 1, sector 1
.81        13.16     44.393   46.303    73.5    6.9132  -2.5306  -3.5497

source =   2; node 11, sector 1
.81        57.597    65.643   87.33     48.7    3.2042  -5.6086  -1.3959

source =   3; node 21, sector 1
.81        62.626    46.445   77.969    36.6    2.3062  -8.0665  -.737

source =   4; node 31, sector 1
.81        5.3731    30.85    31.314    80.1    12.878  -1.3517  -5.7274
```

FIGURE 7
WRSO MOMENT MODEL SUMMARY FOR
DIRECTIONAL DAY MODE

```
CURRENT rms
Frequency   = .81 MHz
Input power = 20,000. watts
Efficiency  = 100. %
coordinates in degrees
```

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	14.3908	1.4	14.3868	.340922
2	0	0	9.65	14.7135	.8	14.7121	.202131
3	0	0	19.3	14.5145	.4	14.5141	.10502
4	0	0	28.95	13.8928	.1	13.8927	.0264191
5	0	0	38.6	12.8779	359.8	12.8778	-.0355023
6	0	0	48.25	11.4992	359.6	11.4989	-.0803309
7	0	0	57.9	9.78984	359.4	9.78926	-.107014
8	0	0	67.55	7.78531	359.2	7.78447	-.114348
9	0	0	77.2	5.51781	359.	5.51688	-.101099
10	0	0	86.85	2.9972	358.7	2.99649	-.0656428
END	0	0	96.5	0	0	0	0
GND	13.1475	-89.0345	0	12.9567	265.5	-1.02345	-12.9162
12	13.1475	-89.0345	9.6	13.4673	263.	-1.63043	-13.3682
13	13.1475	-89.0345	19.2	13.4336	261.6	-1.97168	-13.2881
14	13.1475	-89.0345	28.8	12.9755	260.4	-2.15967	-12.7945
15	13.1475	-89.0345	38.4	12.1214	259.5	-2.21057	-11.9181
16	13.1475	-89.0345	48.	10.8978	258.7	-2.13273	-10.6871
17	13.1475	-89.0345	57.6	9.33466	258.	-1.93352	-9.13221
18	13.1475	-89.0345	67.2	7.46468	257.5	-1.62078	-7.28659
19	13.1475	-89.0345	76.8	5.31777	256.9	-1.20195	-5.18015
20	13.1475	-89.0345	86.4	2.90268	256.5	-.6796	-2.822
END	13.1475	-89.0345	96.	0	0	0	0
GND	223.323	-27.4206	0	10.6227	264.9	-.938196	-10.5812
22	223.323	-27.4206	9.65	10.8886	262.3	-1.46813	-10.7892
23	223.323	-27.4206	19.3	10.7693	260.6	-1.76492	-10.6236
24	223.323	-27.4206	28.95	10.3339	259.3	-1.92665	-10.1527
25	223.323	-27.4206	38.6	9.60155	258.2	-1.9675	-9.3978
26	223.323	-27.4206	48.25	8.59224	257.3	-1.89486	-8.3807
27	223.323	-27.4206	57.9	7.32948	256.5	-1.71532	-7.12594
28	223.323	-27.4206	67.55	5.83915	255.8	-1.43594	-5.65983
29	223.323	-27.4206	77.2	4.14509	255.1	-1.06348	-4.00635
30	223.323	-27.4206	86.85	2.25478	254.6	-.60047	-2.17336
END	223.323	-27.4206	96.5	0	0	0	0
GND	199.427	59.4518	0	10.012	349.3	9.83826	-1.85722
32	199.427	59.4518	9.65	10.1324	349.1	9.94864	-1.92081
33	199.427	59.4518	19.3	9.93024	348.9	9.74478	-1.91023
34	199.427	59.4518	28.95	9.45594	348.8	9.27484	-1.84179
35	199.427	59.4518	38.6	8.72779	348.6	8.55677	-1.7193
36	199.427	59.4518	48.25	7.765	348.5	7.60953	-1.54606
37	199.427	59.4518	57.9	6.58971	348.4	6.45499	-1.32568
38	199.427	59.4518	67.55	5.22569	348.3	5.11665	-1.06198
39	199.427	59.4518	77.2	3.6943	348.2	3.61563	-.75833
40	199.427	59.4518	86.85	2.00203	348.	1.95853	-.415087
END	199.427	59.4518	96.5	0	0	0	0

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

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

```
WRSO NIGHT

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency =  .81 MHz

        field ratio
tower  magnitude      phase (deg)
 1     1.             0
 2     0              0
 3     .95            -29.5
 4     0              0

VOLTAGES AND CURRENTS - rms
source voltage                        current
node   magnitude      phase (deg)     magnitude      phase (deg)
 1     164.627        63.8            2.37815        3.2
 11    48.2653        296.8           .0838396       27.5
 21    132.326        21.8            2.32942        334.2
 31    93.6368        269.            .167967        358.8
Sum of square of source currents = 22.234
Total power = 400. watts

TOWER ADMITTANCE MATRIX
admittance     real (mhos)      imaginary (mhos)
Y(1, 1)        .00871243        -.00882986
Y(1, 2)        .00496811        .00269084
Y(1, 3)        .00272785        -.00149079
Y(1, 4)        .00332803        -.00202396
Y(2, 1)        .00496807        .00269091
Y(2, 2)        .00865981        -.00902374
Y(2, 3)        .00278277        -.00215183
Y(2, 4)        .0020943         -.00141139
Y(3, 1)        .00272784        -.00149078
Y(3, 2)        .00278277        -.00215185
Y(3, 3)        .00848884        -.00890128
Y(3, 4)        .00491857        .0025569
Y(4, 1)        .00332803        -.00202395
Y(4, 2)        .0020943         -.00141141
Y(4, 3)        .00491857        .0025569
Y(4, 4)        .00852187        -.00877838

TOWER IMPEDANCE MATRIX
impedance      real (ohms)      imaginary (ohms)
Z(1, 1)        51.0064          55.2755
Z(1, 2)        25.7748          -24.7706
Z(1, 3)        -18.1711         -3.06078
Z(1, 4)        -16.5232         -8.91811
Z(2, 1)        25.7744          -24.7709
Z(2, 2)        49.6066          52.1707
Z(2, 3)        -17.189          -5.32849
Z(2, 4)        -17.8057         1.08107
Z(3, 1)        -18.171          -3.06079
Z(3, 2)        -17.189          -5.32855
```

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

z(3, 3)	50.7966	55.1332
z(3, 4)	25.9233	-25.0164
z(4, 1)	-16.5232	-8.91811
z(4, 2)	-17.8056	1.081
z(4, 3)	25.9233	-25.0164
z(4, 4)	50.7251	55.2564

FIGURE 9
WRSO MOMENT MODEL SUMMARY FOR
DIRECTIONAL NIGHT MODE

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

```
GEOMETRY
WRSO 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             .243        10
           0             0             96.5
 2    none 90.           81.6          0             .243        10
           90.           81.6          96.
 3    none 225.          7.            0             .243        10
           225.          7.            96.5
 4    none 208.1         343.4         0             .243        10
           208.1         343.4         96.5

Number of wires       =   4
          current nodes  =  40


                    minimum                 maximum
Individual wires    wire    value           wire    value
segment length       2      9.6              1      9.65
radius               1      .243             1      .243


ELECTRICAL DESCRIPTION
Frequencies (MHz)
      frequency                 no. of  segment length (wavelengths)
no. lowest          step        steps   minimum       maximum
 1  .81             0            1       .0266667      .0268056

Sources
source node      sector  magnitude      phase         type
 1    1            1      232.817        63.8          voltage
 2    21           1      187.137        21.8          voltage

Lumped loads
               resistance    reactance      inductance  capacitance passive
load   node    (ohms)        (ohms)         (mH)        (uF)        circuit
 1     11      0             575.64         0           0           0
 2     31      0             557.47         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
.81         33.962    60.298    69.204    60.6      4.0454    -4.385    -1.9677

source =  2; node 21, sector 1
.81         38.307    41.942    56.803    47.6      2.6061    -7.0254   -.96023
```

FIGURE 9
WRSO MOMENT MODEL SUMMARY FOR
DIRECTIONAL NIGHT MODE

```
CURRENT rms
Frequency   = .81 MHz
Input power = 400. watts
Efficiency  = 100. %
coordinates in degrees
```

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	2.37861	3.2	2.37493	.132359
2	0	0	9.65	2.46164	1.7	2.4605	.0750189
3	0	0	19.3	2.44764	.8	2.44738	.036138
4	0	0	28.95	2.35775	.1	2.35775	5.86E-03
5	0	0	38.6	2.19733	359.6	2.19726	-.0168924
6	0	0	48.25	1.97135	359.1	1.97108	-.0323633
7	0	0	57.9	1.68539	358.6	1.6849	-.0406187
8	0	0	67.55	1.34544	358.2	1.34479	-.0417169
9	0	0	77.2	.956957	357.9	.95629	-.0357237
10	0	0	86.85	.521547	357.5	.521059	-.0225592
END	0	0	96.5	0	0	0	0
GND	13.1475	-89.0345	0	.0839735	26.8	.074951	.0378669
12	13.1475	-89.0345	9.6	.0462457	26.7	.0412989	.0208101
13	13.1475	-89.0345	19.2	.0212658	26.3	.0190663	9.42E-03
14	13.1475	-89.0345	28.8	2.42E-03	17.1	2.32E-03	7.13E-04
15	13.1475	-89.0345	38.4	.0112656	210.2	-9.73E-03	-5.67E-03
16	13.1475	-89.0345	48.	.0200294	209.5	-.0174351	-9.86E-03
17	13.1475	-89.0345	57.6	.0242098	209.5	-.021067	-.0119289
18	13.1475	-89.0345	67.2	.0241126	209.7	-.020936	-.0119625
19	13.1475	-89.0345	76.8	.0200658	210.	-.0173698	-.0100462
20	13.1475	-89.0345	86.4	.0123212	210.4	-.0106294	-6.23E-03
END	13.1475	-89.0345	96.	0	0	0	0
GND	223.323	-27.4206	0	2.32935	334.2	2.09728	-1.01355
22	223.323	-27.4206	9.65	2.37803	332.6	2.11045	-1.09592
23	223.323	-27.4206	19.3	2.34445	331.5	2.06053	-1.11833
24	223.323	-27.4206	28.95	2.24331	330.7	1.95597	-1.09846
25	223.323	-27.4206	38.6	2.07908	330.	1.80038	-1.03981
26	223.323	-27.4206	48.25	1.85632	329.4	1.59776	-.945034
27	223.323	-27.4206	57.9	1.58028	328.9	1.35275	-.816912
28	223.323	-27.4206	67.55	1.25663	328.4	1.07033	-.658427
29	223.323	-27.4206	77.2	.890562	328.	.755004	-.472303
30	223.323	-27.4206	86.85	.483689	327.6	.408257	-.259387
END	223.323	-27.4206	96.5	0	0	0	0
GND	199.427	59.4518	0	.1679	358.9	.167871	-3.11E-03
32	199.427	59.4518	9.65	.094281	358.9	.0942651	-1.73E-03
33	199.427	59.4518	19.3	.0448671	359.	.0448606	-7.6E-04
34	199.427	59.4518	28.95	6.88E-03	.2	6.88E-03	2.49E-05
35	199.427	59.4518	38.6	.021208	178.3	-.0211983	6.41E-04
36	199.427	59.4518	48.25	.0398862	178.4	-.0398714	1.08E-03
37	199.427	59.4518	57.9	.0494597	178.4	-.0494414	1.34E-03
38	199.427	59.4518	67.55	.0502426	178.4	-.0502228	1.41E-03
39	199.427	59.4518	77.2	.0425701	178.3	-.0425515	1.26E-03
40	199.427	59.4518	86.85	.0266035	178.2	-.02659	8.48E-04
END	199.427	59.4518	96.5	0	0	0	0

FIGURE 10
DERIVED DIRECTIONAL PARAMETERS

APPLICATION FOR LICENSE INFORMATION
EMPLOYING MOMENT METHOD MODELING
WRSO, 810 KHZ, DA-2
ORLOVISTA, FLORIDA
FEBRUARY, 2015

DAY:

Tower	Theoretical		Base Network Input Current		Normalized TCT	
	Field	Phase	Amplitude	Phase	Amplitude	Phase
1 (SW)	1.000	0.0°	14.62	+1.15°	1.114	+95.9°
2 (SE)	.931	-99.8°	13.12	-94.76°	1.000	0.0°
3 (NE)	.744	-101.0°	10.80	-95.84°	.823	-1.1°
4 (NW)	.680	-11.3°	10.14	-10.79°	.773	+84.0°

NIGHT:

Tower	Theoretical		Base Network Input Current		Normalized TCT	
	Field	Phase	Amplitude	Phase	Amplitude	Phase
1 (SW)	1.000	0.0°	2.42	+2.77°	1.000	0.0°
2 (SE)			DETUNED			
3 (NE)	.950	-29.5°	2.37	-26.27°	.979	-29.0°
4 (NW)			DETUNED			

FIGURE 11
WRSO TOWER BASE CIRCUIT ANALYSIS DESCRIPTION

APPLICATION FOR LICENSE INFORMATION
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ORLOVISTA, FLORIDA
FEBRUARY, 2015

CIRCUIT ANALYSIS

Circuit Analysis was performed on each Tower of the WRSO 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.
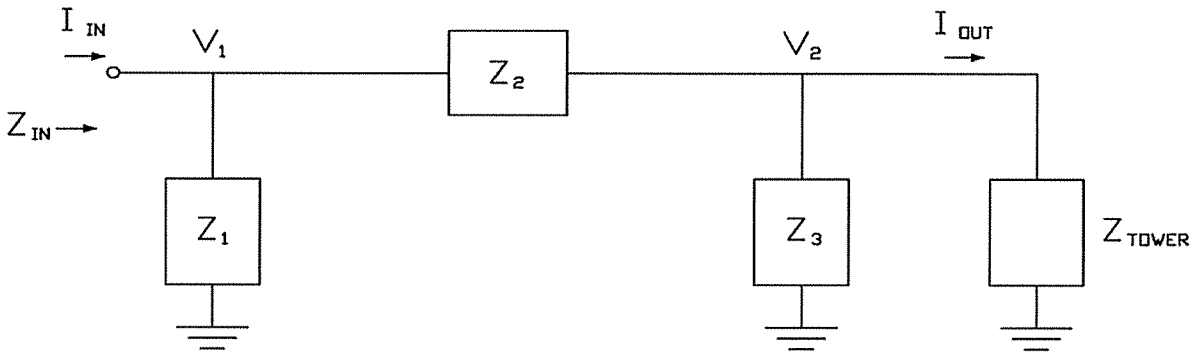
FIGURE 12
WRSO CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

```
CUSTOMER : WRSO
NETWORK ID : TOWER 1 (OTHERS OPEN)


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,    20.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :  51.00,    55.39 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	51.43	55.42
1		2	0.00	20.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	100.00	0.00
2	82.82	-8.57

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	49.18	74.50	89.27	56.57
INPUT CURRENT (AMPS) :	0.62	-0.93	1.12	-56.57
OUTPUT CURRENT (AMPS) :	0.62	-0.91	1.10	-55.93

```
INPUT/OUTPUT CURRENT RATIO =  1.0183
INPUT/OUTPUT PHASE =   -0.64 DEGREES
```

FIGURE 12
WRSO CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

```
CUSTOMER : WRSO
NETWORK ID : TOWER 2 (OTHERS OPEN)


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,    26.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00, -4366.40 OHMS
TOWER IMPEDANCE (R,X) :  49.85,    52.31 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	51.06	52.36
1		2	0.00	26.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	100.00	0.00
2	78.19	-11.19

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	48.74	77.29	91.38	57.76
INPUT CURRENT (AMPS) :	0.58	-0.93	1.09	-57.76
OUTPUT CURRENT (AMPS) :	0.58	-0.91	1.08	-57.57

```
INPUT/OUTPUT CURRENT RATIO =  1.0113
INPUT/OUTPUT PHASE =    -0.19 DEGREES
```

FIGURE 12
WRSO CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

```
CUSTOMER : WRSO
NETWORK ID : TOWER 3 (OTHERS OPEN)


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,     21.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :  51.04,     55.24 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	51.47	55.27
1		2	0.00	21.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	100.00	0.00
2	82.08	-8.95

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	49.20	75.31	89.95	56.85
INPUT CURRENT (AMPS) :	0.61	-0.93	1.11	-56.85
OUTPUT CURRENT (AMPS) :	0.61	-0.91	1.09	-56.21

```
INPUT/OUTPUT CURRENT RATIO =  1.0186
INPUT/OUTPUT PHASE =    -0.64 DEGREES
```

FIGURE 12
WRSO CIRCUIT ANALYSIS FOR INDIVIDUAL TOWERS

```
CUSTOMER : WRSO
NETWORK ID : TOWER 4 (OTHERS OPEN)


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,     20.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :  50.94,     55.33 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	51.38	55.37
1		2	0.00	20.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	100.00	0.00
2	82.81	-8.58

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	49.13	74.45	89.20	56.58
INPUT CURRENT (AMPS) :	0.62	-0.94	1.12	-56.58
OUTPUT CURRENT (AMPS) :	0.62	-0.91	1.10	-55.94

```
INPUT/OUTPUT CURRENT RATIO =  1.0183
INPUT/OUTPUT PHASE =   -0.64 DEGREES
```

FIGURE 13
WRSO CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

```
CUSTOMER : WRSO
NETWORK ID : TOWER 1 DAY


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,    20.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :  13.16,    44.39 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	13.25	44.53
1		2	0.00	20.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	944.81	79.77
2	666.33	74.80

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	12.75	63.36	64.63	78.62
INPUT CURRENT (AMPS) :	14.62	0.29	14.62	1.15
OUTPUT CURRENT (AMPS) :	14.39	0.33	14.39	1.31

```
INPUT/OUTPUT CURRENT RATIO =  1.0158
INPUT/OUTPUT PHASE =    -0.16 DEGREES
```

FIGURE 13
WRSO CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

```
CUSTOMER : WRSO
NETWORK ID : TOWER 2 DAY


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,    26.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00, -4366.40 OHMS
TOWER IMPEDANCE (R,X) :  57.60,    65.64 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	59.36	65.85
1		2	0.00	26.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	1395.79	-36.64
2	1131.51	314.20

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	56.22	90.37	106.43	58.12
INPUT CURRENT (AMPS) :	-1.09	-13.07	13.12	-94.76
OUTPUT CURRENT (AMPS) :	-1.02	-12.92	12.96	-94.54

```
INPUT/OUTPUT CURRENT RATIO =  1.0122
INPUT/OUTPUT PHASE =   -0.22 DEGREES
```

FIGURE 13
WRSO CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

```
CUSTOMER : WRSO
NETWORK ID : TOWER 3 DAY


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,     21.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :  62.63,    46.44 OHMS
```

| | | | IMPEDANCE (OHMS) | |
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	63.07	46.31
1		2	0.00	21.00

| | VOLTAGE | |
NODE	MAGNITUDE	PHASE
1	976.38	-47.93
2	828.24	301.50

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	60.59	67.10	90.41	47.92
INPUT CURRENT (AMPS) :	-1.10	-10.74	10.80	-95.84
OUTPUT CURRENT (AMPS) :	-0.94	-10.58	10.62	-95.06

```
INPUT/OUTPUT CURRENT RATIO =  1.0167
INPUT/OUTPUT PHASE =    -0.78 DEGREES
```

FIGURE 13
WRSO CIRCUIT ANALYSIS FOR DIRECTIONAL DAY MODE

```
CUSTOMER : WRSO
NETWORK ID : TOWER 4 DAY


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,    20.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :   5.37,    30.85 OHMS
```

| | | | IMPEDANCE (OHMS) | |
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	5.40	30.92
1		2	0.00	20.00

| | VOLTAGE | |
NODE	MAGNITUDE	PHASE
1	511.47	73.25
2	313.52	69.40

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	5.24	50.17	50.44	84.04
INPUT CURRENT (AMPS) :	9.96	-1.90	10.14	-10.79
OUTPUT CURRENT (AMPS) :	9.84	-1.86	10.01	-10.72

```
INPUT/OUTPUT CURRENT RATIO =  1.0128
INPUT/OUTPUT PHASE =   -0.07 DEGREES
```

FIGURE 14
WRSO CIRCUIT ANALYSIS FOR DIRECTIONAL NIGHT MODE

```
CUSTOMER : WRSO
NETWORK ID : TOWER 1 NIGHT


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :    0.00,   3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :    0.00,     20.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :    0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :  33.96,     60.30 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	34.28	60.49
1		2	0.00	20.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	207.15	70.27
2	164.63	63.80

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	32.68	78.93	85.43	67.51
INPUT CURRENT (AMPS) :	2.42	0.12	2.42	2.77
OUTPUT CURRENT (AMPS) :	2.38	0.13	2.38	3.19

```
INPUT/OUTPUT CURRENT RATIO =  1.0194
INPUT/OUTPUT PHASE =   -0.42 DEGREES
```

FIGURE 14
WRSO CIRCUIT ANALYSIS FOR DIRECTIONAL NIGHT MODE

```
CUSTOMER : WRSO
NETWORK ID : TOWER 3 NIGHT


FREQUENCY :  810.00 kHz
ATU SHUNT IMPEDANCE (R,X) :   0.00,  3350.00 OHMS
TOWER FEED IMPEDANCE (R,X) :   0.00,     21.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) :   0.00,-13099.20 OHMS
TOWER IMPEDANCE (R,X) :  38.31,     41.94 OHMS
```

			IMPEDANCE (OHMS)	
NODE	TO	NODE	R	X
1		GROUND	0.00	3350.00
2		GROUND	38.55	41.96
1		2	0.00	21.00

	VOLTAGE	
NODE	MAGNITUDE	PHASE
1	171.44	32.90
2	132.33	21.80

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	37.14	62.22	72.46	59.17
INPUT CURRENT (AMPS) :	2.12	-1.05	2.37	-26.27
OUTPUT CURRENT (AMPS) :	2.10	-1.01	2.33	-25.79

```
INPUT/OUTPUT CURRENT RATIO =  1.0156
INPUT/OUTPUT PHASE =    -0.48 DEGREES
```

FIGURE 15

Radial		Dist km	Time	mV/m		CO-ORD NAD27 deg	min	sec	Description
N 10 E	1	1.52	1003	160.0	N	28	35	6.4	Mercy Drive at Unisource entrance
					W	81	25	52.5	
	2	4.91	1020	35.0	N	28	36	54.4	Parking lot of #6401 Edgewater Drive
					W	81	25	31.7	
	3	5.45	1025	33.0	N	28	37	11.9	Driveway 3531 Dr. Love Road
					W	81	25	27.9	
N 72 E	1	1.84	1040	1310.0	N	28	34	36.2	John Young Pkwy. --south end of Wawa parking lot
					W	81	24	57.4	
	2	2.40	1048	1080.0	N	28	34	41.9	Regent Ave. 100' north of Silver Star Rd.
					W	81	24	37.9	
	3	2.74	1053	1100.0	N	28	34	45.5	Orange Blossom Trail opposite gate
					W	81	24	26.2	
N 127.5 E	1	2.22	1126	138.0	N	28	33	35.3	100' west of int. John Young Pkwy + WD Judge Road
					W	81	24	56.8	
	2	3.67	1105	81.0	N	28	33	5.9	Arlington St + Vern Dr -- southwest corner
					W	81	24	14.6	
	3	3.54	1114	105.0	N	28	33	8.5	W Colonial Dr -- east edge of Citgo parking lot
					W	81	24	19.1	

FIGURE 15 CONTINUED

WRSO REFERENCE POINTS -- DA-D cont.   1/3/2015

Radial		Dist km	Time	mV/m		deg	min	sec	Description
						CO-ORD NAD27			
N 230 E	1	2.48	1048	7.6	N	28	33	26.6	San Domingo Rd near Balboa -- drwy opp spd lim 25
					W	81	27	12.1	
	2	2.93	1032	22.0	N	28	33	16.7	Mailbox 810 Governors Ave
					W	81	27	24.4	
	3	3.24	1027	18.3	N	28	33	10.6	Hastings St -- St Andrew Church lot drwy
					W	81	27	33.6	
N 269.5 E	1	1.45	1055	43.0	N	28	34	17.0	Drwy 2117 Beecher St
					W	81	26	55.2	
	2	1.94	1105	20.5	N	28	34	16.9	Casa Vida Apts. @ curve south of Building N -- on road
					W	81	27	13.6	
	3	2.27	1112	22.2	N	28	34	15.6	Golf Club Pkwy + Silver Spruce @ fire hydrant
					W	81	27	25.4	
N 322.5 E	1	2.60	1122	24.2	N	28	35	24.5	White Heron Dr + Donovan St -- west side
					W	81	27	0.8	
	2	2.89	1128	27.8	N	28	35	31.5	Grandview off Pine Hills Rd @ spd lim 25
					W	81	27	7.9	
	3	3.50	1133	23.1	N	28	35	47.0	Mailbox 4403 Robbins Ave
					W	81	27	22.0	

FIGURE 15 CONTINUED

WRSO REFERENCE POINTS -- DA-N   1/3/2015

Radial		Dist km	Time	mV/m		CO-ORD NAD27 deg	min	sec	Description
N 28.5 E	1	1.24	1338	14.1	N	28	34	58.6	Road to industrial building -- @ fence
					W	81	25	41.3	
	2	2.16	1353	7.7	N	28	35	18.8	Int of Bay Lake Road + Eunice Ave
					W	81	25	22.7	
	3	3.73	1403	5.6	N	28	36	3.2	Trotters Park lot by fire hydrant + stop sign
					W	81	24	55.2	
N 89.5 E	1	2.31	1428	135.0	N	28	34	18.5	Lynx Lane @ bus stop
					W	81	24	37.1	
	2	2.71	1413	91.0	N	28	34	19.3	Orange Blossom Trl W side -- Pr'ton Commerce Ctr.
					W	81	24	22.1	
	3	3.11	1421	72.0	N	28	34	19.1	1503 W Smith St -- parking lot
					W	81	24	7.5	
N 139 E	1	3.05	1453	8.0	N	28	33	3.8	John Young Pkwy W side -- center of mall parking lot
					W	81	24	47.8	
	2	4.04	1448	1.95	N	28	32	39.1	int Lakeland Ave + Washington St
					W	81	24	25.1	
	3	4.68	1439	2.8	N	28	32	23.7	Church St opp stadium box office
					W	81	24	9.0	

FIGURE 15 CONTINUED

WRSO REFERENCE POINTS -- DA-N cont.   1/3/2015

Radial		Dist km	Time	mV/m		deg	min	sec	Description
N 235 E	1	1.76	1343	7.0	N	28	33	45.2	Mailbox 4913 Cortez Dr
					W	81	26	55.0	
	2	2.09	1350	4.5	N	28	33	39.1	Drwy 1109 Santa Anita St
					W	81	27	4.8	
	3	2.46	1356	9.6	N	28	33	31.8	Mailbox 1006 Emeralda Rd
					W	81	27	15.9	
N 284.5 E	1	1.70	1406	120.0	N	28	34	31.3	Queensway Rd + Kipp @ street sign
					W	81	27	2.6	
	2	2.30	1413	96.0	N	28	34	37.1	Drwy 5800 Golf Club Pkwy
					W	81	27	23.7	
	3	3.02	1419	71.0	N	28	34	42.1	Mailbox 2609 Pioneer Rd
					W	81	27	49.7	
N 345.5 E	1	1.14	1432	20.4	N	28	34	53.5	Seaboard Rd north side @ C+S -- on drain
					W	81	26	13.0	
	2	1.67	1441	13.7	N	28	35	10.1	Shader Rd W of Daltile plant + rail -- S side @ drain
					W	81	26	17.6	
	3	4.45	1458	3.0	N	28	36	37.3	opp drwy 5426 Lee Ann Dr
					W	81	26	43.6	

The column header *CO-ORD NAD27* spans the deg/min/sec coordinate columns.