

January 16, 2013

VIA UPS OVERNIGHT COURIER

Federal Communications Commission
Media Bureau
P.O. Box 979089
St. Louis, MO 63197-9000

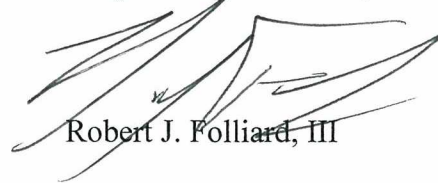
Re: WDAY(AM), Fargo, North Dakota (Facility ID No. 22126)
FCC Covering License Application (FCC Form 302-AM)

Dear Sir or Madam:

On behalf of Forum Communications Company, licensee of WDAY(AM), Fargo, North Dakota, we hereby submit, in triplicate, an application for a covering license for WDAY(AM). We also enclose an FCC Form 159 providing payment information for the filing fee of \$1,365 for the license application.

Please contact me if any questions should arise regarding this submission.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Robert J. Folliard, III', written over a horizontal line.

Enclosures

FCC 162
February 2000

Approved by OMB
3060-0919

Federal Communications Commission
Commission Registration System (CORES)
CORES Certification Form

I, Susan Anderson, certify that the FCC Registration Number (FRN) listed below is true and correct to the best of my knowledge, information and belief.

FCC Registration Number (FRN)

0002480085

ENTITY NAME:

Forum Communications Company

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. *Bm m L 20130124 AG 2*

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial) *Anderson, Susan E.*
Dow Lohnes PLLC

MAILING ADDRESS (Line 1) (Maximum 35 characters) *1200 New Hampshire Avenue, NW, Suite 800*

MAILING ADDRESS (Line 2) (Maximum 35 characters) *Attention: Robert J. Folliard, III*

CITY *Washington*

STATE OR COUNTRY (if foreign address)
DC

ZIP CODE
20036

TELEPHONE NUMBER (include area code)
202-776-2000

CALL LETTERS
WDAY (AM)

OTHER FCC IDENTIFIER (If applicable)
22126

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		
M	M	R

(B) FEE MULTIPLE			
0	0	0	1

(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)
\$ 635.00

FOR FCC USE ONLY

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

(A)		
M	O	R

(B)			
0	0	0	1

(C)
\$ 730.00

FOR FCC USE ONLY

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
\$ 1365.00

FOR FCC USE ONLY

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Forum Communications Company		
MAILING ADDRESS 301 Eighth Street South		
CITY Fargo	STATE ND	ZIP CODE 58103

2. This application is for:

☐ Commercial
 ☐ Noncommercial
☐ AM Directional
 ☐ AM Non-Directional

Call letters WDAY(AM)	Community of License Fargo, ND	Construction Permit File No. BP-20111223AAJ	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit 06/07/2015
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3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☒ No

If No, explain in an Exhibit.

Exhibit No.

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

☒ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No.

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☒ No

If Yes, explain in an Exhibit.

Exhibit No.

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

☐ Yes ☐ No

☒ Does not apply

If No, explain in an Exhibit.

Exhibit No.

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

☐ Yes ☒ No

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

Exhibit No.

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

☐ Yes ☒ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

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


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

CERTIFICATION

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

☒ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name Mark Prather	Signature 	
Title Vice President, Broadcast Operations	Date Jan 16, 2013	Telephone Number 701-237-6500

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 Forum Communications Company

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☒ Station License
BMML

☐ 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	
WDAY	BP-20111223AAJ	970	Unlimited	Night 10	Day 10
2. Station location					
State North Dakota			City or Town Fargo		
3. Transmitter location					
State MN	County Clay	City or Town Barnesville	Street address (or other identification) 16821 210th St. South		
4. Main studio location					
State ND	County Cass	City or Town Fargo	Street address (or other identification) 301 8th St. South		
5. Remote control point location (specify only if authorized directional antenna)					
State ND	County Cass	City or Town Fargo	Street address (or other identification) 301 8th St. South		

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 Stmt

8. Operating constants:						
RF common point or antenna current (in amperes) without modulation for night system 14.51			RF common point or antenna current (in amperes) without modulation for day system 14.51			
Measured antenna or common point resistance (in ohms) at operating frequency Night 50.0			Measured antenna or common point reactance (in ohms) at operating frequency Night 0.0			
Day 50.0			Day 0.0			
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 (center)	0.0	0.0	1.000	1.000		
2 (southeast)	123.8	78.4	0.366	0.537		
3 (north)	-134.4	-----	0.672	-----		
Manufacturer and type of antenna monitor: Potomac Instruments, Model 1901-3, s/n 620						

SECTION III - Page 2

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

Type Radiator tapered, self-supporting, steel	Overall height in meters of radiator above base insulator, or above base, if grounded. 77.3	Overall height in meters above ground (without obstruction lighting) 78.7	Overall height in meters above ground (include obstruction lighting) 79.4	If antenna is either top loaded or sectionalized, describe fully in an Exhibit. Exhibit No. N/A
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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	46 °	38 '	48 "	West Longitude	96 °	21 '	50 "
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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 Stmt

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system.

Exhibit No.
Eng Stmt

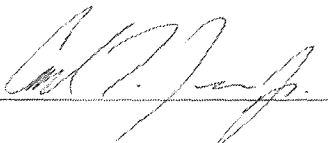
10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

None

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

N/A

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) Carl T. Jones, Jr.	Signature 
Address (include ZIP Code) Carl T. Jones Corporation 7901 Yarnwood Court Springfield, VA 22153	Date January 14, 2013 Telephone No. (Include Area Code) (703) 569-7704

☐ Technical Director

☒ Registered Professional Engineer

☐ Chief Operator

☐ Technical Consultant

☐ Other (specify)

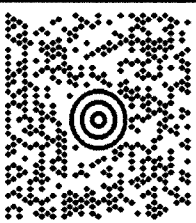

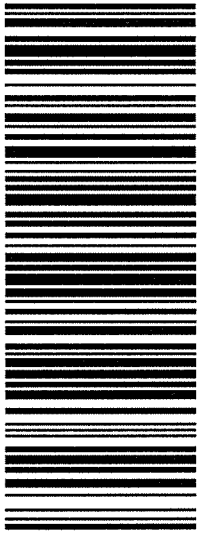

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Client Matter Number: 01783 Reference # 2: 0001	
 CS 15.0.26 WNTES0 33.0A 10/2012	



**ENGINEERING EXHIBIT
IN SUPPORT OF
AN APPLICATION FOR STATION LICENSE
STATION WDAY(AM) – FARGO, NORTH DAKOTA
970 kHz, 10 kW, U, DA-2
Facility ID: 22126**

Applicant: Forum Communications Company

JANUARY, 2013

7901 Yarnwood Court
Springfield, VA 22153-2899

⋮

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⋮

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ENGINEERING STATEMENT OF CARL T. JONES, JR.

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**ENGINEERING STATEMENT OF CARL T. JONES, JR., P.E.
IN SUPPORT OF
AN APPLICATION FOR STATION LICENSE
STATION WDAY(AM) – FARGO, NORTH DAKOTA
970 kHz, 10 kW, U, DA-2
Facility ID: 22126**

Applicant: Forum Communications Company

I am a Consulting Engineer, president in the firm of Carl T. Jones Corporation, with offices located in Springfield, Virginia. My education and experience are a matter of record with the Federal Communications Commission. I am a Registered Professional Engineer in the Commonwealth of Virginia, Registration No. 013391.

1.0 GENERAL

This office has been authorized by Forum Communications Company ("Forum"), licensee of Station WDAY(AM), to prepare this engineering statement and the associated figures and appendices in support of an Application for License to cover outstanding Construction Permit, FCC File No. BP-20111223AAJ. The construction permit was granted by the FCC on June 6, 2012. The construction permit authorizes: 1) relocation and modification of the daytime and nighttime directional antenna systems; 2) a change in the daytime pattern from non-directional to directional; 3) modification of the nighttime directional pattern; and 4) an increase in daytime and nighttime power from 5 kW to 10 kW.

Following completion of construction of the modified facilities, Forum authorized this office to adjust the daytime and nighttime directional patterns for conformance with the technical terms of the Construction Permit using computer modeling and sample system verification techniques, as described in Section 47 CFR 73.151(c) of the Commission's Rules and Regulations. In addition, electromagnetic field measurements

were performed by the undersigned to verify that the fields outside of the fenced area surrounding each tower were below the maximum permissible general public exposure level.

The specific measurement and modeling techniques used in performing the proof of performance on the WDAY daytime and nighttime directional patterns are described in detail in this engineering statement. Impedance measurement data, sample system verification measurement data, and model derived operating parameters are tabulated in the figures attached to this engineering statement. All pertinent computer model input and output files are contained in the attached Appendices A through D.

2.0 IMPEDANCE MEASUREMENTS, COMPUTER MODELING, AND SAMPLE SYSTEM VERIFICATION

The WDAY antenna array consists of three, identical, triangular, tapered, self-supporting, series-fed towers. The height of each tower is 90 electrical degrees (77.3 meters). There are no other antennas mounted on the WDAY towers, nor are there any isolation circuits across the base insulator associated with auxiliary antennas. Lighting chokes are installed across the base of each tower to allow AC power to cross the base insulator for the purpose of tower lighting.

The sample system utilizes identical toroidal current transformers located at the base of each tower in the output branch of the Antenna Tuning Unit (“ATU”) network. This location corresponds to the input to the tower feed line.

A detailed description of the impedance measurements, the computer models employed, and the sample system verification measurements is contained below.

2.1 INDIVIDUAL TOWER IMPEDANCE MEASUREMENTS

Impedance measurements were performed at the base of each tower, by the undersigned, at the ATU network output branch J-Plug that is located adjacent to the sampling system toroidal current transformer. The impedance measurements were performed using a Delta Electronics Model OIB-1 operating impedance bridge. Measurement of a precision resistor using the impedance bridge verified that the

measurement accuracy was well within the manufacturers stated tolerance.

The impedance was measured by applying power to the tower under test with the impedance bridge connected across the output branch J-Plug terminals and with the other two towers in the array open-circuited with respect to ground at the corresponding output branch J-Plug location. The measured impedance data for each tower is tabulated in Figure 3.

2.2 INDIVIDUAL TOWER COMPUTER MODELS

A Method of Moments (“MoM”) computer model was developed to model each element in the WDAY array using Expert MiniNEC Broadcast Professional (Version 23.0). Because the towers are tapered and have a face-width at their base of 23 feet, a detailed wireframe model of each tower in the array, including the “spider” feed system, was developed. A sketch of the model for one of the towers is shown in Figure 1.

To replicate the individual measured base impedances to within FCC specified tolerances, it was necessary to adjust the physical height of two of the three towers in the MiniNEC model and, in a separate circuit model, to add a small amount of inductive reactance in series with the model derived base impedance of each tower. Details of the modeled individual tower adjusted heights are contained in Figure 2. A comparison of the measured individual tower impedances, the modeled individual tower impedances and the adjusted circuit model impedances is contained in Figure 3. The adjusted tower height percentage changes and the magnitude of the inductance used in replicating the measured impedance are well within the tolerances set forth in the Rules.

As demonstrated by the data contained in Figure 3, the adjusted modeled individual tower resistances and reactances are well within ± 2 ohms and ± 4 percent of the respective measured individual tower resistances and reactances. The text files containing all necessary input and output data associated with the individual tower models are contained in Appendix A.

2.3 DIRECTIONAL ANTENNA COMPUTER MODELS AND ANTENNA MONITOR PARAMETERS

The WDAY theoretical daytime and nighttime directional field parameters were used in combination with the individual tower computer models to produce the directional antenna computer models. Since the daytime directional antenna system uses only the center and southeast tower, the north tower was detuned in the daytime computer model by installing a terminating inductor between the spider feed system and ground. The value of the terminating inductor that results in a detuned condition was determined by exciting the tower under study with a plane wave field and adjusting the value of the terminating inductor in the model until a minimum horizontal plane radiated field was achieved. The input and output files for the detuned tower model are contained in the attached Appendix D.

From the daytime and nighttime computer models, tower currents were derived that, when numerically integrated and normalized to the appropriate reference tower, are essentially identical to the authorized relative field parameters for the WDAY theoretical daytime and nighttime antenna patterns. The model derived relative antenna monitor parameters, as determined from the normalized relative currents input to the spider feed system at the base of each tower, are tabulated in Figure 4 for the daytime and nighttime patterns. The text files containing all pertinent input and output data associated with the daytime and nighttime directional antenna computer models are contained in Appendices B and C, respectively.

2.4 SAMPLE SYSTEM DESCRIPTION AND VERIFICATION MEASUREMENTS

The WDAY antenna sampling system is comprised of: 1) identical Delta Electronics, Model TCT-3, toroidal current transformers mounted in the same manner in each ATU network output branch (this location corresponds to the input to the tower “spider” feed system); 2) approximate equal lengths of Andrew Type LDF4-50A, 1/2-inch, foam dielectric, coaxial cable between each toroidal current transformer and the transmitter building; 3) short lengths of Andrew Type FSJ4-50B, 1/2-inch, foam dielectric, “superflex”, coaxial cable between the LDF4-50A sampling lines and the antenna

monitor; and 4) a Potomac Instruments, Model 1901-3 antenna monitor. The sample lines between the ATU enclosure and the transmitter building, including excess lengths of line, are buried; therefore, each sample line is subjected to the same environmental conditions.

The length of each LDF4-50A sample line was initially measured and the variation in length between the three sample lines was found to be 1.4 electrical degrees at 970 kHz. The length of the short FSJ4-50B “superflex” cables were then trimmed such that the variation in the overall electrical length of LDF4-50A and FSJ4-50B cables was within 1 electrical degree at 970 kHz. The measurement of the sample line length was accomplished by measuring the open-circuit series resonate frequency closest to the carrier frequency. The characteristic impedance was verified by measuring the impedance at frequencies corresponding to odd multiples of 1/8 wavelength immediately above and below the open circuit series resonant frequency closest to the carrier frequency, while the line was open circuited at the sample element end of the line. The characteristic impedance was calculated using the following formula:

$$Z = \sqrt{\sqrt{R_1^2 + X_1^2} \times \sqrt{R_2^2 + X_2^2}}$$

where: Z = Characteristic impedance and

$R_1 + X_1$ and $R_2 + X_2$ are the measured impedances

at the 45 degree offset frequencies.

A tabulation of the measured sample line lengths and characteristic impedances is contained in Figure 5. All sample line verification measurements were performed by the undersigned using a Hewlett-Packard Model 8753C network analyzer; an ENI Model 310L power amplifier; and a Tunwall Radio directional coupler. As demonstrated by the measured values in Figure 5, the measured sample line lengths are within 1 electrical degree of each other and the measured characteristic impedances are within 2 Ohms of

each other as required by Section CFR73.151(c)(2)(i) of the FCC's Rules and Regulations.

An impedance measurement was performed at the input to each sample line, at the antenna monitor end of the line, with the sample current transformer connected at the ATU end of the line. The measurement was performed at the WDAY operating frequency of 970 kHz. The measured sample line impedances with the current transformers connected are tabulated in Figure 5 under the heading, "Reference Impedance Sample Transformer Connected".

The performance of the sampling system toroidal current transformers was verified by driving a common reference current through all three transformers and comparing their outputs against one another as observed on the network analyzer. Based on the test results, the performance of the transformers was determined to be well within the manufacturer's stated accuracy. A tabulation of the toroidal current transformer measurement data, and the manufacturer, model number and the serial number of each toroidal current transformer is contained in Figure 6.

The antenna monitor that is employed at WDAY is a Potomac Instruments, Model 1901-3, Serial Number 620. The antenna monitor was calibrated by the manufacturer in September, 2012.

3.0 DIRECTIONAL ANTENNA ADJUSTMENT, COMMON POINT IMPEDANCE AND COMMON POINT CURRENT

In preparation for the adjustment of the daytime antenna system, tower #3 (north) was first detuned. While exciting tower #1, the current on tower #3 was sampled at the height corresponding to the height of the current minimum for a detuned condition. Based on the results of the MiniNEC detune model, this height was determined to be approximately 80 feet above the base of the radiator. While sampling the current at the 80-foot height, the detuning inductor at the base of tower #3 was adjusted until a minimum sampled current was achieved.

After completing the detuning effort as described above, the daytime and nighttime phasors were adjusted to produce the MiniNEC model derived operating

parameters. For each antenna system, the ATU and phasor networks were adjusted for proper impedance transformation. The daytime and nighttime common point impedance matching networks were then adjusted for $Z = 50 + j0.0$ Ohms. The transmitter output power level was adjusted for a daytime and nighttime common point current of 14.51 amperes, corresponding to an input power of 10,530 Watts.

4.0 REFERENCE FIELD STRENGTH MEASUREMENTS

Reference field strength measurements for the daytime pattern were performed on the 315° radial bearing, corresponding to the daytime pattern main radiation lobe, and the 133° radial bearing corresponding to the approximate daytime pattern minimum. The bearing of the actual daytime pattern minimum is 135°. However, because one of the nighttime pattern minima is on a bearing of 133° degrees and because there is essentially no difference in the radiated daytime field between the two bearings, it was decided to select a single radial for both the daytime and nighttime reference field strength measurements.

Reference field strength measurements for the nighttime pattern were performed on the 351° radial bearing, corresponding to the nighttime pattern main radiation lobe, and the 133° and 261° radial bearings corresponding to the nighttime pattern minima.

The measurements were performed by the undersigned with the assistance of Mr. Dave Johnson, Chief Engineer of WDAY. The meter that was employed to perform the measurements is a Potomac Instruments, Model FIM-41, Serial Number 989, last calibrated by the manufacturer in March, 2012.

The measured field strength value for each established reference point location is tabulated in Figure 7, Sheets 1 and 2. The tabulations contained in Figure 7 also include GPS coordinates (NAD83), distance from WDAY array center, and descriptions for each reference point location.

5.0 COMPLIANCE WITH RADIOFREQUENCY ENERGY GUIDELINES

Each of the three WDAY towers is surrounded by a 6 foot high wooden fence to restrict access around the base of the tower. A gate is installed in the fence to allow

station personnel to access the ATU enclosure and tower base for maintenance purposes. The gate is locked at all times other than when scheduled maintenance is being performed. Appropriate radiofrequency energy warning signs are posted on all four sides of the fence surrounding each tower, warning of high radio frequency energy levels within the fenced area.

The fence dimensions vary slightly from tower to tower, but in general the fence dimensions are 30 feet by 34 feet. The three towers employed by WDAY are tapered, self-supporting, towers, having a face-width at their base of 23 feet. In addition, there are ice shields installed at the base of each tower leg that are 3 feet in diameter; therefore, the total distance across the tower base including the ice shields is 26 feet. The large tower base width, results in the energized portions of the tower base being relatively close to the perimeter fence. Because of the proximity of the energized tower legs to the fence, radiofrequency energy measurements were performed outside of the fenced area surrounding each tower to verify compliance with guidelines for general public exposure to radiofrequency energy.

Electric ("E-Field") and Magnetic ("H-Field") measurements were performed for both the daytime and nighttime directional operating modes. For each directional pattern, an initial E-Field and H-Field survey was performed along the fence perimeter to identify the locations of the highest radiated fields. In all cases, the highest measured field locations were determined to be immediately adjacent to the three tower legs. At all other locations the magnitude of the E-Field and H-Field was verified during the survey to be well below the corresponding Maximum Permissible Exposure Level ("MPE") for general public exposure.

For each tower, detailed measurements were performed on the outside of the fence, immediately adjacent to each of the three tower legs, at a distance of 20 centimeters from the fence. A fourth detailed measurement was performed within the fenced area directly in front of the metal ATU enclosure with the enclosure door open. This fourth measurement was performed to evaluate the exposure of station personnel performing a base current reading with full power applied to the antenna system.

At each measurement location, the measurement probe was slowly moved along

a vertical line starting at ground level and extending to a height of 6 feet above ground. The maximum reading was observed and recorded. If the reading was well below the applicable MPE, no further measurements were performed at the location. If the maximum reading was reasonably close to or exceeded the MPE, a spatial average measurement was performed along the same vertical line and the average value was recorded.

Figures 8, 9, and 10 contain sketches of the base of towers #1, #2 and #3, respectively. The sketches identify the tower leg base locations with respect to the perimeter fence and the location of the ATU enclosure. The four measurement locations are identified on the sketches as locations A, B, C and D.

All of the measurements were performed using a Narda Model 8718, electromagnetic survey meter. All E-Field measurements were performed using a Narda Model A8742D, isotropic, shaped frequency response, electric field probe. All H-Field measurements were performed using a Narda Model 8754D, isotropic, magnetic probe. The survey meter and both probes were last calibrated by the manufacturer in September, 2011.

Figure 11 contains a tabulation of the measured E-Fields and H-Fields for the WDAY daytime and nighttime patterns. With regard to the measurements outside of the fenced area (locations A, B and C), in no case does the E-Field or H-Field measured spatial average exceed the general public MPE. In fact, in no case does the measured maximum E-Field or H-Field exceed the general public MPE outside of the fenced area. Within the fenced area at location D, in front of the metal ATU enclosure with the door open, the H-Field spatial average exceeds the MPE at Tower #1 (center) by 9.2% for both the daytime and nighttime operating modes. The station will reduce power or limit the duration of exposure when personnel have to perform maintenance within the fenced enclosure surrounding the towers.

In summary, the fences surrounding the WDAY towers restrict access to all locations where the general public MPE is exceeded. The fence gates are locked at all times except when maintenance activities are being performed. The fences have appropriate signage on all four sides warning of high RF fields within the restricted area.

The station will reduce power, operate non-directionally, or shut down the transmitter at times when personnel require access within the fenced area to perform maintenance tasks. Therefore, it is concluded that the WDAY transmitter facilities, as constructed, are compliant with the FCC's Rules and Regulations with respect to human exposure to radiofrequency electromagnetic energy.

6.0 TOWER SURVEY

An "as built" survey of the tower locations was performed by Mr. Nicholas R. Stattelmann. Mr. Stattelmann is a licensed land surveyor in the State of Minnesota. The results of the "as built" survey are contained in Figure 12. Based on the information provided in Figure 12, the "as built" relative tower locations are within a small fraction of an electrical degree at 970 kHz of the relative locations specified in the construction permit. It is therefore concluded that the "as built" tower locations fully satisfy the FCC required tolerance of 1.5 electrical degrees.

7.0 GROUND SYSTEM

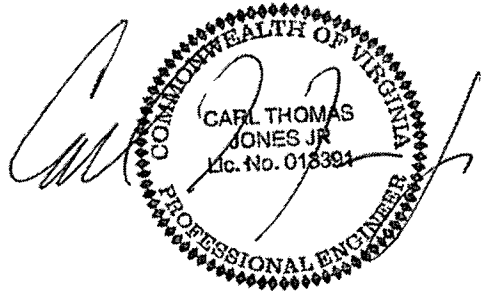
The ground system consists of 120, buried, #10, soft drawn, copper wires extending 77.3 meters from the base of each tower. The radials are shortened and bonded to transverse copper ground straps along intersections between towers.

8.0 SUMMARY

It is submitted that the WDAY daytime and nighttime directional antenna systems have been constructed and adjusted to comply with the technical specifications contained in Construction Permit, FCC File No. BP-20111223AAJ. The daytime and nighttime directional pattern performance has been verified using computer modeling and sample system verification procedures in accordance with Section 47 CFR 73.151(c). It is believed that directional antenna patterns, as adjusted, fully comply with the terms of the station's FCC Authorization and all applicable FCC Rules and Regulations. It is requested that a license be issued to Forum reflecting the model derived operating parameters as contained herein.

This engineering statement, FCC Form 302-AM, Section III and the attached figures were prepared by the undersigned or under the direct supervision of the undersigned and are believed to be true and correct.

Dated: January 14, 2013



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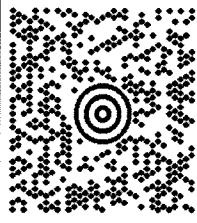

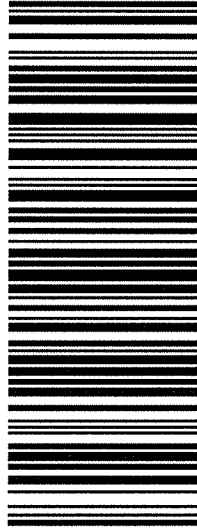

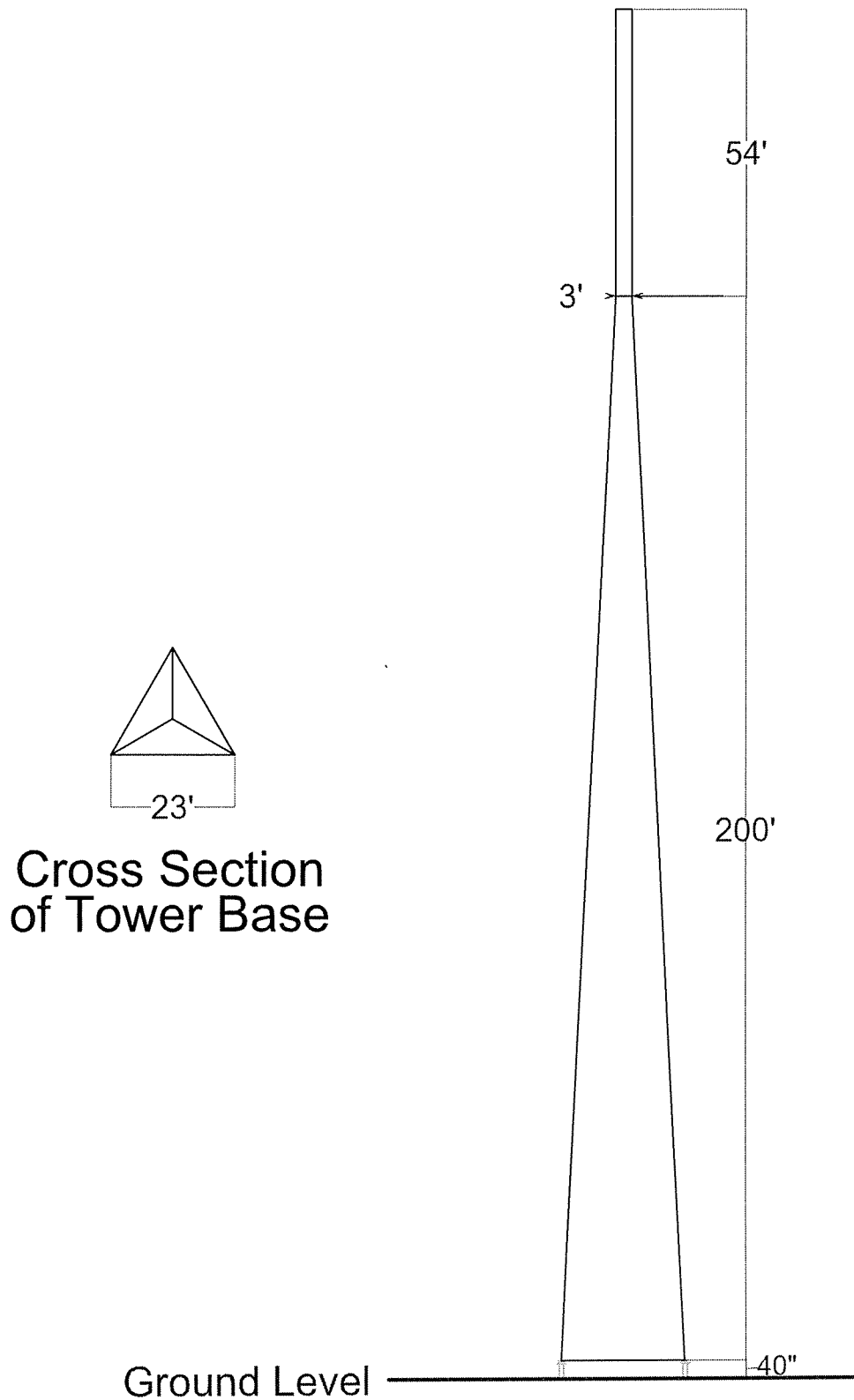
VERDETTE COLTRANE (202) 776-2890 DOW LOHNES PLLC 1200 NEW HAMPSHIRE AVE NW WASHINGTON DC 20036	5 LBS PAK 1 OF 1
SHIP TO: # 979089 XXX-XXX-XXXX U.S BANK - GOVERNMENT LOCKBOX 1005 CONVENTION PLAZA SL-MO-C2-GL SAINT LOUIS MO 63101-1229	
	MO 631 9-02 
UPS NEXT DAY AIR TRACKING #: 1Z A7V 821 01 9785 9223	
	
BILLING: P/P	
Client Matter Number: 07138 Reference # 2: 0001	
 CS 15.0.26. WNTIES0 33.0A 10/2012	

Figure 1



WIREFRAME TOWER MODEL
STATION WDAY - FARGO, NORTH DAKOTA
970 kHz - 10 kW, DA-2
JANUARY 2013

Figure 2

TOWER MODEL HEIGHT AND RADIUS
 STATION WDAY - FARGO, NORTH DAKOTA
 970 kHz - 10 kW, U, DA-2
 JANUARY, 2013

Tower	Physical Height (meters)	Modeled Height (meters)	Percent of Physical Height	Modeled Radius (meters)	Percent of Equivalent Radius
1	77.3	78.8	101.9	See Note	See Note
2	77.3	78.8	101.9	See Note	See Note
3	77.3	77.3	100.0	See Note	See Note

Note: The complete structure of the wide-based self-supporting towers was modeled using thin wires of a radius typically found in such construction. The actual radius values for each of the elements that make up each tower are shown in the geometry files contained in the Appendices. A scale drawing based on the actual physical height is contained in Figure 1.

MEASURED AND MODELED IMPEDANCES

STATION WDAY - FARGO, NORTH DAKOTA

970 kHz - 10 kW, U, DA-2

JANUARY, 2013

Tower	Measured Tower Base Impedance ¹	Modeled Tower Base Impedance	Shunt Capacitance (pF)	Modeled plus Shunt Capacitance	Lumped Series Inductance (uH)	Total Adjusted Tower Base Impedance
1	37.2 +j 27.6	36.3 +j 23.4	0.0	36.3 +j 23.4	0.7	36.3 +j 27.7
2	38.2 +j 28.1	39.0 +j 23.6	0.0	39.0 +j 23.6	0.7	39.0 +j 27.8
3	36.0 +j 22.8	36.4 +j 17.6	0.0	36.4 +j 17.6	0.9	36.4 +j 23.1

¹ Measured at J-Plug in output branch of matching network with other towers open-circuited at same J-Plug location.

Figure 3

Figure 4

**ANTENNA MONITOR PARAMETERS
AND COMMON POINT DATA**
STATION WDAY - FARGO, NORTH DAKOTA
970 kHz - 10 kW, U, DA-2
JANUARY, 2013

DAYTIME		
Tower	Ratio	Phase (deg)
1	1.000	0.0
2	0.537	78.4
Common Point Impedance = $50 + j0.0$ Ohms Common Point Current = 14.51 Amperes Antenna Input Power = 10,530 Watts		

NIGHTTIME		
Tower	Ratio	Phase (deg)
1	1.000	0.0
2	0.366	123.8
3	0.672	-134.4
Common Point Impedance = $50 + j0.0$ Ohms Common Point Current = 14.51 Amperes Antenna Input Power = 10,530 Watts		

SAMPLE LINE VERIFICATION MEASUREMENTS

STATION WDAY - FARGO, NORTH DAKOTA

970 kHz - 10 kW, U, DA-2

JANUARY, 2013

Tower	Open Circuit Series Resonant Frequency ¹ (kHz)	Open Circuit Measured Line Length ² (degrees)	Resonant Frequency -45 degree Offset Frequency (kHz)	Resonant Frequency -45 degree Offset Impedance (Ohms)	Resonant Frequency +45 degree Offset Frequency (kHz)	Resonant Frequency +45 degree Offset Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)	Reference Impedance Sample Toroid Connected ² (Ohms)
1	885.1	295.9	737.6	3.80 -j 47.97	1032.6	5.67 +j 47.65	48.05	47.47 - j2.08
2	884.6	296.1	737.2	3.60 -j 48.09	1032.0	5.48 +j 47.65	48.09	47.29 - j2.01
3	886.0	295.6	738.3	3.63 -j 48.05	1033.7	5.44 +j 47.62	48.06	47.32 - j2.11

¹ At this frequency, the sample line electrical length is equal to 270°.

² At carrier frequency (970 kHz)

Figure 6

SAMPLE DEVICE VERIFICATION
STATION WDAY - FARGO, NORTH DAKOTA
970 kHz - 10 kW, U, DA-2
JANUARY, 2013

Reference Sample Toroid Number	Measured Sample Toroid Number	Measured	
		Field Ratio	Phase (degrees)
1	2	0.997	0.2
1	3	0.997	0.2

Sample Toroid Number	Type	Serial Number
1	Delta Electronics, TCT-3	18123
2	Delta Electronics, TCT-3	18125
3	Delta Electronics, TCT-3	18124

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION WDAY - FARGO, NORTH DAKOTA

970 kHz - 10 kW, U, DA-2

JANUARY, 2013

133 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	2.59	190	23.2	46° 37' 50.7"	96° 20' 22.5"	North side of 180th Ave South, 15ft West of Telco pedestal
2	4.92	108	10.1	46° 37' 00.0"	96° 19' 01.0"	South side of 110th St, opposite R/W marker at West end of wood line
3	6.44	70	8.4	46° 36' 26.3"	96° 18' 08.8"	West side of 330th Ave, 0.7 mile South of 110th St

261 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	1.45	—	219	46° 38' 41.4"	96° 22' 59.3"	East side of 200th St South, 50ft south of intersection with 170th Ave South
2	4.30	—	68	46° 38' 27.4"	96° 25' 12.1"	West side of 3rd St, SW, at driveway to barn, 100ft South of mail box 17273
3	6.05	—	47.5	46° 38' 16.7"	96° 26' 33.2"	East side of Hwy 9, opposite fenceline and telephone pole on West side of road, 0.5 miles South of 170th Ave. South

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION WDAY - FARGO, NORTH DAKOTA

970 kHz - 10 kW, U, DA-2

JANUARY, 2013

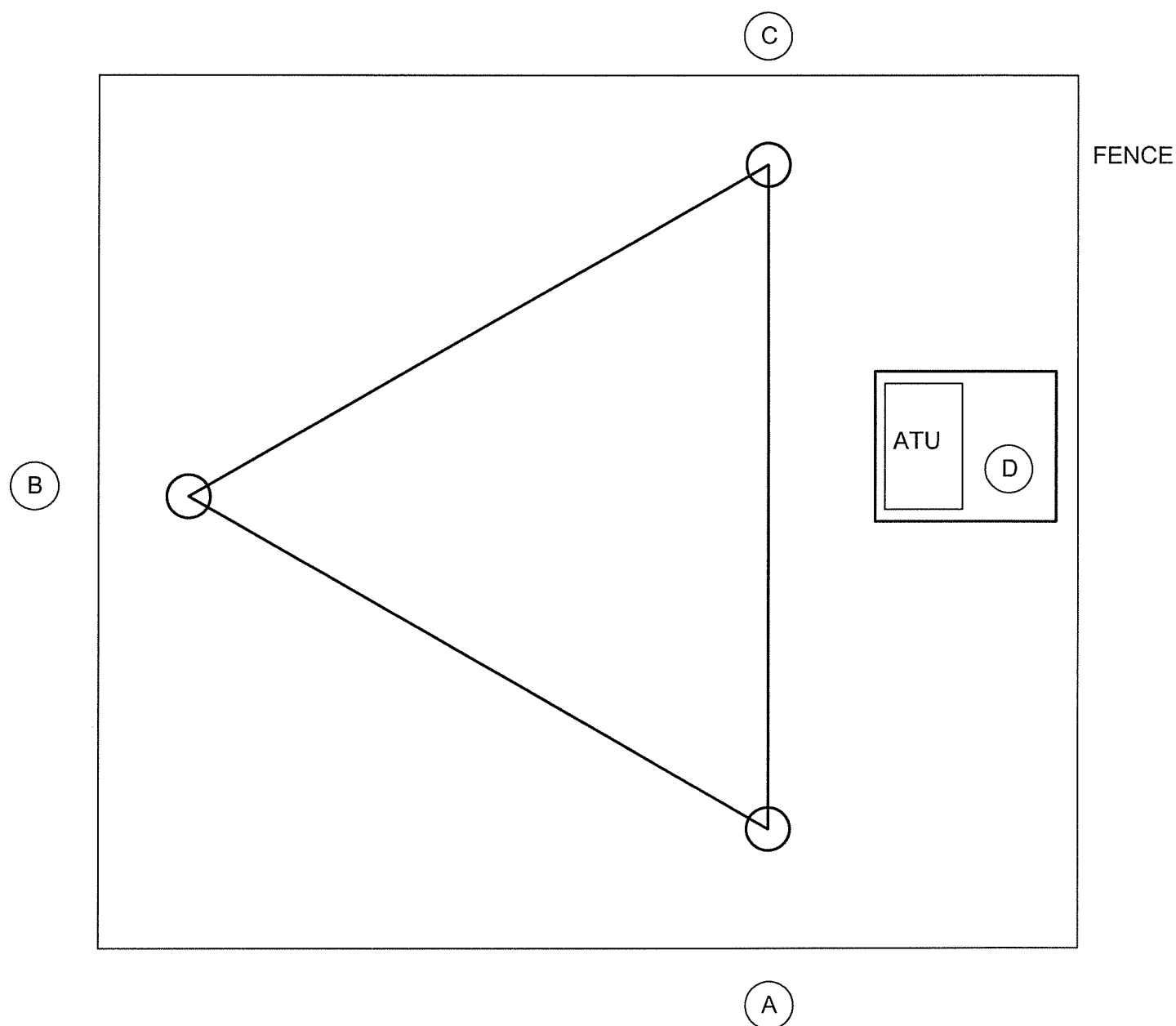
315 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	2.12	510	—	46° 39' 36.2"	96° 23' 02.2"	East side of 200th St at mailbox 20032, just off Hwy 34
2	4.32	280	—	46° 40' 26.2"	96° 24' 16.3"	Southwest side of 150th Ave South, at 90 degree curve
3	6.61	174	—	46° 41' 19.1"	96° 25' 32.0"	South side of 140th Ave South, in line with fenceline and state wildlife sign

351 Degree Radial

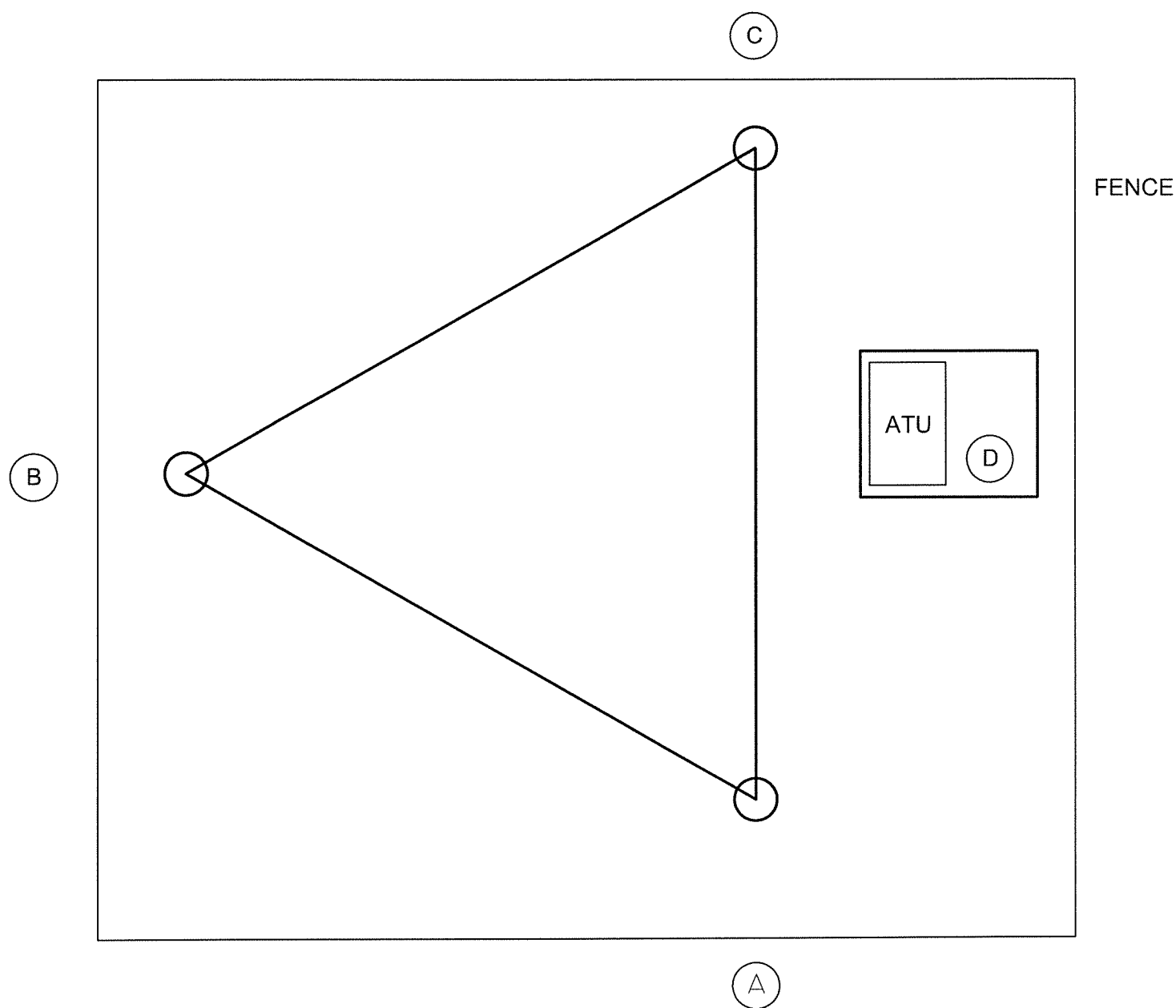
Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	3.11	—	485	46° 40' 27.1"	96° 22' 16.4"	North side of 150th Ave South at culvert pipe under field entrance, 0.6 miles East of 200th St South
2	4.71	—	344	46° 41' 18.7"	96° 22' 24.0"	North side of 140th Ave South at culvert under field entrance, 0.5 mile East of 200th Street
3	6.36	—	250	46° 42' 11.1"	96° 22' 38.0"	North side of 130th Ave South at locked chain gate, 0.35 mile East of 200th Street

Figure 8



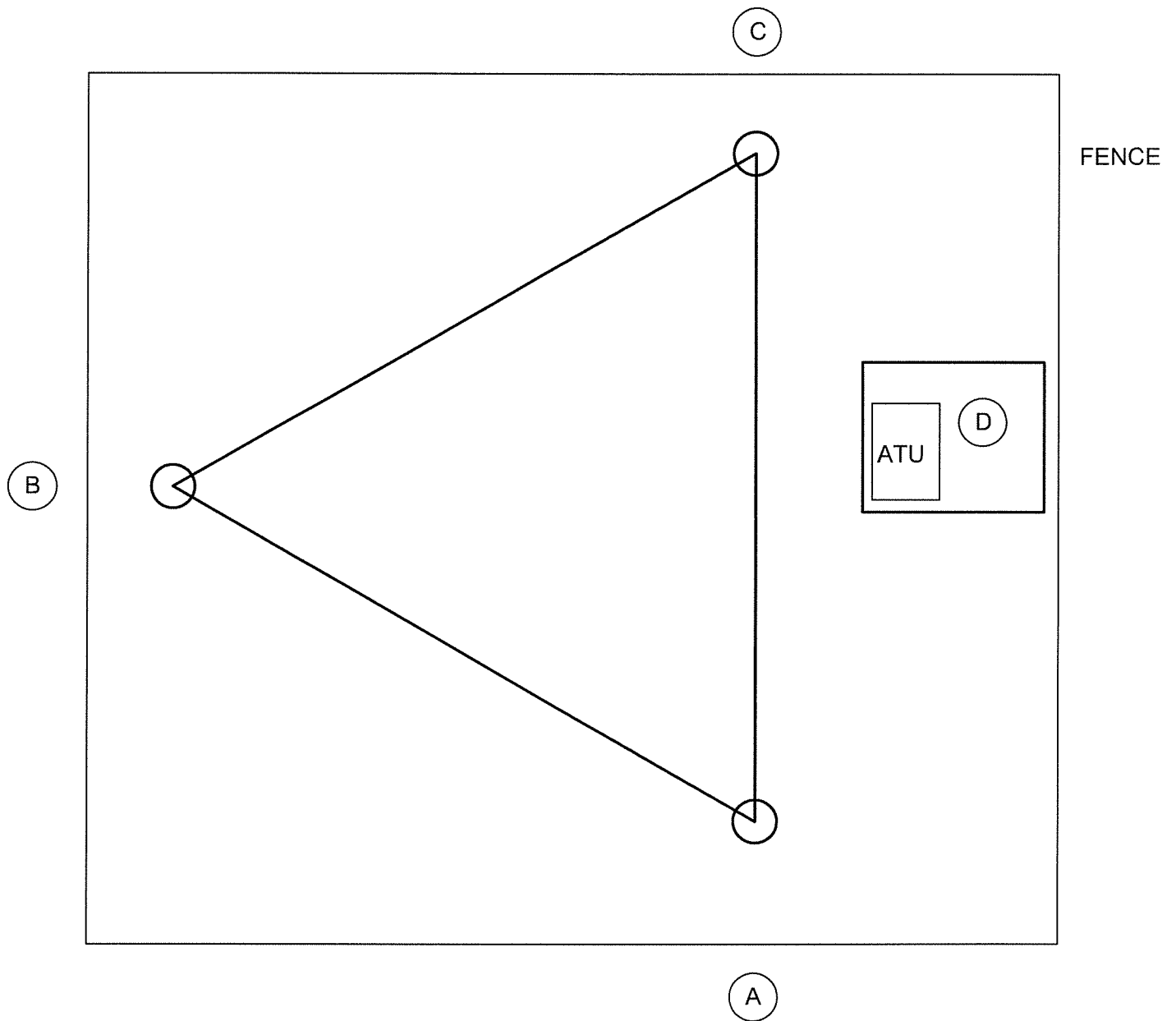
TOWER 1 - RFE MEASUREMENT LOCATIONS
STATION WDAY - FARGO, NORTH DAKOTA
970 kHz - 10 kW, U, DA-2
JANUARY, 2013

Figure 9



TOWER 2 - RFE MEASUREMENT LOCATIONS
STATION WDAY - FARGO, NORTH DAKOTA
970 kHz - 10 kW, U, DA-2
JANUARY, 2013

Figure 10



TOWER 3 - RFE MEASUREMENT LOCATIONS
STATION WDAY - FARGO, NORTH DAKOTA
970 kHz - 10 kW, U, DA-2
JANUARY, 2013

Figure 11

E-FIELD AND H-FIELD MEASUREMENTS

WDAY - FARGO, NORTH DAKOTA

970 kHz - 10 kW, U, DA-2

JANUARY, 2013

Daytime Pattern								
Tower	Location	Maximum E-Field (% of MPE)	Average E-Field (% of MPE)		Maximum H-Field (amps/m)	Maximum H-Field (% of MPE)	Average H-Field (amps/m)	Average H-Field (% of MPE)
1	A	95.5	48.8		0.813	24.9	-	-
1	B	65.1	53.6		0.890	29.8	-	-
1	C	143.1	61.4		0.813	24.9	-	-
1	D	4.0	-		1.820	124.7	1.703	109.2
2	A	10.1	-		0.194	1.4	-	-
2	B	66.9	-		0.465	8.1	-	-
2	C	44.5	-		0.426	6.8	-	-
2	D	6.2	-		0.830	25.9	-	-
3	A	17.2	-		0.487	8.9	-	-
3	B	27.7	-		0.406	6.2	-	-
3	C	30.5	-		0.446	7.5	-	-
3	D	0.0	-		0.325	4.0	-	-

Nighttime Pattern								
Tower	Location	Maximum E-Field (% of MPE)	Average E-Field (% of MPE)		Maximum H-Field (amps/m)	Maximum H-Field (% of MPE)	Average H-Field (amps/m)	Average H-Field (% of MPE)
1	A	44.0	-		0.542	11.1	-	-
1	B	30.0	-		0.658	16.3	-	-
1	C	11.7	-		0.619	14.4	-	-
1	D	29.7	-		1.897	135.4	1.703	109.2
2	A	3.9	-		0.426	6.8	-	-
2	B	18.8	-		0.504	9.6	-	-
2	C	20.1	-		0.387	5.6	-	-
2	D	6.6	-		0.696	18.2	-	-
3	A	65.0	-		0.658	16.3	-	-
3	B	52.7	-		0.696	18.2	-	-
3	C	25.5	-		0.658	16.3	-	-
3	D	8.4	-		1.431	77.1	1.202	54.4

NORTH



0 100



Scale in Feet

Tower 3
N3

Lat: 46°38'50.53821"N
 Long: 96°21'50.89891"W

NOTES

BASIS OF BEARINGS: TRUE NORTH

DISTANCES: U.S. SURVEY FEET

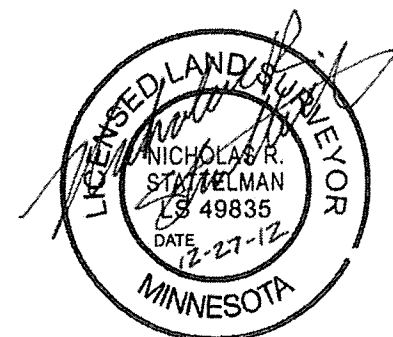
COORDINATES: LATITUDE AND
 LONGITUDE BASED ON THE NORTH
 AMERICAN DATUM OF 1983 (NAD 83)

Tower 1
D1/N1

Lat: 46°38'47.80094"N
 Long: 96°21'51.60089"W

Tower 2
D2/N2

Lat: 46°38'46.22671"N
 Long: 96°21'49.31547"W



Nicholas R. Stettelman 12-27-12
 Nicholas R. Stettelman, Minnesota Licensed Land Surveyor No. 49835 Date



WDAY TOWER SITE
 SABRE INDUSTRIES, INC.
 BARNESVILLE, MN

TOWER AS-BUILT LOCATIONS

DRAWING TYPE AS-BUILT	CHECKED / APPROVED NRS	SHEET 1 of 1
PREPARED BY NRS	DATE Dec. 2012	DRAWING 1
PROJECT NUMBER P11349-2012-00		

APPENDIX A

INDIVIDUAL TOWER MODELING

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-1

IMPEDANCE - TOWER 1

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.97	36.255	23.408	43.155	32.8	1.8724	-10.35	-.42033

GEOMETRY - TOWER 1

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.0025	2
		0	0	2.2799		
2	none	0	0	2.2799	.005	4
		4.05	0	1.0363		
3	none	0	0	2.2799	.005	4
		-2.02	3.51	1.0363		
4	none	0	0	2.2799	.005	4
		-2.02	-3.51	1.0363		
5	none	4.05	0	0	.0254	1
		4.05	0	1.0363		
6	none	4.05	0	1.0363	.0254	61
		.53	0	63.2155		
7	none	.53	0	63.2155	.0254	16
		.53	0	80.0039		
8	none	-2.02	3.51	0	.0254	1
		-2.02	3.51	1.0363		
9	none	-2.02	3.51	1.0363	.0254	61
		-.26	.46	63.2155		
10	none	-.26	.46	63.2155	.0254	16
		-.26	.46	80.0039		
11	none	-2.02	-3.51	0	.0254	1
		-2.02	-3.51	1.0363		
12	none	-2.02	-3.51	1.0363	.0254	61
		-.26	-.46	63.2155		
13	none	-.26	-.46	63.2155	.0254	16
		-.26	-.46	80.0039		
14	none	.53	0	63.2155	.0254	1
		-.26	.46	63.2155		
15	none	-.26	.46	63.2155	.0254	1
		-.26	-.46	63.2155		
16	none	-.26	-.46	63.2155	.0254	1
		.53	0	63.2155		
17	none	.53	0	80.0039	.0254	1
		-.26	.46	80.0039		
18	none	-.26	.46	80.0039	.0254	1
		-.26	-.46	80.0039		
19	none	-.26	-.46	80.0039	.0254	1
		.53	0	80.0039		
20	none	-48.6	48.6	0	.0025	2
		-48.6	48.6	2.2799		
21	none	-48.6	48.6	2.2799	.005	4
		-44.55	48.6	1.0363		
22	none	-48.6	48.6	2.2799	.005	4
		-50.62	52.11	1.0363		
23	none	-48.6	48.6	2.2799	.005	4
		-50.62	45.09	1.0363		
24	none	-44.55	48.6	0	.0254	1
		-44.55	48.6	1.0363		
25	none	-44.55	48.6	1.0363	.0254	61
		-48.07	48.6	63.2155		
26	none	-48.07	48.6	63.2155	.0254	16

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-2

		-48.07	48.6	80.0039		
27	none	-50.62	52.11	0	.0254	1
		-50.62	52.11	1.0363		
28	none	-50.62	52.11	1.0363	.0254	61
		-48.86	49.06	63.2155		
29	none	-48.86	49.06	63.2155	.0254	16
		-48.86	49.06	80.0039		
30	none	-50.62	45.09	0	.0254	1
		-50.62	45.09	1.0363		
31	none	-50.62	45.09	1.0363	.0254	61
		-48.86	48.14	63.2155		
32	none	-48.86	48.14	63.2155	.0254	16
		-48.86	48.14	80.0039		
33	none	-48.07	48.6	63.2155	.0254	1
		-48.86	49.06	63.2155		
34	none	-48.86	49.06	63.2155	.0254	1
		-48.86	48.14	63.2155		
35	none	-48.86	48.14	63.2155	.0254	1
		-48.07	48.6	63.2155		
36	none	-48.07	48.6	80.0039	.0254	1
		-48.86	49.06	80.0039		
37	none	-48.86	49.06	80.0039	.0254	1
		-48.86	48.14	80.0039		
38	none	-48.86	48.14	80.0039	.0254	1
		-48.07	48.6	80.0039		
39	none	84.5	14.9	0	.0025	2
		84.5	14.9	2.2352		
40	none	84.5	14.9	2.2352	.005	4
		88.55	14.9	1.016		
41	none	84.5	14.9	2.2352	.005	4
		82.48	18.41	1.016		
42	none	84.5	14.9	2.2352	.005	4
		82.48	11.39	1.016		
43	none	88.55	14.9	0	.0254	1
		88.55	14.9	1.016		
44	none	88.55	14.9	1.016	.0254	61
		85.03	14.9	61.976		
45	none	85.03	14.9	61.976	.0254	16
		85.03	14.9	78.4352		
46	none	82.48	18.41	0	.0254	1
		82.48	18.41	1.016		
47	none	82.48	18.41	1.016	.0254	61
		84.24	15.36	61.976		
48	none	84.24	15.36	61.976	.0254	16
		84.24	15.36	78.4352		
49	none	82.48	11.39	0	.0254	1
		82.48	11.39	1.016		
50	none	82.48	11.39	1.016	.0254	61
		84.24	14.44	61.976		
51	none	84.24	14.44	61.976	.0254	16
		84.24	14.44	78.4352		
52	none	85.03	14.9	61.976	.0254	1
		84.24	15.36	61.976		
53	none	84.24	15.36	61.976	.0254	1
		84.24	14.44	61.976		
54	none	84.24	14.44	61.976	.0254	1
		85.03	14.9	61.976		
55	none	85.03	14.9	78.4352	.0254	1
		84.24	15.36	78.4352		
56	none	84.24	15.36	78.4352	.0254	1
		84.24	14.44	78.4352		
57	none	84.24	14.44	78.4352	.0254	1
		85.03	14.9	78.4352		

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-3

Number of wires = 57
current nodes = 789

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	14	.914166	1	1.13995
segment/radius ratio	14	35.9908	1	455.98
radius	1	2.5E-03	5	.0254

ELECTRICAL DESCRIPTION - TOWER 1

Frequencies (MHz)

frequency			no. of steps	segment length (wavelengths)	
no.	lowest	step		minimum	maximum
1	.97	0	1	2.96E-03	3.69E-03

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	15	0	0	0	1.5E-05	0
2	94	0	0	0	1.5E-05	0
3	173	0	0	0	1.5E-05	0
4	278	0	0	0	1.5E-05	0
5	357	0	0	0	1.5E-05	0
6	436	0	0	0	1.5E-05	0
7	541	0	0	0	1.5E-05	0
8	620	0	0	0	1.5E-05	0
9	699	0	0	0	1.5E-05	0
10	1	1.E-03	0	0	0	0
11	264	10,000.	0	0	0	0
12	527	10,000.	0	0	0	0

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-4

IMPEDANCE - TOWER 2

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 264, sector 1							
.97	38.999	23.57	45.568	31.1	1.7875	-10.979	-.36125

GEOMETRY - TOWER 2

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.0025	2
		0	0	2.2799		
2	none	0	0	2.2799	.005	4
		4.05	0	1.0363		
3	none	0	0	2.2799	.005	4
		-2.02	3.51	1.0363		
4	none	0	0	2.2799	.005	4
		-2.02	-3.51	1.0363		
5	none	4.05	0	0	.0254	1
		4.05	0	1.0363		
6	none	4.05	0	1.0363	.0254	61
		.53	0	63.2155		
7	none	.53	0	63.2155	.0254	16
		.53	0	80.0039		
8	none	-2.02	3.51	0	.0254	1
		-2.02	3.51	1.0363		
9	none	-2.02	3.51	1.0363	.0254	61
		-.26	.46	63.2155		
10	none	-.26	.46	63.2155	.0254	16
		-.26	.46	80.0039		
11	none	-2.02	-3.51	0	.0254	1
		-2.02	-3.51	1.0363		
12	none	-2.02	-3.51	1.0363	.0254	61
		-.26	-.46	63.2155		
13	none	-.26	-.46	63.2155	.0254	16
		-.26	-.46	80.0039		
14	none	.53	0	63.2155	.0254	1
		-.26	.46	63.2155		
15	none	-.26	.46	63.2155	.0254	1
		-.26	-.46	63.2155		
16	none	-.26	-.46	63.2155	.0254	1
		.53	0	63.2155		
17	none	.53	0	80.0039	.0254	1
		-.26	.46	80.0039		
18	none	-.26	.46	80.0039	.0254	1
		-.26	-.46	80.0039		
19	none	-.26	-.46	80.0039	.0254	1
		.53	0	80.0039		
20	none	-48.6	48.6	0	.0025	2
		-48.6	48.6	2.2799		
21	none	-48.6	48.6	2.2799	.005	4
		-44.55	48.6	1.0363		
22	none	-48.6	48.6	2.2799	.005	4
		-50.62	52.11	1.0363		
23	none	-48.6	48.6	2.2799	.005	4
		-50.62	45.09	1.0363		
24	none	-44.55	48.6	0	.0254	1
		-44.55	48.6	1.0363		
25	none	-44.55	48.6	1.0363	.0254	61
		-48.07	48.6	63.2155		
26	none	-48.07	48.6	63.2155	.0254	16

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-5

		-48.07	48.6	80.0039		
27	none	-50.62	52.11	0	.0254	1
		-50.62	52.11	1.0363		
28	none	-50.62	52.11	1.0363	.0254	61
		-48.86	49.06	63.2155		
29	none	-48.86	49.06	63.2155	.0254	16
		-48.86	49.06	80.0039		
30	none	-50.62	45.09	0	.0254	1
		-50.62	45.09	1.0363		
31	none	-50.62	45.09	1.0363	.0254	61
		-48.86	48.14	63.2155		
32	none	-48.86	48.14	63.2155	.0254	16
		-48.86	48.14	80.0039		
33	none	-48.07	48.6	63.2155	.0254	1
		-48.86	49.06	63.2155		
34	none	-48.86	49.06	63.2155	.0254	1
		-48.86	48.14	63.2155		
35	none	-48.86	48.14	63.2155	.0254	1
		-48.07	48.6	63.2155		
36	none	-48.07	48.6	80.0039	.0254	1
		-48.86	49.06	80.0039		
37	none	-48.86	49.06	80.0039	.0254	1
		-48.86	48.14	80.0039		
38	none	-48.86	48.14	80.0039	.0254	1
		-48.07	48.6	80.0039		
39	none	84.5	14.9	0	.0025	2
		84.5	14.9	2.2352		
40	none	84.5	14.9	2.2352	.005	4
		88.55	14.9	1.016		
41	none	84.5	14.9	2.2352	.005	4
		82.48	18.41	1.016		
42	none	84.5	14.9	2.2352	.005	4
		82.48	11.39	1.016		
43	none	88.55	14.9	0	.0254	1
		88.55	14.9	1.016		
44	none	88.55	14.9	1.016	.0254	61
		85.03	14.9	61.976		
45	none	85.03	14.9	61.976	.0254	16
		85.03	14.9	78.4352		
46	none	82.48	18.41	0	.0254	1
		82.48	18.41	1.016		
47	none	82.48	18.41	1.016	.0254	61
		84.24	15.36	61.976		
48	none	84.24	15.36	61.976	.0254	16
		84.24	15.36	78.4352		
49	none	82.48	11.39	0	.0254	1
		82.48	11.39	1.016		
50	none	82.48	11.39	1.016	.0254	61
		84.24	14.44	61.976		
51	none	84.24	14.44	61.976	.0254	16
		84.24	14.44	78.4352		
52	none	85.03	14.9	61.976	.0254	1
		84.24	15.36	61.976		
53	none	84.24	15.36	61.976	.0254	1
		84.24	14.44	61.976		
54	none	84.24	14.44	61.976	.0254	1
		85.03	14.9	61.976		
55	none	85.03	14.9	78.4352	.0254	1
		84.24	15.36	78.4352		
56	none	84.24	15.36	78.4352	.0254	1
		84.24	14.44	78.4352		
57	none	84.24	14.44	78.4352	.0254	1
		85.03	14.9	78.4352		

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-6

Number of wires = 57
current nodes = 789

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	14	.914166	1	1.13995
segment/radius ratio	14	35.9908	1	455.98
radius	1	2.5E-03	5	.0254

ELECTRICAL DESCRIPTION – TOWER 2

Frequencies (MHz)

frequency			no. of steps	segment length (wavelengths)	
no.	lowest	step		minimum	maximum
1	.97	0	1	2.96E-03	3.69E-03

Sources

source node	sector	magnitude	phase	type
1 264	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	15	0	0	0	1.5E-05	0
2	94	0	0	0	1.5E-05	0
3	173	0	0	0	1.5E-05	0
4	278	0	0	0	1.5E-05	0
5	357	0	0	0	1.5E-05	0
6	436	0	0	0	1.5E-05	0
7	541	0	0	0	1.5E-05	0
8	620	0	0	0	1.5E-05	0
9	699	0	0	0	1.5E-05	0
10	1	10,000.	0	0	0	0
11	264	1.E-03	0	0	0	0
12	527	10,000.	0	0	0	0

APPENDIX A – INDIVIDUAL TOWER MODEL WDAY(AM) – FARGO, NORTH DAKOTA

PAGE A-7

IMPEDANCE – TOWER 3

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 527, sector 1							
.97	36.405	17.648	40.457	25.9	1.676	-11.951	-.28636

GEOMETRY – TOWER 3

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.0025	2
		0	0	2.2799		
2	none	0	0	2.2799	.005	4
		4.05	0	1.0363		
3	none	0	0	2.2799	.005	4
		-2.02	3.51	1.0363		
4	none	0	0	2.2799	.005	4
		-2.02	-3.51	1.0363		
5	none	4.05	0	0	.0254	1
		4.05	0	1.0363		
6	none	4.05	0	1.0363	.0254	61
		.53	0	63.2155		
7	none	.53	0	63.2155	.0254	16
		.53	0	80.0039		
8	none	-2.02	3.51	0	.0254	1
		-2.02	3.51	1.0363		
9	none	-2.02	3.51	1.0363	.0254	61
		-.26	.46	63.2155		
10	none	-.26	.46	63.2155	.0254	16
		-.26	.46	80.0039		
11	none	-2.02	-3.51	0	.0254	1
		-2.02	-3.51	1.0363		
12	none	-2.02	-3.51	1.0363	.0254	61
		-.26	-.46	63.2155		
13	none	-.26	-.46	63.2155	.0254	16
		-.26	-.46	80.0039		
14	none	.53	0	63.2155	.0254	1
		-.26	.46	63.2155		
15	none	-.26	.46	63.2155	.0254	1
		-.26	-.46	63.2155		
16	none	-.26	-.46	63.2155	.0254	1
		.53	0	63.2155		
17	none	.53	0	80.0039	.0254	1
		-.26	.46	80.0039		
18	none	-.26	.46	80.0039	.0254	1
		-.26	-.46	80.0039		
19	none	-.26	-.46	80.0039	.0254	1
		.53	0	80.0039		
20	none	-48.6	48.6	0	.0025	2
		-48.6	48.6	2.2799		
21	none	-48.6	48.6	2.2799	.005	4
		-44.55	48.6	1.0363		
22	none	-48.6	48.6	2.2799	.005	4
		-50.62	52.11	1.0363		
23	none	-48.6	48.6	2.2799	.005	4
		-50.62	45.09	1.0363		
24	none	-44.55	48.6	0	.0254	1
		-44.55	48.6	1.0363		
25	none	-44.55	48.6	1.0363	.0254	61
		-48.07	48.6	63.2155		
26	none	-48.07	48.6	63.2155	.0254	16

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-8

		-48.07	48.6	80.0039		
27	none	-50.62	52.11	0	.0254	1
		-50.62	52.11	1.0363		
28	none	-50.62	52.11	1.0363	.0254	61
		-48.86	49.06	63.2155		
29	none	-48.86	49.06	63.2155	.0254	16
		-48.86	49.06	80.0039		
30	none	-50.62	45.09	0	.0254	1
		-50.62	45.09	1.0363		
31	none	-50.62	45.09	1.0363	.0254	61
		-48.86	48.14	63.2155		
32	none	-48.86	48.14	63.2155	.0254	16
		-48.86	48.14	80.0039		
33	none	-48.07	48.6	63.2155	.0254	1
		-48.86	49.06	63.2155		
34	none	-48.86	49.06	63.2155	.0254	1
		-48.86	48.14	63.2155		
35	none	-48.86	48.14	63.2155	.0254	1
		-48.07	48.6	63.2155		
36	none	-48.07	48.6	80.0039	.0254	1
		-48.86	49.06	80.0039		
37	none	-48.86	49.06	80.0039	.0254	1
		-48.86	48.14	80.0039		
38	none	-48.86	48.14	80.0039	.0254	1
		-48.07	48.6	80.0039		
39	none	84.5	14.9	0	.0025	2
		84.5	14.9	2.2352		
40	none	84.5	14.9	2.2352	.005	4
		88.55	14.9	1.016		
41	none	84.5	14.9	2.2352	.005	4
		82.48	18.41	1.016		
42	none	84.5	14.9	2.2352	.005	4
		82.48	11.39	1.016		
43	none	88.55	14.9	0	.0254	1
		88.55	14.9	1.016		
44	none	88.55	14.9	1.016	.0254	61
		85.03	14.9	61.976		
45	none	85.03	14.9	61.976	.0254	16
		85.03	14.9	78.4352		
46	none	82.48	18.41	0	.0254	1
		82.48	18.41	1.016		
47	none	82.48	18.41	1.016	.0254	61
		84.24	15.36	61.976		
48	none	84.24	15.36	61.976	.0254	16
		84.24	15.36	78.4352		
49	none	82.48	11.39	0	.0254	1
		82.48	11.39	1.016		
50	none	82.48	11.39	1.016	.0254	61
		84.24	14.44	61.976		
51	none	84.24	14.44	61.976	.0254	16
		84.24	14.44	78.4352		
52	none	85.03	14.9	61.976	.0254	1
		84.24	15.36	61.976		
53	none	84.24	15.36	61.976	.0254	1
		84.24	14.44	61.976		
54	none	84.24	14.44	61.976	.0254	1
		85.03	14.9	61.976		
55	none	85.03	14.9	78.4352	.0254	1
		84.24	15.36	78.4352		
56	none	84.24	15.36	78.4352	.0254	1
		84.24	14.44	78.4352		
57	none	84.24	14.44	78.4352	.0254	1
		85.03	14.9	78.4352		

**APPENDIX A – INDIVIDUAL TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE A-9

Number of wires = 57
current nodes = 789

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	14	.914166	1	1.13995
segment/radius ratio	14	35.9908	1	455.98
radius	1	2.5E-03	5	.0254

ELECTRICAL DESCRIPTION - TOWER 3

Frequencies (MHz)

frequency		no. of steps	segment length (wavelengths)	
no. lowest	step		minimum	maximum
1	.97	0	2.96E-03	3.69E-03

Sources

source node	sector	magnitude	phase	type
1	527	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	15	0	0	0	1.5E-05	0
2	94	0	0	0	1.5E-05	0
3	173	0	0	0	1.5E-05	0
4	278	0	0	0	1.5E-05	0
5	357	0	0	0	1.5E-05	0
6	436	0	0	0	1.5E-05	0
7	541	0	0	0	1.5E-05	0
8	620	0	0	0	1.5E-05	0
9	699	0	0	0	1.5E-05	0
10	1	10,000.	0	0	0	0
11	264	10,000.	0	0	0	0
12	527	1.E-03	0	0	0	0

APPENDIX B

DAYTIME DIRECTIONAL ARRAY MODEL

APPENDIX B – DAYTIME DIRECTIONAL ARRAY MODEL WDAY(AM) – FARGO, NORTH DAKOTA

PAGE B-1

IMPEDANCE - DAYTIME

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.97	50.649	31.994	59.908	32.3	1.8695	-10.371	-.41824
source = 2; node 264, sector 1							
.97	10.72	-24.403	26.654	293.7	5.8176	-3.016	-3.0046

GEOMETRY - DAYTIME

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.0025	2
		0	0	2.2799		
2	none	0	0	2.2799	.005	4
		4.05	0	1.0363		
3	none	0	0	2.2799	.005	4
		-2.02	3.51	1.0363		
4	none	0	0	2.2799	.005	4
		-2.02	-3.51	1.0363		
5	none	4.05	0	0	.0254	1
		4.05	0	1.0363		
6	none	4.05	0	1.0363	.0254	61
		.53	0	63.2155		
7	none	.53	0	63.2155	.0254	16
		.53	0	80.0039		
8	none	-2.02	3.51	0	.0254	1
		-2.02	3.51	1.0363		
9	none	-2.02	3.51	1.0363	.0254	61
		-.26	.46	63.2155		
10	none	-.26	.46	63.2155	.0254	16
		-.26	.46	80.0039		
11	none	-2.02	-3.51	0	.0254	1
		-2.02	-3.51	1.0363		
12	none	-2.02	-3.51	1.0363	.0254	61
		-.26	-.46	63.2155		
13	none	-.26	-.46	63.2155	.0254	16
		-.26	-.46	80.0039		
14	none	.53	0	63.2155	.0254	1
		-.26	.46	63.2155		
15	none	-.26	.46	63.2155	.0254	1
		-.26	-.46	63.2155		
16	none	-.26	-.46	63.2155	.0254	1
		.53	0	63.2155		
17	none	.53	0	80.0039	.0254	1
		-.26	.46	80.0039		
18	none	-.26	.46	80.0039	.0254	1
		-.26	-.46	80.0039		
19	none	-.26	-.46	80.0039	.0254	1
		.53	0	80.0039		
20	none	-48.6	48.6	0	.0025	2
		-48.6	48.6	2.2799		
21	none	-48.6	48.6	2.2799	.005	4
		-44.55	48.6	1.0363		
22	none	-48.6	48.6	2.2799	.005	4
		-50.62	52.11	1.0363		
23	none	-48.6	48.6	2.2799	.005	4
		-50.62	45.09	1.0363		
24	none	-44.55	48.6	0	.0254	1
		-44.55	48.6	1.0363		
25	none	-44.55	48.6	1.0363	.0254	61

APPENDIX B – DAYTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA

PAGE B-2

		-48.07	48.6	63.2155		
26	none	-48.07	48.6	63.2155	.0254	16
		-48.07	48.6	80.0039		
27	none	-50.62	52.11	0	.0254	1
		-50.62	52.11	1.0363		
28	none	-50.62	52.11	1.0363	.0254	61
		-48.86	49.06	63.2155		
29	none	-48.86	49.06	63.2155	.0254	16
		-48.86	49.06	80.0039		
30	none	-50.62	45.09	0	.0254	1
		-50.62	45.09	1.0363		
31	none	-50.62	45.09	1.0363	.0254	61
		-48.86	48.14	63.2155		
32	none	-48.86	48.14	63.2155	.0254	16
		-48.86	48.14	80.0039		
33	none	-48.07	48.6	63.2155	.0254	1
		-48.86	49.06	63.2155		
34	none	-48.86	49.06	63.2155	.0254	1
		-48.86	48.14	63.2155		
35	none	-48.86	48.14	63.2155	.0254	1
		-48.07	48.6	63.2155		
36	none	-48.07	48.6	80.0039	.0254	1
		-48.86	49.06	80.0039		
37	none	-48.86	49.06	80.0039	.0254	1
		-48.86	48.14	80.0039		
38	none	-48.86	48.14	80.0039	.0254	1
		-48.07	48.6	80.0039		
39	none	84.5	14.9	0	.0025	2
		84.5	14.9	2.2352		
40	none	84.5	14.9	2.2352	.005	4
		88.55	14.9	1.016		
41	none	84.5	14.9	2.2352	.005	4
		82.48	18.41	1.016		
42	none	84.5	14.9	2.2352	.005	4
		82.48	11.39	1.016		
43	none	88.55	14.9	0	.0254	1
		88.55	14.9	1.016		
44	none	88.55	14.9	1.016	.0254	61
		85.03	14.9	61.976		
45	none	85.03	14.9	61.976	.0254	16
		85.03	14.9	78.4352		
46	none	82.48	18.41	0	.0254	1
		82.48	18.41	1.016		
47	none	82.48	18.41	1.016	.0254	61
		84.24	15.36	61.976		
48	none	84.24	15.36	61.976	.0254	16
		84.24	15.36	78.4352		
49	none	82.48	11.39	0	.0254	1
		82.48	11.39	1.016		
50	none	82.48	11.39	1.016	.0254	61
		84.24	14.44	61.976		
51	none	84.24	14.44	61.976	.0254	16
		84.24	14.44	78.4352		
52	none	85.03	14.9	61.976	.0254	1
		84.24	15.36	61.976		
53	none	84.24	15.36	61.976	.0254	1
		84.24	14.44	61.976		
54	none	84.24	14.44	61.976	.0254	1
		85.03	14.9	61.976		
55	none	85.03	14.9	78.4352	.0254	1
		84.24	15.36	78.4352		
56	none	84.24	15.36	78.4352	.0254	1
		84.24	14.44	78.4352		

APPENDIX B – DAYTIME DIRECTIONAL ARRAY MODEL WDAY(AM) – FARGO, NORTH DAKOTA

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57	none	84.24	14.44	78.4352	.0254	1
		85.03	14.9	78.4352		

Number of wires = 57
current nodes = 789

		minimum		maximum
Individual wires	wire	value	wire	value
segment length	14	.914166	1	1.13995
segment/radius ratio	14	35.9908	1	455.98
radius	1	2.5E-03	5	.0254

ELECTRICAL DESCRIPTION - DAYTIME

Frequencies (MHz)

no.	frequency	step	no. of steps	segment length (wavelengths)	minimum	maximum
1	.97	0	1	2.96E-03	3.69E-03	

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,155.75	42.1	voltage
2	264	1	275.973	21.9	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	15	0	0	0	1.5E-05	0
2	94	0	0	0	1.5E-05	0
3	173	0	0	0	1.5E-05	0
4	278	0	0	0	1.5E-05	0
5	357	0	0	0	1.5E-05	0
6	436	0	0	0	1.5E-05	0
7	541	0	0	0	1.5E-05	0
8	620	0	0	0	1.5E-05	0
9	699	0	0	0	1.5E-05	0
10	1	1.E-03	0	0	0	0
11	264	1.E-03	0	0	0	0
12	527	1.E-03	0	.042	0	0

PEAK CURRENTS - DAYTIME

Frequency = .97 MHz

Input power = 10,000. watts

Efficiency = 100. %

coordinates in meters

current				mag	phase	real	imaginary
no.	X	Y	Z	(amps)	(deg)	(amps)	(amps)
GND	0	0	0	19.2921	9.8	19.0079	3.29947
2	0	0	1.13995	19.3406	9.6	19.0691	3.22968
END	0	0	2.2799	19.3581	9.5	19.0918	3.19941
2J1	0	0	2.2799	6.47733	9.8	6.38331	1.09967
4	1.0125	0	1.969	6.48792	9.5	6.3992	1.06929
5	2.025	0	1.6581	6.49997	9.1	6.41798	1.02913
6	3.0375	0	1.3472	6.51097	8.7	6.43599	.985256
END	4.05	0	1.0363	6.5193	8.3	6.45042	.945155
2J1	0	0	2.2799	6.41619	9.1	6.3347	1.01939
8	-.505	.8775	1.969	6.42715	8.9	6.35059	.989025
9	-1.01	1.755	1.6581	6.43973	8.5	6.36944	.948936
10	-1.515	2.6325	1.3472	6.45133	8.1	6.38752	.905181
END	-2.02	3.51	1.0363	6.4602	7.7	6.402	.865218
2J1	0	0	2.2799	6.46475	9.6	6.37385	1.08034
12	-.505	-.8775	1.969	6.47542	9.3	6.38974	1.04995
13	-1.01	-1.755	1.6581	6.48762	9.	6.40854	1.00981

**APPENDIX B – DAYTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

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14	-1.515	-2.6325	1.3472	6.49877	8.5	6.42657	.965965
END	-2.02	-3.51	1.0363	6.50721	8.2	6.441	.925897
GND	4.05	0	0	.0901293	288.4	.0284129	-.0855336
END	4.05	0	1.0363	.18238	288.2	.0571027	-.17321
2J2	4.05	0	1.0363	6.55315	6.8	6.50752	.771946
18	3.9923	0	2.05563	6.56252	6.3	6.52317	.71752
19	3.93459	0	3.07496	6.56878	5.8	6.53492	.666052
20	3.87689	0	4.09429	6.57161	5.4	6.54243	.618518
21	3.81918	0	5.11362	6.57112	5.	6.54599	.574134
22	3.76148	0	6.13296	6.56743	4.6	6.54581	.532374
23	3.70377	0	7.15229	6.56059	4.3	6.54204	.492884
24	3.64607	0	8.17162	6.55063	4.	6.53478	.455405
25	3.58836	0	9.19095	6.5376	3.7	6.52411	.41974
26	3.53066	0	10.2103	6.52152	3.4	6.5101	.385727
27	3.47295	0	11.2296	6.50244	3.1	6.49283	.353237
28	3.41525	0	12.2489	6.48037	2.8	6.47235	.322155
29	3.35754	0	13.2683	6.45535	2.6	6.44872	.29239
30	3.29984	0	14.2876	6.4274	2.4	6.42198	.263861
31	3.24213	0	15.3069	6.39657	2.1	6.3922	.2365
32	3.18443	0	16.3263	6.36287	1.9	6.3594	.210251
33	3.12672	0	17.3456	6.32633	1.7	6.32363	.185062
34	3.06902	0	18.3649	6.28699	1.5	6.28494	.16089
35	3.01131	0	19.3843	6.24488	1.3	6.24337	.137697
36	2.95361	0	20.4036	6.20002	1.1	6.19895	.115452
37	2.8959	0	21.4229	6.15244	.9	6.15172	.0941247
38	2.8382	0	22.4423	6.10218	.7	6.10174	.0736902
39	2.78049	0	23.4616	6.04926	.5	6.04902	.0541258
40	2.72279	0	24.4809	5.99372	.3	5.99362	.0354116
41	2.66508	0	25.5002	5.9356	.2	5.93558	.0175293
42	2.60738	0	26.5196	5.87494	0.0	5.87494	4.62E-04
43	2.54967	0	27.5389	5.81175	359.8	5.81173	-.0158037
44	2.49197	0	28.5582	5.74609	359.7	5.74601	-.0312829
45	2.43426	0	29.5776	5.678	359.5	5.67781	-.045988
46	2.37656	0	30.5969	5.60749	359.4	5.60717	-.0599306
47	2.31885	0	31.6162	5.53464	359.2	5.53416	-.0731219
48	2.26115	0	32.6356	5.45947	359.1	5.4588	-.0855723
49	2.20344	0	33.6549	5.38202	359.	5.38114	-.0972917
50	2.14574	0	34.6742	5.30235	358.8	5.30124	-.10829
51	2.08803	0	35.6936	5.2205	358.7	5.21915	-.118575
52	2.03033	0	36.7129	5.1365	358.6	5.1349	-.128158
53	1.97262	0	37.7322	5.05042	358.4	5.04856	-.137046
54	1.91492	0	38.7516	4.9623	358.3	4.96018	-.145248
55	1.85721	0	39.7709	4.8722	358.2	4.86981	-.152772
56	1.79951	0	40.7902	4.78016	358.1	4.7775	-.159627
57	1.7418	0	41.8095	4.68625	358.	4.68332	-.165821
58	1.6841	0	42.8289	4.59052	357.9	4.58732	-.171363
59	1.62639	0	43.8482	4.49303	357.8	4.48957	-.176261
60	1.56869	0	44.8675	4.39383	357.6	4.39012	-.180524
61	1.51098	0	45.8869	4.293	357.5	4.28905	-.18416
62	1.45328	0	46.9062	4.1906	357.4	4.18642	-.187179
63	1.39557	0	47.9255	4.0867	357.3	4.0823	-.189589
64	1.33787	0	48.9449	3.98138	357.2	3.97677	-.191401
65	1.28016	0	49.9642	3.8747	357.2	3.86991	-.192623
66	1.22246	0	50.9835	3.76676	357.1	3.7618	-.193267
67	1.16475	0	52.0029	3.65763	357.	3.65251	-.193342
68	1.10705	0	53.0222	3.5474	356.9	3.54216	-.192859
69	1.04934	0	54.0415	3.43618	356.8	3.43083	-.191831
70	.991639	0	55.0608	3.32408	356.7	3.31863	-.19027
71	.933934	0	56.0802	3.21122	356.6	3.2057	-.188189
72	.87623	0	57.0995	3.09772	356.6	3.09216	-.185603
73	.818525	0	58.1188	2.98377	356.5	2.97818	-.182529
74	.76082	0	59.1382	2.86956	356.4	2.86397	-.178987
75	.703115	0	60.1575	2.75537	356.4	2.74981	-.174999

**APPENDIX B – DAYTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

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76	.64541	0	61.1768	2.64172	356.3	2.6362	-.170602
77	.587705	0	62.1962	2.52989	356.2	2.52444	-.165872
END	.53	0	63.2155	2.4321	356.2	2.42674	-.161419
2J6	.53	0	63.2155	2.36623	355.7	2.3597	-.175642
79	.53	0	64.2648	2.26489	355.7	2.25845	-.170618
80	.53	0	65.314	2.14731	355.6	2.14101	-.164395
81	.53	0	66.3633	2.02596	355.5	2.01983	-.157568
82	.53	0	67.4126	1.90186	355.5	1.89592	-.150182
83	.53	0	68.4619	1.77525	355.4	1.76954	-.142242
84	.53	0	69.5111	1.64617	355.3	1.64073	-.133744
85	.53	0	70.5604	1.51462	355.3	1.50948	-.124678
86	.53	0	71.6097	1.38048	355.2	1.37568	-.11503
87	.53	0	72.659	1.24357	355.2	1.23915	-.104777
88	.53	0	73.7083	1.10365	355.1	1.09965	-.0938884
89	.53	0	74.7575	.96029	355.1	.956755	-.0823185
90	.53	0	75.8068	.812866	355.1	.809846	-.069999
91	.53	0	76.8561	.66034	355.1	.65789	-.05682
92	.53	0	77.9053	.500858	355.1	.499044	-.0425876
93	.53	0	78.9546	.330762	355.3	.329665	-.0269218
END	.53	0	80.0039	.149534	356.3	.149219	-9.7E-03
GND	-2.02	3.51	0	.0898753	288.6	.0285963	-.0852046
END	-2.02	3.51	1.0363	.181859	288.4	.057466	-.172541
2J3	-2.02	3.51	1.0363	6.4965	6.1	6.45946	.692677
97	-1.99115	3.46	2.05563	6.50662	5.6	6.47521	.638482
98	-1.9623	3.41	3.07496	6.51358	5.2	6.48705	.587254
99	-1.93344	3.36	4.09429	6.51705	4.8	6.49464	.53997
100	-1.90459	3.31	5.11362	6.51715	4.4	6.49826	.495849
101	-1.87574	3.26	6.13296	6.51401	4.	6.49814	.454363
102	-1.84689	3.21	7.15229	6.50768	3.7	6.49442	.415159
103	-1.81803	3.16	8.17162	6.49821	3.3	6.4872	.377979
104	-1.78918	3.11	9.19095	6.48562	3.	6.47656	.342627
105	-1.76033	3.06	10.2103	6.46996	2.7	6.46258	.308939
106	-1.73148	3.01	11.2296	6.45128	2.5	6.44533	.276785
107	-1.70262	2.96	12.2489	6.42957	2.2	6.42486	.246051
108	-1.67377	2.91	13.2683	6.40489	1.9	6.40123	.216645
109	-1.64492	2.86	14.2876	6.37727	1.7	6.37449	.188487
110	-1.61607	2.81	15.3069	6.34672	1.5	6.34467	.161506
111	-1.58721	2.76	16.3263	6.3133	1.2	6.31185	.135645
112	-1.55836	2.71	17.3456	6.27701	1.	6.27604	.110854
113	-1.52951	2.66	18.3649	6.23791	.8	6.23731	.0870878
114	-1.50066	2.61	19.3843	6.19601	.6	6.19568	.0643089
115	-1.4718	2.56	20.4036	6.15135	.4	6.15121	.0424841
116	-1.44295	2.51	21.4229	6.10397	.2	6.10393	.0215838
117	-1.4141	2.46	22.4423	6.05388	0.0	6.05388	1.58E-03
118	-1.38525	2.41	23.4616	6.00112	359.8	6.0011	-.0175443
119	-1.35639	2.36	24.4809	5.94575	359.7	5.94564	-.035816
120	-1.32754	2.31	25.5002	5.88778	359.5	5.88754	-.0532519
121	-1.29869	2.26	26.5196	5.82724	359.3	5.82682	-.069869
122	-1.26984	2.21	27.5389	5.76419	359.1	5.76355	-.0856827
123	-1.24098	2.16	28.5582	5.69864	359.	5.69775	-.100707
124	-1.21213	2.11	29.5776	5.63065	358.8	5.62948	-.114956
125	-1.18328	2.06	30.5969	5.56026	358.7	5.55877	-.128442
126	-1.15443	2.01	31.6162	5.4875	358.5	5.48568	-.141175
127	-1.12557	1.96	32.6356	5.41242	358.4	5.41025	-.153168
128	-1.09672	1.91	33.6549	5.33506	358.2	5.33252	-.164431
129	-1.06787	1.86	34.6742	5.25547	358.1	5.25255	-.174973
130	-1.03902	1.81	35.6936	5.17369	358.	5.17038	-.184805
131	-1.01016	1.76	36.7129	5.08976	357.8	5.08606	-.193935
132	-.981311	1.71	37.7322	5.00374	357.7	4.99964	-.202374
133	-.952459	1.66	38.7516	4.91568	357.6	4.91119	-.210129
134	-.923607	1.61	39.7709	4.82563	357.4	4.82074	-.217209
135	-.894754	1.56	40.7902	4.73364	357.3	4.72836	-.223624
136	-.865902	1.51	41.8095	4.63978	357.2	4.63411	-.229383

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137	-.837049	1.46	42.8289	4.54408	357.	4.53803	-.234494
138	-.808197	1.41	43.8482	4.44663	356.9	4.44021	-.238966
139	-.779344	1.36	44.8675	4.34747	356.8	4.34068	-.242808
140	-.750492	1.31	45.8869	4.24667	356.7	4.23954	-.246028
141	-.721639	1.26	46.9062	4.1443	356.6	4.13683	-.248637
142	-.692787	1.21	47.9255	4.04042	356.4	4.03264	-.250643
143	-.663934	1.16	48.9449	3.93511	356.3	3.92703	-.252057
144	-.635082	1.11	49.9642	3.82846	356.2	3.8201	-.252887
145	-.606229	1.06	50.9835	3.72053	356.1	3.7119	-.253145
146	-.577377	1.01	52.0029	3.61141	356.	3.60254	-.252841
147	-.548525	.96	53.0222	3.5012	355.9	3.49212	-.251986
148	-.519672	.91	54.0415	3.38998	355.8	3.38071	-.250593
149	-.49082	.86	55.0608	3.27787	355.6	3.26843	-.248673
150	-.461967	.81	56.0802	3.16501	355.5	3.15542	-.24624
151	-.433115	.76	57.0995	3.05151	355.4	3.0418	-.243309
152	-.404262	.71	58.1188	2.93756	355.3	2.92775	-.239897
153	-.37541	.66	59.1382	2.82334	355.2	2.81346	-.236023
154	-.346557	.61	60.1575	2.70916	355.1	2.69923	-.231711
155	-.317705	.56	61.1768	2.59548	355.	2.58553	-.226995
156	-.288852	.51	62.1962	2.48361	354.9	2.47367	-.221953
END	-.26	.46	63.2155	2.38578	354.8	2.37587	-.217201
2J9	-.26	.46	63.2155	2.35643	355.3	2.34866	-.1911
158	-.26	.46	64.2648	2.25495	355.3	2.24728	-.185771
159	-.26	.46	65.314	2.13725	355.2	2.12972	-.179232
160	-.26	.46	66.3633	2.01579	355.1	2.00844	-.17209
161	-.26	.46	67.4126	1.89156	355.	1.88441	-.164386
162	-.26	.46	68.4619	1.76483	354.9	1.75791	-.156128
163	-.26	.46	69.5111	1.63562	354.8	1.62897	-.147311
164	-.26	.46	70.5604	1.50393	354.7	1.49759	-.137927
165	-.26	.46	71.6097	1.36964	354.6	1.36365	-.12796
166	-.26	.46	72.659	1.23259	354.5	1.22699	-.117388
167	-.26	.46	73.7083	1.09251	354.4	1.08734	-.106181
168	-.26	.46	74.7575	.949003	354.3	.944307	-.0942928
169	-.26	.46	75.8068	.801416	354.2	.797245	-.0816552
170	-.26	.46	76.8561	.648719	354.	.645128	-.068158
171	-.26	.46	77.9053	.489059	353.7	.486113	-.0536072
172	-.26	.46	78.9546	.318776	353.2	.316548	-.0376219
END	-.26	.46	80.0039	.137351	351.6	.135876	-.0200762
GND	-2.02	-3.51	0	.0900633	288.4	.0284343	-.0854569
END	-2.02	-3.51	1.0363	.182245	288.3	.0571433	-.173055
2J4	-2.02	-3.51	1.0363	6.54161	6.6	6.49814	.752842
176	-1.99115	-3.46	2.05563	6.55114	6.1	6.51379	.698467
177	-1.9623	-3.41	3.07496	6.55756	5.7	6.52555	.647049
178	-1.93344	-3.36	4.09429	6.56051	5.2	6.53305	.599567
179	-1.90459	-3.31	5.11362	6.56014	4.9	6.5366	.555235
180	-1.87574	-3.26	6.13296	6.55656	4.5	6.53641	.513529
181	-1.84689	-3.21	7.15229	6.54982	4.2	6.53263	.474096
182	-1.81803	-3.16	8.17162	6.53995	3.8	6.52535	.436677
183	-1.78918	-3.11	9.19095	6.52701	3.5	6.51467	.401073
184	-1.76033	-3.06	10.2103	6.511	3.2	6.50064	.367126
185	-1.73148	-3.01	11.2296	6.49199	3.	6.48335	.334703
186	-1.70262	-2.96	12.2489	6.46998	2.7	6.46284	.303691
187	-1.67377	-2.91	13.2683	6.44501	2.4	6.43918	.273997
188	-1.64492	-2.86	14.2876	6.41711	2.2	6.41241	.245543
189	-1.61607	-2.81	15.3069	6.38632	2.	6.38259	.218259
190	-1.58721	-2.76	16.3263	6.35265	1.7	6.34975	.192089
191	-1.55836	-2.71	17.3456	6.31614	1.5	6.31394	.16698
192	-1.52951	-2.66	18.3649	6.27682	1.3	6.2752	.142891
193	-1.50066	-2.61	19.3843	6.23472	1.1	6.23357	.119783
194	-1.4718	-2.56	20.4036	6.18987	.9	6.1891	.0976248
195	-1.44295	-2.51	21.4229	6.14228	.7	6.14181	.076386
196	-1.4141	-2.46	22.4423	6.09203	.5	6.09177	.0560416
197	-1.38525	-2.41	23.4616	6.03911	.3	6.039	.0365688

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198	-1.35639	-2.36	24.4809	5.98356	.2	5.98354	.0179477
199	-1.32754	-2.31	25.5002	5.92544	0.0	5.92544	1.6E-04
200	-1.29869	-2.26	26.5196	5.86475	359.8	5.86473	-.0168115
201	-1.26984	-2.21	27.5389	5.80156	359.7	5.80147	-.032981
202	-1.24098	-2.16	28.5582	5.73588	359.5	5.73568	-.0483627
203	-1.21213	-2.11	29.5776	5.66776	359.4	5.66741	-.0629692
204	-1.18328	-2.06	30.5969	5.59724	359.2	5.59671	-.0768126
205	-1.15443	-2.01	31.6162	5.52436	359.1	5.52363	-.089904
206	-1.12557	-1.96	32.6356	5.44916	358.9	5.4482	-.102254
207	-1.09672	-1.91	33.6549	5.37168	358.8	5.37047	-.113872
208	-1.06787	-1.86	34.6742	5.29197	358.6	5.2905	-.124769
209	-1.03902	-1.81	35.6936	5.21008	358.5	5.20833	-.134954
210	-1.01016	-1.76	36.7129	5.12605	358.4	5.12401	-.144434
211	-.981311	-1.71	37.7322	5.03992	358.3	5.03759	-.153221
212	-.952459	-1.66	38.7516	4.95176	358.1	4.94914	-.161321
213	-.923607	-1.61	39.7709	4.86161	358.	4.85869	-.168744
214	-.894754	-1.56	40.7902	4.76953	357.9	4.7663	-.175498
215	-.865902	-1.51	41.8095	4.67556	357.8	4.67204	-.181592
216	-.837049	-1.46	42.8289	4.57978	357.7	4.57596	-.187033
217	-.808197	-1.41	43.8482	4.48223	357.5	4.47812	-.191832
218	-.779344	-1.36	44.8675	4.38297	357.4	4.37859	-.195995
219	-.750492	-1.31	45.8869	4.28209	357.3	4.27744	-.199533
220	-.721639	-1.26	46.9062	4.17963	357.2	4.17472	-.202454
221	-.692787	-1.21	47.9255	4.07566	357.1	4.07051	-.204768
222	-.663934	-1.16	48.9449	3.97027	357.	3.96489	-.206484
223	-.635082	-1.11	49.9642	3.86352	356.9	3.85794	-.207611
224	-.606229	-1.06	50.9835	3.75551	356.8	3.74973	-.20816
225	-.577377	-1.01	52.0029	3.6463	356.7	3.64035	-.208142
226	-.548525	-.96	53.0222	3.53599	356.6	3.5299	-.207568
227	-.519672	-.91	54.0415	3.42469	356.5	3.41847	-.206449
228	-.49082	-.86	55.0608	3.3125	356.5	3.30617	-.204797
229	-.461967	-.81	56.0802	3.19954	356.4	3.19312	-.202628
230	-.433115	-.76	57.0995	3.08595	356.3	3.07947	-.199954
231	-.404262	-.71	58.1188	2.97189	356.2	2.96537	-.196794
232	-.37541	-.66	59.1382	2.85758	356.1	2.85104	-.193165
233	-.346557	-.61	60.1575	2.74328	356.	2.73675	-.189093
234	-.317705	-.56	61.1768	2.62948	356.	2.62299	-.184611
235	-.288852	-.51	62.1962	2.5175	355.9	2.51107	-.179798
END	-.26	-.46	63.2155	2.41955	355.8	2.4132	-.175263
2J12	-.26	-.46	63.2155	2.3666	355.6	2.35975	-.179933
237	-.26	-.46	64.2648	2.26506	355.6	2.2583	-.174826
238	-.26	-.46	65.314	2.14729	355.5	2.14067	-.168514
239	-.26	-.46	66.3633	2.02575	355.4	2.0193	-.161599
240	-.26	-.46	67.4126	1.90144	355.4	1.89519	-.154123
241	-.26	-.46	68.4619	1.77462	355.3	1.7686	-.146092
242	-.26	-.46	69.5111	1.64534	355.2	1.63959	-.137502
243	-.26	-.46	70.5604	1.51357	355.1	1.50812	-.128344
244	-.26	-.46	71.6097	1.37921	355.1	1.3741	-.118602
245	-.26	-.46	72.659	1.24209	355.	1.23736	-.108254
246	-.26	-.46	73.7083	1.10192	354.9	1.09762	-.0972698
247	-.26	-.46	74.7575	.958333	354.9	.954502	-.0856035
248	-.26	-.46	75.8068	.810666	354.8	.807355	-.0731865
249	-.26	-.46	76.8561	.657886	354.8	.655152	-.0599087
250	-.26	-.46	77.9053	.498139	354.8	.49605	-.0455761
251	-.26	-.46	78.9546	.327755	354.8	.326397	-.029808
END	-.26	-.46	80.0039	.146168	355.1	.145634	-.012483
2J6	.53	0	63.2155	.0404369	17.6	.03855	.0122082
END	-.26	.46	63.2155	.0180121	125.7	-.0105166	.0146232
2J9	-.26	.46	63.2155	.0202561	325.5	.0166899	-.0114786
END	-.26	-.46	63.2155	.0340452	195.3	-.0328318	-9.01E-03
2J12	-.26	-.46	63.2155	.0210643	348.1	.0206128	-4.34E-03
END	.53	0	63.2155	.0285553	184.	-.0284841	-2.01E-03
2J7	.53	0	80.0039	.0762292	357.2	.0761378	-3.73E-03

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END	-.26	.46	80.0039	.0678884	171.2	-.0670955	.0103454
2J10	-.26	.46	80.0039	.0694651	351.9	.0687802	-9.73E-03
END	-.26	-.46	80.0039	.0755725	176.6	-.0754395	4.48E-03
2J13	-.26	-.46	80.0039	.0706492	353.5	.0701947	-8.E-03
END	.53	0	80.0039	.0733249	175.3	-.0730812	5.97E-03
GND	-48.6	48.6	0	10.3539	88.2	.323191	10.3488
265	-48.6	48.6	1.13995	10.3324	88.2	.331525	10.3271
END	-48.6	48.6	2.2799	10.3215	88.1	.335036	10.3161
2J20	-48.6	48.6	2.2799	3.46891	89.5	.0299211	3.46879
267	-47.5875	48.6	1.969	3.45496	89.4	.0332532	3.4548
268	-46.575	48.6	1.6581	3.43514	89.4	.0376074	3.43494
269	-45.5625	48.6	1.3472	3.41258	89.3	.0423119	3.41232
END	-44.55	48.6	1.0363	3.39073	89.2	.0465598	3.39041
2J20	-48.6	48.6	2.2799	3.38417	86.3	.220416	3.37699
271	-49.105	49.4775	1.969	3.37039	86.2	.223687	3.36296
272	-49.61	50.355	1.6581	3.35134	86.1	.227876	3.34359
273	-50.115	51.2325	1.3472	3.32951	86.	.232311	3.3214
END	-50.62	52.11	1.0363	3.30854	85.9	.236235	3.30009
2J20	-48.6	48.6	2.2799	3.47135	88.6	.0846986	3.47032
275	-49.105	47.7225	1.969	3.45733	88.5	.0880126	3.45621
276	-49.61	46.845	1.6581	3.43851	88.5	.0923349	3.43727
277	-50.115	45.9675	1.3472	3.41669	88.4	.0969717	3.41532
END	-50.62	45.09	1.0363	3.39637	88.3	.101164	3.39487
GND	-44.55	48.6	0	.0484299	280.7	9.E-03	-.0475872
END	-44.55	48.6	1.0363	.0982857	280.7	.018216	-.0965829
2J21	-44.55	48.6	1.0363	3.29446	88.9	.0647757	3.29383
281	-44.6077	48.6	2.05563	3.26318	88.8	.0704754	3.26242
282	-44.6654	48.6	3.07496	3.23225	88.7	.0758214	3.23136
283	-44.7231	48.6	4.09429	3.20223	88.6	.0807089	3.20122
284	-44.7808	48.6	5.11362	3.17271	88.5	.0852203	3.17157
285	-44.8385	48.6	6.13296	3.14341	88.4	.0894101	3.14214
286	-44.8962	48.6	7.15229	3.11416	88.3	.0933149	3.11276
287	-44.9539	48.6	8.17162	3.0848	88.2	.0969609	3.08328
288	-45.0116	48.6	9.19095	3.05525	88.1	.100368	3.0536
289	-45.0693	48.6	10.2103	3.02543	88.	.103552	3.02366
290	-45.127	48.6	11.2296	2.99526	88.	.106526	2.99337
291	-45.1848	48.6	12.2489	2.96471	87.9	.1093	2.9627
292	-45.2425	48.6	13.2683	2.93373	87.8	.111885	2.9316
293	-45.3002	48.6	14.2876	2.90229	87.7	.114286	2.90004
294	-45.3579	48.6	15.3069	2.87036	87.7	.11651	2.86799
295	-45.4156	48.6	16.3263	2.83791	87.6	.118564	2.83543
296	-45.4733	48.6	17.3456	2.80493	87.5	.120449	2.80234
297	-45.531	48.6	18.3649	2.77141	87.5	.122172	2.76872
298	-45.5887	48.6	19.3843	2.73736	87.4	.123733	2.73456
299	-45.6464	48.6	20.4036	2.70274	87.3	.125137	2.69984
300	-45.7041	48.6	21.4229	2.66758	87.3	.126384	2.66458
301	-45.7618	48.6	22.4423	2.63184	87.2	.127477	2.62875
302	-45.8195	48.6	23.4616	2.59556	87.2	.128416	2.59238
303	-45.8772	48.6	24.4809	2.55873	87.1	.129204	2.55546
304	-45.9349	48.6	25.5002	2.52135	87.	.129841	2.518
305	-45.9926	48.6	26.5196	2.48342	87.	.130327	2.48
306	-46.0503	48.6	27.5389	2.44497	86.9	.130663	2.44147
307	-46.108	48.6	28.5582	2.40598	86.9	.130851	2.40242
308	-46.1657	48.6	29.5776	2.36649	86.8	.130889	2.36286
309	-46.2234	48.6	30.5969	2.32648	86.8	.130779	2.3228
310	-46.2811	48.6	31.6162	2.28598	86.7	.130521	2.28225
311	-46.3389	48.6	32.6356	2.245	86.7	.130114	2.24122
312	-46.3966	48.6	33.6549	2.20355	86.6	.12956	2.19973
313	-46.4543	48.6	34.6742	2.16164	86.6	.128857	2.15779
314	-46.512	48.6	35.6936	2.11929	86.5	.128008	2.11543
315	-46.5697	48.6	36.7129	2.07652	86.5	.127011	2.07264
316	-46.6274	48.6	37.7322	2.03333	86.5	.125867	2.02944
317	-46.6851	48.6	38.7516	1.98975	86.4	.124576	1.98585

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318	-46.7428	48.6	39.7709	1.9458	86.4	.123138	1.9419
319	-46.8005	48.6	40.7902	1.90149	86.3	.121555	1.8976
320	-46.8582	48.6	41.8095	1.85683	86.3	.119826	1.85296
321	-46.9159	48.6	42.8289	1.81185	86.3	.117952	1.80801
322	-46.9736	48.6	43.8482	1.76658	86.2	.115934	1.76277
323	-47.0313	48.6	44.8675	1.72102	86.2	.113772	1.71726
324	-47.089	48.6	45.8869	1.67521	86.2	.111468	1.6715
325	-47.1467	48.6	46.9062	1.62916	86.2	.109022	1.62551
326	-47.2044	48.6	47.9255	1.5829	86.1	.106437	1.57932
327	-47.2621	48.6	48.9449	1.53645	86.1	.103712	1.53295
328	-47.3198	48.6	49.9642	1.48986	86.1	.100851	1.48644
329	-47.3775	48.6	50.9835	1.44311	86.1	.097855	1.43979
330	-47.4352	48.6	52.0029	1.39628	86.1	.0947262	1.39306
331	-47.493	48.6	53.0222	1.34937	86.1	.0914675	1.34627
332	-47.5507	48.6	54.0415	1.30243	86.1	.0880819	1.29945
333	-47.6084	48.6	55.0608	1.25549	86.1	.0845729	1.25264
334	-47.6661	48.6	56.0802	1.20861	86.2	.0809449	1.20589
335	-47.7238	48.6	57.0995	1.16182	86.2	.0772032	1.15925
336	-47.7815	48.6	58.1188	1.11518	86.2	.0733538	1.11276
337	-47.8392	48.6	59.1382	1.06878	86.3	.0694053	1.06652
338	-47.8969	48.6	60.1575	1.02271	86.3	.0653693	1.02062
339	-47.9546	48.6	61.1768	.97718	86.4	.0612664	.975257
340	-48.0123	48.6	62.1962	.932671	86.5	.0571501	.930918
END	-48.07	48.6	63.2155	.893993	86.6	.0535097	.89239
2J25	-48.07	48.6	63.2155	.894935	84.	.0942874	.889955
342	-48.07	48.6	64.2648	.855109	83.9	.0904283	.850314
343	-48.07	48.6	65.314	.809175	83.9	.0858352	.804609
344	-48.07	48.6	66.3633	.762051	83.9	.0810025	.757734
345	-48.07	48.6	67.4126	.714137	83.9	.075968	.710085
346	-48.07	48.6	68.4619	.665534	83.9	.0707382	.661764
347	-48.07	48.6	69.5111	.61627	83.9	.0653129	.6128
348	-48.07	48.6	70.5604	.566341	84.	.0596872	.563187
349	-48.07	48.6	71.6097	.515713	84.	.0538534	.512893
350	-48.07	48.6	72.659	.464329	84.1	.0478001	.461862
351	-48.07	48.6	73.7083	.412097	84.2	.0415109	.410001
352	-48.07	48.6	74.7575	.358879	84.4	.0349625	.357172
353	-48.07	48.6	75.8068	.304453	84.7	.0281192	.303152
354	-48.07	48.6	76.8561	.248463	85.2	.0209244	.24758
355	-48.07	48.6	77.9053	.19027	86.	.0132782	.189806
356	-48.07	48.6	78.9546	.128636	87.8	4.99E-03	.128539
END	-48.07	48.6	80.0039	.0637629	93.6	-4.E-03	.0636377
GND	-50.62	52.11	0	.0466498	280.2	8.23E-03	-.0459185
END	-50.62	52.11	1.0363	.094643	280.1	.0166592	-.0931652
2J22	-50.62	52.11	1.0363	3.21688	85.5	.252894	3.20693
360	-50.5911	52.06	2.05563	3.18715	85.4	.258069	3.17669
361	-50.5623	52.01	3.07496	3.15772	85.2	.262866	3.14676
362	-50.5334	51.96	4.09429	3.12911	85.1	.267188	3.11768
363	-50.5046	51.91	5.11362	3.10091	85.	.271113	3.08904
364	-50.4757	51.86	6.13296	3.07289	84.9	.274694	3.06059
365	-50.4469	51.81	7.15229	3.04485	84.8	.277966	3.03214
366	-50.418	51.76	8.17162	3.01666	84.7	.280956	3.00355
367	-50.3892	51.71	9.19095	2.98823	84.6	.283682	2.97474
368	-50.3603	51.66	10.2103	2.9595	84.5	.286162	2.94563
369	-50.3315	51.61	11.2296	2.93038	84.4	.288408	2.91615
370	-50.3026	51.56	12.2489	2.90083	84.3	.290433	2.88625
371	-50.2738	51.51	13.2683	2.87081	84.2	.292246	2.8559
372	-50.2449	51.46	14.2876	2.8403	84.1	.293855	2.82506
373	-50.2161	51.41	15.3069	2.80926	84.	.295267	2.7937
374	-50.1872	51.36	16.3263	2.77768	83.9	.296489	2.76181
375	-50.1584	51.31	17.3456	2.74554	83.8	.297526	2.72937
376	-50.1295	51.26	18.3649	2.71283	83.7	.298382	2.69637
377	-50.1007	51.21	19.3843	2.67954	83.6	.299061	2.6628
378	-50.0718	51.16	20.4036	2.64568	83.5	.299567	2.62866

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379	-50.0429	51.11	21.4229	2.61123	83.4	.299903	2.59395
380	-50.0141	51.06	22.4423	2.5762	83.3	.300072	2.55866
381	-49.9852	51.01	23.4616	2.54059	83.2	.300076	2.5228
382	-49.9564	50.96	24.4809	2.5044	83.1	.299918	2.48637
383	-49.9275	50.91	25.5002	2.46764	83.	.299599	2.44938
384	-49.8987	50.86	26.5196	2.43031	82.9	.299121	2.41183
385	-49.8698	50.81	27.5389	2.39244	82.8	.298487	2.37374
386	-49.841	50.76	28.5582	2.354	82.7	.297696	2.3351
387	-49.8121	50.71	29.5776	2.31504	82.6	.296752	2.29594
388	-49.7833	50.66	30.5969	2.27555	82.5	.295655	2.25626
389	-49.7544	50.61	31.6162	2.23555	82.4	.294406	2.21608
390	-49.7256	50.56	32.6356	2.19505	82.3	.293007	2.1754
391	-49.6967	50.51	33.6549	2.15406	82.2	.29146	2.13425
392	-49.6679	50.46	34.6742	2.1126	82.1	.289764	2.09264
393	-49.639	50.41	35.6936	2.07068	82.	.287922	2.05057
394	-49.6102	50.36	36.7129	2.02831	81.9	.285934	2.00806
395	-49.5813	50.31	37.7322	1.98553	81.8	.283802	1.96515
396	-49.5525	50.26	38.7516	1.94234	81.7	.281527	1.92183
397	-49.5236	50.21	39.7709	1.89875	81.5	.279111	1.87813
398	-49.4948	50.16	40.7902	1.8548	81.4	.276553	1.83407
399	-49.4659	50.11	41.8095	1.81049	81.3	.273857	1.78966
400	-49.437	50.06	42.8289	1.76585	81.2	.271022	1.74493
401	-49.4082	50.01	43.8482	1.7209	81.	.268052	1.6999
402	-49.3793	49.96	44.8675	1.67566	80.9	.264947	1.65458
403	-49.3505	49.91	45.8869	1.63015	80.8	.261708	1.60901
404	-49.3216	49.86	46.9062	1.58441	80.6	.258339	1.56321
405	-49.2928	49.81	47.9255	1.53844	80.5	.254839	1.51719
406	-49.2639	49.76	48.9449	1.49229	80.3	.251213	1.47099
407	-49.2351	49.71	49.9642	1.44596	80.1	.247462	1.42463
408	-49.2062	49.66	50.9835	1.3995	80.	.243588	1.37814
409	-49.1774	49.61	52.0029	1.35294	79.8	.239594	1.33156
410	-49.1485	49.56	53.0222	1.3063	79.6	.235484	1.2849
411	-49.1197	49.51	54.0415	1.25963	79.4	.23126	1.23822
412	-49.0908	49.46	55.0608	1.21296	79.2	.226926	1.19154
413	-49.062	49.41	56.0802	1.16633	79.	.222488	1.14491
414	-49.0331	49.36	57.0995	1.11981	78.8	.21795	1.09839
415	-49.0043	49.31	58.1188	1.07343	78.5	.213318	1.05202
416	-48.9754	49.26	59.1382	1.0273	78.3	.208603	1.00589
417	-48.9466	49.21	60.1575	.981488	78.	.203813	.960093
418	-48.9177	49.16	61.1768	.936209	77.7	.19897	.914822
419	-48.8889	49.11	62.1962	.891956	77.4	.194128	.870575
END	-48.86	49.06	63.2155	.853501	77.2	.189799	.83213
2J28	-48.86	49.06	63.2155	.868303	81.2	.132919	.858069
421	-48.86	49.06	64.2648	.828514	81.1	.128354	.818511
422	-48.86	49.06	65.314	.78263	81.	.123032	.772899
423	-48.86	49.06	66.3633	.735556	80.8	.117467	.726116
424	-48.86	49.06	67.4126	.687694	80.7	.1117	.678562
425	-48.86	49.06	68.4619	.639147	80.5	.105737	.63034
426	-48.86	49.06	69.5111	.589941	80.3	.0995791	.581476
427	-48.86	49.06	70.5604	.540071	80.1	.0932213	.531964
428	-48.86	49.06	71.6097	.489505	79.8	.0866565	.481774
429	-48.86	49.06	72.659	.438188	79.5	.0798735	.430847
430	-48.86	49.06	73.7083	.38603	79.1	.0728567	.379092
431	-48.86	49.06	74.7575	.332894	78.6	.0655824	.32637
432	-48.86	49.06	75.8068	.278566	78.	.0580156	.272458
433	-48.86	49.06	76.8561	.222703	77.	.0500995	.216994
434	-48.86	49.06	77.9053	.164702	75.3	.0417341	.159327
435	-48.86	49.06	78.9546	.103476	71.6	.0327225	.0981657
END	-48.86	49.06	80.0039	.0405269	55.4	.0230111	.0333604
GND	-50.62	45.09	0	.0456684	281.1	8.82E-03	-.044808
END	-50.62	45.09	1.0363	.0926196	281.1	.0178674	-.0908799
2J23	-50.62	45.09	1.0363	3.30613	87.9	.119031	3.30399
439	-50.5911	45.14	2.05563	3.27694	87.8	.124614	3.27457

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440	-50.5623	45.19	3.07496	3.2481	87.7	.129838	3.24551
441	-50.5334	45.24	4.09429	3.22011	87.6	.134599	3.2173
442	-50.5046	45.29	5.11362	3.19256	87.5	.138977	3.18954
443	-50.4757	45.34	6.13296	3.16519	87.4	.143027	3.16196
444	-50.4469	45.39	7.15229	3.1378	87.3	.146786	3.13437
445	-50.418	45.44	8.17162	3.11029	87.2	.150279	3.10666
446	-50.3892	45.49	9.19095	3.08254	87.1	.153526	3.07872
447	-50.3603	45.54	10.2103	3.05449	87.1	.156543	3.05048
448	-50.3315	45.59	11.2296	3.02607	87.	.159343	3.02187
449	-50.3026	45.64	12.2489	2.99723	86.9	.161938	2.99285
450	-50.2738	45.69	13.2683	2.96791	86.8	.164337	2.96336
451	-50.2449	45.74	14.2876	2.93811	86.8	.166546	2.93339
452	-50.2161	45.79	15.3069	2.90779	86.7	.168574	2.9029
453	-50.1872	45.84	16.3263	2.87692	86.6	.170425	2.87187
454	-50.1584	45.89	17.3456	2.8455	86.5	.172103	2.84029
455	-50.1295	45.94	18.3649	2.81351	86.5	.173613	2.80815
456	-50.1007	45.99	19.3843	2.78094	86.4	.174958	2.77543
457	-50.0718	46.04	20.4036	2.74778	86.3	.176141	2.74213
458	-50.0429	46.09	21.4229	2.71405	86.3	.177164	2.70826
459	-50.0141	46.14	22.4423	2.67972	86.2	.178028	2.6738
460	-49.9852	46.19	23.4616	2.64481	86.1	.178736	2.63876
461	-49.9564	46.24	24.4809	2.60932	86.1	.17929	2.60315
462	-49.9275	46.29	25.5002	2.57324	86.	.179689	2.56696
463	-49.8987	46.34	26.5196	2.53659	85.9	.179936	2.5302
464	-49.8698	46.39	27.5389	2.49938	85.9	.180031	2.49289
465	-49.841	46.44	28.5582	2.46161	85.8	.179975	2.45502
466	-49.8121	46.49	29.5776	2.42329	85.7	.179769	2.41661
467	-49.7833	46.54	30.5969	2.38443	85.7	.179412	2.37767
468	-49.7544	46.59	31.6162	2.34505	85.6	.178907	2.33821
469	-49.7256	46.64	32.6356	2.30515	85.6	.178252	2.29824
470	-49.6967	46.69	33.6549	2.26475	85.5	.177449	2.25778
471	-49.6679	46.74	34.6742	2.22386	85.4	.176498	2.21684
472	-49.639	46.79	35.6936	2.18249	85.4	.1754	2.17543
473	-49.6102	46.84	36.7129	2.14067	85.3	.174155	2.13357
474	-49.5813	46.89	37.7322	2.0984	85.3	.172763	2.09128
475	-49.5525	46.94	38.7516	2.0557	85.2	.171225	2.04856
476	-49.5236	46.99	39.7709	2.01259	85.2	.169542	2.00544
477	-49.4948	47.04	40.7902	1.96909	85.1	.167713	1.96194
478	-49.4659	47.09	41.8095	1.92521	85.1	.165741	1.91807
479	-49.437	47.14	42.8289	1.88099	85.	.163625	1.87386
480	-49.4082	47.19	43.8482	1.83642	85.	.161366	1.82932
481	-49.3793	47.24	44.8675	1.79153	84.9	.158966	1.78447
482	-49.3505	47.29	45.8869	1.74637	84.9	.156425	1.73935
483	-49.3216	47.34	46.9062	1.70092	84.8	.153745	1.69396
484	-49.2928	47.39	47.9255	1.65522	84.8	.150927	1.64833
485	-49.2639	47.44	48.9449	1.60932	84.7	.147973	1.6025
486	-49.2351	47.49	49.9642	1.5632	84.7	.144885	1.55647
487	-49.2062	47.54	50.9835	1.51692	84.6	.141664	1.51029
488	-49.1774	47.59	52.0029	1.4705	84.6	.138313	1.46398
489	-49.1485	47.64	53.0222	1.42398	84.6	.134834	1.41758
490	-49.1197	47.69	54.0415	1.37738	84.5	.131232	1.37111
491	-49.0908	47.74	55.0608	1.33074	84.5	.127508	1.32462
492	-49.062	47.79	56.0802	1.28411	84.5	.123668	1.27814
493	-49.0331	47.84	57.0995	1.23755	84.4	.119717	1.23174
494	-49.0043	47.89	58.1188	1.19109	84.4	.115661	1.18546
495	-48.9754	47.94	59.1382	1.14483	84.4	.111508	1.13938
496	-48.9466	47.99	60.1575	1.09886	84.4	.10727	1.09361
497	-48.9177	48.04	61.1768	1.05337	84.4	.102967	1.04832
498	-48.8889	48.09	62.1962	1.00886	84.4	.0986533	1.00402
END	-48.86	48.14	63.2155	.970137	84.4	.0948219	.965492
2J31	-48.86	48.14	63.2155	.890254	83.2	.104918	.88405
500	-48.86	48.14	64.2648	.850382	83.2	.100863	.844379
501	-48.86	48.14	65.314	.804404	83.1	.0960668	.798647

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502	-48.86	48.14	66.3633	.757234	83.1	.0910304	.751743
503	-48.86	48.14	67.4126	.709272	83.1	.0857914	.704064
504	-48.86	48.14	68.4619	.660619	83.	.080357	.655713
505	-48.86	48.14	69.5111	.611303	83.	.0747268	.606719
506	-48.86	48.14	70.5604	.561318	82.9	.0688961	.557074
507	-48.86	48.14	71.6097	.510631	82.9	.0628574	.506747
508	-48.86	48.14	72.659	.459184	82.9	.0565992	.455683
509	-48.86	48.14	73.7083	.406883	82.9	.0501053	.403786
510	-48.86	48.14	74.7575	.353587	83.	.0433524	.35092
511	-48.86	48.14	75.8068	.299073	83.	.0363047	.296861
512	-48.86	48.14	76.8561	.242973	83.2	.0289057	.241247
513	-48.86	48.14	77.9053	.184632	83.5	.0210553	.183428
514	-48.86	48.14	78.9546	.122755	84.1	.0125574	.122111
END	-48.86	48.14	80.0039	.0572426	86.6	3.37E-03	.0571434
2J25	-48.07	48.6	63.2155	.0366649	149.1	-.0314655	.0188212
END	-48.86	49.06	63.2155	.0335098	180.7	-.0335072	-4.23E-04
2J28	-48.86	49.06	63.2155	.0352311	311.6	.0233723	-.0263622
END	-48.86	48.14	63.2155	.0504516	294.9	.0212327	-.0457661
2J31	-48.86	48.14	63.2155	.0373742	72.7	.0111363	.0356766
END	-48.07	48.6	63.2155	.0188468	60.4	9.31E-03	.0163855
2J26	-48.07	48.6	80.0039	.036109	98.3	-5.2E-03	.035732
END	-48.86	49.06	80.0039	.0200493	230.7	-.0127014	-.0155129
2J29	-48.86	49.06	80.0039	.0206112	60.	.0103097	.0178475
END	-48.86	48.14	80.0039	.0338332	274.5	2.67E-03	-.0337279
2J32	-48.86	48.14	80.0039	.0241811	75.5	6.04E-03	.0234155
END	-48.07	48.6	80.0039	.0279318	267.5	-1.21E-03	-.0279056
GND	84.5	14.9	0	2.33344	55.8	1.3117	1.92987
528	84.5	14.9	1.1176	2.29386	55.8	1.28945	1.89713
END	84.5	14.9	2.2352	2.27274	55.8	1.27759	1.87966
2J39	84.5	14.9	2.2352	.758573	46.4	.523084	.549377
530	85.5125	14.9	1.9304	.737391	46.1	.510993	.53163
531	86.525	14.9	1.6256	.709462	45.8	.494982	.508261
532	87.5375	14.9	1.3208	.679121	45.3	.477526	.482882
END	88.55	14.9	1.016	.651444	44.9	.461549	.45973
2J39	84.5	14.9	2.2352	.758915	59.7	.383387	.654955
534	83.995	15.7775	1.9304	.737465	59.8	.371323	.637161
535	83.49	16.655	1.6256	.709382	59.9	.355536	.613855
536	82.985	17.5325	1.3208	.678795	60.1	.338356	.588454
END	82.48	18.41	1.016	.650899	60.3	.322695	.565277
2J39	84.5	14.9	2.2352	.77058	61.2	.371114	.675327
538	83.995	14.0225	1.9304	.749176	61.4	.359055	.657528
539	83.49	13.145	1.6256	.721133	61.6	.34327	.634192
540	82.985	12.2675	1.3208	.690591	61.8	.326099	.60875
END	82.48	11.39	1.016	.662737	62.1	.310449	.585527
GND	88.55	14.9	0	.0598428	235.3	-.0340988	-.0491776
END	88.55	14.9	1.016	.120345	235.3	-.0685671	-.0989017
2J40	88.55	14.9	1.016	.533509	42.6	.392982	.360828
544	88.4923	14.9	2.01534	.496911	41.6	.37157	.329934
545	88.4346	14.9	3.01469	.462394	40.6	.351291	.300671
546	88.3769	14.9	4.01403	.430636	39.4	.332537	.273618
547	88.3192	14.9	5.01338	.401123	38.3	.315006	.248337
548	88.2615	14.9	6.01272	.373511	37.	.298492	.224528
549	88.2038	14.9	7.01207	.347575	35.5	.282856	.201993
550	88.1461	14.9	8.01141	.323161	34.	.267998	.180583
551	88.0884	14.9	9.01075	.300159	32.3	.253841	.160187
552	88.0307	14.9	10.0101	.278487	30.4	.240321	.140715
553	87.973	14.9	11.0094	.258094	28.2	.227389	.122092
554	87.9152	14.9	12.0088	.238944	25.9	.214999	.104256
555	87.8575	14.9	13.0081	.221026	23.2	.203118	.087154
556	87.7998	14.9	14.0075	.204347	20.3	.191712	.0707409
557	87.7421	14.9	15.0068	.188932	16.9	.180756	.0549788
558	87.6844	14.9	16.0062	.174826	13.2	.170227	.0398352
559	87.6267	14.9	17.0055	.16209	9.	.160106	.0252819

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560	87.569	14.9	18.0049	.150799	4.3	.150375	.0112949
561	87.5113	14.9	19.0042	.141037	359.1	.141021	-2.15E-03
562	87.4536	14.9	20.0035	.132886	353.5	.13203	-.0150613
563	87.3959	14.9	21.0029	.126411	347.5	.123391	-.0274646
564	87.3382	14.9	22.0022	.121642	341.1	.115094	-.0393707
565	87.2805	14.9	23.0016	.118562	334.6	.107131	-.0507918
566	87.2228	14.9	24.0009	.117092	328.2	.0994933	-.0617391
567	87.1651	14.9	25.0003	.117098	321.9	.0921737	-.0722221
568	87.1074	14.9	25.9996	.118399	316.	.0851658	-.0822498
569	87.0497	14.9	26.999	.120786	310.5	.0784638	-.0918301
570	86.992	14.9	27.9983	.124048	305.5	.0720624	-.10097
571	86.9343	14.9	28.9976	.127981	301.	.0659563	-.109676
572	86.8766	14.9	29.997	.132403	297.	.0601412	-.117956
573	86.8189	14.9	30.9963	.137155	293.5	.0546124	-.125813
574	86.7611	14.9	31.9957	.142104	290.3	.0493659	-.133254
575	86.7034	14.9	32.995	.147142	287.6	.0443976	-.140284
576	86.6457	14.9	33.9944	.152178	285.1	.0397038	-.146907
577	86.588	14.9	34.9937	.15714	283.	.0352808	-.153128
578	86.5303	14.9	35.993	.16197	281.1	.0311252	-.158951
579	86.4726	14.9	36.9924	.166622	279.4	.0272333	-.164382
580	86.4149	14.9	37.9917	.171059	277.9	.0236018	-.169423
581	86.3572	14.9	38.9911	.17525	276.6	.0202274	-.174079
582	86.2995	14.9	39.9904	.179172	275.5	.0171066	-.178354
583	86.2418	14.9	40.9898	.182807	274.5	.0142361	-.182252
584	86.1841	14.9	41.9891	.186139	273.6	.0116125	-.185777
585	86.1264	14.9	42.9885	.189159	272.8	9.23E-03	-.188934
586	86.0687	14.9	43.9878	.191857	272.1	7.09E-03	-.191726
587	86.011	14.9	44.9871	.194228	271.5	5.19E-03	-.194159
588	85.9533	14.9	45.9865	.196266	271.	3.52E-03	-.196235
589	85.8956	14.9	46.9858	.197971	270.6	2.08E-03	-.19796
590	85.8379	14.9	47.9852	.199339	270.2	8.66E-04	-.199338
591	85.7802	14.9	48.9845	.200374	270.	-1.26E-04	-.200374
592	85.7225	14.9	49.9839	.201076	269.7	-9.E-04	-.201074
593	85.6648	14.9	50.9832	.201446	269.6	-1.46E-03	-.201441
594	85.607	14.9	51.9826	.201491	269.5	-1.81E-03	-.201483
595	85.5493	14.9	52.9819	.201213	269.4	-1.95E-03	-.201204
596	85.4916	14.9	53.9812	.20062	269.5	-1.9E-03	-.200611
597	85.4339	14.9	54.9806	.199716	269.5	-1.64E-03	-.19971
598	85.3762	14.9	55.9799	.198513	269.7	-1.2E-03	-.19851
599	85.3185	14.9	56.9793	.197019	269.8	-5.74E-04	-.197019
600	85.2608	14.9	57.9786	.195246	270.1	2.29E-04	-.195246
601	85.2031	14.9	58.978	.193208	270.4	1.2E-03	-.193205
602	85.1454	14.9	59.9773	.190927	270.7	2.33E-03	-.190913
603	85.0877	14.9	60.9767	.188444	271.1	3.58E-03	-.18841
END	85.03	14.9	61.976	.186079	271.5	4.77E-03	-.186018
2J44	85.03	14.9	61.976	.128431	251.8	-.0400261	-.122034
605	85.03	14.9	63.0047	.125414	252.1	-.0386428	-.119312
606	85.03	14.9	64.0334	.121659	252.4	-.0368565	-.115942
607	85.03	14.9	65.0621	.117524	252.7	-.0348583	-.112235
608	85.03	14.9	66.0908	.113036	253.2	-.0326626	-.108214
609	85.03	14.9	67.1195	.108203	253.8	-.0302715	-.103882
610	85.03	14.9	68.1482	.103027	254.4	-.0276833	-.0992384
611	85.03	14.9	69.1769	.0975074	255.2	-.0248945	-.0942759
612	85.03	14.9	70.2056	.0916422	256.2	-.0218997	-.0889871
613	85.03	14.9	71.2343	.0854298	257.4	-.0186914	-.0833599
614	85.03	14.9	72.263	.0788677	258.8	-.0152582	-.0773777
615	85.03	14.9	73.2917	.0719543	260.7	-.0115845	-.0710156
616	85.03	14.9	74.3204	.0646901	263.2	-7.65E-03	-.0642366
617	85.03	14.9	75.3491	.0570827	266.6	-3.4E-03	-.0569811
618	85.03	14.9	76.3778	.049159	271.4	1.21E-03	-.0491442
619	85.03	14.9	77.4065	.0410119	278.9	6.32E-03	-.040522
END	85.03	14.9	78.4352	.0332898	291.1	.0119574	-.0310682
GND	82.48	18.41	0	.0593196	236.	-.0331836	-.0491698

APPENDIX B – DAYTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA

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END	82.48	18.41	1.016	.119252	236.	-.0667111	-.098847
2J41	82.48	18.41	1.016	.532057	61.2	.255984	.46643
623	82.5089	18.36	2.01534	.495069	61.6	.235201	.43563
624	82.5377	18.31	3.01469	.460096	62.1	.215545	.406483
625	82.5666	18.26	4.01403	.427834	62.5	.197408	.379568
626	82.5954	18.21	5.01338	.397755	63.	.180491	.354447
627	82.6243	18.16	6.01272	.369501	63.5	.164592	.330818
628	82.6531	18.11	7.01207	.342832	64.1	.149575	.308482
629	82.682	18.06	8.01141	.317573	64.8	.13534	.28729
630	82.7108	18.01	9.01075	.293593	65.5	.121811	.267131
631	82.7397	17.96	10.0101	.270787	66.3	.108925	.247913
632	82.7685	17.91	11.0094	.24907	67.2	.0966323	.22956
633	82.7974	17.86	12.0088	.228374	68.2	.0848883	.212011
634	82.8262	17.81	13.0081	.208643	69.3	.0736568	.195209
635	82.8551	17.76	14.0075	.189836	70.6	.0629066	.179111
636	82.8839	17.71	15.0068	.171924	72.2	.0526111	.163676
637	82.9128	17.66	16.0062	.154887	74.	.0427473	.148871
638	82.9416	17.61	17.0055	.138724	76.1	.0332954	.134669
639	82.9705	17.56	18.0049	.123445	78.7	.024238	.121042
640	82.9993	17.51	19.0042	.109087	81.8	.0155602	.107971
641	83.0282	17.46	20.0035	.0957098	85.7	7.25E-03	.0954349
642	83.0571	17.41	21.0029	.0834206	90.5	-7.08E-04	.0834176
643	83.0859	17.36	22.0022	.0723841	96.6	-8.32E-03	.0719042
644	83.1148	17.31	23.0016	.062848	104.4	-.0155991	.0608814
645	83.1436	17.26	24.0009	.0551577	114.1	-.0225504	.0503373
646	83.1725	17.21	25.0003	.0497254	125.9	-.0291828	.0402614
647	83.2013	17.16	25.9996	.0468989	139.2	-.0355031	.0306438
648	83.2302	17.11	26.999	.0467432	152.6	-.0415177	.0214757
649	83.259	17.06	27.9983	.0489228	164.9	-.0472325	.012749
650	83.2879	17.01	28.9976	.0528412	175.2	-.0526529	4.46E-03
651	83.3167	16.96	29.997	.0578845	183.4	-.057784	-3.41E-03
652	83.3456	16.91	30.9963	.0635646	189.8	-.0626307	-.0108561
653	83.3744	16.86	31.9957	.0695376	194.9	-.0671974	-.0178882
654	83.4033	16.81	32.995	.0755743	198.9	-.0714887	-.0245121
655	83.4321	16.76	33.9944	.0815239	202.1	-.0755088	-.0307338
656	83.461	16.71	34.9937	.0872865	204.8	-.0792615	-.0365586
657	83.4898	16.66	35.993	.0927957	206.9	-.082751	-.0419918
658	83.5187	16.61	36.9924	.0980071	208.7	-.0859811	-.0470387
659	83.5475	16.56	37.9917	.10289	210.2	-.0889555	-.0517042
660	83.5764	16.51	38.9911	.107425	211.4	-.0916779	-.0559935
661	83.6052	16.46	39.9904	.111597	212.5	-.0941521	-.0599114
662	83.6341	16.41	40.9898	.115399	213.4	-.0963818	-.0634629
663	83.6629	16.36	41.9891	.118825	214.1	-.0983706	-.0666529
664	83.6918	16.31	42.9885	.121872	214.8	-.100122	-.0694866
665	83.7207	16.26	43.9878	.12454	215.3	-.10164	-.0719687
666	83.7495	16.21	44.9871	.126829	215.8	-.102928	-.0741046
667	83.7784	16.16	45.9865	.128743	216.1	-.10399	-.0758993
668	83.8072	16.11	46.9858	.130283	216.4	-.10483	-.0773582
669	83.8361	16.06	47.9852	.131454	216.7	-.105451	-.0784867
670	83.8649	16.01	48.9845	.132261	216.8	-.105858	-.0792903
671	83.8938	15.96	49.9839	.132709	217.	-.106055	-.0797752
672	83.9226	15.91	50.9832	.132806	217.	-.106046	-.0799471
673	83.9515	15.86	51.9826	.132556	217.	-.105835	-.0798125
674	83.9803	15.81	52.9819	.131969	217.	-.105427	-.079378
675	84.0092	15.76	53.9812	.131052	216.9	-.104827	-.0786506
676	84.038	15.71	54.9806	.129815	216.7	-.10404	-.0776382
677	84.0669	15.66	55.9799	.128269	216.5	-.103072	-.0763489
678	84.0957	15.61	56.9793	.126425	216.3	-.101928	-.074792
679	84.1246	15.56	57.9786	.124296	216.	-.100616	-.0729784
680	84.1534	15.51	58.978	.121899	215.6	-.099144	-.0709212
681	84.1823	15.46	59.9773	.119258	215.1	-.0975251	-.0686398
682	84.2111	15.41	60.9767	.116422	214.6	-.0957859	-.0661757
END	84.24	15.36	61.976	.113747	214.1	-.0941374	-.063848

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2J47	84.24	15.36	61.976	.114425	230.1	-.0733582	-.0878155
684	84.24	15.36	63.0047	.111211	230.	-.0715033	-.0851773
685	84.24	15.36	64.0334	.107234	229.8	-.0692274	-.0818945
686	84.24	15.36	65.0621	.102864	229.6	-.0667355	-.0782771
687	84.24	15.36	66.0908	.0981284	229.3	-.0640431	-.0743482
688	84.24	15.36	67.1195	.0930334	228.9	-.0611527	-.0701111
689	84.24	15.36	68.1482	.0875778	228.5	-.0580629	-.0655634
690	84.24	15.36	69.1769	.0817574	227.9	-.0547704	-.0606999
691	84.24	15.36	70.2056	.0755661	227.3	-.0512701	-.0555122
692	84.24	15.36	71.2343	.0689947	226.4	-.0475545	-.0499884
693	84.24	15.36	72.263	.0620316	225.3	-.0436127	-.0441118
694	84.24	15.36	73.2917	.0546611	223.8	-.0394289	-.0378575
695	84.24	15.36	74.3204	.0468644	221.7	-.0349793	-.0311886
696	84.24	15.36	75.3491	.038623	218.5	-.0302253	-.0240451
697	84.24	15.36	76.3778	.0299399	213.	-.0250994	-.0163223
698	84.24	15.36	77.4065	.0209805	201.9	-.0194702	-7.82E-03
END	84.24	15.36	78.4352	.0133911	173.5	-.0133046	1.52E-03
GND	82.48	11.39	0	.0593889	236.1	-.0331516	-.0492749
END	82.48	11.39	1.016	.119389	236.1	-.0666452	-.0990565
2J42	82.48	11.39	1.016	.544145	63.4	.243803	.486471
702	82.5089	11.44	2.01534	.507275	63.9	.223047	.455607
703	82.5377	11.49	3.01469	.472437	64.5	.203423	.426399
704	82.5666	11.54	4.01403	.440325	65.1	.18532	.399428
705	82.5954	11.59	5.01338	.41041	65.8	.168442	.374251
706	82.6243	11.64	6.01272	.382339	66.5	.152588	.350572
707	82.6531	11.69	7.01207	.355872	67.3	.137619	.328186
708	82.682	11.74	8.01141	.330837	68.1	.123436	.306947
709	82.7108	11.79	9.01075	.307104	69.	.109963	.286742
710	82.7397	11.84	10.0101	.284572	70.	.0971384	.267479
711	82.7685	11.89	11.0094	.263158	71.2	.0849093	.249083
712	82.7974	11.94	12.0088	.242799	72.4	.073233	.231491
713	82.8262	11.99	13.0081	.223444	73.9	.0620727	.214649
714	82.8551	12.04	14.0075	.205057	75.5	.0513972	.198512
715	82.8839	12.09	15.0068	.187614	77.3	.0411796	.183039
716	82.9128	12.14	16.0062	.171103	79.4	.0313968	.168198
717	82.9416	12.19	17.0055	.155527	81.9	.0220286	.153959
718	82.9705	12.24	18.0049	.140904	84.7	.0130579	.140298
719	82.9993	12.29	19.0042	.127271	88.	4.47E-03	.127192
720	83.0282	12.34	20.0035	.114685	91.9	-3.75E-03	.114623
721	83.0571	12.39	21.0029	.103229	96.5	-.0116138	.102573
722	83.0859	12.44	22.0022	.0930173	101.9	-.0191307	.0910288
723	83.1148	12.49	23.0016	.0841921	108.2	-.0263107	.0799753
724	83.1436	12.54	24.0009	.0769174	115.5	-.0331624	.0694013
725	83.1725	12.59	25.0003	.0713554	123.8	-.0396935	.059296
726	83.2013	12.64	25.9996	.0676234	132.8	-.0459112	.0496496
727	83.2302	12.69	26.999	.0657418	142.	-.0518219	.0404533
728	83.259	12.74	27.9983	.0655989	151.1	-.0574318	.0316987
729	83.2879	12.79	28.9976	.06696	159.6	-.0627463	.0233783
730	83.3167	12.84	29.997	.0695173	167.1	-.0677707	.015485
731	83.3456	12.89	30.9963	.0729514	173.7	-.0725101	8.01E-03
732	83.3744	12.94	31.9957	.0769752	179.3	-.0769693	9.54E-04
733	83.4033	12.99	32.995	.0813522	184.	-.0811525	-5.7E-03
734	83.4321	13.04	33.9944	.0858991	188.	-.0850645	-.011945
735	83.461	13.09	34.9937	.0904767	191.3	-.0887093	-.0177962
736	83.4898	13.14	35.993	.094982	194.2	-.0920909	-.0232557
737	83.5187	13.19	36.9924	.0993386	196.6	-.0952135	-.0283291
738	83.5475	13.24	37.9917	.10349	198.6	-.0980808	-.0330212
739	83.5764	13.29	38.9911	.107396	200.3	-.100697	-.0373371
740	83.6052	13.34	39.9904	.111025	201.8	-.103065	-.041282
741	83.6341	13.39	40.9898	.114357	203.1	-.10519	-.0448609
742	83.6629	13.44	41.9891	.117374	204.2	-.107075	-.0480786
743	83.6918	13.49	42.9885	.120065	205.1	-.108723	-.0509401
744	83.7207	13.54	43.9878	.122425	205.9	-.11014	-.0534507

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745	83.7495	13.59	44.9871	.124447	206.5	-.111328	-.0556156
746	83.7784	13.64	45.9865	.126129	207.1	-.112291	-.0574398
747	83.8072	13.69	46.9858	.127472	207.5	-.113033	-.0589288
748	83.8361	13.74	47.9852	.128477	207.9	-.113559	-.0600881
749	83.8649	13.79	48.9845	.129145	208.1	-.113872	-.0609233
750	83.8938	13.84	49.9839	.129483	208.3	-.113977	-.0614404
751	83.9226	13.89	50.9832	.129493	208.4	-.113878	-.0616453
752	83.9515	13.94	51.9826	.129182	208.5	-.113579	-.0615445
753	83.9803	13.99	52.9819	.128557	208.4	-.113085	-.0611448
754	84.0092	14.04	53.9812	.127628	208.3	-.112402	-.0604532
755	84.038	14.09	54.9806	.126401	208.1	-.111533	-.0594775
756	84.0669	14.14	55.9799	.124889	207.8	-.110485	-.0582262
757	84.0957	14.19	56.9793	.123104	207.4	-.109264	-.0567084
758	84.1246	14.24	57.9786	.12106	207.	-.107878	-.0549351
759	84.1534	14.29	58.978	.118775	206.5	-.106334	-.0529197
760	84.1823	14.34	59.9773	.116273	205.8	-.104646	-.0506814
761	84.2111	14.39	60.9767	.113602	205.1	-.10284	-.048262
END	84.24	14.44	61.976	.111092	204.4	-.10113	-.045979
2J50	84.24	14.44	61.976	.111048	227.8	-.0746567	-.0822066
763	84.24	14.44	63.0047	.107841	227.6	-.0727397	-.0796156
764	84.24	14.44	64.0334	.103876	227.3	-.0703995	-.0763822
765	84.24	14.44	65.0621	.0995224	227.	-.0678433	-.0728148
766	84.24	14.44	66.0908	.094808	226.6	-.0650867	-.0689367
767	84.24	14.44	67.1195	.089739	226.2	-.0621321	-.0647509
768	84.24	14.44	68.1482	.0843156	225.6	-.0589782	-.0602552
769	84.24	14.44	69.1769	.0785356	224.9	-.0556219	-.055444
770	84.24	14.44	70.2056	.0723952	224.	-.052058	-.0503092
771	84.24	14.44	71.2343	.0658893	222.9	-.0482791	-.044839
772	84.24	14.44	72.263	.0590125	221.4	-.0442742	-.0390162
773	84.24	14.44	73.2917	.0517604	219.3	-.0400277	-.0328165
774	84.24	14.44	74.3204	.0441354	216.4	-.0355158	-.0262023
775	84.24	14.44	75.3491	.036164	211.9	-.0306998	-.0191143
776	84.24	14.44	76.3778	.0279628	204.2	-.0255123	-.0114472
777	84.24	14.44	77.4065	.0200472	188.6	-.0198218	-3.E-03
END	84.24	14.44	78.4352	.0149746	155.2	-.0135939	6.28E-03
2J44	85.03	14.9	61.976	.0369017	305.7	.0215114	-.0299832
END	84.24	15.36	61.976	.0363076	307.8	.0222412	-.0286979
2J47	84.24	15.36	61.976	4.95E-03	287.2	1.46E-03	-4.73E-03
END	84.24	14.44	61.976	4.25E-03	304.8	2.43E-03	-3.49E-03
2J50	84.24	14.44	61.976	.0406164	126.3	-.0240431	.0327357
END	85.03	14.9	61.976	.041211	124.4	-.0232873	.0340007
2J45	85.03	14.9	78.4352	.0158987	291.8	5.91E-03	-.0147576
END	84.24	15.36	78.4352	.0128396	327.1	.010778	-6.98E-03
2J48	84.24	15.36	78.4352	6.01E-03	245.2	-2.53E-03	-5.46E-03
END	84.24	14.44	78.4352	3.5E-03	40.6	2.66E-03	2.28E-03
2J51	84.24	14.44	78.4352	.0138875	141.9	-.0109356	8.56E-03
END	85.03	14.9	78.4352	.017394	110.3	-6.04E-03	.0163106

APPENDIX C

NIGHTTIME DIRECTIONAL ARRAY MODEL

APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL WDAY(AM) – FARGO, NORTH DAKOTA

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IMPEDANCE - NIGHTTIME

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.97	22.024	36.703	42.803	59.	3.6608	-4.8689	-1.7129
source = 2; node 264, sector 1							
.97	1.2899	-6.9875	7.1056	280.5	39.519	-.43967	-10.165
source = 3; node 527, sector 1							
.97	35.911	57.972	68.193	58.2	3.713	-4.797	-1.7481

GEOMETRY - NIGHTTIME

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.0025	2
		0	0	2.2799		
2	none	0	0	2.2799	.005	4
		4.05	0	1.0363		
3	none	0	0	2.2799	.005	4
		-2.02	3.51	1.0363		
4	none	0	0	2.2799	.005	4
		-2.02	-3.51	1.0363		
5	none	4.05	0	0	.0254	1
		4.05	0	1.0363		
6	none	4.05	0	1.0363	.0254	61
		.53	0	63.2155		
7	none	.53	0	63.2155	.0254	16
		.53	0	80.0039		
8	none	-2.02	3.51	0	.0254	1
		-2.02	3.51	1.0363		
9	none	-2.02	3.51	1.0363	.0254	61
		-.26	.46	63.2155		
10	none	-.26	.46	63.2155	.0254	16
		-.26	.46	80.0039		
11	none	-2.02	-3.51	0	.0254	1
		-2.02	-3.51	1.0363		
12	none	-2.02	-3.51	1.0363	.0254	61
		-.26	-.46	63.2155		
13	none	-.26	-.46	63.2155	.0254	16
		-.26	-.46	80.0039		
14	none	.53	0	63.2155	.0254	1
		-.26	.46	63.2155		
15	none	-.26	.46	63.2155	.0254	1
		-.26	-.46	63.2155		
16	none	-.26	-.46	63.2155	.0254	1
		.53	0	63.2155		
17	none	.53	0	80.0039	.0254	1
		-.26	.46	80.0039		
18	none	-.26	.46	80.0039	.0254	1
		-.26	-.46	80.0039		
19	none	-.26	-.46	80.0039	.0254	1
		.53	0	80.0039		
20	none	-48.6	48.6	0	.0025	2
		-48.6	48.6	2.2799		
21	none	-48.6	48.6	2.2799	.005	4
		-44.55	48.6	1.0363		
22	none	-48.6	48.6	2.2799	.005	4
		-50.62	52.11	1.0363		
23	none	-48.6	48.6	2.2799	.005	4
		-50.62	45.09	1.0363		
24	none	-44.55	48.6	0	.0254	1

**APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

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		-44.55	48.6	1.0363		
25	none	-44.55	48.6	1.0363	.0254	61
		-48.07	48.6	63.2155		
26	none	-48.07	48.6	63.2155	.0254	16
		-48.07	48.6	80.0039		
27	none	-50.62	52.11	0	.0254	1
		-50.62	52.11	1.0363		
28	none	-50.62	52.11	1.0363	.0254	61
		-48.86	49.06	63.2155		
29	none	-48.86	49.06	63.2155	.0254	16
		-48.86	49.06	80.0039		
30	none	-50.62	45.09	0	.0254	1
		-50.62	45.09	1.0363		
31	none	-50.62	45.09	1.0363	.0254	61
		-48.86	48.14	63.2155		
32	none	-48.86	48.14	63.2155	.0254	16
		-48.86	48.14	80.0039		
33	none	-48.07	48.6	63.2155	.0254	1
		-48.86	49.06	63.2155		
34	none	-48.86	49.06	63.2155	.0254	1
		-48.86	48.14	63.2155		
35	none	-48.86	48.14	63.2155	.0254	1
		-48.07	48.6	63.2155		
36	none	-48.07	48.6	80.0039	.0254	1
		-48.86	49.06	80.0039		
37	none	-48.86	49.06	80.0039	.0254	1
		-48.86	48.14	80.0039		
38	none	-48.86	48.14	80.0039	.0254	1
		-48.07	48.6	80.0039		
39	none	84.5	14.9	0	.0025	2
		84.5	14.9	2.2352		
40	none	84.5	14.9	2.2352	.005	4
		88.55	14.9	1.016		
41	none	84.5	14.9	2.2352	.005	4
		82.48	18.41	1.016		
42	none	84.5	14.9	2.2352	.005	4
		82.48	11.39	1.016		
43	none	88.55	14.9	0	.0254	1
		88.55	14.9	1.016		
44	none	88.55	14.9	1.016	.0254	61
		85.03	14.9	61.976		
45	none	85.03	14.9	61.976	.0254	16
		85.03	14.9	78.4352		
46	none	82.48	18.41	0	.0254	1
		82.48	18.41	1.016		
47	none	82.48	18.41	1.016	.0254	61
		84.24	15.36	61.976		
48	none	84.24	15.36	61.976	.0254	16
		84.24	15.36	78.4352		
49	none	82.48	11.39	0	.0254	1
		82.48	11.39	1.016		
50	none	82.48	11.39	1.016	.0254	61
		84.24	14.44	61.976		
51	none	84.24	14.44	61.976	.0254	16
		84.24	14.44	78.4352		
52	none	85.03	14.9	61.976	.0254	1
		84.24	15.36	61.976		
53	none	84.24	15.36	61.976	.0254	1
		84.24	14.44	61.976		
54	none	84.24	14.44	61.976	.0254	1
		85.03	14.9	61.976		
55	none	85.03	14.9	78.4352	.0254	1
		84.24	15.36	78.4352		

APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL WDAY(AM) – FARGO, NORTH DAKOTA

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56	none	84.24	15.36	78.4352	.0254	1
		84.24	14.44	78.4352		
57	none	84.24	14.44	78.4352	.0254	1
		85.03	14.9	78.4352		

Number of wires = 57
current nodes = 789

	minimum		maximum
Individual wires	wire	value	wire value
segment length	14	.914166	1 1.13995
segment/radius ratio	14	35.9908	1 455.98
radius	1	2.5E-03	5 .0254

ELECTRICAL DESCRIPTION - NIGHTTIME

Frequencies (MHz)

frequency		no. of steps	segment length (wavelengths)	
no.	lowest step		minimum	maximum
1	.97	0	2.96E-03	3.69E-03

Sources

source	node	sector	magnitude	phase	type
1	1	1	976.689	63.3	voltage
2	264	1	59.3886	48.6	voltage
3	527	1	1,045.64	288.1	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	15	0	0	0	1.5E-05	0
2	94	0	0	0	1.5E-05	0
3	173	0	0	0	1.5E-05	0
4	278	0	0	0	1.5E-05	0
5	357	0	0	0	1.5E-05	0
6	436	0	0	0	1.5E-05	0
7	541	0	0	0	1.5E-05	0
8	620	0	0	0	1.5E-05	0
9	699	0	0	0	1.5E-05	0
10	1	1.E-03	0	0	0	0
11	264	1.E-03	0	0	0	0
12	527	1.E-03	0	0	0	0

PEAK CURRENTS - NIGHTTIME

Frequency = .97 MHz

Input power = 10,000. watts

Efficiency = 100. %

coordinates in meters

current	no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	0	22.8178	4.3	22.7538	1.70879
2	0	0	0	1.13995	22.8838	4.2	22.8226	1.67309
END	0	0	0	2.2799	22.908	4.1	22.8479	1.65759
2J1	0	0	0	2.2799	7.71924	4.4	7.69681	.58809
4	1.0125	0	0	1.969	7.73516	4.2	7.71394	.572516
5	2.025	0	0	1.6581	7.75362	4.1	7.73395	.551925
6	3.0375	0	0	1.3472	7.77085	3.9	7.7528	.529421
END	4.05	0	0	1.0363	7.78425	3.7	7.7676	.508844
2J1	0	0	0	2.2799	7.61032	3.8	7.59362	.503835
8	-.505	.8775	0	1.969	7.62643	3.7	7.61078	.488287
9	-1.01	1.755	0	1.6581	7.6452	3.5	7.63088	.467775
10	-1.515	2.6325	0	1.3472	7.66283	3.3	7.64987	.445399
END	-2.02	3.51	0	1.0363	7.67658	3.2	7.66481	.424973

**APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

PAGE C-4

2J1	0	0	2.2799	7.57863	4.3	7.55749	.565663
12	-.505	-.8775	1.969	7.59461	4.2	7.57466	.550096
13	-1.01	-1.755	1.6581	7.61323	4.	7.59479	.529535
14	-1.515	-2.6325	1.3472	7.63071	3.8	7.61384	.507075
END	-2.02	-3.51	1.0363	7.64434	3.6	7.62884	.486548
GND	4.05	0	0	.0524418	303.2	.0287349	-.0438685
END	4.05	0	1.0363	.105923	303.	.0576697	-.0888472
2J2	4.05	0	1.0363	7.83653	3.1	7.82527	.419997
18	3.9923	0	2.05563	7.85043	2.9	7.84064	.392045
19	3.93459	0	3.07496	7.86005	2.7	7.85155	.365576
20	3.87689	0	4.09429	7.86501	2.5	7.85761	.341091
21	3.81918	0	5.11362	7.8656	2.3	7.85916	.318192
22	3.76148	0	6.13296	7.862	2.2	7.8564	.296609
23	3.70377	0	7.15229	7.85435	2.	7.84949	.276161
24	3.64607	0	8.17162	7.84273	1.9	7.83853	.256718
25	3.58836	0	9.19095	7.82724	1.7	7.82362	.238177
26	3.53066	0	10.2103	7.80793	1.6	7.80482	.220459
27	3.47295	0	11.2296	7.78488	1.5	7.78222	.203495
28	3.41525	0	12.2489	7.75813	1.4	7.75587	.187229
29	3.35754	0	13.2683	7.72775	1.3	7.72584	.171616
30	3.29984	0	14.2876	7.69377	1.2	7.69218	.156615
31	3.24213	0	15.3069	7.65627	1.1	7.65495	.142192
32	3.18443	0	16.3263	7.61528	1.	7.6142	.128318
33	3.12672	0	17.3456	7.57085	.9	7.56998	.11497
34	3.06902	0	18.3649	7.52302	.8	7.52233	.102125
35	3.01131	0	19.3843	7.47184	.7	7.4713	.0897663
36	2.95361	0	20.4036	7.41736	.6	7.41695	.0778773
37	2.8959	0	21.4229	7.35961	.5	7.35931	.0664448
38	2.8382	0	22.4423	7.29864	.4	7.29843	.0554567
39	2.78049	0	23.4616	7.2345	.4	7.23436	.0449029
40	2.72279	0	24.4809	7.16723	.3	7.16714	.034774
41	2.66508	0	25.5002	7.09688	.2	7.09683	.025062
42	2.60738	0	26.5196	7.0235	.1	7.02348	.0157598
43	2.54967	0	27.5389	6.94713	.1	6.94712	6.86E-03
44	2.49197	0	28.5582	6.86783	360.	6.86783	-1.64E-03
45	2.43426	0	29.5776	6.78563	359.9	6.78563	-9.75E-03
46	2.37656	0	30.5969	6.70061	359.9	6.70059	-.0174717
47	2.31885	0	31.6162	6.6128	359.8	6.61276	-.0248106
48	2.26115	0	32.6356	6.52227	359.7	6.5222	-.0317707
49	2.20344	0	33.6549	6.42906	359.7	6.42895	-.0383558
50	2.14574	0	34.6742	6.33325	359.6	6.33309	-.0445697
51	2.08803	0	35.6936	6.23486	359.5	6.23466	-.0504157
52	2.03033	0	36.7129	6.13398	359.5	6.13373	-.0558972
53	1.97262	0	37.7322	6.03067	359.4	6.03036	-.0610176
54	1.91492	0	38.7516	5.92498	359.4	5.92461	-.0657799
55	1.85721	0	39.7709	5.81697	359.3	5.81654	-.0701872
56	1.79951	0	40.7902	5.70672	359.3	5.70623	-.074243
57	1.7418	0	41.8095	5.59428	359.2	5.59373	-.0779501
58	1.6841	0	42.8289	5.47975	359.1	5.47914	-.0813119
59	1.62639	0	43.8482	5.36318	359.1	5.36251	-.0843314
60	1.56869	0	44.8675	5.24465	359.	5.24393	-.0870123
61	1.51098	0	45.8869	5.12424	359.	5.12346	-.0893577
62	1.45328	0	46.9062	5.00201	359.	5.00118	-.0913713
63	1.39557	0	47.9255	4.87809	358.9	4.8772	-.0930567
64	1.33787	0	48.9449	4.75253	358.9	4.75159	-.0944178
65	1.28016	0	49.9642	4.62542	358.8	4.62444	-.0954587
66	1.22246	0	50.9835	4.49689	358.8	4.49586	-.0961835
67	1.16475	0	52.0029	4.36701	358.7	4.36594	-.0965969
68	1.10705	0	53.0222	4.2359	358.7	4.23479	-.0967035
69	1.04934	0	54.0415	4.10368	358.7	4.10254	-.0965088
70	.991639	0	55.0608	3.97048	358.6	3.96931	-.0960183
71	.933934	0	56.0802	3.83645	358.6	3.83526	-.0952383
72	.87623	0	57.0995	3.70173	358.5	3.70054	-.0941757

**APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

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73	.818525	0	58.1188	3.56656	358.5	3.56535	-.0928385
74	.76082	0	59.1382	3.43113	358.5	3.42992	-.0912359
75	.703115	0	60.1575	3.29582	358.4	3.29461	-.08938
76	.64541	0	61.1768	3.16118	358.4	3.15998	-.0872886
77	.587705	0	62.1962	3.02877	358.4	3.02758	-.0850007
END	.53	0	63.2155	2.91303	358.4	2.91185	-.0828291
2J6	.53	0	63.2155	2.79902	358.1	2.79742	-.0945563
79	.53	0	64.2648	2.67912	358.	2.67753	-.0920731
80	.53	0	65.314	2.54009	358.	2.53853	-.0889543
81	.53	0	66.3633	2.3967	358.	2.39517	-.0855055
82	.53	0	67.4126	2.25012	357.9	2.24864	-.0817479
83	.53	0	68.4619	2.10065	357.9	2.09922	-.0776834
84	.53	0	69.5111	1.94837	357.8	1.94699	-.0733092
85	.53	0	70.5604	1.79322	357.8	1.79191	-.0686192
86	.53	0	71.6097	1.63512	357.8	1.63388	-.063604
87	.53	0	72.659	1.47383	357.7	1.47268	-.0582511
88	.53	0	73.7083	1.30908	357.7	1.30802	-.0525429
89	.53	0	74.7575	1.14036	357.7	1.13941	-.0464536
90	.53	0	75.8068	.966949	357.6	.966124	-.0399455
91	.53	0	76.8561	.787633	357.6	.786943	-.0329578
92	.53	0	77.9053	.60024	357.6	.599703	-.025384
93	.53	0	78.9546	.400478	357.6	.400116	-.0170164
END	.53	0	80.0039	.187725	357.6	.187564	-7.79E-03
GND	-2.02	3.51	0	.0523797	303.8	.0291439	-.0435231
END	-2.02	3.51	1.0363	.105778	303.6	.0584841	-.0881402
2J3	-2.02	3.51	1.0363	7.73063	2.5	7.72329	.336833
97	-1.99115	3.46	2.05563	7.74508	2.3	7.73891	.309136
98	-1.9623	3.41	3.07496	7.75519	2.1	7.75003	.282946
99	-1.93344	3.36	4.09429	7.7606	1.9	7.75629	.258761
100	-1.90459	3.31	5.11362	7.7616	1.7	7.75801	.236183
101	-1.87574	3.26	6.13296	7.75839	1.6	7.75541	.214944
102	-1.84689	3.21	7.15229	7.75109	1.4	7.74864	.19486
103	-1.81803	3.16	8.17162	7.73981	1.3	7.73781	.175803
104	-1.78918	3.11	9.19095	7.72462	1.2	7.72301	.157669
105	-1.76033	3.06	10.2103	7.70559	1.	7.70431	.140378
106	-1.73148	3.01	11.2296	7.6828	.9	7.6818	.123862
107	-1.70262	2.96	12.2489	7.65629	.8	7.65553	.108064
108	-1.67377	2.91	13.2683	7.62613	.7	7.62556	.0929367
109	-1.64492	2.86	14.2876	7.59236	.6	7.59195	.0784384
110	-1.61607	2.81	15.3069	7.55504	.5	7.55476	.064535
111	-1.58721	2.76	16.3263	7.51421	.4	7.51403	.0511967
112	-1.55836	2.71	17.3456	7.46992	.3	7.46982	.038398
113	-1.52951	2.66	18.3649	7.42222	.2	7.42217	.0261171
114	-1.50066	2.61	19.3843	7.37116	.1	7.37114	.0143348
115	-1.4718	2.56	20.4036	7.31677	0.0	7.31677	3.03E-03
116	-1.44295	2.51	21.4229	7.25911	359.9	7.2591	-7.8E-03
117	-1.4141	2.46	22.4423	7.19823	359.9	7.1982	-.0181767
118	-1.38525	2.41	23.4616	7.13416	359.8	7.1341	-.0281118
119	-1.35639	2.36	24.4809	7.06695	359.7	7.06685	-.0376137
120	-1.32754	2.31	25.5002	6.99666	359.6	6.9965	-.0466914
121	-1.29869	2.26	26.5196	6.92333	359.5	6.9231	-.0553531
122	-1.26984	2.21	27.5389	6.847	359.5	6.8467	-.0636063
123	-1.24098	2.16	28.5582	6.76774	359.4	6.76737	-.0714575
124	-1.21213	2.11	29.5776	6.68558	359.3	6.68512	-.0789132
125	-1.18328	2.06	30.5969	6.60059	359.3	6.60003	-.0859788
126	-1.15443	2.01	31.6162	6.51282	359.2	6.51216	-.0926599
127	-1.12557	1.96	32.6356	6.4223	359.1	6.42154	-.0989612
128	-1.09672	1.91	33.6549	6.32912	359.1	6.32825	-.104887
129	-1.06787	1.86	34.6742	6.23332	359.	6.23234	-.110444
130	-1.03902	1.81	35.6936	6.13495	358.9	6.13386	-.115634
131	-1.01016	1.76	36.7129	6.03408	358.9	6.03288	-.120462
132	-.981311	1.71	37.7322	5.93078	358.8	5.92946	-.124932
133	-.952459	1.66	38.7516	5.82509	358.7	5.82366	-.129048

**APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL
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134	-.923607	1.61	39.7709	5.7171	358.7	5.71555	-.132814
135	-.894754	1.56	40.7902	5.60685	358.6	5.60519	-.136234
136	-.865902	1.51	41.8095	5.49442	358.5	5.49265	-.139312
137	-.837049	1.46	42.8289	5.37989	358.5	5.37801	-.142051
138	-.808197	1.41	43.8482	5.26333	358.4	5.26135	-.144456
139	-.779344	1.36	44.8675	5.1448	358.4	5.14272	-.146529
140	-.750492	1.31	45.8869	5.02439	358.3	5.0222	-.148276
141	-.721639	1.26	46.9062	4.90217	358.3	4.89989	-.149701
142	-.692787	1.21	47.9255	4.77825	358.2	4.77587	-.150807
143	-.663934	1.16	48.9449	4.6527	358.1	4.65023	-.151599
144	-.635082	1.11	49.9642	4.52561	358.1	4.52305	-.152082
145	-.606229	1.06	50.9835	4.39708	358.	4.39444	-.15226
146	-.577377	1.01	52.0029	4.2672	358.	4.26449	-.152138
147	-.548525	.96	53.0222	4.13611	357.9	4.13332	-.151721
148	-.519672	.91	54.0415	4.0039	357.8	4.00105	-.151015
149	-.49082	.86	55.0608	3.87072	357.8	3.86781	-.150027
150	-.461967	.81	56.0802	3.73671	357.7	3.73375	-.148761
151	-.433115	.76	57.0995	3.60202	357.7	3.59901	-.147227
152	-.404262	.71	58.1188	3.46686	357.6	3.46381	-.145431
153	-.37541	.66	59.1382	3.33147	357.5	3.32838	-.143383
154	-.346557	.61	60.1575	3.19617	357.5	3.19306	-.141096
155	-.317705	.56	61.1768	3.06156	357.4	3.05842	-.138587
156	-.288852	.51	62.1962	2.92916	357.3	2.92601	-.135896
END	-.26	.46	63.2155	2.81342	357.3	2.81026	-.133346
2J9	-.26	.46	63.2155	2.77426	357.8	2.77219	-.107033
158	-.26	.46	64.2648	2.65432	357.8	2.65227	-.104168
159	-.26	.46	65.314	2.51527	357.7	2.51325	-.100654
160	-.26	.46	66.3633	2.37184	357.7	2.36986	-.0968098
161	-.26	.46	67.4126	2.22524	357.6	2.22331	-.092656
162	-.26	.46	68.4619	2.07573	357.6	2.07386	-.0881957
163	-.26	.46	69.5111	1.92341	357.5	1.9216	-.0834262
164	-.26	.46	70.5604	1.76822	357.5	1.76649	-.0783412
165	-.26	.46	71.6097	1.61007	357.4	1.60842	-.0729322
166	-.26	.46	72.659	1.44875	357.3	1.44719	-.0671867
167	-.26	.46	73.7083	1.28394	357.3	1.28248	-.061087
168	-.26	.46	74.7575	1.11517	357.2	1.11383	-.0546079
169	-.26	.46	75.8068	.941696	357.1	.940487	-.0477114
170	-.26	.46	76.8561	.762312	357.	.761244	-.0403367
171	-.26	.46	77.9053	.574845	356.8	.573932	-.0323773
172	-.26	.46	78.9546	.375003	356.4	.374259	-.0236244
END	-.26	.46	80.0039	.16218	355.	.161574	-.0140055
GND	-2.02	-3.51	0	.0526795	303.8	.029296	-.0437821
END	-2.02	-3.51	1.0363	.106386	303.6	.058796	-.0886618
2J4	-2.02	-3.51	1.0363	7.69793	3.	7.68764	.397886
176	-1.99115	-3.46	2.05563	7.71224	2.8	7.70336	.370025
177	-1.9623	-3.41	3.07496	7.72225	2.6	7.7146	.343673
178	-1.93344	-3.36	4.09429	7.72759	2.4	7.72099	.319331
179	-1.90459	-3.31	5.11362	7.72853	2.2	7.72284	.296598
180	-1.87574	-3.26	6.13296	7.72528	2.	7.72038	.275205
181	-1.84689	-3.21	7.15229	7.71797	1.9	7.71376	.25497
182	-1.81803	-3.16	8.17162	7.7067	1.8	7.70309	.235761
183	-1.78918	-3.11	9.19095	7.69153	1.6	7.68846	.217479
184	-1.76033	-3.06	10.2103	7.67256	1.5	7.66995	.200038
185	-1.73148	-3.01	11.2296	7.64982	1.4	7.64762	.183372
186	-1.70262	-2.96	12.2489	7.62339	1.3	7.62155	.167424
187	-1.67377	-2.91	13.2683	7.59331	1.1	7.59179	.152147
188	-1.64492	-2.86	14.2876	7.55964	1.	7.55839	.1375
189	-1.61607	-2.81	15.3069	7.52243	.9	7.52142	.123448
190	-1.58721	-2.76	16.3263	7.48174	.8	7.48093	.109962
191	-1.55836	-2.71	17.3456	7.43758	.7	7.43695	.0970158
192	-1.52951	-2.66	18.3649	7.39004	.7	7.38955	.0845876
193	-1.50066	-2.61	19.3843	7.33912	.6	7.33876	.0726585
194	-1.4718	-2.56	20.4036	7.28491	.5	7.28465	.0612121

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195	-1.44295	-2.51	21.4229	7.22742	.4	7.22724	.0502337
196	-1.4141	-2.46	22.4423	7.16671	.3	7.1666	.0397105
197	-1.38525	-2.41	23.4616	7.10283	.2	7.10276	.0296314
198	-1.35639	-2.36	24.4809	7.03581	.2	7.03578	.0199863
199	-1.32754	-2.31	25.5002	6.96571	.1	6.9657	.0107659
200	-1.29869	-2.26	26.5196	6.89258	0.0	6.89257	1.96E-03
201	-1.26984	-2.21	27.5389	6.81645	359.9	6.81645	-6.43E-03
202	-1.24098	-2.16	28.5582	6.73738	359.9	6.73737	-.0144224
203	-1.21213	-2.11	29.5776	6.65543	359.8	6.6554	-.022017
204	-1.18328	-2.06	30.5969	6.57064	359.7	6.57058	-.0292205
205	-1.15443	-2.01	31.6162	6.48307	359.7	6.48297	-.0360386
206	-1.12557	-1.96	32.6356	6.39276	359.6	6.39262	-.0424759
207	-1.09672	-1.91	33.6549	6.29978	359.6	6.29959	-.0485375
208	-1.06787	-1.86	34.6742	6.20418	359.5	6.20394	-.0542276
209	-1.03902	-1.81	35.6936	6.10601	359.4	6.10572	-.0595507
210	-1.01016	-1.76	36.7129	6.00535	359.4	6.005	-.064511
211	-.981311	-1.71	37.7322	5.90224	359.3	5.90183	-.0691125
212	-.952459	-1.66	38.7516	5.79675	359.3	5.79628	-.0733593
213	-.923607	-1.61	39.7709	5.68895	359.2	5.68842	-.0772553
214	-.894754	-1.56	40.7902	5.57891	359.2	5.57832	-.0808044
215	-.865902	-1.51	41.8095	5.46668	359.1	5.46603	-.0840105
216	-.837049	-1.46	42.8289	5.35234	359.1	5.35163	-.0868775
217	-.808197	-1.41	43.8482	5.23597	359.	5.23521	-.0894096
218	-.779344	-1.36	44.8675	5.11764	359.	5.11682	-.0916105
219	-.750492	-1.31	45.8869	4.99742	358.9	4.99655	-.0934846
220	-.721639	-1.26	46.9062	4.87539	358.9	4.87447	-.0950359
221	-.692787	-1.21	47.9255	4.75165	358.8	4.75068	-.0962689
222	-.663934	-1.16	48.9449	4.62628	358.8	4.62526	-.0971881
223	-.635082	-1.11	49.9642	4.49937	358.8	4.49831	-.097798
224	-.606229	-1.06	50.9835	4.37102	358.7	4.36992	-.0981037
225	-.577377	-1.01	52.0029	4.24133	358.7	4.24019	-.0981101
226	-.548525	-.96	53.0222	4.11041	358.6	4.10924	-.0978226
227	-.519672	-.91	54.0415	3.97837	358.6	3.97718	-.0972471
228	-.49082	-.86	55.0608	3.84535	358.6	3.84414	-.0963896
229	-.461967	-.81	56.0802	3.7115	358.5	3.71028	-.0952569
230	-.433115	-.76	57.0995	3.57697	358.5	3.57574	-.0938564
231	-.404262	-.71	58.1188	3.44195	358.5	3.44072	-.0921966
232	-.37541	-.66	59.1382	3.3067	358.4	3.30547	-.0902871
233	-.346557	-.61	60.1575	3.17155	358.4	3.17033	-.0881404
234	-.317705	-.56	61.1768	3.03707	358.4	3.03586	-.0857748
235	-.288852	-.51	62.1962	2.9048	358.4	2.90361	-.0832302
END	-.26	-.46	63.2155	2.78919	358.3	2.78802	-.080826
2J12	-.26	-.46	63.2155	2.76737	358.1	2.76585	-.0916614
237	-.26	-.46	64.2648	2.64758	358.1	2.64608	-.0889476
238	-.26	-.46	65.314	2.50868	358.	2.50722	-.0855913
239	-.26	-.46	66.3633	2.36541	358.	2.36399	-.0819051
240	-.26	-.46	67.4126	2.21895	358.	2.21759	-.0779104
241	-.26	-.46	68.4619	2.06961	358.	2.0683	-.0736098
242	-.26	-.46	69.5111	1.91743	357.9	1.91619	-.0690003
243	-.26	-.46	70.5604	1.7624	357.9	1.76124	-.064076
244	-.26	-.46	71.6097	1.6044	357.9	1.60332	-.0588279
245	-.26	-.46	72.659	1.44322	357.9	1.44224	-.0532435
246	-.26	-.46	73.7083	1.27857	357.9	1.27769	-.0473051
247	-.26	-.46	74.7575	1.10995	357.9	1.10919	-.0409875
248	-.26	-.46	75.8068	.936627	357.9	.936001	-.0342527
249	-.26	-.46	76.8561	.757394	358.	.756911	-.0270397
250	-.26	-.46	77.9053	.570075	358.1	.56975	-.0192422
251	-.26	-.46	78.9546	.37038	358.4	.370227	-.0106516
END	-.26	-.46	80.0039	.157699	359.6	.157695	-1.2E-03
2J6	.53	0	63.2155	.0566138	12.3	.0553102	.012079
END	-.26	.46	63.2155	.013606	101.9	-2.8E-03	.013314
2J9	-.26	.46	63.2155	.0375862	339.8	.0352669	-.0129988
END	-.26	-.46	63.2155	.0259988	206.6	-.0232394	-.0116562

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2J12	-.26	-.46	63.2155	1.35E-03	217.4	-1.07E-03	-8.21E-04
END	.53	0	63.2155	.0591237	179.7	-.0591226	3.52E-04
2J7	.53	0	80.0039	.0930264	358.8	.0930064	-1.93E-03
END	-.26	.46	80.0039	.0758533	175.7	-.075638	5.71E-03
2J10	-.26	.46	80.0039	.0863355	354.5	.0859361	-8.29E-03
END	-.26	-.46	80.0039	.0836826	180.3	-.083681	-5.02E-04
2J13	-.26	-.46	80.0039	.0740332	358.7	.0740137	-1.7E-03
END	.53	0	80.0039	.0947389	176.5	-.0945574	5.86E-03
GND	-48.6	48.6	0	8.35795	128.1	-5.1619	6.57345
265	-48.6	48.6	1.13995	8.35245	128.1	-5.15781	6.56967
END	-48.6	48.6	2.2799	8.34866	128.1	-5.15516	6.56693
2J20	-48.6	48.6	2.2799	2.81957	128.9	-1.77126	2.19377
267	-47.5875	48.6	1.969	2.81318	128.9	-1.767	2.189
268	-46.575	48.6	1.6581	2.80358	128.9	-1.76065	2.18179
269	-45.5625	48.6	1.3472	2.79227	128.9	-1.7532	2.17327
END	-44.55	48.6	1.0363	2.78089	128.9	-1.74574	2.16465
2J20	-48.6	48.6	2.2799	2.68362	127.	-1.61473	2.14348
271	-49.105	49.4775	1.969	2.67726	127.	-1.61049	2.1387
272	-49.61	50.355	1.6581	2.66813	127.	-1.6045	2.13179
273	-50.115	51.2325	1.3472	2.6573	127.	-1.59744	2.12354
END	-50.62	52.11	1.0363	2.64655	126.9	-1.5905	2.11531
2J20	-48.6	48.6	2.2799	2.84631	128.4	-1.76917	2.22969
275	-49.105	47.7225	1.969	2.83983	128.4	-1.76486	2.22484
276	-49.61	46.845	1.6581	2.83096	128.4	-1.75898	2.21819
277	-50.115	45.9675	1.3472	2.82018	128.4	-1.75188	2.21006
END	-50.62	45.09	1.0363	2.80998	128.4	-1.74518	2.20234
GND	-44.55	48.6	0	.0250009	310.8	.0163309	-.0189301
END	-44.55	48.6	1.0363	.050834	310.8	.0332087	-.0384873
2J21	-44.55	48.6	1.0363	2.73008	128.8	-1.71253	2.12617
281	-44.6077	48.6	2.05563	2.71314	128.8	-1.70146	2.11334
282	-44.6654	48.6	3.07496	2.6959	128.8	-1.6902	2.10027
283	-44.7231	48.6	4.09429	2.67864	128.8	-1.67895	2.08717
284	-44.7808	48.6	5.11362	2.66118	128.8	-1.66757	2.07391
285	-44.8385	48.6	6.13296	2.64335	128.8	-1.65597	2.06036
286	-44.8962	48.6	7.15229	2.62509	128.8	-1.6441	2.04647
287	-44.9539	48.6	8.17162	2.60632	128.8	-1.63191	2.03219
288	-45.0116	48.6	9.19095	2.58699	128.8	-1.61937	2.01747
289	-45.0693	48.6	10.2103	2.56707	128.7	-1.60646	2.00229
290	-45.127	48.6	11.2296	2.54653	128.7	-1.59316	1.98662
291	-45.1848	48.6	12.2489	2.52535	128.7	-1.57946	1.97046
292	-45.2425	48.6	13.2683	2.50351	128.7	-1.56535	1.95378
293	-45.3002	48.6	14.2876	2.481	128.7	-1.55081	1.93658
294	-45.3579	48.6	15.3069	2.45781	128.7	-1.53585	1.91885
295	-45.4156	48.6	16.3263	2.43393	128.7	-1.52046	1.90059
296	-45.4733	48.6	17.3456	2.40937	128.6	-1.50465	1.88178
297	-45.531	48.6	18.3649	2.38412	128.6	-1.48841	1.86244
298	-45.5887	48.6	19.3843	2.35819	128.6	-1.47174	1.84257
299	-45.6464	48.6	20.4036	2.33158	128.6	-1.45465	1.82216
300	-45.7041	48.6	21.4229	2.3043	128.6	-1.43715	1.80122
301	-45.7618	48.6	22.4423	2.27634	128.6	-1.41923	1.77975
302	-45.8195	48.6	23.4616	2.24772	128.6	-1.4009	1.75776
303	-45.8772	48.6	24.4809	2.21845	128.5	-1.38218	1.73525
304	-45.9349	48.6	25.5002	2.18854	128.5	-1.36306	1.71224
305	-45.9926	48.6	26.5196	2.15799	128.5	-1.34356	1.68872
306	-46.0503	48.6	27.5389	2.12683	128.5	-1.32368	1.66471
307	-46.108	48.6	28.5582	2.09505	128.5	-1.30343	1.64021
308	-46.1657	48.6	29.5776	2.06268	128.5	-1.28283	1.61524
309	-46.2234	48.6	30.5969	2.02972	128.4	-1.26187	1.5898
310	-46.2811	48.6	31.6162	1.9962	128.4	-1.24058	1.5639
311	-46.3389	48.6	32.6356	1.96214	128.4	-1.21897	1.53756
312	-46.3966	48.6	33.6549	1.92753	128.4	-1.19703	1.51079
313	-46.4543	48.6	34.6742	1.8924	128.4	-1.17479	1.48359
314	-46.512	48.6	35.6936	1.85677	128.4	-1.15226	1.45598

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315	-46.5697	48.6	36.7129	1.82065	128.3	-1.12945	1.42797
316	-46.6274	48.6	37.7322	1.78406	128.3	-1.10637	1.39958
317	-46.6851	48.6	38.7516	1.74702	128.3	-1.08303	1.37081
318	-46.7428	48.6	39.7709	1.70955	128.3	-1.05945	1.34169
319	-46.8005	48.6	40.7902	1.67167	128.3	-1.03564	1.31222
320	-46.8582	48.6	41.8095	1.63339	128.3	-1.01161	1.28242
321	-46.9159	48.6	42.8289	1.59475	128.3	-.98739	1.25231
322	-46.9736	48.6	43.8482	1.55575	128.2	-.962976	1.2219
323	-47.0313	48.6	44.8675	1.51643	128.2	-.938388	1.19121
324	-47.089	48.6	45.8869	1.4768	128.2	-.913643	1.16025
325	-47.1467	48.6	46.9062	1.43688	128.2	-.888757	1.12904
326	-47.2044	48.6	47.9255	1.39671	128.2	-.863745	1.09761
327	-47.2621	48.6	48.9449	1.35631	128.2	-.838624	1.06596
328	-47.3198	48.6	49.9642	1.3157	128.2	-.813412	1.03413
329	-47.3775	48.6	50.9835	1.27492	128.2	-.788126	1.00213
330	-47.4352	48.6	52.0029	1.23398	128.2	-.762786	.969981
331	-47.493	48.6	53.0222	1.19293	128.2	-.737412	.93771
332	-47.5507	48.6	54.0415	1.15179	128.2	-.712025	.905344
333	-47.6084	48.6	55.0608	1.11061	128.2	-.68665	.872911
334	-47.6661	48.6	56.0802	1.06943	128.2	-.661311	.840443
335	-47.7238	48.6	57.0995	1.02829	128.2	-.636038	.807978
336	-47.7815	48.6	58.1188	.98724	128.2	-.610863	.775557
337	-47.8392	48.6	59.1382	.94636	128.2	-.585831	.743236
338	-47.8969	48.6	60.1575	.905744	128.3	-.560998	.711092
339	-47.9546	48.6	61.1768	.865556	128.3	-.536467	.679257
340	-48.0123	48.6	62.1962	.826243	128.3	-.512508	.648085
END	-48.07	48.6	63.2155	.792045	128.4	-.491687	.620951
2J25	-48.07	48.6	63.2155	.790093	127.1	-.476366	.630336
342	-48.07	48.6	64.2648	.754869	127.1	-.454962	.602359
343	-48.07	48.6	65.314	.71423	127.	-.430321	.570042
344	-48.07	48.6	66.3633	.672515	127.	-.405072	.536835
345	-48.07	48.6	67.4126	.630075	127.	-.379432	.503018
346	-48.07	48.6	68.4619	.587003	127.	-.353454	.468661
347	-48.07	48.6	69.5111	.543323	127.	-.327158	.433783
348	-48.07	48.6	70.5604	.499031	127.	-.300541	.39838
349	-48.07	48.6	71.6097	.4541	127.	-.273592	.362429
350	-48.07	48.6	72.659	.408479	127.1	-.246281	.325885
351	-48.07	48.6	73.7083	.362089	127.1	-.218563	.288685
352	-48.07	48.6	74.7575	.314804	127.2	-.190366	.250724
353	-48.07	48.6	75.8068	.266429	127.3	-.161575	.211844
354	-48.07	48.6	76.8561	.216639	127.5	-.132003	.171778
355	-48.07	48.6	77.9053	.164858	127.9	-.101311	.130054
356	-48.07	48.6	78.9546	.109939	128.8	-.0688224	.0857328
END	-48.07	48.6	80.0039	.0518249	131.7	-.0344683	.0387008
GND	-50.62	52.11	0	.0233799	310.	.0150333	-.0179059
END	-50.62	52.11	1.0363	.0475062	310.	.0305468	-.0363832
2J22	-50.62	52.11	1.0363	2.59911	126.9	-1.55995	2.07893
360	-50.5911	52.06	2.05563	2.58334	126.9	-1.54982	2.06682
361	-50.5623	52.01	3.07496	2.56729	126.8	-1.53952	2.05447
362	-50.5334	51.96	4.09429	2.5512	126.8	-1.52924	2.04207
363	-50.5046	51.91	5.11362	2.53489	126.8	-1.51884	2.02948
364	-50.4757	51.86	6.13296	2.51822	126.8	-1.50824	2.0166
365	-50.4469	51.81	7.15229	2.50112	126.8	-1.49739	2.00335
366	-50.418	51.76	8.17162	2.48349	126.8	-1.48623	1.98969
367	-50.3892	51.71	9.19095	2.46533	126.7	-1.47475	1.97559
368	-50.3603	51.66	10.2103	2.44657	126.7	-1.46292	1.96101
369	-50.3315	51.61	11.2296	2.42719	126.7	-1.45071	1.94594
370	-50.3026	51.56	12.2489	2.40717	126.7	-1.43812	1.93036
371	-50.2738	51.51	13.2683	2.3865	126.7	-1.42513	1.91426
372	-50.2449	51.46	14.2876	2.36516	126.6	-1.41174	1.89762
373	-50.2161	51.41	15.3069	2.34314	126.6	-1.39794	1.88045
374	-50.1872	51.36	16.3263	2.32045	126.6	-1.38373	1.86273
375	-50.1584	51.31	17.3456	2.29706	126.6	-1.3691	1.84446

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376	-50.1295	51.26	18.3649	2.27299	126.6	-1.35406	1.82565
377	-50.1007	51.21	19.3843	2.24823	126.5	-1.3386	1.80629
378	-50.0718	51.16	20.4036	2.22279	126.5	-1.32273	1.78639
379	-50.0429	51.11	21.4229	2.19668	126.5	-1.30645	1.76595
380	-50.0141	51.06	22.4423	2.16988	126.5	-1.28976	1.74497
381	-49.9852	51.01	23.4616	2.14243	126.4	-1.27267	1.72346
382	-49.9564	50.96	24.4809	2.11432	126.4	-1.25518	1.70143
383	-49.9275	50.91	25.5002	2.08556	126.4	-1.23731	1.67888
384	-49.8987	50.86	26.5196	2.05616	126.4	-1.21905	1.65581
385	-49.8698	50.81	27.5389	2.02614	126.3	-1.20042	1.63225
386	-49.841	50.76	28.5582	1.9955	126.3	-1.18141	1.60819
387	-49.8121	50.71	29.5776	1.96425	126.3	-1.16205	1.58364
388	-49.7833	50.66	30.5969	1.93241	126.2	-1.14233	1.55862
389	-49.7544	50.61	31.6162	1.9	126.2	-1.12227	1.53313
390	-49.7256	50.56	32.6356	1.86702	126.2	-1.10187	1.50719
391	-49.6967	50.51	33.6549	1.83349	126.1	-1.08115	1.48081
392	-49.6679	50.46	34.6742	1.79943	126.1	-1.06012	1.45399
393	-49.639	50.41	35.6936	1.76485	126.1	-1.03878	1.42675
394	-49.6102	50.36	36.7129	1.72976	126.	-1.01715	1.3991
395	-49.5813	50.31	37.7322	1.6942	126.	-.995242	1.37106
396	-49.5525	50.26	38.7516	1.65817	125.9	-.97306	1.34264
397	-49.5236	50.21	39.7709	1.62169	125.9	-.950619	1.31385
398	-49.4948	50.16	40.7902	1.58478	125.8	-.927933	1.2847
399	-49.4659	50.11	41.8095	1.54746	125.8	-.905013	1.25522
400	-49.437	50.06	42.8289	1.50975	125.7	-.881874	1.22541
401	-49.4082	50.01	43.8482	1.47167	125.7	-.858528	1.1953
402	-49.3793	49.96	44.8675	1.43324	125.6	-.834991	1.16489
403	-49.3505	49.91	45.8869	1.39449	125.6	-.811274	1.13421
404	-49.3216	49.86	46.9062	1.35543	125.5	-.787394	1.10327
405	-49.2928	49.81	47.9255	1.31611	125.5	-.763366	1.0721
406	-49.2639	49.76	48.9449	1.27651	125.4	-.739207	1.0407
407	-49.2351	49.71	49.9642	1.2367	125.3	-.714933	1.00911
408	-49.2062	49.66	50.9835	1.19669	125.2	-.690561	.977338
409	-49.1774	49.61	52.0029	1.15651	125.2	-.666112	.945411
410	-49.1485	49.56	53.0222	1.11618	125.1	-.641601	.913353
411	-49.1197	49.51	54.0415	1.07576	125.	-.617053	.88119
412	-49.0908	49.46	55.0608	1.03526	124.9	-.592489	.84895
413	-49.062	49.41	56.0802	.994732	124.8	-.567934	.816666
414	-49.0331	49.36	57.0995	.954225	124.7	-.543418	.784374
415	-49.0043	49.31	58.1188	.913791	124.6	-.518974	.752117
416	-48.9754	49.26	59.1382	.873497	124.5	-.494643	.719948
417	-48.9466	49.21	60.1575	.833441	124.4	-.470484	.687945
418	-48.9177	49.16	61.1768	.793788	124.2	-.446597	.65624
419	-48.8889	49.11	62.1962	.754983	124.1	-.423252	.625186
END	-48.86	49.06	63.2155	.721246	124.	-.402998	.598154
2J28	-48.86	49.06	63.2155	.760013	125.9	-.445512	.615742
421	-48.86	49.06	64.2648	.725212	125.8	-.424676	.587862
422	-48.86	49.06	65.314	.685016	125.8	-.400623	.555651
423	-48.86	49.06	66.3633	.643743	125.7	-.375961	.522551
424	-48.86	49.06	67.4126	.601746	125.7	-.350904	.48884
425	-48.86	49.06	68.4619	.559112	125.6	-.325507	.454589
426	-48.86	49.06	69.5111	.51587	125.5	-.299789	.419819
427	-48.86	49.06	70.5604	.472014	125.4	-.273748	.384524
428	-48.86	49.06	71.6097	.427516	125.4	-.247369	.348681
429	-48.86	49.06	72.659	.382325	125.2	-.220625	.312246
430	-48.86	49.06	73.7083	.336362	125.1	-.193468	.275154
431	-48.86	49.06	74.7575	.2895	124.9	-.165826	.237301
432	-48.86	49.06	75.8068	.241543	124.7	-.137585	.198528
433	-48.86	49.06	76.8561	.192168	124.4	-.108557	.158568
434	-48.86	49.06	77.9053	.140796	123.8	-.0784013	.116948
435	-48.86	49.06	78.9546	.0862939	122.6	-.0464432	.0727301
END	-48.86	49.06	80.0039	.0287134	116.1	-.0126169	.0257928
GND	-50.62	45.09	0	.022828	310.7	.0148972	-.0172971

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END	-50.62	45.09	1.0363	.0463635	310.7	.0302622	-.0351251
2J23	-50.62	45.09	1.0363	2.76365	128.4	-1.71492	2.16722
439	-50.5911	45.14	2.05563	2.74831	128.3	-1.7049	2.15559
440	-50.5623	45.19	3.07496	2.73268	128.3	-1.69469	2.14373
441	-50.5334	45.24	4.09429	2.71702	128.3	-1.68448	2.13184
442	-50.5046	45.29	5.11362	2.70111	128.3	-1.67412	2.11975
443	-50.4757	45.34	6.13296	2.68483	128.3	-1.66353	2.10737
444	-50.4469	45.39	7.15229	2.6681	128.3	-1.65266	2.09464
445	-50.418	45.44	8.17162	2.65084	128.3	-1.64146	2.08149
446	-50.3892	45.49	9.19095	2.63301	128.2	-1.6299	2.0679
447	-50.3603	45.54	10.2103	2.61458	128.2	-1.61796	2.05384
448	-50.3315	45.59	11.2296	2.59552	128.2	-1.60563	2.03929
449	-50.3026	45.64	12.2489	2.57581	128.2	-1.59289	2.02423
450	-50.2738	45.69	13.2683	2.55541	128.2	-1.57972	2.00864
451	-50.2449	45.74	14.2876	2.53434	128.2	-1.56613	1.99252
452	-50.2161	45.79	15.3069	2.51259	128.2	-1.55211	1.97587
453	-50.1872	45.84	16.3263	2.49013	128.1	-1.53765	1.95867
454	-50.1584	45.89	17.3456	2.46697	128.1	-1.52275	1.94092
455	-50.1295	45.94	18.3649	2.44311	128.1	-1.50742	1.92262
456	-50.1007	45.99	19.3843	2.41855	128.1	-1.49165	1.90378
457	-50.0718	46.04	20.4036	2.3933	128.1	-1.47545	1.88439
458	-50.0429	46.09	21.4229	2.36735	128.	-1.45882	1.86445
459	-50.0141	46.14	22.4423	2.34072	128.	-1.44177	1.84398
460	-49.9852	46.19	23.4616	2.31341	128.	-1.4243	1.82297
461	-49.9564	46.24	24.4809	2.28542	128.	-1.40642	1.80142
462	-49.9275	46.29	25.5002	2.25677	128.	-1.38813	1.77936
463	-49.8987	46.34	26.5196	2.22747	127.9	-1.36944	1.75678
464	-49.8698	46.39	27.5389	2.19753	127.9	-1.35036	1.73368
465	-49.841	46.44	28.5582	2.16696	127.9	-1.3309	1.71009
466	-49.8121	46.49	29.5776	2.13577	127.9	-1.31107	1.686
467	-49.7833	46.54	30.5969	2.10396	127.8	-1.29087	1.66142
468	-49.7544	46.59	31.6162	2.07158	127.8	-1.27032	1.63638
469	-49.7256	46.64	32.6356	2.03861	127.8	-1.24942	1.61086
470	-49.6967	46.69	33.6549	2.00508	127.8	-1.22819	1.5849
471	-49.6679	46.74	34.6742	1.97101	127.7	-1.20664	1.55849
472	-49.639	46.79	35.6936	1.9364	127.7	-1.18478	1.53165
473	-49.6102	46.84	36.7129	1.90127	127.7	-1.16261	1.50438
474	-49.5813	46.89	37.7322	1.86566	127.7	-1.14016	1.47672
475	-49.5525	46.94	38.7516	1.82955	127.6	-1.11744	1.44865
476	-49.5236	46.99	39.7709	1.79299	127.6	-1.09445	1.42021
477	-49.4948	47.04	40.7902	1.75599	127.6	-1.07121	1.3914
478	-49.4659	47.09	41.8095	1.71857	127.6	-1.04774	1.36224
479	-49.437	47.14	42.8289	1.68073	127.5	-1.02404	1.33273
480	-49.4082	47.19	43.8482	1.64252	127.5	-1.00014	1.30291
481	-49.3793	47.24	44.8675	1.60393	127.5	-.97604	1.27277
482	-49.3505	47.29	45.8869	1.56502	127.5	-.951761	1.24235
483	-49.3216	47.34	46.9062	1.52578	127.4	-.927318	1.21165
484	-49.2928	47.39	47.9255	1.48625	127.4	-.902726	1.18069
485	-49.2639	47.44	48.9449	1.44646	127.4	-.878003	1.1495
486	-49.2351	47.49	49.9642	1.40642	127.3	-.853165	1.11809
487	-49.2062	47.54	50.9835	1.36617	127.3	-.828231	1.08648
488	-49.1774	47.59	52.0029	1.32572	127.3	-.803218	1.05469
489	-49.1485	47.64	53.0222	1.28513	127.3	-.778146	1.02276
490	-49.1197	47.69	54.0415	1.24441	127.2	-.753038	.990699
491	-49.0908	47.74	55.0608	1.2036	127.2	-.727915	.958538
492	-49.062	47.79	56.0802	1.16275	127.2	-.702804	.926312
493	-49.0331	47.84	57.0995	1.1219	127.2	-.677735	.894055
494	-49.0043	47.89	58.1188	1.0811	127.1	-.652738	.861809
495	-48.9754	47.94	59.1382	1.04043	127.1	-.627856	.82963
496	-48.9466	47.99	60.1575	.999969	127.1	-.603148	.797591
497	-48.9177	48.04	61.1768	.959895	127.1	-.578715	.765824
498	-48.8889	48.09	62.1962	.920648	127.1	-.554825	.734685
END	-48.86	48.14	63.2155	.886462	127.	-.534042	.707541

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2J31	-48.86	48.14	63.2155	.797294	126.6	-.475832	.639736
500	-48.86	48.14	64.2648	.762059	126.6	-.454451	.611725
501	-48.86	48.14	65.314	.721413	126.6	-.429835	.579377
502	-48.86	48.14	66.3633	.679685	126.5	-.404607	.546135
503	-48.86	48.14	67.4126	.637231	126.5	-.378986	.512283
504	-48.86	48.14	68.4619	.594141	126.5	-.353025	.477888
505	-48.86	48.14	69.5111	.550441	126.4	-.326744	.442971
506	-48.86	48.14	70.5604	.506124	126.4	-.30014	.407526
507	-48.86	48.14	71.6097	.461166	126.3	-.2732	.371532
508	-48.86	48.14	72.659	.415514	126.3	-.245896	.334943
509	-48.86	48.14	73.7083	.369088	126.2	-.218183	.297695
510	-48.86	48.14	74.7575	.321762	126.2	-.189986	.259684
511	-48.86	48.14	75.8068	.273339	126.1	-.161193	.220751
512	-48.86	48.14	76.8561	.223493	126.1	-.131615	.180629
513	-48.86	48.14	77.9053	.171642	126.	-.100912	.138844
514	-48.86	48.14	78.9546	.116628	125.9	-.0684093	.094458
END	-48.86	48.14	80.0039	.0583077	125.7	-.0340294	.0473476
2J25	-48.07	48.6	63.2155	.025946	158.9	-.0241984	9.36E-03
END	-48.86	49.06	63.2155	.0145761	196.7	-.0139603	-4.19E-03
2J28	-48.86	49.06	63.2155	.0359123	322.7	.028554	-.0217799
END	-48.86	48.14	63.2155	.0526018	317.6	.0388614	-.0354505
2J31	-48.86	48.14	63.2155	.0376985	120.9	-.0193485	.0323545
END	-48.07	48.6	63.2155	.0207422	115.3	-8.88E-03	.0187466
2J26	-48.07	48.6	80.0039	.0308753	132.1	-.0207177	.0228923
END	-48.86	49.06	80.0039	.015554	293.4	6.17E-03	-.0142758
2J29	-48.86	49.06	80.0039	.0131963	119.2	-6.44E-03	.011517
END	-48.86	48.14	80.0039	.0331108	308.5	.0206208	-.0259057
2J32	-48.86	48.14	80.0039	.0252892	122.	-.0134086	.0214419
END	-48.07	48.6	80.0039	.020952	311.	.0137506	-.0158085
GND	84.5	14.9	0	15.3333	229.9	-9.87843	-11.7272
528	84.5	14.9	1.1176	15.4037	229.7	-9.95761	-11.7524
END	84.5	14.9	2.2352	15.4306	229.7	-9.9892	-11.761
2J39	84.5	14.9	2.2352	5.10308	231.1	-3.20639	-3.96994
530	85.5125	14.9	1.9304	5.1246	230.9	-3.23468	-3.97471
531	86.525	14.9	1.6256	5.1506	230.6	-3.27028	-3.97919
532	87.5375	14.9	1.3208	5.17721	230.3	-3.30775	-3.98275
END	88.55	14.9	1.016	5.20017	230.	-3.34095	-3.98495
2J39	84.5	14.9	2.2352	5.17074	229.2	-3.38135	-3.9119
534	83.995	15.7775	1.9304	5.19272	229.	-3.40951	-3.91658
535	83.49	16.655	1.6256	5.22068	228.7	-3.44575	-3.92203
536	82.985	17.5325	1.3208	5.24899	228.4	-3.48359	-3.92638
END	82.48	18.41	1.016	5.27368	228.2	-3.51721	-3.9295
2J39	84.5	14.9	2.2352	5.15921	228.8	-3.40147	-3.8791
538	83.995	14.0225	1.9304	5.18133	228.6	-3.42962	-3.8838
539	83.49	13.145	1.6256	5.20933	228.3	-3.46575	-3.88917
540	82.985	12.2675	1.3208	5.23769	228.	-3.50348	-3.89346
END	82.48	11.39	1.016	5.26247	227.8	-3.53701	-3.89655
GND	88.55	14.9	0	.0683687	181.9	-.0683302	-2.29E-03
END	88.55	14.9	1.016	.137074	181.8	-.137008	-4.25E-03
2J40	88.55	14.9	1.016	5.29244	228.9	-3.47796	-3.9892
544	88.4923	14.9	2.01534	5.31939	228.6	-3.51908	-3.98898
545	88.4346	14.9	3.01469	5.34244	228.3	-3.5561	-3.98696
546	88.3769	14.9	4.01403	5.36097	228.	-3.58818	-3.98308
547	88.3192	14.9	5.01338	5.37539	227.7	-3.61597	-3.97738
548	88.2615	14.9	6.01272	5.38599	227.5	-3.63989	-3.9699
549	88.2038	14.9	7.01207	5.39299	227.3	-3.66026	-3.96066
550	88.1461	14.9	8.01141	5.39653	227.	-3.67728	-3.9497
551	88.0884	14.9	9.01075	5.39671	226.8	-3.69112	-3.93702
552	88.0307	14.9	10.0101	5.39364	226.7	-3.70193	-3.92264
553	87.973	14.9	11.0094	5.38741	226.5	-3.70982	-3.90658
554	87.9152	14.9	12.0088	5.37808	226.3	-3.71489	-3.88887
555	87.8575	14.9	13.0081	5.36572	226.1	-3.71723	-3.86951
556	87.7998	14.9	14.0075	5.35039	226.	-3.71693	-3.84852

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557	87.7421	14.9	15.0068	5.33216	225.9	-3.71405	-3.82593
558	87.6844	14.9	16.0062	5.31107	225.7	-3.70866	-3.80175
559	87.6267	14.9	17.0055	5.28716	225.6	-3.7008	-3.77601
560	87.569	14.9	18.0049	5.26049	225.4	-3.69054	-3.7487
561	87.5113	14.9	19.0042	5.2311	225.3	-3.67792	-3.71986
562	87.4536	14.9	20.0035	5.19903	225.2	-3.66299	-3.68951
563	87.3959	14.9	21.0029	5.16432	225.1	-3.64579	-3.65766
564	87.3382	14.9	22.0022	5.12701	225.	-3.62636	-3.62433
565	87.2805	14.9	23.0016	5.08714	224.9	-3.60474	-3.58955
566	87.2228	14.9	24.0009	5.04474	224.8	-3.58096	-3.55333
567	87.1651	14.9	25.0003	4.99986	224.7	-3.55506	-3.5157
568	87.1074	14.9	25.9996	4.95253	224.6	-3.52708	-3.47668
569	87.0497	14.9	26.999	4.90279	224.5	-3.49705	-3.43628
570	86.992	14.9	27.9983	4.85069	224.4	-3.46501	-3.39454
571	86.9343	14.9	28.9976	4.79626	224.3	-3.43099	-3.35148
572	86.8766	14.9	29.997	4.73953	224.2	-3.39502	-3.30711
573	86.8189	14.9	30.9963	4.68056	224.2	-3.35715	-3.26147
574	86.7611	14.9	31.9957	4.61938	224.1	-3.3174	-3.21459
575	86.7034	14.9	32.995	4.55603	224.	-3.27581	-3.16647
576	86.6457	14.9	33.9944	4.49056	224.	-3.23241	-3.11716
577	86.588	14.9	34.9937	4.42302	223.9	-3.18725	-3.06668
578	86.5303	14.9	35.993	4.35343	223.8	-3.14035	-3.01506
579	86.4726	14.9	36.9924	4.28186	223.8	-3.09176	-2.96232
580	86.4149	14.9	37.9917	4.20834	223.7	-3.04151	-2.9085
581	86.3572	14.9	38.9911	4.13294	223.7	-2.98964	-2.85363
582	86.2995	14.9	39.9904	4.05568	223.6	-2.93619	-2.79773
583	86.2418	14.9	40.9898	3.97662	223.6	-2.8812	-2.74084
584	86.1841	14.9	41.9891	3.89583	223.5	-2.82471	-2.683
585	86.1264	14.9	42.9885	3.81334	223.5	-2.76676	-2.62423
586	86.0687	14.9	43.9878	3.72922	223.4	-2.70741	-2.56457
587	86.011	14.9	44.9871	3.64354	223.4	-2.64669	-2.50407
588	85.9533	14.9	45.9865	3.55633	223.4	-2.58465	-2.44275
589	85.8956	14.9	46.9858	3.46767	223.4	-2.52134	-2.38066
590	85.8379	14.9	47.9852	3.37763	223.3	-2.45682	-2.31784
591	85.7802	14.9	48.9845	3.28627	223.3	-2.39113	-2.25435
592	85.7225	14.9	49.9839	3.19366	223.3	-2.32433	-2.1902
593	85.6648	14.9	50.9832	3.0999	223.3	-2.2565	-2.12547
594	85.607	14.9	51.9826	3.00504	223.3	-2.18768	-2.06019
595	85.5493	14.9	52.9819	2.9092	223.3	-2.11794	-1.99444
596	85.4916	14.9	53.9812	2.81246	223.3	-2.04737	-1.92827
597	85.4339	14.9	54.9806	2.71493	223.3	-1.97604	-1.86175
598	85.3762	14.9	55.9799	2.61674	223.3	-1.90406	-1.79497
599	85.3185	14.9	56.9793	2.51805	223.3	-1.83154	-1.72802
600	85.2608	14.9	57.9786	2.41902	223.4	-1.75861	-1.66101
601	85.2031	14.9	58.978	2.31992	223.4	-1.68547	-1.59412
602	85.1454	14.9	59.9773	2.22119	223.5	-1.61246	-1.52763
603	85.0877	14.9	60.9767	2.12401	223.5	-1.54046	-1.46232
END	85.03	14.9	61.976	2.03917	223.6	-1.47751	-1.40542
2J44	85.03	14.9	61.976	2.08126	221.8	-1.55093	-1.3879
605	85.03	14.9	63.0047	1.99319	221.8	-1.48546	-1.32899
606	85.03	14.9	64.0334	1.89065	221.8	-1.40908	-1.26058
607	85.03	14.9	65.0621	1.78464	221.8	-1.32997	-1.19001
608	85.03	14.9	66.0908	1.67606	221.8	-1.24881	-1.11788
609	85.03	14.9	67.1195	1.56515	221.9	-1.16576	-1.04436
610	85.03	14.9	68.1482	1.45193	221.9	-1.08084	-.969469
611	85.03	14.9	69.1769	1.33639	221.9	-.994051	-.893195
612	85.03	14.9	70.2056	1.21843	222.	-.905298	-.815484
613	85.03	14.9	71.2343	1.09791	222.1	-.814469	-.736234
614	85.03	14.9	72.263	.974572	222.3	-.721375	-.655293
615	85.03	14.9	73.2917	.848066	222.5	-.625736	-.572425
616	85.03	14.9	74.3204	.717829	222.8	-.527115	-.487267
617	85.03	14.9	75.3491	.58295	223.2	-.424798	-.399221
618	85.03	14.9	76.3778	.441823	224.1	-.31752	-.307227

**APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL
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619	85.03	14.9	77.4065	.291368	225.9	-.202805	-.209203
END	85.03	14.9	78.4352	.132373	232.5	-.0805138	-.105072
GND	82.48	18.41	0	.0699411	184.2	-.0697488	-5.18E-03
END	82.48	18.41	1.016	.140328	184.2	-.139959	-.0101673
2J41	82.48	18.41	1.016	5.37548	227.1	-3.65717	-3.93966
623	82.5089	18.36	2.01534	5.40565	226.8	-3.6994	-3.94151
624	82.5377	18.31	3.01469	5.43177	226.5	-3.73749	-3.94149
625	82.5666	18.26	4.01403	5.45318	226.3	-3.77059	-3.93952
626	82.5954	18.21	5.01338	5.47034	226.	-3.79937	-3.93566
627	82.6243	18.16	6.01272	5.48356	225.8	-3.82424	-3.92996
628	82.6531	18.11	7.01207	5.49306	225.6	-3.84552	-3.92245
629	82.682	18.06	8.01141	5.49901	225.4	-3.86343	-3.91317
630	82.7108	18.01	9.01075	5.50151	225.2	-3.87813	-3.90213
631	82.7397	17.96	10.0101	5.50067	225.	-3.88977	-3.88935
632	82.7685	17.91	11.0094	5.4966	224.8	-3.89847	-3.87485
633	82.7974	17.86	12.0088	5.48935	224.7	-3.90432	-3.85865
634	82.8262	17.81	13.0081	5.47901	224.5	-3.90742	-3.84077
635	82.8551	17.76	14.0075	5.46563	224.4	-3.90784	-3.82123
636	82.8839	17.71	15.0068	5.44927	224.2	-3.90566	-3.80005
637	82.9128	17.66	16.0062	5.43	224.1	-3.90094	-3.77724
638	82.9416	17.61	17.0055	5.40786	223.9	-3.89374	-3.75283
639	82.9705	17.56	18.0049	5.38288	223.8	-3.8841	-3.72682
640	82.9993	17.51	19.0042	5.35513	223.7	-3.87208	-3.69925
641	83.0282	17.46	20.0035	5.32465	223.6	-3.85773	-3.67013
642	83.0571	17.41	21.0029	5.29146	223.5	-3.84107	-3.63947
643	83.0859	17.36	22.0022	5.25563	223.3	-3.82217	-3.60731
644	83.1148	17.31	23.0016	5.21717	223.2	-3.80103	-3.57365
645	83.1436	17.26	24.0009	5.17614	223.1	-3.77773	-3.53853
646	83.1725	17.21	25.0003	5.13257	223.	-3.75228	-3.50196
647	83.2013	17.16	25.9996	5.0865	222.9	-3.72472	-3.46396
648	83.2302	17.11	26.999	5.03797	222.8	-3.69508	-3.42456
649	83.259	17.06	27.9983	4.98703	222.7	-3.6634	-3.38378
650	83.2879	17.01	28.9976	4.9337	222.6	-3.62972	-3.34164
651	83.3167	16.96	29.997	4.87804	222.5	-3.59408	-3.29817
652	83.3456	16.91	30.9963	4.82008	222.5	-3.55649	-3.25339
653	83.3744	16.86	31.9957	4.75986	222.4	-3.51701	-3.20733
654	83.4033	16.81	32.995	4.69744	222.3	-3.47566	-3.16002
655	83.4321	16.76	33.9944	4.63283	222.2	-3.43247	-3.11147
656	83.461	16.71	34.9937	4.56611	222.1	-3.3875	-3.06173
657	83.4898	16.66	35.993	4.49729	222.	-3.34076	-3.01081
658	83.5187	16.61	36.9924	4.42645	221.9	-3.2923	-2.95875
659	83.5475	16.56	37.9917	4.35361	221.9	-3.24216	-2.90557
660	83.5764	16.51	38.9911	4.27884	221.8	-3.19038	-2.85131
661	83.6052	16.46	39.9904	4.20218	221.7	-3.13699	-2.796
662	83.6341	16.41	40.9898	4.12368	221.6	-3.08203	-2.73967
663	83.6629	16.36	41.9891	4.04339	221.6	-3.02555	-2.68235
664	83.6918	16.31	42.9885	3.96136	221.5	-2.96759	-2.62408
665	83.7207	16.26	43.9878	3.87766	221.4	-2.90819	-2.56489
666	83.7495	16.21	44.9871	3.79235	221.3	-2.84741	-2.50483
667	83.7784	16.16	45.9865	3.70548	221.3	-2.78528	-2.44393
668	83.8072	16.11	46.9858	3.61712	221.2	-2.72185	-2.38224
669	83.8361	16.06	47.9852	3.52733	221.1	-2.65719	-2.31978
670	83.8649	16.01	48.9845	3.43618	221.1	-2.59133	-2.25663
671	83.8938	15.96	49.9839	3.34376	221.	-2.52435	-2.1928
672	83.9226	15.91	50.9832	3.25011	220.9	-2.45629	-2.12835
673	83.9515	15.86	51.9826	3.15535	220.8	-2.38722	-2.06335
674	83.9803	15.81	52.9819	3.05955	220.8	-2.31722	-1.99783
675	84.0092	15.76	53.9812	2.96281	220.7	-2.24635	-1.93188
676	84.038	15.71	54.9806	2.86523	220.6	-2.1747	-1.86555
677	84.0669	15.66	55.9799	2.76696	220.6	-2.10236	-1.79893
678	84.0957	15.61	56.9793	2.66811	220.5	-2.02944	-1.73211
679	84.1246	15.56	57.9786	2.56889	220.4	-1.95609	-1.66521
680	84.1534	15.51	58.978	2.46956	220.3	-1.8825	-1.59841

**APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL
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681	84.1823	15.46	59.9773	2.37053	220.3	-1.809	-1.53197
682	84.2111	15.41	60.9767	2.273	220.2	-1.73647	-1.4667
END	84.24	15.36	61.976	2.18775	220.1	-1.67295	-1.40978
2J47	84.24	15.36	61.976	2.09295	220.6	-1.58967	-1.36139
684	84.24	15.36	63.0047	2.00443	220.5	-1.5236	-1.30245
685	84.24	15.36	64.0334	1.90144	220.5	-1.44661	-1.23402
686	84.24	15.36	65.0621	1.79496	220.4	-1.36687	-1.16342
687	84.24	15.36	66.0908	1.68591	220.3	-1.28507	-1.09127
688	84.24	15.36	67.1195	1.5745	220.3	-1.20137	-1.01772
689	84.24	15.36	68.1482	1.46079	220.2	-1.11581	-.942803
690	84.24	15.36	69.1769	1.34475	220.1	-1.02836	-.866502
691	84.24	15.36	70.2056	1.22629	220.	-.938958	-.788762
692	84.24	15.36	71.2343	1.10524	219.9	-.847465	-.709482
693	84.24	15.36	72.263	.981374	219.8	-.753704	-.62851
694	84.24	15.36	73.2917	.854315	219.7	-.657392	-.545609
695	84.24	15.36	74.3204	.723498	219.5	-.55809	-.460417
696	84.24	15.36	75.3491	.587993	219.3	-.455087	-.372333
697	84.24	15.36	76.3778	.446153	218.9	-.347113	-.280295
698	84.24	15.36	77.4065	.294762	218.2	-.231688	-.182222
END	84.24	15.36	78.4352	.133758	215.7	-.108648	-.0780186
GND	82.48	11.39	0	.0697262	184.2	-.0695354	-5.15E-03
END	82.48	11.39	1.016	.13989	184.1	-.139525	-.0101016
2J42	82.48	11.39	1.016	5.36459	226.7	-3.67654	-3.90665
702	82.5089	11.44	2.01534	5.39482	226.4	-3.71861	-3.90846
703	82.5377	11.49	3.01469	5.421	226.1	-3.75655	-3.9084
704	82.5666	11.54	4.01403	5.44244	225.9	-3.7895	-3.90639
705	82.5954	11.59	5.01338	5.45961	225.6	-3.8181	-3.90248
706	82.6243	11.64	6.01272	5.47283	225.4	-3.84281	-3.89674
707	82.6531	11.69	7.01207	5.48231	225.2	-3.86392	-3.88918
708	82.682	11.74	8.01141	5.48822	225.	-3.88166	-3.87984
709	82.7108	11.79	9.01075	5.49067	224.8	-3.89618	-3.86874
710	82.7397	11.84	10.0101	5.48978	224.6	-3.90764	-3.8559
711	82.7685	11.89	11.0094	5.48563	224.4	-3.91614	-3.84134
712	82.7974	11.94	12.0088	5.4783	224.3	-3.9218	-3.82508
713	82.8262	11.99	13.0081	5.46788	224.1	-3.92471	-3.80713
714	82.8551	12.04	14.0075	5.4544	224.	-3.92493	-3.78754
715	82.8839	12.09	15.0068	5.43795	223.8	-3.92255	-3.76629
716	82.9128	12.14	16.0062	5.41857	223.7	-3.91763	-3.74341
717	82.9416	12.19	17.0055	5.39632	223.6	-3.91022	-3.71893
718	82.9705	12.24	18.0049	5.37122	223.4	-3.90037	-3.69285
719	82.9993	12.29	19.0042	5.34335	223.3	-3.88814	-3.66521
720	83.0282	12.34	20.0035	5.31273	223.2	-3.87357	-3.63601
721	83.0571	12.39	21.0029	5.27942	223.1	-3.8567	-3.60529
722	83.0859	12.44	22.0022	5.24344	223.	-3.83757	-3.57305
723	83.1148	12.49	23.0016	5.20485	222.8	-3.81624	-3.53933
724	83.1436	12.54	24.0009	5.16368	222.7	-3.79271	-3.50414
725	83.1725	12.59	25.0003	5.11997	222.6	-3.76704	-3.4675
726	83.2013	12.64	25.9996	5.07376	222.5	-3.73926	-3.42943
727	83.2302	12.69	26.999	5.02509	222.4	-3.70941	-3.38997
728	83.259	12.74	27.9983	4.974	222.3	-3.67752	-3.34912
729	83.2879	12.79	28.9976	4.92054	222.2	-3.64363	-3.30692
730	83.3167	12.84	29.997	4.86474	222.1	-3.60777	-3.26339
731	83.3456	12.89	30.9963	4.80664	222.	-3.56997	-3.21856
732	83.3744	12.94	31.9957	4.74629	221.9	-3.53028	-3.17244
733	83.4033	12.99	32.995	4.68372	221.9	-3.48872	-3.12508
734	83.4321	13.04	33.9944	4.61898	221.8	-3.44533	-3.07648
735	83.461	13.09	34.9937	4.55213	221.7	-3.40016	-3.02669
736	83.4898	13.14	35.993	4.4832	221.6	-3.35322	-2.97573
737	83.5187	13.19	36.9924	4.41223	221.5	-3.30457	-2.92363
738	83.5475	13.24	37.9917	4.33928	221.4	-3.25424	-2.87041
739	83.5764	13.29	38.9911	4.2644	221.3	-3.20227	-2.81612
740	83.6052	13.34	39.9904	4.18762	221.2	-3.14869	-2.76078
741	83.6341	13.39	40.9898	4.109	221.2	-3.09355	-2.70441

**APPENDIX C – NIGHTTIME DIRECTIONAL ARRAY MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

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742	83.6629	13.44	41.9891	4.02861	221.1	-3.03689	-2.64707
743	83.6918	13.49	42.9885	3.94649	221.	-2.97875	-2.58878
744	83.7207	13.54	43.9878	3.86269	220.9	-2.91918	-2.52958
745	83.7495	13.59	44.9871	3.77728	220.8	-2.85822	-2.4695
746	83.7784	13.64	45.9865	3.69033	220.7	-2.79592	-2.40859
747	83.8072	13.69	46.9858	3.60188	220.7	-2.73234	-2.34688
748	83.8361	13.74	47.9852	3.51201	220.6	-2.66751	-2.28443
749	83.8649	13.79	48.9845	3.42078	220.5	-2.60149	-2.22126
750	83.8938	13.84	49.9839	3.32828	220.4	-2.53435	-2.15743
751	83.9226	13.89	50.9832	3.23457	220.3	-2.46614	-2.09298
752	83.9515	13.94	51.9826	3.13973	220.2	-2.39692	-2.02798
753	83.9803	13.99	52.9819	3.04388	220.1	-2.32677	-1.96248
754	84.0092	14.04	53.9812	2.94709	220.1	-2.25577	-1.89654
755	84.038	14.09	54.9806	2.84947	220.	-2.18398	-1.83023
756	84.0669	14.14	55.9799	2.75115	219.9	-2.1115	-1.76363
757	84.0957	14.19	56.9793	2.65228	219.8	-2.03846	-1.69684
758	84.1246	14.24	57.9786	2.55304	219.7	-1.96499	-1.62998
759	84.1534	14.29	58.978	2.45368	219.6	-1.89128	-1.56321
760	84.1823	14.34	59.9773	2.35465	219.5	-1.81767	-1.49682
761	84.2111	14.39	60.9767	2.25712	219.4	-1.74503	-1.43159
END	84.24	14.44	61.976	2.17188	219.3	-1.68142	-1.37474
2J50	84.24	14.44	61.976	2.08968	220.3	-1.59293	-1.35253
763	84.24	14.44	63.0047	2.00113	220.3	-1.52676	-1.29365
764	84.24	14.44	64.0334	1.89813	220.2	-1.44967	-1.22529
765	84.24	14.44	65.0621	1.79162	220.1	-1.36983	-1.15476
766	84.24	14.44	66.0908	1.68255	220.1	-1.28794	-1.08267
767	84.24	14.44	67.1195	1.57113	220.	-1.20415	-1.00919
768	84.24	14.44	68.1482	1.45741	219.9	-1.11849	-.934348
769	84.24	14.44	69.1769	1.34135	219.8	-1.03094	-.858118
770	84.24	14.44	70.2056	1.22287	219.7	-.941439	-.78045
771	84.24	14.44	71.2343	1.10181	219.5	-.849849	-.701244
772	84.24	14.44	72.263	.977932	219.4	-.755992	-.620345
773	84.24	14.44	73.2917	.850867	219.2	-.659582	-.537519
774	84.24	14.44	74.3204	.720051	218.9	-.560184	-.452401
775	84.24	14.44	75.3491	.584558	218.6	-.457084	-.364394
776	84.24	14.44	76.3778	.442753	218.	-.349014	-.272432
777	84.24	14.44	77.4065	.291455	216.8	-.233492	-.174435
END	84.24	14.44	78.4352	.130849	212.5	-.110353	-.0703104
2J44	85.03	14.9	61.976	.0358232	352.3	.0355002	-4.8E-03
END	84.24	15.36	61.976	.0723651	19.8	.068087	.0245127
2J47	84.24	15.36	61.976	.0283046	237.5	-.0151952	-.02388
END	84.24	14.44	61.976	.0188057	17.4	.0179407	5.64E-03
2J50	84.24	14.44	61.976	.0724656	193.2	-.0705464	-.016567
END	85.03	14.9	61.976	.0399988	161.5	-.037924	.0127153
2J45	85.03	14.9	78.4352	.0653975	231.6	-.0406526	-.0512269
END	84.24	15.36	78.4352	.0675122	29.4	.0588433	.0330962
2J48	84.24	15.36	78.4352	.0670711	222.	-.0498047	-.0449224
END	84.24	14.44	78.4352	.0644938	38.2	.0506843	.0398818
2J51	84.24	14.44	78.4352	.0669798	207.	-.059669	-.0304286
END	85.03	14.9	78.4352	.0669937	53.5	.0398611	.0538446

APPENDIX D

DETUNED TOWER MODEL

APPENDIX D – DETUNED TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA

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ELECTRICAL DESCRIPTION - UNMODIFIED TOWER STRUCTURE

Frequencies (MHz)

frequency			no. of steps	segment length (wavelengths)	
no.	lowest	step		minimum	maximum
1	.97	0	1	2.96E-03	3.62E-03

Plane wave source

zenith angle (deg)	=	90
increment (deg)	=	0
number of angles	=	1
azimuth angle (deg)	=	0
increment (deg)	=	0
number of angles	=	1
polarization angle (deg)	=	0
magnitude (v/m)	=	1

Lumped loads

		resistance	reactance	inductance	capacitance	
passive						
load node		(ohms)	(ohms)	(mH)	(uF)	
circuit						
1	15	0	0	0	1.5E-05	0
2	94	0	0	0	1.5E-05	0
3	173	0	0	0	1.5E-05	0
4	1	0	0	.042	0	0

GEOMETRY - UNMODIFIED TOWER STRUCTURE

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.0025	2
		0	0	2.2352		
2	none	0	0	2.2352	.005	4
		4.05	0	1.016		
3	none	0	0	2.2352	.005	4
		-2.02	3.51	1.016		
4	none	0	0	2.2352	.005	4
		-2.02	-3.51	1.016		
5	none	4.05	0	0	.0254	1
		4.05	0	1.016		
6	none	4.05	0	1.016	.0254	61
		.53	0	61.976		
7	none	.53	0	61.976	.0254	16
		.53	0	78.4352		
8	none	-2.02	3.51	0	.0254	1
		-2.02	3.51	1.016		
9	none	-2.02	3.51	1.016	.0254	61
		-.26	.46	61.976		
10	none	-.26	.46	61.976	.0254	16
		-.26	.46	78.4352		
11	none	-2.02	-3.51	0	.0254	1
		-2.02	-3.51	1.016		
12	none	-2.02	-3.51	1.016	.0254	61
		-.26	-.46	61.976		
13	none	-.26	-.46	61.976	.0254	16

APPENDIX D – DETUNED TOWER MODEL
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		-.26	-.46	78.4352		
14	none	.53	0	61.976	.0254	1
		-.26	.46	61.976		
15	none	-.26	.46	61.976	.0254	1
		-.26	-.46	61.976		
16	none	-.26	-.46	61.976	.0254	1
		.53	0	61.976		
17	none	.53	0	78.4352	.0254	1
		-.26	.46	78.4352		
18	none	-.26	.46	78.4352	.0254	1
		-.26	-.46	78.4352		
19	none	-.26	-.46	78.4352	.0254	1
		.53	0	78.4352		

Number of wires = 19
current nodes = 263

		minimum		maximum
Individual wires	wire	value	wire	value
segment length	14	.914166	1	1.1176
segment/radius ratio	14	35.9908	1	447.04
radius	1	2.5E-03	5	.0254

PEAK CURRENTS - UNMODIFIED TOWER STRUCTURE

Frequency = .97 MHz
Plane wave zenith (deg) = 90
Plane wave azimuth (deg) = 0
Polarization angle (deg) = 0
coordinates in meters

current				mag	phase	real	imaginary
no.	X	Y	Z	(amps)	(deg)	(amps)	(amps)
GND	0	0	0	.363198	270.2	1.1E-03	-.363196
2	0	0	1.1176	.357035	270.2	1.08E-03	-.357033
END	0	0	2.2352	.353746	270.2	1.07E-03	-.353744
2J1	0	0	2.2352	.118586	276.8	.0141418	-.11774
4	1.0125	0	1.9304	.115259	277.	.0141285	-.11439
5	2.025	0	1.6256	.110889	277.3	.0141057	-.109988
6	3.0375	0	1.3208	.106136	277.6	.014075	-.105199
END	4.05	0	1.016	.101793	277.9	.0140412	-.10082
2J1	0	0	2.2352	.118177	266.8	-6.55E-03	-.117995
8	-.505	.8775	1.9304	.114832	266.7	-6.56E-03	-.114644
9	-1.01	1.755	1.6256	.110438	266.6	-6.57E-03	-.110242
10	-1.515	2.6325	1.3208	.105657	266.4	-6.58E-03	-.105452
END	-2.02	3.51	1.016	.101288	266.3	-6.58E-03	-.101074
2J1	0	0	2.2352	.118189	266.8	-6.52E-03	-.118009
12	-.505	-.8775	1.9304	.114843	266.7	-6.52E-03	-.114658
13	-1.01	-1.755	1.6256	.110449	266.6	-6.53E-03	-.110256
14	-1.515	-2.6325	1.3208	.105669	266.5	-6.54E-03	-.105466
END	-2.02	-3.51	1.016	.101299	266.3	-6.54E-03	-.101088
GND	4.05	0	0	9.21E-03	90.5	-8.21E-05	9.21E-03
END	4.05	0	1.016	.0185065	90.5	-1.61E-04	.0185058
2J2	4.05	0	1.016	.0834766	279.6	.0138798	-.0823146
18	3.9923	0	2.01534	.0777351	280.2	.0138321	-.0764946
19	3.93459	0	3.01469	.0723104	281.	.0137909	-.0709831
20	3.87689	0	4.01403	.0673069	281.8	.0137566	-.0658861
21	3.81918	0	5.01338	.0626433	282.7	.0137282	-.0611205
22	3.76148	0	6.01272	.0582652	283.6	.0137051	-.0566304
23	3.70377	0	7.01207	.0541364	284.6	.0136871	-.0523776
24	3.64607	0	8.01141	.0502318	285.8	.0136737	-.0483349

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25	3.58836	0	9.01075	.0465325	287.1	.0136646	-.0444809
26	3.53066	0	10.0101	.0430249	288.5	.0136598	-.0407989
27	3.47295	0	11.0094	.0396984	290.1	.013659	-.0372746
28	3.41525	0	12.0088	.0365461	292.	.0136619	-.0338965
29	3.35754	0	13.0081	.0335638	294.	.0136685	-.0306545
30	3.29984	0	14.0075	.0307502	296.4	.0136786	-.0275404
31	3.24213	0	15.0068	.0281074	299.2	.013692	-.024547
32	3.18443	0	16.0062	.0256406	302.3	.0137086	-.0216683
33	3.12672	0	17.0055	.0233588	306.	.0137282	-.018899
34	3.06902	0	18.0049	.0212755	310.3	.0137507	-.0162347
35	3.01131	0	19.0042	.0194085	315.2	.013776	-.0136715
36	2.95361	0	20.0035	.0177798	320.9	.0138038	-.0112061
37	2.8959	0	21.0029	.016415	327.4	.0138342	-8.84E-03
38	2.8382	0	22.0022	.0153391	334.7	.0138668	-6.56E-03
39	2.78049	0	23.0016	.0145722	342.6	.0139017	-4.37E-03
40	2.72279	0	24.0009	.0141222	350.8	.0139386	-2.27E-03
41	2.66508	0	25.0003	.0139798	358.9	.0139774	-2.57E-04
42	2.60738	0	25.9996	.0141172	6.8	.0140179	1.67E-03
43	2.54967	0	26.999	.0144931	14.	.0140601	3.52E-03
44	2.49197	0	27.9983	.0150591	20.5	.0141038	5.28E-03
45	2.43426	0	28.9976	.0157677	26.2	.0141489	6.96E-03
46	2.37656	0	29.997	.0165761	31.1	.0141951	8.56E-03
47	2.31885	0	30.9963	.0174489	35.3	.0142424	.0100806
48	2.26115	0	31.9957	.0183577	38.9	.0142907	.0115231
49	2.20344	0	32.995	.0192802	41.9	.0143397	.0128879
50	2.14574	0	33.9944	.020199	44.6	.0143894	.0141755
51	2.08803	0	34.9937	.0211011	46.8	.0144396	.0153868
52	2.03033	0	35.993	.0219761	48.7	.0144901	.0165223
53	1.97262	0	36.9924	.0228165	50.4	.0145409	.0175828
54	1.91492	0	37.9917	.0236161	51.8	.0145917	.0185688
55	1.85721	0	38.9911	.0243701	53.1	.0146424	.0194808
56	1.79951	0	39.9904	.0250753	54.1	.014693	.0203196
57	1.7418	0	40.9898	.0257286	55.	.0147431	.0210856
58	1.6841	0	41.9891	.0263281	55.8	.0147927	.0217795
59	1.62639	0	42.9885	.0268722	56.5	.0148417	.0224018
60	1.56869	0	43.9878	.0273598	57.	.0148899	.0229532
61	1.51098	0	44.9871	.0277899	57.5	.0149371	.0234342
62	1.45328	0	45.9865	.0281621	57.9	.0149831	.0238455
63	1.39557	0	46.9858	.028476	58.1	.0150279	.0241877
64	1.33787	0	47.9852	.0287318	58.4	.0150713	.0244616
65	1.28016	0	48.9845	.0289294	58.5	.0151132	.0246678
66	1.22246	0	49.9839	.0290691	58.6	.0151533	.0248071
67	1.16475	0	50.9832	.0291516	58.6	.0151915	.0248804
68	1.10705	0	51.9826	.0291773	58.5	.0152276	.0248885
69	1.04934	0	52.9819	.0291473	58.4	.0152616	.0248324
70	.991639	0	53.9812	.0290623	58.2	.0152932	.0247131
71	.933934	0	54.9806	.0289237	58.	.0153223	.0245318
72	.87623	0	55.9799	.0287328	57.7	.0153486	.0242898
73	.818525	0	56.9793	.0284913	57.3	.0153721	.0239886
74	.76082	0	57.9786	.0282011	56.9	.0153925	.0236299
75	.703115	0	58.978	.0278647	56.4	.0154096	.0232161
76	.64541	0	59.9773	.0274856	55.9	.0154233	.0227504
77	.587705	0	60.9767	.02707	55.2	.0154332	.0222396
END	.53	0	61.976	.0266579	54.6	.015439	.021732
2J6	.53	0	61.976	.0219669	76.7	5.06E-03	.021377
79	.53	0	63.0047	.0214068	76.3	5.06E-03	.0208001
80	.53	0	64.0334	.020733	75.9	5.06E-03	.0201049
81	.53	0	65.0621	.0199906	75.3	5.07E-03	.0193372
82	.53	0	66.0908	.0191831	74.7	5.07E-03	.0185
83	.53	0	67.1195	.0183113	73.9	5.08E-03	.017593
84	.53	0	68.1482	.0173752	73.	5.08E-03	.0166151
85	.53	0	69.1769	.016375	71.9	5.09E-03	.0155645
86	.53	0	70.2056	.0153107	70.6	5.09E-03	.0144389

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87	.53	0	71.2343	.0141829	68.9	5.1E-03	.013235
88	.53	0	72.263	.0129925	66.9	5.1E-03	.0119484
89	.53	0	73.2917	.0117425	64.2	5.11E-03	.0105731
90	.53	0	74.3204	.0104383	60.7	5.11E-03	9.1E-03
91	.53	0	75.3491	9.09E-03	55.7	5.12E-03	7.51E-03
92	.53	0	76.3778	7.73E-03	48.5	5.13E-03	5.79E-03
93	.53	0	77.4065	6.44E-03	37.1	5.13E-03	3.88E-03
END	.53	0	78.4352	5.43E-03	18.9	5.14E-03	1.76E-03
GND	-2.02	3.51	0	9.21E-03	90.	-1.06E-06	9.21E-03
END	-2.02	3.51	1.016	.0185088	90.	-3.95E-06	.0185088
2J3	-2.02	3.51	1.016	.0828271	265.4	-6.58E-03	-.082565
97	-1.99115	3.46	2.01534	.077026	265.1	-6.59E-03	-.0767439
98	-1.9623	3.41	3.01469	.0715356	264.7	-6.59E-03	-.0712314
99	-1.93344	3.36	4.01403	.0664616	264.3	-6.6E-03	-.0661334
100	-1.90459	3.31	5.01338	.0617214	263.9	-6.6E-03	-.0613671
101	-1.87574	3.26	6.01272	.0572594	263.4	-6.61E-03	-.0568763
102	-1.84689	3.21	7.01207	.0530382	262.8	-6.62E-03	-.0526231
103	-1.81803	3.16	8.01141	.0490308	262.2	-6.63E-03	-.04858
104	-1.78918	3.11	9.01075	.045217	261.5	-6.65E-03	-.0447259
105	-1.76033	3.06	10.0101	.0415808	260.8	-6.66E-03	-.0410439
106	-1.73148	3.01	11.0094	.0381091	259.9	-6.68E-03	-.0375198
107	-1.70262	2.96	12.0088	.0347917	258.9	-6.69E-03	-.034142
108	-1.67377	2.91	13.0081	.0316206	257.7	-6.71E-03	-.0309005
109	-1.64492	2.86	14.0075	.02859	256.4	-6.73E-03	-.027787
110	-1.61607	2.81	15.0068	.0256962	254.8	-6.75E-03	-.0247943
111	-1.58721	2.76	16.0062	.0229379	252.8	-6.77E-03	-.0219164
112	-1.55836	2.71	17.0055	.0203165	250.5	-6.79E-03	-.019148
113	-1.52951	2.66	18.0049	.0178374	247.5	-6.81E-03	-.0164848
114	-1.50066	2.61	19.0042	.015511	243.8	-6.84E-03	-.0139228
115	-1.4718	2.56	20.0035	.013356	239.1	-6.86E-03	-.0114586
116	-1.44295	2.51	21.0029	.0114039	232.8	-6.89E-03	-9.09E-03
117	-1.4141	2.46	22.0022	9.71E-03	224.6	-6.91E-03	-6.81E-03
118	-1.38525	2.41	23.0016	8.34E-03	213.7	-6.94E-03	-4.63E-03
119	-1.35639	2.36	24.0009	7.41E-03	199.9	-6.97E-03	-2.53E-03
120	-1.32754	2.31	25.0003	7.01E-03	184.2	-6.99E-03	-5.17E-04
121	-1.29869	2.26	25.9996	7.16E-03	168.7	-7.02E-03	1.41E-03
122	-1.26984	2.21	26.999	7.77E-03	155.2	-7.05E-03	3.25E-03
123	-1.24098	2.16	27.9983	8.68E-03	144.7	-7.08E-03	5.01E-03
124	-1.21213	2.11	28.9976	9.76E-03	136.7	-7.11E-03	6.69E-03
125	-1.18328	2.06	29.997	.0109408	130.7	-7.14E-03	8.29E-03
126	-1.15443	2.01	30.9963	.01215	126.2	-7.17E-03	9.81E-03
127	-1.12557	1.96	31.9957	.0133562	122.6	-7.2E-03	.0112498
128	-1.09672	1.91	32.995	.0145374	119.8	-7.23E-03	.0126125
129	-1.06787	1.86	33.9944	.0156796	117.6	-7.26E-03	.0138981
130	-1.03902	1.81	34.9937	.0167737	115.8	-7.29E-03	.0151073
131	-1.01016	1.76	35.993	.0178135	114.3	-7.32E-03	.0162408
132	-.981311	1.71	36.9924	.018795	113.	-7.35E-03	.0172992
133	-.952459	1.66	37.9917	.0197152	112.	-7.38E-03	.0182831
134	-.923607	1.61	38.9911	.0205722	111.1	-7.41E-03	.0191931
135	-.894754	1.56	39.9904	.0213648	110.4	-7.43E-03	.0200298
136	-.865902	1.51	40.9898	.022092	109.7	-7.46E-03	.0207938
137	-.837049	1.46	41.9891	.0227534	109.2	-7.49E-03	.0214857
138	-.808197	1.41	42.9885	.0233485	108.8	-7.52E-03	.022106
139	-.779344	1.36	43.9878	.0238774	108.4	-7.54E-03	.0226553
140	-.750492	1.31	44.9871	.0243402	108.1	-7.57E-03	.0231344
141	-.721639	1.26	45.9865	.024737	107.9	-7.59E-03	.0235437
142	-.692787	1.21	46.9858	.0250681	107.7	-7.61E-03	.023884
143	-.663934	1.16	47.9852	.0253341	107.5	-7.64E-03	.024156
144	-.635082	1.11	48.9845	.0255353	107.4	-7.66E-03	.0243603
145	-.606229	1.06	49.9839	.0256726	107.4	-7.68E-03	.0244979
146	-.577377	1.01	50.9832	.0257465	107.4	-7.7E-03	.0245694
147	-.548525	.96	51.9826	.0257577	107.4	-7.71E-03	.0245757
148	-.519672	.91	52.9819	.0257075	107.5	-7.73E-03	.0245179

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149	-.49082	.86	53.9812	.0255965	107.6	-7.74E-03	.0243969
150	-.461967	.81	54.9806	.0254262	107.8	-7.76E-03	.0242139
151	-.433115	.76	55.9799	.0251979	108.	-7.77E-03	.0239703
152	-.404262	.71	56.9793	.0249131	108.2	-7.78E-03	.0236674
153	-.37541	.66	57.9786	.0245736	108.5	-7.79E-03	.0233071
154	-.346557	.61	58.978	.024182	108.8	-7.79E-03	.0228916
155	-.317705	.56	59.9773	.0237414	109.2	-7.8E-03	.0224242
156	-.288852	.51	60.9767	.0232588	109.6	-7.8E-03	.0219117
END	-.26	.46	61.976	.0227805	110.	-7.8E-03	.0214031
2J9	-.26	.46	61.976	.0215069	97.	-2.61E-03	.0213481
158	-.26	.46	63.0047	.0209324	97.2	-2.61E-03	.0207693
159	-.26	.46	64.0334	.0202408	97.4	-2.61E-03	.0200722
160	-.26	.46	65.0621	.0194776	97.7	-2.61E-03	.0193025
161	-.26	.46	66.0908	.0186459	98.	-2.6E-03	.0184631
162	-.26	.46	67.1195	.0177458	98.4	-2.6E-03	.0175539
163	-.26	.46	68.1482	.0167765	98.9	-2.6E-03	.0165737
164	-.26	.46	69.1769	.0157367	99.5	-2.6E-03	.0155206
165	-.26	.46	70.2056	.0146247	100.2	-2.6E-03	.0143924
166	-.26	.46	71.2343	.0134385	101.1	-2.59E-03	.0131858
167	-.26	.46	72.263	.0121753	102.3	-2.59E-03	.0118964
168	-.26	.46	73.2917	.0108318	103.8	-2.59E-03	.010518
169	-.26	.46	74.3204	9.4E-03	106.	-2.59E-03	9.04E-03
170	-.26	.46	75.3491	7.89E-03	109.1	-2.58E-03	7.45E-03
171	-.26	.46	76.3778	6.28E-03	114.2	-2.58E-03	5.73E-03
172	-.26	.46	77.4065	4.6E-03	124.	-2.57E-03	3.82E-03
END	-.26	.46	78.4352	3.07E-03	146.8	-2.57E-03	1.68E-03
GND	-2.02	-3.51	0	9.21E-03	90.	-1.15E-06	9.21E-03
END	-2.02	-3.51	1.016	.0185089	90.	-4.14E-06	.0185089
2J4	-2.02	-3.51	1.016	.082838	265.5	-6.55E-03	-.0825789
176	-1.99115	-3.46	2.01534	.0770367	265.1	-6.55E-03	-.0767578
177	-1.9623	-3.41	3.01469	.0715461	264.7	-6.55E-03	-.0712453
178	-1.93344	-3.36	4.01403	.0664719	264.3	-6.56E-03	-.0661474
179	-1.90459	-3.31	5.01338	.0617313	263.9	-6.57E-03	-.061381
180	-1.87574	-3.26	6.01272	.0572691	263.4	-6.58E-03	-.0568903
181	-1.84689	-3.21	7.01207	.0530476	262.9	-6.59E-03	-.0526372
182	-1.81803	-3.16	8.01141	.0490399	262.3	-6.6E-03	-.0485941
183	-1.78918	-3.11	9.01075	.0452258	261.6	-6.61E-03	-.0447401
184	-1.76033	-3.06	10.0101	.0415892	260.8	-6.62E-03	-.0410582
185	-1.73148	-3.01	11.0094	.038117	260.	-6.64E-03	-.0375342
186	-1.70262	-2.96	12.0088	.034799	259.	-6.66E-03	-.0341564
187	-1.67377	-2.91	13.0081	.0316273	257.8	-6.67E-03	-.030915
188	-1.64492	-2.86	14.0075	.028596	256.5	-6.69E-03	-.0278016
189	-1.61607	-2.81	15.0068	.0257014	254.9	-6.71E-03	-.024809
190	-1.58721	-2.76	16.0062	.022942	252.9	-6.73E-03	-.0219312
191	-1.55836	-2.71	17.0055	.0203194	250.6	-6.76E-03	-.019163
192	-1.52951	-2.66	18.0049	.0178385	247.7	-6.78E-03	-.0164998
193	-1.50066	-2.61	19.0042	.0155099	244.	-6.8E-03	-.0139378
194	-1.4718	-2.56	20.0035	.0133522	239.2	-6.83E-03	-.0114738
195	-1.44295	-2.51	21.0029	.0113965	233.	-6.85E-03	-9.1E-03
196	-1.4141	-2.46	22.0022	9.69E-03	224.8	-6.88E-03	-6.83E-03
197	-1.38525	-2.41	23.0016	8.32E-03	213.9	-6.91E-03	-4.64E-03
198	-1.35639	-2.36	24.0009	7.39E-03	200.1	-6.94E-03	-2.54E-03
199	-1.32754	-2.31	25.0003	6.98E-03	184.4	-6.96E-03	-5.32E-04
200	-1.29869	-2.26	25.9996	7.13E-03	168.7	-6.99E-03	1.39E-03
201	-1.26984	-2.21	26.999	7.73E-03	155.3	-7.02E-03	3.24E-03
202	-1.24098	-2.16	27.9983	8.64E-03	144.7	-7.05E-03	5.E-03
203	-1.21213	-2.11	28.9976	9.73E-03	136.7	-7.08E-03	6.68E-03
204	-1.18328	-2.06	29.997	.0109106	130.7	-7.11E-03	8.27E-03
205	-1.15443	-2.01	30.9963	.0121211	126.1	-7.14E-03	9.79E-03
206	-1.12557	-1.96	31.9957	.0133284	122.6	-7.17E-03	.0112343
207	-1.09672	-1.91	32.995	.0145107	119.8	-7.2E-03	.012597
208	-1.06787	-1.86	33.9944	.0156538	117.5	-7.23E-03	.0138826
209	-1.03902	-1.81	34.9937	.0167486	115.7	-7.26E-03	.0150918

**APPENDIX D – DETUNED TOWER MODEL
WDAY(AM) – FARGO, NORTH DAKOTA**

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210	-1.01016	-1.76	35.993	.0177892	114.2	-7.29E-03	.0162254
211	-.981311	-1.71	36.9924	.0187713	113.	-7.32E-03	.0172838
212	-.952459	-1.66	37.9917	.019692	111.9	-7.35E-03	.0182677
213	-.923607	-1.61	38.9911	.0205496	111.1	-7.38E-03	.0191778
214	-.894754	-1.56	39.9904	.0213427	110.3	-7.41E-03	.0200146
215	-.865902	-1.51	40.9898	.0220703	109.7	-7.44E-03	.0207786
216	-.837049	-1.46	41.9891	.0227321	109.2	-7.47E-03	.0214706
217	-.808197	-1.41	42.9885	.0233277	108.7	-7.49E-03	.022091
218	-.779344	-1.36	43.9878	.0238571	108.4	-7.52E-03	.0226405
219	-.750492	-1.31	44.9871	.0243202	108.1	-7.55E-03	.0231196
220	-.721639	-1.26	45.9865	.0247175	107.8	-7.57E-03	.0235291
221	-.692787	-1.21	46.9858	.0250491	107.7	-7.6E-03	.0238696
222	-.663934	-1.16	47.9852	.0253155	107.5	-7.62E-03	.0241418
223	-.635082	-1.11	48.9845	.0255172	107.4	-7.64E-03	.0243463
224	-.606229	-1.06	49.9839	.0256549	107.4	-7.66E-03	.0244841
225	-.577377	-1.01	50.9832	.0257292	107.4	-7.68E-03	.0245558
226	-.548525	-.96	51.9826	.025741	107.4	-7.7E-03	.0245624
227	-.519672	-.91	52.9819	.0256913	107.5	-7.72E-03	.0245049
228	-.49082	-.86	53.9812	.0255809	107.6	-7.73E-03	.0243842
229	-.461967	-.81	54.9806	.0254111	107.7	-7.75E-03	.0242015
230	-.433115	-.76	55.9799	.0251832	107.9	-7.76E-03	.0239581
231	-.404262	-.71	56.9793	.0248989	108.2	-7.77E-03	.0236555
232	-.37541	-.66	57.9786	.0245603	108.5	-7.78E-03	.0232957
233	-.346557	-.61	58.978	.0241693	108.8	-7.79E-03	.0228806
234	-.317705	-.56	59.9773	.0237295	109.2	-7.79E-03	.0224137
235	-.288852	-.51	60.9767	.0232477	109.6	-7.8E-03	.0219017
END	-.26	-.46	61.976	.0227702	110.	-7.8E-03	.0213937
2J12	-.26	-.46	61.976	.0213997	97.	-2.6E-03	.0212407
237	-.26	-.46	63.0047	.0208259	97.2	-2.6E-03	.0206624
238	-.26	-.46	64.0334	.0201348	97.4	-2.6E-03	.0199657
239	-.26	-.46	65.0621	.0193723	97.7	-2.6E-03	.0191965
240	-.26	-.46	66.0908	.0185413	98.1	-2.6E-03	.0183576
241	-.26	-.46	67.1195	.0176421	98.5	-2.6E-03	.017449
242	-.26	-.46	68.1482	.0166737	99.	-2.6E-03	.0164694
243	-.26	-.46	69.1769	.0156349	99.6	-2.6E-03	.015417
244	-.26	-.46	70.2056	.0145241	100.3	-2.6E-03	.0142895
245	-.26	-.46	71.2343	.0133392	101.2	-2.6E-03	.0130836
246	-.26	-.46	72.263	.0120775	102.4	-2.6E-03	.011795
247	-.26	-.46	73.2917	.0107359	104.	-2.6E-03	.0104175
248	-.26	-.46	74.3204	9.31E-03	106.2	-2.59E-03	8.94E-03
249	-.26	-.46	75.3491	7.8E-03	109.4	-2.59E-03	7.35E-03
250	-.26	-.46	76.3778	6.2E-03	114.7	-2.59E-03	5.63E-03
251	-.26	-.46	77.4065	4.53E-03	124.8	-2.59E-03	3.72E-03
END	-.26	-.46	78.4352	3.03E-03	148.4	-2.58E-03	1.59E-03
2J6	.53	0	61.976	.687047	270.4	5.24E-03	-.687027
END	-.26	.46	61.976	.687234	270.4	5.24E-03	-.687214
2J9	-.26	.46	61.976	.687159	270.	5.25E-05	-.687159
END	-.26	-.46	61.976	.687348	270.	5.29E-05	-.687348
2J12	-.26	-.46	61.976	.687214	269.6	-5.14E-03	-.687195
END	.53	0	61.976	.687401	269.6	-5.14E-03	-.687382
2J7	.53	0	78.4352	.707072	270.2	2.61E-03	-.707067
END	-.26	.46	78.4352	.708745	270.2	2.62E-03	-.70874
2J10	-.26	.46	78.4352	.707056	270.	4.94E-05	-.707056
END	-.26	-.46	78.4352	.708741	270.	5.32E-05	-.708741
2J13	-.26	-.46	78.4352	.707157	269.8	-2.53E-03	-.707152
END	.53	0	78.4352	.708829	269.8	-2.53E-03	-.708825