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Tulsa, OK 74133

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www.iHeartRadio.com
#iheartradio

February 17, 2023

*VIA EMAIL*

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

RE: IHM LICENSES, LLC (FRN No. 0014042816)
FCC Form 302-AM
KBME (AM), 790 kHz, Houston, TX; Facility ID No. 23082

Dear Ms. Dortch:

On behalf of IHM LICENSES, LLC, the licensee of the above-referenced station, enclosed is a copy of FCC Form 302-AM.

Please contact the undersigned with any communications concerning this application.

Respectfully submitted,
IHM LICENSES, LLC

By: Troy Langham
VP, Technical Regulatory Affairs

cc: Public Inspection File

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

# FCC 302-AM
# APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.)

**FOR COMMISSION USE ONLY**

**FILE NO.**

## SECTION I - APPLICANT FEE INFORMATION

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

IHM LICENSES, LLC

MAILING ADDRESS (Line 1) (Maximum 35 characters)
7136 S YALE AVE

MAILING ADDRESS (Line 2) (Maximum 35 characters)
SUITE 501

| CITY | STATE OR COUNTRY (if foreign address) | ZIP CODE |
|---|---|---|
| TULSA | OK | 74136 |

| TELEPHONE NUMBER (include area code) | CALL LETTERS | OTHER FCC IDENTIFIER (If applicable) |
|---|---|---|
| 918-664-4581 | KBME | 23082 |

2. A. Is a fee submitted with this application? [✓] Yes [ ] No

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

[ ] Governmental Entity [ ] Noncommercial educational licensee [ ] Other (Please explain):

C. If Yes, provide the following information:

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

| (A) FEE TYPE CODE | (B) FEE MULTIPLE | (C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A) | FOR FCC USE ONLY |
|---|---|---|---|
| MMR | 0001 | $ 645.00 | |

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

| (A) | (B) | (C) | FOR FCC USE ONLY |
|---|---|---|---|
| MOR | 0001 | $ 1260.00 | |

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

| TOTAL AMOUNT REMITTED WITH THIS APPLICATION | FOR FCC USE ONLY |
|---|---|
| $ 1905.00 | |

| SECTION II - APPLICANT INFORMATION | | |
|---|---|---|
| 1. NAME OF APPLICANT<br>IHM LICENSES, LLC | | |
| MAILING ADDRESS<br>7136 S YALE AVE, SUITE 501 | | |
| CITY<br>TULSA | STATE<br>OK | ZIP CODE<br>74136 |

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

| Call letters | Community of License | Construction Permit File No. | Modification of Construction Permit File No(s). | Expiration Date of Last Construction Permit |
|---|---|---|---|---|
| KBME | HOUSTON, TX | BP-20220303AAS | | 05/31/2025 |

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

☐ Yes ☑ No

If No, explain in an Exhibit.

Exhibit No.

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

☑ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No.

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

☐ Yes ☑ No

If Yes, explain in an Exhibit.

Exhibit No.

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

☑ Yes ☐ No

☐ Does not apply

If No, explain in an Exhibit.

Exhibit No.

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

☐ Yes ☑ No

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

Exhibit No.

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

☐ Yes ☑ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

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

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

## CERTIFICATION

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

☑ Yes ☐ No

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

| Name | Signature | |
|---|---|---|
| Troy Langham | Troy Langham<br>Digitally signed by Troy Langham<br>DN: cn=Troy Langham, o, ou, email=Troylangham@iheartmedia.com, c=US<br>Date: 2023.02.17 07:22:45 -06'00' | |
| Title | Date | Telephone Number |
| VP, Technical Regulatory Affairs | 2/14/2023 | 918-664-4581 |

**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
IHM Licensees, LLC

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 | |
|---|---|---|---|---|---|
| | | | | Night | Day |
| KBME | BP-20220303AAS | 790 | Unlimited | 5 | 5 |

2. Station location

| State | City or Town |
|---|---|
| Texas | Houston |

3. Transmitter location

| State | County | City or Town | Street address (or other identification) |
|---|---|---|---|
| TX | Harris | Houston | 3000 Hansom Rd |

4. Main studio location

| State | County | City or Town | Street address (or other identification) |
|---|---|---|---|
| TX | Harris | Houston | 1233 West Loop South |

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

| State | County | City or Town | Street address (or other identification) |
|---|---|---|---|
| TX | Harris | Houston | 1233 West Loop 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 | RF common point or antenna current (in amperes) without modulation for day system |
|---|---|
| 10.39 | 10.39 |
| Measured antenna or common point resistance (in ohms) at operating frequency<br>Night 50 Day 50 | Measured antenna or common point reactance (in ohms) at operating frequency<br>Night -j 4 Day -j 4 |

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 |
| See Engineering Figures 3 & 4 | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Manufacturer and type of antenna monitor: Potomac Instruments, Model 1901-8

**SECTION III - Page 2**

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

| Type Radiator | Overall height in meters of radiator above base insulator, or above base, if grounded. | Overall height in meters above ground (without obstruction lighting) | Overall height in meters above ground (include obstruction lighting) | If antenna is either top loaded or sectionalized, describe fully in an Exhibit. |
|---|---|---|---|---|
| Uniform cross-section, guyed, tower | 103.5 | 104.9 | 106.2 | Exhibit No. N/A |

Excitation ☑ Series ☐ Shunt

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

| North Latitude | West Longitude |
|---|---|
| 29 ° 54 ' 56 " | 95 ° 27 ' 45 " |

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. On file

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) | Signature (check appropriate box below) |
|---|---|
| James D. Sadler | |
| Address (include ZIP Code)<br>Carl T. Jones Corporation<br>7901 Yarnwood Ct<br>Springfield, VA 22153 | Date<br>February 6, 2023<br>Telephone No. (Include Area Code)<br>(703) 569-7704 |

☐ Technical Director ☐ Registered Professional Engineer

☐ Chief Operator ☑ Technical Consultant

☐ Other (specify)

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

# ENGINEERING EXHIBIT
# IN SUPPORT OF AN
# APPLICATION FOR STATION LICENSE
# STATION KBME - HOUSTON, TEXAS
# 790 kHz – 5 kW-D, 5 kW-N, U, DA-2
# Facility ID: 23082

Applicant: IHM Licensees, LLC

FEBRUARY, 2023

7901 Yarnwood Court
Springfield, VA 22153-2899

tel: (703) 569-7704
fax: (703) 569-6417

email: info@ctjc.com
www.ctjc.com

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SECTION III OF FCC FORM 302-AM

ENGINEERING STATEMENT OF JAMES D. SADLER

FIGURE



Consulting Engineers CTJC CARL T. JONES CORPORATION

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

**ENGINEERING STATEMENT OF JAMES D. SADLER**
**IN SUPPORT OF AN**
**APPLICATION FOR STATION LICENSE**
**STATION KBME - HOUSTON, TEXAS**
**790 kHz – 5 kW-D, 5 kW-N, U, DA-2**
**Facility ID: 23082**

Applicant: IHM Licensees, LLC

I am a Technical Consultant, an employee 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.

## 1.0 GENERAL

This office has been authorized by IHM Licensees ("IHM"), licensee of AM Radio Station KBME, to prepare this engineering statement, FCC Form 302-AM, Section III, and the associated figures and appendices in support of an Application for License to cover outstanding Construction Permit, FCC File No. BP-20220303AAS, granted May 31, 2022. The construction permit corrects the geographic coordinates for the center of the directional antenna array. KBME is licensed for operation on 790 kilohertz at a power of 5 kilowatts during daytime and nighttime hours. The station uses a four tower directional antenna during daytime hours and an eight tower directional antenna during

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email: info@ctjc.com
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nighttime hours (DA-2). The four daytime towers are shared with the nighttime directional array.

IHM is the licensee of AM Stations KPRC and KXYZ, both licensed to serve Houston, Texas. Each station holds a construction permit[1] authorizing relocation of the transmission facilities to the transmitter site of KBME. Station KPRC is authorized to operate on 950 kilohertz at a daytime power of 7 kilowatts and a nighttime power of 4.3 kilowatts employing a single tower for daytime non-directional operation and 4 towers for nighttime directional operation (DA-N). Station KXYZ is authorized to operate on 1320 kHz at a daytime power of 8.4 kilowatts and a nighttime power of 2.8 kilowatts employing the same three towers for directional operation during daytime and nighttime hours (DA-2).

After completion of the installation of the new KPRC and KXYZ phasing and coupling systems and all triplexing filters required to minimize interaction between the three collocated stations, the KBME directional antenna patterns were verified using computer modeling and sample system verification techniques as described in Section 47 CFR 73.151(c) of the FCC's Rules and Regulations. The specific measurement and modeling techniques used in performing the verification of the KBME daytime and nighttime directional patterns are described in detail in this engineering statement.

Impedance measurement data, sample system verification measurement data, model derived operating parameters and reference point field strength data 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, B, C, and D.

[1] Station KPRC construction permit, BP-20200917AAN, granted January 13, 2021, and Station KXYZ construction permit, BP-20210125AAC, granted May 4, 2021.

## 2.0 IMPEDANCE MEASUREMENTS, COMPUTER MODELING AND SAMPLE SYSTEM VERIFICATION

The proof of performance contained herein is based on the computer modeling and sample system verification procedures described in Section 47 CFR 73.151(c) of the FCC's Rules and Regulations. The KBME antenna array consists of eight, triangular, uniform cross-section, guyed, series fed towers. The height of each tower is 98.2 electrical degrees. The sampling system employs identical toroidal current transformers located at the output of each antenna matching network. This location corresponds to the input to the triplexing filters.

## 2.1 INDIVIDUAL TOWER IMPEDANCE MEASUREMENTS

Tower base impedance measurements were performed at a location immediately adjacent to the KBME sample current transformer on the tower side of the transformer. The impedance measurements were performed by Mr. Nicolas Blomstrand, Corporate RF Engineer for the licensee, and the undersigned, using a Keysight, Model P5020A vector network analyzer; an ENI, Model 325LA, power amplifier; and a Tunwall Radio directional coupler. The impedance of each tower was measured with the other towers open-circuited at the same ATU output J-Plug location that was used to perform the impedance measurement. The measured impedances are tabulated in Figure 2.

## 2.2 INDIVIDUAL TOWER COMPUTER MODELS

A Method of Moments ("MoM") computer model was developed to model each element in the array using Expert MiniNEC Broadcast Professional (Version 23.0). A

wire model consisting of 24 segments was developed for each of the eight towers. To replicate the individual measured base impedances to within FCC specified tolerances, each tower's physical height was adjusted in the MiniNEC model and series inductances, shunt capacitances and measured series capacitances were employed in a separate circuit model.[2] The actual equivalent physical radius of each tower was used in all computer models contained in this application for all but one tower. Details of the modeled individual tower adjusted radius and tower heights are contained in Figure 1.

The values of the shunt capacitances, lumped series inductances and measured series capacitances used in the circuit model are contained in the table of Figure 2. A comparison of the measured individual tower impedances, the modeled individual tower impedances, and the adjusted modeled (circuit model) individual tower impedances is also contained in the table of Figure 2. The percentage difference between the adjusted modeled tower radius and height and the actual physical tower radius and height and the magnitude of the lumped series inductances and shunt capacitances that were used in the circuit models are all within the tolerances set forth in the Rules.

As demonstrated by the data contained in Figure 2, the adjusted modeled individual tower resistance and reactance for each tower is well within ± 2 ohms and ± 4 percent tolerance of the corresponding measured individual tower resistance and reactance. The text files containing all pertinent input and output data associated with the individual tower models are contained in Appendix A.

[2] A variable vacuum capacitor was installed in series with the input to each tower that was in common with all three station's transmission paths. After final adjustment, the value of each series capacitor was measured at all three frequencies and the measured capacitance values at 790 kHz were used in the KBME separate circuit model.

## 2.3 DIRECTIONAL ANTENNA COMPUTER MODEL AND ANTENNA MONITOR PARAMETERS

The KBME theoretical daytime and nighttime directional field parameters and the licensed tower spacings and orientations were used in combination with the adjusted individual tower models to produce the daytime and nighttime directional antenna computer models. From the daytime and nighttime directional computer models, tower currents were derived that, when numerically integrated and normalized to the appropriate reference tower, are essentially identical to the theoretical relative field parameters for the KBME daytime and nighttime directional antenna patterns.

The new daytime and nighttime directional array operating parameters were determined from the modeled base currents and are tabulated in Figures 3 and 4. The text files containing all pertinent input and output data associated with the daytime and nighttime directional antenna computer models are contained in Appendix B and C. Note that in Appendix B the unused towers (#3, #4, #5, and #6) are included in the model. The unused towers are detuned at their base using the detuning impedance determined by modeling for the adjusted tower's height. Details of the detune model are contained in Appendix D.

## 2.4 SAMPLE SYSTEM DESCRIPTION AND VERIFICATION MEASUREMENTS

The KBME antenna sampling system is comprised of: 1) Delta Electronics, Model TCT-3, toroidal current transformers mounted in an identical manner in the output branch of each tower's impedance matching network; 2) equal lengths of 3/8-inch, foam dielectric, coaxial cable; and 3) a Potomac Instruments, Model 1901-8, antenna monitor. Each sample line between the ATU building and the transmitter building, including

excess lengths, is buried such that each cable is subjected to the same environmental conditions.

The sample lines were verified to be equal in length 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 by 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*

$\boldsymbol{R_1 + j\,X_1}$ *and* $\boldsymbol{R_2 + j\,X_2}$ *are the measured impedances at ± 45 degrees offset frequencies.*

A tabulation of the measured sample line lengths and the characteristic impedance of each line is contained in Figure 5. All sample line verification measurements were performed by Mr. Randy Mullinax and Mr. Nicolas Blomstrand, using a Keysight, Model P5020A vector network analyzer; an ENI, Model 325LA, power amplifier; and a Tunwall Radio directional coupler. Mr. Mullinax is also a Corporate RF Engineer for the licensee. As demonstrated by the measured values in Figure 5, the measured sample line lengths are within 1 electrical degree with respect to each other

and the measured characteristic impedances are within 2 ohms of each other, as required by Section 47 CFR 73.151(c)(2)(I) of the FCC 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 toroidal current transformer connected. The measurement was performed at the KBME operating frequency of 790 kilohertz. 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 toroidal current transformers was verified by driving a common reference current through the eight KBME transformers and comparing the relative outputs as observed on the network analyzer. The test confirmed that the performance of all eight of the KBME current transformers is well within the manufacturer’s stated accuracy. A tabulation of the toroidal current transformer measurement data and the serial number of each toroidal current transformer is contained in Figure 6.

The antenna monitor that is employed by KBME is a Potomac Instruments, Model 1901-8. The performance of the antenna monitor was verified by Mr. Randy Mullinax and found to be well within the manufacturers stated accuracy.

## 3.0 COMMON POINT IMPEDANCE AND COMMON POINT CURRENT

The networks associated with the daytime and nighttime directional antenna system were adjusted for proper impedance transformation and each common point impedance matching network was set for Z = 50 -j 4 Ohms (uncorrected inline bridge

reading). The transmitter output power level was adjusted for a daytime and nighttime common point current of 10.39 amperes, corresponding to daytime and nighttime input power of 5,400 Watts.

## 4.0 REFERENCE FIELD STRENGTH MEASUREMENTS

Reference field strength measurements were performed on the KBME daytime directional antenna pattern on the 166.5° radial bearing, corresponding to the major lobe of the daytime pattern. In addition, reference field strength measurements were performed on the 232°, and 352.5° radial bearings, corresponding to the daytime directional pattern minima. Reference field strength measurements were performed on the KBME nighttime directional antenna pattern on the 151.5° radial bearing, corresponding to the major lobe of the nighttime pattern. In addition, reference field strength measurements were performed on the 47°, 116.5°, 197.5°, 233.5°, and 302.5° radial bearings, corresponding to the nighttime directional pattern minima. Three reference field strength measurements were performed on each of the selected radial bearings.

The measurements were performed by Mr. Randy Mullinax and Mr. Nicolas Blomstrand. A single Potomac Instruments, Model PI-4100, Serial Number 133, last calibrated June, 2021, was used to perform the measurements.

The measured field strength value for each established reference point location is tabulated in Figure 7, Sheets 1 through 5. The tabulations contained in Figure 7 also include for each reference location; GPS coordinates (NAD83), distance from the KBME array center, and a description of measurement location.

## 5.0 SPURIOUS EMISSION MEASUREMENTS

IHM has designed, purchased, installed and adjusted filtering and detuning equipment sufficient to prevent interaction and the generation of spurious emissions. The schematic diagram of Figure 10 shows the KBME phasing and coupling system. The schematic diagrams of Figure 11, Sheets 1 through 8 show the tri-plexing filters and detuning circuits that have been installed at the base of each tower for this purpose.

Measurements of spurious and harmonic emissions radiated by the combined operations of KBME, KPRC and KXYZ were performed by the Mr. Randy Mullinax and Mr. Nicolas Blomstrand. The measurement data confirms that all spurious and harmonic emissions generated by the common usage of the transmitter site and antennas are below the emissions limits specified in Section 73.44(b) of the Commission's Rules and Regulations. Also included in the measurements were intermodulation products that included nearby stations operating on 1070 kHz and 610 kHz. The spurious, harmonic and intermodulation product emission measurement data is tabulated in Figures 8 and 9.

## 6.0 OTHER ANTENNAS MOUNTED ON THE TOWER

An STL antenna is mounted on tower #5(NE). A Kintronic Laboratories isocoupler is mounted across the base insulator of tower #5.

## 7.0 SUMMARY

It is submitted that the KBME daytime and nighttime directional antenna systems have been properly adjusted to comply with the technical specifications contained in

Construction Permit, FCC File No. BP-20220303AAS. 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) of the Commission's Rules and Regulations. It is believed that the daytime and nighttime 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 IHM reflecting the new MoM model derived operating parameters as contained herein and in Section III of FCC Form 302-AM.

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

Dated: February 6, 2023

James D. Sadler

Figure 1

# TOWER MODEL HEIGHT AND RADIUS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

| Tower | Physical Height (meters) | Modeled Height (meters) | Percent of Physical Height | Modeled Radius (meters) | Percent of Equivalent Radius |
|---|---|---|---|---|---|
| 1 | 103.5 | 107.6 | 103.9 | 0.2911 | 100.0 |
| 2 | 103.5 | 110.2 | 106.5 | 0.2911 | 100.0 |
| 3 | 103.5 | 111.2 | 107.4 | 0.2911 | 100.0 |
| 4 | 103.5 | 107.4 | 103.7 | 0.2911 | 100.0 |
| 5 | 103.5 | 108.8 | 105.1 | 0.2358 | 81.0 |
| 6 | 103.5 | 111.3 | 107.5 | 0.2911 | 100.0 |
| 7 | 103.5 | 111.8 | 108.0 | 0.2911 | 100.0 |
| 8 | 103.5 | 109.2 | 105.5 | 0.2911 | 100.0 |

## MEASURED AND MODELED IMPEDANCES

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

| Tower | Measured Tower Base Impedance[1] | Modeled Tower Base Impedance | Shunt Capacitance (pF) | Modeled plus Shunt Reactance | Measured Series Capacitance (pF) | Lumped Series Inductance (uH) | Total Adjusted Tower Base Impedance |
|---|---|---|---|---|---|---|---|
| 1 | 68.82 +j 7.33 | 67.91 +j 94.45 | 15.0 | 68.88 +j 94.77 | 1730 | 5.9 | 68.88 +j 7.36 |
| 2 | 72.76 -j 170.0 | 71.60 +j 111.46 | 15.0 | 72.80 +j 112.00 | 677.8 | 3.1 | 72.80 -j 170.0 |
| 3 | 74.82 -j 17.64 | 73.49 +j 116.73 | 15.0 | 74.78 +j 117.34 | 1330 | 3.3 | 74.78 -j 17.65 |
| 4 | 65.66 -j 63.19 | 64.79 +j 91.43 | 15.0 | 65.68 +j 91.74 | 1090 | 6.0 | 65.68 -j 63.21 |
| 5 | 64.81 +j 28.51 | 67.58 +j 102.95 | 15.0 | 68.63 +j 103.40 | 1590 | 10.0 | 68.63 +j 26.33 |
| 6 | 75.00 -j 46.16 | 73.64 +j 117.33 | 15.0 | 74.94 +j 117.95 | 1040 | 6.0 | 74.94 -j 46.23 |
| 7 | 77.21 -j 10.15 | 75.72 +j 121.29 | 15.0 | 77.10 +j 121.96 | 1280 | 5.1 | 77.10 -j 10.12 |
| 8 | 73.19 -j 93.22 | 72.15 +j 104.57 | 15.0 | 73.29 +j 104.99 | 938.4 | 3.3 | 73.29 -j 93.31 |

[1] Measured at output of matching network with other towers open-circuited.

Figure 2

# ANTENNA MONITOR PARAMETERS AND COMMON POINT DATA

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

| DAYTIME | | |
|---|---|---|
| | Modeled Parameters | |
| **Tower** | **Ratio** | **Phase (deg)** |
| 1(NW) - ASR#1058670 | 1.000 | 0.0 |
| 2(NWC) - ASR#1058671 | 0.147 | -107.4 |
| 7(SEC) - ASR#1058676 | 0.535 | -89.9 |
| 8(SE) - ASR#1058677 | 0.065 | -156.0 |
| Common Point Impedance = 50 -j 4 ohms<br>Common Point Current = 10.39 amperes<br>Antenna Input Power = 5,400 Watts | | |

# NIGHTTIME ANTENNA MONITOR PARAMETERS AND COMMON POINT DATA

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

| Tower | Modeled Parameters | |
|---|---|---|
| | Ratio | Phase (deg) |
| 1(NW) - ASR#1058670 | 1.290 | 8.2 |
| 2(NWC) - ASR#1058671 | 1.188 | -156.6 |
| 3(SWC) - ASR#1058672 | 1.477 | 42.0 |
| 4(SW) - ASR#1058673 | 0.588 | -66.9 |
| 5(NE) - ASR#1058674 | 1.000 | 0.0 |
| 6(NEC) - ASR#1058675 | 0.867 | -165.5 |
| 7(SEC) - ASR#1058676 | 1.130 | 29.7 |
| 8(SE) - ASR#1058677 | 0.422 | -78.1 |

Common Point Impedance = 50 -j 4 ohms

Common Point Current = 10.39 amperes

Antenna Input Power = 5,400 Watts

## SAMPLE LINE VERIFICATION MEASUREMENTS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

| 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 | 895.85 | 555.56 | 831.86 | 14.88 -j 47.14 | 959.84 | 16.89 +j 46.03 | 49.23 | 50.46 +j 2.30 |
| 2 | 895.86 | 555.56 | 831.87 | 14.73 -j 46.74 | 959.85 | 16.93 +j 45.96 | 48.99 | 49.33 +j 1.54 |
| 3 | 895.50 | 555.78 | 831.54 | 14.44 -j 45.34 | 959.46 | 16.88 +j 46.01 | 48.29 | 48.59 -j 0.16 |
| 4 | 895.90 | 555.53 | 831.91 | 14.80 -j 47.54 | 959.89 | 17.71 +j 47.53 | 50.25 | 50.53 +j 1.67 |
| 5 | 895.75 | 555.62 | 831.77 | 14.94 -j 47.04 | 959.73 | 17.24 +j 46.36 | 49.41 | 51.83 +j 0.23 |
| 6 | 895.74 | 555.63 | 831.76 | 14.78 -j 47.56 | 959.72 | 17.53 +j 47.38 | 50.16 | 50.26 +j 1.48 |
| 7 | 895.87 | 555.55 | 831.88 | 15.21 -j 48.00 | 959.86 | 16.91 +j 46.50 | 49.91 | 49.58 +j 2.12 |
| 8 | 895.99 | 555.47 | 831.99 | 14.66 -j 47.10 | 959.99 | 17.59 +j 47.19 | 49.84 | 50.11 +j 2.28 |

[1] At this frequency, the sample line electrical length is equal to 630°.
[2] At carrier frequency (790 kHz)

Figure 5

# SAMPLE DEVICE VERIFICATION MEASUREMENTS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

| Reference Sample Toroid Number | Measured Sample Toroid Number | Measured | |
|---|---|---|---|
| | | Field Ratio | Phase (degrees) |
| 7 | 1 | 1.000 | 0.34 |
| 7 | 2 | 1.000 | -0.04 |
| 7 | 3 | 0.999 | 0.11 |
| 7 | 4 | 0.999 | 0.16 |
| 7 | 5 | 1.000 | 0.09 |
| 7 | 6 | 1.000 | -0.28 |
| 7 | 8 | 0.999 | 0.58 |

| Sample Toroid Number | Type | Serial Number |
|---|---|---|
| 1 | Delta Electronics, TCT-3 | 18267 |
| 2 | Delta Electronics, TCT-3 | 96 |
| 3 | Delta Electronics, TCT-3 | 17942 |
| 4 | Delta Electronics, TCT-3 | 17694 |
| 5 | Delta Electronics, TCT-3 | 17943 |
| 6 | Delta Electronics, TCT-3 | 17145 |
| 7 | Delta Electronics, TCT-3 | 17659 |
| 8 | Delta Electronics, TCT-3 | 18226 |

## REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

**47 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 4.08 | - - - | 17.5 | 29° 56' 26.4" | 95° 25' 55.4" | Point is located on Grand Plaza Drive, at the end of divided road. |
| 2 | 5.78 | - - - | 16 | 29° 57' 03.7" | 95° 25' 08.5" | Point is located at the fire hydrant on the south side, opposite #13 Glenborough Drive. |
| 3 | 9.14 | - - - | 6.55 | 29° 58' 18.2" | 95° 23' 37.1" | Point is located at #1018 Carolina Wren Circle. |

**116.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 4.55 | - - - | 83.6 | 29° 53' 51.0" | 95° 25' 14.6" | Point is located at #1118 Twin Falls Road. |
| 2 | 5.77 | - - - | 72.8 | 29° 53' 33.4" | 95° 24' 34.3" | Point is located at #614 Rainey River Drive. |
| 3 | 8.09 | - - - | 43.0 | 29° 52' 56.6" | 95° 23' 16.6" | Point is located on the south edge of road at #191 Mitchell Road. |

## REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

**151.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 3.81 | - - - | 425 | 29° 53' 08.5" | 95° 26' 38.8" | Point is located at the end of Logger Pines Trail. |
| 2 | 8.94 | - - - | 168 | 29° 50' 42.5" | 95° 25' 07.5" | Point is located on the northeast corner of the junction of Dunsmere Street and Marcella Street. |
| 3 | 12.60 | - - - | 115 | 29° 48' 58.0" | 95° 24' 02.0" | Point is located at the "Road Humps" sign, #220 W 32nd Street. |

**166.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 3.23 | 292 | - - - | 29° 53' 14.8" | 95° 27' 18.8" | Point is located at #2914 McCrarey Drive. |
| 2 | 4.26 | 224 | - - - | 29° 52' 42.8" | 95° 27' 09.4" | Point is located at #2905 Rigel Road. |
| 3 | 6.47 | 146 | - - - | 29° 51' 32.9" | 95° 26' 51.0" | Point is located at #2435 Cliffdale Street. |

## REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

**197.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 3.26 | - - - | 114 | 29° 53' 16.1" | 95° 28' 23.2" | Point is located at #8297 Enchanted Forest Drive. |
| 2 | 4.86 | - - - | 80 | 29° 52' 26.8" | 95° 28' 41.1" | Point is located at #5922 Green Terrace Lane. |
| 3 | 10.20 | - - - | 32.2 | 29° 49' 41.0" | 95° 29' 41.3" | Point is located at #6754 Limestone Street. |

**232 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 3.43 | 75.8 | - - - | 29° 53' 48.6" | 95° 29' 27.7" | Point is located next to the fire hydrant at #6806 Bayou Crest Drive. |
| 2 | 4.68 | 48.0 | - - - | 29° 53' 23.3" | 95° 30' 04.1" | Point is located at #7314 Log View Drive. |
| 3 | 6.41 | 38.4 | - - - | 29° 52' 49.2" | 95° 30' 55.5" | Point is located at #7410 Woodoak Drive. |

## REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

**233.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 3.55 | - - - | 37.30 | 29° 53' 48.4" | 95° 29' 33.1" | Point is located at #7003 Bayou Crest Drive. |
| 2 | 4.91 | - - - | 18.30 | 29° 53' 22.5" | 95° 30' 14.5" | Point is located at #10234 Hannon Drive. |
| 3 | 6.10 | - - - | 15.10 | 29° 52' 59.7" | 95° 30' 49.9" | Point is located at the junction of Split Oak Drvie and Flair Oak Drive at the stop sign. |

**302.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 3.24 | - - - | 61.1 | 29° 55' 53.1" | 95° 29' 28.7" | Point is located at #7027 Sandswept Lane. |
| 2 | 4.29 | - - - | 39.4 | 29° 56' 11.0" | 95° 30' 01.7" | Point is located at #10938 Loch Bend Court. |
| 3 | 12.10 | - - - | 19.1 | 29° 58' 26.6" | 95° 34' 08.2" | Point is located at #13263 Mansfield Point Lane. |

## REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

**352.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) | | Description |
|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | |
| 1 | 4.37 | 41.0 | - - - | 29° 57' 16.6" | 95° 28' 08.5" | Point is located at junction of Copper Valley Court and Ironstone Court. |
| 2 | 5.42 | 39.6 | - - - | 29° 57' 50.4" | 95° 28' 13.0" | Point is located at #2678 Grand Canyon Drive. |
| 3 | 7.39 | 28.0 | - - - | 29° 58' 53.5" | 95° 28' 32.0" | Point is located at #13808 Sableglen Street. |

**MEASURED SPURIOUS AND HARMONIC EMISSIONS**
**DAYTIME OPERATION**
STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

**Measured Attenuation**

| Emission | Frequency (kHz) | Field Strength (mV/m) | Reference Carrier | Below Carrier (dBc) | FCC Limit (dBc) |
|---|---|---|---|---|---|
| F1 | 790 | 1050 | - - - | - - - | - - - |
| F2 | 950 | 804 | - - - | - - - | - - - |
| F3 | 1320 | 1500 | - - - | - - - | - - - |
| F4 | 1070 | 210 | - - - | - - - | - - - |
| F5 | 610 | 42.5 | - - - | - - - | - - - |
| 2F2-F3 | 580 | 0.022 | -91.3 | F2 | -80.0 |
| 2F1-F2 | 630 | 0.109 | (Note 1) | F1 | -80.0 |
| 2F2-F1 | 1110 | 1.35 | (Note 1) | F2 | -80.0 |
| F1-F2+F3 | 1160 | 0.024 | -90.5 | F2 | -80.0 |
| F1+F5 | 1400 | 0.431 | (Note 1) | F1 | -80.0 |
| -F1+F2+F3 | 1480 | 2.17 | (Note 1) | F2 | -80.0 |
| F2+F5 | 1560 | 0.953 | (Note 1) | F2 | -80.0 |
| 2F1 | 1580 | 0.066 | (Note 2) | F1 | -80.0 |
| 2F3-F2 | 1690 | 0.018 | -98.4 | F3 | -80.0 |
| F1+F2 | 1740 | 0.035 | -89.5 | F2 | -80.0 |
| 2F3-F1 | 1850 | 0.025 | -95.6 | F3 | -80.0 |
| F1+F4 | 1860 | 0.029 | -91.2 | F1 | -80.0 |
| 2F2 | 1900 | 0.019 | -92.5 | F2 | -80.0 |
| F3+F5 | 1930 | 0.011 | -102.7 | F3 | -80.0 |
| F2+F4 | 2020 | 0.013 | -95.8 | F2 | -80.0 |
| F1+F3 | 2110 | 0.052 | -86.1 | F1 | -80.0 |
| F5+2F1 | 2190 | 0.011 | -99.6 | F1 | -80.0 |
| F2+F3 | 2270 | 0.075 | -80.6 | F2 | -80.0 |
| F1+F2+F5 | 2350 | 0.01 | -98.1 | F2 | -80.0 |
| 3F1 | 2370 | 0.025 | -92.5 | F1 | -80.0 |
| F3+F4 | 2390 | 0.025 | -95.6 | F3 | -80.0 |
| F5+2F2 | 2510 | 0.011 | -97.3 | F2 | -80.0 |
| F2+2F1 | 2530 | 0.032 | -90.3 | F1 | -80.0 |
| 2F3 | 2640 | 0.095 | -84.0 | F3 | -80.0 |
| F4+2F1 | 2650 | 0.011 | -99.6 | F1 | -80.0 |

## Measured Attenuation

| Emission | Frequency (kHz) | Field Strength (mV/m) | Reference Carrier | Below Carrier (dBc) | FCC Limit (dBc) |
|---|---|---|---|---|---|
| F1+2F2 | 2690 | 0.018 | -93.0 | F2 | -80.0 |
| F1+F3+F5 | 2720 | 0.01 | -100.4 | F1 | -80.0 |
| F1+F2+F4 | 2810 | 0.01 | -98.1 | F2 | -80.0 |
| 3F2 | 2850 | 0.016 | -94.0 | F2 | -80.0 |
| F2+F3+F5 | 2880 | 0.01 | -98.1 | F2 | -80.0 |
| F3+2F1 | 2900 | 0.027 | -91.8 | F1 | -80.0 |
| F4+2F2 | 2970 | 0.01 | -98.1 | F2 | -80.0 |
| F1+F2+F3 | 3060 | 0.03 | -88.6 | F2 | -80.0 |
| F1+F3+F4 | 3180 | 0.011 | -99.6 | F1 | -80.0 |
| F3+2F2 | 3220 | 0.033 | -87.7 | F2 | -80.0 |
| F5+2F3 | 3250 | 0.058 | -88.3 | F3 | -80.0 |
| F2+F3+F4 | 3340 | 0.01 | -98.1 | F2 | -80.0 |
| F1+2F3 | 3430 | 0.043 | -90.9 | F3 | -80.0 |
| F2+2F3 | 3590 | 0.072 | -86.4 | F3 | -80.0 |
| F4+2F3 | 3710 | 0.013 | -101.2 | F3 | -80.0 |
| 3F3 | 3960 | 0.084 | -85.0 | F3 | -80.0 |

Note 1 - Signal from another station, no audio from reference station(s) observed

Note 2 - Splatter from strong local station on adjacent frequency, no audio from reference station(s) observed

**MEASURED SPURIOUS AND HARMONIC EMISSIONS**
**NIGHTTIME OPERATION**
STATION KBME - HOUSTON, TEXAS
790 kHz - 5 kW-D, 5 kW-N, U, DA-2
FEBRUARY, 2023

**Measured Attenuation**

| Emission | Frequency (kHz) | Field Strength (mV/m) | Reference Carrier | Below Carrier (dBc) | FCC Limit (dBc) |
|---|---|---|---|---|---|
| F1 | 790 | 1860 | - - - | - - - | - - - |
| F2 | 950 | 920 | - - - | - - - | - - - |
| F3 | 1320 | 870 | - - - | - - - | - - - |
| F4 | 1070 | 162 | - - - | - - - | - - - |
| F5 | 610 | 10.4 | - - - | - - - | - - - |
| 2F2-F3 | 580 | 0.023 | -92.0 | F2 | -79.3 |
| 2F1-F2 | 630 | 0.109 | (Note 1) | F1 | -80.0 |
| 2F2-F1 | 1110 | 1.22 | (Note 1) | F2 | -79.3 |
| F1-F2+F3 | 1160 | 0.025 | -91.3 | F2 | -79.3 |
| F1+F5 | 1400 | 0.39 | (Note 1) | F1 | -80.0 |
| -F1+F2+F3 | 1480 | 2.06 | (Note 1) | F2 | -79.3 |
| F2+F5 | 1560 | 0.881 | (Note 1) | F2 | -79.3 |
| 2F1 | 1580 | 0.629 | (Note 2) | F1 | -80.0 |
| 2F3-F2 | 1690 | 0.017 | -94.2 | F3 | -77.5 |
| F1+F2 | 1740 | 0.036 | -88.1 | F2 | -79.3 |
| 2F3-F1 | 1850 | 0.022 | -91.9 | F3 | -77.5 |
| F1+F4 | 1860 | 0.019 | -99.8 | F1 | -80.0 |
| 2F2 | 1900 | 0.016 | -95.2 | F2 | -79.3 |
| F3+F5 | 1930 | 0.011 | -98.0 | F3 | -77.5 |
| F2+F4 | 2020 | 0.014 | -81.3 | F2 | -79.3 |
| F1+F3 | 2110 | 0.078 | -87.5 | F1 | -80.0 |
| F5+2F1 | 2190 | 0.011 | -104.6 | F1 | -80.0 |
| F2+F3 | 2270 | 0.062 | -83.4 | F2 | -79.3 |
| F1+F2+F5 | 2350 | 0.01 | -99.3 | F2 | -79.3 |
| 3F1 | 2370 | 0.089 | -86.4 | F1 | -80.0 |
| F3+F4 | 2390 | 0.023 | -91.6 | F3 | -77.5 |
| F5+2F2 | 2510 | 0.011 | -98.4 | F2 | -79.3 |
| F2+2F1 | 2530 | 0.065 | -89.1 | F1 | -80.0 |
| 2F3 | 2640 | 0.08 | -80.7 | F3 | -77.5 |
| F4+2F1 | 2650 | 0.017 | -100.8 | F1 | -80.0 |

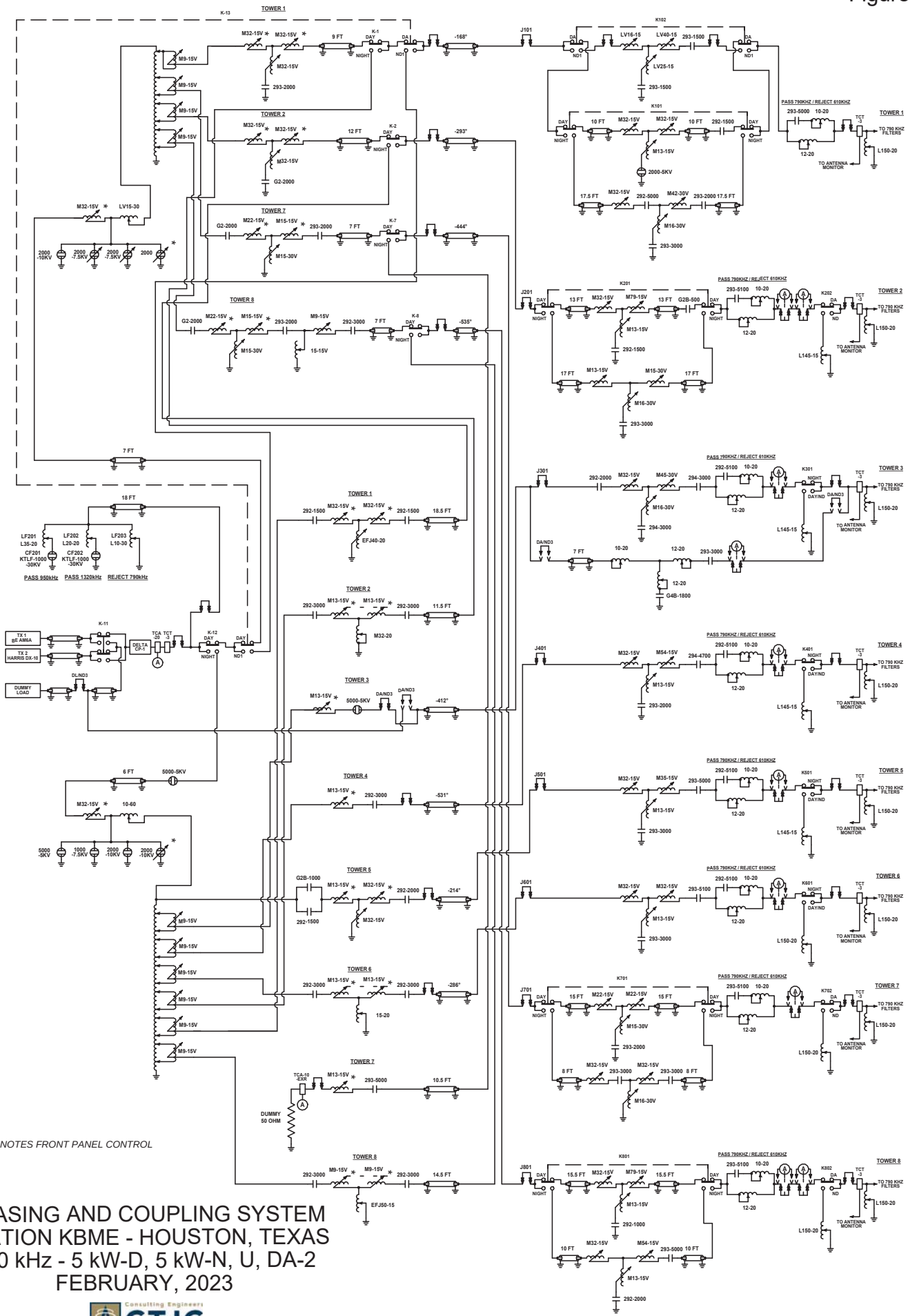
## Measured Attenuation

| Emission | Frequency (kHz) | Field Strength (mV/m) | Reference Carrier | Below Carrier (dBc) | FCC Limit (dBc) |
|---|---|---|---|---|---|
| F1+2F2 | 2690 | 0.035 | -88.4 | F2 | -79.3 |
| F1+F3+F5 | 2720 | 0.011 | -104.6 | F1 | -80.0 |
| F1+F2+F4 | 2810 | 0.014 | -81.3 | F2 | -79.3 |
| 3F2 | 2850 | 0.015 | -95.8 | F2 | -79.3 |
| F2+F3+F5 | 2880 | 0.011 | -98.4 | F2 | -79.3 |
| F3+2F1 | 2900 | 0.046 | -92.1 | F1 | -80.0 |
| F4+2F2 | 2970 | 0.01 | -99.3 | F2 | -79.3 |
| F1+F2+F3 | 3060 | 0.043 | -86.6 | F2 | -79.3 |
| F1+F3+F4 | 3180 | 0.019 | -99.8 | F1 | -80.0 |
| F3+2F2 | 3220 | 0.029 | -90.0 | F2 | -79.3 |
| F5+2F3 | 3250 | 0.059 | -83.4 | F3 | -77.5 |
| F2+F3+F4 | 3340 | 0.013 | -81.9 | F2 | -79.3 |
| F1+2F3 | 3430 | 0.067 | -82.3 | F3 | -77.5 |
| F2+2F3 | 3590 | 0.036 | -87.7 | F3 | -77.5 |
| F4+2F3 | 3710 | 0.038 | -87.2 | F3 | -77.5 |
| 3F3 | 3960 | 0.022 | -91.9 | F3 | -77.5 |

Note 1 - Signal from another station, no audio from reference station(s) observed

Note 2 - Splatter from strong local station on adjacent frequency, no audio from reference station(s) observed

Figure 10

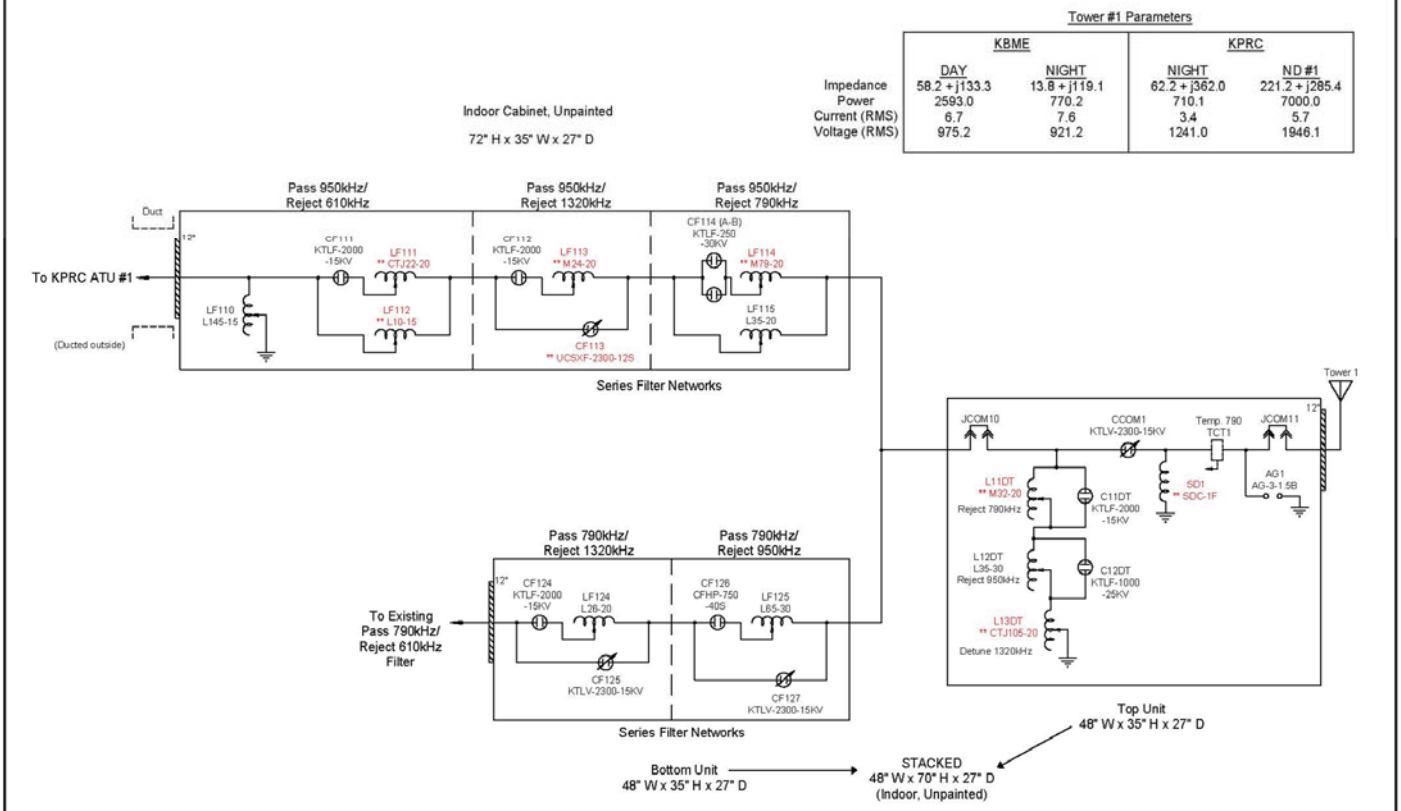



*DENOTES FRONT PANEL CONTROL

# PHASING AND COUPLING SYSTEM
# STATION KBME - HOUSTON, TEXAS
# 790 kHz - 5 kW-D, 5 kW-N, U, DA-2
# FEBRUARY, 2023

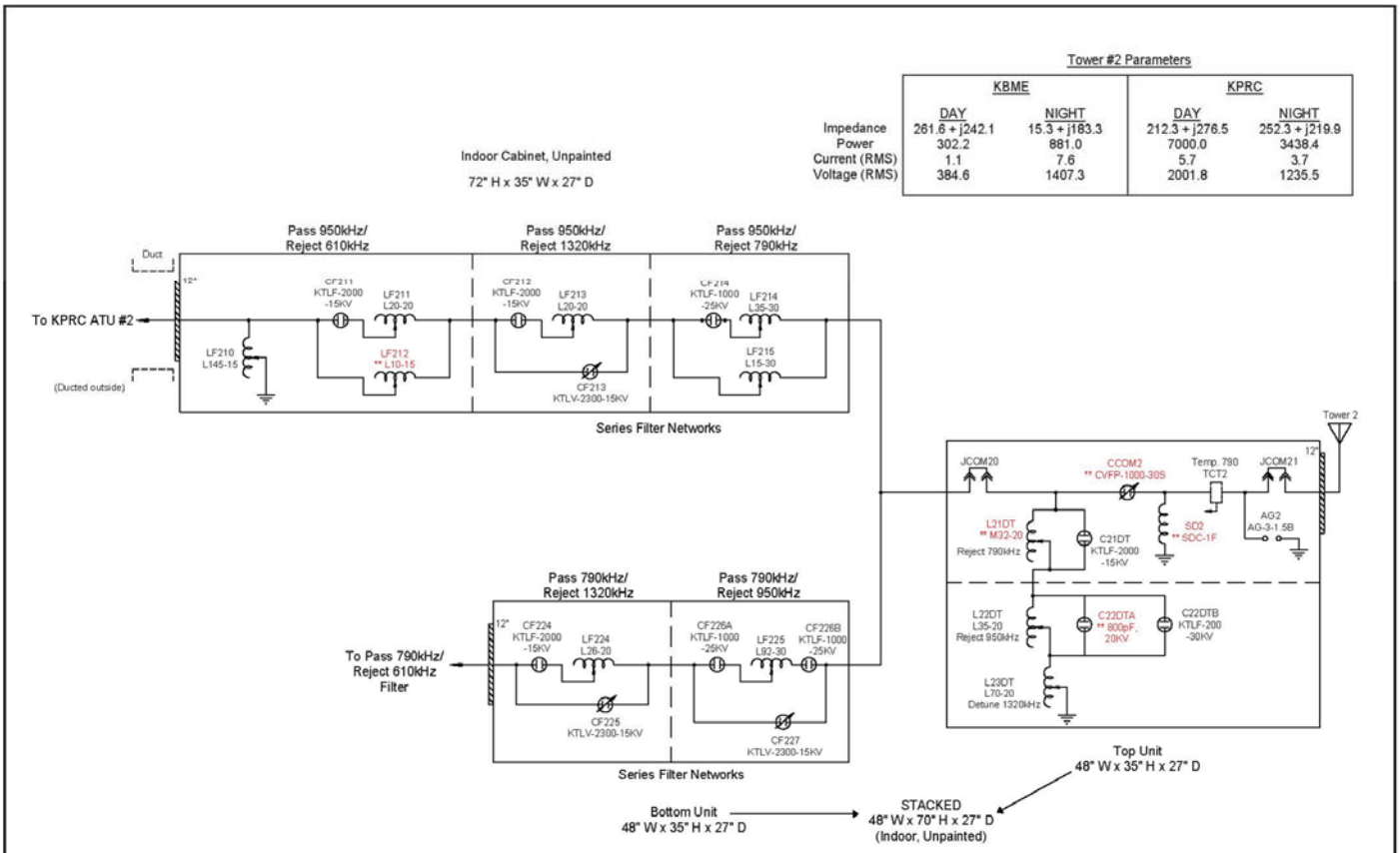
Revision 11292022-JS

Consulting Engineers
CTJC
CARL T. JONES CORPORATION




NOTES:
1. ** Indicates customer - supplied surplus part.

| | | | | | |
|---|---|---|---|---|---|
| KINTRONIC LABORATORIES INC.<br>BLUFF CITY, TN. | | | | FREQ: Varies<br>POWER: Varies | KPRC KXYZ onto KBME<br>Tower #1 RF SCHEMATIC<br>HOUSTON, TX |
| COPYRIGHT 2021 KINTRONIC LABORATORIES INC. | | | | | |
| REV. 02 | REV. DESCRIPTION: | REV. DATE: 27-JULY-21 | JOB NO: 118488 | DESIGNED: B.Cox | THE CONTENTS OF THIS DRAWING ARE THE INTELLECTUAL PROPERTY OF KINTRONIC LABS, INC. AND ARE NOT TO BE DISTRIBUTED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF KINTRONIC LABS, INC. |
| DWG NO: 12337-RFS-01 | REF DWG. | DATE: 06-JULY-21 | DRAWN: N.Ormes | APPROVED: | |



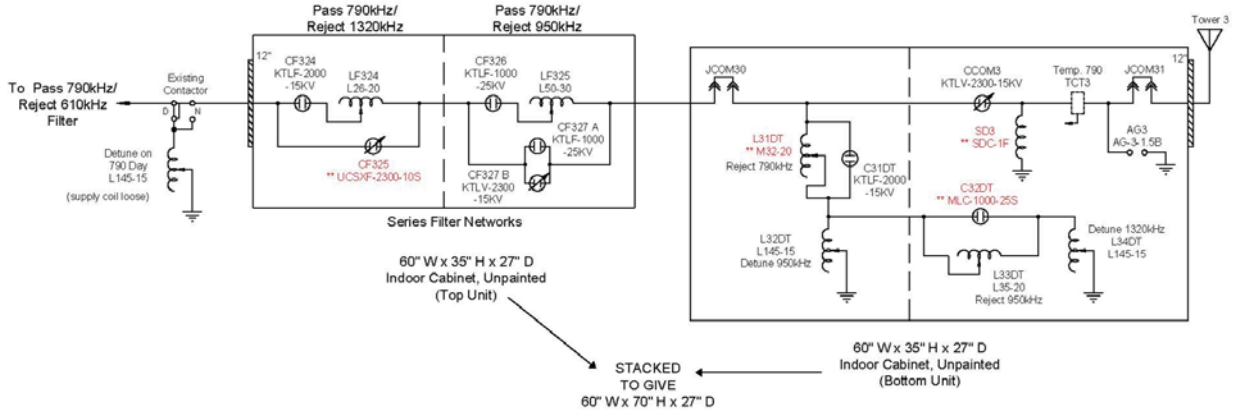

NOTES:
1. ** Indicates customer - supplied surplus part.

| | | | | | |
|---|---|---|---|---|---|
| KINTRONIC LABORATORIES INC.<br>BLUFF CITY, TN. | | | | FREQ: Varies<br>POWER: Varies | KPRC KXYZ onto KBME<br>Tower #2 RF SCHEMATIC<br>HOUSTON, TX |
| COPYRIGHT 2021 KINTRONIC LABORATORIES INC. | | | | | |
| REV. 02 | REV. DESCRIPTION: | REV. DATE: 27-JULY-21 | JOB NO: 118488 | DESIGNED: B.Cox | THE CONTENTS OF THIS DRAWING ARE THE INTELLECTUAL PROPERTY OF KINTRONIC LABS, INC. AND ARE NOT TO BE DISTRIBUTED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF KINTRONIC LABS, INC. |
| DWG NO: 12337-RFS-02 | REF DWG. | DATE: 06-JULY-21 | DRAWN: N.Ormes | APPROVED: | |

Figure 11
Sheet 2 of 8

Tower #3 Parameters

| | KBME |
|---|---|
| | NIGHT |
| Impedance | 8.26 + j140.4 |
| Power | 811.1 |
| Current (RMS) | 9.5 |
| Voltage (RMS) | 1336.3 |

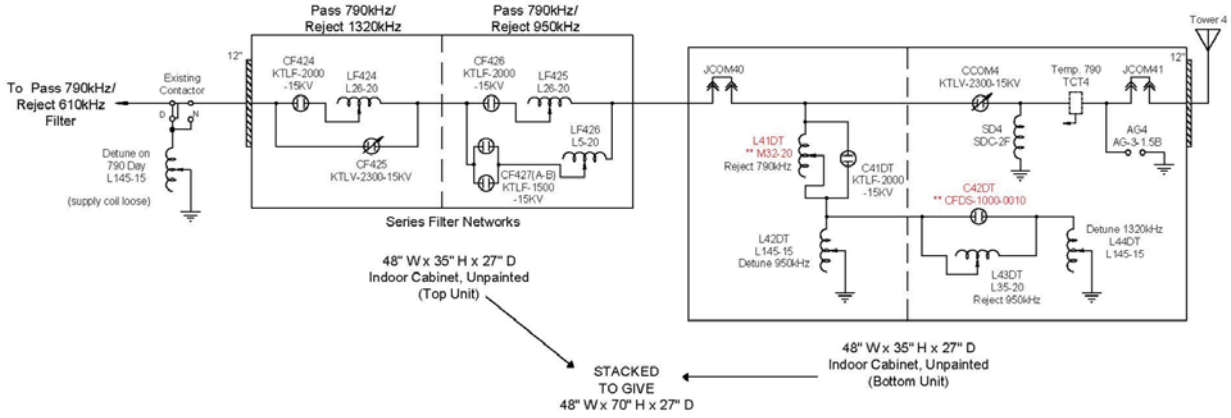



NOTES:
1. ** Indicates customer - supplied surplus part.

| | | | | | |
|---|---|---|---|---|---|
| KINTRONIC LABORATORIES INC. BLUFF CITY, TN. | | | | FREQ: Varies | KPRC KXYZ onto KBME Tower #3 RF SCHEMATIC HOUSTON, TX |
| | | | | POWER: Varies | |
| REV. 02 | REV. DESCRIPTION: | REV. DATE: 27-JULY-21 | JOB NO: 118488 | DESIGNED: B.Cox | THE CONTENTS OF THIS DRAWING ARE THE INTELLECTUAL PROPERTY OF KINTRONIC LABS, INC. AND ARE NOT TO BE DISTRIBUTED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF KINTRONIC LABS, INC. |
| DWG NO: 12337-RFS-03 | REF DWG. | DATE: 06-JULY-21 | DRAWN: N.Ormes | APPROVED: | |

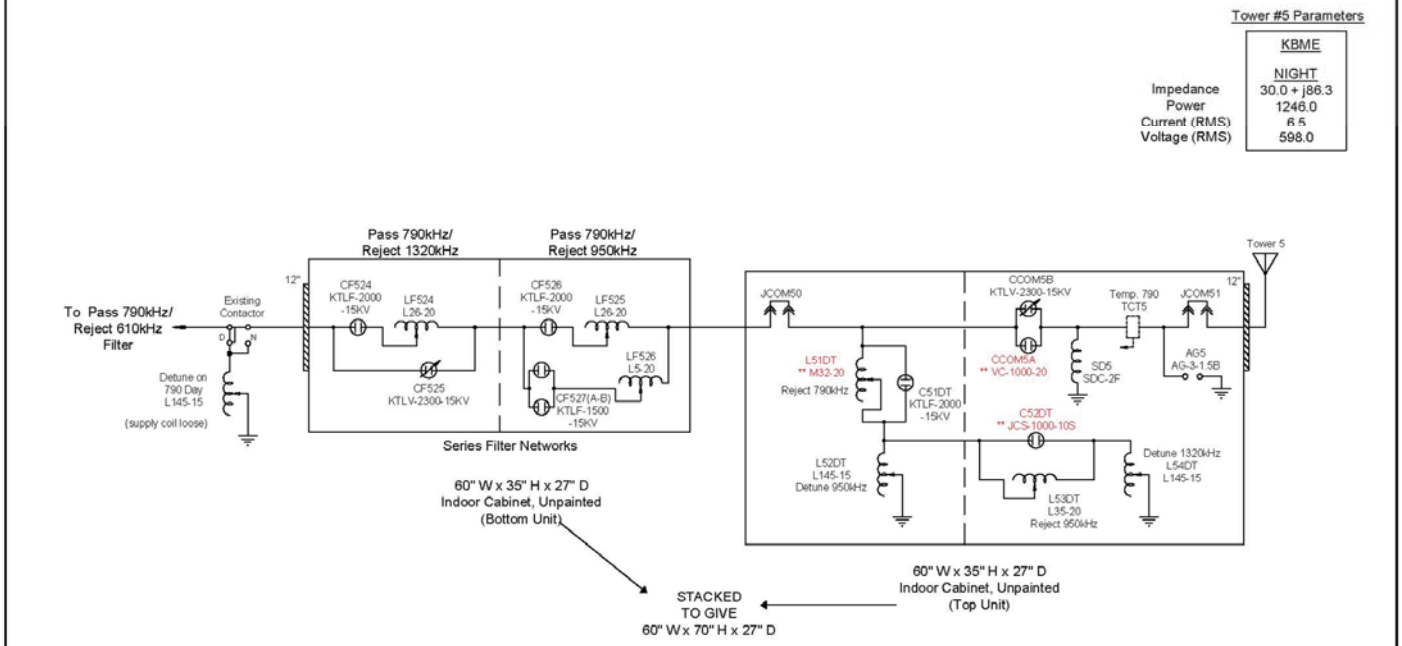
Tower #4 Parameters

| | KBME |
|---|---|
| | NIGHT |
| Impedance | 50.7 + j149.0 |
| Power | 842.2 |
| Current (RMS) | 4.0 |
| Voltage (RMS) | 664.0 |




NOTES:
1. ** Indicates customer - supplied surplus part.

| | | | | | |
|---|---|---|---|---|---|
| KINTRONIC LABORATORIES INC.<br>BLUFF CITY, TN. | | | | FREQ: Varies<br>POWER: Varies | KPRC KXYZ onto KBME<br>Tower #4 RF SCHEMATIC<br>HOUSTON, TX |
|  | | | | | |
| REV.: 02 | REV. DESCRIPTION: | REV. DATE: 27-JULY-21 | JOB NO: 118488 | DESIGNED: B.Cox |  |
| DWG NO: 12337-RFS-04 | REF DWG. | DATE: 06-JULY-21 | DRAWN: N.Ormes | APPROVED: | |




NOTES:
1. ** Indicates customer - supplied surplus part.

| | | | | | |
|---|---|---|---|---|---|
| KINTRONIC LABORATORIES INC. BLUFF CITY, TN. | | | | FREQ: Varies | KPRC KXYZ onto KBME Tower #5 RF SCHEMATIC HOUSTON, TX |
| COPYRIGHT 2021 KINTRONIC LABORATORIES INC. | | | | POWER: Varies | |
| REV. 02 | REV. DESCRIPTION: | REV. DATE: 27-JULY-21 | JOB NO: 118488 | DESIGNED: B.Cox | THE CONTENTS OF THIS DRAWING ARE THE INTELLECTUAL PROPERTY OF KINTRONIC LABS, INC. AND ARE NOT TO BE DISTRIBUTED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF KINTRONIC LABS, INC. |
| DWG NO: 12337-RFS-05 | REF DWG. | DATE: 06-JULY-21 | DRAWN: N.Ormes | APPROVED: | |

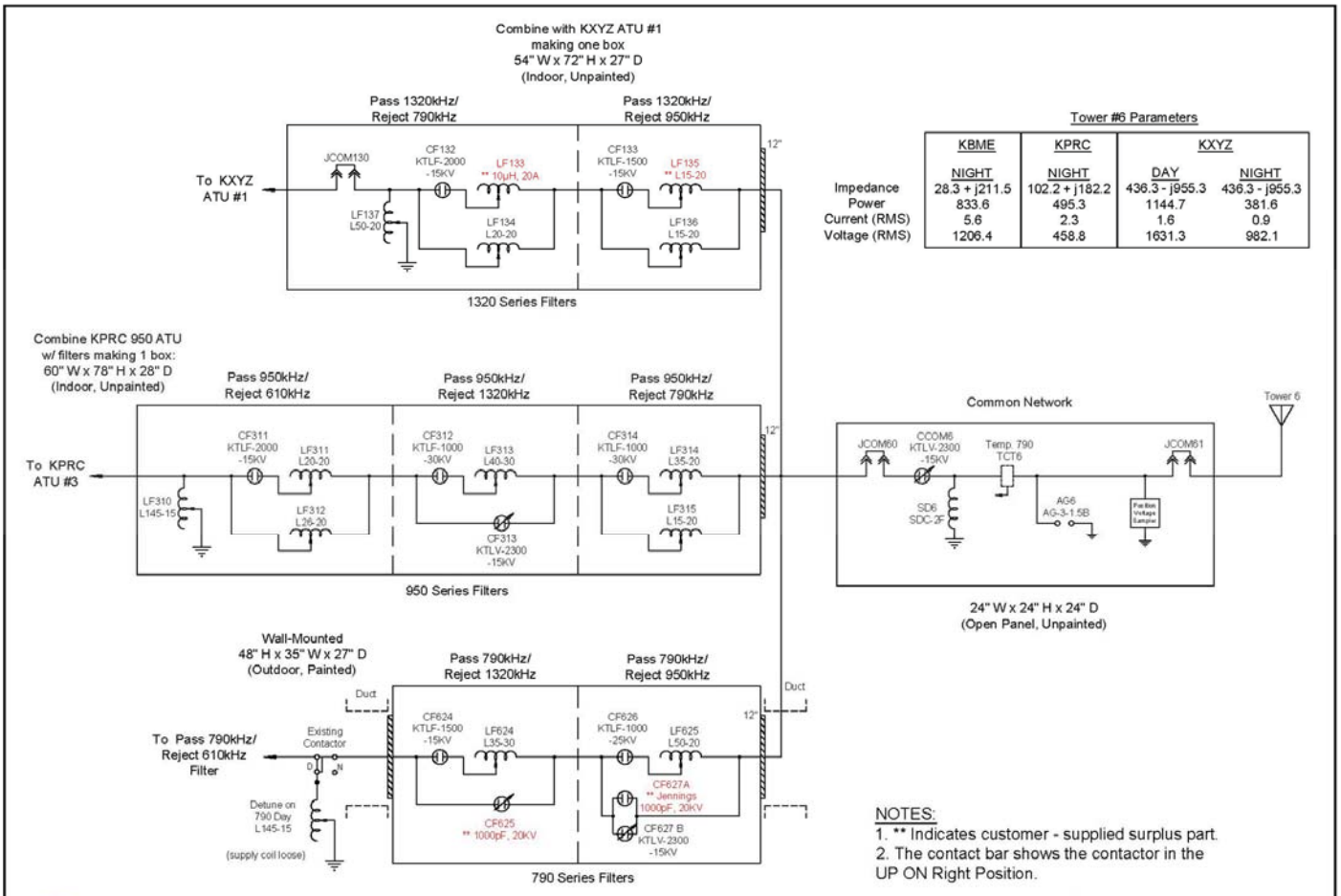
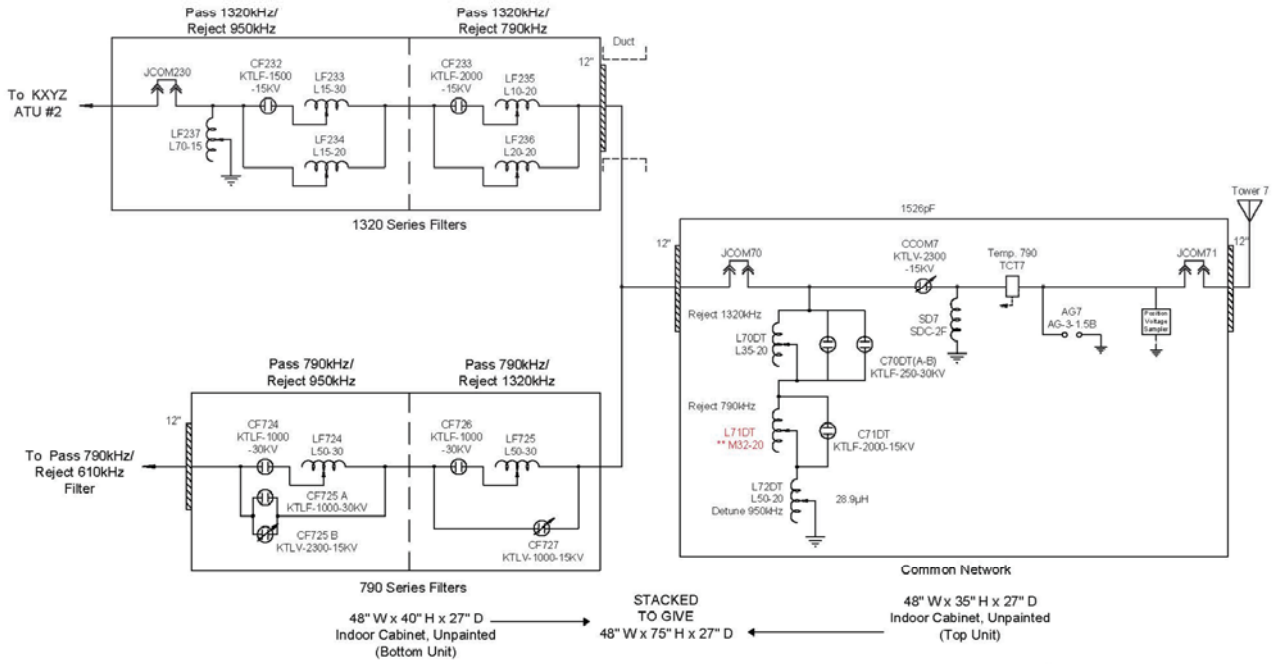



Figure 11
Sheet 6 of 8

NOTES:
1. ** Indicates customer - supplied surplus part.

Tower #7 Parameters

| | KBME | | KXYZ | | |
|---|---|---|---|---|---|
| | DAY | NIGHT | DAY | NIGHT | ND #2 |
| Impedance | 118.1 + j79.7 | -14.6 + j134.0 | 404.2 - j388.4 | 404.2 - j388.4 | 487.5 - j500.8 |
| Power | 1912.9 | 746.5 | 5770.3 | 1923.4 | 2100.0 |
| Current (RMS) | 4.0 | 7.6 | 3.8 | 2.2 | 2.1 |
| Voltage (RMS) | 573.5 | 1013.1 | 2118.0 | 1222.8 | 1495.6 |




| | | | | | |
|---|---|---|---|---|---|
| KINTRONIC LABORATORIES INC.<br>BLUFF CITY, TN. | | | | FREQ: Varies<br>POWER: Varies | KPRC KXYZ onto KBME<br>Tower #7 RF SCHEMATIC<br>HOUSTON, TX |
|  | | | | | |
| REV.: 05 | REV. DESCRIPTION: Removed 1320 Voltage Sampler & Edited Com. Network Pos. Voltage Sampler | REV. DATE: 24-OCT-22 | JOB NO: 118488 | DESIGNED: B.Cox |  |
| DWG NO: 12337-RFS-07 | REF DWG. | DATE: 07-JULY-21 | DRAWN: N.Ormes | APPROVED: | |

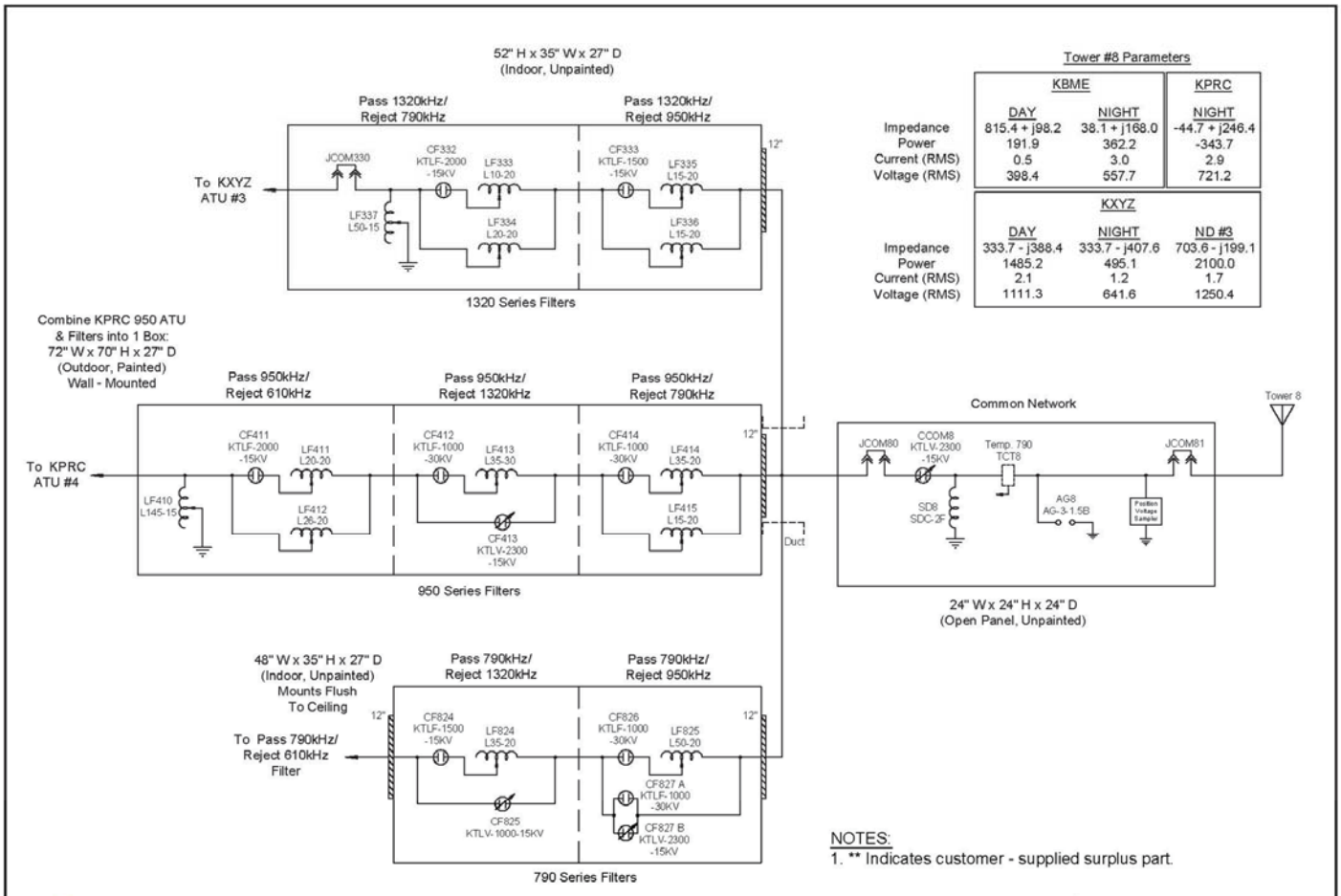



Figure 11
Sheet 8 of 8

# APPENDIX A

INDIVIDUAL TOWER MODEL

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 | | | | | | | |
| .79 | 67.913 | 94.452 | 116.33 | 54.3 | 4.4995 | -3.9264 | -2.2542 |

GEOMETRY – TOWER #1
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #1
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

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 | 1 | 1.E-03 | 0 | 0 | 0 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |

IMPEDANCE – TOWER #2
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 25, sector 1 | | | | | | | |
| .79 | 71.599 | 111.46 | 132.47 | 57.3 | 5.4158 | -3.2448 | -2.7878 |

GEOMETRY – TOWER #2
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #2
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

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

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 0 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |

IMPEDANCE – TOWER #3
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 49, sector 1 | | | | | | | |
| .79 | 73.486 | 116.73 | 137.93 | 57.8 | 5.6824 | -3.0893 | -2.9327 |

GEOMETRY – TOWER #3
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum wire | minimum value | maximum wire | maximum value |
|---|---|---|---|---|
| Individual wires | | | | |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #3
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

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

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 0 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |

IMPEDANCE – TOWER #4
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 73, sector 1 | | | | | | | |
| .79 | 64.794 | 91.432 | 112.06 | 54.7 | 4.4218 | -3.9977 | -2.2063 |

GEOMETRY – TOWER #4
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum wire | minimum value | maximum wire | maximum value |
|---|---|---|---|---|
| Individual wires | | | | |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #4
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 73 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 0 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |

IMPEDANCE – TOWER #5
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 97, sector 1 | | | | | | | |
| .79 | 67.581 | 102.95 | 123.15 | 56.7 | 5.0294 | -3.5007 | -2.5697 |

GEOMETRY – TOWER #5
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #5
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 97 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 0 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |

IMPEDANCE – TOWER #6
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 121, sector 1 | | | | | | | |
| .79 | 73.642 | 117.33 | 138.53 | 57.9 | 5.7157 | -3.0709 | -2.9505 |

GEOMETRY – TOWER #6
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum wire | minimum value | maximum wire | maximum value |
|---|---|---|---|---|
| Individual wires | | | | |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #6
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 121 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 0 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |

IMPEDANCE – TOWER #7
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 145, sector 1 | | | | | | | |
| .79 | 75.718 | 121.29 | 142.99 | 58. | 5.8908 | -2.9778 | -3.0431 |

GEOMETRY – TOWER #7
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #7
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 145 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 0 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |

IMPEDANCE – TOWER #8
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 169, sector 1 | | | | | | | |
| .79 | 72.153 | 104.57 | 127.05 | 55.4 | 4.9657 | -3.5468 | -2.5328 |

GEOMETRY – TOWER #8
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – TOWER #8
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 169 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 1.5E-05 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 0 | 0 |

# APPENDIX B

DAYTIME DIRECTIONAL ARRAY MODEL

IMPEDANCE – DAYTIME OPERATION
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 1, sector 1 | | | | | | | |
| .79 | 46.258 | 98.769 | 109.06 | 64.9 | 6.0588 | -2.8937 | -3.1302 |
| source = 2; node 25, sector 1 | | | | | | | |
| .79 | 239.23 | 238.93 | 338.11 | 45. | 9.6628 | -1.8043 | -4.6858 |
| source = 3; node 145, sector 1 | | | | | | | |
| .79 | 120.18 | 82.296 | 145.66 | 34.4 | 3.6746 | -4.8497 | -1.7222 |
| source = 4; node 169, sector 1 | | | | | | | |
| .79 | 865.15 | -27.097 | 865.57 | 358.2 | 17.32 | -1.0041 | -6.8524 |

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum wire | minimum value | maximum wire | maximum value |
|---|---|---|---|---|
| Individual wires | | | | |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – DAYTIME OPERATION
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 1,153.98 | 69.5 | voltage |
| 2 | 25 | 1 | 530.504 | 301.5 | voltage |
| 3 | 145 | 1 | 823.063 | 308.8 | voltage |
| 4 | 169 | 1 | 587.9 | 203.4 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 0 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 0 | 0 |
| 3 | 49 | 1.E-03 | 0 | .09 | 0 | 0 |
| 4 | 73 | 1.E-03 | 0 | .094 | 0 | 0 |
| 5 | 97 | 1.E-03 | 0 | .098 | 0 | 0 |
| 6 | 121 | 1.E-03 | 0 | .09 | 0 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 0 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 0 | 0 |

RMS CURRENT – DAYTIME OPERATION
Frequency = .79 MHz
Input power = 5,000. watts
Efficiency = 100. %
coordinates in degrees

| current no. | X | Y | Z | mag (amps) | phase (deg) | real (amps) | imaginary (amps) |
|---|---|---|---|---|---|---|---|
| GND | 0 | 0 | 0 | 7.48019 | 4.6 | 7.45614 | .599333 |
| 2 | 0 | 0 | 4.25125 | 7.82737 | 3.4 | 7.81393 | .458497 |
| 3 | 0 | 0 | 8.5025 | 8.01095 | 2.6 | 8.00255 | .366761 |
| 4 | 0 | 0 | 12.7538 | 8.12486 | 2. | 8.11977 | .287727 |
| 5 | 0 | 0 | 17.005 | 8.17999 | 1.5 | 8.1771 | .217227 |
| 6 | 0 | 0 | 21.2563 | 8.18116 | 1.1 | 8.17972 | .153543 |
| 7 | 0 | 0 | 25.5075 | 8.13108 | .7 | 8.13051 | .0958947 |
| 8 | 0 | 0 | 29.7588 | 8.03159 | .3 | 8.03147 | .043905 |
| 9 | 0 | 0 | 34.01 | 7.88414 | 360. | 7.88413 | -2.61E-03 |
| 10 | 0 | 0 | 38.2613 | 7.69006 | 359.7 | 7.68993 | -.0437408 |
| 11 | 0 | 0 | 42.5125 | 7.45091 | 359.4 | 7.45048 | -.0795087 |
| 12 | 0 | 0 | 46.7638 | 7.16797 | 359.1 | 7.16713 | -.109917 |
| 13 | 0 | 0 | 51.015 | 6.84279 | 358.9 | 6.84146 | -.134954 |
| 14 | 0 | 0 | 55.2663 | 6.47704 | 358.6 | 6.4752 | -.154605 |
| 15 | 0 | 0 | 59.5175 | 6.07239 | 358.4 | 6.07004 | -.168862 |
| 16 | 0 | 0 | 63.7688 | 5.63057 | 358.2 | 5.62777 | -.177717 |
| 17 | 0 | 0 | 68.02 | 5.15334 | 358. | 5.15015 | -.181172 |
| 18 | 0 | 0 | 72.2713 | 4.64238 | 357.8 | 4.63892 | -.179231 |
| 19 | 0 | 0 | 76.5225 | 4.09923 | 357.6 | 4.09563 | -.171899 |
| 20 | 0 | 0 | 80.7738 | 3.52507 | 357.4 | 3.52147 | -.159166 |
| 21 | 0 | 0 | 85.025 | 2.92037 | 357.2 | 2.91696 | -.140986 |
| 22 | 0 | 0 | 89.2763 | 2.28413 | 357.1 | 2.28112 | -.11723 |
| 23 | 0 | 0 | 93.5275 | 1.61196 | 356.9 | 1.60958 | -.0875483 |
| 24 | 0 | 0 | 97.7788 | .890725 | 356.7 | .889262 | -.0510327 |
| END | 0 | 0 | 102.03 | 0 | 0 | 0 | 0 |
| GND | -99.6195 | -8.71558 | 0 | 1.10925 | 256.5 | -.25828 | -1.07876 |
| 26 | -99.6195 | -8.71558 | 4.3575 | 1.24524 | 250.5 | -.416179 | -1.17363 |
| 27 | -99.6195 | -8.71558 | 8.715 | 1.33171 | 247.3 | -.514589 | -1.22827 |
| 28 | -99.6195 | -8.71558 | 13.0725 | 1.40022 | 244.9 | -.594442 | -1.26778 |
| 29 | -99.6195 | -8.71558 | 17.43 | 1.45384 | 243. | -.660511 | -1.29513 |
| 30 | -99.6195 | -8.71558 | 21.7875 | 1.49376 | 241.4 | -.714812 | -1.31162 |
| 31 | -99.6195 | -8.71558 | 26.145 | 1.52052 | 240.1 | -.758325 | -1.31792 |
| 32 | -99.6195 | -8.71558 | 30.5025 | 1.5344 | 238.9 | -.791588 | -1.31444 |
| 33 | -99.6195 | -8.71558 | 34.86 | 1.53561 | 237.9 | -.81496 | -1.30151 |
| 34 | -99.6195 | -8.71558 | 39.2175 | 1.52434 | 237.1 | -.828696 | -1.2794 |
| 35 | -99.6195 | -8.71558 | 43.575 | 1.50078 | 236.3 | -.833016 | -1.24836 |
| 36 | -99.6195 | -8.71558 | 47.9325 | 1.46517 | 235.6 | -.828131 | -1.20868 |
| 37 | -99.6195 | -8.71558 | 52.29 | 1.41776 | 234.9 | -.814253 | -1.16062 |
| 38 | -99.6195 | -8.71558 | 56.6475 | 1.35887 | 234.4 | -.791609 | -1.10448 |
| 39 | -99.6195 | -8.71558 | 61.005 | 1.28882 | 233.8 | -.760432 | -1.04057 |
| 40 | -99.6195 | -8.71558 | 65.3625 | 1.20797 | 233.4 | -.72099 | -.969213 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 41 | -99.6195 | -8.71558 | 69.72 | 1.11672 | 232.9 | -.673535 | -.89074 |
| 42 | -99.6195 | -8.71558 | 74.0775 | 1.01545 | 232.5 | -.618342 | -.805473 |
| 43 | -99.6195 | -8.71558 | 78.435 | .904509 | 232.1 | -.555659 | -.713709 |
| 44 | -99.6195 | -8.71558 | 82.7925 | .7842 | 231.7 | -.485694 | -.615687 |
| 45 | -99.6195 | -8.71558 | 87.15 | .654661 | 231.4 | -.408553 | -.511532 |
| 46 | -99.6195 | -8.71558 | 91.5075 | .515705 | 231.1 | -.324135 | -.401109 |
| 47 | -99.6195 | -8.71558 | 95.865 | .366364 | 230.7 | -.231824 | -.28369 |
| 48 | -99.6195 | -8.71558 | 100.223 | .203639 | 230.4 | -.129695 | -.156997 |
| END | -99.6195 | -8.71558 | 104.58 | 0 | 0 | 0 | 0 |
| GND | -199.239 | -17.4312 | 0 | .523351 | 284.3 | .129453 | -.507088 |
| 50 | -199.239 | -17.4312 | 4.39458 | .40574 | 284.3 | .100425 | -.393115 |
| 51 | -199.239 | -17.4312 | 8.78917 | .328587 | 284.4 | .0815292 | -.318312 |
| 52 | -199.239 | -17.4312 | 13.1838 | .261956 | 284.4 | .0653571 | -.253672 |
| 53 | -199.239 | -17.4312 | 17.5783 | .202387 | 284.6 | .0510444 | -.195845 |
| 54 | -199.239 | -17.4312 | 21.9729 | .14847 | 284.9 | .0382314 | -.143463 |
| 55 | -199.239 | -17.4312 | 26.3675 | .0995766 | 285.6 | .0267489 | -.0959167 |
| 56 | -199.239 | -17.4312 | 30.7621 | .0554305 | 287.3 | .0165059 | -.0529159 |
| 57 | -199.239 | -17.4312 | 35.1567 | .0161458 | 297.5 | 7.45E-03 | -.014325 |
| 58 | -199.239 | -17.4312 | 39.5513 | .0199178 | 91.3 | -4.59E-04 | .0199125 |
| 59 | -199.239 | -17.4312 | 43.9458 | .0503352 | 98.3 | -7.24E-03 | .0498111 |
| 60 | -199.239 | -17.4312 | 48.3404 | .0764667 | 99.7 | -.0129322 | .0753652 |
| 61 | -199.239 | -17.4312 | 52.735 | .0981442 | 100.3 | -.017547 | .0965628 |
| 62 | -199.239 | -17.4312 | 57.1296 | .11534 | 100.5 | -.0211151 | .113391 |
| 63 | -199.239 | -17.4312 | 61.5242 | .128047 | 100.7 | -.0236658 | .125841 |
| 64 | -199.239 | -17.4312 | 65.9188 | .13627 | 100.7 | -.0252317 | .133914 |
| 65 | -199.239 | -17.4312 | 70.3133 | .140021 | 100.6 | -.0258489 | .137615 |
| 66 | -199.239 | -17.4312 | 74.7079 | .13932 | 100.6 | -.0255566 | .136956 |
| 67 | -199.239 | -17.4312 | 79.1025 | .134186 | 100.5 | -.0243966 | .131949 |
| 68 | -199.239 | -17.4312 | 83.4971 | .124631 | 100.4 | -.0224114 | .122599 |
| 69 | -199.239 | -17.4312 | 87.8917 | .110639 | 100.2 | -.0196415 | .108882 |
| 70 | -199.239 | -17.4312 | 92.2863 | .0921317 | 100.1 | -.0161194 | .0907106 |
| 71 | -199.239 | -17.4312 | 96.6808 | .0688589 | 99.9 | -.011853 | .0678311 |
| 72 | -199.239 | -17.4312 | 101.075 | .0401272 | 99.7 | -6.78E-03 | .03955 |
| END | -199.239 | -17.4312 | 105.47 | 0 | 0 | 0 | 0 |
| GND | -298.858 | -26.1468 | 0 | .427306 | 193.4 | -.415686 | -.0989729 |
| 74 | -298.858 | -26.1468 | 4.24375 | .329092 | 193.4 | -.320125 | -.0762991 |
| 75 | -298.858 | -26.1468 | 8.4875 | .265057 | 193.5 | -.257779 | -.0616874 |
| 76 | -298.858 | -26.1468 | 12.7313 | .20981 | 193.6 | -.203947 | -.0492519 |
| 77 | -298.858 | -26.1468 | 16.975 | .160449 | 193.8 | -.155808 | -.0383113 |
| 78 | -298.858 | -26.1468 | 21.2188 | .115781 | 194.3 | -.112199 | -.028576 |
| 79 | -298.858 | -26.1468 | 25.4625 | .0752791 | 195.3 | -.0725996 | -.0199058 |
| 80 | -298.858 | -26.1468 | 29.7063 | .0387395 | 198.4 | -.0367611 | -.0122218 |
| 81 | -298.858 | -26.1468 | 33.95 | 7.13E-03 | 230.2 | -4.57E-03 | -5.47E-03 |
| 82 | -298.858 | -26.1468 | 38.1938 | .0240297 | .9 | .0240267 | 3.74E-04 |
| 83 | -298.858 | -26.1468 | 42.4375 | .0493194 | 6.2 | .0490282 | 5.35E-03 |
| 84 | -298.858 | -26.1468 | 46.6813 | .0710598 | 7.7 | .0704238 | 9.49E-03 |
| 85 | -298.858 | -26.1468 | 50.925 | .0891155 | 8.3 | .088191 | .0128035 |
| 86 | -298.858 | -26.1468 | 55.1688 | .103448 | 8.5 | .102305 | .0153334 |
| 87 | -298.858 | -26.1468 | 59.4125 | .114031 | 8.6 | .11274 | .0171053 |
| 88 | -298.858 | -26.1468 | 63.6563 | .120848 | 8.6 | .119477 | .0181518 |
| 89 | -298.858 | -26.1468 | 67.9 | .123885 | 8.6 | .122495 | .0185077 |
| 90 | -298.858 | -26.1468 | 72.1438 | .123134 | 8.5 | .12178 | .0182101 |
| 91 | -298.858 | -26.1468 | 76.3875 | .118579 | 8.4 | .117311 | .0172974 |
| 92 | -298.858 | -26.1468 | 80.6313 | .110199 | 8.2 | .109059 | .0158089 |
| 93 | -298.858 | -26.1468 | 84.875 | .0979431 | 8.1 | .0969686 | .0137821 |
| 94 | -298.858 | -26.1468 | 89.1188 | .0817001 | 7.9 | .0809219 | .0112493 |
| 95 | -298.858 | -26.1468 | 93.3625 | .0612039 | 7.7 | .0606486 | 8.23E-03 |
| 96 | -298.858 | -26.1468 | 97.6063 | .0357877 | 7.5 | .0354802 | 4.68E-03 |
| END | -298.858 | -26.1468 | 101.85 | 0 | 0 | 0 | 0 |
| GND | 137.179 | -137.179 | 0 | .32465 | 295.2 | .137984 | -.293867 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 98 | 137.179 | -137.179 | 4.30042 | .252454 | 295.2 | .107355 | -.228491 |
| 99 | 137.179 | -137.179 | 8.60083 | .203895 | 295.2 | .0868817 | -.184458 |
| 100 | 137.179 | -137.179 | 12.9013 | .161912 | 295.3 | .0693088 | -.146327 |
| 101 | 137.179 | -137.179 | 17.2017 | .124367 | 295.6 | .0537207 | -.112166 |
| 102 | 137.179 | -137.179 | 21.5021 | .0904068 | 296.1 | .0397433 | -.0812026 |
| 103 | 137.179 | -137.179 | 25.8025 | .0596542 | 297.1 | .0271999 | -.0530922 |
| 104 | 137.179 | -137.179 | 30.1029 | .0319604 | 300. | .0159955 | -.0276697 |
| 105 | 137.179 | -137.179 | 34.4033 | 7.78E-03 | 321.3 | 6.07E-03 | -4.86E-03 |
| 106 | 137.179 | -137.179 | 38.7038 | .0155898 | 99.6 | -2.6E-03 | .0153714 |
| 107 | 137.179 | -137.179 | 43.0042 | .0345243 | 106.9 | -.0100572 | .033027 |
| 108 | 137.179 | -137.179 | 47.3046 | .0507955 | 108.7 | -.0163191 | .0481027 |
| 109 | 137.179 | -137.179 | 51.605 | .0642596 | 109.5 | -.0214098 | .0605881 |
| 110 | 137.179 | -137.179 | 55.9054 | .0748945 | 109.8 | -.0253538 | .0704725 |
| 111 | 137.179 | -137.179 | 60.2058 | .0826957 | 109.9 | -.0281777 | .077747 |
| 112 | 137.179 | -137.179 | 64.5063 | .087667 | 109.9 | -.0299109 | .0824066 |
| 113 | 137.179 | -137.179 | 68.8067 | .0898163 | 109.9 | -.0305852 | .0844483 |
| 114 | 137.179 | -137.179 | 73.1071 | .0891566 | 109.8 | -.0302345 | .0838735 |
| 115 | 137.179 | -137.179 | 77.4075 | .0857001 | 109.7 | -.0288942 | .0806823 |
| 116 | 137.179 | -137.179 | 81.7079 | .0794527 | 109.6 | -.0265984 | .0748682 |
| 117 | 137.179 | -137.179 | 86.0083 | .070405 | 109.4 | -.0233773 | .0664106 |
| 118 | 137.179 | -137.179 | 90.3088 | .0585052 | 109.2 | -.0192493 | .0552478 |
| 119 | 137.179 | -137.179 | 94.6092 | .0435992 | 109. | -.0142015 | .0412215 |
| 120 | 137.179 | -137.179 | 98.9096 | .0252501 | 108.8 | -8.13E-03 | .0239041 |
| END | 137.179 | -137.179 | 103.21 | 0 | 0 | 0 | 0 |
| GND | 37.4776 | -145.966 | 0 | .647643 | 340.8 | .611763 | -.212574 |
| 122 | 37.4776 | -145.966 | 4.39875 | .502068 | 340.8 | .47426 | -.164773 |
| 123 | 37.4776 | -145.966 | 8.7975 | .406673 | 340.9 | .384169 | -.133406 |
| 124 | 37.4776 | -145.966 | 13.1963 | .324401 | 340.9 | .306487 | -.10631 |
| 125 | 37.4776 | -145.966 | 17.595 | .250961 | 340.9 | .237158 | -.0820807 |
| 126 | 37.4776 | -145.966 | 21.9938 | .184592 | 341. | .17452 | -.0601429 |
| 127 | 37.4776 | -145.966 | 26.3925 | .124501 | 341.1 | .117818 | -.0402394 |
| 128 | 37.4776 | -145.966 | 30.7913 | .0702974 | 341.6 | .0666843 | -.022247 |
| 129 | 37.4776 | -145.966 | 35.19 | .0218024 | 343.7 | .0209297 | -6.11E-03 |
| 130 | 37.4776 | -145.966 | 39.5888 | .0211921 | 157.2 | -.0195383 | 8.21E-03 |
| 131 | 37.4776 | -145.966 | 43.9875 | .0585474 | 159.3 | -.0547644 | .020704 |
| 132 | 37.4776 | -145.966 | 48.3863 | .0903935 | 159.7 | -.0847707 | .0313836 |
| 133 | 37.4776 | -145.966 | 52.785 | .116728 | 159.8 | -.109572 | .0402434 |
| 134 | 37.4776 | -145.966 | 57.1838 | .137562 | 159.9 | -.129181 | .0472811 |
| 135 | 37.4776 | -145.966 | 61.5825 | .152915 | 159.9 | -.143622 | .0524955 |
| 136 | 37.4776 | -145.966 | 65.9813 | .162815 | 159.9 | -.152923 | .0558881 |
| 137 | 37.4776 | -145.966 | 70.38 | .1673 | 159.9 | -.157122 | .0574624 |
| 138 | 37.4776 | -145.966 | 74.7788 | .166413 | 159.9 | -.156265 | .0572232 |
| 139 | 37.4776 | -145.966 | 79.1775 | .1602 | 159.9 | -.150399 | .055174 |
| 140 | 37.4776 | -145.966 | 83.5763 | .148695 | 159.8 | -.13956 | .0513127 |
| 141 | 37.4776 | -145.966 | 87.975 | .131901 | 159.8 | -.123759 | .0456241 |
| 142 | 37.4776 | -145.966 | 92.3738 | .109742 | 159.7 | -.10293 | .0380626 |
| 143 | 37.4776 | -145.966 | 96.7725 | .081943 | 159.6 | -.0768237 | .0285093 |
| 144 | 37.4776 | -145.966 | 101.171 | .0477023 | 159.6 | -.0447001 | .0166557 |
| END | 37.4776 | -145.966 | 105.57 | 0 | 0 | 0 | 0 |
| GND | -62.1398 | -154.578 | 0 | 3.99477 | 274.4 | .306385 | -3.983 |
| 146 | -62.1398 | -154.578 | 4.41917 | 4.15757 | 271.1 | .0790336 | -4.15682 |
| 147 | -62.1398 | -154.578 | 8.83833 | 4.24758 | 269.1 | -.0666623 | -4.24706 |
| 148 | -62.1398 | -154.578 | 13.2575 | 4.30476 | 267.5 | -.188842 | -4.30062 |
| 149 | -62.1398 | -154.578 | 17.6767 | 4.33315 | 266.1 | -.294279 | -4.32315 |
| 150 | -62.1398 | -154.578 | 22.0958 | 4.33441 | 264.9 | -.385772 | -4.31721 |
| 151 | -62.1398 | -154.578 | 26.515 | 4.30935 | 263.8 | -.46462 | -4.28423 |
| 152 | -62.1398 | -154.578 | 30.9342 | 4.25853 | 262.8 | -.531498 | -4.22523 |
| 153 | -62.1398 | -154.578 | 35.3533 | 4.18242 | 261.9 | -.586786 | -4.14106 |
| 154 | -62.1398 | -154.578 | 39.7725 | 4.08156 | 261.1 | -.63072 | -4.03253 |
| 155 | -62.1398 | -154.578 | 44.1917 | 3.9565 | 260.3 | -.663467 | -3.90047 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 156 | -62.1398 | -154.578 | 48.6108 | 3.80789 | 259.6 | -.685164 | -3.74574 |
| 157 | -62.1398 | -154.578 | 53.03 | 3.63648 | 259. | -.695943 | -3.56926 |
| 158 | -62.1398 | -154.578 | 57.4492 | 3.44308 | 258.3 | -.69595 | -3.37201 |
| 159 | -62.1398 | -154.578 | 61.8683 | 3.22857 | 257.7 | -.685342 | -3.15499 |
| 160 | -62.1398 | -154.578 | 66.2875 | 2.9939 | 257.2 | -.6643 | -2.91927 |
| 161 | -62.1398 | -154.578 | 70.7067 | 2.74004 | 256.6 | -.633014 | -2.66592 |
| 162 | -62.1398 | -154.578 | 75.1258 | 2.46795 | 256.1 | -.591686 | -2.39597 |
| 163 | -62.1398 | -154.578 | 79.545 | 2.17853 | 255.6 | -.540508 | -2.11042 |
| 164 | -62.1398 | -154.578 | 83.9642 | 1.87252 | 255.2 | -.479634 | -1.81005 |
| 165 | -62.1398 | -154.578 | 88.3833 | 1.55028 | 254.7 | -.409124 | -1.49532 |
| 166 | -62.1398 | -154.578 | 92.8025 | 1.21145 | 254.3 | -.328819 | -1.16597 |
| 167 | -62.1398 | -154.578 | 97.2217 | .853871 | 253.8 | -.238032 | -.820022 |
| 168 | -62.1398 | -154.578 | 101.641 | .470809 | 253.4 | -.134675 | -.451136 |
| END | -62.1398 | -154.578 | 106.06 | 0 | 0 | 0 | 0 |
| GND | -161.64 | -163.342 | 0 | .480172 | 205.2 | -.434495 | -.204402 |
| 170 | -161.64 | -163.342 | 4.31667 | .515113 | 181.8 | -.514866 | -.0159408 |
| 171 | -161.64 | -163.342 | 8.63333 | .572817 | 169.5 | -.563277 | .104107 |
| 172 | -161.64 | -163.342 | 12.95 | .634674 | 161.2 | -.600835 | .20447 |
| 173 | -161.64 | -163.342 | 17.2667 | .693883 | 155.2 | -.630015 | .290784 |
| 174 | -161.64 | -163.342 | 21.5833 | .747307 | 150.7 | -.651884 | .365397 |
| 175 | -161.64 | -163.342 | 25.9 | .793254 | 147.2 | -.666982 | .429403 |
| 176 | -161.64 | -163.342 | 30.2167 | .830744 | 144.4 | -.675634 | .483379 |
| 177 | -161.64 | -163.342 | 34.5333 | .859183 | 142.1 | -.678071 | .52765 |
| 178 | -161.64 | -163.342 | 38.85 | .878205 | 140.2 | -.674483 | .56242 |
| 179 | -161.64 | -163.342 | 43.1667 | .887598 | 138.5 | -.665043 | .587834 |
| 180 | -161.64 | -163.342 | 47.4833 | .887257 | 137.1 | -.649923 | .604008 |
| 181 | -161.64 | -163.342 | 51.8 | .877157 | 135.8 | -.629301 | .611053 |
| 182 | -161.64 | -163.342 | 56.1167 | .85734 | 134.7 | -.60336 | .609089 |
| 183 | -161.64 | -163.342 | 60.4333 | .8279 | 133.7 | -.572299 | .598241 |
| 184 | -161.64 | -163.342 | 64.75 | .788974 | 132.8 | -.536321 | .578653 |
| 185 | -161.64 | -163.342 | 69.0667 | .740728 | 132. | -.495636 | .550475 |
| 186 | -161.64 | -163.342 | 73.3833 | .683346 | 131.2 | -.450455 | .51386 |
| 187 | -161.64 | -163.342 | 77.7 | .617003 | 130.5 | -.400972 | .46895 |
| 188 | -161.64 | -163.342 | 82.0167 | .541835 | 129.9 | -.347353 | .415849 |
| 189 | -161.64 | -163.342 | 86.3333 | .457873 | 129.2 | -.289698 | .354574 |
| 190 | -161.64 | -163.342 | 90.65 | .364915 | 128.7 | -.227961 | .28495 |
| 191 | -161.64 | -163.342 | 94.9667 | .262176 | 128.1 | -.161755 | .206329 |
| 192 | -161.64 | -163.342 | 99.2833 | .14737 | 127.5 | -.0898021 | .116848 |
| END | -161.64 | -163.342 | 103.6 | 0 | 0 | 0 | 0 |

# APPENDIX C

NIGHTTIME DIRECTIONAL ARRAY MODEL

IMPEDANCE – NIGHTTIME OPERATION
normalization = 50.

| freq (MHz) | resist (ohms) | react (ohms) | imped (ohms) | phase (deg) | VSWR | S11 dB | S12 dB |
|---|---|---|---|---|---|---|---|
| source = 1; node 1, sector 1 | | | | | | | |
| .79 | 10.223 | 86.582 | 87.183 | 83.3 | 19.711 | -.8821 | -7.3563 |
| source = 2; node 25, sector 1 | | | | | | | |
| .79 | 13.018 | 169.12 | 169.62 | 85.6 | 48.024 | -.36178 | -10.973 |
| source = 3; node 49, sector 1 | | | | | | | |
| .79 | 7.6833 | 130.33 | 130.56 | 86.6 | 50.858 | -.34162 | -11.212 |
| source = 4; node 73, sector 1 | | | | | | | |
| .79 | 53.851 | 167.9 | 176.32 | 72.2 | 12.394 | -1.4047 | -5.5855 |
| source = 5; node 97, sector 1 | | | | | | | |
| .79 | 27.531 | 89.837 | 93.961 | 73. | 8.1064 | -2.154 | -4.078 |
| source = 6; node 121, sector 1 | | | | | | | |
| .79 | 24.448 | 200.98 | 202.46 | 83.1 | 35.551 | -.48878 | -9.7288 |
| source = 7; node 145, sector 1 | | | | | | | |
| .79 | -14.451 | 137.34 | 138.1 | 96. | **** | **** | **** |
| source = 8; node 169, sector 1 | | | | | | | |
| .79 | 43.118 | 209.34 | 213.74 | 78.4 | 22.305 | -.77936 | -7.8443 |

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 102.03 | | |
| 2 | none | 100. | 175. | 0 | .2911 | 24 |
| | | 100. | 175. | 104.58 | | |
| 3 | none | 200. | 175. | 0 | .2911 | 24 |
| | | 200. | 175. | 105.47 | | |
| 4 | none | 300. | 175. | 0 | .2911 | 24 |
| | | 300. | 175. | 101.85 | | |
| 5 | none | 194. | 45. | 0 | .2358 | 24 |
| | | 194. | 45. | 103.21 | | |
| 6 | none | 150.7 | 75.6 | 0 | .2911 | 24 |
| | | 150.7 | 75.6 | 105.57 | | |
| 7 | none | 166.6 | 111.9 | 0 | .2911 | 24 |
| | | 166.6 | 111.9 | 106.06 | | |
| 8 | none | 229.8 | 134.7 | 0 | .2911 | 24 |
| | | 229.8 | 134.7 | 103.6 | | |

Number of wires = 8
current nodes = 192

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 4.24375 | 7 | 4.41917 |
| radius | 5 | .2358 | 1 | .2911 |

ELECTRICAL DESCRIPTION – NIGHTTIME OPERATION

Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0117882 | .0122755 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 1,086.04 | 50.3 | voltage |
| 2 | 25 | 1 | 1,962.05 | 247.8 | voltage |
| 3 | 49 | 1 | 1,868.34 | 87.4 | voltage |
| 4 | 73 | 1 | 1,009.36 | 323.8 | voltage |
| 5 | 97 | 1 | 908.022 | 31.6 | voltage |
| 6 | 121 | 1 | 1,712.44 | 236.2 | voltage |
| 7 | 145 | 1 | 1,512.69 | 84.6 | voltage |
| 8 | 169 | 1 | 881.371 | 318.7 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 1.E-03 | 0 | 0 | 0 | 0 |
| 2 | 25 | 1.E-03 | 0 | 0 | 0 | 0 |
| 3 | 49 | 1.E-03 | 0 | 0 | 0 | 0 |
| 4 | 73 | 1.E-03 | 0 | 0 | 0 | 0 |
| 5 | 97 | 1.E-03 | 0 | 0 | 0 | 0 |
| 6 | 121 | 1.E-03 | 0 | 0 | 0 | 0 |
| 7 | 145 | 1.E-03 | 0 | 0 | 0 | 0 |
| 8 | 169 | 1.E-03 | 0 | 0 | 0 | 0 |

RMS CURRENT – NIGHTTIME OPERATION
Frequency = .79 MHz
Input power = 5,000. watts
Efficiency = 99.99 %
coordinates in degrees

| current no. | X | Y | Z | mag (amps) | phase (deg) | real (amps) | imaginary (amps) |
|---|---|---|---|---|---|---|---|
| GND | 0 | 0 | 0 | 8.81474 | 327. | 7.3955 | -4.79648 |
| 2 | 0 | 0 | 4.25125 | 9.16928 | 326.8 | 7.66892 | -5.02626 |
| 3 | 0 | 0 | 8.5025 | 9.34924 | 326.6 | 7.80471 | -5.1473 |
| 4 | 0 | 0 | 12.7538 | 9.45218 | 326.5 | 7.87852 | -5.22232 |
| 5 | 0 | 0 | 17.005 | 9.48968 | 326.3 | 7.89932 | -5.25877 |
| 6 | 0 | 0 | 21.2563 | 9.46699 | 326.2 | 7.87123 | -5.26 |
| 7 | 0 | 0 | 25.5075 | 9.38719 | 326.2 | 7.79672 | -5.22786 |
| 8 | 0 | 0 | 29.7588 | 9.25227 | 326.1 | 7.67734 | -5.16361 |
| 9 | 0 | 0 | 34.01 | 9.06403 | 326. | 7.51459 | -5.06829 |
| 10 | 0 | 0 | 38.2613 | 8.82406 | 325.9 | 7.30974 | -4.94285 |
| 11 | 0 | 0 | 42.5125 | 8.53413 | 325.9 | 7.06429 | -4.78823 |
| 12 | 0 | 0 | 46.7638 | 8.1959 | 325.8 | 6.77958 | -4.60544 |
| 13 | 0 | 0 | 51.015 | 7.8112 | 325.8 | 6.45715 | -4.39547 |
| 14 | 0 | 0 | 55.2663 | 7.38195 | 325.7 | 6.09855 | -4.15943 |
| 15 | 0 | 0 | 59.5175 | 6.91016 | 325.7 | 5.70548 | -3.89844 |
| 16 | 0 | 0 | 63.7688 | 6.39789 | 325.6 | 5.27962 | -3.61368 |
| 17 | 0 | 0 | 68.02 | 5.84719 | 325.6 | 4.82266 | -3.3063 |
| 18 | 0 | 0 | 72.2713 | 5.26006 | 325.5 | 4.33625 | -2.97743 |
| 19 | 0 | 0 | 76.5225 | 4.63828 | 325.5 | 3.82187 | -2.62811 |
| 20 | 0 | 0 | 80.7738 | 3.98327 | 325.4 | 3.28067 | -2.25913 |
| 21 | 0 | 0 | 85.025 | 3.29563 | 325.4 | 2.71315 | -1.87083 |
| 22 | 0 | 0 | 89.2763 | 2.5743 | 325.4 | 2.11843 | -1.46262 |
| 23 | 0 | 0 | 93.5275 | 1.81441 | 325.3 | 1.49251 | -1.03175 |
| 24 | 0 | 0 | 97.7788 | 1.00131 | 325.3 | .823339 | -.569848 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| END | 0 | 0 | 102.03 | 0 | 0 | 0 | 0 |
| GND | -99.6195 | -8.71558 | 0 | 8.18515 | 162.2 | -7.79339 | 2.50196 |
| 26 | -99.6195 | -8.71558 | 4.3575 | 8.85413 | 161.9 | -8.41404 | 2.75673 |
| 27 | -99.6195 | -8.71558 | 8.715 | 9.2363 | 161.7 | -8.76742 | 2.90543 |
| 28 | -99.6195 | -8.71558 | 13.0725 | 9.50899 | 161.5 | -9.01827 | 3.01524 |
| 29 | -99.6195 | -8.71558 | 17.43 | 9.69321 | 161.4 | -9.18612 | 3.0941 |
| 30 | -99.6195 | -8.71558 | 21.7875 | 9.79814 | 161.3 | -9.27952 | 3.14546 |
| 31 | -99.6195 | -8.71558 | 26.145 | 9.82861 | 161.2 | -9.30302 | 3.17104 |
| 32 | -99.6195 | -8.71558 | 30.5025 | 9.78766 | 161.1 | -9.25943 | 3.17196 |
| 33 | -99.6195 | -8.71558 | 34.86 | 9.67761 | 161. | -9.15095 | 3.14901 |
| 34 | -99.6195 | -8.71558 | 39.2175 | 9.50062 | 160.9 | -8.97964 | 3.10287 |
| 35 | -99.6195 | -8.71558 | 43.575 | 9.25862 | 160.9 | -8.74733 | 3.0342 |
| 36 | -99.6195 | -8.71558 | 47.9325 | 8.95364 | 160.8 | -8.45593 | 2.94362 |
| 37 | -99.6195 | -8.71558 | 52.29 | 8.5879 | 160.7 | -8.10757 | 2.83183 |
| 38 | -99.6195 | -8.71558 | 56.6475 | 8.16363 | 160.7 | -7.70437 | 2.69955 |
| 39 | -99.6195 | -8.71558 | 61.005 | 7.68316 | 160.6 | -7.24853 | 2.54751 |
| 40 | -99.6195 | -8.71558 | 65.3625 | 7.14906 | 160.6 | -6.7425 | 2.3765 |
| 41 | -99.6195 | -8.71558 | 69.72 | 6.56376 | 160.5 | -6.18858 | 2.18733 |
| 42 | -99.6195 | -8.71558 | 74.0775 | 5.92976 | 160.5 | -5.58915 | 1.98077 |
| 43 | -99.6195 | -8.71558 | 78.435 | 5.24933 | 160.4 | -4.94637 | 1.75755 |
| 44 | -99.6195 | -8.71558 | 82.7925 | 4.52431 | 160.4 | -4.26197 | 1.51822 |
| 45 | -99.6195 | -8.71558 | 87.15 | 3.75567 | 160.3 | -3.5369 | 1.26309 |
| 46 | -99.6195 | -8.71558 | 91.5075 | 2.94247 | 160.3 | -2.7703 | .991751 |
| 47 | -99.6195 | -8.71558 | 95.865 | 2.07942 | 160.3 | -1.9572 | .70238 |
| 48 | -99.6195 | -8.71558 | 100.223 | 1.14987 | 160.2 | -1.08198 | .389248 |
| END | -99.6195 | -8.71558 | 104.58 | 0 | 0 | 0 | 0 |
| GND | -199.239 | -17.4312 | 0 | 10.1262 | .8 | 10.1253 | .13675 |
| 50 | -199.239 | -17.4312 | 4.39458 | 10.7625 | .6 | 10.762 | .10653 |
| 51 | -199.239 | -17.4312 | 8.78917 | 11.1153 | .4 | 11.1149 | .0865739 |
| 52 | -199.239 | -17.4312 | 13.1838 | 11.3539 | .3 | 11.3537 | .0692085 |
| 53 | -199.239 | -17.4312 | 17.5783 | 11.4985 | .3 | 11.4984 | .0535526 |
| 54 | -199.239 | -17.4312 | 21.9729 | 11.5581 | .2 | 11.558 | .0392528 |
| 55 | -199.239 | -17.4312 | 26.3675 | 11.5374 | .1 | 11.5374 | .0261587 |
| 56 | -199.239 | -17.4312 | 30.7621 | 11.4395 | .1 | 11.4395 | .0142061 |
| 57 | -199.239 | -17.4312 | 35.1567 | 11.267 | 0.0 | 11.267 | 3.37E-03 |
| 58 | -199.239 | -17.4312 | 39.5513 | 11.022 | 360. | 11.022 | -6.34E-03 |
| 59 | -199.239 | -17.4312 | 43.9458 | 10.7069 | 359.9 | 10.7069 | -.01491 |
| 60 | -199.239 | -17.4312 | 48.3404 | 10.3239 | 359.9 | 10.3238 | -.0223263 |
| 61 | -199.239 | -17.4312 | 52.735 | 9.87531 | 359.8 | 9.87527 | -.028561 |
| 62 | -199.239 | -17.4312 | 57.1296 | 9.36386 | 359.8 | 9.3638 | -.0335895 |
| 63 | -199.239 | -17.4312 | 61.5242 | 8.7922 | 359.8 | 8.79212 | -.0373878 |
| 64 | -199.239 | -17.4312 | 65.9188 | 8.16301 | 359.7 | 8.16291 | -.0399337 |
| 65 | -199.239 | -17.4312 | 70.3133 | 7.47925 | 359.7 | 7.47914 | -.0412068 |
| 66 | -199.239 | -17.4312 | 74.7079 | 6.74369 | 359.7 | 6.74357 | -.0411886 |
| 67 | -199.239 | -17.4312 | 79.1025 | 5.95881 | 359.6 | 5.95868 | -.039861 |
| 68 | -199.239 | -17.4312 | 83.4971 | 5.12672 | 359.6 | 5.12658 | -.0372041 |
| 69 | -199.239 | -17.4312 | 87.8917 | 4.24846 | 359.6 | 4.24833 | -.0331908 |
| 70 | -199.239 | -17.4312 | 92.2863 | 3.32301 | 359.5 | 3.3229 | -.0277749 |
| 71 | -199.239 | -17.4312 | 96.6808 | 2.34444 | 359.5 | 2.34434 | -.0208604 |
| 72 | -199.239 | -17.4312 | 101.075 | 1.29408 | 359.5 | 1.29402 | -.0122158 |
| END | -199.239 | -17.4312 | 105.47 | 0 | 0 | 0 | 0 |
| GND | -298.858 | -26.1468 | 0 | 4.05079 | 251.6 | -1.27975 | -3.84333 |
| 74 | -298.858 | -26.1468 | 4.24375 | 4.37551 | 250.2 | -1.48284 | -4.11659 |
| 75 | -298.858 | -26.1468 | 8.4875 | 4.56117 | 249.4 | -1.60421 | -4.26975 |
| 76 | -298.858 | -26.1468 | 12.7313 | 4.69414 | 248.8 | -1.69768 | -4.3764 |
| 77 | -298.858 | -26.1468 | 16.975 | 4.7844 | 248.3 | -1.7695 | -4.44515 |
| 78 | -298.858 | -26.1468 | 21.2188 | 4.83632 | 247.9 | -1.82237 | -4.47984 |
| 79 | -298.858 | -26.1468 | 25.4625 | 4.85216 | 247.5 | -1.85765 | -4.48247 |
| 80 | -298.858 | -26.1468 | 29.7063 | 4.83332 | 247.2 | -1.87615 | -4.45433 |
| 81 | -298.858 | -26.1468 | 33.95 | 4.7809 | 246.9 | -1.87844 | -4.39641 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 82 | -298.858 | -26.1468 | 38.1938 | 4.69581 | 246.6 | -1.86498 | -4.30958 |
| 83 | -298.858 | -26.1468 | 42.4375 | 4.57895 | 246.4 | -1.83617 | -4.19467 |
| 84 | -298.858 | -26.1468 | 46.6813 | 4.43121 | 246.1 | -1.79243 | -4.05251 |
| 85 | -298.858 | -26.1468 | 50.925 | 4.25354 | 245.9 | -1.73416 | -3.88398 |
| 86 | -298.858 | -26.1468 | 55.1688 | 4.04695 | 245.8 | -1.66182 | -3.69001 |
| 87 | -298.858 | -26.1468 | 59.4125 | 3.81248 | 245.6 | -1.57587 | -3.47155 |
| 88 | -298.858 | -26.1468 | 63.6563 | 3.55121 | 245.4 | -1.47677 | -3.22959 |
| 89 | -298.858 | -26.1468 | 67.9 | 3.26425 | 245.3 | -1.36504 | -2.96513 |
| 90 | -298.858 | -26.1468 | 72.1438 | 2.95266 | 245.1 | -1.24114 | -2.67914 |
| 91 | -298.858 | -26.1468 | 76.3875 | 2.61741 | 245. | -1.10553 | -2.37247 |
| 92 | -298.858 | -26.1468 | 80.6313 | 2.25923 | 244.9 | -.958536 | -2.04581 |
| 93 | -298.858 | -26.1468 | 84.875 | 1.87841 | 244.8 | -.800327 | -1.69938 |
| 94 | -298.858 | -26.1468 | 89.1188 | 1.47429 | 244.7 | -.630645 | -1.3326 |
| 95 | -298.858 | -26.1468 | 93.3625 | 1.04397 | 244.6 | -.448255 | -.942834 |
| 96 | -298.858 | -26.1468 | 97.6063 | .578826 | 244.5 | -.249439 | -.522321 |
| END | -298.858 | -26.1468 | 101.85 | 0 | 0 | 0 | 0 |
| GND | 137.179 | -137.179 | 0 | 6.83825 | 318.6 | 5.13245 | -4.51881 |
| 98 | 137.179 | -137.179 | 4.30042 | 7.10262 | 318. | 5.27415 | -4.75716 |
| 99 | 137.179 | -137.179 | 8.60083 | 7.24149 | 317.5 | 5.34109 | -4.88998 |
| 100 | 137.179 | -137.179 | 12.9013 | 7.32129 | 317.2 | 5.36982 | -4.97658 |
| 101 | 137.179 | -137.179 | 17.2017 | 7.35064 | 316.9 | 5.36517 | -5.02463 |
| 102 | 137.179 | -137.179 | 21.5021 | 7.33338 | 316.6 | 5.32938 | -5.03748 |
| 103 | 137.179 | -137.179 | 25.8025 | 7.27166 | 316.4 | 5.26375 | -5.01696 |
| 104 | 137.179 | -137.179 | 30.1029 | 7.16702 | 316.2 | 5.16931 | -4.96432 |
| 105 | 137.179 | -137.179 | 34.4033 | 7.0208 | 316. | 5.04696 | -4.88056 |
| 106 | 137.179 | -137.179 | 38.7038 | 6.83425 | 315.8 | 4.8976 | -4.7666 |
| 107 | 137.179 | -137.179 | 43.0042 | 6.60866 | 315.6 | 4.72215 | -4.62338 |
| 108 | 137.179 | -137.179 | 47.3046 | 6.34538 | 315.4 | 4.5216 | -4.45185 |
| 109 | 137.179 | -137.179 | 51.605 | 6.04585 | 315.3 | 4.29699 | -4.25302 |
| 110 | 137.179 | -137.179 | 55.9054 | 5.71161 | 315.2 | 4.04944 | -4.02797 |
| 111 | 137.179 | -137.179 | 60.2058 | 5.34426 | 315. | 3.7801 | -3.77782 |
| 112 | 137.179 | -137.179 | 64.5063 | 4.94543 | 314.9 | 3.49014 | -3.50374 |
| 113 | 137.179 | -137.179 | 68.8067 | 4.51682 | 314.8 | 3.18079 | -3.20691 |
| 114 | 137.179 | -137.179 | 73.1071 | 4.06006 | 314.6 | 2.8532 | -2.88849 |
| 115 | 137.179 | -137.179 | 77.4075 | 3.57663 | 314.5 | 2.50843 | -2.54952 |
| 116 | 137.179 | -137.179 | 81.7079 | 3.06777 | 314.4 | 2.14737 | -2.1909 |
| 117 | 137.179 | -137.179 | 86.0083 | 2.5341 | 314.3 | 1.77047 | -1.81304 |
| 118 | 137.179 | -137.179 | 90.3088 | 1.97505 | 314.2 | 1.37735 | -1.41554 |
| 119 | 137.179 | -137.179 | 94.6092 | 1.38726 | 314.1 | .965697 | -.995954 |
| 120 | 137.179 | -137.179 | 98.9096 | .759879 | 314. | .528016 | -.546457 |
| END | 137.179 | -137.179 | 103.21 | 0 | 0 | 0 | 0 |
| GND | 37.4776 | -145.966 | 0 | 5.98503 | 153.1 | -5.33911 | 2.70453 |
| 122 | 37.4776 | -145.966 | 4.39875 | 6.57233 | 152.5 | -5.82967 | 3.03488 |
| 123 | 37.4776 | -145.966 | 8.7975 | 6.91464 | 152.1 | -6.11349 | 3.23071 |
| 124 | 37.4776 | -145.966 | 13.1963 | 7.16614 | 151.9 | -6.31976 | 3.37849 |
| 125 | 37.4776 | -145.966 | 17.595 | 7.34506 | 151.6 | -6.46381 | 3.48841 |
| 126 | 37.4776 | -145.966 | 21.9938 | 7.45929 | 151.5 | -6.55231 | 3.56487 |
| 127 | 37.4776 | -145.966 | 26.3925 | 7.51291 | 151.3 | -6.58872 | 3.61006 |
| 128 | 37.4776 | -145.966 | 30.7913 | 7.50845 | 151.1 | -6.57522 | 3.62535 |
| 129 | 37.4776 | -145.966 | 35.19 | 7.4478 | 151. | -6.51348 | 3.6117 |
| 130 | 37.4776 | -145.966 | 39.5888 | 7.33261 | 150.9 | -6.40492 | 3.5699 |
| 131 | 37.4776 | -145.966 | 43.9875 | 7.16445 | 150.8 | -6.25095 | 3.50071 |
| 132 | 37.4776 | -145.966 | 48.3863 | 6.9449 | 150.6 | -6.05297 | 3.40488 |
| 133 | 37.4776 | -145.966 | 52.785 | 6.67564 | 150.5 | -5.81247 | 3.28319 |
| 134 | 37.4776 | -145.966 | 57.1838 | 6.35844 | 150.4 | -5.53103 | 3.13648 |
| 135 | 37.4776 | -145.966 | 61.5825 | 5.99518 | 150.4 | -5.21031 | 2.96562 |
| 136 | 37.4776 | -145.966 | 65.9813 | 5.58781 | 150.3 | -4.85203 | 2.77154 |
| 137 | 37.4776 | -145.966 | 70.38 | 5.13833 | 150.2 | -4.45798 | 2.55517 |
| 138 | 37.4776 | -145.966 | 74.7788 | 4.64871 | 150.1 | -4.02988 | 2.31744 |
| 139 | 37.4776 | -145.966 | 79.1775 | 4.12076 | 150. | -3.56936 | 2.05921 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 140 | 37.4776 | -145.966 | 83.5763 | 3.55599 | 149.9 | -3.07774 | 1.78116 |
| 141 | 37.4776 | -145.966 | 87.975 | 2.95519 | 149.9 | -2.55577 | 1.48364 |
| 142 | 37.4776 | -145.966 | 92.3738 | 2.3177 | 149.8 | -2.00291 | 1.16623 |
| 143 | 37.4776 | -145.966 | 96.7725 | 1.63938 | 149.7 | -1.41564 | .826764 |
| 144 | 37.4776 | -145.966 | 101.171 | .907152 | 149.6 | -.782736 | .45853 |
| END | 37.4776 | -145.966 | 105.57 | 0 | 0 | 0 | 0 |
| GND | -62.1398 | -154.578 | 0 | 7.75119 | 348.6 | 7.59809 | -1.53294 |
| 146 | -62.1398 | -154.578 | 4.41917 | 8.26726 | 349. | 8.11486 | -1.58007 |
| 147 | -62.1398 | -154.578 | 8.83833 | 8.55621 | 349.2 | 8.40484 | -1.60232 |
| 148 | -62.1398 | -154.578 | 13.2575 | 8.75477 | 349.4 | 8.60496 | -1.61268 |
| 149 | -62.1398 | -154.578 | 17.6767 | 8.87909 | 349.5 | 8.73141 | -1.61271 |
| 150 | -62.1398 | -154.578 | 22.0958 | 8.93646 | 349.7 | 8.79148 | -1.60316 |
| 151 | -62.1398 | -154.578 | 26.515 | 8.93061 | 349.8 | 8.78894 | -1.58444 |
| 152 | -62.1398 | -154.578 | 30.9342 | 8.86397 | 349.9 | 8.72617 | -1.5569 |
| 153 | -62.1398 | -154.578 | 35.3533 | 8.73852 | 350. | 8.60517 | -1.52079 |
| 154 | -62.1398 | -154.578 | 39.7725 | 8.5559 | 350.1 | 8.42756 | -1.47642 |
| 155 | -62.1398 | -154.578 | 44.1917 | 8.31798 | 350.1 | 8.19517 | -1.42406 |
| 156 | -62.1398 | -154.578 | 48.6108 | 8.0264 | 350.2 | 7.90965 | -1.36402 |
| 157 | -62.1398 | -154.578 | 53.03 | 7.6831 | 350.3 | 7.5729 | -1.29663 |
| 158 | -62.1398 | -154.578 | 57.4492 | 7.29001 | 350.3 | 7.18682 | -1.22224 |
| 159 | -62.1398 | -154.578 | 61.8683 | 6.8492 | 350.4 | 6.75346 | -1.1412 |
| 160 | -62.1398 | -154.578 | 66.2875 | 6.36285 | 350.5 | 6.27496 | -1.05388 |
| 161 | -62.1398 | -154.578 | 70.7067 | 5.83314 | 350.5 | 5.75349 | -.960666 |
| 162 | -62.1398 | -154.578 | 75.1258 | 5.26224 | 350.6 | 5.19117 | -.861918 |
| 163 | -62.1398 | -154.578 | 79.545 | 4.65212 | 350.6 | 4.58996 | -.757969 |
| 164 | -62.1398 | -154.578 | 83.9642 | 4.0044 | 350.7 | 3.95144 | -.649112 |
| 165 | -62.1398 | -154.578 | 88.3833 | 3.31991 | 350.7 | 3.27644 | -.535486 |
| 166 | -62.1398 | -154.578 | 92.8025 | 2.59782 | 350.8 | 2.56414 | -.416983 |
| 167 | -62.1398 | -154.578 | 97.2217 | 1.83349 | 350.8 | 1.80995 | -.292893 |
| 168 | -62.1398 | -154.578 | 101.641 | 1.01232 | 350.9 | .999443 | -.16094 |
| END | -62.1398 | -154.578 | 106.06 | 0 | 0 | 0 | 0 |
| GND | -161.64 | -163.342 | 0 | 2.91792 | 240.3 | -1.44401 | -2.53557 |
| 170 | -161.64 | -163.342 | 4.31667 | 3.21352 | 239.2 | -1.64379 | -2.76128 |
| 171 | -161.64 | -163.342 | 8.63333 | 3.38629 | 238.6 | -1.76259 | -2.89142 |
| 172 | -161.64 | -163.342 | 12.95 | 3.51417 | 238.2 | -1.85303 | -2.98591 |
| 173 | -161.64 | -163.342 | 17.2667 | 3.60624 | 237.8 | -1.9213 | -3.05181 |
| 174 | -161.64 | -163.342 | 21.5833 | 3.66644 | 237.5 | -1.97006 | -3.09219 |
| 175 | -161.64 | -163.342 | 25.9 | 3.69678 | 237.2 | -2.00066 | -3.10862 |
| 176 | -161.64 | -163.342 | 30.2167 | 3.69849 | 237. | -2.01391 | -3.10209 |
| 177 | -161.64 | -163.342 | 34.5333 | 3.67248 | 236.8 | -2.0104 | -3.07334 |
| 178 | -161.64 | -163.342 | 38.85 | 3.61951 | 236.6 | -1.99061 | -3.02297 |
| 179 | -161.64 | -163.342 | 43.1667 | 3.5403 | 236.5 | -1.95498 | -2.95157 |
| 180 | -161.64 | -163.342 | 47.4833 | 3.43558 | 236.3 | -1.90397 | -2.85974 |
| 181 | -161.64 | -163.342 | 51.8 | 3.30611 | 236.2 | -1.83805 | -2.74808 |
| 182 | -161.64 | -163.342 | 56.1167 | 3.15269 | 236.1 | -1.75769 | -2.61724 |
| 183 | -161.64 | -163.342 | 60.4333 | 2.97615 | 236. | -1.66341 | -2.4679 |
| 184 | -161.64 | -163.342 | 64.75 | 2.7774 | 235.9 | -1.55577 | -2.30076 |
| 185 | -161.64 | -163.342 | 69.0667 | 2.55731 | 235.9 | -1.43531 | -2.11653 |
| 186 | -161.64 | -163.342 | 73.3833 | 2.31676 | 235.8 | -1.30256 | -1.91591 |
| 187 | -161.64 | -163.342 | 77.7 | 2.05657 | 235.7 | -1.15806 | -1.69952 |
| 188 | -161.64 | -163.342 | 82.0167 | 1.77735 | 235.7 | -1.00219 | -1.46785 |
| 189 | -161.64 | -163.342 | 86.3333 | 1.47939 | 235.6 | -.835177 | -1.2211 |
| 190 | -161.64 | -163.342 | 90.65 | 1.16222 | 235.6 | -.656808 | -.958826 |
| 191 | -161.64 | -163.342 | 94.9667 | .823604 | 235.6 | -.465874 | -.679179 |
| 192 | -161.64 | -163.342 | 99.2833 | .456799 | 235.5 | -.258599 | -.376553 |
| END | -161.64 | -163.342 | 103.6 | 0 | 0 | 0 | 0 |

# APPENDIX D

DETUNE MODEL

ELECTRICAL DESCRIPTION –TOWER #3 DETUNE
Frequencies (MHz)

| | frequency | | no. of | segment length (wavelengths) | |
|---|---|---|---|---|---|
| no. | lowest | step | steps | minimum | maximum |
| 1 | .79 | 0 | 1 | .0122072 | .0122072 |

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

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | .01 | 0 | .09 | 0 | 0 |

GEOMETRY – TOWER #3 DETUNE
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2911 | 24 |
| | | 0 | 0 | 105.47 | | |

Number of wires = 1
current nodes = 24

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 1 | 4.39458 | 1 | 4.39458 |
| radius | 1 | .2911 | 1 | .2911 |

RMS CURRENTS – TOWER #3 DETUNE
Frequency = .79 MHz
Plane wave zenith (deg) = 90
Plane wave azimuth (deg) = 0
Polarization angle (deg) = 0
coordinates in degrees

| current no. | X | Y | Z | mag (amps) | phase (deg) | real (amps) | imaginary (amps) |
|---|---|---|---|---|---|---|---|
| GND | 0 | 0 | 0 | .224666 | 270.2 | 8.85E-04 | -.224664 |
| 2 | 0 | 0 | 4.39458 | .174116 | 270.2 | 6.88E-04 | -.174114 |
| 3 | 0 | 0 | 8.78917 | .140812 | 270.2 | 5.59E-04 | -.14081 |
| 4 | 0 | 0 | 13.1838 | .111906 | 270.2 | 4.48E-04 | -.111905 |
| 5 | 0 | 0 | 17.5783 | .0859213 | 270.2 | 3.49E-04 | -.0859205 |
| 6 | 0 | 0 | 21.9729 | .0622583 | 270.2 | 2.61E-04 | -.0622577 |
| 7 | 0 | 0 | 26.3675 | .0406586 | 270.3 | 1.81E-04 | -.0406582 |
| 8 | 0 | 0 | 30.7621 | .0210062 | 270.3 | 1.09E-04 | -.0210059 |
| 9 | 0 | 0 | 35.1567 | 3.26E-03 | 270.8 | 4.56E-05 | -3.26E-03 |
| 10 | 0 | 0 | 39.5513 | .0126005 | 90. | -1.04E-05 | .0126005 |
| 11 | 0 | 0 | 43.9458 | .0265497 | 90.1 | -5.87E-05 | .0265496 |
| 12 | 0 | 0 | 48.3404 | .0385684 | 90.1 | -9.96E-05 | .0385682 |
| 13 | 0 | 0 | 52.735 | .048628 | 90.2 | -1.33E-04 | .0486278 |
| 14 | 0 | 0 | 57.1296 | .0566981 | 90.2 | -1.59E-04 | .0566979 |

```
 15    0         0         61.5242   .0627491 90.2   -1.78E-04 .0627488
 16    0         0         65.9188   .0667522 90.2   -1.9E-04  .0667519
 17    0         0         70.3133   .0686809 90.2   -1.96E-04 .0686806
 18    0         0         74.7079   .0685086 90.2   -1.94E-04 .0685083
 19    0         0         79.1025   .0662075 90.2   -1.86E-04 .0662072
 20    0         0         83.4971   .0617431 90.2   -1.72E-04 .0617429
 21    0         0         87.8917   .0550655 90.2   -1.52E-04 .0550653
 22    0         0         92.2863   .0460885 90.2   -1.25E-04 .0460883
 23    0         0         96.6808   .0346377 90.2   -9.27E-05 .0346376
 24    0         0         101.075   .0203073 90.2   -5.35E-05 .0203073
END    0         0         105.47    0        0      0         0
```

```
ELECTRICAL DESCRIPTION – TOWER #4 DETUNE
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step          steps   minimum        maximum
 1   .79          0              1      .0117882       .0117882

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     1     .01           0             .094        0            0

GEOMETRY – TOWER #4 DETUNE
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire  caps Distance     Angle        Z            radius      segs
 1    none 0            0            0            .2911        24
           0            0            101.85

Number of wires          =  1
          current nodes  =  24

                         minimum                  maximum
Individual wires      wire    value             wire  value
segment length         1      4.24375            1    4.24375
radius                 1      .2911              1    .2911
```

RMS CURRENTS – TOWER #4 DETUNE
Frequency = .79 MHz
Plane wave zenith (deg) = 90
Plane wave azimuth (deg) = 0
Polarization angle (deg) = 0
coordinates in degrees

| current no. | X | Y | Z | mag (amps) | phase (deg) | real (amps) | imaginary (amps) |
|---|---|---|---|---|---|---|---|
| GND | 0 | 0 | 0 | .209411 | 270.1 | 5.11E-04 | -.20941 |
| 2 | 0 | 0 | 4.24375 | .161246 | 270.1 | 3.95E-04 | -.161246 |
| 3 | 0 | 0 | 8.4875 | .12977 | 270.1 | 3.2E-04 | -.12977 |
| 4 | 0 | 0 | 12.7313 | .102537 | 270.1 | 2.55E-04 | -.102537 |
| 5 | 0 | 0 | 16.975 | .0781306 | 270.1 | 1.98E-04 | -.0781304 |
| 6 | 0 | 0 | 21.2188 | .0559668 | 270.2 | 1.47E-04 | -.0559666 |
| 7 | 0 | 0 | 25.4625 | .0357884 | 270.2 | 1.02E-04 | -.0357882 |
| 8 | 0 | 0 | 29.7063 | .0174748 | 270.2 | 6.08E-05 | -.0174747 |
| 9 | 0 | 0 | 33.95 | 9.74E-04 | 271.4 | 2.46E-05 | -9.74E-04 |
| 10 | 0 | 0 | 38.1938 | .0137309 | 90. | -7.03E-06 | .0137309 |
| 11 | 0 | 0 | 42.4375 | .0266343 | 90.1 | -3.42E-05 | .0266342 |
| 12 | 0 | 0 | 46.6813 | .0377214 | 90.1 | -5.71E-05 | .0377213 |
| 13 | 0 | 0 | 50.925 | .046971 | 90.1 | -7.57E-05 | .0469709 |
| 14 | 0 | 0 | 55.1688 | .0543598 | 90.1 | -9.01E-05 | .0543598 |
| 15 | 0 | 0 | 59.4125 | .059864 | 90.1 | -1.E-04 | .0598639 |
| 16 | 0 | 0 | 63.6563 | .0634601 | 90.1 | -1.07E-04 | .06346 |
| 17 | 0 | 0 | 67.9 | .0651254 | 90.1 | -1.09E-04 | .0651253 |
| 18 | 0 | 0 | 72.1438 | .0648367 | 90.1 | -1.08E-04 | .0648366 |
| 19 | 0 | 0 | 76.3875 | .0625684 | 90.1 | -1.03E-04 | .0625683 |
| 20 | 0 | 0 | 80.6313 | .058288 | 90.1 | -9.52E-05 | .0582879 |
| 21 | 0 | 0 | 84.875 | .0519469 | 90.1 | -8.36E-05 | .0519468 |
| 22 | 0 | 0 | 89.1188 | .0434617 | 90.1 | -6.89E-05 | .0434616 |
| 23 | 0 | 0 | 93.3625 | .0326642 | 90.1 | -5.09E-05 | .0326642 |
| 24 | 0 | 0 | 97.6063 | .0191675 | 90.1 | -2.93E-05 | .0191675 |
| END | 0 | 0 | 101.85 | 0 | 0 | 0 | 0 |

ELECTRICAL DESCRIPTION – TOWER #5 DETUNE
Frequencies (MHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | .79 | 0 | 1 | .0119456 | .0119456 |

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

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | .01 | 0 | .098 | 0 | 0 |

GEOMETRY – TOWER #5 DETUNE
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .2358 | 24 |
| | | 0 | 0 | 103.21 | | |

Number of wires = 1
current nodes = 24

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 1 | 4.30042 | 1 | 4.30042 |
| radius | 1 | .2358 | 1 | .2358 |

RMS CURRENTS – TOWER #5 DETUNE
Frequency = .79 MHz
Plane wave zenith (deg) = 90
Plane wave azimuth (deg) = 0
Polarization angle (deg) = 0
coordinates in degrees

| current no. | X | Y | Z | mag (amps) | phase (deg) | real (amps) | imaginary (amps) |
|---|---|---|---|---|---|---|---|
| GND | 0 | 0 | 0 | .20286 | 270.1 | 4.98E-04 | -.20286 |
| 2 | 0 | 0 | 4.30042 | .157689 | 270.1 | 3.88E-04 | -.157688 |
| 3 | 0 | 0 | 8.60083 | .127171 | 270.1 | 3.15E-04 | -.12717 |
| 4 | 0 | 0 | 12.9013 | .100649 | 270.1 | 2.52E-04 | -.100649 |
| 5 | 0 | 0 | 17.2017 | .0767949 | 270.1 | 1.96E-04 | -.0767946 |
| 6 | 0 | 0 | 21.5021 | .0550812 | 270.2 | 1.46E-04 | -.055081 |
| 7 | 0 | 0 | 25.8025 | .0352778 | 270.2 | 1.01E-04 | -.0352777 |
| 8 | 0 | 0 | 30.1029 | .0172813 | 270.2 | 6.06E-05 | -.0172812 |
| 9 | 0 | 0 | 34.4033 | 1.05E-03 | 271.4 | 2.49E-05 | -1.05E-03 |
| 10 | 0 | 0 | 38.7038 | .0134236 | 90. | -6.26E-06 | .0134236 |
| 11 | 0 | 0 | 43.0042 | .0261301 | 90.1 | -3.31E-05 | .0261301 |
| 12 | 0 | 0 | 47.3046 | .0370499 | 90.1 | -5.56E-05 | .0370499 |
| 13 | 0 | 0 | 51.605 | .0461588 | 90.1 | -7.39E-05 | .0461587 |
| 14 | 0 | 0 | 55.9054 | .0534311 | 90.1 | -8.81E-05 | .053431 |
| 15 | 0 | 0 | 60.2058 | .0588416 | 90.1 | -9.82E-05 | .0588415 |
| 16 | 0 | 0 | 64.5063 | .0623659 | 90.1 | -1.04E-04 | .0623658 |
| 17 | 0 | 0 | 68.8067 | .0639813 | 90.1 | -1.07E-04 | .0639812 |
| 18 | 0 | 0 | 73.1071 | .0636653 | 90.1 | -1.06E-04 | .0636652 |
| 19 | 0 | 0 | 77.4075 | .0613936 | 90.1 | -1.01E-04 | .0613935 |
| 20 | 0 | 0 | 81.7079 | .0571364 | 90.1 | -9.27E-05 | .0571363 |
| 21 | 0 | 0 | 86.0083 | .0508494 | 90.1 | -8.13E-05 | .0508493 |
| 22 | 0 | 0 | 90.3088 | .0424565 | 90.1 | -6.68E-05 | .0424565 |
| 23 | 0 | 0 | 94.6092 | .0318032 | 90.1 | -4.91E-05 | .0318031 |
| 24 | 0 | 0 | 98.9096 | .0185221 | 90.1 | -2.8E-05 | .0185221 |
| END | 0 | 0 | 103.21 | 0 | 0 | 0 | 0 |

```
ELECTRICAL DESCRIPTION – TOWER #6 DETUNE
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   .79          0             1      .0122188       .0122188

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     1     1.E-03        0             .09         0            0

GEOMETRY – TOWER #6 DETUNE
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire  caps Distance     Angle        Z            radius      segs
 1    none 0            0            0            .2911        24
           0            0            105.57

Number of wires          =  1
          current nodes  =  24

                         minimum                  maximum
Individual wires      wire    value             wire  value
segment length         1      4.39875            1    4.39875
radius                 1      .2911              1    .2911


RMS CURRENTS – TOWER #6 DETUNE
Frequency   = .79 MHz
Plane wave zenith (deg)  =  90
Plane wave azimuth (deg) =  0
Polarization angle (deg) =  0
coordinates in degrees
current                                  mag      phase  real      imaginary
no.    X         Y         Z            (amps)   (deg)  (amps)    (amps)
GND    0         0         0            .224885  270.2  8.63E-04  -.224883
 2     0         0         4.39875      .174256  270.2  6.7E-04   -.174255
 3     0         0         8.7975       .140894  270.2  5.43E-04  -.140893
 4     0         0         13.1963      .111938  270.2  4.34E-04  -.111937
 5     0         0         17.595       .0859057 270.2  3.38E-04  -.085905
 6     0         0         21.9938      .0622    270.2  2.51E-04  -.0621995
 7     0         0         26.3925      .040561  270.2  1.73E-04  -.0405606
 8     0         0         30.7913      .0208731 270.3  1.03E-04  -.0208728
 9     0         0         35.19        3.09E-03 270.8  4.07E-05  -3.09E-03
 10    0         0         39.5888      .0127926 90.1   -1.4E-05  .0127926
 11    0         0         43.9875      .0267648 90.1   -6.12E-05 .0267648
 12    0         0         48.3863      .038802  90.1   -1.01E-04 .0388019
 13    0         0         52.785       .0488753 90.2   -1.34E-04 .0488751
 14    0         0         57.1838      .0569543 90.2   -1.59E-04 .0569541
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 15 | 0 | 0 | 61.5825 | .0630091 | 90.2 | -1.77E-04 | .0630088 |
| 16 | 0 | 0 | 65.9813 | .0670109 | 90.2 | -1.89E-04 | .0670107 |
| 17 | 0 | 0 | 70.38 | .0689331 | 90.2 | -1.94E-04 | .0689329 |
| 18 | 0 | 0 | 74.7788 | .0687492 | 90.2 | -1.92E-04 | .068749 |
| 19 | 0 | 0 | 79.1775 | .0664312 | 90.2 | -1.84E-04 | .066431 |
| 20 | 0 | 0 | 83.5763 | .0619448 | 90.2 | -1.69E-04 | .0619446 |
| 21 | 0 | 0 | 87.975 | .0552398 | 90.2 | -1.49E-04 | .0552396 |
| 22 | 0 | 0 | 92.3738 | .0462301 | 90.2 | -1.23E-04 | .0462299 |
| 23 | 0 | 0 | 96.7725 | .034741 | 90.2 | -9.12E-05 | .0347409 |
| 24 | 0 | 0 | 101.171 | .0203657 | 90.1 | -5.25E-05 | .0203657 |
| END | 0 | 0 | 105.57 | 0 | 0 | 0 | 0 |