ANN

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

SNC 01/24/12

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

BMML-20120118

FOR COMMISSION USE ONLY
FILE NO. BMML-20120118AGD

SECTION I - APPLICANT FEE INFORMATION

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

Lerman Senter PLLC

MAILING ADDRESS (Line 1) (Maximum 35 characters)
2000 K Street, NW

MAILING ADDRESS (Line 2) (Maximum 35 characters)
Suite 600

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Washington	DC	20006

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
202-429-8974	KFAQ	68329

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	$ 635	

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	$ 730	

	TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.	$ 1365	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Journal Broadcast Corporation		
MAILING ADDRESS 3355 South Valley View Boulevard		
CITY Las Vegas	STATE NV	ZIP CODE 89102

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
KFAQ	Tulsa, OK	N/A	N/A	N/A

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. See Exhibit 1

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	
Steven J. Smith		
Title: Vice President	Date: 1/13/12	Telephone Number: (414) 967-5400 414-332-9611

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

Journal Broadcast Corporation

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

[X] Station License [ ] Direct Measurement of Power

1. Facilities authorized in construction permit					
Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
KFAQ	N/A	1170	U	50.0	50.0

2. Station location	
State	City or Town
OK	Tulsa

3. Transmitter location			
State	County	City or Town	Street address (or other identification)
OK	Tulsa	Tulsa	15050 East 11th Street

4. Main studio location			
State	County	City or Town	Street address (or other identification)
OK	Tulsa	Tulsa	4590 East 29th Street

5. Remote control point location (specify only if authorized directional antenna)			
State	County	City or Town	Street address (or other identification)
OK	Tulsa	Tulsa	4590 East 29th Street

6. Has type-approved stereo generating equipment been installed? [ ] Yes [X] No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? [X] Yes [ ] No [ ] Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. E-11

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
32.5 A	27.5 A

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50.0	66.0	-j 9.4	-j 138.1

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (SW)	-95.3		0.729		NOT	
2 (C)	0.0		1.000		REQUIRED	
3 (NE)	96.6		0.387			

Manufacturer and type of antenna monitor: Potomac Instruments 1901 (4188), S/N 428

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 and base insulated	137.2 m	#1 - 138.4 #2 - 139.0 #3 - 138.4	#1 - 139.3 #2 - 139.9 #3 - 139.3	Exhibit No. N/A

Excitation [X] Series [ ] Shunt

ASRN: #1 - 1009524
#2 - 1009523
#3 - 1009522

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			
	°	'	"		°	'	"
	36	08	47		95	48	26

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. N/A

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. N/A

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

N/A

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

Installation of a new LED lighting system on each tower
installation of a new sample system.

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)
Derek R. Gorman	
Address (include ZIP Code) 2324 N. Cleveland-Massillon Road P.O. Box 807 Bath, OH 44210	Date 1/11/2012
	Telephone No. (Include Area Code) 330/659-4440

[ ] Technical Director

[ ] Registered Professional Engineer

[ ] Chief Operator

[X] Technical Consultant

[ ] Other (specify)

FCC Form 302-AM
Exhibit 1
January 2012

Journal Broadcast Corporation currently operates station KFAQ(AM), Tulsa, Oklahoma (Facility ID Number 68329) pursuant to special temporary authority ("STA"). *See* BSTA-20110718ABY. This authority is scheduled to expire on January 21, 2012. A request to extend that authority will be made prior to its expiration to allow the station to continue to operate pursuant to STA pending the processing of this application.

ENGINEERING EXHIBIT E-11

APPLICATION FOR STATION LICENSE

(METHOD OF MOMENTS PROOF)

KFAQ(AM) - TULSA, OK

Journal Broadcast Corporation
Tulsa, OK

January 11, 2012

Prepared For: Mr. Jim Hobbs
Journal Broadcast Corporation
4590 East 29th Street
Tulsa, OK 74114

CARL E. SMITH CONSULTING ENGINEERS

2324 N. CLEVE-MASS RD., BOX 807 330/659-4440 FAX: 330/659-9234 BATH, OHIO 44210-0807

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installation of a new sample system.

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)
Derek R. Gorman	
Address (include ZIP Code) 2324 N. Cleveland-Massillon Road P.O. Box 807 Bath, OH 44210	Date 1/11/2012
	Telephone No. (Include Area Code) 330/659-4440

[ ] Technical Director

[ ] Registered Professional Engineer

[ ] Chief Operator

[X] Technical Consultant

[ ] Other (specify)

ENGINEERING AFFIDAVIT

State of Ohio)
) ss:
County of Summit)

Roy P. Stype, III, being duly sworn, deposes and states that he is a graduate Electrical Engineer, a qualified and experienced Communications Consulting Engineer whose works are a matter of record with the Federal Communications Commission and that he is a member of the Firm of "Carl E. Smith Consulting Engineers" located at 2324 North Cleveland-Massillon Road in the Township of Bath, County of Summit, State of Ohio, and that the Firm has been retained by Journal Broadcast Corporation to prepare the attached "Engineering Exhibit E-11."

The deponent states that the Exhibit was prepared by him or under his direction and is true of his own knowledge, except as to statements made on information and belief and as to such statements, he believes them to be true.

Roy P. Stype, III

Subscribed and sworn to before me on **January 11, 2012.**

Notary Public

Nancy A. Adams, Notary Public
Residence - Cuyahoga County
State Wide Jurisdiction, Ohio
My Commission Expires Sept. 20, 2015

/SEAL/

ENGINEERING AFFIDAVIT

State of Ohio)
) ss:
County of Summit)

Derek R. Gorman, being duly sworn, deposes and states that he is a qualified and experienced Communications Consulting Engineer whose works are a matter of record with the Federal Communications Commission and that he is a member of the Firm of "Carl E. Smith Consulting Engineers" located at 2324 North Cleveland-Massillon Road in the Township of Bath, County of Summit, State of Ohio, and that the Firm has been retained by Journal Broadcast Corporation to prepare the attached "Engineering Exhibit E-11."

The deponent states that the Exhibit was prepared by him or under his direction and is true of his own knowledge, except as to statements made on information and belief and as to such statements, he believes them to be true.

Derek R. Gorman

Subscribed and sworn to before me on **January 11, 2012.**

Nancy A. Adams
Notary Public

Nancy A. Adams, Notary Public
Residence - Cuyahoga County
State Wide Jurisdiction, Ohio
My Commission Expires Sept. 20, 2015

/SEAL/

ENGINEERING STATEMENT

1.0 GENERAL

This engineering exhibit is prepared on behalf of Journal Broadcast Corporation, licensee of Radio Station KFAQ(AM) - Tulsa, Oklahoma in support of an application for a modified station license. It details the results of a recent proof of performance conducted on the KFAQ nighttime directional antenna system utilizing the computer modeling method of moments (MoM) technique outlined in Section 73.151(c) of the FCC rules. KFAQ's nighttime directional antenna system is eligible to use this proof methodology since it employs a standard ground system and all the elements of this antenna system are series fed.

KFAQ operates full time on 1170 kHz utilizing a non-directional antenna daytime, and a three tower directional antenna nighttime. A new LED lighting system was installed on each of the three towers, with the AC conductors used to feed these lights isolated using 1/4-wave isolation stubs. In addition, a new sample system utilizing base voltage sampling was installed prior to conducting this proof of performance.

The ground system for the KFAQ nighttime directional antenna system consists of 120 equally spaced #10 AWG copper radials, each 103.6 meters in length, buried approximately 10 cm deep about each tower. These radials are truncated where they intersect a transverse copper strap running between adjacent towers. A 7.6 meter square expanded mesh copper ground screen is installed at the base of each tower. In addition, antennas for an Aural STL, a Remote Pickup Station, and a communications antenna, are installed on Tower #1 of the nighttime directional antenna system just above the mid-level point. The transmission lines for these antennas are isolated across the tower base by the use of a quarter wave isolation stub. The ground system

description and the STL, RPU, and communications antennas remain unchanged from what is currently on file, and is provided only for clarity purposes.

Additionally, it was determined that the geographic coordinates for the center of array of the KFAQ antenna system do not agree with the presently licensed geographic coordinates, and this application requests a modification of the KFAQ license to correct these coordinates. The presently licensed geographic coordinates (NAD 27) for the center of the KFAQ antenna system are:

NL - 36° 08' 49"
WL - 95° 48' 27"

and the corrected geographic coordinates (NAD 27) for the center of this array are:

NL - 36° 08' 47"
WL - 95° 48' 26"

Since it involves a change of only two seconds of latitude and one second of longitude, this coordinate correction can be accomplished in the context of a license modification application, pursuant to Section 73.1690(c)(11) of the FCC Rules, which states that a coordinate correction may be accomplished in the context of a license modification application so long as the corrected geographic coordinates differ from the previously licensed values by no more than 3 seconds of latitude and no more than 3 seconds of longitude and no physical changes are proposed to the actual tower location. Based on the above information, this coordinate correction does not require the filing of a construction permit application and can be accomplished in the attached license modification application.

Pursuant to the FCC's October 29, 2009 Public Notice (DA 09-2340), no surveyor's certification is required to verify the locations of the KFAQ towers since this application is re-licensing an existing licensed antenna system without making any

changes. The data contained in this exhibit shows that the KFAQ nighttime directional pattern is in proper adjustment based on a Method of Moments analysis.

2.0 SAMPLE SYSTEM

The sample system for the KFAQ nighttime directional antenna system is in full compliance with Section 73.151(c)(2)(i) of the FCC rules with regard to sample systems for directional antenna systems utilizing the computer modeling method of moments technique. The sample system consists of base voltage samplers used as the sample elements, equal lengths of sample line, and a Potomac Instruments antenna monitor.

The sample elements utilized in the KFAQ nighttime sample system are Phasetek P600-206-2 base voltage sample elements mounted adjacent to the feed at each tower. Each sample element was field verified to be within the manufacturers specifications of ±2% ratio and ±2 degree phase accuracy by placing them in parallel with a common reference signal and using the antenna monitor to compare the phase and ratio of the output sample from the sample element from Tower #2 to the output sample from each of the other sample elements. The results of this field verification are tabulated in Table 2.0 and confirms that the phase and ratio of the outputs of all of these sample elements are well within the manufacturer's specifications.

The sample lines utilized in the KFAQ nighttime sample system consist of three equal length runs (330'/100.6m each) of Cablewave FLC12-50J phase stabilized foam Flexwell coaxial cable with a 3' (0.91m) Belden RG-213 jumper at the antenna monitor end. The runs from the towers to the transmitter building, including all excess cable lengths, are buried. Impedance measurements were conducted on this sample system as required by Section 73.153(c)(2)(i) of the FCC Rules using an Agilent Technologies model 8753ES Vector Network Analyzer (VNA), S/N US39175348, an Electronic Navigation Industries (ENI) model 310L linear amplifier, S/N 654, and a Tunwall Radio directional coupler, S/N DC11, as a calibrated measurement system. These

measurements were conducted both with the sample lines open circuited and with them connected to the P600-206-2 sample elements.

The frequencies above and below the carrier frequency where resonance, defined as zero reactance corresponding with low resistance, were found and are listed in Table 2.0. These frequencies of resonance occur at odd multiples of 90 degrees electrical length, and the sample line length at the resonant frequency above the carrier frequency, which is the closest one to the carrier frequency, was found to be 180 electrical degrees. The electrical lengths of these sample lines at the carrier frequency are tabulated in Table 2.0 and were calculated utilizing the ratio between the frequencies.

To determine the characteristic impedance values of the sample lines, open circuit measurements were conducted on frequencies offset to result in electrical lengths $\pm$ 45 degrees from the electrical length at this resonant frequency. The characteristic impedance was calculated using the following formula, where $R_1 + jX_1$ and $R_2 + jX_2$ are the measured impedances at the +45 and -45 degree offset frequencies, respectively:

$$Z_0 = ((R_1^2 + X_1^2)^{1/2} \times (R_2^2 + X_2^2)^{1/2})^{1/4}$$

These measured offset frequencies, along with the calculated characteristic impedance of each sample line, are also tabulated in Table 2.0. These measured values comply with the requirement that the measured characteristic impedance of each sample line be within two ohms of the measured characteristic impedance of every other sample line in the antenna system.

The antenna monitor utilized with KFAQ's nighttime antenna system is a type accepted Potomac Instruments 1901(4188), S/N 428. This antenna monitor was field

verified to be within the manufacturers specifications of ±1% ratio accuracy and ±1 degree phase accuracy.

TABLE 2.0

KFAQ NIGHTTIME
SAMPLE ELEMENT MEASUREMENTS
Journal Broadcast Corporation
Tulsa, OK

Tower	Sample Element * Model	Sample Element * Serial Number	Measured Ratio	Measured Phase (degrees)
1	P600-206-2	3	1.005	1.1
2	P600-206-2	1	1.000	0.0
3	P600-206-2	2	1.005	0.3

* Sample Elements Manufactured By Phasetek, Inc.

Tower	Resonant Frequency (kHz) Below 1170 kHz	Resonant Frequency (kHz) Above 1170 kHz	Calculated Electrical Length At 1170 kHz (degrees)	Measured Impedance Connected To Sample Element At 1170 kHz (ohms)
1	639.3	1279.5	164.6	20.3-j1.4
2	640.8	1281.4	164.4	20.7-j1.5
3	639.8	1279.5	164.6	20.8-j1.6

Tower	-45 Degree Offset Frequency (kHz)	-45 Degree Offset Impedance (ohms)	+45 Degree Offset Frequency (kHz)	+45 Degree Offset Impedance (ohms)	Calculated Characteristic Impedance (ohms)
1	958.5	3.3+j49.8	1604.3	3.0-j49.8	49.9
2	958.9	3.3+j49.8	1605.7	3.0-j49.8	49.9
3	958.5	3.3+j49.8	1605.2	3.0-j49.8	49.9

3.0 ANTENNA SYSTEM MODELING

The KFAQ nighttime antenna system was modeled using Expert MININEC Broadcast Professional Version 23. One wire was used to represent each tower, and each wire was modeled using 21 wire segments. The top and bottom end points of each wire were specified in electrical degrees at 1170 kHz. The tower heights of all towers in the nighttime antenna system are 193.0 electrical degrees, which equates to a segment length of 9.2 electrical degrees. This meets the requirement that wire segments may be no longer than 10 electrical degrees in length.

All towers in the nighttime antenna system are identical and have a uniform square cross section with a face width of 84" (2.13m). Each tower's modeled height, relative to its physical height, falls within the required range of 75 to 125 percent of its physical height. Each tower's modeled radius, relative to the radius of a circle having a circumference equal to the sum of the widths of the physical tower sides, falls within the required range of 80 to 150 percent of its physical radius. Table 3.0 details the characteristics of each tower in the MoM model of the antenna system.

The individual characteristics of each tower were adjusted to provide a match of its modeled impedance with its measured impedance, when presented to a circuit model that includes base region stray capacity, a tower feed, and a static drain choke, at the antenna tuning unit (ATU) output jack. Each tower in the array was driven individually with all towers in the MoM model and all non-driven towers loaded with their open circuit impedance computed from the circuit model. Each tower has a specified base region stray capacity of 250 pF or less and a tower feed inductance of 10uH or less, as required by the rules.

The measured impedances were determined using a Delta Electronics OIB-3 impedance bridge driven by a Delta Electronics RG-4 receiver/generator, as shown in Figure 6.0, with all non-driven towers short circuited. Table 3.1 presents all of the individual tower MoM model data and measurements and Figure 3.1 details the tower base circuit diagram used in the MoM model. Tables 3.2 to 3.7 present in detail the MoM calculations and base circuit analysis for each tower driven individually. As shown in Table 3.1, the measured and modeled ATU output impedances agree within $\pm$ 2 ohms and $\pm$ 4 percent for resistance and reactance as required by the rules.

Once the MoM model was developed and verified with the measured impedances, it was synthesized with the theoretical parameters for the nighttime directional array as specified on the station's license. The results of this synthesis with the MoM model driven as a directional array are presented in Tables 3.8 and 3.9. Additionally, Table 3.9 presents the array admittance and impedance matrixes resulting from the MoM model.

After the nighttime directional array was synthesized, the resulting MoM base voltage and current for each tower was presented to the same circuit model used in verifying the individual tower impedance to calculate the voltage at the ATU output where the sample element to drive the antenna monitor is located. Once these voltages were calculated, they were normalized to the tower used as the reference tower for the nighttime directional array. Tables 3.10 to 3.12 present in detail the base circuit analysis for each tower resulting from the array synthesis. Table 3.13 presents the calculated sample element voltage for all towers and the resulting normalized antenna monitor parameters. These normalized antenna monitor parameters were established on the antenna monitor as the operating parameters for the nighttime directional array.

TABLE 3.0

KFAQ NIGHTTIME
INDIVIDUAL TOWER
MoM MODEL DETAILS
Journal Broadcast Corporation
Tulsa, OK

Tower	Physical Height (degrees)	Modeled Height (degrees)	Modeled Percent Of Height (%)	Modeled Radius (meters)	Percent Equivalent Radius (%)
1	193.0	196.8	102.0	1.36	100.0
2	193.0	196.5	101.8	1.36	100.0
3	193.0	199.0	103.1	1.36	100.0

Tower	Wire Number	Number Of Segments	Base Segment Number
1	1	21	1
2	2	21	22
3	3	21	43

TABLE 3.1

KFAQ NIGHTTIME INDIVIDUAL
TOWER IMPEDANCE MEASUREMENTS
TO VERIFY MoM MODEL
Journal Broadcast Corporation
Tulsa, OK

Tower	Measured X_{SE} (ohms)	Specified X_F (ohms)	Specified L_F (uH)	Specified X_S (ohms)	Specified C_S (pF)	Modeled X_{OC} (ohms)
1	j100,000	j46.5	6.33	-j13,603	10.0	j46.7
2	j100,000	j58.3	7.93	-j13,603	10.0	j58.6
3	j100,000	j55.6	7.56	-j13,603	10.0	j55.8

Tower	Measured Z_{ATU} (ohms)	Modeled Z_{ATU} (ohms)	Modeled Z_{ANT} (ohms)
1	75.0-j153.9	75.1-j154.0	77.2-j202.8
2	67.0-j135.7	67.0-j135.7	68.8-j196.3
3	70.0-j138.7	70.1-j138.7	71.9-j196.6

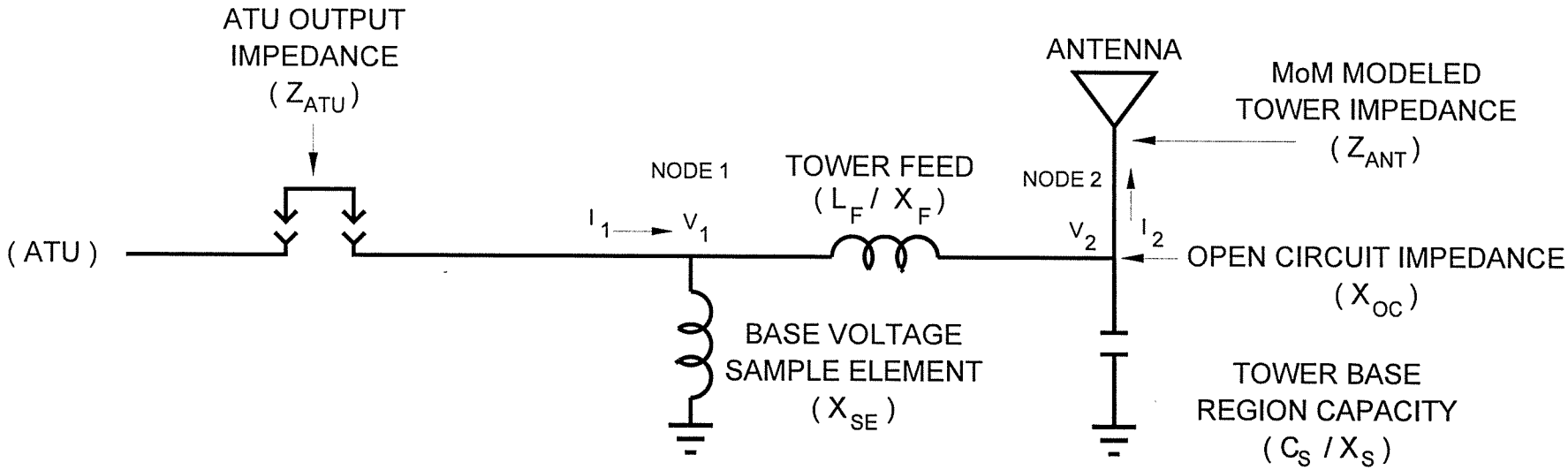


FIG. 3.1

KFAQ NIGHTTIME
TOWER BASE CIRCUIT DIAGRAM
USED TO VERIFY IMPEDANCES

JOURNAL BROADCAST CORPORATION
TULSA, OK

CARL E. SMITH CONSULTING ENGINEERS
2324 N. CLEVE-MASS RD., BOX 807
BATH, OHIO 44210-0807
(330) 659-4440

TABLE 3.2

KFAQ NIGHTTIME
TOWER 1 MoM SUMMARY
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	1.36	21
		0	0	196.8		
2	none	90.	67.5	0	1.36	21
		90.	67.5	196.5		
3	none	180.	67.5	0	1.36	21
		180.	67.5	199.		

Number of wires = 3
current nodes = 63

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	9.35714	3	9.47619
radius	1	1.36	1	1.36

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.17	0	1	.0259921	.0263228

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	22	0	58.6	0	0	0
2	43	0	55.8	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.17	77.159	-202.84	217.02	290.8	12.778	-1.3623	-5.6985

TABLE 3.2 (cont'd)

CURRENT rms
Frequency = 1.17 MHz
Input power = 8.191E-04 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	3.26E-03	69.2	1.16E-03	3.05E-03
2	0	0	9.37143	1.96E-03	54.1	1.15E-03	1.59E-03
3	0	0	18.7429	1.41E-03	36.5	1.13E-03	8.38E-04
4	0	0	28.1143	1.11E-03	7.4	1.1E-03	1.43E-04
5	0	0	37.4857	1.17E-03	334.9	1.06E-03	-4.96E-04
6	0	0	46.8571	1.48E-03	312.8	1.01E-03	-1.09E-03
7	0	0	56.2286	1.88E-03	300.2	9.43E-04	-1.62E-03
8	0	0	65.6	2.27E-03	292.6	8.73E-04	-2.1E-03
9	0	0	74.9714	2.63E-03	287.6	7.95E-04	-2.51E-03
10	0	0	84.3429	2.93E-03	284.1	7.13E-04	-2.84E-03
11	0	0	93.7143	3.16E-03	281.5	6.28E-04	-3.09E-03
12	0	0	103.086	3.31E-03	279.4	5.42E-04	-3.26E-03
13	0	0	112.457	3.37E-03	277.8	4.56E-04	-3.34E-03
14	0	0	121.829	3.34E-03	276.4	3.74E-04	-3.32E-03
15	0	0	131.2	3.23E-03	275.2	2.95E-04	-3.22E-03
16	0	0	140.571	3.03E-03	274.2	2.23E-04	-3.02E-03
17	0	0	149.943	2.75E-03	273.3	1.59E-04	-2.74E-03
18	0	0	159.314	2.38E-03	272.5	1.04E-04	-2.38E-03
19	0	0	168.686	1.95E-03	271.7	5.88E-05	-1.94E-03
20	0	0	178.057	1.44E-03	271.	2.55E-05	-1.43E-03
21	0	0	187.429	8.55E-04	270.3	4.63E-06	-8.55E-04
END	0	0	196.8	0	0	0	0
GND	34.4415	-83.1492	0	9.51E-04	348.	9.31E-04	-1.98E-04
23	34.4415	-83.1492	9.35714	8.32E-04	348.3	8.15E-04	-1.69E-04
24	34.4415	-83.1492	18.7143	7.6E-04	349.1	7.46E-04	-1.44E-04
25	34.4415	-83.1492	28.0714	6.83E-04	350.7	6.74E-04	-1.11E-04
26	34.4415	-83.1492	37.4286	6.05E-04	353.1	6.E-04	-7.21E-05
27	34.4415	-83.1492	46.7857	5.25E-04	356.8	5.24E-04	-2.91E-05
28	34.4415	-83.1492	56.1429	4.47E-04	2.1	4.47E-04	1.64E-05
29	34.4415	-83.1492	65.5	3.74E-04	9.6	3.69E-04	6.23E-05
30	34.4415	-83.1492	74.8571	3.12E-04	20.	2.93E-04	1.07E-04
31	34.4415	-83.1492	84.2143	2.65E-04	33.9	2.2E-04	1.48E-04
32	34.4415	-83.1492	93.5714	2.37E-04	50.6	1.51E-04	1.83E-04
33	34.4415	-83.1492	102.929	2.3E-04	67.5	8.79E-05	2.12E-04
34	34.4415	-83.1492	112.286	2.35E-04	82.1	3.22E-05	2.33E-04
35	34.4415	-83.1492	121.643	2.46E-04	93.5	-1.52E-05	2.45E-04
36	34.4415	-83.1492	131.	2.54E-04	102.1	-5.33E-05	2.48E-04
37	34.4415	-83.1492	140.357	2.55E-04	108.6	-8.13E-05	2.42E-04
38	34.4415	-83.1492	149.714	2.46E-04	113.7	-9.88E-05	2.25E-04
39	34.4415	-83.1492	159.071	2.26E-04	117.7	-1.05E-04	2.E-04
40	34.4415	-83.1492	168.429	1.95E-04	121.1	-1.E-04	1.67E-04
41	34.4415	-83.1492	177.786	1.5E-04	123.9	-8.4E-05	1.25E-04
42	34.4415	-83.1492	187.143	9.39E-05	126.5	-5.59E-05	7.55E-05
END	34.4415	-83.1492	196.5	0	0	0	0
GND	68.883	-166.298	0	5.01E-04	266.3	-3.23E-05	-5.E-04
44	68.883	-166.298	9.47619	4.41E-04	266.4	-2.73E-05	-4.4E-04
45	68.883	-166.298	18.9524	4.02E-04	266.9	-2.18E-05	-4.01E-04
46	68.883	-166.298	28.4286	3.59E-04	267.7	-1.41E-05	-3.59E-04
47	68.883	-166.298	37.9048	3.14E-04	269.1	-4.68E-06	-3.14E-04
48	68.883	-166.298	47.381	2.67E-04	271.3	6.25E-06	-2.67E-04
49	68.883	-166.298	56.8571	2.18E-04	274.8	1.82E-05	-2.17E-04
50	68.883	-166.298	66.3333	1.7E-04	280.4	3.08E-05	-1.67E-04
51	68.883	-166.298	75.8095	1.26E-04	290.1	4.33E-05	-1.18E-04
52	68.883	-166.298	85.2857	8.97E-05	308.1	5.54E-05	-7.05E-05

TABLE 3.2 (cont'd)

53	68.883	-166.298	94.7619	7.13E-05	338.6	6.64E-05	-2.6E-05
54	68.883	-166.298	104.238	7.71E-05	10.7	7.58E-05	1.43E-05
55	68.883	-166.298	113.714	9.68E-05	30.7	8.32E-05	4.94E-05
56	68.883	-166.298	123.191	1.18E-04	41.5	8.82E-05	7.81E-05
57	68.883	-166.298	132.667	1.35E-04	47.9	9.04E-05	9.98E-05
58	68.883	-166.298	142.143	1.45E-04	51.8	8.94E-05	1.14E-04
59	68.883	-166.298	151.619	1.47E-04	54.5	8.52E-05	1.2E-04
60	68.883	-166.298	161.095	1.4E-04	56.4	7.75E-05	1.17E-04
61	68.883	-166.298	170.571	1.24E-04	57.8	6.62E-05	1.05E-04
62	68.883	-166.298	180.048	9.86E-05	58.9	5.1E-05	8.44E-05
63	68.883	-166.298	189.524	6.29E-05	59.7	3.17E-05	5.43E-05
END	68.883	-166.298	199.	0	0	0	0

TABLE 3.3

KFAQ NIGHTTIME
TOWER 1 BASE CIRCUIT ANALYSIS
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

FREQUENCY: 1170 kHz

BASE VOLTAGE SAMPLE ELEMENT IMPEDANCE (R,X): 0.00,100000.00 OHMS
TOWER FEED IMPEDANCE (R,X): 0.00, 46.50 OHMS
TOWER BASE REGION IMPEDANCE (R,X): 0.00,-13603.00 OHMS
MoM MODELED TOWER IMPEDANCE (R,X): 77.16, -202.84 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	100000.00
2	GROUND	74.91	-200.28
1	2	0.00	46.50

NODE	VOLTAGE (VOLTS) MAGNITUDE	PHASE
1	0.800	5.46
2	1.000	0.00

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT CURRENT I1 (AMPS):	0.164E-02	0.437E-02	0.467E-02	69.45
OUTPUT CURRENT I2 (AMPS):	0.164E-02	0.431E-02	0.461E-02	69.17

MODELED ATU OUTPUT IMPEDANCE V1/I1 (OHMS):	75.14	-153.96	171.32	-63.99

TABLE 3.4

KFAQ NIGHTTIME
TOWER 2 MoM SUMMARY
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	1.36	21
		0	0	196.8		
2	none	90.	67.5	0	1.36	21
		90.	67.5	196.5		
3	none	180.	67.5	0	1.36	21
		180.	67.5	199.		

Number of wires = 3
current nodes = 63

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	9.35714	3	9.47619
radius	1	1.36	1	1.36

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.17	0	1	.0259921	.0263228

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	46.7	0	0	0
2	43	0	55.8	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 22, sector 1							
1.17	68.781	-196.34	208.04	289.3	13.236	-1.3149	-5.8297

TABLE 3.4 (cont'd)

CURRENT rms
Frequency = 1.17 MHz
Input power = 7.946E-04 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	8.77E-04	349.8	8.63E-04	-1.56E-04
2	0	0	9.37143	7.89E-04	350.1	7.77E-04	-1.36E-04
3	0	0	18.7429	7.32E-04	351.	7.23E-04	-1.15E-04
4	0	0	28.1143	6.71E-04	352.7	6.66E-04	-8.55E-05
5	0	0	37.4857	6.08E-04	355.3	6.06E-04	-5.E-05
6	0	0	46.8571	5.42E-04	359.	5.42E-04	-9.72E-06
7	0	0	56.2286	4.77E-04	4.	4.76E-04	3.33E-05
8	0	0	65.6	4.16E-04	10.7	4.09E-04	7.71E-05
9	0	0	74.9714	3.62E-04	19.3	3.41E-04	1.2E-04
10	0	0	84.3429	3.18E-04	29.9	2.76E-04	1.59E-04
11	0	0	93.7143	2.87E-04	42.1	2.13E-04	1.93E-04
12	0	0	103.086	2.69E-04	55.	1.54E-04	2.2E-04
13	0	0	112.457	2.6E-04	67.3	1.E-04	2.4E-04
14	0	0	121.829	2.56E-04	78.	5.31E-05	2.5E-04
15	0	0	131.2	2.52E-04	87.	1.32E-05	2.52E-04
16	0	0	140.571	2.45E-04	94.4	-1.87E-05	2.44E-04
17	0	0	149.943	2.31E-04	100.4	-4.17E-05	2.27E-04
18	0	0	159.314	2.09E-04	105.4	-5.56E-05	2.01E-04
19	0	0	168.686	1.77E-04	109.7	-5.98E-05	1.67E-04
20	0	0	178.057	1.36E-04	113.5	-5.41E-05	1.25E-04
21	0	0	187.429	8.42E-05	116.9	-3.81E-05	7.51E-05
END	0	0	196.8	0	0	0	0
GND	34.4415	-83.1492	0	3.4E-03	70.7	1.12E-03	3.21E-03
23	34.4415	-83.1492	9.35714	2.08E-03	57.5	1.12E-03	1.75E-03
24	34.4415	-83.1492	18.7143	1.49E-03	42.3	1.1E-03	1.E-03
25	34.4415	-83.1492	28.0714	1.11E-03	15.8	1.07E-03	3.03E-04
26	34.4415	-83.1492	37.4286	1.09E-03	341.8	1.03E-03	-3.39E-04
27	34.4415	-83.1492	46.7857	1.35E-03	316.5	9.81E-04	-9.32E-04
28	34.4415	-83.1492	56.1429	1.74E-03	302.	9.22E-04	-1.47E-03
29	34.4415	-83.1492	65.5	2.13E-03	293.6	8.55E-04	-1.96E-03
30	34.4415	-83.1492	74.8571	2.5E-03	288.2	7.82E-04	-2.37E-03
31	34.4415	-83.1492	84.2143	2.8E-03	284.5	7.04E-04	-2.71E-03
32	34.4415	-83.1492	93.5714	3.04E-03	281.8	6.23E-04	-2.98E-03
33	34.4415	-83.1492	102.929	3.2E-03	279.7	5.4E-04	-3.15E-03
34	34.4415	-83.1492	112.286	3.27E-03	278.	4.57E-04	-3.24E-03
35	34.4415	-83.1492	121.643	3.25E-03	276.7	3.77E-04	-3.23E-03
36	34.4415	-83.1492	131.	3.15E-03	275.5	3.01E-04	-3.14E-03
37	34.4415	-83.1492	140.357	2.96E-03	274.5	2.3E-04	-2.95E-03
38	34.4415	-83.1492	149.714	2.69E-03	273.5	1.66E-04	-2.68E-03
39	34.4415	-83.1492	159.071	2.34E-03	272.7	1.11E-04	-2.33E-03
40	34.4415	-83.1492	168.429	1.91E-03	272.	6.52E-05	-1.91E-03
41	34.4415	-83.1492	177.786	1.41E-03	271.2	3.06E-05	-1.41E-03
42	34.4415	-83.1492	187.143	8.41E-04	270.5	7.83E-06	-8.41E-04
END	34.4415	-83.1492	196.5	0	0	0	0
GND	68.883	-166.298	0	9.4E-04	347.3	9.17E-04	-2.07E-04
44	68.883	-166.298	9.47619	8.27E-04	347.5	8.08E-04	-1.78E-04
45	68.883	-166.298	18.9524	7.57E-04	348.5	7.41E-04	-1.51E-04
46	68.883	-166.298	28.4286	6.82E-04	350.3	6.72E-04	-1.15E-04
47	68.883	-166.298	37.9048	6.05E-04	353.	6.E-04	-7.32E-05
48	68.883	-166.298	47.381	5.26E-04	357.2	5.26E-04	-2.6E-05
49	68.883	-166.298	56.8571	4.5E-04	3.1	4.5E-04	2.4E-05
50	68.883	-166.298	66.3333	3.8E-04	11.3	3.73E-04	7.45E-05
51	68.883	-166.298	75.8095	3.22E-04	22.5	2.98E-04	1.23E-04
52	68.883	-166.298	85.2857	2.81E-04	36.8	2.25E-04	1.68E-04

TABLE 3.4 (cont'd)

53	68.883	-166.298	94.7619	2.6E-04	53.	1.57E-04	2.08E-04
54	68.883	-166.298	104.238	2.57E-04	68.6	9.39E-05	2.39E-04
55	68.883	-166.298	113.714	2.65E-04	81.7	3.81E-05	2.62E-04
56	68.883	-166.298	123.191	2.75E-04	92.	-9.48E-06	2.75E-04
57	68.883	-166.298	132.667	2.82E-04	99.8	-4.79E-05	2.78E-04
58	68.883	-166.298	142.143	2.81E-04	105.8	-7.65E-05	2.7E-04
59	68.883	-166.298	151.619	2.69E-04	110.6	-9.45E-05	2.52E-04
60	68.883	-166.298	161.095	2.45E-04	114.5	-1.02E-04	2.23E-04
61	68.883	-166.298	170.571	2.1E-04	117.8	-9.76E-05	1.85E-04
62	68.883	-166.298	180.048	1.61E-04	120.6	-8.2E-05	1.39E-04
63	68.883	-166.298	189.524	9.99E-05	123.2	-5.47E-05	8.36E-05
END	68.883	-166.298	199.	0	0	0	0

TABLE 3.5

KFAQ NIGHTTIME
TOWER 2 BASE CIRCUIT ANALYSIS
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

FREQUENCY: 1170 kHz

BASE VOLTAGE SAMPLE ELEMENT IMPEDANCE (R,X): 0.00,100000.00 OHMS
TOWER FEED IMPEDANCE (R,X): 0.00, 58.30 OHMS
TOWER BASE REGION IMPEDANCE (R,X): 0.00,-13603.00 OHMS
MoM MODELED TOWER IMPEDANCE (R,X): 68.78, -196.34 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	100000.00
2	GROUND	66.84	-193.88
1	2	0.00	58.30

NODE	VOLTAGE (VOLTS) MAGNITUDE	PHASE
1	0.737	7.22
2	1.000	0.00

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT CURRENT I1 (AMPS):	0.159E-02	0.460E-02	0.487E-02	70.94
OUTPUT CURRENT I2 (AMPS):	0.159E-02	0.454E-02	0.481E-02	70.69

MODELED ATU OUTPUT IMPEDANCE V1/I1 (OHMS):	67.02	-135.72	151.36	-63.72

TABLE 3.6

KFAQ NIGHTTIME
TOWER 3 MoM SUMMARY
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	1.36	21
		0	0	196.8		
2	none	90.	67.5	0	1.36	21
		90.	67.5	196.5		
3	none	180.	67.5	0	1.36	21
		180.	67.5	199.		

Number of wires = 3
current nodes = 63

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	9.35714	3	9.47619
radius	1	1.36	1	1.36

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.17	0	1	.0259921	.0263228

Sources

source	node	sector	magnitude	phase	type
1	43	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	46.7	0	0	0
2	22	0	58.6	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 43, sector 1							
1.17	71.927	-196.63	209.37	290.1	12.806	-1.3593	-5.7066

TABLE 3.6 (cont'd)

CURRENT rms
Frequency = 1.17 MHz
Input power = 8.204E-04 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	4.72E-04	267.8	-1.81E-05	-4.71E-04
2	0	0	9.37143	4.24E-04	267.9	-1.53E-05	-4.23E-04
3	0	0	18.7429	3.92E-04	268.4	-1.11E-05	-3.91E-04
4	0	0	28.1143	3.56E-04	269.2	-5.13E-06	-3.56E-04
5	0	0	37.4857	3.17E-04	270.5	2.56E-06	-3.17E-04
6	0	0	46.8571	2.76E-04	272.4	1.16E-05	-2.75E-04
7	0	0	56.2286	2.32E-04	275.3	2.16E-05	-2.31E-04
8	0	0	65.6	1.89E-04	279.8	3.22E-05	-1.86E-04
9	0	0	74.9714	1.48E-04	286.9	4.28E-05	-1.41E-04
10	0	0	84.3429	1.11E-04	298.6	5.3E-05	-9.71E-05
11	0	0	93.7143	8.33E-05	318.4	6.23E-05	-5.53E-05
12	0	0	103.086	7.22E-05	346.5	7.03E-05	-1.68E-05
13	0	0	112.457	7.84E-05	12.7	7.65E-05	1.73E-05
14	0	0	121.829	9.28E-05	29.8	8.06E-05	4.61E-05
15	0	0	131.2	1.07E-04	39.9	8.22E-05	6.88E-05
16	0	0	140.571	1.17E-04	46.2	8.12E-05	8.46E-05
17	0	0	149.943	1.21E-04	50.4	7.72E-05	9.32E-05
18	0	0	159.314	1.17E-04	53.3	7.01E-05	9.39E-05
19	0	0	168.686	1.05E-04	55.4	5.98E-05	8.66E-05
20	0	0	178.057	8.45E-05	57.	4.61E-05	7.09E-05
21	0	0	187.429	5.46E-05	58.2	2.87E-05	4.64E-05
END	0	0	196.8	0	0	0	0
GND	34.4415	-83.1492	0	9.6E-04	347.	9.35E-04	-2.16E-04
23	34.4415	-83.1492	9.35714	8.39E-04	347.3	8.19E-04	-1.85E-04
24	34.4415	-83.1492	18.7143	7.66E-04	348.1	7.49E-04	-1.58E-04
25	34.4415	-83.1492	28.0714	6.88E-04	349.7	6.77E-04	-1.23E-04
26	34.4415	-83.1492	37.4286	6.08E-04	352.3	6.02E-04	-8.19E-05
27	34.4415	-83.1492	46.7857	5.26E-04	356.	5.25E-04	-3.64E-05
28	34.4415	-83.1492	56.1429	4.47E-04	1.5	4.47E-04	1.17E-05
29	34.4415	-83.1492	65.5	3.73E-04	9.3	3.68E-04	6.04E-05
30	34.4415	-83.1492	74.8571	3.1E-04	20.3	2.91E-04	1.08E-04
31	34.4415	-83.1492	84.2143	2.64E-04	34.9	2.16E-04	1.51E-04
32	34.4415	-83.1492	93.5714	2.39E-04	52.2	1.46E-04	1.89E-04
33	34.4415	-83.1492	102.929	2.35E-04	69.4	8.27E-05	2.2E-04
34	34.4415	-83.1492	112.286	2.44E-04	83.8	2.62E-05	2.43E-04
35	34.4415	-83.1492	121.643	2.57E-04	94.9	-2.18E-05	2.56E-04
36	34.4415	-83.1492	131.	2.67E-04	103.	-6.02E-05	2.6E-04
37	34.4415	-83.1492	140.357	2.68E-04	109.2	-8.83E-05	2.53E-04
38	34.4415	-83.1492	149.714	2.59E-04	114.	-1.06E-04	2.37E-04
39	34.4415	-83.1492	159.071	2.39E-04	117.9	-1.12E-04	2.11E-04
40	34.4415	-83.1492	168.429	2.05E-04	121.1	-1.06E-04	1.76E-04
41	34.4415	-83.1492	177.786	1.59E-04	123.8	-8.84E-05	1.32E-04
42	34.4415	-83.1492	187.143	9.9E-05	126.4	-5.87E-05	7.97E-05
END	34.4415	-83.1492	196.5	0	0	0	0
GND	68.883	-166.298	0	3.38E-03	69.9	1.16E-03	3.17E-03
44	68.883	-166.298	9.47619	2.06E-03	56.	1.15E-03	1.71E-03
45	68.883	-166.298	18.9524	1.48E-03	39.8	1.13E-03	9.45E-04
46	68.883	-166.298	28.4286	1.13E-03	12.1	1.1E-03	2.35E-04
47	68.883	-166.298	37.9048	1.14E-03	338.3	1.06E-03	-4.2E-04
48	68.883	-166.298	47.381	1.44E-03	314.2	1.E-03	-1.03E-03
49	68.883	-166.298	56.8571	1.84E-03	300.6	9.36E-04	-1.59E-03
50	68.883	-166.298	66.3333	2.25E-03	292.5	8.63E-04	-2.08E-03
51	68.883	-166.298	75.8095	2.63E-03	287.3	7.83E-04	-2.51E-03
52	68.883	-166.298	85.2857	2.95E-03	283.7	6.98E-04	-2.86E-03

TABLE 3.6 (cont'd)

53	68.883	-166.298	94.7619	3.19E-03	281.	6.11E-04	-3.13E-03
54	68.883	-166.298	104.238	3.35E-03	279.	5.23E-04	-3.31E-03
55	68.883	-166.298	113.714	3.43E-03	277.3	4.35E-04	-3.4E-03
56	68.883	-166.298	123.191	3.41E-03	275.9	3.51E-04	-3.39E-03
57	68.883	-166.298	132.667	3.3E-03	274.7	2.73E-04	-3.29E-03
58	68.883	-166.298	142.143	3.1E-03	273.7	2.01E-04	-3.09E-03
59	68.883	-166.298	151.619	2.81E-03	272.8	1.38E-04	-2.81E-03
60	68.883	-166.298	161.095	2.44E-03	272.	8.43E-05	-2.44E-03
61	68.883	-166.298	170.571	2.E-03	271.2	4.24E-05	-2.E-03
62	68.883	-166.298	180.048	1.47E-03	270.5	1.29E-05	-1.47E-03
63	68.883	-166.298	189.524	8.77E-04	269.8	-3.16E-06	-8.77E-04
END	68.883	-166.298	199.	0	0	0	0

TABLE 3.7

KFAQ NIGHTTIME
TOWER 3 BASE CIRCUIT ANALYSIS
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

FREQUENCY: 1170 kHz

BASE VOLTAGE SAMPLE ELEMENT IMPEDANCE (R,X): 0.00,100000.00 OHMS
TOWER FEED IMPEDANCE (R,X): 0.00, 55.60 OHMS
TOWER BASE REGION IMPEDANCE (R,X): 0.00,-13603.00 OHMS
MoM MODELED TOWER IMPEDANCE (R,X): 71.93, -196.63 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	100000.00
2	GROUND	69.89	-194.19
1	2	0.00	55.60

NODE	VOLTAGE (VOLTS) MAGNITUDE	PHASE
1	0.752	6.97
2	1.000	0.00

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT CURRENT I1 (AMPS):	0.164E-02	0.455E-02	0.484E-02	70.17
OUTPUT CURRENT I2 (AMPS):	0.164E-02	0.449E-02	0.478E-02	69.91
MODELED ATU OUTPUT IMPEDANCE V1/I1 (OHMS):	70.09	-138.74	155.43	-63.20

TABLE 3.8

KFAQ NIGHTTIME
DIRECTIONAL ARRAY MoM SUMMARY
Journal Broadcast Corporation
Tulsa, OK

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	1.36	21
		0	0	196.8		
2	none	90.	67.5	0	1.36	21
		90.	67.5	196.5		
3	none	180.	67.5	0	1.36	21
		180.	67.5	199.		

Number of wires = 3
current nodes = 63

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	9.35714	3	9.47619
radius	1	1.36	1	1.36

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.17	0	1	.0259921	.0263228

Sources

source	node	sector	magnitude	phase	type
1	1	1	4,775.17	336.7	voltage
2	22	1	6,309.37	71.3	voltage
3	43	1	2,163.31	170.7	voltage

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.17	42.418	-157.61	163.22	285.1	13.666	-1.2735	-5.9492
source = 2; node 22, sector 1							
1.17	73.076	-209.81	222.17	289.2	14.122	-1.2321	-6.0727
source = 3; node 43, sector 1							
1.17	125.25	-327.96	351.07	290.9	20.03	-.86802	-7.4193

TABLE 3.8 (cont'd)

CURRENT rms
Frequency = 1.17 MHz
Input power = 50,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	20.6877	51.7	12.8261	16.2319
2	0	0	9.37143	14.0437	44.5	10.018	9.84195
3	0	0	18.7429	10.6364	37.8	8.40518	6.51815
4	0	0	28.1143	7.5982	26.8	6.77956	3.43078
5	0	0	37.4857	5.18348	6.4	5.15155	.574396
6	0	0	46.8571	4.09348	329.4	3.52351	-2.08361
7	0	0	56.2286	4.91791	293.	1.92154	-4.52698
8	0	0	65.6	6.73686	273.2	.379174	-6.72618
9	0	0	74.9714	8.71313	263.	-1.06744	-8.6475
10	0	0	84.3429	10.531	256.9	-2.38253	-10.2579
11	0	0	93.7143	12.0572	253.	-3.53269	-11.5281
12	0	0	103.086	13.2193	250.2	-4.48829	-12.4341
13	0	0	112.457	13.9721	248.	-5.22454	-12.9585
14	0	0	121.829	14.2876	246.4	-5.72219	-13.0917
15	0	0	131.2	14.1511	245.1	-5.96801	-12.831
16	0	0	140.571	13.5593	243.9	-5.95481	-12.1818
17	0	0	149.943	12.5188	243.	-5.68108	-11.1555
18	0	0	159.314	11.0433	242.2	-5.14995	-9.7689
19	0	0	168.686	9.14898	241.5	-4.36691	-8.03953
20	0	0	178.057	6.84026	240.8	-3.33203	-5.97384
21	0	0	187.429	4.13172	240.2	-2.05106	-3.58668
END	0	0	196.8	0	0	0	0
GND	34.4415	-83.1492	0	20.0811	142.1	-15.8388	12.3443
23	34.4415	-83.1492	9.35714	11.7945	127.4	-7.16017	9.37236
24	34.4415	-83.1492	18.7143	8.22674	109.2	-2.69921	7.77132
25	34.4415	-83.1492	28.0714	6.38994	77.3	1.39954	6.23479
26	34.4415	-83.1492	37.4286	7.00833	42.8	5.14206	4.76192
27	34.4415	-83.1492	46.7857	9.19981	21.3	8.57212	3.33993
28	34.4415	-83.1492	56.1429	11.8342	9.6	11.6675	1.97941
29	34.4415	-83.1492	65.5	14.4054	2.8	14.3885	.69789
30	34.4415	-83.1492	74.8571	16.6982	358.3	16.6911	-.484287
31	34.4415	-83.1492	84.2143	18.5978	355.2	18.5334	-1.5464
32	34.4415	-83.1492	93.5714	20.0325	352.9	19.8798	-2.4687
33	34.4415	-83.1492	102.929	20.9542	351.1	20.7033	-3.23343
34	34.4415	-83.1492	112.286	21.333	349.7	20.9872	-3.82553
35	34.4415	-83.1492	121.643	21.1539	348.5	20.726	-4.23305
36	34.4415	-83.1492	131.	20.4159	347.4	19.9255	-4.44756
37	34.4415	-83.1492	140.357	19.1301	346.5	18.602	-4.46413
38	34.4415	-83.1492	149.714	17.3188	345.7	16.7813	-4.28124
39	34.4415	-83.1492	159.071	15.0112	344.9	14.4957	-3.9
40	34.4415	-83.1492	168.429	12.2386	344.2	11.7789	-3.32275
41	34.4415	-83.1492	177.786	9.01499	343.6	8.64764	-2.54723
42	34.4415	-83.1492	187.143	5.36685	342.9	5.13036	-1.57562
END	34.4415	-83.1492	196.5	0	0	0	0
GND	68.883	-166.298	0	4.35728	239.8	-2.19411	-3.76455
44	68.883	-166.298	9.47619	1.81478	201.	-1.69448	-.649734
45	68.883	-166.298	18.9524	1.75446	146.6	-1.46436	.966333
46	68.883	-166.298	28.4286	2.7642	117.5	-1.27466	2.45276
47	68.883	-166.298	37.9048	3.97136	106.4	-1.11905	3.81044
48	68.883	-166.298	47.381	5.14722	101.1	-.987907	5.05153
49	68.883	-166.298	56.8571	6.22624	98.1	-.874826	6.16448
50	68.883	-166.298	66.3333	7.17353	96.2	-.774474	7.1316
51	68.883	-166.298	75.8095	7.96318	94.9	-.682384	7.93389
52	68.883	-166.298	85.2857	8.57434	94.	-.594996	8.55367

TABLE 3.8 (cont'd)

53	68.883	-166.298	94.7619	8.99042	93.3	-.50975	8.97595
54	68.883	-166.298	104.238	9.19975	92.6	-.425151	9.18992
55	68.883	-166.298	113.714	9.19532	92.1	-.340798	9.189
56	68.883	-166.298	123.191	8.97526	91.6	-.257374	8.97157
57	68.883	-166.298	132.667	8.54269	91.2	-.176575	8.54087
58	68.883	-166.298	142.143	7.90547	90.7	-.101014	7.90483
59	68.883	-166.298	151.619	7.07547	90.3	-.0340636	7.07539
60	68.883	-166.298	161.095	6.06718	89.8	.0203274	6.06715
61	68.883	-166.298	170.571	4.89593	89.3	.057828	4.89559
62	68.883	-166.298	180.048	3.57013	88.8	.073711	3.56937
63	68.883	-166.298	189.524	2.10209	88.3	.0636081	2.10113
END	68.883	-166.298	199.	0	0	0	0

TABLE 3.9

KFAQ NIGHTTIME
DIRECTIONAL ARRAY SYNTHESIS
Journal Broadcast Corporation
Tulsa, OK

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.17 MHz

tower	field ratio magnitude	phase (deg)
1	.5	-96.
2	1.	0
3	.5	96.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	3,376.55	336.7	20.6877	51.7
22	4,461.4	71.3	20.0811	142.1
43	1,529.69	170.7	4.3573	239.8

Sum of square of source currents = 1,700.43
Total power = 50,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00166254	.00436618
Y(1, 2)	.00102299	-8.4014E-05
Y(1, 3)	5.6215E-05	-.000454997
Y(2, 1)	.00102299	-8.401E-05
Y(2, 2)	.00162845	.00466625
Y(2, 3)	.00102168	-9.9533E-05
Y(3, 1)	5.6208E-05	-.000454997
Y(3, 2)	.00102166	-9.9575E-05
Y(3, 3)	.00166804	.00454867

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	69.4174	-194.206
Z(1, 2)	36.5377	25.8493
Z(1, 3)	6.98979	-7.23271
Z(2, 1)	36.5378	25.849
Z(2, 2)	52.9335	-178.994
Z(2, 3)	35.8408	24.1512
Z(3, 1)	6.98966	-7.2327
Z(3, 2)	35.8404	24.153
Z(3, 3)	65.1006	-188.03

TABLE 3.10

KFAQ NIGHTTIME
TOWER 1 BASE CIRCUIT ANALYSIS
DRIVEN FROM ARRAY SYNTHESIS
Journal Broadcast Corporation
Tulsa, OK

FREQUENCY: 1170 kHz

BASE VOLTAGE SAMPLE ELEMENT IMPEDANCE (R,X): 0.00,100000.00 OHMS
TOWER FEED IMPEDANCE (R,X): 0.00, 46.50 OHMS
TOWER BASE REGION IMPEDANCE (R,X): 0.00,-13603.00 OHMS
MoM MODELED TOWER IMPEDANCE (R,X): 42.42, -157.61 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	100000.00
2	GROUND	41.28	-155.97
1	2	0.00	46.50

NODE	VOLTAGE (VOLTS) MAGNITUDE	PHASE
1	2448.487	342.54
2	3376.550	336.70

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT CURRENT I1 (AMPS):	12.913	16.440	20.905	51.85
OUTPUT CURRENT I2 (AMPS):	12.822	16.235	20.688	51.70
MODELED ATU OUTPUT IMPEDANCE V1/I1 (OHMS):	41.37	-109.58	117.12	-69.32

TABLE 3.11

KFAQ NIGHTTIME
TOWER 2 BASE CIRCUIT ANALYSIS
DRIVEN FROM ARRAY SYNTHESIS
Journal Broadcast Corporation
Tulsa, OK

FREQUENCY: 1170 kHz

BASE VOLTAGE SAMPLE ELEMENT IMPEDANCE (R,X): 0.00,100000.00 OHMS
TOWER FEED IMPEDANCE (R,X): 0.00, 58.30 OHMS
TOWER BASE REGION IMPEDANCE (R,X): 0.00,-13603.00 OHMS
MoM MODELED TOWER IMPEDANCE (R,X): 73.08, -209.81 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	100000.00
2	GROUND	70.86	-207.00
1	2	0.00	58.30

NODE	VOLTAGE (VOLTS) MAGNITUDE	PHASE
1	3358.816	77.88
2	4461.400	71.30

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT CURRENT I1 (AMPS):	-16.123	12.434	20.361	142.36
OUTPUT CURRENT I2 (AMPS):	-15.846	12.335	20.081	142.10
MODELED ATU OUTPUT IMPEDANCE V1/I1 (OHMS):	71.07	-148.87	164.97	-64.48

TABLE 3.12

KFAQ NIGHTTIME
TOWER 3 BASE CIRCUIT ANALYSIS
DRIVEN FROM ARRAY SYNTHESIS
Journal Broadcast Corporation
Tulsa, OK

FREQUENCY: 1170 kHz

BASE VOLTAGE SAMPLE ELEMENT IMPEDANCE (R,X): 0.00,100000.00 OHMS
TOWER FEED IMPEDANCE (R,X): 0.00, 55.60 OHMS
TOWER BASE REGION IMPEDANCE (R,X): 0.00,-13603.00 OHMS
MoM MODELED TOWER IMPEDANCE (R,X): 125.25, -327.96 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	100000.00
2	GROUND	119.41	-321.34
1	2	0.00	55.60

NODE	VOLTAGE (VOLTS) MAGNITUDE	PHASE
1	1300.003	174.51
2	1529.690	170.70

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT CURRENT I1 (AMPS):	-2.209	-3.864	4.450	240.25
OUTPUT CURRENT I2 (AMPS):	-2.192	-3.766	4.357	239.80
MODELED ATU OUTPUT IMPEDANCE V1/I1 (OHMS):	120.05	-266.30	292.11	-65.73

TABLE 3.13

KFAQ NIGHTTIME
ANTENNA MONITOR PARAMETERS
RESULTING FROM ARRAY SYNTHESIS
Journal Broadcast Corporation
Tulsa, OK

	Base Voltage Sample Element		Antenna Monitor	
	Magnitude	Phase		Phase
Tower	(volts)	(degrees)	Ratio	(degrees)
1	2,448.49	342.54	0.729	-95.3
2	3,358.82	77.88	1.000	0.0
3	1,300.00	174.51	0.387	96.6

4.0 ANTENNA SYSTEM STABILITY ANALYSIS

A stability analysis was conducted on the KFAQ nighttime antenna system MoM model because of segment length to radius ratio warnings detected in the model's "Problem Definition Evaluation", as outputted by Expert MININEC Broadcast Professional Version 23. This stability analysis was performed to show that a change in segment length by ±1 segment, holding the segment radius at 100% of the tower's modeled radius, would not abruptly change the modeled antenna impedance, thus verifying the validity of the model. A copy of this evaluation detailing the warnings is shown in table 4.0.

The KFAQ nighttime antenna system MoM model, as described in section 3.0 of this document, is constructed of three individual wires, each representing an individual tower in the KFAQ nighttime array. Each one of these wires was modeled using 21 segments. Since all of the towers in the array are identical, an individual wire representing one of the towers in the array will be used for this analysis. Wire 1 representing tower 1 was chosen and will be used in this analysis.

Table 4.1 details the analysis of tower 1 with 21 segments, as defined in the proposed model, with all non-driven towers loaded with their short circuit impedance computed from the circuit model. Table 4.2 details the analysis of tower 1 with 20 segments, and table 4.3 details the analysis of tower 1 with 22 segments. It should be noted that in each of these tables, segment length meets the requirements that a segment may be no longer than 10 electrical degrees in length. Table 4.4 is a summary of the modeled MoM antenna input impedance for each segment configuration, and

shows that as the segment length is varied, the modeled antenna input impedance is close to that computed in the proposed model.

TABLE 4.0

KFAQ NIGHTTIME MoM MODEL
PROBLEM DEFINITION EVALUATION
Journal Broadcast Corporation
Tulsa, OK

```
PROBLEM DEFINITION EVALUATION

maximum frequency = 1.17 MHz
shortest wavelength = 256.239 meters
number of wires =  3

INDIVIDUAL WIRES
segment length to wavelength ratio: No detected violations!
segment length to radius ratio:
  wire  1  - warning  4.904674
  wire  2  - warning  4.897197
  wire  3  - warning  4.959503
radius to wavelength ratio:         No detected violations!
checking for wires in ground plane:  No detected violations!

WIRE JUNCTIONS
junction segment length ratio:      No detected violations!
junction radius ratio:              No detected violations!

ELECTRICAL DESCRIPTION
    No detected violations!
```

TABLE 4.1

KFAQ NIGHTTIME STABILITY ANALYSIS
TOWER 1 MoM SUMMARY WITH 21 SEGMENTS
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

KFAQ Nighttime

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	1.36	21
		0	0	196.8		
2	none	90.	67.5	0	1.36	21
		90.	67.5	196.5		
3	none	180.	67.5	0	1.36	21
		180.	67.5	199.		

Number of wires = 3
current nodes = 63

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	9.35714	3	9.47619
radius	1	1.36	1	1.36

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.17	0	1	.0259921	.0263228

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	22	0	58.6	0	0	0
2	43	0	55.8	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.17	77.159	-202.84	217.02	290.8	12.778	-1.3623	-5.6985

TABLE 4.1 (cont'd)

CURRENT rms
Frequency = 1.17 MHz
Input power = 8.191E-04 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	3.26E-03	69.2	1.16E-03	3.05E-03
2	0	0	9.37143	1.96E-03	54.1	1.15E-03	1.59E-03
3	0	0	18.7429	1.41E-03	36.5	1.13E-03	8.38E-04
4	0	0	28.1143	1.11E-03	7.4	1.1E-03	1.43E-04
5	0	0	37.4857	1.17E-03	334.9	1.06E-03	-4.96E-04
6	0	0	46.8571	1.48E-03	312.8	1.01E-03	-1.09E-03
7	0	0	56.2286	1.88E-03	300.2	9.43E-04	-1.62E-03
8	0	0	65.6	2.27E-03	292.6	8.73E-04	-2.1E-03
9	0	0	74.9714	2.63E-03	287.6	7.95E-04	-2.51E-03
10	0	0	84.3429	2.93E-03	284.1	7.13E-04	-2.84E-03
11	0	0	93.7143	3.16E-03	281.5	6.28E-04	-3.09E-03
12	0	0	103.086	3.31E-03	279.4	5.42E-04	-3.26E-03
13	0	0	112.457	3.37E-03	277.8	4.56E-04	-3.34E-03
14	0	0	121.829	3.34E-03	276.4	3.74E-04	-3.32E-03
15	0	0	131.2	3.23E-03	275.2	2.95E-04	-3.22E-03
16	0	0	140.571	3.03E-03	274.2	2.23E-04	-3.02E-03
17	0	0	149.943	2.75E-03	273.3	1.59E-04	-2.74E-03
18	0	0	159.314	2.38E-03	272.5	1.04E-04	-2.38E-03
19	0	0	168.686	1.95E-03	271.7	5.88E-05	-1.94E-03
20	0	0	178.057	1.44E-03	271.	2.55E-05	-1.43E-03
21	0	0	187.429	8.55E-04	270.3	4.63E-06	-8.55E-04
END	0	0	196.8	0	0	0	0
GND	34.4415	-83.1492	0	9.51E-04	348.	9.31E-04	-1.98E-04
23	34.4415	-83.1492	9.35714	8.32E-04	348.3	8.15E-04	-1.69E-04
24	34.4415	-83.1492	18.7143	7.6E-04	349.1	7.46E-04	-1.44E-04
25	34.4415	-83.1492	28.0714	6.83E-04	350.7	6.74E-04	-1.11E-04
26	34.4415	-83.1492	37.4286	6.05E-04	353.1	6.E-04	-7.21E-05
27	34.4415	-83.1492	46.7857	5.25E-04	356.8	5.24E-04	-2.91E-05
28	34.4415	-83.1492	56.1429	4.47E-04	2.1	4.47E-04	1.64E-05
29	34.4415	-83.1492	65.5	3.74E-04	9.6	3.69E-04	6.23E-05
30	34.4415	-83.1492	74.8571	3.12E-04	20.	2.93E-04	1.07E-04
31	34.4415	-83.1492	84.2143	2.65E-04	33.9	2.2E-04	1.48E-04
32	34.4415	-83.1492	93.5714	2.37E-04	50.6	1.51E-04	1.83E-04
33	34.4415	-83.1492	102.929	2.3E-04	67.5	8.79E-05	2.12E-04
34	34.4415	-83.1492	112.286	2.35E-04	82.1	3.22E-05	2.33E-04
35	34.4415	-83.1492	121.643	2.46E-04	93.5	-1.52E-05	2.45E-04
36	34.4415	-83.1492	131.	2.54E-04	102.1	-5.33E-05	2.48E-04
37	34.4415	-83.1492	140.357	2.55E-04	108.6	-8.13E-05	2.42E-04
38	34.4415	-83.1492	149.714	2.46E-04	113.7	-9.88E-05	2.25E-04
39	34.4415	-83.1492	159.071	2.26E-04	117.7	-1.05E-04	2.E-04
40	34.4415	-83.1492	168.429	1.95E-04	121.1	-1.E-04	1.67E-04
41	34.4415	-83.1492	177.786	1.5E-04	123.9	-8.4E-05	1.25E-04
42	34.4415	-83.1492	187.143	9.39E-05	126.5	-5.59E-05	7.55E-05
END	34.4415	-83.1492	196.5	0	0	0	0
GND	68.883	-166.298	0	5.01E-04	266.3	-3.23E-05	-5.E-04
44	68.883	-166.298	9.47619	4.41E-04	266.4	-2.73E-05	-4.4E-04
45	68.883	-166.298	18.9524	4.02E-04	266.9	-2.18E-05	-4.01E-04
46	68.883	-166.298	28.4286	3.59E-04	267.7	-1.41E-05	-3.59E-04
47	68.883	-166.298	37.9048	3.14E-04	269.1	-4.68E-06	-3.14E-04
48	68.883	-166.298	47.381	2.67E-04	271.3	6.25E-06	-2.67E-04
49	68.883	-166.298	56.8571	2.18E-04	274.8	1.82E-05	-2.17E-04
50	68.883	-166.298	66.3333	1.7E-04	280.4	3.08E-05	-1.67E-04
51	68.883	-166.298	75.8095	1.26E-04	290.1	4.33E-05	-1.18E-04
52	68.883	-166.298	85.2857	8.97E-05	308.1	5.54E-05	-7.05E-05

TABLE 4.1 (cont'd)

53	68.883	-166.298	94.7619	7.13E-05	338.6	6.64E-05	-2.6E-05
54	68.883	-166.298	104.238	7.71E-05	10.7	7.58E-05	1.43E-05
55	68.883	-166.298	113.714	9.68E-05	30.7	8.32E-05	4.94E-05
56	68.883	-166.298	123.191	1.18E-04	41.5	8.82E-05	7.81E-05
57	68.883	-166.298	132.667	1.35E-04	47.9	9.04E-05	9.98E-05
58	68.883	-166.298	142.143	1.45E-04	51.8	8.94E-05	1.14E-04
59	68.883	-166.298	151.619	1.47E-04	54.5	8.52E-05	1.2E-04
60	68.883	-166.298	161.095	1.4E-04	56.4	7.75E-05	1.17E-04
61	68.883	-166.298	170.571	1.24E-04	57.8	6.62E-05	1.05E-04
62	68.883	-166.298	180.048	9.86E-05	58.9	5.1E-05	8.44E-05
63	68.883	-166.298	189.524	6.29E-05	59.7	3.17E-05	5.43E-05
END	68.883	-166.298	199.	0	0	0	0

TABLE 4.2

KFAQ NIGHTTIME STABILITY ANALYSIS
TOWER 1 MoM SUMMARY WITH 20 SEGMENTS
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

KFAQ Nighttime

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	1.36	20
		0	0	196.8		
2	none	90.	67.5	0	1.36	20
		90.	67.5	196.5		
3	none	180.	67.5	0	1.36	20
		180.	67.5	199.		

Number of wires = 3
current nodes = 60

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	9.825	3	9.95
radius	1	1.36	1	1.36

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.17	0	1	.0272917	.0276389

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	21	0	58.6	0	0	0
2	41	0	55.8	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.17	78.245	-203.93	218.42	291.	12.755	-1.3647	-5.6919

TABLE 4.2 (cont'd)

CURRENT rms
Frequency = 1.17 MHz
Input power = 8.2E-04 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	3.24E-03	69.	1.16E-03	3.02E-03
2	0	0	9.84	1.93E-03	53.3	1.15E-03	1.54E-03
3	0	0	19.68	1.36E-03	33.9	1.13E-03	7.61E-04
4	0	0	29.52	1.1E-03	2.1	1.1E-03	3.99E-05
5	0	0	39.36	1.22E-03	329.4	1.05E-03	-6.22E-04
6	0	0	49.2	1.58E-03	308.9	9.92E-04	-1.23E-03
7	0	0	59.04	2.E-03	297.5	9.24E-04	-1.77E-03
8	0	0	68.88	2.41E-03	290.6	8.47E-04	-2.25E-03
9	0	0	78.72	2.76E-03	286.1	7.64E-04	-2.65E-03
10	0	0	88.56	3.04E-03	282.8	6.76E-04	-2.97E-03
11	0	0	98.4	3.24E-03	280.4	5.86E-04	-3.19E-03
12	0	0	108.24	3.35E-03	278.5	4.96E-04	-3.31E-03
13	0	0	118.08	3.36E-03	277.	4.07E-04	-3.34E-03
14	0	0	127.92	3.28E-03	275.7	3.23E-04	-3.26E-03
15	0	0	137.76	3.1E-03	274.5	2.45E-04	-3.09E-03
16	0	0	147.6	2.82E-03	273.5	1.75E-04	-2.82E-03
17	0	0	157.44	2.46E-03	272.7	1.14E-04	-2.46E-03
18	0	0	167.28	2.01E-03	271.9	6.52E-05	-2.01E-03
19	0	0	177.12	1.49E-03	271.1	2.86E-05	-1.49E-03
20	0	0	186.96	8.84E-04	270.4	5.53E-06	-8.84E-04
END	0	0	196.8	0	0	0	0
GND	34.4415	-83.1492	0	9.5E-04	348.1	9.3E-04	-1.96E-04
22	34.4415	-83.1492	9.825	8.29E-04	348.4	8.12E-04	-1.67E-04
23	34.4415	-83.1492	19.65	7.52E-04	349.3	7.39E-04	-1.4E-04
24	34.4415	-83.1492	29.475	6.72E-04	351.1	6.64E-04	-1.04E-04
25	34.4415	-83.1492	39.3	5.89E-04	353.9	5.86E-04	-6.3E-05
26	34.4415	-83.1492	49.125	5.06E-04	358.	5.06E-04	-1.72E-05
27	34.4415	-83.1492	58.95	4.25E-04	4.1	4.24E-04	3.07E-05
28	34.4415	-83.1492	68.775	3.52E-04	12.9	3.43E-04	7.86E-05
29	34.4415	-83.1492	78.6	2.92E-04	25.1	2.64E-04	1.24E-04
30	34.4415	-83.1492	88.425	2.51E-04	41.1	1.89E-04	1.65E-04
31	34.4415	-83.1492	98.25	2.32E-04	59.	1.19E-04	1.99E-04
32	34.4415	-83.1492	108.075	2.32E-04	75.7	5.72E-05	2.25E-04
33	34.4415	-83.1492	117.9	2.41E-04	89.1	3.6E-06	2.41E-04
34	34.4415	-83.1492	127.725	2.51E-04	99.2	-4.02E-05	2.48E-04
35	34.4415	-83.1492	137.55	2.55E-04	106.7	-7.32E-05	2.44E-04
36	34.4415	-83.1492	147.375	2.49E-04	112.4	-9.46E-05	2.3E-04
37	34.4415	-83.1492	157.2	2.3E-04	116.9	-1.04E-04	2.06E-04
38	34.4415	-83.1492	167.025	1.99E-04	120.5	-1.01E-04	1.72E-04
39	34.4415	-83.1492	176.85	1.55E-04	123.6	-8.57E-05	1.29E-04
40	34.4415	-83.1492	186.675	9.66E-05	126.4	-5.73E-05	7.78E-05
END	34.4415	-83.1492	196.5	0	0	0	0
GND	68.883	-166.298	0	5.E-04	266.4	-3.14E-05	-4.99E-04
42	68.883	-166.298	9.95	4.38E-04	266.6	-2.64E-05	-4.37E-04
43	68.883	-166.298	19.9	3.97E-04	267.1	-2.04E-05	-3.97E-04
44	68.883	-166.298	29.85	3.52E-04	268.	-1.22E-05	-3.52E-04
45	68.883	-166.298	39.8	3.05E-04	269.6	-2.09E-06	-3.05E-04
46	68.883	-166.298	49.75	2.55E-04	272.2	9.59E-06	-2.54E-04
47	68.883	-166.298	59.7	2.04E-04	276.3	2.23E-05	-2.03E-04
48	68.883	-166.298	69.65	1.54E-04	283.3	3.54E-05	-1.5E-04
49	68.883	-166.298	79.6	1.1E-04	296.	4.84E-05	-9.91E-05
50	68.883	-166.298	89.55	7.88E-05	320.2	6.06E-05	-5.04E-05
51	68.883	-166.298	99.5	7.15E-05	355.5	7.13E-05	-5.67E-06
52	68.883	-166.298	109.45	8.7E-05	22.9	8.01E-05	3.38E-05

TABLE 4.2 (cont'd)

53	68.883	-166.298	119.4	1.09E-04	37.8	8.64E-05	6.69E-05
54	68.883	-166.298	129.35	1.29E-04	45.9	8.98E-05	9.25E-05
55	68.883	-166.298	139.3	1.42E-04	50.7	8.99E-05	1.1E-04
56	68.883	-166.298	149.25	1.47E-04	53.9	8.64E-05	1.18E-04
57	68.883	-166.298	159.2	1.42E-04	56.1	7.91E-05	1.17E-04
58	68.883	-166.298	169.15	1.27E-04	57.6	6.79E-05	1.07E-04
59	68.883	-166.298	179.1	1.01E-04	58.8	5.24E-05	8.65E-05
60	68.883	-166.298	189.05	6.46E-05	59.6	3.27E-05	5.58E-05
END	68.883	-166.298	199.	0	0	0	0

TABLE 4.3

KFAQ NIGHTTIME STABILITY ANALYSIS
TOWER 1 MoM SUMMARY WITH 22 SEGMENTS
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

KFAQ Nighttime

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	1.36	22
		0	0	196.8		
2	none	90.	67.5	0	1.36	22
		90.	67.5	196.5		
3	none	180.	67.5	0	1.36	22
		180.	67.5	199.		

Number of wires = 3
current nodes = 66

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	8.93182	3	9.04546
radius	1	1.36	1	1.36

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.17	0	1	.0248106	.0251263

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	23	0	58.6	0	0	0
2	45	0	55.8	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.17	76.152	-201.83	215.72	290.7	12.8	-1.3599	-5.7049

TABLE 4.3 (cont'd)

CURRENT rms
Frequency = 1.17 MHz
Input power = 8.182E-04 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	3.28E-03	69.3	1.16E-03	3.07E-03
2	0	0	8.94546	2.E-03	54.8	1.15E-03	1.63E-03
3	0	0	17.8909	1.45E-03	38.7	1.13E-03	9.09E-04
4	0	0	26.8364	1.13E-03	12.1	1.11E-03	2.38E-04
5	0	0	35.7818	1.13E-03	340.4	1.07E-03	-3.8E-04
6	0	0	44.7273	1.39E-03	316.9	1.02E-03	-9.52E-04
7	0	0	53.6727	1.76E-03	303.	9.6E-04	-1.48E-03
8	0	0	62.6182	2.15E-03	294.6	8.95E-04	-1.95E-03
9	0	0	71.5636	2.5E-03	289.2	8.23E-04	-2.36E-03
10	0	0	80.5091	2.81E-03	285.4	7.46E-04	-2.71E-03
11	0	0	89.4545	3.06E-03	282.6	6.66E-04	-2.99E-03
12	0	0	98.4	3.24E-03	280.4	5.84E-04	-3.19E-03
13	0	0	107.346	3.34E-03	278.6	5.02E-04	-3.31E-03
14	0	0	116.291	3.37E-03	277.2	4.21E-04	-3.34E-03
15	0	0	125.236	3.31E-03	276.	3.44E-04	-3.29E-03
16	0	0	134.182	3.18E-03	274.9	2.71E-04	-3.17E-03
17	0	0	143.127	2.96E-03	274.	2.04E-04	-2.96E-03
18	0	0	152.073	2.67E-03	273.1	1.45E-04	-2.67E-03
19	0	0	161.018	2.31E-03	272.3	9.41E-05	-2.31E-03
20	0	0	169.964	1.88E-03	271.6	5.32E-05	-1.88E-03
21	0	0	178.909	1.39E-03	270.9	2.28E-05	-1.39E-03
22	0	0	187.855	8.29E-04	270.3	3.86E-06	-8.29E-04
END	0	0	196.8	0	0	0	0
GND	34.4415	-83.1492	0	9.53E-04	347.9	9.32E-04	-1.99E-04
24	34.4415	-83.1492	8.93182	8.35E-04	348.2	8.18E-04	-1.71E-04
25	34.4415	-83.1492	17.8636	7.66E-04	348.9	7.52E-04	-1.47E-04
26	34.4415	-83.1492	26.7955	6.93E-04	350.3	6.84E-04	-1.16E-04
27	34.4415	-83.1492	35.7273	6.19E-04	352.5	6.13E-04	-8.03E-05
28	34.4415	-83.1492	44.6591	5.42E-04	355.8	5.41E-04	-3.98E-05
29	34.4415	-83.1492	53.5909	4.67E-04	.4	4.67E-04	3.28E-06
30	34.4415	-83.1492	62.5227	3.96E-04	6.9	3.93E-04	4.73E-05
31	34.4415	-83.1492	71.4545	3.32E-04	15.8	3.2E-04	9.06E-05
32	34.4415	-83.1492	80.3864	2.81E-04	27.9	2.48E-04	1.31E-04
33	34.4415	-83.1492	89.3182	2.46E-04	42.9	1.81E-04	1.68E-04
34	34.4415	-83.1492	98.25	2.31E-04	59.4	1.18E-04	1.99E-04
35	34.4415	-83.1492	107.182	2.31E-04	74.7	6.08E-05	2.23E-04
36	34.4415	-83.1492	116.114	2.4E-04	87.4	1.09E-05	2.39E-04
37	34.4415	-83.1492	125.046	2.5E-04	97.1	-3.1E-05	2.48E-04
38	34.4415	-83.1492	133.977	2.56E-04	104.5	-6.41E-05	2.47E-04
39	34.4415	-83.1492	142.909	2.54E-04	110.2	-8.79E-05	2.38E-04
40	34.4415	-83.1492	151.841	2.43E-04	114.8	-1.02E-04	2.21E-04
41	34.4415	-83.1492	160.773	2.22E-04	118.5	-1.06E-04	1.95E-04
42	34.4415	-83.1492	169.705	1.9E-04	121.6	-9.94E-05	1.62E-04
43	34.4415	-83.1492	178.636	1.46E-04	124.2	-8.24E-05	1.21E-04
44	34.4415	-83.1492	187.568	9.14E-05	126.7	-5.46E-05	7.33E-05
END	34.4415	-83.1492	196.5	0	0	0	0
GND	68.883	-166.298	0	5.02E-04	266.2	-3.31E-05	-5.01E-04
46	68.883	-166.298	9.04546	4.43E-04	266.3	-2.82E-05	-4.42E-04
47	68.883	-166.298	18.0909	4.05E-04	266.8	-2.3E-05	-4.05E-04
48	68.883	-166.298	27.1364	3.65E-04	267.5	-1.58E-05	-3.65E-04
49	68.883	-166.298	36.1818	3.23E-04	268.8	-7.01E-06	-3.22E-04
50	68.883	-166.298	45.2273	2.78E-04	270.7	3.23E-06	-2.78E-04
51	68.883	-166.298	54.2727	2.31E-04	273.6	1.45E-05	-2.31E-04
52	68.883	-166.298	63.3182	1.85E-04	278.2	2.65E-05	-1.83E-04

TABLE 4.3 (cont'd)

53	68.883	-166.298	72.3636	1.41E-04	285.9	3.86E-05	-1.36E-04
54	68.883	-166.298	81.4091	1.03E-04	299.4	5.04E-05	-8.94E-05
55	68.883	-166.298	90.4545	7.64E-05	323.5	6.14E-05	-4.55E-05
56	68.883	-166.298	99.5	7.14E-05	356.1	7.13E-05	-4.85E-06
57	68.883	-166.298	108.546	8.55E-05	21.6	7.95E-05	3.14E-05
58	68.883	-166.298	117.591	1.06E-04	36.1	8.56E-05	6.24E-05
59	68.883	-166.298	126.636	1.25E-04	44.3	8.94E-05	8.74E-05
60	68.883	-166.298	135.682	1.39E-04	49.4	9.06E-05	1.06E-04
61	68.883	-166.298	144.727	1.47E-04	52.7	8.88E-05	1.17E-04
62	68.883	-166.298	153.773	1.47E-04	55.1	8.4E-05	1.2E-04
63	68.883	-166.298	162.818	1.38E-04	56.7	7.59E-05	1.16E-04
64	68.883	-166.298	171.864	1.22E-04	58.	6.45E-05	1.03E-04
65	68.883	-166.298	180.909	9.61E-05	59.	4.96E-05	8.24E-05
66	68.883	-166.298	189.955	6.13E-05	59.7	3.09E-05	5.3E-05
END	68.883	-166.298	199.	0	0	0	0

TABLE 4.4

KFAQ NIGHTTIME STABILITY ANALYSIS
TOWER 1 MoM SUMMARY
DRIVEN INDIVIDUALLY
Journal Broadcast Corporation
Tulsa, OK

Segment Configuration	Modeled Z_{ANT} (ohms)
21 Segments *	77.2-j202.8
20 Segments	78.3-j203.9
22 Segments	76.2-j201.8

* Proposed Model Configuration

5.0 REFERENCE FIELD STRENGTH MEASUREMENTS

Reference field strength measurements, measured on the pattern minima radial bearings and center of pattern maxima bearing, were made on the KFAQ nighttime pattern. Three measurements were made on each radial bearing and the measurement values, along with GPS coordinates and point description, are listed in Table 5.0. All field strength measurements were made by Derek Gorman using a Potomac Instruments FIM-41, S/N 870. This meter was last calibrated on September 2, 2010.

TABLE 5.0

KFAQ NIGHTTIME REFERENCE
FIELD STRENGTH MEASUREMENTS
Journal Broadcast Corporation
Tulsa, OK

Azimuth (Degrees)	Point	Distance (km)	Field Strength (mV/m)	Date	Time (CDT)	GPS Coordinates (NAD 27)	Description
47	1	3.44	50.0	8/14/11	0952	N36-10-04.9 W95-46-46.4	East edge of the road opposite the driveway to 800/810/820 N 177th East Avenue
47	2	4.48	60.0	8/14/11	1002	N36-10-26.6 W95-46-14.6	South West edge of the road in front of a fire hydrant next to the driveway to 1262 Forest Lane
47	3	4.86	45.0	8/14/11	1015	N36-10-36.3 W95-46-05.1	Center of the road at the driveway to 1490 Hickory Lane
67.5	1	2.72	39.0	8/14/11	0933	N36-09-21.3 W95-46-46.6	Field entrance on the West side of Lynn Lane 0.9 km North of E 11th Street
67.5	2	3.69	26.0	8/14/11	1027	N36-09-32.8 W95-46-10.7	Center of the intersection of S 185th E Avenue and S 184th E Place
67.5	3	4.10	34.0	8/14/11	1040	N36-09-38.8 W95-45-55.6	East entrance to 18811 E Admiral Place (Equipment World) 21.3 m from the North edge of the road
98	1	2.62	32.0	8/14/11	1052	N36-08-36.2 W95-46-44.5	South edge of the road opposite the driveway to 17809 E 13th Street
98	2	4.20	44.0	8/14/11	1100	N36-08-29.2 W95-45-41.6	Field entrance on the East side of S 193rd E Avenue 0.75 km South of E 11th Street

TABLE 5.0 (cont'd)

Azimuth (Degrees)	Point	Distance (km)	Field Strength (mV/m)	Date	Time (CDT)	GPS Coordinates (NAD 27)	Description
98	3	6.84	27.5	8/14/11	1117	N36-08-17.5 W95-43-56.9	Grass area in the center of Creek Turnpike 0.5 km North of the E 21st Street bridge
247	1	3.42	900	8/14/11	1150	N36-08-05.2 W95-50-33.7	Center of the road at the Driveway to 2007 S 120th E Avenue
247	2	4.22	750	8/14/11	1208	N36-07-54.5 W95-51-03.3	East side of S Garnett Road at the entrance to 2119 S Garnett Road (Morelos Supermercados)
247	3	4.87	620	8/14/11	1219	N36-07-46.4 W95-51-26.2	Center of Road at Driveway to 2317 S 107th E Avenue

6.0 ANTENNA SYSTEM IMPEDANCE MEASUREMENTS

All impedance measurements were conducted on August 13, 2011 by Derek Gorman using the equipment shown in Figure 6.0. A Delta Electronics RG-4 receiver/generator was used as the signal source and as the bridge detector. A Delta Electronics OIB-3 was used as the bridge. The manufacturer's stated accuracy is ±2%, ±1 ohm.

The KFAQ non-directional Tower #2 base impedance measurements are tabulated in Table 6.1 and plotted in Figure 6.1 The KFAQ nighttime directional common point impedance measurements are tabulated in Table 6.2 and plotted in Figure 6.2. While conducting these measurements, the resistance values were read directly from the sum of the switch and dial positions on the bridge. The reactance values were also read according to the sum of the switch and dial positions and then corrected by multiplying the reading by the frequency in MHz.

Figure 6.3 is a diagram of the KFAQ feeder system for the KFAQ directional antenna system showing the point at which these impedance measurements were made.

JBCBD1 1/11/12

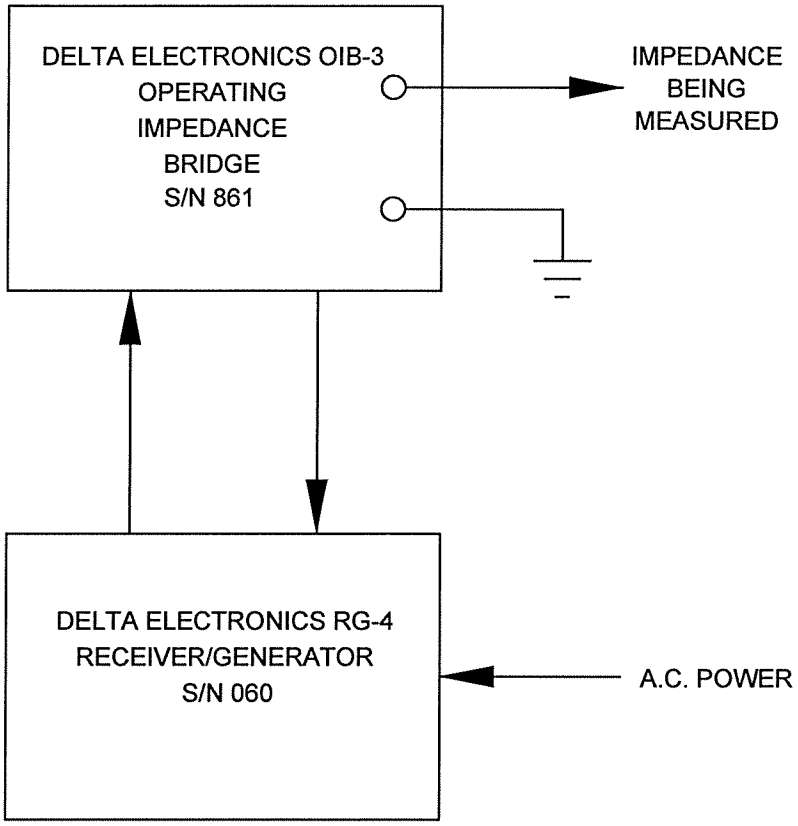


FIG. 6.0

BLOCK DIAGRAM OF
IMPEDANCE MEASURING EQUIPMENT

JOURNAL BROADCAST CORPORATION
TULSA, OK

CARL E. SMITH CONSULTING ENGINEERS
2324 N. CLEVE-MASS., RD. BOX 807
BATH, OHIO 44210-0807
(330) 659-4440

TABLE 6.1

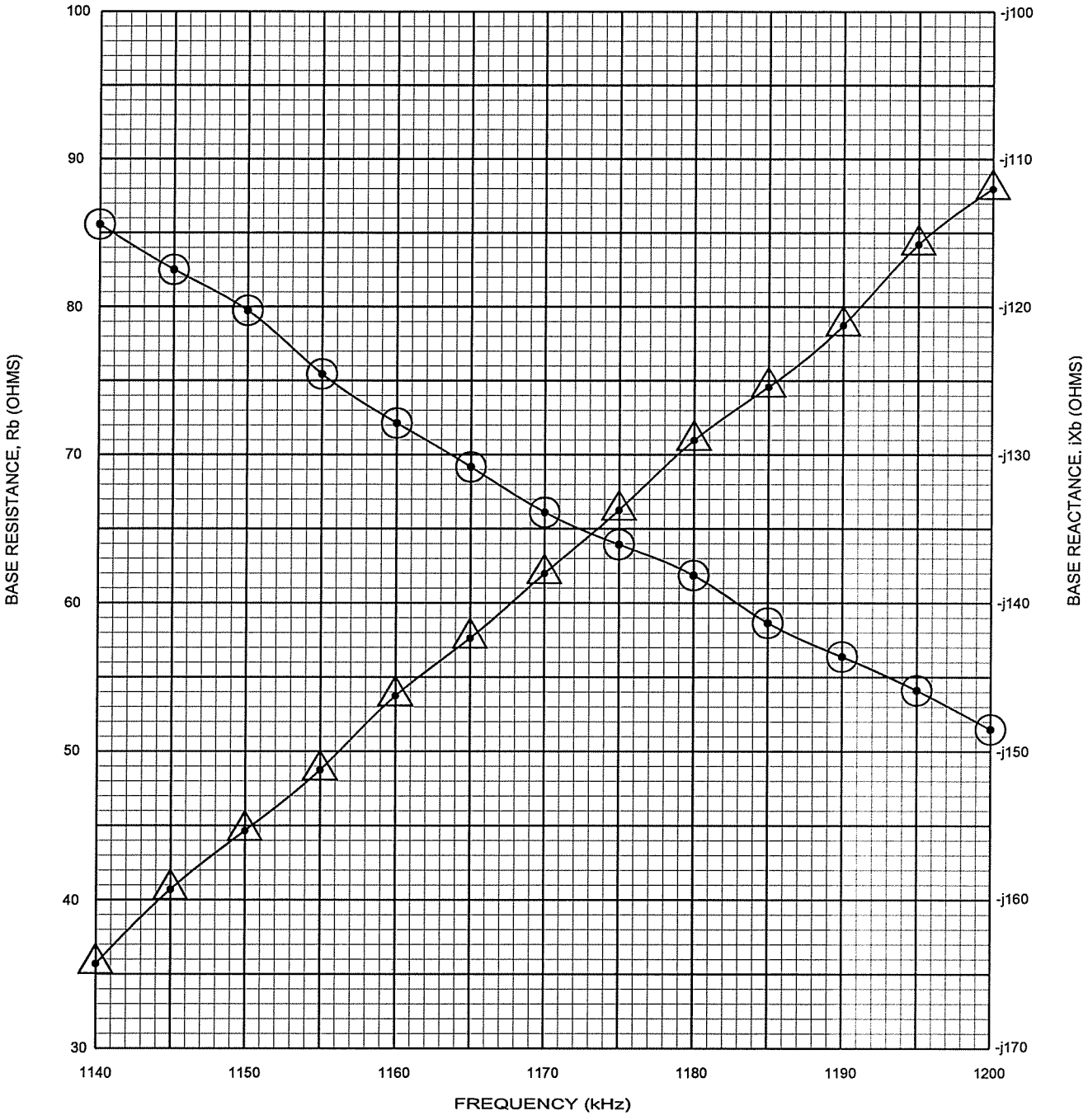
KFAQ DAYTIME NONDIRECTIONAL TOWER #2
BASE IMPEDANCE MEASUREMENTS
Journal Broadcast Corporation
Tulsa, OK

Frequency (kHz)	Resistance (ohms)	Reactance (ohms)
1140	85.6	-j164.4
1145	82.5	-j159.4
1150	79.9	-j155.4
1155	75.3	-j151.4
1160	72.2	-j146.2
1165	69.1	-j142.2
*1170	66.0	-j138.1
1175	63.9	-j133.9
1180	61.9	-j129.1
1185	58.8	-j125.5
1190	56.7	-j121.2
1195	54.1	-j115.7
1200	51.6	-j112.0

*Operating Frequency

CES-116

JBCIM4 1/11/12



- Rb

- jXb

Zb = 66.0 - j138.1 OHMS

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(330) 659-4440

FIG. 6.1

KFAQ DAYTIME NON-DIRECTIONAL
TOWER 2
BASE IMPEDANCE MEASUREMENTS

JOURNAL BROADCAST CORPORATION
TULSA, OK

TABLE 6.2

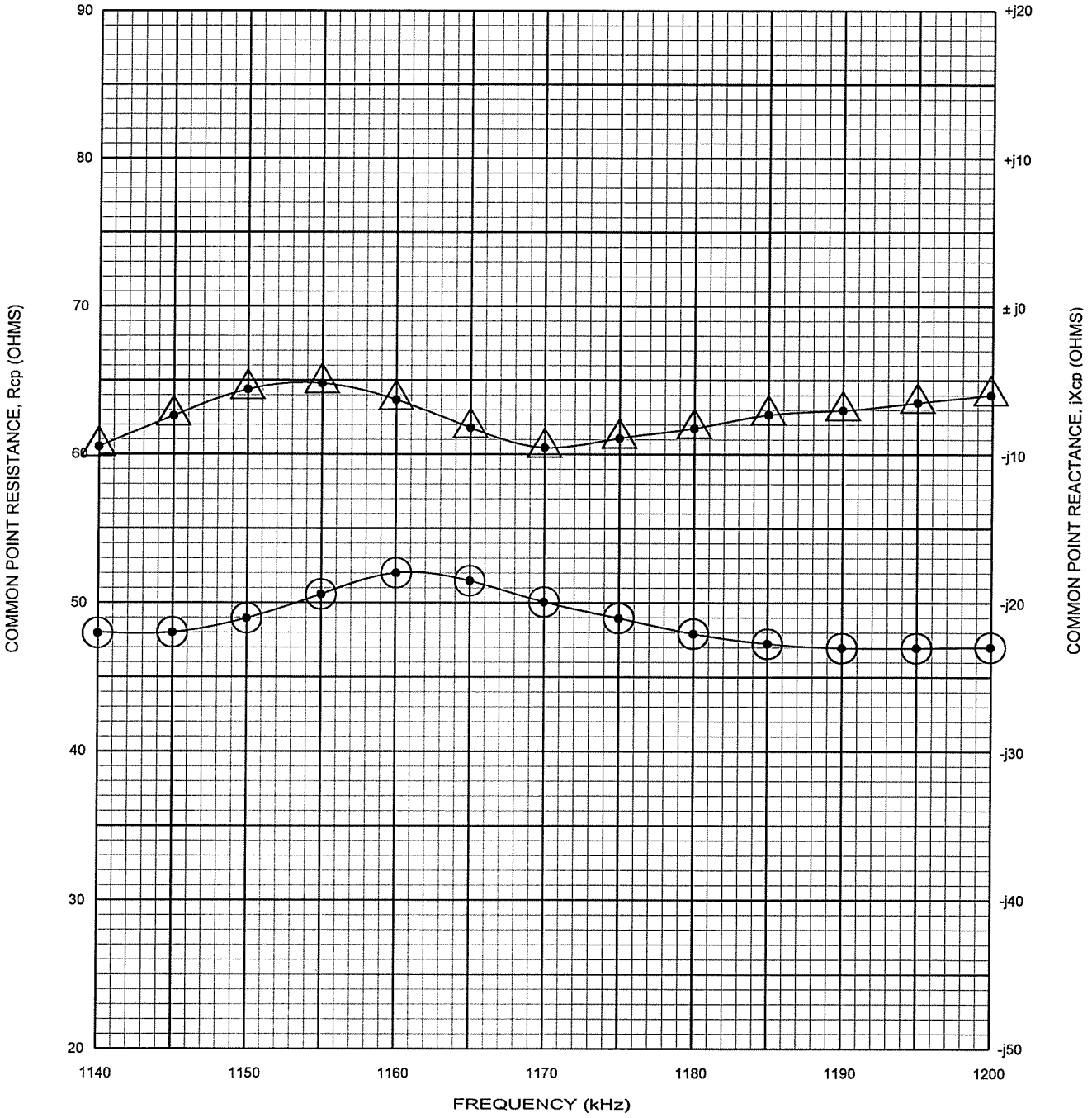
KFAQ NIGHTTIME DIRECTIONAL COMMON
POINT IMPEDANCE MEASUREMENTS
Journal Broadcast Corporation
Tulsa, OK

Frequency (kHz)	Resistance (ohms)	Reactance (ohms)
1140	48.0	-j9.7
1145	48.0	-j7.4
1150	49.0	-j5.8
1155	50.5	-j5.2
1160	52.0	-j6.4
1165	51.5	-j8.2
*1170	50.0	-j9.4
1175	49.0	-j8.8
1180	48.0	-j8.3
1185	47.5	-j7.7
1190	47.0	-j7.1
1195	47.0	-j6.6
1200	47.0	-j6.0

*Operating Frequency

CES-116

JBCIM5 1/11/12



- Rcp

- jXcp

Zcp = 50.0 - j9.4 OHMS

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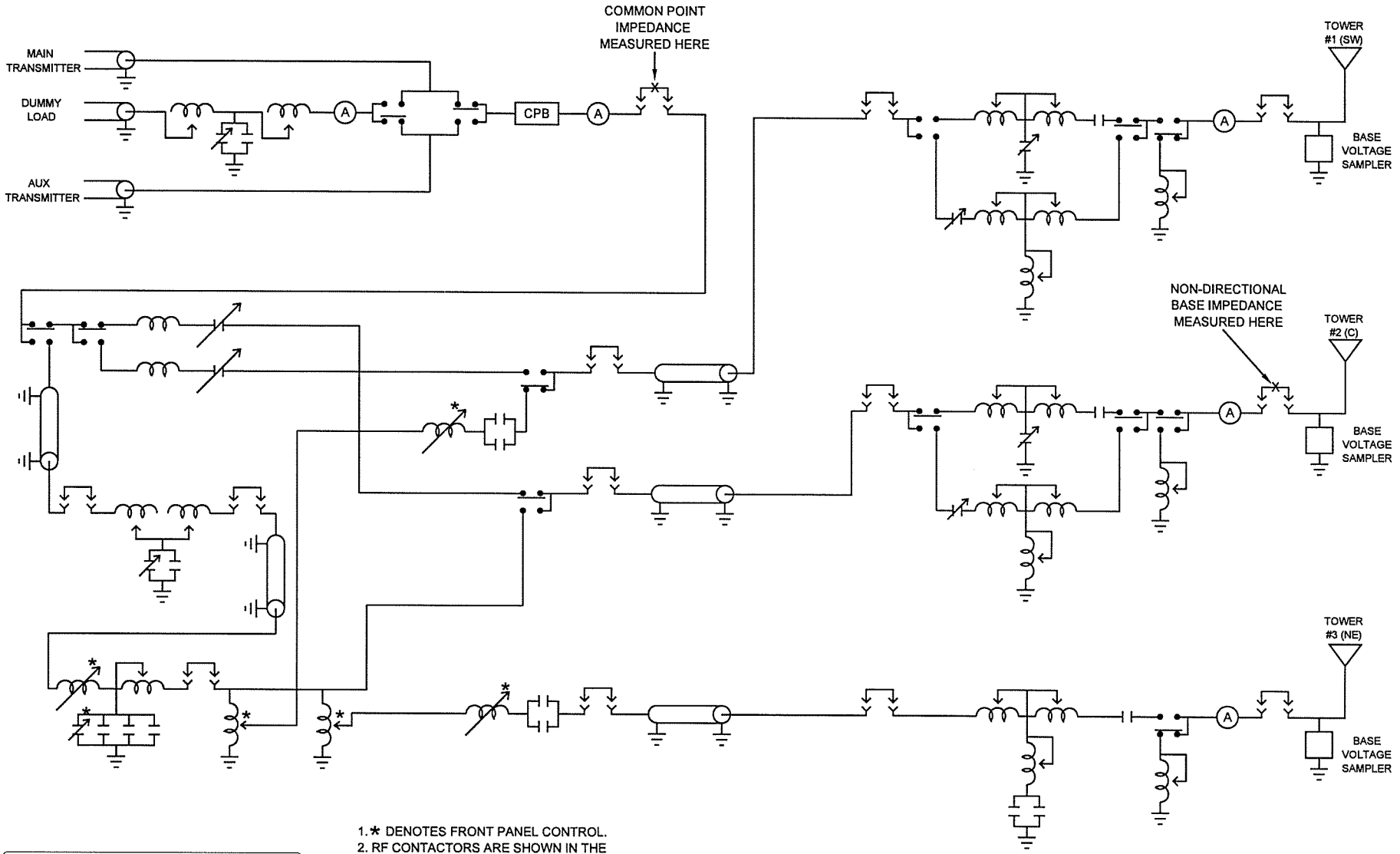
FIG. 6.2

KFAQ NIGHTTIME DIRECTIONAL
COMMON POINT
IMPEDANCE MEASUREMENTS

JOURNAL BROADCAST CORPORATION
TULSA, OK



1. * DENOTES FRONT PANEL CONTROL.
2. RF CONTACTORS ARE SHOWN IN THE MAIN TRANSMITTER/ND-2 MODE OF OPERATION.

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FIG. 6.3

KFAQ FEEDER SYSTEM

JOURNAL BROADCAST GROUP
TULSA, OK