3661160

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

Received & Inspected
MAY 13 2015
FCC Mail Room

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY
FILE NO. 2014101444WB

SECTION I - APPLICANT FEE INFORMATION

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

Entercom Communications Corp.

MAILING ADDRESS (Line 1) (Maximum 35 characters)
401 E. City Avenue

MAILING ADDRESS (Line 2) (Maximum 35 characters)
Suite 809

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Bala Cynwyd	PA	19004

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
(610) 660-5610	KNSS	53152

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): Amendment

C. If Yes, provide the following information:

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

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

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

(A)	(B)	(C)	FOR FCC USE ONLY
	0001	$	

	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.	$	

2015 MAY 14 A 10:29

FCC 302-AM
August 1995

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Entercom License, LLC		
MAILING ADDRESS 401 E. City Avenue, Suite 809		
CITY Bala Cynwyd	STATE PA	ZIP CODE 19004

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
KNSS	Wichita	KS	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. BESTA 20141219ACB

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. N/A

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. N/A

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	
Andrew P. Sutor		
Title	Date	Telephone Number
SVP/General Counsel	05/04/2015	(610) 660-5610

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

Entercom License, LLC

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
KNSS	N/A	1330	Unlimited	5.0	5.0

2. Station location

State	City or Town
Kansas	Wichita

3. Transmitter location

State	County	City or Town	Street address (or other identification)
KS	Sedgwick	Wichita	1630 N. Rock Rd.

4. Main studio location

State	County	City or Town	Street address (or other identification)
KS	Sedgwick	Wichita	2120 N. Woodlawn

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

State	County	City or Town	Street address (or other identification)
KS	Sedgwick	Wichita	2120 N. Woodlawn

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. Eng Rpt

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
10.4	10.0
Measured antenna or common point resistance (in ohms) at operating frequency Night: 50 Day: 50*	Measured antenna or common point reactance (in ohms) at operating frequency Night: j0 Day: j0

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	0		1.0			
2	-75.1		.909			

Manufacturer and type of antenna monitor: Gorman-Redlich CMR

*Measured at Common Point

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.
See Eng Rpt #1/#2	127.0/68.8	128.4/69.9	128.4/69.9	Exhibit No.

Excitation [X] 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
37 ° 42 ' 47 "	97 ° 14 ' 49 "

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 Rpt

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. No change in data on file - BZ-19950711AB Exhibit No.

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

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

Replacement of FM antenna, feedline and isocoupler

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)
Thomas S. Gorton	
Address (include ZIP Code) Hatfield & Dawson Consulting Engineers 9500 Greenwood Ave N Seattle WA 98103-3012	Date May 4, 2015
	Telephone No. (Include Area Code) 206-783-9151

[ ] Technical Director

[X] Registered Professional Engineer

[ ] Chief Operator

[ ] Technical Consultant

[ ] Other (specify)

HATFIELD & DAWSON
CONSULTING ELECTRICAL ENGINEERS
9500 GREENWOOD AVE. N.
SEATTLE, WASHINGTON 98103

BENJAMIN F. DAWSON III, PE
THOMAS M. ECKELS, PE
STEPHEN S. LOCKWOOD, PE
DAVID J. PINION, PE
ERIK C. SWANSON, PE

THOMAS S. GORTON, PE
MICHAEL H. MEHIGAN, PE

TELEPHONE (206) 783-9151
FACSIMILE (206) 789-9834
E-MAIL hatdaw@hatdaw.com

JAMES B. HATFIELD, PE
CONSULTANT

MAURY L. HATFIELD, PE
(1942-2009)
PAUL W. LEONARD, PE
(1925-2011)

Method of Moments Proof of Performance

and

Application for Modified Station License

KNSS (AM)

Wichita, Kansas

Facility ID 53152

1330 kHz

5 kW DA-N

Entercom License, LLC

May 2015

APPLICATION FOR LICENSE
RADIO STATION KNSS-AM Wichita, KS
1330 kHz 5kW DA-N

Purpose of Application

Item 1	Analysis of Tower Impedance Measurements to Verify Method of Moments Model
Item 2	Method of Moments Model Details for Towers Driven Individually
Item 3	Method of Moments Model Details for Directional Antenna Pattern
Item 4	Derivation of Operating Parameters for Directional Antenna
Item 5	Array Geometry Statement & Survey
Item 6	Sampling System Measurements
Item 7	Antenna Monitor and Sampling System
Item 8	Reference Field Strength Measurements
Item 9	Direct Measurement of Power
Item 10	Spurious Emissions Measurements
Appendix A	FCC Form 302-AM

Purpose of Application

This engineering exhibit supports an application for a modified station license for KNSS-AM, Wichita, Kansas. Following the replacement of an FM antenna and isolation circuits on the #1 tower of the KNSS array, Entercom License, LLC ("Entercom") has elected to re-license KNSS by way of a Method of Moments proof of performance, rather than a traditional measurement based partial proof of performance.

Information is provided herein demonstrating that the directional antenna parameters for the patterns authorized by the station license have been determined in accordance with the requirements of section §73.151(c) of the FCC Rules. The system has been adjusted to produce antenna monitor parameters within +/- 5 percent in ratio and +/- 3 degrees in phase of the modeled values, as required by the Rules.

All measurements used in this report were made by the undersigned engineer, with the exception of the reference point field strength measurements, which were taken by KNSS engineer Craig Maudlin.

Item 1

Analysis of Tower Impedance Measurements to Verify Method of Moments Model - KNSS

Tower base impedance measurements were made at the locations of the sample system current transformers using a Hewlett Packard 8751A network analyzer in a calibrated measurement system. The other towers were open circuited at the same point where impedance measurements were made (the "reference points") for each of the measurements.

KNSS Measured "Reference Point" Impedances

Tower	Measured R	Measured X
1	58.6	-122.8
2	68.6	51.1

Circuit calculations were performed to relate the method of moments modeled impedances at the tower base feed points to those at the measurement locations as shown in the diagram titled *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The series/parallel equivalent impedance of X_C, X_L, X_s and X_{LC} was used in the moment method model as a load at ground level (lumped load) for the open circuited tower. In all cases, the modeled impedance at the reference point is within one ohm of the measured reference point impedance.

Item 2

Method of Moments Model Details for Towers Driven Individually - KNSS

The array of towers was modeled using Expert MININEC Broadcast Professional Ver 14.0. Multiple wires were used to represent each tower because of the differences in tower radius at different elevations. The top and bottom wire end points were specified in feet in the geographic coordinate system, using the theoretical directional antenna specifications for tower spacing and orientation. All segments are less than 10° in length, as required by the Commission's rules.

Each tower's modeled height relative to its physical height falls within the required range of 75 to 125 percent and each modeled radius falls within the required range of 80 percent to 150 percent of the radius of a circle having a circumference equal to the sum of the widths of the tower faces.

KNSS Tower Dimensions - Physical and Modeled

Tower	Physical Height (degrees)	Modeled Height (degrees)	Modeled Percentage of Height	Modeled Radius (meters)	Percentage of Equivalent Radius
1	202	202	100	See Below	See Below
2	109	107.3	98.4	See Below	See Below

KNSS MININEC Model Node and Wire Numbering

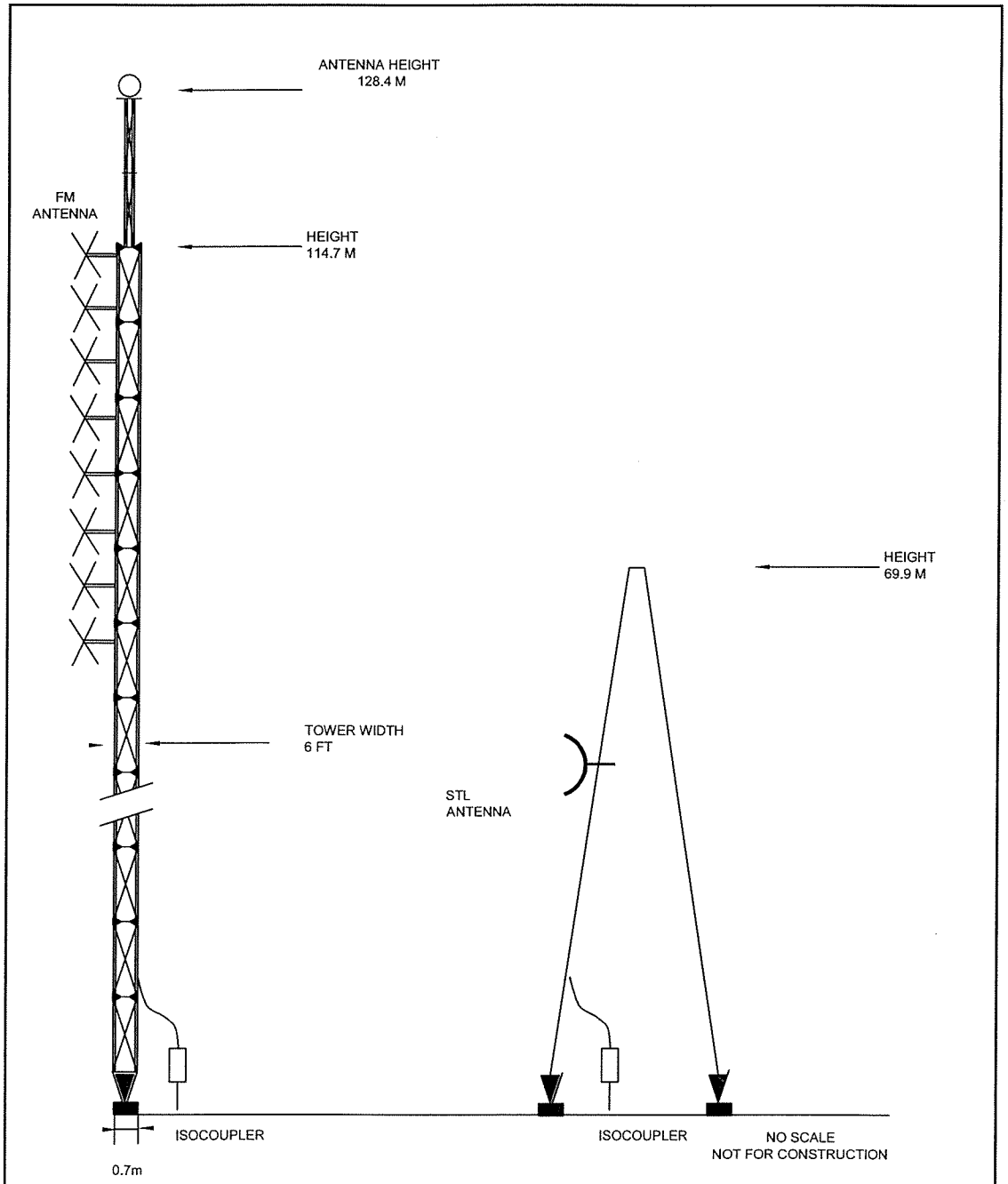
Tower	Wires	Base Node
1	1-2	1
2	3-7	26

KNSS Array Geometry and Model

Tower #1 of the KNSS array is a uniform cross section guyed tower. This tower has four sides, each with a face width of 6 feet, to a height of 376 feet. Above 376 feet the tower is reduced to a 18 inch face width to an overall height of 421.4 feet above ground level. The top of the base insulator is 4 feet above ground. This tower was modeled using a two layer "wedding cake" design, with the wire radius of each segment equal to 100% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides.

Tower #2 is a self-supporting tower, with a face width of 13.25 feet at the base, tapering linearly to 2 feet at the top of the tower. This tower also has four sides. The overall height of the tower is 229.3 feet above ground level, the top of the base insulators is at 3.7 feet above ground. This tower was modeled using a five layer "wedding cake" design, with the wire radius of each segment equal to 100% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides at the mid-point of each "layer".

The following pages show the details of the method of moments model.



Dwayne Straume, H&D 9/24/2014 10:12 AM KNSS antenna.dwg

HATFIELD & DAWSON
CONSULTING ENGINEERS

KNSS-AM WICHITA, KANSAS 9/2014

KNSS Tower 1 Driven Tower 2 Open Circuit at Current Transformer Location

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.819	20
		0	0	372.		
2	none	0	0	372.	.9549	5
		0	0	415.		
3	none	346.75	69.	0	7.639	3
		346.75	69.	50.		
4	none	346.75	69.	50.	6.045	3
		346.75	69.	100.		
5	none	346.75	69.	100.	4.615	3
		346.75	69.	140.		
6	none	346.75	69.	140.	3.342	3
		346.75	69.	180.		
7	none	346.75	69.	180.	2.037	3
		346.75	69.	220.5		

Number of wires = 7
current nodes = 40

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	8.6	1	18.6
segment/radius ratio	3	2.18179	2	9.00618
radius	2	.9549	3	7.639

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.33	0	1	.0116288	.0251506

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	26	0	17,439.	0	0	0

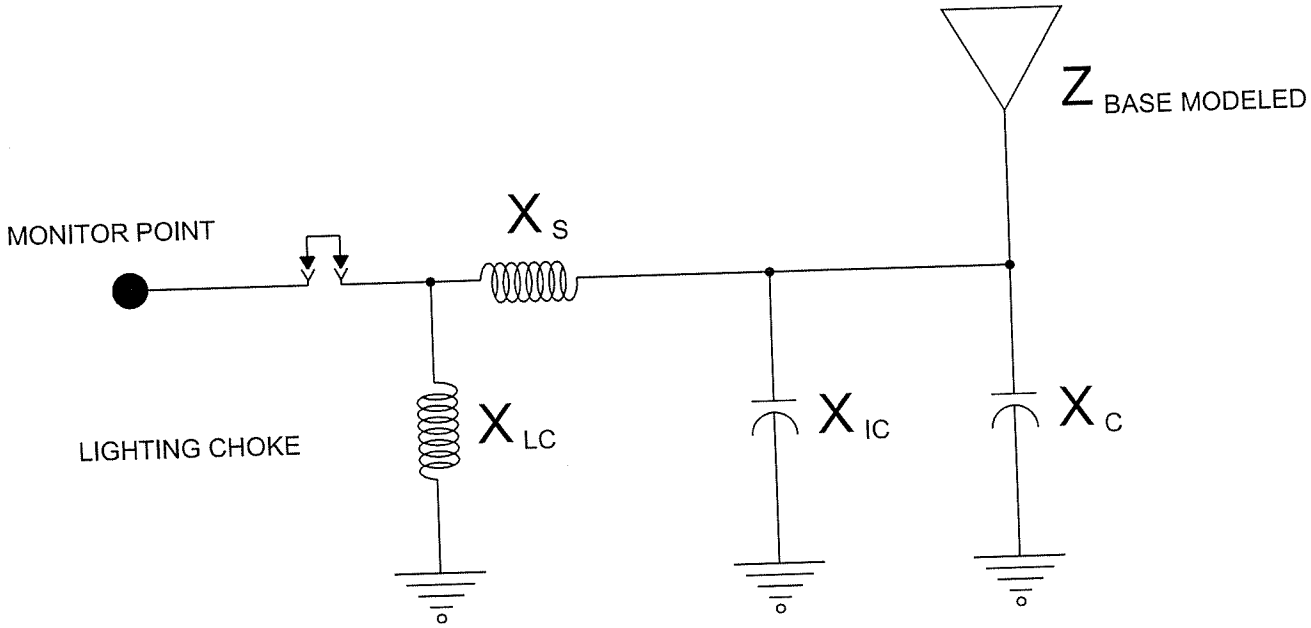
C:\AM\KNSS\KNSS Tower 1 10-08-2014 14:29:27

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.33	**89.056**	**-211.78**	229.74	292.8	12.334	-1.4116	-5.5674

KNSS Tower 2 Driven Tower 1 Open Circuit at Current Transformer Location

```
GEOMETRY
Dimensions in feet
Environment: perfect ground

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0            0            3.819         20
           0            0            372.
 2    none 0            0            372.         .9549         5
           0            0            415.
 3    none 346.75       69.          0            7.639         3
           346.75       69.          50.
 4    none 346.75       69.          50.          6.045         3
           346.75       69.          100.
 5    none 346.75       69.          100.         4.615         3
           346.75       69.          140.
 6    none 346.75       69.          140.         3.342         3
           346.75       69.          180.
 7    none 346.75       69.          180.         2.037         3
           346.75       69.          220.5

Number of wires          =  7
          current nodes  =  40

                          minimum                    maximum
Individual wires       wire    value              wire  value
segment length          2      8.6                 1    18.6
segment/radius ratio    3      2.18179             2    9.00618
radius                  2      .9549               3    7.639


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                  no. of  segment length (wavelengths)
 no. lowest       step          steps   minimum        maximum
 1   1.33         0              1      .0116288       .0251506

Sources
source node    sector  magnitude      phase          type
 1      26      1       1.             0              voltage

Lumped loads
              resistance    reactance     inductance  capacitance passive
load  node    (ohms)        (ohms)        (mH)        (uF)        circuit
 1     1      0             952.6         0           0            0

C:\AM\KNSS\KNSS Tower 2  10-08-2014   14:31:09

IMPEDANCE
   normalization = 50.
freq     resist   react    imped    phase    VSWR    S11      S12
(MHz)    (ohms)   (ohms)   (ohms)   (deg)             dB       dB
source =  1; node 26, sector 1
1.33     70.074   18.998   72.604   15.2     1.5885  -12.866  -.23049
```



TOWER	X_{LC} (Ω)	X_S (Ω)	X_{IC} (Ω)	X_C (Ω)	$Z_{BASE\ MODELED}$ (Ω)	$Z_{MP\ MODELED}$ (Ω)	$Z_{MP\ MEASURED}$ (Ω)
#1	+j8500	+j53	-j1200	-j3000	89.1-j211.8	58.6-j122.9	58.6 -j122.8
#2	+j2750	+j33	-j12000	-j3000	70.1+j19.0	68.6+j50.9	68.6 +j51.1

Dwayne Straume, H&D 10/6/2014 11:45 AM KNSS MOM TABLE.dwg

HATFIELD & DAWSON
CONSULTING ENGINEERS

ANALYSIS OF TOWER IMPEDANCE MEASUREMENTS TO VERIFY METHOD OF MOMENTS MODEL

RADIO STATION KNSS 1330 kHz WICHITA, KANSAS 10/2014

Item 3

Method of Moments Model Details for Directional Antenna- KNSS

The array of towers was modeled using MININEC with the individual tower characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna patterns. The following pages contain details of the method of moments models of the directional antenna patterns.

KNSS Driven Array - Night

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.819	20
		0	0	372.		
2	none	0	0	372.	.9549	5
		0	0	415.		
3	none	346.75	69.	0	7.639	3
		346.75	69.	50.		
4	none	346.75	69.	50.	6.045	3
		346.75	69.	100.		
5	none	346.75	69.	100.	4.615	3
		346.75	69.	140.		
6	none	346.75	69.	140.	3.342	3
		346.75	69.	180.		
7	none	346.75	69.	180.	2.037	3
		346.75	69.	220.5		

Number of wires = 7
current nodes = 40

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	8.6	1	18.6
segment/radius ratio	3	2.18179	2	9.00618
radius	2	.9549	3	7.639

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.33	0	1	.0116288	.0251506

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,765.37	64.4	voltage
2	26	1	433.01	87.9	voltage

C:\AM\KNSS\KNSS Driven 05-01-2015 14:45:56

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.33	**120.26**	**-197.86**	231.54	301.3	9.2231	-1.8909	-4.5223
source = 2; node 26, sector 1							
1.33	**42.864**	**28.86**	51.674	34.	1.8807	-10.294	-.42614

CURRENT rms
Frequency = 1.33 MHz
Input power = 5,000. watts
Efficiency = 100. %
coordinates in feet

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	**5.39109**	**123.1**	-2.94475	4.51578
2	0	0	18.6	3.5027	101.7	-.708328	3.43034
3	0	0	37.2	2.88054	81.7	.415303	2.85044
4	0	0	55.8	2.70485	58.1	1.43032	2.29574
5	0	0	74.4	2.93182	37.	2.34053	1.76564
6	0	0	93.	3.40045	21.7	3.16041	1.25493
7	0	0	111.6	3.96233	11.2	3.88739	.766958
8	0	0	130.2	4.52493	3.9	4.51446	.30763
9	0	0	148.8	5.03463	358.7	5.03329	-.116203
10	0	0	167.4	5.4586	354.8	5.43587	-.497575
11	0	0	186.	5.77547	351.7	5.71553	-.829916
12	0	0	204.6	5.97097	349.3	5.86738	-1.10739
13	0	0	223.2	6.03598	347.3	5.88873	-1.32512
14	0	0	241.8	5.96554	345.6	5.7792	-1.47935
15	0	0	260.4	5.75827	344.2	5.5408	-1.56755
16	0	0	279.	5.41588	342.9	5.17773	-1.58837
17	0	0	297.6	4.94264	341.8	4.69607	-1.54163
18	0	0	316.2	4.34448	340.8	4.10308	-1.42804
19	0	0	334.8	3.62665	339.9	3.40502	-1.24836
20	0	0	353.4	2.79551	339.	2.60899	-1.00403
END	0	0	372.	1.72541	337.9	1.59863	-.649182
2J1	0	0	372.	1.72541	337.9	1.59863	-.649182
22	0	0	380.6	1.48139	337.7	1.37038	-.562634
23	0	0	389.2	1.17956	337.4	1.08905	-.45314
24	0	0	397.8	.846647	337.1	.780103	-.329014
25	0	0	406.4	.48119	336.8	.442437	-.189191
END	0	0	415.	0	0	0	0
GND	124.264	-323.719	0	**5.92503**	**53.9**	3.48702	4.79027
27	124.264	-323.719	16.6667	6.53773	46.1	4.53019	4.71374
28	124.264	-323.719	33.3333	6.55753	44.5	4.67942	4.59393
END	124.264	-323.719	50.	6.46692	42.8	4.74548	4.39335
2J3	124.264	-323.719	50.	6.46692	42.8	4.74548	4.39335
30	124.264	-323.719	66.6667	6.26097	41.7	4.67223	4.16774
31	124.264	-323.719	83.3333	5.91918	40.8	4.48186	3.86647
END	124.264	-323.719	100.	5.42277	39.9	4.15935	3.47939
2J4	124.264	-323.719	100.	5.42277	39.9	4.15935	3.47939
33	124.264	-323.719	113.333	5.03436	39.4	3.88923	3.19666
34	124.264	-323.719	126.667	4.55593	38.9	3.54428	2.86262
END	124.264	-323.719	140.	3.97457	38.4	3.11313	2.47096
2J5	124.264	-323.719	140.	3.97457	38.4	3.11313	2.47096
36	124.264	-323.719	153.333	3.46238	38.1	2.72549	2.13537
37	124.264	-323.719	166.667	2.86358	37.7	2.26534	1.75165
END	124.264	-323.719	180.	2.1581	37.3	1.71592	1.30883
2J6	124.264	-323.719	180.	2.1581	37.3	1.71592	1.30883
39	124.264	-323.719	193.5	1.58575	37.1	1.26542	.95567
40	124.264	-323.719	207.	.919016	36.8	.736137	.550176
END	124.264	-323.719	220.5	0	0	0	0

CURRENT MOMENTS(amp-feet) rms

Frequency = 1.33 MHz
Input power = 5,000. watts

wire	magnitude	phase (deg)	vertical current moment magnitude	phase (deg)
1	590.286	.7	590.286	.7
2	17.9845	337.5	17.9845	337.5
3	138.336	46.2	138.336	46.2
4	130.197	41.3	130.197	41.3
5	82.1213	39.2	82.1213	39.2
6	53.9801	38.	53.9801	38.
7	20.8549	37.1	20.8549	37.1

Medium wave array vertical current moment (amps-feet) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower	magnitude	phase (deg)
1	**606.857**	**0.0**
2	**424.801**	**41.9**

Comparison of Current Moments with Theoretical Antenna Field Parameters

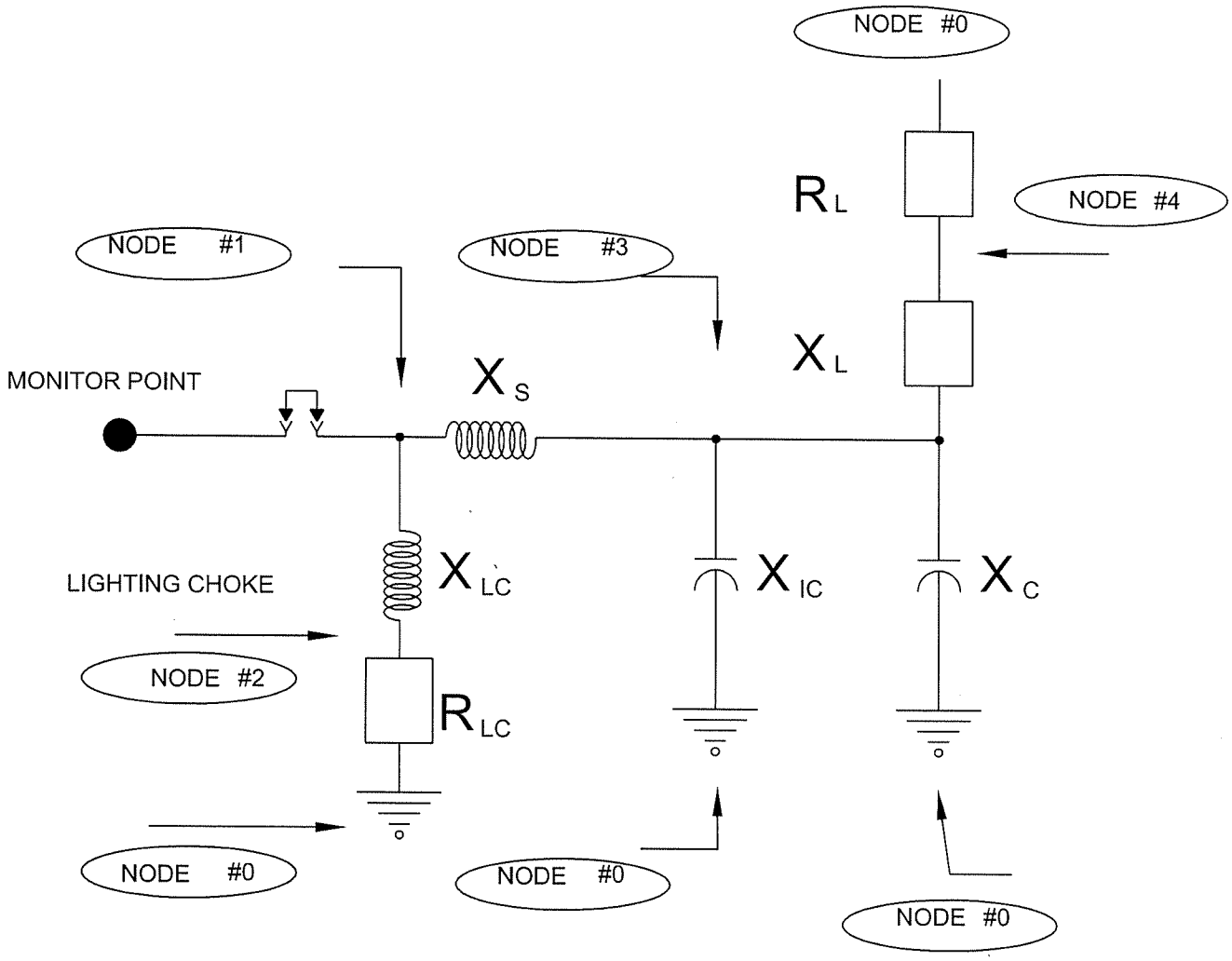
Tower	Current Moment Magnitude	Current Moment Phase	Normalized Magnitude	Normalized Phase	Standard Pattern Ratio	Standard Pattern Phase
1	606.857	0	1.0	0	1.0	0
2	424.801	41.9	0.700	41.9	0.700	41.9

As shown in the tables above, the base currents used in the Method of Moments computer model produce current moments in each of the towers that are identical to the field ratios and phases of the theoretical antenna parameters specified in the KNSS station license.

Item 4

Derivation of Operating Parameters for Directional Antennas - KNSS

The currents at the tower reference points have been calculated by using the computer circuit simulation program pspice. A pspice model has been made for each tower using the antenna base currents and base impedances calculated by MININEC and shown above, and the reactances listed previously in the table *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The magnitude and phase of the current source in the pspice model was adjusted such that the current calculated in the output branch of the pspice model (the current through resistor R_L) was the same as the base current for the tower calculated by MININEC. The current at the reference point is the current source in the pspice model. These calculated currents are then normalized to the reference tower to obtain the antenna monitor phase and ratio readings, as shown in the tables labeled Antenna Monitor Parameters, which follow the pspice data below.



Dwayne Straume, H&D	10/9/2014 10:45 AM	KNSS MOM TABLE.dwg

HATFIELD & DAWSON
CONSULTING ENGINEERS

PSPICE MODEL NODE MAP

RADIO STATION KNSS 1330 kHz WICHITA, KANSAS 10/2014

```
## KNSS TOWER 1 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************

.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 1330kHz 1330kHz

IIN             0                       1       AC 6.587 129.1
LXlc            1                       2               1017uH
Rlc             2                       0               .001ohms
LXs             1                       3               6.342uH
CXc             3                       0               39.89pF
CXic            3                       0               99.7pf
CL              3                       4               604.8pF
RL              4                       0               120.26ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END


 ****     AC ANALYSIS                    TEMPERATURE =   27.000 DEG C

  FREQ         IM(RL)       IP(RL)

   1.330E+06   5.391E+00   1.231E+02

          JOB CONCLUDED

          TOTAL JOB TIME            0.00
```

```
## KNSS TOWER 2 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

********************************************************************************

.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 1330kHz 1330kHz

IIN             0                       1       AC 5.986 54.04
LXlc            1                       2               329uH
Rlc             2                       0               .001ohms
LXs             1                       3               3.949uH
CXc             3                       0               39.89pF
CXic            3                       0               9.97pf
LL              3                       4               3.4535uH
RL              4                       0               42.86ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END

 ****     AC ANALYSIS                    TEMPERATURE =   27.000 DEG C

  FREQ         IM(RL)       IP(RL)

   1.330E+06   5.925E+00    5.390E+01

          JOB CONCLUDED

          TOTAL JOB TIME            0.00
```

Antenna Monitor Parameters - Night Pattern - KNSS

Tower	Ref Point Current Magnitude	Ref Point Current Phase	Normalized Magnitude	Normalized Phase
1	6.587	129.1	1.0	0
2	5.986	54.04	0.909	-75.1

Item 5

Post Construction Array Geometry Statement & Survey - KNSS

The KNSS station license specifies that the towers be spaced at a distance of 168.8 electrical degrees, at a bearing of 69.0 degrees. The post-construction survey on the following page states that the actual distance is 347.03 feet (168.933 degrees) at a bearing of 68.97 degrees. Thus the actual location of Tower #2 differs from that specified in the station license by 0.16 electrical degrees.

Hatfield & Dawson Consulting Engineers

MKEC ENGINEERING SUCCESS

Tower Location and Height determination Survey
1630 N. Rock Road

Field Work Completed on: 7-18-14, Overcast/Partly Sunny with average temperature of 67°

Datum:
The horizontal and vertical positions of each of the two towers are based on NAD83 State Plane Coordinates as generated using the City of Wichita GPS Network. GPS Observations were made from 8:30 to 8:47 on 7-18-14 with a minimum of 5 minute sessions for each of the three primary control points. A second set of observations were made from 12:30 to 1:54 with a minimum of 5 minute sessions for each of the control points. These positions were then averaged for use in computing the tower positions.

Horizontal Position:
The centers of the towers were determined using horizontal angle measurements from two of the primary control points. The State Plane coordinates were then converted to Geodetic coordinate values and verified using NGS (National Geodetic Survey) software. The azimuth between the two towers was computed using NGS software.

Vertical Position:
The height of each of the key elements on each tower was computed using vertical angle measurement from two of the primary control points. The data points collected from each of the instrument setups was then averaged to determine the height of the structure. The Vertical Datum is NAVD88 and based on multiple GPS observations.

East Tower:
NAD83, State Plane Coordinate, South Zone (1502)
N: 1695879.632
E: 1674859.126
EL: 1390.57 (ground elevation)

NAD83, Geodetic Coordinates (Latitude and Longitude)
Lat: N 37°42'47.96"
Long: W 97°14'48.11"

Height:
229.3' (69.9m) Top Ring
227.6' (69.4m) Top of Structure
3.7' (1.1m) Top of the bottom insulator at the bottom of the electrified tower

West Tower:
NAD83, State Plane Coordinate, South Zone (1502)
N: 1695750.779
E: 1674536.930
EL: 1395.42 (ground elevation)

MKEC ENGINEERING SUCCESS

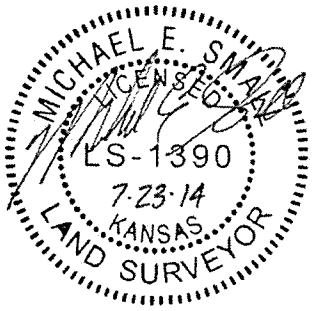
NAD83, Geodetic Coordinates (Latitude and Longitude)
Lat: N 37°42'46.73"
Long: W 97°14'52.14"

Height:
421.4' (128.4m) Top of Light Guard
420.1 (128.1m) Top of Light
376.2' (114.65) Top of Primary Structure at Transition
2.2' (0.7m) Bottom of the insulator at the concrete base.

Azimuth:
Grid Azimuth: 248°12'09" (S68°12'09"W), 347.01'
Average Convergence Angle for each of the tower locations: 0°46'11.4"
Geodetic Azimuth: 248°58'21.49" (S68°58'21.49"W), 347.03'

Certification:
I, Michael E. Small, a Professional Land Surveyor in the State of Kansas do hereby certify that a Height Measurement Survey was completed for the above-described property on 7-18-14, under my direct supervision and that the information provided in this letter is true and correct to the best of my knowledge.

Dated this 23RD day of JULY, 2014



Michael E. Small, P.L.S. 1390

Revised 7-23-14: Added additional measurements

Item 6

Sampling System Measurements - KNSS

Impedance measurements were made of the antenna monitor sampling system using a Hewlett Packard 8751A network analyzer in a calibrated measurement system. The measurements were made looking into the antenna monitor ends of the sampling lines for two conditions – with and without the sampling lines connected to the sampling transformers at the antenna tuning units.

The following table shows the frequency closest to the carrier frequency where series resonance – zero reactance corresponding with low resistance – was found. As frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sampling line length at the resonant frequency above carrier frequency – which is the closest one to the carrier frequency – was found to be 270 electrical degrees. The electrical length at carrier frequency appearing in the table below was calculated by ratioing the carrier frequency to the resonant frequency.

KNSS Sample Line Measurements

Tower	Sample Line Open-Circuited Resonant Frequency (kHz)	Sample Line Electrical Length in Degrees at 1330 kHz	Measured Impedance at 1330 kHz with Sample TCT Connected
1	1354.247	265.17	48.0 -j2.0
2	1356.039	264.82	47.5 -j2.5

The sample line lengths meet the requirement that they be equal in length to within 1 electrical degree.

In order to determine the characteristic impedance values of the sampling lines, open-circuited measurements were made with frequencies offset to produce +/- 45 degrees of electrical length from resonance. The characteristic impedance was calculated using the following formula, where R1 +j X1 and R2 +j X2 are the measured impedances at the +45 and –45 degree offset frequencies, respectively:

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

KNSS Sample Line Characteristic Impedance Calculations

Tower	-45° Offset Frequency (KHz)	-45° Measured Impedance (Ohms)	+45° Offset Frequency (kHz)	+45° Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
1	1128.539	4.6 -j48.5	1579.955	7.1 +j48.2	48.7
2	1130.033	4.5 -j47.9	1582.046	7.1 +j48.3	48.5

The sample line measured characteristic impedances meet the requirement that they be equal within 2 ohms.

Item 7

Antenna Monitor and Sampling System - KNSS

The antenna monitor is a Gorman-Redlich model CMR. The antenna monitor is new, the factory calibration certificate in included in this report. The sample transformers are connected through equal lengths of Cablewave FCC-38-50J 3/8" cable to the antenna monitor. The sample lines are routed to the towers such that they are subject to similar environmental conditions. The sample current transformers were tested by feeding their outputs to the "A" and "B" inputs of the network analyzer, while feeding the amplified output of the network analyzer through the sample transformers into a resistive load. The transformers were found to be in agreement to within 0.1° of phase and 0.02% of ratio.

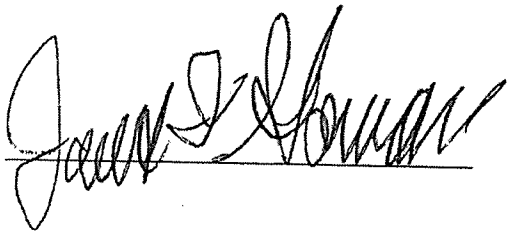
Gorman-Redlich
257 West Union Street
Athens, Ohio 45701
PH: (740) 593-3150

email jimg@gorman-redlich.com
www.gorman-redlich.com

October 13, 2014

CALIBRATION CERTIFICATE

I hereby certify that the Model CMR digital antenna monitor Serial Number **1047B** meets all the FCC requirements for type approval (FCC Type Approval # 3-242)



Item 8

Reference Field Strength Measurements - KNSS

Reference field strength measurements were made along radials at the azimuths with radiation limits specified on the construction permit and, additionally, on the radial of the line of the towers in the maximum. The transmitter output power was adjusted to 5.4 kW

The measured field strengths and descriptions and GPS coordinates for the reference measurement points are shown on the following pages.

KNSS Reference Points

Radial	Distance (km)	mV/m	Coordinates (NAD83)
34°	.647	125	37 43 4.8 97 14 35.3 First parking stall SE of south entrance to Barnes & Noble parking lot, near small tree on island
34°	1.41	50	37 43 25.3 97 14 17.8 8715 Peppertree (Peppertree & Tallgrass) Fireplug east of driveway
34°	3.76	41	37 44 0.7 97 13 45.9 Center of cul-de-sac in front of 9301 Shannonwoods Circle (Shannonwoods & Webb Rd)
104°	1.87	37	37 42 32.7 97 13 35.7 Storm drain along Webb Rd, east edge of Whole Foods parking lot
104°	4.19	5.8	37 42 14.0 97 12 4.1 Middle of cul-de-sac in front of 1126 Bedford Circle
104°	5.26	5.2	37 42 6.8 97 11 21.2 Northwest corner of parking lot of Crestview Country Club
249°	3.04	71	37 42 12.0 97 16 46.0 End of driveway 1107 Glendale (north of 10th)
249°	3.47	66	37 42 7.9 97 17 2.7 End of driveway 1039 North Terrace Drive (south of 10th)
249°	5.09	53	37 41 48.6 97 18 4.6 End of driveway 637 North Chautauqua (south of Murdock)

Radial	Distance (km)	mV/m	Coordinates (NAD83)
325°	4.08	279	37 44 34.7 97 16 27.0 Chisolm Creek Park, parking space north of handicap stalls, NE corner of parking lot
325°	8.33	70	37 46 27.8 97 18 6.2 Mailbox pedestal on SE side of street near 2917 Lanners Circle
325°	10.7	56	37 47 33.7 97 18 59.0 Fireplug on north side of road near 1722 Beaumont, Park City (Beaumont & Hydraulic)

Item 9

Direct Measurement of Power - KNSS

Common point impedance measurements were made using a Hewlett Packard 8751A network analyzer in a calibrated measurement system. The measurements were made at the phasor cabinet input jack adjacent to the common point current meter that is used to determine operating power. The impedance measured at this point was adjusted to a value of 50 +/- j0 Ohms. Power for the daytime non-directional operation of KNSS is also measured at the common point ammeter. The measured impedance at this location in non-directional mode is also 50 +/- j0 Ohms.

Stability Analysis of Tower Model

The method of moments model of the KNSS array uses a "wedding cake"characterization of each tower to account for the vertical taper of tower #2 and the cross-sectional transition of tower #1. Tower #1 was modeled using two wires, one for each of the two cross-sectional dimensions of this tower. The lower layer was modeled with 19 segments, the upper layer with 5. Tower #2 was modeled using 5 wires, with 3 segments per wire.

All wire segments, when checked using the "problem definition evaluation" function of MININEC Broadcast Professional Version 14, have no errors relative to the software's specified geometry guidelines. However, "warnings" are given due to the segment length-to-radius ratio for all wires in the model, with the exception of the upper wire in the tower #1 model. As the Commission's rules do not allow segments more than 10° in length (20.54 feet at 1330 kHz), and the segment length-to radius warning is triggered when this ratio is less than 8.0, it is not possible to create an warning-free model with wire radii greater than 2.54 feet.

In order to evaluate the stability of the KNSS directional antenna method of moments model, additional models were run with the same wire lengths and radii, but with one additional segment per wire, and one less segment per wire. The results are summarized in the table below.

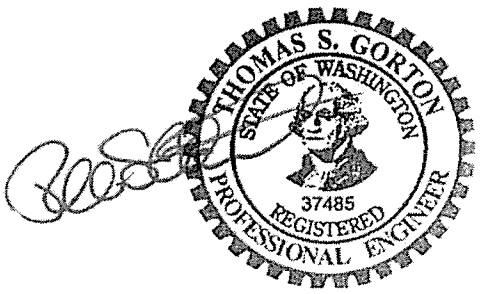
Model	Tower #1 Z	ΔZ	Tower #2 Z	ΔZ
One fewer segment/wire	90.4 -j213.0	+1.3 +j1.2	66.5 +j19.6	-4.1 +j0.6
As modeled	89.1 -j211.8	Ref	70.1 +19.0	Ref
One additional segment/wire	87.8 -j210.7	-j1.3 -j1.1	72.4 +j17.9	+2.4 -j1.1

The MININEC modeled base impedances remain within the +/- 2 ohm and +/- 4% range required by the Commission's rules for matching measured and modeled impedances. The model is therefore valid with regards to the characteristics of the KNSS array.

Certification

This Engineering Report has been prepared personally by the undersigned or under my immediate supervision, and all representations are true and correct to the best of my knowledge. I am an experienced radio engineer whose qualifications are a matter of record with the Federal Communications Commission, I am an engineer in the firm of Hatfield & Dawson Consulting Engineers, LLC, and I am Registered as a Professional Engineer in the States of Washington and Oregon.

May 4, 2015



Thomas S. Gorton P.E.

Hatfield & Dawson Consulting Engineers