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June 4, 2010

Honorable Marlene H. Dortch
Office of the Secretary
Federal Communications Commission
Washington, DC 20554

Attention: Audio Division, Media Bureau

RE: Covenant Network
FRN 0004-7603-77
KHOJ(AM), St. Charles, Missouri
Facility ID # 7114
Application for License to Cover
File Nos. BP-20050706ACB
BMP-20090903AAW

0004760377

Dear Madame Secretary:

On behalf of our client Covenant Network, this is to submit in triplicate an application on FCC Form 302-AM for a new license for AM Broadcast Station KHOJ, St. Charles, Missouri. This application is filed prior to the expiration of construction permit File No. BP-20050706ACB, as modified by File No. BMP-20090903AAW.

As the applicant is a non-profit corporation and as Station KHOJ is a "non-commercial, educational" AM station, this application is non-feeable pursuant to Section 1.1114(c) of the Commission's Rules.

Should additional information be desired in connection with the above matter, kindly communicate with this office.

Very truly yours,

Dennis J. Kelly

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. BNML20100604AGC

SECTION I - APPLICANT FEE INFORMATION

FILED/ACCEPTED
JUN - 4 2010
Federal Communications Commission
Office of the Secretary

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

COVENANT NETWORK FRN: 0004-7603-77

MAILING ADDRESS (Line 1) (Maximum 35 characters)
4424 Hampton Avenue

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
St. Louis	MO	63109

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
314-752-7000	KHOJ	7114

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
	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	$	

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

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT COVENANT NETWORK		
MAILING ADDRESS 4424 Hampton Avenue		
CITY St. Louis	STATE MO	ZIP CODE 63109

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
KHOJ	St. Charles, MO	BP-20050706ACB	BMP-20090903AAW	June 7, 2010

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620? ☐ Yes ☑ No

NIGHTTIME PROGRAM TEST AUTHORITY IS HEREBY REQUESTED.

Exhibit No.

If No, explain in an Exhibit.

KHOJ(AM) IS OPERATING DURING THE DAY UNDER BSTA-20091214AHO.

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met? ☑ Yes ☐ No

Exhibit No.

If No, state exceptions in an Exhibit.

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

Exhibit No.

If Yes, explain in an Exhibit.

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

Exhibit No.

If No, explain in an Exhibit.

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

Exhibit 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.

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	
John Anthony Holman		
Title	Date	Telephone Number
President	06/03/2010	806-350-1360

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
Covenant Network

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☑ Station License ☐ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
KHOJ	BMP-20090903AAW	1460	Unlimited	0.21	5

2. Station location

State	City or Town
Missouri	St. Charles

3. Transmitter location

State	County	City or Town	Street address (or other identification)
MO	St. Charles	St. Charles	3713 N. Highway 94

4. Main studio location

State	County	City or Town	Street address (or other identification)
MO	St. Louis City	St. Louis	4424 Hampton Ave.

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

State	County	City or Town	Street address (or other identification)
MO	St. Louis City	St. Louis	4424 Hampton Ave.

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

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

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. EE

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
2.13	10.4

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	50	0	0

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (N) ASRN 1252338	+123.7°	+139.1°	0.769	0.751	dna	dna
2 (S) ASRN 1252339	0°	-121.1°	1.000	0.473	dna	dna
3 (C) ASRN 1232337	+5.3°	0°	0.252	1.000	dna	dna

Manufacturer and type of antenna monitor: Potomac Instruments AM-19 (204) s/n 873

SECTION III - Page 2

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

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
Vertical steel uniform cross section insulated guyed towers	51.3	53	53	Exhibit No. DNA

Excitation ☑ Series ☐ Shunt

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

North Latitude	West Longitude
38 ° 50 ' 05 "	90 ° 28 ' 08 "

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. none

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

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

none

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

n/a

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature (check appropriate box below)
Mark A. Mueller	Mark A. Mueller
Address (include ZIP Code) Mueller Broadcast Design 613 S. La Grange Rd. La Grange, IL 60525	Date May 29, 2010 Telephone No. (Include Area Code) (708) 352-2166

mark@muellerbroadcastdesign.com

☐ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☑ Technical Consultant

☐ Other (specify)

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Engineering Report For
Covenant Network
K H O J (A M)
St. Charles, Missouri
May 2010

This engineering report documents the Directional Antenna Performance Verification measurements for KHOJ (AM), FCC facility ID number 7114, St. Charles, Missouri. KHOJ currently operates on 1460 KHz with 5 KW and a three tower directional antenna daytime and the same pattern with 85 watts at night. This Verification is for the new 210-watt 3 tower nighttime antenna pattern authorized by BMP-20090903AAW as well as the licensed daytime pattern (BL-20070206ABT) and documents the required "model proof" in order to grant the covering license. All measurements were made personally by the writer in accordance with the FCC rules at 47 CFR 73.151(c).

Background

The currently licensed KHOJ three tower directional antenna was constructed over 40 years ago and did not have an approved sample system. It used rotatable loops as sample elements and unequal lengths of RG-8 as sample lines. This arrangement has become troublesome in the last several years, causing both erratic antenna monitor readings and operational problems particularly with the south tower (#2). Since the sample system needed to be re-done in conjunction with the new night pattern it was completely replaced with Delta TCT-3 current transformers as sample elements and equal lengths of Andrew 3/8" foam Heliax as sample lines. The Potomac Instruments AM-19 antenna monitor is operating properly and continues to be used. Due to these changes the licensed daytime operation was also included in the proof of performance and we request that it be relicensed with the new parameters along with the new night pattern.

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Measurements

The KHOJ antenna system was modeled using Westberg Consulting's Phasor Professional 2.1.1 which calculates the tower matrix values as well as the proper operating parameters. The towers and sample lines were measured and documented using an Array Solutions PowerAIM-120 network analyzer serial number 1019 operated in accordance with the manufacturer's instructions. This analyzer has been used in several recent projects and exhibits excellent stability and field performance and since it operates "floating" via battery power and a Bluetooth radio connection to the associated computer no RF ground loop issues arise.

The three KHOJ towers are identical in height and are base sampled using torodial current transformers. Each tower was disconnected from its ATU at the sample transformer and was measured at that point. The other towers were individually shorted and left floating for each measurement as required, plus additional measurements with the subject tower base insulator shorted to measure the feedline impedance and electrical length from the ATU to the tower as well as at the tower itself with the ATU disconnected. These measurements are documented below and show good agreement with the Westberg theoretical numbers.

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Theoretical Data:

STATION INFORMATION

Call Letters	No. Towers	Frequency
KHOJ	3	1.4600

TOWER MODEL INFORMATION

	Tower Height (°)	Spacing (°)	Orientation	Face Width (in.)	Radius (in.)	Velocity Factor
Tower 1	90.0000	90.0000	32.0000	13.5000 / 13.5000	6.2354 / 6.2354	0.905000
Tower 2	90.0000	90.0000	212.0000	13.5000 / 13.5000	6.2354 / 6.2354	0.915000
Tower 3	90.0000	20.0000	357.0000	13.5000 / 13.5000	6.2354 / 6.2354	0.900000

CALCULATED MATRIX INFORMATION

	Impedance (other towers open)	Impedance (other towers shorted)
Tower 1	57.87 + j73.08	65.59 + j89.05
Tower 2	56.06 + j69.15	67.88 + j69.26
Tower 3	56.22 + j76.78	86.15 + j106.25

Measured Impedance Matrix [47 CFR 73.151(c)(1)]

	Measured Tower Feed Reactance	Impedance (other towers open)	Impedance (other towers shorted)
Tower 1	+ j27.3	57.94 + j72.55	67.44 + j87.85
Tower 2	+ j28.1	57.58 + j68.28	66.68 + j70.20
Tower 3	+ j26.4	56.64 + j78.53	84.92 + j104.90

The measured lead inductance from the sample element TCT to the tower is 2.8 to 3.1 uH. The Westberg Phasor Professional method-of-moments model fully complies with all FCC requirements for tower radius, height, segment length, and calculation references points. No shunt capacitance was used. Towers were adjusted by varying the propagation velocity as shown above. The corrected measured impedances agree with the model within +/- 2 ohms and +/- 4%.

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Westberg's Phasor Professional uses a single wire of the desired effective radius divided into segments or no more than 10° electrical length each to model the tower.

TOWER CURRENTS from Westberg Phasor Professional

DETUNED TOWER CURRENTS

Tower 1
0.000000 > 0.000000 - 90.00° above ground
0.077563 > 147.204803 - 80.00° above ground
0.118023 > 147.914510 - 70.00° above ground
0.131378 > 148.663787 - 60.00° above ground
0.117388 > 149.579626 - 50.00° above ground
0.075739 > 151.185310 - 40.00° above ground
0.007033 > 179.823030 - 30.00° above ground
0.092198 > -32.643037 - 20.00° above ground
0.221017 > -30.835652 - 10.00° above ground
0.425749 > -29.855428 - 0.00° above ground
Tower 2
0.000000 > 0.000000 - 90.00° above ground
0.076490 > 147.396026 - 80.00° above ground
0.116276 > 148.084209 - 70.00° above ground
0.129319 > 148.789689 - 60.00° above ground
0.115423 > 149.624004 - 50.00° above ground
0.074326 > 151.047812 - 40.00° above ground
0.006512 > 177.581617 - 30.00° above ground
0.090844 > -32.326859 - 20.00° above ground
0.217376 > -30.776503 - 10.00° above ground
0.418585 > -29.956970 - 0.00° above ground

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DETUNED TOWER CURRENTS Cont'd.

Tower 3
0.000000 > 0.000000 - 90.00° above ground
0.124111 > -111.079814 - 80.00° above ground
0.190258 > -112.054473 - 70.00° above ground
0.213490 > -113.117165 - 60.00° above ground
0.192639 > -114.375362 - 50.00° above ground
0.126418 > -116.424997 - 40.00° above ground
0.015283 > -143.074829 - 30.00° above ground
0.147941 > 68.456893 - 20.00° above ground
0.361106 > 66.200578 - 10.00° above ground
0.701990 > 65.090295 - 0.00° above ground

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MATRIX CALCULATIONS from Westberg Phasor Professional

Zmatrix (1 to 3 across, 1 to 3 down)		
57.87 + j73.08	-16.99 - j21.32	37.17 - j21.34
-16.99 - j21.32	56.06 + j69.15	17.34 - j29.19
37.17 - j21.34	17.34 - j29.19	56.22 + j76.78

YMatrix		
0.005362 - j0.007280	0.001024 - j0.000623	0.003339 + j0.003012
0.001024 - j0.000623	0.007218 - j0.007365	0.003655 + j0.001829
0.003339 + j0.003012	0.003655 + j0.001829	0.004604 - j0.005679

HMatrix - [I] = [H] X [F]		
0.023541 + j0.002401	0.000964 - j0.000434	0.000565 + j0.001629
0.000947 - j0.000424	0.024089 + j0.002364	0.001058 + j0.000952
0.000569 + j0.001645	0.001087 + j0.000980	0.023266 + j0.002423

HMatrix-inverse - [F] = $[H]^{-1}$ X [I]		
41.939435 - j4.187217	-1.522506 + j1.253764	-1.470527 - j2.676869
-1.496471 + j1.227658	41.202821 - j3.982504	-2.041742 - j1.217019
-1.481817 - j2.702601	-2.097607 - j1.253989	42.443924 - j4.107738

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TOWER CURRENTS

Mode 1 - Daytime

Tower 1
0.000000 > 0.000000 - 90.00° above ground
1.799071 > 135.618194 - 80.00° above ground
3.272767 > 135.929605 - 70.00° above ground
4.587706 > 136.240301 - 60.00° above ground
5.720083 > 136.559664 - 50.00° above ground
6.640003 > 136.896651 - 40.00° above ground
7.318230 > 137.264862 - 30.00° above ground
7.729212 > 137.686962 - 20.00° above ground
7.850805 > 138.203373 - 10.00° above ground
7.586866 > 139.067090 - 0.00° above ground

Tower 2
0.000000 > 0.000000 - 90.00° above ground
1.554701 > -129.176271 - 80.00° above ground
2.767013 > -128.745734 - 70.00° above ground
3.791449 > -128.274393 - 60.00° above ground
4.611720 > -127.735634 - 50.00° above ground
5.206616 > -127.098628 - 40.00° above ground
5.555417 > -126.315805 - 30.00° above ground
5.639213 > -125.302878 - 20.00° above ground
5.438559 > -123.891918 - 10.00° above ground
4.784264 > -121.078434 - 0.00° above ground

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Tower 3
0.000000 > 0.000000 - 90.00° above ground
2.814328 > -4.539556 - 80.00° above ground
5.064464 > -4.270562 - 70.00° above ground
7.017654 > -3.977956 - 60.00° above ground
8.639255 > -3.646877 - 50.00° above ground
9.885564 > -3.261344 - 40.00° above ground
10.714003 > -2.797785 - 30.00° above ground
11.086499 > -2.215908 - 20.00° above ground
10.966666 > -1.438960 - 10.00° above ground
10.113191 > 0.000000 - 0.00° above ground

Mode 2 - Nighttime

Tower 1
0.000000 > 0.000000 - 90.00° above ground
0.309157 > 117.932729 - 80.00° above ground
0.556032 > 118.340139 - 70.00° above ground
0.770369 > 118.766079 - 60.00° above ground
0.948629 > 119.228440 - 50.00° above ground
1.086267 > 119.745685 - 40.00° above ground
1.178832 > 120.345430 - 30.00° above ground
1.222349 > 121.074936 - 20.00° above ground
1.213048 > 122.023461 - 10.00° above ground
1.126052 > 123.737582 - 0.00° above ground

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Tower 2
0.000000 > 0.000000 - 90.00° above ground
0.370415 > -14.070947 - 80.00° above ground
0.668442 > -13.133356 - 70.00° above ground
0.929996 > -12.129298 - 60.00° above ground
1.151160 > -11.015231 - 50.00° above ground
1.326824 > -9.746324 - 40.00° above ground
1.452060 > -8.257431 - 30.00° above ground
1.522747 > -6.440199 - 20.00° above ground
1.535670 > -4.098045 - 10.00° above ground
1.472142 > 0.000000 - 0.00° above ground

Tower 3
0.000000 > 0.000000 - 90.00° above ground
0.102016 > -12.312441 - 80.00° above ground
0.183369 > -11.421585 - 70.00° above ground
0.253775 > -10.402555 - 60.00° above ground
0.312035 > -9.196065 - 50.00° above ground
0.356686 > -7.735864 - 40.00° above ground
0.386399 > -5.925532 - 30.00° above ground
0.400146 > -3.602894 - 20.00° above ground
0.397233 > -0.465605 - 10.00° above ground
0.371531 > 5.310957 - 0.00° above ground

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TOWER DRIVE INFORMATION - DAY						
Tower	Field Ratio	Field Phase	Drive Impedance (Ω)	Current (amps)	Current Ratios*	Power (Watts)
1	0.6800	140.00°	16.89 + j53.85	7.59 ∠ 139.07°	0.751 ∠ 139.07°	971.9258
2	0.5100	-123.50°	61.29 +j164.73	4.78 ∠ -121.08°	0.473 ∠ -121.08°	1402.8617
3	1.0000	0°	29.58 +j107.24	10.11 ∠ 0°	1.000 ∠ 0°	3025.2125

TOWER DRIVE INFORMATION - NIGHT						
Tower	Field Ratio	Field Phase	Drive Impedance (Ω)	Current (amps)	Current Ratios*	Power (Watts)
1	0.8200	128.50°	35.00 +j99.59	1.13 ∠ 123.74°	0.769 ∠ 123.74°	44.3826
2	1.0000	0°	81.88 +j60.47	1.47 ∠ 0.00°	1.000 ∠ 0.00°	177.4427
3	0.2700	2.50°	117.18 +j85.10	0.37 ∠ 5.31°	0.252 ∠ 5.31°	16.1746

*** = These are the pattern parameters used to tune the array and are on the Form 302.**

Tower drive voltages, currents and impedances were calculated using Westberg Consulting's WCAP Professional, which provides the node voltages and currents for each component in a phasing system. In this case we are interested in the tower data which is easily obtained from the node connecting the last series component of the ATU network to the tower impedance. This data is shown on the following tables.

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Branch and Node Values from Westberg WCAP Professional

WCAP OUTPUT AT FREQUENCY: 1.460 mHz

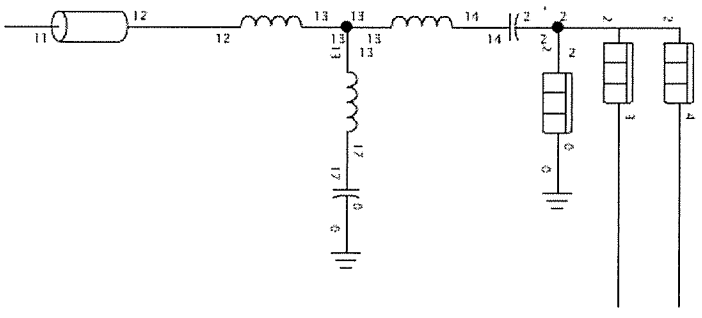
Mode 1 (Daytime)

NODE		NODE VOLTAGES
Node:2	(Tower 1)	428.1382 ∠ -45.7396° V
Node:3	(Tower 2)	911.7485 ∠ 51.1168° V
Node:4	(Tower 3)	1125.1418 ∠ 177.1846° V

WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
C	14-2	827.05 ∠ 151.671° V	7.59 ∠ -118.329° A
C	24-3	1043.08 ∠ -108.475° V	4.78 ∠ -18.475° A
C	32-4	2204.90 ∠ 12.604° V	10.11 ∠ 102.604° A

WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
C	14-2	16.89 -j 55.165	16.89 +j 53.846
C	24-3	61.29 -j 53.289	61.29 +j 164.732
C	32-4	29.58 -j 110.775	29.58 +j 107.245

In the WCAP phasing system model, nodes 2, 3 and 4 are the output (tower) sides of the tower ATU networks and the location of the current sampling element. Nodes 14, 24 and 32 are the input sides of those components in the daytime phasor, respectively, and the "To Impedance" column shows the calculated tower impedances. Tower 1 is shown below as an example:



Nodes 3 and 4 above connect to the other three towers and represent the calculated mutual impedances to/from each tower from the matrix.

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WCAP OUTPUT AT FREQUENCY: 1.460 mHz

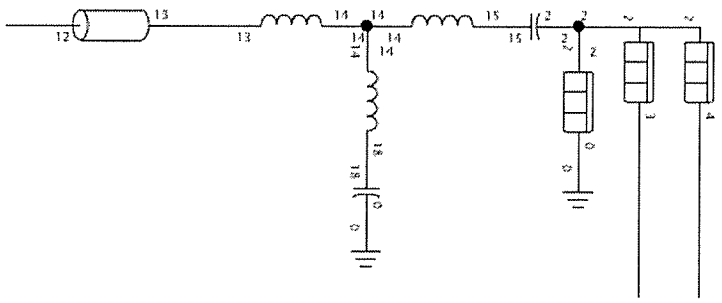
Mode 2 (Nighttime)

NODE		NODE VOLTAGES
Node:2	(Tower 1)	118.8676 ∠ -66.5100° V
Node:3	(Tower 2)	149.8442 ∠ 135.5620° V
Node:4	(Tower 3)	53.8076 ∠ 140.4155° V

WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
C	15-2	122.75 ∠ 132.854° V	1.13 ∠-137.146° A
C	23-3	320.96 ∠ 9.114° V	1.47 ∠ 99.114° A
C	32-4	81.01 ∠ 14.422° V	0.37 ∠ 104.422° A

WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
C	15-2	35.00 -j 9.420	35.00 +j 99.590
C	23-3	81.88 -j 157.549	81.88 +j 60.471
C	32-4	117.16 -j 132.916	117.16 +j 85.105

In the WCAP phasing system model, nodes 2, 3 and 4 are the output (tower) sides of the tower ATU networks and the location of the current sampling element. Nodes 15, 23 and 32 are the input sides of those components in the daytime phasor, respectively, and the "To Impedance" column shows the calculated tower impedances. Tower 1 is shown below as an example:



Nodes 3 and 4 above connect to the other three towers and represent the calculated mutual impedances to/from each tower from the matrix.

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Sample System Verification [47 CFR 73.151(c)(2)]

Sample Lines: Andrew 3/8" LDF2-50 Foam Dielectric Heliax

88% velocity factor, 50 +/-1 ohms

Lines were cut to equal electrical length and terminated with proper connectors at factory. An additional short flexible cable connects the 3/8" Heliax to the antenna monitor. These jumpers are accounted for in the data which follows.

Sample Element Type: Delta Electronics TCT-3 Toroidal Current Transformers

Location: At output of antenna tuning network on tower feedline

Operating Potential: Grounded

TCT-3 Serial Numbers & Z at 1460 KHz:

Tower 1:	15103	49.164 +j0.945 ohms
Tower 2:	15105	49.435 +j0.899 ohms
Tower 3:	15104	49.436 +j1.041 ohms

(Current Transformers are matched within +/- 0.2 ohm resistance and reactance)

TCT-3 Phase and Ratio Test (Tower 2 is reference):

Tower 1:	0.994/+0.2°
Tower 3:	1.000/ 0.0°

(Current Transformers are matched within 0.6% ratio and 0.2° phase)

The phase and ratio calibration test was done with all transformers removed from the ACUs and configured adjacent to each other reading RF current to the nighttime common point buss at 500 watts. The cables used to connect the TCTs to the monitor are identical in electrical length and

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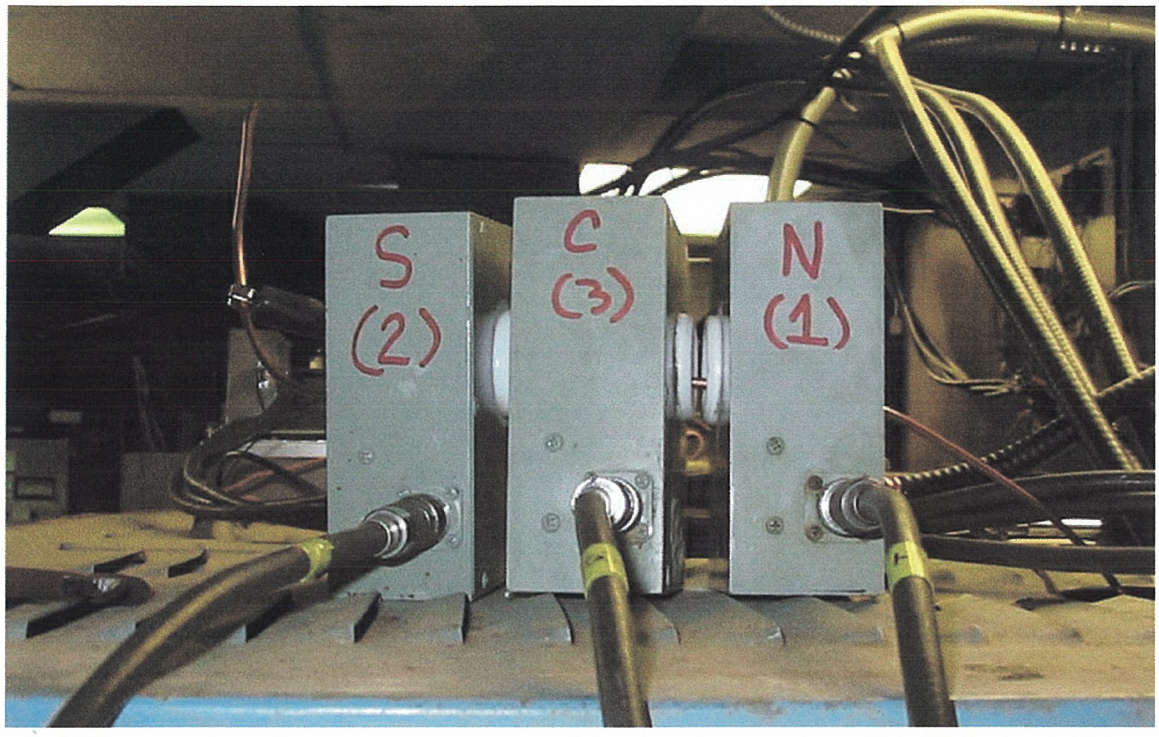
characteristic impedance, and have been marked as to which tower they apply to and stored in the phasor for use in future tests.



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Sample Line Length Test (see graph data which follows):

Tower 1 Closest Odd ¼ wave Resonant Frequency: 1.543418 MHz (420.78 feet)

Tower 2 Closest Odd ¼ wave Resonant Frequency: 1.538938 MHz (422.16 feet)

Tower 3 Closest Odd ¼ wave Resonant Frequency: 1.538765 MHz (422.05 feet)

Maximum Difference in Electrical Length: +/-0.69 feet, 0.37° at 1460 KHz

Sample Line Impedance Test (see graph data which follows):

Tower 1 (North) Sample Line Mean Zmag: 50.39 ohms

Tower 2 (South) Sample Line Mean Zmag: 50.35 ohms

Tower 3 (Center) Sample Line Mean Zmag: 50.38 ohms

Maximum Variation in Sample Line Impedance: +/-0.02 ohms (0.04%)

Sample Impedance From Monitor End (with sample element connected, see graph data):

Tower 1 (North) Sample Impedance: 52.438 -j0.348 ohms

Tower 2 (South) Sample Impedance: 52.226 +j0.272 ohms

Tower 3 (Center) Sample Impedance: 52.307 +j0.240 ohms

Maximum Variation in Sample Resistance: +/- 0.106 ohms (0.22%)
Maximum Variation in Sample Reactance: +/- 0.31 ohms

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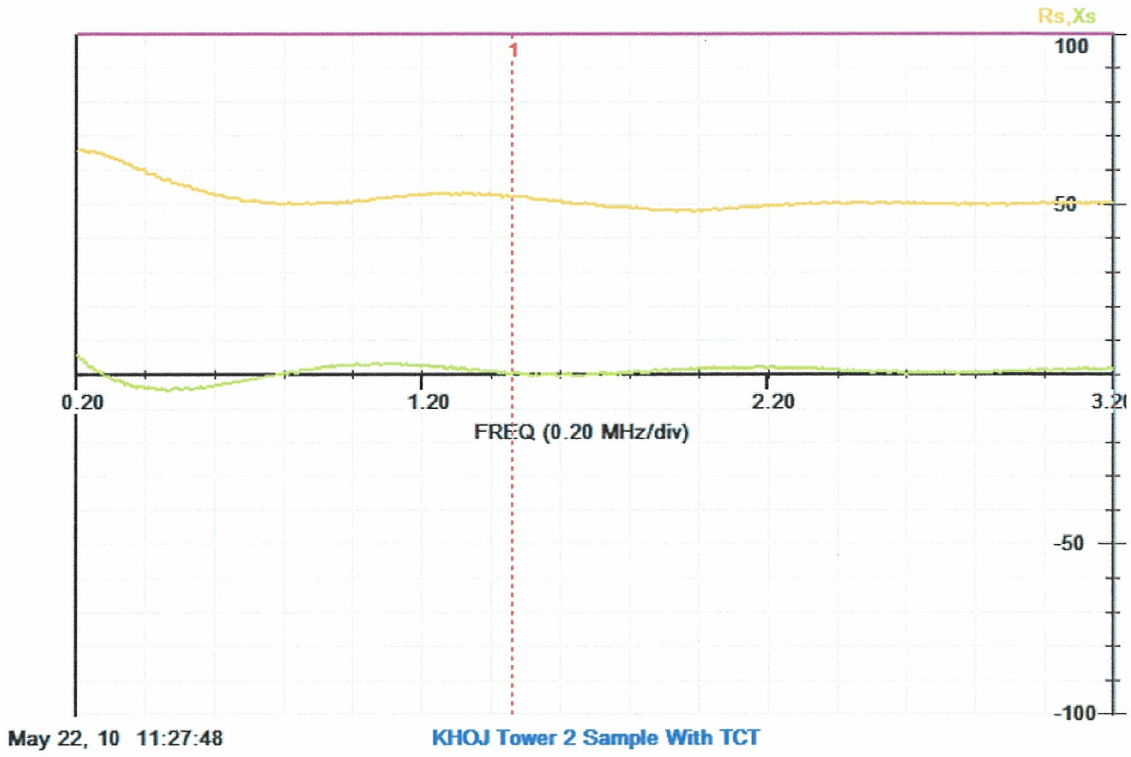

Impedance of Tower 2 line at 1460 KHz, monitor end with transformer connected at other end:

52.226 +j0.272 ohms (Zmag = 52.227 ohms)

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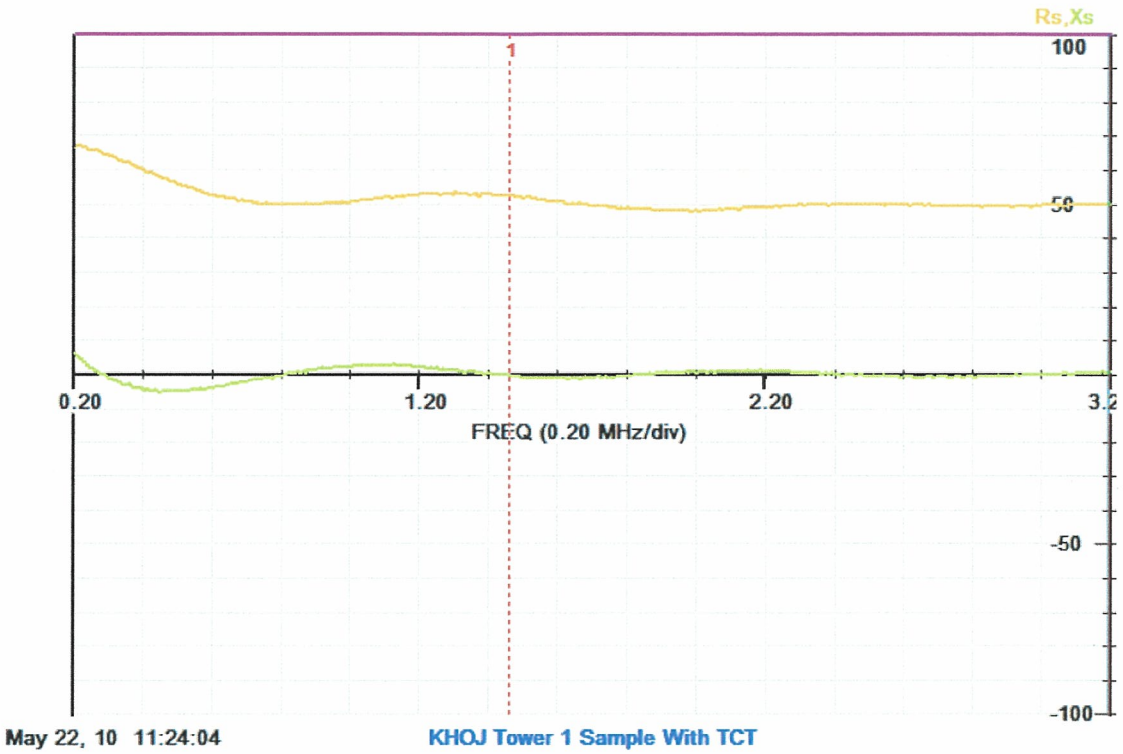
Sample lines with TCTs connected as normal:



Impedance of Tower 1 line at 1460 KHz, monitor end with transformer connected at other end:

52.438 -j0.348 ohms (Zmag = 52.439 ohms)

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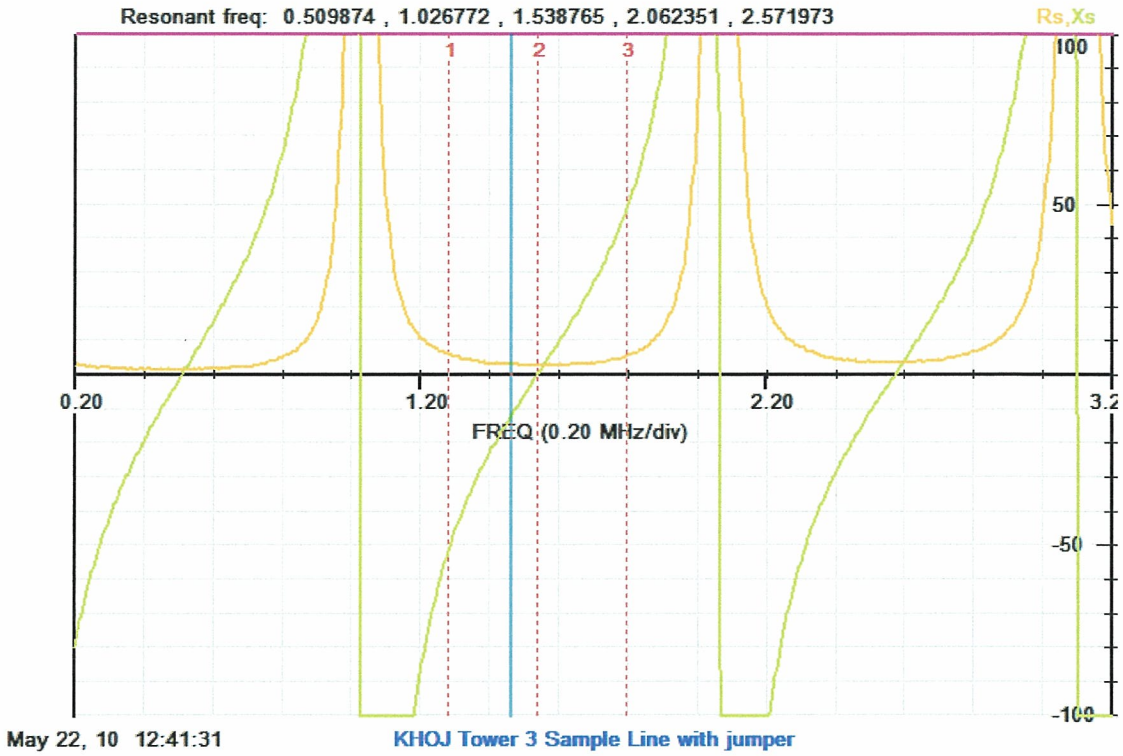
Tower 3 Sample Line Including Monitor Jumper (open circuit)



Marker	Freq	Rs	Xs	Zmag
1	1.282304	5.937	-51.474	51.815
2	1.538765	2.970	-0	
3	1.795226	5.555	+48.624	48.940

Mean Tower 3 (Center) Sample Line Zmag: 50.38 ohms

Tower 3 Closest Odd ¼ wave Resonant Frequency: 1.538765 MHz (422.05 feet)

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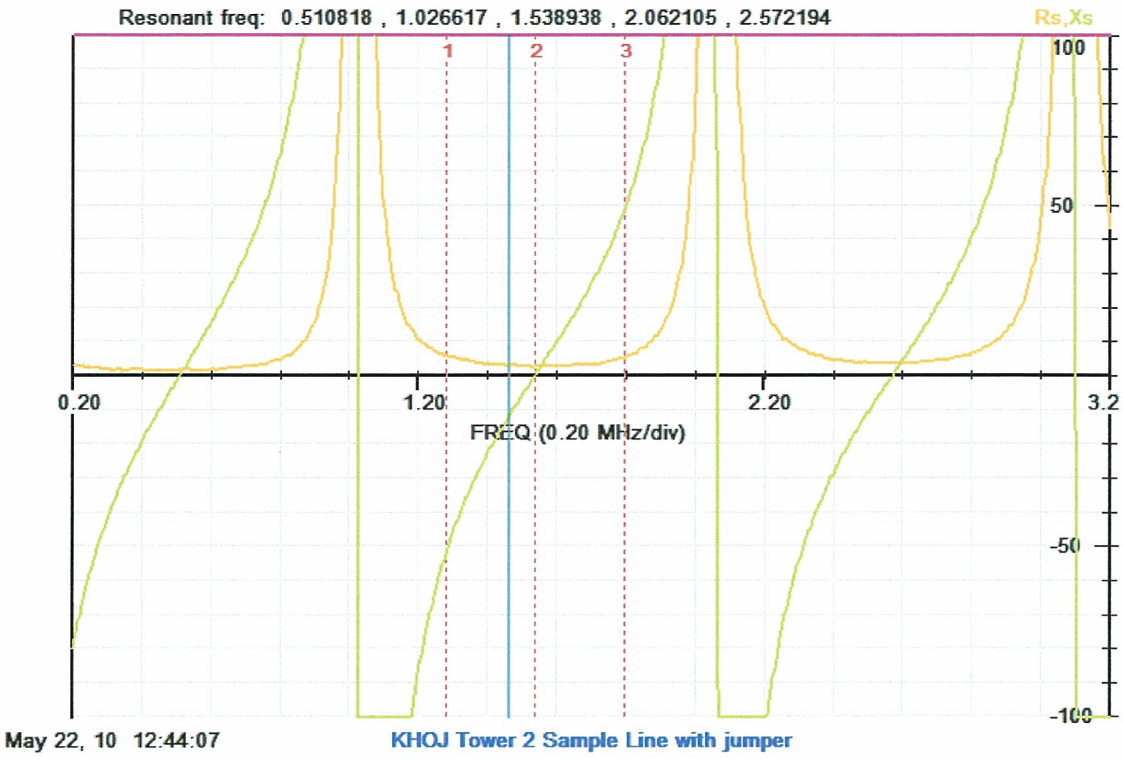
Tower 2 Sample Line Including Monitor Jumper (open circuit)



Marker	Freq	Rs	Xs	Zmag
1	1.282448	5.749	-51.560	51.880
2	1.538938	2.619	-0	
3	1.795428	5.406	+48.827	48.827

Mean Tower 2 (South) Sample Line Zmag: 50.35 ohms

Tower 2 Closest Odd ¼ wave Resonant Frequency: 1.538938 MHz (422.16 feet)

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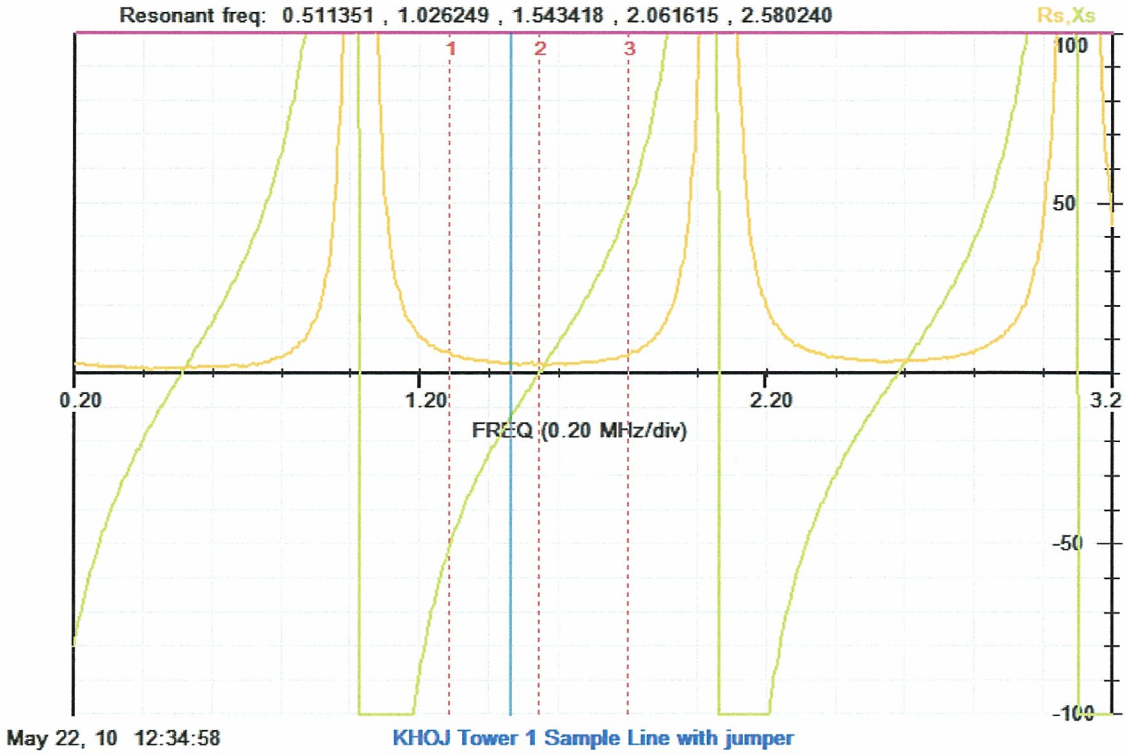
Tower 1 Sample Line Including Monitor Jumper (open circuit)



Marker	Freq	Rs	Xs	Zmag
1	1.286182	5.942	-50.942	51.288
2	1.543418	2.668	-0	
3	1.800654	5.488	+49.179	49.485

Mean Tower 1 (North) Sample Line Zmag: 50.39 ohms

Tower 1 Closest Odd ¼ wave Resonant Frequency: 1.543418 MHz (420.78 feet)

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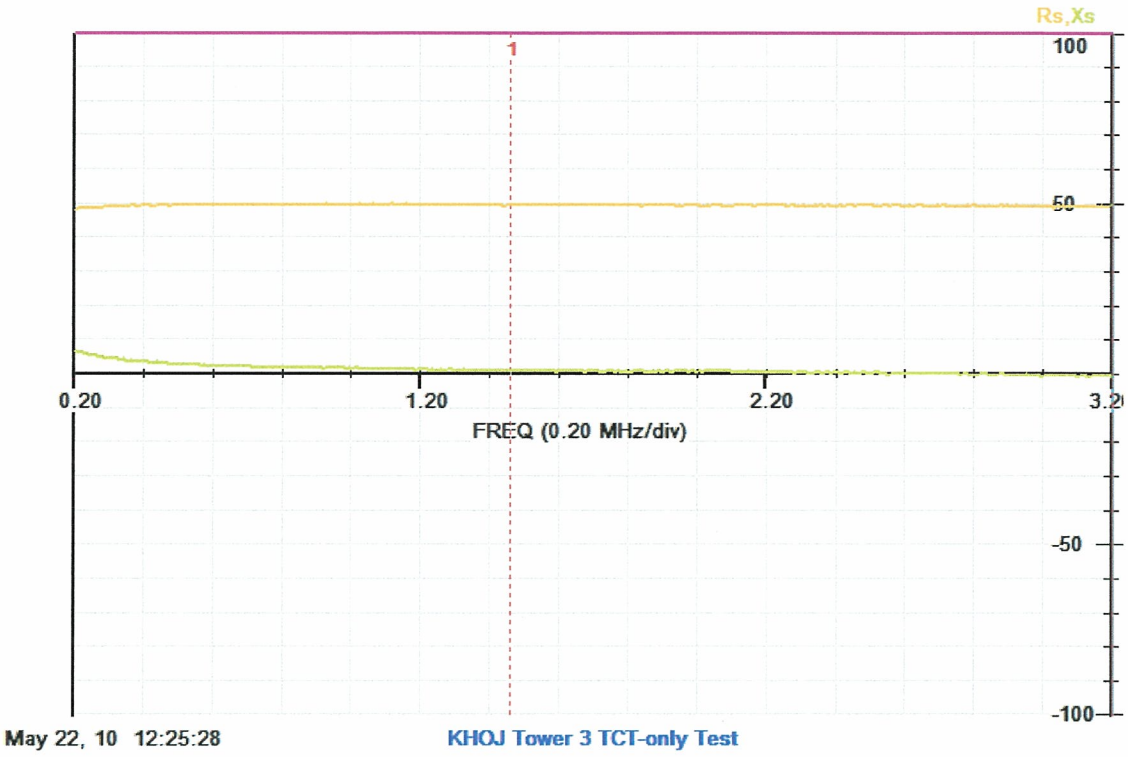

Tower 3 (Center), TCT-3 Sample Transformer Only

49.436 +j1.041 ohms

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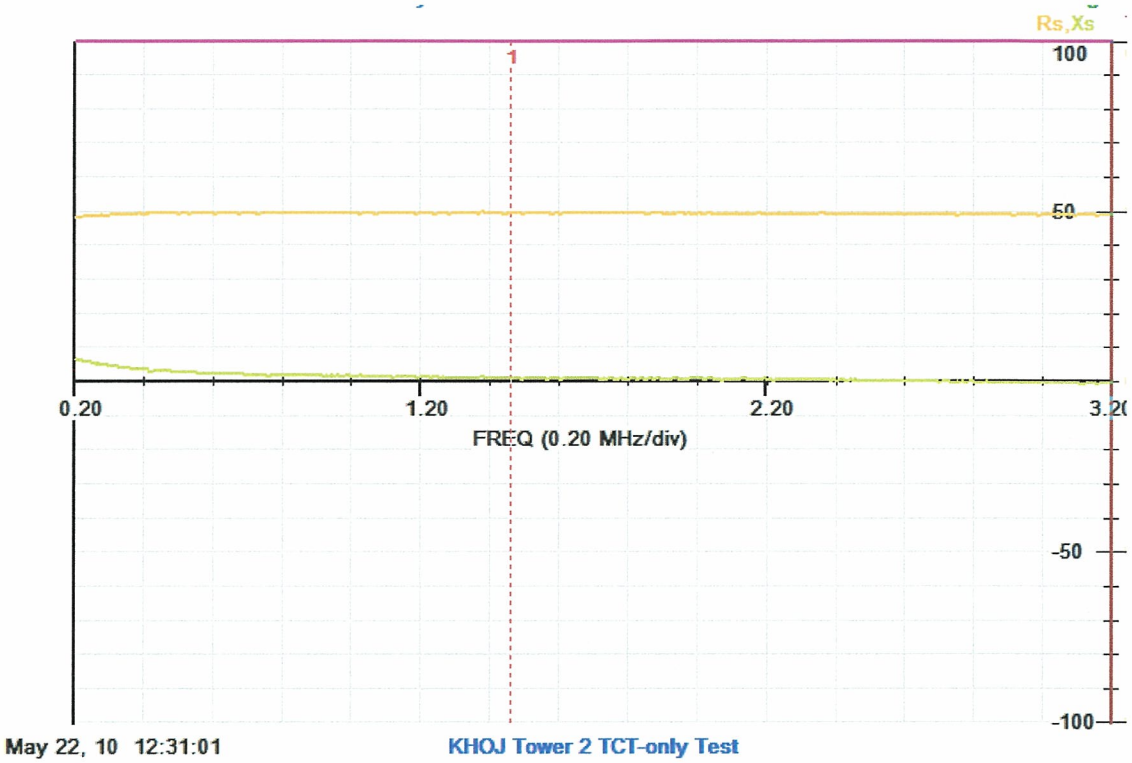

Tower 2 (South), TCT-3 Sample Transformer Only

49.435 +j0.899 ohms

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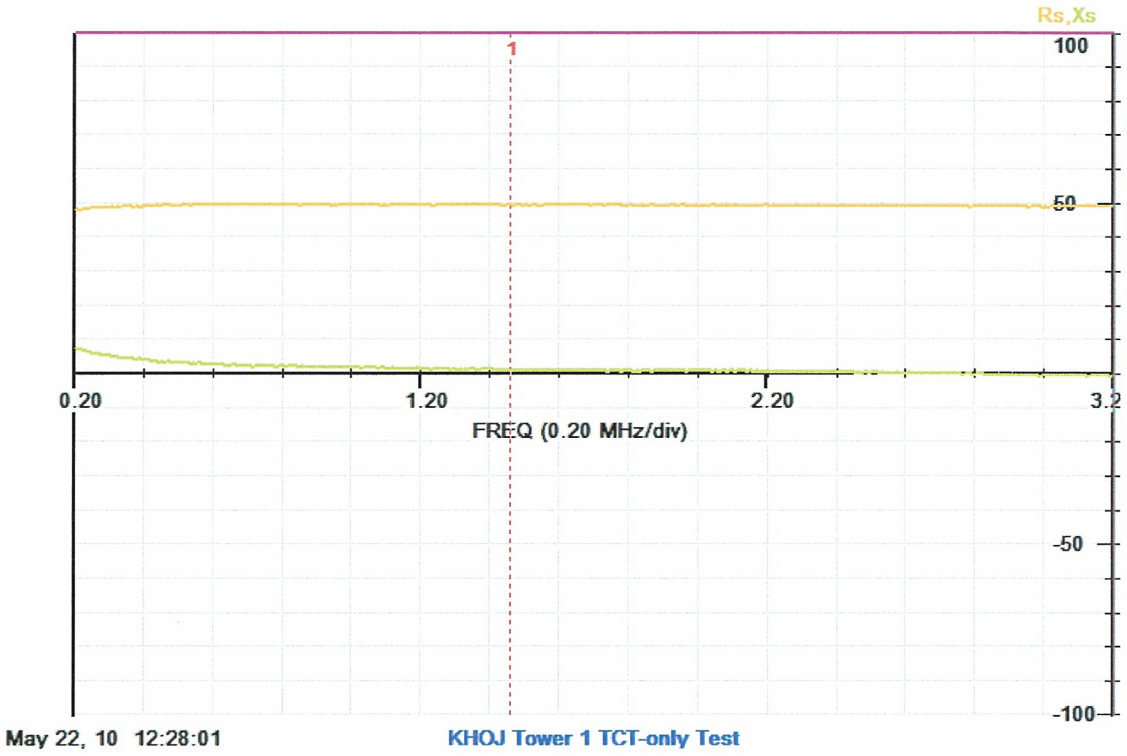
Delta TCT-3 Sample Element Test Results:



Tower 1 (North), TCT-3 Sample Transformer Only

49.164 +j0.945 ohms at 1460 KHz

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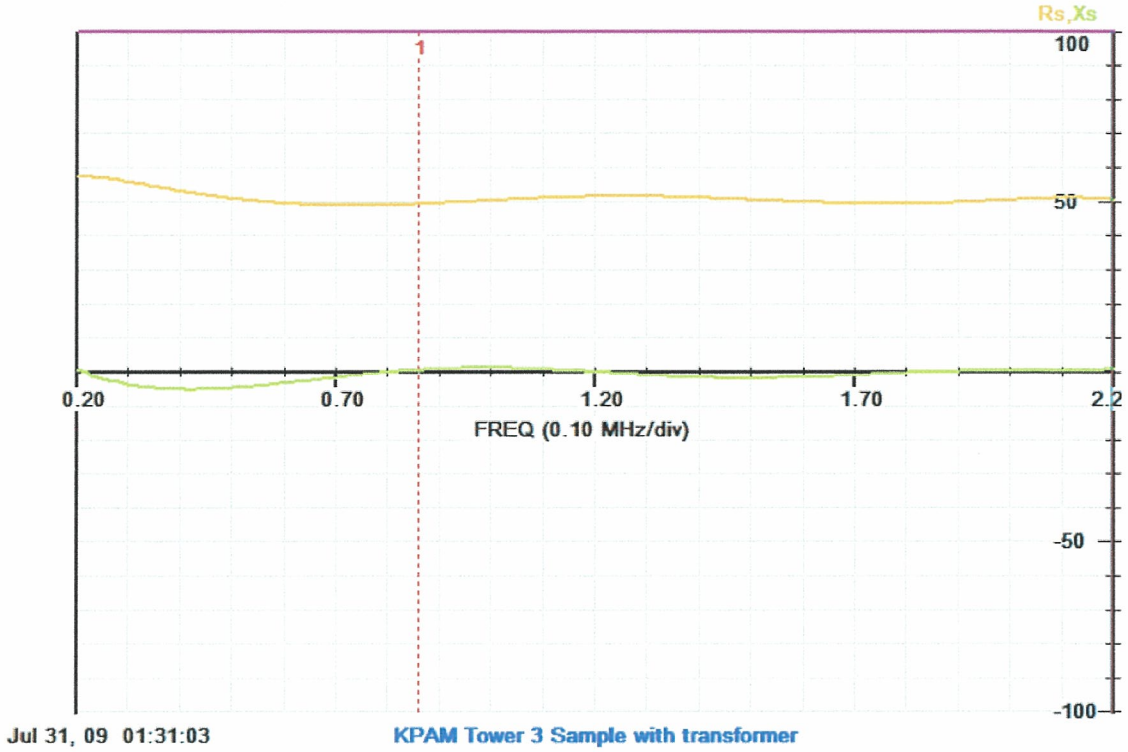

Impedance of Tower 3 line at 1460 KHz, monitor end with transformer connected at other end:

52.307 +j0.240 ohms (Zmag = 52.308 ohms)

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KHOJ Daytime Reference Field Strength Measurements

[47 CFR 73.151(c)(3)]

Point	Distance	mv/m	Coordinates (NAD 84)	Description
14° True (Minima)				
1:	1.24 km	74	38.845468,-90.465360	on Blase Station Road
2:	3.85	45	38.868341,-90.457974	on Church Rd.
3:	7.28	17	38.898096,-90.448236	CR V at school entrance
30° True (Maxima)				
1:	1.11 km	94	38.843379,-90.462454	on Blase Station Road
2:	3.12	22	38.858986,-90.450825	on SR 94
3:	4.30	17.5	38.868170,-90.444015	4804 Church Road
54° True (Minima)				
1:	1.13	22	38.840704,-90.458279	on Wiedey Road
2:	4.58	15	38.858929,-90.426120	on Towerline Road
3:	6.05	8.0	38.866653,-90.412357	5068 Highway H
93° True (Maxima)				
1:	2.91	27	38.833523,-90.435334	at curve on Weidey Road
2:	5.03	20	38.832407,-90.410915	5016 Weidey Road driveway
3:	6.34	20	38.831749,-90.395878	Farm access road near pwr line tower
141° True (Minima)				
1:	8.92	4.7	38.802134,-90.374811	2212 Riverwoods Trail
2:	9.29	3.0	38.800800,-90.371158	1002 McBride Place
3:	9.49	2.2	38.800038,-90.368895	1004 Pratt Place
213.5° True (Maxima, main lobe)				
1:	1.84	620	38.820949,-90.480691	Apricot Dr.at Catalpa Dr.
2:	1.97	600	38.819933,-90.481314	802 Clarence Dr.
3:	2.57	440	38.815427,-90.485204	3210 Country Bluff Dr.
311° True (Minima)				
1:	2.62	52	38.850231,-90.491691	on Highway B at curve sign
2:	3.14	44	38.853264,-90.496269	on Highway B
3:	4.77	31.5	38.862863,-90.510504	Seeburger Rd at pipeline markers
333° True (Minima)				
1:	4.22	60	38.868599,-90.491074	Church Rd. East of Washeon Rd.
2:	4.35	50	38.869543,-90.491648	Washeon Rd. at railroad tracks
3:	6.51	26.5	38.886909,-90.503124	Yacht Club of St. Louis by meters

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KHOJ Nighttime Reference Field Strength Measurements

[47 CFR 73.151(c)(3)]

Point	Distance	mv/m	Coordinates (NAD 84)	Description
34° True (Maxima)				
1:	4.48 km	22	38.868062,-90.439887	on Church Rd.
2:	5.16	24.5	38.873169,-90.435524	on Church Rd.
3:	5.48	22	38.875573,-90.433446	@ electric meter on farm drive
103° True (Minima-monitor point radial)				
1:	9.65 km	1.5	38.815212,-90.360380	600 Leonard Drive
2:	10.25	1.7	38.814025,-90.353630	1015 Dewayne Drive
3:	10.56	1.5	38.813438,-90.350069	Randall Ct. At Danelle Dr.
167° True (Maxima-main lobe)				
1:	5.20	14.5	38.789184,-90.455375	Across from 13893 Earth City Expy.
2:	6.50	13	38.777690,-90.451928	Rock Industrial Park Dr. at fireplug
3:	9.22	7.5	38.753979,-90.445025	El Ferroll Ct at Spanish Village Dr.
209.3° True (Minima-monitor point radial)				
1:	1.88	86	38.819954,-90.479429	720 Clarence Drive
2:	2.45	70	38.815541,-90.482693	3034 DePaulia Drive
3:	2.56	62	38.814654,-90.483299	3177 Country Bluff Drive
258° True (Maxima-main lobe)				
1:	3.27	62	38.828588,-90.505863	Elm Park Industrial Dr. Near FedEx
2:	3.69	60	38.827844,-90.510570	Mueller Rd. in parking lot to south
3:	4.44	52	38.826528,-90.518599	3779 New Town Blvd. in lot to east
323° True (Minima-monitor point radial)				
1:	3.27	10	38.858242,-90.491619	on Washeon Rd.
2:	4.74	11.5	38.868706,-90.501822	on Church Rd.
3:	5.78	9.5	38.876166,-90.509213	4977 Seeburger Rd.

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Tower Survey [47 CFR 73.151(c)(1)(ix)]

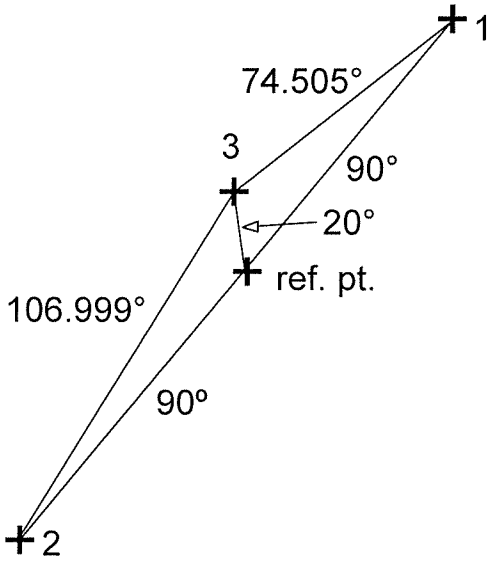
The three KHOJ towers were surveyed on May 19, 2010 by Lee C. Ferrenbach III of Gateway Land Services, Inc., a licensed Professional Land Surveyor in the state of Missouri, and were found to be as follows:

Tower 2 (S) to 1 (N): 336.8 feet (179.901°) at 31.913° True (theo. = 180.0° at 32.0° T)

Tower 3 (C) to 1 (N): 139.1 feet (74.299°) at 40.729° True (theo. = 74.51° at 40.857° T)

Tower 2 (S) to 3 (C): 200.5 feet (107.096°) at 25.808° True (theo. = 107.0° at 25.85° T)

Note: The KHOJ towers are in a 'dogleg' arrangement and the spacing and orientation to/from the center tower (#3) is specified from a reference that is not a tower location. The geometry is approximately illustrated here:



A copy of the survey report is attached. This corresponds to a maximum relative spacing error of less than +0.1°/-0.22° and bearing error of less than +0.0°/-0.13°, well within the allowed tolerances of +/- 1.5°.

Gateway Land Services Inc

1525 Belton Ave.
St. Louis MO 63119
Phone 314.881.9556
Fax 314.961.7336
www.glsstl.com

GEODETIC COORDINATE CERTIFICATION

North Tower
Ground Elevation = 451.0

	DEGREES	MINUTES	SECONDS	
LATITUDE	38°	50'	06.77" N	NAD 83
LONGITUDE	90°	28'	07.10" W	NAD 83

Middle Tower
Ground Elevation = 450.8

	DEGREES	MINUTES	SECONDS	
LATITUDE	38°	50'	05.73" N	NAD 83
LONGITUDE	90°	28'	08.25" W	NAD 83

South Tower
Ground Elevation = 449.1

	DEGREES	MINUTES	SECONDS	
LATITUDE	38°	50'	03.95" N	NAD 83
LONGITUDE	90°	28'	09.35" W	NAD 83

Calculated Geodetic Bearings between towers:

South Tower to Middle Tower - North 25° 48' 27" East, Distance = 200.5'
Middle Tower to North Tower - North 40° 43' 45" East, Distance = 139.1'
South Tower to North Tower - North 31° 54' 45" East, Distance = 336.8'

DATE: May 18, 2010
JOB #: 10-127
RE: Covenant Network
LOCATION: 3713 N. Highway 94, St. Charles, MO 63301

I certify that the Latitude and the Longitude are accurate to within plus or minus 5 feet horizontally; and that the site elevation is accurate to within plus or minus 10 feet vertically. Relative tolerance between points is +\- 0.5 feet The horizontal datum (coordinates) are in terms of the North American Datum of 1983 (NAD83) and are expressed as degrees, minutes and seconds to the nearest hundredth of a second. The vertical datum (heights) are in terms of the North American Vertical Datum of 1988 and are determined to the nearest foot.

Licensed Professional Land Surveyor
State of Missouri # 2310
Lee C Ferrenbach III

5/19/2010
DATE

STATE OF MISSOURI
LEE C. FERRENBACH III
NUMBER PLS- 2310
PROFESSIONAL LAND SURVEYOR

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Preparer's Certification

This engineering report was prepared by me from data personally collected on site using equipment owned and maintained by me for this purpose. It is true and correct to the best of my knowledge and belief. The KHOJ antenna system is properly constructed and adjusted and program test authority is hereby requested.

Mark A. Mueller

May 29, 2010