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**STAMP & RETURN**

June 24, 2019

**BY HAND VIA COURIER**

Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 Twelfth Street, S.W.  
12<sup>th</sup> Street Lobby, TW-A325  
Washington, DC 20554

**Accepted / Filed**

**JUN 24 2019**

**Federal Communications Commission  
Office of the Secretary**

Re: **Inspiration Media, Inc. – FRN 0001635275**  
**Station KKOL(AM), Seattle, WA (Fac. ID 20355)**  
**Application for Station License**  
**Request for Program Test Authority**

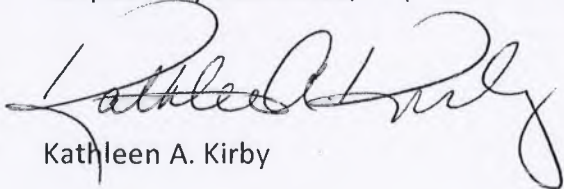
Dear Ms. Dortch:

On behalf of Inspiration Media, Inc., licensee of AM station KKOL, Seattle, Washington, we are submitting herewith an original and two copies of an application on FCC Form 302-AM for license to cover Construction Permit BP-20171207ABL. Program Test Authority is requested.

**The fee due for this application, \$1,560.00, has been paid, using the FCC Fee Filer system. A copy of Form 159 confirming the payment is included herewith.**

Should there be any questions concerning this application, please contact the undersigned.

Respectfully Submitted,



Kathleen A. Kirby

Enclosures

# Agency Tracking ID:PGC3262127

## Authorization Number:038147

### Successful Authorization -- Date Paid: 6/24/19

### FILE COPY ONLY!!

READ INSTRUCTIONS CAREFULLY BEFORE PROCEEDING  (1) LOCKBOX #979089	FEDERAL COMMUNICATIONS COMMISSION <b>REMITTANCE ADVICE</b> <b>FORM 159</b> PAGE NO 1 OF 1	APPROVED BY OMB 3060-059 SPECIAL USE FCC USE ONLY
<b>SECTION A - Payer Information</b>		
(2) PAYER NAME (if paying by credit card, enter name exactly as it appears on your card) <b>Inspiration Media, Inc.</b>		(3) TOTAL AMOUNT PAID (dollars and cents) <b>\$1560.00</b>
(4) STREET ADDRESS LINE NO. 1 <b>4880 Santa Rosa Road</b>		
(5) STREET ADDRESS LINE NO. 2		
(6) CITY <b>Camarillo</b>	(7) STATE <b>CA</b>	(8) ZIP CODE <b>93012</b>
(9) DAYTIME TELEPHONE NUMBER (INCLUDING AREA CODE) <b>805-3844502</b>	(10) COUNTRY CODE (IF NOT IN U.S.A.) <b>US</b>	
<b>FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED</b>		
(11) PAYER (FRN) <b>0001635275</b>	(12) FCC USE ONLY	
<b>IF PAYER NAME AND THE APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159-C)</b>		
(13) APPLICANT NAME <b>Inspiration Media, Inc.</b>		
(14) STREET ADDRESS LINE NO. 1 <b>4880 Santa Rosa Road</b>		
(15) STREET ADDRESS LINE NO. 2		
(16) CITY <b>Camarillo</b>	(17) STATE <b>CA</b>	(18) ZIP CODE <b>93012</b>
(19) DAYTIME TELEPHONE NUMBER (INCLUDING AREA CODE) <b>805-3844502</b>	(20) COUNTRY CODE (IF NOT IN U.S.A.) <b>US</b>	
<b>FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED</b>		
(21) APPLICANT (FRN) <b>0001635275</b>	(22) FCC USE ONLY	
<b>COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEET</b>		
(23A) FCC Call Sign/Other ID <b>KKOL</b>	(24A) Payment Type Code(PTC) <b>MMR</b>	(25A) Quantity <b>1</b>
(26A) Fee Due for (PTC) <b>\$725.00</b>	(27A) Total Fee <b>\$725.00</b>	FCC Use Only
(28A) FCC CODE 1 <b>20355</b>	(29A) FCC CODE 2 <b>Form302-AM</b>	
(23B) FCC Call Sign/Other ID <b>KKOL</b>	(24B) Payment Type Code(PTC) <b>MOR</b>	(25B) Quantity <b>1</b>
(26B) Fee Due for (PTC) <b>\$835.00</b>	(27B) Total Fee <b>\$835.00</b>	FCC Use Only
(28B) FCC CODE 1	(29B) FCC CODE 2	

**20355**

**Form302-AM**

FOR  
FCC  
USE  
ONLY

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

(Please read instructions before filling out form.)

**FOR COMMISSION USE ONLY**

**FILE NO.**

**SECTION I - APPLICANT FEE INFORMATION**

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

MAILING ADDRESS (Line 1) (Maximum 35 characters)

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY

STATE OR COUNTRY (if foreign address)

ZIP CODE

TELEPHONE NUMBER (include area code)

CALL LETTERS

OTHER FCC IDENTIFIER (If applicable)

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			
0	0	0	1

(C)

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

FOR FCC USE ONLY

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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)

0	0	0	1
---	---	---	---

(C)

\$
----

FOR FCC USE ONLY

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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

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SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT		
MAILING ADDRESS		
CITY	STATE	ZIP CODE

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

☐ Yes ☐ No

If No, explain in an Exhibit. Program test authority is hereby requested pursuant to condition #6 of the CP. See Engineering Exhibit.

Exhibit No.

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

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No.

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

☐ Yes ☐ No

If Yes, explain in an Exhibit.

Exhibit No.

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

☐ Yes ☐ No

If No, explain in an Exhibit.

☐ Does not apply

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 <b>Christopher J. Henderson</b>	Signature 	
Title <b>Executive Vice President &amp; Secretary</b>	Date <b>6/21/2019</b>	Telephone Number <b>(805)987-0400</b>

**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.



**ENGINEERING EXHIBIT  
IN SUPPORT OF AN  
APPLICATION FOR STATION LICENSE  
STATION KKOL – SEATTLE, WASHINGTON  
1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2  
FACILITY ID: 20355**

Applicant: Inspiration Media, Inc.

JUNE, 2019

7901 Yarnwood Court  
Springfield, VA 22153-2899

⋮

tel: (703) 569-7704  
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⋮

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**[www.ctjc.com](http://www.ctjc.com)**

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ENGINEERING STATEMENT OF CARL T. JONES, JR., P.E.

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**SECTION III - LICENSE APPLICATION ENGINEERING DATA**

Name of Applicant  
Inspiration Media, Inc.

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	
KKOL	BP-20171207ABL	1300	Unlimited	Night 3.2	Day 50.0

2. Station location

State Washington	City or Town Seattle
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3. Transmitter location

State WA	County Kitsap	City or Town Bainbridge Island	Street address (or other identification) 10108 Madison Ave, NE
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4. Main studio location

State WA	County King	City or Town Seattle	Street address (or other identification) 705 5th Ave, South
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5. Remote control point location (specify only if authorized directional antenna)

State WA	County King	City or Town Seattle	Street address (or other identification) 705 5th Ave, South
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6. Has type-approved stereo generating equipment been installed?



Yes



No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68?



Yes



No



Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed.

Exhibit No.  
Eng Stmt

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system 8.31	RF common point or antenna current (in amperes) without modulation for day system 32.45
Measured antenna or common point resistance (in ohms) at operating frequency Night 50.0 Day 50.0	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(N)	+179.9	-87.8	0.628	0.699	----	----
2(S)	0.0	0.0	1.000	1.000	----	----

Manufacturer and type of antenna monitor:

Potomac Instruments, Model 1901-2, S/N: 677

## 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 vertical, guyed. steel, uniform cross-section	Overall height in meters of radiator above base insulator, or above base, if grounded. 54.9	Overall height in meters above ground (without obstruction lighting) 55.8	Overall height in meters above ground (include obstruction lighting) 57.6	If antenna is either top loaded or sectionalized, describe fully in an Exhibit. <div>Exhibit No. N/A</div>
--	---	--	--	--

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	47 °	39 '	19 "	West Longitude	122 °	31 '	06 "
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If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits.

Exhibit No.  
Eng Stmt

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

Exhibit No.  
Eng Stmt

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

None.

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

N/A

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

Name (Please Print or Type) Carl T. Jones, Jr.	Signature (check appropriate box below) 
Address (include ZIP Code) Carl T. Jones Corporation 7901 Yarnwood Court Springfield, VA 22153	Date June 20, 2019  Telephone No. (Include Area Code) (703) 569-7704

- |   |  |
|---|--|
| <input type="checkbox"/> Technical Director | <input checked="" type="checkbox"/> Registered Professional Engineer |
| <input type="checkbox"/> Chief Operator     | <input type="checkbox"/> Technical Consultant                        |
| <input type="checkbox"/> Other (specify)    |  |



**ENGINEERING STATEMENT OF CARL T. JONES, JR., P.E.  
IN SUPPORT OF AN  
APPLICATION FOR STATION LICENSE  
STATION KKOL – SEATTLE, WASHINGTON  
1300 kHz – 50 kW-D, 3.2 kW-N, U, DA-2**

**FACILITY ID: 20355**

Applicant: Inspiration Media, Inc.

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

**1.0 GENERAL**

This office has been authorized by Inspiration Media, Inc. ("IMI"), licensee of AM Station KKOL, to prepare this engineering statement and the associated figures and appendices in support of an Application for License to cover outstanding Construction Permit, FCC File No. BP-20171207ABL ("the construction permit"). The construction permit authorizes: 1) relocation of the KKOL transmission facilities to the licensed transmitter site of collocated and co-owned stations KLFE and KNTS on Bainbridge Island, Washington; 2) directional daytime operation at a power of 50 kW and directional nighttime operation at a power of 3.2 kW using the two existing towers at the site (DA-2).

Following completion of construction of the modified facilities, including all necessary filtering to prevent interaction between the three stations sharing the site, IMI authorized this office to adjust the daytime and nighttime directional patterns for conformance with the technical terms of the Construction Permit using computer modeling and sample system verification techniques, as described in Section 47 CFR 73.151(c) of the Commission's Rules and Regulations. The specific measurement procedures and modeling techniques used in performing the proof-of-performance on the KKOL directional patterns are described in detail in this engineering statement. Impedance measurement data, sample system verification measurement data, reference point field strength data, and model derived operating parameters are tabulated in the figures attached to this engineering statement. All pertinent computer model input and output files are contained in the attached Appendices A, B, and C.

The construction permit contains several conditions with respect to the common usage of the same antennas at the site by KKOL, KLFE and KNTS. With the filing of the information contained within instant Application for Licenses for KKOL and the near concurrent filings of applications notifying the return to direct measurements of power for KLFE and KNTS, it is believed that the construction permit conditions will have been fully satisfied.

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

The KKOL proof of performance contained herein is based on the computer modeling and sample system verification procedures described in Section 47 CFR 73.151(c) of the FCC's Rules and Regulations. The KKOL antenna array consists of two, triangular, uniform cross-section, guyed, series fed towers. The towers have different face widths. Tower #1(N) has a face width of 15.125 inches while tower #2 (S) has a face width of 17.5 inches. Both towers have an electrical height of 85.8 electrical degrees at the KKOL operating frequency of 1300 kHz. Tower #1(N) has an STL antenna mounted on it with an associated isocoupler mounted across the base insulator. The sampling system employs identical toroidal current transformers located at the output of the triplex filters just prior to the input feed to the base of each series-fed tower.

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

### **2.1 INDIVIDUAL TOWER IMPEDANCE MEASUREMENTS**

Impedance measurements were performed at the base of each tower, by the undersigned, at a location adjacent to the KKOL and KLFE toroidal current transformers, on the tower side of the transformers. This measurement location corresponds to the input to the tower. The impedance measurements were performed

using a Hewlett-Packard Model 8751A network analyzer; an Amplifier Research Model 5W1000 power amplifier; and a Tunwall Radio directional coupler. The impedance of each tower was measured with the other tower open-circuited at the corresponding measurement location. The measured base impedances are tabulated in Figure 2.

## **2.2 INDIVIDUAL TOWER COMPUTER MODELS**

A Method of Moments ("MoM") computer model was developed to model each element in the array using Expert MiniNEC Broadcast Professional (Version 23.0). A wire model consisting of 18 segments was developed for each of the two towers. In order to replicate the individual measured base impedances to within FCC specified tolerances, each tower's physical height was adjusted in the MiniNEC model and lumped series inductances were employed in a separate circuit model. The actual equivalent physical radius of each tower was used in all computer models contained in this application. Details of the modeled individual tower adjusted heights are contained in Figure 1.

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

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

### **2.3 DIRECTIONAL ANTENNA COMPUTER MODEL AND ANTENNA MONITOR PARAMETERS**

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

The new daytime and nighttime directional array operating parameters were determined from the modeled base currents and are tabulated in Figures 3 and 4, respectively. The text files containing all pertinent input and output data associated with the daytime and nighttime directional antenna computer models are contained in Appendices B and C, respectively.

## **2.4 SAMPLE SYSTEM DESCRIPTION AND VERIFICATION MEASUREMENTS**

The KKOL antenna sampling system is comprised of: 1) Delta Electronics, Model TCT-1, toroidal current transformers mounted in an identical manner at the output of the final filter at the base of each tower; 2) equal lengths of Radio Frequency Systems, Type LCF12-50J, phase stabilized, 1/2-inch, foam dielectric, coaxial cable between the antenna monitor located in the transmitter building and the final filter cabinet at the base of each tower with flexible 8-foot jumper cables of Pasternack Enterprises, Type RG-214, coaxial cable connected between the ends of the Type LCF12-50J sample cables and the toroidal transformers; and 3) a Potomac Instruments, Model 1901-2, antenna monitor. Each sample line between the transmitter building and the final filter enclosure, including excess lengths, is buried; and therefore each sample line is subjected to the same environmental conditions.

The sample lines, including the 8-foot jumper cables, were verified to be equal in electrical length by measuring the open-circuit series resonate frequency closest to the carrier frequency. The characteristic impedance was verified by measuring the impedance at frequencies corresponding to odd multiples of  $1/8$  wavelength immediately above and below the open circuit series resonant frequency closest to the carrier frequency, while the line was open-circuited at the sample element end of the line. The characteristic impedance was calculated by the following formula:



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

where:

*Z = Characteristic impedance and  
R<sub>1</sub> + j X<sub>1</sub> and R<sub>2</sub> + j X<sub>2</sub> are the measured impedances  
at ±45 degrees offset frequencies.*

A tabulation of the measured sample line lengths and the characteristic impedance of each line is contained in Figure 5. All sample line verification measurements were performed by the undersigned using a Hewlett-Packard, Model 8751A, network analyzer; an Amplifier Research, Model 5W1000, power amplifier; and a Tunwall Radio directional coupler. As demonstrated by the measured values tabulated in Figure 5, the KKOL measured sample line lengths are well within 1 electrical degree with respect to each other and the measured characteristic impedances are well within 2 ohms of each other, as required by Section 47 CFR 73.151(c)(2)(I) of the FCC Rules and Regulations.

An impedance measurement was performed at the input to each sample line, at the antenna monitor end of the line, with the toroidal current transformer connected. The measurement was performed at the KKOL operating frequency of 1300 kHz. The measured sample line impedances, with the current transformers connected, are tabulated in Figure 5 under the heading "Reference Impedance Sample Toroid Connected."

The performance of the toroidal current transformers was verified by driving a common reference current through both transformers and comparing the relative outputs as observed on the network analyzer. The test confirmed that the performance of both KKOL current transformers are well within the manufacturer's stated accuracy. A tabulation of the toroidal current transformer measurement data and the serial number of each toroidal current transformer is contained in Figure 6.

The antenna monitor that is employed at KKOL is a Potomac Instruments, Model 1901-2, Serial Number 677. The antenna monitor was modified by the manufacturer to add filters to prevent interaction with the KLFE signal on 1590 kHz and the KNTS signal on 1680 kHz. After installation and adjustment of the filters, the antenna monitor was calibrated by the manufacturer on May 10, 2018.

### **3.0 COMMON POINT IMPEDANCE AND COMMON POINT CURRENT**

The networks associated with the daytime and nighttime directional antenna system were adjusted for proper impedance transformation and the daytime and nighttime common point impedance matching networks were set for an input impedance of  $Z = 50 + j 0$  Ohms as read on the common point impedance bridge. The transmitter output power level was adjusted for a daytime common point current of 32.45 amperes corresponding to a daytime directional input power of 52,650 Watts. The transmitter was then adjusted for a nighttime common point current of 8.31 amperes corresponding to a nighttime directional input power of 3,456 Watts.

#### **4.0 REFERENCE FIELD STRENGTH MEASUREMENTS**

Reference field strength measurements for the KKOL daytime antenna pattern were performed on the 24° radial bearing, corresponding to the pattern maximum, and the 167° and 241° radial bearings, corresponding to the daytime directional pattern minima. Reference field strength measurements for the KKOL nighttime antenna pattern were performed on the 115° and 293° radial bearings, corresponding to the nighttime directional pattern minima. Three reference field strength measurements were performed on each of the selected radial bearings.

The measurements were performed by Mr. Monte Passmore, Chief Engineer of Station KKOL. Two field intensity meters were employed to perform the measurements: Potomac Instruments, Model FIM-4100, Serial Numbers 0352 and Potomac Instruments, Model FIM-4100, Serial Numbers 0353. Both meters were last calibrated by the manufacturer on March 11, 2016. Measured field strength comparisons were performed at several full scale settings and the difference in readings between the two meters was determined to be within the manufacturers stated accuracy.

The measured field strength value for each established reference point location is tabulated in Figure 7, Sheets 1 through 3. The tabulations contained in Figure 7 also include for each reference location; GPS coordinates (NAD83), distance from the KKOL array center, and a description of the measurement location.

## **5.0 CONSTRUCTION PERMIT SPECIAL CONDITIONS**

The KKOL construction permit contains several special conditions with regard to common usage of the towers at the transmitter site. The construction permit requires that before program tests are authorized: 1) sufficient data shall be submitted to show that adequate filters, traps and other equipment has been installed and adjusted to prevent interaction, intermodulation and/or generation of spurious radiation products; 2) there shall be filed with the license application copies of a firm agreement entered into by the three stations involved clearly fixing the responsibility of each with regard to the installation and maintenance of such equipment; 3) field observations shall be made to determine whether spurious emissions exist and any objectionable problems resulting therefrom shall be eliminated; and 4) all three stations shall each measure antenna or common point resistance and submit FCC Form 302 as application notifying the return to direct measurement of power.

IMI has designed, purchased, installed and adjusted filtering and detuning equipment sufficient to prevent interaction and the generation of spurious emissions. The schematic diagram of Figures 8 shows the KKOL phasing and coupling system. The schematic diagrams of Figures 9, 10, 11, and 12 show the tri-plexing filters and detuning circuits that have been installed at the base of each tower for this purpose.

KKOL, KLFE and KNTS are currently owned by IMI, which assumes sole responsibility for the installation and maintenance of the filtering and detuning equipment and, therefore, the requirement for the submission of an agreement is moot.

Applications to return to direct measurement of power for Stations KLFE and KNTS will be filed nearly concurrent with this application.

Measurements of spurious and harmonic emissions radiated by the combined operations of KKOL, KLFE and KNTS were performed by the undersigned with the support of Monte Passmore. The measurement data confirms that all spurious and harmonic emissions generated by the common usage of the transmitter site and antennas are below the emissions limits specified in Section 73.44(b) of the Commission's Rules and Regulations. The spurious, harmonic and intermodulation product emission measurement data is tabulated in Figure 13.

#### **6.0 OTHER ANTENNAS MOUNTED ON THE TOWER**

An STL antenna is mounted on tower #1(N) 93 feet above the base insulator. A Kintronic Laboratories isocoupler is mounted across the base insulator of tower #1.

#### **7.0 SUMMARY**

It is submitted that the KKOL daytime and nighttime directional antenna systems have been constructed and adjusted to comply with the technical specifications contained in Construction Permit, FCC File No. BP-20171207ABL. The daytime and nighttime directional pattern performance has been verified using computer modeling and sample system verification procedures in accordance with Section 47 CFR 73.151(c) of the Commission's Rules and Regulations. It is believed that the daytime

and nighttime directional antenna patterns, as adjusted, fully comply with the terms of the station's FCC Authorization and all applicable FCC Rules and Regulations.

With the filing of the information contained herein and the near concurrent filing of the KLFE and KNTS applications to return to direct measurement of power, it is submitted that IMI has satisfied all of the special conditions contained in the construction permit regarding the common usage of the antennas at the transmitter site by all three stations. It is therefore requested that program test authority be issue at the full authorized daytime and nighttime power levels and that a license be issued to IMI reflecting the new MoM model derived operating parameters as contained herein and in Section III of FCC Form 302-AM.

This engineering statement and the attached figures and appendices were prepared by the undersigned or under the direct supervision of the undersigned and are believed to be true and correct.

DATED: June 20, 2019



## **TOWER MODEL HEIGHT AND RADIUS**

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

<b>Tower</b>	<b>Physical Height (degrees)</b>	<b>Modeled Height (degrees)</b>	<b>Percent of Physical Height</b>	<b>Tower Face Width (inches)</b>	<b>Equivalent Radius (meters)</b>	<b>Modeled Radius (meters)</b>	<b>Percent of Equivalent Radius</b>
1	85.8	90.6	105.6	15.125	0.1834	0.1834	100.0
2	85.8	93.2	108.6	17.500	0.2122	0.2122	100.0

Figure 1

## MEASURED AND MODELED IMPEDANCES

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

Tower	Measured Tower Base Impedance <sup>1</sup>	Modeled Tower Base Impedance	Shunt Capacitance (pF)	Modeled plus Shunt Reactance	Lumped Series Inductance (uH)	Total Adjusted Tower Base Impedance
1	41.7 +j 49.4	41.5 +j 25.0	0.0	41.5 +j 25.0	3.0	41.5 +j 49.5
2	46.3 +j 43.3	46.4 +j 39.0	0.0	46.4 +j 39.0	0.5	46.4 +j 43.1

<sup>1</sup> Measured at output of final filter network with other tower open-circuited



**DAYTIME ANTENNA MONITOR PARAMETERS  
AND COMMON POINT DATA**

STATION KKOL - SEATTLE, WASHINGTON  
1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2  
JUNE, 2019

Tower	MiniNEC Modeled Parameters	
	Ratio	Phase (degrees)
1	0.699	-87.8
2	1.000	0.0
Common Point Impedance = 50 +j 0 ohms Common Point Current = 32.45 amperes Antenna Input Power = 52,650 Watts		

**NIGHTTIME ANTENNA MONITOR PARAMETERS  
AND COMMON POINT DATA**

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

Tower	MiniNEC Modeled Parameters	
	Ratio	Phase (degrees)
1	0.628	179.9
2	1.000	0.0
Common Point Impedance = 50 +j 0 ohms		
Common Point Current = 8.31 amperes		
Antenna Input Power = 3,456 Watts		

## SAMPLE LINE VERIFICATION MEASUREMENTS

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

Tower	Open Circuit Series Resonant Frequency <sup>1</sup> (kHz)	Open Circuit Measured Line Length <sup>2</sup> (degrees)	Resonant Frequency -45 degree Offset Frequency (kHz)	Resonant Frequency -45 degree Offset Impedance (Ohms)	Resonant Frequency +45 degree Offset Frequency (kHz)	Resonant Frequency +45 degree Offset Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)	Reference Impedance Sample Toroid Connected <sup>2</sup> (Ohms)
1	1915.2	183.3	1596.00	2.60 -j 46.60	2234.40	3.75 +j 46.80	46.81	47.2 +j 0.5
2	1913.8	183.4	1594.83	2.63 -j 46.80	2232.77	3.74 +j 46.90	46.96	47.3 +j 0.7

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

<sup>2</sup> At carrier frequency (1300 kHz)

**SAMPLE DEVICE VERIFICATION MEASUREMENTS**

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

Reference Sample Toroid Number	Measured Sample Toroid Number	Measured	
		Ratio	Phase
			(degrees)
2	1	1.001	-0.3

Sample Toroid Number	Type	Serial Number
1	Delta Electronics, TCT-1	17498
2	Delta Electronics, TCT-1	17499

## REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

### 24 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	1.19	522	- - -	47° 39' 53"	122° 30' 46"	The point is located adjacent to the mailbox at 10152 NE Valley Road.
2	1.74	301	- - -	47° 40' 10"	122° 30' 37"	The point is located adjacent to the mailbox at 11700 Sunrise Drive NE.
3	2.01	138	- - -	47° 40' 18"	122° 30' 32"	The point is located 200 feet east of the street sign at the intersection of Sunrise Drive NE and NE Winthers Road.

### 115 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	0.56	- - -	1500	47° 39' 16"	122° 31' 05"	The point is located adjacent to the mailbox at 9777 NE Murden Cove Drive.
2	0.64	- - -	856	47° 39' 14"	122° 31' 01"	The point is located at the stop sign at the corner of Manitou Beach Drive NE and NE Murden Cove Drive.
3	0.68	- - -	650	47° 39' 14"	122° 31' 00"	The point is located adjacent to the mailbox at 9788 Manitou Beach Drive NE.

## REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

### 167 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	1.05	222	- - -	47° 38' 44"	122° 32' 19"	The point is located adjacent to the phone pedestal at 9870 NE Yaguina Avenue.
2	3.38	24.1	- - -	47° 37' 33"	122° 33' 20"	The point is located adjacent to the stop sign northeast corner of Ferncliff Avenue NE.
3	7.89	7.44	- - -	47° 35' 22.1"	122° 29' 49.9"	The point is located 25 feet west of telephone pole #621945 58990 on north side of NE Country Club Road.

### 241 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	1.00	277	- - -	47° 39' 02.6"	122° 31' 54.0"	The point is located in front of large tree at 9690 Bucsit Lane NE.
2	2.37	32.8	- - -	47° 38' 41.7"	122° 32' 52.1"	The point is located in the driveway next to mailbox 8968 Mandus Olson Road NE.
3	4.51	14.4	- - -	47° 38' 05.0"	122° 34' 28.5"	The point is located across the street from 7869 Hansen Road NE, 10 feet south of utility pole #623640 157099.

## REFERENCE FIELD STRENGTH MEASUREMENTS

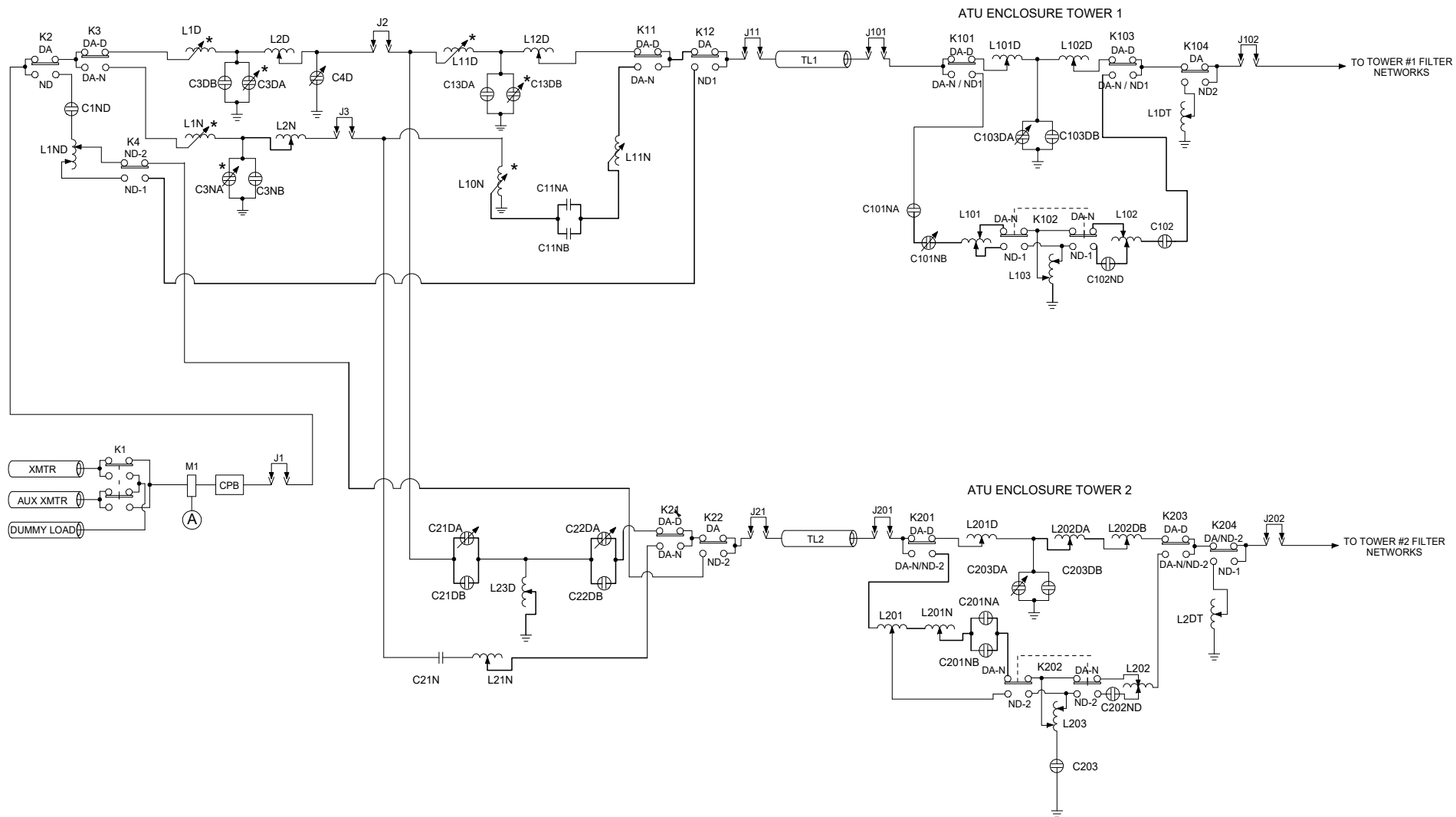
STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2

JUNE, 2019

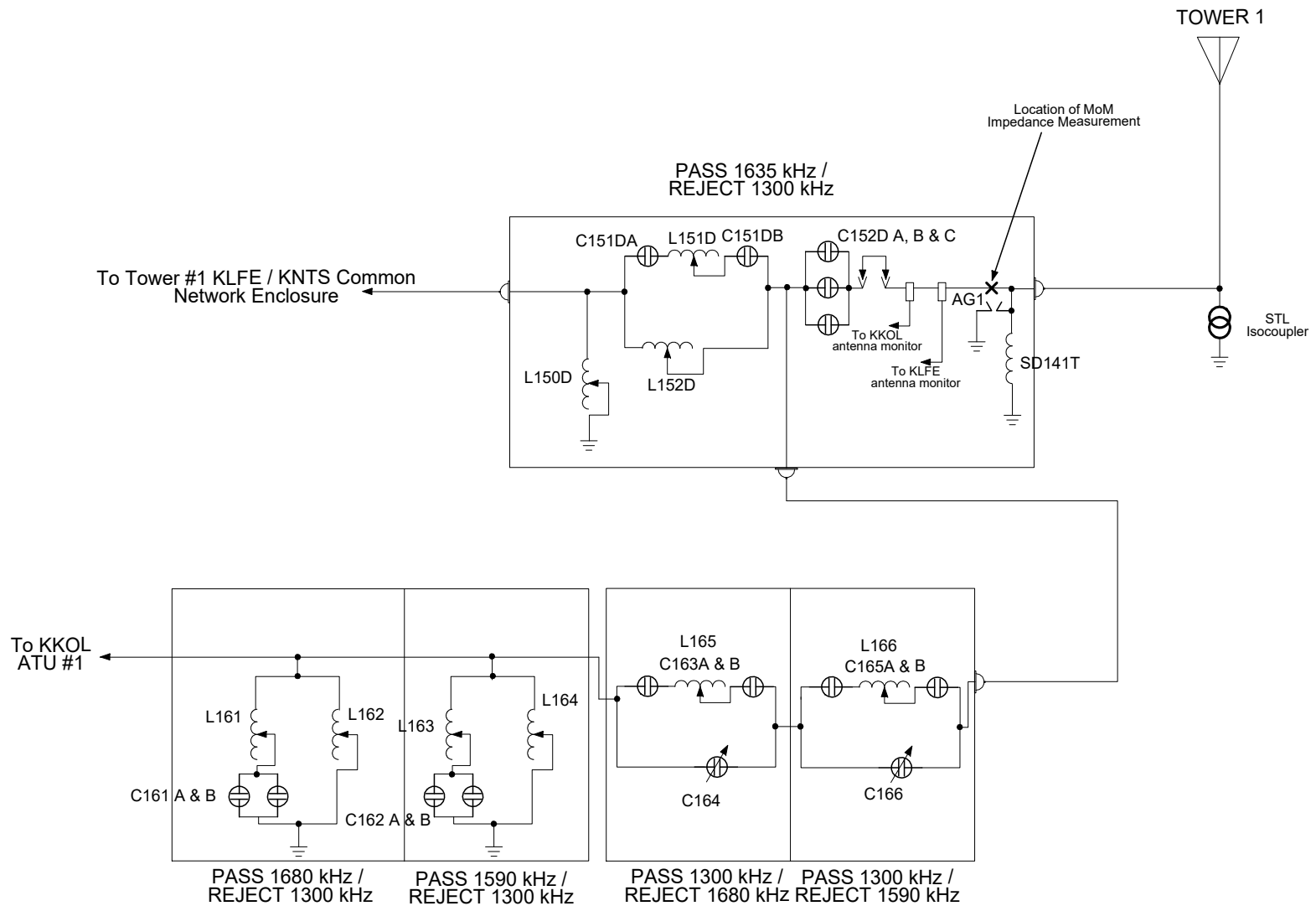
### 293 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	0.60	- - -	11.2	47° 39' 30.1"	122° 31' 54.1"	The point is located 100 feet south of the end of NE Wardwell Road at large tree.
2	2.90	- - -	5.37	47° 39' 55.6"	122° 33' 23.6"	The point is located in front of driveway at 11250 Miller Road NE.
3	4.51	- - -	3.55	47° 40' 17.6"	122° 34' 28.7"	The point is located on the north (left) side of the driveway at 11986 Arrow Point Loop NE.

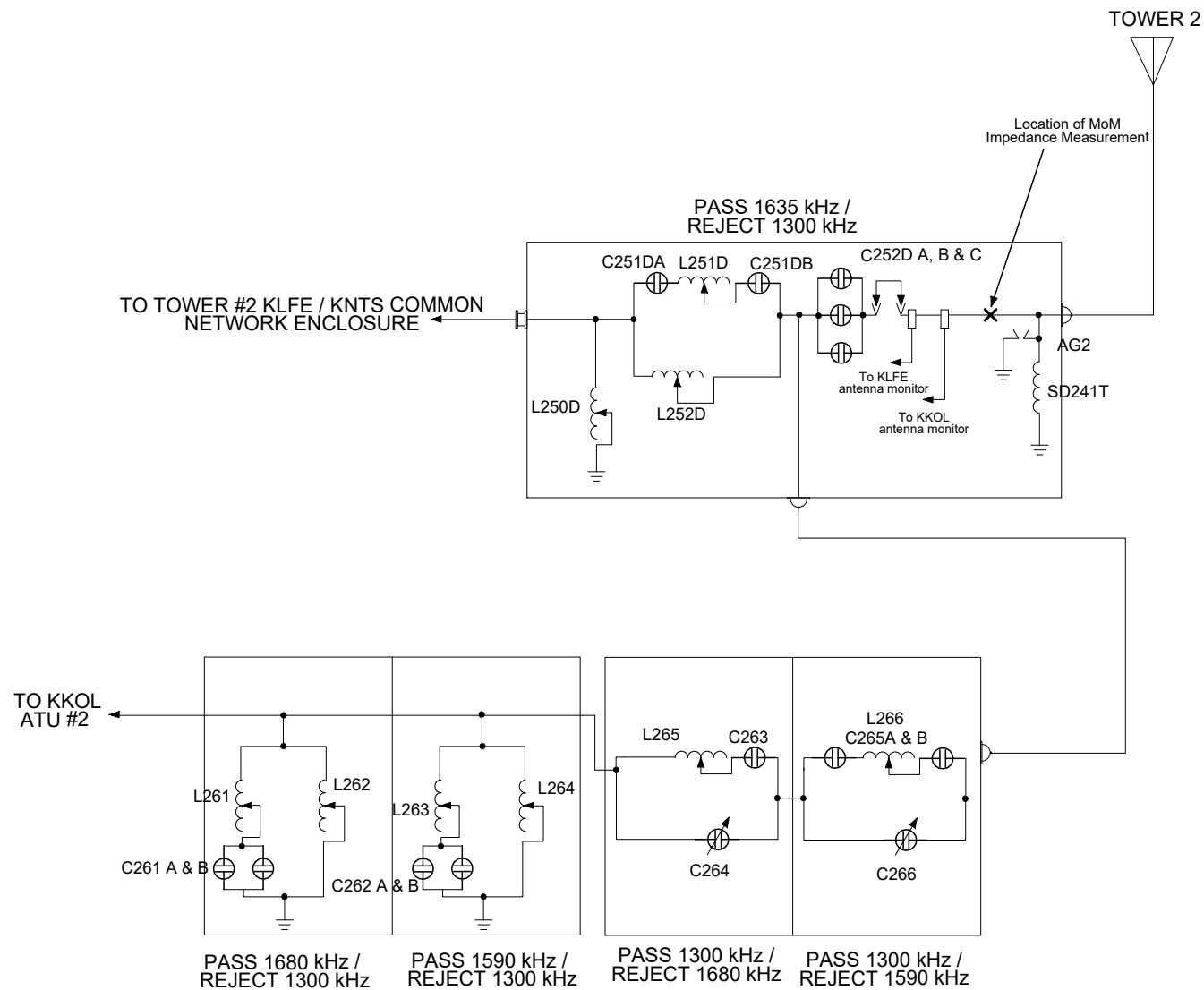


**PHASING AND COUPLING SYSTEM SCHEMATIC DIAGRAM**  
 STATION KKOL - SEATTLE, WASHINGTON  
 1300 KHZ - 50 KW-D, 3.2 KW-N, U, DA-2  
 JUNE 2019

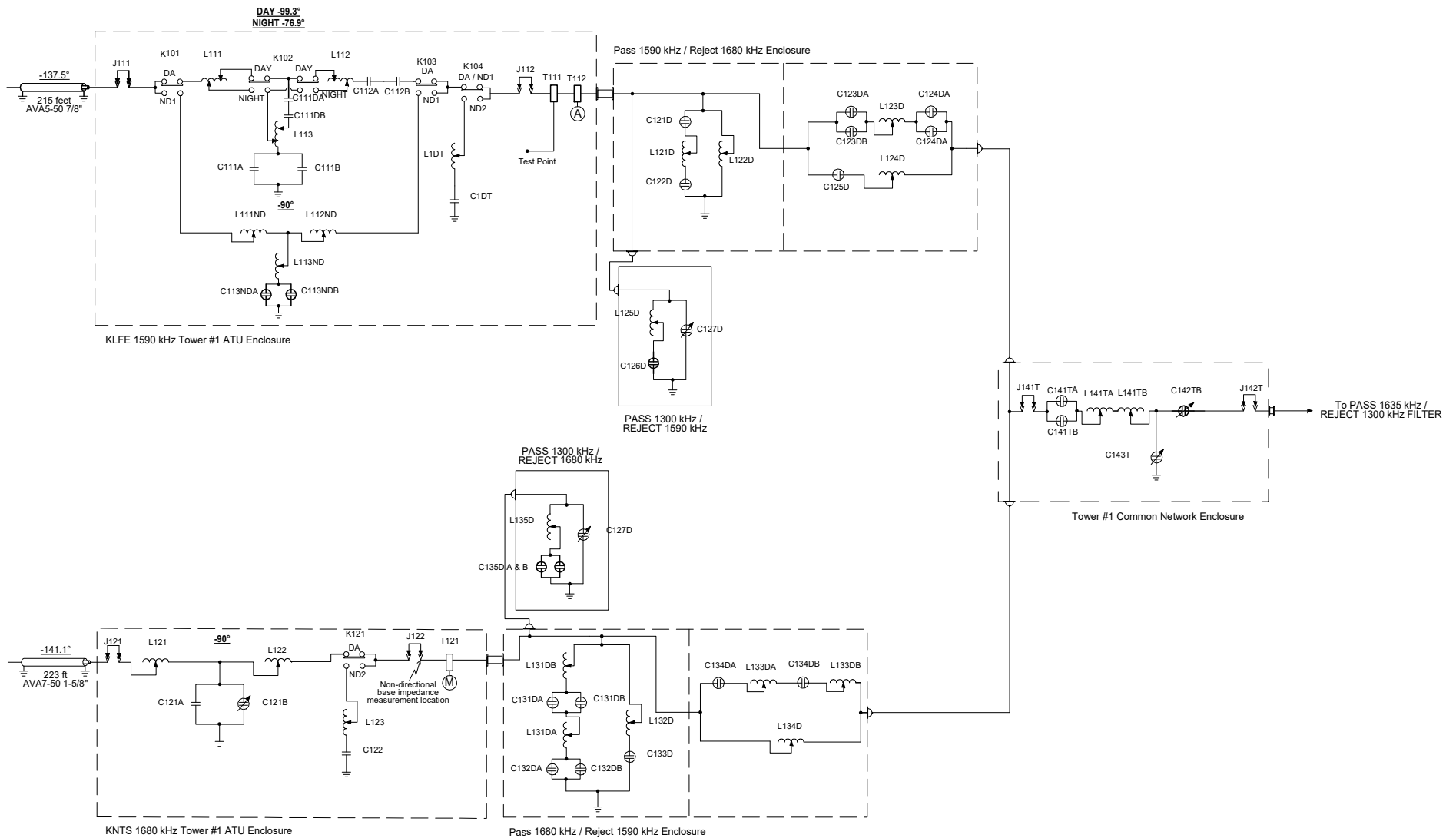


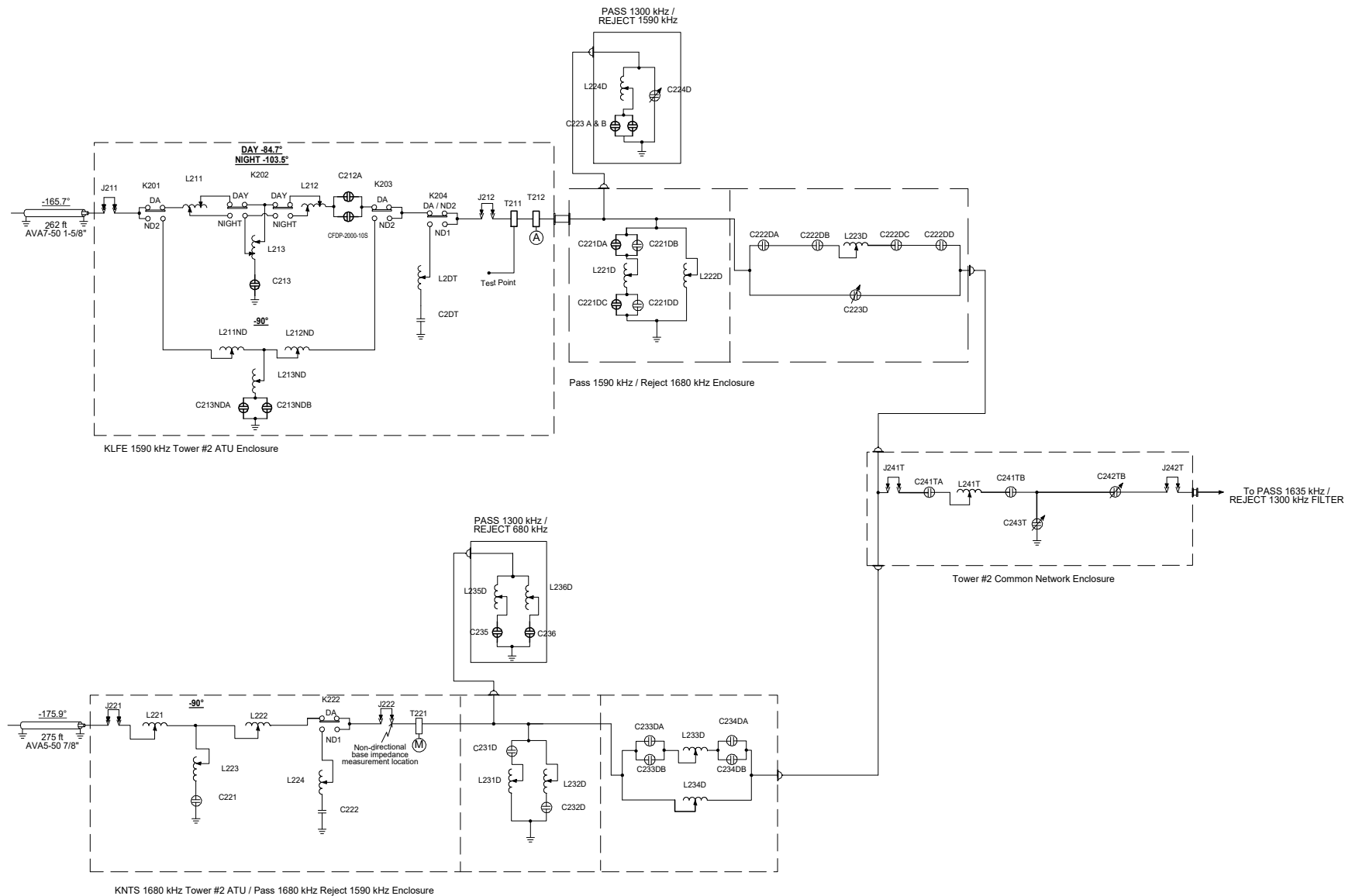


**TOWER NUMBER 1 FILTER SCHEMATIC DIAGRAM**  
 STATION KKOL - SEATTLE, WASHINGTON  
 1300 KHZ - 50 kW-D, 3.2 kW-N, U, DA-2  
 JUNE 2019



**TOWER NUMBER 2 FILTER SCHEMATIC DIAGRAM**  
 STATION KKOL - SEATTLE, WASHINGTON  
 1300 KHZ - 50 kW-D, 3.2 kW-N, U, DA-2  
 JUNE 2019





## KLFE / KNTS TOWER NUMBER 2 ATU AND FILTER SCHEMATIC DIAGRAM

STATION KKOL - SEATTLE, WASHINGTON  
1300 kHz - 50 kW-D, 3.2 kW-N, U, DA-2  
JUNE 2019

**MEASURED SPURIOUS AND HARMONIC EMISSIONS**

STATION KKOL - SEATTLE, WASHINGTON

1300 kHz - 50 kW-D, 3.2 kW-N,U, DA-2

JUNE, 2019

Measured Attenuation

<u>Emission</u>	<u>Frequency</u> <u>(kHz)</u>	<u>Field</u> <u>Strength</u> <u>(mV/m)</u>	<u>Reference</u> <u>Carrier</u>	<u>Below</u> <u>Carrier</u> <u>(dBc)</u>	<u>FCC</u> <u>Limit</u> <u>(dBc)</u>
F1	1300	850	----	----	----
F2	1590	2100	----	----	----
F3	1680	980	----	----	----
2F1-F3	920	0.056	F1	-83.6	-80
2F1-F2	1010	0.070	F1	-81.7	-80
F1+F2-F3	1210	0.410	F1 or F2 or F3	See Note 1	-80
F1-F2+F3	1390	0.050	F1 or F2 or F3	-84.6	-80
2F2-F1	1880	0.175	F2	-81.6	-80
-F1+F2+F3	1970	0.050	F1 or F2 or F3	-84.6	-80
2F3-F1	2060	0.013	F3	-97.5	-80
2F1	2600	0.038	F1	-87	-80
F1+F2	2890	0.042	F1 or F2	-96.1	-80
F1+F3	2980	0.021	F1 or F3	-92.1	-80
3F1	3900	0.017	F1	-94	-80
2F1+F2	4190	0.021	F1	-92.1	-80
2F1+F3	4280	0.011	F1	-97.8	-80
F1+2F2	4480	0.049	F2	-92.6	-80
F1+F2+F3	4570	0.047	F1 or F2 or F3	-85.1	-80
F1+2F3	4660	0.010	F3	-99.8	-80

Note 1 - Strong local station on this frequency, no audio from triplexed stations observed

## **APPENDIX A**

### INDIVIDUAL TOWER MODELING

# APPENDIX A – INDIVIDUAL TOWER MODEL STATION KKOL – SEATTLE, WASHINGTON

PAGE A-1

## IMPEDANCE - TOWER #1

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.3	41.487	24.958	48.415	31.	1.7704	-11.117	-.34952

## GEOMETRY - TOWER #1

Wire coordinates in degrees; other dimensions in meters

Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.1834	18
		0	0	90.6		
2	none	110.4	204.	0	.2122	18
		110.4	204.	93.2		

Number of wires = 2  
current nodes = 36

	minimum	maximum
Individual wires	wire value	wire value
segment length	1 5.03333	2 5.17778
radius	1 .1834	2 .2122

## ELECTRICAL DESCRIPTION - TOWER #1

Frequencies (MHz)

no.	frequency	step	no. of steps	segment length (wavelengths)
	lowest			minimum maximum
1	1.3	0	1	.0139815 .0143827

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	0	0	0	0
2	19	.01	-10,000.	0	0	0

# APPENDIX A – INDIVIDUAL TOWER MODEL STATION KKOL – SEATTLE, WASHINGTON

PAGE A-2

## IMPEDANCE – TOWER #2

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 19, sector 1							
1.3	46.354	38.972	60.56	40.1	2.2082	-8.4826	-.66422

## GEOMETRY – TOWER #2

Wire coordinates in degrees; other dimensions in meters

Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.1834	18
		0	0	90.6		
2	none	110.4	204.	0	.2122	18
		110.4	204.	93.2		

Number of wires = 2  
current nodes = 36

	minimum	maximum
Individual wires	wire value	wire value
segment length	1 5.03333	2 5.17778
radius	1 .1834	2 .2122

## ELECTRICAL DESCRIPTION – TOWER #2

Frequencies (MHz)

no.	lowest	step	no. of steps	segment length (wavelengths)
				minimum maximum
1	1.3	0	1	.0139815 .0143827

Sources

source	node	sector	magnitude	phase	type
1	19	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	-10,000.	0	0	0
2	19	.01	0	0	0	0



## **APPENDIX B**

### DAYTIME DIRECTIONAL ARRAY MODEL

# APPENDIX B – DAYTIME OPERATION STATION KKOL – SEATTLE, WASHINGTON

PAGE B-1

## IMPEDANCE – DAYTIME OPERATION

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.3	76.376	42.807	87.554	29.3	2.2094	-8.4771	-.66514
source = 2; node 19, sector 1							
1.3	30.126	28.89	41.74	43.8	2.3996	-7.7084	-.80657

## GEOMETRY – DAYTIME OPERATION

Wire coordinates in degrees; other dimensions in meters

Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.1834	18
		0	0	90.6		
2	none	110.4	204.	0	.2122	18
		110.4	204.	93.2		

Number of wires = 2  
current nodes = 36

Individual wires	minimum		maximum	
	wire	value	wire	value
segment length	1	5.03333	2	5.17778
radius	1	.1834	2	.2122

## ELECTRICAL DESCRIPTION – DAYTIME OPERATION

Frequencies (MHz)

frequency		no. of steps	segment length (wavelengths)	
no.	lowest		minimum	maximum
1	1.3	0	.0139815	.0143827

Sources

source	node	sector	magnitude	phase	type
1	1	1	2,356.84	304.8	voltage
2	19	1	1,607.03	47.1	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	0	0	0	0
2	19	.01	0	0	0	0

## RMS CURRENT – DAYTIME OPERATION

Frequency = 1.3 MHz

Input power = 50,000. watts

Efficiency = 99.98 %

coordinates in degrees

current				mag	phase	real	imaginary
no.	X	Y	Z	(amps)	(deg)	(amps)	(amps)
GND	0	0	0	19.0344	275.5	1.83609	-18.9456
2	0	0	5.03333	19.427	273.2	1.08533	-19.3967
3	0	0	10.0667	19.5297	271.8	.602425	-19.5204
4	0	0	15.1	19.4472	270.6	.202879	-19.4461
5	0	0	20.1333	19.1921	269.6	-.135259	-19.1916

**APPENDIX B – DAYTIME OPERATION  
STATION KKOL – SEATTLE, WASHINGTON**

**PAGE B-2**

6	0	0	25.1667	18.7707	268.7	-.420772	-18.7659
7	0	0	30.2	18.1877	267.9	-.657649	-18.1758
8	0	0	35.2333	17.448	267.2	-.84795	-17.4274
9	0	0	40.2667	16.5565	266.6	-.992872	-16.5267
10	0	0	45.3	15.519	266.	-1.09323	-15.4804
11	0	0	50.3333	14.3415	265.4	-1.14969	-14.2953
12	0	0	55.3667	13.0303	264.9	-1.16285	-12.9783
13	0	0	60.4	11.5918	264.4	-1.1333	-11.5363
14	0	0	65.4333	10.0319	263.9	-1.06158	-9.9756
15	0	0	70.4667	8.35477	263.5	-.94802	-8.30081
16	0	0	75.5	6.56097	263.1	-.792435	-6.51294
17	0	0	80.5333	4.64163	262.7	-.593286	-4.60356
18	0	0	85.5667	2.56277	262.3	-.345245	-2.53941
END	0	0	90.6	0	0	0	0
GND	-100.855	44.9037	0	27.2245	3.3	27.1792	1.57003
20	-100.855	44.9037	5.17778	27.594	2.3	27.5717	1.11038
21	-100.855	44.9037	10.3556	27.5958	1.7	27.5838	.814539
22	-100.855	44.9037	15.5333	27.3501	1.2	27.3443	.564793
23	-100.855	44.9037	20.7111	26.8731	.7	26.8708	.348057
24	-100.855	44.9037	25.8889	26.1741	.3	26.1736	.159186
25	-100.855	44.9037	31.0667	25.2612	360.	25.2612	-3.96E-03
26	-100.855	44.9037	36.2444	24.142	359.7	24.1416	-.142294
27	-100.855	44.9037	41.4222	22.8251	359.4	22.8237	-.25617
28	-100.855	44.9037	46.6	21.3195	359.1	21.3167	-.345676
29	-100.855	44.9037	51.7778	19.6348	358.8	19.6305	-.410787
30	-100.855	44.9037	56.9556	17.7808	358.5	17.7751	-.45144
31	-100.855	44.9037	62.1333	15.7675	358.3	15.7606	-.467567
32	-100.855	44.9037	67.3111	13.604	358.1	13.5963	-.459081
33	-100.855	44.9037	72.4889	11.2972	357.8	11.2892	-.425827
34	-100.855	44.9037	77.6667	8.84874	357.6	8.84111	-.367412
35	-100.855	44.9037	82.8444	6.24768	357.4	6.24127	-.282773
36	-100.855	44.9037	88.0222	3.44973	357.2	3.44559	-.168961
END	-100.855	44.9037	93.2	0	0	0	0

## **APPENDIX C**

### NIGHTTIME DIRECTIONAL ARRAY MODEL

# APPENDIX C – NIGHTTIME OPERATION STATION KKOL – SEATTLE, WASHINGTON

PAGE C-1

## IMPEDANCE - NIGHTTIME OPERATION

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.3	20.092	62.838	65.972	72.3	6.6712	-2.6238	-3.4346
source = 2; node 19, sector 1							
1.3	37.996	53.924	65.966	54.8	3.3038	-5.4282	-1.4663

## GEOMETRY - NIGHTTIME OPERATION

Wire coordinates in degrees; other dimensions in meters

Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.1834	18
		0	0	90.6		
2	none	110.4	204.	0	.2122	18
		110.4	204.	93.2		

Number of wires = 2  
current nodes = 36

	minimum	maximum
Individual wires	wire value	wire value
segment length	1 5.03333	2 5.17778
radius	1 .1834	2 .2122

## ELECTRICAL DESCRIPTION - NIGHTTIME OPERATION

Frequencies (MHz)

no.	frequency	step	no. of steps	segment length (wavelengths)
lowest				minimum maximum
1	1.3	0	1	.0139815 .0143827

Sources

source	node	sector	magnitude	phase	type
1	1	1	489.273	256.1	voltage
2	19	1	778.72	58.8	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	0	0	0	0
2	19	.01	0	0	0	0

## RMS CURRENT - NIGHTTIME OPERATION

Frequency = 1.3 MHz

Input power = 3,200. watts

Efficiency = 99.97 %

coordinates in degrees

current				mag	phase	real	imaginary
no.	X	Y	Z	(amps)	(deg)	(amps)	(amps)
GND	0	0	0	5.24417	183.9	-5.23225	-.35339
2	0	0	5.03333	5.40534	183.3	-5.39661	-.307008
3	0	0	10.0667	5.46236	182.9	-5.45543	-.275036
4	0	0	15.1	5.45998	182.6	-5.45442	-.246321
5	0	0	20.1333	5.40404	182.3	-5.39958	-.219576

**APPENDIX C – NIGHTTIME OPERATION  
STATION KKOL – SEATTLE, WASHINGTON**

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6	0	0	25.1667	5.29753	182.1	-5.29397	-.194323
7	0	0	30.2	5.14249	181.9	-5.13967	-.17039
8	0	0	35.2333	4.94073	181.7	-4.93852	-.147735
9	0	0	40.2667	4.69405	181.5	-4.69235	-.126381
10	0	0	45.3	4.40432	181.4	-4.40303	-.106383
11	0	0	50.3333	4.07348	181.2	-4.07254	-.0878137
12	0	0	55.3667	3.70356	181.1	-3.70288	-.0707533
13	0	0	60.4	3.29653	181.	-3.29607	-.0552863
14	0	0	65.4333	2.8542	180.8	-2.8539	-.0414938
15	0	0	70.4667	2.37791	180.7	-2.37772	-.0294543
16	0	0	75.5	1.86791	180.6	-1.86781	-.0192409
17	0	0	80.5333	1.32177	180.5	-1.32173	-.0109203
18	0	0	85.5667	.729927	180.4	-.729913	-4.55E-03
END	0	0	90.6	0	0	0	0
GND	-100.855	44.9037	0	8.34734	4.	8.32748	.575519
20	-100.855	44.9037	5.17778	8.58393	2.7	8.57433	.40599
21	-100.855	44.9037	10.3556	8.66053	2.	8.65543	.297058
22	-100.855	44.9037	15.5333	8.64571	1.4	8.64327	.205277
23	-100.855	44.9037	20.7111	8.54775	.8	8.54682	.125804
24	-100.855	44.9037	25.8889	8.37108	.4	8.37089	.0567195
25	-100.855	44.9037	31.0667	8.11881	360.	8.11881	-2.79E-03
26	-100.855	44.9037	36.2444	7.79372	359.6	7.79354	-.0531015
27	-100.855	44.9037	41.4222	7.39873	359.3	7.39812	-.0943707
28	-100.855	44.9037	46.6	6.93667	359.	6.93551	-.126671
29	-100.855	44.9037	51.7778	6.41083	358.7	6.40908	-.150033
30	-100.855	44.9037	56.9556	5.82446	358.4	5.82214	-.164471
31	-100.855	44.9037	62.1333	5.18082	358.1	5.17803	-.170001
32	-100.855	44.9037	67.3111	4.4829	357.9	4.4798	-.166625
33	-100.855	44.9037	72.4889	3.73297	357.6	3.72978	-.154322
34	-100.855	44.9037	77.6667	2.93159	357.4	2.92858	-.132975
35	-100.855	44.9037	82.8444	2.07508	357.2	2.07256	-.102225
36	-100.855	44.9037	88.0222	1.14862	357.	1.147	-.0610205
END	-100.855	44.9037	93.2	0	0	0	0