#909505

Agency Tracking ID:PGC3085546 Authorization Number:057404

Successful Authorization -- Date Paid: 4/19/18

FILE COPY ONLY!!

READ INSTRUCTIONS CAREFULLY BEFORE PROCEEDING (1) LOCKBOX #979089	FEDERAL COMMUNICATIONS COMMISSION **REMITTANCE ADVICE** **FORM 159** PAGE NO 1 OF 1	APPROVED BY OMB 3060-059 SPECIAL USE FCC USE ONLY

SECTION A - Payer Information

(2) PAYER NAME (if paying by credit card, enter name exactly as it appears on your card)	(3) TOTAL AMOUNT PAID (dollars and cents)
Salem Communications Holding Corporation	**$1505.00**

(4) STREET ADDRESS LINE NO. 1
4880 Santa Rosa Rd.

(5) STREET ADDRESS LINE NO. 2

(6) CITY	(7) STATE	(8) ZIP CODE
Camarillo	**CA**	**93012**

(9) DAYTIME TELEPHONE NUMBER (INCLUDING AREA CODE)	(10) COUNTRY CODE (IF NOT IN U.S.A.)
805-3844502	**US**

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(11) PAYER (FRN)	(12) FCC USE ONLY
0011040359	

IF PAYER NAME AND THE APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B
IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159-C)

(13) APPLICANT NAME
Salem Communications Holding Corporation

(14) STREET ADDRESS LINE NO. 1
4880 Santa Rosa Rd.

(15) STREET ADDRESS LINE NO. 2

(16) CITY	(17) STATE	(18) ZIP CODE
Camarillo	**CA**	**93012**

(19) DAYTIME TELEPHONE NUMBER (INCLUDING AREA CODE)	(20) COUNTRY CODE (IF NOT IN U.S.A.)
805-3844502	**US**

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(21) APPLICANT (FRN)	(22) FCC USE ONLY
0011040359	

COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEET

(23A) FCC Call Sign/Other ID	(24A) Payment Type Code(PTC)	(25A) Quantity
KLUP	**MMR**	**1**
(26A) Fee Due for (PTC)	(27A) Total Fee	FCC Use Only
$700.00	**$700.00**	
(28A) FCC CODE 1	(29A) FCC CODE 2	
0	**0**	

(23B) FCC Call Sign/Other ID	(24B) Payment Type Code(PTC)	(25B) Quantity
KLUP	**MOR**	**1**
(26B) Fee Due for (PTC)	(27B) Total Fee	FCC Use Only
$805.00	**$805.00**	
(28B) FCC CODE 1	(29B) FCC CODE 2	
0	**0**	

Accepted / Filed

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

APR 19 2018

Federal Communications Commission
Office of the Secretary

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. BmmL-20180419ADK

SECTION I - APPLICANT FEE INFORMATION

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

Salem Communications Holding Corporation

MAILING ADDRESS (Line 1) (Maximum 35 characters)
4880 Santa Rosa Road, Suite 300

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Camarillo	CA	93012

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
(805) 987-0400	KLUP	34975

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
M M R	0 0 0 1	$ 700.00	

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

(A)	(B)	(C)	FOR FCC USE ONLY
M O R	0 0 0 1	$ 805.00	

	TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.	$ 1,505.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Salem Communications Holding Corporation		
MAILING ADDRESS 4880 Santa Rosa Road, Suite 300		
CITY Camarillo	STATE CA	ZIP CODE 93012

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
KLUP	Terrell Hills, TX	N/A	N/A	N/A

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

☐ Yes ☑ No

If No, explain in an Exhibit.

Exhibit No. 1

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

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No. N/A

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

☐ Yes ☐ No

If Yes, explain in an Exhibit.

Exhibit No. N/A

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

☐ Yes ☐ No

☑ Does not apply

If No, explain in an Exhibit.

Exhibit No.

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

☐ Yes ☑ No

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

Exhibit No. N/A

Fletcher, Heald & Hildreth

1300 NORTH 17th STREET, 11th FLOOR
ARLINGTON, VIRGINIA 22209

OFFICE: (703) 812-0400
FAX: (703) 812-0486
www.fhhlaw.com
www.commlawblog.com

ORIGINAL

2018 APR 20 PM 1:27

April 19, 2018

FRANK R. JAZZO
(703) 812-0470
JAZZO@FHHLAW.COM

VIA HAND DELIVERY
Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Attn: Audio Division, Media Bureau

Re: Salem Communications Holding Corporation
KLUP, Terrell Hills, Texas (Facility ID No. 34975)
Methods of Moments License Application (FCC 302-AM)

Dear Ms. Dortch:

Submitted herewith, in triplicate, is a Method of Moments license application (FCC 302-AM) filed on behalf of Salem Communications Holding Corporation, licensee of KLUP, Terrell Hills, Texas (Facility ID No. 34975). Form 159 is also attached, demonstrating payment of the $1,505.00 filing fee.

Please contact the undersigned if you have any questions or if any issues arise.

Sincerely,

Mark DeSantis

Frank R. Jazzo
Mark C. DeSantis
Counsel for Salem Communications Holding Corporation

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	
Christopher J. Henderson		
Title	Date	Telephone Number
Sr. Vice President and Secretary	4/18/2018	(805) 987-0400

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
Salem Communications Holding Corporation

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☑ Station License ☐ Direct Measurement of Power
BMML-

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
KLUP	N/A	930	Unlimited	1.0	5.0

2. Station location

State	City or Town
Texas	Terrell Hills

3. Transmitter location

State	County	City or Town	Street address (or other identification)
TX	Bexar	San Antonio	Industrial Center Road

4. Main studio location

State	County	City or Town	Street address (or other identification)
TX	Bexar	San Antonio	9601 McAllister Freeway

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

State	County	City or Town	Street address (or other identification)
TX	Bexar	San Antonio	9601 McAllister Freeway

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. No Change

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
4.65	10.43
Measured antenna or common point resistance (in ohms) at operating frequency	**Measured antenna or common point reactance (in ohms) at operating frequency**
Night: 50 Day: 46	Night: +j0 Day: +j122.8

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(S)	0.0	-----	1.000	-----	-----	-----
2(N)	75.2	-----	1.025	-----	-----	-----

Manufacturer and type of antenna monitor: Potomac Instuments, Model 1901-2, serial #223

SECTION III - Page 2

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

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
uniform, cross-section with guy wire top loading	68.2	68.3	69.2	Exhibit No. No Change

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	29 °	31 '	06 "	West Longitude	98 °	24 '	25 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. N/A

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

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

N/A

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

N/A

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

Name (Please Print or Type)	Signature (check appropriate box below)
James D. Sadler	
Address (include ZIP Code)	Date
Carl T. Jones Corporation 7901 Yarnwood Court Springfield, VA 22153	April 17, 2018
	Telephone No. (Include Area Code) (703) 569-7704

☐ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☑ Technical Consultant

☐ Other (specify)

Exhibit 1

This application is for a superseding license to reflect new MoM model derived daytime and nighttime operating parameters, not a license to cover application. Therefore, program testing is not required.

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

ENGINEERING EXHIBIT
IN SUPPORT OF AN
APPLICATION FOR STATION LICENSE
STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
FACILITY ID: 34975

Applicant: Salem Communications Holding Corporation

APRIL, 2018

7901 Yarnwood Court
Springfield, VA 22153-2899

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

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

TABLE OF CONTENTS

SECTION III OF FCC FORM 302-AM

ENGINEERING STATEMENT OF JAMES D. SADLER

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

ENGINEERING STATEMENT OF JAMES D. SADLER
IN SUPPORT OF AN
APPLICATION FOR STATION LICENSE
STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
FACILITY ID: 34975

Applicant: Salem Communications Holding Corporation

I am a Technical Consultant, an employee in the firm of Carl T. Jones Corporation, with offices located in Springfield, Virginia. My education and experience are a matter of record with the Federal Communications Commission.

1.0 GENERAL

This office has been authorized by Salem Communications Holding Corporation ("Salem"), licensee of AM Station KLUP, to prepare this engineering statement, FCC Form 302-AM, Section III, and the associated figures and appendices in support of an Application for License. Station KLUP is licensed for operation on 930 kilohertz at a power of 5 kilowatts during daytime hours and 1 kilowatt during nighttime hours. The station operates non-directionally daytime from the north tower of its 2-tower array and uses both towers for its directional nighttime operation (DA-N). Presently, Station KLUP is operating under the terms of a special temporary authorization (STA), originally granted on April 6, 2017, that authorizes operation with parameters at variance.

7901 Yarnwood Court
Springfield, VA 22153-2899
tel: (703) 569-7704
fax: (703) 569-6417
email: info@ctjc.com
www.ctjc.com

Following evaluation of the directional pattern issues it was decided to prepare an application for license under the Commission's moment of methods rules.

Computer modeling and sample system verification techniques, as described in Section 47 CFR 73.151(c) of the Commission's Rules and Regulations, were used to verify the performance of the KLUP nighttime directional antenna system. The specific measurement and modeling techniques used in performing the proof of performance on the KLUP directional pattern are described in detail in this engineering statement. Impedance measurement data, sample system verification measurement data and model derived operating parameters are tabulated in the figures attached to this engineering statement. Finally, all pertinent computer model input and output files are contained in the attached Appendices A and B.

2.0 IMPEDANCE MEASUREMENTS, COMPUTER MODELING AND SAMPLE SYSTEM VERIFICATION

The proof of performance contained herein is based on the computer modeling and sample system verification procedures described in Section 47 CFR 73.151(c) of the FCC's Rules and Regulations. The KLUP antenna array consists of two identical, uniform cross-section, guyed, base insulated, steel, series-fed towers with guy wire top loading. The towers have an electrical height of 76.2 degrees (68.2 meters) and have an 18-inch face width. In addition, the towers are top loaded with three guy wires 15.1 degrees in length (13.5 meters). The sampling system employs identical toroidal current transformers located at the output of the antenna matching network at the base of each tower.

A detailed description of the impedance 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 the output branch of the antenna matching network. This measurement location is immediately adjacent to the location of the sampling system toroidal current transformer. The impedance measurements were performed using a Hewlett-Packard Model 4396A network analyzer; an ENI, Model 240L, power amplifier; and a Tunwall Radio directional coupler. The impedance of each tower was measured with the other tower open-circuited at the same ATU output location that was used to perform the impedance measurement. The measured impedances are tabulated in Figure 2.

2.2 INDIVIDUAL TOWER COMPUTER MODELS

A Method of Moments ("MoM") computer model was developed to model each element in the array using Expert MiniNEC Broadcast Professional (Version 23.0). A wire model was developed for each tower in the array that is comprised of 15 segments representing the tower and 6 segments representing the top loading[1]. A short guy wire segment having a greater radius was placed against the tower to step down the tower radius to the guy wire radius so the 10:1 adjoining wire constraint in MiniNEC would not be exceeded. The lower ends of the three top load wires are connected with a

[1] The geometry of the top loading was obtained from the application for license on file, FCC File No. BL-7391.

horizontal ring that is comprised of 5 segments between each guy wire base. The physical height of the towers was increased by equally ratioing up the Z coordinates in both the tower and guy wire segments in order to maintain a constant horizontal separation between the far end of the guy wire top loading and the tower. A scale drawing of the wireframe model for each of the two towers as modeled is included herein as Figure 1.

To replicate the individual measured base impedances to within FCC specified tolerances, it was necessary to adjust the physical height of the towers and guy wire top loading in the MiniNEC model as described above. In a separate circuit model a small amount of series inductance and shunt capacitance was employed to further adjust the model derived base impedance of each tower. The actual equivalent physical tower radius and guy wire radius[2] was used in all computer models contained in this application. Details of the modeled individual tower adjusted heights are contained in Figure 2.

The values of the lumped series inductances and capacitances used in the circuit model are contained in the table of Figure 3. A comparison of the measured individual tower impedances, the modeled individual tower impedances, and the adjusted modeled (circuit model) individual tower impedances is also contained in the table of Figure 3. 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 within the tolerances set forth in the Rules.

---

[2] The 5/16 inch guy wire radius was employed for all of the guy wire top loading segments except the segment adjoining the tower where it was necessary to step the radius up to connect to the tower without violating the 10:1 MiniNEC constraint.

As demonstrated by the data contained in Figure 3, the adjusted modeled individual tower resistance and reactance for each tower is well within ± 2 ohms and ± 4 percent tolerance of the corresponding measured individual tower resistance and reactance. The text files containing all pertinent input and output data associated with the individual tower models are contained in Appendix A.

2.3 DIRECTIONAL ANTENNA COMPUTER MODEL AND ANTENNA MONITOR PARAMETERS

The theoretical nighttime directional field parameters and the licensed tower spacings and orientations were used in combination with the adjusted individual tower models to produce the nighttime directional antenna computer model. From the directional computer model, tower currents were derived for each wire segment of each antenna.

The new nighttime directional array operating parameters were determined from the modeled base currents and are tabulated in Figure 4. The text files containing all pertinent input and output data associated with the nighttime directional antenna computer model are contained in Appendix B.

2.4 SAMPLE SYSTEM DESCRIPTION AND VERIFICATION MEASUREMENTS

The KLUP nighttime antenna sampling system is comprised of: 1) Delta Electronics, Model TCT-3, toroidal current transformers mounted in an identical manner in the output branch of each tower's impedance matching network; 2) equal lengths of 3/8-inch, foam dielectric, coaxial cable between each toroidal current transformer and

the antenna monitor located in the transmitter building; and 3) a Potomac Instruments, Model 1901-2, antenna monitor. Each sample line between the ATU building and the transmitter building, including excess lengths, is buried below ground level such that each sample line is subjected to the same environmental conditions.

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

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

where:

$\boldsymbol{Z}$ = *Characteristic impedance and*

$\boldsymbol{R_1 + j\,X_1}$ *and* $\boldsymbol{R_2 + j\,X_2}$ *are the measured impedances at* $\pm$ *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 4396A, network analyzer; an ENI, Model 240L, power amplifier; and a Tunwall Radio directional coupler. As demonstrated by the measured values in Figure 5, the measured sample line lengths are within 1 electrical degree with respect to each other

and the measured characteristic impedances are 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 KLUP operating frequency of 930 kilohertz. The measured sample line impedances with the current transformers connected are tabulated in Figure 5 under the heading "Reference Impedance Sample Transformer Connected."

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

The performance of the Potomac Instruments, Model 1901-2, Serial No. 223, antenna monitor employed at KLUP was checked, by the undersigned, and the accuracy was found to be outside of the manufacturer's stated accuracy. Therefore, the antenna monitor is being returned to Potomac Instruments for repair and calibration.

3.0 COMMON POINT IMPEDANCE AND COMMON POINT CURRENT

The networks associated with the nighttime directional antenna system were adjusted for proper impedance transformation and the common point impedance

matching network was set for Z = 50 +j 0 Ohms. The transmitter output power level was adjusted for a common point current of 4.65 amperes.

3.1 DAYTIME TOWER NUMBER 2 NON-DIRECTIONAL BASE IMPEDANCE AND OPERATING CURRENT

The non-directional impedance at the output of the tower number 2 (north) matching network was measured by the undersigned, using a Delta Electronics, Model OIB-3, operating impedance bridge, and found to be Z = 46 +j 122.8 ohms. Based on the licensed antenna input of 5,000 Watts, the transmitter output power level was adjusted for an unmodulated base current of 10.43 amperes.

4.0 REFERENCE FIELD STRENGTH MEASUREMENTS

Reference field strength measurements were performed on the KLUP nighttime directional antenna pattern on the 190° radial bearing, corresponding to the major lobe of the pattern[3] and on the 10° radial bearing, corresponding to the nighttime directional pattern minima. Three reference field strength measurements were performed on each of the selected radial bearings.

The field strength measurements were performed by Mr. Pat Delaney, Contract Engineer for Station KLUP, and the undersigned. A single meter was used to perform the measurements, a Potomac Instruments, Model FIM-41, Serial Number 714, last calibrated by the manufacturer in August, 2017.

[3] The 190 degree radial bearing represents the maxima of the modified standard pattern and is within 2 percent of the standard pattern maxima at 153 and 227 degrees. Therefore, this was the only radial selected for measurement of the reference points representing the major lobe of the pattern.

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

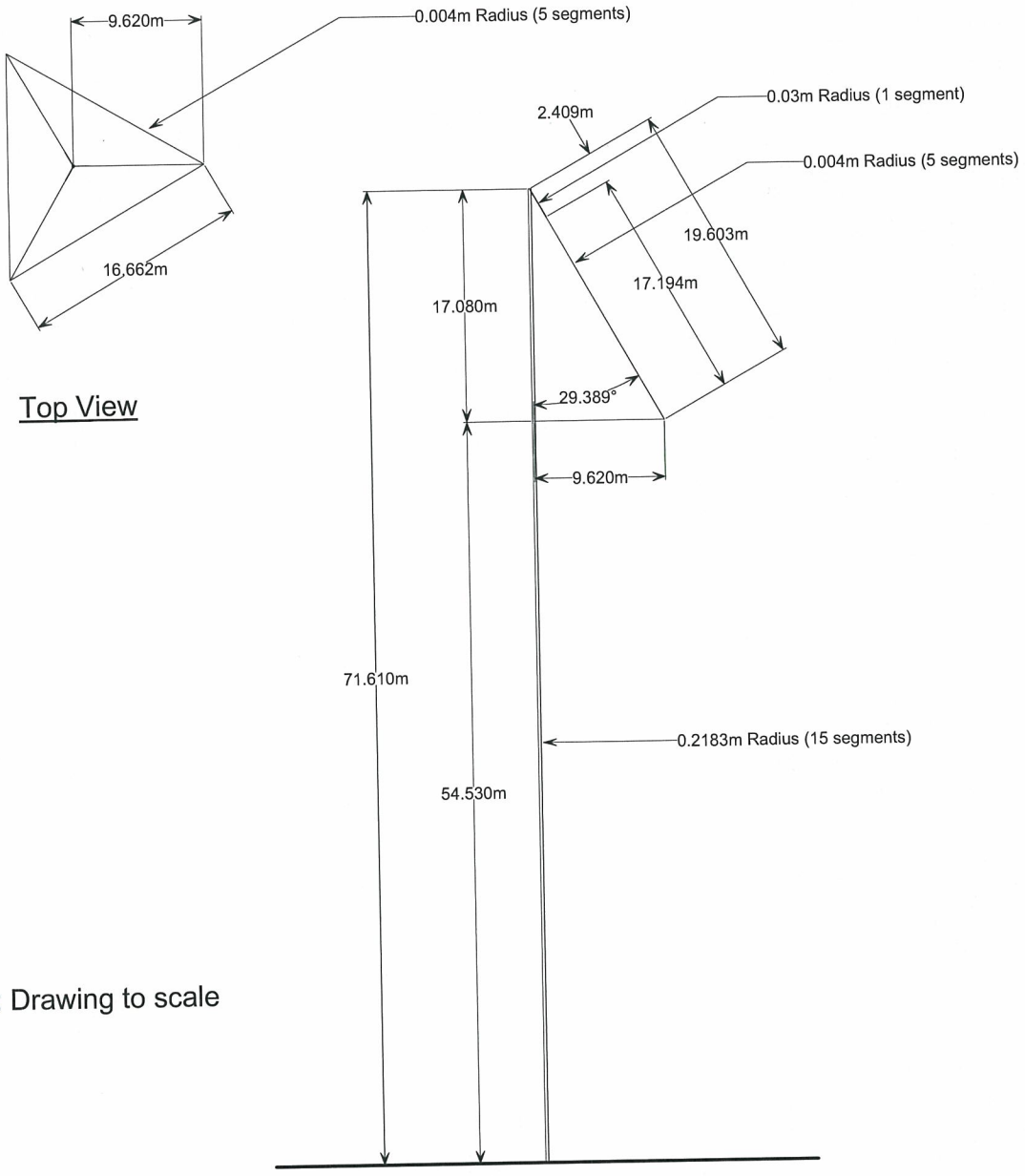
SUMMARY

It is submitted that the KLUP 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 nighttime directional antenna system, as adjusted, fully complies with the terms of the station's FCC Authorization and all applicable FCC Rules and Regulations. It is requested that a superseding license be issued to Salem reflecting the new MoM model derived nighttime operating parameters and the daytime non-directional base impedance and operating current as contained herein.

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

Dated: April 17, 2018

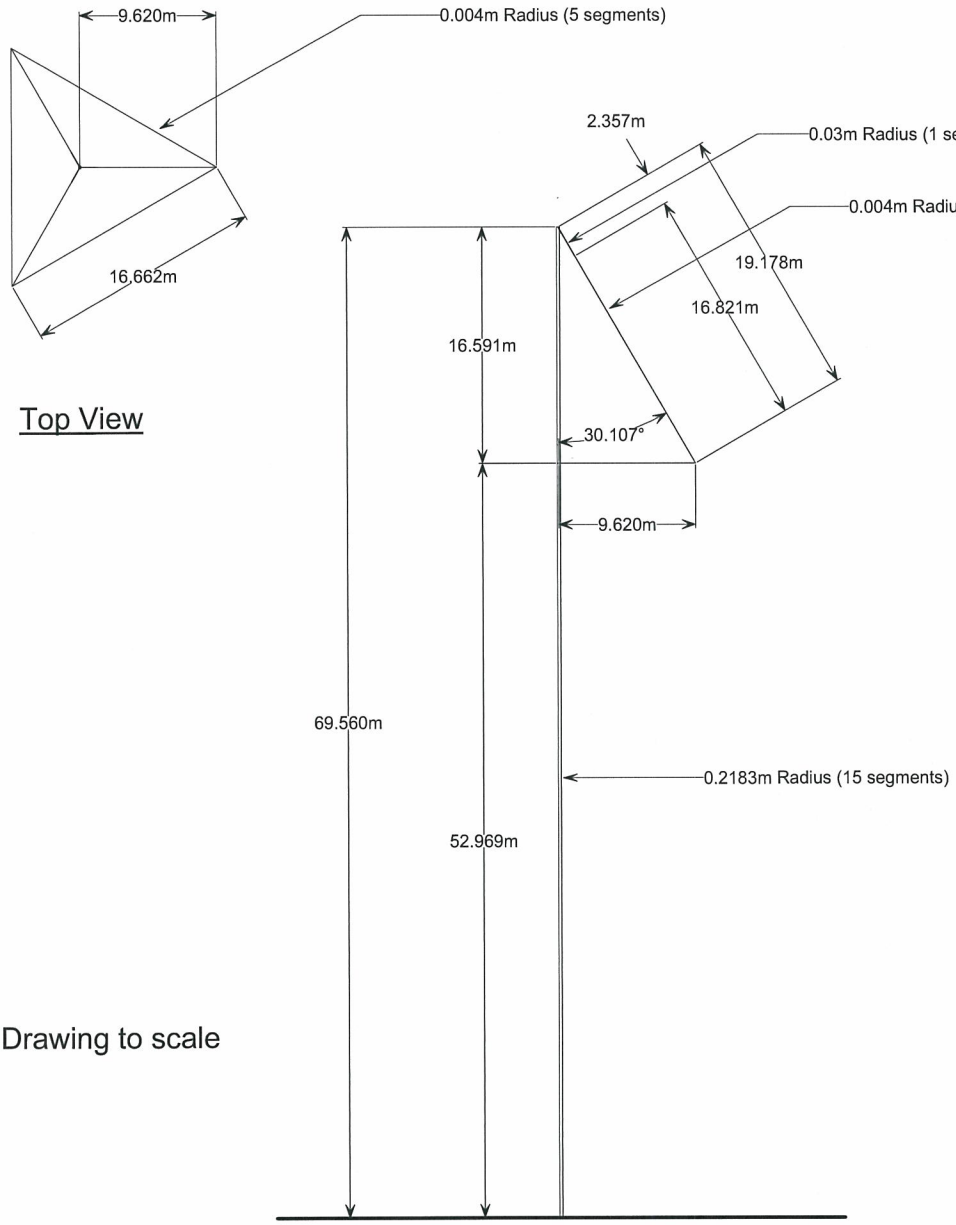
James D. Sadler



Note: Drawing to scale

WIREFRAME MODEL - TOWER 1
STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

Consulting Engineers
CTJC
CARL T. JONES CORPORATION



Top View

Elevation View

Note: Drawing to scale

WIREFRAME MODEL - TOWER 2
STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

TOWER MODEL HEIGHT AND RADIUS

STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

Tower	Physical Tower Height (degrees)	Modeled Tower Height (degrees)	Percent of Tower Physical Height	Physical Guy Wire Top Load Length (degrees)[1]	Modeled Guy Wire Top Load Length (degrees)	Percent of Guy Wire Top Load Length	Modeled Radius (meters)	Percent of Equivalent Radius
1	68.23	71.61	104.95	18.90	19.60	103.70	0.2183	100.0
2	68.23	69.56	101.95	18.90	19.18	101.48	0.2183	100.0

[1] This is based on the actual physical length of the guy wire top loading of 62 feet (18.90 meters).

Figure 2

MEASURED AND MODELED IMPEDANCES

STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

Tower	Measured Tower Base Impedance[1]	Modeled Tower Base Impedance	Shunt Capacitance (pF)	Modeled plus Shunt Reactance	Lumped Series Inductance (uH)	Total Adjusted Tower Base Impedance
1	58.6 +j 156.5	56.9 +j 134.5	17.11	58.4 +j 135.9	3.5	58.4 +j 156.4
2	51.6 +j 129.2	50.8 +j 116.4	17.11	52.0 +j 117.5	2.0	52.0 +j 129.2

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

Figure 3

ANTENNA MONITOR PARAMETERS AND COMMON POINT DATA

STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

NIGHTTIME		
	Modeled Parameters	
Tower	**Ratio**	**Phase (deg)**
1	1.000	0.0
2	1.025	75.2
Common Point Impedance = 50 +j 0 ohms Common Point Current = 4.65 amperes Antenna Input Power = 1,080 Watts		

SAMPLE LINE VERIFICATION MEASUREMENTS

STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

Tower	Open Circuit Series Resonant Frequency[1] (kHz)	Open Circuit Measured Line Length[2] (degrees)	Resonant Frequency -45 degree Offset Frequency (kHz)	Resonant Frequency -45 degree Offset Impedance (Ohms)	Resonant Frequency +45 degree Offset Frequency (kHz)	Resonant Frequency +45 degree Offset Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)	Reference Impedance Sample Toroid Connected[2] (Ohms)
1	923.70	271.8	769.8	5.94 -j 50.62	1077.7	8.85 +j 50.37	51.05	52.16 -j 2.24
2	926.10	271.1	771.8	5.93 -j 50.63	1080.5	8.72 +j 50.30	51.01	52.24 -j 3.13

[1] At this frequency, the sample line electrical length is equal to 270°.

[2] At carrier frequency (930 kHz)

Figure 5

SAMPLE DEVICE VERIFICATION MEASUREMENTS

STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

Reference Sample Toroid Number	Measured Sample Toroid Number	Measured	
		Field Ratio	Phase (degrees)
1	2	1.005	-0.6
1	Test Unit	1.005	-0.5

Sample Toroid Number	Type	Serial Number
1	Delta Electronics, TCT-3	2363
2	Delta Electronics, TCT-3	17832
Test Unit	Delta Electronics, TCT-3	1443

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KLUP - TERRELL HILLS, TEXAS
930 kHz - 5 kW-D, 1 kW-N, U, DA-N
APRIL, 2018

10 Degree Radial

Point Number	Distance (km)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
			Latitude	Longitude	
1	2.95	12.2	29° 32' 41.7"	98° 23' 54.8"	The point is located adjacent to the mailbox at #4734 Guadalajara Dr., San Antonio, Texas.
2	3.42	5.4	29° 32' 56.9"	98° 23' 52.2"	The point is located adjacent to the fire hydrant on the east corner of the intersection of Casa Manana St. and Casa Bonita St., San Antonio, Texas.
3	4.30	6	29° 33' 24.8"	98° 23' 45.9"	The point is located at the curb, center of house #4807 El Gusto St., San Antonio, Texas.

190 Degree Radial

Point Number	Distance (km)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
			Latitude	Longitude	
1	1.16	290	29° 30' 30.8"	98° 24' 21.6"	The point is located approximately 15 feet east of the wooden fence at the dead end of Northgate Dr., San Antonio, Texas.
2	2.23	179	29° 29' 56.8"	98° 24' 29.1"	The point is located at the edge of the street in the center of the driveway apron for #262 Goodhue Ave., San Antonio, Texas.
3	2.99	136	29° 29' 32.6"	98° 24' 33.3"	The point is located adjacent to the mailbox for #4218 Tropical Dr., San Antonio, Texas.

Figure 7

APPENDIX A

INDIVIDUAL TOWER MODELING

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							
.93	56.863	134.45	145.98	67.1	8.2535	-2.1152	-4.1391

GEOMETRY - TOWER 1
Dimensions in meters
Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.2183	15
		0	0	71.61		
2	none	9.62	0	54.53	.004	5
		1.18	0	69.51		
3	none	-4.81	-8.33	54.53	.004	5
		-.59	-1.02	69.51		
4	none	-4.81	8.33	54.53	.004	5
		-.59	1.02	69.51		
5	none	1.18	0	69.51	.03	1
		0	0	71.61		
6	none	-.59	-1.02	69.51	.03	1
		0	0	71.61		
7	none	-.59	1.02	69.51	.03	1
		0	0	71.61		
8	none	9.62	0	54.53	.004	5
		-4.81	-8.33	54.53		
9	none	-4.81	-8.33	54.53	.004	5
		-4.81	8.33	54.53		
10	none	-4.81	8.33	54.53	.004	5
		9.62	0	54.53		
11	none	88.2	-15.5	0	.2183	15
		88.2	-15.5	69.56		
12	none	97.82	-15.5	52.97	.004	5
		89.38	-15.5	67.52		
13	none	83.39	-23.83	52.97	.004	5
		87.61	-16.52	67.52		
14	none	83.39	-7.17	52.97	.004	5
		87.61	-14.48	67.52		
15	none	89.38	-15.5	67.52	.03	1
		88.2	-15.5	69.56		
16	none	87.61	-16.52	67.52	.03	1
		88.2	-15.5	69.56		
17	none	87.61	-14.48	67.52	.03	1
		88.2	-15.5	69.56		
18	none	97.82	-15.5	52.97	.004	5
		83.39	-23.83	52.97		
19	none	83.39	-23.83	52.97	.004	5
		83.39	-7.17	52.97		
20	none	83.39	-7.17	52.97	.004	5
		97.82	-15.5	52.97		

Number of wires = 20
current nodes = 102

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	16	2.35587	1	4.774
segment/radius ratio	11	21.2429	3	859.717
radius	2	4.E-03	1	.2183

ELECTRICAL DESCRIPTION - TOWER 1

Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	.93	0	1	7.31E-03	.0148093

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	52	.01	-10,000.	0	0	0

IMPEDANCE - TOWER 2
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 52, sector 1							
.93	50.805	116.42	127.02	66.4	7.1966	-2.4296	-3.6808

GEOMETRY - TOWER 2
Dimensions in meters
Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.2183	15
		0	0	71.61		
2	none	9.62	0	54.53	.004	5
		1.18	0	69.51		
3	none	-4.81	-8.33	54.53	.004	5
		-.59	-1.02	69.51		
4	none	-4.81	8.33	54.53	.004	5
		-.59	1.02	69.51		
5	none	1.18	0	69.51	.03	1
		0	0	71.61		
6	none	-.59	-1.02	69.51	.03	1
		0	0	71.61		
7	none	-.59	1.02	69.51	.03	1
		0	0	71.61		
8	none	9.62	0	54.53	.004	5
		-4.81	-8.33	54.53		
9	none	-4.81	-8.33	54.53	.004	5
		-4.81	8.33	54.53		
10	none	-4.81	8.33	54.53	.004	5
		9.62	0	54.53		
11	none	88.2	-15.5	0	.2183	15
		88.2	-15.5	69.56		
12	none	97.82	-15.5	52.97	.004	5
		89.38	-15.5	67.52		
13	none	83.39	-23.83	52.97	.004	5
		87.61	-16.52	67.52		
14	none	83.39	-7.17	52.97	.004	5
		87.61	-14.48	67.52		
15	none	89.38	-15.5	67.52	.03	1
		88.2	-15.5	69.56		
16	none	87.61	-16.52	67.52	.03	1
		88.2	-15.5	69.56		
17	none	87.61	-14.48	67.52	.03	1
		88.2	-15.5	69.56		
18	none	97.82	-15.5	52.97	.004	5
		83.39	-23.83	52.97		
19	none	83.39	-23.83	52.97	.004	5
		83.39	-7.17	52.97		
20	none	83.39	-7.17	52.97	.004	5
		97.82	-15.5	52.97		

Number of wires = 20
current nodes = 102

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	16	2.35587	1	4.774
segment/radius ratio	11	21.2429	3	859.717
radius	2	4.E-03	1	.2183

ELECTRICAL DESCRIPTION - TOWER 2

Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	.93	0	1	7.31E-03	.0148093

Sources

source	node	sector	magnitude	phase	type
1	52	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	52	.01	0	0	0	0

APPENDIX B

NIGHTTIME DIRECTIONAL ARRAY MODEL

IMPEDANCE - NIGHTTIME
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.93	90.465	149.26	174.53	58.8	7.1472	-2.4466	-3.6582
source = 2; node 52, sector 1							
.93	29.622	88.237	93.077	71.4	7.402	-2.3614	-3.7735

GEOMETRY - NIGHTTIME
Dimensions in meters
Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.2183	15
		0	0	71.61		
2	none	9.62	0	54.53	.004	5
		1.18	0	69.51		
3	none	-4.81	-8.33	54.53	.004	5
		-.59	-1.02	69.51		
4	none	-4.81	8.33	54.53	.004	5
		-.59	1.02	69.51		
5	none	1.18	0	69.51	.03	1
		0	0	71.61		
6	none	-.59	-1.02	69.51	.03	1
		0	0	71.61		
7	none	-.59	1.02	69.51	.03	1
		0	0	71.61		
8	none	9.62	0	54.53	.004	5
		-4.81	-8.33	54.53		
9	none	-4.81	-8.33	54.53	.004	5
		-4.81	8.33	54.53		
10	none	-4.81	8.33	54.53	.004	5
		9.62	0	54.53		
11	none	88.2	-15.5	0	.2183	15
		88.2	-15.5	69.56		
12	none	97.82	-15.5	52.97	.004	5
		89.38	-15.5	67.52		
13	none	83.39	-23.83	52.97	.004	5
		87.61	-16.52	67.52		
14	none	83.39	-7.17	52.97	.004	5
		87.61	-14.48	67.52		
15	none	89.38	-15.5	67.52	.03	1
		88.2	-15.5	69.56		
16	none	87.61	-16.52	67.52	.03	1
		88.2	-15.5	69.56		
17	none	87.61	-14.48	67.52	.03	1
		88.2	-15.5	69.56		
18	none	97.82	-15.5	52.97	.004	5
		83.39	-23.83	52.97		
19	none	83.39	-23.83	52.97	.004	5
		83.39	-7.17	52.97		
20	none	83.39	-7.17	52.97	.004	5
		97.82	-15.5	52.97		

Number of wires = 20
current nodes = 102

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	16	2.35587	1	4.774
segment/radius ratio	11	21.2429	3	859.717
radius	2	4.E-03	1	.2183

ELECTRICAL DESCRIPTION - NIGHTTIME

Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	.93	0	1	7.31E-03	.0148093

Sources

source	node	sector	magnitude	phase	type
1	1	1	709.03	65.8	voltage
2	52	1	385.069	153.9	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	0	0	0	0
2	52	.01	0	0	0	0

PEAK CURRENTS - NIGHTTIME

Frequency = .93 MHz

Input power = 1,000. watts

Efficiency = 99.98 %

coordinates in meters

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	4.06245	7.	4.03226	.49433
2	0	0	4.774	4.3793	4.4	4.36623	.338121
3	0	0	9.548	4.56413	2.9	4.55812	.234083
4	0	0	14.322	4.68878	1.8	4.68647	.14708
5	0	0	19.096	4.76258	.9	4.76203	.0726464
6	0	0	23.87	4.78986	.1	4.78985	9.06E-03
7	0	0	28.644	4.77368	359.5	4.77347	-.044446
8	0	0	33.418	4.71728	358.9	4.71645	-.0882839
9	0	0	38.192	4.62524	358.5	4.62361	-.12273
10	0	0	42.966	4.50528	358.1	4.50285	-.148061
11	0	0	47.74	4.37271	357.8	4.36961	-.164689
12	0	0	52.514	4.26034	357.7	4.25681	-.173396
13	0	0	57.288	4.17526	357.6	4.1716	-.174732
14	0	0	62.062	4.02967	357.6	4.02617	-.16795
15	0	0	66.836	3.83643	357.7	3.83333	-.154128
J1	0	0	71.61	3.62552	357.9	3.623	-.135112
J2	9.62	0	54.53	.585325	180.3	-.585316	-3.2E-03
16	7.932	0	57.526	.702168	179.9	-.702167	1.45E-03
17	6.244	0	60.522	.825724	179.5	-.825687	7.87E-03
18	4.556	0	63.518	.947241	179.1	-.947114	.0155254
19	2.868	0	66.514	1.06219	178.7	-1.06192	.0240046
J2	1.18	0	69.51	1.16401	178.4	-1.16355	.0325998
J3	-4.81	-8.33	54.53	.556553	178.6	-.556387	.0136015
20	-3.966	-6.868	57.526	.674764	178.6	-.674577	.0158982
21	-3.122	-5.406	60.522	.799446	178.5	-.799188	.0203221
22	-2.278	-3.944	63.518	.921814	178.4	-.921435	.0264411
23	-1.434	-2.482	66.514	1.03735	178.1	-1.0368	.0338449

J3	-.59	-1.02	69.51	1.13949	177.9	-1.13872	.0418215
J4	-4.81	8.33	54.53	.550555	178.3	-.550308	.0165118
24	-3.966	6.868	57.526	.669024	178.4	-.668771	.0184023
25	-3.122	5.406	60.522	.79393	178.4	-.793613	.0224566
26	-2.278	3.944	63.518	.916474	178.2	-.916038	.0282721
27	-1.434	2.482	66.514	1.03214	178.	-1.03153	.0354516
J4	-.59	1.02	69.51	1.13436	177.8	-1.13353	.043293
2J1	1.18	0	69.51	1.16401	178.4	-1.16355	.0325998
2J2	0	0	71.61	1.22654	178.2	-1.22593	.0385442
2J1	-.59	-1.02	69.51	1.13949	177.9	-1.13872	.0418215
2J2	0	0	71.61	1.20206	177.7	-1.20112	.0475698
2J1	-.59	1.02	69.51	1.13436	177.8	-1.13353	.043293
2J2	0	0	71.61	1.19695	177.7	-1.19595	.0489983
1J1	9.62	0	54.53	.291458	.1	.291457	6.35E-04
35	6.734	-1.666	54.53	.182203	1.2	.182164	3.78E-03
36	3.848	-3.332	54.53	.0682522	5.7	.0679164	6.76E-03
37	.962	-4.998	54.53	.0464523	168.4	-.0455062	9.33E-03
38	-1.924	-6.664	54.53	.16073	176.	-.160331	.011317
1J2	-4.81	-8.33	54.53	.271011	177.3	-.270719	.012581
1J1	-4.81	-8.33	54.53	.28567	359.8	.285668	-1.02E-03
41	-4.81	-4.998	54.53	.17506	360.	.17506	-1.14E-04
42	-4.81	-1.666	54.53	.0596457	.9	.0596385	9.28E-04
43	-4.81	1.666	54.53	.0547762	177.9	-.0547411	1.96E-03
44	-4.81	4.998	54.53	.170304	179.	-.17028	2.84E-03
1J2	-4.81	8.33	54.53	.281129	179.3	-.281108	3.43E-03
1J1	-4.81	8.33	54.53	.269517	357.2	.2692	-.013079
47	-1.924	6.664	54.53	.159012	355.6	.158542	-.0122149
48	.962	4.998	54.53	.0447526	346.3	.0434771	-.0106086
49	3.848	3.332	54.53	.0706317	186.8	-.0701348	-8.36E-03
50	6.734	1.666	54.53	.184596	181.7	-.184511	-5.61E-03
1J2	9.62	0	54.53	.29387	180.5	-.293859	-2.56E-03
GND	88.2	-15.5	0	4.13712	82.5	.539715	4.10177
53	88.2	-15.5	4.63733	4.31787	81.7	.626792	4.27214
54	88.2	-15.5	9.27467	4.41023	81.1	.679884	4.35751
55	88.2	-15.5	13.912	4.45822	80.7	.719341	4.39981
56	88.2	-15.5	18.5493	4.46806	80.4	.747842	4.40503
57	88.2	-15.5	23.1867	4.44297	80.1	.766555	4.37634
58	88.2	-15.5	27.824	4.38551	79.8	.776185	4.31628
59	88.2	-15.5	32.4613	4.29865	79.6	.777351	4.22778
60	88.2	-15.5	37.0987	4.18653	79.4	.770833	4.11496
61	88.2	-15.5	41.736	4.05617	79.2	.757885	3.98474
62	88.2	-15.5	46.3733	3.92124	79.1	.740959	3.8506
63	88.2	-15.5	51.0107	3.81022	79.	.725185	3.74057
64	88.2	-15.5	55.648	3.72756	79.	.711454	3.65904
65	88.2	-15.5	60.2853	3.5971	79.	.686309	3.53102
66	88.2	-15.5	64.9227	3.42839	79.	.651735	3.36587
J11	88.2	-15.5	69.56	3.24747	79.1	.612906	3.18911
J12	97.82	-15.5	52.97	.536047	261.7	-.0772254	-.530455
67	96.132	-15.5	55.88	.640484	261.2	-.0980696	-.632932
68	94.444	-15.5	58.79	.749914	260.8	-.120379	-.740189
69	92.756	-15.5	61.7	.85658	260.4	-.142555	-.844635
70	91.068	-15.5	64.61	.956603	260.1	-.163744	-.942485
J12	89.38	-15.5	67.52	1.04444	259.9	-.182692	-1.02834
J13	83.39	-23.83	52.97	.513993	259.	-.0979851	-.504567
71	84.234	-22.368	55.88	.619025	259.1	-.116654	-.607934
72	85.078	-20.906	58.79	.728911	259.2	-.137022	-.715917
73	85.922	-19.444	61.7	.83589	259.1	-.157625	-.820894
74	86.766	-17.982	64.61	.936102	259.1	-.17766	-.919089
J13	87.61	-16.52	67.52	1.02407	259.	-.195919	-1.00515

J14	83.39	-7.17	52.97	.50815	258.2	-.103535	-.497491
75	84.234	-8.632	55.88	.613243	258.6	-.121581	-.60107
76	85.078	-10.094	58.79	.723187	258.7	-.141426	-.709224
77	85.922	-11.556	61.7	.830217	258.8	-.161629	-.814332
78	86.766	-13.018	64.61	.930473	258.8	-.181387	-.912622
J14	87.61	-14.48	67.52	1.01846	258.7	-.199488	-.998728
2J1	89.38	-15.5	67.52	1.04444	259.9	-.182692	-1.02834
2J2	88.2	-15.5	69.56	1.09799	259.8	-.194466	-1.08063
2J1	87.61	-16.52	67.52	1.02407	259.	-.195919	-1.00515
2J2	88.2	-15.5	69.56	1.0776	258.9	-.20746	-1.05744
2J1	87.61	-14.48	67.52	1.01846	258.7	-.199488	-.998728
2J2	88.2	-15.5	69.56	1.07201	258.6	-.21098	-1.05104
1J1	97.82	-15.5	52.97	.266874	81.4	.0400657	.263849
86	94.934	-17.166	52.97	.16571	82.9	.0204051	.164449
87	92.048	-18.832	52.97	.0609465	89.7	2.91E-04	.0609458
88	89.162	-20.498	52.97	.0457894	245.2	-.0192066	-.0415665
89	86.276	-22.164	52.97	.150456	255.2	-.038406	-.145472
1J2	83.39	-23.83	52.97	.252014	257.1	-.0563338	-.245637
1J1	83.39	-23.83	52.97	.262259	80.9	.0416513	.25893
92	83.39	-20.498	52.97	.160436	81.3	.024229	.158596
93	83.39	-17.166	52.97	.0546025	83.4	6.29E-03	.0542394
94	83.39	-13.834	52.97	.0502756	257.	-.0113039	-.0489884
95	83.39	-10.502	52.97	.156153	259.3	-.0289709	-.153442
1J2	83.39	-7.17	52.97	.258067	259.8	-.045873	-.253957
1J1	83.39	-7.17	52.97	.250267	76.7	.0576618	.243534
98	86.276	-8.836	52.97	.14872	74.3	.0403096	.143153
99	89.162	-10.502	52.97	.0446173	61.1	.0215564	.0390644
100	92.048	-12.168	52.97	.0636282	272.1	2.37E-03	-.0635842
101	94.934	-13.834	52.97	.168093	264.	-.017565	-.167173
1J2	97.82	-15.5	52.97	.269183	262.1	-.0371597	-.266606