Kathleen A. Kirby
202.719.3360
kkirby@wiley.law

Wiley Rein LLP
2050 M Street NW
Washington, DC 20036
Tel: 202.719.7000

wiley.law

March 27, 2023

VIA e-mail: audiofilings@fcc.gov

Marlene H. Dortch, Secretary
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Re: Salem Communications Holding Corporation – FRN 0003760352
Station KPXQ(AM), Glendale, AZ (Fac. ID 55912)
Application for Direct Measurement of Power

Dear Ms. Dortch:

On behalf of Salem Communications Holding Corporation, licensee of AM station KPXQ, Glendale, AZ, we are submitting herewith an application on FCC Form 302-AM for direct measurement of power. There is no filing fee associated with this application.

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

Respectfully Submitted,

Kathleen A. Kirby

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY

FILE NO.

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)384-4502	KPXQ	55912

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): Non-feeable application

C. If Yes, provide the following information:

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

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

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

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

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

CLEAR ALL PAGES

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
KPXQ	Glendale, AZ	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. Not applicable - Direct Measurement application

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. Not applicable - Direct Measurement application

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. Not applicable - Direct Measurement application

Exhibit No.

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

☐ Yes ☐ No ☑ Does not apply

If No, explain in an Exhibit.

Exhibit No.

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

☐ Yes ☑ No

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

Exhibit No.

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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	Christopher Henderson	
Title	Date	Telephone Number
Executive Vice President & Secretary	3/27/2023	(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.

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Consulting Engineers
CTJC
CARL T. JONES CORPORATION

ENGINEERING EXHIBIT
IN SUPPORT OF AN APPLICATION FOR
DIRECT MEASUREMENT OF POWER
STATION KPXQ – GLENDALE, ARIZONA
1360 kHz – 50 kW-D, 1 kW-N, U, DA-N
Facility ID: 55912

Applicant: Salem Communications Holding Corporation

March, 2023

7901 Yarnwood Court
Springfield, VA 22153-2899

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

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

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SECTION III OF FCC FORM 302-AM

ENGINEERING STATEMENT OF JAMES D. SADLER

FIGURE

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

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
KPXQ	N/A	1360	Unlimited	1	50

2. Station location	
State	City or Town
Arizona	Glendale

3. Transmitter location			
State	County	City or Town	Street address (or other identification)
AZ	Maricopa	Phoenix	7401 Camelback Road

4. Main studio location			
State	County	City or Town	Street address (or other identification)
AZ	Maricopa	Phoenix	2425 E Camelback Road

5. Remote control point location (specify only if authorized directional antenna)			
State	County	City or Town	Street address (or other identification)
AZ	Maricopa	Phoenix	2425 E Camelback Road

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	RF common point or antenna current (in amperes) without modulation for day system
4.65	31.0
Measured antenna or common point resistance (in ohms) at operating frequency	**Measured antenna or common point reactance (in ohms) at operating frequency**
Night: 50.0 Day: 52.0	Night: +j 0 Day: +j 8.2

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(NW)	80.8	----	1.428	----	----	----
2(NE)	-60.8	----	1.288	----	----	----
3(S)	0.0	----	1.000	----	----	----

Manufacturer and type of antenna monitor: Potomac Insturments, Model 1901-3

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, guyed, base insulated	All - 54.9	All - 55.8	#1 & #2 - 56.7 #3 - 55.8	Exhibit No. N/A

Excitation ☑ Series ☐ Shunt

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

North Latitude	West Longitude
33 ° 30 ' 28 "	112 ° 13 ' 01 "

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. On File

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

N/A

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

Installation of diplex filters required for collocation of station KXXT

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) Carl T. Jones Corporation 7901 Yarnwood Court Springfield, VA 22153	Date March 27, 2023 Telephone No. (Include Area Code) (703) 569-7704

☐ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☑ Technical Consultant

☐ Other (specify)

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

ENGINEERING STATEMENT OF JAMES D. SADLER
IN SUPPORT OF AN APPLICATION
FOR DIRECT MEASUREMENT OF POWER
STATION KPXQ – GLENDALE, ARIZONA
1360 kHz – 50 kW-D, 1 kW-N, U, DA-N
Facility ID: 55912

Licensee: 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 ("SCHC"), licensee of AM Station KPXQ, to prepare this engineering statement, FCC Form 302-AM and the associated figures and appendices in support of an Application for Direct Measurement of Power. Station KPXQ is licensed pursuant to a proof of performance using moment method modeling and internal array parameters (Section 47 CFR 73.151(c)) for operation on 1360 kilohertz at a power of 50 kilowatts during daytime hours and 1 kilowatt during nighttime hours.

AM Station KXXT holds a construction permit (FCC File No. BP-20210528AAJ) which authorizes collocation of its transmission facilities at the KPXQ transmitter site

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Springfield, VA 22153-2899
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and diplexing onto the KPXQ towers. The KXXT construction permit specifies operation on 1010 kilohertz with a daytime power of 23 kilowatts, a critical hours power of 9.8 kilowatts, and a nighttime power of 0.3 kilowatts. The KXXT daytime and critical hours directional antenna will use KPXQ towers #1 and #2 and the KXXT nighttime hours directional antenna will use KPXQ towers #1 and #3.

Following the installation of the new diplexing filters and the KXXT phasing and coupling systems, the KPXQ sample transformer for each tower was replaced and the new transformers relocated from the output of the ATU networks to the output of the filter networks. The location of the sample transformers are shown on the diplex filter circuit schematic diagrams included in Figure 6. Impedance measurements were performed at the output of each of the KPXQ filter networks with the other towers open circuited at the corresponding filter output locations. The location of the impedance measurement at each tower was immediately adjacent to the location of the relocated KPXQ sample toroidal transformer. Based on these measurements, it was determined that it would be necessary to modify the previous moment method model and file FCC Form 302-AM.

The specific measurement and modeling techniques used in performing the modified proof of performance on the KPXQ directional pattern are described in detail in this engineering statement. Impedance measurement data and model derived operating parameters are tabulated in the figures attached to this engineering statement. In accordance with the Rules, sampling system measurements, and the reference field strength measurements have not been repeated. However, because

the sample transformers were replaced, measurements were performed to verify the performance of the new transformers and, in addition, the sample line measurements with the transformers attached have been repeated. All pertinent modified computer model input and output files are contained in the attached Appendices A and B.

2.0 IMPEDANCE MEASUREMENTS, COMPUTER MODELING AND PARTIAL SAMPLE SYSTEM VERIFICATION

The pattern verification 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 KPXQ antenna array consists of three, triangular, uniform cross-section, guyed towers. All three towers have an electrical height of 89.6 degrees and a face width of 16 inches. Towers 1 and 2 are identical. Tower 3 was replaced in recent years and is just slightly different in that the face width on the bottom 10 foot section tapers from 16 inches to 10 inches at the base insulator. Due to the relatively short and insignificant nature of the tapered section on tower 3 and, as was done in the previous method of moments proof, all three towers were modeled using the same cylindrical vertical wire model. A detailed description of the tower base impedance measurements and the computer models employed is contained below.

The sampling system employs identical Delta Electronics Model TCT-1 toroidal current transformers located in the output branch of each tower's filter network except that the toroidal current transformer at tower 1 is a high voltage unit to handle the high

daytime voltage on tower 1. The performance of the toroidal current transformers was verified by driving a common reference current through each transformer and comparing the outputs as observed on the Hewlett-Packard Model 8753C network analyzer. A tabulation of the toroidal current transformer measurement data along with the serial number of each current transformer is contained in Figure 5. The measured ratio and relative phase values for each of the current transformers when compared to the reference transformer were within the manufacturers stated accuracy.

2.1 BASE IMPEDANCE MEASUREMENTS

An impedance measurement was performed, by the undersigned, at the output J-Plug of each KPXQ filter network with the other towers open circuited at the corresponding J-Plug location. This location is immediately adjacent to the sampling system toroidal current transformer. The impedance measurement was performed using a Hewlett-Packard Model 4396A network analyzer; an Amplifier Research Model 5W1000 power amplifier; and a Tunwall Radio directional coupler. The new measured impedances are contained in Figure 2.

2.2 INDIVIDUAL TOWER COMPUTER MODELS

The original moment method computer model and the separate circuit model were modified for each tower in order to replicate the new measured base impedances. The modified individual tower models were developed using Expert MiniNEC Broadcast Professional (Version 23.0). To replicate the individual measured base impedances to

within the tolerance specified in the FCC's Rules, each tower's physical height and radius was adjusted in the MiniNEC model and series inductance and shunt capacitance and inductance were employed in a separate circuit model.[1] Details of the modeled individual tower adjusted heights and radii are contained in Figure 1.

The values of the lumped series inductances and shunt reactances used in the circuit model are contained in Figure 2. The measured individual tower impedances, the modeled individual tower impedances, and the adjusted modeled (circuit model) individual tower impedances are also contained in Figure 2. The percentage difference between the adjusted modeled tower heights and radii and the physical tower heights and radii are within the tolerances set forth in the FCC's Rules. The magnitude of the lumped series inductance and shunt capacitance that was used in each circuit model is also within the tolerances set forth in the FCC's Rules.

As demonstrated by the data contained in Figure 2, 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.

[1] A shunt inductor is installed between the KXXT and KPXQ filters and the base of the tower on towers #1 and #2 to enhance the bandwidth performance of the stations. Each shunt inductor was adjusted for a value of 40 uH. The measured shunt inductance was included in a separate circuit model for towers #1 and #2 as indicated on Figure 2.

2.3 DIRECTIONAL ANTENNA COMPUTER MODEL AND ANTENNA MONITOR PARAMETERS

The theoretical 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. Each segment current was multiplied by the segment length and numerically integrated and normalized to the appropriate reference tower to verify that the modeled current moments are essentially identical to the authorized relative directional field parameters.

The new nighttime directional array operating parameters were determined from the modeled base currents and are tabulated in Figure 3. Also included in Figure 3 is the adjusted common point impedance and common point current for the licensed nighttime 1 kilowatt operation. The text files containing all pertinent input and output data associated with the nighttime directional antenna computer model are contained in Appendix B.

3.0 MEASURED DAYTIME BASE IMPEDANCE AND CURRENT

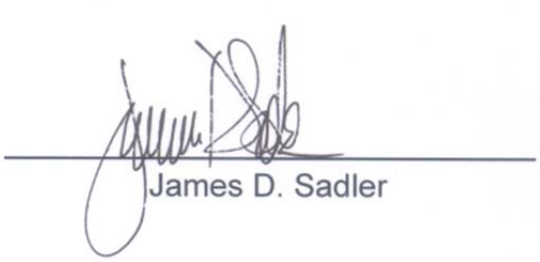
The daytime non-directional base impedance of tower 1 was measured by the undersigned using a Delta Electronics OIB-3 impedance bridge and found to be Z = 52.0 + j8.2 Ohms. The transmitter was adjusted for a base current of 31.00 Amperes corresponding to an antenna input power of 50,000 Watts.

4.0 SUMMARY

It is submitted that the KPXQ nighttime directional antenna pattern 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 SCHC reflecting the new Moment Method model derived nighttime operating parameters and to reflect the new daytime measured non-directional base impedance and current as contained herein and on 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: March 27, 2023



TOWER MODEL HEIGHT AND RADIUS

STATION KPXQ - GLENDALE, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

Tower	Physical Height (degrees)	Modeled Height (degrees)	Percent of Physical Height	Tower Face Width (meters)	Equivalent Radius (meters)	Modeled Radius (meters)	Percent of Equivalent Radius
1	89.60	97.66	109.0	0.4064	0.1940	0.1940	100.0
2	89.60	86.91	97.0	0.4064	0.1940	0.1940	100.0
3	89.60	96.32	107.5	0.4064	0.1940	0.1940	100.0

MEASURED AND MODELED IMPEDANCES

STATION KPXQ - GLENDALE, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

Tower	Measured Tower Base Impedance[1]	Modeled Tower Base Impedance	Shunt Capacitance (pF)	Shunt Inductance (uH)	Modeled plus Shunt Reactance	Lumped Series Inductance (uH)	Total Adjusted Tower Base Impedance
1	45.0 +j 80.3	59.2 +j 65.0	90.0	40.0	45.0 +j 62.1	2.13	45.0 +j 80.3
2	36.8 +j 73.9	38.2 +j 4.5	15.0	40.0	36.9 +j 8.4	7.67	36.9 +j 73.9
3	59.3 +j 76.3	53.6 +j 56.6	105.0	0.0	59.3 +j 56.5	2.32	59.3 +j 76.3

[1] Measured at output of Filter network adjacent to the sample toroid with the other towers open circuited at the same relative location.

Figure 2

NIGHTTIME ANTENNA MONITOR PARAMETERS AND COMMON POINT DATA

STATION KPXQ - GLENDALE, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

Tower	MiniNEC Modeled Parameters	
	Ratio	Phase (degrees)
1	1.428	80.8
2	1.288	-60.8
3	1.000	0.0

Common Point Impedance = 50 +j 0 ohms

Common Point Current = 4.65 amperes

Antenna Input Power = 1,080 Watts

SAMPLE TOROID REFERENCE IMPEDANCE

STATION KPXQ - GLENDALE, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

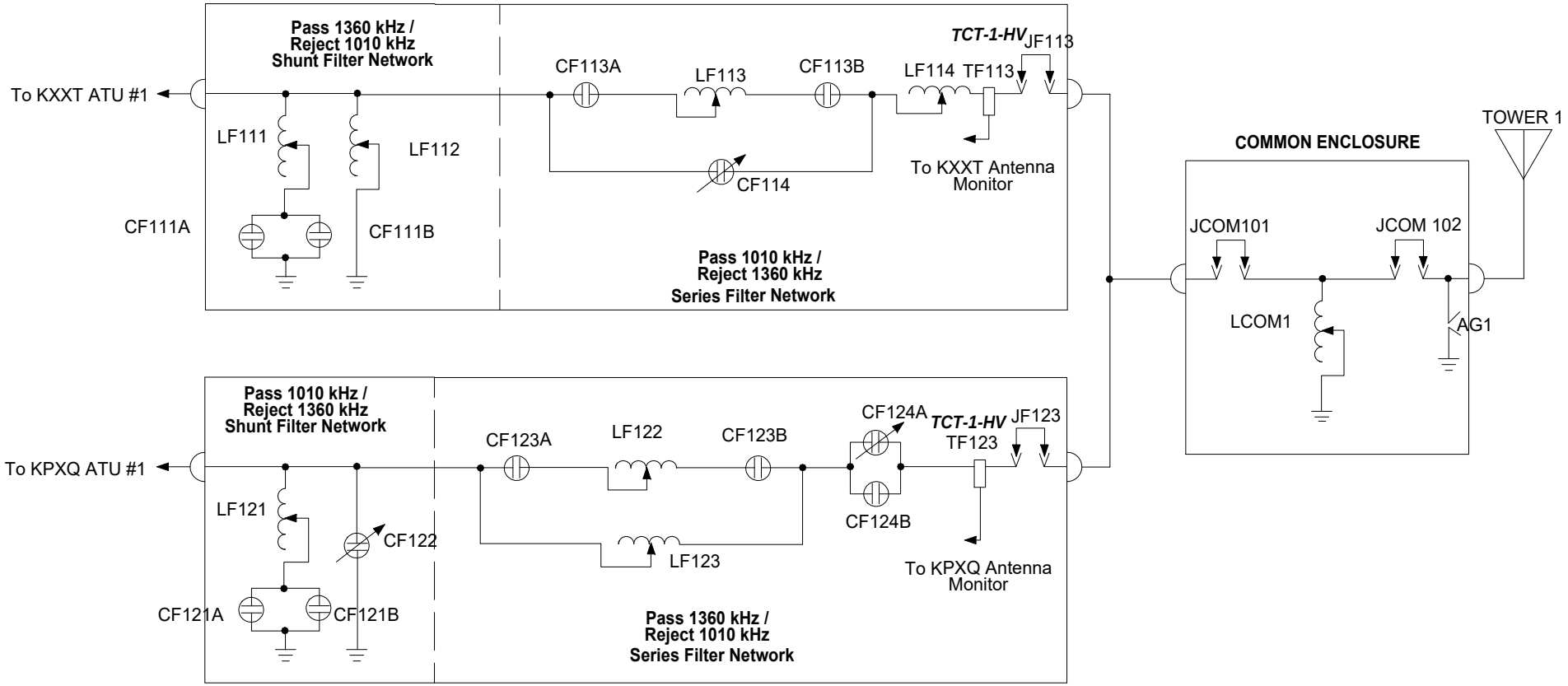
Tower Number	Measured Impedance (Ohms)
1	50.22 +j 0.94
2	49.72 +j 0.05
3	49.77 +j 0.08

SAMPLE DEVICE CALIBRATION

STATION KPXQ - GLENDALE, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

Reference Sample Toroid Number	Measured Sample Toroid Number	Measured	
		Field Ratio	Phase (degrees)
1	2	1.003	-0.4
1	3	1.003	-0.3
2	3	1.003	-0.1

Sample Toroid Number	Type	Serial Number
1	Delta Electronics, TCT-1HV	1462
2	Delta Electronics, TCT-1	4925
3	Delta Electronics, TCT-1	15054



DIPLEX FILTER CIRCUIT SCHEMATIC DIAGRAM
TOWER #1 (NORTHWEST)

STATION KPXQ - PHOENIX, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

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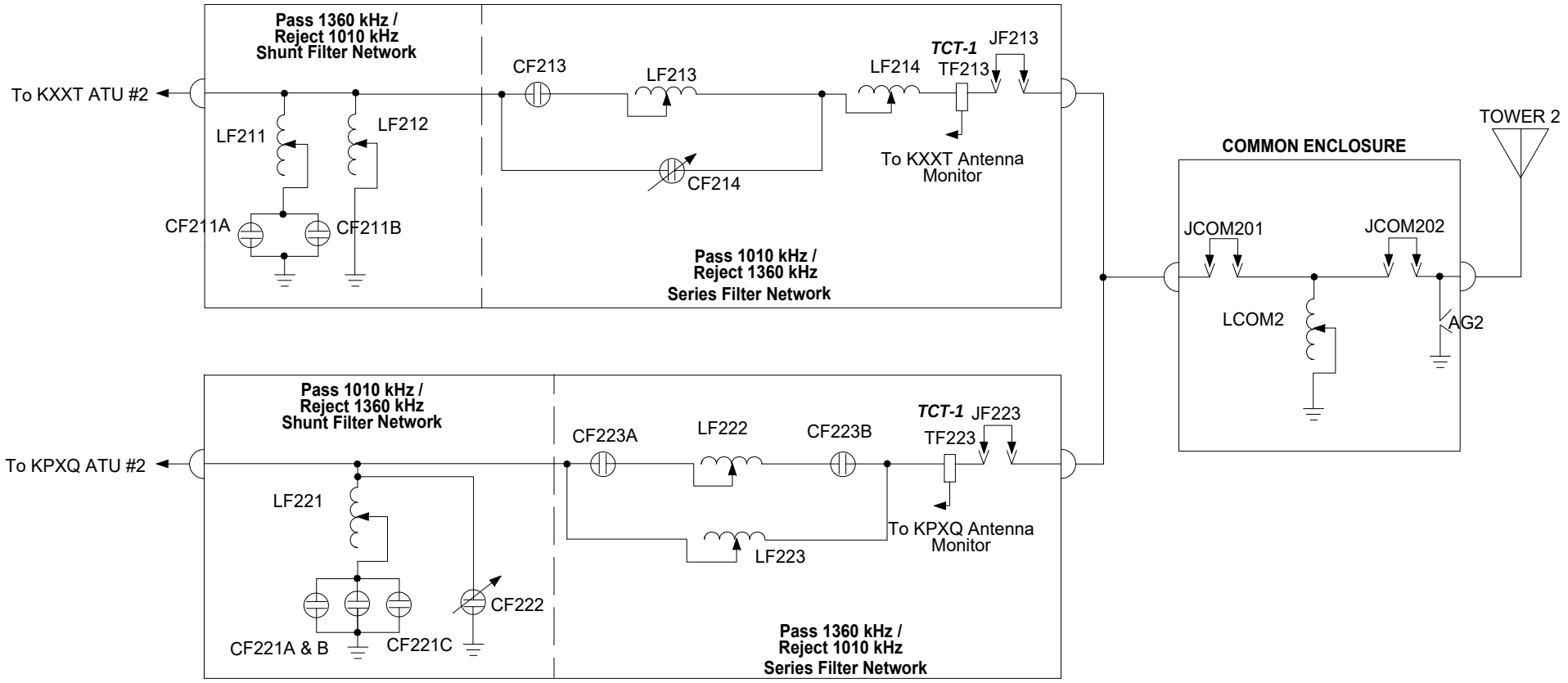
Figure 6
Sheet 1 of 3



DIPLEX FILTER CIRCUIT SCHEMATIC DIAGRAM
TOWER #2 (NORTHEAST)

STATION KPXQ - PHOENIX, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

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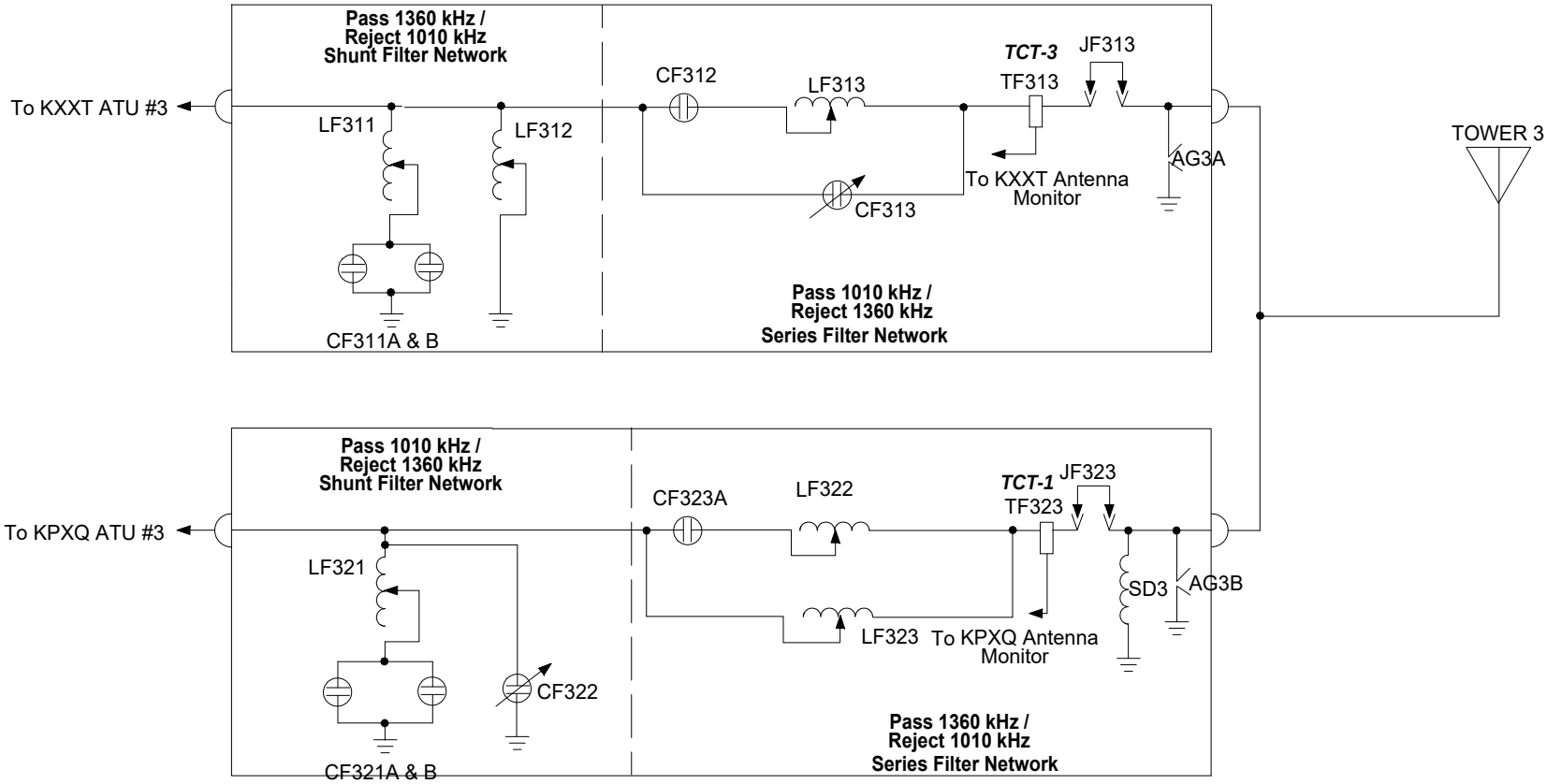
Figure 6
Sheet 2 of 3



DIPLEX FILTER CIRCUIT SCHEMATIC DIAGRAM
TOWER #3 (SOUTH)

STATION KPXQ - PHOENIX, ARIZONA
1360 kHz - 50 kW-D, 1 kW-N, U, DA-N
MARCH, 2023

Consulting Engineers
CTJC
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Figure 6
Sheet 3 of 3

APPENDIX A

INDIVIDUAL TOWER MODEL

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							
1.36	59.245	65.007	87.954	47.7	3.1366	-5.7383	-1.3477

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	.194	21
		0	0	97.66		
2	none	89.6	62.	0	.194	21
		89.6	62.	86.91		
3	none	179.2	157.	0	.194	21
		179.2	157.	96.32		

Number of wires = 3
current nodes = 63

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	4.13857	1	4.65048
radius	1	.194	1	.194

ELECTRICAL DESCRIPTION – TOWER #1
Frequencies (MHz)

frequency			no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.36	0	1	.011496	.012918

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	22	.01	357.47	0	0	0
3	43	.01	-1,114.53	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 22, sector 1							
1.36	38.287	4.558	38.558	6.8	1.3315	-16.944	-8.9E-02

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	.194	21
		0	0	97.66		
2	none	89.6	62.	0	.194	21
		89.6	62.	86.91		
3	none	179.2	157.	0	.194	21
		179.2	157.	96.32		

Number of wires = 3
current nodes = 63

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	2	4.13857	1	4.65048
radius	1	.194	1	.194

ELECTRICAL DESCRIPTION – TOWER #2
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.36	0	1	.011496	.012918

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	463.7	0	0	0
2	22	.01	0	0	0	0
3	43	.01	-1,114.53	0	0	0

IMPEDANCE – TOWER #3
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 43, sector 1							
1.36	53.527	56.429	77.777	46.5	2.8426	-6.3838	-1.1348

GEOMETRY – TOWER #3
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.194	21
		0	0	97.66		
2	none	89.6	62.	0	.194	21
		89.6	62.	86.91		
3	none	179.2	157.	0	.194	21
		179.2	157.	96.32		

Number of wires = 3
current nodes = 63

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	2	4.13857	1	4.65048
radius	1	.194	1	.194

ELECTRICAL DESCRIPTION – TOWER #3
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.36	0	1	.011496	.012918

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	463.7	0	0	0
2	22	.01	357.47	0	0	0
3	43	.01	0	0	0	0

APPENDIX B

NIGHTTIME DIRECTIONAL ARRAY MODEL

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							
1.36	7.4948	74.319	74.696	84.2	21.514	-.80805	-7.7012
source = 2; node 22, sector 1							
1.36	30.95	21.445	37.654	34.7	2.042	-9.306	-.54201
source = 3; node 43, sector 1							
1.36	57.953	47.048	74.647	39.1	2.3624	-7.8468	-.77888

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	.194	21
		0	0	97.66		
2	none	89.6	62.	0	.194	21
		89.6	62.	86.91		
3	none	179.2	157.	0	.194	21
		179.2	157.	96.32		

Number of wires = 3
current nodes = 63

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	4.13857	1	4.65048
radius	1	.194	1	.194

ELECTRICAL DESCRIPTION – NIGHTTIME OPERATION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.36	0	1	.011496	.012918

Sources

source	node	sector	magnitude	phase	type
1	1	1	375.697	85.1	voltage
2	22	1	186.37	257.9	voltage
3	43	1	318.064	315.3	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	.01	0	0	0	0
2	22	.01	0	0	0	0
3	43	.01	0	0	0	0

RMS CURRENT – NIGHTTIME OPERATION
Frequency = 1.36 MHz
Input power = 1,000. watts
Efficiency = 99.97 %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	3.55651	.9	3.5561	.0536196
2	0	0	4.65048	3.69067	.6	3.69045	.0411008
3	0	0	9.30095	3.75101	.5	3.75087	.0328462
4	0	0	13.9514	3.77594	.4	3.77585	.0255895
5	0	0	18.6019	3.76998	.3	3.76993	.0189828
6	0	0	23.2524	3.73529	.2	3.73527	.0128961
7	0	0	27.9029	3.67318	.1	3.67317	7.29E-03
8	0	0	32.5533	3.58466	0.0	3.58466	2.15E-03
9	0	0	37.2038	3.47066	360.	3.47066	-2.49E-03
10	0	0	41.8543	3.3321	359.9	3.3321	-6.62E-03
11	0	0	46.5048	3.16995	359.8	3.16993	-.0101946
12	0	0	51.1552	2.9852	359.7	2.98517	-.0131783
13	0	0	55.8057	2.77891	359.7	2.77887	-.0155312
14	0	0	60.4562	2.55215	359.6	2.55209	-.017213
15	0	0	65.1067	2.30599	359.5	2.30592	-.0181835
16	0	0	69.7572	2.04145	359.5	2.04137	-.0184031
17	0	0	74.4076	1.75937	359.4	1.75928	-.0178324
18	0	0	79.0581	1.46028	359.4	1.46019	-.0164292
19	0	0	83.7086	1.14397	359.3	1.14388	-.0141429
20	0	0	88.3591	.808522	359.2	.808449	-.0108968
21	0	0	93.0095	.447685	359.2	.447637	-6.54E-03
END	0	0	97.66	0	0	0	0
GND	42.0647	-79.1121	0	3.49989	223.2	-2.55268	-2.39438
23	42.0647	-79.1121	4.13857	3.52958	222.3	-2.61163	-2.3743
24	42.0647	-79.1121	8.27714	3.52667	221.7	-2.63165	-2.34773
25	42.0647	-79.1121	12.4157	3.50188	221.3	-2.63124	-2.31079
26	42.0647	-79.1121	16.5543	3.45647	220.9	-2.6125	-2.2632
27	42.0647	-79.1121	20.6929	3.39119	220.6	-2.5765	-2.20496
28	42.0647	-79.1121	24.8314	3.30657	220.2	-2.52391	-2.13618
29	42.0647	-79.1121	28.97	3.20313	220.	-2.45526	-2.05711
30	42.0647	-79.1121	33.1086	3.0814	219.7	-2.37105	-1.96804
31	42.0647	-79.1121	37.2471	2.94196	219.4	-2.27176	-1.86928
32	42.0647	-79.1121	41.3857	2.78541	219.2	-2.15793	-1.7612
33	42.0647	-79.1121	45.5243	2.6124	219.	-2.03007	-1.64422
34	42.0647	-79.1121	49.6629	2.42359	218.8	-1.88872	-1.51873
35	42.0647	-79.1121	53.8014	2.21966	218.6	-1.73442	-1.38517
36	42.0647	-79.1121	57.94	2.00125	218.4	-1.5677	-1.24391
37	42.0647	-79.1121	62.0786	1.76893	218.3	-1.38901	-1.09533
38	42.0647	-79.1121	66.2172	1.5231	218.1	-1.19869	-.939667
39	42.0647	-79.1121	70.3557	1.26387	217.9	-.996822	-.77699
40	42.0647	-79.1121	74.4943	.990669	217.8	-.782965	-.606953
41	42.0647	-79.1121	78.6329	.701397	217.6	-.555447	-.428294
42	42.0647	-79.1121	82.7714	.390205	217.5	-.309615	-.237484
END	42.0647	-79.1121	86.91	0	0	0	0
GND	-164.955	-70.019	0	3.01293	276.2	.324388	-2.99542
44	-164.955	-70.019	4.58667	3.08281	274.4	.23822	-3.07359
45	-164.955	-70.019	9.17333	3.10832	273.4	.183139	-3.10292
46	-164.955	-70.019	13.76	3.10961	272.5	.136279	-3.10662
47	-164.955	-70.019	18.3467	3.08891	271.8	.0951221	-3.08745
48	-164.955	-70.019	22.9333	3.04735	271.1	.0586266	-3.04679
49	-164.955	-70.019	27.52	2.98563	270.5	.0263236	-2.98552
50	-164.955	-70.019	32.1067	2.90436	270.	-2.02E-03	-2.90436
51	-164.955	-70.019	36.6933	2.80412	269.5	-.0265115	-2.804

52	-164.955	-70.019	41.28	2.68555	269.	-.0472211	-2.68514
53	-164.955	-70.019	45.8667	2.54932	268.6	-.064178	-2.54851
54	-164.955	-70.019	50.4533	2.39614	268.1	-.0774027	-2.39489
55	-164.955	-70.019	55.04	2.22678	267.8	-.0869133	-2.22508
56	-164.955	-70.019	59.6267	2.04201	267.4	-.0927264	-2.0399
57	-164.955	-70.019	64.2133	1.84262	267.	-.0948626	-1.84018
58	-164.955	-70.019	68.8	1.62935	266.7	-.093343	-1.62668
59	-164.955	-70.019	73.3867	1.4028	266.4	-.0881825	-1.40003
60	-164.955	-70.019	77.9733	1.16332	266.1	-.0793784	-1.16061
61	-164.955	-70.019	82.56	.910681	265.8	-.0668779	-.908222
62	-164.955	-70.019	87.1467	.643294	265.5	-.0505048	-.641309
63	-164.955	-70.019	91.7333	.356134	265.2	-.029753	-.354889
END	-164.955	-70.019	96.32	0	0	0	0