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. BZ-20140919AEC

SECTION I - APPLICANT FEE INFORMATION

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

Actualidad 1040AM Licensee, LLC

MAILING ADDRESS (Line 1) (Maximum 35 characters)
2525 Ponce De Leon Blvd.

MAILING ADDRESS (Line 2) (Maximum 35 characters)
Suite 250

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Coral Gables	FL	33134

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
305-260-7577	WLVJ(AM)	4341

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	$ 690.00	

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	$ 790.00	

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
$ 1480.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Actualidad 1040AM Licensee, LLC		
MAILING ADDRESS 2525 Ponce De Leon Blvd, Suite 250		
CITY Coral Gables	STATE FL	ZIP CODE 33134

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
WLVJ	Boynton Beach, FL	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.
N/A

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.
N/A

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

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.
N/A

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	
Jorge A. Gonzalez	[signature]	
Title	**Date**	**Telephone Number**
President	09/11/2014	305-250-7577

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
ACTUALIDAD 1040AM LICENSEE, LLC

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
WLVJ	N/A	1040	UNLIIMITED	1.1	25

2. Station location	
State	City or Town
FLORIDA	BOYNTON BEACH

3. Transmitter location			
State	County	City or Town	Street address (or other identification)
FL	PALM BEACH	BOYNTON BEACH	2.3 KM N. OF US 441 AND 806 INTERSECTION

4. Main studio location			
State	County	City or Town	Street address (or other identification)
FL	DADE	CORAL GABLES	2525 PONCE DE LEON BLVD SUITE 250

5. Remote control point location (specify only if authorized directional antenna)			
State	County	City or Town	Street address (or other identification)
FL	DADE	CORAL GABLES	2525 PONCE DE LEON BLVD SUITE 250

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.
TECH EXHIBIT

8. Operating constants:	
RF common point or antenna current (in amperes) without modulation for night system 4.87	RF common point or antenna current (in amperes) without modulation for day system 22.95
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 -j6.0 Day -j6.0

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (SE)	0.0	+85.1	1.000	0.650	N/A	N/A
2 (SW)	+108.7	-158.4	0.962	0.763	N/A	N/A
3 (NE)	N/A	0.0	N/A	1.000	N/A	N/A
4 (NW)	-66.7	+92.2	0.114	0.819	N/A	N/A
					-	

Manufacturer and type of antenna monitor: POTOMAC INSTRUMENTS AM-1901

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	56.1	56.7	56.7	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	26 ° 28 ' 26 "	West Longitude	80 ° 12 ' 11 "

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. TECH EXHIBIT

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

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.

FEED SYSTEM EQUIPMENT UPDATED, REFURBISHED AND READJUSTED

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
RONALD D. RACKLEY, P.E.	Ronald D. Rackley
Address (include ZIP Code) DUTREIL, LUNDIN & RACKLEY, INC. 201 FLETCHER AVENUE SARASOTA, FL 34237	Date SEPTEMBER 9, 2014 Telephone No. (Include Area Code) 941-329-6000

☐ Technical Director

☑ Registered Professional Engineer

☐ Chief Operator

☐ Technical Consultant

☐ Other (specify)

APPLICATION FOR DIRECT MEASUREMENT OF POWER
INFORMATION
RADIO STATION WLVJ
BOYNTON BEACH, FLORIDA

September 9, 2014

1040 KHZ 25 KW – D 1.1 KW - N DA-2

APPLICATION FOR DIRECT MEASUREMENT OF POWER
INFORMATION
RADIO STATION WLVJ
BOYNTON BEACH, FLORIDA

1040 KHZ 25 KW - D 1.1 KW – N DA-2

Table of Contents

Executive Summary - WLVJ

This engineering exhibit supports an application for Direct Measurement of Power (requesting modification of the station license to specify new antenna monitor operating parameters) for the directional antenna system of radio station WLVJ in Boynton Beach. Florida. WLVJ operates fulltime on 1040 kilohertz with 25 kilowatts in the daytime and 1.1 kilowatt at night, employing different directional antenna patterns during daytime and nighttime hours.

The authorized WLVJ directional antenna theoretical parameters and array geometry remain unchanged. The antenna monitor operating parameters specified herein were derived through Method of Moments modeling following modification of the antenna system's phasing and coupling equipment. In all other respects, the WLVJ antenna system remains unchanged.

The antenna system measurements presented herein were made by Mr. Kurt Gorman and Mr. James Johnson, who were also responsible for the antenna parameter adjustments. Both are well experienced in AM directional antenna engineering and their qualifications are a matter of record with the FCC. The computer modeling was the responsibility of the undersigned.

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

Ronald D. Rackley, P.E.
September 9, 2014

Analysis of Tower Impedance Measurements to Verify Method of Moments Model – WLVJ

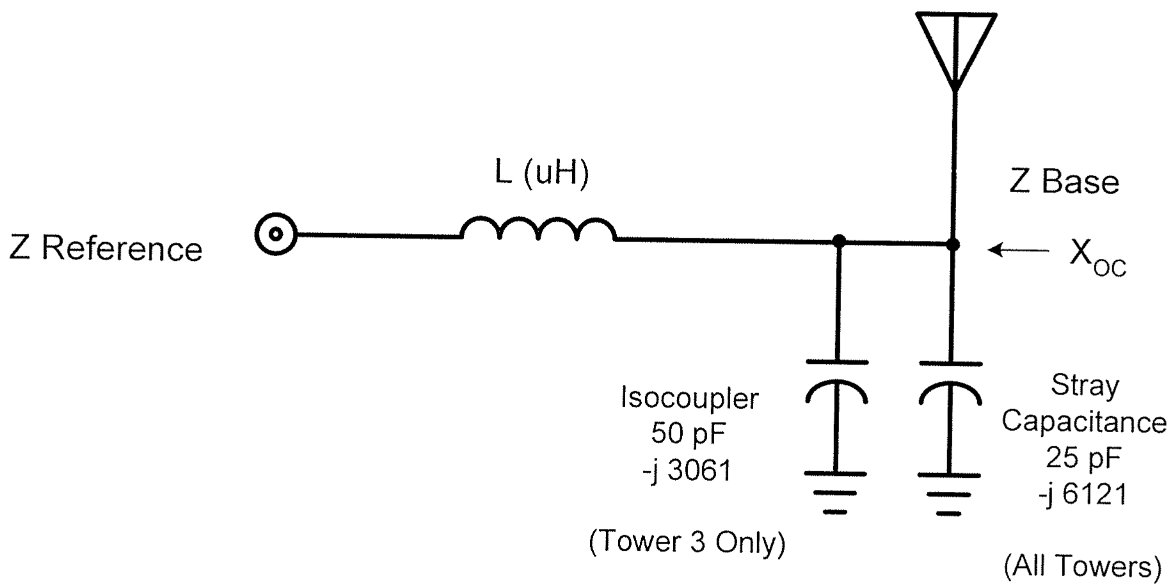
Tower base impedance measurements were made at the final J-plugs within the antenna tuning units ("ATUs") using a Power Aim 120 network analyzer in a calibrated measurement system. The other towers were all open circuited at the same points where impedance measurements were made for them (the "reference points") for each of the measurements.

The reference point at each tower is adjacent to the sampling transformer of the antenna monitor system at the output of the ATU enclosure. The current passes directly from that point over conductors through the enclosure insulator and on to the tower above the base insulator. There are no adjustable shunt components following the sampling transformers. An assumed value for the sum of the base insulator and base region stray capacitances across the ATU output was employed in the base circuit calculations for each tower. In addition, an assumed capacitance representing the STL isocoupler across the base of tower 3 was included in the analysis. The static drain coils across the five tower bases have high impedances that do not require consideration, as evidenced by the fact that satisfactory analysis was possible with typical base shunt capacitances and all other assumptions well within the range limitations of the FCC Rules. Circuit calculations were performed to relate the method of moments modeled impedances of the tower feedpoints to the ATU output measurement (reference) points as shown on the following pages. The Xoc shown for each tower, which was calculated for the assumed base conditions, was used in the method of moments model as a load at ground level for the open circuited case.

In addition to the page showing the schematic of the assumed circuit and tabulation of calculated values, pages showing the results of calculations using the WCAP network analysis program from Westberg Consulting are provided. WCAP performs such calculations using nodal analysis, as do other modern circuit analysis programs such as the commonly available ones based on SPICE software.

In each of the WCAP tabulations, node 2 represents the ATU output reference point and node 3 represents the tower feedpoint. Node 0 represents ground potential. The numerals in the file names shown on the tabulations correspond to the tower numbers. It should be noted that the calculated reference point impedances appear under the "TO NODE IMPEDANCE" columns of the WCAP tabulations, following the phantom 1.0 ohm resistors (R 1 - 2) that were included in series with the drive current sources (I 0 -1)) to provide calculation points for the impedances. The tower base impedances from the method of moments model are represented by complex loads from node 3 to ground (R 3 - 0). The shunt capacitances shown for the towers on the schematic were used for the calculations, although they only appear to the nearest 0.0001 microfarad on the WCAP printout due to rounding.

The modeled and measured base impedances at the ATU output jacks with the other towers open circuited at their filter unit output jacks agree within +/- 2 ohms and +/- 4 percent for resistance and reactance, as required by the FCC Rules.



TOWER	L (uH)	X_L	X_{OC}	Z Base (Modeled)	Z Reference (Modeled)	Z Reference (Measured)
1 (SE)	1.132	+ j 7.4	- j 6121	26.3 -j 43.7	25.9 -j 36.1	26.0 -j 36.1
2 (SW)	1.224	+ j 8.0	- j 6121	26.1 -j 43.5	25.7 -j 35.3	26.7 -j 35.3
3 (NE)	2.601	+ j 17.0	- j 2040	25.3 -j 48.3	24.2 -j 30.5	24.0 -j 30.5
4 (NW)	3.963	+ j 25.9	- j 6121	24.0 -j 55.3	23.6 -j 29.0	23.2 -j 29.0

ANALYSIS OF TOWER IMPEDANCE MEASUREMENTS TO VERIFY METHOD OF MOMENTS MODEL

RADIO STATION WLVJ
BOYNTON BEACH, FLORIDA
1040 KHZ 25 KW-D 1.1 KW-N DA-2

du Treil, Lundin & Rackley, Inc. Sarasota, Florida

Tower 1 Individually Driven Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ1OC.TXT

I	1000.0000	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	1.1320	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	26.2830	3	0	-43.6660	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	45003.1600	-53.2738
2	44412.3900	-54.3078
3	50604.3900	-59.2001

			BRANCH VOLTAGE MAG	PHASE	BRANCH CURRENT MAG	PHASE	FROM NODE IMPEDANCE RESISTANCE	REACTANCE	TO NODE IMPEDANCE RESISTANCE	REACTANCE
R	1- 2	1.000	1000.00	.000	1000.00	.000	26.91	-36.07	25.91	-36.07
L	2- 3	1.132	7397.07	90.000	1000.00	.000	25.91	-36.07	25.91	-43.47
C	3- 0	.000	50604.39	-59.200	8.27	30.800	.00	-6121.34	.00	.00
R	3- 0	26.283	50604.39	-59.200	992.91	-.244	26.28	-43.67	.00	.00

Tower 2 Individually Driven Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ2OC.TXT

I	1.0000	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	1.2240	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	26.0650	3	0	-43.5090	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	44.2690	-52.9089
2	43.6731	-53.9554
3	50.3606	-59.3176

			BRANCH VOLTAGE MAG	PHASE	BRANCH CURRENT MAG	PHASE	FROM NODE IMPEDANCE RESISTANCE	REACTANCE	TO NODE IMPEDANCE RESISTANCE	REACTANCE
R	1- 2	1.000	1.00	.000	1.00	.000	26.70	-35.31	25.70	-35.31
L	2- 3	1.224	8.00	90.000	1.00	.000	25.70	-35.31	25.70	-43.31
C	3- 0	.000	50.36	-59.318	.01	30.682	.00	-6121.34	.00	.00
R	3- 0	26.065	50.36	-59.318	.99	-.242	26.06	-43.51	.00	.00

Tower 3 Individually Driven Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ3OC.TXT

I	1.0000	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	2.6010	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	25.3290	3	0	-48.2810	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	39.5139	-50.4359
2	38.8846	-51.5719
3	53.2575	-63.0125

			BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT MAG	BRANCH CURRENT PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE
R	1- 2	1.000	1.00	.000	1.00	.000	25.17	-30.46	24.17	-30.46
L	2- 3	2.601	17.00	90.000	1.00	.000	24.17	-30.46	24.17	-47.46
C	3- 0	.000	53.26	-63.013	.03	26.987	.00	-2040.45	.00	.00
R	3- 0	25.329	53.26	-63.013	.98	-.695	25.33	-48.28	.00	.00

Tower 4 Individually Driven Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ4OC.TXT

I	1.0000	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.9630	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	24.0300	3	0	-55.3110	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	38.0378	-49.7024
2	37.3988	-50.8710
3	59.7650	-66.7402

			BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT MAG	BRANCH CURRENT PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE
R	1- 2	1.000	1.00	.000	1.00	.000	24.60	-29.01	23.60	-29.01
L	2- 3	3.963	25.90	90.000	1.00	.000	23.60	-29.01	23.60	-54.91
C	3- 0	.000	59.76	-66.740	.01	23.260	.00	-6121.34	.00	.00
R	3- 0	24.030	59.76	-66.740	.99	-.223	24.03	-55.31	.00	.00

Derivation of Operating Parameters for Daytime Directional Antenna - WLVJ

The method of moments model of the array, following verification with the measured individual open circuited base impedances, was utilized for directional antenna calculations. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. With these voltage sources, the tower currents were calculated. The currents at the ATU unit outputs, where the antenna monitor samples are taken, were calculated from the method of moments tower currents for directional antenna operation using WCAP circuit modeling with the assumptions that were derived from the single tower measurements on the array and the method of moments calculated tower operating impedances. In each of the following WCAP tabulations, node 2 represents the reference point and node 3 represents the tower feedpoint. Node 0 represents ground potential. The tower operating impedances are represented by complex loads from node 3 to ground (R 3 - 0). It should be noted that the calculated reference point current magnitudes and phases appear in the first and fourth columns following the drive current sources (I 0 -1)). As the current transformers and sampling lines are identical, the antenna monitor ratios and phases corresponding to the theoretical parameters were calculated directly from the modeled reference point currents.

Tower	Modeled Current Pulse	Modeled Current Magnitude @ Toroid (amperes)	Modeled Current Phase @ Toroid (degrees)	Modeled Antenna Monitor Ratio	Modeled Antenna Monitor Phase (degrees)
1	1	14.3820	+89.3	0.650	+85.1
2	11	16.9050	-154.2	0.763	-158.4
3	21	22.1430	+4.2	1.000	0.0
4	31	18.1440	+96.4	0.819	+92.2

Tower 1 Day-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ1DAD.TXT

I	1438.2000	0	1	89.3000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	1.1320	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	4.8679	3	0	-5.1642	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	9018.7760	110.1638
2	7691.9530	113.9820
3	10198.1000	42.5627

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
R	1- 2	1.000	1438.20	89.300	1438.20	89.300	5.86	2.23	4.86	2.23
L	2- 3	1.132	10638.46	179.300	1438.20	89.300	4.86	2.23	4.86	-5.16
C	3- 0	.000	10198.10	42.563	1.67	132.563	.00	-6121.34	.00	.00
R	3- 0	4.868	10198.10	42.563	1436.99	89.254	4.87	-5.16	.00	.00

Tower 2 Day-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ2DAD.TXT

I	1690.5000	0	1	205.8000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	1.2240	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	15.5030	3	0	-25.7600	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	40751.5900	158.5821
2	39622.8100	156.7877
3	50612.2000	146.6961

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
R	1- 2	1.000	1690.50	-154.200	1690.50	-154.200	16.37	-17.69	15.37	-17.69
L	2- 3	1.224	13521.03	-64.200	1690.50	-154.200	15.37	-17.69	15.37	-25.69
C	3- 0	.000	50612.20	146.696	8.27	-123.304	.00	-6121.34	.00	.00
R	3- 0	15.503	50612.20	146.696	1683.41	-154.344	15.50	-25.76	.00	.00

Currents are multiplied X 100 for improved resolution.

Tower 3 Day-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ3DAD.TXT

I	2214.3000	0	1	4.2000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	2.6010	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	35.2130	3	0	-36.0120	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	88134.7000	-24.2599
2	86194.4600	-24.9613
3	109577.3000	-42.4143

			BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT MAG	BRANCH CURRENT PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE
R	1- 2	1.000	2214.30	4.200	2214.30	4.200	34.99	-18.97	33.99	-18.97
L	2- 3	2.601	37634.84	94.200	2214.30	4.200	33.99	-18.97	33.99	-35.96
C	3- 0	.000	109577.30	-42.414	53.70	47.586	.00	-2040.45	.00	.00
R	3- 0	35.213	109577.30	-42.414	2175.58	3.228	35.21	-36.01	.00	.00

Tower 4 Day-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ4DAD.TXT

I	1814.4000	0	1	96.4000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.9630	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	9.1141	3	0	-67.9930	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	77174.8900	19.8798
2	76772.2300	18.5629
3	123102.4000	13.9503

			BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT MAG	BRANCH CURRENT PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE
R	1- 2	1.000	1814.40	96.400	1814.40	96.400	9.92	-41.36	8.92	-41.36
L	2- 3	3.963	46986.20	-173.600	1814.40	96.400	8.91	-41.36	8.91	-67.26
C	3- 0	.000	123102.40	13.950	20.11	103.950	.00	-6121.34	.00	.00
R	3- 0	9.114	123102.40	13.950	1794.47	96.316	9.11	-67.99	.00	.00

Currents are multiplied X 100 for improved resolution.

Derivation of Operating Parameters for Nighttime Directional Antenna - WLVJ

The method of moments model of the array, following verification with the measured individual open circuited base impedances, was utilized for directional antenna calculations. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. With these voltage sources, the tower currents were calculated. The currents at the ATU unit outputs, where the antenna monitor samples are taken, were calculated from the method of moments tower currents for directional antenna operation using WCAP circuit modeling with the assumptions that were derived from the single tower measurements on the array and the method of moments calculated tower operating impedances. In each of the following WCAP tabulations, node 2 represents the reference point and node 3 represents the tower feedpoint. Node 0 represents ground potential. The tower operating impedances are represented by complex loads from node 3 to ground (R 3 - 0). It should be noted that the calculated reference point current magnitudes and phases appear in the first and fourth columns following the drive current sources (I 0 -1)). As the current transformers and sampling lines are identical, the antenna monitor ratios and phases corresponding to the theoretical parameters were calculated directly from the modeled reference point currents.

Tower	Modeled Current Pulse	Modeled Current Magnitude @ Toroid (amperes)	Modeled Current Phase @ Toroid (degrees)	Modeled Antenna Monitor Ratio	Modeled Antenna Monitor Phase (degrees)
1	1	5.1930	+2.9	1.000	0
2	11	4.9975	+111.6	0.962	+108.7
4	31	0.5941	-63.8	0.114	-66.7

Tower 1 Night-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ1DAN.TXT

I	519.3000	0	1	2.9000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	1.1320	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	30.0840	3	0	-23.9900	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	18203.0800	-25.4504
2	17747.7900	-26.2465
3	19903.4500	-35.9505

			BRANCH VOLTAGE MAG	PHASE	BRANCH CURRENT MAG	PHASE	FROM NODE IMPEDANCE RESISTANCE	REACTANCE	TO NODE IMPEDANCE RESISTANCE	REACTANCE
R	1- 2	1.000	519.30	2.900	519.30	2.900	30.85	-16.65	29.85	-16.65
L	2- 3	1.132	3841.30	92.900	519.30	2.900	29.85	-16.65	29.85	-24.04
C	3- 0	.000	19903.45	-35.951	3.25	54.049	.00	-6121.34	.00	.00
R	3- 0	30.084	19903.45	-35.951	517.27	2.620	30.08	-23.99	.00	.00

Tower 2 Night-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ2DAN.TXT

I	499.7480	0	1	111.6000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	1.2240	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	11.5210	3	0	-57.2800	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	25137.8000	35.7638
2	25020.2100	34.6541
3	28928.1200	32.8656

			BRANCH VOLTAGE MAG	PHASE	BRANCH CURRENT MAG	PHASE	FROM NODE IMPEDANCE RESISTANCE	REACTANCE	TO NODE IMPEDANCE RESISTANCE	REACTANCE
R	1- 2	1.000	499.75	111.600	499.75	111.600	12.31	-48.77	11.31	-48.77
L	2- 3	1.224	3997.11	-158.400	499.75	111.600	11.31	-48.77	11.31	-56.77
C	3- 0	.000	28928.12	32.866	4.73	122.866	.00	-6121.34	.00	.00
R	3- 0	11.521	28928.12	32.866	495.11	111.493	11.52	-57.28	.00	.00

Currents are multiplied X 100 for improved resolution.

Tower 3 Night-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ3DAN.TXT

I	5.9270	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	2.6010	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	.0000	3	0	-677.8800	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	2915.1290	-89.8835
2	2915.1230	-90.0000
3	3015.8600	-90.0000

			BRANCH VOLTAGE MAG	PHASE	BRANCH CURRENT MAG	PHASE	FROM NODE IMPEDANCE RESISTANCE	REACTANCE	TO NODE IMPEDANCE RESISTANCE	REACTANCE
R	1- 2	1.000	5.93	.000	5.93	.000	1.00	-491.84	.00	-491.84
L	2- 3	2.601	100.74	90.000	5.93	.000	.00	-491.84	.00	-508.83
C	3- 0	.000	3015.86	-90.000	1.48	.000	.00	-2040.45	.00	.00
R	3- 0	.000	3015.86	-90.000	4.45	.000	.00	-677.88	.00	.00

WESTBERG CIRCUIT ANALYSIS PROGRAM

Tower 4 Night-DA Base Circuit Analysis

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WLVJ4DAN.TXT

I	59.4120	0	1	296.2000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.9630	2	3	.0000	.0000	.0000
C	.0000	3	0	.0000	.0000	.0000
R	36.9250	3	0	-64.2830	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = 1.040

NODE	VOLT MAG	VOLT PHASE
1	3154.9460	-109.3907
2	3113.6600	-110.1717
3	4358.5630	-124.2683

			BRANCH VOLTAGE MAG	PHASE	BRANCH CURRENT MAG	PHASE	FROM NODE IMPEDANCE RESISTANCE	REACTANCE	TO NODE IMPEDANCE RESISTANCE	REACTANCE
R	1- 2	1.000	59.41	-63.800	59.41	-63.800	37.16	-37.93	36.16	-37.93
L	2- 3	3.963	1538.55	26.200	59.41	-63.800	36.16	-37.93	36.16	-63.83
C	3- 0	.000	4358.56	-124.268	.71	-34.268	.00	-6121.34	.00	.00
R	3- 0	36.925	4358.56	-124.268	58.79	-64.142	36.93	-64.28	.00	.00

Currents are multiplied X 100 for improved resolution.

Item 4

Method of Moments Model Details for Towers Driven Individually – WLVJ

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5. One wire was used to represent each tower. The tower geometry was specified using the geographic coordinate system. Each tower was modeled using 10 wire segments. The towers are all physically 70.0 degrees in electrical height and their segment length is 7.0 electrical degrees.

The individual tower characteristics were adjusted to provide a match of their modeled impedances, when presented to a circuit model which included branches representing the shunt capacitances and feedline hookup inductances, with the base impedances that were measured at the output jacks of the filter units while the other towers of the array were open circuited. The method of moments model assumed loads at ground level having the reactances that were calculated for them using the base circuit models for the open circuited towers of the array.

Each tower's modeled height relative to its physical height falls within the required range of 75 to 125 percent and each modeled radius falls within the required range of 80 percent to 150 percent of the radius of a circle having a circumference equal to the sum of the widths of the tower sides. The array consists of triangular uniform cross section towers having a face width of 16 ¾ inches.

TOWER	Physical Height (degrees)	Modeled Height (degrees)	Modeled Percent of Height	Modeled Radius (meters)	Percent Equivalent Radius
1	70.0	78.7	112.4	0.180	88.6
2	70.0	78.7	112.4	0.180	88.6
3	70.0	77.7	111.0	0.180	88.6
4	70.0	76.5	109.3	0.180	88.6

The following pages show the details of the method of moments models for the individually driven towers. The numerals in the file names shown on the tabulations correspond to the tower numbers.

Tower 1 Driven Individually

C:\MBPRO14.5\WLVJ1OC 04-19-2013 11:45:15

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.04	26.283	-43.666	50.966	301.	3.6013	-4.9538	-1.6724

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	188.71	176.53	0	.18	10
		188.71	176.53	78.7		
2	none	135.84	195.625	0	.18	10
		135.84	195.625	78.7		
3	none	0	0	0	.18	10
		0	0	77.7		
4	none	107.691	334.191	0	.18	10
		107.691	334.191	76.5		

Number of wires = 4
current nodes = 40

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	4	7.65	1	7.87
radius	1	.18	1	.18

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.04	0	1	.02125	.0218611

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	11	0	-6,121.	0	0	0
2	21	0	-2,040.	0	0	0
3	31	0	-6,121.	0	0	0

Tower 2 Driven Individually

C:\MBPRO14.5\WLVJ2OC 04-19-2013 12:00:36

IMPEDANCE

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 11, sector 1							
1.04	26.065	-43.509	50.719	300.9	3.6156	-4.9331	-1.6822

GEOMETRY

Wire coordinates in degrees; other dimensions in meters

Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	188.71	176.53	0	.18	10
		188.71	176.53	78.7		
2	none	135.84	195.625	0	.18	10
		135.84	195.625	78.7		
3	none	0	0	0	.18	10
		0	0	77.7		
4	none	107.691	334.191	0	.18	10
		107.691	334.191	76.5		

Number of wires = 4

current nodes = 40

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	4	7.65	1	7.87
radius	1	.18	1	.18

ELECTRICAL DESCRIPTION

Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.04	0	1	.02125	.0218611

Sources

source	node	sector	magnitude	phase	type
1	11	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,121.	0	0	0
2	21	0	-2,040.	0	0	0
3	31	0	-6,121.	0	0	0

Tower 3 Driven Individually

C:\MBPRO14.5\WLVJ3OC 04-19-2013 12:02:27

IMPEDANCE

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 21, sector 1							
1.04	25.329	-48.281	54.522	297.7	4.0759	-4.3508	-1.9874

C:\MBPRO14.5\WINK3OC 03-29-2012 05:37:35

GEOMETRY

Wire coordinates in degrees; other dimensions in meters

Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	188.71	176.53	0	.18	10
		188.71	176.53	78.7		
2	none	135.84	195.625	0	.18	10
		135.84	195.625	78.7		
3	none	0	0	0	.18	10
		0	0	77.7		
4	none	107.691	334.191	0	.18	10
		107.691	334.191	76.5		

Number of wires = 4

current nodes = 40

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	4	7.65	1	7.87
radius	1	.18	1	.18

ELECTRICAL DESCRIPTION

Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.04	0	1	.02125	.0218611

Sources

source	node	sector	magnitude	phase	type
1	21	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,121.	0	0	0
2	11	0	-6,121.	0	0	0
3	31	0	-6,121.	0	0	0

Tower 4 Driven Individually

C:\MBPRO14.5\WLVJ4OC 04-19-2013 12:04:14

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 31, sector 1							
1.04	24.03	-55.311	60.305	293.5	4.9036	-3.5931	-2.4966

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	188.71	176.53	0	.18	10
		188.71	176.53	78.7		
2	none	135.84	195.625	0	.18	10
		135.84	195.625	78.7		
3	none	0	0	0	.18	10
		0	0	77.7		
4	none	107.691	334.191	0	.18	10
		107.691	334.191	76.5		

Number of wires = 4
current nodes = 40

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	4	7.65	1	7.87
radius	1	.18	1	.18

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.04	0	1	.02125	.0218611

Sources

source	node	sector	magnitude	phase	type
1	31	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,121.	0	0	0
2	11	0	-6,121.	0	0	0
3	21	0	-2,040.	0	0	0

Method of Moments Model Details for Daytime Directional Antenna - WLVJ

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5 with the characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. The following pages contain details of the method of moments model of the directional antenna pattern.

Tower	Wire	Base Node
1	1	1
2	2	11
3	3	21
4	4	31

It should be noted that voltages and currents shown on the tabulations that are not specified as “rms” values are the corresponding peak values.

C:\MBPRO14.5\WLVJDAD 04-19-2013 14:29:31

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.04 MHz

tower	field ratio magnitude	phase (deg)
1	.7	88.9
2	.794	-155.8
3	1.	0
4	.772	95.4

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	101.982	42.6	14.3699	89.2
11	506.135	146.7	16.8344	205.7
21	1,095.75	317.5	21.7556	3.2
31	1,231.03	13.9	17.9447	96.3

Sum of square of source currents = 2,570.42
Total power = 25,000. watts

NOTE: The array synthesis calculations (above) were performed to solve for the base voltage drives required to produce the specified field parameters. The following information is from the final model.

GEOMETRY

Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	188.71	176.53	0	.18	10
		188.71	176.53	78.7		
2	none	135.84	195.625	0	.18	10
		135.84	195.625	78.7		
3	none	0	0	0	.18	10
		0	0	77.7		
4	none	107.691	334.191	0	.18	10
		107.691	334.191	76.5		

Number of wires = 4
current nodes = 40

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	4	7.65	1	7.87
radius	1	.18	1	.18

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.04	0	1	.02125	.0218611

Sources

source	node	sector	magnitude	phase	type
1	1	1	144.224	42.6	voltage
2	11	1	715.783	146.7	voltage
3	21	1	1,549.63	317.5	voltage
4	31	1	1,740.94	13.9	voltage

IMPEDANCE

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.04	4.8679	-5.1642	7.0969	313.3	10.382	-1.6785	-4.9409
source = 2; node 11, sector 1							
1.04	15.503	-25.76	30.065	301.	4.1502	-4.2697	-2.0352
source = 3; node 21, sector 1							
1.04	35.213	-36.012	50.366	314.4	2.4531	-7.5181	-.84646
source = 4; node 31, sector 1							
1.04	9.1141	-67.993	68.601	277.6	15.75	-1.1045	-6.4868

CURRENT rms

Frequency = 1.04 MHz
Input power = 25,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	-188.364	-11.4219	0	14.3699	89.2	.189228	14.3686
2	-188.364	-11.4219	7.87	14.1654	89.1	.231103	14.1636
3	-188.364	-11.4219	15.74	13.6706	89.	.248907	13.6683
4	-188.364	-11.4219	23.61	12.8832	88.9	.251934	12.8807
5	-188.364	-11.4219	31.48	11.8134	88.8	.242255	11.8109
6	-188.364	-11.4219	39.35	10.4762	88.8	.221503	10.4739
7	-188.364	-11.4219	47.22	8.88883	88.8	.191304	8.88678
8	-188.364	-11.4219	55.09	7.06869	88.8	.153307	7.06702
9	-188.364	-11.4219	62.96	5.02733	88.8	.10901	5.02615
10	-188.364	-11.4219	70.83	2.75282	88.8	.0593132	2.75218
END	-188.364	-11.4219	78.7	0	0	0	0
GND	-130.82	36.5871	0	16.8344	205.7	-15.1693	-7.30003
12	-130.82	36.5871	7.87	16.3691	205.1	-14.8236	-6.94317
13	-130.82	36.5871	15.74	15.6537	204.7	-14.2236	-6.53671
14	-130.82	36.5871	23.61	14.6417	204.3	-13.3418	-6.03129
15	-130.82	36.5871	31.48	13.3391	204.	-12.1854	-5.42642
16	-130.82	36.5871	39.35	11.7609	203.7	-10.7686	-4.72819
17	-130.82	36.5871	47.22	9.92636	203.4	-9.1086	-3.94539
18	-130.82	36.5871	55.09	7.8552	203.1	-7.22302	-3.08742
19	-130.82	36.5871	62.96	5.56099	202.9	-5.12374	-2.16146
20	-130.82	36.5871	70.83	3.03149	202.6	-2.79867	-1.16506
END	-130.82	36.5871	78.7	0	0	0	0
GND	0	0	0	21.7556	3.2	21.7219	1.21081
22	0	0	7.77	21.0196	1.8	21.0087	.675143
23	0	0	15.54	20.0235	.9	20.0209	.323496

24	0	0	23.31	18.6757	.2	18.6756	.0542316
25	0	0	31.08	16.9776	359.5	16.9769	-.145776
26	0	0	38.85	14.9447	358.9	14.9421	-.281018
27	0	0	46.62	12.5988	358.4	12.5939	-.353469
28	0	0	54.39	9.96216	357.9	9.9555	-.364234
29	0	0	62.16	7.04939	357.4	7.04241	-.313675
30	0	0	69.93	3.8427	357.	3.83749	-.200001
END	0	0	77.7	0	0	0	0
GND	96.9489	46.8857	0	17.9447	96.3	-1.96874	17.8363
32	96.9489	46.8857	7.65	16.9719	95.9	-1.75746	16.8806
33	96.9489	46.8857	15.3	15.9301	95.7	-1.57935	15.8516
34	96.9489	46.8857	22.95	14.674	95.5	-1.39828	14.6073
35	96.9489	46.8857	30.6	13.1958	95.3	-1.21099	13.1401
36	96.9489	46.8857	38.25	11.5043	95.1	-1.01785	11.4592
37	96.9489	46.8857	45.9	9.61467	94.9	-.82047	9.5796
38	96.9489	46.8857	53.55	7.54305	94.7	-.620814	7.51746
39	96.9489	46.8857	61.2	5.29958	94.6	-.420468	5.28288
40	96.9489	46.8857	68.85	2.8702	94.4	-.21928	2.86181
END	96.9489	46.8857	76.5	0	0	0	0

Method of Moments Model Details for Nighttime Directional Antenna - WLVJ

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5 with the characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. The following pages contain details of the method of moments model of the directional antenna pattern.

Tower 3 of the array, which is not used by the nighttime pattern, was detuned by terminating it with a load reactance at its base (node 21) as shown in the tabulation. The detuning reactance, +j 678, is the opposite sign values of the imaginary component of the method of moments modeled operating impedance for the nighttime directional antenna with a field ratio of zero specified for the unused tower. In order to provide the detuning reactance at the tower base through its ATU-to-base circuit model, the detuning inductance was adjusted to +j 496 for tower 3 at its respective ATU output jack reference point.

Tower	Wire	Base Node
1	1	1
2	2	11
3	3	21
4	4	31

It should be noted that voltages and currents shown on the tabulations that are not specified as "rms" values are the corresponding peak values.

C:\MBPRO14.5\WLVJDAN 04-19-2013 14:41:17

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.04 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	.906	110.2
3	0	0
4	.104	-67.5

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	199.027	324.1	5.17304	2.6
11	289.246	32.8	4.95105	111.4
21	30.1698	318.5	.0444926	47.2
31	43.6033	235.8	.587938	295.9

Sum of square of source currents = 103.242
Total power = 1,100. watts

NOTE: The array synthesis calculations (above) were performed to solve for the base voltage drives required to produce the specified field parameters, including the detuned condition for tower 3 which is unused at night. The base impedances were calculated and the model was revised to have voltage drives only for the towers of the nighttime directional antenna pattern, towers 1, 2 and 4, and a detuning reactance to ground for tower 3. The detuning reactance is equal in magnitude and opposite in sign to the reactive component of the operating impedance that was determined using the voltage sources from the array synthesis calculations. The final model does not include a voltage source for tower 3 because its base voltage is developed across the detuning reactance. The specified detuning reactance represents how the tower is detuned for normal operation. The following information is from the final model.

GEOMETRY

Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	188.71	176.53	0	.18	10
		188.71	176.53	78.7		
2	none	135.84	195.625	0	.18	10
		135.84	195.625	78.7		
3	none	0	0	0	.18	10
		0	0	77.7		
4	none	107.691	334.191	0	.18	10
		107.691	334.191	76.5		

Number of wires = 4
current nodes = 40

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	4	7.65	1	7.87
radius	1	.18	1	.18

ELECTRICAL DESCRIPTION

Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.04	0	1	.02125	.0218611

Sources

source	node	sector	magnitude	phase	type
1	1	1	281.467	324.1	voltage
2	11	1	409.055	32.8	voltage
3	31	1	61.6644	235.8	voltage

Lumped loads

passive load circuit	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	
1	21	0	677.88	0	0	0

IMPEDANCE

normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.04	30.084	-23.99	38.478	321.4	2.1896	-8.5667	-.65047
source = 2; node 11, sector 1							
1.04	11.521	-57.28	58.427	281.4	10.168	-1.7141	-4.8664
source = 3; node 31, sector 1							
1.04	36.925	-64.283	74.134	299.9	4.0861	-4.3395	-1.994

CURRENT rms

Frequency = 1.04 MHz
Input power = 1,100. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	-188.364	-11.4219	0	5.17244	2.7	5.16683	.240957
2	-188.364	-11.4219	7.87	5.03625	1.5	5.03448	.133488
3	-188.364	-11.4219	15.74	4.82152	.8	4.8211	.0635497
4	-188.364	-11.4219	23.61	4.51451	.1	4.5145	.0106779
5	-188.364	-11.4219	31.48	4.11697	359.6	4.11687	-.0279517
6	-188.364	-11.4219	39.35	3.63338	359.2	3.63299	-.0534977
7	-188.364	-11.4219	47.22	3.0695	358.8	3.06878	-.0666659
8	-188.364	-11.4219	55.09	2.43127	358.4	2.43032	-.0680193

9	-188.364	-11.4219	62.96	1.72272	358.1	1.72175	-.057989
10	-188.364	-11.4219	70.83	.939943	357.8	.939231	-.0365991
END	-188.364	-11.4219	78.7	0	0	0	0
GND	-130.82	36.5871	0	4.95055	111.4	-1.80856	4.60837
12	-130.82	36.5871	7.87	4.71181	111.	-1.68623	4.39975
13	-130.82	36.5871	15.74	4.44037	110.6	-1.56501	4.15544
14	-130.82	36.5871	23.61	4.1027	110.3	-1.42611	3.84686
15	-130.82	36.5871	31.48	3.69789	110.1	-1.2686	3.47348
16	-130.82	36.5871	39.35	3.22928	109.8	-1.09369	3.03844
17	-130.82	36.5871	47.22	2.70186	109.5	-.903458	2.54633
18	-130.82	36.5871	55.09	2.12091	109.3	-.700145	2.00201
19	-130.82	36.5871	62.96	1.49012	109.	-.485534	1.4088
20	-130.82	36.5871	70.83	.806447	108.8	-.259264	.763636
END	-130.82	36.5871	78.7	0	0	0	0
GND	0	0	0	.0444621	48.7	.0293699	.0333808
22	0	0	7.77	.0245346	48.8	.0161676	.0184542
23	0	0	15.54	.0115484	49.7	7.48E-03	8.8E-03
24	0	0	23.31	1.75E-03	62.8	8.E-04	1.56E-03
25	0	0	31.08	5.57E-03	221.5	-4.18E-03	-3.69E-03
26	0	0	38.85	.0103697	223.3	-7.55E-03	-7.11E-03
27	0	0	46.62	.0128562	223.4	-9.34E-03	-8.83E-03
28	0	0	54.39	.0131077	223.	-9.58E-03	-8.95E-03
29	0	0	62.16	.0111817	222.5	-8.24E-03	-7.56E-03
30	0	0	69.93	7.06E-03	221.9	-5.26E-03	-4.72E-03
END	0	0	77.7	0	0	0	0
GND	96.9489	46.8857	0	.588169	295.9	.257156	-.528974
32	96.9489	46.8857	7.65	.557822	294.5	.231331	-.507594
33	96.9489	46.8857	15.3	.524737	293.5	.209297	-.48119
34	96.9489	46.8857	22.95	.484333	292.7	.186636	-.446929
35	96.9489	46.8857	30.6	.436345	291.9	.162916	-.404791
36	96.9489	46.8857	38.25	.38106	291.3	.138138	-.35514
37	96.9489	46.8857	45.9	.318967	290.6	.112445	-.298489
38	96.9489	46.8857	53.55	.250598	290.1	.0860148	-.235373
39	96.9489	46.8857	61.2	.176292	289.5	.0589678	-.166137
40	96.9489	46.8857	68.85	.09559	289.	.031173	-.0903642
END	96.9489	46.8857	76.5	0	0	0	0

Sampling System Measurements – WLVJ

Impedance measurements were made of the antenna monitor sampling system using a calibrated measurement system employing a Power Aim 120 network analyzer. The measurements were made looking into the antenna monitor ends of the sampling lines for two conditions – with them open circuited at their tower ends and with them connected to the sampling devices at the tower bases.

The following table shows the frequencies above and below the carrier frequency where resonance – zero reactance corresponding with low resistance – was found. As the length of a distortionless transmission line is 180 electrical degrees at the difference frequency between adjacent frequencies of resonance, and frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sampling line length at the resonant frequency above carrier frequency – which is the closest one to the carrier frequency in terms of the ratio of frequencies – was found to be 270 electrical degrees. The electrical lengths at carrier frequency appearing in the table below were calculated by ratioing the frequencies.

Tower	Sampling Line Open-Circuited Resonance Below 1040 kHz (kHz)	Sampling Line Open-Circuited Resonance Above 1040 kHz (kHz)	Sampling Line Calculated Electrical Length at 1040 kHz (degrees)	1040 kHz Measured Impedance with Toroid Connected (Ohms)
1	414.7	1256.1	223.5	52.2 – j 2.1
2	416.4	1257.4	223.3	51.6 – j 1.1
3	420.3	1257.0	223.4	51.8 +J 0.1
4	417.0	1255.0	223.7	50.2 – j 1.5

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

The characteristic impedance was calculated using the following formula, where R_1 +j X_1 and R_2 +j X_2 are the measured impedances at the +45 and –45 degree offset frequencies, respectively:

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

Tower	-45 Degree Offset Frequency (kHz)	-45 Degree Measured Impedance (Ohms)	+45 Degree Offset Frequency (kHz)	+45 Degree Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
1	1046.7	5.2 –j 49.2	1465.5	7.9 +j 49.2	49.7 ✓
2	1046.8	5.6 –j 49.6	1467.0	8.1 +j 48.8	49.7 ✓
3	1047.5	5.1 –J 49.6	1466.5	7.5 +J 48.9	49.7 ✓
4	1045.8	5.2 –j 49.3	1464.2	7.5 +j 48.3	49.2 ✓

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

The toroidal transformers were calibrated by measuring their outputs with a common reference signal while connected to the antenna monitor through identical test cables. They were placed side-by-side with a conductor carrying the reference signal passing through them and their outputs were fed into the antenna monitor to measure the relative ratios and phases of their output voltages. Tower 3 was the antenna monitor's reference tower for the measurements. The following results were found for carrier frequency, 1200 kilohertz:

Tower	Toroid Ratio	Toroid Phase (Degrees)
1	1.006	-0.1
2	1.001	0.0
3	1.000	-0.1
4	1.000	-0.1

Delta type TCT-1 toroidal transformers are rated for absolute magnitude accuracy of +/- 2% and absolute phase accuracy of +/- 3 degrees. As the maximum measured transformer-to-transformer variations among the four were no more than 0.1 percent and 0.1 degree, they provide far more accurate relative indications than could be the case within their rated accuracies.

Reference Field Strength Measurements – WLVJ

Reference field strength measurements were made at three locations each along radials at the azimuths specified for monitoring by WLVJ, at 109.0 and 294.5 degrees true for the daytime pattern and at 307.0 and 349.5 degrees true for the nighttime pattern. Additionally, measurements were made on major lobe radials at 174 degrees true for the daytime pattern and at 145.0 degrees true for the nighttime pattern. The measured field strengths, descriptions and GPS coordinates for the reference measurement points are shown on the following pages.

Reference Field Strength Measurements

WLVJ DA-D

Radial (Deg.)	Point	Dist. (Km)	Field (mV/m)	Coordinates (NAD 27)		Description
				N	W	
109.0	1	0.79	610	26-28-18.0	80-11-43.6	E. side Smith Sunday Rd.
	2	1.62	250	26-28-08.0	80-11-15.1	E. side Rd. by sign
	3	2.47	218	26-28-00.4	80-10-46.0	E. side Starkey by shed
174.0	1	1.01	2200	26-27-53.7	80-12-53.7	S. side of canal
	2	1.44	1450	26-27-39.9	80-12-05.0	S. side of canal
	3	2.26	910	26-27-13.2	80-12-02.6	Atlantic Ave.
294.5	1	0.86	135	26-28-37.5	80-12-38.9	In field
	2	1.09	132	26-28-40.5	80-12-46.8	In field
	3	1.52	113	26-28-46.6	80-13-00.4	In field

Reference Field Strength Measurements

WLVJ DA-N

Radial (Deg.)	Point	Dist. (Km)	Field (mV/m)	Coordinates (NAD 27)		Description
				N	W	
145.0	1	1.27	325	26-27-52.6	80-11-44.0	E. side of Smith Sunday Rd.
	2	1.72	165	26-27-40.6	80-11-35.1	N. side of canal
	3	2.45	155	26-27-21.2	80-11-19.5	Front of 122 in mall
307.0	1	0.26	175	26-28-31.6	80-12-17.9	By sign on W. side
	2	1.24	40	26-28-50.5	80-12-46.1	In field
	3	1.72	26	26-29-00.1	80-13-00.0	In field
349.5	1	0.89	25	26-28-54.9	80-12-16.5	E. side 441
	2	1.24	13	26-29-05.8	80-12-18.9	W. side 441 on sidewalk
	3	2.96	16	26-29-54.5	80-12-29.4	In field

All of the field strength observations were made on September 5, 2014 by Mr. James Johnson. The Potomac Instruments FIM-4100 field strength meter used for the measurements, serial number 154, had its calibration checked against another field strength meter that had been calibrated by its manufacturer traceable to a reference standard field on May 19, 2014. The readings of the two meters were found to be in agreement.

Direct Measurement of Power - WLVJ

Common point impedance measurements were made using a calibrated measurement system employing a Power Aim 120 network analyzer. The common point impedance was adjusted to 50.0 – j 6.0 ohms for both directional patterns. The reactance was set to – j 6.0 to compensate for series inductance in the circuit between the transmitter and the common point in the phasor cabinet, including the main-auxiliary transmitter switching contactor, in order to provide a non-reactive load for the transmitter's output port at carrier frequency.

Section 73.51(b)(1) of the FCC Rules specifies that the authorized antenna input power of a directional antenna for up to 5.0 kilowatts nominal power shall be increased by 8 percent above the nominal power. For the 1.1 kilowatt nighttime pattern, the common point current was calculated for 1,188 watts antenna input power.

Section 73.51(b)(2) of the FCC Rules specifies that the authorized antenna input power of a directional antenna for greater than 5.0 kilowatts nominal power shall be increased by 5.3 percent above the nominal power. For the 25 kilowatt daytime pattern, the common point current was calculated for 26,325 watts antenna input power.

Antenna Monitor and Sampling System - WLVJ

The antenna monitor is a Potomac Instruments model AM-1901-4. The sampling devices are Delta Electronics Type TCT-1 shielded toroidal transformers located at the ATU output reference points. The TCT-1 transformers have a sensitivity of 0.5 volt per ampere of RF current. The toroids are connected through equal length 3/8 inch foam heliax sampling lines to the antenna monitor. The outdoor portions of the sampling lines are buried underground.

The antenna monitor was calibrated by comparing the indicated tower current ratios and phases with all four inputs fed a common reference signal in equal ratio and phase.

Tower	Day-DA Mode (Tower 3 Reference)		Night-DA Mode (Tower 1 Reference)	
	Ratio	Phase	Ratio	Phase
1	1.000	+ 0.5	1.000	0.0
2	1.000	- 0.1	1.000	- 0.1
3	1.000	- 0.1	1.000	0.0
4	1.000	0.0	1.000	- 0.3

The antenna monitor indications agreed within less than the manufacturer's rated accuracies of 0.010 ratio and 1.0 degree phase.

Radio Frequency Radiation Considerations - WLVJ

The operation of WLVJ will not result in the exposure of workers or the general public to levels of radio frequency radiation in excess of the limits specified in 47 CFR 1.1310. Fences have been installed about the tower bases to restrict access beyond the distances necessary to prevent electric and magnetic field exposure above the required levels.

No changes have been made to the WLVJ antenna system other than modification of circuitry located within the antenna tuning enclosures located at the tower bases and the phasor cabinet located inside the transmitter building. All RF networks are inside shielding enclosures. The towers and ground system remain unchanged. Fences to restrict access to areas near the towers remain in place. The measures to restrict human exposure to radio frequency fields previously provided to the FCC remain in force at the WLVJ transmitter site.

Tower Numbering - WLVJ

There is confusion with regard to the numbering scheme for the towers of the WLVJ directional antenna system in the FCC records. The standard pattern in the FCC's engineering database shows theoretical parameters specified with the towers numbered from 1 to 4 for the daytime directional antenna pattern and from 1 to 3 for the nighttime directional antenna pattern – with towers 1 and 2 being identical for both patterns but with the nighttime tower 3 designation being used to refer to tower 4 of the daytime directional antenna system. All references to tower numbering at the site – including the antenna monitor and the nomenclature of the phasing and coupling equipment – follow the scheme of the daytime pattern specifications. Tower 3 of the array is not used at night and the parameters of the 3rd tower of the nighttime directional antenna system are read using the tower 4 position of the antenna monitor.

To eliminate this confusion, it is requested that the new license have the numbering scheme that is in use at the site, with operating parameters specified for towers 1, 2, 3 and 4 in the daytime and 1, 2 and 4 at night. All tower numbering herein adheres to that scheme. The antenna monitor parameters provided herein and on the associated FCC Form 302 technical section correspond to the towers numbered accordingly.