ORIGINAL

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. BMML-20090916ADR

SECTION I - APPLICANT FEE INFORMATION

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

Disney Worldwide Services, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters)
77 West 66th Street, 16th Floor

MAILING ADDRESS (Line 2) (Maximum 35 characters)
ATTN: John Zucker

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
New York	NY	10023-6298

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
212-456-7777 x 7387	WDWD	Fac. ID #8623

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	$ 615.00	

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	$ 705.00	

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
$ 1320.00	

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SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Radio Disney Atlanta, LLC		
MAILING ADDRESS 77 West 66th Street, 16th Floor		
CITY New York	STATE NY	ZIP CODE 10023-6298

2. This application is for:

[x] Commercial [ ] Noncommercial

[x] 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
WDWD	Atlanta GA	BP-20080801AYO	NA	Nov. 19, 2011

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

Rule 73.1620(a)(4)

If No, explain in an Exhibit. Exhibit No.

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

If No, state exceptions in an Exhibit. Exhibit No.

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect? [ ] Yes [x] No

If Yes, explain in an Exhibit. Exhibit No.

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)? [x] 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 [x] 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	
JOHN W. ZUCKER	[signature]	
Title	**Date**	**Telephone Number**
ASSISTANT SECRETARY	9.15.09	212.456.7777

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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APPLICATION FOR LICENSE INFORMATION
RADIO STATION WDWD
ATLANTA, GEORGIA

September 15, 2009

590 KHZ 12 KW-D 4.5 KW-N U DA-2

APPLICATION FOR LICENSE INFORMATION
RADIO STATION WDWD
ATLANTA, GEORGIA

590 KHZ 12 KW-D 4.5 KW-N U DA-2

Executive Summary - WDWD

This engineering exhibit supports an application for license for the newly constructed daytime directional antenna system of radio station WDWD in Atlanta, Georgia. Proof of performance information for the WDWD nighttime directional antenna pattern, which remains unchanged, is also provided herein. WDWD is authorized to operate on 590 kilohertz with 12 kilowatts in the daytime and 4.5 kilowatts at night, employing different directional antenna patterns day and night. The WDWD daytime pattern change and power increase to 12 kilowatts was authorized by FCC construction permit number BP-20080801AYO.

The towers and ground system remain unchanged. The new daytime directional antenna pattern uses three of the four towers that were employed by the former daytime pattern and that continue to be employed by the nighttime pattern.

New phasing and coupling equipment has been installed for both the daytime and nighttime directional antenna patterns. The new antenna system equipment design was based on computer modeling for bandwidth optimization. For the nighttime directional antenna, negative tower power is terminated into a dissipative load and the common point input power is compensated to make up for it. This provides a very significant improvement in pattern bandwidth – greatly reducing null region signal distortion on the back and sides of the nighttime pattern. The details of the input power compensation are provided herein. The negative power flow tower of the nighttime system, tower 4, has controls for ratio and phase on the phasor front panel and the power dissipation takes place in a dummy load that is connected to the phasor network that provides those controls.

Information is provided herein demonstrating that the directional antenna parameters for both the daytime and nighttime patterns have been determined in accordance with the requirements of section 73.151(c) of the FCC Rules. The 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.

Ronald D. Rackley, P.E.
September 15, 2009

Analysis of Tower Impedance Measurements to Verify Method of Moments Model - WDWD

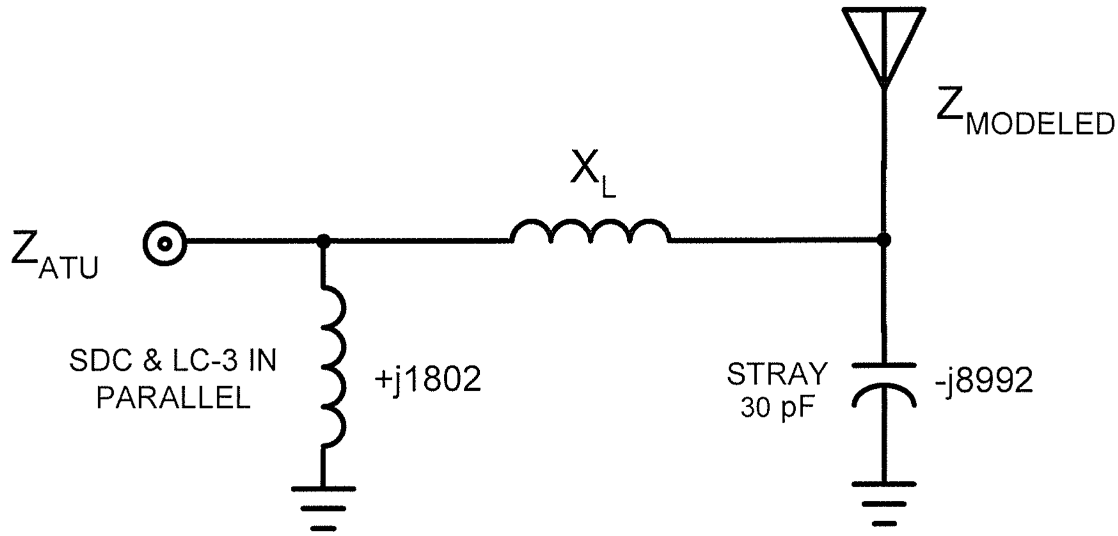
Tower base impedance measurements were made at the final J-plugs within the Antenna Tuning Units ("ATUs") using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The other towers were all open circuited at the same points where impedance measurements were made for them (the "reference points") for each of the measurements.

The reference point in each ATU 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 components in shunt with the ATU outputs following the sampling transformers other than static drain chokes and lighting chokes, which were considered using their manufacturer's stated inductive reactances at 590 kilohertz in the process of calibrating the method of moments model to the measured base impedances. Circuit calculations were performed to relate the method of moments modeled impedances 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. It should be noted that the calculated ATU output 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 feedpoint impedances from the method of moments model are represented by complex loads from node 3 to ground (R 3 - 0). The assumed stray capacitance of 30 picofarads was used across all of the tower bases, although it appears as 0.0000 (microfarad) on the WCAP printout due to rounding. The numerals in the file names shown on the tabulations correspond to the tower numbers.

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



Manufacturer's Stated Reactance at 590 kHz
KTL SDC: +j8660
KTL LC-3: +j2276
+j8660 and +j2276 in parallel: +j1802

TOWER	L(uH)	X_L*	$Z_{MODELED}$	$Z_{ATU\ (MODELED)}$	$Z_{ATU\ (MEASURED)}$
1	10.628	+j39.4	50.1 +j51.7	45.9 +j88.0	45.8 +j90.7
2	11.330	+j42.0	49.6 +j53.3	45.3 +j91.8	45.3 +j91.2
3	10.790	+j40.0	49.4 +j52.5	45.2 +j89.2	45.2 +j89.1
4	11.222	+j41.6	49.0 +j48.4	44.9 +j86.9	43.3 +j88.9

*Measured at ATU output jack, with the base insulator short-circuited

ANALYSIS OF TOWER IMPEDANCE MEASUREMENTS TO VERIFY METHOD OF MOMENTS MODEL

RADIO STATION WDWD
ATLANTA, GEORGIA
590 KHZ 12 KW-D 4.5 KW-N U DA-2

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

Tower 1

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD1OC.CIR

I	1.0000	0	1	0.0000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	10.6280	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	50.1290	3	0	51.7490	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	99.7251	61.9400
2	99.2586	62.4493
3	68.9495	47.1241

				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
VSWR											
R	1-	2	1.000	1.00	0.000	1.00	0.000	46.91	88.00	45.91	88.00
L	2-	0	486.097	99.26	62.449	0.06	-27.551	0.00	1802.00	0.00	1802.00
L	2-	3	10.628	37.49	91.534	0.95	1.534	50.71	91.16	50.71	51.76
C	3-	0	0.000	68.95	47.124	0.01	137.124	0.00	-8991.81	0.00	-8991.81
R	3-	0	50.129	68.95	47.124	0.96	1.213	50.13	51.75	50.13	51.75

Tower 2

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD2OC.CIR

I	1.0000	0	1	0.0000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	11.3300	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	49.6210	3	0	53.3460	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	102.7874	63.2528
2	102.3413	63.7528
3	69.5811	48.2697

				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
VSWR											
R	1-	2	1.000	1.00	0.000	1.00	0.000	46.26	91.79	45.26	91.79
L	2-	0	486.097	102.34	63.753	0.06	-26.247	0.00	1802.00	0.00	1802.00
L	2-	3	11.330	39.88	91.516	0.95	1.516	50.21	95.39	50.21	53.39
C	3-	0	0.000	69.58	48.270	0.01	138.270	0.00	-8991.81	0.00	-8991.81
R	3-	0	49.621	69.58	48.270	0.96	1.198	49.62	53.35	49.62	53.35

Tower 3

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD3OC.CIR

I	1.0000	0	1	0.0000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	10.7900	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	49.3810	3	0	52.5150	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	100.4549	62.6394
2	99.9993	63.1483
3	68.9419	47.9558

VSWR				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	0.000	1.00	0.000	46.17	89.22	45.17	89.22
L	2-	0	486.097	100.00	63.148	0.06	-26.852	0.00	1802.00	0.00	1802.00
L	2-	3	10.790	38.03	91.511	0.95	1.511	49.96	92.55	49.96	52.55
C	3-	0	0.000	68.94	47.956	0.01	137.956	0.00	-8991.81	0.00	-8991.81
R	3-	0	49.381	68.94	47.956	0.96	1.194	49.38	52.51	49.38	52.51

Tower 4

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD4OC.CIR

I	1.0000	0	1	0.0000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	11.2220	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	49.0420	3	0	48.4360	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	98.3131	62.1440
2	97.8498	62.6617
3	65.9808	45.8305

VSWR				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	0.000	1.00	0.000	45.94	86.92	44.94	86.92
L	2-	0	486.097	97.85	62.662	0.05	-27.338	0.00	1802.00	0.00	1802.00
L	2-	3	11.222	39.61	91.501	0.95	1.501	49.57	90.03	49.57	48.43
C	3-	0	0.000	65.98	45.830	0.01	135.830	0.00	-8991.81	0.00	-8991.81
R	3-	0	49.042	65.98	45.830	0.96	1.187	49.04	48.44	49.04	48.44

Derivation of Operating Parameters for Daytime Directional Antenna – WDWD

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 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 ATU output 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 ATU output 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 ATU currents.

TOWER	Modeled Current Pulse	Current Magnitude @ Toroid (amperes)	Current Phase @ Toroid (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase (degrees)
1	1	14.01	+114.2	1.412	+109.2
2	21	9.92	+5.0	1.000	0.0
4	61	2.30	-152.7	0.232	-157.7

Tower 1

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD1DAD.CIR

I	14.0100	0	1	114.1600	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	10.6280	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	26.3920	3	0	37.5990	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	1099.9076	-174.7709
2	1095.4425	-174.0777
3	619.7075	169.7363

VSWR				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	14.01	114.160	14.01	114.160	25.47	74.26	24.47	74.26
L	2-	0	486.097	1095.44	-174.078	0.61	95.922	0.00	1802.00	0.00	1802.00
L	2-	3	10.628	529.28	-155.029	13.43	114.971	26.61	77.08	26.61	37.68
C	3-	0	0.000	619.71	169.736	0.07	-100.264	0.00	-8991.81	0.00	-8991.81
R	3-	0	26.392	619.71	169.736	13.49	114.803	26.39	37.60	26.39	37.60

Tower 2

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD2DAD.CIR

I	9.9200	0	1	4.9600	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	11.3300	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	73.7210	3	0	104.6800	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	1520.7274	69.7098
2	1516.5223	70.0488
3	1187.0277	61.5466

VSWR				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	9.92	4.960	9.92	4.960	65.39	138.65	64.39	138.65
L	2-	0	486.097	1516.52	70.049	0.84	-19.951	0.00	1802.00	0.00	1802.00
L	2-	3	11.330	384.88	97.177	9.16	7.177	75.46	147.29	75.46	105.29
C	3-	0	0.000	1187.03	61.547	0.13	151.547	0.00	-8991.81	0.00	-8991.81
R	3-	0	73.721	1187.03	61.547	9.27	6.702	73.72	104.68	73.72	104.68

Tower 4

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD4DAD.CIR

I	2.3000	0	1	207.2700	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	9.9000	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	198.9400	3	0	191.6100	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	627.3979	-99.4032
2	626.0269	-99.2344
3	573.1310	-104.2607

VSWR			BRANCH VOLTAGE MAG	PHASE	BRANCH CURRENT MAG	PHASE	FROM NODE IMPEDANCE RESISTANCE	REACTANCE	TO NODE IMPEDANCE RESISTANCE	REACTANCE
R	1- 2	1.000	2.30	-152.730	2.30	-152.730	162.92	218.78	161.92	218.78
L	2- 0	486.097	626.03	-99.234	0.35	170.766	0.00	1802.00	0.00	1802.00
L	2- 3	9.900	74.55	-56.890	2.03	-146.890	207.59	227.79	207.59	191.09
C	3- 0	0.000	573.13	-104.261	0.06	-14.261	0.00	-8991.81	0.00	-8991.81
R	3- 0	198.940	573.13	-104.261	2.07	-148.186	198.94	191.61	198.94	191.61

Derivation of Operating Parameters for Nighttime Directional Antenna - WDWD

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 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 ATU output 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 ATU output 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 ATU currents.

TOWER	Modeled Current Pulse	Current Magnitude @ Toroid (amperes)	Current Phase @ Toroid (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase (degrees)
1	1	10.97	+153.4	0.613	+152.4
2	21	17.89	+1.0	1.000	0.0
3	41	16.59	-156.1	0.927	-157.1
4	61	7.01	+33.7	0.392	+32.7

Tower 1

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD1DAN.CIR

I	10.9700	0	1	153.4000	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	10.6280	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	16.3020	3	0	38.3720	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	839.4594	-128.7503
2	837.2192	-128.0163
3	440.2617	-139.2210

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
		VSWR	MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
R	1- 2	1.000	10.97	153.400	10.97	153.400	16.11	74.81	15.11	74.81
L	2- 0	486.097	837.22	-128.016	0.46	141.984	0.00	1802.00	0.00	1802.00
L	2- 3	10.628	414.28	-116.099	10.51	153.901	16.44	77.91	16.44	38.51
C	3- 0	0.000	440.26	-139.221	0.05	-49.221	0.00	-8991.81	0.00	-8991.81
R	3- 0	16.302	440.26	-139.221	10.56	153.797	16.30	38.37	16.30	38.37

Tower 2

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WDWD2DAN.CIR

I	17.8900	0	1	0.9900	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	486.0970	2	0	0.0000	0.0000	0.0000
L	11.3300	2	3	0.0000	0.0000	0.0000
C	0.0000	3	0	0.0000	0.0000	0.0000
R	12.8530	3	0	73.9140	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.590

NODE	VOLT MAG	VOLT PHASE
1	1971.9471	84.4641
2	1969.9941	84.9810
3	1271.0742	81.4331

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
		VSWR	MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
R	1- 2	1.000	17.89	0.990	17.89	0.990	12.53	109.51	11.53	109.51
L	2- 0	486.097	1969.99	84.981	1.09	-5.019	0.00	1802.00	0.00	1802.00
L	2- 3	11.330	705.75	91.380	16.80	1.380	13.07	116.51	13.07	74.51
C	3- 0	0.000	1271.07	81.433	0.14	171.433	0.00	-8991.81	0.00	-8991.81
R	3- 0	12.853	1271.07	81.433	16.94	1.298	12.85	73.91	12.85	73.91

Tower 3

```
WESTBERG CIRCUIT ANALYSIS PROGRAM


FILE NAME = WDWD3DAN.CIR

I    16.5900    0    1  203.8600    0.0000    0.0000
R     1.0000    1    2    0.0000    0.0000    0.0000
L   486.0970    2    0    0.0000    0.0000    0.0000
L    10.7900    2    3    0.0000    0.0000    0.0000
C     0.0000    3    0    0.0000    0.0000    0.0000
R     5.8749    3    0   91.1740    0.0000    0.0000
EX    0.0000    0    0    0.0000    0.0000    0.0000


FREQ = 0.590

  NODE       VOLT MAG      VOLT PHASE
   1       2044.7644       -69.0256
   2       2043.9963       -68.5611
   3       1426.6454       -69.6870
                             BRANCH VOLTAGE       BRANCH CURRENT FROM NODE IMPEDANCE  TO NODE IMPEDANCE
                             MAG        PHASE       MAG        PHASE RESISTANCE REACTANCE RESISTANCE REACTANCE
VSWR
 R    1-  2      1.000      16.59  -156.140     16.59  -156.140       6.20     123.10       5.20     123.10
 L    2-  0    486.097    2044.00   -68.561      1.13  -158.561       0.00    1802.00       0.00    1802.00
 L    2-  3     10.790     618.26   -65.962     15.46  -155.962       6.00     132.10       6.00      92.10
 C    3-  0      0.000    1426.65   -69.687      0.16    20.313       0.00   -8991.81       0.00   -8991.81
 R    3-  0      5.875    1426.65   -69.687     15.62  -156.000       5.87      91.17       5.87      91.17
```

Tower 4

```
WESTBERG CIRCUIT ANALYSIS PROGRAM


FILE NAME = WDWD4DAN.CIR

I     7.0100    0    1   33.7100    0.0000    0.0000
R     1.0000    1    2    0.0000    0.0000    0.0000
L   486.0970    2    0    0.0000    0.0000    0.0000
L    11.2220    2    3    0.0000    0.0000    0.0000
C     0.0000    3    0    0.0000    0.0000    0.0000
R   -54.4930    3    0   57.4790    0.0000    0.0000
EX    0.0000    0    0    0.0000    0.0000    0.0000


FREQ = 0.590

  NODE       VOLT MAG      VOLT PHASE
   1        750.2677       150.6846
   2        753.4733       151.1597
   3        529.4291       165.8689
                             BRANCH VOLTAGE       BRANCH CURRENT FROM NODE IMPEDANCE  TO NODE IMPEDANCE
                             MAG        PHASE       MAG        PHASE RESISTANCE REACTANCE RESISTANCE REACTANCE
VSWR
 R    1-  2      1.000       7.01    33.710      7.01    33.710     -48.55      95.38     -49.55      95.38
 L    2-  0    486.097     753.47   151.160      0.42    61.160       0.00    1802.00       0.00    1802.00
 L    2-  3     11.222     276.30   122.047      6.64    32.047     -55.19      99.11     -55.19      57.51
 C    3-  0      0.000     529.43   165.869      0.06  -104.131       0.00   -8991.81       0.00   -8991.81
 R    3-  0    -54.493     529.43   165.869      6.68    32.396     -54.49      57.48     -54.49      57.48
```

Method of Moments Model Details for Towers Driven Individually – WDWD

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5. One wire was used to represent each tower. The top and bottom wire end points were specified using meters in the Cartesian coordinate system, as converted from the theoretical directional antenna specifications taking into account the carrier frequency wavelength. Each tower was modeled using 20 wire segments. As the towers are physically 90.7 degrees in electrical height, the segment length is 4.5 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 stray capacitances, feedline hookup inductances and lighting choke and static drain shunt inductances with the base impedances that were measured at the output jacks of the Antenna Tuning 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 identical, uniform cross section towers having a face width of 30 inches.

TOWER	Physical Height (meters)	Modeled Height (meters)	Modeled Percent of Height	Modeled Radius (meters)	Percent Equivalent Radius
1	128	134.6	105%	0.364	100
2	128	135.0	105%	0.364	100
3	128	134.8	105%	0.364	100
4	128	133.8	105%	0.364	100

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

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
590.	50.129	51.749	72.048	45.9	2.6978	-6.7612	-1.0282

GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.364	20
		0	0	134.6		
2	none	-84.34	94.99	0	.364	20
		-84.34	94.99	135.		
3	none	-168.68	189.99	0	.364	20
		-168.68	189.99	134.8		
4	none	-253.02	284.98	0	.364	20
		-253.02	284.98	133.8		

Number of wires = 4
current nodes = 80

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	4	6.69	2	6.75
segment/radius ratio	4	18.3791	2	18.544
radius	1	.364	1	.364

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	590.	0	1	.0131658	.0132839

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,000.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	21	0	2,320.	0	0	0
2	41	0	2,317.	0	0	0
3	61	0	2,319.	0	0	0

Tower 2

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IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 21, sector 1							
590.	49.621	53.346	72.856	47.1	2.7884	-6.5198	-1.095

GEOMETRY

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.364	20
		0	0	134.6		
2	none	-84.34	94.99	0	.364	20
		-84.34	94.99	135.		
3	none	-168.68	189.99	0	.364	20
		-168.68	189.99	134.8		
4	none	-253.02	284.98	0	.364	20
		-253.02	284.98	133.8		

Number of wires = 4

current nodes = 80

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	4	6.69	2	6.75
segment/radius ratio	4	18.3791	2	18.544
radius	1	.364	1	.364

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	590.	0	1	.0131658	.0132839

Sources

source	node	sector	magnitude	phase	type
1	21	1	1,000.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	2,316.	0	0	0
2	41	0	2,317.	0	0	0
3	61	0	2,319.	0	0	0

Tower 3

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IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 41, sector 1							
590.	49.381	52.515	72.085	46.8	2.754	-6.6092	-1.0697

GEOMETRY

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.364	20
		0	0	134.6		
2	none	-84.34	94.99	0	.364	20
		-84.34	94.99	135.		
3	none	-168.68	189.99	0	.364	20
		-168.68	189.99	134.8		
4	none	-253.02	284.98	0	.364	20
		-253.02	284.98	133.8		

Number of wires = 4

current nodes = 80

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	4	6.69	2	6.75
segment/radius ratio	4	18.3791	2	18.544
radius	1	.364	1	.364

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	590.	0	1	.0131658	.0132839

Sources

source	node	sector	magnitude	phase	type
1	41	1	1,000.	0	voltage

Lumped loads

passive load circuit	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	
1	1	0	2,316.	0	0	0
2	21	0	2,320.	0	0	0
3	61	0	2,319.	0	0	0

Tower 4

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IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 61, sector 1							
590.	49.042	48.436	68.929	44.6	2.5677	-7.1426	-.9317

GEOMETRY

Dimensions in meters

Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.364	20
		0	0	134.6		
2	none	-84.34	94.99	0	.364	20
		-84.34	94.99	135.		
3	none	-168.68	189.99	0	.364	20
		-168.68	189.99	134.8		
4	none	-253.02	284.98	0	.364	20
		-253.02	284.98	133.8		

Number of wires = 4

current nodes = 80

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	4	6.69	2	6.75
segment/radius ratio	4	18.3791	2	18.544
radius	1	.364	1	.364

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	590.	0	1	.0131658	.0132839

Sources

source	node	sector	magnitude	phase	type
1	61	1	1,000.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	2,316.	0	0	0
2	21	0	2,320.	0	0	0
3	41	0	2,317.	0	0	0

Method of Moments Model Details for Daytime Directional Antenna- WDWD

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5 with the individual tower 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 daytime pattern, was detuned by terminating it with the load reactance, +j 522 ohms, shown at its base (node 41) in the tabulation. This value is the opposite sign reactance of the method of moments modeled operating impedance for the directional antenna with a field ratio 0.0 specified for tower 3. In order to provide +j522 ohms at the tower base through the ATU-to-base circuit model, the detuning inductance was adjusted to +j606 at the ATU output jack for tower 3.

Tower	Wire	Base Node
1	1	1
2	2	21
3	3	41
4	4	61

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

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MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 590 KHz

tower	field ratio magnitude	phase (deg)
1	1.289	112.
2	1.	0
3	1.E-05	0
4	.26	-164.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	619.833	169.7	13.4938	114.8
21	1,187.04	61.5	9.27019	6.7
41	481.314	341.	.922509	71.1
61	572.629	255.7	2.07335	211.8

Sum of square of source currents = 546.337
Total power = 12,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00797	-.00820731
Y(1, 2)	.0040992	.00412833
Y(1, 3)	.00116369	-.000614834
Y(1, 4)	-.000292186	-.000345434
Y(2, 1)	.0040992	.00412832
Y(2, 2)	.00566838	-.00648508
Y(2, 3)	.00430554	.00469249
Y(2, 4)	.00117241	-.000609365
Y(3, 1)	.00116369	-.000614835
Y(3, 2)	.00430554	.00469249
Y(3, 3)	.00567436	-.00653079
Y(3, 4)	.00414962	.00436857
Y(4, 1)	-.000292187	-.000345433
Y(4, 2)	.00117241	-.000609366
Y(4, 3)	.0041496	.00436859
Y(4, 4)	.00842447	-.00839756

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	49.7258	51.7251
Z(1, 2)	24.9329	-23.3203
Z(1, 3)	-13.3573	-18.9726
Z(1, 4)	-15.3046	9.89788
Z(2, 1)	24.933	-23.3203
Z(2, 2)	48.8872	53.3225
Z(2, 3)	24.3075	-21.5008
Z(2, 4)	-13.1894	-18.8327
Z(3, 1)	-13.3573	-18.9726
Z(3, 2)	24.3075	-21.5008
Z(3, 3)	48.665	52.4971
Z(3, 4)	24.6469	-22.9811
Z(4, 1)	-15.3046	9.89791
Z(4, 2)	-13.1895	-18.8327
Z(4, 3)	24.6468	-22.9812
Z(4, 4)	48.6471	48.4132
Z(4, 4)	48.6471	48.4128

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GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.364	20
		0	0	134.6		
2	none	-84.34	94.99	0	.364	20
		-84.34	94.99	135.		
3	none	-168.68	189.99	0	.364	20
		-168.68	189.99	134.8		
4	none	-253.02	284.98	0	.364	20
		-253.02	284.98	133.8		

Number of wires = 4
current nodes = 80

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	4	6.69	2	6.75
segment/radius ratio	4	18.3791	2	18.544
radius	1	.364	1	.364

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	590.	0	1	.0131658	.0132839

Sources

source	node	sector	magnitude	phase	type
1	1	1	876.576	169.7	voltage
2	21	1	1,678.73	61.5	voltage
3	61	1	809.82	255.7	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	41	0	522.	0	0	0

IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
590.	26.392	37.599	45.937	54.9	3.1791	-5.6562	-1.378
source = 2; node 21, sector 1							
590.	73.721	104.68	128.04	54.8	4.9224	-3.5789	-2.5076
source = 3; node 61, sector 1							
590.	198.94	191.61	276.21	43.9	7.7929	-2.2415	-3.9451

CURRENT rms
Frequency = 590 KHz
Input power = 12,000. watts
Efficiency = 100. %
coordinates in meters

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	13.4949	114.8	-5.65335	12.2537
2	0	0	6.73	13.7142	114.	-5.58054	12.5275
3	0	0	13.46	13.7624	113.5	-5.49511	12.6177
4	0	0	20.19	13.702	113.1	-5.38374	12.6
5	0	0	26.92	13.5418	112.8	-5.24522	12.4847
6	0	0	33.65	13.2862	112.5	-5.07958	12.2768
7	0	0	40.38	12.9386	112.2	-4.88736	11.98
8	0	0	47.11	12.5021	111.9	-4.66945	11.5974
9	0	0	53.84	11.9799	111.7	-4.42695	11.1319
10	0	0	60.57	11.3754	111.5	-4.16112	10.587
11	0	0	67.3	10.6922	111.2	-3.87341	9.9659
12	0	0	74.03	9.93411	111.	-3.56532	9.27228
13	0	0	80.76	9.10522	110.8	-3.23845	8.50984
14	0	0	87.49	8.20963	110.6	-2.89439	7.68248
15	0	0	94.22	7.25116	110.5	-2.53468	6.79373
16	0	0	100.95	6.2333	110.3	-2.16069	5.84683
17	0	0	107.68	5.15837	110.1	-1.7734	4.84395
18	0	0	114.41	4.02638	109.9	-1.37302	3.78505
19	0	0	121.14	2.83166	109.8	-.957849	2.66474
20	0	0	127.87	1.55333	109.6	-.521174	1.46329
END	0	0	134.6	0	0	0	0
GND	-84.34	94.99	0	9.27244	6.7	9.20997	1.07452
22	-84.34	94.99	6.75	9.74478	4.6	9.71322	.783687
23	-84.34	94.99	13.5	9.9874	3.4	9.96986	.59168
24	-84.34	94.99	20.25	10.1181	2.4	10.109	.428746
25	-84.34	94.99	27.	10.1511	1.6	10.1471	.286366
26	-84.34	94.99	33.75	10.0931	.9	10.0918	.161145
27	-84.34	94.99	40.5	9.94751	.3	9.94737	.0515528
28	-84.34	94.99	47.25	9.71734	359.7	9.71725	-.0431802
29	-84.34	94.99	54.	9.40512	359.2	9.40431	-.12347
30	-84.34	94.99	60.75	9.0136	358.8	9.0116	-.189566
31	-84.34	94.99	67.5	8.54551	358.4	8.54209	-.241648
32	-84.34	94.99	74.25	8.00392	358.	7.99903	-.279868
33	-84.34	94.99	81.	7.3918	357.6	7.38553	-.304381
34	-84.34	94.99	87.75	6.71256	357.3	6.70514	-.315351
35	-84.34	94.99	94.5	5.96919	357.	5.96098	-.312947
36	-84.34	94.99	101.25	5.16448	356.7	5.15591	-.297323
37	-84.34	94.99	108.	4.30029	356.4	4.2919	-.268572
38	-84.34	94.99	114.75	3.37652	356.2	3.3689	-.22663
39	-84.34	94.99	121.5	2.38821	355.9	2.38208	-.171021
40	-84.34	94.99	128.25	1.31736	355.6	1.31355	-.100133
END	-84.34	94.99	135.	0	0	0	0
GND	-168.68	189.99	0	.922233	71.	.299881	.872115
42	-168.68	189.99	6.74	.67518	71.	.219557	.638485
43	-168.68	189.99	13.48	.511789	71.	.166456	.483963
44	-168.68	189.99	20.22	.372823	71.	.121317	.352532
45	-168.68	189.99	26.96	.251066	71.	.0817915	.23737
46	-168.68	189.99	33.7	.143661	70.9	.0469474	.135774
47	-168.68	189.99	40.44	.049341	70.6	.0163697	.0465464
48	-168.68	189.99	47.18	.032511	251.8	-.0101448	-.0308876
49	-168.68	189.99	53.92	.102189	251.3	-.0327012	-.0968153
50	-168.68	189.99	60.66	.15986	251.3	-.0513581	-.151385
51	-168.68	189.99	67.4	.205612	251.2	-.0661534	-.19468
52	-168.68	189.99	74.14	.239514	251.2	-.0771169	-.22676

53	-168.68	189.99	80.88	.261631	251.2	-.0842795	-.247684
54	-168.68	189.99	87.62	.272033	251.2	-.0876698	-.257519
55	-168.68	189.99	94.36	.270797	251.2	-.087319	-.256333
56	-168.68	189.99	101.1	.25799	251.2	-.0832484	-.244189
57	-168.68	189.99	107.84	.233627	251.2	-.0754599	-.221105
58	-168.68	189.99	114.58	.197594	251.1	-.0639035	-.186975
59	-168.68	189.99	121.32	.149423	251.1	-.048406	-.141365
60	-168.68	189.99	128.06	.087658	251.1	-.0284591	-.0829096
END	-168.68	189.99	134.8	0	0	0	0
GND	-253.02	284.98	0	2.07345	211.8	-1.76269	-1.09184
62	-253.02	284.98	6.69	2.27769	206.5	-2.03803	-1.01701
63	-253.02	284.98	13.38	2.40183	203.6	-2.20094	-.961605
64	-253.02	284.98	20.07	2.4912	201.4	-2.31972	-.908282
65	-253.02	284.98	26.76	2.55051	199.6	-2.40292	-.855036
66	-253.02	284.98	33.45	2.58159	198.1	-2.45412	-.801169
67	-253.02	284.98	40.14	2.5853	196.8	-2.47519	-.746474
68	-253.02	284.98	46.83	2.56223	195.6	-2.4673	-.690982
69	-253.02	284.98	53.52	2.51286	194.6	-2.43135	-.634845
70	-253.02	284.98	60.21	2.43773	193.7	-2.36815	-.578278
71	-253.02	284.98	66.9	2.33739	192.9	-2.27846	-.52155
72	-253.02	284.98	73.59	2.21248	192.1	-2.16307	-.46495
73	-253.02	284.98	80.28	2.06369	191.4	-2.0228	-.408784
74	-253.02	284.98	86.97	1.89175	190.8	-1.85846	-.353362
75	-253.02	284.98	93.66	1.69738	190.1	-1.67084	-.298991
76	-253.02	284.98	100.35	1.4812	189.6	-1.46064	-.245957
77	-253.02	284.98	107.04	1.24358	189.	-1.22827	-.194512
78	-253.02	284.98	113.73	.984292	188.5	-.973578	-.144837
79	-253.02	284.98	120.42	.701683	187.9	-.694953	-.0969504
80	-253.02	284.98	127.11	.390142	187.4	-.386866	-.0504497
END	-253.02	284.98	133.8	0	0	0	0

Method of Moments Model Details for Nighttime Directional Antenna- WDWD

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5 with the individual towers 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	21
3	3	41
4	4	61

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

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MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 590 KHz

tower	field ratio magnitude	phase (deg)
1	.584	152.1
2	1.	0
3	.947	-156.5
4	.382	37.8

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	440.094	220.8	10.5559	153.8
21	1,271.05	81.4	16.9421	1.3
41	1,426.39	290.4	15.6124	204.
61	529.744	165.8	6.68834	32.4

Sum of square of source currents = 1,373.88
Total power = 4,500. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00796967	-.00820721
Y(1, 2)	.00409914	.00412796
Y(1, 3)	.00116375	-.00061484
Y(1, 4)	-.000292178	-.000345438
Y(2, 1)	.00409915	.00412795
Y(2, 2)	.00566821	-.00648497
Y(2, 3)	.00430552	.00469227
Y(2, 4)	.00117237	-.000609372
Y(3, 1)	.00116375	-.000614841
Y(3, 2)	.00430552	.00469227
Y(3, 3)	.00567447	-.00653078
Y(3, 4)	.00414962	.00436849
Y(4, 1)	-.000292179	-.000345438
Y(4, 2)	.00117236	-.000609372
Y(4, 3)	.0041496	.00436851
Y(4, 4)	.00842437	-.00839755

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	49.7264	51.7283
Z(1, 2)	24.9332	-23.3206
Z(1, 3)	-13.3574	-18.9727
Z(1, 4)	-15.3047	9.89795
Z(2, 1)	24.9332	-23.3205
Z(2, 2)	48.8877	53.326
Z(2, 3)	24.3077	-21.5009
Z(2, 4)	-13.1895	-18.8328
Z(3, 1)	-13.3574	-18.9727
Z(3, 2)	24.3076	-21.5009
Z(3, 3)	48.665	52.4973
Z(3, 4)	24.647	-22.981
Z(4, 1)	-15.3047	9.89797
Z(4, 2)	-13.1895	-18.8328
Z(4, 3)	24.6468	-22.9812
Z(4, 4)	48.6472	48.4139

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GEOMETRY
Dimensions in meters
Environment: perfect ground

wire	caps	X	Y	Z	radius	segs
1	none	0	0	0	.364	20
		0	0	134.6		
2	none	-84.34	94.99	0	.364	20
		-84.34	94.99	135.		
3	none	-168.68	189.99	0	.364	20
		-168.68	189.99	134.8		
4	none	-253.02	284.98	0	.364	20
		-253.02	284.98	133.8		

Number of wires = 4
current nodes = 80

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	4	6.69	2	6.75
segment/radius ratio	4	18.3791	2	18.544
radius	1	.364	1	.364

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	590.	0	1	.0131658	.0132839

Sources

source	node	sector	magnitude	phase	type
1	1	1	622.387	220.8	voltage
2	21	1	1,797.53	81.4	voltage
3	41	1	2,017.23	290.4	voltage
4	61	1	749.171	165.8	voltage

IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
590.	16.302	38.372	41.692	67.	4.9995	-3.5222	-2.5525
source = 2; node 21, sector 1							
590.	12.853	73.914	75.023	80.1	12.569	-1.385	-5.6374
source = 3; node 41, sector 1							
590.	5.8749	91.174	91.363	86.3	36.9	-.47089	-9.8819
source = 4; node 61, sector 1							
590.	-54.493	57.479	79.204	133.5	****	****	****

CURRENT rms
Frequency = 590 KHz
Input power = 4,500. watts
Efficiency = 100. %
coordinates in meters

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	10.5559	153.8	-9.47298	4.65722
2	0	0	6.73	10.7307	153.4	-9.59099	4.81264
3	0	0	13.46	10.7693	153.1	-9.6004	4.87949
4	0	0	20.19	10.7217	152.8	-9.53704	4.89904
5	0	0	26.92	10.5952	152.6	-9.40616	4.87671
6	0	0	33.65	10.3934	152.4	-9.21071	4.81508
7	0	0	40.38	10.119	152.2	-8.9529	4.71581
8	0	0	47.11	9.77467	152.1	-8.63513	4.58025
9	0	0	53.84	9.36302	151.9	-8.25958	4.40969
10	0	0	60.57	8.88684	151.8	-7.82881	4.20544
11	0	0	67.3	8.34922	151.6	-7.34557	3.96887
12	0	0	74.03	7.75331	151.5	-6.81271	3.70146
13	0	0	80.76	7.10243	151.4	-6.23318	3.40469
14	0	0	87.49	6.39994	151.2	-5.61001	3.0801
15	0	0	94.22	5.64909	151.1	-4.9461	2.72916
16	0	0	100.95	4.85276	151.	-4.24404	2.35316
17	0	0	107.68	4.01296	150.9	-3.50566	1.95299
18	0	0	114.41	3.12991	150.8	-2.73122	1.52864
19	0	0	121.14	2.1994	150.7	-1.91714	1.07794
20	0	0	127.87	1.20546	150.5	-1.0496	.592862
END	0	0	134.6	0	0	0	0
GND	-84.34	94.99	0	16.9421	1.3	16.9381	.37156
22	-84.34	94.99	6.75	17.5291	.9	17.5269	.273738
23	-84.34	94.99	13.5	17.7857	.7	17.7845	.208793
24	-84.34	94.99	20.25	17.8669	.5	17.8663	.153315
25	-84.34	94.99	27.	17.7931	.3	17.7928	.104467
26	-84.34	94.99	33.75	17.5741	.2	17.574	.0611396
27	-84.34	94.99	40.5	17.216	.1	17.216	.0228561
28	-84.34	94.99	47.25	16.724	360.	16.724	-.0105938
29	-84.34	94.99	54.	16.1029	359.9	16.1028	-.0392959
30	-84.34	94.99	60.75	15.3576	359.8	15.3575	-.0632737
31	-84.34	94.99	67.5	14.4935	359.7	14.4932	-.0825202
32	-84.34	94.99	74.25	13.516	359.6	13.5157	-.0970159
33	-84.34	94.99	81.	12.4309	359.5	12.4305	-.106739
34	-84.34	94.99	87.75	11.244	359.4	11.2434	-.111665
35	-84.34	94.99	94.5	9.96087	359.4	9.96025	-.111773
36	-84.34	94.99	101.25	8.58651	359.3	8.58584	-.107035
37	-84.34	94.99	108.	7.12442	359.2	7.12376	-.0974012
38	-84.34	94.99	114.75	5.57469	359.1	5.57407	-.0827669
39	-84.34	94.99	121.5	3.92969	359.1	3.92919	-.0628768
40	-84.34	94.99	128.25	2.16042	359.	2.1601	-.0370534
END	-84.34	94.99	135.	0	0	0	0
GND	-168.68	189.99	0	15.6124	204.	-14.2575	-6.36172
42	-168.68	189.99	6.74	16.2894	203.9	-14.8947	-6.59505
43	-168.68	189.99	13.48	16.6123	203.8	-15.2015	-6.69959
44	-168.68	189.99	20.22	16.7571	203.7	-15.3433	-6.73676
45	-168.68	189.99	26.96	16.7468	203.6	-15.3418	-6.71464
46	-168.68	189.99	33.7	16.5919	203.6	-15.2066	-6.63702
47	-168.68	189.99	40.44	16.299	203.5	-14.9441	-6.50632
48	-168.68	189.99	47.18	15.8732	203.5	-14.5588	-6.32448
49	-168.68	189.99	53.92	15.3192	203.4	-14.0552	-6.09332
50	-168.68	189.99	60.66	14.6417	203.4	-13.4375	-5.81473
51	-168.68	189.99	67.4	13.8457	203.4	-12.7105	-5.49065
52	-168.68	189.99	74.14	12.9365	203.3	-11.8788	-5.12316

53	-168.68	189.99	80.88	11.9194	203.3	-10.9474	-4.71439
54	-168.68	189.99	87.62	10.8	203.3	-9.9215	-4.26649
55	-168.68	189.99	94.36	9.58333	203.2	-8.80568	-3.78157
56	-168.68	189.99	101.1	8.27428	203.2	-7.60438	-3.26146
57	-168.68	189.99	107.84	6.87602	203.2	-6.32055	-2.70746
58	-168.68	189.99	114.58	5.38854	203.2	-4.95416	-2.11958
59	-168.68	189.99	121.32	3.8042	203.1	-3.49818	-1.49488
60	-168.68	189.99	128.06	2.09463	203.1	-1.92649	-.822267
END	-168.68	189.99	134.8	0	0	0	0
GND	-253.02	284.98	0	6.68835	32.4	5.64928	3.58045
62	-253.02	284.98	6.69	6.8655	33.9	5.69818	3.82961
63	-253.02	284.98	13.38	6.93439	34.9	5.69011	3.96339
64	-253.02	284.98	20.07	6.9417	35.6	5.6413	4.04512
65	-253.02	284.98	26.76	6.89339	36.3	5.55422	4.08284
66	-253.02	284.98	33.45	6.79235	36.9	5.43034	4.08012
67	-253.02	284.98	40.14	6.64047	37.5	5.27091	4.03898
68	-253.02	284.98	46.83	6.43943	38.	5.07721	3.96083
69	-253.02	284.98	53.52	6.19088	38.4	4.85058	3.84693
70	-253.02	284.98	60.21	5.89657	38.8	4.59247	3.69848
71	-253.02	284.98	66.9	5.55836	39.2	4.30448	3.51665
72	-253.02	284.98	73.59	5.17826	39.6	3.98828	3.30273
73	-253.02	284.98	80.28	4.75834	40.	3.64561	3.058
74	-253.02	284.98	86.97	4.30073	40.3	3.27824	2.78378
75	-253.02	284.98	93.66	3.80745	40.7	2.88786	2.48133
76	-253.02	284.98	100.35	3.28032	41.	2.47599	2.15174
77	-253.02	284.98	107.04	2.72053	41.3	2.04369	1.79573
78	-253.02	284.98	113.73	2.12805	41.6	1.59111	1.41315
79	-253.02	284.98	120.42	1.4998	41.9	1.11614	1.00181
80	-253.02	284.98	127.11	.824572	42.2	.610753	.553986
END	-253.02	284.98	133.8	0	0	0	0

Summary of Post Construction Certified Array Geometry- WDWD

The tower locations based on the relative distances in feet and azimuths (referenced to true north) provided on the certified survey drawing of Appendix A were compared to the relative distances and azimuths relative to true north of the array elements specified on the construction permit. The surveyed and specified values were converted to the rectangular coordinate system to facilitate finding the individual tower specified-to-surveyed differences, which were then converted to the polar coordinate system to determine their magnitudes. This tabulation shows those distances and other information that is relevant to their determination.

Tower	Specified Array Geometry			Post-Construction Certification*		Distance From Specified Base Location	
	Spacing (Deg.)	Spacing (Feet)	Azimuth (Deg. T.)	Spacing (Feet)	Azimuth (Deg. T.)	(Feet)	(Deg.)
1	90.0	416.8	311.6	415.84	311.9	2.3	0.5
2	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
3	90.0	416.8	131.6	417.73	131.9	2.3	0.5
4	180.0	833.5	131.6	834.17	131.9	4.3	0.9

*From 7/3/09 Record Survey Plan prepared by Benjamin W. Crusselle, P.L.S.

The "as built" tower displacements from their specified locations expressed in electrical degrees at carrier frequency, which correspond to space phasing differences in the far-field radiation pattern of the array, are well below the +/- 3 degree operating phase range specified for antenna monitor parameters by the FCC Rules.

Sampling System Measurements – WDWD

Impedance measurements were made of the antenna monitor sampling system using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The measurements were made looking into the antenna monitor ends of the sampling lines for two conditions – with and without the sampling lines connected to the sampling devices at the tower bases under open-circuited conditions.

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 below 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 590 kHz (kHz)	Sampling Line Open-Circuited Resonance Above 590 kHz (kHz)	Sampling Line Calculated Electrical Length at 590 kHz (degrees)	590 kHz Measured Impedance with Sampling Loop Connected (Ohms)
1	521.0	871.3	305.7	48.6 - j2.7
2	521.0	871.1	305.7	48.8 - j2.6
3	521.0	871.6	305.7	48.3 - j2.6
4	520.9	871.3	305.8	48.3 - j2.3

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	434.2	5.5 – j50.4	607.9	8.0 + j50.0	50.6
2	434.2	5.5 - j50.4	607.9	8.0 + j50.1	50.7
3	434.2	5.5 - j50.4	607.9	8.0 + j50.1	50.7
4	434.1	5.4 - j50.1	607.7	7.8 + j49.5	50.3

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 using a Hewlett-Packard 8751A network analyzer in a calibrated measurement system. They were placed side-by-side with a conductor passing the reference signal passing through them and their outputs were fed into the A and B receiver inputs of the analyzer which was configured to measure the relative ratios and phases of their output voltages. The following results were found for carrier frequency, 590 kilohertz:

Tower	Ratio	Phase(Degrees)
1	1.000	+0.23
2	REF.	REF.
3	1.001	+0.19
4	1.001	+0.13

Delta type TCT-3 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 of the four were approximately 0.1 percent and 0.2 degree, they provide far more accurate relative indications than could be the case within their rated accuracies.

Reference Field Strength Measurements – WDWD

Reference field strength measurements were made using a Potomac Instruments field strength meter of known calibration at three locations along radials at the azimuths with radiation values specified on the construction permit and, additionally, on a major lobe radial for each directional pattern. The measured field strengths, descriptions and GPS coordinates for the reference measurement points are shown on the following pages

WDWD, 590 kHz., Atlanta, GA

Daytime Reference Field Strength Measurements

Radial Deg. T	Point Num.	Distance (km)	Field (mV/m)	Coordinates Lat. N	(NAD 27) Long. W	Description
	1	3.76	206.0	33-49-22.8	84-36-50.1	At Birdsong, on Gherry Dr. SW, 40 ft. N of STOP Sign.
131.6	2	5.70	140.0	33-48-39.9	84-35-54.3	1514 Pendley Dr. SW, at mailbox.
Main	3	7.50	70.4	33-48-02.0	84-35-01.7	6300 Sweetbriar Dr. SW, at mailbox.
	1	3.00	36.1	33-51-01.0	84-40-34.6	4307 Morningside Dr. SW, at mailbox.
280.5	2	5.60	10.0	33-51-16.2	84-42-14.6	4188 Oak Springs Rd. SW, at 25 MPH sign.
CP	3	8.05	2.05	33-51-31.0	84-43-43.9	1875 Cleburne Pkwy, at black mailbox.
	1	3.60	11.8	33-52-33.8	84-39-20.9	3522 Mustang Dr., at mailbox.
343	2	5.60	11.0	33-53-35.6	84-39-43.7	3664 Homewood Trail, at mailbox.
CP	3	8.12	3.97	33-54-54.5	84-40-12.3	3921 McEachern Farm Dr. SW, at mailbox.
FCC		7.41	8.35	33-51-59.3	84-43-13.8	At driveway to FCC Monitor Station, Powder Springs, GA

All measurements were taken using Potomac Instruments PI-4100 meter, Ser.# 122, Factory Calibrated July 27, 2009.

DA-Day Measurements were made on Saturday, September 5, 2009, between 1000 and 1530 hours EDT.

DA-Night Measurements were made on Sunday, September 6, 2009, between 0913 and 1330 hours EDT.

The FCC Monitoring Station measurements Day (1425 hrs) and Night (1515 hrs) were measured on Saturday, September 5, 2009,

WDWD, 590 kHz, Atlanta, GA

Nighttime Reference Field Strength Measurements

Radial Deg. T	Point Num.	Distance (km)	Field (mV/m)	Coordinates Lat. N	(NAD 27) Long. W	Description
	1	3.18	25.7	33-52-09.5	84-37-32.4	2420 Hurt Rd. SW across Hurt from mailbox.
33	2	5.05	8.65	33-52-59.9	84-36-52.4	2841 Tiffany Dr. SW, across street from 25 MPH sign.
MP	3	7.30	10.0	33-54-01.6	84-36-04.7	In Lamplight Village, 642 Winston Rd., at fire hydrant.
	1	3.40	31.6	33-51-35.3	84-36-42.9	1987 Indian Springs Dr. SW, at mailbox.
61.5	2	5.52	17.4	33-52-07.9	84-35-31.6	Austell & Amy Lane SW at traffic switchbox.
MP	3	7.66	8.96	33-52-40.4	84-34-17.9	3078 Favor Pines Ct. SW, at mailbox.
	1	3.76	173.0	33-49-22.8	84-36-50.1	At Birdsong, on Gherry Dr. SW, 40 ft. N of STOP Sign.
131.6	2	5.70	113.0	33-48-39.9	84-35-54.3	1514 Pendley Dr. SW, at mailbox.
Main	3	7.50	29.0	33-48-02.0	84-35-01.7	6300 Sweetbriar Dr. SW, at mailbox.
	1	3.55	22.4	33-48-55.9	84-39-30.8	Westside Rd. & Judy St., street sign.
201.5	2	5.70	13.6	33-47-51.2	84-40-01.4	2827 Janet St., at mailbox.
MP	3	7.95	8.21	33-46-43.2	84-40-34.1	4169 Riley Rd., opposite edge of drive from mailbox.
	1	2.67	15.7	33-51-12.7	84-40-18.1	Grady Grier & Old Austell Rd., on Grier opposite STOP sign.
290	2	3.88	9.32	33-51-25.9	84-41-02.3	3955 Anderson Rd., at mailbox .
MP	3	6.43	8.32	33-51-54.7	84-42-35.9	5270 Story Rd., at mailbox.
	1	3.62	17.8	33-52-27.4	84-39-43.9	3742 Bengal Dr., at telephone terminal box.
333	2	5.17	10.1	33-53-12.3	84-40-11.6	2741 Old Villa Rica Rd. SW, at mailbox.
MP	3	7.13	7.85	33-54-08.8	84-40-46.1	4300 Walker Rd., at mailbox.
FCC		7.41	7.10	33-51-59.3	84-43-13.8	At driveway to FCC Monitor Station, Powder Springs, GA

Direct Measurement of Power - WDWD

Common point impedance measurements were made using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The measurements were made at the phasor cabinet input jack adjacent to the common point current meter that is used to determine operating power. The resistance value was adjusted to provide the correct input power with the specified common point current. The reactance value was adjusted to cancel incidental inductance in the circuit between the transmitter output port and the common point in the phasor cabinet, including the main-auxiliary switching contactor, to provide a non-reactive load for the transmitter at carrier frequency.

The common point input power of the nighttime directional antenna system is the total of the 4,860 watt authorized nighttime antenna input power (4,500 X 1.08) and the power that is dissipated in a dummy load to stabilize the pattern bandwidth of the system. To facilitate calculating the total common point input power, the input resistance of the dummy load at carrier frequency was measured at the J-plug within the phasor cabinet and found to be 52.0 ohms. The ratio of the current at the dummy load input to the common point current was measured with the network analyzer system and sampling toroids at both locations. The dummy load current was found to be 0.438 times the common point current with the nighttime directional antenna system adjusted to the antenna monitor parameters shown herein. As the common point resistance was set to 50.0 ohms:

$$(I_{CP})^2\,(50.0) \;-\; (0.438)^2\,(I_{CP})^2\,(52.0) \;=\; 4{,}860 \text{ Watts}$$

Therefore

$$I_{CP} = 11.02 \text{ A}$$

Total Power = 6,070 W

Dissipated Power = 1,210 W

Antenna Monitor and Sampling System - WDWD

The antenna monitor is a Potomac Instruments model AM-1901. The sampling devices for the towers are Delta Electronics Type TCT-3 shielded toroidal transformers located at the ATU output reference points. The TCT-3 transformers have a sensitivity of 1.0 volt per ampere of RF current. The toroids are connected through equal length ½ inch foam heliax sampling lines to the antenna monitor, with short flexible line sections inside the rack enclosure to reduce stress on the antenna monitor's connectors.

RFR Protection - WDWD

The operation of WDWD 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 those necessary to prevent electric and magnetic field exposure above the required levels.

The fence sizes were determined with reference to Table 2 of Supplement A to FCC OET Bulletin 65 (Edition 97-01). According to Table 2, the predicted "Distance for Compliance with FCC limits" at 590 kilohertz, for 12 kilowatts fed into a single tower 0.25 wavelength in height, is less than 5 meters. Although the 12 kilowatt input to the WDWD daytime antenna system is divided between the several towers, fences were installed to restrict access within a 50-by-50 foot (15.2-by-15.2 meter) area surrounding each tower base to ensure that the requirement is met. For the 4.5 kilowatt WDWD nighttime power, Table 2 also specifies a predicted distance of 2 meters.

The fences and tuning houses limit access to areas with fields that exceed the requirements of the Rules for both directional antenna patterns. If it is necessary for workers to be inside them for extended periods of time, the station may switch to nondirectional operation with tower 3 to de-activate towers 1, 2, and 4, switch to daytime directional mode to de-activate tower 3, or temporarily terminate operation. The WDWD facility is, therefore, in full compliance with the FCC's requirements with regard to radio frequency radiation exposure.

Derivation of Inverted Nighttime Directional Antenna Parameters

The WDWD nighttime directional antenna pattern, which remains unchanged on the construction permit authorizing the new daytime pattern, was studied with regard to bandwidth improvement. By mathematical analysis, the parameters of the four towers were found to be from multiplication of three tower pairs that define the null locations of the resulting pattern shape. As the array employs equal height towers, the embedded design pairs can be inverted (having their field ratios changed to their inverse values) in any combination to achieve different base impedance, power division and pattern bandwidth characteristics.[1] The eight possible sets of theoretical field parameters to produce the same pattern shape were studied in combination with nodal analysis of hypothetical feeder system designs - and the one that was found to provide the optimum pattern bandwidth characteristics was chosen for use by WDWD.

To demonstrate the equivalence of the pattern shape for the field parameters to which the nighttime directional antenna system was adjusted - as shown in the analysis contained herein - to the pattern shape calculated for the parameters shown on the station license, tabulations for both appear on the following pages. It can be seen that the patterns are identical within the range allowed by rounding of the normalized field ratios and phases, with no difference in standard field approaching even one percent at any combination of azimuth and vertical angle.

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[1] Rackley, Ronald D. *AM Antenna Systems*, chapter 4.3 of NAB Engineering Handbook, 10th ed., ed. Edmund Williams, National Association of Broadcasters (Washington, 2007), pp.721-722.

CALCULATION USING INVERTED PARAMETERS

RADIO STATION WDWD
ATLANTA, GEORGIA

590 KHZ 12 KW-D 4.5 KW-N U DA-2

NIGHTTIME RADIATION PATTERN
(Radiation Values at One Kilometer)

Tower Number	Field Ratio	Phase (deg.)	Spacing (deg.)	Bearing (deg.)	Height (deg.)
1	0.584	+152.1	0.0	0.0	90.7
2	1.000	+0.0	90.0	131.6	90.7
3	0.947	-156.5	180.0	131.6	90.7
4	0.382	+37.8	270.0	131.6	90.7

Input Power (kW)	Loop Loss (ohms)	Theo. RMS (mV/m)	Theo. RSS (mV/m)	Q Factor (mV/m)	Standard RMS (mV/m)
4.5	1.0	715.8	1745	43.6	752.9

Standard Radiation Pattern
(at One Kilometer)

Azimuth Angle (deg)	Elevation Angle in Degrees 0 (mV/m)	5 (mV/m)	10 (mV/m)	15 (mV/m)	20 (mV/m)	25 (mV/m)	30 (mV/m)
0	289	288	286	281	273	262	246
5	301	300	295	287	275	259	240
10	295	293	287	277	263	245	224
15	272	270	263	253	238	221	200
20	236	234	228	219	206	190	173
25	197	196	191	184	174	162	149
30	170	169	166	161	154	145	136
35	167	166	163	159	153	146	138
40	182	181	178	174	167	159	149
45	199	197	194	188	181	172	161
50	201	200	197	192	185	176	165
55	187	186	184	180	174	167	158
60	168	167	165	161	156	150	144
65	181	180	174	166	156	146	135
70	261	257	245	227	205	180	156
75	390	384	365	336	299	257	214
80	549	540	514	474	421	361	298
85	722	711	678	625	558	480	397
90	899	885	845	782	700	604	502
95	1071	1055	1009	935	840	728	607
100	1232	1214	1162	1079	971	845	708
105	1376	1356	1300	1209	1090	951	800
110	1499	1479	1418	1321	1193	1043	880
115	1599	1578	1514	1412	1277	1119	945
120	1674	1652	1586	1480	1340	1176	995
125	1723	1700	1632	1524	1382	1213	1028
130	1745	1722	1654	1544	1400	1230	1043
135	1740	1717	1649	1540	1396	1226	1040
140	1708	1686	1619	1511	1369	1202	1018
145	1650	1628	1563	1458	1320	1157	979
150	1566	1545	1482	1381	1249	1094	924
155	1457	1437	1378	1283	1158	1012	852
160	1326	1307	1252	1164	1049	914	768
165	1175	1158	1108	1029	925	804	673
170	1010	995	951	881	790	684	570
175	835	822	785	726	649	559	464

Standard Radiation Pattern
(at One Kilometer)

Azimuth Angle (deg)	Elevation Angle in Degrees 35 (mV/m)	40 (mV/m)	45 (mV/m)	50 (mV/m)	55 (mV/m)	60 (mV/m)	65 (mV/m)
0	226	202	176	147	118	91.0	67.4
5	217	191	164	136	109	84.4	63.6
10	200	175	149	123	99.3	78.1	60.4
15	178	155	132	110	90.5	73.0	58.1
20	155	136	117	100	83.9	69.7	57.1
25	135	121	107	93.3	80.7	68.8	57.5
30	125	115	104	92.4	81.3	70.2	59.1
35	128	118	108	96.4	85.0	73.4	61.5
40	139	127	115	103	90.1	77.2	64.3
45	149	136	123	109	94.9	80.8	66.8
50	153	140	127	112	98.0	83.3	68.7
55	148	137	125	112	98.5	84.3	69.8
60	136	128	119	108	96.2	83.5	69.9
65	126	118	109	101	91.6	81.0	68.9
70	134	117	104	94.3	86.0	77.3	67.1
75	173	138	111	93.0	81.7	73.3	64.6
80	237	181	135	102	81.4	70.1	62.0
85	315	238	173	122	87.6	69.1	59.6
90	400	303	218	149	100.0	71.3	57.9
95	486	370	267	181	117	76.6	57.4
100	569	436	316	214	136	84.3	58.0
105	645	496	361	246	156	93.3	59.6
110	712	550	402	275	174	102	61.9
115	767	595	436	299	189	111	64.4
120	810	629	462	318	202	117	66.6
125	837	651	479	330	210	122	68.2
130	850	661	487	336	214	124	69.0
135	847	659	485	335	213	123	68.8
140	829	644	474	326	207	120	67.7
145	796	618	454	312	198	115	65.9
150	749	580	425	291	184	108	63.5
155	689	532	388	265	168	99.2	61.1
160	619	475	345	235	149	90.0	58.9
165	540	412	298	202	129	81.3	57.6
170	455	346	249	169	111	74.4	57.4
175	369	279	201	139	94.9	70.1	58.4

Standard Radiation Pattern
(at One Kilometer)

Azimuth Angle (deg)	Elevation Angle in Degrees 0 (mV/m)	5 (mV/m)	10 (mV/m)	15 (mV/m)	20 (mV/m)	25 (mV/m)	30 (mV/m)
180	659	648	618	570	508	436	360
185	490	482	458	422	375	322	266
190	339	334	318	293	261	225	189
195	225	222	213	198	181	162	144
200	170	168	164	159	152	144	136
205	173	173	171	167	162	156	149
210	194	193	190	186	179	171	162
215	202	201	198	192	185	176	165
220	194	193	189	184	177	168	157
225	176	175	172	167	161	154	145
230	165	164	162	157	151	144	135
235	177	176	173	167	159	149	139
240	211	209	204	196	185	171	157
245	250	248	242	232	218	202	183
250	282	280	274	263	248	230	209
255	300	298	292	282	269	251	231
260	299	298	294	286	276	261	243
265	280	280	278	275	269	259	246
270	246	246	248	249	249	247	240
275	200	202	206	213	220	225	226
280	150	153	160	171	185	197	206
285	106	109	117	130	148	167	184
290	86.1	86.1	88.3	97.5	115	139	161
295	98.8	95.0	86.7	82.4	91.9	114	141
300	125	119	103	85.4	80.6	97.3	125
305	146	139	120	95.0	78.7	87.5	115
310	157	150	129	101	79.6	83.7	110
315	155	147	127	100	79.3	84.5	111
320	140	133	115	91.6	78.7	90.2	118
325	115	110	96.3	82.8	83.3	103	130
330	91.4	88.9	84.2	85.4	99.0	122	148
335	89.3	90.5	95.8	108	126	149	169
340	120	123	131	145	161	178	192
345	168	170	177	187	198	208	214
350	217	219	222	227	232	234	231
355	260	260	260	260	258	252	243

Standard Radiation Pattern
(at One Kilometer)

Azimuth Angle (deg)	Elevation Angle in Degrees 35 (mV/m)	40 (mV/m)	45 (mV/m)	50 (mV/m)	55 (mV/m)	60 (mV/m)	65 (mV/m)
180	285	216	158	113	84.6	69.2	60.4
185	212	163	125	97.3	80.9	71.1	62.9
190	156	128	107	92.5	82.9	74.7	65.5
195	128	115	105	96.4	88.0	78.7	67.8
200	129	121	113	104	93.5	82.0	69.4
205	141	132	121	110	97.3	84.0	70.0
210	151	139	126	113	98.6	84.1	69.5
215	153	140	126	112	97.1	82.6	68.1
220	146	133	120	107	93.3	79.6	65.9
225	135	124	112	100	88.2	75.8	63.3
230	126	116	105	94.6	83.4	72.1	60.6
235	127	116	104	92.1	80.7	69.5	58.4
240	141	125	110	95.0	81.4	68.8	57.2
245	163	142	122	103	85.9	70.6	57.3
250	187	162	138	115	93.5	74.7	58.8
255	207	181	154	128	103	80.3	61.5
260	221	196	168	140	112	86.8	64.9
265	228	205	179	150	121	93.3	68.9
270	227	209	186	158	129	99	72.9
275	220	208	189	164	135	105	76.8
280	208	203	189	167	140	110	80.3
285	194	195	186	168	143	113	83.3
290	178	186	182	168	145	116	85.7
295	164	177	178	167	146	118	87.7
300	152	169	174	166	147	119	89.1
305	143	164	171	165	147	120	90.0
310	139	161	170	164	147	121	90.4
315	140	162	170	165	147	121	90.3
320	146	165	172	165	147	120	89.7
325	156	172	175	166	146	119	88.7
330	169	180	180	168	146	117	87.1
335	184	189	184	168	144	115	84.9
340	199	198	187	168	142	112	82.2
345	213	205	189	166	138	108	79.0
350	223	209	188	162	133	103	75.4
355	228	208	184	156	126	97.3	71.5

CALCULATION USING LICENSED PARAMETERS

RADIO STATION WDWD
ATLANTA, GEORGIA

590 KHZ 12 KW-D 4.5 KW-N U DA-2

NIGHTTIME RADIATION PATTERN
(Radiation Values at One Kilometer)

Tower Number	Field Ratio	Phase (deg.)	Spacing (deg.)	Bearing (deg.)	Height (deg.)
1	0.435	+155.4	0.0	0.0	90.7
2	1.000	0.0	90.0	131.6	90.7
3	0.965	-153.0	180.0	131.6	90.7
4	0.513	+41.0	270.0	131.6	90.7

Input Power (kW)	Loop Loss (ohms)	Theo. RMS (mV/m)	Theo. RSS (mV/m)	Q Factor (mV/m)	Standard RMS (mV/m)
4.5	1.0	715.7	1747	43.7	752.9

Standard Radiation Pattern
(at One Kilometer)

Azimuth Angle (deg)	Elevation Angle in Degrees 0 (mV/m)	5 (mV/m)	10 (mV/m)	15 (mV/m)	20 (mV/m)	25 (mV/m)	30 (mV/m)
0	289	288	286	281	273	262	246
5	302	300	295	287	275	259	240
10	296	294	287	277	263	245	224
15	272	270	264	253	238	221	200
20	236	234	228	219	206	191	173
25	197	196	191	184	174	162	149
30	170	169	166	161	154	145	136
35	167	166	164	159	153	146	138
40	183	182	179	174	167	159	150
45	199	198	194	189	181	172	161
50	202	201	197	192	185	176	165
55	187	186	184	180	174	167	158
60	167	166	164	161	156	150	144
65	180	178	173	165	155	145	135
70	259	255	244	226	203	179	155
75	389	383	364	335	298	256	213
80	548	539	513	472	420	360	297
85	721	710	677	624	557	479	396
90	898	884	844	781	699	603	501
95	1070	1055	1008	935	839	727	607
100	1231	1214	1162	1079	971	844	707
105	1376	1356	1299	1209	1090	951	799
110	1499	1479	1418	1321	1193	1043	879
115	1599	1578	1514	1412	1277	1119	945
120	1674	1652	1586	1480	1340	1176	995
125	1723	1700	1633	1525	1382	1213	1028
130	1745	1722	1654	1545	1401	1230	1043
135	1741	1717	1649	1540	1396	1226	1039
140	1709	1686	1619	1511	1370	1202	1018
145	1650	1628	1563	1458	1320	1157	979
150	1566	1545	1482	1381	1249	1093	923
155	1457	1437	1378	1283	1158	1012	852
160	1326	1307	1252	1164	1049	914	767
165	1175	1158	1108	1028	925	803	672
170	1009	994	950	880	789	683	569
175	834	821	784	725	648	558	463

Standard Radiation Pattern
(at One Kilometer)

Azimuth Angle (deg)	Elevation Angle in Degrees 35 (mV/m)	40 (mV/m)	45 (mV/m)	50 (mV/m)	55 (mV/m)	60 (mV/m)	65 (mV/m)
0	226	203	176	147	118	91.1	67.5
5	217	191	164	136	109	84.5	63.7
10	200	175	149	123	99.4	78.2	60.4
15	178	155	132	111	90.6	73.1	58.2
20	155	136	117	100	84.0	69.8	57.2
25	135	121	107	93.4	80.8	68.9	57.6
30	126	115	104	92.5	81.4	70.3	59.2
35	129	118	108	96.6	85.1	73.5	61.6
40	139	128	116	103	90.3	77.3	64.4
45	149	137	123	109	95.0	80.9	66.9
50	153	141	127	113	98.1	83.5	68.9
55	149	137	125	112	98.6	84.4	69.9
60	136	128	119	108	96.3	83.6	70.0
65	126	117	109	101	91.7	81.1	69.0
70	133	116	104	94.1	86.0	77.3	67.1
75	172	137	110	92.6	81.5	73.2	64.6
80	236	180	134	101	81.1	70.0	61.9
85	314	237	172	121	87.0	68.9	59.5
90	399	302	217	149	99.4	70.9	57.8
95	485	369	266	180	116	76.1	57.2
100	568	435	315	214	136	83.8	57.7
105	645	496	360	245	155	92.8	59.3
110	712	549	401	274	173	102	61.5
115	767	594	435	298	189	110	64.0
120	809	628	461	317	201	117	66.2
125	837	651	479	330	209	121	67.8
130	849	661	487	335	213	123	68.5
135	847	659	485	334	212	123	68.4
140	829	644	474	326	207	120	67.3
145	796	617	453	311	197	115	65.4
150	748	579	424	290	183	107	63.1
155	689	531	387	264	167	98.6	60.7
160	618	475	344	234	148	89.5	58.6
165	539	412	297	202	129	80.8	57.4
170	454	345	248	169	110	73.9	57.2
175	368	278	200	138	94.3	69.8	58.3

Standard Radiation Pattern
(at One Kilometer)

Azimuth Angle (deg)	Elevation Angle in Degrees 0 (mV/m)	5 (mV/m)	10 (mV/m)	15 (mV/m)	20 (mV/m)	25 (mV/m)	30 (mV/m)
180	658	647	617	569	507	435	359
185	488	480	457	421	374	320	264
190	338	332	316	291	260	224	188
195	224	220	211	197	180	161	143
200	169	167	164	158	151	144	136
205	173	173	170	167	162	156	149
210	194	193	190	186	179	172	162
215	203	202	198	193	185	176	165
220	194	193	190	184	177	168	158
225	176	175	172	168	162	154	145
230	165	164	162	157	151	144	136
235	178	176	173	167	159	149	139
240	211	209	204	196	185	172	157
245	250	248	242	232	218	202	183
250	282	280	274	263	248	230	210
255	300	298	292	282	269	251	231
260	299	298	294	286	276	261	243
265	280	280	278	275	269	260	246
270	245	246	248	249	249	247	240
275	200	201	206	213	220	225	225
280	149	152	160	171	184	197	206
285	106	108	116	130	148	167	183
290	85.9	85.8	87.9	97.0	115	138	161
295	99.1	95.3	86.8	82.2	91.4	114	141
300	125	119	103	85.5	80.3	96.8	125
305	147	140	121	95.3	78.6	87.1	114
310	158	151	130	101	79.6	83.3	110
315	156	148	128	100	79.2	84.1	111
320	140	134	115	91.9	78.5	89.8	117
325	116	110	96.6	82.9	82.9	102	130
330	91.6	89.0	84.1	85.1	98.5	122	148
335	89.0	90.1	95.3	107	126	148	169
340	120	122	131	144	161	178	192
345	167	170	176	186	198	207	213
350	217	218	222	227	231	233	231
355	259	260	260	260	258	252	243

Standard Radiation Pattern
(at One Kilometer)

Azimuth	Elevation Angle in Degrees						
Angle	35	40	45	50	55	60	65
(deg)	(mV/m)	(mV/m)	(mV/m)	(mV/m)	(mV/m)	(mV/m)	(mV/m)
180	284	216	157	113	84.1	68.9	60.3
185	210	162	124	96.8	80.6	71.0	62.9
190	155	127	106	92.2	82.8	74.7	65.6
195	127	115	105	96.3	88.0	78.8	67.9
200	128	121	113	104	93.6	82.1	69.5
205	141	132	122	110	97.5	84.1	70.1
210	151	139	127	113	98.8	84.3	69.7
215	153	140	126	112	97.3	82.7	68.2
220	146	134	121	107	93.5	79.7	66.0
225	135	124	113	101	88.4	75.9	63.4
230	126	116	106	94.7	83.5	72.2	60.7
235	127	116	104	92.2	80.8	69.6	58.5
240	141	125	110	95.1	81.5	68.9	57.3
245	163	143	122	103	86.0	70.7	57.4
250	187	163	138	115	93.6	74.8	58.9
255	207	181	154	128	103	80.4	61.5
260	221	196	168	140	112	86.9	65.0
265	228	205	179	150	121	93.4	69.0
270	227	209	186	158	129	100	73.0
275	220	208	189	164	135	105	76.8
280	208	203	189	167	140	110	80.3
285	194	195	186	168	143	113	83.3
290	178	186	182	168	145	116	85.8
295	163	177	178	167	146	118	87.8
300	151	169	174	166	147	119	89.2
305	143	163	171	165	147	120	90.1
310	139	161	170	164	147	121	90.5
315	140	161	170	165	147	121	90.4
320	146	165	172	165	147	120	89.8
325	155	171	175	166	146	119	88.7
330	168	180	180	168	146	117	87.1
335	184	189	184	168	144	115	85.0
340	199	198	187	168	142	112	82.3
345	213	205	189	166	138	108	79.1
350	223	209	188	162	133	103	75.5
355	228	208	184	156	126	97.4	71.5

Measured Field Strength Levels at FCC Monitoring Station

A condition on the construction permit requires that the field strength at the FCC's Powder Springs monitoring station not exceed 10 mV/m. In order to evaluate compliance with this requirement, a measurement location was selected immediately outside the entrance gate at the northeastern boundary of the property on Monitoring Station Road where it turns off at the address 3600 Hiram Lithia Springs Road, Powder Springs, Georgia. The geographic coordinates (NAD 27) of the location are 33° 51' 59.3" North Latitude and 84° 43' 13.8" West Longitude. The measured field strength at this point was found to be 8.35 mV/m for the daytime WDWD antenna pattern and 7.1 mV/m for the nighttime pattern.

Appendix A

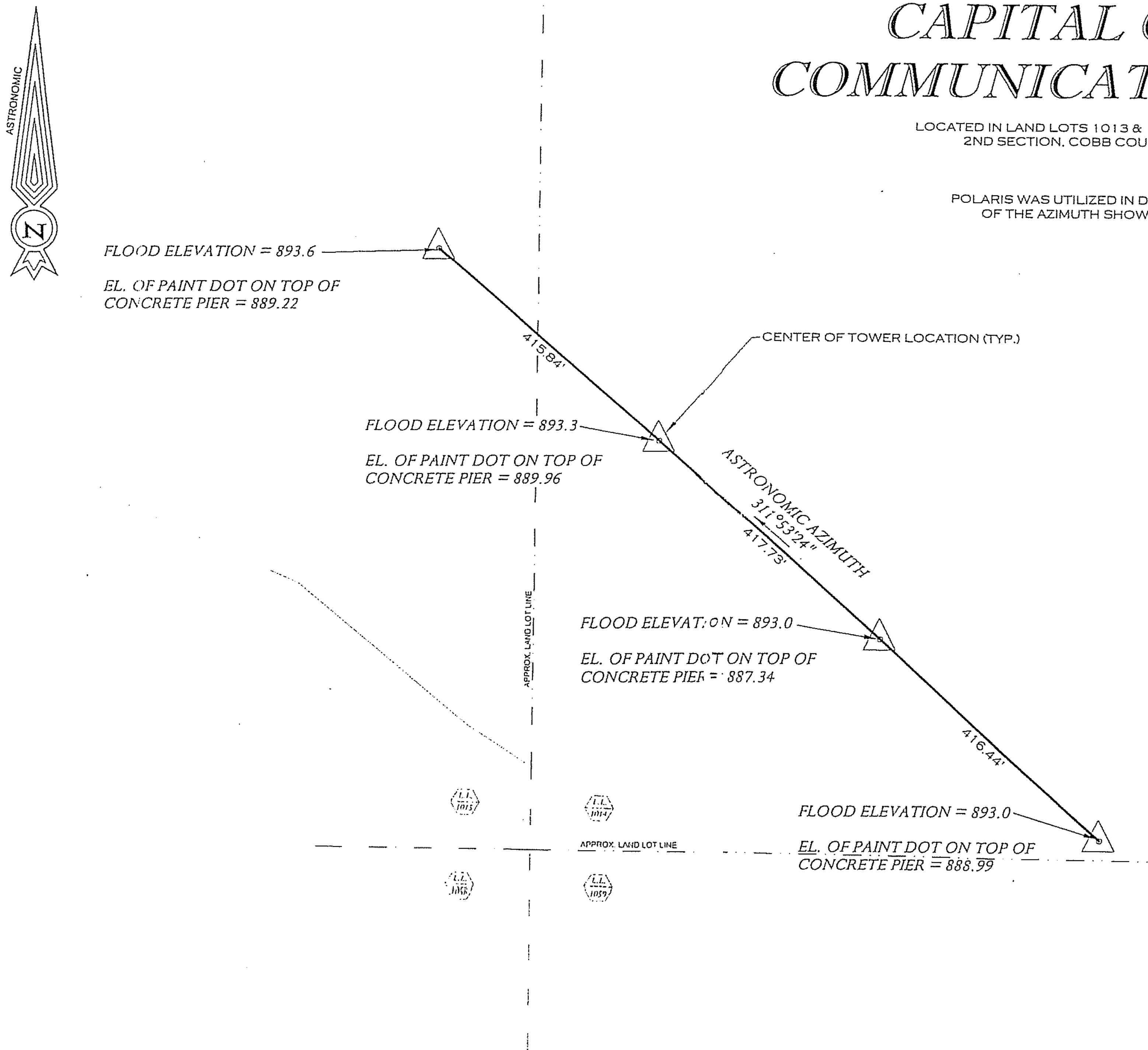
Certified Post Construction Array Geometry Survey

Elevation And Azimuth Determination For:

CAPITAL CITIES COMMUNICATIONS, INC.

LOCATED IN LAND LOTS 1013 & 1014, 19TH DISTRICT,
2ND SECTION, COBB COUNTY, GEORGIA

POLARIS WAS UTILIZED IN DETERMINATION
OF THE AZIMUTH SHOWN HEREON



GEORGIA REGISTERED No. 2841 LAND SURVEYOR BENJAMIN W. CRUSSELLE

GRAPHIC SCALE
100 0 100 200

DATE	DESCRIPTION

REVISIONS

THE CRUSSELLE COMPANY
PROFESSIONAL LAND SURVEYORS
2981 POWDER SPRINGS ROAD
MARIETTA, GEORGIA 30064
(770) 943-5903
E-MAIL: GCRUSSELLESR @ MINDSPRING.COM

PROJ. NO. CO6024 FILE: CO6024.DWG
FIELD SURVEY DATE: 7/3/09
PLAT DATE: 7/16/09 SCALE: 1"=100'

Appendix B

Construction Permit BP-20080801AYO

United States of America

FEDERAL COMMUNICATIONS COMMISSION

AM BROADCAST STATION CONSTRUCTION PERMIT

Authorizing Official:

Son Nguyen
Supervisory Engineer
Audio Division
Media Bureau

Grant Date: November 19, 2008

This permit expires 3:00 a.m. local time, 36 months after the grant date specified above.

Official Mailing Address:

RADIO DISNEY ATLANTA, LLC
77 W 66TH ST FL 16
NEW YORK NY 10023

Facility Id: 8623

Call Sign: WDWD

Permit File Number: BP-20080801AYO

Subject to the provisions of the Communications Act of 1934, as amended, subsequent acts and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions set forth in this permit, the permittee is hereby authorized to construct the radio transmitting apparatus herein described. Installation and adjustment of equipment not specifically set forth herein shall be in accordance with representations contained in the permittee's application for construction permit except for such modifications as are presently permitted, without application, by the Commission's Rules.

Commission rules which became effective on February 16, 1999, have a bearing on this construction permit. See Report & Order, Streamlining of Mass Media Applications, MM Docket No. 98-43, 13 FCC RCD 23056, Para. 77-90 (November 25, 1998); 63 Fed. Reg. 70039 (December 18, 1998). Pursuant to these rules, this construction permit will be subject to automatic forfeiture unless construction is complete and an application for license to cover is filed prior to expiration. See Section 73.3598.

Equipment and program tests shall be conducted only pursuant to Sections 73.1610 and 73.1620 of the Commission's Rules.

Hours of Operation: Unlimited

Average hours of sunrise and sunset:
Local Standard Time (Non-Advanced)

Jan.	7:45 AM	5:45 PM	Jul.	5:30 AM	7:45 PM
Feb.	7:30 AM	6:15 PM	Aug.	6:00 AM	7:30 PM
Mar.	6:45 AM	6:45 PM	Sep.	6:15 AM	6:45 PM
Apr.	6:15 AM	7:15 PM	Oct.	6:45 AM	6:00 PM
May	5:45 AM	7:30 PM	Nov.	7:15 AM	5:30 PM
Jun.	5:30 AM	7:45 PM	Dec.	7:30 AM	5:30 PM

Callsign: WDWD Permit No.: BP-20080801AYO

Name of Permittee: RADIO DISNEY ATLANTA, LLC

Station Location: ATLANTA, GA

Frequency (kHz): 590

Station Class: B

Antenna Coordinates:

	Day			
Latitude:	N	33 Deg	50 Min	43 Sec
Longitude:	W	84 Deg	38 Min	40 Sec

	Night			
Latitude:	N	33 Deg	50 Min	43 Sec
Longitude:	W	84 Deg	38 Min	40 Sec

Transmitter(s): Type Accepted. See Sections 73.1660, 73.1665 and 73.1670 of the Commission's Rules.

Nominal Power (kW):	Day: 12.0	Night: 4.5
Antenna Mode:	Day: DA	Night: DA

(DA=Directional Antenna, ND=Non-directional Antenna; CH=Critical Hours)

Antenna Registration Number(s):

Day:

Tower No.	ASRN	Overall Height (m)
1	1019411	
2	1019412	
3	1019414	

Night:

Tower No.	ASRN	Overall Height (m)
1	1019411	
2	1019412	
3	1019413	
4	1019414	

Callsign: WDWD Permit No.: BP-20080801AYO

DESCRIPTION OF DIRECTIONAL ANTENNA SYSTEM

Theoretical RMS (mV/m/km): Day: 1106 Night: 715.7

Standard RMS (mV/m/km): Day: 1162 Night: 752.9

Augmented RMS (mV/m/km):

Q Factor: Day: Night:

Theoretical Parameters:

Day Directional Antenna:

Tower No.	Field Ratio	Phasing (Deg.)	Spacing (Deg.)	Orientation (Deg.)	Tower Ref Switch *	Height (Deg.)
1	1.2890	112.000	0.0000	0.000	0	90.7
2	1.0000	0.000	90.0000	131.600	0	90.7
3	0.2600	-164.000	270.0000	131.600	0	90.7

* Tower Reference Switch
0 = Spacing and orientation from reference tower
1 = Spacing and orientation from previous tower

Theoretical Parameters:

Night Directional Antenna:

Tower No.	Field Ratio	Phasing (Deg.)	Spacing (Deg.)	Orientation (Deg.)	Tower Ref Switch *	Height (Deg.)
1	0.4350	155.400	0.0000	0.000	0	90.7
2	1.0000	0.000	90.0000	131.600	0	90.7
3	0.9650	-153.000	180.0000	131.600	0	90.7
4	0.5130	41.000	270.0000	131.600	0	90.7

* Tower Reference Switch
0 = Spacing and orientation from reference tower
1 = Spacing and orientation from previous tower

Inverse Distance Field Strength:
The inverse distance field strength at a distance of one kilometer from the above antenna in the directions specified shall not exceed the following values:

Day:

Azimuth:	Radiation:	
280.5	73	mV/m
343	73	mV/m

Special operating conditions or restrictions:

1 A complete nondirectional proof of performance, in addition to a complete proof on the day directional antenna system, shall be submitted before program tests are authorized. The nondirectional and directional field strength measurements must be made under similar environmental conditions.

2 Permittee shall install a type accepted transmitter, or submit application (FCC Form 301) along with data prescribed in Section 73.1660(b) should non-type accepted transmitter be proposed.

3 Licensee shall be responsible for satisfying all reasonable complaints of blanketing interference within the 1 V/m contour as required by Section 73.88 of the Commission's rules.

4 The authority granted herein is subject to the condition that the field intensity from the licensee's transmitter shall not exceed 10 mV/m as measured at the Federal Communications Commission's Powder Springs, Georgia monitoring station. In the event of interference to monitoring, direction finding, or related operations at the Federal Communications Commission's Powder Springs, Georgia monitoring station caused by either harmonic or spurious radiation, the licensee shall take such immediate corrective action as is necessary to eliminate the interference. This shall include responsibility for furnishing, installing and adjusting transmitter filter circuits, shielding, or other corrective devices. If these measures fail to eliminate interference to FCC operations caused by the presence of the licensee's signal, or if the field intensity exceeds 10 mV/m, the licensee shall immediately reduce power to the extent necessary to eliminate the interference and to comply with field limit. After determining this lower power level, the licensee shall immediately apply for a Special Temporary Authority (STA) and shall file an application to the Commission for the altered parameters.

*** END OF AUTHORIZATION ***

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
RADIO DISNEY ATLANTA, 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
WDWD	BP-2008081AYO	590	UNLIMITED	4.5	12

2. Station location	
State	City or Town
GEORGIA	ATLANTA

3. Transmitter location			
State	County	City or Town	Street address (or other identification)
GA	COBB	POWDER SPRINGS	N OF CLAY RD AT NOSES CREEK

4. Main studio location			
State	County	City or Town	Street address (or other identification)
GA	FULTON	ATLANTA	900 Circle 76, Suite 1320

5. Remote control point location (specify only if authorized directional antenna)			
State	County	City or Town	Street address (or other identification)
GA	FULTON	ATLANTA	900 Circle 76, Suite 1320

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.

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
11.0 (Including 1,210 W Dissipated Power)	15.8

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50.0	50.0	-j1.5	-j1.5

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	+152.4	+109.2	0.613	1.412	-	-
2	0.0	0.0	1.000	1.000	-	-
3	-157.1	-	0.927	-	-	-
4	+32.7	-157.7	0.392	0.232		-

Manufacturer and type of antenna monitor: POTOMAC INSTRUMENTS 1901

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, STEEL GUYED	128.0	129.5	130.4	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			
North Latitude	33 °	50 '	43 "	West Longitude	84 °	38 '	40 "

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

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.

N/A

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

Name (Please Print or Type)	Signature
RONALD D. RACKLEY	[signature]
Address (include ZIP Code) DLR, INC. 201 FLETCHER AVENUE SARASOTA, FL 34237	Date 9/15/2009 Telephone No. (Include Area Code) 941-329-6000

☐ Technical Director ☑ Registered Professional Engineer

☐ Chief Operator ☐ Technical Consultant

☐ Other (specify)