Print Form

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. BL-20090918ADD

RECEIVED - FCC
SEP 18 2009
Federal Communications Commission
Bureau / Office

SECTION I - APPLICANT FEE INFORMATION

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

MAILING ADDRESS (Line 1) (Maximum 35 characters)
2175 K Street NW

MAILING ADDRESS (Line 2) (Maximum 35 characters)
Suite 350

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Washington	DC	20037

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
202-457-4505	KXNT	FAC ID 33068

2. A. Is a fee submitted with this application? Yes [X] 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
MMR	0001	$ 615	

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
MOR	0001	$ 705	

	TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.	$ 1,320	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT CBS Radio Stations inc		
MAILING ADDRESS 2175 K Street NW., Suite 350		
CITY Washington	STATE DC	ZIP CODE 20037

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
KXNT	North Las Vegas			

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.

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	
Stephen A. Hildebrandt		
Title	Date	Telephone Number
Assistant Secretary	9-17-09	202-457-4505

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.

CARL T. JONES
CORPORATION

ENGINEERING EXHIBIT
IN SUPPORT OF AN
APPLICATION FOR LICENSE
STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
Facility ID: 33068

Applicant: CBS Radio Stations, Inc.

AUGUST, 2009

Carl T. Jones Corporation
7901 Yarnwood Court, Springfield, Virginia 22153-2899 (703) 569-7704 Fax: (703) 569-6417

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SECTION III OF FCC FORM 302-AM

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

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
CBS Radio Stations, Inc.

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☒ Station License ☐ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
KXNT	N/A	840	Unlimited	25	50

2. Station location

State	City or Town
Nevada	North Las Vegas

3. Transmitter location

State	County	City or Town	Street address (or other identification)
NV	Clark	Apex	840 Great Basin Hwy

4. Main studio location

State	County	City or Town	Street address (or other identification)
NV	Clark	Las Vegas	6655 West Sahara Ave

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

State	County	City or Town	Street address (or other identification)
NV	Clark	Las Vegas	6655 West Sahara Ave

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☒ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☒ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. Eng Stmt

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
22.95	32.45

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	-j3	-j3

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	0.0	0.0	1.000	1.000	---	---
2	34.2	34.2	1.005	1.005	---	---
3	87.4	87.4	1.119	1.119	---	---
4	122.4	122.4	1.003	1.003	---	---

Manufacturer and type of antenna monitor: Potomac Instruments, Model 1901-4

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

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
uniform, cross-section, guyed, base insulated	89	90	91	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			
	36 °	23 '	53 "		114 °	54 '	57 "

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

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

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

N/A

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

N/A

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

Name (Please Print or Type)	Signature (check appropriate box below)
Carl T. Jones, Jr., P.E.	
Address (include ZIP Code)	Date
Carl T. Jones Corporation 7901 Yarnwood Court Springfield, Virginia 22153	August 31, 2009
	Telephone No. (Include Area Code)
	(703) 569-7704

☐ Technical Director

☒ Registered Professional Engineer

☐ Chief Operator

☐ Technical Consultant

☐ Other (specify)

CARL T. JONES
CORPORATION

ENGINEERING STATEMENT OF CARL T. JONES, JR., P.E.
IN SUPPORT OF AN
APPLICATION FOR LICENSE
STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
Facility ID: 33068

Applicant: CBS Radio Stations, Inc.

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

1.0 GENERAL

Station KXNT is licensed for operation on a frequency of 840 kHz at a power of 50 kilowatts during daytime hours and 25 kilowatts during nighttime hours employing the same directional antenna pattern day and night (DA-2). This office has been authorized by CBS Radio Stations, Inc. ("CBS"), licensee of Station KXNT, North Las Vegas, Nevada, to prepare this engineering statement and the associated figures in support of an Application for License. This application follows the repair of a faulty transmission line and the replacement of the existing antenna monitor with a new Potomac Instruments, Model 1901-4, antenna monitor. Information is provided herein to support a complete directional antenna performance verification pursuant to Section 47 CFR 73.151(c) of the FCC Rules, computer modeling and sample system verification. The measurement and modeling

modeling techniques used to perform the proof of performance are described in this engineering statement. The measurement data and the pertinent computer generated input and output files are contained in the associated figures and Appendices A, B and C.

2.0 COMPUTER MODELING AND SAMPLE SYSTEM VERIFICATION

The proof of performance contained herein is based on the computer modeling and sample system verification procedures described in 47 CFR 73.151(c). The KXNT antenna array consists of four, triangular, uniform cross-section, steel, guyed, series-fed towers. A fifth tower located on the property is detuned to minimize impact on the KXNT array. All towers have a 18-inch face width, with the exception of tower 4 which has a 24-inch face width. The sampling system utilizes identical toroidal current transformers located at the base of each tower.

2.1 INDIVIDUAL TOWER IMPEDANCE MEASUREMENTS

Impedance measurements were performed at the base of each tower by the undersigned at the Antenna Tuning Unit ("ATU") output J-Plug. This measurement location corresponds to the input to the tower feed line and the location of the sampling system toroidal current transformer. The impedance measurements were performed using a Hewlett-Packard, Model 4396A, network analyzer; an Amplifier Research, Model 5W1000, power amplifier and a Tunwall Radio directional coupler. The impedance was measured

for each tower in the array with the other three towers open circuited at the same ATU output J-Plug location that was used to perform the impedance measurement.

2.2 INDIVIDUAL TOWER COMPUTER MODELS

A Method of Moments ("MoM") computer model was developed to model each element in the array using Expert MININEC Broadcast Professional (Version 12.5). The KXNT towers are all equal height, uniform cross-section, guyed structures with base insulators. A vertical wire model was developed for each tower. The radiator was defined by twelve segments, and an equivalent radius was calculated based on the tower face width using the following formula:

$$R = \frac{1}{2} \times \frac{3F}{\pi}$$

where:

R = *Equivalent Radius*

F = *Tower face width*

The calculated equivalent radius was employed in the model without any adjustments. The tower physical heights were individually adjusted and lumped series inductances were inserted at the base of each tower to replicate the individual measured tower base impedances within FCC Rule tolerances. No shunt capacitance was used in the model at the base of any tower.

A tabulation of the details employed in the individual tower modeling is included herein as Figure 1. A comparison of the measured individual tower impedances versus the modeled individual tower impedances along with the lumped series inductances employed in the model is contained in Figure 2. The adjusted tower heights, radii, and lumped series inductances employed are all well within the corresponding tolerances set forth in the Rules. As demonstrated in Figure 2, the adjusted modeled individual tower resistances and reactances are within ± 2 ohms and ± 4 percent of the respective individual measured tower resistances and reactances. The text files containing all necessary input and output data associated with the individual tower modeling are contained in Appendix A.

2.3 DIRECTIONAL ANTENNA COMPUTER MODELS

The theoretical directional antenna parameters were used in conjunction with the individual tower computer models to produce the daytime and nighttime directional antenna computer models. From the computer model, tower current distributions were derived that, when numerically integrated and normalized to the reference tower, are identical to the authorized field parameters of the theoretical directional antenna patterns. The modeled relative antenna monitor parameters, as calculated at the base of the tower and corresponding to the location of the individual tower impedance measurement locations used in the model, are provided in Figure 3. The text files containing all necessary input and output data associated with the daytime and nighttime directional antenna computer models are contained in Appendices B and C, respectively.

2.4 COMMON POINT IMPEDANCE AND CURRENT

The networks associated with the directional antenna system were adjusted for proper impedance transformation and the common point impedance matching network was set for Z = 50 - j3 ohms. The transmitter output power level was adjusted such that the common point current was 32.45 amperes and 22.95 amperes to achieve a daytime input power of 52,650 Watts and a nighttime input power of 26,325 Watts, respectively.

2.5 SAMPLE SYSTEM DESCRIPTION AND VERIFICATION MEASUREMENTS

The KXNT antenna sampling system utilizes identical Delta Electronics, Model TCT-3, toroidal current transformers mounted at the output of each tower's impedance matching network. The transformers are connected to a Potomac Instruments, Model 1901-4, antenna monitor with equal lengths of Cablewave, Type FLC12-50J, phase stabilized, foam dielectric, ½ inch coaxial cable. In addition, each FLC12-50J coaxial sample cable is connected to the antenna monitor via a 2-foot RG-213U jumper cable and to the toroidal current transformer via a 1.5-foot RG-213U jumper cable. The sample cables, including excess lengths of cable, are buried such that each cable is subjected to the same environmental conditions.

In accordance with the Rules, the sampling system toroidal current transformer performance was verified by driving a common reference current through all four transformers and comparing their outputs against one another as observed on the

Potomac Instruments Model 1901-4 antenna monitor. The devices were found to perform well within the manufacturer's stated accuracy. A tabulation of the measured values along with the serial number for each of the toroidal current transformers is included in Figure 4.

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

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

where:

Z = *Characteristic impedance and*

$R_1 + jX_1$ *and* $R_2 + jX_2$ *are the measured impedances at* $\pm$ *45 degrees offset frequencies.*

A tabulation of the sample line verification measurements is included herein as Figure 5. All sample line verification measurements were performed by the undersigned using a Hewlett-Packard, Model4396A, network analyzer; an Amplifier Research, Model 5W1000, power amplifier and a Tunwall Radio directional coupler. As demonstrated by the measured values in Figure 5, the measured sample line lengths are within 1 electrical

degree of each other and the measured characteristic impedances are well within 2 ohms of each other as required by 47 CFR 73.151(c)(2)(i) of the FCC Rules and Regulations.

An impedance measurement was performed at the input to each sample line, at the antenna monitor end of the line, with the sample toroid connected. The measurement was performed at the KXNT operating frequency of 840 kilohertz. The measurements are contained in the table of Figure 5.

2.7 POST-CONSTRUCTION CERTIFICATION

The orientation and distances between the individual antenna towers in the array were confirmed by a post-construction survey conducted by a licensed land surveyor, registered in the state of Nevada. Figure 6 summarizes the results of the survey which is contained in Figure 7. As demonstrated by the survey data, all towers were constructed to within 1.06 degrees of the design location. It should be noted that the tower numbers indicated on the survey were assigned arbitrarily and do not correspond to the actual tower numbers on the KXNT license. The following table provides a cross-reference of the survey tower numbers relative to the licensed tower numbers.

License Tower Number	Survey Tower Number
1	1
2	4
3	2
4	5

2.8 REFERENCE FIELD STRENGTH MEASUREMENTS

Reference field strength measurements were performed on eight radial bearings: 0°, 60°, 79.5°, 100.5°, 160°, 212°, 268°, and 312°. The 0° and 212° correspond to the pattern major lobes while all others correspond to the pattern minima. A total of three field strength measurements were performed on each of the eight radials. The measurements were performed by Mr. Tracy Teagarden, Chief Engineer of Station KXNT, and by Mr. Raymundo Ragle, employee of CBS Radio, using a Potomac Instruments, Model PI 4100, field intensity meter, Serial Number 165, most recently calibrated in March 2, 2009. The GPS coordinates (NAD83) and descriptions of the reference point locations are provided in Figure 8 along with the corresponding measured field strength value for each established location.

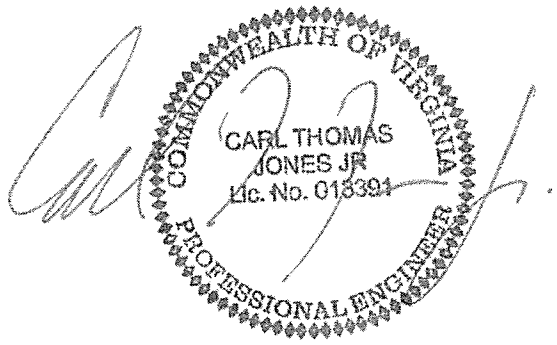
SUMMARY

It is submitted that the KXNT daytime and nighttime directional antenna systems have been modified and adjusted to conform with the technical specifications contained in the Station License. The KXNT daytime and nighttime pattern performance has been verified using computer modeling and sample system verification procedures in accordance with Section 47 CFR 73.151(c) and it is believed that the KXNT antenna system is operating within the terms of it's License Authorization and the FCC's Rules and Regulations. It is requested that a superceding license authorization be issued to reflect the new operating parameters and additional supporting data contained herein. The

license should also identify the new antenna monitor and reflect the replacement of the existing monitoring points with the newly established reference points.

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

Dated: August 31, 2009



TOWER MODEL HEIGHT AND RADIUS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

Tower	Physical Height (meters)	Modeled Height (meters)	Percent of Physical Height	Tower Face Width (meters)	Equivalent Radius (meters)	Modeled Radius (meters)	Percent of Equivalent Radius
1	90.0	91.5	101.7	0.4572	0.2183	0.2183	100.0
2	90.0	90.0	100.0	0.4572	0.2183	0.2183	100.0
3	90.0	89.5	99.4	0.4572	0.2183	0.2183	100.0
4	90.0	93.0	103.3	0.6096	0.2911	0.2911	100.0

MEASURED AND MODELED IMPEDANCES

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

Tower	Measured Tower Base Impedance[1]	Modeled Tower Base Impedance	Lumped Series Inductance (uH)	Shunt Capacitance (pF)	Adjusted Tower Base Impedance
1	42.1 +j 73.3	42.1 +j 28.1	8.6	0.0	42.1 +j 73.5
2	39.4 +j 67.8	39.7 +j 19.8	9.1	0.0	39.7 +j 67.8
3	39.1 +j 68.0	39.2 +j 17.0	9.7	0.0	39.2 +j 68.2
4	45.1 +j 67.3	45.0 +j 35.9	6.0	0.0	45.0 +j 67.6

[1] Measured at output J-Plug of matching network with other towers opened at J-Plug

ANTENNA MONITOR PARAMETERS AND COMMON POINT DATA

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

DAYTIME		
Tower	**Ratio**	**Phase (deg)**
1	1.000	0.0
2	1.005	34.2
3	1.119	87.4
4	1.003	122.4
Common Point Impedance = 50 -j 3 ohms Common Point Current = 32.45 amperes Antenna Input Power = 52,650 Watts		

NIGHTTIME		
Tower	**Ratio**	**Phase (deg)**
1	1.000	0.0
2	1.005	34.2
3	1.119	87.4
4	1.003	122.4
Common Point Impedance = 50 -j 3 ohms Common Point Current = 22.95 amperes Antenna Input Power = 26,325 Watts		

SAMPLE DEVICE CALIBRATION

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

Reference Sample Toroid Number	Measured Sample Toroid Number	Measured	
		Field Ratio	Phase (degrees)
2	1	0.995	0.0
2	3	0.995	0.0
2	4	1.000	0.0
1	4	1.005	0.0

Sample Toroid Number	Type	Serial Number
1	Delta Electronics, TCT-3	212
2	Delta Electronics, TCT-3	218
3	Delta Electronics, TCT-3	217
4	Delta Electronics, TCT-3	214

SAMPLE LINE VERIFICATION MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

Tower	Open Circuit Series Resonant Frequency[1] (kHz)	Open Circuit Measured Line Length[2] (degrees)	Resonant Frequency -45 degree Offset Frequency (kHz)	Resonant Frequency -45 degree Offset Impedance (Ohms)	Resonant Frequency +45 degree Offset Frequency (kHz)	Resonant Frequency +45 degree Offset Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)	Reference Impedance Sample Toroid Connected[2] (Ohms)
1	799.1	283.8	665.9	5.89 -j 47.78	932.3	4.28 +j 51.94	50.09	49.43 -j1.27
2	798.0	284.2	665.0	6.93 -j 47.98	931.0	5.35 +j 51.19	49.95	49.09 -j1.16
3	798.7	284.0	665.6	6.08 -j 48.18	931.8	4.45 +j 51.67	50.18	49.64 -j1.29
4	799.4	283.7	666.2	7.08 -j 47.73	932.6	5.31 +j 51.98	50.21	49.39 -j1.34

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

[2] At carrier frequency (840 kHz)

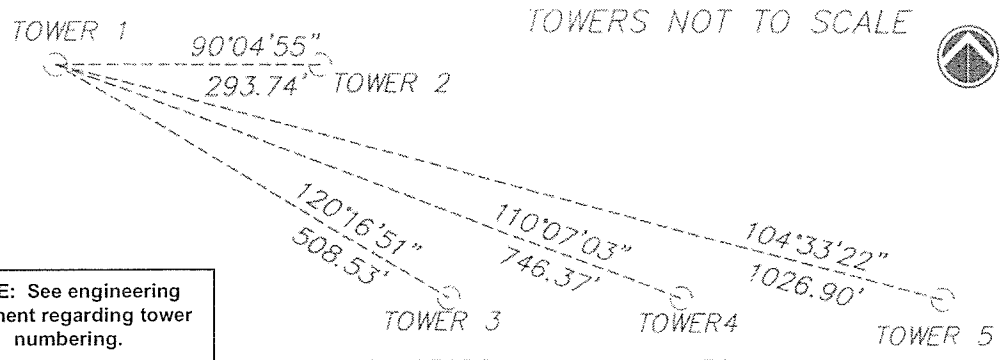
Figure 5

POST-CONSTRUCTION SURVEY SUMMARY

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

Tower	As Designed			As Constructed			Distance from Designed Location	
	Spacing		Orientation	Spacing		Orientation		
	(deg)	(feet)	(deg. T)	(deg)	(feet)	(deg. T)	(deg)	(feet)
1	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
2	229.00	744.83	110.0	229.47	746.37	110.12	0.67	2.17
3	90.00	292.73	90.0	90.31	293.74	90.08	0.34	1.09
4	315.10	1024.88	104.4	315.72	1026.90	104.56	1.06	3.45

Figure 7



NOTE: See engineering statement regarding tower numbering.

TOWER GEODETIC COORDINATES

TOWER	LAT	LONG	GROUND ELEV.
1	36°23'53.89"N	114°55'07.97"W	2208.7'
2	36°23'53.88"N	114°55'04.38"W	2203.7'
3	36°23'51.33"N	114°55'02.62"W	2202.7'
4	36°23'51.31"N	114°54'59.42"W	2198.6'
5	36°23'51.27"N	114°54'55.84"W	2193.3'

BENCHMARK

U.S.C.&G.S. STATION: J171, BEING A BRASS DISK SET IN CONCRETE, 3.05 MILES NORTHEAST OF THE I-15 AND APEX TURNOFF (LAS VEGAS BLVD. NORTH) ALONG A DIRT ROAD 200 FEET FROM LAS VEGAS BLVD. NORTH, APPROXIMATELY 50 FEET NORTHE OF THE U.P.R.R. RAILROAD TRACKS.
ELEVATION: 2410.29 U.S. SURVEY FEET (PUBLISHED BY NGS NAVD88)

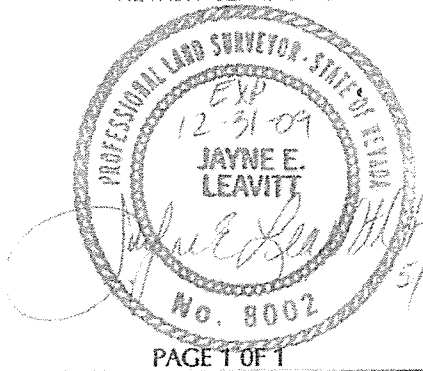
BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS PROJECT IS GRID NORTH AS DEFINED BY THE NEVADA COORDINATE SYSTEM OF 1983 (NAD83), NEVADA EAST ZONE (2701), AS DETERMINED USING THE NGS CORS COORDINATES FOR POINTS NVCA, CARLTON SQUARE 2 LAS VEGAS, AND J171, SHOWN IN FILE 88 OF SURVEYS, PAGE 33, CLARK COUNTY, NEVADA OFFICIAL RECORDS.

SURVEYOR'S CERTIFICATE

I, JAYNE E. LEAVITT, A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF NEVADA, ACTING AS AN AGENT FOR SOUTHWEST ENGINEERING, DO HEREBY CERTIFY THAT THIS SURVEY WAS MADE ON THE GROUND UNDER MY DIRECT SUPERVISION AND THAT THIS EXHIBIT REPRESENTS THE RESULTS OF SAID SURVEY.

JAYNE E. LEAVITT, P.L.S.
NEVADA CERTIFICATE NO. 8002



5/12/09

RADIO TOWER EXHIBIT
1"=200'
CBS RADIO

3610 North Rancho Drive
Las Vegas, Nevada 89130
Telephone: (702) 648-9700
fax: (702) 648-4143

SOUTHWEST ENGINEERING
LAND PLANNING • MAPPING • DEVELOPMENT

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

0 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	4.13	40.3	29.5	36° 26' 06.9"	114° 54' 57.1"	From the transmitter site access road, turn left (NW) on Highway 93 and proceed 2.48 miles to gravel road on right (NE). Proceed on gravel road 1.9 miles to pile of rocks on SE side of road. Point is 7 paces from road.
2	15.4	31.4	22.9	36° 32' 10.9"	114° 54' 57.4"	From the transmitter site access road, turn left (NW) on Highway 93 and proceed 11.3 miles to dirt road on right (E). Proceed on dirt road 1.3 miles to pile of rocks on S side of road.
3	22.0	23.2	18.9	36° 35' 47.0"	114° 54' 56.9"	From the transmitter site access road, turn left (NW) on Highway 93 and proceed 14.6 miles to gravel/dirt road on right (E). Proceed N on gravel/dirt road 0.4 mile to pile of rocks on E side of road.

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

60 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	2.69	70.6	51.7	36° 24' 36.6"	114° 53' 23.1"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to South Frontage Road. Turn left (N) on Frontage Road and proceed 1.52 miles. Turn left (NW) on paved road and proceed 0.81 mile. Point is on the W side between road and fence on drainage rocks.
2	3.52	32.2	24.5	36° 24' 50.0"	114° 52' 54.2"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to South Frontage Road. Turn left (N) on Frontage Road and proceed 1.97 miles. Turn left (NW) on paved road and proceed 0.36 mile. Continue 0.18 mile on dirt road to point located on SW side of road near pile of rocks.
3	4.69	40.3	29.5	36° 25' 09.0"	114° 52' 13.9"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to South Frontage Road. Turn left (N) on Frontage Road and proceed 2.85 miles. Point is located E of road 10 paces near pile of rocks.

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

79.5 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	3.61	19.2	13.8	36° 24' 36.6"	114° 53' 23.1"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.85 miles to North Frontage Road. Turn left (N) on Frontage Road and proceed 1.79 miles. Turn right (E) on dirt road and proceed 0.05 mile. Point is on the S side near pile of rocks.
2	6.20	14.4	11.1	36° 24' 29.6"	114° 50' 51.5"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.85 miles to North Frontage Road. Turn left (N) on Frontage Road and proceed 1.79 miles. Turn right (E) on dirt road and proceed 1.9 miles. Point is on the E side just S of storm drainage tunnel.
3	8.61	10.4	7.33	36° 24' 43.9"	114° 49' 16.4"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.85 miles to ramp for I-15 N. Enter interstate and proceed N 11.2 miles to exit for Highway 169. Travel E 0.1 mile to large parking lot on S side of road. Take dirt road W from parking lot and follow SW along I-15 continuing S on along power line access road for 8 miles. Point is 0.1 mile W of road in center of wash.

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

100.5 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	2.81	41.7	30.8	36° 23' 36.4"	114° 53' 05.8"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to South Frontage Road. Turn left (N) on Frontage Road and proceed 0.93 mile. Point is 10 paces from the W side of road adjacent to wooden power pole (P93639), S side at pile of rocks.
2	2.94	31	22.4	36° 23' 35.6"	114° 53' 00.7"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.85 miles to North Frontage Road. Turn left (N) on Frontage Road and proceed 0.95 mile. Point is located 18 paces E of paved road near pile of rocks.
3	4.07	8.56	6.13	36° 23' 29.2"	114° 52' 16.2"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.89 miles to Republic entrance on W side of I-15. Proceed past security check point and turn left on dirt road before railroad track underpass. Proceed 1.23 miles on dirt road from the Republic entrance to the point located on the E side of road, 5 paces from road adjacent to pile of rocks.

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

160 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	2.32	131	96.1	36° 22' 42.3"	114° 54' 25.1"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 0.72 mile to gravel road. Turn right (S) on gravel road and proceed 0.92 mile along power lines. Point is located 28 paces N under power line from pole number P94741 near pile of rocks.
2	3.74	40.9	29.4	36° 21' 59.2"	114° 54' 05.7"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to South Frontage Road. Turn right (S) on Frontage Road and proceed 1.14 miles. Point is located just S of storm tunnel under road, 18 paces off paved road near pile of rocks.
3	4.10	39	27	36° 21' 48.1"	114° 54' 00.6"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.85 miles to Republic entrance on W side of I-15. Proceed on dirt road up to railroad tracks and continue S along railroad tracks 1.40 miles. Point is located on W side of road on top of hill near pile of rocks.

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

212 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	15.9	117	88.8	36° 16' 37.2"	115° 00' 35.0"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to ramp for I-15 S. Turn right (S) on ramp and proceed 12 miles to Exit 54, Speedway Blvd. Turn left (E) on Speedway Blvd and proceed 1.05 miles. Point is located on S side of road 28 paces E of ground electrical box.
2	16.9	108	80.8	36° 16' 09.8"	115° 00' 55.9"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to ramp for I-15 S. Turn right (S) on ramp and proceed 12 miles to Exit 54, Speedway Blvd. Turn left (E) on Speedway Blvd and proceed 0.72 mile to Checkered Flag Lane. Turn right (S) on Checkered Flag Lane and left (E) into parking lot at Gate A. Point is located at NE corner of lot at electrical switch SW4112, N side of concrete pad.
3	18.4	84.1	61.6	36° 15' 28.2"	115° 01' 27.9"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to ramp for I-15 S. Turn right (S) on ramp and proceed 12 miles to Exit 54. Turn left (E) on Speedway Blvd and proceed 0.2 mile. Turn right (S) on Hollywood Blvd and proceed 1.63 miles to Las Vegas Blvd. Cross over Las Vegas Blvd and the point is located on the E side 3 paces N of round manhole cover on shoulder.

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

268 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	5.00	23.8	22.1	36° 23' 47.4"	114° 58' 18.0"	From the transmitter site access road, turn left (NW) on Highway 93 and proceed 3.66 miles to dirt road. Turn left (W) on dirt road and proceed 0.17 mile to Power Line Road. Turn left (S) and proceed 2.96 miles to end of fence. Follow fence W 90 paces from gravel road along wildlife fence. Cross fence 15 paces north from the 15th fence post.
2	18.2	3.61	2.62	36° 23' 31.9"	115° 07' 07.6"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to ramp for I-15 S. Turn right (S) on ramp and proceed 13.8 miles to Exit 52. Take ramp and proceed (NW) 3.2 miles on CR 215 from I-15 to N Pecos Road. Turn right (N) and proceed 6.8 miles to fork in road. Stay right (N) at fork and proceed 1.87 miles. Point is 17 paces west of road at top of hill from wash near pile of rocks.
3	41.4	1.15	0.834	36° 23' 05.2"	115° 22' 41.0"	From the transmitter site access road, turn right (SE) on Highway 93 and proceed 1.75 miles to ramp for I-15 S. Turn right (S) on ramp and proceed 13.8 miles to Exit 52. Take ramp and proceed (W) 13.2 miles on CR 215 from I-15 to ramp for I-95. Proceed N on I-95 9.22 miles to point on E side of highway. The point is just beyond the yellow and black sign that marks the wash, 18 paces off road to pile of rocks.

REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KXNT - NORTH LAS VEGAS, NEVADA
840 kHz - 50 kW-D, 25 kW-N, U, DA-2
AUGUST, 2009

312 Degree Radial

Point Number	Distance (km)	Daytime Field (mV/m)	Nighttime Field (mV/m)	Geographic Coordinates (NAD83)		Description
				Latitude	Longitude	
1	5.76	38.5	28.1	36° 25' 57.8"	114° 57' 49.2"	From the transmitter site access road, turn left (NW) on Highway 93 and proceed 3.66 miles to dirt road. Turn left (W) on dirt road and proceed 0.17 mile to Power Line Road. Turn left (S) and proceed 0.45 mile to gate on W side of gravel road. Proceed through gate 58 paces W of dirt road to point.
2	6.66	13.6	10.2	36° 26' 17.3"	114° 58' 16.1"	From the transmitter site access road, turn left (NW) on Highway 93 and proceed 3.66 miles to dirt road. Turn left (W) on dirt road and proceed 0.57 mile. Turn left (S) (no road) and proceed 0.26 mile to gravel river bed. Follow river bed W 0.15 mile. Point is located 360 feet S of river bed at pile of rocks.
3	7.79	21.7	16	36° 26' 42.0"	114° 58' 50.0"	From the transmitter site access road, turn left (NW) on Highway 93 and proceed 3.66 miles to dirt road. Turn left (W) on dirt road and proceed 1.39 miles on dirt road. Stay right (W) at fork in road. Point is located just beyond fork 4 paces N of road at pile of rocks.

APPENDIX A

INDIVIDUAL TOWER MODELING

IMPEDANCE - TOWER 1
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
840.	42.088	28.067	50.588	33.7	1.869	-10.374	-.41795

GEOMETRY - TOWER 1
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2183	12
		0	0	91.5		
2	none	229.	110.	0	.2183	12
		229.	110.	90.		
3	none	90.	90.	0	.2183	12
		90.	90.	89.5		
4	none	315.1	104.4	0	.2911	12
		315.1	104.4	93.		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	7.45833	4	7.75
radius	1	.2183	4	.2911

ELECTRICAL DESCRIPTION - TOWER 1
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	840.	0	1	.0207176	.0215278

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	0	0	0	0
2	13	100,000.	0	0	0	0
3	25	100,000.	0	0	0	0
4	37	100,000.	0	0	0	0

IMPEDANCE - TOWER 2
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 13, sector 1							
840.	39.705	19.834	44.383	26.5	1.6428	-12.279	-.26487

GEOMETRY - TOWER 2
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2183	12
		0	0	91.5		
2	none	229.	110.	0	.2183	12
		229.	110.	90.		
3	none	90.	90.	0	.2183	12
		90.	90.	89.5		
4	none	315.1	104.4	0	.2911	12
		315.1	104.4	93.		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	7.45833	4	7.75
radius	1	.2183	4	.2911

ELECTRICAL DESCRIPTION - TOWER 2
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	840.	0	1	.0207176	.0215278

Sources

source	node	sector	magnitude	phase	type
1	13	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	100,000.	0	0	0	0
2	13	0	0	0	0	0
3	25	100,000.	0	0	0	0
4	37	100,000.	0	0	0	0

IMPEDANCE - TOWER 3
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 25, sector 1							
840.	39.162	16.965	42.678	23.4	1.5701	-13.08	-.2191

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2183	12
		0	0	91.5		
2	none	229.	110.	0	.2183	12
		229.	110.	90.		
3	none	90.	90.	0	.2183	12
		90.	90.	89.5		
4	none	315.1	104.4	0	.2911	12
		315.1	104.4	93.		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	7.45833	4	7.75
radius	1	.2183	4	.2911

ELECTRICAL DESCRIPTION - TOWER 3
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	840.	0	1	.0207176	.0215278

Sources

source	node	sector	magnitude	phase	type
1	25	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	100,000.	0	0	0	0
2	13	100,000.	0	0	0	0
3	25	0	0	0	0	0
4	37	100,000.	0	0	0	0

IMPEDANCE - TOWER 4
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 37, sector 1							
840.	44.971	35.9	57.543	38.6	2.1106	-8.9457	-.59223

GEOMETRY - TOWER 4
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2183	12
		0	0	91.5		
2	none	229.	110.	0	.2183	12
		229.	110.	90.		
3	none	90.	90.	0	.2183	12
		90.	90.	89.5		
4	none	315.1	104.4	0	.2911	12
		315.1	104.4	93.		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	7.45833	4	7.75
radius	1	.2183	4	.2911

ELECTRICAL DESCRIPTION - TOWER 4
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	840.	0	1	.0207176	.0215278

Sources

source	node	sector	magnitude	phase	type
1	37	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	100,000.	0	0	0	0
2	13	100,000.	0	0	0	0
3	25	100,000.	0	0	0	0
4	37	0	0	0	0	0

APPENDIX B

DAYTIME DIRECTIONAL ARRAY MODEL

IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
840.	44.937	74.374	86.895	58.9	4.2372	-4.1785	-2.0906
source = 2; node 13, sector 1							
840.	63.305	81.959	103.56	52.3	3.9232	-4.5277	-1.888
source = 3; node 25, sector 1							
840.	-.48154	27.527	27.532	91.	****	****	****
source = 4; node 37, sector 1							
840.	22.406	48.315	53.258	65.1	4.5433	-3.8872	-2.2811

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2183	12
		0	0	91.5		
2	none	229.	110.	0	.2183	12
		229.	110.	90.		
3	none	90.	90.	0	.2183	12
		90.	90.	89.5		
4	none	315.1	104.4	0	.2911	12
		315.1	104.4	93.		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	7.45833	4	7.75
radius	1	.2183	4	.2911

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	840.	0	1	.0207176	.0215278

Sources - Peak

source	node	sector	magnitude	phase	type
1	1	1	2,402.53	63.	voltage
2	13	1	2,877.55	90.6	voltage
3	25	1	851.42	182.5	voltage
4	37	1	1,477.04	191.6	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	45.39	0	0	0
2	13	0	48.03	0	0	0
3	25	0	51.2	0	0	0
4	37	0	31.67	0	0	0

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 840 KHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	1.	32.5
3	1.	91.5
4	1.	124.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	1,698.84	63.	19.5482	4.1
13	2,034.73	90.6	19.6439	38.3
25	602.045	182.5	21.8714	91.5
37	1,044.42	191.6	19.6099	126.5

Sum of square of source currents = 3,261.84
Total power = 50,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00564091	-.00906502
Y(1, 2)	.000138277	-.00154711
Y(1, 3)	.00376069	.00105916
Y(1, 4)	-.000537639	-.000172049
Y(2, 1)	.000138286	-.00154709
Y(2, 2)	.00705519	-.00947993
Y(2, 3)	.00397305	-.00160414
Y(2, 4)	.00393976	.00139972
Y(3, 1)	.00376066	.00105929
Y(3, 2)	.00397305	-.00160413
Y(3, 3)	.0070766	-.00970985
Y(3, 4)	.000200598	-.00158906
Y(4, 1)	-.000537641	-.000172053
Y(4, 2)	.00393982	.00139953
Y(4, 3)	.000200593	-.0015891
Y(4, 4)	.00638903	-.00891448

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	42.103	73.4391
Z(1, 2)	-15.0919	-3.43703
Z(1, 3)	21.1742	-19.0338
Z(1, 4)	-3.99363	13.031
Z(2, 1)	-15.0919	-3.43692
Z(2, 2)	39.7117	67.8454
Z(2, 3)	.167058	-19.2867
Z(2, 4)	21.9109	-20.0127
Z(3, 1)	21.1735	-19.0344
Z(3, 2)	.166943	-19.2867
Z(3, 3)	39.1675	68.1484
Z(3, 4)	-15.5845	-3.3174
Z(4, 1)	-3.99369	13.031
Z(4, 2)	21.912	-20.0118
Z(4, 3)	-15.5844	-3.31766
Z(4, 4)	45.002	67.5478

CURRENT rms
Frequency = 840 KHz
Input power = 50,000. watts
Efficiency = 100. %
coordinates in degrees

no.	X	Y	Z	current mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	19.5551	4.1	19.5046	1.404
2	0	0	7.625	19.7589	2.5	19.74	.863924
3	0	0	15.25	19.5387	1.5	19.5324	.494896
4	0	0	22.875	18.9522	.6	18.9511	.201442
5	0	0	30.5	18.0186	359.9	18.0186	-.0305025
6	0	0	38.125	16.7552	359.3	16.7539	-.205911
7	0	0	45.75	15.1816	358.8	15.178	-.327314
8	0	0	53.375	13.3197	358.3	13.3138	-.396635
9	0	0	61.	11.1932	357.9	11.1855	-.415769
10	0	0	68.625	8.8241	357.5	8.81563	-.386654
11	0	0	76.25	6.22649	357.1	6.21872	-.310892
12	0	0	83.875	3.38512	356.8	3.37988	-.188301
END	0	0	91.5	0	0	0	0
GND	-78.3226	-215.19	0	19.6516	38.3	15.4322	12.1669
14	-78.3226	-215.19	7.5	19.9212	36.	16.1138	11.7131
15	-78.3226	-215.19	15.	19.7518	34.6	16.2678	11.2024
16	-78.3226	-215.19	22.5	19.2073	33.4	16.0381	10.5688
17	-78.3226	-215.19	30.	18.3061	32.4	15.4559	9.80955
18	-78.3226	-215.19	37.5	17.0641	31.6	14.5411	8.92978
19	-78.3226	-215.19	45.	15.4994	30.8	13.3123	7.93812
20	-78.3226	-215.19	52.5	13.6324	30.1	11.7893	6.84508
21	-78.3226	-215.19	60.	11.4852	29.5	9.99266	5.66194
22	-78.3226	-215.19	67.5	9.07848	29.	7.94152	4.39899
23	-78.3226	-215.19	75.	6.42406	28.5	5.64716	3.06238
24	-78.3226	-215.19	82.5	3.50354	28.	3.09384	1.64406
END	-78.3226	-215.19	90.	0	0	0	0
GND	0	-90.	0	21.8708	91.5	-.57085	21.8634
26	0	-90.	7.45833	21.3656	91.5	-.563666	21.3582
27	0	-90.	14.9167	20.6454	91.5	-.547303	20.6382
28	0	-90.	22.375	19.6477	91.5	-.521518	19.6407
29	0	-90.	29.8333	18.3757	91.5	-.486897	18.3693
30	0	-90.	37.2917	16.8424	91.5	-.444255	16.8366
31	0	-90.	44.75	15.0655	91.5	-.394593	15.0603
32	0	-90.	52.2083	13.0659	91.5	-.339035	13.0615
33	0	-90.	59.6666	10.8654	91.5	-.278753	10.8618
34	0	-90.	67.125	8.48438	91.5	-.214851	8.48166
35	0	-90.	74.5833	5.93502	91.4	-.148163	5.93317
36	0	-90.	82.0416	3.20148	91.4	-.078727	3.20051
END	0	-90.	89.5	0	0	0	0
GND	-78.3622	-305.201	0	19.6154	126.4	-11.6518	15.7798
38	-78.3622	-305.201	7.75	19.6821	125.5	-11.4416	16.0149
39	-78.3622	-305.201	15.5	19.3643	124.9	-11.0917	15.8729
40	-78.3622	-305.201	23.25	18.7022	124.4	-10.5794	15.4224
41	-78.3622	-305.201	31.	17.714	124.	-9.90927	14.683
42	-78.3622	-305.201	38.75	16.4169	123.6	-9.09005	13.6706
43	-78.3622	-305.201	46.5	14.8308	123.3	-8.13333	12.4017
44	-78.3622	-305.201	54.25	12.9781	122.9	-7.05247	10.8947
45	-78.3622	-305.201	62.	10.8823	122.6	-5.86164	9.16877
46	-78.3622	-305.201	69.75	8.56542	122.3	-4.57411	7.24182
47	-78.3622	-305.201	77.5	6.04078	122.	-3.19867	5.12441
48	-78.3622	-305.201	85.25	3.29277	121.7	-1.72882	2.80241
END	-78.3622	-305.201	93.	0	0	0	0

APPENDIX C

NIGHTTIME DIRECTIONAL ARRAY MODEL

IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
840.	44.92	74.383	86.894	58.9	4.239	-4.1767	-2.0918
source = 2; node 13, sector 1							
840.	63.285	81.978	103.56	52.3	3.9248	-4.5258	-1.889
source = 3; node 25, sector 1							
840.	-.48556	27.529	27.533	91.	****	****	****
source = 4; node 37, sector 1							
840.	22.391	48.321	53.257	65.1	4.5465	-3.8844	-2.283

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2183	12
		0	0	91.5		
2	none	229.	110.	0	.2183	12
		229.	110.	90.		
3	none	90.	90.	0	.2183	12
		90.	90.	89.5		
4	none	315.1	104.4	0	.2911	12
		315.1	104.4	93.		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	7.45833	4	7.75
radius	1	.2183	4	.2911

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	840.	0	1	.0207176	.0215278

Sources - Peak

source	node	sector	magnitude	phase	type
1	1	1	1,698.84	63.	voltage
2	13	1	2,034.73	90.6	voltage
3	25	1	602.045	182.5	voltage
4	37	1	1,044.42	191.6	voltage

Lumped loads

passive load circuit	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	
1	1	0	45.39	0	0	0
2	13	0	48.03	0	0	0
3	25	0	51.2	0	0	0
4	37	0	31.67	0	0	0

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 840 KHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	1.	32.5
3	1.	91.5
4	1.	124.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	1,201.26	63.	13.8227	4.1
13	1,438.77	90.6	13.8903	38.3
25	425.71	182.5	15.4654	91.5
37	738.519	191.6	13.8663	126.5

Sum of square of source currents = 1,630.92
Total power = 25,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00564091	-.00906502
Y(1, 2)	.000138277	-.00154711
Y(1, 3)	.00376069	.00105916
Y(1, 4)	-.000537639	-.000172049
Y(2, 1)	.000138286	-.00154709
Y(2, 2)	.00705519	-.00947993
Y(2, 3)	.00397305	-.00160414
Y(2, 4)	.00393976	.00139972
Y(3, 1)	.00376066	.00105929
Y(3, 2)	.00397305	-.00160413
Y(3, 3)	.0070766	-.00970985
Y(3, 4)	.000200598	-.00158906
Y(4, 1)	-.000537641	-.000172053
Y(4, 2)	.00393982	.00139953
Y(4, 3)	.000200593	-.0015891
Y(4, 4)	.00638903	-.00891448

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	42.103	73.4391
Z(1, 2)	-15.0919	-3.43703
Z(1, 3)	21.1742	-19.0338
Z(1, 4)	-3.99363	13.031
Z(2, 1)	-15.0919	-3.43692
Z(2, 2)	39.7117	67.8454
Z(2, 3)	.167058	-19.2867
Z(2, 4)	21.9109	-20.0127
Z(3, 1)	21.1735	-19.0344
Z(3, 2)	.166943	-19.2867
Z(3, 3)	39.1675	68.1484
Z(3, 4)	-15.5845	-3.3174
Z(4, 1)	-3.99369	13.031
Z(4, 2)	21.912	-20.0118
Z(4, 3)	-15.5844	-3.31766
Z(4, 4)	45.002	67.5478

CURRENT rms
Frequency = 840 KHz
Input power = 25,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	13.8275	4.1	13.7918	.992781
2	0	0	7.625	13.9716	2.5	13.9582	.610888
3	0	0	15.25	13.8159	1.5	13.8115	.349944
4	0	0	22.875	13.4012	.6	13.4004	.14244
5	0	0	30.5	12.741	359.9	12.741	-.0215689
6	0	0	38.125	11.8477	359.3	11.8468	-.145602
7	0	0	45.75	10.735	358.8	10.7325	-.231447
8	0	0	53.375	9.41851	358.3	9.41433	-.280464
9	0	0	61.	7.91481	357.9	7.90934	-.293994
10	0	0	68.625	6.23957	357.5	6.23358	-.273406
11	0	0	76.25	4.40279	357.1	4.3973	-.219834
12	0	0	83.875	2.39365	356.8	2.38994	-.13315
END	0	0	91.5	0	0	0	0
GND	-78.3226	-215.19	0	13.8957	38.3	10.9122	8.60324
14	-78.3226	-215.19	7.5	14.0864	36.	11.3942	8.28243
15	-78.3226	-215.19	15.	13.9666	34.6	11.5031	7.92123
16	-78.3226	-215.19	22.5	13.5816	33.4	11.3407	7.47324
17	-78.3226	-215.19	30.	12.9444	32.4	10.929	6.93642
18	-78.3226	-215.19	37.5	12.0661	31.6	10.2821	6.3143
19	-78.3226	-215.19	45.	10.9597	30.8	9.4132	5.61308
20	-78.3226	-215.19	52.5	9.63953	30.1	8.33625	4.8402
21	-78.3226	-215.19	60.	8.12131	29.5	7.06589	4.0036
22	-78.3226	-215.19	67.5	6.41944	29.	5.61549	3.11056
23	-78.3226	-215.19	75.	4.5425	28.5	3.99315	2.16543
24	-78.3226	-215.19	82.5	2.47737	28.	2.18767	1.16253
END	-78.3226	-215.19	90.	0	0	0	0
GND	0	-90.	0	15.465	91.5	-.403653	15.4598
26	0	-90.	7.45833	15.1078	91.5	-.398573	15.1026
27	0	-90.	14.9167	14.5986	91.5	-.387003	14.5934
28	0	-90.	22.375	13.893	91.5	-.36877	13.8881
29	0	-90.	29.8333	12.9936	91.5	-.344289	12.9891
30	0	-90.	37.2917	11.9094	91.5	-.314137	11.9053
31	0	-90.	44.75	10.6529	91.5	-.27902	10.6493
32	0	-90.	52.2083	9.23893	91.5	-.239735	9.23582
33	0	-90.	59.6666	7.683	91.5	-.197108	7.68047
34	0	-90.	67.125	5.99937	91.5	-.151923	5.99744
35	0	-90.	74.5833	4.19669	91.4	-.104767	4.19538
36	0	-90.	82.0416	2.26379	91.4	-.0556688	2.26311
END	0	-90.	89.5	0	0	0	0
GND	-78.3622	-305.201	0	13.8703	126.4	-8.23907	11.158
38	-78.3622	-305.201	7.75	13.9174	125.5	-8.09048	11.3242
39	-78.3622	-305.201	15.5	13.6926	124.9	-7.843	11.2238
40	-78.3622	-305.201	23.25	13.2245	124.4	-7.48074	10.9053
41	-78.3622	-305.201	31.	12.5257	124.	-7.0069	10.3825
42	-78.3622	-305.201	38.75	11.6085	123.6	-6.42763	9.66654
43	-78.3622	-305.201	46.5	10.487	123.3	-5.75113	8.76931
44	-78.3622	-305.201	54.25	9.17695	122.9	-4.98686	7.70374
45	-78.3622	-305.201	62.	7.69498	122.6	-4.14481	6.48331
46	-78.3622	-305.201	69.75	6.05666	122.3	-3.23439	5.12073
47	-78.3622	-305.201	77.5	4.27148	122.	-2.26181	3.62351
48	-78.3622	-305.201	85.25	2.32835	121.7	-1.22247	1.98161
END	-78.3622	-305.201	93.	0	0	0	0