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**Akin Gump**
STRAUSS HAUER & FELD LLP

**TOM W. DAVIDSON**
202.887.4011/fax: 202.955.7719
tdavidson@akingump.com

February 15, 2018



VIA HAND DELIVERY

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 22054

Attn: Edward Lubetzky, Processing Engineer, Audio Division, Media Bureau

**Re: ABC Radio Los Angeles**
**KRDC(AM), Pasadena, California**
**Facility ID Number: 250761**
**File Number: BMML-20170711ACG**

Dear Ms. Dortch:

On behalf of ABC Radio Los Angeles Assets, LLC ("ABC Radio"), licensee of KRDC(AM), Pasadena, California, please find enclosed herewith an amendment ("Update") to the above-referenced application ("Application"). This Amendment is being provided in response to a letter, dated January 18, 2018, to ABC Radio from Son Nguyen, Supervisory Engineer, Audio Division, Media Bureau.

Please do not hesitate to contact the undersigned with any questions regarding this matter.

Sincerely,

Tom W. Davidson, Esq.

cc: Son Nguyen, FCC
Benj. F. Dawson III, P.E. (via e-mail only)

Enclosure

ACCEPTED/FILED

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

FEB 15 2018

Federal Communications Commission
Office of the Secretary

# FCC 302-AM
# APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. BAM20170711ACG

## SECTION I - APPLICANT FEE INFORMATION

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

ABC Radio Los Angeles Assets, LLC

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

MAILING ADDRESS (Line 2) (Maximum 35 characters)
Attn: John Zucker, Esq.

| CITY | STATE OR COUNTRY (If foreign address) | ZIP CODE |
|---|---|---|
| New York | NY | 10023 |

| TELEPHONE NUMBER (Include area code) | CALL LETTERS | OTHER FCC IDENTIFIER (If applicable) |
|---|---|---|
| 212-456-7777 | KRDC | 0014625727 |

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:

Amendment to Direct Measurement Application
(BMML-20170711ACG)

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

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

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

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

| 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 |
|---|---|---|
| | $ | |

| SECTION II - APPLICANT INFORMATION | | |
|---|---|---|
| 1. NAME OF APPLICANT<br>ABC Radio Los Angeles Assets, LLC | | |
| MAILING ADDRESS<br>77 W. 66th Street, 16th Floor | | |
| CITY<br>New York | STATE<br>NY | ZIP CODE<br>10023 |

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 |
|---|---|---|---|---|
| KRDC | Pasadena, CA | NA | NA | NA |

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 . Per STA BESTA-20171219ACX

Exhibit No.

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

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No. Does Not Apply

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. Does Not Apply

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

☐ Yes ☐ No

☑ Does not apply

If No, explain in an Exhibit.

Exhibit No.

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

☐ Yes ☑ No

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

Exhibit No.

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 Zucker | | |
| Title | Date | Telephone Number |
| Secretary | 2/15/2018 | 212-456-7387 |

**WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION**

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

## SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant

ABC Radio Los Angeles Assets, LLC

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

[X] 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 |
| KRDC | Not Applicable | 1110 kHz | Unlimited | 20.0 | 50.0 |

2. Station location

| State | City or Town |
|---|---|
| California | Pasadena |

3. Transmitter location

| State | County | City or Town | Street address (or other identification) |
|---|---|---|---|
| CA | Los Angeles | Irwindale | 277 Longden Ave. |

4. Main studio location

| State | County | City or Town | Street address (or other identification) |
|---|---|---|---|
| CA | Los Angeles | Burbank | 3800 W. Alameda Blvd. |

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

| State | County | City or Town | Street address (or other identification) |
|---|---|---|---|
| CA | Los Angeles | Burbank | 3800 W. Alameda Blvd. |

6. Has type-approved stereo generating equipment been installed? [ ] Yes [X] No

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

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

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 |
|---|---|
| 20.5 | 32.4 |
| **Measured antenna or common point resistance (in ohms) at operating frequency** | **Measured antenna or common point reactance (in ohms) at operating frequency** |
| Night: 50 Day: 50 | Night: - J6 Day: - J6 |

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 (NE) | -149.0 | | 0.412 | | no | no |
| 2 (East Center) | 106.6 | | 1.072 | | | |
| 3 (West Center) | 0 | | 1 | | longer | longer |
| 4 (SW) | -106.9 | -48.1 | 0.325 | 0.689 | | |
| 5 (N) | | 0 | | 1 | required | required |
| | | | | | | |

Manufacturer and type of antenna monitor: Potomac Instruments AM-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. |
|---|---|---|---|---|
| five uniform cross section vertical towers | 99.0 (all) | 99.6 (all) | 100.5 (all) | Exhibit No. DNA |

Excitation [X] 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 |
|---|---|
| 34 ° 06 ' 50 " | 117 ° 59 ' 51 " |

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. see below

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

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

Not applicable
Tower Registration: (1) 1012884, (2) 1012885, (3) 1012886, (4) 1012887, (5) 1012888
(Numbered per antenna monitor numbering in paragraph 8 of this form)

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

Mounting of translator antenna on East Center tower. Existing unused STL antenna remains on Northeast (#1)tower.

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) |
|---|---|
| Benj. F. Dawson III, P.E. | Benj. F. Dawson III, P.E. |
| Address (include ZIP Code)<br>Hatfield & Dawson Consulting Engineers<br>9500 Greenwood Avenue North<br>Seattle, WA 98103 | Date<br>February 10, 2018<br>Telephone No. (Include Area Code)<br>(206) 783 9151 |

[ ] Technical Director

[X] Registered Professional Engineer

[ ] Chief Operator

[ ] Technical Consultant

[X] Other (specify) Consulting Engineer

BENJAMIN F. DAWSON III, PE
THOMAS M. ECKELS, PE
STEPHEN S. LOCKWOOD, PE
DAVID J. PINION, PE
ERIK C. SWANSON, PE

THOMAS S. GORTON, PE
MICHAEL H. MEHIGAN, PE

HATFIELD & DAWSON
CONSULTING ELECTRICAL ENGINEERS
9500 GREENWOOD AVE. N.
SEATTLE, WASHINGTON 98103

TELEPHONE (206) 783-9151
FACSIMILE (206) 789-9834
E-MAIL hatdaw@hatdaw.com

JAMES B. HATFIELD, PE
CONSULTANT

MAURY L. HATFIELD, PE
(1942-2009)
PAUL W. LEONARD, PE
(1925-2011)

# ENGINEERING REPORT:

## REVISED APPLICATION FOR LICENSE
## and Direct Power Measurement

## RADIO STATION KRDC Pasadena, CA
## 1110 kHz, 50 kW-D, 20 kW-N, DA-2
## Facility ID #25076

## ABC RADIO LOS ANGELES ASSETS, LLC

**February 10, 2018**

**REVISED APPLICATION FOR LICENSE**
**and Direct Power Measurement**

**RADIO STATION KRDC Pasadena, CA**
**1110 kHz, 50 kW-D, 20 kW-N, DA-2**
**Facility ID #25076**

| | Purpose of Application |
|---|---|
| Item 1 | Tower Impedance Measurements and Verification of Method of Moments Model |
| Item 2 | Derivation of Operating Parameters for Directional Antenna |
| Item 3 | Method of Moments Model Details for Towers Driven Individually |
| Item 4 | Method of Moments Model Details for Directional Antenna Operation |
| Item 5 | Array Geometry |
| Item 6 | Sampling Line Measurements |
| Item 7 | Reference Field Strength Measurements |
| Item 8 | Direct Measurement of Power |
| Item 9 | Antenna Monitor Data, Sample Device Description and Location |

| | |
|---|---|
| Appendix A | License BZ-20091019AGD (Most Recent Complete License Document) |
| Appendix B | FCC Form 302-AM |

**Purpose of Application**

This engineering exhibit supports an application for a "moment method license" for the presently authorized and unmodified antenna radiation patterns of radio station KRDC, Pasadena, CA. KRDC is authorized per license to operate on 1110 kHz with a power of 50 kW day and 20 kW night, employing separate directional antenna patterns for the daytime and nighttime operation. This application replaces the previously filed license allocation due to the modification of the translator antenna on one of the towers of the KRDC array. This modification is required by 47CFR73.10003(2) since the change of the translator antenna resulted in a change of the "standalone" impedance of that tower by more than the allowable margin.

The antenna towers and ground system are unmodified from their long-established conditions and adjustments of the antenna parameters were made in accordance with the terms of the license and specifications provided for the previous licensing of the station. Information is provided herein demonstrating that the directional antenna parameters for the pattern authorized by the station license 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. Measurements described in this report were made by Burt Weiner and Ashley Wallen under my direction.

Benjamin F.Dawson III, P.E.


February 10, 2018

**Item 1**

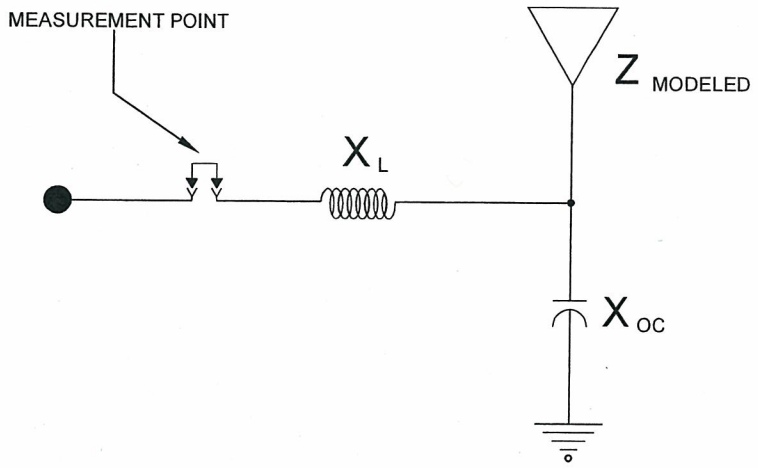
**Analysis of Tower Impedance Measurements to Verify Method of Moments Model - KRDC**

Tower impedance measurements were made at the locations of the sample system current transformers using an AIM-120 network analyzer in a calibrated measurement system. The other towers were open circuited at the same point where impedance measurements were made (the "reference points") for each of the measurements.

Circuit calculations were performed to relate the method of moments modeled impedances at the tower feed points to those at the current sample device locations as shown in the table. The base conditions shown for each tower, which includes the stray capacitances, were used in the moment method model as a load at ground level for the open circuited case. The lighting transformers in use on three of the towers and the newly installed FM isocoupler on one tower have been included in the models because of the high impedance of the 132 degree tall towers. The sample line isolation coils are detuned (parallel resonated with a vacuum variable capacitor) and it is not necessary to include them in the model.

The following page shows the schematic of the assumed circuit and tabulation of calculated values. These calculations show the impedance transformations between the tower base values produced by the MININEC moment method model and the "J" plug locations where the measurements were made.

NOTE: The tower numbering for the 5 antenna towers employed by KRDC is potentially confusing, because the numbering in the CDBS database and given for the theoretical pattern on the station license differs from that given for the operating parameters on that license, and used on the station antenna monitor. All tower numbering in this report is labeled so as to minimized the effects of this insofar as possible, including by showing the approximate orientations of the towers, as NE, SW, etc.




TOWERS NUMBERED PER "THEORETICAL PARAMETERS"
(CDBS DATA) FROM FCC LICENSE BZ20091019AGD

1335,01 on page 6

| TOWER | $X_L$ (Ω) | $X_{OC}$ (Ω) | $Z_{MODELED}$ (Ω) | $Z_{ATU\ MODELED}$ (Ω) | $Z_{ATU\ MEASURED}$ (Ω) |
|---|---|---|---|---|---|
| ~~#1 SW~~ | +j30 | -j1793 | 358.94 + j350.01 | 521.89 ~~+j355.01~~ | 518.76+j322.50 |
| ~~#2 SC~~ | +j40 | -j7170 | 352.90 +j566.61 | 414.87 +j633.06 | 432.53 +j615.00 |
| ~~#3 NC~~ | +j30 | -j1400 | 369.78 +j434.54 | 678.08+j400.41 | 676.36 +j395.16 |
| ~~#4 NE~~ | +j40 | -j1793 | 231.74 +j375.88 | 361.32+j456.49 | 346.40+j474.26 |
| #5 N | +j50 | -j1793 | 533.18+j306.96 | 687.67+j173.63 | 670.64 +j176.65 |

#1 SW
#2 SC
#3 EC.
#4 NE

Xoc= TOWERS 1,4,5 BASE INSULATOR + AUSTIN TRANSFORMER;
TOWER 2 BASE INSULATOR ONLY; TOWER 3 BASE INSULATOR AND FM ISOCOUPLER

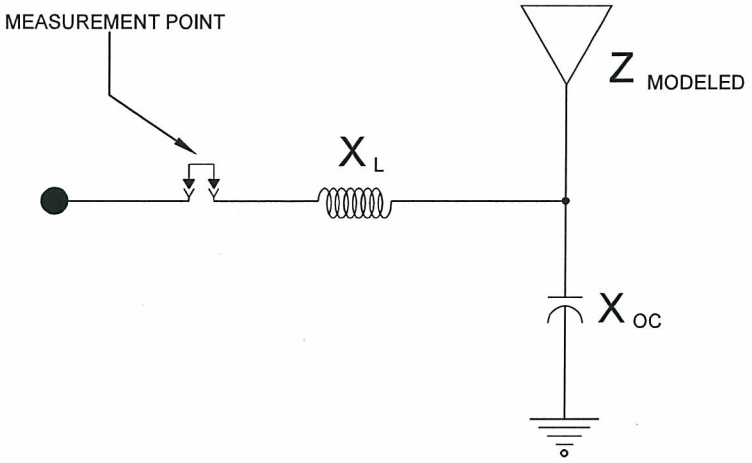
Dwayne Straume, H&D — KRDC MOM TABLE.dwg

HATFIELD & DAWSON
CONSULTING ENGINEERS

ANALYSIS OF TOWER IMPEDANCE MEASUREMENTS TO VERIFY METHOD OF MOMENTS MODEL

RADIO STATION KRDC 1110 KHZ PASADENA, CA 2/7/2018

See next page. clarification




TOWERS NUMBERED PER "THEORETICAL PARAMETERS"
(CDBS DATA) FROM FCC LICENSE BZ20091019AGD

| TOWER | $X_L$ (Ω) | $X_{OC}$ (Ω) | Z MODELED (Ω) | $Z_{ATU}$ MODELED (Ω) | $Z_{ATU}$ MEASURED (Ω) |
|---|---|---|---|---|---|
| #1 SW | +j30 | -j1793 | 358.94 + j350.01 | 521.89 +j335.01 | 518.76+j322.50 |
| #2 WC | +j40 | -j7170 | 352.90 +j566.61 | 414.87 +j633.06 | 432.53 +j615.00 |
| #3 EC | +j30 | -j1400 | 369.78 +j434.54 | 678.08+j400.41 | 676.36 +j395.16 |
| #4 NE | +j40 | -j1793 | 231.74 +j375.88 | 361.32+j456.49 | 346.40+j474.26 |
| #5 N | +j50 | -j1793 | 533.18+j306.96 | 687.67+j173.63 | 670.64 +j176.65 |

Xoc= TOWERS 1,4,5 BASE INSULATOR + AUSTIN TRANSFORMER;
TOWER 2 BASE INSULATOR ONLY; TOWER 3 BASE INSULATOR AND FM ISOCOUPLER

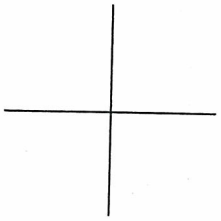
Dwayne Straume, H&D KRDC MOM TABLE.dwg

HATFIELD & DAWSON
CONSULTING ENGINEERS

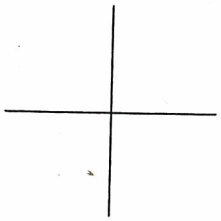
ANALYSIS OF TOWER IMPEDANCE MEASUREMENTS TO VERIFY METHOD OF MOMENTS MODEL

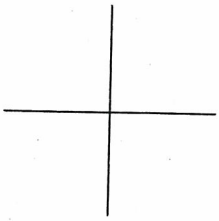
RADIO STATION KRDC 1110 KHZ PASADENA, CA 2/7/2018

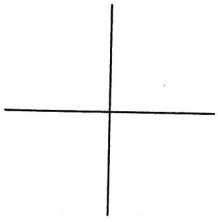
TOWER 5
BOTH METHODS

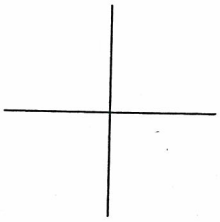


FCC CDBS "THEORETICAL PATTERN" NUMBERING




STATION OPERATING NUMBERING

| | |
|---|---|
| HATFIELD & DAWSON<br>CONSULTING<br>ENGINEERS | KRDC TOWER<br>NUMBERING KEY<br>2/10/18 |

## MEASURED AND MOMENT METHOD MODELING IMPEDANCE COMPARISON

| FCC CDBS Numbering | Low R - 2 ohms -4 % | Meas R | High R +2 ohms +4 % | Model R modified by base | Station Numbering |
|---|---|---|---|---|---|
| 4 | 330.62 | 346.40 | 362.34 | 361.32 | 1 |
| 3 | 647.39 | 676.36 | 705.49 | 678.08 | 2 |
| 2 | 413.31 | 432.53 | 451.91 | 414.87 | 3 |
| 1 | 496.09 | 518.76 | 541.59 | 521.89 | 4 |
| 5 | 641.89 | 670.64 | 699.55 | 687.67 | 5 |

| FCC CDBS Numbering | Low XL - 2 ohms -4 % | Meas XL | High XL +2 ohms +4 % | Model XL modified by base | Station Numbering |
|---|---|---|---|---|---|
| 4 | 453.37 | 474.26 | 495.31 | 456.49 | 1 |
| 3 | 377.43 | 395.16 | 413.05 | 400.41 | 2 |
| 2 | 588.48 | 615.00 | 641.68 | 633.06 | 3 |
| 1 | 307.68 | 322.50 | 337.48 | 335.01 | 4 |
| 5 | 167.66 | 176.65 | 185.80 | 173.63 | 5 |

**Item 2**

**Derivation of Operating Parameters for Directional Antenna - KRDC**

The method of moments model of the array, following verification with the measured individual open circuited base impedances, was used for directional antenna calculations. Calculations were made to determine the complex voltage values for sources located at ground level at the base of 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 and phases were calculated. 33 segments were used for towers in the moment method model. The currents and voltages at the sample loop locations on the towers (segments 11, 44, 77, 110, 143) are shown.

NIGHT

| Tower FCC CDBS Numbering | Modeled Current Pulse | Loop Current Magnitude | Loop Current Phase | Antenna Monitor Sample Ratio | Antenna Monitor Sample Phase | Tower # per Licensed Operating Parameters |
|---|---|---|---|---|---|---|
| 1 | 11 | 3.17511 | 1.8 | 0.325 | -106.9 | 4 (SW) |
| 2 | 44 | 9.77149 | 108.7 | REF 1.0 | REF 0 | 3 (EC) |
| 3 | 77 | 10.4724 | 215.3 | 1.072 | 106.6 | 2 (WC) |
| 4 | 110 | 4.02446 | 319.7 | 0.412 | -149.0 | 1 (NE) |

DAY

| Tower FCC CDBS Numbering | Modeled Current Pulse | Loop Current Magnitude | Loop Current Phase | Antenna Monitor Sample Ratio | Antenna Monitor Sample Phase | Tower # per Licensed Operating Parameters |
|---|---|---|---|---|---|---|
| 1 | 11 | 13.1168 | 312.6 | 0.689 | -48.1 | 4 (SW) |
| 5 | 143 | 19.0323 | 0.7 | REF 1.0 | REF 0 | 5 (N) |

Note: Each segment is 4° in physical length. The bottom of segment 11 from each tower base is 40 degrees and its top is 44 degrees. The detuned current minimum is at segment 11 in each case. The sample loops are located at the approximate midpoint of segment 11 on each tower. The loops are single turn unshielded identical loops, mounted in identical orientation with respect to the tower cross section on each of the 5 identical towers.

These loop values are very close to the far field amplitudes and phases as expected for ~1/3 height loop monitoring.

**Item 3**

**Method of Moments Model Details for Towers Driven Individually - KRDC**

The array of towers was modeled using MININEC. A single wire was used to represent each tower, which are uniform cross section.. The top and bottom wire end points were specified using the theoretical directional antenna specifications in electrical degrees. The maximum and minimum segment lengths are 4.273 and 3.985 electrical degrees respectively.

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.

| Tower # FCC CDBS Numbering | Physical Height (degrees) | Modeled Height (degrees) | Modeled Percentage of Height | Modeled Radius (Meters) | Percent of Equivalent Radius |
|---|---|---|---|---|---|
| 1 | 132.0 | 138.0 | 104.55 | 0.25 | 85.89 |
| 2 | 132.0 | 141.0 | 106.82 | 0.291 | 100 |
| 3 | 132.0 | 139.5 | 105.68 | 0.29 | 99.66 |
| 4 | 132.0 | 131.5 | 99.62 | 0.235 | 80.74 |
| 5 | 132.0 | 139.5 | 105.68 | 0.305 | 104.78 |

The following pages show the details of the method of moments models for the individually driven towers.

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rev for translator ant changes **TOWER #1 STATION NUMBERING OTHERS OPEN**

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .25 | 33 |
| | | 0 | 0 | 138. | | |
| 2 | none | 90. | 60. | 0 | .291 | 33 |
| | | 90. | 60. | 141. | | |
| 3 | none | 180. | 60. | 0 | .29 | 33 |
| | | 180. | 60. | 139.5 | | |
| 4 | none | 270. | 60. | 0 | .235 | 33 |
| | | 270. | 60. | 131.5 | | |
| 5 | none | 165. | 14. | 0 | .305 | 33 |
| | | 165. | 14. | 139.5 | | |

Number of wires = 5
current nodes = 165

| Individual wires | minimum wire | minimum value | maximum wire | maximum value |
|---|---|---|---|---|
| segment length | 4 | 3.98485 | 2 | 4.27273 |
| radius | 4 | .235 | 5 | .305 |

ELECTRICAL DESCRIPTION
Frequencies (KHz)

| no. | frequency lowest | step | no. of steps | segment length (wavelengths) minimum | maximum |
|---|---|---|---|---|---|
| 1 | 1,110. | 1. | 1 | .011069 | .0118687 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 100 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 0 | -1,793. | 0 | 0 | 0 |
| 2 | 34 | 0 | -7,170. | 0 | 0 | 0 |
| 3 | 133 | 0 | -1,793. | 0 | 0 | 0 |
| 4 | 67 | 0 | -1,400. | 0 | 0 | 0 |

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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 100, sector 1 | | | | | | | |
| 1,110. | 231.74 | 375.88 | 441.58 | 58.3 | 16.985 | -1.0239 | -6.777 |

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33 segment KRDC rev to new translator ant **TOWER #2 STATION NUMBERING OTHERS OPEN**

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .25 | 33 |
| | | 0 | 0 | 138. | | |
| 2 | none | 90. | 60. | 0 | .291 | 33 |
| | | 90. | 60. | 141. | | |
| 3 | none | 180. | 60. | 0 | .29 | 33 |
| | | 180. | 60. | 139.5 | | |
| 4 | none | 270. | 60. | 0 | .235 | 33 |
| | | 270. | 60. | 131.5 | | |
| 5 | none | 165. | 14. | 0 | .305 | 33 |
| | | 165. | 14. | 139.5 | | |

Number of wires = 5
current nodes = 165

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 3.98485 | 2 | 4.27273 |
| radius | 4 | .235 | 5 | .305 |

ELECTRICAL DESCRIPTION
Frequencies (KHz)

| | frequency | | no. of | segment length (wavelengths) | |
|---|---|---|---|---|---|
| no. | lowest | step | steps | minimum | maximum |
| 1 | 1,110. | 1. | 1 | .011069 | .0118687 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 67 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 0 | -1,793. | 0 | 0 | 0 |
| 2 | 34 | 0 | -7,170. | 0 | 0 | 0 |
| 3 | 100 | 0 | -1,793. | 0 | 0 | 0 |
| 4 | 133 | 0 | -1,793. | 0 | 0 | 0 |

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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 67, sector 1 | | | | | | | |
| 1,110. | 369.78 | 434.54 | 570.58 | 49.6 | 17.687 | -.98323 | -6.9336 |

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33 segment KRDC new trans antenna config **TOWER #3 STATION NUMBERING OTHERS OPEN**

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .25 | 33 |
| | | 0 | 0 | 138. | | |
| 2 | none | 90. | 60. | 0 | .291 | 33 |
| | | 90. | 60. | 141. | | |
| 3 | none | 180. | 60. | 0 | .29 | 33 |
| | | 180. | 60. | 139.5 | | |
| 4 | none | 270. | 60. | 0 | .235 | 33 |
| | | 270. | 60. | 131.5 | | |
| 5 | none | 165. | 14. | 0 | .305 | 33 |
| | | 165. | 14. | 139.5 | | |

Number of wires = 5
current nodes = 165

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 3.98485 | 2 | 4.27273 |
| radius | 4 | .235 | 5 | .305 |

ELECTRICAL DESCRIPTION
Frequencies (KHz)

| | frequency | | no. of | segment length (wavelengths) | |
|---|---|---|---|---|---|
| no. | lowest | step | steps | minimum | maximum |
| 1 | 1,110. | 1. | 1 | .011069 | .0118687 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 34 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 0 | -1,793. | 0 | 0 | 0 |
| 2 | 67 | 0 | -1,400. | 0 | 0 | 0 |
| 3 | 100 | 0 | -1,793. | 0 | 0 | 0 |
| 4 | 133 | 0 | -1,793. | 0 | 0 | 0 |

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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 34, sector 1 | | | | | | | |
| 1,110. | 352.9 | 566.61 | 667.52 | 58.1 | 25.355 | -.68549 | - |

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tower 4 post translator changes **TOWER #4 STATION NUMBERING OTHERS OPEN**

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .25 | 33 |
| | | 0 | 0 | 138. | | |
| 2 | none | 90. | 60. | 0 | .291 | 33 |
| | | 90. | 60. | 141. | | |
| 3 | none | 180. | 60. | 0 | .29 | 33 |
| | | 180. | 60. | 139.5 | | |
| 4 | none | 270. | 60. | 0 | .235 | 33 |
| | | 270. | 60. | 131.5 | | |
| 5 | none | 165. | 14. | 0 | .305 | 33 |
| | | 165. | 14. | 139.5 | | |

Number of wires = 5
current nodes = 165

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 3.98485 | 2 | 4.27273 |
| radius | 4 | .235 | 5 | .305 |

ELECTRICAL DESCRIPTION
Frequencies (KHz)

| | frequency | | no. of | segment length (wavelengths) | |
|---|---|---|---|---|---|
| no. | lowest | step | steps | minimum | maximum |
| 1 | 1,110. | 1. | 1 | .011069 | .0118687 |

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 | 34 | 0 | -7,170. | 0 | 0 | 0 |
| 2 | 67 | 0 | -1,400. | 0 | 0 | 0 |
| 3 | 100 | 0 | -1,793. | 0 | 0 | 0 |
| 4 | 133 | 0 | -1,793. | 0 | 0 | 0 |

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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 | | | | | | | |
| 1,110. | 358.94 | 350.01 | 501.34 | 44.3 | 14.073 | -1.2365 | -6.0595 |

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tower 5 all open with new translator antenna **TOWER #5 STATION NUMBERING OTHERS OPEN**

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .25 | 33 |
| | | 0 | 0 | 138. | | |
| 2 | none | 90. | 60. | 0 | .291 | 33 |
| | | 90. | 60. | 141. | | |
| 3 | none | 180. | 60. | 0 | .29 | 33 |
| | | 180. | 60. | 139.5 | | |
| 4 | none | 270. | 60. | 0 | .235 | 33 |
| | | 270. | 60. | 131.5 | | |
| 5 | none | 165. | 14. | 0 | .305 | 33 |
| | | 165. | 14. | 139.5 | | |

Number of wires = 5
current nodes = 165

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 3.98485 | 2 | 4.27273 |
| radius | 4 | .235 | 5 | .305 |

ELECTRICAL DESCRIPTION
Frequencies (KHz)

| | frequency | | no. of | segment length (wavelengths) | |
|---|---|---|---|---|---|
| no. | lowest | step | steps | minimum | maximum |
| 1 | 1,110. | 1. | 1 | .011069 | .0118687 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 133 | 1 | 1. | 0 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 1 | 0 | -1,793. | 0 | 0 | 0 |
| 2 | 34 | 0 | -7,170. | 0 | 0 | 0 |
| 3 | 100 | 0 | -1,793. | 0 | 0 | 0 |
| 4 | 67 | 0 | -1,400. | 0 | 0 | 0 |

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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 133, sector 1 | | | | | | | |
| 1,110. | 533.18 | 306.96 | 615.23 | 29.9 | 14.221 | -1.2235 | -6.0991 |

**Item 4**

**Method of Moments Model Details for Directional Antennas - KRDC**

The array was modeled using MININEC with the individual tower characteristics that were verified by the respective 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 (FCC CDBS Numbering) | Wire | Base Node | Loop Node |
|---|---|---|---|
| 1 | 1 | 1 | 11 |
| 2 | 2 | 34 | 44 |
| 3 | 3 | 67 | 77 |
| 4 | 4 | 100 | 110 |
| 5 | 5 | 133 | 143 |

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33 segment KRDC  **DAYTIME**

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .25 | 33 |
| | | 0 | 0 | 138. | | |
| 2 | none | 90. | 60. | 0 | .291 | 33 |
| | | 90. | 60. | 141. | | |
| 3 | none | 180. | 60. | 0 | .29 | 33 |
| | | 180. | 60. | 139.5 | | |
| 4 | none | 270. | 60. | 0 | .235 | 33 |
| | | 270. | 60. | 131.5 | | |
| 5 | none | 165. | 14. | 0 | .305 | 33 |
| | | 165. | 14. | 139.5 | | |

Number of wires = 5
current nodes = 165

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 3.98485 | 2 | 4.27273 |
| radius | 4 | .235 | 5 | .305 |

ELECTRICAL DESCRIPTION
Frequencies (KHz)

| | frequency | | no. of | segment length (wavelengths) | |
|---|---|---|---|---|---|
| no. | lowest | step | steps | minimum | maximum |
| 1 | 1,110. | 1. | 1 | .011069 | .0118687 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 4,392.51 | 12.3 | voltage |
| 2 | 133 | 1 | 6,570.33 | 75.5 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 34 | 0 | 316.76 | 0 | 0 | 0 |
| 2 | 67 | 0 | 334.23 | 0 | 0 | 0 |
| 3 | 100 | 0 | 354.88 | 0 | 0 | 0 |

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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 | | | | | | | |
| 1,110. | 306.57 | 178.83 | 354.92 | 30.3 | 8.2598 | -2.1135 | -4.1417 |
| source = 2; node 133, sector 1 | | | | | | | |
| 1,110. | 308.74 | 394.91 | 501.27 | 52. | 16.378 | -1.062 | -6.6368 |

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CURRENT rms
Frequency = 1110 KHz
Input power = 50,000. watts
Efficiency = 100. %
coordinates in degrees

| current no. | X | Y | Z | mag (amps) | phase (deg) | real (amps) | imaginary (amps) |
|---|---|---|---|---|---|---|---|
| GND | 0 | 0 | 0 | 8.75124 | 342. | 8.32266 | -2.70508 |
| 2 | 0 | 0 | 4.18182 | 9.67159 | 333.6 | 8.66031 | -4.30567 |
| 3 | 0 | 0 | 8.36364 | 10.3116 | 329.1 | 8.84613 | -5.29861 |
| 4 | 0 | 0 | 12.5455 | 10.8764 | 325.6 | 8.979 | -6.13787 |
| 5 | 0 | 0 | 16.7273 | 11.3776 | 322.9 | 9.06916 | -6.87028 |
| 6 | 0 | 0 | 20.9091 | 11.8191 | 320.5 | 9.12134 | -7.5162 |
| 7 | 0 | 0 | 25.0909 | 12.2013 | 318.5 | 9.13789 | -8.08521 |
| 8 | 0 | 0 | 29.2727 | 12.5232 | 316.7 | 9.12028 | -8.58203 |
| 9 | 0 | 0 | 33.4545 | 12.7837 | 315.2 | 9.06951 | -9.00933 |
| 10 | 0 | 0 | 37.6364 | 12.982 | 313.8 | 8.98657 | -9.36876 |
| 11 | 0 | 0 | 41.8182 | 13.1168 | 312.6 | 8.87215 | -9.66108 |
| 12 | 0 | 0 | 46. | 13.1877 | 311.4 | 8.72713 | -9.887 |
| 13 | 0 | 0 | 50.1818 | 13.1942 | 310.4 | 8.55233 | -10.0471 |
| 14 | 0 | 0 | 54.3636 | 13.136 | 309.5 | 8.34868 | -10.1417 |
| 15 | 0 | 0 | 58.5455 | 13.0135 | 308.6 | 8.11718 | -10.1717 |
| 16 | 0 | 0 | 62.7273 | 12.8271 | 307.8 | 7.85894 | -10.1376 |
| 17 | 0 | 0 | 66.9091 | 12.5774 | 307. | 7.57511 | -10.0404 |
| 18 | 0 | 0 | 71.0909 | 12.2656 | 306.3 | 7.26681 | -9.8812 |
| 19 | 0 | 0 | 75.2727 | 11.893 | 305.7 | 6.93552 | -9.66136 |
| 20 | 0 | 0 | 79.4545 | 11.461 | 305.1 | 6.58255 | -9.38219 |
| 21 | 0 | 0 | 83.6364 | 10.9716 | 304.5 | 6.20938 | -9.04547 |
| 22 | 0 | 0 | 87.8182 | 10.4267 | 303.9 | 5.8175 | -8.65295 |
| 23 | 0 | 0 | 92. | 9.82861 | 303.4 | 5.40849 | -8.2067 |
| 24 | 0 | 0 | 96.1818 | 9.17959 | 302.9 | 4.98387 | -7.70882 |
| 25 | 0 | 0 | 100.364 | 8.48207 | 302.4 | 4.54524 | -7.16145 |
| 26 | 0 | 0 | 104.546 | 7.73849 | 301.9 | 4.09408 | -6.56679 |
| 27 | 0 | 0 | 108.727 | 6.95125 | 301.5 | 3.63185 | -5.92702 |
| 28 | 0 | 0 | 112.909 | 6.12243 | 301.1 | 3.15977 | -5.24404 |
| 29 | 0 | 0 | 117.091 | 5.25356 | 300.7 | 2.67881 | -4.51928 |
| 30 | 0 | 0 | 121.273 | 4.3451 | 300.3 | 2.18936 | -3.75321 |
| 31 | 0 | 0 | 125.455 | 3.39528 | 299.9 | 1.69073 | -2.94438 |
| 32 | 0 | 0 | 129.636 | 2.39708 | 299.5 | 1.17974 | -2.08667 |
| 33 | 0 | 0 | 133.818 | 1.33095 | 299.1 | .647291 | -1.16295 |
| END | 0 | 0 | 138. | 0 | 0 | 0 | 0 |
| GND | 45. | -77.9423 | 0 | 4.91915 | 19.7 | 4.6301 | 1.66138 |
| 35 | 45. | -77.9423 | 4.27273 | 4.01874 | 19.7 | 3.78237 | 1.35793 |
| 36 | 45. | -77.9423 | 8.54546 | 3.45356 | 19.8 | 3.2497 | 1.169 |
| 37 | 45. | -77.9423 | 12.8182 | 2.95534 | 19.9 | 2.77959 | 1.00393 |
| 38 | 45. | -77.9423 | 17.0909 | 2.49895 | 20. | 2.34843 | .854172 |
| 39 | 45. | -77.9423 | 21.3636 | 2.07324 | 20.2 | 1.94573 | .715855 |
| 40 | 45. | -77.9423 | 25.6364 | 1.6733 | 20.5 | 1.56689 | .587199 |
| 41 | 45. | -77.9423 | 29.9091 | 1.29694 | 21.1 | 1.20983 | .467302 |
| 42 | 45. | -77.9423 | 34.1818 | .943279 | 22.2 | .873653 | .355676 |
| 43 | 45. | -77.9423 | 38.4545 | .612449 | 24.3 | .558174 | .252061 |
| 44 | 45. | -77.9423 | 42.7273 | .30642 | 30.7 | .263549 | .156318 |
| 45 | 45. | -77.9423 | 47. | .0690834 | 98.2 | -9.85E-03 | .0683778 |
| 46 | 45. | -77.9423 | 51.2727 | .261805 | 182.6 | -.261539 | -.0117951 |
| 47 | 45. | -77.9423 | 55.5455 | .498171 | 189.7 | -.491001 | -.0842194 |
| 48 | 45. | -77.9423 | 59.8182 | .713433 | 192. | -.697719 | -.148912 |
| 49 | 45. | -77.9423 | 64.0909 | .904946 | 193.2 | -.881212 | -.205894 |
| 50 | 45. | -77.9423 | 68.3636 | 1.07187 | 193.8 | -1.04105 | -.255196 |
| 51 | 45. | -77.9423 | 72.6364 | 1.21374 | 194.2 | -1.17688 | -.296866 |
| 52 | 45. | -77.9423 | 76.9091 | 1.33026 | 194.4 | -1.28843 | -.330965 |
| 53 | 45. | -77.9423 | 81.1818 | 1.42123 | 194.6 | -1.37551 | -.357574 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 54 | 45. | -77.9423 | 85.4545 | 1.48658 | 194.7 | -1.43803 | -.37679 |
| 55 | 45. | -77.9423 | 89.7273 | 1.52633 | 194.8 | -1.476 | -.388729 |
| 56 | 45. | -77.9423 | 94. | 1.54061 | 194.8 | -1.4895 | -.393528 |
| 57 | 45. | -77.9423 | 98.2727 | 1.52961 | 194.8 | -1.4787 | -.391338 |
| 58 | 45. | -77.9423 | 102.546 | 1.49362 | 194.8 | -1.44386 | -.382328 |
| 59 | 45. | -77.9423 | 106.818 | 1.43296 | 194.8 | -1.38525 | -.366677 |
| 60 | 45. | -77.9423 | 111.091 | 1.348 | 194.8 | -1.30321 | -.344571 |
| 61 | 45. | -77.9423 | 115.364 | 1.23907 | 194.8 | -1.19805 | -.316192 |
| 62 | 45. | -77.9423 | 119.636 | 1.10641 | 194.8 | -1.06995 | -.281699 |
| 63 | 45. | -77.9423 | 123.909 | .950009 | 194.7 | -.91888 | -.241198 |
| 64 | 45. | -77.9423 | 128.182 | .769295 | 194.7 | -.744259 | -.194662 |
| 65 | 45. | -77.9423 | 132.455 | .562323 | 194.6 | -.544168 | -.141731 |
| 66 | 45. | -77.9423 | 136.727 | .323972 | 194.5 | -.31361 | -.0812785 |
| END | 45. | -77.9423 | 141. | 0 | 0 | 0 | 0 |
| GND | 90. | -155.885 | 0 | 2.90265 | 345.3 | 2.8081 | -.734813 |
| 68 | 90. | -155.885 | 4.22727 | 2.34647 | 345.3 | 2.27016 | -.59354 |
| 69 | 90. | -155.885 | 8.45455 | 1.99878 | 345.4 | 1.93417 | -.504107 |
| 70 | 90. | -155.885 | 12.6818 | 1.69313 | 345.5 | 1.63908 | -.424398 |
| 71 | 90. | -155.885 | 16.9091 | 1.41396 | 345.6 | 1.36982 | -.350509 |
| 72 | 90. | -155.885 | 21.1364 | 1.15433 | 345.9 | 1.11968 | -.280726 |
| 73 | 90. | -155.885 | 25.3636 | .91117 | 346.4 | .885603 | -.214329 |
| 74 | 90. | -155.885 | 29.5909 | .683078 | 347.2 | .666175 | -.151019 |
| 75 | 90. | -155.885 | 33.8182 | .469553 | 348.9 | .460707 | -.0907114 |
| 76 | 90. | -155.885 | 38.0455 | .271016 | 352.9 | .268945 | -.0334435 |
| 77 | 90. | -155.885 | 42.2727 | .0931887 | 12.8 | .0908655 | .0206782 |
| 78 | 90. | -155.885 | 46.5 | .102491 | 135.8 | -.0734275 | .0715035 |
| 79 | 90. | -155.885 | 50.7273 | .253371 | 152. | -.223763 | .118858 |
| 80 | 90. | -155.885 | 54.9545 | .394945 | 155.7 | -.359942 | .162552 |
| 81 | 90. | -155.885 | 59.1818 | .522552 | 157.2 | -.481765 | .202391 |
| 82 | 90. | -155.885 | 63.4091 | .635383 | 158. | -.589051 | .238182 |
| 83 | 90. | -155.885 | 67.6364 | .733074 | 158.4 | -.681646 | .269733 |
| 84 | 90. | -155.885 | 71.8636 | .815395 | 158.6 | -.759434 | .296865 |
| 85 | 90. | -155.885 | 76.0909 | .882204 | 158.8 | -.822352 | .319407 |
| 86 | 90. | -155.885 | 80.3182 | .933409 | 158.8 | -.870372 | .3372 |
| 87 | 90. | -155.885 | 84.5455 | .968986 | 158.8 | -.903529 | .3501 |
| 88 | 90. | -155.885 | 88.7727 | .988955 | 158.8 | -.921892 | .357977 |
| 89 | 90. | -155.885 | 93. | .993388 | 158.7 | -.925583 | .360715 |
| 90 | 90. | -155.885 | 97.2273 | .982413 | 158.6 | -.914779 | .358212 |
| 91 | 90. | -155.885 | 101.455 | .956198 | 158.5 | -.88969 | .350378 |
| 92 | 90. | -155.885 | 105.682 | .914916 | 158.4 | -.850538 | .337131 |
| 93 | 90. | -155.885 | 109.909 | .85877 | 158.2 | -.797568 | .318389 |
| 94 | 90. | -155.885 | 114.136 | .787944 | 158.1 | -.731015 | .294061 |
| 95 | 90. | -155.885 | 118.364 | .70254 | 157.9 | -.651038 | .264029 |
| 96 | 90. | -155.885 | 122.591 | .602513 | 157.8 | -.557663 | .22811 |
| 97 | 90. | -155.885 | 126.818 | .487453 | 157.6 | -.450581 | .185977 |
| 98 | 90. | -155.885 | 131.046 | .35607 | 157.4 | -.32868 | .136951 |
| 99 | 90. | -155.885 | 135.273 | .205083 | 157.2 | -.189023 | .0795581 |
| END | 90. | -155.885 | 139.5 | 0 | 0 | 0 | 0 |
| GND | 135. | -233.827 | 0 | 1.54449 | 287. | .452638 | -1.47668 |
| 101 | 135. | -233.827 | 3.98485 | 1.26831 | 287.1 | .37205 | -1.21251 |
| 102 | 135. | -233.827 | 7.9697 | 1.09075 | 287.1 | .321052 | -1.04243 |
| 103 | 135. | -233.827 | 11.9546 | .934562 | 287.2 | .276998 | -.892568 |
| 104 | 135. | -233.827 | 15.9394 | .791731 | 287.5 | .237502 | -.755269 |
| 105 | 135. | -233.827 | 19.9242 | .658793 | 287.8 | .201509 | -.627218 |
| 106 | 135. | -233.827 | 23.9091 | .534196 | 288.4 | .168509 | -.506922 |
| 107 | 135. | -233.827 | 27.8939 | .417222 | 289.3 | .138218 | -.393662 |
| 108 | 135. | -233.827 | 31.8788 | .307623 | 291. | .110463 | -.287106 |
| 109 | 135. | -233.827 | 35.8636 | .205584 | 294.5 | .0851266 | -.187132 |
| 110 | 135. | -233.827 | 39.8485 | .112459 | 303.5 | .0621221 | -.0937441 |
| 111 | 135. | -233.827 | 43.8333 | .0419678 | 350.4 | .0413774 | -7.01E-03 |
| 112 | 135. | -233.827 | 47.8182 | .0764324 | 72.6 | .0228278 | .0729438 |
| 113 | 135. | -233.827 | 51.803 | .146139 | 87.5 | 6.41E-03 | .145999 |
| 114 | 135. | -233.827 | 55.7879 | .212158 | 92.1 | -7.94E-03 | .212009 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 115 | 135. | -233.827 | 59.7727 | .271597 | 94.3 | -.0202876 | .270839 |
| 116 | 135. | -233.827 | 63.7576 | .323816 | 95.4 | -.0307069 | .322357 |
| 117 | 135. | -233.827 | 67.7424 | .368548 | 96.1 | -.039273 | .36645 |
| 118 | 135. | -233.827 | 71.7273 | .405642 | 96.5 | -.0460672 | .403018 |
| 119 | 135. | -233.827 | 75.7121 | .435002 | 96.8 | -.0511756 | .431981 |
| 120 | 135. | -233.827 | 79.697 | .456569 | 96.9 | -.0546895 | .453282 |
| 121 | 135. | -233.827 | 83.6818 | .47031 | 96.9 | -.0567045 | .466879 |
| 122 | 135. | -233.827 | 87.6667 | .476216 | 96.9 | -.0573202 | .472753 |
| 123 | 135. | -233.827 | 91.6515 | .474299 | 96.9 | -.0566402 | .470905 |
| 124 | 135. | -233.827 | 95.6364 | .464588 | 96.8 | -.0547708 | .461348 |
| 125 | 135. | -233.827 | 99.6212 | .447119 | 96.7 | -.0518209 | .444106 |
| 126 | 135. | -233.827 | 103.606 | .421933 | 96.5 | -.0479003 | .419205 |
| 127 | 135. | -233.827 | 107.591 | .389058 | 96.4 | -.0431192 | .386662 |
| 128 | 135. | -233.827 | 111.576 | .348483 | 96.2 | -.0375851 | .34645 |
| 129 | 135. | -233.827 | 115.561 | .300113 | 96. | -.0314001 | .298465 |
| 130 | 135. | -233.827 | 119.546 | .243673 | 95.8 | -.024652 | .242423 |
| 131 | 135. | -233.827 | 123.53 | .178449 | 95.6 | -.0173949 | .177599 |
| 132 | 135. | -233.827 | 127.515 | .102661 | 95.4 | -9.6E-03 | .102212 |
| END | 135. | -233.827 | 131.5 | 0 | 0 | 0 | 0 |
| GND | 160.099 | -39.9171 | 0 | 9.26838 | 23.5 | 8.49944 | 3.69626 |
| 134 | 160.099 | -39.9171 | 4.22727 | 11.514 | 15.2 | 11.1131 | 3.01202 |
| 135 | 160.099 | -39.9171 | 8.45455 | 12.9241 | 11.6 | 12.6623 | 2.58812 |
| 136 | 160.099 | -39.9171 | 12.6818 | 14.1322 | 9. | 13.9575 | 2.21492 |
| 137 | 160.099 | -39.9171 | 16.9091 | 15.1879 | 7.1 | 15.0719 | 1.87356 |
| 138 | 160.099 | -39.9171 | 21.1364 | 16.1149 | 5.5 | 16.0397 | 1.55545 |
| 139 | 160.099 | -39.9171 | 25.3636 | 16.9231 | 4.3 | 16.8763 | 1.25682 |
| 140 | 160.099 | -39.9171 | 29.5909 | 17.6171 | 3.2 | 17.59 | .975858 |
| 141 | 160.099 | -39.9171 | 33.8182 | 18.1993 | 2.2 | 18.1854 | .711782 |
| 142 | 160.099 | -39.9171 | 38.0455 | 18.6709 | 1.4 | 18.6651 | .464315 |
| 143 | 160.099 | -39.9171 | 42.2727 | 19.0323 | .7 | 19.0309 | .233509 |
| 144 | 160.099 | -39.9171 | 46.5 | 19.2841 | .1 | 19.284 | .0195725 |
| 145 | 160.099 | -39.9171 | 50.7273 | 19.4264 | 359.5 | 19.4256 | -.177194 |
| 146 | 160.099 | -39.9171 | 54.9545 | 19.4599 | 359. | 19.4566 | -.356455 |
| 147 | 160.099 | -39.9171 | 59.1818 | 19.3855 | 358.5 | 19.3786 | -.517869 |
| 148 | 160.099 | -39.9171 | 63.4091 | 19.2043 | 358. | 19.1929 | -.661118 |
| 149 | 160.099 | -39.9171 | 67.6364 | 18.9176 | 357.6 | 18.9013 | -.785922 |
| 150 | 160.099 | -39.9171 | 71.8636 | 18.5274 | 357.2 | 18.5059 | -.892045 |
| 151 | 160.099 | -39.9171 | 76.0909 | 18.0359 | 356.9 | 18.0093 | -.979316 |
| 152 | 160.099 | -39.9171 | 80.3182 | 17.4454 | 356.6 | 17.4139 | -1.04763 |
| 153 | 160.099 | -39.9171 | 84.5455 | 16.7588 | 356.2 | 16.7229 | -1.09693 |
| 154 | 160.099 | -39.9171 | 88.7727 | 15.9795 | 356. | 15.9397 | -1.12724 |
| 155 | 160.099 | -39.9171 | 93. | 15.1107 | 355.7 | 15.0678 | -1.13866 |
| 156 | 160.099 | -39.9171 | 97.2273 | 14.1562 | 355.4 | 14.1109 | -1.13132 |
| 157 | 160.099 | -39.9171 | 101.455 | 13.1196 | 355.2 | 13.0729 | -1.10541 |
| 158 | 160.099 | -39.9171 | 105.682 | 12.0048 | 354.9 | 11.9578 | -1.06118 |
| 159 | 160.099 | -39.9171 | 109.909 | 10.8153 | 354.7 | 10.769 | -.998868 |
| 160 | 160.099 | -39.9171 | 114.136 | 9.55438 | 354.5 | 9.51011 | -.918731 |
| 161 | 160.099 | -39.9171 | 118.364 | 8.22422 | 354.3 | 8.18315 | -.82091 |
| 162 | 160.099 | -39.9171 | 122.591 | 6.82542 | 354.1 | 6.78887 | -.705396 |
| 163 | 160.099 | -39.9171 | 126.818 | 5.35471 | 353.9 | 5.3241 | -.571739 |
| 164 | 160.099 | -39.9171 | 131.046 | 3.8002 | 353.7 | 3.7771 | -.418457 |
| 165 | 160.099 | -39.9171 | 135.273 | 2.13117 | 353.5 | 2.11741 | -.241772 |
| END | 160.099 | -39.9171 | 139.5 | 0 | 0 | 0 | 0 |

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CURRENT MOMENTS(amp-degrees) rms

Frequency =  1110 KHz
Input power = 50,000. watts

| wire | magnitude | phase (deg) | vertical current moment magnitude | phase (deg) |
|---|---|---|---|---|
| 1 | 1,410.68 | 311.4 | 1,410.68 | 311.4 |
| 2 | 11.3263 | 117. | 11.3263 | 117. |
| 3 | 14.5273 | 125.1 | 14.5273 | 125.1 |
| 4 | 6.54377 | 8.3 | 6.54377 | 8.3 |
| 5 | 2,091.68 | 360. | 2,091.68 | 360. |

Medium wave array vertical current moment (amps-degrees) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

| tower | magnitude | phase (deg) | Normalized |
|---|---|---|---|
| 1 | 1,388.88 | 311.8 | 1.506 / 0 |
| 2 | 2,091.68 | 360. | 1.00 / 48.2 |

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33 segment KRDC NIGHTTIME

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

| wire | caps | Distance | Angle | Z | radius | segs |
|---|---|---|---|---|---|---|
| 1 | none | 0 | 0 | 0 | .25 | 33 |
| | | 0 | 0 | 138. | | |
| 2 | none | 90. | 60. | 0 | .291 | 33 |
| | | 90. | 60. | 141. | | |
| 3 | none | 180. | 60. | 0 | .29 | 33 |
| | | 180. | 60. | 139.5 | | |
| 4 | none | 270. | 60. | 0 | .235 | 33 |
| | | 270. | 60. | 131.5 | | |
| 5 | none | 165. | 14. | 0 | .305 | 33 |
| | | 165. | 14. | 139.5 | | |

Number of wires = 5
current nodes = 165

| | minimum | | maximum | |
|---|---|---|---|---|
| Individual wires | wire | value | wire | value |
| segment length | 4 | 3.98485 | 2 | 4.27273 |
| radius | 4 | .235 | 5 | .305 |

ELECTRICAL DESCRIPTION
Frequencies (KHz)

| | frequency | | no. of | segment length (wavelengths) | |
|---|---|---|---|---|---|
| no. | lowest | step | steps | minimum | maximum |
| 1 | 1,110. | 1. | 1 | .011069 | .0118687 |

Sources

| source | node | sector | magnitude | phase | type |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 2,626.62 | 81.1 | voltage |
| 2 | 34 | 1 | 4,580.83 | 182.7 | voltage |
| 3 | 67 | 1 | 3,704. | 290.5 | voltage |
| 4 | 100 | 1 | 1,003.3 | 39.7 | voltage |

Lumped loads

| load | node | resistance (ohms) | reactance (ohms) | inductance (mH) | capacitance (uF) | passive circuit |
|---|---|---|---|---|---|---|
| 1 | 133 | 0 | 313.5 | 0 | 0 | 0 |

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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 | | | | | | | |
| 1,110. | 450.39 | -964.49 | 1,064.5 | 295. | 50.407 | -.34467 | -11.175 |
| source = 2; node 34, sector 1 | | | | | | | |
| 1,110. | 901.14 | 352.77 | 967.73 | 21.4 | 20.792 | -.83614 | -7.5664 |
| source = 3; node 67, sector 1 | | | | | | | |
| 1,110. | 319.8 | 415.5 | 524.32 | 52.4 | 17.291 | -1.0058 | -6.846 |
| source = 4; node 100, sector 1 | | | | | | | |
| 1,110. | 71.436 | 244.76 | 254.97 | 73.7 | 18.847 | -.92257 | -7.181 |

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CURRENT rms
Frequency = 1110 KHz
Input power = 20,000. watts
Efficiency = 100. %
coordinates in degrees

| current no. | X | Y | Z | mag (amps) | phase (deg) | real (amps) | imaginary (amps) |
|---|---|---|---|---|---|---|---|
| GND | 0 | 0 | 0 | 1.74483 | 146. | -1.44734 | .974486 |
| 2 | 0 | 0 | 4.18182 | .948124 | 120.1 | -.475441 | .820301 |
| 3 | 0 | 0 | 8.36364 | .732263 | 79.2 | .137776 | .719185 |
| 4 | 0 | 0 | 12.5455 | .915973 | 43.3 | .666674 | .628133 |
| 5 | 0 | 0 | 16.7273 | 1.26213 | 25.5 | 1.13945 | .5428 |
| 6 | 0 | 0 | 20.9091 | 1.63476 | 16.4 | 1.56829 | .461396 |
| 7 | 0 | 0 | 25.0909 | 1.99586 | 11.1 | 1.95872 | .383206 |
| 8 | 0 | 0 | 29.2727 | 2.33385 | 7.6 | 2.31344 | .307981 |
| 9 | 0 | 0 | 33.4545 | 2.64434 | 5.1 | 2.63381 | .235714 |
| 10 | 0 | 0 | 37.6364 | 2.92517 | 3.3 | 2.92042 | .166531 |
| 11 | 0 | 0 | 41.8182 | 3.17511 | 1.8 | 3.17351 | .100636 |
| 12 | 0 | 0 | 46. | 3.39329 | .6 | 3.39308 | .0382796 |
| 13 | 0 | 0 | 50.1818 | 3.5791 | 359.7 | 3.57905 | -.0202661 |
| 14 | 0 | 0 | 54.3636 | 3.73205 | 358.9 | 3.7313 | -.0747186 |
| 15 | 0 | 0 | 58.5455 | 3.85179 | 358.1 | 3.84977 | -.1248 |
| 16 | 0 | 0 | 62.7273 | 3.93812 | 357.5 | 3.93444 | -.170238 |
| 17 | 0 | 0 | 66.9091 | 3.99093 | 357. | 3.98536 | -.210784 |
| 18 | 0 | 0 | 71.0909 | 4.01026 | 356.5 | 4.0027 | -.246203 |
| 19 | 0 | 0 | 75.2727 | 3.99626 | 356. | 3.9867 | -.276291 |
| 20 | 0 | 0 | 79.4545 | 3.94921 | 355.6 | 3.93773 | -.300867 |
| 21 | 0 | 0 | 83.6364 | 3.8695 | 355.3 | 3.85627 | -.319782 |
| 22 | 0 | 0 | 87.8182 | 3.75766 | 354.9 | 3.74288 | -.332913 |
| 23 | 0 | 0 | 92. | 3.61429 | 354.6 | 3.59824 | -.340169 |
| 24 | 0 | 0 | 96.1818 | 3.4401 | 354.3 | 3.42311 | -.341483 |
| 25 | 0 | 0 | 100.364 | 3.23585 | 354. | 3.21827 | -.336816 |
| 26 | 0 | 0 | 104.546 | 3.00237 | 353.8 | 2.9846 | -.326145 |
| 27 | 0 | 0 | 108.727 | 2.74045 | 353.5 | 2.72292 | -.309461 |
| 28 | 0 | 0 | 112.909 | 2.4508 | 353.3 | 2.43396 | -.286753 |
| 29 | 0 | 0 | 117.091 | 2.13392 | 353.1 | 2.11827 | -.25799 |
| 30 | 0 | 0 | 121.273 | 1.78985 | 352.8 | 1.77589 | -.223085 |
| 31 | 0 | 0 | 125.455 | 1.41767 | 352.6 | 1.40596 | -.181816 |
| 32 | 0 | 0 | 129.636 | 1.01415 | 352.4 | 1.00531 | -.13363 |
| 33 | 0 | 0 | 133.818 | .5705 | 352.2 | .565257 | -.0771666 |
| END | 0 | 0 | 138. | 0 | 0 | 0 | 0 |
| GND | 45. | -77.9423 | 0 | 3.34714 | 161.3 | -3.17084 | 1.07198 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 35 | 45. | -77.9423 | 4.27273 | 4.37679 | 138. | -3.25395 | 2.92712 |
| 36 | 45. | -77.9423 | 8.54546 | 5.22611 | 129.1 | -3.29418 | 4.05716 |
| 37 | 45. | -77.9423 | 12.8182 | 6.01681 | 123.5 | -3.31787 | 5.01934 |
| 38 | 45. | -77.9423 | 17.0909 | 6.74419 | 119.6 | -3.3276 | 5.8661 |
| 39 | 45. | -77.9423 | 21.3636 | 7.40887 | 116.7 | -3.32463 | 6.62104 |
| 40 | 45. | -77.9423 | 25.6364 | 8.01055 | 114.4 | -3.30965 | 7.29487 |
| 41 | 45. | -77.9423 | 29.9091 | 8.54849 | 112.6 | -3.28316 | 7.89287 |
| 42 | 45. | -77.9423 | 34.1818 | 9.0219 | 111.1 | -3.24555 | 8.4179 |
| 43 | 45. | -77.9423 | 38.4545 | 9.42984 | 109.8 | -3.19718 | 8.8713 |
| 44 | 45. | -77.9423 | 42.7273 | 9.77149 | 108.7 | -3.13843 | 9.25377 |
| 45 | 45. | -77.9423 | 47. | 10.0461 | 107.8 | -3.06969 | 9.56561 |
| 46 | 45. | -77.9423 | 51.2727 | 10.2531 | 107. | -2.99135 | 9.80701 |
| 47 | 45. | -77.9423 | 55.5455 | 10.3922 | 106.2 | -2.90386 | 9.97828 |
| 48 | 45. | -77.9423 | 59.8182 | 10.4633 | 105.6 | -2.80767 | 10.0795 |
| 49 | 45. | -77.9423 | 64.0909 | 10.4664 | 105. | -2.70326 | 10.1113 |
| 50 | 45. | -77.9423 | 68.3636 | 10.4021 | 104.4 | -2.59116 | 10.0742 |
| 51 | 45. | -77.9423 | 72.6364 | 10.2708 | 103.9 | -2.4719 | 9.96894 |
| 52 | 45. | -77.9423 | 76.9091 | 10.0738 | 103.5 | -2.34604 | 9.79676 |
| 53 | 45. | -77.9423 | 81.1818 | 9.81184 | 103. | -2.21416 | 9.55875 |
| 54 | 45. | -77.9423 | 85.4545 | 9.48666 | 102.6 | -2.07685 | 9.25653 |
| 55 | 45. | -77.9423 | 89.7273 | 9.09985 | 102.3 | -1.93472 | 8.89181 |
| 56 | 45. | -77.9423 | 94. | 8.6533 | 101.9 | -1.78837 | 8.46648 |
| 57 | 45. | -77.9423 | 98.2727 | 8.14895 | 101.6 | -1.63843 | 7.98254 |
| 58 | 45. | -77.9423 | 102.546 | 7.58904 | 101.3 | -1.48548 | 7.44224 |
| 59 | 45. | -77.9423 | 106.818 | 6.97581 | 101. | -1.33013 | 6.84783 |
| 60 | 45. | -77.9423 | 111.091 | 6.31135 | 100.7 | -1.17289 | 6.2014 |
| 61 | 45. | -77.9423 | 115.364 | 5.5976 | 100.4 | -1.01429 | 5.50494 |
| 62 | 45. | -77.9423 | 119.636 | 4.83599 | 100.2 | -.854695 | 4.75987 |
| 63 | 45. | -77.9423 | 123.909 | 4.02693 | 99.9 | -.694318 | 3.96662 |
| 64 | 45. | -77.9423 | 128.182 | 3.16864 | 99.7 | -.533045 | 3.12348 |
| 65 | 45. | -77.9423 | 132.455 | 2.25421 | 99.4 | -.369967 | 2.22364 |
| 66 | 45. | -77.9423 | 136.727 | 1.26517 | 99.2 | -.202453 | 1.24887 |
| END | 45. | -77.9423 | 141. | 0 | 0 | 0 | 0 |
| GND | 90. | -155.885 | 0 | 4.9953 | 238. | -2.64392 | -4.23824 |
| 68 | 90. | -155.885 | 4.22727 | 6.23777 | 229.7 | -4.03807 | -4.75434 |
| 69 | 90. | -155.885 | 8.45455 | 7.02688 | 226. | -4.87964 | -5.05631 |
| 70 | 90. | -155.885 | 12.6818 | 7.70383 | 223.5 | -5.58976 | -5.30128 |
| 71 | 90. | -155.885 | 16.9091 | 8.29664 | 221.6 | -6.20801 | -5.50407 |
| 72 | 90. | -155.885 | 21.1364 | 8.81811 | 220. | -6.75233 | -5.67143 |
| 73 | 90. | -155.885 | 25.3636 | 9.2737 | 218.8 | -7.23088 | -5.80653 |
| 74 | 90. | -155.885 | 29.5909 | 9.66605 | 217.7 | -7.648 | -5.91105 |
| 75 | 90. | -155.885 | 33.8182 | 9.9963 | 216.8 | -8.00587 | -5.98599 |
| 76 | 90. | -155.885 | 38.0455 | 10.265 | 216. | -8.30576 | -6.03197 |
| 77 | 90. | -155.885 | 42.2727 | 10.4724 | 215.3 | -8.54843 | -6.04949 |
| 78 | 90. | -155.885 | 46.5 | 10.6187 | 214.7 | -8.73433 | -6.03894 |
| 79 | 90. | -155.885 | 50.7273 | 10.7041 | 214.1 | -8.86395 | -6.00072 |
| 80 | 90. | -155.885 | 54.9545 | 10.7288 | 213.6 | -8.93756 | -5.93527 |
| 81 | 90. | -155.885 | 59.1818 | 10.6932 | 213.1 | -8.95566 | -5.84307 |
| 82 | 90. | -155.885 | 63.4091 | 10.5981 | 212.7 | -8.91889 | -5.72469 |
| 83 | 90. | -155.885 | 67.6364 | 10.444 | 212.3 | -8.82788 | -5.58076 |
| 84 | 90. | -155.885 | 71.8636 | 10.232 | 211.9 | -8.68356 | -5.41203 |
| 85 | 90. | -155.885 | 76.0909 | 9.96338 | 211.6 | -8.48692 | -5.21932 |
| 86 | 90. | -155.885 | 80.3182 | 9.6395 | 211.3 | -8.23922 | -5.00352 |
| 87 | 90. | -155.885 | 84.5455 | 9.26194 | 211. | -7.94181 | -4.76563 |
| 88 | 90. | -155.885 | 88.7727 | 8.83252 | 210.7 | -7.59624 | -4.50671 |
| 89 | 90. | -155.885 | 93. | 8.35313 | 210.4 | -7.20415 | -4.22789 |
| 90 | 90. | -155.885 | 97.2273 | 7.82582 | 210.1 | -6.76727 | -3.93032 |
| 91 | 90. | -155.885 | 101.455 | 7.25277 | 209.9 | -6.28751 | -3.61522 |
| 92 | 90. | -155.885 | 105.682 | 6.63611 | 209.7 | -5.7667 | -3.28376 |
| 93 | 90. | -155.885 | 109.909 | 5.9779 | 209.4 | -5.20661 | -2.93708 |
| 94 | 90. | -155.885 | 114.136 | 5.27997 | 209.2 | -4.60882 | -2.57621 |
| 95 | 90. | -155.885 | 118.364 | 4.54366 | 209. | -3.97449 | -2.20189 |
| 96 | 90. | -155.885 | 122.591 | 3.76935 | 208.8 | -3.3039 | -1.81445 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 97 | 90. | -155.885 | 126.818 | 2.95538 | 208.6 | -2.59558 | -1.41323 |
| 98 | 90. | -155.885 | 131.046 | 2.09537 | 208.4 | -1.84383 | -.995409 |
| 99 | 90. | -155.885 | 135.273 | 1.17232 | 208.2 | -1.03359 | -.5532 |
| END | 90. | -155.885 | 139.5 | 0 | 0 | 0 | 0 |
| GND | 135. | -233.827 | 0 | 2.78246 | 326. | 2.30666 | -1.55609 |
| 101 | 135. | -233.827 | 3.98485 | 3.12137 | 324.2 | 2.53077 | -1.82707 |
| 102 | 135. | -233.827 | 7.9697 | 3.32686 | 323.2 | 2.66459 | -1.99199 |
| 103 | 135. | -233.827 | 11.9546 | 3.49451 | 322.5 | 2.77205 | -2.12776 |
| 104 | 135. | -233.827 | 15.9394 | 3.63421 | 321.9 | 2.85985 | -2.24249 |
| 105 | 135. | -233.827 | 19.9242 | 3.75032 | 321.4 | 2.93095 | -2.33974 |
| 106 | 135. | -233.827 | 23.9091 | 3.84488 | 321. | 2.98678 | -2.42121 |
| 107 | 135. | -233.827 | 27.8939 | 3.91902 | 320.6 | 3.02808 | -2.48785 |
| 108 | 135. | -233.827 | 31.8788 | 3.97338 | 320.3 | 3.05533 | -2.54022 |
| 109 | 135. | -233.827 | 35.8636 | 4.00842 | 320. | 3.06884 | -2.57869 |
| 110 | 135. | -233.827 | 39.8485 | 4.02446 | 319.7 | 3.06885 | -2.60354 |
| 111 | 135. | -233.827 | 43.8333 | 4.02177 | 319.4 | 3.05555 | -2.615 |
| 112 | 135. | -233.827 | 47.8182 | 4.00062 | 319.2 | 3.02915 | -2.61328 |
| 113 | 135. | -233.827 | 51.803 | 3.96131 | 319. | 2.98987 | -2.59858 |
| 114 | 135. | -233.827 | 55.7879 | 3.90413 | 318.8 | 2.93793 | -2.57115 |
| 115 | 135. | -233.827 | 59.7727 | 3.82946 | 318.6 | 2.87361 | -2.53122 |
| 116 | 135. | -233.827 | 63.7576 | 3.73767 | 318.5 | 2.79722 | -2.47906 |
| 117 | 135. | -233.827 | 67.7424 | 3.62922 | 318.3 | 2.70909 | -2.41497 |
| 118 | 135. | -233.827 | 71.7273 | 3.50461 | 318.1 | 2.60961 | -2.33928 |
| 119 | 135. | -233.827 | 75.7121 | 3.36438 | 318. | 2.49919 | -2.25235 |
| 120 | 135. | -233.827 | 79.697 | 3.20911 | 317.8 | 2.3783 | -2.15455 |
| 121 | 135. | -233.827 | 83.6818 | 3.03943 | 317.7 | 2.24741 | -2.04628 |
| 122 | 135. | -233.827 | 87.6667 | 2.856 | 317.5 | 2.10703 | -1.92799 |
| 123 | 135. | -233.827 | 91.6515 | 2.65949 | 317.4 | 1.95771 | -1.80008 |
| 124 | 135. | -233.827 | 95.6364 | 2.4506 | 317.3 | 1.79996 | -1.663 |
| 125 | 135. | -233.827 | 99.6212 | 2.23001 | 317.1 | 1.63434 | -1.51719 |
| 126 | 135. | -233.827 | 103.606 | 1.99835 | 317. | 1.46134 | -1.36303 |
| 127 | 135. | -233.827 | 107.591 | 1.75616 | 316.9 | 1.28141 | -1.20087 |
| 128 | 135. | -233.827 | 111.576 | 1.50382 | 316.7 | 1.09485 | -1.03091 |
| 129 | 135. | -233.827 | 115.561 | 1.24139 | 316.6 | .901774 | -.853146 |
| 130 | 135. | -233.827 | 119.546 | .968302 | 316.5 | .701801 | -.667145 |
| 131 | 135. | -233.827 | 123.53 | .68246 | 316.3 | .493491 | -.4714 |
| 132 | 135. | -233.827 | 127.515 | .378223 | 316.2 | .272842 | -.261934 |
| END | 135. | -233.827 | 131.5 | 0 | 0 | 0 | 0 |
| GND | 160.099 | -39.9171 | 0 | 1.63799 | 201.2 | -1.52702 | -.592641 |
| 134 | 160.099 | -39.9171 | 4.22727 | 1.33616 | 201.2 | -1.24554 | -.483679 |
| 135 | 160.099 | -39.9171 | 8.45455 | 1.14901 | 201.3 | -1.07079 | -.416688 |
| 136 | 160.099 | -39.9171 | 12.6818 | .984061 | 201.3 | -.916553 | -.358199 |
| 137 | 160.099 | -39.9171 | 16.9091 | .833028 | 201.5 | -.77511 | -.305189 |
| 138 | 160.099 | -39.9171 | 21.1364 | .692129 | 201.7 | -.642943 | -.256256 |
| 139 | 160.099 | -39.9171 | 25.3636 | .559721 | 202.1 | -.518523 | -.210763 |
| 140 | 160.099 | -39.9171 | 29.5909 | .435046 | 202.8 | -.401139 | -.168382 |
| 141 | 160.099 | -39.9171 | 33.8182 | .317821 | 203.9 | -.290491 | -.128938 |
| 142 | 160.099 | -39.9171 | 38.0455 | .208115 | 206.3 | -.186509 | -.092339 |
| 143 | 160.099 | -39.9171 | 42.2727 | .10673 | 213.3 | -.0892469 | -.0585343 |
| 144 | 160.099 | -39.9171 | 46.5 | .0275245 | 272.4 | 1.17E-03 | -.0274997 |
| 145 | 160.099 | -39.9171 | 50.7273 | .0845772 | .5 | .0845736 | 7.78E-04 |
| 146 | 160.099 | -39.9171 | 54.9545 | .162923 | 9.3 | .160786 | .026306 |
| 147 | 160.099 | -39.9171 | 59.1818 | .234811 | 12.1 | .229621 | .0490929 |
| 148 | 160.099 | -39.9171 | 63.4091 | .299012 | 13.4 | .290906 | .0691491 |
| 149 | 160.099 | -39.9171 | 67.6364 | .355173 | 14.1 | .344481 | .0864898 |
| 150 | 160.099 | -39.9171 | 71.8636 | .403101 | 14.5 | .390207 | .101135 |
| 151 | 160.099 | -39.9171 | 76.0909 | .442667 | 14.8 | .427971 | .113114 |
| 152 | 160.099 | -39.9171 | 80.3182 | .473786 | 15. | .457687 | .12246 |
| 153 | 160.099 | -39.9171 | 84.5455 | .496407 | 15.1 | .479295 | .129215 |
| 154 | 160.099 | -39.9171 | 88.7727 | .510511 | 15.2 | .492767 | .133426 |
| 155 | 160.099 | -39.9171 | 93. | .51611 | 15.2 | .498101 | .135149 |
| 156 | 160.099 | -39.9171 | 97.2273 | .513242 | 15.2 | .49532 | .134444 |
| 157 | 160.099 | -39.9171 | 101.455 | .501969 | 15.2 | .484472 | .131377 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 158 | 160.099 | -39.9171 | 105.682 | .482371 | 15.1 | .46562 | .126017 |
| 159 | 160.099 | -39.9171 | 109.909 | .454533 | 15.1 | .438832 | .118434 |
| 160 | 160.099 | -39.9171 | 114.136 | .418532 | 15.1 | .404171 | .108696 |
| 161 | 160.099 | -39.9171 | 118.364 | .374409 | 15. | .361663 | .096861 |
| 162 | 160.099 | -39.9171 | 122.591 | .32212 | 14.9 | .311252 | .082967 |
| 163 | 160.099 | -39.9171 | 126.818 | .261424 | 14.9 | .252691 | .067003 |
| 164 | 160.099 | -39.9171 | 131.046 | .191599 | 14.8 | .185269 | .0488401 |
| 165 | 160.099 | -39.9171 | 135.273 | .110864 | 14.7 | .107247 | .0280881 |
| END | 160.099 | -39.9171 | 139.5 | 0 | 0 | 0 | 0 |

C:\Expert MBPro V.14\KRDC Nite 1-25-18 01-25-2018 13:53:56

CURRENT MOMENTS(amp-degrees) rms

Frequency = 1110 KHz
Input power = 20,000. watts

| | | | vertical current moment | |
|---|---|---|---|---|
| wire | magnitude | phase (deg) | magnitude | phase (deg) |
| 1 | 366.334 | 0.0 | 366.334 | 0.0 |
| 2 | 1,101.57 | 107.6 | 1,101.57 | 107.6 |
| 3 | 1,151.39 | 214.6 | 1,151.39 | 214.6 |
| 4 | 411.6 | 319.4 | 411.6 | 319.4 |
| 5 | 4.51614 | 297.4 | 4.51614 | 297.4 |

Medium wave array vertical current moment (amps-degrees) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

| tower | magnitude | phase (deg) | Normalized |
|---|---|---|---|
| 1 | 366.334 | 0.0 | 1 / 0 |
| 2 | 1,101.57 | 107.6 | 3.0070 / 107.6 |
| 3 | 1,151.39 | 214.6 | 3.143 / 214.6 |
| 4 | 415.791 | 319.2 | 1.135 / 319.2 |

**Item 5**
**Array Geometry – KRDC**

Per the provisions of the Commission's Public Notice DA 09-2340, October 29, 2009, paragraph 5, licensed stations applying to be re-licensed under the MM Docket 93-177 Rules are exempt from the requirement to submit an as-built surveyor's certification when there is no change in the theoretical patterns, as is the case in this application.

**Item 6**

**Sampling System Measurements – KRDC**

Impedance measurements were made of the antenna monitor sampling system using an AIM-120 network analyzer 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 loops.

The following table shows the frequency closest to the carrier frequency where series resonance – zero reactance corresponding with low resistance – was found. As frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sampling line length at the resonant frequency above carrier frequency – which is the closest one to the carrier frequency – was found to be 450 electrical degrees. The electrical length at carrier frequency appearing in the table below was calculated by ratioing the carrier frequency to the resonant frequency.

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 R1 + jX1 and R2 + jX2 are the measured impedances of the +45 and -45 degree offset frequencies respectively:

$$Zo = (® ^2 + X ^2)^{½} \times ® ^2 + X ^2)^{1/2})^{½}$$

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

# KRDC 1110 kHz Sample Line Measurements

| Tower | Sampling Line Open-Circuited Resonance Below 1110 kHz (kHz) | Sampling Line Open-Circuited Resonance Above 1110 kHz (kHz) | Sampling Line Calculated Electrical Length at 1110 kHz (Degrees) | 1110 kHz Measured Impedance with Sampling Loops Connected (Ohms) |
|---|---|---|---|---|
| 1 | 779.377 | 1304.277 | 382.970 | 5.04 +j29.3 |
| 2 | 778.790 | 1304.298 | 382.964 | 4.50 +j29.9 |
| 3 | 778.962 | 1304.036 | 383.041 | 5.35 +j29.6 |
| 4 | 778.662 | 1303.577 | 383.176 | 5.00 +j30.0 |
| 5 | 777.668 | 1301.779 | 383.705 | 4.77 +j29.9 |

| Tower | -45 Degrees Offset Frequency (kHz) | -45 Degrees Measured Impedance (Ohms) | +45 Degrees Offset Frequency (kHz) | +45 Degrees Measured Impedance (Ohms) | Calculated Characteristic Impedance (Ohms) |
|---|---|---|---|---|---|
| 1 | 1173.849 | 6.286-j49.380 | 1434.705 | 7.929+j49.512 | 49.9607 |
| 2 | 1173.868 | 6.233-j49.513 | 1434.728 | 7.800+j49.113 | 49.8162 |
| 3 | 1173.632 | 6.282-j49.527 | 1434.439 | 7.913+j49.178 | 49.8672 |
| 4 | 1173.219 | 6.576–j49.592 | 1433.935 | 8.346+j49.924 | 50.3214 |
| 5 | 1171.601 | 6.281-j49.624 | 1431.977 | 7.817+j49.276 | 49.9560 |

**Item 7**

**Reference Field Strength Measurements - KRDC**

Reference field strength measurements were made along radials of five of the eight pattern inflection azimuths for the night pattern and four of the 6 for the day pattern. Both patterns are symmetrical around the lines of the respective towers and one radial of each symmetrical pair has been included, rendering measurement of the additional inflection radials unnecessary. The measured field strengths, point descriptions, and measured coordinates are shown on the following page. The measurements were made on July 7, 2017. The coordinates are NAD-27.

The measurements were performed by Burt Weiner and Ashley Wallen, who are experienced in the proper techniques for such work. The measurements were made with a Potomac Instruments FIM-4100 serial number 226. This instrument's calibration was checked by comparison with readings of a Potomac Instruments FIM-21, serial number 803, which was most recently calibrated by the manufacturer on March 3, 2016, and found to agree well within the manufacturer's stated accuracy for the instruments.

KRDC Reference Point Field Measurements

| DAY | PATTERN | | | | | |
|---|---|---|---|---|---|---|
| Radial | KM Distance | Time | Field mV/m | Latitude | Longitude | Description |
| | | | 01/31/18 | | | |
| 51° | 2.30 | 11:29 AM | 127 | 34 07 36.9 | 117 58 43.6 | 1232 Galen St. on water meter |
| | 3.80 | 11:38 AM | 99 | 34 08 6.2 | 117 57 59.1 | 1504 Highland Ave. GTE manhole cover |
| | 5.18 | 11:51 AM | 51 | 34 08 36.0 | 117 57 13.3 | 2322 Royal Oaks Drive between mailboxes |
| | | | | | | on sidewalk |
| | | | | | | |
| 14° | 2.10 | 12:01 PM | 570 | 34 07 55.4 | 117 59 35.3 | 458 Duarte at curb on manhole cover |
| | 4.00 | 12:11 PM | 295 | 34 08 55.4 | 117 59 11.9 | 825 Oakdale at fire hydrant |
| | 4.89 | 12:18 PM | 198 | 34 09 23.3 | 117 59 8.6 | 921 Graystone Ave opposite driveway |
| | | | | | | at stop sign |
| | | | 02/01/18 | | | |
| 121° | 2.70 | 09:45 AM | 812 | 34 06 4.9 | 117 58 22.5 | 13819 Calais St. on water meter |
| | 4.10 | 09:50 AM | 491 | 34 05 40.8 | 117 57 40.3 | 14359 Rockenbach St. on water meter |
| | 6.40 | 09:59 AM | 301 | 34 05 3.8 | 117 56 21.2 | 740 Conlon Ave. on water meter |
| | | | | | | |
| 194° | 5.80 | 10:13 AM | 234 | 34 03 48.0 | 118 00 45.4 | 12260 Garvey Ave. center of driveway |
| | | | | | | on curb |
| | 4.00 | 10:22 AM | 259 | 34 04 42.0 | 118 00 27.2 | 12140 Lambert Ave. on water meter |
| | 1.80 | 10:32 AM | 237 | 34 05 51.5 | 118 00 10.4 | 11937 Rio Hondo P'way center of driveway |
| | | | | | | on curb |
| | | | | | | |
| NIGHT | PATTERN | | | | | |
| Radial | KM Distance | Time | Field mV/m | Latitude | Longitude | Description |
| | | | 02/01/18 | | | |
| 5° | 2.03 | 12:19 PM | 69.1 | 34 07 55.3 | 117 59 46.1 | E. Duarte Rd. on curb right of driveway |
| | 4.20 | 12:35 PM | 36 | 34 09 6.4 | 117 59 39 | 415 Foothill Blvd @ fire hydrant |
| | 5.40 | 12:43 PM | 35.2 | 34 09 46.6 | 117 59 37.8 | Crestview Pl. manhole center of |
| | | | | | | cul de sac 470 Crestview Place |
| | | | | | | |
| 39° | 1.80 | 01:02 PM | 16.1 | 34 07 35.7 | 117 59 8.9 | 2138 Broach Ave in front of fire hydrant |
| | 2.60 | 01:05 PM | 13.1 | 34 07 55.4 | 117 58 49.8 | 1803 Broadland Ave. @ fire hydrant |
| | 4.30 | 01:15 PM | 8.4 | 34 08 36.4 | 117 58 4.7 | 1714 Royal Oaks Drive center of |
| | | | | | | driveway on street edge |
| | | | | | | |
| 60° | 2.20 | 01:26 PM | 58.5 | 34 07 26.7 | 117 58 38.3 | 2240 Buena Vista St. center of shipping |
| | | | | | | driveway at curb |
| | 6.50 | 01:43 PM | 18 | 34 08 34.9 | 117 56 15.3 | 777 Encanto P'way center of driveway |
| | | | | | | at curb |
| | 4.90 | 01:48 PM | 10.8 | 34 08 9.3 | 117 57 9.9 | Andres Duarte School end of walkway |
| | | | | | | right of driveway |
| | | | | | | |
| 109° | 6.70 | 02:31 PM | 4.3 | 34 05 39.2 | 117 55 47.6 | 16166 E. Ringside Dr. at water meter |
| | 4.40 | 02:43 PM | 9.7 | 34 06 4.5 | 117 57 11.8 | 14853 Anada St. @ Park Ave on water mtr |
| | 3.00 | 02:50 PM | 36.6 | 34 06 18.7 | 117 58 05.0 | 5074 Benham Ave on manhole cover |
| | | | | | | in cul de sac |
| | | | | | | |
| 240° | 6.00 | 03:26 PM | 397 | 34 05 16.8 | 118 03 20 | 4410 Temple City Bvd in front of hydrant |
| | 4.00 | 03:34 PM | 402 | 34 05 46.2 | 118 02 9.2 | 10703 Grand Ave in front of hydrant |
| | 2.00 | 03:43 PM | 1390 | 34 06 17.0 | 118 01 2.5 | 3237 Hempstead Ave on water meter |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | Hatfield & Dawson Consulting Engineers | | | |

**POTOMAC INSTRUMENTS, inc.**
Frederick, MD

## CERTIFICATE OF CALIBRATION

Field Intensity Meter Type FIM-21 Serial Number 803

This instrument was calibrated in an induction field of 220.0 millivolts per meter. At each measurement frequency the measured field was recorded and a correction factor K was computed; the indicated field must be multiplied by K to obtain the true field.

| kHz | K | kHz | K |
|---|---|---|---|
| 540 | 1.000 | 1100 | 1.000 |
| 600 | 1.000 | 1200 | 1.000 |
| 700 | 1.000 | 1300 | 1.000 |
| 800 | 1.000 | 1400 | 1.000 |
| 900 | 1.000 | 1500 | 1.005 |
| 1000 | 1.000 | 1600 | 1.005 |

The calibrating field is maintained equal to the National Institute of Standards and Technology (NIST) standard field within an accuracy of 1.0 percent. NIST states that the absolute accuracy of its field is "believed to be within 3.0 percent."

The error at points on the meter scale other than the calibration point is less than 3.0 percent. The attenuator ratios are correct within 2.0 percent. These accuracies apply for battery voltages that are indicated by the instrument's battery check circuit to be useable.

NEXT RECOMMENDED CALIBRATION DATE: March 3, 2018

Calibrated by _____ Date: Mar. 3, 2016

STATE OF MARYLAND

Technician Michael Prettyman, personally appeared before me on Mar. 3, 2016, and testified under oath that the above calibration was made either by himself or under his direction and that the statements in the above certificate are true to the best of his knowledge and belief.

MARCELLA R. LALIBERTE NOTARY PUBLIC MY COMMISSION EXPIRES 12/17/2016 FREDERICK COUNTY, MD

Marcella R. Laliberte
Notary Public

**Item 8**

**Direct Measurement of Power - KRDC**

Common point impedance measurements were made with a Delta OIB impedance meter. The measurements were made at the phasor cabinet input adjacent to the common point current meter used to determine operating power. The impedance measured at this point was adjusted to a value of 50 - J6 ohms for the day and night common point networks, providing the main transmitter with its desired load.

## Item 9

### Antenna Monitor and Sampling System – KRDC

The antenna monitor is a Potomac Instruments model AM-1901 serial number 106. The sample transformers are connected through equal lengths of Andrew 3/8 inch foam Heliax solid outer conductor transmission lines to the antenna monitor. The five sample lines are routed to the towers such that they are subject to similar environmental conditions. The five identical sample loops are mounted at approximately 32% of the total height of the towers (42 degrees from the base), such that with 33 segments in the moment method model segment 11 on each tower (40 to 44 electrical degrees) encompasses the location of the loops.

The antenna monitor calibration was checked by placing an RF feed divided into outputs with T connectors and the outputs were connected with short, equal length coaxial cables to the inputs of the antenna monitor. The resulting readings are well within the manufacturer's rated specifications.

| DAY | | | NIGHT | |
|---|---|---|---|---|
| Input # | Ratio | Phase | Ratio | Phase |
| 1 | 1.000 | +/-0 | 1.000 | -0.1 |
| 2 | 1.000 | -0.1 | 1.000 | -0.2 |
| 3 | 1.000 | +0.2 | 1.000 | -0.1 |
| 4 | 1.000 | +/-0 | 0.999 | -0.1 |
| 5 | 1.000 | -0.1 | 0.998 | +0.3 |

United States of America

# FEDERAL COMMUNICATIONS COMMISSION

# AM BROADCAST STATION LICENSE

Authorizing Official:

Official Mailing Address:

ABC RADIO LOS ANGELES ASSETS, LLC
77 W. 66TH ST., 16TH FLOOR
ATTN: JOHN W. ZUCKER, ESQ.
NEW YORK NY 10023

Son Nguyen
Supervisory Engineer
Audio Division
Media Bureau

Grant Date: February 18, 2010

This license expires 3:00 a.m. local time, December 01, 2013.

Facility Id: 25076

Call Sign: KRDC

License File Number: BZ-20091019AGD

Subject to the provisions of the Communications Act of 1934, subsequent acts and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions set forth in this license, the licensee is hereby authorized to use and operate the radio transmitting apparatus herein described.

This license is issued on the licensee's representation that the statements contained in licensee's application are true and that the undertakings therein contained so far as they are consistent herewith, will be carried out in good faith. The licensee shall, during the term of this license, render such broadcasting service as will serve the public interest, convenience, or necessity to the full extent of the privileges herein conferred.

This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequency designated in the license beyond the term hereof, nor in any other manner than authorized herein. Neither the license nor the right granted hereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934. This license is subject to the right of use or control by the Government of the United States conferred by Section 606 of the Communications Act of 1934.

Hours of Operation: Unlimited

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

| | | | | | |
|---|---|---|---|---|---|
| Jan. | 7:00 AM | 5:00 PM | Jul. | 4:45 AM | 7:00 PM |
| Feb. | 6:45 AM | 5:30 PM | Aug. | 5:15 AM | 6:45 PM |
| Mar. | 6:00 AM | 6:00 PM | Sep. | 5:30 AM | 6:00 PM |
| Apr. | 5:15 AM | 6:30 PM | Oct. | 6:00 AM | 5:15 PM |
| May | 4:45 AM | 6:45 PM | Nov. | 6:30 AM | 4:45 PM |
| Jun. | 4:45 AM | 7:00 PM | Dec. | 6:45 AM | 4:45 PM |

Callsign: KRDC License No.: BZ-20091019AGD

Name of Licensee: ABC RADIO LOS ANGELES ASSETS, LLC

Station Location: PASADENA, CA

Frequency (kHz): 1110

Station Class: B

Antenna Coordinates:

| | Day | | | | | |
|---|---|---|---|---|---|---|
| Latitude: | N | 34 | Deg | 06 | Min | 50 Sec |
| Longitude: | W | 117 | Deg | 59 | Min | 51 Sec |

| | Night | | | | | |
|---|---|---|---|---|---|---|
| Latitude: | N | 34 | Deg | 06 | Min | 50 Sec |
| Longitude: | W | 117 | Deg | 59 | Min | 51 Sec |

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

Nominal Power (kW): Day: 50.0 Night: 20.0

Antenna Input Power (kW): Day: 52.49 Night: 21.01

Antenna Mode: Day: DA Night: DA

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

Current (amperes): Day: 32.4 Night: 20.5

Resistance (ohms): Day: 50 Night: 50

Antenna Registration Number(s):

Day:

| Tower No. | ASRN | Overall Height (m) |
|---|---|---|
| 1 | 1012887 | |
| 2 | 1012888 | |

Night:

| Tower No. | ASRN | Overall Height (m) |
|---|---|---|
| 1 | 1012884 | |
| 2 | 1012885 | |
| 3 | 1012886 | |
| 4 | 1012887 | |

Callsign: KRDC License No.: BZ-20091019AGD

DESCRIPTION OF DIRECTIONAL ANTENNA SYSTEM

Theoretical RMS (mV/m/km): Day: 2257.3 Night: 1560.7

Standard RMS (mV/m/km): Day: 2371.33 Night: 1639.41

Augmented RMS (mV/m/km):

Q Factor: Day: 70.71 Night: 44.72

Theoretical Parameters:

Day Directional Antenna:

| Tower No. | Field Ratio | Phasing (Deg.) | Spacing (Deg.) | Orientation (Deg.) | Tower Ref Switch * | Height (Deg.) |
|---|---|---|---|---|---|---|
| 1 | 1.0000 | 0.000 | 0.0000 | 0.000 | 0 | 132.0 |
| 2 | 1.5060 | 48.200 | 165.0000 | 14.000 | 0 | 132.0 |

* 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 | 1.0000 | 0.000 | 0.0000 | 0.000 | 0 | 132.0 |
| 2 | 3.0070 | 107.560 | 90.0000 | 60.000 | 0 | 132.0 |
| 3 | 3.1430 | 214.580 | 180.0000 | 60.000 | 0 | 132.0 |
| 4 | 1.1350 | 319.200 | 270.0000 | 60.000 | 0 | 132.0 |

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

Day Directional Operation:

| Twr. No. | Phase (Deg.) | Antenna Monitor Sample Current Ratio |
|---|---|---|
| 4 | -48.5 | 0.718 |
| 5 | 0 | 1 |

Night Directional Operation:

| Twr. No. | Phase (Deg.) | Antenna Monitor Sample Current Ratio |
|---|---|---|
| 1 | -142.2 | 0.286 |
| 2 | 105.3 | 1.003 |
| 3 | 0 | 1 |
| 4 | -102.7 | 0.338 |

Antenna Monitor: POTOMAC INSTRUMENTS 1901

Sampling System Approved Under Section 73.68 of the Rules.

Monitoring Points:

Day Operation:

| Radial (Deg. T) | Distance From Transmitter (kM) | Maximum Field Strength (mV/m) |
|---|---|---|
| 14 | 4.89 | 186 |
| 51 | 5.18 | 81 |
| 194 | 4.91 | 325 |
| 337 | 4.78 | 143.8 |

Night Operation:

| Radial (Deg. T) | Distance From Transmitter (kM) | Maximum Field Strength (mV/m) |
|---|---|---|
| 5 | 2.03 | 30.13 |
| 60 | 4.09 | 9.6 |
| 115 | 5.44 | 4.6 |

Special operating conditions or restrictions:

1 The permittee/licensee must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.

2 Description of Directional Antenna system:

Five (5), Guyed, series-excited, steel radiators. RPU antenna is side mounted on NE(#1) tower. An STL antenna is side mounted on E(#2) tower.

Ground system consists of 120 equally spaced, buried copper radials 67.7 m in length with 120 radials 15.2 m interspersed between the longer radials, plus a 14.6 m x 14.6 m ground screen about the base of each tower.

Special operating conditions or restrictions:

3 DESCRIPTION OF NIGHTTIME MONITORING POINTS:

Direction of 5 True North- From the transmitter driveway, turn right onto Longden Avenue, proceed 0.2 miles west to Myrtle Avenue. Turn right onto Myrtle Avenue and proceed north 0.2 miles to California Avenue. Turn right onto California Avenue and continue north 1.2 miles on California Avenue to Duarte Road. Turn left on Duarte Road, proceed 0.07 miles to entrance of Live Oak Cemetery. Measurement point is located 100 feet west of cemetery driveway on the south side of Duarte Road on the sidewalk. Nighttime

Direction of 60 True North From the transmitter driveway, turn left onto Longden Avenue. Go southeast 200 feet to Live Oak Avenue. Turn left onto Live Oak Avenue and proceed east 0.4 miles to the intersection where Live Oak Avenue joins Arrow Highway. Go straight at the traffic light traveling east on Arrow Highway 0.35 miles to Buena Vista Street. Turn left onto Buena Vista Street and proceed north 1.65 miles to Central Avenue. Turn right onto Central Avenue and go east 1.45 miles to Andres Duarte School which is encountered just west of Crestfield Street on the North Side of Central Avenue. Turn left into the east end of the school driveway. The monitoring point is at the east end of the sidewalk by the loading zone and is approximately 40 feet north of Central Avenue. Nighttime

Direction of 115 True North From the transmitter driveway, turn left onto Longden Avenue. Go southeast 200 feet to Live Oak Avenue. Turn left onto Live Oak Avenue and proceed east 0.4 miles to the intersection where Live Oak Avenue joins Arrow Highway. Go straight at the traffic light traveling east on Arrow Highway 2.0 miles to Maine Avenue. Turn right onto Main Avenue and proceed south 1.0 mile to Los Angeles Street. Turn left onto Los Angeles Street and proceed east 0.9 miles to the access road on the west side of Big Daulton Wash (a canal). The measurement point is on the paved canal access road to 60 feet north of Los Angeles Street. Nighttime

Special operating conditions or restrictions:

4 DESCRIPTION OF DAYTIME MONITORING POINTS;

Direction of 14 True North. From the transmitter driveway, turn right onto Longden Avenue, proceed 0.2 miles west to Myrtle Avenue. Turn right onto Myrtle Avenue. Go north 2.6 miles to Foothill Boulevard; turn right onto Foothill Boulevard; go east 0.83 miles to Mountain Avenue; turn left onto Mountain Avenue go north 0.4 miles to Greystone Avenue; turn right onto Greystone Avenue; go west 0.2 miles to intersection of Greystone Avenue and Broadoaks Avenue; point is by curb five feet north of street sign on south corner of intersection. It is across the street from driveway for 921 E. Greystone. Daytime

Direction of 51 True North. From the transmitter driveway, turn left onto Longden Avenue. Go southeast 200 feet to Live Oak Avenue. Turn left onto Live Oak Avenue and proceed east 0.4 miles to the intersection where Live Oak Avenue joins Arrow Highway. Go straight at the traffic light traveling east on Arrow Highway 0.85 miles to the 605 Freeway, go north on the 605 Freeway 2.15 miles to the end of the Freeway at Huntington Drive; continue straight through the intersection traveling north on Mt. Olive Drive 0.25 miles to Royal Oak Avenue; turn right on Royal Oaks Avenue and travel east to House #2322 Royal Oaks Avenue on south side of street. Point is on sidewalk between driveways for 2322 and 2338 Royal Oaks Avenue north of mailbox for 23222 for Royal Oaks. Daytime

Direction of 194 True North. From the transmitter driveway, turn right onto Longden Avenue, proceed 0.2 miles west to Myrtle Avenue; Turn right onto Myrtle Avenue . Go south 2.95 miles to Ramona Boulevard (Myrtle Avenue changes name to Peck Road at the intersection of Live Oak Avenue); turn left onto Ramona Boulevard; go east 0.85 miles to Maxson Road; turn right onto Maxson Road; go south 0.32 miles to Deana Street; turn right onto Deana Street; go west 0.05 miles to point in Zamora park on north side of Deana Street. Point is opposite 12132 Deana Street, 20 paces north of curb, 10 feet north of light pole in Zamara park. Daytime

Direction of 337 True North. From the transmitter driveway, turn right onto Longden Avenue, proceed 0.2 miles west to Myrtle Avenue. Turn right onto Myrtle Avenue; Go north 2.6 miles to Foothill Boulevard; turn left onto Foothill Boulevard; go west 0.98 miles to Madison Avenue; turn right onto Madison Avenue; go north 0.05 miles to House #170 on right. Point is onside walk in driveway of 170 Madison Avenue. Daytime

*** END OF AUTHORIZATION ***