**ENGINEERING EXHIBIT**
**IN SUPPORT OF AN**
**APPLICATION FOR STATION LICENSE**
**STATION KSPN – LOS ANGELES, CALIFORNIA**
**710 kHz – 34 kW-D, 2.5 kW-N, U, DA-2**
**FACILITY ID: 33255**

**Licensee: Good Karma Broadcasting, L.L.C.**

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

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FCC Form 302-AM, Section III

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

## SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
Good Karma Broadcasting, L.L.C.

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 | Power in kilowatts Day |
|---|---|---|---|---|---|
| KSPN | BP-20200914AAV | 710 | Unlimited | 2.5 | 34.0 |

**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 Avenue |

**4. Main studio location**

| State | County | City or Town | Street address (or other identification) |
|---|---|---|---|
| CA | Los Angeles | Burbank | 800 W Olympic Blvd., Ste A |

**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 | 800 W Olympic Blvd., Ste. A |

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. Sttmt

**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 |
|---|---|
| 7.35 | 26.76 |

| Measured antenna or common point resistance (in ohms) at operating frequency — Night | Day | Measured antenna or common point reactance (in ohms) at operating frequency — Night | Day |
|---|---|---|---|
| 50.0 | 50.0 | -j3.0 | -j3.0 |

Antenna indications for directional operation

| Towers | Antenna monitor Phase reading(s) in degrees | | Antenna monitor sample current ratio(s) | | Antenna base currents | |
|---|---|---|---|---|---|---|
| | Night | Day | Night | Day | Night | Day |
| 1 (1012886) | 0.0 | +97.3 | 1.000 | 0.483 | | |
| 2 (1012888) | +129.1 | 0.0 | 0.513 | 1.000 | | |
| 3 (1012885) | +150.6 | | 0.567 | | | |
| 4 (1012884) | | +124.0 | | 1.041 | | |
| | | | | | | |
| | | | | | | |

Manufacturer and type of antenna monitor: Potomac Instruments Model 1901-4, Serial No. 985

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. |
|---|---|---|---|---|
| steel, uniform cross-section, guyed | 99.0 (All) | 99.6 (All) | 100.5 (All) | 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 | 34 ° | 06 ' | 50 " | West Longitude | 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. Eng. Sttmt

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

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

None

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

No Change

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 below) |
|---|---|
| Carl T. Jones, Jr. | [signature] |
| Address (include ZIP Code)<br>Carl T. Jones Corporation<br>7901 Yarnwood Court<br>Springfield, VA 22153 | Date<br>July 26, 2022<br><br>Telephone No. (Include Area Code)<br>(703) 569-7704 |

- ☐ Technical Director
- ☑ Registered Professional Engineer
- ☐ Chief Operator
- ☐ Technical Consultant
- ☐ Other (specify)

Consulting Engineers
CTJC
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**ENGINEERING STATEMENT OF CARL T. JONES, JR., P.E.**
**IN SUPPORT OF AN**
**APPLICATION FOR STATION LICENSE**
**STATION KSPN – LOS ANGELES, CALIFORNIA**
**710 kHz – 34 kW-D, 2.5 kW-N, U, DA-2**
**FACILITY ID: 33255**

**Licensee: Good Karma Broadcasting, L.L.C.**

I am a Consulting Engineer and president of the 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

This office has been authorized by Good Karma Broadcasting, L.L.C. ("Good Karma"), licensee of AM Broadcast Station KSPN, Los Angeles, California, to prepare this engineering statement, Section III of FCC Form 302-AM and the associated figures and appendices in support of an Application for License. Station KSPN is licensed for operation on 710 kilohertz with a daytime power of 50 kilowatts and a nighttime power of 10 kW. The station uses two different directional patterns for its daytime and nighttime operations (DA-2). Both directional patterns employ the same three-tower inline directional antenna array.

7901 Yarnwood Court
Springfield, VA 22153-2899
tel: (703) 569-7704
fax: (703) 569-6417
email: info@ctjc.com
www.ctjc.com

Good Karma was granted a Construction Permit that authorizes relocation of the KSPN transmission facilities to the transmitter site of station KRDC; a reduction in daytime and nighttime power and changes to both the daytime and nighttime directional patterns.[1] After completion of the installation of the new KSPN daytime and nighttime phasing and coupling systems and all diplexing filters required to minimize interaction between the two collocated stations, the KSPN directional patterns were verified using computer modeling and sample system verification techniques as described in Section 47 CFR 73.151(c) of the FCC's Rules and Regulations. The specific measurement and modeling techniques used in performing the verification of the KSPN daytime and nighttime directional patterns are described in detail in this engineering statement.

Impedance measurement data, sample system verification measurement data, model derived operating parameters, and reference point field strength measurement data for the KSPN directional antenna systems are tabulated in the figures attached to this engineering statement. All pertinent computer model input and output files are contained in the attached Appendices A, B, C and D.

## 2.0 IMPEDANCE MEASUREMENTS, COMPUTER MODELING AND SAMPLE SYSTEM VERIFICATION

The KSPN daytime and nighttime directional antenna arrays consist of three, equal height, uniform cross-section, guyed, base insulated towers. The daytime array consists of KSPN towers #1 (ASR #1012886), #2 (ASR #1012888) and #4 (ASR

[1] Construction Permit BP-20200914AAV was granted January 5, 2021.

#1012884) while the nighttime array consists of KSPN towers #1 (ASR #1012886), #2 (ASR #1012888) and #3 (ASR #1012885). KSPN tower #5 (ASR #1012887) is not used in either directional array but is used for emergency non-directional operation.

The KSPN sampling system employs identical toroidal current transformers that are located in the output branch of each directional ATU network. This location corresponds to the input to the diplex filter networks. A detailed description of the impedance and sample system measurements and the computer models employed is contained below.

## 2.1 INDIVIDUAL TOWER IMPEDANCE MEASUREMENTS

Impedance measurements were performed at the base of each tower including KSPN tower #5, by the undersigned, at the J-Plug located in the output branch of each ATU network. The location of the impedance measurements is immediately adjacent to the sample system toroidal current transformers. 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 base impedance of each tower was measured with the other four towers open-circuited at the corresponding J-Plug location. The measured impedances are tabulated in Figure 2.

Host station KRDC uses tower mounted loops to sample the current flowing in each of the five towers. In order for the sample line from each loop to cross the tower base insulator, an isolation inductor and variable vacuum capacitor are employed that are adjusted for parallel resonance to achieve an extremely high impedance at the KRDC frequency of 1110 kHz. After each capacitor was adjusted for parallel resonance at 1110 kHz, the impedance to ground was measured at the KSPN frequency of 710 kHz so that the inductive reactance of the circuit could be included in the circuit models for each tower. The measured shunt inductive reactance for each tower is contained in Figure 2.

## 2.2 INDIVIDUAL TOWER COMPUTER MODELS

A detailed Method of Moments ("MoM") computer model was developed to model each element in the antenna array using Expert MiniNEC Broadcast Professional (Version 23.0). A wire model was developed for each tower that is comprised of 24 segments. To replicate the individual measured base impedances to within the tolerance specified in the FCC's Rules, each tower's physical height and radius was adjusted in the MiniNEC model and the measured shunt inductance of the KRDC resonated isolation inductors was employed in a separate circuit model. Details of the modeled individual tower adjusted heights and radii are contained in Figure 1.

The values of the measured shunt inductances used in the circuit models for each tower are contained in Figure 2. The measured individual tower impedances, the modeled individual tower impedances, and the adjusted modeled (circuit model) individual tower impedances are also contained in Figure 2. The percentage difference between the adjusted modeled tower heights and radii and the physical tower heights and radii are within the tolerances set forth in the FCC's Rules.

As demonstrated by the data contained in Figure 2, the adjusted modeled individual tower resistance and reactance for each tower is well within ±2 ohms and ±4 percent tolerance of the corresponding measured individual tower resistance and reactance. The text files containing all pertinent input and output data associated with the individual tower models are contained in Appendix A.

## 2.3 DAYTIME AND NIGHTTIME DIRECTIONAL ANTENNA COMPUTER MODELS

The KSPN daytime and nighttime construction permit directional antenna theoretical field parameters and the authorized tower spacings and orientations were used in combination with the adjusted individual tower models to produce the daytime and nighttime directional antenna computer models. From the directional computer models, tower currents were derived for each wire segment of each antenna. The currents in each segment at each segment height were added and the combined currents were multiplied by the segment length and numerically integrated and normalized to the appropriate reference tower to verify that the modeled current moments are essentially identical to the authorized relative daytime and nighttime directional field parameters. The new daytime and nighttime operating parameters were determined from the modeled base currents as modified by the circuit models and are tabulated in Figure 3 and in Section III of FCC Form 302-AM. The text files containing all pertinent input and output data associated with the KSPN daytime and nighttime directional antenna computer models are contained in Appendices B and C, respectively. Text files containing all pertinent input and output data associated with detune models for those towers that are not used in either the daytime operating mode or the nighttime operating mode are contained in Appendix D.

## 2.4 SAMPLE SYSTEM DESCRIPTION AND VERIFICATION MEASURMENTS

The KSPN antenna sampling system is comprised of: 1) Delta Electronics, Model TCT-3 toroidal current transformers mounted in an identical manner at the output of each ATU network; 2) equal lengths of RFS, Type LCF12-50J, 1/2-inch, foam dielectric, coaxial cable between each sample current transformer and the transmitter building and short equal lengths of Times Microwave Systems LMR-600 flexible coaxial cable connecting the LCF12-50J cable to the antenna monitor; and 3) a Potomac Instruments Model 1901-4 antenna monitor.

Because the KSPN/KRDC transmitter site is located on a land fill, it was not possible to bury the KSPN sample lines. Therefore, each sample line between the ATU enclosure and the transmitter building is mounted above ground on short metal posts with horizontal support brackets. Ground kits are installed at approximate intervals of 100 feet along each sample line. The excess lengths of line are coiled in the basement of the transmitter building.

Because unequal lengths of sample line are exposed to varying outdoor temperatures, a calculation was made to determine the maximum phase shift that would be expected for the two sample lines that have the greatest difference in exposed length. In the greater Los Angeles area, the normal temperature ranges between approximately 40°F and 100°F. The maximum difference in length of the outdoor portion of the sample lines is 65.5 meters (62 electrical degrees at 710 kHz). Using equation (25) and the associated graph on page 644 in the Technical Information Section of the RFS Products-Infrastructure Solutions, Edition 4 catalog, a maximum expected phase difference of 0.0089 degrees was calculated for the 65.5 meter difference in sample line length exposed to outdoor temperature variation. Because the worst cast phase difference due to temperature variation is expected to be less than 0.1 degree, it is submitted that the exposure of unequal lengths of sample line to varying outdoor temperatures is not significant with regard to FCC requirements for approved sample systems or for sample system verification requirements for MoM proofed stations.

The electrical lengths of the sample system coaxial cables including the short jumper cables were verified to be equal in length by measuring the open-circuit series resonant frequency closest to the carrier frequency. The characteristic impedances of the sample coaxial cables were verified by measuring the impedance at frequencies corresponding to odd multiples of 1/8 wavelength (45 degrees) immediately above and below the open circuit series resonant frequency closest to the carrier frequency, while the line was open-circuited at the sample element end of the line. The characteristic impedance was calculated using 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

$R_1 + X_1$ and $R_2 + X_2$ are the measured impedances

at 45 degree offset frequencies.

A tabulation of the measured sample line lengths and characteristic impedances is contained in Figure 4. All sample line verification measurements were performed by the undersigned using a Hewlett-Packard Model 4396A network analyzer; an Amplifier Research Model 5W1000 power amplifier; and a Tunwall Radio directional coupler. As demonstrated by the measured values in Figure 4, the sample line lengths are within 1 electrical degree with respect to each other and the measured characteristic impedances are well within 2 Ohms with respect to each other, as required by Section CFR73.151(c)(2)(i) of the FCC's 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 toroidal current transformer connected. The measurement was performed at the KSPN operating frequency of 710 kHz. The measured sample line impedances with the current transformers connected are tabulated in Figure 4 under the heading, "Reference Impedance Sample Transformer Connected".

The performance of the Delta Electronics Model TCT-3 toroidal current transformers was verified by driving a common reference current through each transformer and comparing the outputs as observed on the Hewlett-Packard Model 4396A network analyzer. A tabulation of the toroidal current transformer measurement data along with the serial number of each current transformer is contained in Figure 5. The measured ratio and relative phase values for each of the TCT-3 current transformers when compared to the reference transformer were well within the manufacturers stated accuracy.

The KSPN antenna monitor is a Potomac instruments Model 1901-4, Serial Number 985 that was calibrated by the manufacturer on April 28, 2022, just prior to the installation and adjustment of the KSPN phasing, coupling and filtering equipment. Filters were installed in the antenna monitor by the manufacturer to attenuate the KRDC signal.

## 3.0 DAYTIME AND NIGHTTIME COMMON POINT IMPEDANCE AND CURRENT

The KSPN daytime and nighttime directional antenna systems were adjusted for the new computer derived operating parameters and for proper impedance transformation. The daytime and nighttime common point impedances were adjusted for $Z_{CP}$ = 50 – j3.0 Ohms. The transmitter output power level was adjusted for a daytime common point current of 26.76 amperes to achieve an input power of approximately 35,800 Watts. The transmitter output power level was adjusted for a nighttime common point current of 7.35 amperes to achieve an input power of approximately 2,700 Watts.

## 4.0 REFERENCE FIELD STRENGTH MEASUREMENTS

Reference field strength measurements were performed on three radial bearings for the KSPN daytime directional pattern and on three different radial bearings for the KSPN nighttime directional pattern. Measurements were performed on the 309º radial bearing, corresponding to the daytime pattern main radiation lobe; and on the 45.5º, and 158.5º radial bearings, corresponding to the daytime directional pattern minima. Measurements were performed on the 208º radial bearing, corresponding to the nighttime pattern main radiation lobe; and on the 53º, and 337º radial bearings, corresponding to the nighttime directional pattern minima. Three reference field strength measurements were performed on each of the selected reference radial bearings.

The field strength measurements were performed by Mr. Scott Clifton, Senior Media Engineer with the Walt Disney Company, and the undersigned. Mr. Clifton and the undersigned are experienced in performing field strength measurements on AM directional patterns. The field intensity meter used to perform the measurements was a Potomac Instruments, Model PI 4100, Serial Number 226, last calibrated by the manufacturer in June, 2011. The field intensity meter was returned to the manufacturer after the completion of the reference point field strength measurements and the meter calibration was verified to be within the manufacturer's calibration tolerance on 710 kHz.

The measured field strength value for each established reference point location is tabulated in Figure 6, Sheets 1 and 2. The tabulations contained in Figure 6 also include for each reference location: GPS coordinates (NAD83), distance from the KSPN antenna array center, and a description of the measurement location.

## 5.0 COMPLIANCE WITH FCC RADIOFREQUENCY ENERGY GUIDELINES

Access to the area around each of the KSPN/KRDC towers is restricted by a six foot chain link fence having approximate dimensions of 50 feet by 50 feet. The fence gate is locked at all times except during times when maintenance is being performed by station personnel. Appropriate warning signs are posted on the fence. The closest distance between the tower and the fence is approximately 7 meters.

The electrical height of the towers at the KSPN frequency is 0.234 wavelengths and the electrical height of the towers at the KRDC frequency is 0.367 wavelengths. The tower with the highest combined power is KSPN tower #2 (KRDC Tower #5) with both stations in the daytime operating mode. The power levels derived from the MiniNEC computer models are 21,858 Watts and 26,861 Watts for KSPN and KRDC, respectively.

The graphs of Figures 1, 2 and 3 of Supplement A (Edition 97-01) to OET

Bulletin 65 (Edition 97-01) were used to determine the power density at the 7 meter fence distance for each station. For KSPN the electric and magnetic fields were interpolated using the graphs of Figures 1 and 2 and for KRDC the electric and magnetic fields were interpolated using the graphs of Figures 2 and 3. For both stations the magnetic field produced the highest power density at the 7 meter fence distance. The interpolated magnetic fields for KSPN and KRDC at a distance of 7 meters were 0.598 A/m and 0.357 A/m, respectively. The corresponding power densities represent 13.5% and 4.8% of the FCC's Maximum Permissible Exposure (MPE) limit for General Population/Uncontrolled exposure, respectively. The calculated combined power density at the closest fence distance for the tower with the highest combined input power represents only 18.3% of the FCC's MPE limit and therefore the site is fully compliant with respect to the FCC's General Population/Uncontrolled exposure guidelines.

. At times when station personnel or their contractors are required to enter the fenced area surrounding each tower, the licensees of each station will reduce power, operate with a mode that doesn't energize the tower to be accessed or turn off power to one or both stations, as necessary, to ensure that exposure is limited to levels below the MPE limit.

## 6.0 OTHER ANTENNAS MOUNTED ON THE KSPN/KRDC TOWERS

There is an FM translator antenna for station K256CX mounted on KSPN tower #3 (KRDC tower #2). A Kintronic Laboratories isocoupler is used to allow the coaxial cable from the FM translator antenna to cross the base insulator of the tower.

## 7.0 GROUND SYSTEM DESCRIPTION

KSPN will utilize the existing ground system at the KRDC site. The existing ground system consists of 120 evenly spaced, buried, copper radial wires around each tower having a length or 67.7 meters. There are an additional 120 buried copper radial wires having a length of 15.2 meters interspersed between the longer radial wires. Further, there is a 14.6 meter square ground screen about the base of each tower. While the ground system radial wires around each tower are 0.1604 wavelengths long at KSPN’s frequency of 710 kHz, it is believed that the contribution of the ground system from the other two unused antennas that are tied into the ground system of the antennas used by KSPN, provide an ample ground system for efficient operation of the KSPN day and night directional antenna systems.

## 8.0 CONSTRUCTION PERMIT SPECIAL CONDITIONS

The KSPN Construction Permit contains several special requirements with respect to collocated Station KRDC which must be satisfied before program tests are authorized. These special requirements are described in Special Condition 4 of the

Construction Permit and are paraphrased here as follows: 4(a) sufficient data shall be submitted to show that adequate filters, traps and other equipment has been installed and adjusted to prevent interaction, intermodulation and/or the generation of spurious radiation products which may be caused by common usage of the same antenna system; 4(b) there shall be filed with the license application a copy of a firm agreement entered into by the two stations involved clearly fixing the responsibility of each with regard to the installation and maintenance of such equipment; 4(c) field observations shall be made to determine whether spurious emissions exist and any objectionable problems resulting therefrom shall be eliminated; and 4(d) KRDC shall measure antenna or common point resistance and submit FCC Form 302 as application notifying the return to direct measurement of power.

With regard to special condition 4(a), series pass/reject type filters have been installed in each station's transmission path, between the ATU output and the antenna input, to isolate the two transmission paths and minimize interaction between the signals of each station. The KSPN and KRDC series filter networks at the base of each tower are shown in the KSPN phasing, coupling and filtering schematic diagram of Figure 7. Also shown in the schematic diagram of Figure 7 is a pass/reject type shunt filter network that was installed at the output of J-Plug J1 and prior to RF contactor K2 (DA/ND Select) to further attenuate the 1110 kHz signal prior to entering the KSPN transmitter. A similar pass/reject type shunt filter network is installed in a similar manner within the KRDC phasor to further attenuate the 710 kHz signal prior to entering the KRDC transmitter. A schematic diagram of the KRDC shunt filter is contained in Figure 8.

A copy of a firm agreement fixing the responsibility for the installation and maintenance of the diplexing filters, as required by special condition 4b) is contained elsewhere in this application.

Relative field strength observations and measurements were performed by Mr. Scott Clifton and the undersigned which verified that all harmonic, intermodulation product and spurious emissions from the common use of the same towers are attenuated to levels that are fully compliant with the requirements of Section 73.44(b) of the FCC's Rules and Regulations. A tabulation of the measured harmonic, intermodulation product and spurious emissions is contained in Figure 9. In no case does the measured emission level exceed the corresponding FCC emission limit.

Finally, after all installation and modifications were completed, the KRDC base impedances were measured at the ATU output J-plug location with all other towers open circuited at the corresponding location. Method of Moments computer modeling was performed to develop a revised set of KRDC daytime and nighttime operating parameters. With the KRDC antenna systems adjusted for the new computer derived operating parameters, the ATU networks were adjusted for proper impedance matches and the common point networks were adjusted for a resistance of 50 Ohms and the authorized daytime and nighttime input power levels. It is planned to file FCC Form 302-AM requesting modified operating parameters and requesting a return to direct measurement of power concurrent or near concurrent with the filing of this application.

Based on the above discussion, the data and figures contained herein, and the agreement between parties contained elsewhere in this application, it is believed that with the filing of this License Application and the KRDC Return to Direct Measurement of Power Application, all of the special conditions regarding Station KRDC have been fully satisfied.

**9.0 SUMMARY**

It is submitted that the KSPN daytime and nighttime directional pattern performance has been verified using computer modeling and sample system verification procedures in accordance with Section 47 CFR 73.151(c) of the FCC's Rules and Regulations. It is believed that the KSPN daytime and nighttime directional antenna systems, as adjusted, fully comply with the terms of the station's FCC Authorization and all applicable FCC Rules and Regulations. This engineering statement and the attached figures and appendices were prepared by the undersigned or under the direct supervision of the undersigned and the information contained in these documents is believed to be true and correct.

Dated: July 28, 2022

Figure 1

# TOWER MODEL HEIGHT AND RADIUS

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34 kW DAY, 2.5 kW NIGHT, DA-2
JULY, 2022

| Tower | Physical Height (meters) | Modeled Height (meters) | Percent of Physical Height | Modeled Radius (meters) | Percent of Equivalent Radius |
|---|---|---|---|---|---|
| 1 | 99.0 | 105.5 | 106.5 | 0.4075 | 140.0 |
| 2 | 99.0 | 106.0 | 107.0 | 0.3057 | 105.0 |
| 3 | 99.0 | 105.8 | 106.8 | 0.4075 | 140.0 |
| 4 | 99.0 | 104.0 | 105.0 | 0.4075 | 140.0 |
| 5 | 99.0 | 106.3 | 107.3 | 0.2911 | 100.0 |

Figure 2

# MEASURED AND MODELED IMPEDANCES

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34 kW Day, 2.5 kW NIGHT, DA-2
JULY, 2022

| Tower | Measured Tower Base Impedance[1] | Modeled Tower Base Impedance | Measured Shunt Inductance (uH) | Modeled plus Shunt Reactance | Lumped Series Inductance (uH) | Total Adjusted Tower Base Impedance |
|---|---|---|---|---|---|---|
| 1 | 40.4 +j 20.4 | 41.6 +j 19.8 | 167.2 | 39.3 +j 21.4 | 0.0 | 39.3 +j 21.4 |
| 2 | 38.7 +j 22.7 | 41.1 +j 23.1 | 165.1 | 38.6 +j 24.5 | 0.0 | 38.6 +j 24.5 |
| 3 | 40.8 +j 21.6 | 41.9 +j 21.5 | 166.3 | 39.5 +j 23.0 | 0.0 | 39.5 +j 23.0 |
| 4 | 38.3 +j 14.0 | 39.3 +j 13.7 | 165.0 | 37.8 +j 15.4 | 0.0 | 37.8 +j 15.4 |
| 5 | 42.0 +j 24.1 | 42.8 +j 24.4 | 169.6 | 39.9 +j 25.9 | 0.0 | 39.9 +j 25.9 |

[1] Measured at output of matching network with other towers open-circuited

Figure 3

# ANTENNA MONITOR PARAMETERS AND COMMON POINT DATA

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34 kW DAY, 2.5 kW NIGHT, U, DA-2
JULY, 2022

| DAYTIME | | |
|---|---|---|
| **Tower** | **Ratio** | **Phase (deg)** |
| 1 | 0.483 | 97.3 |
| 2 | 1.000 | 0.0 |
| 3 | 1.041 | 124.0 |
| Common Point Impedance = 50 -j3 Ohms<br>Common Point Current = 26.76 Amperes<br>Antenna Input Power = 35,802 Watts | | |

| NIGHTTIME | | |
|---|---|---|
| **Tower** | **Ratio** | **Phase (deg)** |
| 1 | 1.000 | 0.0 |
| 2 | 0.513 | 129.1 |
| 3 | 0.567 | 150.6 |
| Common Point Impedance = 50 -j3 Ohms<br>Common Point Current = 7.35 Amperes<br>Antenna Input Power = 2,700 Watts | | |

# SAMPLE LINE VERIFICATION MEASUREMENTS

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34.0 kW DAY, 2.5 kW NIGHT, U, DA-2
JULY, 2022

| 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 | 1093.5 | 175.31 | 911.25 | 4.04 -j 47.48 | 1275.75 | 5.98 +j 47.49 | 47.76 | 46.7 +j 2.3 |
| 2 | 1093.0 | 175.39 | 910.83 | 4.12 -j 47.60 | 1275.17 | 6.02 +j 47.46 | 47.81 | 46.9 +j 2.2 |
| 2 | 1094.0 | 175.23 | 911.67 | 4.05 -j 47.35 | 1276.33 | 6.06 +j 47.27 | 47.59 | 46.9 +j 2.2 |
| 4 | 1092.7 | 175.44 | 910.58 | 4.10 -j 47.40 | 1274.82 | 6.01 +j 47.27 | 47.61 | 46.6 +j 2.0 |

[1] At this frequency, the sample line electrical length is equal to 270°.
[2] At carrier frequency (710 kHz)

Figure 4

# SAMPLE LINE VERIFICATION MEASUREMENTS

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34.0 kW DAY, 2.5 kW NIGHT, U, DA-2
JULY, 2022

| Reference Sample Toroid Number | Measured Sample Toroid Number | Measured Field Ratio | Measured Phase (degrees) |
|---|---|---|---|
| 2 | 1 | 1.006 | 0.02 |
| 2 | 3 | 1.008 | -0.13 |
| 2 | 4 | 1.004 | 0.02 |

| Sample Toroid Number | Type | Serial Number |
|---|---|---|
| 1 | Delta Electronics, TCT-3 | 18488 |
| 2 | Delta Electronics, TCT-3 | 18487 |
| 3 | Delta Electronics, TCT-3 | 18486 |
| 4 | Delta Electronics, TCT-3 | 18485 |

# REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34.0 kW DAY, 2.5 kW NIGHT, U, DA-2
JULY, 2022

**45.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) Latitude | Longitude | Description |
|---|---|---|---|---|---|---|
| 1 | 1.51 | 273 | - - - | 34° 07' 24.3" | 117° 59' 12.0" | Location is at 847 Meridian Avenue, opposite main entrance parking lot. |
| 2 | 4.17 | 85 | - - - | 34° 08' 24.5" | 117° 57' 57.8" | Location is on east side of "Foothill Family Donna and Pricilla Hunt Family Center" opposite east building entrance on east side of |
| 3 | 5.52 | 83.5 | - - - | 34° 08' 53.1" | 117° 57' 21.8" | Location is on west side of drive to 330 Mt. Olive Lane, north side of road. |

**53 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) Latitude | Longitude | Description |
|---|---|---|---|---|---|---|
| 1 | 2.36 | - - - | 12.8 | 34° 07' 36.6" | 117° 58' 39.2" | Location is on sidewalk on the northwest corner of Galen Street and Buena Vista Street. |
| 2 | 3.64 | - - - | 5.45 | 34° 08' 01.0" | 117° 58' 00.6" | Location is at the northwest corner of parking lot to Highland Industrial Center, 1801 Highland Avenue. |
| 3 | 5.08 | - - - | 2.25 | 34° 08' 28.7" | 117° 57' 15.7" | Location is at mailbox for 2334 Beardslee Street. |

# REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34.0 kW DAY, 2.5 kW NIGHT, U, DA-2
JULY, 2022

**158.5 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) Latitude | Longitude | Description |
|---|---|---|---|---|---|---|
| 1 | 2.62 | 108 | - - - | 34° 05' 31.0" | 117° 59' 16.8" | Location is on the north side of Los Angeles Street on west end of visitor parking lot to Southern California Edison Building at drive. |
| 2 | 4.11 | 63.1 | - - - | 34° 04' 45.6" | 117° 58' 55.1" | Location is at driveway to to 3861 Athol Street. |
| 3 | 5.27 | 74 | - - - | 34° 04' 11.3" | 117° 58' 38.6" | Location is in Target parking lot, west side of store, 4 parking spaces west of lightpole, in designated drive up parking area. |

**208 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) Latitude | Longitude | Description |
|---|---|---|---|---|---|---|
| 1 | 1.94 | - - - | 340 | 34° 05' 54.9" | 118° 00' 30.1" | Location is at fire hydrant in front of 5348 Hammill Road. |
| 2 | 3.30 | - - - | 187 | 34° 05' 15.0" | 118° 00' 54.5" | Location is at the entrance to Apartment parking lot on north side of Mulhall Street. |
| 3 | 4.43 | - - - | 115 | 34° 04' 43.7" | 118° 01' 15.4" | Location is on street drain at 11567 Bryant Road. |

# REFERENCE FIELD STRENGTH MEASUREMENTS

STATION KSPN - LOS ANGELES, CALIFORNIA
710 kHz - 34.0 kW DAY, 2.5 kW NIGHT, U, DA-2
JULY, 2022

**309 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) Latitude | Longitude | Description |
|---|---|---|---|---|---|---|
| 1 | 1.97 | 1480 | - - - | 34° 07' 30.3" | 118° 00' 53.8" | Location is at drive to 815 Camino Grove Avenue, north side of road. |
| 2 | 3.83 | 679 | - - - | 34° 08' 08.3" | 118° 01' 50.3" | Location is at sidewalk entry to #1/#2 Diamond Street. |
| 3 | 5.80 | 460 | - - - | 34° 08' 47.8" | 118° 02' 50.0" | Location is at drive to 432 Cambridge Drive on south side of road. |

**337 Degree Radial**

| Point Number | Distance (km) | Daytime Field (mV/m) | Nighttime Field (mV/m) | Geographic Coordinates (NAD83) Latitude | Longitude | Description |
|---|---|---|---|---|---|---|
| 1 | 1.81 | - - - | 31.7 | 34° 07' 42.8" | 118° 00' 21.6" | Location is at sidewalk to 1954 Graydon Avenue. |
| 2 | 3.46 | - - - | 18.8 | 34° 08' 32.4" | 118° 00' 47.4" | Location is at sidewalk to chainlink fence gate, north side of Chesnut Avenue. |
| 3 | 4.76 | - - - | 15.7 | 34° 09' 11.8" | 118° 01' | Location is at drive to 2334 Madison Avenue, east side of road. |

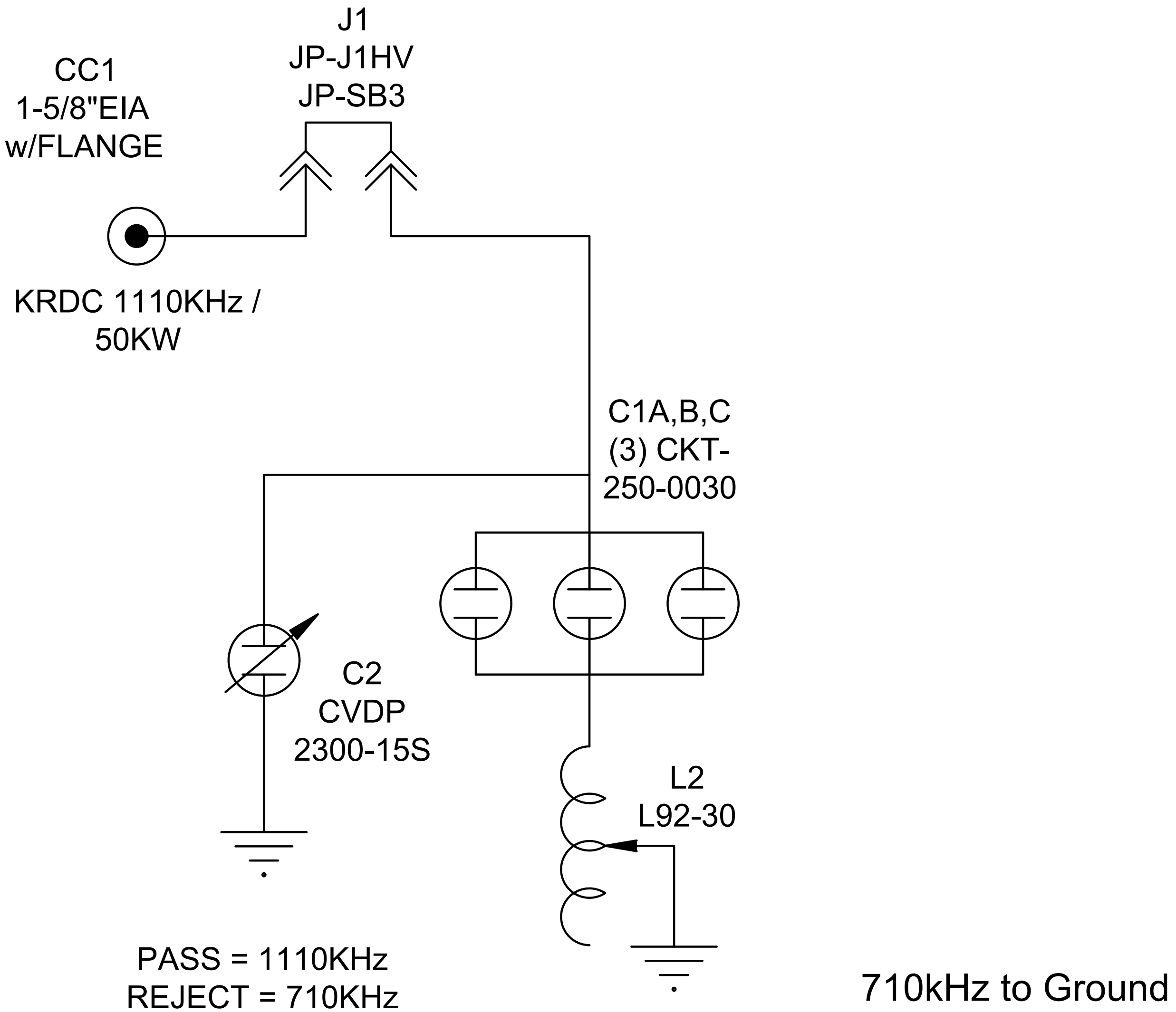
## Notes

- * Indicates Front Panel Control
- 24VDC slave panels at each RF Contactor
- Both 12" and 16" Homopolymer Panels have a 7/8" Ouput Pipe
- Inputs to Phasor on Top / Transmission Line Outputs on Bottom
- See cabinet drawings for locations of inputs and outputs - phasor and ATU


| KINTRONIC LABORATORIES INC.<br>BLUFF CITY, TN.<br>COPYRIGHT 2022 KINTRONIC LABORATORIES INC. | | | FREQ:<br>710kHz<br>1110kHz<br>POWER:<br>34kW D<br>2.5kW N DA-2 | KSPN KRDC<br>DIPLEXER RF SCHEMATIC<br>LOS ANGELES, CA |
|---|---|---|---|---|
| REV.<br>04 | REV. DESCRIPTION:<br>Phasor-50 > 42.05+j0.26 changed to Night Common Point | REV. DATE:<br>07/14/2022 | JOB NO:<br>118858 | DESIGNED:<br>CTCJ |
| DWG NO:<br>12365-RFS-12 | REF DWG. | DATE:<br>01/17/2022 | DRAWN:<br>N.Ormes | APPROVED: |

THE CONTENTS OF THIS DRAWING ARE THE INTELLECTUAL PROPERTY OF KINTRONIC LABS, INC. AND ARE NOT TO BE DISTRIBUTED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF KINTRONIC LABS, INC.

FIGURE 7




| | | | | |
|---|---|---|---|---|
| KINTRONIC LABORATORIES INC.<br>BLUFF CITY, TN.<br>COPYRIGHT 2022 KINTRONIC LABORATORIES INC. | | | FREQ: 1110kHz 710kHz<br>POWER: 50kW | EXISTING KRDC INPUT<br>REPURPOSE 710<br>LOS ANGELES, CA |
| REV.: 00 | REV. DESCRIPTION: | REV. DATE: | JOB NO: 118858 | DESIGNED: C.T.Jones |
| DWG NO: 12365–RFS–13 | REF DWG. | DATE: 01/24/2022 | DRAWN: N.Ormes | APPROVED: |

# MEASURED SPURIOUS AND HARMONIC EMISSIONS

KSPN - LOS ANGELES, CALIFORNIA
710 kHZ - 34.0 kW DAY, 2.5 kW NIGHT, DA-2, U
JULY, 2022

**Measured Attenuation**

| Emission | Frequency (kHz) | Field Strength (mV/m) | Reference Carrier | Below Carrier (dBc) | FCC Limit (dBc) |
|---|---|---|---|---|---|
| F1 (KSPN) | 710 | 806 | F1 | | |
| F2 (KRDC) | 1110 | 1100 | F2 | | |
| 3F1-F2 | 1020 | * | F1 | * | -80.00 |
| 2F1 | 1420 | 0.0225 | F1 | -91.08 | -80.00 |
| 2F2-F1 | 1510 | 0.036 | F2 | -89.70 | -80.00 |
| F1+F2 | 1820 | 0.038 | F1 or F2 | -86.53 | -80.00 |
| 3F1 | 2130 | 0.0415 | F1 | -85.77 | -80.00 |
| 2F1+F2 | 2530 | 0.06 | F1 | -82.56 | -80.00 |
| 3F2-F1 | 2620 | 0.01 | F2 | -100.83 | -80.00 |
| 4F1 | 2840 | 0.008 | F1 | -100.06 | -80.00 |
| 2F2+F1 | 2930 | 0.055 | F2 | -86.02 | -80.00 |
| 3F1+F2 | 3240 | 0.014 | F1 | -95.20 | -80.00 |
| 5F1 | 3550 | 0.009 | F1 | -99.04 | -80.00 |
| 3F2+F1 | 4040 | 0.009 | F2 | -101.74 | -80.00 |
| 6F1 | 4260 | 0.009 | F1 | -99.04 | -80.00 |
| 7F1 | 4970 | 0.0075 | F1 | -100.63 | -80.00 |

*Hispanic station on 1020 kHz, no KSPN or KRDC audio perceptible.