ENGINEERING STATEMENT
IN SUPPORT OF 302-AM

APPLICATION FOR LICENSE EMPLOYING
MOMENT METHOD MODELING

KXST, 1140kHz (Facility ID 47745)

10,000 Watt ND-D

2,500 Watt DA-N

North Las Vegas, NV.

March, 2020

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SUMMARY

The following engineering statement has been prepared on behalf of Entercom License, LLC ("Entercom"), licensee of standard broadcast station KXST (AM), North Las Vegas, NV, 1140kHz, Facility ID 47745, in support of an application to return to direct measurement of power using a Method Moments proof of performance following the diplexing of KXST with KDWN (720kHz). A 302-AM application for KDWN is being filed concurrently with this application.

The antenna system has been adjusted to produce monitoring system parameters which are within ± 5% in field ratio and ± 3° in phase of the modeled values as required by 47 C.F.R. §73.151(c)(2)(ii). There are no appurtenances attached to any of the four towers above the base insulator.

KDWN Night Tower 2 is not used by KXST and is a base insulated tower which was built to hold a backup antenna for several FM stations. Although the FM tower, appurtenances and transmission line is included in the MoM analysis, it is not a driven tower for KXST.

FCC 302-AM form exhibits

Exhibit 1 – Station Operation

DESCRIPTION OF KXST TRANSMISSION FACILITIES

RF Power Day, nominal 10kW (Non-directional)

RF Power night, nominal 2.5kW (Directional)

RF Antenna Input ND DAY 8.3a, 145Ω Antenna Input resistance (10kW input)

RF Common Point DA NIGHT 7.35a, 50Ω common point resistance (2.7kW input[1])

TOWERS[2] Electrical, Towers 1 - 4, 100.2° height

Physical, Towers 1 - 4, each 74.7m OAGL

Antenna Struct .Reg. 1058336 Night only, designated Tower 1
1058337 Day Tower, Night designated Tower 2
1058338 Night only, designated Tower 3
1058339 Night only, designated Tower 4

GROUND SYSTEM: 120 equally spaced, buried, copper radials, about the base of each of towers 1-4, each 65.7 meters in length. There is additionally 120, 89.2 meters of radials around the unused KXST tower (KDWN #2(W)), except where intersecting radials are shortened and bonded to a transverse copper strap midway between adjacent towers, plus 120 interspersed radials 15.2 meters in length around towers 1-4, and 7.3 meters around the unused KDWN tower #2(W).

[1] Per FCC 73.51(b)(2), For stations with nominal powers of 5 kW or less, the authorized antenna input power to directional antennas shall exceed the nominal power by 8 percent.

DAY- Non-Directional operation

NIGHT MoM OPERATING PARAMETERS (Normalized TCT)

TOWER	**#1**	**#2**	**#3**	**#4**
Phasing	-42.7°	0°	38.0°	71.7°
Field Ratio	0.604	1	1.138	0.487

Exhibit 2 – Description of sampling system

Description of Sampling System as Constructed

Samples for the antenna monitor are obtained from Delta TCT-3 TCT's (1.0V/A) toroidal current transformers mounted at the outputs of the antenna coupling units (prior to filtering).

The TCT's were measured with a HP 8753ES Network Analyzer and have the following measured characteristics:

Tower Number	Serial No.	Magnitude	Phase
1	352	1.000	0.05°
2	351	1.010	0.0°
3	218	0.998	-0.1°
4	350	0.999	0.15

The above measurements certify compliance within 1 percent ratio and one-degree phase accuracy.

Samples are returned to the antenna monitor using equal lengths of Andrew LDF-4-50J, ½" foam coaxial cable with solid copper outer shield.

All sample lines were tested and verified to be within 1° electrical length and with characteristic impedance to be within FCC guidelines. Verification of the sample lines is included below.

The phase monitor is a Potomac Instruments 1901-3 antenna monitor (serial number 904). Phase monitor accuracy was confirmed by feeding two tower inputs at a time through a splitter and equal length jumpers to confirm equal magnitude and phase on each tower within .001 current ratio and 0.1 degrees phase. Antenna monitor was last factory calibrated 11/19/2016.

Antenna Monitor Verification

DAY (N/A) Non-directional

NIGHT (Reference #2)

Tower Number	Value	Phase
2-1	0.999	-0.2°
2-3	0.999	-0.1°
2-4	0.999	-0.2

Impedance measurements were made of the antenna sampling system using a Power AIM 120. The measurements were made looking into the antenna monitor ends of the sample lines with the tower ends open-circuited. All connectors were installed on the sample lines and readings were normalized to include the test leads. All sample lines were equally cut prior to installation and trimmed to achieve identical electrical length and phase stability.

The table in Exhibit 1 shows the frequencies above and below the carrier frequency where resonance, defined as zero reactance corresponding with low resistance, was found. As the length of distortionless transmission line is 180 electrical degrees at the difference frequency between adjacent frequencies of resonance, and frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sample 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 Exhibit 1 below was calculated by ratioing the frequencies.

KXST Tower Sample Measurements

	Resonance Below 1140Khz	Resonance Above 1140Khz	Calculated Electrical Length@1140kHz	Impedance into TCT @1140kHz
Tower 1	687.24	1150.71	445.8°	49.8 –j 3.6
Tower 2	687.87	1151.13	445.6°	50.6 –j 2.9
Tower 3	686.80	1149.40	446.3°	51.3 –j 3.0
Tower 4	686.03	1149.03	446.5°	51.5 –j 2.8

Max Delta 0.9 deg

Based upon the measurements shown above, the sample lines are within the one electrical degree requirement.

To determine the characteristic impedance values of the sample lines, open-circuited measurements were made with frequencies offset to produce ± 45 degrees of electrical length from resonance

The characteristic impedance was calculated using the following formula, where R1 +j X1 and R2 +j X2 are the measured impedances at the +45 and -45 degree offset frequencies, respectively:

$$ZO = ((R1^2 + X1^2)^{½} \times (R2^2 + X2^2)^{½})^{½}$$

KXST Sample Line Characteristic Impedance Measurements

SAMPLE LINE IMPEDANCE MEASUREMENTS

	+45 Degree Offset Frequency (KHz)	+45 Degree Measured Impedance (Ohms)	-45 Degree Offset Frequency (KHz)	-45 Degree Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
Tower 1	1265.8	11.86 +j49.46	1035.6	9.01 - j49.35	50.51
Tower 2	1266.2	11.79 +j49.12	1036.0	9.29 - j49.88	50.63
Tower 3	1264.3	11.91 +j48.82	1034.5	9.19 - j49.43	50.26
Tower 4	1263.9	11.80 +j48.82	1034.1	9.23 – j49.59	50.33

MAX Impedance	50.63
MIN Impedance	50.26
MAX IMPEDANCE DELTA	**0.36 Ω**

As shown above, the sample lines measured characteristic impedances meet the requirement that they be equal to 50 Ohms within +-2 ohms.

The sampling system for KXST is type approved under 47CFR 73.68 of the FCC rules.

Exhibit 3 – Tower details and isolation circuits

The following isolation circuits are attached to the KXST towers and have been included in the MoM analysis:

KXST Towers 1-4: Uniform cross-section 20 inch face, guyed towers. Leg diameter 2.5 inches. Each tower with an Austin Ring transformer and Utility base insulator.

Unused KDWN Tower #2: Austin A4722B base insulator plus ERI Model 430 ISO Transformer to couple FM stations . Total assumed Base capacity: 14pf (-j9,972.1 Ω @ 1140kHz) towers1-4,

200pf (-j698.0 Ω @ 1140kHz) tower 5. Stray capacity is shunt reactance of the filtering circuitry for towers 1-4 and measures –j600 Ω @ 1140 kHz. Stray capacity for tower 5 is static drain choke that measures –j25,000 Ω @ 1140 kHz. Series reactance is incorporated in filtering circuitry for towers 1-4, and is in series with tower feed reactance. Tower 5 has only tower feed reactance.

Direct Measurement of Power

The common point current was measured using a Delta TCA RF current meter. Common point resistance was set to 50Ω –j4. The transmitter was adjusted to yield the correct current as reflected on this 302-AM.

CONCLUSION

All adjustments and measurements were conducted jointly by Bertram Goldman and Kurt Gorman. Method of Moments analysis was conducted by Kurt Gorman. Both Gorman's and Goldman's qualifications are a matter of record with the Federal Communications Commission.

This application was prepared on behalf of Entercom by Bertram Goldman of Goldman Engineering Management. All statements herein are true and correct to the best of his knowledge.

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Exhibit 4 – Method of Moments Computations

Method of Moments Detail

All Moment Method Modeling was done with Expert MININEC Broadcast Professional, Version 23. One wire was used to represent each tower. Towers were driven individually to verify the Model compared to measured impedance data. Once the Model was verified, the Night Directional Antenna System was computed. For the Directional mode, the complex voltage values for sources located at ground level were computed. These sources produce current moment sums for each Tower that, when normalized, equate to the Theoretical Field Parameters for each respective Tower.

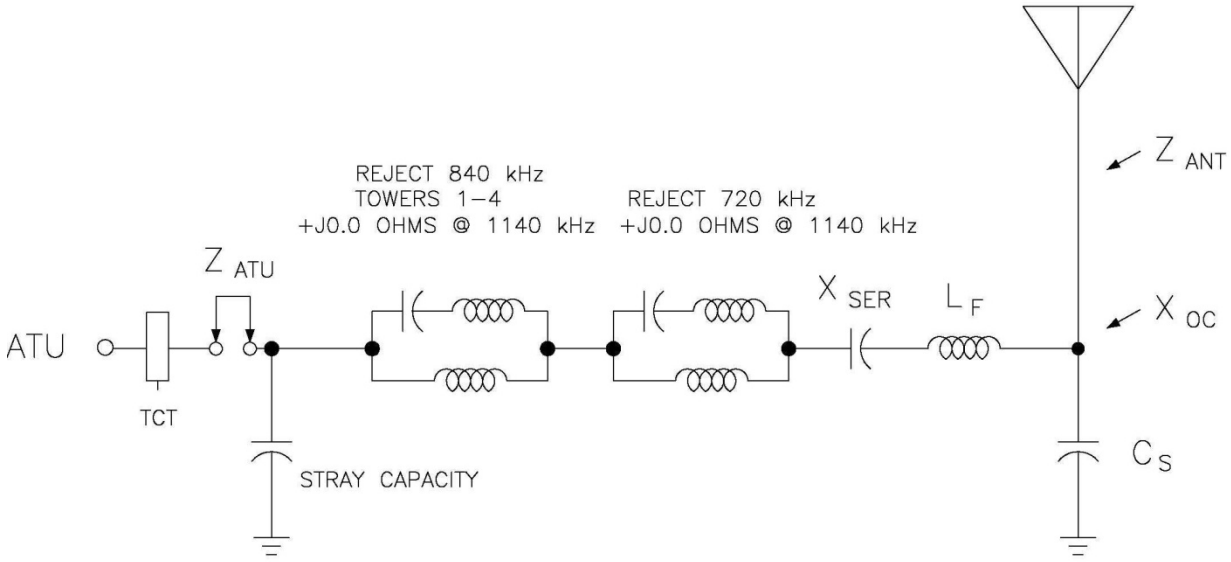
Exhibit 4A - Tower Base Impedance Measurements

The impedance of each tower was measured at the J plug at the output of the T matching network and at the TCT at the base of each tower. All impedance measurements were obtained using a HP 8753ES Network Analyzer with an external power amplifier operating on 1140kHz. The measurements were taken via remote calibration of the new sample lines after being disconnected from the Delta TCT's. All measurements were taken for each tower with all other towers open-circuited.

Exhibit 4B- Tower Impedances

The following exhibit describes the measurement conditions and assumptions used in the MoM analysis

KXST, 1140 kHz, BASE CIRCUIT DESCRIPTION
METHOD OF MOMENTS MODEL



TOWER	Specified Cs (pf)	Measured L_F (µH)	Measured X_F (Ω)	Filter X_{SER} (Ω)	Series Total X_{SERT} (Ω)	Stray C X_{SHUNT} (Ω)
1	14	2.79	+j20.0	-j 65.0	-j 45.0	-j 600.0
2	14	1.81	+j13.0	-j53.0	-j 40.0	-j 600.0
3	14	1.40	+j10.0	-j 90.0	-j 80.0	-j 600.0
4	14	4.61	+j33.0	-j 58.0	-j 25.0	-j 600.0
5	200	0.70	+j5.0	+j 0.0	+j 5.0	-j 25,000.0

KXST, 1140 KHz, TOWER IMPEDANCE MEASUREMENTS COMPARED TO METHOD OF MOMENTS MODEL

TOWER	Modeled Z_{ANT} (Ω)	Modeled Z_{ATU} (Ω)	Measured Z_{ATU} (Ω)
1	73.3 +j 104.9	90.8 +j 54.7	93.4 +j 53.8
2	79.7 +j 195.8	148.3 +j 188.6	142.1 +j 179.9
3	97.8 +j 120.0	111.6 +j 23.4	118.1 +j 23.7
4	89.1 +j 116.6	123.3 +j 86.7	125.1 +j 88.4
5	272.3 +j 258.0	499.6 +j 98.2	492.5 +j 95.7

Tower	Calculated X_{OC} (Ω)
1	-j605.8
2	-j601.4
3	-j636.6
4	-j588.1
5	-j679.0

EXHIBIT 4C - MoM Model Parameters

Note: For the MoM model, towers 1-4 are as designated in the license. For purposes of MoM modeling, however, the KDWN tower1 (DAY), which is not driven in the KXST array either daytime or nighttime was added as tower 5.

Tower	Wire No.	Segments	Base Node	Radius (meters)	Percent of equivalent radius	Model Length (deg)	Physical Length (deg)
1	1	15	1	.2426	100.0	106.0	100.2
2	2	15	16	.2426	100.0	113.0	100.2
3	3	15	46	.2426	100.0	110.0	100.2
4	4	15	61	.2426	100.0	108.0	100.2
5	5	15	76	.60	137.4	135.0	122.2

CIRCUIT ANALYSIS

Circuit analysis was performed on each tower of the KXST model. The “Phasetek” Nodal Circuit Analysis program was used to compute base model Input/ Output voltages and currents. For directional operation, the calculated Mininec Tower Base Drive Voltage was used to determine the Base Network Input Current. This point is the location of the sampling TCT. “Z_1” represents the ATU Shunt impedance, “Z_2” represents the Tower Feed impedance, and “Z_3” represents the Tower Base Shunt impedance.

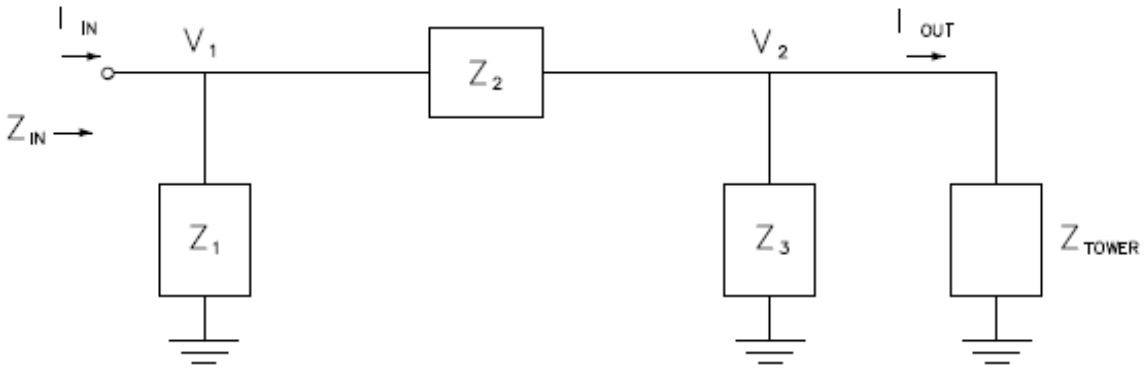


EXHIBIT 4D- DERIVED DIRECTIONAL PARAMETERS

APPLICATION FOR LICENSE INFORMATION

EMPLOYING MOMENT METHOD MODELING

KXST, 1140kHz, DA-N

DAY: **Non-Directional (All other towers detuned)**

NIGHT: **KDWN Day tower detuned**

	Theoretical		Base Network Input Current		Normalized TCT	
Tower	**Field**	**Phase**	**Amplitude**	**Phase**	**Amplitude**	**Phase**
1	1.0	0.0	2.01	12.37°	0.604	-42.7°
2	2.2	38.6	3.33	55.10°	1.0	0°
3	2.16	80.9	3.79	93.08°	1.138	38.0°
4	0.95	117.6	1.62	126.77°	0.487	71.7°

Exhibit 5 - Method of Moment Analysis

EXHIBIT 5A BASE NETWORK COMPUTATION

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 1 (OTHERS OPEN)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -45.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 73.25, 104.90 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-600.00
2		GROUND	74.81	105.46
1		2	0.00	-45.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	134.42	15.70

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	90.77	54.65	105.95	31.05
INPUT CURRENT (AMPS) :	0.81	-0.49	0.94	-31.05
OUTPUT CURRENT (AMPS) :	0.81	-0.67	1.05	-39.37

INPUT/OUTPUT CURRENT RATIO = 0.8983
INPUT/OUTPUT PHASE = 8.32 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 1 NIGHT

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -45.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 57.32, 74.13 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-600.00
2	GROUND	58.18	74.35
1	2	0.00	-45.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	137.30	33.31
2	198.91	58.50

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	63.66	24.37	68.16	20.95
INPUT CURRENT (AMPS) :	1.97	0.43	2.01	12.37
OUTPUT CURRENT (AMPS) :	2.11	0.23	2.12	6.21

INPUT/OUTPUT CURRENT RATIO = 0.9489
INPUT/OUTPUT PHASE = 6.15 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 2 (OTHERS OPEN)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -40.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 79.67, 195.83 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-600.00
2	GROUND	82.89	199.08
1	2	0.00	-40.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	120.22	4.92

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	148.25	188.60	239.89	51.83
INPUT CURRENT (AMPS) :	0.26	-0.33	0.42	-51.83
OUTPUT CURRENT (AMPS) :	0.26	-0.51	0.57	-62.94

INPUT/OUTPUT CURRENT RATIO = 0.7331
INPUT/OUTPUT PHASE = 11.11 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 2 NIGHT

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -40.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 74.09, 129.49 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-600.00
2	GROUND	76.05	130.62
1	2	0.00	-40.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	458.88	96.61
2	586.28	106.40

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	103.21	91.33	137.82	41.51
INPUT CURRENT (AMPS) :	1.91	2.73	3.33	55.10
OUTPUT CURRENT (AMPS) :	2.72	2.84	3.93	46.18

INPUT/OUTPUT CURRENT RATIO = 0.8473
INPUT/OUTPUT PHASE = 8.92 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 3 (OTHERS OPEN)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -80.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 97.81, 119.98 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-600.00
2	GROUND	100.20	120.45
1	2	0.00	-80.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	145.00	28.26

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	111.63	23.38	114.05	11.83
INPUT CURRENT (AMPS) :	0.86	-0.18	0.88	-11.83
OUTPUT CURRENT (AMPS) :	0.87	-0.36	0.94	-22.55

INPUT/OUTPUT CURRENT RATIO = 0.9361
INPUT/OUTPUT PHASE = 10.72 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 3 NIGHT

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -80.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 57.19, 117.85 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-600.00
2	GROUND	58.56	118.92
1	2	0.00	-80.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	283.21	120.73
2	533.89	150.90

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	66.25	34.70	74.79	27.65
INPUT CURRENT (AMPS) :	-0.20	3.78	3.79	93.08
OUTPUT CURRENT (AMPS) :	0.23	4.07	4.08	86.79

INPUT/OUTPUT CURRENT RATIO = 0.9291
INPUT/OUTPUT PHASE = 6.29 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 4 (OTHERS OPEN)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -25.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 89.10, 116.57 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-600.00
2	GROUND	91.21	117.12
1	2	0.00	-25.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	114.51	6.80

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	123.33	86.69	150.74	35.10
INPUT CURRENT (AMPS) :	0.54	-0.38	0.66	-35.10
OUTPUT CURRENT (AMPS) :	0.54	-0.56	0.78	-45.80

INPUT/OUTPUT CURRENT RATIO = 0.8500
INPUT/OUTPUT PHASE = 10.70 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 4 NIGHT

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00, -600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, -25.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -9972.10 OHMS
TOWER IMPEDANCE (R,X) : 41.19, 103.97 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-600.00
2		GROUND	42.06	104.89
1		2	0.00	-25.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	167.73	-175.62
2	209.95	190.30

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	55.61	87.66	103.82	57.61
INPUT CURRENT (AMPS) :	-0.97	1.29	1.62	126.77
OUTPUT CURRENT (AMPS) :	-0.99	1.59	1.88	121.91

INPUT/OUTPUT CURRENT RATIO = 0.8606
INPUT/OUTPUT PHASE = 4.86 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

CUSTOMER : KXST
NETWORK ID : TOWER 5 (OTHERS OPEN)
(*KDWN Tower 2 not driven by KXST*)

FREQUENCY : 1140.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-25000.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 5.00 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -698.00 OHMS
TOWER IMPEDANCE (R,X) : 272.27, 257.99 OHMS

NODE	TO NODE	IMPEDANCE (OHMS) R	X
1	GROUND	0.00	-25000.00
2	GROUND	495.45	102.68
1	2	0.00	5.00

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	99.80	-0.55

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	499.55	98.21	509.11	11.12
INPUT CURRENT (AMPS) :	0.19	-0.04	0.20	-11.12
OUTPUT CURRENT (AMPS) :	0.19	-0.18	0.27	-44.01

INPUT/OUTPUT CURRENT RATIO = 0.7383
INPUT/OUTPUT PHASE = 32.89 DEGREES

EXHIBIT 5B- TOWER GEOMETRY

KXST TOWER 1 (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	.2426	15
		0	0	106.		
2	none	194.	129.1	0	.2426	15
		194.	129.1	113.		
3	none	388.	129.1	0	.2426	15
		388.	129.1	110.		
4	none	582.	129.1	0	.2426	15
		582.	129.1	108.		
5	none	224.55	150.9	0	.6	15
		224.55	150.9	135.		

Number of wires = 5
current nodes = 75

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.06667	5	9.
radius	1	.2426	5	.6

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0196296	.025

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	16	0	-601.4	0	0	0
2	31	0	-636.6	0	0	0
3	46	0	-588.1	0	0	0
4	61	0	-679.	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.14	73.249	104.9	127.95	55.1	4.9503	-3.5582	-2.5239

KXSTTOWER 2 (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	.2426	15
		0	0	106.		
2	none	194.	129.1	0	.2426	15
		194.	129.1	113.		
3	none	388.	129.1	0	.2426	15
		388.	129.1	110.		
4	none	582.	129.1	0	.2426	15
		582.	129.1	108.		
5	none	224.55	150.9	0	.6	15
		224.55	150.9	135.		

Number of wires = 5
current nodes = 75

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.06667	5	9.
radius	1	.2426	5	.6

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0196296	.025

Sources

source	node	sector	magnitude	phase	type
1	16	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-605.8	0	0	0
2	31	0	-636.6	0	0	0
3	46	0	-588.1	0	0	0
4	61	0	-679.	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 16, sector 1							
1.14	79.665	195.83	211.42	67.9	11.764	-1.4803	-5.3936

KXST TOWER 3 (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	.2426	15
		0	0	106.		
2	none	194.	129.1	0	.2426	15
		194.	129.1	113.		
3	none	388.	129.1	0	.2426	15
		388.	129.1	110.		
4	none	582.	129.1	0	.2426	15
		582.	129.1	108.		
5	none	224.55	150.9	0	.6	15
		224.55	150.9	135.		

Number of wires = 5
current nodes = 75

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.06667	5	9.
radius	1	.2426	5	.6

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0196296	.025

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-605.8	0	0	0
2	16	0	-601.4	0	0	0
3	46	0	-588.1	0	0	0
4	61	0	-679.	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 31, sector 1							
1.14	97.808	119.98	154.79	50.8	5.2192	-3.3701	-2.678

KXST TOWER 4 (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	.2426	15
		0	0	106.		
2	none	194.	129.1	0	.2426	15
		194.	129.1	113.		
3	none	388.	129.1	0	.2426	15
		388.	129.1	110.		
4	none	582.	129.1	0	.2426	15
		582.	129.1	108.		
5	none	224.55	150.9	0	.6	15
		224.55	150.9	135.		

Number of wires = 5
current nodes = 75

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.06667	5	9.
radius	1	.2426	5	.6

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0196296	.025

Sources

source	node	sector	magnitude	phase	type
1	46	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-605.8	0	0	0
2	16	0	-601.4	0	0	0
3	31	0	-636.6	0	0	0
4	61	0	-679.	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 46, sector 1							
1.14	89.104	116.57	146.72	52.6	5.2008	-3.3823	-2.6677

KXST TOWER 5 (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	.2426	15
		0	0	106.		
2	none	194.	129.1	0	.2426	15
		194.	129.1	113.		
3	none	388.	129.1	0	.2426	15
		388.	129.1	110.		
4	none	582.	129.1	0	.2426	15
		582.	129.1	108.		
5	none	224.55	150.9	0	.6	15
		224.55	150.9	135.		

Number of wires = 5
current nodes = 75

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.06667	5	9.
radius	1	.2426	5	.6

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0196296	.025

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-605.8	0	0	0
2	16	0	-601.4	0	0	0
3	31	0	-636.6	0	0	0
4	46	0	-588.1	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 61, sector 1							
1.14	272.27	257.99	375.08	43.5	10.422	-1.672	-4.9548

EXHIBIT 5C- NIGHT GEOMETRY

KXST NIGHT

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2426	15
		0	0	106.		
2	none	194.	129.1	0	.2426	15
		194.	129.1	113.		
3	none	388.	129.1	0	.2426	15
		388.	129.1	110.		
4	none	582.	129.1	0	.2426	15
		582.	129.1	108.		
5	none	224.55	150.9	0	.6	15
		224.55	150.9	135.		

Number of wires = 5
current nodes = 75

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.06667	5	9.
radius	1	.2426	5	.6

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.14	0	1	.0196296	.025

Sources

source	node	sector	magnitude	phase	type
1	1	1	281.301	58.5	voltage
2	16	1	829.13	106.4	voltage
3	31	1	755.035	150.9	voltage
4	46	1	296.916	190.3	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	61	0	285.73	0	0	0

IMPEDANCE
   normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.14	57.319	74.129	93.705	52.3	3.6631	-4.8658	-1.7144
source = 2; node 16, sector 1							
1.14	74.088	129.49	149.19	60.2	6.53	-2.6814	-3.3661
source = 3; node 31, sector 1							
1.14	57.186	117.85	130.99	64.1	6.7264	-2.6019	-3.4611
source = 4; node 46, sector 1							
1.14	41.193	103.97	111.84	68.4	7.1466	-2.4468	-3.6579

CURRENT rms
Frequency = 1.14 MHz
Input power = 2,500. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	2.12372	6.2	2.11125	.229814
2	0	0	7.06667	2.22551	4.	2.22011	.154944
3	0	0	14.1333	2.26419	2.7	2.26175	.10505
4	0	0	21.2	2.26473	1.6	2.26384	.0634618
5	0	0	28.2667	2.23048	.7	2.2303	.0282683
6	0	0	35.3333	2.16325	360.	2.16325	-1.17E-03
7	0	0	42.4	2.06457	359.3	2.06442	-.0250879
8	0	0	49.4667	1.93603	358.7	1.93554	-.0435652
9	0	0	56.5333	1.77939	358.2	1.77848	-.0566566
10	0	0	63.6	1.59661	357.7	1.59531	-.0644211
11	0	0	70.6667	1.38976	357.2	1.38814	-.0669418
12	0	0	77.7333	1.16086	356.8	1.15908	-.0643257
13	0	0	84.8	.911663	356.4	.909899	-.0566829
14	0	0	91.8667	.642826	356.1	.641314	-.0440626
15	0	0	98.9333	.351759	355.7	.350777	-.0262575
END	0	0	106.	0	0	0	0
GND	-122.351	-150.553	0	3.93168	46.2	2.72248	2.83659
17	-122.351	-150.553	7.53333	4.29173	43.3	3.12335	2.9434
18	-122.351	-150.553	15.0667	4.4747	41.7	3.34286	2.97461
19	-122.351	-150.553	22.6	4.56181	40.4	3.47302	2.95774
20	-122.351	-150.553	30.1333	4.56309	39.4	3.52554	2.89695
21	-122.351	-150.553	37.6667	4.48323	38.6	3.50555	2.79473
22	-122.351	-150.553	45.2	4.32575	37.8	3.41644	2.65331
23	-122.351	-150.553	52.7333	4.09421	37.2	3.26137	2.47509
24	-122.351	-150.553	60.2667	3.79264	36.6	3.04371	2.26273
25	-122.351	-150.553	67.8	3.42561	36.1	2.76727	2.01916
26	-122.351	-150.553	75.3333	2.99815	35.7	2.43621	1.7475
27	-122.351	-150.553	82.8667	2.51541	35.2	2.05482	1.45086
28	-122.351	-150.553	90.4	1.98208	34.8	1.62701	1.13202
29	-122.351	-150.553	97.9333	1.40068	34.5	1.15491	.792507

30	-122.351	-150.553	105.467	.766808	34.1	.634933	.429947
END	-122.351	-150.553	113.	0	0	0	0
GND	-244.702	-301.106	0	4.0778	86.8	.228659	4.07138
32	-244.702	-301.106	7.33333	4.40763	84.6	.416039	4.38795
33	-244.702	-301.106	14.6667	4.56685	83.3	.531719	4.53579
34	-244.702	-301.106	22.	4.63262	82.3	.617755	4.59124
35	-244.702	-301.106	29.3333	4.61488	81.5	.679159	4.56463
36	-244.702	-301.106	36.6667	4.51848	80.9	.717809	4.4611
37	-244.702	-301.106	44.	4.3471	80.3	.734639	4.28458
38	-244.702	-301.106	51.3333	4.10439	79.8	.730316	4.03889
39	-244.702	-301.106	58.6667	3.79439	79.3	.705516	3.72822
40	-244.702	-301.106	66.	3.42159	78.9	.660995	3.35713
41	-244.702	-301.106	73.3333	2.99083	78.5	.597617	2.93051
42	-244.702	-301.106	80.6667	2.50699	78.1	.516305	2.45325
43	-244.702	-301.106	88.	1.97438	77.8	.417902	1.92964
44	-244.702	-301.106	95.3333	1.39508	77.5	.3028	1.36183
45	-244.702	-301.106	102.667	.764194	77.2	.169812	.745088
END	-244.702	-301.106	110.	0	0	0	0
GND	-367.053	-451.659	0	1.87817	121.9	-.992846	1.5943
47	-367.053	-451.659	7.2	2.00883	120.3	-1.01437	1.73391
48	-367.053	-451.659	14.4	2.06795	119.4	-1.01519	1.80161
49	-367.053	-451.659	21.6	2.08709	118.7	-1.00158	1.83106
50	-367.053	-451.659	28.8	2.07044	118.1	-.97458	1.82672
51	-367.053	-451.659	36.	2.02011	117.6	-.934929	1.79074
52	-367.053	-451.659	43.2	1.93773	117.1	-.883328	1.72468
53	-367.053	-451.659	50.4	1.82495	116.7	-.82055	1.63008
54	-367.053	-451.659	57.6	1.68353	116.4	-.747458	1.50851
55	-367.053	-451.659	64.8	1.51542	116.	-.664962	1.36174
56	-367.053	-451.659	72.	1.3227	115.7	-.574036	1.19164
57	-367.053	-451.659	79.2	1.10743	115.4	-.475627	1.00009
58	-367.053	-451.659	86.4	.871398	115.2	-.37055	.788687
59	-367.053	-451.659	93.6	.615387	114.9	-.259191	.558141
60	-367.053	-451.659	100.8	.337079	114.7	-.140645	.306335
END	-367.053	-451.659	108.	0	0	0	0
GND	-196.206	-109.207	0	.764181	69.9	.262866	.717547
62	-196.206	-109.207	9.	.498779	69.9	.171281	.468448
63	-196.206	-109.207	18.	.336153	70.1	.114505	.31605
64	-196.206	-109.207	27.	.199657	70.6	.0662708	.188338
65	-196.206	-109.207	36.	.0839647	72.8	.0248806	.0801937
66	-196.206	-109.207	45.	.0142645	225.	-.0100894	-.0100836
67	-196.206	-109.207	54.	.0914325	245.	-.0385871	-.0828912
68	-196.206	-109.207	63.	.150976	246.4	-.0604777	-.138334
69	-196.206	-109.207	72.	.192109	246.8	-.0756859	-.176572
70	-196.206	-109.207	81.	.215148	246.9	-.0842502	-.197967
71	-196.206	-109.207	90.	.220698	247.	-.0863223	-.203116
72	-196.206	-109.207	99.	.209594	246.9	-.0821413	-.192827
73	-196.206	-109.207	108.	.182779	246.8	-.071962	-.168017
74	-196.206	-109.207	117.	.141043	246.6	-.0559288	-.12948
75	-196.206	-109.207	126.	.0844813	246.4	-.0338412	-.0774071
END	-196.206	-109.207	135.	0	0	0	0

EXHIBIT 5D- Medium Wave Array Synthesis From Field Ratios (NIGHT)

(KXSTNIGHTSYN)

KXST NIGHT
MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.14 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	2.2	38.6
3	2.16	80.9
4	.95	117.6
5	0	0

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	198.91	58.5	2.12423	6.2
16	586.284	106.4	3.93263	46.1
31	533.891	150.9	4.07472	86.8
46	209.951	190.3	1.87861	121.9
61	219.039	340.3	.766517	69.6

Sum of square of source currents = 81.3959
Total power = 2,500. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.00411425	-.00649815
Y(1, 2)	.000575611	-.00142381
Y(1, 3)	-.000159442	.000429141
Y(1, 4)	-1.1634E-05	-.000319737
Y(1, 5)	-5.7738E-05	-.000885014
Y(2, 1)	.000575594	-.00142381
Y(2, 2)	.00298309	-.00440857
Y(2, 3)	.000513925	-.00110999
Y(2, 4)	-.000247785	.000481822
Y(2, 5)	.00149223	.000141942
Y(3, 1)	-.000159441	.000429138
Y(3, 2)	.000513921	-.00111
Y(3, 3)	.00341267	-.00568343
Y(3, 4)	.00028458	-.00127361
Y(3, 5)	.000338844	-.000903942
Y(4, 1)	-1.1626E-05	-.000319738
Y(4, 2)	-.000247771	.000481839
Y(4, 3)	.000284603	-.00127361
Y(4, 4)	.00374922	-.00584655
Y(4, 5)	-.000261316	.000455041
Y(5, 1)	-5.7839E-05	-.000885

Y(5, 2)	.00149213	.000141763
Y(5, 3)	.000338738	-.000903951
Y(5, 4)	-.000261293	.000455066
Y(5, 5)	.001946	-.00134737

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	79.3297	105.174
Z(1, 2)	-21.1106	-14.2808
Z(1, 3)	20.9474	2.06807
Z(1, 4)	-15.4109	.337016
Z(1, 5)	-55.2446	26.4607
Z(2, 1)	-21.111	-14.2821
Z(2, 2)	83.6864	163.601
Z(2, 3)	-27.6525	-9.6926
Z(2, 4)	17.7319	2.62447
Z(2, 5)	50.2221	-121.745
Z(3, 1)	20.9474	2.06825
Z(3, 2)	-27.652	-9.69152
Z(3, 3)	101.388	129.082
Z(3, 4)	-34.3793	-15.8611
Z(3, 5)	-67.648	2.73275
Z(4, 1)	-15.4112	.337042
Z(4, 2)	17.7317	2.62349
Z(4, 3)	-34.3796	-15.8608
Z(4, 4)	89.8061	121.252
Z(4, 5)	40.0809	-.479922
Z(5, 1)	-55.2481	26.4566
Z(5, 2)	50.237	-121.749
Z(5, 3)	-67.6497	2.72752
Z(5, 4)	40.0813	-.478381
Z(5, 5)	305.505	235.543

KXST NIGHT

CURRENT MOMENTS(amp-degrees) rms

Frequency = 1.14 MHz
Input power = 2,500. watts

			vertical current moment	
wire	magnitude	phase (deg)	magnitude	phase (deg)
1	175.343	0.0	175.343	0.0
2	385.826	38.6	385.826	38.6
3	379.067	80.9	379.067	80.9
4	166.603	117.6	166.603	117.6
5	.90616	158.9	.90616	158.9

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)
1	175.343	0.0
2	385.826	38.6
3	379.067	80.9
4	166.603	117.6
5	.90616	158.9

EXHIBIT 6 – Spurious Radiation Measurements

KDWN/KXST SPURIOUS RADIATION MEASUREMENTS
JANUARY, 2020
KDWN (720 KHZ), 25.0 KW DAY (ND) MODE
KXST (1140 KHZ), 10.0 KW DAY(ND) MODE

Frequency (kHz)	Field Intensity (mV/M)	Attenuation (dB) relative to KDWN	Attenuation (dB) relative to KXST
720	1510	--	--
1140	1416	--	--
300	.059	88.2	87.6
420	.014	100.7	100.1
840	N.R.	--	--
1020	.080	85.5	85.0
1260	.055	88.8	88.2
1440	.020	97.6	97.0
1560	.062	87.7	87.2
1860	.019	98.0	97.4
1980	.016	99.5	98.9
2160	.015	100.1	99.5
2280	.013	101.3	100.7
2580	.059	88.2	87.6
2700	.010	103.6	103.0
3000	.084	85.1	84.5
3300	.008	105.5	105.0
3420	.058	88.3	87.8
3720	.009	104.5	103.9
4140	.010	103.6	103.0
4440	.010	103.6	103.0
4860	.011	102.8	102.2

Above taken with Potomac Instruments, PI 4100, SN249, 0.97 kM from the Antenna on a bearing of 244°T.

Point coordinates: (NAD 27): N36° 15' 50.1", W115° 03' 16.7".

N.R. denotes not readable due to other station on the same frequency

Above readings meet required attenuation of 80.0dB (KDWN Day) and 80.0dB (KXST Day).

KDWN/KXST SPURIOUS RADIATION MEASUREMENTS
JANUARY, 2020
KDWN (720 KHZ), 7.5 KW NIGHT (DA) MODE
KXST (1140 KHZ), 2.5 KW NIGHT(DA) MODE

Frequency (kHz)	Field Intensity (mV/M)	Attenuation (dB) relative to KDWN	Attenuation (dB) relative to KXST
720	1170	--	--
1140	862	--	--
300	.070	84.5	81.8
420	.015	97.8	95.2
840	N.R.	--	--
1020	.043	88.7	86.0
1260	.040	89.3	86.7
1440	.027	92.7	90.1
1560	.049	87.6	84.9
1860	.012	99.8	97.1
1980	.011	100.5	97.9
2160	.024	93.8	91.1
2280	.013	99.1	96.4
2580	.070	84.5	81.8
2700	.010	101.4	98.7
3000	.089	82.4	79.7
3300	.008	103.3	100.6
3420	.013	99.1	96.4
3720	.008	103.3	100.6
4140	.010	101.4	98.7
4440	.015	97.8	95.2
4860	.012	99.8	97.1

Above taken with Potomac Instruments, PI 4100, SN249, 0.97 kM from the Antenna on a bearing of 244°T.

Point coordinates: (NAD 27): N36° 15' 50.1", W115° 03' 16.7".

N.R. denotes not readable due to other station on the same frequency

Above readings meet required attenuation of 80.0dB (KDWN Night) and 77.0dB (KXST Night).

EXHIBIT 7 - Reference Field Strength Measurements- KXST

Reference field strength measurements were made using a Potomac Instruments FIM-4100, serial number 249 Calibrated 1/21/2016). To assure accuracy, this meter was compared with another FIM-4100, serial number 134, calibrated 6/19/2019. Both meters were in agreement. Measurements were made at three locations along radials at the azimuths with radiation values as determined by pattern minima, Night pattern readings were taken at 10°, and 141.5°, with lobes at 67°, 242°.

The measured field strengths, descriptions, and GPS coordinates for the reference measurement points are shown on the following pages. All locations indicated are listed using NAD 83 datum. All measurements were taken on January 14th, 2020 between 12pm and 3:30pm, and January 15 between 9am and 12pm.

NIGHT REFERENCE MEASUREMENTS

27.5° Radial

Point No	Dist. Km.	N Latitude	W. Longitude	Field mV/m	Comments
1	0.255	36° 16’ 12.2”	115° 02’ 36.2”	2400	Dirt lot off Tropical across form KXST
2	1.01	36° 16’ 33.8”	115° 02’ 22.1”	890	Dirt lot across from Sysco
3	2.09	36° 17’ 5.2”	115° 02’ 2.1”	518	Open dirt lot- walk to location

65.5° Radial

Point No	Dist. Km.	N. Latitude	W. Longitude	Field mV/m	Comments
1	0.318	36° 16’ 19”	115° 02’ 27”	1560	Guest parking nr light pole- Amazon lot
2	0.674	36° 16’ 14”	115° 02’ 16”	463	Near Gym, 2819-A Transworld Rd
3	1.313	36° 16’ 22.6”	115° 01’52.7”	180	Azure Ave

169° Radial

Point No	Dist. Km.	N. Latitude	W. Longitude	Field mV/m	Comments
1	0.632	36° 15’ 44.9”	115° 02’ 36.1”	115	Ann Ave
2	0.985	36° 15’ 33.7”	115° 02’ 34”	26.3	Sloan & Howdy Wells @ fire hydrant
3	1.272	36° 15’ 24.7”	115° 02’ 31.6”	20.4	Sloan & Fisher N of intersection

NIGHT REFERENCE POINTs (Cont'd)

193.5° Radial

Point No	Dist. Km.	N. Latitude	W. Longitude	Field mV/m	Comments
1	0.683	36° 15' 43.5"	115° 02' 47.4"	288	5675 Ann Ave- W side of lot
2	1.068	36° 15' 31.3"	115° 02' 50.3"	83.9	5265 Howdy Wells
3	1.156	36° 15' 28.4"	115° 02' 51.4"	69	Across Street from pt 2

231.5° Radial

Point No	Dist. Km.	N. Latitude	W. Longitude	Field mV/m	Comments
1	0.405	36° 15' 56.3"	115° 02' 54.1"	1950	Across St from White bldg.- dirt lot
2	0.8	36° 15' 49"	115° 03' 05.8"	1150	Dirt lot next to Air Force fence- solar array
3	3.265	36° 15' 00"	115° 04' 24.5"	249	At LKQ building end of road, far as possible

282.5° Radial

Point No	Dist. Km.	N. Latitude	W. Longitude	Field mV/m	Comments
1	0.239	36° 15' 56.3"	115° 02' 54.1"	1590	Bldg Across St from KXST, fire hydrant
2	0.381	36° 15' 49"	115° 03' 05.8"	400	Other side of bldg. at fire hydrant
3	3.265	36° 15' 00"	115° 04' 24.5"	145	So side Tropical near turn in street

336.5° Radial

Point No	Dist. Km.	N. Latitude	W. Longitude	Field mV/m	Comments
1	0.231	36° 16' 11.8"	115° 02' 44.5"	1920	Dirt lot- tropical across from KXST
2	0.491	36° 16' 19.6"	115° 02' 49.1"	550	Dirt lot- follow coords
3	0.653	36° 16' 24.3"	115° 02' 51.8"	368	Dirt frontage road nr fwy, before turn

EXHIBIT 8 – Site Survey

Although the KXST site was surveyed for the additional "new" tower for KDWN which is unused by KXST, other than using the tower for the MoM array modeling, it is not a driven tower for KXST. There is no change in the tower spacing parameters for KXST from the currently licensed parameters.