THE INAUGURAL INSTALLATION OF THE FIRST KINSTAR AM "GREEN" ANTENNA

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Why a Short AM Antenna?

- No legal fees necessary to meet local zoning height restrictions.
- No requirement for marking and lighting.
- Low vulnerability to lightning.
- Environmentally friendly.
- Suitable for installation near airports
- Simple to install using the services of a local electric utility company where the frequency allows for wooden pole supports

The Downside of Short Antennas

- Problems with short antennas include:
  - Low radiation resistance
  - High reactive impedance
  - Low radiation efficiency
  - Poor antenna bandwidth for IBOC
  - Higher ground losses
- Can't beat the gain-volume-bandwidth limitations on antenna performance.

THE ADVENT OF A NEW LOW PROFILE AM ANTENNA TECHNOLOGY

- **SEPT. 25, 2002: STAR-H CORP GRANTED FCC CP FOR EXPERIMENTAL LICENSE WS2XTR**
- **JULY 30, 2004: "ENGR REPORT FOR EXPERIMENTAL STATION WS2XTR & REQUEST FOR APPLICATION OF 47 CFR 73.160(b)(2) FOR THE KINSTAR AM TRANSMITTING ANTENNA FOR GENERAL USE BY AM RADIO STATIONS IN THE US" SUBMITTED TO FCC BY dLR, INC.**
- **OCT. 25, 2005: FCC PUBLIC NOTICE DA 05-2741 "MEDIA BUREAU ADOPTS SIMPLIFIED APPLICATION PROCEDURES FOR AM NONDIRECTIONAL KINSTAR ANTENNAS"**
- **JAN. 11, 2009:FIRST KINSTAR AT KCST ON AIR**

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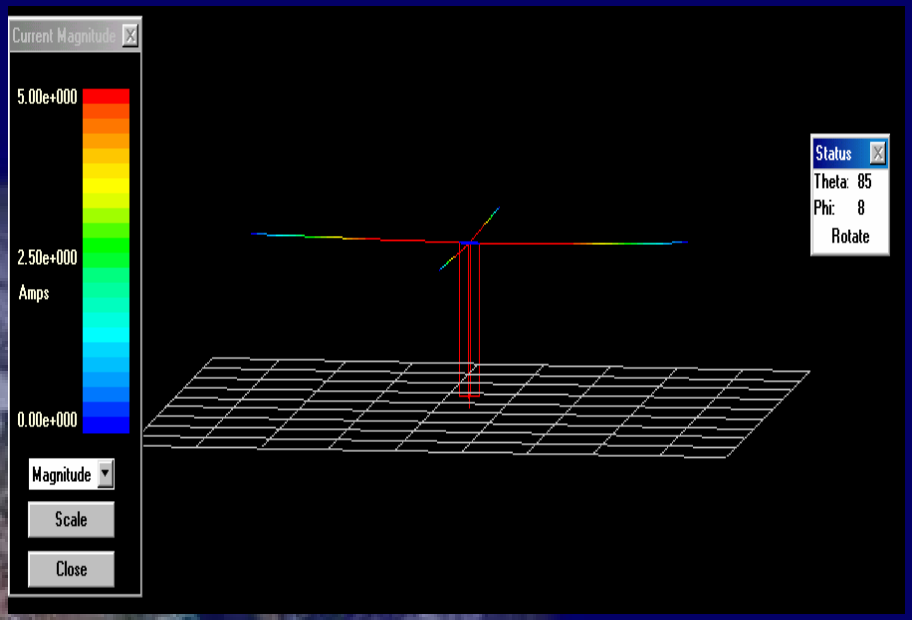
A New Concept in Short Antennas

- Solutions to these problems are:
  - Increase radiation resistance by division of current among multiple radiators.
  - Reduce reactive component by top loading.
  - Improve radiation efficiency by achieving a nearly constant current distribution on the vertical radiator.
  - Improve bandwidth by using a cage radiator structure.
- Principle: Reduce the height but maintain the volume.
- Result: an efficient, inexpensive low-profile antenna suitable for Digital AM broadcasting and other applications.

The KinStar Low Profile Antenna



- Height: Approximately 0.08 wavelengths.
- Uses standard quarterwave 120-radial ground screen.
- Horizontal Top Loading: Approximately 0.34 wavelengths end-to-end
- 300 mV/m predicted unattenuated field at 1 km from 1 kW for normal soil conditions.
- Constructed using stranded wire conductors and common overhead line hardware.

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KINSTAR EXPERIMENTAL ANTENNA 1680KHZ, 250W

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Measured Efficiency and Calculated Equivalent Field Summary

Antenna	Measured Field @ 1km	Equivalent Field with 1kW @ 1km	Average Radial Efficiency
Monopole Reference	153 mV/m	306 mV/m	1.00
Kinstar Config. A	152 mV/m	304 mV/m	0.995
Kinstar Config. B	150 mV/m	300 mV/m	0.980

(all values by duTreil, Lundin, and Rackley)

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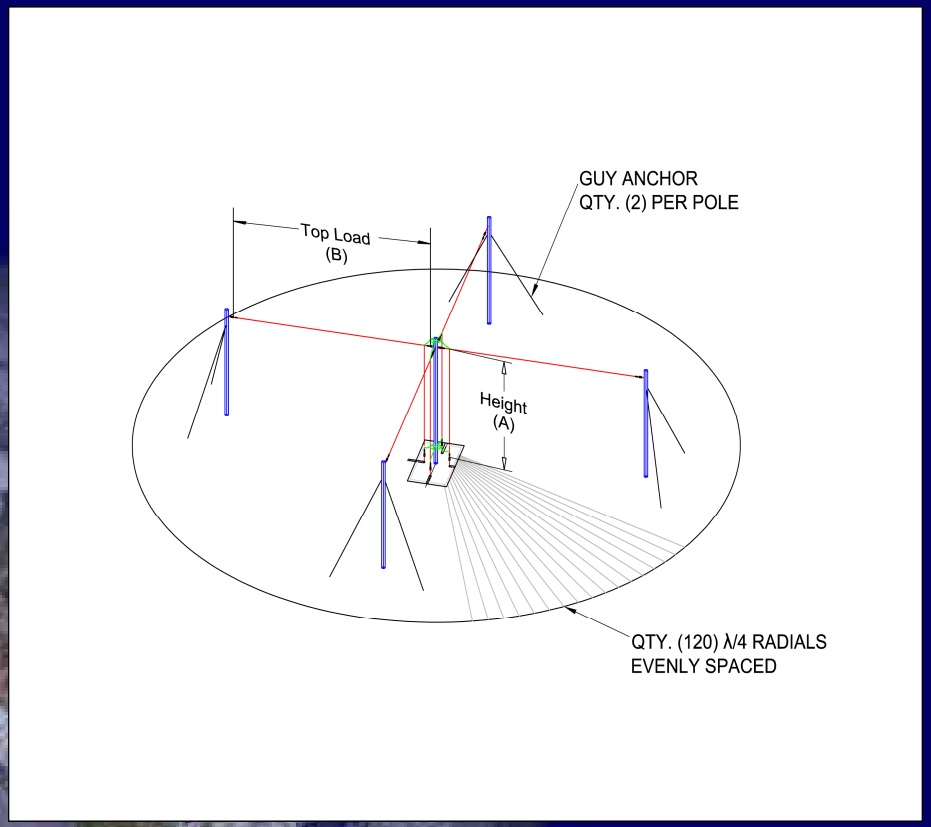
FILING FOR THE KCST KINSTAR
REF: FCC RULES SECTION 73.160(b)(2)



- A = Physical Height in Electrical Degrees = 27.65°
- B = Effective Top Loading in Electrical Degrees = 70.34°
- G = Effective Height in Electrical Degrees = 97.99° Based on the Location of the Current Maximum at 7.99° Above Ground

ARRIVAL OF INSTALL CREW AT SITE

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WOODEN UTILITY POLE INSTALLATION

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WOODEN UTILITY POLES IN PLACE

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INSTALLATION OF TOP LOAD ELEMENTS

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INSTALLATION OF SCREW ANCHORS

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INSTALLATION OF VERTICAL ELEMENTS AT CENTER SUPPORT

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GROUND SYSTEM INSTALLATION

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STL DISH INSTALLATION

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KCST KINSTAR ANTENNA FEED WITH ATU INSTALLED

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COMPLETED KCST KINSTAR ANTENNA

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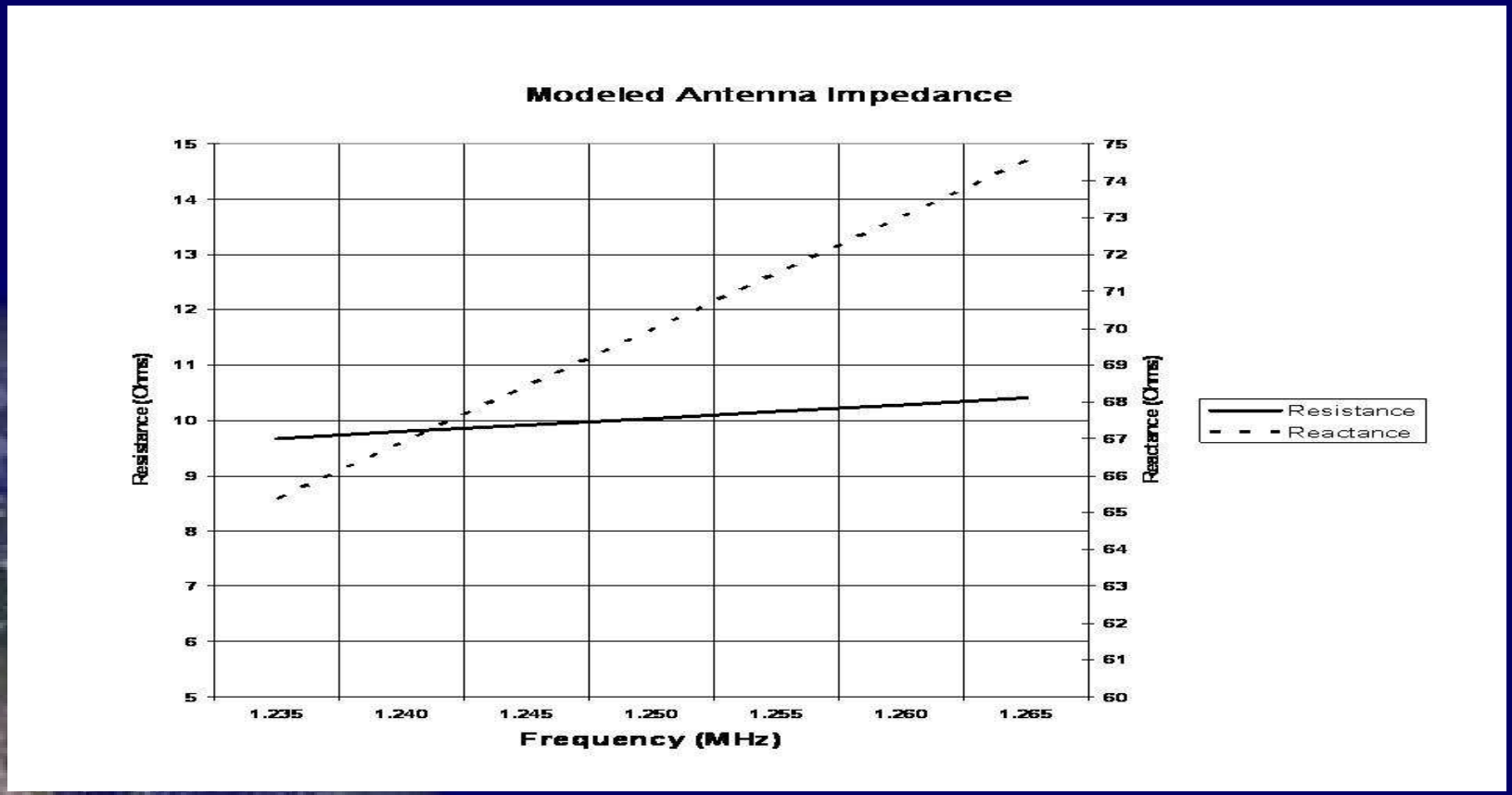
KCST PREDICTED DRIVE Z



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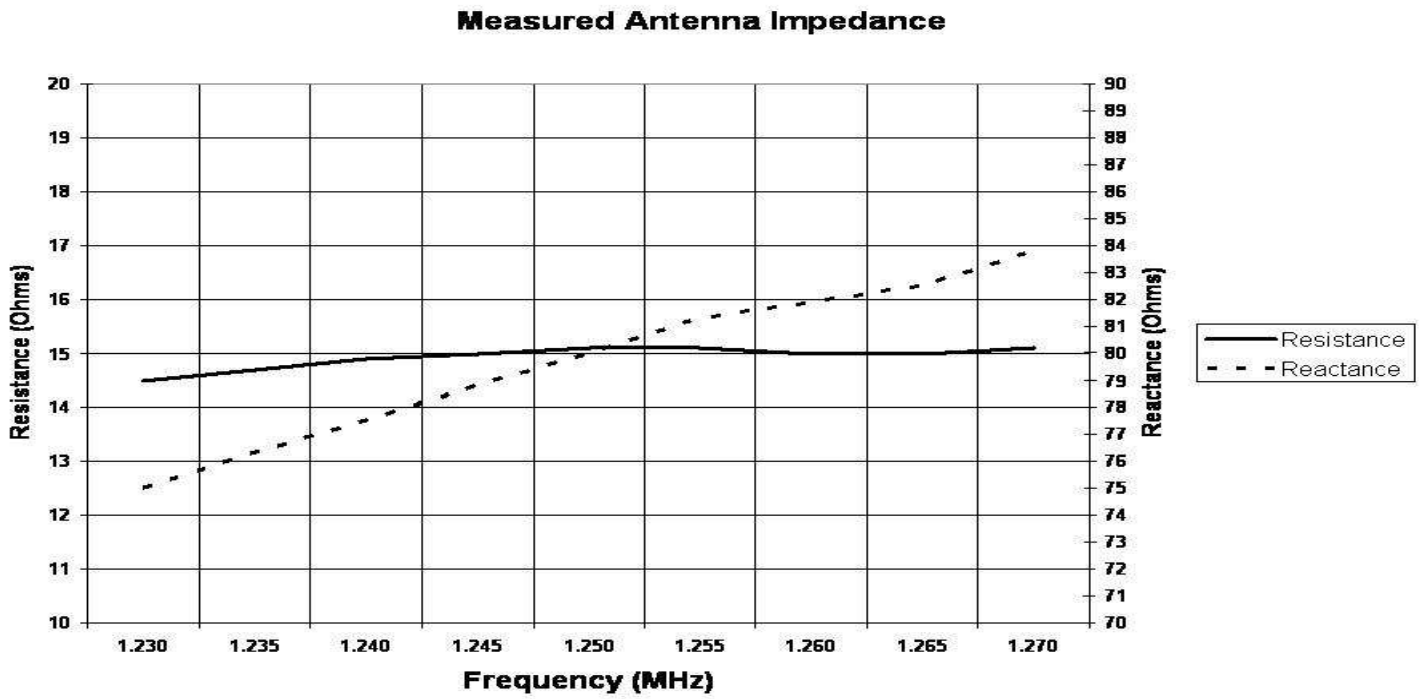
DRIVE Z OF THE KCST KINSTAR
1250 KHZ +/- 20 KHZ



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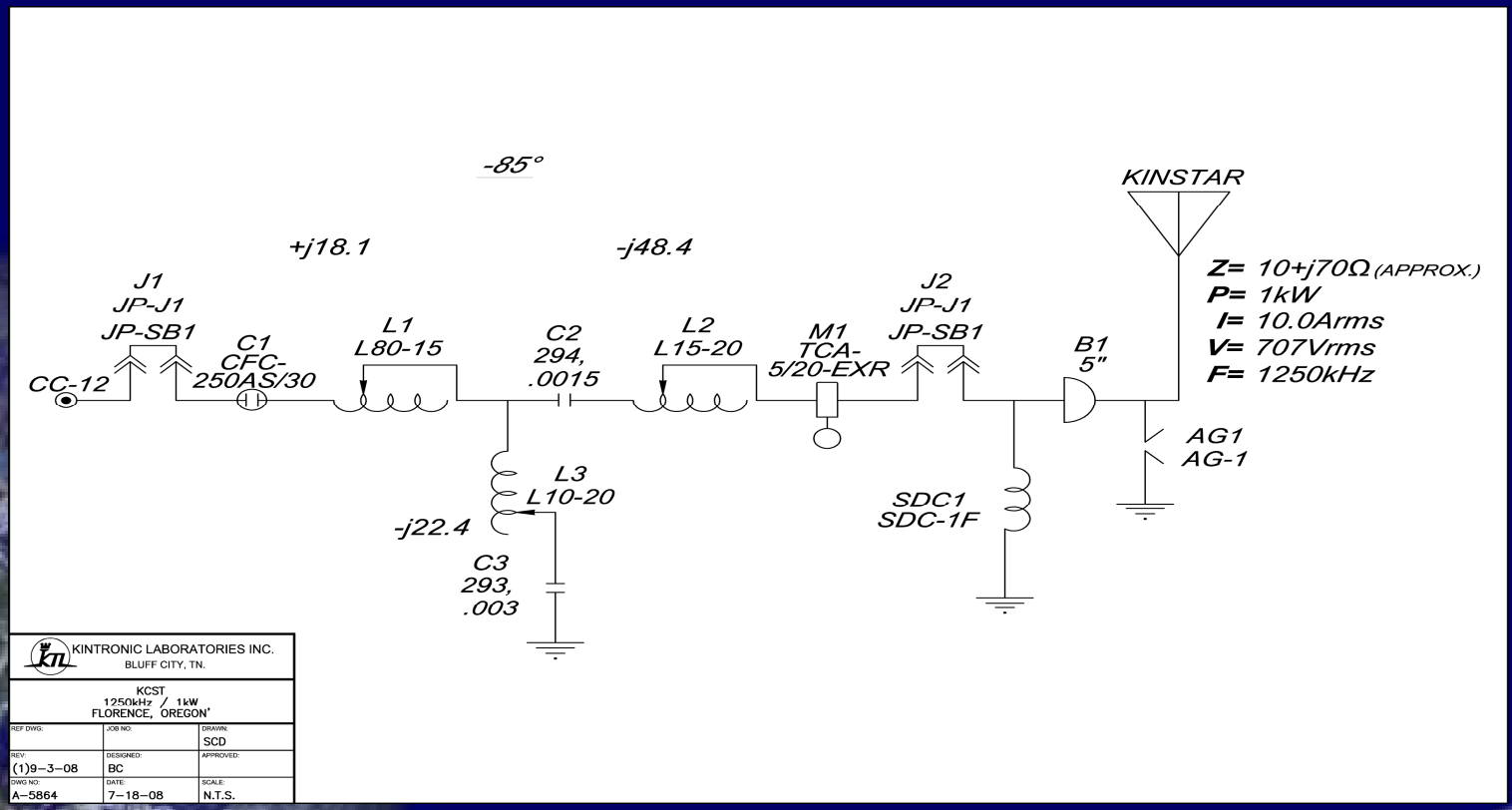
MATCHING NETWORK WITH INPUT SLOPE CORRECTION FOR KCST KINSTAR



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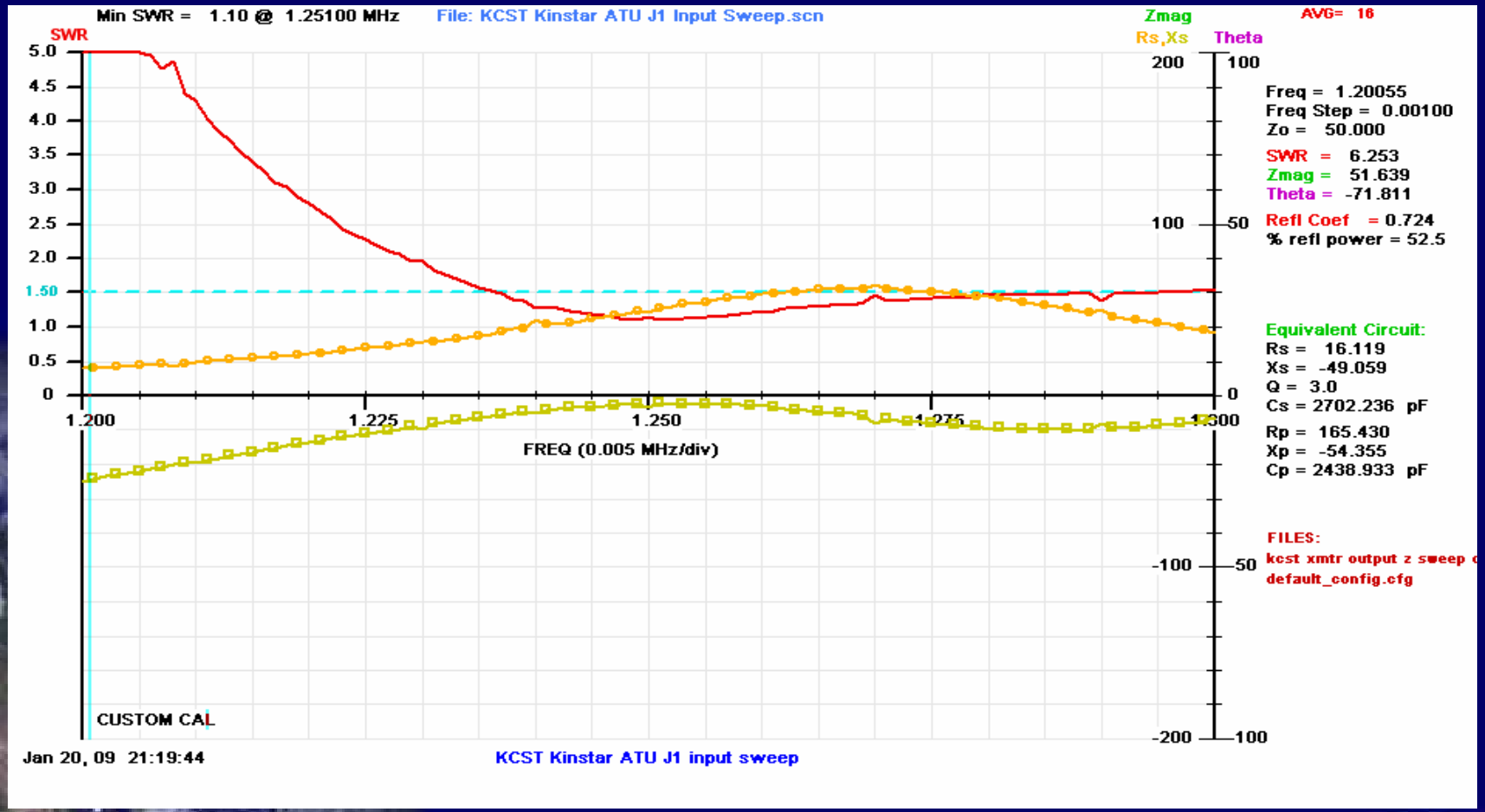
KCST ATU INPUT Z SWEEP



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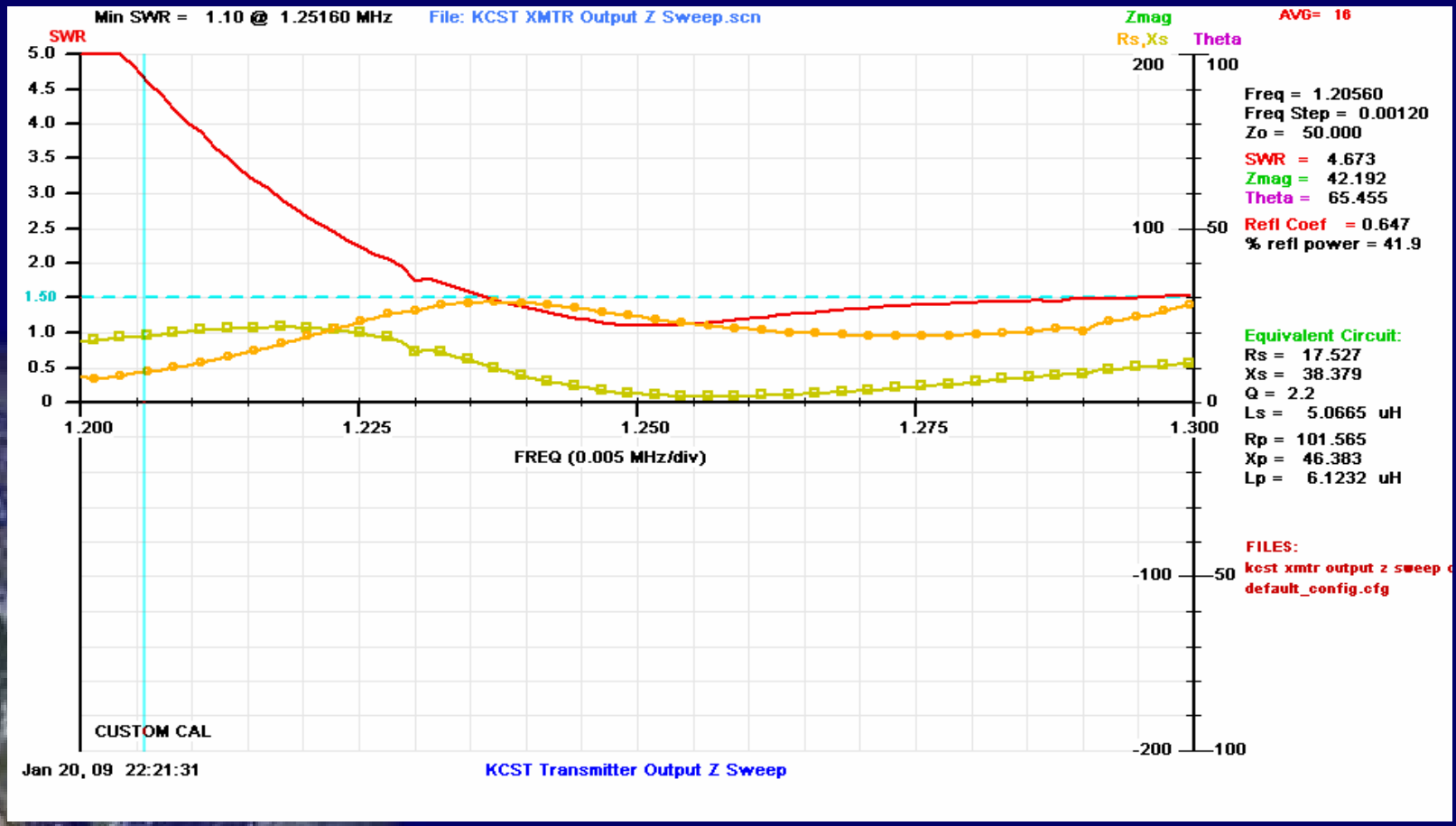
Z SWEEP AT KCST TRANSMITTER OUTPUT



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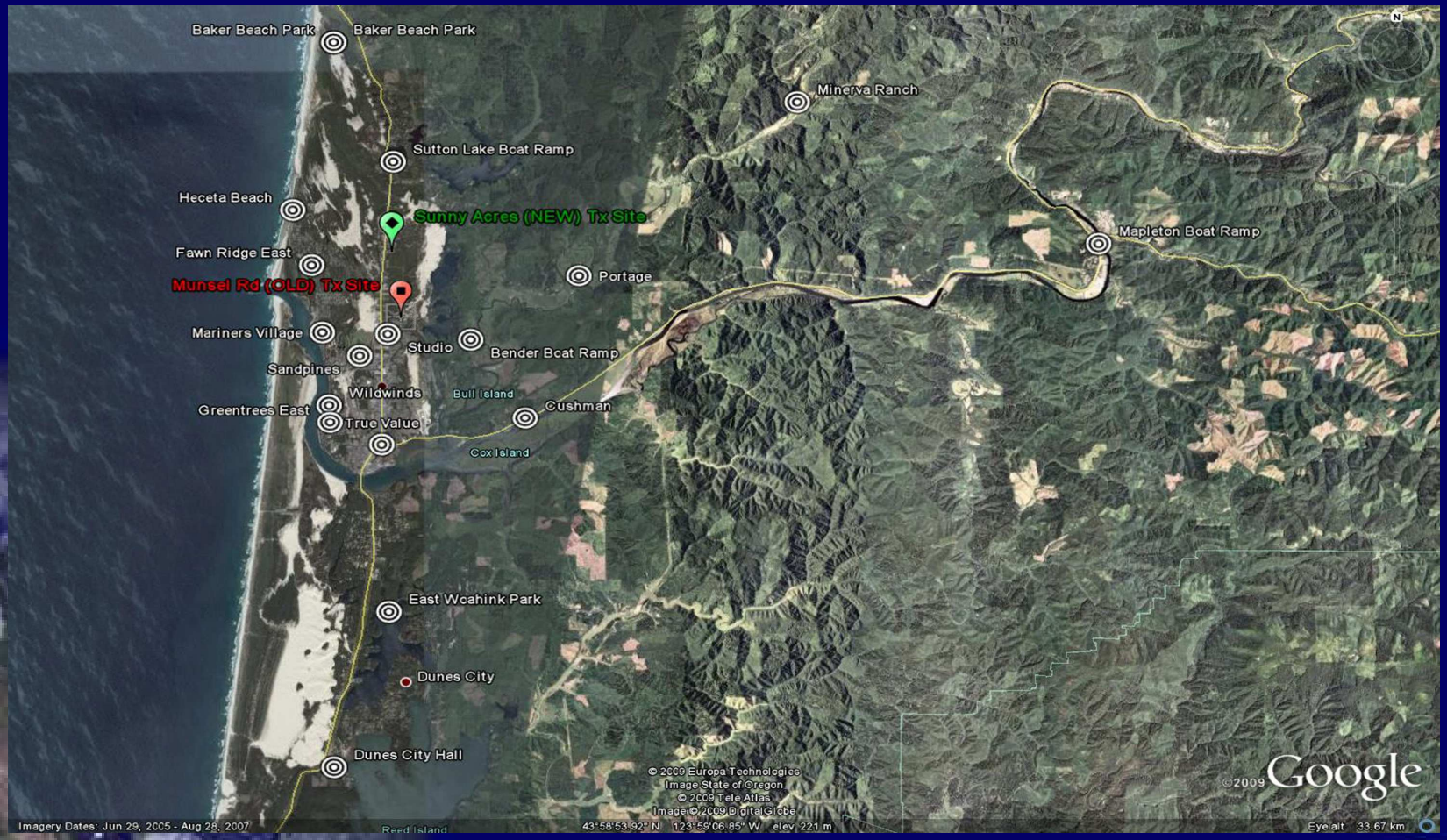
MAP SHOWING THE KCST OLD TOWER AND KINSTAR SITES AND MONITORING LOCATIONS



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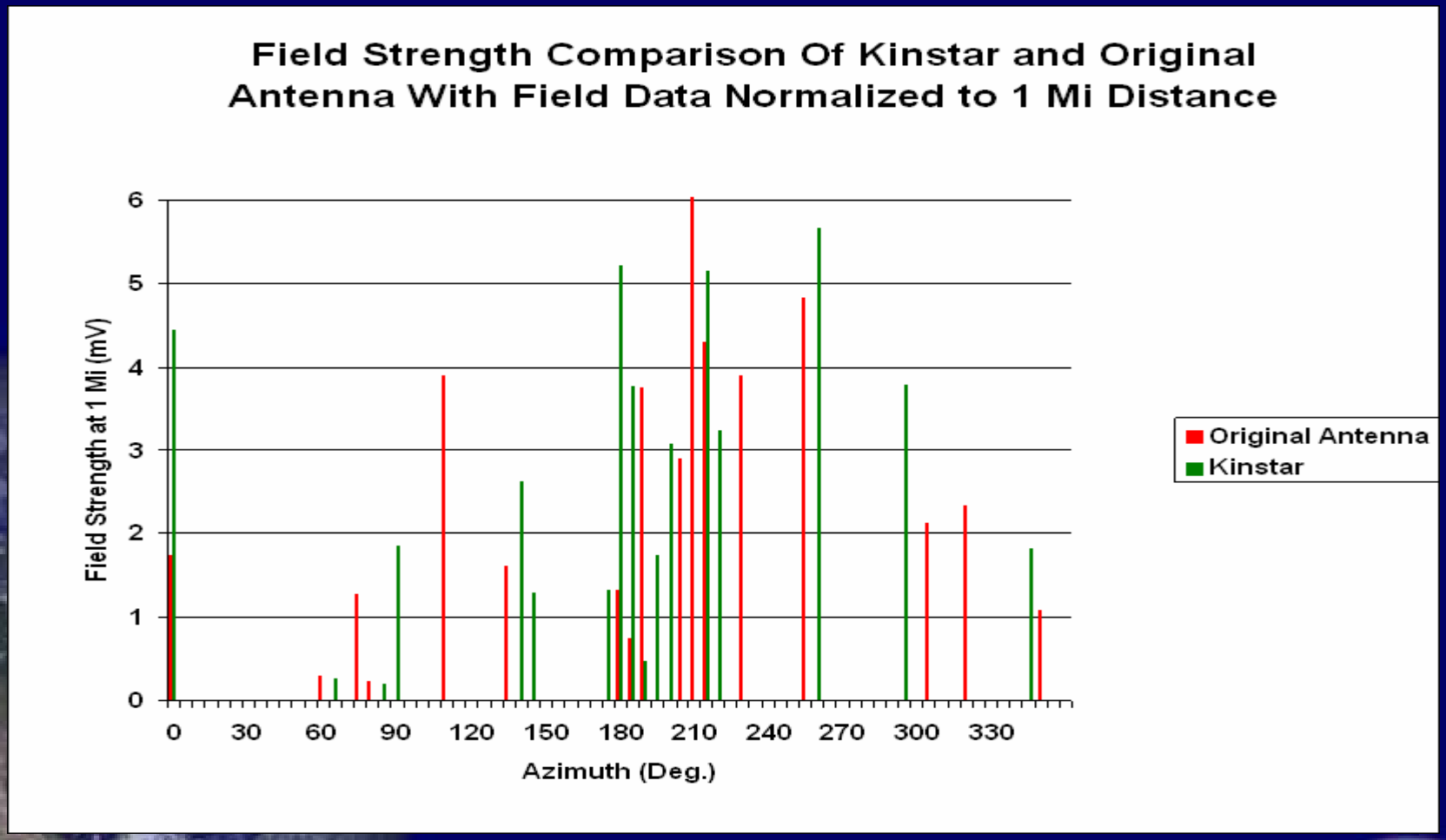
COMPARISON OF KCST OLD TOWER VS. KINSTAR FIELD INTENSITY MEASUREMENTS



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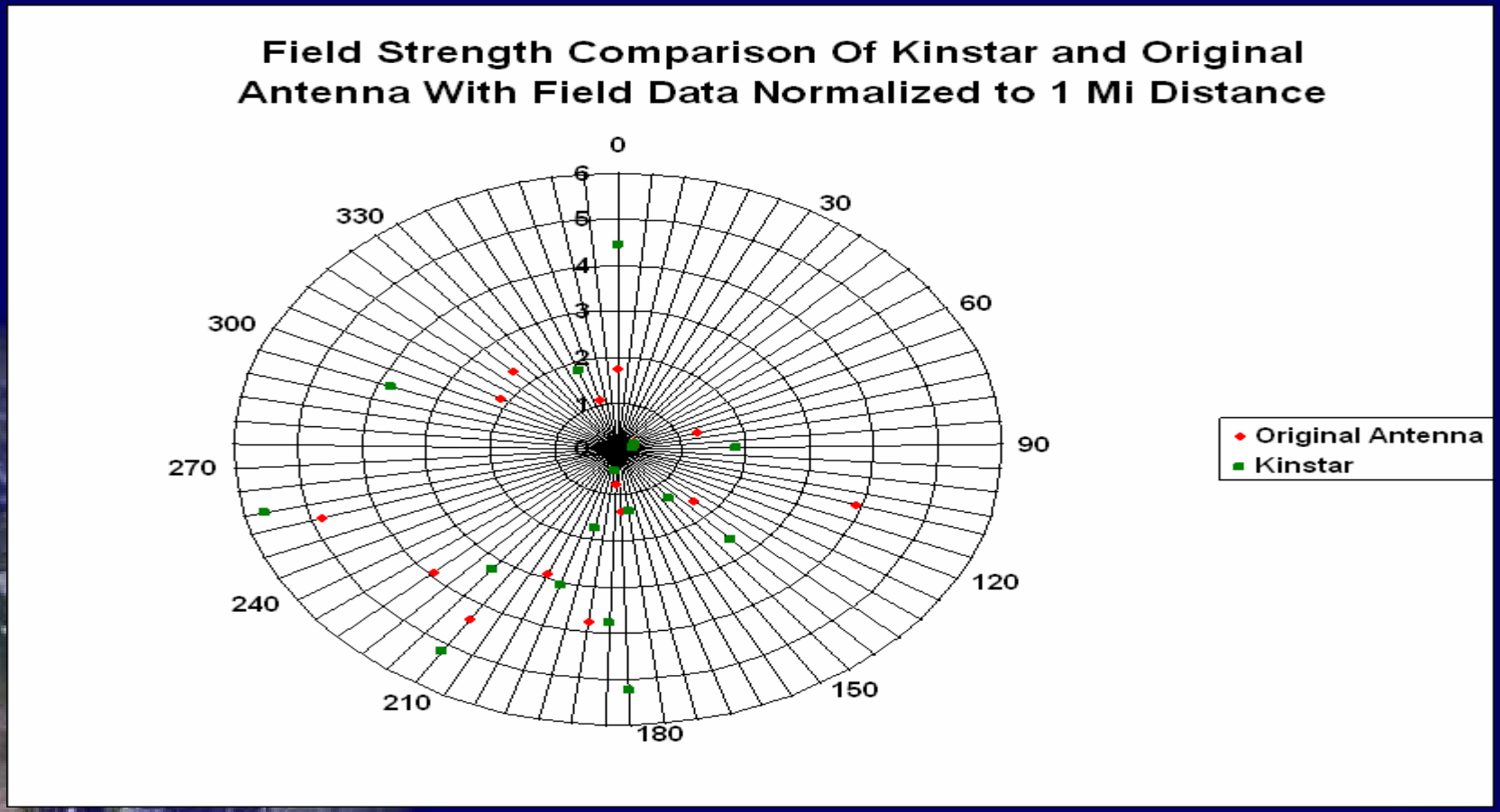
COMPARISON OF KCST OLD TOWER VS. KINSTAR FIELD INTENSITY DATA



DEMONSTRATION OF THE LOW OBSERVABLE IMPACT OF THE KCST KINSTAR

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Success!

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KINSTAR APPLICATIONS

- REFER TO FCC RULES SECTION 73.160(b)(2) FOR TOP LOADED ANTENNAS
- STATE EFFICIENCY OF 300mV/m FOR 1 KW AND 1 KM.
- KINSTAR ONLY APPROVED FOR FULLTIME NDA OPERATION.
- MULTIPLEXING IS ACCEPTABLE AS LONG AS THE FOLLOWING ARE MET:
  - SECTION 73.189(b) MINIMUM EFFICIENCY
  - SECTION 73.45(b) COMMON ANTENNA REQUIREMENTS

CONCLUSIONS

- THE KINSTAR LOW PROFILE AM ANTENNA TECHNOLOGY HAS BEEN SUCCESSFULLY LAUNCHED FROM INITIAL PATENTED CONCEPT TO INITIAL LICENSED OPERATION OVER A PERIOD OF 6-1/2 YEARS
- THE KINSTAR OFFERS UNPARALLELED PERFORMANCE FOR A SHORT AM ANTENNA
- THE KINSTAR IS THE FIRST ENVIRONMENTALLY FRIENDLY HIGH EFFICIENCY, WIDEBAND AM ANTENNA TO BE OFFERED IN THE US MARKET

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