Dielectric

# PATTERN CERTIFICATION

## TABLE OF CONTENTS



EXHIBIT #C
APP FOR STATION LICENSE
CUMULUS LICENSING LLC
WWFF-FM RADIO STATION
CH 227C2 - 14.5 KW (DA)
NEW MARKET, ALABAMA
December 2007

Dielectric

# PATTERN CERTIFICATION

## Method of Measurement

The azimuth pattern for "WHRP", Dielectric Document Sketch #08, was measured in the following manner.

A single 4.4 to1 scale model "DCRM4E5RD" bay radiator was mounted on a similarly scaled model of the tower according to information provided to Dielectric by the customer; refer to Dielectric Document Sketch #08. The antenna under test, all parasitics, all known tower appurtenances, and the tower section were rotated through 360 degrees while receiving a signal at the appropriate frequency from a linear cavity-backed source antenna. Both the horizontal and vertical polarization azimuth patterns were measured in an anechoic test range.

The transmit and scale model antennas are mounted at identical elevations and at opposite ends of the chamber. A Hewlett Packard model 8752C network analyzer was used to supply the RF signal to the source antenna at 4.4 times the fundamental FM frequency and to receive the signal intercepted by the antenna under test. The received signal was converted to a relative level, referenced to the source. This level was stored on a computer acting as the master controller. The computer controls the measurement system via IEEE-488 control bus through a GPIB card.

## Statement of Qualifications

Keith L. Pelletier is a Senior Electrical Engineer here at Dielectric. He received a BS in Electrical Engineering Technology from the University of Maine in 1998. He has over 8 years experience in RF antenna engineering and has been employed by Dielectric Communications since 1997.

Signed By: Keith L. Pelletier

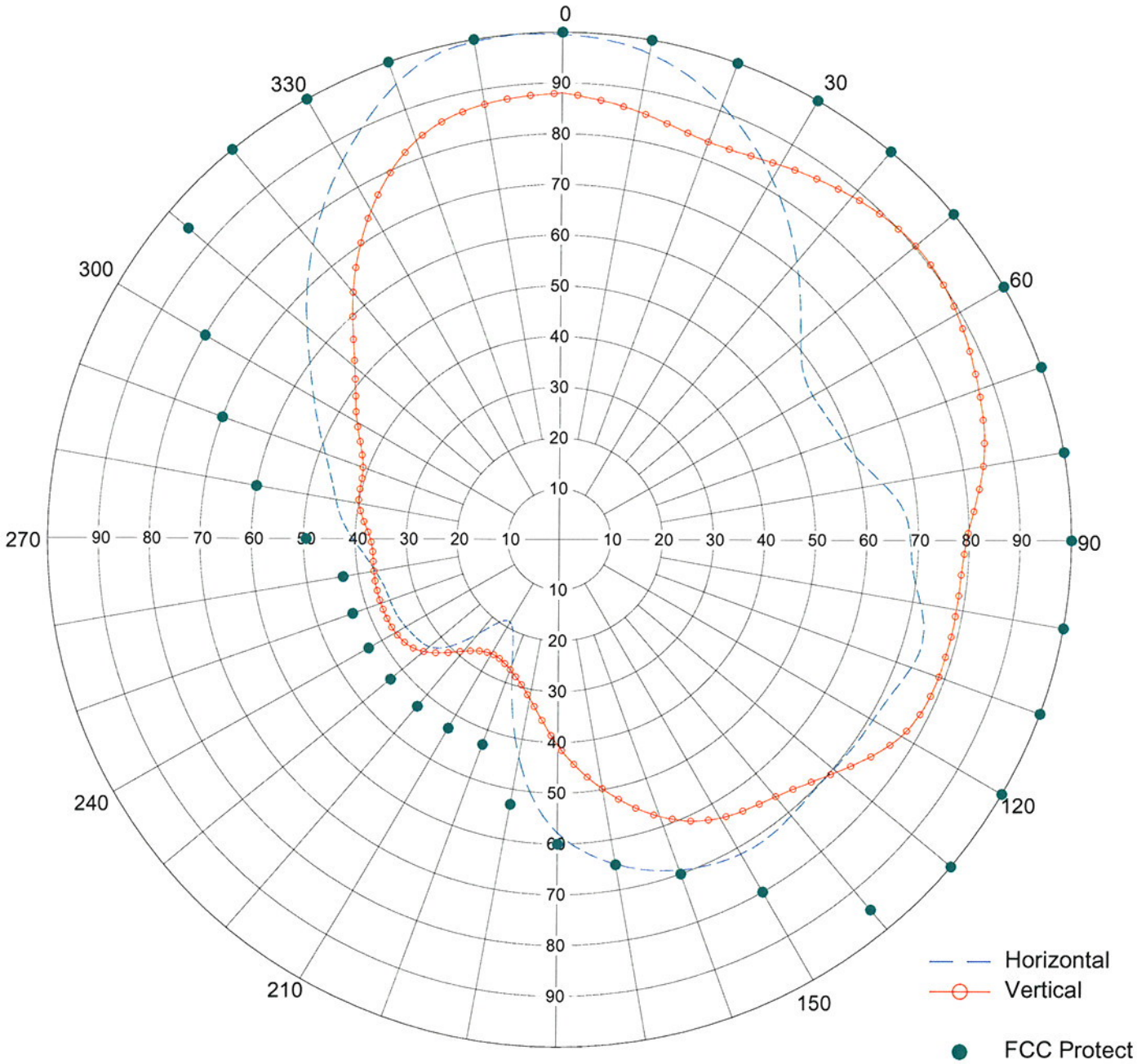
Date: 8/1/07

| | | | |
|---|---|---|---|
| Proposal Number | **C-01681** | Revision | **1** |
| Date | **Aug 1, 2007** | | |
| Call Letters | **WHRP** | | |
| Location | **New Market, AL** | | |
| Customer | **Cumulus** | | |
| Antenna Type | **DCRM4E5RD** | | |

# AZIMUTH PATTERN

85.0% Ccov - 50.0% Hrms - 50.0% Vrms

| | | | |
|---|---|---|---|
| Gain | **2.32 (3.65) HPOL 1.89 (2.76) VPOL** | Frequency | **93.3 MHz** |
| Calculated / Measured | **Measured** | Drawing # | **08** |




Remarks: Antenna Face Mounted with 1 Horizontal Parasitic

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| Customer | **Cumulus** |
| Antenna Type | **DCRM4E5RD** |
| Frequency | **93.30 MHz** |
| Drawing #: | **8** |

# TABULATION OF HORIZONTAL AZIMUTH PATTERN

| Angle | Field | dBk | ERP kW |
|---|---|---|---|
| 0 | 0.995 | 11.570 | 14.355 |
| 10 | 0.973 | 11.376 | 13.728 |
| 20 | 0.912 | 10.814 | 12.060 |
| 30 | 0.821 | 9.901 | 9.774 |
| 40 | 0.716 | 8.712 | 7.434 |
| 50 | 0.612 | 7.349 | 5.431 |
| 60 | 0.569 | 6.716 | 4.695 |
| 70 | 0.585 | 6.957 | 4.962 |
| 80 | 0.640 | 7.737 | 5.939 |
| 90 | 0.684 | 8.315 | 6.784 |
| 100 | 0.714 | 8.688 | 7.392 |
| 110 | 0.731 | 8.892 | 7.748 |
| 120 | 0.708 | 8.614 | 7.268 |
| 130 | 0.701 | 8.528 | 7.125 |
| 140 | 0.708 | 8.614 | 7.268 |
| 150 | 0.714 | 8.688 | 7.392 |
| 160 | 0.692 | 8.416 | 6.944 |
| 170 | 0.649 | 7.859 | 6.107 |
| 180 | 0.578 | 6.852 | 4.844 |
| 190 | 0.436 | 4.403 | 2.756 |
| 200 | 0.264 | 0.046 | 1.011 |
| 210 | 0.189 | -2.857 | 0.518 |
| 220 | 0.242 | -0.710 | 0.849 |
| 230 | 0.330 | 1.984 | 1.579 |
| 240 | 0.347 | 2.420 | 1.746 |
| 250 | 0.353 | 2.569 | 1.807 |
| 260 | 0.366 | 2.883 | 1.942 |
| 270 | 0.406 | 3.784 | 2.390 |
| 280 | 0.446 | 4.600 | 2.884 |
| 290 | 0.489 | 5.400 | 3.467 |
| 300 | 0.557 | 6.531 | 4.499 |
| 310 | 0.648 | 7.845 | 6.089 |
| 320 | 0.756 | 9.184 | 8.287 |
| 330 | 0.860 | 10.304 | 10.724 |
| 340 | 0.954 | 11.205 | 13.197 |
| 350 | 0.995 | 11.570 | 14.355 |

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| Frequency | **93.30 MHz** |
| Drawing #: | **8** |

# TABULATION OF VERTICAL AZIMUTH PATTERN

| Angle | Field | dBk | ERP kW |
|---|---|---|---|
| 0 | 0.880 | 10.503 | 11.229 |
| 10 | 0.857 | 10.273 | 10.650 |
| 20 | 0.834 | 10.037 | 10.086 |
| 30 | 0.853 | 10.233 | 10.550 |
| 40 | 0.884 | 10.543 | 11.331 |
| 50 | 0.902 | 10.718 | 11.797 |
| 60 | 0.893 | 10.631 | 11.563 |
| 70 | 0.870 | 10.404 | 10.975 |
| 80 | 0.840 | 10.099 | 10.231 |
| 90 | 0.795 | 9.621 | 9.164 |
| 100 | 0.787 | 9.533 | 8.981 |
| 110 | 0.788 | 9.544 | 9.004 |
| 120 | 0.772 | 9.366 | 8.642 |
| 130 | 0.710 | 8.639 | 7.309 |
| 140 | 0.660 | 8.005 | 6.316 |
| 150 | 0.633 | 7.642 | 5.810 |
| 160 | 0.580 | 6.882 | 4.878 |
| 170 | 0.498 | 5.558 | 3.596 |
| 180 | 0.406 | 3.784 | 2.390 |
| 190 | 0.318 | 1.662 | 1.466 |
| 200 | 0.273 | 0.337 | 1.081 |
| 210 | 0.261 | -0.054 | 0.988 |
| 220 | 0.289 | 0.832 | 1.211 |
| 230 | 0.345 | 2.370 | 1.726 |
| 240 | 0.370 | 2.978 | 1.985 |
| 250 | 0.372 | 3.025 | 2.007 |
| 260 | 0.369 | 2.954 | 1.974 |
| 270 | 0.371 | 3.001 | 1.996 |
| 280 | 0.399 | 3.633 | 2.308 |
| 290 | 0.411 | 3.891 | 2.449 |
| 300 | 0.460 | 4.869 | 3.068 |
| 310 | 0.526 | 6.033 | 4.012 |
| 320 | 0.634 | 7.655 | 5.828 |
| 330 | 0.746 | 9.068 | 8.069 |
| 340 | 0.835 | 10.047 | 10.110 |
| 350 | 0.870 | 10.404 | 10.975 |

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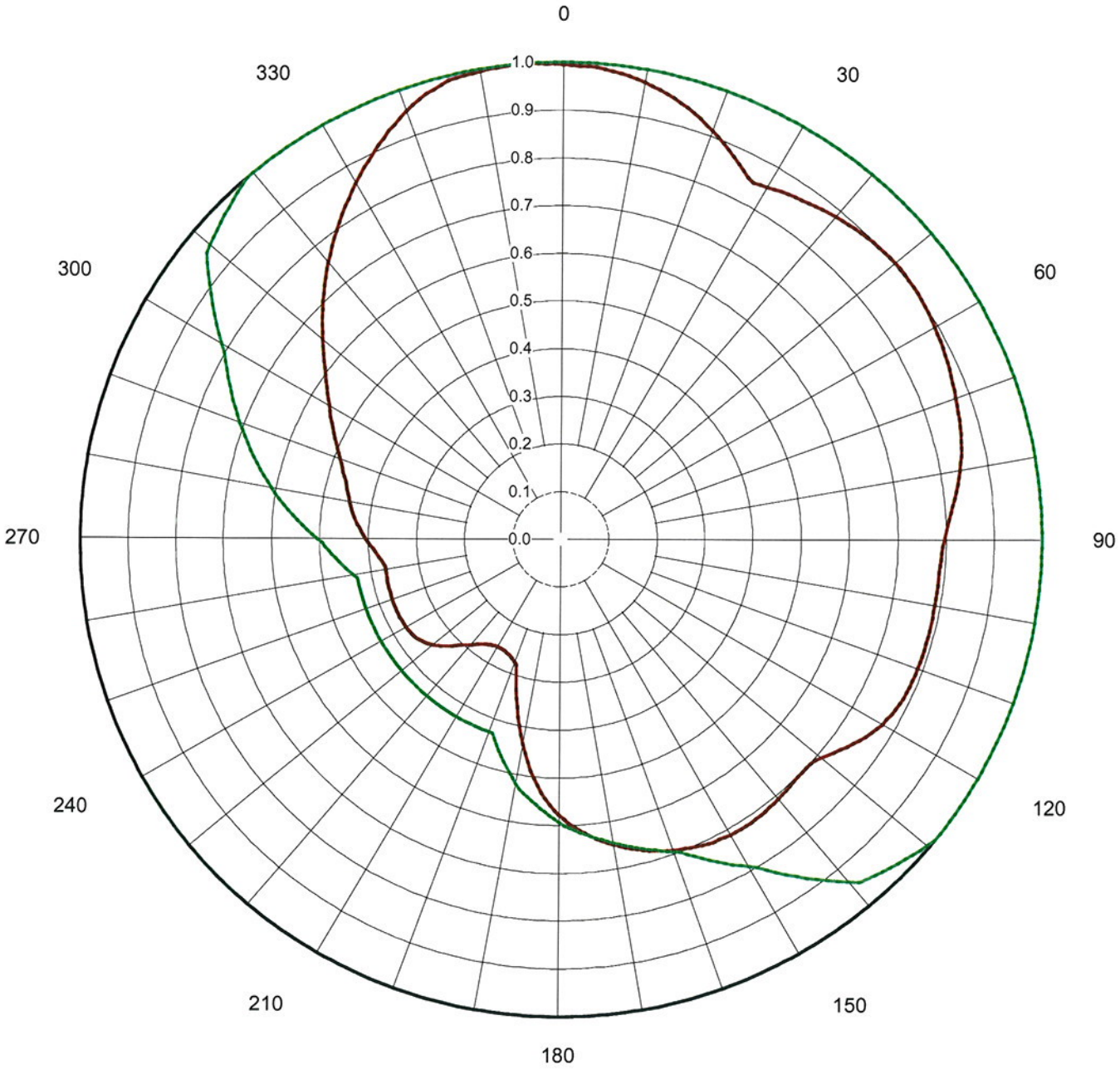
| Location | **New Market, AL** | | |
| Customer | **Cumulus** | | |
| Antenna Type | **DCRM4E5RD** | | |

## COMPOSITE AZIMUTH PATTERN

| | | | |
|---|---|---|---|
| Calculated / Measured | **Measured** | Frequency | **93.30 MHz** |
| | | Drawing # | **8** |



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| Call Letters | **WHRP** |
| Location | **New Market, AL** |
| Customer | **Cumulus** |
| Antenna Type | **DCRM4E5RD** |
| Frequency | **93.30 MHz** |
| Drawing #: | **8** |

# TABULATION OF COMPOSITE AZIMUTH PATTERN

| Angle | Field | dBk | Power kW | Input Power |
|---|---|---|---|---|
| 0 | 0.995 | 11.570 | 14.355 | 14.500 |
| 10 | 0.973 | 11.376 | 13.728 | 14.500 |
| 20 | 0.912 | 10.814 | 12.060 | 14.500 |
| 30 | 0.853 | 10.233 | 10.550 | 14.500 |
| 40 | 0.884 | 10.543 | 11.331 | 14.500 |
| 50 | 0.902 | 10.718 | 11.797 | 14.500 |
| 60 | 0.893 | 10.631 | 11.563 | 14.500 |
| 70 | 0.870 | 10.404 | 10.975 | 14.500 |
| 80 | 0.840 | 10.099 | 10.231 | 14.500 |
| 90 | 0.795 | 9.621 | 9.164 | 14.500 |
| 100 | 0.787 | 9.533 | 8.981 | 14.500 |
| 110 | 0.788 | 9.544 | 9.004 | 14.500 |
| 120 | 0.772 | 9.366 | 8.642 | 14.500 |
| 130 | 0.710 | 8.639 | 7.309 | 14.500 |
| 140 | 0.708 | 8.614 | 7.268 | 14.500 |
| 150 | 0.714 | 8.688 | 7.392 | 14.500 |
| 160 | 0.692 | 8.416 | 6.944 | 14.500 |
| 170 | 0.649 | 7.859 | 6.107 | 14.500 |
| 180 | 0.578 | 6.852 | 4.844 | 14.500 |
| 190 | 0.436 | 4.403 | 2.756 | 14.500 |
| 200 | 0.273 | 0.337 | 1.081 | 14.500 |
| 210 | 0.261 | -0.054 | 0.988 | 14.500 |
| 220 | 0.289 | 0.832 | 1.211 | 14.500 |
| 230 | 0.345 | 2.370 | 1.726 | 14.500 |
| 240 | 0.370 | 2.978 | 1.985 | 14.500 |
| 250 | 0.372 | 3.025 | 2.007 | 14.500 |
| 260 | 0.369 | 2.954 | 1.974 | 14.500 |
| 270 | 0.406 | 3.784 | 2.390 | 14.500 |
| 280 | 0.446 | 4.600 | 2.884 | 14.500 |
| 290 | 0.489 | 5.400 | 3.467 | 14.500 |
| 300 | 0.557 | 6.531 | 4.499 | 14.500 |
| 310 | 0.648 | 7.845 | 6.089 | 14.500 |
| 320 | 0.756 | 9.184 | 8.287 | 14.500 |
| 330 | 0.860 | 10.304 | 10.724 | 14.500 |
| 340 | 0.954 | 11.205 | 13.197 | 14.500 |
| 350 | 0.995 | 11.570 | 14.355 | 14.500 |

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| Drawing # | **8** |

## CUSTOMER GAIN SUMMARY

| | | |
|---|---|---|
| **Azimuth Pattern Gain of Horizontal Polarization** | **2.31** | **(3.64 dB)** |
| **Elevation Pattern Gain Per Polarization** | **1.30** | **(1.14 dB)** |
| **Peak Gain at Horizontal Polarization** | **3.00** | **(4.78 dB)** |

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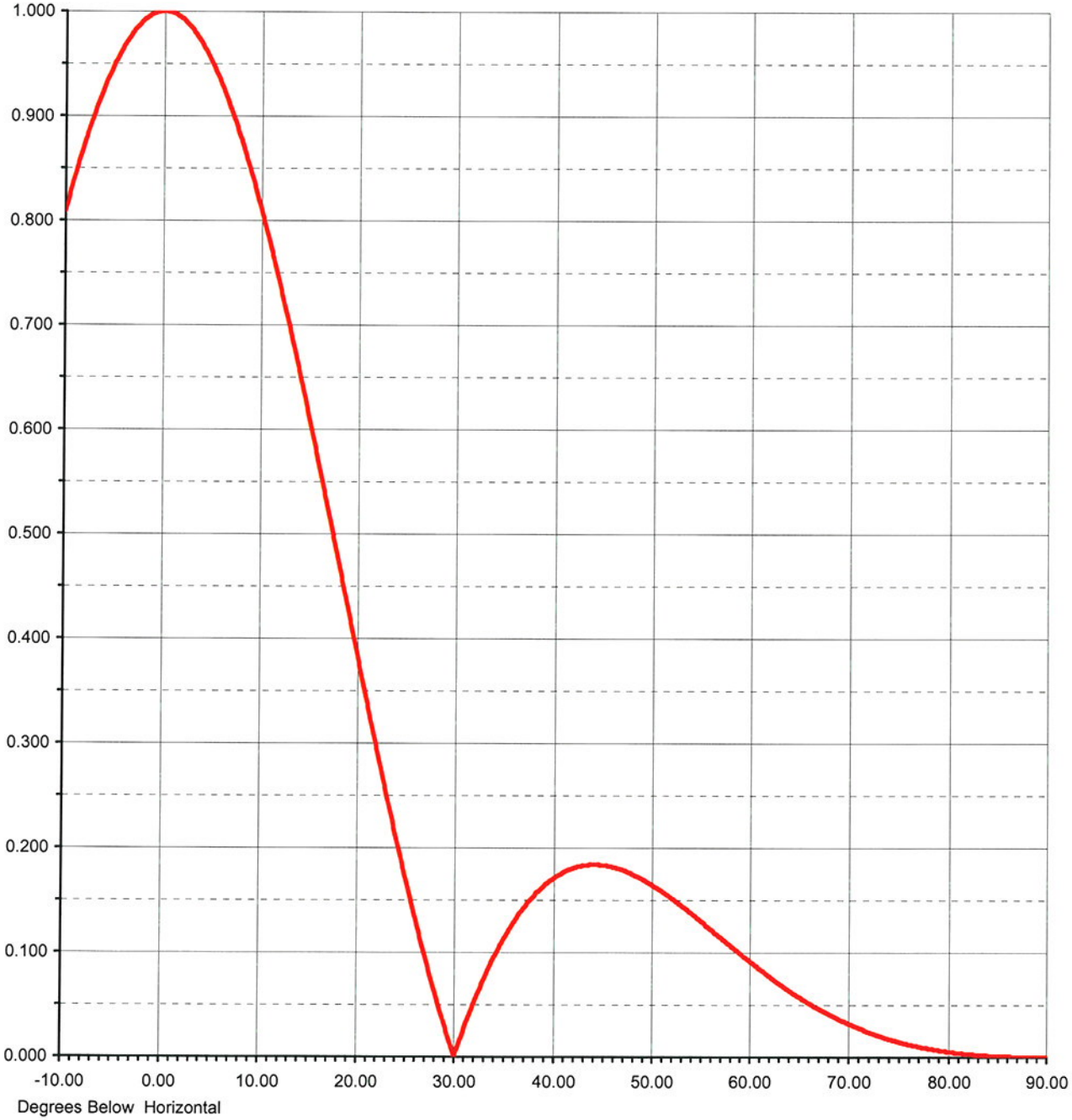
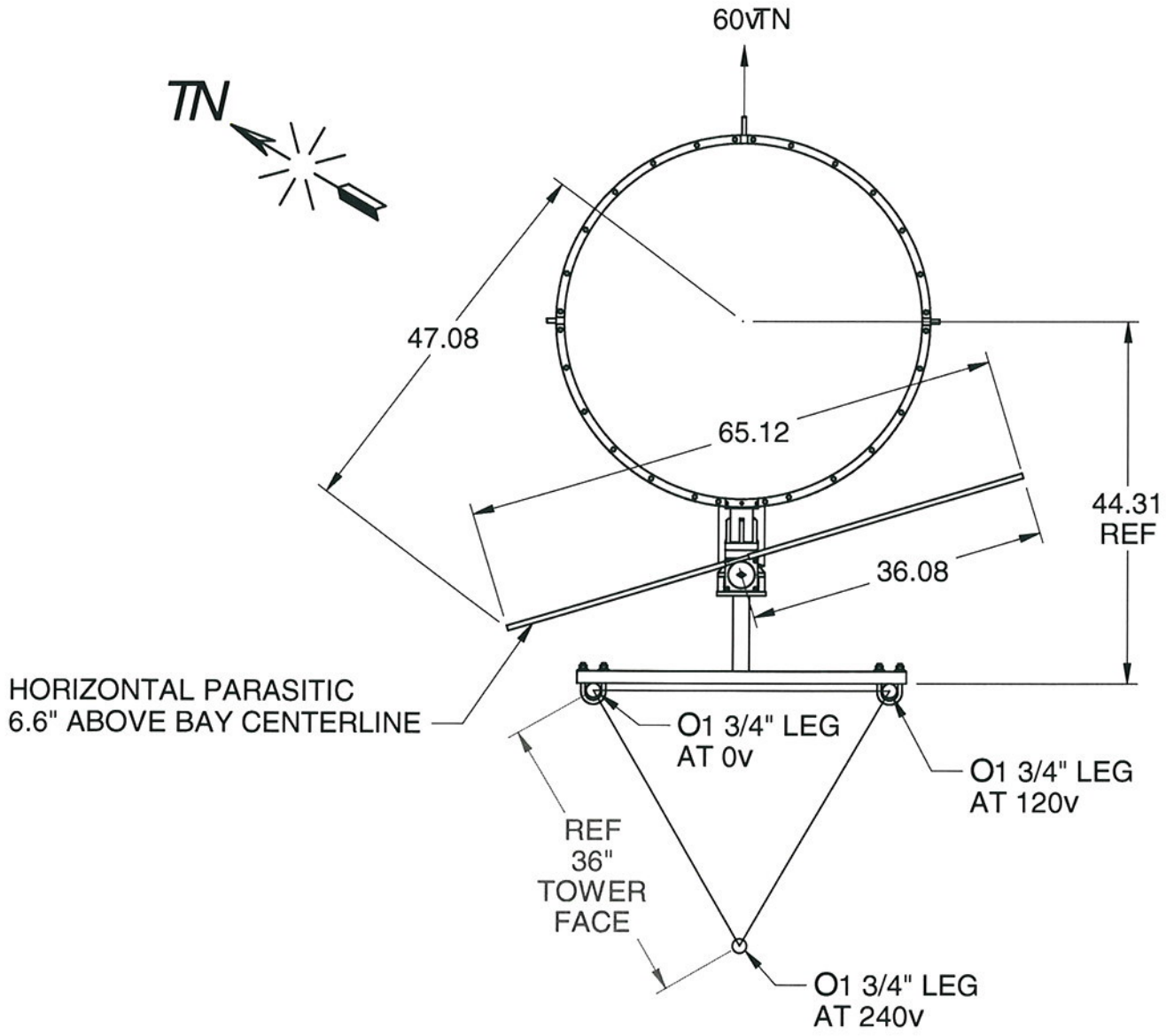
| Drawing # | |

## ELEVATION PATTERN

| | | | |
|---|---|---|---|
| RMS Gain at Main Lobe | **1.30 ( 1.14 dB )** | Beam Tilt | **0.00 deg** |
| Per Polarization | | Frequency | **93.30 MHz** |
| Calculated / Measured | **Calculated** | | |



| REV: | REVISION NOTE<br>CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY. |
|---|---|
| A | SEE SHEET #1 |




WHRP 93.3 MHz
ATHENS, AL
DCRM4E5RP
PATTERN 08.CPN
KLP / KAM

Dielectric
A Unit of SPX Corporation

Error: No reference

| A | GAGE CODE 08441 | DRAWING NO: PATTERN_08CPN |
|---|---|---|
| 12:01:26 PM | | SHEET: 1 OF 1 |