

**S.O. 24973**

**Report of Test 6015-1/2-DA**

**for**

**New Inspiration Broadcasting Co., Inc.**

**KKLA 99.5 MHz Los Angeles, CA**

**OBJECTIVE:**

The objective of this test was to demonstrate the directional characteristics of a 6015-1/2-DA to meet the needs of KKLA and to comply with the requirements of the FCC construction permit, file number BPH-20060221AED.

**RESULTS:**

The measured azimuth pattern for the 6015-1/2-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of the Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BPH-20060221AED indicates that the Horizontal radiation component shall not exceed 10.0 kW at any azimuth and is restricted to the following values at the azimuths specified:

030-060 Degrees T: 0.320 kW

080-110 Degrees T: 0.320 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 219 Degrees T to 222 Degrees T. At the restricted azimuth of 030-060 Degrees T the Vertical component is 16.478 dB down from the maximum of 10.0 kW, or 0.225 kW. At the restricted azimuth of 080-110 Degrees T the Vertical component is 15.139 dB down from the maximum of 10.0 kW, or 0.306 kW.

The R.M.S. of the Horizontal component is 0.514. The total Horizontal power gain is 1.763. The R.M.S. of the Vertical component is 0.501. The total Vertical power gain is 1.728. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.535. The R.M.S. of the measured composite pattern is 0.521. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.455. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

**METHOD OF DIRECTIONALIZATION:**

One bay of the 6015-1/2-DA was mounted on a tower of exact scale to the tower at the KCET-TV main tower site. The spacing of the antenna to the tower was varied to achieve the horizontal and vertical patterns shown in Figure 1. See Figure 2 for mechanical details.

**METHOD OF MEASUREMENT:**

As allowed by the construction permit, file number BPH-20060221AED, a single level of the 6015-1/2-DA was set up on the Howell Laboratories scale model antenna pattern measuring range. A scale of 4.5:1 was used.

**SUPERVISION:**

Mr. Surette was graduated from Lowell Technological Institute, Lowell, Massachusetts in 1973 with the degree of Bachelor of Science in Electrical Engineering. He has been directly involved with design and development of broadcast antennas, filter systems and RF transmission components since 1974, as an RF Engineer for six years with the original Shively Labs in Raymond, ME and for a short period of time with Dielectric Communications. He is currently an Associate Member of the AFCCE and a Senior Member of IEEE. He has authored a chapter on filters and combining systems for the latest edition of the CRC Electronics Handbook and for the 9<sup>th</sup> Edition of the NAB Handbook.

**EQUIPMENT:**

The scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator. The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 feet above ground level. The receiving corner reflector is spaced 50 feet away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable.

The control building is equipped with:

Hewlett Packard Model 8753 Network Analyzer

PC Based Controller

Hewlett Packard 7550A Graphics Plotter

The test equipment is calibrated to ANSI/NCSL Z540-1-1994.

**TEST PROCEDURES:**

The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 447.75 MHz. Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadding reading of 100 in voltage. From the recorded patterns, the R.M.S. values are calculated and recorded as shown in Figure 1.

Respectfully submitted by:

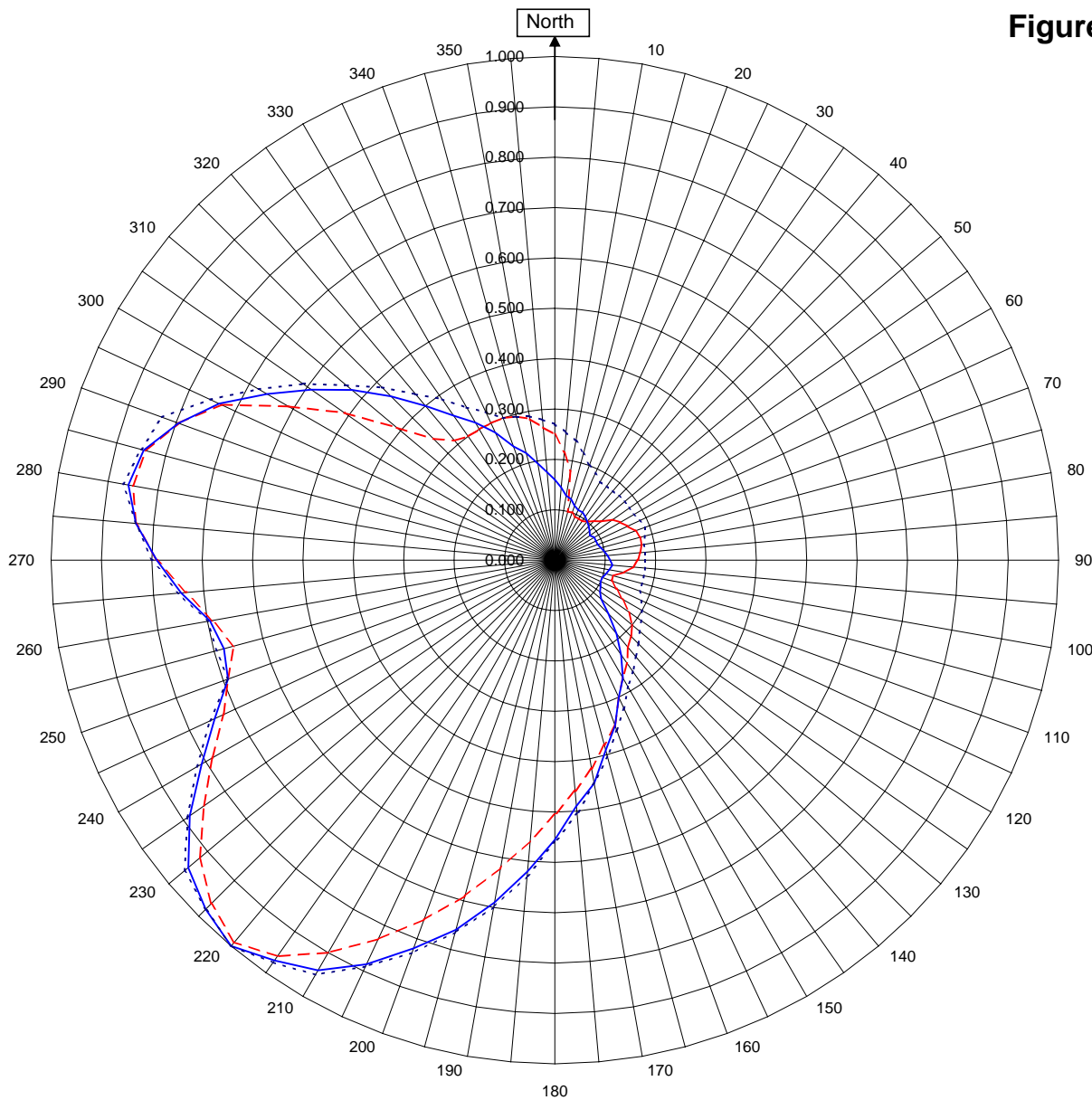


Robert A. Surette  
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S/O 24973  
August 15, 2006

# Shively Labs

Shively Labs, a division of Howell Laboratories, Inc. Bridgton, ME (207)647-3327

Figure 1



## KKLA Los Angeles, CA

24973

August 15, 2006

|                   |       |                                     |                   |
|-------------------|-------|-------------------------------------|-------------------|
| Horizontal RMS    | 0.514 | Frequency                           | 99.5 / 447.75 MHz |
| Vertical RMS      | 0.501 | Plot                                | Relative Field    |
| H/V Composite RMS | 0.521 | Scale                               | 4.5 : 1           |
| FCC Composite RMS | 0.535 | See Figure 2 for Mechanical Details |                   |

|               |                     |
|---------------|---------------------|
| Antenna Model | 6015-1/2-DA         |
| Pattern Type  | Directional Azimuth |

Figure 1a

Tabulation of Horizontal Azimuth Pattern  
KKLA Los Angeles, CA

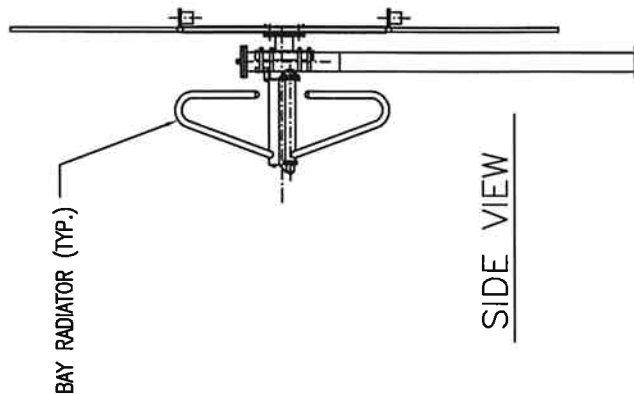
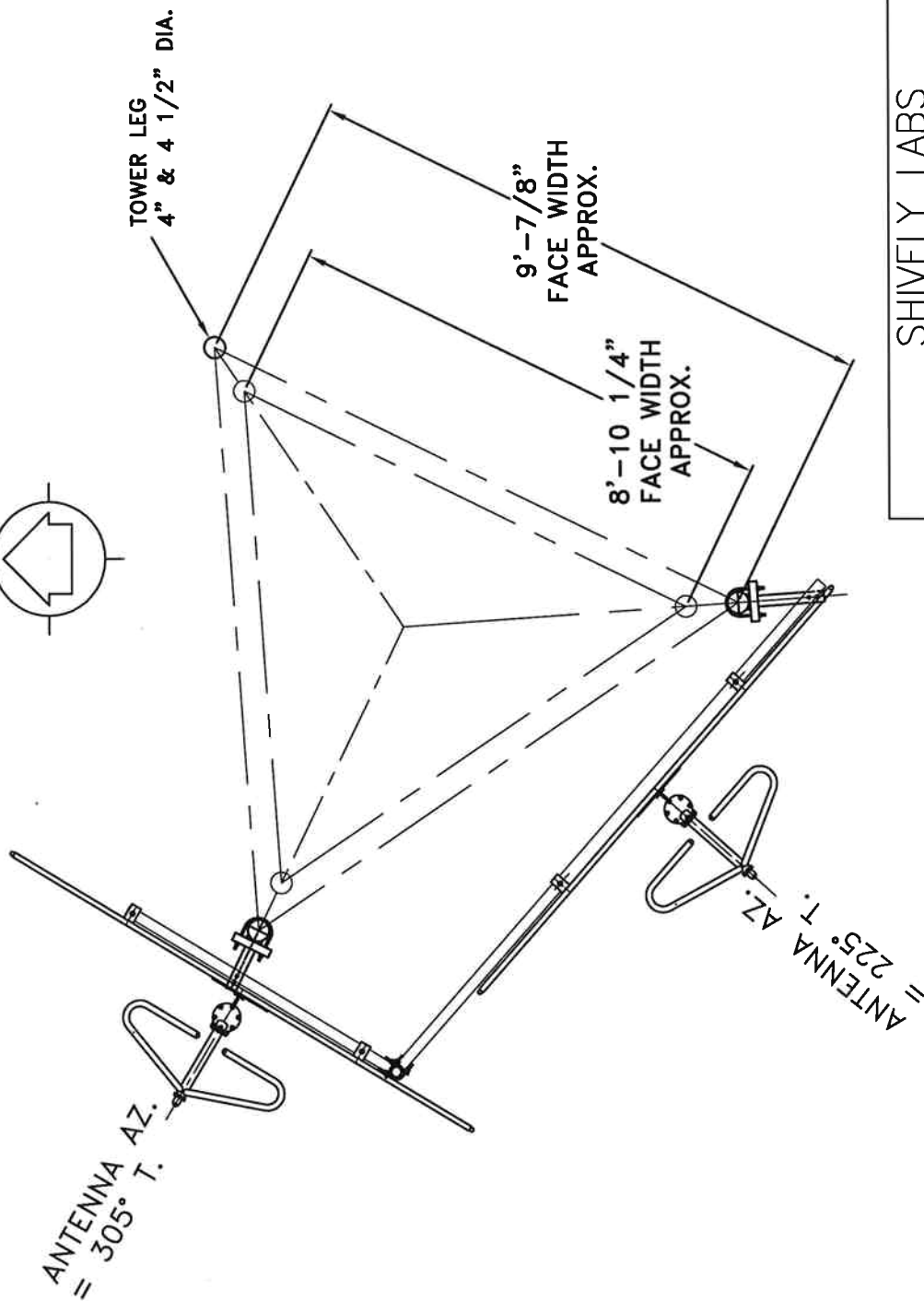
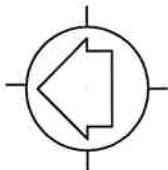
| Azimuth | Rel Field | Azimuth | Rel Field |
|---------|-----------|---------|-----------|
| 0       | 0.160     | 180     | 0.555     |
| 10      | 0.130     | 190     | 0.690     |
| 20      | 0.115     | 200     | 0.820     |
| 30      | 0.110     | 210     | 0.940     |
| 40      | 0.100     | 220     | 1.000     |
| 45      | 0.095     | 225     | 0.980     |
| 50      | 0.090     | 230     | 0.950     |
| 60      | 0.090     | 240     | 0.810     |
| 70      | 0.090     | 250     | 0.690     |
| 80      | 0.100     | 260     | 0.695     |
| 90      | 0.110     | 270     | 0.790     |
| 100     | 0.110     | 280     | 0.860     |
| 110     | 0.100     | 290     | 0.795     |
| 120     | 0.105     | 300     | 0.660     |
| 130     | 0.120     | 310     | 0.525     |
| 135     | 0.150     | 315     | 0.460     |
| 140     | 0.190     | 320     | 0.400     |
| 150     | 0.270     | 330     | 0.315     |
| 160     | 0.350     | 340     | 0.240     |
| 170     | 0.450     | 350     | 0.195     |

Figure 1b

Tabulation of Vertical Azimuth Pattern  
KKLA Los Angeles, CA

| Azimuth | Rel Field | Azimuth | Rel Field |
|---------|-----------|---------|-----------|
| 0       | 0.250     | 180     | 0.505     |
| 10      | 0.180     | 190     | 0.620     |
| 20      | 0.100     | 200     | 0.760     |
| 30      | 0.095     | 210     | 0.900     |
| 40      | 0.100     | 220     | 0.990     |
| 45      | 0.110     | 225     | 0.965     |
| 50      | 0.120     | 230     | 0.920     |
| 60      | 0.150     | 240     | 0.785     |
| 70      | 0.170     | 250     | 0.690     |
| 80      | 0.175     | 260     | 0.690     |
| 90      | 0.165     | 270     | 0.790     |
| 100     | 0.140     | 280     | 0.850     |
| 110     | 0.120     | 290     | 0.795     |
| 120     | 0.155     | 300     | 0.610     |
| 130     | 0.200     | 310     | 0.410     |
| 135     | 0.215     | 315     | 0.340     |
| 140     | 0.225     | 320     | 0.310     |
| 150     | 0.270     | 330     | 0.300     |
| 160     | 0.350     | 340     | 0.300     |
| 170     | 0.420     | 350     | 0.285     |

TRUE NORTH



SIDE VIEW

TOP VIEW

TOWER: SELF SUPPORTING

|   |           |        |                  |
|---|-----------|--------|------------------|
| SHIVELY LABS  |           |        |                  |
| A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE |           |        |                  |
| SHOP ORDER  | FREQUENCY | SCALE  | DRAWN BY         |
| 24973 REMOUNT   | 99.5 MHz. | N.T.S. | DAB              |
| 16651 ORIG.   |           |        | APPROVED BY: RAS |
| GLENDALF CA.  |           |        |                  |
| TITLE:  |           |        |                  |

MODEL-6015-1/2-DIRECTIONAL ANTENNA

ANTENNA HEADING 255° & 305° TRUE NORTH

DATE: 8/15/06

FIGURE 2

Antenna Mfg.: Shively Labs  
Antenna Type: 6015-1/2-DA

Date: 8/15/2006

Station: KKLA

Frequency: 99.5

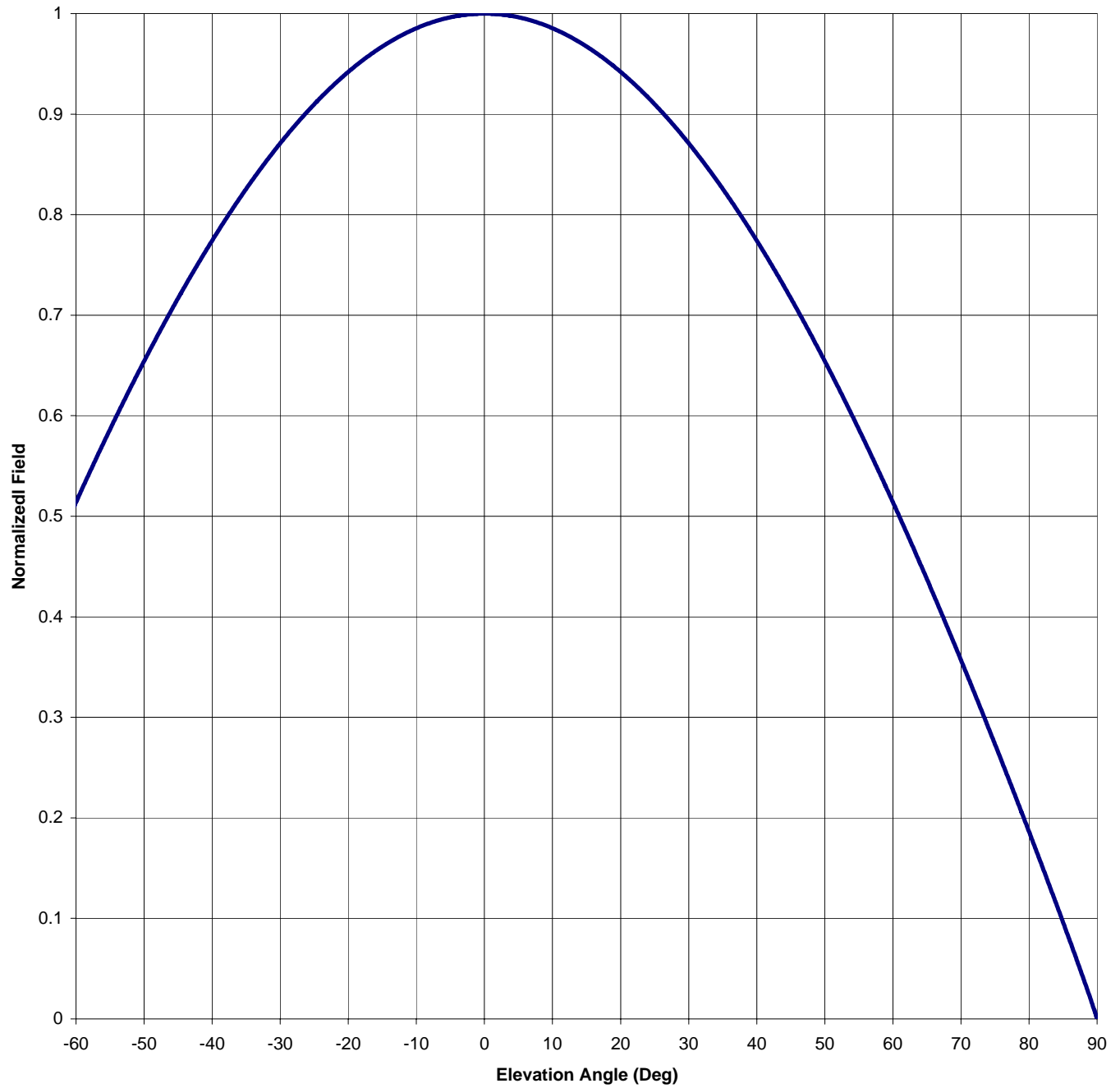
Channel #: 258

Figure: 3

Beam Tilt 0

Gain (Max) 1.763 2.463 dB

Gain (Horizon) 1.763 2.463 dB





Antenna Mfg.: Shively Labs

Date: 8/15/2006

Antenna Type: 6015-1/2-DA

Station: KKLA

Beam Tilt 0

Frequency: 99.5

Gain (Max) 1.763 2.463 dB

Channel #: 258

Gain (Horizon) 1.763 2.463 dB

Figure: 3

| Angle of Depression (Deg) | Relative Field | Angle of Depression (Deg) | Relative Field | Angle of Depression (Deg) | Relative Field | Angle of Depression (Deg) | Relative Field |
|---------------------------|----------------|---------------------------|----------------|---------------------------|----------------|---------------------------|----------------|
| -90                       | 0.000          | -44                       | 0.729          | 0                         | 1.000          | 46                        | 0.705          |
| -89                       | 0.021          | -43                       | 0.741          | 1                         | 1.000          | 47                        | 0.693          |
| -88                       | 0.040          | -42                       | 0.752          | 2                         | 0.999          | 48                        | 0.680          |
| -87                       | 0.059          | -41                       | 0.763          | 3                         | 0.999          | 49                        | 0.667          |
| -86                       | 0.078          | -40                       | 0.774          | 4                         | 0.998          | 50                        | 0.654          |
| -85                       | 0.096          | -39                       | 0.785          | 5                         | 0.996          | 51                        | 0.641          |
| -84                       | 0.114          | -38                       | 0.796          | 6                         | 0.995          | 52                        | 0.628          |
| -83                       | 0.133          | -37                       | 0.806          | 7                         | 0.993          | 53                        | 0.614          |
| -82                       | 0.151          | -36                       | 0.816          | 8                         | 0.991          | 54                        | 0.600          |
| -81                       | 0.168          | -35                       | 0.826          | 9                         | 0.988          | 55                        | 0.586          |
| -80                       | 0.186          | -34                       | 0.835          | 10                        | 0.985          | 56                        | 0.572          |
| -79                       | 0.204          | -33                       | 0.845          | 11                        | 0.982          | 57                        | 0.558          |
| -78                       | 0.221          | -32                       | 0.854          | 12                        | 0.979          | 58                        | 0.544          |
| -77                       | 0.239          | -31                       | 0.862          | 13                        | 0.975          | 59                        | 0.529          |
| -76                       | 0.256          | -30                       | 0.871          | 14                        | 0.971          | 60                        | 0.514          |
| -75                       | 0.273          | -29                       | 0.879          | 15                        | 0.967          | 61                        | 0.499          |
| -74                       | 0.290          | -28                       | 0.887          | 16                        | 0.963          | 62                        | 0.484          |
| -73                       | 0.307          | -27                       | 0.895          | 17                        | 0.958          | 63                        | 0.469          |
| -72                       | 0.324          | -26                       | 0.903          | 18                        | 0.953          | 64                        | 0.453          |
| -71                       | 0.341          | -25                       | 0.910          | 19                        | 0.948          | 65                        | 0.437          |
| -70                       | 0.357          | -24                       | 0.917          | 20                        | 0.942          | 66                        | 0.422          |
| -69                       | 0.373          | -23                       | 0.924          | 21                        | 0.936          | 67                        | 0.406          |
| -68                       | 0.390          | -22                       | 0.930          | 22                        | 0.930          | 68                        | 0.390          |
| -67                       | 0.406          | -21                       | 0.936          | 23                        | 0.924          | 69                        | 0.373          |
| -66                       | 0.422          | -20                       | 0.942          | 24                        | 0.917          | 70                        | 0.357          |
| -65                       | 0.437          | -19                       | 0.948          | 25                        | 0.910          | 71                        | 0.341          |
| -64                       | 0.453          | -18                       | 0.953          | 26                        | 0.903          | 72                        | 0.324          |
| -63                       | 0.469          | -17                       | 0.958          | 27                        | 0.895          | 73                        | 0.307          |
| -62                       | 0.484          | -16                       | 0.963          | 28                        | 0.887          | 74                        | 0.290          |
| -61                       | 0.499          | -15                       | 0.967          | 29                        | 0.879          | 75                        | 0.273          |
| -60                       | 0.514          | -14                       | 0.971          | 30                        | 0.871          | 76                        | 0.256          |
| -59                       | 0.529          | -13                       | 0.975          | 31                        | 0.862          | 77                        | 0.239          |
| -58                       | 0.544          | -12                       | 0.979          | 32                        | 0.854          | 78                        | 0.221          |
| -57                       | 0.558          | -11                       | 0.982          | 33                        | 0.845          | 79                        | 0.204          |
| -56                       | 0.572          | -10                       | 0.985          | 34                        | 0.835          | 80                        | 0.186          |
| -55                       | 0.586          | -9                        | 0.988          | 35                        | 0.826          | 81                        | 0.168          |
| -54                       | 0.600          | -8                        | 0.991          | 36                        | 0.816          | 82                        | 0.151          |
| -53                       | 0.614          | -7                        | 0.993          | 37                        | 0.806          | 83                        | 0.133          |
| -52                       | 0.628          | -6                        | 0.995          | 38                        | 0.796          | 84                        | 0.114          |
| -51                       | 0.641          | -5                        | 0.996          | 39                        | 0.785          | 85                        | 0.096          |
| -50                       | 0.654          | -4                        | 0.998          | 40                        | 0.774          | 86                        | 0.078          |
| -49                       | 0.667          | -3                        | 0.999          | 41                        | 0.763          | 87                        | 0.059          |
| -48                       | 0.680          | -2                        | 0.999          | 42                        | 0.752          | 88                        | 0.040          |
| -47                       | 0.693          | -1                        | 1.000          | 43                        | 0.741          | 89                        | 0.021          |
| -46                       | 0.705          | 0                         | 1.000          | 44                        | 0.729          | 90                        | 0.000          |
| -45                       | 0.717          |                           |                | 45                        | 0.717          |                           |                |

## VALIDATION OF TOTAL POWER GAIN CALCULATION

KKLA Los Angeles, CA

6015-1/2-DA

Elevation Gain of Antenna 0.454

**The RMS values are calculated utilizing the data of a planimeter**

Horizontal RMS value divided by the Vertical RMS value equals the Horiz. - Vert. Ratio

H RMS 0.514 V RMS 0.501 H/V Ratio 1.026

Elevation Gain of Horizontal Component 0.466

Elevation Gain of Vertical Component 0.443

Horizontal Azimuth Gain equals 1/(RMS)SQ. 3.785

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 3.905

Max. Vertical 0.99

**\*Total Horizontal Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Horizontal Power Gain = 1.763

**\*Total Vertical Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Vertical Power Gain = 1.728

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ERP divided by Horizontal Power Gain equals Antenna Input Power

10 KW ERP Equals 5.672 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

5.672 KW Times 1.728 KW Equals 9.801 KW ERP

Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP

0.99 Equals 9.801 KW Vertical ERP

NOTE: Calculating the ERP of the Vertical Component by two methods validates the total power gain calculations