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**FM DIRECTIONAL BROADCAST ANTENNA**  
**PROOF-OF-PERFORMANCE**

**MODEL JMPC-5R DA**

**SERIAL NUMBER 15978**

**WJYJ**

**Fredericksburg, VA**



6340 Sky Creek Drive • Sacramento, California USA 95828  
(916) 383-1177 phone • (916) 383-1182 fax



6340 Sky Creek Drive, Sacramento, California 95828  
P.O. Box 292880, Sacramento, California 95829-2880

(916) 383-1177 FAX (916) 383-1182

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**DATE:** October 29, 2010

| <b>ANTENNA GAIN</b> | <u>H-pol</u>  | <u>V-pol</u>  |
|---------------------|---------------|---------------|
| relative            | <b>4.58</b>   | <b>4.58</b>   |
| (dBd)               | <b>(6.61)</b> | <b>(6.61)</b> |

RMS OF THE  
AZIMUTH PATTERNS:

**FM ANTENNA FOR:**

STATION: **WJYJ**

LOCATION: **Fredericksburg, VA**

MODEL NUMBER: **JMPC-5R DA**

FREQUENCY & ERP: **90.5 MHz, 26.00 kW**

ANTENNA INPUT POWER: **5.678 k W**

ANTENNA BOOM HEADING: **334° T.**

| Composite    | H-pol        | V-pol        |
|--------------|--------------|--------------|
| <b>0.868</b> | <b>0.799</b> | <b>0.736</b> |

**CERTIFICATION**

This certification, along with the accompanying antenna specification sheet, antenna mounting sketches, and azimuth and elevation patterns, certifies the construction and measurement of the *JAMPRO* FM CP antenna to the station's requirements, as measured at the *JAMPRO* antenna site in Sacramento, California. The following is an outline of construction methods, pattern measurements, installation requirements, recommended maintenance and equipment used.

**CONSTRUCTION**

A standard CP FM antenna model was used to create the required directional pattern. From experience and by repeated measurements, this antenna was adjusted as to position until the final configuration was determined and the pattern requirements were met. No additional reflector elements were used; only the antenna's position on the supporting tower was used to achieve this particular pattern. Measurements to establish their exact location are shown on the antenna mounting sketches.

**MEASUREMENT**

The full scale antenna was mounted on an exact duplicate of its final support at the station. We were careful to duplicate conduits, cables and anything peculiar to this mounting. This was then placed on a turntable at the *JAMPRO* antenna range. This directional antenna was used for receiving the radiation from a transmitting antenna that is elevated 25 feet above ground and located at a distance of 4,500 feet. This transmitting antenna is capable of transmitting either horizontal or vertical polarization. The frequency of the signal generator was accurately set to station frequency by use of a frequency counter. A spectrum analyzer was used to continuously measure field strength as the antenna under test was rotated. Field strength at each azimuth was then plotted.



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Station: **WJYJ**

Model: **JMPC-5R DA**

### **INSTALLATION**

The antenna must be installed in exactly the manner in which it was measured at the factory. This is shown in detail on the antenna mounting sketch, including the azimuth bearing of the elements. This boom must be verified by a surveyor at the site when installation is being completed. Good engineering practices should be followed in any details not covered by specific instructions.

### **MAINTENANCE**

Annual or regular inspection should be made on the antenna system. At this time, tightness of U-bolts, or other fastenings, should be routinely checked. Any deterioration of the antenna due to lightning, or other causes should be promptly repaired.

### **EQUIPMENT**

MODEL: -3000 Wavetek Signal Generator, Serial #66479  
-1580 Scientific Atlanta pattern Recorder, Serial # 471, Cal'd 11/01/07  
-8591E H.P. Spectrum Analyzer, Serial #3308A01312, Cal'd 12/18/07  
-TUNED CAVITY DIPOLE

### **CONCLUSION**

In the development of this pattern, *JAMPRO* antennas, Inc. observed known requirements of the FCC, as stated on the station construction permit.

Gain figures and required input power to achieve station ERP, as well as other details, are found on the first page.

This certification, with its calculations were performed by J. Dane Jubera, B.S.E.E., Electrical Engineer, *JAMPRO* Antennas, Inc.

EXECUTED THIS 29 th DAY OF October, 2010

BY:

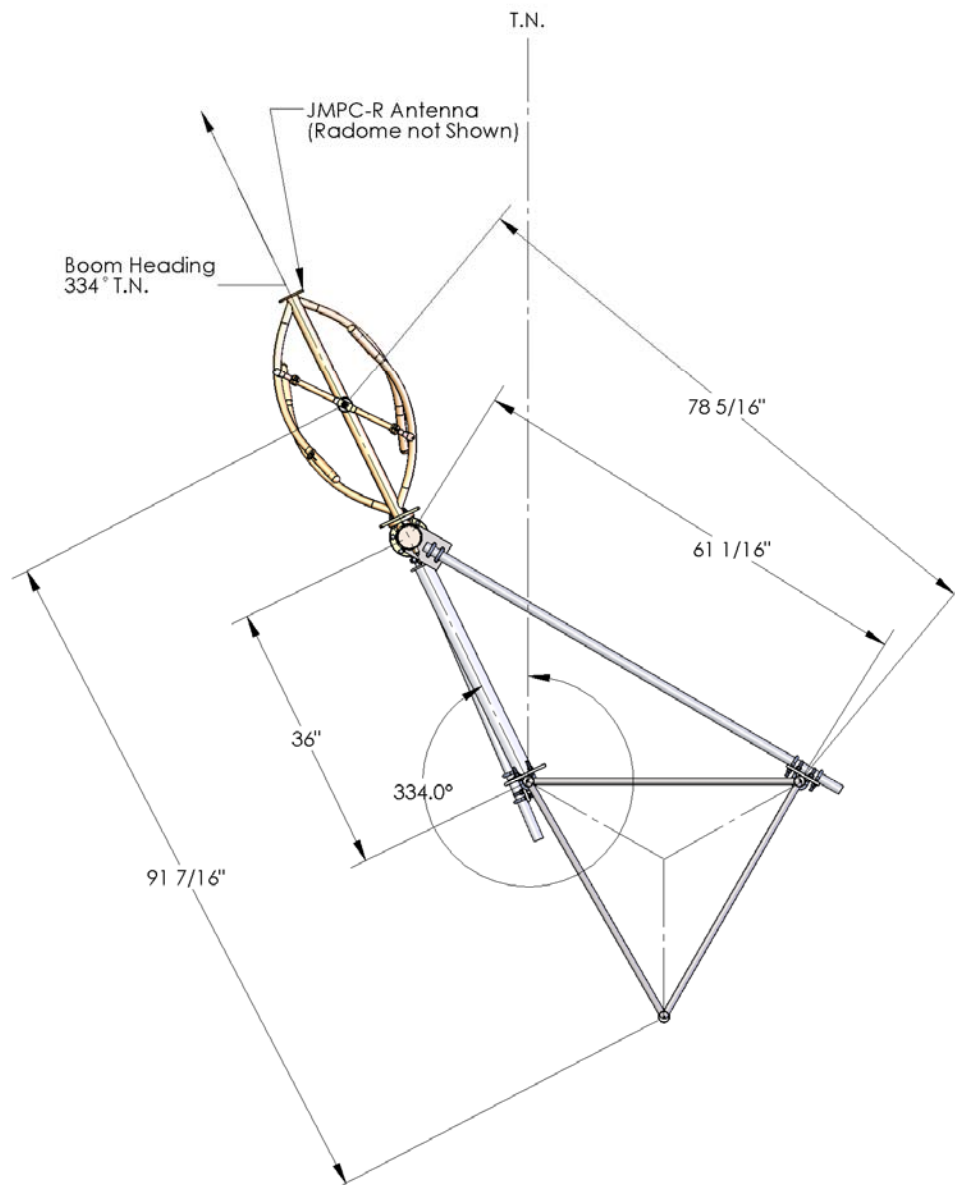
J. Dane Jubera, B.S.E.E. *JAMPRO* Antennas, Inc.



6340 Sky Creek Drive  
Sacramento, California 95828 USA

Telephone (916) 383-1177  
Fax (916) 383-1182

## TOP VIEW

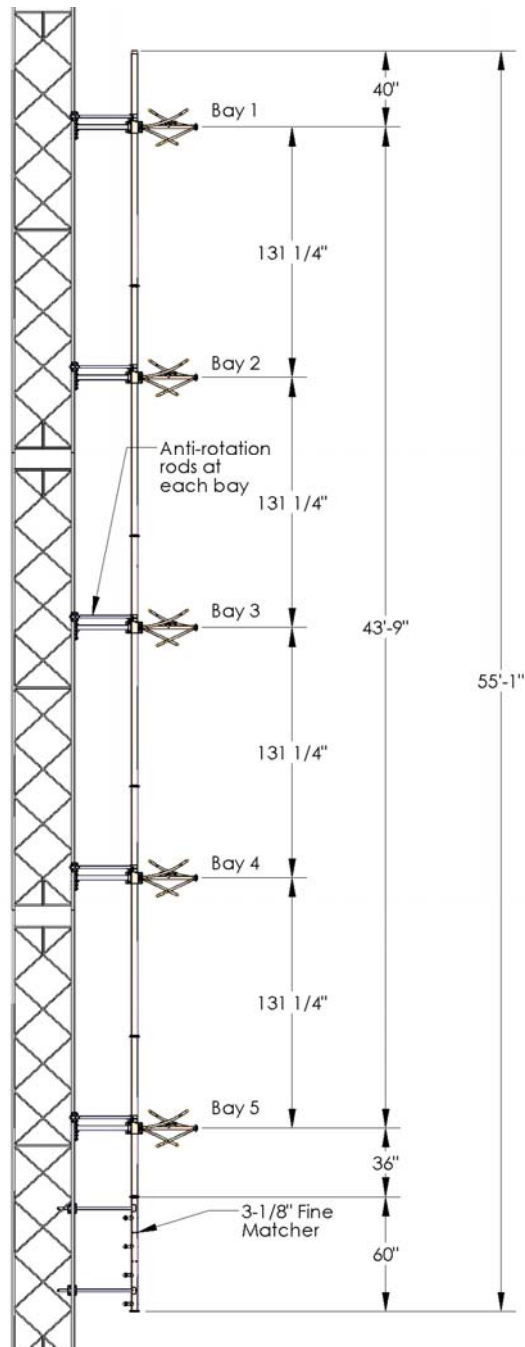




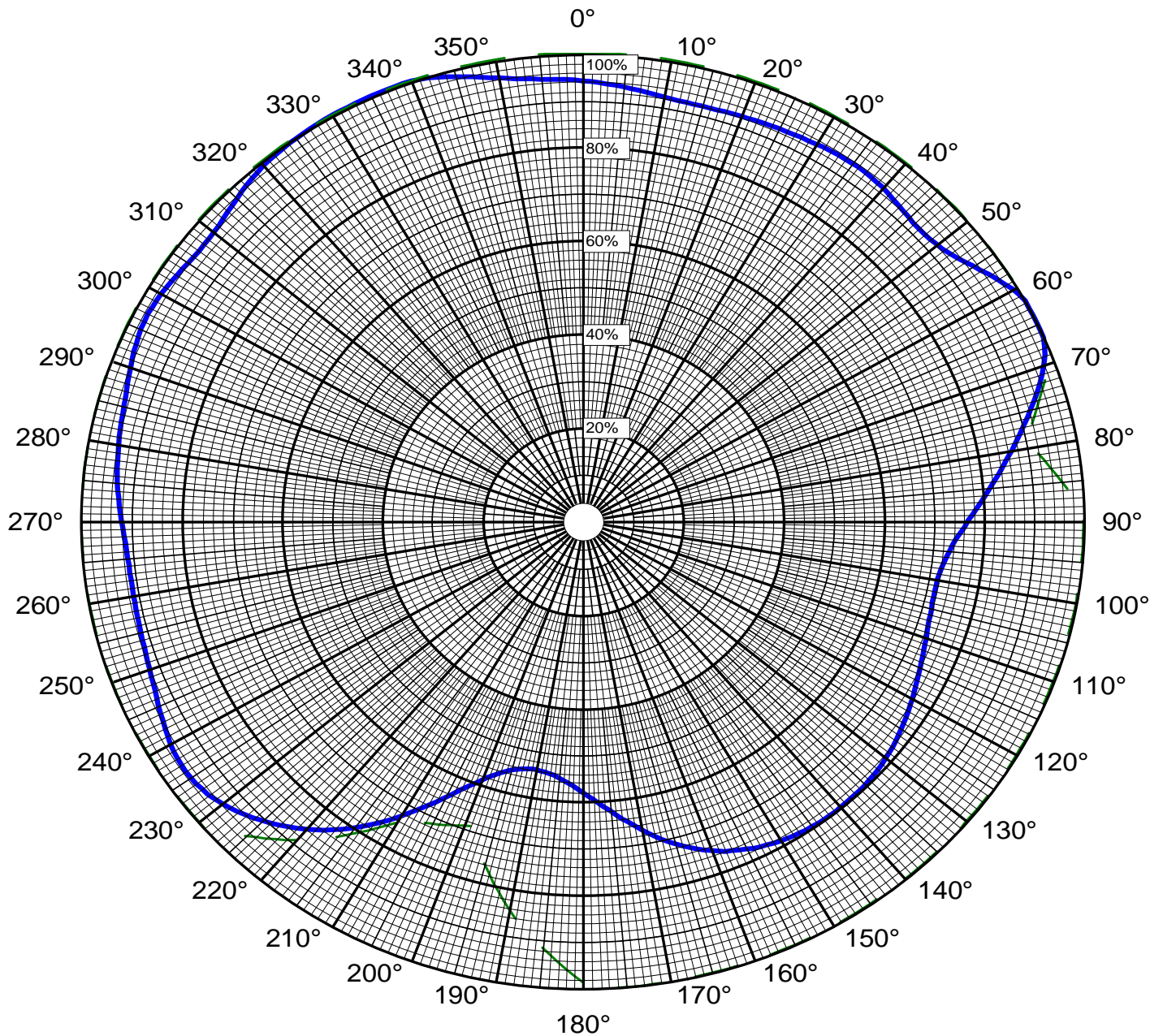
6340 Sky Creek Drive  
Sacramento, California 95828 USA

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Fax (916) 383-1182

## SIDE VIEW







**Azimuth Pattern**

|                                     |                         |
|-------------------------------------|-------------------------|
| Customer: WJYJ                      | Date: October 13, 2010  |
| Frequency: 90.5 MHz                 | Type Number: JMPC-5R DA |
| Notes:                              |                         |
| COMPOSITE PATTERN ENVELOPE (H & V ) |                         |



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WJYJ

ERP = 26.00 kW

October 13, 2010

JMPC-5R DA

TABULATION OF RELATIVE FIELD

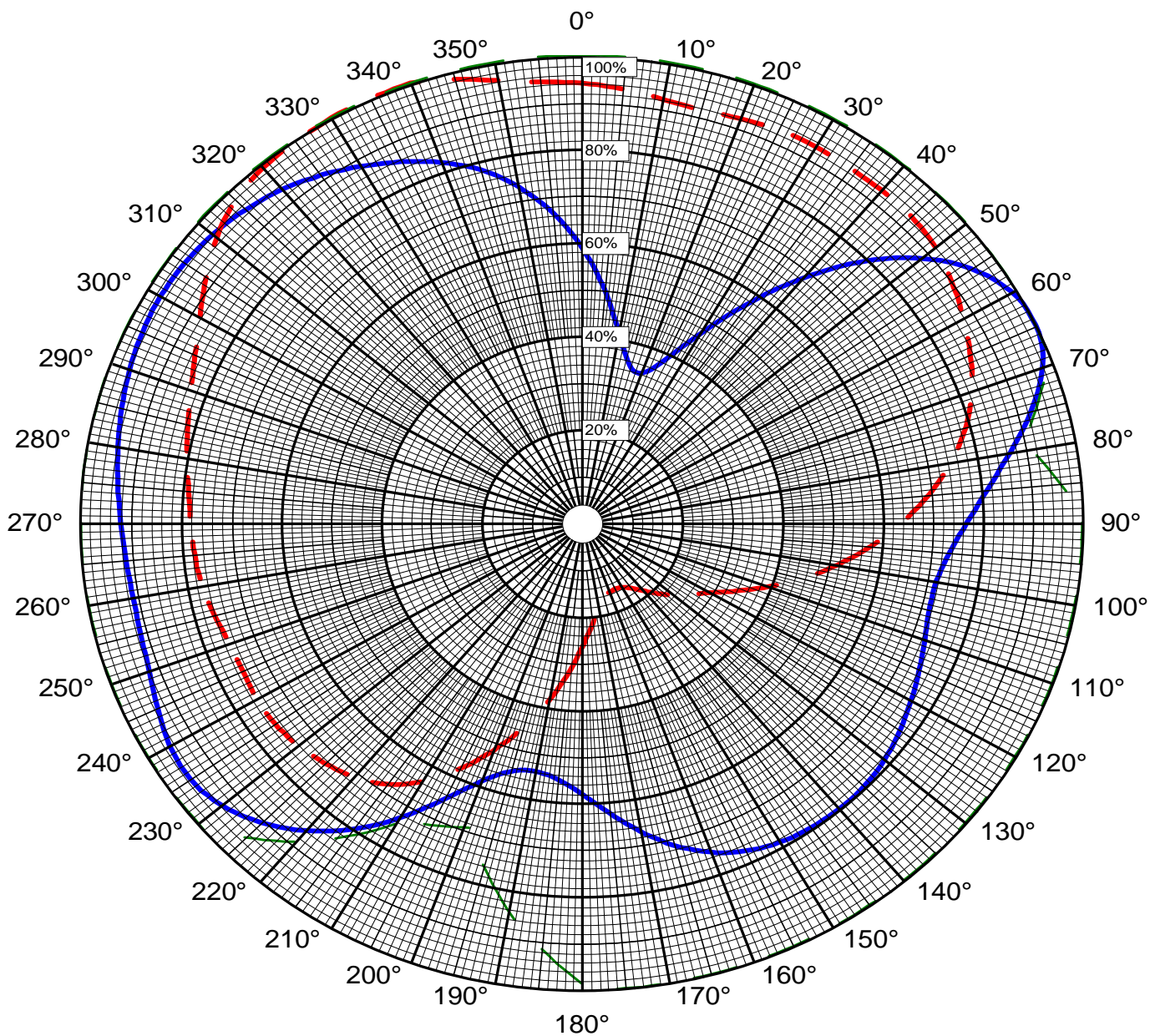
COMPOSITE MEASURED PATTERN (H & V)

| <u>BEARING</u> | <u>FIELD</u> | <u>ERP</u><br><u>(kW)</u> | <u>dBk</u> |
|----------------|--------------|---------------------------|------------|
| 0              | 0.940        | 22.97                     | 13.61      |
| 10             | 0.920        | 22.01                     | 13.43      |
| 20             | 0.920        | 22.01                     | 13.43      |
| 30             | 0.930        | 22.49                     | 13.52      |
| 40             | 0.930        | 22.49                     | 13.52      |
| 50             | 0.920        | 22.01                     | 13.43      |
| 60             | 0.990        | 25.48                     | 14.06      |
| 70             | 0.980        | 24.97                     | 13.97      |
| 80             | 0.870        | 19.68                     | 12.94      |
| 90             | 0.770        | 15.42                     | 11.88      |
| 100            | 0.720        | 13.48                     | 11.30      |
| 110            | 0.730        | 13.86                     | 11.42      |
| 120            | 0.760        | 15.02                     | 11.77      |
| 130            | 0.790        | 16.23                     | 12.10      |
| 140            | 0.800        | 16.64                     | 12.21      |
| 150            | 0.790        | 16.23                     | 12.10      |
| 160            | 0.750        | 14.63                     | 11.65      |
| 170            | 0.670        | 11.67                     | 10.67      |
| 180            | 0.580        | 8.75                      | 9.42       |
| 190            | 0.540        | 7.58                      | 8.80       |
| 200            | 0.590        | 9.05                      | 9.57       |
| 210            | 0.730        | 13.86                     | 11.42      |
| 220            | 0.860        | 19.23                     | 12.84      |
| 230            | 0.940        | 22.97                     | 13.61      |
| 240            | 0.950        | 23.47                     | 13.70      |
| 250            | 0.920        | 22.01                     | 13.43      |
| 260            | 0.910        | 21.53                     | 13.33      |
| 270            | 0.920        | 22.01                     | 13.43      |
| 280            | 0.940        | 22.97                     | 13.61      |
| 290            | 0.960        | 23.96                     | 13.80      |
| 300            | 0.970        | 24.46                     | 13.89      |
| 310            | 0.960        | 23.96                     | 13.80      |
| 320            | 0.990        | 25.48                     | 14.06      |
| 330            | 1.000        | 26.00                     | 14.15      |
| 340            | 1.000        | 26.00                     | 14.15      |
| 350            | 0.960        | 23.96                     | 13.80      |

Relative fields at other azimuths:

|     |       |     |       |
|-----|-------|-----|-------|
| 45  | 0.919 | 225 | 0.906 |
| 135 | 0.797 | 315 | 0.974 |





## Azimuth Pattern

Customer: WJYJ

Date: October 13, 2010

Frequency: 90.5 MHz

Type Number: JMPC-5R DA

Notes:

MEASURED PATTERN IN FULL SCALE

HPOL

VPOL

--- LIMITS



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WJYJ

ERP = 26.00 kW

October 13, 2010

JMPC-5R DA

TABULATION OF MEASURED FIELDS

| <u>BEARING</u>         | <u>HORIZONTAL<br/>POLARIZATION</u> |                | <u>VERTICAL<br/>POLARIZATION</u> |                |
|------------------------|------------------------------------|----------------|----------------------------------|----------------|
|                        | <u>FIELD</u>                       | <u>ERP(kW)</u> | <u>FIELD</u>                     | <u>ERP(kW)</u> |
| 0                      | 0.590                              | 9.05           | 0.940                            | 22.97          |
| 10                     | 0.420                              | 4.59           | 0.920                            | 22.01          |
| 20                     | 0.340                              | 3.01           | 0.920                            | 22.01          |
| 30                     | 0.460                              | 5.50           | 0.930                            | 22.49          |
| 40                     | 0.680                              | 12.02          | 0.930                            | 22.49          |
| 50                     | 0.880                              | 20.13          | 0.920                            | 22.01          |
| 60                     | 0.990                              | 25.48          | 0.880                            | 20.13          |
| 70                     | 0.980                              | 24.97          | 0.830                            | 17.91          |
| 80                     | 0.870                              | 19.68          | 0.750                            | 14.63          |
| 90                     | 0.770                              | 15.42          | 0.640                            | 10.65          |
| 100                    | 0.720                              | 13.48          | 0.520                            | 7.03           |
| 110                    | 0.730                              | 13.86          | 0.400                            | 4.16           |
| 120                    | 0.760                              | 15.02          | 0.300                            | 2.34           |
| 130                    | 0.790                              | 16.23          | 0.240                            | 1.50           |
| 140                    | 0.800                              | 16.64          | 0.190                            | 0.94           |
| 150                    | 0.790                              | 16.23          | 0.160                            | 0.67           |
| 160                    | 0.750                              | 14.63          | 0.160                            | 0.67           |
| 170                    | 0.670                              | 11.67          | 0.190                            | 0.94           |
| 180                    | 0.580                              | 8.75           | 0.270                            | 1.90           |
| 190                    | 0.540                              | 7.58           | 0.390                            | 3.95           |
| 200                    | 0.590                              | 9.05           | 0.520                            | 7.03           |
| 210                    | 0.730                              | 13.86          | 0.640                            | 10.65          |
| 220                    | 0.860                              | 19.23          | 0.710                            | 13.11          |
| 230                    | 0.940                              | 22.97          | 0.740                            | 14.24          |
| 240                    | 0.950                              | 23.47          | 0.750                            | 14.63          |
| 250                    | 0.920                              | 22.01          | 0.750                            | 14.63          |
| 260                    | 0.910                              | 21.53          | 0.770                            | 15.42          |
| 270                    | 0.920                              | 22.01          | 0.780                            | 15.82          |
| 280                    | 0.940                              | 22.97          | 0.800                            | 16.64          |
| 290                    | 0.960                              | 23.96          | 0.830                            | 17.91          |
| 300                    | 0.970                              | 24.46          | 0.880                            | 20.13          |
| 310                    | 0.960                              | 23.96          | 0.950                            | 23.47          |
| 320                    | 0.930                              | 22.49          | 0.990                            | 25.48          |
| 330                    | 0.880                              | 20.13          | 1.000                            | 26.00          |
| 340                    | 0.820                              | 17.48          | 1.000                            | 26.00          |
| 350                    | 0.730                              | 13.86          | 0.960                            | 23.96          |
| <b>MAXIMUM FIELDS:</b> |                                    |                |                                  |                |
| 65                     | 1.000                              | 26.00          |                                  |                |
| 340                    |                                    |                | 1.000                            | 26.00          |
| <b>MINIMUM FIELDS:</b> |                                    |                |                                  |                |
| 20                     | 0.340                              | 3.01           |                                  |                |
| 155                    |                                    |                | 0.157                            | 0.64           |

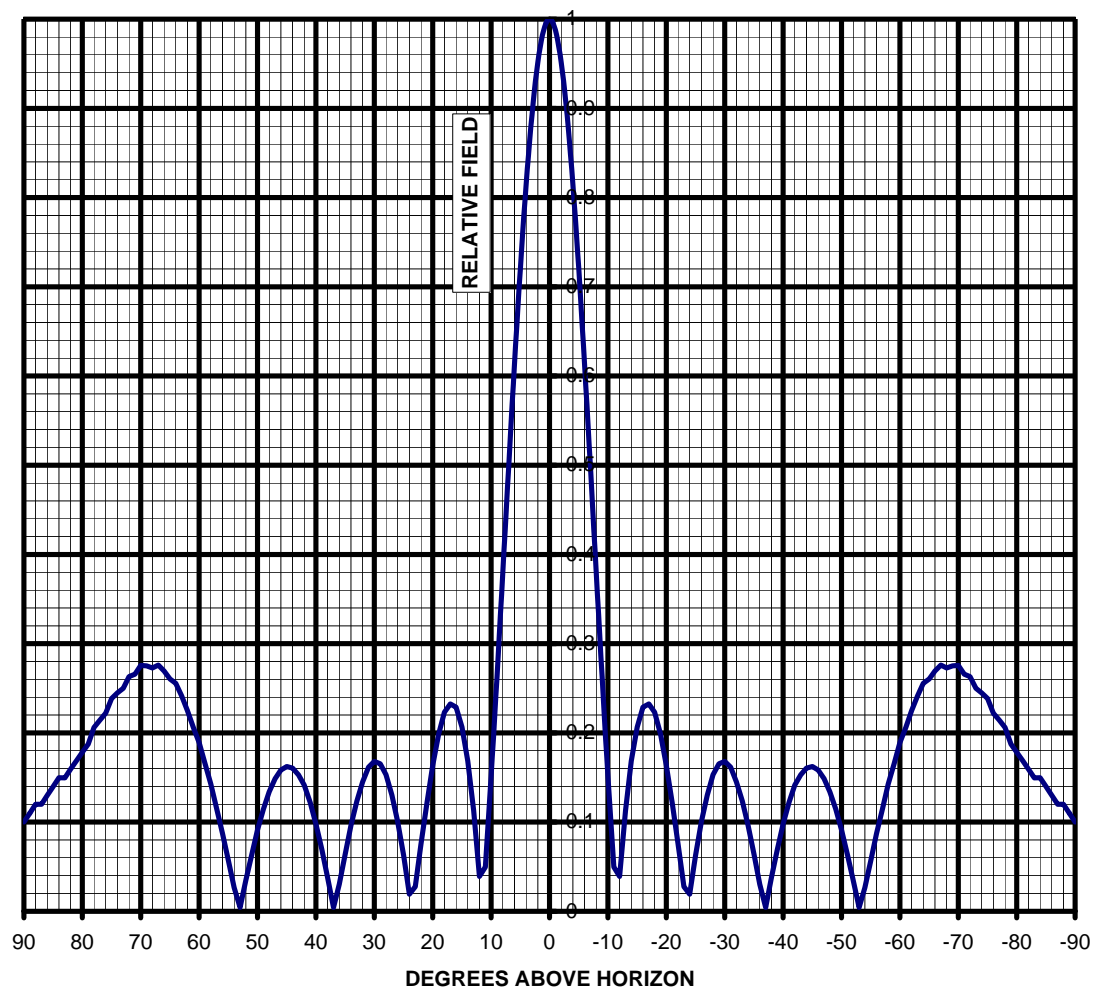


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## PLOT OF ELEVATION PLANE PATTERN

**STATION:** WJYJ      90.5 MHz    JMPC-5R DA    1.00 lambda spacing





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# TABULATION OF ELEVATION PLANE PATTERN

**STATION:** WJYJ 90.5 MHz JMPC-5R DA 1.00 lambda spacing

| <u>ELEVATION</u> | <u>RELATIVE</u> | <u>ELEVATION</u> | <u>RELATIVE</u> | <u>ELEVATION</u> | <u>RELATIVE</u> |
|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| <u>ANGLE</u>     | <u>FIELD</u>    | <u>ANGLE</u>     | <u>FIELD</u>    | <u>ANGLE</u>     | <u>FIELD</u>    |
| 10               | 0.151           | -25              | 0.063           | -60              | 0.189           |
| 9                | 0.263           | -26              | 0.100           | -61              | 0.206           |
| 8                | 0.380           | -27              | 0.130           | -62              | 0.225           |
| 7                | 0.498           | -28              | 0.153           | -63              | 0.241           |
| 6                | 0.613           | -29              | 0.165           | -64              | 0.256           |
| 5                | 0.720           | -30              | 0.168           | -65              | 0.260           |
| 4                | 0.815           | -31              | 0.162           | -66              | 0.269           |
| 3                | 0.893           | -32              | 0.145           | -67              | 0.276           |
| 2                | 0.952           | -33              | 0.124           | -68              | 0.273           |
| 1                | 0.988           | -34              | 0.096           | -69              | 0.275           |
| 0                | 1.000           | -35              | 0.064           | -70              | 0.276           |
| -1               | 0.988           | -36              | 0.030           | -71              | 0.266           |
| -2               | 0.952           | -37              | 0.004           | -72              | 0.263           |
| -3               | 0.893           | -38              | 0.038           | -73              | 0.250           |
| -4               | 0.815           | -39              | 0.069           | -74              | 0.245           |
| -5               | 0.720           | -40              | 0.098           | -75              | 0.239           |
| -6               | 0.613           | -41              | 0.122           | -76              | 0.222           |
| -7               | 0.498           | -42              | 0.141           | -77              | 0.214           |
| -8               | 0.380           | -43              | 0.153           | -78              | 0.206           |
| -9               | 0.263           | -44              | 0.161           | -79              | 0.187           |
| -10              | 0.151           | -45              | 0.162           | -80              | 0.178           |
| -11              | 0.050           | -46              | 0.158           | -81              | 0.169           |
| -12              | 0.039           | -47              | 0.149           | -82              | 0.159           |
| -13              | 0.113           | -48              | 0.134           | -83              | 0.150           |
| -14              | 0.169           | -49              | 0.115           | -84              | 0.150           |
| -15              | 0.206           | -50              | 0.091           | -85              | 0.140           |
| -16              | 0.229           | -51              | 0.064           | -86              | 0.130           |
| -17              | 0.232           | -52              | 0.035           | -87              | 0.120           |
| -18              | 0.223           | -53              | 0.004           | -88              | 0.120           |
| -19              | 0.198           | -54              | 0.027           | -89              | 0.110           |
| -20              | 0.164           | -55              | 0.057           | -90              | 0.100           |
| -21              | 0.121           | -56              | 0.087           |                  |                 |
| -22              | 0.076           | -57              | 0.115           |                  |                 |
| -23              | 0.028           | -58              | 0.143           |                  |                 |
| -24              | 0.019           | -59              | 0.165           |                  |                 |