



SYSTEMS WITH RELIABILITY, Inc.
Broadcast Antennas & Transmission Systems

SYSTEM DATA SHEET

Customer	WWFM
Contact	Phil Joiner
Location	Trenton, NJ
Antenna Model	FMI3D/8
Channel / Frequency	89.1 MHz

ELECTRICAL SPECIFICATION

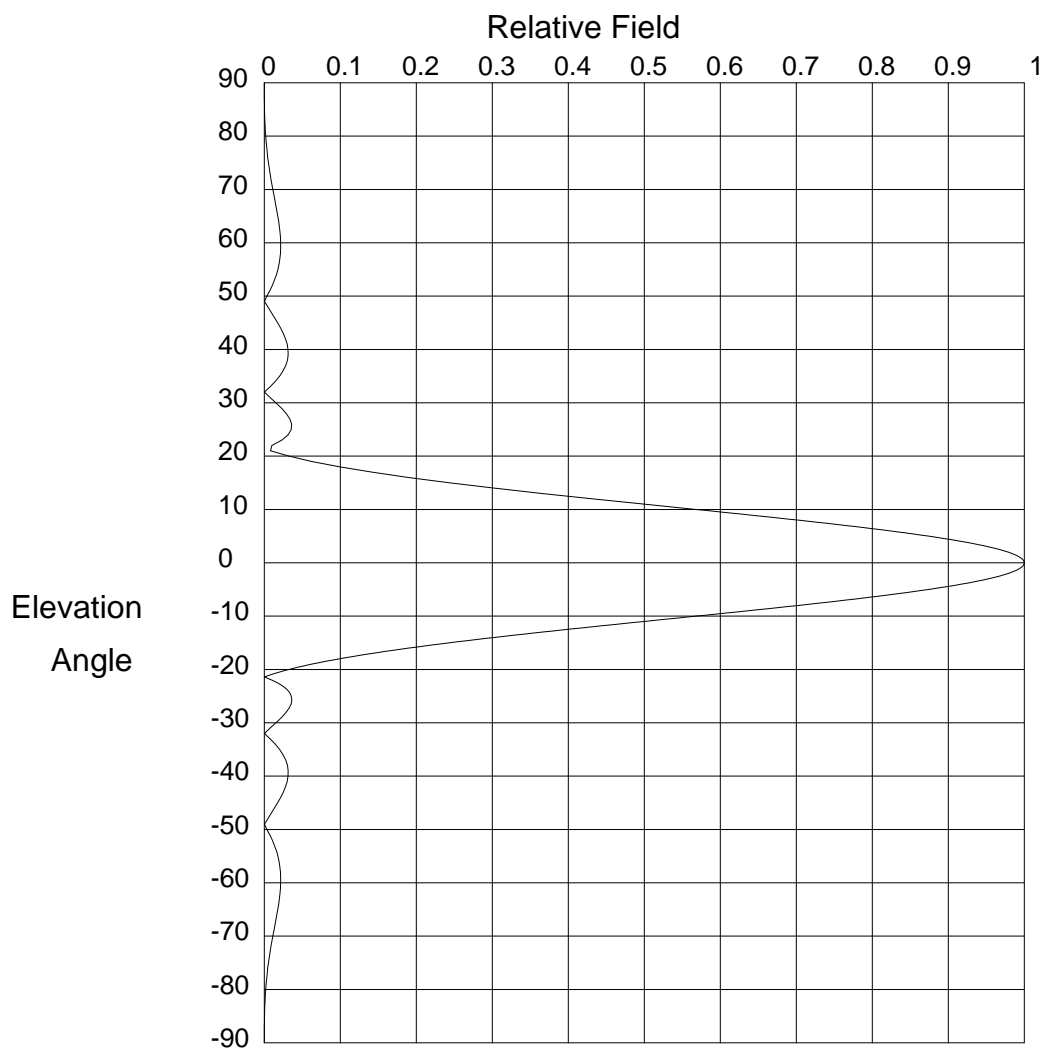
Polarization Type	Circular
Polarization Ratio	
H-Pol. (PRH)	50.0000 %
V-Pol. (PRV)	50.0000 %
Elevation Directivity (ED)	4.291
Azimuth Directivity (AD) H-Pol.	1.000
Azimuth Directivity (AD) V-Pol.	1.000
Antenna Gain (GH)	
H-Pol. (GH)	2.140
V-Pol. (GV)	2.140
dB Gain (AG)	
H-Pol. (AGH)	3.304
V-Pol. (AGV)	3.304
ERP	
H-Pol. (ERPH)	1.150 kW
V-Pol. (ERPV)	1.150 kW
Line Type	7/8" Air HJ5-50
Attenuation per 100 ft.	0.348 dB/100ft
Line Length (LL) **(Estimated)	** 300.00 ft.
Total Line Attenuation	1.04 dB
Line Efficiency (LE)	78.63 %
Line Loss (LPL)	0.15 kW
Antenna Input Power (AIP)	0.54 kW
Req'd. Transmitter Output Power	0.683 kW

MECHANICAL SPECIFICATION

No. Of Bays	8
Center of Radiation (AGL)	285.45 ft. 87.00 m
Antenna Aperture	38.64 ft. 11.78 m
Antenna Over All Length	41.14 ft. 12.54 m
Antenna Weight	280.00 lbs. 127.27 kg
Windload (50/33 psf) / CaAc	730.00 lbs. 21.10 ft.^2

Prepared by:

Mark A. Gergely
SWR, LP, Engineering



Elevation Pattern

Scale: Linear

Units: Field, Relative

Systems With Reliability

CLIENT: *WWFM*

Date: 7/19/2010

ANTENNA TYPE: FMI3D/8

FREQUENCY: 89.1 MHz

PATTERN POL.: Circular

DIRECTIVITY(Peak): 4.291/6.325 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 4.291/6.325 dBd

Null Fill(s)(%) : -28, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
90.0	.00 (-50)	52.0	.011 (-39.524)	14.0	.303 (-10.384)
89.0	.00 (-50)	51.0	.007 (-42.82)	13.0	.365 (-8.743)
88.0	.00 (-87.814)	50.0	.004 (-49.071)	12.0	.431 (-7.301)
87.0	.00 (-79.792)	49.0	.00 (-66.067)	11.0	.50 (-6.029)
86.0	.00 (-73.918)	48.0	.005 (-46.487)	10.0	.568 (-4.909)
85.0	.00 (-69.247)	47.0	.009 (-40.816)	9.8	.582 (-4.702)
84.0	.001 (-65.357)	46.0	.013 (-37.413)	9.6	.596 (-4.5)
83.0	.001 (-62.016)	45.0	.018 (-35.04)	9.4	.609 (-4.303)
82.0	.001 (-59.086)	44.0	.022 (-33.292)	9.2	.623 (-4.112)
81.0	.002 (-56.478)	43.0	.025 (-31.989)	9.0	.636 (-3.926)
80.0	.002 (-54.129)	42.0	.028 (-31.042)	8.8	.65 (-3.744)
79.0	.003 (-51.995)	41.0	.03 (-30.407)	8.6	.663 (-3.568)
78.0	.003 (-50.043)	40.0	.031 (-30.066)	8.4	.676 (-3.397)
77.0	.004 (-48.248)	39.0	.032 (-30.022)	8.2	.689 (-3.23)
76.0	.005 (-46.592)	38.0	.031 (-30.3)	8.0	.702 (-3.068)
75.0	.006 (-45.06)	37.0	.028 (-30.955)	7.8	.715 (-2.911)
74.0	.007 (-43.641)	36.0	.025 (-32.088)	7.6	.728 (-2.758)
73.0	.008 (-42.324)	35.0	.02 (-33.897)	7.4	.74 (-2.61)
72.0	.009 (-41.105)	34.0	.014 (-36.831)	7.2	.753 (-2.466)
71.0	.01 (-39.977)	33.0	.008 (-42.306)	7.0	.765 (-2.327)
70.0	.011 (-38.936)	32.0	.00 (-72.705)	6.8	.777 (-2.192)
69.0	.013 (-37.981)	31.0	.008 (-42.398)	6.6	.789 (-2.062)
68.0	.014 (-37.108)	30.0	.015 (-36.255)	6.4	.80 (-1.936)
67.0	.015 (-36.318)	29.0	.023 (-32.877)	6.2	.812 (-1.814)
66.0	.017 (-35.612)	28.0	.029 (-30.753)	6.0	.823 (-1.697)
65.0	.018 (-34.99)	27.0	.034 (-29.456)	5.8	.833 (-1.583)
64.0	.019 (-34.454)	26.0	.036 (-28.855)	5.6	.844 (-1.474)
63.0	.02 (-34.01)	25.0	.036 (-28.977)	5.4	.854 (-1.369)
62.0	.021 (-33.662)	24.0	.031 (-30.034)	5.2	.864 (-1.268)
61.0	.021 (-33.416)	23.0	.023 (-32.688)	5.0	.874 (-1.171)
60.0	.022 (-33.282)	22.0	.01 (-39.908)	4.8	.883 (-1.078)
59.0	.022 (-33.273)	21.0	.008 (-41.604)	4.6	.892 (-0.989)
58.0	.021 (-33.403)	20.0	.032 (-29.77)	4.4	.901 (-0.904)
57.0	.021 (-33.696)	19.0	.063 (-24.061)	4.2	.91 (-0.822)
56.0	.02 (-34.182)	18.0	.099 (-20.087)	4.0	.918 (-0.745)
55.0	.018 (-34.906)	17.0	.141 (-16.986)	3.8	.926 (-0.672)
54.0	.016 (-35.941)	16.0	.19 (-14.431)	3.6	.933 (-0.603)
53.0	.013 (-37.404)	15.0	.244 (-12.261)	3.4	.94 (-0.537)

Systems With Reliability

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CLIENT: *WWFM*

Date: 7/19/2010

ANTENNA TYPE: FMI3D/8

FREQUENCY: 89.1 MHz

PATTERN POL.: Circular

DIRECTIVITY(Peak): 4.291/6.325 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 4.291/6.325 dBd

Null Fill(s)(%) : -28, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
3.2	.947 (-0.475)	-4.4	.901 (-0.904)	-12.0	.431 (-7.301)
3.0	.953 (-0.418)	-4.6	.892 (-0.989)	-12.2	.418 (-7.575)
2.8	.959 (-0.364)	-4.8	.883 (-1.078)	-12.4	.405 (-7.856)
2.6	.965 (-0.313)	-5.0	.874 (-1.171)	-12.6	.392 (-8.144)
2.4	.97 (-0.267)	-5.2	.864 (-1.268)	-12.8	.378 (-8.44)
2.2	.975 (-0.224)	-5.4	.854 (-1.369)	-13.0	.365 (-8.743)
2.0	.979 (-0.185)	-5.6	.844 (-1.474)	-13.2	.353 (-9.054)
1.8	.983 (-0.15)	-5.8	.833 (-1.583)	-13.4	.34 (-9.374)
1.6	.986 (-0.118)	-6.0	.823 (-1.697)	-13.6	.327 (-9.702)
1.4	.99 (-0.091)	-6.2	.812 (-1.814)	-13.8	.315 (-10.038)
1.2	.992 (-0.067)	-6.4	.80 (-1.936)	-14.0	.303 (-10.384)
1.0	.995 (-0.046)	-6.6	.789 (-2.062)	-14.2	.29 (-10.739)
.8	.997 (-0.03)	-6.8	.777 (-2.192)	-14.4	.279 (-11.103)
.6	.998 (-0.017)	-7.0	.765 (-2.327)	-14.6	.267 (-11.478)
.4	.999 (-0.007)	-7.2	.753 (-2.466)	-14.8	.255 (-11.864)
.2	1.00 (-0.002)	-7.4	.74 (-2.61)	-15.0	.244 (-12.261)
.0	1.00 (0)	-7.6	.728 (-2.758)	-15.2	.233 (-12.669)
-.2	1.00 (-0.002)	-7.8	.715 (-2.911)	-15.4	.222 (-13.089)
-.4	.999 (-0.007)	-8.0	.702 (-3.068)	-15.6	.211 (-13.523)
-.6	.998 (-0.017)	-8.2	.689 (-3.23)	-15.8	.20 (-13.97)
-.8	.997 (-0.03)	-8.4	.676 (-3.397)	-16.0	.19 (-14.431)
-1.0	.995 (-0.046)	-8.6	.663 (-3.568)	-16.2	.18 (-14.907)
-1.2	.992 (-0.067)	-8.8	.65 (-3.744)	-16.4	.17 (-15.4)
-1.4	.99 (-0.091)	-9.0	.636 (-3.926)	-16.6	.16 (-15.91)
-1.6	.986 (-0.118)	-9.2	.623 (-4.112)	-16.8	.151 (-16.438)
-1.8	.983 (-0.15)	-9.4	.609 (-4.303)	-17.0	.141 (-16.986)
-2.0	.979 (-0.185)	-9.6	.596 (-4.5)	-17.2	.132 (-17.556)
-2.2	.975 (-0.224)	-9.8	.582 (-4.702)	-17.4	.124 (-18.148)
-2.4	.97 (-0.267)	-10.0	.568 (-4.909)	-17.6	.115 (-18.766)
-2.6	.965 (-0.313)	-10.2	.555 (-5.122)	-17.8	.107 (-19.412)
-2.8	.959 (-0.364)	-10.4	.541 (-5.34)	-18.0	.099 (-20.087)
-3.0	.953 (-0.418)	-10.6	.527 (-5.564)	-18.2	.091 (-20.797)
-3.2	.947 (-0.475)	-10.8	.513 (-5.793)	-18.4	.084 (-21.543)
-3.4	.94 (-0.537)	-11.0	.50 (-6.029)	-18.6	.076 (-22.332)
-3.6	.933 (-0.603)	-11.2	.486 (-6.271)	-18.8	.069 (-23.169)
-3.8	.926 (-0.672)	-11.4	.472 (-6.519)	-19.0	.063 (-24.061)
-4.0	.918 (-0.745)	-11.6	.459 (-6.773)	-19.2	.056 (-25.017)
-4.2	.91 (-0.822)	-11.8	.445 (-7.033)	-19.4	.05 (-26.047)

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PATTERN POL.: Circular

DIRECTIVITY(Peak): 4.291/6.325 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 4.291/6.325 dBd

Null Fill(s)(%) : -28, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.044 (-27.168)	-27.2	.033 (-29.658)	-54.0	.016 (-35.941)
-19.8	.038 (-28.4)	-27.4	.032 (-29.888)	-55.0	.018 (-34.906)
-20.0	.032 (-29.77)	-27.6	.031 (-30.147)	-56.0	.02 (-34.182)
-20.2	.027 (-31.32)	-27.8	.03 (-30.434)	-57.0	.021 (-33.696)
-20.4	.022 (-33.113)	-28.0	.029 (-30.753)	-58.0	.021 (-33.403)
-20.6	.017 (-35.255)	-28.2	.028 (-31.104)	-59.0	.022 (-33.273)
-20.8	.013 (-37.941)	-28.4	.027 (-31.489)	-60.0	.022 (-33.282)
-21.0	.008 (-41.604)	-28.6	.025 (-31.911)	-61.0	.021 (-33.416)
-21.2	.004 (-47.571)	-28.8	.024 (-32.372)	-62.0	.021 (-33.662)
-21.4	.00 (-71.124)	-29.0	.023 (-32.877)	-63.0	.02 (-34.01)
-21.6	.003 (-49.363)	-29.2	.021 (-33.429)	-64.0	.019 (-34.454)
-21.8	.007 (-43.269)	-29.4	.02 (-34.035)	-65.0	.018 (-34.99)
-22.0	.01 (-39.908)	-29.6	.018 (-34.701)	-66.0	.017 (-35.612)
-22.2	.013 (-37.63)	-29.8	.017 (-35.437)	-67.0	.015 (-36.318)
-22.4	.016 (-35.94)	-30.0	.015 (-36.255)	-68.0	.014 (-37.108)
-22.6	.019 (-34.622)	-31.0	.008 (-42.398)	-69.0	.013 (-37.981)
-22.8	.021 (-33.561)	-32.0	.00 (-72.705)	-70.0	.011 (-38.936)
-23.0	.023 (-32.688)	-33.0	.008 (-42.306)	-71.0	.01 (-39.977)
-23.2	.025 (-31.962)	-34.0	.014 (-36.831)	-72.0	.009 (-41.105)
-23.4	.027 (-31.351)	-35.0	.02 (-33.897)	-73.0	.008 (-42.324)
-23.6	.029 (-30.836)	-36.0	.025 (-32.088)	-74.0	.007 (-43.641)
-23.8	.03 (-30.401)	-37.0	.028 (-30.955)	-75.0	.006 (-45.06)
-24.0	.031 (-30.034)	-38.0	.031 (-30.3)	-76.0	.005 (-46.592)
-24.2	.033 (-29.727)	-39.0	.032 (-30.022)	-77.0	.004 (-48.248)
-24.4	.034 (-29.473)	-40.0	.031 (-30.066)	-78.0	.003 (-50.043)
-24.6	.034 (-29.266)	-41.0	.03 (-30.407)	-79.0	.003 (-51.995)
-24.8	.035 (-29.102)	-42.0	.028 (-31.042)	-80.0	.002 (-54.129)
-25.0	.036 (-28.977)	-43.0	.025 (-31.989)	-81.0	.002 (-56.478)
-25.2	.036 (-28.888)	-44.0	.022 (-33.292)	-82.0	.001 (-59.086)
-25.4	.036 (-28.833)	-45.0	.018 (-35.04)	-83.0	.001 (-62.016)
-25.6	.036 (-28.81)	-46.0	.013 (-37.413)	-84.0	.001 (-65.357)
-25.8	.036 (-28.818)	-47.0	.009 (-40.816)	-85.0	.00 (-69.247)
-26.0	.036 (-28.855)	-48.0	.005 (-46.487)	-86.0	.00 (-73.918)
-26.2	.036 (-28.92)	-49.0	.00 (-66.067)	-87.0	.00 (-79.792)
-26.4	.035 (-29.013)	-50.0	.004 (-49.071)	-88.0	.00 (-87.814)
-26.6	.035 (-29.134)	-51.0	.007 (-42.82)	-89.0	.00 (-50)
-26.8	.034 (-29.281)	-52.0	.011 (-39.524)	-90.0	.00 (-50)
-27.0	.034 (-29.456)	-53.0	.013 (-37.404)	90.0	.00 (-50)

Systems With Reliability

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CLIENT: *WWFM*

Date: 7/19/2010

ANTENNA TYPE: FMI3D/8

FREQUENCY: 89.1 MHz

PATTERN POL.: Circular

DIRECTIVITY(Peak): 4.291/6.325 dBd

Beam Tilt (Deg.) : 0

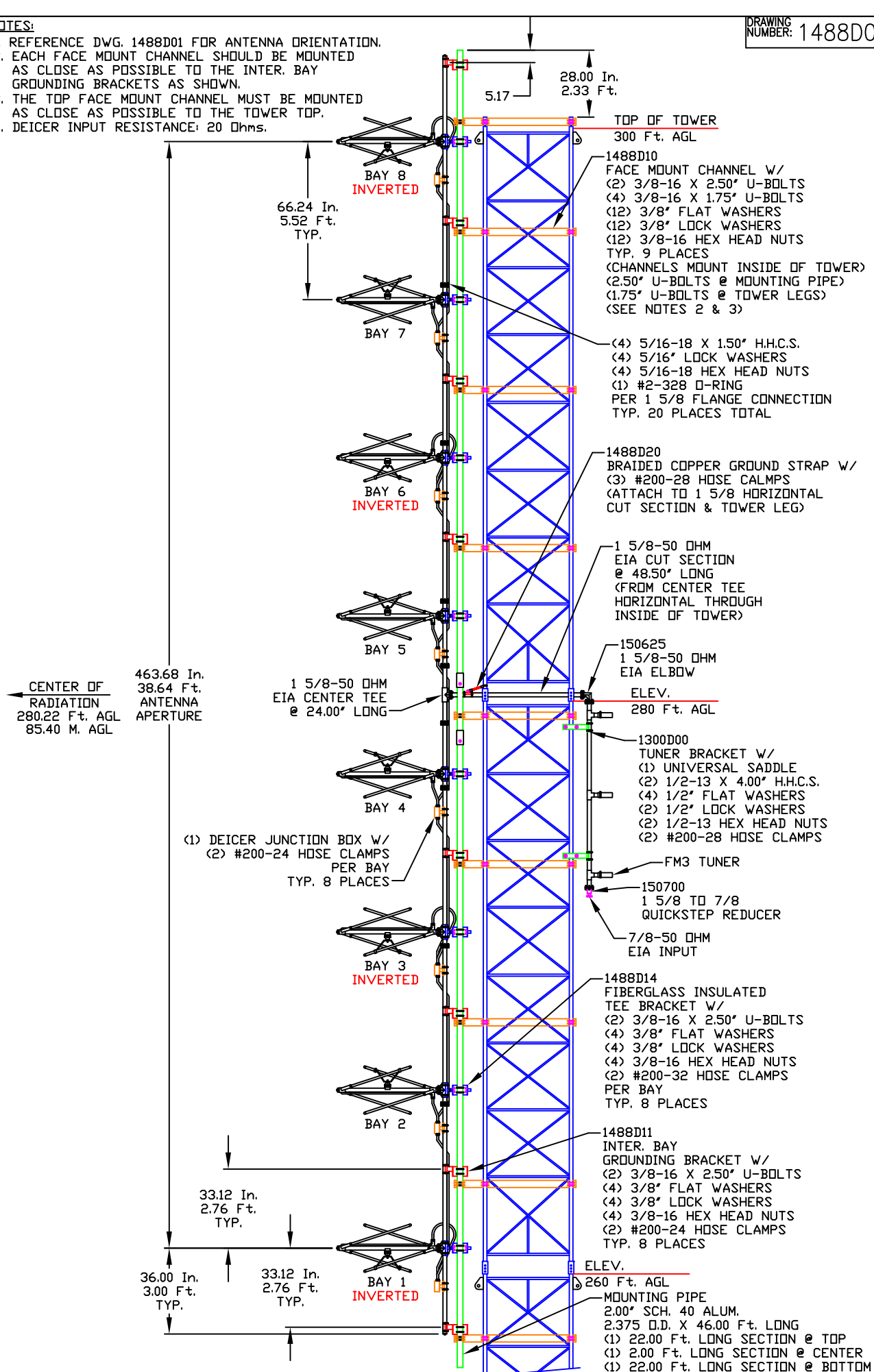
DIRECTIVITY(Horiz): 4.291/6.325 dBd

Null Fill(s)(%) : -28, 0, 0

NOTES:

1. REFERENCE DWG. 1488D01 FOR ANTENNA ORIENTATION.
2. EACH FACE MOUNT CHANNEL SHOULD BE MOUNTED AS CLOSE AS POSSIBLE TO THE INTER. BAY GROUNDING BRACKETS AS SHOWN.
3. THE TOP FACE MOUNT CHANNEL MUST BE MOUNTED AS CLOSE AS POSSIBLE TO THE TOWER TOP.
4. DEICER INPUT RESISTANCE: 20 Ohms.

DRAWING NUMBER: 1488D00



SYSTEMS WITH RELIABILITY, INC.
619 INDUSTRIAL PARK ROAD
EBENSBURG, PENNSYLVANIA 15931

TITLE: FMI3D/8, FREQ. 89.1
WWFM, TRENTON, NJ

MATERIAL:

SIZE/REV/APPR. DATE

1			
2			
3			

ENGINEER:

SCALE: NTS

NAME: RAC

DATE: 10/1/10

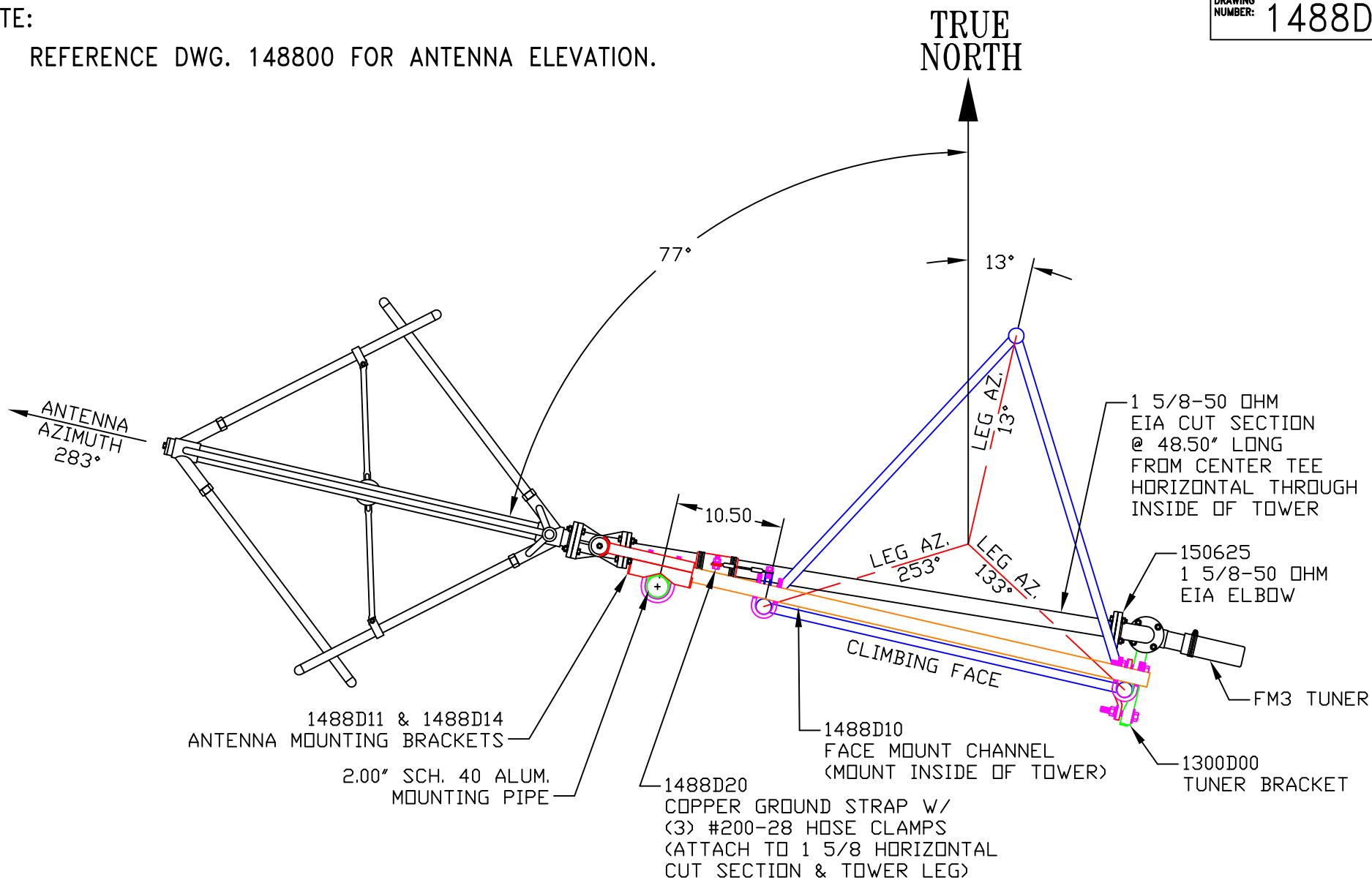
SHEET

1 OF 1

DRAWING NUMBER: 1488D00

REFERENCE DWG. 148800 FOR ANTENNA ELEVATION.

1488D01



TOP VIEW

TOLERANCES		REVISION RECORD	
.X ± .015	REV	APPROVAL	DATE
.XX ± .005			
.XXX ± .002			
X/X ± 1/32			
DEG. ± 1/2			
UNLESS OTHERWISE SPECIFIED			
BY THIS DRAWING	DRAWING NUMBER: 1488D01		
NAME: RAC	DATE: 9/28/10	SHEET	1 OF 1



SYSTEMS WITH RELIABILITY, INC
619 INDUSTRIAL PARK ROAD
EBENSBURG, PENNSYLVANIA 15931

FMI3D/8, FREQ. 89.1,
WWFM, TRENTON, NJ
ANTENNA ORIENTATION
FROM TRUE NORTH

MATERIAL:

A

PARTS MADE BY THIS DRAWING

SCALE: NTS

NAME: RAC

DATE: 9/28/10

SHEET 1 OF 1