



SYSTEMS WITH RELIABILITY, Inc.
Broadcast Antennas and Transmission Systems

PATTERN CERTIFICATION

DIRECTIONAL FM ANTENNA WYUL

December 2, 2002

Station	:	WYUL
Location	:	CHATEAUGAY, NY
Frequency	:	94.7 MHz
Channel	:	234
Antenna Model	:	FM10/8 DA IILumitron
Maximum Antenna Gain	:	
Horizontal	:	4.3971 / 6.4316 dB
Vertical	:	4.3091 / 6.3439 dB

ANTENNA DESCRIPTION

A custom designed FM10 antenna was used to produce the required directional azimuth pattern. Each antenna bay consists of a circularly polarized radiating element with a horizontal/vertical parasitic system. The array consists of 8 bays spaced at 0.50 wavelength. Each bay has a horizontal parasitic system that is oriented swept back from the perpendicular bay heading. The bay heading is **90 Degrees true north**.

DESCRIPTION OF TEST PROCEDURE

The test antenna is a one-third-scale model antenna and parasitic system. This antenna was mounted to a model tower of the actual structure in the field. A ten-foot tower section was mounted on the Orbit platform. All feed cables were properly grounded during pattern testing. Horizontal parasitics were used to obtain the desired directional pattern.

The source antenna, a vertical/horizontal dipole Cavity Back Resonator antenna configuration was mounted approximately 100 feet from the test antenna. The source's height was adjusted to provide a uniform field at the test antenna elevation. The CBR antenna was operated in the transmit mode at a frequency of **284.1 MHz**. The antenna under test was rotated in a clockwise direction. A gain reference was taken using a dipole tuned to **284.1 MHz**. No-where does the received signal exceed a maximum to minimum power ratio of 15 dB.

TEST RESULTS

The attached calculations verify that the **RMS** value of this antenna is **95.96 %** of the **RMS** value of the pattern authorized in the related construction permit **BLH 20010222AAN**. The **vertical** component **RMS** value is **0.664**, and the **horizontal** component **RMS** value is **0.671**.

Azimuth and elevation plots and associated tabulations of this antenna are included with this package.

Measured horizontal polarized directivity: **2.220 / 3.462 dB**
Measured vertical polarized directivity: **2.267 / 3.555 dB**
Measured composite pattern directivity: **1.985 / 2.977 dB**

Gain in each polarization was calculated using the following relation:

GAIN = Azimuth Directivity x Elevation Directivity x Power Ratio Between Polarizations

Using this relationship:

H-Pol. Gain = (2.220) (4.219) (0.5103) (0.92) = 4.3971 / 6.4316 dB

V-Pol. Gain = (2.267) (4.219) (0.4897) (0.92) = 4.3091 / 6.3439 dB

INSTALLATION AND MOUNTING

The antenna is to be mounted in accordance with the supplied drawings. The antenna center of radiation is to be **82.8 meters** above average terrain. The antenna (parasitic system included) aperture is **36.01 ft**. No other antennas are to be mounted within **10 feet** of the antenna. No other obstructions other than those specified by original drawings supplied are to be mounted within **10 feet** of the antenna. The antenna is to be oriented **90 degrees true north**.

The parasitic system is custom designed to shape and direct the antenna pattern as required. The systems orientation and the mounting details are described in the following drawings:

DRAWING NO.	TITLE
2365A12	ANTENNA ORENTATION
2365A20	PARASITIC ASSEMBLY
2365A21	PARASITIC MOUNTING PLATE ASSEMBLY
2365C12	ANTENNA ELEVATION
2365A00	BOOM BRACKET ASSEMBLY / FM RADOME
2365A15	BOOM BRACKET ASSEMBLY / FM RADOME
2365A10	BOOM BRACKET ASSEMBLY
2365A11	BAYS 1,3,7 ASSEMBLY
2365A13	BAYS 2,6,8 ASSEMBLY
2365A14	CENTER TEE ASSEMBLY
2365A16	TUNER BRACKET ASSEMBLY
2105A13	TEST RANGE SCHEMATIC

The array shall be mounted according to **DWG. 2365C12**. Each bay is mounted using the bracket assemblies in **DWG. 2365A00**, **DWG. 2365A15**, and **DWG. 2365A10**. The bracket assemblies in **DWG. 2365A00**, and **DWG. 2365A15** shall be mounted such that the protruding bracket arm and saddle point toward the 145-degree azimuth. The antenna elements shall be aligned at this same heading as in **DWG. 2365A12**. This will ensure that the antenna is oriented properly at 90 degrees true north. **DWG. 2365A20** shows the parasitic assemblies. These shall be mounted according to **DWG. 2365C12**, and **DWG. 2365A21**. The bays are to be assembled according to **DWG. 2365A11**, **DWG. 2365A13**, and **DWG. 2365A14**.

DOCUMENT EXHIBITS

The following exhibits are included as part of this Certificate of Compliance:

Exhibit 1	Measured Azimuth Pattern (Composite) Measured Field Strength Tabulations (Composite)
Exhibit 2	Measured Horizontal Polarized Azimuth Pattern Measured Field Strength Tabulations (Horizontal)
Exhibit 3	Measured Vertical Polarized Azimuth Pattern Measure Field Strength Tabulation (Vertical)
Exhibit 4	Elevation Pattern Elevation Tabulations
Exhibit 5	Antenna Data Sheet

TEST EQUIPMENT


Network Analyzer: Hewlett Packard Model # 8753C
Serial Number: 08753 – 69138
Calibrated 1/10/02, SWR, Inc.

Computer: White Mountain 366 Computer

Plotter: Hewlett-Packard 7550A

Positioner: Orbit Positioner
Calibrated 1/10/02, SWR, Inc.

Prepared by:



Mark A. Gergely
SWR, Inc.



SYSTEMS WITH RELIABILITY, INC.
Broadcast Antennas and Transmission Systems

WYUL Antenna RMS Comparison

PROPOSED ANTENNA

Azimuth Heading	Relative Field
0	0.3190
10	0.3830
20	0.4610
30	0.4800
40	0.5480
50	0.6590
60	0.7920
70	0.9530
80	1.0000
90	1.0000
100	1.0000
110	1.0000
120	1.0000
130	1.0000
140	1.0000
150	1.0000
160	1.0000
170	1.0000
180	1.0000
190	1.0000
200	1.0000
210	1.0000
220	0.9590
230	0.7640
240	0.6080
250	0.4840
260	0.3850
270	0.3070

DESIGNED ANTENNA

Azimuth Heading	Relative Field
0	0.2400
10	0.2800
20	0.3500
30	0.4400
40	0.5400
50	0.6400
60	0.7800
70	0.9500
80	1.0000
90	1.0000
100	1.0000
110	1.0000
120	1.0000
130	0.9600
140	0.8800
150	0.9200
160	0.9600
170	0.9800
180	0.9400
190	0.9400
200	0.9800
210	0.9400
220	0.9000
230	0.7400
240	0.5800
250	0.4600
260	0.3600
270	0.2800

PROPOSED ANTENNA

**Azimuth
Heading** **Relative
Field**

280	0.2440
290	0.1950
300	0.1550
310	0.1550
320	0.1670
330	0.2010
340	0.2420
350	0.2910

Sum of Relative Field Squared :	19.668
Sum Divided by 36 (Readings) :	0.546
Square Root :	0.739

DESIGNED ANTENNA

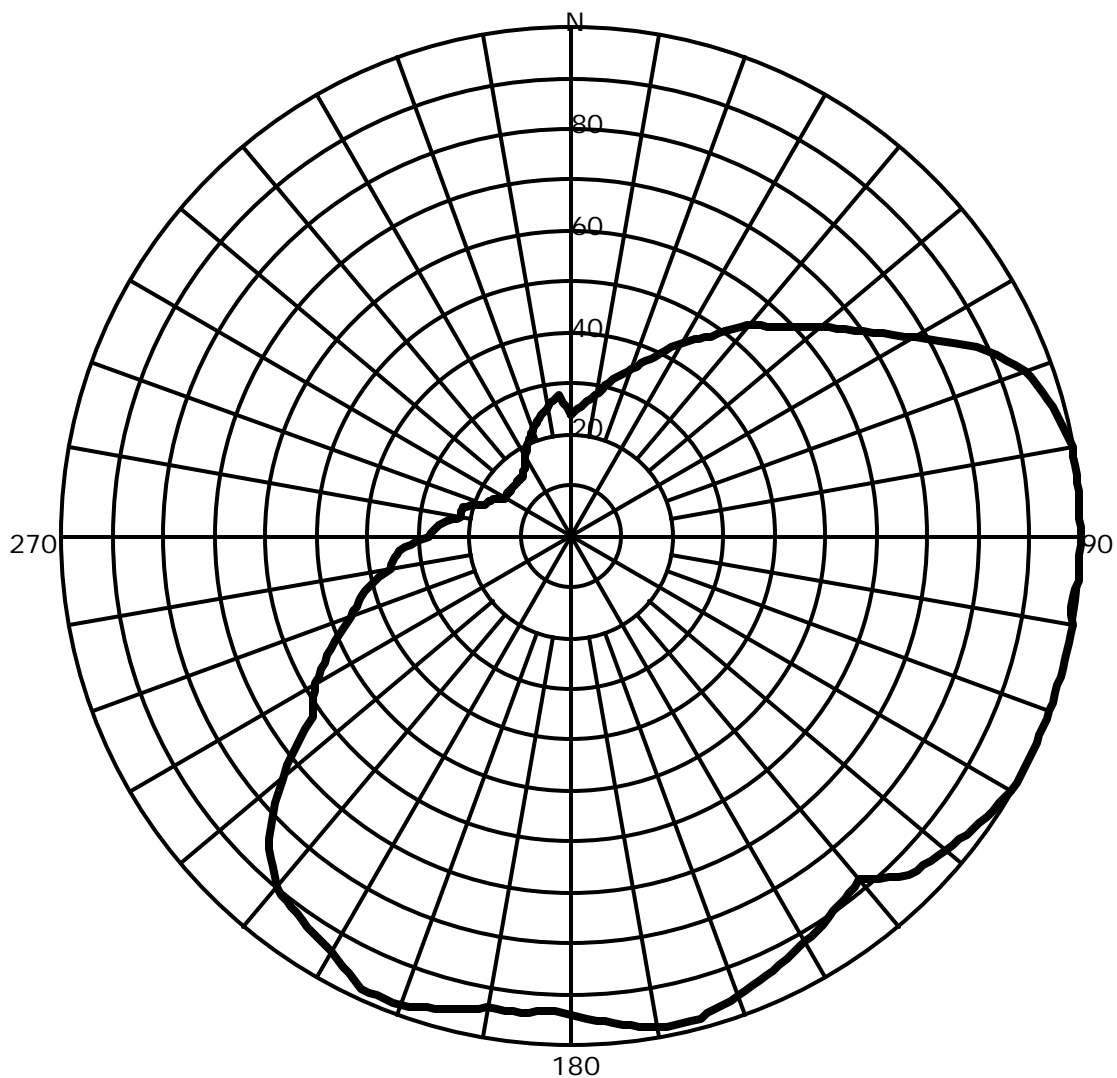
**Azimuth
Heading** **Relative
Field**

280	0.2200
290	0.1800
300	0.1500
310	0.1500
320	0.1500
330	0.1800
340	0.2200
350	0.2600

Sum of Relative Field Squared :	18.110
Sum Divided by 36 (Readings) :	0.503
Square Root :	0.709

Percentage of Construction Permit Antenna Filled :

95.96 %



Azimuth Pattern

Scale: Linear

Unit: Relative Field

Systems With Reliability

CLIENT: *Martz Communications*

Date: 11/25/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM CP Antenna

FREQUENCY: 94.7

PATTERN POL.: Composite

CIRCULARITY(+/-dB): NA

AZ. DIRECTIVITY: 1.9848 / 2.9773dB

PATTERN RMS: 0.710

Relative Field Tabulation(Azimuth)

Azimuth Heading	Relative Field(dB)	Azimuth Heading	Relative Field(dB)
0	.2400 (-12.36)	180	.9400 (-0.53)
5	.2600 (-11.67)	185	.9400 (-0.53)
10	.2800 (-11.03)	190	.9400 (-0.53)
15	.3200 (-9.87)	195	.9600 (-0.35)
20	.3500 (-9.09)	200	.9800 (-0.17)
25	.3900 (-8.16)	205	.9800 (-0.17)
30	.4400 (-7.11)	210	.9400 (-0.53)
35	.4800 (-6.36)	215	.9200 (-0.71)
40	.5400 (-5.34)	220	.9000 (-0.91)
45	.5800 (-4.72)	225	.8400 (-1.5)
50	.6400 (-3.86)	230	.7400 (-2.6)
55	.7000 (-3.09)	235	.6200 (-4.14)
60	.7800 (-2.15)	240	.5800 (-4.72)
65	.8800 (-1.1)	245	.5200 (-5.66)
70	.9500 (-0.44)	250	.4600 (-6.73)
75	.9800 (-0.17)	255	.4200 (-7.51)
80	1.0000 (0.01)	260	.3600 (-8.85)
85	1.0000 (0.01)	265	.3400 (-9.34)
90	1.0000 (0.01)	270	.2800 (-11.03)
95	1.0000 (0.01)	275	.2600 (-11.67)
100	1.0000 (0.01)	280	.2200 (-13.11)
105	1.0000 (0.01)	285	.2200 (-13.11)
110	1.0000 (0.01)	290	.1800 (-14.85)
115	1.0000 (0.01)	295	.1700 (-15.34)
120	1.0000 (0.01)	300	.1500 (-16.42)
125	.9800 (-0.17)	305	.1500 (-16.42)
130	.9600 (-0.35)	310	.1500 (-16.42)
135	.9400 (-0.53)	315	.1500 (-16.42)
140	.8800 (-1.1)	320	.1500 (-16.42)
145	.9000 (-0.91)	325	.1600 (-15.86)
150	.9200 (-0.71)	330	.1800 (-14.85)
155	.9400 (-0.53)	335	.2000 (-13.94)
160	.9600 (-0.35)	340	.2200 (-13.11)
165	.9800 (-0.17)	345	.2400 (-12.36)
170	.9800 (-0.17)	350	.2600 (-11.67)
175	.9600 (-0.35)	355	.2800 (-11.03)

Systems With Reliability

CLIENT: *Martz Communications*

Date: 11/25/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM CP Antenna

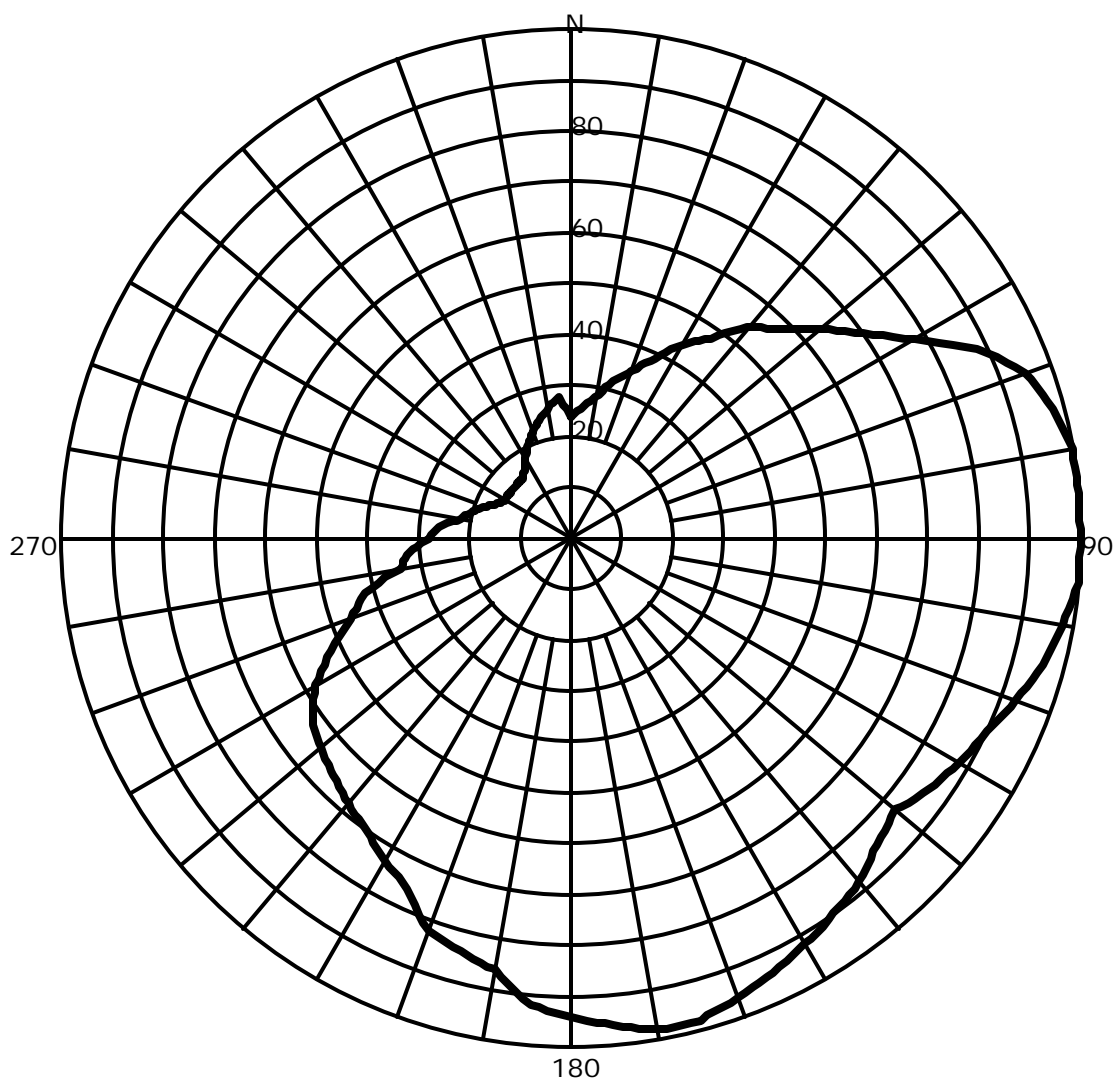
FREQUENCY: 94.7

PATTERN POL.: Composite

CIRCULARITY(+/-dB):NA

AZ. DIRECTIVITY: 1.9848 / 2.9773dB

PATTERN RMS: 0.710



Azimuth Pattern

Scale: Linear

Unit: Relative Field

Systems With Reliability

CLIENT: *Martz Communications*

Date: 11/25/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM CP Antenna

FREQUENCY: 94.7

PATTERN POL.: Horizontal

CIRCULARITY(+/-dB): NA

AZ. DIRECTIVITY: 2.22/3.462

PATTERN RMS: 0.671

Relative Field Tabulation(Azimuth)

Azimuth Heading	Relative Field(dB)	Azimuth Heading	Relative Field(dB)
0	.2400 (-12.36)	180	.9400 (-0.53)
5	.2600 (-11.67)	185	.9200 (-0.71)
10	.2800 (-11.03)	190	.8600 (-1.3)
15	.3200 (-9.87)	195	.8400 (-1.5)
20	.3500 (-9.09)	200	.8200 (-1.71)
25	.3900 (-8.16)	205	.7600 (-2.37)
30	.4400 (-7.11)	210	.7300 (-2.72)
35	.4800 (-6.36)	215	.7000 (-3.09)
40	.5400 (-5.34)	220	.6800 (-3.34)
45	.5800 (-4.72)	225	.6600 (-3.6)
50	.6400 (-3.86)	230	.6400 (-3.86)
55	.7000 (-3.09)	235	.6200 (-4.14)
60	.7800 (-2.15)	240	.5800 (-4.72)
65	.8800 (-1.1)	245	.5200 (-5.66)
70	.9500 (-0.44)	250	.4600 (-6.73)
75	.9800 (-0.17)	255	.4200 (-7.51)
80	1.0000 (0.01)	260	.3400 (-9.34)
85	1.0000 (0.01)	265	.3200 (-9.87)
90	1.0000 (0.01)	270	.2800 (-11.03)
95	1.0000 (0.01)	275	.2600 (-11.67)
100	.9800 (-0.17)	280	.2200 (-13.11)
105	.9600 (-0.35)	285	.2000 (-13.94)
110	.9300 (-0.62)	290	.1800 (-14.85)
115	.9000 (-0.91)	295	.1600 (-15.86)
120	.8800 (-1.1)	300	.1500 (-16.42)
125	.8600 (-1.3)	305	.1500 (-16.42)
130	.8300 (-1.61)	310	.1500 (-16.42)
135	.8500 (-1.4)	315	.1500 (-16.42)
140	.8800 (-1.1)	320	.1500 (-16.42)
145	.9000 (-0.91)	325	.1600 (-15.86)
150	.9200 (-0.71)	330	.1800 (-14.85)
155	.9400 (-0.53)	335	.2000 (-13.94)
160	.9600 (-0.35)	340	.2200 (-13.11)
165	.9800 (-0.17)	345	.2400 (-12.36)
170	.9800 (-0.17)	350	.2600 (-11.67)
175	.9600 (-0.35)	355	.2800 (-11.03)

Systems With Reliability

CLIENT: *Martz Communications*

Date: 11/25/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM CP Antenna

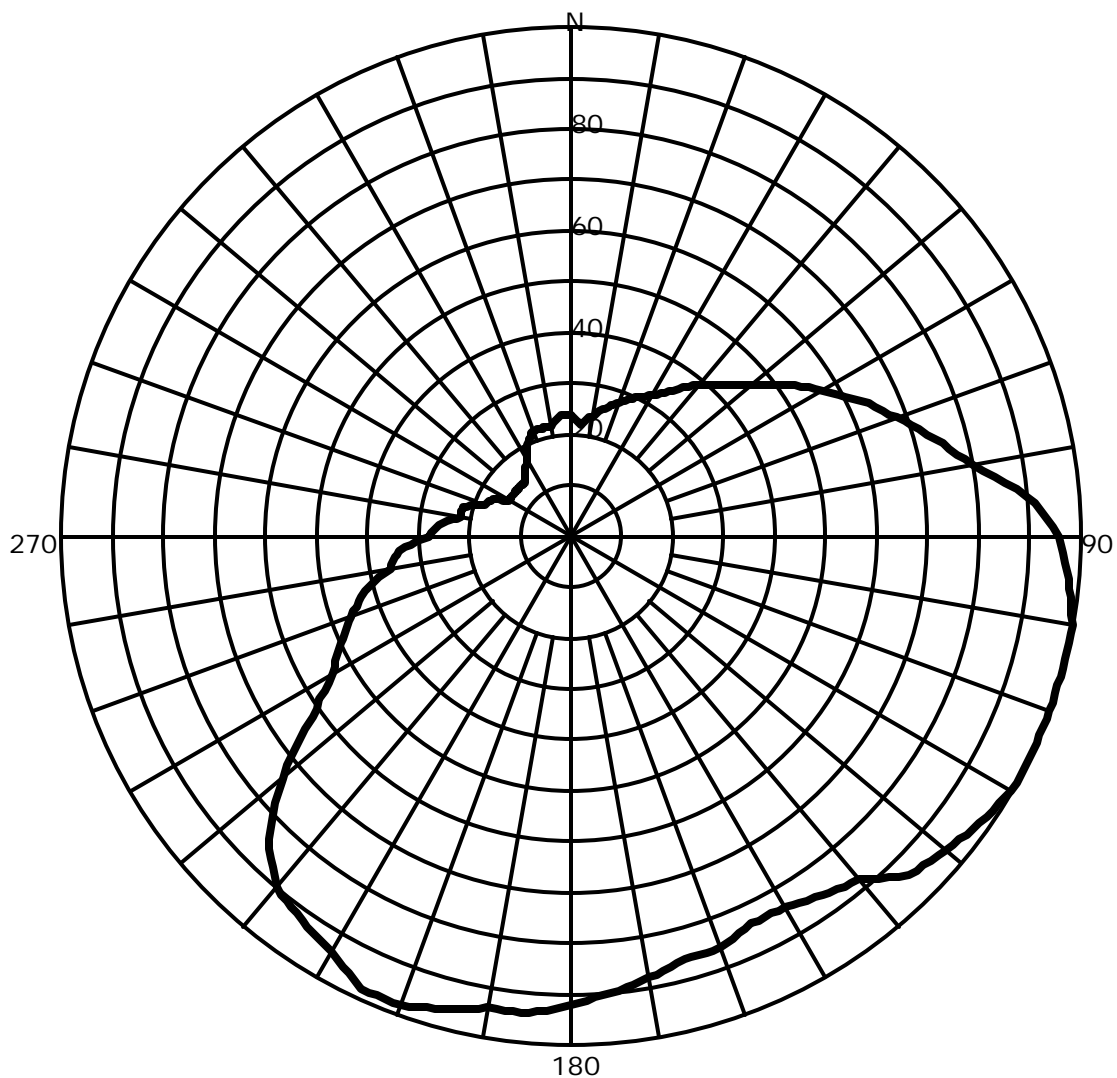
FREQUENCY: 94.7

PATTERN POL.: Horizontal

CIRCULARITY(+/-dB):NA

AZ. DIRECTIVITY: 2.22/3.462

PATTERN RMS: 0.671



Azimuth Pattern

Scale: Linear

Unit: Relative Field

Systems With Reliability

CLIENT: *Martz Communications*

Date: 11/25/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM CP Antenna

FREQUENCY: 94.7

PATTERN POL.: Vertical

CIRCULARITY(+/-dB):NA

AZ. DIRECTIVITY: 2.2673 / 3.5551dB

PATTERN RMS: 0.664

Relative Field Tabulation(Azimuth)

Azimuth Heading	Relative Field(dB)	Azimuth Heading	Relative Field(dB)
0	.2400 (-12.36)	180	.9200 (-0.71)
5	.2200 (-13.11)	185	.9400 (-0.53)
10	.2400 (-12.36)	190	.9400 (-0.53)
15	.2600 (-11.67)	195	.9600 (-0.35)
20	.2800 (-11.03)	200	.9800 (-0.17)
25	.3000 (-10.43)	205	.9800 (-0.17)
30	.3200 (-9.87)	210	.9400 (-0.53)
35	.3500 (-9.09)	215	.9200 (-0.71)
40	.3900 (-8.16)	220	.9000 (-0.91)
45	.4200 (-7.51)	225	.8400 (-1.5)
50	.4600 (-6.73)	230	.7400 (-2.6)
55	.5200 (-5.66)	235	.6200 (-4.14)
60	.5700 (-4.87)	240	.5400 (-5.34)
65	.6300 (-4)	245	.5000 (-6)
70	.6800 (-3.34)	250	.4600 (-6.73)
75	.7400 (-2.6)	255	.4200 (-7.51)
80	.8000 (-1.93)	260	.3600 (-8.85)
85	.9000 (-0.91)	265	.3400 (-9.34)
90	.9600 (-0.35)	270	.2800 (-11.03)
95	.9800 (-0.17)	275	.2600 (-11.67)
100	1.0000 (0.01)	280	.2200 (-13.11)
105	1.0000 (0.01)	285	.2200 (-13.11)
110	1.0000 (0.01)	290	.1800 (-14.85)
115	1.0000 (0.01)	295	.1700 (-15.34)
120	1.0000 (0.01)	300	.1400 (-17.02)
125	.9800 (-0.17)	305	.1400 (-17.02)
130	.9600 (-0.35)	310	.1400 (-17.02)
135	.9400 (-0.53)	315	.1400 (-17.02)
140	.8800 (-1.1)	320	.1400 (-17.02)
145	.8600 (-1.3)	325	.1600 (-15.86)
150	.8400 (-1.5)	330	.1700 (-15.34)
155	.8400 (-1.5)	335	.2000 (-13.94)
160	.8600 (-1.3)	340	.2200 (-13.11)
165	.8600 (-1.3)	345	.2200 (-13.11)
170	.8800 (-1.1)	350	.2200 (-13.11)
175	.9000 (-0.91)	355	.2400 (-12.36)

Systems With Reliability

CLIENT: *Martz Communications*

Date: 11/25/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM CP Antenna

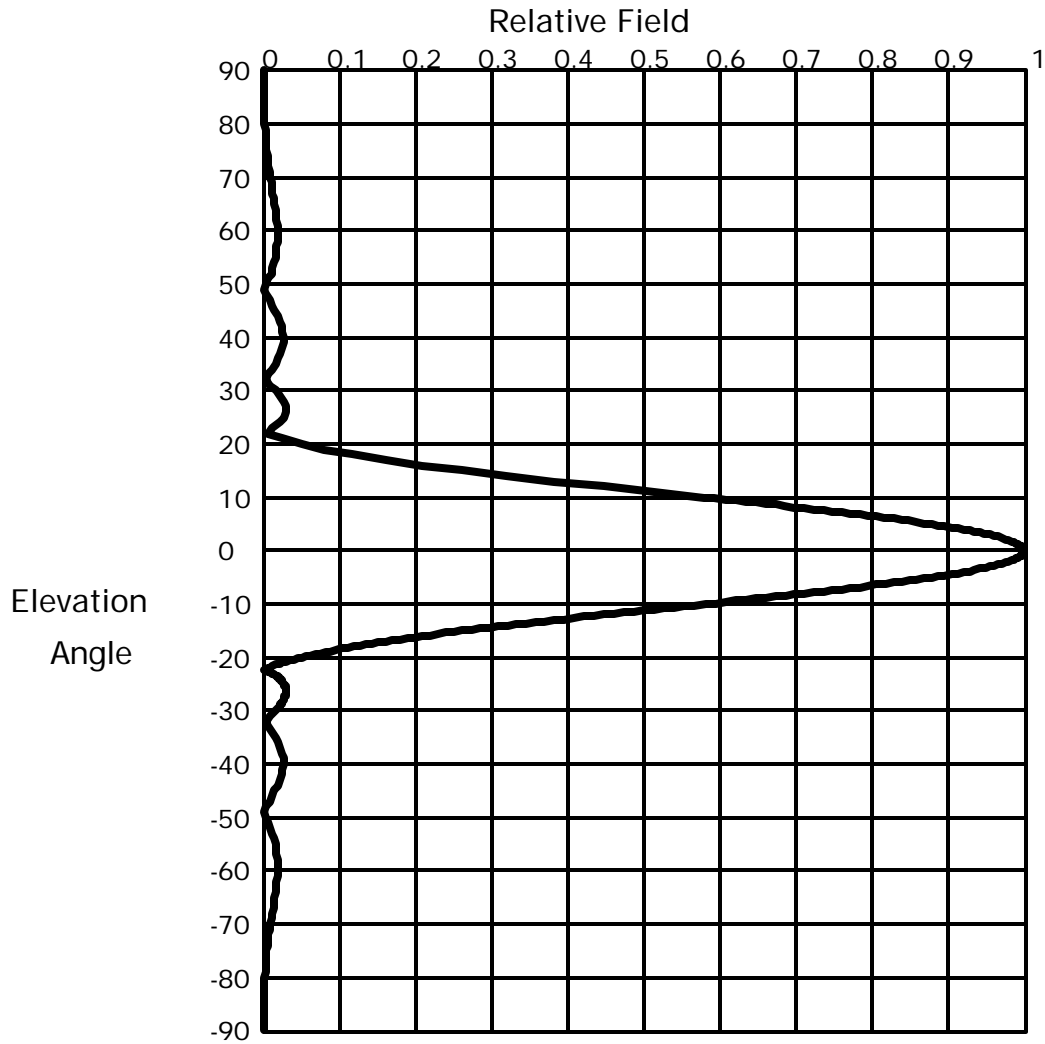
FREQUENCY: 94.7

PATTERN POL.: Vertical

CIRCULARITY(+/-dB):NA

AZ. DIRECTIVITY: 2.2673 / 3.5551dB

PATTERN RMS: 0.664



Elevation Pattern

Scale: Linear

Systems With Reliability

Units: Field, Relative

CLIENT: *Martz Communications*

Date: 12/2/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM Cp Antenna

FREQUENCY: 94.7

PATTERN POL.: Circular

DIRECTIVITY(Peak): 4.219/6.252 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 4.219/6.252 dBd

Null Fill(s)(%) : -30, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
3.2	.948 (-0.462)	-4.4	.904 (-0.874)	-12.0	.446 (-7.006)
3.0	.954 (-0.406)	-4.6	.896 (-0.957)	-12.2	.433 (-7.266)
2.8	.96 (-0.353)	-4.8	.887 (-1.043)	-12.4	.42 (-7.532)
2.6	.966 (-0.305)	-5.0	.878 (-1.133)	-12.6	.407 (-7.804)
2.4	.971 (-0.259)	-5.2	.868 (-1.226)	-12.8	.394 (-8.083)
2.2	.975 (-0.218)	-5.4	.859 (-1.324)	-13.0	.382 (-8.369)
2.0	.979 (-0.18)	-5.6	.849 (-1.426)	-13.2	.369 (-8.662)
1.8	.983 (-0.146)	-5.8	.838 (-1.531)	-13.4	.356 (-8.962)
1.6	.987 (-0.115)	-6.0	.828 (-1.641)	-13.6	.344 (-9.269)
1.4	.99 (-0.088)	-6.2	.817 (-1.754)	-13.8	.332 (-9.584)
1.2	.993 (-0.065)	-6.4	.806 (-1.872)	-14.0	.32 (-9.907)
1.0	.995 (-0.045)	-6.6	.795 (-1.994)	-14.2	.308 (-10.239)
.8	.997 (-0.029)	-6.8	.783 (-2.119)	-14.4	.296 (-10.578)
.6	.998 (-0.016)	-7.0	.772 (-2.249)	-14.6	.284 (-10.926)
.4	.999 (-0.007)	-7.2	.76 (-2.383)	-14.8	.273 (-11.283)
.2	1.00 (-0.002)	-7.4	.748 (-2.522)	-15.0	.262 (-11.65)
.0	1.00 (0)	-7.6	.736 (-2.664)	-15.2	.25 (-12.026)
-.2	1.00 (-0.002)	-7.8	.723 (-2.811)	-15.4	.24 (-12.413)
-.4	.999 (-0.007)	-8.0	.711 (-2.963)	-15.6	.229 (-12.81)
-.6	.998 (-0.016)	-8.2	.698 (-3.118)	-15.8	.218 (-13.218)
-.8	.997 (-0.028)	-8.4	.686 (-3.279)	-16.0	.208 (-13.638)
-1.0	.995 (-0.045)	-8.6	.673 (-3.443)	-16.2	.198 (-14.07)
-1.2	.993 (-0.064)	-8.8	.66 (-3.613)	-16.4	.188 (-14.514)
-1.4	.99 (-0.087)	-9.0	.647 (-3.787)	-16.6	.178 (-14.973)
-1.6	.987 (-0.114)	-9.2	.633 (-3.965)	-16.8	.169 (-15.445)
-1.8	.983 (-0.145)	-9.4	.62 (-4.149)	-17.0	.16 (-15.933)
-2.0	.98 (-0.179)	-9.6	.607 (-4.337)	-17.2	.151 (-16.436)
-2.2	.975 (-0.217)	-9.8	.594 (-4.53)	-17.4	.142 (-16.957)
-2.4	.971 (-0.258)	-10.0	.58 (-4.729)	-17.6	.133 (-17.496)
-2.6	.966 (-0.303)	-10.2	.567 (-4.932)	-17.8	.125 (-18.054)
-2.8	.96 (-0.352)	-10.4	.553 (-5.14)	-18.0	.117 (-18.634)
-3.0	.955 (-0.404)	-10.6	.54 (-5.354)	-18.2	.109 (-19.236)
-3.2	.948 (-0.46)	-10.8	.526 (-5.573)	-18.4	.102 (-19.864)
-3.4	.942 (-0.52)	-11.0	.513 (-5.798)	-18.6	.094 (-20.518)
-3.6	.935 (-0.583)	-11.2	.50 (-6.028)	-18.8	.087 (-21.203)
-3.8	.928 (-0.65)	-11.4	.486 (-6.264)	-19.0	.08 (-21.92)
-4.0	.92 (-0.721)	-11.6	.473 (-6.505)	-19.2	.073 (-22.674)
-4.2	.912 (-0.796)	-11.8	.46 (-6.753)	-19.4	.067 (-23.47)

Systems With Reliability

Page 1 of 2

CLIENT: *Martz Communications*

Date: 12/2/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM Cp Antenna

FREQUENCY: 94.7

PATTERN POL.: Circular

DIRECTIVITY(Peak): 4.219/6.252 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 4.219/6.252 dBd

Null Fill(s)(%) : -30, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.061 (-24.312)	-27.2	.028 (-31.179)	-54.0	.013 (-37.588)
-19.8	.055 (-25.208)	-27.4	.027 (-31.334)	-55.0	.015 (-36.61)
-20.0	.049 (-26.165)	-27.6	.027 (-31.519)	-56.0	.016 (-35.936)
-20.2	.044 (-27.196)	-27.8	.026 (-31.733)	-57.0	.017 (-35.497)
-20.4	.038 (-28.313)	-28.0	.025 (-31.977)	-58.0	.017 (-35.252)
-20.6	.033 (-29.537)	-28.2	.024 (-32.253)	-59.0	.017 (-35.169)
-20.8	.029 (-30.892)	-28.4	.024 (-32.56)	-60.0	.017 (-35.228)
-21.0	.024 (-32.418)	-28.6	.023 (-32.902)	-61.0	.017 (-35.414)
-21.2	.02 (-34.171)	-28.8	.022 (-33.278)	-62.0	.016 (-35.715)
-21.4	.015 (-36.246)	-29.0	.021 (-33.693)	-63.0	.016 (-36.123)
-21.6	.011 (-38.814)	-29.2	.02 (-34.148)	-64.0	.015 (-36.632)
-21.8	.008 (-42.235)	-29.4	.019 (-34.647)	-65.0	.014 (-37.238)
-22.0	.004 (-47.517)	-29.6	.017 (-35.195)	-66.0	.013 (-37.938)
-22.2	.001 (-61.001)	-29.8	.016 (-35.797)	-67.0	.012 (-38.731)
-22.4	.002 (-53.055)	-30.0	.015 (-36.461)	-68.0	.01 (-39.618)
-22.6	.005 (-45.777)	-31.0	.009 (-41.144)	-69.0	.009 (-40.6)
-22.8	.008 (-42.085)	-32.0	.002 (-52.678)	-70.0	.008 (-41.681)
-23.0	.01 (-39.66)	-33.0	.004 (-48.133)	-71.0	.007 (-42.866)
-23.2	.013 (-37.893)	-34.0	.01 (-40.3)	-72.0	.006 (-44.163)
-23.4	.015 (-36.53)	-35.0	.015 (-36.676)	-73.0	.005 (-45.583)
-23.6	.017 (-35.443)	-36.0	.019 (-34.535)	-74.0	.004 (-47.14)
-23.8	.019 (-34.558)	-37.0	.022 (-33.208)	-75.0	.004 (-48.855)
-24.0	.02 (-33.826)	-38.0	.024 (-32.429)	-76.0	.003 (-50.757)
-24.2	.022 (-33.216)	-39.0	.025 (-32.068)	-77.0	.002 (-52.891)
-24.4	.023 (-32.706)	-40.0	.025 (-32.056)	-78.0	.002 (-55.32)
-24.6	.024 (-32.279)	-41.0	.024 (-32.362)	-79.0	.001 (-58.157)
-24.8	.025 (-31.923)	-42.0	.022 (-32.979)	-80.0	.001 (-61.602)
-25.0	.026 (-31.63)	-43.0	.02 (-33.922)	-81.0	.00 (-66.1)
-25.2	.027 (-31.391)	-44.0	.017 (-35.237)	-82.0	.00 (-73.016)
-25.4	.028 (-31.201)	-45.0	.014 (-37.019)	-83.0	.00 (-99.586)
-25.6	.028 (-31.056)	-46.0	.011 (-39.461)	-84.0	.00 (-76.544)
-25.8	.028 (-30.952)	-47.0	.007 (-43.009)	-85.0	.00 (-71.692)
-26.0	.029 (-30.885)	-48.0	.004 (-49.102)	-86.0	.00 (-69.644)
-26.2	.029 (-30.854)	-49.0	.00 (-86.489)	-87.0	.00 (-68.817)
-26.4	.029 (-30.857)	-50.0	.003 (-49.845)	-88.0	.00 (-68.755)
-26.6	.029 (-30.891)	-51.0	.006 (-44.12)	-89.0	.00 (-69.291)
-26.8	.028 (-30.957)	-52.0	.009 (-41.003)	-90.0	.00 (-70.377)
-27.0	.028 (-31.053)	-53.0	.011 (-38.982)	90.0	.00 (-50)

Systems With Reliability

Page 2 of 2

CLIENT: *Martz Communications*

Date: 12/2/02

ANTENNA TYPE: 8 Bay Suppressed Sidelobe FM Cp Antenna

FREQUENCY: 94.7

PATTERN POL.: Circular

DIRECTIVITY(Peak): 4.219/6.252 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 4.219/6.252 dBd

Null Fill(s)(%) : -30, 0, 0



SYSTEMS WITH RELIABILITY, INC.
Broadcast Antennas and Transmission Systems

ANTENNA DATA SHEET

Call Sign WYUL
Customer Martz Communications
Location Chateaugay, NY
Antenna Model FM10/8 DA IILumitron
Channel/Frequency 94.7 MHz
Polarization Type Circular

Antenna Specifications:

	H. Pol.	dB	V. Pol.	dB
License ERP (KW)	50.0000	16.9897	49.0000	16.9020
Elevation Directivity	4.2190	6.2521	4.2190	6.2521
Azimuth Directivity	2.2200	3.4635	2.2670	3.5545
Polarization Ratio	0.5103	-2.9219	0.4897	-3.1006
Antenna Efficiency	0.9200	-0.3621	0.9200	-0.3621
Antenna Gain	4.3971	6.4316	4.3091	6.3439
Antenna Input Power (KW)	11.3712	10.5581	11.3712	10.5581

Feed Line Specifications:

Line Type	3" Heliax
Attenuation Per 100 ft (dB)	0.125
Line Length (ft)	280
Total Line Attenuation (dB)	-0.3500
Line Efficiency	0.9226
Combiner Attenuation (dB)	0.0600
Input to the Line (KW)	12.4970 10.9681

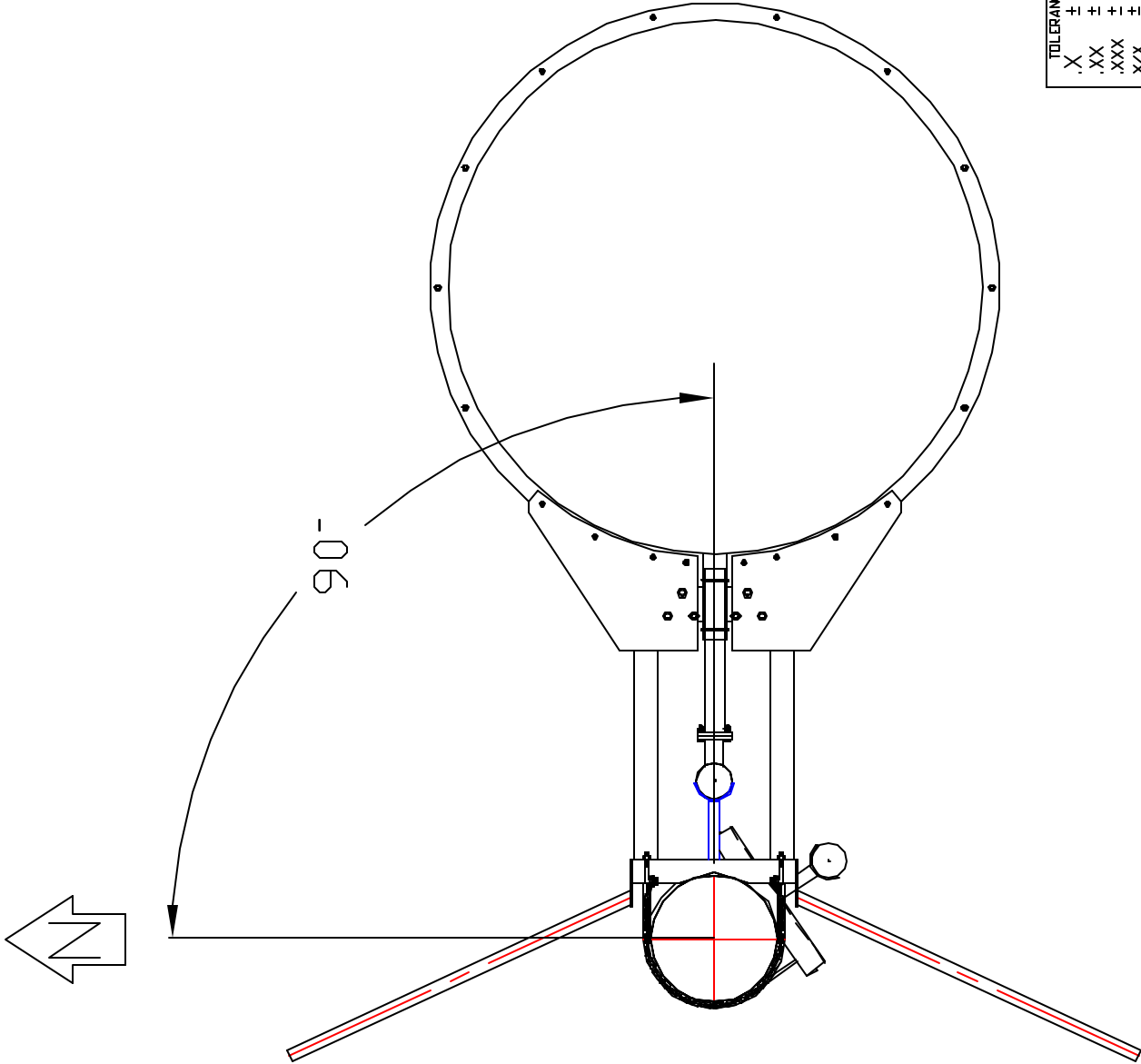
Physical Specifications:

No. of Bays	8		
Antenna Aperture	36.01	ft	10.9831 m
Center of Radiation	271.5	ft	82.8075 m
Antenna Weight	1560	lbs	709.0909 kg
Wind load (50/33,)	2563	lbs	1165.0000 kg
Antenna Weight with 0.5" Radial Ice	1610	lbs	731.8182 kg
Windload (50/33) w/ 0.5" Radial Ice	3105	lbs	1411.3636 kg

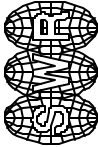
Prepared By: Mark A. Gergely
Mark A. Gergely

NOTE:

DRAWING
NUMBER: 2365A12



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



PROJECT: ORIENTATION VIEW

TITLE: FM10/8-HWS-DA

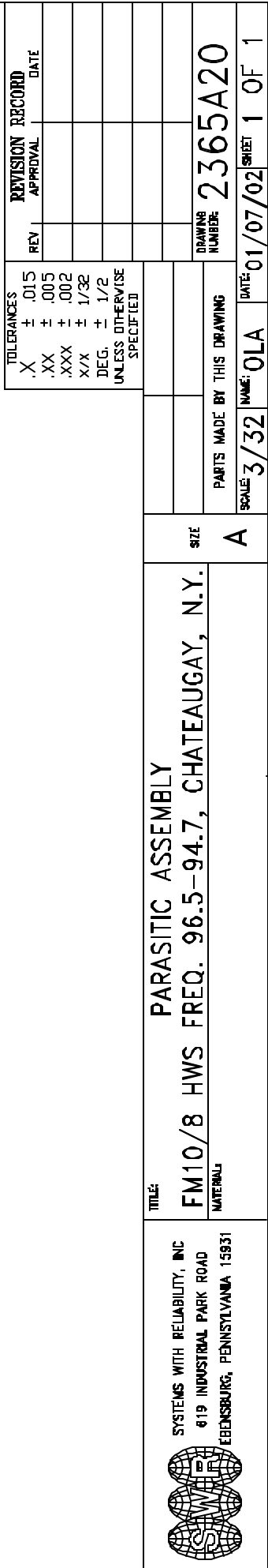
FREQ. 96.5/94.7, CHATEAUGAY, N.Y.

SIZE

A

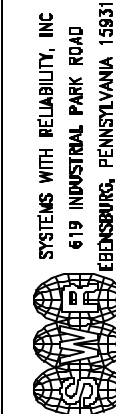
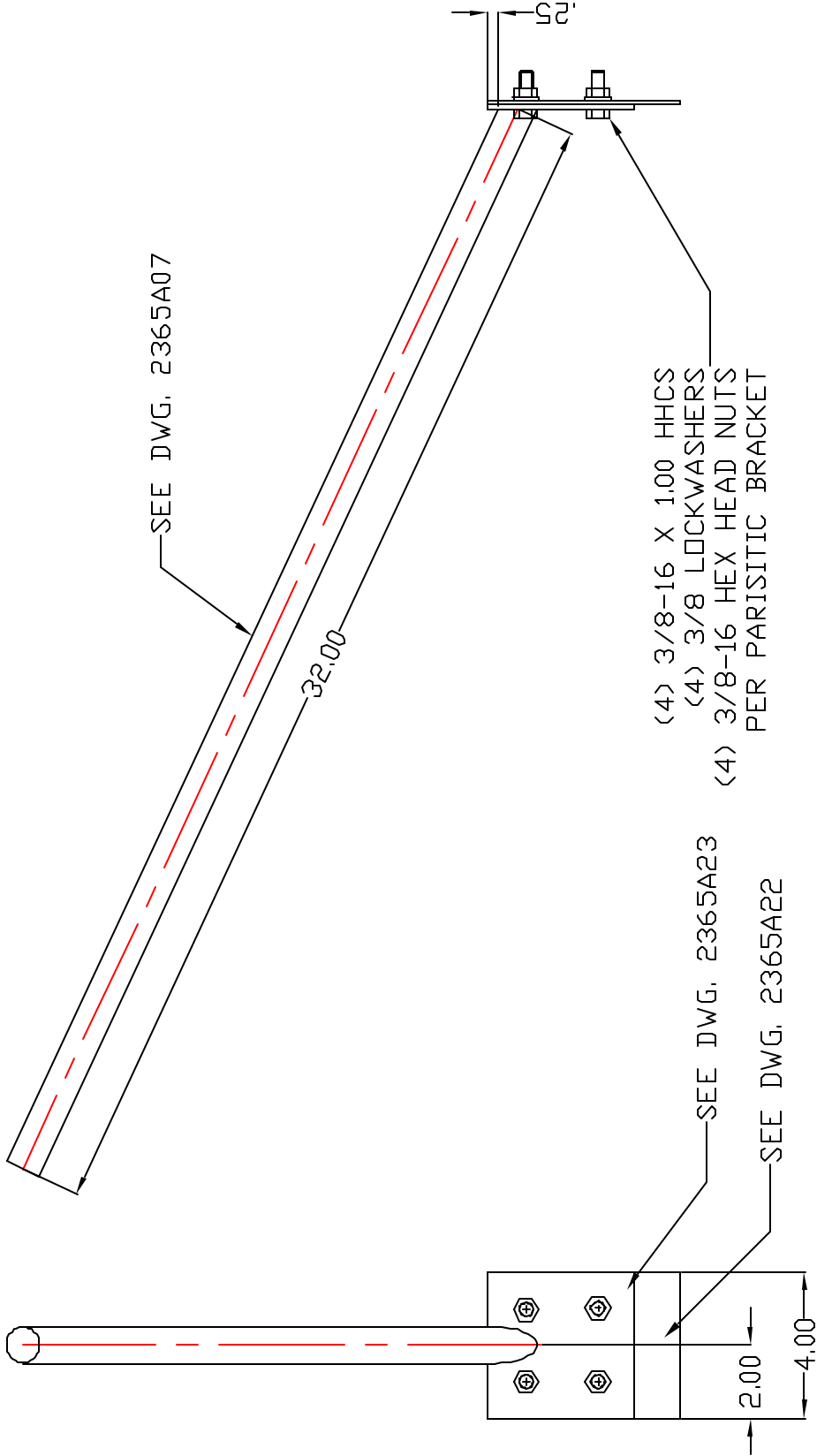
TOLERANCES		REVISION RECORD	
X	± .015	REV	APPROVAL
.XX	± .005		DATE
.XXX	± .002		
X/X	± 1/32		
DEG.	± 1/2		
UNLESS OTHERWISE SPECIFIED			
		1	9/11/02
		DRAWING NUMBER: 2365A12	
		PARTS MADE BY THIS DRAWING	
		SCALE: NTS	
		NAME: OLA	
		DATE: 12/4/01	
		SHEET 1 OF 1	

DRAWING
NUMBER:
2365A20



NOTE:

DRAWING
NUMBER: 2365A21



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

TITLE: PARASITIC MOUNTING PLATE ASSEMBLY
FM10/8 96.5-94.7, CHATEAUGAY, N.Y.

MATERIAL:

SIZE

A

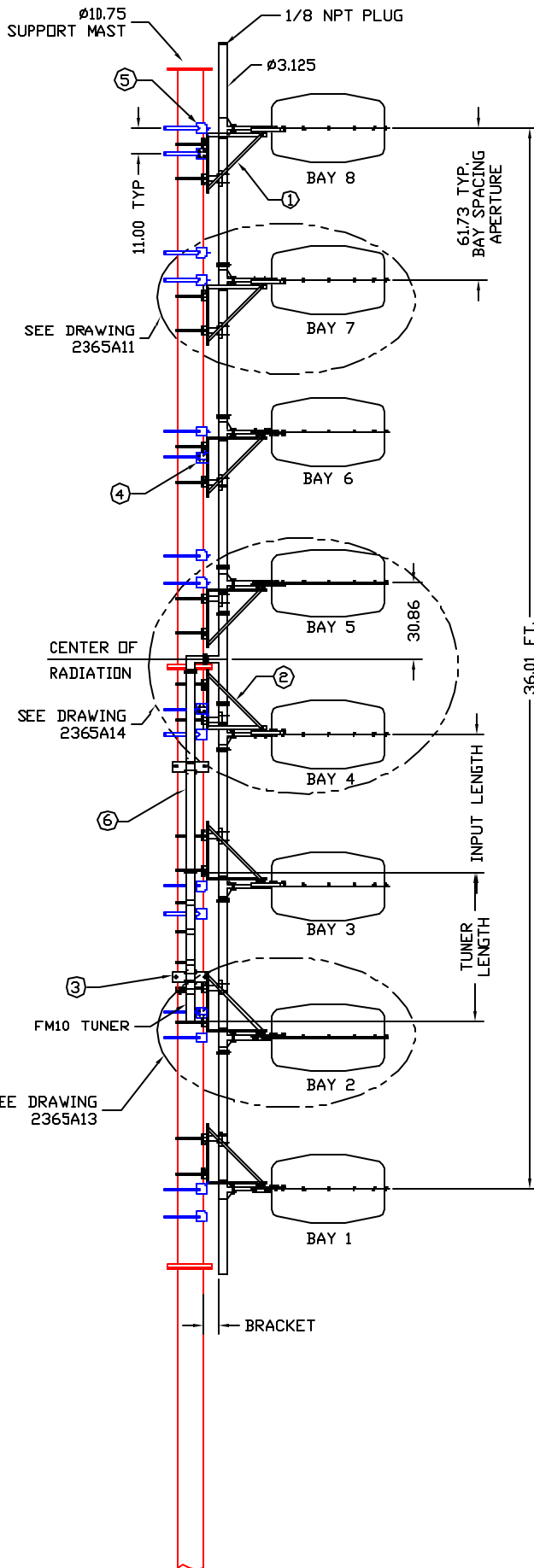
PARTS MADE BY THIS DRAWING

SCALE: 1/4 NAME: OLA DATE: 01/10/02 SHEET 1 OF 1

TOLERANCES	
X	± .015
.XX	± .005
.XXX	± .002
X/X	± 1/32
DEG.	± 1/2
UNLESS OTHERWISE SPECIFIED	

REVISION RECORD	
REV	DATE

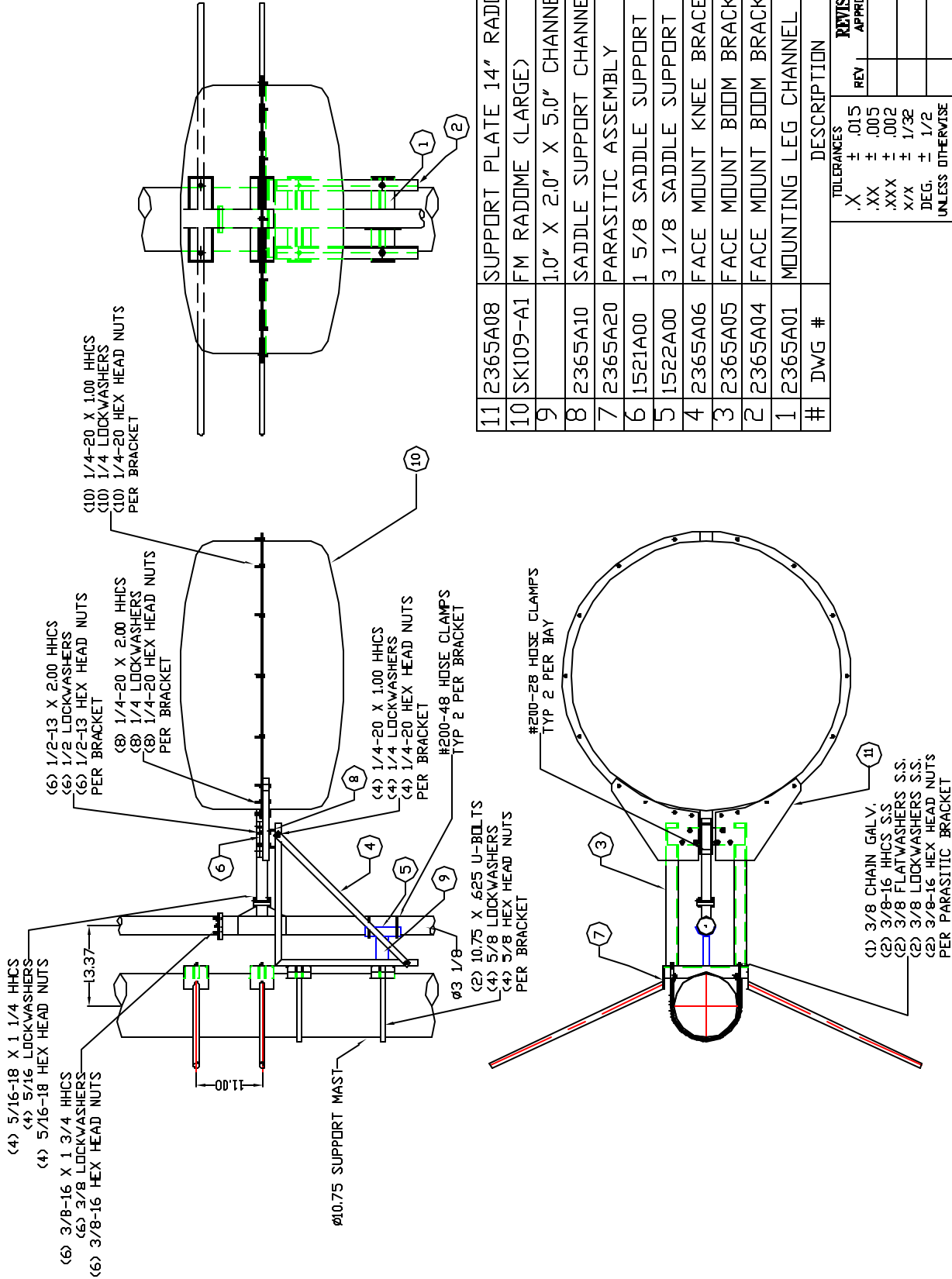
DRAWING
NUMBER: 2365A21



30			
29			
28		#200-48 HOSE CLAMPS	20
27		#200-28 HOSE CLAMPS	16
26		5/8 HEX HEAD NUT	36
25		5/8 LOCKWASHER	36
24		10.75 X .625 U-BOLTS	18
23		1/2-13 HEX HEAD NUTS	48
22		1/2 LOCKWASHERS	48
21		1/2-13 X 2.00 HHCS	48
20		3/8 GALV. CHAIN X	12
19		3/8 HEX HEAD NUT	122
18		3/8 FLATWASHER	24
17		3/8 LOCKWASHER	122
16		3/8-16 X (J-BOLT)	24
15		3/8-16 X 1 3/4 HHCS	66
14		3/8-16 X 1.00 HHCS	36
13		5/16 HEX HEAD NUT	36
12		5/16 LOCKWASHERS	36
11		5/16-18 X 1 1/4 HHCS	32
10		1/4 HEX HEAD NUT	176
9		1/4 LOCKWASHER	176
8		1/4-20 X 2.00 HHCS	64
7		1/4-20 X 1.00 HHCS	112
6		BO* MATCHING TRANSFORMER SECT.	1
5	2365A20	PARASITIC ASSEMBLY	8
4	2365A21	PARASITIC ASSEMBLY	8
3	2365A16	TUNER BRACKET ASSEMBLY	2
2	2365A15	BOOM BRACKET ASSEMBLY	2
1	2365A00	BOOM BRACKET ASSEMBLY	6
#	DWG #	DESCRIPTION	QTY

NOTE:

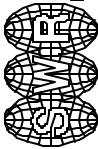
1. TYPICAL FOR BAYS 1, 3 & 7, BAYS 1 & 3 ARE INVERTED.



DRAWING NUMBER: 2365A00

#	DWG #	DESCRIPTION	QTY
11	2365A08	SUPPORT PLATE 14" RADOME	2
10	SK109-A1	FM RADOME (LARGE)	2
9		1.0" X 2.0" X 5.0" CHANNEL	1
8	2365A10	SADDLE SUPPORT CHANNEL	1
7	2365A20	PARASITIC ASSEMBLY	2
6	1521A00	1 5/8 SADDLE SUPPORT BRACKET	1
5	1522A00	3 1/8 SADDLE SUPPORT BRACKET	1
4	2365A06	FACE MOUNT KNEE BRACE	2
3	2365A05	FACE MOUNT BOOM BRACKET	2
2	2365A04	FACE MOUNT BOOM BRACKET	2
1	2365A01	MOUNTING LEG CHANNEL	2

TOLERANCES		REVISION RECORD	
REV	APPROVAL	DATE	DATE
X	± .015		
.XX	± .005		
.XXX	± .002		
X/X	± 1/32		
DEG.	± 1/2		
UNLESS OTHERWISE SPECIFIED			
PARTS MADE BY THIS DRAWING		DRAWING NUMBER: 2365A00	
SCALE: 1/16		DATE: 12/17/01	
NAME: OLA		SHEET 1 OF 1	



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

TITLE: BOOM BRACKET ASSEMBLY / FM RADOME
FM10/8 HWS FREQ. 96.5-94.7 CHATEAUGAY, N.Y.

MATERIAL: A

NOTE:

DRAWING
NUMBER: 2365A10

(2) #200-48 HOSE CLAMPS

13.37

6

(4) 1/4-20 X 1.00 HHCS

(4) 1/4 LOCKWASHERS

(4) 1/4-20 HEX HEAD NUTS

5

4

8

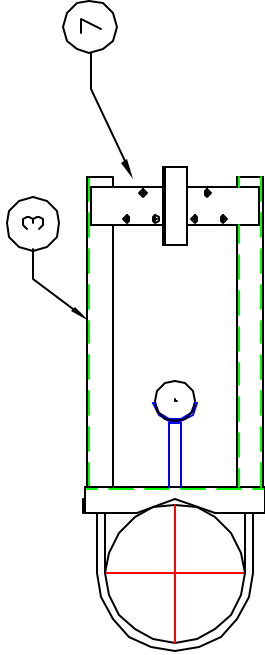
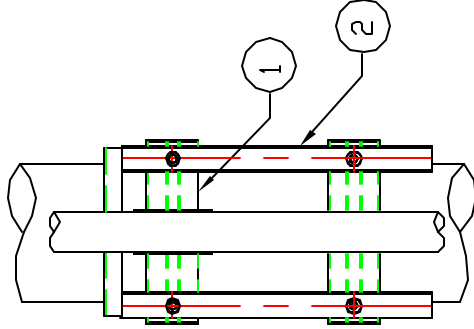
(2) 10.75 X .625 U-BOLTS

(4) 5/8 LOCKWASHERS

(4) 5/8 HEX HEAD NUTS


Ø10.75 SUPPORT MAST

Ø3 1/8



#	DWG #	DESCRIPTION	QTY
9			1
8		10" X 2.0" X 5.0" CHANNEL	1
7	2365A10	SADDLE SUPPORT CHANNEL	1
6	1521A00	1 5/8 SADDLE SUPPORT BRACKET	1
5	1522A00	3 1/8 SADDLE SUPPORT BRACKET	1
4	2365A06	FACE MOUNT KNEE BRACE	2
3	2365A05	FACE MOUNT BOOM BRACKET	2
2	2365A04	FACE MOUNT BOOM BRACKET	2
1	2365A01	MOUNTING LEG CHANNEL	2

TOLERANCES		REVISION RECORD	
REV	APPROVAL	DATE	DATE
X	± .015		
.XX	± .005		
.XXX	± .002		
X/X	± 1/32		
DEG.	± 1/2		
UNLESS OTHERWISE SPECIFIED			
PARTS MADE BY THIS DRAWING		DRAWING NUMBER: 2365A10	
SCALE: 1/16	NAME: OLA	DATE: 12/21/01	SHEET 1 OF 1



SYSTEMS WITH RELIABILITY, INC

619 INDUSTRIAL PARK ROAD

EBENSBURG, PENNSYLVANIA 15931

TITLE: BOOM BRACKET ASSEMBLY

FM10/8 HWS FREQ. 96.5-94.7 CHATEAUGAY, N.Y.

MATERIAL: A

DRAWING
NUMBER:
2365A11

(6) 3/8-16 X 1 3/4 HHCS
(6) 3/8 LOCKWASHERS
(6) 3/8-16 HEX HEAD NUTS

(4) 5/16-18 X 1 1/4 HHCS
(4) 5/16 LOCKWASHERS

—(2) #200-28 HOSE CLAMPS

(6) 1/2-13 X 2.00 HHCS

(6) 1 1/2 LOCK WASHER

(6) 1/2-13 HEX HEAD NUT
PER BRACKET

(8) 1/4-20 X 2.00 HHCS

(8) 1/4 LOCKWASHERS

(8) 1/4-20 HEX HEAD NUTS
PER BRACKET

100 1/4-20 X 1.00 HHCS

(10) 1/4 LOCKWASHERS

105 1/4-20 HEX HEAD NUTS
PER RADOME

1

(4) 1/4-20 X 1.00 HHCS

(4) 1/4 LOCKWASHER:

(4) 1/4-20 HEX HEAD NUTS
PER BRACKET

A

(2) #200-48 HOSE CLAMPS

PER BRACKET

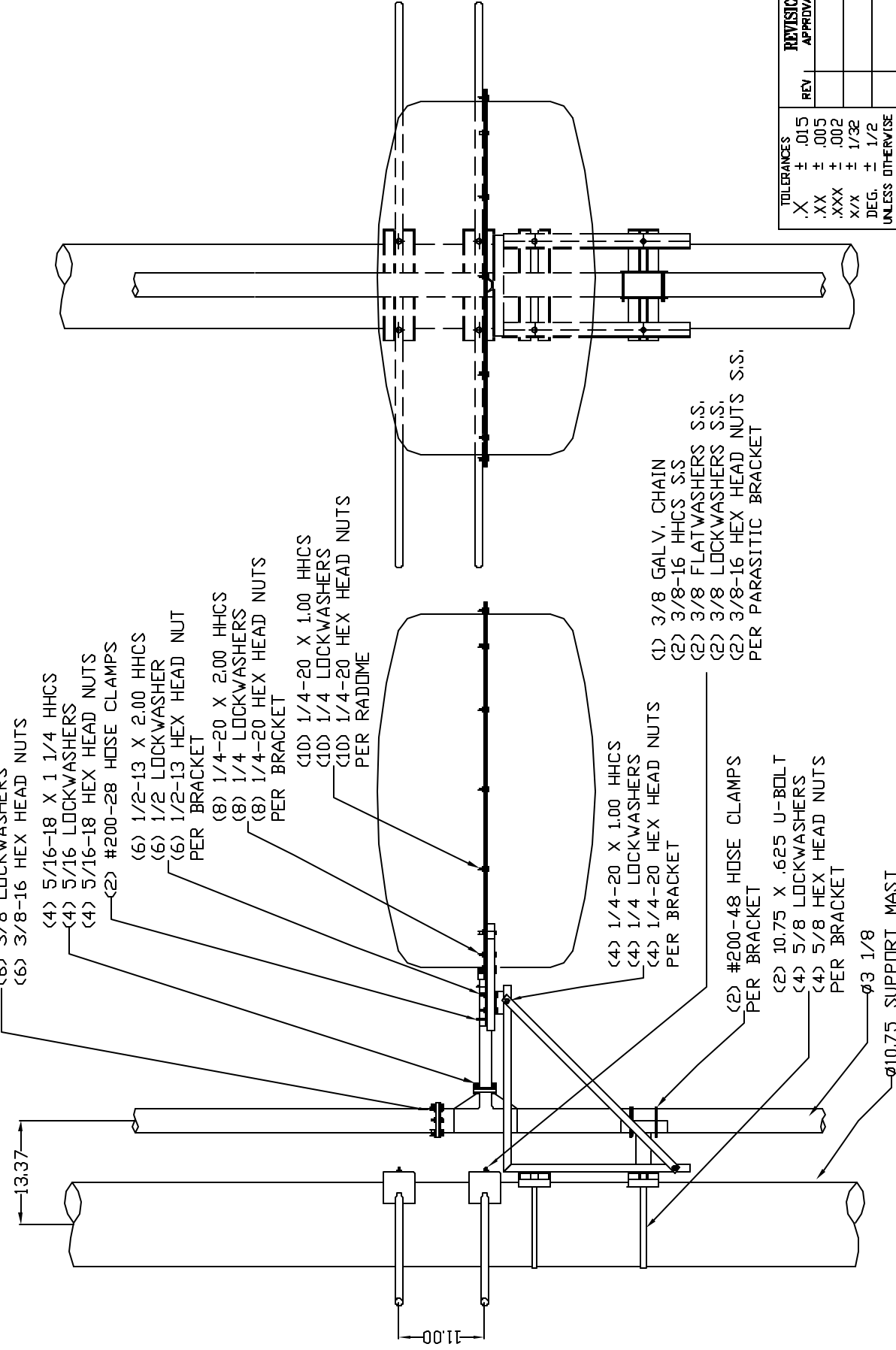
(2) 10.75 X .625 U-BOLT

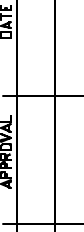
(4) 5/8 LOCKWASHERS

(4) 3/8 HEX PER BRACKET


 $\varnothing 3 \frac{1}{8}$

SUPPORT MAST



		TOLERANCES		REVISION RECORD		
		.X ± .015		REV	APPROVAL	DATE
		.XX ± .005				
		.XXX ± .002				
		X/X ± 1/32				
		DEG. ± 1/2				
		UNLESS OTHERWISE SPECIFIED				
PARTS MADE BY THIS DRAWING			DRAWING NUMBER: 2365A11			
SCALE 1/16	NAME: OLA	DATE: 12/17/01	SHEET 1	OF 1		

TIME	BAYS 1, 3 & 7 ASSEMBLY
FM10/8	HWS FREQ. 96.5-94.7 CHATEAUGAY, N.Y.



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

DRAWING
NUMBER:

13.37

(2) 10.75 X .625 U-BOLTS
(4) 5/8 LOCKWASHERS
(4) 5/8 HEX HEAD NUTS
PER BRACKET

(2) #200-48 HOSE CLAMPS
PER BRACKET

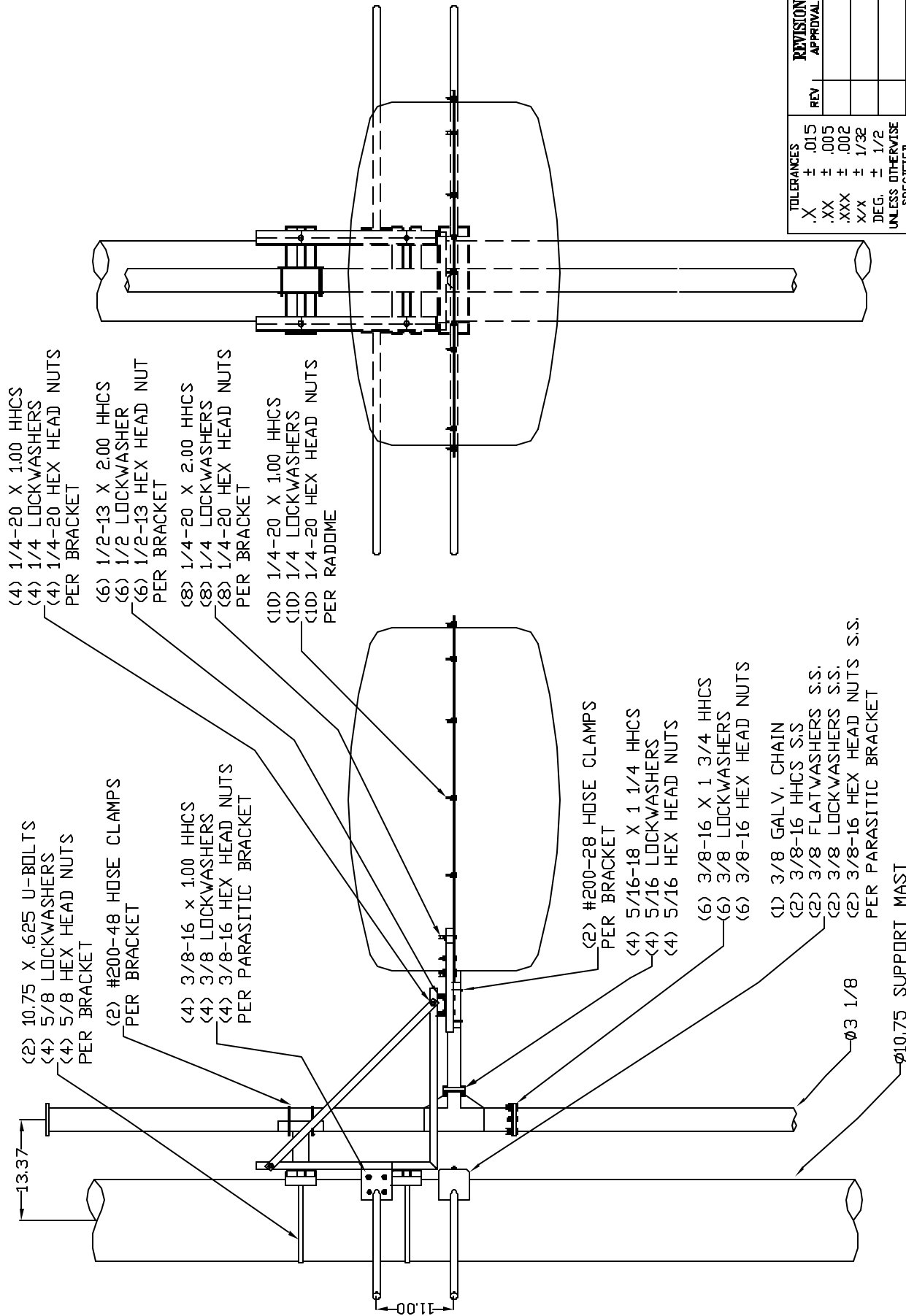
(4) 3/8-16 x 1.00 HHCS
(4) 3/8 LOCKWASHERS
(4) 3/8-16 HEX HEAD NUTS
PER PARASITIC BRACKET

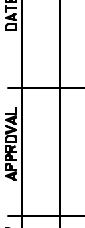
(4) 1/4-20 X 1.00 HHCS
(4) 1/4 LOCKWASHERS
(4) 1/4-20 HEX HEAD NUTS
PER BRACKET

(6) 1/2-13 X 2.00 HHCS
(6) 1/2 LOCKWASHER
(6) 1/2-13 HEX HEAD NUT
PER BRACKET

(8) 1/4-20 X 2.00 HHCS
(8) 1/4 LOCKWASHERS
(8) 1/4-20 HEX HEAD NUTS
PER BRACKET

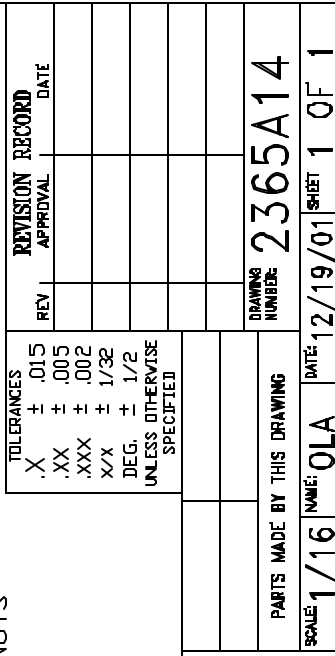
(10) 1/4-20 X 1.00 HHCS
(10) 1/4 LOCKWASHERS
(10) 1/4-20 HEX HEAD NUTS
PER RADOME



	TOLERANCES		REV		REVISION RECORD		DATE	
	.X	± .015						
	.XX	± .005						
	.XXX	± .002						
	X/X	± 1/32						
	DEG.	± 1/2						
UNLESS OTHERWISE SPECIFIED								
PARTS MADE BY THIS DRAWING		DRAWING NUMBER		2365A13				
SCALE: 1/16	NAME: OLA	DATE: 12/19/01		SHEET 1 OF 1				

<p>(2) 3/8-16 HHCS S.S. (2) 3/8 FLATWASHERS S.S. (2) 3/8 LOCKWASHERS S.S. (2) 3/8-16 HEX HEAD NUTS S.S. PER PARASITIC BRACKET</p> <p>SUPPORT MAST</p>	<p>SYSTEMS WITH RELIABILITY, INC 619 INDUSTRIAL PARK ROAD LEBENSBURG, PENNSYLVANIA 15931</p>	<p>SIZE</p>	<p>A</p>
	<p>TITLE:</p>	<p>BAYS 2, 6 & 8 ASSEMBLY</p>	
	<p>MATERIAL:</p>	<p>FM10/8 96.5-94.7, CHATEAUGAY, N.Y.</p>	

DRAWING
NUMBER:
2365A14



FM10/8 HWS FREQ. 96.5-94.7, CHATEAUGAY, N.Y.

375

△

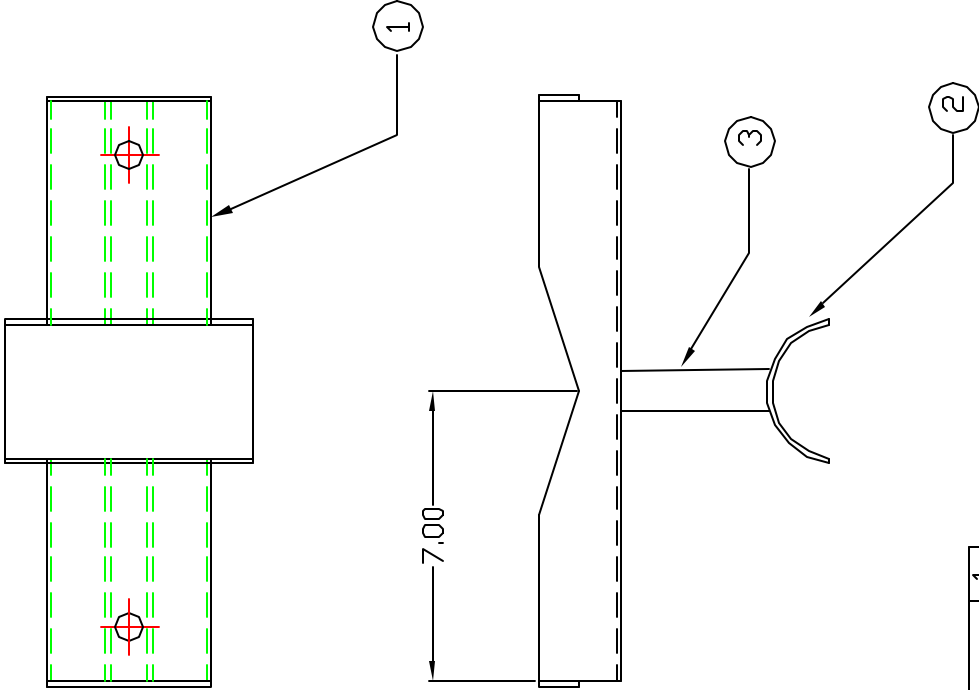
PARIS MADE BY THIS DRAWING

2300414

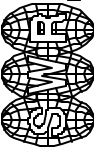
SCALE: 1/16	NAME: OIA	DATE: 12/19/01	SHEET 1 OF 1
-------------	-----------	----------------	--------------

NOTE:

DRAWING
NUMBER: 2365A16



3		1.0" X 2.0" X 3.50" CHANNEL	1
2	1522A00	3 1/8 SADDLE SUPPORT BRACKET	1
1	2365A01	MOUNTING LEG CHANNEL	1
#	DWG #	DESCRIPTION	QTY



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

TITLE:
TUNER BRACKET ASSEMBLY
FM10/8 DA. 96.5-94.7, CHATEAUGAY, N.Y.

MATERIAL:

SIZE

A

PARTS MADE BY THIS DRAWING

SCALE: 1/4 NAME: OLA DATE: 12/21/01 SHEET 1 OF 1

TOLERANCES	
X	± .015
.XX	± .005
.XXX	± .002
X/X	± 1/32
DEG.	± 1/2
UNLESS OTHERWISE SPECIFIED	

REVISION RECORD

REV	APPROVAL	DATE
-----	----------	------

DRAWING
NUMBER: 2365A16

DRAWING
NUMBER: 2105A13

