

**Antenna Model:****TFU-22JTH/VP-R 04**

Proposal Number: **C-71348-2**  
Date: **21-Nov-22**  
Customer: **AETC**  
Location: **Huntsville, AL**

**Electrical Specifications**

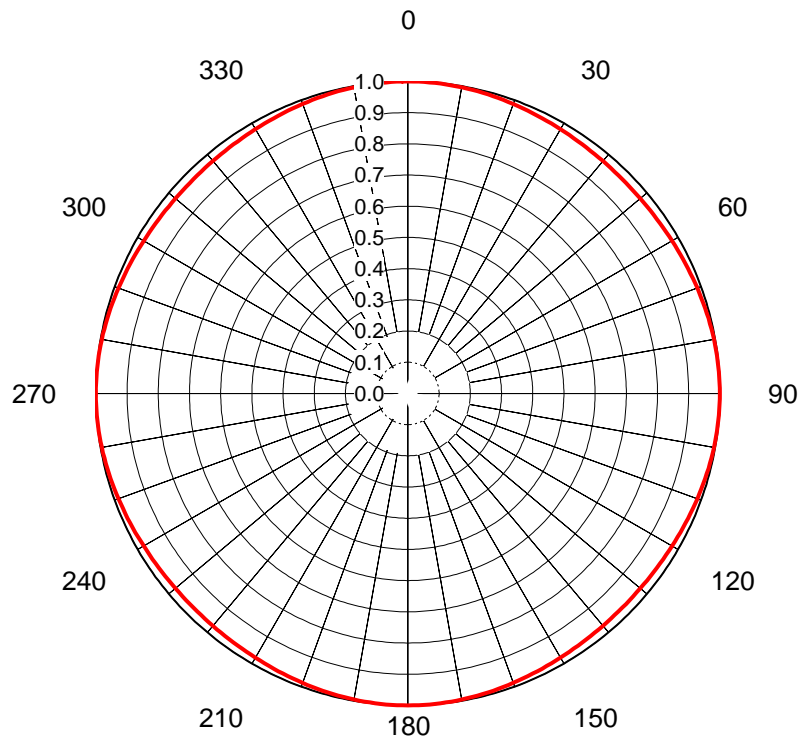
Polarization: **Elliptical**  
Azimuth Pattern: **Omni**  
Antenna Input: **6-1/8"** **75 Ohm** **EIA/DCA**  
VSWR: **Channel** **1.08 : 1**  
Bandwidth: **6 MHz**  
Rated Input Power: **36 kW** **(15.56 dBk)** **Maximum Average Power**

**Mechanical Specifications**

Mounting: **Top Mounted**  
Environmental Protection: **Full Radome**  
Height: **43.5 ft (13.3m)** less Lightning Protector **47.5 ft (14.5m)** with Lightning Protector  
Weight: **3500 lb (1.6t)**  
Effective Projected Area: **44.2 ft² (4.1m²)** **TIA-222-H** Design Ult. Wind Speed: **106 m/h (170.6 km/h)**

**Channel Specifications**

Call	CH	Freq	Hpol ERP	Vpol ERP	TPO	RMS Main Lobe Hpol Gain	RMS Main Lobe Vpol Gain	RMS at Horizontal Hpol Gain	RMS at Horizontal Vpol Gain
WHIQ	24	533 MHz	396 kW (25.98 dBk)	100 kW (20.01 dBk)	27.3 kW (14.36 dBk)	15.96 (12.03dB)	4.04 (6.06dB)	12.11 (10.83dB)	3.06 (4.86dB)

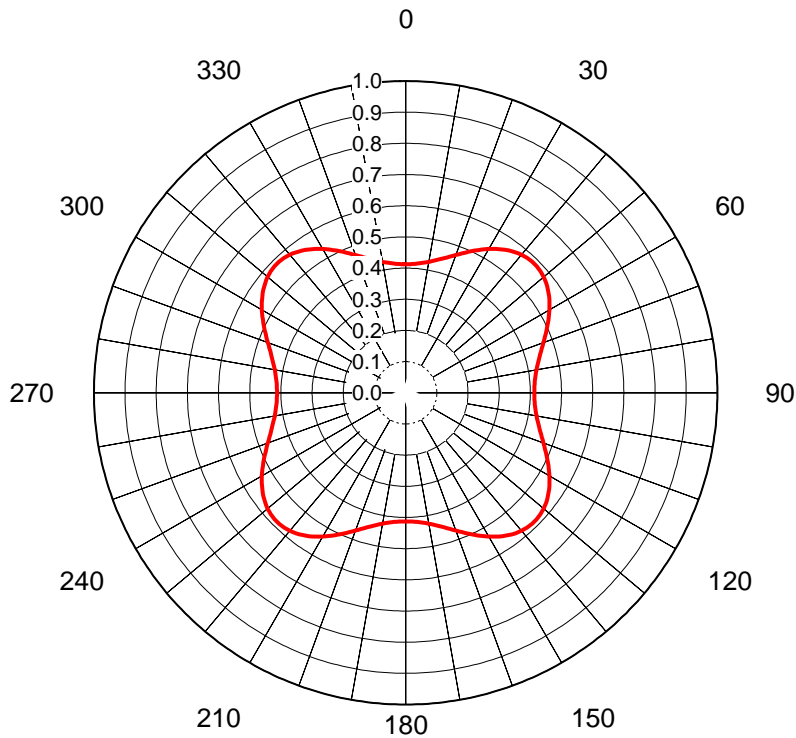


## AZIMUTH PATTERN Horizontal Polarization

Proposal No. **C-71348-2**  
 Date **21-Nov-22**  
 Call Letters **WHIQ**  
 Channel **24**  
 Frequency **533 MHz**  
 Antenna Type **TFU-22JTH/VP-R O4**  
 Gain **1.03 (0.13dB)**  
 Calculated  
 Circularity **+/- 1.0 dB**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	1.000	36	0.974	72	0.989	108	0.989	144	0.974	180	1.000	216	0.974	252	0.989	288	0.989
1	1.000	37	0.973	73	0.990	109	0.988	145	0.974	181	1.000	217	0.973	253	0.990	289	0.988
2	1.000	38	0.973	74	0.991	110	0.987	146	0.975	182	1.000	218	0.973	254	0.991	290	0.987
3	1.000	39	0.973	75	0.992	111	0.986	147	0.976	183	1.000	219	0.973	255	0.992	291	0.986
4	0.999	40	0.972	76	0.993	112	0.985	148	0.976	184	0.999	220	0.972	256	0.993	292	0.985
5	0.999	41	0.972	77	0.994	113	0.984	149	0.977	185	0.999	221	0.972	257	0.994	293	0.984
6	0.999	42	0.972	78	0.995	114	0.983	150	0.978	186	0.999	222	0.972	258	0.995	294	0.983
7	0.998	43	0.972	79	0.996	115	0.982	151	0.979	187	0.998	223	0.972	259	0.996	295	0.982
8	0.998	44	0.972	80	0.996	116	0.981	152	0.980	188	0.998	224	0.972	260	0.996	296	0.981
9	0.997	45	0.972	81	0.997	117	0.980	153	0.980	189	0.997	225	0.972	261	0.997	297	0.980
10	0.996	46	0.972	82	0.998	118	0.980	154	0.981	190	0.996	226	0.972	262	0.998	298	0.980
11	0.996	47	0.972	83	0.998	119	0.979	155	0.982	191	0.996	227	0.972	263	0.998	299	0.979
12	0.995	48	0.972	84	0.999	120	0.978	156	0.983	192	0.995	228	0.972	264	0.999	300	0.978
13	0.994	49	0.972	85	0.999	121	0.977	157	0.984	193	0.994	229	0.972	265	0.999	301	0.977
14	0.993	50	0.972	86	0.999	122	0.976	158	0.985	194	0.993	230	0.972	266	0.999	302	0.976
15	0.992	51	0.973	87	1.000	123	0.976	159	0.986	195	0.992	231	0.973	267	1.000	303	0.976
16	0.991	52	0.973	88	1.000	124	0.975	160	0.987	196	0.991	232	0.973	268	1.000	304	0.975
17	0.990	53	0.973	89	1.000	125	0.974	161	0.988	197	0.990	233	0.973	269	1.000	305	0.974
18	0.989	54	0.974	90	1.000	126	0.974	162	0.989	198	0.989	234	0.974	270	1.000	306	0.974
19	0.988	55	0.974	91	1.000	127	0.973	163	0.990	199	0.988	235	0.974	271	1.000	307	0.973
20	0.987	56	0.975	92	1.000	128	0.973	164	0.991	200	0.987	236	0.975	272	1.000	308	0.973
21	0.986	57	0.976	93	1.000	129	0.973	165	0.992	201	0.986	237	0.976	273	1.000	309	0.973
22	0.985	58	0.976	94	0.999	130	0.972	166	0.993	202	0.985	238	0.976	274	0.999	310	0.972
23	0.984	59	0.977	95	0.999	131	0.972	167	0.994	203	0.984	239	0.977	275	0.999	311	0.972
24	0.983	60	0.978	96	0.999	132	0.972	168	0.995	204	0.983	240	0.978	276	0.999	312	0.972
25	0.982	61	0.979	97	0.998	133	0.972	169	0.996	205	0.982	241	0.979	277	0.998	313	0.972
26	0.981	62	0.980	98	0.998	134	0.972	170	0.996	206	0.981	242	0.980	278	0.998	314	0.972
27	0.980	63	0.980	99	0.997	135	0.972	171	0.997	207	0.980	243	0.980	279	0.997	315	0.972
28	0.980	64	0.981	100	0.996	136	0.972	172	0.998	208	0.980	244	0.981	280	0.996	316	0.972
29	0.979	65	0.982	101	0.996	137	0.972	173	0.998	209	0.979	245	0.982	281	0.996	317	0.972
30	0.978	66	0.983	102	0.995	138	0.972	174	0.999	210	0.978	246	0.983	282	0.995	318	0.972
31	0.977	67	0.984	103	0.994	139	0.972	175	0.999	211	0.977	247	0.984	283	0.994	319	0.972
32	0.976	68	0.985	104	0.993	140	0.972	176	0.999	212	0.976	248	0.985	284	0.993	320	0.972
33	0.976	69	0.986	105	0.992	141	0.973	177	1.000	213	0.976	249	0.986	285	0.992	321	0.973
34	0.975	70	0.987	106	0.991	142	0.973	178	1.000	214	0.975	250	0.987	286	0.991	322	0.973
35	0.974	71	0.988	107	0.990	143	0.973	179	1.000	215	0.974	251	0.988	287	0.990	323	0.973

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## AZIMUTH PATTERN Vertical Polarization

Proposal No. **C-71348-2**  
 Date **21-Nov-22**  
 Call Letters **WHIQ**  
 Channel **24**  
 Frequency **533 MHz**  
 Antenna Type **TFU-22JTH/VP-R O4**  
 Gain **1.39 (1.43dB)**  
 Calculated  
 Circularity **+/- 2.0 dB**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.413	36	0.564	72	0.459	108	0.459	144	0.564	180	0.413	216	0.564	252	0.459	288	0.459
1	0.413	37	0.568	73	0.454	109	0.465	145	0.560	181	0.413	217	0.568	253	0.454	289	0.465
2	0.413	38	0.572	74	0.449	110	0.470	146	0.555	182	0.413	218	0.572	254	0.449	290	0.470
3	0.414	39	0.575	75	0.445	111	0.476	147	0.550	183	0.414	219	0.575	255	0.445	291	0.476
4	0.415	40	0.578	76	0.440	112	0.482	148	0.544	184	0.415	220	0.578	256	0.440	292	0.482
5	0.416	41	0.580	77	0.436	113	0.488	149	0.538	185	0.416	221	0.580	257	0.436	293	0.488
6	0.417	42	0.582	78	0.433	114	0.495	150	0.532	186	0.417	222	0.582	258	0.433	294	0.495
7	0.419	43	0.583	79	0.429	115	0.501	151	0.526	187	0.419	223	0.583	259	0.429	295	0.501
8	0.421	44	0.584	80	0.426	116	0.507	152	0.520	188	0.421	224	0.584	260	0.426	296	0.507
9	0.424	45	0.584	81	0.424	117	0.514	153	0.514	189	0.424	225	0.584	261	0.424	297	0.514
10	0.426	46	0.584	82	0.421	118	0.520	154	0.507	190	0.426	226	0.584	262	0.421	298	0.520
11	0.429	47	0.583	83	0.419	119	0.526	155	0.501	191	0.429	227	0.583	263	0.419	299	0.526
12	0.433	48	0.582	84	0.417	120	0.532	156	0.495	192	0.433	228	0.582	264	0.417	300	0.532
13	0.436	49	0.580	85	0.416	121	0.538	157	0.488	193	0.436	229	0.580	265	0.416	301	0.538
14	0.440	50	0.578	86	0.415	122	0.544	158	0.482	194	0.440	230	0.578	266	0.415	302	0.544
15	0.445	51	0.575	87	0.414	123	0.550	159	0.476	195	0.445	231	0.575	267	0.414	303	0.550
16	0.449	52	0.572	88	0.413	124	0.555	160	0.470	196	0.449	232	0.572	268	0.413	304	0.555
17	0.454	53	0.568	89	0.413	125	0.560	161	0.465	197	0.454	233	0.568	269	0.413	305	0.560
18	0.459	54	0.564	90	0.413	126	0.564	162	0.459	198	0.459	234	0.564	270	0.413	306	0.564
19	0.465	55	0.560	91	0.413	127	0.568	163	0.454	199	0.465	235	0.560	271	0.413	307	0.568
20	0.470	56	0.555	92	0.413	128	0.572	164	0.449	200	0.470	236	0.555	272	0.413	308	0.572
21	0.476	57	0.550	93	0.414	129	0.575	165	0.445	201	0.476	237	0.550	273	0.414	309	0.575
22	0.482	58	0.544	94	0.415	130	0.578	166	0.440	202	0.482	238	0.544	274	0.415	310	0.578
23	0.488	59	0.538	95	0.416	131	0.580	167	0.436	203	0.488	239	0.538	275	0.416	311	0.580
24	0.495	60	0.532	96	0.417	132	0.582	168	0.433	204	0.495	240	0.532	276	0.417	312	0.582
25	0.501	61	0.526	97	0.419	133	0.583	169	0.429	205	0.501	241	0.526	277	0.419	313	0.583
26	0.507	62	0.520	98	0.421	134	0.584	170	0.426	206	0.507	242	0.520	278	0.421	314	0.584
27	0.514	63	0.514	99	0.424	135	0.584	171	0.424	207	0.514	243	0.514	279	0.424	315	0.584
28	0.520	64	0.507	100	0.426	136	0.584	172	0.421	208	0.520	244	0.507	280	0.426	316	0.584
29	0.526	65	0.501	101	0.429	137	0.583	173	0.419	209	0.526	245	0.501	281	0.429	317	0.583
30	0.532	66	0.495	102	0.433	138	0.582	174	0.417	210	0.532	246	0.495	282	0.433	318	0.582
31	0.538	67	0.488	103	0.436	139	0.580	175	0.416	211	0.538	247	0.488	283	0.436	319	0.580
32	0.544	68	0.482	104	0.440	140	0.578	176	0.415	212	0.544	248	0.482	284	0.440	320	0.578
33	0.550	69	0.476	105	0.445	141	0.575	177	0.414	213	0.550	249	0.476	285	0.445	321	0.575
34	0.555	70	0.470	106	0.449	142	0.572	178	0.413	214	0.555	250	0.470	286	0.449	322	0.572
35	0.560	71	0.465	107	0.454	143	0.568	179	0.413	215	0.560	251	0.465	287	0.454	323	0.568

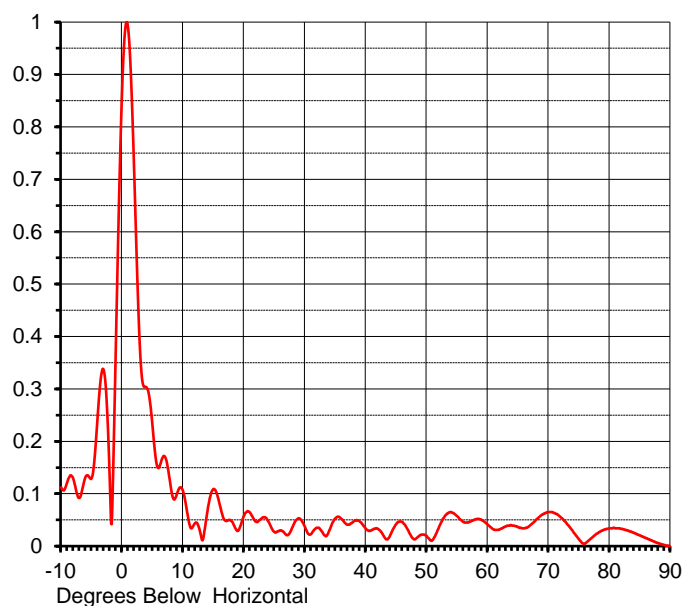
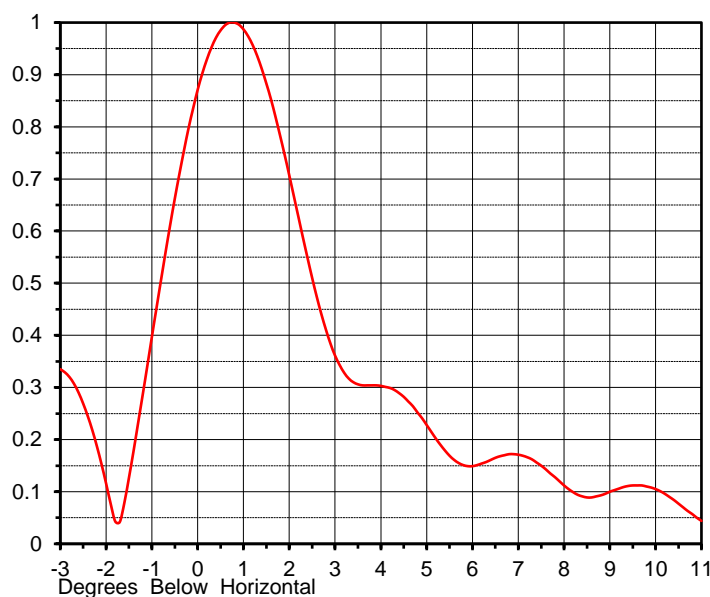
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## ELEVATION PATTERN

Proposal No. **C-71348-2**  
 Date **21-Nov-22**  
 Call Letters **WHIQ**  
 Channel **24**  
 Frequency **533 MHz**  
 Antenna Type **TFU-22JTH/VP-R 04**

RMS Directivity at Main Lobe **20.0 ( 13.01 dB )**  
 RMS Directivity at Horizontal **15.2 ( 11.82 dB )**  
**Calculated**

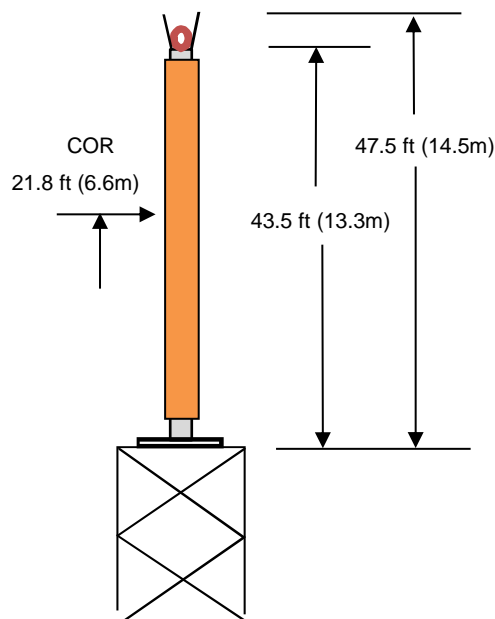
Beam Tilt **0.75 deg**  
 Pattern Number **22J200075**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.112	10.0	0.105	30.0	0.037	50.0	0.019	70.0	0.065
-9.0	0.122	11.0	0.044	31.0	0.023	51.0	0.012	71.0	0.063
-8.0	0.128	12.0	0.044	32.0	0.035	52.0	0.036	72.0	0.055
-7.0	0.092	13.0	0.017	33.0	0.024	53.0	0.058	73.0	0.043
-6.0	0.132	14.0	0.066	34.0	0.030	54.0	0.065	74.0	0.028
-5.0	0.130	15.0	0.109	35.0	0.053	55.0	0.057	75.0	0.013
-4.0	0.250	16.0	0.080	36.0	0.052	56.0	0.046	76.0	0.005
-3.0	0.335	17.0	0.048	37.0	0.041	57.0	0.046	77.0	0.015
-2.0	0.116	18.0	0.047	38.0	0.047	58.0	0.051	78.0	0.024
-1.0	0.397	19.0	0.029	39.0	0.047	59.0	0.050	79.0	0.031
0.0	0.871	20.0	0.058	40.0	0.033	60.0	0.041	80.0	0.034
1.0	0.987	21.0	0.064	41.0	0.031	61.0	0.032	81.0	0.034
2.0	0.707	22.0	0.047	42.0	0.033	62.0	0.032	82.0	0.033
3.0	0.361	23.0	0.054	43.0	0.018	63.0	0.038	83.0	0.030
4.0	0.303	24.0	0.047	44.0	0.021	64.0	0.039	84.0	0.025
5.0	0.228	25.0	0.027	45.0	0.042	65.0	0.036	85.0	0.020
6.0	0.149	26.0	0.030	46.0	0.046	66.0	0.034	86.0	0.015
7.0	0.171	27.0	0.021	47.0	0.029	67.0	0.040	87.0	0.010
8.0	0.112	28.0	0.037	48.0	0.013	68.0	0.051	88.0	0.006
9.0	0.100	29.0	0.053	49.0	0.021	69.0	0.060	89.0	0.002
								90.0	0.000

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## MECHANICAL SPECIFICATIONS



Proposal No. **C-71348-2**  
 Date **21-Nov-22**  
 Call Letters **WHIQ**  
 Channel **24**  
 Frequency **533 MHz**  
 Antenna Type **TFU-22JTH/VP-R O4**

### Preliminary Specifications

#### Top Mounted

#### With ice TIA-222-H

Height AGL(z) 289.5 ft (88.2 m)  
 Design Ult. Wind Speed 106 m/h (170.6 km/h)

Risk Category II  
 Exposure Category B  
 Topography Category 1

Design Ice 1 in  $t_{iz} = 1.25$  in  
 Wind Speed w/Ice 30 m/h (48.3 km/h)

#### Mechanical Specifications

		without ice	with ice
Height with Lightning Protector	H4	47.5 ft (14.5m)	
Height less Lightning Protector	H2	43.5 ft (13.3m)	
Height of Center of Radiation	H3	21.8 ft (6.6m)	
Effective Projected Area	(EPA) <sub>S</sub>	44.2 ft <sup>2</sup> (4.1m <sup>2</sup> )	103.7 ft <sup>2</sup> (9.6m <sup>2</sup> )
Moment Arm	D1	22.6 ft (6.9m)	22.9 ft (7m)

Weight W 3500 lb (1.6t) 4900 lb (2.2t)

Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA-222-H

Prepared by: JBC Date: 11-Jun-19 ME: EE:  
 Rev. No.2 by: SPJC Date: 21-Nov-22

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## Summary

Proposal No.	<b>C-71348-2</b>
Date	<b>21-Nov-22</b>
Call Letters	<b>WHIQ</b>
Channel	<b>24</b>
Frequency	<b>533 MHz</b>
Antenna Type	<b>TFU-22JTH/VP-R O4</b>

## Antenna

	Hpol		Vpol	
ERP:	<b>396 kW</b>	<b>( 25.98 dBk )</b>	<b>100 kW</b>	<b>( 20.01 dBk )</b>
RMS Gain*	15.96	( 12.03 dB )	4.04	( 6.06 dB )

<b>Antenna Input Power</b>	<b>24.8 kW</b>	<b>( 13.95 dBk )</b>
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## Transmission Line

Type:	<b>Rigid</b>	Attenuation:	<b>( 0.41 dB )</b>	
Size:	<b>6-1/8"</b>	Efficiency:	<b>91.0%</b>	
Impedance:	<b>75 Ohm</b>			
Length:	<b>365 ft</b>	<b>111.3 m</b>		

## Transmitter Output

<b>27.3 kW</b>	<b>( 14.36 dBk )</b>
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Transmitter filter losses not included

\* Directivity and Gain are with respect to half wave dipole. The gain includes feed system losses

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