



Antenna Model: **TFU-31JTH/VP-R O4 (SP)**

Proposal Number: **C-70677-2**
Date: **26-Jun-17**
Customer: **WNEO**
Location: **Alliance, OH**

Electrical Specifications

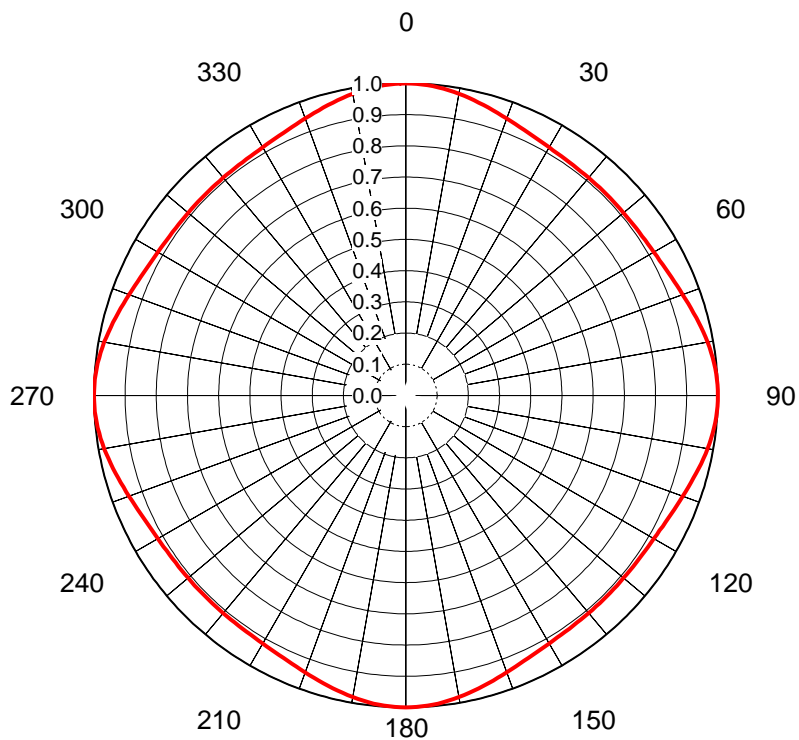
Polarization: **Elliptical**
Azimuth Pattern: **Omni**
Antenna Input: **6-1/8"** **75 Ohm** **EIA/DCA**
VSWR: **Channel** **1.08 : 1**
Bandwidth: **6 MHz**
Rated Input Power: **57 kW** **(17.56 dBk)** **Maximum Average Power**

Mechanical Specifications

Mounting: **Top Mounted**
Environmental Protection: **Full Radome**
Height: **58.75 ft (17.9m)** less Lightning Protector **62.75 ft (19.1m)** with Lightning Protector
Weight: **8300 lb (3.8t)**
Effective Projected Area: **66.4 ft² (6.2m²)** **TIA-222-G** Basic Wind Speed: **90 m/h (144.8 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
WNEO	29	563 MHz	365 kW (25.62 dBk)	120 kW (20.81 dBk)	17.5 kW (12.43 dBk)	24.44 (13.88dB)	8.06 (9.07dB)	19.01 (12.79dB)	6.27 (7.97dB)



AZIMUTH PATTERN

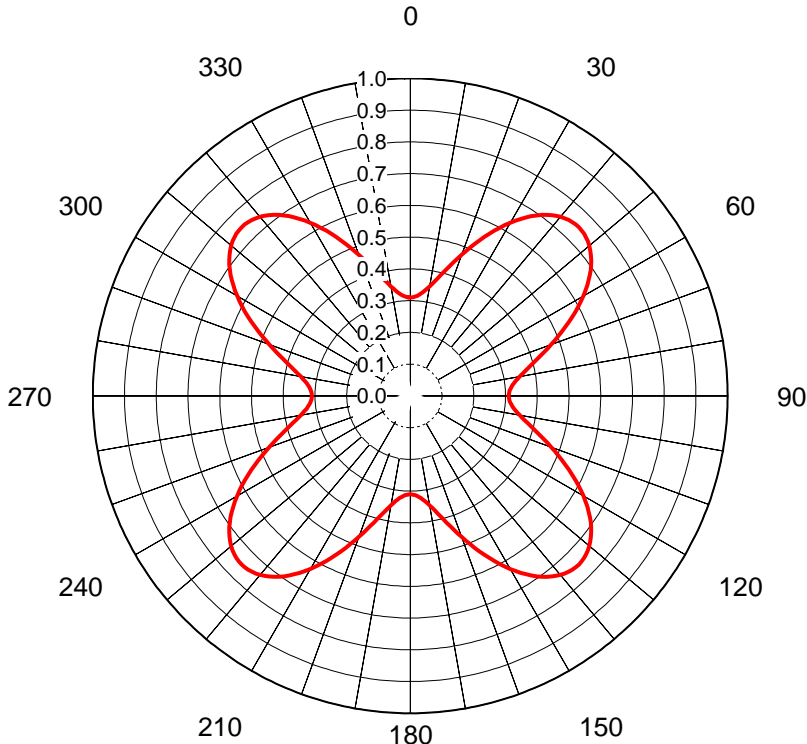
Horizontal Polarization

Proposal No.	C-70677-2
Date	26-Jun-17
Call Letters	WNEO
Channel	29
Frequency	563 MHz
Antenna Type	TFU-31JTH/VP-R O4 (SP)
Gain	1.12 (0.48dB)
	Calculated
Circularity	+/- 1.0 dB

Row	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13	Col 14	Col 15	Col 16	Col 17	Col 18	
0	1.000	36	0.912	72	0.952	108	0.952	144	0.912	180	1.000	216	0.912	252	0.952	288	0.952	324	0.912
1	1.000	37	0.912	73	0.956	109	0.948	145	0.913	181	1.000	217	0.912	253	0.956	289	0.948	325	0.913
2	0.999	38	0.911	74	0.960	110	0.944	146	0.913	182	0.999	218	0.911	254	0.960	290	0.944	326	0.913
3	0.998	39	0.911	75	0.963	111	0.941	147	0.914	183	0.998	219	0.911	255	0.963	291	0.941	327	0.914
4	0.997	40	0.911	76	0.967	112	0.938	148	0.915	184	0.997	220	0.911	256	0.967	292	0.938	328	0.915
5	0.995	41	0.911	77	0.971	113	0.934	149	0.917	185	0.995	221	0.911	257	0.971	293	0.934	329	0.917
6	0.993	42	0.911	78	0.975	114	0.931	150	0.918	186	0.993	222	0.911	258	0.975	294	0.931	330	0.918
7	0.991	43	0.911	79	0.978	115	0.929	151	0.920	187	0.991	223	0.910	259	0.978	295	0.929	331	0.920
8	0.988	44	0.910	80	0.982	116	0.926	152	0.922	188	0.988	224	0.910	260	0.982	296	0.926	332	0.922
9	0.985	45	0.910	81	0.985	117	0.924	153	0.924	189	0.985	225	0.910	261	0.985	297	0.924	333	0.924
10	0.982	46	0.910	82	0.988	118	0.922	154	0.926	190	0.982	226	0.910	262	0.988	298	0.922	334	0.926
11	0.978	47	0.911	83	0.991	119	0.920	155	0.929	191	0.978	227	0.910	263	0.991	299	0.920	335	0.929
12	0.975	48	0.911	84	0.993	120	0.918	156	0.931	192	0.975	228	0.911	264	0.993	300	0.918	336	0.931
13	0.971	49	0.911	85	0.995	121	0.917	157	0.934	193	0.971	229	0.911	265	0.995	301	0.917	337	0.934
14	0.967	50	0.911	86	0.997	122	0.915	158	0.938	194	0.967	230	0.911	266	0.997	302	0.915	338	0.938
15	0.963	51	0.911	87	0.998	123	0.914	159	0.941	195	0.963	231	0.911	267	0.998	303	0.914	339	0.941
16	0.960	52	0.911	88	0.999	124	0.913	160	0.944	196	0.960	232	0.911	268	0.999	304	0.913	340	0.944
17	0.956	53	0.912	89	1.000	125	0.913	161	0.948	197	0.956	233	0.912	269	1.000	305	0.913	341	0.948
18	0.952	54	0.912	90	1.000	126	0.912	162	0.952	198	0.952	234	0.912	270	1.000	306	0.912	342	0.952
19	0.948	55	0.913	91	1.000	127	0.912	163	0.956	199	0.948	235	0.913	271	1.000	307	0.912	343	0.956
20	0.944	56	0.913	92	0.999	128	0.911	164	0.960	200	0.944	236	0.913	272	0.999	308	0.911	344	0.960
21	0.941	57	0.914	93	0.998	129	0.911	165	0.963	201	0.941	237	0.914	273	0.998	309	0.911	345	0.963
22	0.938	58	0.915	94	0.997	130	0.911	166	0.967	202	0.938	238	0.915	274	0.997	310	0.911	346	0.967
23	0.934	59	0.917	95	0.995	131	0.911	167	0.971	203	0.934	239	0.917	275	0.995	311	0.911	347	0.971
24	0.931	60	0.918	96	0.993	132	0.911	168	0.975	204	0.931	240	0.918	276	0.993	312	0.911	348	0.975
25	0.929	61	0.920	97	0.991	133	0.910	169	0.978	205	0.929	241	0.920	277	0.991	313	0.910	349	0.978
26	0.926	62	0.922	98	0.988	134	0.910	170	0.982	206	0.926	242	0.922	278	0.988	314	0.910	350	0.982
27	0.924	63	0.924	99	0.985	135	0.910	171	0.985	207	0.924	243	0.924	279	0.985	315	0.910	351	0.985
28	0.922	64	0.926	100	0.982	136	0.910	172	0.988	208	0.922	244	0.926	280	0.982	316	0.910	352	0.988
29	0.920	65	0.929	101	0.978	137	0.910	173	0.991	209	0.920	245	0.929	281	0.978	317	0.911	353	0.991
30	0.918	66	0.931	102	0.975	138	0.911	174	0.993	210	0.918	246	0.931	282	0.975	318	0.911	354	0.993
31	0.917	67	0.934	103	0.971	139	0.911	175	0.995	211	0.917	247	0.934	283	0.971	319	0.911	355	0.995
32	0.915	68	0.938	104	0.967	140	0.911	176	0.997	212	0.915	248	0.938	284	0.967	320	0.911	356	0.997
33	0.914	69	0.941	105	0.963	141	0.911	177	0.998	213	0.914	249	0.941	285	0.963	321	0.911	357	0.998
34	0.913	70	0.944	106	0.960	142	0.911	178	0.999	214	0.913	250	0.944	286	0.960	322	0.911	358	0.999
35	0.913	71	0.948	107	0.956	143	0.912	179	1.000	215	0.913	251	0.948	287	0.956	323	0.912	359	1.000

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AZIMUTH PATTERN Vertical Polarization



Proposal No. **C-70677-2**
 Date **26-Jun-17**
 Call Letters **WNEO**
 Channel **29**
 Frequency **563 MHz**
 Antenna Type **TFU-31JTH/VP-R O4 (SP)**
 Gain **1.91 (2.8dB)**
 Calculated
 Circularity **+/- 4.0 dB**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.310	36	0.704	72	0.443	108	0.443	144	0.704	180	0.310	216	0.704	252	0.443	288	0.443	324	0.704
1	0.310	37	0.714	73	0.429	109	0.458	145	0.694	181	0.310	217	0.714	253	0.429	289	0.458	325	0.694
2	0.312	38	0.722	74	0.415	110	0.473	146	0.683	182	0.312	218	0.722	254	0.415	290	0.473	326	0.683
3	0.314	39	0.730	75	0.402	111	0.488	147	0.670	183	0.314	219	0.730	255	0.402	291	0.488	327	0.670
4	0.316	40	0.736	76	0.390	112	0.504	148	0.658	184	0.316	220	0.736	256	0.390	292	0.504	328	0.658
5	0.320	41	0.742	77	0.379	113	0.520	149	0.644	185	0.320	221	0.742	257	0.379	293	0.520	329	0.644
6	0.324	42	0.746	78	0.368	114	0.536	150	0.630	186	0.324	222	0.746	258	0.368	294	0.536	330	0.630
7	0.329	43	0.749	79	0.359	115	0.552	151	0.615	187	0.329	223	0.749	259	0.359	295	0.552	331	0.615
8	0.335	44	0.751	80	0.350	116	0.568	152	0.600	188	0.335	224	0.751	260	0.350	296	0.568	332	0.600
9	0.342	45	0.751	81	0.342	117	0.584	153	0.584	189	0.342	225	0.751	261	0.342	297	0.584	333	0.584
10	0.350	46	0.751	82	0.335	118	0.600	154	0.568	190	0.350	226	0.751	262	0.335	298	0.600	334	0.568
11	0.359	47	0.749	83	0.329	119	0.615	155	0.552	191	0.359	227	0.749	263	0.329	299	0.615	335	0.552
12	0.368	48	0.746	84	0.324	120	0.630	156	0.536	192	0.368	228	0.746	264	0.324	300	0.630	336	0.536
13	0.379	49	0.742	85	0.320	121	0.644	157	0.520	193	0.379	229	0.742	265	0.320	301	0.644	337	0.520
14	0.390	50	0.736	86	0.316	122	0.658	158	0.504	194	0.390	230	0.736	266	0.316	302	0.658	338	0.504
15	0.402	51	0.730	87	0.314	123	0.670	159	0.488	195	0.402	231	0.730	267	0.314	303	0.670	339	0.488
16	0.415	52	0.722	88	0.312	124	0.683	160	0.473	196	0.415	232	0.722	268	0.312	304	0.683	340	0.473
17	0.429	53	0.714	89	0.310	125	0.694	161	0.458	197	0.429	233	0.714	269	0.310	305	0.694	341	0.458
18	0.443	54	0.704	90	0.310	126	0.704	162	0.443	198	0.443	234	0.704	270	0.310	306	0.704	342	0.443
19	0.458	55	0.694	91	0.310	127	0.714	163	0.429	199	0.458	235	0.694	271	0.310	307	0.714	343	0.429
20	0.473	56	0.683	92	0.312	128	0.722	164	0.415	200	0.473	236	0.683	272	0.312	308	0.722	344	0.415
21	0.488	57	0.670	93	0.314	129	0.730	165	0.402	201	0.488	237	0.670	273	0.314	309	0.730	345	0.402
22	0.504	58	0.658	94	0.316	130	0.736	166	0.390	202	0.504	238	0.658	274	0.316	310	0.736	346	0.390
23	0.520	59	0.644	95	0.320	131	0.742	167	0.379	203	0.520	239	0.644	275	0.320	311	0.742	347	0.379
24	0.536	60	0.630	96	0.324	132	0.746	168	0.368	204	0.536	240	0.630	276	0.324	312	0.746	348	0.368
25	0.552	61	0.615	97	0.329	133	0.749	169	0.359	205	0.552	241	0.615	277	0.329	313	0.749	349	0.359
26	0.568	62	0.600	98	0.335	134	0.751	170	0.350	206	0.568	242	0.600	278	0.335	314	0.751	350	0.350
27	0.584	63	0.584	99	0.342	135	0.751	171	0.342	207	0.584	243	0.584	279	0.342	315	0.751	351	0.342
28	0.600	64	0.568	100	0.350	136	0.751	172	0.335	208	0.600	244	0.568	280	0.350	316	0.751	352	0.335
29	0.615	65	0.552	101	0.359	137	0.749	173	0.329	209	0.615	245	0.552	281	0.359	317	0.749	353	0.329
30	0.630	66	0.536	102	0.368	138	0.746	174	0.324	210	0.630	246	0.536	282	0.368	318	0.746	354	0.324
31	0.644	67	0.520	103	0.379	139	0.742	175	0.320	211	0.644	247	0.520	283	0.379	319	0.742	355	0.320
32	0.658	68	0.504	104	0.390	140	0.736	176	0.316	212	0.658	248	0.504	284	0.390	320	0.736	356	0.316
33	0.670	69	0.488	105	0.402	141	0.730	177	0.314	213	0.670	249	0.488	285	0.402	321	0.730	357	0.314
34	0.683	70	0.473	106	0.415	142	0.722	178	0.312	214	0.683	250	0.473	286	0.415	322	0.722	358	0.312
35	0.694	71	0.458	107	0.429	143	0.714	179	0.310	215	0.694	251	0.458	287	0.429	323	0.714	359	0.310

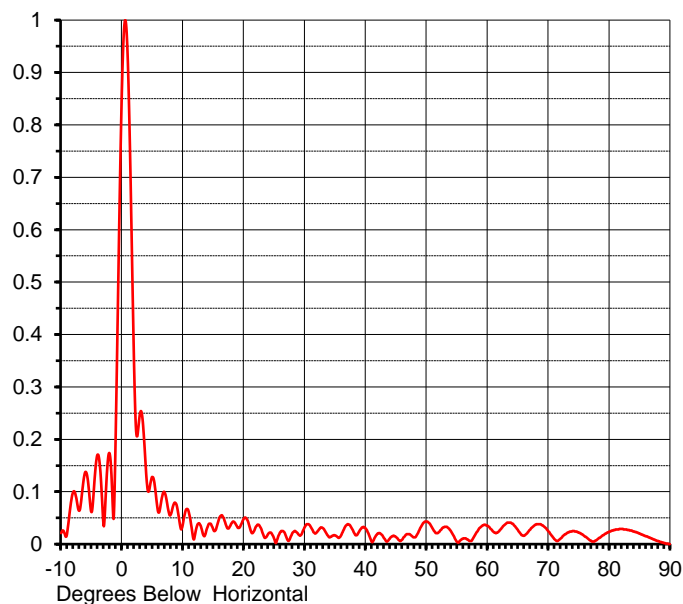
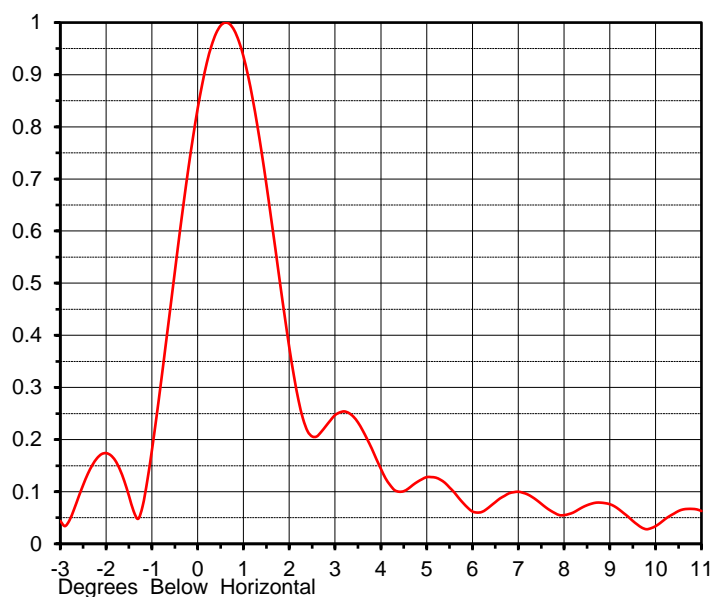
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ELEVATION PATTERN

Proposal No. **C-70677-2**
 Date **26-Jun-17**
 Call Letters **WNEO**
 Channel **29**
 Frequency **563 MHz**
 Antenna Type **TFU-31JTH/VP-R O4 (SP)**

RMS Directivity at Main Lobe **32.5 (15.12 dB)**
 RMS Directivity at Horizontal **25.3 (14.03 dB)**
Calculated

Beam Tilt **0.50 deg**
 Pattern Number **31J325050**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.021	10.0	0.040	30.0	0.033	50.0	0.043	70.0	0.024
-9.0	0.023	11.0	0.058	31.0	0.032	51.0	0.029	71.0	0.009
-8.0	0.100	12.0	0.020	32.0	0.023	52.0	0.023	72.0	0.011
-7.0	0.064	13.0	0.031	33.0	0.030	53.0	0.033	73.0	0.021
-6.0	0.138	14.0	0.032	34.0	0.013	54.0	0.024	74.0	0.025
-5.0	0.061	15.0	0.027	35.0	0.016	55.0	0.004	75.0	0.022
-4.0	0.171	16.0	0.051	36.0	0.018	56.0	0.011	76.0	0.014
-3.0	0.034	17.0	0.038	37.0	0.038	57.0	0.006	77.0	0.006
-2.0	0.170	18.0	0.040	38.0	0.023	58.0	0.019	78.0	0.009
-1.0	0.243	19.0	0.031	39.0	0.026	59.0	0.034	79.0	0.017
0.0	0.882	20.0	0.049	40.0	0.029	60.0	0.035	80.0	0.024
1.0	0.898	21.0	0.030	41.0	0.004	61.0	0.023	81.0	0.028
2.0	0.323	22.0	0.034	42.0	0.020	62.0	0.027	82.0	0.029
3.0	0.252	23.0	0.023	43.0	0.011	63.0	0.039	83.0	0.027
4.0	0.126	24.0	0.020	44.0	0.012	64.0	0.039	84.0	0.024
5.0	0.128	25.0	0.009	45.0	0.013	65.0	0.026	85.0	0.020
6.0	0.060	26.0	0.023	46.0	0.009	66.0	0.016	86.0	0.015
7.0	0.098	27.0	0.012	47.0	0.019	67.0	0.028	87.0	0.010
8.0	0.057	28.0	0.022	48.0	0.013	68.0	0.038	88.0	0.006
9.0	0.072	29.0	0.018	49.0	0.032	69.0	0.036	89.0	0.002
								90.0	0.000

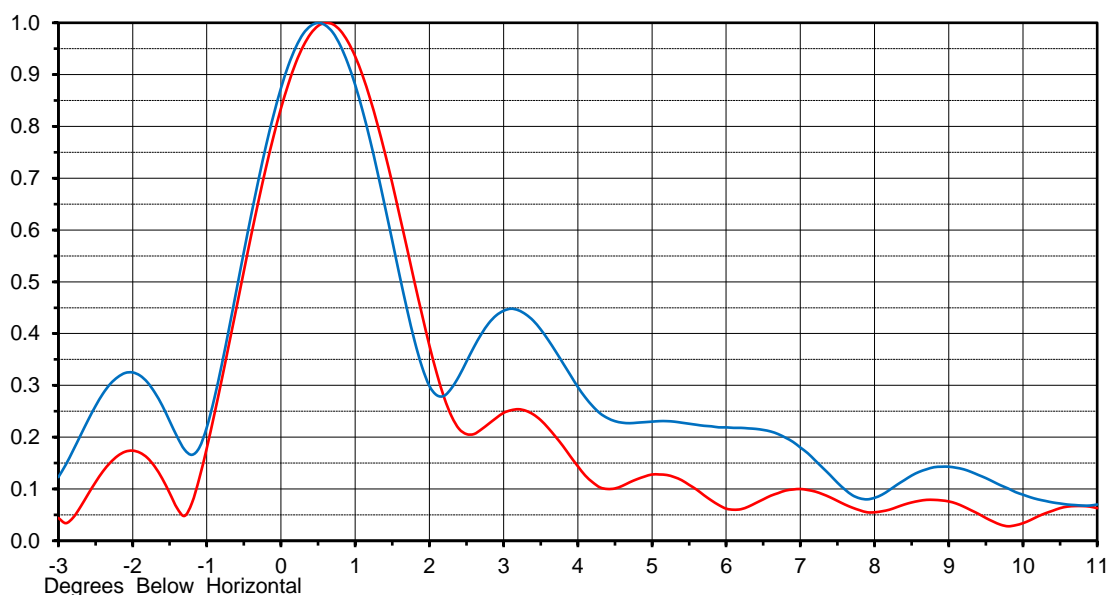
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***FutureFill** refers to broadband panels or limited bandwidth slotted coaxial antennas that can be modified in the field to provide the flexibility to customize the null structure at a future date.*

FutureFill OVERLAY

Proposal No. **C-70677-2**
 Date **26-Jun-17**
 Call Letters **WNEO**
 Channel **29**
 Frequency **563 MHz**
 Antenna Type **TFU-31JTH/VP-R O4 (SP)**

RMS Directivity 32.5 **(15.12dB)** Beam Tilt 0.50 Pattern No. 31J325050 **Red**
 RMS Directivity 23.4 **(13.69dB)** Beam Tilt 0.50 Pattern No. 31J320050-FF **Blue**
 Calculated



Tabulations for 31J320050-FF

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.111	10.0	0.089	30.0	0.038	50.0	0.026	70.0	0.028
-9.0	0.164	11.0	0.070	31.0	0.042	51.0	0.028	71.0	0.020
-8.0	0.242	12.0	0.141	32.0	0.035	52.0	0.067	72.0	0.030
-7.0	0.114	13.0	0.151	33.0	0.033	53.0	0.091	73.0	0.041
-6.0	0.076	14.0	0.094	34.0	0.007	54.0	0.085	74.0	0.045
-5.0	0.090	15.0	0.115	35.0	0.029	55.0	0.061	75.0	0.043
-4.0	0.203	16.0	0.148	36.0	0.011	56.0	0.046	76.0	0.034
-3.0	0.123	17.0	0.098	37.0	0.008	57.0	0.055	77.0	0.024
-2.0	0.325	18.0	0.042	38.0	0.025	58.0	0.076	78.0	0.016
-1.0	0.219	19.0	0.041	39.0	0.070	59.0	0.089	79.0	0.016
0.0	0.874	20.0	0.044	40.0	0.080	60.0	0.082	80.0	0.021
1.0	0.880	21.0	0.027	41.0	0.053	61.0	0.053	81.0	0.025
2.0	0.299	22.0	0.081	42.0	0.041	62.0	0.018	82.0	0.027
3.0	0.444	23.0	0.074	43.0	0.053	63.0	0.016	83.0	0.026
4.0	0.297	24.0	0.031	44.0	0.066	64.0	0.024	84.0	0.023
5.0	0.230	25.0	0.025	45.0	0.061	65.0	0.020	85.0	0.019
6.0	0.219	26.0	0.053	46.0	0.050	66.0	0.025	86.0	0.015
7.0	0.180	27.0	0.031	47.0	0.054	67.0	0.039	87.0	0.010
8.0	0.083	28.0	0.013	48.0	0.047	68.0	0.046	88.0	0.006
9.0	0.143	29.0	0.014	49.0	0.036	69.0	0.041	89.0	0.002
								90.0	0.000

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MECHANICAL SPECIFICATIONS

Proposal No. **C-70677-2**
 Date **26-Jun-17**
 Call Letters **WNEO**
 Channel **29**
 Frequency **563 MHz**
 Antenna Type **TFU-31JTH/VP-R O4 (SP)**

Preliminary Specifications

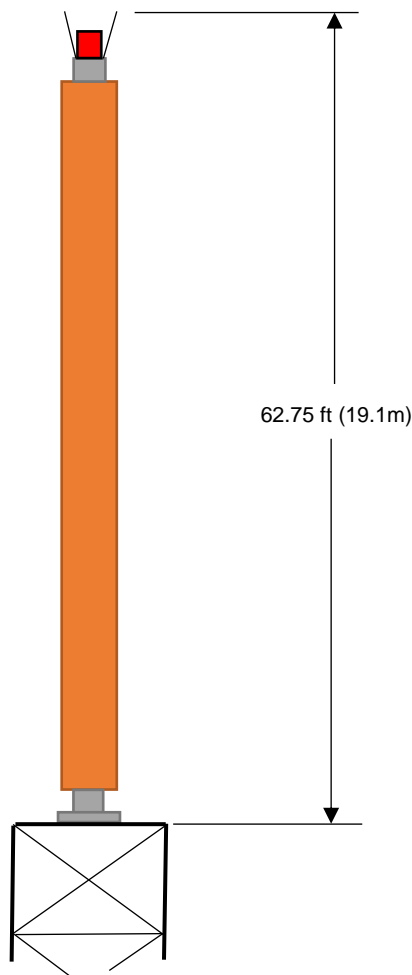
Top Mounted

With ice TIA-222-G

Height AGL(z) 701.5 ft (213.8 m)
 Basic Wind Speed 90 m/h (144.8 km/h)

Structure Class II
 Exposure Category C
 Topography Category 1

Design Ice 0.75 in $t_{iz} = 2.04$ in
 Wind Speed w/Ice 40 m/h (64.4 km/h)



Mechanical Specifications

		without ice	with ice
Height with Lightning Protector	H4	62.75 ft (19.1m)	
Height less Lightning Protector	H2	58.75 ft (17.9m)	
Height of Center of Radiation	H3	29.375 ft (9m)	
Effective Projected Area	(EPA) _S	66.4 ft² (6.2m²)	172.5 ft² (16m²)
Moment Arm	D1	31 ft (9.4m)	31.9 ft (9.7m)

Weight	W	8300 lb (3.8t)	12550 lb (5.7t)
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Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA-222-G

Prepared by: NJS
 Rev. No.2 by: SPJC

Date: 8-May-17
 Date: 26-Jun-17

ME: *SPJC*

EE:

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Summary

Proposal No.	C-70677-2
Date	26-Jun-17
Call Letters	WNEO
Channel	29
Frequency	563 MHz
Antenna Type	TFU-31JTH/VP-R O4 (SP)

Antenna

	Hpol	Vpol
ERP:	365 kW (25.62 dBk)	120 kW (20.81 dBk)
RMS Gain*	24.44 (13.88 dB)	8.06 (9.07 dB)

Antenna Input Power	14.9 kW (11.74 dBk)
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Transmission Line

Type:	Rigid	Attenuation:	(0.69 dB)
Size:	8-3/16"	Efficiency:	85.3%
Impedance:	75 Ohm		
Length:	800 ft	243.8 m	

Transmitter Output

17.5 kW (12.43 dBk)

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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