

Amendment of Application for NCE-FM Construction Permit

88.3 MHz, Channel 202, Casper, WY
NEW, FCC ID 92997
FCC File Number BPED-19990311MN
WCN, Inc., Applicant

DIRECTORY OF ILLUSTRATIONS FOLLOWING

1. DISSIMILAR PATTERN STUDY, COLOCATED FM CHANNEL 202 TO TV CHANNEL 6
2. ELEVATION SKETCH OF TOWER INSTALLATION PLAN
3. VERTICAL ELEVATION PATTERN AND TABULATIONS OF KUWC (NCE-FM) ANTENNA
4. VERTICAL ELEVATION PATTERN AND TABULATIONS OF KPTW ANTENNA
5. VERTICAL ELEVATION PATTERN AND TABULATIONS OF PROPOSED ANTENNA

ANALYSIS OF DISSIMILAR COLOCATED ANTENNA PATTERNS RESPECTIVE TO FM CHANNEL 202 TO TV CHANNEL 6 INTERFERENCE STUDY

990311.A Amended
BPED19990311MN amdmt
Latitude: 42-44-26 N
Longitude: 106-21-34 W
ERP: 0.0125 kW
Channel: 202
Frequency: 88.3 MHz
AGL Height: 20m
Tower Height 43m
RED CONTOURS
50.8 dBu
52.6 dBu
55.8 dBu
59.2 dBu
62.7 dBu
66.8 dBu
71.2 dBu
75.7 dBu
80.3 dBu
84.9 dBu

990311.A Amended
KPTW.C

Bar Nunn

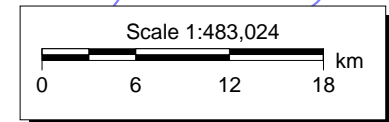
Casper

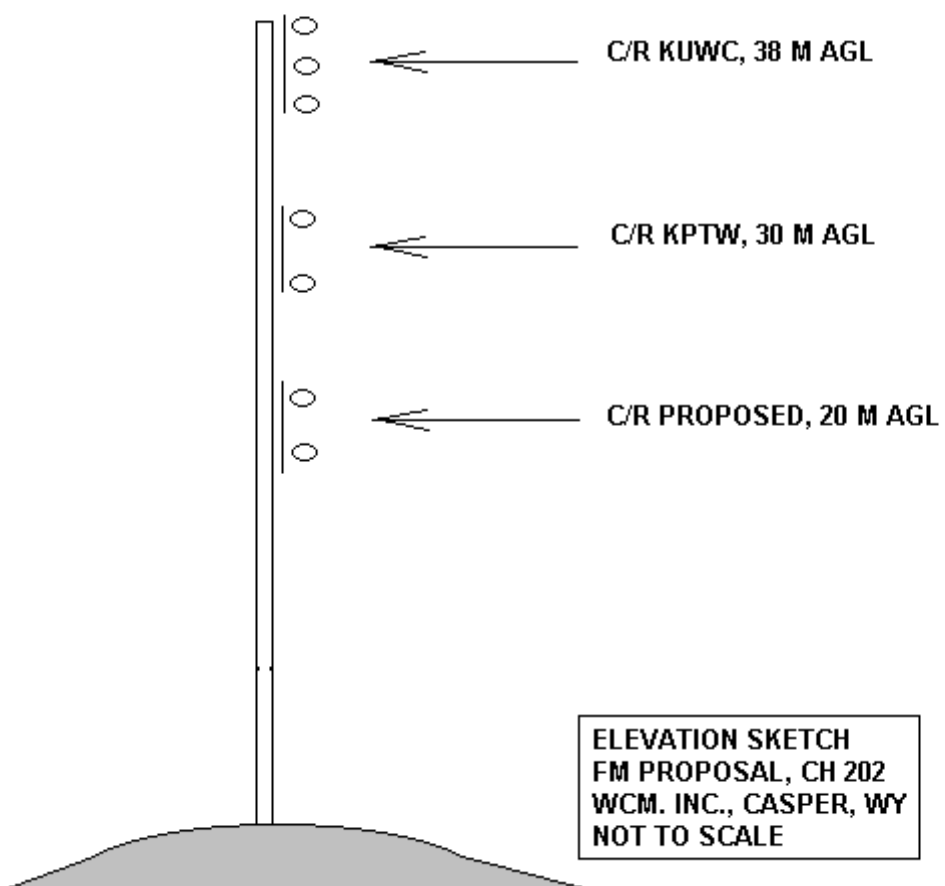
Mills

KPTW
BPET19960624KT
Latitude: 42-44-26 N
Longitude: 106-21-34 W
ERP: 0.331 kW
Channel 6
Frequency 82-88 MHz
AGL Height 30m
Tower Height 43m
BLUE CONTOURS
47.0 dBu
50.0 dBu
55.0 dBu
60.0 dBu
65.0 dBu
70.0 dBu
75.0 dBu
80.0 dBu
85.0 dBu
90.0 dBu

990311.A Amended
KPTW.C

*Black lines enclose intersection points of
FM interference to TV protected contours*





Shively Labs®

KUWC ANTENNA ELEVATION PATTERN AND TABULATION

Antenna Mfr.: Shively Labs

Date: 12/30/2004

Antenna Type: 6812B or 6602B 3-Bay, 1/2-wave-spaced

Frequency: 98.1

6812B Gain (Max)

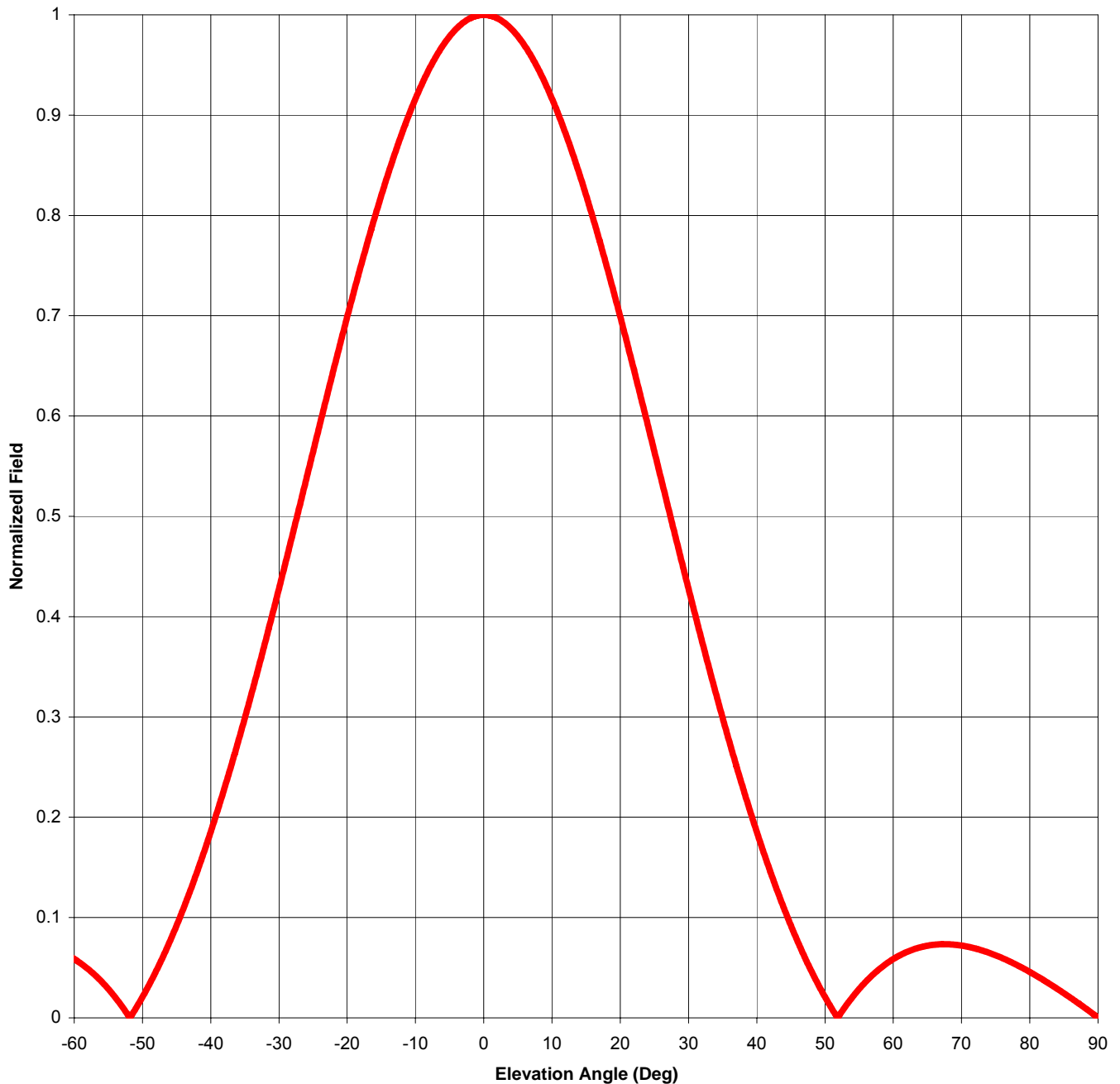
0.89

-0.51 dB

6602B Gain (Max)

1.78

2.49 dB



KUWC ANTENNA ELEVATION PATTERN AND TABULATION

Elevation Pattern Tabulation, 6602B and 6812B 3-Bay Half-Wave-Spaced

Relative Field at 0° Depression = 1.000

Degrees	Rel. Field
1	0.999
2	0.997
3	0.992
4	0.986
5	0.979
6	0.969
7	0.958
8	0.946
9	0.932
10	0.916
11	0.900
12	0.881
13	0.862
14	0.842
15	0.820
16	0.797
17	0.774
18	0.750

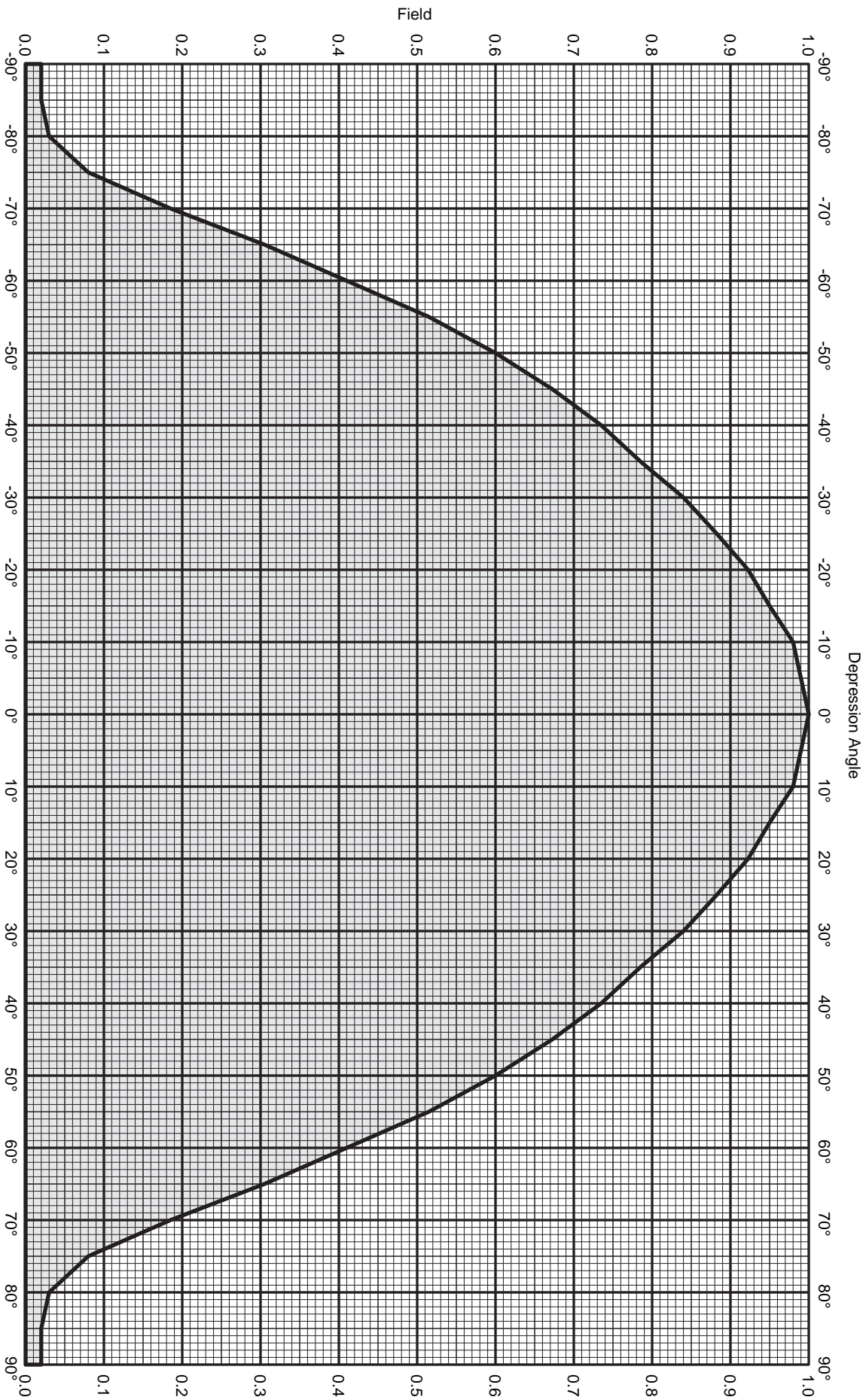
Degrees	Rel. Field
19	0.725
20	0.699
21	0.673
22	0.646
23	0.619
24	0.592
25	0.565
26	0.537
27	0.510
28	0.482
29	0.455
30	0.428
31	0.401
32	0.375
33	0.349
34	0.324
35	0.299
36	0.275

Degrees	Rel. Field
37	0.251
38	0.229
39	0.207
40	0.185
41	0.165
42	0.146
43	0.127
44	0.109
45	0.092
46	0.076
47	0.061
48	0.047
49	0.033
50	0.021
51	0.009
52	0.002
53	0.011
54	0.021

Degrees	Rel. Field
55	0.029
56	0.036
57	0.043
58	0.049
59	0.054
60	0.059
61	0.063
62	0.066
63	0.068
64	0.070
65	0.072
66	0.073
67	0.073
68	0.073
69	0.073
70	0.072
71	0.071
72	0.069

Degrees	Rel. Field
73	0.067
74	0.065
75	0.062
76	0.060
77	0.056
78	0.053
79	0.050
80	0.046
81	0.042
82	0.038
83	0.033
84	0.029
85	0.025
86	0.020
87	0.015
88	0.010
89	0.005
90	0.000

KPTW CH.6 ANTENNA ELEVATION PATTERN AND TABULATION



CA2 Dipole/Reflector

Ch-6

4.0 dBd (6.15 dBi)

Horizontal polarization



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<http://www.kathrein-scala.com>



CA2 Dipole/Reflector

Vertical radiation pattern

Ch-6

4.0 dBd (6.15 dBi)

Horizontal polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
-90	0.020	-33.98	-29.98	0.00	-45	0.673	-3.45	0.55	1.14
-89	0.020	-33.98	-29.98	0.00	-44	0.685	-3.29	0.71	1.18
-88	0.020	-33.98	-29.98	0.00	-43	0.697	-3.13	0.87	1.22
-87	0.020	-33.98	-29.98	0.00	-42	0.710	-2.97	1.03	1.27
-86	0.020	-33.98	-29.98	0.00	-41	0.722	-2.82	1.18	1.31
-85	0.020	-33.98	-29.98	0.00	-40	0.735	-2.67	1.33	1.36
-84	0.022	-33.15	-29.15	0.00	-39	0.745	-2.56	1.44	1.39
-83	0.024	-32.40	-28.40	0.00	-38	0.755	-2.44	1.56	1.43
-82	0.026	-31.70	-27.70	0.00	-37	0.765	-2.33	1.67	1.47
-81	0.028	-31.06	-27.06	0.00	-36	0.775	-2.21	1.79	1.51
-80	0.030	-30.46	-26.46	0.00	-35	0.785	-2.10	1.90	1.55
-79	0.040	-27.96	-23.96	0.00	-34	0.796	-1.98	2.02	1.59
-78	0.050	-26.02	-22.02	0.01	-33	0.807	-1.86	2.14	1.64
-77	0.060	-24.44	-20.44	0.01	-32	0.818	-1.74	2.26	1.68
-76	0.070	-23.10	-19.10	0.01	-31	0.829	-1.63	2.37	1.73
-75	0.080	-21.94	-17.94	0.02	-30	0.840	-1.51	2.49	1.77
-74	0.101	-19.91	-15.91	0.03	-29	0.849	-1.43	2.57	1.81
-73	0.122	-18.27	-14.27	0.04	-28	0.857	-1.34	2.66	1.84
-72	0.143	-16.89	-12.89	0.05	-27	0.865	-1.25	2.75	1.88
-71	0.164	-15.70	-11.70	0.07	-26	0.874	-1.17	2.83	1.92
-70	0.185	-14.66	-10.66	0.09	-25	0.883	-1.09	2.91	1.96
-69	0.209	-13.60	-9.60	0.11	-24	0.891	-1.01	2.99	1.99
-68	0.233	-12.65	-8.65	0.14	-23	0.898	-0.93	3.07	2.03
-67	0.257	-11.80	-7.80	0.17	-22	0.906	-0.85	3.15	2.06
-66	0.281	-11.03	-7.03	0.20	-21	0.914	-0.78	3.22	2.10
-65	0.305	-10.31	-6.31	0.23	-20	0.923	-0.70	3.30	2.14
-64	0.326	-9.74	-5.74	0.27	-19	0.928	-0.65	3.35	2.16
-63	0.347	-9.19	-5.19	0.30	-18	0.933	-0.60	3.40	2.19
-62	0.368	-8.68	-4.68	0.34	-17	0.939	-0.55	3.45	2.21
-61	0.389	-8.20	-4.20	0.38	-16	0.944	-0.50	3.50	2.24
-60	0.410	-7.74	-3.74	0.42	-15	0.950	-0.45	3.55	2.27
-59	0.431	-7.31	-3.31	0.47	-14	0.956	-0.39	3.61	2.30
-58	0.452	-6.90	-2.90	0.51	-13	0.962	-0.34	3.66	2.32
-57	0.473	-6.50	-2.50	0.56	-12	0.968	-0.28	3.72	2.35
-56	0.494	-6.13	-2.13	0.61	-11	0.974	-0.23	3.77	2.38
-55	0.515	-5.76	-1.76	0.67	-10	0.980	-0.18	3.82	2.41
-54	0.532	-5.48	-1.48	0.71	-9	0.982	-0.16	3.84	2.42
-53	0.549	-5.21	-1.21	0.76	-8	0.984	-0.14	3.86	2.43
-52	0.566	-4.94	-0.94	0.80	-7	0.986	-0.12	3.88	2.44
-51	0.583	-4.69	-0.69	0.85	-6	0.988	-0.10	3.90	2.45
-50	0.600	-4.44	-0.44	0.90	-5	0.990	-0.09	3.91	2.46
-49	0.615	-4.23	-0.23	0.95	-4	0.992	-0.07	3.93	2.47
-48	0.629	-4.03	-0.03	0.99	-3	0.994	-0.05	3.95	2.48
-47	0.643	-3.83	0.17	1.04	-2	0.996	-0.03	3.97	2.49
-46	0.658	-3.64	0.36	1.09	-1	0.998	-0.02	3.98	2.50
					0	1.000	0.00	4.00	2.51



CA2 Dipole/Reflector
Ch-6

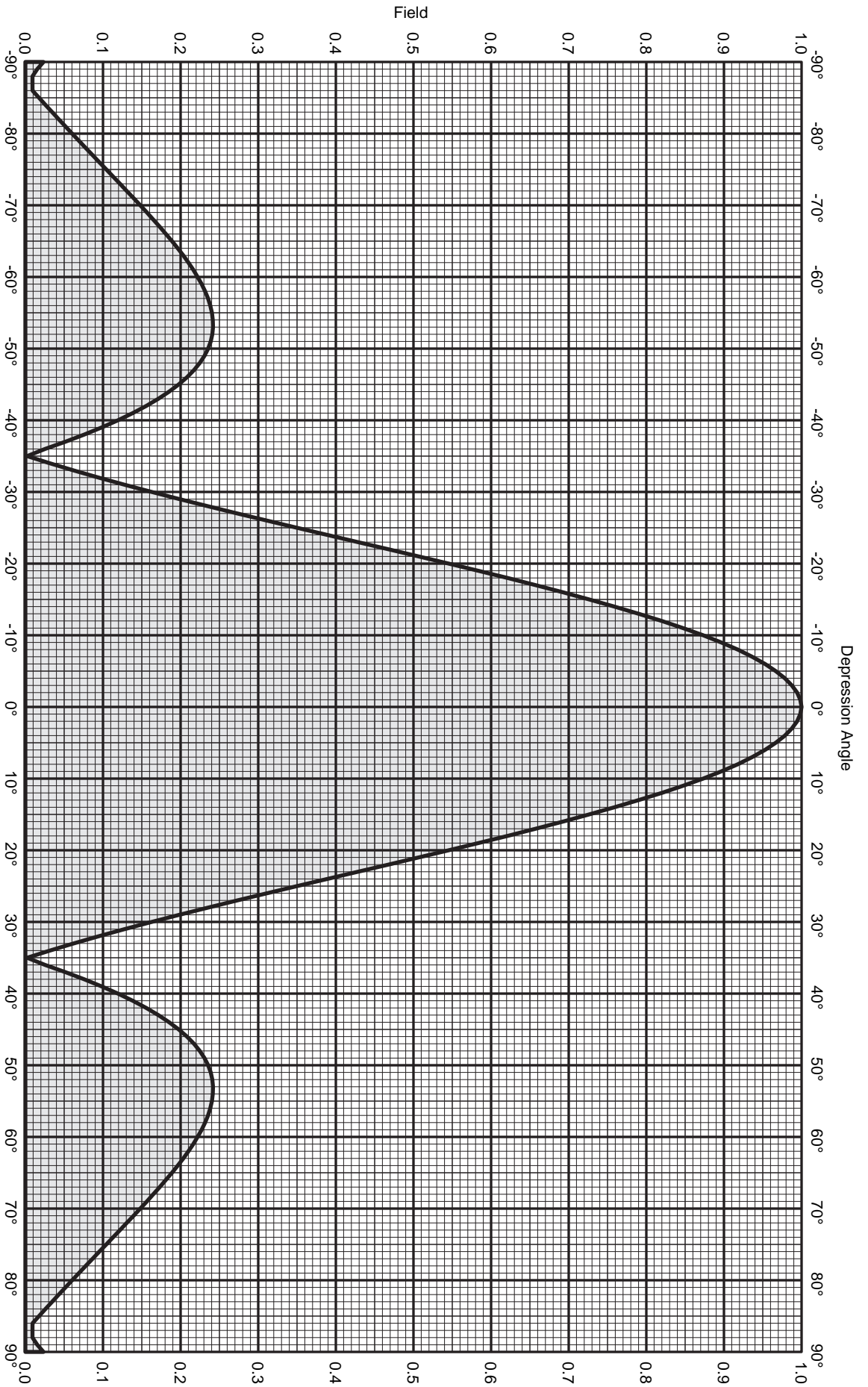
4.0 dBd (6.15 dBi)

Horizontal polarization

Vertical radiation pattern

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	4.00	2.51	45	0.673	-3.45	0.55	1.14
1	0.998	-0.02	3.98	2.50	46	0.658	-3.64	0.36	1.09
2	0.996	-0.03	3.97	2.49	47	0.643	-3.83	0.17	1.04
3	0.994	-0.05	3.95	2.48	48	0.629	-4.03	-0.03	0.99
4	0.992	-0.07	3.93	2.47	49	0.615	-4.23	-0.23	0.95
5	0.990	-0.09	3.91	2.46	50	0.600	-4.44	-0.44	0.90
6	0.988	-0.10	3.90	2.45	51	0.583	-4.69	-0.69	0.85
7	0.986	-0.12	3.88	2.44	52	0.566	-4.94	-0.94	0.80
8	0.984	-0.14	3.86	2.43	53	0.549	-5.21	-1.21	0.76
9	0.982	-0.16	3.84	2.42	54	0.532	-5.48	-1.48	0.71
10	0.980	-0.18	3.82	2.41	55	0.515	-5.76	-1.76	0.67
11	0.974	-0.23	3.77	2.38	56	0.494	-6.13	-2.13	0.61
12	0.968	-0.28	3.72	2.35	57	0.473	-6.50	-2.50	0.56
13	0.962	-0.34	3.66	2.32	58	0.452	-6.90	-2.90	0.51
14	0.956	-0.39	3.61	2.30	59	0.431	-7.31	-3.31	0.47
15	0.950	-0.45	3.55	2.27	60	0.410	-7.74	-3.74	0.42
16	0.944	-0.50	3.50	2.24	61	0.389	-8.20	-4.20	0.38
17	0.939	-0.55	3.45	2.21	62	0.368	-8.68	-4.68	0.34
18	0.933	-0.60	3.40	2.19	63	0.347	-9.19	-5.19	0.30
19	0.928	-0.65	3.35	2.16	64	0.326	-9.74	-5.74	0.27
20	0.923	-0.70	3.30	2.14	65	0.305	-10.31	-6.31	0.23
21	0.914	-0.78	3.22	2.10	66	0.281	-11.03	-7.03	0.20
22	0.906	-0.85	3.15	2.06	67	0.257	-11.80	-7.80	0.17
23	0.898	-0.93	3.07	2.03	68	0.233	-12.65	-8.65	0.14
24	0.891	-1.01	2.99	1.99	69	0.209	-13.60	-9.60	0.11
25	0.883	-1.09	2.91	1.96	70	0.185	-14.66	-10.66	0.09
26	0.874	-1.17	2.83	1.92	71	0.164	-15.70	-11.70	0.07
27	0.865	-1.25	2.75	1.88	72	0.143	-16.89	-12.89	0.05
28	0.857	-1.34	2.66	1.84	73	0.122	-18.27	-14.27	0.04
29	0.849	-1.43	2.57	1.81	74	0.101	-19.91	-15.91	0.03
30	0.840	-1.51	2.49	1.77	75	0.080	-21.94	-17.94	0.02
31	0.829	-1.63	2.37	1.73	76	0.070	-23.10	-19.10	0.01
32	0.818	-1.74	2.26	1.68	77	0.060	-24.44	-20.44	0.01
33	0.807	-1.86	2.14	1.64	78	0.050	-26.02	-22.02	0.01
34	0.796	-1.98	2.02	1.59	79	0.040	-27.96	-23.96	0.00
35	0.785	-2.10	1.90	1.55	80	0.030	-30.46	-26.46	0.00
36	0.775	-2.21	1.79	1.51	81	0.028	-31.06	-27.06	0.00
37	0.765	-2.33	1.67	1.47	82	0.026	-31.70	-27.70	0.00
38	0.755	-2.44	1.56	1.43	83	0.024	-32.40	-28.40	0.00
39	0.745	-2.56	1.44	1.39	84	0.022	-33.15	-29.15	0.00
40	0.735	-2.67	1.33	1.36	85	0.020	-33.98	-29.98	0.00
41	0.722	-2.82	1.18	1.31	86	0.020	-33.98	-29.98	0.00
42	0.710	-2.97	1.03	1.27	87	0.020	-33.98	-29.98	0.00
43	0.697	-3.13	0.87	1.22	88	0.020	-33.98	-29.98	0.00
44	0.685	-3.29	0.71	1.18	89	0.020	-33.98	-29.98	0.00
					90	0.020	-33.98	-29.98	0.00

PROPOSED ANTENNA VERTI CAL PATTERN AND TABULATION



FMV-2 Dipole array

FM

3.5 dBd (5.65 dBi)

Vertical polarization



KATHREIN
SCALA DIVISION

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PROPOSED ANTENNA VERTICAL PATTERN AND TABULATION



FMV-2 Dipole array

Vertical radiation pattern

FM

3.5 dBd (5.65 dBi)

Vertical polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
-90	0.023	-32.64	-29.14	0.00	-45	0.198	-14.09	-10.59	0.09
-89	0.015	-36.31	-32.81	0.00	-44	0.185	-14.64	-11.14	0.08
-88	0.010	-40.00	-36.50	0.00	-43	0.171	-15.32	-11.82	0.07
-87	0.010	-40.00	-36.50	0.00	-42	0.156	-16.15	-12.65	0.05
-86	0.010	-40.00	-36.50	0.00	-41	0.138	-17.18	-13.68	0.04
-85	0.018	-35.09	-31.59	0.00	-40	0.119	-18.47	-14.97	0.03
-84	0.026	-31.71	-28.21	0.00	-39	0.098	-20.14	-16.64	0.02
-83	0.035	-29.24	-25.74	0.00	-38	0.076	-22.41	-18.91	0.01
-82	0.043	-27.33	-23.83	0.00	-37	0.051	-25.78	-22.28	0.01
-81	0.052	-25.74	-22.24	0.01	-36	0.025	-31.91	-28.41	0.00
-80	0.060	-24.40	-20.90	0.01	-35	0.010	-40.00	-36.50	0.00
-79	0.069	-23.22	-19.72	0.01	-34	0.032	-30.02	-26.52	0.00
-78	0.078	-22.19	-18.69	0.01	-33	0.062	-24.11	-20.61	0.01
-77	0.087	-21.25	-17.75	0.02	-32	0.094	-20.49	-16.99	0.02
-76	0.095	-20.42	-16.92	0.02	-31	0.128	-17.86	-14.36	0.04
-75	0.104	-19.64	-16.14	0.02	-30	0.163	-15.77	-12.27	0.06
-74	0.113	-18.93	-15.43	0.03	-29	0.199	-14.04	-10.54	0.09
-73	0.122	-18.28	-14.78	0.03	-28	0.235	-12.56	-9.06	0.12
-72	0.131	-17.68	-14.18	0.04	-27	0.273	-11.28	-7.78	0.17
-71	0.139	-17.11	-13.61	0.04	-26	0.311	-10.14	-6.64	0.22
-70	0.148	-16.59	-13.09	0.05	-25	0.350	-9.12	-5.62	0.27
-69	0.157	-16.11	-12.61	0.05	-24	0.389	-8.20	-4.70	0.34
-68	0.165	-15.66	-12.16	0.06	-23	0.428	-7.36	-3.86	0.41
-67	0.173	-15.23	-11.73	0.07	-22	0.468	-6.60	-3.10	0.49
-66	0.181	-14.85	-11.35	0.07	-21	0.507	-5.91	-2.41	0.57
-65	0.189	-14.47	-10.97	0.08	-20	0.545	-5.26	-1.76	0.67
-64	0.196	-14.14	-10.64	0.09	-19	0.584	-4.68	-1.18	0.76
-63	0.204	-13.83	-10.33	0.09	-18	0.621	-4.14	-0.64	0.86
-62	0.210	-13.55	-10.05	0.10	-17	0.657	-3.65	-0.15	0.97
-61	0.216	-13.30	-9.80	0.10	-16	0.693	-3.19	0.31	1.07
-60	0.222	-13.08	-9.58	0.11	-15	0.726	-2.78	0.72	1.18
-59	0.227	-12.87	-9.37	0.12	-14	0.759	-2.40	1.10	1.29
-58	0.232	-12.71	-9.21	0.12	-13	0.790	-2.05	1.45	1.40
-57	0.235	-12.57	-9.07	0.12	-12	0.820	-1.73	1.77	1.50
-56	0.238	-12.46	-8.96	0.13	-11	0.847	-1.44	2.06	1.61
-55	0.240	-12.38	-8.88	0.13	-10	0.873	-1.18	2.32	1.71
-54	0.241	-12.34	-8.84	0.13	-9	0.896	-0.95	2.55	1.80
-53	0.242	-12.33	-8.83	0.13	-8	0.918	-0.74	2.76	1.89
-52	0.241	-12.37	-8.87	0.13	-7	0.936	-0.57	2.93	1.96
-51	0.239	-12.44	-8.94	0.13	-6	0.953	-0.42	3.08	2.03
-50	0.235	-12.56	-9.06	0.12	-5	0.967	-0.29	3.21	2.09
-49	0.231	-12.74	-9.24	0.12	-4	0.978	-0.19	3.31	2.14
-48	0.225	-12.97	-9.47	0.11	-3	0.988	-0.11	3.39	2.18
-47	0.217	-13.26	-9.76	0.11	-2	0.994	-0.05	3.45	2.21
-46	0.208	-13.63	-10.13	0.10	-1	0.998	-0.01	3.49	2.23
					0	1.000	0.00	3.50	2.24

PROPOSED ANTENNA VERTICAL PATTERN AND TABULATION



FMV-2 Dipole array

Vertical radiation pattern

FM

3.5 dBd (5.65 dBi)

Vertical polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	3.50	2.24	45	0.198	-14.09	-10.59	0.09
1	0.998	-0.01	3.49	2.23	46	0.208	-13.63	-10.13	0.10
2	0.994	-0.05	3.45	2.21	47	0.217	-13.26	-9.76	0.11
3	0.988	-0.11	3.39	2.18	48	0.225	-12.97	-9.47	0.11
4	0.978	-0.19	3.31	2.14	49	0.231	-12.74	-9.24	0.12
5	0.967	-0.29	3.21	2.09	50	0.235	-12.56	-9.06	0.12
6	0.953	-0.42	3.08	2.03	51	0.239	-12.44	-8.94	0.13
7	0.936	-0.57	2.93	1.96	52	0.241	-12.37	-8.87	0.13
8	0.918	-0.74	2.76	1.89	53	0.242	-12.33	-8.83	0.13
9	0.896	-0.95	2.55	1.80	54	0.241	-12.34	-8.84	0.13
10	0.873	-1.18	2.32	1.71	55	0.240	-12.38	-8.88	0.13
11	0.847	-1.44	2.06	1.61	56	0.238	-12.46	-8.96	0.13
12	0.820	-1.73	1.77	1.50	57	0.235	-12.57	-9.07	0.12
13	0.790	-2.05	1.45	1.40	58	0.232	-12.71	-9.21	0.12
14	0.759	-2.40	1.10	1.29	59	0.227	-12.87	-9.37	0.12
15	0.726	-2.78	0.72	1.18	60	0.222	-13.08	-9.58	0.11
16	0.693	-3.19	0.31	1.07	61	0.216	-13.30	-9.80	0.10
17	0.657	-3.65	-0.15	0.97	62	0.210	-13.55	-10.05	0.10
18	0.621	-4.14	-0.64	0.86	63	0.204	-13.83	-10.33	0.09
19	0.584	-4.68	-1.18	0.76	64	0.196	-14.14	-10.64	0.09
20	0.545	-5.26	-1.76	0.67	65	0.189	-14.47	-10.97	0.08
21	0.507	-5.91	-2.41	0.57	66	0.181	-14.85	-11.35	0.07
22	0.468	-6.60	-3.10	0.49	67	0.173	-15.23	-11.73	0.07
23	0.428	-7.36	-3.86	0.41	68	0.165	-15.66	-12.16	0.06
24	0.389	-8.20	-4.70	0.34	69	0.157	-16.11	-12.61	0.05
25	0.350	-9.12	-5.62	0.27	70	0.148	-16.59	-13.09	0.05
26	0.311	-10.14	-6.64	0.22	71	0.139	-17.11	-13.61	0.04
27	0.273	-11.28	-7.78	0.17	72	0.131	-17.69	-14.19	0.04
28	0.235	-12.56	-9.06	0.12	73	0.122	-18.28	-14.78	0.03
29	0.199	-14.04	-10.54	0.09	74	0.113	-18.93	-15.43	0.03
30	0.163	-15.77	-12.27	0.06	75	0.104	-19.64	-16.14	0.02
31	0.128	-17.86	-14.36	0.04	76	0.095	-20.42	-16.92	0.02
32	0.095	-20.49	-16.99	0.02	77	0.087	-21.25	-17.75	0.02
33	0.062	-24.11	-20.61	0.01	78	0.078	-22.19	-18.69	0.01
34	0.032	-30.02	-26.52	0.00	79	0.069	-23.22	-19.72	0.01
35	0.010	-40.00	-36.50	0.00	80	0.060	-24.40	-20.90	0.01
36	0.025	-31.91	-28.41	0.00	81	0.052	-25.74	-22.24	0.01
37	0.051	-25.78	-22.28	0.01	82	0.043	-27.33	-23.83	0.00
38	0.076	-22.41	-18.91	0.01	83	0.035	-29.24	-25.74	0.00
39	0.098	-20.14	-16.64	0.02	84	0.026	-31.71	-28.21	0.00
40	0.119	-18.47	-14.97	0.03	85	0.018	-35.09	-31.59	0.00
41	0.138	-17.18	-13.68	0.04	86	0.010	-40.00	-36.50	0.00
42	0.156	-16.15	-12.65	0.05	87	0.010	-40.00	-36.50	0.00
43	0.171	-15.32	-11.82	0.07	88	0.010	-40.00	-36.50	0.00
44	0.185	-14.64	-11.14	0.08	89	0.015	-36.31	-32.81	0.00
					90	0.023	-32.64	-29.14	0.00