TECHNICAL EXHIBIT
RADIO TROPICAL, INC.
APPLICATION FOR NEW FM TRANSLATOR STATION
FOR AM STATION WQBN - FACILITY ID 74155
CHANNEL 294   245 WATTS   DA

APRIL 22, 2018

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Technical Narrative

The technical exhibit, of which this narrative is part, has been prepared on behalf of Radio Tropical, Inc., licensee of a AM radio station WQBN, 1300 KHz in Temple Terrace, FL, Facility ID 74155. Radio Tropical, Inc. is requesting a new FM translator to serve as a fill-in translator for AM radio station WQBN.

Proposed Transmitter Location

The proposed transmitting facility would operate on channel 294 using a Scala CL-FM Vertical Stack array, vertically polarized antenna, side-mounted on an existing WQBN tower. The proposed site location, at the WQBN antenna, is described by the following NAD27 geographic coordinates:

27° 56' 50.9" North
82° 23' 44.7" West

It is proposed to side mount the antenna radiation center (RC) at a height of 49 meters (161 feet) above ground on an existing tower at a site with an elevation of 1 meter AMSL. Thus, the antenna RC will be mounted at a height of 50 meters AMSL, which corresponds to a HAAT of 50 meters. The permissible ERP of 245 Watts allowed under the proposed conditions is requested. The proposed tower currently is being used by AM station WQBN, 1300 KHz, Temple Terrace, FL. It is proposed to mount the proposed FM translator antenna on this tower using a properly designed isolator, as to not affect the operation of WQBN. The WQBN antenna impedance will be measured before and after the FM translator antenna is installed, and should there be a significant impedance change, a new license application for WQBN will be filed.

Tower Registration

        The FAA is not being notified of the proposed construction, as it is proposed to side-mount the FM antenna on an existing 55.8 meter registered tower, ASRN 1056030.

Environmental Considerations

        The proposal is excluded from environmental processing, as an existing supporting structure is to be employed and the proposal complies with the FCC Rules concerning human exposure to radio frequency (RF) energy. The proposal would not exceed the RF exposure limit for general population/uncontrolled environments for the frequency proposed. The calculation of RF energy at 2-m above ground was made under the procedures of OET Bulletin No. 65.[*] The formula employed is as follows:

$$S = \frac{(33.4)F^2 P}{R^2}$$

where, S = power density in uW/cm^2, F = relative field factor at the angle to the calculation point, P = the total effective radiated power relative to a dipole in watts, and R = distance from the antenna radiation center to the calculation point in meters.

        Based on the vertical radiation pattern of the proposed antenna, a relative field factor of 0.178 or less for any depression angle equal or greater than 30 degrees below horizon, a total effective radiated power of 245 watts (vertical polarization) and an antenna radiation center height above ground of 49 m, the calculated power density will not exceed 0.1 uW/cm^2. Therefore, the calculated RF exposure at 2 m above ground will not exceed 0.1% of the limit of 200 uW/cm^2 for the general population and uncontrolled environments.

        The antenna system will be restricted from access and appropriate warning signs posted. In the event that personnel are required to climb the structure, the transmissions of the proposed FM translator will be reduced or terminated as necessary to prevent RF exposure above the FCC recommended limits.

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[*] Federal Communications Commission OET Bulletin No. 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (Edition 97-01, August 1997).

FCC Monitoring Stations

  FCC rules pertaining to FCC monitoring stations, Section 73.1030(c), requires that the proposed facility does not produce a field strength greater than 10 mV/m at the FCC stations. The closest FCC monitoring station to the proposed operation is located at 177.6 km in Vero Beach, FL. The proposed operation will produce field strengths much lower than 10 mV/m at this FCC station.

AM Stations within 3.2 kilometers

  Other than WQBN, where the proposed translator will be located, there are no other AM stations located within 3.2 km of the proposed site. Since the existing AM tower of WQBN, for which no structural change is contemplated, is proposed and the FM Translator antenna will be properly isolated, no adverse effect should be caused to WQBN; thus the proposal is believed to be compliant with Section 47 CFR 73.1692.

Fill-In Compliance and Allocation Considerations

  Figure 1 is a Fill-In Compliance map. As shown in Figure 1, the proposed translator 60 dBu contour will be contained within a 25 mile radius of WQBN. Figure 2a summarizes the allocation study for the proposed facility. As indicated in Figure 2a there is no co-channel or first-adjacent full-service station, translator, or LPFM facility to be concerned, as far as causing interference to by the proposed facility. Figure 2b shows the predicted contour overlap with station WRUB (FM); while no interference to WRUB is predicted, some interference from this station to the proposed translator is predicted. However, as shown Figure 2b, the intervening long path between WRUB, 1st adjacent channel, and the proposed facility, with most of the Fresnel zone of WRUB obstructed, is not expected to cause significant interference to the proposed facility. Figure 2c shows the predicted contour overlap with station WXXL (FM); while no interference to WXXL is predicted, some interference from this station to the proposed translator is predicted. However, as shown Figure 2C, the intervening path between WXXL and the proposed facility is heavily obstructed, so no significant interference to the proposed facility is expected.

  The proposed FM station will operate on Channel 294, third adjacent channel to WXGL (FM), Channel 297C1. The protection requirements of the undesired signal from the proposal is 40 dB higher that the desired signals of these stations. WXGL is predicted to put a signal of 78.2 dBm at the proposed translator

The proposed transmitter site is located 27.3 kilometers from station WXGL, which operates with an ERP of 100 kW and HAAT of 182 meters. The predicted WXGL F(50,50) field strength at the proposed site is 78.2 dBu. Using the U/D ratio of 40 dB, the proposed F(50,10) interfering signal is 118.2 dBu, thus this contour defines the maximum extent of predicted interference.

Since an ERP of 245 watts is proposed, the 118.2 dBu signal contour is calculated by means of a free-space calculation. Based on free-space calculations, the minimum height above ground level that the 118.2 dBu contour would reach is 84 feet at a horizontal distance of 286 feet from the transmitting antenna. This is graphically depicted in Figure 3. There are no residences or office building within 286 ft. of the proposed translator tower, therefore, no harmful interference is predicted to WXGL as a result of the proposed facility. Figure 3 is a tabulation and Figure 4 a graphic representation of the computed distances and heights of the predicted 118.2 dBu contour under these assumptions.

The predicted contours were calculated in accordance with Section 73.313 of the FCC Rules, using the V-Soft FMCommander@2016 software in conjunction with the 30 second Global terrain database; contour calculation were made using an evenly spaced set of radials. The antenna height elevations of the facilities was used in conjunction with the propagation prediction curves of Section 73.333 to determine distances to contours.

For the reasons stated above, it is believed that the proposed facility is in compliance with FCC Rules and Regulations and will serve the public interest.
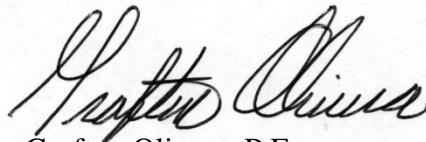
Grafton Olivera, P.E.
Consulting Engineer
5119 60th Drive E
Bradenton, Florida 34203

(941) 329-6001

April 22, 2018

FIGURE 1
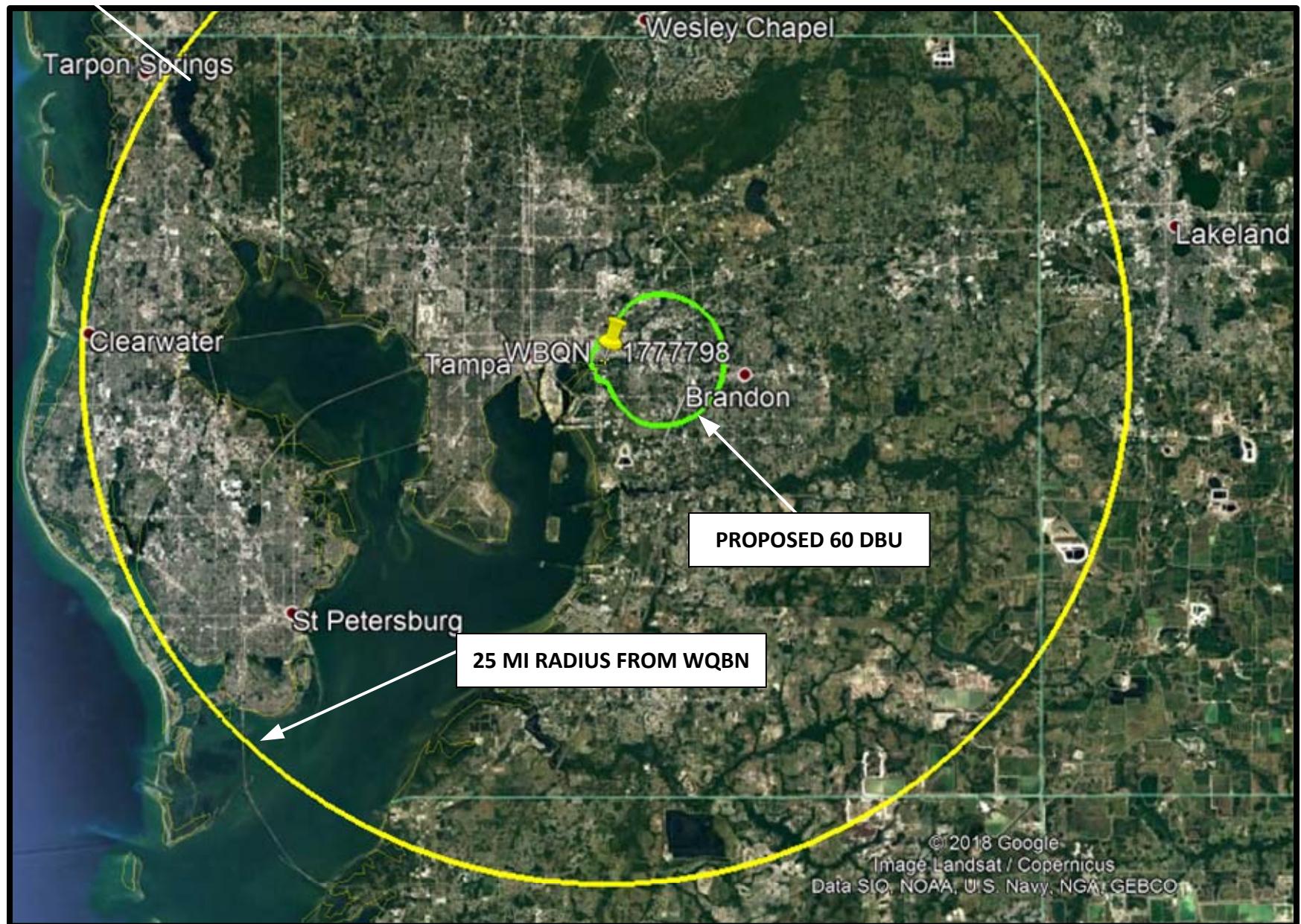
AM FILL-IN COMPLIANCE MAP – NEW FM TRANSLATOR FOR WQBN (AM)
CH 294D (106.7 MHZ)   -   0.245 KW DA
TAMPA, FLORIDA

Allocation Study – Proposed NEW FX Facility CH 294D for WQBN

```
IX Issue!                        GLOBE 30 Sec   [icons]      DATA: 04-15-18 East Zone
AM tower
          N. Lat. 27 56 50.9   50 m COR   Contours are detailed   Tampa FL    X   FX for WQBN - FINAL
          W. Lng. 82 23 44.7   0.245 kW DA  CH 294. 106.7    D    50.0 m HAAT     1777798   04-22-18
```

Call	Type	Ch	Location		Azi	Dist	In	Out
WXXL	LIC	294C1	Tavares	FL	48.9	103.84	-74.8*	6.3
WXGL	LIC	297C1	St. Petersburg	FL	292.1	27.27	18.3	-35.2*
WRUB	LIC-N	293C2	Sarasota	FL	201.5	48.06	-19.6*	0.0
1777798	APP-D	294D	Tampa	FL	0.0	0.00	-5.9	-5.8
W295CF	LIC-D	295D	Clearwater	FL	248.3	24.16	-0.8*	5.9
W295CF	CP-D	295D	St Petersburg	FL	245.8	24.62	1.0	8.0
WQTA-LP	CP	295L1	Tampa	FL	137.0	19.45	3.3	3.2
WGHR	LIC-N	292C3	Spring Hill	FL	347.2	66.20	58.0	25.5
W291AG	LIC	291D	Highland City	FL	90.8	47.27	36.9	26.5
W291CW	LIC	291D	Clearwater	FL	274.1	39.46	37.3	29.5
WZZS	LIC	295A	Zolfo Springs	FL	137.5	87.41	33.4	47.3

End of Screen List, Cardinal Radials = 12

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                          Radio Tropical, Inc.
REFERENCE           CH#  294D  - 106.7 MHz, Pwr= 0.245 kW DA,  HAAT= 50.0 M,  COR= 50 M    DISPLAY DATES
27 56 50.9 N.                 Average Protected F(50-50)= 9.22 km                          DATA    04-15-18
82 23 44.7 W.                      Standard Directional                                   SEARCH 04-22-18
--------------------------------------------------------------------------------------------------------
CH    CALL          TYPE  ANT   AZI    DIST         LAT       PWR(kW) INT(km)  PRO(km)   *IN*     *OUT*
CITY                STATE       <--    FILE #       LNG       HAAT(M) COR(M)   LICENSEE  (Overlap in km)
--------------------------------------------------------------------------------------------------------
294C1 WXXL          LIC _CX     48.9   103.84       28 33 31.0 100.000  170.4   71.1  -74.8*      6.3
Tavares             FL          229.3  BMLH20100809CHA  81 35 38.0    251     284   Amfm Radio Licenses, L.l.c

297C1 WXGL          LIC _CN     292.1  27.27        28 02 22.0 100.000    7.9   62.5   18.3     -35.2*
St. Petersburg      FL          112.0  BLH20000606ACQ   82 39 12.0    182     186   Cox Radio, Inc.

293C2 WRUB          LIC NCX     201.5  48.06        27 32 42.0  13.000   64.4   43.7  -19.6*      0.0
Sarasota            FL          21.4   BLH20070420ABF   82 34 27.0    178     180   Citicasters Licenses, Inc.

294D  1777798       APP DC_     0.0    0.00         27 56 50.9  0.245           0.00   64.5R    -64.5M
Tampa               FL          0.0    BNPFT20180130AFI 82 23 44.7            51    Radio Tropical, Inc.

295D  W295CF        LIC DC_     248.3  24.16        27 52 01.0  0.250          24.0   15.7   -0.8       5.9
Clearwater          FL          68.2   BLFT20161121AAG  82 37 27.0            173   Beasley Media Group Licens

295D  W295CF        CP  DC_     245.8  24.62        27 51 23.0  0.250          22.5   14.9    1.0       8.0
St Petersburg       FL          65.7   BPFT20170517AAT  82 37 27.0            138   Beasley Media Group Licens

295L1 WQTA-LP       CP  ___     137.0  19.45        27 49 10.0  0.003                        3.3       3.2
Tampa               FL          317.1  BNPL20131112AHQ  82 15 39.0            172   North Tampa Community Radi
                                                                             193

292C3 WGHR          LIC NCX     347.2  66.20        28 31 41.0  25.000    4.3   40.7   58.0      25.5
Spring Hill         FL          167.1  BLH20031217AAA   82 32 45.0     96     110   Wgul-fm, Inc.

291D  W291AG        LIC _C_     90.8   47.27        27 56 27.5  0.250     1.1   19.7   36.9      26.5
Highland City       FL          271.0  BLFT20140527AIH  81 54 52.0            226   Radio Training Network, In

291D  W291CW        LIC _C_     274.1  39.46        27 58 21.0  0.250     1.1    9.9   37.3      29.5
Clearwater          FL          93.9   BLFT20160712AAQ  82 47 48.0             57   Radio World, Inc.

295A  WZZS          LIC _CX     137.5  87.41        27 21 59.0  5.000    46.2   30.2   33.4      47.3
Zolfo Springs       FL          317.8  BMLH20141112AGT  81 47 52.0    109     127   Solmart Media, Llc
--------------------------------------------------------------------------------------------------------
Terrain database is GLOBE 30 Sec , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
In & Out distances between contours are shown at closest points. Reference zone=  East Zone, Co to 3rd adjacent.
All separation margins (if shown) include rounding.
Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
"*"affixed to 'IN' or 'OUT' values = site inside restricted contour.
Reference station has protected zone issue: AM tower
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Figure 2b

CONTOUR OVERLAP WITH 1ST ADJACENT WRUB AND LINE-OF-SIGHT PROJECTION
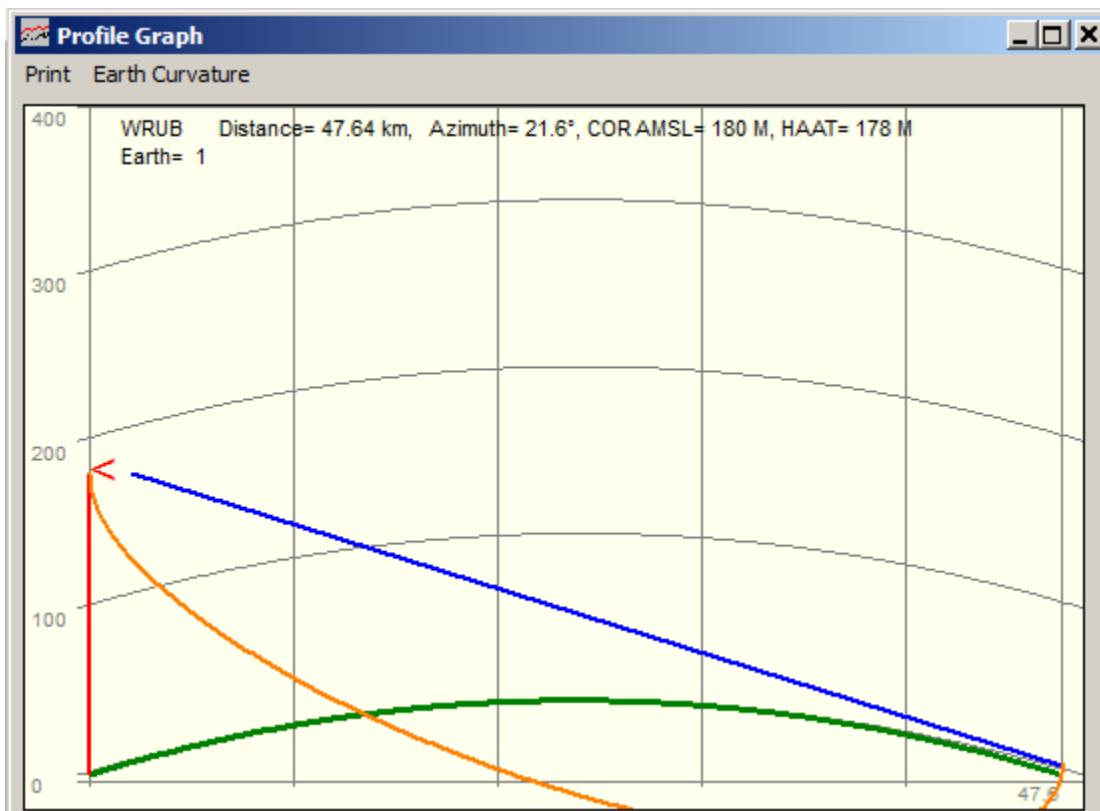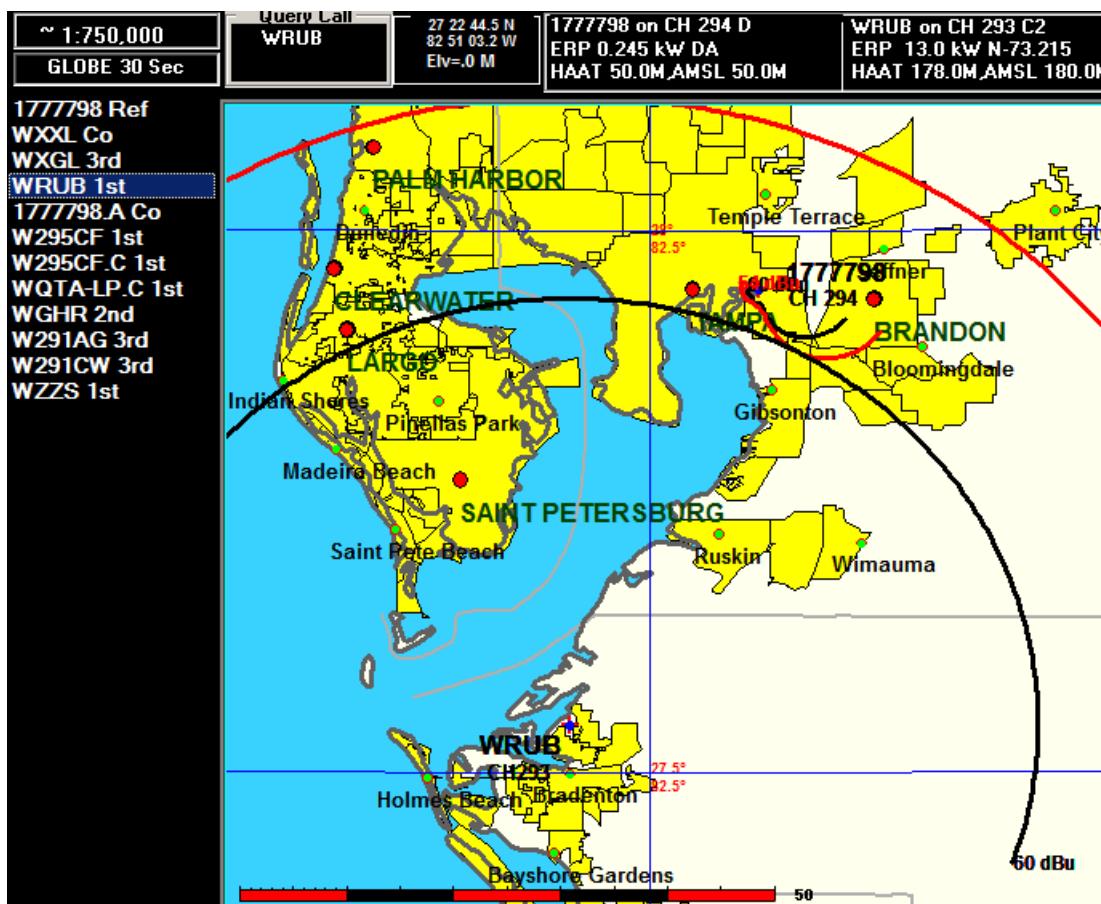
CONTOUR OVERLAP WITH CO-CHANNEL WXXL AND LINE-OF-SIGHT PROJECTION
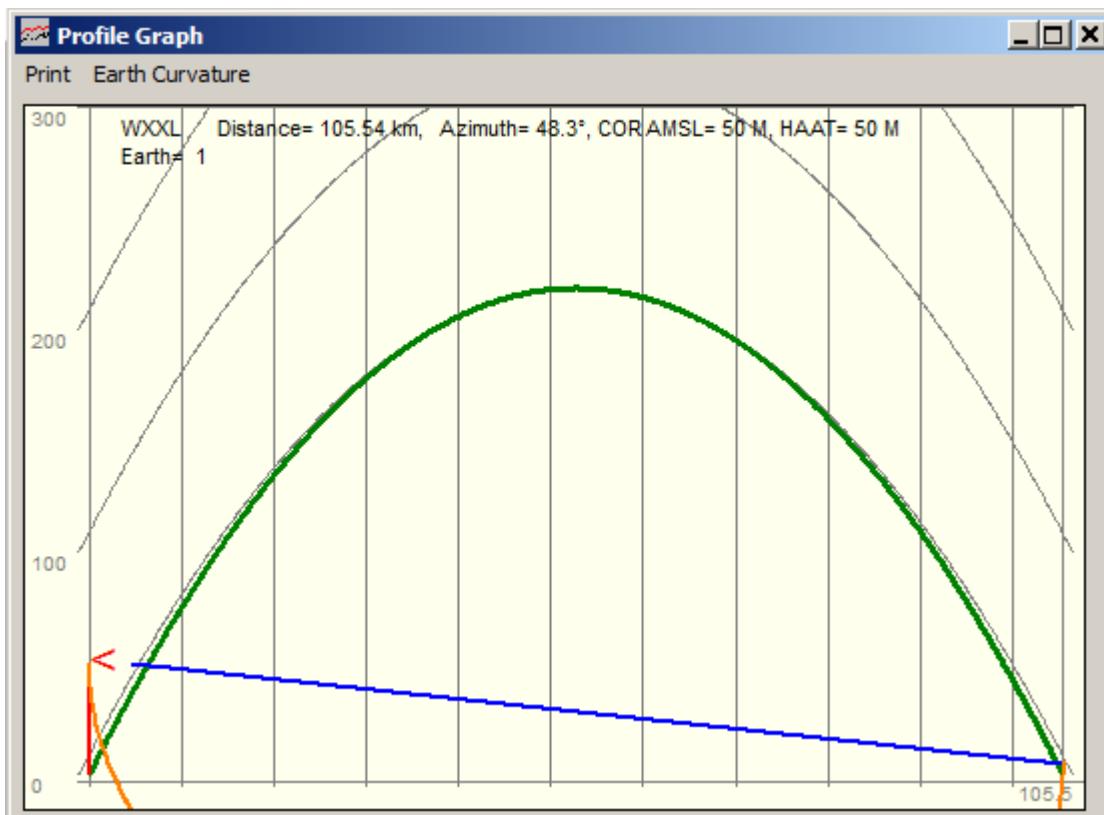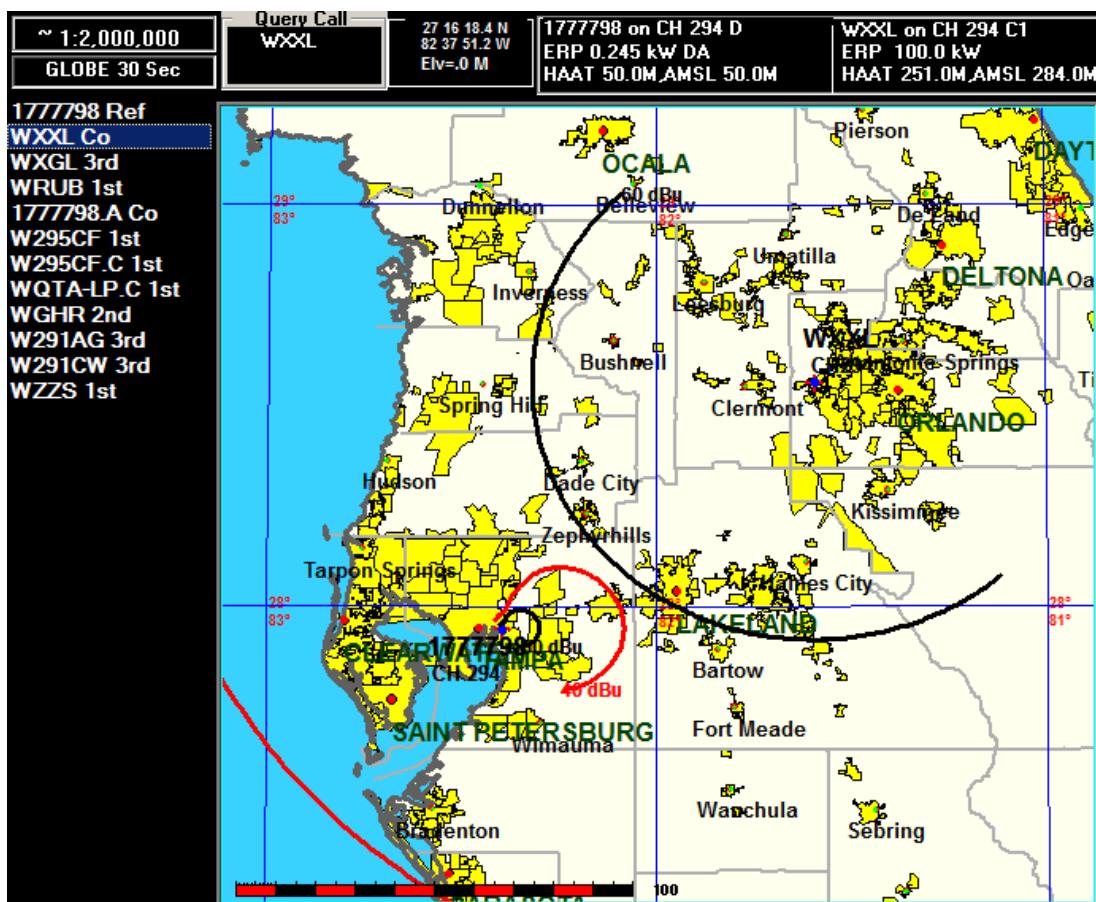
Figure 3

	RCAGL-FT	RCAGL-M
	RCAGL-M	**RCAGL-FT**
	49	161

NEW FX FOR WQBN	CHANNEL:	294
ASR 1056030		
Interfering Field Strength Vs. Distance Graph		
Antenna: Scala CL-FM Vertical Stack		

RCAGL	**161**	feet	IX TO:	ERP:	0.245	kW
Interfering Contour	**118.2**	dBu	WXGL		-6.108339156	dBk
Signal from Station	**78.2**	dBu				

Depression Angle	VRF	ERP (dBk)	Distance to Contour (m)**	Distance to Contour (feet)**	Horiz. Dist. (feet)	Height AGL (feet)
90	0.010	-46.1	1.4	5	0	156
85	0.010	-46.1	1.4	5	0	156
80	0.010	-46.1	1.4	5	1	156
75	0.010	-46.1	1.4	5	1	156
70	0.019	-40.5	2.7	9	3	153
65	0.040	-34.1	5.6	18	8	144
60	0.071	-29.1	9.9	32	16	133
55	0.116	-24.8	16.2	53	30	117
50	0.159	-22.1	22.2	73	47	105
45	0.178	-21.1	24.8	81	58	103
40	0.151	-22.5	21.1	69	53	116
35	0.069	-29.3	9.6	32	26	143
30	0.061	-30.4	8.5	28	24	147
25	0.233	-18.8	32.5	107	97	116
20	0.436	-13.3	60.8	200	188	93
15	0.646	-9.9	90.1	296	286	84
10	0.828	-7.7	115.5	379	373	95
5	0.948	-6.6	132.2	434	432	123
0	1.000	-6.1	139.5	458	458	161

Figure 4

Interfering Field Strength Versus Distance Graph
ERP: 245 Watts / Protected Station WXGL (FM)
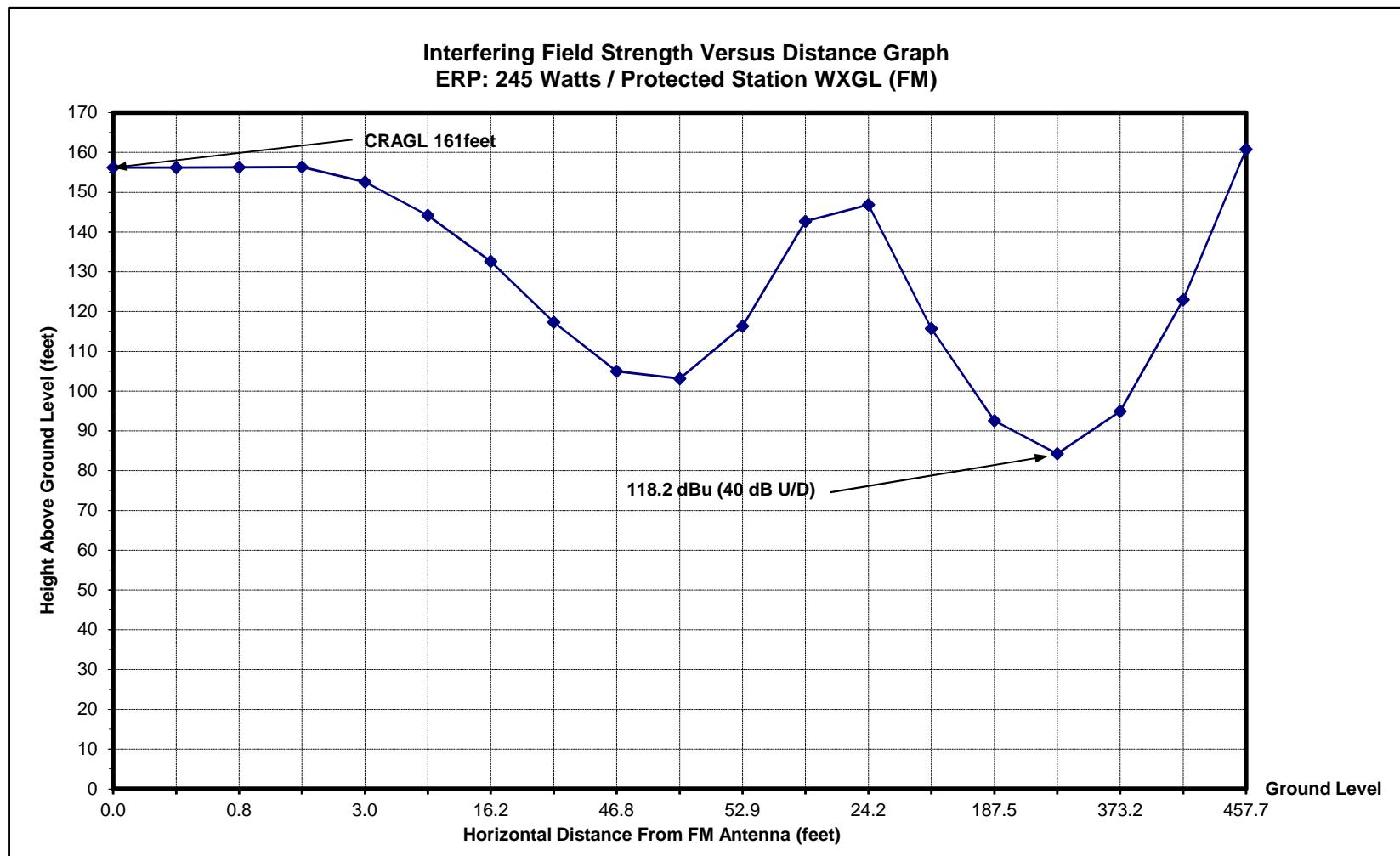
Appendix 1

ANTENNA MANUFACTURER DATA

{eight sheets follow}
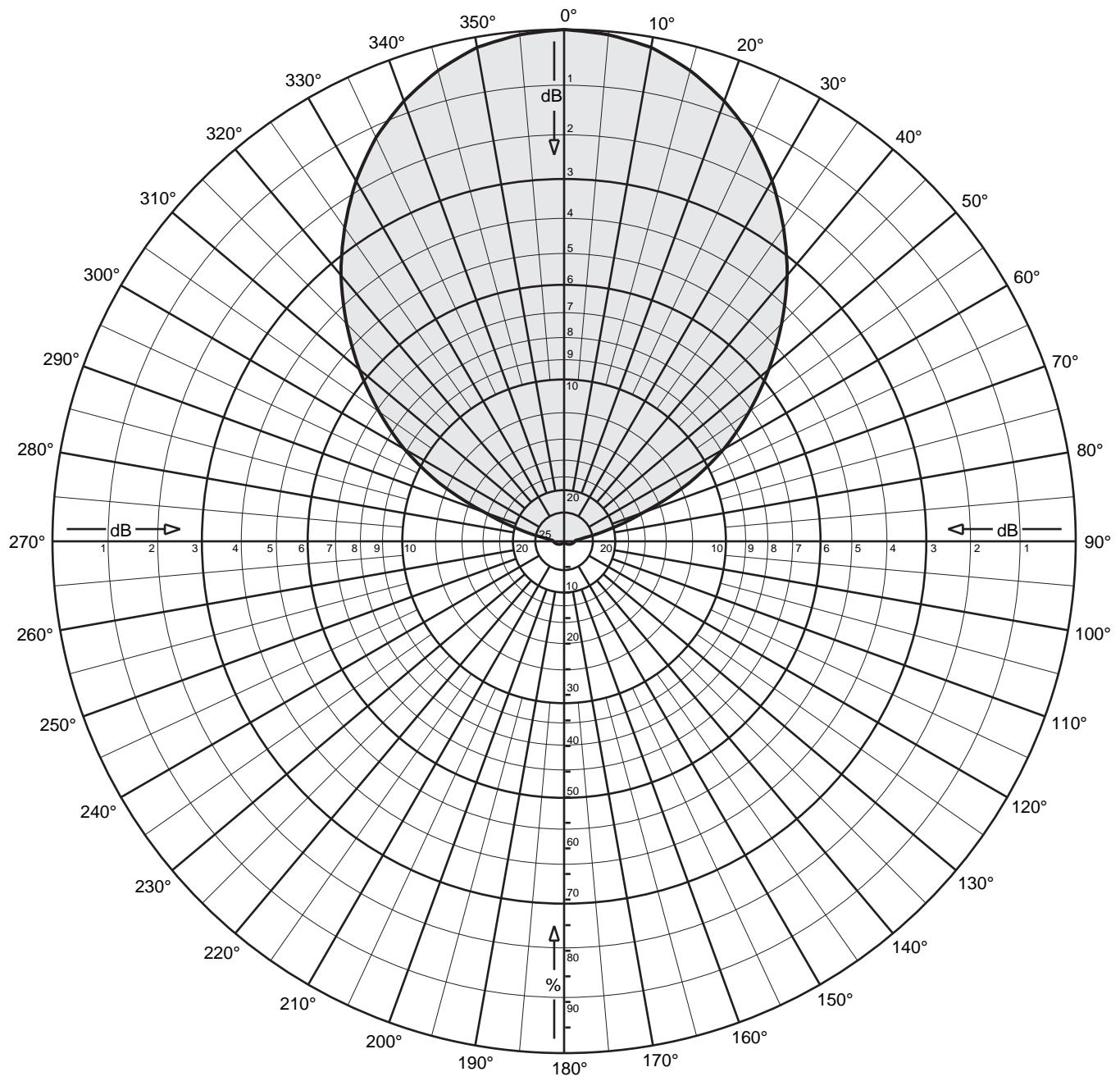
Two CL-FM log-periodics

Oriented at 0 degrees

Maximum array gain: 9.5 dBd

Vertical polarization

Vertical stack

Horizontal plane pattern

Stacked for increased F/B ratio

KATHREIN
SCALA DIVISION

Two CL-FM log-periodics   Vertical stack
Oriented at 0 degrees   Horizontal plane pattern
Maximum array gain: 9.5 dBd
Vertical polarization   Stacked for increased F/B ratio

| Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	9.50	8.91	45	0.601	-4.42	5.08	3.22
1	0.998	-0.01	9.49	8.89	46	0.585	-4.65	4.85	3.05
2	0.997	-0.02	9.48	8.87	47	0.570	-4.89	4.61	2.89
3	0.996	-0.03	9.47	8.84	48	0.554	-5.13	4.37	2.73
4	0.995	-0.04	9.46	8.82	49	0.538	-5.38	4.12	2.58
5	0.993	-0.06	9.44	8.80	50	0.522	-5.64	3.86	2.43
6	0.991	-0.08	9.42	8.75	51	0.506	-5.91	3.59	2.28
7	0.988	-0.11	9.39	8.70	52	0.490	-6.20	3.30	2.14
8	0.985	-0.13	9.37	8.66	53	0.474	-6.49	3.01	2.00
9	0.982	-0.15	9.35	8.60	54	0.457	-6.79	2.71	1.86
10	0.980	-0.18	9.32	8.56	55	0.442	-7.10	2.40	1.74
11	0.974	-0.23	9.27	8.46	56	0.425	-7.43	2.07	1.61
12	0.969	-0.27	9.23	8.37	57	0.409	-7.77	1.73	1.49
13	0.963	-0.32	9.18	8.27	58	0.393	-8.12	1.38	1.37
14	0.958	-0.38	9.12	8.18	59	0.376	-8.49	1.01	1.26
15	0.952	-0.43	9.07	8.08	60	0.360	-8.87	0.63	1.16
16	0.945	-0.49	9.01	7.96	61	0.342	-9.32	0.18	1.04
17	0.937	-0.56	8.94	7.83	62	0.324	-9.80	-0.30	0.93
18	0.930	-0.63	8.87	7.71	63	0.306	-10.30	-0.80	0.83
19	0.923	-0.70	8.80	7.59	64	0.288	-10.83	-1.33	0.74
20	0.915	-0.77	8.73	7.47	65	0.270	-11.38	-1.88	0.65
21	0.906	-0.85	8.65	7.32	66	0.248	-12.10	-2.60	0.55
22	0.898	-0.94	8.56	7.18	67	0.227	-12.87	-3.37	0.46
23	0.888	-1.03	8.47	7.03	68	0.206	-13.71	-4.21	0.38
24	0.879	-1.12	8.38	6.89	69	0.186	-14.63	-5.13	0.31
25	0.870	-1.21	8.29	6.75	70	0.165	-15.64	-6.14	0.24
26	0.859	-1.32	8.18	6.57	71	0.150	-16.47	-6.97	0.20
27	0.847	-1.44	8.06	6.40	72	0.135	-17.37	-7.87	0.16
28	0.836	-1.56	7.94	6.23	73	0.121	-18.37	-8.87	0.13
29	0.824	-1.68	7.82	6.06	74	0.106	-19.48	-9.98	0.10
30	0.813	-1.80	7.70	5.89	75	0.092	-20.74	-11.24	0.08
31	0.800	-1.93	7.57	5.71	76	0.081	-21.82	-12.32	0.06
32	0.787	-2.08	7.42	5.52	77	0.071	-23.03	-13.53	0.04
33	0.774	-2.22	7.28	5.34	78	0.060	-24.42	-14.92	0.03
34	0.761	-2.38	7.12	5.16	79	0.050	-26.04	-16.54	0.02
35	0.748	-2.52	6.98	4.99	80	0.040	-27.99	-18.49	0.01
36	0.734	-2.69	6.81	4.80	81	0.036	-28.81	-19.31	0.01
37	0.720	-2.85	6.65	4.63	82	0.033	-29.69	-20.19	0.01
38	0.706	-3.02	6.48	4.44	83	0.029	-30.66	-21.16	0.01
39	0.693	-3.19	6.31	4.28	84	0.026	-31.72	-22.22	0.01
40	0.678	-3.37	6.13	4.10	85	0.023	-32.91	-23.41	0.00
41	0.663	-3.57	5.93	3.92	86	0.022	-33.02	-23.52	0.00
42	0.648	-3.77	5.73	3.74	87	0.022	-33.13	-23.63	0.00
43	0.632	-3.98	5.52	3.56	88	0.022	-33.24	-23.74	0.00
44	0.617	-4.20	5.30	3.39	89	0.022	-33.35	-23.85	0.00

KATHREIN
SCALA DIVISION

Two CL-FM log-periodics	Vertical stack
Oriented at 0 degrees	Horizontal plane pattern
Maximum array gain: 9.5 dBd	
Vertical polarization	Stacked for increased F/B ratio

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
90	0.021	-33.47	-23.97	0.00	135	0.010	-40.00	-30.50	0.00
91	0.021	-33.59	-24.09	0.00	136	0.010	-40.00	-30.50	0.00
92	0.021	-33.71	-24.21	0.00	137	0.010	-40.00	-30.50	0.00
93	0.020	-33.84	-24.34	0.00	138	0.010	-40.00	-30.50	0.00
94	0.020	-33.97	-24.47	0.00	139	0.010	-40.00	-30.50	0.00
95	0.020	-34.11	-24.61	0.00	140	0.010	-40.00	-30.50	0.00
96	0.019	-34.24	-24.74	0.00	141	0.010	-40.00	-30.50	0.00
97	0.019	-34.38	-24.88	0.00	142	0.010	-40.00	-30.50	0.00
98	0.019	-34.53	-25.03	0.00	143	0.010	-40.00	-30.50	0.00
99	0.018	-34.68	-25.18	0.00	144	0.010	-40.00	-30.50	0.00
100	0.018	-34.83	-25.33	0.00	145	0.010	-40.00	-30.50	0.00
101	0.018	-34.99	-25.49	0.00	146	0.010	-40.00	-30.50	0.00
102	0.017	-35.15	-25.65	0.00	147	0.010	-40.00	-30.50	0.00
103	0.017	-35.31	-25.81	0.00	148	0.010	-40.00	-30.50	0.00
104	0.017	-35.48	-25.98	0.00	149	0.010	-40.00	-30.50	0.00
105	0.016	-35.65	-26.15	0.00	150	0.010	-40.00	-30.50	0.00
106	0.016	-35.83	-26.33	0.00	151	0.010	-40.00	-30.50	0.00
107	0.016	-36.01	-26.51	0.00	152	0.010	-40.00	-30.50	0.00
108	0.015	-36.20	-26.70	0.00	153	0.010	-40.00	-30.50	0.00
109	0.015	-36.39	-26.89	0.00	154	0.010	-40.00	-30.50	0.00
110	0.015	-36.58	-27.08	0.00	155	0.010	-40.00	-30.50	0.00
111	0.014	-36.78	-27.28	0.00	156	0.010	-40.00	-30.50	0.00
112	0.014	-36.98	-27.48	0.00	157	0.010	-40.00	-30.50	0.00
113	0.014	-37.19	-27.69	0.00	158	0.010	-40.00	-30.50	0.00
114	0.013	-37.41	-27.91	0.00	159	0.010	-40.00	-30.50	0.00
115	0.013	-37.63	-28.13	0.00	160	0.010	-40.00	-30.50	0.00
116	0.013	-37.85	-28.35	0.00	161	0.010	-40.00	-30.50	0.00
117	0.012	-38.08	-28.58	0.00	162	0.010	-40.00	-30.50	0.00
118	0.012	-38.31	-28.81	0.00	163	0.010	-40.00	-30.50	0.00
119	0.012	-38.55	-29.05	0.00	164	0.010	-40.00	-30.50	0.00
120	0.011	-38.80	-29.30	0.00	165	0.010	-40.00	-30.50	0.00
121	0.011	-39.05	-29.55	0.00	166	0.010	-40.00	-30.50	0.00
122	0.011	-39.31	-29.81	0.00	167	0.010	-40.00	-30.50	0.00
123	0.011	-39.57	-30.07	0.00	168	0.010	-40.00	-30.50	0.00
124	0.010	-39.84	-30.34	0.00	169	0.010	-40.00	-30.50	0.00
125	0.010	-40.00	-30.50	0.00	170	0.010	-40.00	-30.50	0.00
126	0.010	-40.00	-30.50	0.00	171	0.010	-40.00	-30.50	0.00
127	0.010	-40.00	-30.50	0.00	172	0.010	-40.00	-30.50	0.00
128	0.010	-40.00	-30.50	0.00	173	0.010	-40.00	-30.50	0.00
129	0.010	-40.00	-30.50	0.00	174	0.010	-40.00	-30.50	0.00
130	0.010	-40.00	-30.50	0.00	175	0.010	-40.00	-30.50	0.00
131	0.010	-40.00	-30.50	0.00	176	0.010	-40.00	-30.50	0.00
132	0.010	-40.00	-30.50	0.00	177	0.010	-40.00	-30.50	0.00
133	0.010	-40.00	-30.50	0.00	178	0.010	-40.00	-30.50	0.00
134	0.010	-40.00	-30.50	0.00	179	0.010	-40.00	-30.50	0.00

Two CL-FM log-periodics Vertical stack

Oriented at 0 degrees Horizontal plane pattern

Maximum array gain: 9.5 dBd

Vertical polarization Stacked for increased F/B ratio

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
180	0.010	-40.00	-30.50	0.00	225	0.010	-40.00	-30.50	0.00
181	0.010	-40.00	-30.50	0.00	226	0.010	-40.00	-30.50	0.00
182	0.010	-40.00	-30.50	0.00	227	0.010	-40.00	-30.50	0.00
183	0.010	-40.00	-30.50	0.00	228	0.010	-40.00	-30.50	0.00
184	0.010	-40.00	-30.50	0.00	229	0.010	-40.00	-30.50	0.00
185	0.010	-40.00	-30.50	0.00	230	0.010	-40.00	-30.50	0.00
186	0.010	-40.00	-30.50	0.00	231	0.010	-40.00	-30.50	0.00
187	0.010	-40.00	-30.50	0.00	232	0.010	-40.00	-30.50	0.00
188	0.010	-40.00	-30.50	0.00	233	0.010	-40.00	-30.50	0.00
189	0.010	-40.00	-30.50	0.00	234	0.010	-40.00	-30.50	0.00
190	0.010	-40.00	-30.50	0.00	235	0.010	-40.00	-30.50	0.00
191	0.010	-40.00	-30.50	0.00	236	0.010	-39.84	-30.34	0.00
192	0.010	-40.00	-30.50	0.00	237	0.011	-39.57	-30.07	0.00
193	0.010	-40.00	-30.50	0.00	238	0.011	-39.31	-29.81	0.00
194	0.010	-40.00	-30.50	0.00	239	0.011	-39.05	-29.55	0.00
195	0.010	-40.00	-30.50	0.00	240	0.011	-38.80	-29.30	0.00
196	0.010	-40.00	-30.50	0.00	241	0.012	-38.55	-29.05	0.00
197	0.010	-40.00	-30.50	0.00	242	0.012	-38.31	-28.81	0.00
198	0.010	-40.00	-30.50	0.00	243	0.012	-38.08	-28.58	0.00
199	0.010	-40.00	-30.50	0.00	244	0.013	-37.85	-28.35	0.00
200	0.010	-40.00	-30.50	0.00	245	0.013	-37.63	-28.13	0.00
201	0.010	-40.00	-30.50	0.00	246	0.013	-37.41	-27.91	0.00
202	0.010	-40.00	-30.50	0.00	247	0.014	-37.19	-27.69	0.00
203	0.010	-40.00	-30.50	0.00	248	0.014	-36.98	-27.48	0.00
204	0.010	-40.00	-30.50	0.00	249	0.014	-36.78	-27.28	0.00
205	0.010	-40.00	-30.50	0.00	250	0.015	-36.58	-27.08	0.00
206	0.010	-40.00	-30.50	0.00	251	0.015	-36.39	-26.89	0.00
207	0.010	-40.00	-30.50	0.00	252	0.015	-36.20	-26.70	0.00
208	0.010	-40.00	-30.50	0.00	253	0.016	-36.01	-26.51	0.00
209	0.010	-40.00	-30.50	0.00	254	0.016	-35.83	-26.33	0.00
210	0.010	-40.00	-30.50	0.00	255	0.016	-35.65	-26.15	0.00
211	0.010	-40.00	-30.50	0.00	256	0.017	-35.48	-25.98	0.00
212	0.010	-40.00	-30.50	0.00	257	0.017	-35.31	-25.81	0.00
213	0.010	-40.00	-30.50	0.00	258	0.017	-35.15	-25.65	0.00
214	0.010	-40.00	-30.50	0.00	259	0.018	-34.99	-25.49	0.00
215	0.010	-40.00	-30.50	0.00	260	0.018	-34.83	-25.33	0.00
216	0.010	-40.00	-30.50	0.00	261	0.018	-34.68	-25.18	0.00
217	0.010	-40.00	-30.50	0.00	262	0.019	-34.53	-25.03	0.00
218	0.010	-40.00	-30.50	0.00	263	0.019	-34.38	-24.88	0.00
219	0.010	-40.00	-30.50	0.00	264	0.019	-34.24	-24.74	0.00
220	0.010	-40.00	-30.50	0.00	265	0.020	-34.11	-24.61	0.00
221	0.010	-40.00	-30.50	0.00	266	0.020	-33.97	-24.47	0.00
222	0.010	-40.00	-30.50	0.00	267	0.020	-33.84	-24.34	0.00
223	0.010	-40.00	-30.50	0.00	268	0.021	-33.71	-24.21	0.00
224	0.010	-40.00	-30.50	0.00	269	0.021	-33.59	-24.09	0.00

KATHREIN
SCALA DIVISION

Two CL-FM log-periodics	Vertical stack
Oriented at 0 degrees	Horizontal plane pattern
Maximum array gain: 9.5 dBd	
Vertical polarization	Stacked for increased F/B ratio

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
270	0.021	-33.47	-23.97	0.00	315	0.601	-4.42	5.08	3.22
271	0.022	-33.35	-23.85	0.00	316	0.617	-4.20	5.30	3.39
272	0.022	-33.24	-23.74	0.00	317	0.632	-3.98	5.52	3.56
273	0.022	-33.13	-23.63	0.00	318	0.648	-3.77	5.73	3.74
274	0.022	-33.02	-23.52	0.00	319	0.663	-3.57	5.93	3.92
275	0.023	-32.91	-23.41	0.00	320	0.678	-3.37	6.13	4.10
276	0.026	-31.72	-22.22	0.01	321	0.693	-3.19	6.31	4.28
277	0.029	-30.66	-21.16	0.01	322	0.706	-3.02	6.48	4.44
278	0.033	-29.69	-20.19	0.01	323	0.720	-2.85	6.65	4.63
279	0.036	-28.81	-19.31	0.01	324	0.734	-2.69	6.81	4.80
280	0.040	-27.99	-18.49	0.01	325	0.748	-2.52	6.98	4.99
281	0.050	-26.04	-16.54	0.02	326	0.761	-2.38	7.12	5.16
282	0.060	-24.42	-14.92	0.03	327	0.774	-2.22	7.28	5.34
283	0.071	-23.03	-13.53	0.04	328	0.787	-2.08	7.42	5.52
284	0.081	-21.82	-12.32	0.06	329	0.800	-1.93	7.57	5.71
285	0.092	-20.74	-11.24	0.08	330	0.813	-1.80	7.70	5.89
286	0.106	-19.48	-9.98	0.10	331	0.824	-1.68	7.82	6.06
287	0.121	-18.37	-8.87	0.13	332	0.836	-1.56	7.94	6.23
288	0.135	-17.37	-7.87	0.16	333	0.847	-1.44	8.06	6.40
289	0.150	-16.47	-6.97	0.20	334	0.859	-1.32	8.18	6.57
290	0.165	-15.64	-6.14	0.24	335	0.870	-1.21	8.29	6.75
291	0.186	-14.63	-5.13	0.31	336	0.879	-1.12	8.38	6.89
292	0.206	-13.71	-4.21	0.38	337	0.888	-1.03	8.47	7.03
293	0.227	-12.87	-3.37	0.46	338	0.898	-0.94	8.56	7.18
294	0.248	-12.10	-2.60	0.55	339	0.906	-0.85	8.65	7.32
295	0.270	-11.38	-1.88	0.65	340	0.915	-0.77	8.73	7.47
296	0.288	-10.83	-1.33	0.74	341	0.923	-0.70	8.80	7.59
297	0.306	-10.30	-0.80	0.83	342	0.930	-0.63	8.87	7.71
298	0.324	-9.80	-0.30	0.93	343	0.937	-0.56	8.94	7.83
299	0.342	-9.32	0.18	1.04	344	0.945	-0.49	9.01	7.96
300	0.360	-8.87	0.63	1.16	345	0.952	-0.43	9.07	8.08
301	0.376	-8.49	1.01	1.26	346	0.958	-0.38	9.12	8.18
302	0.393	-8.12	1.38	1.37	347	0.963	-0.32	9.18	8.27
303	0.409	-7.77	1.73	1.49	348	0.969	-0.27	9.23	8.37
304	0.425	-7.43	2.07	1.61	349	0.974	-0.23	9.27	8.46
305	0.442	-7.10	2.40	1.74	350	0.980	-0.18	9.32	8.56
306	0.457	-6.79	2.71	1.86	351	0.982	-0.15	9.35	8.60
307	0.474	-6.49	3.01	2.00	352	0.985	-0.13	9.37	8.66
308	0.490	-6.20	3.30	2.14	353	0.988	-0.11	9.39	8.70
309	0.506	-5.91	3.59	2.28	354	0.991	-0.08	9.42	8.75
310	0.522	-5.64	3.86	2.43	355	0.993	-0.06	9.44	8.80
311	0.538	-5.38	4.12	2.58	356	0.995	-0.04	9.46	8.82
312	0.554	-5.13	4.37	2.73	357	0.996	-0.03	9.47	8.84
313	0.570	-4.89	4.61	2.89	358	0.997	-0.02	9.48	8.87
314	0.585	-4.65	4.85	3.05	359	0.998	-0.01	9.49	8.89

KATHREIN
SCALA DIVISION
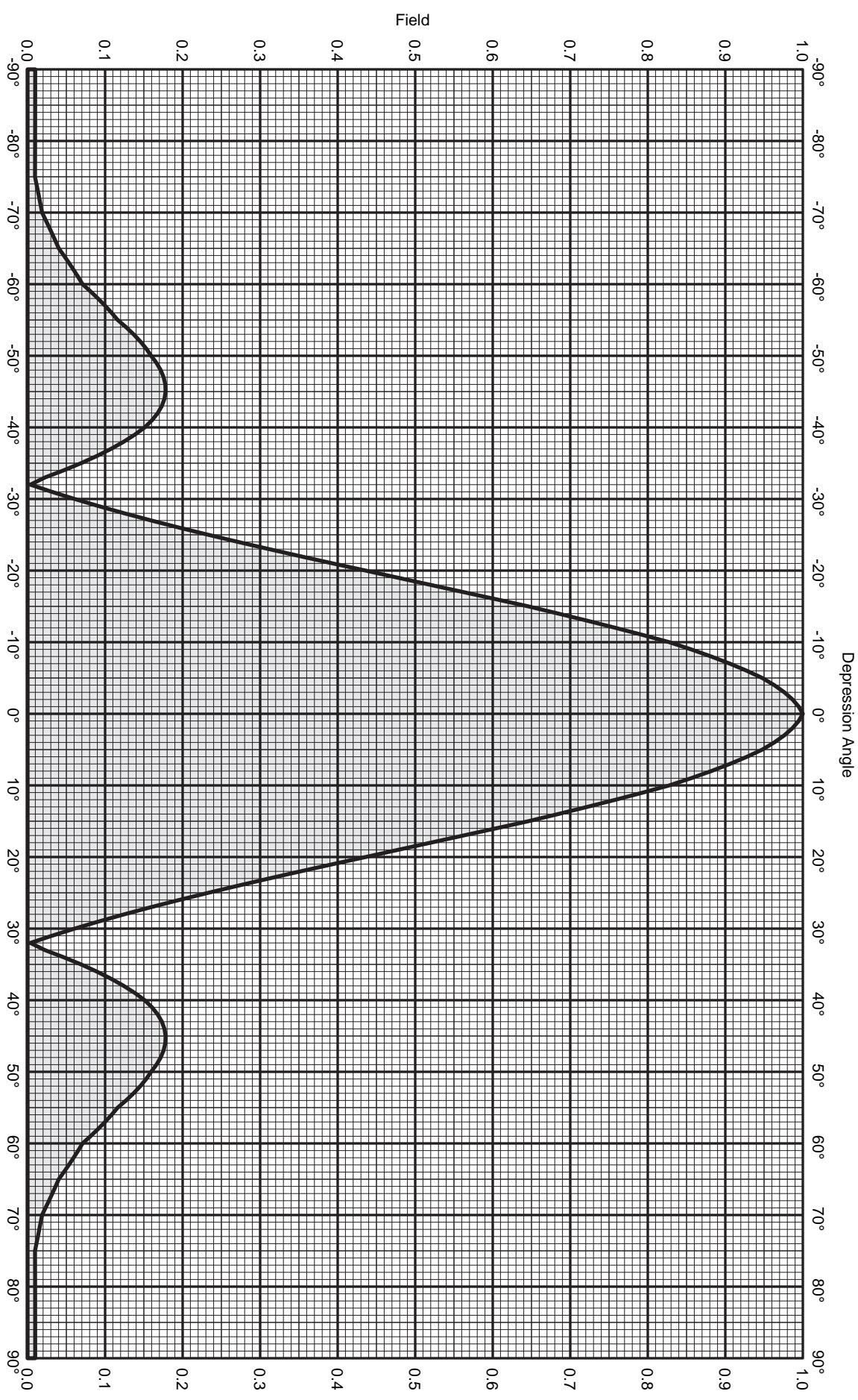
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Two CL-FM log-periodics
Oriented at horizon
Maximum array gain: 9.5 dBd
Vertical polarization

Vertical stack
Vertical plane pattern

Stacked for increased F/B ratio

KATHREIN
SCALA DIVISION

Two CL-FM log-periodics

Oriented at horizon

Maximum array gain: 9.5 dBd

Vertical polarization

Vertical stack

Vertical plane pattern

Stacked for increased F/B ratio

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
-90	0.010	-40.00	-30.50	0.00	-45	0.178	-14.99	-5.49	0.28
-89	0.010	-40.00	-30.50	0.00	-44	0.177	-15.06	-5.56	0.28
-88	0.010	-40.00	-30.50	0.00	-43	0.173	-15.23	-5.73	0.27
-87	0.010	-40.00	-30.50	0.00	-42	0.168	-15.50	-6.00	0.25
-86	0.010	-40.00	-30.50	0.00	-41	0.161	-15.89	-6.39	0.23
-85	0.010	-40.00	-30.50	0.00	-40	0.151	-16.41	-6.91	0.20
-84	0.010	-40.00	-30.50	0.00	-39	0.139	-17.17	-7.67	0.17
-83	0.010	-40.00	-30.50	0.00	-38	0.124	-18.13	-8.63	0.14
-82	0.010	-40.00	-30.50	0.00	-37	0.108	-19.36	-9.86	0.10
-81	0.010	-40.00	-30.50	0.00	-36	0.089	-20.98	-11.48	0.07
-80	0.010	-40.00	-30.50	0.00	-35	0.069	-23.22	-13.72	0.04
-79	0.010	-40.00	-30.50	0.00	-34	0.047	-26.64	-17.14	0.02
-78	0.010	-40.00	-30.50	0.00	-33	0.022	-33.02	-23.52	0.00
-77	0.010	-40.00	-30.50	0.00	-32	0.010	-40.00	-30.50	0.00
-76	0.010	-40.00	-30.50	0.00	-31	0.031	-30.08	-20.58	0.01
-75	0.010	-40.00	-30.50	0.00	-30	0.061	-24.33	-14.83	0.03
-74	0.011	-38.82	-29.32	0.00	-29	0.092	-20.73	-11.23	0.08
-73	0.013	-37.52	-28.02	0.00	-28	0.125	-18.07	-8.57	0.14
-72	0.015	-36.41	-26.91	0.00	-27	0.159	-15.95	-6.45	0.23
-71	0.017	-35.44	-25.94	0.00	-26	0.196	-14.17	-4.67	0.34
-70	0.019	-34.58	-25.08	0.00	-25	0.233	-12.65	-3.15	0.48
-69	0.023	-32.70	-23.20	0.00	-24	0.272	-11.32	-1.82	0.66
-68	0.028	-31.19	-21.69	0.01	-23	0.311	-10.13	-0.63	0.86
-67	0.032	-29.92	-20.42	0.01	-22	0.352	-9.07	0.43	1.11
-66	0.036	-28.84	-19.34	0.01	-21	0.394	-8.10	1.40	1.38
-65	0.040	-27.91	-18.41	0.01	-20	0.436	-7.21	2.29	1.70
-64	0.047	-26.59	-17.09	0.02	-19	0.478	-6.41	3.09	2.04
-63	0.053	-25.48	-15.98	0.03	-18	0.520	-5.68	3.82	2.41
-62	0.059	-24.53	-15.03	0.03	-17	0.562	-5.00	4.50	2.82
-61	0.065	-23.70	-14.20	0.04	-16	0.604	-4.38	5.12	3.25
-60	0.071	-22.99	-13.49	0.04	-15	0.646	-3.79	5.71	3.72
-59	0.081	-21.82	-12.32	0.06	-14	0.684	-3.29	6.21	4.18
-58	0.091	-20.84	-11.34	0.07	-13	0.722	-2.83	6.67	4.65
-57	0.100	-20.01	-10.51	0.09	-12	0.759	-2.40	7.10	5.13
-56	0.108	-19.30	-9.80	0.10	-11	0.794	-2.01	7.49	5.62
-55	0.116	-18.69	-9.19	0.12	-10	0.828	-1.64	7.86	6.11
-54	0.127	-17.92	-8.42	0.14	-9	0.856	-1.35	8.15	6.53
-53	0.137	-17.28	-7.78	0.17	-8	0.882	-1.09	8.41	6.93
-52	0.145	-16.74	-7.24	0.19	-7	0.906	-0.86	8.64	7.32
-51	0.153	-16.30	-6.80	0.21	-6	0.928	-0.65	8.85	7.67
-50	0.159	-15.95	-6.45	0.23	-5	0.948	-0.47	9.03	8.00
-49	0.166	-15.58	-6.08	0.25	-4	0.963	-0.33	9.17	8.27
-48	0.172	-15.30	-5.80	0.26	-3	0.976	-0.21	9.29	8.49
-47	0.176	-15.11	-5.61	0.27	-2	0.987	-0.12	9.38	8.68
-46	0.178	-15.01	-5.51	0.28	-1	0.995	-0.05	9.45	8.82
					0	1.000	0.00	9.50	8.91

KATHREIN
SCALA DIVISION

Two CL-FM log-periodics		Vertical stack	
Oriented at horizon		Vertical plane pattern	
Maximum array gain: 9.5 dBd			
Vertical polarization		Stacked for increased F/B ratio	

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	9.50	8.91	45	0.178	-14.99	-5.49	0.28
1	0.995	-0.05	9.45	8.82	46	0.178	-15.01	-5.51	0.28
2	0.987	-0.12	9.38	8.68	47	0.176	-15.11	-5.61	0.27
3	0.976	-0.21	9.29	8.49	48	0.172	-15.30	-5.80	0.26
4	0.963	-0.33	9.17	8.27	49	0.166	-15.58	-6.08	0.25
5	0.948	-0.47	9.03	8.00	50	0.159	-15.95	-6.45	0.23
6	0.928	-0.65	8.85	7.67	51	0.153	-16.30	-6.80	0.21
7	0.906	-0.86	8.64	7.32	52	0.145	-16.74	-7.24	0.19
8	0.882	-1.09	8.41	6.93	53	0.137	-17.28	-7.78	0.17
9	0.856	-1.35	8.15	6.53	54	0.127	-17.92	-8.42	0.14
10	0.828	-1.64	7.86	6.11	55	0.116	-18.69	-9.19	0.12
11	0.794	-2.01	7.49	5.62	56	0.108	-19.30	-9.80	0.10
12	0.759	-2.40	7.10	5.13	57	0.100	-20.01	-10.51	0.09
13	0.722	-2.83	6.67	4.65	58	0.091	-20.84	-11.34	0.07
14	0.684	-3.29	6.21	4.18	59	0.081	-21.82	-12.32	0.06
15	0.646	-3.79	5.71	3.72	60	0.071	-22.99	-13.49	0.04
16	0.604	-4.38	5.12	3.25	61	0.065	-23.70	-14.20	0.04
17	0.562	-5.00	4.50	2.82	62	0.059	-24.53	-15.03	0.03
18	0.520	-5.68	3.82	2.41	63	0.053	-25.48	-15.98	0.03
19	0.478	-6.41	3.09	2.04	64	0.047	-26.59	-17.09	0.02
20	0.436	-7.21	2.29	1.70	65	0.040	-27.91	-18.41	0.01
21	0.394	-8.09	1.41	1.38	66	0.036	-28.84	-19.34	0.01
22	0.352	-9.07	0.43	1.11	67	0.032	-29.92	-20.42	0.01
23	0.311	-10.13	-0.63	0.86	68	0.028	-31.19	-21.69	0.01
24	0.272	-11.32	-1.82	0.66	69	0.023	-32.70	-23.20	0.00
25	0.233	-12.65	-3.15	0.48	70	0.019	-34.58	-25.08	0.00
26	0.196	-14.17	-4.67	0.34	71	0.017	-35.44	-25.94	0.00
27	0.159	-15.95	-6.45	0.23	72	0.015	-36.41	-26.91	0.00
28	0.125	-18.07	-8.57	0.14	73	0.013	-37.52	-28.02	0.00
29	0.092	-20.73	-11.23	0.08	74	0.011	-38.82	-29.32	0.00
30	0.061	-24.33	-14.83	0.03	75	0.010	-40.00	-30.50	0.00
31	0.031	-30.08	-20.58	0.01	76	0.010	-40.00	-30.50	0.00
32	0.010	-40.00	-30.50	0.00	77	0.010	-40.00	-30.50	0.00
33	0.022	-33.02	-23.52	0.00	78	0.010	-40.00	-30.50	0.00
34	0.047	-26.64	-17.14	0.02	79	0.010	-40.00	-30.50	0.00
35	0.069	-23.22	-13.72	0.04	80	0.010	-40.00	-30.50	0.00
36	0.089	-20.98	-11.48	0.07	81	0.010	-40.00	-30.50	0.00
37	0.108	-19.36	-9.86	0.10	82	0.010	-40.00	-30.50	0.00
38	0.124	-18.13	-8.63	0.14	83	0.010	-40.00	-30.50	0.00
39	0.139	-17.17	-7.67	0.17	84	0.010	-40.00	-30.50	0.00
40	0.151	-16.41	-6.91	0.20	85	0.010	-40.00	-30.50	0.00
41	0.161	-15.89	-6.39	0.23	86	0.010	-40.00	-30.50	0.00
42	0.168	-15.50	-6.00	0.25	87	0.010	-40.00	-30.50	0.00
43	0.173	-15.23	-5.73	0.27	88	0.010	-40.00	-30.50	0.00
44	0.177	-15.06	-5.56	0.28	89	0.010	-40.00	-30.50	0.00
					90	0.010	-40.00	-30.50	0.00