

## **Technical Report W292ED Minor Modification**

This technical report is submitted for a minor modification to W292ED at Franklin, TN, FCC file no. BLFT-20190923ABR. Changes in tower site, COR AGL, antenna and ERP are submitted for the translator to serve as a fill-in facility for WBUZ(FM) 275C1 HD4 at La Vergne, TN, FCC facility I.D. 74243.

### **W292ED Modification Analysis:**

An overlap study in exhibit E-1 shows the W292ED modification is within the WNRQ(FM) 290C and WNFN(FM).CP 294C2 second-adjacent protected contours. The +40 153.9 F(50-10) interfering contour within WNRQ(FM) (exhibit E-2) and 141.1 F(50-10) dBu interfering contour within WNFN(FM) (exhibit E-3) calculated within the protected contours will not encompass any population, major roads or buildings (exhibit E-4). Based on this showing, a waiver of Section 74.1204 is requested, in accordance with *Living Way Ministries, Inc.* (FCC 08-242). The 60 dBu contour overlaps the licensed 60 dBu contour and is contained within the primary WBUZ(FM) 275C1 HD4 60 dBu analog equivalent contour (exhibit E-5).

### **Antenna System:**

The W292ED modification will be located on the existing tower, ASR 1043479, at coordinates:

**36 00 16.8N 086 50 01.7W NAD 83.**

Two Scala CL-FM single bay, directional antennas skewed at 90 degrees, 45 degree slant and rotated at a 170 degree azimuth (exhibit E-6) will be mounted at a COR AGL of 79.5 meters, 391.3 meters AMSL, 179 meters HAAT (exhibit E-7) and operate at 99 watts

ERP.

**RF Exposure Calculation:**

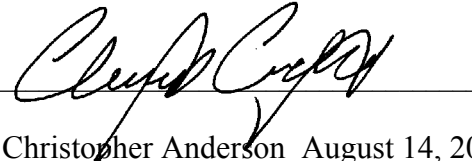
The RF contribution was calculated using the formula from the OET Bulletin 65:

$$S \text{ (RF in microwatts/cm}^2\text{)} = \frac{33.4 \times F^2 \times (H \text{ ERP} + V \text{ ERP in watts})}{R^2 \text{ (height of radiation center in meters}^2\text{)}}$$

Using a worst case vertical (F) factor of 1.0, the RF is calculated to be 1.1  $\mu\text{W}/\text{cm}^2$  to the ground, which is well below 5% of the 200  $\mu\text{W}/\text{cm}^2$  maximum permissible for uncontrolled, general public exposure, allowing exclusion from consideration.

**Conclusion:**

It is concluded that the W292ED modification complies with all Commission rules and policies.



Christopher Anderson August 14, 2020  
andersce@bham.rr.com  
© 2020 Anderson Associates

# E-1 W292ED Mod. Overlap Study

REFERENCE		CH#	292D - 106.3 MHz, Pwr= 0.099 kW DA, HAAT= 179.0 M, COR= 391.3 M				DISPLAY DATES				
36 00 16.80 N.			Average Protected F(50-50)= 13.77 km				DATA 08-14-20				
86 50 01.70 W.			Standard Directional				SEARCH 08-14-20				
CH	CALL	TYPE	ANT	AZI	DI ST	LAT	PWR(kW)	INT(km)	PRO(km)	*IN*	*OUT*
CITY		STATE		<--	FILE #	LNG	HAAT(M)	COR(M)	LICENSEE	(Overlap in km)	
290C	WNRQ	LIC	___	338.5	3.69	36 02 08.20	100.000	11.0	76.5	-10.2*	-72.8*
Nashville		TN		158.5	BLH19831212AN	86 50 56.00	376	611	Capstar Tx, LLC		
294C2	WNFN	APP D	___	3.8	4.74	36 02 50.00	15.000	5.2	49.0	-3.2*	-44.3*
Franklin		TN		183.8	0000106493	86 49 49.00	278	479	Midwest Communications, Inc		
294C2	WNFN	CP Z	___	3.8	4.74	36 02 50.20	15.000	5.2	49.0	-3.2*	-44.3*(1)
Franklin		TN		183.8	BPH20170627AAL	86 49 49.00	278	479	Midwest Communications, Inc		
292D	W292ED	LIC D	___	181.7	19.68	35 49 39.80	0.149		---	Reference---	
Franklin		TN		1.7	BLFT20190923ABR	86 50 25.60		376	Educational Media Foundati		
292C2	WOVO	LIC	___	26.5	129.36	37 02 39.20	50.000	136.7	51.0	-13.8*	68.1
Horse Cave		KY		206.9	BLH20121019ACC	86 10 59.90	123	314	Soky Radio, LLC		
292L1	WXNS-LP	CP	___	14.6	19.80	36 10 37.20	0.100			-10.2*	3.0
Nashville		TN		194.7	BNPL20131112AHF	86 46 41.00	10	226	North Nashville Community		
294C3	WNFN	LIC Z	___	7.0	29.04	36 15 50.20	2.950	2.5	36.5	22.2	-7.5*(2)
Millersville		TN		187.1	BLH20080428AAO	86 47 39.00	294	476	Midwest Communications, Inc		
292L1	WXNS-LP	LIC	___	13.3	21.21	36 11 25.50	0.010			6.8	8.4
Nashville		TN		193.3	0000093433	86 46 46.40	12	176	North Nashville Community		

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.

- (1) The +40 153.9 F(50-10) dBu contour within the WNRQ(FM) 290C second-adjacent protected contour (exhibit E-2) and 141.1 F(50-10) dBu contour within the WNFN(FM) 294C2.CP second-adjacent protected contour (exhibit E-3) do not encompass any population, roads or buildings (exhibit E-4).
- (2) The WNFN construction permit (BPH-20170627AAL) has been constructed and a license to cover filed on 2-24-20) (LMS file # 0000106493). The WNFN facility is operating at the new site. Therefore, the former licensed facility does not require protection,

E-2 W292ED Mod. +40 F(50-10) dBu Contour Calculation Within WNRQ(FM) 290C

W292ED Franklin, TN, Showing Protection to WNRQ(FM), Channel: 290  
Geographic Coordinates: N. 360016.80 W. 865001.70  
74.1204(d) Study - Using GLOBE 30 SEC Terrain Database Translator or  
LPFM Maximum Licensed ERP = 0.25 kW, Channel: 292 Translator or  
LPFM Antenna Height AG = 79.5 meters  
W292ED Antenna Model = CL-FM Composite

Protected Station's Contour = 113.9456 dBu  
Translator's or LPFM's full Interference contour 153.9456

Review Azimuth = 170 Degrees True  
Horizontal Relative Field at Review Azimuth = 1.000  
Translator/LPFM ERP on the horizontal at Review Azimuth = 0.25 kW  
Distance between stations = 3.7 km  
Protected Station= WNRQ, 100 kW, 611 M meters COR AMSL

Depression Angle From Degree(Deg)	Vertical Relative Field	Horizontal Relative Field	ERP (kw)	Dist to IX Contour Along Dep. Angle(m)	Dist to IX Contour From Tower Base(m)	Height IX Above Ground (m)
00.00	1.0	1.0	0.2500	002.2268	002.2268	079.500
05.00	0.98	1.0	0.2401	002.1823	002.1740	079.310
10.00	0.95	1.0	0.2256	002.1155	002.0834	079.133
15.00	0.895	1.0	0.2003	001.9930	001.9251	078.984
20.00	0.82	1.0	0.1681	001.8260	001.7159	078.875
25.00	0.735	1.0	0.1351	001.6367	001.4834	078.808
30.00	0.645	1.0	0.1040	001.4363	001.2439	078.782
35.00	0.563	1.0	0.0791	001.2526	001.0261	078.782
40.00	0.47	1.0	0.0552	001.0466	000.8018	078.827
45.00	0.36	1.0	0.0324	000.8017	000.5669	078.933
50.00	0.25	1.0	0.0156	000.5567	000.3578	079.074
55.00	0.155	1.0	0.0060	000.3452	000.1980	079.217
60.00	0.085	1.0	0.0018	000.1893	000.0946	079.336
65.00	0.045	1.0	0.0005	000.1002	000.0423	079.409
70.00	0.02	1.0	0.0001	000.0445	000.0152	079.458
75.00	0.01	1.0	0.0000	000.0223	000.0058	079.478
80.00	0.01	1.0	0.0000	000.0223	000.0039	079.478
85.00	0.01	1.0	0.0000	000.0223	000.0019	079.478
90.00	0.01	1.0	0.0000	000.0223	000.0000	079.478

E-3 W292ED Mod. +40 141.1 F(50-10) dBu Contour Calculation Within WNFN(FM).CP 294C2

W292ED Franklin, TN, Showing Protection to WNFN.CP, Channel: 294  
Geographic Coordinates: N. 360016.80 W. 865001.70  
74.1204(d) Study - Using GLOBE 30 SEC Terrain Database  
Translator or LPFM Maximum Licensed ERP = 0.25 kW, Channel: 292  
Translator or LPFM Antenna Height AG = 79.5 meters  
W292ED Antenna Model = CL-FM Composite

Protected Station's Contour = 101.1162 dBu  
Translator's or LPFM's full Interference contour 141.1162

Review Azimuth = 170 Degrees True  
Horizontal Relative Field at Review Azimuth = 1.000  
Translator/LPFM ERP on the horizontal at Review Azimuth = 0.25 kW  
Distance between stations = 4.7 km  
Protected Station= WNFN.C, 15 kW, 479 M meters COR AMSL

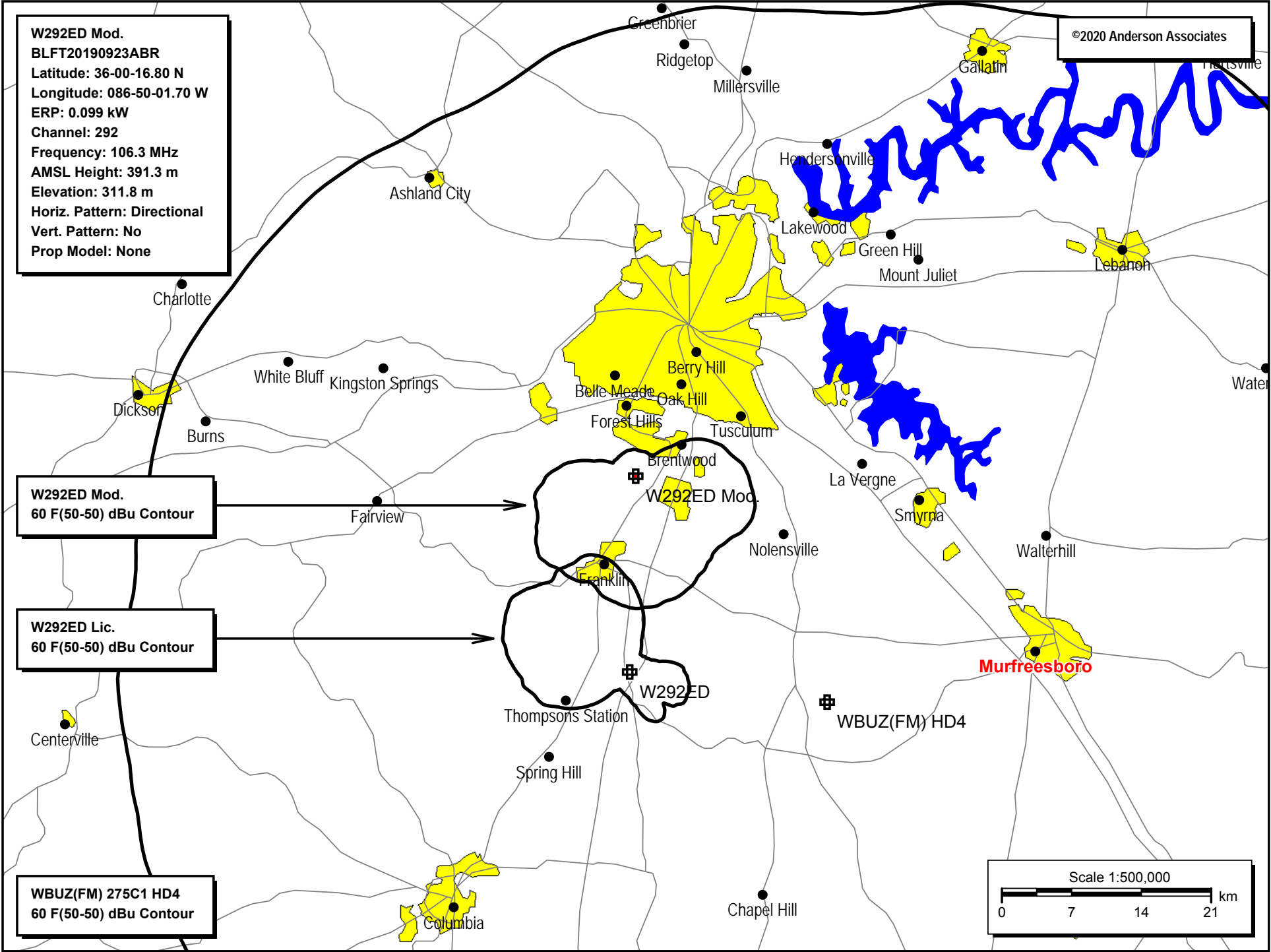
Depression Angle From Degree(Deg)	Vertical Relative Field	Horizontal Relative Field	ERP (kw)	Dist to IX Contour Along Dep. Angle(m)	Dist to IX Contour From Tower Base(m)	Height IX Above Ground (m)
00.00	1.0	1.0	0.2500	009.7535	009.7535	079.500
05.00	0.98	1.0	0.2401	009.5584	009.5220	078.667
10.00	0.95	1.0	0.2256	009.2658	009.1250	077.891
15.00	0.895	1.0	0.2003	008.7294	008.4319	077.241
20.00	0.82	1.0	0.1681	007.9979	007.5155	076.765
25.00	0.735	1.0	0.1351	007.1688	006.4972	076.470
30.00	0.645	1.0	0.1040	006.2910	005.4482	076.354
35.00	0.563	1.0	0.0791	005.4863	004.4941	076.353
40.00	0.47	1.0	0.0552	004.5841	003.5117	076.553
45.00	0.36	1.0	0.0324	003.5113	002.4828	077.017
50.00	0.25	1.0	0.0156	002.4384	001.5674	077.632
55.00	0.155	1.0	0.0060	001.5118	000.8671	078.262
60.00	0.085	1.0	0.0018	000.8290	000.4145	078.782
65.00	0.045	1.0	0.0005	000.4389	000.1855	079.102
70.00	0.02	1.0	0.0001	000.1951	000.0667	079.317
75.00	0.01	1.0	0.0000	000.0975	000.0252	079.406
80.00	0.01	1.0	0.0000	000.0975	000.0169	079.404
85.00	0.01	1.0	0.0000	000.0975	000.0085	079.403
90.00	0.01	1.0	0.0000	000.0975	000.0000	079.402





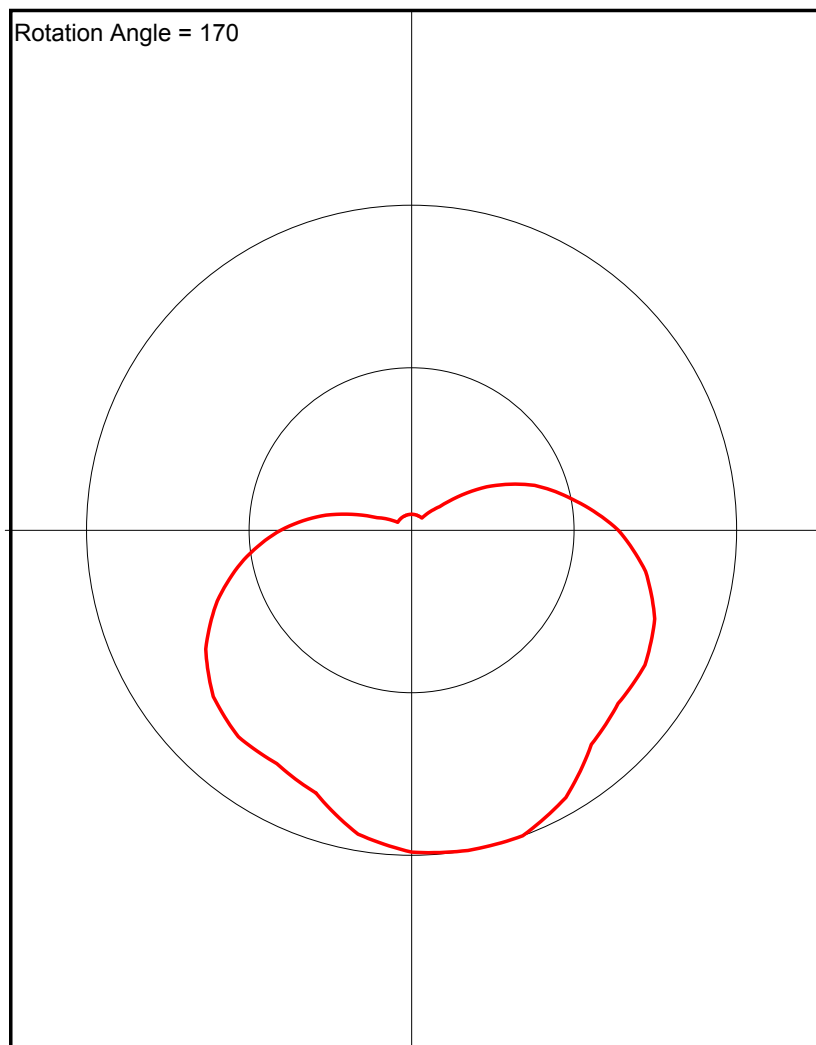


E-5 W292ED Mod. 60 F(50-50) dBu Contour Plot



## E-6 W292ED Mod. Antenna Pattern

Azimuth (deg)	Relative Field
0.0	0.049
10.0	0.049
20.0	0.049
30.0	0.049
40.0	0.049
50.0	0.113
60.0	0.267
70.0	0.403
80.0	0.514
90.0	0.636
100.0	0.731
110.0	0.796
120.0	0.829
130.0	0.829
140.0	0.86
150.0	0.949
160.0	0.99
170.0	1.0
180.0	0.99
190.0	0.949
200.0	0.86
210.0	0.829
220.0	0.829
230.0	0.796
240.0	0.731
250.0	0.636
260.0	0.524
270.0	0.403
280.0	0.267
290.0	0.113
300.0	0.049
310.0	0.049
320.0	0.049
330.0	0.049
340.0	0.049
350.0	0.049





## E-7 W292ED Mod. HAAT Calculation

### Antenna Height Above Average Terrain Calculations -- Results

#### Input Data

Latitude **36° 0' 16.8"** North

Longitude **86° 50' 1.7"** West (NAD 83)

Height of antenna radiation center above mean sea level: **391.3** meters AMSL

Number of Evenly Spaced Radials = **12**      0° is referenced to True North

#### Results

Calculated HAAT = **179 meters**

Antenna Height Above Average Terrain calculated  
using 1 km [GLOBE terrain data](#)

#### Individual "Radial HAAT" Values, in meters

0°	201.6 m
30°	184.9 m
60°	199.0 m
90°	187.3 m
120°	157.0 m
150°	144.7 m
180°	166.5 m
210°	163.0 m
240°	168.6 m
270°	185.5 m
300°	197.3 m
330°	193.5 m

## ASR Registration 1043479

### Registration Detail

Reg Number	1043479	Status	Constructed
File Number	A1036548	Constructed	03/07/1962
EMI	No	Dismantled	
NEPA	No		

### Antenna Structure

#### Structure Type

#### Location (in NAD83 Coordinates)

Lat/Long	36-00-16.8 N 086-50-01.7 W	Address	6117-A Murray Lane (088709 / Brentwood)
City, State	NASHVILLE , TN		
Zip	37027	County	WILLIAMSON
Center of AM Array		Position of Tower in Array	

#### Heights (meters)

Elevation of Site Above Mean Sea Level	Overall Height Above Ground (AGL)
311.8	91.7
Overall Height Above Mean Sea Level	Overall Height Above Ground w/o Appurtenances
403.5	85.6

### Painting and Lighting Specifications

FAA Chapters 4, 6, 13  
Paint and Light in Accordance with FAA Circular Number 70/7460-1H

### FAA Notification

FAA Study	2002-ASO-5563-OE	FAA Issue Date	10/23/2002
-----------	------------------	----------------	------------

### Owner & Contact Information

FRN	0011498342	Owner Entity	Limited Liability Company Type
-----	------------	--------------	-----------------------------------

#### Owner

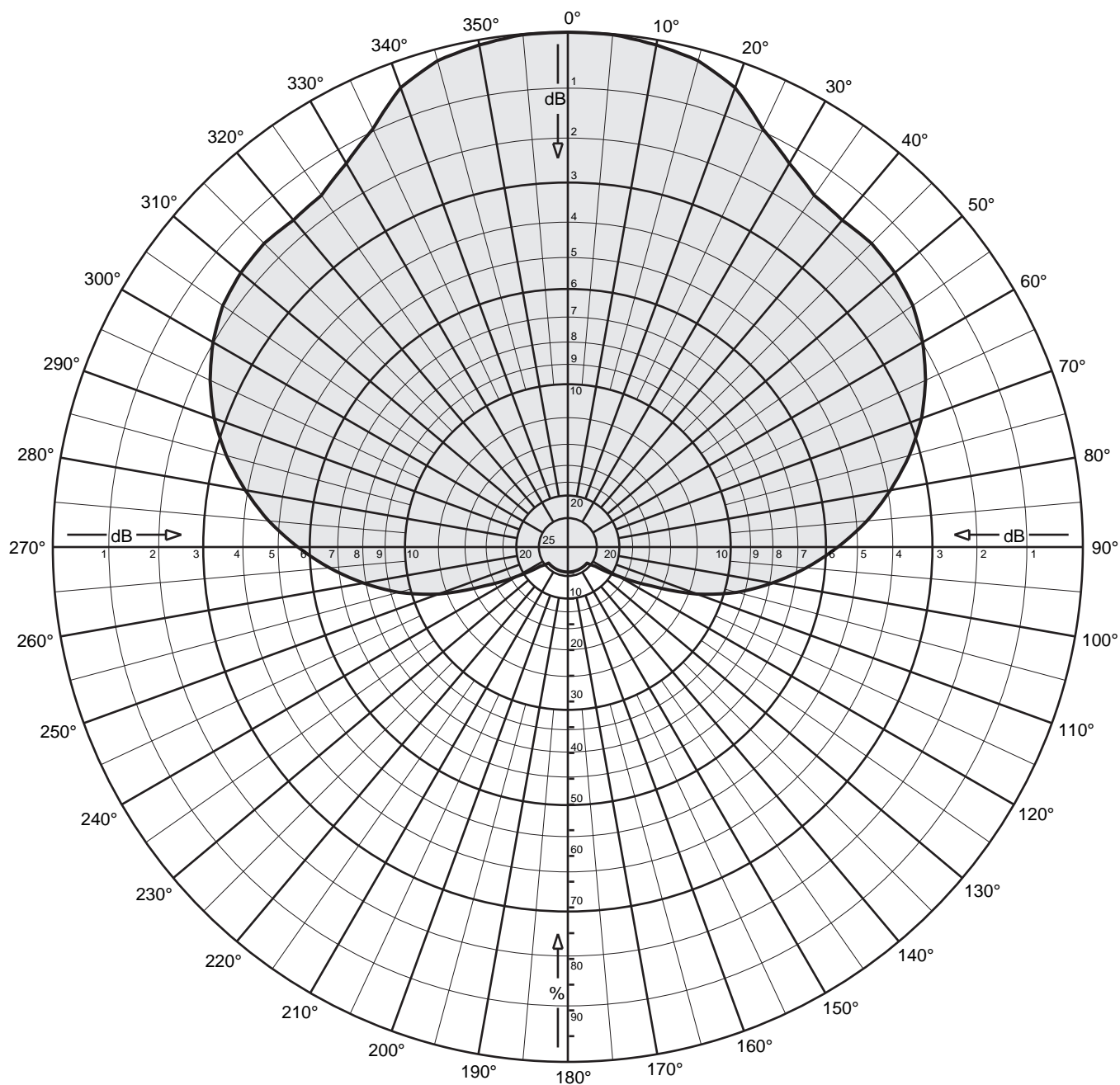
American Towers LLC	P: (781)926-4500
Attention To: FAA/FCC Regulatory Team	F:
10 Presidential Way	E: faa-fcc@americantower.com
Woburn , MA 01801	

#### Contact

Attention To: FAA/FCC Regulatory Team	P: (781)926-4500
10 Presidential Way	F:
Woburn , MA 01801	E: faa-fcc@americantower.com

### Last Action Status

Status	Constructed	Received	06/21/2016
Purpose	Admin Update	Entered	06/21/2016



Two CL-FM Log-periodic Antennas

Slant 45 Polarity

Skew 90 degrees

Gain: 2.3 dBd (x 1.7)

Vertical stacked 0.87 wavelength

Horizontal plane Pattern



Two CL-FM Log-periodic Antennas  
 Slant 45 Polarity  
 Skew 90 degrees  
 Gain: 2.3 dBd (x 1.7)

Vertical stacked 0.87 wavelength  
 Horizontal plane Pattern

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	2.30	1.70	45	0.834	-1.58	0.72	1.18
1	1.000	-0.00	2.30	1.70	46	0.833	-1.59	0.71	1.18
2	1.000	-0.00	2.30	1.70	47	0.832	-1.60	0.70	1.18
3	0.999	-0.01	2.29	1.70	48	0.831	-1.61	0.69	1.17
4	0.999	-0.01	2.29	1.70	49	0.830	-1.62	0.68	1.17
5	0.999	-0.01	2.29	1.69	50	0.829	-1.63	0.67	1.17
6	0.998	-0.02	2.28	1.69	51	0.827	-1.65	0.65	1.16
7	0.995	-0.04	2.26	1.68	52	0.824	-1.68	0.62	1.15
8	0.994	-0.05	2.25	1.68	53	0.822	-1.70	0.60	1.15
9	0.991	-0.07	2.23	1.67	54	0.820	-1.73	0.57	1.14
10	0.990	-0.08	2.22	1.67	55	0.818	-1.75	0.55	1.14
11	0.987	-0.11	2.19	1.66	56	0.813	-1.79	0.51	1.12
12	0.985	-0.13	2.17	1.65	57	0.809	-1.84	0.46	1.11
13	0.983	-0.15	2.15	1.64	58	0.804	-1.89	0.41	1.10
14	0.981	-0.17	2.13	1.63	59	0.800	-1.94	0.36	1.09
15	0.978	-0.20	2.10	1.62	60	0.796	-1.99	0.31	1.07
16	0.972	-0.25	2.05	1.60	61	0.790	-2.05	0.25	1.06
17	0.966	-0.30	2.00	1.59	62	0.784	-2.12	0.18	1.04
18	0.961	-0.35	1.95	1.57	63	0.778	-2.18	0.12	1.03
19	0.955	-0.40	1.90	1.55	64	0.772	-2.25	0.05	1.01
20	0.949	-0.45	1.85	1.53	65	0.766	-2.31	-0.01	1.00
21	0.939	-0.55	1.75	1.50	66	0.759	-2.39	-0.09	0.98
22	0.928	-0.65	1.65	1.46	67	0.752	-2.47	-0.17	0.96
23	0.917	-0.75	1.55	1.43	68	0.745	-2.56	-0.26	0.94
24	0.906	-0.85	1.45	1.40	69	0.738	-2.64	-0.34	0.93
25	0.896	-0.95	1.35	1.36	70	0.731	-2.72	-0.42	0.91
26	0.889	-1.03	1.27	1.34	71	0.722	-2.83	-0.53	0.88
27	0.882	-1.09	1.21	1.32	72	0.713	-2.94	-0.64	0.86
28	0.874	-1.16	1.14	1.30	73	0.704	-3.05	-0.75	0.84
29	0.868	-1.23	1.07	1.28	74	0.695	-3.16	-0.86	0.82
30	0.860	-1.31	0.99	1.26	75	0.686	-3.27	-0.97	0.80
31	0.855	-1.36	0.94	1.24	76	0.677	-3.39	-1.09	0.78
32	0.850	-1.41	0.89	1.23	77	0.666	-3.53	-1.23	0.75
33	0.845	-1.47	0.83	1.21	78	0.656	-3.66	-1.36	0.73
34	0.839	-1.52	0.78	1.20	79	0.646	-3.80	-1.50	0.71
35	0.834	-1.58	0.72	1.18	80	0.636	-3.93	-1.63	0.69
36	0.833	-1.59	0.71	1.18	81	0.625	-4.08	-1.78	0.66
37	0.832	-1.60	0.70	1.18	82	0.615	-4.22	-1.92	0.64
38	0.831	-1.61	0.69	1.17	83	0.604	-4.38	-2.08	0.62
39	0.830	-1.62	0.68	1.17	84	0.594	-4.53	-2.23	0.60
40	0.829	-1.63	0.67	1.17	85	0.583	-4.69	-2.39	0.58
41	0.830	-1.62	0.68	1.17	86	0.571	-4.86	-2.56	0.55
42	0.831	-1.61	0.69	1.17	87	0.560	-5.04	-2.74	0.53
43	0.832	-1.60	0.70	1.18	88	0.548	-5.23	-2.93	0.51
44	0.833	-1.59	0.71	1.18	89	0.536	-5.42	-3.12	0.49



Two CL-FM Log-periodic Antennas  
 Slant 45 Polarity  
 Skew 90 degrees  
 Gain: 2.3 dBd (x 1.7)

Vertical stacked 0.87 wavelength  
 Horizontal plane Pattern

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
90	0.524	-5.61	-3.31	0.47	135	0.049	-26.27	-23.97	0.00
91	0.512	-5.81	-3.51	0.45	136	0.049	-26.27	-23.97	0.00
92	0.500	-6.01	-3.71	0.43	137	0.049	-26.27	-23.97	0.00
93	0.488	-6.23	-3.93	0.40	138	0.049	-26.27	-23.97	0.00
94	0.477	-6.44	-4.14	0.39	139	0.049	-26.27	-23.97	0.00
95	0.464	-6.66	-4.36	0.37	140	0.049	-26.27	-23.97	0.00
96	0.452	-6.89	-4.59	0.35	141	0.049	-26.27	-23.97	0.00
97	0.440	-7.14	-4.84	0.33	142	0.049	-26.27	-23.97	0.00
98	0.428	-7.38	-5.08	0.31	143	0.049	-26.27	-23.97	0.00
99	0.415	-7.64	-5.34	0.29	144	0.049	-26.27	-23.97	0.00
100	0.403	-7.90	-5.60	0.28	145	0.049	-26.27	-23.97	0.00
101	0.390	-8.17	-5.87	0.26	146	0.049	-26.27	-23.97	0.00
102	0.378	-8.46	-6.16	0.24	147	0.049	-26.27	-23.97	0.00
103	0.365	-8.75	-6.45	0.23	148	0.049	-26.27	-23.97	0.00
104	0.353	-9.05	-6.75	0.21	149	0.049	-26.27	-23.97	0.00
105	0.340	-9.37	-7.07	0.20	150	0.049	-26.27	-23.97	0.00
106	0.326	-9.75	-7.45	0.18	151	0.049	-26.27	-23.97	0.00
107	0.311	-10.15	-7.85	0.16	152	0.049	-26.27	-23.97	0.00
108	0.296	-10.56	-8.26	0.15	153	0.049	-26.27	-23.97	0.00
109	0.282	-11.00	-8.70	0.13	154	0.049	-26.27	-23.97	0.00
110	0.267	-11.46	-9.16	0.12	155	0.049	-26.27	-23.97	0.00
111	0.249	-12.06	-9.76	0.11	156	0.049	-26.27	-23.97	0.00
112	0.232	-12.71	-10.41	0.09	157	0.049	-26.27	-23.97	0.00
113	0.214	-13.40	-11.10	0.08	158	0.049	-26.27	-23.97	0.00
114	0.196	-14.16	-11.86	0.07	159	0.049	-26.27	-23.97	0.00
115	0.178	-14.98	-12.68	0.05	160	0.049	-26.27	-23.97	0.00
116	0.165	-15.64	-13.34	0.05	161	0.049	-26.27	-23.97	0.00
117	0.152	-16.35	-14.05	0.04	162	0.049	-26.27	-23.97	0.00
118	0.139	-17.12	-14.82	0.03	163	0.049	-26.27	-23.97	0.00
119	0.126	-17.97	-15.67	0.03	164	0.049	-26.27	-23.97	0.00
120	0.113	-18.91	-16.61	0.02	165	0.049	-26.27	-23.97	0.00
121	0.104	-19.69	-17.39	0.02	166	0.049	-26.27	-23.97	0.00
122	0.094	-20.54	-18.24	0.01	167	0.049	-26.27	-23.97	0.00
123	0.084	-21.49	-19.19	0.01	168	0.049	-26.27	-23.97	0.00
124	0.074	-22.56	-20.26	0.01	169	0.049	-26.27	-23.97	0.00
125	0.065	-23.77	-21.47	0.01	170	0.049	-26.27	-23.97	0.00
126	0.062	-24.22	-21.92	0.01	171	0.049	-26.27	-23.97	0.00
127	0.058	-24.69	-22.39	0.01	172	0.049	-26.27	-23.97	0.00
128	0.055	-25.18	-22.88	0.01	173	0.049	-26.27	-23.97	0.00
129	0.052	-25.71	-23.41	0.00	174	0.049	-26.27	-23.97	0.00
130	0.049	-26.27	-23.97	0.00	175	0.049	-26.27	-23.97	0.00
131	0.049	-26.27	-23.97	0.00	176	0.049	-26.27	-23.97	0.00
132	0.049	-26.27	-23.97	0.00	177	0.049	-26.27	-23.97	0.00
133	0.049	-26.27	-23.97	0.00	178	0.049	-26.27	-23.97	0.00
134	0.049	-26.27	-23.97	0.00	179	0.049	-26.27	-23.97	0.00





Two CL-FM Log-periodic Antennas  
 Slant 45 Polarity  
 Skew 90 degrees  
 Gain: 2.3 dBd (x 1.7)

Vertical stacked 0.87 wavelength  
 Horizontal plane Pattern

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
180	0.049	-26.27	-23.97	0.00	225	0.049	-26.27	-23.97	0.00
181	0.049	-26.27	-23.97	0.00	226	0.049	-26.27	-23.97	0.00
182	0.049	-26.27	-23.97	0.00	227	0.049	-26.27	-23.97	0.00
183	0.049	-26.27	-23.97	0.00	228	0.049	-26.27	-23.97	0.00
184	0.049	-26.27	-23.97	0.00	229	0.049	-26.27	-23.97	0.00
185	0.049	-26.27	-23.97	0.00	230	0.049	-26.27	-23.97	0.00
186	0.049	-26.27	-23.97	0.00	231	0.052	-25.71	-23.41	0.00
187	0.049	-26.27	-23.97	0.00	232	0.055	-25.18	-22.88	0.01
188	0.049	-26.27	-23.97	0.00	233	0.058	-24.69	-22.39	0.01
189	0.049	-26.27	-23.97	0.00	234	0.062	-24.22	-21.92	0.01
190	0.049	-26.27	-23.97	0.00	235	0.065	-23.77	-21.47	0.01
191	0.049	-26.27	-23.97	0.00	236	0.074	-22.56	-20.26	0.01
192	0.049	-26.27	-23.97	0.00	237	0.084	-21.49	-19.19	0.01
193	0.049	-26.27	-23.97	0.00	238	0.094	-20.54	-18.24	0.01
194	0.049	-26.27	-23.97	0.00	239	0.104	-19.69	-17.39	0.02
195	0.049	-26.27	-23.97	0.00	240	0.113	-18.91	-16.61	0.02
196	0.049	-26.27	-23.97	0.00	241	0.126	-17.97	-15.67	0.03
197	0.049	-26.27	-23.97	0.00	242	0.139	-17.12	-14.82	0.03
198	0.049	-26.27	-23.97	0.00	243	0.152	-16.35	-14.05	0.04
199	0.049	-26.27	-23.97	0.00	244	0.165	-15.64	-13.34	0.05
200	0.049	-26.27	-23.97	0.00	245	0.178	-14.98	-12.68	0.05
201	0.049	-26.27	-23.97	0.00	246	0.196	-14.16	-11.86	0.07
202	0.049	-26.27	-23.97	0.00	247	0.214	-13.40	-11.10	0.08
203	0.049	-26.27	-23.97	0.00	248	0.232	-12.71	-10.41	0.09
204	0.049	-26.27	-23.97	0.00	249	0.249	-12.06	-9.76	0.11
205	0.049	-26.27	-23.97	0.00	250	0.267	-11.46	-9.16	0.12
206	0.049	-26.27	-23.97	0.00	251	0.282	-11.00	-8.70	0.13
207	0.049	-26.27	-23.97	0.00	252	0.296	-10.56	-8.26	0.15
208	0.049	-26.27	-23.97	0.00	253	0.311	-10.15	-7.85	0.16
209	0.049	-26.27	-23.97	0.00	254	0.326	-9.75	-7.45	0.18
210	0.049	-26.27	-23.97	0.00	255	0.340	-9.37	-7.07	0.20
211	0.049	-26.27	-23.97	0.00	256	0.353	-9.05	-6.75	0.21
212	0.049	-26.27	-23.97	0.00	257	0.365	-8.75	-6.45	0.23
213	0.049	-26.27	-23.97	0.00	258	0.378	-8.46	-6.16	0.24
214	0.049	-26.27	-23.97	0.00	259	0.390	-8.17	-5.87	0.26
215	0.049	-26.27	-23.97	0.00	260	0.403	-7.90	-5.60	0.28
216	0.049	-26.27	-23.97	0.00	261	0.415	-7.64	-5.34	0.29
217	0.049	-26.27	-23.97	0.00	262	0.428	-7.38	-5.08	0.31
218	0.049	-26.27	-23.97	0.00	263	0.440	-7.14	-4.84	0.33
219	0.049	-26.27	-23.97	0.00	264	0.452	-6.89	-4.59	0.35
220	0.049	-26.27	-23.97	0.00	265	0.464	-6.66	-4.36	0.37
221	0.049	-26.27	-23.97	0.00	266	0.477	-6.44	-4.14	0.39
222	0.049	-26.27	-23.97	0.00	267	0.488	-6.23	-3.93	0.40
223	0.049	-26.27	-23.97	0.00	268	0.500	-6.01	-3.71	0.43
224	0.049	-26.27	-23.97	0.00	269	0.512	-5.81	-3.51	0.45



Two CL-FM Log-periodic Antennas  
 Slant 45 Polarity  
 Skew 90 degrees  
 Gain: 2.3 dBd (x 1.7)

Vertical stacked 0.87 wavelength  
 Horizontal plane Pattern

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
270	0.524	-5.61	-3.31	0.47	315	0.834	-1.58	0.72	1.18
271	0.536	-5.42	-3.12	0.49	316	0.833	-1.59	0.71	1.18
272	0.548	-5.23	-2.93	0.51	317	0.832	-1.60	0.70	1.18
273	0.560	-5.04	-2.74	0.53	318	0.831	-1.61	0.69	1.17
274	0.571	-4.86	-2.56	0.55	319	0.830	-1.62	0.68	1.17
275	0.583	-4.69	-2.39	0.58	320	0.829	-1.63	0.67	1.17
276	0.594	-4.53	-2.23	0.60	321	0.830	-1.62	0.68	1.17
277	0.604	-4.38	-2.08	0.62	322	0.831	-1.61	0.69	1.17
278	0.615	-4.22	-1.92	0.64	323	0.832	-1.60	0.70	1.18
279	0.625	-4.08	-1.78	0.66	324	0.833	-1.59	0.71	1.18
280	0.636	-3.93	-1.63	0.69	325	0.834	-1.58	0.72	1.18
281	0.646	-3.80	-1.50	0.71	326	0.839	-1.52	0.78	1.20
282	0.656	-3.66	-1.36	0.73	327	0.845	-1.47	0.83	1.21
283	0.666	-3.53	-1.23	0.75	328	0.850	-1.41	0.89	1.23
284	0.677	-3.39	-1.09	0.78	329	0.855	-1.36	0.94	1.24
285	0.686	-3.27	-0.97	0.80	330	0.860	-1.31	0.99	1.26
286	0.695	-3.16	-0.86	0.82	331	0.868	-1.23	1.07	1.28
287	0.704	-3.05	-0.75	0.84	332	0.874	-1.16	1.14	1.30
288	0.713	-2.94	-0.64	0.86	333	0.882	-1.09	1.21	1.32
289	0.722	-2.83	-0.53	0.88	334	0.889	-1.03	1.27	1.34
290	0.731	-2.72	-0.42	0.91	335	0.896	-0.95	1.35	1.36
291	0.738	-2.64	-0.34	0.93	336	0.906	-0.85	1.45	1.40
292	0.745	-2.56	-0.26	0.94	337	0.917	-0.75	1.55	1.43
293	0.752	-2.47	-0.17	0.96	338	0.928	-0.65	1.65	1.46
294	0.759	-2.39	-0.09	0.98	339	0.939	-0.55	1.75	1.50
295	0.766	-2.31	-0.01	1.00	340	0.949	-0.45	1.85	1.53
296	0.772	-2.25	0.05	1.01	341	0.955	-0.40	1.90	1.55
297	0.778	-2.18	0.12	1.03	342	0.961	-0.35	1.95	1.57
298	0.784	-2.12	0.18	1.04	343	0.966	-0.30	2.00	1.59
299	0.790	-2.05	0.25	1.06	344	0.972	-0.25	2.05	1.60
300	0.796	-1.99	0.31	1.07	345	0.978	-0.20	2.10	1.62
301	0.800	-1.94	0.36	1.09	346	0.981	-0.17	2.13	1.63
302	0.804	-1.89	0.41	1.10	347	0.983	-0.15	2.15	1.64
303	0.809	-1.84	0.46	1.11	348	0.985	-0.13	2.17	1.65
304	0.813	-1.79	0.51	1.12	349	0.987	-0.11	2.19	1.66
305	0.818	-1.75	0.55	1.14	350	0.990	-0.08	2.22	1.67
306	0.820	-1.73	0.57	1.14	351	0.991	-0.07	2.23	1.67
307	0.822	-1.70	0.60	1.15	352	0.994	-0.05	2.25	1.68
308	0.824	-1.68	0.62	1.15	353	0.995	-0.04	2.26	1.68
309	0.827	-1.65	0.65	1.16	354	0.998	-0.02	2.28	1.69
310	0.829	-1.63	0.67	1.17	355	0.999	-0.01	2.29	1.69
311	0.830	-1.62	0.68	1.17	356	0.999	-0.01	2.29	1.70
312	0.831	-1.61	0.69	1.17	357	0.999	-0.01	2.29	1.70
313	0.832	-1.60	0.70	1.18	358	1.000	-0.00	2.30	1.70
314	0.833	-1.59	0.71	1.18	359	1.000	-0.00	2.30	1.70