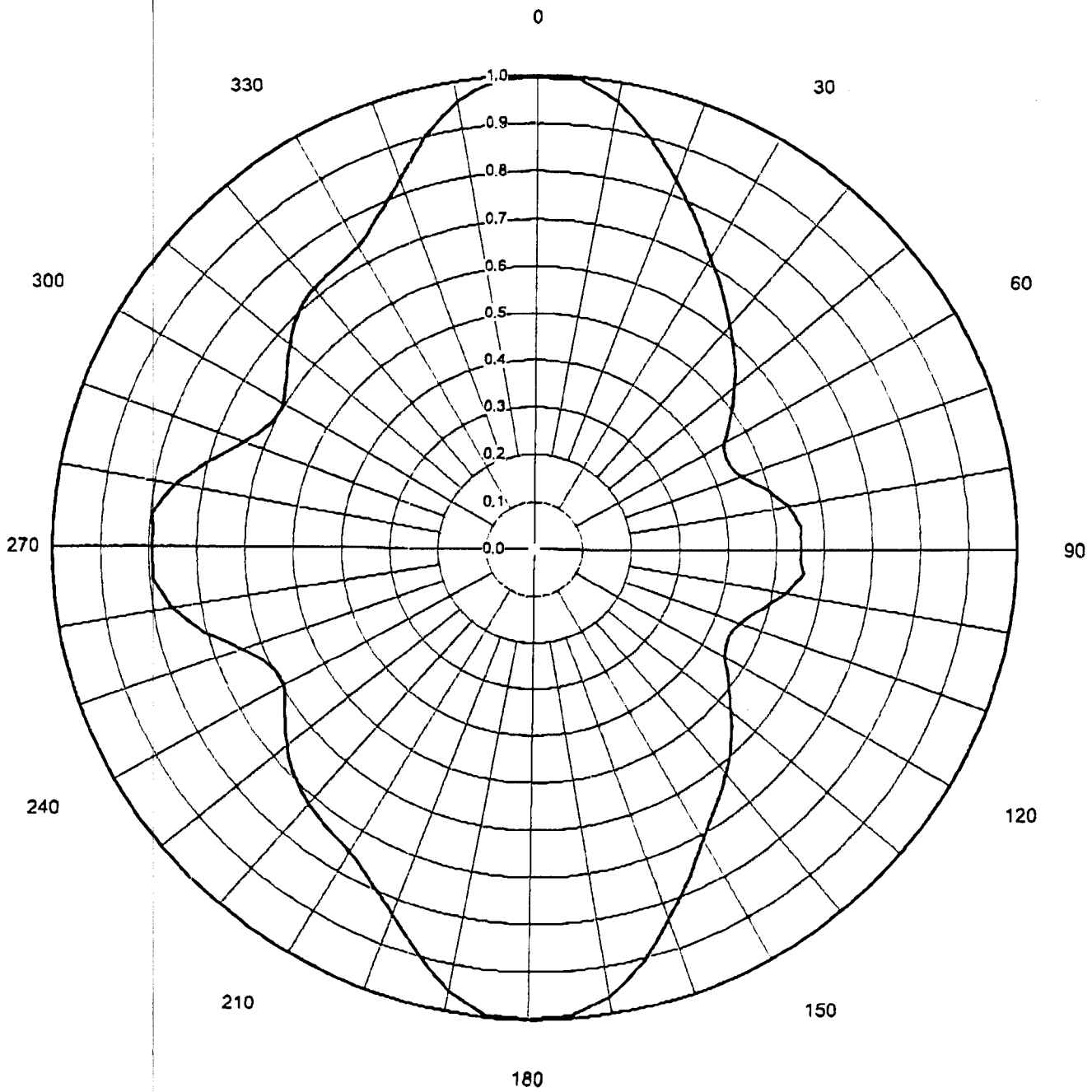
Proposal Number	DCA-10026	Revision:	2
Date	04-Nov-02		
Call Letters		Channel	47
Location	Kalkaska, MI		
Customer	Central Michigan University		
Antenna Type	TUF-P4-12/48H-1		

AZIMUTH PATTERN

Gain	1.91	(2.81 dB)	Frequency	671.00 MHz
Calculated / Measured	Calculated		Drawing #	TUF-P4-671_2



Proposal Number	DCA-10026	Revision:	2
Date	04-Nov-02		
Call Letters		Channel	47
Location	Kalkaska, MI		
Customer	Central Michigan University		
Antenna Type	TUF-P4-12/48H-1		

TABULATION OF AZIMUTH PATTERN

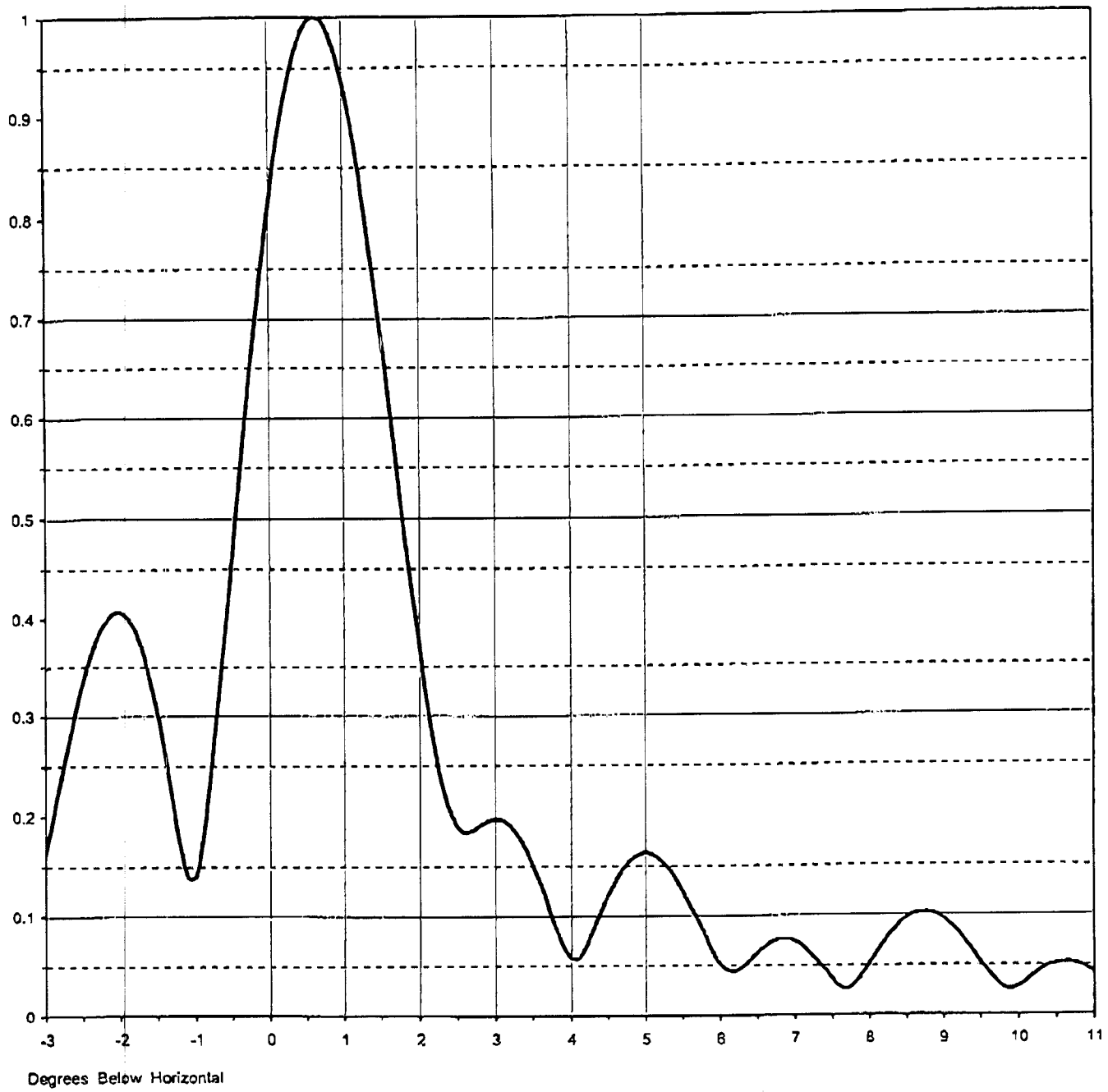
Azimuth Pattern Drawing #: TUF-P4-671_2

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
0	0.997	45	0.578	90	0.551	135	0.580	180	1.000	225	0.695	270	0.793	315	0.699
1	0.995	46	0.570	91	0.550	136	0.589	181	0.998	226	0.690	271	0.792	316	0.704
2	0.994	47	0.562	92	0.551	137	0.598	182	0.997	227	0.684	272	0.791	317	0.709
3	0.994	48	0.553	93	0.552	138	0.606	183	0.996	228	0.678	273	0.792	318	0.712
4	0.995	49	0.544	94	0.555	139	0.614	184	0.997	229	0.670	274	0.794	319	0.714
5	0.997	50	0.534	95	0.559	140	0.621	185	0.998	230	0.662	275	0.798	320	0.716
6	0.989	51	0.526	96	0.553	141	0.630	186	0.989	231	0.655	276	0.789	321	0.718
7	0.982	52	0.517	97	0.547	142	0.638	187	0.981	232	0.648	277	0.781	322	0.721
8	0.974	53	0.509	98	0.540	143	0.646	188	0.973	233	0.641	278	0.773	323	0.722
9	0.966	54	0.500	99	0.534	144	0.654	189	0.964	234	0.633	279	0.765	324	0.724
10	0.959	55	0.491	100	0.528	145	0.663	190	0.956	235	0.626	280	0.757	325	0.726
11	0.946	56	0.482	101	0.518	146	0.671	191	0.943	236	0.619	281	0.744	326	0.728
12	0.934	57	0.473	102	0.509	147	0.680	192	0.930	237	0.612	282	0.731	327	0.730
13	0.922	58	0.465	103	0.500	148	0.689	193	0.918	238	0.605	283	0.719	328	0.732
14	0.910	59	0.457	104	0.492	149	0.699	194	0.906	239	0.600	284	0.708	329	0.736
15	0.898	60	0.449	105	0.485	150	0.708	195	0.895	240	0.595	285	0.698	330	0.740
16	0.884	61	0.445	106	0.476	151	0.720	196	0.881	241	0.594	286	0.685	331	0.746
17	0.870	62	0.441	107	0.469	152	0.732	197	0.868	242	0.594	287	0.673	332	0.753
18	0.857	63	0.439	108	0.462	153	0.744	198	0.856	243	0.595	288	0.662	333	0.760
19	0.845	64	0.438	109	0.457	154	0.758	199	0.844	244	0.598	289	0.652	334	0.769
20	0.833	65	0.438	110	0.452	155	0.771	200	0.834	245	0.603	290	0.643	335	0.779
21	0.820	66	0.439	111	0.448	156	0.783	201	0.823	246	0.609	291	0.633	336	0.788
22	0.807	67	0.440	112	0.445	157	0.795	202	0.812	247	0.615	292	0.625	337	0.798
23	0.795	68	0.443	113	0.443	158	0.808	203	0.803	248	0.623	293	0.619	338	0.808
24	0.784	69	0.447	114	0.443	159	0.821	204	0.794	249	0.632	294	0.613	339	0.819
25	0.773	70	0.453	115	0.443	160	0.835	205	0.787	250	0.643	295	0.609	340	0.832
26	0.760	71	0.459	116	0.443	161	0.849	206	0.778	251	0.654	296	0.605	341	0.844
27	0.748	72	0.467	117	0.445	162	0.863	207	0.770	252	0.666	297	0.602	342	0.856
28	0.736	73	0.475	118	0.448	163	0.878	208	0.763	253	0.679	298	0.601	343	0.870
29	0.725	74	0.485	119	0.451	164	0.893	209	0.757	254	0.693	299	0.602	344	0.885
30	0.714	75	0.496	120	0.455	165	0.908	210	0.751	255	0.709	300	0.603	345	0.900
31	0.705	76	0.502	121	0.462	166	0.919	211	0.747	256	0.718	301	0.607	346	0.911
32	0.695	77	0.509	122	0.469	167	0.929	212	0.744	257	0.728	302	0.613	347	0.922
33	0.686	78	0.516	123	0.477	168	0.940	213	0.741	258	0.738	303	0.618	348	0.934
34	0.676	79	0.524	124	0.484	169	0.952	214	0.738	259	0.749	304	0.624	349	0.946
35	0.666	80	0.532	125	0.491	170	0.963	215	0.734	260	0.760	305	0.630	350	0.959
36	0.657	81	0.536	126	0.500	171	0.969	216	0.731	261	0.766	306	0.637	351	0.966
37	0.648	82	0.540	127	0.508	172	0.975	217	0.728	262	0.773	307	0.645	352	0.972
38	0.638	83	0.544	128	0.516	173	0.982	218	0.725	263	0.779	308	0.652	353	0.979
39	0.629	84	0.549	129	0.524	174	0.988	219	0.721	264	0.786	309	0.658	354	0.986
40	0.620	85	0.554	130	0.533	175	0.995	220	0.717	265	0.793	310	0.665	355	0.993
41	0.611	86	0.552	131	0.542	176	0.995	221	0.714	266	0.792	311	0.673	356	0.993
42	0.603	87	0.551	132	0.552	177	0.996	222	0.710	267	0.792	312	0.680	357	0.994
43	0.595	88	0.550	133	0.562	178	0.997	223	0.705	268	0.792	313	0.687	358	0.994
44	0.586	89	0.550	134	0.571	179	0.998	224	0.701	269	0.792	314	0.693	359	0.996

Proposal Number	DCA-10026	Revision:	2
Date	04-Nov-02		
Call Letters		Channel	47
Location	Kalkaska, MI		
Customer	Central Michigan University		
Antenna Type	TUF-P4-12/48H-1		

ELEVATION PATTERN

RMS Gain at Main Lobe	26.80 (14.28 dB)	Beam Tilt	0.75 deg
RMS Gain at Horizontal	17.80 (12.50 dB)	Frequency	671.00 MHz
Calculated / Measured	Calculated	Drawing #	12U268060



Proposal Number **DCA-10026** Revision: **2**
Date **04-Nov-02**
Call Letters Channel **47**
Location **Kalkaska, MI**
Customer **Central Michigan University**
Antenna Type **TUF-P4-12/48H-1**

TABULATION OF ELEVATION PATTERN

Elevation Pattern Drawing #: **12U268060-90**

Angle	Fieid	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.084	2.4	0.204	10.6	0.051	30.5	0.014	51.0	0.233	71.5	0.003
-9.5	0.090	2.6	0.184	10.8	0.052	31.0	0.010	51.5	0.244	72.0	0.004
-9.0	0.053	2.8	0.191	11.0	0.046	31.5	0.006	52.0	0.231	72.5	0.004
-8.5	0.023	3.0	0.197	11.5	0.020	32.0	0.018	52.5	0.200	73.0	0.004
-8.0	0.058	3.2	0.190	12.0	0.051	32.5	0.026	53.0	0.157	73.5	0.004
-7.5	0.051	3.4	0.167	12.5	0.077	33.0	0.026	53.5	0.111	74.0	0.003
-7.0	0.037	3.6	0.131	13.0	0.066	33.5	0.016	54.0	0.070	74.5	0.003
-6.5	0.105	3.8	0.088	13.5	0.028	34.0	0.008	54.5	0.045	75.0	0.002
-6.0	0.146	4.0	0.058	14.0	0.024	34.5	0.015	55.0	0.039	75.5	0.001
-5.5	0.118	4.2	0.069	14.5	0.040	35.0	0.018	55.5	0.041	76.0	0.001
-5.0	0.036	4.4	0.104	15.0	0.027	35.5	0.012	56.0	0.038	76.5	0.002
-4.5	0.076	4.6	0.135	15.5	0.028	36.0	0.010	56.5	0.029	77.0	0.002
-4.0	0.108	4.8	0.156	16.0	0.062	36.5	0.023	57.0	0.017	77.5	0.003
-3.5	0.057	5.0	0.163	16.5	0.074	37.0	0.033	57.5	0.011	78.0	0.003
-3.0	0.164	5.2	0.156	17.0	0.052	37.5	0.032	58.0	0.017	78.5	0.003
-2.8	0.237	5.4	0.137	17.5	0.014	38.0	0.021	58.5	0.024	79.0	0.003
-2.6	0.305	5.6	0.109	18.0	0.030	38.5	0.007	59.0	0.028	79.5	0.004
-2.4	0.361	5.8	0.078	18.5	0.039	39.0	0.015	59.5	0.028	80.0	0.004
-2.2	0.396	6.0	0.051	19.0	0.020	39.5	0.022	60.0	0.024	80.5	0.004
-2.0	0.406	6.2	0.043	19.5	0.041	40.0	0.017	60.5	0.017	81.0	0.003
-1.8	0.386	6.4	0.055	20.0	0.082	40.5	0.011	61.0	0.011	81.5	0.003
-1.6	0.335	6.6	0.069	20.5	0.098	41.0	0.026	61.5	0.007	82.0	0.003
-1.4	0.258	6.8	0.076	21.0	0.077	41.5	0.042	62.0	0.008	82.5	0.003
-1.2	0.169	7.0	0.074	21.5	0.032	42.0	0.049	62.5	0.010	83.0	0.003
-1.0	0.140	7.2	0.062	22.0	0.048	42.5	0.042	63.0	0.011	83.5	0.003
-0.8	0.238	7.4	0.045	22.5	0.093	43.0	0.023	63.5	0.010	84.0	0.002
-0.6	0.386	7.6	0.028	23.0	0.112	43.5	0.008	64.0	0.008	84.5	0.002
-0.4	0.541	7.8	0.031	23.5	0.102	44.0	0.025	64.5	0.004	85.0	0.002
-0.2	0.688	8.0	0.052	24.0	0.073	44.5	0.034	65.0	0.004	85.5	0.002
0.0	0.814	8.2	0.074	24.5	0.042	45.0	0.027	65.5	0.006	86.0	0.002
0.2	0.912	8.4	0.091	25.0	0.017	45.5	0.017	66.0	0.009	86.5	0.002
0.4	0.975	8.6	0.101	25.5	0.008	46.0	0.042	66.5	0.011	87.0	0.001
0.6	1.000	8.8	0.102	26.0	0.007	46.5	0.078	67.0	0.012	87.5	0.001
0.8	0.986	9.0	0.095	26.5	0.008	47.0	0.105	67.5	0.012	88.0	0.001
1.0	0.935	9.2	0.081	27.0	0.005	47.5	0.115	68.0	0.011	88.5	0.001
1.2	0.852	9.4	0.063	27.5	0.006	48.0	0.101	68.5	0.009	89.0	0.001
1.4	0.743	9.6	0.042	28.0	0.014	48.5	0.065	69.0	0.007	89.5	0.001
1.6	0.619	9.8	0.033	28.5	0.017	49.0	0.036	69.5	0.005	90.0	0.001
1.8	0.490	10.0	0.025	29.0	0.014	49.5	0.081	70.0	0.003		
2.0	0.369	10.2	0.033	29.5	0.007	50.0	0.144	70.5	0.002		
2.2	0.268	10.4	0.044	30.0	0.010	50.5	0.198	71.0	0.003		