

JULY 18, 1989

**CIRCULAR POLARIZED DIRECTIONAL ANTENNA SYSTEM
FOR RADIO STATIONS KPLU, KLSY, KMPS AND KRPM
WITH TRANSMITTING AND ANTENNA FACILITIES
LOCATED AT WEST TIGER MOUNTAIN, WASHINGTON**

Electronics Research, Inc. is providing a custom fabricated directional antenna system that is specially designed to meet the F.C.C. requirements and the general needs of radio stations KPLU, KLSY, KMPS and KRPM.

The antenna is the 1082-4CP-DA type configuration. The circular polarized system consists of four 10' vertically spaced bays using 2 individually excited iris cells per bay. The antenna was tested on a full scale model of a section of a self supporting Magnum tower that exists at the West Tiger Mountain site. This is the structure planned to support the array. This model contained all ladders, transmission lines and other devices that will be in the aperture of the proposed antenna system. All tests were performed on frequencies of 88.5 MHz, 92.5 MHz, 94.1 Mhz and 106.1 MHz which are the centers of the FM broadcast channels assigned to the above stations. In anticipation of possible expanded use of the antenna additional pattern measurements were made on other FM channels which are allotted to the general Seattle-Tacoma area.

Pattern measurements were made on a fifty-acre antenna pattern range which is owned and operated by Electronics Research, Inc. The tests were performed under the direction of Thomas B. Silliman, President of Electronics Research, Inc. Mr. Silliman has both the Bachelor of Electrical Engineering and the Master of Electrical Engineering degrees from Cornell University, and is also a registered professional engineer in the states of Indiana, Maryland and Minnesota.

DESCRIPTION OF THE TEST PROCEDURE

The test antenna consisted of the complete four bay circular polarized system. The elements and brackets that were used in this test are the ones that will be installed at the West Tiger Mountain site.

The tower was erected vertically on a turntable mounted on a non-metallic building with the antenna centered vertically on the structure, making the center of radiation of the test approximately 30 feet above ground. The turntable is equipped with a motor drive and azimuth indicating mechanism, resolution of this azimuth measuring system is one-tenth of a degree.

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(Continued)

The antenna under test was operated in the transmitting mode and fed from a Wavetek Model 3000 signal generator. The frequency of the signal source was set at each of the carrier frequencies of the involved stations.

A broad-band horizontal and vertical dipole system, located approximately 628 feet from the test antenna, and mounted at the same height above terrain as the center of the antenna under test, was used to receive the emitted test signals. The signals received by the dipole system were fed to the test building by way of two buried Heliac cables to an Anritsu Model ML521B measuring receiver. This data was interfaced to a Hewlett-Packard Model 9872C plotter by means of a Hewlett-Packard Model 86 computer system. Relative field strength was plotted as a function of azimuth.

The measurements were performed by rotating the test antenna in a counter-clockwise direction and plotting the received signal on polar co-ordinated graph paper in a clockwise direction. Both horizontal and vertical components were recorded separately. The patterns furnished herewith are the averages of multiple separate measurements performed on each of the frequencies indicated.



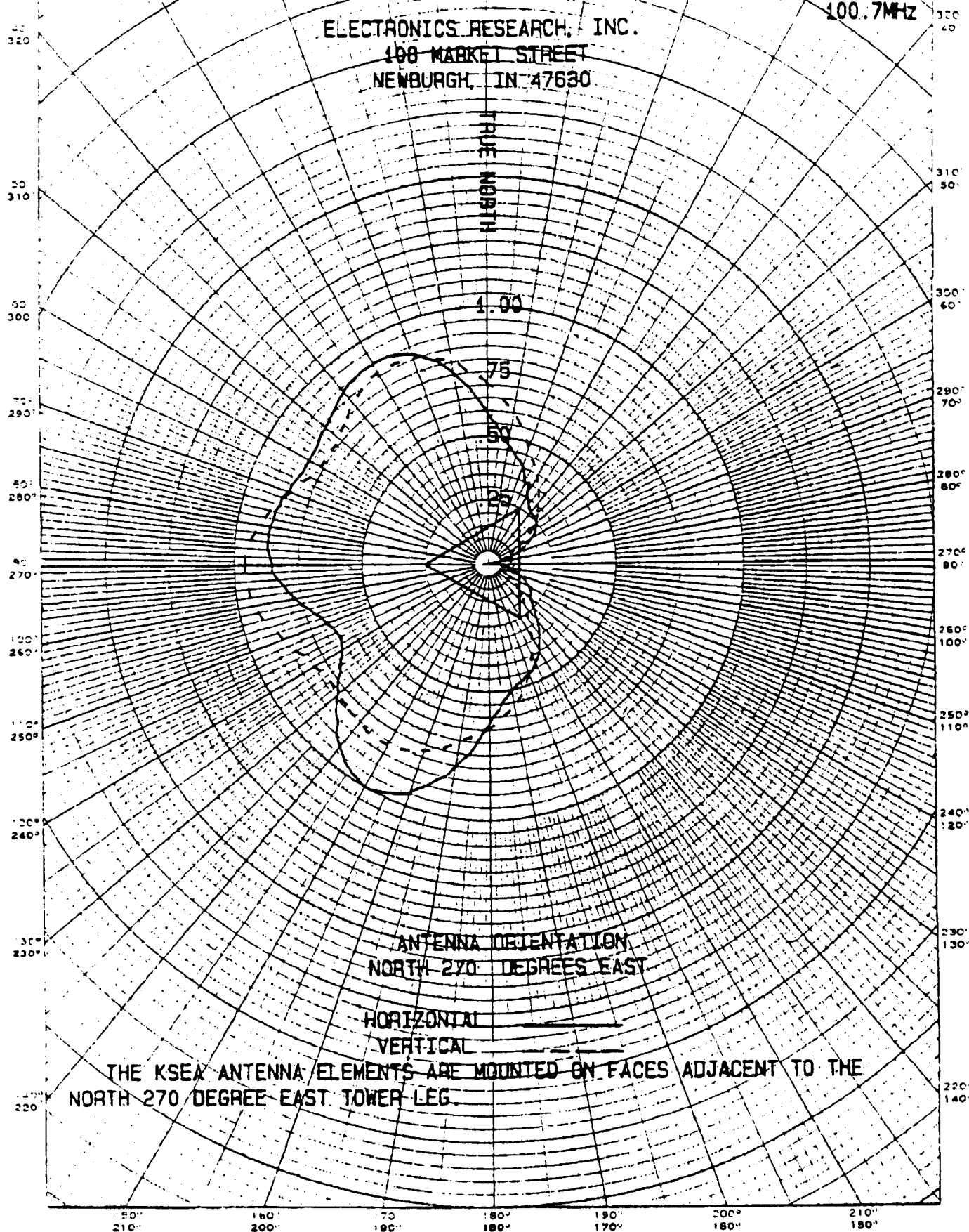
Dan Dowdle, Test Site Director
Electronics Research, Inc.
108 Market Street
Newburgh, Indiana 47630

FIGURE # 1
1082-4CP-DA ANTENNA
TAPERED TOWER

HORIZONTAL PLANE RELATIVE FIELD PATTERN

JULY 5, 1988
STATION KSEA
SEATTLE WA
100.7MHz

ELECTRONICS RESEARCH, INC.
108 MARKET STREET
NEWBURGH, IN 47630



DIETZEN CORPORATION
MADE IN U.S.A.

NO. 341 1" DIETZEN GRAPH PAPER
PLOT AP TO ORIGIN

JULY 5 1989
HORIZONTAL PLANE RELATIVE FIELD & DBM LIST
FOR RADIO STATION KSEA 100.7MHz

AZIMUTH	H POL RELATIVE FIELD	H POL DBM	H POL POWER KW	V POL RELATIVE FIELD	V POL DBM	V POL POWER KW	AZIMUTH	H POL RELATIVE FIELD	H POL DBM	H POL POWER KW	V POL RELATIVE FIELD	V POL DBM	V POL POWER KW
0.0	.596	10.13	20.58	.710	14.86	29.21	180.0	.631	10.63	20.89	.647	10.86	24.30
5.0	.534	12.19	18.35	.655	12.96	24.56	185.0	.729	14.33	30.82	.652	14.31	28.95
10.0	.479	11.23	19.29	.624	13.36	21.16	190.0	.613	15.83	38.32	.710	14.66	29.21
15.0	.439	10.49	11.18	.545	12.36	17.21	195.0	.886	16.55	45.56	.747	15.11	32.40
20.0	.487	9.83	9.63	.485	11.36	15.66	200.0	.955	17.23	52.90	.776	15.46	35.12
25.0	.353	8.84	7.31	.435	10.41	18.96	205.0	.933	17.48	56.03	.821	15.71	37.20
30.0	.316	7.63	5.80	.394	9.58	9.80	210.0	1.000	17.63	58.00	.815	15.86	38.50
35.0	.267	6.73	4.77	.358	8.71	7.40	215.0	.972	17.38	54.76	.817	15.86	38.50
40.0	.265	6.23	4.20	.321	7.78	5.96	220.0	.920	16.93	49.07	.805	15.76	37.63
45.0	.260	5.93	3.92	.231	6.91	4.58	225.0	.851	16.23	42.82	.792	15.61	36.35
50.0	.251	5.63	3.66	.243	5.36	3.43	230.0	.776	15.43	34.95	.778	15.46	35.12
55.0	.250	4.89	3.89	.195	3.42	2.20	235.0	.716	14.73	29.75	.778	15.46	35.12
60.0	.280	3.63	2.31	.145	.36	1.22	240.0	.668	14.13	25.91	.796	15.66	36.77
65.0	.165	2.00	1.58	.107	-1.77	.67	245.0	.637	13.98	25.03	.824	15.96	39.41
70.0	.127	-1.27	.94	.081	-4.14	.39	250.0	.684	14.33	27.13	.863	16.36	43.20
75.0	.264	-2.89	.41	.273	-5.89	.31	255.0	.724	14.83	30.44	.904	16.76	47.36
80.0	.341	-10.67	.10	.062	-4.34	.39	260.0	.776	15.43	34.95	.936	17.06	50.76
85.0	.311	-21.18	.01	.095	-2.79	.53	265.0	.822	15.93	39.22	.952	17.21	52.55
90.0	.350	-12.37	.05	.104	-2.84	.62	270.0	.851	16.23	42.82	.957	17.26	53.15
95.0	.353	-6.88	.20	.103	-2.09	.62	275.0	.871	16.43	44.00	.941	17.11	51.35
100.0	.062	-3.47	.45	.096	-2.74	.53	280.0	.871	16.43	44.00	.914	16.86	48.47
105.0	.114	-1.25	.75	.073	-4.44	.36	285.0	.856	16.28	42.51	.873	16.46	44.22
110.0	.140	.53	1.13	.068	-5.74	.27	290.0	.832	16.03	40.13	.824	15.96	39.40
115.0	.166	2.84	1.60	.075	-4.84	.30	295.0	.818	15.88	38.77	.787	15.56	35.94
120.0	.191	3.23	2.11	.100	-2.34	.58	300.0	.813	15.83	38.32	.760	15.26	33.54
125.0	.210	4.03	2.56	.132	.87	1.02	305.0	.818	15.88	38.77	.760	15.26	33.54
130.0	.221	4.53	2.84	.164	1.96	1.57	310.0	.832	16.03	40.13	.769	15.36	34.32
135.0	.256	5.79	3.79	.191	3.26	2.12	315.0	.856	16.28	42.51	.792	15.61	36.35
140.0	.302	7.23	5.29	.235	5.06	3.20	320.0	.881	16.53	45.02	.824	15.96	39.40
145.0	.351	8.54	7.14	.283	6.66	4.64	325.0	.896	16.68	46.61	.848	16.21	41.74
150.0	.403	9.73	9.41	.344	8.36	6.85	330.0	.902	16.73	47.14	.863	16.36	42.20
155.0	.434	10.39	10.93	.404	9.76	9.46	335.0	.896	16.68	46.61	.863	16.36	43.20
160.0	.462	10.93	12.40	.463	10.96	12.46	340.0	.871	16.43	44.00	.853	16.26	42.22
165.0	.491	11.28	13.44	.523	12.01	15.87	345.0	.822	15.93	39.22	.834	16.06	40.33
170.0	.507	11.73	14.91	.564	12.66	18.43	350.0	.759	15.23	33.38	.796	15.66	36.77
175.0	.558	12.59	18.15	.606	13.31	21.41	355.0	.680	14.29	26.84	.752	15.16	32.78

CITY OF LICENSE: SEATTLE WA

MOUNTING STRUCTURE: MAGNUM TOWER-TIGER MT SITE

ANTENNA TYPE: 1082-4CF-DA NUMBER OF BAYS:4

HORIZONTAL MAXIMUM RELATIVE FIELD=.999999999998 AZIMUTH 208

HORIZONTAL MINIMUM RELATIVE FIELD= 8.12010839354E-3 AZIMUTH 86

VERTICAL MAXIMUM RELATIVE FIELD= .95729218325 AZIMUTH 266

VERTICAL MINIMUM RELATIVE FIELD= 6.77710968555E-2 AZIMUTH 110

HORIZONTAL R.M.S.=.63068 VERTICAL R.M.S.=.63068

MAXIMUM HORIZONTAL E.R.P.= 58.00000W MAXIMUM VERTICAL E.R.P.= 53.15170W

ANTENNA ORIENTATION: NORTH 270 DEGREES EAST

ELECTRONICS RESEARCH, INC.
 100 MARKET STREET
 NEWBURGH, N.Y. 10986

THEORETICAL
 VERTICAL PLANE RELATIVE FIELD

APRIL 10, 1964

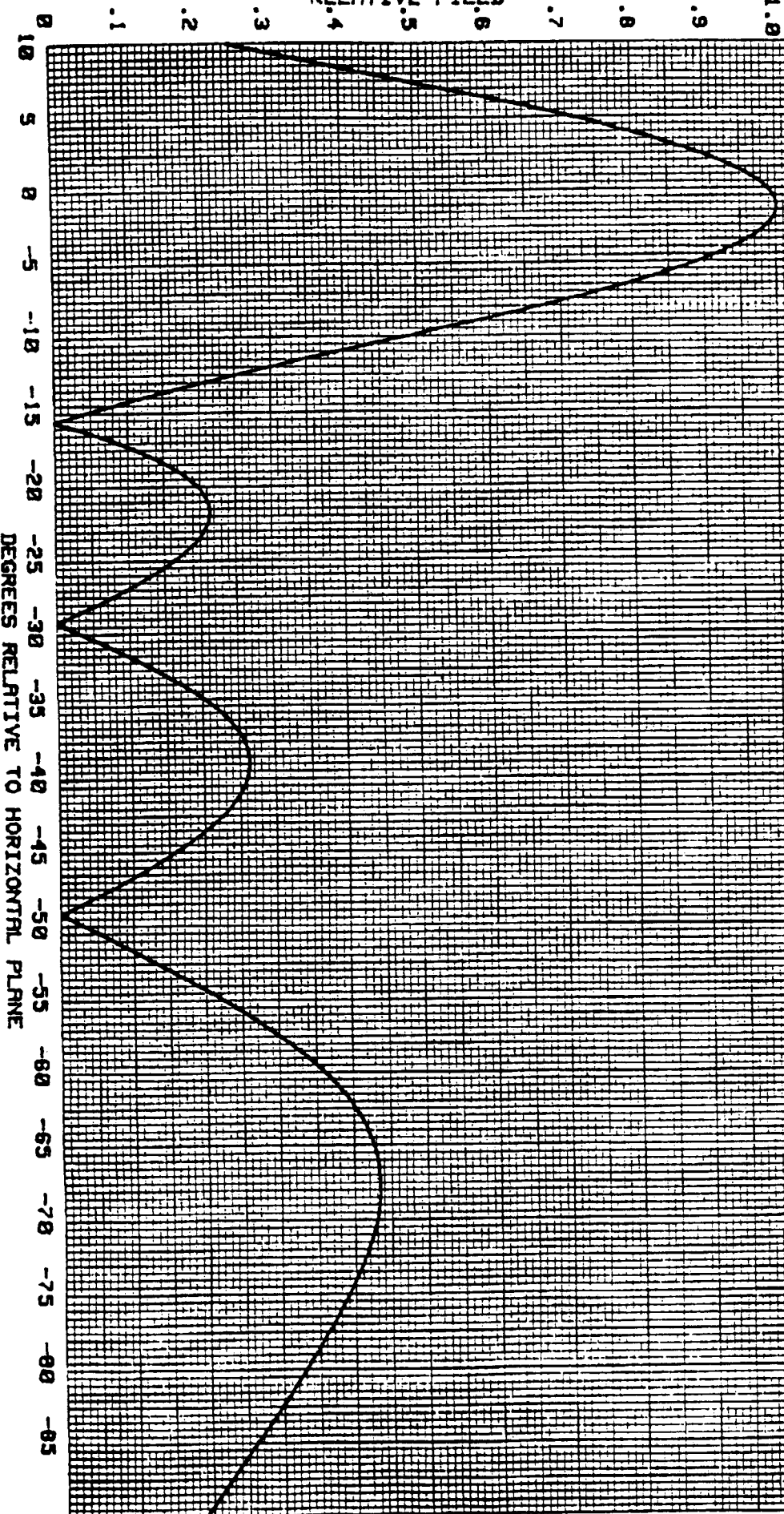
100 X 100

FIGURE 2

LEVELS OF TYPE 1000 ELEMENTS
 1. 0.0000000000000000
 2. 0.0000000000000000
 3. 0.0000000000000000
 4. 0.0000000000000000

NOT SPECIFIC
 100 X 100
 1. 0.0000000000000000

RELATIVE FIELD



DEGREES RELATIVE TO HORIZONTAL PLANE