Construction Permit Special Operating Conditions
Special Operating Conditions 1 & 4

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- An Employee-Owned Company -

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S.O. 23392

Report of Test 6513-1-DA

for

FAMILY STATIONS, INC.

KFRB 91.3 MHz BAKERSFIELD, CA

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6513-1-DA to meet the needs of KFRB and to comply with the requirements of the FCC construction permit, file number BMPED-20040510AAA.

RESULTS:

The measured azimuth pattern for the 6513-1-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPED-20040510AAA indicates that the Vertical radiation component shall not exceed 2.8 kW at any azimuth and is restricted to the following values at the azimuths specified:

320-90 Degrees T: 0.090 kW

From Figure 1, the maximum radiation of the Vertical component occurs at 191 Degrees T to 202 Degrees T. At the restricted azimuth of 320-90 Degrees T the Vertical component is 15.92 dB down from the maximum of 2.8 kW, or 0.072 kW.

Construction Permit Special Operating Conditions
Special Operating Conditions 1 & 4

Test Report 6513-1-DA
KFRB
Page Two

The R.M.S. of the Vertical component is 0.47. The total Vertical power gain is 4.237. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.50. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

The 6513-1-DA was mounted on a tower of exact scale to a 5′ 3″ Dresser tower. The spacing of the antenna to the tower was varied and a vertical parasitic element was attached to the interbay feedline to achieve the vertical pattern shown in Figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20040510AAA, a single level of the 6513-1-DA was set up on the Howell Laboratories scale model antenna pattern measuring range. A scale of 4.5:1 was used.

SUPERVISION:

Mr. Surette was graduated from Lowell Technological Institute, Lowell, Massachusetts in 1973 with the degree of Bachelor of Science in Electrical Engineering. He has been directly involved with design and development of broadcast antennas, filter systems and RF transmission components since 1974, as an RF Engineer for six years with the original Shively Labs in Raymond, ME and for a short period of time with Dielectric Communications. He is currently an Associate Member of the AFCCE and a Senior Member of IEEE. He has authored a chapter on filters and combining systems for the latest edition of the CRC Electronics Handbook and for the 9th Edition of the NAB Handbook.

Construction Permit Special Operating Conditions
Special Operating Conditions 1 & 4

Test Report 6513-1-DA
KFRB
Page Three

EQUIPMENT:

The scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator. The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 feet above ground level. The receiving corner reflector is spaced 50 feet away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable.
The control building is equipped with:

Hewlett Packard Model 8753 Network Analyzer
PC Based Controller
Hewlett Packard 7550A Graphics Plotter

The test equipment is calibrated to ANSI/NCSL Z540-1-1994.

TEST PROCEDURES:

The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 410.85 MHz. Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadded reading of 100 in voltage. From the recorded patterns, the R.M.S. values are calculated and recorded as shown in Figure 1.

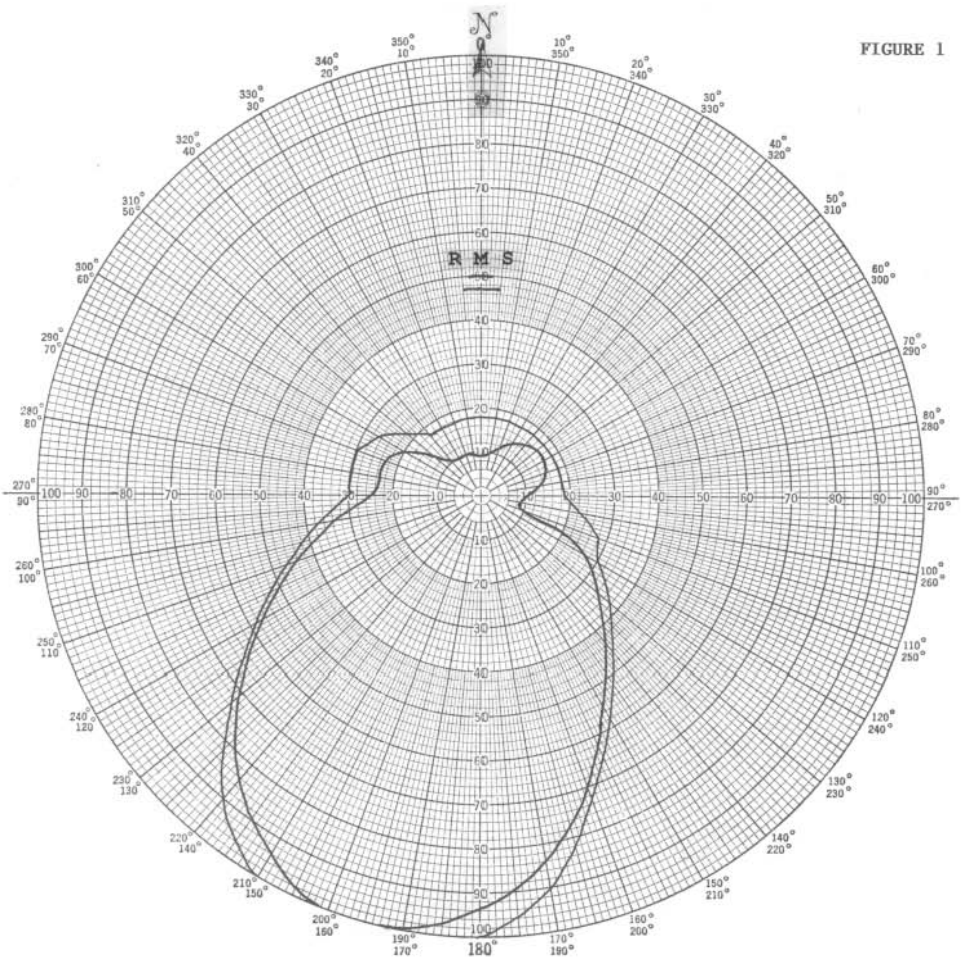
Respectfully submitted by:

Robert A. Surette
Manager of RF Engineering
S/O 23392
July 25, 2005

Construction Permit Special Operating Conditions

Special Operating Conditions 1 & 4

FIGURE 1



Shively Labs

PROJECT NAME KFRB BAKERSFIELD, CA
PROJECT NUMBER 23392 DATE 4/13/04
MODEL (X) FULL SCALE ( ) FREQUENCY 410.85/91.3 MHz
POLARIZATION VERTICAL
CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )
OBSERVER RAS

ANTENNA TYPE 6513-1-DA
PATTERN TYPE DIRECTIONAL AZIMUTH
REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

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Construction Permit Special Operating Conditions
Special Operating Conditions 1 & 4

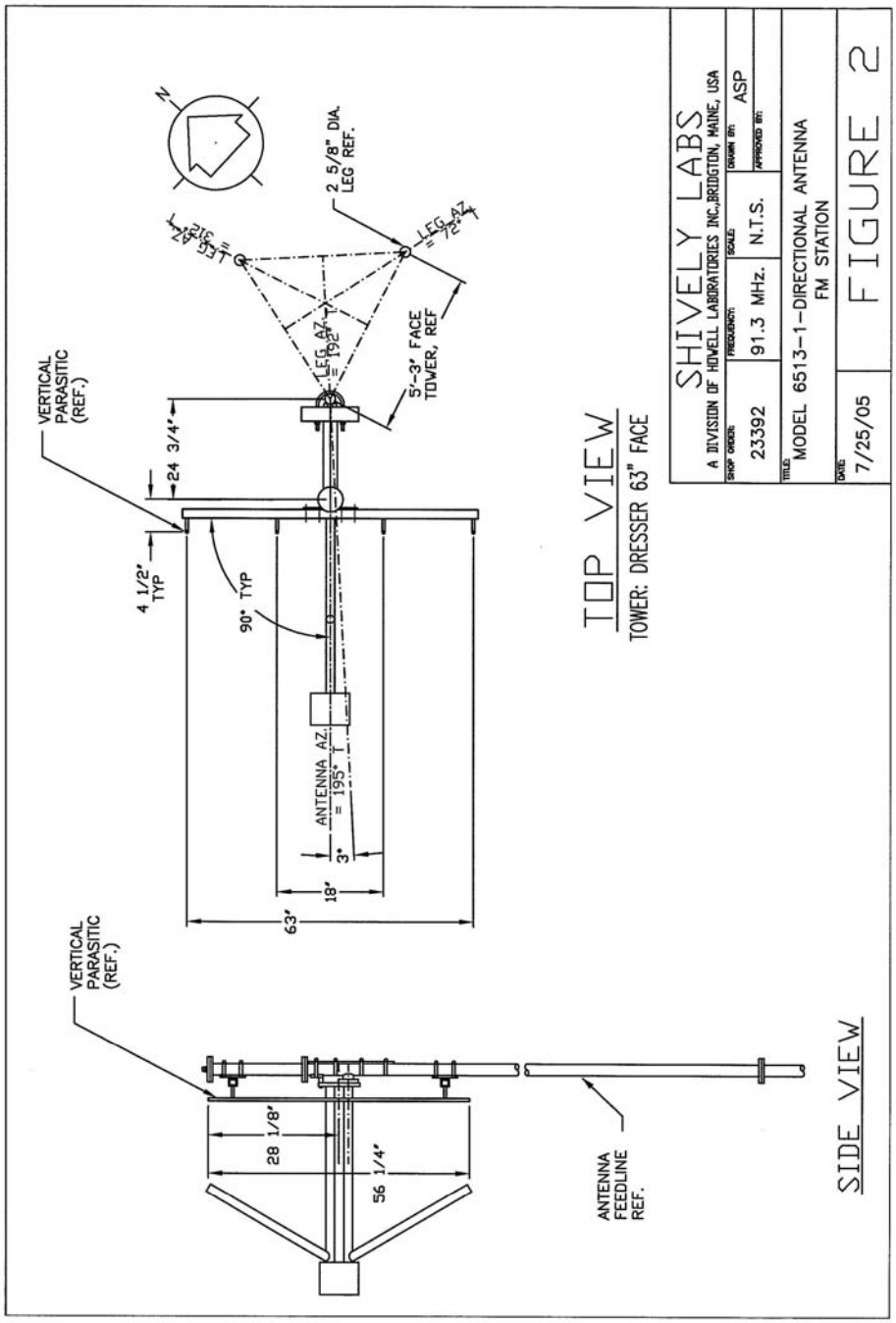
Figure 1A

S/O 23392
TABULATION OF VERTICAL POLARIZATION
KFRB BAKERSFIELD, CA

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.095	180	0.935
10	0.100	190	0.995
20	0.115	200	1.000
30	0.140	210	0.940
40	0.150	220	0.845
45	0.160	225	0.780
50	0.160	230	0.710
60	0.160	240	0.570
70	0.155	250	0.445
80	0.135	260	0.340
90	0.110	270	0.245
100	0.090	280	0.235
110	0.100	290	0.230
120	0.270	300	0.200
130	0.345	310	0.140
135	0.380	315	0.110
140	0.435	320	0.105
150	0.550	330	0.100
160	0.700	340	0.100
170	0.840	350	0.100

Construction Permit Special Operating Conditions

Special Operating Conditions 1 & 4



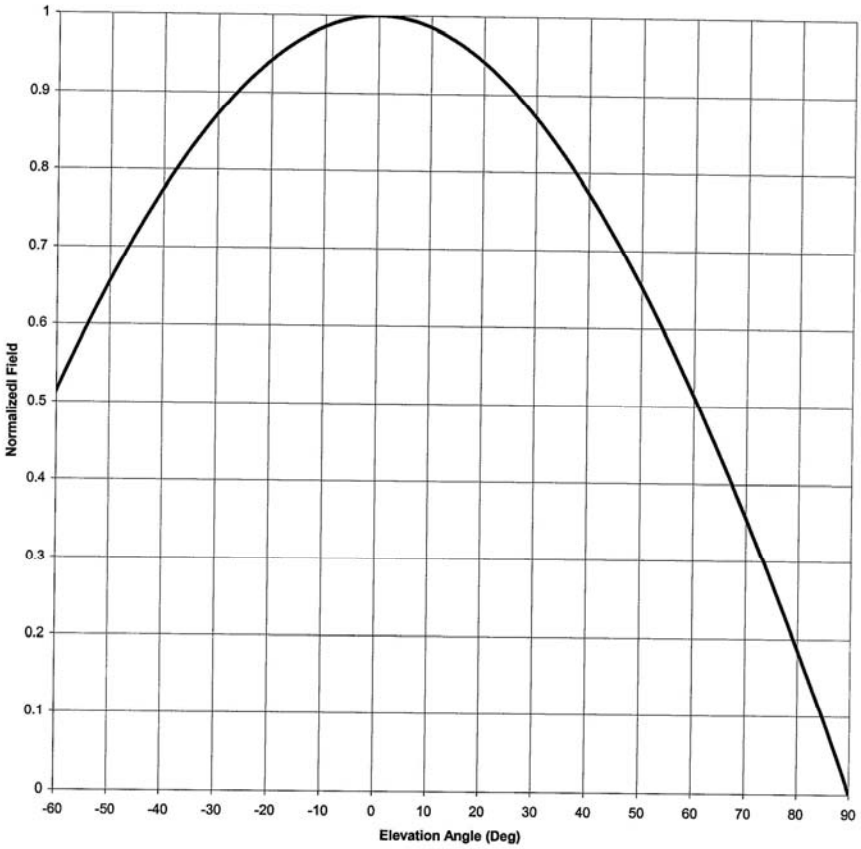
Construction Permit Special Operating Conditions

Special Operating Conditions 1 & 4

Antenna Mfg.: Shively Labs
Antenna Type: 6513-1-DA
Station: KFRB
Frequency: 91.3
Channel #: 217
Figure: 3

Date: 5/14/2004

Beam Tilt	0	
Gain (Max)	4.237	6.271 dB
Gain (Horizon)	4.237	6.271 dB



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Beam Tilt	**0**	
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Gain (Horizon)	**4.237**	**6.271 dB**

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.729	0	1.000	46	0.705
-89	0.021	-43	0.741	1	1.000	47	0.693
-88	0.040	-42	0.752	2	0.999	48	0.680
-87	0.059	-41	0.763	3	0.999	49	0.667
-86	0.078	-40	0.774	4	0.998	50	0.654
-85	0.096	-39	0.785	5	0.996	51	0.641
-84	0.114	-38	0.796	6	0.995	52	0.628
-83	0.133	-37	0.806	7	0.993	53	0.614
-82	0.151	-36	0.816	8	0.991	54	0.600
-81	0.168	-35	0.826	9	0.988	55	0.586
-80	0.186	-34	0.835	10	0.985	56	0.572
-79	0.204	-33	0.845	11	0.982	57	0.558
-78	0.221	-32	0.854	12	0.979	58	0.544
-77	0.239	-31	0.862	13	0.975	59	0.529
-76	0.256	-30	0.871	14	0.971	60	0.514
-75	0.273	-29	0.879	15	0.967	61	0.499
-74	0.290	-28	0.887	16	0.963	62	0.484
-73	0.307	-27	0.895	17	0.958	63	0.469
-72	0.324	-26	0.903	18	0.953	64	0.453
-71	0.341	-25	0.910	19	0.948	65	0.437
-70	0.357	-24	0.917	20	0.942	66	0.422
-69	0.373	-23	0.924	21	0.936	67	0.406
-68	0.390	-22	0.930	22	0.930	68	0.390
-67	0.406	-21	0.936	23	0.924	69	0.373
-66	0.422	-20	0.942	24	0.917	70	0.357
-65	0.437	-19	0.948	25	0.910	71	0.341
-64	0.453	-18	0.953	26	0.903	72	0.324
-63	0.469	-17	0.958	27	0.895	73	0.307
-62	0.484	-16	0.963	28	0.887	74	0.290
-61	0.499	-15	0.967	29	0.879	75	0.273
-60	0.514	-14	0.971	30	0.871	76	0.256
-59	0.529	-13	0.975	31	0.862	77	0.239
-58	0.544	-12	0.979	32	0.854	78	0.221
-57	0.558	-11	0.982	33	0.845	79	0.204
-56	0.572	-10	0.985	34	0.835	80	0.186
-55	0.586	-9	0.988	35	0.826	81	0.168
-54	0.600	-8	0.991	36	0.816	82	0.151
-53	0.614	-7	0.993	37	0.806	83	0.133
-52	0.628	-6	0.995	38	0.796	84	0.114
-51	0.641	-5	0.996	39	0.785	85	0.096
-50	0.654	-4	0.998	40	0.774	86	0.078
-49	0.667	-3	0.999	41	0.763	87	0.059
-48	0.680	-2	0.999	42	0.752	88	0.040
-47	0.693	-1	1.000	43	0.741	89	0.021
-46	0.705	0	1.000	44	0.729	90	0.000
-45	0.717			45	0.717		

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Special Operating Conditions 1 & 4

FIGURE 4

S.O. 23392

VALIDATION OF GAIN CALCULATION

KFRB BAKERSFIELD, CA

MODEL 6513-1-DA

Elevation Gain of 6513-1-DA equals 0.936

The RMS values are calculated utilizing the data of a planimeter.

Vertical Azimuth Gain equals $1/(RMS)^2$
$1/(0.470)^2 = 4.527$

*** Total Vertical Gain is Elevation Gain times Azimuth Gain**
0.936 x 4.527 = 4.237

ERP divided by Vertical Gain equals Antenna Input Power
2.8 kW ÷ 4.237 = 0.661 kW