Report Of Intermodulation Product Findings

SCONNIX MULTIPLEXED BROADCAST FACILITY
BOSTON, MASSACHUSETTS

Project# 26748A

October 29, 2010

Electronics Research Inc.
7777 Gardner Road
Chandler, Indiana 47610
Phone (812) 925-6000 Fax (812) 925- 4030

TABLE OF CONTENTS

Report of Findings for Intermodulation Product Measurements

Exhibits Accompanying This Report

REPORT OF FINDINGS
SCONNIX BROADCAST FACILITY
NEWTON, MASSACHUSETTS

Introduction: This report of findings is based on data collected at the Sconnix FM broadcast facility located in Newton, MA. The report includes measurements offered as proof that the combined operations of WBOS (92.9 MHz.), WJMN (94.5 MHz.), WTKK (96.9 MHz.), WBZ-FM (98.5 MHz.), WKLB (102.5 MHz.), WODS (103.3 MHz.), WROR (105.7 MHz.), WMJX (106.7 MHz.), and WXKS (107.9 MHz.) transmitters are in compliance with the FCC Rules and Regulations as required by the Code of Federal Regulations (CFR) Title 47 section 73.317 paragraph (b) through (d). In brief, the collection of measurements presented in this report shows that all possible third order inter-modulation (IM) products generated by this multiplexed system are less than the maximum allowable level as required by section 73.317 (b) through (d). The WBUR-FM (90.9 MHz.) operates into a separate side mount antenna located lower on the same tower. The effects on the stations operating from the multiplexed system has been considered in this report. Jeff Taylor of Electronics Research, Inc. located in Chandler, Indiana performed the measurements summarized herein on October 29, 2010.

The following exhibits are provided:

Exhibit A:
- A-1 Drawing Depicting Antenna.
- A-2 COG 1084-2CP Antenna Specification Sheet.
- A-3 Drawing Depicting Multiplexed Scheme.
- A-4 Multiplexer Specification Sheet.
- A-5 Theoretical Vertical Plane Relative Field Antenna Plots

Exhibit B:
- B-1 Equipment Employed In Intermodulation Product Measurement.
- B-2 Broadcasting Scheme of the Multiplexed Systems.

Table 1. Carrier Reference Levels.
Table 2. Calculated Third Order Products.
Table 3. Intermodulation Analysis Measurements.

Exhibits Accompanying Report: Exhibit A provides comprehensive information on both antenna and filters used by these radio stations. Exhibit B illustrates the broadcasting scheme of each station, the layout of the equipment used to isolate and measure potential intermodulation products and forward carrier reference levels. Found within Table 1 are the narrow band carrier frequency measurements that provide relative output signal levels for the IM analysis. Table 2 lists the calculated third order products that can be generated from FM transmitters broadcasting from the multiplexed system. The IM Analysis Measurements, in Table 3, provides detailed information obtained from the product frequency investigation.

The Nature of Intermodulation Products (IM): Intermodulation products result from inadequate transmitter-to-transmitter isolation. Intermodulation products are commonly generated from radio stations operating into multiplexed facilities and congested antenna broadcast sites. The mechanics associated with the phenomenon have been well documented. When two or more transmitters are coupled to each other, new spectral components are produced by the mixing of the station frequencies in the active circuits of each transmitter. The common term used to describe this phenomenon is third order product denoted by the mathematical expression $[2(F_1)-(F_2)]$, where F_1 signifies the frequency of the transmitter that is generating the intermodulation product, and F2 signifies the frequency causing the interference.

The Multiplexed System: These measurements were taken with all three FM stations operating from the combined antenna system. The WBOS, WJMN, WTKK, WBZ-FM, WKLB, WODS, WROR, WMJX, and WXKS multiplexed system is fundamentally comprised of antenna, feed line and multiplexer unit. The COG 1084-2CP (antenna) and combiner units, are products of Electronics Research, Inc. while the feedline is Dielectric. Refer to Exhibit B-1, for an illustration of the Broadcasting Scheme of these stations.

To accomplish the aggregation of nine transmitter signals into a common antenna feed and provide transmitter-to-transmitter isolation, a multiplexing scheme consisting of Combiner modules was used. Specifically, one combiner module 963-6 WKLB 102.5 MHz. was removed and replaced with a 970-4 combiner module. An additional 970-4 combiner WODS 103.3 MHz. was added to this system. Refer to Exhibit A-3 for the multiplexer layout. The multiplexer, fully assembled, exhibited transmitter port-to-port isolation in excess of -52dB. Other performance measurements, such as match, loss, group-delay, etc, revealed that the multiplexer unit was in proper working condition. Refer to Exhibit A-4 for the Combiner Specification Sheet.

The IM Investigation: Directional Couplers were placed at key locations throughout the combiner to monitor and maintain the multiplexer's performance. All couplers furnished with the system are factory calibrated and capable of delivering accurate and repeatable RF measurements. To facilitate the taking of the measurements, the coupler located at the antenna output of the multiplexed system was used. Care was taken in the selection of the measurement location to insure that the measurements would be made far removed from transmitters and any filtering used to reduce broadcast emissions. The coupler selected would normally be used for antenna reflection measurements and thus would provide greater than -33 dB directivity and a forward signal sample of -47 dB.

The forward port of the coupler was used for sampling the outgoing carrier levels and IM products. The IM sampled signal was fed by shielded cable into a Band Pass Filter where all extraneous energy was steeply attenuated. Various attenuation pads were used, when needed, on the band pass filter and/or the Spectrum Analyzer to ensure an adequate signal level for measurements without overloading the measurement equipment. Various attenuation pads were used, when needed, on the band pass filter and/or the FIM71 to ensure an adequate signal level for measurements without overloading the measurement equipment. A Potomac Instruments FIM-71 Field Strength Receiver Serial # 242 was employed to record the level of all signals investigated. To facilitate the selective tuning of the Receiver and Band Pass Filter a Wavetek Model 3000 Serial # 7512028 signal generator was used.

Prior to recording measurements, all pertinent broadcasting equipment including Transmitters, Multiplexer, Feed Line and Antenna were adjusted to optimal performance. Also, it was confirmed before taking any measurements that all transmitters were operating at full licensed power. From the equipment setup described above, the relative output signal level of each stations forward carrier was made. The resulting signal levels of these measurements are listed in Table 1, column labeled "Adjusted Level". This level will be used as the reference level for possible IM products of each carrier and was necessary to confirm that no significant levels of spurious energy, referenced to each carrier, were present from any transmitter operating from the multiplexed system.

Table 1 - Carrier Reference Levels.

Carrier Frequency (MHz)	Pad One (dB)	Bandpass Filter Loss (dB)	Measured Level (dBm)	**Adjusted Level (dBµ)**	Notes
932.9	**0**	**-**	**13.8**	**106.2**	
94.5	**0**	**-**	**5.7**	**114.3**	
96.9	**0**	**-**	**12.9**	**107.1**	
98.5	**0**	**-**	**4.7**	**115.3**	
102.5	**0**	**-**	**5.7**	**114.3**	
103.3	**0**	**-**	**5.9**	**114.1**	
105.7	**0**	**-**	**11.7**	**108.3**	
106.7	**0**	**-**	**11.2**	**108.8**	
107.9	**0**	**-**	**12.00**	**108.0**	

Predictable third-order products due to system harmonics mixed with all on-site interfering frequencies that could be generated from the multiplexed system are calculated and listed in Table 2.

Table 2 - Third order Products.

	Carrier Frequencies								
Interfering Frequency MHz	**WBOS 92.9**	**WJMN 94.5**	**WTKK 96.9**	**WBZ-FM 98.5**	**WKLB 102.5**	**WODS 103.3**	**WROR 105.7**	**WMJX 106.7**	**WXKS 107.9**
WBUR 90.9	**94.9**	**98.1**	**102.9**	**106.1**	**114.1**	**115.7**	**120.5**	**122.5**	**124.9**
WBOS 92.9	**---**	**96.1**	**100.9**	**104.1**	**112.1**	**113.7**	**118.5**	**120.5**	**122.9**
WJMN 94.5	**91.3**	**---**	**99.3**	**102.5**	**110.5**	**112.1**	**116.9**	**118.9**	**121.3**
WTKK 96.9	**88.9**	**92.1**	**---**	**100.1**	**108.1**	**109.7**	**114.5**	**116.5**	**118.9**
WBZ-FM 98.5	**87.3**	**90.5**	**95.3**	**---**	**106.5**	**108.1**	**112.9**	**114.9**	**117.3**
WKLB 102.5	**83.3**	**86.5**	**91.3**	**94.5**	**---**	**104.1**	**108.9**	**110.9**	**113.3**
WODS 103.3	**82.5**	**85.7**	**90.5**	**93.7**	**101.7**	**---**	**108.1**	**110.1**	**112.5**
WROR 105.7	**80.1**	**83.3**	**88.1**	**91.3**	**99.3**	**100.9**	**---**	**107.7**	**110.1**
WMJX 106.7	**79.1**	**82.3**	**87.1**	**90.3**	**98.3**	**99.9**	**104.7**	**---**	**109.1**
WXKS 107.9	**77.9**	**81.1**	**85.9**	**89.1**	**97.1**	**98.7**	**103.5**	**105.5**	**---**

Using the equipment previously described the IM product measurements were recorded and are listed in Table 3. The signal levels referenced to the carriers are calculated and listed in the column labeled "Level Referenced to Carrier". Refer to Exhibit B-2 for a layout of the measurement equipment.

Table 3 – Intermodulation Measurements

IM Measurements Taken at Sconnix											
Product Frequency (MHz)	**Transmitter Frequency (MHz)**	**Interfering Frequency (MHz)**	**Pad (dB)**	**Bandpass Filter Loss (dB)**	**Total Loss**	**Full Scale Range (dBµ)**	**Scale Reading (dBµ)**	**Adjusted Level (dBµ)**	**Carrier Reference Level (dBµ)**	**Level Referenced to Carrier (dB)**	**Notes***
Transmitter Mixes											
	92.9		**0**		**0**	**120**	**13.8**		**106.2**		
	94.5		**0**		**0**	**120**	**5.7**		**114.3**		
	96.9		**0**		**0**	**120**	**12.9**		**107.1**		
	98.5		**0**		**0**	**120**	**4.7**		**115.3**		
	102.5		**0**		**0**	**120**	**5.7**		**114.3**		
	103.3		**0**		**0**	**120**	**5.9**		**114.1**		
	105.7		**0**		**0**	**120**	**11.7**		**108.3**		
	106.7		**0**		**0**	**120**	**11.2**		**108.8**		
	107.9		**0**		**0**	**120**	**12**		**108**		
77.9	92.9	107.9	0	11	11	20	20	11	106.2	-95.2	
79.1	92.9	106.7	0	10.7	10.7	20	20	10.7	106.2	-95.5	
80.1	92.9	105.7	0	11	11	20	20	11	106.2	-95.2	
81.1	94.5	107.9	0	11.4	11.4	20	20	11.4	114.3	-102.9	
82.3	94.5	106.7	0	10.5	10.5	20	20	10.5	114.3	-103.8	
82.5	92.9	103.3	0	10.8	10.8	20	20	10.8	106.2	-95.4	
83.3	94.5	105.7	0	10	10	20	20	10	114.3	-104.3	
83.3	92.9	102.5	0	10	10	20	20	10	106.2	-96.2	
85.7	94.5	103.3	0	9.7	9.7	20	20	9.7	114.3	-104.6	
85.9	96.9	107.9	0	11	11	20	20	11	107.1	-96.1	
86.5	94.5	102.5	0	10.4	10.4	20	20	10.4	114.3	-103.9	
87.1	96.9	106.7	0	10.3	10.3	20	19	11.3	107.1	-95.8	
87.3	92.9	98.5	0	10.5	10.5	20	20	10.5	106.2	-95.7	
88.1	96.9	105.7	0	10.5	10.5	20	20	10.5	107.1	-96.6	
88.9	92.9	96.9	0	10.2	10.2	20	20	10.2	106.2	-96	
89.1	98.5	107.9	0	10.4	10.4	20	20	10.4	115.3	-104.9	
90.3	98.5	106.7	0	10	10	20	20	10	115.3	-105.3	
90.5	94.5	98.5	0	10.2	10.2	20	20	10.2	114.3	-104.1	

90.5	96.9	103.3	0	10.2	10.2	20	20	10.2	107.1	-96.9	
91.3	98.5	105.7	0	9.8	9.8	20	20	9.8	115.3	-105.5	
91.3	92.9	94.5	0	9.8	9.8	20	20	9.8	106.2	-96.4	
91.3	96.9	102.5	0	9.8	9.8	20	20	9.8	107.1	-97.3	
92.1	94.5	96.9	0	10	10	20	20	10	114.3	-104.3	
93.7	98.5	103.3	0	9.6	9.6	20	4.2	25.4	115.3	-89.9	
94.5	98.5	102.5	0	9.9	9.9	20	20	9.9	115.3	-105.4	See Note #1
94.9	92.9	90.9	0	9.8	9.8	20	20	9.8	106.2	-96.4	See Note #1
95.3	96.9	98.5	0	9.8	9.8	20	4	25.8	107.1	-81.3	See Note #2
96.1	94.5	92.9	0	9.6	9.6	20	11.5	18.1	114.3	-96.2	
97.1	102.5	107.9	0	9.5	9.5	20	20	9.5	114.3	-104.8	See Note #3
98.1	94.5	90.9	0	9.3	9.3	20	20	9.3	114.3	-105	See Note #4
98.3	102.5	106.7	0	9.3	9.3	20	20	9.3	114.3	-105	See Note #4
98.7	103.3	107.9	0	9.2	9.2	20	20	9.2	114.1	-104.9	See Note #4
99.3	102.5	105.7	0	9.2	9.2	20	8	21.2	114.3	-93.1	
99.3	96.9	94.5	0	9.2	9.2	20	8	21.2	107.1	-85.9	
99.9	103.3	106.7	0	9.2	9.2	20	20	9.2	114.1	-104.9	
100.1	98.5	96.9	0	9.2	9.2	20	20	9.2	115.3	-106.1	
100.9	103.3	105.7	0	9.1	9.1	20	20	9.1	114.1	-105	
100.9	96.9	92.9	0	9.1	9.1	20	20	9.1	107.1	-98	
101.7	102.5	103.3	0	9	9	20	9	20	114.3	-94.3	
102.5	98.5	94.5	0	9.2	9.2	20	20	9.2	115.3	-106.1	See Note #5
102.9	96.9	90.9	0	9	9	20	20	9	107.1	-98.1	See Note #6
103.5	105.7	107.9	10	9	19	20	20	19	108.3	-89.3	See Note #7
104.1	98.5	92.9	0	9.2	9.2	20	1	28.2	115.3	-87.1	
104.1	103.3	102.5	0	9.2	9.2	20	1	28.2	114.1	-85.9	
104.7	105.7	106.7	0	8.8	8.8	20	16.5	12.3	108.3	-96	
105.5	106.7	107.9	10	8.8	18.8	20	20	18.8	108.8	-90	See Note #8
106.1	98.5	90.9	10	8.5	18.5	20	20	18.5	115.3	-96.8	See Note #9
106.5	102.5	98.5	10	8.8	18.8	20	20	18.8	114.3	-95.5	See Note #10
107.7	106.7	105.7	10	8.5	18.5	20	20	18.5	108.8	-90.3	See Note #11
108.1	102.5	96.9	10	8.5	18.5	20	20	18.5	114.3	-95.8	See Note #11
108.1	103.3	98.5	10	8.5	18.5	20	20	18.5	114.1	-95.6	See Note #11
108.1	105.7	103.3	10	8.5	18.5	20	20	18.5	108.3	-89.8	See Note #11
108.9	105.7	102.5	0	8.5	8.5	20	20	8.5	108.3	-99.8	
109.1	107.9	106.7	0	8.3	8.3	20	20	8.3	108	-99.7	
109.7	103.3	96.9	0	8.5	8.5	20	20	8.5	114.1	-105.6	
110.1	106.7	103.3	0	8.5	8.5	20	18	10.5	108.8	-98.3	
110.1	107.9	105.7	0	8.5	8.5	20	18	10.5	108	-97.5	

110.5	102.5	94.5	0	8.7	8.7	20	20	8.7	114.3	-105.6	
110.9	106.7	102.5	0	8.3	8.3	20	20	8.3	108.8	-100.5	
112.1	102.5	92.9	0	8.3	8.3	20	20	8.3	114.3	-106	
112.1	103.3	94.5	0	8.3	8.3	20	20	8.3	114.1	-105.8	
112.5	107.9	103.3	0	8.5	8.5	20	20	8.5	108	-99.5	
112.9	105.7	98.5	0	9	9	20	20	9	108.3	-99.3	
113.3	107.9	102.5	0	8.5	8.5	20	20	8.5	108	-99.5	
113.7	103.3	92.9	0	8.5	8.5	20	20	8.5	114.1	-105.6	
114.1	102.5	90.9	0	8.7	8.7	20	20	8.7	114.3	-105.6	
114.5	105.7	96.9	0	8.5	8.5	20	20	8.5	108.3	-99.8	
114.9	106.7	98.5	0	8.2	8.2	20	20	8.2	108.8	-100.6	
115.7	103.3	90.9	0	8.7	8.7	20	20	8.7	114.1	-105.4	
116.5	106.7	96.9	0	8.5	8.5	20	20	8.5	108.8	-100.3	
116.9	105.7	94.5	0	9	9	20	20	9	108.3	-99.3	
117.3	107.9	98.5	0	9	9	20	20	9	108	-99	
118.5	105.7	92.9	0	8.5	8.5	20	20	8.5	108.3	-99.8	
118.9	106.7	94.5	0	8.7	8.7	20	20	8.7	108.8	-100.1	
118.9	107.9	96.9	0	8.7	8.7	20	20	8.7	108	-99.3	
120.5	105.7	90.9	0	9	9	20	20	9	108.3	-99.3	
120.5	106.7	92.9	0	9	9	20	20	9	108.8	-99.8	
121.3	107.9	94.5	0	8.8	8.8	20	20	8.8	108	-99.2	
122.5	106.7	90.9	0	0	0	20	20	0	108.8	-108.8	See Note #12
122.9	107.9	92.9	0	0	0	20	20	0	108	-108	See Note #12
124.9	107.9	90.9	0	0	0	20	20	0	108	-108	See Note #12

Notes:

(1) 94.5 MHz. Transmitter off for this measurement.
(2) Checked with 6 dB pad.
(3) 96.9 MHz. Transmitter off for this measurement.
(4) 98.5 MHz. Transmitter off for this measurement.
(5) 102.5 MHz. Transmitter off for this measurement.
(6) 103.3 and 102 5 MHz. Transmitters off for this measurement.
(7) 103.3 MHz. Transmitter off for this measurement.
(8) 105.7 MHz. Transmitter off for this measurement.
(9) 106.7 and 105.7 MHz. Transmitters off for this measurement.
(10) 106.7 MHz. Transmitter off for this measurement.
(11) 107.9 MHz. Transmitter off for this measurement.
(12) Direct Measurement Method.

Conclusion: Based upon my observations and measurements taken on October 29, 2010 as summarized in this document, I, Jeff Taylor, find the subject system, specifically the transmitter and filter system for the operation of WBOS, WJMN, WTKK, WBZ-FM, WKLB, WODS, WROR, WMJX, and WXKS into the antenna to be in proper working order. Furthermore, based on the measured data, it is my opinion that there are no inter-modulation products in excess of 80 dB below carrier levels generated from or within the station operating on the installed system. Based on this recorded data, I conclude that WBOS, WJMN, WTKK, WBZ-FM, WKLB, WODS, WROR, WMJX, and WXKS are in compliance with the requirements of Section 73.317 paragraph (b) through (d) of the FCC Rules and Regulations.

Respectfully submitted,
Electronics Research, Inc.

Jeff Taylor, Field Technician

State of Indiana)
) SS:
County of Warrick)

AFFIDAVIT

I, Jeff Taylor, hereby declare that the following statements are true and correct to the best of my knowledge and belief :

1.) I am a Field Technician for Electronics Research, Inc ("ERI ") and have been employed by ERI for fourteen years. I am familiar with and have assisted in the design, manufacturing and installation of FM Antennas and FM Multiplexers in my long tenure with ERI.

2.) I have either prepared and/or directly supervised the preparation of all technical information contained in this Report Of Findings and to my knowledge to be accurate and true.

3.) ERI has been requested by CBS Radio, on behalf of radio Stations WBOS, WJMN, WTKK, WBZ-FM, WKLB, WODS, WROR, WMJX, and WXKS to prepare this Report of Findings.

Jeff Taylor; Field Technician

Jeff Taylor

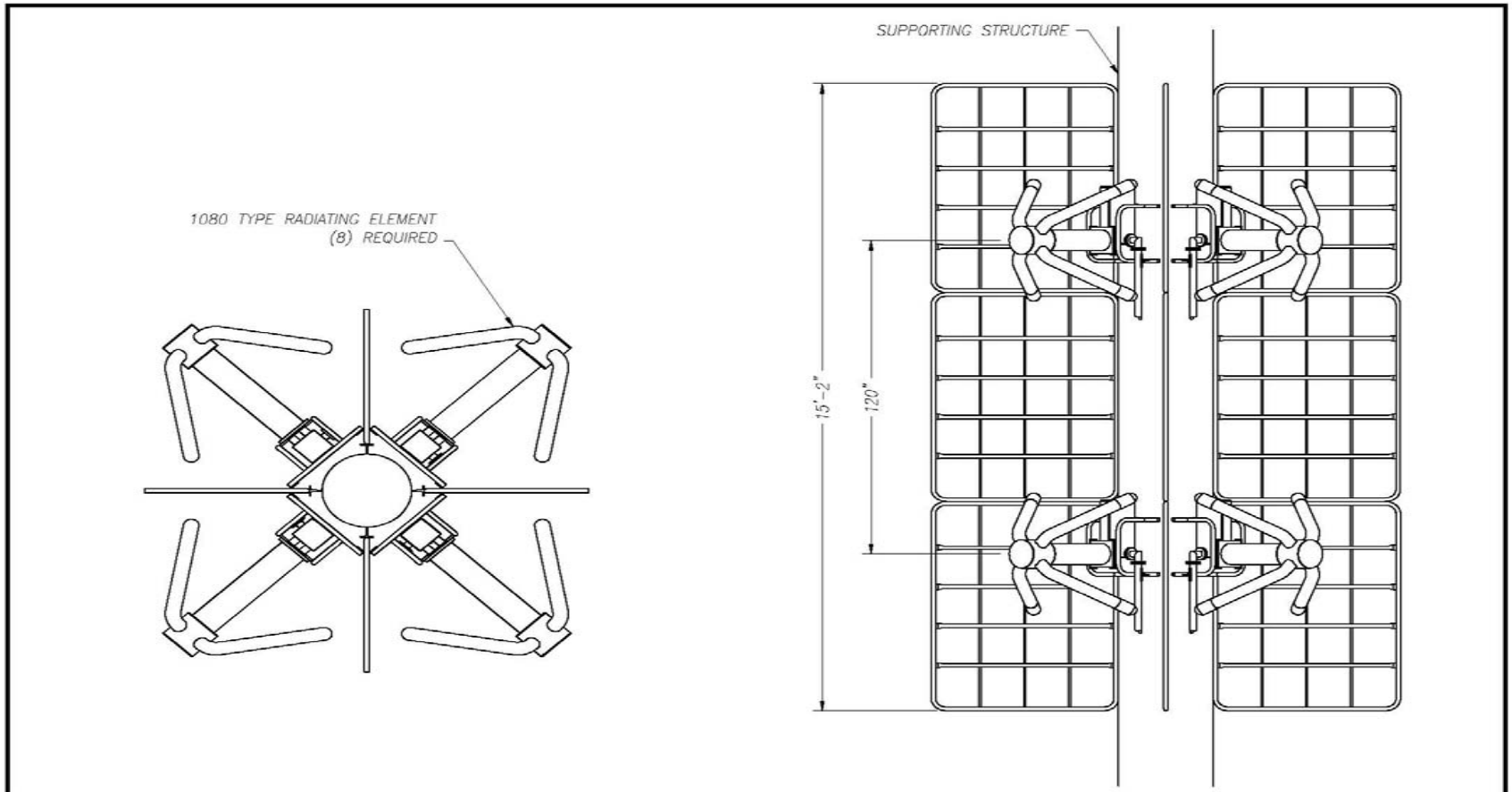
Subscribed and sworn to before me on this 1st, day of November, 2010.

Jacquelyn Kinney; Notary Public
My commission expires July 5, 2015

Jacquelyn S. Kinney

JACQUELYN S. KINNEY
Notary Public, State of Indiana
Vanderburgh County
My Commission Expires
July 05, 2015

EXHIBIT, A-1



ELECTRONICS RESEARCH, INC.
Established 1943
7777 GARDNER RD.
CHANDLER, IN. 47610-9637
PHONE: (812) 925-6000
FAX: (812) 925-4030

NO	REVISION	APP'D	DATE
6			
5			
4			
3			
2			
1			

NAME INTER-MODULATION REPORT
STATION: AMERICAN TOWER / NEWTON, MA SITE
FREQUENCY: PROJECT NO.: 10092
PATH G:\DRAFTING\ALL\PROJECTS\10092
FILE IR — 1 | DRAWN BAM | FACTOR NTS
DATE 7/29/03 | APP'D | DWG. NO. IR — 1
MODEL COG1084-2CP

EXHIBIT A-1

A-2 ERI Antenna Specification Sheet

MASTER-FM ~ SCONNIX TRANSMISSION SITE
BOSTON, MASSACHUSETTS

General Specifications

Antenna Type . . . . . .High Power FM-Broadcast, Suitable For Multiplexing
Model Number ..... COG1084-2CP (Cogwheel)
Number of Bay Levels ..... Two
Polarization ..... Right Hand Circular

Electrical Specifications

Antenna Input Power Capability . . . . . 59 kW Max (1)
Operating Frequency Band ..... 88 ~ 108 Megahertz.
VSWR. . . . . <1.15:1 @ Operating Frequencies(2)
Azimuthal Pattern Circularity ..... Better Then +/- 2dB From RMS (Free Space)
Power Split ..... 50/50 (Horizontal & Vertical)
Frequency Specific Information:

Frequency	Station ERP	Beam Tilt	First Null Fill	Second Null Fill	Power Gain	Line Loss (3)	Filter Loss (4)	Computed TPO
102.5	**7.2 KW**	**0°**	**0 %**	**0 %**	**.977**	**-0.901 dB**	**.432 dB**	**10.02 kW**
103.3	**8.7 KW**	**0°**	**0 %**	**0 %**	**.975**	**-0.901 dB**	**.527 dB**	**12.39 kW**

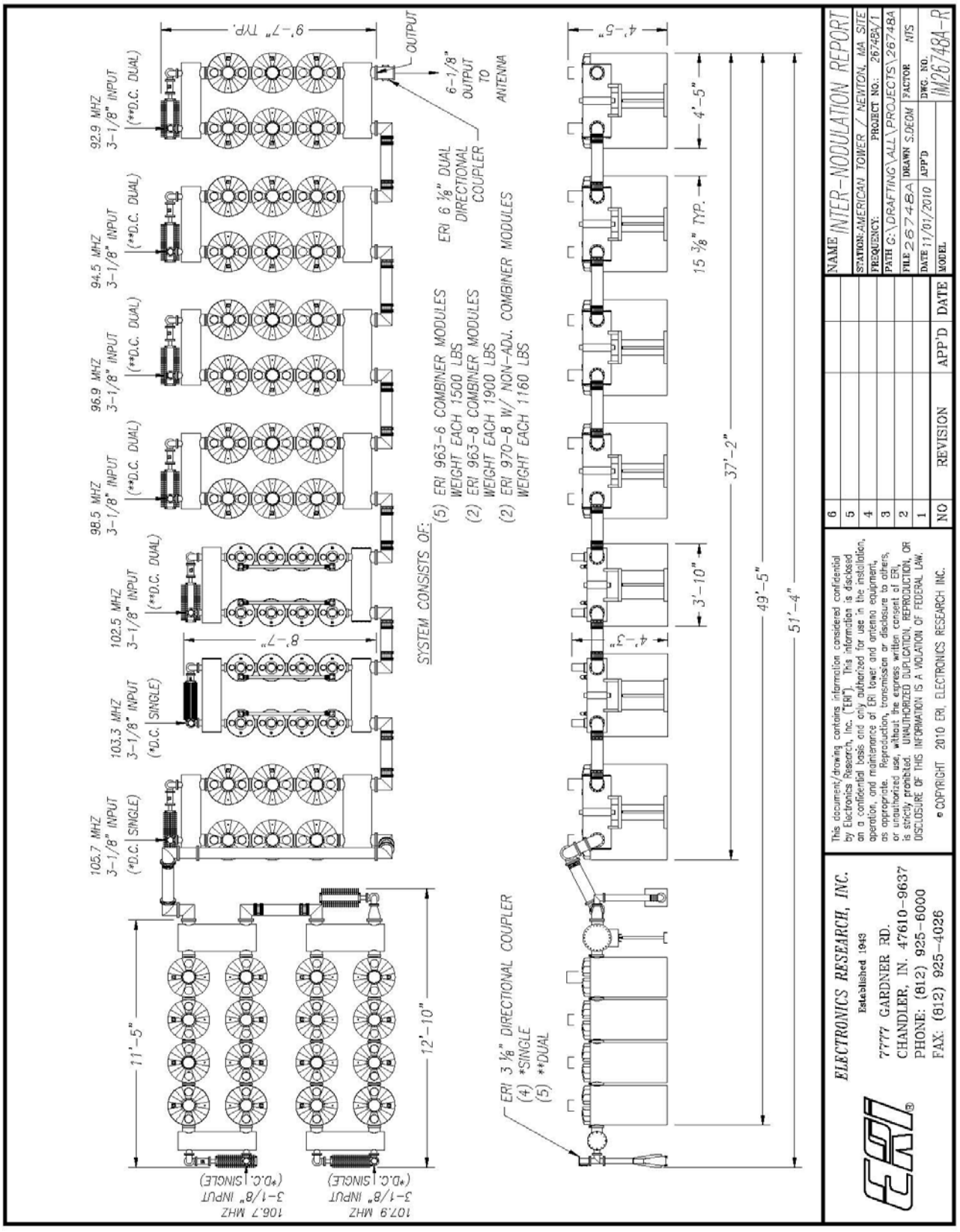
Mechanical Specifications

Antenna Feed System ..... Branch Fed Single Input
Input Connector ..... . 6 1/8”-50 Ohm EIA Flanged
Element Deicing..... Low Q Element (5)
Interbay Spacing ..... 120” Center to Center
Array Length..... 15 Feet 2 Inches
Construction Material (Antenna) ..... Galvanized Plated Steel and Stainless Steel
Construction Material (Mounting) ..... Step Pole

.

1) Power Capability Has Been Rated Assuming an Operating Transmission VSWR of 1.5:1
2) VSWR Specification Achieved After On Site Tuning For User Specific Frequencies.
3) Line Loss Assumes A Feed Run of 1145 Feet, of Dielectric Type DC-675-004 Rigid 6 1/8” Coax (Output of Multiplexer to Main 3” Power Splitter). Also, 335 Feet of Dielectric Type 375-003 Rigid 3 1/8” Coax (Between the Main 3” Power Splitter and Antenna Bay Level Power Dividers).
4) Losses Taken From Actual Combiner.
5) With Low Q Element Design, Moderate Icing Will Not Cause Appreciable VSWR Rise.

EXHIBIT A-3


105.7 MHZ 3-1/8" INPUT (*D.C. SINGLE)
103.3 MHZ 3-1/8" INPUT (*D.C. SINGLE)
102.5 MHZ 3-1/8" INPUT (**D.C. DUAL)
98.5 MHZ 3-1/8" INPUT (**D.C. DUAL)
96.9 MHZ 3-1/8" INPUT (**D.C. DUAL)
94.5 MHZ 3-1/8" INPUT (**D.C. DUAL)
92.9 MHZ 3-1/8" INPUT (**D.C. DUAL)
9'-7" TYP.
8'-7"
OUTPUT
6-1/8" OUTPUT TO ANTENNA
ERI 6 1/8" DUAL DIRECTIONAL COUPLER
SYSTEM CONSISTS OF:
(5) ERI 963-6 COMBINER MODULES WEIGHT EACH 1500 LBS
(2) ERI 963-8 COMBINER MODULES WEIGHT EACH 1900 LBS
(2) ERI 970-8 W/ NON-ADJ. COMBINER MODULES WEIGHT EACH 1160 LBS
ERI 3 1/8" DIRECTIONAL COUPLER
(4) *SINGLE
(5) **DUAL
11'-5"
12'-10"
106.7 MHZ 3-1/8" INPUT (*D.C. SINGLE)
107.9 MHZ 3-1/8" INPUT (*D.C. SINGLE)
4'-3"
3'-10"
49'-5"
51'-4"
4'-5"
15 3/8" TYP.
37'-2"
4'-5"
ELECTRONICS RESEARCH, INC.
Established 1943
7777 GARDNER RD.
CHANDLER, IN. 47610-9637
PHONE: (812) 925-6000
FAX: (812) 925-4026
This document/drawing contains information considered confidential by Electronics Research, Inc. ("ERI"). This information is disclosed on a confidential basis and only authorized for use in the installation, operation, and maintenance of ERI tower and antenna equipment, as appropriate. Reproduction, transmission or disclosure to others, or unauthorized use, without the express written consent of ERI, is strictly prohibited. UNAUTHORIZED DUPLICATION, REPRODUCTION, OR DISCLOSURE OF THIS INFORMATION IS A VIOLATION OF FEDERAL LAW.
© COPYRIGHT 2010 ERI, ELECTRONICS RESEARCH INC.
NO REVISION APP'D DATE
6
5
4
3
2
1
NAME INTER-MODULATION REPORT
STATION: AMERICAN TOWER / NEWTON, MA SITE
FREQUENCY: PROJECT NO.: 26748A/1
PATH G:\DRAFTING\ALL\PROJECTS\26748A
FILE 26748A DRAWN S.DEOM SCALE: NTS
DATE 11/01/2010 APP'D
MODEL
DWG. NO. M26748A-R

A-4 ERI Combiner Specification Sheet

MASTER-FM ~ SCONNIX TRANSMISSION SITE
BOSTON, MASSACHUSETTS

General Specifications:

Multiplexer Type .....Band Pass Constant Impedance
Number of Combining Units .....Nine
Injected Port to Injected Port Isolation ..... < - 52 dB
Output Connector ..... 6 1/8 "50 Ohm EIA (Flanged)
Output Power (Designed) ..... 140 kW(1)

Heat Removal .....Natural Convection
Physical Arrangement .....All Components Standing on Mezzanine

Injected Port Specifications:

Frequency Assignment ..... 92.9, 94.5, 96.9, 98.5, 102.5, 103.3, 105.7, 106.7, and 107.9 MHz.
Power Rating, Each Injected Port (Designed)..... 13kW
Input Connector .....3-1/8" 50 Ohm EIA (Flanged).
VSWR.....< 1.08:1 @ +/-150 KHz.(2)
Group Delay .....Less than 260 ns Overall Variation, Carrier @ +/- 150 KHz.
Insertion Loss (Measured):

102.5 MHz. ..... - 0.432 dB
103.3 MHz. ..... - 0.527 dB

1) Power Rating Listed is as Designed Only. Actual Power Capabilities May Vary.
2) When Terminated in 50 Ohm Resistive Load.

EXHIBIT A – 5

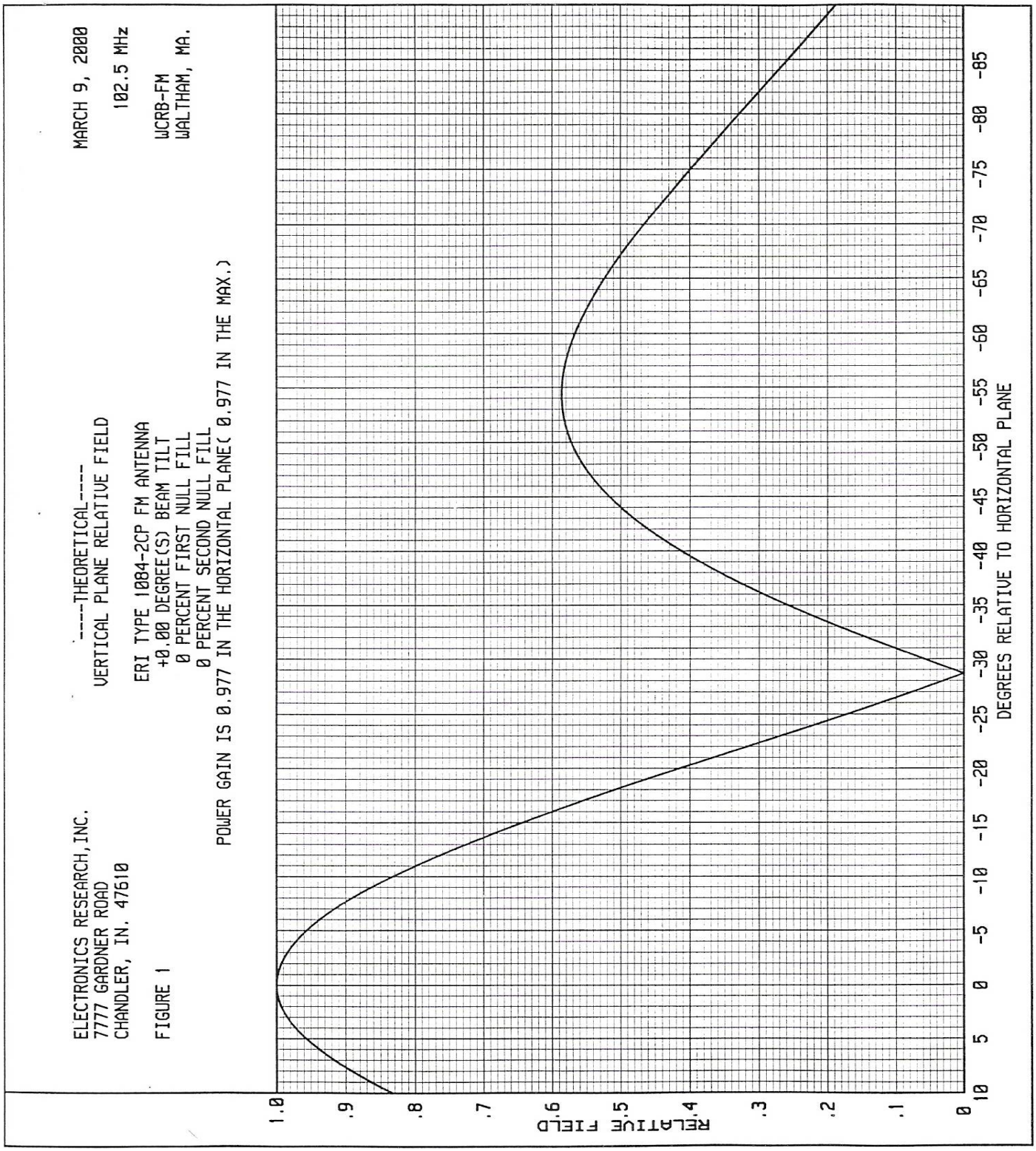

ELECTRONICS RESEARCH, INC.
7777 GARDNER ROAD
CHANDLER, IN. 47610
FIGURE 1
----THEORETICAL----
VERTICAL PLANE RELATIVE FIELD
ERI TYPE 1084-2CP FM ANTENNA
+0.00 DEGREE(S) BEAM TILT
0 PERCENT FIRST NULL FILL
0 PERCENT SECOND NULL FILL
POWER GAIN IS 0.977 IN THE HORIZONTAL PLANE(0.977 IN THE MAX.)
MARCH 9, 2000
102.5 MHz
WCRB-FM
WALTHAM, MA.
RELATIVE FIELD
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50 -55 -60 -65 -70 -75 -80 -85
DEGREES RELATIVE TO HORIZONTAL PLANE

EXHIBIT A – 5

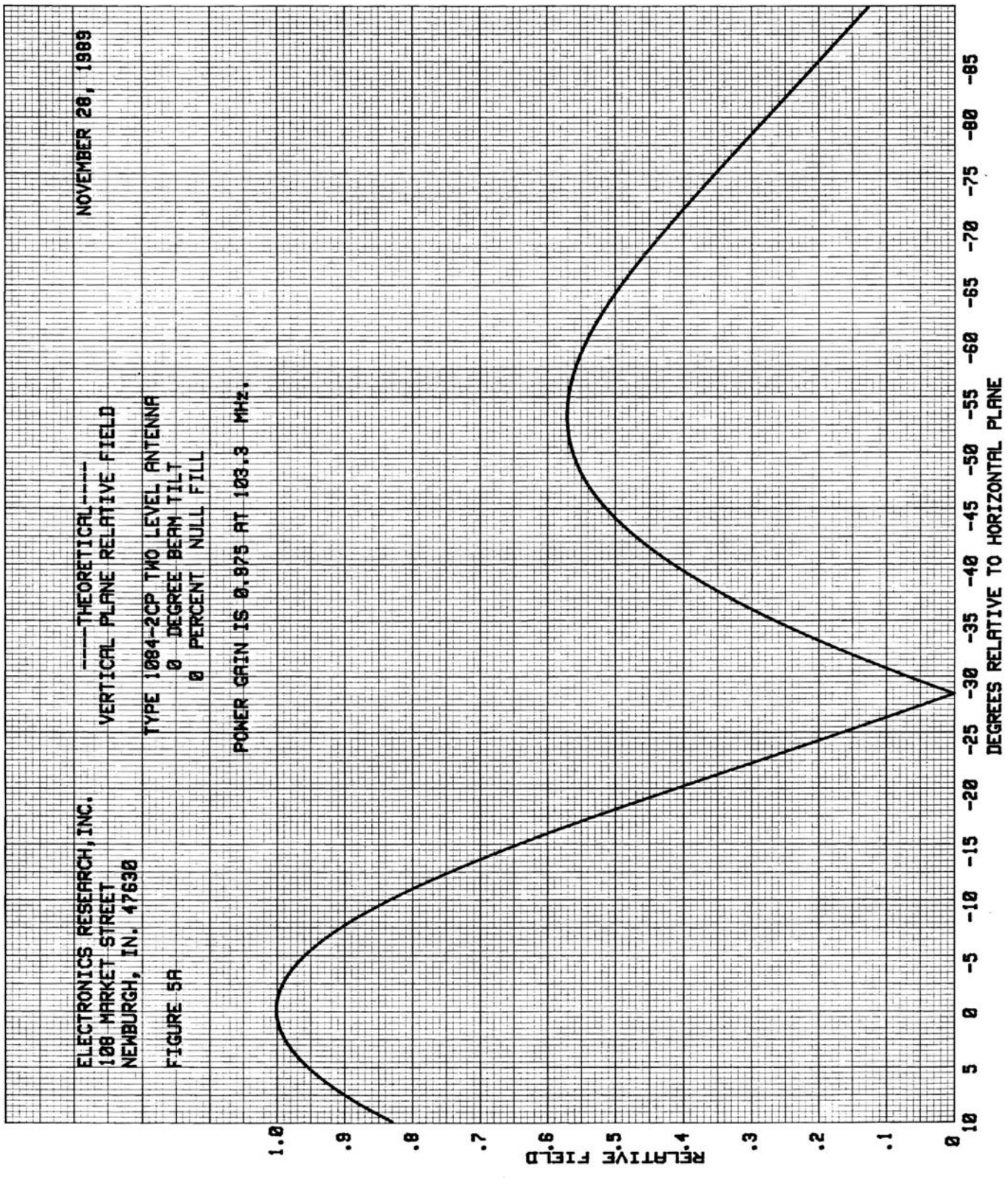

ELECTRONICS RESEARCH,INC.
100 MARKET STREET
NEWBURGH, IN. 47630
FIGURE 5A
----THEORETICAL----
VERTICAL PLANE RELATIVE FIELD
NOVEMBER 28, 1989
TYPE 1084-2CP TWO LEVEL ANTENNA
0 DEGREE BEAM TILT
0 PERCENT NULL FILL
POWER GAIN IS 0.975 AT 103.3 MHz.
RELATIVE FIELD
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50 -55 -60 -65 -70 -75 -80 -85
DEGREES RELATIVE TO HORIZONTAL PLANE

EXHIBIT B

Broadcasting Scheme and Equipment Employed in Intermodulation Measurements