ELECTRONICS RESEARCH, INC. ERI®

Report Of Intermodulation Product Findings

Charleston, SC.

WIHB 92.5 MHz.
WXST 99.7 MHz.
WAVF 101.7 MHz.

Project# 22482

September 15, 2008

Electronics Research Inc.
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EXHIBIT B

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Report of Findings for Intermodulation Product Measurements

Exhibits Accompanying This Report

REPORT OF FINDINGS
WIHB / WXST / WAVF
92.5 MHz. / 99.7 MHz. / WAVF 101.7 MHz.

Introduction: This report of findings is based on data collected at the WIHB, WXST and WAVF broadcast facility located in Mt. Pleasant, South Carolina. The report includes measurements offered as proof that the combined operations of WIHB (92.5 MHz.), WXST (99.7 MHz.) and WAVF (101.7) 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 diplex system are less than the maximum allowable level as required by section 73.317 (b) through (d).WFCH (88.5 MHz.), WSCC (94.3 MHz.), WKZQ (96.1 MHz.),WLAC (100.5 MHz.), WXLY (102.5 MHz.), WEZL (103.5 MHz.) and WRFQ (104.5 MHz.) operate into separate antennas on another tower within 100' of the combined antenna. Their effects on the stations operating from the multiplexed system have been considered in this report. Mike Ahlert and Jeff Taylor of Electronics Research, Inc. located in Chandler, Indiana performed the measurements summarized herein on September 15, 2008.

The following exhibits are provided:

Exhibit A:
- A-1 Drawing Depicting Antenna.
- A-2 SHPX-10AC6-SP Antenna Specification Sheet.
- A-3 Drawing Depicting Diplexed Scheme.
- A-4 973-3 Branch Combiner 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 the three FM stations operating from the combined antenna system. The WIHB, WXST and WAVF multiplexed system is fundamentally comprised of antenna, feed line and multiplexer unit. The SHPX-10AC6-SP (antenna) and 973-3 combiner units, are products of Electronics Research, Inc. while the 4 1/16" feedline is Dielectric. Refer to Exhibit B-1, for an illustration of the Broadcasting Scheme of these stations.

To accomplish the aggregation of three transmitter signals into a common antenna feed and provide transmitter-to-transmitter isolation, a multiplexing scheme consisting of 973 Branch Combiner, was installed. Specifically, the Branch Combiner utilizes one ERI Model 973-3 module for each frequency (92.5 MHz., 99.7 MHz. and 101.7 MHz.). Interconnecting "TEE's" are required to complete the combiner which is illustrated in the attached Exhibit A-3. The combiner, fully assembled, exhibited transmitter port-to-port isolation in excess of -42 dB. 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 -40 dB directivity and a forward signal sample of -54 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 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. An Anritsu Model S114B Spectrum Analyzer Serial # 2082 was used to measure the close in spectral attenuation of each carrier and wide band search for any anomalies that may need further investigation. See attached Exhibit B-1 for an illustration of the measurement equipment.

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 stations of concern, 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)	Full Scale Range (dBμ)	Scale Reading (dB)	**Adjusted Level (dBμ)**	Notes
WIHB 92.5	**3**	**-**	**140**	**10.1**	**132.9**	
WXST 99.7	**3**	**-**	**140**	**11.2**	**131.8**	
WAVF 101.7	**3**	**-**	**140**	**9.9**	**133.1**	

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 Frequencies	**92.5**	**99.7**	**101.7**
WFCH 88.5	96.5	110.9	114.9
WIHB 92.5	----	106.9	110.9
WSCC 94.3	90.7	105.1	109.1
WXST 99.7	85.3	----	103.7
WLAC 100.5	84.5	98.9	102.9
WAVF 101.7	83.3	97.7	----
WXLY 102.5	82.5	96.9	100.9
WEZL 103.5	81.5	95.9	99.9
WRFQ 104.5	80.5	94.9	98.9

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.

IM Measurements Taken in											
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											
	92.5	Ref.	3		3	140	10.1		132.9		
	99.7	Ref.	3		3	140	11.2		131.8		
	101.7	Ref.	3		3	140	9.9		133.1		
80.5	92.5	104.5	3	12	15	20	20	15	132.9	-117.9	
81.5	92.5	103.5	3	14	17	20	20	17	132.9	-115.9	
82.5	92.5	102.5	3	13.5	16.5	20	20	16.5	132.9	-116.4	
83.3	92.5	101.7	3	13.2	16.2	20	20	16.2	132.9	-116.7	
84.5	92.5	100.5	3	12.7	15.7	20	20	15.7	132.9	-117.2	
85.3	92.5	99.7	3	13.1	16.1	20	20	16.1	132.9	-116.8	
90.7	92.5	94.3	6	11.2	17.2	40	6.4	50.8	132.9	-82.1	
94.9	99.7	104.5	3	11.8	14.8	20	1.9	32.9	131.8	-98.9	Turned off 94.3 MHz. WSCC
95.9	99.7	103.5	3	11.8	14.8	20	20	14.8	131.8	-117	Turned off 96.1 MHz. WKZQ
96.5	92.5	88.5	3	12.7	15.7	20	6.1	29.6	132.9	-103.3	Turned off 96.1 MHz. WKZQ
96.9	99.7	102.5	3	11.4	14.4	40	10.1	44.3	131.8	-87.5	Local Carrier 96.9 MHz. WLWF
97.7	99.7	101.7	3	12.6	15.6	20	7.4	28.2	131.8	-103.6	
98.9	99.7	100.5	3	12.1	15.1	40	7.2	47.9	131.8	-83.9	
98.9	101.7	104.5	3	12.1	15.1	40	7.2	47.9	133.1	-83.9	
99.9	101.7	103.5	3	12.2	15.2	20	20	15.2	133.1	-117.9	Turned off 99.7 MHz. WXST
100.9	101.7	102.5	3	11.9	14.9	40	4.9	50	133.1	-83.1	
102.9	101.7	100.5	3	11.3	14.3	20	8.1	26.2	133.1	-106.9	Turned off 102.5 MHz. WXLY
103.7	101.7	99.7	3	11.1	14.1	40	9.2	44.9	133.1	-88.2	Turned off 103.5 MHz. WEZL
105.1	99.7	94.3	3	10.4	13.4	20	20	13.4	131.8	-118.4	Turned off 104.5 MHz. WRFQ
106.9	99.7	92.5	3	10.3	13.3	20	5.2	28.1	131.8	-103.7	
109.1	101.7	94.3	3	10.8	13.8	20	20	13.8	133.1	-119.3	
110.9	99.7	88.5	3	10.9	13.9	20	20	13.9	131.8	-117.9	
110.9	101.7	92.5	3	10.9	13.9	20	20	13.9	133.1	-119.2	
114.9	101.7	88.5	3	10.4	13.4	20	20	13.4	133.1	-119.7	

The Spectrum Analyzer was used to check the close in spectral attenuation of the carrier to confirm the operation of the transmitter is in compliance with Sections (b) and (c) of the FCC Rules and Regulations.

As a final proof of the systems IM Product performance, a wide band search was undertaken using the Spectrum Analyzer. The purpose for this measurement was to look for suspicious anomalies that may warrant further investigation. My search ranged the complete frequency span of the receiver and resulted in no additional investigations.

Conclusion: Based upon my observations and measurements taken on September 15, 2008 as summarized in this document, I, Jeff Taylor, find the subject system, specifically the transmitter and filter system for the operation of WIHB, WXST and WAVF 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 WIHB, WXST and WAVF 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

ELECTRONICS RESEARCH, INC. ERI

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 eleven 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 Apex Broadcasting, on behalf of radio Stations WIHB, WXST and WAVF to prepare this Report of Findings.

Jeff Taylor; Field Technician

Jeff Taylor

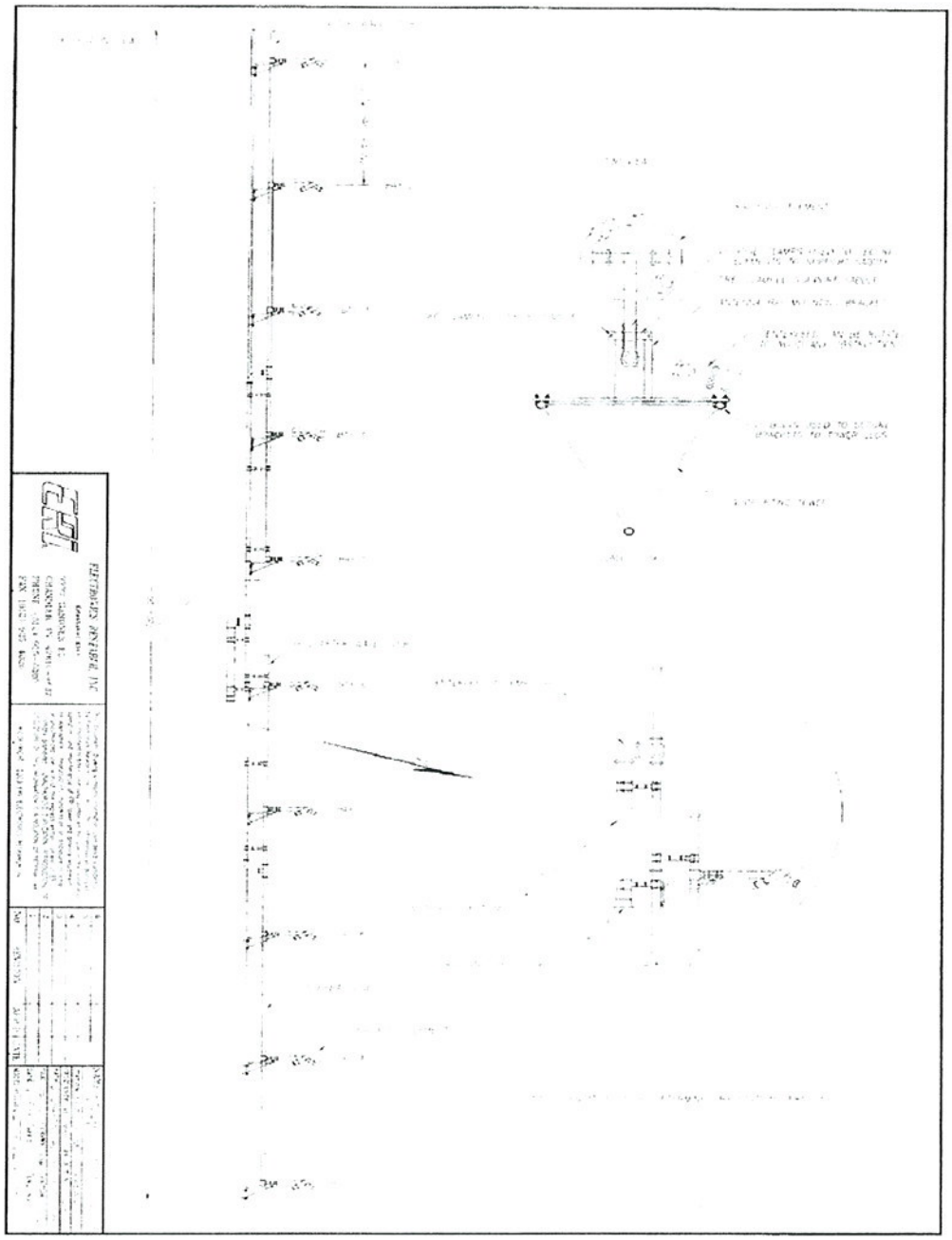
Subscribed and sworn to before me on this 23rd. day of September, 2008.

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

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

Jacquelyn S. Kinney

EXHIBIT, A-1



ELECTRONICS RESEARCH, INC. ERI®

EXHIBIT, A - 2

A-2 ERI Antenna Specification Sheet

Charleston. South Carolina

General Specifications

Antenna Type ..... .High Power FM-Broadcast, Suitable For Multiplexing
Model Number SHPX-10AC6-SP
Number of Bay Levels ..... Ten
Polarization ..... Right Hand Circular

Electrical Specifications

Antenna Input Power Capability ..... 63 kW Max (1)
Operating Frequency Band ..... 92.5 ~ 99.7 ~ 101.7 Megahertz.
VSWR. ..... <1.15:1 @ Operating Frequencies(2)
Azimuthal Pattern Circularity ..... Better Then +/- 1dB From RMS (Free Space)
Power Split ..... 50/50 (Horizontal & Vertical)
Frequency Specific Information:

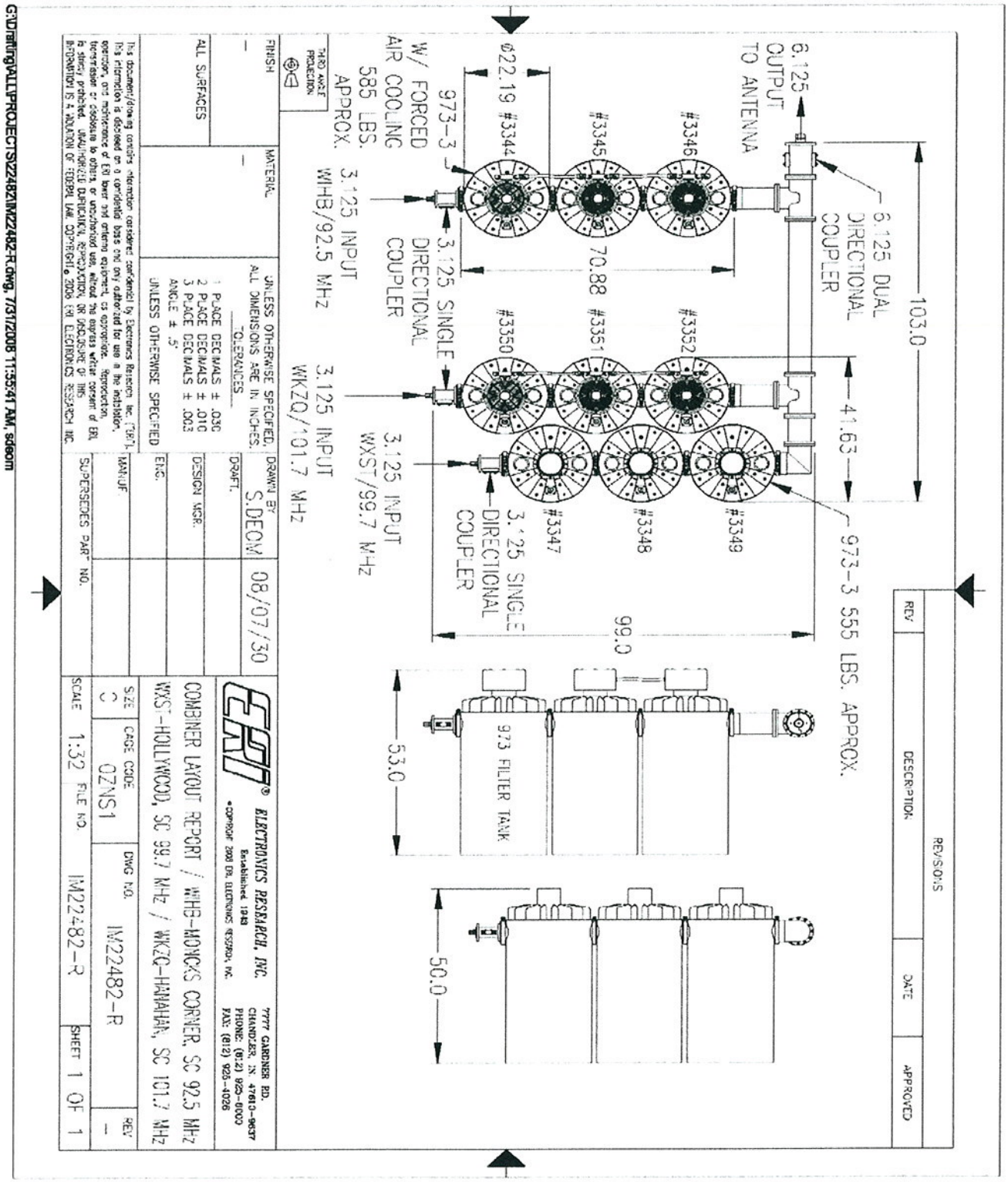
Frequency	Station ERP	Beam Tilt	First Null Fill	Second Null Fill	Power Gain	Line Loss (3)	Filter Loss (4)	Computed TPO
92.5	100 KW	0°	7 %	9 %	5.473	-0.534 dB	.1660 dB	21.4 kW
99.7	70 KW	0°	7 %	10 %	5.278	-0.551 dB	.1621 dB	15.6 kW
101.7	100 KW	0°	11 %	14 %	4.882	-0.556 dB	.1582 dB	24.1 kW

Mechanical Specifications

Antenna Feed System ..... Fed With One 6 1/8" Line
Input Connector ..... . 6 1/8"-50 Ohm EIA Flanged
Element Deicing..... None
Interbay Spacing ..... 122 3/8" Center to Center
Array Length..... 96 Feet
Construction Material (Antenna) ..... All Noncorrosive
Construction Material (Mounting) ..... All Stainless Steel

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 835 Feet, 4 1/16" Dielectric EIIT Rigid along with transmitter to input of filters. (per station)
4) Losses Taken From Actual Combiner.

EXHIBIT A-3


REVISIONS
REV
DESCRIPTION
DATE
APPROVED
103.0
41.63
6.125 DUAL DIRECTIONAL COUPLER
6.125 OUTPUT TO ANTENNA
973-3 555 LBS. APPROX.
#3346
#3345
#3344
70.88
#3352
#3351
#3350
#3349
#3348
#3347
99.0
973-3 W/ FORCED AIR COOLING 585 LBS. APPROX.
Ø22.19
3.125 SINGLE DIRECTIONAL COUPLER
3.125 INPUT WHB/92.5 MHz
3.125 SINGLE DIRECTIONAL COUPLER
3.125 INPUT WXST/99.7 MHz
3.125 INPUT WKZQ/101.7 MHz
973 FILTER TANK
53.0
50.0
THIRD ANGLE PROJECTION
FINISH
—
MATERIAL
—
ALL SURFACES
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES.
TOLERANCES
1 PLACE DECIMALS ± .030
2 PLACE DECIMALS ± .010
3 PLACE DECIMALS ± .003
ANGLE ± .5°
UNLESS OTHERWISE SPECIFIED
DRAWN BY
S.DEOM
08/07/30
DRAFT.
DESIGN MGR.
ENG.
MANUF.
SUPERSEDES PART NO.
ELECTRONICS RESEARCH, INC.
Established 1949
COPYRIGHT 2008 ERI, ELECTRONICS RESEARCH, INC.
7777 GARDNER RD.
CHANDLER, IN 47610-9637
PHONE: (812) 925-6000
FAX: (812) 925-4026
COMBINER LAYOUT REPORT / WHB-MONKS CORNER, SC 92.5 MHz
WXST-HOLLYWOOD, SC 99.7 MHz / WKZQ-HANAHAN, SC 101.7 MHz
SIZE
C
CAGE CODE
0ZNS1
DWG NO.
IM22482-R
REV
—
SCALE
1:32
FILE NO.
IM22482-R
SHEET 1 OF 1
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A-4 ERI Combiner Specification Sheet

Charleston< South Carolina.

General Specifications:

Diplexer Type ..... **973-3 Branch Combiner**
Number of Combining Units ..... **Three**
Injected Port to Injected Port Isolation ..... **< - 42 dB**
Output Connector ..... **6 1/8 "50 Ohm EIA (Flanged)**
Output Power (Designed) ..... **63 kW**(1)

Heat Removal ..... Forced Air Cooling for 92.5 and 101.7 MHz. Natural Convection for 99.7 MHz.
Physical Arrangement ..... **All Components Floor Standing**

Injected Port Specifications:

Frequency Assignment .....**102.9 and 104.9 MHz.**
Power Rating, Each Injected Port (Designed)..... 22 kW for 92.5, 16 kW for 99.7 and 25 kW for 101.7 MHz.
Input Connector ..... **3-1/8" 50 Ohm EIA (Flanged) per Each Input Port.**
VSWR.....**< 1.07:1 @ +/-150 KHz.**(2)
Group Delay .....**Less than 75 ns Overall Variation, Carrier @ +/- 150 KHz.**
Insertion Loss (Measured):

92.5 MHz. ..... **- 0.1660 dB**
99.7 MHz. ..... **- 0.1621 dB**
101.7 MHz. ..... **- 0.1582 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

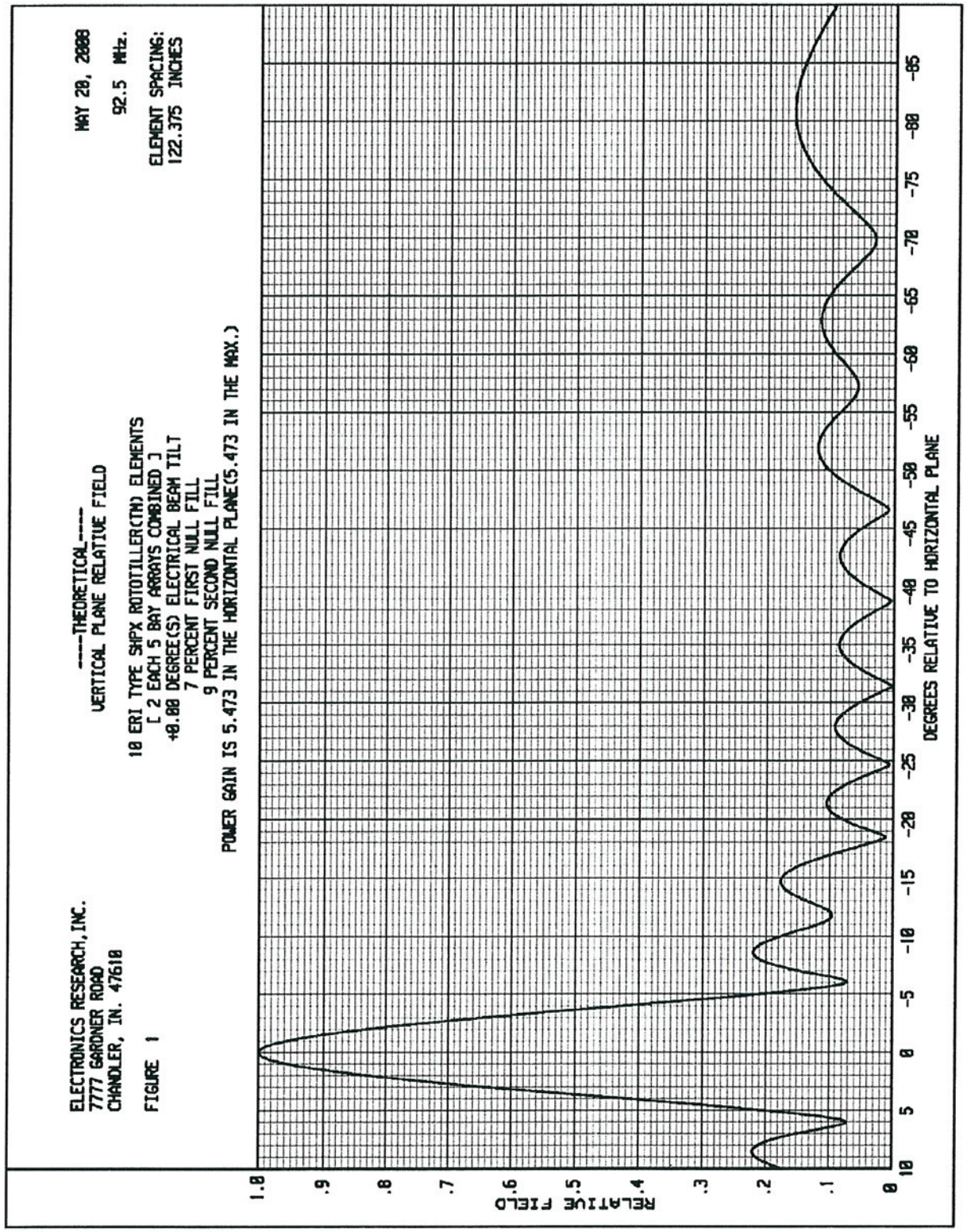
ELECTRONICS RESEARCH, INC.
7777 GARDNER ROAD
CHANDLER, IN. 47610
FIGURE 1
----THEORETICAL----
VERTICAL PLANE RELATIVE FIELD
10 ERI TYPE SHPX ROTOTILLER(TM) ELEMENTS
[2 EACH 5 BAY ARRAYS COMBINED]
+0.00 DEGREE(S) ELECTRICAL BEAM TILT
7 PERCENT FIRST NULL FILL
9 PERCENT SECOND NULL FILL
POWER GAIN IS 5.473 IN THE HORIZONTAL PLANE(5.473 IN THE MAX.)
MAY 20, 2008
92.5 MHz.
ELEMENT SPACING:
122.375 INCHES
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

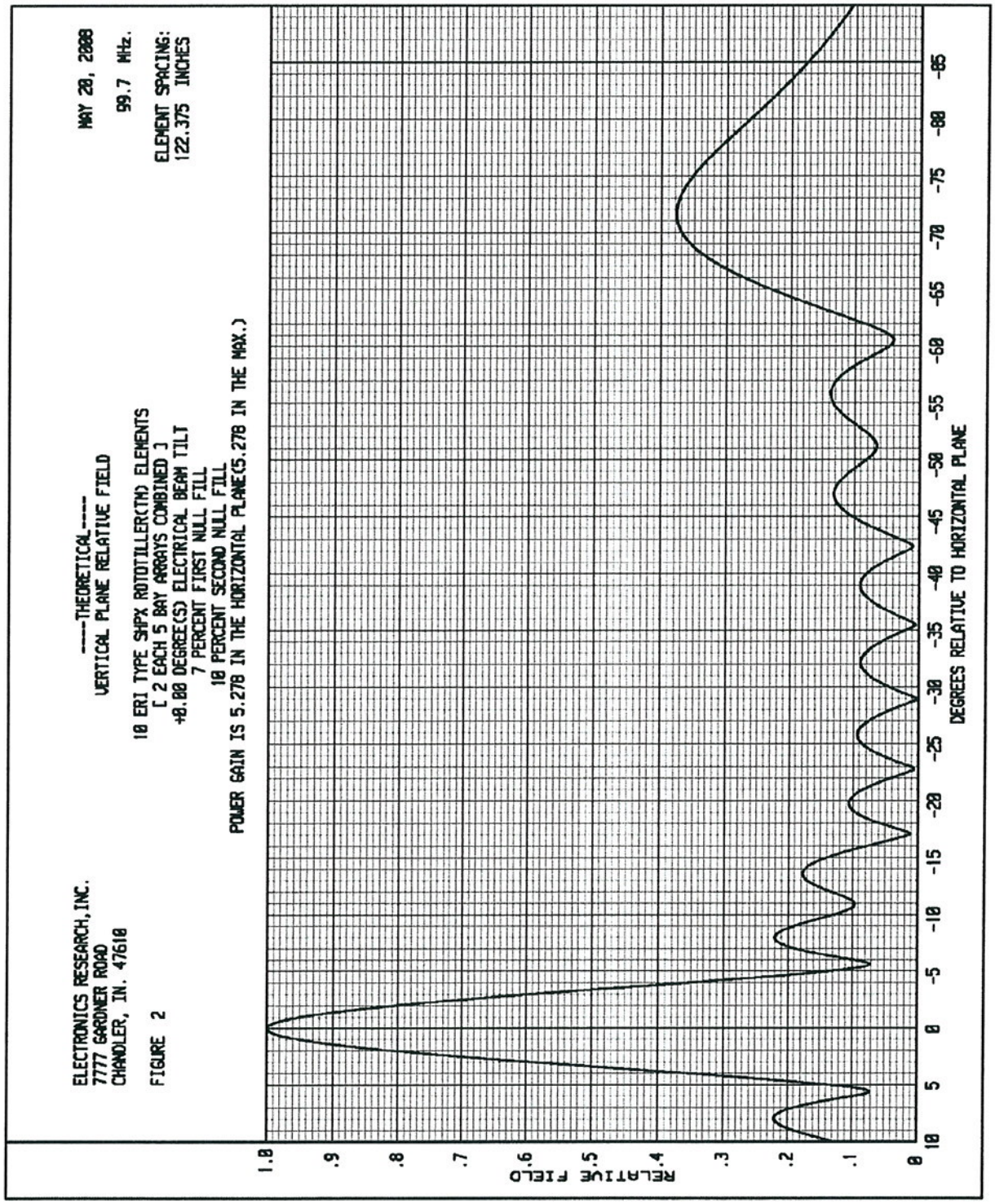
ELECTRONICS RESEARCH, INC.
7777 GARDNER ROAD
CHANDLER, IN. 47610
FIGURE 2
----THEORETICAL----
VERTICAL PLANE RELATIVE FIELD
10 ERI TYPE SHPX ROTOTILLER(TM) ELEMENTS
[2 EACH 5 BAY ARRAYS COMBINED]
+0.00 DEGREE(S) ELECTRICAL BEAM TILT
7 PERCENT FIRST NULL FILL
10 PERCENT SECOND NULL FILL
POWER GAIN IS 5.278 IN THE HORIZONTAL PLANE(5.278 IN THE MAX.)
MAY 20, 2008
99.7 MHz.
ELEMENT SPACING:
122.375 INCHES
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

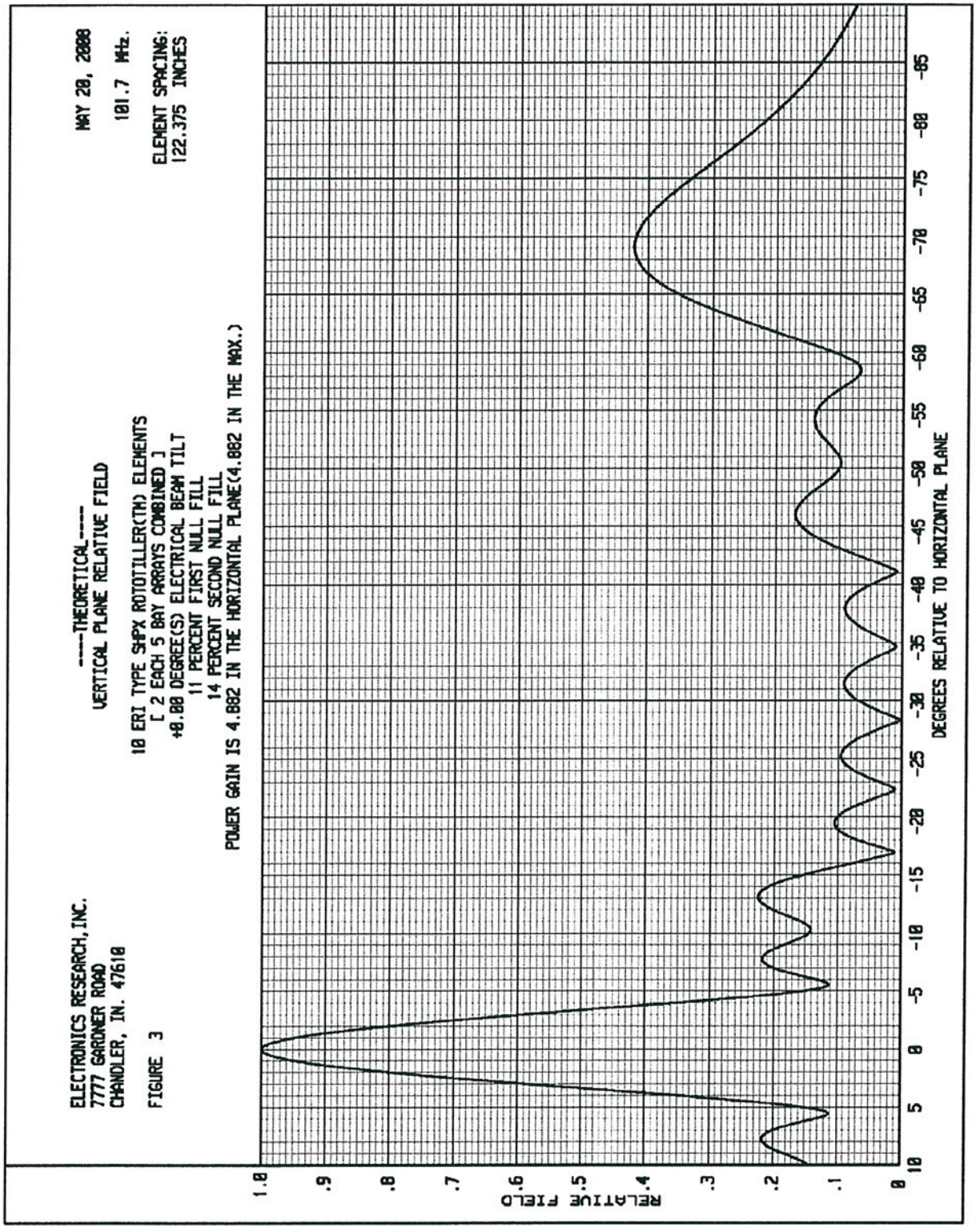
ELECTRONICS RESEARCH, INC.
7777 GARDNER ROAD
CHANDLER, IN. 47610
FIGURE 3
----THEORETICAL----
VERTICAL PLANE RELATIVE FIELD
10 ERI TYPE SHPX ROTOTILLER(TM) ELEMENTS
[2 EACH 5 BAY ARRAYS COMBINED]
+0.00 DEGREE(S) ELECTRICAL BEAM TILT
11 PERCENT FIRST NULL FILL
14 PERCENT SECOND NULL FILL
POWER GAIN IS 4.882 IN THE HORIZONTAL PLANE(4.882 IN THE MAX.)
MAY 20, 2008
101.7 MHz.
ELEMENT SPACING:
122.375 INCHES
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