ELECTRONICS RESEARCH, INC. ERI

Report Of
Intermodulation Product Findings

Hazelwood, MO.

KYKY – 98.1 MHz.
KEZK – 102.5 MHz.
WHHL– 104.1 MHz.

Project# 18344C

August 2, 2023

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Report of Findings for Intermodulation Product Measurements

Exhibits Accompanying This Report

REPORT OF FINDINGS
HAZELWOOD, MO
BROADCAST FACILITY

Introduction: This report of findings is based on data collected at the FM broadcast facility located in St. Louis, MO. The report includes measurements offered as proof that the addition of the WHHL (104.1 MHz.) combiner module to the combined operations of KYKY (98.1 MHz.), and KEZK (102.5 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 (c). 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). KSD (93.7 MHz.), KSHE (94.7 MHz.), KXBS (95.5 MHz.), WFUN (96.3 MHz.), KFTK (97.1 MHz.), K254CR (98.7 MHz.), KPNT (105.7 MHz.), and K297BI (107.3 MHz.), operate into separate antennas co-located on the tower. Their effects on the stations operating from the multiplexed system are considered in this report. Zach Condi and Nick Paulin of Electronics Research, Inc. located in Chandler, Indiana performed the measurements summarized herein on August 2, 2023.

The following exhibits are provided:

Exhibit A:
- A-1 Drawing Depicting Antenna.
- A-2 SHPX-4AC-SP 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.
Tables 3. through 7. 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 Tables 3 through 7, 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 FM stations operating from the antenna system. The KYKY, KEZK, and WHHL multiplexed system is fundamentally comprised of antenna, feed line, and multiplexer unit. The SHPX-4AC-SP antenna, 3" MACX350B Rigid line and WHHL 780-8 combiner unit, are products of Electronics Research, Inc. The KYKY and KEZK Combiner units are products of Shively Labs. 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 feed and provide transmitter-to-transmitter isolation, a multiplexed scheme consisting of a 780-8 Constant Impedance Module was installed on the antenna output of the existing two station constant impedance Shively Combiner. Specifically, the combiner uses one ERI 780-8 module for frequency (104.1 MHz.) and two Constant Impedance Shively combiner modules for frequency (98.1 MHz.) and (102.5 MHz.). An interconnecting U-Link is required to complete the three-station combiner. The combiner, fully assembled, exhibited transmitter port-to-port isolation in excess of -57dB. Other performance measurements, such as match, loss, group-delay, etc. revealed that the branch combiner 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 combiner output of the multiplexed systems were used. Care was taken in the selection of the measurement location to ensure 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 -30 dB directivity and a forward signal sample of -45 dB.

The forward port of the couplers was used for sampling the outgoing carrier levels and IM products. The IM sampled signal was fed by shielded cable into Spectrum Analyzer. Various attenuation pads were used, when needed, on the Spectrum Analyzer to ensure an adequate signal level for measurements without overloading the measurement equipment. A Rohde & Schwarz ZPH serial# 103069 Spectrum Analyzer was employed to record the level of all signals investigated. A Copper Mountain serial# 15047066 Vector Network Analyzer was used to measure the performance of the combiner modules and to facilitate the selective tuning of the bandpass filter. The Rohde & Schwarz ZPH was also 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 transmitters were operating at full licensed power. From the equipment setup described above, the relative output signal level of each station's 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.

The predicted Intermodulation products that would be generated from the WHHL (104.1 MHz.) transmitter operating from their combined antenna were measured on all the other users transmitting from this site were measured and are listed in the tables 5 thru 8.

Table 1 - Carrier Reference Levels.

Carrier Frequency (MHz)	Pad One (dB)	Full Scale Range (dB)	Measured Level (dBm)	**Adjusted Level (dBm)**	Notes
KYKY 98.1	**6**	**---**	**16.7**	**22.7**	
KEZK 102.5	**6**	**---**	**19.3**	**25.3**	
WHHL 104.1	**6**	**---**	**15.7**	**21.7**	

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

Table 2 -Third order Products.

	Carrier Frequencies		
Interfering Frequencies	**98.1**	**102.5**	**104.1**
93.7 MHz.	102.5	111.3	114.5
94.7 MHz.	101.5	110.3	113.5
95.5 MHz.	100.7	109.5	112.7
96.3 MHz.	99.9	108.7	111.9
97.1 MHz.	99.1	107.9	111.1
98.1 MHz.	---	106.9	110.1
98.7 MHz.	97.5	106.3	109.5
102.5 MHz.	93.7	---	105.7
104.1 MHz.	92.1	100.9	---
105.7 MHz.	90.5	99.3	102.5
107.3 MHz.	88.9	97.7	100.9

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.

Table 3 – Intermodulation Measurements on WHLL Updated 3 Station Combiner

IM Measurements Taken in Hazelwood, Missouri KYKY - KEZK - WHHL										
Product Frequency (MHz)	**Transmitter Frequency (MHz)**	**Interfering Frequency (MHz)**	**Pad (dB)**	**Bandpass Filter Loss (dB)**	**Total Loss**	**Measured Level (dBm)**	**Adjusted Level (dBm)**	**Carrier Reference Level (dBm)**	**Level Referenced to Carrier (dBm)**	**Notes***
Transmitter Mixes										
KYKY	**98.1**	**Ref.**	6	0	6	16.7	22.7	**22.7**		
KEZK	**102.5**	**Ref.**	6	0	6	19.3	25.3	**25.3**		
WHHL	**104.1**	**Ref.**	6	0	6	15.7	21.7	**21.7**		
88.9	98.1	107.3	0	12.75	12.75	-117.3	-104.55	22.7	**-127.25**	
90.5	98.1	105.7	0	12.7	12.7	-112.8	-100.1	22.7	**-122.8**	
92.1	98.1	104.1	0	12.75	12.75	-114.8	-102.05	22.7	**-124.75**	
93.7	98.1	102.5	0	12.83	12.83	-79.8	-66.97	22.7	**-89.67**	1
97.5	98.1	98.7	0	12.73	12.73	-108.1	-95.37	22.7	**-118.07**	
97.7	102.5	107.3	0	12.74	12.74	-91.4	-78.66	25.3	**-103.96**	
99.1	98.1	97.1	0	12.72	12.72	-74.5	-61.78	22.7	**-84.48**	
99.3	102.5	105.7	0	12.62	12.62	-114.3	-101.68	25.3	**-126.98**	
99.9	98.1	96.3	0	12.5	12.5	-115.1	-102.6	22.7	**-125.3**	
100.7	98.1	95.5	0	12.49	12.49	-114.5	-102.01	22.7	**-124.71**	
100.9	104.1	107.3	0	12.45	12.45	-111.3	-98.85	21.7	**-120.55**	
100.9	102.5	104.1	0	12.45	12.45	-111.3	-98.85	25.3	**-124.15**	
101.5	98.1	94.7	0	12.4	12.4	-99.3	-86.9	22.7	**-109.6**	
102.5	98.1	93.7	0	12.25	12.25	-115.1	-102.85	22.7	**-125.55**	
102.5	104.1	105.7	0	12.25	12.25	-115.1	-102.85	21.7	**-124.55**	
105.7	104.1	102.5	0	12.1	12.1	-100.2	-88.1	21.7	**-109.8**	
106.3	102.5	98.7	0	12.05	12.05	-100.2	-88.15	25.3	**-113.45**	
106.9	102.5	98.1	0	11.99	11.99	-109.2	-97.21	25.3	**-122.51**	
107.9	102.5	97.1	0	12.15	12.15	-106.5	-94.35	25.3	**-119.65**	
108.7	102.5	96.3	0	12.04	12.04	-106.9	-94.86	25.3	**-120.16**	
109.5	104.1	98.7	0	12.08	12.08	-116.5	-104.42	21.7	**-126.12**	
109.5	102.5	95.5	0	12.08	12.08	-116.5	-104.42	25.3	**-129.72**	
110.1	104.1	98.1	0	11.96	11.96	-114	-102.04	21.7	**-123.74**	
110.3	102.5	94.7	0	12	12	-116.1	-104.1	25.3	**-129.4**	
111.1	104.1	97.1	0	11.93	11.93	-116.2	-104.27	21.7	**-125.97**	
111.3	102.5	93.7	0	11.97	11.97	-116.2	-104.23	25.3	**-129.53**	
111.9	104.1	96.3	0	11.95	11.95	-115.3	-103.35	21.7	**-125.05**	
112.7	104.1	95.5	0	11.98	11.98	-114.2	-102.22	21.7	**-123.92**	
113.5	104.1	94.7	0	11.91	11.91	-114	-102.09	21.7	**-123.79**	
114.5	104.1	93.7	0	11.95	11.95	-115.8	-103.85	21.7	**-125.55**	

(1) Local Carrier KSD 93.7 MHz.

Table 4 – Intermodulation Measurements on the existing 4 station ERI Constant Impedance System. Collocated at this facility with WHLL operating into their separate combiner

4 Station ERI Combiner IM Measurements KSD - KSHE - WFUN - KFTK										
Product Frequency (MHz)	**Transmitter Frequency (MHz)**	**Interfering Frequency (MHz)**	**Pad (dB)**	**Bandpass Filter Loss (dB)**	**Total Loss**	**Measured Level (dBm)**	**Adjusted Level (dBm)**	**Carrier Reference Level (dBm)**	**Level Referenced to Carrier (dBm)**	**Notes***
Transmitter Mixes										
KSD	**93.7**	**Ref.**	6	0	6	16.4	22.4	**22.4**		
KSHE	**94.7**	**Ref.**	6	0	6	15.5	21.5	**21.5**		
WFUN	**96.3**	**Ref.**	6	0	6	15.6	21.6	**21.6**		
KFTK	**97.1**	**Ref.**	0	0	0	6	6	**6**		
83.3	93.7	104.1	0	12.81	12.81	-128	-115.19	22.4	**-137.59**	
85.3	94.7	104.1	0	12.77	12.77	-127.1	-114.33	21.5	**-135.83**	
88.5	96.3	104.1	0	12.42	12.42	-123.6	-111.18	21.6	**-132.78**	
90.1	97.1	104.1	0	12.59	12.59	-128.3	-115.71	6	**-121.71**	

Table 5 – Intermodulation Measurements on existing 2 station ERI Tee Combiner System. Theses Transmitters operate into a separate Tee combiner collocated at this site.

2 Station Tee Combiner IM Measurements KXBS - KPNT										
Product Frequency (MHz)	**Transmitter Frequency (MHz)**	**Interfering Frequency (MHz)**	**Pad (dB)**	**Bandpass Filter Loss (dB)**	**Total Loss**	**Measured Level (dBm)**	**Adjusted Level (dBm)**	**Carrier Reference Level (dBm)**	**Level Referenced to Carrier (dBm)**	**Notes***
Transmitter Mixes										
KXBS	**95.5**	**Ref.**	10	0	10	6.3	16.3	**16.3**	-	
KPNT	**105.7**	**Ref.**	10	0	10	13.1	23.1	**23.1**	-	
		-				-	-	-	-	
86.9	95.5	104.1	0	13.1	13.1	-116.5	-103.4	16.6	-120	
107.3	105.7	104.1	0	12.2	12.2	-115.5	-103.3	23.5	-126.8	*

* Translator for K297B 107.3 MHz. was turned off for this measurement.

Table 6 – Intermodulation Measurements on K254CR Single Translator

Single Station Translator IM Measurements K254CR										
Product Frequency (MHz)	**Transmitter Frequency (MHz)**	**Interfering Frequency (MHz)**	**Pad (dB)**	**Bandpass Filter Loss (dB)**	**Total Loss**	**Measured Level (dBm)**	**Adjusted Level (dBm)**	**Carrier Reference Level (dBm)**	**Level Referenced to Carrier (dBm)**	**Notes***
Transmitter Mixes										
K254CR	**98.7**	**Ref.**	13	0	13	-21.2	-8.2	**-8.2**		
						0				
93.3	98.7	104.1	0	12.49	12.49	-115	-102.51	-8.2	-94.31	

Table 7 – Intermodulation Measurements K297B1

Single Station Translator IM Measurements K297BI										
Product Frequency (MHz)	**Transmitter Frequency (MHz)**	**Interfering Frequency (MHz)**	**Pad (dB)**	**Bandpass Filter Loss (dB)**	**Total Loss**	**Measured Level (dBm)**	**Adjusted Level (dBm)**	**Carrier Reference Level (dBm)**	**Level Referenced to Carrier (dBm)**	**Notes***
Transmitter Mixes										
K297BI	**107.3**	**Ref.**	3		3	-4.3	-1.3	**-1.3**		
110.5	107.3	104.1	0	0	0	-98.5	-98.5	-1.3	-97.2	

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

Conclusion: Based upon my observations and measurements taken on August 2, 2023 as summarized in this document, I, Nicholas Polin PE, find the subject system, specifically the transmitters and filter systems for the operation of WHHL, KYKY and KEZK, into the combined antenna to be in proper working order. Furthermore, based on the measured data, it is my opinion that there are third order inter-modulation products in excess of -80 dB below carrier levels generated from or within the stations operating on the installed system.

Respectfully submitted,

Electronics Research, Inc.
Nicholas Paulin, Product Engineering Manager

State of Indiana)
) SS:
County of Warrick)

AFFIDAVIT

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

1. I am a Field Service Manager for Electronics Research, Inc ("ERI" and have been employed by ERI for 43 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 believe all information within to be accurate and true.

3. ERI has been requested by Audacy Inc. on behalf of radio station WHHL, Licenses to Hazelwood, MO. to prepare this Report of Findings.

Mark Steapleton; Field Technician

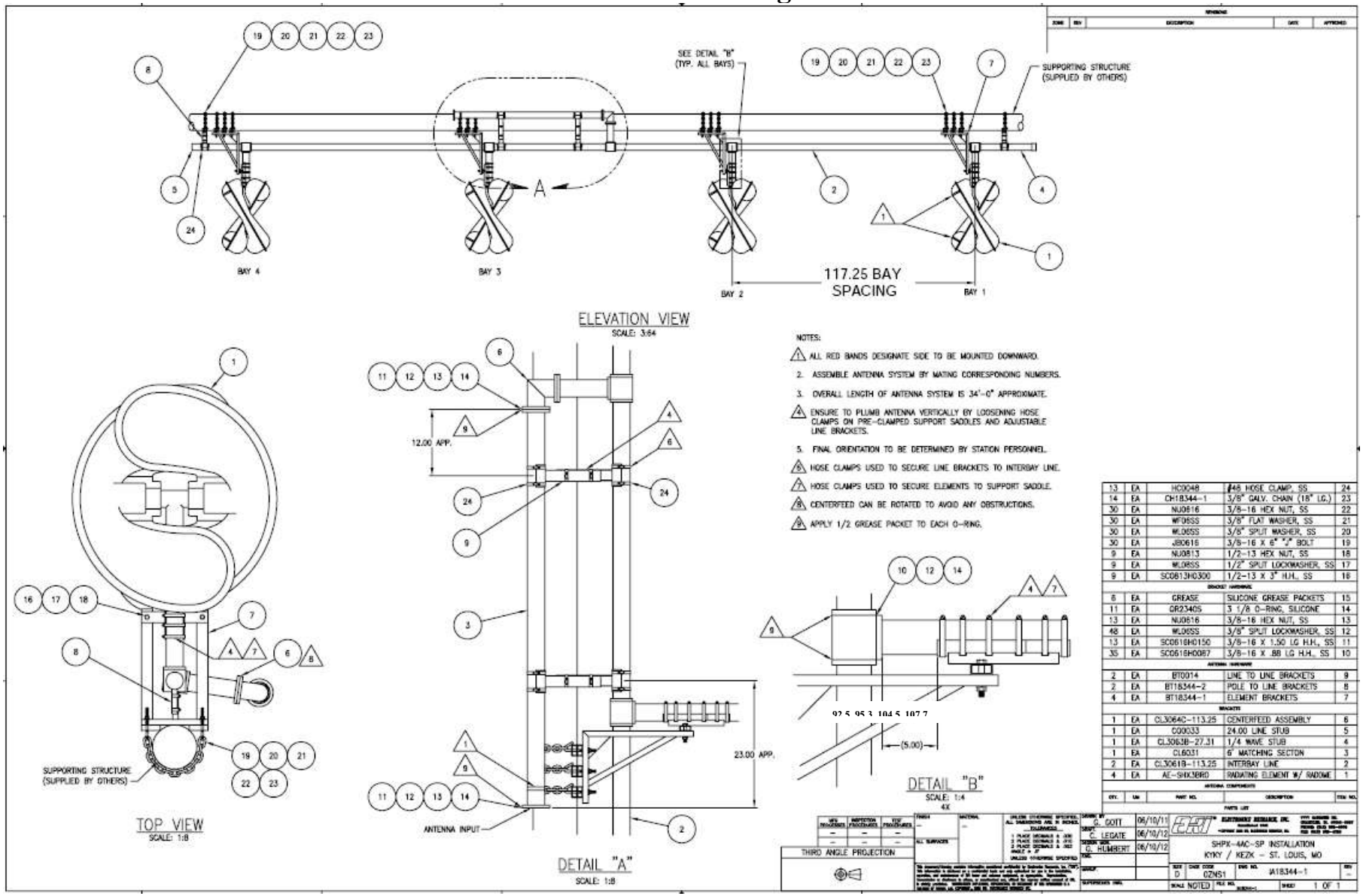
Subscribed and sworn to before me on this 8rd. day of August 2023.

Cindy D Tomes; Notary Public
My commission expires September 17, 2030

CINDY D TOMES
Notary Public, State of Indiana
Warrick County
Commission Number NP0688197
My Commission Expires
September 17, 2030

EXHIBIT, A - 1

Antenna Drawing:



13	EA	HC0048	#48 HOSE CLAMP, SS	24
14	EA	CH18344-1	3/8" GALV. CHAIN (18" LG.)	23
30	EA	NU0616	3/8-16 HEX NUT, SS	22
30	EA	WF06SS	3/8" FLAT WASHER, SS	21
30	EA	WL06SS	3/8" SPLIT WASHER, SS	20
30	EA	JB0616	3/8-16 X 6" "J" BOLT	19
9	EA	NU0813	1/2-13 HEX NUT, SS	18
9	EA	WL08SS	1/2" SPLIT LOCKWASHER, SS	17
9	EA	SC0813H0300	1/2-13 X 3" H.H., SS	16
		BRACKET HARDWARE		
6	EA	GREASE	SILICONE GREASE PACKETS	15
11	EA	OR2340S	3 1/8 O-RING, SILICONE	14
13	EA	NU0616	3/8-16 HEX NUT, SS	13
48	EA	WL06SS	3/8" SPLIT LOCKWASHER, SS	12
13	EA	SC0616H0150	3/8-16 X 1.50 LG H.H., SS	11
35	EA	SC0616H0087	3/8-16 X .88 LG H.H., SS	10
		ANTENNA HARDWARE		
2	EA	BT0014	LINE TO LINE BRACKETS	9
2	EA	BT18344-2	POLE TO LINE BRACKETS	8
4	EA	BT18344-1	ELEMENT BRACKETS	7
		BRACKETS		
1	EA	CL3064C-113.25	CENTERFEED ASSEMBLY	6
1	EA	C00033	24.00 LINE STUB	5
1	EA	CL3063B-27.31	1/4 WAVE STUB	4
1	EA	CL6031	6" MATCHING SECTION	3
2	EA	CL3061B-113.25	INTERBAY LINE	2
4	EA	AE-SHX3BRD	RADIATING ELEMENT W/ RADOME	1
		ANTENNA COMPONENTS		
QTY.	UM	PART NO.	DESCRIPTION	ITEM NO.
		PARTS LIST		

ELECTRONICS RESEARCH, INC. ERI

EXHIBIT, A - 2

A-2 ERI Antenna Specification Sheet

TRANSMISSION SITE
HAZELWOOD, MO.

General Specifications

Antenna Type .....High Power FM-Broadcast, Suitable For Multiplexing
Model Number SHPX-4AC-SP
Number of Bay Levels.....Four
Polarization..... Circular Polarized

Electrical Specifications

Antenna Input Power Capability ..... 39.00 kW Max (1)
Operating Frequency Band ..... 98.1 ~ 102.5 ~ 104.1 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
98.1	**20.00 KW**	**0.0°**	**4.7 %**	**0.0 %**	**2.135**	**-0.433 dB**	**-0.32 dB**	**11.14 kW**
102.5	**40.00 KW**	**0.0°**	**4.7 %**	**0.0 %**	**2.098**	**-0.442 dB**	**-0.36 dB**	**22.93 kW**
104.1	**12.50 KW**	**0.0°**	**8.2 %**	**0.0 %**	**2.055**	**-0.446 dB**	**-0.37 dB**	**7.34 kW**

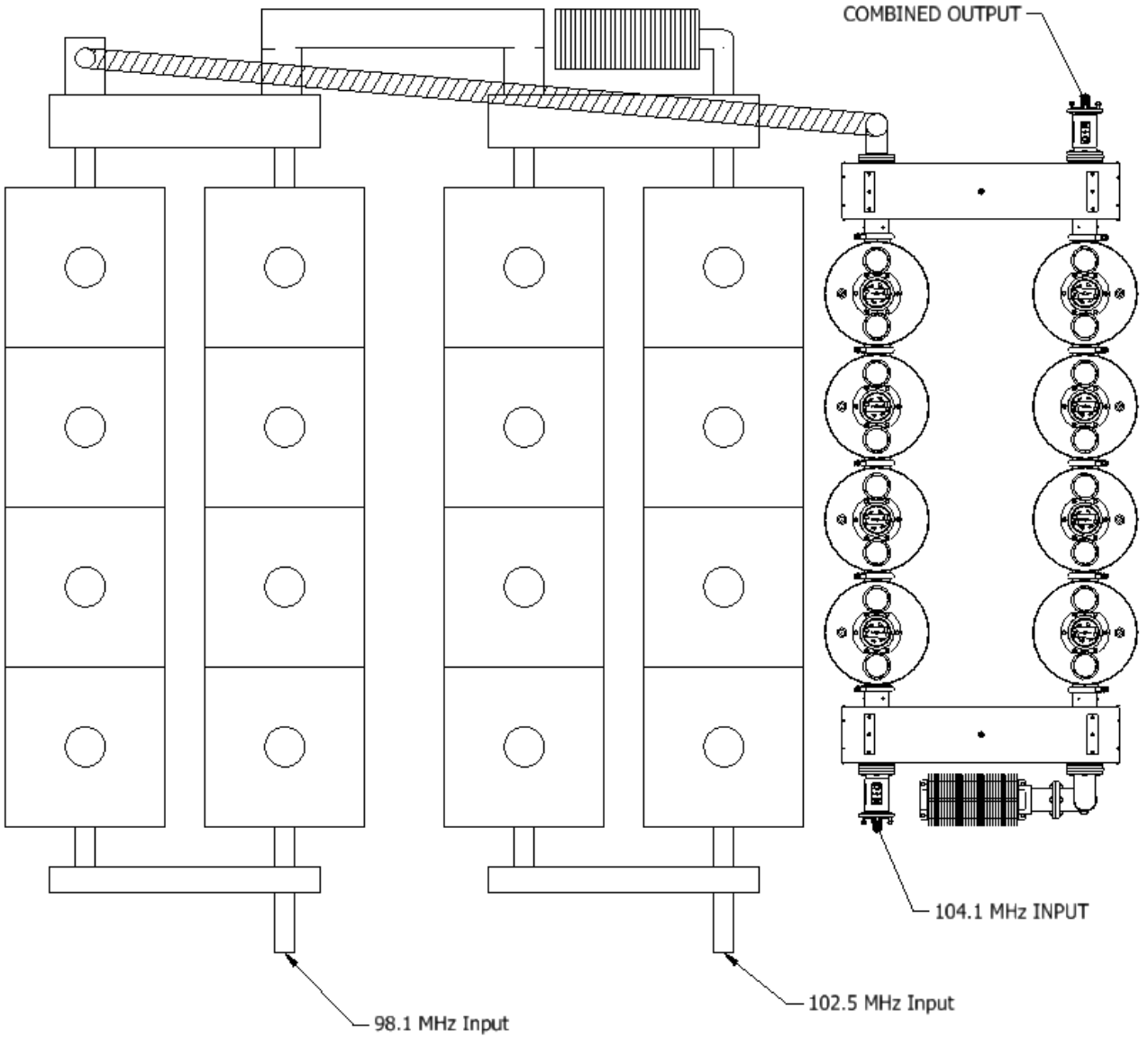
Mechanical Specifications

Antenna Feed System.....Single Input
Input Connector .....3” 50-Ohm EIA Flanged
Element Deicing .....Radomes
Interbay Spacing..... 117.25” Center to Center
Array Length ..... 34.0 Feet
Construction Material (Antenna)..... Galvanized Plated Steel and 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 456 ft. of ERI MACX-350 Rigid line..
4) Losses Taken from Actual Combiner.

EXHIBIT A-3

Combiner Drawing:



ELECTRONICS RESEARCH, INC. ERI

EXHIBIT A - 4

ERI 780-8 and Shively Constant impedance Combiner Specification Sheet

TRANSMISSION SITE
HAZELWOOD, MO.

General Specifications:

Multiplexer Type .....(1) ERI 780-8 and (2) Shively Constant Impedance Combiner Modules
Number of Combining Units .....Three
Injected Port to Injected Port Isolation ..... < - 57 dB
Output Connector ..... 6 1/8 " 50 Ohm EIA (Flanged)
Output Power (Designed) ..... 41 kW(1)

Heat Removal .....Natural Convection
Physical Arrangement .....Floor Standing/Wall Mount

Injected Port Specifications:

Frequency Assignment .....98.1 ~ 102.5 ~ 104.1 MHz.
Power Rating, Each Injected Port (Designed).. 12 kW 98.1 MHz., 24 kW 102.5 MHz., 10 kW 104.1 MHz.
Input Connector .....3-1/8" 50 Ohm EIA (Flanged).
VSWR.....< 1.06:1 @ +/-200 KHz.(2)
Group Delay .....Less than 60 ns Overall Variation, Carrier @ +/- 150 KHz.
Insertion Loss (Measured):

98.1 MHz. ..... - 0.32 dB
102.5 MHz. ..... - 0.36 dB
104.1 MHz. ..... - 0.37 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

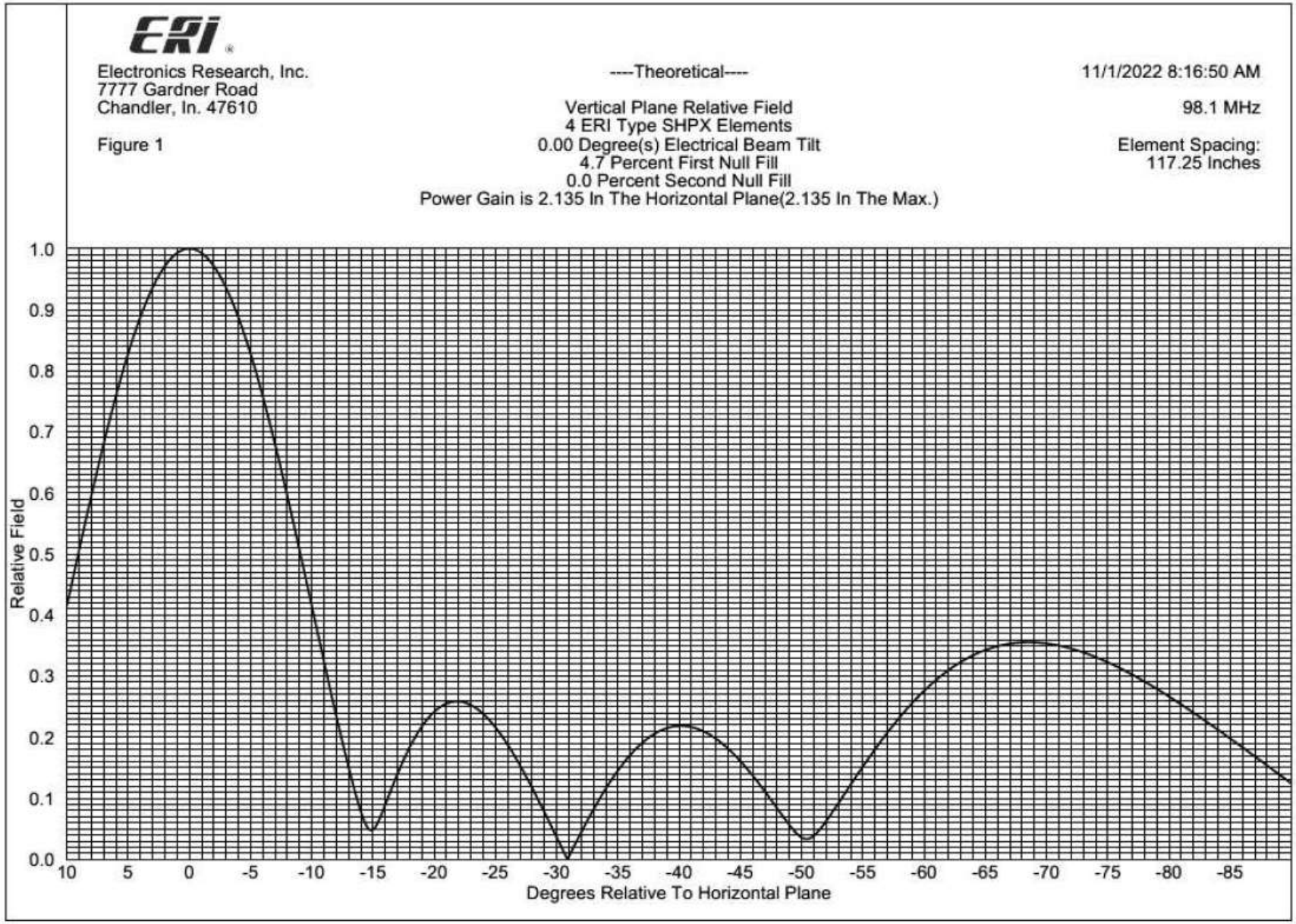

ERI
Electronics Research, Inc.
7777 Gardner Road
Chandler, In. 47610
Figure 1
----Theoretical----
Vertical Plane Relative Field
4 ERI Type SHPX Elements
0.00 Degree(s) Electrical Beam Tilt
4.7 Percent First Null Fill
0.0 Percent Second Null Fill
Power Gain is 2.135 In The Horizontal Plane(2.135 In The Max.)
11/1/2022 8:16:50 AM
98.1 MHz
Element Spacing:
117.25 Inches
Relative Field
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
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

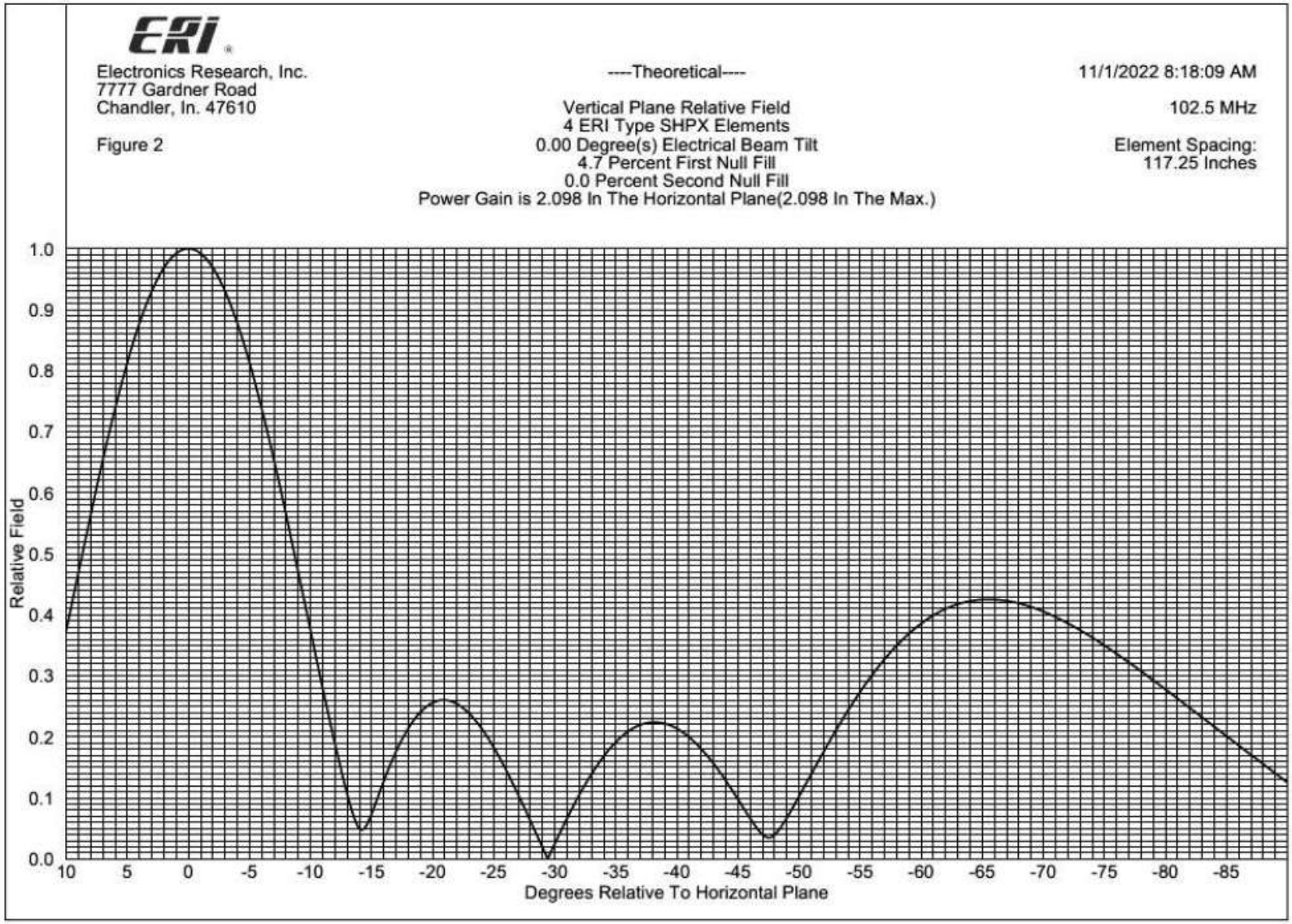
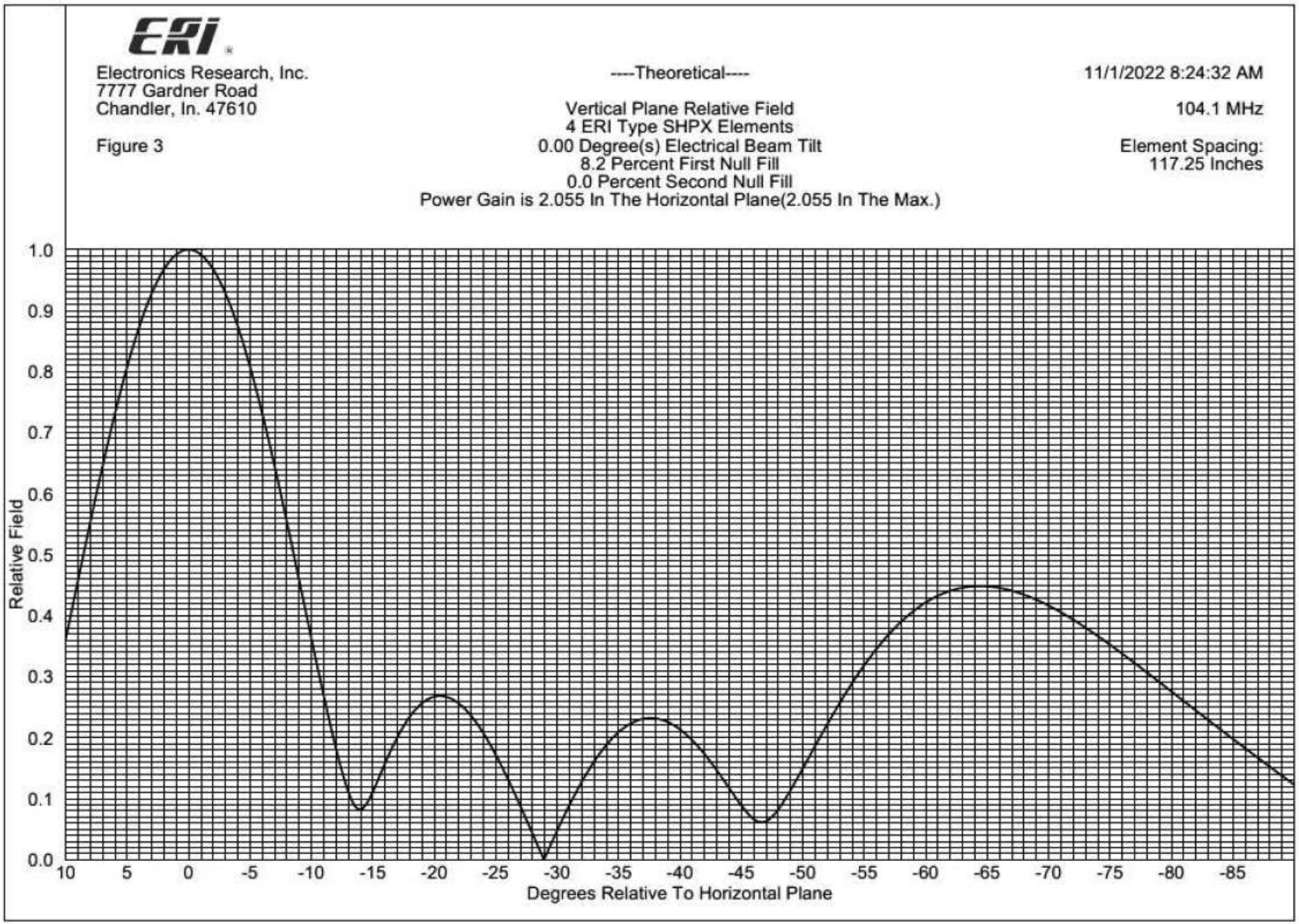
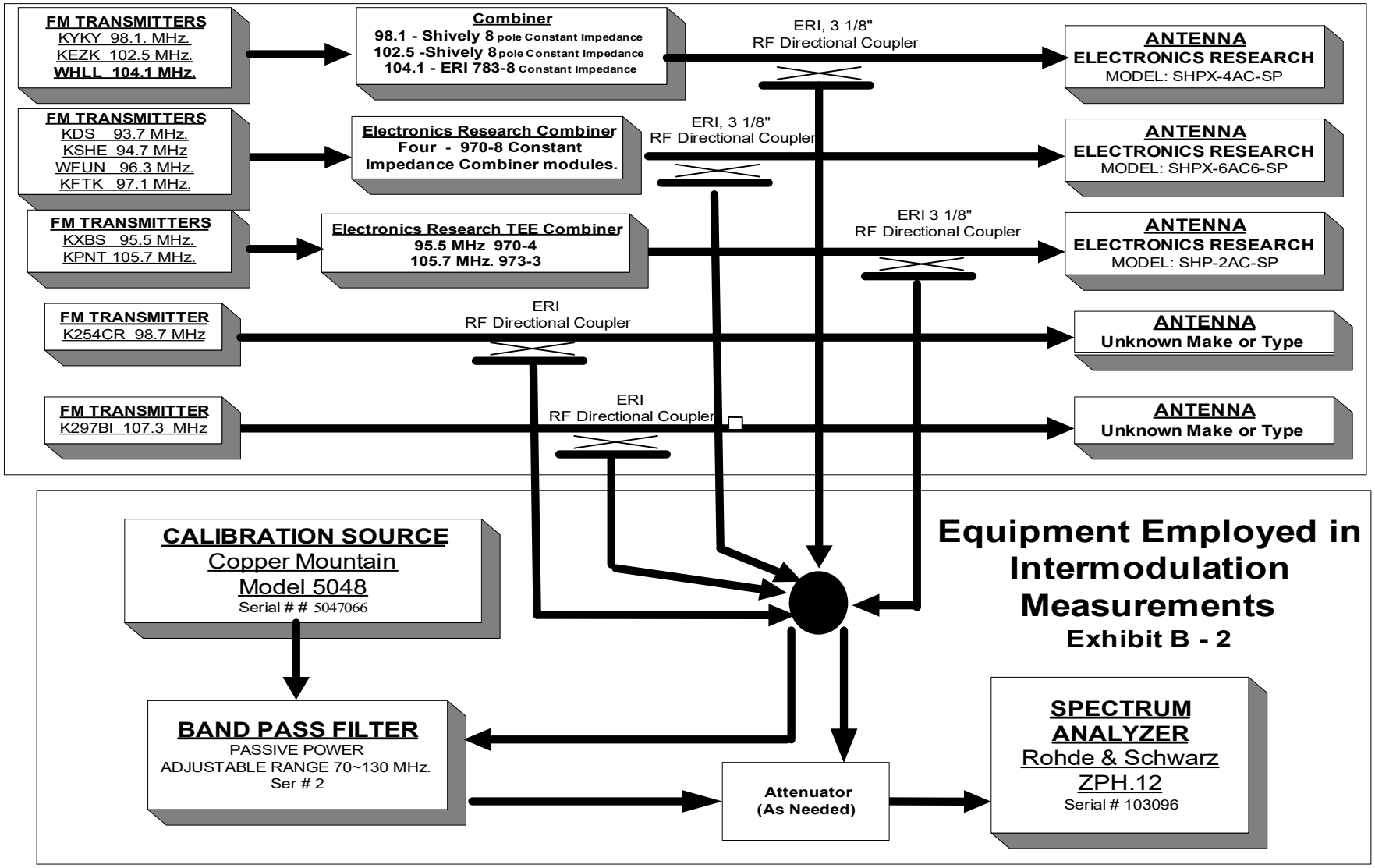

ERI
Electronics Research, Inc.
7777 Gardner Road
Chandler, In. 47610
Figure 2
----Theoretical----
Vertical Plane Relative Field
4 ERI Type SHPX Elements
0.00 Degree(s) Electrical Beam Tilt
4.7 Percent First Null Fill
0.0 Percent Second Null Fill
Power Gain is 2.098 In The Horizontal Plane(2.098 In The Max.)
11/1/2022 8:18:09 AM
102.5 MHz
Element Spacing:
117.25 Inches
Relative Field
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
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


ERI
Electronics Research, Inc.
7777 Gardner Road
Chandler, In. 47610
Figure 3
----Theoretical----
Vertical Plane Relative Field
4 ERI Type SHPX Elements
0.00 Degree(s) Electrical Beam Tilt
8.2 Percent First Null Fill
0.0 Percent Second Null Fill
Power Gain is 2.055 In The Horizontal Plane(2.055 In The Max.)
11/1/2022 8:24:32 AM
104.1 MHz
Element Spacing:
117.25 Inches
Relative Field
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
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

Broadcasting Scheme EXHIBIT - B1



Broadcasting Scheme and Equipment Employed in Intermodulation Measurements