

Compliance with Special Operating Conditions

The KPLV Construction Permit (File Number 0000110388) contains Four Special Operating Conditions:

1. *The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.*
2. *BEFORE PROGRAM TESTS COMMENCE, sufficient measurements shall be made to establish that the operation authorized in this construction permit is in compliance with the spurious emissions requirements of 47 C.F.R. Sections 73.317(b) through 73.317(d). All measurements must be made with all stations simultaneously utilizing the shared antenna. These measurements shall be submitted to the Commission along with the FCC application for FM license.*
3. *Further modifications of Station KKWV(FM), Aransas Pass, Texas (Facility ID No. 91069) will not be construed as a "per se" modification of KPLV's facility. See Educational Information Corporation, 6 FCC Rcd 2207 (1991).*
4. *Further modifications of Station KAWV(FM), Alice, Texas (Facility ID No. 91097) will not be construed as a "per se" modification of KPLV's facility. See Educational Information Corporation, 6 FCC Rcd 2207 (1991).*

Educational Media Foundation ("EMF") complies with, or agrees to, the conditions as follows:

1. EMF in coordination with other users of the site agrees to reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna, from radiofrequency electromagnetic fields in excess of FCC guidelines.
2. Spurious Emission Measurements have been done and are shown in Exhibit 1-A.
3. EMF agrees with this statement pertaining to KKWV(FM) Aransas Pass, TX
4. EMF agrees with this statement pertaining to KAWV(FM) Alice, TX

Report Of Intermodulation Product Findings

**KPLV 88.7 MHz. Corpus Christi, TX.
KLUX 89.5 MHz. Corpus Christi, TX.
KFTX 97.5 MHz. Corpus Christi, TX.
KXAI 103.7 MHz. Corpus Christi, TX.**

Project# 38249A

June 2, 2021

**Electronics Research Inc.
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TABLE OF CONTENTS

Report of Findings for Intermodulation Product Measurements

Page 3-4	Introduction
Page 5	Carrier Reference Levels
Page 5	Table of Third order Products Expected
Page 6	Intermodulation Product Measurements
Page 7	Conclusion
Page 8	Affidavit

Exhibits Accompanying This Report

EXHIBIT A	Antenna and Combiner Specification Sheet and Drawing
A-1	Drawing Depicting Antenna
A-2	ERI Antenna Specification Sheet
A-3	Drawing Depicting Combiner Layout
A-4	ERI Combiner Specification Sheet
 EXHIBIT B -1	 Intermodulation Product Measurement Equipment Layout
B-2	Broadcasting Scheme of the Multiplexed System

REPORT OF FINDINGS
KPLV~KLUX~KFTX~KXAI
88.7 MHz. / 89.5 MHz. / 97.5 MHz. / 103.7 MHz.

Introduction: This report of findings is based on data collected at the KPLV, KLUX, KFTX, and KXAI broadcast facility located in Robstown, Texas. The report includes measurements offered as proof that the combined operations of KPLV (88.7 MHz.), KLUX (89.5 MHz.), KFTX (97.5 MHz.), and KXAI (103.7 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) while operating at full power for each transmitter. 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). Jeff Taylor of Electronics Research, Inc. located in Chandler, Indiana performed the measurements summarized herein on June 2, 2021.

The following Tables and Exhibits are provided:

Table 1. Carrier Reference Levels.

Table 2. Calculated Third Order Products.

Table 3. Intermodulation Analysis Measurements.

Exhibit A:

A-1 Drawing Depicting Antenna.

A-2 SHPXA-16BC-HW-SP Antenna Specification Sheet.

A-3 ERI Constant Impedance Combiner Specification Sheet.

A-4 Multiplexed 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.

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 F_2 signifies the frequency causing the interference.

The Multiplexed System: These measurements were taken with all FM stations operating from the combined antenna system. The KPLV, KLUX, KFTX and KXAI multiplexed system is fundamentally comprised of antenna, feed line and constant impedance combiner units. The SHPXA-16BC-HW-SP antenna, 955 and 783 constant impedance combiner units and feedline are products of Electronics Research, Inc.

To accomplish the aggregation of four transmitter signals into a common antenna feed and provide transmitter-to-transmitter isolation, a multiplexed scheme consisting of a 955 / 783 constant impedance combiner was installed. Specifically, the combiner uses two 955-8-NA modules for frequency (88.7 MHz. and 89.5 MHz.), and two 783-6 modules for frequency (97.5 MHz. and 103.7 MHz.). Interconnecting “U-Links” are required to complete the combiner. The combiner fully assembled, exhibited transmitter port-to-port isolation in excess of -69 dB. Other performance measurements, such as match, loss, group-delay, etc, revealed that the 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 system was 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 -37 dB directivity and a forward signal sample of -51 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. A Rohde & Schwarz ZPH Spectrum Analyzer serial# 103069 was employed to record the level of all signals investigated. A Copper Mountain S5048 serial# 10577029 was used for selective tuning of the Band Pass Filter. The Spectrum Analyzer 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, the combiner was adjusted to optimal performance. Also, it was confirmed before taking any measurements that all transmitters were operating at full power except for KFTX 97.5 MHz. KFTX can only operate at 10kW due to amplifier issues. 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 (dBm)	Notes
88.7	3	-	7.8	10.8	
89.5	3	-	11.8	14.8	
97.5	3	-	12.5	15.5	
103.7	3	-	16.8	19.8	

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	88.7	89.5	97.5	103.7
88.7 MHz.	----	90.3	106.3	118.7
89.5 MHz.	87.9	----	105.5	117.9
97.5 MHz.	79.9	81.5	----	109.9
103.7 MHz.	73.7	75.3	91.3	----

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 in Robstown, Texas										
Product Frequency (MHz)	Transmitter Frequency (MHz)	Interfering Frequency (MHz)	Pad (dB)	Bandpass Filter Loss (dB)	Total Loss	Measured Level (dB)	Adjusted Level (dB)	Carrier Reference Level (dB)	Level Referenced to Carrier (dB)	Notes*
Transmitter Mixes										
	88.7	Ref.	3		3	7.8	10.8	10.8		
	89.5	Ref.	3		3	11.8	14.8	14.8		
	97.5	Ref.	3		3	12.5	15.5	15.5		
	103.7	Ref.	3		3	16.8	19.8	19.8		
73.7	88.7	103.7	3	13.5	16.5	-127.6	-111.1	10.8	-121.9	
75.3	89.5	103.7	3	13.5	16.5	-128.8	-112.3	14.8	-127.1	
79.9	88.7	97.5	3	13.1	16.1	-129.1	-113	10.8	-123.8	
81.5	89.5	97.5	3	13.1	16.1	-128.4	-112.3	14.8	-127.1	
87.9	88.7	89.5	3	12.5	15.5	-130.3	-114.8	10.8	-125.6	
90.3	89.5	88.7	3	12.3	15.3	-122.5	-107.2	14.8	-122	
91.3	97.5	103.7	3	12.4	15.4	-127.3	-111.9	15.5	-127.4	
105.5	97.5	89.5	3	12.1	15.1	-129.7	-114.6	15.5	-130.1	
106.3	97.5	88.7	3	11.8	14.8	-128.4	-113.6	15.5	-129.1	
109.9	103.7	97.5	3	11.8	14.8	-129.2	-114.4	19.8	-134.2	
117.9	103.7	89.5	3	11.7	14.7	-126.5	-111.8	19.8	-131.6	
118.7	103.7	88.7	3	11.6	14.6	-129.7	-115.1	19.8	-134.9	

The Rhode & Schwarz Spectrum Analyzer was used to check the close in spectral attenuation of the carrier to confirm the operation of the transmitters are 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 Rhode & Schwarz Spectrum Analyzer. The purpose for this measurement was to look for suspicious anomalies that may warrant further investigation. I performed a broad sweep on the receiver and resulted in no additional investigations.

Conclusion: Based upon my observations and measurements taken on June 2, 2021, as summarized in this document, I, Jeff Taylor, find the subject system, specifically the transmitter and filter system for the operation of KPLV, KLUX, KFTX, and KXAI 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 KPLV, KLUX, KFTX, and KXAI, 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 25 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 American Tower Corporation on behalf of radio Stations KPLV, KLUX, KFTX, and KXAI in Robstown, TX. to prepare this Report of Findings.

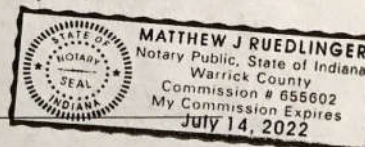
Jeff Taylor; Field Technician

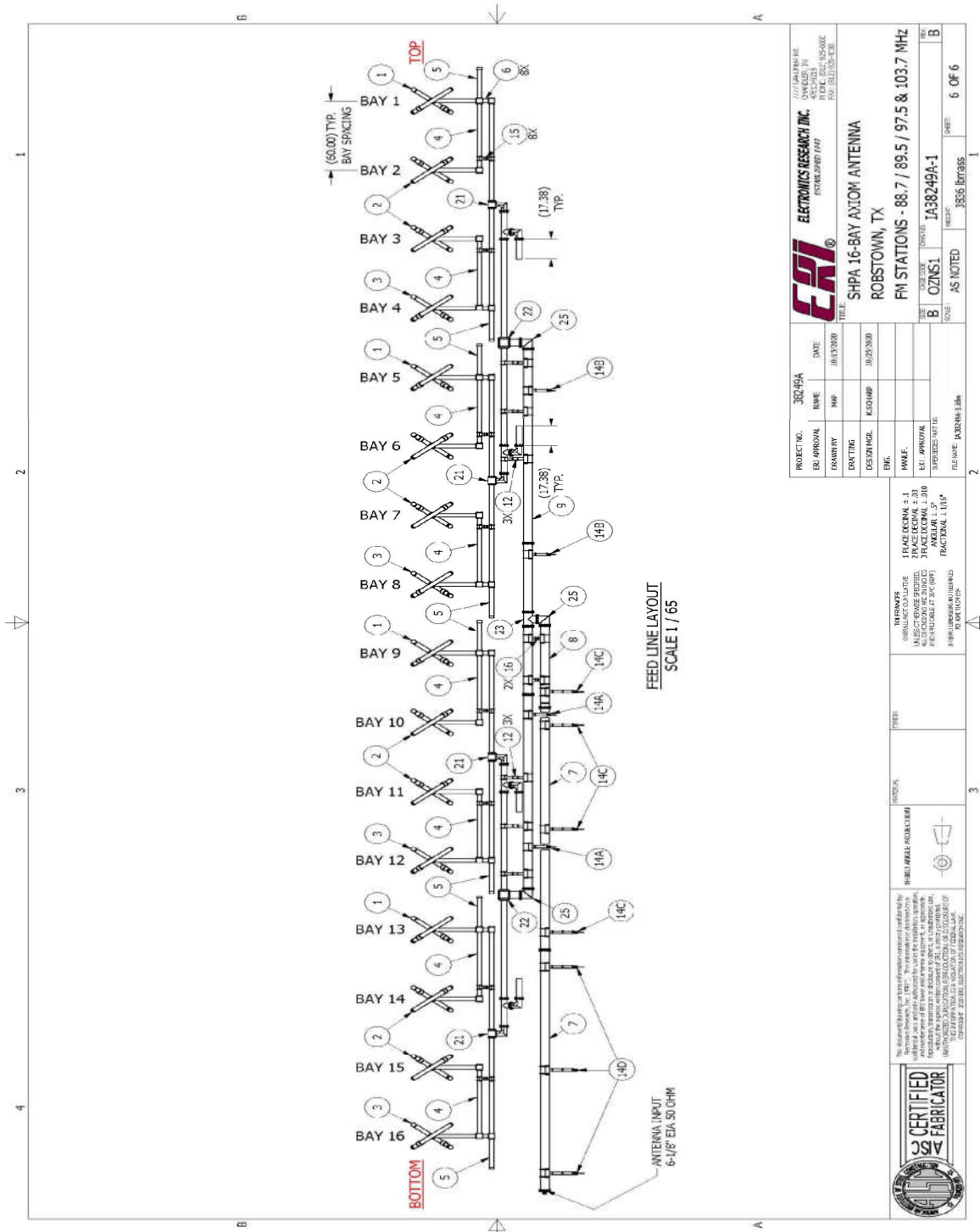
Jeff Taylor

Subscribed and sworn to before me on this 2nd, day of June, 2021.

Matt Ruedlinger; Notary Public
My commission # 655602 expires July 14, 2022

[Signature]
6-2-2021





A-2 ERI 1183 Antenna Specification Sheet

TRANSMISSION SITE

ROBSTOWN, TEXAS

General Specifications

Antenna Type High Power FM-Broadcast, Suitable for Multiplexing
 Model Number SHPXA-16BC-HW-SP
 Number of Bay Levels Sixteen
 Polarization..... Right Hand Circular Polarized

Electrical Specifications

Antenna Input Power Capability 51.5 kW Max ⁽¹⁾
 Operating Frequency Band 88.7~89.5~97.5~103.7 Megahertz.
 VSWR. <1.03:1 @ Operating Frequencies⁽²⁾
 Azimuthal Pattern Circularity Better Than +/- 2dB From RMS (Free Space)
 Power Split 50/50 (Horizontal & Vertical)
 Frequency Specific Information:

<u>Frequency</u>	<u>Station ERP</u>	<u>Beam Tilt</u>	<u>First Null Fill</u>	<u>Second Null Fill</u>	<u>Power Gain</u>	<u>Line Loss</u> ⁽³⁾	<u>Filter Loss</u> ⁽⁴⁾	<u>Computed TPO</u>
88.7	14.0 kW	0.0°	0.1 %	0.0 %	4.427	-0.449 dB	-0.521 dB	3.95 kW
89.5	42.0 kW	0.0°	0.0 %	0.0 %	4.476	-0.449 dB	-0.425 dB	11.47 kW
97.5	73.0 kW	0.0°	0.1 %	0.0 %	4.921	-0.468 dB	-0.209 dB	17.34 kW
103.7	83.0 kW	0.0°	0.0 %	0.0 %	5.191	-0.488 dB	-0.190 dB	18.69 kW

Mechanical Specifications

Antenna Feed System..... Fed with one Line
 Input Connector 6 1/8 "50-Ohm EIA Flanged
 Element Deicing..... None
 Interbay Spacing..... 60" Center to Center
 Array Length 80 Feet
 Construction Material (Antenna)..... Brass, Copper 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 976 Feet of ERI MACXLine 6 1/8" Rigid 17.5 Foot Sticks.

4) Losses Taken from Actual Combiner.

EXHIBIT, A - 3

NOTES:

1. REMOVE ALL BURRS & SHARP EDGES.
2. ASSEMBLE COMBINER SYSTEM BY MATING CORRESPONDING LETTERS AND NUMBERS (SEE SHEET 3).
3. CUTTING CUTTING THROUGH MEZZANINE GRATING SHALL BE REQUIRED FOR INSTALLATION OF TRANSMISSION LINE.

REVISION HISTORY

REV	DESCRIPTION	DATE	APPROVED
A	ITEM 16 WAS CD651-4-SMA.	11/18/2020	NP
B	ITEM 14 WAS CD251-1-N000, ITEM 15 WAS CD351-1-N000.	1/12/2021	NP
C	RECONFIGURED ASSEMBLY W/ MEZZANINE TO FIT IN ALLOTTED SPACE WITHIN TRANSMITTER BUILDING, ADDED SHEET 3, ITEM 6 P/N WAS 1329150-29-9-36-00, ITEM 10 P/N WAS 1329350-5-24-00, ITEM 7 QTY. WAS 9, ITEM 10 QTY. WAS 2, ITEMS 36, 38 & 39 QTY. WAS 20, ITEM 23 WAS 84 & ADDED ITEMS 44 - 56	1/29/2021	NP
D	ITEM 4 QTY. WAS 3, ITEM 8 QTY. WAS 3, ITEM 17 QTY. WAS 3, ITEM 23 QTY. WAS 1, ITEM 24 QTY. WAS 3, ITEM 41 QTY. WAS 84, ITEM 42 QTY. WAS 86.	5/5/2021	NP

88.7 MHz INPUT
1-5/8" DUAL PORT DIR. COUPLER

103.7 MHz INPUT
3-1/8" DUAL PORT DIR. COUPLER

6-1/8" OUTPUT

97.5 MHz INPUT
3-1/8" DUAL PORT DIR. COUPLER

ITEM QTY PART NUMBER

56	2	SC0813HX000
55	2	W0R6A-N001
54	1	1329150-5-TBD
53	2	N0U6-16
52	1	W0R6SS
51	1	SC0614HX000
50	4	A0N616503505
49	1	LA04-A002
48	2	LA04-N005
47	1	3024W-LA1
46	1	PURCHASE
45	1	1329150-5-99.83
44	1	1329650-10SE
43	4	W0R6SS
42	104	W0U6SS
41	102	SC0614HX000
40	4	N0U518B2
39	20	N0U518
38	20	W0U5SS
37	4	SC0518T040
36	20	SC0518H0125
35	16	N0U420
34	16	W0U4SS
33	16	W0R4SS
32	8	SC0420H0175FT
31	4	SC0001
30	1	RLA650-350
29	7	RLA350-150
28	3	RLA350-NT-AL
27	2	DC20050A
26	8	LD0006
25	3	JK0002-N001
24	4	HY024M
23	2	HY0241A
22	4	FI0272
21	4	PR0220
20	4	CM0036
19	3	Q1032
18	4	CP230-01MA
17	2	CP230
16	1	CD651-2-N1000
15	2	CD551-2-N1000
14	2	CD251-2-N1000
13	1	783-6-00-36
12	2	783-3-00-66
11	1	1329150-2-247435
10	1	1329150-5-38-08
9	1	1329150-5-21-179
8	7	1329150-5-4-00
7	11	1329150-10SE
6	1	1329150-29-5-012
5	1	1329150-29-5-27-729
4	5	1329150-29-5-6-00
3	3	1329150-39A
2	2	1329150-10SE-3
1	8	1329100-38

BILL OF MATERIAL

PROJECT NO: 38249A/11

DATE: 1/26/2021

DESIGNED BY: NAME

DRAWN BY: NAME

CHECKED BY: NAME

DATE: 01/26/2021

REVISIONS:

REVISION:

DATE:

BY:

DESCRIPTION:

FM CHANNEL COMBINER

ROBSTOWN, TX

FM STATIONS 88.7, 89.5, 97.5 & 103.7 MHz

ITEM NO: B

QTY: 1

DESCRIPTION: OZNS1 IM38249A-1

SCALE: AS NOTED

SHEET: 1 OF 3

A-4 ERI Combiner Specification SheetTRANSMISSION SITE
ROBSTOWN, TEXAS**General Specifications:**

Multiplexer Type Constant Impedance Combiner
 Number of Combining Units Four
 Injected Port to Injected Port Isolation < - 69 dB
 Output Connector 6 1/8 "50 Ohm EIA (Flanged)
 Output Power (Designed) 51.5 kW⁽¹⁾

Heat Removal Natural Convection Cooling
 Physical Arrangement Free Standing and Mezzanine

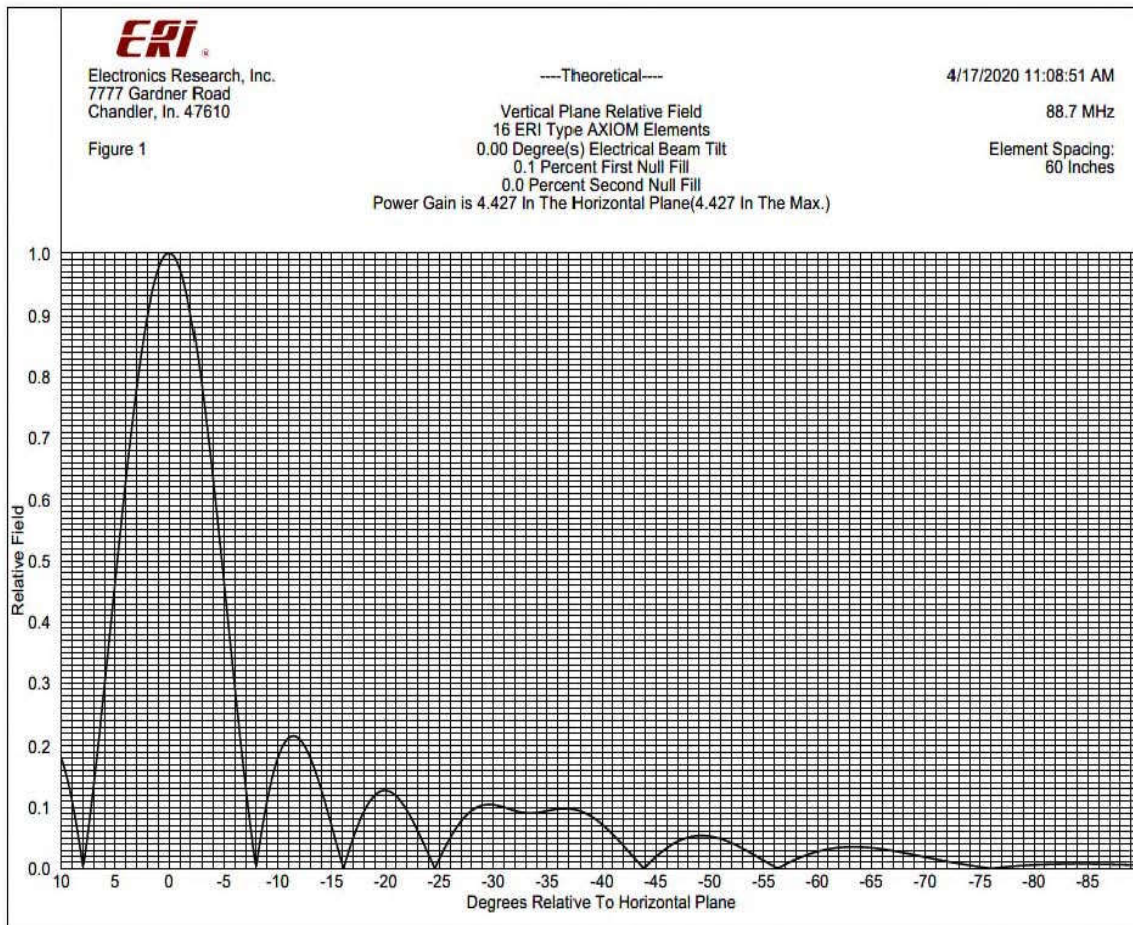
Injected Port Specifications:

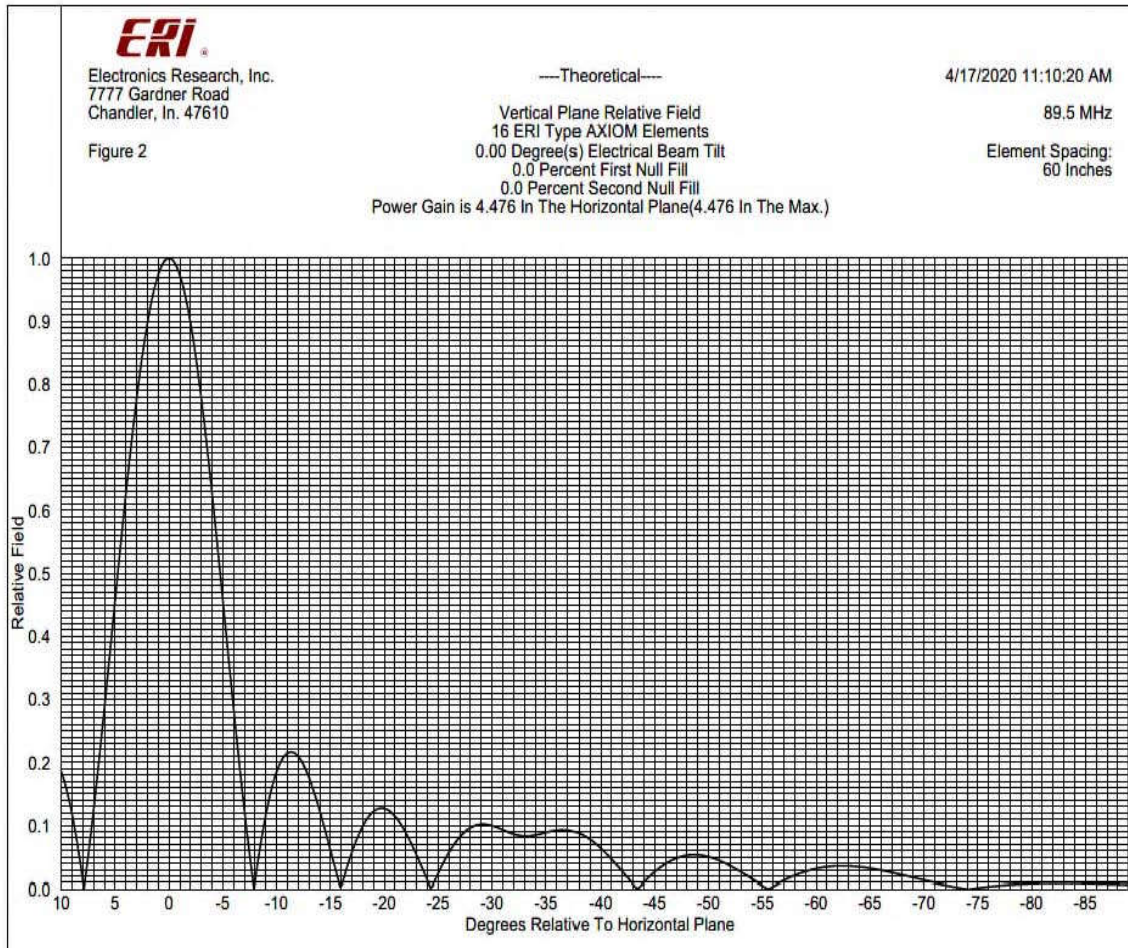
Frequency Assignment 88.7~89.5~97.5~103.7 MHz.
 Power Rating, Each Injected Port (Designed)..... 3.95 kW 88.7 MHz, 11.47 kW 89.5 MHz.
 Power Rating, Each Injected Port (Designed)..... 17.34 kW 97.5 MHz, 18.69 kW 103.7 MHz.
 Input Connector 1-5/8" 50 Ohm EIA (Flanged) 88.7and 89.5 MHz.
 Input Connector 3 1/8" 50 Ohm EIA (Flanged) 97.5, and 103.7 MHz.
 VSWR..... < 1.08:1 @ +/-200 KHz.⁽²⁾
 Group Delay Less than 250 ns Overall Variation, Carrier @ +/- 150 KHz.
 Insertion Loss (Measured):

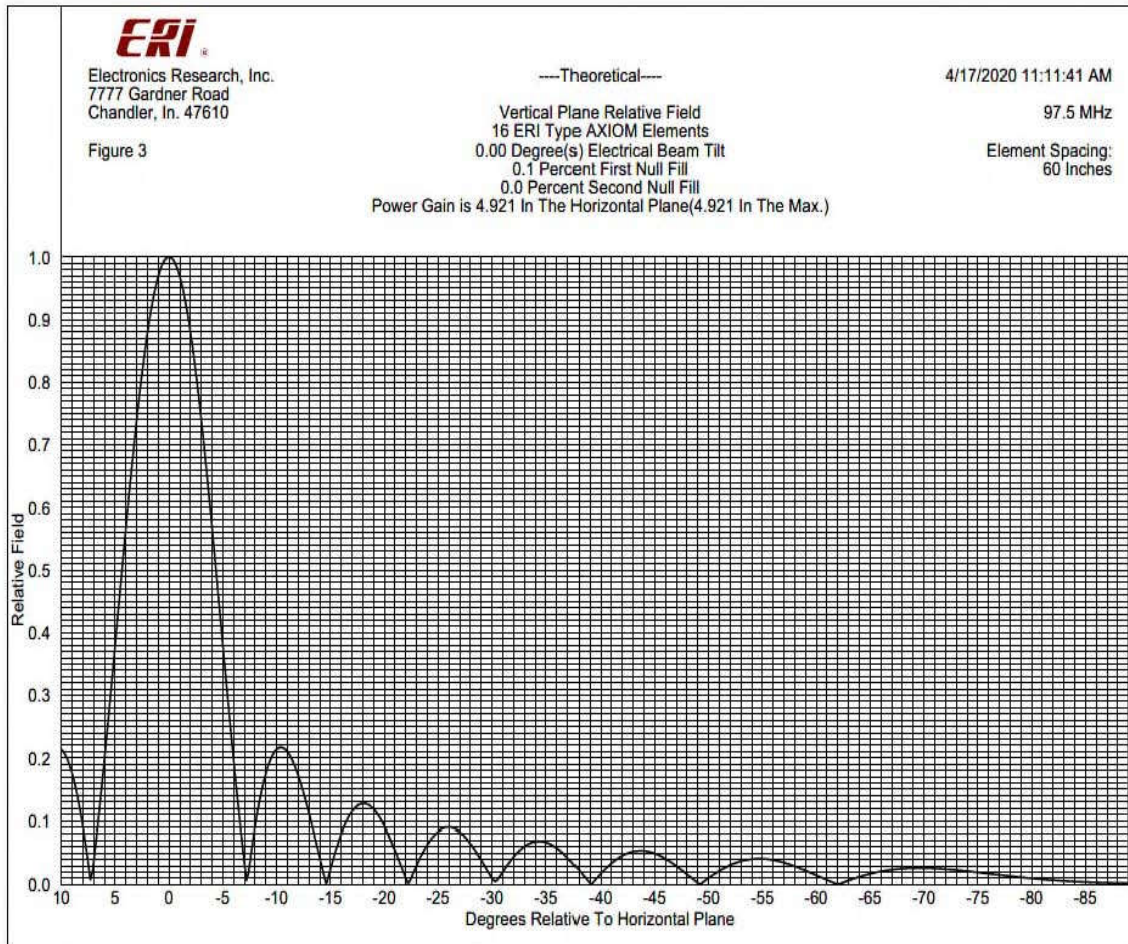
88.7 MHz. - 0.5211 dB
 89.5 MHz. - 0.4255 dB
 97.5 MHz. - 0.2098 dB
 103.7 MHz. - 0.1904 dB

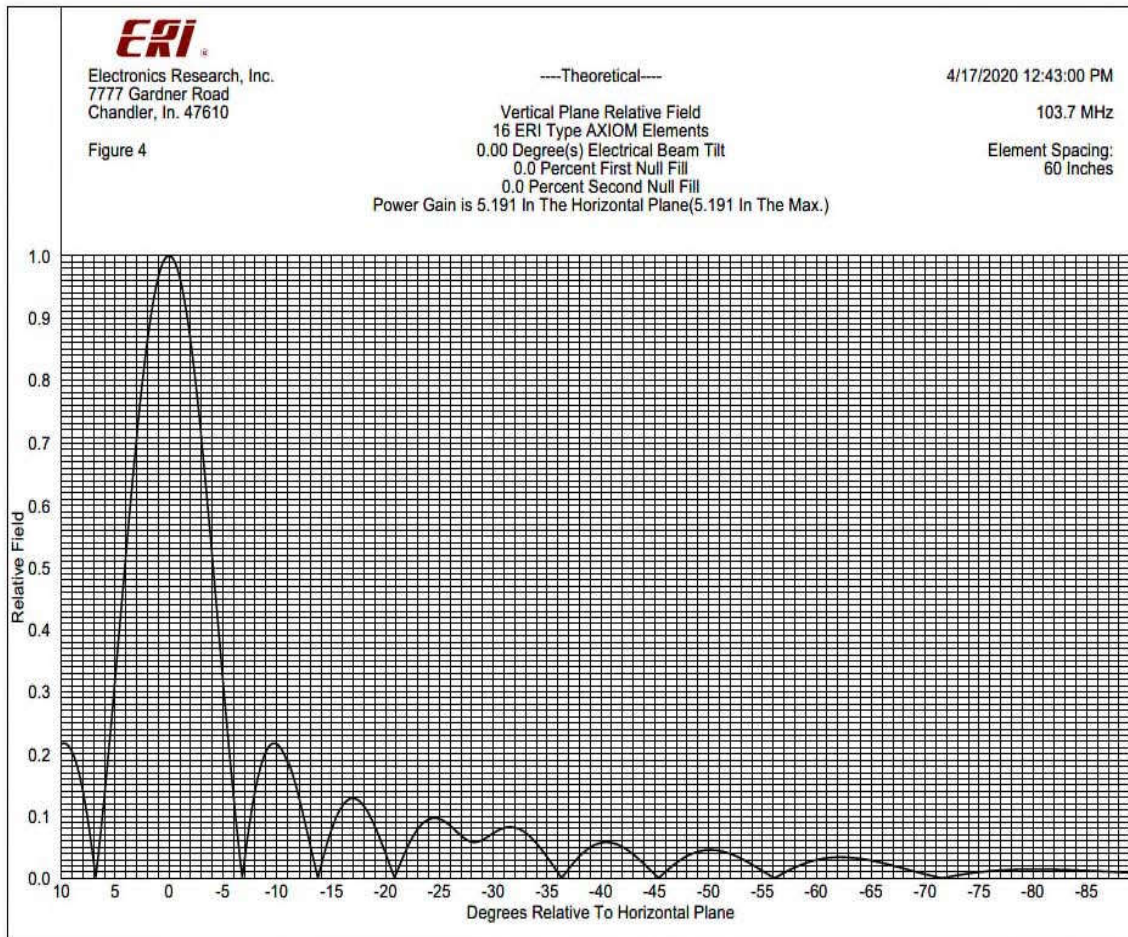
1) Power Rating Listed is as Designed Only. Actual Power Capabilities May Vary.

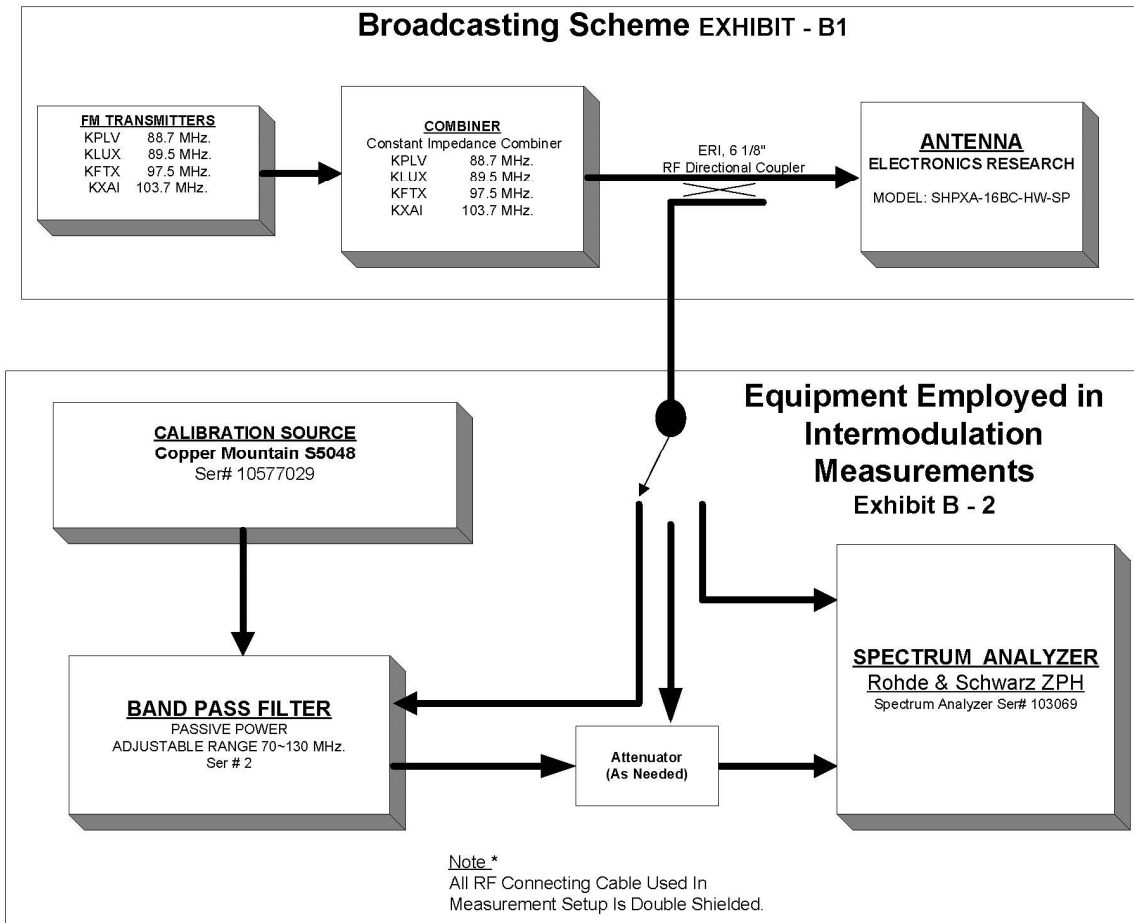
2) When Terminated in 50 Ohm Resistive Load.











Broadcasting Scheme and Equipment Employed in Intermodulation Measurements

EXHIBIT B