

Anderson Associates

Broadcast Engineering Consultants

**WMGI 264B TERRE HAUTE, IN #6828
WTHI-FM 260B TERRE HAUTE, IN #70652**

**ENGINEERING FOR JOINT STA
APPLICATION AND COMBINED OPERATION**

Applicant:

Midwest Communications, Inc.
904 Grand Avenue
Wausau, WI 54403

Paul.rahmlow@mwcradio.com
715-842-1437

Proposed WMGI facility parameters:

WMGI
264B
Terre Haute, IN
FCC Facility #6828

12.41 kW ERP - 5.9 kW TPO

N 39-27-57.0
W 87-24-12.0 (NAD83) ASR #1029950

Site elevation = 150.8 meters
Radiation Center AGL = 162 meters
Radiation Center AMSL = 312 meters
HAAT = 149.7 METERS (12 radials - 30 meter FCC terrain)

ERI FMH-5AC rototiller antenna full-wave spaced at 99.9 mHz.

Anderson Associates

Broadcast Engineering Consultants

Proposed WTHI-FM facility parameters:

WTHI-FM
260B
Terre Haute, IN
FCC Facility #70652

41.6 kW ERP - 19.614 kW TPO

N 39-27-57.0
W 87-24-12.0 (NAD83) ASR #1029950

Site elevation = 150.8 meters
Radiation Center AGL = 162 meters
Radiation Center AMSL = 312 meters
HAAT = 149.7 meters (12 radials - FCC 30 meter terrain)

ERI FMH-5AC antenna full-wave spaced at 99.9 mHz.

Purpose and discussion:

During tree clearing at the WMGI tower site, the tower was irreparably damaged and a temporary facility is required while the tower is replaced. ERI was commissioned to develop and install a combined facility for WMGI at the existing WTHI-FM tower and using the existing WTHI-FM antenna. It was necessary to temporarily reduce the WTHI-FM ERP due to the power handling capacity of the combining system.

60 dBu maps are included herein demonstrating that the STA 60 dBu contours are contained within the licensed WMGI and WTHI-FM 60 dBu contours.

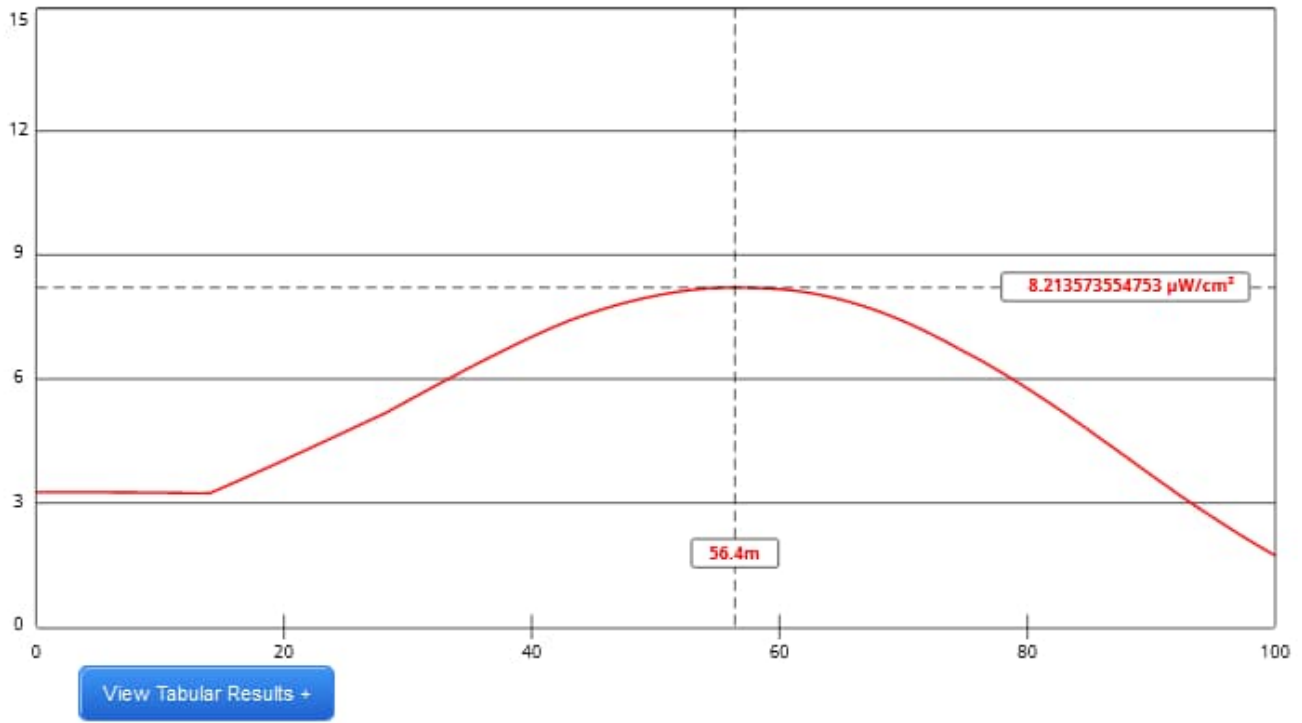
A full technical report from ERI including spurious emissions measurements is attached demonstrating full compliance with Commission rules.

FMMODEL analysis of the RF levels for each facility are included below demonstrating that the maximum WTHI-FM level is 8.21 $\mu\text{Watts}/\text{cm}^2$ and the WMGI maximum is 2.63 $\mu\text{Watts}/\text{cm}^2$ with a combined level of 10.84 $\mu\text{Watts}/\text{cm}^2$ and less than the 200 $\mu\text{Watts}/\text{cm}^2$ general population exposure limit.

Collocated W250BZ with 250 Watts at 148 meters AGL contributes 0.783 $\mu\text{W}/\text{cm}^2$ using a worst case vertical factor of 1.0 (see formula below) less than 5% and not attributable.

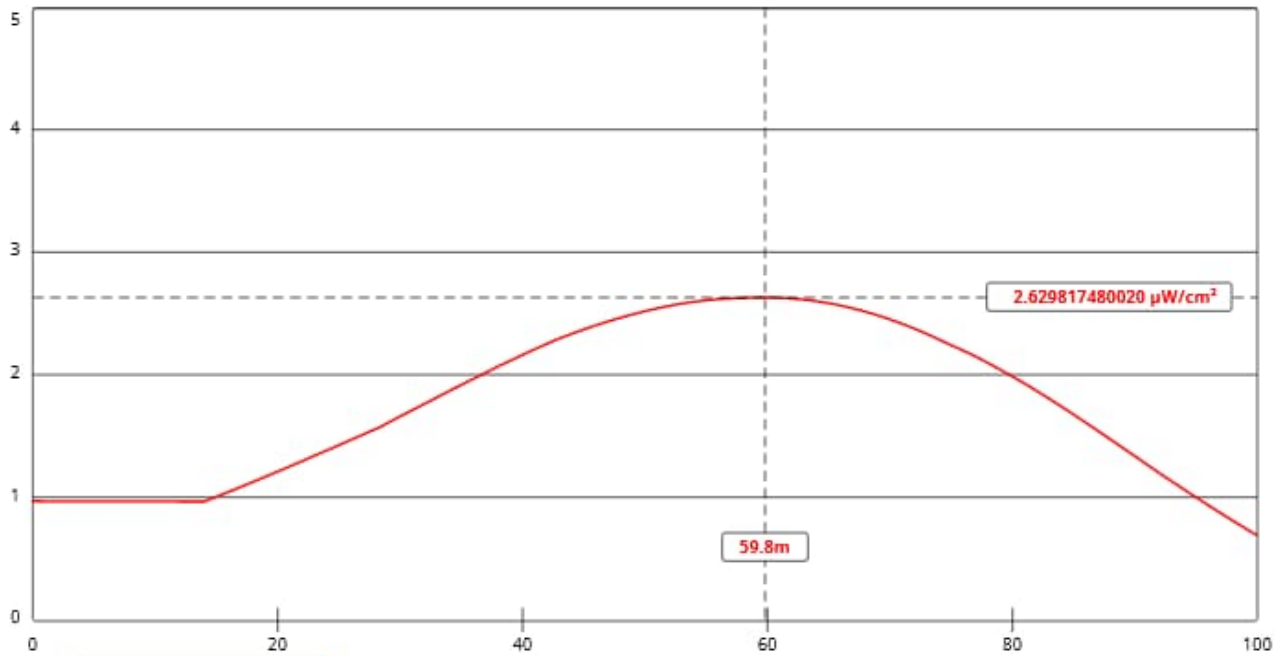
$$S \text{ (RF in } \mu\text{Watts}/\text{cm}^2) = \frac{33.4 (F^2 - \text{Vert Factor}) X (H \text{ ERP} + V \text{ ERP in Watts})}{R^2 \text{ (distance to radiation center in meters} - 2 \text{ m)}}$$

WTHI-FM FMMModel Output:



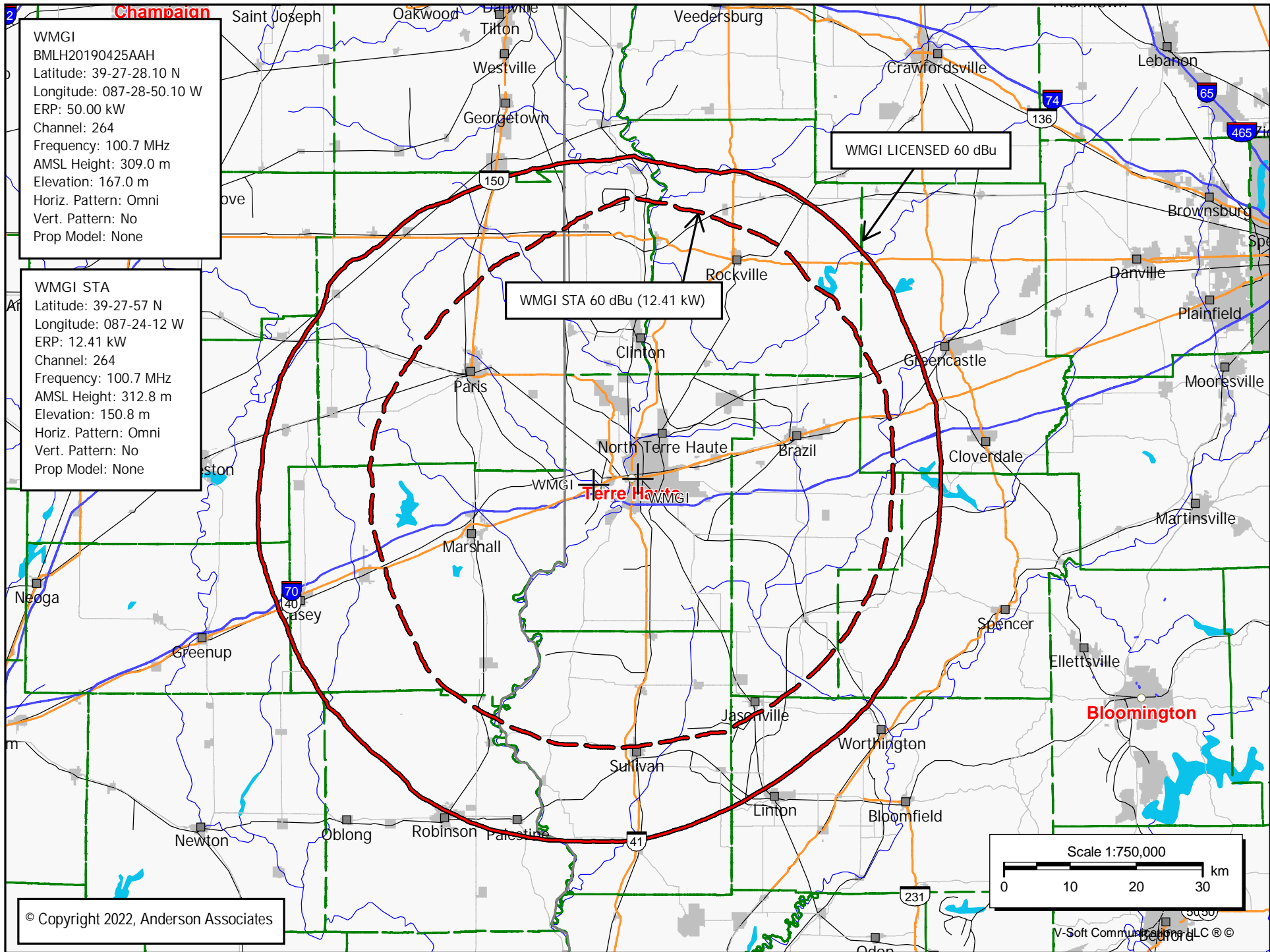
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Antenna Type +	EPA Type 3: Opposed U Dipole ▾		
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ERP-H (W)	<input type="text" value="41600"/>	ERP-V (W)	<input type="text" value="41600"/>
Num of Elements	<input type="text" value="5"/>	Element Spacing (?)	<input type="text" value="1"/>
Num of Points	<input type="text" value="500"/>	<input type="button" value="Apply"/>	

WMGI FMModel Output:



Channel Selection	Channel 264 (100.7 MHz) ▾		
Antenna Type +	EPA Type 3: Opposed U Dipole ▾		
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ERP-H (W)	<input type="text" value="12410"/>	ERP-V (W)	<input type="text" value="12410"/>
Num of Elements	<input type="text" value="5"/>	Element Spacing (?)	<input type="text" value="1.008"/>
Num of Points	<input type="text" value="500"/>	<input type="button" value="Apply"/>	

Charles M. Anderson 3-15-2022
cmanderson43@yahoo.com
270-535-4432



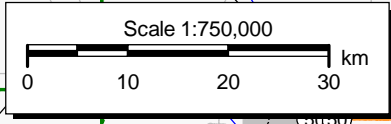
WMGI
 BMLH20190425AAH
 Latitude: 39-27-28.10 N
 Longitude: 087-28-50.10 W
 ERP: 50.00 kW
 Channel: 264
 Frequency: 100.7 MHz
 AMSL Height: 309.0 m
 Elevation: 167.0 m
 Horiz. Pattern: Omni
 Vert. Pattern: No
 Prop Model: None

WMGI STA
 Latitude: 39-27-57 N
 Longitude: 087-24-12 W
 ERP: 12.41 kW
 Channel: 264
 Frequency: 100.7 MHz
 AMSL Height: 312.8 m
 Elevation: 150.8 m
 Horiz. Pattern: Omni
 Vert. Pattern: No
 Prop Model: None

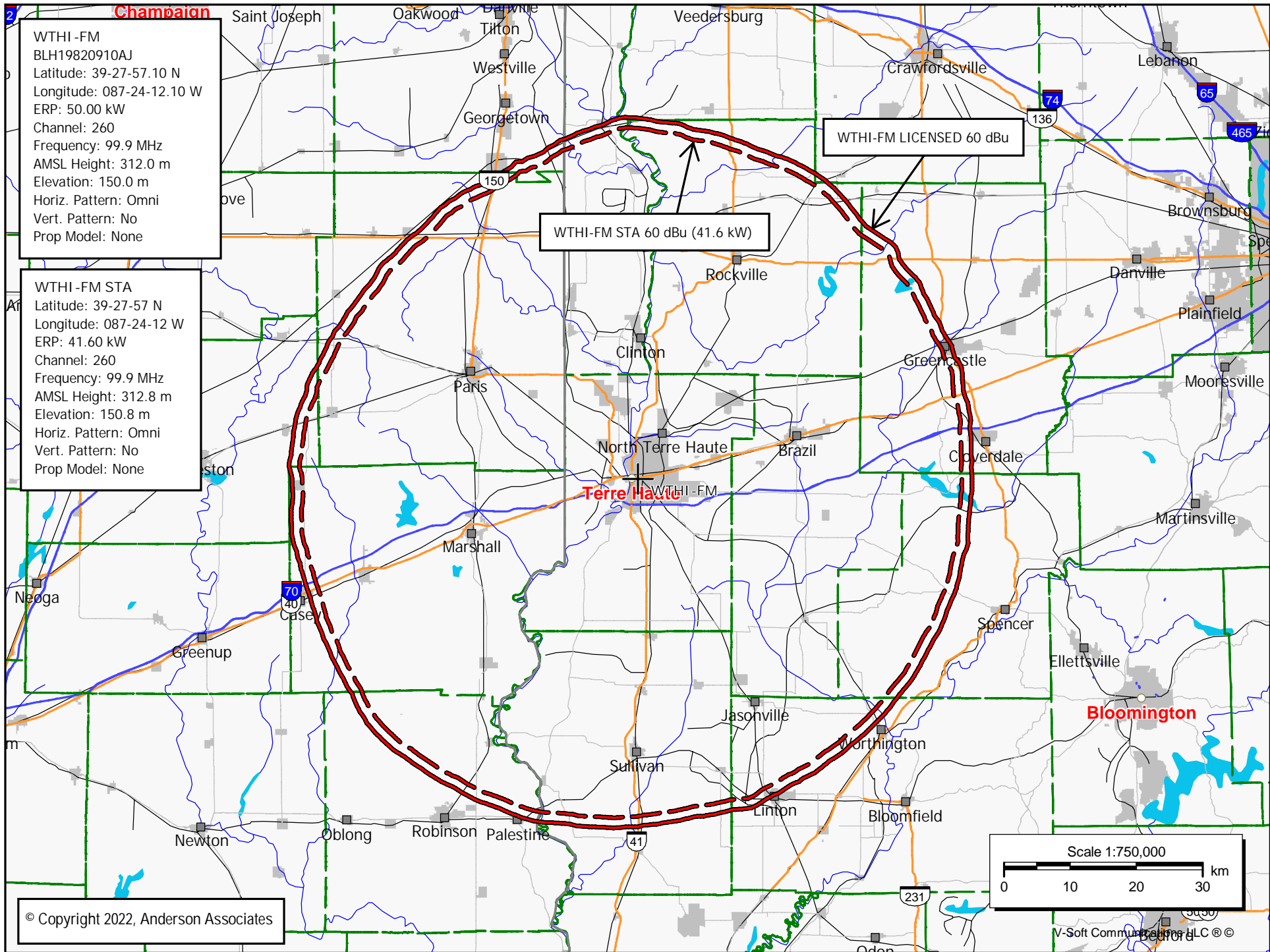
WMGI STA 60 dBu (12.41 kW)

WMGI LICENSED 60 dBu

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V-Soft Communications LLC ©



Field Service Report

FM Combiner and Antenna System

Terre Haute, IN.
Broadcast Facility

ERI Antenna: SHP-8AC-SP
ERI 783-4 "T" Combiner
99.9 MHz. ~ 100.7 MHz.
Feedline: Comscope Heliax
586 Feet of HJ8-50B 3"

WTHI-FM 99.9 MHz. ~ WMGI 100.7 MHz.

ERI Project # 39175A

March 11, 2022

Submitted By:

Jeff Taylor
7777 Gardner Rd.
Chandler, In. 47610
TX: 812-925-6000 Ext. 276
Cell: 812-459-6544
EM: JTaylor@eriinc.com



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INTRODUCTION

Listed below is a summary of the data and attached are the plots collected from the WTHI-FM ~ WMGI transmission site in Terre Haute, IN. by Jeff Taylor March 11, 2022.

- The antenna is an FMH-5AC.
- The combiner is a 783-4 "T" Combiner.
- Equipment used for testing combiner was a Copper Mountain S5048 VNA.
- Equipment used for filter to antenna testing was a Rohde & Schwarz ZVL3 VNA with amp.
- Equipment used for feedline and antenna testing was a Rohde & Schwarz ZVL3 VNA with amp.
- All output measurements of the combiner system were taken at the 3 1/8" output directional coupler unless noted otherwise.
- All input measurements of the ERI products were taken at the 3 1/8" input directional couplers.
- All feedline and antenna measurements were taken on the 3 1/8" flex in the transmitter room.

Site Address: 925 Wabash Avenue
Terre Haute, IN. 47807

Attendees: Jeff Taylor Electronics Research, Inc.
Keven Berlen Station Engineer

The reason for this Field Service Trip was install the ERI filter system and conduct intermodulation measurements.

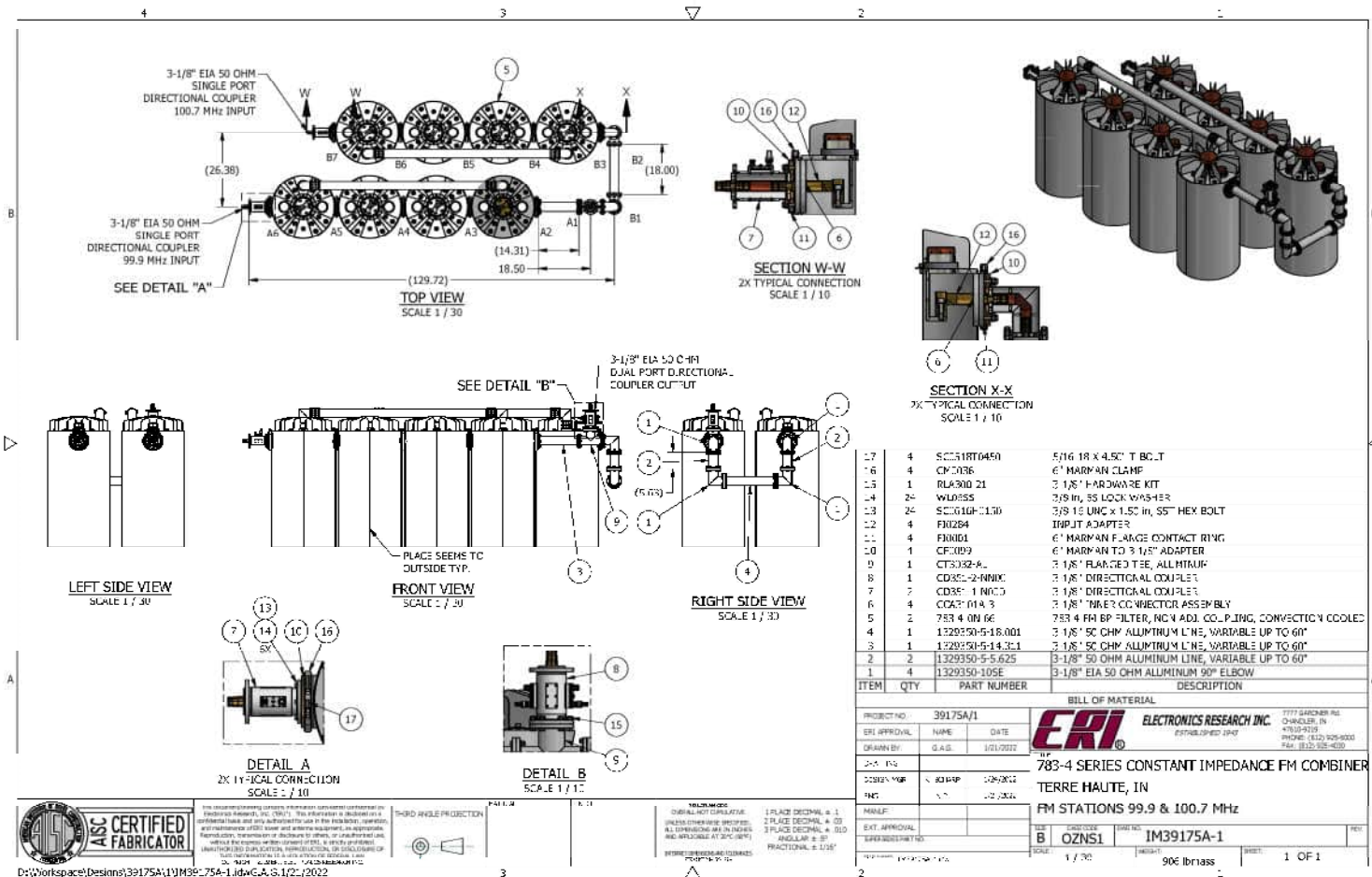
SUMMARY and RECOMMENDATIONS

All measurements were taken by Jeff Taylor of Electronics Research Inc. March 2022.

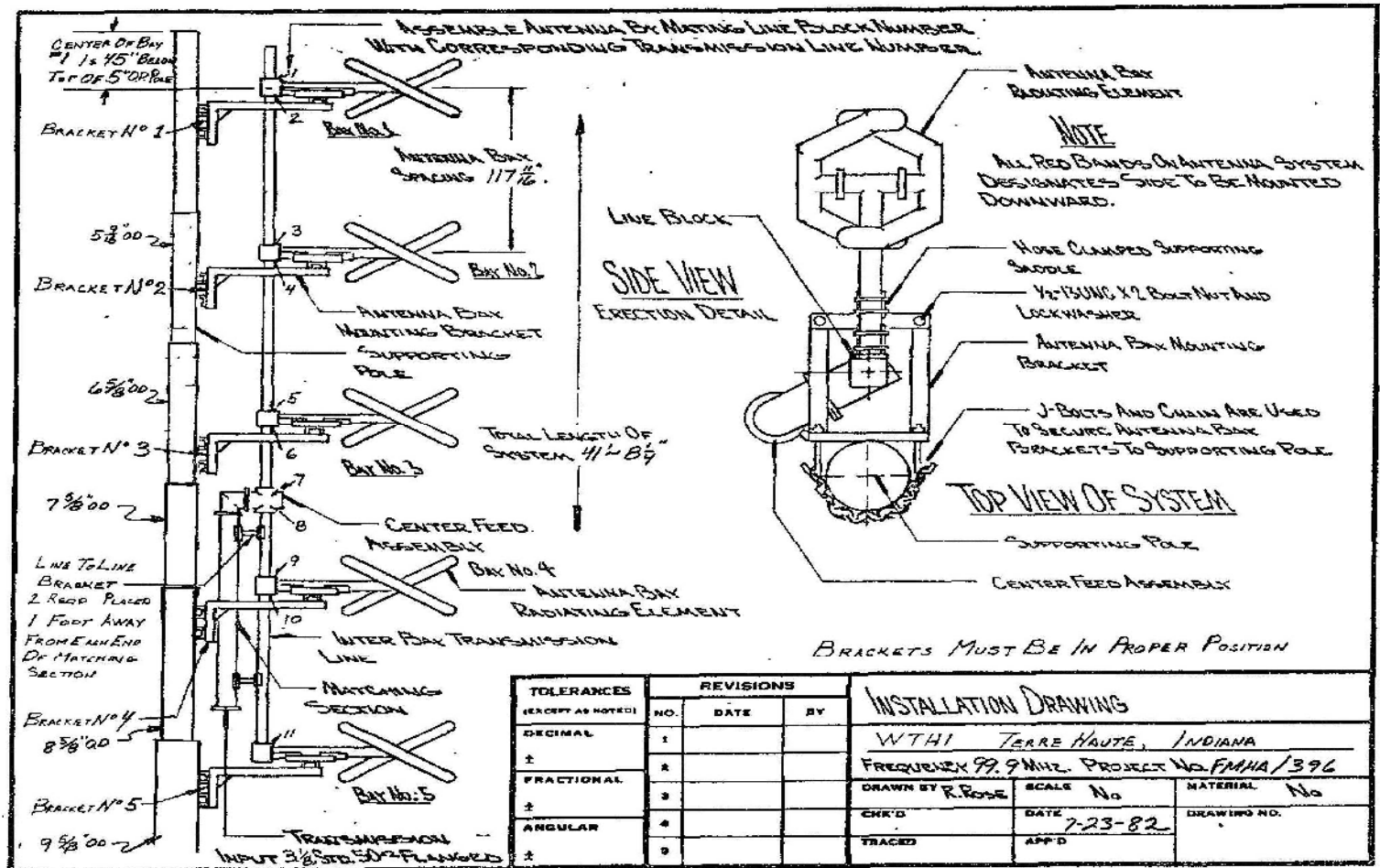
Sincerely Jeff Taylor

DRAWINGS

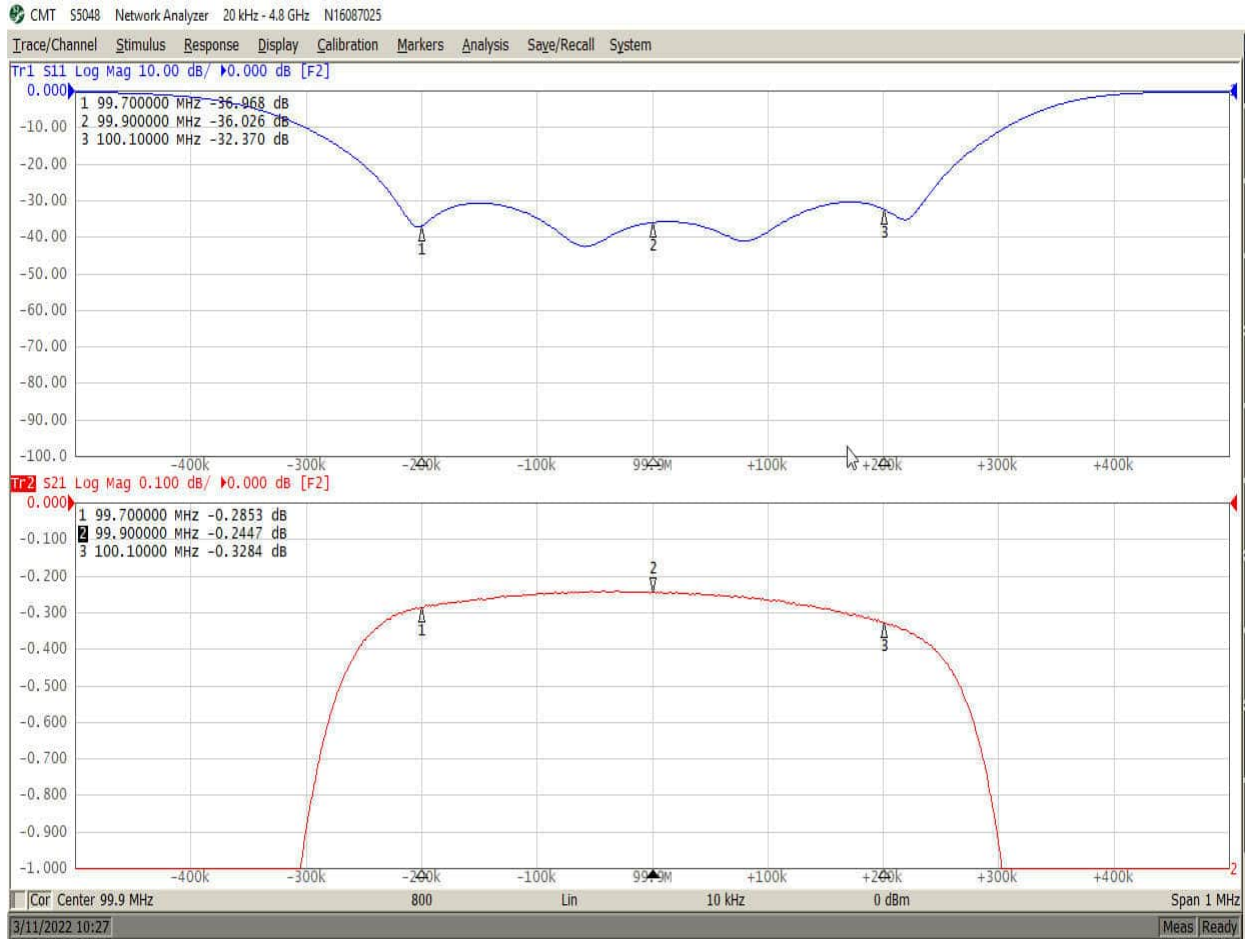
Drawing 1: Combiner Drawing.



Drawing 2: Antenna Drawing.



Measurement 1: Match and Insertion Loss of 99.9 MHz.



Measurement 2: Isolation +/- 800 KHz. of 99.9 MHz.

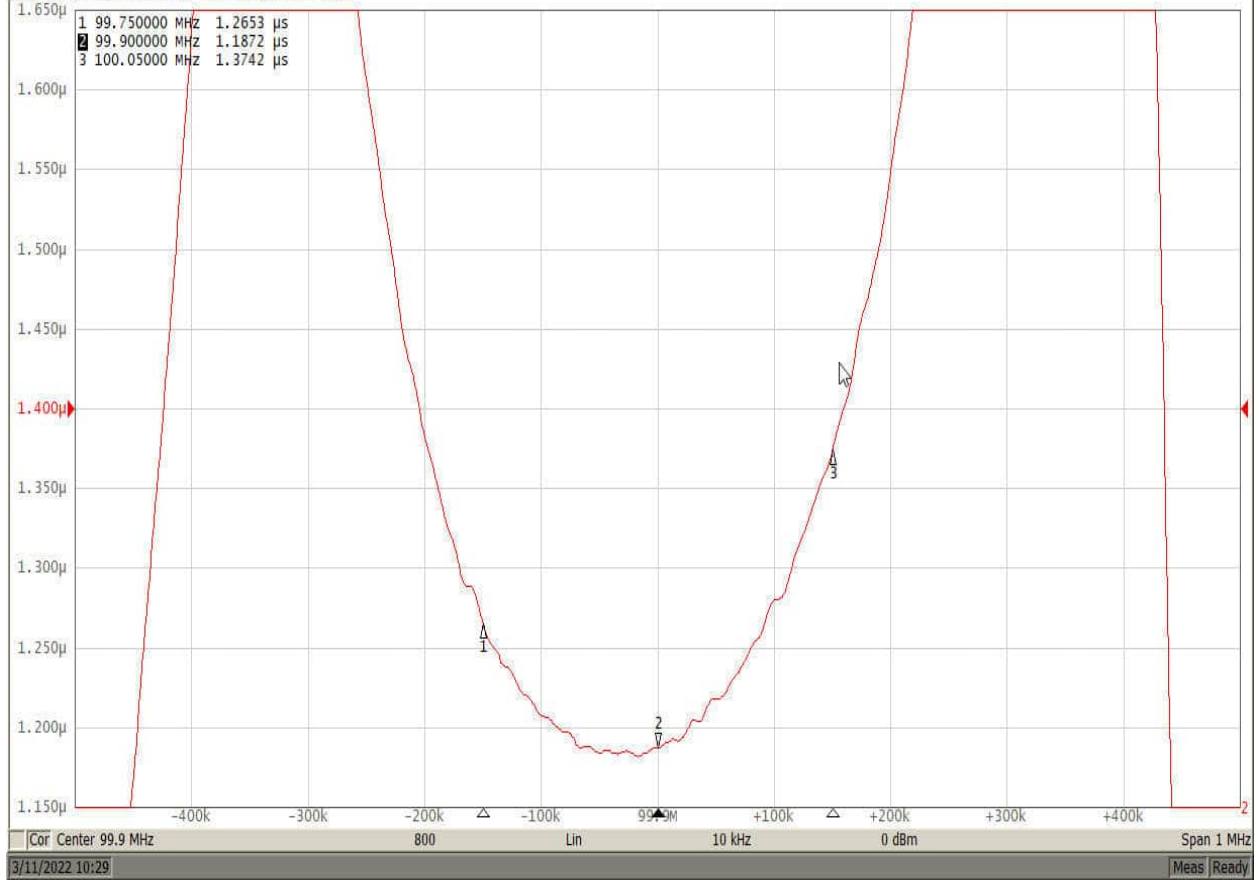


Measurement 3: Group Delay of 99.9 MHz.

CMT S5048 Network Analyzer 20 kHz - 4.8 GHz N16087025

Trace/Channel Stimulus Response Display Calibration Markers Analysis Save/Recall System

Tr2 S21 Delay 50.00 ns / 1.400 μ s [F2 Smo]

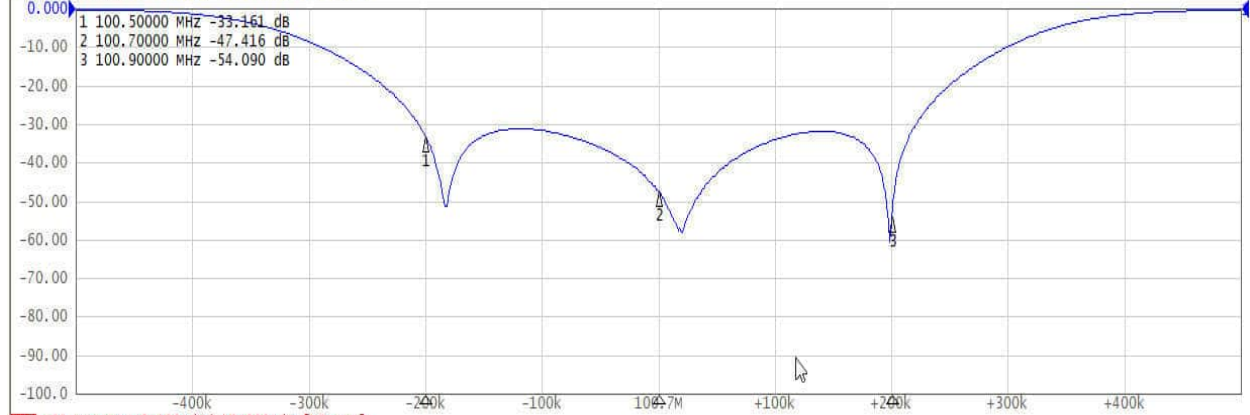


Measurement 4: Match and Insertion Loss of 100.7 MHz.

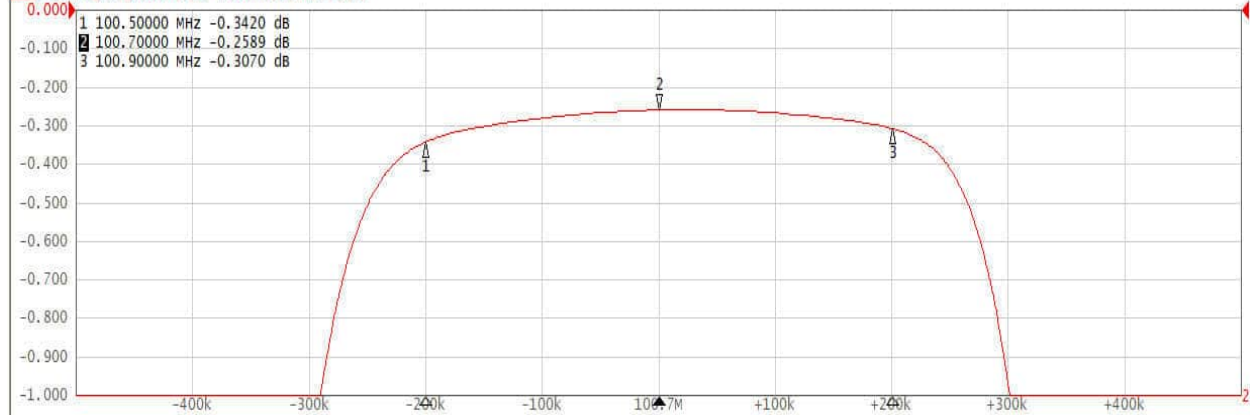
CMT S5048 Network Analyzer 20 kHz - 4.8 GHz N16087025

Trace/Channel Stimulus Response Display Calibration Markers Analysis Save/Recall System

Tr1 S11 Log Mag 10.00 dB/ 0.000 dB [F2 Dat]



Tr2 S21 Log Mag 0.100 dB/ 0.000 dB [F2 Smo]



Cor Center 100.7 MHz 800 Lin 10 kHz 0 dBm Span 1 MHz

9/11/2022 10:30

Meas Ready

Measurement 5: Isolation +/- 800 KHz. of 100.7 MHz.

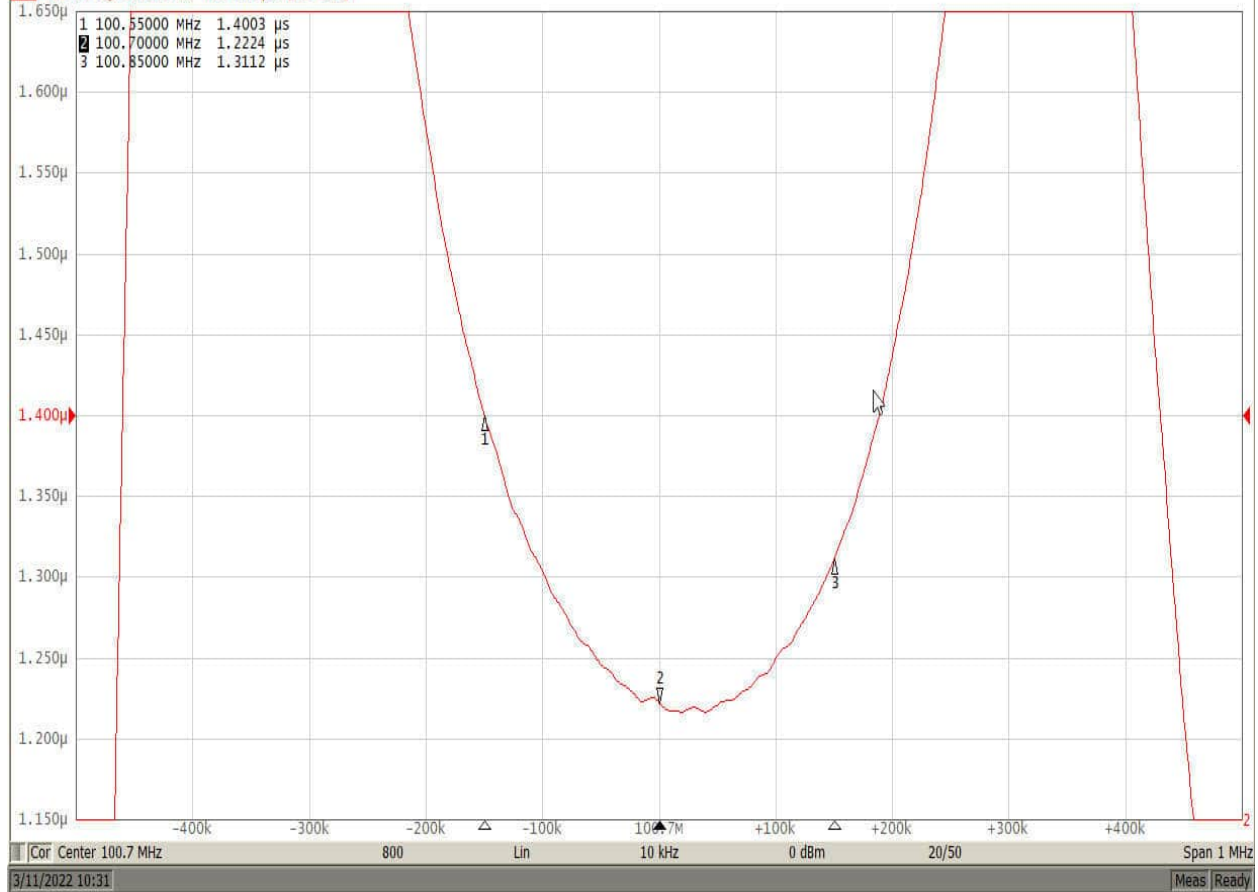


Measurement 6: Group Delay of 100.7 MHz.

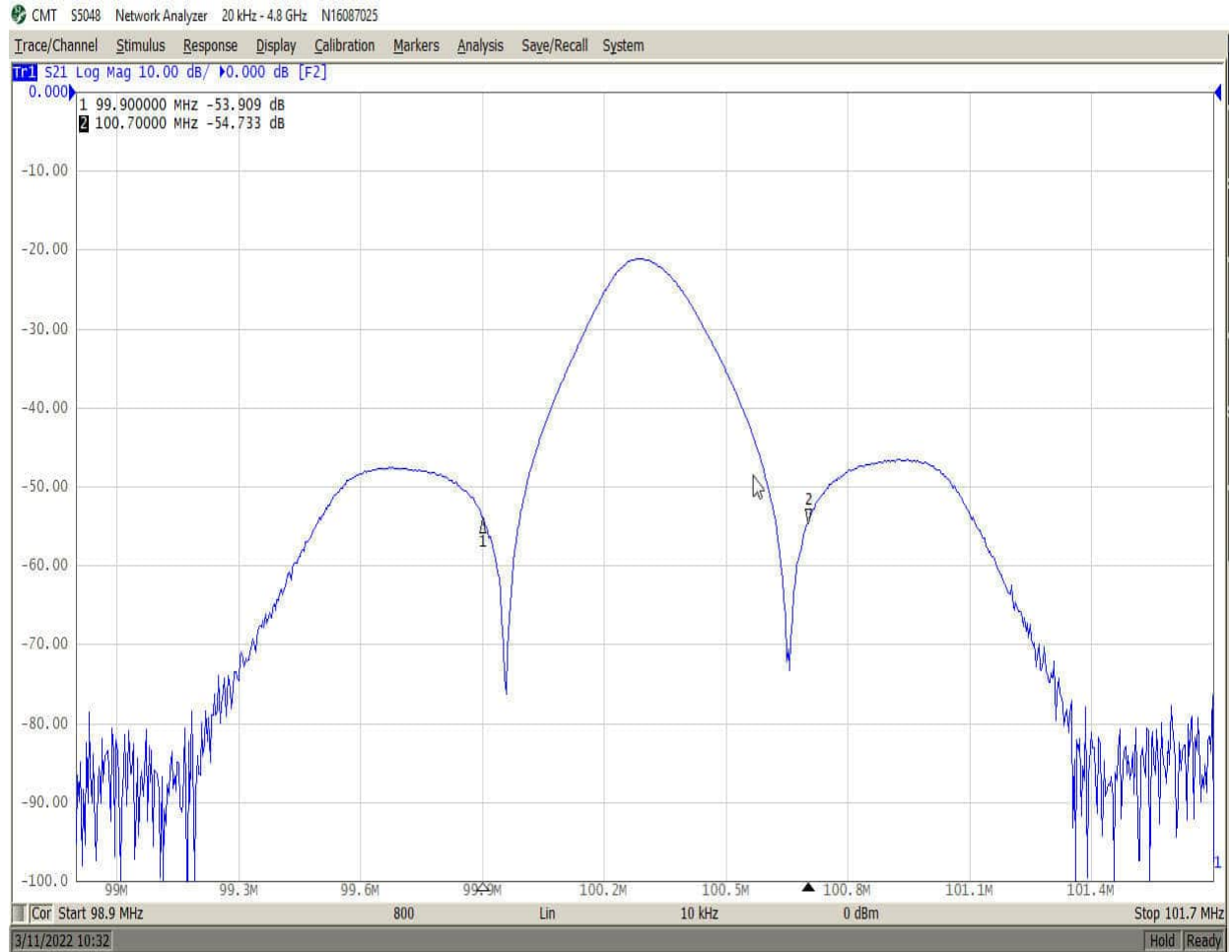
CMT S5048 Network Analyzer 20 kHz - 4.8 GHz N16087025

Trace/Channel Stimulus Response Display Calibration Markers Analysis Save/Recall System

Tr2 S21 Delay 50.00 ns / 1.400 μ s [F2 Smo]



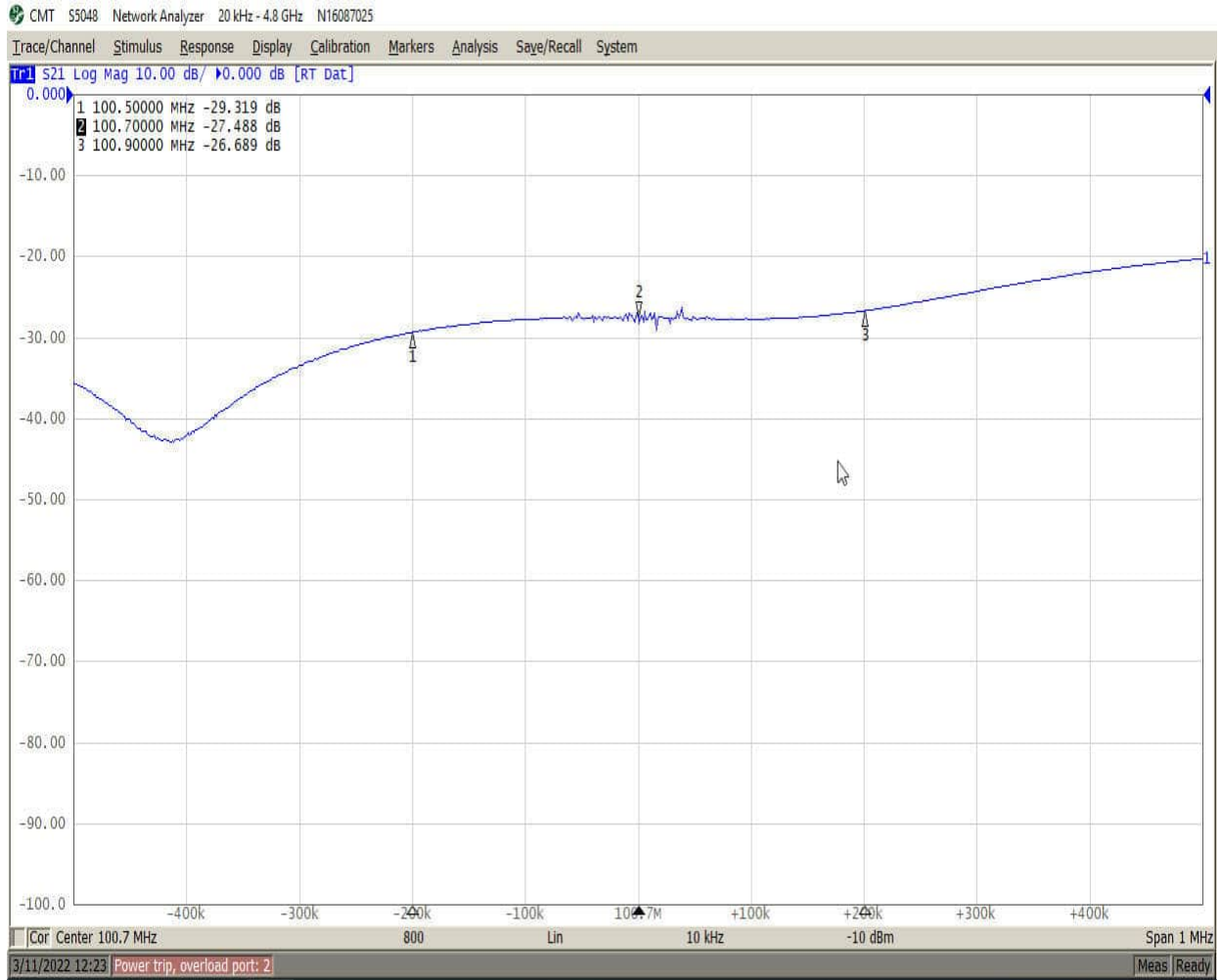
Measurement 7: Port to Port Isolation 99.9 to 100.7 MHz.



Measurement 8: Antenna Match 99.9 MHz.



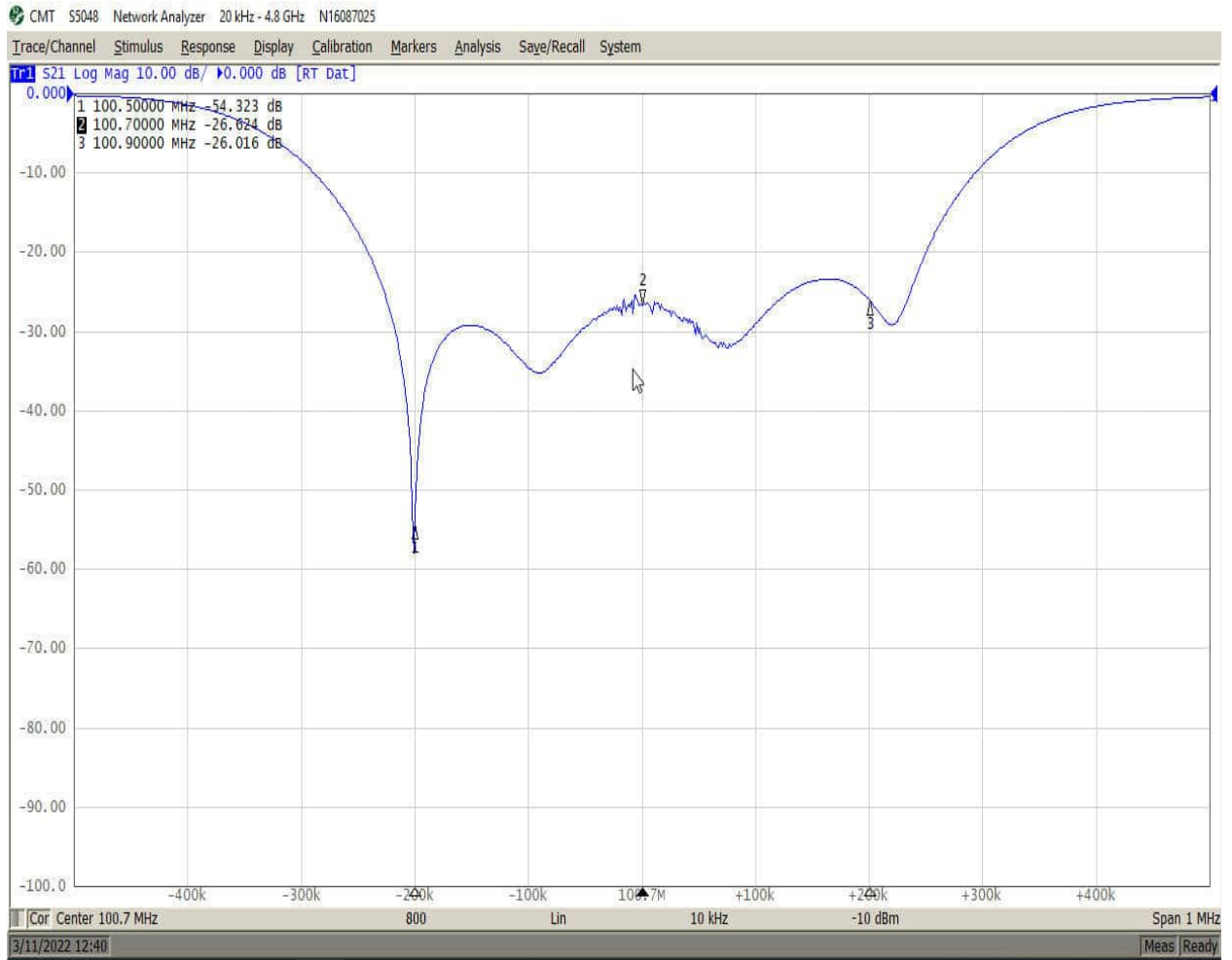
Measurement 9: Antenna Match 100.7 MHz.



Measurement 10: Filter to Antenna Match 99.9 MHz.



Measurement 11: Filter to Antenna Match 100.7 MHz.



Measurement 12: 50 to 400 MHz Sweep of Antenna After Tuning.

Mkr#1 is the Test Transition @ Zero Feet.

Mkr#2 is the Elbow @ Top of Flex @ Approx. 7 Feet.

Mkr#3 is the Elbow at Tower Base @ Approx. 79 Feet.

Mkr#4 is the Antenna Input @ Approx. 586 Feet.

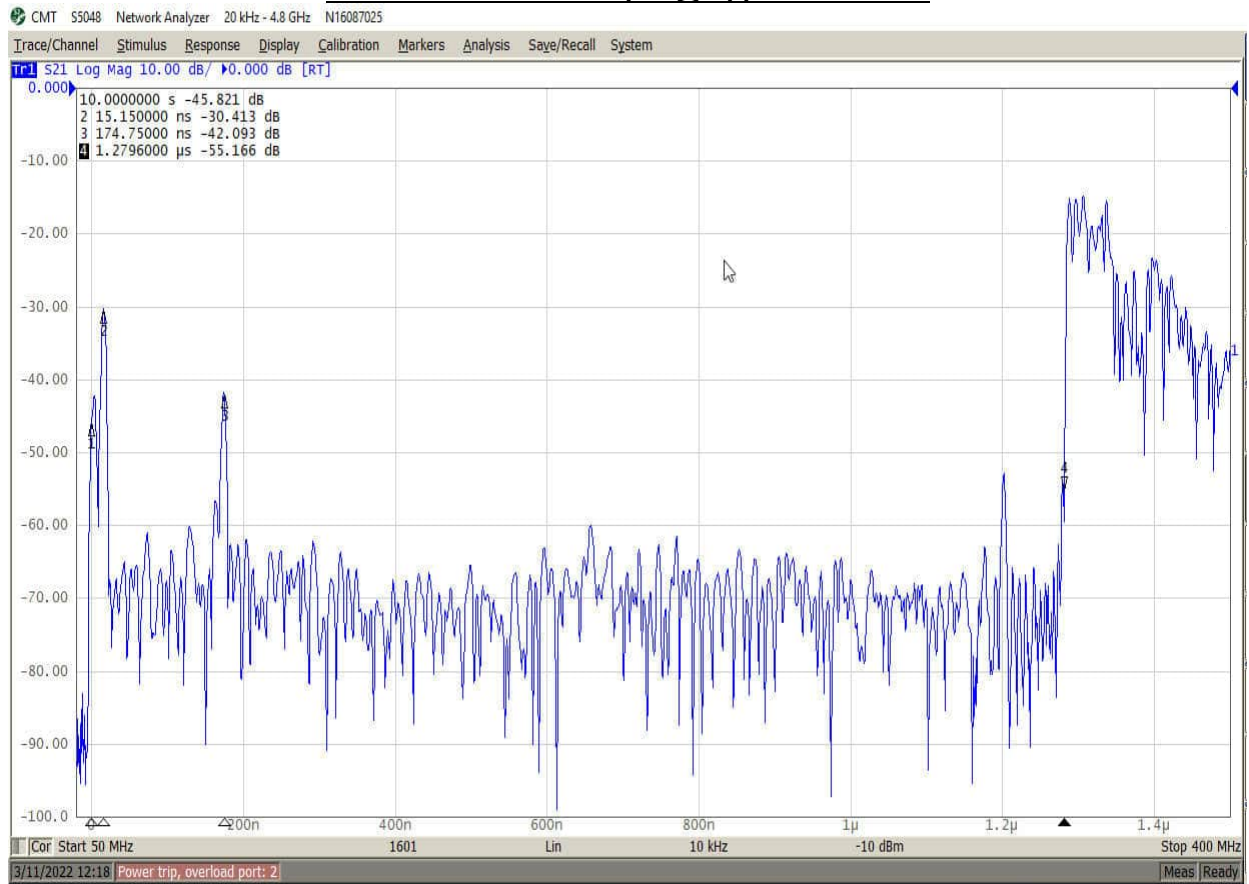
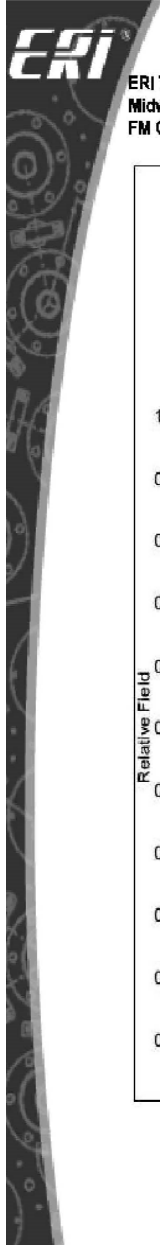


Figure 1: Vertical Plane Relative Field Plot of 99.9 MHz.



ERI Technical Proposal 20220110-233
Midwest Communications
FM Channel Combiner for WTHI-FM and WMGI (FM), both Terre Haute, Indiana

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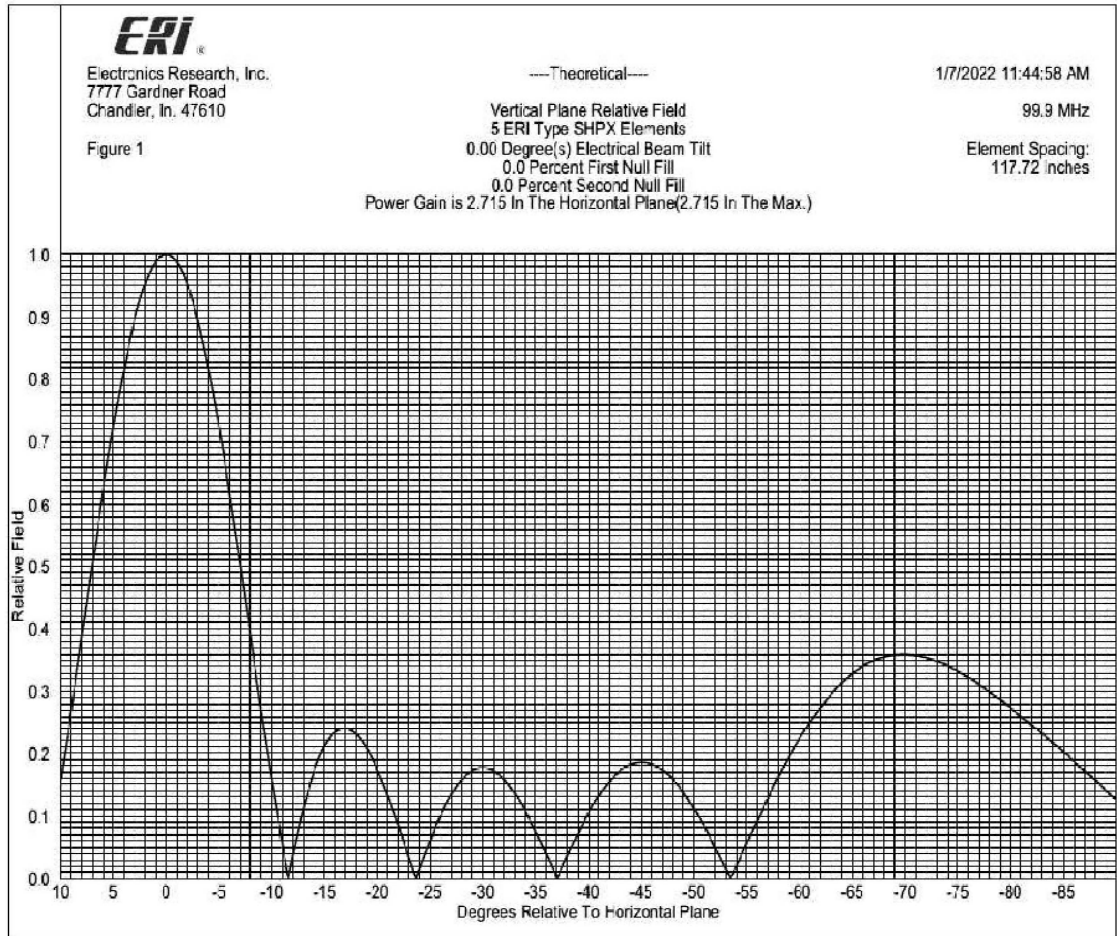
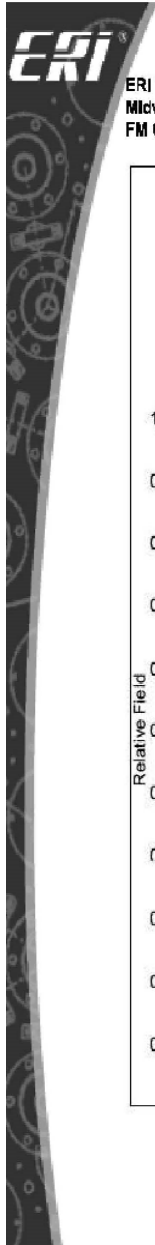


Figure 2: Vertical Plane Relative Field Plot of 100.7 MHz.



ERI Technical Proposal 20220110-233
Midwest Communications
FM Channel Combiner for WTHI-FM and WMGI (FM), both Terre Haute, Indiana

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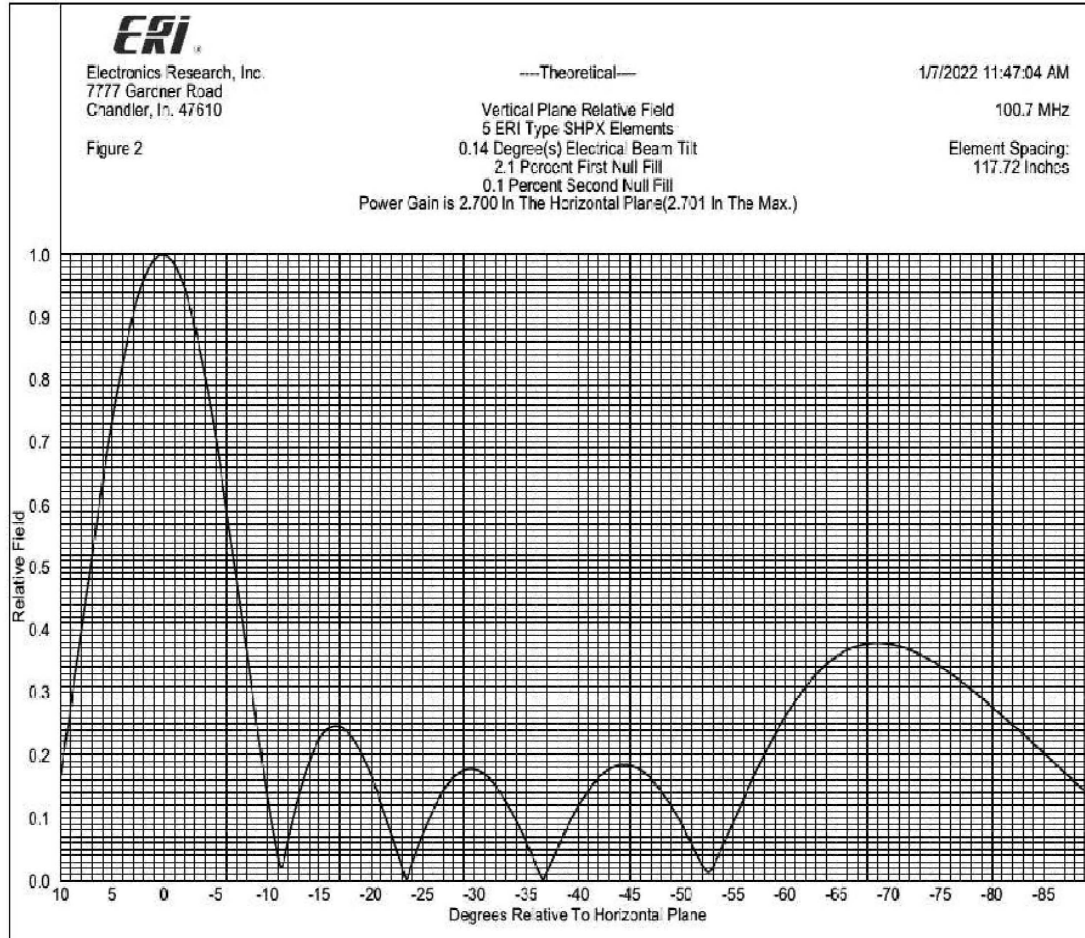


Table 1: Power Analysis for 99.9 MHz.

Antenna Model:	FMH-5AE	
	<i>Analog</i>	
Call Letters:	WTHI-FM, Terre haute, Indiana	
Frequency:	99.9 MHz	Channel 260
ERP:	41.600 kW	16.191 dBk
Polarization:	Circular	
Antenna RMS Gain:	2.715 Numeric	4.338 dB
Antenna Input Power:	15.322 kW	11.853 dBk
Peak Voltage:	1,238 volts	
Transmission Line Type - Vertical Run:	HJ8-50B 3-inch Air HELIAX®	
Vertical Run Length:	536 feet	163.4 meters
Vertical Run Attenuation:	0.141 dB/100-feet	0.463 dB/100-meters
Transmission Line Type - Horizontal Run:	HJ8-50B 3-inch Air HELIAX®	
Horizontal Run Length:	50 feet	15.2 meters
Horizontal Run Attenuation:	0.141 dB/100-feet	0.463 dB/100-meters
Line Loss:	-3.217 kW	0.828 dB
Line Efficiency:	82.646%	
Power Output from Combiner:	18.540 kW	12.681 dBk
Peak Voltage:	1,362 volts	
Combiner Losses:	-1.075 kW	0.245 dB
Transmitter Power Output:	19.614 kW	12.926 dBk

Table 2: Power Analysis for 100.7 MHz.

Call Letters:	WMGI (FM), Terre Haute, Indiana	
Frequency:	100.7 MHz	Channel 264
ERP:	12.410 kW	10.938 dBk
Polarization:	Circular	
Antenna RMS Gain:	2.701 Numeric	4.315 dB
Antenna Input Power:	4.595 kW	6.622 dBk
Peak Voltage:	678 volts	
Transmission Line Type - Vertical Run:	HJ8-50B 3-inch Air HELIAX®	
Vertical Run Length:	536 feet	163.4 meters
Vertical Run Attenuation:	0.142 dB/100-feet	0.466 dB/100-meters
Transmission Line Type - Horizontal Run:	HJ8-50B 3-inch Air HELIAX®	
Horizontal Run Length:	50 feet	15.2 meters
Horizontal Run Attenuation:	0.142 dB/100-feet	0.466 dB/100-meters
Line Loss:	-0.970 kW	0.831 dB
Line Efficiency:	82.575%	
Power Output from Combiner:	5.564 kW	7.454 dBk
Peak Voltage:	746 volts	
Combiner Losses:	-0.342 kW	0.259 dB
Transmitter Power Output:	5.906 kW	7.713 dBk

Report Of Intermodulation Product Findings

Terre Haute, IN.

WTHI-FM – 99.9 MHz.

WMGI – 100.7 MHz.

Project# 39175A

March 11, 2022

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

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Report of Findings for Intermodulation Product Measurements

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Page 5	Table of Third order Products Expected
Page 6	Intermodulation Product Measurements for all Stations
Page 7	Conclusion
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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 System
A-4.....	ERI Combiner Specification Sheet
A-5.....	Theoretical Vertical Plane Relative Field Antenna Plots
EXHIBIT B-1	Intermodulation Product Measurement Equipment Layout
B-2.....	Broadcasting Scheme of the Multiplexed System

REPORT OF FINDINGS TERRE HAUTE, INDIANA BROADCAST FACILITY

Introduction: This report of findings is based on data collected at the FM broadcast facility located in Terre Haute, IN. The report includes measurements offered as proof that the combined operations of WTHI-FM (99.9 MHz.) and WMGI (100.7 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). 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 is 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 March 11, 2022.

The following exhibits are provided:

Exhibit A:

- A-1 Drawing Depicting Antenna.
- A-2 FMH-5AC Antenna Specification Sheet.
- A-3 Drawing Depicting Diplexed Scheme.
- A-4 Diplexer 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 F_2 signifies the frequency causing the interference.

The Multiplexed System: These measurements were taken with both FM stations operating from the antenna system. The WTHI-FM and WMGI, diplexed system is fundamentally comprised of antenna, feed line and diplexer unit. The FMH-5AC antenna, 783-4 combiner units, are products of Electronics Research, Inc. The 3" HJ8-50B is a product of Comscope.

Refer to Exhibit B-1, for an illustration of the Broadcasting Scheme of these stations.

To accomplish the aggregation of two transmitter signals into a common feed and provide transmitter-to-transmitter isolation, a diplexed scheme consisting of a 783-4 "TEE" Combiner" was installed. Specifically, the combiner uses one 783-4 module for frequency (99.9 MHz.), and one 783-4 module for frequency (100.7 MHz.), both non-adjacent coupled. An interconnecting "T" is required to complete the combiner. The "T" combiner, fully assembled, exhibited transmitter port-to-port isolation in excess of -53 dB. Other performance measurements, such as match, loss, group-delay, etc, revealed that the "T" 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 antenna 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 -38 dB directivity and a forward signal sample of -46 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 Spectrum Analyzer serial# 100396 was employed to record the level of all signals investigated. A Rohde & Schwarz Network Analyzer serial# 100396 was used for selective tuning of the Band Pass Filter. The Rohde & Schwarz Spectrum Analyzer 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 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)	Full Scale Range (dB)	Scale Reading (dBm)	Carrier Level (dBm)	Notes
WTHI-FM 99.9	3	---	14.83	17.83	
WMGI 100.7	3	---	9.05	12.05	

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	99.9	100.7
99.9 MHz.	----	101.5
100.7 MHz.	99.1	----

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 Terre Haute, Indiana										
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										
	99.9	Ref.	3		3	14.83	17.83	17.83		
	100.7	Ref.	3		3	9.05	12.05	12.05		
99.1	99.9	100.7	3	12.9	15.9	-88.67	-72.77	17.83	-90.6	
101.5	100.7	99.9	3	13.9	16.9	-87.33	-70.43	12.05	-82.48	

The Spectrum Analyzer was used to check the close in spectral attenuation of the carrier to confirm the operation of the transmitter, 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 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 March 11, 2022 as summarized in this document, I, Jeff Taylor, find the subject system, specifically the transmitters and filter systems for the operation of WTHI-FM and WMGI 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 WTHI-FM and WMGI, 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

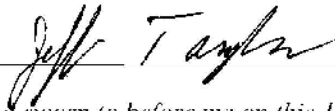
State of Indiana)
) SS:
County of Warrick)

AFFIDAVIT

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

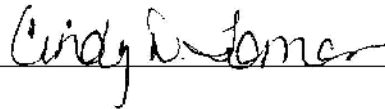
- 1.) I am a Field Technician for Electronics Research, Inc ("ERI") and have been employed by ERI for 26 years. I am familiar with and have assisted in the design, manufacturing and installation of FM Antennas and FM Multiplexers in my long tenure with ERI.
- 2.) I have either prepared and/or directly 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 Midwest Communications, Inc., on behalf of radio Stations WTHH-FM and WMGI in Terre Haute, IN, to prepare this Report Of Findings.

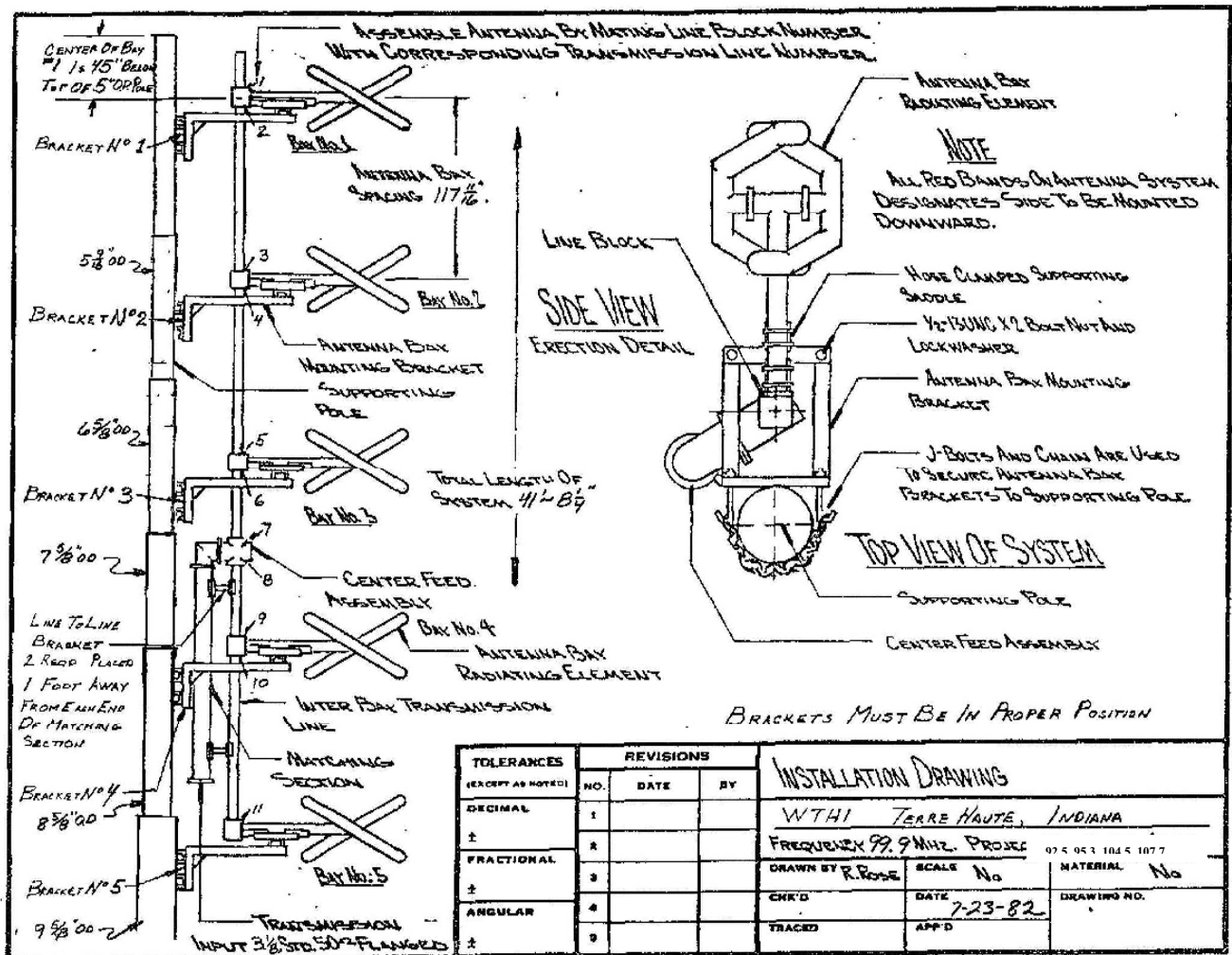
Jeff Taylor; Field Technician



Subscribed and sworn to before me on this 14th, day of March, 2022.

Cindy D Tomes; Notary Public
My commission expires September 17, 2022





TOLERANCES (EXCEPT AS NOTED)	REVISIONS			INSTALLATION DRAWING		
	NO.	DATE	BY			
DECIMAL	1			WTH1 TERRE HAUTE, INDIANA		
±	2			FREQUENCY 99.9 MHz. PROJEC		
FRACTIONAL	3			DRAWN BY R. ROSE	SCALE No	MATERIAL No
±	4			CHK'D	DATE 7-23-82	DRAWING NO.
ANGULAR	5			TRACED	APP'D	
±						

A-2 ERI Antenna Specification Sheet

**TRANSMISSION SITE
TERRE HAUTE, INDIANA**

General Specifications

Antenna TypeHigh Power FM-Broadcast, Suitable For Diplexing
 Model Number FMH-5AC
 Number of Bay Levels Five
 Polarization..... Left Hand Circular

Electrical Specifications

Antenna Input Power Capability 25.5 kW Max ⁽¹⁾
 Operating Frequency Band 99.9 ~ 100.7 Megahertz.
 VSWR. <1.09:1 @ Operating Frequencies⁽²⁾
 Azimuthal Pattern Circularity Better Than +/- 2dB From RMS (Free Space)
 Power Split 50/50 (Horizontal & Vertical)
 Frequency Specific Information:

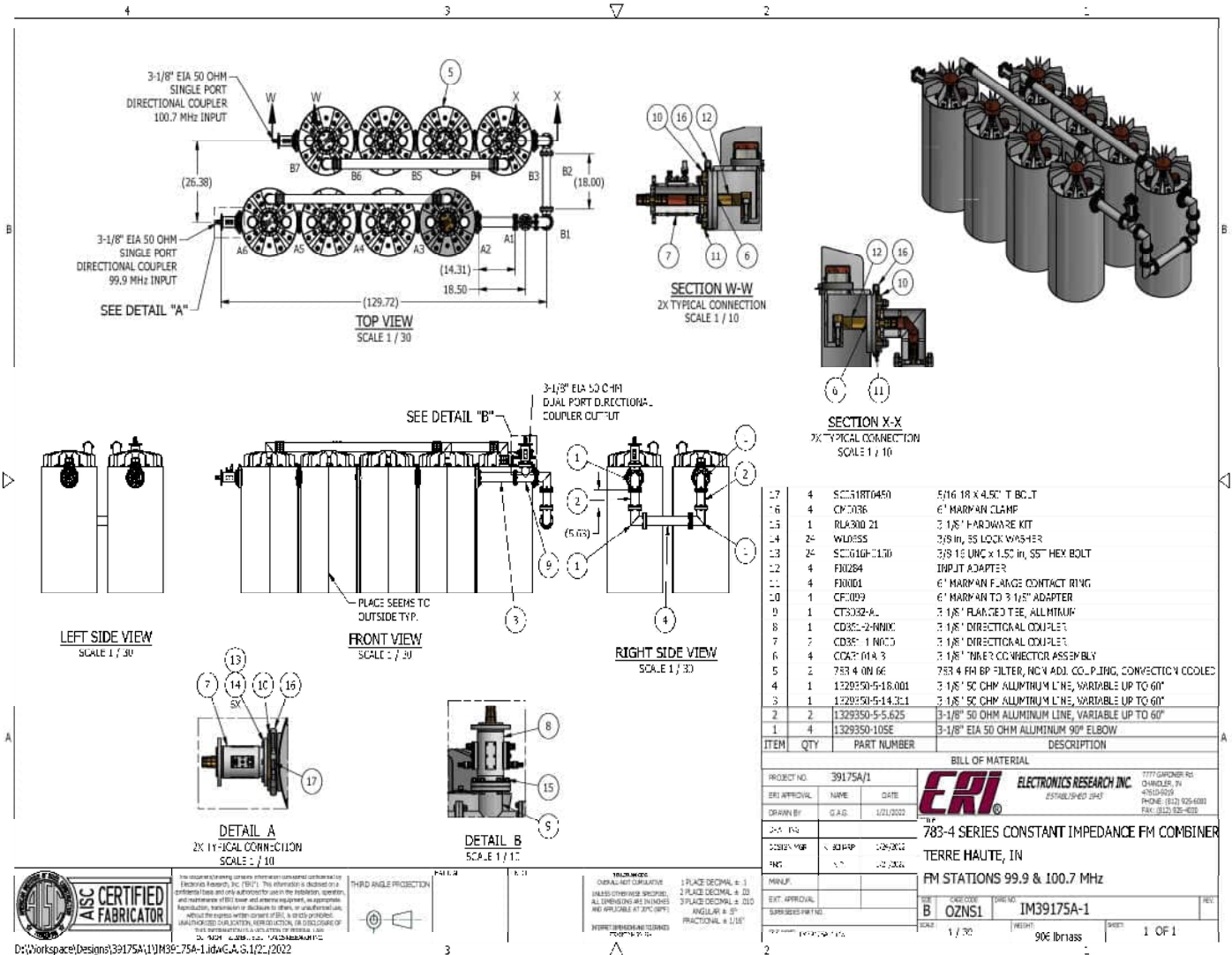
<u>Frequency</u>	<u>Station ERP</u>	<u>Beam Tilt</u>	<u>First Null Fill</u>	<u>Second Null Fill</u>	<u>Power Gain</u>	<u>Line Loss</u> ⁽³⁾	<u>Filter Loss</u> ⁽⁴⁾	<u>Computed TPO</u>
99.9	41.6 KW	0.00°	0.0 %	0.0 %	2.715	-0.828 dB	-0.244 dB	19.6 kW
100.7	12.4 KW	0.14°	2.1 %	0.1 %	2.701	-0.831 dB	-0.258 dB	5.9 kW

Mechanical Specifications

Antenna Feed System.....Single Input
 Input Connector6 1/8”50-Ohm EIA Flanged
 Element Deicing.....None
 Interbay Spacing..... 117.72” Center to Center
 Array Length 42 Feet
 Construction Material (Antenna)..... Brass 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 586 Feet of HJ8-50B 3” Flex.
 4) Losses Taken from Actual Combiner.

EXHIBIT A-3



A-4 ERI "T" Combiner Specification Sheet

**TRANSMISSION SITE
TTERRE HAUTE, INDIANA**

General Specifications:

**Multiplexer Type Non-Adjacent Coupled 783-4 "T" Combiner
Number of Combining Units Two
Injected Port to Injected Port Isolation < - 53 dB
Output Connector 3 1/8 "50 Ohm EIA (Flanged)
Output Power (Designed) 25.5 kW⁽¹⁾**

**Heat Removal Natural Convection
Physical Arrangement Floor Standing**

Injected Port Specifications:

**Frequency Assignment 99.9 ~ 100.7 MHz.
Power Rating, Each Injected Port (Designed)..... 19.6 kW 99.9 MHz, 5.9 kW 100.7 MHz.
Input Connector 3 1/8" 50 Ohm EIA (Flanged).
VSWR.....< 1.06:1 @ +/-200 KHz.⁽²⁾
Group DelayLess than 200 ns Overall Variation, Carrier @ +/- 150 KHz.
Insertion Loss (Measured):**

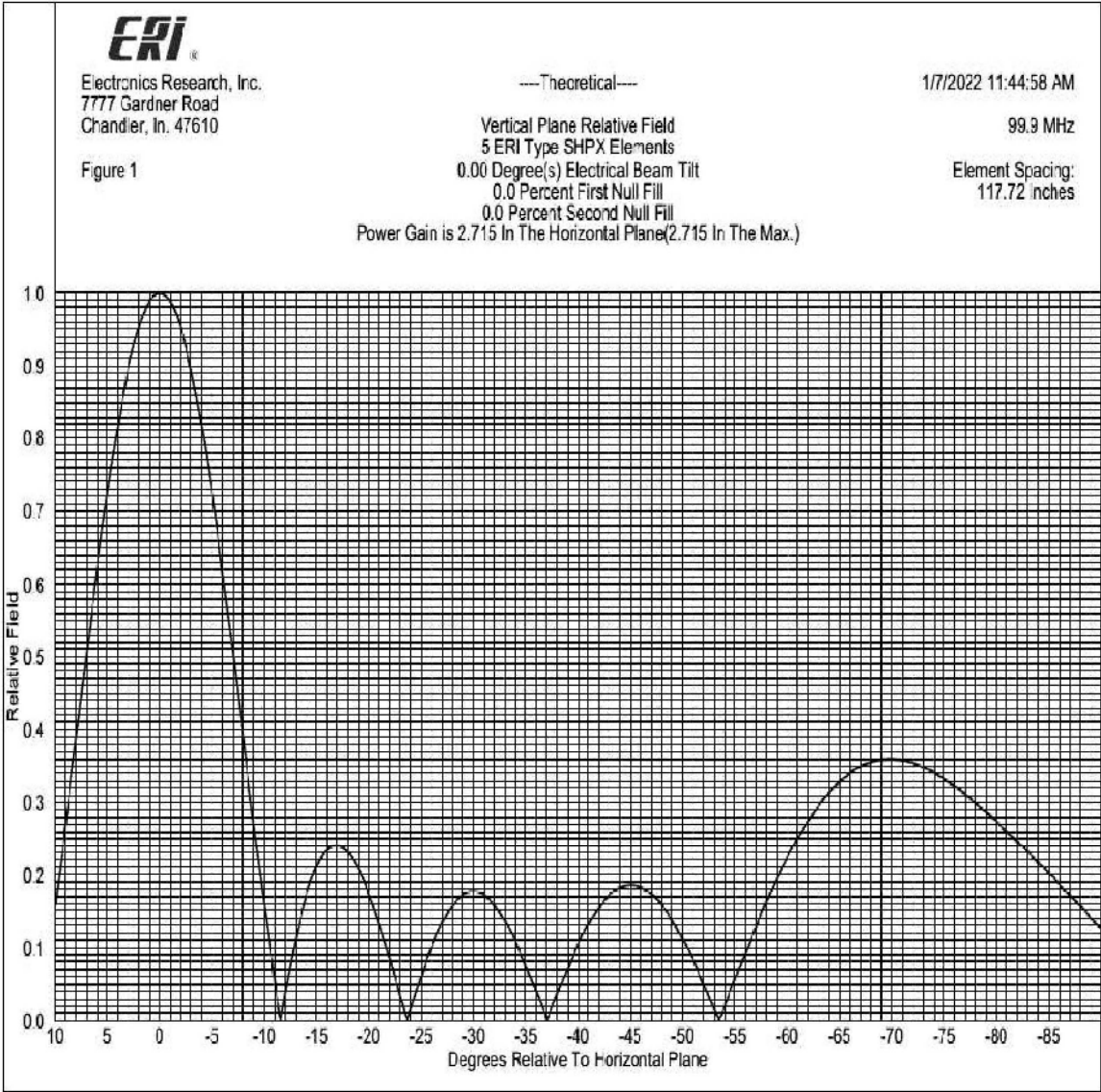
**99.9 MHz. - 0.244 dB
100.7 MHz. - 0.258 dB**

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

2) When Terminated in 50 Ohm Resistive Load.

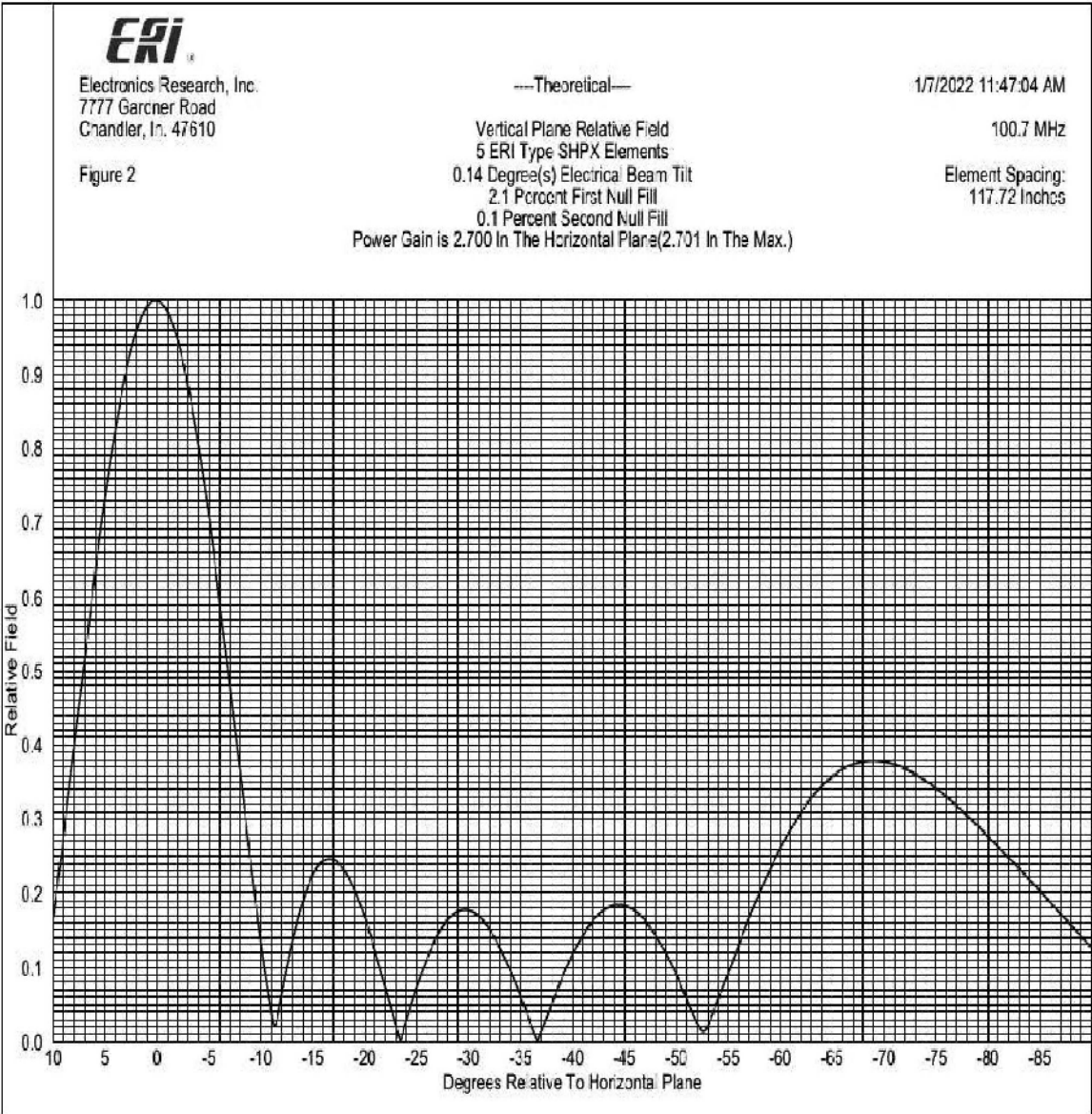


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Midwest Communications
FM Channel Combiner for WTHI-FM and WMGI (FM), both Terre Haute, Indiana

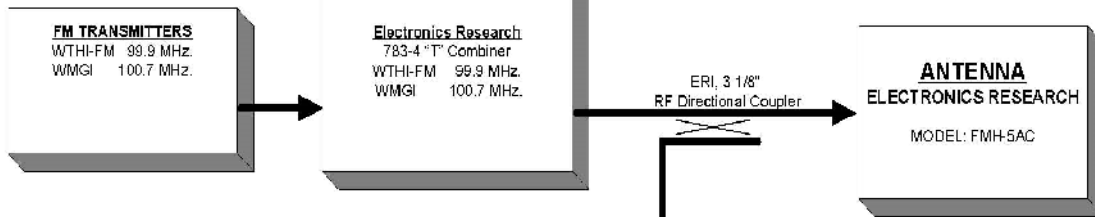




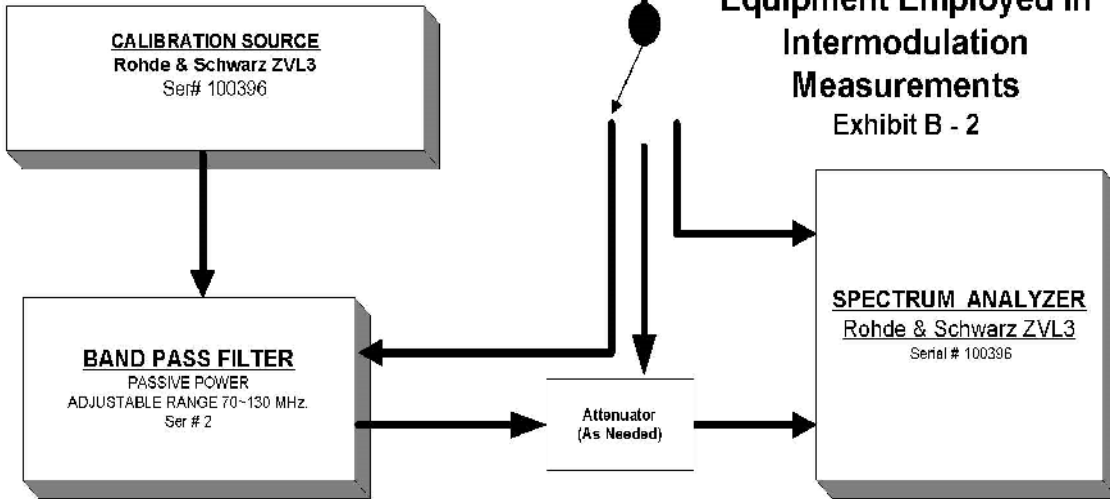
ERI Technical Proposal 20220110-233
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Broadcasting Scheme EXHIBIT - B1



Equipment Employed in Intermodulation Measurements Exhibit B - 2



Note *
All RF Connecting Cable Used In
Measurement Setup Is Double Shielded.

Broadcasting Scheme and Equipment Employed in
Intermodulation Measurements

EXHIBIT B