ELECTRONICS RESEARCH, INC.
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Report Of Intermodulation Product Findings

AMERICAN TOWER COMBINED BROADCAST FACILITY
MIAMI, FLORIDA

MAIN ANTENNA

WPYM	***93.1***
WLVE	***93.9***
WMGE	***94.9***
WPOW	***96.5***
WFLC	***97.3***
WHYI	***100.7***
WMXJ	***102.7***
WMIB	***103.5***
WHQT	***105.1***
WAMR	***107.5***

February 2005

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MIAMI, FLORIDA

Introduction : This report of findings is based on data collected at the WPYM, WLVE, WMGE, WPOW, WFLC, WHYI, WMXJ, WMIB, WHQT and WAMR American Tower master FM broadcast facility located in Miami, FL. The report includes measurements offered as proof that the combined operations of WPYM (93.1 MHz.), WLVE (93.9 MHz.), WMGE (94.9 MHz.), WPOW (96.5 MHz.), WFLC (97.3 MHz.), WHYI (100.7 MHz.), WMXJ (102.7 MHz.), WMIB (103.5 MHz.), WHQT (105.1 MHz.) and WAMR (107.5 MHz.) transmitters into the COG1084-8CP-DA main antenna 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).WEDR (99.1 MHz.) operates into a separate side mounted antenna located on the same tower. Their effect on the stations operating from the multiplexed system has been considered in this report. In brief, the collection of measurements presented in this report shows that all possible third order inter-modulation (IM) products generated by this multiplex system are less than the maximum allowable level as required by section 73.317 (b) through (d). Tom Silliman, Mark Steapleton and Jon Adams of Electronics Research, Inc. located in Chandler, Indiana performed the measurements summarized herein on February 20, 2005.

The following exhibits are provided:

Exhibit A:
- A-1 Drawing Depicting Antenna.
- A-2 COG1084-8CP-DA Antenna Specification Sheet.
- A-3 Drawing Depicting Multiplexing Scheme.
- A-4 Multiplexer Specification Sheet

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

Exhibit C: Description of the Electrical Operations of the Multiplexed Facility.
- 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. Exhibit C describes the technical description of the electrical operations of the multiplexed facility. 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 : At the time of my measurements ten (10) FM stations were operating from the combined antenna system. The WPYM, WLVE, WMGE, WPOW, WFLC, WHYI, WMXJ, WMIB, WHQT and WAMR multiplexed system is fundamentally comprised of antenna, feed lines and multiplexer units. The COG1084-8CP-DA antenna and multiplexer are products of Electronics Research, Inc, whereas the feed line is manufactured by Dielectric Inc. Refer to Exhibit B-1, for an illustration of the Broadcasting Scheme of these stations.

To accomplish the aggregation of ten (10) transmitter signals into a common antenna feed and provide transmitter-to-transmitter isolation, a multiplexing scheme consisting of 973-8 Constant Impedance Combiner modules is used. See attached Exhibit C-1 for the description of the electrical operations of the multiplexer and the antenna. The multiplexer, fully assembled, exhibited transmitter port-to-port isolation in excess of - 55 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. See attached Exhibit A-3 for an illustration of the combiner layout.

The IM Investigation : Directional Couplers were placed at key locations throughout the combiner to monitor and maintain the multiplexers performance. The couplers furnished were factory calibrated and capable of delivering accurate and repeatable RF measurements. To facilitate the taking of the measurements, the couplers located at the antenna output of both multiplexed systems were used. Care was taken in the selection of the measurement locations to insure that the measurements would be made far removed from transmitters and any filtering used to reduce broadcast emissions. It is noted within the Carrier Reference Table and IM Measurement Table which bank the Directional Coupler was located when making a special measurement. The couplers selected could normally be used for antenna reflection measurements and thus would provide greater than 35 dB directivity and a forward signal sample of -47 dB. Exhibit A-3 also shows the location of the couplers used.

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 a Celwave Model PD500-OS Adjustable Band Pass Filter (Serial # 22828) 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 Model 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 Signal Generator (Serial # 7512028) was used. An IFR Model 2399 Spectrum Analyzer (Serial # 02113071) 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-2 for an illustration of the measurement equipment.

Prior to recording measurements, all pertinent broadcasting equipment including Transmitters, Feed Lines and Antenna were adjusted to optimal performance. Also, it was confirmed before taking any measurements that all stations of concern were operating at their full licensed power level. From the equipment setup described above, the relative output signal level of each stations forward carrier was made from each directional coupler. 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 (dB :)	Scale Reading (dB)	**Adjusted Level (dB :)**	Directional Coupler Bank A or B	Notes
WPYM (93.1)	10	---	140	17.8	**132.2**	B	
WLVE (93.9)	10	---	140	18	**132.0**	A	
WMGE (94.9)	10	---	140	19	**131.0**	B	
WPOW (96.5)	10	---	140	17.8	**132.2**	A	
WFLC (97.3)	10	---	140	17.9	**132.1**	B	
WHYI (100.7)	10	---	140	18	**132.0**	B	
WMXJ (102.7)	10	---	140	17.8	**132.2**	A	
WMIB (103.5)	10	---	140	17.5	**132.5**	B	
WHQT (105.1)	10	---	140	17.4	**132.6**	A	
WAMR (107.5)	10	---	140	18.1	**131.9**	A	

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

	TRANSMITTER FREQUENCY									
Mix Freq.	**93.1**	**93.9**	**94.9**	**96.5**	**97.3**	**100.7**	**102.7**	**103.5**	**105.1**	**107.5**
93.1	---	94.7	96.7	99.9	101.5	108.3	112.3	113.9	117.1	121.9
93.9	92.3	---	95.9	99.1	100.7	107.5	111.5	113.1	116.3	121.1
94.9	91.3	92.9	---	98.1	99.7	106.5	110.5	112.1	115.3	120.1
96.5	89.7	91.3	93.3	---	98.1	104.9	108.9	110.5	113.7	118.5
97.3	88.9	90.5	92.5	95.7	---	104.1	108.1	109.7	112.9	117.7
100.7	85.5	87.1	89.1	92.3	93.9	---	104.7	106.3	109.5	114.3
102.7	83.5	85.1	87.1	90.3	91.9	98.7	---	104.3	107.5	112.3
103.5	82.7	84.3	86.3	89.5	91.1	97.9	101.9	---	106.7	111.5
105.1	81.1	82.7	84.7	87.9	89.5	96.3	100.3	101.9	---	109.9
107.5	78.7	80.3	82.3	85.5	87.1	93.9	97.9	99.5	102.7	—

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 for a layout of the measurement equipment.

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)	Directional Coupler Bank A or B	Notes*
78.7	**93.1**	**107.5**	**3**	**11.1**	**14.1**	**20**	**20**	**14.1**	**132.2**	**-118.1**	**B**	
80.3	93.9	107.5	3	10.9	13.9	20	20	13.9	132	-118.1	A	
81.1	**93.1**	**105.1**	**3**	**10.2**	**13.2**	**20**	**20**	**13.2**	**132.2**	**-119**	**B**	
82.3	94.9	107.5	3	10.3	13.3	20	20	13.3	131	-117.7	B	
82.7	**93.1**	**103.5**	**3**	**10.5**	**13.5**	**20**	**12.5**	**21**	**132.2**	**-111.2**	**B**	
82.7	**93.9**	**105.1**	**3**	**10.5**	**13.5**	**20**	**20**	**13.5**	**132**	**-118.5**	**A**	
83.5	93.1	102.7	3	10.4	13.4	20	15.2	18.2	132.2	-114	B	
84.3	**93.9**	**103.5**	**3**	**10.2**	**13.2**	**20**	**20**	**13.2**	**132**	**-118.8**	**A**	
84.7	94.9	105.1	3	10.1	13.1	20	20	13.1	131	-117.9	B	
85.1	**93.9**	**102.7**	**3**	**10.1**	**13.1**	**20**	**20**	**13.1**	**132**	**-118.9**	**A**	
85.5	93.1	100.7	3	10	13	20	13.8	19.2	132.2	-113	B	
85.5	96.5	107.5	3	10	13	20	20	13	132.2	-119.2	A	
86.3	**94.9**	**103.5**	**3**	**9.9**	**12.9**	**20**	**12.2**	**20.7**	**131**	**-110.3**	**B**	
87.1	93.1	99.1	3	9.8	12.8	20	18.9	13.9	132.2	-118.3	B	
87.1	97.3	107.5	3	9.8	12.8	20	18.9	13.9	132.1	-118.2	B	
87.1	93.9	100.7	3	9.8	12.8	20	20	12.8	132	-119.2	A	
87.1	94.9	102.7	3	9.8	12.8	20	18.9	13.9	131	-117.1	B	
87.9	**96.5**	**105.1**	**3**	**9.5**	**12.5**	**20**	**20**	**12.5**	**132.2**	**-119.7**	**A**	
88.7	93.9	99.1	3	9.2	12.2	20	18.5	13.7	132	-118.3	A	
88.9	**93.1**	**97.3**	**3**	**9.1**	**12.1**	**40**	**15**	**37.1**	**132.2**	**-95.1**	**B**	
89.1	94.9	100.7	13	9.2	22.2	20	3.5	38.7	131	-92.3	B	
89.5	**96.5**	**103.5**	**3**	**9.1**	**12.1**	**20**	**5.5**	**26.6**	**132.2**	**-105.6**	**A**	
89.5	**97.3**	**105.1**	**9**	**9.1**	**18.1**	**20**	**6.5**	**31.6**	**132.1**	**-100.5**	**B**	
89.7	93.1	96.5	6	9.1	15.1	40	4.8	50.3	132.2	-81.9	B	
90.3	**96.5**	**102.7**	**9**	**9**	**18**	**20**	**3.2**	**34.8**	**132.2**	**-97.4**	**A**	

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)	Directional Coupler Bank A or B	Notes*
90.5	93.9	97.3	9	9	18	20	3.4	34.6	132	-97.4	A	
90.7	**94.9**	**99.1**	**3**	**9.1**	**12.1**	**20**	**1.8**	**30.3**	**131**	**-100.7**	**B**	
91.1	97.3	103.5	9	9	18	40	13.1	44.9	132.1	-87.2	B	
91.3	**93.1**	**94.9**	**9**	**9**	**18**	**60**	**5.2**	**72.8**	**132.2**	**-59.4**	**B**	**1**
91.3	**93.9**	**96.5**	**9**	**9**	**18**	**40**	**1.3**	**56.7**	**132**	**-75.3**	**A**	**1**
91.9	97.3	102.7	9	8.9	17.9	20	6.3	31.6	132.1	-100.5	B	
92.3	**93.1**	**93.9**	**16**	**8.9**	**24.9**	**40**	**8.2**	**56.7**	**132.2**	**-75.5**	**B**	**2**
92.3	**96.5**	**100.7**	**16**	**8.9**	**24.9**	**40**	**16.2**	**48.7**	**132.2**	**-83.5**	**A**	**2**
92.5	94.9	97.3	13	8.9	21.9	20	1.9	40	131	-91	B	
92.9	**93.9**	**94.9**	**16**	**8.6**	**24.6**	**20**	**15.9**	**28.7**	**132**	**-103.3**	**A**	**3**
93.3	94.9	96.5	16	8.8	24.8	20	18.4	26.4	131	-104.6	B	3
93.9	**97.3**	**100.7**	**16**	**8.9**	**24.9**	**20**	**18.1**	**26.8**	**132.1**	**-105.3**	**B**	**4**
93.9	**96.5**	**99.1**	**16**	**8.9**	**24.9**	**20**	**19.4**	**25.5**	**132.2**	**-106.7**	**A**	**4**
93.9	**100.7**	**107.5**	**16**	**8.9**	**24.9**	**20**	**18.1**	**26.8**	**132**	**-105.2**	**B**	**4**
94.7	93.9	93.1	16	8.8	24.8	20	15.9	28.9	132	-103.1	A	5
95.5	**97.3**	**99.1**	**10**	**8.8**	**18.8**	**40**	**14.2**	**44.6**	**132.1**	**-87.5**	**B**	
95.7	96.5	97.3	10	8.5	18.5	20	4.2	34.3	132.2	-97.9	A	
95.9	**94.9**	**93.9**	**10**	**8.5**	**18.5**	**20**	**7.9**	**30.6**	**131**	**-100.4**	**B**	
96.3	100.7	105.1	16	8.5	24.5	20	19.7	24.8	132	-107.2	B	6
96.7	**94.9**	**93.1**	**16**	**8.5**	**24.5**	**20**	**3.6**	**40.9**	**131**	**-90.1**	**B**	**6**
97.9	100.7	103.5	19	8.5	27.5	40	18	49.5	132	-82.5	B	
97.9	102.7	107.5	13	8.5	21.5	20	2.5	39	132.2	-93.2	A	
98.1	**96.5**	**94.9**	**13**	**8.5**	**21.5**	**40**	**17.9**	**43.6**	**132.2**	**-88.6**	**A**	
98.1	**97.3**	**96.5**	**16**	**8.5**	**24.5**	**40**	**16.5**	**48**	**132.1**	**-84.1**	**B**	
98.7	100.7	102.7	16	8.4	24.4	20	6.5	37.9	132	-94.1	B	
99.1	**96.5**	**93.9**	**16**	**8.5**	**24.5**	**20**	**20**	**24.5**	**132.2**	**-107.7**	**A**	**7**
99.5	103.5	107.5	16	8.4	24.4	20	2.5	41.9	132.5	-90.6	B	
99.7	**97.3**	**94.9**	**10**	**8.5**	**18.5**	**20**	**8.9**	**29.6**	**132.1**	**-102.5**	**B**	
99.9	96.5	93.1	10	8.5	18.5	40	15.5	43	132.2	-89.2	A	
100.3	**102.7**	**105.1**	**16**	**8.5**	**24.5**	**20**	**5.2**	**39.3**	**132.2**	**-92.9**	**A**	
100.7	97.3	93.9	16	8.5	24.5	20	20	24.5	132.1	-107.6	B	8
101.5	**97.3**	**93.1**	**10**	**8.5**	**18.5**	**20**	**15.6**	**22.9**	**132.1**	**-109.2**	**B**	**9**
101.9	102.7	103.5	16	8.5	24.5	20	11.1	33.4	132.2	-98.8	A	

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)	Directional Coupler Bank A or B	Notes*
101.9	103.5	105.1	10	8.5	18.5	20	10.5	28	132.5	-104.5	B	
102.3	**100.7**	**99.1**	**10**	**8.5**	**18.5**	**20**	**9.4**	**29.1**	**132**	**-102.9**	**B**	
102.7	105.1	107.5	16	8.5	24.5	20	20	24.5	132.6	-108.1	A	10
104.1	**100.7**	**97.3**	**16**	**8.5**	**24.5**	**40**	**15.2**	**49.3**	**132**	**-82.7**	**B**	
104.3	103.5	102.7	10	8.5	18.5	20	4.5	34	132.5	-98.5	B	
104.7	**102.7**	**100.7**	**10**	**8.6**	**18.6**	**40**	**14.2**	**44.4**	**132.2**	**-87.8**	**A**	**11**
104.9	100.7	96.5	16	8.6	24.6	20	20	24.6	132	-107.4	B	11
106.3	**103.5**	**100.7**	**10**	**8.6**	**18.6**	**20**	**4.2**	**34.4**	**132.5**	**-98.1**	**B**	
106.3	**102.7**	**99.1**	**10**	**8.6**	**18.6**	**20**	**17.3**	**21.3**	**132.2**	**-110.9**	**A**	
106.5	100.7	94.9	10	8.6	18.6	20	11.8	26.8	132	-105.2	B	
106.7	**105.1**	**103.5**	**13**	**8.2**	**21.2**	**40**	**9.5**	**51.7**	**132.6**	**-80.9**	**A**	
107.5	105.1	102.7	16	8.7	24.7	20	17.4	27.3	132.6	-105.3	A	12
107.5	100.7	93.9	16	8.7	24.7	20	20	24.7	132	-107.3	B	12
107.9	**103.5**	**99.1**	**13**	**8.8**	**21.8**	**20**	**15.5**	**26.3**	**132.5**	**-106.2**	**B**	
108.1	102.7	97.3	10	8.1	18.1	40	8.9	49.2	132.2	-83	A	
108.3	**100.7**	**93.1**	**10**	**8.1**	**18.1**	**20**	**14.7**	**23.4**	**132**	**-108.6**	**B**	
108.9	102.7	96.5	10	8.2	18.2	20	19	19.2	132.2	-113	A	
109.5	**105.1**	**100.7**	**10**	**8.7**	**18.7**	**20**	**17**	**21.7**	**132.6**	**-110.9**	**A**	
109.7	103.5	97.3	10	8.8	18.8	20	20	18.8	132.5	-113.7	B	
109.9	**107.5**	**105.1**	**10**	**8.8**	**18.8**	**20**	**20**	**18.8**	**131.9**	**-113.1**	**A**	
110.5	102.7	94.9	10	8.8	18.8	20	20	18.8	132.2	-113.4	A	
110.5	103.5	96.5	10	8.8	18.8	20	19.2	19.6	132.5	-112.9	B	
111.1	**105.1**	**99.1**	**10**	**8.8**	**18.8**	**20**	**20**	**18.8**	**132.6**	**-113.8**	**A**	
111.5	102.7	93.9	10	8.8	18.8	20	20	18.8	132.2	-113.4	A	
111.5	107.5	103.5	10	8.8	18.8	20	20	18.8	131.9	-113.1	A	
112.1	**103.5**	**94.9**	**10**	**8.8**	**18.8**	**20**	**17.1**	**21.7**	**132.5**	**-110.8**	**B**	
112.3	107.5	102.7	10	8.8	18.8	20	20	18.8	131.9	-113.1	A	
112.3	102.7	93.1	10	8.8	18.8	20	20	18.8	132.2	-113.4	A	
112.9	**105.1**	**97.3**	**10**	**8.8**	**18.8**	**20**	**19.1**	**19.7**	**132.6**	**-112.9**	**A**	
113.1	103.5	93.9	10	8.8	18.8	20	20	18.8	132.5	-113.7	B	
113.7	**105.1**	**96.5**	**10**	**8.8**	**18.8**	**20**	**20**	**18.8**	**132.6**	**-113.8**	**A**	
113.9	103.5	93.1	10	8.8	18.8	20	13.1	25.7	132.5	-106.8	B	
114.3	**107.5**	**100.7**	**10**	**8.9**	**18.9**	**20**	**20**	**18.9**	**131.9**	**-113**	**A**	

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)	Directional Coupler Bank A or B	Notes*
115.3	105.1	94.9	10	8.8	18.8	20	20	18.8	132.6	-113.8	A	
115.9	**107.5**	**99.1**	**10**	**8.8**	**18.8**	**20**	**20**	**18.8**	**131.9**	**-113.1**	**A**	
116.3	105.1	93.9	10	8.8	18.8	20	20	18.8	132.6	-113.8	A	
117.1	**105.1**	**93.1**	**10**	**9**	**19**	**20**	**20**	**19**	**132.6**	**-113.6**	**A**	
117.7	107.5	97.3	10	9.1	19.1	20	20	19.1	131.9	**-112.8**	A	
118.5	**107.5**	**96.5**	**10**	**9**	**19**	**20**	**20**	**19**	**131.9**	**-112.9**	**A**	
120.1	107.5	94.9	10	8.5	18.5	20	20	18.5	131.9	**-113.4**	A	
121.1	**107.5**	**93.9**	**10**	**8.5**	**18.5**	**20**	**20**	**18.5**	**131.9**	**-113.4**	**A**	
121.9	107.5	93.1	10	8.5	18.5	20	20	18.5	131.9	**-113.4**	A	

NOTES:

1) Measured signal is a local carrier WLRN-FM operating at 91.3 MHz: No discernable signal was measured
2) Measured signal is a local carrier WCMQ operating at 92.3 MHz: No discernable signal was measured
3) System transmitter WPYM operating 93.1 MHz was turned off for this measurement.
4) System transmitter WLVE operating 93.9 MHz was turned off for this measurement.
5) System transmitter WMGE operating 94.9 MHz was turned off for this measurement.
6) System transmitter WPOW operating 96.5 MHz was turned off for this measurement.
7) Local transmitter WEDR operating 99.1 MHz was turned off for this measurement.
8) System transmitter WHYI operating 100.7 MHz was turned off for this measurement.
9) Local transmitter WLYF operating 101.5 MHz was turned off for this measurement.
10) System transmitter WMXJ operating102.7 MHz was turned off for this measurement.
11) System transmitter WHQT operating 105.1 MHz was turned off for this measurement.
12) System transmitter WAMR operating 107.5 MHz was turned off for this measurement.

The Spectrum Analyzer was used to check the close in spectral attenuation of each carrier to confirm the operation of these 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 on both couplers 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 of IM products and occupied bandwidth measurements with the test equipment shown in Exhibit B taken February 20, 2005 as summarized in this document, I, Thomas B. Silliman, find the subject multiplexed system- specifically the transmitters and combiner system for the operation of the WPYM, WLVE, WZTA, WPOW, WFLC, WHYI, WMXJ WMIB, WHQT and WAMR into the COG1084-8CP-DA 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 stations operating on the installed system. Also, based on this recorded data, I conclude that WPYM, WLVE, WZTA, WPOW, WFLC, WHYI, WMXJ, WMIB, WHQT and WAMR 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.

By Thomas B. Silliman
Thomas B. Silliman P.E. President

By Mark Steapleton
Mark Steapleton Field Technician

By Jon Adams
Jon Adams Field Technician

AFFIDAVIT

WARRICK COUNTY)
) SS:
STATE OF INDIANA)

THOMAS B. SILLIMAN, being duly sworn upon his oath deposes and says:

That his qualifications are a matter of record with the Federal Communications Commission;

That he is a registered professional engineer in Indiana, Maryland and Minnesota and is the President of Electronics Research, Inc.;

That this corporation has been retained by American Tower for the Inter Modulation Product Measurements for the American Tower Miami Multiplex FM Facility; and

That he has either prepared or directly observed the preparation of all technical information contained in this engineering statement and that the facts stated in this engineering statement are true of his knowledge except as such statements as are herein stated to be on information and belief and as to such statements he believes them to be true.

Thomas Silliman
Thomas B. Silliman

Subscribed and sworn to before me this 17th day of February, 2005.

Jacquelyn S. Kinney
Notary Public

My Commission Expires: July 5 2007
I Reside in Vanderburgh **County.**

JACQUELYN S. KINNEY
Printed Name

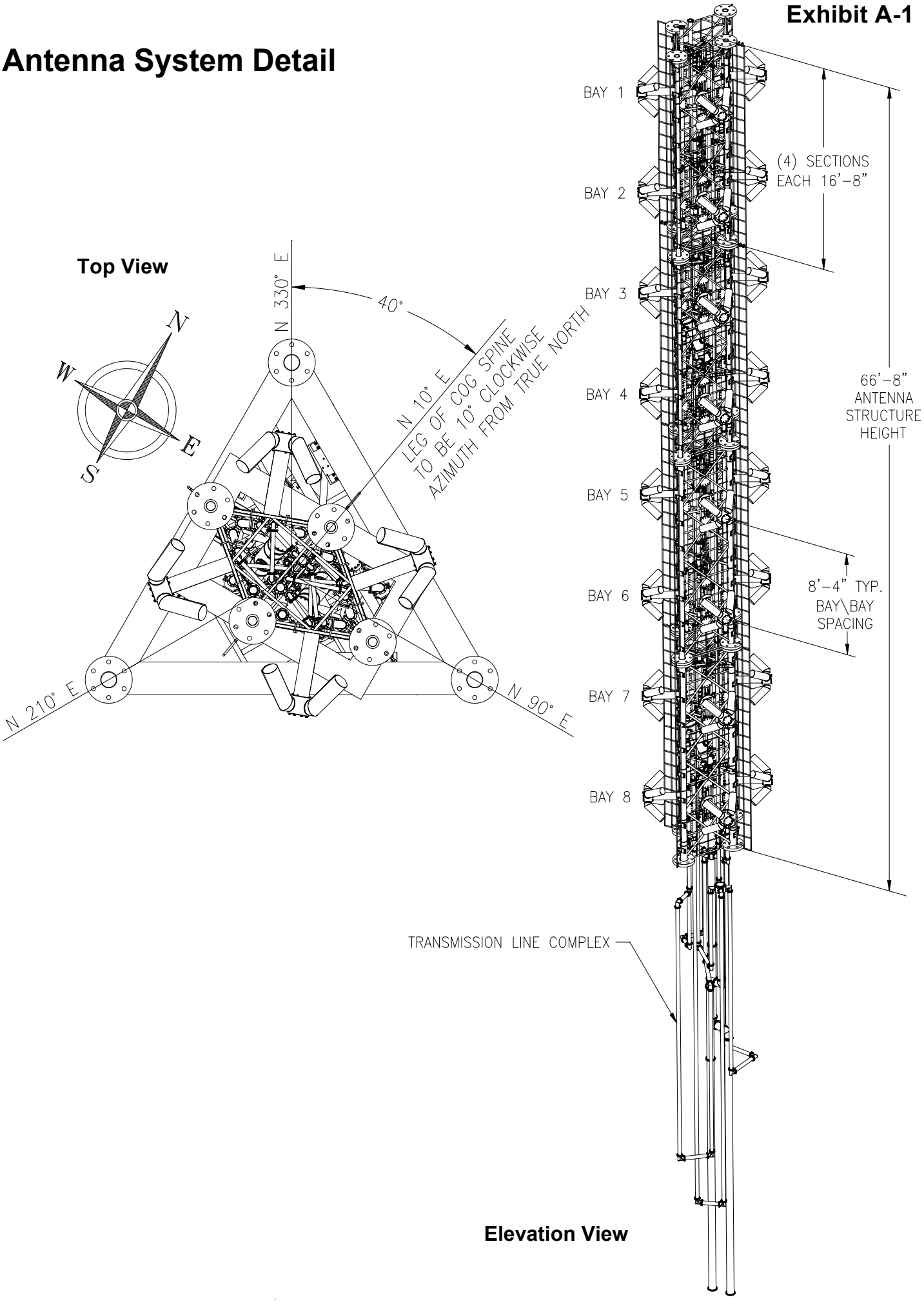
(Seal)

THOMAS BOUGHTON SILLIMAN II REGISTERED NO. 10106 STATE

Thomas Silliman
Feb 17, 2005

Exhibit A-1

Antenna System Detail



A-2 ERI Antenna Specification Sheet

Miami, Florida

General Specifications

Antenna Type . . . . . High Power FM-Broadcast, Suitable For Multiplexing
Model Number COG1084-8CP-DA
Number Of Bay Levels ..... Eight
Polarization..... Right, Left-Hand Circular

Frequency MHz.	Antenna ERP	Beam Tilt	1st Null Fill	2nd Null Fill	Power Gain	Accumulated Loss -dB(1)	Computed TPO / kW.
Group "A"							
107.5	95	-0.062°	10%	N/A	8.504	0.908	13.74
105.1	100				8.108	1.109	15.92
102.7	100				7.803	0.926	15.86
96.5	100				7.381	1.035	17.19
93.9	100				7.203	1.029	17.59
Group "B"							
103.5	100	-0.062°	10%	N/A	8.548	0.915	14.40
100.7	100				8.011	0.908	15.38
97.3	100				7.845	1.017	16.11
94.9	100				7.300	1.037	17.39
93.1	100				7.256	1.034	17.48

Mechanical Specifications

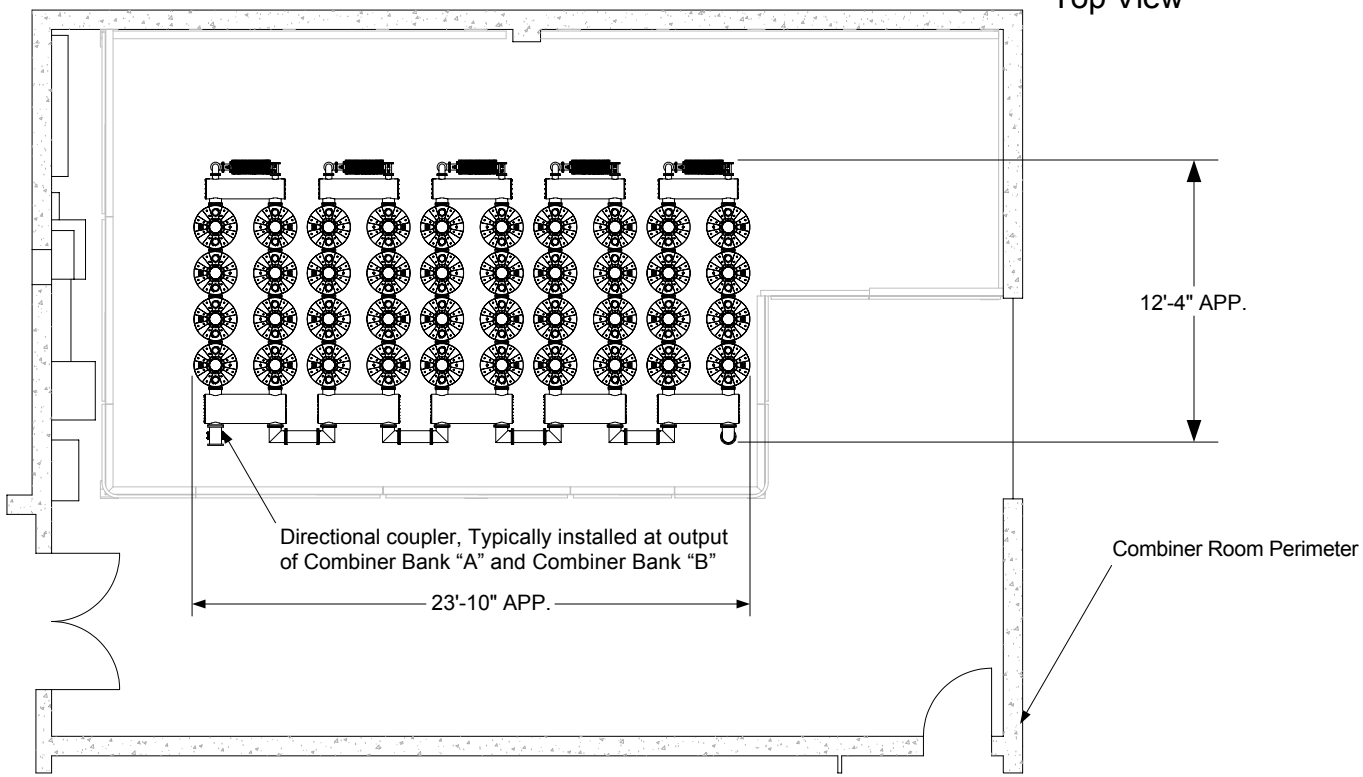
Antenna Feed System..... Fed With Dual Lines
Input Connector..... 6 1/8" 50-Ohm EIA Flanged
Element Deicing .....None Applicable
Array Length..... 66'-8"
Construction Material (Antenna)..... All Non-corrosive
Construction Material (Mounting) .....All Stainless Steel

1) Accumulated losses (combiner loss, transmitter to combiner transmission run, antenna transmission run and R/H & L/H coupling loss).

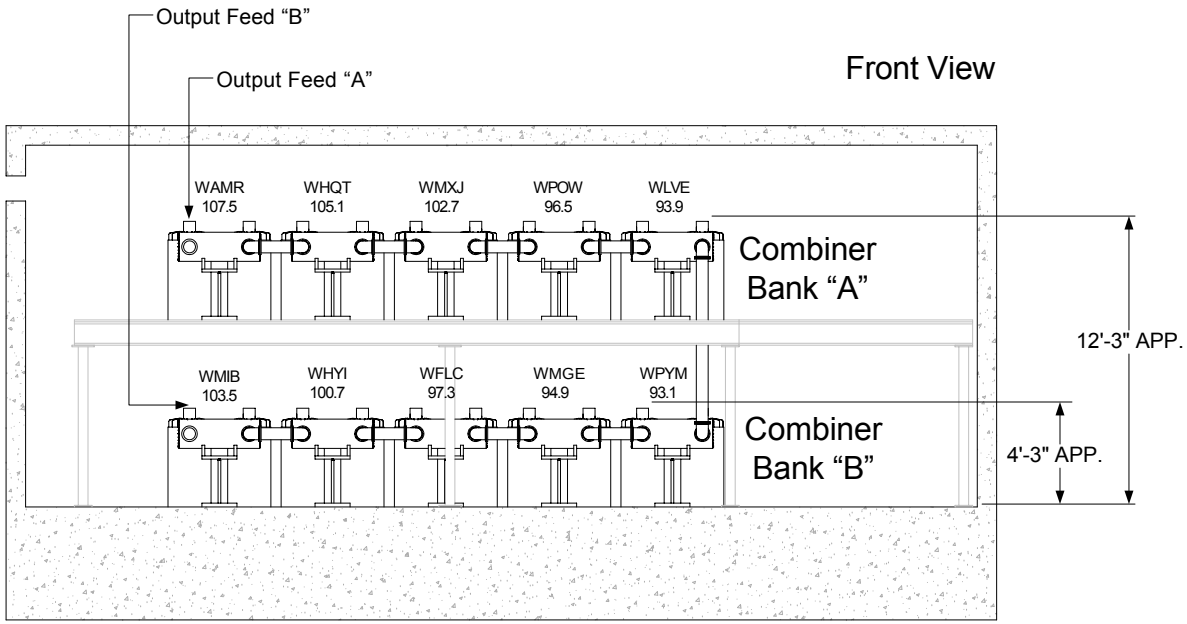
Multiplexer Detail

Note: Adjoining transmission line configurations have been omitted for clarity of detail

Top View



Front View



Side View

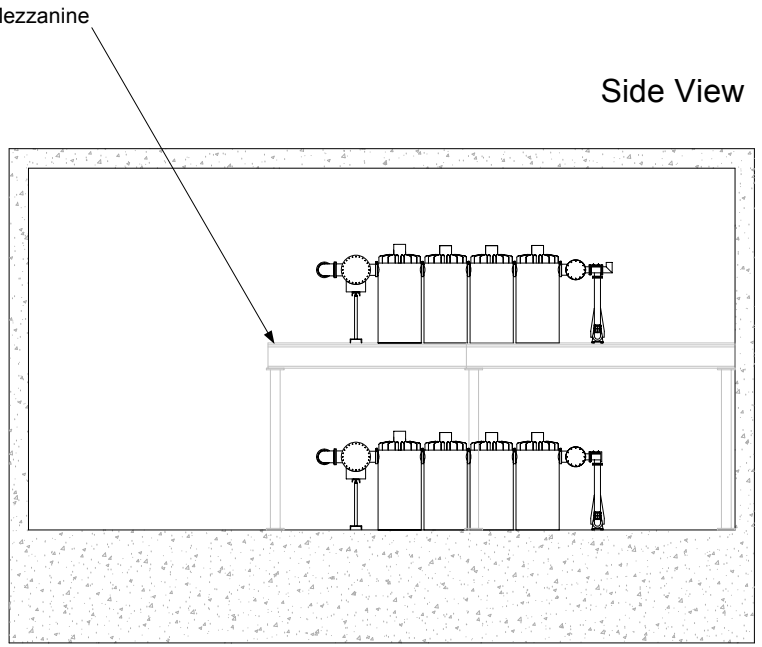


Exhibit A-3

A-2 ERI Combiner Specification Sheet

Miami, Florida

General Specifications:

Multiplexer Model # MA970F8-000-036
Combiner Type .....973-8 Constant Impedance Combiner with Non Adjacent Coupling
Number of Combining Units..... Ten arranged into groups of Five
Injected Port to Injected Port Isolation .....- 55 dB
Output Connector..... 6 1/8 " 50 Ohm EIA (Flanged)
Output Power (Designed) .....120 kW (1)
Typical Combiner Unit, Size and Weight.....146" x 53" x 50" (LxWxH), 1900 lbs.
Heat Removal..... Natural Convection
Physical Arrangement..... All Components Free Standing

Injected Port Specifications:

Frequency Assignment ..... See Exhibit A-3
Power Rating, Each Injected Port (Designed).....25 kW
Input Connector .....3-1/8" 50 Ohm EIA (Flanged)
VSWR .....Less than 1.07:1 @ +/-200 KHz(2)
Group Delay .....Less than 60 ns Overall Variation, Carrier @ +/- 150 KHz

Insertion Loss (Measured) 1

Group "A"		Group "B"	
Frequency MHz.	Loss (-dB)	Frequency MHz.	Loss (-dB)
107.5	0.231	103.5	0.226
105.1	0.403	100.7	0.251
102.7	0.271	97.3	0.250
96.5	0.281	94.9	0.290
93.9	0.310	93.1	0.317

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

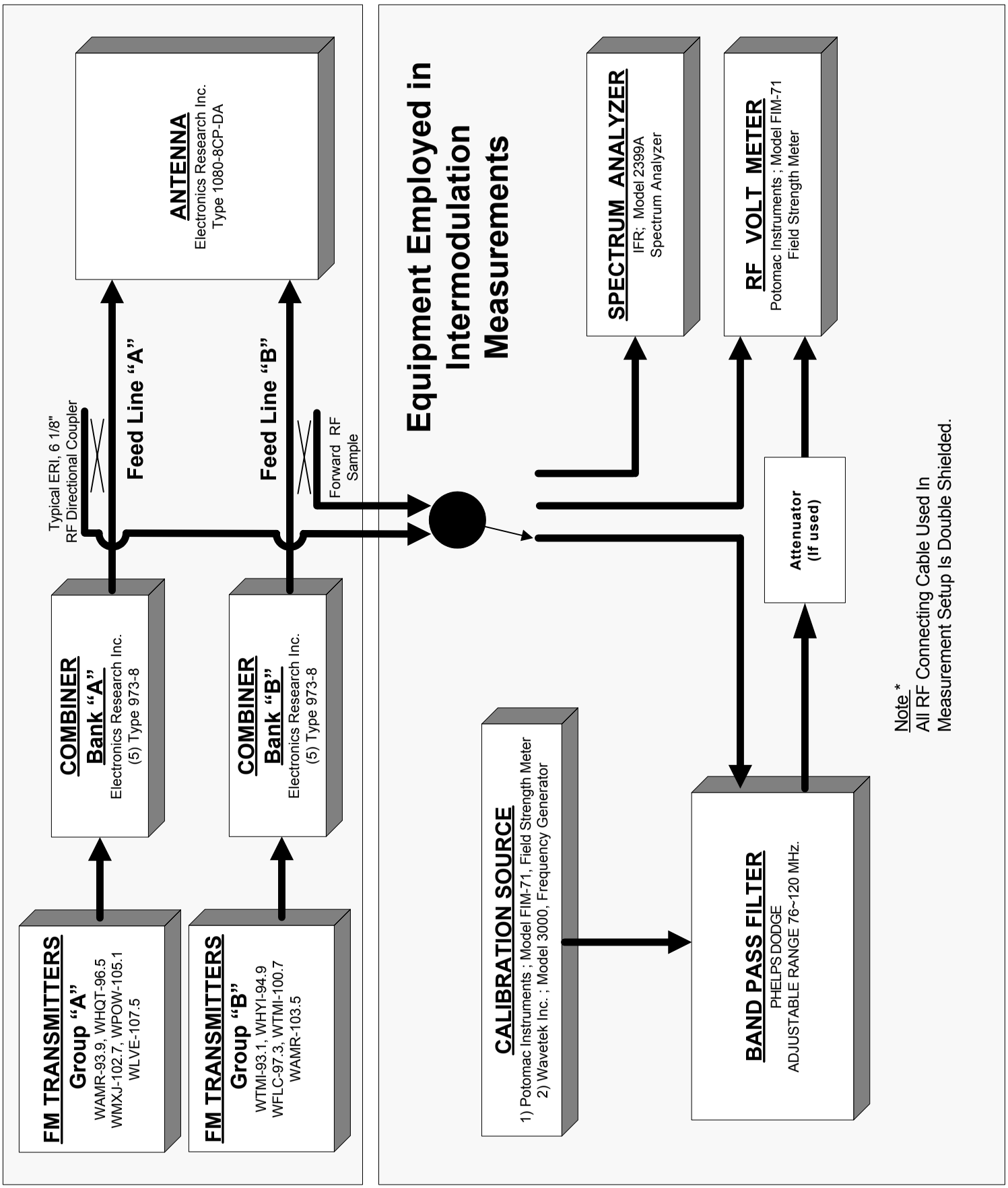


EXHIBIT C

ELECTRONICS RESEARCH, INC.

7777 Gardner Road, Chandler, Indiana 47610, (812) 925-6000, Fax (812) 925-4030

Exhibit C

Description of the electrical operation of the Multiplex Facility

The master FM antenna system supplied for the Miami facility was designed and manufactured by Electronics Research, Inc. located in Chandler, Indiana. The FM antenna has separate inputs for slant right polarization and slant left polarization and has a ninety degree hybrid coaxial splitter to combine these antenna inputs on the tower at the base of the antenna. This input hybrid has two input ports with one input port providing right hand circularization and the other input port providing left hand circular polarization.

The antenna is fed with two six and one eighth rigid coaxial feed lines, and these rigid coaxial feed lines do not require phasing. The two feed lines are attached to the output of two constant impedance FM multiplex combiner chains with alternate analog frequencies distributed between the two feed lines to add additional isolation between adjacent frequencies on the system.

The digital IBOC carriers are added to the system by back feeding each bank of combiner modules, and this is accomplished by replacing the normally used dump load on each constant impedance combiner for analog input with a circulator so that the analog signal goes toward the antenna output port of the combiner and the digital signal goes toward the normal dump load at the bottom of the analog filter chain. In order to make this system work, the normal dump loads at the bottom of the analog filter chains have been removed, and these two ports have been connected together. In this way, each stations analog carrier is separated or isolated from its digital carrier by polarization.

For example, consider station A with a right hand circularly polarized analog FM radiated signal. With this facility, station A's analog goes into the right hand circularly polarized feed line to the antenna, and station A's digital output goes into the left hand circularly polarized feed to the antenna.

In summary, this facility has been designed as a dual input antenna, and the inputs are isolated with polarization of the radiated signal. The combiner utilizes a unique method of additionally isolating the individual stations analog and digital transmitter output signals as described above.