

**ENGINEERING REPORT
FM SPECTRUM ANALYSIS**

**WIBM-AM – JACKSON, MI
W268CA – JACKSON, MI
W270CJ – JACKSON, MI**

April 2014

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MUNN-REESE, INC.
Broadcast Engineering Consultants
Coldwater, MI 49036

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CERTIFICATION OF ENGINEERS

The firm of Munn-Reese, Inc., Broadcast Engineering Consultants, with offices at 385 Airport Drive, Coldwater, Michigan, has been retained for the purpose of preparing the technical data forming this report.

The data utilized in this report is based on field measurements or observations made by the undersigned, or others under the supervision of the undersigned, on the dates and times indicated in the report.

The report has been prepared by properly trained electronics specialists under the direction of the undersigned whose qualifications are a matter of record before the Federal Communications Commission.

I declare under penalty of perjury that the contents of this report are true and accurate to the best of my knowledge and belief.

April 25, 2014

Munn-Reese, Inc.

By 
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COMPLIANCE WITH §73.317

W268CA W270CJ WIBM-AM

This firm was retained by Jackson Radio Works, Jackson, MI, to perform the required measurements to show compliance with the provisions of §73.317 of the Rules governing FM Translator Stations. Jackson Radio Works has di-plexed W268CA, 101.5 Mhz, ERP 250 watts and W270CJ, 101.9 Mhz, ERP 250 watts into a common antenna located on the WIBM-AM broadcast tower.

These measurements were made to confirm proper operation of the two station combiner and FM broadcast antenna. As well the possible mixing products with WIBM-AM were included and measured.

Measurements were taken off air to show compliance with §73.317 of the rules. The occupied spectrum measurements were made using a properly calibrated and operated spectrum analyzer. That plotted data is found at the end of this report. Inter-modulation products were calculated using a computer program to list all possible mixing products that may have developed with the di-plexed operation. The computer generated print out of possible mixing products was then used to set the FM field meter frequency dial before the individual measurements were recorded.

The Inter-modulation products were measured using a Potomac Instruments Model FIM-71 Field Strength Meter. The measurements were made April 17, 2014. The measurements were taken in an unobstructed location within 1 km of the

transmitting antenna. The meter was setup and calibrated in accordance with the manufacturer's instructions, and the readings taken on the fundamental carrier frequencies and on suggested inter-modulation frequencies. The readings were logged. The appropriate antenna factor was determined from the chart in the manual for the meter, and the reading on each frequency was then noted and logged. That logged data was then used to construct Table 1 of this report.

Equipment employed:

Anritsu MS2721A Spectrum Master, Serial No. 1002033 Technical specifications of the Anritsu MS2721A are available on the Internet at www.anritsu.com.

Potomac Instruments FIM-41, Field Meter, Serial No. 1149. Technical specifications of the FIM-41 field intensity meter are available at www.pi-usa.com .

Potomac Instruments FIM-71, Field Meter, Serial No. 533. Technical specifications of the FIM-71 field intensity meter are available at www.pi-usa.com .

Based on these spectrum measurements and the data logged in Table 1 the operation of W268CA and W270CJ are well within the rules set forth in §73.317 of the Rules governing FM Translator Stations.

TABLE 1

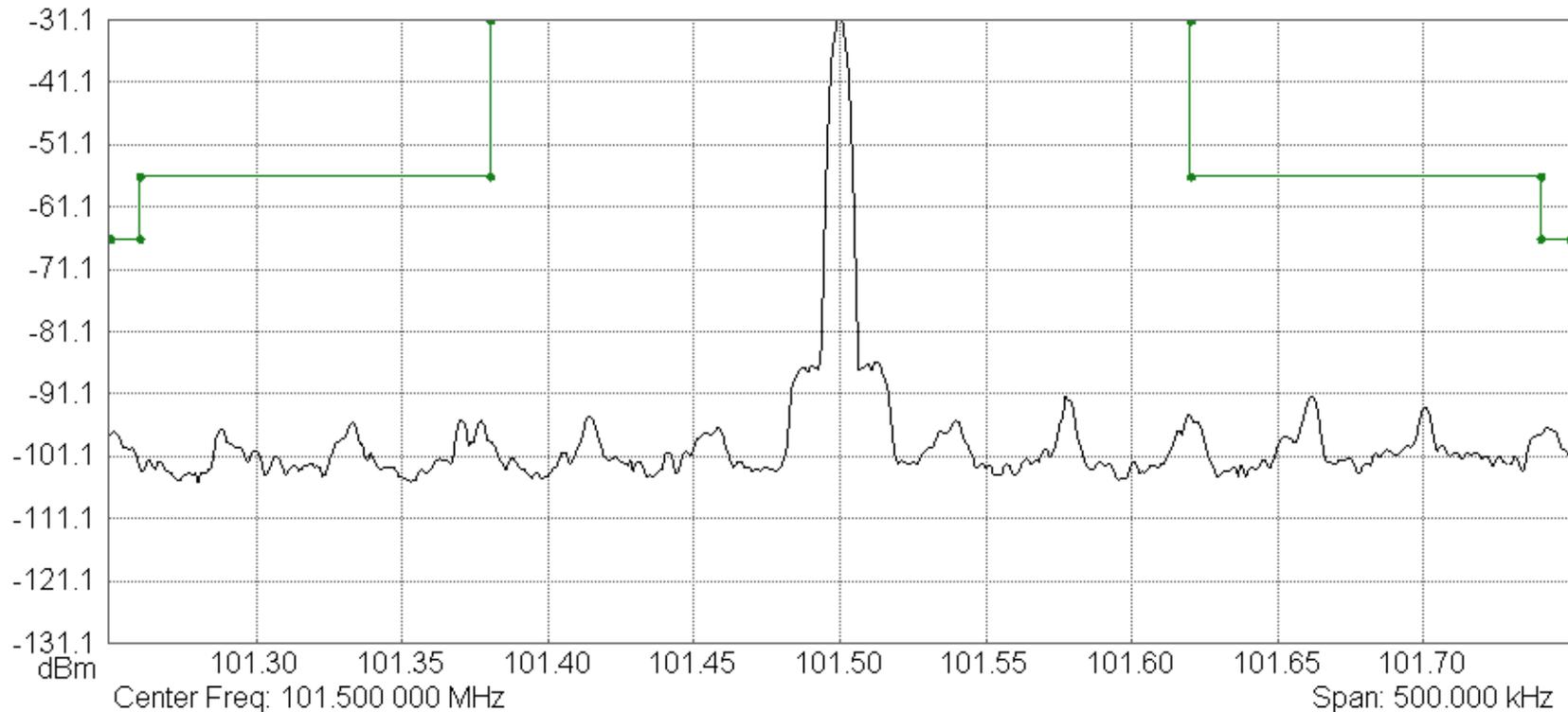
Tabulation of Intermod Frequencies and Fields

Call Sign		Frequency	Fundamental Field	Power	Required Attenuation	
<u>WIBM-AM</u>	A	1450 Mhz	2480 mV/m	810 w	72.08 dB.	
<u>W270CJ</u>	B	101.9 Mhz	185 mV/m	250 W	66.98 dB.	
<u>W268CA</u>	C	101.5 Khz	185 mV/m	250 W	66.98 dB.	
Relationshi	IM	Frequency	Mix Field	Attenuation	Reference Frequency	Flag
2A		2.90 Mhz	7.00 uV/m	88.44 dB.	A	Passed
2B		203.80 MHZ	4.00 uV/m	93.30 dB.	B	Passed
2C		203.00 MHZ	4.20 uV/m	92.88 dB.	C	Passed
A + B		103.35 MHZ	1.20 uV/m	103.76 dB.	B	Passed
A + C		102.95 MHZ	1.10 uV/m	104.52 dB.	B	Passed
B + C		203.40 MHZ	7.45 uV/m	87.90 dB.	c	Passed
2A + B		104.80 MHZ	1.10 uV/m	104.52 dB.	A	Passed
2A - B		99.00 MHZ	1.20 uV/m	103.76 dB.	A	Passed
2B + A		205.25 MHZ	1.10 uV/m	104.52 dB.	B	Passed
2B - A		202.35 MHZ	1.00 uV/m	105.34 dB.	B	Passed
2C + A		204.45 MHZ	1.30 uV/m	103.06 dB.	C	Passed
2C - A		201.55 MHZ	1.10 uV/m	104.52 dB.	C	Passed
3A		4.35 MHZ	1.10 uV/m	104.52 dB.	A	Passed
3B		305.70 MHZ	1.10 uV/m	104.52 dB.	B	Passed
3C		304.50 MHZ	1.60 uV/m	101.26 dB.	C	Passed

Spectrum Analyzer Data

W268CA-FIG-A (4/17/2014 4:18:13 PM)

Spectrum Analyzer

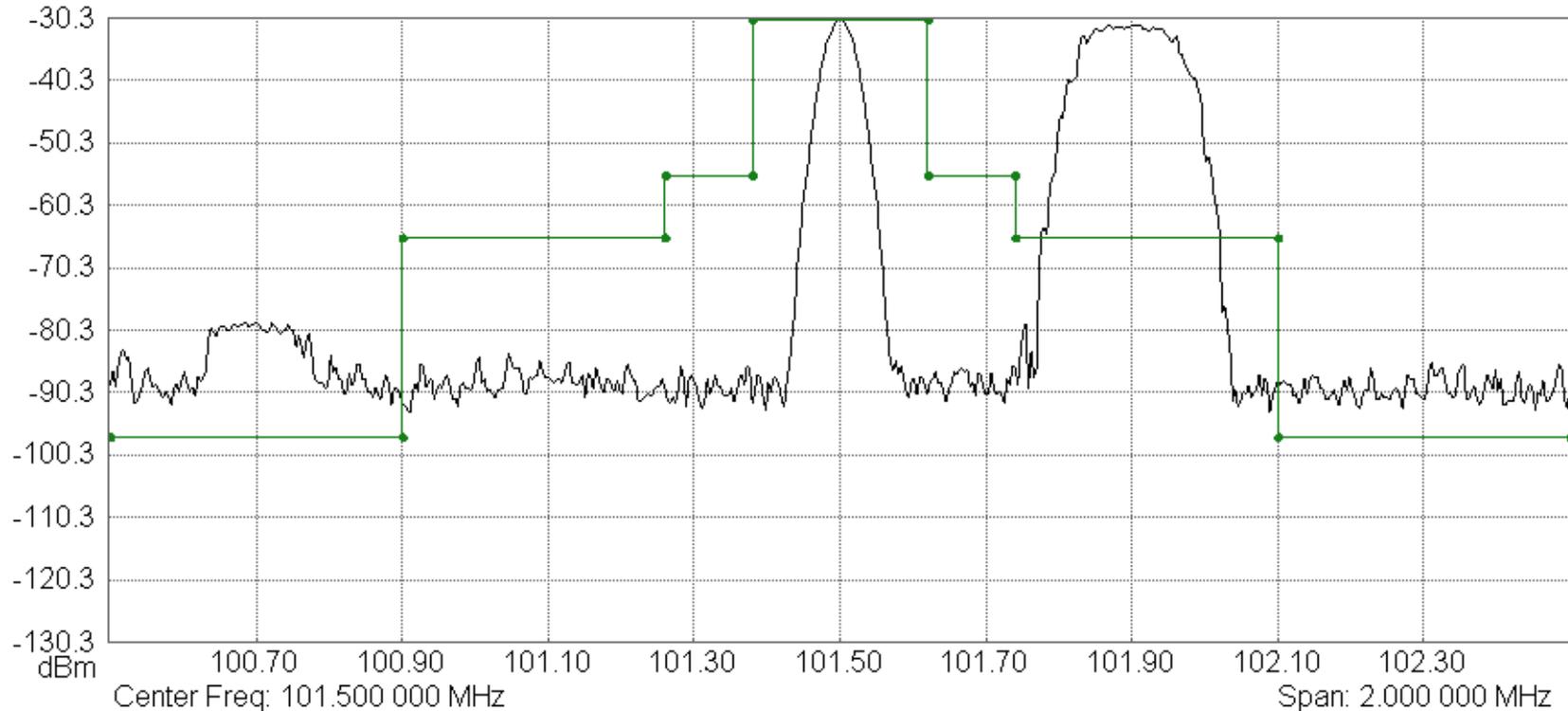


Trace A data:	Detection = Peak	Base Ver. = V4.32
Trace Mode = Max Hold	Center Frequency = 101.500 000 MHz	App Ver. = V5.69
Preamplifier = OFF	Start Frequency = 101.250 000 MHz	Model = MS2721B
Min Sweep Time = 0.001 S	Stop Frequency = 101.750 000 MHz	Options = 9, 20, 31
Reference Level Offset = 0 dB	Frequency Span = 500.000 000 kHz	Date = 4/17/2014 4:18:13 PM
Input Attenuation = 0.0 dB	Reference Level = -31.100 dBm	Device Name =
RBW = 3.0 kHz	Scale = 10.0 dB/div	
VBW = 1.0 kHz	Serial Number = 1002033	

Spectrum Analyzer Data

W268CA-FIG-B (4/17/2014 4:14:08 PM)

Spectrum Analyzer



Trace A data:
 Trace Mode = Max Hold
 Preamp = OFF
 Min Sweep Time = 0.001 S
 Reference Level Offset = 0 dB
 Input Attenuation = 0.0 dB
 RBW = 30.0 kHz
 VBW = 10.0 kHz

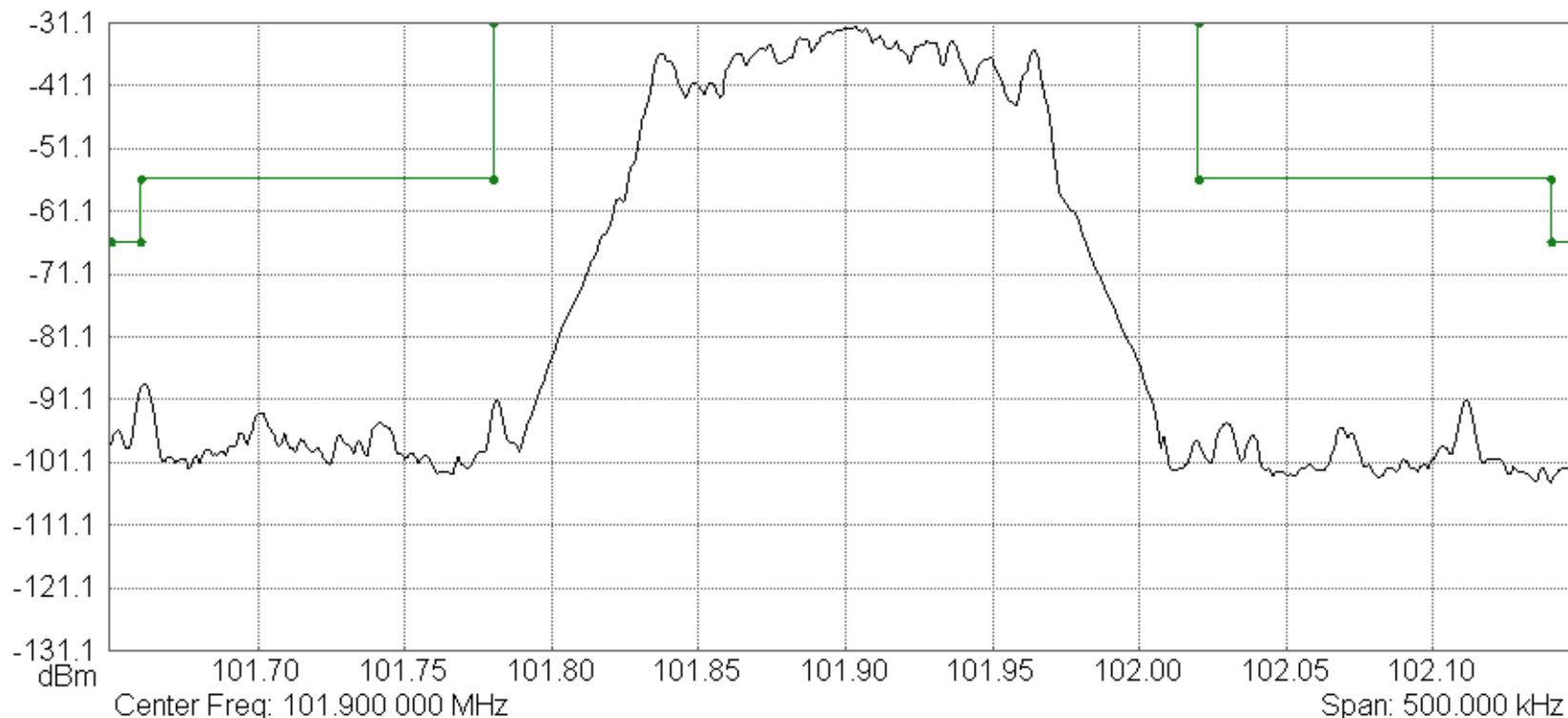
Detection = Peak
 Center Frequency = 101.500 000 MHz
 Start Frequency = 100.500 000 MHz
 Stop Frequency = 102.500 000 MHz
 Frequency Span = 2.000 000 MHz
 Reference Level = -30.300 dBm
 Scale = 10.0 dB/div
 Serial Number = 1002033

Base Ver. = V4.32
 App Ver. = V5.69
 Model = MS2721B
 Options = 9, 20, 31
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 Device Name =

Spectrum Analyzer Data

W270CJ-FIG-A (4/17/2014 4:20:21 PM)

Spectrum Analyzer



Trace A data:
Trace Mode = Max Hold
Preamp = OFF
Min Sweep Time = 0.001 S
Reference Level Offset = 0 dB
Input Attenuation = 0.0 dB
RBW = 3.0 kHz
VBW = 1.0 kHz

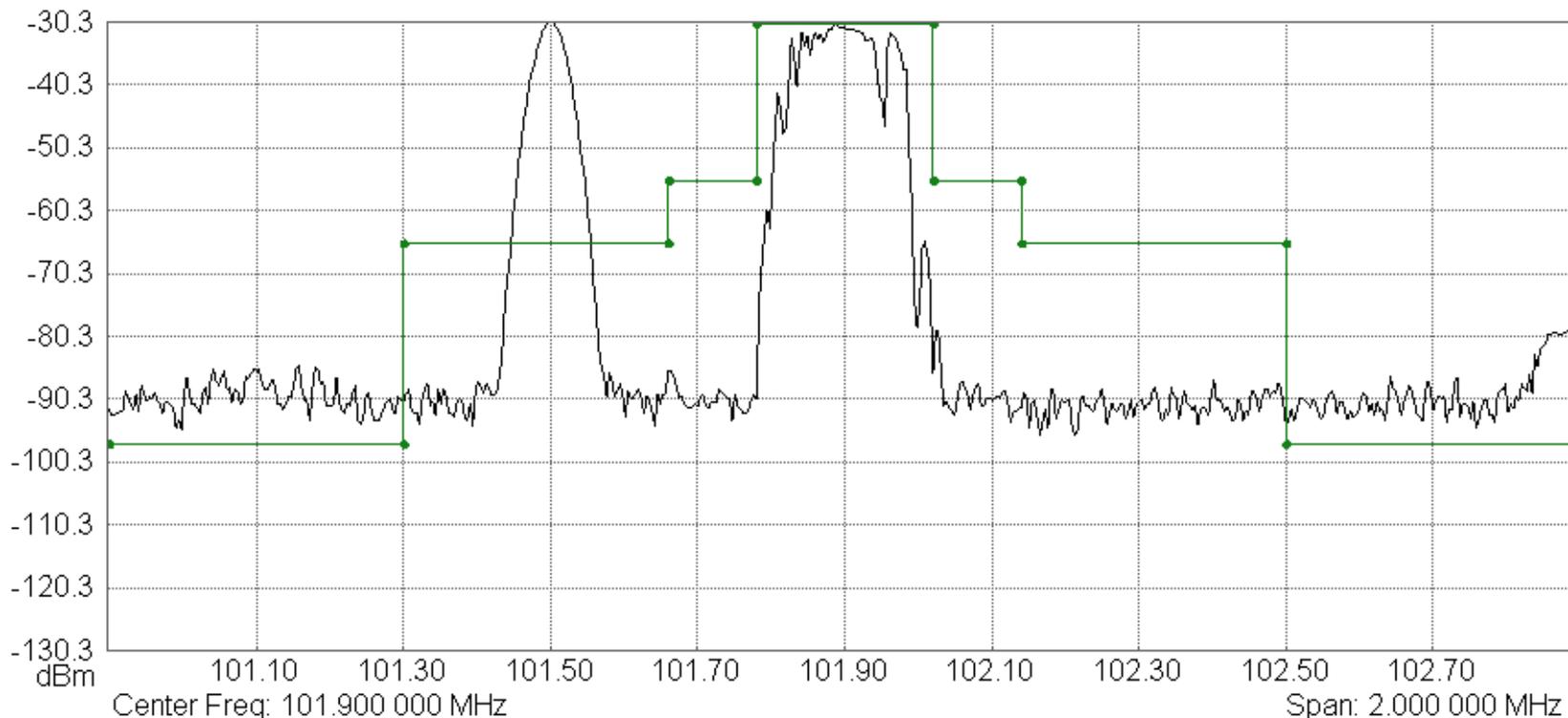
Detection = Peak
Center Frequency = 101.900 000 MHz
Start Frequency = 101.650 000 MHz
Stop Frequency = 102.150 000 MHz
Frequency Span = 500.000 000 kHz
Reference Level = -31.100 dBm
Scale = 10.0 dB/div
Serial Number = 1002033

Base Ver. = V4.32
App Ver. = V5.69
Model = MS2721B
Options = 9, 20, 31
Date = 4/17/2014 4:20:21 PM
Device Name =

Spectrum Analyzer Data

W270CJ-FIG-B (4/17/2014 4:15:37 PM)

Spectrum Analyzer



Trace A data:
 Trace Mode = Max Hold
 Preamp = OFF
 Min Sweep Time = 0.001 S
 Reference Level Offset = 0 dB
 Input Attenuation = 0.0 dB
 RBW = 30.0 kHz
 VBW = 10.0 kHz

Detection = Peak
 Center Frequency = 101.900 000 MHz
 Start Frequency = 100.900 000 MHz
 Stop Frequency = 102.900 000 MHz
 Frequency Span = 2.000 000 MHz
 Reference Level = -30.300 dBm
 Scale = 10.0 dB/div
 Serial Number = 1002033

Base Ver. = V4.32
 App Ver. = V5.69
 Model = MS2721B
 Options = 9, 20, 31
 Date = 4/17/2014 4:15:37 PM
 Device Name =