

ENGINEERING REPORT

Spurious Emissions Measurement Study Pursuant to 47 C.F.R. §73.317(b)

associated with the licensing of

W245CA.C (Fac ID: 157030)

Fort Wayne, IN

BMPFT-20140530ARB

&

W277AK.C (Fac ID: 83637)

Fort Wayne, IN

BPFT-20140515AFM

April, 2014

COPYRIGHT 2014

RF Signal Spurious Emissions Study for the Combined Master Antenna of W245CA.C – Fort Wayne, IN & W277AK.C – Fort Wayne, IN

This firm has been retained to prepare the required engineering report in support of this Spurious Emissions Measurement Study for the di-plexed operation of FM Translators W245CA.C – Fort Wayne, IN and W277AK.C – Fort Wayne, IN onto tower Antenna Structure Registration Tower Number 1028214. This study has been conducted pursuant to 47 C.F.R. §73.317(b) and is associated with, and a condition of licensing for W245CA.C Construction Permit BMPFT-20140530ARB and by default, W277AK.C Construction Permit BPFT-20140515AFM.

W245CA.C operates on 96.9 MHz with a maximum effective radiated power (ERP) of 0.250 kW (H&V) circular (H&V) polarization. W277AK.C operates on 103.3 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular (H&V) polarization. As stated before, the common antenna is mounted on tower bearing ASR #1028214. The common FM antenna is a one (1) bay Nicom BKG/77-1, "Crossed V" antenna mounted with a Center of Radiation 96 meters above ground level (AGL). The antenna is matched with a BEXT Model FDCSDC2 Combiner. The diplexer was set using information from the FCC database concerning the W245CA.C and W277AK.C operating parameters; and manufacturer specifications.

RF signal purity measurements were conducted on August 14, 2014 during the equipment test operations associated with W245CA.C Construction Permit BMPFT-20140530ARB and W277AK.C Construction Permit BPFT-20140515AFM. Measurements were conducted by Mr. Greg Case, an contract engineer in the employ of Adams Radio of Fort Wayne, LLC. Mr. Case conducted his measurements utilizing an Anritsu MS2721A Spectrum Master spectrum analyzer, serial number 514100 with the FM transmitters in full operation employing the BEXT diplexer for the dual FM translator operations. A broad spectral sweep found no obvious products above the analyzer noise floor. Using a computer generated mixing product chart, high resolution, low noise floor measurements were also made out to the 1st, 2nd and 3rd order. With the exception of noted carrier frequencies, nothing was observed over the noise floor of the analyzer as reported in the **Exhibit A** attachment.

Attached as **Exhibit A** is a copy of the 1st, 2nd and 3rd order potential mixing product measurement results for the spurious relationships associated with the 96.9 MHz and 103.3 MHz diplexed operations. As a result of these studies, it has been concluded the proposed di-plexed operation of W245CA.C and W277AK.C, meets or exceeds the requirements of 47 C.F.R. §73.317(b) and the special condition of licensing associated with W245CA.C Construction Permit BMPFT-20140530ARB and W277AK.C Construction Permit BPFT-20140515AFM.

CERTIFICATION OF ENGINEER

The data utilized in this report was taken from the FCC Secondary Database and data on file. While this information is believed accurate, errors or omissions in the database and file data are possible. This firm may not be held liable for damages as a result of such data errors or omissions.

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 the laws of perjury that the contents of this report are true and accurate to the best of my knowledge and belief.

August 15, 2014

By 
Justin W. Asher, Staff Engineer
MUNN-REESE, INC.
Broadcast Engineering Consultants
COLDWATER, MI 49036-0220
517-278-7339 (x107)

Exhibit A - Tabulation of Potential Mixing Products W245CA.C (96.9 MHz) & W277AK.C (103.3 MHz)

Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)
6.4 MHz	-109 dBc	303.5 MHz	-89 dBc	650.0 MHz	-109 dBc
8.0 MHz	-109 dBc	309.9 MHz	-101 dBc	652.0 MHz	-109 dBc
12.0 MHz	-109 dBc	387.6 MHz	-109 dBc	654.0 MHz	-109 dBc
12.8 MHz	-92 dBc	400.4 MHz	-101 dBc	656.0 MHz	Colocated but not diplexed WFWC(DTV) Carrier
90.5 MHz	-80 dBc	413.2 MHz	-109 dBc	658.0 MHz	Colocated but not diplexed WFWC(DTV) Carrier
96.9 MHz	W245CA Carrier	552.7 MHz	-109 dBc	660.0 MHz	Colocated but not diplexed WFWC(DTV) Carrier
103.3 MHz	W277AK Carrier	554.7 MHz	-109 dBc	662.0 MHz	Colocated but not diplexed WFWC(DTV) Carrier
109.7 MHz	-80 dBc	556.7 MHz	-109 dBc	664.0 MHz	-109 dBc
193.8 MHz	-82 dBc	558.7 MHz	-109 dBc	666.0 MHz	-109 dBc
200.2 MHz	-80 dBc	559.1 MHz	-109 dBc	668.0 MHz	-109 dBc
206.6 MHz	-83 dBc	561.1 MHz	-109 dBc	752.9 MHz	-109 dBc
290.7 MHz	-94 dBc	563.1 MHz	-109 dBc	754.9 MHz	-109 dBc
297.1 MHz	-84 dBc	565.1 MHz	-109 dBc	756.9 MHz	-109 dBc
*No intermodulation mixing was noted on any carrier frequencies.					

Title 47: Telecommunication: PART 73—RADIO BROADCAST SERVICES Subpart B—FM Broadcast Stations § 73.317 FM transmission system requirements.

(a) FM broadcast stations employing transmitters authorized after January 1, 1960, must maintain the bandwidth occupied by their emissions in accordance with the specification detailed below. FM broadcast stations employing transmitters installed or type accepted before January 1, 1960, must achieve the highest degree of compliance with these specifications practicable with their existing equipment. In either case, should harmful interference to other authorized stations occur, the licensee shall correct the problem promptly or cease operation.

(b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.

(c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

(d) Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least $43 + 10 \log_{10}(\text{Power, in watts})$ dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

(e) Preemphasis shall not be greater than the impedance-frequency characteristics of a series inductance resistance network having a time constant of 75 microseconds. (See upper curve of Figure 2 of §73.333.) [51 FR 17028, May 8, 1986]

Title 47: Telecommunication: PART 74—EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER SERVICES Subpart L—FM Broadcast Translator Stations and FM Broadcast Booster Stations: § 74.1236 Emission and bandwidth.

(a) The license of a station authorized under this subpart allows the transmission of either F3 or other types of frequency modulation (see §2.201 of this chapter) upon a showing of need, as long as the emission complies with the following:

(1) For transmitter output powers no greater than 10 watts, paragraphs (b), (c), and (d) of this section apply.

(2) For transmitter output powers greater than 10 watts, §73.317 (a), (b), (c), and (d) apply.

(b) Standard width FM channels will be assigned and the transmitting apparatus shall be operated so as to limit spurious emissions to the lowest practicable value. Any emissions including intermodulation products and radiofrequency harmonics which are not essential for the transmission of the desired aural information shall be considered to be spurious emissions.

(c) The power of emissions appearing outside the assigned channel shall be attenuated below the total power of the emission as follows:

Distance of emission from center frequency	Minimum attenuation below unmodulated carrier
120 to 240 kHz	25 dB
Over 240 and up to 600 kHz	35 dB
Over 600 kHz	60 dB

(d) Greater attenuation than that specified in paragraph (c) of this section may be required if interference results outside the assigned channel.

[35 FR 15388, Oct. 2, 1970, as amended at 52 FR 31406, Aug. 20, 1987; 55 FR 50698, Dec. 10, 1990]