

ENGINEERING REPORT

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

associated with the
combined operations of

W273CW.L (Fac ID: 150280)
Columbus, GA
BLFT-20160610ABJ

W288CV.L (Fac ID: 146642)
Columbus, GA
BLFT-20160610ABK

W293BV.C (Fac ID: 146650)
Columbus, GA
BPFT-20160718AAM

August, 2016

COPYRIGHT 2016

RF Signal Spurious Emissions Study for the Combined Master Antenna of W273CW.L, W288CV.L & W293BV.C - Columbus, GA

This firm has been retained to prepare the required engineering report in support of this Spurious Emissions Measurement Study for the combined operation of FM Translator(s) W273CW.L, W288CV.L and W293BV.C - Columbus, GA onto the tower identified by Antenna Structure Registration Number #1032658. This study has been conducted pursuant to 47 C.F.R. §73.317(b) and is associated with, and a condition of licensing for W293BV.C Construction Permit BPFT-20160718AAM and license modifications for W273CW.L (BLFT-20160610ABJ) and W288CV.L (BLFT-20160610ABK).

W273CW.L operates on 102.5 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular (H&V) polarization. W288CV.L operates on 105.5 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular (H&V) polarization. W293BV.C operates on 106.5 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 ASR #1032658. The common FM antenna is a two (2) bay PSIFMLB-2C-75WS, "Opposed V Dipole" antenna mounted with a Center of Radiation 215 meters above ground level (AGL). The antenna is matched with a Jampro, Model RCCS-103-0.8H Combiner. Factory settings were matched employing information from the FCC database concerning the W273CW.L, W288CV.L and W293BV.C operating parameters; and manufacturer specifications for the combiner.

RF signal purity measurements were conducted on August 1, 2016 during the equipment test operations associated with W293BV.C Construction Permit BPFT-20160718AAM and license modifications for W273CW.L and W288CV.L. Measurements were conducted by Mr. Frank McLemore. Mr. McLemore conducted his measurements utilizing an HP L1500A spectrum analyzer, Serial Number #US26450319, with the FM transmitters in full operation employing the Jampro Combiner for the common 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 harmonic relationships associated with the 102.5 MHz, 105.5 MHz and 106.5 MHz combined operations. As a result of these studies, it has been concluded the proposed combined operations of W273CW.L, W288CV.L and W293BV.C meets or exceeds the requirements of 47 C.F.R. §73.317(b) and the special condition of licensing associated with W293BV.C Construction Permit BPFT-20160718AAM and license modifications for W273CW.L (BLFT-20160610ABJ) and W288CV.L (BLFT-20160610ABK).

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 1, 2016

By 
Justin W. Asher, Staff Engineer

MUNN-REESE, INC.
Broadcast Engineering Consultants
COLDWATER, MI 49036-0220
517-278-7339 (x107)
justin@munn-reese.com

Exhibit A - Tabulation of Potential Mixing Products

W273CW.L (102.5 MHz), W288CV.L (105.5 MHz) & W293BV.C (106.5 MHz)

Frequency (MHz)	Measured Level (dBc)		Frequency (MHz)	Measured Level (dBc)		Frequency (MHz)	Measured Level (dBc)		Frequency (MHz)	Measured Level (dBc)
1.0 MHz	-72.5 dBc		104.5 MHz	-75.4 dBc		211.0 MHz	<-84.0 dBc		317.5 MHz	-78.4 dBc
2.0 MHz	-77.0 dBc		105.5 MHz	W288CV.L Carrier*		212.0 MHz	<-84.0 dBc		318.5 MHz	-77.9 dBc
3.0 MHz	-73.0 dBc		106.5 MHz	W293BV.C Carrier*		213.0 MHz	<-84.0 dBc		319.5 MHz	-80.0 dBc
4.0 MHz	-73.0 dBc		107.5 MHz	-68.0 dBc		307.5 MHz	-80.7 dBc		410.0 MHz	-79.5 dBc
6.0 MHz	-75.0 dBc		108.5 MHz	-68.5 dBc		310.5 MHz	-78.0 dBc		416.0 MHz	-80.5 dBc
8.0 MHz	-76.0 dBc		110.5 MHz	-69.2 dBc		311.5 MHz	-77.9 dBc		418.0 MHz	-80.5 dBc
98.5 MHz	-73.0 dBc		205.0 MHz	<-84.0 dBc		313.5 MHz	-78.7 dBc		422.0 MHz	-81.0 dBc
99.5 MHz	-71.0 dBc		208.0 MHz	<-84.0 dBc		315.5 MHz	-79.2 dBc		424.0 MHz	-81.0 dBc
102.5 MHz	W273CC.L Carrier*		209.0 MHz	<-84.0 dBc		316.5 MHz	-80.0 dBc		426.0 MHz	-81.0 dBc
*No intermodulation mixing was noted on any carrier frequencies.										
W273CW.L minimum attenuation Level: -67 dBc (250 watts ERP)										
W288CV.L minimum attenuation Level: -67 dBc (250 watts ERP)										
W293BV.C minimum attenuation Level: -67 dBc (250 watts ERP)										

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]