

Technical Engineering Report

SPURIOUS EMISSIONS MEASUREMENTS STUDY

Pursuant to 47 C.F.R. §73.317(b) associated with the licensing of:

*W261CV.C - Harrisonburg, VA
BPFT-20190826AAJ
(FAC ID: 139550)*

*W267BA.C - Harrisonburg, VA
BPFT-20190826AAK
(FAC ID: 141357)*

*W295CP.L - Harrisonburg, VA
LMS-0000112081
(FAC ID: 200014)*

July 2020

EXPLANATION OF STUDY: The applicant has prepared the required Spurious Emissions Measurement Study for the tri-plexed operation of FM Translator(s) W261CV.C - Harrisonburg, VA; W267BA.C - Harrisonburg, VA; and W295CP.L - Harrisonburg, VA. This study has been conducted pursuant to 47 C.F.R. Section 73.317(b) and is associated with, and a condition of licensing for, W261CV.C Construction Permit File Number BPFT-20190826AAJ; W267BA.C Construction Permit File Number BPFT-20190826AAK; and a license modification filing for W295CP.L License File Number LMS-0000112081.

SUMMARY OF STATIONS: W261CV.C operates on 100.1 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular polarization (H&V). W267BA.C operates on 101.3 MHz with a maximum effective radiated power (ERP) of 0.099 kW circular polarization (H&V). W295CP.L operates on 106.9 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular polarization (H&V). The common antenna is mounted on the tower bearing Antenna Structure Registration Number 1018184. The common FM antenna is a four (4) bay, Nicom model BKG1/P-4L(Slant45)(0.75WL) "Slant 45 Yagi Dipole" antenna mounted with a Center of Radiation 116 meters above ground level (AGL). The antenna is matched with a Kintronic Model FMC4X2K2C3C Combiner. The combiner was set using manufacturer specifications as well as information from the FCC database concerning the above-mentioned operating parameters.

MEASUREMENT RESULTS: RF Spurious Emissions Measurements were conducted on July 1, 2020 during the equipment test operations associated with the aforementioned Construction Permits. Measurements were conducted by Mr. J. Paxton Durham, a contract engineer in the employ of the common licensee, Tidewater Communications, LLC. Measurements were conducted utilizing an Agilent Model: E4411B Spectrum Analyzer, Serial Number #MY44210837 with the FM transmitters in full operation employing the combiner for the multiple 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 through 3rd orders. With the exception of noted carrier frequencies, nothing was observed over the noise floor of the analyzer as noted at the end of this report.

The following is a copy of the 1st through 3rd order potential mixing product measurement results for the spurious relationships associated with the 100.1 MHz, 101.3 MHz and 106.9 MHz common operations. As a result of these studies, it has been concluded the combined operation(s) meets or exceeds the requirements of 47 C.F.R. Section 73.317(b) and the special condition of licensing associated with W261CV.C Construction Permit File Number BPFT-20190826AAJ; W267BA.C Construction Permit File Number BPFT-20190826AAK; and W295CP.L License LMS-0000112081.

For a W261CV.C operational power of 0.250 kW, the minimum attenuation level is -67 dBc.
 For a W267BA.C operational power of 0.099 kW, the minimum attenuation level is -63 dBc.
 For a W295CP.L operational power of 0.250 kW, the minimum attenuation level is -67 dBc.

Frequency (in MHz)	Measurement (in dBc)	Frequency (in MHz)	Measurement (in dBc)	Frequency (in MHz)	Measurement (in dBc)	Frequency (in MHz)	Measurement (in dBc)
1.20 MHz	below -80 dBc	201.40 MHz	below -80 dBc	405.20 MHz	below -80 dBc		
2.40 MHz	below -80 dBc	202.60 MHz	below -80 dBc	414.00 MHz	below -80 dBc		
5.60 MHz	-80 dBc	207.00 MHz	below -80 dBc	416.40 MHz	below -80 dBc		
6.80 MHz	below -80 dBc	208.20 MHz	below -80 dBc	427.60 MHz	below -80 dBc		
11.20 MHz	below -80 dBc	213.80 MHz	below -80 dBc				
13.60 MHz	below -80 dBc	300.30 MHz	below -80 dBc				
93.30 MHz	below -80 dBc	301.50 MHz	below -80 dBc				
95.70 MHz	below -80 dBc	302.70 MHz	below -80 dBc				
98.90 MHz	below -80 dBc	303.90 MHz	below -80 dBc				
100.10 MHz	W261CV.C Carrier*	307.10 MHz	below -80 dBc				
101.30 MHz	W267BA.C Carrier*	309.50 MHz	below -80 dBc				
102.50 MHz	-68 dBc	313.90 MHz	below -80 dBc				
106.90 MHz	W295CP.C Carrier*	315.10 MHz	-78 dBc				
112.50 MHz	below -80 dBc	320.70 MHz	below -80 dBc				
113.70 MHz	below -80 dBc	400.40 MHz	below -80 dBc				
200.20 MHz	below -80 dBc	402.80 MHz	below -80 dBc				

***No intermodulation mixing was noted on any carrier frequency**

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:

(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]

§ 74.1236 (c) Attenuations:

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

CERTIFICATION OF TECHNICAL CONSULTANT: I declare, under penalty of perjury, that the contents of this report are true and accurate to the best of my knowledge and belief. I further certify I have over twenty-one years of experience as a broadcast technical consultant before the Federal Communications Commission ("the FCC"); and am familiar with the Code of Federal Regulations Title 47 ("the Rules") as pertaining to this report and its contents herein. The underlying data utilized in this report was taken directly from FCC databases or indirectly through third party software vendors securing data directly from FCC databases. The information contained herein is believed accurate to the date reported below.


 Justin W. Asher, Technical Consultant

July 02, 2020