

Technical Engineering Report

SPURIOUS EMISSIONS MEASUREMENTS STUDY

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

*W231DK.L - Ithaca, NY
BLFT-20170131ABZ
(FAC ID: 148852)*

*W235BR.L - Ithaca, NY
BMLFT-20170131ACA
(FAC ID: 144458)*

&

*W249DW.C - Ithaca, NY
BNPFT-20180418AEP
(FAC ID: 201993)*

August 2018

EXPLANATION OF STUDY: The applicant has prepared the required Spurious Emissions Measurement Study for the triplexed operation of FM Translator(s) W231DK.L - Ithaca, NY; W235BR.L - Ithaca, NY; and W249DW.C - Ithaca, NY. This study has been conducted pursuant to 47 C.F.R. Section 73.317(b) and is associated with, and believed to be a condition of licensing for, W249DW.C Construction Permit, File Number BNPFT-20180418AEP.

SUMMARY OF STATIONS: W231DK.L operates on 94.1 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular polarization (H&V). W235BR.L operates on 94.9 MHz with a maximum effective radiated power (ERP) of 0.125 kW circular polarization (H&V). W249DW.C operates on 97.7 MHz with a maximum effective radiated power (ERP) of 0.175 kW circular polarization (H&V). The common antenna is mounted on the tower bearing ASR Number 1048243. The common FM antenna is a four (4) bay, Scala CL-FM-4DA(Slant45) (1.0 spaced) log periodic antenna mounted with a Center of Radiation 84 meters above ground level (AGL). The antenna is matched with a Microwave Filter Company, Model 18930-2 (R1806) branched 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 August 7, 2018 during the equipment test operations associated with the aforementioned Construction Permit. Measurements were conducted by Mr. Ben Van Patten, staff engineer in the employ of the common licensee, Saga Communications of New England, LLC. Measurements were conducted utilizing a Tektronix Model 2712 Spectrum Analyzer, Serial Number B022961, 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 94.1 MHz, 94.9 MHz and 97.7 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 believed associated with W249DW.C Construction Permit, File Number BNPFT-20180418AEP.

RF Signal Spurious Emissions Study

For a W231DK.L operational power of 0.250 kW, the minimum attenuation level is -67 dBc.

For a W235BR.L operational power of 0.125 kW, the minimum attenuation level is -64 dBc.

For a W249DW.C operational power of 0.175 kW, the minimum attenuation level is -65 dBc.

Frequency (in MHz)	Measurement (in dBc)						
0.80 MHz	-78.6 dBc	189.00 MHz	-95.4 dBc	379.60 MHz	-96.4 dBc		
1.60 MHz	-91.7 dBc	189.80 MHz	-94.1 dBc	383.60 MHz	-97.1 dBc		
2.80 MHz	-106.6 dBc	191.80 MHz	-95.1 dBc	385.20 MHz	-115.1 dBc		
3.60 MHz	-105.5 dBc	192.60 MHz	-96.7 dBc	390.80 MHz	-96.1 dBc		
5.60 MHz	-94.1 dBc	195.40 MHz	-118.4 dBc				
7.20 MHz	-89.0 dBc	282.30 MHz	-101.4 dBc				
90.50 MHz	-112.7 dBc	283.10 MHz	-99.5 dBc				
92.10 MHz	-119.7 dBc	283.90 MHz	-93.1 dBc				
93.30 MHz	-92.7 dBc	284.70 MHz	-96.4 dBc				
94.10 MHz	W231DK.L Carrier*	285.90 MHz	-96.4 dBc				
94.90 MHz	W235BR.L Carrier*	287.50 MHz	-118.1 dBc				
95.70 MHz	-98.7 dBc	289.50 MHz	-117.7 dBc				
97.70 MHz	W249DW.C Carrier*	290.30 MHz	-118.1 dBc				
100.50 MHz	-78.6 dBc	293.10 MHz	-117.7 dBc				
101.30 MHz	-92.4 dBc	376.40 MHz	-119.9 dBc				
188.20 MHz	-96.1 dBc	378.00 MHz	-96.7 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 Log₁₀(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 nineteen 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
August 7, 2018