

# **ENGINEERING REPORT**

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

associated with the licensing of

**W235BR.C (Fac ID: 144458)**

**Ithaca, NY**

BPFT-20140428ABI

&

**W249CD.C (Fac ID: 156452)**

**Ithaca, NY**

BPFT-20130919ADD

&

**W254BF.C (Fac ID: 25008)**

**Ithaca, NY**

BPFT-20140428ABM

February, 2015

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# **RF Signal Spurious Emissions Study for the Combined Master Antenna of W235BR.C - Ithaca, NY; W249CD.C - Ithaca, NY; & W254BF.C - Ithaca, NY**

This firm has been retained to prepare the required engineering report in support of this Spurious Emissions Measurement Study for the tri-plexed operation of FM Translators W235BR.C - Ithaca, NY; W249CD.C - Ithaca, NY; & W254BF.C - Ithaca, NY onto Antenna Structure Registration Tower Number 1048243. This study has been conducted pursuant to 47 C.F.R. §73.317(b) and is associated with, and a condition of licensing for, W235BR.C Construction Permit BPFT-20140428ABI; W249CD.C Construction Permit BPFT-20130919ADD; and W254BF.C Construction Permit BPFT-20140428ABM.

W235BR.C operates on 94.9 MHz with a maximum effective radiated power (ERP) of 0.125 kW circular (H&V) polarization. W249CD.C operates on 97.7 MHz with a maximum effective radiated power (ERP) of 0.175 kW circular (H&V) polarization. W254BF.C operates on 98.7 MHz with a maximum effective radiated power (ERP) of 0.054 kW circular (H&V) polarization. As stated before, the common antenna is mounted on the tower bearing ASR #1048243. The common FM antenna is a four (4) bay, fully spaced Scala CL-FM(Slant45) "Log Periodic" antenna mounted with a Center of Radiation 84 meters above ground level (AGL). The antenna is matched with a Microwave Filter Company combiner. The combiner was set using manufacturer specifications as well as information from the FCC database concerning the W235BR.C, W249CD.C and W254BF.C operating parameters.

RF signal purity measurements were conducted on February 6, 2015 during the equipment test operations associated with W235BR.C Construction Permit BPFT-20140428ABI; W249CD.C Construction Permit BPFT-20130919ADD; and W254BF.C Construction Permit BPFT-20140428ABM. Measurements were conducted by Mr. Edmond R. Trombley, Field Engineering for Munn-Reese, Inc. Mr. Trombley conducted his measurements utilizing an Anritsu Model MS2721A Spectrum Analyzer, Serial Number 1002033, with the FM transmitters in full operation employing the Microwave Filter Company 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 and 2nd orders. 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 and 2nd order potential mixing product measurement results for the spurious relationships associated with the 94.9 MHz, 97.7 MHz and 98.7 MHz tri-plexed operations. As a result of these studies, it has been concluded the proposed tri-plexed operation of W235BR.C, W249CD.C and W254BF.C meets or exceeds the requirements of 47 C.F.R. §73.317(b) and the special condition of licensing associated with W235BR.C Construction Permit BPFT-20140428ABI; W249CD.C Construction Permit BPFT-20130919ADD; and W254BF.C Construction Permit BPFT-20140428ABM.

## **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.

February 13, 2015

By   
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## Exhibit A - Tabulation of Potential Mixing Products W235BR.C (94.9 MHz), W249CD.C (97.7 MHz) & W254BF.C (98.7 MHz)

Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)
91.1 MHz	-87.0 dB	99.7 MHz	-86.0 dB	195.4 MHz	-97.0 dB
94.9 MHz	<i>W235BR Carrier</i>	100.5 MHz	-94.0 dB	196.4 MHz	-86.0 dB
96.7 MHz	-101 dB	189.8 MHz	-85.0 dB	197.4 MHz	-89.0 dB
97.7 MHz	<i>W249CD Carrier</i>	192.6 MHz	-86.0 dB		
98.7 MHz	<i>W254BF Carrier</i>	195.4 MHz	-88.0 dB		
*No intermodulation mixing was noted on any carrier frequencies.					
**dBc values reference to the lowest ERP value of 0.054 kW (W254BF)					

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]