

# **ENGINEERING REPORT**

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

associated with the License  
Modifications of

**W272BA – Cocoa Beach, FL**  
BLFT-20111019AEC

&

the License Modification of

**W234BI – Cocoa, FL**  
BLFT-20100730ADK

July, 2012

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# **RF Signal Spurious Emissions Study for the Combined Master Antenna of W234BI – Cocoa, FL & W272BA – Cocoa Beach, FL**

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 W234BI – Cocoa, FL and W272BA – Cocoa Beach, FL. This study has been conducted pursuant to 47 C.F.R. §73.317(b).

W234BI (BLFT-20100730ADK) operates on 94.7 MHz with a maximum effective radiated power (ERP) of 0.125 kW circular polarization. W272BA (BLFT-20111019AEC) operates on 102.3 MHz with a maximum effective radiated power (ERP) of 0.097 kW circular polarization. The common antenna is a two bay Nicom BKG77/2DA (0.9λ) antenna mounted 76 meters above ground level (AGL). The antenna is matched with an EMR Corp FM63720/7SBH-6 cavity resonator/di-plexer. Factory settings were matched employing information from the FCC database concerning the W234BI and W272BA operating parameters and individual manufacturer specifications for the di-plexer and antenna. Both stations will be co-located with, but not di-plexed with WLRQ-FM – Cocoa, FL CH257C2 (99.3 MHz).

RF signal purity measurements were conducted on June 12, 2012. Measurements were conducted by Mr. Jim Johnson, a contract engineer in the employ of National Christian Network, Inc. Mr. Johnson conducted his measurements utilizing an IFR 120-B spectrum analyzer, serial number #9224. The analyzer was connected to a precision directional coupler (forward power) on the output (antenna side) of the EMR Corp Diplexer with both transmitters on the air with full FM modulation. 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 orders. With the exception of noted carrier frequencies, nothing was observed over the -64 dBc noise floor of the analyzer<sup>1</sup>.

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 94.7 MHz and 102.3 MHz combined operation in addition to the co-located, but not diplexed 99.3 MHz signal. As a result of these studies, it has been concluded the proposed di-plexed operation of W234BI and W272BA meets or exceeds the requirements of 47 C.F.R. §73.317(b). therefore W234BI License BLFT-20100730ADK and W272BA License BLFT-20111019AEC may be modified accordingly.

## **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.

July, 17 2012

By   
Justin W. Asher, Staff Engineer

**MUNN-REESE, INC.**  
Broadcast Engineering Consultants  
COLDWATER, MI 49036-0220  
517-278-7339 (x107)

<sup>1</sup> Engineer's Note: the coupling factor of the directional coupler will normally show a rising response to higher frequencies, therefore products significantly higher in frequency could be significantly lower in level while still remaining detectable if present. (see attached spreadsheet).

# Exhibit A

## Tabulation of Potential Mixing Products

### W234BI (94.7 MHz) & W272BA (102.3 MHz) & WLRQ-FM (99.3 MHz)

| Frequency (MHz) | Measured Level (dBc)    | Frequency (MHz) | Measured Level (dBc) | Frequency (MHz) | Measured Level (dBc) |
|-----------------|-------------------------|-----------------|----------------------|-----------------|----------------------|
| 87.1            | -76                     | 105.3           | -85                  | 284.1           | -84                  |
| 90.1            | -64                     | 109.9           | -73                  | 288.7           | -87                  |
| 91.7            | -64                     | 106.9           | -85                  | 291.7           | -79                  |
| 94.7*           | <i>W234BI Carrier*</i>  | 189.4           | -74                  | 293.3           | -87                  |
| 96.3            | -83                     | 194.0           | -87                  | 296.3           | -87                  |
| 97.7            | -83                     | 197.0           | -70                  | 297.9           | -87                  |
| 99.3*           | <i>WLRQ-FM Carrier*</i> | 198.6           | -87                  | 299.3           | -81                  |
| 102.3*          | <i>W272BA Carrier*</i>  | 201.6           | -88                  | 300.9           | -87                  |
| 103.9           | -85                     | 204.6           | -76                  | 303.9           | -87                  |

\*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<sub>10</sub>(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]