

Occupied Bandwidth and Spurious Emissions Measurements

RE: BNPFT-20130304AAK
Special Operating Condition / Restriction (3)

K239BN
Idaho Falls, Idaho

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ENGINEERING REPORT

This report has been prepared as a condition of BNPFT-20130304AAK to verify compliance with 47CFR, §73.317 (b) - (d). Performance measurements and spectral analysis were conducted as required by 47CFR, §73.1590 (a) & (b). The method outlined and specifications given in 47CFR, §73.317 (b) - (d) for FM stations were used to validate the combined K239BN and K286BU transmission system and verify compliance with FCC standards. All measurements were made by Rickey D. Hughes, Contract Engineer retained by the Cache Valley Media Group.

All measurements were made while the two translators were operating normally with typical program content and modulation levels. K239BN operates in stereo mode with no SCA channels and no HD service. Translator K286BU operates similarly.

The K239BN and K286BU translators are combined in a Kathrein two-station branched combiner. The combiner feeds the shared Nicom BKG-77 antenna. Both translators were operating at their licensed power. The attenuation required for frequencies greater than 600 kHz. removed from either side of the carrier center frequency relative to the unmodulated carrier was determined to be -65 dBc using the higher of the two translator powers and the formula given in 47CFR, §73.317 (d).

47CFR, §73.317 (b) - (d) requires all emission to be attenuated according to the table shown below. Attenuation is relative to an unmodulated carrier at the center frequency. Frequencies shown in the table below specify inclusive values removed from the carrier center frequency.

Frequency	Attenuation
120 – 240 kHz.	-25 dB
240 – 600 kHz.	-35 dB
More than 600 kHz.	-65 dB

Two sets of measurements were made to verify compliance. First, a spectral analysis of the occupied bandwidth between -600 KHz and +600 kHz was made using the limits specified in 47CFR, §73.317 (b) - (d) and the above table. Second, an incremental scan of all frequencies between 50 kHz and 1 GHz looking for any out-of-band intermodulation products, harmonics or other spurious emissions.

All spectral measurements were made with a recently calibrated Agilent FieldFox Model N9913A, S/N: MY52401271. A Bird Model 43 Inline Wattmeter was inserted between the Kathrein combiner's output and the antenna. A broadband 50 dB slug (Bird P/N: 4274-025) was used with Wattmeter to sample the RF signal out of the combiner. A 10 dB pad was inserted between the sample port and the spectrum analyzer to optimize the signal levels to the spectrum analyzer.

Occupied Bandwidth Measurement

The occupied bandwidth was measured by setting the spectrum analyzer center frequency to 95.7 MHz and a horizontal scale of 150 kHz per division (total span of 1.5 MHz). During the measurements, the

resolution bandwidth was set to 1 kHz with the video bandwidth set to 3 kHz. In order to establish the reference point at the top of the screen (0 dBc), the spectrum analyzer was temporarily set to a lower resolution bandwidth of 300 Hz without modulation and the reference level was adjusted until the top of trace was even with the top of the graticule. The spectrum analyzer was then set to “Max Hold” and modulation was then applied. Ten minutes of modulation data was then collected and the plot saved as an image file which is shown in Figure 1.

Figure 1 shows the resulting plot of K239BN occupied bandwidth. Emission limits as specified in 47CFR, §73.317 (b) - (d) are identified as red lines on the Figure 1 plot. It can be seen from the resulting plot, that the K239BN occupied bandwidth is within the required spectral limits.

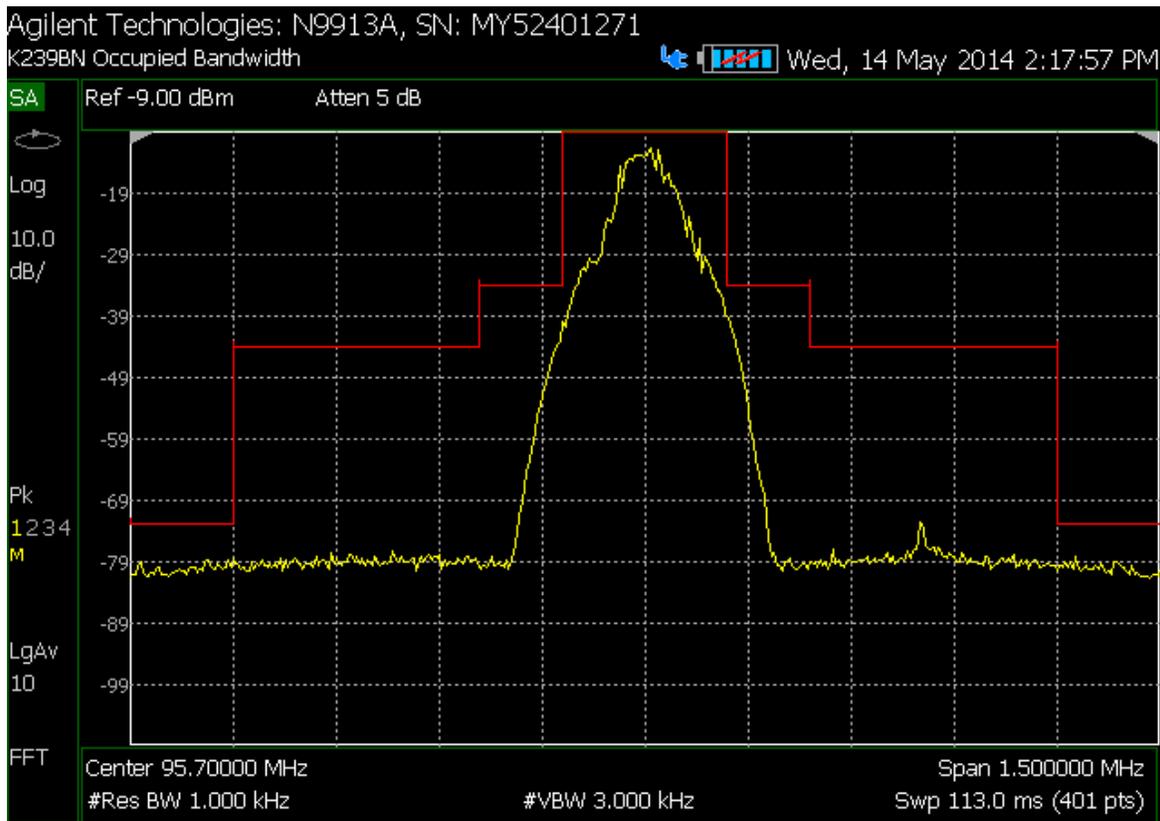


Figure 1: K239BN Occupied Bandwidth measured at the combiner output.

Spurious Emissions Measurement

The spectrum analyzer center frequency was initially set to 10 MHz with a frequency span of 20 MHz resulting in 2 MHz per division on the horizontal (frequency) scale. The resolution bandwidth was increased to 3 kHz and the video bandwidth to 10 kHz. The spectrum beginning at the analyzer's lower limit of 50 kHz limit continuing up to 1 GHz was scanned by successively incrementing the center

frequency by 20 MHz. Any signals above the -65 dBc limit were noted and compared against known transmitter frequencies which could then be identified as ingress signals.

No spurious emissions or intermodulation products attributable to K239BN or K286BU at the combiner output were detected. Signals detected were identifiable as ingress signals from other nearby FM stations.

Conclusion

Given the results of the herein described measurements, it is believed that K239BN complies with the requirements of 47CFR, §73.317 (b) through (d)

Engineer's Qualifications

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Rickey D. Hughes is a Broadcast Engineer with over 45 years of experience in radio, television and telecommunications. Prior to joining the Cache Valley Media Group, he retired from a responsible management position with Utah State University in Logan, Utah where he developed the first electronic classrooms on campus and the first statewide satellite-delivered distance learning network in Utah. He graduated *cum laude* from Utah State University with a Bachelor's Degree in Electrical Engineering. He also received an Associate Degree in Electronics Engineering Technology from Ricks College (now BYU-Idaho) in Rexburg, Idaho. He is a lifetime member of Tau Beta Pi, the national engineering honor society and a long-time member of IEEE. He holds two US patents, US 8432281 and US 5081406. He has worked extensively with test and measurement equipment and has attended numerous seminars and training sessions sponsored by HP, Agilent, Rohde&Schwarz, Tektronix and others. He has been a consultant for radio stations in Utah, Idaho and Wyoming for many years and has previously prepared applications for submission to the FCC.

Engineer's Statement

This report and its contents were prepared by me. All statements, facts and measurement data contained herein are believed to be true to the best of my personal knowledge.



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