

ENGINEERING REPORT

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

associated with the licensing of
K253BQ.C – Jonesboro, AR
BNPFT-20130807ACJ

January, 2014

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RF Signal Purity Proof for the Combined Master Antenna K298AV, K224DW & K253BQ – Jonesboro, AR

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 K298AV – Jonesboro, AR; K224DW – Jonesboro, AR; and K253BQ – Jonesboro, AR. This study has been conducted pursuant to 47 C.F.R. §73.317(b) and is associated with, and a condition of licensing for, K253BQ.C Construction Permit BNPFT-20130807ACJ.

K298AV operates on 107.5 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular polarization. K224DW operates on 92.7 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular polarization. K253BQ operates on 98.5 MHz with a maximum effective radiated power (ERP) of 0.250 kW circular polarization. The common antenna is a one bay Nicom BKG77/1-NDA antenna mounted 91 meters above ground level (AGL). The antenna is matched with a Nicom Starpoint FST-2000 Tri-plexer. Factory settings were matched employing information from the FCC database concerning the K298AV, K224DW and K253BQ operating parameters; and manufacturer specifications for the tri-plexer and antenna, both manufactured by NicomUSA inc.

RF signal purity measurements were conducted on January 29, 2014 during the equipment test operations associated with K253BQ.C Construction Permit BNPFT-20130807ACJ. Measurements were conducted by Mr. Alan Simpson, chief engineer of primary station KJBX(FM) - Cash, AR (Saga Communications of Arkansas, LLC.). Mr. Simpson conducted his measurements utilizing a Anritsu model MS2721B spectrum analyzer, serial number 0745041. The analyzer was connected to a Bird (-50 dB) Sampling Plugin via a Bird Line Section on the output (antenna side) of the Nicom FST-2000 Tri-plexer with all three transmitters on the air and 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 order. With the exception of noted carrier frequencies, nothing was observed over the noise floor of the analyzer¹.

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 92.7 MHz, 107.5 MHz and 98.5 MHz combined operation. As a result of these studies, it has been concluded the proposed tri-plexed operation of K298AV, K224DW and K253BQ meets or exceeds the requirements of 47 C.F.R. §73.317(b) and the special condition of licensing associated with BNPFT-20130807ACJ.

CERTIFICATION OF ENGINEERS

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.

January 30, 2014

By 
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¹ 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

K298AV (107.5 MHz), K224DW (92.7 MHz) & K253BQ (98.5 MHz)

Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)
3.20	-87	98.50	<i>K253BQ Carrier*</i>	188.60	-89	283.90	-76
5.80	-64	101.70	-60	191.20	-62	287.10	-86
9.00	-62	104.30	-65	194.40	-88	289.70	-75
11.60	-86	104.90	-77	197.00	-65	292.90	-77
12.20	-88	107.50	<i>K298AV Carrier*</i>	197.60	-89	295.50	-80
14.80	-64	110.10	-80	200.20	-62	296.10	-86
17.40	-87	110.70	-81	202.80	-88	301.90	-86
18.00	-88	113.30	-60	203.40	-88	304.50	-81
20.60	-88	116.50	-63	206.00	-60	305.10	-86
26.40	-88	119.10	-87	209.20	-88	307.70	-74
27.00	-88	119.70	-87	211.80	-87	310.30	-86
29.60	-87	122.30	-62	212.40	-87	310.90	-87
35.40	-87	124.90	-88	215.00	-70	313.50	-72
44.40	-87	125.50	-88	217.60	-87	316.70	-87
54.10	-87	128.10	-89	218.20	-87	319.30	-86
59.90	-87	133.90	-87	220.80	-87	322.50	-60
63.10	-87	137.10	-88	224.00	-87	325.10	-86
65.70	-87	142.90	-90	226.60	-88	328.30	-87
68.90	-82	152.60	-88	229.80	-87	334.10	-86
74.70	-80	158.40	-89	232.40	-87	339.90	-86
77.90	-67	161.60	-88	235.60	-87	358.60	-86
80.50	-82	167.40	-89	241.40	-87	367.60	-86
81.10	-86	170.60	-89	251.10	-88	373.40	-86
83.70	-60	173.20	-88	260.10	-86	376.60	-87
86.90	-63	176.40	-90	265.90	-87	382.40	-86
89.50	-60	179.60	-87	269.10	-87	385.60	-86
90.10	-82	182.20	-88	274.90	-87	388.20	-85
92.70	<i>K2442W Carrier*</i>	185.40	-74	278.10	-86	394.60	-87
95.90	-78	188.00	-87	280.70	-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 Log₁₀(Power, in watts) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser.

(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]

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