



**Occupied Bandwidth and  
Spurious Emissions Measurements  
To Demonstrate Compliance with  
Section 73.317(b) through 73.317(d) of the  
FCC Rules and Regulations**

**Clear Channel Broadcasting Licenses, Inc.  
WFKS(FM) – 97.9 MHz  
Neptune Beach, FL (Facility ID No: 67243)  
WROO(FM) – 107.3 MHz  
Jacksonville, FL (Facility ID No: 51974)  
Citicasters Licenses, Inc.  
WQIK-FM – 99.1 MHz  
Jacksonville, FL (Facility ID No: 29728)**

**February 4, 2003**

Measurements were conducted to demonstrate that WFKS(FM), Neptune Beach, FL, WROO(FM), Jacksonville, FL and WQIK-FM, Jacksonville, FL operating into a combined antenna system comply with section 73.317(b) through 73.317(d) of the FCC Rules and Regulations. The measurements were conducted during the experimental period on February 4, 2003 by Randall L. Mullinax, with all three stations simultaneously utilizing the shared antenna as specified in "Special operating conditions or restrictions 1." of WROO(FM) Construction Permit BPH20020110AAP and by "Special operating conditions or restrictions 2." Of WQIK-FM Construction Permit BPH20020110AAS. The spectrum analyzer used for the measurements was a Tektronix model 2710, S/N B020735. A sample of the WFKS(FM), WROO(FM) and WQIK-FM signals was derived from the main transmission line at the output of the combiner and was coupled to the analyzer using a short length of RG-142 50Ω double-shielded coaxial cable. Two 6 dB pads (Bird model 5-A-MFN-06) were inserted ahead of the analyzer to avoid overload and to provide isolation.

The unmodulated carrier level of WFKS(FM) was -5 dBm and the unmodulated carrier levels of both WROO(FM) and WQIK-FM were +4 dBm. Since the WFKS(FM) reference level was lower, it was used as the reference for all harmonic, spurious and intermodulation measurements. All measurements were conducted with the transmitters and associated equipment adjusted as used in normal program operation.

For all occupied bandwidth measurements, the spectrum analyzer was placed in the peak hold mode for at least 10 minutes per measurement before the waveforms were observed. All three transmitters were observed to be in full compliance with section 73.317(b) of the FCC Rules with emissions appearing on frequencies removed from the carrier frequencies by between 120 kHz and 240 kHz attenuated by at least 25 dB below the unmodulated carrier level indicating the occupied bandwidth of each transmitter to be 240 kHz or less. All three transmitters were also observed to be in full compliance with section 73.317(c) of the FCC Rules with emissions appearing on frequencies removed from the carrier frequencies by between 240 kHz and 600 kHz attenuated by at least 35 dB.

Extensive measurement were also conducted to insure that emissions appearing on frequencies removed from the carrier frequencies by more than 600 kHz were attenuated by at least 80 dB as required by section 73.317(d) of the FCC Rules. To facilitate these measurements, notch filters were placed between the two 6 dB pads so that the spectrum analyzer gain could be increased by 10 dB. The filters were necessary to avoid the possible generation of false spurious or intermodulation products in the analyzer. The attenuation of the notch filters was 17.1 dB at 97.9 MHz, 46.8 dB at 107.3 MHz and 44.5 dB at 99.1 MHz.

All harmonic and intermodulation frequencies in the range of frequencies between 5 MHz and 500 MHz through the 3<sup>rd</sup> order that could be produced by the combined operation of WFKS(FM), WROO(FM) and WQIK-FM(FM) were calculated and the results of the measurements at these frequencies are listed in Table 1.


TABLE 1

DESCRIPTION	FREQ. MHz	ATTENUATION dB	DESCRIPTION	FREQ. MHz	ATTENUATION dB
97.9 + 99.1	197	98	3 X 99.1	297.3	>100
97.9 + 107.3	205.2	86	(3 X 99.1) - 97.9	199.4	>100
99.1 + 107.3	206.4	>100	(3 X 99.1) - 107.3	190	>100
107.3 - 97.9	9.4	>100	3 X 107.3	321.9	92
107.3 - 99.1	8.2	>100	(3 X 107.3) - 97.9	224	>100
97.9 + (2 X 99.1)	296.1	>100	(3 X 107.3) - 99.1	222.8	>100
97.9 + (2 X 107.3)	312.5	>100	(3 X 97.9) - (2 X 99.1)	95.5	98
99.1 + (2 X 97.9)	294.9	>100	(3 X 97.9) - (2 X 107.3)	79.1	>100
99.1 + (2 X 107.3)	313.7	>100	(3 X 99.1) - (2 X 97.9)	101.5	98
107.3 + (2 X 97.9)	303.1	>100	(3 X 99.1) - (2 X 107.3)	82.7	>100
107.3 + (2 X 99.1)	305.5	>100	(3 X 107.3) - (2 X 99.1)	123.7	>100
97.9 + (3 X 99.1)	395.2	>100	(3 X 107.3) - (3 X 97.9)	28.2	>100
97.9 + (3 X 107.3)	419.8	>100	(3 X 107.3) - (3 X 99.1)	24.6	>100
99.1 + (3 X 97.9)	392.8	>100	97.9 + 99.1 + 107.3	304.3	>100
99.1 + (3 X 107.3)	421	>100	97.9 + 99.1 - 107.3	89.7	>100
107.3 + (3 X 97.9)	401	>100	97.9 + 107.3 - 99.1	106.1	98
107.3 + (3 X 99.1)	404.6	>100	99.1 + 107.3 - 97.9	108.5	94
2 X 97.9	195.8	98	97.9 + 99.1 + (2 X 107.3)	411.6	>100
(2 X 97.9) - 99.1	96.7	98	97.9 + 107.3 + (2 X 99.1)	403.4	>100
(2 X 97.9) - 107.3	88.5	>100	99.1 + 107.3 + (2 X 97.9)	402.2	>100
2 X 99.1	198.2	>100	99.1 + 107.3 - (2 X 97.9)	10.6	>100
(2 X 99.1) - 97.9	100.3	90	97.9 + (2 X 99.1) - 107.3	188.8	>100
(2 X 99.1) - 107.3	90.9	90	97.9 + (2 X 107.3) - 99.1	213.4	>100
2 X 107.3	214.6	>100	99.1 + (2 X 97.9) - 107.3	187.6	>100
(2 X 107.3) - 97.9	116.7	93	99.1 + (2 X 107.3) - 97.9	215.8	>100
(2 X 107.3) - 99.1	115.5	90	107.3 + (2 X 97.9) - 99.1	204	>100
(2 X 97.9) + (2 X 99.1)	394	>100	107.3 + (2 X 99.1) - 97.9	207.6	>100
(2 X 97.9) + (2 X 107.3)	410.4	>100	97.9 + (2 X 99.1) - (2 X 107.3)	81.5	>100
(2 X 99.1) + (2 X 107.3)	412.8	>100	97.9 + (2 X 107.3) - (2 X 99.1)	114.3	>100
(2 X 107.3) - (2 X 97.9)	18.8	>100	99.1 + (2 X 97.9) - (2 X 107.3)	80.3	>100
(2 X 107.3) - (2 X 99.1)	16.4	>100	99.1 + (2 X 107.3) - (2 X 97.9)	117.9	>100
(2 X 97.9) + (3 X 99.1)	493.1	>100	107.3 + (2 X 97.9) - (2 X 99.1)	104.9	98
(2 X 99.1) + (3 X 97.9)	491.9	>100	107.3 + (2 X 99.1) - (2 X 97.9)	109.7	>100
3 X 97.9	293.7	>100	97.9 + (2 X 107.3) - (3 X 99.1)	15.2	>100
(3 X 97.9) - 99.1	194.6	95	99.1 + (2 X 107.3) - (3 X 97.9)	20	>100
(3 X 97.9) - 107.3	186.4	>100	107.3 + (2 X 97.9) - (3 X 99.1)	5.8	95

DESCRIPTION	FREQ. MHz	ATTENUATION dB	DESCRIPTION	FREQ. MHz	ATTENUATION dB
107.3 + (2 X 99.1) - (3 X 97.9)	11.8	>100	( 2 X 97.9) + (3 X 107.3) - 99.1	418.6	>100
97.9 + (3 X 99.1) - 107.3	287.9	>100	(2 X 99.1) + (3 X 97.9) - 107.3	384.6	>100
97.9 + (3 X 107.3) - 99.1	320.7	>100	(2 X 99.1) + (3 X 107.3) - 97.9	422.2	>100
99.1 + (3 X 97.9) - 107.3	285.5	>100	(2 X 107.3) + (3 X 97.9) - 99.1	409.2	>100
99.1 + (3 X 107.3) - 97.9	323.1	>100	(2 X 107.3) + (3 X 99.1) - 97.9	414	>100
107.3 + (3 X 97.9) - 99.1	301.9	>100	(2 X 97.9) + (3 X 99.1) - (2 X 107.3)	278.5	>100
107.3 + (3 X 99.1) - 97.9	306.7	>100	(2 X 97.9) + (3 X 107.3) - (2 X 99.1)	319.5	>100
97.9 + (3 X 99.1) - (2 X 107.3)	180.6	>100	(2 X 99.1) + (3 X 97.9) - (2 X 107.3)	277.3	>100
97.9 + (3 X 107.3) - (2 X 99.1)	221.6	>100	(2 X 99.1) + (3 X 107.3) - (2 X 97.9)	324.3	>100
99.1 + (3 X 97.9) - (2 X 107.3)	178.2	>100	(2 X 107.3) + (3 X 97.9) - (2 X 99.1)	310.1	>100
107.3 + (3 X 97.9) - (2 X 99.1)	202.8	>100	(2 X 97.9) + (3 X 99.1) - (3 X 107.3)	171.2	>100
107.3 + (3 X 99.1) - (2 X 97.9)	208.8	>100	(2 X 97.9) + (3 X 107.3) - (3 X 99.1)	220.4	>100
97.9 + (3 X 99.1) - (3 X 107.3)	73.3	>100	(2 X 99.1) + (3 X 97.9) - (3 X 107.3)	170	>100
97.9 + (3 X 107.3) - (3 X 99.1)	122.5	>100	(2 X 99.1) + (3 X 107.3) - (3 X 97.9)	226.4	>100
99.1 + (3 X 97.9) - (3 X 107.3)	70.9	>100	(2 X 107.3) + (3 X 97.9) - (3 X 99.1)	211	>100
99.1 + (3 X 107.3) - (3 X 97.9)	127.3	>100	(2 X 107.3) + (3 X 99.1) - (3 X 97.9)	218.2	>100
107.3 + (3 X 97.9) - (3 X 99.1)	103.7	90	(3 X 97.9) + (3 X 99.1) - 107.3	483.7	>100
107.3 + (3 X 99.1) - (3 X 97.9)	110.9	>100	(3 X 97.9) + (3 X 99.1) - (2 X 107.3)	376.4	>100
(2 X 97.9) + (2 X 99.1) - 107.3	286.7	>100	(3 X 97.9) + (3 X 107.3) - (2 X 99.1)	417.4	>100
(2 X 97.9) + (2 X 107.3) - 99.1	311.3	>100	(3 X 99.1) + (3 X 107.3) - (2 X 97.9)	423.4	>100
(2 X 97.9) + (2 X 99.1) - (2 X 107.3)	179.4	>100	(3 X 97.9) + (3 X 107.3) - (3 X 99.1)	318.3	>100
(2 X 97.9) + (2 X 107.3) - (2 X 99.1)	212.2	>100	(3 X 99.1) + (3 X 107.3) - (3 X 97.9)	325.5	>100
(2 X 99.1) + (2 X 107.3) - (2 X 97.9)	217	>100	4 X 97.9	391.6	>100
(2 X 97.9) + (2 X 99.1) - (3 X 107.3)	72.1	>100	4 X 99.1	396.4	95
(2 X 97.9) + (2 X 107.3) - (3 X 99.1)	113.1	>100	4 X 107.3)	429.2	83
(2 X 99.1) + (2 X 107.3) - (3 X 97.9)	119.1	>100	5 X 97.9	489.5	>100
(2 X 97.9) + (3 X 99.1) - 107.3	385.8	>100	5 X 99.1	495.5	90

While special attention was given to the “product” frequencies listed in Table 1, measurements were conducted covering the entire range of frequencies between 5 MHz and 500 MHz. The only signals detected at levels attenuated by less than 80 dB below the unmodulated carrier levels and appearing on frequencies removed from the WFKS(FM), WROO(FM) and WQIK-FM carrier frequencies by more than 600 kHz were the carriers of nearby FM and Television stations. In each case where these signals were observed to be at a level greater than -85 dBm (80 dB below the unmodulated carrier level of WFKS(FM) which was -5 dBm) the WFKS(FM), WROO(FM) and WQIK-FM transmitters were turned off while the amplitude of the signal was observed to be unchanged, indicating that the signal was not the result of the combined operation of WFKS(FM), WROO(FM) and WQIK-FM.

The results of these measurements confirm that the combined operations of WFKS(FM), WROO(FM) and WQIK-FM into a shared antenna are in full compliance with section 73.317(b) through 73.317(d) of the FCC Rules and Regulations.

A handwritten signature in dark ink, appearing to read 'R. Mullinax', is written over a horizontal line.

Randall L. Mullinax  
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