

Engineering Report Spurious Emissions Measurements KGXX and KAJK Radio October 25, 2010

Upon completion of construction of FM Broadcast Station KGXX spurious emission measurements were made to ascertain compliance with 47 CFR section 73.317. An LP Technology model LPT-3000 Spectrum Analyzer was used to make these measurements. Stations KGXX on 100.7 MHz and KAJK on 96.3 MHz share a common antenna. The outputs of the transmitters for these stations are combined in an ERI model 955 combiner; the output of the combiner is fed to an SWR model FMECR/5-HWS-DF circularly polarized antenna that was designed and built to operate on the two frequencies. This construction of KGXX involved changes in the antenna system of KAJK, thus complete measurements are included for both stations.

Measurements were taken in two ways, 1) from an RF sample port at the output of the ERI combiner, and 2) in the field with an antenna. The transmitters were modulated with normal program material during these measurements except that unmodulated carriers were used to establish the carrier reference level on the spectrum analyzer.

At the output of the combiner emissions within 800 KHz of the carrier were plotted and recorded, Figure A for KGXX and Figure B for KAJK. The unmodulated carrier level for these two plots was set at the top graticle of the display to establish the carrier reference level. For these measurements the analyzer was set for 1 KHz resolution bandwidth and no video filter. These plots demonstrate compliance with §§73.317(b) and (c) for the two stations.

All first, second, and third order intermodulation products of these two station fall within the range between 4 MHz and 591 MHz. To determine levels of emissions removed from the carriers by more than 600 KHz a plot of the spectrum from 3 MHz to 603 MHz is shown in figure C. For these measurements notch filters set to 96.3 MHz and 100.7 MHz were inserted between the combiner output and the input to the spectrum analyzer. The notch filters reduced the levels of the two carriers by 25 dB. to increase the dynamic range of the measurements. The peak of the unmodulated carriers was set to the top graticle on the spectrum to establish a reference of 25 decibels below carrier (dbc) at the top graticle of the display.

Other than the two subject FM stations and other FM Broadcast Stations and FM Translators in the area the signals that exceed 80 dbc were more closely examined with the spectrum analyzer using a span of a few Mhz. The signals are shown in Figure C and are tabulated as follows:

Technical Design

Installation

Maintenance

5703 Crown Court

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916-624-3431 Business

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Engineering report, continued

192.6 MHz, 77 dbc, second harmonic of KAJK

197.0 MHz, 78 dbc, first order intermodulation product of KAJK and KGXX


201.4 MHz, 77 dbc, second harmonic of KGXX

The power output of the combiner is 989 watts for KGXX and 1025 watts for KAJK. The required attenuation of spurious emissions removed from the carrier by more than 600 KHz is $43 + 10\log(\text{power in watts})$ dB. This is 73.1 dB for KGXX and 73.0 dB. for KAJK. These measurements demonstrate that KGXX and KAJK meet the requirements of §73.317(d) at the combiner output.

At a distance of 0.2 Km. northwest of the transmit antennas a dipole antenna was used to receive signals transmitted by the FM Stations. The spectrum was swept from 3 MHz to 603 MHz with the spectrum analyzer. Notch filters set to reduce the 96.3 MHz and 100.7 MHz carrier levels 25 dB. were inserted ahead of the spectrum analyzer input to increase the dynamic range of the measurements. During the sweep of the spectrum as the measurement frequency increased above 70 MHz the length of the dipole elements was adjusted to apx. one-quarter wavelength at the frequency being measured. The plot of this measurement is shown in Figure D. Except for the FM Stations carriers no signal is recorded that exceeds 77 dbc of KGXX and KAJK. These two stations have an ERP of 1.5 Kw. The required attenuation of spurious emissions is 74.8 dB.

These measurements demonstrate that KGXX and KAJK meet the FM transmission system requirements of §§73.317(b), (c), and (d).

These measurements were conducted personally by the undersigned on October 16, 25, and 26, 2010.



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Technical Director

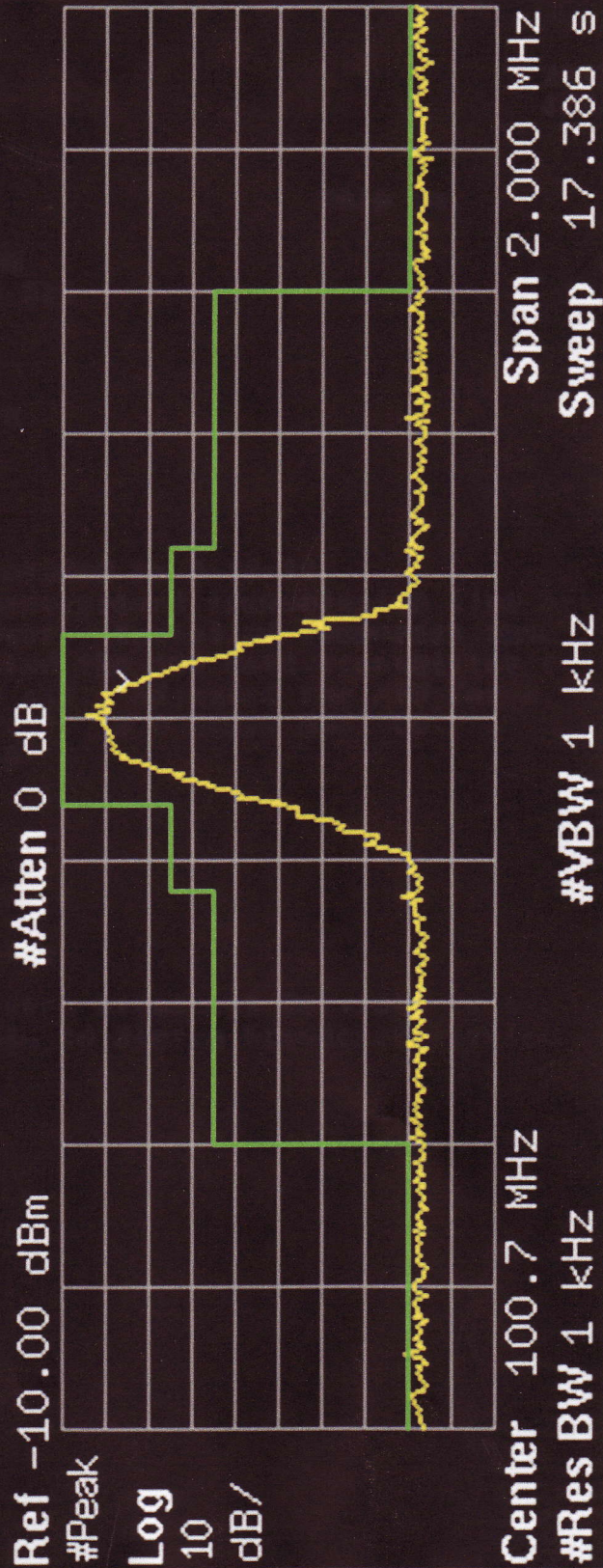
11:50:01 2000-10-16

Ch Freq 100.7 MHz

Trig Free

PASS

NRC Mask



FM FCC R&R 73.317

Number Frequency

1
2
3
4
5

Amplitude

Sweep: 35
Avg: OFF
Trace: Max Hold



12:06:34 2000-10-16

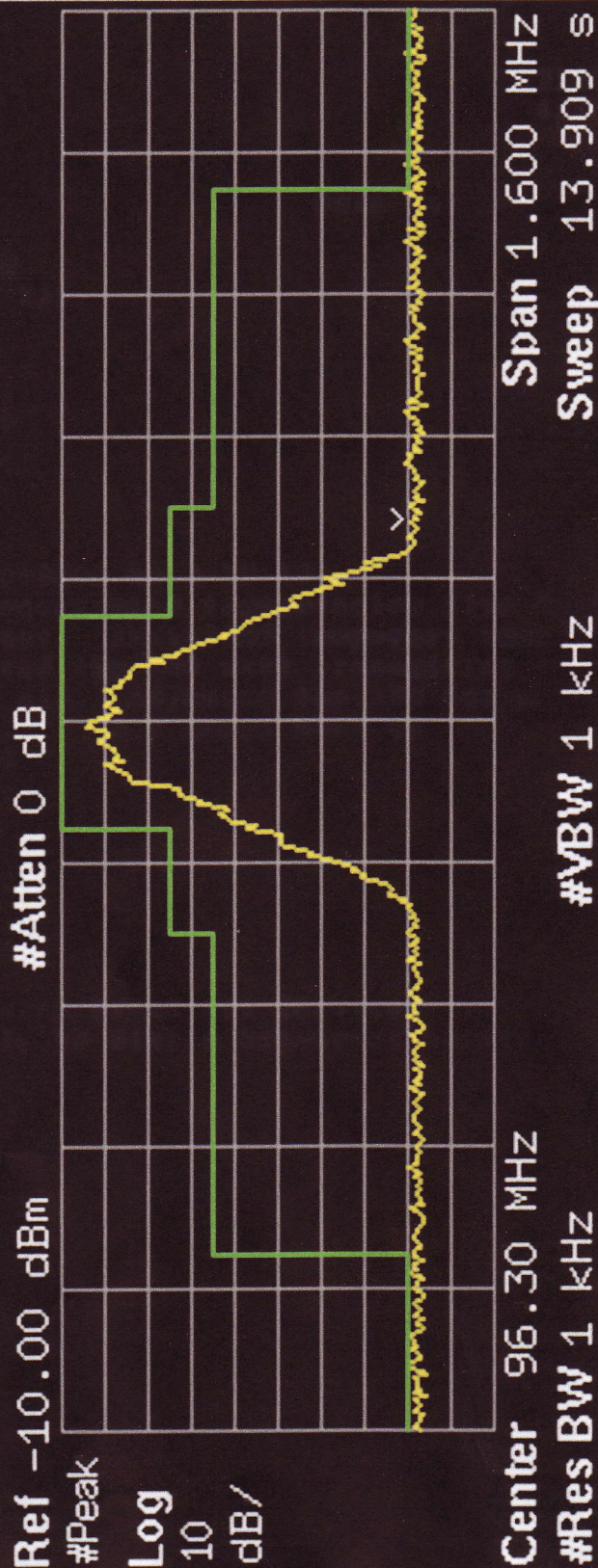
Ch Freq 96.30 MHz

Trig Free

NRC Mask

PASS

Span 1.600000 MHz



FM FCC R&R 73.317

Number Frequency

1 2 3 4 5

Amplitude

Sweep: 37
Avg: OFF
Trace: Max Hold

Figure B
Spectral display of KAJK Radio
October 16, 2010



17:05:56

2000-10-25

Ref -30.00 dBm Atten 0 dB

Peak

Log

10

dB/

Center Freq
303.000000 MHz

W1 S2

S3 FC

Center 303.0 MHz

#Res BW 3 kHz

Span 600.0 MHz

Sweep 888.510 s

#VBW 3 kHz

KGXX & KAJK

25 dbc

35 dbc

45 dbc

55 dbc

65 dbc

75 dbc

85 dbc

95 dbc

Figure C

Spectral display at combiner output

KGXX & KJAK Radio

October 25, 2010

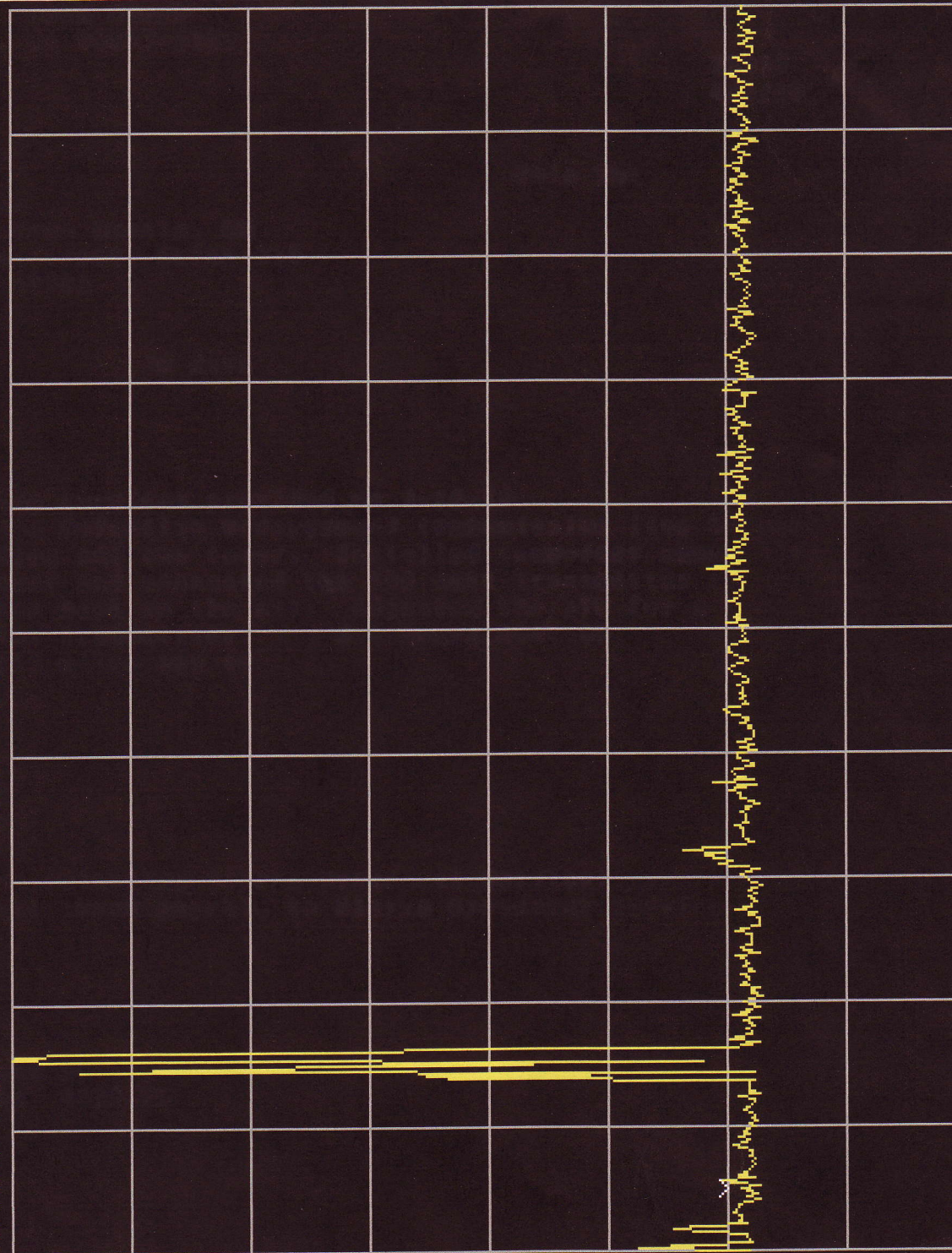


12:09:31

2000-10-26

Ref -20.00 dBm
Peak
Log
10
dB/

Atten 10 dB



W1 S2
S3 FC

Center 303.0 MHz
#Res BW 3 kHz

VBW 3 kHz

Span 600.0 MHz
Sweep 888.510 s

KGXX & KAJK
25 dbc

35 dbc

45 dbc

55 dbc

65 dbc

75 dbc

85 dbc

95 dbc

Figure D

Spectral display at 0.2 Km. from the antenna

KGXX & KJAK Radio

October 26, 2010