

FM Translator RF Emissions Proof Report

K282AV Great Falls, MT

FIN# 145435

103.9 MHz

September 4, 2014

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Introduction

The licensee for K282AV, K298BL, and K260AU is The Montana Radio Company, LLC. K282AV has been constructed to combine with K298BL, and K260AU. Steve Wilde completed the K282AV, K260AU, and K298BL emissions proof on September, 4 2014.

Test Equipment

- Agilent N9912A 2-Port Network Analyzer
- Agilent N9912A Spectrum Analyzer
- ERI 1-5/8" 4-port Directional Coupler
- Shively FM 3-Cavity Band Pass Filters
- Mini Circuits High Pass filters

Station Equipment

- Gates Air Flexiva 1KW FM Transmitter
- Bext FTCSDC1-2 3-Channel Star Point Combiner
- Nicom BKG-77 Antenna
- Andrew 7/8" Foam Coaxial line, AVA5-50

Summary

Harmonics, Intermodulation, Spurious, and Occupied Bandwidth Emissions measurements were completed for K282AV, K260AU, and K298BL. The test equipment was terminated to a directional coupler located at the output of the Bext FTCSDC1-2 FM combiner. The measurements were completed with K282AV, K260AU, and K298BL operating at 100% power. These measurements provide proof that K282AV, K260AU, and K298BL are in compliance with the requirements of FCC Part 73.317.

AFFIDAVIT

STATE OF CALIFORNIA
Sacramento County

I, Steve Wilde, do affirm that:

1. That I have been a Broadcast Engineer involved in RF Engineering since 2005.
2. I further declare, under penalty of perjury, that the statements contained herein are true and correct to the best of my knowledge.

Steve Wilde
SWE Services, LLC
June 21, 2014

9/22/2014

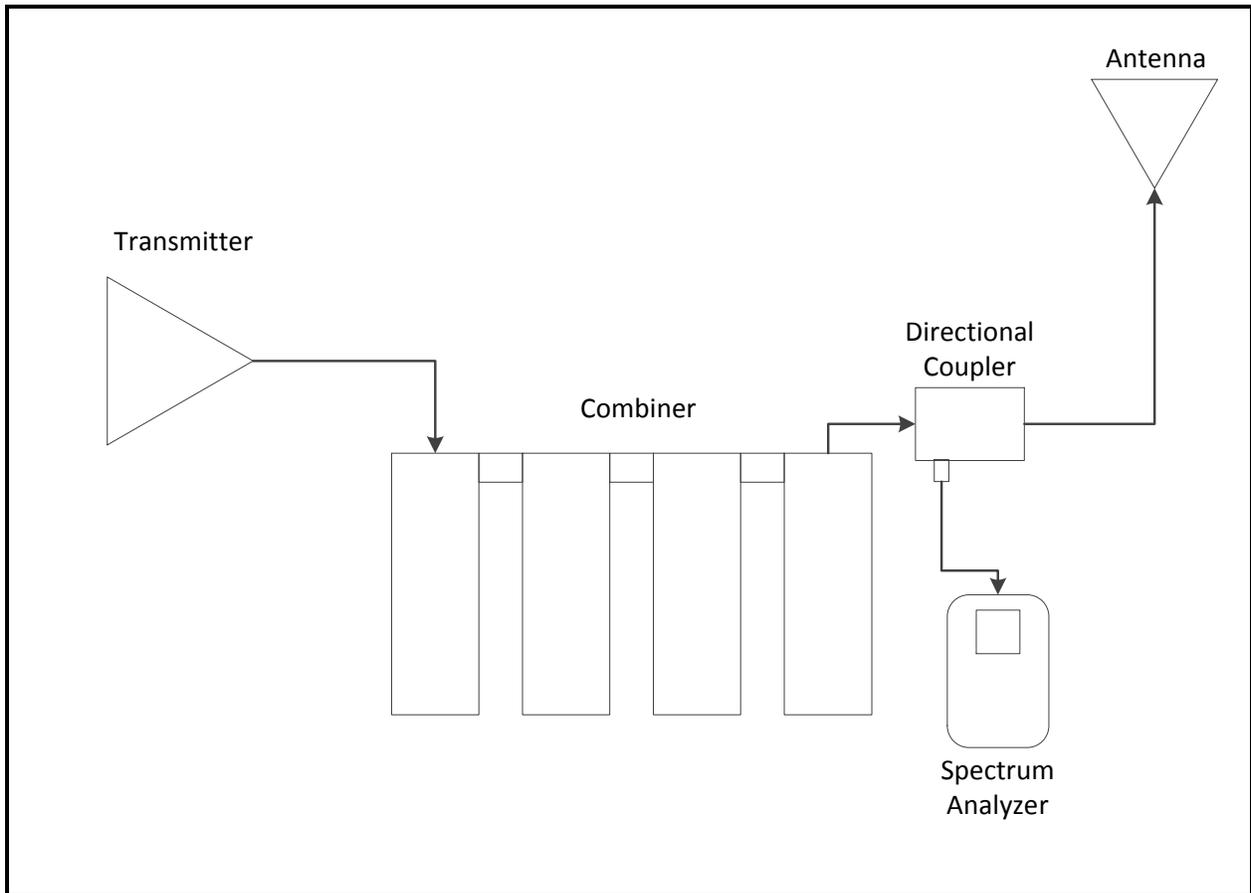
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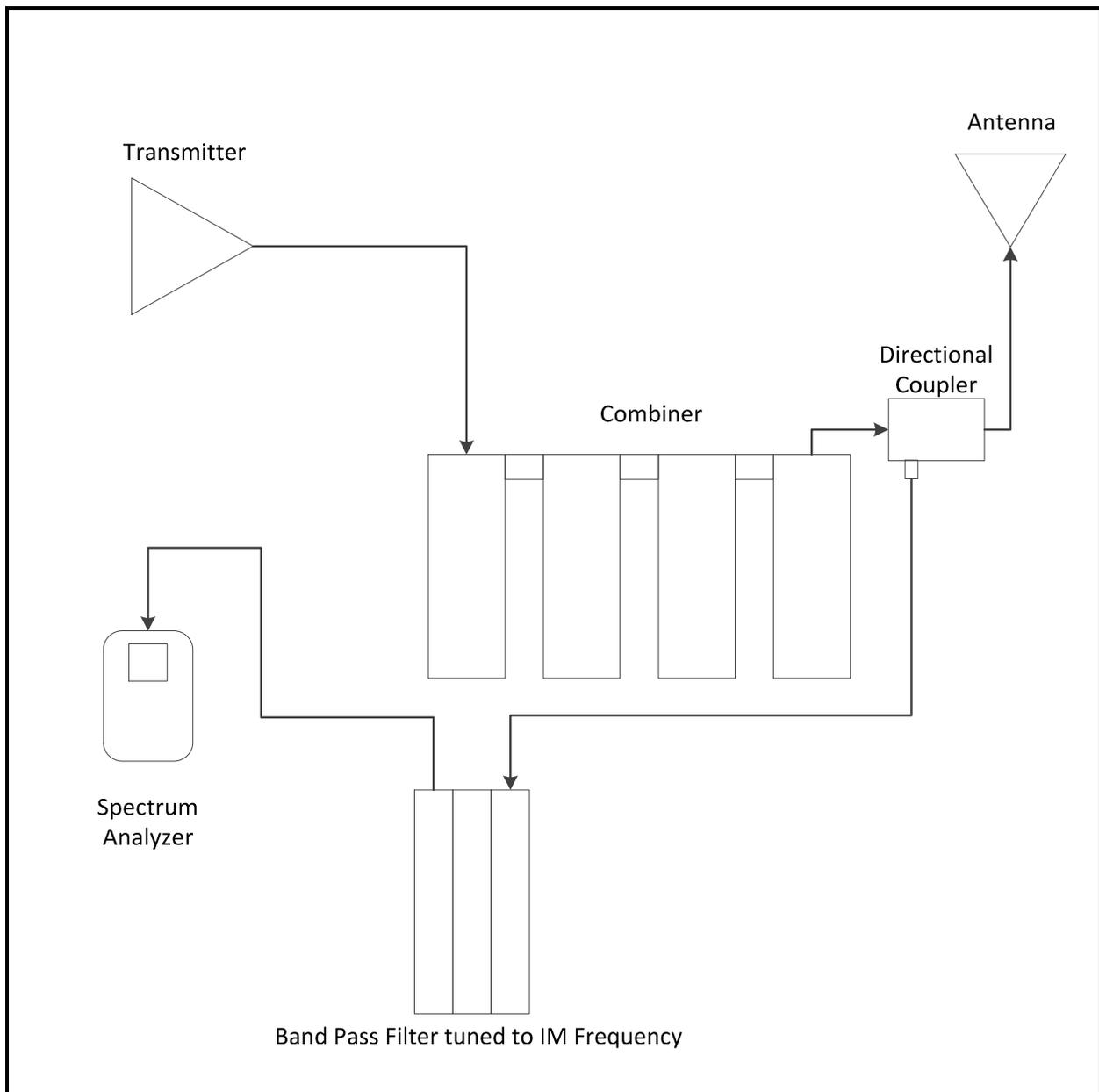
Steve Wilde
Broadcast Engineer

Measurement Diagrams

Harmonic Emissions, Spurious Emissions, and Occupied Bandwidth measurement configuration



Intermodulation frequency measurement configuration



Measurement Results

Frequency Measurement

Assigned Frequency	103.9000000	MHz	Variance in Hz
Measured Frequency	103.9000622	MHz	62.2

TPO Calculation

Transmitter output (KW)	Combiner Power Efficiency	Coax Power Efficiency	Coax Jumper Efficiency	Antenna Power Efficiency	ERP (KW)
0.787	0.938	0.763	0.965	0.46	0.250

Measurement Methodology

To ensure accurate measurements, the frequency response of all couplers, RF filters, and sample ports were determined prior to taking any measurements. The resulting dB reductions at each frequency were then added to the recorded measurements to ensure accurate calculations.

The spectrum analyzer reference point of the fundamental frequency is 0.00 dBm. The directional coupler has less reduction at the harmonic frequencies and thus appears as a gain in reference to the fundamental frequency. The high pass filters have more reduction at all harmonic frequencies and thus appear as a loss in reference to the fundamental frequency. The losses and gains are a dB reference relative to the fundamental frequency; therefore the directional coupler gain, high pass filter loss, and reference point are then added to the measurement to provide the resulting dBc calculation.

Harmonic Emissions Measurement

Harmonic	Frequency (MHz)	Directional Coupler (dB)	High Pass Filter (dB)	103.9 MHz Reference Level (dB)	Instrument Reading (dB)	Corrected Measurement (dBc)	FCC Limit (dBc)	Clearance (dB)
X2	207.8	-5.72	0.50	0.00	-125.20	-130.42	-66.98	63.44
X3	311.7	-9.16	0.40	0.00	-114.90	-123.66	-66.98	56.68
X4	415.6	-11.44	0.30	0.00	-127.50	-138.64	-66.98	71.66
X5	519.5	-13.19	0.10	0.00	-96.30	-109.39	-66.98	42.41
X6	623.4	-14.52	0.10	0.00	-124.00	-138.42	-66.98	71.44
X7	727.3	-15.58	0.10	0.00	-122.30	-137.78	-66.98	70.80
X8	831.2	-16.60	0.10	0.00	-117.30	-133.80	-66.98	66.82
X9	935.1	-17.09	0.20	0.00	-124.50	-141.39	-66.98	74.41

Intermodulation Emissions Measurement

Due to the relationship between the fundamental frequencies, intermodulation products were evaluated at 4.0 MHz, 7.6 MHz, or 3.6 MHz above and below each fundamental frequency.

IM Product Frequency (MHz)	Bandpass Filter (dB)	Fundamental Reference Level (dB)	Directional Coupler (dB)	Instrument Reading (dB)	Corrected Measurement (dBc)	FCC Limit (dBc)	Clearance (dB)
95.9	1.57	0.00	-0.06	-123.10	-121.59	-66.98	54.61
107.9	2.14	0.00	0.27	-81.27	-78.86	-66.98	11.88
92.3	1.77	0.00	0.15	-106.90	-104.98	-66.98	38.00
115.1	1.64	0.00	-0.10	-114.80	-113.26	-66.98	46.28
100.3	1.13	0.00	0.20	-76.13	-74.80	-66.98	7.82
111.1	2.16	0.00	-0.05	-96.00	-93.89	-66.98	26.91

Spurious Emissions Measurement

The K282AV transmitter emissions were thoroughly analyzed using an Agilent N9912A spectrum analyzer. The K282AV transmitter and RF circuit are free of spurious emissions.

Occupied Bandwidth Measurement

The occupied bandwidth was measured with an Agilent N9912A spectrum analyzer utilizing fourteen mask segments to determine the occupied bandwidth. Measurements were made over twenty minutes using a max-hold spectrum sweep, and demonstrate that K282AV is operating within the permissible bandwidth.

