

Proof of Performance Report

KN CJ Reno, NV

FIN: 78489

89.5 MHz

August 25, 2017

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Introduction

The permittee for the KNCJ Construction Permit (file number BPED-20161122ABX) is the Board of Regents of the Nevada System of Higher Education, on behalf of the University of Nevada, Reno. Stephen Wilde is an Electrical RF Engineer employed by SWE Services, LLC. Stephen Wilde completed the KNCJ spurious emissions proof on August 25, 2017.

Test Equipment

- Agilent N9912A 2-Port Network Analyzer
- Agilent N9912A Spectrum Analyzer
- Bird B series Directional Coupler
- Shively FM 2-Cavity Band Pass Filters
- Mini Circuits High Pass filters

Station Equipment

- Harris FAX 3 KW FM Transmitter
- AAT FM Branch Combiner
- ERI LPX-4C-HW Antenna
- Andrew 2-1/4'' Transmission line

Summary

Harmonics, Intermodulation, Spurious, and Occupied Bandwidth Emissions measurements were completed at the output of the AAT Combiner network with KNCJ and all other transmissions operating at 100% power. These measurements provide proof that KNCJ is in compliance with the requirements of FCC Part 73.317.

Affidavit

STATE OF CALIFORNIA
Sacramento County

I, Stephen Wilde, do affirm that:

1. I have been engaged in the RF engineering and installation of broadcast facilities since 2005.
2. I hold Bachelor of Science degree in Electrical Engineering from DeVry University Chicago, IL.
3. I further declare, under penalty of perjury, that the statements contained herein are true and correct to the best of my knowledge.

Stephen Wilde
August 28, 2017

8/28/2017

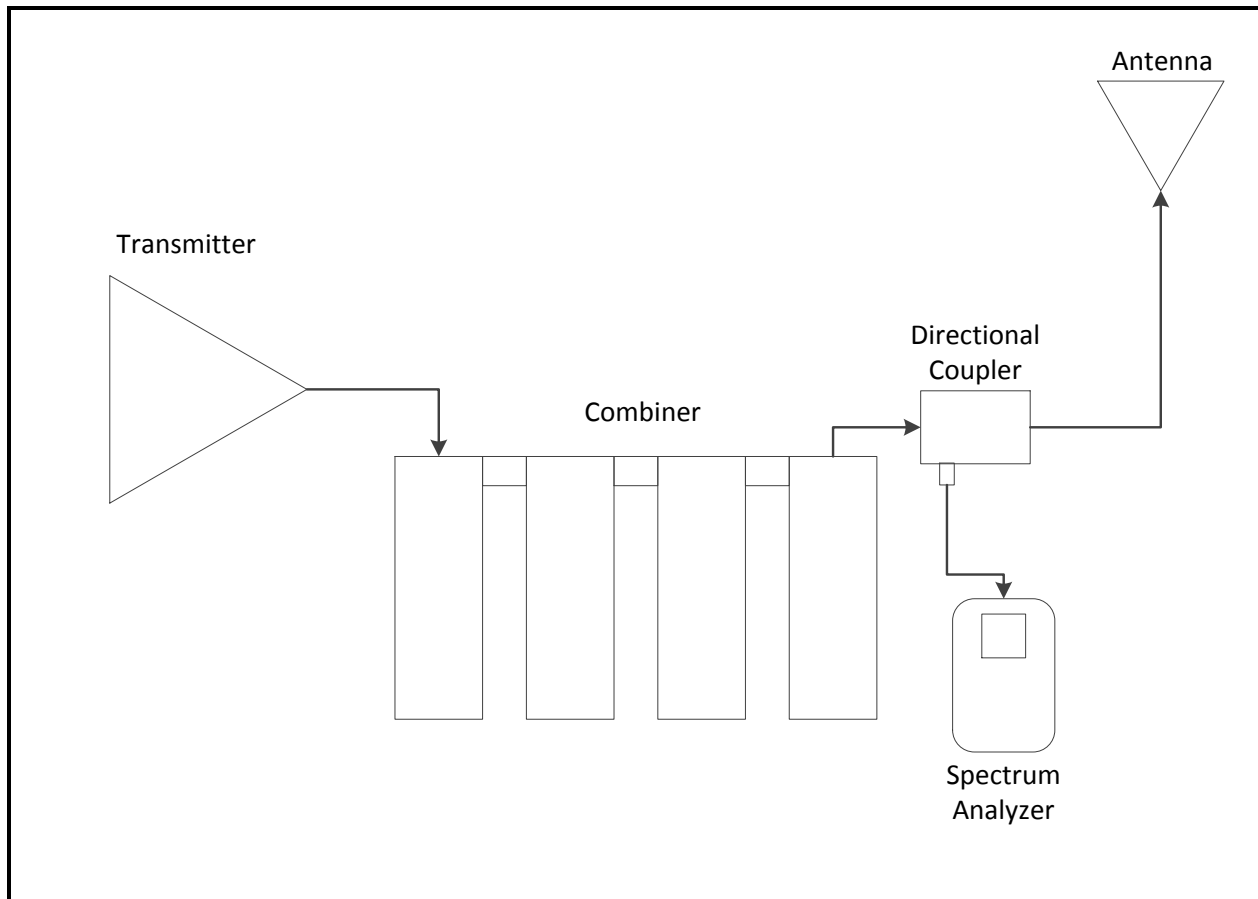
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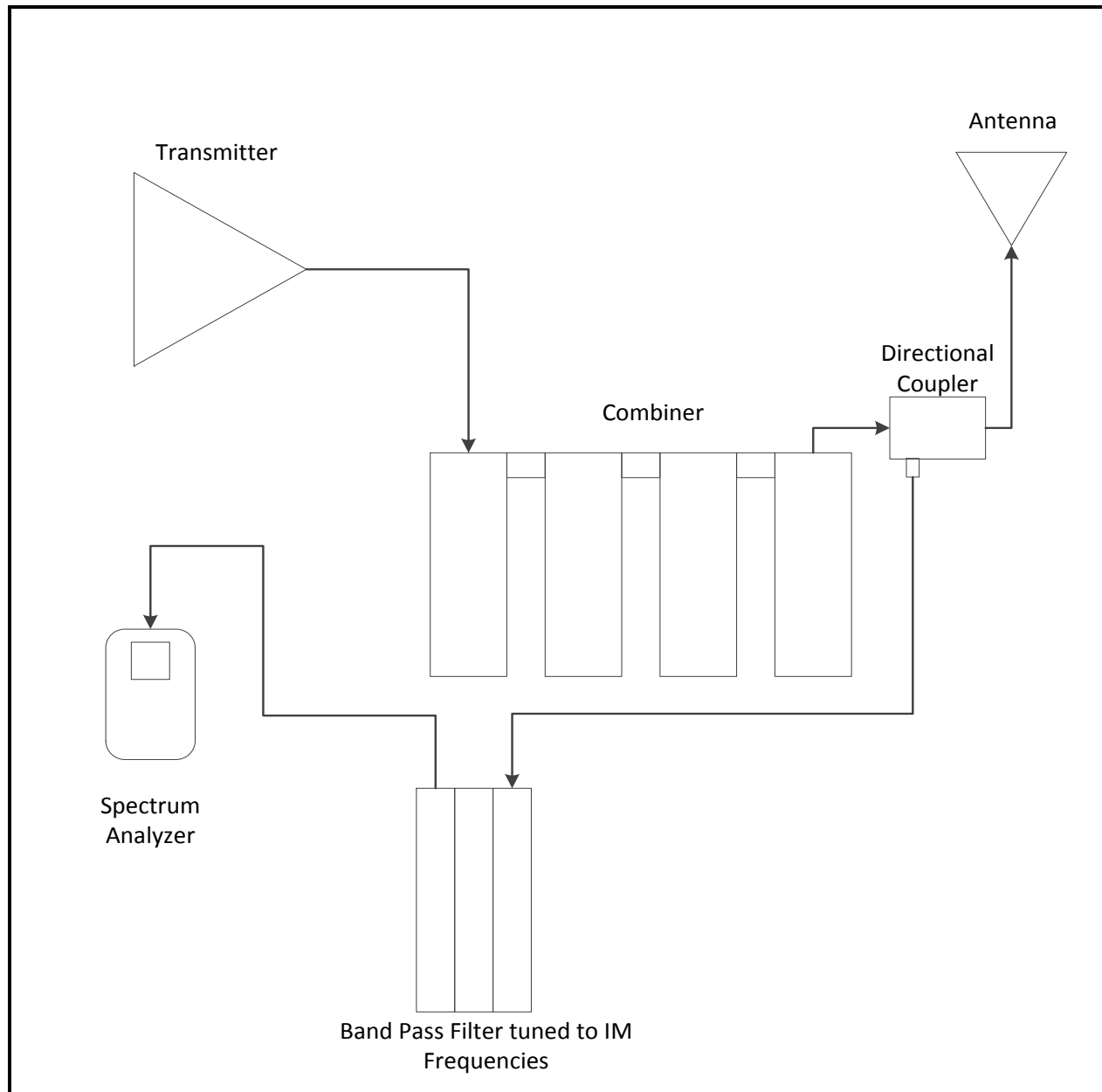
Stephen Wilde
RF Engineer
Signed by: swilde

Measurement Diagrams

Harmonic Emissions, Spurious Emissions, and Occupied Bandwidth measurement configuration



Intermodulation frequency measurement configuration



Measurement Results

Frequency Measurement

| | | | |
|--------------------|------------|-----|----------------|
| Assigned Frequency | 89.5000000 | MHz | Variance in Hz |
| Measured Frequency | 89.5001065 | MHz | 106.5 |

TPO Calculation

| Transmitter output KW | Combiner Efficiency | Coax Efficiency | Antenna Power Gain | ERP KW |
|--------------------------|------------------------|--------------------|-----------------------|--------|
| 2.832 | 0.851 | 0.946 | 1.25 | 2.85 |

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 forward power sample port has less loss at all harmonic frequencies in reference to the fundamental frequency. The losses and gains are a dB reference relative to the fundamental frequency; therefore the directional coupler forward port loss or gain, high pass filter loss, and dB reference point are added to the instrument measurement to provide the resulting dBc calculation.

Harmonic Emissions Measurement

| Harmonic | Frequency (MHz) | Directional Coupler (dB) | High Pass Filter (dB) | Reference Level (dB) | Instrument Reading (dB) | Corrected Measurement (dBc) | FCC Limit (dBc) | Clearance (dB) |
|----------|-----------------|--------------------------|-----------------------|----------------------|-------------------------|-----------------------------|-----------------|----------------|
| X2 | 179.00 | 0.06 | 0.50 | 0.00 | -84.74 | -84.18 | -77.55 | 6.63 |
| X3 | 268.50 | 1.26 | 0.40 | 0.00 | -88.29 | -86.63 | -77.55 | 9.08 |
| X4 | 358.00 | 3.86 | 0.30 | 0.00 | -121.10 | -116.94 | -77.55 | 39.39 |
| X5 | 447.50 | 6.66 | 0.10 | 0.00 | -101.90 | -95.14 | -77.55 | 17.59 |
| X6 | 537.00 | 8.96 | 0.10 | 0.00 | -122.80 | -113.74 | -77.55 | 36.19 |
| X7 | 626.50 | 11.16 | 0.10 | 0.00 | -97.06 | -85.80 | -77.55 | 8.25 |
| X8 | 716.00 | 11.96 | 0.10 | 0.00 | -106.10 | -94.04 | -77.55 | 16.49 |
| X9 | 805.50 | 13.26 | 0.20 | 0.00 | -97.31 | -83.85 | -77.55 | 6.30 |

Intermodulation Emissions Measurement

Due to the relationship between the fundamental frequencies, the resulting intermodulation products were evaluated with all fundamental frequencies within the combiner network operating at 100% power.

| IM Product Frequency (MHz) | Bandpass Filter (dB) | Reference Level (dB) | Directional Coupler (dB) | Instrument Reading (dB) | Corrected Measurement (dBc) | FCC Limit (dBc) | Clearance (dB) |
|----------------------------|----------------------|----------------------|--------------------------|-------------------------|-----------------------------|-----------------|----------------|
| 121.9 | 0.00 | 0.00 | 0.00 | -95.39 | -95.39 | -77.55 | 17.84 |
| 119.5 | 0.00 | 0.00 | 0.00 | -95.18 | -95.18 | -77.55 | 17.63 |
| 99.5 | 0.00 | 0.00 | 0.00 | -95.81 | -95.81 | -77.55 | 18.26 |
| 84.5 | 0.00 | 0.00 | 0.00 | -87.23 | -87.23 | -77.55 | 9.68 |
| 74.5 | 0.00 | 0.00 | 0.00 | -94.1 | -94.10 | -77.55 | 16.55 |
| 73.3 | 0.00 | 0.00 | 0.00 | -96.01 | -96.01 | -77.55 | 18.46 |

Spurious Emissions Measurement

The KNCJ transmitter emissions were thoroughly analyzed using an Agilent N9912A spectrum analyzer. The KNCJ 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 completed over five minutes using a max-hold spectrum sweep, and demonstrate that KNCJ is operating within the permissible bandwidth.

