

KZUS, Highwood, Montana
KEAU, Fairfield, MT
KUUS, Vaughn, Montana

Equipment Performance Measurements

On June 2, 2008, the attached measurements were made on the combined antenna system to be utilized by KZUS, KEAU and KUUS. These measurements were made by Paul A. Strater, field engineer for College Creek Media, LLC (the licensee of the stations) and the undersigned.

The test procedure used a Rohde & Schwarz spectrum analyzer (Model FSH-3, serial number 100872, calibrated on March 29, 2006) and a Trilithic Company filter set (Model VF-40003, serial number 200814002, calibrated on April 1, 2008). The filter was utilized to act as a bandpass filter and was properly tuned to each of the frequencies under test. Correction factors due to the loss in each of the filter sections were applied to the final results. The test equipment was connected to the output directional coupler that is part of the Shively 2530-3A-24/24/16 combiner that was installed for the use of the 3 stations. The equipment was calibrated using manufacturer's recommendations and input levels were adjusted to prevent overload of the spectrum analyzer.

The carrier of the 3 stations, all harmonics through the 10th of each of the stations and all expected intermod products were measured by marker on the analyzer and manually recorded. In addition the analyzer was tuned from 50 MHz through 250 MHz and no unexpected spurious emissions were noted.

Based on the tests performed and the measurements recorded the transmission system utilized by KZUS, KEAU and KUUS is in compliance with 47 CFR 73.317.

The measurements recorded herein are true and accurate to the best of my knowledge and belief.



Alan D. Kirschner
Technical Consultant
June 4, 2008

KZUS, KUUS, and KEAU Harmonic and Spurious Measurements

KZUS, Highwood, MT 101.7 MHz
 KEAU, Fairfield, MT 102.7 MHz
 KUUS, Vaughn, MT 103.9 MHz

| | | | Coupler Response 6 dB Per Octave | Filter Insertion Loss Correction Factor | Normalized Values |
|-----------------------|------------|----------|---|--|----------------------|
| KZUS Harmonics | | | 101.7 MHz | | |
| Fundamental: | 101.7 Mhz | 18.8 dBm | | | 18.8 dBm |
| 2nd Harmonic: | 203.4 Mhz | -78 dBc | -6.00 dB | 2.90 dB | -99.90 dBc |
| 3rd Harmonic: | 305.1 Mhz | -80 dBc | -9.00 dB | 2.40 dB | -105.40 dBc |
| 4th Harmonic: | 406.8 Mhz | -87 dBc | -12.00 dB | 2.10 dB | -115.70 dBc |
| 5th Harmonic: | 508.5 Mhz | -89 dBc | -13.50 dB | 1.80 dB | -119.50 dBc |
| 6th Harmonic: | 610.2 Mhz | -84 dBc | -15.00 dB | 1.70 dB | -116.10 dBc |
| 7th Harmonic: | 711.9 Mhz | -86 dBc | -16.50 dB | 2.30 dB | -119.00 dBc |
| 8th Harmonic: | 813.6 Mhz | -87 dBc | -18.00 dB | 2.10 dB | -121.70 dBc |
| 9th Harmonic: | 915.3 Mhz | -82 dBc | -18.75 dB | 1.90 dB | -117.65 dBc |
| 10th Harmonic | 1017.0 Mhz | -86 dBc | -19.50 dB | 1.90 dB | -122.40 dBc |

| | | | | | |
|-----------------------|------------|----------|------------------|---------|-------------|
| KEAU Harmonics | | | 102.7 MHz | | |
| Fundamental: | 102.7 Mhz | 18.2 dBm | | | 18.2 dBm |
| 2nd Harmonic: | 205.4 Mhz | -78 dBc | -6.00 dB | 2.90 dB | -99.30 dBc |
| 3rd Harmonic: | 308.1 Mhz | -83 dBc | -9.00 dB | 2.40 dB | -107.80 dBc |
| 4th Harmonic: | 410.8 Mhz | -86 dBc | -12.00 dB | 2.10 dB | -114.10 dBc |
| 5th Harmonic: | 513.5 Mhz | -68 dBc | -13.50 dB | 1.80 dB | -97.90 dBc |
| 6th Harmonic: | 616.2 Mhz | -82 dBc | -15.00 dB | 1.70 dB | -113.50 dBc |
| 7th Harmonic: | 718.9 Mhz | -82 dBc | -16.50 dB | 2.30 dB | -114.40 dBc |
| 8th Harmonic: | 821.6 Mhz | -84 dBc | -18.00 dB | 2.10 dB | -118.10 dBc |
| 9th Harmonic: | 924.3 Mhz | -82 dBc | -18.75 dB | 1.90 dB | -117.05 dBc |
| 10th Harmonic | 1027.0 Mhz | -86 dBc | -19.50 dB | 1.90 dB | -121.80 dBc |

| | | | | | |
|-----------------------|------------|----------|------------------|---------|-------------|
| KUUS Harmonics | | | 103.9 MHz | | |
| Fundamental: | 103.9 Mhz | 4.5 dBm | | | 4.5 dBm |
| 2nd Harmonic: | 207.8 Mhz | -93 dBc* | -6.00 dB | 2.90 dB | -100.60 dBc |
| 3rd Harmonic: | 311.7 Mhz | -93 dBc* | -9.00 dB | 2.40 dB | -104.10 dBc |
| 4th Harmonic: | 415.6 Mhz | -93 dBc* | -12.00 dB | 2.10 dB | -107.40 dBc |
| 5th Harmonic: | 519.5 Mhz | -93 dBc* | -13.50 dB | 1.80 dB | -109.20 dBc |
| 6th Harmonic: | 623.4 Mhz | -93 dBc* | -15.00 dB | 1.70 dB | -110.80 dBc |
| 7th Harmonic: | 727.3 Mhz | -93 dBc* | -16.50 dB | 2.30 dB | -111.70 dBc |
| 8th Harmonic: | 831.2 Mhz | -93 dBc* | -18.00 dB | 2.10 dB | -113.40 dBc |
| 9th Harmonic: | 935.1 Mhz | -93 dBc* | -18.75 dB | 1.90 dB | -114.35 dBc |
| 10th Harmonic | 1039.0 Mhz | -93 dBc* | -19.50 dB | 1.90 dB | -115.10 dBc |

*= In noise floor of test set up.

KZUS, KUUS, and KEAU Harmonic and Spurious Measurements

| Mult | x Freq. | Sum | Mult | x Freq. | Sum | Mult | x Freq. | = Product | Normalized Values |
|------|---------|------|------|---------|------|------|---------|-----------|-------------------|
| | MHz | Diff | | MHz | Diff | | MHz | MHz | dBc |

| | | | | | | | | |
|---|---------|---|---|---------|---|---|-----------------|---------|
| 1 | x 101.7 | + | 1 | x 102.7 | | | = 204.4 | -104.3 |
| 1 | x 101.7 | + | 1 | x 103.9 | | | = 205.6 | -105.2* |
| 1 | x 102.7 | + | 1 | x 103.9 | | | = 206.6 | -105.2* |
| 1 | x 101.7 | + | 2 | x 102.7 | | | = 307.1 | -105.2* |
| 1 | x 101.7 | + | 2 | x 103.9 | | | = 309.5 | -105.2* |
| 1 | x 102.7 | + | 2 | x 101.7 | | | = 306.1 | -105.2* |
| 1 | x 102.7 | + | 2 | x 103.9 | | | = 310.5 | -105.2* |
| 1 | x 103.9 | + | 2 | x 101.7 | | | = 307.3 | -105.2* |
| 1 | x 103.9 | + | 2 | x 102.7 | | | = 309.3 | -105.2* |
| 2 | x 101.7 | - | 1 | x 102.7 | | | = 100.7 | - 82.4 |
| 2 | x 101.7 | - | 1 | x 103.9 | | | = 99.5 | - 81.6 |
| 2 | x 102.7 | - | 1 | x 101.7 | | | = 103.7 | - 86.3 |
| 2 | x 102.7 | - | 1 | x 103.9 | | | = 101.5 | - 96.1 |
| 2 | x 103.9 | - | 1 | x 101.7 | | | = 106.1 | & |
| 2 | x 103.9 | - | 1 | x 102.7 | | | = 105.1 | - 98.4 |
| 2 | x 101.7 | + | 2 | x 102.7 | | | = 408.8 | -103.1 |
| 2 | x 101.7 | + | 2 | x 103.9 | | | = 411.2 | -103.1 |
| 2 | x 102.7 | + | 2 | x 103.9 | | | = 413.2 | -105.2* |
| 1 | x 101.7 | + | 1 | x 102.7 | - | 1 | x 103.9 = 100.5 | - 98.1 |
| 1 | x 101.7 | + | 1 | x 103.9 | - | 1 | x 102.7 = 102.9 | # |
| 1 | x 102.7 | + | 1 | x 103.9 | - | 1 | x 101.7 = 104.9 | @ |
| 1 | x 101.7 | + | 2 | x 102.7 | - | 1 | x 103.9 = 203.2 | -105.2* |
| 1 | x 101.7 | + | 2 | x 103.9 | - | 1 | x 102.7 = 206.8 | -105.2* |
| 1 | x 102.7 | + | 2 | x 101.7 | - | 1 | x 103.9 = 202.2 | -105.2* |
| 1 | x 102.7 | + | 2 | x 103.9 | - | 1 | x 101.7 = 208.8 | -105.2* |
| 1 | x 103.9 | + | 2 | x 101.7 | - | 1 | x 102.7 = 204.6 | -105.2* |
| 1 | x 103.9 | + | 2 | x 102.7 | - | 1 | x 101.7 = 207.6 | -105.2* |
| 1 | x 101.7 | + | 2 | x 102.7 | - | 2 | x 103.9 = 99.3 | -104.1 |
| 1 | x 101.7 | + | 2 | x 103.9 | - | 2 | x 102.7 = 104.1 | # |
| 1 | x 102.7 | + | 2 | x 101.7 | - | 2 | x 103.9 = 98.3 | -104.2 |
| 1 | x 102.7 | + | 2 | x 103.9 | - | 2 | x 101.7 = 107.1 | -104.1 |
| 1 | x 103.9 | + | 2 | x 101.7 | - | 2 | x 102.7 = 101.9 | # |
| 1 | x 103.9 | + | 2 | x 102.7 | - | 2 | x 101.7 = 105.9 | -100.5 |
| 2 | x 101.7 | + | 2 | x 102.7 | - | 1 | x 103.9 = 304.9 | -105.2* |
| 2 | x 101.7 | + | 2 | x 103.9 | - | 1 | x 102.7 = 308.5 | -105.2* |
| 2 | x 102.7 | + | 2 | x 103.9 | - | 1 | x 101.7 = 311.5 | -105.2* |
| 2 | x 101.7 | + | 2 | x 102.7 | - | 2 | x 103.9 = 201.0 | -105.2* |
| 2 | x 101.7 | + | 2 | x 103.9 | - | 2 | x 102.7 = 205.8 | -105.2* |
| 2 | x 102.7 | + | 2 | x 103.9 | - | 2 | x 101.7 = 209.8 | -105.2* |

*= In noise floor of test set up.

#= First adjacent channels to stations being tested, can not be read.

&= Frequency of KQDI-FM, Great Falls, MT. Not readable since KQDI-FM was on air. Listening on a radio receiver at the antenna site could not detect any presence of the stations under test.

@= Frequency of KIKF, Cascade, MT. Not readable since KIKF was on air. Listening on a radio receiver at the antenna site could not detect any presence of the stations under test.