

## **Intermodulation report for Radio Stations KMGW and KTRS.**

**Introduction:** This report is to show compliance with FCC rules 73.317 (b) through (D) for Radio stations KMGW and KTRS. Both Stations are utilizing the same antenna in diplexed operations at the Clear Channel facility in Casper Wyoming. The measurements and report were prepared by Paul Jellison, Regional V-P of engineering for Clear Channel. Also at this same location though not using the same diplexed antenna. Radio stations KWYY and KRVK operate from this same tower location and were considered in the study.

**Intermodulation:** Intermodulation can be caused by the combining of two or more transmitters whose antennas are in close proximity by space or by the actual combining of the transmitters on a single antenna system with out adequate isolation maintained between the transmitters output ports. This phenomenon is well studied, understood and documented.

**System:** The system consists of a Dielectric DCRM 6 bay branch fed antenna, Dielectric Well flex 1 and 5/8th inch transmission line and a Dielectric 2 port Branch fed combiner system designed specifically for this application. This system was fitted with a Bird directional sampling coupler fitted into the output line section of the combining system. This is to facilitate intermodulation proof measurements.

**Intermodulation Study:** Measurements were made utilizing the above mentioned directional coupler. All measurements taken were made using an Agilent 4402 spectrum analyzer coupled to the directional coupler with a shielded coaxial cable. Resistive Pads were utilized where necessary to adjust levels for ease of measurements. Transmitters were operated at the power level required to make Rated ERP as required. Carrier reference levels were set at Zero DBM on the spectrum analyzer for KTRS and -9 DBM for KMGW. This is due to the Power level difference in the two transmitters being measured. Once the reference level was set on the analyzer, steep skirt notch filters made by the Microwave filter company were inserted into the line between the coupler and the analyzer. This was to reduce the fundamental carrier level to allow increased resolution on the analyzer without front end overload. This reduced the fundamental signal by an additional 15 DB on KMGW and by 21 DB while passing all other channels to be measured with no appreciable attenuation.

Frequencies specifically observed and measured were ones flagged by the intermodulation study software program supplied by RF specialties version 2.44, although a thorough sweep was made of other frequencies in the 50 to 500 MHz range with the analyzer. Harmonic measurements were also taken in this study.

**Tabulation of measurements:** The following is a tabulation of the results of this study. This is direct measurements of the signals observed that were a contribution of the radio stations being measured. Signals observed but not contributing were eliminated from this

report. The determination for contribution was made by cutting carriers under test and observing the signal. If it did not change then the signal was considered to be contributing from an outside source such as another local Broadcast station or other communications system. This was verified by checking the FCC data base and as such was eliminated for the purpose of this report.

KMGW Carrier reference level = 0 DBm (corrected) KTRS carrier reference level = +6 DBm corrected.

100.1 mHz -113 DBm  
94.0 mHz -114 DBm  
112.8 mHz - 96 DBm  
191 mHz -105 DBm  
201.4 mHz -105 DBm  
209.5 mHz -106 DBm  
286.5 mHz -111 DBm  
306.3 mHz -101 DBm

**Results of Measurements:** The results of study shows that Radio stations KMGW and KTRS are in compliance with FCC part 73.317 (b) through (d).