



Harmonic and Intermodulation Measurements

Date: **June 24, 2005**

Station Call Sign: **KEGL, KZPS, & KHKS FM**

Location: **Cedar Hill, TX (Cowboy Tower)**

Frequency: **92.5 MHz, 97.1 MHz, & 106.1 MHz (respectively)**

Antenna: **Dielectric CBR**

Transmission Line: **3-1/8" Dielectric FleXLine**

Work Description: **Intermodulation measurements on the three IBOC stations combined.**

Prepared for Clear Channel Communications

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Description

Test equipment used: **IFR Spectrum Analyzer, Model 7550**

RF System: **Three station constant impedance combiner**

Notes:

- **All three stations were on the air at their normal operating power for IBOC which is 23 db lower than the analog signal.**
- **The measurements were made from a sample port at the combined output of the combiner.**
- **Two notch filters were used in series for each carrier frequency.**
- **Measurements were made only at calculated intermodulation frequencies that were in FM band.**
- **-23 db was added to each measurement to obtain a final calculation.**
- **The following chart has all the measured data.**
- **All the final calculated intermodulation frequencies are less than -80 db relative to the analog signal level.**

			measured intermod signal level	iboc signal relative to analog	final calculation
101.7	<2B-A	92.5 & 97.1	-62	-23	-85
106.3	<3B-2A	92.5 & 97.1	-75	-23	-98
88.1	<2A-B	97.1 & 106.1	-58	-23	-81

INTERMODULATION CALCULATIONS, 2 FREQUENCY, 3RD ORDER, UP TO 3RD HARMONIC

KEGL KZPS KHKS
 Ref signal Ref signal Ref signal
 level level level
 92.5 97.1 106.1

Levels in dbm

92.5	<FREQ A	levels in	97.1	<FREQ A	levels in	92.5	<FREQ A	levels in
97.1	<FREQ B	dbm	106.1	<FREQ B	dbm	106.1	<FREQ B	dbm
189.6	<A+B		203.2	<A+B		198.6	<A+B	
4.6	<B-A		9	<B-A		13.6	<B-A	
185	<2A		194.2	<2A		185	<2A	
194.2	<2B		212.2	<2B		212.2	<2B	
87.9	<2A-B		88.1	<2A-B	-58	78.9	<2A-B	
101.7	<2B-A	-62	115.1	<2B-A		119.7	<2B-A	
282.1	<2A+B		300.3	<2A+B		291.1	<2A+B	
286.7	<2B+A		309.3	<2B+A		304.7	<2B+A	
379.2	<2A+2B		406.4	<2A+2B		397.2	<2A+2B	
9.2	<2B-2A		18	<2B-2A		27.2	<2B-2A	
277.5	<3A		291.3	<3A		277.5	<3A	
291.3	<3B		318.3	<3B		318.3	<3B	
180.4	<3A-B		185.2	<3A-B		171.4	<3A-B	
374.6	<3A+B		397.4	<3A+B		383.6	<3A+B	
383.8	<3B+A		415.4	<3B+A		410.8	<3B+A	
198.8	<3B-A		221.2	<3B-A		225.8	<3B-A	
471.7	<3A+2B		503.5	<3A+2B		489.7	<3A+2B	
83.3	<3A-2B		79.1	<3A-2B		65.3	<3A-2B	
476.3	<3B+2A		512.5	<3B+2A		503.3	<3B+2A	
106.3	<3B-2A	-75	124.1	<3B-2A		133.3	<3B-2A	
568.8	<3B+3A		609.6	<3B+3A		595.8	<3B+3A	
13.8	<3B-3A		27	<3B-3A		40.8	<3B-3A	