

**Jim White**  
**Chicago Radio Engineers**  
**1220 Grant Street**  
**Evanston, IL 60201**  
**Voice 847-328-0775 Fax 847-328-7975**  
**jpw@cre-radio.Com**



Keith R. Warner  
Chief Engineer  
100.3 Love FM WILV  
130 East Randolph  
Suite 2780  
Chicago, IL 60601

RE: John Hancock FM Station AM Noise Measurements Summary 5/29/07

Dear Keith,

Here is a summary of the John Hancock Center FM station AM noise measurements taken on May 24, 2007. These measurements were taken using the following test equipment: (1) An HP8901A Modulation Analyzer, (2) a Tektronix 2710 Spectrum Analyzer, and (3) a Bird type 501-50 wattmeter sample element. The element was found to have 20dB of directional separation for these tests, as verified using the 2720 Spectrum Analyzer. For detailed photo records of these tests please visit the John Hancock Center FM Combiner site at <http://www.cre-combiner.com>.

Once on the combiner site, select "Projects" then "FM Station - HP 8901A AM Noise Measurements".

Also, When making the measurements I followed Todd Loney's suggestion, as per Todd, "Make sure you are using the 'average' detection and not peak. Noise is 20 log RMS (-60dB = 0.1%, -46 = 0.5% & -40 = 1.0%) Also set the bandwidth to something narrow like 25kHz so you don't get pilot or AM L-R. If you have a spectrum analyzer, check the directivity of the Bird sample."

And in addition to Todd suggestions, I also measured (1) Peak AM noise, (2) difference in AM noise readings with IBOC transmissions ON and OFF. These tests were done with WBEZ and WUSN (using the high level IBOC method), and WLUP, WKQX, using the low-level IBOC method.

A Table of the average AM noise results is on the following page.

## John Hancock FM Station Average AM Noise Summary Table

Station	Ave. AM ( No Filter )	Ave. AM ( with 20 Khz Filter )
<b>WBEZ IBOC ON</b>	<b>0.10%</b>	<b>0.08%</b>
<b>IBOC OFF</b>	<b>0.06%</b>	<b>0.04%</b>
<b>RDL ACM-3/U</b>	<b>-45 dB ( IBOC ON )</b>	
<b>WNUA</b>	<b>0.28%</b>	<b>0.18%</b>
<b>RDL ACM-3/U</b>	<b>-39 dB ( IBOC ON )</b>	
<b>WUSN IBOC ON</b>	<b>8.55%</b>	<b>0.66%</b>
<b>IBOC OFF</b>	<b>0.54%</b>	<b>0.53%</b>
<b>RDL ACM-3/U</b>	<b>-35 dB ( IBOC ON )</b>	
<b>WLUP IBOC ON</b>	<b>1.12%</b>	<b>1.01%</b>
<b>IBOC OFF</b>	<b>1.10%</b>	<b>1.00%</b>
<b>RDL ACM-3/U</b>	<b>-34 dB ( IBOC ON )</b>	
<b>WLIV</b>	<b>1.56%</b>	<b>1.52%</b>
<b>RDL ACM-3/U</b>	<b>-24dB WLIV's RDL 2</b>	<b>-26dB</b>
<b>WKQX IBOC ON</b>	<b>0.54%</b>	<b>0.53%</b>
<b>IBOC OFF</b>	<b>0.52%</b>	<b>0.49%</b>
<b>RDL ACM-3/U</b>	<b>-35dB</b>	
<b>WVAZ</b>	<b>0.26%</b>	<b>0.25%</b>
<b>RDL ACM-3/U</b>	<b>Output too low</b>	
<b>WOJO</b>	<b>1.82%</b>	<b>1.39%</b>
<b>RDL ACM-3/U</b>	<b>-26dB</b>	
<b>RDL ACM-2</b>	<b>-45dB</b>	