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Here is a synopsis below of research, measurements, consultations I have had with Mr. Sean Edwards of Shively Labs. Most importantly, Sean concurs with me that employing a line stretcher to improve AM noise performance of some of our older tube type transmitters.

Here is Sean's synopsis below, and of course, I am always happy to answer any questions you, the FM group, or Mead Elliott may have.

Dr. Jim White,

It has been my experience that tube transmitters are susceptible to synchronous AM noise (slope modulation, incidental AM) when transmitter tuning is not optimized into a load and/or the load has a changing phase across the channel i.e. a broadband antenna system with phase variations across the channel, a multiplexing system, a narrowband (high Q) antenna match. The transmitter operation into a dummy load may be very good or into a single frequency antenna with a very flat match but the same problem sometimes occurs. If the AM noise figure is not within spec when the load is acceptable the source of the distortion is usually the tuning of the stages within the transmitter itself.

There are a number of solutions to improve AM noise. The first is to improve the match of the load. If the match of the load is already acceptable (less than 1.1:1 across the channel with less than 6 dB variation), then changing the phase between the load and the transmitter so as to produce a complex conjugate match. This can be done with a line stretcher or by changing the line length thru and iterative process. I have used the latter (cut and try) technique to improve AM noise and although as effective as using a line stretcher it is more cumbersome and time consuming. Another more effective solution is to replace the tube transmitter with a solid state transmitter. These transmitters have much better AM noise figures and can increase the system AM noise figure by 30 dB.

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