

Letters to the Editor

EXPERIMENTAL DETERMINATION OF GROUND SYSTEM PERFORMANCE FOR HF VERTICALS (JAN/FEB 2009 THROUGH JAN/FEB 2010) LETTERS (MAR/APR 2010)

Larry,

With regard to the Letter from Rudy Severns, N6LF, in the Mar/Apr 2010 issue, his "Equation 18" is the same as "Scale (4)" (Reflection Loss, dB) of "Table I" in Phillip H. Smith's article on his "Mega-Rule" in *QST*, March 1969. [That article is available for download on the Members Only section of the ARRL Web site. — Ed.] An extensive table of "Reflection Loss, dB" and nine other function values appears in the Mega-Rule instruction manual as "Table II" and as "Table 14.1" in Smith's *Electronic Applications of the Smith Chart*, Noble Publishing, Atlanta, GA, 1995.

Further, with reference to Rudy's excellent summary article in *QST*, March 2010, I've already heard two enthusiastic, on-the-air references to it.

— 73, James L Olsen Jr, W3KMN, 5905 Landon Ln, Bethesda, MD 20817; w3kmn@aol.com

Hi James,

Thanks for the kind words. I think too many people are taking the *QST* article as gospel when it should be viewed only as an interesting set of experiments, which shed some light on a few questions. Even the *QEX* series, which is much more detailed, raises far more questions than it answers.

I was really hoping to encourage others to expand on my work (as I expanded on Sevick's) by showing how it might be done.

— 73, Rudy Severns, N6LF, PO Box 589, Cottage Grove, OR 974249; n6lf@arrl.net

A QUESTION FOR QEX READERS

Dear Larry,

It has been some years now since publishing my Dirdoyne and Bedford receiver articles in *QEX*.^{1, 2} I am still developing equipment that is radical in design, and as such I do tend to come across problems that few ever see. I wonder if the readers of *QEX* can assist me with a problem that I have never seen answered in the literature before, but which must be seen from time to time. Anyway here it is.

I have been using a balanced mixer with the Fairchild quad switch type FST3125 IC in a direct conversion receiver. It consists of four FETs, which simply act as four SPST switches. I have used these in direct conver-

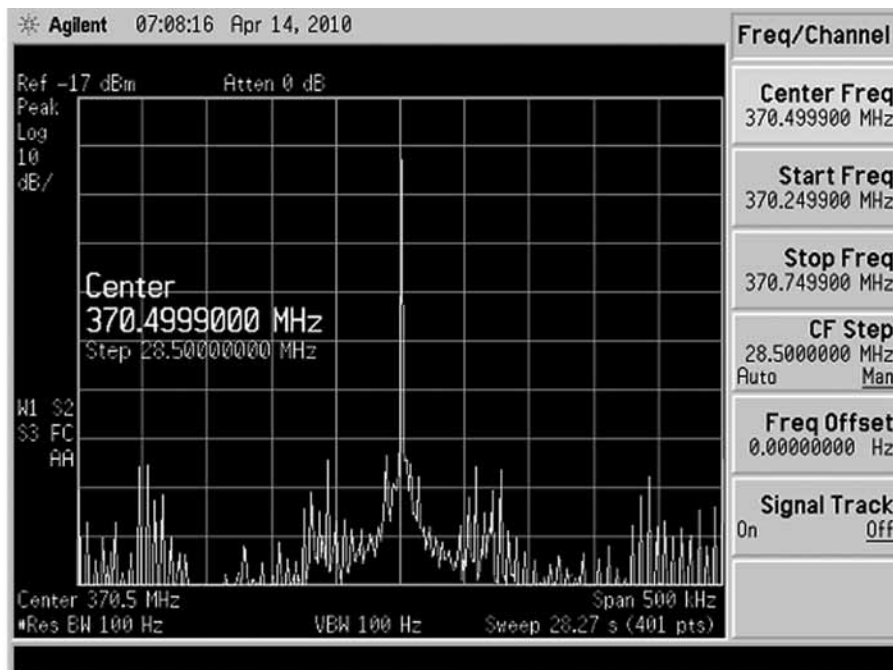


Figure 1—A spectral display of Rod Green's mixer output.

sion receivers and at the lower frequencies — say below 20 MHz — they work very well. From about 25 to 30 MHz, however, they introduce weak drifting birdies and other noise into the audio.

I recently went all out to find and fix the problem. I used two of the FETs as a series switching demodulator. The clock is a very clean square wave from a frequency divider as used commonly in ARRL literature. I decided to look at the antenna port of the receiver operating at about 28 MHz, and there was nothing unusual there. The normal carrier leak of about -50 dBm was evident and as clean as can be determined on my spectrum analyser (analyzer for your USA readers). No other signal was fed to the demodulator for this test.

When looking from about 300 to 500 MHz, between the harmonic content of the clock there were many spurs that were not quite stable but responded to temperature changes by a small amount. Typically they lay in multiples of 60 kHz at 300 MHz. See Figure 1. They were not evident below say 200 MHz at all.

These spurs were not on the oscillator signal but were generated by the mixer itself. I can only suggest that the FETs in the mixer, which have a finite turn on time of about 5 ns must contribute to the problem in some way. It is baffling and I have never seen anything about this in print. It has occurred in every mixer using FET switching that I have built. It only occurs at the upper end of the HF spectrum. The mixer loss only rises by perhaps 1 dB or so, com-

pared to lower frequency operation.

Has anyone ever had this problem, and what is more, solved it? I have done some experiments by placing an RC filter to limit the rise time of the clock signal. There is evidence that it has improved the situation at the antenna terminal but the audio noise is still present so I am not yet convinced that I have accomplished anything.

In closing, I enjoy your magazine and try to read every issue. Perhaps you may be able to start a questions from readers section, as I am sure that I am not the only one doing radical design.

— 73, Rod Green, VK6KRG, 106 Rosebery St, Bedford, WA 6052, Australia; vk6krg@yahoo.com.au

Hi Rod,

Let's see what our readers come up with. I hope we both hear from anyone who has experience using the FST3125 switches in a mixer circuit. It has been a while since you have published an article in *QEX*. Perhaps you would like to consider writing an article about your mixer experiments.

— 73, Larry Wolfgang, WR1B, QEX Editor; lwolfgang@arrl.org

Notes

¹Rodney Green, VK6KRG, "The Bedford Receiver: A New Approach," *QEX*, Sep/Oct 1999, pp 9-23.

²Rodney Green, VK6KRG, "The Dirdoyne: A New Radio Architecture?," *QEX*, Jul/Aug 2002, pp 3-12.

