

After our Mar/Apr 2003 *QEX* article about a high-level accessory for the HF amateur bands, my father, I4FAF, has been quite busy developing a broadband HF amplifier. It is a high-gain 300 W pep/CW, high-voltage (100-V) unit using low-cost power MOSFETs.

We faced some reliability problems. We already have and enjoy very much our tetrode linear amplifiers built around the rugged 4CX800A (I added new photos to my Web site). So we decided instead to dedicate our free time to evaluating the high level H-MODE mixer with the FST3125M (Fairchild IC) having three-balun (trifilar-winding) transformers and a simpler version presented by I7SWX in the April, 2003 *Radcom*, p 82, which has only two baluns.

We have produced with EAGLE CAD a small evaluation board. The original version has three binocular transformers (Amidon BN-43-2402, 4 trifilar turns, AWG 29) and a 74HC86, two-channel squarer, an H-MODE FST3125M IC and all other parts. We tested it: it works as specified by G3SBI (see CDG2000 Web site), but with these bonuses:

- a single 5-V supply (without any need-- with good decoupling for noise-- to split the supply for the squarer and with 7 V for the FST3125M),
- with 74HC86/74AC86 you do *not* need to put your LO at twice frequency to achieve the desired IF, i.e., 9 MHz; but you get extremely high IIP3 (over + 40 dbm) and conversion loss around 5.5 dB. We measured LO-IF isolation in our practical circuit at around 40 dB (with adjustment of a balance trimmer in the squarer circuit). We tested the LO range from 10.8 MHz to 39 MHz (i.e., IF at 9 MHz) and measured, at the IF port, isolation ranging from 42 dB to a worst-case figure of 34 dB;
- Isolation at RF-IF port is much more adjustment-balance-trimmer sensitive and we have measured values ranging from 55 dB (at RF of 1.8 MHz) to 24 dB worst-case at an RF frequency of 30 MHz (best case was at an RF of 14 MHz with 60 dB);
- LO power level is only a 0-dBm sine wave at the squarer input.

We have successfully tested the LO frequency range from 10.8 to 39 MHz. The PC board is small and well behaved (and shielded).

The best following circuits are a diplexer and a roofing filter like those already presented in the CDG2000 Web site, as found in *Radcom* magazine, about CDG2000 (issues June 2002 to December 2002) and in *Experimental Methods in RF Design* (ARRL) pp 6.49 – 6.53.

Today I discovered from a Google Web search on H-MODE mixers that JA9TTT, Mr. Takahiro Kato has put today, July 26, on his Web site a very complete article with plenty of spectrum-analyzer (an ADVANTEST TR4171) photos of performance tests of both the H-MODE FST3125M versions. It includes the W7AAZ-G3SBI three-baluns version and Giancarlo, I7SWX's version with only two baluns, both of which have fundamental frequency input at the local-oscillator side.

Since JA9TTT has done a very nice job with a lot of photos, well documenting the performances that we also have verified, we already have experienced an on-air test of it with a full RX chain with a very favourable first impressions: a very clean RX experience. We placed the mixer unit after our *QEX* Mar/Apr 2003 front-end unit. We

added a 9-MHz, 2.4-kHz crystal filter and a W7AAZ IF-AGC with AD600 ICs and a product detector with audio amplifier.

I just wanted to inform you and your readers about JA9TTT's work and the well documented reports available on his web site: <http://www.ksky.ne.jp/~t-kato/hamf/hamhome.html>. (\*). Click on the translator option from Japanese to English; of course, it is not a perfect translation but it is useful. I will put the circuit board templates on my Web site at <http://www.qsl.net/ik4auy/>.

73, Sergio Cartoceti, IK4AUY, [sergio.cartoceti@tin.it](mailto:sergio.cartoceti@tin.it)

(\* ) PS I have checked his web site at the end of august 2003 but JA9TTT leaved only the message that it has reached 100.000 visitors and he has closed his web site!!! Look in my web site for all boards and details.