Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Senior Assistant Technical Editor

TESTING FOR PCB

☐ Does the oil in that dummy load of yours contain PCB (polychlorinated biphenyl), a toxic substance? There is a relatively inexpensive way to find out: Use the CLOR-N-OL™ 50 PCB screening kit sold by the DEXSIL Corporation. DEXSIL states: "The test is intended for use only with transformer oil of petroleum origin. It may not be useful for other fluids." CAUTION: *Wear rubber gloves and safety glasses when performing the test! Used kits—and any PCB-containing oil you discover—should be treated as hazardous waste and disposed of properly.*

The screening kits are available as single kits for $7 each and $6 each in packages of 20 kits, plus shipping and handling charges. Contact DEXSIL at One Hamden Park Dr, Hamden, CT 06517, tel 203-288-3509. (Thanks to Bill Jacobs, WA8YCG, for bringing this to our attention.)—*Paul K. Pagel, N1FB, ARRL HQ*

IMPROVING RECEIVER DYNAMIC RANGE WITH A SQUARE-WAVE LOCAL OSCILLATOR

☐ Although it's common for experimenters to borrow bits and pieces of projects to build a larger project, the circuit presented here goes the other way around. It's a simplification of an already elegant circuit.

Charles Wenzel won the second annual *rf design* Awards Contest with his implementation of an odd-order frequency multiplier circuit.[1] Part of his circuit makes an excellent sine-to-square-wave converter for shaping a receiver local-oscillator (LO) signal. The revised circuit I've devised is shown in Fig 1. While using the same drive power to an SBL-1 mixer, the input intercept was raised from 11.5 dBm to 17.5 dBm by using the wave-shaping circuit. The intercepts are relative to a single tone. An HP453B equipped with an HP8482A power sensor was used to measure the drive power (11 dBm in both cases).

For those wishing to verify my results, my experimental setup used a mixer that converted a 13.77-MHz signal to 10.00 MHz. The 3.77-MHz LO (I've yet to build the 4- to 4.1-MHz VFO for my 20-m transceiver!) has a seven-element, low-pass filter at the output to remove harmonics. The wave-shaping circuit produces them!

In lieu of MMICs, you can use one of the many 2N5109 or 2N5179 broadband amplifier circuits published,[2] although MMICs are much easier to use and are available by mail order.[3] The wave-shaping circuit requires a drive level of between 5 and 10 mW, and provides a conversion gain of between 1.8 and 2.5 dB. On a wideband oscilloscope, the wave shape appears to be acceptable between frequencies of 3.5 and 6.1 MHz, but the ARRL Lab lacks a third high-quality signal generator required to make the proper measurements. A high-dynamic-range system is needed to see the improvement—at power levels near the compression point, the reduction in IMD is barely measurable.—*Zachary Lau, ARRL Lab Engineer*

HW-9 TIPS

☐ I read the article, "Improving the HW-9 Transceiver,"[4] with great interest. I built an HW-9 about two years ago, and the first thing I added to it was a Curtis keyer chip; the second thing was a 100-kHz crystal calibration oscillator. The keyer and calibration oscillator circuits are contained on a small perf board that's secured to the left rear corner of the rig by means of small metal angle brackets. The calibrator has proved extremely useful in light of the HW-9 reduction drive's tendency to slip.

I'd like to add a couple of suggestions concerning the addition of the keyer circuit. I like to use a straight key from time to time, so I removed the original key jack, enlarged the hole and mounted a four-pin microphone connector in its place (see Fig 2). This provides connections for both a paddle and straight key without adding another jack. I also added a small push-button switch to the rear panel and connected it to the keying line for use as a TUNE switch.

I found the HW-9's keying to be a bit on the heavy side. Although the weighting could have been altered by using a weighting control connected to the Curtis chip, I decided it was better to correct the problem at its source: This is the HW-9's keying line, which has a slow return to +12 V. I solved this by adding a 1-kΩ resistor from the transmitter keying line to +12 V. Observation of the rig's output on a scope shows almost perfect weighting. I recommend this simple modification to anyone using an external keyer as well.

I'm already planning my next project: Add the SWR meter, thump suppressor and filter modifications described in the April article. With these additions, this great little rig will be even more of a joy to operate! Now—if I could just find a way to reduce the warm-up drift of the VFO...—*Larry V. East, W1HUE, 119-7 Buckland St, Plantsville, CT 06479*

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary.

[1]C. Wenzel, "New Topology Multiplier Generates Odd Harmonics," *rf design*, Jul 1987, pp 31-34.
[2]D. DeMaw and W. Hayward, *Solid State Design for the Radio Amateur* (ARRL: Newington, 1986), p 147, Fig 12.
[3]MMICs are available from Microwave Components of Michigan, 11216 Cape Cod, Taylor, MI 48180, tel 313-941-8469 (evenings).
[4]C. Hutchinson and Z. Lau, "Improving the HW-9 Transceiver," *QST*, Apr 1988, pp 26-29.

Feedback

☐ Please refer to "RX Noise Bridges," *QST*, May 1988, pp 34-35 and 39. On p 39,

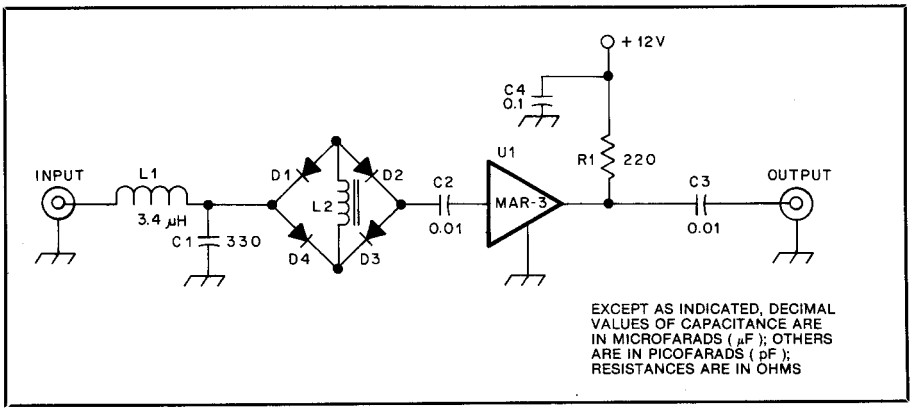

Fig 1—Schematic of the sine-to-square-wave converter.
C1—330-pF silver mica
C2-C4—Disc-ceramic capacitors
D1-D4—Schottky diodes.
L1—28 turns no. 26 enam. wire on an Amidon or Palomar Engineers T-37-2 toroidal core. (Amidon Associates, Inc, 12033 Otsego St, N Hollywood, CA 91607, tel 818-760-4429; Palomar Engineers, Box 455, Escondido, CA 92025, tel 619-747-3343.
L2—28 turns no. 26 enam. wire on an FT-37-72 toroidal core.
R1—220-Ω, ½-W.
U1—Mini-Circuits MAR-3, Avantek MSA 0304 or MSA 0385.

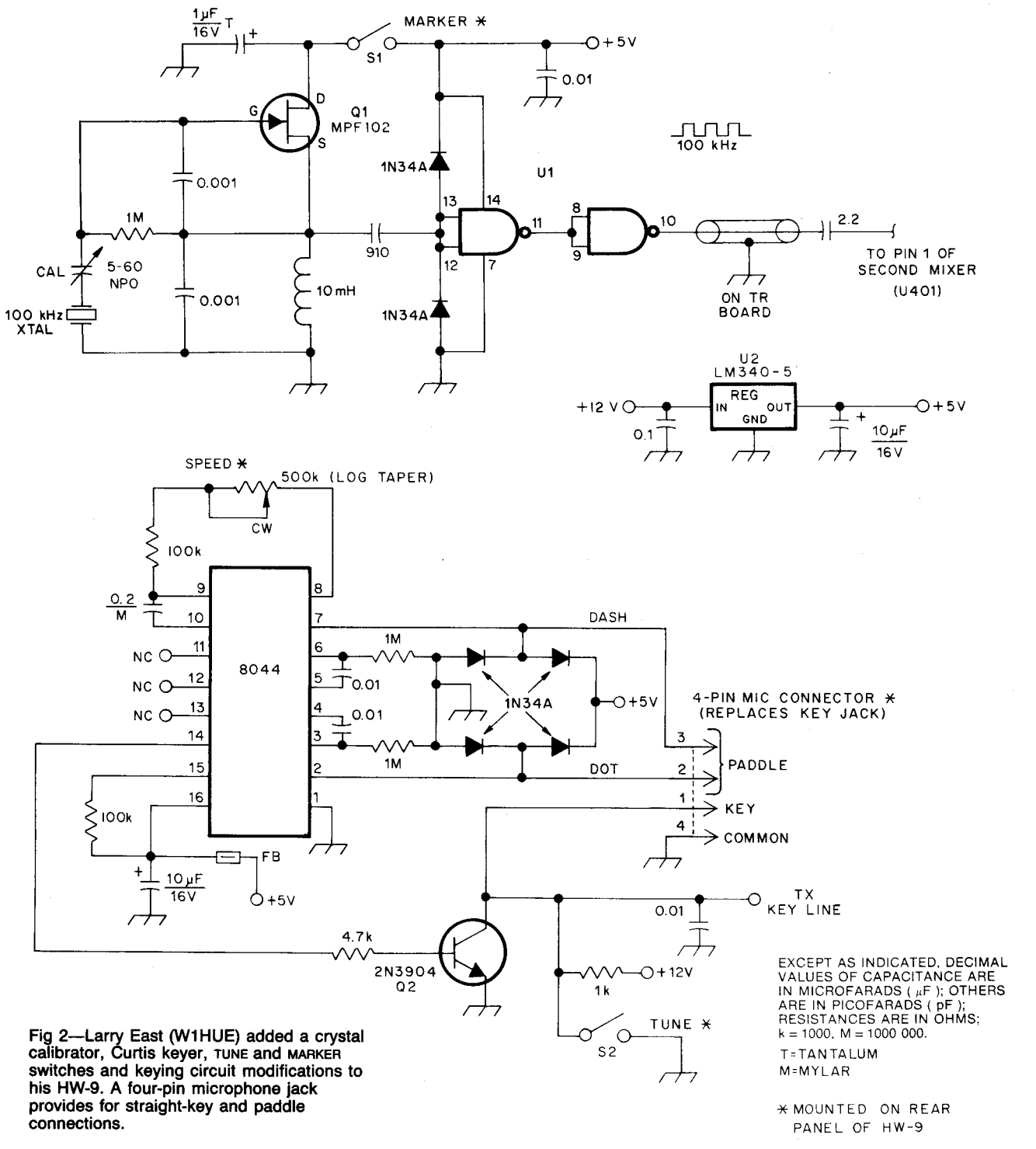

Fig 2—Larry East (W1HUE) added a crystal calibrator, Curtis keyer, TUNE and MARKER switches and keying circuit modifications to his HW-9. A four-pin microphone jack provides for straight-key and paddle connections.

there is a typographical error to the left of the equals sign in equation 6. The equation should read: $Z'_{in} = 67.2 \angle 174.13°$.—(*tnx John Belrose, VE2CV.*)

☐ The Amidon T-44-0 core specified in the caption of Fig 1 of "Joe Ham Versus VCR RFI" (*QST*, Jul 1988, p 35) is not a powdered-iron core—it's phenolic. Although this core appears in the Amidon catalog under the powdered-iron core heading, a source at Micrometals, Inc confirms that the 0-mix cores are phenolic and have a permeability of 1 (see Jim Cox, "Iron Powder Cores for RF Power Applications," *rf design*, Feb 1987, pp 39-43.) Thanks to Michael A. Czuhajewski (WA8MCQ) for bringing this to our attention.

☐ In Doug DeMaw's "Preamplifier for 80- and 160-M Loop and Beverage Antennas," *QST*, Aug 1988, pp 22-24, there is an error in the Fig 1 parts list on p 23. L1 is wound on an FT-37-61 ferrite core, not an FT-50-61. (Although the FT-50 core yields a slightly higher inductance, it should fall within the tuning range specified.)

☐ Author Al Christman, KB8I, reported two errors in "Elevated Vertical Antenna Systems," *QST*, Aug 1988, pp 35-42. In Table 3, the input impedance of the 4-radial monopole at 15 feet should be 33.77 $+j$ 0.59 Ω, not 3.77 $+j$ 0.59 Ω. In Table 9, the antenna designations are reversed. The left-hand columns apply to a 1/8-λ monopole with a 1/4-λ radial, and the right-hand columns represent a 1/8-λ monopole with a 1/8-λ radial.