Edited by **Bob Schetgen, KU7G** • Assistant Technical Editor

MORE ON THE DRIFT-FREE VFO

[Here are a couple of hints for Jacob Makhinson's article in the December issue [1] —*Ed.*]

◊ As stated in the article, the analog switch (U12A) opens the control loop when the main tuning knob is active, and for a short time thereafter. There is no provision to open the loop when tuning an RIT control. Figure 1 shows a simple solution.

Mount an interrupter wheel to the RIT shaft and an interrupter sensor to read the new wheel. When the RIT knob moves, the new sensor will output about +5 V. The two 1N4002 steering diodes prevent either interrupter sensor's output from interfering with the output of the other sensor. (This is sometimes known as wire ORing the two tputs.) U13 then receives pulses whenever either the main tuning or RIT is active, and opens the control loop whenever either control is active.

Some builders may find it difficult to make the toothed disk that works with the interrupter sensor. Actually, the tooth shape is not critical. One could simply cut grooves into the disk circumference with a hacksaw, scroll saw, hand-held grinder and thin wheel or saw blade. If the system does not seem to work, widen the slots somewhat. For example, a hobbyist's razor saw would likely make slots too thin to pass sufficient light. Indeed, the disk need not have *physical* serrations at all. Opaque lines on a transparent disk will work as well as a toothed disk. You could use a copier that makes dark, solid copies to copy Figure 4 of the December article onto acetate film as shown here in Figure 2.—*Jacob Makhinson, N6NWP, 100 N Sunset Canyon Dr Burbank, CA 91504*

[1] Jacob Makhinson, N6NWP, "A Drift-Free VFO," *QST*, Dec 1996, pp 32-36.

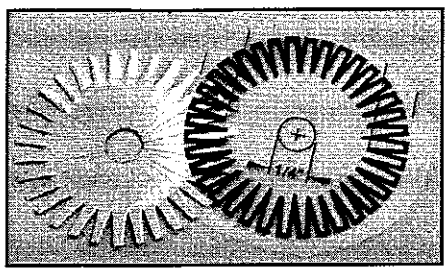

Figure 2—An alternate method to make interrupter wheels. The aluminum wheel is the author's original; the other is an acetate photocopy of his drawing.

◊ From the ARRL Lab: Use high-Q chip capacitors instead of NP0 discs. An air-dielectric piston trimmer works a lot better than a ceramic trimmer. Both changes increase the resonator Q.

Harmonics of the crystal oscillator that fall in the RF tuning range often generate "birdies." If you experience birdies, consider changing the crystal frequency (and divide ratio) so that the harmonics fall outside the band of interest.—*Zack Lau, W1VT, ARRL Laboratory Engineer*

BROADBAND MATCHING FOR HF MOBILE WHIPS

◊ I recently purchased an assortment of Lakeview HAM STICK mobile whips for the 75, 40, and 20-meter bands. Lakeview's quick-disconnect adapters permit easy whip changing for the desired band. To hold the antennas, I bolted a ball antenna base through the fender on my pickup. With this setup, the minimum SWR for each band was approximately 2:1. This SWR doesn't add significant loss to a 10-foot length of RG-8X, but it did cause the protective circuitry in my transceiver to reduce the power output.

Lakeview makes an accessory matching coil that mounts at the base of the whip. You simply adjust the coil tap for minimum SWR. This works just fine, but you must readjust the tap each time you change whips for a different band. Also, I consider the coil assembly at the base unsightly.

The ARRL Antenna Book suggests placing a small capacitor between the base of the whip and ground, then lengthening the whip to compensate for the detuning effect of the capacitor.[2] Each band requires a different capacitor, so I secured each capacitor to its whip with heat-shrink tubing. One lead of each capacitor connects to the base of its whip, and the other lead to a short flexible wire. This wire grounds the capacitor via a connector under one of the ball-mount bolts.

This works great, but with one drawback: The adjustable top-whip sections are too short to achieve resonance with the added capacitors. I purchased one new whip section (about six-inches longer) for

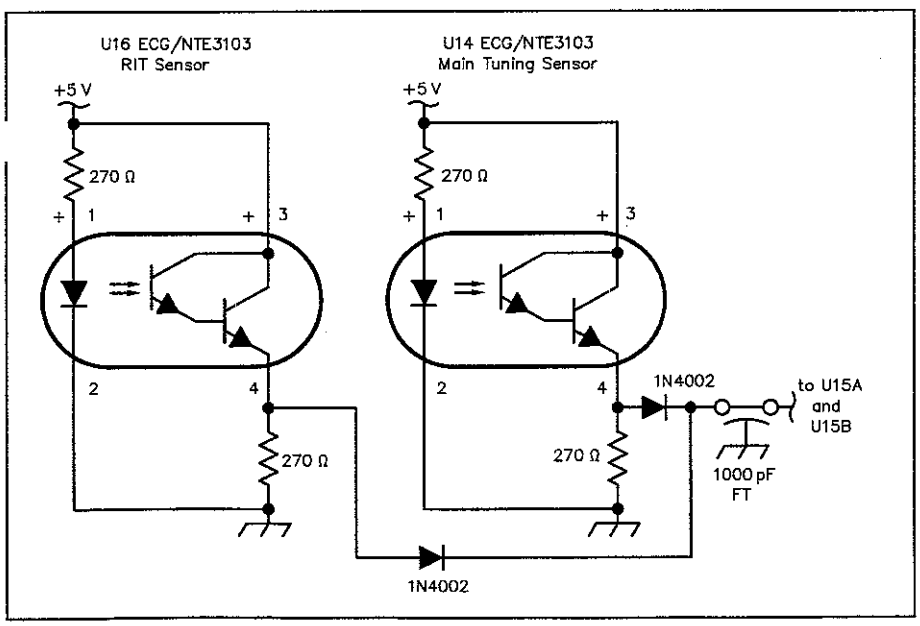

Figure 1—A second interrupter switch, interrupter wheel and a couple of steering diodes permit the drift-free VFO to operate in radios with RIT. U15A and B are in Figure 3 on page 35 of the December 1996 *QST*.

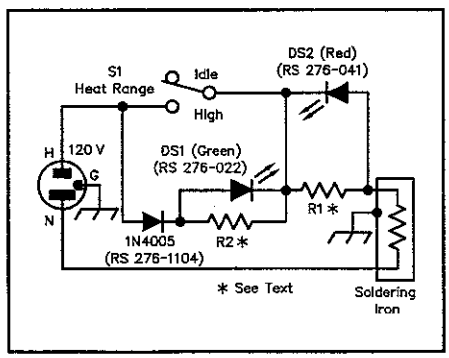

Figure 3—A revised circuit for "A Deluxe Soldering Station."

the 40-meter antenna. It works fine, but I don't want to replace all of my nice new Lakeview whip sections.

After reading *Building and Using Baluns and Ununs: Practical Designs for the Experimenter* by Jerry Sevick, W2FMI, I decided that a 50 Ω to 22 Ω unun mounted at the antenna base would do the trick.[3] The SWR for each of the whips was approximately 2:1, which means that each has a load impedance near 25 Ω. [For purely resistive loads, SWR equals the ratio of load resistance to line characteristic impedance, or its reciprocal. For a 50-Ω line, an SWR of 2:1 indicates a load of either 25 Ω or 100 Ω.—*Ed.*] Ununs are broadband (eg, 1 to 30 MHz) unbalanced to unbalanced transmission-line transformers wound on toroid cores, so one should work for all bands. My tests showed these assumptions to be true. I now have an SWR of 1.1:1 at resonance on all bands.

Next, I designed an enclosure for the unun that mounts to the base of my ball mount, inside the fender. I purchased a small cast-aluminum utility box from a local electronic supply house. Then I cut holes in the box so that it slides over the ball mount's center insulator and three mounting bolts, inside the fender well. A coaxial connector added to the box provides a place to solder the 50-Ω and ground leads of the unun and provides for easy coax-cable connection. The 22-Ω unun lead attaches to the ball mount's antenna connector with a lug and screw supplied with the mount. I used Coax Seal to seal three edges of the box to the fender. I left the bottom lip of the cover unsealed, so any condensation inside the box can drain through this small crack.

I have not tried this matching technique with other antennas or with the HAM STICK antennas mounted in different locations on the vehicle. W2FMI's book also describes ununs to match 50 Ω to 12.5 and 5.5 Ω loads. Use one of these if your mobile whip has a lower impedance. For a single unun to work, the antennas must present approximately the same impedance—at resonance—on all bands. If you're not into winding your own unun, you can buy one from Amidon.[4]—*Robert W. Lewis, AA4PB, PO Box 522, Garrisonville, VA 22463*

[2]R. Dean Straw, *The ARRL Antenna Book* (Newington: ARRL, 1994), Figure 20C on page 16-13. ARRL Publications are available from your local ARRL dealer or directly from ARRL. Mail orders to Pub Sales Dept, ARRL, 225 Main St, Newington, CT 06111-1494. You can call us toll-free at tel 888-277-5289; fax your order to 860-594-0303; or send e-mail to **pubsales@arrl.org**. Check out the full ARRL publications line on the World Wide Web at **http://www.arrl.org/catalog**.

[3]Jerry Sevick, W2FMI, *Building and Using Baluns and Ununs*, (Hicksville: CQ). Order No. BALUN from CQ Communications Inc, 76 N Broadway, Hicksville, NY 11801-9962; tel 516-681-2922, fax 516-681-2926.

[4]Amidon Inc sells parts and ready-made baluns and ununs along with and current design and construction information from Jerry. Contact Amidon at 3122 Alpine Ave, Santa Ana, CA 92799; tel 714-850-4660, fax 714-850-1163.

A NEW STATUS INDICATOR FOR THE *HANDBOOK* DELUXE SOLDERING STATION

◊ This perennial *ARRL Handbook* project has a neon lamp in a circuit that illuminates only one electrode when the soldering iron is idling, and two electrodes when full power is appled.[5] It is not always easy to see whether one or both electrodes are glowing, however. Therefore, I replaced the neon bulb with a *pair* of LEDs (one green *and* one red), as shown in Figure 3. At first, I connected a diode in series with the red LED, but it proved unnecessary.

For my 240-V, 60-W iron, R1 is 4.7 Ω/1 W and R2 is 10 Ω/2 W. For 120-V mains, or if the power of your iron differs greatly—say 120 W or 30 W—adjust the resistances. The idea is to obtain about 1 to 2 V across the resistor in order to light the associated LED. Thus, you will need to find the current drawn by your iron: I = P/E; where I is in amperes; P is in watts and E is in volts. Then R1 = 1.5/I Ω, and R2 = 2 × R1. Each resistor dissipates R × I. [I see no reason for R1 and R2 to differ in this circuit. Table 1 shows R values for several common US soldering-irons.—*Ed.*]

With this circuit, the status of your soldering iron is obvious—even with the quickest sidelong glance—green for idle, red for *hot*.—*André Jacquet, F9OL, 13 Ave Léon Dubas, 44380 Pornichet, France*

[5]See the Construction chapter of a recent *ARRL Handbook*.

Table 1
Values of R1 and R2 for Common 120-V Soldering Irons

Power (W)	Current (A)	R1, R2 (Ω)	R1, R2 Size (W)
25	0.21	7.5	1
40	0.33	4.7	2
60	0.5	3.0	2
100	0.83	1.8	3

AUTOMATIC TRANSMITTER KEYING FOR SCREWDRIVER (MOBILE) ANTENNA ADJUSTMENTS

◊ Some popular mobile antennas use an electric screwdriver mechanism to adjust a large loading coil. This permits a single whip antenna to tune the whole HF range. It's helpful for the transmitter to be keyed during antenna adjustments. Here's a simple way to make that happen:

Connect a small 12-V dc relay or reed-relay to the output of the antenna's **UP/DOWN** DPDT switch as shown in Figure 4. Wire the relay contacts to the CW keying jack on the transceiver using an appropriate plug. When tuning the antenna, switch the transceiver to the CW mode. Now, each time you operate the antenna's **UP/DOWN** switch, the transceiver will transmit in the CW mode as you tune the antenna. This works well with my Kenwood TS-50S.—*Tom Lloyd, N5AS, 2010 Rosemond Ave Jonesboro, AR 72401-4679*

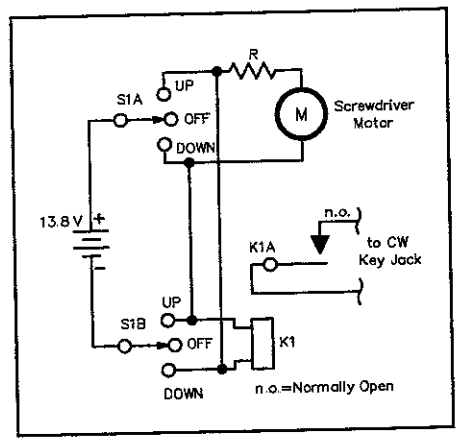

Figure 4—N5AS added a reed relay (Radio Shack 275-233) to his electric-screwdriver-tuned mobile antenna. The relay keys the transmitter whenever the operator adjusts the antenna.

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