

276 *Build simple VLF radio receivers*

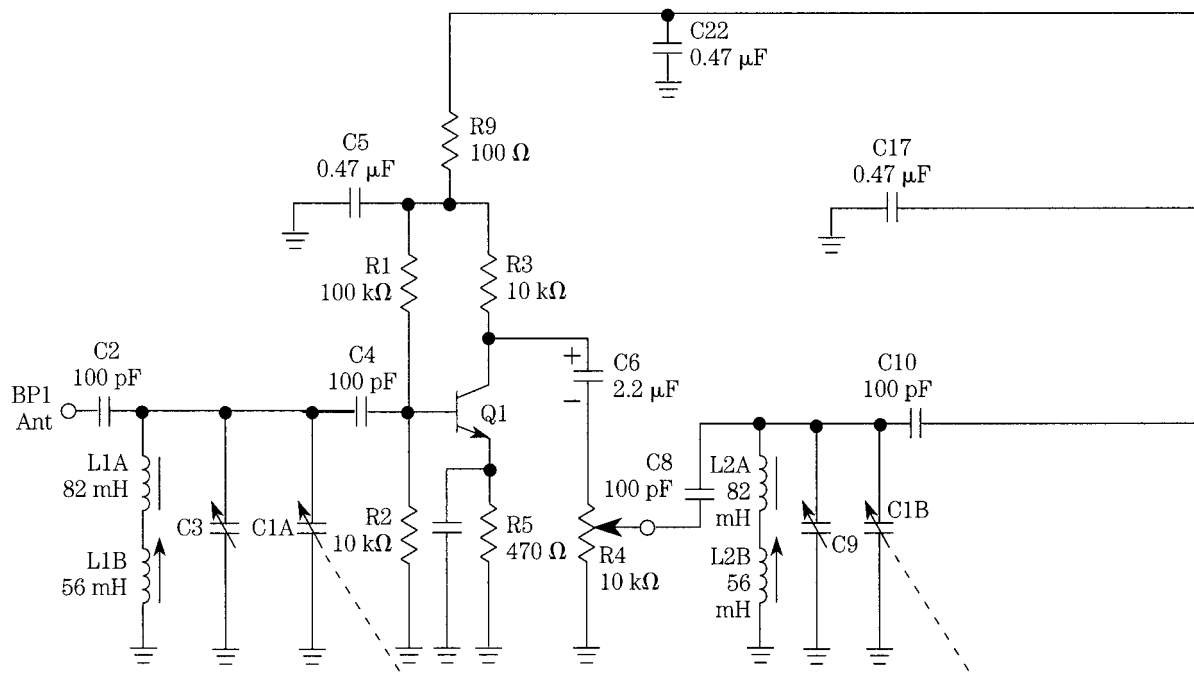
tion of the main tuning capacitor reduced the tuning range to 20 to 30 kHz. The approach in Fig. 13-8A uses a capacitor (C_4) for the mutual reactance, and in Fig. 13-8B, an inductor is used (L_3).

The trigger transformers are widely available from mail-order sources. However, I ordered several from an English source, Maplin Electronics (P.O. Box 3, Rayleigh, Essex SS6 8LR, England). They have variable capacitors, coil forms, and a number of other things of interest to amateur radio constructors. The U.S. credit cards accepted include VISA and American Express and the currency exchange is automatic.

Another alternative, although I've not tested it, is to use pulse transformers. Unfortunately, these transformers typically have limited turns ratios (2:1:1).

A VLF receiver project

The circuit for a modified VLF receiver is shown in Fig. 13-9. It uses the same basic circuit as the Stokes design but with these modified tuning circuits. The 82-mH fixed inductors (L_{1A} , L_{2A} , and L_{3A}) are the Toko 181LY-823J, which are available from Digi-Key (P.O. Box 677, Thief River Falls, MN 56701-0677; 1-800-344-4539) under catalog number TK-4424. The 56-mH variable inductors are Toko CLNS-T1039Z,



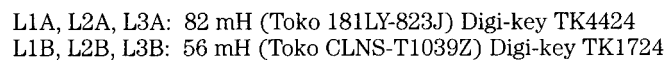
Q1, Q2, Q3: 2N4401

C1: 3×365 pF (see text)

C3, C9, C14: 8–80 pF trimmer capacitor (Sprague-Goodman GZC80000) Digi-key SG3010

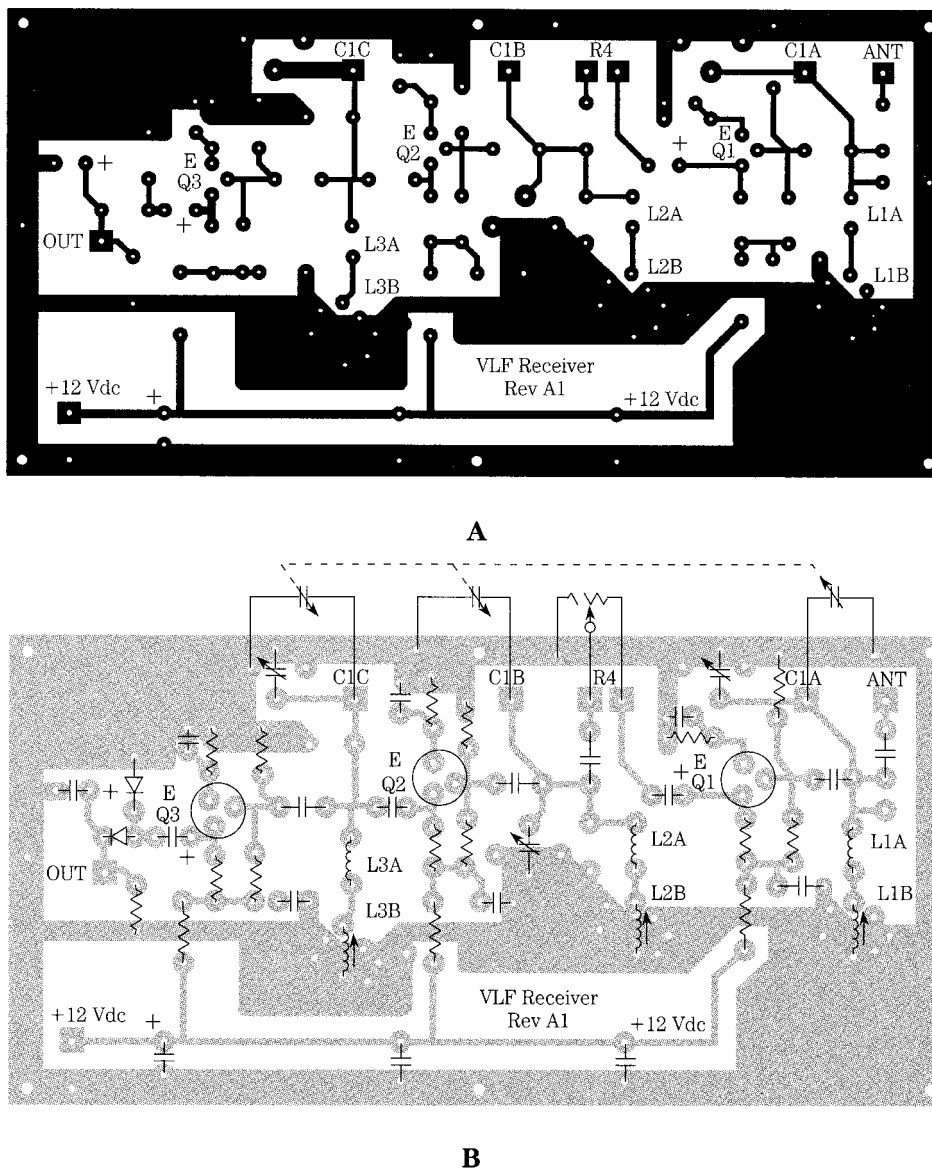
13-9 Schematic of the VLF receiver project.

The output circuit for this receiver reflects the fact that it is a SID monitor receiver. The detector is a voltage doubler (D_1/D_2) made from germanium diodes. The original diodes specified were 1N34 but 1N60s work well also. If you cannot find these diodes (RadioShack and Jim-Pak sells them) then try using replacements from the “universal” service shop replacement lines, such as SK, NTE, and ECG. The NTE-109s and ECG-109s will work well. The output of the detector is heavily integrated by a 470- μ F electrolytic capacitor. The output as shown is designed to feed a current-input recorder or a microammeter. If a voltage output is desired then connect a resistor (3.3 to 10 k Ω) across capacitor C_{19} .



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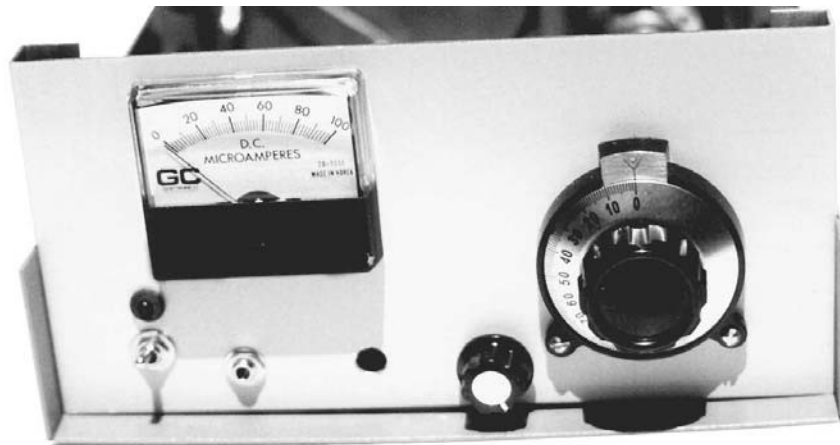
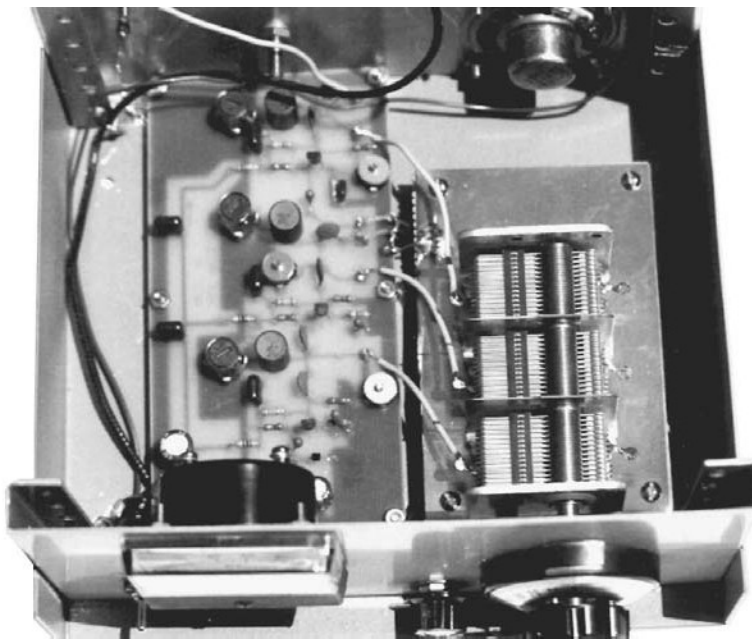
Figure 13-10A shows a printed circuit board for use with this circuit, and Fig. 13-10B is the components' placement "roadmap." The board is designed for these specific components (Fig. 13-9). Variations on the theme can be accommodated by using different value inductors from the same Toko series (see Digi-Key catalog; the L_1 -series coils are Toko size 10RB and the L_2 -series coils are size 10PA). Also, if you don't want



13-10 PC board for the VLF receiver. (A) PCB pattern for VLF receiver; (B) parts layout.

to use two coils in each tuning circuit, then short out the holes for L_1 positions and use a coil in the L_2 positions with the required inductance.

The final receiver is shown in Fig. 13-11. A front-panel view is in Fig. 13-11A, and an internal view is shown in Fig. 13-11B. The tuning capacitor was a three-

**A****B****13-11** Completed receiver.