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WWV-to-80-Meter Converter

This simple and inexpensive frequency converter will place the WWV 10-MHz signal anywhere within the 80-meter band. Credit for the basic design goes to PM Electronics, a local firm that is now defunct.

Referring to the schematic in Fig. 1, L1-C2 are tuned to the WWV 10-MHz signal. This signal is coupled to the base of Q1 by L2. Oscillator Q2 operates at any selected crystal frequency between 6 and 6.5 MHz, and is coupled to the emitter of Q1 by C7. Q1 mixes the two frequencies. The L3-C5-C6 combination is tuned to the 3.5-to-4-MHz difference frequency which appears at the collector of Q1. Impedance matching to the 50-Ohm receiver antenna is provided by the C5-C6 capacitive divider.

Crystal frequency is determined by subtracting the desired 80-meter frequency from the WWV 10-MHz frequency. The 3750-to-3800-kHz range (6250-to-6200-kHz crystal) might be a good choice for minimum signal interference. The crystal may be obtained from Jan Crystals, 2400 Crystal Drive, Ft. Myers FL 33906. Specify type FT-243 holder and desired crystal frequency. This crystal will be .005% tolerance. Jan's 1980 catalog (#23) lists this crystal at $2.00 each with a 30-cent per crystal handling and first class mail charge. The FT-243 socket, part SSO-1, also may be obtained for an additional 30 cents.

The circuit board can be quickly and easily made by first positioning and securing the copper face of a 1-3/4" × 3-3/8" board under the circuit pattern in Fig. 2. Next, mark through the pattern at each hole location and then drill a #60 hole at each mark. The inductor pin and crystal socket holes may require pattern adjustment and larger holes. Also, check the lead spacing of your capacitors. The layout is for 1/4-inch spacing but room is available for the 3/8-inch variety.

Finally, carefully connect the related holes with 1/8-inch strips of art or masking tape. Place masking tape over the component side of the board to prevent acid from entering the holes. Thoroughly clean the copper surface after etching. Using this method, I easily etched and assembled a checkout board in one afternoon.

The inductors are wound on a 1/4-inch diameter slug-tuned coil form as shown in Photo A. These may be found in most junked TV sets and radios. As viewed from the base, coils L1 and L2 are wound counterclock-

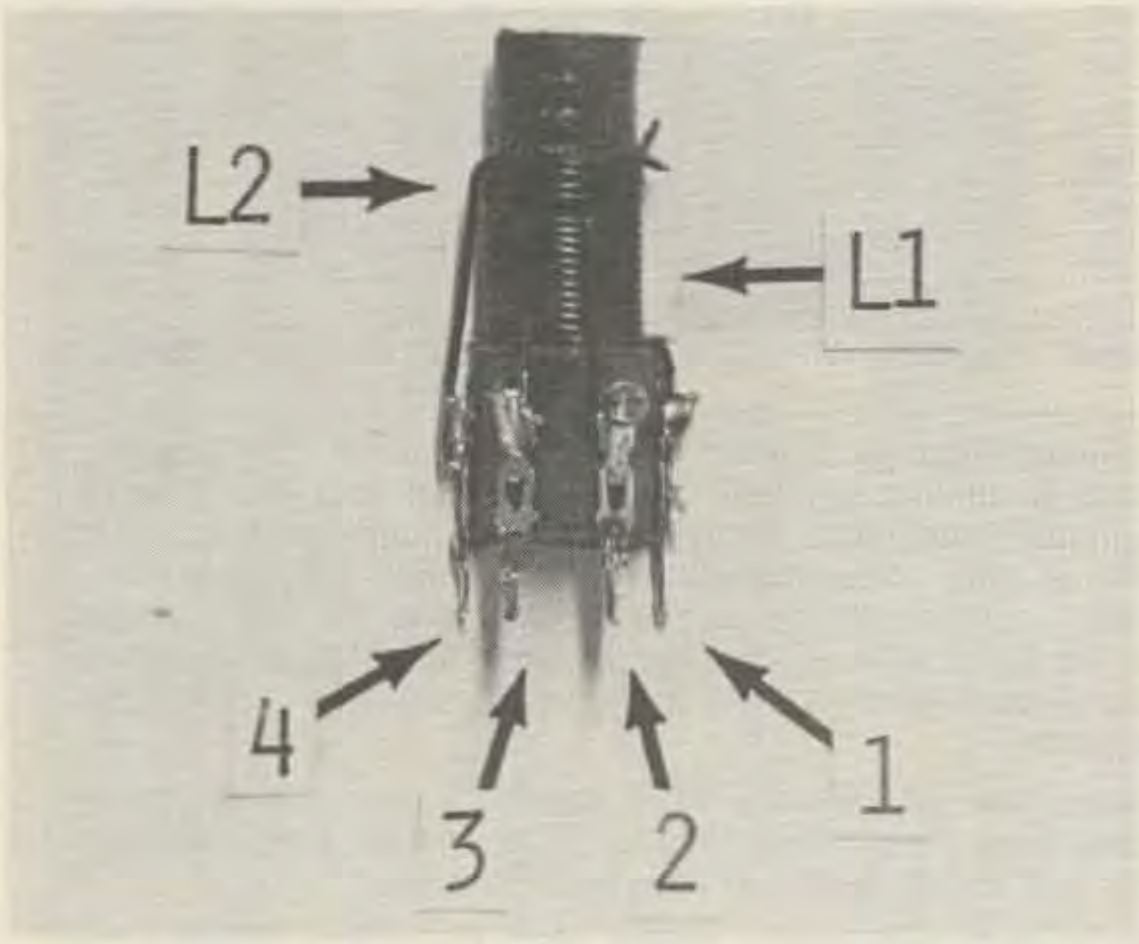

Photo A. Close-up of the L1-L2 inductor. L1 is 12 ccw turns and L2 is 4 ccw turns of #24 enameled wire. L3 is 35 cw turns of #32 enameled wire. All inductors are wound on a 1/4-inch slug-tuned coil form.

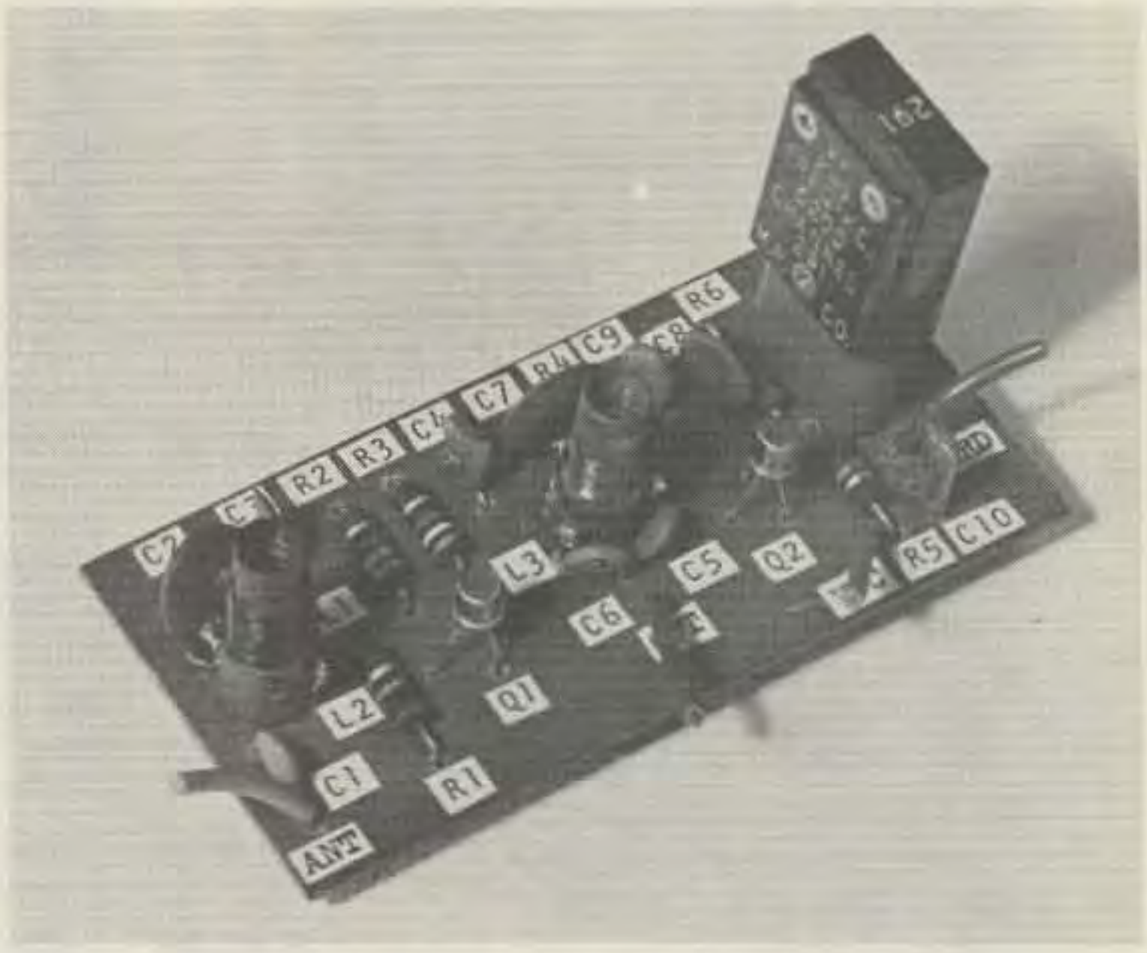

Photo B. Top view of the completed WWV-to-80-meter frequency converter.

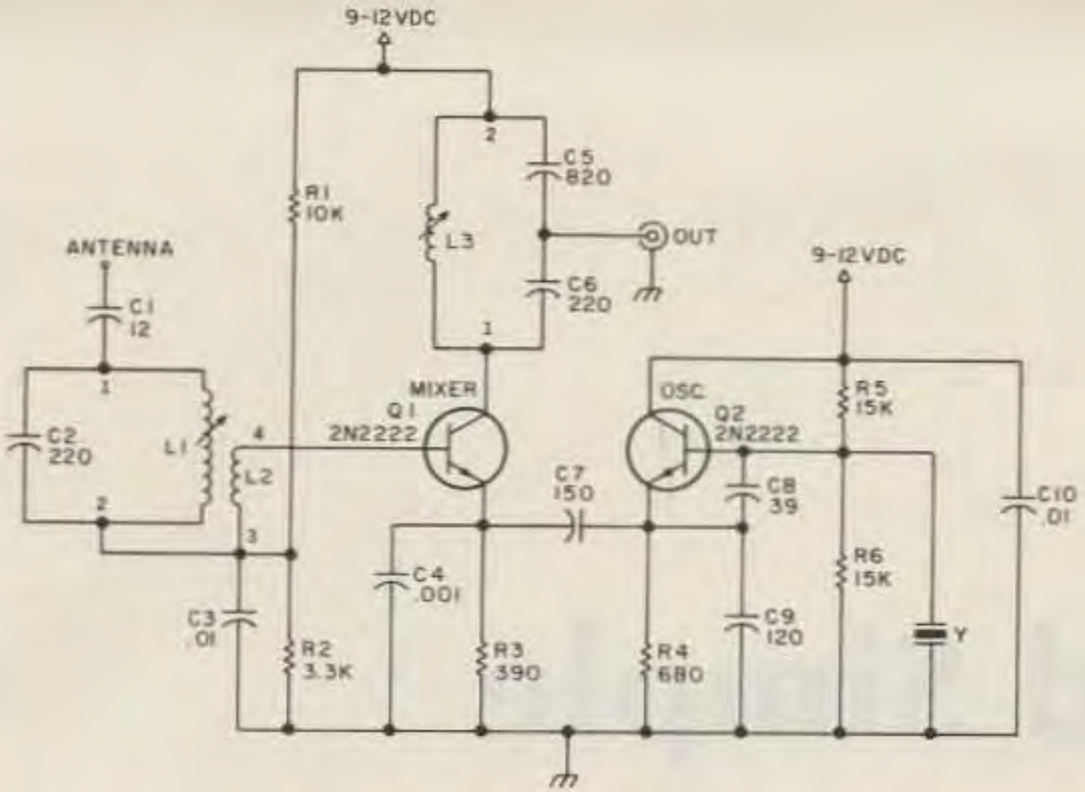

Fig. 1. Schematic diagram of the WWV converter. Resistors are 1/4 or 1/2 Watt. Capacitors C3 and C10 are Mylar™, with all others being disc ceramic.

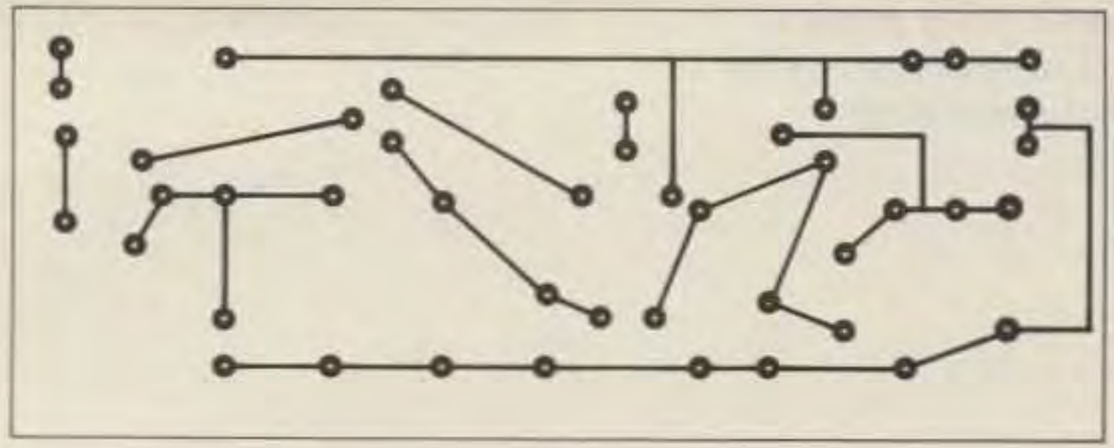

Fig. 2. Foil side of the circuit board.

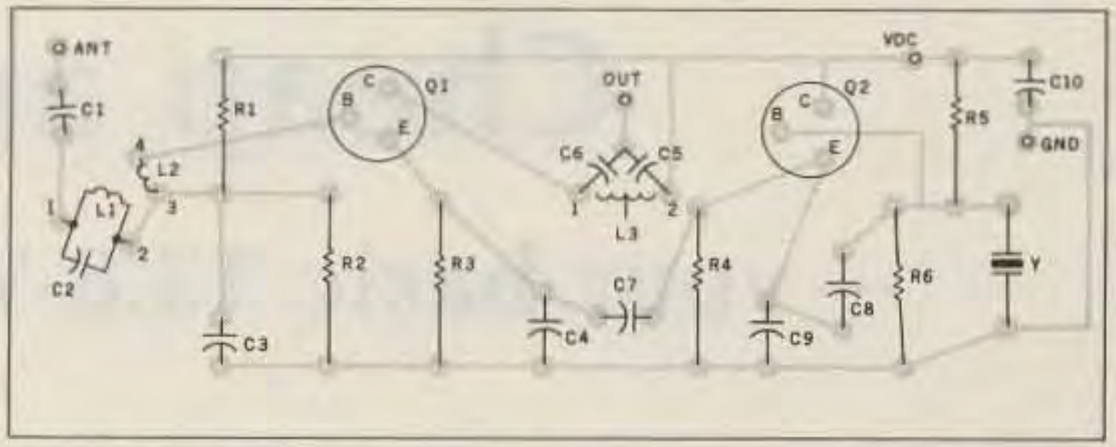

Fig. 3. Parts placement guide (foil side shown).

wise with #24 enameled wire, and L3 is wound clockwise with #32 enameled wire. All three inductors are wound with no space between turns. L2 begins at the end of L1 with no space between the end of L1 and the start of L2. Secure the coil ends with thread or tape and apply two or three coats of varnish to hold the coil in place.

Capacitors C2, C5, and C6 are soldered directly to the inductor pins. I tried several sets of transistors, both NPN and PNP types, and they all worked. Just reverse the voltage polarity for PNP types. To align, connect a short antenna and set L1 and L3 for maximum S-meter reading with a nonmetallic tool. Use shielded cable for hookup to the receiver.

My thanks to Chuck Allyn, who so kindly provided the photographs for this article. If you have a question or need parts help, an SASE will bring a prompt reply.■