

40/80 Meter Wave Ryder

A QRP tube transmitter powered by 12 volts DC.

by Charles D. Rakes KI5AZ

If you've been looking for a new project to build that has a nostalgic quality mixed with a touch of today's technology, then look no farther because our 40/80 Meter Wave Ryder CW QRP transmitter offers these features and more.

The transmitter's circuit design is similar to the single tube crystal controlled QRP rigs that were in vogue during the fabulous '50s. A 3A4 miniature power amplifier pentode tube is connected in a crystal controlled tuned-plate oscillator circuit with a power output of 1 to 2 watts.

The circuitry's modern mix allows the transmitter to operate from a single 12-volt DC power source. A 7805 5-volt regulator IC is connected in a 100 mA constant current circuit that keeps the tube's filament glowing just right as long as the DC input stays above 8 volts.

The tube's B+ is generated on command, and to see how, take a look at the schematic diagram in Figure 1. A 555 IC timer is connected in an astable oscillator circuit with C1, R1, R2 and R9, setting the operating frequency to about 25 kHz.

Q1 holds pin 5, of the IC, at ground level while the key is in the "up" position, keeping the 555 circuit from oscillating. The majority of the battery drain at standby, or during the time between dits and dahs, is the filament current.

Each time the key is closed, the 555 circuit becomes active, supplying base drive to the MJE 3055 power transistor. The power transistor's pulsing collector current turns the 12 volt supply into about 150 volts at the secondary of T1.

The full-wave bridge circuit converts T1's output to DC, and C4 smooths out any glitches. At key-down, the tube is supplied with almost instant B+, causing the circuit to oscillate and send out a CW signal.

Building the Wave Ryder

The circuit may be built breadboard style if you like, as long as the wiring is neat and the leads are kept short. Or you may take the easy route and use a PC board. If so, just follow the component placement layout shown in the 40 73 *Amateur Radio Today* • March, 1992

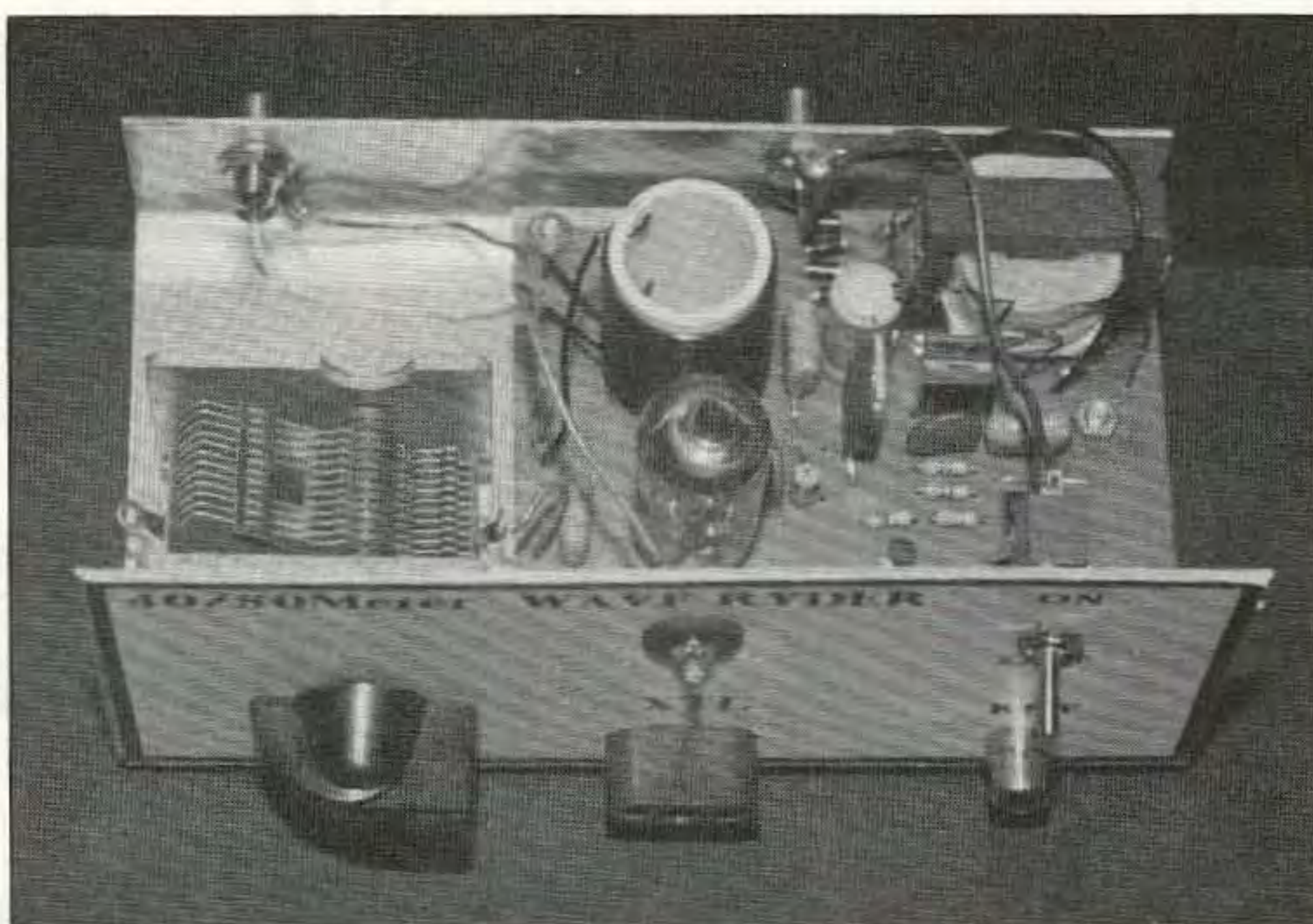


Photo A. The 40/80 Meter QRP CW Wave Ryder.

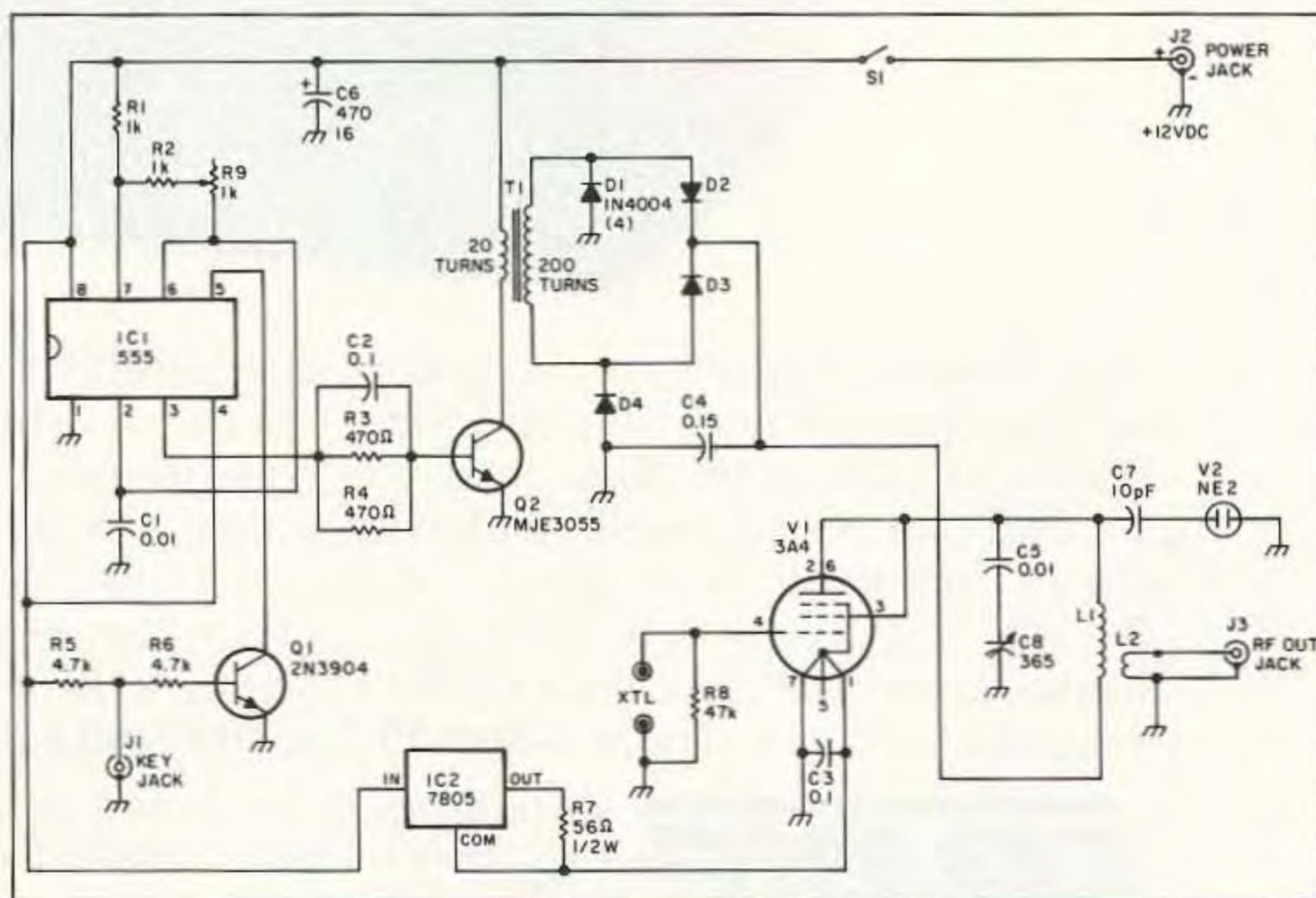


Figure 1. Schematic for the Wave Ryder.

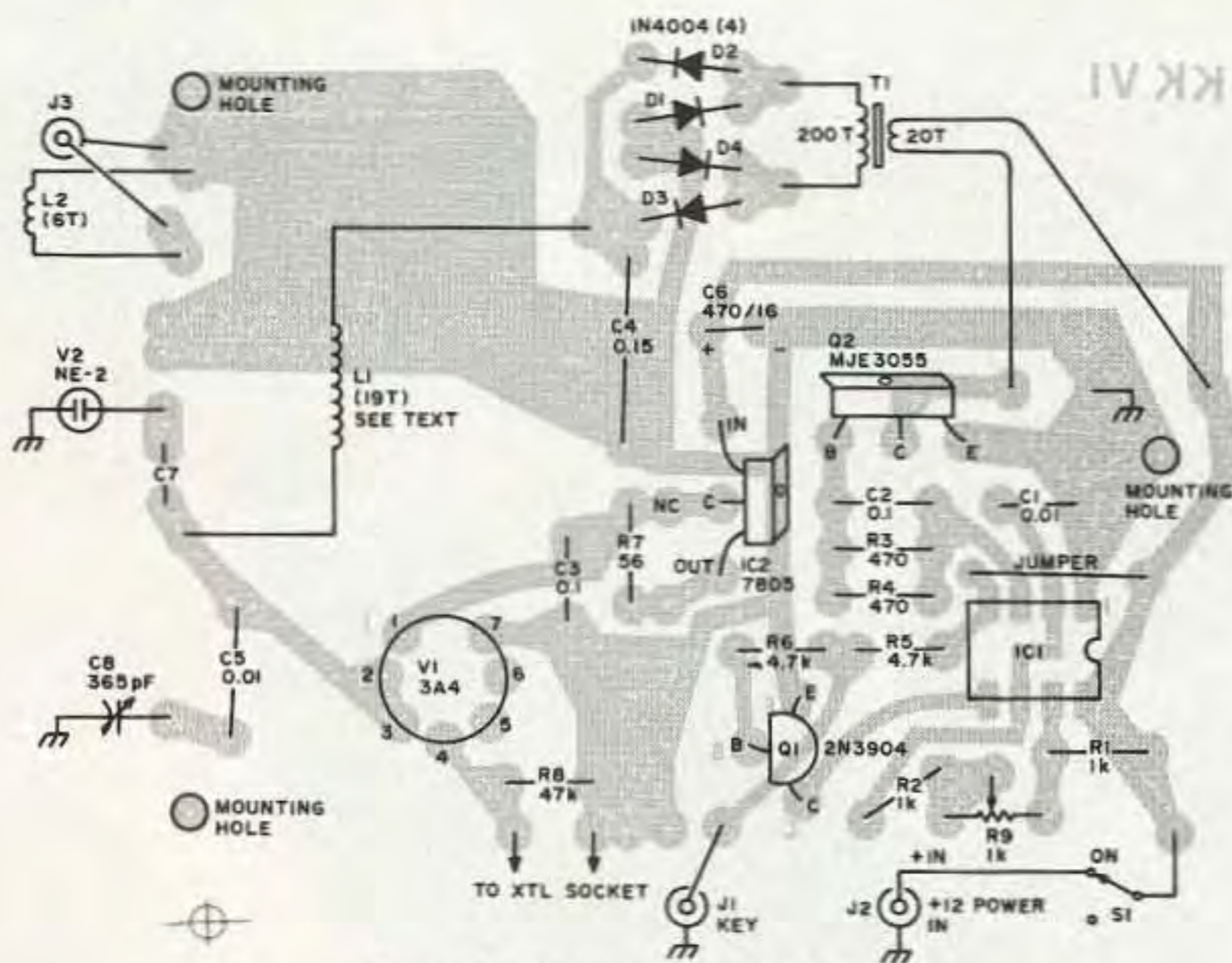


Figure 2. Parts layout diagram.

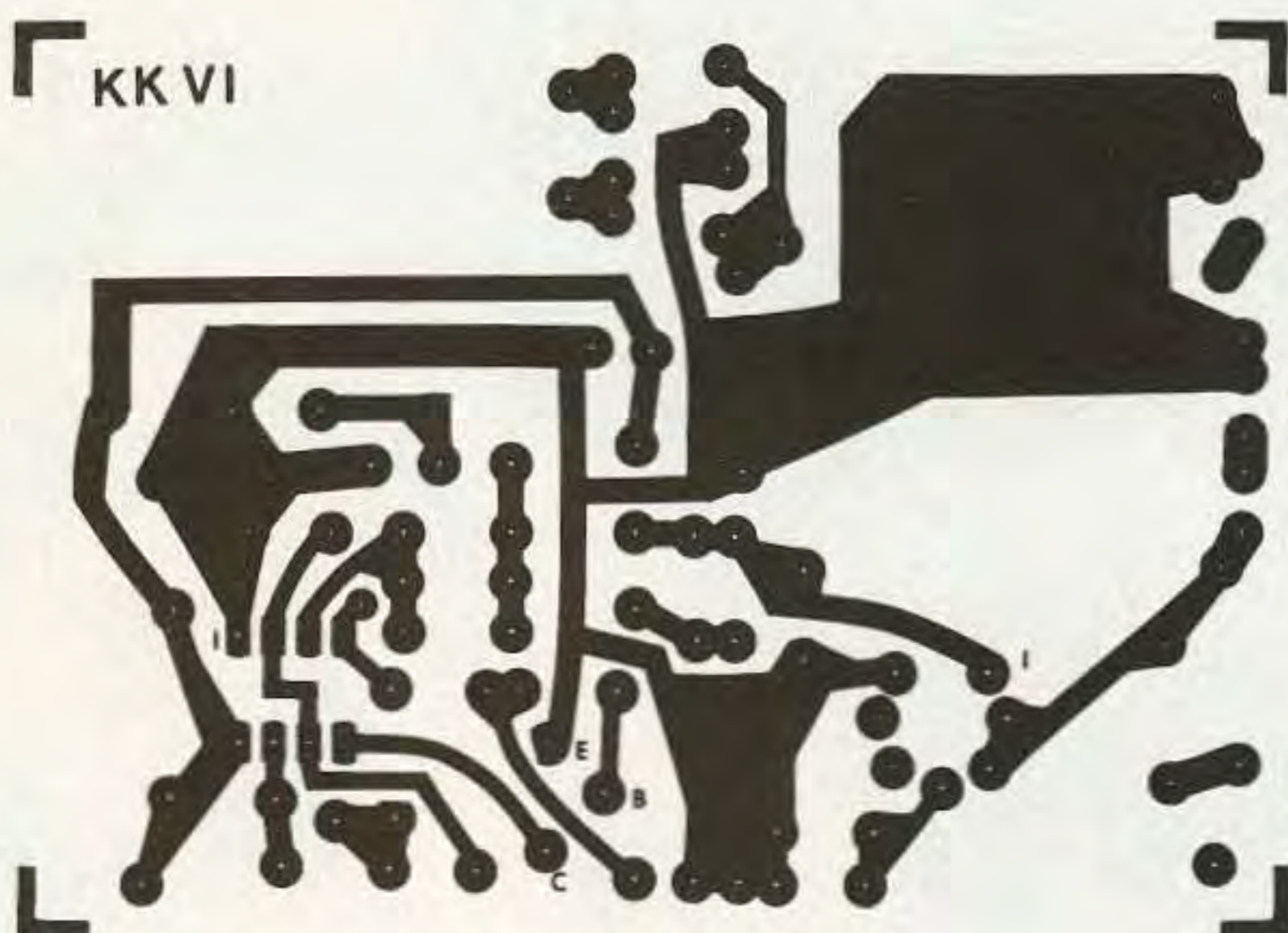


Figure 3. Foil diagram.

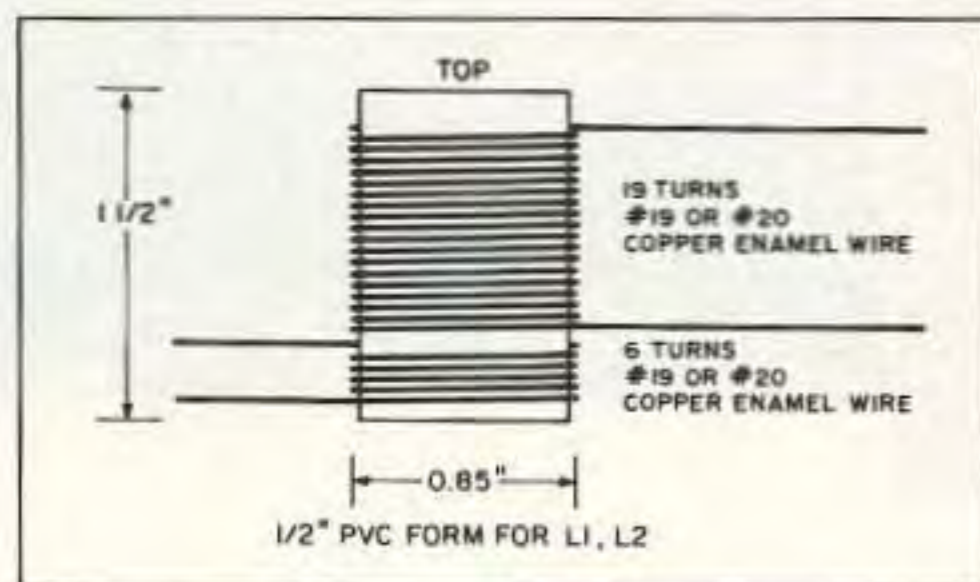


Figure 4. A piece of 1/2" PVC pipe serves as the coil form for L1 and L2.

PC foil pattern drawing in Figure 2, and stuff the parts on the board. The tube socket is made up of five Concord #09-9006 socket pins (cost of five is less than two bucks) soldered in place on the circuit board. But you can also use a regular tube socket and wire it to the circuit board with short leads.

Winding T1

The transformer's two windings are wound on the nylon bobbin supplied with the Amidon EA-77-375 "E" core. Wind 20 turns of #26 copper enamel wire in a solenoid fashion on the bobbin. On both windings, leave at least three inches of wire at each end to con-

nect to the circuit board. Place a layer of plastic tape around the winding to complete the primary. On top of the primary winding, wind 200 turns of #26 copper wire for the secondary and tape in place. Place the bobbin between the two cores and tape or glue in place.

Winding L1/L2

The tank circuit is wound on a 1-1/2" length of 1/2" PVC cold water pipe that actually measures 0.85" in diameter. Just about any hardware or plumbing shop will have the PVC pipe on hand.

Refer to Figure 4, and close wind 19 turns of #19 or #20 copper enamel wire on the form for L1. Space down the form about the width of two turns, and wind 6 turns of the same size wire for L2. An easy way to keep the windings in place and looking neat is to drill two wire size holes for each wire end, and fish through for a snug fit.

Making the Chassis

Since cabinets are so expensive and difficult to find, the Wave Ryder was constructed on a piece of 0.05-inch thick aluminum cut to 7" x 5-3/4". To duplicate our Wave Ryder, just follow the drawing in Figure 5.

Parts List		
C1	0.01 μ F/100V	Mylar
C2,3	0.1 μ F/50V	disc ceramic
C4	0.15 μ F/250V	Mylar
C5	0.01 μ F/630V	Mylar
C6	470 μ F/16V	electrolytic
C7	10 pF/500V	disc ceramic
C8	365 pF variable	broadcast type
D1-4	1N4004 1 amp	silicon
IC1	555	timer
IC2	7805 5V	regulator
Q1	2N3904	transistor
Q2	MJE 3055 power	transistor
V1	3A4 miniature power amp	pentode tube
V2	NE-2 or similar	neon lamp
R1,2	1k 1/4W	resistor
R3,4	470 ohm	resistor
R5,6	4.7k	resistor
R7	56 ohm 1/2W	resistor
R8	47k 1/4W	resistor
R9	1k trim pot	single turn
J1-3	RCA jacks	phono
S1	Small switch	toggle on/off
T1	EA-77-375 core and bobbin	Amidon*
L1,2	see text	
Misc.	Chassis, circuit board, knob, grommet, crystal socket, hardware, wire, etc.	

*Amidon Associates, Inc., 2216 East Gladwick St., Dominguez Hills CA 90220. Tel. (213) 763-5770.

You can get a kit of parts for the Wave Ryder, including the circuit board and all components that mount on it and parts for T1 (less winding wire), a coil form, and five socket contacts, all for \$24.95 postpaid, from Krystal Kits, P.O. Box 445, Bentonville AR 72712, or call (501) 273-5340 and ask for K15AZ.

You will have to furnish the chassis, tuning capacitor, neon lamp, grommet, power switch, crystal socket, jacks, tube, wire and hardware to complete your TX. A PC board only is available for \$7.95 postpaid, and five Concord socket contacts are available for \$3.00 postpaid.

J1, the crystal socket, S1, and the neon lamp, all mount to the front panel. The neon lamp is placed in the middle of a chassis mount rubber grommet with one lead going to the circuit board, and the other to circuit ground under the grommet's lip. The tuning capacitor and circuit board are mounted to the chassis' bottom, and the two remaining jacks are located on the back lip.

Making Waves

Connect power, a dummy load, a crystal, and close the key. Start with C8 at maximum capacitance and rotate clockwise until V2 lights. Tune a receiver to your crystal's frequency, and send a few dits. Slowly rotate C8 clockwise until a clean, chirp-free tone is heard. With R9 set at its maximum resistance, the B+ voltage will be at its minimum with an RF power output slightly under one watt and at its minimum resistance the B+ will be at its maximum with an output of over one watt. If Murphy didn't make an untimely visit to your shack, you should now be ready to make waves. *Continued on page 46*

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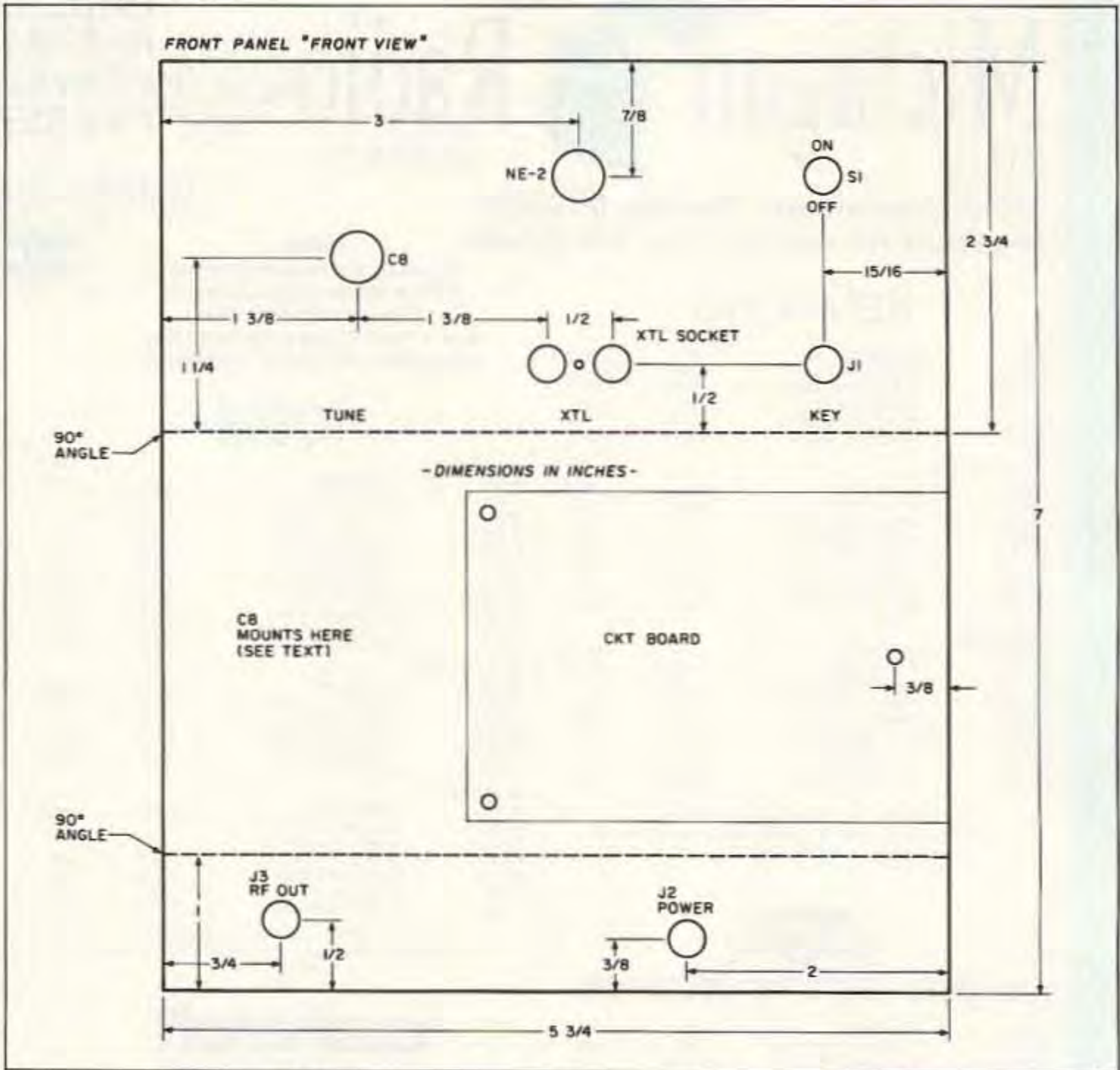


Figure 5. Chassis design and placement of lights and controls.