An Improved Crystal Tester

Check out those surplus crystals with this portable circuit.

by Larry G. Ledford KA4J

Wayne Green's book *Practical Test Instruments You Can Build [currently out-of-print]* contains a very useful circuit for a crystal tester developed by Mike Kaufman. It's a good, simple, portable and very handy test item. But with a few modifications it can be made better.

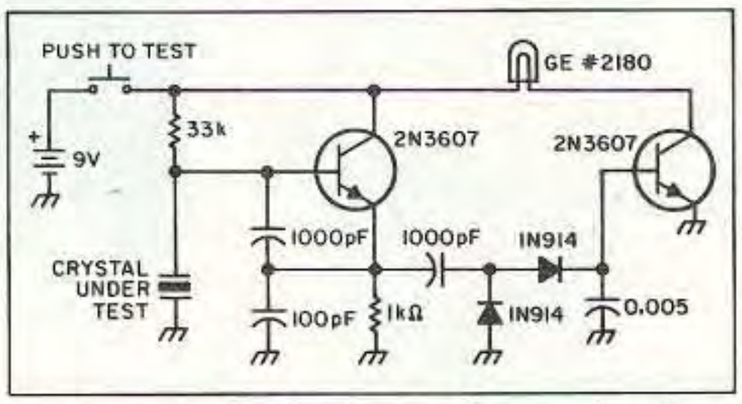

Figure 1. Original crystal tester circuit.

Modifications

See Figure 1 for the original circuit. If you are building this from scratch, be advised that plastic 2N2222s (the ten-for-a-dollar at any hamfest variety) will work very well in place of 2N3607s.

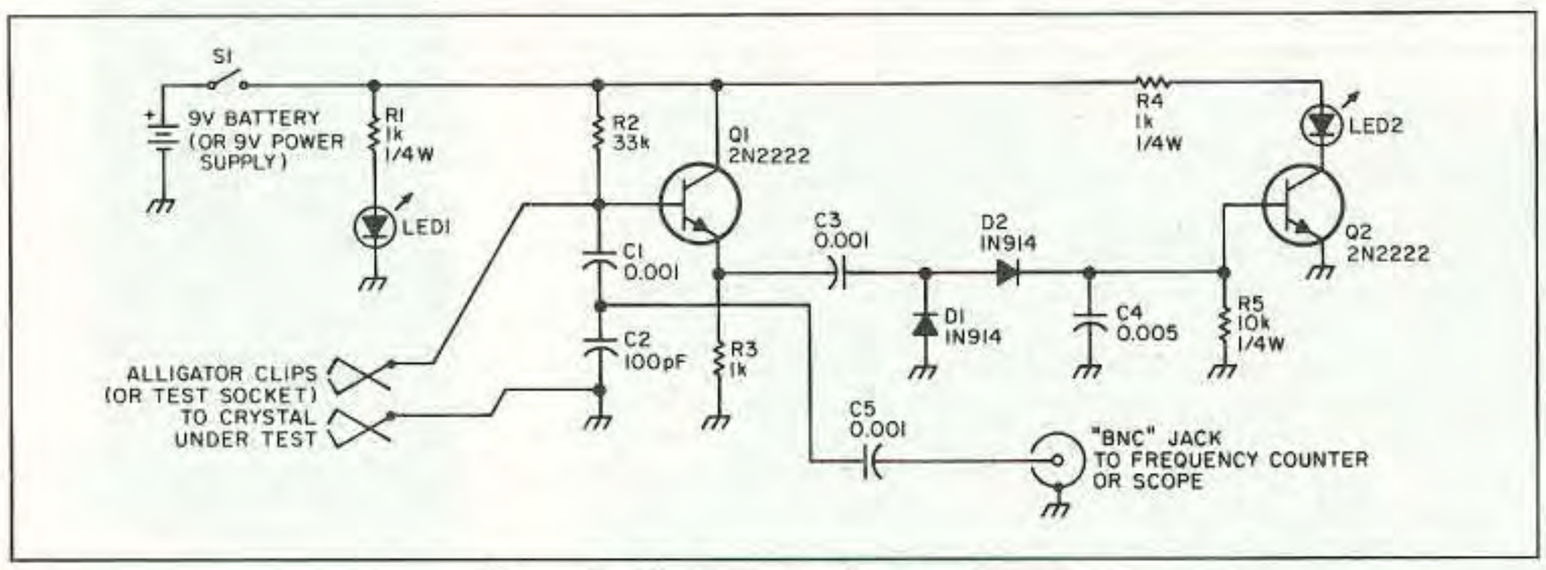

Figure 2. The improved crystal tester.

The first change is to replace the incandescent bulb used for a go/no-go indicator with a light-emitting diode and current limiting resistor. When I did this, the LED switching transistor would "latch" on so I added a 10k resistor from base to ground for a cure. Apparently the transistor had sufficient bias to turn off the higher current of a bulb, but would allow a lower current LED to stay on.

The next mod is to add another LED and resistor to act as a very simple battery indicator. If the battery were low (or dead), you'd never get a "good" crystal indication and you might discard a non-defective crystal. If the power LED lights but the crystal's "good" LED doesn't, you can assume the crystal is bad! Although you could mount several different crystal sockets on your tester, I used two alligator clips on short leads that will fit any crystal.

The last modification is to add a capacitor and BNC connector so that a counter or scope can be hooked to the oscillator for rough frequency checks. Bear in mind that this circuit will not be the same as the circuit that the crystal will be used in, so the frequency will be different. However, it will give you an idea of where you are.

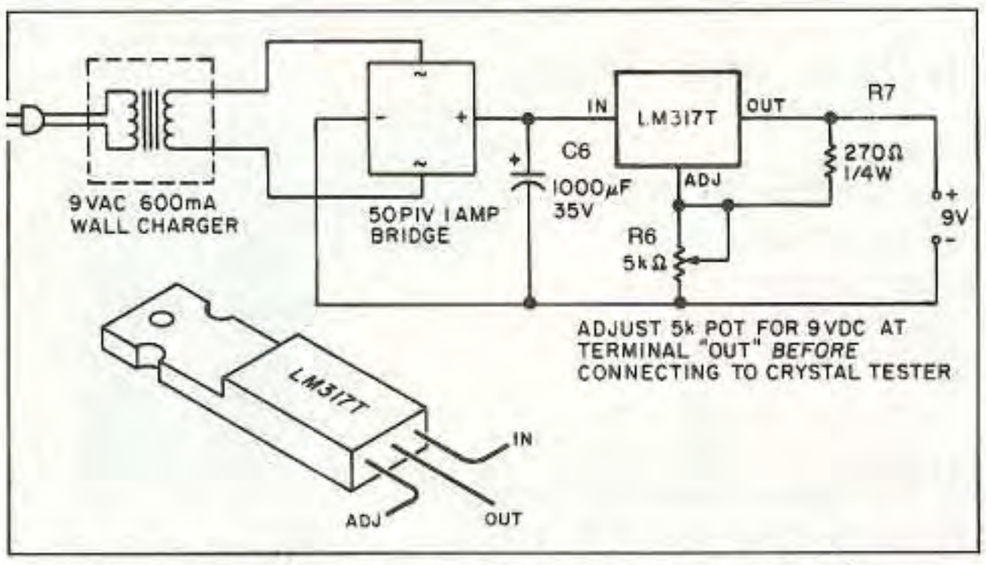

Figure 3. AC power supply for the crystal checker.

Due to the lack of any tuned circuits, third overtone crystals will oscillate on their fundamental frequency. It may take some work with pencil and paper to see exactly what frequency a receive crystal is on. You can also plug a short antenna or wire into the BNC jack to loosely couple it to your receiver.

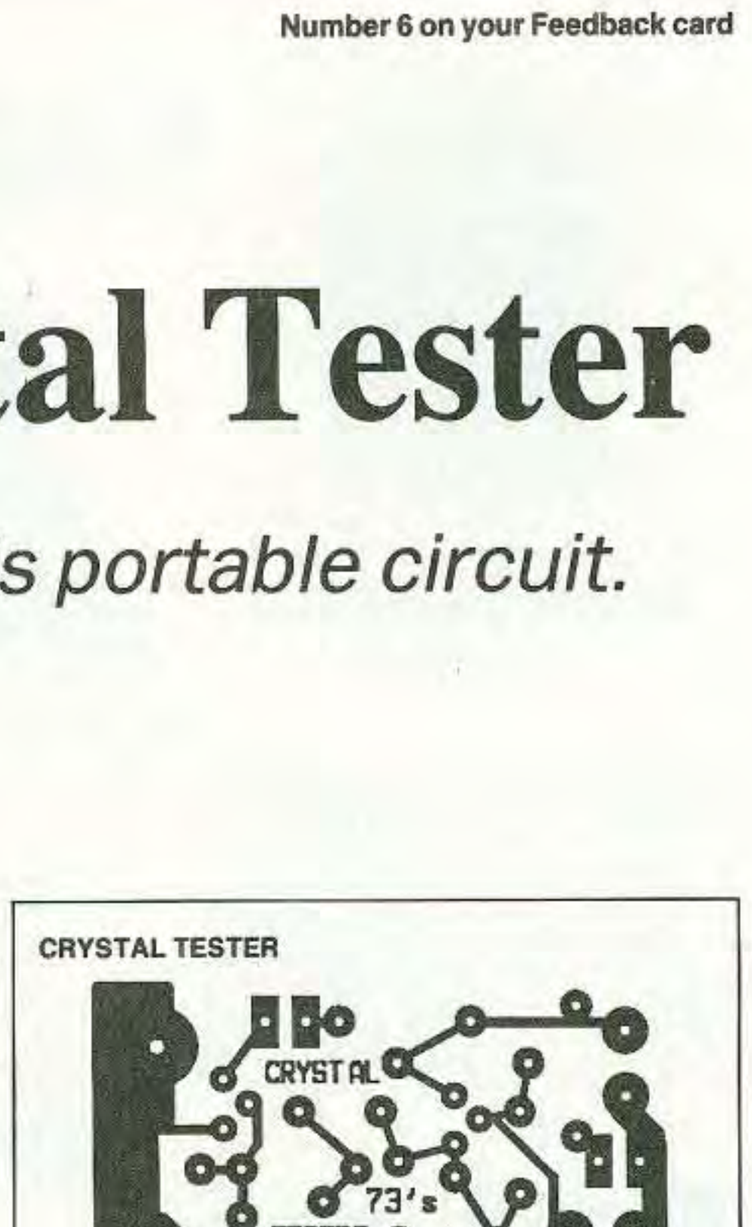

Figure 4. PC board foil pattern.

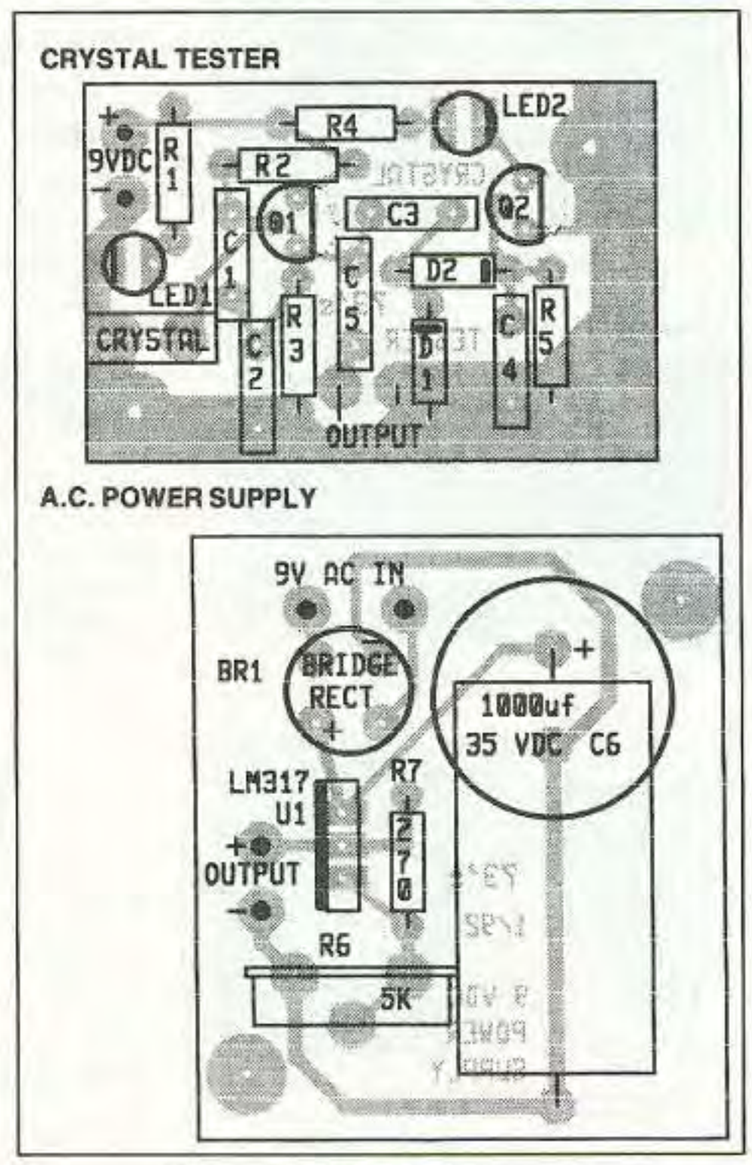

Figure 5. Parts placement.

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See Figure 2 for the improved circuit. If you power the tester with a 9-volt battery, it will make a very handy portable test instrument. It's especially useful when rummaging through those bins of surplus crystal at a hamfest or surplus store.

For a more permanent setup, you may wish to run the tester from 110 volts AC. I built the power supply shown in Figure 3 for mine. 73

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Parts List

Q1,Q2	2N2222 transistors
D1–D4	1N914 diodes
LED 1 & 2	Red LEDs
R1,R3,R4	1k, ¼W resistor
R2	33k, ¼W resistor
R5	10k, ¼W resistor
C1,C3,C5	0.001 µF capacitors
C2	100 pF capacitor
C4	0.005 µF capacitor
S1	SPST switch

Misc: XTAL sockets (optional), 9V battery, mini alligator clips (2), PC board, case, battery clip.

A blank PC board for the XTAL tester is available for $3 + $1.50 shipping/handling per order (the optional power supply board is $3.50) from FAR Circuits, 18N640 Field Court, Dundee IL 60118.