Testing the Heath Mohican (GC-1A) Transistor Communications Receiver

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PERHAPS you can imagine the doubts which would build up in your mind if you were to take on the job of writing something good about a one hundred dollar "Communications" receiver. Add to this, that it is transistorized and you've had sour experiences with previously available amateur transistor gear.

After the receiver had been assembled (Heath sells *kits*, you know), which took me about 30 hours, the receiver was ready for alignment. I followed the rather complete and thorough instructions provided. Alignment requires a signal generator (like the Heath SG-7) and a VTVM (like the Heath V-7a). Once aligned, I antenna'd it with the whip which comes with the kit and started tuning to determine the magnitude of the disaster.

HMMM, Well, what do you know? HMMM. HMMMMMMMMM! Well I'll be darned! By George! Hey! This thing is really something. The advertised specs of 2 microvolts sensitivity (except on the broadcast band), were found to be quite conservative, even on the ten meter band where most receivers are strangely quiet. This little box of parts held its own right alongside of receivers costing up to twice as much. Let's see what makes it tick.

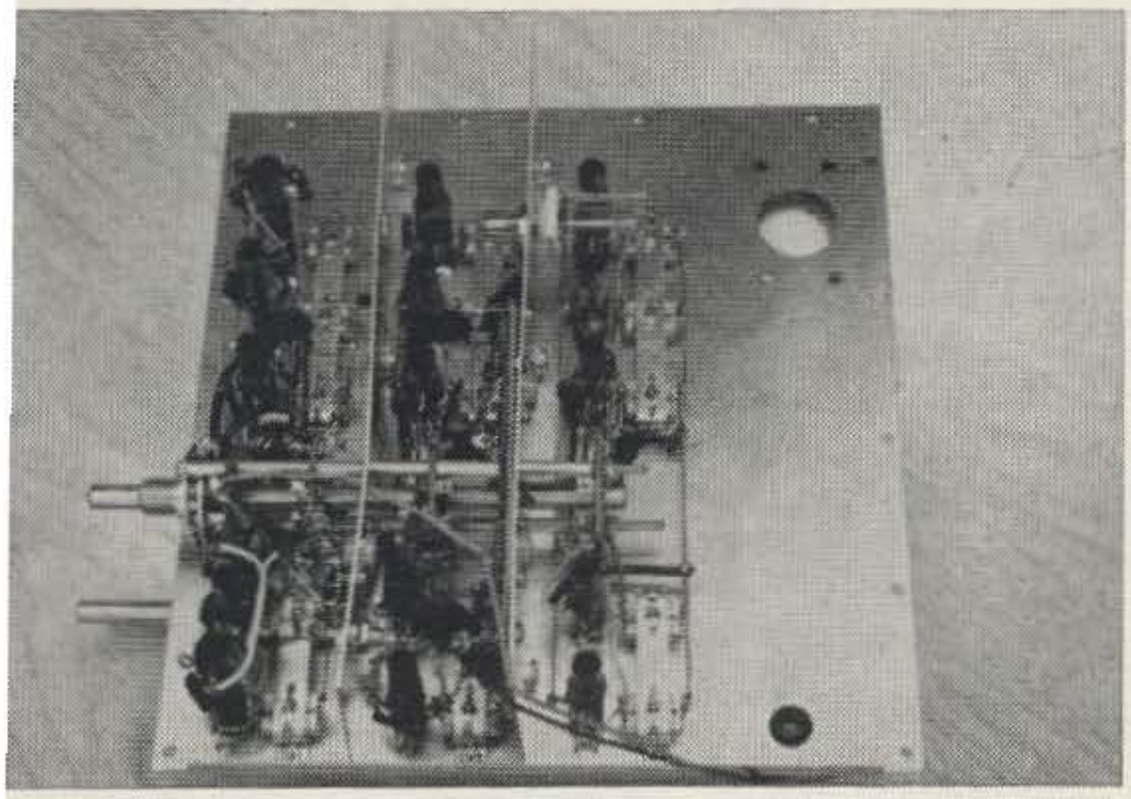
The biggest secret is probably in the front end. After all, if it doesn't have it up front, it doesn't have it. Three transistors are used in the front end. One for rf amplifier, one each for oscillator and mixer. These transistors are not run of the mill jobs, but are good at frequencies up to 100 mc! Thus it's not much of a problem getting performance up to 30 mc. The way the front end layout was designed helps to keep leads short. The transistors are mounted on shields and the band change switch is installed through these shields.

By using adjustable coils in the front end, plus trimmer capacitors, fairly constant sensitivity across the dial is obtained. This eliminates the "dead spots" that we all have experienced.

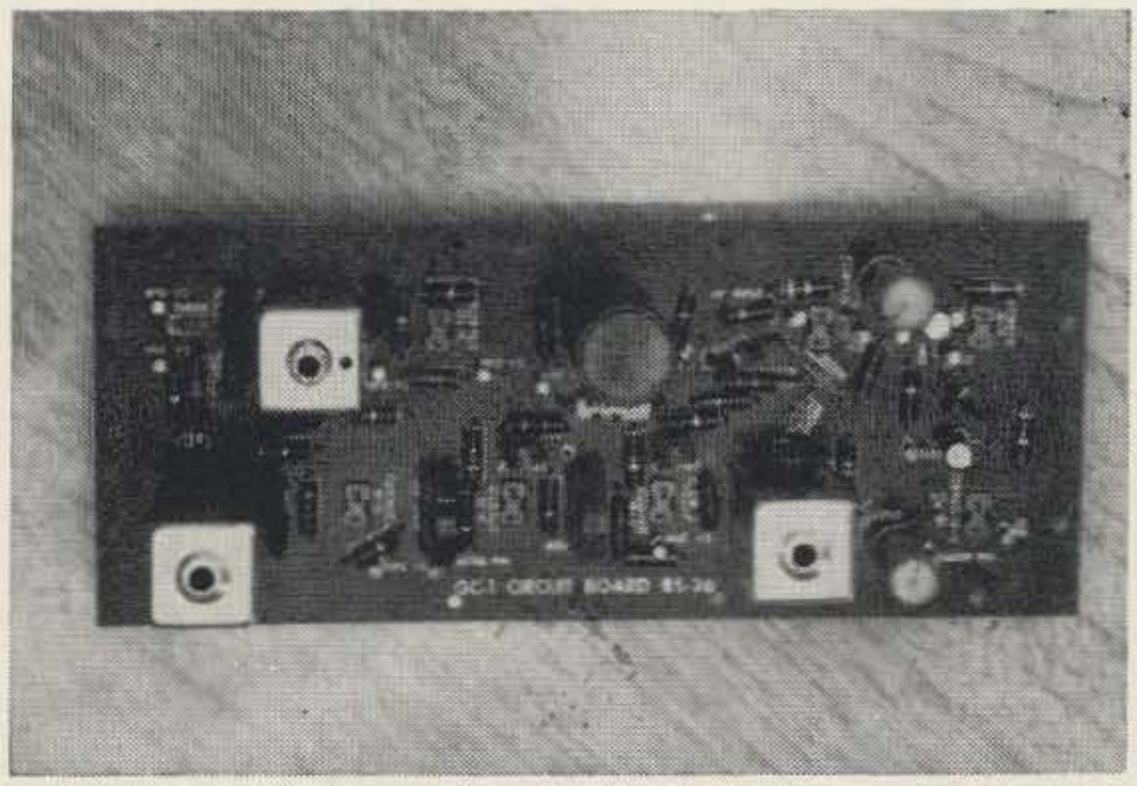
What about selectivity? The figures are 3 kc to the half power point (6 db down), which is made possible by the use of "transfilters". These little jobs are unusual in that they do the job of an if transformer, crystal filter and coupling capacitor, but are none of these. They are somewhat similar to a crystal lattice filter in their operation, though not as efficient. They give much better selectivity than could be achieved from standard if transformers, are rugged and never need adjustment! (Though they have been used by the Signal Corps, this is the first commercial application of them).

What's the line up? 10 transistors, 3 germanium diodes, 2 compensating diodes and 1 voltage regulating Zener diode are used. This gives an rf stage, a separate oscillator and mixer, three if stages, a diode detector, an audio driver and a push-pull output stage. A separate transistor is used for the variable BFO. Diodes are used for automatic noise limiter and AVC.

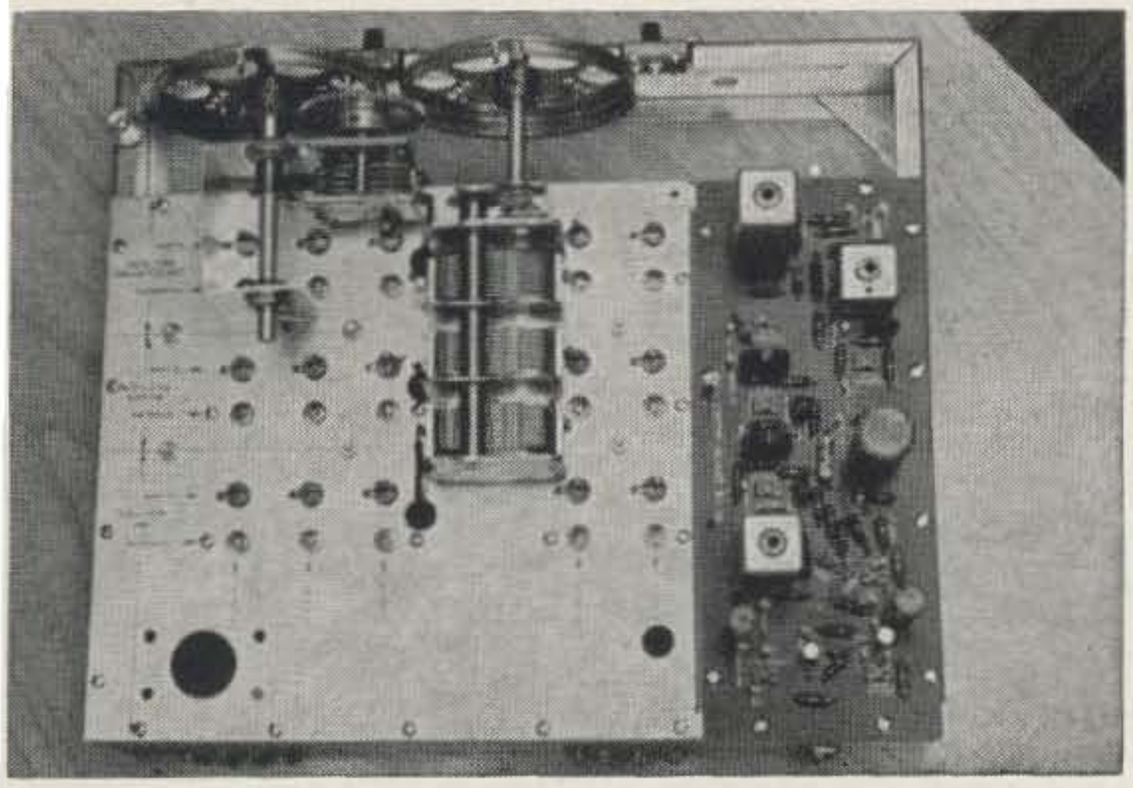
And that's not all! A Zener diode is used



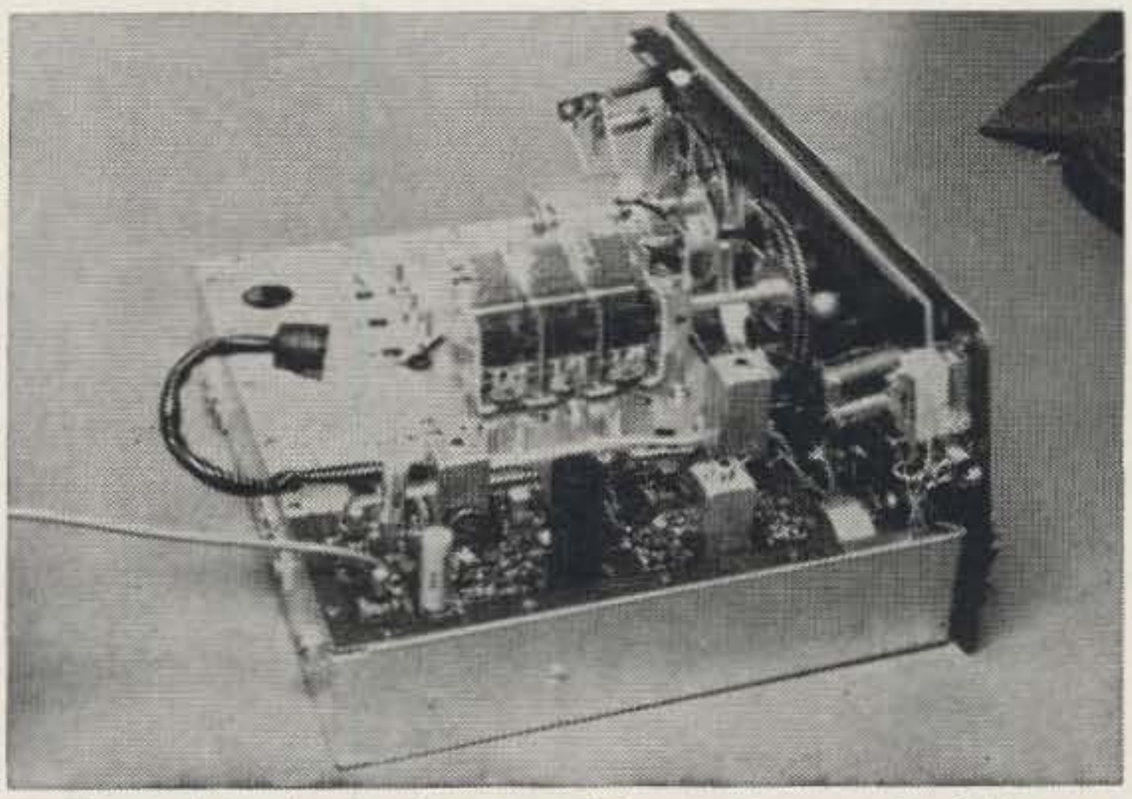
The *rf* section is constructed first. Note that all parts are mounted on a flat sheet, simplifying construction.



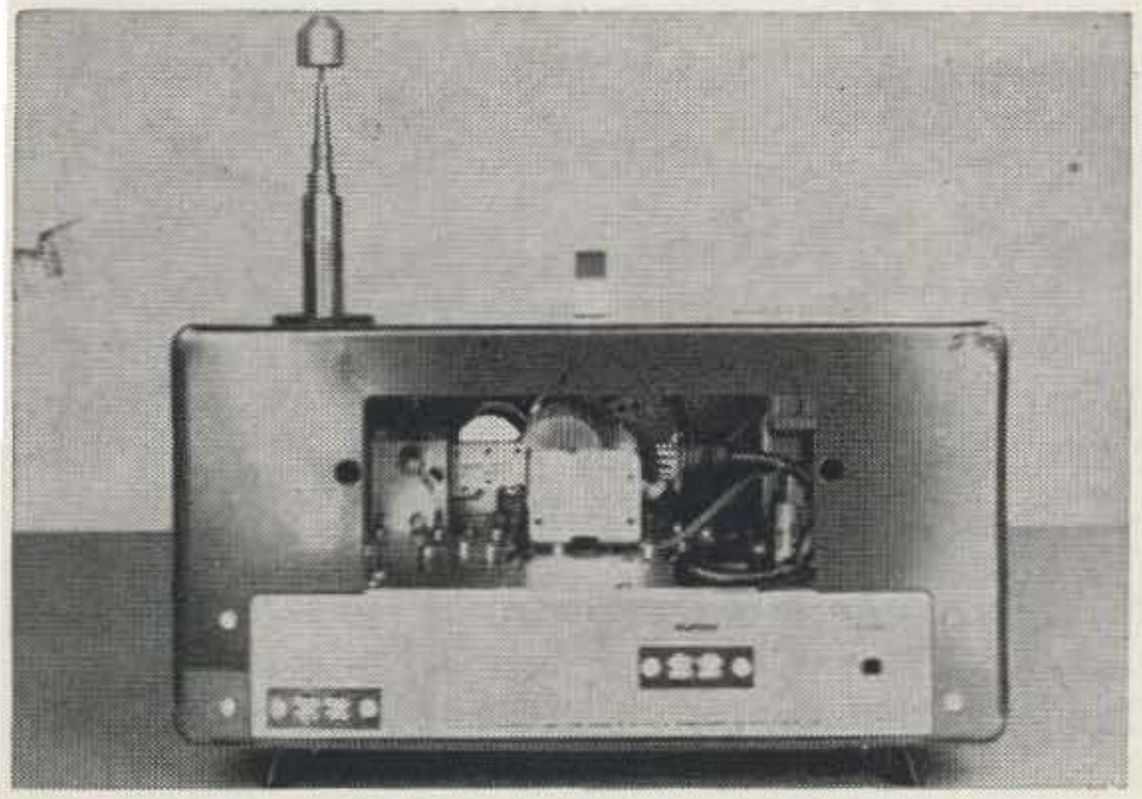
A printed circuit board is used for mounting and wiring of the *if* and audio sections of the receiver.



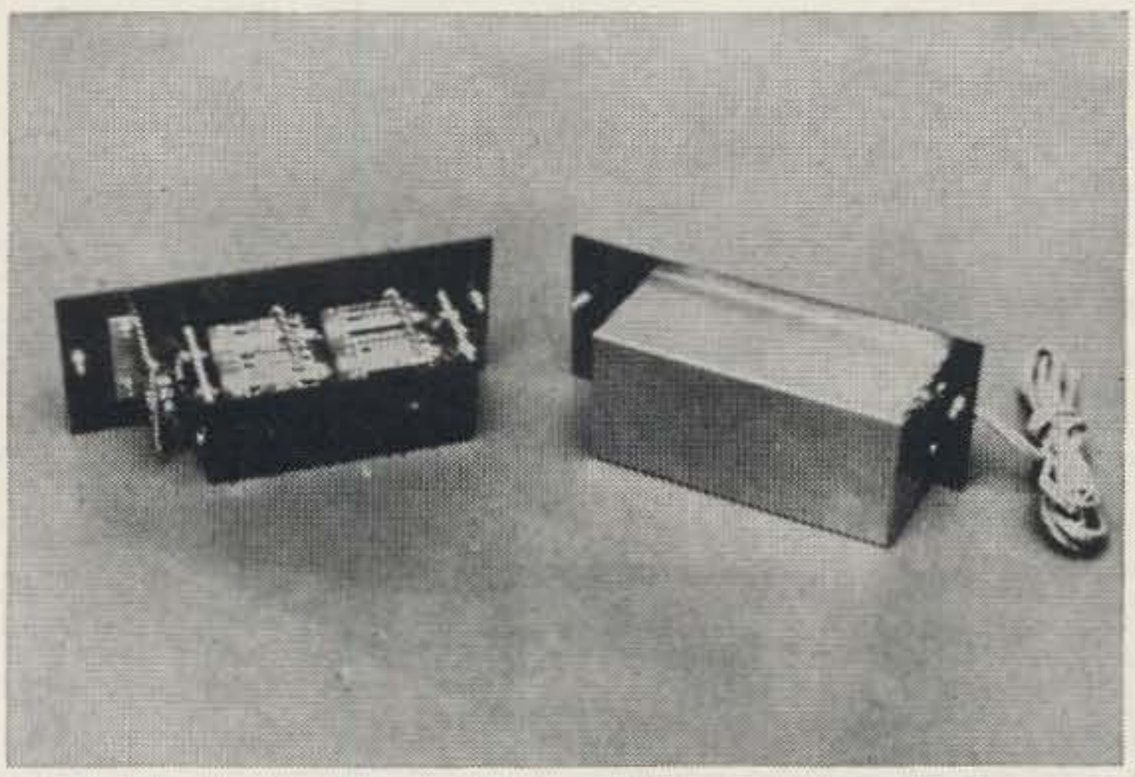
The completed *rf* section and the printed circuit board are mounted on the main chassis and wired to each other.



Completed receiver, cabinet removed. Wire going off to the left connects to speaker mounted in cabinet. Large hole in upper left corner is where "Whip" antenna goes.



Rear of completed receiver with power supply removed. Plug shown in the cut-out, is power plug which is plugged into power supply.



Battery supply on left is furnished with the kit, (less batteries). The supply on the right is *ac* operated supply which is purchased separately, if desired.

as a voltage regulator for the local oscillator. -6.8 volts is applied from the diode to the transistor oscillator base, holding drift down to a *very* low amount. It is the nature of a Zener diode that when a voltage is applied to the diode backwards, reverse current is very low. If the voltage should exceed this amount, the breakdown potential of the diode occurs and the reverse current through the diode increases, bring the voltage back down to the pre-set amount, which is -6.8v in our case.

Another interesting circuit is in the push-pull audio output stage. Two 1N2326 compensating diodes are used, one in each of the output stages, connected to the transistor base circuits. These diodes have a negative tem-

perature coefficient so that as the transistors increase in temperature (as class B transistor output stages do) the diodes will compensate for this increase. By so doing, excessive battery drain is prevented and audio quality is maintained.

These same two diodes also act like voltage regulators, which is important for battery life. As the batteries begin to fall off, they compensate for it (within certain limits, of course). Perhaps you have noticed how the audio becomes distorted as soon as the battery voltage begins to decrease a little in your transistor portable.

By using a push-pull class B output stage more than enough audio is available. A 35 ohm (low impedance) phone jack is provided on the rear of the receiver chassis. The volume is considerably lower if high impedance earphones are used.

Ordinary flashlight batteries of the "C" size are used and they last up to 400 hours! Replacement costs you less than one dollar. Not bad eh? If you intend using the receiver mostly for shack operation an ac power supply is available for $9.95 which fits in the space provided for the battery case.

Mechanical Aspects

Steel construction gives excellent mechanical and electrical stability. The front end is built on a single sheet of steel, simplifying to some extent this important part of the receiver. The coils, trimmers, band-switch, shields and transistors are built on this plate as a separate section. Steel is also used for the main chassis and the cabinet.

The tuning capacitors (both the bandspread and main tuning capacitors), have anti-backlash gears which are quite effective in providing good vernier tuning. The bandspread, by the way, is good.

Construction begins with the assembling of the front end and the printed circuit board which contains the if stages, audio noise limiter, and BFO. These two sections are then bolted to the main chassis and interconnected. Tuning capacitors and front panel follow. No difficulty was experienced.

In Use

The GC-1A was tested rather thoroughly using the built-in whip, the regular station antennas, and at beach parties. It pulls 'em in no matter how you use it. After several weeks of constant use I was convinced that it did everything I wanted or expected it to do. The selectivity and sensitivity were fine, it worked well on SSB (though a product detector would be somewhat easier to use, of course), and it was a gem for use with my 6 and 2 meter converters.

The spring loaded pilot lamp switch lets you light up the dials when needed and conserves the batteries for more important uses of the amperes.

A close look at the photos will tell you all about the controls on the receiver. It has about everything you really need, including the S-meter. Quite a bundle for the low price and one you'll have a ball with if you give it a try. 73