

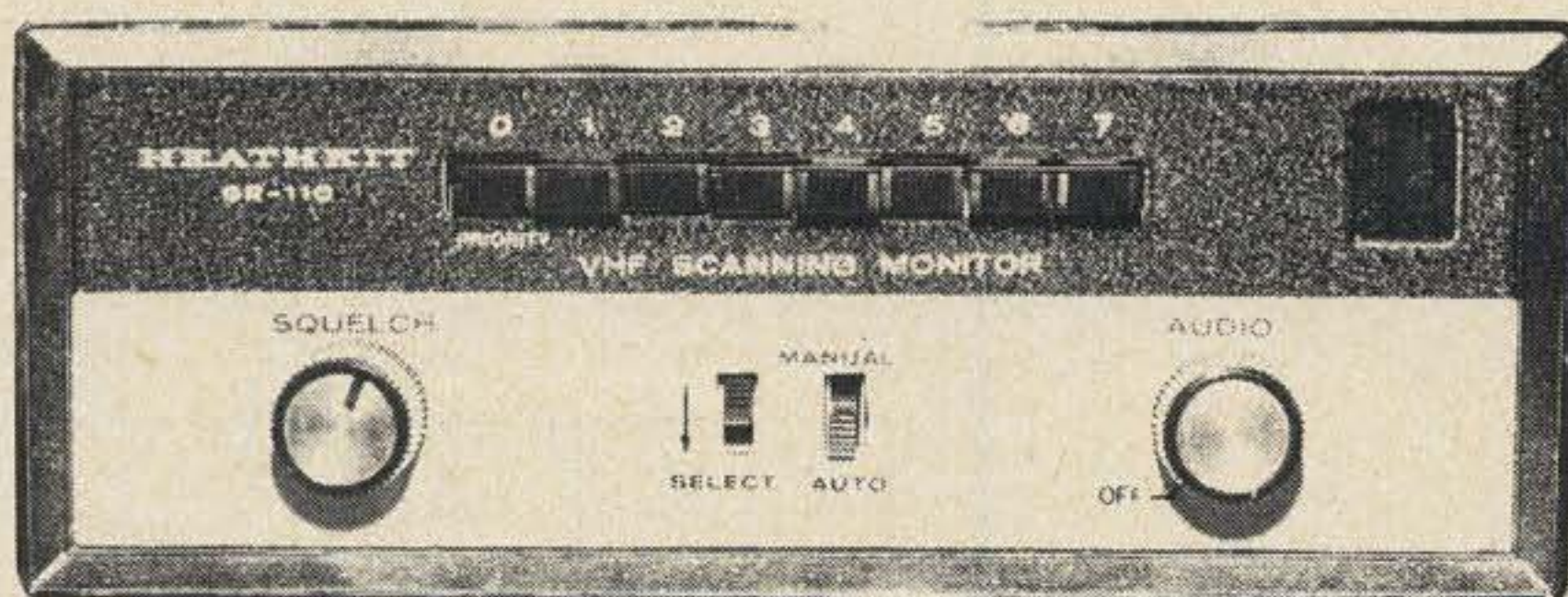
Kent A. Mitchell W3WTO
1760 Preston Rd.
Hagerstown MD 21740

HEATH GR-110

VHF

SCANNING

MONITOR



One of the popular fads these days is monitoring the radio transmissions of the local fuzz, fire companies and ambulance services. In fact, the local official parties concerned have no difficulty locating the scene of the crime, fire or accident...there is usually a crowd of "monitor freaks" which have beaten them to the event. The scanning type receiver is most often seen, as the chance of missing any excitement is eliminated. Most monitors around seem to be primarily brands available at the friendly neighborhood CB equipment store. One of these receivers had been on my want list for quite some time but, as I already had a shack full of gear and needed another receiver as much as the Senate Watergate Committee needed another witness, especially a non-ham band receiver, it was far down on the list. However, as usually happens, a Heathkit ad caught my eye because being offered was a unit with a frequency range that would enable me to monitor the local FM repeater gang (146.94) in addition to the police in my area (155.79) and at a price that is considerably less than other comparable units.

The Heath GR-110 circuits are comprised of 29 transistors, 8 ICs, 17 diodes and a 7 segment indicator tube. The unit operates either from a 120V power source via a conventional transformer-rectifier-filter arrangement or directly from a 12V battery in a mobile installation. The receiver front end consists of two rf stages and a mixer, all

of which are 40673 field effect transistors.

A feature of this monitor receiver is a "priority channel" which, if desired, will automatically take precedence over any other signal that is being received. For this purpose, a separate oscillator circuit, consisting of a 2N5232A and a X29A829, pulses the gating circuits and activates the priority channel crystal. If an rf signal is being detected on that frequency, the resultant voltage completes the gate logic and the receiver is locked on the priority channel as long as a signal is present, after which normal scanning is resumed.

Front panel pushbuttons allow selection or bypassing of any or all channels during the frequency scanning process, or a selector switch may be placed in the "manual" mode to continuously monitor one particular frequency. A "select" switch provides manual stepping to the desired channel or the scanning may be stopped by switching from auto to manual while the receiver is locked on a transmitted signal.

Assembly of the kit is facilitated by the use of three separate etched circuit boards and the usual Heath check-by-step assembly manual, which has improved over the years from a "Connect a 680 ohm resistor from N5 (S) to N7 (NS)" step on one page and an illustration on another page, to a combined step-with-arrow pictorial format that is easier to follow. However, after building Heathkits for twenty years, I've noticed that the usual paper bag full of resistors, capaci-

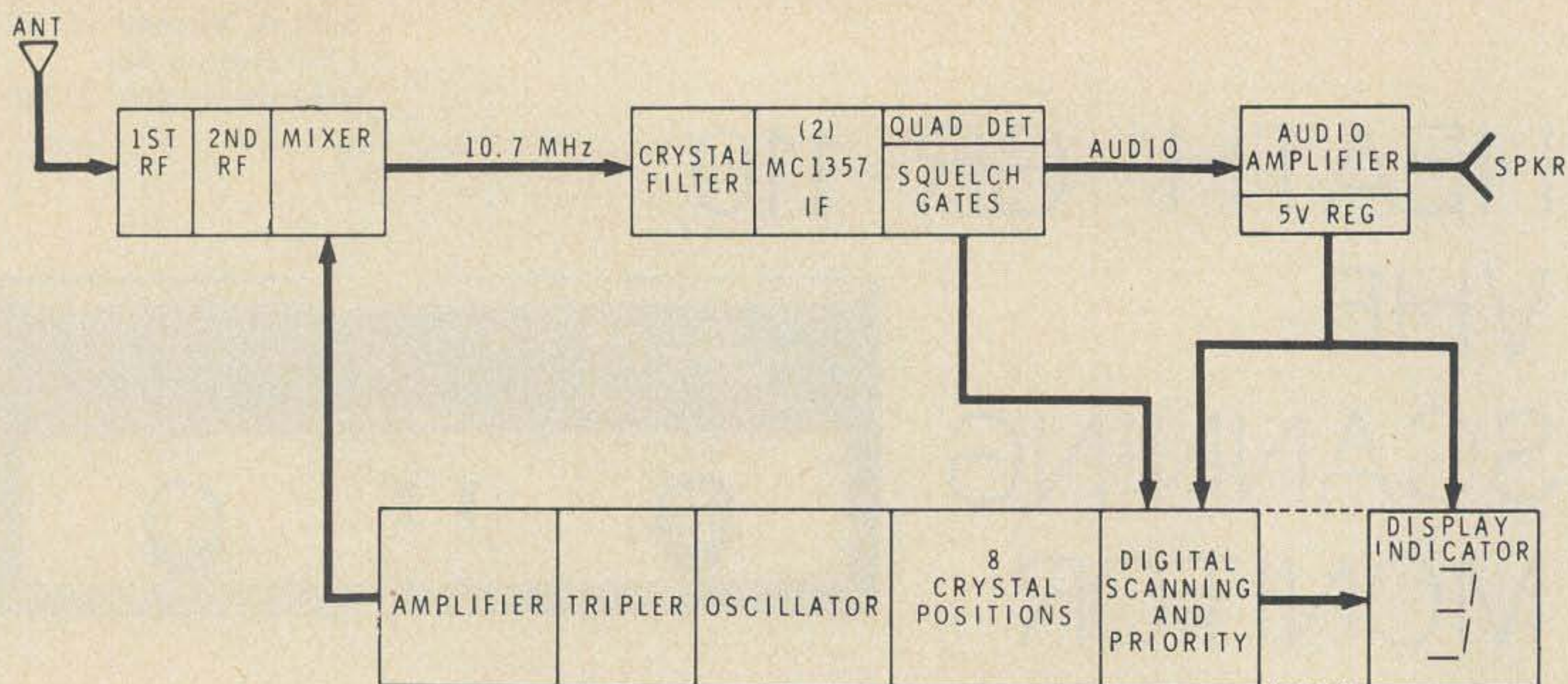
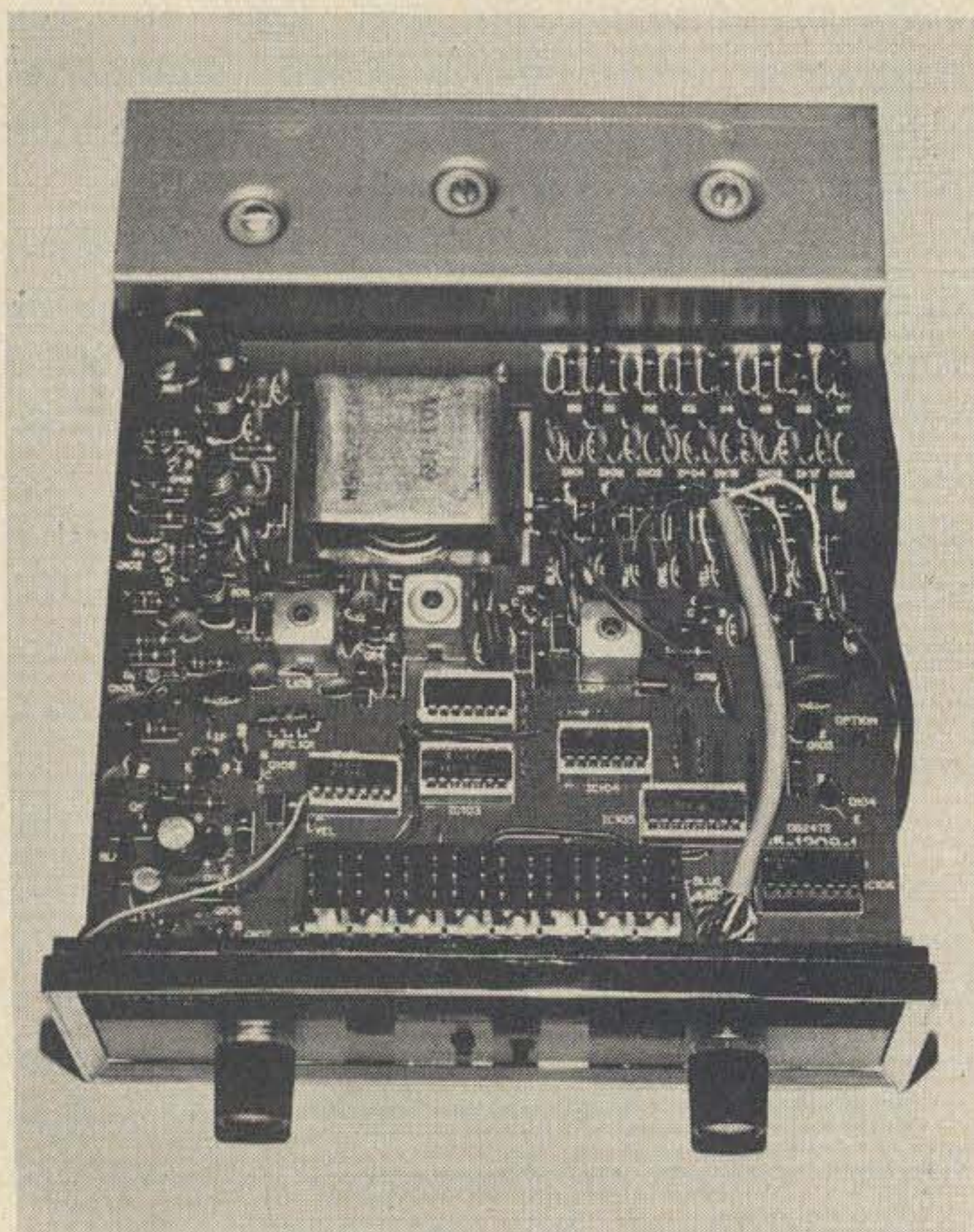


Fig. 1. Block diagram of the Heath GR-110 Scanning monitor.

tors, transistors and such has progressed (?) to a system wherein the bag and its contents are assigned a multitude of pack numbers, index numbers, Heath part numbers and the manufacturers part number. This may assist in some manner with Heath's inventory control or kit packaging process, but I personally feel that the inexperienced kit builder has enough problems without such numerical profusion.



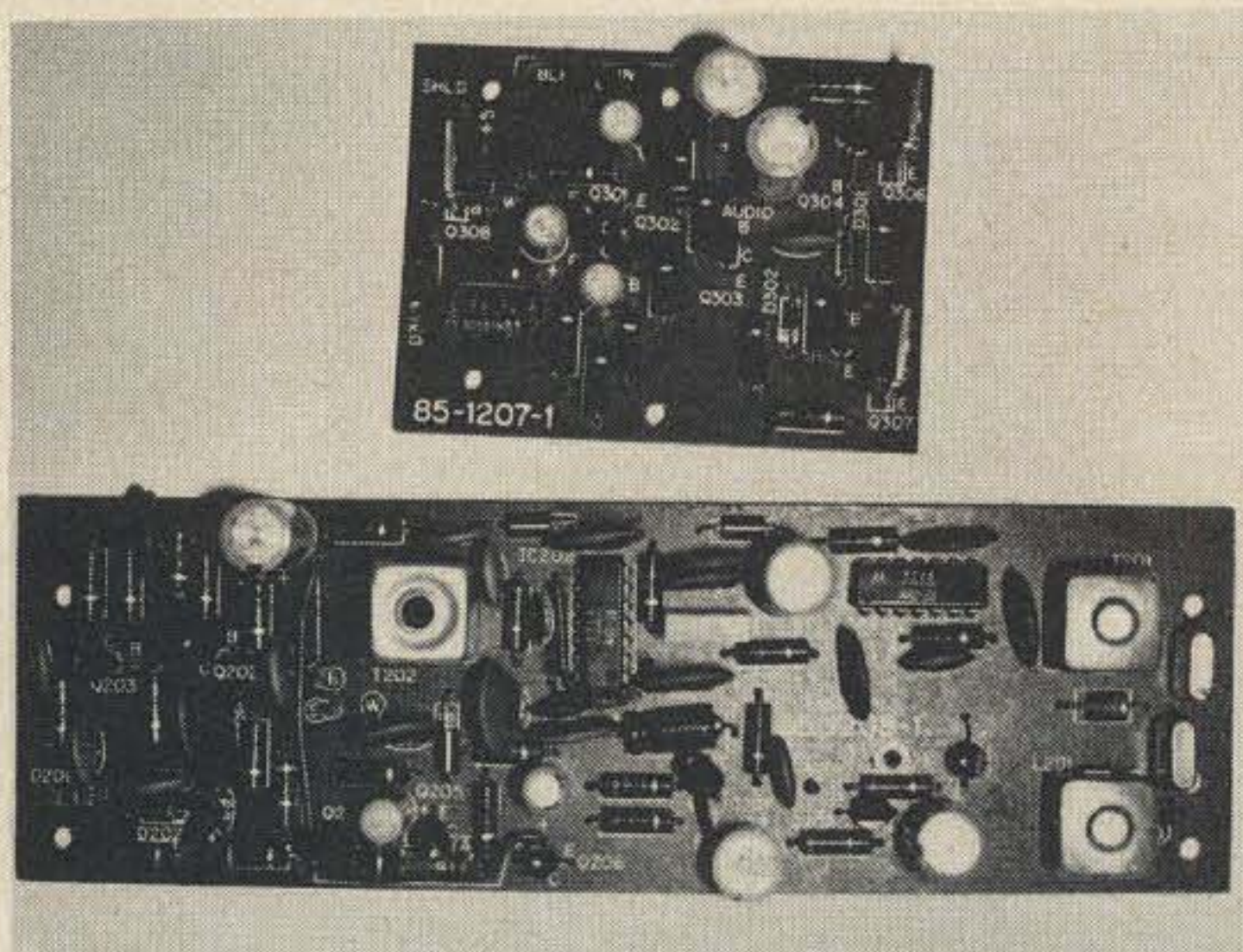
The main circuit board contains the receiver front end (along left side), crystal oscillator circuitry (top right and center) and scanning circuitry (ICs at bottom).

The GR-110 is called a four-evening project. But, if you are a newcomer in the kit building world or are a Theodore Thumbs type, I recommend taking all the time that you personally require for a properly assembled unit. Good soldering techniques are a must. In fact, because I was trained in NASA methods of soldering, I went so far as to clean each circuit board foil pad and individual component lead prior to soldering, and cleaned the residual flux from the completed boards with alcohol upon completion. Also, I recommend the use of heat sinks on each transistor and diode lead while soldering. Alligator clips are fine.

Before the completed receiver can be aligned, at least one and preferably two, crystals must be installed. Crystals are *not* included with the kit, for obvious reasons. Heath does provide crystal certificates, at \$4.95 each, which should be ordered at the same time as the kit, and upon receipt, filled out with your desired local frequency and mailed immediately, directly to the crystal manufacturer. Hopefully, the arrival of a crystal and the finish date of the kit will be concurrent. Also, your local parts supplier more than likely has a supply of the more popular frequency crystals for your area in stock.

Alignment may be accomplished with or without instruments. The instrument method requires the use of an FM signal generator capable of covering the desired frequencies and a VTVM. If these instru-

ments are not available, the monitor can be aligned with a simple one-transistor crystal oscillator signal generator kit that is furnished. This generator is very basically an up-converter and is a boot-strap operation in that it obtains its power from the receiver via an alligator clip, obtains an rf signal from the receiver i.o. tripler buffer with another clip, mixes this rf with its own 10.7 MHz oscillator output and feeds the resultant rf signal into the monitor's antenna jack. Using this method of alignment, with a high frequency and a low frequency pair of crystals installed for the desired scanning range of the receiver, was found to be entirely adequate for the type of reception normally expected.



The audio (top) and i-f section (bottom) occupy separate pc boards.

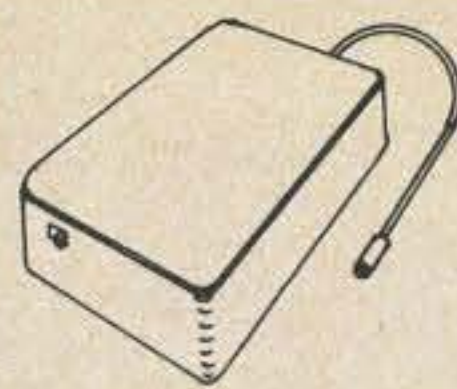
Since completion, my GR-110 has been almost continually on, and it is somewhat satisfying knowing that I am not missing a thing that is happening around town.

Two modifications have been made to my unit already. First was the removal of the phono type antenna input jack and installation of a BNC type, which is more compatible with ham shack environs. Next, because I have on several occasions forgotten to turn off the squelched receiver prior to hitting the sack and consequently have been awakened by voices in the night, I installed a pilot light on the front panel.

Priced at \$119.95, Heath's GR-110 Scanning Monitor is a worthwhile addition to any ham shack...and will cause you to wonder how you got along without one.

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