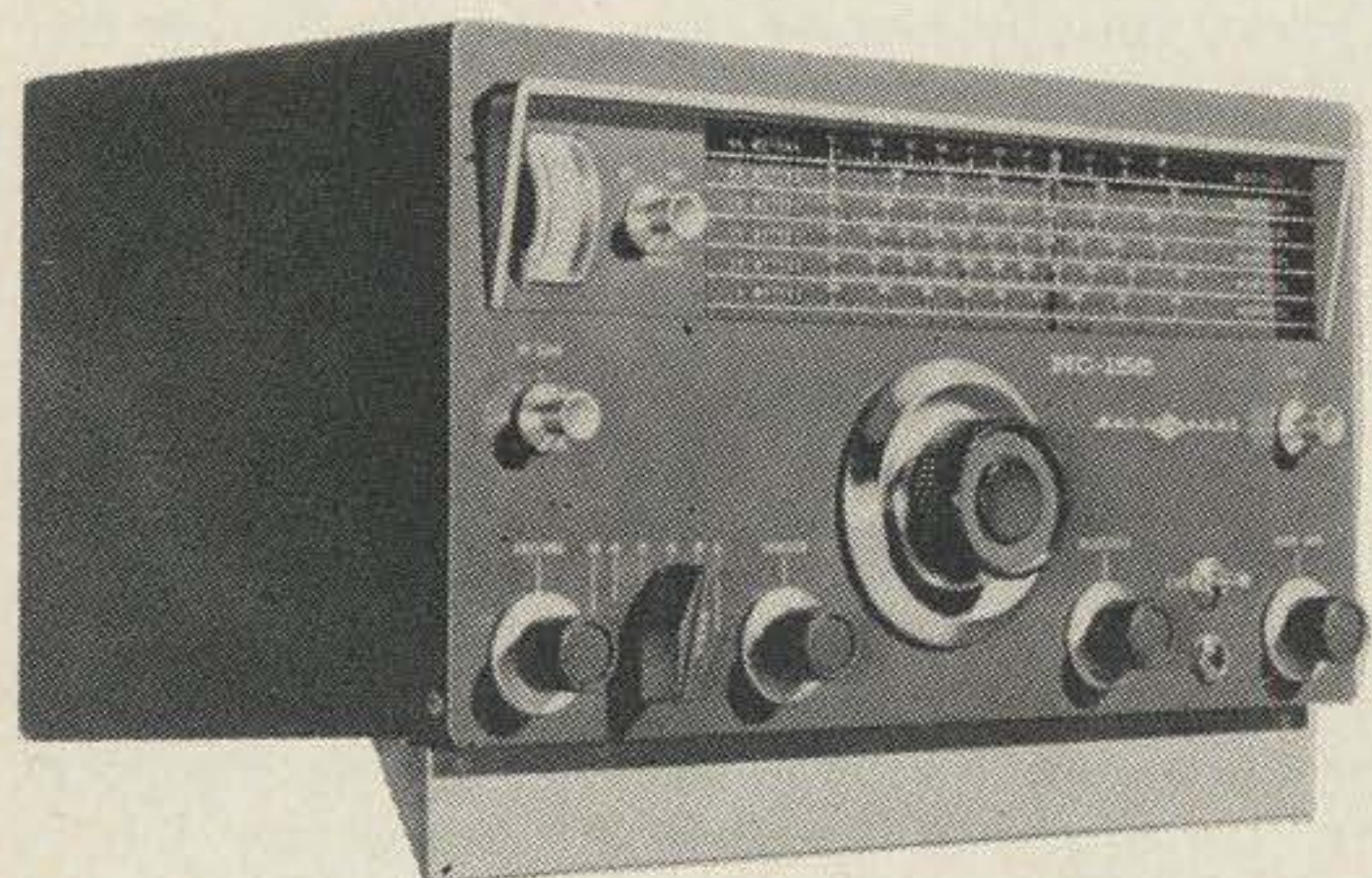


A Review of the



and the NC-190



Two of the most popular receivers to appear on the ham market in the past few years are National Radio Company's new NC-155 and NC-190. The NC-190 is a double conversion general coverage receiver tuning 540 kc to 30 mc, and the NC-155 is its ham-band-only equivalent covering all amateur bands between 80 and 6 meters. While both receivers are priced at the lower end of the National line, they offer features and performance equal to most receivers of similar types selling in the medium to high price area, and in a couple of instances (which we will take up separately) provide conveniences which are found in no other units that we are aware of.

Both receivers are quite similar in appearance and identical in size. They are both finished in a handsome color combination of dark blue and silver gray, and measure a very compact 8 $\frac{5}{8}$ " high, 15 $\frac{5}{8}$ " wide and 9" deep. With the exception of front end circuitry, the two receivers are extremely similar electrically (see block diagram Fig. 1). A 6BZ6 is used as a pentode rf amplifier exhibiting semi-remote cut-off characteristics to provide good AVC control and low intermodulation. The 6BE6 first mixer with its self-contained local oscillator converts the signal frequency to the first *if* of 2215 kc. Great care has obviously been taken in the local oscillator portion of the first mixer in both receivers to obtain maximum stability through the use of ceramic coil

forms, rigid wiring techniques and the use of a solid $\frac{1}{8}$ " steel front panel rather than aluminum. The 2215 kc *if* signal moves along to the second 6BE6 mixer and local oscillator combination, where it is converted again to 230 kc and introduced into the Ferrite Filter. This little package, which was first developed by National for use in the well-known NC-270, is composed of ferrite cup cores with Q's of 500 to provide a high degree of selectivity at a relatively high intermediate frequency, thus reducing secondary images. Capacitive coupling between the cup cores is varied to obtain bandwidths of 600 cycles, 3 kc, and 5 kc for CW, SSB, and AM respectively. Coming out of the Ferrite Filter, the signal is fed to two 6BA6 *if* amplifiers also operating at 230 kc after which (depending upon the mode of reception) the signal passes to either a diode AM detector or a triode product detector using one-half of a 12AX7. The other half of the 12AX7 is used as the variable BFO. The triode section of a 6T8 is used for the first stage of audio amplification, and the three diodes available in the 6T8 envelope are used for AM detection, the extremely efficient AM noise limiter, and the clamp to provide delayed AVC operation for maximum sensitivity on weak signals. The audio output from the 6T8 is fed to the grid of the 6CW5 which provides up to one watt of audio at the 3.2 ohm speaker terminals. So much for the circuit description—Now let's see how they work!

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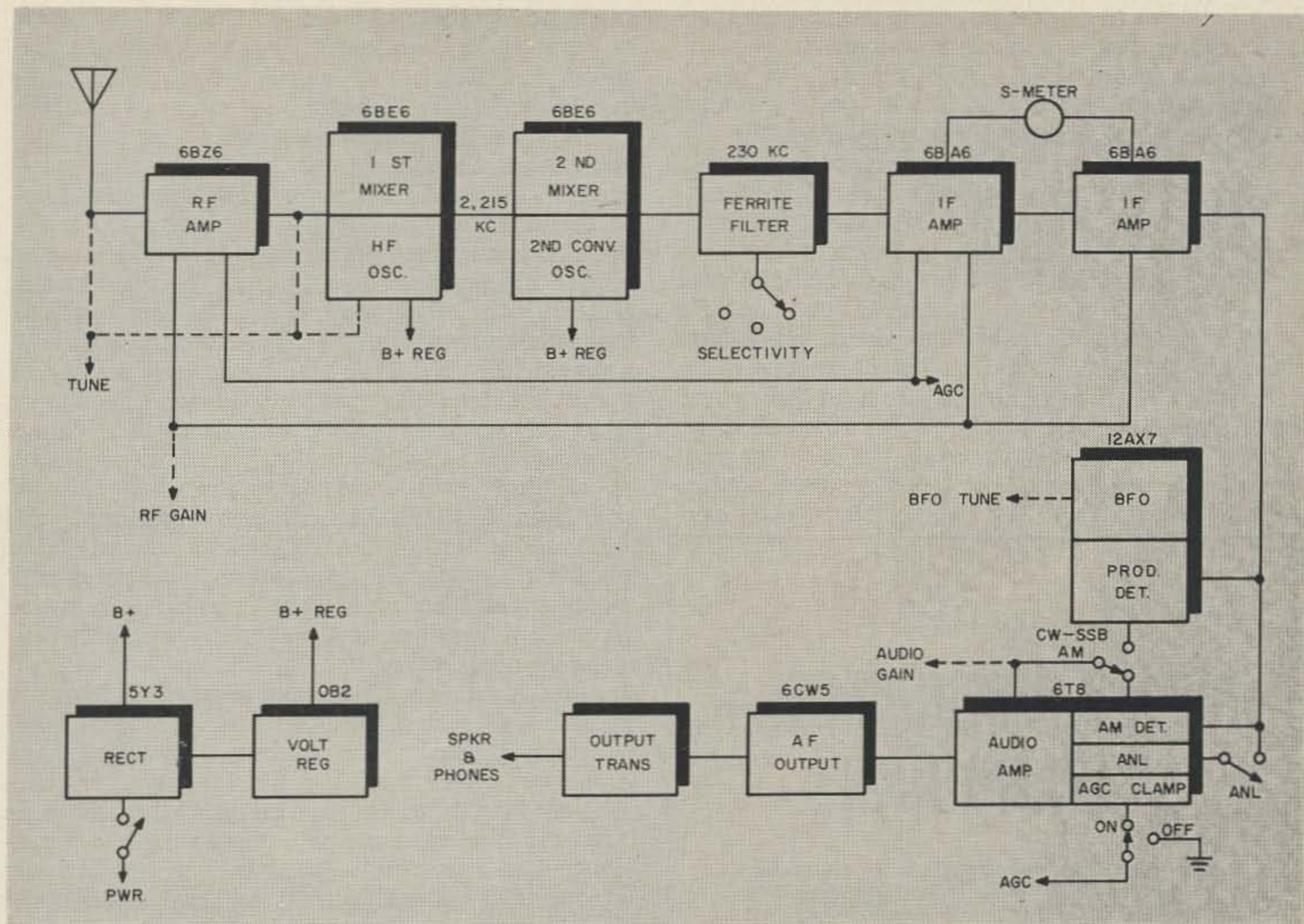
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The NC-190, the general coverage receiver, is a little wonder—This is the first general coverage unit we have laid our hands on (with the exception of some equipment designed primarily for the military in the two kilobuck price region) which handles like a conventional ham-band-only box—Probably the greatest single reason for the "feel" of the NC-190 is the miniature Velvet Vernier employed in the bandspread dial to provide a drive reduction of 60:1—As a result, the tuning ratio of the '190 approximates that of the average ham-band receiver. We understand from National that the planetary drive in question will be soon available as a separate component. We foresee a happy future for this little gadget since it provides a 5:1 reduction in a package the size of an overgrown shaft bushing—Drill one hole, slip in the vernier, tighten up the lock nut and the job is done (if you are wondering how the 60:1 ratio is achieved, the 5:1 vernier drives a 12:1 pinch mechanism— $5 \times 12 = 60$) A shiny little knob under the bandspread scale entitled *Dial Selector* caught our attention as soon as the receiver was unpacked. A quiver with anticipation, we approached the knob carefully, pulled it out a fraction of an inch and rotated it 180 degrees. Lo and behold, a whole new set of bandspread scales appeared in the dial window calibrated for the five most popular foreign broadcast bands! You fellows who occasionally like to listen to foreign broadcast stations finally have a receiver that allows you to locate a station by frequency! Another immediately apparent advantage of the NC-190 is the use of *five* main tuning bands rather than the usual three or four—Thus instead of covering the 10 to 30 mc range in one fell swoop, this range is divided into two 10 mc bands which thereby afford greatly improved calibration and stability (the latter as a result of more efficient temperature compensation over a reduced tuning range).

We operated the NC-190 for approximately two weeks on AM, CW, and SSB. We found the receiver to be remarkably sensitive in all modes of operation (National claims sensitivity better than one microvolt for 10 db), with excellent electrical and mechanical stability. SSB operation is easier than we ever thought possible on a general coverage receiver, and this is accounted for in large part by the very high tuning ratio together with the excellent product detector and SSB/CW AGC system. Sideband selection is by means of a USB/LSB calibrated BFO control, which takes the guess-work out of properly setting the BFO for proper reception. CW performance was excellent, and with the Ferrite Filter set in the 600 cycle position, single signal CW reception was easily attained.

In summary, the NC-190 offers a surprising amount of performance for 220 bucks, and seems to us to be an ideal receiver for the



Block Diagram

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ham who wants excellent ham band performance along with general coverage at a relatively low price. We foresee a couple of other areas where the NC-190 will be quite popular—as a general coverage stand-by receiver for the snazzy ham-band-only shack and as a tunable *if* for some of the new VHF converters—The combination of price and performance on this package is hard to beat!

The trial of the ham-band-only NC-155 was viewed with some trepidation in view of the \$199 price tag. Twenty-five years ago it was possible to buy an awful lot of receiver for this kind of money, but the cost of labor and materials has risen to the point where it takes around \$250 to start getting the kind of performance necessary for today's more sophisticated operation. We were, therefore, pre-

pared to be disappointed in the NC-155 even in view of its handsome appearance and high quality of finish and construction. This feeling began to be dispelled as soon as we laid a hand on the main tuning dial, and by the end of our first forty-five minute session with the NC-155 our original opinion was completely replaced by the happy conclusion that the NC-155 was more than able to hold its own in far higher priced company! Just as in the NC-190, the first operating feature noticed was the extraordinarily smooth tuning mechanism. The NC-155 also uses a 60:1 dial reduction, and the combination of the heavy flywheel on the tuning dial and the Velvet Vernier in a ham-band-only receiver results in a "feel" which closely approaches that of our own NC303. According to National, the 60:1 reduction on the NC-155 is almost twice as high as that of any other ham-band-only receiver, and as a result it is possible to work in on sideband almost as easily as AM (advanced modulation). Dial calibration and illumination is excellent, and electrical features are basically the same as those of the NC-190 since both receivers are almost identical from the first mixer back to the loudspeaker. The NC-155 seems to be as mechanically stable as any receiver we have yet tried with a crystal-controlled front end—We tuned in a relatively strong CW signal on 20 meters, picked the front of the receiver up three inches and let go—There was a slight microphonic bong when the Flip Foot crashed on the tabletop, but the receiver had apparently not shifted a cycle. Electrical stability was almost as impressive—Total observed drift over a four to five hour period from a cold start on 15 meters was in the order of 1 kc.

Six meter stability was naturally not nearly as good, but sensitivity on this band certainly exceeded our expectations—National claims six meter sensitivity better than one microvolt for 10 db, and while we did not actually measure sensitivity, the '155 dug up all the weak ones and had enough hop in the front end to show an appreciable decrease in noise when the antenna was replaced with a 50 ohm resistor. Six meter signals were quite easy to tune as a result of the excellent dial ratio, and we are presently toying with the possibility of using the six meter range on the '155 as a tunable *if* for 2 and 1¼ meter converters because of its complete 4 mc coverage and excellent performance.

Both the NC-155 and NC-190 fill big holes in the current crop of receivers.

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A variety of foreign posts is available. Rotation of the employee and his family from post to post is accomplished in accordance with standard government regulations and usually involves tours of 24 months duration at each post followed by Stateside leave between assignments. Work is challenging and varies from post to post. If you are in good health, not subject to military draft, and are interested in the above openings, please write, giving us the following information:

1) Name, address, telephone number, and hours when you can be reached; 2) Date of birth; 3) Military history, including dates, schools, experience, grade or rank, and MOS (primary and others); 4) Civilian training and experience; 5) FCC license if any; 6) CW speed; 7) Typing speed; 8) Marital status and dependents.

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