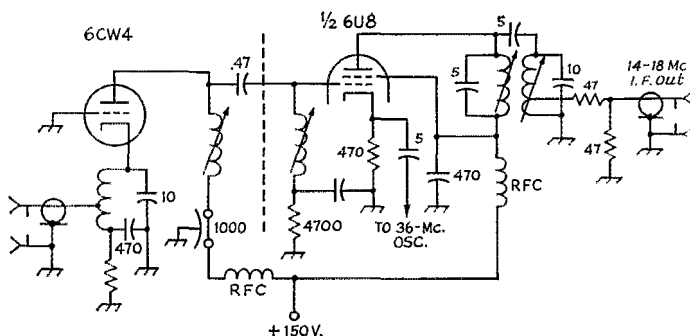


Fig. 1—Principal circuit features of the TELco 50-Mc. converter. Resistances are in ohms, capacitances are in μf .



operated in the condition that makes it least susceptible to overloading. This is with low bias and high screen voltage, so that it draws a reasonable amount of plate current. Third, interstage and output coupling circuits having a minimum of capacitive coupling are set up to provide the desired bandpass characteristics, and at the same time provide considerable reduction in interference from out-of-band signals. Finally, all power leads are well filtered and decoupled, to prevent pickup or radiation of spurious frequencies, and to provide good stage isolation.

The principal circuits of interest are shown in Fig. 1. The 50-Mc. signal is fed into the cathode of the 6CW4, using a tuned circuit here for some selectivity, and for impedance-matching purposes. Note that the plate circuit of the Nuvistor and the grid circuit of the mixer are shielded from each other, the only coupling being through the very small capacitor connecting them. (Note to constructors looking for ideas to lift: a 0.47- μf . capacitor is easily made by twisting insulated leads together. About one twist should be enough.)

Two tuned circuits are used in the mixer output, but here there is a combination of inductive and capacitive coupling. Adjustment of the interstage and output-coupling circuits is done with a

sweep generator, the aim being to develop a flat-topped steep-sided response curve for the 50-Mc. band.

The instruction book accompanying the converter goes into some detail on additional means to be taken to combat overloading and spurious responses. A coaxial filter for insertion in the antenna lead is described, and information is given on making an i.f. attenuator to be inserted in the line between the converter and receiver, in case the gain of the over-all system turns out to be higher than optimum. A balun for use with antenna systems employing balanced lines is also described.

— E. P. T.

TELco Model 201 Converter

Height: 1½ inches.

Width: 6 inches.

Depth: 3 inches.

Power requirements: 150 volts d.c., 40 ma., 6.3 volts, 1 amp.

Price class: \$35.

Manufacturer: Tapetone Electronics Laboratories, Inc., 99 Elm St., West Newton, Mass.

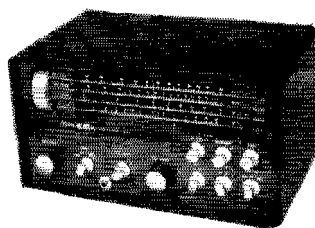
National NC-105 Receiver

THE National NC-105 receiver is designed primarily for the short-wave listener and beginner radio amateur. Although this receiver is in the \$120 class, it contains many features usually reserved for the higher priced models. It has a separate detector for c.w./s.s.b. reception, variable selectivity, a built-in speaker, and an S meter. Although it does not improve the performance of the receiver, a hand-rubbed oiled walnut cabinet is available for an extra twenty bucks!

Housed in a wrap-around cabinet finished in what is becoming a traditional National color,

blue-gray, the NC-105 has a large illuminated slide-rule dial calibrated in four bands, from 550 kc. to 30 Mc. There is also a bandspread dial, marked from 0 to 100, just below the main dial. An illuminated edge-reading S meter sits at one end of the panel and chrome knobs for the various controls are grouped along the bottom and on one edge.

Six tubes are used in the NC-105, several of them performing more than one job. A look at the block diagram in Fig. 1 shows the tube lineup and functions. The NC-105 does not have an r.f.



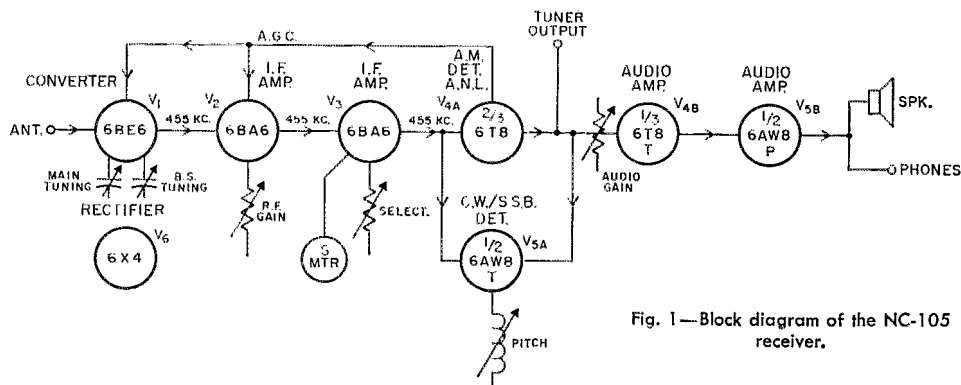


Fig. 1—Block diagram of the NC-105 receiver.

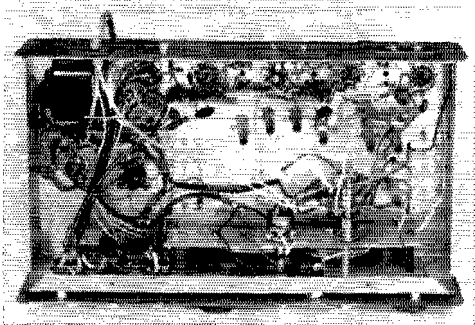
stage, and its front end uses only one tube, a converter. Signals coming from the antenna are coupled into a single tuned circuit and then converted directly to the i.f., 455 kc., in the 6BE6 converter tube, V_1 . The converter is a five-grid tube operating as combination mixer and oscillator. The proper oscillator and antenna input coils are switched in the front-end circuits by the panel BAND SWITCH. The 550 kc. to 30 Mc. range is covered in four bands: 550 kc. to 1600 kc., 1.6 to 4.5 Mc., 4 to 12 Mc., and 11 to 30 Mc.

The oscillator portion of V_1 operates 455 kc. above the signal frequency on the three lower bands and 455 kc. below the signal on the high-frequency band. The resulting 455-kc. i.f. signal is then amplified in the first i.f. amplifier, V_2 . This stage has its cathode returned to ground through a potentiometer, the R.F. GAIN control, so that the gain of this stage can be adjusted.

A second i.f. amplifier, V_3 , can be made regenerative by a panel control labeled SELECTIVITY, which permits adjustment of the i.f. selectivity from a broad position, for hi-fi broadcast reception, to sharp selectivity for c.w. and s.s.b. reception. Also located in the i.f. amplifier circuits is the S meter which, with the r.f. gain control set at maximum, indicates relative signal strength of the received signal.

A.g.c. voltage is applied to the first i.f. amplifier and, in the case of the 550-kc. to 1600-kc. band, to the converter stage, too.

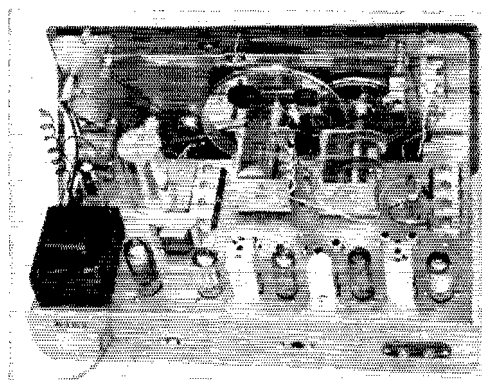
Two detectors are available in the NC-105. A diode detector, V_{4A} , is used for a.m. reception, and an oscillating triode detector, V_{5A} , for c.w. and s.s.b. reception. A panel BFO switch selects the desired detector. The panel PITCH control determines the frequency of oscillation of the oscillating triode, V_{5A} .



Bottom view of the NC-105 receiver.

An automatic noise limiter, consisting of a diode section of V_{4A} , can be used when in the a.m. mode of reception. It is turned on and off by the panel NOISE LIMITER switch.

Output from either the a.m. or s.s.b./c.w. detector is available at a plug at the rear of the receiver. This TUNER OUTPUT can be used to drive a high-fidelity amplifier. Output from the detectors can also drive the built-in audio amplifiers, V_{4B} and V_{5B} . V_{5B} feeds a loudspeaker



View of the NC-105 with its cabinet removed. The coiled lead at the left of the photograph connects to the speaker attached to the cabinet top. Rear apron connections and leads are, from left to right: Line cord, tuner output, S-meter zero adjust, and antenna and ground-terminal strip.

National NC-105 Receiver

Height: 7 $\frac{1}{2}$ inches.
Width: 13 $\frac{1}{2}$ inches.
Depth: 8 $\frac{3}{8}$ inches.
Weight: 30 pounds.

Power requirements: 105-125 volts a.c., 50-60 cycles.

Price class: \$120.

Manufacturer: National Radio Company, Inc., Melrose 76, Mass.

which is mounted inside the NC-105's cabinet. The audio output signal is also available at a front-panel phone jack. Inserting a standard phone plug automatically disconnects the loud-speaker.

Other panel controls not previously mentioned are an AUDIO GAIN control for adjusting the speaker or headphone level and a FUNCTION switch that has three positions: STBY, REC, and TUNER. In the STBY position, the receiver high voltage is disconnected to mute the receiver. In the REC position, the receiver audio circuits are connected and output goes to the built-in audio amplifiers and speaker. In the TUNER position, the audio circuits are disconnected and the detector

output is fed to the rear apron TUNER OUTPUT jack.

The NC-105 has its own transformer power supply which delivers about 130 volts d.c. A 6X4 rectifier tube is connected in the full-wave center-tap circuit.

The instruction manual for the receiver contains the usual operating information, specifications and parts list but, in addition, has a dial-scale calibration chart for use with the band-spread dial. The calibration chart includes all the amateur bands plus several of the popular short-wave bands, and is used to convert the bandspread 0-100 scale directly to frequency.

— E. L. C.

Strays

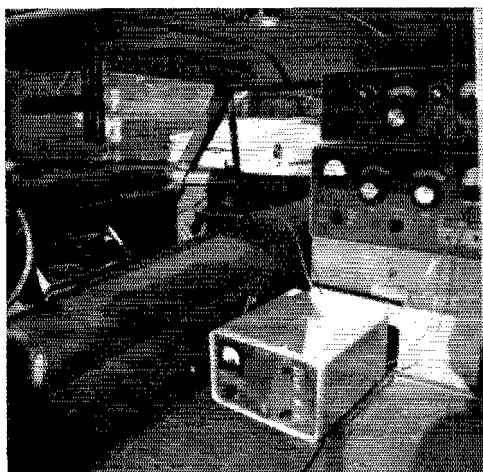
Better check your v.f.o. calibration, gang. Effective January 1 WWV increased each of its standard frequencies by 2 parts in one billion. This was necessitated by irregular variations in the speed of rotation of the earth. Astronomical observations made at the U.S. Naval Observatory show that the earth was rotating at a successively slower speed each year from 1955 to 1958, and that since then the earth has been rotating at a faster speed each year.

W6ISQ reminds us of a new service offered by Western Union, called a *Personal Opinion Message*. For 75¢ you may express your opinion on political affairs in a telegram to your Senator or Congressman, provided you can do it in 15 words or less. These *POM*'s can be filed anytime, from anywhere. If you haven't written yet concerning Senate Bill 2361 — reciprocal licensing — maybe this would be a good bet. What! You don't have the details on what this bill is all about? See pages 9 and 73 of *QST* for October, 1961.

Every member get a member. See page 64A.



You don't have to be, but it helps. K4YYR with his mobile station.



W4EYI runs a full kw. mobile with the outfit shown above. The radio gear consists of Collins S-Line, and is used only on 40 meters. A.c. power for the station is supplied by the 1500-watt Onan generator mounted on the back. Special overload springs are installed on the station wagon to take care of the weight of the generator. W4EYI operates very nicely underway—we just hope that no one ever rams him from the rear!

