

from this setting. When receiving CW signals, a mid-position setting of the beat oscillator would correspond to a condition wherein the maximum IF selectivity occurs at zero beat with the incoming signal and no audio tone would be observed at the point of maximum signal reception. It is therefore necessary to slightly detune the beat oscillator in either direction to provide a suitable audio tone which is comfortable to the operator and to obtain maximum sensitivity. During CW reception it is often convenient to adjust the beat oscillator to phase an undesired signal to zero beat, thus eliminating it as an audible interfering signal.

The signal from the beat oscillator is coupled through a small capacitor to the grid of the other 12AX7 triode which serves as a triode product detector. The IF signal from the plate of the second IF tube is coupled through a small capacitor to the cathode of the product detector and the desired product appears in the plate circuit. The undesired mixer products are filtered out, and the audio signal is coupled to the FUNCTION switch through an RF filter composed of resistor R23 and capacitor C49.

## FUNCTION SWITCH

The FUNCTION switch allows selection of the AM signal or the output of the automatic noise limiter (ANL) with AGC either operating or not operating, and also allows selection of the output from the product detector for single sideband (SSB) or CW reception. In normal operation, the noise limiter may be used at will, depending on incoming noise level and operating convenience. In the event that CW or single sideband reception is desired, it is essential that the mode switch be placed in the CW/SSB position. The ANL, AM and CW/SSB positions appear twice on the mode switch corresponding to operation with AGC either on or off for each receiving mode.

The S meter is connected between the plates of the two 6BA6 IF stages and, as was mentioned above, the AGC is applied to the first of these IF stages with the result that as signal amplitude increases, conduction through the first IF stage is decreased, but conduction through the last IF stage remains constant, thereby changing the potential difference between the plates which causes a current flow and an effective meter reading. The zero-adjust is accomplished by adjusting the S Meter Zero Adjust control to establish zero potential difference across the meter under conditions of no incoming signal.

## S METER

Normal adjustment of the S Meter is readily accomplished by increasing the RF GAIN control to maximum sensitivity which corresponds to its extreme clockwise setting. The receiver should be tuned so that only background noise is heard and the antenna trimmer peaked. The S Meter Zero Adjust control should then be adjusted for a reading of approximately S1 on the incoming noise level which will assure proper S Meter reading. When properly adjusted, an

microvolts of signal at the antenna terminals.

The desired audio signal output from the FUNCTION switch is then coupled to the AUDIO GAIN control and in turn, to the grid of the first audio amplifier which is the triode section of the 6T8 tube.

## AUDIO GAIN

The AUDIO GAIN control is used to adjust the speaker or earphone level to comfortable listening volume. It is important not to confuse the function of the AUDIO GAIN control with the function of the RF GAIN control which controls the over-all receiver sensitivity. Normally, with the RF GAIN control advanced to provide proper S Meter reading, all additional variation of listening level is accomplished with the AUDIO GAIN control. In the event of operation with AGC off, the RF GAIN control is sometimes used as the master sensitivity control and the AUDIO GAIN control is left set in a predetermined position. Proper balance between the two controls under this condition is normally a matter of individual operating preference.

The output from the plate of the first audio amplifier is impedance-coupled directly to the grid of the 6CW5 audio output stage. The amplified audio is taken from the plate of the audio output stage through the audio transformer to the speaker terminals. The secondary winding of the audio transformer is designed to match a 3.2-ohm speaker such as the matching NTS-3 table speaker assembly. The secondary of the audio transformer is also connected through a shorting type phone jack which is so wired that upon the insertion of a standard phone plug the loud speaker circuit will be broken and the speaker silenced.

## PHONE JACK

The head phone jack is available on the front panel and will accept any normal 2 circuit phone plug. There is no DC voltage associated with the head phone circuit. Because of the low impedance of the audio transformer secondary, almost any type of head phone may be used with completely satisfactory results.

An accessory socket is provided on the rear apron of the NC-155 receiver and is wired to accept the XCU-109 one megacycle crystal calibrator. Power to this accessory socket is provided through the front panel CALIBRATE switch. The signal from this accessory calibrator is coupled to the antenna terminals of the receiver to provide a strong CW signal at every 1 mc point on the dial.

## CALIBRATE SWITCH

To properly calibrate the dial, with the accessory XCU-109 calibrator, the RF GAIN control should be advanced to normal receiver sensitivity and the front panel CALIBRATE switch should be rotated to the ON position. The calibrator signal may then be tuned at any even 1 mc point on the dial scale corresponding to the band in use. It is sometimes convenient to use the CW mode reception in

order to avoid using the calibrator signal and make location of the signal less difficult. After an appropriate calibrator signal has been tuned, the operator may observe that this signal does not correspond exactly to the 1 mc calibration point of the dial scale. In this event, the CALIBRATE switch knob may be moved from side to side thus moving the entire dial scale to place the calibrated mark directly over the tuning pointer. Once this is achieved, the calibrator may be turned off and an accurate calibration is assured.

The power supply of the NC-155 receiver is a conventional transformer-type power supply which employs a 3Y3GT tube in a full-wave rectifier circuit with a suitable power supply filter and a shunt feed to an OB2 voltage regulator tube. The OB2 is used to regulate the plate supply voltage to the high frequency or first converter oscillator and the beat frequency oscillator. A STBY-REC (standby-receive) switch is provided in the 145 volt supply bus in order to remove power from the plates and screens of most tubes for STBY operation. Terminals 4 and 5 of the accessory socket are wired in parallel with the STBY-REC switch for remote control of the receiver.

## STBY-REC

The STBY-REC switch is a two-position toggle switch which may be set at STBY to mute the receiver, or placed in the REC position for normal operation. An auxiliary pair of terminals on this switch is connected to the rear relay terminals in such a manner that the rear relay terminals are effectively open-circuited in the REC position and short-circuited in the STBY position. This allows control of an external relay circuit by means of the STBY-REC switch. If the STBY-REC switch is placed in the STBY position

the receiver may be activated by externally shorting terminals 4 and 5 of the receiver.

The mechanical structure of the NC-155 employs a solid 1/8" panel for extreme mechanical rigidity and stability. A separate bottom cover and cabinet top are employed for ease in servicing and the National Radio Company patented Flip-Foot has been added for operator convenience.

## CABINET

The Flip-Foot of the NC-155 receiver may be easily elevated into the raised position, or dropped back to the flat position for maximum operating ease. To elevate the Flip-Foot, simply lift the forward portion of the cabinet and reach under and pull the rear edge of the Flip-Foot down and forward until it reaches its forward or upright position. To remove the top half of the cabinet for normal service, it is necessary only to remove the two screws on the lower forward corner of each side of the cabinet and the two screws at the lower outside corners of the back. It is then possible to remove the cabinet top by simply lifting and springing the front top lip of the cabinet free from the retaining clips attached to the panel. The cabinet is simply replaced by reversing this procedure, taking care to engage the slots in the forward lip of the cabinet into the two clips welded to the rear of the top section of the panel. The bottom cover of the receiver may be removed independently by removing the two rear mounting feet which serve as combination mounting feet and retaining screws, and by removing the four retaining screws. After removing these screws, the bottom cover may be slipped to the rear and removed from under the Flip-Foot to allow free access to the wiring of the receiver.