indicated by improved signal strength when the trimmer is rotated clockwise), the series padding condenser of the coil being adjusted must have more capacity. If any of the Nos. 1, 3 or 5 trimmers require less capacity, a corresponding decrease must be made in the capacity of the series padding condenser. After the series padding condenser has been adjusted for trial, the dial is returned to 450 and the procedure repeated.

The above instructions may seem complicated, but they cover complete alignment under the worst possible conditions, where everything is out of adjustment. The chances are that the only adjustments that will need to be made are the conventional trimmer adjustments of the trimmers Nos. 1 to 8.

Simple antenna compensation for the general coverage range is made by adjusting trimmer No. 2, and for the bandspread range by adjusting trimmer No. 1.

The instructions will probably be simplified after reading the general description of the tuning system given in the last section of this booklet.

With regard to the coil groups covering the frequencies between 2.05 megacycles and 50 kilocycles, there are only five trimmer adjustments. These are Nos. 2, 4, 6, 7 and 8. The No. 8 adjustment is used here as in the other coils for adjusting the oscillator circuits to correspond with the calibration. The No. 7 trimmer is the conventional series padding adjustment. Nos. 2, 4 and 6 are the usual trimmers.

I.F. and Crystal Alignment Instructions

Before attempting to check the alignment or adjust a single signal receiver it is essential that the operator be familiar with the principles involved and the type of performance to be expected.

A receiver of this type is simply a superheterodyne which may be adjusted to have extremely high selectivity on all signals. The effective width of the selectivity curve is only a few cycles, usually between 20 and 100. This means that when tuning in a given c.w. signal, tuning is going to be very sharp and the dial must be turned slowly in order to avoid missing the signal entirely. As compared to the straight superheterodyne, the single signal receiver is about 100 times as selective. The straight super will pick up a signal and will reproduce both sides of the audio beat note at about the same strength; that is, the carrier whistle may be varied from either side of zero beat up to about 3000 cycles when the receiver is tuned and the whistle will remain about the same strength at any pitch. The s.s. receiver, however, being 100 times as sharp, will not perform in this manner, but as the receiver is tuned across the carrier the audio response will be very sharply peaked at one certain pitch of the carrier whistle. Detuning the receiver a small fraction of a degree, while it changes the pitch only slightly, will make the signal much weaker, since it has been detuned from the sharp selectivity peak.

It is evident, therefore, that the great selectivity available shows up as a peak in the audio response and when the receiver is in operation all signals, after being correctly tuned, will peak at the same audio frequency.

General Superheterodyne Theory and the Explanation of Single Signal Operation

(It is extremely important that these paragraphs be very carefully studied, if a full understanding is to be had of the detailed data on adjusting Single Signal receivers)

To those who are not entirely familiar with the operating principles of a superheterodyne, the following explanation may be of interest:

It is the function of the first detector and high frequency oscillator of a super to convert a high frequency signal to the frequency of the intermediate amplifier. If, for instance, a 7000-k.c. signal is being received, the high frequency oscillator, in the case of the HRO receivers, will be tuned to 7456 k.c. producing a beat with the signal equal to the difference between these two frequencies; that is, 456 k.c., the frequency of the I.F. amplifier. The 456-k.c. beat is amplified in the I.F. amplifier and is detected or de-modulated in the case of phone signals at the second detector. When receiving c.w. signals a beat note is obtained by the use of a separate beat oscillator coupled to the second detector and operating at, or close to, the intermediate frequency. If the beat oscillator is tuned exactly to 456 k.c. and if the signal mentioned above is tuned to give an I.F. beat of exactly 456 k.c., it is evident that the receiver as a whole will be tuned to zero beat.

An audible beat note may be obtained by doing either one of two different things. The first is to change the tuning of the high frequency oscillator (by means of the tuning dial) slightly, so that it will produce a different I.F. beat with the signal. For example, suppose the dial is changed so that the high frequency oscillator oscillates at 7457 k.c.; the I.F. beat will now be 457 k.c., which will be amplified as before by the intermediate amplifier, but when reaching the second detector will produce a 1 k.c. (thousand cycle) audio beat with the beat oscillator, which is operating at 456 k.c. as before. Similarly, the tuning dial could be moved in the other direction, so that the high frequency oscillator is tuned to 7455 k.c., in which event the I.F. beat would be 455 k.c. and the audio beat note would be a thousand cycles but on the other side of the carrier.

The selectivity of the I.F. amplifier is such that a signal detuned from it by only one kilocycle (.2 of 1%) will still be amplified **almost** as much as a 456-kc. signal, although there will, of course, be some loss in gain.

The other method of getting an audible beat