MODELS NC-100 Series

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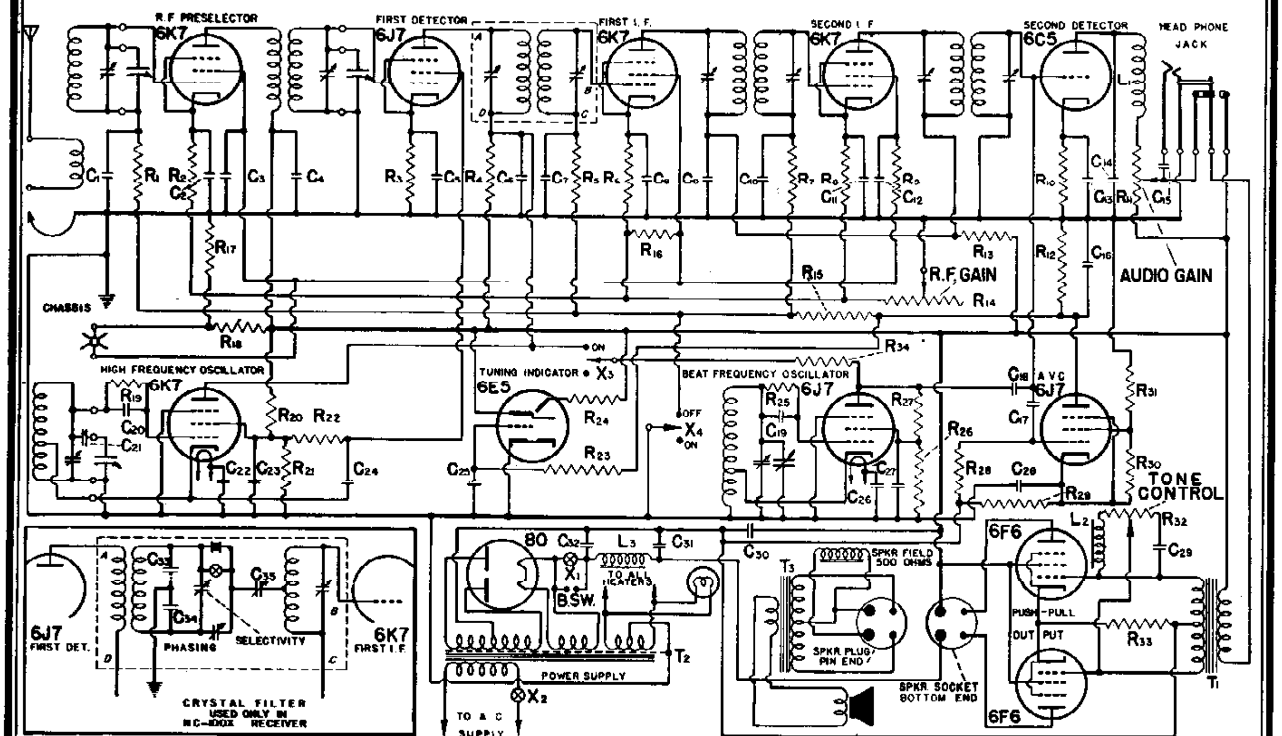
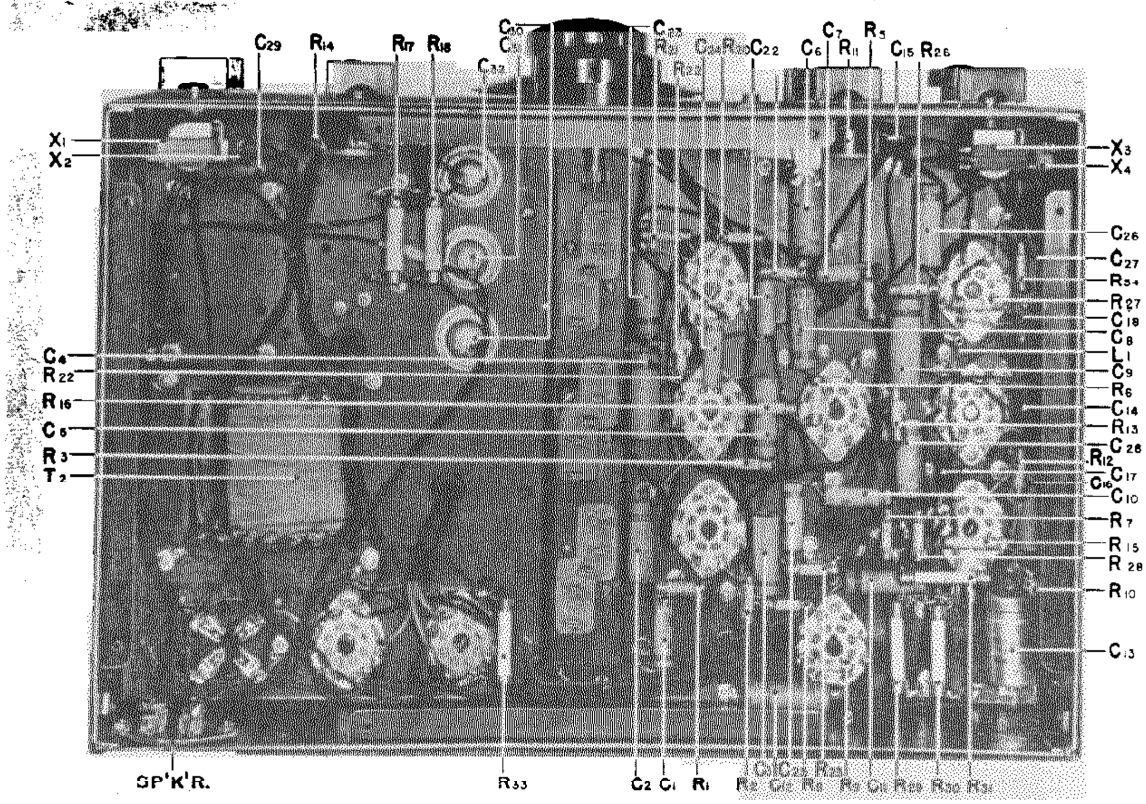
SCHEMATIC DIAGRAM —— TYPE NC-100 RECEIVER



Models NC-100S and NC-100XS are the same as Models NC-100 and NC-100X respectively except that they have a 12-inch speaker instead of a 10-inch speaker.



FOR PARTS VALUES, SEE NEXT PAGE

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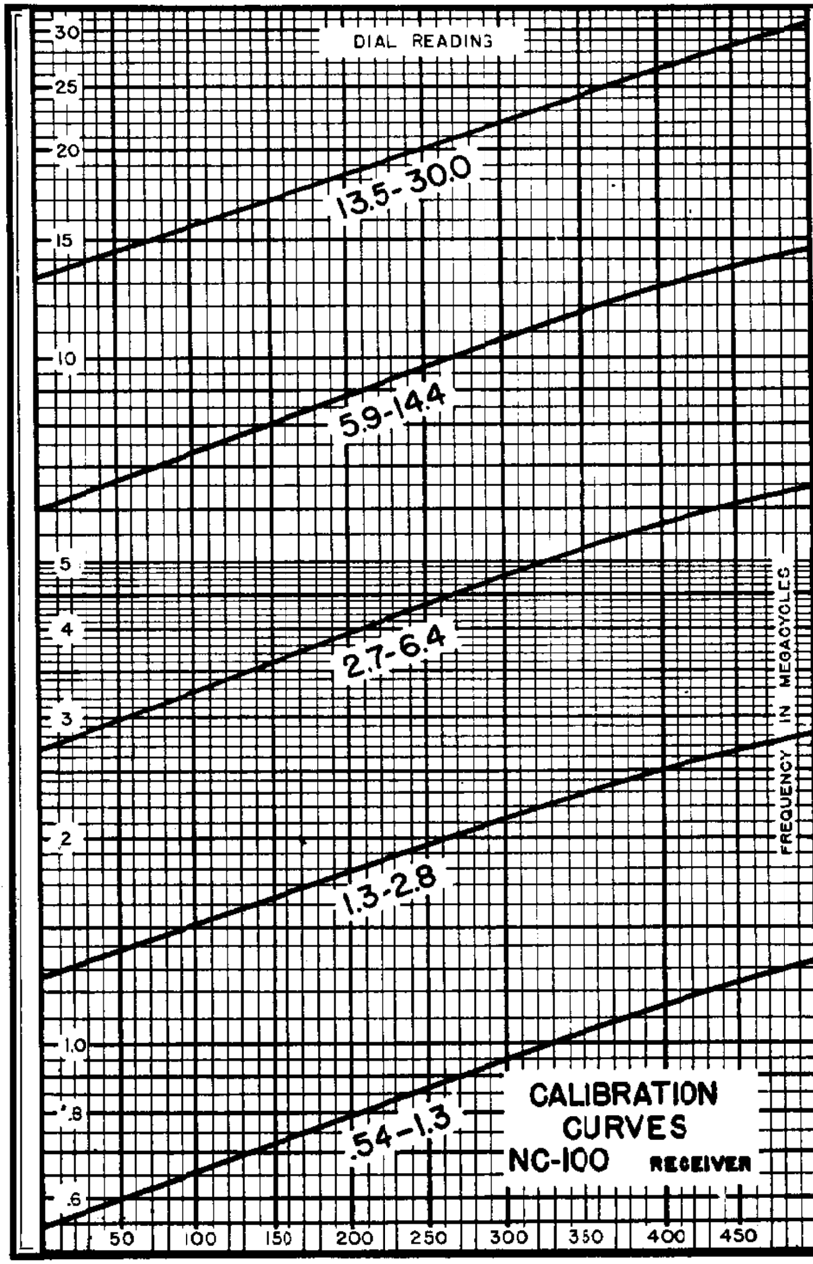

The alignment and other instructions pertaining to Model NC-100A also apply to Model NC-100 and NC-100X with the following exceptions:

Under "Preliminary Adjustments --- The I.F.", paragraph 3, The I.F. adjustments are indicated on the layout diagram, Nos. 4 to 8 inclusive.

The crystal filter output coupling condenser, adjustment No. 3, serves as a fixed I.F. gain control and, in general, should not be touched.

Resistor and Condenser List

R_1	R.F. Grid filter	.5 megohm	½ watt
R_2	R.F. Cathode Bias	350 ohms	½ watt
R_3	1st Det. Cathode Bias	5000 ohms	½ watt
R_4	H.F. Circuit B + Filter	2000 ohms	½ watt
R_5	1st I.F. Grid Filter	.5 megohm	½ watt
R_6	1st I.F. Cathode Bias	350 ohms	½ watt
R_7	2nd I.F. Grid Filter	.5 megohm	½ watt
R_8	2nd I.F. Cathode Bias	500 ohms	½ watt
R_9	2nd I.F. Screen Filter	2000 ohms	½ watt
R_{10}	2nd Det. Cathode Bias	20,000 ohms	½ watt
R_{11}	Audio Volume Control	50,000 ohm potentiometer	
R_{12}	AVC Plate	.5 megohm	½ watt
R_{13}	I.F. B + Filter	2000 ohms	½ watt
R_{14}	R.F. Gain Control	10,000 ohm variable	
R_{15}	Common Grid Filter	.5 megohm	½ watt
R_{16}	Gain Control Bleeder	50,000 ohms	½ watt
R_{17}	Voltage Divider	20,000 ohms	2 watt
R_{18}	Voltage Divider	20,000 ohms	2 watt
R_{19}	H.F. Oscillator Grid Leak	20,000 ohms	½ watt
R_{20}	H.F. Oscillator Voltage Divider	50,000 ohms	½ watt
R_{21}	H.F. Oscillator Voltage Divider	100,000 ohms	½ watt
R_{22}	1st Det. Screen Filter	100,000 ohms	½ watt
R_{23}	Tuning Indicator Grid Filter	.5 megohm	½ watt
R_{24}	Tuning Indicator Target	.1 megohm	½ watt
R_{25}	C.W. Oscillator Grid Leak	50,000 ohms	½ watt
R_{26}	C.W. Oscillator Voltage Divider	100,000 ohms	½ watt
R_{27}	C.W. Oscillator Voltage Divider	100,000 ohms	½ watt
R_{28}	AVC Grid Return	.5 megohm	½ watt
R_{29}	AVC Voltage Divider	350 ohms	1 watt
R_{30}	AVC Voltage Divider	1000 ohms	2 watt
R_{31}	AVC Voltage Divider	1000 ohms	2 watt
R_{32}	Tone Control	500,000 ohm potentiometer	
R_{33}	Output Cathode Bias	250 ohms	2 watt
R_{34}	C.W. Oscillator Plate Filter	.25 megohm	½ watt
C_1	R.F. Grid Filter	.01 mfd.	400 volt
C_2	R.F. Cathode Bypass	.1 mfd.	200 volt
C_3	R.F. and 1st I.F. Screen Bypass	.1 mfd.	200 volt
C_4	R.F. and H.F. Osc. Plate Bypass	1 mfd.	400 volt
C_5	1st Det. Cathode Bypass	.1 mfd	200 volt

C_6	1st Det. Plate Filter	.1 mfd.	400 volt
C_7	1st I.F. Grid Filter	.01 mfd.	400 volt
C_8	1st I.F. Cathode Bypass	.1 mfd.	200 volt
C_9	1st and 2nd I.F. Plate Filter	.1 mfd.	400 volt
C_{10}	2nd I.F. Grid Filter	.01 mfd.	400 volt
C_{11}	2nd I.F. Cathode Bypass	.1 mfd.	200 volt
C_{12}	2nd I.F. Screen Filter	.1 mfd.	200 volt
C_{13}	2nd Det. Cathode Bypass	10. mfd.	50 volt
C_{14}	2nd Det. Plate Bypass	.001 mfd.	Mica
C_{15}	Phone Coupling	.1 mfd.	400 volt
C_{16}	AVC Plate Bypass	.1 mfd.	200 volt
C_{17}	AVC Grid Coupling	.0001 mfd.	Mica
C_{18}	C.W. Oscillator Coupling	2 mmf.	Special
C_{19}	C.W. Oscillator Grid	.001 mfd.	Mica
C_{20}	H.F. Oscillator Grid	.0001 mfd.	Mica
C_{21}	H.F. Oscillator Series Padding — Different for each range		
C_{22}	H.F. Oscillator Heater Bypass	.01 mfd.	400 volt
C_{23}	H.F. Oscillator Screen Bypass	.1 mfd.	200 volt
C_{24}	H.F. Oscillator Coupling	.01 mfd.	400 volt
C_{25}	Tuning Indicator Grid Filter	.01 mfd.	400 volt
C_{26}	C.W. Oscillator Heater Bypass	.1 mfd.	200 volt
C_{27}	C.W. Oscillator Screen Bypass	.1 mfd.	200 volt
C_{28}	AVC Cathode Bypass	.1 mfd.	200 volt
C_{29}	Tone Control	.01 mfd.	400 volt
C_{30}	B-Supply Filter	8 mfd.	450 volt
C_{31}	B-Supply Filter	8 mfd.	450 volt
C_{32}	B-Supply Filter	8 mfd.	450 volt
C_{33}	Crystal Filter Bridge	.0001 mfd.	Mica
C_{34}	Crystal Filter Bridge	.0001 mfd.	Mica
C_{35}	Crystal Filter Coupling	35 mmf.	Variable
X_1	B + (stand-by) Switch		
X_2	AC On-Off Switch		
X_3	C.W. Oscillator Switch		
X_4	AVC On-Off Switch		
L_1	2nd Det. I.F. Choke	7. mh.	
L_2	Tone Filter Choke	15. Henry	
L_3	B-Supply Filter Choke	20. Henry	
T_1	Push-Pull Input Audio Transformer	4:1 Ratio	
T_2	Power Transformer		
T_3	Output Transformer	Mounted on Speaker	

MODELS NC-100 Series

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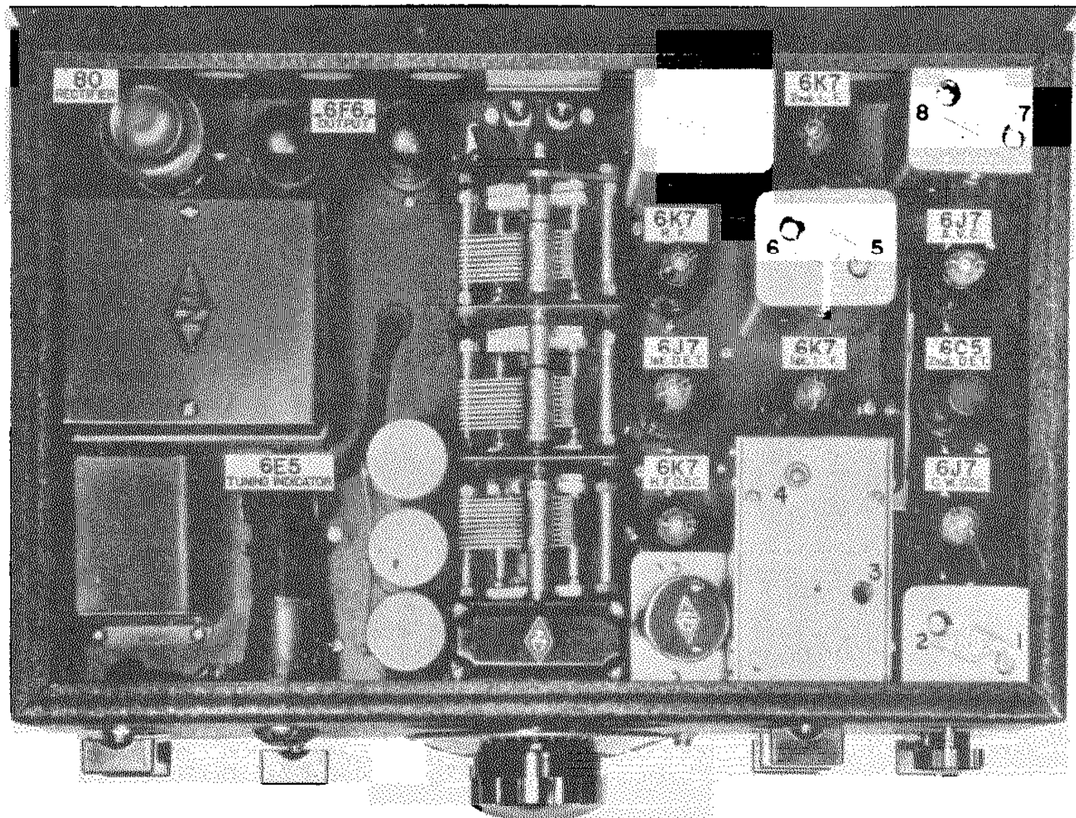


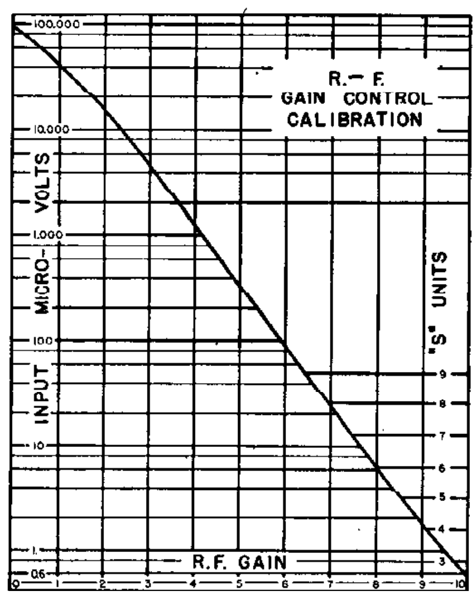
TOP VIEW OF NC- 100X RECEIVER

Measurement of Signal Strength

The combination of the R.F. gain control and tuning indicator make possible the accurate measurement of signal strength. With AVC either on or off, the R.F. gain control is advanced to the point where the electron ray tuning indicator just begins to show some change in pattern. The accompanying calibration curve shows the relation between signal input and this setting of the R.F. gain control.

The size of the shaded area will vary with the modulation of the signal when the AVC is off. This variation does not indicate over-modulation, or carrier shift, but is the normal result to be expected when using an amplified-delayed system of AVC.

For the amateur station operator who prefers to give reports in R or S units, rather than microvolts input, we suggest the use of the righthand scale of the chart. Adjacent points are 6 db. apart, this spacing giving a total range, between the weakest signal and an S-9 signal, of 48 db. Most operators seem to agree that the S-steps should be separated by a 4 to 1 power ratio (6 db.), and since the characteristics of the receiver determine the level of the weakest signals which may be received intelligibly, an "extremely strong" signal (S-9) is, on the NC-100, defined as one resulting in an input of 51 microvolts.



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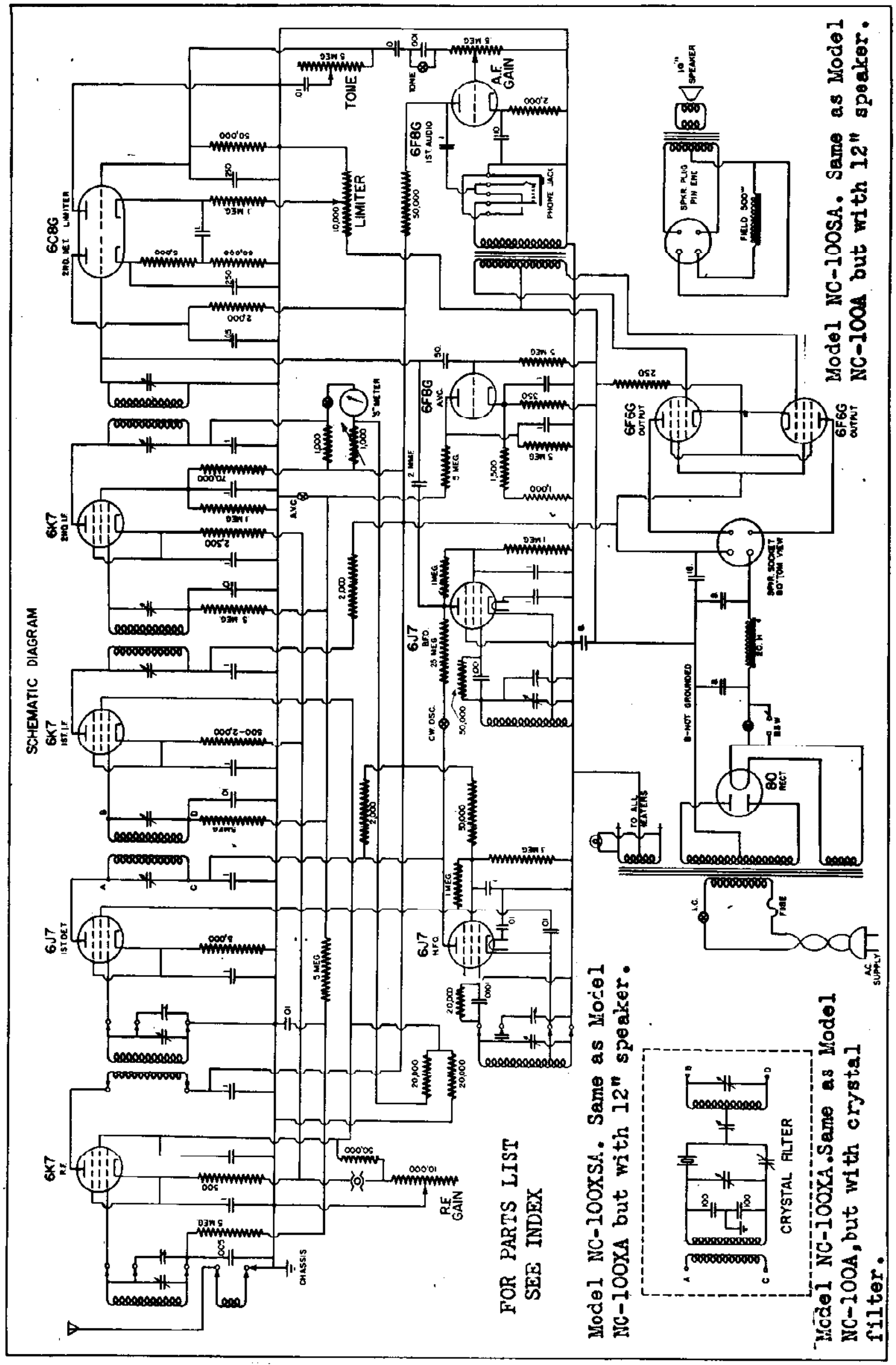

FOR PARTS LIST SEE INDEX

Model NC-100XSA. Same as Model NC-100XA but with 12" speaker.

Model NC-101XA.Same as Model NC-100A,but with crystal filter.

Model NC-100SA. Same as Model NC-100A but with 12" speaker.

Model NC-101XA. Same as Model NC-100XA but frequency coverage is only 160,80,40,20, and 10-meter amateur bands.

MODELS NC-100A Series

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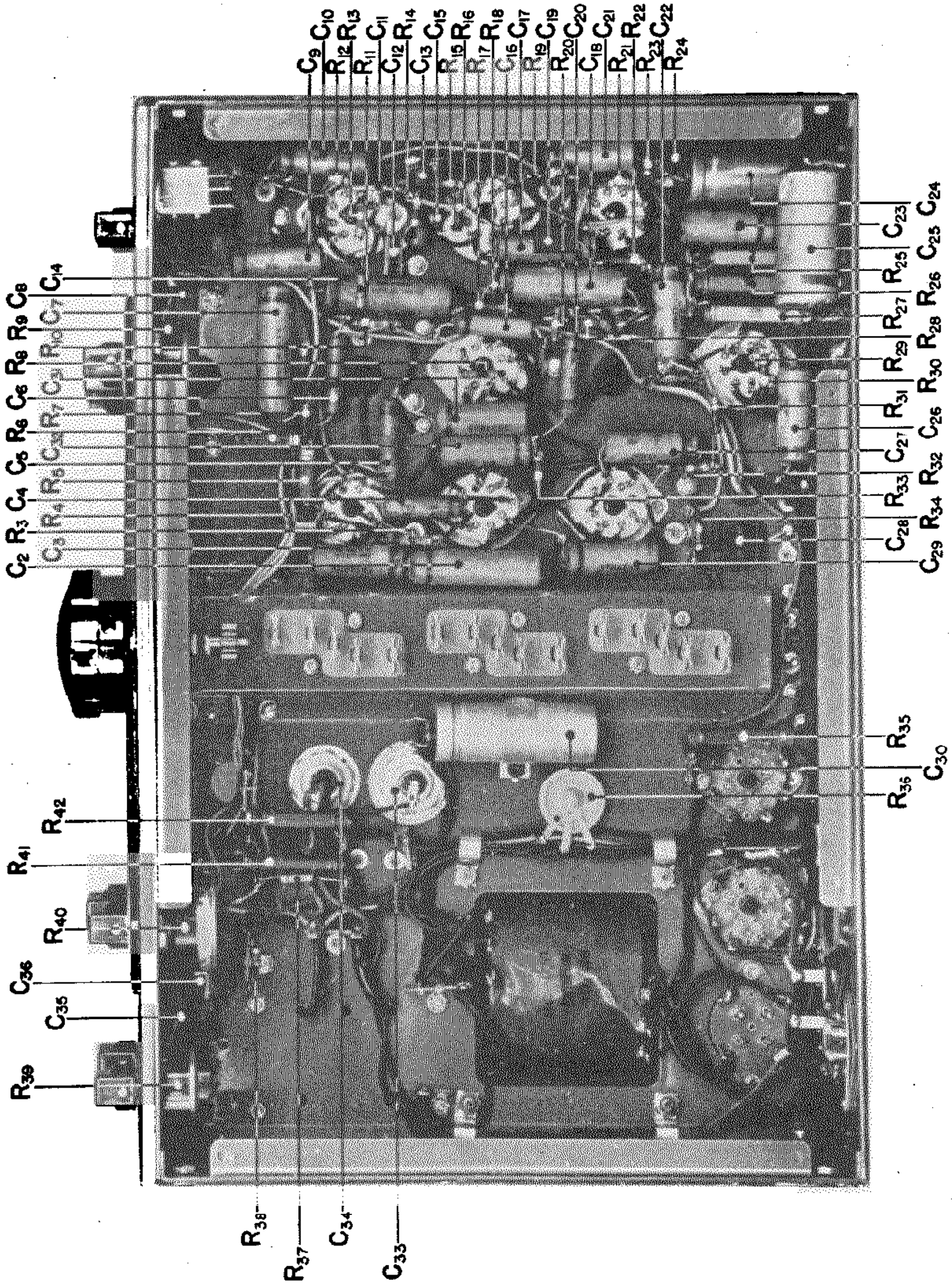

Bottom View of NC-100XA

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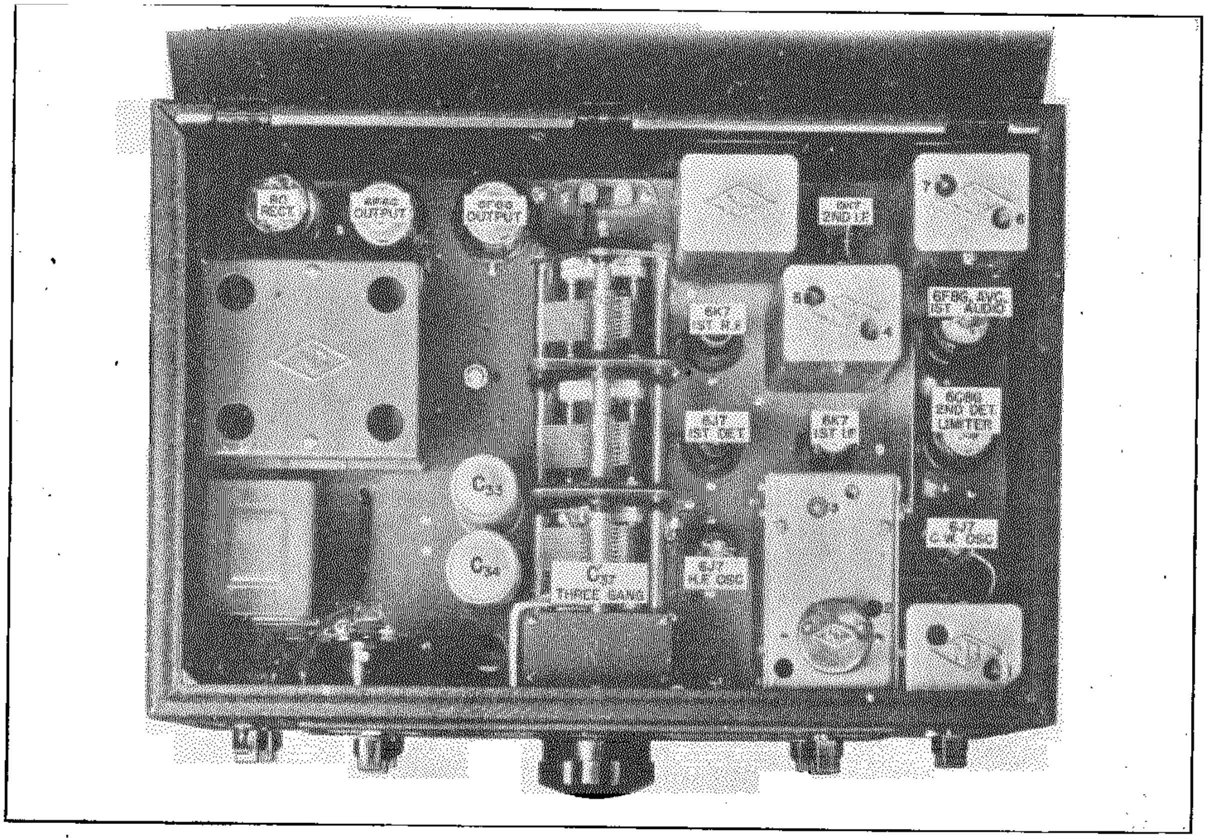
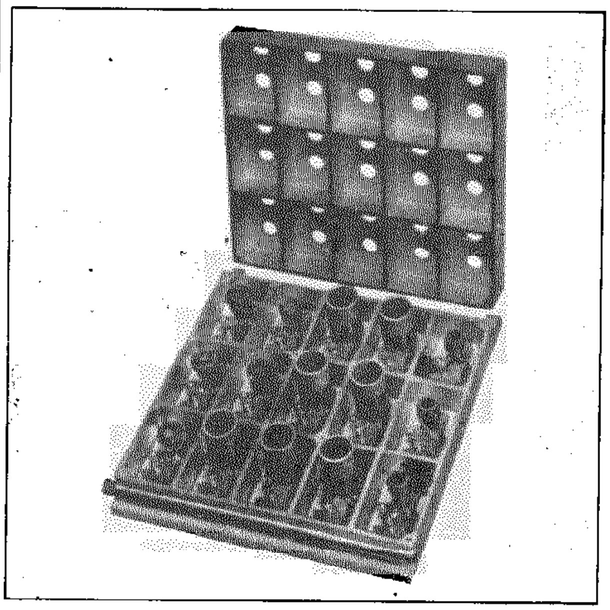
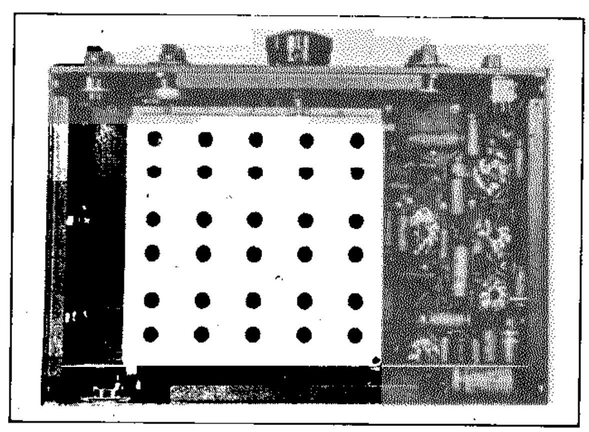


Top View of NC-100XA



THE COMPLETE COIL ASSEMBLY

Permanence of circuit characteristics is assured by the rigid cast aluminum shield and by air dielectric trimmer condensers with R-39 insulation.



BOTTOM VIEW

The coil assembly is shown midway between the 1.3-2.8 mc. and 2.7-6.4 mc. ranges.

MODELS NC-100AB Series

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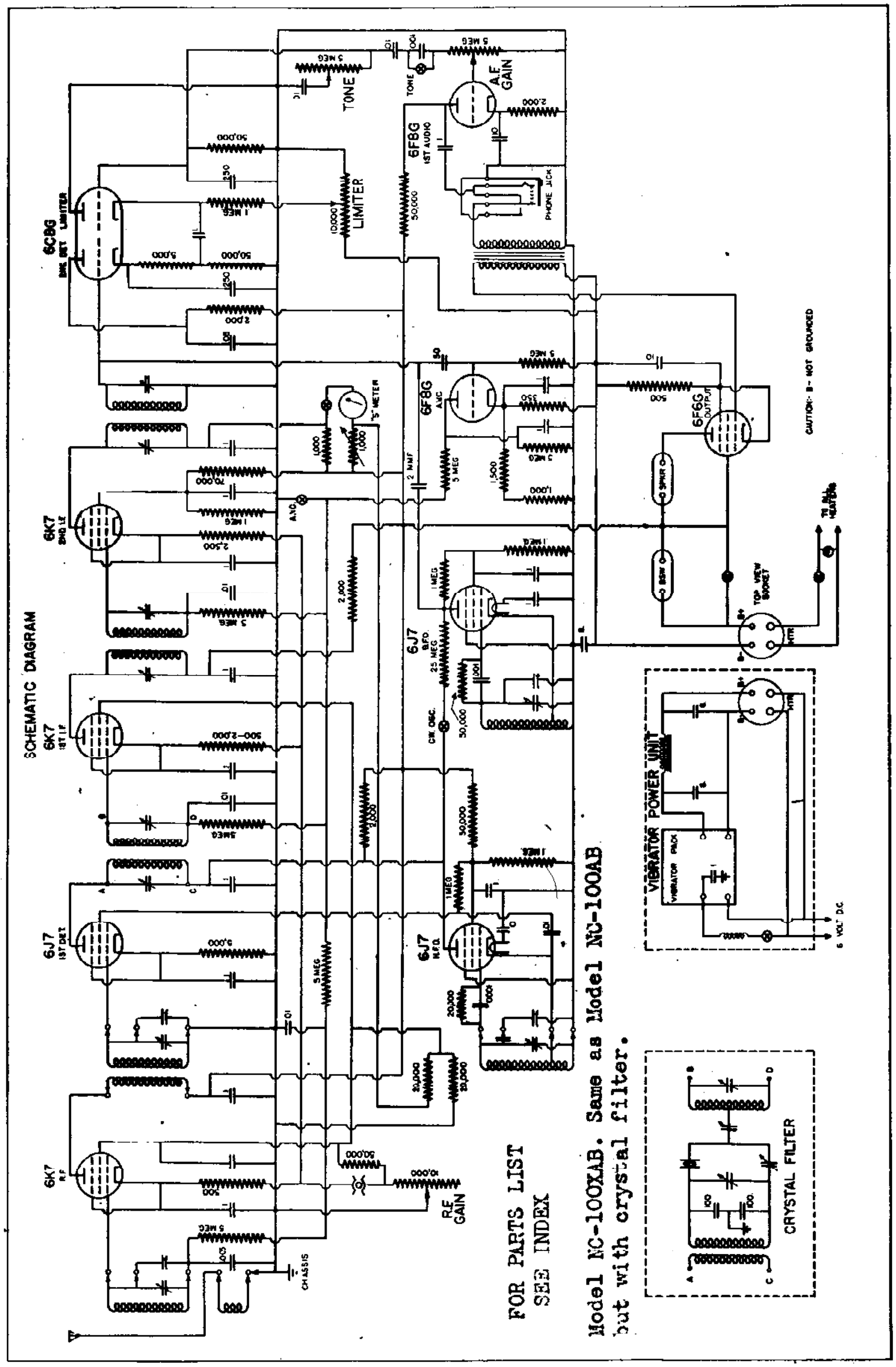

Battery Model NC-100AB

Alignment and Service Data

TUBES

Individual tubes of the same type will vary slightly in their characteristics and it is well to remember this fact when replacements become necessary. Even though the circuit is designed to reduce the effect of such variations to a minimum, the high frequency oscillator and I.F. tubes should be selected with some care. A replacement high frequency oscillator should be checked in the receiver to make sure that the inter-electrode capacities are the same as those of the tube originally employed. This is easily determined by noting any change in calibration at the high frequency end of any coil range. The change should not exceed two or three dial divisions. Compensation for small variations in tube capacity may be made by changing the position of the oscillator grid lead with relation to the body of the tube.

Substitution of new tubes in the I.F. amplifier may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in detail in the following pages.

Two other points should be checked when trying the new high frequency oscillator; a fairly strong steady signal should be tuned in, preferably on some frequency above 10 mc.; the C.W. oscillator should be turned of; jarring the receiver or lightly tapping the tube, should not show any evidence of noise in the output. Next turn on the C.W. oscillator to make sure that the tube does not introduce "modulation hum" on the carrier. The tube should again be lightly tapped to see whether or not its characteristics change.

R.F. AND H.F. OSCILLATOR ALIGNMENT

All circuits are carefully and accurately aligned before shipment, using precision crystal oscillators which insure close conformation to the calibration curves. No readjustments will be required, therefore, unless the receiver is subjected to extremely rough handling. Do not attempt to make any adjustments without first determining the exact function of each trimmer condenser and the effect that it will have upon performance.

The coil group which is plugged into the circuit at any time is the one directly underneath the 3-gang tuning condenser at the center of the chassis. The coil nearest the front of the receiver is the high frequency oscillator, the middle coil is the first detector, and the coil nearest the antenna-ground binding post strip is the R.F.

As shown in the photographs, there are two holes in each coil compartment; of each pair, the one nearest the front of the receiver is directly over the trimmer condenser.

Complete alignment of any one coil range is made as follows: Set the tuning dial near the high frequency end of the range and check the dial reading by means of an accurate test oscillator or a signal of known frequency; readjustment should be made if the dial reading is in error by more than 2 per cent.

Correction for calibration is made by adjustment of the high frequency oscillator trimmer (nearest the front of the receiver). A screw driver with a metal shaft may be used, but the shaft should not touch the aluminum casting while the trimmer is being turned. If the dial reading is found to be too low, more trimmer capacity is needed and vice versa. In adjusting the R.F. and first detector trimmers, no signal is necessary, correct alignment being indicated by maximum background noise. This background noise should be fairly loud when the R.F. and audio gain controls are fully advanced, the crystal filter being switched off. Furthermore, the background noise will be approximately the same on all ranges. The first detector trimmer will have much greater effect upon the amplitude of this noise than the R.F. trimmer, but actually the setting of each is equally important.

With calibration correct at the high frequency end of the range, the dial should be rotated toward the lower numbers. The background noise may vary slightly over the range but should not get appreciably weaker except in the case of the .54 to 1.3 mc. coils. Ganging is checked by pressing one of the outside rotor plates of the oscillator condenser sideways toward the stator, but not enough to make the plates touch. The same check may be applied to the first detector and R.F. tuning condensers. Any bending of the rotor plates should make the background noise definitely weaker. A similar check can, of course, be made by bending the rotor plates out, away from the stator, care being taken not to bend the plates so far that they will not return to their original position.

On the two highest frequency ranges, it may be possible to make the initial oscillator adjustment incorrectly. There are two settings of the oscillator trimmer condenser which will tune in the desired signal at the proper point on the dial; of these, the higher frequency setting (least trimmer capacity) is correct. In checking the ganging of the 13.5 to 30 mc. range, the R.F. condenser has little effect upon the background noise at the low frequency end of the scale and at this one point it is better to use a test signal. Should any error in tracking be found on one range, it is probable that the same error will be present on all ranges and correction may be made by permanently bending the rotor plates of the tuning condenser section in question.

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 single signal 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.

The main point to remember when considering single signal receivers is that they are simply ultra selective superheterodynes, which must be tuned exactly to the signal and that the beat oscillator must be detuned from the crystal frequency in order to obtain an audible beat note.

PRELIMINARY ADJUSTMENTS—THE I.F.

From the above explanation, the reader will see that it is absolutely essential that the I.F. transformers be aligned to the crystal, since the two must work together. This alignment may be accomplished in a number of ways. If the I.F. transformers are far out of adjustment, it is necessary to connect an external crystal oscillator which uses the crystal from the receiver. This oscillator is put in operation and is coupled to the first detector of the receiver. In most cases no actual connection will be required since the field from the oscillator will be sufficiently strong to be picked up, even with the I.F. far out of adjustment. If coupling is required, a lead twisted around the grid cap of the detector tube and run near the oscillator tank coil, will be suitable. The beat oscillator is turned on and adjusted until the crystal signal is picked up. The pitch of the beat note is not important as long as it is well inside the audible range.

All the I.F. transformers are now adjusted for maximum signal. This adjustment need not be made with any great degree of precision, since the crystal will not oscillate at exactly the same frequency to which it will be resonant in the receiver. The phasing control should be set at 0.

The I.F. adjustments are indicated on the layout diagram, Nos. 3 to 7, inclusive.

The crystal filter output coupling condenser, adjustment No. 2, serves as a fixed I.F. gain control and, in general, *should not* be touched.

The crystal may now be removed from the oscillator and installed in the receiver. Throw the switch to connect the crystal for single signal reception. Set the selectivity control for maximum selectivity; that is, with the pointer rotated all the way to the right. Now, tune in a steady signal from a local oscillator or monitor. Tuning very slowly across the carrier, there should be one point at which the signal will peak very sharply. The audio pitch of this peak will be nearly the same as the pitch of the beat used when the crystal oscillator was being picked up.

THE BEAT OSCILLATOR

Once the peak has been found, it would be well for the operator to familiarize himself with the action of the beat oscillator control by changing its tuning in order to obtain an audio note which is most pleasing to copy, or which coincides with any peaks in the loudspeaker or headphones. It makes little difference to which side of the audio beat the beat oscillator is tuned. After a satisfactory pitch has been found, tune the signal by means of the tuning dial so that the signal goes down through zero beat and up to approximately the same pitch on the other side. This response is, of course, much weaker than that of the peak and it may be necessary to turn up the volume control in order to obtain fair volume. The phasing, or balancing, condenser is now adjusted until the signal is WEAKEST. Normally, this setting is near mid-scale.

THE SELECTIVITY CONTROL

The action of the selectivity control may now be checked. With the receiver tuned exactly as it was *before adjusting the phasing condenser*, the selectivity control should be rotated and it will be found that the signal will be loudest at a certain setting. This setting is usually found with the pointer nearly vertical. The setting giving this maximum response is that at which the selectivity of the crystal filter is minimum. Since even at this minimum selectivity the crystal filter is much more selective than the straight super, the signal will be weaker than that obtainable when the crystal is cut out.

When a pure steady signal is carefully tuned to a single signal peak, the selectivity control should have practically no effect upon signal strength. If there is any form of modulation, however, the signal will be loudest when the selectivity control is set for minimum selectivity, since this adjustment allows a greater width of signal or modulation to be passed.

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FINAL I.F. ADJUSTMENT

The final adjustment of the I.F. transformers may now be made. Set the control for maximum selectivity, carefully tune in a steady signal until it is exactly on the crystal peak, and adjust each of the I.F. transformer tuning condensers for maximum signal strength. (*In almost all cases where the I.F. amplifier has once been aligned to the crystal, this check is all that would be required, and it is not necessary to put the crystal in an external oscillator.*) Even if the I.F. amplifier is considerably out of alignment, the crystal frequency may be found by employing a strong local signal from a monitor or frequency meter, slowly tuning across it while listening for a peak in the audio beat note. If the peak is found at a very high audio pitch it will be necessary to change the tuning of the beat oscillator so that the audio peak will be well inside the limits of audibility. It is probable that if the peak signal is found at all, the I.F. amplifier will not be far out of tune and the readjustments required will be small.

Since the I.F. transformers are tuned with air dielectric condensers, the adjustments when once made are permanent and need only be checked when new tubes are substituted, provided of course the receiver is not subjected to severe mechanical shocks or vibration.

CHECKING CRYSTAL ACTION

The crystal response, or crystal activity, may be easily checked as follows: With the signal tuned in exactly as mentioned in the previous paragraph and the selectivity control set at maximum selectivity, disconnecting the filter (by turning the phasing knob to 0), should weaken the signal slightly. There will, of course, be a great increase in tube hiss, background noise, and interfering signal, but the actual strength of the desired signal should be weaker. It is possible, of course, to obtain a louder signal in the straight super connection by resetting the selectivity control and this is quite normal. The fact that a signal is weakened when using the crystal filter is relatively unimportant, inasmuch as the filter is only used when interference or static is present, and such interference will be made about 100 times weaker, thereby greatly improving the readability of the signal.

A crystal which is found to be a poor resonator should be carefully removed from the holder and both crystal and plates cleaned with alcohol, gasoline, carbon, ether, or some similar fluid. In reassembling the holder care must be taken to see that the crystal is free between the plates; that is, that there is a suitable air gap (usually two or three thousandths) between the plates and the crystal and that the crystal is free to move sideways in any direction. The fibre pieces may be removed if desired as they serve only to protect the crystal in shipment.

"S" METER ADJUSTMENT

If it should happen that the "S" meter network gets out of balance, the procedure for correction is as follows: Disconnect the antenna and turn the CONTROL switch to MVC, set the R.F. GAIN full on. Then, by means of a screwdriver, adjust the balancing control (No. 8, receiver top view) until the meter reads 0.

Special Instructions for the NC-101X and NC-101XA Receivers

The NC-101X is a special model of the NC-100X receiver, employing the same circuit, etc., but covering only the five low-frequency amateur bands. Each of these bands is spread out over the major portion of the dial and, as shown by the accompanying calibration curves, each band starts at 50 and ends at 450. The curves are accurate to about .25% of the operating frequency.

All operating instructions, circuit data, alignment and service notes contained in the NC-100 Instruction Manual apply to the NC-101X receiver, except those sections referring to the calibration and alignment of the high frequency circuits.

Complete alignment of any coil range is made as follows: Set the tuning dial at 450, and check the calibration curve by means of an *accurate* test oscillator. Readjustment of the high frequency oscillator trimmer condenser should be made if the calibration is in error by more than 20 dial divisions. Check the alignment of R.F. and 1st Det. circuits by setting the trimmers for maximum background noise. (See Page 9.) Re-check the H.F. Oscillator, then turn the dial to 50, and note the calibration. Ganging is tested by checking R.F. and 1st Det. trimmer adjustments.

The design of the high frequency circuits, particularly that of the H.F. Oscillator, is such that frequency drift is extremely small, after the receiver has reached its operating temperature. It should be remembered, however, that the band spread tuning arrangement tends to magnify a small change in frequency. For instance, on the 20 meter band, each dial division represents only 1000 cycles. Ten kilocycles will, therefore, be spread over about two-and-one-half inches of scale length, even though the actual frequency change is but .07 of one percent. Only a comparatively few amateur transmitters will maintain constant frequency to such a high degree of precision, even with crystal control.

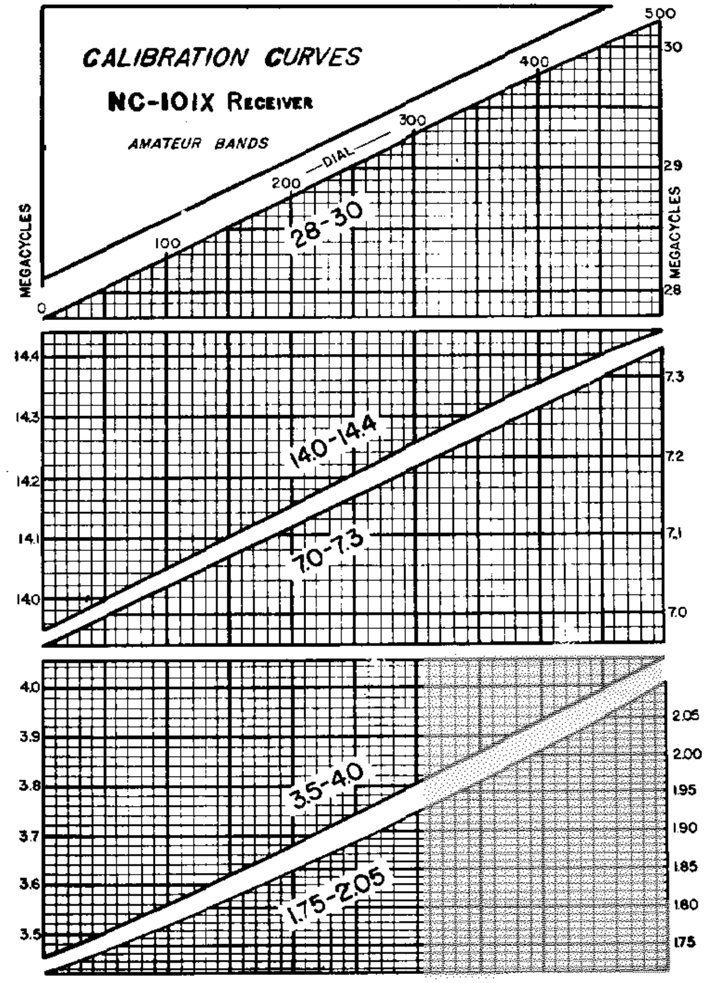
There should be ample room for air to circulate on all sides of the receiver, in order to reduce drift to a minimum. Do not pile magazines or papers on the cover and do not install the receiver in a small console or in a closely fitting compartment or bookcase.

Supplementary Instructions for Battery Models

The Battery Operated Types of the NC-100A series are identical in operation and adjustment to the standard AC models. Battery power drain is reduced by using a single 6F6G output tube. The recommended speaker is an 8-inch permanent magnet type.

Normal operation of the NC-100B series may be obtained by using either a combination of batteries or a properly filtered battery operated vibrator pack or gen-e-motor to supply 6 volts to the heater and approximately 180 volts to the receiver B circuits.

Receivers primarily designed for battery operation can be used with an external power pack, such as the National Type 5886, for operation from AC lines. When used in this manner, the four prong plug attached to the receiver power cable should be inserted in the socket outlet of the power unit. For use with other power supplies, the cable plug may be unsoldered and the wires connected to the outlet terminals of the power unit.



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CAPACITOR AND RESISTOR LIST

Symbol	Function	Type	Rating
C_1	H.F. Osc. Grid	Mica	.0001 mfd., 500 Volt
C_2	R.F. B+ Bypass	Paper	.1 mfd., 600 Volt
C_3	H.F. Osc. Screen	Paper	.1 mfd., 400 Volt
C_4	H.F. Osc. Coupling	Paper	.01 mfd., 400 Volt
C_5	H.F. Osc. Heater Bypass	Paper	.01 mfd., 400 Volt
C_6	1st I.F. Grid Filter	Paper	.01 mfd., 400 Volt
C_7	1st Det. B+ Bypass	Paper	.1 mfd., 600 Volt
C_8	1st Aud.-Output Coupling	Paper	.1 mfd., 600 Volt
C_9	C.W. Osc. Heater Bypass	Paper	.1 mfd., 400 Volt
C_{10}	C.W. Osc. Screen Bypass	Paper	.1 mfd., 400 Volt
C_{11}	C.W. Osc. Coupling	Bakelite	1. mmf., 400 Volt
C_{12}	Limiter Output Bypass	Mica	.00025 mfd., 500 Volt
C_{13}	Lim.-1st Audio Coupling	Paper	.01 mfd., 400 Volt
C_{14}	1st I.F. B+ Bypass	Paper	.1 mfd., 600 Volt
C_{15}	2nd Det. Cathode Bypass	Mica	.00025 mfd., 500 Volt
C_{16}	R.F. Grid Filter	Paper	.01 mfd., 400 Volt
C_{17}	2nd Det. Plate Bypass	Paper	.05 mfd., 600 Volt
C_{18}	2nd I.F. B+ Bypass	Paper	.1 mfd., 600 Volt
C_{19}	AVC Input Coupling	Mica	.00005 mfd., 500 Volt
C_{20}	2nd I.F. Grid Filter	Paper	.01 mfd., 400 Volt
C_{21}	AVC Plate Bypass	Paper	.1 mfd., 400 Volt
C_{22}	2nd I.F. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{23}	AVC Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{24}	1st Audio Cathode Bypass	Electrolytic	10. mfd., 50 Volt
C_{25}	2nd Det.-Lim. Audio Coupling	Paper	1. mfd., 200 Volt
C_{26}	2nd I.F. Screen Bypass	Paper	.1 mfd., 400 Volt
C_{27}	R.F. Screen Bypass	Paper	.1 mfd., 400 Volt
C_{28}	R.F. Grid Filter	Mica	.005 mfd., 300 Volt
C_{29}	R.F. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{30}	B− to Chassis Bypass	Electrolytic	8. mfd., 200 Volt
C_{31}	1st I.F. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{32}	1st Det. Cathode Bypass	Paper	.1 mfd., 400 Volt
C_{33}	B+ Filter	Electrolytic	16. mfd., 350 Volt
C_{34}	B+ Filter	Electrolytic	8.-8. mfd., 475 Volt
C_{35}	Tone Control	Paper	.01 mfd., 400 Volt
C_{36}	Tone Control	Mica	.001 mfd., 500 Volt
C_{37}	Main Tuning	Air	225 mmf., 3 Gang
R_1	H.F. Osc. Grid	Carbon	20,000 Ohm, ½ Watt
R_2	Limiter Control	Wire Wound	10,000 Ohm, Variable
R_3	1st Det. Screen	Carbon	100,000 Ohm, ½ Watt
R_4	H.F. Osc. Volt. Div.	Carbon	100,000 Ohm, ½ Watt
R_5	H.F. Osc. Screen	Carbon	50,000 Ohm, 1 Watt
R_6	1st Audio Plate	Carbon	50,000 Ohm, 1 Watt
R_7	1st Det. Plate Filter	Carbon	2,000 Ohm, ½ Watt
R_8	1st I.F. Cathode Bias	Carbon	500–2,000 Ohm, ½ Watt
R_9	Audio Gain Control	Composition	500,000 Ohm, Variable
R_{10}	1st I.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{11}	C.W. Osc. Volt. Div.	Carbon	100,000 Ohm, ½ Watt
R_{12}	C.W. Osc. Plate Filter	Carbon	250,000 Ohm, ½ Watt
R_{13}	C.W. Osc. Screen	Carbon	100,000 Ohm, ½ Watt
R_{14}	Limiter Output	Carbon	50,000 Ohm, ½ Watt
R_{15}	2nd Det. Load	Carbon	50,000 Ohm, ½ Watt
R_{16}	2nd Det. I.F. Filter	Carbon	5,000 Ohm, ½ Watt
R_{17}	1st I.F. Plate Filter	Carbon	2,000 Ohm, ½ Watt
R_{18}	2nd Det. Plate Filter	Carbon	2,000 Ohm, ½ Watt
R_{19}	Limiter Input	Carbon	100,000 Ohm, ½ Watt
R_{20}	R.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{21}	AVC Plate Filter	Carbon	500,000 Ohm, ½ Watt
R_{22}	AVC Grid	Carbon	5. Megohm, ½ Watt
R_{23}	AVC Plate	Carbon	500,000 Ohm, ½ Watt
R_{24}	1st Audio Cathode Bias	Carbon	2,000 Ohm, ½ Watt
R_{25}	AVC Volt. Div.	Carbon	1,000 Ohm, 2 Watt
R_{26}	AVC Volt. Div.	Carbon	1,500 Ohm, 2 Watt
R_{27}	AVC Cathode Bias	Carbon	350 Ohm, 2 Watt
R_{28}	2nd I.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{29}	2nd I.F. Volt. Div.	Carbon	100,000 Ohm, ½ Watt
R_{30}	2nd I.F. Screen	Carbon	70,000 Ohm, ½ Watt
R_{31}	2nd I.F. Cathode	Carbon	2,500 Ohm, ½ Watt
R_{32}	R.F. Cathode Bias	Carbon	500 Ohm, ½ Watt
R_{33}	1st Det. Cathode Bias	Carbon	5,000 Ohm, ½ Watt
R_{34}	R.F. Grid Filter	Carbon	500,000 Ohm, ½ Watt
R_{35}	Output Cathode Bias	Carbon	250 Ohm, 2 Watt
R_{36}	S Meter Adjustment	Wire Wound	1,000 Ohm, Variable
R_{37}	S Meter Bridge	Carbon	1,000 Ohm, ½ Watt
R_{38}	R.F. Gain Bleeder	Carbon	50,000 Ohm, ½ Watt
R_{39}	Tone Control	Composition	500,000 Ohm, Variable
R_{40}	R.F. Gain Control	Wire Wound	10,000 Ohm, Variable
R_{41}	B+ Volt. Div.	Carbon	20,000 Ohm, 2 Watt
R_{42}	B+ Volt. Div.	Carbon	20,000 Ohm, 2 Watt