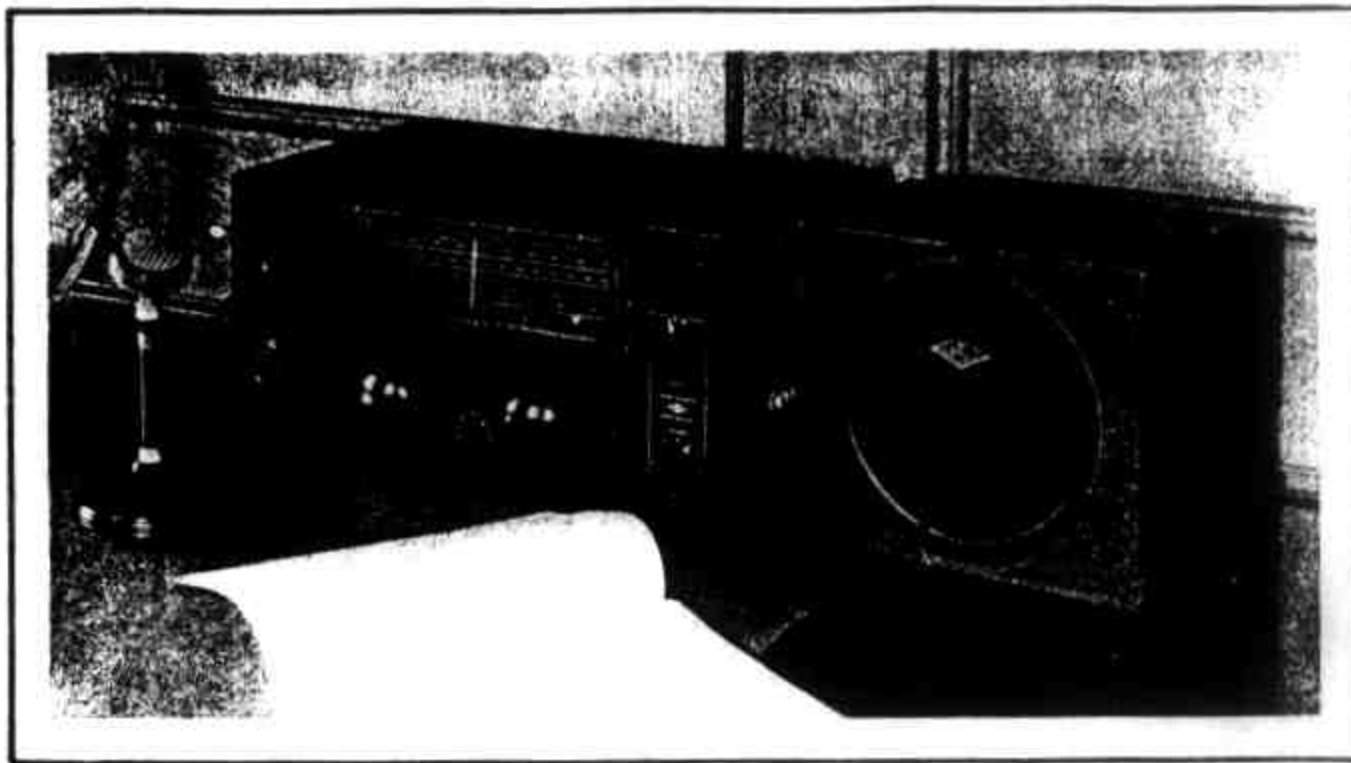


Instruction Manual

for the

NATIONAL NC-44 RECEIVER

TYPES NC-44, NC-44A, NC-44B



A well-designed, low-priced receiver covering a range of from 540 to 30,000 kilocycles.



Courtesy of N7RK

Instructions

for the

NATIONAL NC-44 RECEIVER

AC-DC Model

GENERAL DESCRIPTION: The NC-44 is an inexpensive seven-tube receiver covering frequencies from 540 to 30,000 kilocycles in four ranges, the various ranges being selected by means of a conventional band switch.

The circuit of the receiver, as shown in the schematic diagram, is simple, but effective. It consists of a 6K8 combination first detector and oscillator, two I.F. stages with permeability tuned iron-core transformers and 6L7 tubes, a 6SQ7 combination second detector - AVC - first audio stage, and a single audio output stage employing a 25L6G. The C.W. oscillator is a 6J7 and the rectifier is a 25Z5. The receiver is designed for operation from 105-130 volt AC or DC lines and draws approximately 40 watts.

A dual tuning system provides both general coverage and band spread operation. The main tuning capacitor is of straight line frequency design and is coupled to a scale calibrated accurately in megacycles; it is operated through a vernier reduction drive having a ratio of about 30 to 1. The electrical bandspread system comprises a separate two-gang tuning capacitor with a separate dial mechanism and dial scale. Practically all tuning in the short-wave ranges will be done with this bandspread capacitor and the various amateur bands are spread as follows:

3.5 to 4.0 megacycles	65 divisions
7.0 to 7.3 "	50 "
14.0 to 14.4 "	56 "
28.0 to 30.0 "	40 "

Separate audio and I.F. gain controls are provided and each of these controls is fitted with a switch. When the audio gain control is turned to the "off" position, the B-supply circuit is opened to place the receiver in stand-by position. Turning the R.F. gain control to the minimum position turns the receiver completely off. In addition to these controls, separate switches are provided for the C.W. oscillator and the AVC circuits. A BSW terminal panel for external (remote) stand-by control is mounted at the rear of the chassis. The terminals are connected in series with the B+ switch.

ANTENNA: Three antenna terminals are located on the right-hand side of the cabinet. The center terminal is grounded to the cabinet and is provided with a strap by means of which it may be connected to either of the other terminals when using a single-wire antenna. In general, it will be found best to connect this strap between the center and the right-hand terminals; the single-wire antenna being connected to the remaining terminal. For all-around short-wave reception, the simple single-wire antenna will be found satisfactory except in extremely noisy locations. The overall length may be between 50 and 100 feet and an external ground is not required.

For amateurs who wish to obtain best performance on any particular band, the single-wire antenna should be made to have

an overall length, including lead-in, approximately equal to an odd quarter-wave length. For instance, at 10 meters the antenna may be 24, 40 or 56 feet, etc. These figures represent 3, 5 and 7 quarter-wave lengths, respectively. An antenna designed in this manner will provide good signal pick-up with efficient transfer to the receiver and will, at the same time, minimize hand-capacity and other similar undesirable effects.

From the above, it will be seen that the same antenna cannot be expected to function with full efficiency on more than one band, unless some provision is made for tuning. Such tuning can often be satisfactorily accomplished by means of a series variable capacitor having a maximum capacity of 100 or 200 mmf.

Doublet antennae, directive arrays, etc., having two-wire feeder systems, can be connected directly to the two outside antenna terminals, the center terminal and strap not being used.

Where local noise is not bothersome, the single-wire type of antenna is to be preferred. In some installations, however, where there are some one or more sources of interference within fifty feet of the receiver, the single-wire will pick up the disturbance on the lead-in. Under such conditions, the doublet may provide the better signal-to-noise ratio. The improvement will be small, however, unless the pick-up portion can be erected at a considerable distance from the noise source (i.e., about twice the distance which separates the source from the receiver). If the installation cannot be made in this manner, the use of a doublet may weaken signals due to unavoidable losses in the feeder system, and the signal-to-noise ratio will not be improved.

OUTPUT CIRCUIT: As shown in the schematic diagram, the output terminals of the receiver are connected in the plate circuit of the 25L6G power output tube. The speaker terminals are at the rear of the chassis. The speaker furnished with the receiver is of the permanent magnet dynamic type having a suitable coupling transformer to match the load impedance of the tube - 1500 ohms. A headphone jack is mounted at the rear of the chassis and is wired in such manner that the speaker is quiet when the phones are in use. The impedance of the headphones should be approximately 20,000 ohms, this being the usual impedance of phones having a total DC resistance of between 2000 and 3000 ohms. The NC-44 should not be operated unless either a speaker or a headphone set is connected to the proper terminals. Also, the receiver will not function with the output tube removed from its socket, since all heaters are connected in series and since this tube supplies both speaker and headphone outputs.

SPEAKER MOUNTING: The loud speaker is mounted in a small cabinet finished to match the receiver. To obtain best tone quality the speaker chassis should be mounted on a large baffle isolated mechanically from the receiver. The baffle should be of non-resonant material, so that it will not vibrate. A baffle three or four feet square will generally prove satisfactory. More uniform bass response will be obtained by increasing the baffle size up to about nine feet square. Mounting the speaker and receiver in the same cabinet, or console, is not recommended since vibration from the speaker is apt to be transferred to the tubes, producing microphonic noises.

OPERATING INSTRUCTIONS: As previously stated, the NC-44 receiver may be connected to either the AC or DC lines. In the case of a DC line, the receiver will be inoperative unless the

plug has the correct polarity. This must be determined by trial, but the receiver will not be harmed in any way if the plug happens to be reversed. After the receiver is plugged in and the antenna is connected, both the R.F. and A.F. gain controls should be advanced to 6 or 7. The AVC switch should be "on" and the C.W. oscillator switch "off". The band selector switch, which is located in the middle of the front panel between the two tuning knobs, should be set to indicate the desired frequency range, and the bandspread tuning knob at the right should be set so that the small pointer reads ninety on the scale. Stations may then be tuned in, in the regular way, by means of the left-hand, or general coverage, tuning knob.

It should be noted that the frequency calibration of the main scale will only be correct when the bandspread pointer is at ninety. After a station has been found, however, the bandspread control will provide a vernier action which makes tuning of high frequency signals very easy, particularly where the receiver is to be used in amateur communication work. Ordinarily, the AVC switch will be "on" at all times and the R.F. gain control will be well advanced with volume being controlled by the A.F. gain adjustment. When receiving extremely strong signals, such as would be obtained from a local broadcast station, the R.F. gain control should be retarded in order to avoid any possibility of tube overload or distortion. The C.W. oscillator may be used if desired in locating weak signals with the AVC switch either "on" or "off".

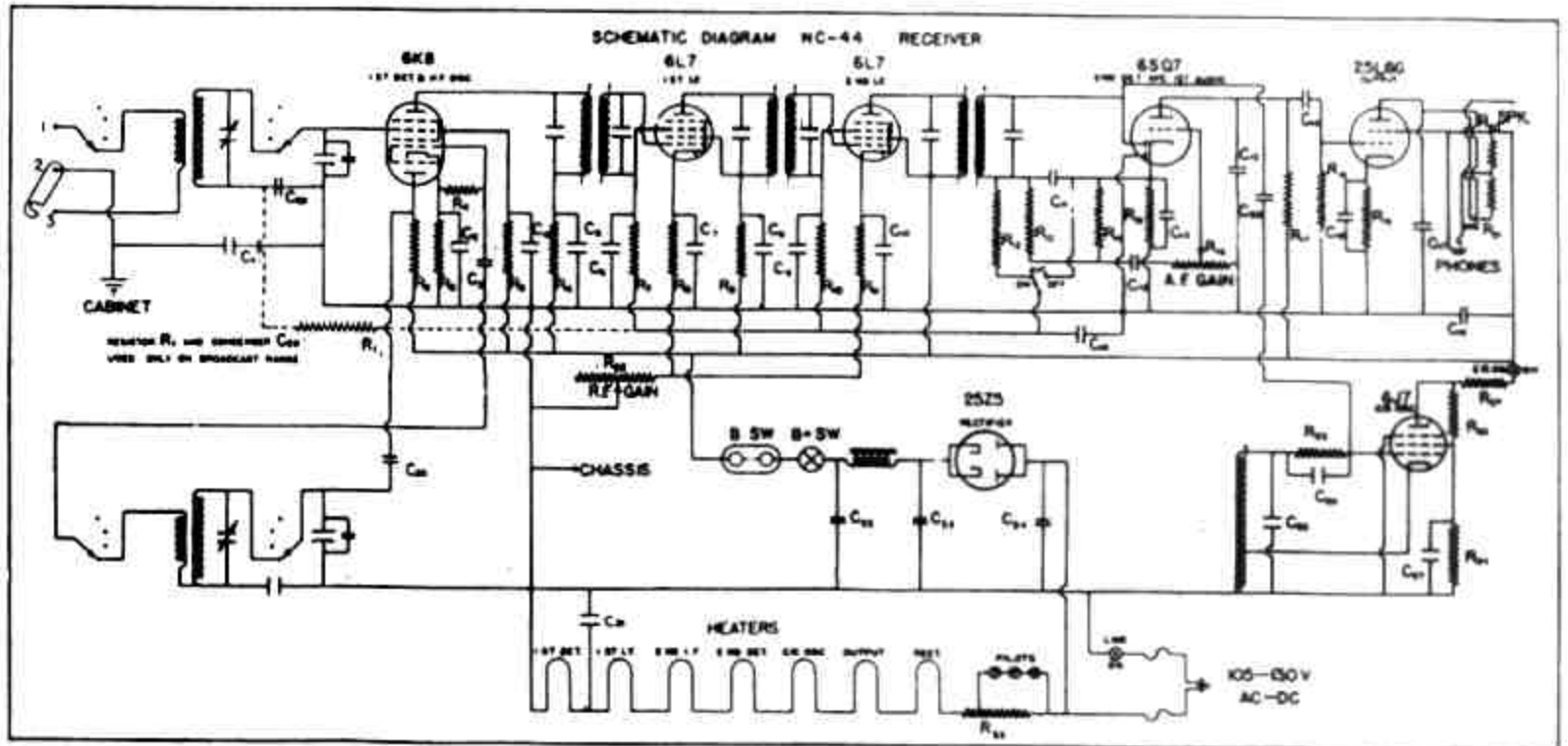
ALIGNMENT AND SERVICE DATA: Individual tubes of the same type will vary slightly in their characteristics and it is well to remember this fact when replacements become necessary. Even though the circuit is designed to reduce the effect of such variations to a minimum, the converter and I.F. tubes should be selected with some care. A replacement converter should be checked in the receiver to make sure that the interelectrode 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.

The intermediate frequency of the NC-44 receiver is 456 kilocycles. The three I.F. transformers are of the permeability tuned iron-core type and are adjustable from the outside of the cabinet. The transformers are of such construction that the factory adjustment is permanent and they should not be re-tuned, therefore, unless there are definite indications that such tuning is required. The high frequency coils and trimmer capacitors are mounted underneath the chassis, being grouped above the band-selector switch. The oscillator coils are mounted nearest the left-hand side of the receiver with the first detector coils at the right. The adjustment of these circuits is quite conventional but here, again, the various trimmers should NOT be adjusted indiscriminately, as it is often rather difficult to determine the correct capacitor settings without special test equipment.

PROTECTIVE DEVICES: A double fuse block is mounted underneath the chassis and contains two standard fuses designated as the type 3AG, having a rating of 2 amperes. One fuse is connected in either side of the line and will provide adequate protection against damage to the various tubes and circuit elements which might result from any short-circuit or ground.

The operator who uses break-in, or who is experimenting with various types of transmitting and receiving antennae should provide some means of preventing excessive R.F. pick-up which might harm the input circuit of the receiver. In case of doubt, it is recommended that an R.F. ammeter be connected in the antenna lead-in, or in one of the doublet feeders close to the receiver, in order to measure the actual R.F. pick-up. This current should not exceed .1 ampere.

DIAL LAMPS: From the circuit diagram, it may be seen that the dial is illuminated by three lamps connected in series across a portion of the series heater resistor. These lamps are the standard "brown bead" type, designed for 6.3 volts and drawing .15 ampere. Since they necessarily form a part of the heater circuit of the receiver, burned out lamps should be replaced promptly, for, although the receiver will not be harmed, the various tubes will not function quite as efficiently if the dial lamps are not lighted.



CAPACITORS

RESISTORS

mfd.	volts	mfd.	volts
C1- .1	400	C15-.0005	mica
C2- .1	400	C16- 25.	50
C3- .0001	mica	C17-.001	mica
C4- .1	400	C18-.1	400
C5- .1	400	C19-.01	400
C6- .01	400	C20-.005	mica
C7- .1	400	C21-.1	400
C8- .1	400	C22- 40	200
C9- .01	400	C23- 40	200
C10-.1	400	C24-.1	400
C11-.00025	mica	C25-.0001	mica
C12-.01	400	C26-.0001	mica
C13- 25	50	C27-.1	400
C14-.1	400	C28-.000002	
		C29-.01	400

ohms	watts	ohms	watts
R1- .5 meg-	1/2	R15-5,000	1/2
R2- 10,000	1/2	R16-.5 meg-	
R3- 200	1/2		A.F. Gain
R4- 25,000	1/2	R17-.1 meg-	1/2
R5- 1,000	1/2	R18-.5 meg-	1/2
R6- 1,000	1/2	R19- 140	1
R7- .5 meg-	1/2	R20- 500	1/2
R8- 300	1/2	R21-1,000	2
R9- 1,000	1/2	R22-10,000	
R10- .5 meg-	1/2		R.F. Gain
R11- 300	1/2	R23- 132	10
R12- 1. meg-	1/2	R24-.1 meg-	1/2
R13- .5 meg-	1/2	R25-50,000	1/2
R14- 1. meg-	1/2	R26-.1 meg-	1/2
		R27-.1 meg-	1/2

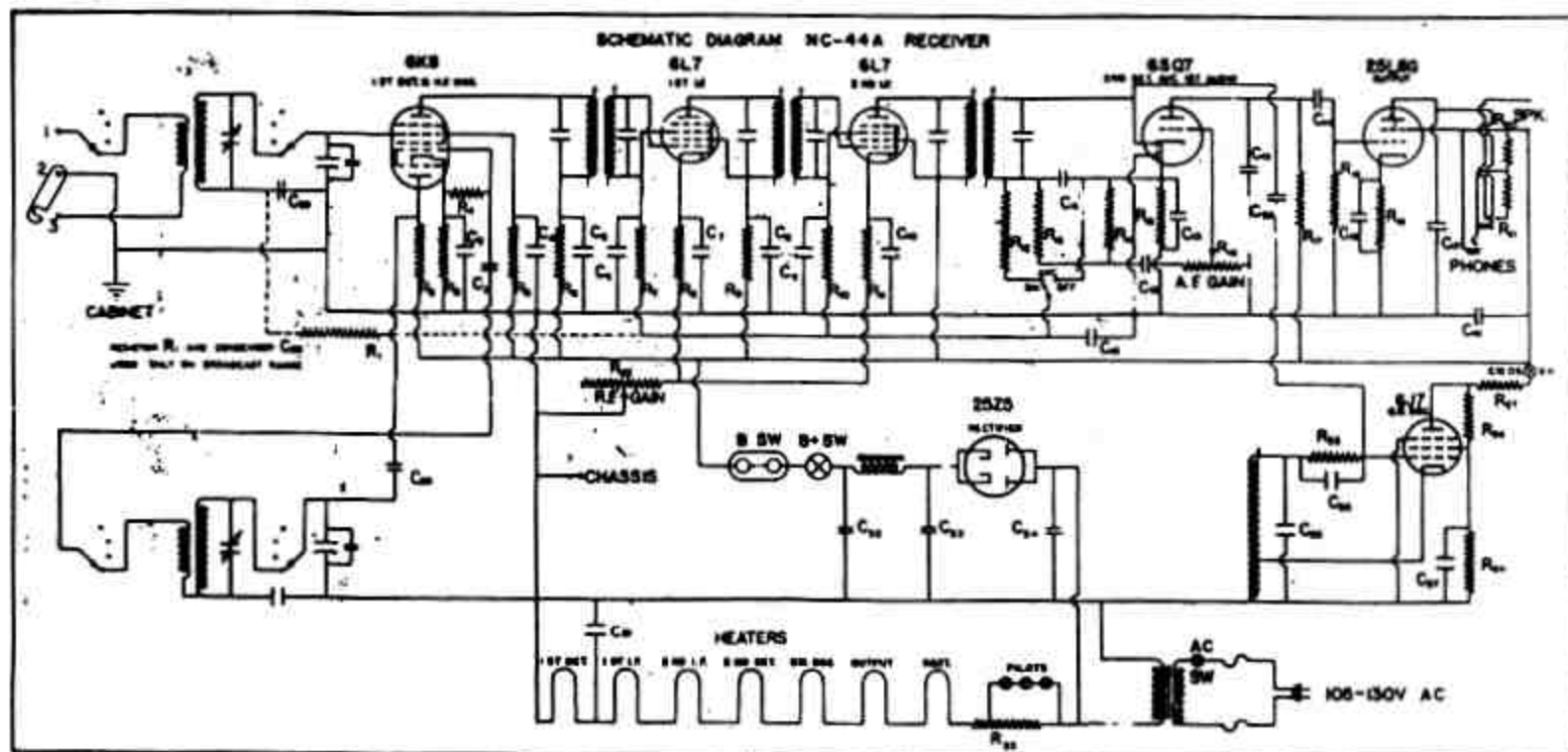
THE NC-44A RECEIVER

AC Model

Recommendations pertinent to the NC-44 (AC-DC) receiver apply also to the NC-44A (AC) model, except as follows:

The NC-44A is designed for operation from 105-130 volt, 50-60 cycle lines only and draws approximately 50 watts. Attempted operation from other AC sources or from DC lines will cause serious damage to the receiver.

The schematic diagram below shows the circuit of the NC-44A model.



Parts List same as NC-44, except that C1 is not used.

THE NC-44B RECEIVER

Battery Model

The NC-44B (Battery Operated) is basically the same as the NC-44 (AC-DC) model, the power supply being omitted. In general, the data given on pages 2 to 5 inclusive applies to the NC-44B. Data applicable to the NC-44B only is as follows:

The tube complement is the same as the NC-44 except that a type 6V6G tube is used in the audio output stage; the rectifier tube is omitted. The heater circuit requires 2.25 amps. at 6 volts; a "B" supply of 90-135 volts is recommended. The "B" drain is approximately 40-65 milliamperes.

THE NC-44 RECEIVER

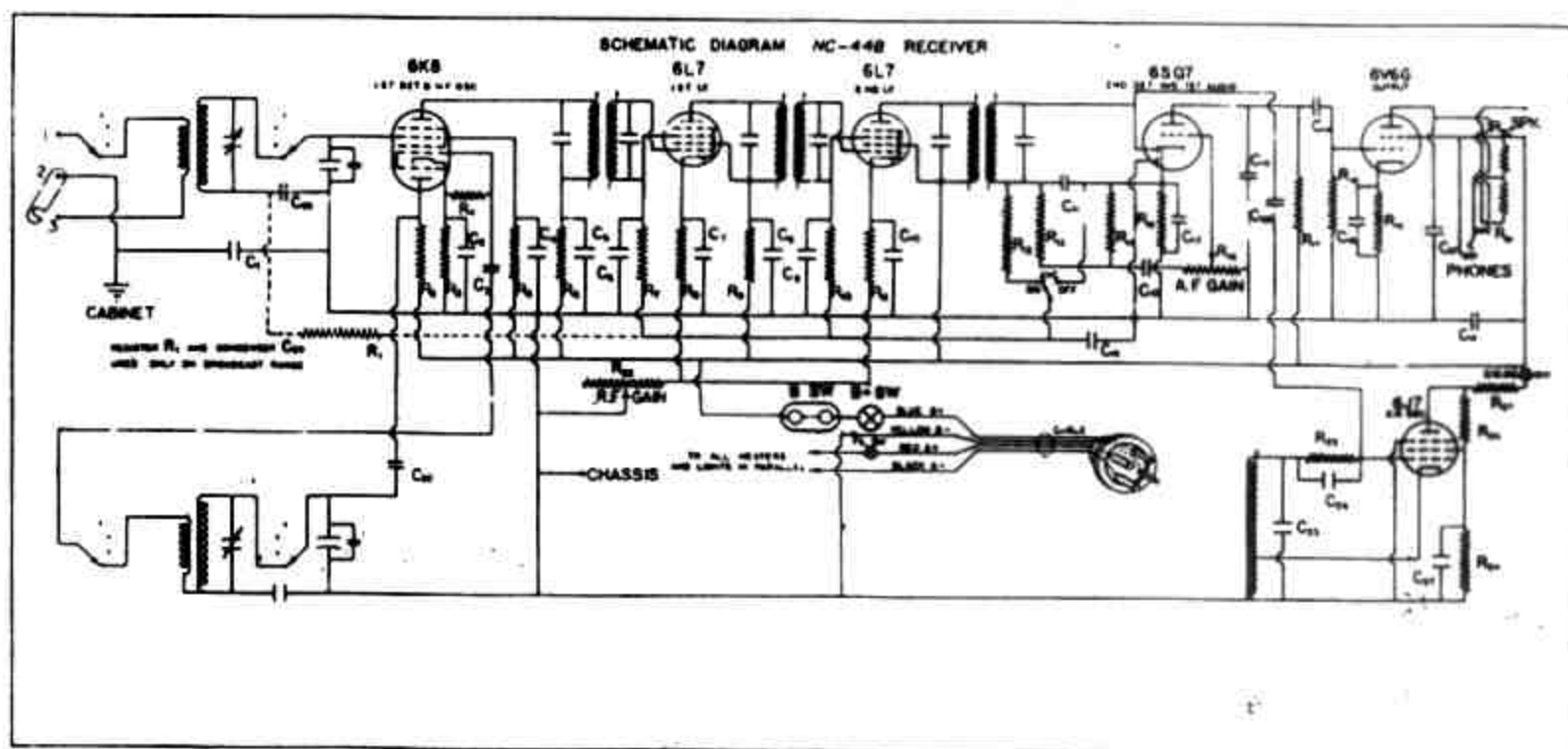
If desired, the NC-44B may be operated entirely from a 6-volt DC source in conjunction with a National Type 686 Vibrator Power Pack. On special order and at an increase in price, the receiver can be furnished with a built-in vibrator pack (Type NC-44BV).

Operation from AC lines is made possible by employing a National Type 5886AB Power Supply.

Receiver power cable color code and connector plug connections are shown on the circuit diagram below. Plug prong connections match the output socket wiring of the Types 686 and 5886AB Power Supplies.

As stated above, the output stage employs a 6V6G tube. The loud speaker furnished with the receiver is equipped with a coupling transformer to match the load impedance of the output tube - 5000 ohms. Since both speaker and headphone outputs are obtained from the output tube, it is not possible to operate the receiver with this tube removed from its socket.

The main dial is illuminated by two dial lamps connected in parallel across the heater circuit. These lamps are the standard "brown bead" type, designed from 6.3 volts and drawing .15 ampere each.



CAPACITORS

mfd.	volts	mfd.	volts	
C1-	.1	400	C14-.1	400
C2-	.1	400	C15-.0005	mica
C3-	.0001	mica	C16- 25	50
C4-	.1	400	C17-.001	mica
C5-	.1	400	C18-.1	400
C6-	.01	400	C19-.01	400
C7-	.1	400	C20-.005	mica
C8-	.1	400	C25-.0001	mica
C9-	.01	400	C26-.0001	mica
C10-.1	400	C27-.1	400	
C11-.00025	mica	C28-.000002		
C12-.01	400	C29-.01	400	
C13- 25	50			

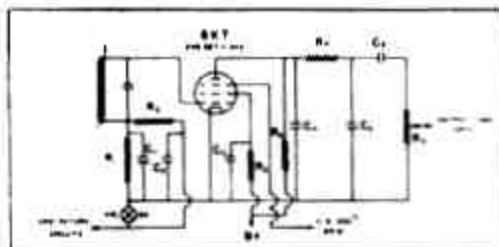
RESISTORS

ohms	watts	ohms	watts	
R1-	.5 meg-	1/2	R15-5,000	1/2
R2-	10,000	1/2	R16-.5 meg-	1/2
R3-	200	1/2	A. F. Gain	
R4-	25,000	1/2	R17-.1 meg-	1/2
R5-	1,000	1/2	R18-.5 meg-	1/2
R6-	1,000	1/2	R19- 350	1
R7-	.5 meg-	1/2	R20- 500	1/2
R8-	300	1/2	R21-1,000	2
R9-	1,000	1/2	R22-10,000	Rheo.
R10-	.5 meg-	1/2	R. F. Gain	
R11-	300	1/2	R24-.1 meg-	1/2
R12-1.0 meg-	1/2	R25-50,000	1/2	
R13-.5 meg-	1/2	R26-.1 meg-	1/2	
R14-1.0 meg-	1/2	R27-.1 meg-	1/2	

DET - AVC - AUDIO TUBE

6K7-6SQ7

Earlier models of the NC-44 Series of Receivers used a type 6K7 as a combination second detector - AVC - first audio. Later models employed a 6SQ7 in place of the 6K7, with improved AVC action. The diagram of circuit connections of the 6K7 tube is shown below.



CAPACITORS

	mfd.	volts
C1	.00025	mica
C2	.01	400
C3	.1	400
C4	.0001	mica
C5	.0005	mica
C6	.1	400

RESISTORS

	ohms	watts
R1	1 meg-	1/2
R2	1 meg-	1/2
R3	.5 meg-	1/2
R4	20,000	1/2
R5	.5 meg-	
	Audio Gain	
R6	.1 meg-	1/8

PRICE LIST

- NC-44 Receiver, table mounting, black wrinkle finish, complete with tubes and speaker in matching cabinet - 105-130 volts AC or DC operation List \$82.50
- NC-44A Receiver, same as above but for 105-130 volt, 50-60 cycle operation only List \$82.50
- NC-44B Receiver, same as above but for battery operation - 6 volt "A" and 90-135 volt "B" required List \$82.50
- NC-44BV Receiver, same as NC-44B but with a built-in vibrator pack for operation from a 6-volt DC source List \$112.50
- LDR-44 Resistor, line dropping resistor permits use of NC-44 and NC-44A from 210-260 volt lines List \$3.00
- RRA Relay Rack Adapters designed for mounting any NC-44 model receiver in a standard relay rack List \$2.50
- Type 686 Vibrator Pack, 6-volt DC model List \$45.00
- Type 5886-AB Power Supply, 110-120 volt, 50-60 cycle List \$29.50

NATIONAL COMPANY, INC., MALDEN, MASS.



U. S.