NATIONAL COMPANY, INC. MODELS NC-108R, NC-108T

SECTION 1. INSTALLATION

1-1. Installation Procedure

After the NC-108 has been removed from its packing crate proceed as follows:

1. Connect a good external ground (water pipe or radiator) to the G terminal on the antenna terminal strip at the rear of the Receiver. This connection is not absolutely required but, in certain localities, better reception can be achieved by such a connection.

2. Connect the antenna as recommended in Section 1-2.

3. Connect the external audio amplifier, if one is used, as follows: connect the input terminals of the amplifier to the output terminals, X-2, at the rear of the NC-108, terminal 2 is the ground connection. The A.C. line plug of the amplifier may be connected to the A.C. socket, X-1, at the rear of the NC-108. With such a connection both units will receive their power from the same A.C. power source and the A.C. line switch on the NC-108 can be used to turn both units on and off.

4. Connect the power cord, P-1, to a 110/125 volt, 50/60 cycle, A.C. source of supply.

5. Set controls as recommended in Section 2 for the reception of stations.

1-2. Antenna Recommendations

The antenna input circuit of the NC-108 is arranged for operation from either a single-wire type, doublet type antenna or other types having impedances of 70 ohms or more. The input impedance of the antenna circuit is approximately 300 ohms.

The use of an efficient antenna with the NC-108 is strongly recommended if optimum results are to be obtained. Although, if the Receiver is to be operated in localities relatively close to F.M. transmitting stations, a single-wire antenna of from 2 to 10 feet may prove very satisfactory. The two types of antennae shown on Figure No. 2 have proven to be highly efficient. The drawing shows sufficient detail so that either one or the other type of antenna can

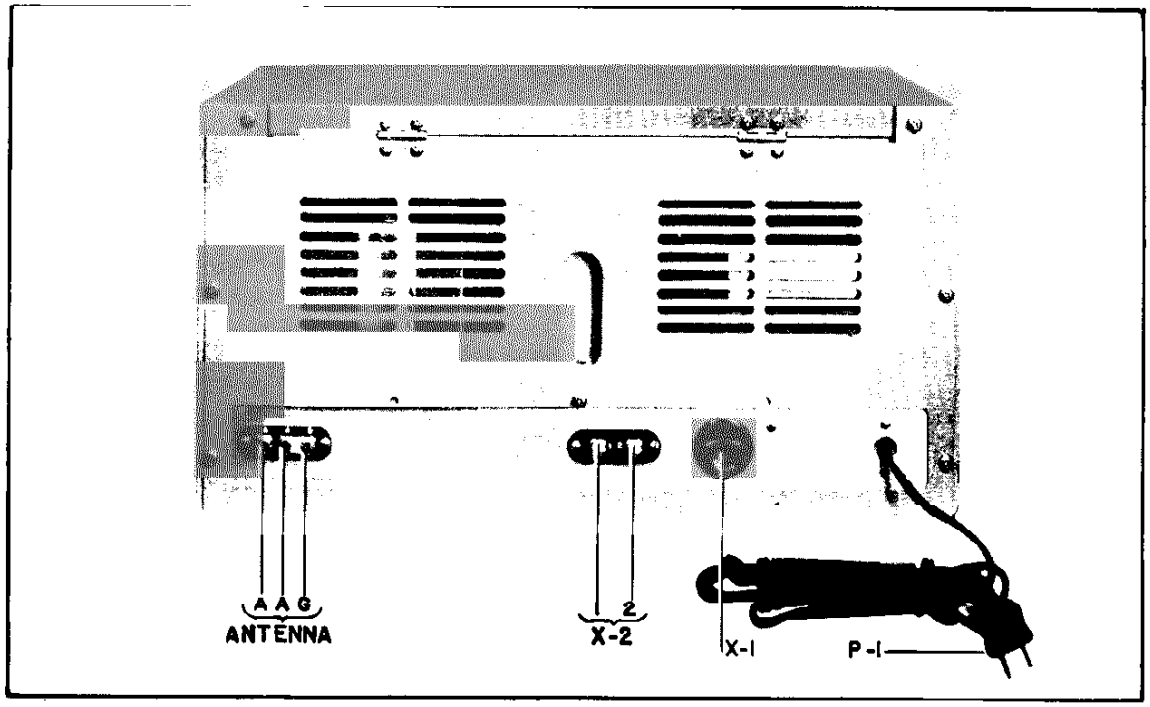

Figure No. 1. Rear View of Receiver

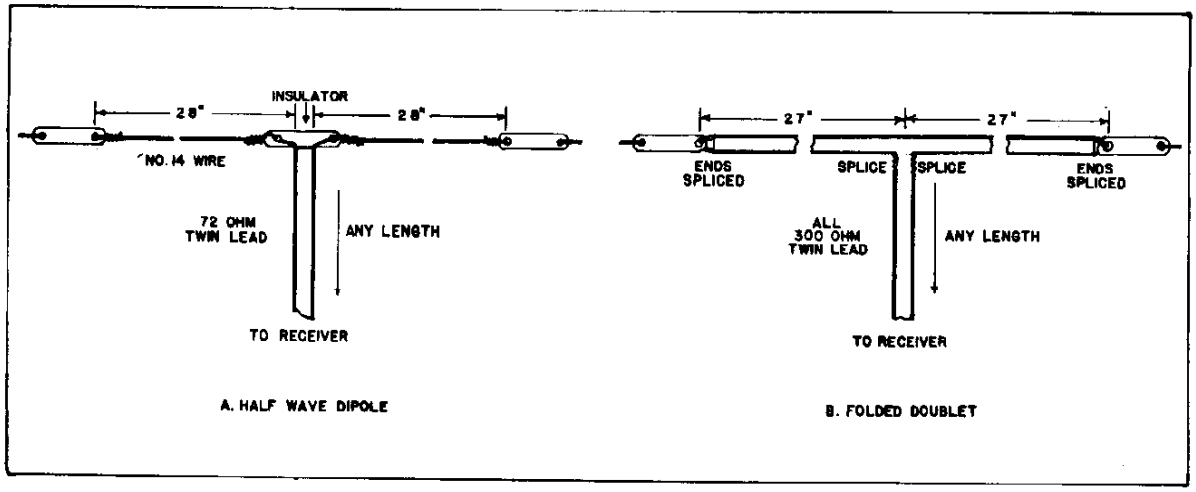

Figure No. 2. Typical Antenna Types

be easily assembled. It will be found that these types of antennae are directional, that is, best results are obtained with the antenna parallel to the transmitting antenna. Only by trial, of course, can the best position for the antenna be determined. There are also available various types of commercial antennae which are very satisfactory. Some of these are directional, while others are designed to give good results no matter what the position of the antenna is, relative to the transmitting antenna. Regardless of which type of antenna is employed, better reception will be obtained if the antenna is mounted in an area free of obstructions. Atop the roof usually proves a good mounting place.

The method of connecting the various types of antennae to the antenna terminal strip at the rear of the Receiver is as follows:

1. Single-wire type--Connect antenna to terminal A at the left of the strip.

2. Doublet type--Connect the antenna feeders to the two terminals marked A.

For either of the above type of connections attaching the metal link on the G terminal to the adjacent A terminal should be tried and left in the position giving the best reception.

SECTION 2. OPERATION

2-1. *Operating Instructions*

After the NC-108 is properly installed, as outlined in Section 2-1, it is placed in operation by adjusting the receiver controls in the following manner:

1. Set the MONITOR switch at On. This switch silences the loud-speaker on the NC-108 when it is in the Off position. The MONITOR switch positions do not effect the external amplifier-loud-speaker system connected to the NC-108.

2. Turn the VOLUME control to approximately 5. This control adjusts receiver volume from a minimum at zero to a maximum at 10.

3. Turn the TONE control from A.C. Off to zero thus turning On the Receiver and the external audio system, if the A.C. socket, X-1, is used as the power source for the external system. The Tone control progressively adjusts the tonal output of the NC-108 from normal receiver reproduction at 10 to an output at zero, in which the higher tones are subdued, emphasizing the lower tones.

4. Tune in the desired station by means of the Main Tuning knob. The dial scale is calibrated directly in megacycles and also is marked with channel indicating numbers. The correct dial setting for any specific station will be indicated as

follows:

a. NC-108T--maximum closing of the Tuning Eye.

b. NC-108R--maximum deflection of the Tuning Meter pointer.

After the four steps above have been completed, the operator may readjust the VOLUME and TONE controls to achieve the desired output characteristics of volume and tone, respectively.

2-2.. *Operation with an External Audio System*

After the external amplifier-loudspeaker system, to be used with the NC-108, has been installed as outlined in Section 2-1, operation of both units is accomplished as follows:

1. Initial adjustment of the NC-108 is the same as though it were to be used alone, and the procedure in Section 2-1 should be followed.

2. After the desired station has been properly tuned in on the NC-108, set the MONITOR switch at Off and adjust the external amplifier controls (volume and tone) for the desired output from the external loud-speaker.

It is important that the control adjustments of the NC-108 are accomplished before those of the external amplifier.

It should be noted that use of the A.C. socket, X-1, as the power source for the external audio system will permit extreme flexibility in the placement of units. After the completion of the initial adjustments, the NC-108 may be located at the operating position and the external audio system may be placed at a remote position.

SECTION 3. ALIGNMENT DATA

3-1. General

The alignment of the NC-108 may be divided into two steps:

1. Intermediate Frequency Amplifier Alignment.
2. R.F. Amplifier Alignment
   a. H.F. Oscillator
   b. Mixer and R.F. Amplifier

The necessity for any realignment may be determined by checking the performance of the NC-108 against its normal operation, as outlined in Section 2, and the dial calibration. It is recommended that any indicated realignment be accomplished by experienced personnel.

3-2. I.F. Amplifier Alignment

The intermediate frequency of the NC-108 is 10.7 megacycles. The three I.F. transformers and the ratio detector transformer have permeability tuned iron-core inductors with screw adjustments for alignment purposes. The inductor adjustments L-3, L-5, L-7 and L-11 are accessible from the top inside of the cabinet and the inductor adjustments L-4, L-6, L-8 and L-10 from the bottom inside of the cabinet. See Figure Nos. 3 and 4.

The alignment procedure is as follows:

1. Connect the "high" output lead of an accurately calibrated signal generator to the stator of the mixer portion, C-2C, of the main tuning capacitor and the ground lead to any convenient grounded point on the chassis. Set the signal generator at 10.7 megacycles and turn the modulation off.

2. Connect the D.C. volt probe of a high-impedance vacuum tube voltmeter to the junction of R-27 and C-36 (diode load) and the common lead to chassis. Use the 10 volt scale of the meter.

3. Connect the power cord of the NC-108 to a 110/125 volt, 50/60 cycle, A.C. source of supply.

4. Set the VOLUME control at zero.

5. Set the MONITOR switch at OFF.

6. Set the TONE control at zero.

7. Adjust the attenuator of the signal generator for a reading of approximately 3 volts on the voltmeter. (The diode load voltage is negative with respect to chassis.)

8. Adjust the I.F. inductors L-3 thru L-8 and L-10 for maximum, as indicated on the voltmeter, retarding the attenuator as necessary to maintain a low reading in the

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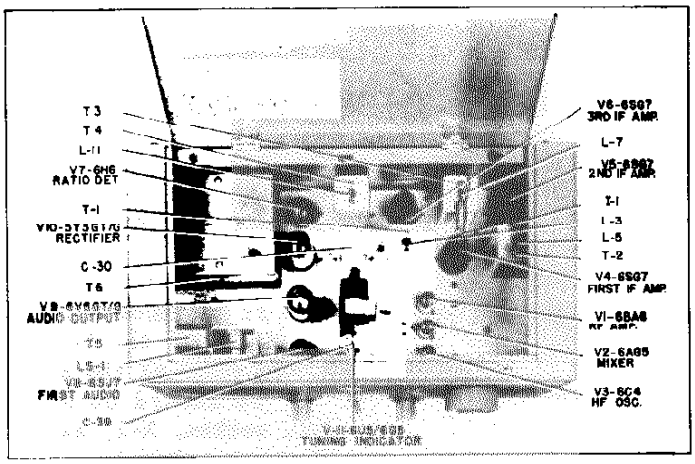

Figure No. 3. Top View of Receiver

vicinity of 3 volts on the voltmeter. The maintenance of a low meter reading is recommended to assure proper alignment.

9. Increase the attenuator of the signal generator until a reading of 10 volts is obtained on the voltmeter.

10. Connect the D.C. volt probe of the voltmeter to the junction of R-29 and C-37. Adjust the secondary inductor L-11 for a reading of 5 volts on the voltmeter without disturbing the setting of the attenuator of the signal generator.

11. Check the voltmeter reading with the voltmeter probe connected to R-27 and C-36. Repeat the adjustments of L-10 and L-11, as necessary, until the voltmeter reading obtained at R-29 and C-37 is one-half the reading at R-27 and C-36.

3-2. R.F. Amplifier Alignment

The R.F. amplifier, mixer and H.F. oscillator stages have variable trimmer capacitors, C-1, C-9 and C-5 respectively, for alignment adjustments. See Figure No. 4. Alignment is accomplished using an accurate test signal of 108 megacycles. The signal source may be a signal generator, crystal oscillator or an F.M. broadcast station of known frequency near the upper frequency limit of the NC-108. The alignment procedure is as follows:

1. Connect the signal source to the two A antenna terminals; disconnect the metal link. In the case where a signal generator is used, make the connection through a 300 ohm dummy antenna. In the case where the signal from an F.M. broadcast station is used, connect the antenna to the antenna terminals.

2. Connect the power cord of the NC-108 to a 110/125 volt, 50/60 cycle, A.C. source of supply.

3. Set the MONITOR switch at On.

4. Set the VOLUME control at approximately 5.

5. Set the TONE control at 10.

6. Set the main tuning dial pointer to the exact frequency of the test signal.

7. Adjust the H.F. oscillator trimmer capacitor, C-5, to receive the test signal.

8. Adjust trimmers C-1 and C-9 for maximum gain as observed on the visual tuning indicator.

9. Check step 7 and repeat steps 7 and 8 as necessary.

SECTION 4. MAINTENANCE AND TEST DATA

4-1. Circuit

A stage outline of the circuit employed in the NC-108 is given below together with the tube associated with each stage:

R.F. Amplifier	6BA6
Mixer	6AG5
H.F. Oscillator	6C4
First I.F. Amplifier	6SG7
Second I.F. Amplifier	6SG7
Third I.F. Amplifier	6SG7

Ratio Detector.....6H6
First Audio.....6SJ7
Audio Output.....6V6GT/G
Rectifier.....5Y3GT/G
Tuning Indicator.....6U5/6G5

The tuning indicator tube, 6U5/6G5, is used on the NC-108T only.

4-2. *General Maintenance Data*

The NC-108 is designed and constructed to assure a long period of uninterrupted service. A few service hints are given below to aid in locating individual components which, due to age or weakness, cause abnormal operation of the NC-108.

Vacuum tube failure may be evidenced by reduction in sensitivity, intermittent operation or an inoperative Receiver. Tubes may be checked in suitable tube testing equipment, or by replacement with tubes of proven quality. Care must be taken that tubes removed for checking are returned to their original sockets. Tubes of the same type will vary slightly in their individual characteristics and selection of a new tube that closely approximates the replaced tube will reduce the necessity of realignment.

Bypass or filter capacitors which become open may cause decreased sensitivity, oscillation, or complete failure of the Receiver. The defective unit can be located by temporarily connecting a good capacitor in parallel with each suspected capacitor. Leaky or short-circuited capacitors can be detected by an ohmmeter check; a zero resistance reading of the ohmmeter will indicate a shorted capacitor.

Defective resistors, sometimes caused by capacitor failure in associated circuits, can be definitely located by measuring the resistance of each resistor. The Schematic Diagram should be consulted to ascertain that any particular resistor under test is not connected in parallel with some other circuit element which might produce a false measurement. An overloaded resistor may be located by visual inspection if the resistor becomes scorched due to excessive heating.

4-3. *Voltage Tabulation*

The measurements of voltage shown on the following table are tabulated using a high-impedance vacuum tube voltmeter with a line voltage of 115 volts and the antenna disconnected. The control settings to be observed are as follows:

1. VOLUME control at zero.
2. Main tuning dial pointer at low frequency limit.
3. TONE control at zero.
4. MONITOR switch at On.

All voltages are measured between specified terminal and chassis.

TUBE TERMINAL	PIN	VOLTS ±15%
R.F. Amp. Grid	1	-.76
R.F. Amp. Plate	5	208
R.F. Amp. Screen	6	90
R.F. Amp. Cathode	2-7	0
Mixer Grid	1	0
Mixer Plate	5	203
Mixer Screen	6	173
Mixer Cathode	2-7	3.7
H.F. Osc. Plate	1	90
H.F. Osc. Grid	6	-6
H.F. Osc. Cathode	7	0
First I.F. Amp. Cathode	3-5	0
First I.F. Amp. Grid	4	-.76
First I.F. Amp. Screen	6	103
First I.F. Amp. Plate	8	187
Second I.F. Amp. Cathode	3-5	0
Second I.F. Amp. Grid	4	-.8
Second I.F. Amp. Screen	6	100
Second I.F. Amp. Plate	8	190
Third I.F. Amp. Cathode	3-5	0
Third I.F. Amp. Grid	4	0
Third I.F. Amp. Screen	6	110
Third I.F. Amp. Plate	8	175
Ratio Det. Plate No. 2	3	-.45
Ratio Det. Plate No. 1	5	-.1
Ratio Det. Cathode No. 2	4	-.1
Ratio Det. Cathode No. 1	8	0
First Audio Grid	4	0
First Audio Cathode	5	1.35
First Audio Screen	6	36
First Audio Plate	8	73
Audio Output Plate	3	201
Audio Output Screen	4	208
Audio Output Grid	5	0
Audio Output Cathode	8	10.5
Tuning Indicator Plate	2	12*
Tuning Indicator Grid	3	-.1*
Tuning Indicator Target	4	208*
Tuning Indicator Cathode	5	0*
Rectifier Filament	2	235
Rectifier Plate No. 2	4	275 A.C.
Rectifier Plate No. 1	6	275 A.C.
Rectifier Filament	8	235

* Used on NC-108T only.

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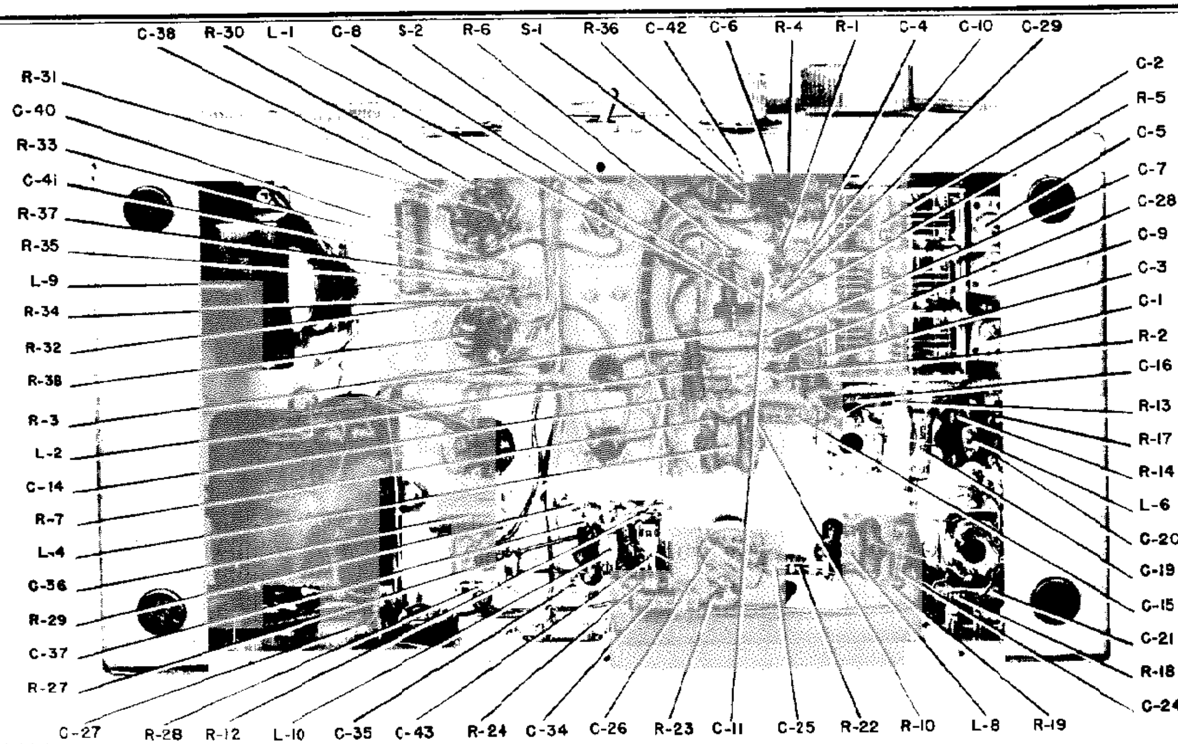
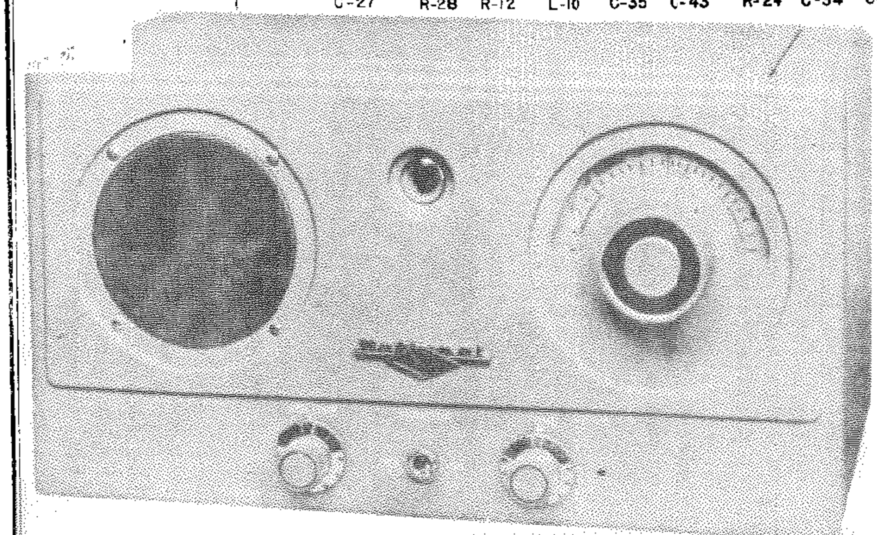


Figure No. 4. Bottom View of Receiver



The only electrical difference between the NC-108T, table model, and the NC-108R, rack model, is in the type of tuning indicator circuit used. The NC-108T employs a tuning eye tube, and the NC-108R employs a milliameter, for use as a visual tuning indicator.

The milliameter pointer on the NC-108R should be at the first scale marker with the Receiver turned on and with no signal input. If correction is required it is made by the screw-adjustment on the bezel of the meter.

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SECTION 5. PARTS LIST

Symbol	Function	Rating
	CAPACITORS	
C-1	R.F. Amp. Trimmer	Ceramic, Var. 5-20 mmf.
C-2	Main Tuning	Air, Var. 3 Sec. Ganged
C-2A	R.F. Amp. Tuning	4-24 mmf., Part of C-2
C-2B	H.F. Osc. Tuning	4-24 mmf., Part of C-2
C-2C	Mixer Tuning	4-24 mmf., Part of C-2
C-3	R.F. Amp. Grid Coupling	Ceramic, 50 mmf. 500 vdcw
C-4	H.F. Osc. Plate Fil.	Ceramic, 100 mmf. 500 vdcw
C-5	H.F. Osc. Trimmer	Ceramic, Var. 5-20 mmf.
C-6	H.F. Osc. Grid Coupling	Ceramic, 100 mmf. 500 vdcw
C-7	R.F. Amp. Screen Bypass	Ceramic, 100 mmf. 500 vdcw
C-8	Mixer Grid Coupling	Ceramic, 100 mmf. 500 vdcw
C-9	Mixer Trimmer	Ceramic, Var, 5-20 mmf.
C-10	Mixer Cathode Bypass	Ceramic, C.001 mfd 500 vdcw
C-11	Mixer Screen Bypass	Ceramic, 100 mmf. 500 vdcw
C-12	T-1 Primary Tuning	Ceramic, 100 mmf. 500 vdcw
C-13	T-1 Sec. Tuning	Ceramic, 100 mmf. 500 vdcw
C-14	Mixer Plate Bypass	Paper, 0.01 mfd. 400 vdcw
C-15	1st. I.F. Amp. Grid	Paper, 0.01 mfd. 400 vdcw
C-16	1st. I.F. Amp. Screen Bypass	Paper, 0.01 mfd. 400 vdcw
C-17	T-2 Primary Tuning	Ceramic, 100 mmf. 500 vdcw
C-18	T-2 Secondary Tuning	Ceramic, 100 mmf. 500 vdcw
C-19	1st. I.F. Amp. Plate Bypass	Paper, 0.01 mfd. 400 vdcw
C-20	2nd. I.F. Amp. Grid Fil.	Paper, 0.01 mfd. 400 vdcw
C-21	2nd. I.F. Amp. Screen Bypass	Paper, 0.01 mfd. 400 vdcw
C-22	T-3 Primary Tuning	Ceramic, 100 mmf. 500 vdcw
C-23	T-3 Secondary Tuning	Ceramic, 100 mmf. 500 vdcw
C-24	2nd. I.F. Amp. Plate Bypass	Paper, 0.01 mfd. 400 vdcw
C-25	3rd. I.F. Amp. Cathode Bypass	Paper, 0.01 mfd. 400 vdcw
C-26	3rd. I.F. Amp. Screen Bypass	Paper, 0.01 mfd. 400 vdcw
C-27	A.C. Line Bypass	Paper, 0.01 mfd. 400 vdcw
C-28	R.F. Amp. Filament Bypass	Ceramic, 100 mmf. 500 vdcw
C-29	Mixer Filament Bypass	Ceramic, 100 mmf. 500 vdcw
C-30		Elect, 10+10 mfd 450 vdcw
C-30A	Power Supply Filter	Part of C-30
C-30B	Power Supply Filter	Part of C-30
C-31	T-4 Primary Tuning	Mica, 100 mmf. 500 vdcw
C-32	T-4 Secondary Tuning	Mica, 200 mmf. 500 vdcw
C-33	T-4 Secondary Tuning	Mica, 200 mmf. 500 vdcw
C-34	3rd. I.F. Amp. Plate Bypass	Paper, 0.01 mfd. 400 vdcw

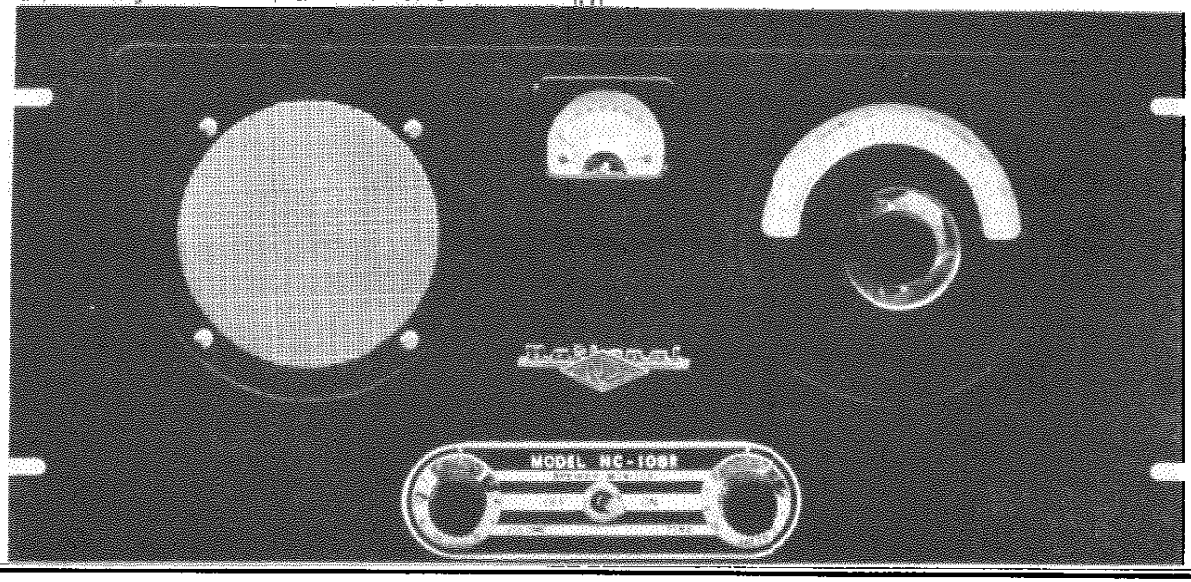
Symbol	Function	Rating
	CAPACITORS (Continued)	
C-35	Ratio Det. Load	Ceramic, 0.001 mfd 500 vdcw
C-36	Ratio Det. Load	Elect, 10 mfd 50 vdcw
C-37	De-emphasis	Ceramic, 0.001 mfd 500 vdcw
C-38	Audio Coupling	Paper, 0.01 mfd. 400 vdcw
C-39		Elect, 25+25+8 mfd
C-39A	1st. Audio Cathode Bypass	25 mfd, 50 vdcw
C-39B	1st. Audio Plate Fil.	8 mfd, 450 vdcw
C-39C	Audio Output Cathode Bypass	25 mfd, 50 vdcw
C-40	1st. Audio Screen Bypass	Paper, 0.1 mfd. 400 vdcw
C-41	Audio Output Coupling	Paper, 0.01 mfd. 400 vdcw
C-42	Tone	Paper, 0.005 mfd, 500 vdcw
C-43	B Plus Bypass	Paper, 0.01 mfd. 400 vdcw
	RESISTORS	
R-1	H.F. Osc. Plate Fil.	Fixed, 33,000 ohms 1 W
R-2	R.F. Amp. Grid	Fixed, 100,000 ohms 1/2 W
R-3	R.F. Amp. Screen Fil.	Fixed, 47,000 ohms 1/2 W
R-4	H.F. Osc. Grid	Fixed, 47,000 ohms 1/2 W
R-5	Mixer Cathode	Fixed, 2,200 ohms 1/2 W
R-6	Mixer Screen Fil.	Fixed, 100,000 ohms 1/2 W
R-7	Mixer Plate Fil.	Fixed, 2,200 ohms 1/2 W
R-8	T-1 Primary Load	Fixed, 47,000 ohms 1/2 W
R-9	T-1 Secondary Load	Fixed, 47,000 ohms 1/2 W
R-10	1st. I.F. Amp. Grid	Fixed, 220,000 ohms 1/2 W
R-11*	Tun. Indicator Plate Load	Fixed, 1,000,000 ohms 1/2W
R-12	A.V.C. Fil.	Fixed, 2,200,000 ohms 1/2W
R-13	1st. I.F. Amp. Screen Fil.	Fixed, 33,000 ohms 1/2 W
R-14	1st. I.F. Amp. Plate Fil.	Fixed, 2,200 ohms 1/2 W
R-15	T-2 Primary Load	Fixed, 47,000 ohms 1/2 W
R-16	T-2 Secondary Load	Fixed, 47,000 ohms 1/2 W
R-17	2nd. I.F. Amp. Grid	Fixed, 220,000 ohms 1/2 W
R-18	2nd. I.F. Amp. Screen Fil.	Fixed, 33,000 ohms 1/2 W
R-19	2nd. I.F. Amp. Plate Fil.	Fixed, 2,200 ohms 1/2 W
R-20	T-3 Primary Load	Fixed, 47,000 ohms 1/2 W
R-21	T-3 Secondary Load	Fixed, 47,000 ohms 1/2 W
R-22	3rd. I.F. Amp. Cathode	Fixed, 100 ohms 1/2 W
R-23	3rd. I.F. Amp. Screen Fil.	Fixed, 33,000 ohms 1/2 W
R-24	3rd. I.F. Amp. Plate Fil.	Fixed, 4,700 ohms 1/2 W
R-25	Ratio Det. Output	Fixed, 47,000 ohms 1/2 W
R-26	Ratio Det. Output	Fixed, 47,000 ohms 1/2 W
R-27	Diode Load	Fixed, 15,000 ohms 1/2 W
R-28*	Diode Load	Fixed, 4,700 ohms 1/2 W
R-28**	Diode Load	Fixed, 10,000 ohms 1/2 W

RESISTORS (Continued)		
R-29	De-emphasis	Fixed, 33,000 ohms 1/2 W
R-30	Volume Control	Variable, 500,000 ohms
R-31	1st. Audio Cathode	Fixed, 2,200 ohms 1/2 W
R-32	1st. Audio Screen Fil.	Fixed, 1,000,000 ohms 1/2W
R-33	1st. Audio Plate Load	Fixed, 220,000 ohms 1/2 W
R-34	1st. Audio Screen and Plate Fil.	Fixed, 22,000 ohms 1/2 W
R-35	Audio Output Grid	Fixed, 470,000 ohms 1/2 W
R-36	Tone Control	Variable, 500,000 ohms
R-37	Audio Output Grid Series	Fixed, 470,000 ohms 1/2 W
R-38	Audio Output Cathode	Fixed, 330 ohms 2 W
R-39**	Meter Adjusting	Fixed, 8,200 ohms 1/2 W

MISCELLANEOUS		
I-1	Dial Lamp	6-8 V., 0.15 Amp.
I-2**	Meter Lamp	6-8 V., 0.15 Amp.
L-1	R.F. Amp. Plate Load	Choke, 4 microhenries
L-2	B Plus Fil.	Choke, 4 microhenries
L-3	T-1 Primary Ind.	Var. Iron-Core
L-4	T-1 Secondary Ind.	Var. Iron-Core
L-5	T-2 Primary Ind.	Var. Iron-Core
L-6	T-2 Secondary Ind.	Var. Iron-Core

MISCELLANEOUS (Continued)		
L-7	T-3 Primary Ind.	Var. Iron-Core
L-8	T-3 Secondary Ind.	Var. Iron-Core
L-9	Fil. Choke	10 Henries, 100 ma.
L-10	T-4 Primary Ind.	Var. Iron-Core
L-11	T-4 Secondary Ind.	Var. Iron-Core
M-1**	Tun. Meter	0-1 Ma.
P-1	A.C. Power Plug	2 Contacts
S-1	A.C. Line Switch	D.P.D.T.
S-2	Monitor Switch	Toggle, S.P.D.T.
T-1	1st. I.F. Trans.	10.7 Mc.
T-2	2nd. I.F. Trans.	10.7 Mc.
T-3	3rd. I.F. Trans.	10.7 Mc.
T-4	Ratio Det. Trans.	10.7 Mc.
T-5	Audio Output Trans.	5,000/4 Ohms
T-6	Power Trans.	115 V., 50/60 cycles
X-1	A.C. Connector	2 Pole
X-2	Amplifier Connector	2 Terminals
LS-1	Loud-speaker	5" P.M.

* Used on NC-108 T only.
** Used on NC-108 R only.



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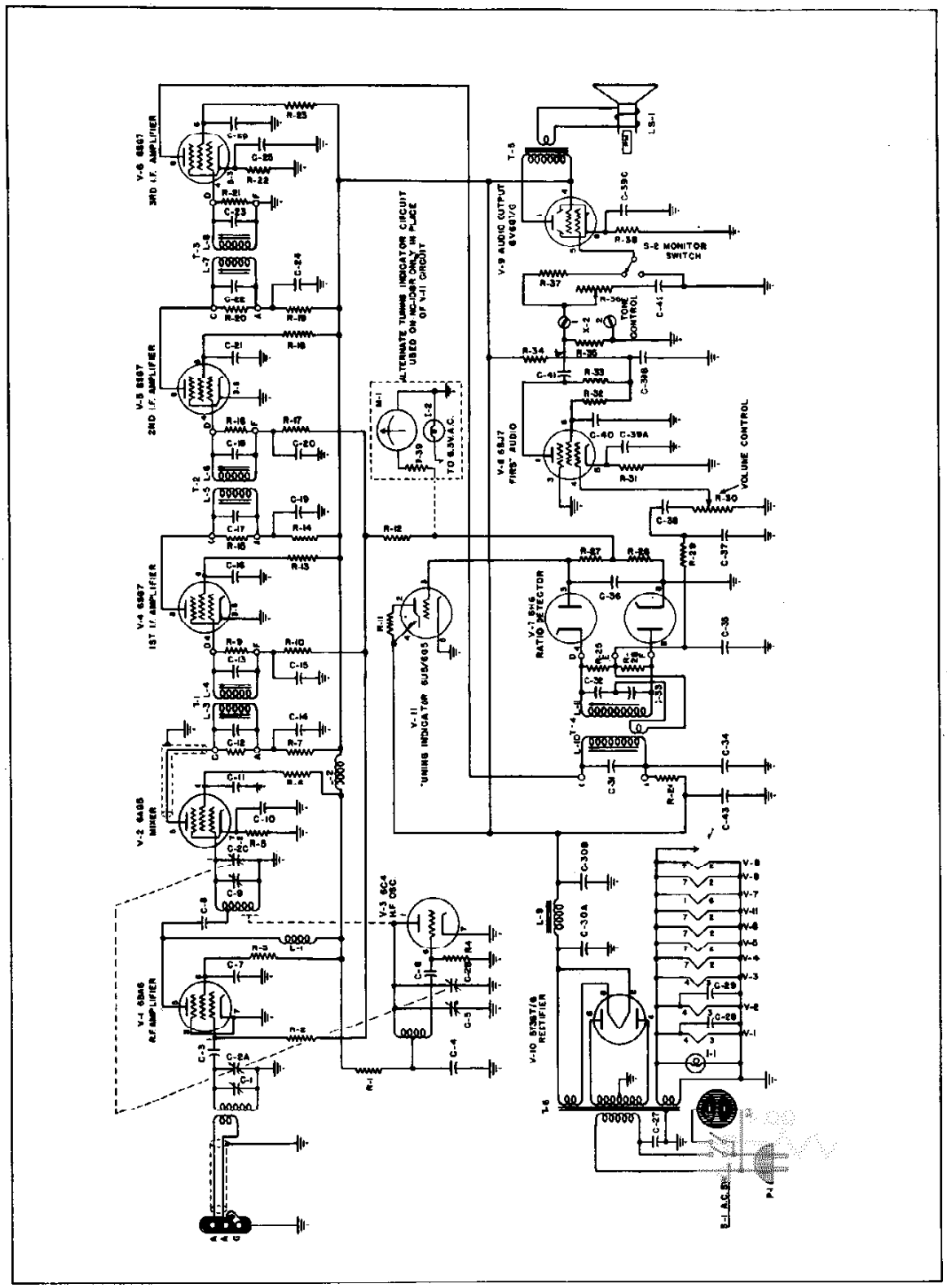

Figure No. 5. Schematic Diagram NC-108 Receiver

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ADDENDA
NC-108 Receiver

1. A DE-EMPHASIS switch is mounted on the top side of the receiver chassis to the right of the power transformer. In the ON position, the de-emphasis circuit, R-29 and C-37, in the NC-108 functions in a manner to remove from the incoming signal the pre-emphasis (over-emphasis of the higher frequency tones) that is ordinarily imposed on the signal at the transmitter. The listener will, therefore, enjoy reproduction approaching "live" programs. In the OFF position, the DE-EMPHASIS switch alters the de-emphasis circuit in the NC-108 and the pre-emphasis on the signal is, for the most part, retained resulting in reproduction in which the higher frequency tones are over-emphasized.

In operation of the NC-108 the listener should select the position of the DE-EMPHASIS switch which provides, for him, the most enjoyable range of frequency tones. For example, if the NC-108 is used with an external amplifier-loud-speaker, either of which has a tendency to subdue the higher frequency tones, setting the DE-EMPHASIS switch at OFF will result in more realistic reproduction. The action of the TONE control is the same as described in paragraph 2-1 of Section 2, except that the range of the control will depend on the setting of the DE-EMPHASIS switch.

Schematically, the DE-EMPHASIS switch is an S.P.S.T. type and is connected between the ground side of capacitor, C-37, and chassis.

2. The coupling capacitor, C-8, is connected directly to the grid of the mixer tube instead of to the tap on the mixer coil as shown on the Schematic Diagram.

3. The output impedance of the NC-108 is approximately 150,000 ohms and approximately 11 volts, maximum, of undistorted output is available at the output terminals. Most amplifiers have high-impedance input circuits so that the NC-108 will work efficiently with such an amplifier without the use of a matching transformer. The 11 volts of output is more than ample, as the average amplifier requires approximately one volt for operation.

When using the NC-108 with an external amplifier, it is recommended that the interconnection be made using a low-loss shielded cable with a length not exceeding 10 feet and preferably as short as possible. This recommendation is made to prevent the attenuation of high frequency tones due to the capacity of the interconnecting cable.

However, if the NC-108 is to be used in an installation requiring a cable longer than 10 feet, a voltage divider network connected across the output terminals of the NC-108 will compensate for the resulting loss of high-frequency tones due to the longer cable. This network will result in an output with less gain at the NC-108 but this loss in gain can be tolerated when using a high gain amplifier.

The following drawing illustrates the method and components used to install the voltage divider network.