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INSTRUCTION BOOK
for
PANORAMIC RADIO ADAPTORS

NAVY MODELS RCX, RCX-1
RBV-1, RBU-1, RBW-2, RBW-2M

NAVSHIPS 900, 288—I B

R E S T R I C T E D
(For Official Use Only)

MANUFACTURED
BY
PANORAMIC RADIO CORPORATION
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FOR

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BUREAU OF SHIPS

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Figure 1-1. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBU-1, and RBV-1, Front View.

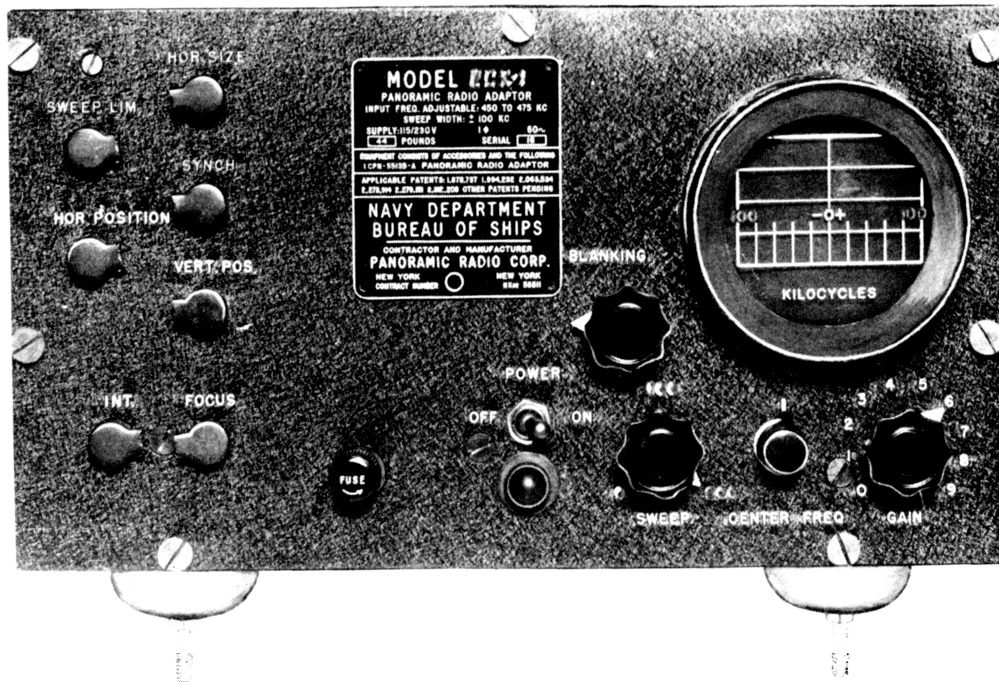


Figure 1-2. - Panoramic Adaptors, Navy Models RBW-2M and RCX-1, Front View.

SECTION I - GENERAL DESCRIPTION

1. QUICK REFERENCE DATA.a. Contractual Data.

(1) Name and Designation of Equipment. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBW-2M, RCX-1, RBV-1, and RBU-1.

(2) Contract Numbers and Dates. - NXss-33781 9 July 1943
 NXsr-41003 10 November 1943
 NXsr-56811 15 April 1944
 NXsr-64122 31 April 1944

(3) Contractor. - Panoramic Radio Corporation
 242 West 55th Street
 New York City, N.Y.

(4) Cognizant Naval Inspector. - J. Davidson, INM, NY

b. Shipping Data.

(1) Number of Packages Involved per Complete Shipment. - One

(2) Total Cubical Contents, including Equipment Spares, Installed and Packed for Shipment. - 10.4 cu. ft.

(3) Total Weight, including Equipment Spares, Installed and Packed for Shipment. - 151 lbs.

c. Tube Complement.

<u>Symbol</u> <u>(Drawing)</u>	<u>Type</u>	<u>Function</u>
V101	6AC7/1852	R.F. Amplifier
V102	6SA7	Converter
V103	6SG7	I.F. Amplifier
V104	6SQ7 (GT/G)	2nd Det. and 1/2 of push-pull Vert. Amp.
V105	2x2	C.R.T. Power Supply Rectifier
V106	VR105/30	Voltage Regulator for Reactor and Mixer screens with R.F. plate
V107	6AC7/1852	Reactance Modulator
V108	6SL7GT	1/2 of push-pull Vert. Amplifier 1/2 of push-pull Hor. Amplifier
V109	3BP1	Cathode Ray Tube
V110	6x5 (GT/G)	Low Voltage Rectifier
V111	6SL7GT	Blocking Tube Osc., and 1/2 of push-pull Hor. Amplifier

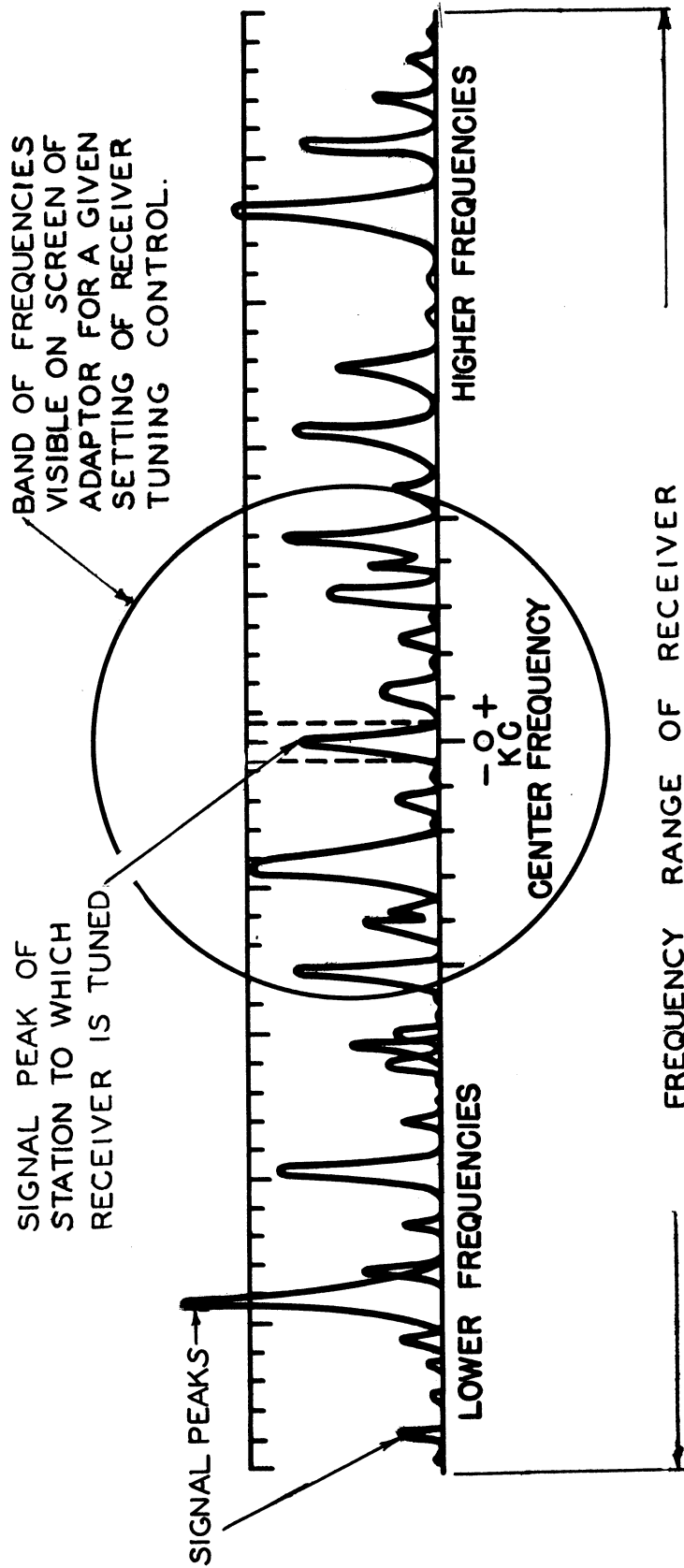


Figure 1-3. - The Radio Frequency Spectrum.

2. INTRODUCTION.

The Panoramic Radio Adaptor is a new type of electronic equipment which provides additional information for the Naval radio operator.

Upon connecting the Panoramic Adaptor to the receiver for which it is designed, the operator will be enabled to see, on a screen, all stations receivable within a band of frequencies.

The receiver will operate normally and the operator will not only hear the station to which it is tuned, but will also see it and signals of adjacent frequency. This will allow him to intercept quickly many stations appearing on the air, even for short periods of time.

The Panoramic Adaptor is a device which allows the operator to visualize the radio spectrum on a two-dimensional surface: On the horizontal axis of the screen (base line) frequencies are shown, and on the vertical axis the signal amplitudes are shown. This is illustrated in Fig. 1-3.

The entire strip represents the portion of the radio-frequency spectrum covered by the tuning range of your receiver. The circle in the center represents the range visible on the screen of the Panoramic Adaptor. The dotted section, directly over the Zero (0) on the scale, represents the signal to which the receiver is tuned. The peaks represent signals or stations. Every signal has its own separate peak or deflection, which tells its own story.

First: It tells the frequency of the signal with respect to the station to which the receiver is tuned, and which is read on the receiver dial.

The screen has a calibrated scale, marked Zero in the center, plus (+) to the right, and minus (-) to the left. Zero represents the receiver dial indication, and each division equals 10% of the total adaptor sweepwidth.

Taking the frequency reading of the station to which you are listening from the receiver dial, add or subtract the calibration on the screen scale corresponding to the signal peak under observation, and you have the frequency of that signal.

Second: It also tells roughly the strength of the signals that are shown on the screen. The height of each signal peak varies with the strength of the signal, strong signals having high peaks and weak signals having small peaks. With a little experience the operator will be able to judge comparative signal strengths.

Third: It reveals the character of the signal and the type of modulation, whether amplitude or frequency modulation, whether CW, or phone, or pulse, etc.

In case of interference, the screen will tell the nature of the interference, and how to counteract it.

Because the screen shows all of the stations that are on the air, it shows where the clear spots are, so that a transmitter can go on the air without any interference.

The operator must be on the alert to catch all signals. The Panoramic Adaptor will help him to spot them, identify them, and tune them in. The enemy tries many tricks to avoid interception and location. Changing frequencies and short, fast signals are among the most common tricks.

3. PHYSICAL CHARACTERISTICS.

The Panoramic equipment consists of accessories and one Panoramic Adaptor. The latter with a mounted panel is placed inside a metal cabinet, black wrinkled, with ventilating louvres extending on each side and in the back. See Section I, paragraph 4 for physical characteristics.

4. DIMENSIONS AND WEIGHTS.

RBW-2, RCX, RBW-2M, RCX-1, RBU-1, RBV-1

<u>Panel size.</u>	Width	- - - - -	13-1/4 inches
	Height	- - - - -	7-3/8 inches

C.R. Shield projection from panel. - - - - - 1-7/8 inches

Depth of cabinet. - - - - - 13 inches

Weight of chassis with tubes. - - - - - 32 lbs.

Weight of complete equipment. - - - - - 44 lbs.

Overall dimensions of complete equipment.

	Width	- - - - -	13-1/2 inches
	Height	- - - - -	8-3/4 inches
	Depth	- - - - -	15 inches

5. THE FRONT PANEL.

a. The power switch is located in the center of the panel and must be turned on, in addition to the receiver's power switch, when operation is desired.

b. The pilot light is directly underneath. It goes on and off with the power switch.

c. The fuse, located just to the left of the switch and pilot light, is easily replaced.

d. The screen is at the right. It is the end of the cathode ray tube which is mounted in the panel in a rubber "boot".

e. The screen shield. - The end of the tube is protected by a green plastic screen shield. This plastic shield protects the tube from damage, and protects the operator from shattered glass if it is hit or if it implodes.

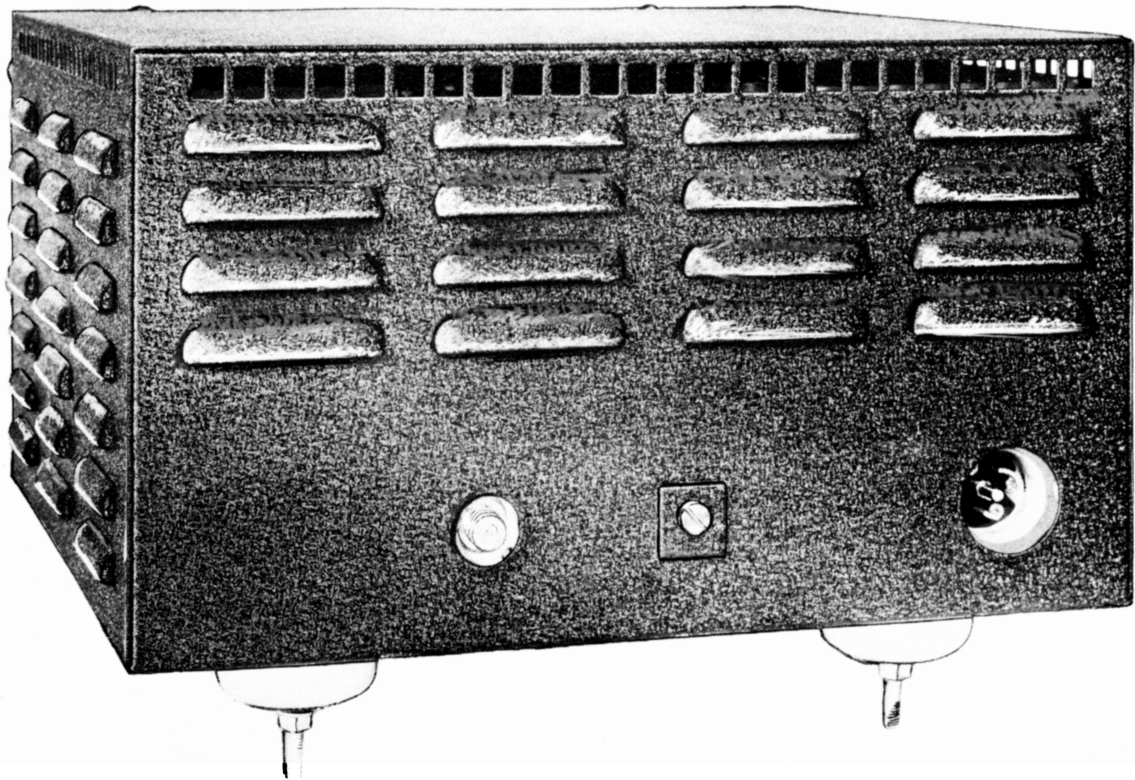


Figure 1-4. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBU-1, and RBV-1, Rear View of Cabinet.

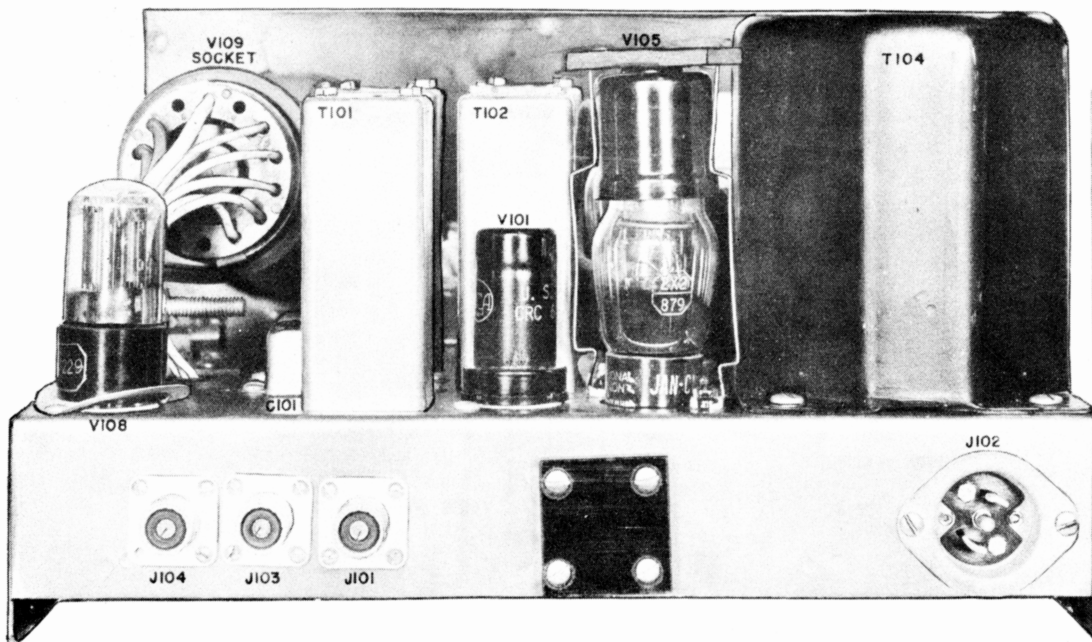


Figure 1-5. - Panoramic Adaptors, Navy Models RBW-2M, and RCX-1, Rear View of Chassis.

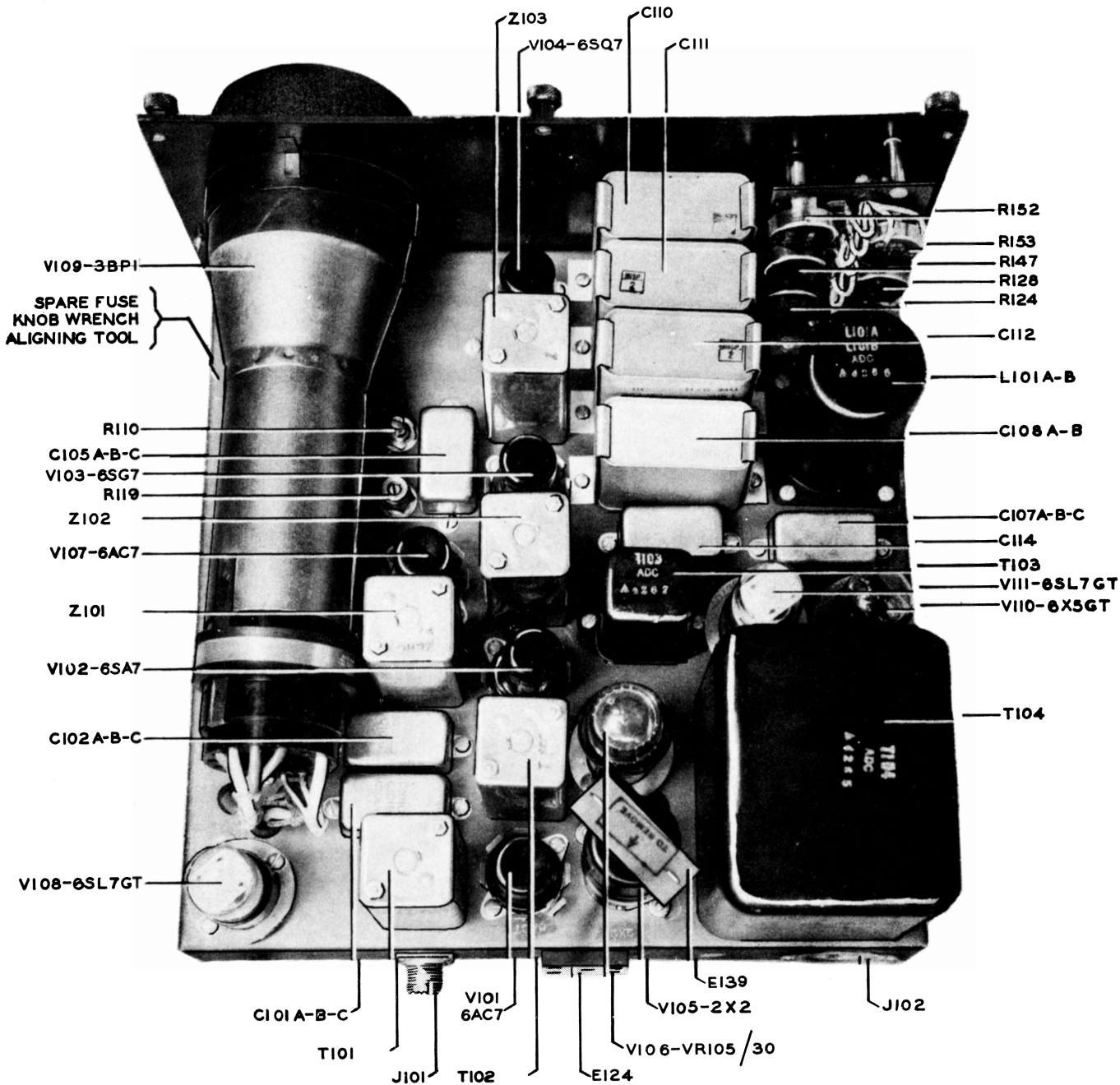


Figure 1-6. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBU-1, and RBV-1, Top View of Chassis.

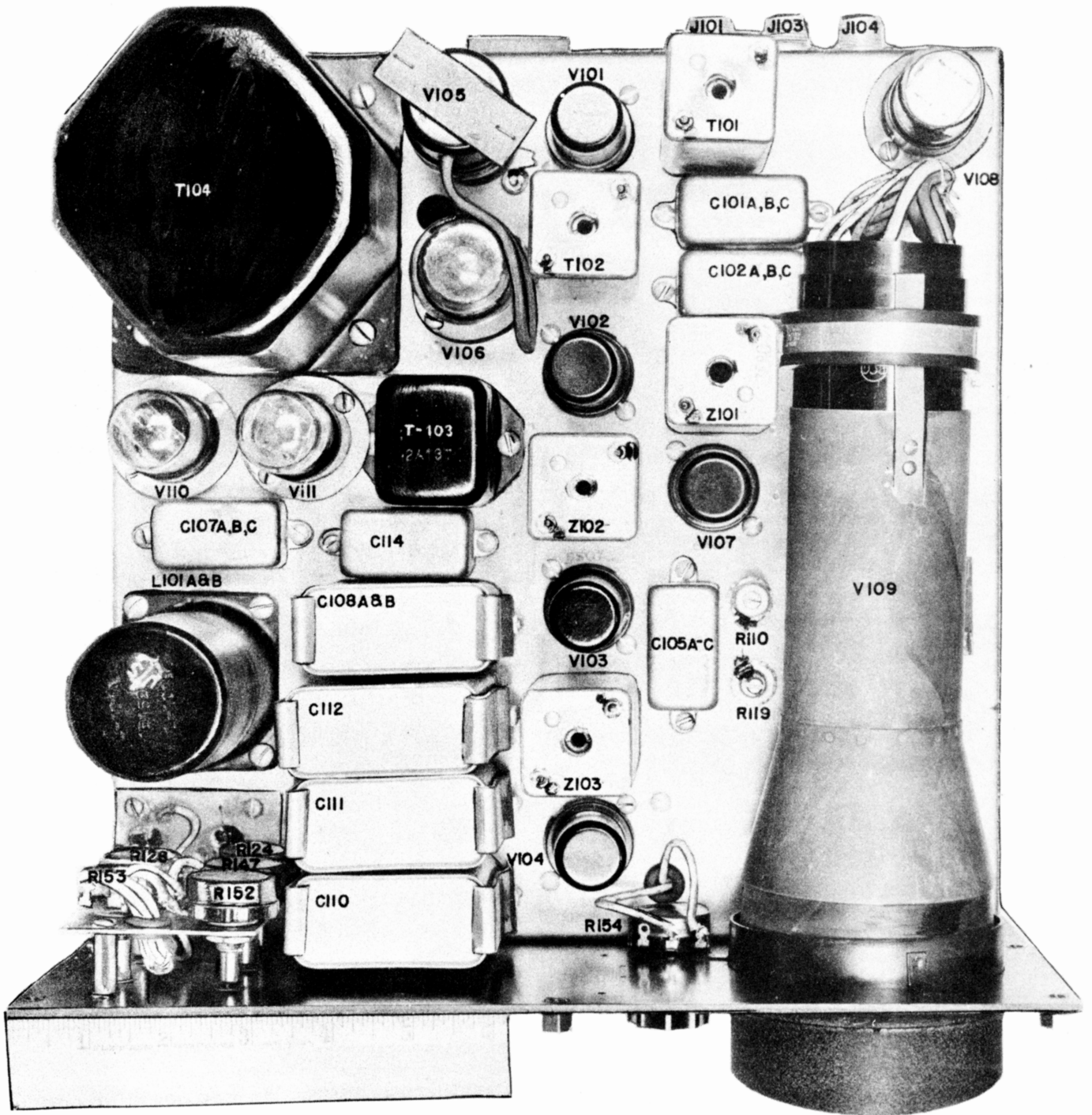


Figure 1-7. - Panoramic Adaptors, Navy Models RBW-2M, RCX-1, Top View of Chassis.

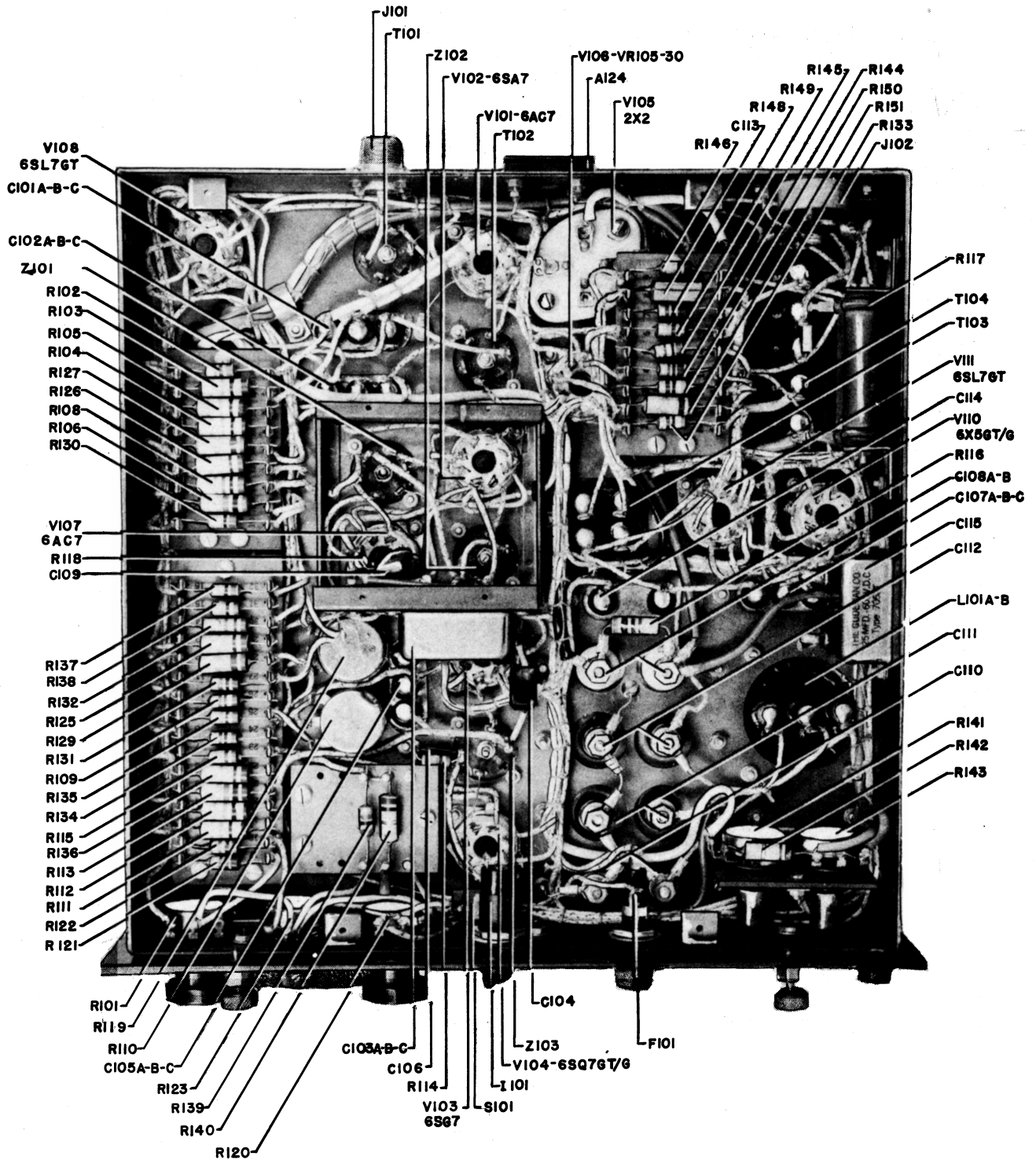


Figure 1-8. - Panoramic Adaptor, Navy Model RBW-2,
Bottom View of Chassis.

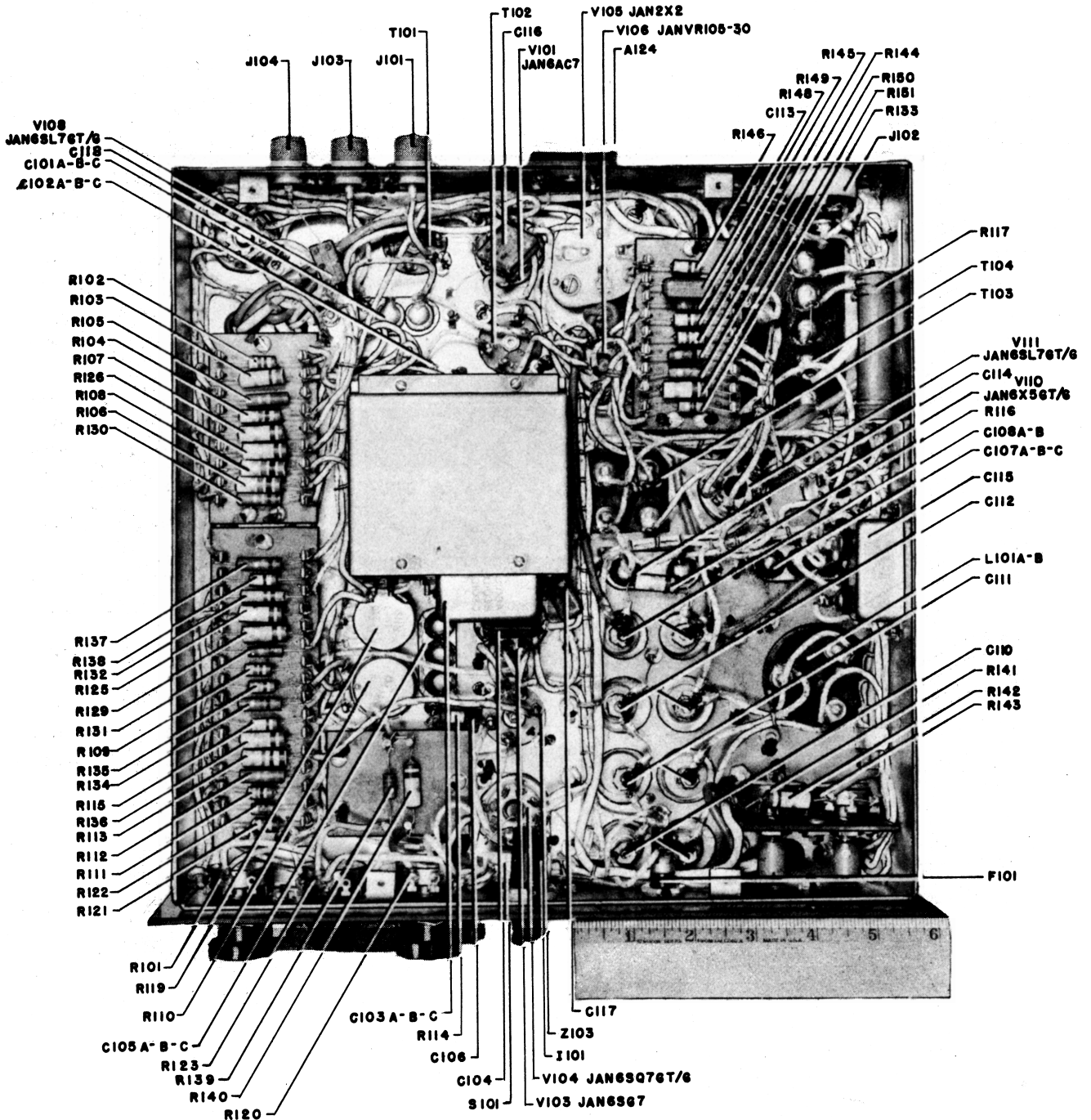


Figure I-9. - Panoramic Adaptors, Navy Models RCX-1 and RBW-2M, Bottom View of Chassis.

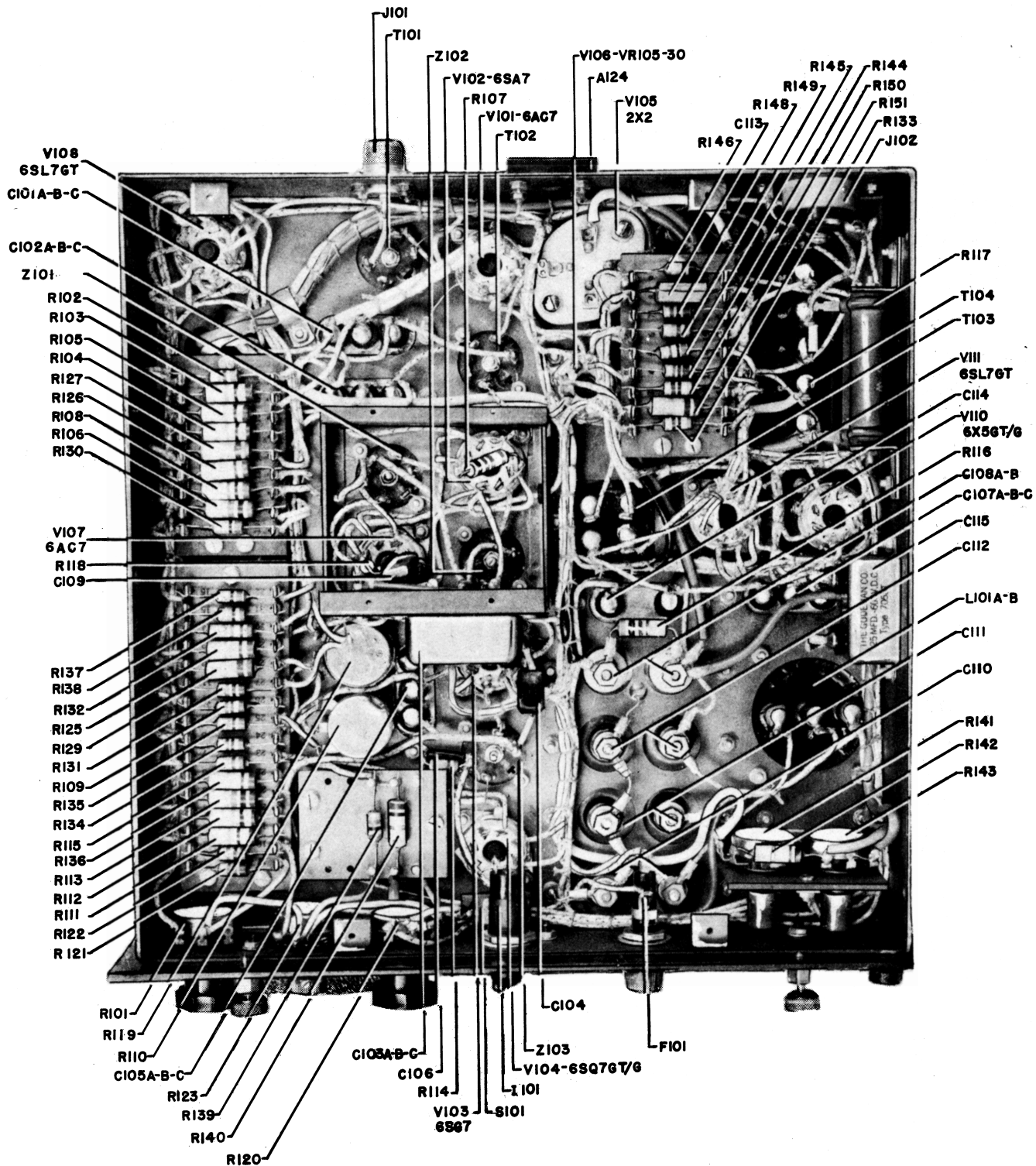


Figure I-10. - Panoramic Adaptors, Navy Models RCX, RBU-1, and RBV-1, Bottom View of Chassis.

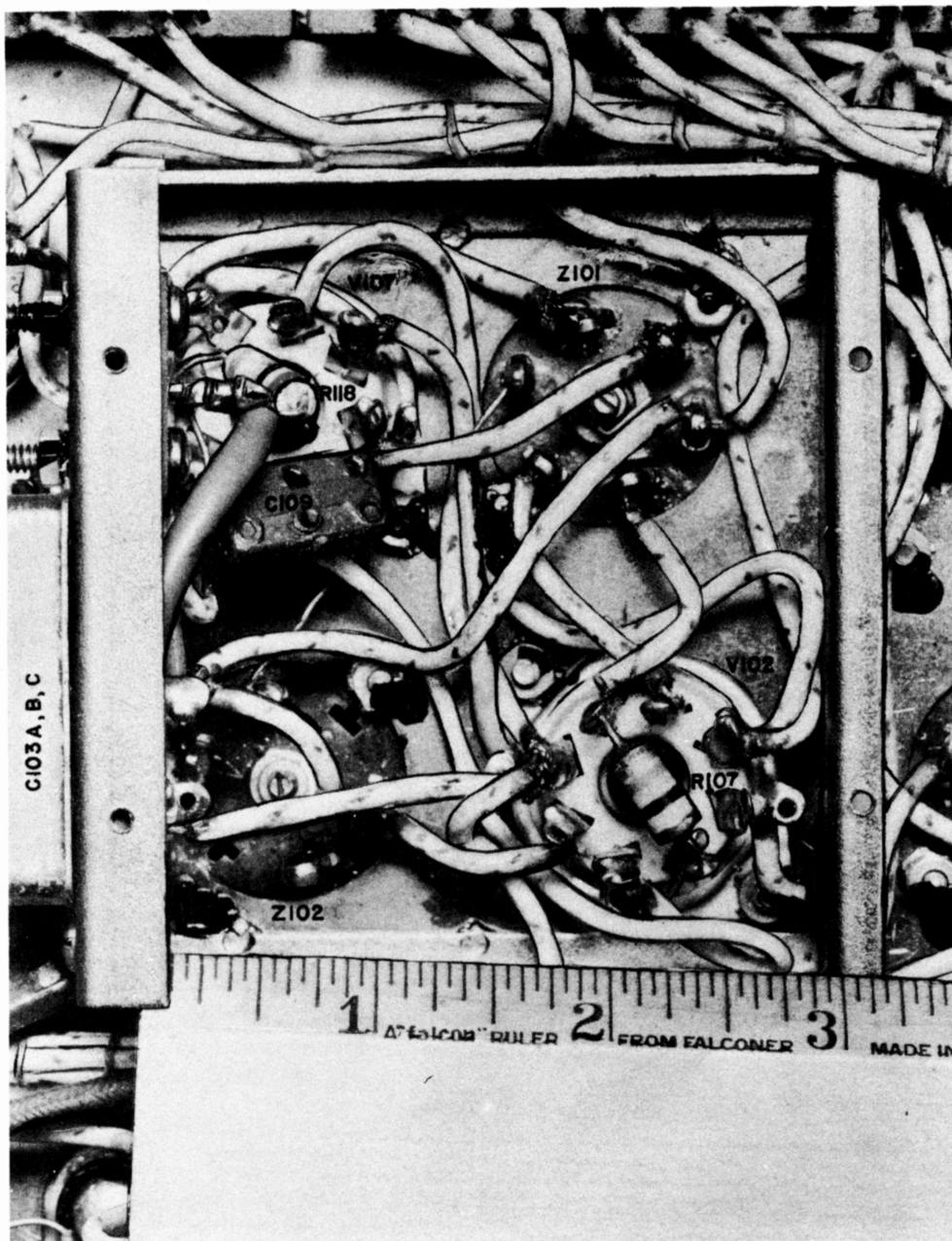


Figure I-11. - Panoramic Adaptors, Navy Models RCX, RCX-1, RBU-1, and RBV-1, Swept Oscillator Section.

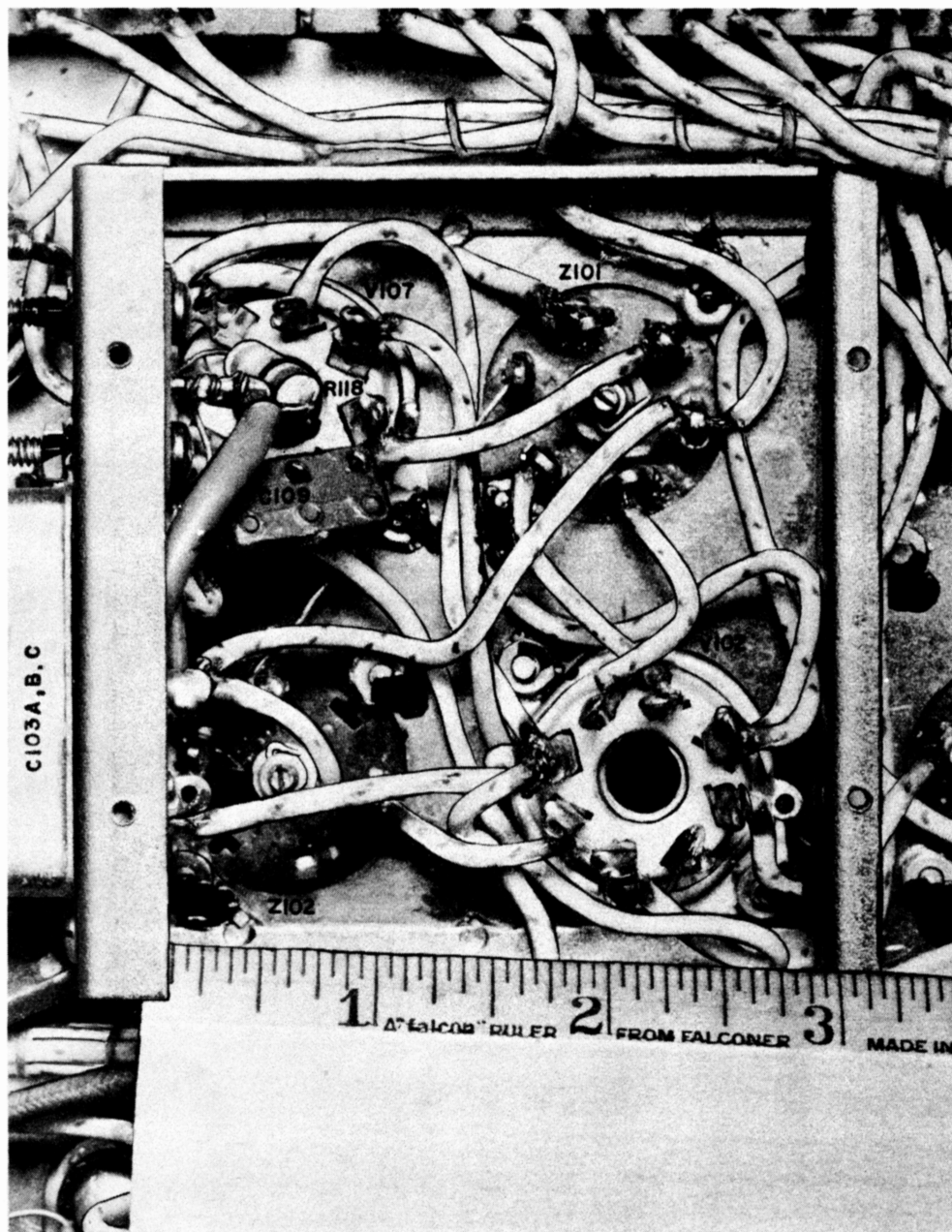


Figure 1-12. - Panoramic Adaptors, Navy Models RBW-2 and RBW-2M, Swept Oscillator Section.

DON'T MAKE THE TRACE ON THE SCREEN COMPETE WITH A STRONG LIGHT OR SUNLIGHT. The screen shield is marked with a zero (0) in the center of the horizontal line. On the right of zero is a plus (+) sign, indicating higher frequency than at the center. On the left of zero is a minus (-) sign, indicating lower frequency than at the center. Remember that zero (0) is the frequency to which the companion receiver is tuned.

The screen is calibrated with five equal spaces, right and left of the center. Each line represents 10% of the total adaptor sweepwidth.

Note: When the adaptor is tested alone (i.e., without a receiver) and the signals from a signal generator are fed directly into its input, the operator should remember that the above signs must be reversed.

6. MAIN OPERATING CONTROLS.

a. SWEEP. - This is the sweepwidth control. When this control is turned all the way to the right (clockwise) the maximum band for which the adaptor is designed can be seen on the screen. As this control is turned to the left, the band is made narrower, but the part that can be seen is magnified.

This control is very useful when two or more signals are so close as almost to merge into each other. Then when the sweep is reduced they will seem to separate, and the operator can tune the receiver more accurately.

b. BLANKING CONTROL. - The Blanking Control which is present on Panoramic Adaptors, Navy Models RCX-1 and RBW-2M only, is used only for special applications with voltage applied to J103. It has no effect upon ordinary installations.

c. CENTER FREQ. - It is desirable to match the adaptor accurately to the receiver. By this it is meant that the signals which are heard in the receiver should come exactly in the center of the base line at its zero mark. Once proper initial alignment has been established, this control is used to maintain or restore the match-condition. The method will be detailed below in Section III 1(e).

d. GAIN. - This controls the R.F. gain of the adaptor and affects the height of the signals shown on the screen. Keep the gain low. Best results can be obtained by keeping the gain as low as possible, while still being able to see a peak on the screen for the weakest signal the operator can hear through the receiver. Keeping the gain low keeps the noise level and the spurious signal level down, and makes it much easier to compare weak signals that are close to strong ones.

7. SEMI-ADJUSTABLE CONTROLS.

a. On the left of the panel, (see Figure 1-1.) there are seven snap covers, under each of which is a control which can be adjusted by a screw-driver. Ordinarily these controls, in all models, are not used, but sometimes they are necessary in adjusting or servicing equipment. The name of each control is plainly marked on the panel.

Four are marked in white.
Three are marked in red.

Caution: Until the operator thoroughly understands how the set performs, the adaptor will be put out of action fast if the controls are moved.

b. The WHITE (seldom used) controls are:

(1) VERT. POS. - This adjusts the vertical position of the base line on the screen, which should be very close to the calibration line of the screen scale.

(2) INT. - This controls the intensity or brightness of the line on the screen.

(3) FOCUS. - This controls the sharpness of the line on the screen.

(4) HOR. POSITION. - This control governs the position of the base line and is used to bring the signal you hear on the receiver exactly in line with the zero (0) on the scale at full sweep. This control which is used in conjunction with CENTER FREQ(uency), does not have to be used much, but it does permit rapid correction of slight center frequency drift while the receiver or adaptor is cold.

There will be little need for adjusting any of these white marked controls.

c. The RED (DON'T TOUCH) controls are:

(1) SWEEP LIM. - This control limits the width of the band which is covered.

(2) HOR. SIZE. - This controls the length of the base line on the screen, which should be slightly longer than the calibrated scale.

(3) SYNCH. - This controls the speed with which the "spot" sweeps across the screen in synchronism with the A.C. power source. Normally, it is set for 30 sweep cycles per second when operating from a 60 cycle source of power, and for 25 sweep cycles when operating from 50 cycles.

8. TERMS AND DEFINITIONS.

Considering the fact that the Panoramic Adaptor fulfills certain particular functions which are not found in ordinary radio receivers, it becomes necessary to establish certain terms and definitions which apply particularly to this type of radio equipment.

a. Panoramic Reception is the simultaneous visual reception of several radio signaling stations whose frequencies are distributed over a continuous portion of the frequency spectrum. This definition distinguishes Panoramic Reception from the conventional reception, which can be called "uni-signal" reception, and which can be either aural or visual, or both.

The main distinction between Panoramic and uni-signal reception is the following: Panoramic Reception is periodic reception over a wide range of the spectrum. Each signal is received at fixed, rapid intervals, for a short period of time. (These signals are received so rapidly as to appear to be continuous). Uni-signal reception is continuous reception, of one signal at a time, over a very narrow range of the spectrum.

b. Companion Receiver is the aural receiver with which the Panoramic Adaptor is operated.

c. Sweepwidth is the total band, measured in kilocycles, which can be observed by Panoramic Reception and which corresponds to the range of frequency sweep of the oscillator in the Panoramic Adaptor. Sweepwidth should not be confused with signal frequency, although both are measured in the same units (kilocycles).

d. Base Line is the horizontal line produced on the cathode-ray tube by the sawtooth generator and its associated amplifiers.

e. Center Frequency is the frequency of a signal which causes a vertical deflection of the base line when the sweepwidth control is set at zero. The center frequency of the Panoramic Adaptor must be made to correspond to the frequency of the intermediate amplifier of the companion receiver.

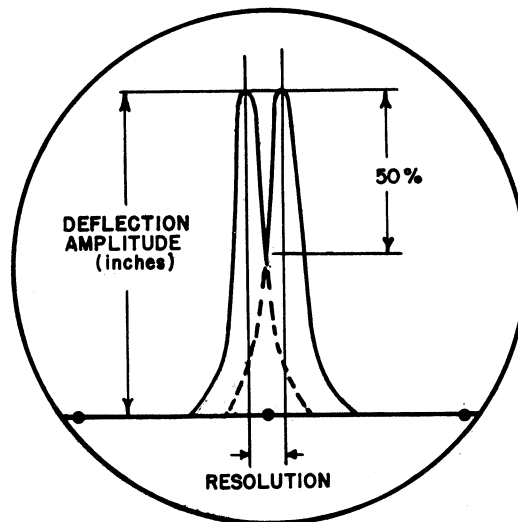


Figure 1-13. - Resolution.

f. Screen Scale is the scale adjacent to the base line, which is calibrated in kilocycles above and below center frequency for a maximum sweepwidth setting.

g. Deflection Amplitude is the visual equivalent of signal output strength, and is represented by the height of a given signal deflection measured from the base line to the tip of the deflection.

h. Resolution (Fig. 1-14.) is the visual equivalent of selectivity and is represented by the frequency difference between two signals of equal amplitude which intersect 50% down from their peak amplitude. It can be said that the resolution is "better" as this frequency difference decreases.

i. Sweep Frequency is the frequency of the voltage applied to the horizontal plates of the cathode-ray tube. This voltage has a sawtooth wave shape.

9. ELECTRICAL CHARACTERISTICS.

	RBV-1	RBV-1	RCX RCX-1	RBW-2 RBW-2M
<u>GENERAL</u>				
MAXIMUM SWEEPWIDTH	50KC	100KC	200KC	1000KC
INPUT FREQUENCY	400KC	400KC	450KC to 470KC	5.25MC
TYPE OF INPUT	CATHODE FOLLOWER	CATHODE FOLLOWER	50,000 OHMS	25,000 OHMS
POWER SOURCE REQUIRED	115/230V. 50/70 CYCLES AC	115/230V. 50/70 CYCLES AC	115/230V. 50/70 CYCLES AC	115/230V. 50/70 CYCLES AC
<u>BANDPASS AMPLIFYING STAGE</u>				
PEAK FREQUENCIES	375KC (-5KC, +2.5KC) 425KC (+5KC, -2.5KC)	350KC±5KC 450KC±5KC	90KC±10KC FROM THE CHOSEN CENTER FREQ.	4.825MC±100KC 5.675MC±100KC
PEAK TO CENTER AMPLITUDE RATIO: GREATER THAN	6:1	8:1	12:1	5:1
<u>SENSITIVITY</u> DEFLECTION AMPLITUDE MORE THAN 1/4" FOR	*A 400KC SIGNAL OF 50MICROVOLTS APPLIED AT INPUT CABLE	**A 400KC SIGNAL OF 50MICROVOLTS APPLIED AT INPUT CABLE	A 455KC SIGNAL OF 200MICRO - VOLTS APPLIED THROUGH A COUP- LING RESISTOR	A 5.25MC SIGNAL OF 200MICROVOLTS AP- PLIED THROUGH A COUPLING RESISTOR
I.F. TRANSFORMERS ADJUSTED TO	226KC (APPROX)	226KC (APPROX)	226KC (APPROX)	912KC (APPROX)
OSCILLATOR MEAN FREQUENCY (SWEEPWIDTH REDUCED TO ZERO)	RECEIVER I.F. +226KC	RECEIVER I.F. +226KC	RECEIVER I.F. +226KC	RECEIVER I.F. +912KC
OSCILLATOR SWING UP TO	±25KC	±50KC	±100KC	±500KC
SWEEP FREQUENCY ADJUSTMENT	30 CYCLES	30 CYCLES	30 CYCLES	30 CYCLES
SWEEP VOLTAGE WAVEFORM	SAWTOOTH LINEAR	SAWTOOTH LINEAR	SAWTOOTH LINEAR	SAWTOOTH LINEAR

*Companion Receiver for RBV-1 is the Navy Model RBB.

**Companion Receiver for RBV-1 is the Navy Model RBC.

SECTION II - INSTALLATION AND ADJUSTMENT

1. PRELIMINARY CHECKING PROCEDURE.

a. The adaptors are wired for 115/230 volt, 50/70 cycles single phase, alternating current, power source. BE SURE TO HAVE THIS POWER AVAILABLE. The power connections set at the factory are for 115 volt operation. For 230 V. operation see Fig. 5-1. After removing the adaptor from its packing case, attach the power cable which plugs into a receptacle on the back of the chassis. The plug is polarized. A right turn locks it. Now make a preliminary check on the adaptor before connecting it to the receiver:-

(1) Turn the power switch on. The pilot light should go on at once, AND IN HALF A MINUTE THE BASE LINE SHOULD APPEAR ON THE PANORAMIC SCREEN.

(2) Turn GAIN control fully on - clockwise. The base line will show "bumps", particularly near each end. It is noise - and O.K.

(3) Turn GAIN fully off - counterclockwise. The base line should be clear and clean from one end to the other.

2. CONNECTION OF PANORAMIC ADAPTOR TO RECEIVER.

a. Find the proper place for the adaptor. Do not mount adaptor over ventilation holes of companion receiver.

b. See Figs. 2-1 and 2-2 for installation dimensions and weight.

(1) Make sure that the RECEIVER has an intermediate frequency which corresponds to the input frequency of the adaptor.

(2) Disconnect both the adaptor and the receiver from the power line.

(3) Panoramic Adaptors, Navy Models RCX, RCX-1, RBW-2, and RBW-2M are connected to the companion receiver by means of a shielded single co-axial cable. One end of the cable should have a male plug, Navy Type Number 49195, which is fitted into the input female connector (J101) at the rear of the adaptor chassis. If the companion receiver is provided with a connector for operation with the Panoramic Adaptor, the other end of the co-axial cable should be fitted with a suitable plug which is to be inserted into the connector of the receiver. A receiver, which is to be operated with either Navy Model RCX or Navy Model RCX-1, should have a 25,000 ohm resistor between the plate of the first detector and the above mentioned connector. On the other hand, a receiver, which is to be operated with Navy Models RBW-2 and RBW-2M, should have a 50,000 ohm resistor between the plate of the first detector and the connector.

At the rear of Panoramic Adaptors RBU-1 and RBV-1 and their companion receivers, Navy Models RBB and RBC respectively, there are twin contact female connectors. In the companion receivers the twin contact female connectors are attached to the output of an isolating cathode follower

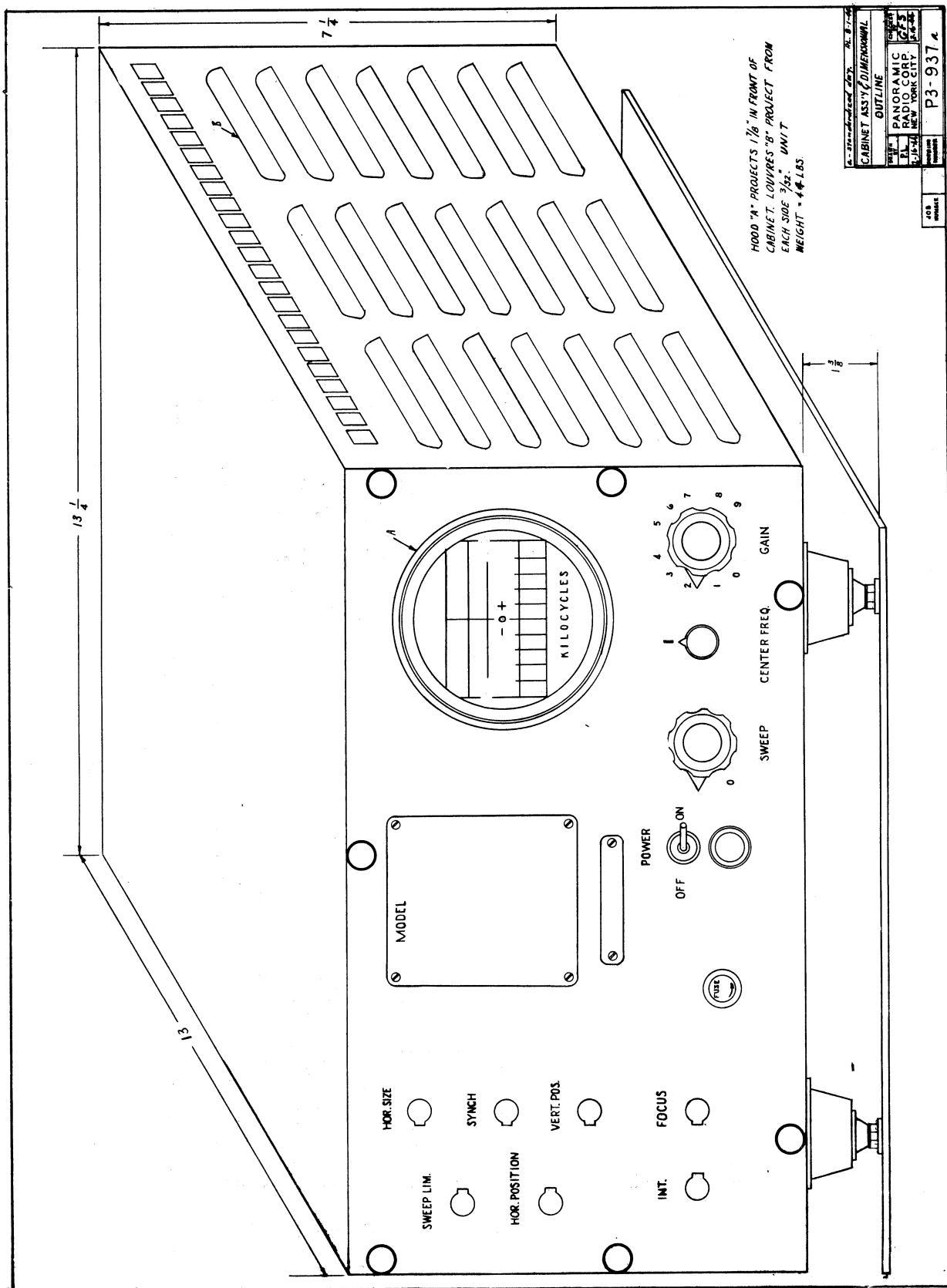


Figure 2-1. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBW-2M, RCX-1, RBU-1, and RBV-1, Cabinet Assembly and Dimensional Outline.

NOTE:
 MIDPOINTS OF PLUGS
 ARE LOCATED 1.469"
 FROM BOTTOM OF
 CABINET.
 PANORAMIC INPUT
 CONNECTOR PROJECTS
 .375 FROM BACK OF
 CABINET.

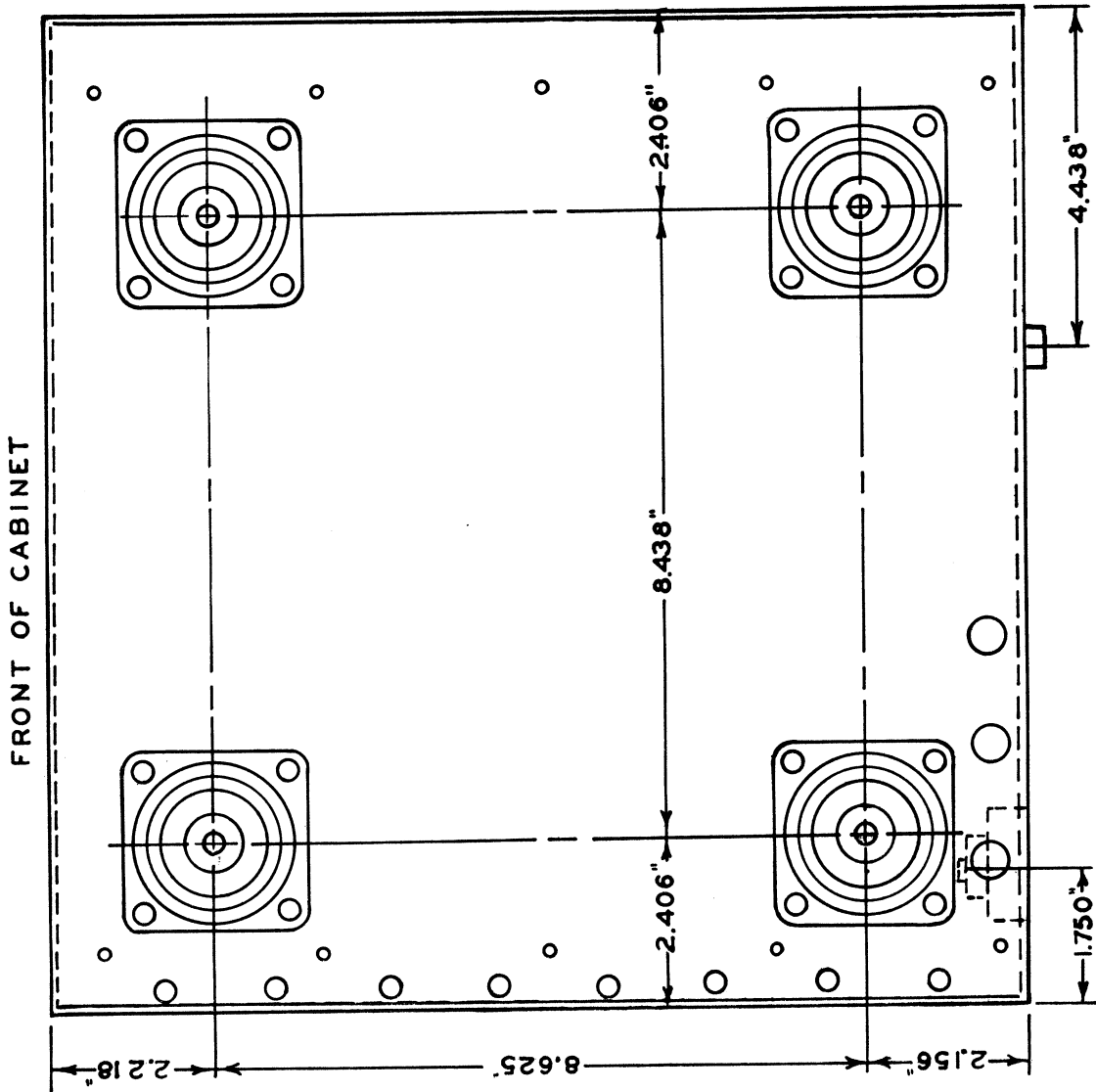


Figure 2-2. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBW-2M, RCX-1, RBU-1, and RBV-1, Mounting Dimensions.

circuit, the input of which is connected to the plate of the receiver's first detector. This arrangement assures the practical elimination of de-tuning or reduction of gain of the receiver. A dual conductor co-axial cable with suitable dual contact male plugs at each end is used as an interconnecting cable for the receiver and adaptor. Navy Model RBB and RBC receivers must be equipped with Navy Type---10335 coupling unit before RBU and RBV series adaptors can be connected.

NOTE: IF THE COMPANION RECEIVER IS NOT PROVIDED WITH A RECEPTACLE FOR OPERATION WITH A PANORAMIC ADAPTOR, PROCEED AS FOLLOWS:

(a) In the receiver there is to be installed an isolating resistor, a permanent shielded co-axial cable, a standard female connector Navy Type #49194, and mounting accessories.

(b) Determine the most suitable and convenient location on the receiver chassis to mount the female connector, which should be as near to the mixer tube as possible.

(c) At this location drill an 11/16" hole. Fit the connector over this hole so that the connector is centered. Now using the connector as a template, mark off connector mounting holes on the receiver chassis, and drill the necessary holes. Mount the connector with suitable screws and lockwashers.

(d) If space permits, mount a one lug resistor standoff near the plate prong of the mixer tube socket so that a 50,000 or 25,000 ohm 1/2 watt resistor (depending upon whether an RCX or RBW-2 series Panoramic Adaptor is to be used with the receiver) can be installed between the plate prong and the resistor standoff lug. It must be borne in mind that the resistor should be mounted as close to the plate prong as possible. See Figure 2-3. If it is not feasible to mount a resistor standoff, the resistor can be tied directly to the inner conductor of the shielded cable instead of to the standoff lug, although this practice should be avoided.

(e) Using a suitable length of RG 11/U cable, trim off each end of the cable as shown in the lower sketch in Figure 2-3. Tin the exposed shield at one end of the cable and solder the cable clamp to it, as shown in Figure 2-3. Ground the cable clamp, to the chassis, near the resistor standoff. Solder the inner conductor of the cable to the resistor stand-off lug, thus connecting together the isolating resistor and the cable. If, however, it is impossible to mount the standoff, then fasten the cable clamp to the chassis so that the isolating resistor is supported by the plate prong and the inner conductor of the cable. This support may be made firm by making the resistor and cable leads short, thus, at the same time, reducing the possibility of a short circuit between the 'hot' lead of the cable and ground.

(f) Now connect the other end of the inner conductor to the female connector pin. This completes the installation in the receiver.

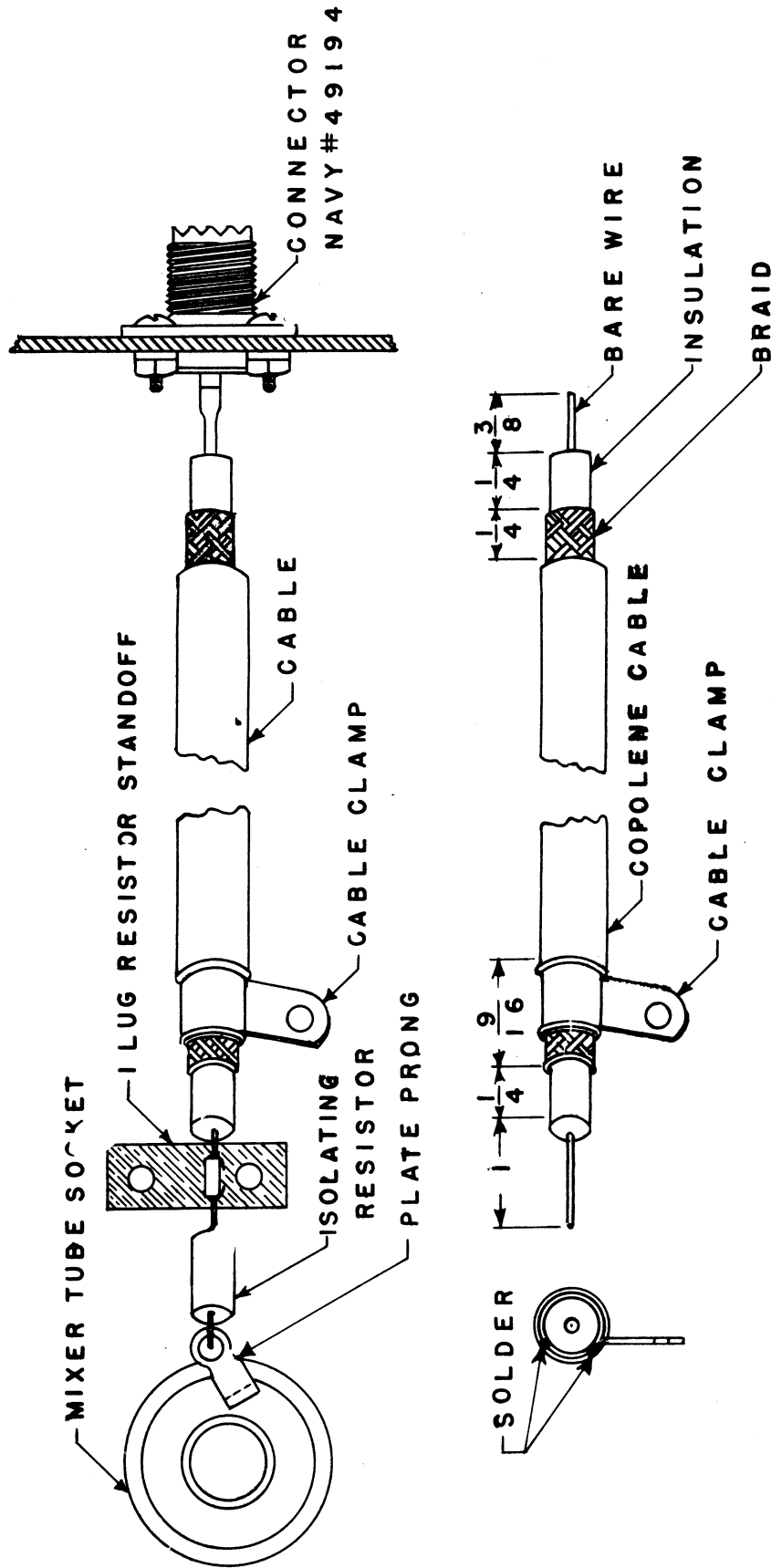


Figure 2-3. - Receiver Cable and Isolating Resistor Assembly.

(g) Shorten the Panoramic Cable by an amount equal to the length of cable used above, and fit a straight plug Navy Type #49195 or an angle plug Navy Type #49192, as desired, to the Panoramic cable. Either plug can now be attached to the female connector on the receiver. Attach the other end of the cable to the adaptor.

SECTION III - OPERATION

1. OPERATING PROCEDURE.

Now that the receiver and the adaptor are connected, they are ready to operate as follows:

a. Again plug in both receiver and adaptor power cords. Turn on the receiver - check its operation.

NOTE: The antenna should remain connected to the receiver in the normal manner.

b. Turn on the adaptor and wait for the base line to appear.

c. Turn "GAIN" control up about half way.

d. Slowly tune the receiver and soon there will be one or more signals appearing on the panoramic screen, moving across it.

e. Tune in any station on the receiver, using phones or speaker. The signal should appear on the Panoramic Adaptor screen DIRECTLY over the zero (0), that is, exactly in the center of the scale. For best results it is advisable to adjust the mean frequency of the Panoramic Adaptor oscillator, to give a signal which remains in the center of the screen, no matter what is the position of the "SWEEP" control. (This should be done after the adaptor has been allowed to warm up). The above adjustment is accomplished by turning the "SWEEP" control not quite fully counterclockwise and then centering the deflection peak by rotating the "CENTER FREQ" knob. Turning the "SWEEP" fully clockwise should now leave the peak at the zero mark on the screen; if not, adjust the HOR. POSITION control. The "CENTER FREQ." control knob had purposely been made small and placed between two larger knobs where it will not interfere with operation of the other two controls. It must be clearly borne in mind by the operating personnel that this control should be adjusted only infrequently. Incorrect adjustment of the "CENTER FREQ." control will result in throwing the adaptor out of alignment with the companion receiver, as far as "CENTER FREQ." is concerned.

2. INTERPRETATION OF SIGNALS.

a. With a little experience the operator will be able to recognize visually the character of the various types of signals, without the need of listening to them. It must be remembered, however, that the Panoramic Radio Adaptor can show only what the radio receiver is able to receive and no more. A poorly adjusted receiver cannot be expected to give good results even with a perfectly adjusted adaptor.

(1) A constant carrier appears as a deflection of fixed height.

(2) An amplitude modulated carrier appears as a deflection of variable height. Voice or music modulation causes the carrier to vary irregularly.

A constant tone modulation of low frequency will produce a series of convolutions varying in height, their number being determined by the modulation frequency.

As the modulation frequency increases, the convolutions move toward the two sides of the deflection, as the side-bands tend to become visible. When the modulation frequency is increased, it becomes possible to separate the two side-bands by reducing the sweepwidth of the adaptor. The higher the frequency of modulation the farther away these side-bands will move from the center deflection, representing the carrier. One should remember, that due to possible non-linear amplification of the receiver, or of the adaptor, or both, over a wide band, the two side-bands may appear unequal in height, even though they are of equal strength. Their relative heights may vary as the receiver is tuned and as the deflection moves from one end of the screen to the other.

(3) Single side-band modulation appears as two carriers of slightly different frequency (See below: "Signal Interferences").

(4) A frequency modulated carrier appears as a carrier which is "wobbling" sideways.

(5) A speech or music modulation FM signal appears as a multiplicity of deflections spreading over a variable bandwidth. During periods of silence a single carrier appears.

(6) A CW signal appears and disappears in step with the keying of the transmitter. During the moments when the signal is off, the frequency sweep axis closes at the base of the signal. A radio operator used to reading CW signals on phones can, with a little practice, read such signals directly off the screen. In very rapidly keyed signals the deflection and the base line are seen simultaneously.

(7) An MCW signal appears like a CW signal of periodically varying height. If the modulation rate is high, sidebands will appear as explained above.

(8) Signal Interference. Two signals which are so close in frequency as to cause aural interference (beats) may appear on the screen as a single deflection, varying in height, as with a modulated signal. As the frequency separation is increased, the deflection appears as if modulated on one side only. Further increase of frequency separation will cause a "break" in the apex of the deflection. By reducing the sweepwidth of the adaptor, the respective deflections will gradually separate.

(9) Transient disturbances, generally received as noises in the receiver, are of two types: periodic and aperiodic transients.

Periodic transients, such as produced by automobile ignition, motors, vibrators, buzzers, etc., appear as signals moving along the frequency sweep base line in one direction or another. Thus, an automobile which is accelerating will produce a set of deflections which may move first in one direction, slow down, stop, and then move in an opposite direction.

This is caused by the fact that the adaptor is sweeping at a fixed rate (30 times per second), whereas the transient occurs at a variable rate. The images stand still on the screen when there is synchronism between the two. If the transient disturbance is synchronized with the 60 cycle line, the "noise" appears as a fixed signal which, however, does not move on the screen when the receiver is tuned, but only varies in height. Such deflections may appear like amplitude modulated signals or like steady carriers. (See below: "Diathermy apparatus"). Aperiodic transients, such as "static", appear as irregular deflections and flashes along the whole frequency sweep axis.

(10) Tube noises, due to too great an amplification of the receiver, or adaptor, or both, appear as varying irregularities along the frequency sweep axis. Proper adjustment of the gain controls should reduce or eliminate this disturbance.

(11) Images. If the receiver allows "images" to pass (due to poor image rejection of the R.F. circuits), these will be distinguishable from normal signals by the fact that they move in an opposite direction when the companion receiver is being tuned. Such images are most likely to appear on the higher frequency ranges of the receiver.

(12) Harmonics produced in the receiver by the beat of very strong signals with harmonics of the oscillator, will be distinguishable from other signals by the fact that they move on the screen more rapidly (with tuning) than the normal signals. (Twice as fast for second harmonic spurious signals). Generally, a reduction in the gain of the receiver will eliminate this type of spurious signal.

(13) Diathermy apparatus using an unfiltered or A.C. power supply will produce a periodic disturbance which will cause a deflection to appear on certain portions of the screen and disappear on other portions. This is due to the fact that such equipment emits a signal pulsating in synchronism with the power line. On the other hand, the adaptor, too, is sweeping the spectrum in synchronism with the line, but at a lower frequency (30 cycles). Only when a certain phase relationship exists, is it possible for the adaptor to receive those periodic pulses.

(14) Spurious Signals. If the signal strength exceeds a certain value, the deflection caused by any signal breaks up into a series of parallel deflections, somewhat similar to side-bands. These spurious signals can take place either in the receiver or adaptor on extremely strong signals. A slight reduction in the gain of the adaptor will eliminate this type of distortion.

(15) Use of the A.V.C. of the receiver. When the receiver is using A.V.C., the signal appearing in the center of the screen will control the height of all other signals. If the receiver is tuned to a strong signal, the weaker adjacent signals will be reduced in height or may not appear at all. It may be found expedient, in most applications, to operate the receiver with the A.V.C. cut off.

SECTION IV - THEORY OF OPERATION

1. COMPANION RECEIVER.

The companion receiver must be a superheterodyne receiver having an intermediate frequency equal to the frequency input of the particular adaptor used. See Electrical Characteristics, Section I, Paragraph 9. In the output of the converter tube of a superheterodyne receiver there are signals whose frequencies extend on either side of the I.F. amplifier frequency.

This I.F. amplifier (being very selective) will pass only those signals to which it is tuned, and that is why the operator will hear only one station, in the phones or loudspeaker.

2. PANORAMIC ADAPTOR.

The Panoramic Adaptor is a complete superheterodyne receiver in itself. The adaptor's input is connected to the output of the mixer tube of the companion receiver. On account of the selectivity of the radio frequency amplifiers of the receiver, the signals in the plate of the receiver converter other than those of its intermediate frequency will be relatively weak.

The Panoramic Adaptor has an input-amplifying stage with a bandpass characteristic which is inverse to that of the receiver. That is, it amplifies where the receiver attenuates and vice-versa. When the two units are used together, the overall bandpass characteristic tends to be uniform through the frequency spectrum. Figure 4-2. (heavy line) is a view of the approximate variation of amplitude of a signal of constant strength, seen on the adaptor screen, when

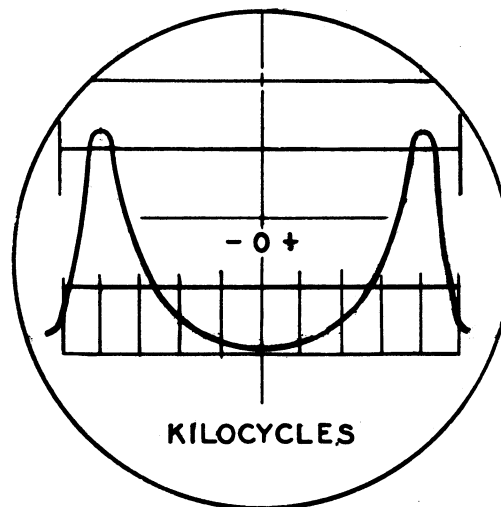


Figure 4-1. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBW-2M, RCX-1, and RBV-1, Bandpass Characteristics.

the receiver is tuned in the region where compensation is accurate. As the receiver is tuned to higher frequencies, the side peaks will tend to increase with respect to the center peak.

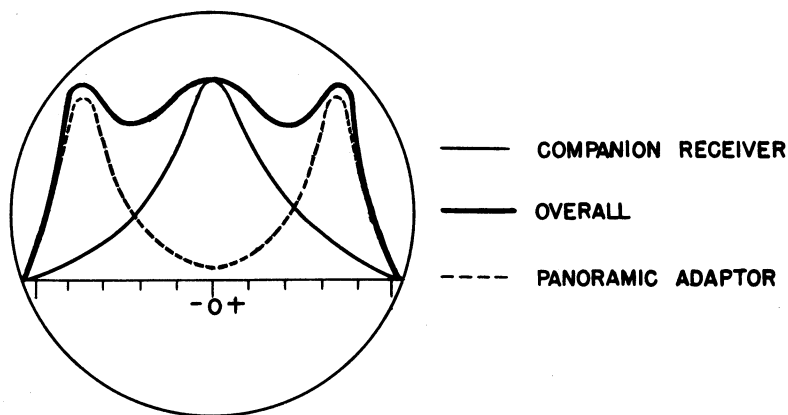


Figure 4-2. - Panoramic Adaptors, Navy Models RBW-2, RCX, RBW-2M, RCX-1, and RBV-1, Overall Bandpass Characteristics.

a. Bandpass Amplifying Stage. - Refer to Block Diagram shown in Figure 4-3. for a description of the various steps by which Panoramic Reception is obtained. Block marked (1) is an R.F. bandpass amplifier (Fig. 4-3.) which is the input stage of the Panoramic Adaptor, and is connected to the plate of the first detector of the receiver, through the isolating or blocking resistor "R". This blocking resistor prevents detuning of the receiver and permits the latter to operate normally. Similarly, in the in the Block Diagram for Panoramic Adaptors RBU-1 and RBV-1, Fig. 4-4., the block marked (1) is an R.F. bandpass amplifier which is the input stage of the Panoramic Adaptor. Here, however, the input stage is connected to the plate of the first detector of the receiver through a cathode follower circuit to prevent detuning or loss of gain of the receiver.

As previously stated, the amplifying characteristic of this R.F. bandpass amplifier is such as to emphasize the bands away from the center frequency, thus amplifying the extremities of the bands more than the center. In this manner we obtain partial compensation for the selectivity of the R.F. or pre-selector stages of the companion receiver's input frequency.

b. Mixer Stage. - The signals from the R.F. bandpass amplifier are fed into the converter stage (2), where they are mixed with the signals from an oscillator (3).

c. Oscillator Stage. - This oscillator (3) is frequency-modulated, at a fixed rate, over a frequency range, extending equally above and below the mean frequency, F_0 , by one half of the sweepwidth of the particular adaptor model under consideration. See Electrical Characteristics, Section I, Par. 9. The mean frequency is adjusted to represent the sum of the receiver's I.F.

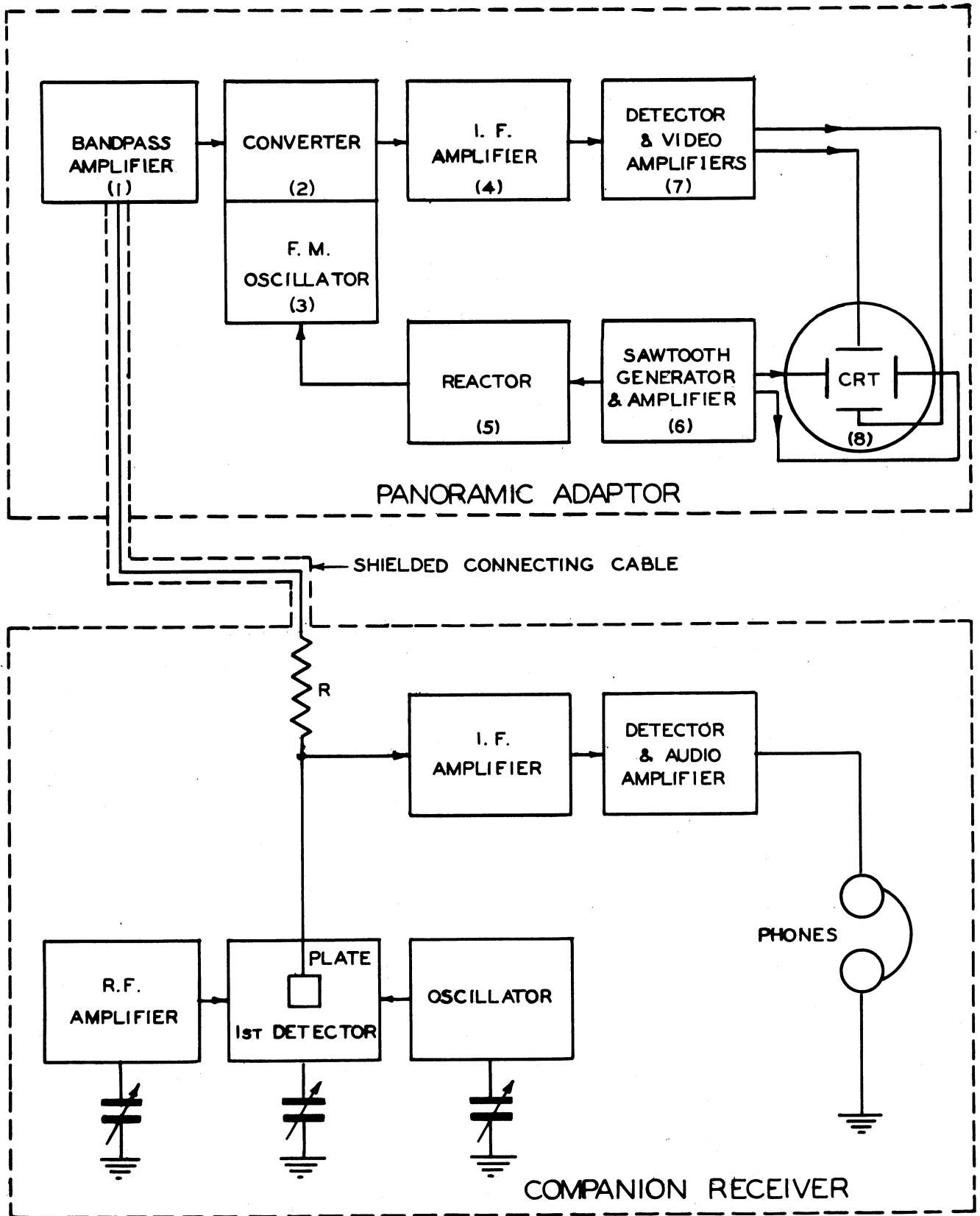


Figure 4-3. - Panoramic Adaptors, Navy Models RCX, RCX-1, RBW-2, and RBW-2M, Block Diagram.

and the adaptor's I.F. Example: If the receiver has an I.F. of 455KC and the I.F. of the Adaptor is 226KC, the oscillator mean frequency is 681KC.

d. Reactor. - The oscillator (3) is frequency-modulated as stated above. This action takes place entirely by electronic means. A reactance tube (5), forming part of the tuned circuit of the oscillator, varies the frequency of the oscillator in step with a sawtooth sweep voltage applied to the grid of the reactor tube.

e. I.F. Amplifier. - The signals from the output of the converter are fed into an I.F. amplifier (4), sharply tuned to the I.F. of the particular adaptor under consideration (See Electrical Characteristics), and from there the signals are detected and then amplified by a video amplifier (7). The signals from the output of this amplifier are fed into the vertical deflecting plates of the cathode ray tube (8).

f. Sweep Generator. - The sweep voltage is supplied to the reactor by a sawtooth voltage generator (6), thereby effecting a linear frequency excursion, or tuning, of the oscillator. The same sawtooth voltage is also applied to the horizontal deflecting plates of the cathode ray tube. Thus the movement of the cathode ray beam on the screen is synchronized with the tuning of the oscillator.

Remember, however, that each signal appears only periodically, and for only a fraction of the total time. All the signals will give the illusion of being on the screen simultaneously, due to the persistence of the cathode ray screen, retentivity of vision, and rapidity of the horizontal sweep. This must be fully understood to facilitate the operator's interpretation of the signals seen.

More complete details as to the functioning of every circuit of the Panoramic Adaptor are given in the paragraph below.

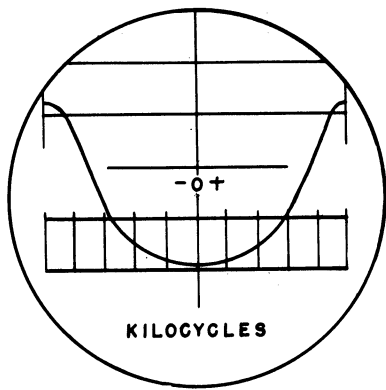
3. CIRCUIT COMPONENTS.

a. Input Bandpass Transformer. - As indicated below, it will be found that each input bandpass transformer possesses an identification number according to the respective adaptor in which it belongs.

RCX, RCX-1	T101-01
RBW-2, RBW-2M	T101-02
RBU-1	T101-03
RBV-1	T101-04

Hereafter, T101 will be considered as the general designation number of the input bandpass transformer. All coil components will bear the last two numbers (T101-02 or Z101-04) which will identify the model to which a particular coil belongs. EXAMPLES: -04 = RBW-2 or RBW-2M.

T101 is the input bandpass transformer, containing two windings (T and B), (NOTE: In Model RBW-2 the designation letters are A and B), permeability - tuned by means of iron cores, which can be reached from the top and from the bottom of the chassis, respectively. It is connected to the grid of V101, a 6AC7, which is the bandpass amplifier tube. This transformer is tuned to pass a band centered at the receiver's I.F. and extending on each side of the center by



OVERALL BANDPASS ———
 COMPANION RECEIVER ———
 PANORAMIC ADAPTOR - - - - -

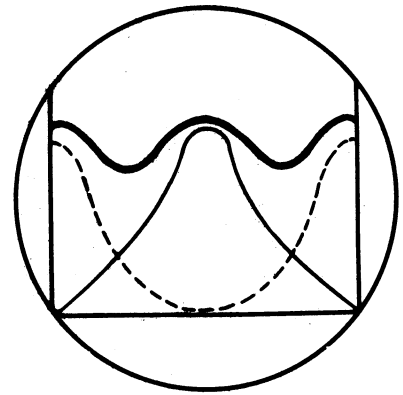


Figure 4-4. - Panoramic Adaptor, Navy Model RBU-1, Bandpass Characteristic.

Figure 4-5. - Panoramic Adaptor, Navy Model RBU-1, Overall Bandpass Characteristics.

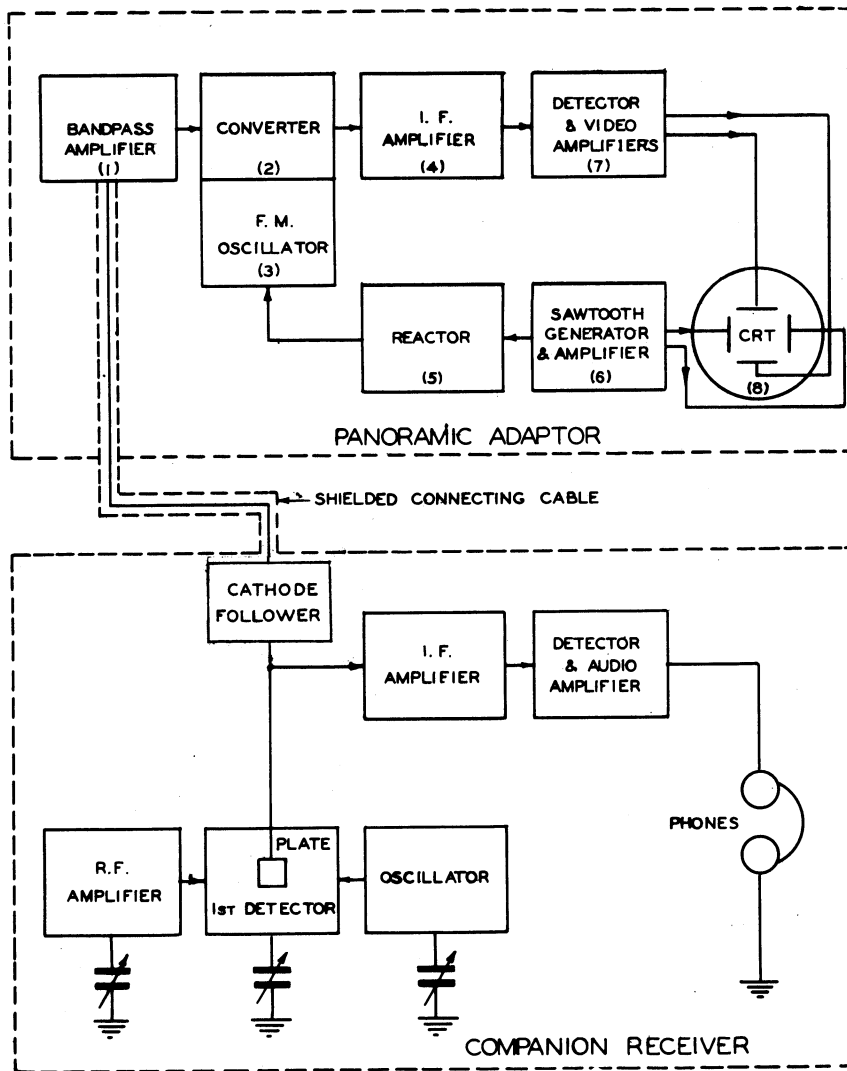


Figure 4-6. - Panoramic Adaptors, Navy Models RBU-1 and RBV-1, Block Diagram.

one half the sweepwidth of the particular model under consideration. In Models RBU-1 and RBV-1 there is an additional third coil to couple the R.F. input.

b. Gain Control. - Potentiometer R101, which is connected in the cathode circuit of the V101 tube, is the GAIN CONTROL of the Panoramic Adaptor.

c. Output Bandpass Transformer. - T102 is the output bandpass transformer containing two windings (T and B), (NOTE: In Model RBW-2 the designation letters are A and B), permeability-tuned by means of iron cores, and is connected to the grid of V102. It is tuned in the same manner as T101 from the top and from the bottom of the chassis, and to the same frequency as its respective input bandpass transformer, T101.

d. Mixer-Oscillator Tube. - Tube V102, 6AC7, functions as the mixer and oscillator.

e. Composite Coil. - Transformer Z101 is a composite coil. It consists of the coil used in the tuned circuit of the oscillator, a resistance-capacity phasing network, and a choke coil. To facilitate interchangeability of this very critical circuit, all the components have been wired into a single shielded container. This composite coil is connected between the reactor tube, V107, and the mixer-oscillator tube V102.

The proper mean frequency, F_o , of the oscillator is the sum of the intermediate frequencies of the receiver and of the adaptor. Tuning is usually obtained by adjustment of the panel control marked "CENTER FREQ." as described in Par. 1e, Section III. However, in extreme circumstances, it may be necessary to re-align the adaptor by tuning the F.M. oscillator coil from the top of the chassis.

f. Reactor Tube. - This is a 6AC7, V107, on the schematic diagram. It may be considered to behave as an artificial, variable inductance connected as part of the oscillator tuned circuit. As the value of its "inductance" changes, due to the action of the sawtooth voltage applied to its grid, it produces a variation (sweep) of the oscillator frequency.

g. Reactor Pad. - A potentiometer, R119, marked REACTOR PAD, connected in the cathode, serves to adjust the Panoramic Adaptor for a linear frequency sweep at the correct center frequency. This pad is mounted on the chassis near the cathode-ray tube. It has been set at the factory. Unless the Panoramic Adaptor has been serviced, this pad will need no adjustment. If V107 has to be replaced by another 6AC7 tube, there may result a change in frequency on account of the variation in characteristics of the two tubes. This may be offset by resetting either the REACTOR PAD or the zero adjustment in Z101.

NOTE: DO NOT ADJUST THIS CONTROL BEFORE YOU BECOME THOROUGHLY FAMILIAR WITH SERVICING PROCEDURE.

h. Sweep Voltage Generator. - The sweep, or sawtooth voltage generator, is an oscillator, of the B.T.O. (blocking tube oscillator) type. It is composed of a B.T.O. transformer T103, one-half of tube V111 and potentiometer R147.

The B.T.O. tube is a 6SL7-GT double triode. One-half of the tube is used to generate the sawtooth voltage, which is then applied through the other half of the tube. This circuit is capable of generating a sawtooth voltage of any frequency between 20 and 40 cycles. A certain amount of alternating voltage is fed to the grid of the B.T.O. tube from the filament winding of the main power transformer T104, in order to "lock" the sweep frequency to a sub-multiple of the line frequency. That is - if the A.C. line frequency is 60 cycles per second, the sweep frequency is locked at 30 cycles; if the A.C. line frequency is 50 cycles or 25 cycles per second, the sweep frequency is locked at 25 cycles.

i. Sweep Frequency Control. - The potentiometer, R147, is the semi-adjustable control (front panel) marked in red, SYNCH. This resistor regulates the blocking time of the sawtooth generator, and, therefore, controls the sweep frequency.

j. Sawtooth Voltage Amplifier. - The output from the sawtooth generator half of the B.T.O. tube is fed through a coupling capacitor to a potentiometer.

The latter is a semi-adjustable control marked in red, "HOR. SIZE". This potentiometer controls the amount of sawtooth voltage applied to the grid of the horizontal amplifier. The greater the amplitude of the sawtooth voltage, the longer the horizontal base line.

The output from this section of V111 drives one horizontal deflection plate of the cathode ray tube, V109, and also passes through fixed resistor, R133, to drive the grid of one section of tube, V108. The output from this half of the pushpull horizontal amplifier drives the remaining horizontal deflection plate in V109 in phase opposition to the voltage driving the other horizontal deflection plate.

k. Sweepwidth Control. - The sawtooth voltage developed across the cathode resistor of the sawtooth amplifier is fed through a coupling capacitor to two potentiometers in series. The sweepwidth control, R120, (SWEEP) regulates the amplitude of the sawtooth voltage to the grid of the reactor tube. When the sweep voltage is reduced to zero, the reactor tube will no longer affect the oscillator, and therefore this oscillator will operate only at its mean frequency, F_0 .

l. Sweepwidth Limiter. - R153 is a semi-adjustable pad (marked "SWEEP LIM." on the front panel), so adjusted that, with the sweepwidth control (SWEEP) at its maximum value (full clockwise position) the sweepwidth is equal to the maximum sweepwidth of the model under consideration. (See Electrical Characteristics). On the front panel, where the control knob (SWEEP) is located, there are engraved, in KC, three calibration marks. These marks, in a clockwise direction, are zero, one half of the maximum sweepwidth, and maximum sweepwidth. The calibration for one half of the maximum sweepwidth is approximate while the calibration for maximum sweepwidth is more accurate.

m. I.F. Amplifier Stage. - This stage consists of an I.F. input transformer, Z102, a V103 tube 6SG7, and an output I.F. transformer Z103. These transformers are tuned to the I.F. of the adaptor under consideration, and are set for critical coupling.

n. I.F. Gain Limiter. - I.F. amplifier gain is limited by the potentiometer R110, which varies the gain of the I.F. amplifying tube V103 (6SG7). This pad is marked I.F. PAD and it is mounted on the chassis beside the REACTOR PAD. It has been set at the factory. Reserve gain has been built into this section of the circuit. In the event that the overall gain diminishes as the tubes weaken, it is possible by adjusting the I.F. PAD to bring up the gain without inserting new tubes.

The voltage input (through the R.F. input coupling circuit) necessary for a 1/4 inch deflection at the center of the screen (with the GAIN control on full) is the sensitivity of the Panoramic Adaptor (See Electrical Characteristics.) Do not give more sensitivity than required. Too much sensitivity will make the adaptor screen appear "noisy".

o. Detector and Video Amplifier. - Tube V104 (6SQ7) is a duplex diode and triode in one envelope. One diode is used as the detector, and the triode is used as one of the video amplifiers. Direct coupling is used between the detector, the video amplifiers, and the vertical deflecting plates of the cathode-ray tube. (3BP1.)

p. Vertical Positioning Control. - This control serves to position the base line vertically. This is accomplished by varying the operating point of one-half of the push-pull vertical amplifier, upon adjusting R124. It is a semi-adjustable control marked in white, VERT. POS.

q. Horizontal Positioning Control. - The resistor, R128, serves to position the base line horizontally by adjusting the operating point of one-half of the push-pull horizontal amplifier. It is a semi-adjustable control marked in white, HOR. POSITION.

r. Cathode-Ray Tube. - The cathode-ray tube (3BP1) consists of a number of elements operating at high potentials. When the potentials are applied in a proper ratio they cause the electrons emitted from the cathode to be accelerated to a high velocity and focused into a sharp beam. This high velocity electron beam continues toward the face of the tube, striking a phosphorescent coating and causing a green glow to appear as a dot on the screen of the cathode-ray tube. There are two sets of parallel plates in the cathode-ray tube; one set causes the beam (green dot) to be deflected in a horizontal direction, the other set causes the beam (green dot) to be deflected in a vertical direction.

As a result of these deflections, which are very rapid, the moving beam will trace a continuous pattern on the screen of the cathode-ray tube.

s. Intensity Control. - Resistor R143 is used to control the brightness or intensity of the trace on the screen. This control is semi-adjustable and marked in white, INT.

t. Focus Control. - Potentiometer R141 is used to control the sharpness of the trace on the screen. This control is semi-adjustable and marked in white, FOCUS.

u. Power Supply. - The power supply of the Panoramic Adaptor consists of a main power transformer T104, and two rectifying tubes 2x2 and 6X5GT. The power transformer is normally wired for 115 volts.

The high voltage rectifier 2X2 provides the necessary voltages to the cathode-ray tube. The output of the low voltage rectifier 6X5GT is filtered by chokes L101A and L101B and capacitors C110, C111 and C112. The filtered output from the low voltage rectifier needs a voltage regulating tube (VR-105-30). This regulated 105 volt output supplies the plate voltage for V101, and the screen voltages for V102 and the reactor tube.

v. Blanking Voltage Input. - A maximum of 165 volts applied to J103 will blank visual reception. For use only for special applications not a part of this instruction book. This will be found in Models RBW-2M and RCX-1 only.

w. Synchronizing Voltage Output. - Sweep voltage output for use in special applications not a part of this instruction book. This will be found in Models RBW-2M and RCX-1 only.

x. Blanking Control. - Controls blanking voltage applied to tubes V101 and V103. For use in special applications not a part of this instruction book. This will be found in Models RBW-2M and RCX-1 only.

SECTION V - MAINTENANCE

1. SERVICING PROCEDURE.

CAUTION

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE ON. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS REMOVE POWER, DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

a. Equipment Required for Servicing.

In order to service the Panoramic Adaptor, the following equipment should be available.

(1) Volt-ohmmeter (at least 1000 ohms per volt).

(2) Signal generator to cover a range of 200 KC to 6000 KC.

(3) In addition, a 10KC and a 50KC multi-vibrator will considerably simplify the alignment procedures, for Models RBW-2, RCX-1, RCX, and RBW-2M. For RBV-1, use a 1KC and 10KC Multivibrator. For RBU-1, use a 1KC and 5KC Multivibrator.

(4) A cathode ray oscillograph is optional, but will be needed if it is desired to examine the sawtooth voltage form.

b. Removal of Chassis from Cabinet.

(1) Disconnect the power cable from the A.C. line. Then at chassis end of cable, rotate plug to the left and disengage.

(2) Disconnect the input cable, by unscrewing the connector at the chassis end of cable.

(3) Unfasten the seven panel thumbscrews and the screw in the center rear of the cabinet.

(4) Grasp two of the thumbscrews on the panel and pull forward.

c. Removal of Cathode Ray Tube.

(1) Loosen the clamp which supports the tube and C.R.T. magnetic shield.

(2) Lift the spring fingers of the shield which are on the lip of the socket.

(3) Grasping the tube and shield in one hand, remove the socket with the other hand. (A prying tool may have to be used here.)

(4) Grasp the tube and shield with one hand, and ease it out through the metal hood or shield which forms part of the front panel. Note that the cathode-ray tube is protected by a sponge rubber boot, which will come out with the tube when it is removed. The boot also serves to hold in place the calibrated green filter screen.

(5) Remove boot simply by pulling it off the cathode-ray tube. The tube will then come out of the shield.

d. Power Transformer Connections.

The power transformer may be connected for 115 or 230 volt, 50-70 cycle operation.

(1) For 115 volt operation, connect one side of line to terminals 3 and 4, the other side to 9 and 10.

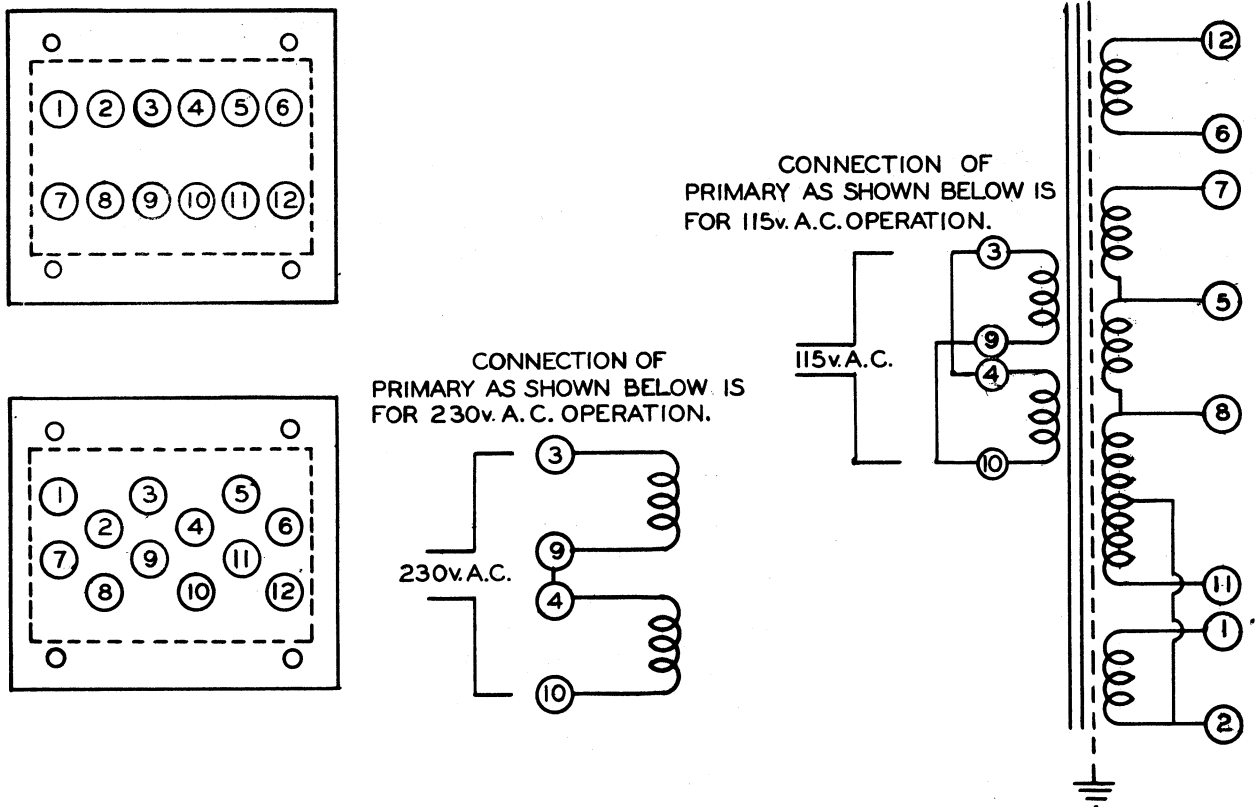


Figure 5-1. - Panoramic Adaptors, Navy Models RBW-2, RBW-2M, RCX, RCX-1, RBU-1 and RBV-1, Power Transformer Connections.

(2) For 230 volt operation, connect one side of line to terminal 3, the other side to 10, and tie 9 and 4 together.

e. Tuning the R.F., I.F., and F.M. Oscillator Coils:

Transformers T101, T102, Z101, Z102, Z103 are tuned by means of movable iron cores. Windings "T" or "A", depending upon the model, can be tuned at the top of the coils by means of the tuning tool which is provided in the accessory kit of the Panoramic Adaptor. Use the end which has a pin passed through the bakelite rod. Windings "B" can be tuned either from the top of the transformer or from the bottom. In either case a screwdriver tip is required. When the tuning is done from the top, use the other end of the tuning tool, which is ended as a screwdriver, and insert it through the opening of the core. The iron slugs of winding "B" have a slot provided for the purpose.

2. ALIGNMENT PROCEDURE.

(First: Allow equipment to warm up for at least 1/2 hour.)

NOTE: When the Panoramic Adaptor is used in conjunction with a companion receiver, the (+) sign on the calibration screen indicates high frequency, and the (-) sign on the calibration screen indicates low frequency; but when the signals are fed directly into the adaptor (as from a signal generator), the (+) sign indicates low frequency, and the (-) sign indicates high frequency. The following adjustments are made with a signal generator having a band of frequencies of 200 to 6000KC.

a. I.F. Amplifier Alignment.

The I.F. amplifier frequency for a particular adaptor model will be found under Electrical Characteristics, (see Section I, Paragraph 9)

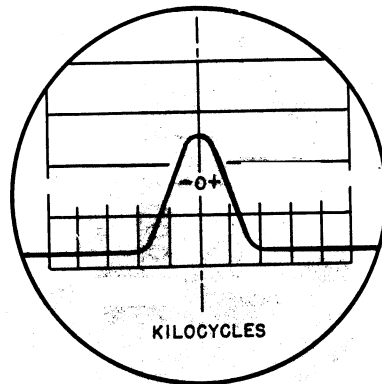


Figure 5-2. - Symmetrically Centered Curve.

(1) Using the signal generator, feed the I.F. specified under Electrical Characteristics into the grid (pin 4) of tube V103 (6SG7). Adjust the cores of the second I.F. transformer (Z103) for the highest vertical deflection obtainable on the screen of the cathode-ray tube.

(2) Feed the specified I.F. into the grid (pin 8) of tube V102 (6SA7). Adjust the cores of the first I.F. transformer (Z102) for the highest vertical deflection obtainable on the screen of the cathode-ray tube.

b. Frequency Modulated Oscillator Alignment.

The following adjustments are a series of approximations, which are generally narrowed down until the desired results are obtained. During the entire procedure the signals are fed to the input of the Panoramic Adaptor through the cable and isolating resistor. (NOTE: In Models RBU-1 and RBV-1, the signal is fed through the cable only, since no isolating resistor is used.

(1) Center Frequency Alignment.

Generally, the adjustment of the "zero" control is sufficient. If, however, all controls are out of adjustment, proceed as follows:

(a) A signal of the same frequency as the receiver's I.F. is used.

(b) Set the SWEEP control at maximum.

(c) Set the CENTER FREQ. control at the panel marker. If knob set screws have been disturbed, reset knob pointer to panel marker when pot. is in middle of rotational range (135°).

(d) Adjust the ZERO on transformer Z101 so that the deflection on the cathode-ray tube screen is approximately centered. In order to achieve centering, it also may be necessary to adjust REACTOR CATHODE PAD control until the deflection appears on the screen at the center. Make this adjustment as a last resort. (Some adjustment of SWEEP LIM. may be necessary).

(e) Now gradually rotate the SWEEP control counter-clockwise towards its minimum position. At the same time, continue readjusting the ZERO control for a centered deflection.

(f) The Panoramic Adaptor is properly adjusted for center frequency when, with the SWEEP control set just above its minimum position, a symmetrically centered curve appears on the screen. (Fig. 5-2.)

(g) Rotate SWEEP control to maximum. If the deflection fails to remain centered, the HOR. POSITION control should be used.

(h) In order to achieve a symmetrical curve, it may be necessary to readjust the I.F. alignment slightly.

(2) High Frequency Alignment

(a) Signal frequency = receiver's I.F. + $1/2$ maximum sweepwidth of the model being aligned.

(b) Set SWEEP control at maximum.

(c) Adjust REACTOR PAD until the deflection appears on the screen at 1/2 maximum sweepwidth below the center frequency. Some adjustment of SWEEP LIM. may be necessary.

(3) Now repeat Operation b (1) above (Center Frequency Alignment).

(4) Low Frequency Alignment.

(a) Signal frequency = receiver's I.F. minus 1/2 maximum sweepwidth of the model being aligned.

(b) Set the SWEEP control at maximum.

(c) Adjust SWEEP LIM until the deflection appears on the screen at 1/2 maximum sweepwidth above center frequency.

(5) AGAIN repeat Operation b (1), above (Center Frequency Alignment).

(6) NOW repeat Operation (2) above (High Frequency Alignment).

(7) NOW repeat Operations b (1), (2) and (4.)

(8) FINALLY repeat Center Frequency Alignment Operation.

NOTE

For the above alignment procedure of the oscillator, only a signal generator is required. This alignment procedure is greatly simplified if a multivibrator is used in conjunction with the signal generator, because the signals can be seen simultaneously, on the high and low frequencies, as well as the center. For Panoramic Adaptors RCX, RBW-2, RCX-1, and RBW-2M, the multivibrator is a 50KC oscillator, preferably accurately controlled by a 100KC crystal oscillator. Since the multivibrator is very rich in harmonics, it supplies a multitude of signals every 50 or 100KC.

When the F-M oscillator of Models RCX and RCX-1 is correctly aligned, 50KC signals will show five deflections at intervals of two and one-half divisions between deflections. When the F-M oscillator of Models RBW-2 and RBW-2M is correctly aligned, 100KC signals will show eleven deflections at intervals of one division between deflections.

For Model RBV-1, the multivibrator is a 10KC oscillator. When the F-M oscillator is correctly aligned, 10KC signals will show eleven deflections across the screen scale.

For Model RBU-1, the multivibrator is a 5KC oscillator. When the F-M oscillator is correctly aligned, 5KC signals will show eleven deflections across the screen.

c. R.F. Alignment.

For this alignment, a "cut-and-try" method again is required. Figure 4-2. illustrates a properly aligned bandpass.

The use of a multivibrator having any frequency between 2KC and 15KC, or between 1KC and 5KC, for Model RBU-1 and RBV-1, greatly simplifies alignment, making it possible to view as one complete picture the entire bandpass characteristic of the R.F. amplifier. It is possible to align the R.F. amplifier stage using only a signal generator. In order to obtain the trace illustrated in Figure 4-2., the frequency of the signal generator is varied so that the peaks of the deflection on the screen move from one end to the other to produce this trace.

(1) Procedure for alignment of the R.F. bandpass transformer with the use of the multivibrator:

(a) Feed the multivibrator to the input of the adaptor through the cable and the input isolating resistor. (NOTE: Models RBU-1 and RBV-1 use only the cable for coupling).

(b) Adjust the cores of the R.F. transformers T101 and T102 until the trace approximates that shown in Figure 4-2.

(2) Procedure for the alignment for the R.F. bandpass transformers using the Signal Generator:

(a) Align first the Interstage Transformer T102 (see Chart below for I.F. and Peaking Frequencies).

(1) Feed a signal equal to the receiver I.F. to plate (pin 8) of R.F. amplifier tube V101 (6AC7) through a .01 mfd. coupling capacitor and adjust the secondary (B) for peak deflection at the center of the screen.

(2) Now feed a signal equal to the upper peaking frequency into the grid (pin 4) of the R.F. amplifier tube V101 (6AC7) and tune primary ("T" or "A") for a peak deflection at the left of the screen.

(3) With the signal generator still being fed into the grid (pin 4) of the R.F. amplifier V101 (6AC7) retune the secondary (B) at a frequency equal to the lower peaking frequency for peak deflection at the right side of the screen.

I.F. AND PEAKING FREQUENCY TABLES				
	RBW-2 RBW-2M	RCX RCX-1	RBU-1	RBV-1
Receiver I.F.	5.25MC	455KC	400KC	400KC
Upper Peaking Freq.	5.68MC	545KC	425KC	445KC
Lower Peaking Freq.	4.83MC	365KC	375KC	355KC

(b) Align next the Input Transformer T101 (See Chart Above).

(1) Feed a signal equal to the receiver's I.F. to primary ("T" or "A") of T101 through the isolating resistor and the input cable of the adaptor. (NOTE: No resistor is used in RBU-1 or RBV-1). Adjust secondary (B) for peak deflection at the center of the screen.

(2) Now feed a signal equal to the upper peaking frequency to the end of input cable of the Panoramic Adaptor through the isolating resistor and adjust primary ("T" or "A") for peak deflection at the left side of the screen.

(The capacity of the cable is part of the primary circuit.)

(3) With the signal generator still being fed to the input cable of the Panoramic Adaptor, retune the secondary (B) at a frequency equal to the lower peaking frequency for peak deflection at the right side of the screen.

(4) Now trim the primaries and secondaries of both R.F. transformers until the desired peak deflections are nearly of equal amplitude and appear between 4-5 divisions from the center mark.

3. SYNCHRONIZATION OF SWEEP FREQUENCY.

The frequency of the sawtooth voltage is adjusted by a semi-adjustable synchronization, "SYNCH", control to a sub-multiple of the A.C. line frequency. The standard frequency for the adaptor is 30 cycles when used with a 60 cycle line, and 25 cycles when used with a 25 or a 50 cycle line.

In order to check this adjustment, A.C. line frequency can be obtained for pin #7 of tube V104 and fed through a .01 mfd. capacitor to pin #6 of tube V104. Two peaks will appear on the screen if the sweep frequency is one-half of the line frequency (in case of 50 and 60 cycles). One peak only will appear when the frequency is correct, from a 25 cycle power line.

4. I.F. GAIN LIMITER ADJUSTMENT.

(TO BE DONE ONLY BY EXPERIENCED PERSONNEL)

a. The GAIN control and the SWEEP control should be set at maximum.

b. Except for Models RBU-1 and RBV-1, an 800 microvolt signal of the receiver's I.F. for the adaptor is fed through the isolating resistor to the input cable of the adaptor. Models RBU-1 and RBV-1 require a 200 microvolt signal of the receiver's I.F. fed through the input cable.

c. The limiter, R110, which is marked I.F. PAD, is adjusted so that a deflection of at least one inch is attained at the center of the screen.

Under certain conditions (6SG7 tubes with extra high trans-conductance), I.F. regeneration or oscillation may take place. This condition may be remedied by reducing the "I.F. PAD" (counter-clockwise). The reserve I.F. gain present in the equipment may be employed as the tubes weaken in use.

5. REMOVAL OF SEMI-ADJUSTABLE POTENTIOMETERS.

Whenever it may become necessary to replace any of the seven semi-adjustable potentiometers, the process can be expedited by adherence to the following suggestions:

- a. Remove chassis from cabinet, Section V, Par. 1b.
- b. Remove bottom plate from chassis.
- c. Five low voltage controls are mounted on a metal bracket above the chassis.
 - (1) Remove the two bolts and nuts which secure the bracket to the top of the chassis.

N.B. Do not remove the two screws in the cut-out areas. They are for the high voltage potentiometer assembly.

 - (2) Remove flathead screw from front panel above SWEEP LIM.
 - (3) Move bracket out to the left of chassis, where an end wrench and soldering iron may be used to remove the delinquent potentiometer.
- d. Two high voltage controls are mounted on a sub-chassis mycalex strip.
 - (1) Loosen the set screws in the insulating bushing.
 - (2) Loosen the hexagonal nut on the potentiometer shaft.
 - (3) Unsolder the connections.
 - (4) Pull the potentiometer free of the mycalex "strip".

6. HORIZONTAL SIZE ADJUSTMENT.

It is seldom necessary to change the adjustment of this control. However, should the occasion arise, adjust the HOR. SIZE potentiometer until the baseline is just slightly longer than the calibrated scale at the bottom of the plastic screen.

7. POSSIBLE OPERATION FAILURES AND THEIR LOCATION.

<u>Failure</u>	<u>Look for the Following</u>
Set inoperative.	Check fuse and all DC and AC voltages in accordance with Table of Tube Socket Voltages.
Horizontal line fails to appear on the screen.	Check tubes (6SL7GT) and their associated circuits.
Vertical deflection fails to appear on the screen.	Check all Video, I.F. and R.F. circuits by working back from the vertical plate to the C.R.T. to the input cable of the Panoramic Adaptor.

Failure

With the SWEEP control set at maximum, the vertical deflection (representing a signal) does not appear as a peak, but rather as a shift in the baseline.

When GAIN control is rotated frequency shift takes place.

Curved overload line on C.R.T.

Look for the Following

- a.-The reactor tube is not effecting frequency modulation of the F.M. oscillator.
- b.-Check tube V107(6AC7) and its associated circuit.

Check V106 (VR105) and R117.

Gassy tube, V104 (6SQ7(GT/G)).

8. TABLE OF TUBE SOCKET VOLTAGES.

Readings taken with Voltmeter (5000 ohms per volt)

GAIN and SWEEP controls set at max; FOCUS, INTENSITY, HOR. SIZE, POSITION controls set for normal operation.

All readings taken from indicated pin to ground (chassis).

Voltage readings will vary according to the type meter used.

All voltages are + D.C. unless otherwise marked.

Line voltage = 115 volts A.C.

Circuit Symbol	Pin No.													
	1	2	3	4	5	6	7	8						
V101 6AC7 1st R.F. amp.	---	---	---	---	2.2	150	6.3AC	100						
V102 6SA7 F.M. osc. and 1st det.	---	---	290	105	---	---	6.3AC	---						
V103 6SG7 1st I.F. amp.	---	---	1	---	1	(a)	6.3AC	280						
V104 6SQ7 (GT/G) 2nd det. and video amp.	---	---	---	---	-0.2	100	6.3AC	---						
V105 2x2 High volt. rect.	820AC	---	---	820AC	(Read at Plate Cap -950)									
V106 VR105-30 Voltage reg.	---	---	290	---	105	---	290	---						
V107 6AC7 Reactance mod.	---	---	---	---	(b)	105	6.3AC	280						
V108 6SL7GT Hor. Amp. & video amp.	3	155	(d)	6	170	(e)	6.3AC	---						
V110 6X5 (GT/G) Low volt. rect.	---	---	295AC	---	295AC	---	6.3AC	320						
V111 6SL7GT Sawtooth gen. & horiz. amp.	(c)	170	11	-20	50	---	6.3AC	---						
V109 3BP1 Deflection Screen	1 -920V.	2 -920V.	3 -950V.	4 N.C.	5 -640V.	6 N.C.	7 170 V.	8 170 V.	9 170 V.	10 155 V.	11 100 V.	12 N.C.	13 N.C.	14 -920V.

NOTES:

- (a) Depends upon setting of R110, I.F. PAD.
- (b) Depends upon settings of R119, REACTOR PAD, and R123, CENTER FREQ. control.
- (c) Depends upon setting of R152, HOR. SIZE potentiometer.
- (d) Depends upon setting of R124, V. POSITION control.
- (e) Depends upon setting of R128, H. POSITION control.
- (f) Depends upon setting of R143, INTENSITY control.
- (g) Depends upon setting of R141, FOCUS control.

TABLE I
LIST OF MAJOR UNITS*

Navy Type Designation	Name	Symbol Group or Unit No.	Assembly Drawing
CPN-55088-A	Panoramic Adaptor, Navy Model RBU-1	-	-
CPN-55089-A	Panoramic Adaptor, Navy Model RBV-1	-	-
CPN-55090-A	Panoramic Adaptor, Navy Model RBW-2	-	-
CPN-55090-B	Panoramic Adaptor, Navy Model RBW-2 M	-	-
CPN-55135	Panoramic Adaptor, Navy Model RCX	-	-
CPN-55135-A	Panoramic Adaptor, Navy Model RCX-1	-	-

*Note: Each Panoramic Adaptor model is a complete equipment.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
RCX	A101	Support chassis, mount indicators, etc.	Panel			1			P2-480b +P2-1048a
RCX-1	A102	Shield base section of reactor and converter.	F-M Oscillator shield.			1			P2-481c P1-482c
RCX-1	A103	Cover and shield for adaptor.	Cabinet			1	A1435		P3-522c P2-506a P2-486a P2-487b P3-488a P3-620b
RCX-1	A104	Cover and shield chassis.	Bottom plate			1	A2390		P3-493f
RCX-1	A105	Mount components	Chassis			1	A3390		P4-491h P2-483b P1-478c
RCX-1	A106	Mount potentiometers	Pot bracket			1			P2-476g
RCX-1	A107	Mount and support base of C.R.T. (V109)	C.R.T. Clamp.			26	755-36-2-10		
RCX-1	A107	Mount C.R.T. clamp on chassis.	C.R.T. clamp angle bracket.			1	A1017		P1-477f
RCX-1	A116	Mount H.V. Pot.	Bracket for H.V. pot mount. 5/8"			1			P1-49

STRUCTURAL PARTS, PANELS, FRAMES, ETC.

+ This drawing applies to Models RCX-1 and RBW-2M only.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	QTY.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CON-TRACTOR'S DWG. AND PART NO.
	DESIG.	#								
RCX	X	A116	B Mount H.V. pot.	Bracket for H.V. Pot Mount. 1-7/8"			1	A1005		P1-497c
RCX-1	X	A119	A Mount 18 lug bakelite resistor strip.	Angle bracket.			1	A1198		P1-348d
RCX-1	X	A119	B Same as A119A	Z Angle bracket.			1	A1021		P1-349d
RCX-1	X	*A122	A Shock absorbing mounts for equipment	Shock mountings, square plate, rated 12 lbs. each.			4	150PH12		G1017
RCX-1	X	*A127	B Cushion screen and C.R.T.	Cushion mounting, sponge rubber 3" I.D.			6			P1-C-2107a G1018
RCX-1	X	*A129	A Lock chassis and panel to cabinet.	Panel locking screws.			1	H1151		P1-495a
RCX-1	X	A129	B Lock chassis and panel to cabinet.	Panel locking studs.			1	H1336		P1-494
RCX-1	X	A131	To shield scope screen from direct overhead light.	Scope hood.			1	A1035		P1-312a
RCX-1	X	*A146	Maintain setting of reactor pad.	Shaft lock.			1	H1211		P1-469c P1-470c
RCX-1	X	A149	To shield C.R.T. from external magnetic fields	C.R.T. magnetic shield.			1	A1007		P2-826a

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SF for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

RCX	RBV-1	RBU-1	RBW-2	RBW-2M	EQUIPMENT TYPE		SYMBOL	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	QTY.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
					RCX-1	#									
X	X	X	X	X	X	X	*C101	A B C	R.F. bypass (V101)	#48709A	RE-13A-488d	2	68AB111	±20%, 600V.	PL-E-Z116B C1011
X	X	X	X	X	X	X	*C102	A B C	R.F. bypass 2nd Anode (V109) Heater (V102) V102 through T102 secondary						
X	X	X	X	X	X	X	*C103	A B C	R.F. bypass V102 V102 V107						
X	X	X	X	X	X	X	*C104	A B C	R.F. bypass cathode (V103).			3	1468	±10%, 500V.	C1058
X	X	X	X	X	X	X	*C105	A B C	R.F. bypass (V103).						
X	X	X	X	X	X	X	*C106	A B C	Diode Load Bypass (V104).						
X	X	X	X	X	X	X	*C107	A B C	Line filter, Sawtooth Generator (V111).						
X	X	X	X	X	X	X	*C108	A B	H.V. Filter.			2	20SAL50	±15%, 2000V.	C1007
X	X	X	X	X	X	X	*C109	A B	R.F. bypass (V107)			3	1468	±10%, 500V.	C1055

CAPACITORS

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,286-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RCX	RCX-1								
X	X	*C110	L.V. Filter.	Capacitor, 4 mfd., fixed paper, metal case. Same as C111, C112.			2	6SAL400	±10%, 600V.	C1005
X	X	*C111	L.V. Filter.	Capacitor, same as C110.						
X	X	*C112	L.V. Filter.	Capacitor, same as C110.						
X	X	*C113	Sawtooth grid (V111).	Capacitor, .01 mfd., mica. Same as C116, C117.			3	1467	±10%, 300V.	C1202
X	X	*C114	Sawtooth Coupling.	Capacitor, .25 mfd., fixed paper, top mtg., metal case.			2	6BAT25	±10%, 600V.	C1006
X	X	*C115	Sweep coupling.	Capacitor, .25 mfd., fixed paper, bottom mtg., metal case.			2	6BAB25	±10%, 600V.	P1-E-Z117M C1015
X	X	*C116	Screen bypass (V101)	Capacitor, same as C113.						
X	X	*C117	Screen bypass (V103)	Capacitor, same as C113.						
X	X	*C118	Synch. output coupling.	Capacitor, .001 mfd., fixed mica.			3	1467	±10%, 300V.	C1061
MISCELLANEOUS ELECTRICAL PARTS, KNOBS, ETC.										
X	X	E101	To adjust Center Freq. pot.	Knob, black bakelite, 1/2" dia. Allen head set screws.			13			E1004

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CON-TRACTOR'S DWG. AND PART NO.
	RCX	DESIG.							
X	X	E101	To adjust Sweep and Gain pots.	Knobs, black bakelite, curved, octagonal shape 1-1/8" dia., 5/8" deep, Allen-head set screws.					E1001
X	X	*E102	Hold pilot light.	Pilot light assembly, for bayonet type pilot light.			BV805		B1014
X	X	*E103	Hold fuse F101.	Fuse holder, moulded bakelite bayonet type knob.			HKM		F1001
X	X	*E104	Mount spare fuse and tuning rod.	Dual fuse holder, fiber.					PI-230b F1009
X	X	E107	Mount 10W. resistor.	Terminal strip, mycalex.				Required for "Brown Devil" only.	PI-M-11041
X	X	E108	Mount insulate H.V. pots.	Mount, mycalex, H.V. potentiometer. 1/8" thick, 2-5/8" long, 1-7/8" wide.			K1018		PI-M-1106e
X	X	E109	Mount resistors and condensers for wiring	Resistor standoff, XX bakelite, 32 terminal lugs.			K1015		PI-304c Type B
X	X	E110	Insulate and mount resistors and condensers.	Resistor standoff, 10 round terminal lugs, mycalex, 1/8" thick.			K1042		PI-303a
X	X	E111	Mount resistors and condensers for wiring.	Terminal strip, XX bakelite, 18 terminal lugs.			K1016		PI-305c Type B
X	X	E111	Same as E111A	Same as E111A					

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,268-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.				
	RCX	RBV-1									RBU-1	RBW-2	RBW-2M	DESIG.
X	X	X	X	X	X	X	X	X	X	X	1	K1014		P1-713a Type B
X	X	X	X	X	X	X	X	X	X	X	1	KA1123		P2-662a
X	X	X	X	X	X	X	X	X	X	X	5	91 T-INL WRB-165		K1001
X	X	X	X	X	X	X	X	X	X	X	1	K1021		P1-M-I118b
X	X	X	X	X	X	X	X	X	X	X	18			P1-168a K1002
X	X	X	X	X	X	X	X	X	X	X	22	#52329		X1029
X	X	X	X	X	X	X	X	X	X	X	23	#8599		X1031
X	X	X	X	X	X	X	X	X	X	X	23	#8548		X1030
X	X	X	X	X	X	X	X	X	X	X	1	E1010		P1-170b
X	X	X	X	X	X	X	X	X	X	X	13	#8		E1009
X	X	X	X	X	X	X	X	X	X	X	20	#45		X1038

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SF for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL					FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RCX	RCX-1	RBV-1	RBU-1	RBW-2M								
INDICATING DEVICES, PILOT LAMPS, ETC.													
X	X	X	X	X	X	Prevent damage from overload.	Fuse, 2A., 250V., non-renewable.			15	#3AG/2A		F1003
X	X	X	X	X	X	On -off indicator.	Lamp, pilot light, bayonet base, 6/8V, 150 MA.			16	#47		B1007
X	X	X	X	X	X	Calibration screen.	Lumarith green screen, filter.			1	Green #04650 .125		
CONNECTORS													
X	X	X	X	X	X	Connect adaptor to the companion receiver.	Receptacle, single coaxial, Same as J103, J104.	#49194		11	83-1R		J1004
		X				Connect adaptor to the companion receiver.	Receptacle, Twmax.			11	83-22R		J1001
X	X	X	X	X	X	Connect adaptor to power line.	Receptacle, molded phenolic twist type, 3 pole, flush male base, 10 amp, 250V.			12	7486		J1002
	X					Blanking input.	Same as J101.						
	X					Sync output.	Same as J101.						

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RBW-2M	RBW-2								
X	X	X	*L101	Filter Choke.				T3390		P1-555b
X	X	X	A	Choke, filter, double, each section: 6.5H measured at 40 Ma DC, 5V, 60 cycle.			1			
			B							
INDUCTORS, A.F. and R.F.										
PLUGS										
X	X	X	*P101	Connect adaptor, to companion receiver.	#49195			83-1SP		P1010
X	X	X	*P101	Connect adaptor to companion receiver.						
X	X	X	*P102	Connect adaptor to power line.						
X	X	X	*P103	Same as P101.						
X	X	X	*P103	Same as P101.						
				Plug, 1 pole, male, H.F. input cable coupling to plug, polystyrene insulation.				83-22SP		P1001
				Plug, Twinax, male, H.F. input cable coupling to plug, polystyrene insulation.				7484		P1005
				Plug, molded phenolic, twist type, 3 pole, female 10 Amp., 250V.						P1011
				R.F. Input Angle Plug, single.	#49192			83-1AP		P1002
				R.F. Input Angle Plug, Twinax.				83-22AP		

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE I I
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RBW-2M	#								
RCX	X	*R101	Gain control (V101).	Potentiometer, carbon, 10,000 ohms, 1W, right hand taper, screwdriver slot.			8	V37	± 20%	R1555
RCX-1	X	*R101	Gain control (V101).	Potentiometer, carbon, 3,000 ohms, 1 W, linear taper, screwdriver slot.			8	W37	± 20%	R1538
RBV-1	X	*R102	Grid bias (V101).	Resistor, fixed carbon, 150 ohms, ½ W, ceramic insulated. Same as R109.			7	504	± 10%	R1008
RBU-1	X	*R102	Grid bias (V101).	Resistor, fixed carbon, 500 ohms, ½ W, ceramic insulated.			7	504	± 10%	R1012
RBW-2	X	*R103	Screen Bleeder (V101).	Resistor, fixed carbon, 50,000 ohms, 1 W, ceramic insulated.			7	518	± 10%	R1055
RBW-2M	X	*R103	Bias bleeder (V101).	Resistor, fixed carbon, 250,000 ohms, 1 W, ceramic insulated.			7	518	± 10%	R1062
	X	*R104	Screen Bleeder (V101).	Resistor, fixed carbon, 50,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1055
	X	*R104	Screen decoupler (V101).	Resistor, fixed carbon, 2,000 ohms, ½ W, ceramic insulated.			7	504	± 10%	R1016

RESISTORS

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RCX-1	RBV-1								
X	X	X	Screen Bleeder (V101).	Resistor, fixed carbon, 50,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1055
	X	X	Screen Bleeder (V101).	Resistor, fixed carbon, 85,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1146
X	X	X	Plate Isolation (V101).	Resistor, fixed carbon, 2,000 ohms, 1W, ceramic insulated. Same as R108.			7	518	± 10%	R1045
X	X	X	Oscillator grid (V102).	Resistor, fixed carbon, 20,000 ohms, ½W, ceramic insulated.			7	504	± 10%	R1026
			Screen decoupler (V101).	Resistor, fixed carbon, 2,000 ohms, ½W, ceramic insulated.			7	504	± 10%	R1016
X	X	X	Plate Isolation (V102).	Resistor, same as R106.			7	504	± 10%	R1008
X	X	X	Grid bias (V103).	Resistor, fixed carbon, 150 ohms, ½W, ceramic insulated.			7	504	± 10%	R1008
X	X	X	I.F. Pad (V103).	Potentiometer, carbon, 100,000 ohms, 1W, linear taper, screwdriver slot.			8	W37	± 20%	R1520
	X	X	I.F. Gain Pad (V103).	Potentiometer, 1,000 ohms, 1W, carbon, linear taper, screwdriver slot.			8	W37	± 20%	R1505

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RBW-2M	RBW-2								
RCX	X		Screen dropping resistor (V103).	Resistor, fixed carbon, 50,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1055
RCX-1		X	Screen decoupler (V103).	Resistor, fixed carbon, 2,000 ohms, ½W, ceramic insulated.			7	504	± 10%	R1016
RBU-1	X		Screen dropping resistor (V103).	Resistor, fixed carbon, 50,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1055
RBV-1	X	X	Screen dropping resistor (V103).	Resistor, fixed carbon, 85,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1146
RBU-2	X	X	Plate Isolation (V103).	Resistor, fixed carbon, 5,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1048
RBW-2	X	X	Diode load, bias (V104).	Resistor, fixed carbon, 150,000 ohms, ½W, ceramic insulated.			7	504	± 10%	R1031
RBW-2M	X	X	Plate limiting resistor (V104).	Resistor, fixed carbon, 750,000 ohms, ½W, ceramic insulated.			7	504	± 10%	R1107
	X	X	H.V. Filter.	Resistor, fixed carbon, 25,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1053
	X	X	Regulator Dropping Resistor (V106).	Resistor, fixed, wire wound coated and insulated.			27 or 9	DH or Brown Devil	± 10%	P1-175 R1160

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CON-TRACTOR'S DWG. AND PART NO.
	DESIG.	#								
RCX	X	*R118	Grid return (V107).	Resistor, fixed carbon, 200,000 ohms, ½W, ceramic insulated. Same as R138.			7	504	± 10%	R1032
RCX-1	X	*R119	Reactor Pad.	Potentiometer, carbon, 1,000 ohms, 1W, linear taper, screwdriver slot.			8	W37	± 20%	R1505
RCX-1	X	*R120	Sweep Pad.	Potentiometer, carbon, 250,000 ohms, 1W, linear taper, screwdriver slot. Same as R141.			8	W37	± 20%	R1522
RCX-1	X	*R121	Center Freq. Network.	Resistor, fixed carbon, 500 ohms, ½W, ceramic insulated.			7	504	± 10%	R1012
RCX-1	X	*R122	Center Freq. Network.	Resistor, fixed carbon, 200 ohms, ½W, ceramic insulated.			7	504	± 10%	R1009
RCX-1	X	*R122	Center Freq. Network.	Resistor, fixed carbon, 500 ohms, ½W, ceramic insulated.			7	504	± 10%	R1012
RCX-1	X	*R123	Center Freq. Control.	Potentiometer, carbon, 500 ohms, 1W, linear taper, screwdriver slot.			8	W37	- 10% +20%	R1502
RCX-1	X	*R124	Vertical Position Control.	Potentiometer, carbon, 500,000 ohms, 1W, linear taper, screwdriver slot. Same as R128.			8	W37	± 20%	R1524
RBW-2M	X									
RBW-2	X									
RBU-1	X									
RBV-1	X									

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SF for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	DESIG.	#								
RCX	X	*R125	Bias Net (V108B).	Resistor, fixed carbon, 150,000 ohms, 1W, ceramic insulated. Same as R126, R129, R136, R142.			7	518	± 10%	R1060
RCX-1	X	*R126	Plate load (V108B).	Resistor, same as R125.						
RCX-1	X	*R127	Plate load (V108A).	Resistor, fixed carbon, 250,000 ohms, 1W, ceramic insulated. Same as R151.			7	518	± 10%	R1060
RCX-1	X	*R128	Horizontal position control.	Potentiometer, same as R124.						
RCX-1	X	*R129	Bias net (V108A).	Resistor, same as R125.						
RCX-1	X	*R130	Grid return (V108A).	Resistor, fixed carbon, 100,000 ohms, 1/2W, ceramic insulated. Same as R137.			7	504	± 10%	R1030
RCX-1	X	*R131	Bias (V108A).	Resistor, fixed carbon, 5,000 ohms, 1/2W, ceramic insulated. Same as R148.			7	504	± 10%	R1021
RCX-1	X	*R131	Bias (V108A).	Resistor, fixed carbon, 5,750 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1170
RCX-1	X	*R132	Bias (V108B).	Resistor, fixed carbon, 3,500 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1019
RCX-1	X	*R133	Coupling (V108A).	Resistor, fixed carbon, 2 megohms, 1/2W, ceramic insulated. Same as R134.			7	504	± 10%	R1038

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

EQUIPMENT TYPE	SYMBOL					FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RCX	RCX-1	RBV-1	RBU-1	RBW-2								
X	X	X	X	X	X	Coupling (V108B).	Resistor, same as R133.			7	504	± 10%	R1029
X	X	X	X	X	X	Grid return (V108B).	Resistor, fixed carbon, 75,000 ohms, ½W, ceramic insulated.						
X	X	X	X	X	X	Plate load (V104).	Resistor, same as R125.						
X	X	X	X	X	X	2nd Anode Net (V109).	Resistor, same as R130.						
X	X	X	X	X	X	2nd Anode Net (V109).	Resistor, same as R118.						
X	X	X	X	X	X	Bias (V102).	Resistor, fixed carbon, 1,000 ohms, ½W, ceramic insulated.			7	504	± 10%	R1014
X	X	X	X	X	X	H.V. bleeder.	Resistor, fixed carbon, 500,000 ohms, 1W, ceramic insulated.			7	518	± 10%	R1063
X	X	X	X	X	X	Focus Control.	Potentiometer, same as R120.						
X	X	X	X	X	X	H.V. bleeder.	Resistor, same as R125.						
X	X	X	X	X	X	Intensity control.	Potentiometer, carbon 50,000 ohms, 1W, linear taper, screwdriver slot.			8	W37	± 20%	R1518
X	X	X	X	X	X	Synch Net.	Resistor, same as R121.						
X	X	X	X	X	X	Synch Net.	Resistor, same as R122.						
X	X	X	X	X	X	Grid resistor (V111A).	Resistor, fixed carbon, 500,000 ohms, ½W, ceramic insulated.			7	504	± 10%	R1036

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	RBW-2M	RBW-2								
RCX	X		Grid resistor (V111A).	Resistor, fixed carbon, 250,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1033
RCX	X	X	Synch. control.	Potentiometer, carbon, 1 megohm, 1W, linear taper, screwdriver slot. Same as R153.			8	W37	± 20%	R1525
RCX	X	X	Bias (V111B).	Resistor, fixed carbon, 5,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1021
RCX	X	X	Sweep Net.	Resistor, fixed carbon, 25,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1027
RCX		X	Sweep Net.	Resistor, fixed carbon, 5,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1021
RCX		X	Sweep Net.	Resistor, fixed carbon, 10,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1024
RCX		X	Sawtooth Generator (V111A).	Resistor, fixed carbon, 3 megohm, 1/2W, ceramic insulated.			7	504	± 10%	R1039
RCX	X	X	Sawtooth Generator (V111A).	Resistor, fixed carbon, 1.5 megohm, 1/2W, ceramic insulated.			7	504	± 10%	R1098
RCX	X	X	Plate Load (V111B).	Resistor, same as R127.						

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	DESIG.	#								
RCX	X									
RCX-1	X									
RBV-1	X									
RBU-1	X									
RBW-2	X									
RBW-2M	X									
	X	*R152	Horizontal size control.	Potentiometer, carbon, 2 megohm, 1W, linear taper, screwdriver slot.			8	W37	± 20%	R1527
	X	*R153	Sweep Limiter.	Potentiometer, same as R147.						
	X	*R154	Blanking control.	Potentiometer, carbon, 50,000 ohms, 1W, linear taper, screwdriver slot.			8	W37	± 20%	R1518
	X	*R201	Decoupling resistor.	Resistor, fixed carbon, 25,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1027
	X	*R201	Decoupling resistor.	Resistor, fixed carbon, 50,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	R1028
SWITCHES										
X	X	*S101	Switch power on and off.	Switch, toggle, single pole, single throw, 3A., 250V.			25	#24000		S1007
TRANSFORMERS AND INTEGRAL COMPONENTS										
X	X	*T101-01	Couple input to R.F. amplifier, (V101).	Transformer, bandpass input permeability tuned. Freq.--455 ± 100KC.			1	L1013		P2-762a P2-746a

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SF for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CON-TRACTOR'S DWG. AND PART NO.	
	DESIG.	#									
RCX	X	RBW-2M	Blocking capacitor. Coupling capacitor. Primary tank capacity. Secondary tank capacity.	Capacitor, fixed, .01 mfd.			3		± 20%	P2-763C P2-746a	
		RBW-2		Capacitor, fixed, 15mmfd.					± 10%		
		RBU-1		Capacitor, fixed, 100mmfd.					± 5%		
		RBV-1		Capacitor, same as C3.							
RCX-1	X	#T102-01	Couple first R.F. amp. (V101) to conv. (V102).	Trans., bandpass interstage permeability tuned. Freq.--455KC ± 100KC.			1	L1014			
		C5	Coupling cap,	Capacitor, same as C2.							
		C6	Primary tank cap.	Capacitor same as C3.							
		C7	Secondary tank cap.	Capacitor, same as C3.							
		#T101-02	Couple input to R.F. amplifier, (V101).	Transformer, bandpass input, permeability tuned. Freq.--5.25MC ± 500KC.				1	L1018		P2-793a P2-767
		C1	Blocking cap.	Capacitor, fixed 100 mmfd.				3		± 10%	
		C2	Primary tank cap.	Capacitor, fixed, 20 mmfd.				3		± 10%	
C3	Secondary tank cap.	Capacitor, fixed, 15 mmfd.				3		± 10%			
R5	Loading resistor.	Resistor, fixed carbon, 100,000 ohms, ½W, ceramic insulated.				7	504	± 10%			
R6	Loading resistor.	Resistor, fixed carbon, 300,000 ohms, ½W, ceramic insulated.				7	504	± 10%			
RCX-1	X	#T102-02	Couple first R.F. amp. (V101) to conv. (V102).	Trans. bandpass interstage, permeability tuned. Freq. 5.25MC ± 500KC.			1	L1019		P2-794C P2-767a	
		C4	Primary tank cap.	Capacitor, fixed, 10 mmfd.					± 10%		
		C5	Secondary tank cap.	Capacitor, same as C4.							
		C6	Coupling cap.	Capacitor, fixed, 1000mmfd.						± 10%	
		R7	Loading resistor.	Resistor, same as R6.						± 10%	

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

EQUIPMENT TYPE	SYMBOL	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	*T101-03	Couple input to R.F. amplifier (V101).	Trans. bandpass input, permeability tuned, Freq.--400KC ± 25KC.			1	L1023		P2-807a P2-746a
	C1 C2	Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100 mmfd. Capacitor, same as C1.			3		± 10%	
	*T102-03	Couple first R.F. amp. (V101) to conv. (V102).	Trans. bandpass interstage, permeability tuned. Freq.-- 400 ± 25KC.			1	L1024		P2-806a P2-746a
	C3 C4	Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100 mmfd. Capacitor, same as C3.			3		± 10%	
	*T101-04	Couple input to R.F. amplifier (V101).	Trans. bandpass input permeability tuned. Freq.-- 400KC ± 50KC.			1	L1028		P2-793a P2-767
	C1 C2 C3	Primary tank cap. Secondary tank cap. Coupling cap.	Capacitor, fixed, 100 mmfd. Capacitor, same as C1. Capacitor, fixed, 15 mmfd.			3 3		± 10% ± 10%	
	*T102-04	Coupling first R.F. amp. (V101) to conv. (V102).	Trans. bandpass interstage, permeability tuned. Freq.-- 400KC ± 50KC.			1	L1029		P2-794a P2-767
	C4 C5 C6	Primary tank cap. Secondary tank cap. Coupling cap.	Capacitor, fixed, 100 mmfd. Capacitor, same as C4. Capacitor, fixed, 15 mmfd.			3 3		± 10% ± 10%	
	*T103	Blocking tube oscillator transformer (sawtooth gen).	Transformer, BTO, 2:1 ratio sec. to pri.			1	T2390		P1-554b
X									
X									
X									
X									
X									

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

EQUIPMENT TYPE	SYMBOL	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
RCX									
X	X	Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100 mmfd. Capacitor, same as C8.			3		± 5%	P2-765a P2-746a
	*Z103-01	I.F. Output Transformer.	Trans., I.F. Output, Permeability tuned. Freq.--226KC.			1	L1017		
	C10 C11	Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100mmfd. Capacitor, fixed, 150mmfd.			3 3		± 5% ± 5%	
	*Z101-02	F.M. Oscillator coil, Reactance Modulator Coil, and Resistor Capacitor Phasing Network.	Coil, Oscillator Composite, including oscillator coil and H.F. choke; permeability tuned. Freq.--6.162MC ± 500KC.			1	L1020		P2-795b P2-798e
	C12 C13 C14 C15 C16 C17 R1	Coupling cap. Tank tuning cap. Phase net cap. Phase net cap. Blocking cap. Blocking cap. Damping load.	Capacitor, fixed, 50mmfd. Capacitor, fixed, 10mmfd. Capacitor, fixed, 5mmfd. Capacitor, same as C14. Capacitor, fixed, 100mmfd. Capacitor, fixed, 50mmfd. Resistor, fixed carbon, 3000 ohms, ½W, ceramic insulated.			3 3 3 3 3 3 7		± 10% ± 10% ± 10% ± 10% ± 10% ± 10%	
	R2 R3	Phase net. Grid bias.	Resistor, same as R1. Resistor, fixed carbon, 50,000 ohms, ½W, ceramic insulated.			7	504	± 10%	
	R4	Phase net.	Resistor, same as R1.						
	*Z102-02	I.F. Input Transformer.	Transformer, I.F. input, permeability tuned. Freq.--912KC.			1	L1021		P2-796a P2-746a

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
RCX									
RCX-1									
RBV-1									
RBU-1									
RBW-2									
RBW-2M									
	C8	Primary tank cap.	Capacitor, fixed, 80mmfd.			3		± 10%	
	C9	Secondary tank cap.	Capacitor, fixed, same as C8.						
	*Z103-02	I.F. Output Transformer.	Transformer, I.F. output, permeability tuned. Freq.--912KC.			1	L1022		P2-797a P2-746a
	C10	Primary tank cap.	Capacitor, fixed, 80mmfd.			3		± 10%	
	C11	Secondary tank cap.	Capacitor, fixed, 100mmfd.			3		± 10%	
	*Z101-03	F.M. Oscillator Coil, Reactance Modulator coil, and, Resistor Capacitor Phasing Network.	Coil, oscillator composite, including oscillator coil and H.F. choke; permeability tuned. Freq.--626KC ± 25KC.			1	L1025		P2-766b P2-746a
	C9	Coupling cap.	Capacitor, fixed, 100mmfd.			3		± 10%	
	C10	Phase net cap.	Capacitor, fixed, 5mmfd.			3		± 10%	
	C11	Phase net cap.	Capacitor, same as C14.						
	C12	Blocking cap.	Capacitor, fixed, 100mmfd.			3		± 10%	
	C13	Blocking cap.	Capacitor, fixed, 500mmfd.			3		± 10%	
	C14	Tank tuning cap.	Capacitor, fixed, 100mmfd.			3		± 10%	
	R1	Phase net.	Resistor, fixed carbon, 20,000 ohms, ½W, ceramic insulated.			7	504		
	R2	Phase net.	Same as R1.						
	R3	Damping load.	Resistor, fixed carbon, 50,000 ohms, ½W, ceramic insulated.			7	504	± 10%	
	R4	Reactor plate load.	Resistor, fixed carbon, 3,000 ohms, ½W, ceramic insulated.			7	504	± 10%	

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY SPEC. NO.	QTY.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	DESIG.	#								
	RCX	*Z102-03	I.F. Input Trans.	Transformer, I.F. Input, permeability tuned, Freq.--226KC.			1	L1026		P2-764b P2-746a
		C5 C6	Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100mmfd. Capacitor, same as C8.			3		± 10%	
		*Z103-03	I.F. Output Trans.	Transformer, I.F. Output, permeability tuned, Freq.--226KC.			1	L1027		P2-765b P2-746a
		C7 C8	Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100mmfd. Capacitor, fixed, 150mmfd.			3 3		± 10% ± 10%	
		*Z101-04	F.M. Oscillator Coil, Reactance Modulator Coil, and Resistor Capacitor Phasing Network.	Coil Oscillator Composite, including oscillator coil and H.F. choke; permeability tuned. Freq.--626KC ± 50KC.			1	L1030		P2-795a P2-798e
		C11 C12 C13 C14	Coupling cap. Tank tuning cap. Phase net cap. Phase net cap.	Capacitor, fixed, 100mmfd. Capacitor, fixed, 165mmfd. Capacitor, fixed, 5mmfd. Capacitor, fixed, same as C13.			3 3 3		± 10% ± 10% ± 10%	
		C15 C16 R1	Coupling cap. Blocking cap. Phase Net.	Capacitor, same as C11. Capacitor, fixed, 500mmfd. Resistor, fixed carbon, 20,000 ohms, 1/2W, ceramic insulated.			3 7	504	± 10% ± 10%	
		R2 R3	Phase Net. Damping load.	Same as R1. Resistor, fixed carbon, 50,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	
		R4	Plate load.	Resistor, fixed carbon, 3,000 ohms, 1/2W, ceramic insulated.			7	504	± 10%	

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
RCX-1	X	I.F. Input Trans.	Transformer, I.F. Input, permeability tuned, Freq.-- 226KC.			1	L1031		P2-796a P2-746a
		Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100 mmfd. Capacitor, same as C7.			3		± 10%	
	X	I.F. Output Trans.	Trans., I.F. Output. permeability tuned. Freq.--226KC.			1	L1032		P2-.97a P2-746a
		Primary tank cap. Secondary tank cap.	Capacitor, fixed, 100 mmfd. Capacitor, fixed, 150 mmfd.			3 3		± 10% ± 10%	
TUBES									
X	X	1st R.F. Amplifier	6AC7/1852 (Same as V107)		JAN-1A	10	6AC7		
X	X	Oscillator Mixer	6SA7		JAN-1A	10	6SA7		
X	X	1st I.F. Amplifier	6SG7		JAN-1A	10	6SG7		
X	X	2nd Detector Video Amplifier	6SQ7 (GT/G)		JAN-1A	10	6SQ7 (GT/G)		
X	X	C.R.T. Power Supply Rectifier	2X2		JAN-1A	10	2X2		
X	X	Voltage Regulator	VR105/30		JAN-1A	10	VR105/30		
X	X	Reactance Modulator	Same as V101						
X	X	Video Amplifier Horizontal Amplifier	6SL7/GT (Same as V111)		JAN-1A	10	6SL7/GT		

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	DESIG.	#								
RCX	X	*V109	Cathode Ray Tube	3BP1		JAN-1A	10	3BP1		
	X	*V110	Low Voltage Power Supply	6X5 (GT/G)		JAN-1A	10	6X5 (GT/G)		
	X	*V111	BTO Horizontal Amplifier	Same as V108						

INTERCONNECTING CABLE

X	X	*W103	R.F. Input Cable.	Cord, low-loss, single conductor H.F. copolene terminating in plugs at each end.	RG-11/U	RE-13A-639d	11	21B-290-16CW-XV		W1079
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SOCKETS

X	X	*X101	Mount V101	Socket, octal, mica filled or ceramic. Same as X102, X103, X104, X106, X107, X108, X110, X111.			18	KS 10067		X1028
X	X	*X102	Mount V102	Socket, same as X101.						
X	X	*X103	Mount V103	Socket, same as X101						
X	X	*X105	Mount V105	Socket, 4 prong, ceramic wafer.			24	224N		X1018

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS FOR MODELS
RCX, RCX-1, RBV-1, RBU-1, RBW-2, RBW-2M

NOTE: X in the EQUIPMENT TYPE column indicates the presence of the part in the equipment type shown.

EQUIPMENT TYPE	SYMBOL		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.
	DESIG.	#								
RCX	X	*X106	Mount V106	Socket, same as X101						
RCX-1	X	*X107	Mount V107	Socket, same as X101						
RCX-1	X	*X108	Mount V108	Socket, same as X101						
RCX-1	X	*X109	Mount V109	Socket, 14 prong, molded bakelite.			18	#40-1 #40-3		X1026
RCX-1	X	*X110	Mount V110	Socket, same as X101						
RCX-1	X	*X111	Mount V111	Socket, same as X101						

*Spare Parts Furnished Refer to Spare Parts Catalog NAVSHIPS 900,288-SP for Quantities.

Applicable Color Codes

CAPACITY MARKING: Invariably, capacity is expressed (for coding purposes) in terms of micromicrofarads, as .00025 = 250 mmf.

The colors employed to designate these significant digits in mmf. are listed below. Note that codes are read from left to right in the position required for reading of words molded in case, or by arrow.

Color	Numeral	Volts	Multiplier	Tolerance
Black	0		1	
Brown	1	100	10	1%
Red	2	200	100	2%
Orange	3	300	1,000	3%
Yellow	4	400	10,000	4%
Green	5	500	100,000	5%
Blue	6	600	1,000,000	6%
Violet	7	700	10,000,000	7%
Gray	8	800	100,000,000	8%
White	9	900	1,000,000,000	9%
Gold		1000	.1	
Silver			.01	10%
No Color		500		20%

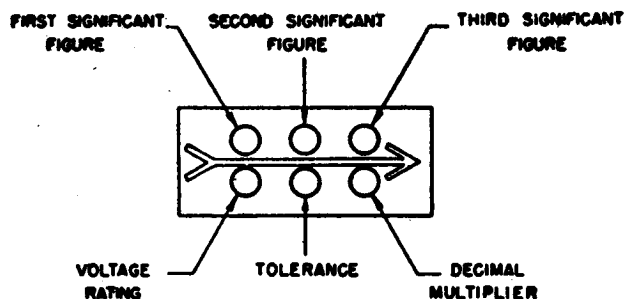
3-DOT COLOR CODE: This is used to indicate capacity (in mmf.) where the working voltage is 500 v.d.c. and the tolerance is ± 20%.

1. The first dot indicates the first significant digit of capacity.
2. The second dot indicates the second digit of capacity.
3. The third dot indicates the number of zeros which follow after the first two digits.

EXAMPLE:

Red Green Black = 25 mmf. = .000025 mfd.

6-DOT R. M. A. COLOR CODE: When it is essential to indicate three significant figures of capacity (such as 1250 mmf.), together with voltage and tolerance information, it is desirable to employ the 6-Dot Code. On units marked with six dots, the upper three dots are significant figures of capacity in mmf. multiplied by the multiplier indicated by the lower right hand dot. The remaining dots are tolerance and D.C. working voltage rating, as shown in sketch.



EXAMPLE:

Brown Red Green } = 1250 mmf.,
Orange Green Brown } 300 v.d.c.w. ± 5%

SILVER MICA IDENTIFICATION: Silver mica capacitors are molded in distinctive Red Low-loss Bakelite, precluding any possibility of confusion.

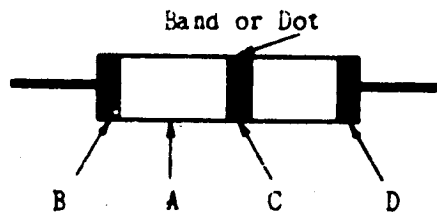
RMA COLOR CODE FOR RESISTORS

COLOR	A 1ST DIGIT	B 2ND DIGIT	C DIGITS
Black	-	0	.0
Brown	1	1	0
Red	2	2	00
Orange	3	3	000
Yellow	4	4	0000
Green	5	5	00000
Blue	6	6	000000
Purple	7	7	0000000
Gray	8	8	00000000
White	9	9	--

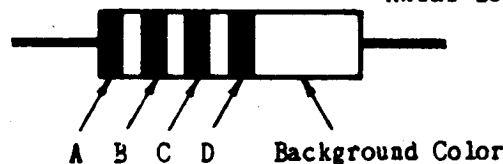
D - Tolerance Code:

Gold = 5% Silver = 10% Omitt = 20%

Original Color Arrangement
for
Axial Leads

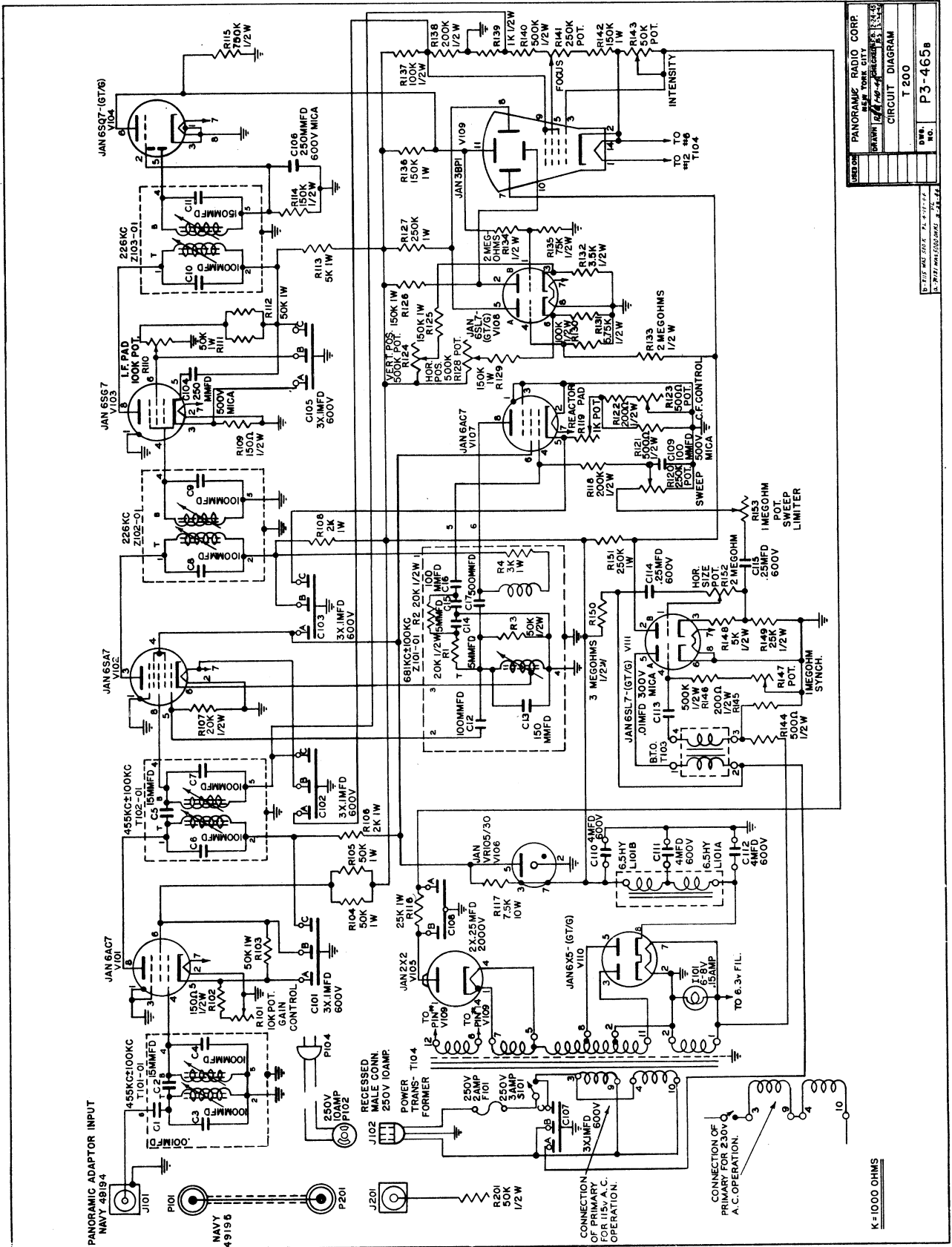


New Color Arrangement
for
Axial Leads



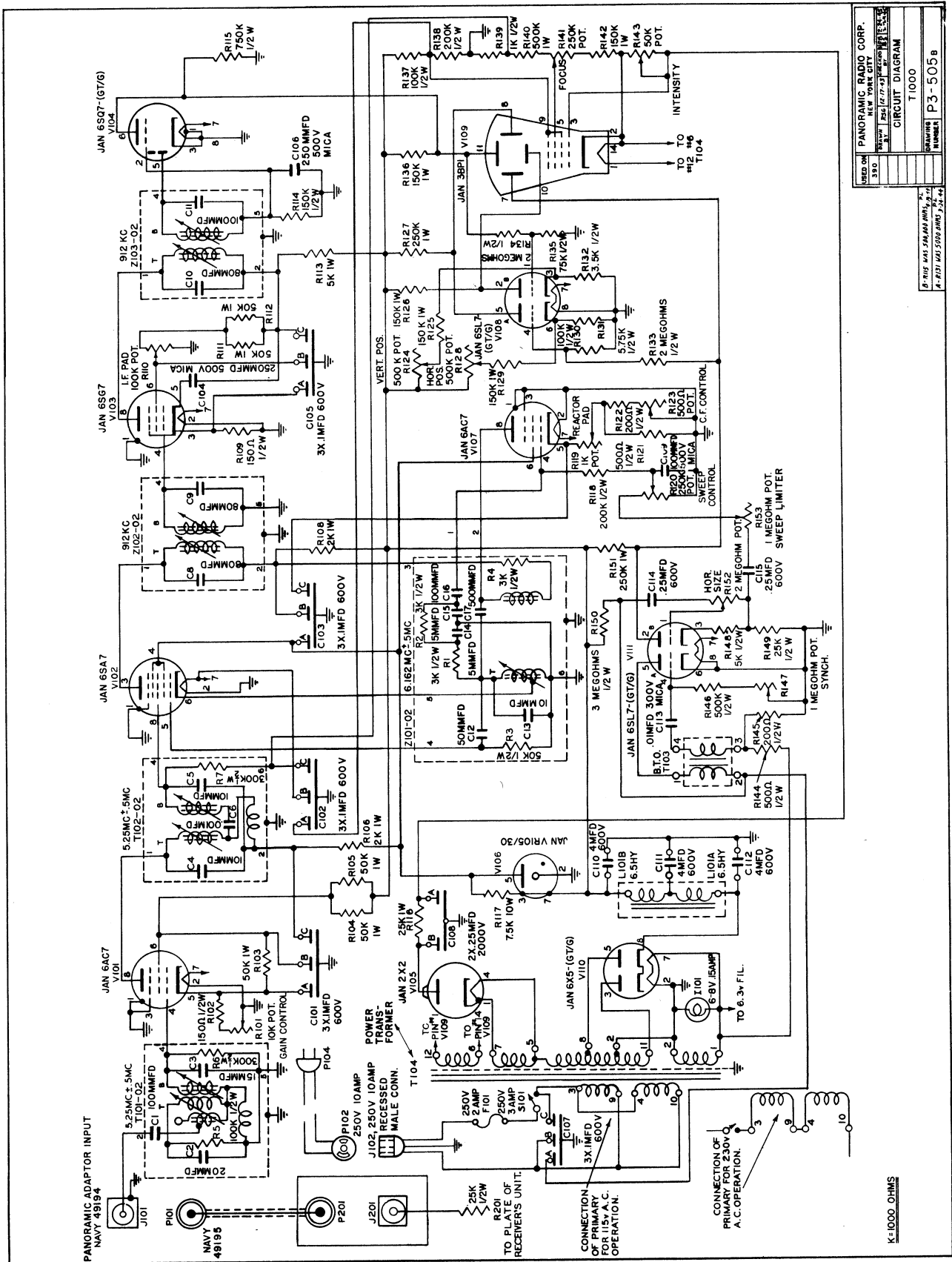
KEY TO MANUFACTURERS

Code	Letters	Manufacturer	Address
1.	CPN	Panoramic Radio Corp.	242 W. 55th St., New York, N.Y.
2.	CIE	Induatrial Condenser Corp.	Chicago, Ill.
3.	CAW	Aerovox Corp.	New Bedford, Mass.
4.		Lord Mfg. Co.	Erie, Pa.
5.		Alden Products Co.	Brockton, Mass.
6.		Harry Goldman	230 W. 58th St., New York, N.Y.
7.	CER	Erie Resistor Co.	Erie, Pa.
8.	CMC	Clarostat Mfg. Co.	Brooklyn, N.Y.
9.	COM	Ohmite Mfg. Co.	Chicago, Ill.
10.	CRU	R.C.A. Manufacturing Co.	Camden, N.J.
11.	CPH	American Phenolic Corp.	Chicago, Ill.
12.	CHU	Harvey Hubbell	Bridgeport, Conn.
13.		Kirz-Kasch Co.	Dayton, Ohio
14.		Dialight Corp. of America	New York, N.Y.
15.	CLF	Littlefuse Inc.	Chicago, Ill.
16.	CG	General Electric Corp.	Schenectady, N.Y.
17.		Eagle Electric Co.	Brooklyn, N.Y.
18.		A. W. Franklin Co.	New York, N.Y.
19.	CNA	National Co.	Malden, Mass.
20.		Fahnstock Electric Co.	Long Island City, N.Y.
21.	CFA	Bussman Mfg.	St. Louis, Mo.
22.	CUF	United Carr Fastener	Cambridge, Mass.
23.	CMG	Cinch Mfg. Corp.	Chicago, Ill.
24.	CEJ	E. F. Johnson Co.	Waseca, Minn.
25.	CHH	Hart & Hegeman	Bridgeport, Conn.
26.		Huntington Precision Products	Huntington, West Va.
27.	CIR	International Resistance Corp.	Philadelphia, Pa.
28.	CMR	Micamold Radio Corp.	Brooklyn, N.Y.
29.		Gudeman Co.	Chicago, Ill.
30.		Capacitrons Inc.	Chicago, Ill.
31.		Electromotive Mfg. Co.	Willimantic, Conn.
32.		J. W. Miller Products Co.	Los Angeles, Calif.
33.	CBK	Allen D. Cardwell Mfg. Co.	Brooklyn, N.Y.
34.	CSR	Russell and Stoll	125 Barclay St., New York, N.Y.



PANORAMIC RADIO CORP.	
NEW YORK CITY	
DRAWN BY: [Signature]	
CHECKED BY: [Signature]	
CIRCUIT DIAGRAM	
T 200	
DWG. NO.	P3-465B

Figure 7-1. - Panoramic Adaptor, Navy Model RCX, Circuit Diagram.



USED ON	PANORAMIC RADIO CORP.
330	87
	CIRCUIT DIAGRAM
	T1000
	BRANCH NUMBER
	P3-505 b

5-715 MAX. STAKRA INNOV. CO.
 4-131 MAX. STAKRA INNOV. CO.

Figure 7-2. - Panoramc Adaptor, Navy Model RBW-2, Circuit Diagram.

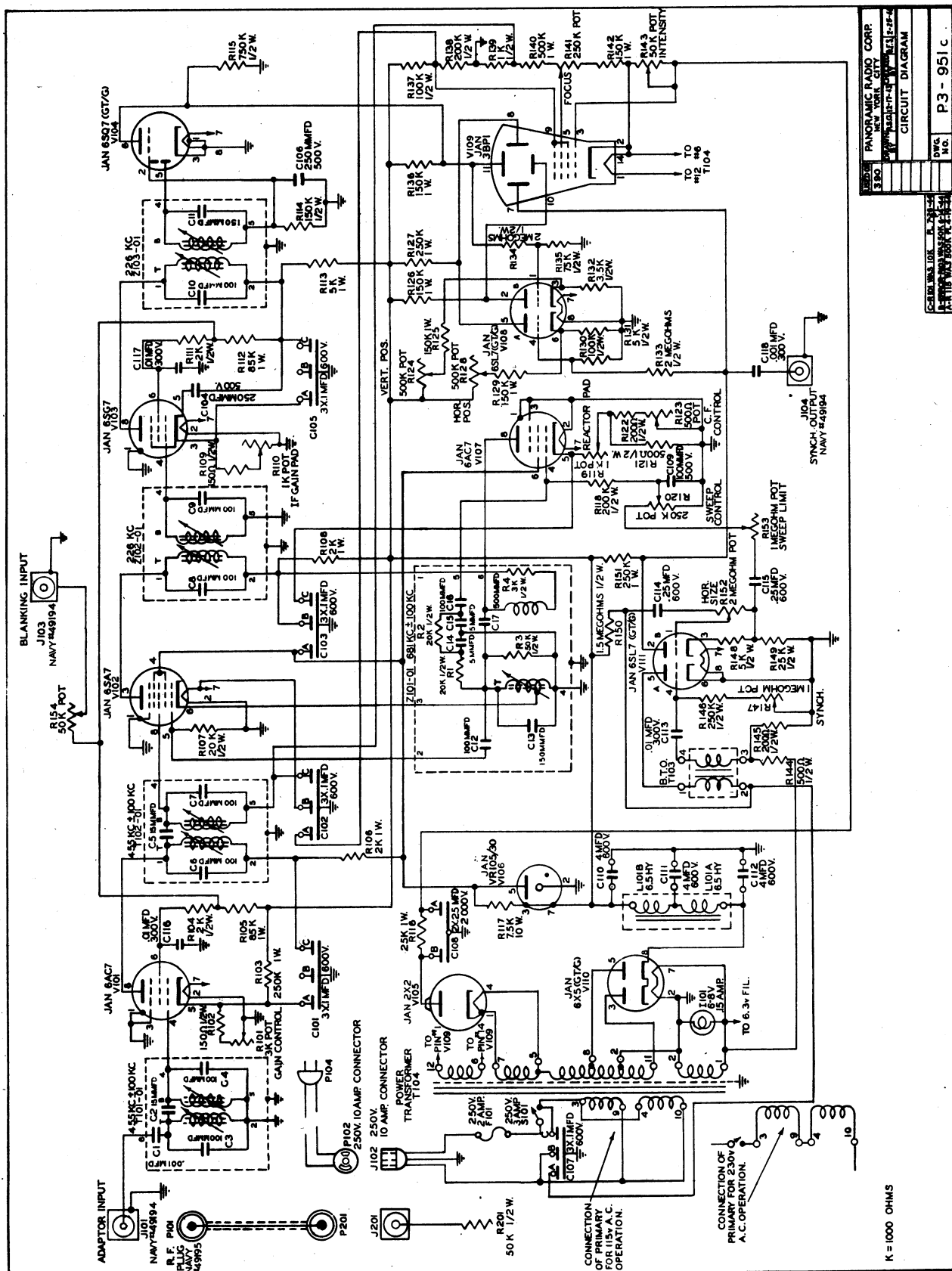


Figure 7-3. - Panoramc Adaptor, Navy Model RCX-1, Circuit Diagram.

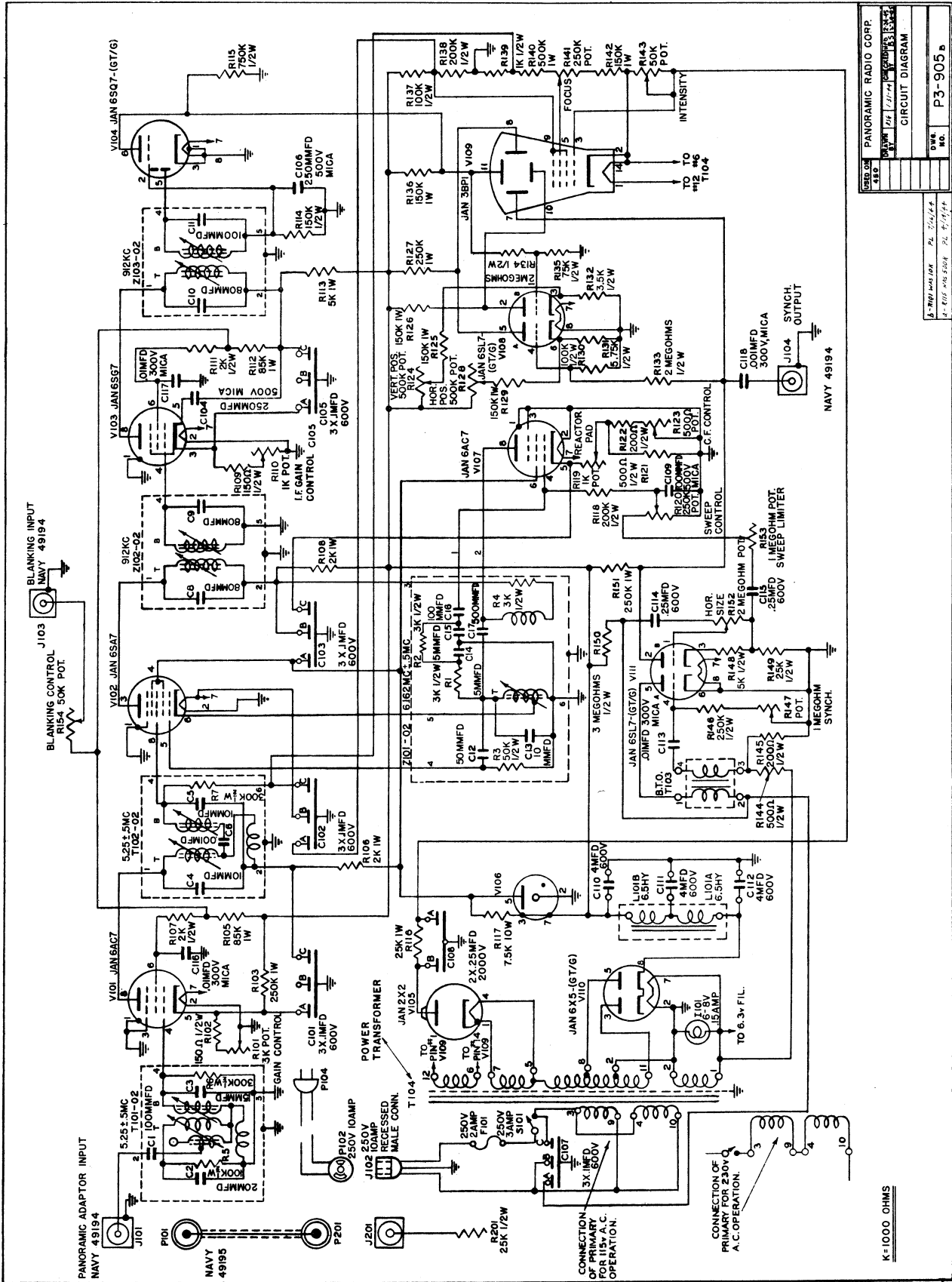
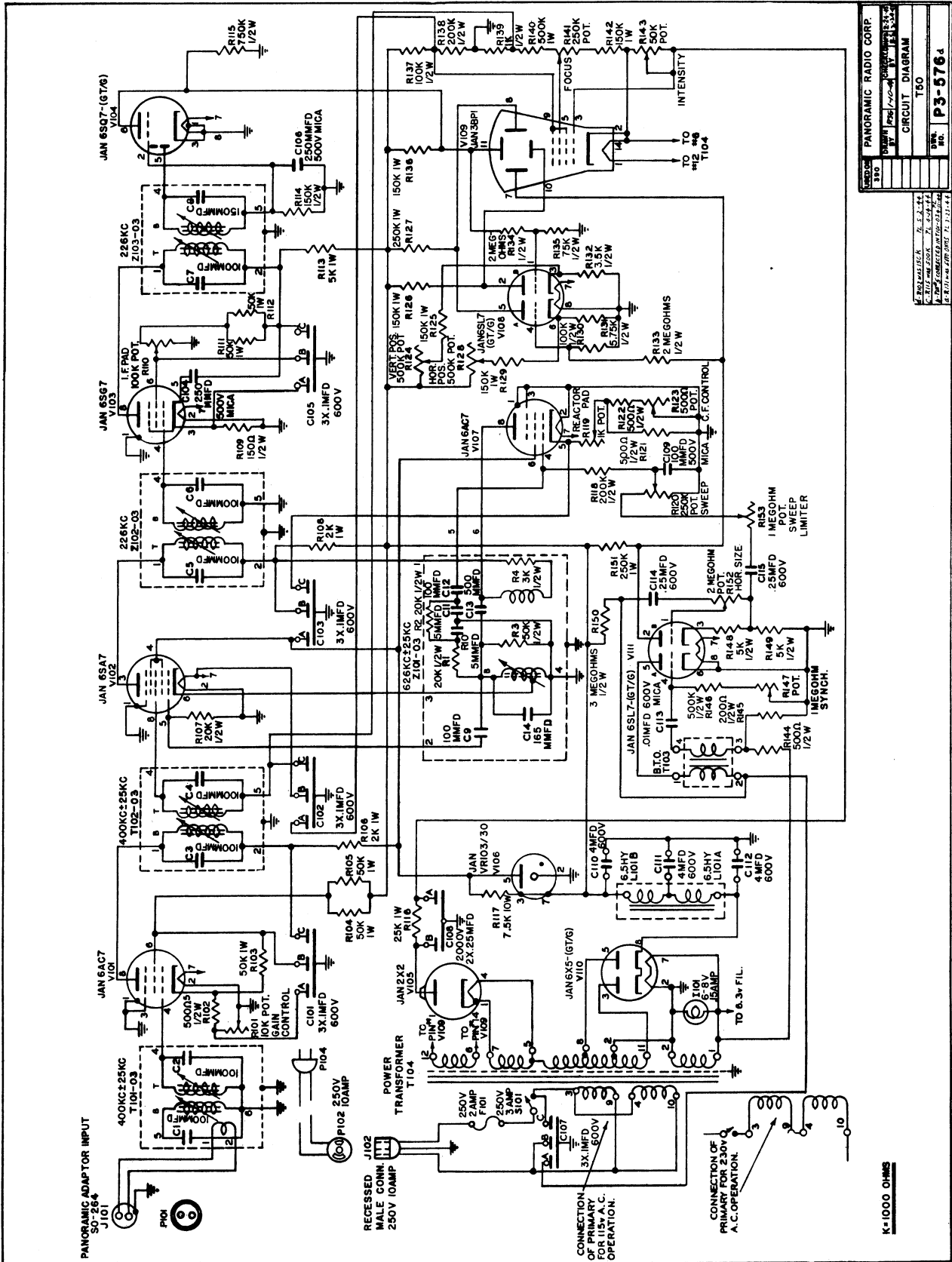


Figure 7-4. - Panoramic Adaptor, Navy Model RBW-2M, Circuit Diagram.



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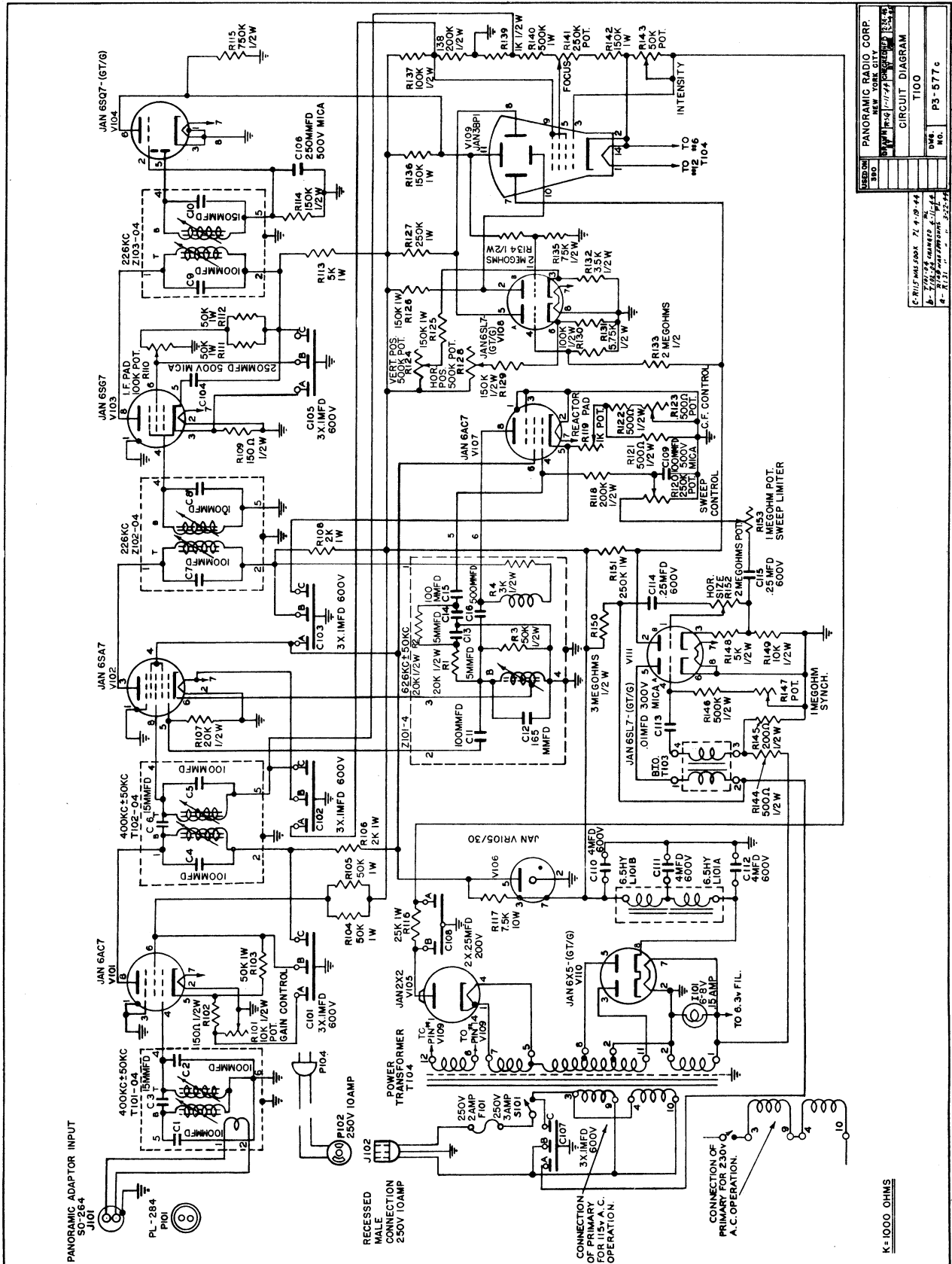
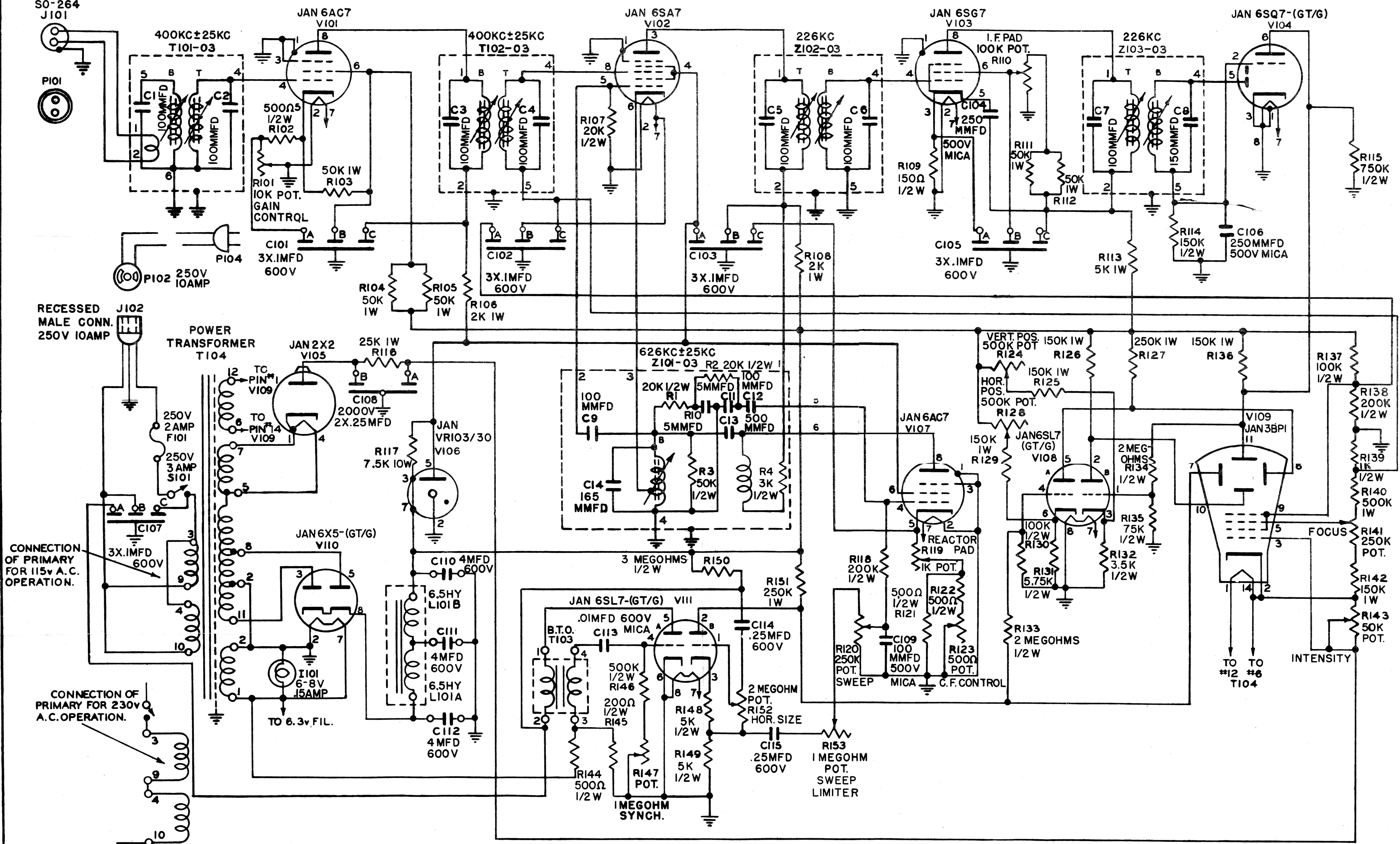


Figure 7-6. - Panoramic Adaptor, Navy Model RBV-1, Circuit Diagram.

DESIGN	890
DATE	7-1-44
BY	W. J. ...
CHECKED	...
APPROVED	...
REVISION	...
DESCRIPTION	PANORAMIC RADIO CORP. NEW YORK CITY
PROJECT	RBV-1
FIGURE NO.	7-6
DRAWING NO.	T100
REV.	P3-577c

PANORAMIC ADAPTOR INPUT



K=1000 OHMS

Figure 8-5. - Panoramic Adaptor, Navy Model RBU-1, Circuit Diagram.

USED ON 390	PANORAMIC RADIO CORP.	
DRAWN BY R3G/1-10-44	CHECKED BY B.S. 2-24-45	
CIRCUIT DIAGRAM		
T50		
DWG. NO.	P3-576d	

d-R102 WAS 150K PL 5-2-44
 c-R115 WAS 500K PL 2-14-44
 b-PIN#S CORRECTED IN T101-03 PL 1-11-44
 a-R131 WAS 500 OHMS PL 7-23-44

PANORAMIC ADAPTOR INPUT

SO-264
J101

PL-284
P101

RECESSED
MALE
CONNECTION
250V 10AMP
J102

CONNECTION
OF PRIMARY
FOR 115v A.C.
OPERATION.

CONNECTION
OF PRIMARY
FOR 230v
A.C. OPERATION.

K= 1000 OHMS

POWER
TRANSFORMER
T104

JAN 6X5-(GT/G)
V110

TO 6.3v FIL.

I101
6-8V
.15AMP

JAN 2X2
V105

JAN 6A7
V101

JAN 6SA7
V102

JAN 6SG7
V103

JAN 6SQ7-(GT/G)
V104

JAN 6SL7-(GT/G)
V111

JAN 6A7
V107

JAN 6SL7-(GT/G)
V108

JAN 3BP1
V109

400KC±50KC
T101-04

400KC±50KC
T102-04

226KC
Z102-04

226KC
Z103-04

626KC±50KC
Z101-4

C1 100MMFD

C4 100MMFD

C7 100MMFD

C9 100MMFD

C11 100MMFD

C104 250MMFD 500V MICA

C10 150MMFD

C12 165 MMFD

C105 3X.1MF 600V

C106 250MMFD 500V MICA

C13 MICA

C101 3X.1MF 600V

C102 3X.1MF 600V

C14 5MMFD

C103 3X.1MF 600V

C103 3X.1MF 600V

C15 100 MMFD

C104 250MMFD 500V MICA

C105 3X.1MF 600V

C16 500MMFD

C106 250MMFD 500V MICA

C107 3X.1MF 600V

C17 6.5HY L101A

C108 2X.25MFD 200V

C109 100MMFD 500V MICA

C18 6.5HY L101B

C109 100MMFD 500V MICA

C110 4MFD 600V

C19 4MFD 600V

C110 4MFD 600V

C111 4MFD 600V

C20 4MFD 600V

C111 4MFD 600V

C112 4MFD 600V

C21 4MFD 600V

C112 4MFD 600V

C113 MICA

C113 MICA

C114 .25MFD 600V

C114 .25MFD 600V

C115 .25 MFD 600V

C115 .25 MFD 600V

C116 500MMFD

C116 500MMFD

C117 500MMFD

C117 500MMFD

C118 500MMFD

C118 500MMFD

C119 500MMFD

C119 500MMFD

C120 500MMFD

C120 500MMFD

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C220 500MMFD

C220 500MMFD

C221 500MMFD

C221 500MMFD

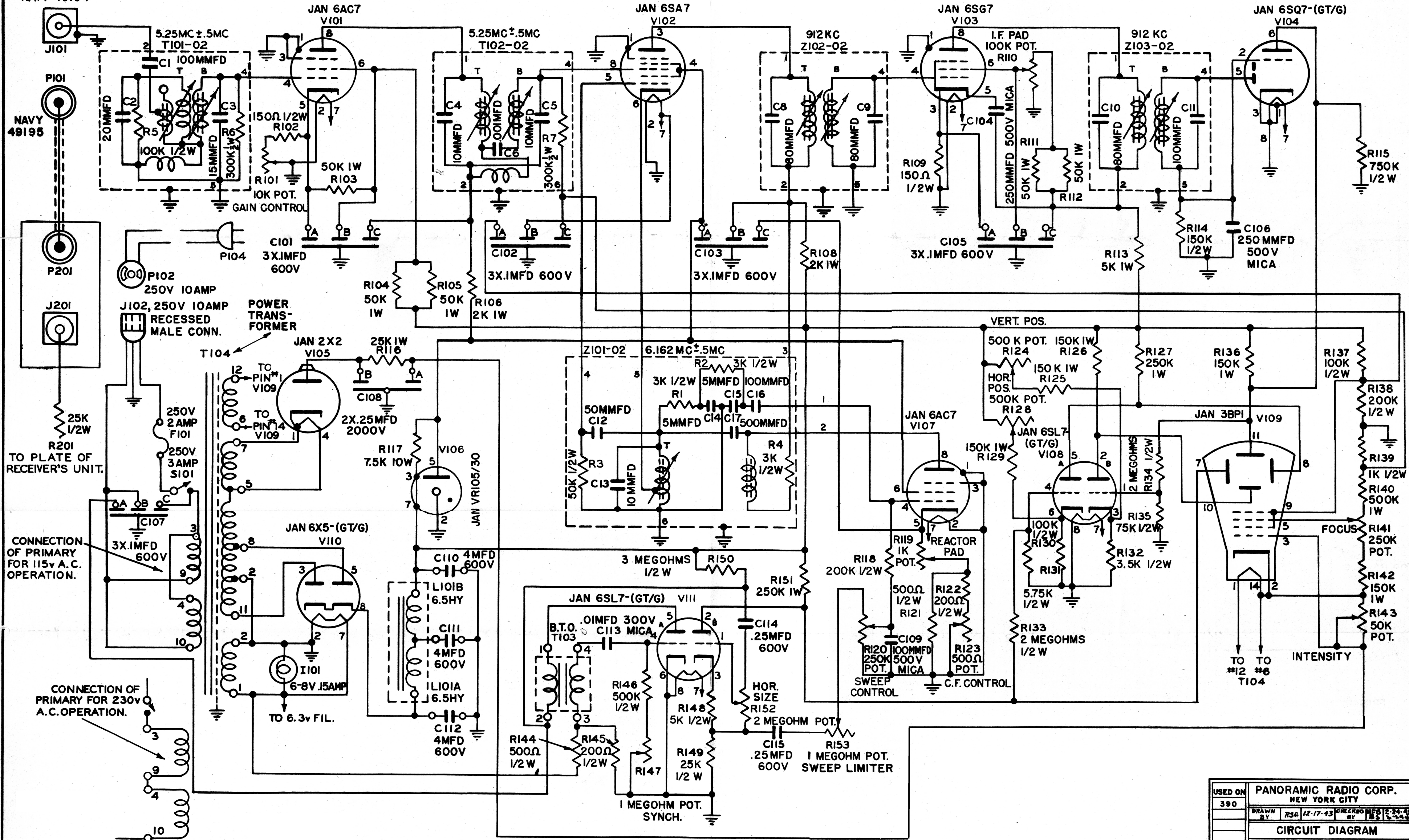
C222 500MMFD

C222 500MMFD

C223 500MMFD

C223 500MMFD

PANORAMIC ADAPTOR INPUT
NAVY 49194



K=1000 OHMS

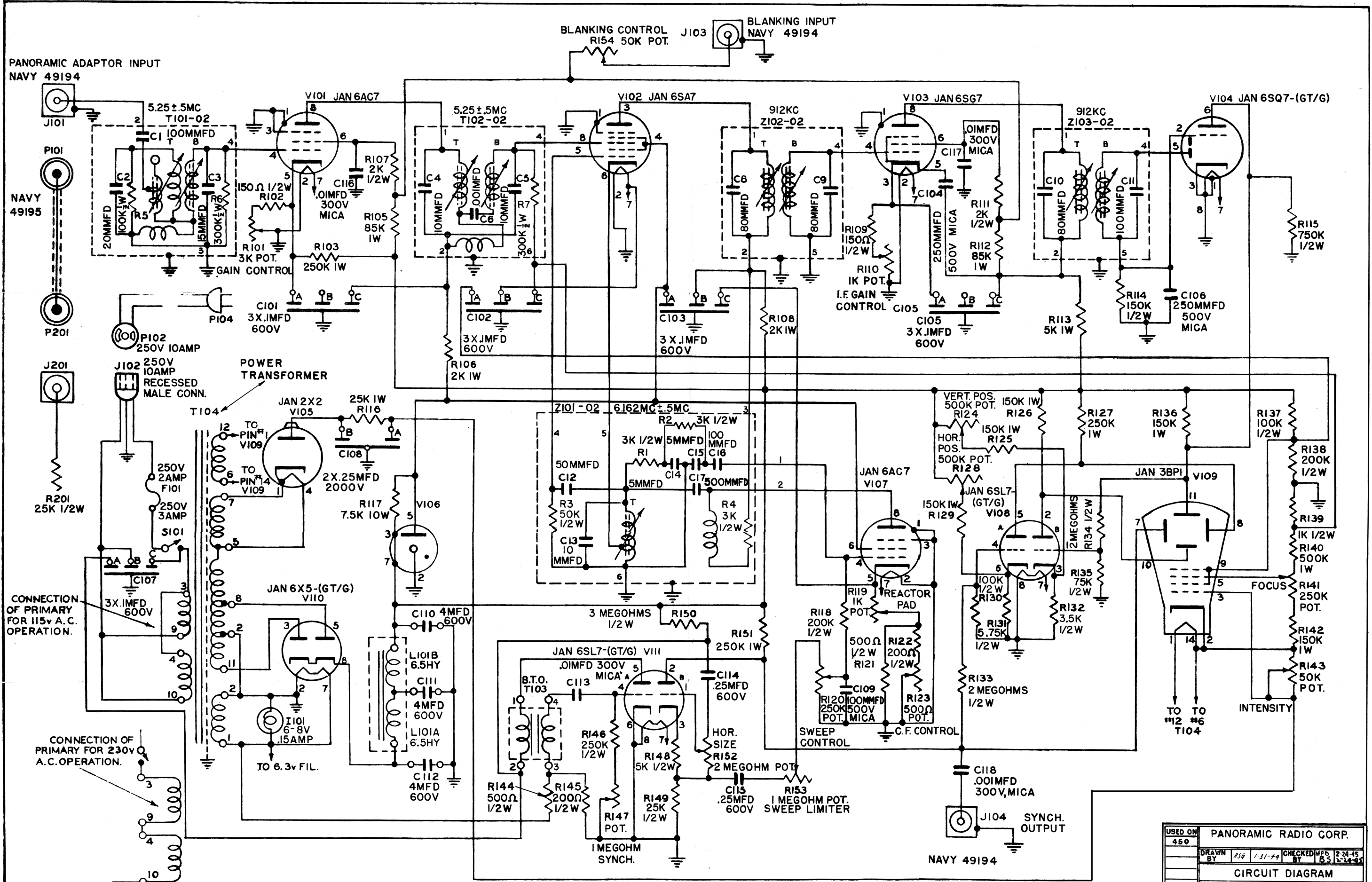
Figure 8-2. - Panoramic Adaptor, Navy Model RBW-2, Circuit Diagram.

B-R115 WAS 500,000 OHMS PL
A-R131 WAS 5000 OHMS 3-24-44

USED ON 390	PANORAMIC RADIO CORP. NEW YORK CITY	
DRAWN BY R36	CHECKED BY R36	DATE 12-17-43
CIRCUIT DIAGRAM		
T1000		
DRAWING NUMBER P3-505B		

RESTRICTED

RESTRICTED



K=1000 OHMS

Figure 8-4. - Panoramic Adaptor, Navy Model RBW-2M, Circuit Diagram.

1-R101 WAS 10K PL 7/26/44
 2-R115 WAS 500K PL 4/19/44

USED ON	PANORAMIC RADIO CORP.	
450		
DRAWN BY	RJF	CHECKED BY
DATE	1/31/44	DATE
CIRCUIT DIAGRAM		
DWG. NO.	P3-905 B	

NAVY 49194

PANORAMIC ADAPTOR INPUT
NAVY 49194

NAVY 49195

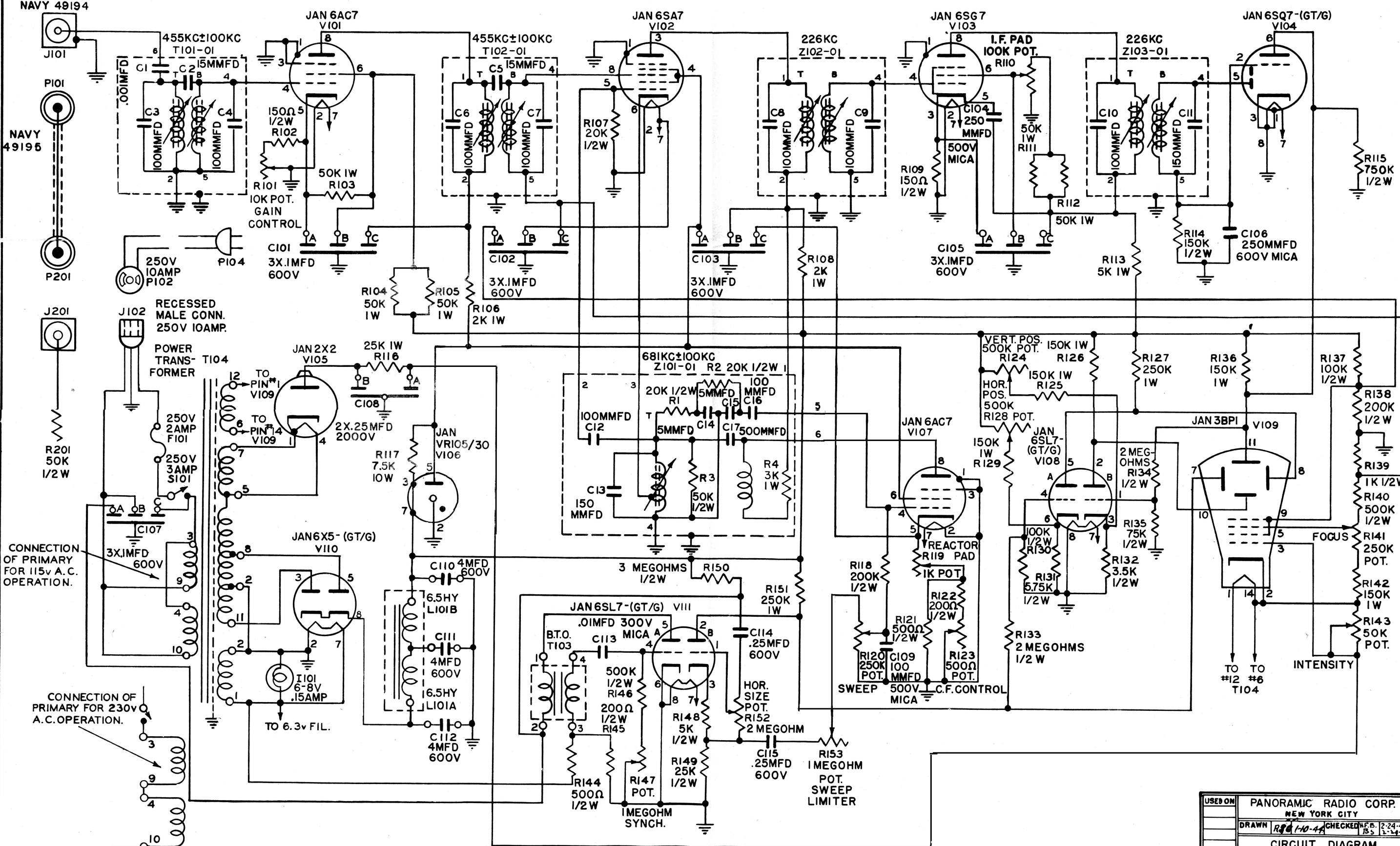


Figure 8-1. - Panoramic Adaptor, Navy Model RCX, Circuit Diagram.

K=1000 OHMS

USE ON	PANORAMIC RADIO CORP. NEW YORK CITY
DRAWN	RSC 1-10-47
CHECKED	PL 2-24-45
CIRCUIT DIAGRAM	
T 200	
DWG. NO.	P3-465B

RESTRICTED

RESTRICTED

b-R115 WAS 500K PL 4-17-44
d-R131 WAS 5000 OHMS PL 8-22-44