INSTRUCTION BOOK

for

PANORAMIC RADIO ADAPTOR

NAVY MODEL RDP

NAVSHIPS 900, 555

RESTRICTED

(For Official Use Only)

MANUFACTURED
BY
PANORAMIC RADIO CORPORATION
NEW YORK, N. Y.
FOR

U. S. NAVY DEPT.   BUREAU OF SHIPS

Contract No. NXsr-73836
Contract No. NXsr-(LL)-83419
Contract No. NXsr-87785

Approved: 27 January 1945

SECURITY NOTICE

NOTICE: This document contains information affecting the national defense of the United States within the meaning of the Espionage Act, 50 U.S.C., 31 and 32, as amended. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law. ARTS $75\frac{1}{2}$ & 76, U.S.N. REGS 1920.)

The information contained in restricted documents and the essential characteristics of restricted material will not be communicated to the public or to the press, but may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

TABLE OF CONTENTS

SECTION V - MAINTENANCE

LIST OF ILLUSTRATIONS AND DRAWINGS

LIST OF TABLES

CONTRACTUAL GUARANTEE

The equipment including all parts and spare parts, except vacuum tubes, batteries, rubber and material normally consumed in operation, is guaranteed for a period of one year from the date of delivery of the equipment to and acceptance by the Government with the understanding that all such items found to be defective as to material, workmanship or manufacture will be repaired or replaced, f.o.b. any point within the continental limits of the United States designated by the Government, without delay and at no expense to the Government; provided that such guarantee will not obligate the Contractor to make repair or replacement of any such defective items unless the defect appears within the aforementioned period and the Contractor is notified thereof in writing within a reasonable time and the defect is not the result of normal expected shelf life deterioration.

To the extent the equipment, including all parts and spare parts, as defined above, is of the Contractor's design or is of a design selected by the Contractor, it is also guaranteed, subject to the foregoing conditions, against defects in design with the understanding that if ten per cent (10%) or more of any such item, but not less than two of any such item, of the total quantity comprising such item furnished under the contract, are found to be defective as to design, such item will be conclusively presumed to be of defective design and subject to one hundred per cent (100%) correction or replacement by a suitably redesigned item.

All such defective items will be subject to ultimate return to the Contractor. In view of the fact that normal activities of the Naval Sercice may result in the use of the equipment in such remote portions of the world or under such conditions as to preclude the return of the defective items for repair or replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service, therefore, may necessitate expeditious repair of such items in order to prevent extended interruption of communications. In such cases the return of defective items for examination by the Contractor prior to repair or replacement will not be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for affecting expeditious adjustment under the provisions of this contractual guarantee.

The above one year period will not include any portion of time the equipment fails to perform satisfactorily due to any such defects, and any items repaired or replaced by the Contractor will be guaranteed anew under this provision.

REPORT OF FAILURE

Report of failure of any part of this equipment, during its service life, shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the 'Bureau of Ships Manual', or superseding instructions.

INSTALLATION RECORD

Contract Numbers:		Date of Contracts:	
	NXsr-73836		August 23, 1944
	NXsr-(LL)-83419		December 6, 1944
	NXsr-87785		January 10, 1945

Serial Number of Equipment ____________________

Date of Acceptance by the Navy ____________________

Date of Delivery to Contract Destination ____________________

Date of Completion of Installation ____________________

Date Placed in Service ____________________

Blank spaces in this book shall be filled in at the time of installation. Operating personnel shall also mark the "date placed in service" on the date plate located below the model nameplate on the equipment, using suitable methods and care to avoid damaging the equipment.

REPLACEMENT MATERIAL

All requests or requisitions for replacement material should include complete descriptive data covering the part desired, in the following form:

1. Name of part desired.
2. Federal Stock number (if assigned).
3. Navy Type Number (if assigned) (including prefix and suffix as applicable).
4. Commercial Designation.
5. Model Designation (including suffix) of equipment in which used.
6. Navy Type Designation (including prefix and suffix where applicable of major unit in which part is used).
7. Contract, purchase order, requisition, etc., under which the equipment was procured.
8. Circuit symbol designation of part.
9. (a) Navy drawing and/or specification number (include part or group number.)
   (b) Manufacturer's drawing specification's number. (Include part or group number.)
10. Rating or other descriptive data.

SAFETY AND WARNING NOTICES

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 SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR GENERATORS OR OTHER POWER EQUIPMENT. 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.

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

ELECTRIC SHOCK
FIRST AID TREATMENT

SAFETY FIRST. Regard electrical apparatus generally, and especially all current-carrying parts as dangerous, irrespective of voltage. Exercise great care in handling and avoid broad contacts such as are made by standing on a metal deck or in water.

Dangerous contact may result through lessened resistance when the skin and clothing are wet with perspiration. Contact with damp metal surfaces -- decks, bulkheads, guns, machinery -- may allow the current to ground through the moist skin and body.

Electric shock is due to current passing through the body -- current actually passing -- irrespective of the voltage. A pressure as low as 110 volts has caused death. Current passing through the body in the region of the heart is especially dangerous. In using electric breast drills avoid the possibility of a ground.

Usually electric shock does not kill instantly. Life can often be saved even though breathing has stopped.

I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY. Use a dry non-conductor (rubber gloves, clothing, rope, board) to move either the victim or the wire. Beware of using metal or moist material. Shut off the current.

If necessary to cut a live wire, use an axe or hatchet with a dry wooden handle; turn your face away from the electrical flash.

II. ATTEND INSTANTLY TO THE VICTIM'S BREATHING. Begin resuscitation at once on the spot. Do not stop to loosen clothing; every moment counts.

RESUSCITATION BY THE PRONE PRESSURE METHOD OF ARTIFICIAL RESPIRATION

Waste no time. When the patient is removed from the water, gas, smoke, or electric contact, get to work at once with your own hands. Send for the medical officer or nearest physician.

No reliance should be placed upon any special mechanical apparatus, as it is frequently out of order and often is not available when most needed. The patient's mouth should be cleared of any obstruction such as chewing gum or tobacco, false teeth, or mucus, so that there is no interference with the entrance and escape of air.

POSITION

1.- Lay the patient on his belly, one arm extended directly overhead, the other arm bent at elbow and with the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing.

2.- Kneel straddling the patient's thighs with your knees placed at such a distance from the hip bones as will allow you to place the palms of the hands on the small of the back with fingers resting on the ribs, the little finger just touching the lowest rib, with the thumb and fingers in a natural position, and the tips of the fingers just out of sight.

FIRST MOVEMENT

3.- With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. Do not bend your elbows. The operation should take about two seconds.

SECOND MOVEMENT

4.- Now immediately swing backward, so as to remove the pressure completely.

5.- After two seconds, swing forward again. Thus repeat deliberately twelve to fifteen times a minute the double movement of compression and release, a complete respiration in four or five seconds.

6.- Continue artificial respiration without interruption until natural breathing is restored. Do not get discouraged at the slow results that sometimes happen. Efforts often have to be continued a long time before signs of life are apparent. Do not discontinue the efforts until certain that all chance is lost. Sometimes, even after several hours' work, recovery takes place.

7.- As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest, or waist. TO KEEP THE PATIENT WARM DURING ARTIFICIAL RESPIRATION IS MOST IMPORTANT AND IT MAY BE NECESSARY TO COVER HIM WITH BLANKETS AND WORK THROUGH THEM, AS WELL AS TO APPLY HOT-WATER BOTTLES, HOT BRICKS, ETC. Do not give any liquids whatever by mouth until the patient is fully conscious.

8.- To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, he should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc. Continue to keep the patient warm and at rest.

9.- Resuscitation should be carried on at the nearest possible point where the patient received his injuries. As a general rule, he should not be moved from this point until he is breathing normally of his own volition and then moved only in a lying position. Should it be necessary, due to extreme weather conditions, etc., to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10.- A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient, after a temporary recovery of respiration, stops breathing again. The patient must be watched, and if natural breathing stops, artificial respiration should be resumed at once.

11.- In carrying out the resuscitation it may be necessary to change the operator. This change must be made without losing the rhythm of respiration. The relief operator should kneel behind the one giving the artificial respiration and at the end of the movement, the operator crawls forward while the relief takes his place. By this procedure no confusion results at the time of change of operator, and a regular rhythm is kept up.

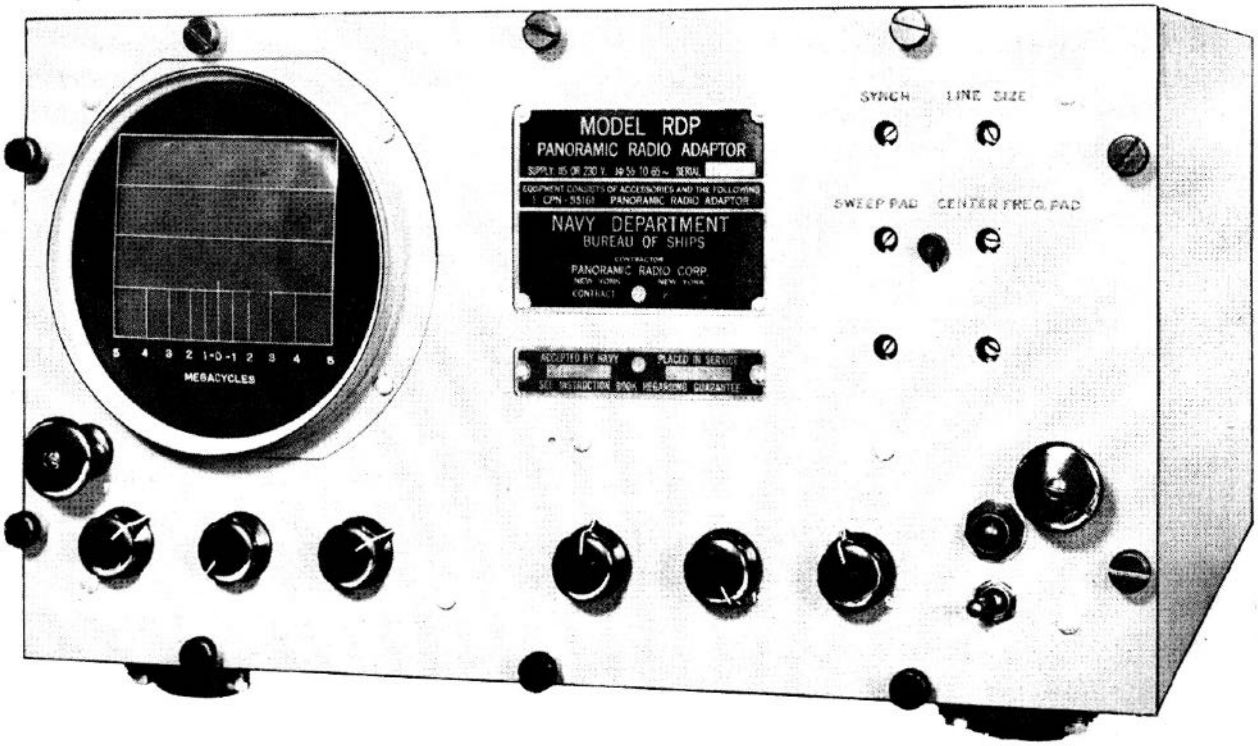
"Since the use of high voltages which are dangerous to human life is necessary to the successful operation of the equipment covered by these instructions, certain reasonable precautionary measures must be carefully observed by the operating personnel during the adjustment and operation of the equipment."

"The major portions of the equipment are within shielding enclosures. While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed:

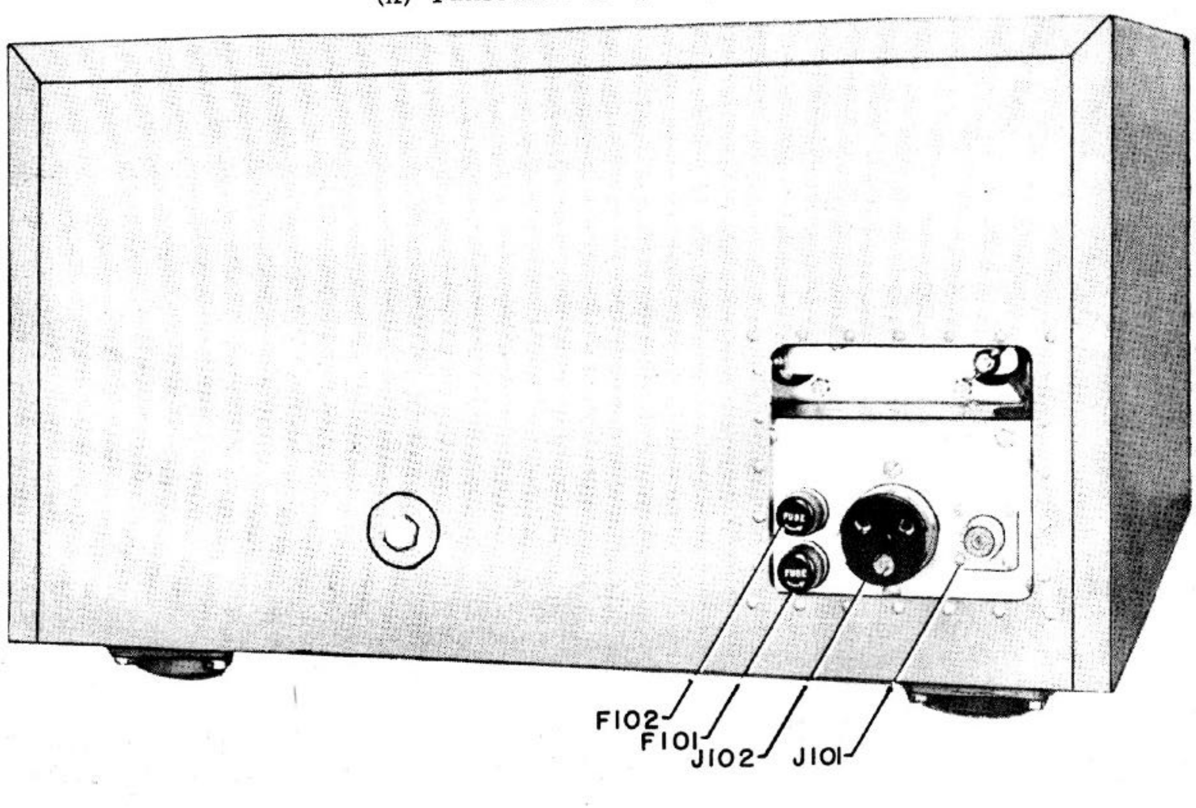
"KEEP AWAY FROM LIVE CIRCUITS. Under no circumstances should any person be permitted to reach within or in any manner gain access to the enclosure with power supply line switches to the equipment closed; or to approach or handle any portion of the equipment which is supplied with power, or to connect any apparatus external to the enclosure to circuits within the equipment; or to apply voltages to the equipment for testing purposes while any portion of the shielding or enclosure is removed or open. Wherever feasible in testing circuits, check for continuity and resistance rather than directly checking voltage at various points."

"DON'T SERVICE OR ADJUST ALONE. Under no circumstances should any person reach within the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid."

"THE ATTENTION OF OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO CHAPTER 67 OF BUREAU OF SHIPS MANUAL OR SUPERSEDING INSTRUCTIONS ON THE SUBJECT OF 'RADIO-SAFETY PRECAUTIONS TO BE OBSERVED!'"



(A) Panoramic Adaptor, front view



(B) Panoramic Adaptor, rear view

Figure 1-1A. - Panoramic Adaptor, Navy Model RDP, Front and Rear View.

SECTION I - GENERAL DESCRIPTION

1. REFERENCE DATA.

a. Contractual Data.

(1) Name and Designation of Equipment - Panoramic Adaptor, Navy Model RDP

(2) Contract Numbers and Dates - NXsr-73836 August 23, 1944
NXsr-(LL)-83149 December 6, 1944
NXsr-87785 January 10, 1945

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

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

b. Electrical Characteristics.

(1) Maximum sweepwidth - 10mc.

(2) Input frequency - 30mc.

(3) Method of coupling in R.F. input - Cathode follower in companion receiver.

(4) Power Source - 115/230 V. 55/65 cycles A. C., single phase.

(5) Power Consumption - 110 Watts at 115 Volts

(6) Peaking Frequencies of Bandpass Stage
R.F. input transformer - 27.5 mc. ± 500KC
32.5 mc. ± 500KC
R.F. output transformer - 25.5 mc. ± 500KC
34.5 mc. ± 500KC

(7) Sensitivity - 25μV signal of 30 mc. applied to input of adaptor directly causes a vertical deflection of 1/4". Gain Control at Standard Noise Level (See Section III, Paragraph 3f)

(8) I.F. Transformer frequency - 7.5 mc.

(9) Oscillator mean frequency - 22.5 mc. ± 250KC

(10) Oscillator swing up to - ± 5 mc.

(11) Sweep Frequency - 30 cycles

(12) Sweep Voltage Waveform - Sawtooth linear

c. Shipping Data.

(1) Number of packages for complete shipment of equipment - two

(2) Total cubical contents, installed and packed for shipment - 16.4 cubic feet.

(3) Total weight, installed and packed for shipment - 280 lbs.

d. Vacuum Tube Complement.

Symbol	Type Designation		Function
V101,V102	6AC7/1852		R.F. Amplifiers
V103	6SA7		Mixer
V104	6SG7		1st I.F. Amplifier
V105	6AC7/1852		2nd I.F. Amplifier
V106	6SN7GT	(A)	Detector (Diode Connection)
		(B)	Unused
V107	6SN7GT		Push-pull video amplifier

signed for 115v/230v. 55/65 cycle operation. However, it is wired at the factory for operation at 115v. The primaries of the power transformers can be rewired easily for 230v. operation. See Section V, Par. 8 and Figure 5-2.

The power supply contains a high voltage DC section which provides the necessary potentials for the cathode ray tube, and a low voltage DC section which provides the necessary potentials for the rest of the adaptor. The power transformers furnish all the heater voltages.

4. PHYSICAL CHARACTERISTICS.

a. Dimensions.

The dimensions of Navy Model RDP are the following:

Width	18 1/8"
Height - from the bottom edge of cabinet . .	9 13/16"
Height of Shockmounts	15/16"
Depth	17 7/16" (including panel thickness)
Distance between mounting hole centers . . .	13 5/8" x 12 23/32"
Hood Projection	1 1/8"
Weight of chassis with tubes	50 lbs.
Total weight of Navy Model RDP . . . . without power plug	71 lbs.

b. Cabinet.

The cabinet of the adaptor is finished in grey. The cabinet is mounted on on four shockmounts so that a minimum of vibration is transferred to the adaptor chassis. A rear view of the cabinet will reveal a cutout at the lower right hand corner. By means of this cutout, easy access is gained to the R.F. input receptacle, power receptacle, and two extractor type fuseholders. Thus, installation of the adaptor and replacement of burned out fuses are facilitated.

At approximately the lower center of the rear of the cabinet there is a guide screw which secures the rear of the chassis to the cabinet.

c. Front Panel.

On the front panel of the adaptor there are, from left to right, the following main operating controls:

(1) FOCUS. This control is used to obtain a clear sharp trace on the screen of the cathode ray tube. On the front panel, behind the knob for this control, there are engraved graduations extending from zero through nine.

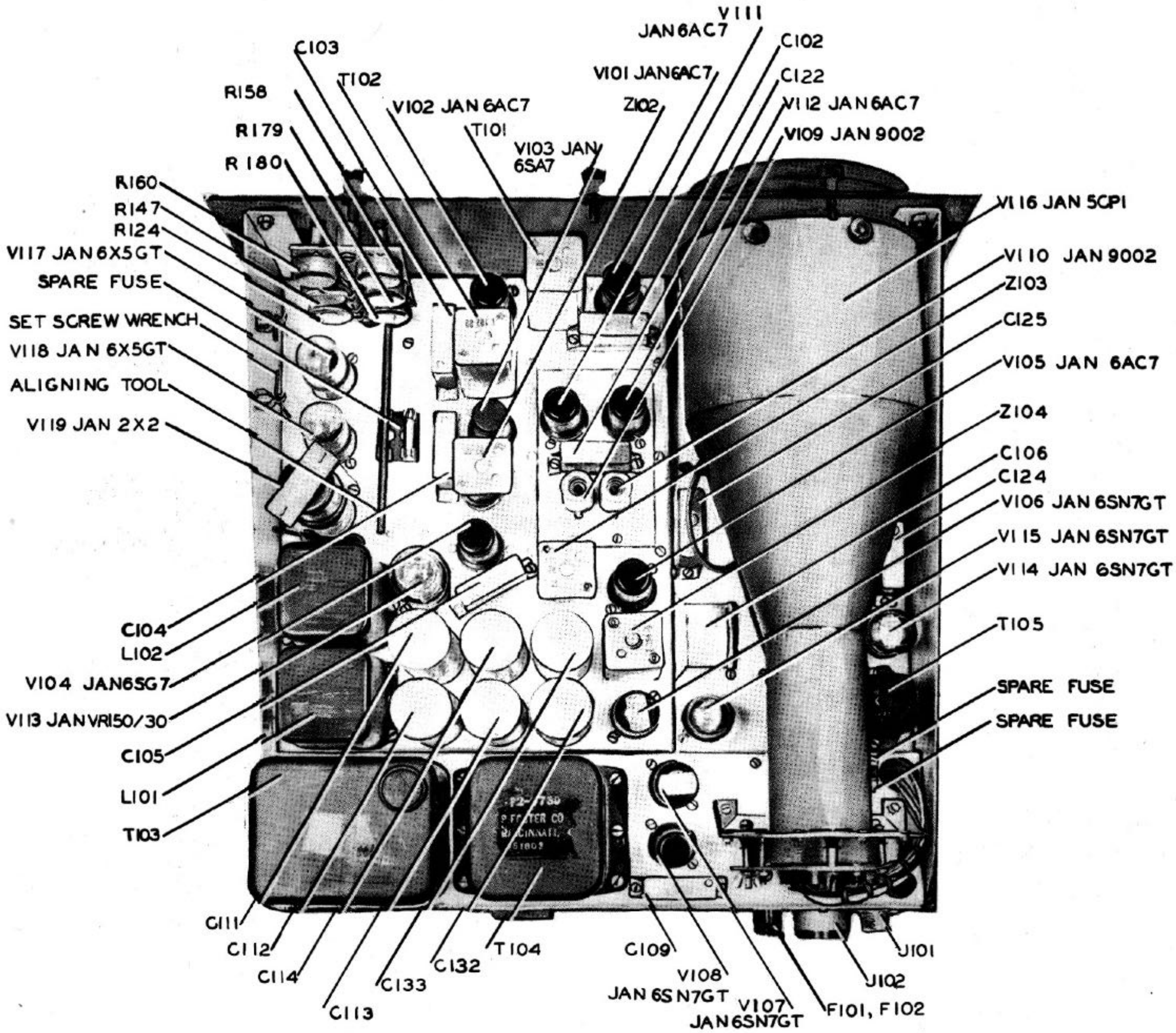


Figure 1-3.- Navy Model RDP, Top View of Chassis.

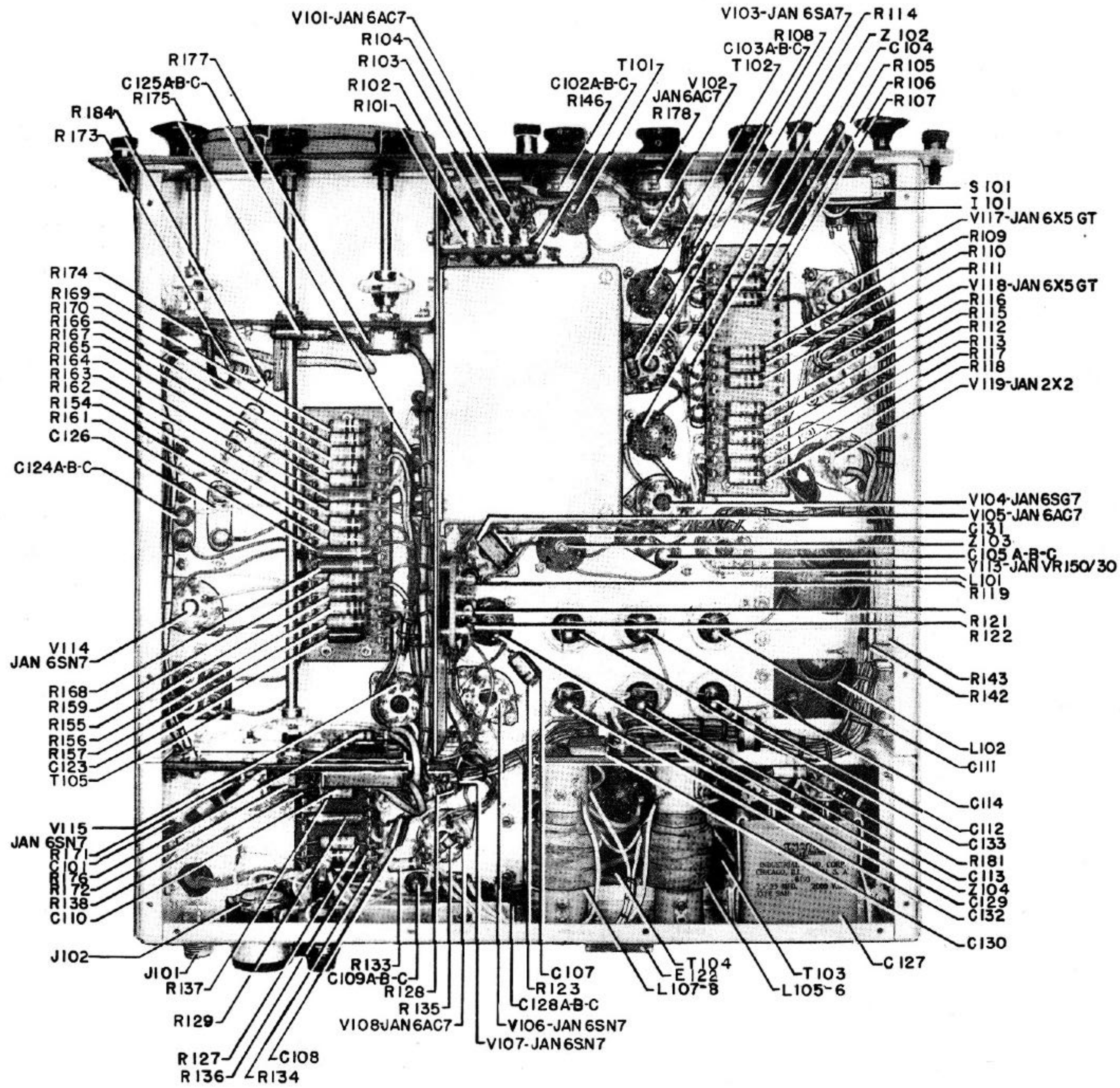


Figure 1-4.- Navy Model RDP, Bottom View of Chassis.

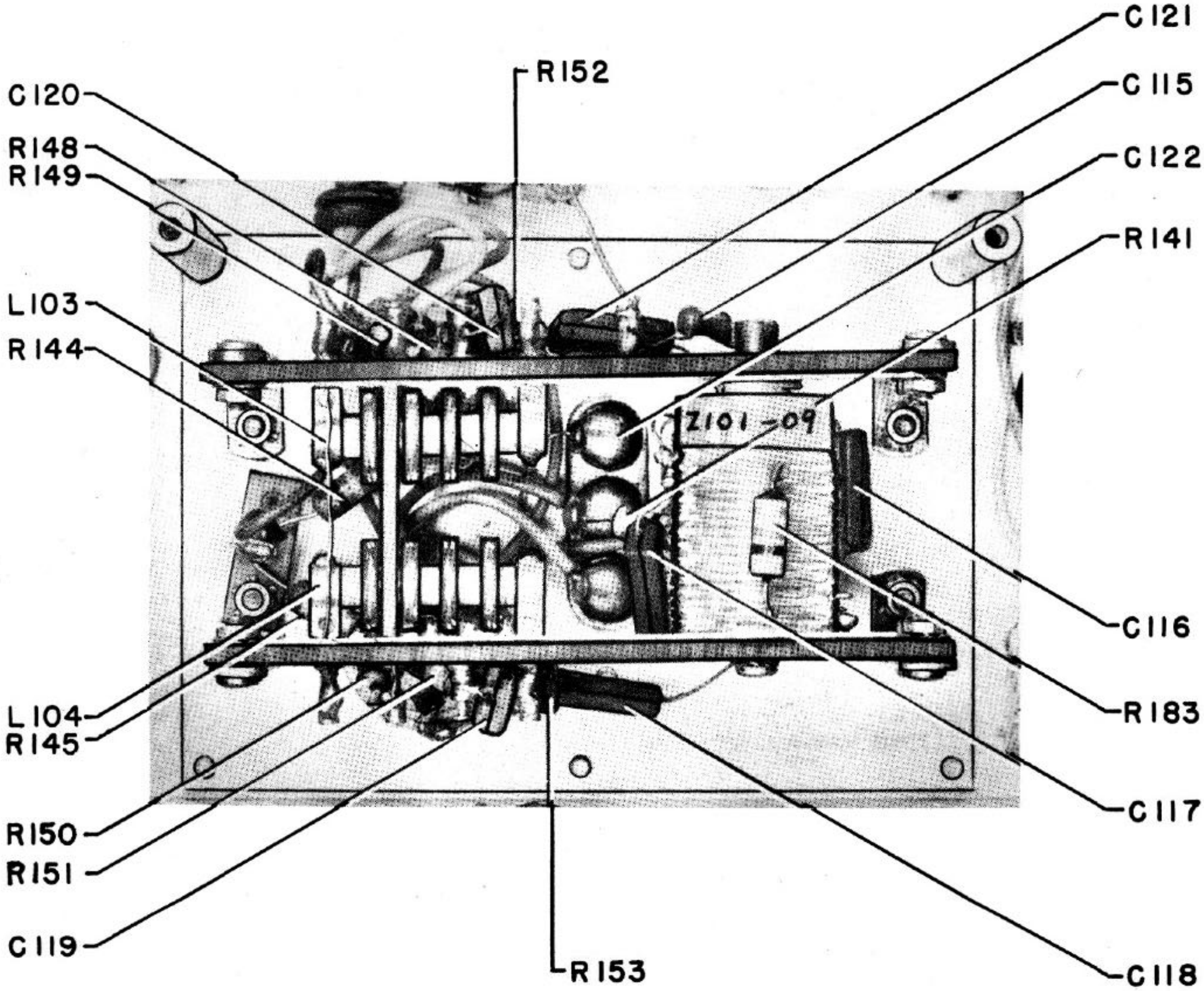


Figure 1-5.- Navy Model RDP, Bottom View of FM Oscillator and Reactor Chassis.

SECTION II – INSTALLATION AND ADJUSTMENT

1. SPECIAL INSTRUCTIONS FOR UNPACKING EQUIPMENT.

When the crate is disassembled, place the carton on a clean working surface with its top up.

Open the top with the hands, a knife, or any other instrument, by pulling up each of the four flanges which form the top of the carton. Immediately under the top is an air cushion, marked INSTRUCTION BOOK and CABLES. Lift up this cushion, take it out of the carton, and remove books and cable.

The next "skin" is a butyral, cloth-backed moisture-vapor barrier which has been heat sealed. Carefully open the barrier by removing the heat sealed portion with a scissor or sharp knife. This will preserve the pouch for possible future use.

Remove the equipment from the open pouch with caution to avoid damage to either the equipment or the barrier. The dehydrating agent (dessicant) found inside the carton may not be reused and hence may be disposed of. Fold the bag along its natural fold lines, and store for future use. It might be found advisable to preserve the carton in its folded form, if its condition warrants it.

In removing the waterproof paper around the equipment, be careful to avoid scratching the cabinet with sharp pointed instruments.

2. PRE-INSTALLATION TESTS.

a. Test Equipment.

Signal generator	– range 5mc. to 40mc.
Voltmeter	– 0–3000V. D.C., 0–2500V. A.C. Sensitivity 1000 ohms/volt min.
Oscilloscope	– Optional

b. Test Procedure.

The Navy Model RDP is factory wired for a 115V, 55/65 cycles single phase A.C. power source. For 230V., 55/65 cycles operation, see Section V, Par. 8 and Fig. 5–2. BE SURE THAT YOU HAVE THE PROPER POWER SOURCE AVAILABLE.

Plug the power cable into the receptacle on the back of the adaptor chassis. The plug is polarized. Insert the plug into the receptacle. A spring lock will lock the plug to the receptacle. Now attach the other end of the power cable to the power source.

"Warning" – Do not tamper with any semi-adjustable control behind the slide panel.

Turn on the power switch which is at the lower right hand corner of the front panel. The pilot light should go on at once. Turn the BRILLIANCE control to approximately its #6 position. In half a minute the baseline should appear on the Panoramic screen as either a blurred or a sharp line.

NOTE: DO NOT ALLOW THE TRACE ON THE SCREEN TO COMPETE WITH SUNLIGHT OR BRIGHT LIGHT.

Now perform the following tests which cover operation of main controls, the R.F. Bandpass characteristics, and the sensitivity of the adaptor.

(1) FOCUS – Turn the FOCUS control from zero through nine. (The GAIN control should be near Zero). You will notice that the baseline will become sharp or blurred. At some setting of the FOCUS control the baseline will be sharp. Find this setting and leave the control there. This control will be used to focus screen traces so that they are clear and sharply defined.

(2) INTENSIFIER – Set the INTENSIFIER control at Zero. Set the GAIN control near eight or nine for almost maximum gain. The baseline will break up into vertical deflections representing noise. Now turn the BRILLIANCE control counterclockwise until the noise deflections almost fade out. Turn up the INTENSIFIER control. The noise lines will become brighter. In duration, noise deflections are somewhat similar to pulse deflections. This control, therefore, is used to intensify pulse signals. During the reception of other types of signals, it should be set at Zero.

(3) BRILLIANCE control can be checked quickly by turning the BRILLIANCE knob from Zero to nine. The baseline or noise deflections should vary in brilliance. Possibly the focus of the trace may be affected as the BRILLIANCE control is varied. Readjustment of the FOCUS control will compensate for such change.

(4) CENTER FREQ(uency) – Connect the output of the signal generator to the R.F. input connector which is at the rear of the chassis of the adaptor. After the signal generator and adaptor have warmed up, apply a 30mc. signal. Set the FOCUS and BRILLIANCE controls for a clear, sharp trace. Set the SWEEP control at ten. Reduce the GAIN so that a minimum of noise shows on the screen. If the signal generator, adaptor, and CENTER FREQ control are adjusted properly, there should be a peak, representing the signal, exactly over the Zero mark on the screen. Turn the SWEEP control counterclockwise. The peak will broaden but it should remain centered. Turn the SWEEP control fully clockwise.

Turn the CENTER FREQ control back and forth. The deflection should shift back and forth across the screen as you turn the control. This CENTER FREQ control is used to maintain or restore the centered condition in a properly aligned adaptor.

(5) GAIN – Turn the GAIN control from Zero to nine. Noise lines should appear and increase in size as you turn the knob clockwise.

(6) SWEEP – Use the same set up as in the CENTER FREQ test. Be sure that the CENTER FREQ control is properly set so that the 30mc. signal appears

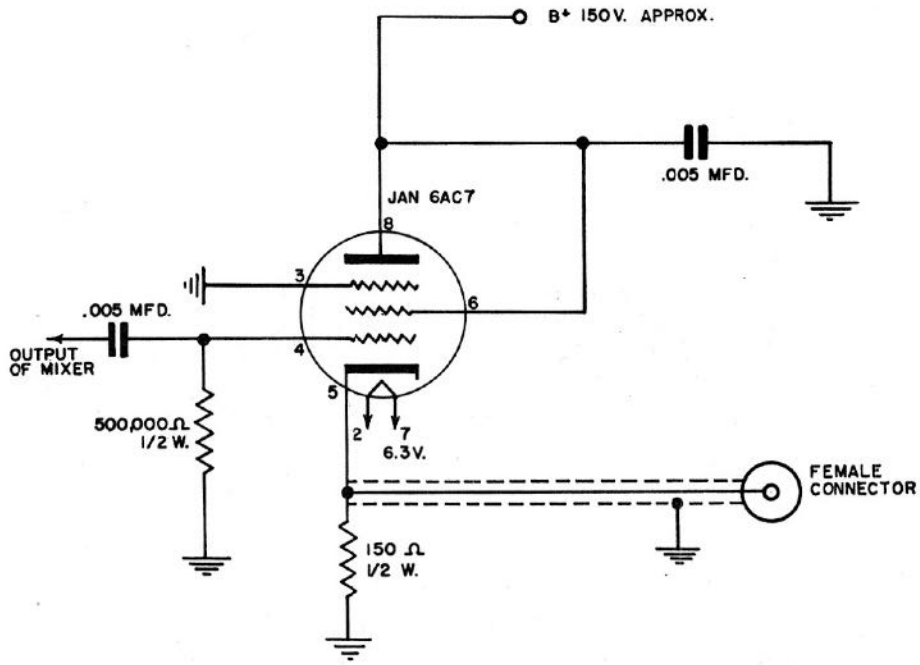


Figure 2-3. - Cathode Follower Circuit.

c. Find a proper place for the adaptor. The adaptor may be mounted over the companion receiver or it may be set in a rack. However, if possible, do not mount the adaptor over ventilation holes of the companion receiver. To prevent a decrease in the strength of the signal applied to the input of the adaptor, the cable connection between the adaptor and receiver should be as short as possible.

d. Reference can be made to the Installation Drawing (see Section II, Figure 2-4) for all necessary mounting dimensions.

e. Insert the male plug at one end of the connecting coaxial cable into the receiver receptacle. Insert the male plug at the other end of the cable into the adaptor input receptacle. Fasten both plugs to their respective connectors.

f. Now you can reconnect the power lines to both the receiver and adaptor.

4. POST-INSTALLATION OPERATING TESTS.

"Warning" — Do not tamper with the controls behind the front slide panel. The operation of the adaptor will be affected seriously if these controls are upset. See Section V, Par. 7.

a. Turn on the receiver and check its operation. The antenna should remain connected to the receiver in the normal manner.

b. Turn on the adaptor by snapping the "OFF-ON" switch to the "ON" position.

c. Turn the GAIN down to Zero.

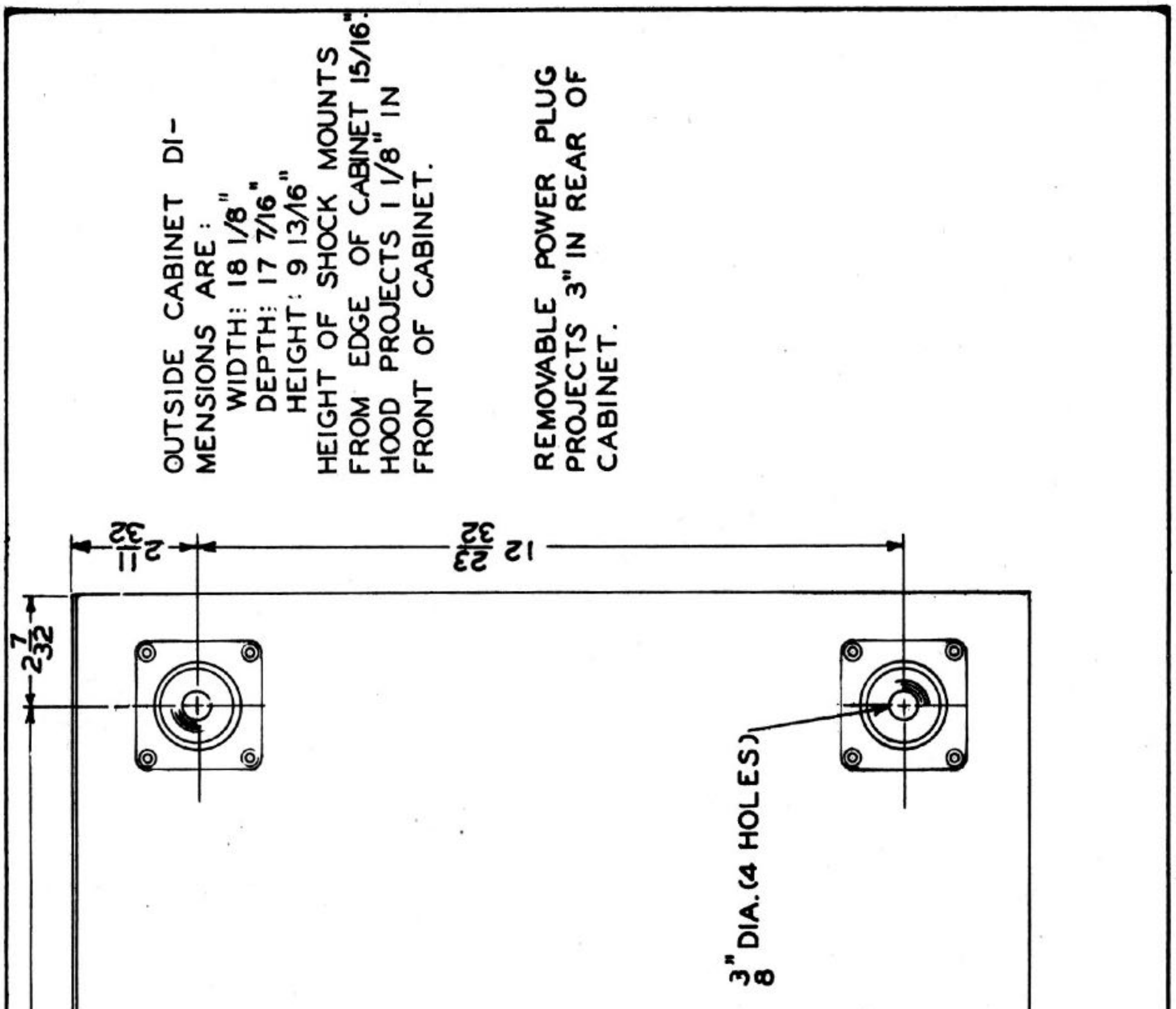


FIGURE 2-4 - Navy Model RDP, Mounting Dimensions

d. Turn the INTENSIFIER control to Zero.

e. Turn the BRILLIANCE control to about 6. Wait for the baseline to appear. This should take about 1/2 minute.

f. Adjust the FOCUS control for a clear, sharp baseline. Use the BRILLIANCE control to vary the brightness of the baseline.

g. Set the SWEEP control to 10 or maximum sweepwidth.

h. Turn the GAIN control up about halfway.

i. Slowly tune the receiver, and soon one or more signals will appear on the panoramic screen and they will move across it as you tune the receiver. If no signals appear, look under Maintenance, Section V, Par. 4.

j. Tune in a single station on the receiver, using phones or speaker. The signal should appear directly over the Zero mark on the screen. If it does not, reduce the SWEEP so that the signal deflection broadens to a base of about one inch to one and a half inches. Turn the CENTER FREQ(uency) control so that the peak of the deflection is directly over the Zero mark. Return the SWEEP to maximum. The peak should remain centered. If it does not, the front slide panel must be raised and the HOR. POS(ition) control must be adjusted, by using a screwdriver, to center the peak. "NOTE" – Do not make any adjustments until the adaptor has had a warm-up period of at least 15 minutes.

The CENTER FREQ(uency) control is used to adjust the mean frequency of the Panoramic Adaptor oscillator so that the signal will remain approximately centered no matter what the position of the SWEEP control may be. If the peak is centered incorrectly, it will run off the screen as the SWEEP is turned toward Zero.

SECTION III — OPERATION

1. DEFINITIONS APPLYING TO PANORAMIC UNITS

Since 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 Unit shall be a device which utilizes intermediate frequency output from a companion receiver to present visually a limited continuous frequency spectrum indication which includes the desired signal to which the receiver is tuned.

b. Panoramic Reception is the simultaneous visual reception of one or several radio signals whose frequencies are distributed over a portion of the radio frequency spectrum.

c.. Input Coupling Device shall be a device inserted between the output of the signal source and the input terminals of the Panoramic Unit. Its electrical constants shall be such as to simulate the impedance characteristics at the panoramic output terminal of the receiver with which the unit is designed to operate.

d. Base Line shall be the trace produced by the horizontal sweep amplifier along which the signal deflections are produced. The baseline shall be visible throughout its entire length which shall be 1-3/4 times the "minimum useful cathode ray tube radius" as defined in the latest revision of the JAN-1 Vacuum Tube Specifications.

e. Standard Signal Deflection shall be the signal deflection above the baseline which is equal to 1/2 the minimum useful cathode ray tube radius of the particular type of cathode ray tube involved.

(1) Standard Signal Deflection Output Voltage shall be the deflection voltage superimposed upon the centering voltage applied to the vertical deflection plates of the cathode ray tube, corresponding to Standard Signal Deflection on the cathode ray tube screen.

f. Standard Gain shall be the gain at which Standard Noise Deflection is obtained.

(1) Standard Noise Deflection shall be the average noise deflection above the baseline which is equal to 1/6 the minimum useful cathode-ray tube radius of the cathode-ray tube used.

g. Static Center Frequency shall be the input frequency to the unit at which maximum screen deflection is obtained when the sweepwidth is zero and the unit is adjusted for Standard Gain.

h. Dynamic Center Frequency shall be the input frequency to the unit which produces a deflection peak at the zero sweep calibration mark on the baseline with the unit adjusted for maximum sweep control setting and Standard Gain.

i. Resolution shall be the extent to which the Panoramic Unit is capable of differentiating between two separate signals.

j. Standard Resolution shall be the frequency difference between two signals of Standard Signal Deflection amplitude which intersect at 50% of the distance between the baseline and the standard deflection peak, at Standard Gain and maximum sweep-width.

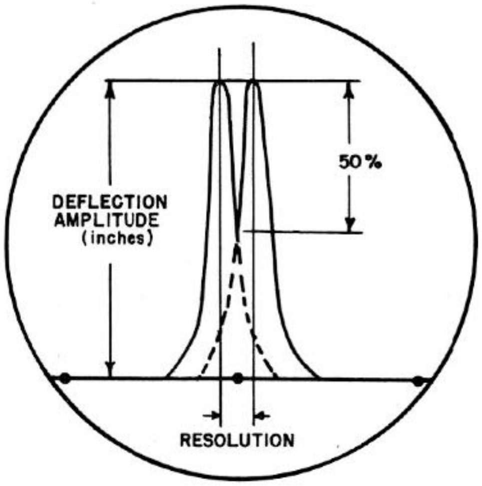


Figure 3-1. - Navy Model RDP, Standard Resolution.

k. Pre-Amplifier (Band-Pass Amplifier) and/or Circuits shall consist of all circuits between the input coupling device and the panoramic first frequency converter.

l. Spurious Modulation Response shall be the degree to which the panoramic unit responds to undesired frequencies, such as the power-line frequency, or undesired audio ripple in the power supply, as regards distortion or aberration of the normal response pattern obtained on the cathode-ray tube screen without such spurious modulation effects.

m. Heterodyne Oscillator Mean Frequency shall be the frequency of the heterodyne or conversion oscillator at zero sweep.

n. Sweep-Frequency (scanning rate) shall be the modulation rate of the heterodyne oscillator.

o. Visual Response Frequency Limits shall be the maximum difference in input frequencies applied to the Panoramic Unit which produces deflection peaks at the extremities of the baseline with the unit adjusted for maximum sweep control setting and Standard Sensitivity.

2. OPERATING PROCEDURE, GENERAL.

"WARNING" - Avoid touching any of the controls behind the front slide panel. Adjustment of these controls should be made by experienced personnel only. See Section V, Par. 7.

a. Turn on the receiver and check its operation.

b. Snap "ON" the "ON - OFF" switch which is at the lower right hand corner of the adaptor. Immediately, the pilot light, above the switch, should glow.

c. Turn the INTENSIFIER control down to Zero. This control should be used only when receiving pulse signals.

d. Turn the GAIN control down to Zero.

e. Rotate the BRILLIANCE control to about 6. This control should be used to vary the brightness of the trace on the Panoramic screen. Wait for the baseline to appear. This should take about one-half a minute.

f. Adjust the FOCUS control until the baseline is clear and sharp.

g. Readjust the BRILLIANCE control to make the baseline as bright as you wish, as long as it can be focused. It is advisable to avoid excessive brilliance in order to prevent injury of the fluorescent coating in the cathode ray tube.

NOTE - DO NOT ALLOW THE TRACE ON THE SCREEN TO COMPETE WITH BRIGHT LIGHT OR SUNLIGHT.

h. Set the SWEEP control at maximum by turning the knob fully clockwise, thus insuring that a signal which appears at either extreme edge of the calibrated screen is approximately 5 mc. away from the frequency to which the receiver is tuned.

Should the SWEEP control be turned counterclockwise to the left, the visible bandwidth on the screen will be made narrower and you will see fewer stations. However, those stations that are seen will be magnified. Therefore, this control is useful when two or more signals are so close that they almost merge into one another. By reducing the SWEEP, these close signals will seem to separate, and you can tune the receiver more accurately.

i. Turn the GAIN control up about halfway. Noise lines will appear along the baseline. If you turn the knob further clockwise, the noise lines will increase in amplitude.

It is best to keep the gain as low as possible, while still being able to see a peak on the screen for the weakest signal that you can hear through the receiver. A low gain keeps the noise level and the spurious signal level down, and makes it easier to compare weak signals that are close to strong ones.

j. Tune in a single station on the receiver using phones or speaker. A peak representing the station should appear directly over the zero mark on the screen. If the peak appears on either side of the zero mark, however, merely reduce the SWEEP so that the peak broadens. Now adjust the CENTER FREQ(uency) control so that the signal deflection is centered. Return the SWEEP to maximum, and if this causes a horizontal shift of the peak, re-center the peak by adjusting the HOR. POS. control. The signal should remain centered regardless of the position of the SWEEP control.

Should more than one signal appear on the screen, one of them appearing over the zero mark, and you are not sure that the one over the zero mark is actually the station to which you are tuned and which you hear, make the following quick check. Turn the SWEEP control almost to zero. The signals will tend to run off the screen. If the signal originally over the zero mark remains over zero, then it is the one to which the receiver is tuned. However, if this signal runs off the screen as you vary the SWEEP, the CENTER FREQ control is not properly adjusted.

k. From the location of signals on the calibrated screen, you can determine the frequencies of these signals provided that the CENTER FREQ control is properly adjusted and the SWEEP CONTROL is set at maximum.

Each division on the calibrated scale represents approximately one megacycle. To determine the frequency of a peak under observation, note the frequency of the station to which the receiver is tuned (as indicated by the receiver dial) and to this frequency add or subtract the calibration on the screen scale corresponding to the signal peak under observation. Whether the calibration is to be added to or subtracted from the frequency to which the receiver is tuned may be determined from the following: If the heterodyne frequency oscillator of the companion receiver tracks above the frequency to which the receiver is tuned, those signals which appear on the right side of the screen are higher in frequency than the one to which the receiver is tuned, whereas those on the left side of the screen are lower in frequency. However, if the heterodyne frequency oscillator of the companion receiver tracks below the frequency to which the receiver is tuned, the reverse is true.

l. To stop operation of the adaptor alone, push the "OFF-ON" switch to the "OFF" position.

3. OPERATING PROCEDURE FOR PULSE SIGNALS.

Pulse signals are composed of a series of pulses which are of extremely short duration. Therefore, a peak produced by one of these pulses traverses the screen vertically for so short a period of time that the excitation of the fluorescent coating of the cathode ray tube may be insufficient to produce a visible trace. Merely turning up the BRILLIANCE control does not help because the baseline becomes so bright that it "washes out" the pulse pattern. Therefore, use the following procedure:

a. Follow the regular operating procedure, but upon reception of pulse signals,

b. Reduce the brightness of the baseline, by varying the BRILLIANCE control, so that the baseline is barely visible.

c. Turn the INTENSIFIER control clockwise. The pulse peaks should be fairly clear and sharp while the baseline is not equally apparent. If not, use FOCUS control.

4. OPERATING PROCEDURE FOR ESTIMATING PULSE RATE OF PULSE SIGNALS.

In case you want to estimate roughly the number of pulses per second, follow the procedure below:

a. Follow the Operating Procedure for Pulse Signals.

b. Turn the SWEEP control to Zero. The pulse peaks should spread across the entire screen. The peaks may appear to move across the screen, but at any one moment the number of peaks on the screen will not vary.

c. Multiply the number of peaks by 30. This will give you a rough estimate of the number of pulses per second.

"NOTE" - The multiplier is 30 only when the line frequency is 60 cycles per second. The multiplier should equal half the line frequency.

5. INTERPRETATION OF SIGNALS.

With a little experience, you will be able to recognize visually the character of various types of signals, without the need of listening to them. Remember that the Panoramic Adaptor can show only what the companion receiver is able to receive. Therefore, for proper all-around service, the companion receiver must be perfectly adjusted.

You will find that many different signals will appear around the signal to which the receiver is tuned. The information below will help you in determining the types of signals under observation.

a. Constant Carrier.- A constant carrier appears as a deflection of fixed height. See Figure 3-2 (A).

b. Amplitude Modulated Carrier.- An amplitude modulated carrier takes on different appearances according to the position of the SWEEP control.

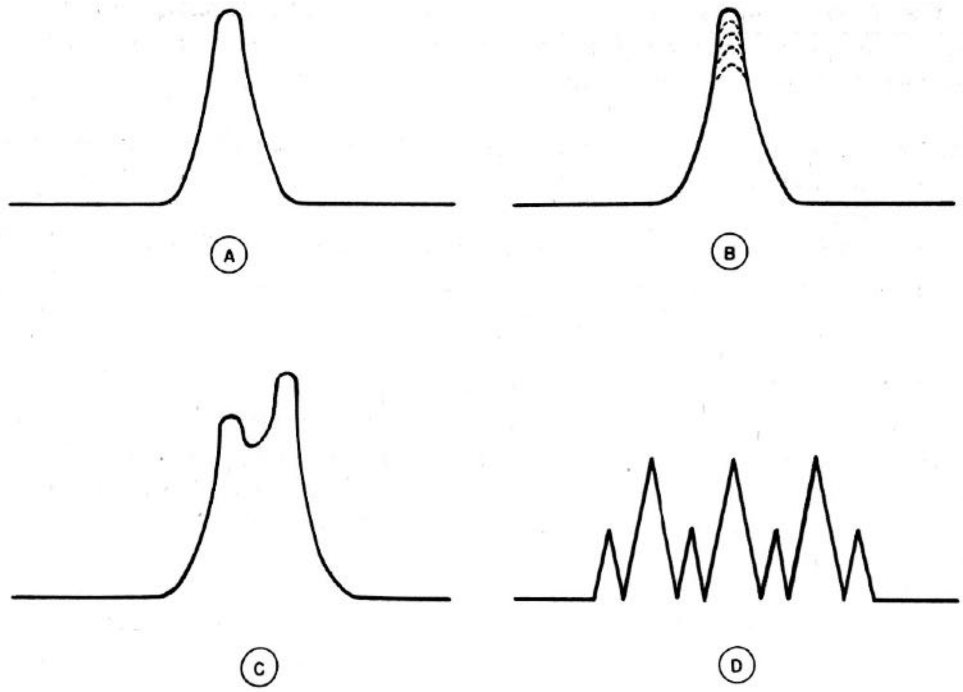
When the SWEEP control is set at maximum, the height of the deflection varies with the percentage of modulation. See Figure 3-2 (B). Possibly you may see irregularities, representing sidebands, at the base of the deflection. As the modulating frequency is increased these irregularities will tend to move away from the center of the deflection.

When the SWEEP control is turned gradually so that the sweepwidth of the adaptor is reduced, convolutions will appear along the sides of the deflection. The number of convolutions is determined by the modulating frequency. In the meantime, the width of the deflection increases more and more as the sweepwidth is reduced and the convolutions become more and more apparent.

Finally, when the SWEEP is brought to Zero, the adaptor becomes an oscilloscope and you will see a pattern of the modulating frequency.

If a constant tone modulation is used, two distinct sidebands will appear if the modulating frequency is sufficiently high. The sidebands will move away from the carrier deflection as the modulating frequency is increased.

You may find that as you tune the receiver, the relative heights of the two sidebands and the carrier will vary as they move across the screen. This is due to the fact that the overall response of the receiver and the adaptor is not perfectly flat. Therefore, the two sidebands may appear unequal in height even though, actually, they are of equal strength.



(A) Constant Carrier
(B) Amplitude Modulated Carrier
(C) Single Side-band Modulation
(D) Frequency Modulated Carrier

Figure 3-2. - Typical Signal Traces.

c. Single Side-band Modulation.- Single sideband modulation will appear as two carriers of slightly different frequency provided that the modulating frequency is high. If the modulating frequency is not high, the sideband and carrier run together and only one deflection will be apparent. See Fig. 3-2 (C).

d. Frequency Modulated Carrier.- A frequency modulated carrier appears as a carrier whose baseline width varies. As the carrier is modulated by voice or music, deflection peaks appear on both sides of the carrier. As the percentage of modulation is increased, the deflection peaks appear farther away from the center carrier deflection. This is due to the fact that modulation of the carrier causes the carrier to shift in frequency. The magnitude of the shift is determined by the amplitude of the modulating frequency. See Figure 3-2 (D).

e. CW Signals.- A CW signal appears and disappears in step with the keying of the transmitter. If the BRILLIANCE control is turned down, and the INTENSIFIER control is turned up, CW signals will appear as flashing peaks. The base line will be rather dim.

f. MCW Signals.- An MCW signal will appear and disappear like a CW signal if the R.F. section of the transmitter is keyed. If the audio section only of the transmitter is keyed, the signal will appear as a deflection which increases in height as a code character is transmitted. If the modulation frequency is high, sidebands may appear.

g. Transient Disturbances.- Transient disturbances are either periodic or aperiodic.

Aperiodic transients, such as static, appear as irregular deflections and flashes along the whole frequency sweep axis.

Period transients, such as ignition or vibrator disturbances appear as deflections which may move along the baseline in one direction or another. This is caused by the fact that the oscillator sweep is of a definite rate while the transient occurs at a variable rate. However, should the transient be synchronized with the line frequency then the deflection of the transient will remain fixed.

h. Tube Noises. - Tube noises appear as varying irregularities along the frequency sweep axis. The high gain of the receiver or adaptor causes these noise deflections. Adjust the gain controls to reduce such disturbances.

i. Images. - Images will move on the screen in an opposite direction with respect to normal signals as the companion receiver is tuned. See Section III, Par. 1h. Images are most likely to appear on higher frequency ranges of the receiver.

j. Harmonics. - Several types of spurious signals may become visible on the screen under certain conditions. One such type of spurious response moves across the screen more rapidly than the true signal as you tune the receiver. This occurs when the input signal to the adaptor is of such strength as to cause non-linear operation of the R.F. section of the adaptor, with consequent production of harmonics. Beating with the oscillator frequency, these harmonics, if of sufficiently high voltage, causes spurious signals to appear. Second harmonic spurious signals will move through double the number of megacycles as compared with the true signal, while higher harmonics will produce relatively faster motion. Reduction of receiver gain will serve to lessen this type of response, since sufficient attenuation of the input signal will appreciably lower the ultimate harmonic content and clear the base line of the screen.

Another type of spurious response, known as "LITTLE BROTHER", may appear along the right half of the screen and is produced by the second harmonic of the swept oscillator beating with the input signal to the adaptor. As the true signal moves across the screen through a certain number of megacycles, this spurious signal moves along with it through half that number of megacycles, appearing to the right of the true signal.

k. Diathermy apparatus. - Diathermy apparatus, which uses an unfiltered or A.C. power supply, will produce periodic disturbances that appear as deflection on certain parts of the screen and disappear on other parts of the screen. This is due to the fact that such equipment emits a pulsating signal in synchronism with the power line. The adaptor, too, sweeps the spectrum in synchronism with the line, but at half the line frequency and only when a certain phase relationship exists, is it possible for the adaptor to receive these periodic pulses.

l. 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 sidebands. These spurious signals can take place in either the receiver or adaptor on extremely strong signals. A slight reduction in the gain of the adaptor will eliminate this type of distortion.

m. Use of AVC of the Receiver.- If the AVC circuit of the receiver affects the mixer or any stages before the mixer, the signal at the center of the screen will affect the height of other signals. If the screen is tuned to a strong signal, AVC will act on the adjacent signals and other deflections may be reduced in height or they may not appear at all. Therefore, it will be found expedient in most applications, to operate the receiver with AVC cut off.

6. SUMMARY OF OPERATING PROCEDURE, GENERAL.

a. Turn on receiver.

b. Turn on the "ON-OFF" switch of the adaptor.

c. Turn the INTENSIFIER control to Zero.

d. Turn the GAIN down to Zero.

e. Turn BRILLIANCE control to about 6. Baseline should appear in about one half minute.

f. Adjust the FOCUS for a clear, sharp baseline.

g. Adjust the BRILLIANCE for desired brightness of the baseline.

h. Set the SWEEP control to maximum.

i. Turn the GAIN control up about half way.

j. Tune the receiver slowly. Signals should appear and move across the screen. Readjust the GAIN control for satisfactory deflection amplitude.

k. If necessary, use the CENTER FREQ. control to center, on the screen, the station which you hear.

l. To stop operation of the Adaptor push "ON-OFF" switch to "OFF".

7. SUMMARY OF OPERATING PROCEDURE OF PULSE SIGNALS.

a. Follow the regular operating procedure. Upon reception of a pulse signal,

b. Reduce the BRILLIANCE control so that baseline is barely visible.

c. Turn the INTENSIFIER control clockwise until the pulse signal is clear.

8. SUMMARY OF PROCEDURE FOR ESTIMATING PULSE RATE.

a. Turn SWEEP control to Zero, after following the procedure under Par. 7.

b. Multiply the number of peaks on the screen by 30 or one half of the line frequency. The product equals the approximate pulse rate.

SECTION IV - THEORY OF OPERATION

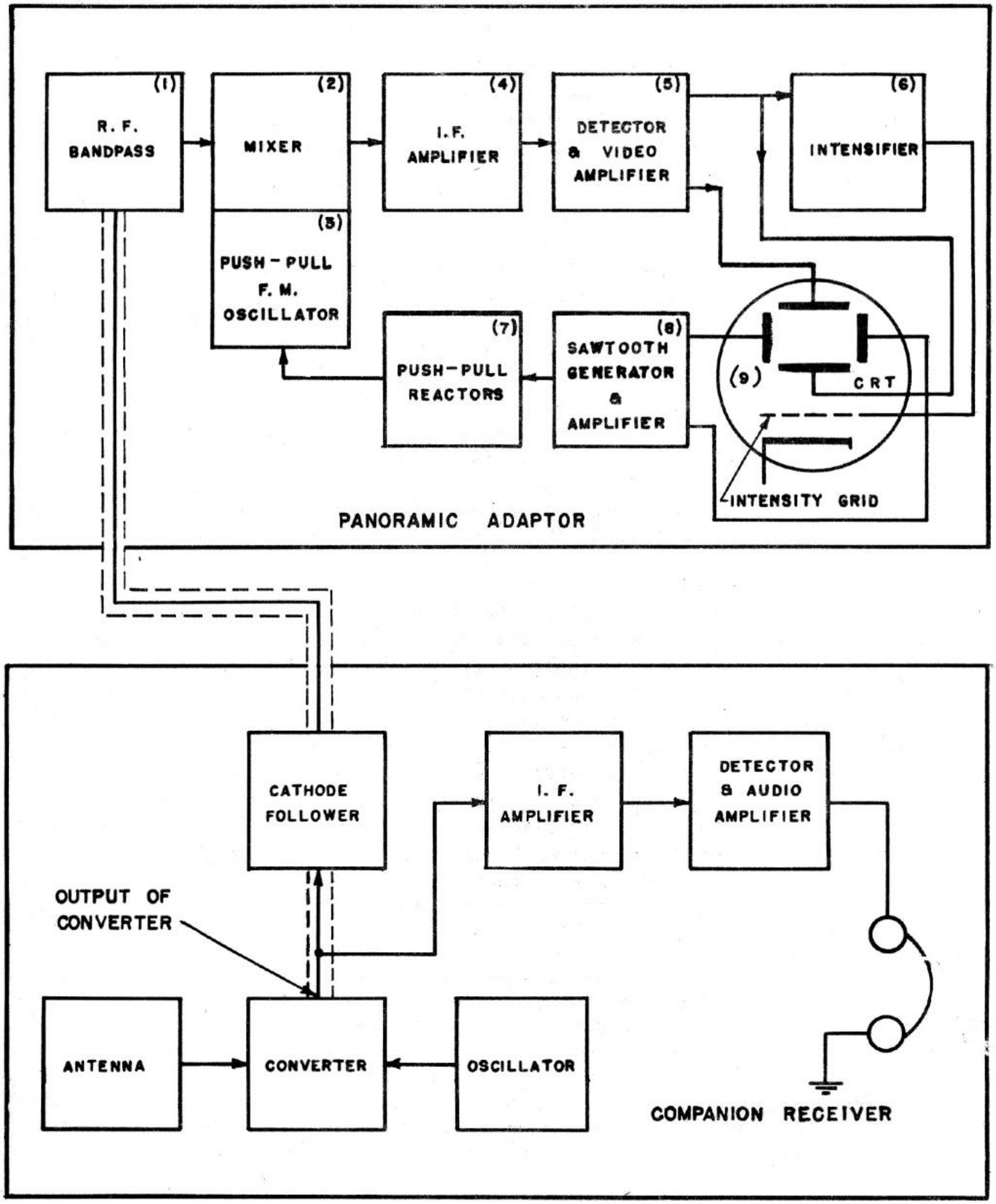


Figure 4-1. - Navy Model RDP, Block Diagram.

1. THEORY OF OPERATION.

The companion receiver must be a superheterodyne receiver having an intermediate frequency of 30mc. ±250KC. In the output of the mixer of the companion receiver there may be signals of many frequencies. The bandpass characteristics of the I.F. Amplifier section determine to a great extent which of these output signals will be amplified and subsequently heard.

The Panoramic Adaptor RDP is a complete superheterodyne receiver in itself. The input of the Adaptor is connected, through a cathode follower circuit, to the output of the mixer of the companion receiver. The frequencies which are fed to the input of the adaptor are determined, for all practical purposes, by the selectivity characteristics of the R.F. section of the companion receiver. If, merely for the sake of analysis, it is assumed that all the signals received by the companion receiver are of equal strength, then the relative strength of these signals, in the output of the mixer, will be determined by the selectivity characteristics of the R.F. section of the receiver. See Figure 4-3. From that drawing it is seen that in the output of the mixer, those frequencies near and corresponding to the I.F. of the receiver will be greater in strength than those frequencies on either side of the receiver's I.F.

The Panoramic Adaptor, on the other hand, has an input amplifying stage with a bandpass characteristic which is inverse to that of the receiver. (Figure 4-2 and Figure 4-3). That is, the input amplifier will amplify the frequencies on the fringe of the receiver's I.F., and vice-versa. Thus, when the two units are used together, the overall bandpass characteristic tends to be more or less uniform over the band for which the adaptor is designed, namely 10mc. The heavy line in Figure 4-3 illustrates the additive effects of the receiver and adaptor responses. The heavy line indicates also the approximate variation in deflection amplitude of a signal of constant strength as it moves across the adaptor screen when the receiver is tuned. "NOTE" - It is seldom that all four peaks are of equal amplitude. As the receiver is tuned to higher and higher frequencies, the side peaks will tend to increase with respect to the center peak. The reason for this is that the selectivity peak of the receiver diminishes as the frequency increases.

Therefore, due to the overall selectivity characteristics of the R.F. section of the receiver and the special input bandpass amplifier (Fig. 4-1 block (1)) of the adaptor, signal voltages within a band of 10 mc. can be fed to the mixer (Fig. 4-1, block (2)) of the adaptor. The mixer also receiver, from an FM oscillator (block (3)), a voltage which sweeps through a bandwidth of 10mc. As the oscillator sweeps through the band of 10mc., it beats progressively and periodically with one signal after another to produce an I.F. of 7.5mc. Thus, one signal after the other is periodically amplified by the I.F. Amplifiers (block (4)) which are tuned to 7.5mc.

Each signal (as an I.F.), in its own order, is subsequently rectified by the Detector (block(5)). The output voltage of the Detector is applied directly to

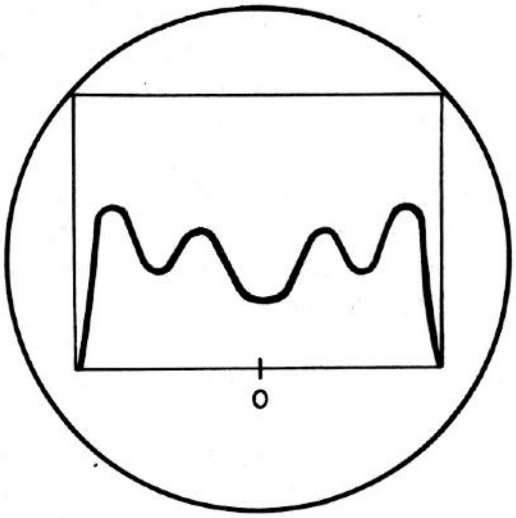


Figure 4-2. - Navy Model RDP, Bandpass Characteristics

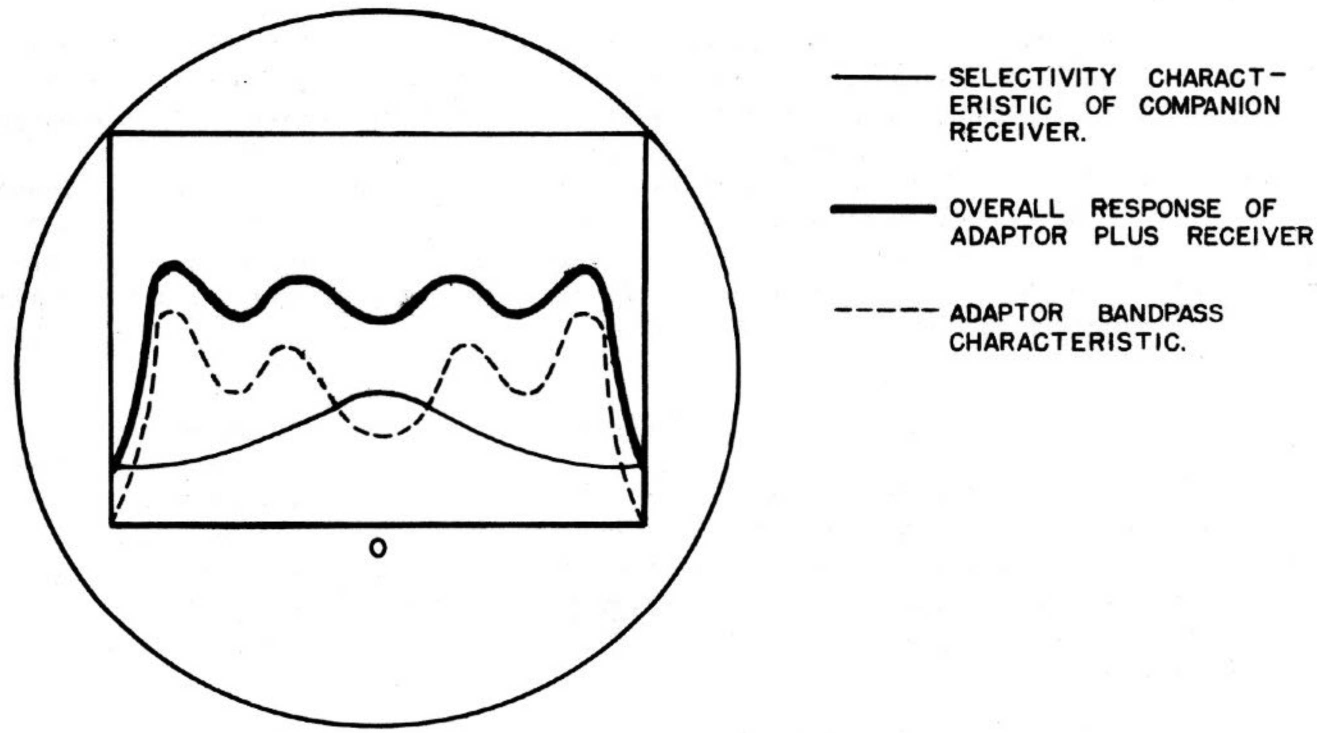


Figure 4-3. - Overall Bandpass Characteristics

The Video Amplifiers (block(5)), and the output of the Video Amplifiers is impressed on the vertical deflection plates of the cathode ray tube (block(9)). Each signal, then, produces a vertical deflection on the CRT screen.

Furthermore, each signal, according to its frequency, will produce a vertical deflection at a definite place along the horizontal axis of the CRT. The Sawtooth Generator (block(8)) produces a sawtooth voltage which is amplified and fed to the horizontal deflection plates of the cathode ray tube. This application of sawtooth voltage causes the electron beam in the CRT to bend periodically along the horizontal axis so that a horizontal trace is produced on the CRT screen. The magnitude of the instantaneous value of the sawtooth voltage determines the magnitude of instantaneous deflection of the electron beam. The sawtooth voltage is also fed to the Reactors (block(7)), which are used to vary electronically the frequency of the oscillator. The magnitude of the instantaneous value of the sawtooth voltage determines, partially, the frequency of the oscillator; and thus as the sawtooth voltage sweeps through all its instantaneous values, the oscillator sweeps through a particular bandwidth. The extent of the oscillator sweep depends upon the value of sawtooth voltage applied to the Reactors. Consequently, since both the degree of horizontal deflection of the electron beam and the oscillator frequency depend upon the same instantaneous value of sawtooth voltage, each vertical signal deflection will appear in a position along the horizontal axis of the screen according to the frequency of the signal. See Section IV, Par. 2g.

2. CIRCUIT ANALYSIS[1]

a. Bandpass Amplifying Section.- Refer to the block marked (1) in Figure 4-1 This section uses, in cascade, two JAN-6AC7 tubes, V101 and V102, which are high gain pentodes. The first stage of this two-stage section is connected to the output of the mixer of the companion receiver through a cathode follower circuit. The stage is an R.F. amplifier whose output is fed into a specially designed R.F. input transformer, T101-09, which couples the first and second stages. The primary and secondary of this transformer are tuned by distributed circuit capacitances. The coupling between the primary and secondary is such that it produces a double humped bandpass characteristic as shown in Figure 4-4. The humps appear at approximately 27.5mc. and 32.5mc.

The second stage also is a bandpass amplifier. The R.F. output transformer, T102-09, is also tuned by distributed circuit capacitances. However, this transformer is so coupled that double peaks appear at approximately 25.5mc. and 34.5mc. See Figure 4-5. The overall bandpass characteristic of this section, therefore, is a four-peak arrangement as shown in Figure 4-2. Thus, the combination of adaptor and receiver has a fairly flat response for 5mc. below and above the frequency to which the companion receiver is tuned. Each of the transformers is permeability tuned.

Condenser C101 is a DC blocking condenser which prevents DC interaction between the adaptor and the companion receiver. Resistor R101 is used to terminate the R.F. input line.

The plate and screen grid currents of V101, which flow through the cathode resistor, R102, develop cathode bias for tube V101. Condenser C102-A is an R.F. bypass condenser which filters the bias voltage developed across R102, thus preventing degeneration. R103 is a series screen dropping resistor for tube V101. Condenser C102-B is an R.F. bypass condenser which places the screen grid of V101 at R.F. ground potential. Resistor R104 and condenser C102-C constitute a decoupling filter

[1]Refer to Circuit Diagram attached to inside back cover of this instruction book.

for the plate circuit of the first stage thus preventing interstage reactions and hum modulation.

R105 is a cathode bias resistor. The plate and screen currents of V102 which flow through R105 develop bias voltage for V102. Condenser C103-A is an R.F. bypass condenser which filters the bias voltage. R106 is a series screen dropping resistor, C103-B, an R.F. bypass condenser, places the screen grid of V102 at R.F. ground potential. Thus the screen becomes an effective shield between the plate and control grid. R107 and C103-C constitute a plate decoupling filter for V102.

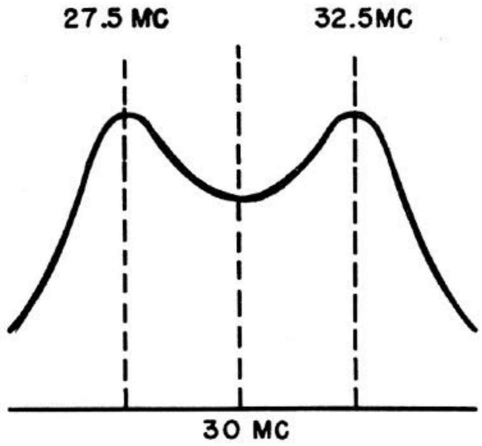


Figure 4-4. - Navy Model RDP, Bandpass Characteristic of Input Transformer.

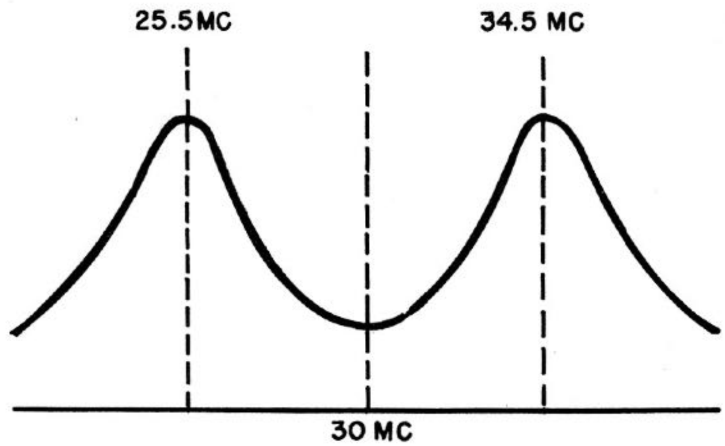


Figure 4-5. - Navy Model RDP, Bandpass Characteristic of Output Transformer.

b. Mixer Stage. - The mixer, marked block (2), is not only fed a series of signals which are within the range of the adaptor but also a signal of varying frequency, which is produced by a frequency modulated oscillator (block marked 3)). The mixer is so operated that beat frequencies are present in its plate circuit. A 6SA7 tube, V103, is used as a mixer.

R108 is the grid return and bias resistor for grid one, the injection grid, of V103. The plate and screen grid currents, which flow through R109, develop, across R109, bias voltage for grid three of V103. C104-A is an R.F. bypass condenser which smooths this bias voltage. R110 is a series screen dropping resistor for V103. C104-B is an R.F. bypass condenser which places the screen grids at R.F. ground potential. R111 and C104-C constitute a plate decoupling filter for the mixer stage.

c. FM Push-pull Oscillator. - The FM oscillator, marked block (3), is a permeability tuned push-pull type using a pair of JAN 9002 triode tubes, V109 and V110. Its frequency varies periodically by 5mc. above and below a mean frequency which is adjusted to represent the difference between the receiver's I.F. of 30mc. and the adaptor's I.F. of 7.5mc. Therefore, the oscillator mean frequency is approximately 22.5mc.

Condenser C115 couples the F.M. oscillator to the mixer stage. R139 and R140 are grid bias resistors for tubes V109 and V110, respectively. C116 and C117 are D.C. blocking condensers which keep from the control grids of V109 and V110 the B+ plate voltage. Resistor R141 is used so that the oscillator coil finds its own electrical center. The tuned circuit of the oscillator consists of the oscillator coil, Z101-09, the distributed capacities across the oscillator coil, and the inductance of the reactor circuit.

d. Reactor.- The block marked (7) is the reactor. The reactor stages, which use a pair of 6AC7 tubes, V112 and V111. form a part of the tuned circuit of the oscillator, and they vary the frequency of the oscillator in step with an amplified sawtooth voltage. The sawtooth voltage is applied to the control grids of the two reactor tubes. "NOTE" - The development of the sawtooth voltage will be treated under the B.T.O. oscillator.

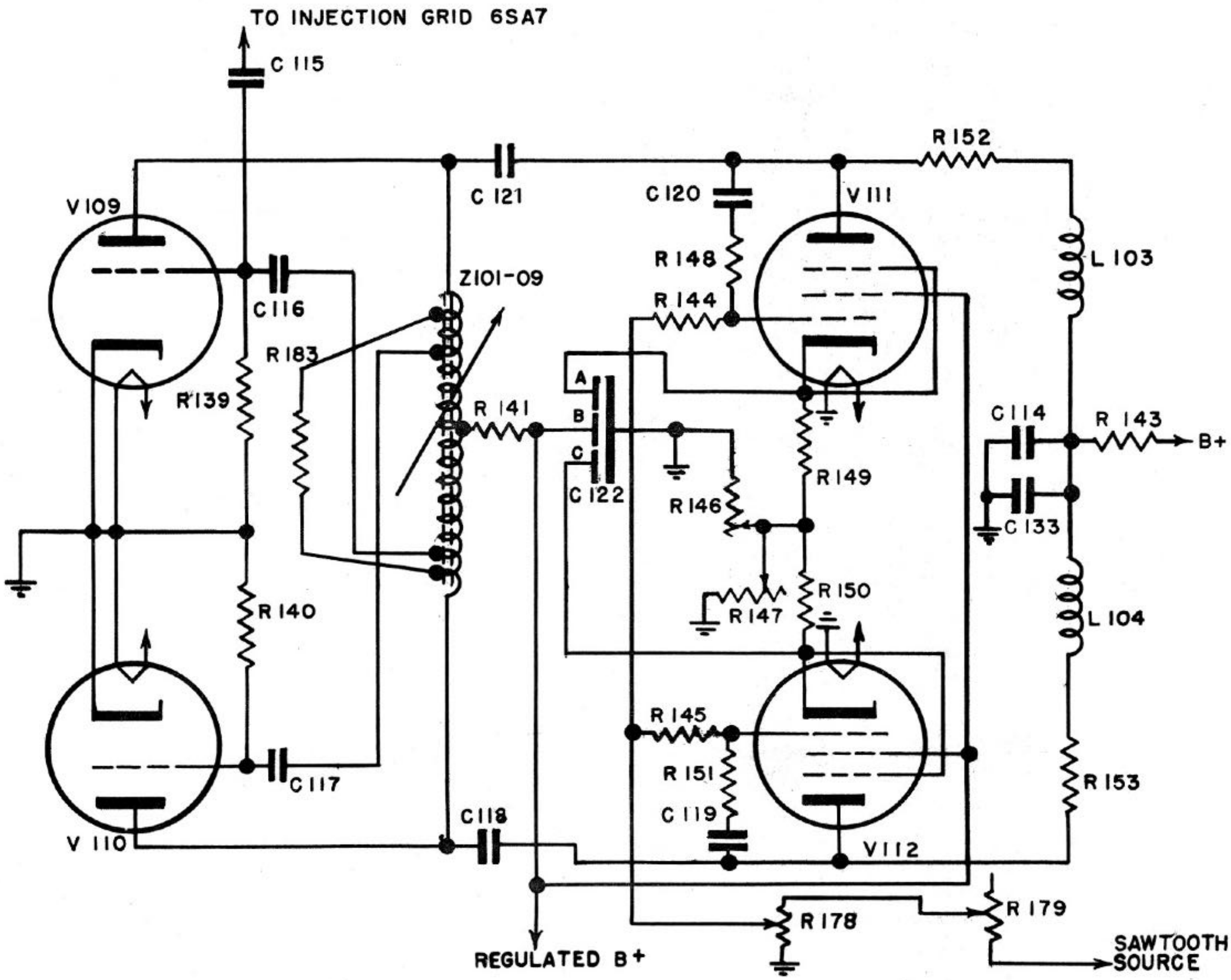


Figure 4-6. - Navy Model RDP, Circuit Diagram of Push-pull Oscillator and Reactor.

The schematic of the reactor and oscillator circuits, which are shown in Figure 4-6, can be represented by the block diagram in Figure 4-7.

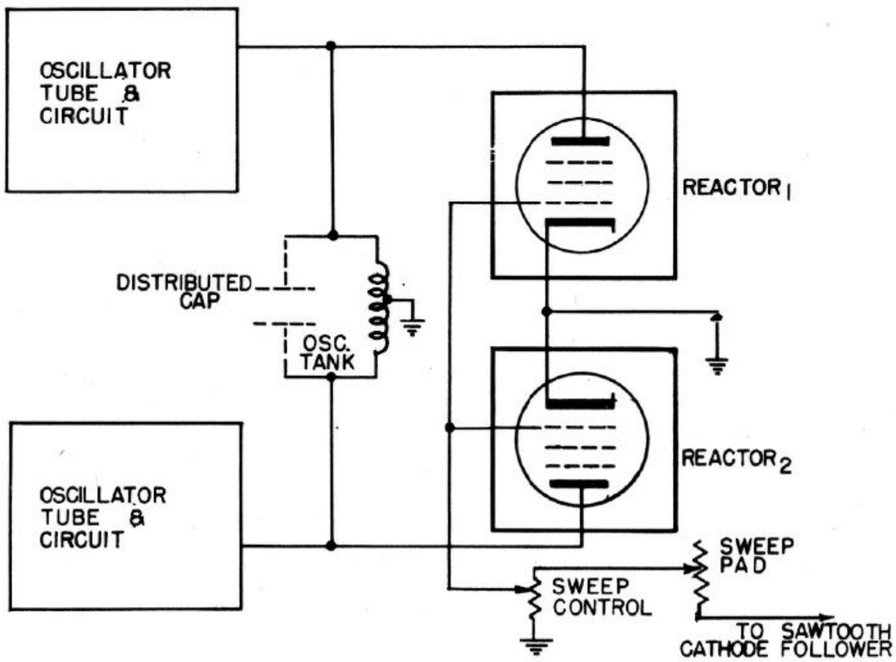
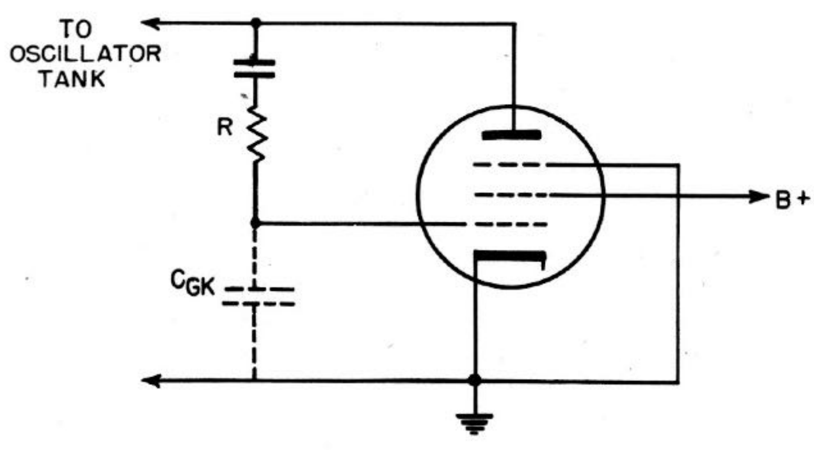


Figure 4-7. - Navy Model RDP, Block Diagram of Push-pull Oscillator and Reactor.

Thus it can be seen that the two reactors are so connected that effectively they are in series; and this series circuit, in turn, is in parallel with the oscillator tank.

A rigorous analysis of either reactor circuit would reveal that due to a phase shift in the reactor tube and in the phasing network between the plate and cathode of the tube, the reactor acts inductively. Figure 4-8 shows a simplified equivalent circuit of either reactors one or two.



(1) R is R148 or R151 in Fig. 4-6

(2) R and Cgk make up the phasing network

Figure 4-8. - Simplified Equivalent Circuit of Reactor.

The approximate value of this inductance may be calculated from the simplified formula below. The derivation of this formula is rather intricate and it is beyond the scope of this instruction book.

$$L = \frac{RCgk}{Gm}$$

where R = ohms
C = $\mu\mu$fd
L = μh
Gm = μmhos

Gm is a tube constant whose value may be changed by varying the voltage between the control grid and cathode. However, from the formula it may be seen that any variation of Gm affects the value of L. Therefore, any change of grid bias will affect the inductive value of the reactor. Hence, in Figure 4-6, R146 and R147, the CENTER FREQ control and the CENTER FREQ. PAD respectively, are used to vary the bias or operating points of the reactor tubes, thus affecting the average inductance of the oscillator tank and, consequently, the oscillator mean frequency. Adjustment of R178 and R179, the SWEEP control and SWEEP PAD respectively, determines the amplitude of the sawtooth voltage applied between the control grids and cathodes of the two reactor tubes and consequently the magnitude of the swing in inductance of the reactor. The magnitude of this inductance swing, in turn, determines the magnitude of the oscillator swing.

When the SWEEP control is set at Zero, the sawtooth voltage applied to the control grids of the reactor tube is Zero. The reactor tubes will no longer vary in inductance, and, therefore, the oscillator will operate only at its mean frequency. "NOTE" - The SWEEP PAD and CENTER FREQ PAD are semi-adjustable controls that should be set by experienced personnel only.

It may be seen then that actually the reactors are variable inductances, in series, connected across the oscillator tank as shown in Figure 4-9.

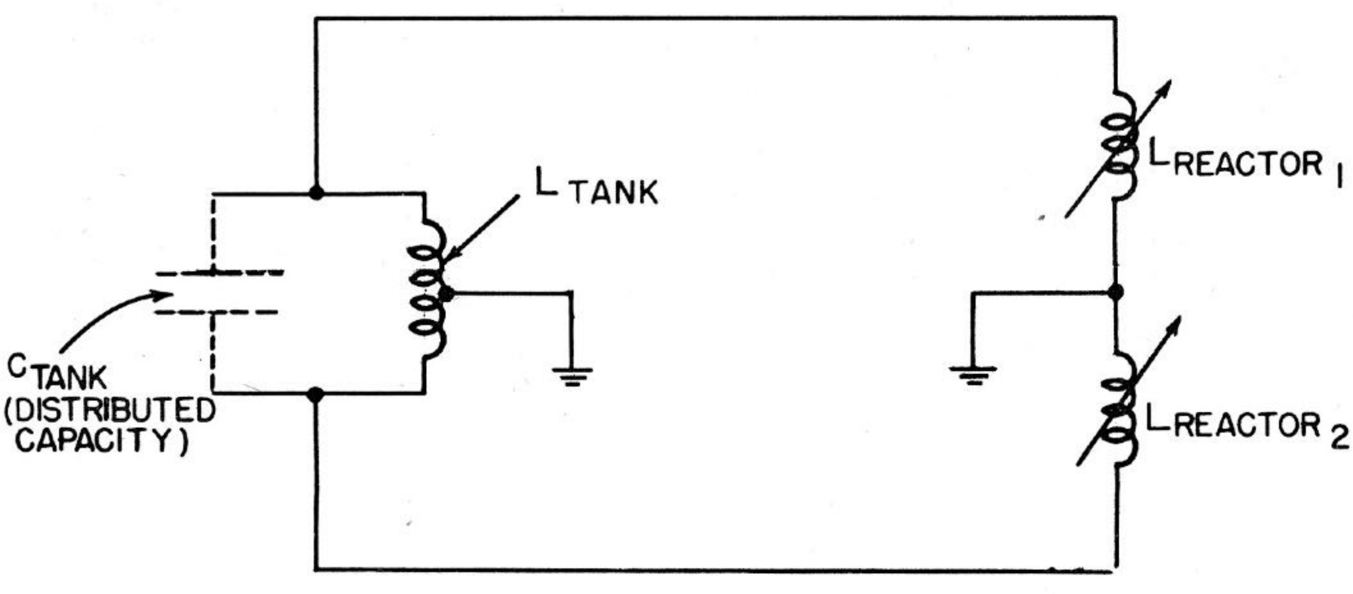


Figure 4-9. - Equivalent Circuit of Reactor and Oscillator Tank.

The two reactors are used effectively in series so that an oscillator swing up to 10mc. is obtained. The oscillator and reactor circuits are highly critical. Therefore, they are shielded.

Function of Parts:

C118, C119, C120, C121	- D.C. Blocking Condenser
C114, C133	- Plate Bypass Condenser
C122 A and C	- Cathode Bypass Condensers, V111 and V112
C122 B	- Oscillator Plate R.F. Bypass Condenser
R148, R151	- Phasing Network Resistors
R149, R150	- Bias Resistors
R146, R147	- Center Frequency Network
R152, R153, L103, L104	- High Impedance Shunt Feed for B+
R143	- Decoupling Resistor
R144, R145	- Isolating Resistors to Prevent Interaction between Reactor and Sawtooth Amplifier
R178, R179	- Sweep Controls
R183	- Oscillator Loading Resistor

It must be borne in mind that as the oscillator frequency changes, different signals that are passed by the bandpass amplifier periodically beat one after the other, with the oscillator frequency to produce an I.F. of 7.5mc. (See Section IV, Par. 2j).

e. I.F. Amplifier Section. The block marked (4) is the I.F. Amplifier which is composed of two stages. The overall response of this amplifier is such that it has a fairly flat top. The first stage uses a 6SG7 tube, V104, and the second stage uses a 6AC7 tube, V105.

The first stage is coupled to the plate of the mixer by means of the permeability tuned transformer, Z102-09, which is tuned to approximately 7.5mc.

A GAIN control, variable resistor R114, is present in this stage. The total grid bias on V104 consists of the minimum bias developed across R112 and the voltage developed across R114. Now, the voltage across R114 is dependent upon several currents which flow through it. First, there is the bleeder current through R114, R112, R113, and R117. Second, there is another bleeder current through R114, R115 and R116. Finally, there are the plate and screen currents of V104 which flow through R114. As R114 is changed in value, the voltage drop across it is varied, and thus the total grid bias is altered. Since V104 is a semi-remote cutoff type of tube, a change in grid bias affects the sensitivity of the stage. Condenser C105A is used to filter the total bias voltage.

The screen bleeder network R113 and R117 furnishes the proper operating potential for the screen grid of V104. C105-B is used to place this grid at R.F. ground potential. R118 and C105-C act as the plate decoupling filter for V104.

The first and second stages are coupled by the transformer Z103-09, which is permeability tuned to approximately 7.5mc. The second stage is a straight I.F. amplifier. It is coupled to the next stage, the detector, by Z104-09, another permeability tuned transformer.

R119 is a cathode resistor across which is developed, due mainly to plate and screen currents, the bias voltage for V105. C106-A and C131, an auxiliary condenser, smooth the bias voltage to prevent degeneration. By means of the series screen dropping resistor R121, the proper operating potential for the screen grid is obtained. C106-B is used to place the screen grid at R.F. ground potential. R122 and C106-C are used as a plate decoupling filter to prevent interaction between stages.

f. Detector Stage.- The block marked (5) contains the detector stage. The detector stage uses a half section, (A), of a 6SN7GT twin-triode tube, V106, while the other half section (B) is left unused. However, the plate and control grid of the used half section are tied together so that the tube operates as a diode.

When a signal voltage which appears across the secondary of Z104-09, is applied between the plate and cathode of the diode, it is rectified. The rectified voltage appears across R123, the diode load resistor.

C107 is an R.F. bypass condenser which offers a low impedance path, around R123, for R.F. Thus a maximum R.F. voltage is made to appear between the plate and cathode of the diode and hence a maximum rectified voltage appears across R123.

The detector stage is directly coupled to the next section, a video amplifier. The elimination of a coupling capacitor by the use of direct coupling prevents loss of gain at low modulation frequencies.

g. Video Amplifier - The Video Amplifier is also contained in the block marked (5). This amplifier is essentially a push-pull circuit using a 6SN7GT, V107, which is a twin triode tube.

The output voltage of the detector is fed directly to and amplified by the half section (A) of the twin triode tube. This amplified voltage is fed directly to one of the vertical deflection plates of the cathode ray tube. Also, a portion of the amplified voltage, (an amount approximately equal to the voltage taken from the detector circuit), is directly coupled to the grid of the half section (B) of the twin triode tube.

A 180^{o} phase shift will take place in the tube of this half section, and therefore, its output voltage will be 180^{o} out of phase with the output voltage of the (A) half section. The half section (B) of the twin triode, then, actually, is a phase inverter whose output is coupled to the remaining vertical deflection plate of the cathode ray tube. By this arrangement one vertical deflection plate is driven positive while the other vertical deflection plate is driven relatively negative. The magnitude of the voltage applied to the vertical deflection plates govern the amplitude of the vertical deflection of the trace on the adaptor screen. R124 serves as the VERT(ical) POS(ition) control which determines the vertical position of the baseline. If equal and similar potentials are applied to the vertical deflection plates, the baseline will appear across the center of the face of the C.R.T. Should the potentials be unequal, the baseline will be deflected toward the more positive vertical deflection plate. Thus, by varying the relative DC potentials on the vertical deflection plates, the position of the baseline is shifted. This may be accomplished by changing the potential on one vertical deflection plate.

Now R124 provides a variable bias for the (B) section of V107. Any change of this bias affects the plate current of the (B) section. However, any change of plate current affects the voltage drop across R132. As this voltage drop across R132 increases, the plate voltage of the (B) section decreases and vice versa. Now the plate of the (B) section is directly coupled to one of the vertical deflection plates. Therefore, any change of the plate voltage of the (B) section affects one deflection plate. Thus, the voltage between the two vertical deflection plates can be varied, and the vertical position of the baseline shifted. R127 limits the bias of the tube to a given minimum value.

h. Intensifier Circuit.- The Intensifier circuit, block marked (6), uses a 6AC7 tube, V108. By means of the voltage divider network R133 and R135, a portion of the output voltage of the phase inverter stage of the video amplifier is fed through C108 to the grid of the intensifier tube. The output voltage of the intensifier tube is fed, in proper phase, to the intensity grid of the cathode ray tube. The magnitude of the voltage fed from the intensifier tube to the intensity grid is readily varied by adjusting the potentiometer, R138, which is the INTENSIFIER control.

The intensifier tube will be excited by pulse signals, among others. As a result, the potential on the intensity grid of the C.R.T. will be so changed with each pulse that the electron stream is intensified as each pulse comes through. If the bias on the intensity grid is increased, by turning down the BRILLIANCE control, the baseline fades out. However, the pulse voltages from the intensifier tube will overcome this bias. Thus a trace will be produced on the C.R.T. screen only when pulses come through. Normally, when pulse signals are not received, the INTENSIFIER control is adjusted so that no intensifier voltage is applied to the intensity grid.

R136 is a cathode bias resistor. C109-A is a bypass condenser which smoothes the bias developed across R136. R137 is a series screen dropping resistor. C109-B places the screen at ground potential. Resistor R182 and condenser C132 constitute a decoupling filter which prevents oscillation of the INTENSIFIER stage. C110 is a D.C. blocking condenser which prevents interaction between the high voltage and low voltage supplies.

i. Sweep Voltage Generator.- The block marked (8) contains the sawtooth generator. The (A) half of V114, a 6SN7GT tube, is used for the sawtooth voltage generator which is of the B.T.O. (blocking tube oscillator) type.

The 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 control grid of the oscillator tube from a filament winding, which supplies the heater voltage of the oscillator tube, in order to "lock" the sweep frequency to a submultiple of the line frequency. If the line frequency is 60 cycles, the sweep frequency is locked at 30 cycles. The submultiple is usually half the line frequency.

The operation of the blocking tube oscillator may be understood upon analysis of the B.T.O. schematic in Figure 4-10.

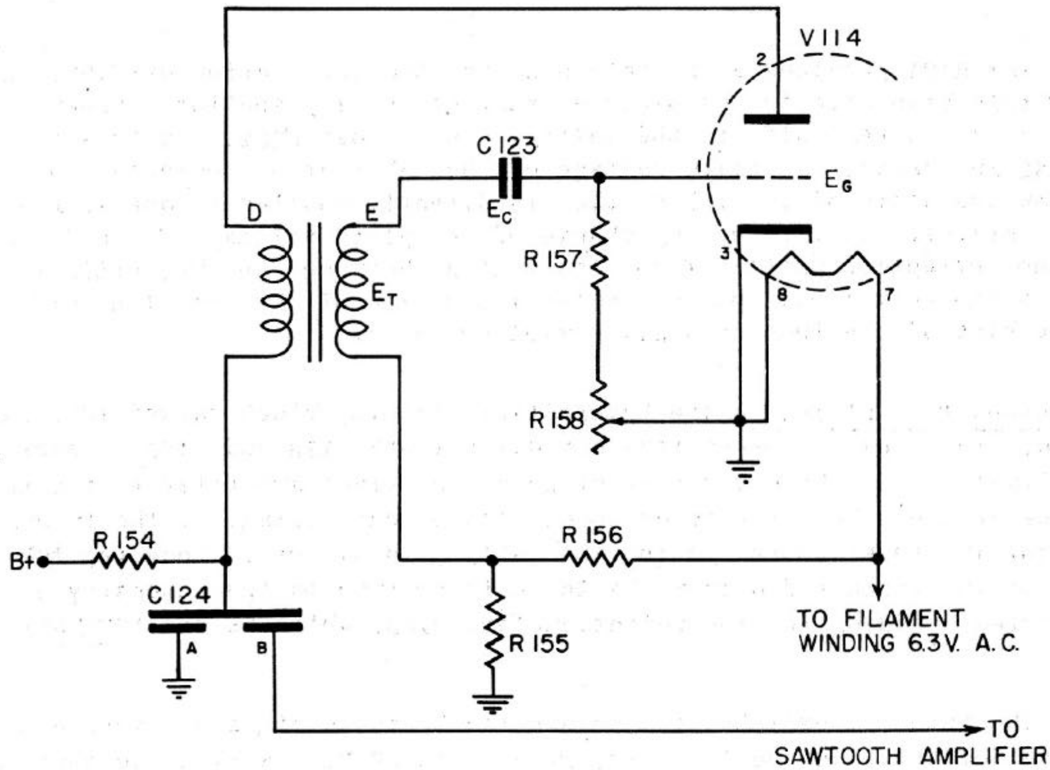


Figure 4-10. - Navy Model RDP, Circuit Diagram of B.T.O.

To analyze the operation of the BTO several voltages should be examined. First, if R155 is ignored due to its small value of resistance, the voltage between the grid and cathode of V114, Eg, will be approximately the vector difference between the voltage across C123, Ec, and the voltage across the transformer winding E, E_T. Second, the waveform of the voltage across C124-A is dependent primarily upon the rate of charge and discharge of C124-A.

Merely for the ease of analysis, it is assumed that when the adaptor is turned on, the low voltage power supply furnishes its output voltage before V114, in Figure 4-10, can conduct. (If the opposite condition were considered, the ultimate analysis would not be different from the one to be followed). Now before V114 can conduct, the low voltage supply, through the large resistor R154, slowly charges up condenser C124-A from point 1 to point 2, as shown in Figure 4-11. But the voltage across C124-A is applied between the plate and cathode of V114, and by the time C124-A is charged up to point 2, V114 can conduct. Therefore, C124-A discharges through V114 and winding D of the transformer. The rate of discharge of C124-A is far more rapid than the rate of charge since the discharge path offers a lower impedance than the charging path, R154.

As a result of this surge of plate current (actually the discharge current of C124-A), a voltage, E_T is developed, by transformer action, across winding E. The polarity of E_T is such that the grid is driven positive with respect to cathode. The positive grid draws current which charges up C123. Thus, at the grid side of the condenser, C123, becomes negative with respect to the other side of the condenser. Furthermore, C123 will charge up to a voltage somewhat smaller than the voltage across winding E since the tube acts almost as a short for grid current.

But as the grid goes in a positive direction with respect to cathode, the plate current rises more and more rapidly until a point is reached where the trans-conductance of the tube effectively falls off. At that point the rate of increase of plate current falls off rapidly. Consequently, the voltage, E_T, falls off rapidly since the magnitude of E_T is dependent upon the rate of change of plate current.

However, this decrease of E_T allows condenser C123 to discharge through R157 and R158. As C123 discharges, the voltage E_c across C123 decreases. E_c decreases SLOWLY since the charge on C123 must leak off through the high resistance network R157 and R158. It is seen, then, that if E_T, which originally was greater than E_c, drops rapidly while E_c drops slowly, E_T will eventually equal E_c. Furthermore, E_T subsequently will fall rapidly to Zero while E_c will merely diminish slowly in magnitude.

Now, the voltage between grid and cathode, Eg, is the vector difference between E_T and E_c, and when E_T equals E_c, Eg equals Zero. But as E_T rapidly becomes less than E_c, Eg becomes greater than Zero and Eg is such that the grid becomes negative with respect to the cathode. This is so since the grid side of C123 was charged negative with respect to the opposite side of C123. Finally, E_T will fall to such a value that Eg is sufficiently negative to cut off plate current (the discharge current of C124-A).

This whole process is so rapid and plate current flows for so short a time, that C124-A discharges only to point 3 in Figure 4-11. However, Eg goes far beyond the cut-off point, for E_T, finally, falls to Zero and hence Eg equals E_c. That is, the full voltage E_c is applied between grid and cathode of V114. Plate current will not flow until Eg returns in a positive direction to and beyond the cut-off point. Eg will reach this value only when C123 has leaked off sufficiently.

In the meantime, however, while the grid blocks the tube, condenser C124-A once again charges up slowly to point 4, at which time Eg is of such value as to allow C124-A to discharge through V114. Thus the whole process or cycle is repeated again and again producing a sawtooth voltage across C124-A as shown in Figure 4-11.

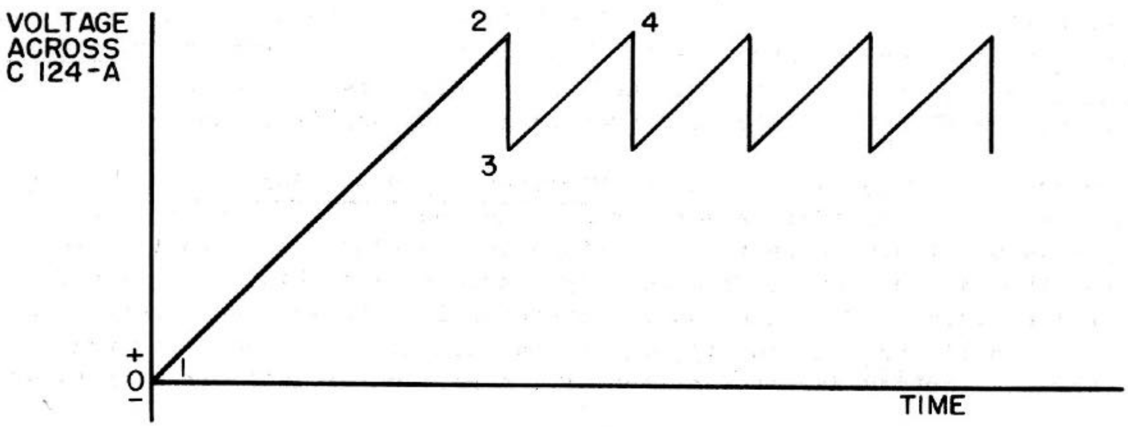


Figure 4-11. - Generation of a Sawtooth Voltage.

The time constant of the combination C123 and the bias resistors, mainly, determines how long the tube is blocked, and hence it determines the frequency of the sawtooth voltage.

The size of R154, mainly, determines the amplitude of the sawtooth voltage (if C124-A is kept the same size). As R154 is decreased in size, C124-A will charge up to a greater voltage in a given time thereby increasing the amplitude of the sawtooth voltage. It is also true that the peak plate voltage will rise as R154 is decreased and one might expect that the frequency of the oscillator should be affected materially. However, it must be borne in mind that the grid rather than the plate has greater control over plate current.

The AC voltage developed across R155 is used to "lock" the oscillator to a submultiple usually half of the line frequency. The SYNCH control, R158, is used toward this end also since an adjustment of this potentiometer affects the time constant of the grid resistor condenser combination.

j. Sawtooth Voltage Amplifier. - The block marked (8) also contains the Sawtooth Voltage Amplifier which is used to drive the horizontal deflection plates of the cathode ray tube and to supply, through a cathode follower circuit, the sawtooth voltage for the reactor circuit. The amplifier, essentially, is made up of two stages in push-pull.

The output of the sawtooth generator, the (A) half of V114, is fed through a coupling capacitor, C124, to a potentiometer, R160. The movable arm of the potentiometer, in turn, is connected to the control grid of the (B) section of V114. This half section of V114 amplifies the sawtooth voltage and the output of this amplifier is fed to three different circuits.

First, it is coupled directly to one of the horizontal deflection plates of the cathode ray tube.

Second, it is capacitively coupled, through an attenuation network, to the grid of the second stage of the amplifier so that the output voltages of the first and second stages are approximately equal. However, a 180° phase shift will take place in the tube of the second stage, and therefore its output voltage will be 180° out of phase with the output voltage of the first stage. The second stage, then, is actually a phase inverter whose output is coupled directly to the remaining horizontal deflection plate. Thus one horizontal deflection plate is driven positive while the other horizontal deflection plate is driven relatively negative, and vice-versa.

Potentiometer, R180, serves as the HOR(izontal) POS(ition) control. R180, R165 and R164 constitute a bleeder network across the low voltage B supply. Any variation in the value of R180 affects the voltage across R164. This voltage is used as bias for the (A) section of V115 and any change of this bias voltage affects the plate current of this half of the tube. Consequently, the voltage across R168 is affected and the plate voltage on V115 (A) is subsequently changed. However, this plate voltage is applied directly to one of the horizontal deflection plate of the C.R.T.

Now the horizontal position of the baseline is governed by the relative potential difference between the horizontal deflection plates. The baseline will be shifted toward the more positive horizontal deflection plate. By varying the potential on one plate, the potential difference between the horizontal deflection plates is varied and thus the baseline is shifted in a horizontal direction.

The potentiometer, R160, is used to vary the magnitude of the sawtooth voltage applied to the grid of the first stage of the amplifier. However, the output of the first stage is coupled to the grid of the second stage. Hence, any variation of R160 affects the magnitude of the output voltages of both stages, and these output voltages are applied to the horizontal deflection plates. The magnitude of the voltage applied to these plates determines the degree of horizontal deflection of the electron beam. Therefore, adjustment of R160 affects the horizontal size or the baseline size. R160 is the LINE SIZE semi-adjustable control.

Third, it is coupled capacitively through an attenuation network to the grid of a cathode follower circuit which uses the remaining half section of V115. V115 is a 6SN7GT tube. The output of the cathode follower is capacitively coupled, by C126, to the SWEEP PAD.

It must be borne in mind that both the reactor and the horizontal deflection plates of the cathode ray tube are affected simultaneously by the sawtooth voltage. Therefore, for a given instantaneous value of sawtooth voltage the horizontal deflection of the electron beam will be of a definite magnitude and the FM oscillator will produce a particular frequency. See Section IV, Par. 2d. Only one R.F. input frequency, excluding images, can beat with this particular oscillator frequency to produce an I.F. of 7.5mc. which ultimately affects the vertical deflection plates. Hence, for this one input frequency the electron beam will strike the face of the cathode ray tube above a particular position on the baseline. For a different given instantaneous value of sawtooth voltage, there will be a different oscillator frequency, hence a different signal frequency to produce an I.F. of 7.5mc. and a different magnitude of horizontal deflection, and hence a different position on the baseline for this signal frequency.

Although each signal actually appears on the screen at a different time, due to retentivity of vision, persistence of the screen, and the rapidity with which the signal deflections appear, all the signals on the screen seem to appear simultaneously.

k. The Cathode Ray Tube. - The block marked (9) represents the cathode ray tube V116 (5CP1). Basically, the tube consists of the following elements contained within an evacuated glass envelope:

(1) An indirectly heated cathode for emitting electrons.

(2) Immediately beyond the cathode there is a grid, which is composed of a metal sleeve with a metal disc at one end. The disc itself has a small aperture which concentrates the electrons, from the cathode, into a narrow beam. The grid is operated at a negative potential with respect to cathode. The magnitude of this potential determines the intensity or concentration of the electron

beam, which strikes a fluorescent screen on the face of the tube. Hence, it controls the brilliance of the trace on the cathode ray screen. The potentiometer R177 serves as a bias control which governs the intensity of the electron beam. R177 is part of the high voltage bleeder network which is composed of R184, R173, R174, R175 and R177, and as R177 is varied, the voltage across it is altered. Thus, R177 is used as a BRILLIANCE control.

(3) The first anode follows the grid. It is operated at a potential which is fairly positive with respect to cathode, and hence it accelerates the electrons which pass through the grid aperture. The first anode is constructed somewhat similar to the grid, that is, it is made up of a metal sleeve with discs which have a small aperture. The first anode forms the electron stream into a beam. Beyond the first anode, the electron stream comes under the influence of a second anode which further accelerates the electron stream.

(4) The second anode operates at a potential which is highly positive with respect to the first anode and consequently a field exists between the first and second anodes. This field acts very much like a lens which can be used to focus the electron beam. By securing the proper ratio of potentials between the first and second anodes, the beam will be so focused that a clear, sharp trace can be produced on the screen of the tube. Potentiometer R174, which is part of the high voltage bleeder network, is used to secure the proper ratio of potentials by controlling the potential on the first anode. Hence, it is called the FOCUS control. The cathode, grid, first anode, and second anode make up the electron gun.

(5) Along the path of the electron beam there are two sets of parallel plates, one set being perpendicular to the other. When there is a difference of potential between the plates of one of the sets, the electron beam bends in a horizontal direction and hence this set is called the horizontal deflection plates. On the other hand the application of a difference of potential upon the remaining set of plates produces a vertical deflection of the electron beam. Therefore this set of plates is called the vertical deflection plates.

Now where the electron beam strikes the viewing end of the cathode ray tube a dot of light is produced. The exact position of the dot of light in both the horizontal or vertical planes can be controlled by adjusting the magnitude of the difference of potential applied to both sets of plates. In the adaptor, adjustment of the HOR. POS. and VERT. POS. controls affects the respective positions of the dot of light by altering the magnitude of D.C. positioning voltages applied to the deflection plates.

In addition to the positioning voltage, a sawtooth voltage is fed to the horizontal deflection plates and this sawtooth voltage causes the electron beam to shift back and forth along the horizontal axis. As a result of this sweeping action a horizontal line of light is produced on the cathode ray tube screen.

If now a varying voltage is applied to the vertical deflection plates, the electron beam is influenced by both a varying horizontal voltage (the sawtooth voltage) and a varying vertical voltage. Consequently, the resultant trace on the screen becomes two dimensional.

(6) The viewing end of the cathode ray tube is coated with a fluorescent material which emits light when it is energized as the electron beam impinges upon it. This material has the property of persistence, that is, it will continue to emit light for a short period of time, even after the electron beam no longer strikes it. It is possible to burn out the screen by setting the BRILLIANCE control for excessive brightness. Therefore, it is advisable to set this control for the minimum brilliance practicable.

(7) Around the inner portion of the glass envelope, near the face of the tube, there is a ring which is used to collect the electrons which strike the screen. The ring operates at the same potential as the second anode.

l. The Power Supply.- The power supply is composed of a high voltage D.C. section and a low voltage D.C. section. The power transformers of both sections provide all the heater voltages. The high voltage D.C. section, which uses a 2x2 half wave rectifier, V119, supplies the anode and grid voltages of the cathode ray tube. Since the current drain on this section is relatively small, a resistance capacity filter is used to smooth the output voltage of the rectifier.

The low voltage D.C. section, which uses two 6x5 tubes, V117 and V118, furnishes the necessary D.C. potentials for the rest of the adaptor. The two plates of each 6x5 tube are tied together externally so that the tube is converted to a single diode. Each tube is connected to opposite ends of the high voltage winding of the low voltage transformer. Thus, although the 6x5 tubes are converted into single diodes, they are so connected in the circuit that full wave rectification is accomplished. Part of the output voltage of the low voltage section is regulated by a VR150/30 tube, V113. The regulated output supplies a number of critical circuits, namely the plates of the oscillators, V109 and V110, and the screens of the reactors, V111 and V112.

A line filter is connected to the primaries of the power transformers to to prevent radiation of energy from the adaptor through the power line. The line filter also prevents disturbances on the line from entering the adaptor.

SECTION V - MAINTENANCE

1. SAFETY NOTICE.

"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.

2. EQUIPMENT FOR SERVICING.

a. Signal generator - range 5mc. to 40mc.

b. Voltohmmeter (1000 ohms per volt minimum) 0-3000V DC, 0-2500V AC

c. An oscilloscope is optional, but it will be needed if it is desired to examine any waveforms.

3. ALIGNMENT PROCEDURE.

Allow the equipment to warm up for half an hour. If the Panoramic Adaptor is used with a receiver whose local oscillator is higher in frequency than the resonance frequency of the receiver's input circuit, the right side[1] of the adaptor screen indicates high frequency and the left side[1] low frequency. If the local oscillator of the receiver is lower in frequency than the input circuit, right means low frequency and left means high frequency. The same reversal of sign is also applicable when signals are fed directly from a signal generator into the adaptor. The following adjustments are made with a signal generator of 5mc. to 40mc.

a. General Instructions.- Transformers T101-09, T102-09, Z102-09, Z103-09 and Z104-09 are tuned by means of movable powdered iron cores. All coils but Z101-09 have windings marked either "T" or "B". The "T" windings can be tuned at the top of the coil by means of the tuning tool which is provided with the equipment. Use the end of the rod which has the short metal pin. Windings "B" can be tuned either from the bottom or top of the transformer by using the screwdriver tip at the other end of the tuning rod. When windings "B" are tuned from the top, push open the dust cover and insert the screwdriver end of the tool through the opening in the top of the shield can. The screwdriver tip will fit into the slot of the iron slug which tunes windings "B". Z101-09 is a coil wound on a polystyrene form under the chassis and it has only one movable core which is adjusted with the pin end of the aligning tool.

"NOTE" - Read Section V, Par. 7 before making any adjustments.

[1]In the alignment procedure the right side will be considered as + and the left side as -.

b. I.F. Amplifier Alignment Procedure.

Sig. Gen. Output	Signal Freq.	SWEEP Control	GAIN Control	Signal Fed to	Procedure
(1) audio modulated 30%	7.5mc.		maximum	pin #4 V105	Step 1. Using the screwdriver tip of the tuning tool through the top of the transformer, Z104-09, rotate the bottom core in a clockwise direction until it is well down in the coil. The core screw will then protrude 7/8" under the bottom of the chassis. Step 2. Adjust the position of the top core until maximum deflection of the signal is seen on the screen. Step 3. Retract the bottom core and adjust for maximum deflection on the screen.
(2) audio modulated 30%	7.5mc.		maximum	pin #4 V104	Adjust transformer Z103-09 by following the procedure above. It may be necessary to reduce the output voltage of the signal generator to keep the entire trace on the screen.
(3) audio modulated 30%			maximum	pin #8 V103	Adjust transformer Z102-09 by following the procedure above.
(4) no modulation. Adjust output to produce a deflection about three divisions in amplitude	30mc.	maximum	maximum	input connector of the adaptor	Trim the frequency of the signal generator to center the signal of the screen. Reduce the Sweepwidth (SWEEP) of the adaptor until the deflection basewidth is 1/2 inch. Trim the bottom "B" core of Z104-09 so that the deflection approximates a flat top response. Slowly reduce the gain of the adaptor and simultaneously increase the output of the generator so that the screen trace is always of about the same amplitude. Continue this adjustment until the maximum output of the generator is used. If the trace does not change essentially (no pronounced double peaks), no further adjustment is necessary. If double peaks appear, adjust the top core of Z102-09 slightly to eliminate them.

The first three steps are performed to peak all three I.F. transformers. The last step is performed to avoid either double peak response curves or too narrow a bandpass.

c. F.M. Oscillator Alignment.

Adjustment For	Sig. Gen. Output and Freq.	SWEEP control	CENTER FREQ. Control	Signal Fed to	Procedure
(1) CENTER FREQUENCY	30mc. unmodulated	maximum	At panel marker	INPUT Connector of the adaptor	Adjust the Zero on Z101-09 to center the deflection on the screen approximately. As a last resort only, it may be necessary to adjust the CENTER FREQ. PAD to center the deflection on the screen. Some adjustment of the SWEEP PAD may be necessary. Gradually rotate the SWEEP control counter-clockwise toward its minimum position and simultaneously readjust the Zero control for a centered deflection. The adaptor is properly adjusted for center frequency when a symmetrically centered curve appears on the screen while the SWEEP control is near its minimum position. See Figure 5-1. Return the SWEEP control to maximum. If the deflection does not remain centered, adjust the HOR. POS. control to center the deflection.
(2) HIGH FREQUENCY	35mc. unmodulated	maximum	same as (1).	same as (1).	Adjust the CENTER FREQ PAD until the deflection appears on the screen at -5mc. Some adjustment of the SWEEP PAD may be necessary. Repeat the CENTER FREQUENCY procedure (1) above.
(3) LOW FREQUENCY	25mc. unmodulated	maximum	same as (1).	same as (1).	Adjust the SWEEP PAD until the deflection appears at +5mc.
(4) OVERALL REPETITION OF CENTER FREQUENCY ALIGNMENT	According to the particular procedure to be followed	maximum	same as (1).	same as (1).	Repeat the procedures above in the following order: Center Freq. Alignment (1), High Freq. Alignment (2), Center Freq. (1), High Freq. (2), Low Freq. (3), finally, Center Freq. (1)

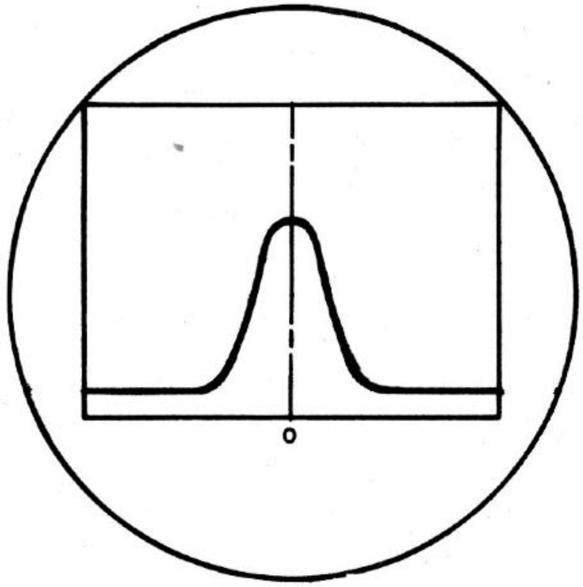


Figure 5-1. - Symmetrically Centered Curve

All the adjustments above are a series of approximations which are generally narrowed down until the desired results are obtained.

d. R.F. Alignment.

For this alignment, an approximation method is employed. Figure 2-1 illustrates an idealized bandpass characteristic. It is possible to align the R.F. amplifier stage using only a signal generator. In order to obtain the trace in Figure 2-1, the frequency of the signal generator is varied so that the peak of the deflection on the screen moves from one end to the other to produce this trace. See Section II, Par. 2b (7).

"NOTE" - Tests of Panoramic Equipment have definitely indicated that, with regard to R.F. Alignment, it is more important to establish the peaks at the correct positions above the calibrated baseline than it is to strive for equal amplitudes of corresponding peaks on each side of the center. Therefore, if alignment difficulties are encountered, stress peak locations. Do not forget that the amplitudes of the 2.5mc. peaks will be less than the amplitudes of the 4.5mc. peaks.

Transformer Aligned	Sig. Gen. Output & Freq.	SWEEP Control	Signal Fed to	Procedure
T102-09	30mc. unmodulated	maximum	Plate Pin 8 of V102 thru a .01 mfd condenser	Adjust the secondary, "T", for peak deflection at the center of the screen.
	34.5mc. unmodulated	maximum	Grid pin 4 of V102	Adjust the primary "B" for peak deflection at the minus side of the screen.

Transformer Aligned	Sig. Gen. Output & Freq.	SWEEP Control	Signal Fed to	Procedure
				This peak should appear approximately above the marker indicating -4.5 divisions on the calibrated screen.
	25.5mc. un-modulated	maximum	Grid pin 4 of V102	A peak should appear +4.5 on the calibrated screen and its amplitude should approximate the amplitude of the peak which appeared at -4.5.
T101-09	30mc. un-modulated	maximum	Plate pin 8 of V101 thru a .01 mfd. condenser	Adjust the secondary "T" for peak deflection at the center of the screen.
	32.5mc. un-modulated	maximum	Input cable of the adaptor	Adjust the primary "B" for peak deflection at the -2.5 division from the center. This peak probably will not be as high as the peak which appeared at -4.5 when T102-09 was adjusted.
	27.5mc. un-modulated	maximum	Input cable of the	A peak should appear above +2.5 on the calibrated screen. The amplitude of this peak should approximate the amplitude of the peak which appeared at -2.5.
T101-09 T102-09	None	maximum	Cable (noise pick-up)	Set the GAIN control sufficiently high so that the noise deflections indicate the R.F. response of the adaptor. If necessary, tune the primaries "B" of T101-09 and T102-09 so that the peaks are so positioned that the response is either similar to that shown in Figure 4-2 or as flat as possible.

4. POSSIBLE OPERATION FAILURES AND THEIR LOCATION.

The servicing procedure generally applied to the repair of other types of radio equipment, such as receivers, applies in general to the repair of the Panoramic Adaptor.

The regular routine procedure for repair work may follow such lines as indicated below.

a. Perform a visual check on the adaptor unit. Look for damaged resistors, broken components and possible broken wires or insulation. Make all proper replacements if any are necessary.

b. Check all tubes to see whether they are in their proper sockets. Check the quality of all tubes. Replace tubes of doubtful condition.

c. Measure voltages at tube socket terminals and compare with charts supplied in this instruction book. This will help isolate the stage in which the defect exists.

d. Make resistance measurements in those stages where there are voltage discrepancies. Use the resistance chart supplied in this instruction book. Make all necessary replacements.

Make free use of the table below to locate defective wiring or components.

Failure	Look for the Following:
Set inoperative, pilot light and tubes fail to go on.	Check the two fuses at the rear of the chassis. Check AC voltages according to the voltage chart. Check the "ON - OFF" switch. Check all connections to the power receptacles.
No trace on the screen. Pilot light on.	Check the connection between the second anode lead and the contact at the side of the 5CP1. Check socket voltages of the 5CP1. CAUTION! - HIGH VOLTAGE
Horizontal line fails to appear on the screen, but a dot shows on the screen.	Check tubes V114 and V115 and their associated circuits. Check voltages and resistances. Check C124 and R154.
Horizontal line short in length or blinks	Check the frequency of the sawtooth generator. See Section V, Par. 7.
Horizontal line normal but signals produce no vertical deflections on the screen.	This effect may be produced by any defect in the Video, Det., I.F., mixer, oscillator, or R.F. sections of the adaptor. To locate the trouble, the following steps are suggested, and if in the step by step check, the expected results are not obtained, then the trouble lies in the stage immediately following the point where the signal is applied. Check voltages, resistances, and continuity on the suspected stage. Make all necessary repairs. (a) To check the video amplifiers, feed the AC voltage from pin #7 of V106, through a .01 mfd., 500V condenser to grid pin #1 of V107. This should produce a wavy line well up on the screen. (b) Feed a 7.5mc. audio modulated signal to pin #4 of V105. A wavy line should appear well upon the screen. (c) Again feed a 7.5 mc. audio modulated signal to pin #4 of V104. The results of step (b) should be present in greater amplitude. Possibly the output of the signal generator will have to be attenuated.

Failure	Look for the Following:
	(d) Now, feed the 7.5mc. audio modulated signal to pin #8 of V103, the mixer. A wavy line should appear on the screen.
	(e) Now, feed a 30mc. unmodulated signal of about 10µV to pin #8 of V103. This should produce a normal signal deflection near the center of the screen, with the SWEEP control set at maximum. If no signal appears check the FM oscillator.
	(f) Using a high resistance voltmeter in series with a 50,000 ohm resistor which is to be tied to pin #6 of V109 and V110, alternately, ascertain whether there is a negative grid voltage. This voltage indicates operation of the oscillator.
	(g) Now, apply a 30mc. signal to grid pin #4 of V102. The results should be similar to that of step (e).
	(h) Repeat with a 30mc. signal applied to the input connector of the adaptor. The results should be similar to that of step (e).
With the SWEEP control set at maximum the vertical deflection does not appear as a peak but rather as a shift in the baseline.	The reactor tube is not modulating the FM oscillator. Check the tubes V111 and V112 and their associated circuits.
When GAIN control is rotated frequency shift takes place.	Check V113 and the gain control itself together with its associated circuit.
Curved overload line on the cathode ray tube.	Gassy detector V106
If pulse reception yields peaks which are dim in comparison with the baseline.	Use the Intensifier control. If no change is noted, check V108 and its associated circuit.
Either V117 or V118 runs excessively hot.	This probably results from the burnout of either V117 or V118. The one which runs cool is the burnout.
Receiver operates normally but no signal reaches the adaptor.	Check the coaxial cable which connects the adaptor and receiver. Check the connections. Check the cathode follower tube and its associated circuit in the companion receiver.

5. REMOVAL OF CHASSIS FROM CABINET.

Disconnect the power cable from the AC line. Then, at the chassis end of the cable, rotate the plug to the left and disengage.

Disconnect the RF input cable by unscrewing the connector at the chassis end of the cable.

Unfasten the ten panel thumbscrews.

Grasp the two pull knobs on the panel and carefully pull the chassis out of the cabinet.

6. REMOVAL OF THE CATHODE RAY TUBE.

"WARNING" - BE SURE THAT ALL POWER IS REMOVED FROM THE ADAPTOR.

Carefully snap off the high voltage lead which passes through the side of the cathode ray tube shield to the tube. Remove the three wing nuts at the rear of the shock mount back plate. This back plate holds the cathode ray tube socket. Next remove the two nuts and lockwashers which hold the cathode ray tube shield to the shock mount back plate. Hold the tube shield in place and carefully pull away the shock mount back plate from the tube shield so that the socket is separated from the tube. Push the socket and back plate to the side. Now ease the shield off the back of the scope hood (the back of the shield will pass through the front shock mount plate) and swing upward the front end of the shield. Carefully remove the front end of the shield.

7. SEMI-ADJUSTABLE CONTROLS.

On the right side of the panel there are six holes under which there is a slide panel. If the slide panel locking screw is loosened, the slide panel can be raised and behind each hole you can see a control which can be adjusted with a screwdriver.

Do not touch these controls unless you are familiar with the correct servicing procedure.

a. SYNCH(ronization). - This governs the sub-multiple of the line frequency to which the sweep oscillator (sawtooth generator) is locked. See Section IV, Par. 21. Normally, the SYNCH control is set for a sweep voltage of one half the line frequency.

In order to check this adjustment, the AC line frequency can be obtained from pin #7 of tube V106 and fed through a .01 mfd coupling condenser to either pin #1 or #2 of tube V106. Two peaks will appear on the screen if the sweep frequency is one half of the line frequency. The sweep frequency is incorrect if any number but two peaks appear. You may also note that the baseline oscillates in a horizontal direction or the peaks move, when the SYNCH control is improperly adjusted.

Should any of these faulty conditions exist, adjust the SYNCH control until two stationary peaks appear on the screen and then remove the coupling condenser.

b. LINE SIZE.- This controls the length of the baseline on the screen. The baseline should be slightly longer than the calibrated scale. If this control is turned completely in a counterclockwise direction, the size of the baseline is diminished. Hence, the line size is increased by turning this control in a clockwise direction. This control is used to determine the magnitude of the sawtooth voltage applied to the horizontal deflection plates.

c. CENTER FREQ. PAD.- This control is used to adjust the proper mean frequency of the FM oscillator. The control should be adjusted only as a last resort to secure proper centering of a deflection which represents the signal to which the receiver is tuned.

d. SWEEP PAD.- This control is used to adjust the sweepwidth of the adaptor. As this control is turned in a clockwise direction, the sweepwidth is increased. This control may have to be adjusted in aligning the FM oscillator.

e. HOR(izontal) POS(ition).- This control governs the horizontal position of the baseline. It controls the amount of D.C. deflection voltage applied to one of the horizontal deflection plates. As it is turned in a clockwise direction the baseline shifts to the right. At times it is necessary to use this control in order to achieve proper centering, on the screen, of the deflection representing the signal to which the receiver is tuned. See Section III, Par. 2j.

f. VERT(ical) POS(ition) - This control governs the vertical position of the baseline which should be very close to the calibration line of the screen scale. When it is turned in a clockwise direction, the baseline goes up. It controls the amount of D.C. deflection voltage applied to one of the vertical deflection plates.

8. POWER TRANSFORMER CONNECTIONS.

It may be found that when power transformers are replaced, the intensity of the trace produced on the screen of the cathode ray tube is lowered. This may be due to improper phasing of transformers, T103 and T104. If this be the case, remove the connection between terminal 5 of T103 and terminal 9 of T104 as shown by the solid line in Figure 5-2. Rewire so that terminal 7 of T103 is tied to terminal 9 of T104 as shown by the dotted line in Figure 5-2.

The power transformers may be connected for 115 or 230 volt, 55-65 cycle operation. The adaptor is factory wired for 115 volt operation. For 230 volt operation make the following changes:

T103
(a) Disconnect terminal three from terminal one. The line connection on terminal one should be left intact.
(b) Disconnect the remaining wire on terminal three. (The other end of this wire is attached to terminal 3 of T104.) Connect and solder this wire to terminal one (T103).

(c) Disconnect terminal two from terminal four.
(d) Disconnect the line from terminal two.
Connect and solder this line to terminal four.
(e) Connect and solder terminals two and three.

T104
(a) Remove the jumper between terminals three and one.
(b) Remove the jumper between terminals two and four.
(c) Transfer the line from terminal three to terminal one.
(d) Connect and solder terminal two to terminal three. See Fig. 5-2 for power transformer connections.

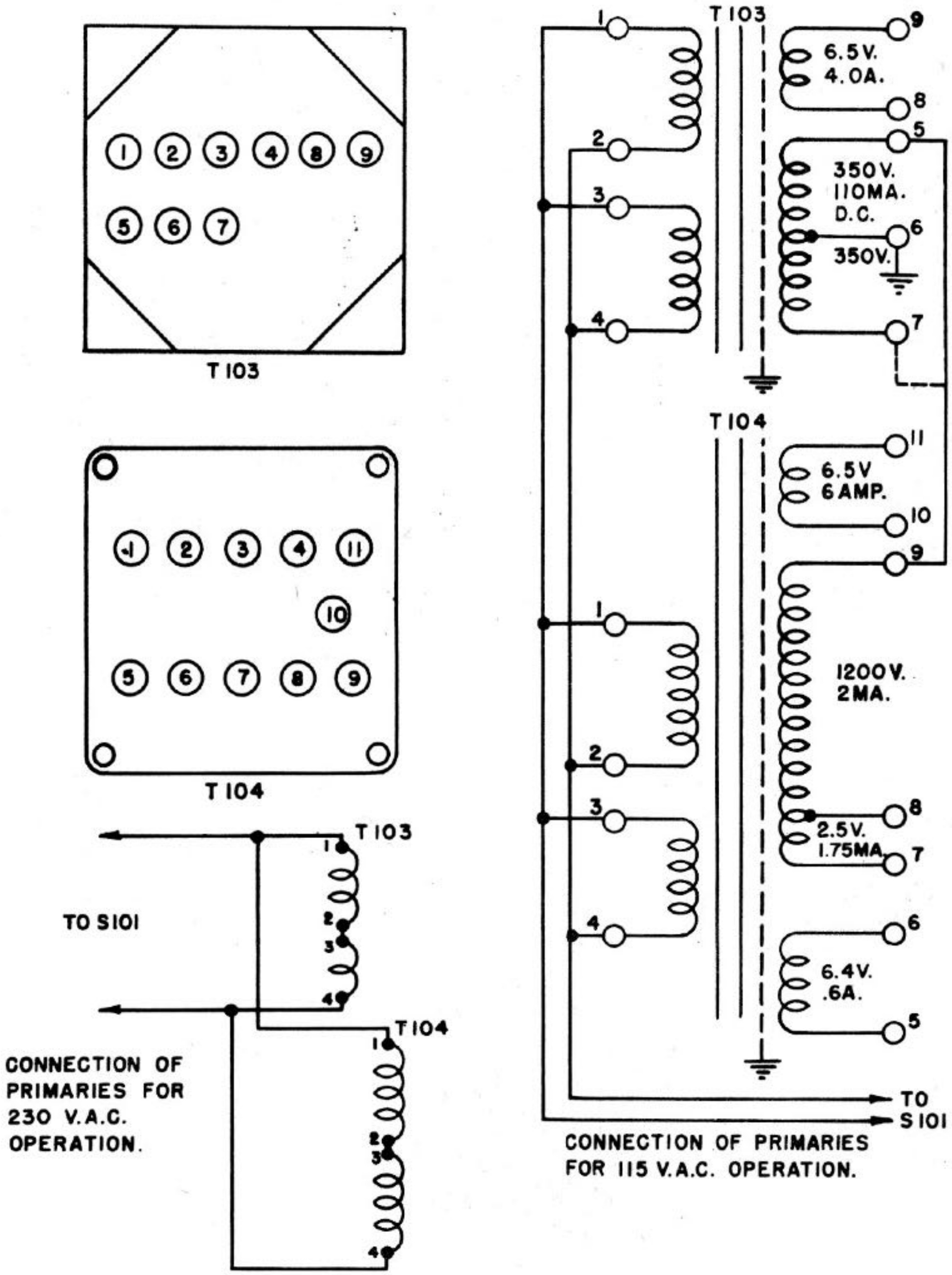


Figure 5-2.- Power Transformer Connections.

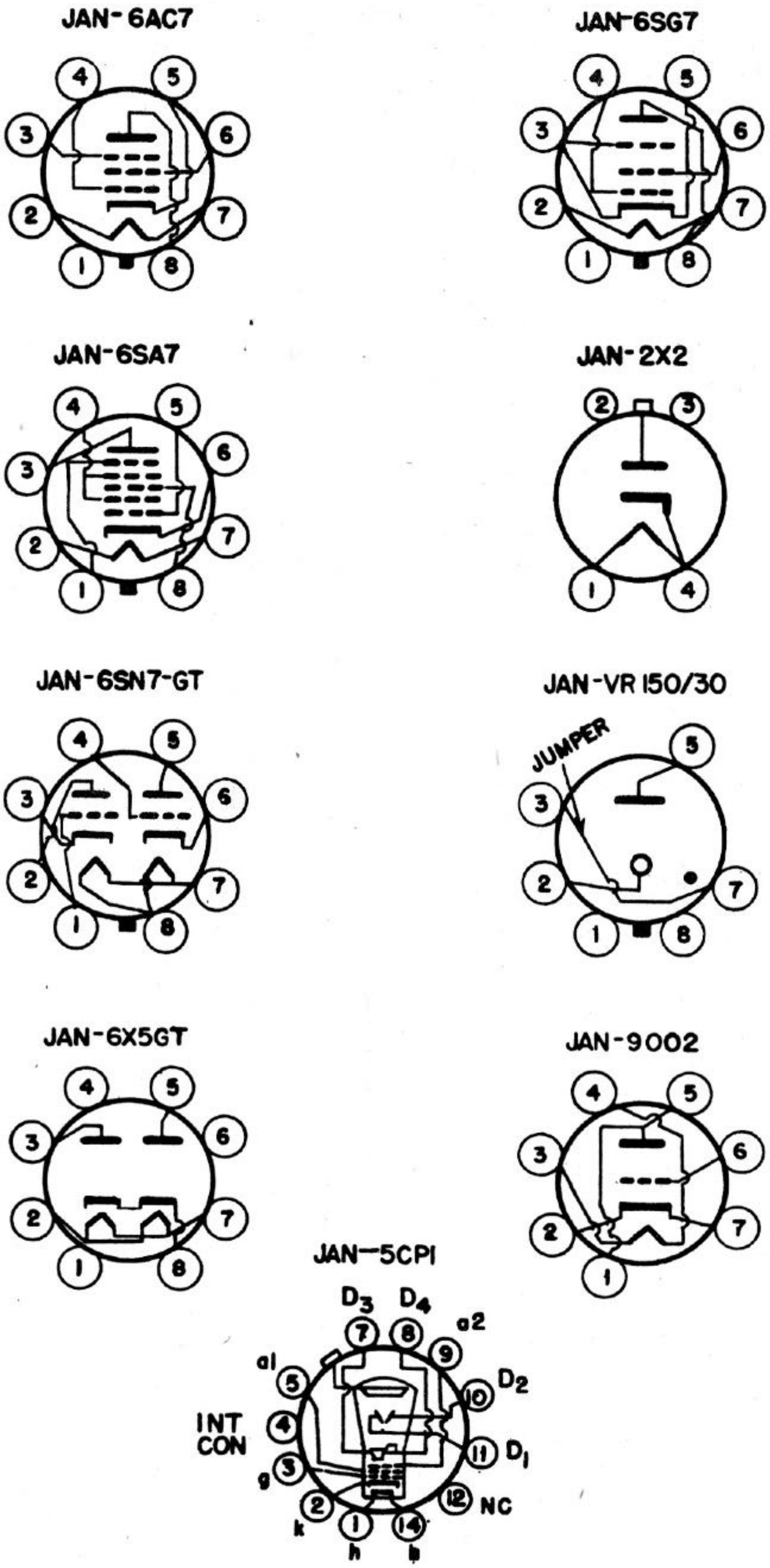


Figure 5-3. - Navy Model RDP, Schematic Diagram of Tubes, Bottom View.

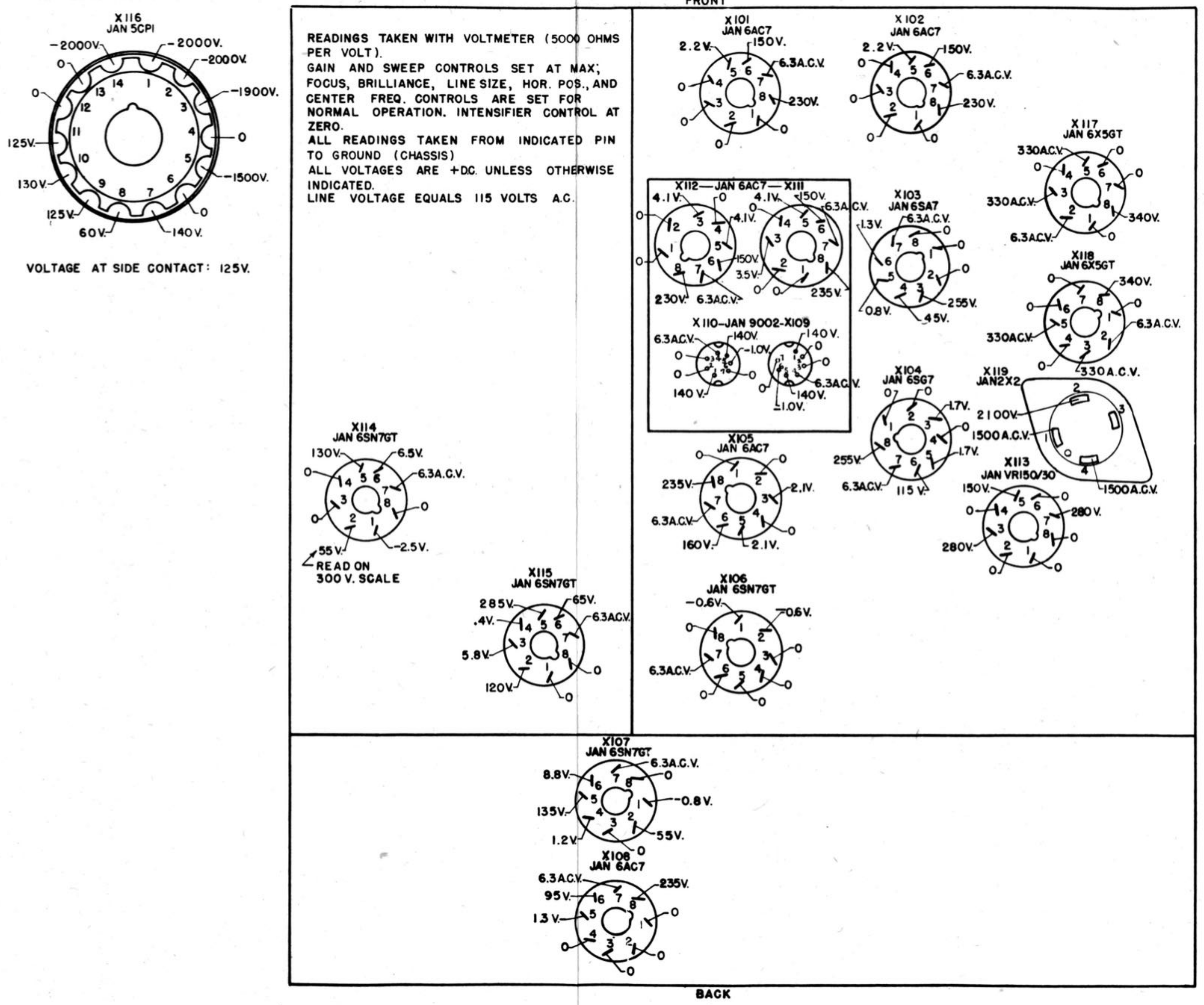


Figure 5-4. - Navy Model RDP, Tube Socket Voltage Diagram, Bottom View.

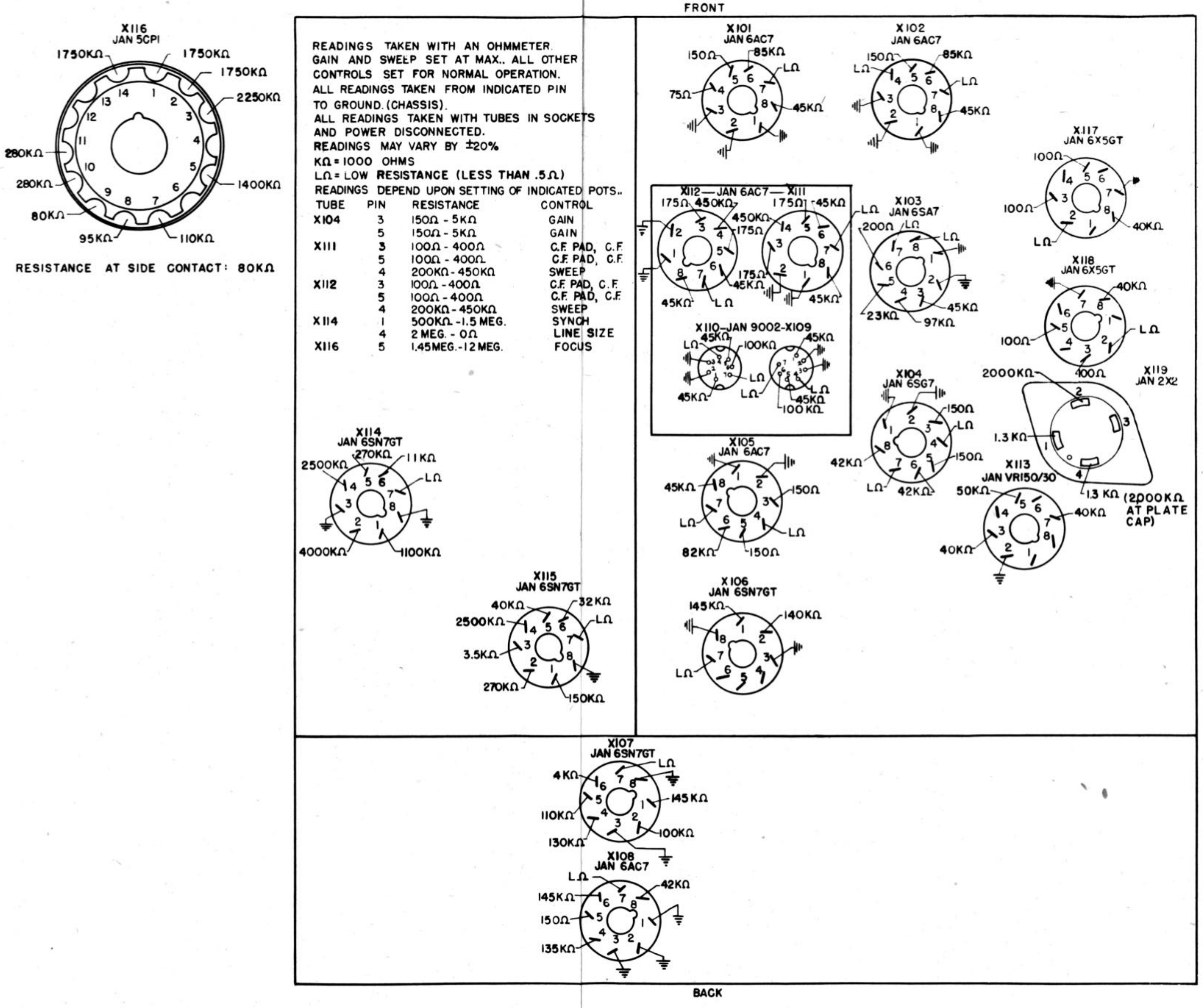


Figure 5-5. - Navy Model RDP, Tube Chassis Socket Resistance Diagram, Bottom View.

SECTION VI
TABLE I

PARTS LIST BY SYMBOL DESIGNATIONS

FOR PANORAMIC ADAPTOR,

NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			STRUCTURAL PARTS, PANELS, FRAMES, ETC.							
A101		Support chassis; indicators, nameplate, etc.	Panel			1	A4450S		A4450S	d
A102		Cover semi-adjustable controls.	Slide plate front panel.			1	A1045		A1045	c
A103		Shield base section of reactor and oscillator.	FM oscillator shield.			1	A1115N		A1115N	
A104		Cover and shield for adaptor.	Cabinet			1	A1418		A1418 A1418E A1418F A1418G	e e
A105		Cover and shield for chassis.	Bottom Plate			1	A2450		A2450	
A106		Mount components.	Chassis			1	A3450S		A1155 A3450S A1157 A1158	c c d h
A107		Brace front panel, mount tools.	Side bracket, right.			1	A1075R		A1075R	c
A108		Brace front panel.	Side bracket, left.			1	A1075L		A1075L	b
A109		Mount Potentiometer.	Pot bracket.			1	A1154S		A1154S	
A110		To anchor H.V. pot mount.	Pot bracket left, H.V.			1	A1153L		A1153L	a
A111		To anchor H.V. pot mount.	Pot bracket right, H.V.			1	A1153R		A1153R	a
A114A		To mount rubber snubbers.	CRT Shock Mount, Part A.			1	A1134		A1134	b

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
STRUCTURAL PARTS, PANELS, FRAMES, ETC. (Continued)										
A114B		To mount CRT Socket and CRT magnetic shield.	CRT Shock Mount, Part B.			1	A1135		A1135	
A115		To lock CRT socket in position.	Franklin ring for diheptal socket.			1	X1066M		X1066M	
A122		To hold CRT magnetic shield, to shield CRT screen from light.	Scope hood.			1	A1183		A1183	b
A123A		Bond between panel and cabinet.	Grounding Strip A.			1	A1164		A1164	
A124		To shield CRT from stray magnetic fields.	CRT magnetic shield.			1	A1146		A1146	a
A126		To hold captive nut.	Bracket for captive nut.			1	A1180		A1180	
A127		To hold cabinet shock-mounts.	Shockmount base, 2-3/4" sq. 2-1/8" dia. of hole.			1	A1162		A1162	b
A131		Bond between cabinet and chassis.	Contact Spring A, cabinet.			1	A1166		A1166	b
*A135		Absorb vibration.	Shockmount, CRT.			4	100PDLN-1		G1010	
*A137		Same as A135.	Shockmount, Cabinet.			4	200P25		G1026	
CAPACITORS										
*C101		Blocking condenser.	Capacitor, .01 mfd., fixed mica, lugs and mounting holes.	483061	RE-13A-389K	28	Type E	± 10%, 300V.	C1200	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			CAPACITORS, (Continued)							
*C102	A B C	R.F. bypass.	Capacitor, 3x.1 mfd., fixed paper, oil impregnated, flat type, metal case. Same as C103, C104,C105,C106,C109, and C122.	481925	RE-13A-488E	29	Type 7710	± 20%, 600V.	C1062	
*C103	A B C	R.F. bypass.	Same as C102A-C.	481925						
*C104	A B C	R.F. bypass.	Same as C102A-C.	481925						
*C105	A B C	R.F. bypass.	Same as C102A-C.	481925						
*C106	A B C	R.F. bypass.	Same as C102A-C.	481925						
*C107		Diode load resistor bypass.	Capacitor, 250 mmfd., fixed mica, low loss.	48690	RE-13A-389K	3	1468	± 10%,500V.	C1058	
*C108		D.C. blocking cond.	Capacitor, .001 mfd., fixed mica, commercial.	482602	RE-13A-389K	31	502L"A"	± 10%,300V.	C1061	
*C109	A B C	Bypass condenser.	Same as C102A-C.	481925						
*C110		D.C. blocking condenser.	Capacitor, .005 mfd., fixed mica, low loss, silver mica.	483060	RE-13A-389K	28	Type 6-19	± 10%,2500V.	C1195	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	#	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			CAPACITORS, (Continued)							
*C111		Low voltage power supply filter cond.	Capacitor, 4 mfd., tubular, fixed paper oil impregnated, metal case. Same as C112,C113, C114, C132, C133.	481080-10	RE-13A-488E	30	6EC400	± 10%, 600V.	C1180	
*C112		Same as C111.	Same as C111.	481080-10						
*C113		Same as C111.	Same as C111.	481080-10						
*C114		Same as C111.	Same as C111.	481080-10						
*C115		Oscillator injection.	Capacitor, fixed, 5 mmfd. silver mica.	JAN Type CC20CK050D	RE-13A-389K	31	603J	± 5%, 500V.	C1067	
*C116		D.C. blocking cond.	Capacitor, 500 mmfd., fixed mica, low loss. Same as C117, C118, C119, C120, C121, and C131.	48691	RE-13A-389K	3	1468	± 10%, 500V.	C1060	
*C117		Same as C116.	Same as C116.	48691						
*C118		Same as C116.	Same as C116.	48691						
*C119		Same as C116.	Same as C116.	48691						
*C120		Same as C116.	Same as C116.	48691						
*C121		Same as C116.	Same as C116.	48691						
*C122		R.F. Bypass Condenser.	Same as C102.	481925						
*C123		D.C. blocking Cond.	Capacitor, .01 mfd., fixed mica. Same as C129, C130.	485106	RE-13A-389K	3	1467	± 10%, 300V.	C1202	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			CAPACITORS, (Continued)							
*C124	A B	Coupling condenser.	Capacitor, 2x.1 mfd., fixed paper, oil impregnated, metal case, flat type.	481923	RE-13A-488E	29	7706-R	± 15%, 600V.	C1175	
*C125	A B	D.C. blocking Cond.	Capacitor, 2x.25 mfd., fixed paper, oil impregnated, flat type metal case.	482216	RE-13A-488E	29	7707	± 15%, 600V.	C1189	
*C126		Coupling condenser.	Capacitor, .25 mfd., fixed paper, oil impregnated, bathtub, bottom mounting, metal case.	481390	RE-13A-488E	2	6BAB25	± 10%, 600V.	C1015	
*C127	A B	H.V. Supply Filter.	Capacitor, 2x.25 mfd., fixed paper, oil impregnated, metal case.	483037	RE-13A-488E	29	7071	± 15%, 2000V.	C1007	
*C128	A B C	Line filter.	Capacitor, 3x.1 mfd., fixed paper, oil impregnated, bathtub, top mtg, metal case.	48849-A	RE-13A-488E	2	6BAT111	± 20%, 600V.	C1010	
*C129		Line filter.	Same as C123.	485106						
*C130		Same as C129.	Same as C123.	485106						
*C131		R.F. bypass, cathode V105.	Same as C116.	48691						
*C132		Plate decoupling filter (V108).	Same as C111.	481080-10						
*C133		L.V. Filter cond.	Same as C111.	481080-10						

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			CONNECTORS							
*J101		Connect adaptor to companion receiver.	Connector, single, co-axial.		49194	11	83-1R		J1004	
*J102		Connect adaptor to A.C. power source.	Connector, Female 3 pole, A.C. 10A., 250V.		49126	34	F7079		J1003	
			MISCELLANEOUS ELECTRICAL PARTS							
E101		To adjust FOCUS, INTENSIFIER, BRILLIANCE, CENTER FREQ., SWEEP, and GAIN controls.	Knobs, black bakelite, curved octoganal shape 1-1/8" dia., Allen head set screws set at right angles.			10			E1018	
*E102		Hold I101.	Assembly, pilot light, bayonet type.			13	BV805		B1014	
*E103		Hold fuse F101, F102.	Fuse holder, molded bakelite.			21	HKM		F1001	
*E104		Mount tuning rod and spare fuses.	Dual fuse holder.			15			F1009	c
*E106		Contact for second anode lead.	Contact, second anode lead.			10	K-870326-1		X1068	
*E107		Shield contact for second anode lead.	Cover, second anode lead.			10	M-426889-1		W1578	
E109		Mount resistors for wiring.	Standoff, resistor, R.F., 8 terminal lugs, 3/32" xxx paper base bakelite.			1	K1056pS		K1056pS	e

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			MISCELLANEOUS ELECTRICAL PARTS (Continued)							
E111		Same as E109.	Standoff, resistor, I.F., 8 terminal lugs, xxx paper base bakelite.			1	K1057pS		K1057pS	c
E115		Same as E109.	Standoff, resistor, 18 terminal lugs, xxx paper base bakelite.			1	K1016pS		K1016pS	d
E116		Same as E109.	Standoff, resistor, 32 terminal lugs, xxx paper base bakelite.			1	K1015pS		K1015pS	d
E117		To mount H.V. pot.	Pot mount, H.V., Mykroy.			1	K1051S		K1051S	c
E118		To mount Intensifier pot and condenser.	Pot mount, Intensifier, 1/8" xxx paper base bakelite.			1	K1062pS		K1062pS	c
E119		To mount oscillator.	Terminal strip "A", oscillator, xxx paper base bakelite.			1	K1059p		K1059p	c
E120		Same as E119.	Terminal strip "B", oscillator, xxx paper base bakelite.			1	K1060p		K1060p	d
E121		Hold line filter assembly components.	Terminal strip, Line filter, xxx paper base bakelite.			1	K1061pS		K1061pS	a
E122		Mount chassis to cabinet.	Anchor plate, bakelite.			1	K1078		P1-1609	
*E123		Clamp down V119.	Tube clamp, top piece, bakelite, and accessories.			18			P2-1499	a
*E124		Contact plate of V119.	Plate cap, plastic.			5	91-T-INL WRB-16S		K1001	
*E125		To align coils and adjust slotted pots.	Aligning tool, bakelite.			1	E1010		E1010	b

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			MISCELLANEOUS ELECTRICAL PARTS (Continued)							
E126		Slide chassis into cabinet.	Cabinet Runner "A", Phenol fibre FBM.			1	A1184		A1184	
E127		Same as E126.	Cabinet Runner "B", Same as E126.			1	A1185		A1185	a
*E146		To fit Allenhead set screws on knobs.	Allen wrench.			13	#8		E1009	
*E147		To fit Allen head set screws on couplers.	Allen wrench.			13	#6		E1021	
*E148		Mount Allen wrenches to chassis.	Allen wrench clip.			20	#45		X1038	
E149		Same as E109.	Standoff, resistor, 32 lugs, xxx paper base bakelite.			1	K1015p0			
			FUSES							
*F101		Prevent damage due to overload.	Fuse, 2A., 250V. non-renewable.		17-F-2	15	#3AG/2A		F1003	
*F102		Same as F101.	Same as F101.							
			HARDWARE							
H101		To pull Chassis out of cabinet.	Pull-knob.			1	E1020Q		E1020Q	b

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			HARDWARE (Continued)							
H105		To lock front slide panel.	Screw, knurled, slide panel.			1	H1247		H1247	
H106		To lock panel and chassis to cabinet.	Panel locking stud.			1	H1319		H1319	b
H109		To hold panel thumbscrew.	Captive nut, mounted on edge of front cabinet.			1	H1288		H1288	
H110		Hold harness assembly to chassis.	Clamp, cabling.			26	#755 10-2-6		X1059	
H115		Hold CRT socket plate to shockmount.	Nut, wing 8:32.			1	H1259		H1259	
H116		Mount pot bracket to front panel.	Spacer, pot bracket.			1	H1331		H1331	
H118		Support swept oscillator shield.	Spacer swept osc. shield.			1	H1327		H1327	
H120		Secure flexible coupling.	Screw, Allen head 6:32 x 1/8.			1	H1183		H1183	
H121		Secure control knobs.	Screw, Allen head 8:32 x 1/8.			1	H1052		H1052	
H122		Lock panel to chassis.	Screw, Panel locking.			1	H1381		H1381	a
H123		Separate CRT shockmount part "A" from part "B".	Spacer, shockmount.			1	H1345		H1345	
H124		Secure pull knob to front panel.	Screw, pull knob.			1	H1374		H1374	

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			INDICATING DEVICES							
I101		OFF-ON indicator.	Lamp, pilot light, bayonet base, 6V./8v., 150 ma.			16	#47		B1007	
I126		Calibration screen.	Lumarith screen, green.			1	Green .050" B1025		B1025	b
I127		Back up calibration screen.	Lumarith screen, colorless, clear.			1	B1024		B1024	
			INDUCTORS, R.F. AND A.F.							
*L101		L.V. Filter Choke.	Choke, filter 10-20 H. at 100 ma. D.C., 5V. 60 cycles, same as L102.	302179	RE-13A-553B + Add. #2	1	T4450		T4450	f
*L102		L.V. Filter Choke.	Same as L101.	302179						
*L103		Shunt feed reactor (VIII).	Choke, RF, 4 pie type, 2.5 mh. Same as L104.			32	4537		L1001	
*L105-6		Line Filter Choke.	Choke, line filter, 3 pie, 1 solenoid L_1 = 400 mh at 1000 cps L_2 = 20 mh at 1000 cps. Total resistance less than .55 ohms. Same as L107-8.	471058		1	L1103	± 10%	L1103	
*L107-8		Line Filter Choke.	Same as L105-6.	471058						

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			MECHANICAL PARTS							
0101		To rotate INTENSIFIER potentiometer	Shaft, extension "A"			1	H1326		H1326	c
0103		To rotate FOCUS and BRILLIANCE potentiometers	Shaft, extension "B"			1	H1325		H1325	c
*0105		Couple extension shafts to pots	Coupling, flexible			33	Type A		G1020	
0107		Bearing for Pot extension shafts	Bearing, panel			1	H1364		H1364	
			PLUGS							
*P101		Connect RF input to chassis connector	Plug, straight, 1 pole, male, HF input, cable coupling to plug, polystyrene insulation.	49195		11	83-1SPN		P1010	
*P101A		Same as P101	RF input angle plug.	49192		11	83-1AP		P1011	
*P102		Connect AC source to adaptor	Plug, AC, 3 pole, 10A, 250V DC, 440V AC, 20A 125V DC.	49125		34	F-7078		P1004	
			RESISTORS							
*R101		Grid return	Resistor, fixed carbon, 75 ohms, 1W. insulated.	63288	RE-13A-340C	7	518	±10%	R1145	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	#	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			RESISTORS (Continued)							
*R102		Grid bias (V101)	Resistor, fixed carbon, 150 ohms, 1W, insulated. Same as R119, R136, R112, R105.	63288	RE-13A-340C	7	518	±10%	R1150	
*R103		Screen dropping resistor (V101)	Resistor, fixed carbon, 50,000 ohms, 1W, insulated. Same as R106, R110, R117, R121, R115, R116.	63288	RE-13A-340C	7	518	±10%	R1055	
*R104		Plate resistor (V101)	Resistor, fixed carbon, 5,000 ohms, 1W, insulated. Same as R107, R111, R118, R122, R167.	63288	RE-13A-340C	7	518	±10%	R1048	
*R105		Grid bias (V102)	Same as R102.							
*R106		Screen dropping resistor (V102)	Same as R103.							
*R107		Plate isolation (V102)	Same as R104.							
*R108		Grid bias resistor (INJECTION GRID V103)	Resistor, fixed carbon, 20,000 ohms, 1/2W, insulated.	63360	RE-13A-340C	7	504	±10%	R1026	
*R109		Grid bias (V103)	Resistor, fixed carbon, 200 ohms, 1W, insulated, same as R155.	63288	RE-13A-340C	7	518	±10%	R1151	
*R110		Screen dropping resistor (V103)	Same as R103.							
*R111		Plate isolation (V103)	Same as R104.							
*R112		Grid bias (V104)	Same as R102.							

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	#	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			RESISTORS (Continued)							
*R113		Screen bleeder (V104)	Resistor, fixed carbon, 75,000 ohms, 1W, insulated. Same as R131, R132.	63288	RE-13A-340C	7	518	±10%	R1058	
*R114		Gain Control (V104)	Potentiometer, carbon, 5,000 ohms, 1W, linear taper, screw-driver slot. Same as R138.	633309-20		8	W37	±20%	R1509	
*R115		Bleeder resistor (V104)	Same as R103.							
*R116		Bleeder resistor (V104)	Same as R103.							
*R117		Screen bleeder (V104)	Same as R103.							
*R118		Plate isolation (V104)	Same as R104.							
*R119		Grid bias (V105)	Same as R102.							
*R121		Sereen bleeder (V105)	Same as R103.							
*R122		Plate isolation (V105)	Same as R104.							
*R123		Diode load resistor (V106)	Resistor, fixed carbon, 150,000 ohms, 1W, insulated, same as R172, R129, R134, R163, R171, R165.	63288	RE-13A-340C	7	518	±10%	R1060	
*R124		Vertical positioning control (V107B)	Potentiometer carbon, 10,000 ohms, 1W, linear taper, screw-driver slot.	633310-20		8	W37	±20%	R1511	
*R127		Grid bias (V107B)	Resistor, fixed carbon, 2,000 ohms, 1W, insulated.	63288	RE-13A-340C	7	518	±10%	R1045	
*R128		Coupling (V107)	Resistor, fixed carbon, 2 meg. 1/2W, ceramic insulated.	63360	RE-13A-340C	7	504	±10%	R1038	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			RESISTORS (Continued)							
*R129		Grid return (V107B)	Same as R123.							
*R131		Plate load resistor (V107A)	Same as R113.							
*R132		Plate load resistor (V107B)	Same as R113.							
*R133		Coupling (V108)	Resistor, fixed carbon, 250,000 ohms, 1W, insulated, same as R161, R168.	63288	RE-13A-340C	7	518	±10%	R1062	
*R134		Grid load resistor (V108)	Same as R123.							
*R135		Grid return (V108)	Resistor, fixed carbon, 250,000 ohms, 1/2W, ceramic insulated.	63360	RE-13A-340C	7	504	±10%	R1033	
*R136		Grid bias (V108)	Same as R102.							
*R137		Screen dropping resistor (V108)	Resistor, fixed carbon, 100,000 ohms, 1W, insulated. Same as R181.	63288	RE-13A-340C	7	518	±10%	R1059	
*R138		Intensifier control (V108)	Same as R114.							
*R139		Grid bias (V109)	Resistor, fixed carbon, 100,000 ohms, 1/2W, insulated. Same as R140.	63360	RE-13A-340C	7	504	±10%	R1030	
*R140		Grid bias (V110)	Same as R139.							
*R141		Oscillator plate resistor (V109, V110)	Resistor, fixed carbon, 100 ohms, 1/2W, insulated, same as R149, R150.	63360	RE-13A-340C	7	504	±10%	R1007	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	#	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV.
			RESISTORS (Continued)							
*R142		Regulator, dropping resistor	Resistor, wire wound, 5,000 ohms, 20W, Glass enclosed, Grade I, Class I.	JAN RW15F502		35		±10%	R1190	
*R143		Regulator, dropping resistor	Resistor, wire wound, 3,100 ohms, 15W, Glass enclosed, Grade I, Class I.	JAN RW16F312		35		±10%	R1189	
*R144		Isolating resistor (V111)	Resistor, fixed carbon, 200,000 ohms, 1/2W, insulated, same as R145.	63360	RE-13A-340C	7	504	±10%	R1032	
*R145		Isolating resistor (V112)	Same as R144.							
*R146		CENTER FREQ(uency) Control (V111-V112)	Potentiometer, carbon, 500 ohms, 1W, linear taper, screw-driver slot.	633308-20		8	W37	±20%-10%	R1502	
*R147		CENTER FREQ PAD (V111-V112)	Potentiometer, carbon, 1000 ohms, 1W, linear taper, screw-driver slot.	633293-20		8	W37	±20%	R1505	
*R148		Phasing network resistor (V111)	Resistor, fixed carbon, 1000 ohms, 1/2W, insulated, same as R151.	63360	RE-13A-340C	7	504	±10%	R1014	
*R149		Grid bias V111	Same as R141.							
*R150		Grid bias V112	Same as R141.							
*R151		Phasing network resistor (V112)	Same as R148.							
*R152		Reactor plate resistor (V111)	Resistor, fixed carbon, 2000 ohms, 1/2W, insulated, same as R153, R182.	63360	RE-13A-340C	7	504	±10%	R1016	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	#	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			RESISTORS (Continued)							
*R153		Reactor plate resistor (V112)	Same as R152.							
*R154		Sawtooth Gen. Plate resistor (V114A)	Resistor, fixed carbon, 3 meg, 1W, insulated.	63288	RE-13A-340C	7	518	±10%	R1154	
*R155		Synch net (V114A)	Same as R109.							
*R156		Synch net (V114A)	Resistor, fixed carbon, 500 ohms, 1W, insulated.	63288	RE-13A-340C	7	518	±10%	R1152	
*R157		Grid bias (V114A)	Resistor, fixed carbon, 500,000 ohms 1W, insulated, same as R173, R184.	63288	RE-13A-340C	7	518	±10%	R1063	
*R158		SYNCH control (V114A)	Potentiometer, carbon, 1 meg, 1W, linear taper, screwdriver slot.	633304-20		8	W37	±20%	R1525	
*R159		Bias resistor (V114B)	Resistor, fixed carbon, 10,000 ohms, 1W, insulated.	63288	RE-13A-340C	7	518	±10%	R1050	
*R160		Horizontal size control (Line size) (V114B)	Potentiometer, carbon, 2 meg, 1W, linear taper, screwdriver slot, same as R179.	633305-20		8	W37	±20%	R1527	
*R161		Plate resistor (V114)	Same as R133.							
*R162		Coupling resistor (V115A)	Resistor, fixed carbon, 2 meg, 1W, insulated, same as R169, R170.	63288	RE-13A-340C	7	518	±10%	R1065	
*R163		Grid return resistor (V115A)	Same as R123.							
*R164		Grid bias (V115A)	Resistor, fixed carbon, 3,500 ohms, 1W, insulated.	63288	RE-13A-340C	7	518	±10%	R1047	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			RESISTORS (Continued)							
*R165		Bleeder resistor (V115A)	Same as R123.							
*R166		Sawtooth output of cathode follower (V115B)	Resistor, fixed carbon, 25,000 ohms, 1W, insulated.	63288	RE-13A-340C	7	518	±10%	R1053	
*R167		Grid bias (V115B)	Same as R104.							
*R168		Plate load resistor (V115A)	Same as R133.							
*R169		Coupling resistor (V115B)	Same as R162.							
*R170		Grid resistor (V115B)	Same as R162.							
*R171		Bleeder resistor (V116)	Same as R123.							
*R172		Bleeder resistor (V116)	Same as R123.							
*R173		Bleeder network (V116)	Same as R157.							
*R174		Focus Control (V116)	Potentiometer, carbon, 500,000 ohms, 1W, linear taper, screwdriver slot.	633303-20		8	W37	±20%	R1524	
*R175		Bleeder network (V116)	Resistor, fixed carbon, 1 Watt, 300,000 ohms, insulated.	63288	RE-13A-340C	7	518	±10%	R1156	
*R176		Grid resistor (V116)	Resistor, fixed carbon, 500,000 ohms, 1/2W, insulated.	63360	RE-13A-340C	7	504	±10%	R1036	
*R177		BRILLIANCE control (V116)	Potentiometer, carbon, 100,000 ohms, 1W, linear taper, screwdriver slot.	633311-20		8	W37	±20%	R1520	
*R178		SWEEP Control	Potentiometer, carbon, 250,000 ohms, 1W, linear taper, screwdriver slot.	632416-20		8	W37	±20%	R1522	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			RESISTORS (Continued)							
*R179		SWEEP PAD	Same as R160.							
*R180		HORizontal POSition Control	Same as R174.							
*R181		H.V. Filter Resistor (V119)	Same as R137.							
*R182		Plate decoupling resistor (V108)	Same as R152.							
*R183		Oscillator loading resistor	Resistor, 5,000 ohm, 1/2W, fixed carbon, ceramic insulated.	63360	RE-13A-340C	7	504	±10%	R1021	
*R184		Bleeder Network (V116)	Same as R157.							
			SWITCHES							
*S101		Switch power on and off	Switch, toggle double pole, single throw, 3A, 250V molded bakelite "baseball bat" handle.	24003	RE-24-AA-118A	25			S1025	
			TRANSFORMERS AND INTEGRAL COMPONENTS							
*T101-09		Couple input stage with bandpass amplifier stage (V102)	Trans. bandpass input, permeability tuned. Frequency is 30mc ± 250KC.	471057		1	L1097		L1097	b
C1		Coupling	Capacitor, 5mmfd. ceramicon, same as C2.			28 or 3		±10%	C1084	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			TRANSFORMERS AND INTEGRAL COMPONENTS (Continued)							
C2		Coupling	Same as C1.							
*T102-09		Couple bandpass amplifier with mixer (V103)	Transformer, bandpass inter-stage, permeability tuned. Frequency is 30mc ± 250KC.	471056		1	L1098		L1098	b
C3		Coupling	Capacitor, 5mmfd. ceramicon.			28 or 3		±10%	C1084	
R1		Loading Resistor	Resistor, fixed carbon, 10,000 ohms, 1/2W, ceramic insulated.	63360	RE-13A-340C	7	504	±10%	R1024	
*T103		Power transformer supply low voltage operating potentials	Transformer, power primary 115/230V 55-65 cycles. Two secondary windings 6.5V at 4.0 Amp. 700V tapped at 350V at 110 ma.	302181	RE-13A-553B + Add. #2	1	T1450		T1450	
*T104		Power transformer, supply high voltage operating potentials	Transformer, power. Primary 115/230V 55-65 cycles. Secondary four windings. 6.5V at 6A, 6.4V at .6A, 2.5V at 1.75A, 1200V at 2 ma.	302182	RE-13A-553B + Add. #2	1	T1451		T1451	
*T105		Blocking tube oscillator transformer (sawtooth generator)	Transformer, BTO 2:1 ratio, secondary to primary.	302180	RE-13A-553B + Add. #2	1	T2418		T2418	c
*Z101-09		FM oscillator coil	Coil, oscillator composite, permeability tuned 22.5 mc. ±5mc.			1	L1099		L1099	a
*Z102-09		I.F. input transformer	Transformer I.F. input, permeability tuned. Frequency is 7.5 mc. Same as Z103-09, Z104-09.	471055		1	L1100		L1100	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
TRANSFORMERS AND INTEGRAL COMPONENTS (Continued)										
C4		Tune primary	Capacitor, fixed 50mmfd., silver mica.			3		±10%	C1071	
C5		Tune secondary	Same as C4.							
R2		Loading resistor	Resistor, fixed carbon, 25,000 ohms, 1/2W, ceramic insulated.	63360	RE-13A-340C	7	504	±10%	R1027	
*Z103-09		I.F. interstage transformer	Same as Z102-09.	471055						
C6		Same as C4	Same as C4.							
C7		Same as C4	Same as C4.							
R3		Same as R2	Same as R2.							
*Z104-09		I.F. output transformer	Same as Z102-09.	471055						
C8		Same as C4	Same as C4.							
C9		Same as C4	Same as C4.							
R4		Same as R2	Same as R2.							
TUBES										
*V101		1st R.F. Amplifier	6AC7/1852	JAN 6AC7	JAN-1A	10	6AC7/1852		6AC7	
*V102		2nd Bandpass Amplifier	6AC7/1852	JAN 6AC7	JAN-1A	10	6AC7/1852		6AC7	
*V103		Mixer	6SA7	JAN 6SA7	JAN-1A	10	6SA7		6SA7	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	#	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			TUBES (Continued)							
*V104		1st I.F.	6SG7	JAN 6SG7	JAN-1A	10	6SG7		6SG7	
*V105		2nd I.F.	6AC7/1852	JAN 6AC7	JAN-1A	10	6AC7/1852		6AC7	
*V106		Detector (diode)	6SN7GT	JAN6SN7GT	JAN-1A	10	6SN7GT		6SN7GT	
*V107		Push-pull video amplifier	6SN7GT	JAN6SN7GT	JAN-1A	10	6SN7GT		6SN7GT	
*V108		Pulse Intensifier	6AC7/1852	JAN 6AC7	JAN-1A	10	6AC7/1852		6AC7	
*V109		Push-pull osc.	9002	JAN 9002	JAN-1A	10	9002		9002	
*V110		Push-pull osc.	9002	JAN 9002	JAN-1A	10	9002		9002	
*V111		Reactor	6AC7/1852	JAN 6AC7	JAN-1A	10	6AC7/1852		6AC7	
*V112		Reactor	6AC7/1852	JAN 6AC7	JAN-1A	10	6AC7/1852		6AC7	
*V113		Voltage Regulator	VR150/30	JAN VR150/30	JAN-1A	10	VR150/30		VR150/30	
*V114		Sawtooth generator, Sawtooth amplifier	6SN7GT	JAN6SN7GT	JAN-1A	10	6SN7GT		6SN7GT	
*V115		Sawtooth amplifier, Sawtooth cathode follower	6SN7GT	JAN6SN7GT	JAN-1A	10	6SN7GT		6SN7GT	
*V116		Cathode Ray Tube	5CP1	JAN 5CP1	JAN-1A	10	5CP1		5CP1	
*V117		L.V. rectifier	6X5GT same as V118	JAN 6X5GT	JAN-1A	10	6X5GT		6X5	
*V118		L.V. rectifier	Same as V117							
*V119		H.V. rectifier	2X2	JAN 2X2	JAN-1A	10	2X2		2X2	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	#	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			CABLES							
*W103		Connect adaptor to companion receiver	Cable, interconnecting, prefabricated, copoline, single coaxial, connected to plug 49195.	RG/11-U		1	W1052		W1052	
			TUBE SOCKETS							
*X101		Mount V101	Socket, octal, mica filled or ceramic.	49402		36	115001-1A		X1020	
*X102		Mount V102	Same as X101.							
*X103		Mount V103	Same as X101.							
*X105		Mount V105	Same as X101.							
*X106		Mount V106	Same as X101.							
*X107		Mount V107	Same as X101.							
*X108		Mount V108	Same as X101.							
*X109		Mount V109	Socket, midget 7 prong ceramic wafer.	49571		23	9834		X1009	
*X110		Mount V110	Same as X109.							
*X111		Mount V111	Same as X101.							
*X112		Mount V112	Same as X101.							
*X113		Mount V113	Same as X101.							

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE I
PARTS LIST BY SYMBOL DESIGNATIONS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

SYMBOL DESIG.	SYMBOL #	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NO.	REV
			TUBE SOCKETS (Continued)							
*X114		Mount V114	Same as X101.							
*X115		Mount V115	Same as X101.							
*X116		Mount V116	Socket, 14 prong, moulded bakelite.	49984		18	#40-1 #40-3		X1026	
*X117		Mount V117	Same as X101.							
*X118		Mount V118	Same as X101.							
*X119		Mount V119	Socket, 4 prong, ceramic.	49368		11	RSS4		X1004	

*Spare Parts Furnished Refer to Table II for Quantities.

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							STRUCTURAL PARTS						
3	1	3	3		A135		Shockmount, CRT		4	100PDLN-1		G1010	
4	1	4	4		A137		Shockmount, Cabinet		4	200P25		G1026	
							CAPACITORS						
1	1	1	1	48690	C107		Capacitor, 250 mmfd., fixed mica, low loss.	RE-13A-389K	3	1468	±10%, 500V	C1058	
7	2	5	7	48691	C116 C117 C118 C119 C120 C121 C131		Capacitor, 500 mmfd., fixed mica, low loss.	RE-13A-389K	3	1468	±10%, 500V	C1060	
1	1	2	3	48849-A	C128		Capacitor, 3x.1 mfd., fixed paper, oil impregnated, bathtub, top mtg, metal case.	RE-13A-488E	2	6BAT111	±20%, 600V	C1010	
6	3	9	15	481080-10	C111 C112 C113 C114 C132 C133		Capacitor, 4 mfd., tubular, fixed paper oil impregnated, metal case.	RE-13A-488E	30	6EC400	±10%, 600V	C1180	
1	1	2	3	481390	C126		Capacitor, .25 mfd., fixed paper, oil impregnated, bathtub, bottom mounting, metal case.	RE-13A-488E	2	6BAB25	±10%, 600V	C1015	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							CAPACITORS (Continued)						
3	1	2	3	481506	C123 C129 C130		Capacitor, .01 mfd., fixed mica.	RE-13A-389K	3	1467	±10%, 300V	C1202	
1	1	2	3	481923	C124	A-B	Capacitor, 2x.1 mfd., fixed paper, oil impregnated, metal case, flat type.	RE-13A-488E	29	7706-R	±15%, 600V	C1175	
7	4	11	18	481925	C102 C103 C104 C105 C106 C109 C122	A-C A-C A-C A-C A-C A-C A-C	Capacitor, 3X.1 mfd., fixed paper, oil impregnated, flat type, metal case.	RE-13A-488E	29	Type 7710	±20%, 600V	C1062	
1	1	2	3	482216	C125	A-B	Capacitor, 2x.25 mfd., fixed paper, oil impregnated, flat type, metal case.	RE-13A-488E	29	7707	±15%, 600V	C1189	
1	1	1	1	482602	C108		Capacitor, .001 mfd., fixed mica, commercial.	RE-13A-389K	31	502L"A"	±10%, 300V	C1061	
1	1	2	3	483037	C127	A-B	Capacitor, 2x.25 mfd., fixed paper, oil impregnated, metal case.	RE-13A-488E	29	7071	±15%, 2000V	C1007	
1	1	1	1	483060	C110		Capacitor, .005 mfd., fixed mica, low loss, silver mica.	RE-13A-389K	28	Type 6-19	±10%, 2500V	C1195	
1	1	1	1	483061	C101		Capacitor, .01 mfd., fixed mica, lugs and mounting holes.	RE-13A-389K	28	Type E	±10%, 300V	C1200	
1	1	1	1	JAN Type CC20CK-050D	C115		Capacitor, fixed, 5 mmfd., silver mica.	JAN-C-20	31	603J	±5%, 500V	C1067	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							CONNECTORS						
1	1	1	2	49126	J102		Connector, Female 3 pole, A.C., 10A., 250V.		34	F7079		J1003	
1	1	1	2	49194	J101		Connector, single, coaxial.		11	83-1R		J1004	
							MISCELLANEOUS ELECTRICAL PARTS						
1	1	1	1		E102		Assembly, pilot light, bayonet type		13	BV805		B1014	
2	1	1	2		E103		Fuse holder, molded bakelite.		21	HKM		F1001	
2	1	1	2		E104		Dual fuse holder.		21			F1009	c
1	4	6	10		E106		Contact, second anode lead.		10	K-870326-1		X1068	
1	2	6	10		E107		Cover, second anode lead.		10	M-426889-1		W1578	
1	1	1	1		E123		Tube clamp, 2X2, top piece, bakelite, and accessories.		18			K1002	a
1	0	0	1		E124		Plate cap, plastic.		5	91-T-INL WRB-165		K1001	
1	1	1	2		E125		Aligning tool, bakelite.		1	E1010		E1010	b
1	1	1	2		E146		Allen wrench.		13	#8		E1009	
1	1	1	2		E147		Allen wrench.		13	#6		E1021	
1	0	0	1		E148		Allen wrench clip.		20	#45		X1038	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							FUSES						
2	20	40	100		F101 F102		Fuse, 2A., 250V., non-renewable.	17-F-2	15	#3AG/2A		F1003	
							HARDWARE						
2	0	0	2		H124		Screw - pull knob.					H1374	
							INDICATING DEVICES						
1	2	4	6		I101		Lamp, pilot light, bayonet base, 6V./8V., 150 ma.		16	#47		B1007	
							INDUCTORS, R.F. & A.F.						
2	2	4	6	302179	L101 L102		Choke, filter 10-20 H. at 100 ma. D.C., 5V. 60 cycles.	RE-13A-553B + Add. #2	1	T4450		T4450	f
2	2	2	3	471058	L105-6 L107-8		Choke, line filter, 3 pie, 1 solenoid L_1=400 mh at 1000 cps. L_2=20 mh at 1000 cps. Total resistance less than .55 ohms.		1	L1103	±10%	L1003	
2	2	4	6		L103 L104		Choke, RF, 4 pie type, 2.5 mh.		32	4537		L1001	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							MECHANICAL PARTS						
3	0	2	3		0105		Coupling, flexible.		33	Type A		G1020	
							PLUGS						
1	1	1	2	49125	P102		Plugs, AC, 3 pole, 10A, 250V DC, 440V AC, 20A, 125V DC.		34	F-7078		P1004	
2	1	2	4	49192	P101A		RF Input angle plug.		11	83-1AP		P1011	
1	1	1	2	49195	P101		Plug, straight, 1 pole, male, RF Input, cable coupling to plug, polystyrene insulation.		11	83-1SPN		P1010	
							RESISTORS						
1	1	3	5	63288	R101		Resistor, fixed carbon, 75 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1145	
5	3	15	25	63288	R102 R119 R136 R112 R105		Resistor, fixed carbon, 150 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1050	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							RESISTORS (Continued)						
7	4	21	35	63288	R103 R106 R110 R115 R116 R117 R121		Resistor, fixed carbon, 50,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1055	
6	3	18	30	63288	R104 R107 R111 R118 R122 R167		Resistor, fixed carbon, 5,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1048	
2	1	6	10	63288	R109 R155		Resistor, fixed carbon, 200 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1151	
3	2	9	15	63288	R113 R131 R132		Resistor, fixed carbon, 75,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1058	
1	1	3	5	63288	R166		Resistor, fixed carbon, 25,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1053	
7	4	21	35	63288	R123 R129 R134 R163 R165 R171 R172		Resistor, fixed carbon, 1W, 150,000 ohms, insulated.	RE-13A-340C	7	518	±10%	R1060	
1	1	3	5	63288	R127		Resistor, fixed carbon, 2,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1045	

TABLE II

SPARE PARTS LIST BY NAVY TYPE NUMBERS

FOR PANORAMIC ADAPTOR,

NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							RESISTORS (Continued)						
3	2	9	15	63288	R133 R161 R168		Resistor, fixed carbon, 250,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1062	
1	1	3	5	63288	R137		Resistor, fixed carbon, 100,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1059	
1	1	3	5	63288	R154		Resistor, fixed carbon, 3 meg. 1W, insulated.	RE-13A-340C	7	518	±10%	R1154	
1	1	3	5	63288	R156		Resistor, fixed carbon, 500 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1152	
3	2	9	15	63288	R157 R173 R184		Resistor, fixed carbon, 500,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1063	
1	1	3	5	63288	R159		Resistor, fixed carbon, 10,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1050	
3	2	9	15	63288	R162 R169 R170		Resistor, fixed carbon, 2 meg. 1W, insulated.	RE-13A-340C	7	518	±10%	R1065	
1	1	3	5	63288	R164		Resistor, fixed carbon, 3,500 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1047	
1	1	3	5	63288	R175		Resistor, fixed carbon, 300,000 ohms, 1W, insulated.	RE-13A-340C	7	518	±10%	R1156	
1	1	3	5	63360	R108		Resistor, fixed carbon, 20,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1026	
1	1	3	5	63360	R128		Resistor, fixed carbon, 2 meg. 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1038	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							RESISTORS (Continued)						
1	1	3	5	63360	R135		Resistor, fixed carbon, 250,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1033	
2	1	6	10	63360	R139 R140		Resistor, fixed carbon, 100,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1030	
3	2	9	15	63360	R141 R149 R150		Resistor, fixed carbon, 100 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1007	
2	1	6	10	63360	R144 R145		Resistor, fixed carbon, 200,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1032	
2	1	6	10	63360	R148 R151		Resistor, fixed carbon, 1,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1014	
3	2	9	15	63360	R152 R153 R182		Resistor, fixed carbon, 2,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1016	
1	1	3	5	63360	R176		Resistor, fixed carbon, 500,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1036	
1	1	3	5	63360	R183		Resistor, fixed carbon, 5,000 ohms, 1/2W, insulated.	RE-13A-340C	7	504	±10%	R1021	
1	1	3	5	JAN RW15F 502	R142		Resistor, wire wound, 5,000 ohms, 20W, glass enclosed, Grade 1, Class 1.		35		±10%	R1190	
1	1	3	5	JAN RW16F 312	R143		Resistor, wire wound, 3,100 ohms, 15W, glass enclosed, Grade 1, Class 1.		35		±10%	R1189	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							RESISTORS (Continued)						
1	1	3	5	632416-20	R178		Potentiometer, carbon, 250,000 ohms, 1W, linear taper, screw-driver slot.		8	W37	±20%	R1522	
1	1	3	5	633293-20	R147		Potentiometer, carbon, 1,000 ohms, 1W, linear taper, screwdriver slot.		8	W37	±20%	R1505	
2	1	6	10	633303-20	R174 R180		Potentiometer, carbon, 500,000 ohms, 1W, linear taper, screw-driver slot.		8	W37	±20%	R1524	
1	1	3	5	633304-20	R158		Potentiometer, carbon, 1 meg, 1W, linear taper, screwdriver slot.		8	W37	±20	R1525	
2	1	6	10	633305-20	R160 R179		Potentiometer, carbon, 2 meg., 1W, linear taper, screwdriver slot.		8	W37	±20%	R1527	
1	1	3	5	633308-20	R146		Potentiometer, carbon, 500 ohms, 1W, linear taper, screwdriver slot.		8	W37	-10%,+20%	R1502	
2	1	6	10	633309-20	R114 R138		Potentiometer, carbon, 5,000 ohms, 1W, linear taper, screwdriver slot.		8	W37	±20%	R1509	
1	1	3	5	633310-20	R124		Potentiometer, carbon, 10,000 ohms, 1W, linear taper, screw-driver slot.		8	W37	±20%	R1511	
1	1	3	5	633311-20	R177		Potentiometer, carbon, 100,000 ohms, 1W, linear taper, screw-driver slot.		8	W37	±20	R1520	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							SWITCHES						
1	1	1	1	24003	S101		Switch, toggle, double pole, single throw, 3A, 250V, molded bakelite "baseball bat" handle.	RE-24-AA-118A		25		S1025	
							TRANSFORMERS AND INTEGRAL COMPONENTS						
1	1	2	3	302180	T105		Transformer, BTO, 2:1 ratio secondary to primary.	RE-13A-553B + Add #2	1	T2418		T2418	c
1	1	2	3	302181	T103		Transformer, power primary 115/230V 55-65 cycles. Two secondary windings 6.5V at 4.0 Amp. 700V tapped at 350V at 110 ma.	RE-13A-553B + Addendum #2	1	T1450		T1450	
1	1	2	3	302182	T104		Transformer, power primary 115/230V 55-65 cycles. Secondary four windings. 6.5V at 6A, 6.4V at .6A, 2.5V at 1.75A, 1200V at 2 ma.	RE-13A-553B + Addendum #2	1	T1451		T1451	
3	3	6	9	471055	Z102-09 Z103-09 Z104-09		Transformer, I.F. input perm. tuned. Frequency is 7.5mc.		1	L1100		L1100	
1	1	2	3	471056	T102-09		Transformer, bandpass interstage, permeability tuned. Frequency is 30mc ± 250Kc.		1	L1098		L1098	b

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							TRANSFORMERS AND INTEGRAL COMPONENTS (Continued)						
1	1	2	3	471057	T101-09		Transformer, bandpass input, permeability tuned. Frequency is 30mc ± 250Kc.		1	L1097		L1097	b
1	1	2	3		Z101-09		Coil, oscillator composite, permeability tuned 22.5mc ±5mc.		1	L1099		L1099	a
							TUBES						
6	12	18	0	JAN6AC7	V101 V102 V105 V108 V111 V112		6AC7/1852	JAN-1A	10	6AC7/1852		6AC7	
1	2	3	0	JAN6SA7	V103		6SA7	JAN-1A	10	6SA7		6SA7	
1	2	3	0	JAN6SG7	V104		6SG7	JAN-1A	10	6SG7		6SG7	
1	2	3	0	JAN2X2	V119		2X2	JAN-1A	10	2X2		2X2	
4	8	12	0	JAN6SN7 -GT	V106 V107 V114 V115		6SN7GT	JAN-1A	10	6SN7GT		6SN7GT	
2	4	6	0	JAN9002	V109 V110		9002	JAN-1A	10	9002		9002	
1	2	3	0	JAN VR150/30	V113		VR150/30	JAN-1A	10	VR150/30		VR150/30	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							TUBES (Continued)						
1	3	6	0	JAN5CP1	V116		5CP1	JAN-1A	10	5CP1		5CP1	
2	4	6	0	JAN6X5 GT	V117 V118		6X5GT	JAN-1A	10	6X5GT		6X5GT	
							CABLES						
1	1	1	2	RG/11-U	W103		Cable, interconnecting, pre-fabricated, copolene, single coaxial with plug at one end.	RE-13A-639C	1	W1052		W1052	
							TUBE SOCKETS						
15	8	8	15	49402	X104 X101 X102 X103 X105 X106 X107 X108 X111 X112 X113 X114 X115 X117 X118		Socket, octal, mica filled or ceramic.		36	115001-1A		X1020	

TABLE II
SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR PANORAMIC ADAPTOR,
NAVY MODEL RDP

QUANT. IN EQUIP.	QUANT. PER EQUIP. SPARES	QUANT. PER TENDER SPARES	QUANT. PER STOCK SPARES	NAVY TYPE NUMBERS	SYMBOL DESIG.	SYMBOL #	DESCRIPTION	NAVY DWG. AND/OR SPEC. NO.	MFR.	MFR. DESIG.	TOLERANCE RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER	REV
							TUBE SOCKETS (Continued)						
2	1	1	2	49571	X109 X110		Socket, midget, 7 prong ceramic wafer.		23	9834		X1009	
1	1	1	1	49936	X119		Socket, 4 prong, ceramic.		11	RSS4		X1004	
1	1	1	1	49984	X116		Socket, 14 prong, moulded bakelite.		18	40-1 40-3		X1026	

TABLE III

Color Code Charts

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.

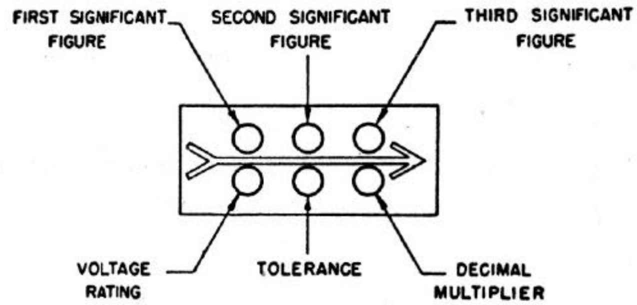
Color	Numeral	Volts	Multiplier	Tolerance
Black	0		1	
Brown	1	100	10	1%
Red	2	200	100	2%
Orange	3	300	1,000	3%
Yellow	4	400	10,000	4%
Green	5	500	100,000	5%
Blue	6	600	1,000,000	6%
Violet	7	700	10,000,000	7%
Gray	8	800	100,000,000	8%
White	9	900	1,000,000,000	9%
Gold		1000	.1	
Silver			.01	10%
No Color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

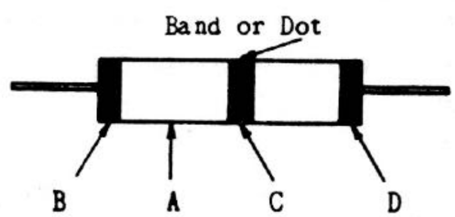
SILVER MICA IDENTIFICATION: Silver mica capacitors are molded in distinctive Red Low-loss Bakelite, precluding any possibility of confusion.

RMA COLOR CODE FOR RESISTORS

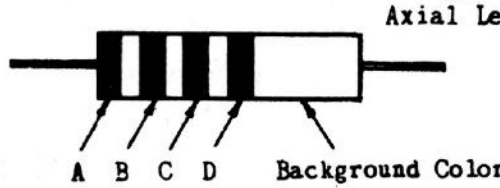
COLOR	A 1ST DIGIT	B 2ND DIGIT	C CIPHERS
Black	-	0	.0
Brown	1	1	0
Red	2	2	00
Orange	3	3	000
Yellow	4	4	0000
Green	5	5	00000
Blue	6	6	000000
Purple	7	7	0000000
Gray	8	8	00000000
White	9	9	--

D - Tolerance Code:
Gold = 5% Silver = 10% Omit = 20%

Original Color Arrangement
for
Axial Leads

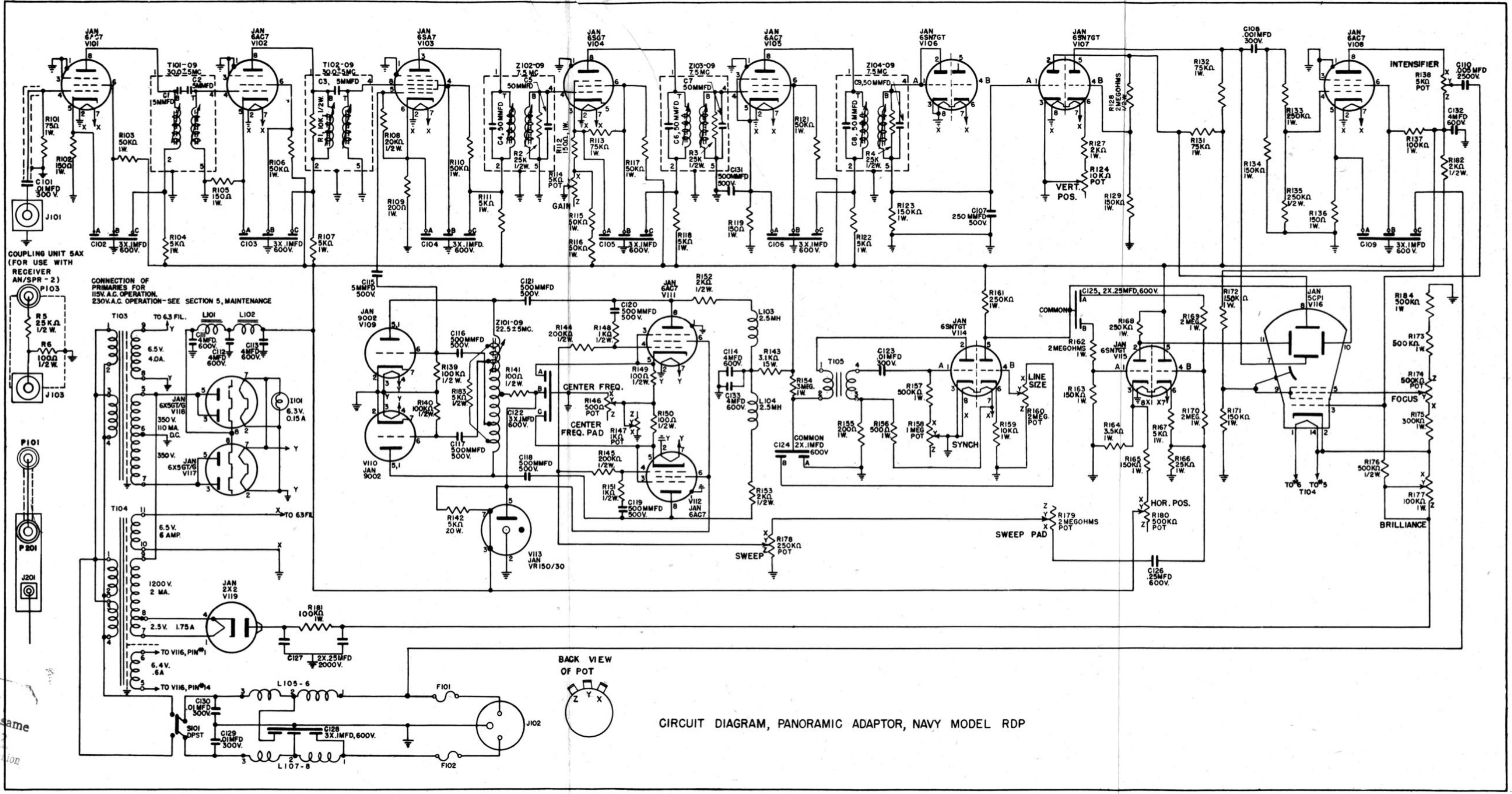


New Color Arrangement
for
Axial Leads



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 Ameriea	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.	CFK	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.	CGF	Gudeman Co.	Chicago, Ill.
30.	CAAI	Capacitrons Inc.	Chicago, Ill.
31.	CMF	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.
35.		Hanovia Chemical Co.	Newark, New Jersey
36.	CUF	Ucinite Co.	Chicago, Ill.



J201 is the same as J202 in connection receiver

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