NAVSHIPS 91616 (Non-Registered)

INSTRUCTION BOOK

for

RADIO RECEIVING EQUIPMENT NAVY MODEL RBK-16

THE HALLICRAFTERS COMPANY

4401 W. Fifth Avenue

Chicago 24, Illinois

BUREAU OF SHIPS NAVY DEPARTMENT

Contract: Nobs-52200 *Approved by BuShips: 4 March 1952*

LIST OF EFFECTIVE PAGES

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DEPARTMENT OF THE NAVY
BUREAU OF SHIPS
WASHINGTON 25, D. C.

IN REPLY REFER TO
Code 993-100
4 March 1952

From: Chief, Bureau of Ships
To: All Activities Concerned with the Installation, Operation and Maintenance of the Subject Equipment

Subj: Instruction Book for Radio Receiving Equipment Navy Model RBK-16 NAVSHIPS 91616

1. This is the instruction book for the subject equipment and is in effect upon receipt.

2. When superseded by a later edition, this publication shall be destroyed.

3. Extracts from this publication may be made to facilitate the preparation of other Department of Defense Publications.

4. All Navy requests for NAVSHIPS Electronics publications should be directed to the nearest District Publications and Printing Office. When changes or revised books are distributed, notice will be included in the BuShips ELECTRON and in the Index of Bureau of Ships General and Electronics Publications, NAVSHIPS 250-020.

H. N. WALLIN
Chief of Bureau

RECORD OF CORRECTIONS MADE

CHANGE No.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

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GUARANTEE

Notwithstanding the provisions of Section 5 of these General Provisions, entitled "Inspection", the Contractor guarantees that at the time of delivery thereof the supplies provided for under this contract will be free from any defects in material or workmanship and will conform to the requirements of this contract. Notice of any such defect or nonconformance shall be given by the Government to the Contractor within one year of the delivery of the defective or nonconforming item, unless a different period of Guaranty is specified in the Schedule. If required by the Government within a reasonable time after such notice, the Contractor shall with all possible speed correct or replace the defective or nonconforming item or part thereof. When such correction or replacement requires transportation of the item or part thereof, shipping costs, not exceeding usual charges, from the delivery point to the Contractor's plant and return, shall be borne by the Contractor; the Government shall bear all other shipping costs. This Guaranty shall then continue as to corrected or replacing supplies, or, if only parts of such supplies are corrected or replaced, to such corrected or replacing parts, until one year after the date of re-delivery, unless a different period of Guaranty is specified in the Schedule. If the Government does not require correction or replacement of a defective or nonconforming item, the Contractor, if required by the Contracting Officer, within a reasonable time after the notice of defect or nonconformance, shall repay such portion of the contract price of the item as is equitable in the circumstances.

INSTALLATION RECORD

Contract Number Nobs-52200 Date of Contract, 6 January 1951

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

REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made to the *Bureau of Ships* in accordance with current regulations using form NAVSHIPS NBS 383 (revised) except for Marine Corps equipment, in which case the "Signal Equipment Failure Report" form shall be used and distributed in accordance with instructions pertaining thereto. 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 instruction.

ORDERING PARTS

All requests or requisitions for replacement material should include the following data:

1. Federal stock number or, when ordering from a Marine Corps or Signal Corps supply depot, the Signal Corps stock number.
2. Name and short description of part.

If the appropriate stock number is not available the following shall be specified:

1. Equipment model or type of designation, circuit symbol, and item number.
2. Name of part and complete description.
3. Manufacturer's designation.
4. Contractor's drawing and part number.
5. JAN or Navy type number.

DESTRUCTION OF ABANDONED MATERIAL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment, and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper or wood.
4. Grenades and shots from available firearms.
5. Burying all debris, where possible and when time permits.
6. Throwing overboard or disposing of in streams or other bodies of water.

Procedure:

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch and instrument boards.
3. Destroy all controls, switches, relays, connections and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water cooling systems in gas engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the *Bureau of* Ships Manual or superseding instructions on the subject of radio-safety precautions to be observed.

This equipment employs voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS:

Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustments inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties always remove power and discharge and ground circuits prior to touching them.

DON'T SERVICE OR ADJUST ALONE:

Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS:

Do not depend upon door switches or interlocks for protection but always shut down motor generators or other power equipment. Under no circumstances should any access gate, door, or safety interlock switch be removed, short circuited, or tampered with in any way, by other than authorized maintenance personnel, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

RESUSCITATION

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.

Figure 1-1. Radio Receiving Equipment Navy Model RBK-16, Identification of Front Panel Controls.

SECTION 1
GENERAL DESCRIPTION

1. PURPOSE AND BASIC PRINCIPLES.

a. The Radio Receiving Equipment Navy Model RBK-16, figure 1-1, described in this manual is intended primarily for use on ships and other stations of the U.S. Navy as a high frequency receiver.

b. The equipment is conventional in design, but incorporates two features not found in most receivers; an r-f amplifier used as a radiation suppressor, and a receptacle for connecting a panoramic adapter.

c. The receiver is designed for satisfactory operation under extreme conditions of temperature, humidity, and vibration often encountered in marine service. It is especially treated to resist the attack of fungus which may be encountered in tropical areas.

d. An outside case (dust cover) is provided with each receiver so that it can be mounted on a desk or table.

e. It will receive a-m (amplitude-modulated), f-m (frequency-modulated), and c-w (continuous-wave) signals over a frequency range of 27.8 to 143 megacycles, in three bands.

f. The receiver is self-contained, except for speaker or headset, antenna, and its connection to an external power source.

g. When receiving a-m signals the circuit consists, basically, of two stages of radio frequency amplification, (the first r-f stage is primarily designed to eliminate radiation from the antenna), a converter stage, a high-frequency oscillator, three stages of intermediate-frequency amplification, a second detector, audio-frequency voltage amplifier, push-pull audio frequency power amplifier, signal level indicator, automatic-gain control circuit, and automatic noise-limiter circuit.

h. When receiving f-m signals the circuit consists, basically, of two stages of radio-frequency amplification, (the first r-f stage is primarily designed to eliminate radiation from the antenna), a converter stage, a high-frequency oscillator, two stages of intermediate amplification, limiter, discriminator, tuning indicator, audio-frequency voltage amplifier, and a push-pull audio frequency power amplifier. The block diagram in figure 2-1 illustrates the above circuit arrangements.

2. DESCRIPTION OF UNIT.

a. Radio Receiving Equipment Navy Model RBK-16 is a 16 tube superheterodyne receiver designed for c-w, a-m and f-m (A1, A3 and F3) reception in the frequency range of 27.8 to 143 megacycles in three bands. Power requirements are 115/230 volts, 60 cycles, single phase at 115 watts, or a battery or a vibrator supply of 270 volts DC and 6 volts DC.

b. The chassis is mounted in a steel cabinet with the overall dimensions of the receiver when in the cabinet being 15-3/4 in. lg by 19-1/8 in. wide by 9-5/16 in. high.

c. Regulated voltage is supplied to the plate of the r-f oscillator, plate and screen grid of the mixer and the screen grid of the 2d and 3d i-f amplifier tubes.

d. An automatic noise limiter (ANL) is provided for the reduction of impulse noise such as is caused by man made interference.

e. For c-w operation a beat frequency oscillator (bfo) is incorporated in the receiver.

f. An "S" meter is mounted on the front panel for convenience in tuning the receiver.

g. A panoramic adapter receptacle is available at the rear of the receiver for use with a suitable panoramic adapter which has a 5.25 mc i-f frequency.

h. To eliminate spurious radiations from the antenna that originate in the receiver, a radiation suppressor circuit is used between the antenna and the r-f section.

i. A 500 ohm audio jack J1 (PHONES) is available at the front of the receiver and a 600 ohm center tapped audio socket SO4 is at the rear of the receiver.

j. The TONE control located on the front of the receiver is adjustable in four steps from bass boost to high fidelity.

k. All tuning controls are located on the front panel of the receiver, and all connections are made at the rear of the receiver, except the 500 ohm audio output PHONES connection which is on the front panel.

3. REFERENCE DATA.

a. The equipment covered in this instruction manual is Radio Receiving Equipment Navy Model RBK-16.

b. The equipment is manufactured under Navy Contract No. Nobs-52200, dated 6 January 1951.

c. The equipment is manufactured by the Hallicrafters Company, 4401 West Fifth Avenue, Chicago 24, Illinois.

d. The cognizant Naval Inspector is Inspector Naval Material Inspection, Naval Material, Chicago, Illinois.

e. Each complete unit involves one package, including spare parts.

f. Each RBK-16 receiver occupies 1.61 cu. ft. uncrated and 10.1 cu. ft. crated.

g. Each unit weighs 78 lbs. uncrated and 200 lbs. crated.

h. Radio Receiving Equipment Navy Model RBK-16 is designed to operate through the frequency range of 27.8 to 143 mc.

i. The entire frequency range is tuned in three bands with the following frequencies:

Band 1. 27.8 to 47 mc.
Band 2. 46 to 82 mc.
Band 3. 82 to 143 mc.

j. A local self-excited oscillator is used as the frequency control.

k. The receiver is of the superheterodyne type.

l. The intermediate frequency is 5.25 mc.

m. The audio output is 3 watts with less than 5% distortion.

n. The receiver is capable of A-M (A3), F-M (F3) and C-W (A1) reception.

o. Two audio output impedances, 500 and 600 ohms, are available.

p. The recommended electrical characteristics of an antenna to be used with this receiver is one which has an impedance of 50 ohms.

q. Power supply requirements are:

AC - 115/230 volts at 50/60 cycles, single phase, at 115 watts.
DC - 270 volts at 145 ma and 6 volts at 4.5 amp.

TABLE 1-1. EQUIPMENT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS			VOLUME	WEIGHT
			HEIGHT	WIDTH	DEPTH		
1	Radio Receiving Equipment Navy Type RBK-16	CHL-46298-A	9-5/16	19-1/8	15-3/4	1.61	78

Unless otherwise stated, dimensions are inches, volume cubic feet, weight pounds.

TABLE 1-2. SHIPPING DATA

SHIPPING BOX No.	CONTENTS		OVER-ALL DIMENSIONS			VOLUME	WEIGHT
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Radio Receiving Equipment Navy Model RBK-16	CHL-46298-A	17-1/2	23-1/2	42-1/2	10.1	200

Unless otherwise stated, dimensions are inches, volume cubic feet, weight pounds.

TABLE 1-3. SIMILARITIES AND DIFFERENCES IN RADIO RECEIVING EQUIPMENT NAVY MODEL RBK-( )

	RBK-1	RBK-3	RBK-4	RBK-5	RBK-6	RBK-7	RBK-8	RBK-9	RBK-11	RBK-12	RBK-13	RBK-14	RBK-16
AUDIO VOLTAGE AMPL TUBE TYPE	6C8	6C8	6C8	6C8	6C8	6SL7	6SL7	6SL7	6C8	6SL7	6SL7	6SL7	6SL7
RECTIFIER TUBE TYPE	5Z3	5Z3	5Z3	5Z3	5Z3	5U4	5U4	5U4	5Z3	5U4	5U4	5U4	5U4
BLANKING CIRCUIT						YES	YES	YES		YES	YES		
PAN ADAPTOR CIRCUIT												YES	YES
RADIATION SUPPRESSOR												YES	YES
SINGLE CONNECTOR FOR AUDIO LINE													YES
FOUR, POST CONNECTORS FOR AUDIO LINE	YES	YES	YES	YES	YES	YES	YES	YES	YES				
SIX, POST CONNECTORS FOR AUDIO LINE										YES	YES	YES	
SINGLE CONNECTOR FOR ANTENNA INPUT													YES
THREE POST CONNECTORS FOR ANTENNA INPUT	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	

TABLE 1-4. ELECTRON TUBE COMPLEMENT

UNIT	954	955	956	6AC7	6AB7	6SK7	6H6	6SL7GT	OD3	6V6GT/G	5U4G	6J5	TOTAL No. OF TUBES
Radiation suppressor			1										1
R.f. amplifier			1										1
Mixer	1												1
1st I.f. amplifier				1									1
2nd I.f. amplifier					1								1
3rd I.f. amplifier						1							1
A.m. 2nd Det, A.G.C., ANL							1						1
B.f.o.												1	1
F.M. limiter				1									1
F.M. discriminator							1						1
1st audio amplifier								1					1
Audio amplifier										2			2
High frequency oscillator		1											1
Rectifier											1		1
Voltage regulator									1				1
Total number each type	1	1	2	2	1	1	2	1	1	2	1	1	16

SECTION 2
THEORY OF OPERATION

1. GENERAL.

The block diagram of Radio Receiving Equipment Navy Model RBK-16 (figure 2-1), shows a superheterodyne receiver which covers the frequency range of 27.8 to 143 mc in three overlapping bands. The signal from the antenna is coupled to the grid of the radiation suppressor tube V16, a type 956 remote cut-off pentode, which has a small amplifying effect on the signal. Its main purpose is to prevent spurious high frequency signals from getting to the antenna and being radiated. The signal from the plate of tube V16 is impressed on the grid of tube V1 which is the same type tube as V16. Here it is further amplified before it is impressed on the grid of tube V2. Tube V2 mixes the incoming signal from V1 and the high frequency oscillator signal from tube V15, to produce an i-f frequency of 5.25 mc. On band 1, which has a range of 27.8 to 47 mc, the r-f oscillator generates a signal 5.25 mc above the incoming signal, and on bands 2 and 3, which cover 46 to 143 mc, the oscillator is 5.25 mc below the incoming signal. This 5.25 mc signal is then amplified by the 1st and 2d i-f amplifier tubes V3 and V4, before it is fed to the 3d i-f amplifier and the f-m limiter. When an a-m signal is being received the signal is amplified by the 3d i-f amplifier and then fed to the 2d detector, 1/2 of tube V6. If cw is being received, the bfo oscillator signal from tube V14 is fed along with the signal from the 3d i-f amplifier into the 2d detector, C60 provides for varying the frequency of the bfo so that the pitch of the signal heard by the operator may be varied to his liking. The other half of tube V6 is used as an automatic noise limiter, which clips the noise peaks off of the signal when they exceed a preset level, and automatic gain control, which automatically controls the audio level. For f-m reception, the signal from the 2d i-f amplifier is fed into the f-m limiter tube V7, where most of the amplitude-modulation present on the carrier is removed. From the limiter stage the i-f signal is sent to the frequency discriminator tube V8, where the frequency deviations are changed to audio frequencies. At this point, either the f-m signal from the discriminator or the a-m signal from the 2d detector, whichever is selected by the AM-FM switch SW8, is applied through the A.F. GAIN, control R43, to the grid of the 1st a-f amplifier (1/2 of tube V9). The other half of tube V9 acts as a phase inversion circuit so that the output from both halves of tube V9 will properly drive the pair of 6V6 tubes, V11 and V12, operated in push-pull for the a-f output. The output from the audio amplifier is available at jack J1 for 500 ohms connection and socket SO4 for 600 ohms connection to a headset, speaker or audio line. The power supply uses one full-wave rectifier, a 5U4G type tube V13. An OD3 voltage regulator, V10, is used to regulate the voltage supplied to the plate of the h-f oscillator, plate and screen grid of the mixer tubes, and the screen grids of the second and third i-f amplifier.

2. RADIATION SUPPRESSOR AND R-F AMPLIFIER.

The electrical functioning of bands 1, 2 and 3 are essentially the same; therefore, this discussion will describe the circuits with the BAND SWITCH in band 3 position. Coupling of the antenna to the receiver is made through coupling capacitor C80 to the grid of the radiation suppressor tube V16, which is a type 956 (acorn type remote cut-off pentode) (figure 2-2). This tube is basically an untuned r-f amplifier used to eliminate the possibility of any spurious signals in the receiver being radiated by the antenna. The circuit of tube V16 is designed primarily to suppress radiations and has very little amplification effect on the signal. Resistor R74 develops the cathode bias with capacitor C81 as the cathode bypass. Resistor R73 is the grid return. Screen voltage is applied through dropping resistor R54, with capacitor C82 as the screen grid bypass. Capacitor C79 is the plate decoupling for tube V16. Signals present at the plate of V16 are fed to the grid of tube V1, which is a type 956 (remote cut-off pentode) the same as tube V16, through coupling capacitor C41 and parasitic suppressor resistor R26. Tube V1 is an r-f amplifier with tuned plate and tuned grid circuits. With BAND SWITCH SW1 in band 3 position, transformer T3 selects the frequency of the r-f signal, in conjunction with tuning capacitor C1A and trimmer capacitor C2. The tuned frequency is applied to the grid of tube V1. Self-bias is supplied by resistor R1 with capacitor C4 as the r-f bypass. Resistor R2, in conjunction with capacitor C5, forms a decoupling network for the screen grid voltage. The plate load decoupling network is comprised of resistors

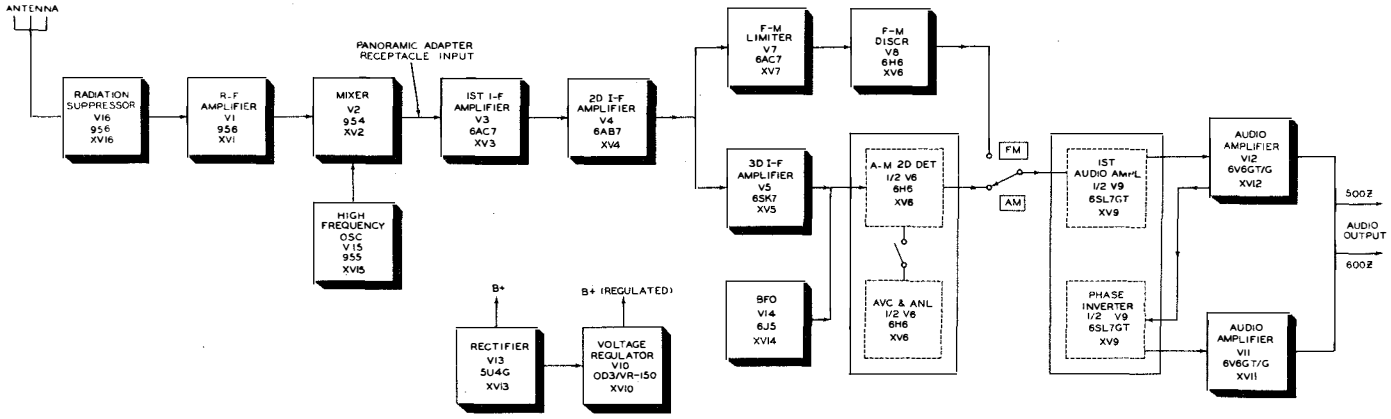


Figure 2-1. Radio Receiving Equipment Navy Model RBK-16, Block Diagram.

R3 and R4 in conjunction with capacitors C6 and C78. To improve the response at the high frequency end of the band, capacitor C7 is used to provide a small amount of capacitive coupling to the grid of the mixer tube V2; thus, equalizing the r-f signal amplitude over the tunable frequency range.

3. MIXER.

The mixer stage, tube V2, is of the electron coupled type which isolates the high-frequency oscillator signal and prevents it from being injected into the preceeding stages (figure 2-3). This stage utilizes a type 954 acorn pentode tube which, in conjunction with its associated circuit parts and the r-f oscillator tube V15, converts the incoming signal to an i-f frequency of 5.25 megacycles. The r-f signal is brought into the mixer grid (the center connection at the short end of the tube) through coupling capacitor C7 and transformer T6, which is resonated by tuning capacitor C1B in conjunction with trimmer capacitor C65. The r-f oscillator signal is injected into the cathode of the mixer through coupling capacitor C9. Self-bias is provided by cathode resistor R5. The incoming signal and the high-frequency oscillator signal mix within tube V2, and the resultant difference frequency of 5.25 megacycles appears in the plate load transformer T10. Transformer T10 is tuned to this frequency; and, therefore, passes the intermediate frequency to the grid of the first i-f amplifier tube V3. Capacitor C62 is the mixer (V2) plate circuit decoupling capacitor, and resistor R67 acts as an isolation resistor to decouple the mixer from the regulated B+ supply line. Capacitor C68 resonates the primary of transformer T10 at the i-f frequency. Series plate

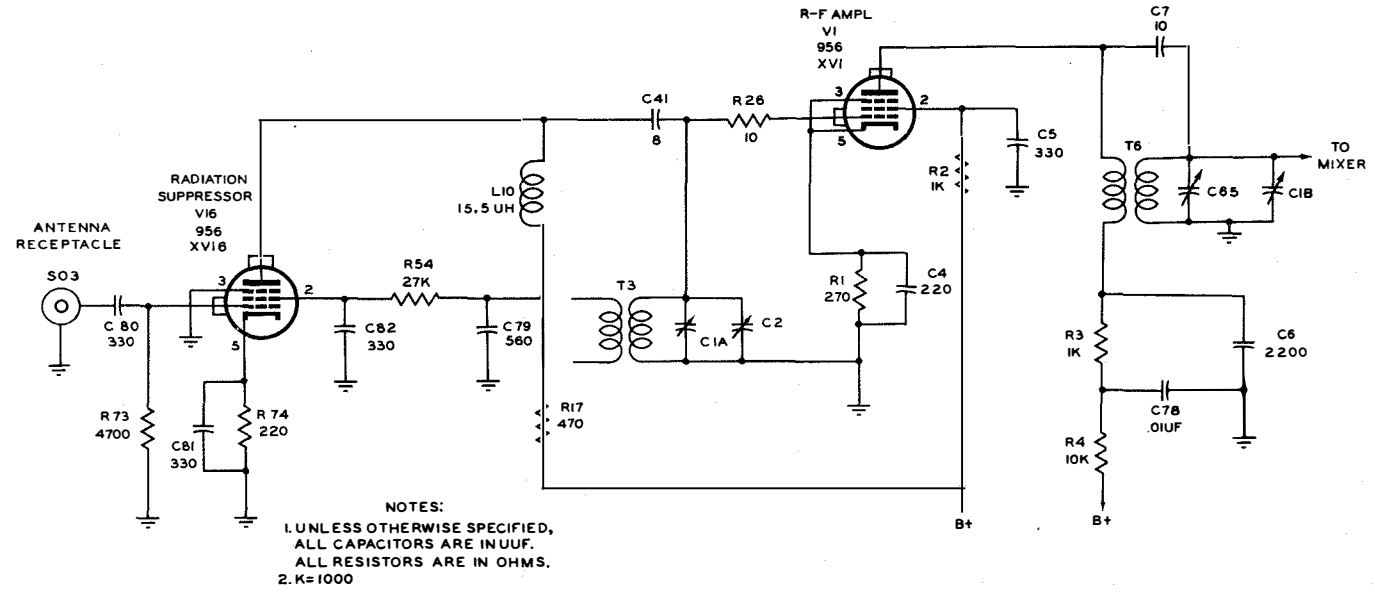


Figure 2-2. Radio Receiving Equipment Navy Model RBK-16, Radiation Suppressor and R-f Amplifier, Simplified Schematic Diagram.

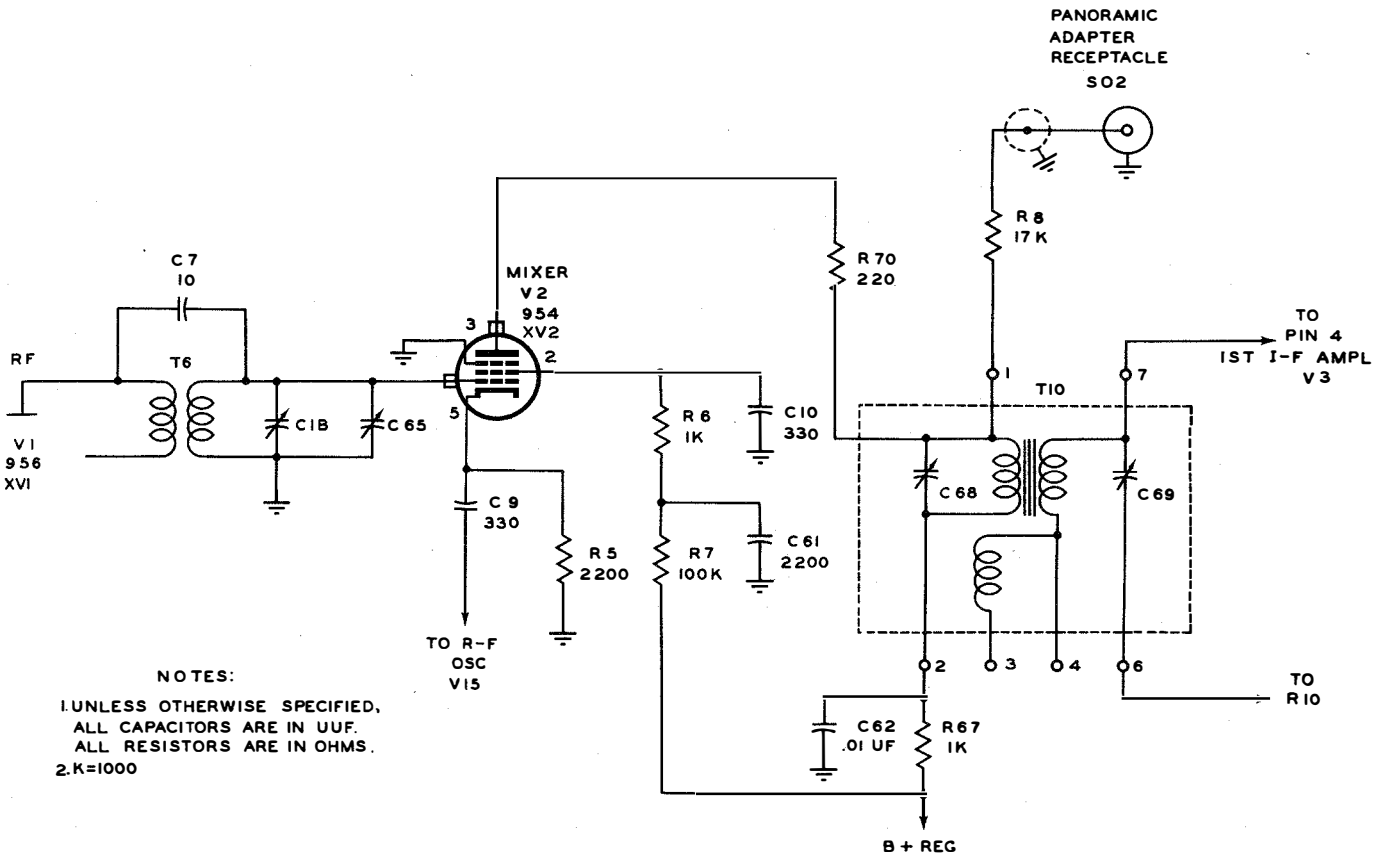


Figure 2-3. Radio Receiving Equipment Navy Model RBK-16, Mixer, Simplified Schematic Diagram.

resistor R70 prevents parasitic oscillations. Capacitors C10 and C61 and resistor R6 form the screen decoupling network. Dropping resistor R7 supplies the proper screen potential. A panoramic adapter receptacle SO2 is tied in at the plate of the mixer tube (through resistors R8 and R70), which permits a panoramic adapter that is designed to be used with a 5.25 megacycle i-f superheterodyne receiver to be used.

4. H-F OSCILLATOR.

The h-f oscillator tube V15, a type 955 acorn triode, generates an r-f signal 5.25 megacycles different from the incoming signal (figure 2-4). On band 1 this signal is 5.25 megacycles higher than the incoming signal, and on bands 2 and 3 it is 5.25 megacycles lower than the incoming signal. The oscillator is a triode with a tuned plate and untuned grid circuit. Resistor R63 in conjunction with r-f choke L1, resistor R62 and capacitor C55, forms the plate load decoupling network. When plate voltage is applied, the grid and cathode are at the same potential and plate current increases, resulting in a feedback voltage through blocking capacitor C56 and coil assembly T9 (for band 3). As oscillations build up, the grid is driven positive and the potential developed across resistor R64 charges grid capacitor C57. During the negative half cycles, capacitor C57 tends to discharge through resistor R64. Capacitor C57 acquires an average negative charge on its grid end providing grid bias. As the triode is alternately driven to saturation and cut-off, oscillations are produced in the tuned circuit at a frequency determined by transformer T9 and tuning capacitor C1C in conjunction with trimmer capacitor C11. Resistor R66 limits the amplitude of oscillations and thus limits grid current. The r-f voltage induced across the lower coil of assembly T9 is applied to the cathode of the mixer tube V2 through capacitor C9.

5. FIRST AND SECOND I-F AMPLIFIERS.

The i-f amplifier tubes, V3 and V4, amplify the 5.25 megacycle output of mixer tube V2 (fig. 2-5). The first i-f amplifier (V3) employs a type 6AC7 tube, which is a sharp cut-off r-f pentode. The second i-f amplifier tube (V4) employs a 6AB7 and, since the circuit parts of both are nearly the same, the circuit discussion will cover the first i-f amplifier and it will also be applicable to the second i-f amplifier. The mixer stage i-f voltage appearing across the secondary of transformer T10, resonated by capacitor C69, is applied to the

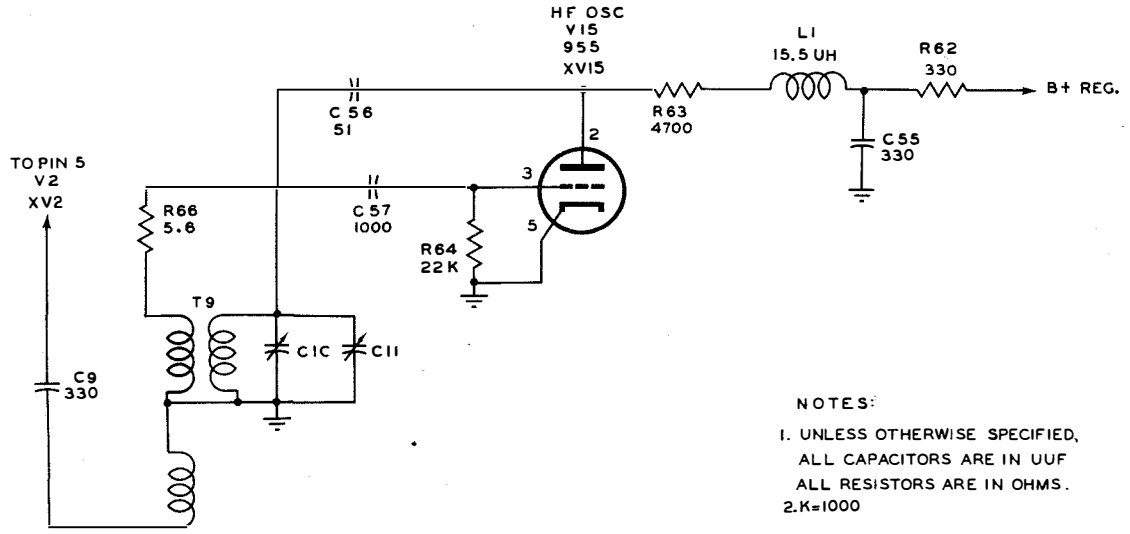


Figure 2-4. Radio Receiving Equipment Navy Model RBK-16, High Frequency Oscillator, Simplified Schematic Diagram.

input of tube V3, and appears in greater amplitude across the primary of T11. Capacitor C15 in conjunction with resistor R15, forms the plate load decoupling network for tube V3. Self-bias is provided by resistor R13 and r-f gain control resistor R11, which are bypassed by capacitor C13. Resistor R13 also limits the minimum bias when r-f gain control resistor R11 is turned to a maximum clockwise position (minimum resistance). When the SELECTIVITY switch SW7 is in the BROAD position, it includes the inductance in series with the secondary of transformer T10, and also resistor R9 which is in series with the inductance. These broaden the bandpass characteristics of transformer T10, to facilitate high-fidelity f-m reception. Resistor R72 reduces the gain in the SHARP position, and L11 compensates for the inductance of the tertiary winding when

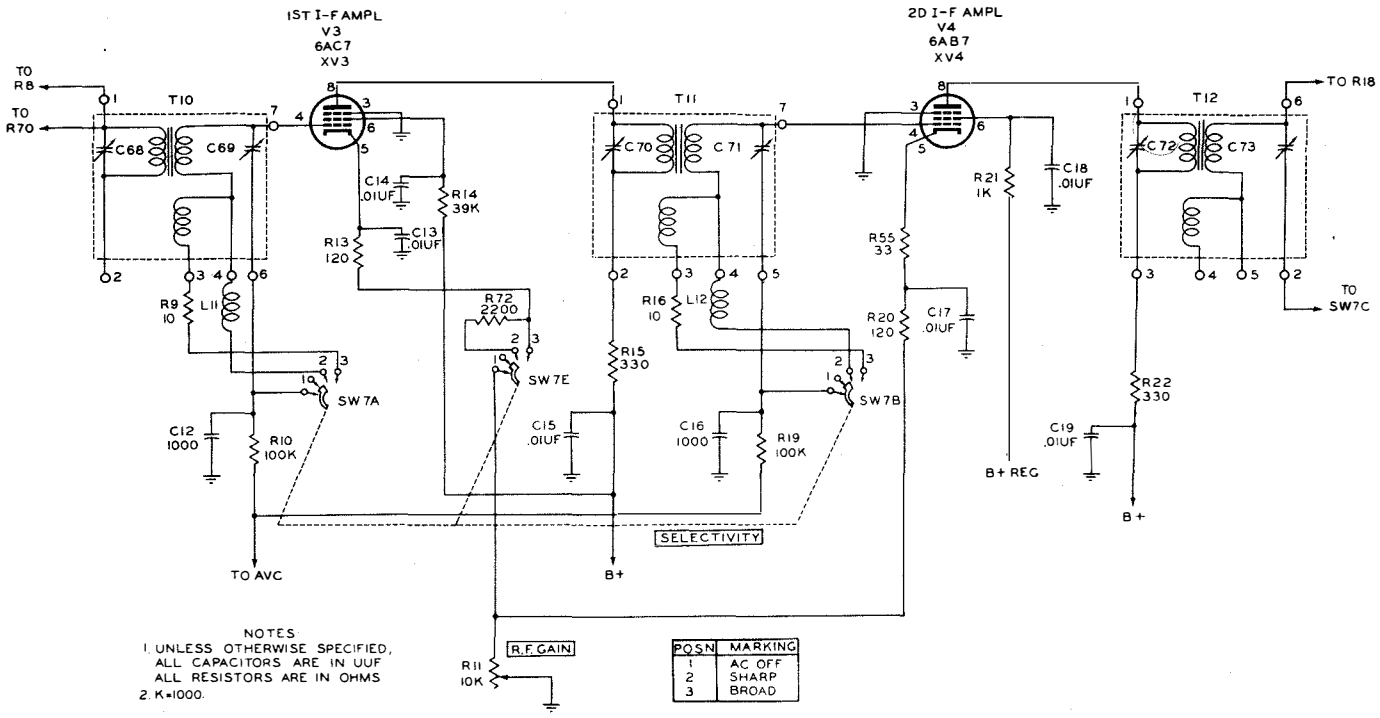


Figure 2-5. Radio Receiving Equipment Navy Model RBK-16, 1st and 2d I-f Amplifier, Simplified Schematic Diagram.

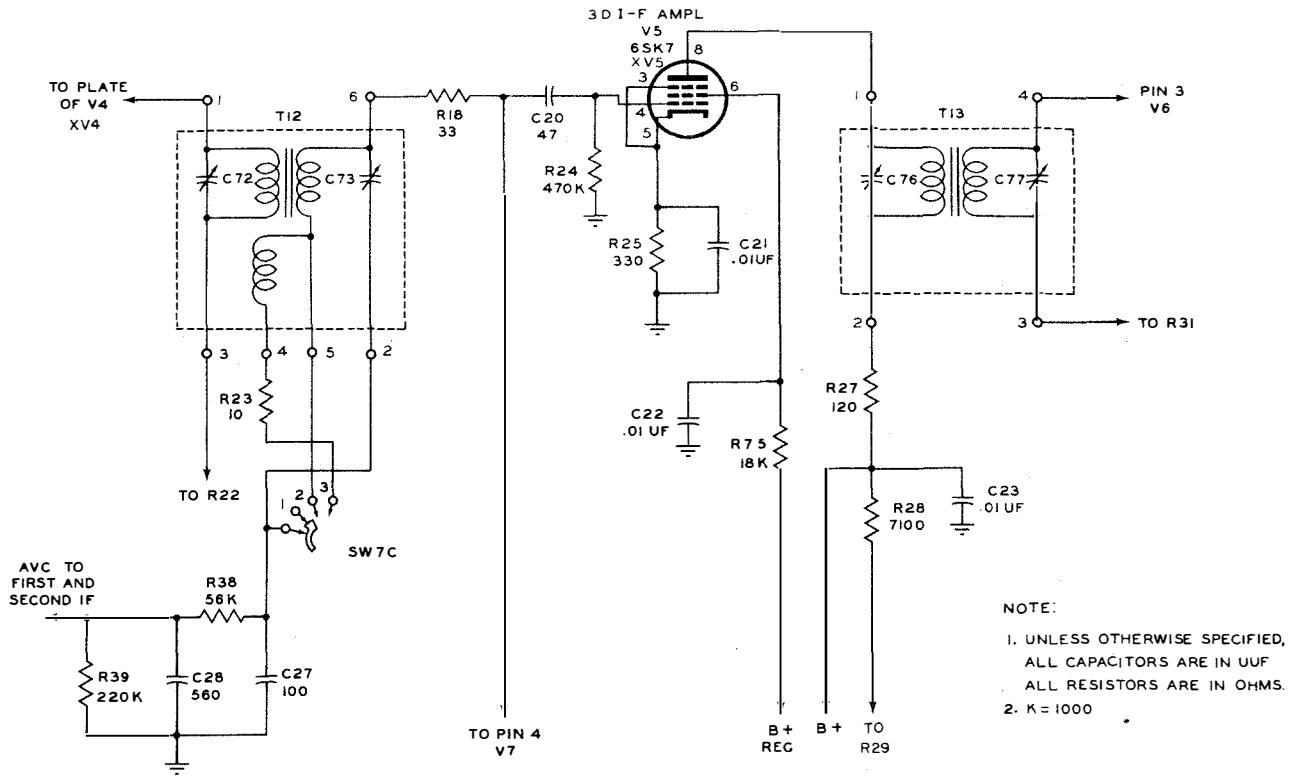


Figure 2-6. Radio Receiving Equipment Navy Model RBK-16, I-f Amplifier, Simplified Schematic Diagram.

changing from the SHARP to the BROAD position to limit the shift in the center frequency. Resistor R10 and capacitor C12 serve as the avc decoupling network. Screen dropping resistor R14 is bypassed by capacitor C14. The output of the first i-f amplifier is applied to the grid of the second i-f stage. The i-f signal voltage appearing across transformer T12 is applied to the f-m limiter stage in the f-m channel and also to the final i-f amplifier in the a-m channel.

6. FINAL I-F AMPLIFIER.

The final i-f amplifier tube V5, a type 6SK7 pentode, further increases the amplitude of the i-f signal before it is applied to the second detector tube V6 (fig. 2-6). The i-f signal appearing across the secondary of transformer T12, which is resonated by capacitor C73, is applied to the input of tube V5. Blocking capacitor C20 isolates the grid bias d-c from the rest of the circuit, and resistor R18 prevents parasitic oscillations. Tube V5 is self-biased by resistor R25 which is bypassed by capacitor C21. Resistor R24 forms the grid load, while B+ regulated is applied to the screen through resistor R75, which is bypassed by capacitor C22. Resistor R27 in conjunction with capacitor C23 forms the plate load decoupling network. When the SELECTIVITY switch is positioned to include resistor R23 and the series inductance at the lower end of transformer T12, the bandpass characteristics of transformer T12 are broadened to facilitate high-fidelity f-m reception. When operating as an f-m receiver, agc action is obtained by appling a portion of the voltage developed across resistors R38 and R39 (bypassed by capacitors C27 and C28) to the control grids of the first and second i-f amplifiers. The primary of transformer T13 is resonated at the i-f frequency by capacitor C76, and the i-f voltage appearing across the secondary is applied to the second detector, tube V6, a type 6H6, for a-m reception.

7. BEAT-FREQUENCY OSCILLATOR (BFO).

(*Figure 2-7*)

To receive continuous waves or keyed continuous waves they must be made audible, and to do this it is necessary to use a beat-frequency oscillator. The BFO generates a signal normally 1,000 cycles higher than the i-f frequency and this output is combined with the i-f signal at the plate of the second detector. Tube V14, a type 6J5 triode, is used in a modified Hartley circuit. When plate voltage is applied, the grid and cathode are at equal potentials and the plate current increases, resulting in a feedback voltage through capacitor C52 to the lower end of coil L5. As oscillations build up, the grid is driven positive and the voltage

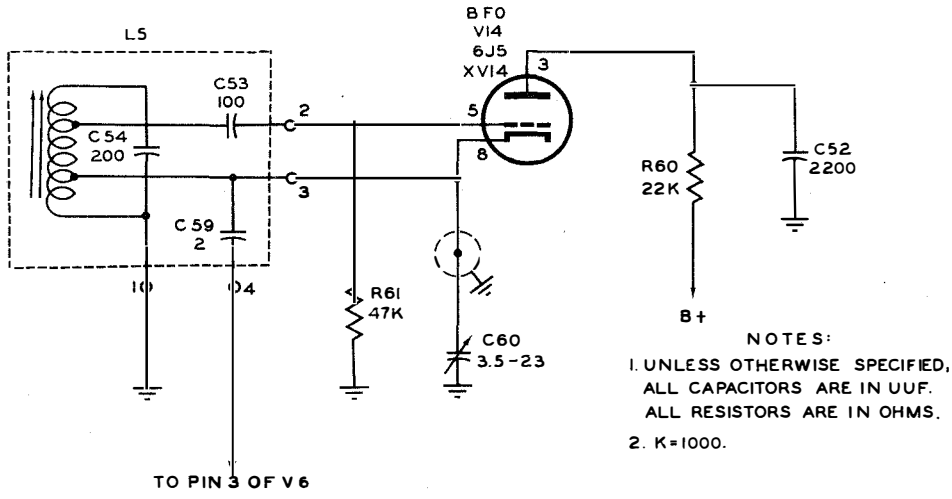


Figure 2-7. Radio Receiving Equipment Navy Model RBK-16, Beat Frequency Oscillator, Simplified Schematic Diagram.

developed across grid resistor R61 charges capacitor C53. During negative half-cycles, the grid capacitor C53 tends to discharge through resistor R61. Capacitor C53 acquires an average negative charge on the grid side providing bias. As the triode is alternately driven to saturation and cut-off, oscillations are produced in the parallel resonant circuit at a frequency determined by coil L5 and capacitor C54. Variable capacitor C60 varies the frequency slightly, thus providing a means of varying the pitch of the audible note to suit the operator.

8. A-M SECOND DETECTOR AND AVC.

The detector, tube V6, is of the diode type and is in the same envelope as the automatic noise limiter (ANL) (fig. 2-8). The final i-f amplifier output from transformer T13 is applied to the second detector which employs one-half of a type 6H6 twin diode tube. As the third i-f transformer supplies i-f voltage, current flows through the voltage divider network, consisting of resistors R31, R33, R34, and R36, which are the diode load resistors. Resistor R31, in conjunction with capacitors C24 and C26, also form the i-f decoupling network between transformer T13 and the other three diode load resistors. Current flows between the cathode and the diode plate when the signal voltage drives the plate positive, and a voltage is developed across these resistors. The audio voltage appearing across resistors R34 and R36 is then applied through capacitor C33 to the A.F. GAIN control R43. The movable arm of the A.F. GAIN control is connected to the grid of the first audio amplifier tube V9 and varies the voltage applied to it; this in turn controls the audio volume in the speaker or headset. The agc voltage developed in this same diode resistor network is applied through a filter network consisting of resistor R35, and filter capacitor C8 to the grids of the 1st and 2d i-f amplifiers, tubes V3 and V4. The A.V.C. switch, SW4, should be in the OFF position (contacts closed) when receiving c-w or f-m signals.

9. AUTOMATIC NOISE LIMITER (ANL).

(*Figure 2-9*)

The automatic noise limiter, anl, is designed to suppress high amplitudes of noise interference (exceeding a preset level) which is picked up by the antenna and amplified through the radio re-

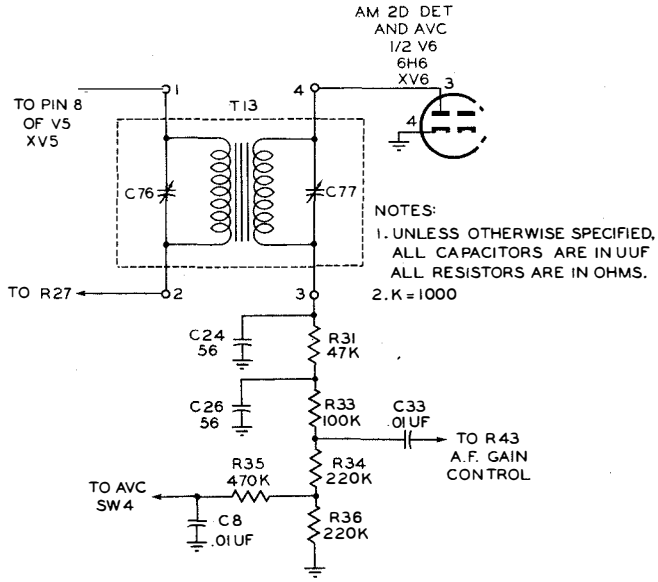


Figure 2-8. Radio Receiving Equipment Navy Model RBK-16, A-m 2d Detector and Avc, Simplified Schematic Diagram.

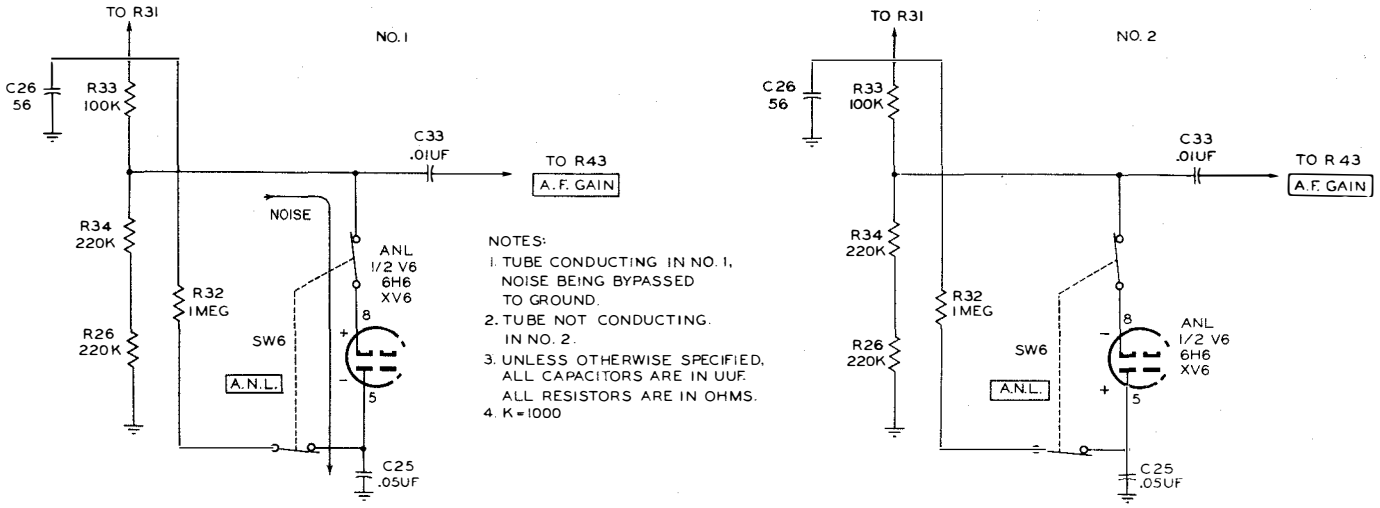


Figure 2-9. Radio Receiving Equipment Navy Model RBK-16, Automatic Noise Limiter, Simplified Schematic Diagram.

ceiver up to the detector. The anl circuit may be switched in or out by switch SW6. When the switch is in the ON position and the incoming i-f signal voltage is normal i.e., the noise amplitudes do not exceed the preset threshold level of the limiter, the negative voltage on the plate of the anl diode will be greater than the negative voltage on the cathode and no current will flow from cathode to plate and there will be no effect on the operation of the receiver, as the time constant of capacitor C25 and resistor R32 is of such a value that the audio-frequency variations do not alter it. When a severe noise pulse reaches the detector, it will appear in the form of a negative voltage, greater than the negative voltage on the plate of the anl tube, and current will flow from the cathode to plate and be bypassed to ground by capacitor C25. As a result of this action the noise pulses are clipped off and do not appear as sudden bursts of noise.

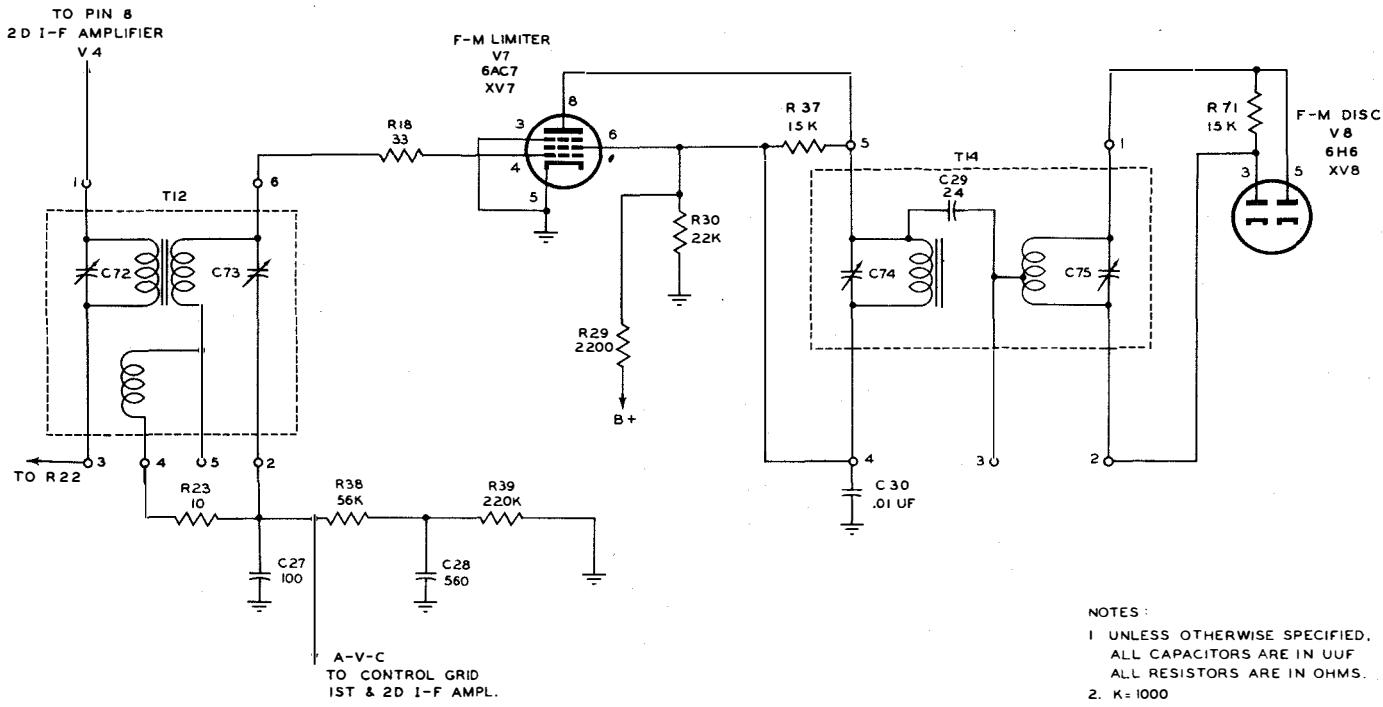


Figure 2-10. Radio Receiving Equipment Navy Model RBK-16, F-m Limiter, Simplified Schematic Diagram.

10. F-M LIMITER.

Tube V7, a type 6AC7 pentode, and its associated circuit comprises the f-m limiter stage, which operates as a saturated amplifier (fig. 2-10). The output signal amplitude of the limiter remains constant over a wide range of input levels, and in doing so eliminates the amplitude variations present in the received signal. Since noise disturbances cause very little frequency modulation but do vary the received carrier amplitude, most noise impulses present at the input of the limiter will not be present at its output. The output of the second i-f amplifier is applied through transformer T12 and the series parasitic suppressor resistor R18 to the input of tube V7. The secondary of transformer T12, which is resonated by capacitor C73, is returned to ground through a decoupling network consisting of resistors R38 and R39, and capacitors C27 and C28. When the SELECTIVITY switch SW7 is in the BROAD position it includes the inductance at the lower end of transformer T12, and resistor R23, in series with the secondary of transformer T12. This broadens the bandpass characteristics of transformer T12 to facilitate high-fidelity f-m reception. The bias on tube V7 without any input signal to the control grid is zero volts. In accordance with the potentials on the plate and screen, a certain amount of d-c plate current flows through the circuit. Since there is zero fixed bias on the tube, the control grid will be driven positive during the positive half of the input signal with respect to the cathode, which is at ground potential. As soon as the grid is driven slightly positive, the grid and cathode act as a diode rectifier where the grid takes the place of the diode plate and grid current starts to flow. As the grid draws current, the coupling transformer T12 is effectively loaded so that the signal voltage applied directly to the grid can become only slightly positive. The moment that grid current begins to flow, a charge is stored on the grid capacitor C27; and, as the signal becomes more positive, the charge on the capacitor increases. On the negative half cycle of input signal, the grid no longer will draw current and the capacitor, C27, will begin to discharge through the resistors R38 and R39. An automatic bias will be developed on the tube, due to the voltage drop across R38 and R39. The time constant of the r-c network, resistor R38 and capacitor C27, is approximately .5 microsecond. This time constant indicates how quickly the grid bias will change with a change in the level of the input signal to produce amplitude limitations. The amplitude variations in the final output i-f signal, due to the response characteristics of the i-f circuit, are not radical or sudden changes but gradual ones, but the short time constant is used so that the operating bias can follow any quick rise in amplitude of the input signal resulting from sudden noise impulses or other interference. If the time constant were too long for the bias to follow this impulse, plate current would flow in accordance with the impulse variations, and the noise impulses would be passed on to the discriminator to be detected; and eventually, reproduced by the audio system. Plate and screen potentials are supplied from a voltage dividing network consisting of resistors R29 and R30; bypassed to ground by capacitor C30. The primary of the transformer T14 is resonated by capacitor C74, and primary shunt resistor R37 broadens the bandpass characteristics of transformer T14. The f-m limiter output signal appearing across the secondary of transformer T14 is applied to the input of the f-m discriminator tube V8, a type 6H6.

11. F-M DISCRIMINATOR.

The f-m discriminator circuit, which comprises tube V8, a type 6H6 twin diode, together with transformer T14, produces audio signals; the amplitude of which is proportional to the frequency variations of the applied signal (fig. 2-11). The limiter stage output is impressed across transformer T14, the primary and secondary of which are inductively coupled and tuned to the center frequency of the i-f bandpass by capacitors C74 and C75. The primary and secondary of transformer T14 are capacitively coupled by C29 from the high end of the primary winding to the center tap of the secondary winding. When the signals applied to the two halves of the diode are of the same frequency, the induced voltages appearing across each half of the secondary winding of transformer T14 cause the diode to conduct an equal amount in opposite directions across load resistors R40 and R41 which then cancel. The phase relationship between the primary and the secondary currents are such that when the applied signals vary in frequency, the tuned secondary becomes inductive or capacitive and the signals add across the top or bottom half of the tapped secondary coil. When unequal voltages are applied to the diode plates, the signal voltages across the diode load resistors will not be equal; and, since these voltages are of opposite polarity, the difference between them will appear at the audio output. Resistor R42 and capacitor C32 attenuate the high frequency end of the audio range since these frequencies are emphasized by some transmitters. This network also attenuates interference which may be present at the discriminator output. Meter M1, a 160-0-40 microammeter, in series with resistor R56, is used as a resonance indicator. When the receiver is tuned to the incoming signal, the voltages developed across resistors R40 and R41 cancel, resulting in a zero meter reading. When the receiver is tuned off resonance the difference in voltages across the load resistors will be indicated and the meter will deflect left or right as the receiver is tuned above or below the in-

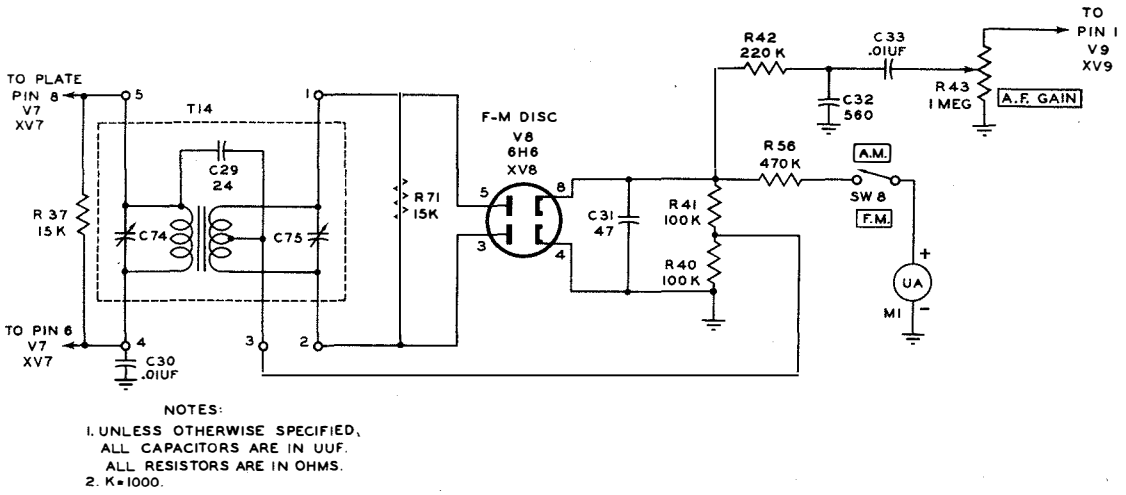


Figure 2-11. Radio Receiving Equipment Navy Model RBK-16, F-m Discriminator, Simplified Schematic Diagram.

coming signal. When the receiver is operating in AM position, the tuning meter indicates changes in the plate current of the secondi-f stage. Maximum current will be drawn with zero signal input and the current will decrease with the increase of signal level. In the FM operating position, the discriminator output is applied through capacitor C33 and A.F. GAIN control R43 to the audio amplifier.

12. AUDIO AMPLIFIER AND TONE CONTROL.

a. In Radio Receiver RBK-16, the A.M.-F.M. switch SW8 selects either the output of the a-m detector or f-m discriminator stage (figs. 2-12 and 2-13). This selected audio voltage appears across the A.F. GAIN control R43, which is coupled to switch SW8 by capacitor C33. The audio voltage from the gain control is fed to the control grid of the 1st audio section of amplifier tube V9 which is a dual-triode type tube (6SL7GT). The other half of tube V9 acts as a phase-inversion circuit so that the output from both halves of the tube will properly drive a pair of push-pull beam power output tubes. The audio amplifier output signals of tube V9 appear across the plate load resistors R44 and R45, and are coupled to the grids of output tubes V11 and V12 through capacitors C36 and C37. A self-balancing circuit is used to supply the properly phased voltage to the grid of the phase-inverter triode. This network consists of grid resistors R49 and R50 which have a common return to ground through phase-inverter grid re-

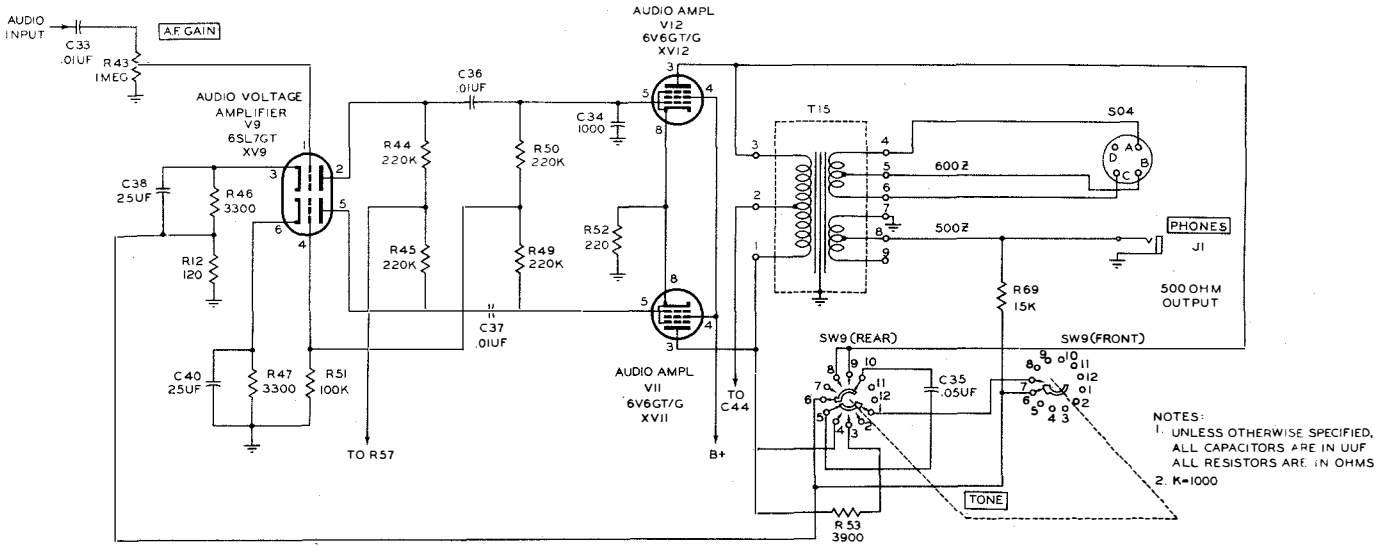


Figure 2-12. Radio Receiving Equipment Navy Model RBK-16, Audio Amplifier, Simplified Schematic Diagram.

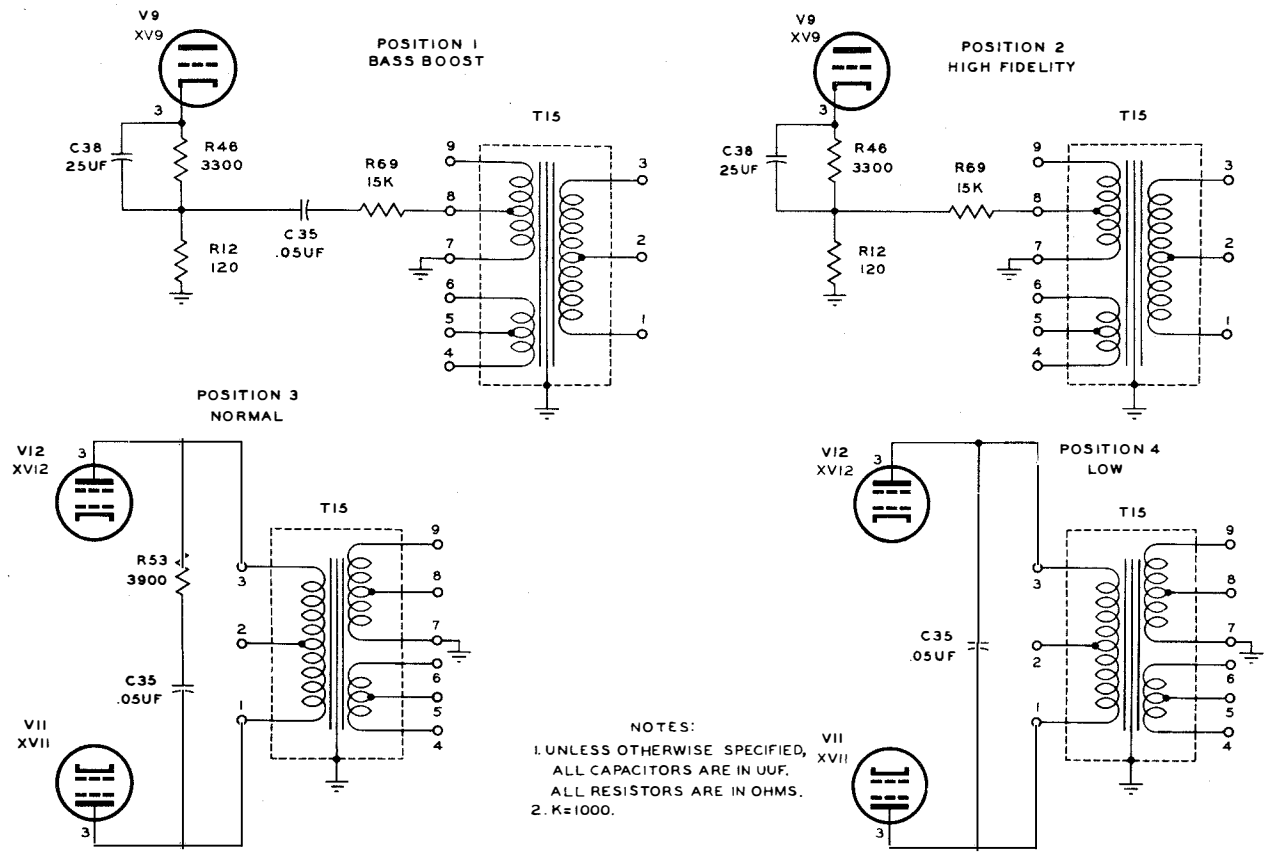


Figure 2-13. Radio Receiving Equipment Navy Model RBK-16, Four Simplified Tone Control Schematics.

sistor R51. The cathode resistor R47 of the phase-inverter section of tube V9 performs the function of providing self-bias to the tube and is bypassed by capacitor C40. The cathode circuit of the first a-f amplifier not only performs the function of self-bias, but also allows degeneration at selected ranges of frequencies to control the over-all frequency response of the audio amplifier system.

b. The audio signals applied to the grids of tube V11 and V12 which are 180° out-of-phase, are amplified and appear in the plate circuit with the same phase difference. At any one instant when the plate current in V11 is increasing, making terminal number 1 of the primary of output transformer T15 positive, the plate current in V12 is decreasing, making terminal number 3, the opposite end of the primary winding, negative. The currents flowing in the primary winding are therefore additive and operate in push-pull. The two secondaries of T15 are 600 ohm balanced output to jack SO4 and 500 ohm to jack J1. Tubes V11 and V12 are self-biased by resistor R52. Resistor R52 does not require a bypass capacitor due to the 180° phase difference between V11 and V12, as no a-c component is present.

c. The audio response curve of the receiver may be changed by the TONE control switch SW9. Switch SW9 has four positions which provide a switching arrangement for various parts to change the amount of feedback and bypassing of the audio stages in the different switch positions. Figure 2-13 indicates the circuit connections of all four switch positions.

(1) In position number one, which is BASS BOOST, negative feedback is fed through resistor R69 and capacitor C35 to voltage-divider resistors R12 and R46, which causes degeneration in the cathode circuit of the first audio amplifier at the higher frequencies.

(2) In position number two, HIGH FID., the capacity coupling is eliminated in the negative feedback circuit through resistors R69 and R12, causing the degeneration to have an effect over a wider range of frequencies; thereby, flattening the over-all response so that the output is fairly constant over the entire frequency range.

(3) In position number three, NORMAL, the degenerative feedback is disconnected and a series

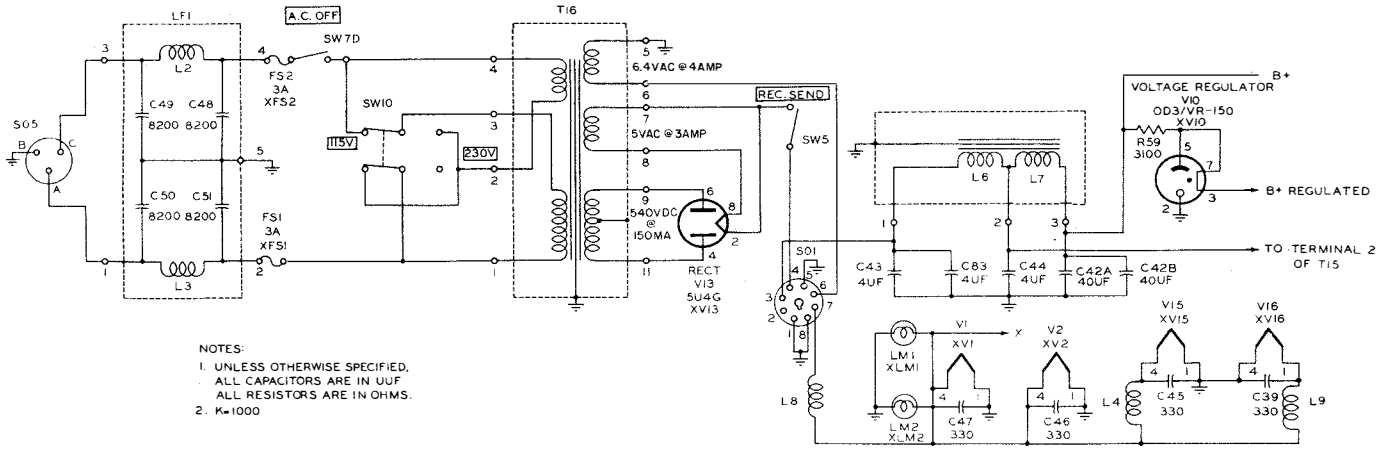


Figure 2-14. Radio Receiving Equipment Navy Model RBK-16, Power Supply, Simplified Schematic Diagram.

resistor-capacity circuit, R53 and C35, is placed across the primary of the audio output transformer T15, which tends to attenuate the higher frequencies causing a gentle roll-off at the upper end of the frequency range.

(4) The fourth position, which is LOW, eliminates the series resistor R53 of the bypass network and causes the high frequency response to be cut-off more sharply than when the switch was in the number three position. This last position narrows the frequency range so that just the voice frequencies will pass. In doing so, much of the interference at the higher frequencies will be eliminated.

13. POWER SUPPLY.

(*Figure 2-14*)

Radio Receiver RBK-16 is designed to operate from 115 or 230 volts, 50/60 cycle alternating current supplied through socket SO5, or from a 6 volt "A" battery and 270 volts of "B" battery or vibrator power supply through socket SO1. For a-c operation, shorting plug PL2 must be in socket SO1 to provide continuity in the power circuits. The a-c supply is applied to the primaries of transformer T16 through filter LF1 which is two low pass pi-type filters consisting of capacitors C48, C49, C50 and C51, and chokes L2 and L3. This line filter reduces interference entering the receiver from the a-c line, and also reduces the possibility of any r-f noise or oscillator output created in the receiver from being sent into the power line. The filtered a-c supply is applied to the power transformer T16 primaries through ON-OFF switch SW7D, fuses FS1 and FS2, and switch SW10. In the 115 volt a-c position, the two primary windings are connected in parallel; in the 230 volt position both transformer T16 primaries are connected in series. The receiver tube heaters and the pilot lamps are connected in parallel and are supplied by the 6.3 volt secondary winding of transformer T16 through choke L8. Filament voltage for the rectifier tube V13 is supplied by the 5 volt secondary winding of transformer T16. Tubes V1 and V2 have r-f decoupling capacitors C46 and C47 connected across their heaters, and tubes V15 and V16 have an r-f decoupling network consisting of capacitors C45 and C39 connected across the heaters and chokes L4 and L9 connected between their heaters and the common heater supply. Tube V13, a type 5U4G full-wave rectifier, receives its high voltage supply from the 540-volt center-tapped secondary of transformer T16. For d-c operation of the receiver, shorting plug PL2 must be removed from socket SO1. The batteries are then connected to the unwired duplicate of plug PL2 (see figure 3-5). Connect the A+ lead of the 6 volts at 4.5 amperes to pin 7 of plug PL2 and the A- lead to pins 1 and 8; the B+ lead of the 270 volts at 145 milliamperes to pin 3 of plug PL2, and B- lead to pin 5.

Note

REC.-SEND SWITCH SW5 IS INOPERATIVE WHEN THE RECEIVER IS OPERATED FROM BATTERIES.

The pulsating d-c output voltage from the rectifier is applied to a ripple filter through plug and socket PL2 and SO1 and the REC.-SEND switch SW5. The filter network, L6, L7, C42A, C42B, C43, C44 and C83, removes the 120 cps ripple from the rectifier tube output voltage before it is applied to the receiver. High voltage for the audio output stage is obtained from the junction of chokes L6 and L7, since less filtering is required for this stage and

a higher potential, which is needed for this stage, is available at this point. The d-c output voltage from filter choke L7 supplies the unregulated high voltage requirements of the receiver. From the same point the unregulated supply is applied through voltage dropping resistor R59 to the voltage regulator tube V10, a type OD3/VR-150. Tube V10 functions as a variable resistor since its current drain is proportional to the potential applied across it. When the voltage drop across resistor R59 decreases or increases, tube V10 will draw more or less current and maintain the potential between the regulated output and ground at a fixed value. The regulated supply is applied to the plate of the r-f oscillator, plate and screen grid of the mixer, and screen grid of the second and third i-f amplifier tubes.

SECTION 3
INSTALLATION

1. UNPACKING.

CAUTION

THIS RADIO RECEIVER AND THE SPARE PARTS MAY BE EASILY DAMAGED DURING THE UNPACKING PROCESS. BE EXTREMELY CAREFUL NOT TO DROP OR DAMAGE THE UNITS. AVOID THRUSTING PINCH BARS OR ANY OTHER UNPACKING TOOLS, SUCH AS A SCREWDRIVER INTO THE INTERIOR OF ANY FIBERBOARD SHIPPING CONTAINER. DO NOT UNPACK IN A LOCATION WHERE DUST, DIRT, OR EXCESSIVE MOISTURE MAY AFFECT THE EQUIPMENT. FOLLOW CLOSELY THE UNPACKING INSTRUCTIONS GIVEN BELOW. FIGURE 3-1 ILLUSTRATES THE UNPACKING OF RADIO RECEIVING EQUIPMENT NAVY MODEL RBK-16 AND ITS SPARE PARTS BOX.

a. Cut the metal straps surrounding the wooden box. The best method of cutting metal straps is to use a heavy pair of side cutters or to twist or bend the strap until it crystallizes and breaks.

b. Using a nail puller, remove the nails in the top of the shipping container. Remove the top cover.

c. Remove the excelsior or wadding from the top of the waterproof barrier.

d. Lift out the waterproof bag containing the radio receiver and spare parts box.

e. Slit the waterproof bag and remove the spare parts box and the outer carton containing the receiver.

f. Slit the seams of the fiberboard carton and open the flaps.

g. Lift the inner vaporproof bag and slit it open.

b. Remove the inner fiberboard carton, slit the seams, and open the flaps.

i. Remove the Z-pads and the dehydrating agent contained in the bags.

j. Remove the receiver from the fiberboard carton.

k. Break the bands surrounding the unit that hold the plywood protection board over the face of the unit.

l. Remove the plywood protection board.

m. The unit is now unpacked and ready for installation.

n. Save all of the packaging material except the bags of dehydrating agent. Store all of the cartons in order in the wooden shipping container.

2. INSTALLATION.

a. The receiver should be located to provide for easy access to the front and rear panels, and with enough clearance above so that the top door on the cabinet may be opened. See figure 3-2.

b. In a permanent installation where it is not necessary to change connections on the rear of the receiver frequently, the receiver may be located with six inches clearance to give good ventilation and with room to replace the fuses.

c. If possible, keep the receiver away from sources of electrical interference or mechanical vibration. Since the receiver is designed for indoor or sheltered use, protection should be given it to prevent conditions of excessive moisture or extreme temperature. If the receiver is a component of larger equipment, place the receiver in a convenient location for easy operation with the above factors considered.

d. A 500 ohm audio PHONES jack J1 is located on the front panel for connection to phones equipped with a plug such as Navy No. 49109. On the rear panel a 600 ohm audio outlet, socket SO4, is available for line connection to a speaker equipped with a plug JAN type AN-3106A-14S-2S.

e. For 115 or 230 volts a-c operation the power cord is connected to plug PL5, a type AN-3106A-14S-7S plug, and inserted into socket SO5. Set 115V-230V switch SW10 to the proper position for the available line voltage. (Refer to figure 7-5).

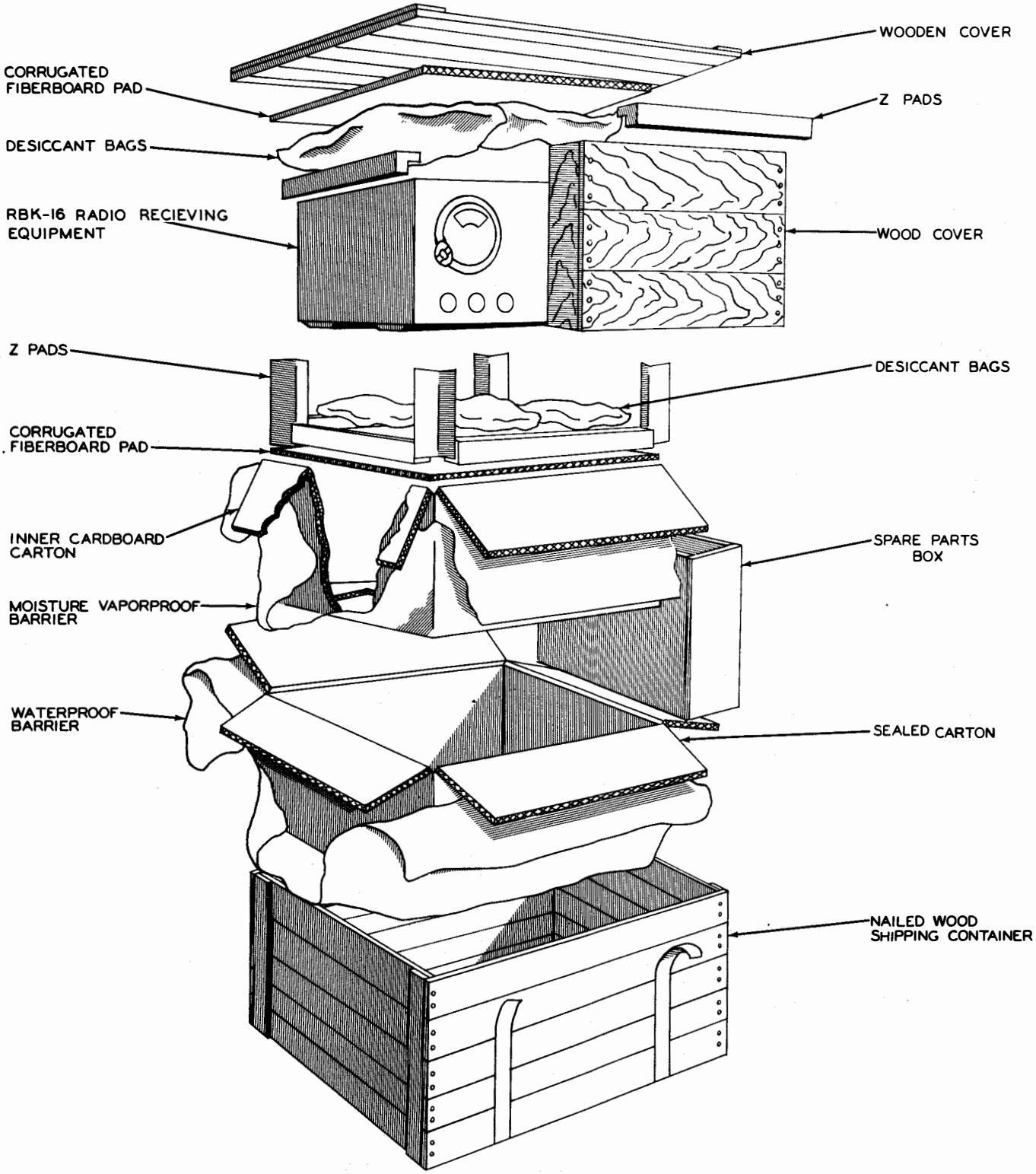


Figure 3-1. Radio Receiving Equipment Navy Model RBK-16, Unpacking Procedure.

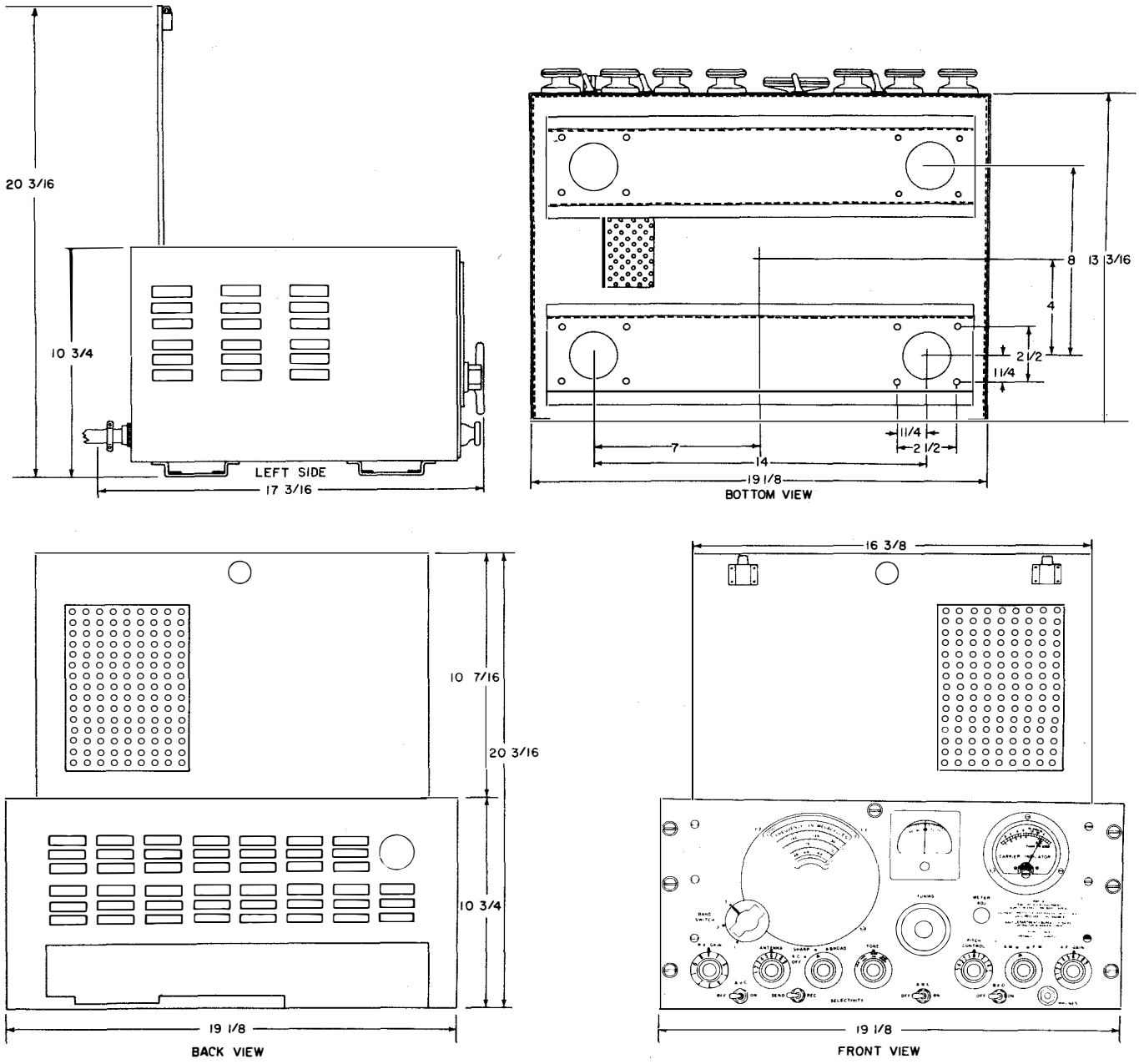


Figure 3-2. Radio Receiving Equipment Navy Model RBK-16, Dimensional Drawing Having Three Views.

f. When batteries are used to power the receiver, 6 volts at 4.5 amp. is connected with the positive (+) lead to pin 7 of the unwired duplicate of plug PL2, and the negative (-) lead to pins 1 or 8. The 270 volts at 145 ma. is connected with the positive (+) lead to pin 3 and the negative (-) lead to pin 5. (See figures 3-3 and 3-5).

CAUTION

REC.-SEND SWITCH SW5 IS INOPERATIVE WHEN BATTERIES ARE USED.

g. To remote control the REC.-SEND switch, a jumper is inserted across pins 6 and 7 of the unwired duplicate of plug PL2, and the remote switch is connected between pins 3 and 4. (See figures 3-3 and 4-3).

h. The antenna lead-in is connected to plug PL3 a type CN-49121A and inserted in socket SO3 on the rear of the receiver. (See figure 3-3).

i. A panoramic adapter receptacle socket SO2 is also available at the rear of the receiver when

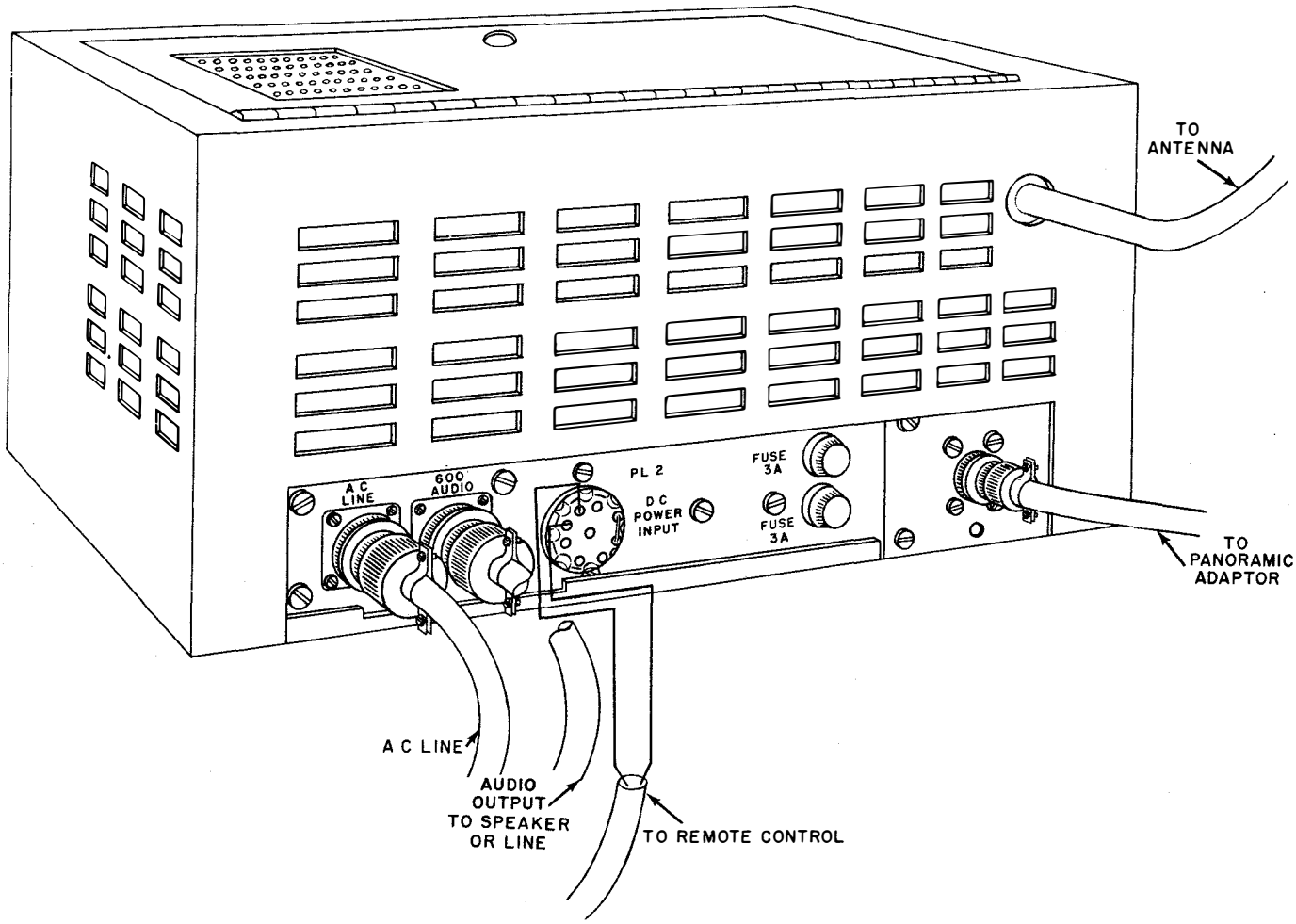


Figure 3-3. Radio Receiving Equipment Navy Model RBK-16, View Showing Cables and Plugs Attached.

a panoramic adapter equipped with a type CPH-49190 plug is to be used with it.

3. INITIAL ADJUSTMENTS.

a. TUNING METER ADJUSTMENT (see figure 4-1 or 4-2).

(1) The tuning meter zero setting control resistor R58 is located behind its front panel button type cover, marked METER ADJ. Remove the button with a knife or screw driver blade.

(2) Disconnect the antenna and short the center lead of the antenna input (SO3) to ground. The six coil terminal jumpers marked "A" in figure 7-1 should also be shorted to ground.

(3) Set the front panel controls for amplitude modulation reception as follows:

(a) Set the A.M.-F.M. switch to A.M.

(b) Set A.V.C. switch to ON.

(c) Turn the R.F. GAIN control to the right until the switch SW3 on the control clicks. This connects the tuning meter into the circuit.

(d) Set the A.F. GAIN control for minimum gain. (Maximum counterclockwise).

(e) Set the A N.L. switch at OFF.

(f) Set the B.F.O. switch at OFF.

(g) Set the REC.-SEND switch at REC.

(h) Set the SELECTIVITY switch at SHARP.

(4) With a screw driver set the METER ADJ. control for the zero reading on the "S" meter scale of the tuning meter.

(5) Remove the antenna and coil terminal jumpers and replace the antenna lead and the meter adjustment cover button. The adjustment is completed.

b. Refer to figure 4-2 for tuning adjustment sequence.

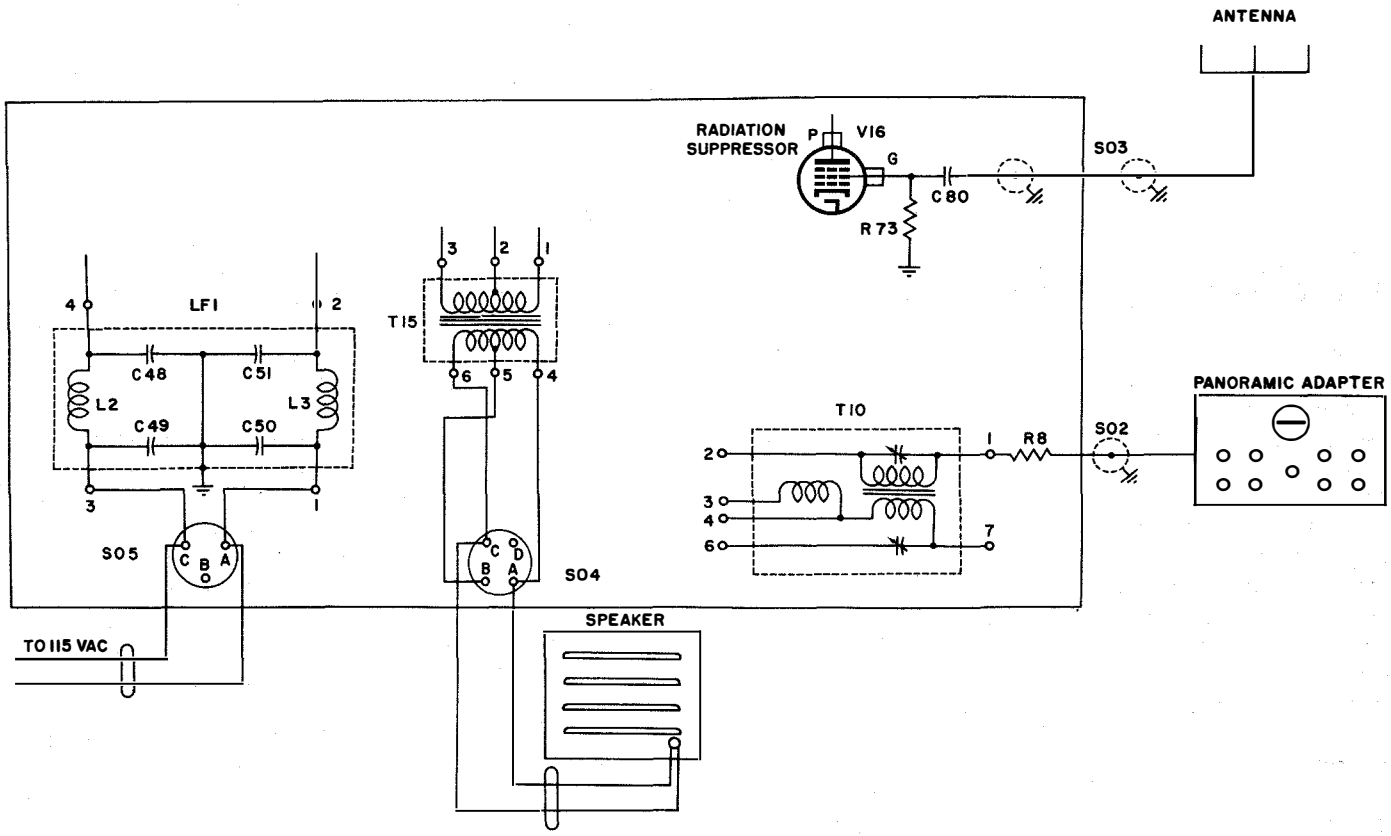
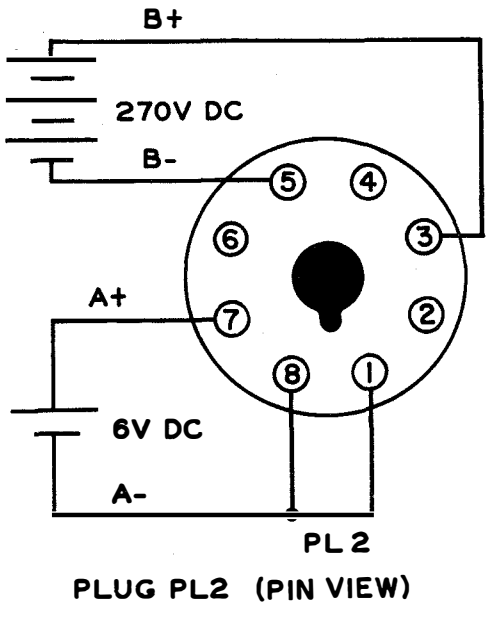


Figure 3-4. Radio Receiving Equipment Navy Model RBK-16, Pictorial Schematic of External Electrical Connections.



PLUG PL2 (PIN VIEW)

Figure 3-5. Radio Receiving Equipment Navy Model RBK-16, D-c Power Plug Wiring Diagram.

SECTION 4
OPERATION

1. CAPABILITIES AND LIMITATIONS.

Radio Receiving Equipment Navy Model RBK-16 is a three-band superheterodyne receiver adapted for use on shipboard or at shore stations. It is designed for the reception of either amplitude-modulated (a-m) or frequency-modulated (f-m) signals in the frequency range of 27.8 to 143 megacycles. It will also receive continuous-wave (c-w) signals by using the beat frequency oscillator (bfo). The frequency range is divided into three overlapping bands to give continuous coverage over the entire frequency range. Standby operation of the receiver can be controlled at some remote point by leaving the REC.-SEND switch in the REC. position and extending the circuit from terminals 3 and 4 of SO1 to a remote switch. Only the operation of turning the receiver plate supply ON and OFF may be accomplished from the remote position. See figure 4-3, and section 3, par. 2g for remote control switch hook-up. Socket SO4 on the rear apron of the chassis is provided with a 600 ohm impedance output (audio) which is used to feed either a loudspeaker or a line terminated in a like impedance. A 500 ohm impedance line (audio) is also available by utilizing the PHONES jack J1 on the front panel. The receiver will deliver 3 watts to the speaker or balanced line with less than 5% distortion. A panoramic adapter receptacle SO2 has been provided on the rear panel of the receiver into which a Panoramic Adapter unit especially designed to be used with this receiver may be connected.

2. OPERATION OF EACH FUNCTION.

For best operating results, the operator must familiarize himself with the function of each control. The following paragraphs explain all of the operating controls.

a. R.F. GAIN.— The R.F. GAIN control functions to permit manual adjustment of the gain (sensitivity) of the receiver by varying the cathode voltage on the first and second intermediate-frequency stages, tubes V3 and V4. This control also switches the "S" meter (M1) into the circuit. The switch SW3 which connects meter M1 into the circuit is operated by the R.F. GAIN control, when it is turned completely (clockwise) connecting the "S" meter into the circuit.

b. BAND SWITCH.— The BAND SWITCH (SW1) is used to select the desired band of frequencies which is to be received. Band 1, 27.8 to 47 mc; 2, 46 to 82 mc; band 3, 82 to 143 mc.

c. A.V.C.— The A.V.C. switch (SW4) activates a circuit functioning to automatically control the i.f. gain of the receiver to maintain a more nearly uniform audio output level to the speaker or headset over a wide range of input signal levels. The a.v.c. switch should be in the ON position whenever amplitude modulated signals are being received. When c-w signals are being received the switch should be in the OFF position.

d. ANTENNA.— The ANTENNA dial controls capacitor C2 which is used to compensate for antenna impedance variations. Once set for a given antenna, its calibration will hold for a wide range of frequencies.

e. REC.-SEND.— The REC.-SEND switch (SW5) is used to silence the receiver when transmitting, or during stand-by. When the REC.-SEND switch is in the SEND position, the high voltage is removed from the receiver circuits, but the filament voltage is still applied to the heaters. Set the switch to REC. position whenever the remote stand-by connection is used. Refer to section 3, par. 2g and figure 4-3 for wiring details for remote stand-by operation.

Note

REC.-SEND SWITCH SW5 IS INOPERATIVE WHEN THE RECEIVER IS OPERATED FROM BATTERIES.

f. SELECTIVITY.— The SELECTIVITY switch (SW7) turns the receiver on and off when operating from an a-c power source and controls the i-f band width in two steps, SHARP and BROAD.

g. TONE.— The TONE switch (SW9) controls a feedback circuit in the audio amplifier stages which modifies the audio fidelity from bass boost to high frequency cut-off in four steps; 1. BASS BOOST, 2. HIGH FID., 3. NORMAL, 4. LOW.

h. A.N.L.— The A.N.L. switch (SW6) controls a circuit which clips off the noise peaks in excess of the normal signal level. This increases the

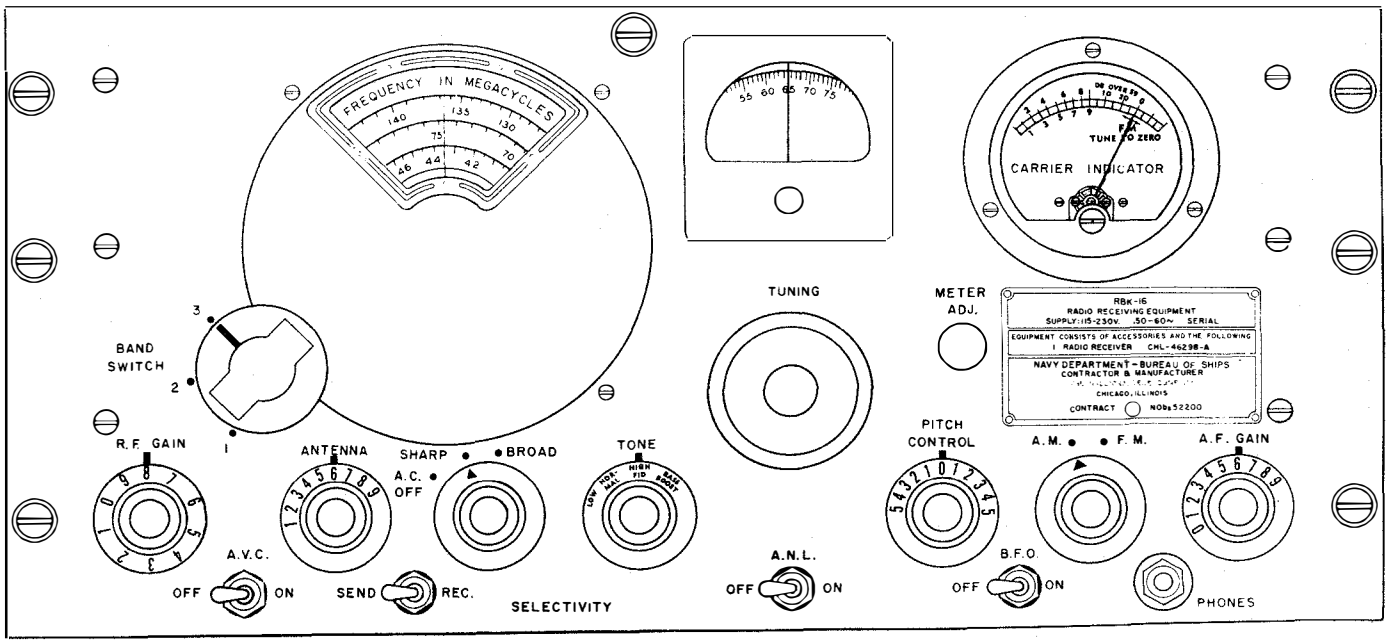


Figure 4-1. Radio Receiving Equipment Navy Model RBK-16, Panel Controls.

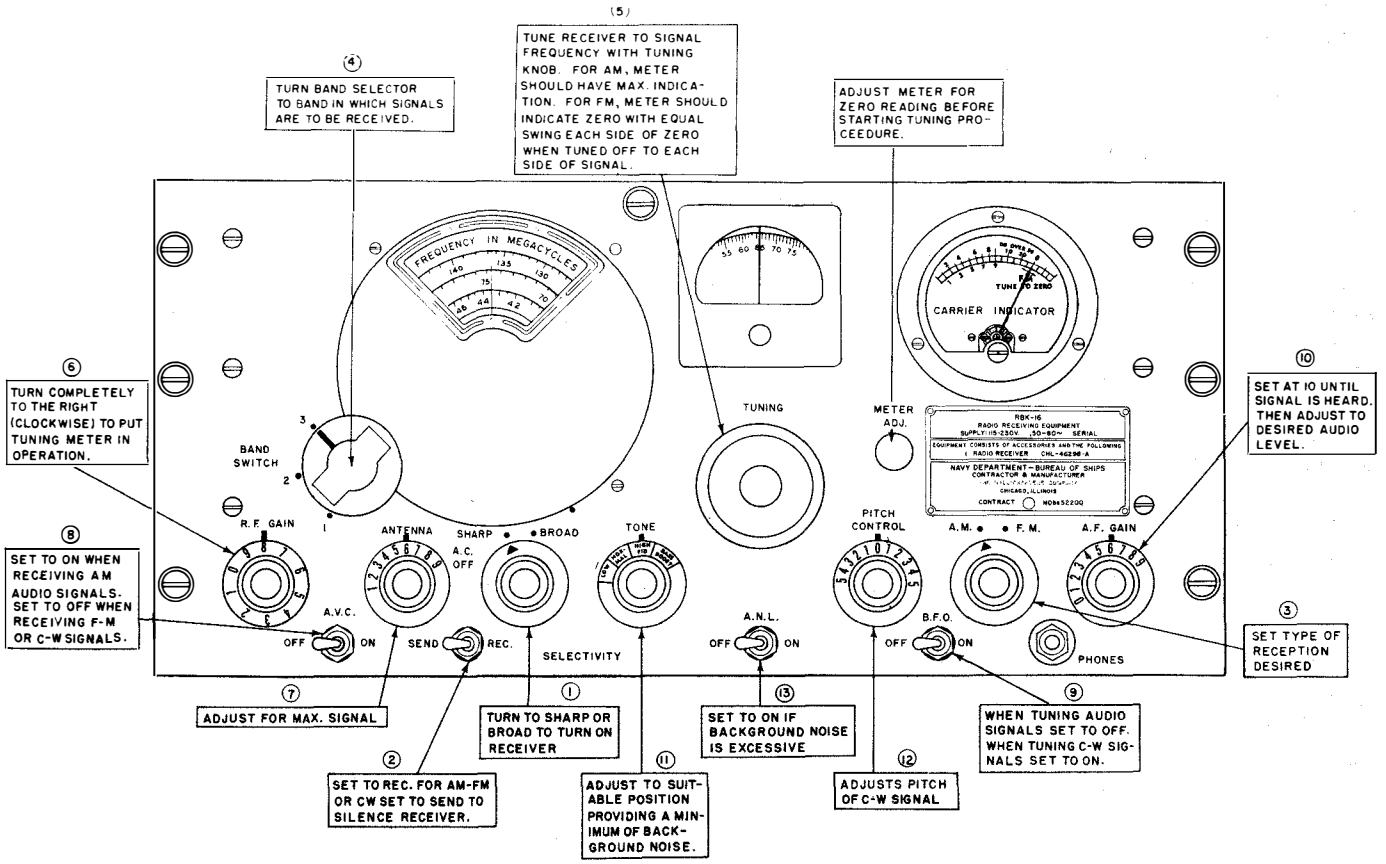


Figure 4-2. Radio Receiving Equipment Navy Model RBK-16, Tuning Adjustments.

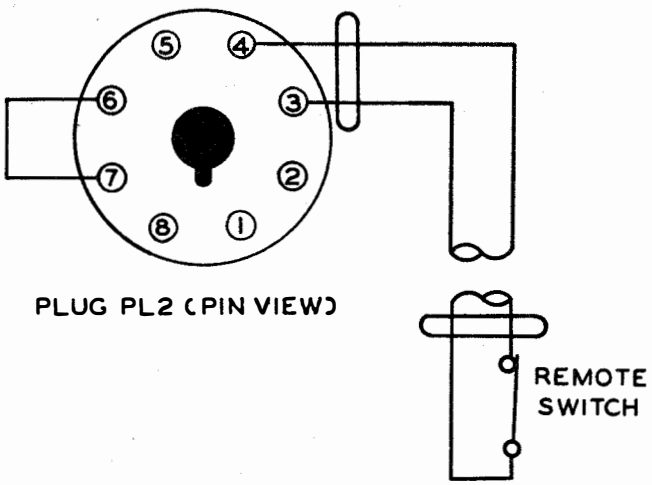


Figure 4-3. Radio Receiving Equipment Navy Model RBK-16, Wiring for Remote Control of Rec.-Send Operation.

intelligibility of the received signal when a high noise level is distorting the incoming signal.

i. TUNING.— The TUNING wheel adjusts the capacitance of capacitor C1 which tunes the receiver to the desired frequency. The frequency of reception is read directly from the main tuning dial. The scale on the logging dial is used in conjunction with the outermost scale on the main tuning dial.

j. PHONES.— The PHONES jack (J1) is connected to the 500-ohm secondary winding of the output transformer.

k. METER ADJ.— The METER ADJ. control R58 is used to adjust the "S" meter to its "O" signal position when the receiver is set for amplitude modulation reception. (Refer to section 3, par. 3a).

l. PITCH CONTROL.— The PITCH CONTROL knob operates capacitor C60 which varies the frequency of the beat frequency oscillator to permit adjustment of the audio tone output for c-w reception.

m. B.F.O.— The B.F.O. switch (SW2) turns on the beat frequency oscillator circuit, which is used to produce the beat note for the reception of c-w signals.

n. A.M.-F.M.— The A.M.-F.M. switch SW8 connects the output of either the a-m detector or the f-m discriminator to the audio amplifier and switches the tuning meter into the correct circuit to be used as an indicator when tuning in a-m or f-m reception.

o. "S" METER.— The "S" METER, or tuning meter (M1) is used when tuning in a-m or f-m signals. To put the meter in operation, turn the R.F. GAIN control to the extreme right (clockwise) until the switch (SW3) snaps on. The A.V.C. switch (SW4) must be in the ON position. When the A.M.-F.M. switch is set for f-m operation, the tuning meter (M1) is used to indicate resonance with the carrier. As the receiver is tuned through an f-m carrier, the meter pointer will first deflect to one side of "O", return to "O", and deflect an equal distance on the opposite side of "O", and return to "O". The zero center position in the middle of the swing represents the correct setting of the receiver tuning dial and indicates resonance. For A-M reception, set dial to desired frequency, and adjust for maximum indication.

p. FUSE HOLDERS.— FUSE HOLDERS XFS1 and XFS2 each contain a 3 amp, 250 volt fuse located on each leg of the primary supply line which protects the receiver against accidental overloads.

q. A.F. GAIN.— The A.F. GAIN control R43 operates to permit manual adjustment of the audio output level of the receiver by varying the signal level to the grid of the first audio-amplifier tube V9.

3. TUNING ADJUSTMENTS.

a. A-M SIGNAL RECEPTION.— To receive amplitude-modulated (a-m) signals, set the front panel controls as follows:

(1) SELECTIVITY switch	--Set at SHARP for reception of amplitude modulated signals.
(2) A.M.-F.M. switch	--Set at A.M.
(3) BAND SWITCH	--Set to band covering desired frequency.
(4) A.V.C. switch	--Set at ON.
(5) REC.-SEND switch	--Set at REC.
(6) B.F.O. switch	--Set at OFF.
(7) PITCH CONTROL	--Not used. (not in circuit.)
(8) R.F. GAIN control	--Turn to right (clockwise) until tuning meter switch snaps on.
(9) TUNING wheel	--Set dial to frequency of desired

signal and adjust for maximum tuning meter reading. (Refer to section 4, par. 2o.

(10) ANTENNA trimmer --Adjust for maximum tuning meter reading.

(11) A.F. GAIN control --Adjust for desired signal level at headset or speaker.

(12) TONE switch --Set at HIGH FID. Set at NORMAL or LOW when very little noise is present. Set at BASS BOOST when signal is very noisy.

(13) A.N.L. switch --Set at OFF unless background noise is excessive.

b. F-M SIGNAL RECEPTION.— To receive frequency-modulated (f-m) signals, set the front panel controls as follows:

(1) SELECTIVITY switch --Set at BROAD for reception of frequency modulated signals.

(2) A.M.-F.M. switch --Set at F.M.

(3) BAND SWITCH --Set to band covering desired frequency.

(4) A.V.C. switch --Set at OFF.

(5) REC.-SEND switch --Set at REC.

(6) B.F.O. switch --Set at OFF.

(7) PITCH CONTROL --Not used. (not in circuit)

(8) R.F. GAIN control --Turn to right until tuning meter switch snaps on.

(9) TUNING wheel --Set dial to frequency of desired signal and adjust for center "O" position of tuning meter. (Refer to section 4, par.2o).

(10) ANTENNA trimmer --Adjust for maximum signal strength.

(11) A.F. GAIN control --Adjust for desired signal level at headset or speaker.

(12) TONE switch --Set at BASS BOOST or HIGH FID.

(13) A.N.L. switch --Set at OFF.

c. C-W RECEPTION.— To receive continuous-wave (c-w) signals, set the front panel controls as follows:

(1) SELECTIVITY switch --Set at SHARP.

(2) A.M.-F.M. switch --Set at A.M.

(3) BAND SWITCH --Set to band covering the desired frequency.

(4) A.V.C. switch --Set at OFF.

(5) REC. - SEND --Set at REC.

(6) B.F.O. switch --Set at ON.

(7) R.F. GAIN control --Turn clockwise as far as the signal strength of the received signal will allow.

(8) TUNING wheel --Set dial to frequency of signal. Tune for maximum signal level at headset or speaker.

(9) PITCH CONTROL --Adjust to produce approximately a 1,000 cycle code signal.

(10) ANTENNA trimmer --Adjust for maximum signal level at headset or speaker.

(11) A.F. GAIN control --Adjust for desired signal level at

headset or speaker.

(12) TONE switch --Set at LOW.

(13) A.N.L. switch --Set at OFF unless background noise is excessive.

4. SUMMARY OF OPERATION.

a. The receiver is put into operation by applying 115v or 230v, 50/60 cps a-c to socket SO5 (refer to Section 3, par. 2e), and turning the SELECTIVITY switch to either the SHARP or BROAD position. Make sure that 115V-230V switch SW10, is in the correct position for the voltage being applied. For d-c operation connect a 270v "B" battery, positive to pin 3 and negative to pin 5 of plug PL2, and 6v "A" battery, positive to pin 7 and negative to pin 8 of plug PL2, and insert plug PL2 in socket SO1. When the batteries are used with the receiver, A.C. OFF switch SW7D and REC.-SEND switch SW5 are not in the circuit, so it is necessary to have an external switching arrangement to turn the receiver on and off. (See figure 3-5).

b. Connect an antenna which has been designed to receive frequencies between 27.8 and 143 megacycles to jack SO3, and turn the BAND SWITCH to the band covering the frequency to be received.

c. Plug a headset into the 500-ohm PHONES jack J1 located on the front of the receiver or plug in a speaker or line to the 600-ohm balanced line available at socket SO4 located on the rear panel of the receiver.

d. When using the tuning meter for a-m reception (the R.F. GAIN control must be all the way clockwise to turn on the tuning meter), the meter indicates the strongest signal when its deflection is the greatest. Tune for maximum deflection of the needle.

e. When using the tuning meter for f-m reception (the R.F. GAIN control must be all the way clockwise to turn on the tuning meter), the receiver is tuned to the carrier when the meter indicates an equal deflection each side of "O" when the receiver is tuned to either side of the frequency that is to be received.

f. The A.N.L. switch should be in the OFF position at all times for f-m reception; and in the OFF position on a-m and c-w reception, unless the background noise is excessive.

g. When operating from an a-c power source, the receiver may be turned off by turning the SELECTIVITY switch to the A.C. OFF position.

h. To turn off receiver operating from battery or vibrator power supply (which is not equipped with a switch to turn off the power to the receiver), plug PL2 should be removed from socket SO1.

SECTION 5

OPERATOR'S MAINTENANCE

1. ROUTINE CHECKS.

The following periodical inspections are those that will determine whether or not the equipment is functioning properly.

a. Make sure that all external connections to the receiver are tight.

b. Notice whether the pilot lamps LM1 and LM2 glow. If they do not glow after a period of 30 seconds has elapsed after turning the equipment on, examine the condition of the fuses FS1 and FS2, which are accessible at the rear of the receiver. REPLACE BLOWN FUSES ONLY WITH FUSES RATED FOR 3 AMPS, 250 VOLTS UNLESS CONTINUED OPERATION OF THE EQUIPMENT IS MORE IMPORTANT THAN POSSIBLE DAMAGE.

c. Make a visual inspection of the antenna.

2. REPLACING ELECTRON TUBES.

In replacing electron tubes, the following should be observed:

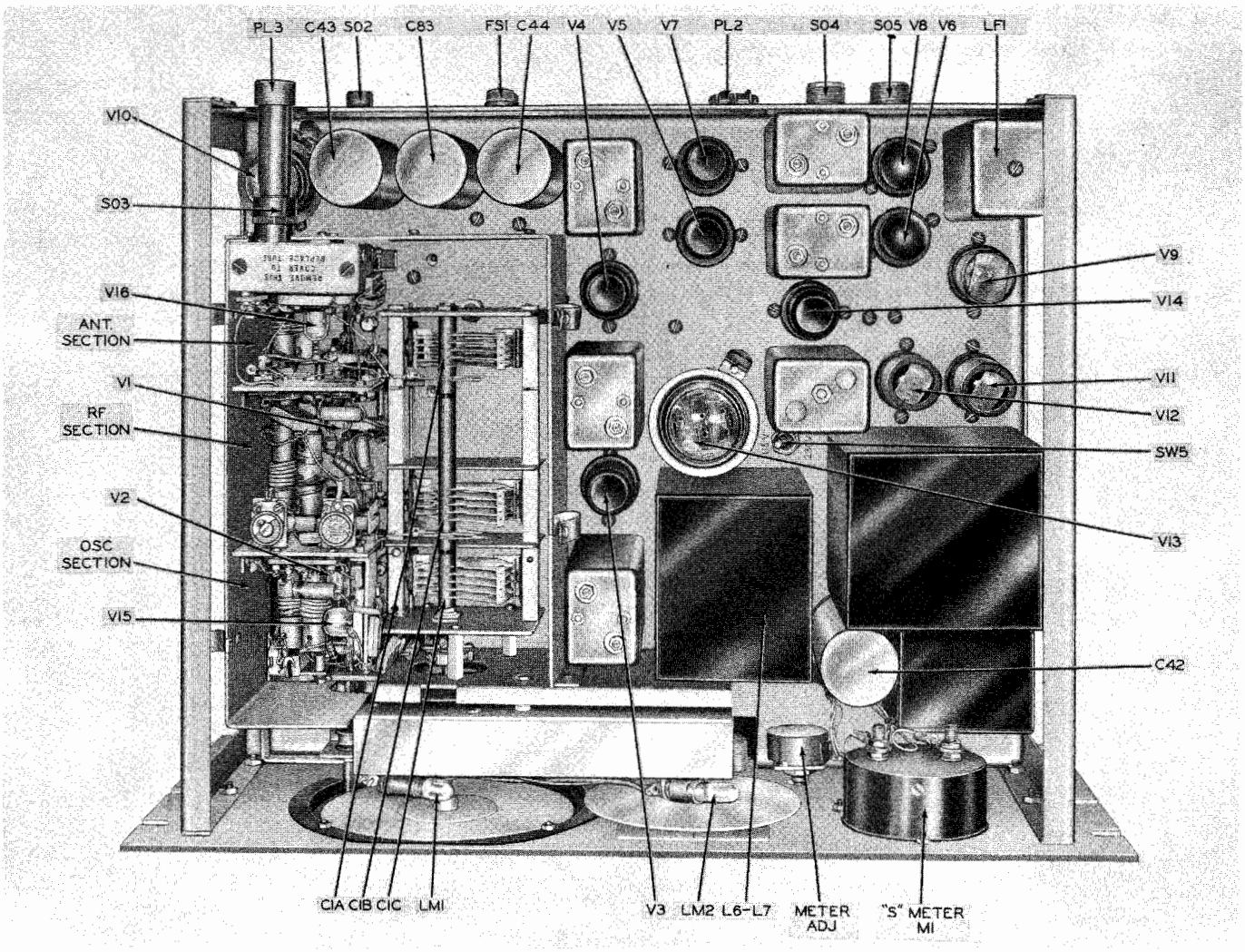


Figure 5-1. Radio Receiving Equipment Navy Model RBK-16, Top View Showing Tube Locations.

a. Be sure to disconnect the power to the receiver before reaching in to touch a tube.

b. Refer to figure 5-1 for tube locations.

c. Use a cloth or other insulating material around the tube when removing hot tubes to prevent damage to the fingers.

d. Tubes V10 and V13 which are held down with the hat type tube holders, may be removed by just pulling up on the holder at the point where it slides down over the threaded rod. Be sure to replace the holder after a new tube has been inserted.

e. To replace tubes V1, V2, V15 and V16, the chassis must be removed from the cabinet and the lid covering these tubes removed. USE EXTREME CARE WHEN REMOVING OR REPLACING THESE TUBES as they are easily damaged. A small screwdriver may be used to release the tube pins from the socket.

f. Tube V10 has a yellowish blue glow, when operating normal, and should not be taken as a sign of its being defective.

WARNING

NEVER REPLACE A FUSE WITH ONE OF HIGHER RATING UNLESS CONTINUED OPERATION OF THE EQUIPMENT IS MORE IMPORTANT THAN PROBABLE DAMAGE. IF A FUSE BURNS OUT IMMEDIATELY AFTER REPLACEMENT, DO NOT REPLACE IT A SECOND TIME UNTIL THE CAUSE HAS BEEN CORRECTED.

TABLE 5-1. SYMPTOMS OF FUSE FAILURE

SYMPTOMS	BLOWN FUSE	VALUE (AMPS.)	COMMENTS
PILOT LIGHTS NOT LIGHTED	FS1 and/or FS2	3	Check plug PL1.
TUNING METER DOES NOT OPERATE	FS1 and/or FS2	3	No sound at output.

TABLE 5-2. FUSE LOCATIONS

SYMBOL	LOCATION	PROTECTS	AMPS	VOLTS	NUMBER
FS1	Mounted at the rear of the chassis.	Primaries of power transformer T16.	3	250	
FS2	Mounted at the rear of the chassis.	Primaries of power transformer T16.	3	250	

SECTION 6

PREVENTIVE MAINTENANCE

1. DEFINITION OF PREVENTIVE MAINTENANCE.

PM (preventive maintenance) is work performed on equipment, usually when the equipment is not in use, to keep it in such good working order that breakdowns and needless interruptions in service will be kept to a minimum. PM differs from trouble and repair since its object is to eliminate certain troubles before they occur. The importance of PM cannot be overemphasized. Therefore, it is important that the equipment be maintained properly.

2. ROUTINE MAINTENANCE CHECK-CHARTS.

The check-charts which follow this paragraph show the operator how to maintain the equipment so that trouble shooting and repair will be reduced to a minimum. They indicate what to check, when to check, how to check, and the precautions which should be taken before, during and after checking the equipment. The check-charts are self-explanatory.

Note

GASOLINE WILL NOT BE USED AS A CLEANING FLUID FOR ANY PURPOSE.

Note

THE ATTENTION OF MAINTENANCE PERSONNEL IS INVITED TO THE REQUIREMENTS OF CHAPTER 67 OF THE BUREAU OF SHIPS MANUAL, OF THE LATEST ISSUE.

TABLE 6-1. MAINTENANCE CHECK CHART

WHAT TO CHECK	*WHEN TO CHECK	HOW TO CHECK	PRECAUTIONS
1. Chassis and panel.	D	a. Inspect outside of panel. b. Check panel screws, pilot lamp, control knobs, and switches for loose mountings. c. Check all connections.	
2. Input and output cables and connectors.	D	a. Examine for loose mountings, dirty contacts, and improper spring tension. b. To remove dirt and corrosion, use crocus cloth and then a clean cloth.	
3. Fuses.	D	a. Inspect fuse caps for evidence of burning or corrosion. b. Throw away blown fuse. c. The tension of the fuse ferrules is made tight by turning the extractor post clockwise. d. Clean fuse ends with emery cloth.	Turn off all power.

WHAT TO CHECK	*WHEN TO CHECK	HOW TO CHECK	PRECAUTIONS
4. Capacitors.	M	a. Inspect fixed capacitors for signs of discoloration, leaks, bulges, dirt, corrosion, loose mountings, and connections. b. Clean cases of fixed capacitors, insulated bushings and dirty or corroded connection. The cases and the bushings can usually be cleaned with a dry cloth. If deposits are hard to remove, moisten cloth in solvent.	Turn off all power. Remove a-c power cord. Be careful not to break the bushing or damage the gasket. Dust, if present, may cause arcing.
5. Resistors.	M	a. Inspect coating of vitreous-enameled resistors for signs of cracks and chipping, especially at ends. Examine the bodies of all types of resistors for blistering, discoloration, and other signs of overheating. b. Inspect leads and all other connections for corrosion, dirt, dust, looseness, and broken strands in connecting wire. c. Check security of all mountings. d. Tighten resistors, connections, and mountings, if necessary. e. Clean carbon resistors with a small brush. Wipe vitreous-enameled resistors with a dry cloth. Dampen cloth with solvent if deposits of dirt are unusually hard to remove. f. Resistors with discolored bodies cannot be cleaned. Bad discoloration indicates circuit trouble due to overloading and overheating.	Do not attempt to move resistors with pigtail connections. The connection may break at the point where it enters the body of the resistor. Such defects cannot be repaired. If resistors remain loose, vibration may break connection or damage the body.
6. Tubes and sockets.	W	a. Inspect glass envelopes for accumulation of dirt and corrosion. b. Replace tubes with loose envelopes. c. Inspect tube sockets when tubes are removed.	Never work on tubes immediately after shutdown; severe burns may result. Do not jiggle tubes or partially withdraw them. Such movements tend to weaken tube pins and spread the contacts in sockets. Be

WHAT TO CHECK	*WHEN TO CHECK	HOW TO CHECK	PRECAUTIONS
		d. Tighten loose connections to sockets and tubes. Clean dirty and corroded connections before tightening. e. Clean tubes when necessary. Use a clean, lint-free, dry cloth to remove dust and dirt from glass envelopes. If sockets and contacts are accessible, use fine sandpaper to remove corrosion, oxidation, and dirt. Wipe off moisture with a clean dry cloth.	careful when removing tubes from their sockets. Never jar a warm tube. Do not apply too much pressure when tightening locknuts that hold sockets to insulated bushings or strips. Do not use excessive pressure.
7. Plugs and connectors.	M	a. Carefully remove from socket and check for evidence of corrosion. b. Inspect female ends of connector for dust. c. Inspect mountings for cracks and loose connections. d. Inspect male end of plugs for loose and broken pins. e. Clean male and female ends of connectors. f. Remove corrosion with #000 sandpaper. Wipe with a clean cloth.	Do not bend pins. Do not use excessive force or the insulating material may crack.

* D--DAILY W--WEEKLY M--MONTHLY

Note

IN THE EVENT OF OPERATION IN TROPICAL AREAS WHERE FUNGUS GROWTH MAY BE ENCOUNTERED, FREQUENT INSPECTION OF THE RECEIVER SHOULD BE OBSERVED PARTICULARLY IF THE RECEIVER HAS NOT BEEN OPERATING. COMPONENTS SHOWING SIGNS OF FUNGUS GROWTH SHOULD BE CLEANED AND THEN COATED WITH A FUNGUS-RESISTANT LACQUER.

SECTION 7

CORRECTIVE MAINTENANCE

1. THEORY OF LOCALIZATION.

Causes for breakdown in electronic equipment are many and of various natures. Since breakdowns will occur, although prevention maintenance will assist in maintaining continuous operation most of the time, their rapid location and remedy will depend on the ability of the technician. The most common cause of trouble will probably be the tubes in the receiver, and a good portion of tube failure results from burned-out filaments. All the tubes except tubes V1, V2, V15 and V16 are visible through the top of the receiver when the cover is open. Observe the tube filaments with the power on; the filaments of all glass tubes should glow visibly. The filaments of the metal tubes are not visible, but they may be checked by feeling them to see if they are warm. To observe tubes V1, V2, V15 and V16 remove the receiver from the cabinet and remove the cover over the r-f section. If all the filaments glow in the glass tubes, and the metal tubes are warm, remove them and check them with a tube checker and replace the weak or defective tube or tubes. The voltage regulator V10 cannot be tested on most tube checkers. With the receiver chassis removed from the cabinet, lay it on its side and visually inspect all capacitors and resistors, etc., and replace any that are burned out or test bad. (See figures 7-1, 7-2, 7-3 and 7-4). The information contained in this section is intended as an assistance in trouble shooting, pinpointing and recognizing where trouble has developed in the event of a breakdown. Use it as a guide but do not misinterpret it as a full and complete index to all possible troubles which might develop.

2. ALIGNMENT PROCEDURE.

a. GENERAL.— The receiver has been carefully aligned at the factory and should not require realignment until the receiver requires new tubes in r-f and i-f amplifier stages, or shows signs of loss of sensitivity, off-frequency calibration or requires service work on one or more of its r-f and i-f amplifier stages. Alignment should not be attempted by inexperienced personnel as maximum performance is obtained only by careful and intelligent alignment. Work in a shielded room if possible.

b. EQUIPMENT NEEDED.— (1) Signal generator capable of providing a 1000-cycle modulated signal at 5.25 mc and 27 to 145 mc range. Standard Navy R.F. Signal Generator AN/URM-25 or equivalent.

(2) A 600 ohm 10W non-inductive resistor.

(3) Either Multimeter ME-25/U or TS-352/U or equivelant may be used.

c. I-F AMPLIFIER ALIGNMENT.— (1) Disconnect the grid lead of the type 954 mixer tube (V2) and connect the "hot" lead of the signal generator to the grid of the mixer tube using a small clip or flexible piece of wire to make the connection. Connect the ground wire of the generator to the receiver chassis.

CAUTION

DO NOT ATTEMPT TO SOLDER TO THE TUBE TERMINAL AS THE HEAT OF THE SOLDERING IRON IS CERTAIN TO CRACK THE GLASS ENVELOPE.

(2) Connect the 600 ohm 10W resistor between pins A and C of the audio output socket SO4 and the multimeter across it. Set the range of the multimeter for its 100 volt range to prevent overloading the meter accidentally.

(3) Let the receiver warm up for approximately half an hour, then set the controls as follows:

R.F. GAIN control at maximum gain (fully clockwise).
A.F. GAIN control at maximum gain (fully clockwise).
SELECTIVITY switch at SHARP.
A.M.-F.M. switch at A.M.
BAND SWITCH at band number 2.
A.V.C. switch at OFF.
REC.-SEND switch at REC.
A.N.L. switch at OFF.
B.F.O. switch at OFF.
TONE control at HIGH FID.

(4) Set the signal generator frequency at 5.25 mc and turn on the 1000-cycle modulation.

(5) Adjust capacitors C68, C69, C70, C71, C72, C73, C76 and C77 on transformers T10, T11, T12 and T13 for maximum meter reading using just enough signal generator output to provide a

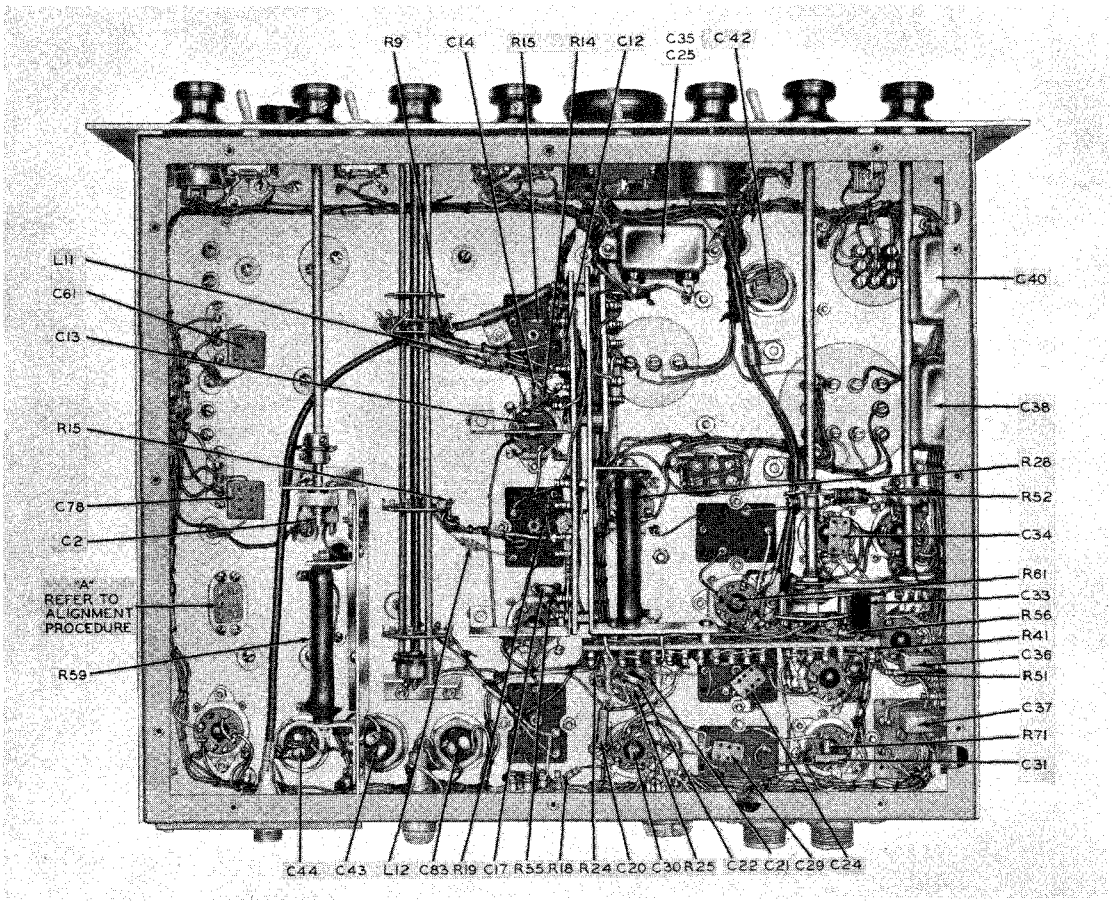


Figure 7-1. Radio Receiving Equipment Navy Model RBK-16, Bottom View Showing Component Parts.

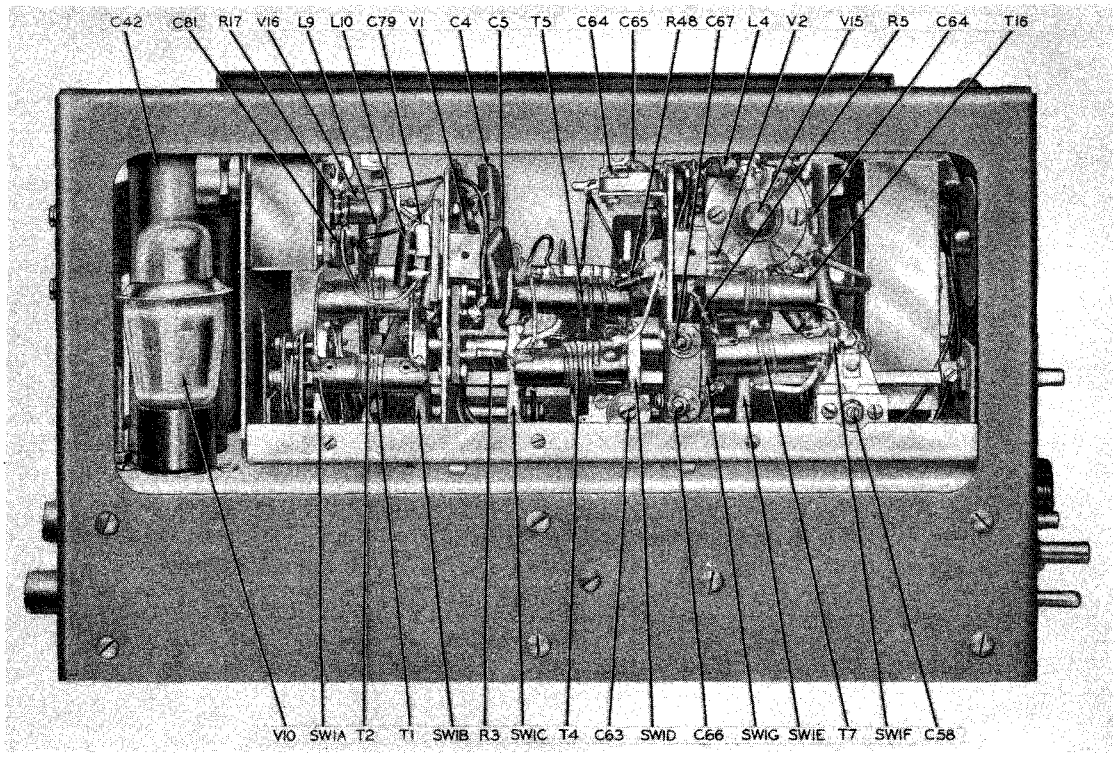
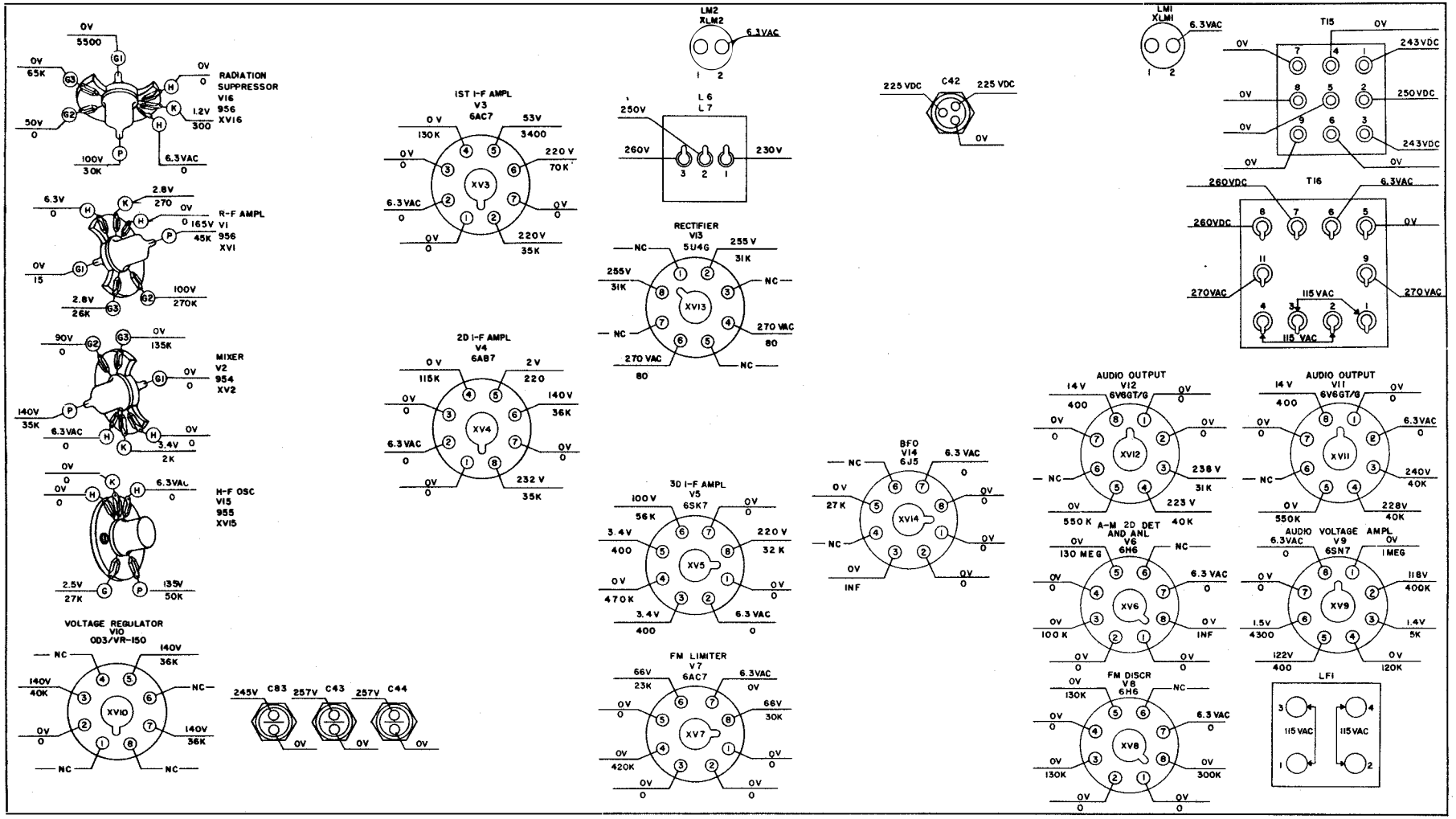


Figure 7-2. Radio Receiving Equipment Navy Model RBK-16, Side View of Ant, R-f and Osc. Sections, Showing Component Parts.



NOTES:

1. INPUT VOLTAGE 115 VAC.
2. V1, V2, V15, AND V16 ARE ACORN TUBES MOUNTED ON A SUB-CHASSIS.
3. VOLTAGE MEASURED BETWEEN EITHER CONTACTS 1 AND 2 OF XFS1 OR XFS2 AND TERMINAL NO. 4 OF LF1 SHOULD BE 115 VAC.
4. NC INDICATES NO CONNECTION.
   WARNING: BEFORE MEASURING ANY RESISTANCE: REMOVE THE A-C LINE CORD FROM THE OUTLET.
5. VOLTAGE AND RESISTANCE MEASUREMENTS ARE BETWEEN TUBESOCKET PINS AND CHASSIS. ANTENNA NOT CONNECTED.
6. ALL VOLTAGE AND RESISTANCE MEASUREMENTS ARE TAKEN WITH A 20,000 OHMS-PER-VOLT METER.
7. SET ALL FRONT PANEL CONTROLS AT MAXIMUM WITH ALL SWITCHES ON. AM/FM SWITCH SET AT AM AND BAND SWITCH AT BAND 1.
8. K = 1000
9. UNLESS OTHERWISE NOTED ALL VOLTAGES ARE DC.

Figure 7-3. Radio Receiving Equipment Navy Model RBK-16, Voltage and Resistances at Tube Sockets.

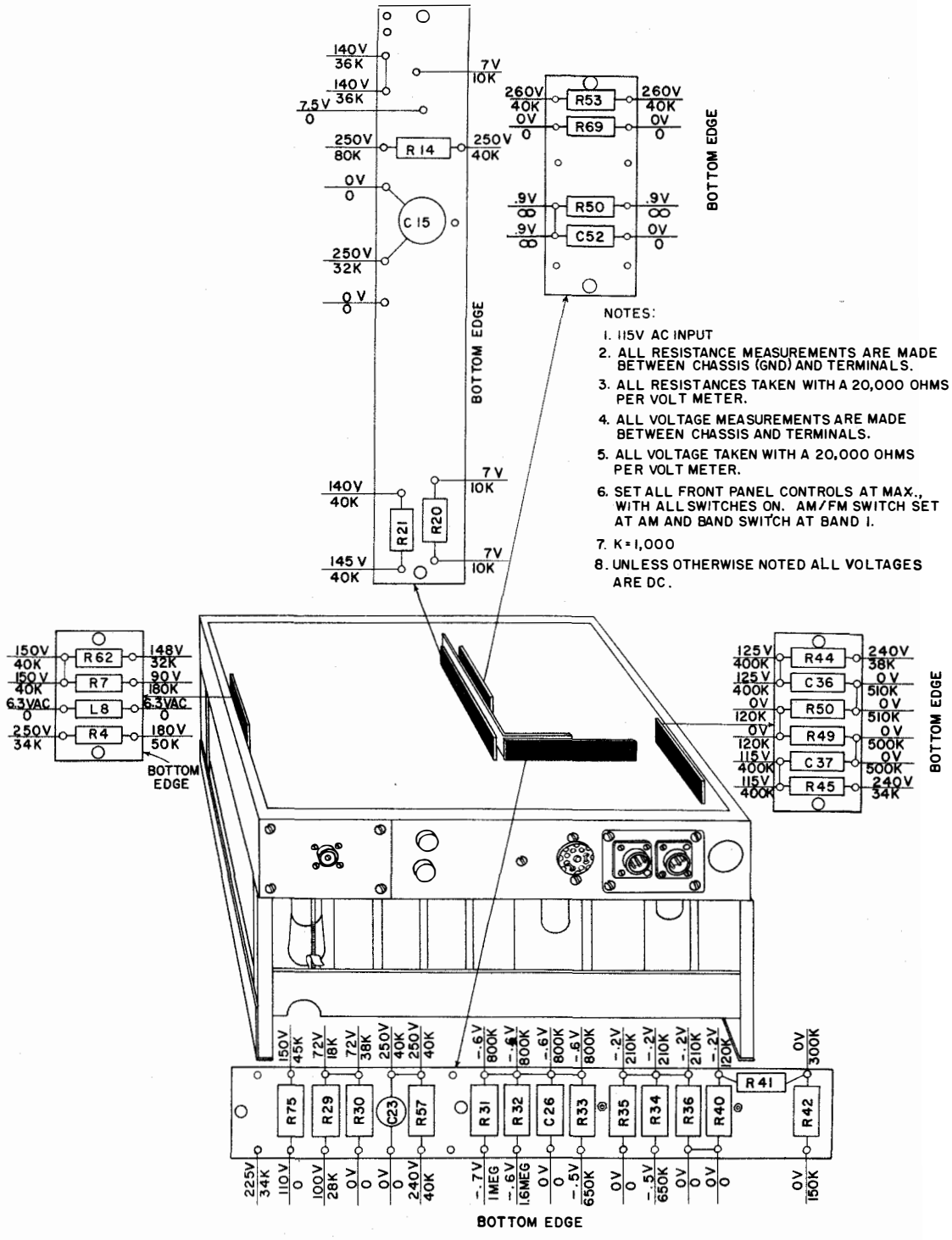


Figure 7-4. Radio Receiving Equipment Navy Model RBK-16, Voltage and Resistances at Terminal Boards.

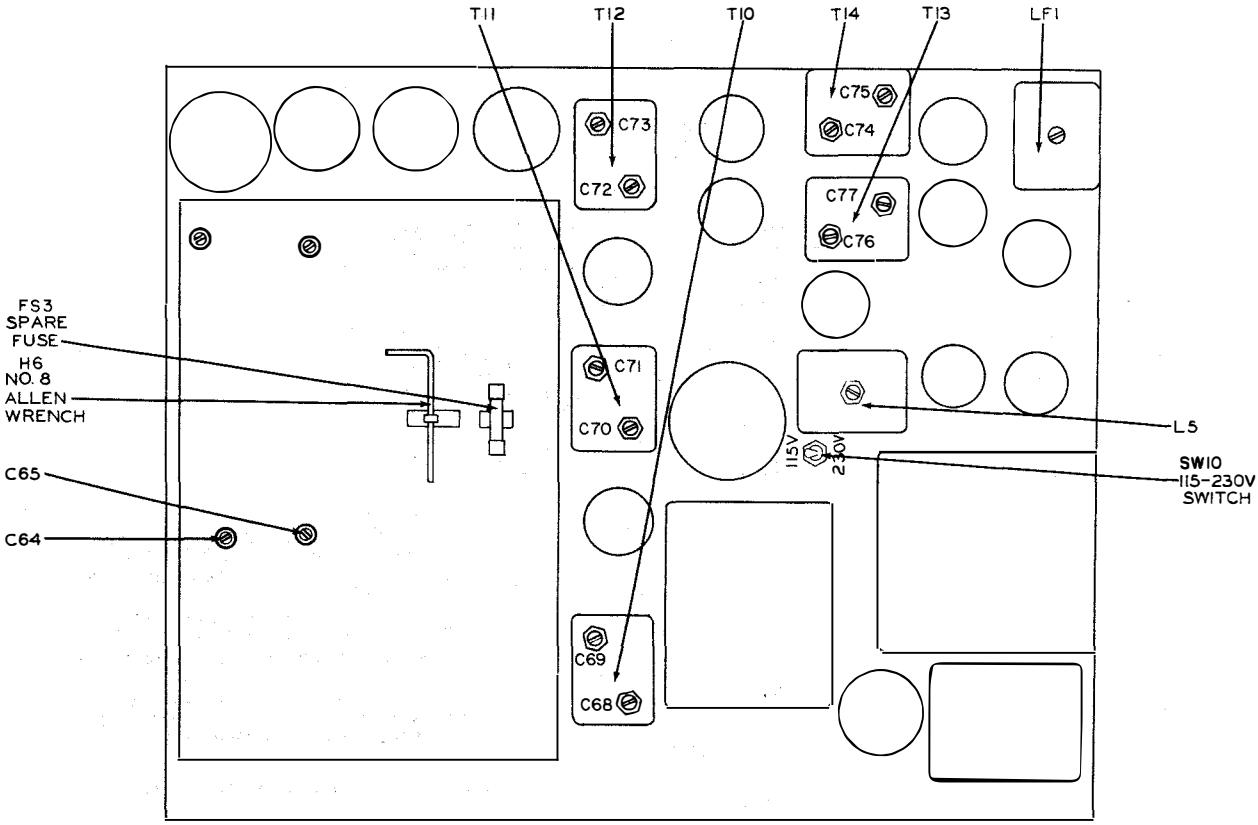


Figure 7-5. Radio Receiving Equipment Navy Model RBK-16, Top View Showing Alignment Points.

good readable indication on the meter. The signal lever at the generator should not be more than 70 microvolts for 5 1/2 volts across the 600 ohm load at the audio output. Repeat the alignment procedure in the reverse order until assured of accurate alignment. Refer to figure 7-5 for the location of i-f transformer adjustment screws.

d. DISCRIMINATOR TRANSFORMER ALIGNMENT. (1) Set the A.M.-F.M. switch at F.M. and the SELECTIVITY switch at BROAD.

(2) Leave the signal generator set at 5.25 mc with 1000-cycle modulation.

(3) Adjust the secondary capacitor (C75) of the discriminator transformer T14 for zero signal level at the meter. Note that this adjustment is critical, therefore turn the adjustment screw slowly. Use sufficient signal generator output to provide a good null indication.

(4) Detune the adjustment made in subparagraph d(3) slightly so that the meter gives a readable indication.

(5) Adjust the primary capacitor (C74) adjustment of the discriminator transformer T14 for maximum response.

(6) Retune the secondary of the discriminator transformer for the null point as in subparagraph d(3).

(7) Detune the signal generator to a frequency lower than the i-f frequency until the maximum output point is reached. Note the meter reading and the frequency deviation from the i-f frequency (5.25 mc).

(8) Repeat the procedure for the frequency above the i-f frequency. The frequency deviation and maximum output should be the same for good balance. If they are not, then tune the signal generator to the lower of the two peaks and adjust the primary capacitor adjustment until the output rises an amount equal to about half the difference of the two peaks previously noted.

(9) Retest for balance as above readjusting the primary capacitor (C74) adjustment until both maximum readings are alike when the signal generator is detuned approximately the same amount on either side of resonance (5.25 mc). If a balance cannot be obtained, it is an indication that the discriminator transformer secondary capacitor (C75) has been misadjusted and will require a very slight correction. The direction of adjustment that will cause the off-tune peaks to assume the same values is the correct one. Care

must be taken in adjusting the discriminator secondary capacitor (C75) as even a very slight misadjustment will result in distortion of frequency-modulated signals.

e. B.F.O. ADJUSTMENT.— Set up the receiver and signal generator as for i-f amplifier alignment and proceed as follows:

(1) Shut off the modulation of the signal generator.

(2) Set the PITCH CONTROL at "O" and set the B.F.O. switch at ON.

(3) Plug a headset into the PHONES jack J1.

(4) Back off the A.F. GAIN control slightly and use just enough signal generator output to provide a clean beat note.

(5) Adjust the slug screw of coil L5 for zero beat.

(6) Check the adjustment by turning the PITCH CONTROL to the right and left of "O". An increase in the pitch of the beat note should result. The frequency of the beat note will vary from zero at the "O" setting to a very high pitch at the number 5 setting of the control.

(7) Disconnect the signal generator and reconnect the grid lead to the mixer tube V2. The alignment of the i-f amplifier stages is completed.

f. R-F AMPLIFIER ALIGNMENT.— The following sequence must be followed to properly align the r-f amplifier stages. Band 3 is aligned first since the adjustment of trimmer C11 is made for band 3 alignment only and will slightly effect the alignment of bands 1 and 2 if band 3 is not aligned first.

(1) Connect the "hot" lead of the signal generator to socket SO2. Connect the ground lead of the generator to the receiver chassis. Turn on the 1000-cycle modulation.

(2) Let the receiver warm up for approximately half an hour, then set the receiver controls as follows:

R.F. GAIN control at maximum gain (fully clockwise).
A.F. GAIN control at maximum gain (fully clockwise).
SELECTIVITY switch at SHARP during alignment of band 1, and at BROAD during alignment of bands 2 and 3.
A.M.-F.M. switch at A.M.
A.V.C. switch at OFF.
REC.-SEND switch at REC.
A.N.L. switch at OFF.
B.F.O. switch at OFF.
TONE control at HIGH FID.

Note

FOR ALL ALIGNMENT ADJUSTMENTS THE SIGNAL GENERATOR OUTPUT ATTENUATOR MUST BE ADJUSTED TO PROVIDE 5 1/2 VOLTS ACROSS THE 600 OHM LOAD AT THE SPEAKER TERMINALS OF THE RECEIVER, SOCKET SO4.

Note

DURING EACH OF THE FOLLOWING ADJUSTMENTS THE ANTENNA CONTROL SHOULD BE TOUCHED UP TO KEEP THE ANTENNA STAGE IN ALIGNMENT.

(3) BAND 3 ALIGNMENT. — (BAND SWITCH AT 3).— (a) Set the signal generator at 135 mc and tune in its signal on the receiver. If the receiver's calibrated dial reads 135 mc no adjustment of capacitor C11 is necessary. If not, adjust C11 for maximum output with the receiver dial set at 135 mc.

(b) Set the signal generator at 90 mc and tune in this signal on the receiver. If the receiver dial reads 90 mc no adjustment of the plate winding inductance of transformer T19 is necessary—if not, loosen the setscrew at the frame of the main tuning capacitor (C1), holding the end of the plate coil, and adjust the inductance (figure 7-2). Increase the inductance if the generator signal falls lower than the 90 mc calibration point on the receiver dial and reduce the inductance if the signal falls above the 90 mc calibration point. Tighten down the setscrew each time before checking the adjustment.

Note

IF THE PLATE COIL INDUCTANCE WAS ALTERED IT WILL BE NECESSARY TO REPEAT STEP (A) AGAIN. SEVERAL ADJUSTMENTS OF CAPACITOR C11 IN STEP (A), AND THE PLATE COIL INDUCTANCE IN STEP (B) MAY BE REQUIRED IN CASES OF WHERE A NEW TRANSFORMER (T9) HAS BEEN INSTALLED.

(c) Set the signal generator and receiver at 135 mc and adjust trimmer capacitor C65 for maximum output. Rock the tuning control back and forth slightly to determine the best adjustment.

(d) Ordinarily no adjustment of the secondary winding inductance of transformers T3 and T6 is necessary at 90 mc, however, if the sensitivity of the receiver falls off at this end of the band or if new transformers have just been

installed, it will be necessary to adjust the secondary winding inductance for maximum response at 90 mc. Transformer T6 is provided with a soldered slider adjustment at the gang capacitor frame, however, the ground side of the secondary of transformer T3 must be unsoldered to be adjusted. The value of inductance that provides maximum audio signal at the output meter is the correct adjustment.

Note

IF THE SECONDARY INDUCTANCE WAS ALTERED IT WILL BE NECESSARY TO REPEAT STEP (C) AGAIN, SEVERAL ADJUSTMENTS OF CAPACITOR C65 IN STEP (C) AND INDUCTANCE IN STEP (D) MAY BE NECESSARY DEPENDING UPON THE CONDITION OF THE COILS.

(4) BAND 2 ALIGNMENT. — (BAND SWITCH AT 2).— (a) Set the signal generator at 80 mc and tune in its signal on the receiver. If the receiver's calibrated dial reads 80 mc no adjustment of capacitor C67 is necessary—if not, adjust capacitor C67 for maximum output with the receiver dial set at 80 mc.

(b) Set the signal generator at 50 mc and tune in its signal on the receiver. If the receiver dial reads 50 mc no adjustment of the plate winding inductance of transformer T8 is necessary—if not, it will be necessary to loosen the winding from the form with lacquer thinner and shift the individual turns until the signal peaks with the receiver dial set at 50 mc. Repeat step (a) above and recheck step (b) again before cementing the coil in place.

Note

THE PRESENCE OF LACQUER THINNER MAY EFFECT THE WINDING INDUCTANCE, HENCE, IT IS WELL TO ALLOW A FEW MINUTES FOR THE LACQUER THINNER TO EVAPORATE BEFORE MAKING INDUCTANCE ADJUSTMENTS.

(c) Set the signal generator and receiver at 80 mc and adjust trimmer capacitor C64 for maximum output. Rock the tuning control back and forth slightly to determine the best adjustment.

(d) Ordinarily no adjustment of the secondary winding inductance of transformers T2 and T3 is necessary at 50 mc, however, if the sensitivity of the receiver falls off at this end of the band or if new transformers have just been installed, it will be necessary to adjust the secondary winding inductance for maximum response at 50 mc. To adjust the secondary inductance it will be necessary to use lacquer thinner as in step (b) to loosen and shift turns until the signal peaks with the receiver dial set at 50 mc. Repeat step (c) above and recheck step (d) again before cementing the coils in place.

(5) BAND 1 ALIGNMENT. — (BAND SWITCH AT 1).— (a) Set the signal generator at 45 mc and tune in its signal on the receiver. If the receiver's calibrated dial reads 45 mc no adjustment of capacitor C66 is necessary—if not, adjust capacitor C66 for maximum response with the receiver dial set at 45 mc.

(b) Set the signal generator at 30 mc and tune in its signal on the receiver. If the receiver dial reads 30 mc no adjustment of the padder capacitor C58 is necessary—if not, adjust capacitor C58 for maximum output with the receiver dial set at 30 mc.

(c) Set the signal generator and receiver at 45 mc and adjust trimmer capacitor C63 for maximum response. Rock the tuning control back and forth slightly to obtain the best adjustment.

(d) Ordinarily no adjustment of the secondary winding inductance of transformers T1 and T4 is necessary at 30 mc, however, if the sensitivity of the receiver falls off at this end of the band or if new transformers have just been installed it will be necessary to adjust the secondary winding inductance for maximum response at 30 mc. To adjust the secondary inductance it will be necessary to use lacquer thinner as before to loosen and shift turns until the signal peaks with the receiver dial set at 30 mc. Repeat step (c) above and recheck step (d) again before cementing the coils in place.

Note

AFTER COMPLETING THE ABOVE ALIGNMENT PROCEDURE CHECK THE IMAGE FREQUENCY TO DETERMINE WHETHER THE OSCILLATOR FREQUENCY IS HIGHER THAN THE SIGNAL FREQUENCY ON BAND 1 AND LOWER THAN THE SIGNAL FREQUENCY ON BANDS 2 AND 3. FOR EXAMPLE: SET THE RECEIVER DIAL AT 100 MC, SET THE SIGNAL GENERATOR FREQUENCY AT TWICE THE I-F FREQUENCY LOWER THAN 100 MC OR 89.5 MC (100-2 x 5.25) AND TURN UP THE SIGNAL GENERATOR OUTPUT TO ABOUT 5000 TIMES THE NORMAL ALIGNMENT OUTPUT. AN IMAGE SIGNAL SHOULD BE HEARD. IF NOT, TUNE THE SIGNAL GENERATOR TO TWICE THE I-F FREQUENCY HIGHER THAN THE SIGNAL FREQUENCY OR 110.5 MC AND LOOK FOR THE IMAGE THERE. IF THE IMAGE SHOWS UP AT 110.5 MC, THE RECEIVER'S OSCILLATOR IS OPERATING

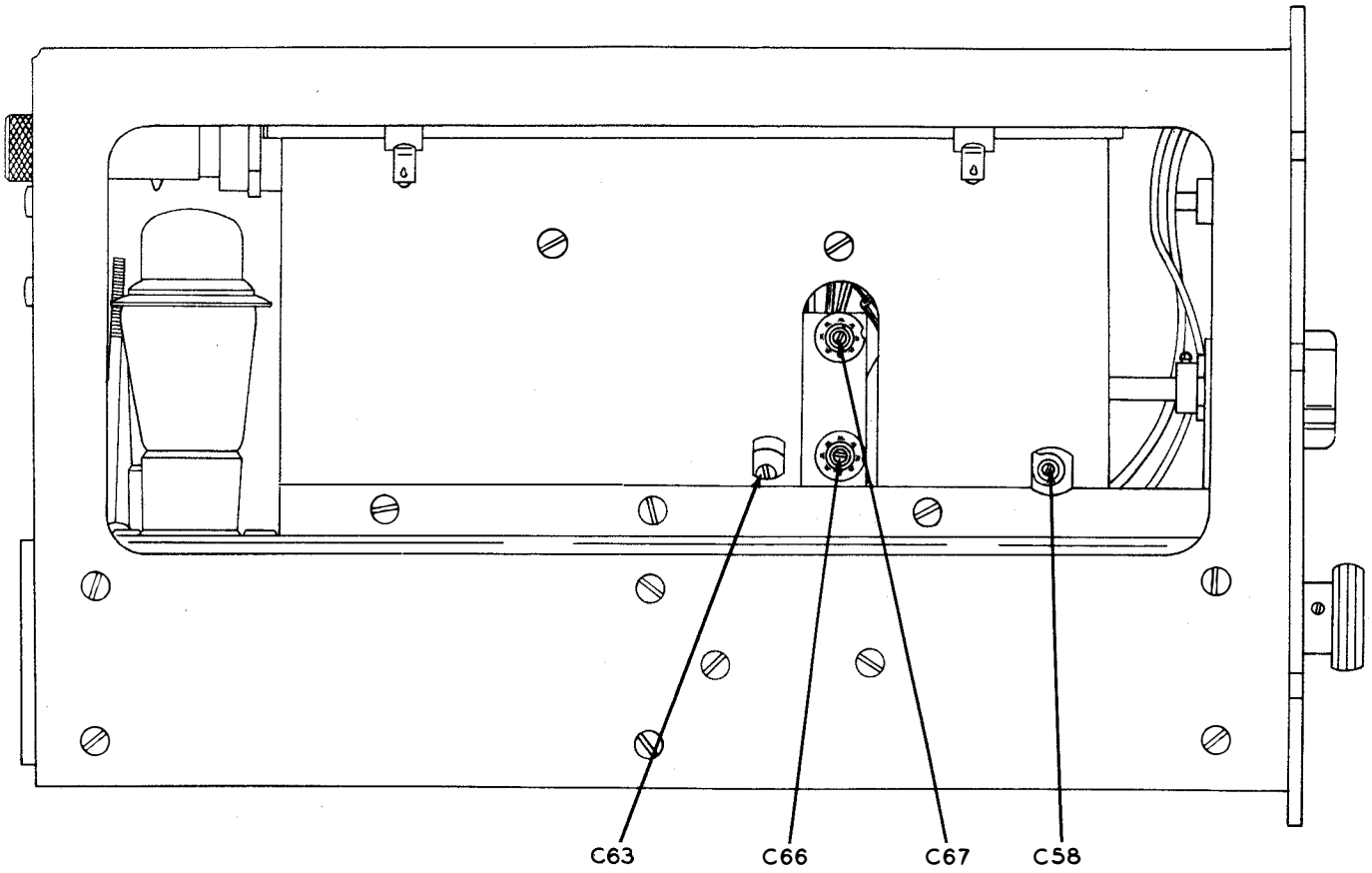


Figure 7-6. Radio Receiving Equipment Navy Model RBK-16, Side View of Ant., R-f and Oscillator Section Showing Alignment Points.

ABOVE THE SIGNAL FREQUENCY ON THIS BAND AND MUST BE READJUSTED SO THAT IT FALLS BELOW THE SIGNAL FREQUENCY. DUE TO THE CONSTRUCTION OF THIS RECEIVER IT IS CONSIDERED IMPOSSIBLE TO ADJUST THE OSCILLATOR FREQUENCY SO THAT IT WILL FALL ON THE WRONG SIDE OF THE SIGNAL FREQUENCY ON ANY OF THE THREE BANDS, HOWEVER, IT IS ALWAYS WELL TO CHECK FOR THE IMAGE AFTER MAKING ANY EXTENSIVE ALIGNMENT ADJUSTMENTS.

(6) After aligning the receiver, the following sensitivity measurements should be made to determine whether the receiver meets the sensitivity requirements. If it does not meet the following requirements the alignment should be checked again.

(a) Connect the standard Navy R.F. Signal Generator AN/URM-25 or equivalent to the antenna input socket SO3, with 1000 cycle modulation.

(b) Let the receiver warm up for approximately one-half an hour, then set the front panel control as follows:

R.F. GAIN control at maximum gain (fully clockwise).
A.F. GAIN control at maximum gain (fully clockwise).
SELECTIVITY switch at SHARP.
A.M.-F.M. switch at A.M.
BAND SWITCH at band number 2.
A.V.C. switch at OFF.
REC.-SEND switch at REC.
A.N.L. switch at OFF.
B.F.O. switch at OFF.
TONE control at HIGH FID.
ANTENNA peak for each frequency.

(c) Terminate socket SO4 with a 600-ohm 10 watt resistor.

(d) Connect Multimeter ME-25/U or equivalent across the 600-ohm 10 watt resistor.

(e) The signal generator output must be adjusted to maintain 5-1/2 V. across the 600-ohm load, with the output of the signal generator set at the output listed in the chart, or less.

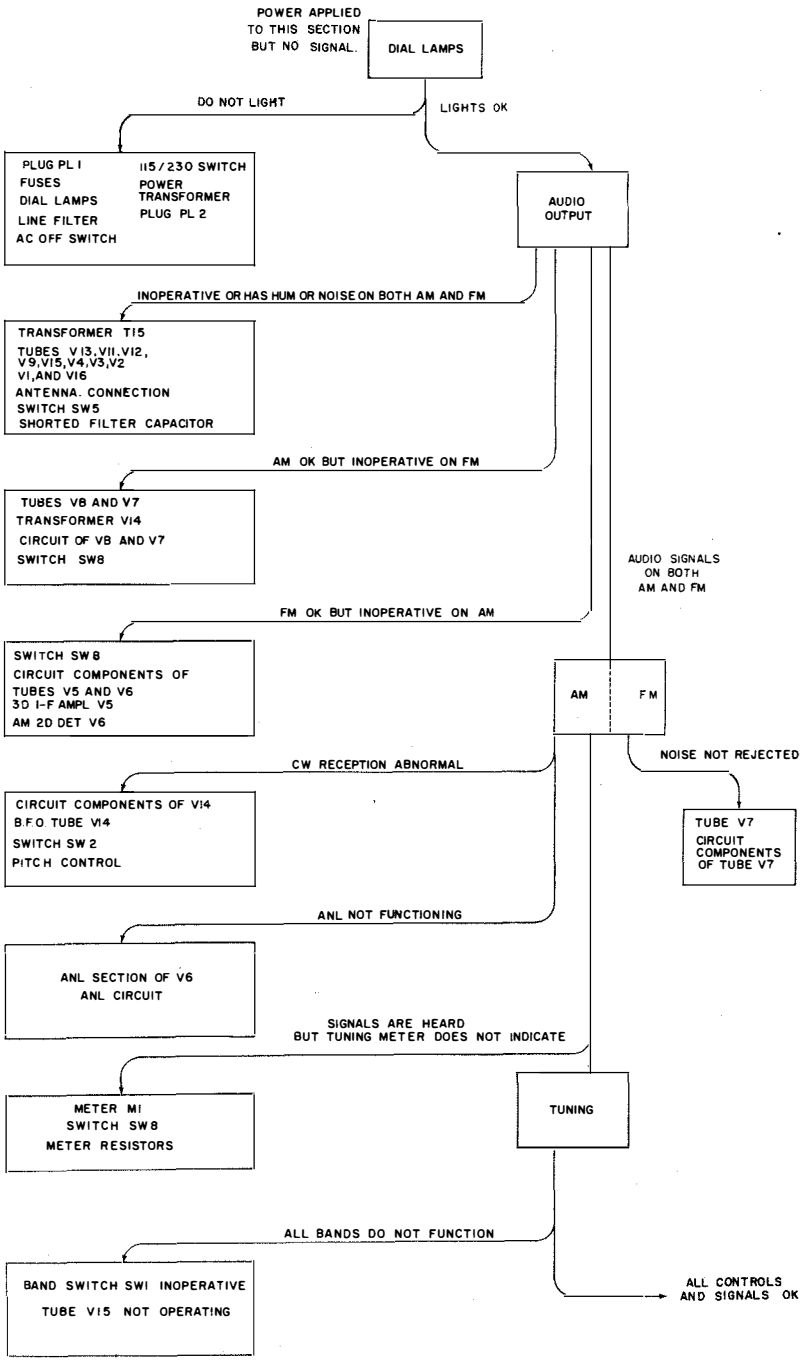
Freq. in megacycles	30	36	45	50	60	80	88	110	135
Sensitivity in microvolts	2	2	2	2	2	2	5	5	5

If the sensitivity at the frequency given is equal to or better than that shown in the chart, the receiver can be considered in proper alinement.

Note

ALL TUBES OF A GIVEN TYPE SUPPLIED WITH THE EQUIPMENT SHALL BE CONSUMED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

TABLE 7-1. TROUBLE SHOOTING CHART



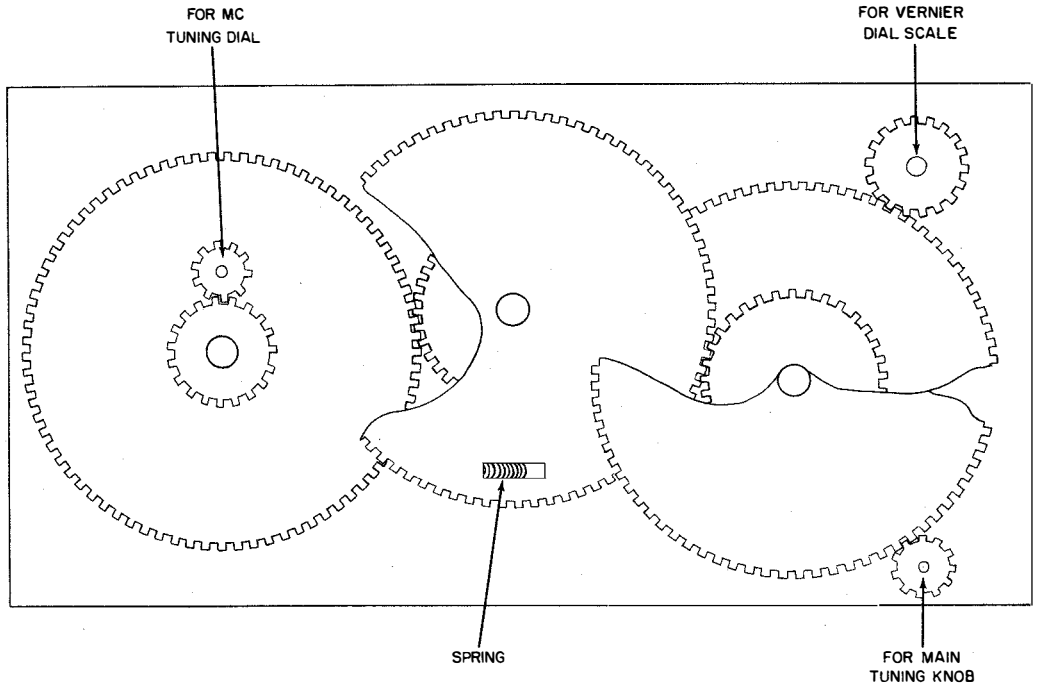


Figure 7-7. Radio Receiving Equipment Navy Model RBK-16, Cutaway View of Tuning Gears.

TABLE 7-2. TUBE OPERATING VOLTAGE AND CURRENT

TUBE TYPE	FUNCTION	PLATE (E)	PLATE (MA)	SCREEN (E)	SUPP. (E)	CATH. (E)	GRID (E)	HEATER (E) A-C
956	Radiation Suppressor	100		50	0	1.2	0	6.1
956	R.F. Amplifier	165		100	0	2.8	2.8	6.1
954	Mixer	140		90	0	3.4	0	6.1
6AC7	1st. I.F. Amp.	220		220	0	5.3	0	6.1
6AB7	2d I.F. Amp.	232		140	0	2	0	6.1
6SK7	3d I.F. Amp.	220		100	0	3.4	3.4	6.1
½ 6H6	AM 2d Det. AVC	0				0		
½ 6H6	ANL	0				0		6.1
6AC7	F.M. Limiter	66		66	0	0	0	6.1
6H6	F.M. Disc.	Pin 3 - 0 Pin 5 - 0				Pin 6 - 0 Pin 8 - 0		6.1
6SL7GT	Audio Voltage Ampl.	Pin 5-122 Pin 2-118			Pin 4-0 Pin 1-0	Pin 6-1.5 Pin 3-1.4		6.1
6J5	B F.O.	0			0	0		6.1
955	High Freq. Osc.	135			2.5	0		6.1
6V6GT	Audio Amplifier (V11)	240		228	0	14		6.1
6V6GT	Audio Amplifier (V12)	238		223	0	14		6.1
5U4G		Pin 4-270 a-c Pin 6-270 a-c				Pin 2-255 Pin 8-255		
OD3	Volt. Reg.	Operating voltage (pin 5) 140 (pins 3 and 7 are shorted internally)						

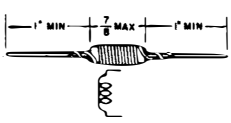
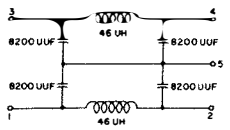
TABLE 7-3. TUBE CHARACTERISTICS

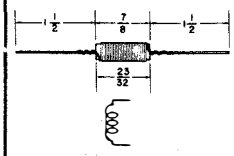
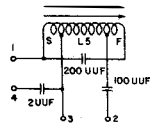
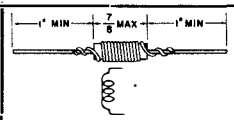
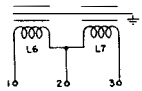
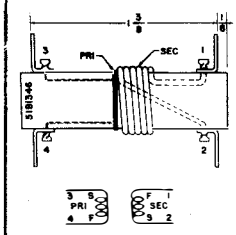
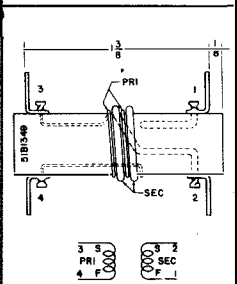
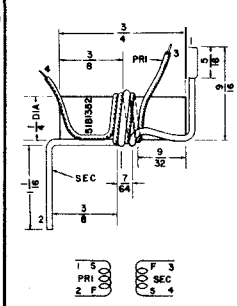
TUBE TYPE	FILAMENT VOLTAGE (V)	FILAMENT CURRENT (A)	PLATE VOLTAGE (V)	GRID BIAS (V)	SCREEN VOLTAGE (V)	PLATE CURRENT (MA)	SCREEN CURRENT (MA)	A-C PLATE RESISTANCE (OHMS)	VOLTAGE AMPLIFICATION FACTOR (MU)	TRANSCONDUCTANCE (MICROMHOS)		EMISSION	
										NORMAL	MINIMUM	IS (MA)	TEST VOLT
954	6.3	0.15	250	-3.0	100	2.0	0.7	1.5 meg	2,000	1,400			
955	6.3	0.15	250	-7.0		6.3		11,400	25	2,200			
956	6.3	0.15	250	-3.0	100	6.7	2.7	700,000	1,440	1,800			
6AC7	6.3	0.45	300	-2.0	150	10.0	2.5	1 meg	6,750	9,000			
6AB7	6.3	0.45	300	-3.0	200	12.5	3.2	700,000	3,500	5,000			
6SK7	6.3	0.3	250	-3.0	100	9.2	2.4	800,000	1,600	2,000			
6J5	6.3	0.3	250	-80		9.0		7,700	20	2,600			
6H6	6.3	0.3	Max. A-C voltage per plate 150V (r.m.s.) Max. D-C output current per plate 8.0 ma										
6SL7GT	6.3	0.3	250	-2.0		2.3[1]		44,000[2]	70[2]	1,600[1]			
6V6GT	6.3	0.45	250	-12.5	250	45/47	4.5/7.0	50,000	218	4,100			
Values for 2 tubes AB1			250	-15	250	70/79	5/13	60,000		3,750			
5U4G	5.0	3.0	Max. A-C voltage per plate[2] 450v Max. D-C output current[2] 225 ma Max. inverse peak voltage 1550v										
OD3/ VR-150			Min. supply voltage 185v Operating voltage 150v Operating current 5-40 ma										

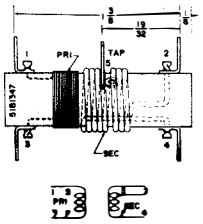
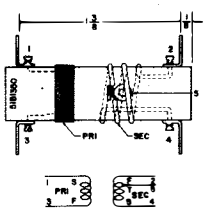
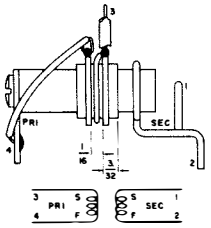
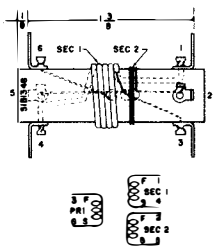
[1] Each triode

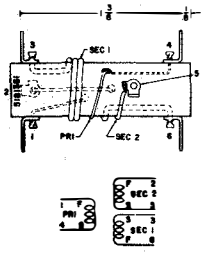
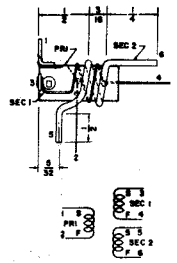
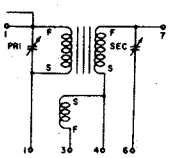
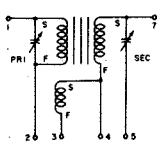
[2] For condenser-input filter

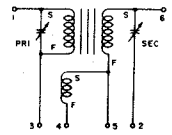
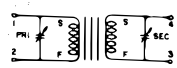
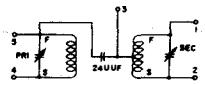
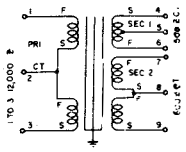
TABLE 7-4. WINDING DATA

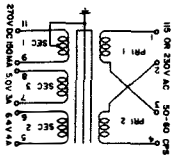
DESIGNATION SYMBOL	HALLICRAFTERS PART No.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D. C. RESISTANCE IN OHMS	IMPEDANCE RATIO	HIPOT A-C VOLTS	REMARKS
L1 L10	53B008		single	No. 36E	70	2			Inductance: 15.5 microhenries at 3950 kilocycles. Coat with chinese blue brushing lacquer. Fungicidal treated.
L2 and L3 part of LF 1	51B1355		pi section	No. 225 Cel. copper wire	57	Term. 1 & 2<1 Term. 3 & 4<1			Universal winding. Inductance 46 microhenries.

DESIGNATION SYMBOL	HALLICRAFTERS PART No.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D. C. RESISTANCE IN OHMS	IMPEDANCE RATIO	HIPOT A-C VOLTS	REMARKS
L4 L8 L9	53B009		single	No. 28E	42	<1			Inductance: 4.2 microhenries at 7.6 megacycles. Coat with chinese blue brushing lacquer. Fungicidal treated.
L5	54C046		single	No. 14 solid tinned	15	<1			Fungicidal treated.
L11 L12	53A267		single	No. 28 Cel. Braid	7	<1			Wound on a 470K resistor. Tunes to 30 mc. with 94 uuf.
L 6 and L 7	56C137		L 6 L 7			94 275			Inductance: 12 henries. Rated at 90 ma dc. Inductance: 3 henries. Rated at 150 ma dc.
T1	51B1346		Primary Secondary	No. 30S Cel. Enam. No. 22D Cel. Br.	$1\frac{1}{2}$ 5	Term. 3 & 4 <1 Term. 1 & 2 <1			One coat of fungicidal varnish. Terminal lugs to be free of varnish.
T2	51B1349		Primary Secondary	No. 30S Cel. Enamel No. 30D Cel. Enamel	1.5 1.8	Term. 3 & 4 <1 Term. 1 & 2 <1			One coat of fungicidal varnish. Terminal lugs to be free of varnish.
T3	51B1352		Primary Secondary	No. 28S Cel. Enamel No. 14 Solid tinned copper	325 1.25	Term. 1 & 2 <1 Term. 3 & 4 <1			One coat of fungicidal varnish. Leads to be free of varnish.

DESIGNATION SYMBOL	HALLICRAFTERS PART No.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D. C. RESISTANCE IN OHMS	IMPEDANCE RATIO	HIPOT A-C VOLTS	REMARKS
T4	51B1347		Primary	No. 34S Cel.	28.5	Term. 1 & 3 <1			One coat of fungicidal varnish.
			Secondary	No. 22D Cel. Braid	6 tap at 2.67	Term. 2 & 4 <1			Terminal lug to be free of varnish.
T5	51B1350		Primary	No. 34S Cel.	11.5	Term. 1 & 3 <1			One coat of fungicidal varnish.
			Secondary	No. 22D Cel.	2.5 tap at .75	Term. 2 & 4 <1 Term. 2 & 5 <1			Terminal lugs to be free of varnish.
T6	51B1353		Primary	No. 26D Cel.	1.125	Term. 3 & 4 <1			One coat of fungicidal varnish.
			Secondary	Tinned copper	.925	Term. 1 & 2 <1			Terminal lugs to be free of varnish.
T7	51B1348		Primary	No. 34S Cel. Br.	1.5	Term. 3 & 6 <1			One coat of fungicidal varnish.
			Sec. No. 1	No. 22D Cel. Br.	4.125	Term. 1 & 4 <1			Terminal lugs to be free of varnish.
			Sec. No. 2	No. 30D Cel. Enamel	2.5	Term. 3 & 6 <1			

DESIGNATION SYMBOL	HALLICRAFTERS PART No.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D. C. RESISTANCE IN OHMS	IMPEDANCE RATIO	HIPOT A-C VOLTS	REMARKS
T8	51B1351		Primary	No. 28S Cel. Br.	.75	Term. 1 & 4 <1			Primary partly interwound with Secondary No. 1.
			Sec. No. 1	No. 18D. Cel. Br.	2.5	Term. 3 & 6 <1			One coat of fungicidal varnish.
			Sec. No. 2	No. 22D Cel. Br.	.5	Term. 2 & 5 1			Terminal lugs to be free of varnish.
T9	51B1354		Primary	No. 26 Enamel	.5	Term. 1 & 2 <1			One coat of fungicidal varnish.
			Sec. No. 1	No. 28S Cel.	1.5	Term. 3 & 4 <1			Terminal lug and wire leads to be free of varnish.
			Sec. No. 2	No. 14B	1	Term. 5 & 6 <1			
T10	50C504		Primary	No. 28 Cel. Br.	18	Term. 1 & 2 <1			Universal winding, one crossover per turn.
			Sec. No. 1	No. 28 Cel. Br.	18	Term. 3 & 4 <1			Coat with clear fungicidal varnish.
			Sec. No. 2	No. 28 Cel. Br.	1	Term. 3 & 4 <1			
T11	50C505		Primary	No. 28 Cel. Br.	18	Term. 1 & 2 <1			Universal winding, one crossover per turn.
			Sec. No. 1	No. 28 Cel. Br.	18	Term. 4 & 7 <1			Coat with clear fungicidal varnish.
			Sec. No. 2	No. 28 Cel. Br.	1	Term. 3 & 4 <1			

DESIGNATION SYMBOL	HALLICRAFTERS PART No.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D. C. RESISTANCE IN OHMS	IMPEDANCE RATIO	HIPOT A-C VOLTS	REMARKS
T12	50C506		Primary	No. 28 Cel. Br.	18	Term. 1 & 3 <1			Universal winding, one crossover per turn.
			Sec. No. 1	No. 28 Cel. Br.	18	Term. 5 & 6 <1			Coat with clear fungicidal varnish.
			Sec. No. 2	No. 28 Cel. Br.	1	Term. 4 & 5 <1			
T13	50C507		Primary	No. 28 Cel. Br.	18	Term. 1 & 2 <1			Universal winding, one crossover per turn.
			Secondary	No. 28 Cel. Br.	13	Term. 3 & 4 <1			Coat with clear fungicidal lacquer.
T14	50C508		Primary	No. 28 Cel. Br.	29	Term. 4 & 5 <1			Universal winding, one crossover per turn.
			Sec.	No. 28 Cel. Br.	33	Term. 1 & 2 <1			Coat with clear fungicidal varnish.
T15	55C172		Primary Term. 1 & 3	37E	2400	600		1250	Hermetically sealed metal case.
			Term. 1 & 2	37E	1200	300			Rating of each primary 35 ma.
			Term. 2 & 3	37E	1200	300			4.47 to 1 ratio of turns primary to low impedance secondary.
			Sec. 1 Term. 4 & 6	32E	576	50			3.464 to 2.236 ratio turns primary to high impedance secondary.
			Term. 4 & 5	32E	288	25			
			Term. 5 & 6	32E	288	25			± 1 db from 30 to 1500 cycles frequency response.
			Sec. 2 Term. 7 & 8	32E	524.5	46			
			Term. 8 & 9	37E	1120	350			

DESIGNATION SYMBOL	HALLICRAFTERS PART No.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D. C. RESISTANCE IN OHMS	IMPEDANCE RATIO	HIPOT A-C VOLTS	REMARKS
T16			Primary No. 1	No. 24	250	4.5			Hermetically sealed metal case.
			Pri. 2	No. 24	250	5			No. 1 sec. 540v DC at 150 ma. rms.
			Sec. #1	No. 29	1246	90		2500	No. 2 sec. 6.4v AC at
			Sec. #2	No. 16	15	<1		1500	4 amp rms.
			Sec. #3	No. 17	11.5	<1		2500	No. 3 sec. 5.0v AC at 3 amp rms.

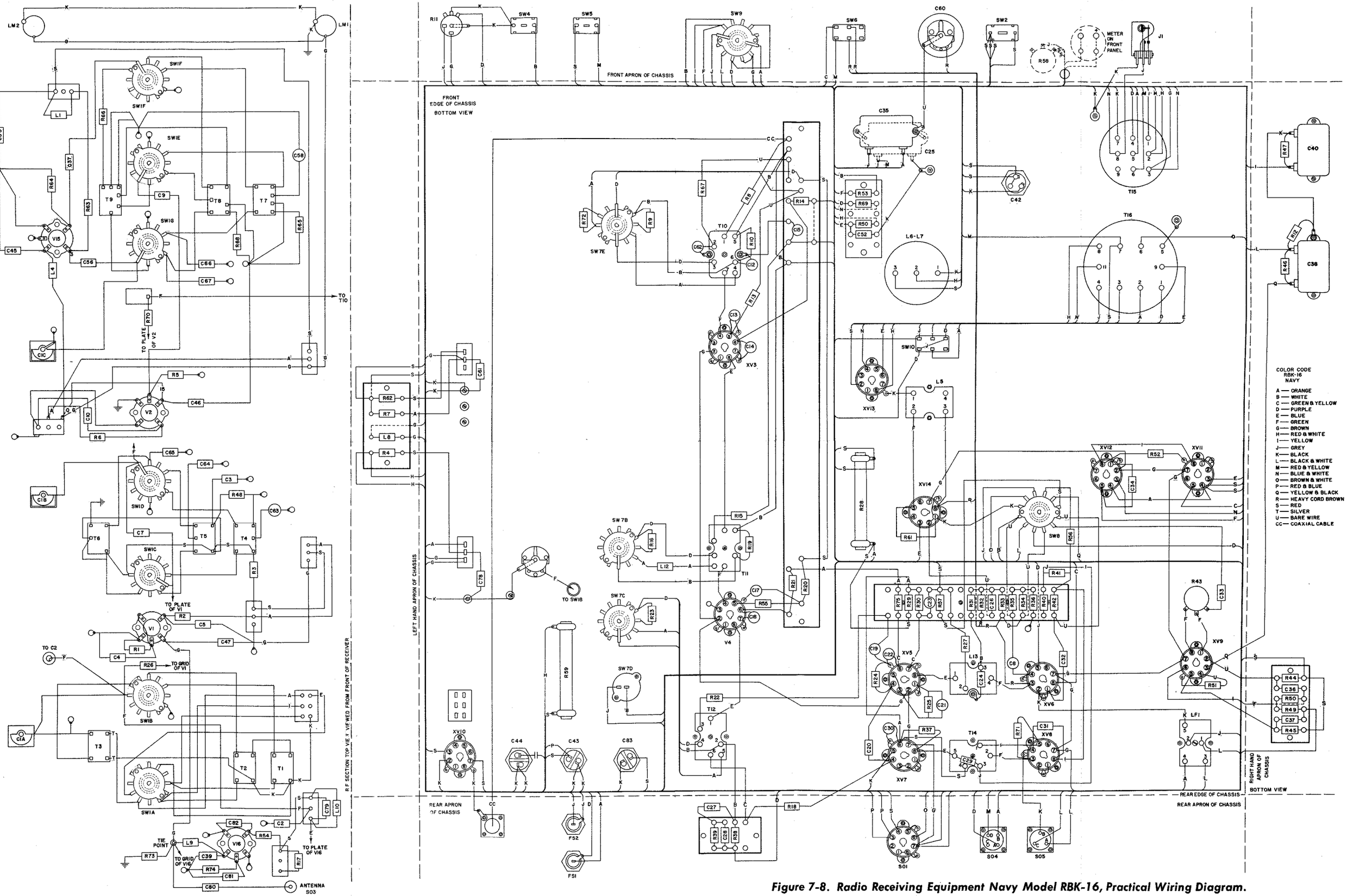


Figure 7-8. Radio Receiving Equipment Navy Model RBK-16, Practical Wiring Diagram.

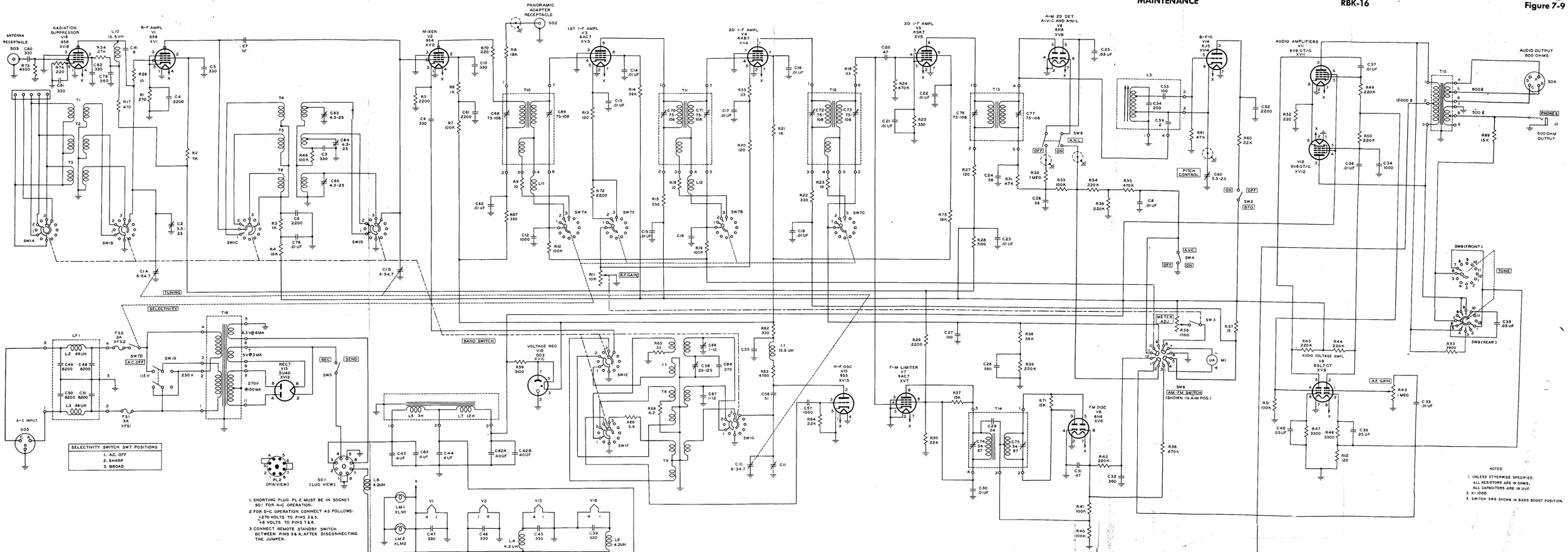


Figure 7-9. Radio Receiving Equipment Navy Model RBK-16, Overall Schematic Diagram.

SECTION 8
PARTS LISTS

TABLE 8-1. WEIGHTS AND DIMENSIONS OF SPARE PARTS BOXES.

EQUIPMENT SPARES						TENDER SPARES						STOCK SPARES					
SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT	SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT	SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT
	HEIGHT	WIDTH	DEPTH				HEIGHT	WIDTH	DEPTH				HEIGHT	WIDTH	DEPTH		
1	9-1/2	18-1/4	12-3/4	1.3	45												

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
	- F16-R-32124-1894 -	RECEIVER, RADIO: A1, A3, and F3 reception, MBCA ref dwg Group 5; 27.8 to 143 megacycles frequency range; 3 bands; 115/230v AC, 60 cycles, single phase 115 watts; mounted in steel cabinet 15-3/4 in. lg by 19-1/8 in. wide by 9-5/16 in. high; 16 electron tubes; superheterodyne circuit; built in BFO, voltage regulated plate supply for IF, RF, and Osc stages, S meter, mechanical bandspread, panoramic adapter input, radiation suppressor; for communications; Spec MIL-R-15511A. Contractor Dwg and Part No. CHL1X1115.	Provides radio reception in the 27.8 to 143 megacycle frequency range.
C1	- N16-C-63210-8993 -	CAPACITOR, VARIABLE, AIR DIELECTRIC: plate meshing type, three sections, ea section 7.5 to 61.8 mmf; 6-1/2 in. lg x 3-3/16 in. wide x 2-3/4 in. high; shaft 0.375 in. diam x 1/2 in. long; clockwise extension shaft adjustment; 182 degree rotation; 5 solder lug terminals per section; mounts by three mounting holes 0.144 in. dia on front plate located on vertices of an isosceles triangle w/1-3/4 in. base and altitude of 2-3/8 in; 9 brass, silver plated finish, plates per section. Mfgr. & Mfgrs Designation COC1783-4-60; Contractor Dwg and Part No. 48D263.	Secondary tuning of transformers T1 to T9 inclusive.
C1A		RF section of capacitor C1; listed for reference only.	Secondary tuning of transformers T1, T2 and T3.
C1B		Converter section of capacitor C1; listed for reference only.	Secondary tuning of transformers T4, T5 and T6.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C1C		Oscillator section of capacitor C1; listed for reference only	Secondary tuning of transformers T7, T8 and T9.
C2	- N16-C-58836-4773 -	CAPACITOR, VARIABLE AIR DIELECTRIC: plate meshing type, single section; 3.5 to 23 mmf; straight line capacity tuning characteristic; over-all dim. excluding shaft and bushing, 1-9/32 in. lg by 15/16 in. wide by 1-7/32 in. high; shaft dim beyond bushing 29/32 in. lg by 0.250 in. dia; extension shaft adjustment; 360° rotation; ceramic insulated base; 2 solder lug type terminals, 2 inserts drilled and tapped; 4-40 on 0.656 in. mounting centers; 7 silver coated aluminum plates. Mfgr. & Mfgrs Designation CHC type HF modified; Contractor Dwg and Part No. 48B267.	Antenna coil trimmer capacitor.
C3	- N16-C-29718-7276 -	CAPACITOR, FIXED, MICA DIELECTRIC: 330 mmf ± 10%, 500 v dcw; molded bakelite case, 51/64 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals, one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation CMFRCM-20B-331K; Contractor Dwg and Part No. 47J20B331K.	Secondary padder on transformer T5.
C4	- N16-C-31908-1564 -	CAPACITOR, FIXED, MICA DIELECTRIC: 2200 mmf ± 10%, 500 v dcw; molded bakelite case, 53/64 in. lg by 53/64 in. wide by 9/32 in. high; 2 wire lead type terminals, one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation CMFRCM30-B222K; Contractor Dwg and Part No. 47J30B222K.	Cathode by-pass for tube V1.
C5		Same as C3	Screen grid by-pass for tube V1.
C6		Same as C4	Plate return for tube V1.
C7	- N16-C-15924-5391 -	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10 mmf ± 1 mmf, 500 v dcw; negative temp coefficient, 470 mmf/mf/deg C +120 mmf/mf/deg C tolerance; ceramic insulation; case 0.562 in. lg by 0.250 in. dia; 2 axial wire type terminals, 1-1/4 in. lg; terminal mounted; Spec JAN-C-20A. Mfgr. & Mfgrs Designation CBN JAN; Contractor Dwg and Part No. 47J21TJ100F.	Coupling between tube V1 and V2.
C8	- N16-C-19140-9501 -	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.01 mf + 80%-20%, 450 v dcw; variable temperature coefficient; phenolic insulated body, 5/32 in. thick by 19/32 in. dia; 2 wire pigtail type terminals 1-1/2 in. long; terminal mounted. Mfgr. & Mfgrs Designation CBNDA-048003A; Contractor Dwg and Part No. 47A217.	AVC filter.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C9		Same as C3.	Coupling between oscillator tube V15 and mixer tube V2.
C10		Same as C3.	Screen grid by-pass for tube V2.
C11	- N16-P-40128-162 -	CAPACITOR, VARIABLE, AIR DIELECTRIC: small variable capacity formed between a 6-32 metal screw and a CRS plate; 1 to 3 mmf approx; 3/4 in. lg by 1/2 in. wide by 1/4 in. high o/a; screwdriver adjustment; one 7/32 in. dia mounting hole located 3/16 in. by 7/32 in. from one end; plate rolled to a 3/16 in. ID one end. Contractor Dwg and Part No. 48A140.	Trimmer adjustment for osc, tuning capacitor C1C.
C12	- N16-C-18631-1501 -	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1000 mmf GMV tolerance, 500 v dcw; phenolic insulation; case 3/8 in. dia by 5/32 in. thick; 2 flexible wire type terminals, 1-1/2 in. lg; terminal mounted; impregnated with a high melting point wax. Mfgr. & Mfgrs Designation CBNDA-140002A; Contractor Dwg and Part No. 47A230.	AVC decoupling.
C13		Same as C8.	Cathode by-pass for tube V3.
C14		Same as C8.	Screen grid by-pass for tube V3.
C15		Same as C8.	Plate return for tube V3.
C16		Same as C12.	AVC decoupling.
C17		Same as C8.	Cathode by-pass for tube V4.
C18		Same as C8.	Screen grid by-pass for tube V4.
C19		Same as C8.	Plate return for tube V4.
C20	- N16-C-27582-1876 -	CAPACITOR, FIXED, MICA DIELECTRIC: 47 mmf ± 10%, 500 v dcw; molded bakelite case, 51/64 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals, located one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation CMFRCM-20B470K; Contractor Dwg and Part No. 47J20B470K.	Grid coupling tube V5.
C21		Same as C8.	Cathode by-pass for tube V5.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C22		Same as C8.	Screen grid by-pass for tube V5.
C23		Same as C8.	Plate return for tube V5.
C24	- N16-C-27766-7676 -	CAPACITOR, FIXED, MICA DIELECTRIC: 56 mmf ± 10%, 500 v dcw; molded bakelite case, 51/64 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals, located one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation RCM20B-560K; Contractor Dwg and Part No. 47J20B560K.	Diode return for tube V6.
C25	- N16-C-35241-5930 -	CAPACITOR, FIXED, PAPER DIELECTRIC: .05 mf + 40%-15%, 600 v dcw; not designed for RF application; hermetically sealed metal can; case dim excluding terminals, 1-13/16 in. lg by 1 in. wide by 3/4 in. high; 2 solder lug type terminals, 3/4 in. high, located on the side, spaced 1-1/16 in. C to C, bakelite insulation; Dykanol-G synthetic oil impregnated, Dykanol-G synthetic oil filled; no internal ground connection; 2 integral mounting ears spaced 2-1/8 in. C to C; Spec JAN-C-25. Mfgr. & Mfgrs Designation CDJAN; Contractor Dwg and Part No. 46J53B1EF503X.	A-N-L by-pass.
C26		Same as C24.	Diode filter for tube V6.
C27	- N16-C-28558-1676 -	CAPACITOR, FIXED, MICA DIELECTRIC: 100 mmf ± 10%, 500 v dcw; molded bakelite case, 51/64 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals; located one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation CMFRCM-20B101K; Contractor Dwg and Part No. 47J20B101K.	AVC filter.
C28	- N16-C-30299-1472 -	CAPACITOR, FIXED, MICA DIELECTRIC: 560 mmf ± 10%, 500 v dcw; molded bakelite case, 51/64 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals, located one on each end terminal mounted; Spec JAN-C-5. Mfgr. and Mfgrs Designation CMF-RCM25B561K; Contractor Dwg and Part No. 47J25B-561K.	AVC filter.
C29	- N16-C-26917-6396 -	CAPACITOR, FIXED, MICA DIELECTRIC: 24 mmf ± 5%, 500 v dcw; molded bakelite case, 51/64 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals, located one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation CMFRCM20B240J; Contractor Dwg and Part No. 47J20B240J.	Coupling between tube V7 and transformer T14.
C30		Same as C8.	Plate return for tube V7.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C31		Same as C20.	Cathode by-pass for tube V8.
C32		Same as C28.	De-emphasis for tube V8.
C33	- N16-C-42767-5130 -	CAPACITOR, FIXED, PAPER DIELECTRIC: 1 section; 10,000 mmf ± 20%, 600 v dcw; designed for rf application; 0.39 amps max rf current at 1 to 10 megacycles; molded phenolic case; dim. excluding terminals; 53/64 in. lg by 53/64 in. wide by 11/32 in. high; 2 wire lead type terminals; located one on each end; phenolic insulation; no internal ground connections terminal mounted; Spec JAN-C-91. Mfgr. & Mfgrs Designation CD JAN; Contractor Dwg and Part No. 46J35A103M.	Coupling between tubes V5, V8 and V9.
C34	- N16-C-31090-4472 -	CAPACITOR, FIXED, MICA DIELECTRIC: 1000 mmf ± 10%, 500 v dcw; molded bakelite case, 1-1/16 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals; located one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation CMFRCM-25B102K; Contractor Dwg and Part No. 47J26B102K.	Grid by-pass for tube V12.
C35		Same as C25.	Tone control for tubes V11 and V12.
C36		Same as C33.	Coupling between tubes V9 and V12.
C37		Same as C33.	Coupling between tubes V9 and V11.
C38	- N16-C-19781-5645 -	CAPACITOR, FIXED, ELECTROLYTIC: 1 section; 25 mf, 25 v dcw; minus 40° C to plug 65° C working temperature; hermetically sealed metal can, 2-1/2 in. lg by 1 in. wide by 15/16 in. high; 2 solder lug type terminals, one on each end, 1-1/16 in. center to center, phenolic insulation; terminals insulated from can; integral mounting ears, 3/16 in. dia mounting holes in each ear, 2-1/8 in. center to center; Spec JAN-C-62. Mfgr & Mfgrs Designation CD JAN; Contractor Dwg and Part No. 45J63F250F.	Cathode by-pass for tube V9.
C39		Same as C3.	Heater by-pass for tube V16.
C40		Same as C38.	Cathode by-pass for tube V9.
C41	- N16-C-15829-7996	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 8 mmf ± 1 mmf, 500 v dcw; negative temp coefficient 750 mmf/mf/deg C + 250 mmf/mf/deg C tolerance; ceramic insulation; case 0.562 in. lg by 0.250 in. dia; 2 axial wire	Coupling between tubes V16 and V1.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
	-	type terminals, 1-1/4 in. lg; terminal mounted; Spec JAN-C-20A. Mfgr. & Mfgrs Designation CBN JAN; Contractor Dwg and Part No. 47J21UK080F.	
C42A C42B	- N16-C-21997-2415 -	CAPACITOR, FIXED, ELECTROLYTIC: 2 sections, 40 mfd per section, 350 v dcw; hermetically sealed metal can; case dim. excluding terminals 3-1/4 in. lg by 1-3/8 in. dia. 3 solder lug type terminals located on bottom end, phenolic insulation; no internal ground connection; bottom end threaded 7/8-16; Spec JAN-C-62. Mfgr. & Mfgrs Designation CD JAN; Contractor Dwg and Part No. 45J42C400P.	Plate voltage supply filter capacitor.
C43	- N16-C-49958-5175 -	CAPACITOR, FIXED, PAPER DIELECTRIC: 1 section, 4 mf ± 10%, 600 v dcw; hermetically sealed metal can; case dim. excluding terminals 4-1/2 in. lg by 1-1/2 in. dia; 2 solder lug type terminals, located on bottom end, phenolic insulation; Dykanol-G synthetic oil impregnated Dykanol-G synthetic oil filled; no internal ground connection; bottom end threaded 3/4-16; Spec JAN-C-25. Mfgr. & Mfgrs Designation CD JAN; Contractor Dwg and Part No. 46J41B1DF405K.	Plate voltage supply filter capacitor.
C46		Same as C3.	Heater by-pass for tube V2.
C47		Same as C3.	Heater by-pass for tube V1.
C48		CAPACITOR, FIXED, MICA DIELECTRIC: 8200 mmf ± 10%; 300 v dcw JAN-C-5; p/o LF1. Mfgr. & Mfgrs Designation CMFRCM35B822K; Contractor Dwg and Part No. 47J35B822K.	Power line filter p/o LF-1 for reference only.
C49		Same as C48, p/o LF1.	Power line filter p/o LF-1 for reference only.
C50		Same as C48, p/o LF1.	Power line filter p/o LF-1 for reference only.
C51		Same as C48, p/o LF1.	Power line filter p/o LF-1 for reference only.
C52		Same as C4.	Plate decoupling for tube V14.
C53		CAPACITOR, FIXED, MICA DIELECTRIC: 100 mmf ± 10%; 500 v dcw; JAN-C-5; for reference only; p/o L5. Mfgr. & Mfgrs Designation CMFRCM20B101K; Contractor Dwg and Part No. 47J20B101K.	p/o B.F.O. coil.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C54		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200 mmf ± 10%; 500 v dcw; JAN-C-20A; for reference only; p/o L5. Mfgr. & Mfgrs Designation CBN JAN; Contractor Dwg and Part No. 47J36SH201K.	p/o B.F.O. coil.
C55		Same as C3.	Plate decoupling for tube V15.
C56	- N16-C-16597-1650 -	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 51 mmf ± 5%; 500 v dcw; negative temp coefficient 750 mmf/mf/deg C + 250 mmf/mf/deg C tolerance; insulated body, 0.562 in. lg by 0.250 in. diam; 2 axial wire type terminals, 1-1/4 in. lg; terminal mounted; Spec JAN-C-20A. Mfgr. & Mfgrs Designation CBN JAN; Contractor Dwg and Part No. 47J1UK510J.	Plate decoupling for tube V15.
C57		Same as C34.	Grid coupling for tube V15.
C58	- N16-C-64232-8500 -	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: rotary type, single section -650 mmf/mf/deg C; 20 to 125 mmf, 500 v dcw; 25/32 in. lg by 15/16 in. wide by 1.218 in. high; 2 solder lug type terminals; one lug on side, one lug on bottom; two 4-40 tapped mounting holes on 0.756 in. centers; screwdriver slot adjustment; ceramic base; Spec JAN-C-91. Mfgr. & Mfgrs Designation CBN823; Contractor Dwg and Part No. 44J12D121.	Padder for transformer T7.
C59		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2 mmf ± .5 mmf; 500 v dcw; JAN-C-20A; for reference only; p/o L5. Mfgr. & Mfgrs Designation CBN JAN; Contractors Dwg and Part No. 47J21UK020D.	p/o B.F.O. coil.
C60		Same as C2.	BFO pitch control.
C61		Same as C4.	Screen grid bypass for tube V2.
C62		Same as C8.	Plate decoupling for tube V2.
C63	- N16-C-64036-4565 -	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: rotary type single section; 4.5 to 25 mmf, 500 v dcw; 23/32 in. lg by 41/64 in. wide by 27/32 in. high; 2 solder lug type terminals; one lug on top, one lug on bottom; two 0.120 in. dia holes on 0.438 in. mounting centers; screwdriver slot adjustment; ceramic base; Spec JAN-C-81. Mfgr. & Mfgrs Designation CBN JAN; Contractor Dwg and Part No. 44J11A250.	Secondary trimmer for transformer T4.
C64		Same as C63.	Secondary trimmer for transformer T5.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C65		Same as C63.	Secondary trimmer for transformer T6.
C66	- N16-C-64452-2554 -	CAPACITOR, VARIABLE, GLASS DIELECTRIC: concentric type single section, 1.5 to 10 mmf cap.; 1-5/16 in. lg less slug by 3/8 in. diam; screwdriver adjustment; base not insulated; 1 wire lead type terminal; mounted by 1/4-28 thread bushing. Mfgr. & Mfgrs Designation CJDVC11G modified; Contractor Dwg and Part No. 48B285.	Secondary trimmer for transformer T7.
C67		Same as C66.	Secondary trimmer for transformer T8.
C68		CAPACITOR, VARIABLE, AIR DIELECTRIC: min cap, 74 mmf ± 5-10%, max cap 108 mmf ± 10-5%; for reference only; p/o T10. Contractor Dwg and Part No. 48B098.	p/o transformer T10 1st IF.
C69		Same as C68, for reference only, p/o T10.	p/o transformer T10.
C70		Same as C68, for reference only, p/o T11.	p/o transformer T11 2nd IF.
C71		Same as C68, for reference only, p/o T11.	p/o transformer T11 2nd IF.
C72		Same as C68, for reference only, p/o T12.	p/o transformer T12 3rd IF.
C73		Same as C68, for reference only, p/o T12.	p/o transformer T12 3rd IF.
C74		CAPACITOR, VARIABLE, AIR DIELECTRIC: 34-67 mmf; for reference only, p/o T14. Contractor Dwg and Part No. 48B097.	p/o transformer T14 Discriminator IF.
C75		Same as C74, for reference only, p/o T14.	p/o transformer T14 Discriminator IF.
C76		Same as C68.	p/o transformer T13 Diode IF.
C77		Same as C68, for reference only, p/o T13.	p/o transformer T13 Diode IF.
C78		Same as C33.	Plate decoupling for tube V1.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C79		Same as C28.	Screen decoupling for tube V16.
C80		Same as C3.	Coupling between antenna and grid of tube V16.
C81		Same as C3.	Cathode by-pass for tube V16.
C82		Same as C3.	Screen grid by-pass for tube V16.
C83		Same as C43.	Plate voltage supply filter capacitor.
C84	- N16-C-29613-2676 -	CAPACITOR, FIXED, MICA DIELECTRIC: 270 mmf ± 10%, 500 v dcw; molded bakelite case, 51/64 in. lg by 15/32 in. wide by 7/32 in. high; 2 wire lead type terminals; located one on each end; terminal mounted; Spec JAN-C-5. Mfgr. & Mfgrs Designation CMFRCM-20B271K; Contractor Dwg and Part No. 47J20B271K.	Fixed padder for transformer T7.
E1	- N16-D-46539-7976 -	DIAL, CONTROL: knob type; arbitrary scale, 5 to 0 to 5 clockwise, graduated in increments of 1,180 deg arc; direct drive, 1 to 1 ratio, 1/4 in. dia shaft coupling; 29/32 in. high by 1-1/2 in. dia; mounted by 2 #8-32 set screws spaced 90 deg apart; dial not illuminated; skirt has black anodized background with plain anodized characters. Contractor Dwg and Part No. 83B177.	Pitch control knob.
E2	- N16-D-46338-3573 -	DIAL, CONTROL: knob type; arbitrary scale, 0 to 9 clockwise, graduated in increments of 1, 180 deg arc; direct drive, 1 to 1 ratio, 1/4 in. dia shaft coupling; 29/32 in. high by 1-1/2 in. dia; mounted by 2 #8-32 set screws spaced 90 deg apart; dial not illuminated; skirt has black anodized background with plain anodized characters. Contractor Dwg and Part No. 83B178.	Antenna control knob.
E3	- N16-D-46338-3511 -	DIAL, CONTROL: knob type; 5 graduation lines spaced 30 deg apart; marked "BASS BOOST" "HIGH FID" "NORMAL" and "LOW", 120 deg arc; direct drive, 1 to 1 ratio, 1/4 in. dia shaft coupling; 29/32 in. high by 1-1/2 in. dia; mounted by 2 #8-32 set screws spaced 90 deg apart; dial not illuminated; skirt has black anodized background with plain anodized markings. Contractor Dwg and Part No. 83B208.	Tone control knob.
E4	- N16-D-46338-3752 -	DIAL, CONTROL: knob type, arbitrary scale, 9 to 0 clockwise, graduated in increments of 1, marked with circular line, 315 deg arc; direct drive, 1 to 1 ratio, 1/4 in. dia shaft coupling; 29/32 in. high by 1-1/2 in. dia;	A F gain control knob.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		mounts by 2 #8-32 set screws spaced 90 deg apart; dial not illuminated skirt has black anodized background with plain anodized characters and line. Contractor Dwg and Part No. 15B409.	
E5		Same as E4	R F gain control knob.
E6	- N16-K-700623 101 -	KNOB: round w/bar face; plastic and aluminum; black knob and aluminum skirt; accomodates a 1/4 in. dia round shaft, 37/64 in. deep shaft hole, two #8-32 set screw mounting; brass insert; arrow marking; over-all dim. 1-3/4 in. dia by 25/32 in. thick; consists of plastic knob and aluminum skirt. Contractor Dwg and Part No. 15B455.	Bandswitch knob.
E7	- N16-K-700350-656 -	KNOB: round; plastic and aluminum; black knob and aluminum skirt; accomodates 1/4 in. round dia shaft, 7/16 in. deep shaft hole; set screw mounting; brass insert; triangular shape pointer; over-all dim 1-1/2 in. dia by 29/32 in. thick; consists of plastic knob and aluminum skirt. Contractor Dwg and Part No. 83B207.	Selectivity control knob.
E8		Same as E7	AM-FM selector knob.
E9	- N16-K-700417-401 -	KNOB: round, hand wheel type; bakelite; black; accomodates a 1/4 in. dia, round; shaft; has a 1/2 in. deep shaft hole, #8-32 set screw brass insert; w/o markings; 2-5/16 in. dia by 1 in. thick. Contractor Dwg and Part No. 81A003.	Hand wheel for main tuning dial.
E10	- N17-S-250051-154 -	SHIELD, CONNECTOR: brass silver plated; square base, approximate cone shaped body; 3/4 in. lg by 1 in. wide by 1 in. high; four 0.125 in. dia mounting holes on 23/32 in. square mounting centers; hood has 0.344 in. dia opening and four 0.125 in. dia solder holes at neck. Mfgr. & Mfgrs Designation CPH83-1H; Contractor Dwg and Part No. 10A055.	Hood for coaxial cable receptacle.
FS1	- N17-F-16303-1004 -	FUSE, CARTRIDGE, 3 amp, 250v; time delay 135% for 60 min and 200% for 2 min; ferrule type terminals; 11/32 in. lg by 1/4 in. OD enclosed type; glass body; one time use; indicating by visible broken element; 1-1/4 in. lg by 1/4 in. OD over-all; vibration factor 500; type #FU-50. Mfgr. & Mfgrs Designation CLF316003; Contractor Dwg and Part No. 39A352.	Power transformer primary protection.
FS2		Same as FS1.	Power transformer primary protection.
FS3		Same as FS1.	Operating spare fuse.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
H1	- N17-C-780616 281 -	CLAMP, ELECTRICAL: cellulose plastic; 1 friction clamp type fastener; 0.61 in. lg by 1/2 in. wide by 1/4 in. high; one 0.204 in. dia mounting hole; designed to hold material 1/8 in. dia; holds cabled wiring in place. Mfgr. & Mfgrs Designation CPC-742-2 Commercial Plastics Co.; Contractor Dwg and Part No. 76B727.	Cable clamp.
H2	- N17-C-780767 -838 -	CLAMP, ELECTRICAL: 1 friction clamp type fastener; 0.7659 in. lg by 1/2 in. wide by 0.313 in. high; one 0.204 in. dia mounting hole; designed to hold material 3/16 in. dia; holds cabled wiring in place. Mfgr. & Mfgrs Designation CPC-742-3 Commercial Plastics Co.; Contractor Dwg and Part No. 76-627.	Cable clamp.
H3		Same as H2.	Cable clamp.
H4	- N16-R-503580-227 and N16-M-84127-6433 -	CLAMP, ELECTRICAL stainless steel, one clamp type fastener; 2-5/16 in. lg by 1-13/16 in. wide by 5-1/4 in. high; mounted on stainless steel post requires #18 drill hole for mounting post; includes hardware; designed to hold material 2-1/4 in. max dia; corrosion proof; used as electron tube clamp, includes post. Mfgr. & Mfgrs Designation CACA3hat32 Post; Contractors Dwg and Part No. 76-723 74B399.	Holds tube V10 in socket.
H5	- N16-R-503580 -226 and N16 M-84127-8183 -	CLAMP, ELECTRICAL stainless steel; 1 clamp type fastener; 2-9/16 in. lg by 2-1/8 in. wide by 5-1/4 in. high; mounted on stainless steel post, requires #18 drill hole for mounting post, includes hardware; designed to hold material 2-1/2 in. max dia; corrosion proof; used as electron tube clamp, includes post. Mfgr. & Mfgrs Designation CACA4hat42 Post; Contractor Dwg and Part No. 76-680 74B379.	Holds tube V13 in socket.
H6	- N41-W-2446 -	WRENCH: Allen head set screws; 0.078 in. across flats of hex; 45/64 in. lg by 1-61/64 in. lg; steel, cadmium plate and iridite, "L" shape; straight handle, solid hex type; for #8 Allen set screw and #4 Allen cap screw. Mfgr. & Mfgrs Designation CAYT8; Contractor Dwg and Part No. 33B428.	For turning set screws.
H7		Same as H2.	Cable clamp.
H8		Same as H2.	Cable clamp.
J1	- N17-J-39150-4702 -	JACK, TELEPHONE: for 2 conductor plug; shank 0.250 in. dia by 1-3/32 in. lg; contact arrangement diagram 3, fig 30 JAN-J-641; 1-29/32 in. lg by 1-11/64 in. wide by 15/16 in. high over-all 3/8 in. dia mounting hole required; mounting accessories consist of, 1 brass cad plated bushing, 1 brass hexagon nut and 1 steel washer; Spec type JJ-102 per Spec JAN-J-641. Contractor Dwg and Part No. 36B053.	Headset connector.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
L1	- N16-C-73226-9608 -	COIL, RADIO FREQUENCY: 15.5 uh ±10%; 2.05 ohm ±5% DC resistance; 70 turns #37AWG, copper conductor enameled, 1 single solenoid winding, untapped, unshielded, molded natural bakelite form, air core; coil dim excluding terminals 1/4 in. dia, 7/8 in. lg; over-all coil form dim 1/4 in. dia by 7/8 in. lg; 2 wire lead type terminals located on ends, terminal mounted; coated with Chinese red lacquer; radio freq choke. Contractor Dwg and Part No. 53B008.	Plate choke for tube V15.
L2		COIL, RADIO FREQUENCY: 46 microhenry; for reference only, p/o LF1.	Radio coil p/o LF1.
L3		COIL, RADIO FREQUENCY: 46 microhenry; for reference only; p/o LF1.	Radio coil p/o LF1.
L4	- N16-C-72969-4574 -	COIL, RADIO FREQUENCY: 4.20 uh ±10%, 0.25 ohms ±20% DC resistance; 42 turns, #28AWG copper, conductor, enameled single celanese covered, one winding, single solenoid winding, untapped, unsheilded, molded natural bakelite form, air core, coil dim. excluding terminals 9/32 in. dia by 23/32 in. lg; over-all coil form dim 1/4 in. dia by 7/8 in. long; 2 wire lead type terminals located on ends; terminal mounted; coated with Chinese blue lacquer. Contractor Dwg and Part No. 53B009.	Choke for heater of tube V15.
L5	- N16-C-76385-1901 -	COIL, RADIO FREQUENCY: 4.1 uh at 5.25 megacycles; 15 turns, 15/44 Litz wire, copper conductors, double celanese covered, one winding, single layer winding, tapped at 5 and 10-7/8 turns; shielded by rectangular aluminum shield, acid finish, bakelite form; polyiron core; coil dim. excluding terminals mounting attachments and tuning devices, 1-5/8 in. lg by 1/2 in. dia, over-all coil dim. 2-5/8 in. lg by 5/8 in. dia adjustable tuning, adjustable iron core, screwdriver adjustment through top of can; 4 turret type terminals, located on bottom; mounted by 2 spade bolts one on each edge of can, on 1-5/16 in. dia circle; consists of C53, C54, C59 and coil. Contractor Dwg and Part No. 54C046.	BFO coil.
L6 L7	- N16-R-29716-8394 -	REACTOR: filter choke dual, 2 sections consisting of L6, 3 henries +30% -10%, and L7, 12 henries ±20% -10%; L6, 150 ma DC, L7 90 ma DC; L6, 85 ohms DC resistance ±10%, L7 section 215 ohms DC resistance ±10%; 2000v rms test voltage, hermetically sealed metal case, 4-7/8 in. lg by 3-9/16 in. wide; ov 3-1/16 in. high, 4 integral mounting studs threaded 8-32 on 2-5/8 in. by 2-1/8 in. mounting centers; 3 solder lug type terminals located on bottom; Spec MIL-T-27. Mfgr. & Mfgrs Designation CTR15746; Contractor Dwg and Part No. 56C137.	Power supply filter choke.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
L8		Same as L4	Choke for heaters.
L9		Same as L4	Choke for heater of tube V16.
L10		Same as L1	Plate choke for tube V16.
L11		COIL, RADIO FREQUENCY: 300 uh at 30 megacycles; 7 turns, #28 AWG copper conductor, celanese braid; one winding, single layer wound; untapped; unshielded; 470,000 ohm 1 watt resistor form, 3/4 in. lg, 0.220 in. dia; coil dim. 5/16 in. dia by 3/8 in. lg; two wire lead type terminals located on ends terminal mounted; compensating RF coil. Contractors Dwg and Part No. 53A367.	Compensating RF coil, T10.
L12		Same as L11	Compensating RF coil, T11.
LF1	- N17-S-50964-8926 -	SUPPRESSOR, ELECTRICAL NOISE power line filter, capacitor and inductor type includes C48, C49, C50, C51, 8200 mmf 300 v dcw capacitors, and L2 and L3, 46 uh inductors; 110 v AC, 5 amp; 1-7/8 in. lg by 1-7/16 in. wide by 4-3/4 in. high; enclosed in rectangular aluminum case, no protective finish; two #6-32 spade bolts on 1-5/16 in. mounting centers; 5 turret type terminals located on bottom; moisture and fungus proof. Contractor Dwg and Part No. 53C220.	To prevent noise pulses on power line from entering receiver.
LM1	- N17-L-6305 -	LAMP, INCANDESCENT 6 to 8 volts, 1.5 to 2W, 0.25 amp; miniature bayonet base, bulb T 3-1/4, clear white; 1 filament, tunsgten C2; 1-3/16 in. max over-all height, over 25 hr rated life, burns any position. Type LM-27. Mfgr. & Mfgrs Designation CACF44; Contractor Dwg and Part No. 39A027.	Main tuning dial lamp.
LM2		Same as LM1	Vernier tuning dial lamp.
M1	- N17-M-32373-3162 -	METER, S UNITS panel mounting; 200 microampere movement; S units, 0 to 9 S units to 30 db over S9; round shape, steel case, style #15 MBCA Ref Dwg Group 27; flush mounted; flange 3.5 in. dia by 0.38 in. thick; 2.82 in. dia body; 1.66 in. body depth from mounting surface excluding terminals; not portable; black and red scale markings, white background; three 0.150 dia mounting holes on 1.58 in. radius spaced 120 degrees apart; 2 screw stud type terminals, 1/4 in. 28 thread; 0.69 in. lg; hermetically sealed; Spec JAN-I-6. Mfgr. & Mfgrs Designation CMYHS-3; Contractor Dwg and Part No. 82-190.	AM-FM tuning meter.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
N1	- N16-S-117101-569 -	DIAL, SCALE: application not indicated on dial; 28 to 47 megacycles counter clockwise; graduated in 38 scale divisions, approximately 340 deg arc; 47 to 82 megacycles counter-clockwise, graduated in 35 scale divisions, approximately 340 deg arc; 81 to 143 megacycles counter-clockwise, graduated in 62 scale divisions, approximately 340 deg arc; 0 to 23 clockwise, graduated in 23 divisions, approximately 330 deg arc; circular shape, 7/16 in. long, 5-1/8 in. dia; secured to shaft by one #8-32 set screw; lamacoid white plastic, satin finish, reverse side glossy; black lithographed characters and markings on satin side. Contractor Dwg and Part No. 83D400.	Main tuning dial
N2	- N16-S-117101-510 -	DIAL, SCALE: application not indicated on dial; arbitrary units, 0 to 100 divisions clockwise, graduated in 100 scale divisions, 360 deg arc; round; 7/16 in. lg by 4-1/2 in. dia; 1/4 in. center hole; secured to shaft by one # 8-32 set screw; lamacoid, black lithographed characters and markings on satin side of plastic; reverse side of plastic glossy. Contractor Dwg and Part No. 83C166.	Bandspread dial.
O1	- N16-B-800200 572 -	BUSHING: brass, nickle plated; female 0.438 in. lg, 1/2 in. hex head 0.062 in. thk, ID 0.252 in; threaded 3/8-32 NEF-2 thread by 21/64 in. lg, counter bored 0.261 in. dia 5/16 in. deep from threaded end, undercut 3/64 in. to thread depth. Contractor Dwg and Part No. 77B414.	Bushing for control shaft.
O2		Same as O1	Bushing for control shaft.
O3		Same as O1	Bushing for control shaft.
O4	- N16-C-812136-101 -	CLIP, ELECTRICAL: grid-plate style 13, MBCA Ref Dwg Group 37; copper; 13/32 in. lg by 3/32 in. by 5/64 in. high; no electrical rating used as electron tube contact clip. Contractor Dwg and Part No. 76A060.	Grid clip for tube V1.
O5		Same as O4	Plate clip for tube V1.
O6		Same as O4	Grid clip for tube V2.
O7		Same as O4	Plate clip for tube V2.
O8		Same as O4	Grid clip for tube V16
O9		Same as O4	Plate clip for tube V16.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
O10	- N17-C-804543-139	CLIP, ELECTRICAL: ferrule style #1, MBCA Ref Dwg Group 37; phosphor bronze; nickel plated finish; 29/64 in. lg by 11/32 in. wide by 5/16 in. high; not insulated; no electrical rating; hold 1/4 in. dia material. Mfgr. & Mfgrs Designation CLF101002; Contractor Dwg and Part No. 76B063.	Holds spare fuse.
O11	- N17-C-806523 219 -	CLIP, ELECTRICAL: fahnestock style #2, MBCA Ref Dwg Group 37; brass nickel plated finish; 1 in. lg by 3/8 in. wide by 7/16 in. high no electrical rating; no terminals; 3/32 in. max jaw opening; mounted by single hole drilled for #8 screw. Contractor Dwg and Part No. 76A163.	Allen head wrench holder.
*O12	- N16-C-600001-249 -	COLLAR, SPACING: brass, dull nickel finish; tubular shape; 3/8 in. lg by 13/16 in. diam OD; mts by 0.7625 in. dia axial hole; 0.025 in. wall tubing; water dipped lacquer finish. Contractor Dwg and Part No. 73B375.	Spacer for coaxial jack SO3.
O13	- N17-C-98378-3897 -	COUPLING, FLEXIBLE: consists of 2 brass hubs and a phosphor bronze ring; 1.094 in. dia by 0.648 in. thick; one hub to fit 1/4 in. dia shaft, one hub to fit 3/8 in. dia shaft, both hubs drilled and tapped for #8-32 set screw, 2 each; brass and bronze parts nickel plated. Mfgr. & Mfgrs Designation COC6402-38; Contractors Dwg and Part No. 29B092.	Couples tuning capacitor C1 to dial assembly.
O14	- N17-C-98378-3918 -	COUPLING, FLEXIBLE: consists of a plastic washer and two brass shaft hubs; 1.094 in. dia by 0.702 in. thick; two 1/4 in. dia holes in hubs with 2 #8-32 set screws in each hub to grip shafts; brass parts nickel plated. Mfgr. & Mfgrs Designation COC6402-42; Contractors Dwg and Part No. 29B097.	Provides insulation and coupling for antenna tuning control.
O15	- N17-C-98378-3895 -	COUPLING, FLEXIBLE: consists of a phosphor bronze ring and 2 brass hubs; 1.094 in. dia by 0.648 in. thick, two 1/4 in. dia holes in hubs with 2 #8-32 set screws in each hub to grip shafts; brass and phosphor bronze parts nickel plated. Mfgr. & Mfgrs Designation COC 6402-113; Contractor Dwg and Part No. 29B155.	Couples AF gain control to extention shaft.
O16		Same as O15	Couples FM-AM switch to extention shaft.
PL1		Not used	
PL2	- N17-C-7154-2601 -	CONNECTOR, PLUG 8 round male contacts; polarized, straight type 1 in. lg by 1-1/4 in. dia cylindrical shape, mica filled plastic; insulated jumpers between contacts 3 and 4 and contacts 6 and 7. Mfgrs & Mfgrs Designation CPH86-CP8T; Contractor Dwg and Part No. 35A017.	Shorting plug for AC operating and remote stand-by connection.

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
PL3	- N17-C-71120-4869 -	CONNECTOR, PLUG: 1 round female contact; straight type; over-all 2-7/8 in. lg by 13/16 in. dia; radio frequency connector; cylindrical body; brass, nickel plated; bakelite insert; 13/32 in. dia max cable opening. Contractor Dwg and Part No. 10A134.	Antenna connector.
PL4	- N17-C-70328-1518 -	CONNECTOR, PLUG: 4 round female contacts; keyed, straight type; 1-21/32 in. lg, excluding terminals, 1-1/16 in. dia; contacts rated at 10 amps; cylindrical body, aluminum alloy, tin plate and clear lacquer finish locking type; molded melamine insert; 3/4 in. dia max cable opening; 1-1/16 in. OD coupling nut 3/4-20 thread Spec type AN-3106A-14S-2S; per spec MIL-C-5015. Mfgr. & Mfgrs Designation CPHAN-3106A-14S-2S; Contractor Dwg and Part No. 10A467.	Audio output plug.
PL5	- N17-C-70334-5473	CONNECTOR, PLUG: 3 round female contacts; keyed, straight type, 1-7/16 in. lg excluding terminals by 1-1/8 in. dia; contacts rated 20 amp; cylindrical body, aluminum alloy, tin plate and clear lacquer finish, locking type; molded melamine insert; 3/4 in. dia max cable opening 1-1/16 in. OD coupling nut; 7/8-20 thread; Spec type AN-3106A-14S-7S; per spec MIL-C-5015. Mfgr. & Mfgrs Designation CPHAN-3106A-14S-7S; Contractor Dwg and Parts No. 10-466.	AC input plug.
R1	- N16-R-49688-811 -	RESISTOR, FIXED, COMPOSITION: 270 ohms ±10%, 1/2 watt F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated; resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB 2711; Contractor Dwg and Part No. 23J20BF271K.	Cathode bias for tube V1.
R2	- N16-R-49922-811 -	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated; resistant to humidity and salt water immersion; two wire lead terminals, 1-1/2 in. lg; spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB1021; Contractor Dwg and Parts No. 23J20BF102K.	Screen voltage dropping for tube V1.
R3		Same as R2	Plate decoupling for tube V1.
R4	- N16-R-50282-186 -	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±5%, 2 watt E characteristic; 1.41 in. lg max by 0.405 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZHB 1035; Contractor Dwg and Part No. 23J20BE103J.	Plate decoupling for tube V1.
R5	- N16-R-50012-811 -	RESISTOR, FIXED, COMPOSITION: 2,200 ohms ±10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. diam max; insulated resistant to humidity and salt water immersion; two wire lead type terminals 1-1/2 in. lg	Cathode bias for tube V2.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB 2221; Contractors Dwg and Part No. 23J20BF222K.	
R6		Same as R2	Screen voltage dropping for tube V2.
R7	- N16-R-50633-811 -	RESISTOR, FIXED, COMPOSITION: 100,000 ohms ±10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB 1041; Contractor Dwg and Part No. 23J20BF104K.	Screen voltage dropping for tube V2.
R8	- N16-R-50399-811 -	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals; 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB 2731; Contractor Dwg and Part No. 23J20BF273K.	Input coupling from panoramic adaptor receptacle.
R9	- N16-R-49238-811 -	RESISTOR, FIXED, COMPOSITION: 10 ohms ±10%; 1/2 watt F characteristic; 0.468 in. lg by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals; 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB 1001; contractors Dwg and Part No. 23J20BF100K.	1st LF band expansion on transformer T 10.
R10		Same as R7	AVC decoupling for tube V3.
R11	- N16-R-87618-8600 -	RESISTOR, VARIABLE: composition element; one section, 10,000 ohms ±20%, 1/2 watt; special taper 8500, 3000, 1500, and 600 ohms resistance at 10, 35, 50, and 70% rotation; three solder lug type terminals; 1-1/8 in. diam by 0.759 in. deep metal case; 1/4 in. diam round metal shaft with flat 7/16 in. lg, 1-3/64 in. lg from mounting surface, normal torque, insulated contact arm, mounted by 3/8-32 by 3/8 in. lg bushing, non-turning device located on 17/32 radius at 9 o'clock; SPST switch, 3 amp, 125v, SW 3 normally open, closes at extreme clockwise position two solder lug type terminals. Mfgr. & Mfgrs Designation CTCGC-35 special; Contractor Dwg and Part No. 25B924.	RF Gain control V3 and V4.
R12	- N16-R-49598-811 -	RESISTOR, FIXED, COMPOSITION: 120 ohms ±10%, 1/2 watt; F characteristic; 0.438 in. lg max by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB1211; Contractor Dwg and Part No. 23J20BF121K.	Cathode bias for tube V9.
R13		Same as R12	Cathode bias for tube V3.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R14	- N16-R-50444-811 -	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. diam max; insulated; resistant to humidity and salt water immersion two wire lead type terminals 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB 3931; Contractor Dwg and Part No. 23J20BF393K.	Screen voltage dropping for tube V3.
R15	- N16-R-49706-811 -	RESISTOR, FIXED, COMPOSITION: 330 ohms ±10%, 1/2 watt F characteristic; 0.468 in. max by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals; 1-1/2 in. lg Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB3311; Contractor Dwg and Part No. 23J20BF331K.	Plate decoupling for tube V3.
R16		Same as R9	2nd IF band expansion on transformer T 11.
R17	- N16-R-49769-811 -	RESISTOR, FIXED, COMPOSITION: 470 ohms ±10%, 1/2 watt; F characteristic, 0.468 in. lg max by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB4711; Contractor Dwg and Part No. 23J20BF471K.	Screen decoupling for tube V16.
R18	- N16-R-49364-811 -	RESISTOR, FIXED, COMPOSITION: 33 ohms ±10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZ EB3301; Contractor Dwg and Part No. 23J20BF330K.	Parasitic suppressor for tube V5.
R19		Same as R7	AVC decoupling for tube V4.
R20		Same as R12	Cathode bias for tube V4.
R21		Same as R2	Screen voltage dropping for tube V4.
R22		Same as R15	Plate decoupling for tube V4.
R23		Same as R9	3rd IF band expansion on transformer T 12.
R24	- N16-R-50822-811	RESISTOR, FIXED, COMPOSITION: 470,000 ohms ±10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. diam max; insulated; resistant to humidity and salt	Grid return for tube V5.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
	-	water immersion; two wire lead type terminals, 1-1/2 in. long; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB4741; Contractor Dwg and Part No. 23J20BF474K.	
R25		Same as R15	Cathode bias for tube V5.
R26		Same as R9	Parasitic suppressor for tube V1.
R27		Same as R12	Plate decoupling for tube V5.
R28	- N16-R-66329-6314 -	RESISTOR, FIXED, WIRE-WOUND: non-inductive winding; 7100 ohms ±5%, 11 watts, 200° C max continuous operating temperature; body dim. excluding terminals 3 in. long by 19/32 in. diam; vitreous enamel coating, resistant to humidity and salt water immersion; 2 tab terminals, 5/16 in. lg by 21/64 in. wide max by 0.016 in. thick min; requires two brackets, mounts by bolt through center; Spec JAN-R-26A. Mfgr. & Mfgrs Designation COM; Contractor Dwg and Part No. 24J33J712.	Screen voltage dropping for tubes V1 and V7.
R29		Same as R5	Screen and plate voltage dropping for tube V7.
R30	- N16-R-50373-506 -	RESISTOR, FIXED, COMPOSITION: 22,000 ohms ±10%, 2 watt; E characteristic; 1.4 in. lg max by 0.405 in. dia max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZHB 2231; Contractor Dwg and Part No. 23J20BE223K.	Screen voltage divider for tube V7.
R31	- N16-R-50480-811 -	RESISTOR, FIXED COMPOSITION: 47000 ohms ± 10%; 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. diam max, insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB4731; Contractor Dwg and Part No. 23J20BF473K.	Diode load for tube V6.
R32	- N16-R-50975-811 -	RESISTOR, FIXED, COMPOSITION: 1 megohm ± 10%; 1/2 watt; F characteristic; 0.468 in. lg by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB105; Contractor Dwg and Part No. 23J20BF105K.	ANL load.
R33		Same as R7.	Diode load for tube V6.
R34	- N16-R-50764 811	RESISTOR, FIXED, COMPOSITION: 220,000 ohms ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals,	Diode load for tube V6.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
	-	1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB2241; Contractor Dwg and Part No. 23J20BF2241.	
R35		Same as R24.	AVC decoupler.
R36		Same as R34.	Diode load for tube V6.
R37	-	RESISTOR, FIXED, COMPOSITION: 15,000 ohms ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB1531; Contractor Dwg and Part No. 23J20BF153K.	Primary load for discriminator transformer T14.
	N16-R-50336-811		
	-		
R38	-	RESISTOR, FIXED, COMPOSITION: 56,000 ohms ± 10%, 1/2 watt; F characteristic; 0.468 in. lg, max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB5631; Contractor Dwg and Part No. 23J20BF563K.	Grid return for tube V7.
	N16-R-50516-811		
	-		
R39		Same as R34.	Grid return for tube V7.
R40		Same as R7	Diode load for tube V8.
R41		Same as R7.	Diode load for tube V8.
R42		Same as R34.	De-emphasis network for tube V8.
R43	-	RESISTOR, VARIABLE: composition element; one section, 1 megohm ± 20%, 1/2 watt; special D taper as per graph, 150,000, 500,000, 850,000 ohms at 30, 50, and 70% of rotation; three solder lug type terminals; 1-1/8 in. dia by 0.491 in. deep metal case; 1/4 in. round metal shaft with flat 3/8 in. lg 1-7/8 in. lg from mounting surface, normal torque, insulated contact arm, no "OFF" position; mounted by 3/8-32 bushing 3/8 in. diam, 1-3/8 in. lg, nonturning device located on 17/32 radius at 9 o'clock. Mfgr. & Mfgrs Designation CTC35; Contractor Dwg and Part No. 25B-923.	AF gain control V9.
	N16-R-88341-8590		
	-		
R44		Same as R34.	Plate load for tube V9.
R45		Same as R34.	Plate load for tube V9.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R46	- N16-R-50066-811 -	RESISTOR, FIXED, COMPOSITION: 3,300 ohms ± 10%, 1/2 watt; F characteristics; 0.468 in. lg max by 0.249 in. dia max; insulated; resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB3321; Contractor Dwg and Part No. 23J20BF332K.	Cathode bias for tube V9.
R47		Same as R46.	Cathode bias for tube V9.
R48		Same as R7.	Grid bias for tube V2 on band 2.
R49		Same as R34.	Grid return for tube V11.
R50		Same as R34.	Grid return for tube V11.
R51		Same as R7	Grid return for tube V9.
R52	- N16-R-49661-186 -	RESISTOR, FIXED, COMPOSITION: 220 ohms ± 5%, 2 watt; E characteristic; 1.41 in. lg max by 0.405 in. dia max; insulated, resistant to humidity and salf water immersion; two wire lead type terminals, 1-1/2 in. lg Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZHB-2215; Contractor Dwg and Part No. 23J20BE221J.	Cathode bias for tube V11 and tube V15.
R53	- N16-R-50094-566 -	RESISTOR, FIXED, COMPOSITION: 3,900 ohm ± 10%, 2 watt; E characteristic; 1.41 in. lg max by 0.405 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals; 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZHB-3921; Contractor Dwg and Part No. 23J20BE392K.	Tone control feedback impedance.
R54		Same as R8.	Screen dropping for tube V16.
R55		Same as R18.	Degeneration for tube V4.
R56		Same as R24.	"S" meter current limiting.
R57	- N16-R-49283-811 -	RESISTOR, FIXED, COMPOSITION: 15 ohms ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. diam max; insulated, resistant to humidity and salt water immersion; two wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB1501; Contractor Dwg and Part No. 23J20BF150K.	"S" meter shunt.
R58	- N16-R-90803-2076	RESISTOR, VARIABLE: wire wound; 1500 ohms ± 10%, 2 watt; std A taper MBCA Ref Dwg Group 3; 3 terminals; enclosed metal case, 1.28 in. dia max by 0.62 in. deep	"S" meter zero adjusting control.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
	-	max; round metal shaft, screwdriver slotted w/0.047 in. wide by 0.063 in. deep slot, 1/4 in. diam by 1/8 in. long, normal torque; insulated contact arm, no "off" position; 3/8-32 bushing 3/8 in. lg, nonturning device located on 0.531 in. radius at 9 o'clock; Spec JAN-R-11. Contractor Dwg and Part No. 25J20A1SA152AK.	
R59	-	RESISTOR, FIXED, WIRE WOUND: non-inductive winding; 3,100 ohms ± 5%, 11 watts, 200° C max continuous operating temperature; body dim. excluding terminals, 3 in. lg by 19/32 in. dia; vitreous enamel coating, resistant to humidity and salt water immersion; 2 tab terminals 5/16 in. lg by 21/64 in. wide max by 0.016 in. thick min; requires 2 brackets mounts by bolt through center; Spec JAN-R-26A. Mfgr. & Mfgrs Designation COM; Contractor Dwg and Part No. 24J33J312.	Voltage dropping for V10.
	N16-R-66167-8663		
	-		
R60		Same as R30.	Plate decoupling for tube V14.
R61		Same as R31.	Grid return for tube V14.
R62		Same as R15.	Plate decoupling for tube V15.
R63	-	RESISTOR, FIXED, COMPOSITION: 4,700 ohms ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; 2 wire lead type terminals; 1-1/2 in. lg. Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB-4721; Contractor Dwg and Part No. 23J20BF472K.	Plate decoupling for tube V15.
	N16-R-50129-811		
	-		
R64	-	RESISTOR, FIXED, COMPOSITION: 22,000 ohm ± 10%, 1/2 watt F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; 2 wire lead type terminals; 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB-2231; Contractor Dwg and Part No. 23J20BF223K.	Grid return for tube V15.
	N16-R-50372-811		
	-		
R65		Same as R18.	Grid current limiter for tube V15, band 1.
R66	-	RESISTOR, FIXED, COMPOSITION: 5.6 ohm ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; 2 wire lead type terminals, 1-1/2 in. lg. Mfgr. & Mfgrs Designation CBZEB0561; Contractor Dwg and Part No. 23X20BF056K.	Grid current limiter for tube V15, band 3.
	N16-R-49121-823		
	-		
R67		Same as R15.	Plate decoupling for tube V2.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R68	- N16-R-49193-823 -	RESISTOR, FIXED, COMPOSITION: 8.2 ohm ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; 2 wire lead type terminals; 1-1/2 in. lg. Mfgr. & Mfgrs Designation CBZEB0821; Contractor Dwg and Part No. 23X20BF082A.	Grid current limiter for tube V15, band 2.
R69		Same as R37.	Tone control feedback impedance.
R70	- N16-R-49661-811 -	RESISTOR, FIXED, COMPOSITION: 220 ohm ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; 2 wire lead type terminals; 1-1/2 in. lg; Spec JAN-R-11. Mfgr. & Mfgrs Designation CBZEB-2211; Contractor Dwg and Part No. 23J20BF221K.	Parasitic suppressor for tube V2.
R71		Same as R37.	Secondary load for discriminator transformer T14.
R72		Same as R5.	Degeneration for tube V3.
R73		Same as R63.	Grid return tube V16.
R74		Same as R70.	Cathode bias for tube V16.
R75	- N16-R-50354-811	RESISTOR, FIXED, COMPOSITION: 18,000 ohm ± 10%, 1/2 watt; F characteristic; 0.468 in. lg max by 0.249 in. dia max; insulated, resistant to humidity and salt water immersion; 2 wire lead type terminals, 1-1/2 in. lg; Spec JAN-R-11. Mfgr. and Mfgrs Designation CBZEB1831; Contractor Dwg and Part No. 23J20BF183K.	Screen dropping resistor for V5.
SO1		Same as XV3.	Socket for DC power input and remote stand-by connection.
SO2	- N17-C-73108-5875 -	CONNECTOR, RECEPTACLE: 1 round female contact not polarized, straight type; over-all, dim. 1-1/16 in. lg excluding protruding contact and terminals by 1 in. wide by 1 in. high; cylindrical shape zinc silver plated, locking type; mica filled bakelite insert; mounted by four 0.120 in. dia holes on 23/32 in. mounting centers, body threaded 5/8-24. Mfgr. & Mfgrs Designation CPH83-1R; Contractor Dwg and Part No. 10A056.	Connector for coaxial cable.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
SO3	- N17-C-73411-2793 -	CONNECTOR, RECEPTACLE: 1 round male contact; straight type; 1-5/16 in. lg, by 7/8 in. wide across flats of hex; radio frequency connector; cylindrical body, brass, nickel plated; bakelite insert; 1/2 in. max cable opening body threaded 3/4-20, 13/16 in. lg. threads; hex coupling nut 7/8 in. across flats No. 3/4-20 coupling nut. Contractor Dwg and Part No. 36A018.	Antenna input.
SO4	- N17-C-72610-5429 -	CONNECTOR, RECEPTACLE: 4 round male contacts; keyed straight type; 1-3/16 in. lg, excluding protruding contact and terminals by 1-3/16 in. wide by 1-3/16 in. high; contacts rated at 20 amp 200v; cylindrical body, aluminum alloy, light sand-blast finish; locking type; melamine insert; 3/4 in. dia max cable opening; 4 mounting holes, 0.120 in. dia. 29/32 in. by 29/32 in. mounting centers Spec type AN-3102A-14S-2P; per MIL-C-5015. Mfgr. & Mfgrs Designation CPHAN-3102A-14S-2P; Contractor Dwg and Part No. 10A433.	Audio output connector.
SO5	- N17-C-72604-1522 -	CONNECTOR, RECEPTACLE: 3 round male contacts; keyed; straight type; 15/16 in. lg, excluding protruding contacts and terminals, by 1-3/16 in. wide by 1-3/16 in. high; contacts rated at 20 amp, 200v; cylindrical body, aluminum alloy; light sandblast finish, locking type; melamine insert; 3/8 in. dia max cable opening; 4 mounting holes 0.120 in. dia; 29/32 in. mounting centers square 7/8-20 thread; Spec type AN-3102-A-14S-7P; per MIL-C-5015. Mfgr. & Mfgrs Designation CPHAN-3102A14S7P; Contractor Dwg and Part No. 10A432.	AC input connector.
SW1A	- N17-S-91897-8793 -	SWITCH ROTARY: 1 section; 3 positions max number of switching positions possible; non "pile-up" type, 1 pole, 3 throws; hard brass contacts; silver plated contact finish; steatite ceramic wafer and insulation; 1-7/8 in. lg by 1-5/8 in. wide by 3/16 in. h; mounts by 2 mounting holes 0.144 in. dia, 1-9/16 in. C to C; solder lug type terminals; metal parts silver plated ceramic treated with DC-200 Dow Corning or equal. Mfgr. & Mfgrs Designation COC47338-HC; Contractor Dwg and Part No. 62B059.	Part of band switch antenna primary section.
SW1B	- N17-S-91897-8794 -	SWITCH, ROTARY: 1 section; 3 positions max number of switching positions possible; non "pile-up" type, 1 pole, 3 throws; hard brass contacts, silver plated contact finish; steatite ceramic wafer and insulation; 1-7/8 in. lg by 1-5/8 in. wide by 3/16 in. high; mounts by 2 mounting holes, 0.144 dia 1-9/16 in. C to C; solder lug type terminals metal parts silver plated; ceramic treated with DC-200 Dow Corning or equal. Mfgr. & Mfgrs Designation COC47253-HC; Contractor Dwg and Part No. 62B061.	Part of band switch-antenna secondary section.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
SW1C	- N17-S-91897-8795 -	SWITCH, ROTARY: 1 section; 3 positions max number of switching positions possible; non "pile-up" type, 1 pole, 3 throws; hard brass contacts, silver plated finish; steatite ceramic wafer and insulation; 1-7/8 in. lg by 1-5/8 in. wide by 3/16 in. high; mounts by 2 mounting holes, 0.144 dia 1-9/16 in. C to C; solder lug type terminals; metal parts silver plated; ceramic treated with DC-200 Dow Corning or equal. Mfgr. & Mfgrs Designation COC47252-HC: Contractor Dwg and Part No. 62B060.	Part of band switch-RF primary section.
SW1D		Same as SW1B.	Part of band switch-RF secondary section.
SW1E		Same as SW1B.	Part of band switch-mixer cathode section.
SW1F	- N17-S-91897-8796 -	SWITCH, ROTARY: 1 section; 3 positions, max number of switching positions possible; non pile-up type, 1 pole, 3 throws; hard brass contacts, silver plated contact finish; steatite ceramic wafer and insulation; 1-7/8 in. lg by 1-5/8 in. wide by 3/16 in. high; mounts by 2 mounting holes 0.144 in. dia 1-9/16 in. C to C; solder lug type; metal parts silver plated ceramic treated with DC-200 Dow Corning or equal. Mfgr. & Mfgrs Designation COC47261-HC; Contractor Dwg and Part No. 62B058.	Part of band switch-oscillator grid section.
SW1G		Same as SW1A.	Part of band switch-oscillator plate section.
SW2	- N17-S-79412-4406 -	SWITCH, TOGGLE: single pole single throw, 15 amperes, 125 volts AC; molded plastic body; over-all dim, 1-9/64 in. lg by 41/64 in. wide by 1-1/16 in. high including terminals; bat type actuating handle, 11/16 in. lg excluding length of bushing; 2 solder lug type terminals, located on back; single hole mounting type, 7/16 in. dia bushing 32 threads per inch, 15/32 in. lg; metals treated for resistance to corrosion; Spec JAN-S-23. Mfgr. & Mfgrs Designation CAE; Contractor Dwg and Part No. 60JST42A.	BFO switch.
SW3		SWITCH: toggle action; "S" meter SPST; part of R11; switch for reference only.	"S" meter switch.
SW4		Same as SW2.	AVC switch.
SW5		Same as SW2.	REC/SEND switch.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
SW6	- N17-S-72828-2605 -	SWITCH, TOGGLE: double pole, single throw; 25 amperes, 125 volts AC; molded plastic body; over-all dim. 1-21/64 in. lg by 49/64 in. wide by 1-1/16 in. high including terminals bat type actuating handle 11/16 in. lg excluding length of bushing; 4 solder lug type terminals, located on back; single hole mounting type; 7/16 in. dia bushing, 32 threads per inch, 15/32 in. lg; metals treated for resistance to corrosion. Mfgr. & Mfgrs Designation CAE; Contractor Dwg and Part No. 60JST52K.	ANL switch.
SW7	- N17-S-66106-2207 -	SWITCH, ROTARY: 3 sections; 3 positions max number of switching positions possible; non "pile-up" type 6 poles, 3 throws; brass contacts; silver plated contacts; phenolic sections, grade LTS-E-4; 11 in. lg by 1-1/4 in. wide by 1-9/16 in. high; mounts by 3/8 in. lg 3/8-32 thread bushing and by bracket, Hallicrafters Part No. 67B1596, on rear of switch; flatted type shaft, 1-3/64 in. lg by 0.250 in. dia; solder lug type terminals; all metal other than clips and rotor blades cadmium plated and OD iridited; shorting type rotor blades; single pole AC power switch at rear, to be open in position 1 and closed in positions 2 and 3. Mfgr. & Mfgrs Designation Grigsby Allison; Contractor Dwg and Part No. 60D423.	SELECTIVITY switch and AC switch.
SW7A		1 pole, 3 position switch, part of SW-7; listed for reference only; not replaceable individually.	Broad tuning T10.
SW7B		Same as SW7A.	Broad tuning T11.
SW7C		Same as SW7A.	Broad tuning T12.
SW7D		Single pole AC power switch, open in position 1 and closed in positions 2 and 3; listed for reference only, not replaceable individually.	AC OFF switch.
SW7E		Same as SW7A. NOTE SW7A and SW7E are mounted on single wafer; SW7B and SW7C utilize half of wafers 2 and 3, respectively.	Cathode bias switch, tube V10.
SW8	- N17-S-62523-1401 -	SWITCH, ROTARY: 1 section; 2 positions max number of switching positions possible; non "pile-up" type; 4 poles, 2 throws; brass contacts; silver plated contact finish; phenolic body, grade LTS-E-4; 3-1/8 in. lg by 1-3/8 in. wide by 1-9/16 in. high; mounts by two 4-40 screws; 1.250 in. C to C; flatted type shaft, 1-7/8 in. lg by 0.250 in. dia; solder lug type terminals all	AM/FM switch.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		metal parts other than clips and rotor blades cadmium plated and OD iridited; non-shorting teeth on sections at 3 and 11. Mfgr. & Mfgrs Designation Grigsby-Allison; Contractor Dwg and Part No. 60C425.	
SW9	- N17-S-62205-9551	SWITCH, ROTARY: 1 section; 4 positions max number of switching positions possible; non "pile-up" type, 3 poles, 4 throws; brass contacts; silver plated contact finish; phenolic body, grade LTS-E-4; 1-1/2 in. lg by 1-3/8 in. wide by 1-33/64 in. flatted type shaft, 1-3/64 in. lg by 1/4 in. dia; solder lug terminals; all metal parts except clips and rotor blades to be cadmium plated and OD iridited. Mfgr. & Mfgrs Designation CGC50; Contractor Dwg and Part No. 60B424.	TONE switch.
SW10	- N17-S-73959-1025 -	SWITCH, TOGGLE: double pole, double throw, 9 and 25 amperes, 250 and 125 volts AC; molded plastic body; over-all dim. excluding terminals barriers, bushings and handle, 1-21/64 in. lg by 49/64 in. wide by 1-1/16 in. high including terminals bat type actuating handle, 11/16 in. lg. locking action; 6 solder lug type terminals, located on back; single hole mounting type; 15/32 in. dia bushing; 32 threads per inch, 15/32 in. lg; all metals treated for resistance to corrosion. Spec JAN-S-23. Mfgr. & Mfgrs Designation CAE; Contractor Dwg and Part No. 60JST52N.	115/230 volt AC change over.
T1	- N17-T-81891-6141 -	TRANSFORMER, RADIO FREQUENCY: 2 windings, single layer wound; primary inductance 0.135 microhenries at 44 megacycles per sec, secondary inductance 0.5 microhenries at 26 megacycles per sec; primary turns #30AWG copper wire, secondary 5 turns #22AWG copper wire; 27.8 to 47 megacycles frequency range untapped; unshielded; 1-5/8 in. over-all by 35/64 in. dia; type LTS-E-4 plastic coil form, air core; 1-5/8 in. lg by 1/2 in. dia; no adjustable tuning; 4 mounting solder type lugs, 4 solder lug type terminals, 2 on each end of coil, coil form stamped 51-1345; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51B1346.	Coupling between antenna and grid of tube V1 for band 1.
T2	- N17-T-81891-6073 -	TRANSFORMER, RADIO FREQUENCY: 2 windings, single layer space wound; primary inductance 0.118 microhenries at 45 megacycles per sec, secondary inductance 0.126 microhenries at 45 megacycles per sec; primary 1-1/2 turns #30AWG copper wire, secondary 1-7/8 turns #18AWG copper wire; 46 to 82 megacycles frequency range; untapped; unshielded; 1-5/8 in. lg by 37/64 in. dia; type LTS-E-4 plastic coil form, air core, 1-5/8 in. lg by 1/2 in. dia; no adjustable tuning; 4 solder type mounting lugs, 2 on each end of coil form; 4 solder lug type terminals, 2 on each end of coil form; coil form stamped 51-1349; lacquer fungicide treatment per Spec JAN-C-172. Contractor Dwg and Part No. 51B1349.	Coupling between antenna and grid of tube V2 for band 2.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
T3	- N17-T-81891-6341 -	TRANSFORMER, RADIO FREQUENCY: 2 windings, single layer space wound, primary inductance 0.195 microhenries at 38 megacycles per sec, secondary inductance 0.185 microhenries at 39 megacycles per sec; primary 3-1/4 turns #28 AWG copper wire, secondary 1-1/4 turns #14 AWG solid copper wire, tinned:81 to 143 megacycles frequency range; untapped; unshielded; 3/4 in. lg by 3/8 in. dia; type LTS-E-4 plastic coil form, solid plastic rod; over-all dim of coil form, 3/4 in. lg by 1/4 in. dia; no adjustable tuning; terminal mounted; 4 wire lead type terminals; coil form marked 51-1352; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51B1352.	Coupling between antenna and grid of tube V1 for band 3.
T4	- N17-T-81892-2501 -	TRANSFORMER, RADIO FREQUENCY 2 windings, single layer wound; primary inductance 10.8 microhenries at 5 megacycles, secondary inductance 0.325 microhenries at 25 megacycles; primary 28-1/2 turns #34 AWG copper wire, secondary 6 turns #22 AWG copper wire, 27.8 to 47 megacycles frequency range; secondary tapped 2-2/3 turns from start of secondary winding; unshielded; 1-5/8 in. lg over-all by 35/64 in. dia; type LTS-E-4 plastic coil form; air core; coil form 1-5/8 in. lg by 1/2 in. dia; not tunable, adjustable external capacitor, screwdriver adjustment, adjusted through opening in mixer stage assembly shield can; 4 solder type mounting lugs; 5 solder lug type terminals, 2 on each end of coil form and one on top of secondary; coil form stamped 51-1347; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51B1347.	Coupling between tubes V1 and V2 on band 1.
T5	- N17-T-81892-2561 -	TRANSFORMER, RADIO FREQUENCY: 2 windings, single layer wound; primary inductance 2.3 microhenries at 10.5 megacycles secondary 0.34 microhenries at 41 megacycles; primary 11-1/2 turns #34 AWG copper wire, secondary 2-1/2 turns #22 AWG copper wire; 46 to 82 megacycles frequency range; secondary tapped 3/4 turn from start of secondary winding; unshielded; 1-5/8 in. lg by 35/64 in. dia; type LTS-E-4 plastic coil form, air core; dim of coil form, 1-5/8 in. lg by 1/2 in. dia; not tunable, adjustable external capacitor, screwdriver adjustment, adjusted through opening in mixer stage shield can; 4 solder lug type terminals, 2 on each end of coil form and one on top of secondary; coil form stamped 51-350; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51B1350.	Coupling between tubes V1 and V2 on band 2.
T6	- N17-F-81891-3621 -	TRANSFORMER, RADIO FREQUENCY: 2 windings, single layer wound; primary inductance 0.26 microhenries at 33 megacycles, secondary 0.08 microhenries at 66 megacycles; primary 2-3/4 turns #36 AWG copper wire, secondary 3/4 #14 AWG solid copper wire tinned; 81 to 143 megacycles frequency response; untapped; unshield-	Coupling between tubes V1 and V2 on band 3.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		ed; 15/16 in. lg by 1/8 in. dia; type LTS-E-4 plastic coil form, solid plastic core, dim of coil form 15/16 in. lg by 3/8 in. dia; not tunable; adjustable external capacitor, screwdriver adjustment, adjusted through opening in mixer stage assembly shield can; terminal mounted; 4 wire lead type terminals; coil form stamped 51-1353; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51-1353.	
T7	- N17-B-81891-6281 -	TRANSFORMER, RADIO FREQUENCY: 3 windings, single layer wound; primary inductance 0.17 microhenries at 40 megacycles; No. 1 secondary inductance 0.315 microhenries at 30 megacycles; No. 2 secondary inductance 0.235 microhenries at 35 megacycles; primary 1-1/2 turns #34 AWG copper wire, No. 1 secondary 4-1/8 turns #22 AWG copper wire, No. 2 secondary 2-1/2 turns #30 AWG copper wire 27.8 to 48 megacycles frequency response; untapped; unshielded; 1-5/8 in. lg by 35/64 in. dia; type LTS-E-4; plastic coil form; air core, dim of coil form 1-5/8 in. lg by 1/2 in. dia; not tunable; adjustable external capacitors, screwdriver adjustment, adjusted through openings in oscillator stage assembly shield can; 6 solder type mounting lugs, 4 on one end of coil and 2 on the other; 6 solder lug type terminals 4 on one end of coil form and 2 on the other end; coil form stamped 51-1348; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51B1348.	Tuned circuit of oscillator stage for band 1.
T8	- N17-B-81891-3824 -	TRANSFORMER, RADIO FREQUENCY: 3 windings, single layer wound; primary inductance 0.095 microhenries at 60 megacycles, No. 1 secondary inductance 0.17 microhenries at 40 megacycles, No. 2 secondary 0.08 microhenries 60 megacycles primary 3/4 turns #28AWG copper wire, No. 1 secondary 2-1/2 turns #18AWG copper wire, No. 2 secondary 1/2 turn #22AWG copper wire; 46 to 82 megacycles frequency response; untapped; unshielded; 1-5/8 in. lg by 37/64 in. dia; type LTS-E-4 plastic coil form, air core, dim of coil form 1-5/8 in. lg by 1/2 in. dia; not tunable adjustable external capacitor, screwdriver adjustments, adjusted through holes in oscillator stage assembly shield can; 6 solder type mounting lugs, 4 on one end and 2 on the other; 6 solder lug type terminals; 4 on one end of coil form and 2 on the other end; coil form stamped 51-1351; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51B1351.	Tuned circuit for oscillator stage band 2.
T9	- N17-T-81891-4003 -	TRANSFORMER, RADIO FREQUENCY: 3 windings, single layer wound; primary inductance 0.095 microhenries at 54 megacycles, No. 1 secondary inductance 0.118 microhenries at 49 megacycles, No. 2 secondary 0.09 microhenries at 56 megacycles; primary 1-1/2 turns #28AWG copper wire, No. 1 secondary 1-1/2 turns #28 AWG copper wire, No. 2 secondary, 1 turn #14 AWG copper wire; 81 to 143 megacycles frequency response; untapped; un-	Tuned circuit for oscillator stage for band 3.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		shielded; 3/4 in. lg by 9/16 in. dia; type LTS-E-4 plastic coil form, air core; dim of coil form 3/4 in. lg by 7/16 in. dia; not tunable adjustable external capacitors, screwdriver adjusted through holes in oscillator stage assembly shield can; terminal mounted; 6 terminals, 4 wire lead type and 2 solder lug type, solder lug terminals at one end of coil form; coil form stamped 51-1354; lacquer fungicide treatment per Spec JAN-C-173. Contractor Dwg and Part No. 51-1354.	
T10	- N17-T-67867-7651 -	TRANSFORMER, INTERMEDIATE FREQUENCY: 5.25 mc peak frequency; input transformer; shielded; 1.834 in. lg by 1.396 in. by 4.5 in. high LTS-E-4 phenolic coil form, polyiron core, double tuned; variable air dielectric tuning-capacitors; mounted by 2 studs spaced 1.396 in. C to C 8 terminals, 1 shielded wire lead 6-1/4 in. lg and 7 turret type terminals; includes C68 and C69. Contractor Dwg and Part No. 50C566.	Couples mixer stage to 1st IF amplifier.
T11	- N17-T-67867 7662 -	TRANSFORMER INTERMEDIATE FREQUENCY: 5.25 mc peak frequency; interstage transformer; shielded; 1.834 in. lg by 1.396 in. wide by 4.5 in. high; LTS-E-4 phenolic coil form, polyiron core; double tuned; variable air dielectric tuning capacitors; mounted by 2 studs, spaced 1.396 in. C to C 7 turret type terminals; includes C70 and C71. Contractor Dwg and Part No. 50C565.	Couples 1st IF amplifier to 2nd IF amplifier.
T12	- N17-T-67867-7656 -	TRANSFORMER, INTERMEDIATE FREQUENCY: 5.25 mc peak frequency; interstage transformer; shielded; 1.834 in. lg by 1.396 in. wide by 4.5 in. high; LTS-E-4 phenolic coil form, polyiron core; double tuned; variable air dielectric tuning capacitors; mounted by 2 studs spaced 1.396 in. C to C; 6 turret type terminals; includes C72 and C73. Contractor Dwg and Part No. 50C564.	Couples 2nd IF amplifier to 3rd IF amplifier and FM limiter.
T13	- N17-T-67867-7658 -	TRANSFORMER, INTERMEDIATE FREQUENCY: 5.25 mc peak frequency; output transformer; shielded; 1.834 in. lg by 1.396 in. wide by 4.5 in. high; LTS-E-4 phenolic coil form, poyliron core; double tuned; variable air dielectric tuning capacitors; mounted by 2 studs, spaced 1.396 in. C to C; 4 turret type terminals, includes C76 and C77. Contractor Dwg and Part No. 50C567.	Couples 3rd IF amplifier to AM detector.
T14	- N17-T-67185-6429 -	TRANSFORMER, DISCRIMINATOR: 5.25 mc peak frequency; FM discriminator; shielded 1-7/8 in. lg by 1-1/2 in. wide by 5-1/32 in. high; paper tube coil form; double tuned; variable air dielectric tuning capacitors; mounted by 2 spade bolts, one on each edge on 1-3/8 in. circle; 5 turret type terminals; includes capacitors C74 and C75. Contractor Dwg and Part No. 50C508.	Couples FM limiter to discriminator.
T15	- N17-T-65577-6818 -	TRANSFORMER, AUDIO FREQUENCY plate coupling type; primary impedance 12,000 ohms, No. 1 secondary 600 ohms, No. 2 secondary 5000 ohms; primary center tapped, No. 1 secondary center tapped, No. 2 secondary	Coupling between audio output tubes V11 and V12 and load.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		tapped for 500 ohms; DC primary rating 35 ma each; 1250 v test voltage; hermetically sealed steel case; silicon steel core; 2-13/16 in. lg by 2-3/4 in. wide by 2-3/8 in. high 4.47 to 1 ratio of turns primary to low impedance secondary 3.464 to 2.236 ratio turns, primary to high impedance secondary; ±3 db from 40 to 12,000 cycles frequency response; not tuned; 9 forked solder lug type terminals, located on bottom, placement must clear a 1-5/8 in. dia cutout in chassis; 4 integral mounting studs #6-32 NC-2 by 3/8 in. lg on 2-1/8 in. by 1-3/4 in. mounting centers. Mfgr. & Mfgrs Designation CTR 15747; Contractor Dwg and Part No. 55C172.	
T16	- N17-T-74369-3003 -	TRANSFORMER, POWER STEP-UP AND STEP-DOWN: hermetically sealed, metal case; 115 v AC-230 v AC, 50-60 cycles, single phase; 3 output windings, No. 1 secondary 540 v AC, No. 2 secondary 6.4 v AC, No. 3 secondary 5.0 v AC; No. 1 secondary 150 ma; No. 2 secondary 4 amps rms; No. 3 secondary 3 amps rms; No. 1 secondary center tapped; primary 1500 volt insulation; No. 1 secondary 2500 volt insulation; No. 2 secondary 1500 volt insulation No. 3 secondary 2500 volt insulation; impregnated per Mil-T-27; 5-1/4 in. lg by 3-3/8 in. wide by 3-15/16 in. high; 10 solder lug type standoff terminals, 3/8 in. dia by 13/16 in. high, located on bottom, must clear a 2-3/4 in. dia cutout in chassis; 4 No. 10-32 NC-2 mounting studs 1/2 in. lg on 3 in. by 2-7/16 in. mounting centers; static shield provided to primary and all other windings. Mfgr. & Mfgrs Designation CTR15748; Contractor Dwg and Part No. 52C236.	AC power transformer.
*TB1	- N17-B-77584-6412 -	TERMINAL BOARD: plastic LTS-E-3 per JAN-P-13; three solder lug type terminals; w/o barriers; over-all dim. 1-7/16 in. lg by 3/8 in. wide by 27/64 in. thick; two 1/8 in. dia mounting holes spaced 1-1/8 in. center to center; vacuum impregnated with varnish and baked dry per JAN-P-173. Contractor Dwg and Part No. 88A596.	Component mounting.
TB2		Same as TB1	Component mounting.
TB3		Same as TB1	Component mounting.
TB4		Same as TB1	Component mounting.
*TB5	- N17-B-78086-4541 -	TERMINAL BOARD: natural LTS-E-4 plastic board per JAN-P-13; 16 turret type terminals; w/o barriers; 7-1/4 in. lg by 1-3/4 in. wide by 11/16 in. thick; 3 mounting inserts with 0.166 dia hole spaced 4.062 in., and 2.625 in. C to C in a line; stamped with circuit symbols R13, R14, R20, R21, R55, R67, C15, C17, and C62; fungus	Resistor mounting.

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		resistant varnish treated. Contractor Dwg and Part No. 88B730.	
*TB6	- N17-B-77984-9211 -	TERMINAL BOARD: natural LTS-E-4 plastic board per JAN-P-13; 12 turret type terminals; w/o barriers; 3-1/8 in. lg by 1-3/4 in. wide by 11/16 in. thick; 2 mounting inserts threaded #6-32, spaced 2.625 in. C to C; stamped with circuit symbols R53, R60, R69, and C52; fungus resistant varnish treated. Contractor Dwg and Part No. 88B731.	Resistor and capacitor mounting.
*TB7	- N17-B-78242-5551 -	TERMINAL BOARD: natural LTS-E-4 plastic per JAN-P-13; 34 turret type terminals; w/o barriers; 6 in. lg by 1-3/4 in. wide by 11/16 in. thick two mounting inserts threaded #6-32 spaced 1.875 in. C to C; stamped with circuit symbols R75, R29, R30, R57, R31, R32, C26, R33, R35, R34, R36, R40, R41, R42 and C8 fungus resistant varnish treated; two 0.156 in. dia holes spaced 1.562 in. C to C for mounting switch. Contractor Dwg and Part No. 88B732.	Resistor and capacitor mounting.
*TB8	- N17-B-77984-9215 -	TERMINAL BOARD: natural LTS-E-4 plastic board per JAN-P-13; 12 turret type terminals; w/o barriers; 3-1/8 in. lg by 1-3/4 in. wide by 11/16 in. thick; 2 mounting inserts threaded #6-32 spaced 2.625 in. C to C stamped with circuit symbols R44, C36, R50, R49, C37 and R45; fungus resistant varnish treated. Contractor Dwg and Part No. 88B733.	Resistor and capacitor mounting.
*TB9	- N17-B-77936-5459 -	TERMINAL BOARD: natural LTS-E-4 plastic board per JAN-P-13; 8 turret type terminals; w/o barriers; 2-3/16 in. lg by 1-3/4 in. wide by 11/16 in. thick; 2 mounting inserts threaded #6-32 spaced 1.687 in. C to C; stamped with circuit symbols R18, R38, R39, C28 fungus resistant varnish treated. Contractors Dwg and Part No. 88 B734.	Resistor and capacitor mounting.
*TB10	- N17-B-77836-5453 -	TERMINAL BOARD: natural LTS-E-4 plastic board per JAN-P-13; 8 turret type terminals; w/o barriers 2-3/16 in. lg by 1-3/4 in. wide by 11/16 in. thick; 2 mounting inserts threaded #6-32 spaced 1.687 in. C to C; stamped with circuit symbols R4, R7 and R62; fungus resistant varnish treated. Contractor Dwg and Part No. 88B735.	Resistor mounting.
TB11	- N17-B-77584-7831 -	TERMINAL BOARD: natural LTS-E-4 plastic board per JAN-P-13; 3 solder lug type terminals w/o barriers; 1-1/2 in. lg by 5/16 in. wide by 21/32 in. thick; two 0.140 in. dia mounting holes spaced 1-1/8 in. C to C; vacuum wax impregnated with fungicide wax per JAN-C-173. Mfgr. & Mfgrs Designation CJC3-3 modified; Contractor Dwg and Part No. 88B736.	Voltage feedthrough, RF section.

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
TB12		Same as TB11	Voltage feed-through RF section.
TB15		Same as TB1	Component mounting.
TB16		Same as TB1	Component mounting.
V1	- N16-T-69560 -	ELECTRON TUBE: pentode; glass envelope; RMS T4-1/2; 7 pin type terminations; located 5 radially on side and one on each end; special purpose tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC956; Contractor Dwg and Part No. 90J956.	RF amplifier.
V2	- N16-T-69540 -	ELECTRON TUBE: pentode; glass envelope RMA T4-1/2; 7 pin type terminations; located 5 radially on side and one on each end; special purpose tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC954; Contractor Dwg and Part No. 90J954.	Converter.
V3	- N16-T-56138 -	ELECTRON TUBE: pentode; metal envelope RMA MT8; 8 pin type terminations; located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC 6AC7; Contractor Dwg and Part No. 90J6AC7.	1st IF amplifier.
V4	- N16-T-56127 -	ELECTRON TUBE: pentode; metal envelope, RMA MT8; 8 pin type terminations, located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC 6AB7; Contractor Dwg and Part No. 90J6AB7.	2nd IF amplifier.
V5	- N16-T-56670 -	ELECTRON TUBE: pentode; metal envelope, RMA MT8; 8 pin type terminations, located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC 6SK7; Contractor Dwg and Part No. 90J6SK7.	3rd IF amplifier.
V6	- N16-T-56346 -	ELECTRON TUBE: twin diode; metal envelope RMA MT8; 8 pin type terminations, located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC 6H6; Contractor Dwg and Part No. 90J6H6.	AM 2nd detector automatic noise limiter.
V7		Same as V3	FM limiter.
V8		Same as V6	FM discriminator.
V9	- N16-T-56677 -	ELECTRON TUBE: twin triode; glass envelope RMA T9; 8 pin type terminations, located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC 6SL7GT; Contractor Dwg and Part No. 90J6SL7GT.	Audio voltage amplifier.
V10	- N16-T-53060 -	ELECTRON TUBE: diode; glass envelope; RMA ST12; 6 pin type terminations; located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC	Voltage regulator.

TABLE 8-2. TABLE OF REPLACEABLE PARTS.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
		OD3/VR150; Contractor Dwg and Part No. 90JOD3/VR-150.	
V11	- N16-T-56758 -	ELECTRON TUBE: beam power tube; glass envelope, RMA T9; 7 pin type terminations, octal base, located on bottom; receiving type; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC6V6-GT/G; Contractor Dwg and Part No. 90J6V6GT/G.	Audio power amplifier.
V12		Same as V11	Audio power amplifier.
V13	- N16-T-55464 -	ELECTRON TUBE: full wave rectifier glass envelope, RMA ST-16; 5 pin type terminations, octal base, located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs CRC5U4-G; Contractor Dwg and Part No. 90J5U4G.	Rectifier.
V14	- N16-T-56350 -	ELECTRON TUBE: triode; metal envelope, RMA MT8; 6 pin type terminations, octal base, located on bottom; receiving tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC6J5; Contractor Dwg and Part No. 90J6J5.	Beat frequency oscillator.
V15	- N16-T-69550 -	ELECTRON TUBE: triode; glass envelope, RMA T4-1/2; 5 radial pin type terminations located on sides; special purpose tube; Spec JAN-1A. Mfgr. & Mfgrs Designation CRC 955; Contractor Dwg and Part No. 90J955.	High frequency oscillator.
V16		Same as tube V1	Radiation suppressor.
XFS1	- N17-F-74266-9081 -	FUSE, HOLDER: extractor post type; 250v, 15 amps; accomodates one cartridge type fuse, 1-1/4 in. lg by 1-4 in. dia; mica filled phenolic body and cap; copper contacts, spring type; over-all 2-1/8 in. lg by 11/16 in. dia; 2 solder lug type terminals; panel mounted in 1/2 in. dia hole by 1/2-24 threaded body section and nut; "FUSE" and white arrow on cap in white. Mfgr. & Mfgrs Designation CFAHKP-BL; Contractor Dwg and Part No. 6B374.	Holds fuse FS1.
XFS2		Same as XFS1	Holds fuse FS2.
XLM1	- N17-L-51626-5035 -	LAMPHOLDER: 1 lamp, miniature bayonet base, 6-8 volts, type 44; steel shell; cadmium plated; bracket mounted on socket base on tuning drive assembly; 1-3/8 in. lg by 1-3/16 in. wide by 9/16 in. high over-all; 2 solder lug type terminals on socket base. Mfgr. & Mfgrs Designation CAYS; Contractor Dwg and Part No. 86B009.	Mounting for panel light LM1.
XLM2		Same as XLM1	Mounting for panel light LM2.
XV1	- N16-S-61646-7026	SOCKET, ELECTRON TUBE: 5 beryllium copper contacts; silver plated; acorn type not miniature, round; over-all dim. excluding terminals; 1-9/16 in. dia by	Socket for tube V1.

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS STANDARD NAVY AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
	-	11/32 in. high; steatite body, grade L3 or better; above chassis mounting, two 0.150 in. dia holes, with 1.187 in. mounting centers. Mfgrs. & Mfgrs Designation CEJ121-265; Contractor Dwg and Part No. 6B398.	
XV2		Same as XV1	Socket for tube V2.
XV3	- N16-S-63529-1976 -	SOCKET, ELECTRON TUBE: 8 beryllium copper contacts; silver plated; not miniature type; round; over-all dim. excluding terminals 1-13/16 in. lg by 1-3/8 in. wide by 5/8 in. high; mica filled plastic body; one piece saddle, 1-1/8 in. dia hole in chassis, 2 mounting holes; 0.156 in. dia on 1-1/2 in. mounting centers. Mfgr. & Mfgrs Designation CMG51B13405; Contractor Dwg and Part No. 6A379.	Socket for tube V3.
XV4		Same as XV3	Socket for tube V4.
XV5		Same as XV3	Socket for tube V5.
XV6		Same as XV3	Socket for tube V6.
XV7		Same as XV3	Socket for tube V7.
XV8		Same as XV3	Socket for tube V8.
XV9		Same as XV3	Socket for tube V9.
XV10		Same as XV3	Socket for tube V10.
XV11		Same as XV3	Socket for tube V11.
XV12		Same as XV3	Socket for tube V12.
XV13		Same as XV3	Socket for tube V13.
XV14		Same as XV3	Socket for tube V14.
XV15		Same as XV1	Socket for tube V15.
XV16		Same as XV1	Socket for tube V16.

TABLE 8-3. MAINTENANCE PARTS LIST.

KEY DESIGNATION	QUANTITY	KEY DESIGNATION	QUANTITY	KEY DESIGNATION	QUANTITY	KEY DESIGNATION	QUANTITY
C8	3	R11	1	T6	1	T13	1
C66	2	R43	1	T7	1	T14	1
L1	1	T1	1	T8	1	T15	1
L4	1	T2	1	T9	1	T16	1
L5	1	T3	1	T10	1		
L6	1	T4	1	T11	1		
O4	2	T5	1	T12	1		

TABLE 8-4. CROSS REFERENCE PARTS LIST.

JAN (OR AWS) DESIGNATION	KEY SYMBOL	NAVY TYPE	KEY SYMBOL	JAN (OR AWS) DESIGNATION	KEY SYMBOL	NAVY TYPE	KEY SYMBOL
CM20B331K	C3	N16-C-63210-8993	C1	CM30B222K	C52	N16-C-42767-5130	C36
CM30B222K	C4	N16-C-58836-4773	C2	CM20B101K	C53	N16-C-42767-5130	C37
CM20B331K	C5	N16-C-29718-7276	C3	CC36SH201K	C54	N16-C-19781-5645	C38
CM30B222K	C6	N16-C-31908-1564	C4	CM20B331K	C55	N16-C-29718-7276	C39
CC21TJ100F	C7	N16-C-29718-7276	C5	CC1UK510J	C56	N16-C-19781-5645	C40
CM20B331K	C9	N16-C-31908-1564	C6	CM25B561K	C57	N16-C-15829-7996	C41
CM20B331K	C10	N16-C-15924-5391	C7	CV12D121	C58	N16-C-21997-2415	C42A
CM20B470K	C20	N16-C-19140-9501	C8				C42B
CM20B560K	C24	N16-C-29718-7276	C9	CC21UK020D	C59	N16-C-49958-5175	C43
CP53BIEF				CM30B222K	C61	N16-C-49958-5175	C44
503X	C25	N16-C-29718-7276	C10	CV11A250	C63	N16-C-29718-7276	C45
CM20B560K	C26	N16-P-401281-162	C11	CV11A250	C64	N16-C-29718-7276	C46
CM20B101K	C27	N16-C-18631-1501	C12	CV11A250	C65	N16-C-29718-7276	C47
CM25B561K	C28	N16-C-19140-9501	C13	CN35A103M	C78	N16-C-31908-1564	C52
CM20B240J	C29	N16-C-19140-9501	C14	CM25B561K	C79	N16-C-29718-7276	C55
CM20B470K	C31	N16-C-19140-9501	C15	CM20B331K	C80	N16-C-16597-1650	C56
CM25B561K	C32	N16-C-18631-1501	C16	CM20B331K	C81	N16-C-31090-4472	C57
CN35A103M	C33	N16-C-19140-9501	C17	CM20B331K	C82	N16-C-64232-8500	C58
CM25B561K	C34	N16-C-19140-9501	C18	CP41B1DF			
CP53BIEF				405K	C83	N16-C-58836-4773	C60
503X	C35	N16-C-19140-9501	C19	CM20B271K	C84	N16-C-31908-1564	C61
CN35A103M	C36	N16-C-27582-1876	C20	JJ-102	J1	N16-C-19140-9501	C62
CN35A103M	C37	N16-C-19140-9501	C21	CN-49121A	PL3	N16-C-64036-4565	C63
CE63F250F	C38	N16-C-19140-9501	C22	AN-3106A-			
CM20B331K	C39	N16-C-19140-9501	C23	14S-2S	PL4	N16-C-64036-4565	C64
CE63F250F	C40	N16-C-27766-7676	C24	AN-3106A-			
CC21UK080F	C41	N16-C-35241-5930	C25	14S-7S	PL5	N16-C-64036-4565	C65
CE42C400P	C42A			RC20BF271K	R1	N16-C-64452-2554	C66
	C42B	N16-C-27766-7676	C26	RC20BF102K	R2	N16-C-64452-2554	C67
CP41B1DF				RC20BF102K	R3	N16-C-42767-5130	C78
405K	C43	N16-C-28558-1676	C27	RC20BE103J	R4	N16-C-30299-1472	C79
CP41B1DF				RC20BF222K	R5	N16-C-29718-7276	C80
405K	C44	N16-C-30299-1472	C28	RC20BF102K	R6	N16-C-29718-7276	C81
CM20B331K	C45	N16-C-26917-6396	C29	RC20BF104K	R7	N16-C-29718-7276	C82
CM20B331K	C46	N16-C-19140-9501	C30	RC20BF273K	R8	N16-C-49958-5175	C83
CM20B331K	C47	N16-C-27582-1876	C31	RC20BF100K	R9	N16-C-29613-2676	C84
CM35B822K	C48	N16-C-30299-1472	C32	RC20BF104K	R10	N16-D-46539-7976	E1
CM35B822K	C49	N16-C-42767-5130	C33	RC20BF121K	R12	N16-D-46337-3573	E2
CM35B822K	C50	N16-C-31090-4472	C34	RC20BF121K	R13	N16-D-46337-3511	E3
CM35B822K	C51	N16-C-35241-5930	C35	RC20BF393K	R14	N16-D-46337-3752	E4

JAN (OR AWS) DESIGNATION	KEY SYMBOL	NAVY TYPE	KEY SYMBOL
RC20BF331K	R15	N16-D-46338-3752	E5
RC20BF100K	R16	N16-K-700623-101	E6
RC20BF471K	R17	N16-K-700350-656	E7
RC20BF330K	R18	N16-K-700350-656	E8
RC20BF104K	R19	N16-K-700417-401	E9
RC20BF121K	R20	N17-S-250051-154	E10
RC20BF102K	R21	N17-F-16303-1004	FS1
RC20BF331K	R22	N17-F-16303-1004	FS2
RC20BF100K	R23	N17-F-16303-1004	FS3
RC20BF474K	R24	N17-C-780616-281	H1
RC20BF331K	R25	N17-C-780616-281	H2
RC20BF100K	R26	N17-C-780616-281	H3
RC20BF121K	R27	N16-R-503580-227 and N16-N-84127-6433	H4
RW33J712	R28	N16-R-503580-226 and	
RC20BF222K	R29	N16-M-84127-8183	H5
RC40BE223K	R30	N41-W-2446	H6
RC20BF473K	R31	N17-J-39150-4702	J1
RC20BF105K	R32	N16-C-73226-9608	L1
RC20BF104K	R33	N16-C-72969-4574	L4
RC20BF224K	R34	N16-C-76385-1901	L5
RC20BF474K	R35	N16-R-29716-8394	L6 L7
RC20BF224K	R36	N16-C-72969-4574	L8
RC20BF153K	R37	N16-C-72969-4574	L9
RC20BF563K	R38	N16-C-73226-9608	L10
RC20BF224K	R39	N17-S-50964-8926	LF1
RC20BF104K	R40	N17-L-6305	LM1
RC20BF104K	R41	N17-L-6305	LM2
RC20BF224K	R42	N17-M-32373-3162	M1
RC20BF224K	R44	N16-S-117101-569	N1
RC20BF224K	R45	N16-S-117101-510	N2
RC20BF332K	R46	N16-B-800200-572	O1
RC20BF332K	R47	N16-B-800200-572	O2
RC20BF104K	R48	N16-B-800200-572	O3
RC20BF224K	R49	N16-C-812136-101	O4
RC20BF224K	R50	N16-C-812136-101	O5
RC20BF104K	R51	N16-C-812136-101	O6
RC40BE221J	R52	N16-C-812136-101	O7
RC40BE392K	R53	N16-C-812136-101	O8
RC20BF273K	R54	N16-C-812136-101	O9
RC20BF330K	R55	N17-C-80454-3139	O10
RC20BF474K	R56	N17-C-80652-3219	O11
RC20BF150K	R57	N16-C-600001-249	O12
RA20A1SA 152AK	R58	N17-C-98378-3897	O13
RW33J312	R59	N17-C-98378-3918	O14
RC40BE223K	R60	N17-C-98378-3895	O15
RC20BF473K	R61	N17-C-98378-3895	O16
RC20BF331K	R62	N17-C-7154-2601	PL2
RC20BF472K	R63	N17-C-71120-4869	PL3
RC20BF223K	R64	N17-C-70328-1518	PL4
RC20BF330K	R65	N17-C-70334-5473	PL5
RC20BF102K	R67	N16-R-49688-811	R1
RC20BF153K	R69	N16-R-49922-811	R2

JAN (OR AWS) DESIGNATION	KEY SYMBOL	NAVY TYPE	KEY SYMBOL
RC20BF221K	R70	N16-R-49922-811	R3
RC20BF153K	R71	N16-R-50282-186	R4
RC20BF222K	R72	N16-R-50012-811	R5
RC20BF472K	R73	N16-R-49922-811	R6
RC20BF221K	R74	N16-R-50633-811	R7
RC20BF183K	R75	N16-R-50399-811	R8
CPH49194	SO2	N16-R-49238-811	R9
CN49120	SO3	N16-R-50633-811	R10
AN-3102A-14S-2P	SO4	N16-R-87681-8600	R11
AN-3102A-14S-7P	SO5	N16-R-49598-811	R12
ST42A	SW2	N16-R-49598-811	R13
ST42A	SW4	N16-R-50444-811	R14
ST42A	SW5	N16-R-49706-811	R15
ST52K	SW6	N16-R-49238-811	R16
ST52N	SW10	N16-R-49769-811	R17
956	V1	N16-R-49364-811	R18
954	V2	N16-R-50633-811	R19
6AC7	V3	N16-R-49598-811	R20
6AB7	V4	N16-R-49922-811	R21
6SK7	V5	N16-R-49706-811	R22
6H6	V6	N16-R-49238-811	R23
6AC7	V7	N16-R-50822-811	R24
6H6	V8	N16-R-49706-811	R25
6SL7GT	V9	N16-R-49238-811	R26
OD3/VR-150	V10	N16-R-49598-811	R27
6V6GT/G	V11	N16-R-66329-6314	R28
6V6GT/G	V12	N16-R-50012-811	R29
5U4G	V13	N16-R-50373-566	R30
6J5	V14	N16-R-50480-811	R31
955	V15	N16-R-50975-811	R32
956	V16	N16-R-50633-811	R33
		N16-R-50764-811	R34
		N16-R-50822-811	R35
		N16-R-50764-811	R36
		N16-R-50336-811	R37
		N16-R-50516-811	R38
		N16-R-50764-811	R39
		N16-R-50633-811	R40
		N16-R-50633-811	R41
		N16-R-50764-811	R42
		N16-R-88341-8590	R43
		N16-R-50764-811	R44
		N16-R-50764-811	R45
		N16-R-50066-811	R46
		N16-R-50066-811	R47
		N16-R-50633-811	R48
		N16-R-50764-811	R49
		N16-R-50764-811	R50
		N16-R-50633-811	R51
		N16-R-49661-186	R52
		N16-R-50094-566	R53
		N16-R-50399-811	R54
		N16-R-49364-811	R55
		N16-R-50822-811	R56
		N16-R-49283-811	R57

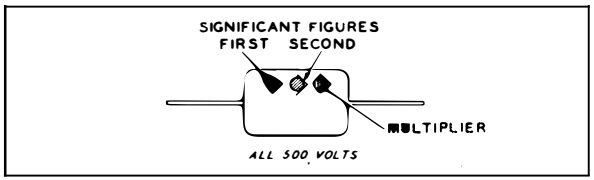
TABLE 8-4. CROSS REFERENCE PARTS LIST.

JAN (OR AWS) DESIGNATION	KEY SYMBOL	NAVY TYPE	KEY SYMBOL	JAN (OR AWS) DESIGNATION	KEY SYMBOL	NAVY TYPE	KEY SYMBOL
		N16-R-90802-2076	R58			N17-T-74369-3003	T16
		N16-R-66167-8663	R59			N17-B-77584-6412	TB1
		N16-R-50373-566	R60			N17-B-77584-6412	TB2
		N16-R-50480-811	R61			N17-B-77584-6412	TB3
		N16-R-49706-811	R62			N17-B-77584-6412	TB4
		N16-R-50129-811	R63			N17-B-78055-4541	TB5
		N16-R-50372-811	R64			N17-B-77984-9211	TB6
		N16-R-49364-811	R65			N17-B-78242-5551	TB7
		N16-R-49121-823	R66			N17-B-77984-9215	TB8
		N16-R-49922-811	R67			N17-B-77936-5459	TB9
		N16-R-49193-828	R68			N17-B-77836-5453	TB10
		N16-R-50336-811	R69			N17-B-77584-7831	TB11
		N16-R-49661-811	R70			N17-B-77584-7831	TB12
		N16-R-50336-811	R71			N17-B-77584-7831	TB13
		N16-R-50012-811	R72			N17-B-77584-7831	TB14
		N16-R-50129-811	R73			N16-T-69560	V1
		N16-R-49661-811	R74			N16-T-69540	V2
		N16-R-50354-811	R75			N16-T-56138	V3
		N17-C-73108-5875	SO2			N16-T-56127	V4
		N17-C-73411-2793	SO3			N16-T-56670	V5
		N17-C-72610-5429	SO4			N16-T-56346	V6
		N17-C-72604-1522	SO5			N16-T-56138	V7
		N17-S-91897-8793	SW1A			N16-T-56346	V8
		N17-S-91897-8494	SW1B			N16-T-56677	V9
		N17-S-91897-8795	SW1C			N16-T-53060	V10
		N17-S-91897-8794	SW1D			N16-T-56758	V11
		N17-S-91897-8794	SW1E			N16-T-56758	V12
		N17-S-91897-8796	SW1F			N16-T-55464	V13
		N17-S-91897-8793	SW1G			N16-T-56350	V14
		N17-S-79412-4406	SW2			N16-T-69550	V15
		N17-S-79412-4406	SW4			N16-T-69560	V16
		N17-S-79412-4406	SW5			N17-F-74266-9081	XFS1
		N17-S-72828-2505	SW6			N17-F-74266-9081	XFS2
		N17-S-66100-2207	SW7			N17-L-51626-5035	XLM1
		N17-S-62523-1401	SW8			N17-L-51626-5035	XLM2
		N17-S-62205-9551	SW9			N16-S-61646-7026	XV1
		N17-S-73959-1025	SW10			N16-S-61646-7026	XV2
		N17-T-81891-6141	T1			N16-S-63529-1976	XV3
		N17-T-81891-6073	T2			N16-S-63529-1976	XV4
		N17-T-81891-6341	T3			N16-S-63529-1976	XV5
		N17-T-80892-2501	T4			N16-S-63529-1976	XV6
		N17-T-81892-2561	T5			N16-S-63529-1976	XV7
		N17-F-81891-3621	T6			N16-S-63529-1976	XV8
		N17-B-81891-6281	T7			N16-S-63529-1976	XV9
		N17-B-81891-3824	T8			N16-S-63529-1976	XV10
		N17-T-81891-4003	T9			N16-S-63529-1976	XV11
		N17-T-67867-7651	T10			N16-S-63529-1976	XV12
		N17-T-67867-7662	T11			N16-S-63529-1976	XV13
		N17-T-67867-7656	T12			N16-S-63529-1976	XV14
		N17-T-67867-7658	T13			N16-S-61646-7026	XV15
		N17-T-67185-6429	T14			N16-S-61646-7026	XV16
		N17-T-65577-6818	T15				

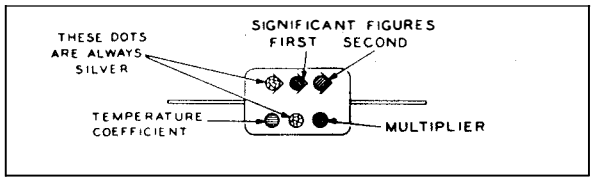
TABLE 8-5. COLOR CODE AND MISCELLANEOUS DATA.

CAPACITOR COLOR CODES

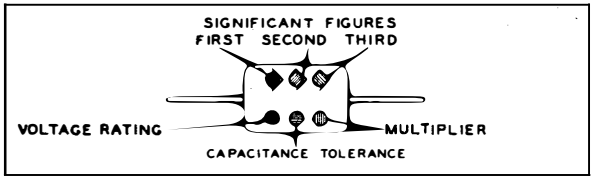
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



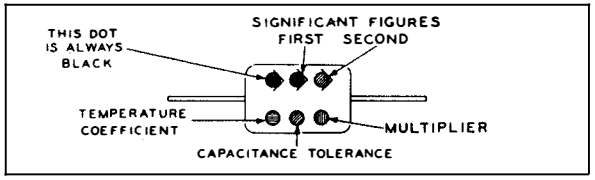
JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



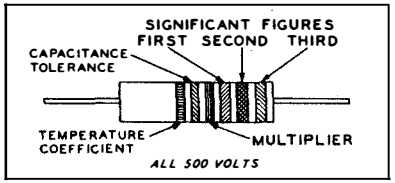
RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

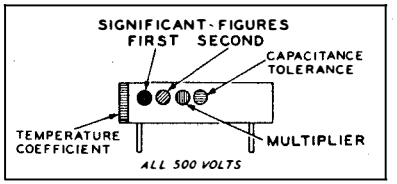


RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS

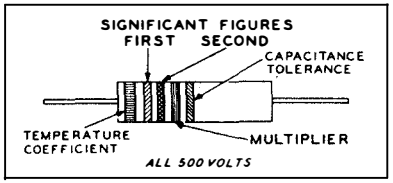


JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS

RADIAL TYPE NON-INSULATED



AXIAL TYPE INSULATED



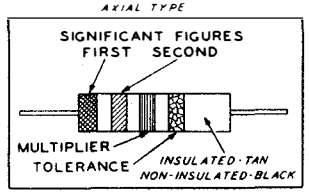
RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY

RESISTORS				CAPACITORS				
				MULTIPLIER				
TOLERANCE	MULTIPLIER	SIGNIFICANT FIGURE	COLOR	RMA MICA AND CERAMIC-DIELECTRIC	JAN MICA AND PAPER-DIELECTRIC	JAN CERAMIC DIELECTRIC	VOLTAGE RATING	TEMPERATURE COEFFICIENT
	1	0	BLACK	1	1	1		A
	10	1	BROWN	10	10	10	100	B
	100	2	RED	100	100	100	200	C
	1,000	3	ORANGE	1,000	1000	1000	300	D
	10,000	4	YELLOW	10,000			400	E
	100,000	5	GREEN	100,000			500	F
	1,000,000	6	BLUE	1,000,000			600	G
	10,000,000	7	VIOLET	10,000,000			700	
	100,000,000	8	GRAY	100,000,000		0.01	800	
	1,000,000,000	9	WHITE	1,000,000,000		0.1	900	
5	0.1		GOLD	0.1	0.1		1000	
10	0.01		SILVER	0.01	0.01		2000	
20			NO COLOR				500	

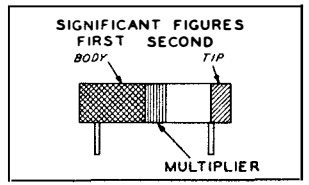
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE

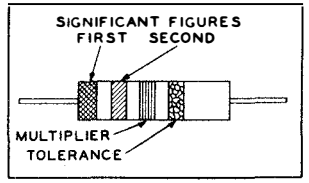


RADIAL TYPE



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE INSULATED



RADIAL TYPE NON-INSULATED

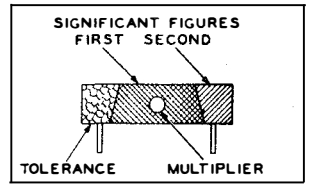


TABLE 8-6. LIST OF MANUFACTURERS.

MANUFACTURER	CODE	MANUFACTURER	CODE
Times Facsimile Corp. New York, N.Y.	CACA	Jones, Howard B. Chicago, Ill.	CJC
General Crystal Co. Schenectady, N.Y.	CACF	Littlefuse Laboratories, Inc. Chicago, Ill.	CLF
Cutler Hammer, Inc. Milwaukee, Wis.	CAE	Electro-Motive Mfg. Co. Willimantic, Conn.	CMF
Drake Mfg. Co. Chicago, Ill.	CAYS	Cinch Mfg. Co. Chicago, Ill.	CMG
Allen Mfg. Co. Hartford, Conn.	CAYT	Meissner Mfg. Co. Mount Carmel, Ill.	CML
Central Radio Laboratory Division of Glove Union Milwaukee, Wis.	CBN	Marion Electrical Inst. Co. Manchester, N.H.	CMY
Allen Bradley Co. Milwaukee, Wis.	CBZ	Oak Mfg. Co. Chicago, Ill.	COC
Cornell-Dubilier Corp. 1000 Hamilton Blvd. South Plainfield, N.J.	CD	Ohmite Mfg. Co. Chicago, Ill.	COM
Johnson, E.F., Co. Waseca, Minn.	CEJ	Potter Co. N. Chicago, Ill.	CPC
Bussman Mfg. Co. St. Louis, Mo.	CFA	American Phenolic Corp. Chicago, Ill.	CPH
Hammarlund Mfg. Co. New York, N.Y.	CHC	RCA Mfg. Co. (Radiotron Div.) Harrison, N.J.	CRC
Hallicrafters Co. Chicago, Ill.	CHL	Chicago Telephone Supply Co. Elkhart, Ind.	CTC
		Chicago Transformer Co. Chicago, Ill.	CTR

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