NAVSHIPS 92676 UNCLASSIFIED

INSTRUCTION BOOK

for

RADIO RECEIVING SET AN/URR-35C

RAULAND-BORG CORPORATION
CHICAGO 18, ILLINOIS

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS

Contract: NObsr-64647 *Approved by BuShips: 19 JANUARY 1956*

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Original	4–1 to 4–4	Original
A–C	Original	5–1 to 5–2	Original
i to v	Original	6–1 to 6–3	Original
1–0 to 1–7	Original	7–0 to 7–40	Original
2–0 to 2–17	Original	8–1 to 8–47	Original
3–0 to 3–12	Original	i–0 to i–4	Original

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

IN REPLY REFER TO
Code 993-100
19 January 1956

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 Set AN/URR-35C NAVSHIPS 92676

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 When superseded by a later edition, this publication shall be destroyed.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 Electronics Information Bulletin, NAVSHIPS 900,022(A) and in the Index of Bureau of Ships General and Electronics Publications, NAVSHIPS 250-020.

A. G. MUMMA
Chief of Bureau

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

TABLE OF CONTENTS

SECTION 1—GENERAL DESCRIPTION

SECTION 2—THEORY OF OPERATION

SECTION 3—INSTALLATION

TABLE OF CONTENTS (Cont)

LIST OF ILLUSTRATIONS

SECTION 1—GENERAL DESCRIPTION

SECTION 2—THEORY OF OPERATION

SECTION 3—INSTALLATION

SECTION 4—OPERATION

SECTION 6—PREVENTIVE MAINTENANCE

SECTION 7—CORRECTIVE MAINTENANCE

LIST OF ILLUSTRATIONS (Cont)

LIST OF TABLES

INSTALLATION RECORD

Contract Number NObsr-64647 Date of Contract, 28 February 1955

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.

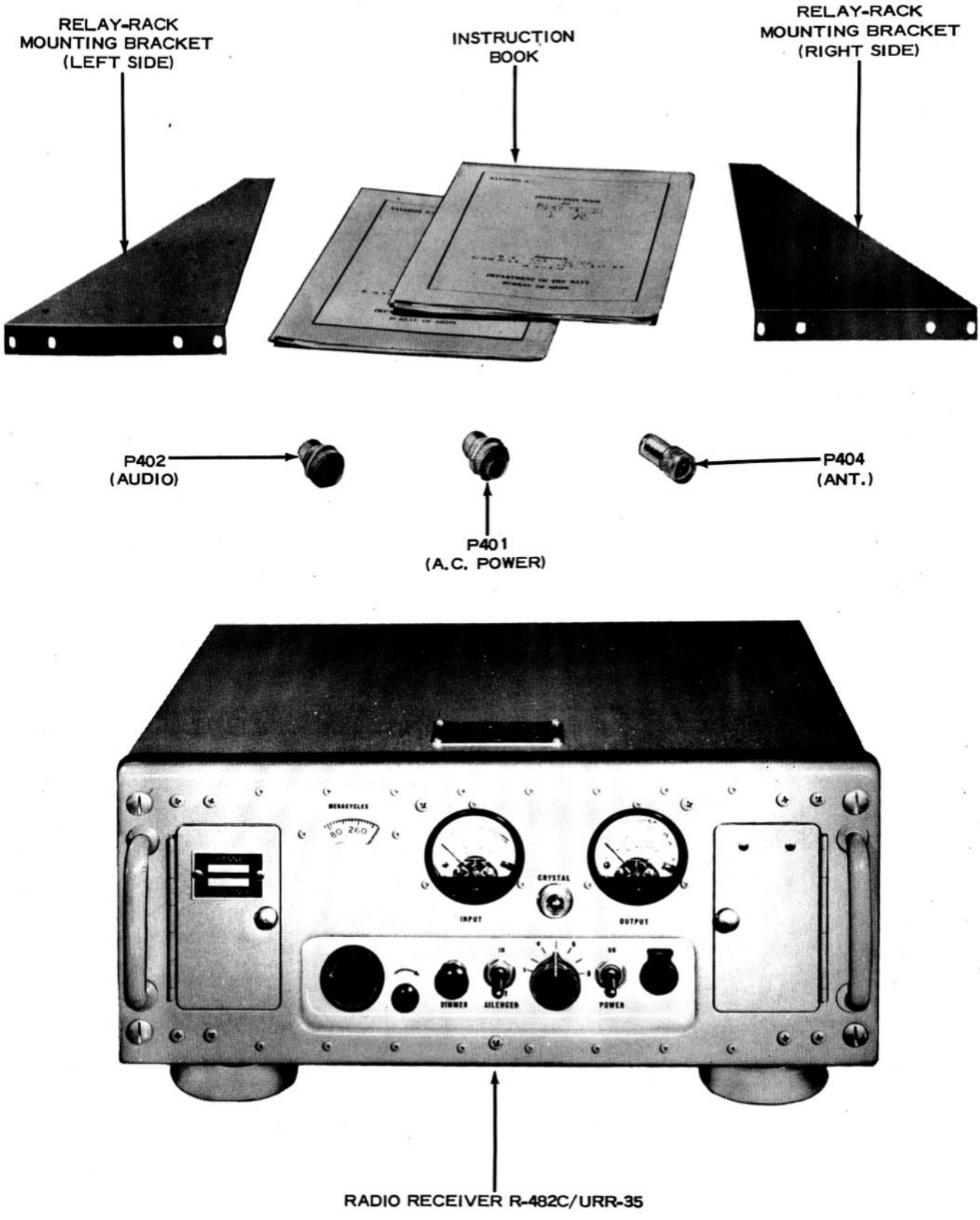


Figure 1–1. Radio Receiving Set AN/URR–35C

SECTION 1
GENERAL DESCRIPTION

1. INTRODUCTION.

This instruction book describes the circuit theory, installation, operation and maintenance of Radio Receiving Set AN/URR-35C.

2. DESCRIPTION.

a. PURPOSE.—Radio Receiving Set AN/URR-35C is designed to provide a means for reception of amplitude-modulated voice (A–3) and modulated-continuous-wave (A–2) transmissions. The carrier frequency range is 225 to 400 megacycles. The receiver may be used on Naval vessels, at Naval air and shore radio stations, or at any other units of the military establishment.

b. BASIC PRINCIPLES OF OPERATION.—Radio Receiving Set AN/URR-35C is a VHF/UHF, double-superheterodyne type of receiving equipment. It is designed primarily for operation as a pretuned, single-channel, crystal-controlled receiver. By using a suitable crystal, any channel within the frequency range of the receiver may be selected. Provisions are also included for continuously variable manual tuning. There is only one tuning control for tuning to any frequency for either crystal-controlled or manual operation. Either of these two methods of operation may be selected by means of the OSC. switch on the front panel.

The receiver sensitivity is eight microvolts or better across the 50 ohm input circuit. The signal-to-noise ratio for the receiver is 10-db. There are two intermediate frequencies: the first is 18.6 megacycles, and the second is 1.775 megacycles.

All power necessary for operation of the receiver is obtained from a built-in power supply which can be adjusted to operate from a 105-, 115-, or 125-volt 50/60-cps, single-phase source. The audio and power source connections to the receiver are filtered to limit possible radio-frequency interference.

c. EQUIPMENT ARRANGEMENT. — Radio Receiving Set AN/URR–35C is shown in figure 1–1. It consists of Radio Receiver R–482C/URR–35, a pair of auxiliary angle brackets for relay-rack mounting, three plugs to mate with receptacles on the receiver for external connections, and two copies of the instruction book. The receiver proper consists of a panel, frame and chassis assembly housed in a cabinet fitted with shockmounts. The equipment may be mounted on a bench or other firm horizontal surface, or (after attaching brackets) in a standard 19-inch relay rack.

The circuit components are grouped, on a functional basis, into five major sections: there are preselector, IF/AF chassis, power supply, front panel, and low-pass filtering sections. The first three sections are assembled within the chassis frame, and the front panel section is attached to the front of this frame. The low-pass filtering section (Low-Pass Filter F–304/URR–35C) is mounted against the rear wall of the cabinet. The preselector section consists of the r-f amplifier-converter and the oscillator-multiplier sub-sections. The ganged tuning capacitors in the two sub-sections are geared togteher through a common dial-drive assembly. The receiver is tuned by means of a single front-panel tuning control.

All primary operating controls and the meters are mounted in the front panel; see figure 1–2. The crystal, the fuses, and those controls which require only occasional change for operational adjustments are in panel compartments accessible through hinged doors. Trimmer adjustment controls are readily accessible when the chassis is removed from the cabinet. Trimmer adjustments in the r-f amplifier and the oscillator-multiplier sections are accessible through holes located in the cover shields and the insulating covers of the preselector unit. Trimmer adjustments for the i-f section are located at the tops (accessible through holes in the shields) and bottoms of the i-f transformer assemblies. Cable connections for antenna, audio output, and power are made to connectors on the lower side of the low-pass filter, attached to the rear of the cabinet. There is a phone jack mounted on the front panel.

The equipment is supplied with a full complement of tubes and fuses installed, and with a spare fuse inside the right-hand access door in the front panel. The tube complement is summarized in table 1–4.

3. DESCRIPTION OF MAJOR COMPONENTS.

a. CABINET.—The receiver cabinet is fabricated from an aluminum alloy and finished in a gray enamel; see figures 1–2 and 1–3. Guide rails, located on the bottom of the cabinet, permit easy withdrawal of the panel-and-chassis assembly. When installed in a standard relay rack, the four shockmounts are removed and the angle brackets are attached to the sides of the cabinet. When the cabinet is arranged for table mounting, the angle brackets are removed and the shockmounts are attached to the bottom of the cabinet. Ventilation within the cabinet is provided by an internally mounted blower, through dust filters and louvres in the sides of the cabinet.

Figure 1-2. Radio Receiver R-482C/URR-35, Front View

b. FRONT PANEL AND CHASSIS FRAME ASSEMBLY.—An aluminum frame, attached to the front panel, mounts the preselector, IF/AF, and power supply chassis to form a complete chassis assembly; see figure 1-4. The panel is finished in gray enamel, which blends with the cabinet color, and is fitted with handles to facilitate withdrawal of the panel-and-chassis assembly from the cabinet. There is a spring-stop mechanism on each side of the chassis which allows it to be withdrawn almost all of the way out of the cabinet, but prevents it from falling out unintentionally. When these stop mechanisms are pressed upward through finger holes on the underside of the chassis frame, the panel-and-chassis assembly can be completely removed from the cabinet. Two hinged doors through the front panel, one at either side, permit access to the crystal, fuses, and semi-fixed controls or adjustments. They are held closed by knurled-head spring fasteners. These are released by turning one half turn to the left.

c. PRESELECTOR SECTION. (*See figures 1-4, 2-2 and 2-3.*)—The preselector section is mounted along the left side of the chassis frame, and comprises all parts of the r-f amplifier-converter and oscillator-multiplier sections. The r-f amplifier-converter section is above the oscillator-multiplier section, and each consists of an aluminum casting with removable metal covers. The two r-f amplifier stages and the mixer, or first detector, are mounted in the r-f amplifier-converter section. The fundamental oscillator, two frequency doubler stages, and one frequency tripler stage are mounted in the oscillator-multiplier section. Partitions in the castings provide r-f shielding between the stages.

The five-section signal-frequency tuning capacitor, C101, in the r-f amplifier-converter section is geared and synchronized to the four-section tuning capacitor, C102, in the oscillator-multiplier section. Each of these ganged capacitors consists of a number of split-stator sections, and of an equal number of rotor sections mounted on a common metal shaft. Wiping contacts ground the shaft to the casting wall. The effective rotation of the ganged capacitors is 85 degrees.

The tuning inductances for the r-f amplifier sections and for the frequency-tripler section consist of semi-circular strips of invar. Each adjustable trimmer inductance consists of two parallel rods and an adjustable shorting bar. These inductances and the concentric-cylinder trimmer capacitors are integral parts of the ganged capacitor sections. The tuning capacitors for the fundamental oscillator and for the two doubler stages are similar in construction. The oscillator coil has a ceramic form to provide a high degree of stability with temperature variations. The frequency-doubler coils are space-wound on mica-filled bakelite forms.

All the tube sockets are mounted directly over the related sections of the ganged tuning capacitors to reduce lead lengths to a minimum.

d. DIAL-DRIVE ASSEMBLY. — Tuning is accomplished by a smooth and free-running gear train mechanism employing spring-loaded gears to eliminate backlash. This mechanism provides an effective 19-to-1 reduction ratio between the tuning crank on the front panel and the main drive shaft of the preselector. There are mechanical stops at each end of the tuning

range. With this arrangement, 19 complete revolutions of the tuning crank cause the dial to rotate through its full 340 degrees, and the ganged tuning capacitors to rotate through their full 85 degrees of rotation. This covers the entire frequency range of 225 to 400 megacycles in one continuous band.

The main tuning indicator dial is 2-5/8 inches in diameter and is calibrated directly in megacycles. There is a mark at each two-megacycle division; each fifth mark is indexed; and each tenth mark is identified with the appropriate frequency numerals. Rotation of the tuning crank in a clockwise direction increases the frequency. There is a LOCK with which the tuning drive mechanism can be locked at any desired frequency setting.

The calibrated dial is illuminated from the rear by two 6-volt pilot lamps mounted behind the panel. A DIMMER control potentiometer, mounted on the front panel, permits control of the brilliance of the dial lamps. The dial lamps are located directly above the dial-drive assembly, behind the front panel.

e. IF/AF SECTION. — The IF/AF section of the chassis is shown in figure 1–4. It is located on the right-hand side of the chassis frame, and mounts the second mixer and oscillator, the i-f stages, the a-f detector, the automatic-gain-control (AGC) circuit, the silencer circuit, the noise-limiter circuit, and the three stages of audio amplification.

f. POWER SUPPLY SECTION.—The power supply section of the chassis, shown in figure 1–4, is mounted

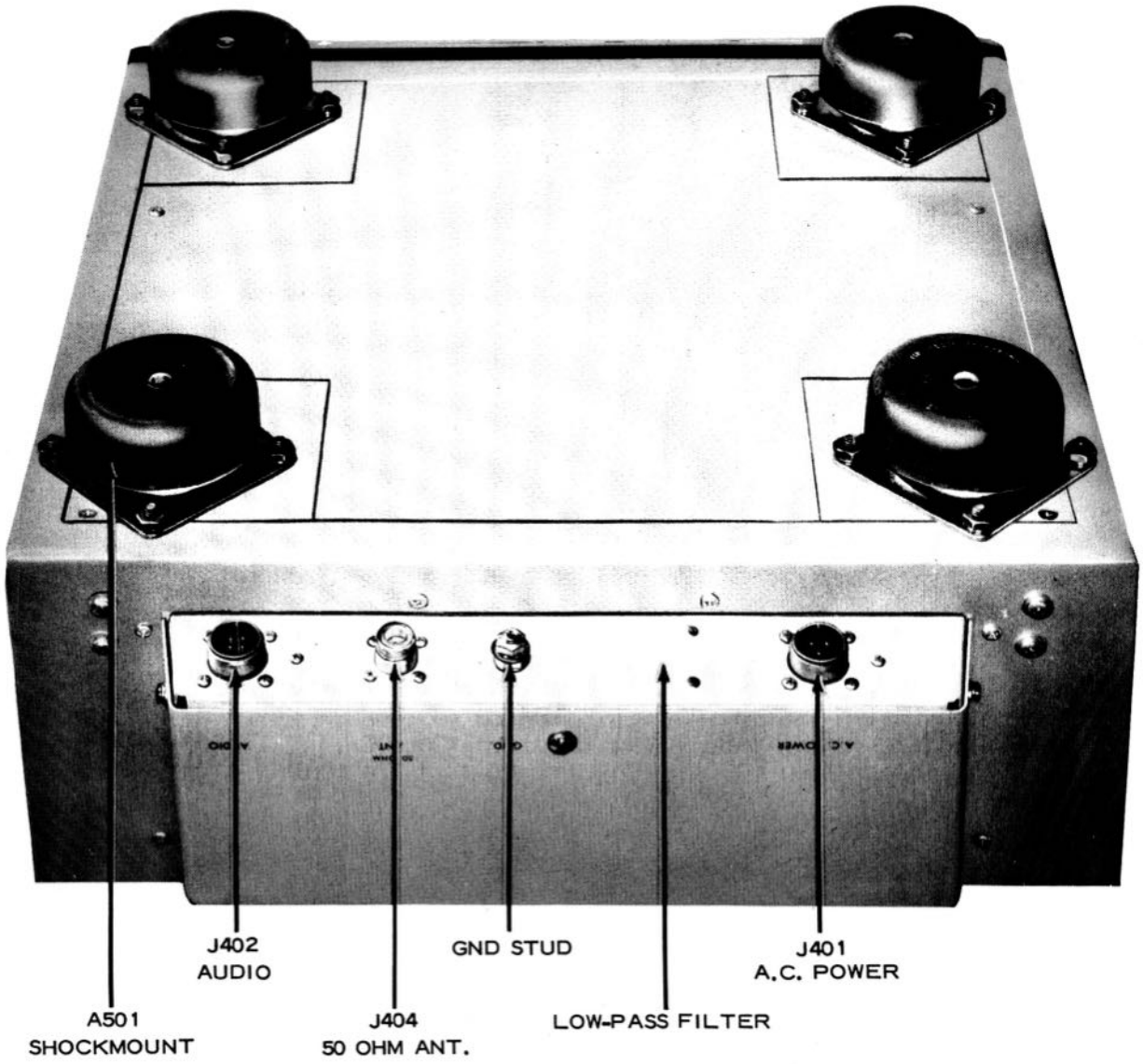


Figure 1–3. Radio Receiver R–482C/URR–35, Rear View (Upside Down) Showing Low-Pass Filter F–304/URR–35

at the rear of the IF/AF section. It includes all the circuit parts necessary to provide the a-c and d-c voltages required for operation of the equipment from a source of 105/115/125-volt, 50/60-cps, single-phase power. The ventilating blower is also mounted on this chassis.

g. LOW-PASS FILTER F-304/URR-35C.–The low-pass filter is shown in figures 1–3 and 7–20. It provides through connections from the receiver proper to the antenna input, and contains r-f noise-filter circuits for audio output and power input. The filter parts are mounted on a base plate which is attached to the rear wall of the receiver cabinet by snap-slide fasteners located on the inside of the cabinet. The filter cover, when attached to the base plate, constitutes an r-f shield. The A.C. POWER input, J401, AUDIO output, J402, and 50 OHM ANT. transmission line input, J404, are mounted on the sloping underside of the base plate. These constitute all the external connections except the headphone jack on the front panel. When the receiver panel-and-chassis assembly is slid into the cabinet, two connector plugs engage mating receptacles on the rear of the filter base plate, making the necessary connections into and out of the receiver circuits. The filter components are accessible for servicing by removing the filter cover, without removing the filter from the cabinet.

Connector plugs P401, P402, and P404 (see figure 1–1) are supplied with the equipment for use as required. A-c power is supplied through P401 and J401. The audio output signal is applied to a 600-ohm line through P402 and J402. The input signal from the antenna is brought into the receiver through P404 and J404. In each case, external cables must be fabricated using these connectors, to fit local conditions.

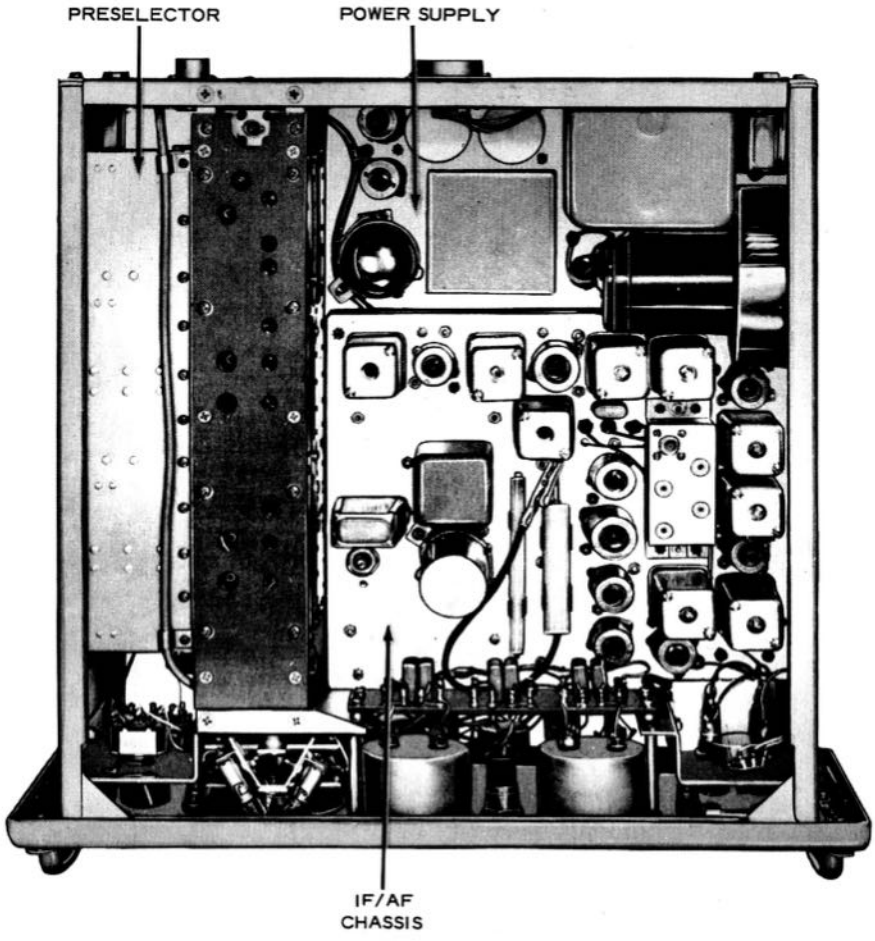


Figure 1–4. Radio Receiver R–482C/URR–35, Identification of Major Subassemblies

4. ASSOCIATED EQUIPMENT.

The components and parts described below are not supplied, but are required to complete the installation of Radio Receiving Set AN/URR–35C.

a. ANTENNA.—The antenna to be used with this receiver must be designed to have an impedance of approximately 50 ohms with characteristics that result in good matching with the transmission line over the frequency range of 225–400 megacycles. Antenna AT–150/SRC or AS–390/SRC will fulfill these requirements. The applicable installation plan will indicate the particular type of antenna to be used.

One rod or the ground plane is grounded to the supporting tube and the outer conductor of the coaxial transmission line. The "line" radiator extending vertically is supported by an insulated stud connected to the center lead of the transmission line.

b. ANTENNA TRANSMISSION LINE.—A coaxial transmission line having a nominal characteristic impedance of about 50 ohms is required for connection between the antenna and the receiver. The applicable installation drawings indicate the type to be used for this purpose.

c. PHONES AND AUDIO OUTPUT.—The audio output circuit at the AUDIO receptacle, J402, on the rear of the equipment is designed to operate into a load impedance of 60 to 600 ohms, and to maintain its output voltage constant within 3 db over this impedance range. Audio output is also wired to a phone jack, J501, on the front panel. Any 600-ohm headphones fitted with a Navy type –49109, –49016, or –49034 plug can be connected into this jack.

d. CRYSTALS.—The equipment is designed for use with a type CR–24/U crystal in the crystal clip in the left-hand front panel compartment. This should be in place whether the equipment is operated with MANUAL or CRYSTAL controlled tuning. A type CR–23/U crystal, used in the second oscillator circuit, is mounted in a socket on the IF/AF chassis. Complete data on these crystal units are given in figures 7–25 and 7–26.

5. REFERENCE DATA.

a. NOMENCLATURE.–Radio Receiving Set AN/URR–35C.

b. CONTRACT NUMBER AND DATE.–NObsr–64647, 28 February, 1955.

c. CONTRACTOR.–Rauland-Borg Corporation, 3515 W. Addison, Chicago 18, Illinois.

d. COGNIZANT NAVAL INSPECTOR. — Inspector of Naval Material, Chicago, Illinois.

e. NUMBER OF BOXES.—Two.

f. CUBICAL CONTENTS.—See tables 1–1 and 1–3.

g. WEIGHT.—See tables 1–1 and 1–3.

h. FREQUENCY RANGE.–225 to 400 megacycles.

i. TUNING BANDS.—One, continuous.

j. NUMBER OF PRESET FREQUENCIES.

(1) MANUAL TUNING.—None.

(2) CRYSTAL TUNING.—One, as determined by the crystal unit installed.

k. TYPE OF FREQUENCY CONTROL.—Crystal-controlled oscillator, used only in CRYSTAL tuning operation.

l. TYPE OF RECEIVER.—Double superheterodyne.

m. INTERMEDIATE FREQUENCIES. — 18.6 and 1.775 megacycles.

n. RECEIVER OUTPUTS.

(1) AUDIO CHANNEL OUTPUT. — 60 milliwatts maximum into a 600-ohm load, with 7 percent maximum distortion.

(2) PHONE JACK OUTPUT. — Same as (1), above.

o. TYPE OF RECEPTION.—Amplitude-modulated voice or MCW.

p. CRYSTALS.

(1) Type CR–23/U, 16.8250 mc.

(2) Type CR–24/U, 20.3000 to 34.8833 mc to cover tuning range of receiver (none supplied by contractor).

q. FREQUENCY STABILITY.—Over-all stability of receiver for any selected frequency when operated between 103.5 and 126.5 volts ac (using 115-volt transformer tap), between −20°C (−4°F) and +50°C +122°F), and between 30 percent and 90 percent humidity:

	CRYSTAL Operation	MANUAL Operation
For voltage variation	Negligible	±0.02%
For temperature variation	±0.008%	±0.1%

r. SILENCER CIRCUIT CHARACTERISTICS.

(1) EFFECTIVE SILENCING RANGE.—Up to a maximum of 300 microvolts input.

(2) AUDIO OUTPUT REDUCTION.—Up to 40 db under standard output conditions.

(3) TIME-CONSTANT.—Less than 0.2 second.

s. IMPEDANCES.

(1) ANTENNA INPUT.—50 ohms, coaxial.

(2) AUDIO CHANNEL OUTPUT. — 600 ohms nominal.

(3) PHONE JACK OUTPUT.—600 ohms nominal.

t. ANTENNA SYSTEM.—None supplied by contractor; see table 1–2.

u. POWER REQUIREMENTS.

(1) VOLTAGE.– 105 to 125 volts, 50 or 60 cps ac, single phase.

(2) CURRENT. — 0.97 amp nominal, 1.04 amp maximum.

TABLE 1–1. EQUIPMENT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS*			VOLUME*	WEIGHT*
			HEIGHT	WIDTH	DEPTH		
1	Radio Receiver	R-482C/URR-35	8-7/16	17-1/2	19-1/8	2824	55
1 Set	Connector Plugs	See table 3–1					3 oz.
1 Pair	Relay-rack mounting brackets		7	1-1/8	12		1 lb. 5 oz.
2	Instruction books	NAVSHIPS 92676	11	8-1/2	1/2	68	1-1/2
1	Maintenance spare parts		13	8-3/4	4	485	12-1/2

*Unless otherwise stated, dimensions are expressed in inches, volumes in cubic inches, and weights in pounds.

TABLE 1–2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	REQUIRED USE	REQUIRED CHARACTERISTICS
1	Antenna	AT–150/SRC or AS–390/SRC (see applicable installation drawing)	Signal pickup	1/4-wave, broad band; to cover 225–400 mc frequency range; 50-ohm terminal impedance
As required	Antenna transmission line	RG–10/U (see applicable installation drawing)	Antenna-to-receiver connection	Coaxial 50-ohm surge impedance
1 Each channel	Crystal unit	CR–24/U	Crystal control of tuning	Crystal freq. = $\frac{\text{(Channel freq.} + 18.6)\text{ mc}}{12}$
As required	Power cable	MCOS–2	Power input from 50–60 cps, 105–125 v source	2 wires; #18 or larger
As required	Audio output cable	TTHFWA–1-1/2	Audio-output connection to interphone or other audio responsive device	Twisted shielded pair
1	Headphones, with cord and plug	49985-A	Listening	600 ohms impedance

(3) POWER.—98 watts with blower off, 108 watts with blower on (at 115 volts, 60 cps).

v. SENSITIVITY.–Eight microvolts across the 50 ohm antenna input circuit, for a 10-db signal-to-noise ratio (signal modulated 30% at 1000 cps).

w. SELECTIVITY.—70 to 85 kc down 6 db; less than 190 kc down 60 db.

TABLE 1–3. SHIPPING DATA

SHIPPING BOX NUMBER	CONTENTS		OVER-ALL DIMENSIONS*			VOLUME*	WEIGHT*
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Radio Receiver and accessories	R-482C/URR-35	14	20-1/2	29-1/4	8395	86
2	Maintenance Parts Kit		13	8-3/4	4	455	12-1/2

*Dimensions are expressed in inches, volumes in cubic inches, and weights in pounds.

TABLE 1–4. ELECTRON TUBE COMPLEMENT

UNIT	NUMBER OF TUBES OF TYPE INDICATED							
	OA2	OB2	6AK6	5654/ 6AK5W	5670	5726/ 6AL5W	5931	Total No. of Tubes
Preselector				6	3			9
IF/AF Section			1	4	2	2		9
Power Supply	1	1					1	3
Total Number of Each Type	1	1	1	10	5	2	1	21

6. SIMILARITIES AND DIFFERENCES.

Radio Receiving Sets AN/URR-35, AN/URR-35A, AN/URR-35B, and AN/URR-35C are all similar in function and external appearance. The range of frequencies tuned, the operating modes, sensitivity, and response characteristics are the same for the entire series.

The AN/URR-35A is the same as the AN/URR-35 except for minor changes in the values of two resistors.

The AN/URR-35B contained a new blower and a plug-and-jack type of connection for the blower motor circuit. This facilitated repair of the blower motor. Later modifications of some of the external connectors replaced earlier versions on previous models. The value of the I.F. GAIN control was increased to a higher value for better control.

The AN/URR-35C eliminates the entire scanning circuit and the test cables which were included with previous equipment. Again, there are a few minor modifications of resistance values. The two voltage regulator tubes were replaced by the "WA" versions, which are late models of tube types OA2 and OB2.

All parts are interchangeable between the various models of the AN/URR-35() series except for the Low Pass Filter, F-304/URR-35C, which is furnished with Radio Receiving Set AN/URR-35C. Since it has no provision for the scanning circuit, connector P201 on the rear of the receiver chassis (all models except R-482C/URR-35) will prevent Low Pass Filter F-304/URR-35C from making contact in the other two connectors between the receiver and the filter.

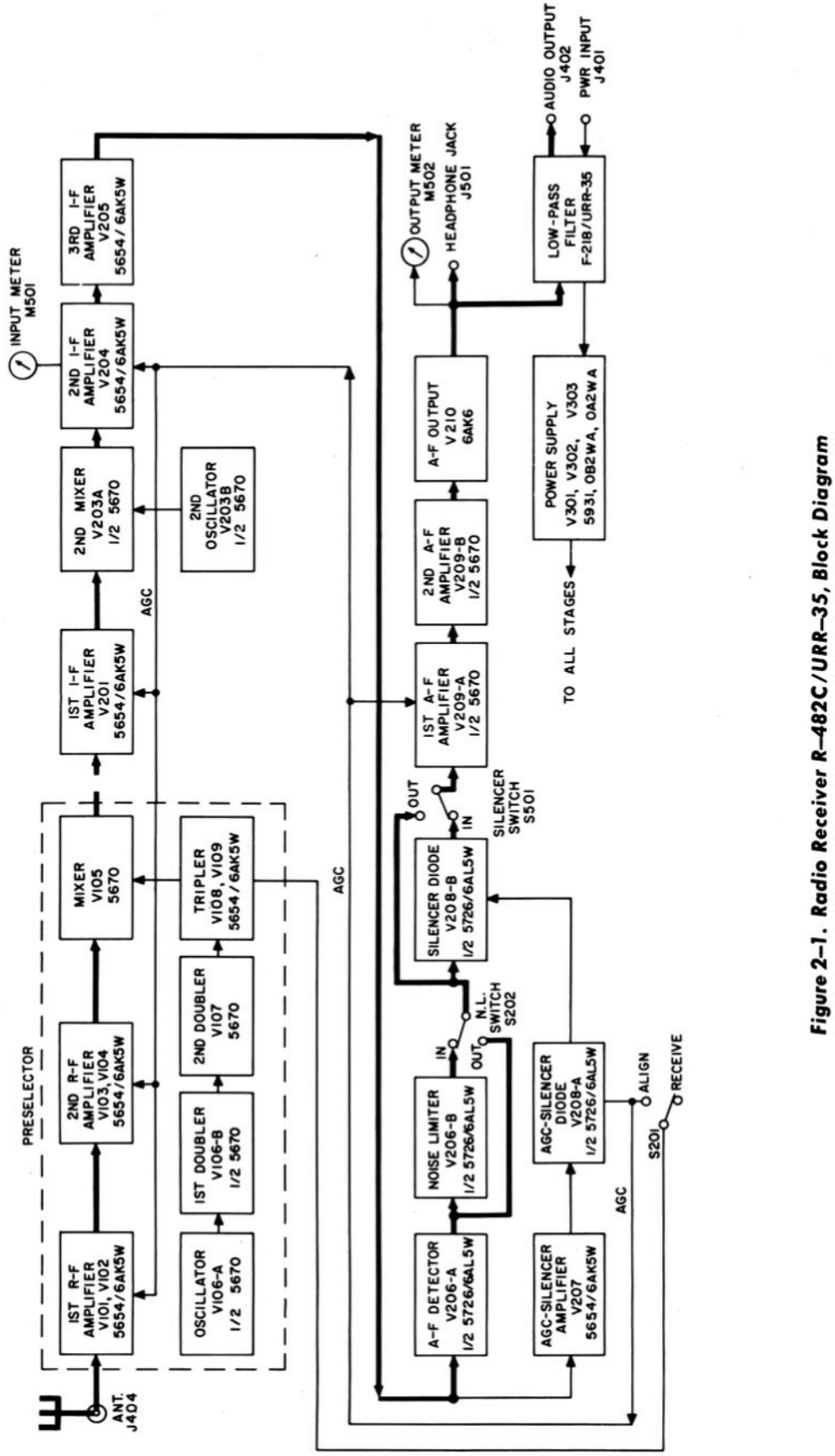


Figure 2–1. Radio Receiver R–482C/URR–35, Block Diagram

SECTION 2
THEORY OF OPERATION

1. GENERAL PRINCIPLES.

Radio Receiver R-482C/URR-35 is of the superheterodyne type, employing two frequency conversions. It is designed for either manual tuning or crystal-controlled operation over a frequency range of 225 to 400 megacycles. The receiver produces an audio output to headphones or to an external speaker or inter-communication system.

As shown in the block diagram, figure 2–1, the receiver is basically conventional in most respects. Two stages of r-f amplification precede the mixer stage. The local injected signal is obtained from an oscillator followed by three stages of frequency multiplication. The oscillator functions as either a crystal-controlled or a self-excited circuit, depending on the position of the OSC. switch. The five-gang capacitor which tunes the r-f and mixer stages is geared to the four-gang capacitor in the oscillator-multiplier section to provide single-control tuning. All stages in the receiver "front end" are part of a compact preselector subassembly.

The received signal is converted to an intermediate frequency of 18.6 mc in the mixer stage of the r-f amplifier section. This signal is then coupled to the first i-f amplifier, which is in the IF/AF section of the receiver. The output of the first i-f amplifier is applied to the second mixer, where the signal is mixed with the output of the crystal-controlled second oscillator. The i-f signal is converted to a frequency of 1.775 mc in the second mixer and then applied to the second i-f amplifier. This amplified signal is then applied to the third i-f amplifier, which further amplifies the signal before it reaches the a-f detector and the AGC-silencer amplifier. The detected a-f signal is fed to the first audio amplifier via the noise limiter and the silencer diode. Each of these two stages may be disabled operationally, if so desired, by means of a front-panel control (N.L. and SILENCER switches, as applicable).

The signal from the first a-f amplifier is applied through the A.F. LEVEL potentiometer to the second a-f amplifier and then to the audio-output stage. The audio-output stage applies its signal through a transformer to the headphone jack, to the OUTPUT meter, and to the AUDIO connector. These outputs are connected in parallel from the secondary of the output transformer.

The silencer circuit and the AGC circuit are interrelated. As previously stated, the signal from the third i-f amplifier is applied both to the a-f detector diode and to the AGC-silencer amplifier. The i-f signal is further amplified by the AGC-silencer amplifier and then applied to the AGC-silencer diode. The rectified output of this stage is used both as AGC voltage and as the control voltage for the silencer diode. When no signal is being received, or a signal below a preset level is received, the silencer-diode cathode is biased to a value which cuts off the silencer diode. When the received signal is greater than this preset level, the output of the AGC-silencer diode reduces the bias to a level which will permit the silencer diode to conduct.

2. DETAILED CIRCUIT ANALYSIS.

a. PRESELECTOR. (*See figures 2–2 and 2–3.*)

(1) R-F AMPLIFIER SECTION.

(*a*) ANTENNA INPUT.—The antenna input circuit of Radio Receiver R-482C/URR-35, having a nominal 50-ohm impedance, is to be used with coaxial transmission line. The transmission line connects to the 50 OHM ANT. receptacle, J404, located on the rear of Low-Pass Filter F-304/URR-35C at the rear of the receiver. Plug P404 has to be assembled to the transmission line to complete this connection.

A short piece of coaxial cable in the filter extends the antenna transmission line to connector J407, at the rear of the filter base plate (figure 3–3). This connector, in turn, plugs into coaxial receptacle P101, from which the antenna circuit extends to the tuned circuit composed of L101, C161, and L121; see figure 2–4. This circuit is inductively coupled to L102, in the input circuit of the first r-f stage.

Inductance L101 is an assembly consisting of an outer conductor of bent copper tubing, with an insulated inner conductor. Capacitor C161 serves to tune out the inductive reactances in the antenna input circuit.

(*b*) TUNING CAPACITOR ASSEMBLY.—The grid and plate circuits of the two r-f amplifier stages and the grid circuit of the mixer stage are arranged in push-pull, and are tuned by means of a balanced-type, five-gang capacitor.

Each section of this capacitor consists of a split-stator plate assembly and a rotor plate assembly mounted on a common metal shaft. The rotor of the capacitor is grounded to the chassis frame by means of wiping contacts. The trimmer inductances, L103, L104, L107, L108 and L111, and the trimmer capacitors, C140 through C144, are integral parts of the stators and are connected across the split-stator plates. The tank circuit inductors, L102, L105, L106, L109, and L110, are semi-circular metal loops, and are also integral

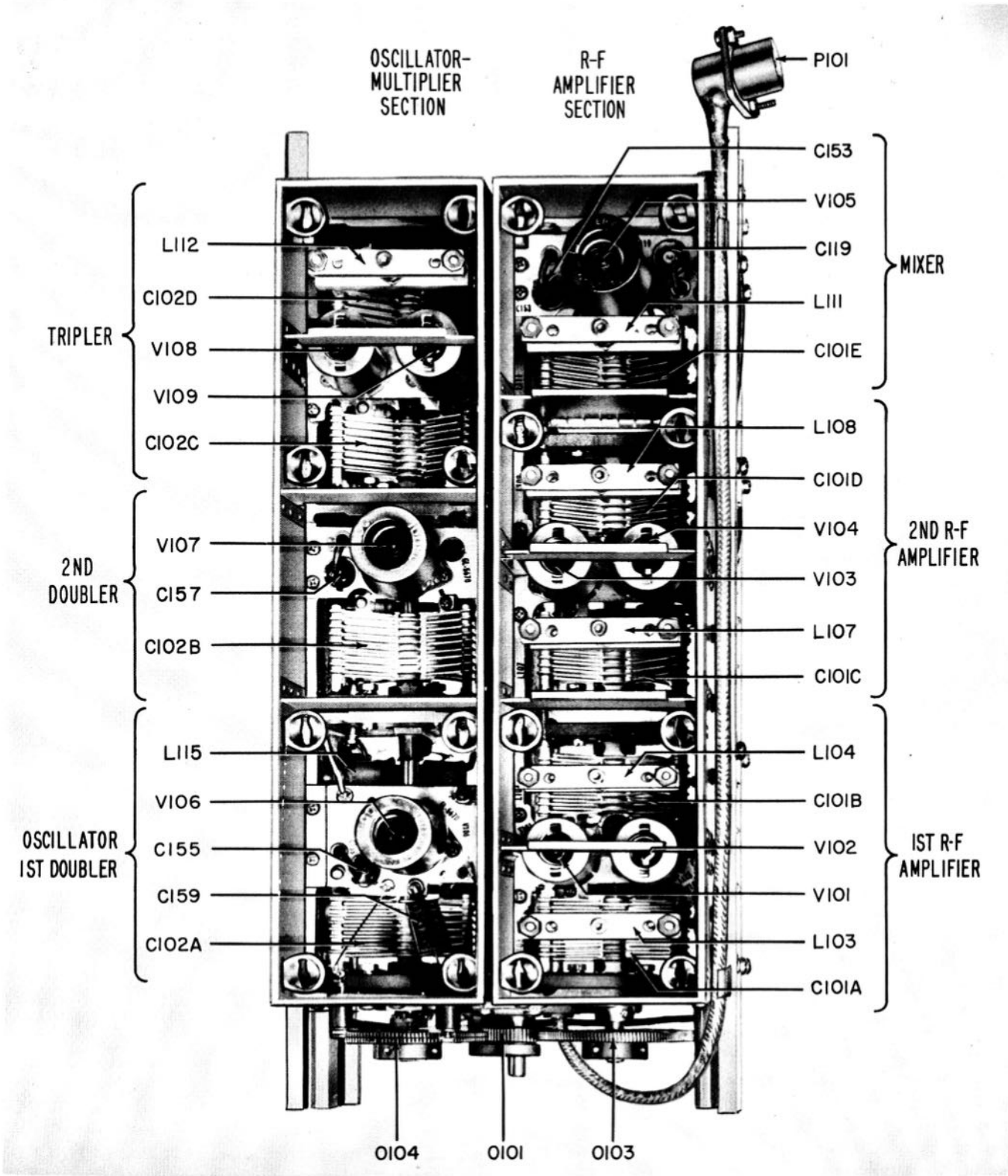


Figure 2–2. Preselector Viewed from Left Side of Unit, Shielding Covers Removed

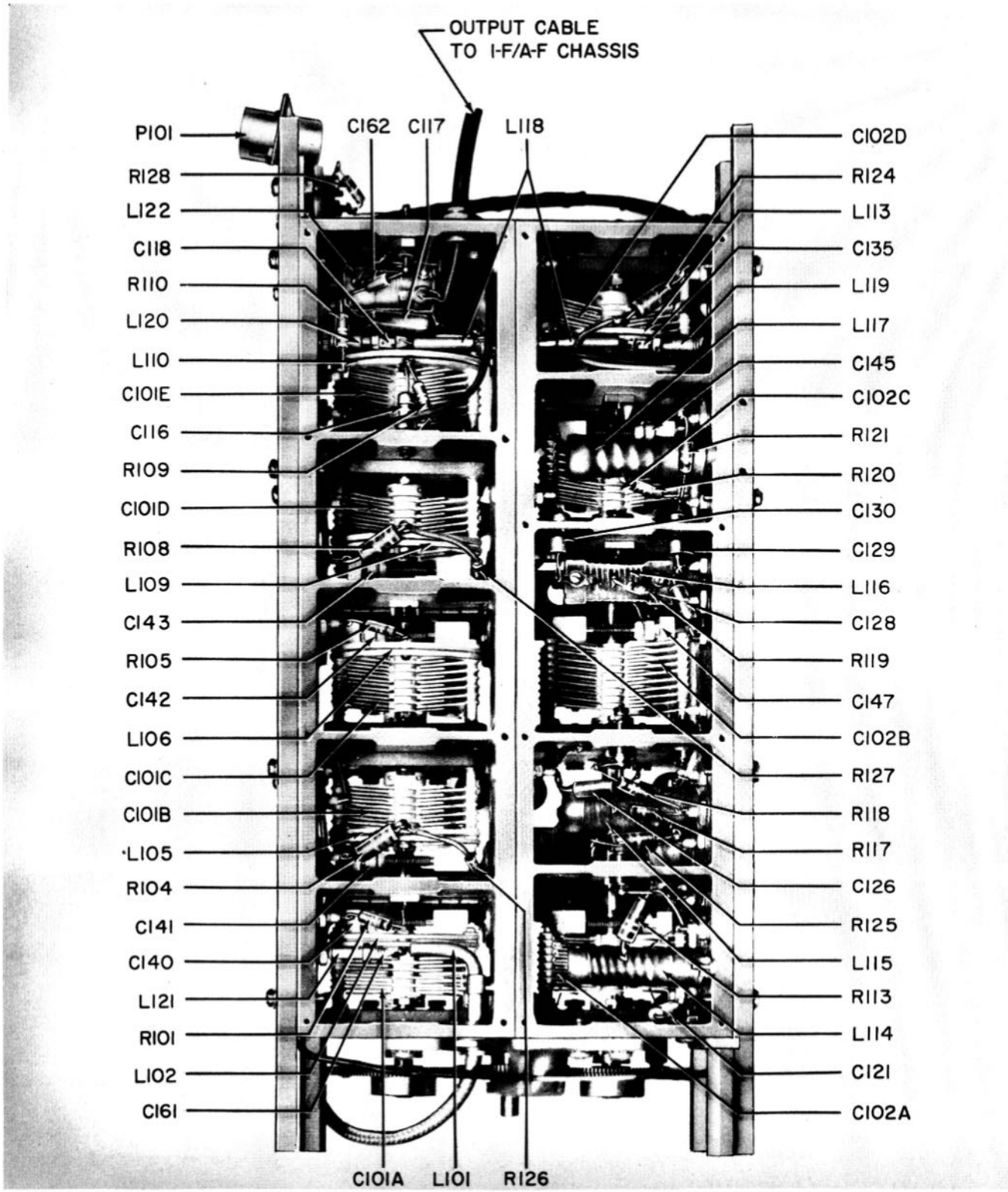


Figure 2–3. Preselector Viewed from Bottom of Unit, Shielding Covers Removed

parts of the stators. The trimmer inductors (figure 7–8) each consist of two parallel round rods connected by a shorting bar. Changing the position of the shorting bar varies the inductance of each coil. Each concentric-cylinder type trimmer capacitor consists of a metal block mounted on one stator section, and a partially threaded rod which extends from a bracket on the other stator section into the center bore in the block. The block and rod constitute, respectively, the stator and rotor plates of the trimmer capacitor. The capacity of the trimmer is varied by turning the rod to adjust the amount of projection into the block. An insulating tube in the bore of the block serves as the dielectric.

(*c*) FIRST R-F AMPLIFIER.—As shown in the simplified schematic diagram, figure 2–4, the antenna circuit is coupled to the grid-input circuit of this stage. The grid circuit consists of tank inductance L102, trimmer inductance L103, section A of capacitor C101, and trimmer capacitor C140. Critical coupling maintains uniform sensitivity over the entire frequency range. Two type 5654/6AK5W tubes, V101 and V102, are operated in push-pull. This circuit arrangement effectively reduces the resulting circuit capacity and inductance to approximately one half the values which would be present with a single tube. This permits a greater range of frequency coverage and a higher circuit operating efficiency. AGC voltage is applied to the grid circuit of the stage through decoupling resistor R101 and the center tap of coil L102. A feed-through type of r-f bypass capacitor, C105, functions to bypass the AGC line at this point. Capacitor C105 is located in the casting wall. Plate and screen voltages are connected through resistor R104, and the B+ circuit is bypassed with capacitor C112. Resistors R102 and R103 are screen-voltage dropping resistors, and resistor R126 decouples the plate and screen circuits. The screen grids are bypassed to ground through the interelectrode capacities of the tubes and the stray wiring and socket capacities. Capacitors C103 and C104 overcome the inductance of the cathode leads, and effectively bring the cathodes closer to r-f ground potential. The plate circuit is similar in design to the grid circuit, and consists of tank inductance L105, section B of tuning capacitor C101, trimmer inductance L104, and trimmer capacitor C141. Plate voltage is brought through resistor R104 to the center tap of coil L105. Coils L105 and L106 are shielded from each other by the wall of the casting, so there is practically no inductive coupling between them. Instead, the coupling from the first r-f stage to the second r-f stage is accomplished through capacitors C108 and C109. These capacitors connect directly from the plate circuit of the first r-f stage to the grid circuit of the second r-f stage.

(*d*) SECOND R-F AMPLIFIER. — This stage, using tubes V103 and V104 in push-pull, is identical in design and in circuit constants to that of the first r-f stage; see figure 2–4. The tuned grid circuit consists of section C of tuning capacitor C101, tank

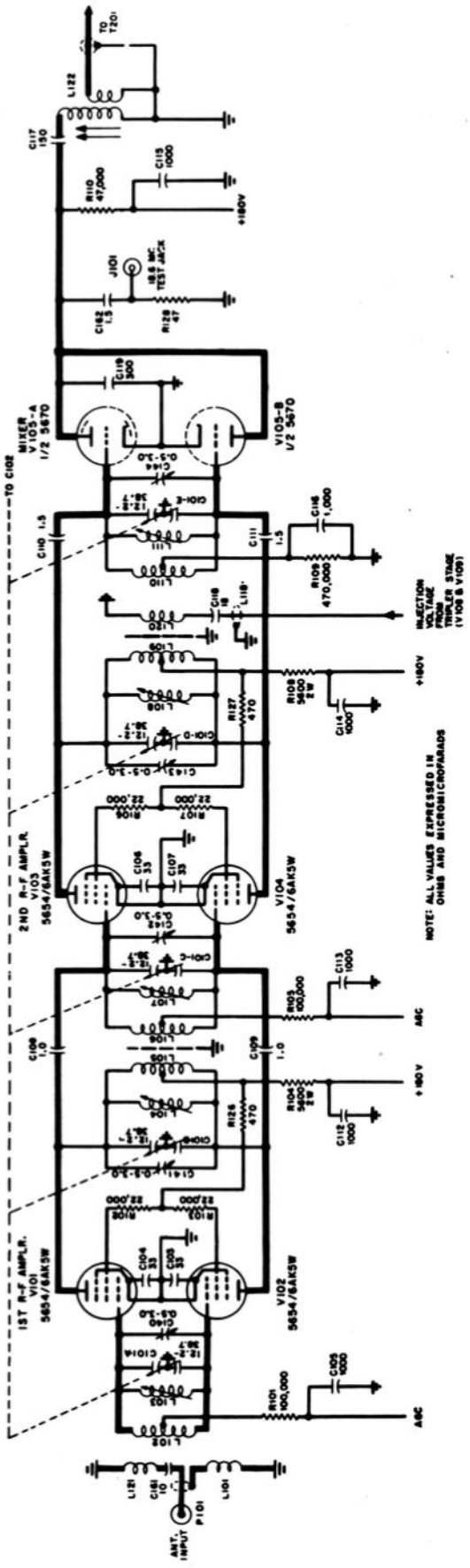


Figure 2–4. R-F Amplifier Section of Preselector, Simplified Schematic Diagram

inductance L106, trimmer inductance L107, and trimmer capacitor C142. The plate circuit consists of section D of tuning capacitor C101, tank inductance L109, and trimmers L108 and C143. AGC voltage is applied to the center tap of coil L106 through decoupling resistor R105; the AGC line is bypassed to ground through capacitor C113. Plate and screen voltages are brought through resistor R108; the supply is bypassed to ground through capacitor C114. Resistors R106 and R107 are screen-voltage dropping resistors, and resistor R127 decouples the plate and screen circuits. The screen grids are bypassed to ground through the interelectrode capacities of the tubes and the stray wiring and tube socket capacities.

(*e*) MIXER.—The mixer, or first detector, stage uses a type 5670 dual triode tube, V105, connected in a push-push arrangement; see figure 2–4. The grids are connected in push-pull through the resonant circuit consisting of section E of tuning capacitor C101, tank inductance L110, trimmer capacitor C144, and trimmer inductance L111. The plates of the two triodes are connected directly together and receive their voltage through resistor R110. Plate voltage is blocked from the grounded primary of L122 by capacitor C117. This capacitor and capacitor C119, connected in series, resonate with L122 at the intermediate frequency of 18.6 mc. The plates of tube V105 are connected to the junction of the two capacitors in order to provide impedance matching between the tube and the tuned circuit. With the push-push arrangement of the mixer, a high gain is obtained in the frequency conversion, because the push-push conversion transconductance is approximately twice that of a single converter tube.

The output of the second r-f stage is coupled to the grid circuit of the mixer stage through capacitors C110 and C111. The output of the oscillator-multiplier circuit is inductively coupled to the grid circuit of the mixer through a coupling loop consisting of inductance L119 and capacitor C135 in the oscillator-multiplier unit (figure 2–5), and inductance L120 and capacitor C118 in the r-f mixer (figure 2–4). Coaxial cable L118, which acts as an RF coil, provides inductive and direct coupling between the oscillator-multiplier and the mixer. This coupling arrangement maintains a more uniform mixer-injection voltage throughout the frequency range of operation. The values of capacitors C118 and C135 are chosen so that, together with the shunt capacity of the short coaxial connecting line and the coupling coils, the loop is series resonant at a frequency below the low end of the band (190 mc), and is parallel resonant at a frequency above the high end of the band (470 mc). Consequently, at the low-frequency end, the transfer voltage induced in the mixer input tank is increased, while at the high-frequency end of the band the induced transfer voltage is decreased. If the coupling were not resonated, as described above, the induced voltage would tend to drop off at the low-frequency end of the band, due to the change in Q of the oscillator-multiplier tank circuits.

The output of the mixer stage is link-coupled to the grid circuit of the first i-f stage. This type of coupling is necessary because of the physical layout of the equipment. The plate inductance of the mixer, L122, is contained in the mixer compartment of the r-f amplifier casting, while the i-f input transformer, T201, is located on the IF/AF chassis. A length of RG58/U coaxial cable joins the secondary winding of transformer L122 in the preselector to the primary winding of transformer T201 on the IF/AF chassis, thus establishing a low-impedance inductive coupling between the two stages. The 18.6-mc test jack, J101, has been provided so that test signals may be inserted through capacitor C162 into the mixer output transformer. Resistor R126 terminates the lead from the test signal generator.

Plate voltage for tube V105 is applied to both plates through decoupling resistor R110. The supply voltage is bypassed to ground through capacitor C115. The grids of the mixer tube are biased by the voltage developed across grid-leak resistor R109, which is bypassed by capacitor C116. This biasing network is connected to the grids through the center tap of inductance L110.

(2) OSCILLATOR-MULTIPLIER SECTION.—The oscillator-multiplier section generates a local injection signal which has a frequency 18.6 mc higher than the received signal. The basic oscillator frequency is generated in triode V106A, and is multiplied 12 times in the two doublers and one tripler which follow; see figure 2–5. When the OSC. switch, S203, is in the MANUAL position, the range of the oscillator is from 20.2063 to 35.05 mc, and the frequency at the plate of the tripler may range from 242.4756 to 420.60 mc, allowing the radio receiver to operate over a frequency range of 223.8756 to 402.0 mc. When switch S203 is in the CRYSTAL position, the receiver will operate at the frequency determined by the crystal unit, within the frequency range of 222.75 to 404.0 mc. The fundamental frequencies of the crystals will be between 20.115 and 35.2167 mc.

Tuning of the various stages is accomplished by capacitor C102, which has four sections, each a split-stator type. The use of split-stator capacitors in the balanced tank circuits permits the use of a grounded rotor to reduce inter-sectional capacitance. Rotor grounding is accomplished through wiping contacts. Since there is no appreciable amount of r-f current through these contacts, the inherent noise associated with wiping contacts is not present. Capacitor C102 is geared to the five-section capacitor, C101, to provide single-control tuning for the receiver; see figures 2–2 and 2–3. The trimmer inductance of the tripler stage and the trimmer capacitors in all the stages of the oscillator-multiplier section are integral parts of the tuning capacitor, similar to those described previously in subparagraph 2*a*(1)(*b*) of this section.

(*a*) OSCILLATOR-FIRST DOUBLER.—The oscillator and first doubler stages are considered toge-

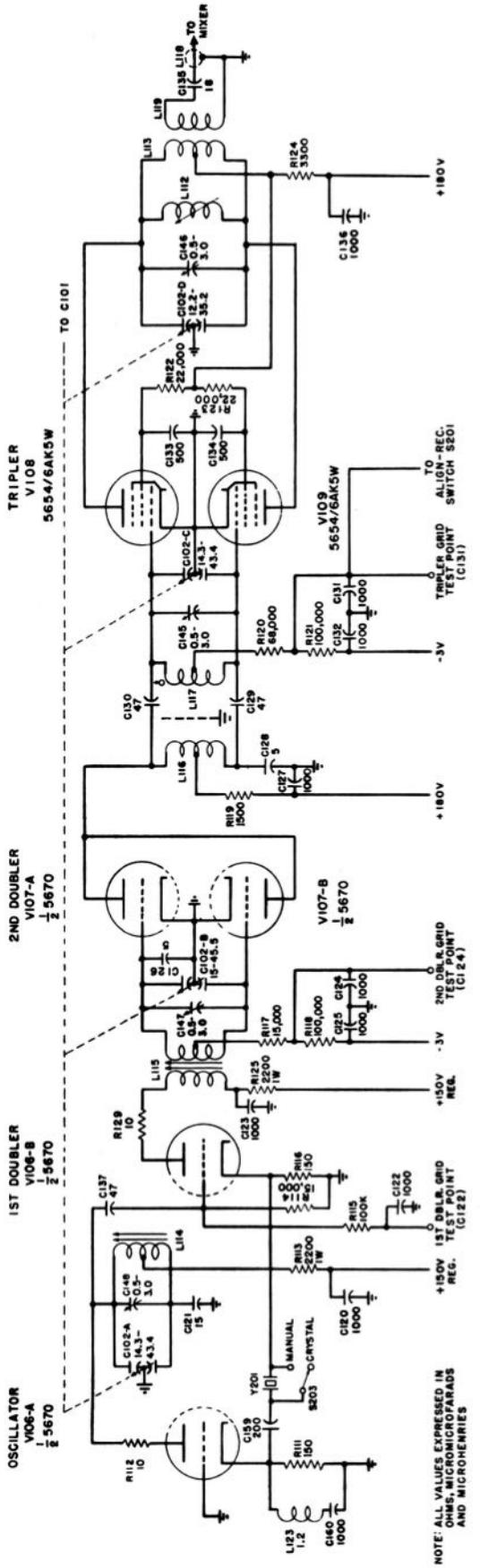


Figure 2–5. Oscillator-Multiplier Section of Preselector, Simplified Schematic Diagram

ther because they are inter-related. They each use one half of a type 5670 dual triode tube, V106; see figure 2–5. One half of the tube, V106A, functions as a grounded-grid oscillator. The second half of the dual triode, V106B, is arranged as a split-load cathode follower, and serves both as a frequency doubler and as a source of feedback to the oscillator cathode.

To explain how the oscillator works, figure 2–6 shows an equivalent, but simplified, circuit. L and C form a tank circuit in the plate circuit of the oscillator, V1; it is tuned to the fundamental resonant frequency of crystal Y1. Oscillations appearing at the plate of V1 are coupled through to the grid of V2 through C1. V2 acts as a cathode follower, with its output voltage across the cathode circuit being in phase with the output from V1. Crystal Y1, oscillating in a series-resonant mode, transmits the voltage at the cathode of V2 back to the cathode of V1. In turn, V1 acts as a grounded-grid amplifier and reinforces the oscillations at its plate. Thus, the positive feedback necessary to sustain oscillation is obtained, but only at the frequency at which the crystal is resonant.

If the crystal were shorted out, the positive feedback path from V2 to V1 would remain, but would no longer be frequency selective. Therefore, the frequency of oscillation would be determined by the resonant at frequency of the L-C tank in the plate circuit of V1.

In the actual circuit (figure 2–5), V106A and V106B correspond, respectively, to V1 and V2 of figure 2–6. Y201 corresponds to Y1, while R111, R116 and C137 are equivalent to R1, R2, and C1, respectively. The oscillator tank circuit, L114, C102A, and C148, corresponds to the simplified components, L and C. The plate circuit of the first doubler, V106B, is tuned to the second harmonic of the oscillator frequency. Therefore, the impedance of the plate circuit at the oscillator frequency is very low, resulting effectively in grounded-plate (cathode follower) operation of V106B at that frequency.

The oscillator functions as a crystal-controlled circuit when OSC. switch S203 is in the CRYSTAL position. The crystal, Y201, is a harmonic-mode type CR–24/U, which establishes the frequency of the feedback voltage from the cathode of V106–B to the cathode of V106–A. Capacitor C159, in series with the crystal, is utilized to resonate the inductance of the crystal leads so that zero phase shift exists between the two cathodes.

For manual tuning, the crystal is shorted out when switch S203 is in the MANUAL position. V106A then functions as a free-running oscillator, with its frequency determined by the setting of tuning capacitor C102A. Since the feedback path between the two cathodes of the two triode sections is not frequency selective, the free-running oscillator is less stable than the crystal-controlled type of operation.

On MANUAL operation, the receiver may be operated either with or without a crystal in the crystal

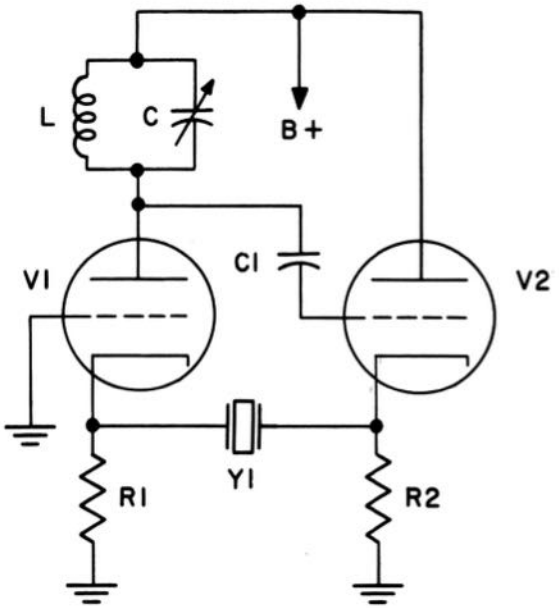


Figure 2–6. Oscillator, Simplified Equivalent Circuit

socket. However, since the original factory adjustment of the receiver was made with a crystal in the socket, it follows that dial calibration will be more accurate, and the reserve gain greater, if the receiver is operated with a crystal in the crystal socket during MANUAL operation. In the neighborhood of 400 megacycles, the resonant frequency of the receiver increases approximately 0.1 percent when the crystal is removed from the socket. Near 225 megacycles, the corresponding increase is approximately 0.04 percent. This effect is attributed to the fact that there is some capacity between the crystal and ground, which also exists effectively between the cathodes of the oscillator tubes and ground. When the crystal is removed from the socket, this capacity is removed, and so there is a shift in the oscillator frequency.

The oscillator tank consists of section A of tuning capacitor C102, trimmer capacitor C148, and inductance L114. The tank circuit is kept balanced by capacitor C121, which equalizes the output capacitance of V106A. Resistor R112 tends to suppress spurious oscillations. Inductance L123 offsets the heater-cathode capacitive reactance to minimize phase shift of the feedback voltage from the cathode of V106B to the cathode of V106A. Capacitor C160 prevents L123 from shorting the bias developed across resistor R111 to ground. Plate voltage is fed to the center tap of L114 through resistor R113 from a 150 volt regulated source. Capacitor C120 is the bypass for radio frequencies for the voltage source.

The output of the oscillator stage is coupled to the grid of the first doubler through capacitor C137. Grid bias for V106B is provided by the voltage drop across resistor R116 and by the drop across grid-leak resistor R114. Plate voltage is applied through the untunned primary of bifilar-wound transformer L115. Voltage is obtained from a 150 volt regulated source through decoupling resistor R125, and the circuit is bypassed for radio frequencies with capacitor C123.

The first-doubler cathode circuit is not bypassed, so that the r-f voltage dropped across resistor R116 may be fed back to cathode resistor R111 in the oscillator. The values of R111 and R116 are such that the feedback is limited, but is large enough to prevent oscillations which might occur due to the capacitance across the crystal holder.

There is a test point at the grid of the first doubler to measure the d-c bias on the tube. The amount of voltage measured indicates the amount of drive from the oscillator. Resistor R115 and capacitor C122 decouple the grid circuit from the test point.

(*b*) SECOND DOUBLER.—The second doubler stage uses two sections of the type 5670 dual triode, V107, in a push-push circuit arrangement; see figure 2–5. The grid circuit is balanced and is tuned to the second harmonic of the oscillator frequency. The tuned circuit consists of the center-tapped secondary winding of transformer L115, section B of tuning capacitor C126 compensates for the capacitance unbalance to ground in the secondary winding of transformer L115.

The grids are returned through the center tap on the secondary of L115 and through resistors R117 and R118 to a —3-volt tap on the power supply. This bias voltage functions to prevent excessive rise in plate current if the driving voltage is removed. Capacitors C124 and C125 function to bypass r-f currents around this circuit. A test point, connected to the junction of resistors R117 and R118, provides means for measuring the second-doubler grid-leak bias. This indicates the relative amount of drive from the first doubler.

The plates of tube V107 are connected together for the push-push arrangement, and untuned inductance L116 is the plate load. This inductance is center tapped to provide a balanced load for coupling to the grids of the tripler stage. Capacitor C128, at the ground side of L116, functions to balance the output capacitance of the second-doubler triodes at the opposite end of the inductance. Plate voltage is applied through decoupling resistor R119 to the center tap of L116. Capacitor C127 is an r-f bypass for the B+ circuit. Coils L116 and L117 are isolated by the preselector casting, and have no noticeable inductive coupling. Instead, capacitors C129 and C130 connect the grids of the tripler stage.

The push-pull circuit arrangement reduces the generation of odd harmonics. This eliminates the possibility of resultant spurious signals, which might otherwise be amplified and radiated by the receiver antenna.

(*c*) TRIPLER.–The tripler stage uses two type 5654/6AK5W pentodes, V108 and V109 in push-pull; see figure 2–5. The parallel-resonant grid cir-

cuit consists of inductance L117, section C of tuning capacitor C102, and trimmer C145. It is tuned to the fourth harmonic of the oscillator fundamental frequency. The center tap of L117 is returned through resistors R120 and R121 to the −3 volt grid-bias tap in the power supply. This bias voltage functions to prevent excessive plate currents in the tubes if their driving voltage is removed. The bias circuit is bypassed to ground for r-f by capacitors C131 and C132. A tap at the junction of resistors R120 and R121 provides a metering point for checking to see that there is driving voltage applied to the grids of the tripler from the second-doubler. Grid-leak bias voltage developed across resistor R120 indicates the relative amount of driving voltage. This tap is also connected to the ALIGN position of switch S201 for alignment purposes; see paragraph 2*f* of this section.

The plate circuit of the tripler stage is tuned to a frequency which is three times its grid input frequency. This produces a total multiplication of 12 times the fundamental oscillator frequency, and results in an output frequency which is 18.6 mc higher than the received frequency. The tripler plate circuit is a parallel-resonant combination of inductances L112 and L113, and capacitors C102D and C146. Inductor L113 and capacitor C146 are trimmers, and capacitor C102D is a part of the tuning capacitor. Plate and screen voltages are applied through resistor R124 to the center tap of L113 and the junction of screen voltage dropping resistors R122 and R123, respectively. Capacitors C133, C134, and C136 bypass radio frequencies to ground, as required.

The output of the tripler stage is coupled through inductor L119 and capacitor C135 in the oscillator-multiplier section of the preselector, and through capacitor C118 and inductor L120 on the r-f converter chassis, to the grid of the mixer stage, as described in paragraph 2*a*(1)(*e*) of this section.

b. I-F AMPLIFIER AND CONVERTER STAGES.—The mixer output is link-coupled to the IF/AF chassis. The first stage on that chassis is tuned to the first intermediate frequency, 18.6 mc. This signal is converted to a frequency of 1.775 mc in the second mixer, and then applied to two more i-f amplifiers, tuned to the second intermediate frequency. The third i-f amplifier is followed by the detector, noise limiter, and AGC circuits, and then by two a-f amplifiers, which precede the audio output stage. The overall i-f selectivity curve is shown in figure 7–6.

(1) FIRST INTERMEDIATE-FREQUENCY AMPLIFIER.—The i-f signal from the mixer stage of the r-f amplifier section is link-coupled into transformer T201. This transformer, tuned to resonance at 18.6 mc, feeds the grid of the first i-f amplifier, V201; see figure 2–7. The first i-f amplifier is a 5654/6AK5W pentode. AGC voltage is applied through resistor R201 and the transformer to the grid of the i-f amplifier. The AGC system is decoupled from the i-f signal by resistor R201 and capacitor C201A. The plate and screen voltages for V201 are obtained from the +180 volt supply through the i-f gain control, R233. Screen voltage is supplied from this potentiometer through screen-voltage dropping resistor R205. This screen is decoupled from the power supply by this resistor and by capacitor C202A. Plate voltage is supplied from potentiometer R233 through resistor R206 and through i-f transformer T202. Capacitor C202B and resistor R206 serve to decouple the power supply from the plate circuit. The output signal from the amplifier is applied to i-f transformer T202, which is a shielded and double-slug-tuned i-f transformer. It is tuned to resonance at 18.6 mc.

Potentiometer R233 is connected as a rheostat, and is the I. F. GAIN control. With it, the actual amount of voltage available for the screen and plate circuits of the first i-f stage can be varied. With less resistance in the circuit, there will be more voltage and a greater resultant gain. Conversely, more resistance decreases plate and screen voltages, and reduces the gain of the stage. The proper adjustment for this control is shown in paragraph 4*c* of Section 7.

(2). SECOND OSCILLATOR.—Triode V203B, one half of a type 5670 tube, is used as a crystal-controlled oscillator in order to create a heterodyning signal for the second of the two frequency conversions in this radio set; see figure 2–7. The crystal, Y202, is a type CR-23/U, cut to have a nominal frequency of 16.8250 mc. Grid-leak bias is supplied for the oscillator tube by resistor R209, connected from the control grid to ground and in parallel with the oscillator crystal. Plate voltage for the stage is supplied from the +105 volt source to the plate through oscillator transformer T203. The output signal is applied to the mixer stage from a tap on the transformer coil. The oscillator may be tested by measuring the grid voltage developed across resistor R209 at test point J202. This test point is connected to the common junction of the grid, the grid-biasing resistor, and the crystal, through resistor R210. Resistor R210 and capacitor C244 form a low-pass filter, which isolates the grid circuit from the meter used to measure the grid bias. The sine-wave signal applied to the grid by the oscillator crystal is amplified in the tube and applied to transformer T203. A portion of the signal is applied from a tap on the transformer winding (for impedance matching) to capacitor C208, and from this capacitor to the cathode of the second mixer.

(3) SECOND MIXER.—The second mixer, V203A, is one half of a 5670 twin-triode tube, as shown in figure 2–7. The i-f input signal is applied through the secondary winding of i-f transformer T202 to the control grid of the mixer, and the oscillator injection voltage is applied to the cathode. Resistor R266, in the grid circuit, tends to prevent spurious oscillation, while cathode resistor R211 serves as the point of oscillator injection. Plate voltage is supplied to this stage through resistor R212 and i-f transformer T204.

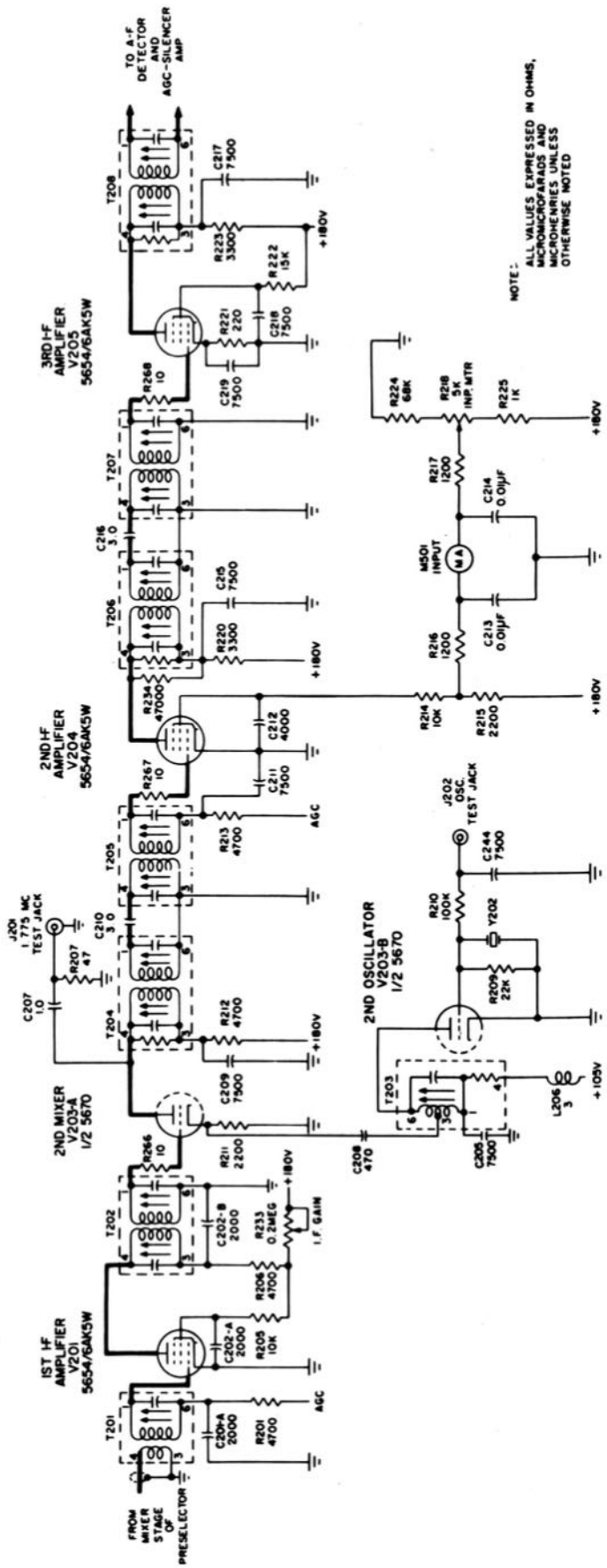


Figure 2-7. I-F Amplifiers and INPUT Meter Circuit, Simplified Schematic Diagram

Resistor R212 and capacitor C209 decouple the power supply from the i-f signal in transformer T204.

Mixing takes place inside the tube, as the i-f signal and the heterodyning signal are applied, respectively, to the control grid and cathode of the mixer stage. Both of these frequencies and the sum and difference frequencies are present in the plate circuit of the tube; however, the second i-f transformer, T204, is sharply tuned to resonance at the difference frequency of 1.775 mc, so this frequency, only, develops output voltage, and the others are all bypassed. The primary of transformer T204, which is the plate load for the mixer, is loaded by a resistor. Capacitor C210 couples the signal from the secondary of transformer T204 to the primary of transformer T205.

Test jack J201 permits test signals to be applied through capacitor C207 into the 1.775 mc i-f stages. Resistor R207 terminates the cable connection from the test signal generator.

(4) SECOND AND THIRD INTERMEDIATE-FREQUENCY AMPLIFIERS.—The components and circuitry of the second and third i-f amplifier stages are almost identical; see figure 2–7. The essential difference between the two i-f amplifier stages is that the gain of the second i-f amplifier stage is controlled by the AGC voltage, while the third i-f amplifier stage is self-biased.

Power is supplied to the type 5654/6AK5W second and third i-f amplifiers, V204 and V205, from the +180-volt source, through the i-f transformers to the plates. The screen grids also are supplied from the +180 volt source. The resistor, R267 and R268, in the control grid circuit of each stage prevents spurious oscillation.

Between the second mixer and the second i-f amplifier, there is an interstage coupling network consisting of i-f transformers T204 and T205. Between the second and third i-f amplifiers, there is another interstage coupling network consisting of transformers T206 and T207. Each of these coupling networks functions as a quadruple-tuned circuit. This results in an i-f passband with a relatively flat top and with very steep sides, to obtain the desired selectivity; see figure 7–6. Transformer T208, between the third i-f amplifier and the a-f detector, is a conventional double-tuned network. Each of the windings in the i-f transformers which connect to d-c voltages is decoupled from the power supply by a resistance-capacity network. Resistor R213 and capacitor C211 decouple the AGC line from the secondary of transformer T205. Resistor R220 and capacitor C215 decouple the B+ line from the primary of transformer T206. Resistor R223 and capacitor C217 decouple the B+ line from the primary of transformer T208.

(5) INPUT METER CIRCUIT.—INPUT meter M501 indicates the approximate incoming signal strength. It also serves as an alignment indicator for the oscillator-multiplier section when switch S201 is placed in the ALIGN position. The meter circuit is shown in figure 2–7. One side of meter M501 is connected through a low-pass filter, consisting of resistor R216 and capacitor C213, to the junction of resistors R214 and R215 in the screen-grid circuit of the second i-f amplifier, V204. The other side of the meter is connected through a similar filter (R217 and C214) to the variable contact of INP. MTR. potentiometer R218. Potentiometer R218, together with resistors R224 and R225, form a series voltage divider network from +180 and ground.

With no signal present in the receiver, pentode V204 will conduct a large current, causing a voltage drop across resistor R215. The INP. MTR. control, R218, is then adjusted to the same potential as the junction of R214 and R215. This results in equal potentials at each side of meter M501 and, consequently, no meter indication. When a signal is received, the AGC voltage increases the bias on tube V204, and reduces the screen grid current through the tube. This decreases the voltage drop across resistor R215. Since a voltage difference then exists across the meter terminals, the meter will show a deflection.

The INPUT meter functions in the same manner when it is used for alignment purposes. However, the AGC voltage is replaced by the tripler grid-leak bias, as explained in detail in paragraph 2*f* of this section.

c. AUDIO-FREQUENCY DETECTOR.—The audio-frequency detector, V206A, is one half of a type 5726/6AL5W twin diode; see figure 2–8. The i-f signal from terminal 1 of transformer T208 is applied to the diode plate. Resistors R226, R227 and R229, connected between the diode cathode and terminal 6 of T208, constitute the diode load. These resistors are bypassed for radio frequencies by capacitors C220, C221 and C222. The audio-frequency output, obtained from the junction of resistors R226 and R227, is applied through the noise-limiter diode and the silencer diode (either or both of which can be disabled—the noise limiter mechanically and the silencer electrically) to the grid of the first a-f amplifier.

The detector output can be checked at jack J203, the detector test point. This jack is connected to terminal 6 of i-f transformer T208 through isolation resistor R262.

d. NOISE LIMITER.—Diode V206B, one half of a type 5726/6AL5W twin diode, functions as a series-type noise limiter. It is connected between the a-f detector and the silencer diode; see figure 2–8. The N.L. (noise limiter) switch S202, cuts the noise limiter in or out of the circuit as desired for operating conditions. When switch S202 is in the OUT position, the audio signal obtained at the junction of resistors R226 and R227 is applied directly to the silencer circuit; noise limiter V206B has no effect on the signal. However, when switch S202 is set at IN, the noise limiter functions as follows:

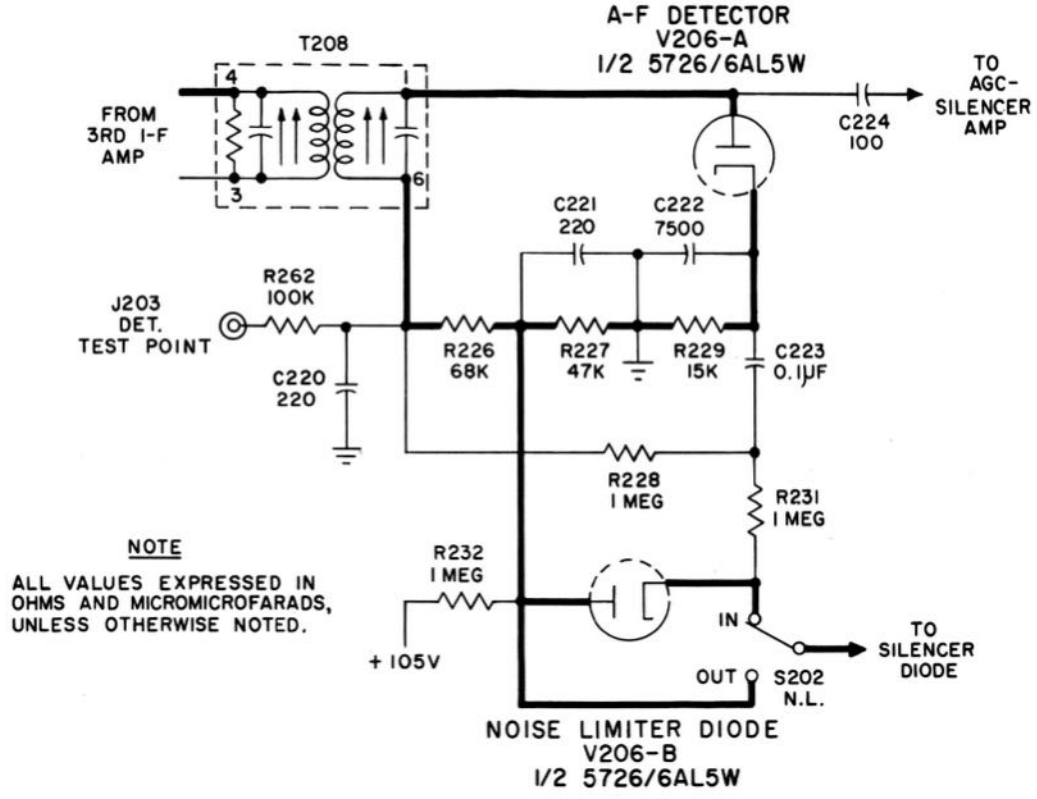


Figure 2–8. A-F Detector and Noise Limiter Circuits, Simplified Schematic Diagram

The negative voltage, developed across detector load resistors R226 and R227, is applied through resistor R228 to capacitor C223, building up on this capacitor a negative potential approximately equal to the total average rectified d-c voltage between terminal 6 of transformer T208 and ground. The audio-frequency component of the rectified voltage is taken from the detector diode circuit at the junction of resistors R226 and R227. The audio-frequency path is then from plate to cathode of V206B, and across switch S202 to the silencer circuit. It will be noted that the cathode of V206B is at the potential of terminal 6 of T208, which is more negative than the diode plate because of the voltage-divider action of R226 and R227. Since the diode cathode is at a negative potential with respect to the plate, current flows within the tube and an a-f path is established.

In the event that a sharp pulse of noise is received, the long time-constant of R228 and C223 does not permit capacitor C223 to charge to the high transient voltage. However, the voltage at the junction of R226 and R227 follows the change rapidly, placing the plate of V206B at a more negative potential than the cathode. This cuts off the diode for the duration of the noise pulse. Consequently, the noise pulse does not reach the a-f circuit (via the silencer diode). Resistor R229, in the load circuit of the a-f detector, acts as an accelerating circuit to bring the noise-limiter diode to the condition of non-conduction more quickly, when a noise pulse enters the receiver. A positive pulse from the cathode end of R229 is coupled to the diode cathode through capacitor C233 and resistor R231. This positive voltage aids the negative voltage at the plate in cutting off the diode for the duration of the noise pulse.

Resistors R232 and R227 form a voltage divider across the 105-volt regulated supply. Since the plate of V206B is tied to the junction of these resistors, it is biased by approximately +4.7 volts. This positive bias determines the operating point of the diode such that the forward (conducting) resistance is sufficiently low to cause less than a 3-db insertion loss.

e. AGC-SILENCER AMPLIFIER. — The AGC-silencer amplifier, shown in figure 2–9, amplifies the output from the i-f amplifiers to a level which is suitable for use in the AGC and silencer circuits. The i-f signal from terminal 1 of transformer T208 is coupled through capacitor C224 to the control grid of V207, a 5654/6AK5W pentode amplifier. The grid is biased from the −9 volt source in the power supply through resistor R230. The screen grid is supplied from the +150 volt source in the power supply, and is decoupled from the power supply by resistor R239 and capacitor C225. Plate voltage is supplied from the +180 volt source through transformer T210. Transformer T210 comprises a parallel-resonant circuit at the second intermediate frequency, 1.775 mc, and serves as the plate load for tube V207. The amplified signal from this stage is coupled through capacitor C226 to AGC-silencer diode V208A.

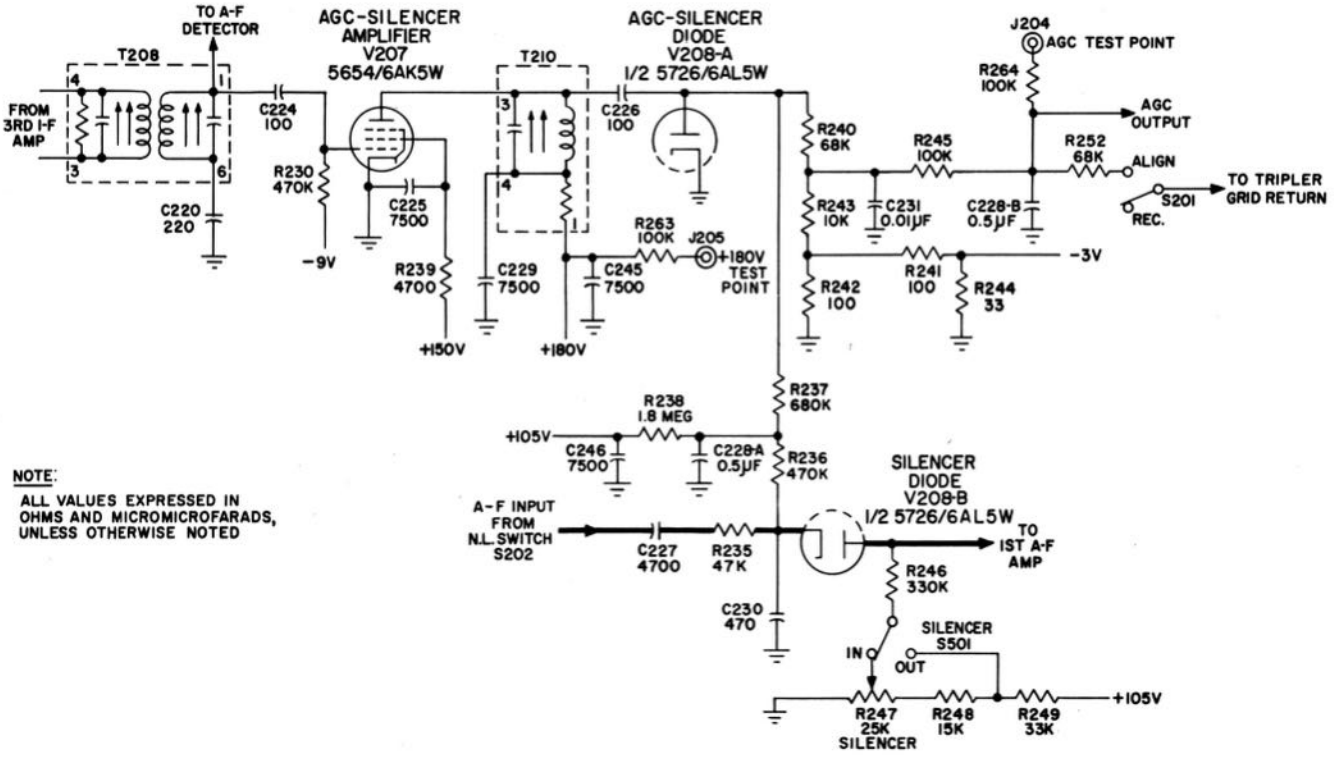


Figure 2–9. AGC and Silencer Circuits, Simplified Schematic Diagram

The AGC-silencer amplifier is decoupled from the power supply by a resistor in transformer T210 and by capacitors C229 and C245. A B+ test point, J205, is connected to the power supply through resistor R263.

f. AGC-SILENCER DIODE. — The AGC-silencer diode, V208A, is a shunt rectifier which provides the required d-c voltages for the AGC and silencer circuits. As shown in figure 2–9, one half of a 5726/6AL5W twin diode serves this purpose. When switch S201 is in the REC. position, the diode load consists of resistors R240 and R243 in series with the series-parallel network of resistors R242, R241, and R244. The junction of resistors R241 and R244 is connected to the −3 volt bias source, so the plate of V208A is biased at approximately −1.8 volts. When the peak value of the 1.775 mc signal, coupled to the diode plate from V207, exceeds this delay bias, the diode conducts to develop a negative rectified voltage across the load resistors. The voltage which is obtained at the junction of resistors R240 and R243 is the AGC voltage; this voltage is bypassed for radio frequencies by capacitor C231 and is fed to the AGC line through a low-pass filter, R245 and C228B, which removes the audio frequency components from the voltage. AGC voltage is applied to the first and second r-f amplifiers, first and second i-f amplifiers, and the first a-f amplifier. Resistance-capacitance decoupling networks are connected in the grid circuits of all the controlled r-f and i-f amplifiers. Regardless of whether or not AGC voltage is developed from a received signal, there is a minimum bias of −1.8 volts at each of the controlled stages because of the connection of the diode load circuit to the −3 volt bias source. AGC voltage may be checked at jack J204, which is connected to the AGC line through isolating resistor R264.

The negative d-c voltage which is developed at the plate of tube V208A is used as the control voltage for silencer diode V208B. This circuit is explained in paragraph 2*g* of this section.

The AGC circuit also provides means for indicating the alignment of the oscillator-multiplier section of the receiver. When switch S201 is placed in the ALIGN position, the grid-leak bias developed across resistor R121 in the tripler grid circuit is applied to the AGC line through resistor R252. As the tank circuits of the oscillator, first and second doublers, and tripler grid circuit are tuned to resonance, the tripler grid-leak bias increases and places a negative voltage on the AGC line. This results in a reading on INPUT meter M501, as explained in paragraph 2*b*(5) of this section. The greater the meter deflection, the greater the drive and bias at the tripler grid. Hence, an indication of alignment is obtained for the oscillator and first and second doubler stages.

g. SILENCER.—The noise silencer (squelch) circuit can be used to prevent noise from reaching the audio section of the receiver in the absence of an incoming signal of predetermined minimum level. Silencer diode

V208B, connected between N.L. switch S202 and the first a-f amplifier, V209A, permits the audio signal to pass during conduction and cuts off the audio signal when it is not conducting. Diode V208B is one half of a type 5726/6AL5W dual diode; see figure 2–9. The silencer may be connected into, or cut out of, the receiver circuit by means of SILENCER switch S501. SILENCER potentiometer R247 is used to adjust the silencing threshold.

Both the plate and the cathode of silencer diode V208B are biased. The plate is biased from a point on the voltage divider, formed by resistors R247, R248, and R249, connected between the +105 volt source and ground. The cathode is biased by the voltage which appears at the junction of resistors R237 and R238, connected between the +105 volt source and the plate of AGC-silencer diode V208A. Audio frequency components of the voltage from V208A are filtered out by R237 and C228A. Capacitor C230, together with resistors R235 and R236, filters high-frequency audio components from the voltages which are applied to the silencer diode. Capacitor C246 bypasses the +105 volt source.

In normal operation, with no signal received, the cathode of the silencer diode is held at about +30 volts by the voltage applied to it through resistor R236 from the junction of resistors R237 and R238. When SILENCER switch S501 is in its OUT position, the diode plate is biased at approximately +58 volts, being connected to the junction of resistors R248 and R249 through resistor R246. Since the plate of the silencer diode is much more positive than the cathode, the diode conducts. In this condition, *any signal or noise* present at the cathode is passed through the diode to the first audio amplifier stage and the silencer does not provide any function.

The silencer circuit is made to operate by placing the SILENCER switch, S501, at the IN position. In this switch position, the plate of diode V208B is connected through resistor R246 to the adjustable arm of SILENCER potentiometer R247. This decreases the positive voltage applied to the plate. Potentiometer R247 permits the plate voltage to be adjusted from zero to approximately +36 volts, so the silencer diode may or may not conduct, depending on the setting of the potentiometer. With no received signal, potentiometer R247 should be set just beyond the point which cuts off the diode, thus preventing noise from passing through to the first audio amplifier. When a signal which exceeds the noise level is received, a negative voltage is developed at the plate of AGC-silencer diode V208A; see paragraph 2*f* of this section. This voltage, applied to the voltage divider network (R237 and R238) in the cathode circuit of the silencer diode, reduces the positive bias at the cathode and permits the diode to conduct. Thus, the audio signal fed to the cathode from switch S202 is passed through the silencer diode to the audio amplifiers.

b. AUDIO FREQUENCY STAGES.–The audio frequency stages of the radio receiver, shown in figure 2–10, are conventional in most respects. The first and second a-f amplifiers, V209A and V209B, are the two halves of a type 5670 twin triode. The input signal is applied from the silencer diode through coupling capacitor C232 to the grid of V209A. Bias is applied to the control grid from the AGC source through a voltage divider, resistors R250 and R251. In the plate circuit, capacitor C235A attenuates the unwanted higher frequencies so that only the voice frequencies necessary to efficient communication legibility are amplified. The output of this amplifier is applied to a two-section high-pass filter which helps establish the lower limit of the 350- to 3500-cps audio passband. The filter is composed of capacitor C233, resistor R254, capacitor C234, and potentiometer R255. Potentiometer R255 is the A.F. LEVEL control. The signal is transferred through the adjustable arm of the potentiometer to the control grid of V209B, the second a-f amplifier.

The second a-f amplifier stage, V209B, has an unbypassed cathode resistor, R256, to provide degenerative feedback. It is boosted by a feedback loop from the secondary of output transformer T209 through resistor R261. The amplified output of the second a-f amplifier is applied to the grid of the a-f output stage, tube V210. Capacitor C235B sets the high-frequency limit at 3500 cycles per second.

The a-f output tube, V210, is a type 6AK6 power pentode which delivers approximately 1.1 watts to audio output transformer T209. The maximum distortion is 5%. Cathode resistor R259 is bypassed by capacitor C237A. Capacitors C238 and C239, in the plate circuit of tube V210, set the high-frequency limit of the audio circuit at 3500 cycles per second.

Audio signals from the a-f output stage are transformer coupled through T209 to the required output circuits. The impedance step-down of the transformer is 10,000 to 60, with a balanced secondary output. The output signals are connected to the OUTPUT meter circuit, and to one circuit for headphones and another for an external speaker or other external applications.

There is an r-f filter between the secondary of transformer T209 and the OUTPUT meter, M502. It is composed of inductors L202 and L203 and capacitors C240 and C241. The OUTPUT meter shows, in decibels, the relative strength of the audio output.

The circuit to the headphones jack, J501, contains a volume control plus an r-f filter similar to the filter for the OUTPUT meter. PHONES volume control R502 allows the audio output to be regulated to the headphone circuit without any interference with the external audio output circuit. The r-f filter consists of inductors L204 and L205 and capacitors C242 and C243.

The third audio output circuit transmits the audio

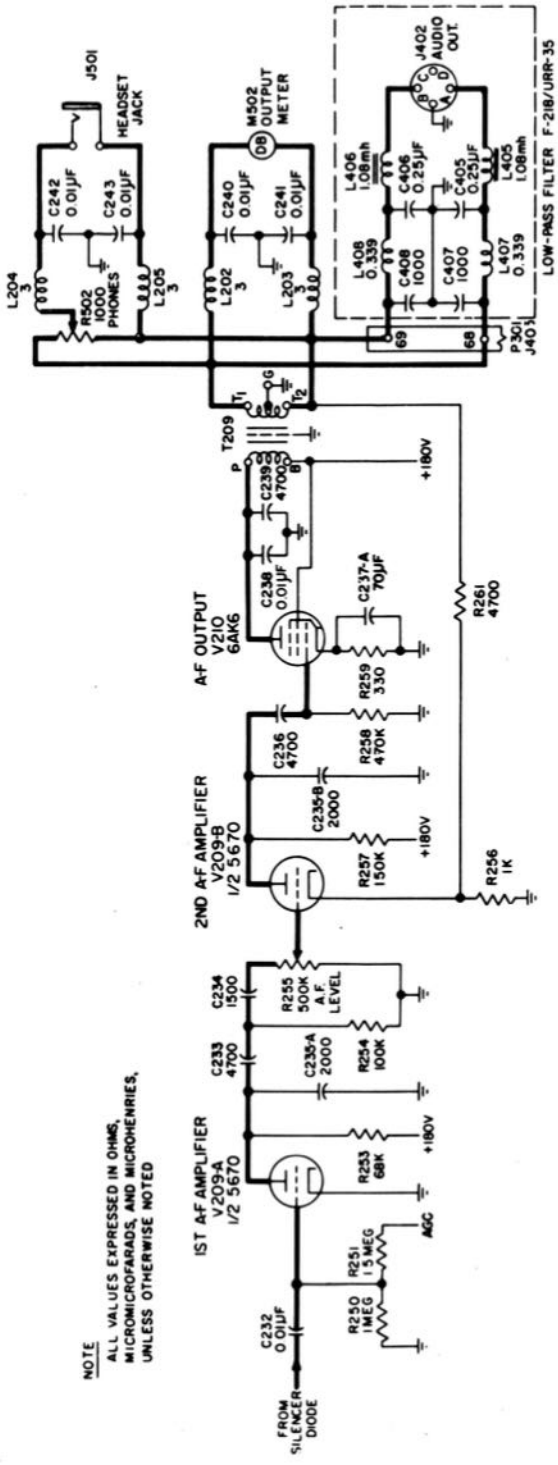
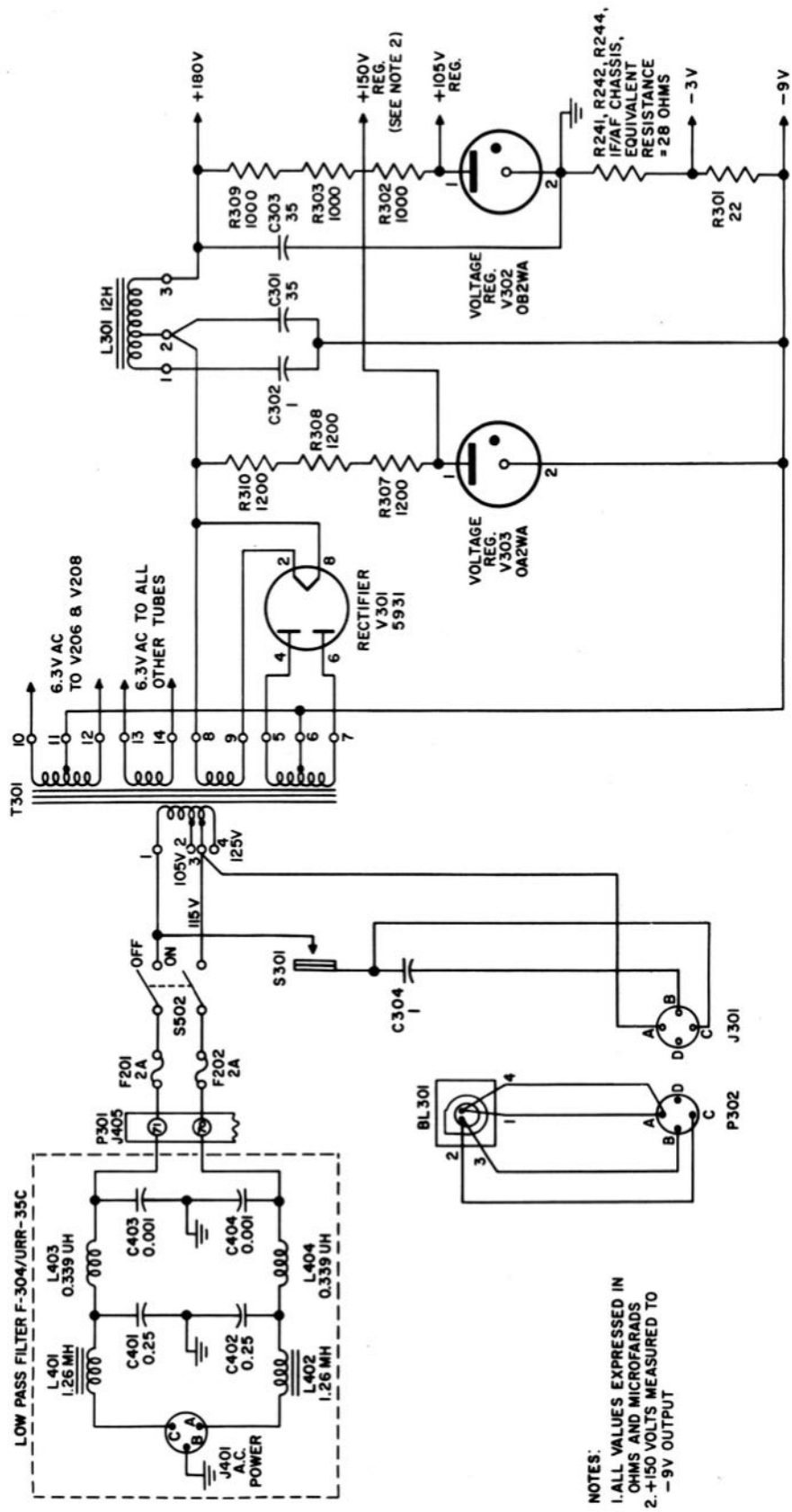


Figure 2–10. Audio-Amplifier Stages, Simplified Schematic Diagram



NOTES:
1. ALL VALUES EXPRESSED IN OHMS AND MICROFARADS
2. +150 VOLTS MEASURED TO -9V OUTPUT

Figure 2-11. Power Supply, Simplified Schematic Diagram

signals via connectors P301 and J405 for external use through the AUDIO output receptacle, J402, located at the rear of the cabinet. This circuit is filtered against external r-f fields by inductors L405, L406, L407, and L408, and capacitors C405, C406, C407, and C408. This filter is a part of Low-Pass Filter F-304/URR-35C. The signals are connected from the receiver into the Filter through connectors P301 and J405.

i. POWER SUPPLY.–The power supply, located at the rear of the IF/AF chassis, contains the power transformer, T301, rectifier V301, voltage regulators V302 and V303, d-c filter and bleeder networks, and a blower unit. The simplified schematic diagram is shown in figure 2–11.

Power transformer T301 is the source for all filament voltages and for the high voltage which is rectified for plate, screen, and bias voltages as required in the receiver.

(1) FILAMENT AND HEATER SUPPLY.–Three of the four secondary windings on transformer T301 provide filament or heater power. One supplies five volts for the type 5931 rectifier tube, V301; a second supplies 6.3 volts for the detector, noise limiter, AGC-silencer, and silencer diodes, tubes V206 and V208; and a third provides 6.3 volts for all the other tube filaments in the receiver, and for lamps I501 and I502 in series with their dimmer rheostat, R501. The center tap of the diode heater secondary (the second mentioned above) is connected to a 9 volt negative potential instead of to ground. This bias on the filaments of these tubes minimizes hum.

(2) PLATE AND SCREEN SUPPLY.–The fourth secondary winding on transformer T301 furnishes high voltage to the plates of rectifier tube V301, a type 5931 tube, for full wave rectification. The rectified output is applied through resistors R307, R308, and R310 to voltage regulator tube V303, a type OA2WA tube. From this circuit, a regulated +150 volts is available for use in the local oscillator and first doubler stages in the preselector, and in the AGC-silencer amplifier. The rectified output is also applied through a filter, consisting of inductor L301 and capacitors C301, C302, and C303, for the +180 volt output; it is also applied from the filter through resistors R302, R303, and R309 to voltage regulator tube V302, a type OB2WA tube, for a regulated +105 volt output. The +180- and +105-volt outputs are used for plates and screens. To minimize hum, inductor L301 is tapped so that its inductance between terminals 1 and 2 and the capacity of C302 form a series resonant circuit at the ripple frequency, so ripple current has a low impedance path to ground.

(3) BIAS VOLTAGE.—Bias voltages are obtained by operating the negative side of the rectifier below ground potential. This output is derived from return current through resistors R301, R241, R242, and R244 to provide –9 volts for biasing the grid of the AGC-silencer amplifier and –3 volts for use in the AGC circuits and as a bias for the grids of the doubler and tripler stages in the oscillator-multiplier section of the preselector. The full –9 volt potential is also applied to the heaters of diodes V206 and V207; see paragraph 2*i*(1) above.

(4) PRIMARY CIRCUIT.—The primary of power transformer T301 is tapped for operation from a 105-, 115-, or 125-volt, 50 or 60 cycle, single phase a-c line. The power supply (and therefore the receiver) is turned on or off by the front-panel POWER switch, S502, which switches both sides of the power line. Circuit protection is provided by the two fuses, F201 and F202, which are in fuseholders mounted inside the right hand front panel compartment. Line power comes into the power supply through A.C. POWER connector J401 and connectors J405 and P301. The circuit is filtered against external r-f fields by a two section filter in Low-Pass Filter F-304/URR-35C; the components used are inductors L401, L402, L403, and L404, and capacitors C401, C402, C403, and C404.

The primary circuit of power transformer T301 is connected for 115 volt input, using terminals 1 and 3. If the voltage in the power source to which it is connected is consistently low or high, more satisfactory receiver operation can be obtained by changing the connections; see paragraph 2*d* of Section 3.

(5) BLOWER AND THERMOSTAT. — Blower BL301 is mounted in the power supply section. It is used to circulate filtered air into the receiver cabinet to keep the operating temperature inside the cabinet within satisfactory limits. It is controlled by thermostatic switch S301, mounted inside the rear wall of the cabinet. Switch S301 automatically closes and applies voltage to the blower through connectors J301 and P302 whenever the inside ambient temperature reaches +49° C (+120° F). Capacitor C304 provides the 90 degree phase shift necessary for operation of the split-phase motor from a single-phase line.

j. LOW-PASS FILTER F-304/URR-35C.–The Low-Pass Filter, F-304/URR-35C, allows the necessary connections into and out of the rear of the receiver, but eliminates unwanted signals from passing through the lines. There are three main circuits through the filter; the antenna lead, the a-c power lead, and the audio output lead.

(1) ANTENNA LEAD CIRCUIT.–R-f signals from an antenna are brought through a coaxial lead and connected to ANT jack J404 with plug P404, which is furnished with the receiver. They pass through the low-pass filter to jack J407, on the receiver side. When the receiver chassis is in place inside the cabinet, plug P101 on the rear of the preselector unit fits into jack J407 and carries the signals through into the receiver.

(2) A-C POWER CIRCUIT.–Power for the receiver is connected through plug P401, furnished with the

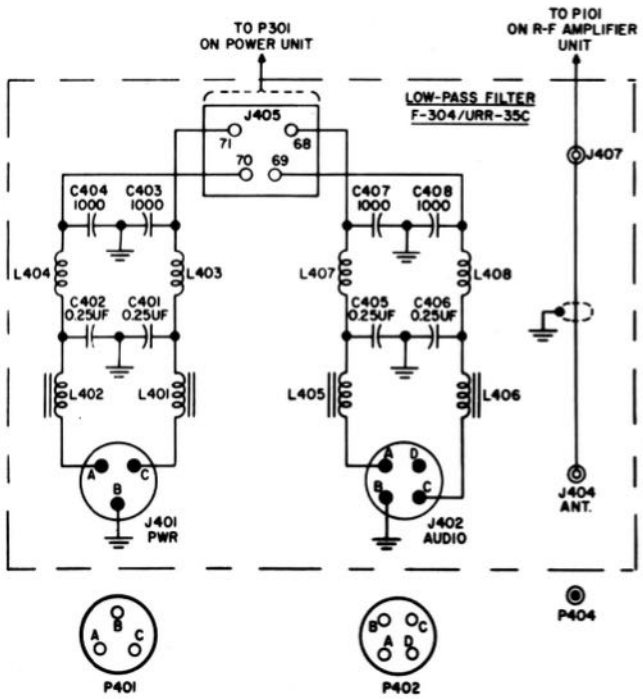


Figure 2–12. Low-Pass Filter F–304/URR–35C, Simplified Schematic Diagram

equipment, to jack J401. There is a two section r-f filter which eliminates any radio frequency energy which may tend to come in through the power lines; this consists of inductors L401, L402, L403, and L404, and capacitors C401, C402, C403, and C404; see paragraph 2*i*(4) above. The a-c power is then connected to terminals 70 and 71 in jack J405, on the receiver side of the Low-Pass Filter. When the receiver chassis is in place inside the cabinet, plug P301 on the rear of the power supply fits into jack J405 and connects the a-c power through into the receiver.

(3) AUDIO OUTPUT CIRCUIT.–The signal from the output transformer, T209, is connected through terminals 68 and 69 of plug P301 to the same numbered terminals of jack J405 on the receiver side of the Low-Pass Filter. The audio signals then pass through a two section filter to jack J402, and are connected through plug P402, furnished with the receiver, to be used for external applications such as speakers, intercommunication systems, recorders, etc. The filter, composed of inductors L405, L406, L407, and L408, and capacitors C405, C406, C407, and C408, allows the audio signals to pass through, but prevents any feeding back of r-f signals through the audio lines from outside the receiver.

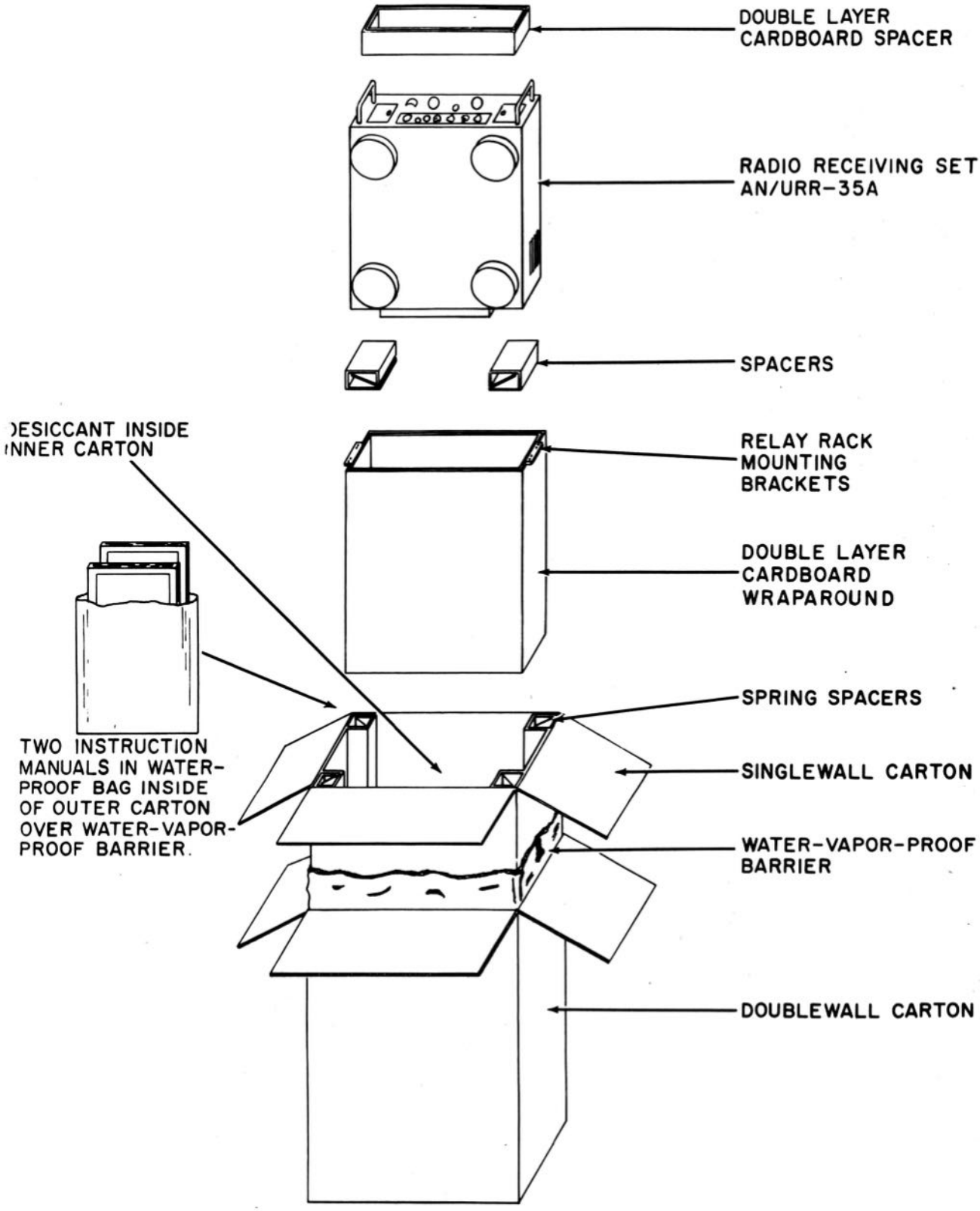


Figure 3–1. Packaging of Radio Receiving Set AN/URR–35C

SECTION 3
INSTALLATION

1. UNPACKING THE EQUIPMENT.

a. GENERAL.–There are two cartons which together comprise one complete Radio Receiving Set AN/URR-35C. These are indicated as Shipping Boxes #1 and #2 in Table 1–3. Shipping Box #1 contains the Radio Receiver R-482C/URR-35 complete as shown in figure 1–1. Shipping Box #2 contains the maintenance spare parts which accompany each receiver. The method of packing Shipping Box #1 is shown in figure 3–1.

b. UNPACKING RADIO RECEIVER R-482C/URR-35 AND ACCESSORIES.

(1) Open the top of the outer carton. Be careful to prevent cutting through the instruction books which are located in a waterproof bag just inside the carton top.

(2) Remove the waterproof bag and open it to obtain the two instruction books which are furnished as a part of each complete equipment.

(3) Open the water-vapor-proof barrier and the top of the inner carton.

(4) Remove the spacer over the front panel of the receiver, and pull the relay rack mounting brackets out of the recesses in the wraparound portion of the liner.

(5) Pull up on the handle at each side of the front panel of Receiver R-482C/URR-35. It will slide straight out of the container. The three plugs (see Table 3–1) which will be used to make external cables for installation are packed in a bag and tied to the receiver.

c. UNPACKING MAINTENANCE PARTS KIT.

The maintenance parts kit for Radio Receiving Set AN/URR-35C is packed in a single carton and sealed with paper tape. Its dimensions are shown in Table 1–3. Cut through the paper tape to open the box, and check the enclosed packing slip against the contents of the kit. Keep the maintenance parts in the box and store them in a place designated by the officer-in-charge.

2. PREPARATION FOR USE.

a. REMOVAL OF CHASSIS.–Remove the chassis from the cabinet prior to installing the equipment. Inspect the receiver to see that all tubes are seated properly in their sockets and that there are no other loose parts (see subparagraph *b* below). Check the power transformer connections (see subparagraph *c* below). To remove the chassis from the cabinet, loosen the four fasteners in the extreme corners of the front panel by turning each a quarter turn to the left. Pull the chassis forward until the spring-actuated stops on the bottoms of the side rails prevent further travel; release these stops (one on each side) by pressing them upward (see figure 3–2). With the stops released, remove the chassis completely from the cabinet. The appearance of the inside of the cabinet is shown in Figure 3–3.

CAUTION

It may be difficult to overcome the friction to unseat the plugs from the jacks at the rear of the chassis. Do not attempt to pry against the gasket between the front panel and the cabinet. Pull only on the two handles on the front panel to perform the removal.

b. INSPECTION.—Before installing or operating the radio receiver, inspect the equipment for possible damage or disarrangement during shipment. Check to see that no nuts, washers, or bits of solder or other foreign particles have become lodged where they might cause a short circuit. A careful search should also be made for broken wires and loose connections, since a detailed mechanical inspection at this time

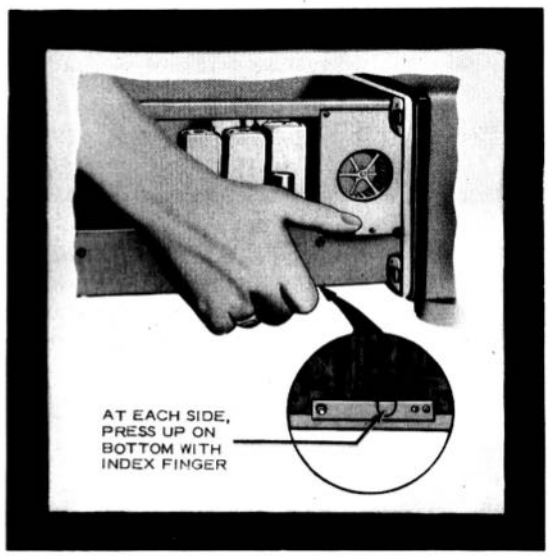


Figure 3–2. Removing Chassis from Cabinet

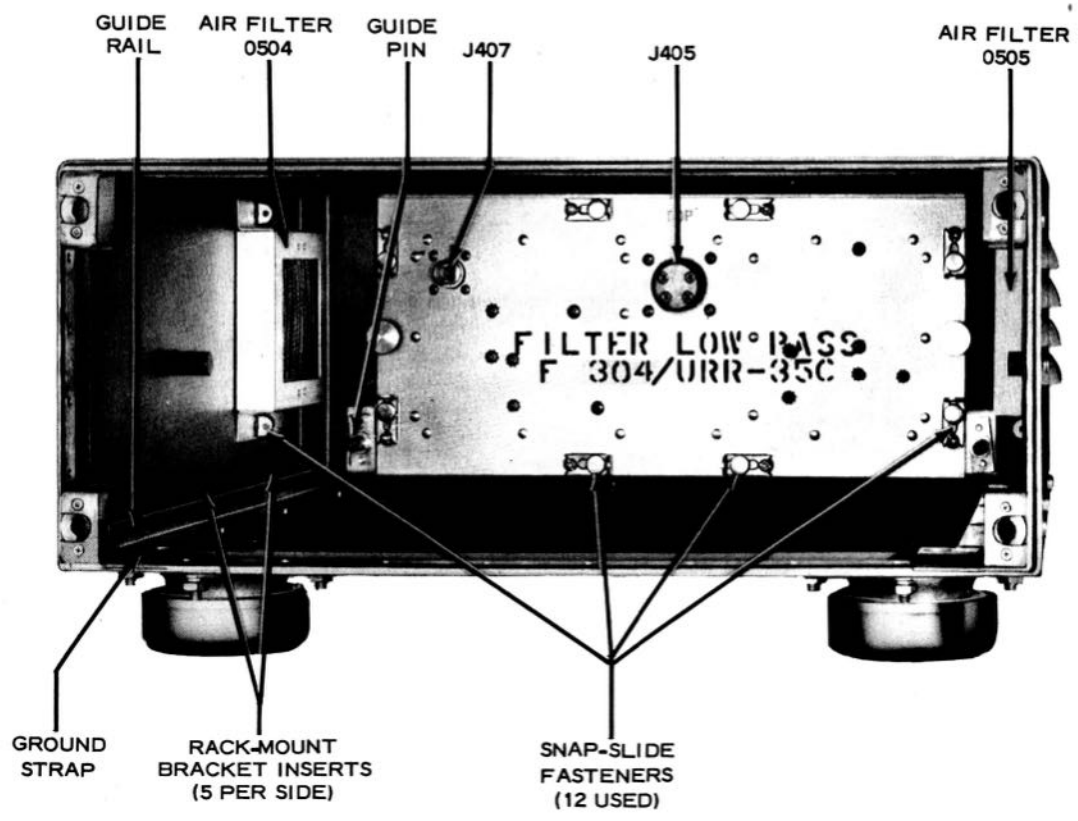


Figure 3–3. Interior of Cabinet with Chassis Removed

can save much inconvenience later. Operate all mechanical controls in each alternate position, or through their full range of travel, in order to detect any bent shafts or other evidences of abnormal operation. Tighten any screws or nuts which may have worked loose. Check to see that all tubes are well seated in their sockets, that all tube shields are firmly in place, that fuses F201 and F202 are in their holders, and that the fuseholders are in place in the panel compartment.

c. CHECK OF TRANSFORMER CONNECTIONS.—The primary of power transformer T301 is tapped to permit operation of the receiver from a 50- or 60-cycle power source of 105, 115, or 125 volts. When the equipment is shipped from the factory, T301 is wired for operation from a 115 volt 60-cps source. If the equipment is to be used where the source voltage is 115 volts, and the receiver has not been previously used, proceed directly to paragraph 3, below. However, if the equipment has been used previously, or if the available power source is closer to 105 volts or 125 volts than to 115 volts, check and possibly change the primary connections for transformer T301. As shown in figure 7–28, a brown wire is connected to terminal 3 of T301 for operation from a 115 volt source. For operation from a 105 volt source, move the wire from terminal 3 to terminal 2; for operation from a 125 volt source, move the wire from terminal 3 to terminal 4.

Note

For operation from a 50-cps source, use the next higher voltage tap on T301 with respect to the line voltage.

3. INSTALLATION.

a. LOCATION OF EQUIPMENT.—In locating the receiver, consider the accessibility of a suitable source of 105/125-volt, 50/60-cps power, of the antenna lead-in, and of any supplemental equipment which may be employed. It should be located where adequate fresh air is available for ventilation. Also, clearance should be adequate to permit removal of the chassis from the cabinet, and to permit access to the tubes and adjustments in the preselector without complete removal of the chassis. Outline drawings, showing all pertinent dimensions, appear in figures 3–7 through 3–10.

Note

The latest applicable Bureau of Ships installation plans should be followed, if available, rather than the instructions specified in this section.

The receiver is shipped with four shockmounts attached, ready for installation on a table or bench. If the receiver is to be installed in a standard relay rack, remove the four shockmounts and attach the mounting brackets to the sides, as shown in figure 3–4.

(1) TABLE OR BENCH MOUNTING.—If the receiver is to be set up on a bench or table, and the installation is to be more than temporary, it should be bolted in place. To do this, drill four 3/8-inch diameter holes in the bench, in line with the centers of the shockmounts; dimensions are shown in figure 3–10. Remove the receiver chassis from the cabinet and drop a 5/16-inch diameter bolt through the hollow core of each shockmount and through the mating hole on the bench. Assemble a suitable flat washer and nut to each bolt under the bench. Draw each nut up tight, but not tight enough to place the shockmount under compression. Then add a second nut and tighten it up against the first to prevent loosening.

Before dropping the mounting bolts through the shockmounts, make sure that the phosphor-bronze ground strap provided is located in the hollow of one of the shockmounts so that the bolt passing through that shockmount will also pass through the large hole in one end of the strap. The other end of the strap should be fastened to the bottom of the cabinet by one of the four screws securing the shockmount involved.

(2) RELAY-RACK MOUNTING.—If the receiver is to be mounted in a standard 19-inch relay rack, it will be necessary to remove the four shockmounts from the bottom of the cabinet and to attach the two angle brackets provided to the sides of the cabinet; see figure 3–4. The shockmounts can be taken off by merely removing the bolts in the corners of their flange plates. The angle brackets are symmetrical in shape and are attached, one to each side of the cabinet, by means of No. 8–32 x 1/2-inch long Phillip's-head machine screws. Five holes in each bracket line up with five tapped inserts in each side of the cabinet; see figure 3–3. (The required screws will be found threaded into the tapped holes in the cabinet.) Removal of the shockmounts will also cause detachment of the phosphor-bronze grounding strap, which is ordinarily connected between one of the shockmount mounting screws and the 5/16-inch diameter cabinet mounting bolt which drops through the hollow core of the shockmount. This strap will not be needed for relay-rack mounting, but should be put in safe keeping for possible future use.

Note

Size "A" or larger spacer panel should be used between equipment when mounted in racks for shore installation.

b. EXTERNAL CONNECTIONS.—External connections are made to suitable connectors on Low-Pass Filter F-304/URR-35C, which is attached to the rear of the receiver cabinet; see figure 1–3. Cables for making external connections to the receiver are not supplied, but connector plugs suitable for use with such cables are provided. The types and functions of these plugs are indicated in figure 3–5 and summarized in table 3–1.

Procedures for fabricating a cable from coaxial transmission line and the coaxial connector are shown in figure 3–6.

Plug P401, provided for the power cable, has three female contacts. Contacts A and C connect to the a-c line, and contact B connects to ground. Pins A and C on the four-contact audio-output connector, P402, provide a balanced output connection for any audio-frequency load having an impedance between 60 and 600 ohms. Pin B of this connector is connected to ground,

Figure 3–4. Radio Receiver R–482C/URR–35, Relay-Rack Mounting Brackets Attached and Shockmounts Removed

and pin D is not used.

If the receiver audio output is to be connected in parallel with the audio output from other receivers of any type, an isolating device must be used to prevent the audio output from being severely attenuated by an impedance mismatch, which will almost invariably result from such connections. The isolating devices which should be used are as follows:

(1) At the shipboard installations, use Amplifier AM-215/U.

(2) At the shore-station installations, use Amplifier AM-213/U.

(3) At ship or shore installations where these amplifiers are not available, use an impedance-matching transformer which, when connected to the speaker, will present a 60-ohm load to the receiver output. (This 60-ohm impedance match provides maximum audio power from the receiver.)

Note

An impedance-matching transformer should be used only as an interim measure until the recommended amplifier can be installed.

The GND stud on the rear of the filter assembly, between receptacles J401 and J404, should be connected to the station ground with a short length of copper strap, not less than one-half inch wide.

4. INITIAL ADJUSTMENTS.

a. GENERAL.

(1) If not already in place, insert the crystal required for the desired channel of operation in the crystal holder in the left-hand compartment of the front panel; see figure 4–1. The correct crystal frequency to be used can be determined from the formula:

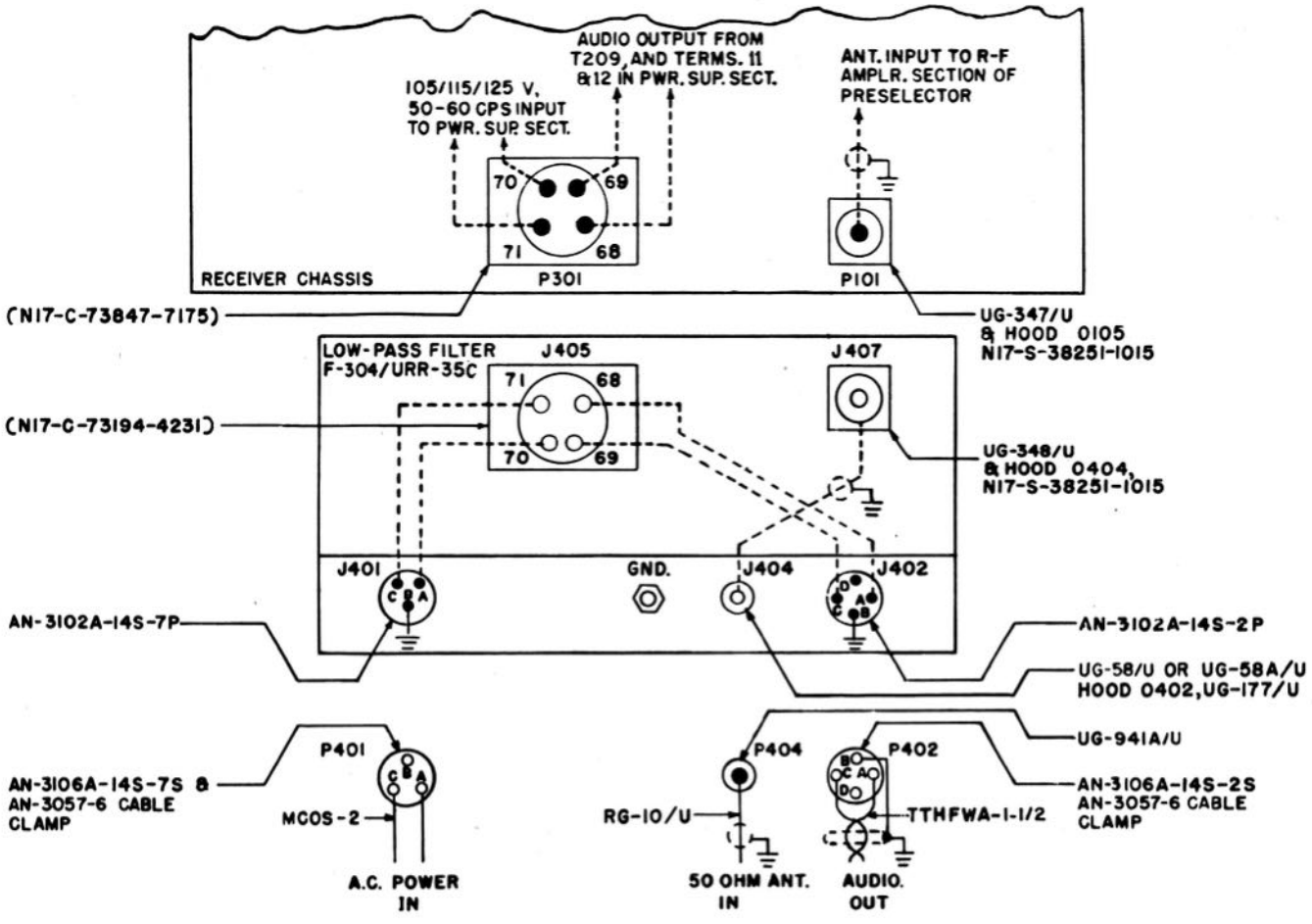


Figure 3–5. Connectors and Cables for External Connections

TABLE 3–1. CONNECTOR PLUGS SUPPLIED FOR EXTERNAL CONNECTIONS

REF. SYMBOL OF PLUG	TYPE OF PLUG	MATING RECEPTACLE	CABLE OR WIRE USED WITH PLUG	EXTERNAL CIRCUIT
P401	AN3106–14S–7S plug, AN3057–6 cable clamp	J401 (A.C. POWER)	MCOS–2	105/125-v, 50/60-cps, 1-ph. power source
P402	AN3106–14S–2S plug, AN3057–6 cable clamp	J402 (AUDIO)	TTHFWA–1-1/2	Audio output to interphone or other audio listening device(s)
P404	UG–941A/U	J404 (50 OHM ANT.)	RG–10/U	Antenna input (50-ohm impedance)

$$\text{Crystal frequency (in mc)} = \frac{\text{selected channel frequency (in mc)} + 18.6 \text{ mc}}{12}$$

(2) Connect one end of the a-c power cable to the A.C. POWER receptacle on the rear of the filter, and the other end to the a-c power source.

(3) Connect the cable from the transfer panel or speaker-amplifier to the AUDIO receptacle on the rear of the filter, or plug a headset into the phone jack, J501 on the front panel.

(4) Connect the antenna transmission line to the 50 OHM ANT. receptacle on the rear of the filter.

(5) Position the receiver controls (see figure 4–1) as follows:

(*a*) OSC. switch in CRYSTAL position.

(*b*) N.L. switch in OUT position.

(*c*) SILENCER switch in OUT position.

(*d*) A.F. LEVEL control turned fully clockwise.

(*e*) PHONES control at 8.

(*f*) ALIGN-REC. switch in REC. position.

(6) Place the POWER switch in its ON position. After about four seconds the CRYSTAL neon lamp should light, indicating that the receiver is under crystal control and that plate power is on. If the panel is not illuminated properly, rotate the DIMMER control to bring lamps I501 and I502 up to the desired brilliance. After about two minutes' warm-up time, loosen the LOCK knob beside the tuning control.

b. CRYSTAL-CONTROLLED TUNING. — Rotate the tuning control until the selected channel frequency appears on the calibrated dial visible through the window marked MEGACYCLES. This frequency will be equal to 12 times the crystal output frequency, less 18.6 megacycles. The dial reading will indicate approximate tuning. With no signal coming into the receiver, the exact setting is obtained by tuning for a maximum reading (maximum noise) on the OUTPUT meter or on the INPUT meter. The level which will be indicated on the OUTPUT meter should be between −5 db and +10 db. The indication on the INPUT meter may rise as high as 0.4 milliampere. With the noise level on the OUTPUT meter within the specified range, zero the INPUT meter by means of the INP. MTR. screwdriver-adjust potentiometer located in the right-hand compartment.

Note

Because a harmonic-mode crystal is used to control the oscillator circuit, it is possible that, at the frequencies mentioned below, resonance peaks will be observed at two different points in the frequency range when the receiver is being tuned for a maximum indication on the OUTPUT meter.

When tuning to a channel between 225 and 233 megacycles, the second response would occur at the high-frequency end of the band, between 387 and 400 megacycles. Conversely, when tuning to a channel between 387 and 400 megacycles, the second response would occur at the low-frequency end of the band, between 225 and 233 megacycles.

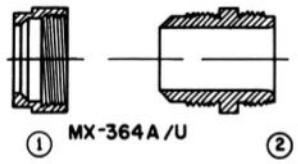
To prevent incorrect tuning of the receiver in the 225-233 and 387-400 megacycle ranges, the calibrated dial should be set at the approximate frequency of the desired channel. The final adjustment should then be made by peaking the OUTPUT meter for maximum noise indication.

c. MANUAL TUNING.—To operate the equipment as a continuously variable, manually tuned receiver, place the OSC. switch in its MANUAL position. This will cause the CRYSTAL neon lamp to go out. The receiver may now be tuned to any frequency within the 225–400 megacycle range by operation of the tuning control, as for crystal-controlled tuning. The sensitivity of the receiver is approximately the same for either crystal-controlled or manual tuning and will be greater than 8 microvolts, in series with 50 ohms, for a 10-db signal-to-noise ratio over the entire range.

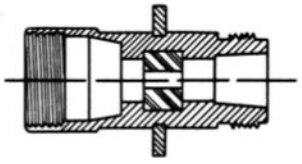
d. NOISE LIMITER.—Place the N.L. switch, located in the right-hand compartment, in its IN posi-

INSTRUCTIONS FOR ASSEMBLY

OF AN TYPE UG-21A/U, UG-21B/U, UG-22A/U, UG-22B/U, UG-23A/U OR UG-23B/U CONNECTOR TO AN TYPE RG-10/U COAXIAL CABLE.

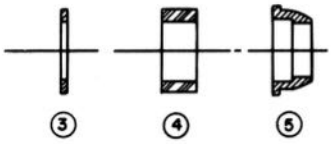


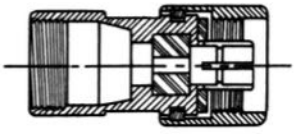
CABLE CLAMPING PARTS



JACK BODY

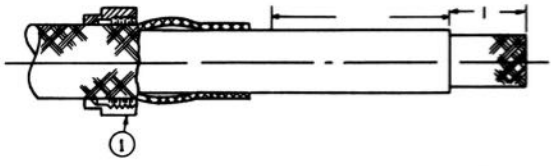
FEMALE CONTACT



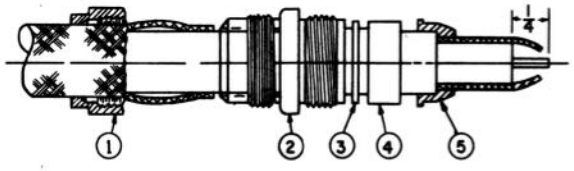


PLUG BODY

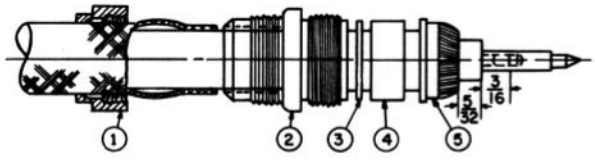
MALE CONTACT



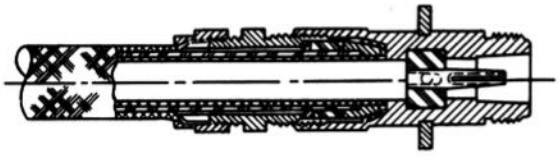
1. SLIDE PART #1 OVER ARMOR AND PUSH ARMOR BACK. CUT VINYLITE OUTER JACKET OFF, SQUARE AND EVEN, ONE INCH FROM END, BEING CAREFUL NOT TO DAMAGE WIRE BRAID.



2. PUSH WIRE BRAID BACK AND CUT OFF 1/4" OF DIELECTRIC. PULL BRAID FORWARD AGAIN AND TAPER INWARD AT END (IF NECESSARY FOR REMAINDER OF THIS STEP). SLIDE PART # 2 OVER VINYLITE JACKET AND FOLLOW WITH PARTS # 3, # 4 AND #5, MAKING SURE THAT # 5 CLEARS ALL BRAID WIRES AND THAT ITS INTERNAL SHOULDER RESTS SQUARELY AGAINST END OF JACKET.



3. UNBRAID ENDS OF WIRE SHIELD AND PULL OUT PARALLEL. THEN FOLD THESE BACK OVER PART # 5 AND CUT OFF FLUSH WITH SHOULDER ON THIS PART. CUT OFF DIELECTRIC AGAIN, THIS TIME SO AS TO LEAVE 5/32" OF DIELECTRIC EXPOSED. CUT SQUARE AND EVEN, BEING CAREFUL NOT TO NICK CENTER CONDUCTOR. CUT OFF CENTER CONDUCTOR 3/16" FROM END OF DIELECTRIC AND TIN. SOLDER THIS TIP TO MALE OR FEMALE CONTACT. KEEP SOLDER AND FLUX OFF OF END OF DIELECTRIC, AND REMOVE EXCESS.



4. INSERT CABLE, AS ASSEMBLED, IN PLUG OR JACK BODY AS FAR AS IT WILL GO. PUSH PARTS # 4 AND # 3 INTO BODY, AND SCREW IN PART # 2. HOLD BODY WITH WRENCH TO TIGHTEN, USING CARE NOT TO LET BODY OR CABLE ROTATE. PULL ARMOR FORWARD OVER TAPERED PORTION OF PART # 2. CUT OFF EXCESS ARMOR AND UNBRAID ENDS FOR A SHORT DISTANCE. BRING PART #1 FORWARD TO CLAMP ARMOR BETWEEN THE TWO TAPERED SURFACES. BE CAREFUL THAT LOOSE ENDS OF ARMOR WIRES DO NOT EXTEND INTO SCREW THREADS AND JAM.

NOTE:

AN TYPE MX-364A/U CONNECTORS MUST BE USED WITH APPROVED CABLE.

Figure 3–6. Assembling Connector Plug P404 to Type RG–10/U Cable

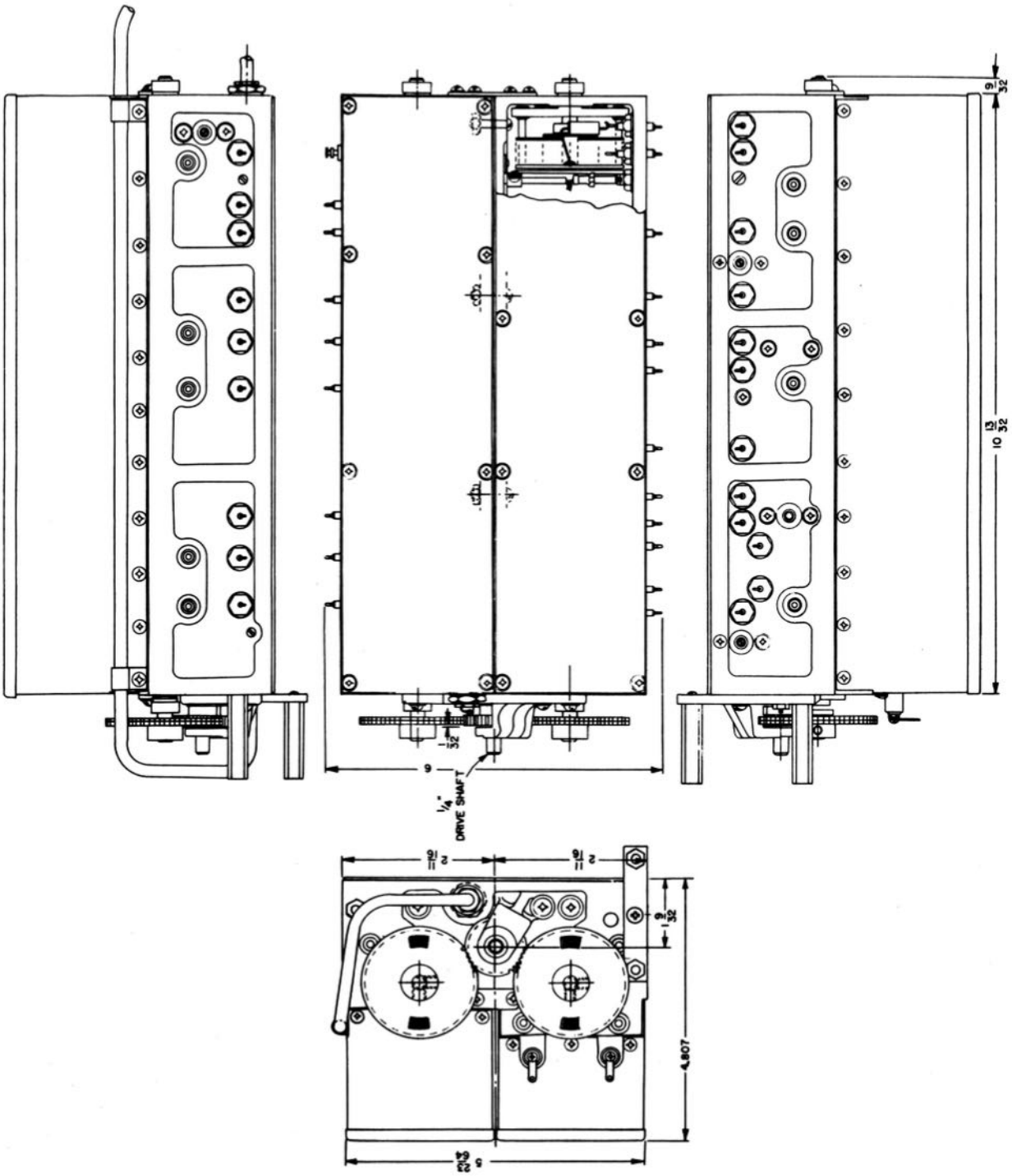


Figure 3–7. Preselector, Outline Drawing

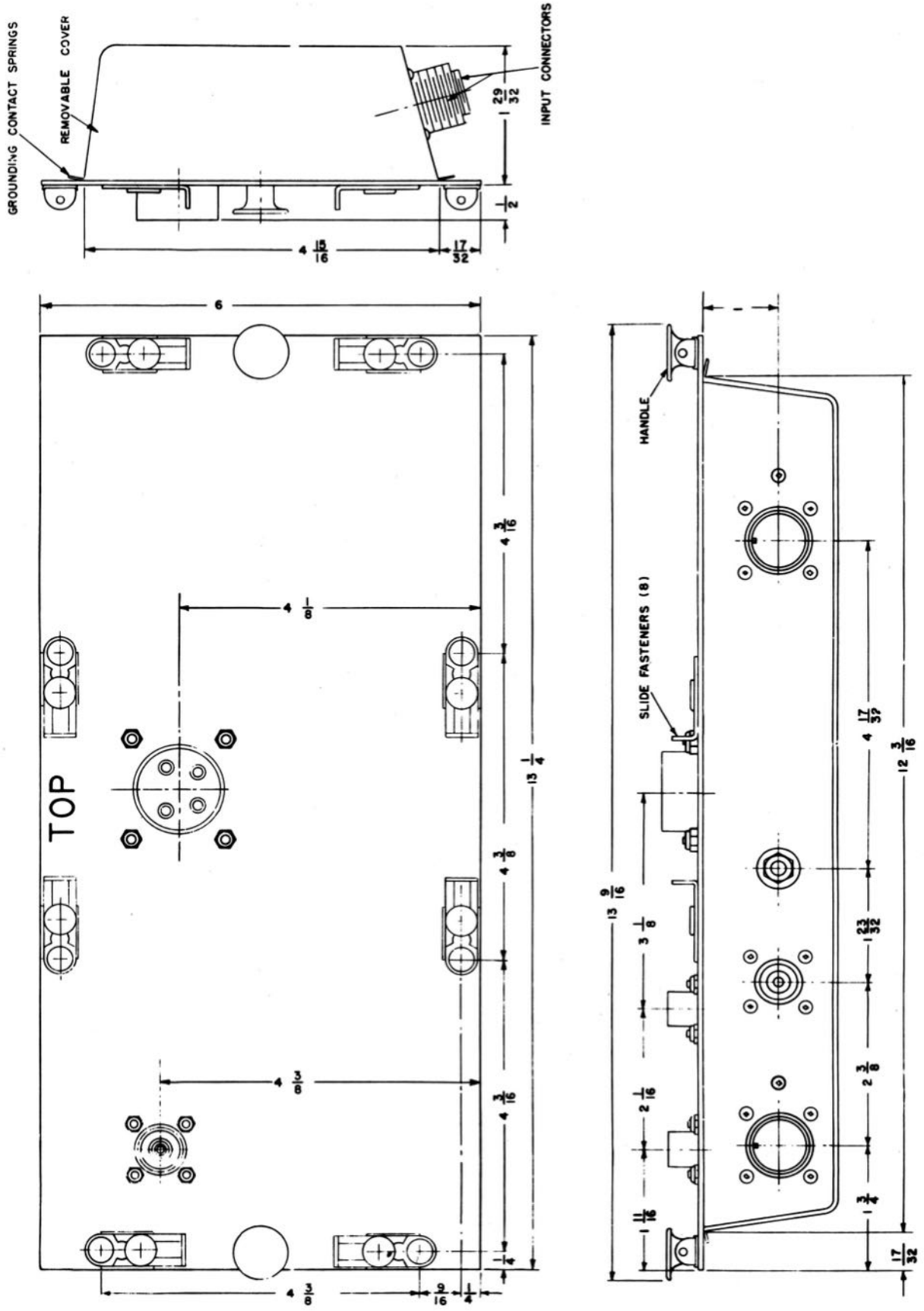


Figure 3–8. Low-Pass Filter F–304/URR–35C, Outline Drawing

tion. Excessive noise at the receiving location should be reduced by the noise limiter. Regardless of the amount of received noise, however, cutting the noise limiter into the receiver circuit will result in a drop of approximately 3 db in the reading of the OUTPUT meter. The N.L. switch may be placed in either the IN or OUT position, depending upon the noise level at the receiving site.

e. SILENCER.—Place the front-panel SILENCER switch to its IN position. With no received signal, set the SILENCER screwdriver-adjust control, located in the right-hand compartment, at the point at which the noise level becomes inaudible. When making this adjustment, be certain that the A.F. LEVEL control is turned fully clockwise and the PHONES control is set to 8. Restore the SILENCER switch to its OUT position.

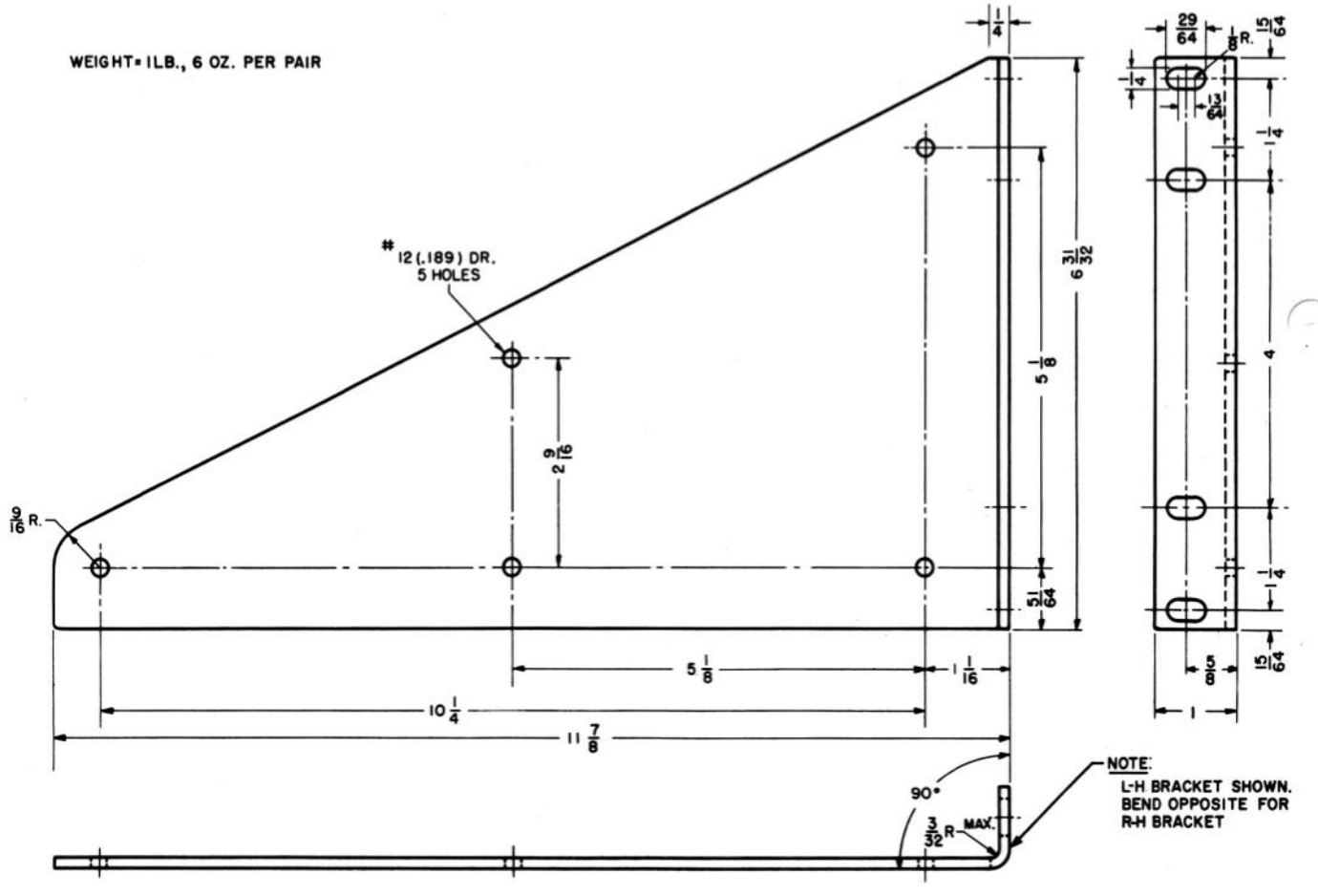
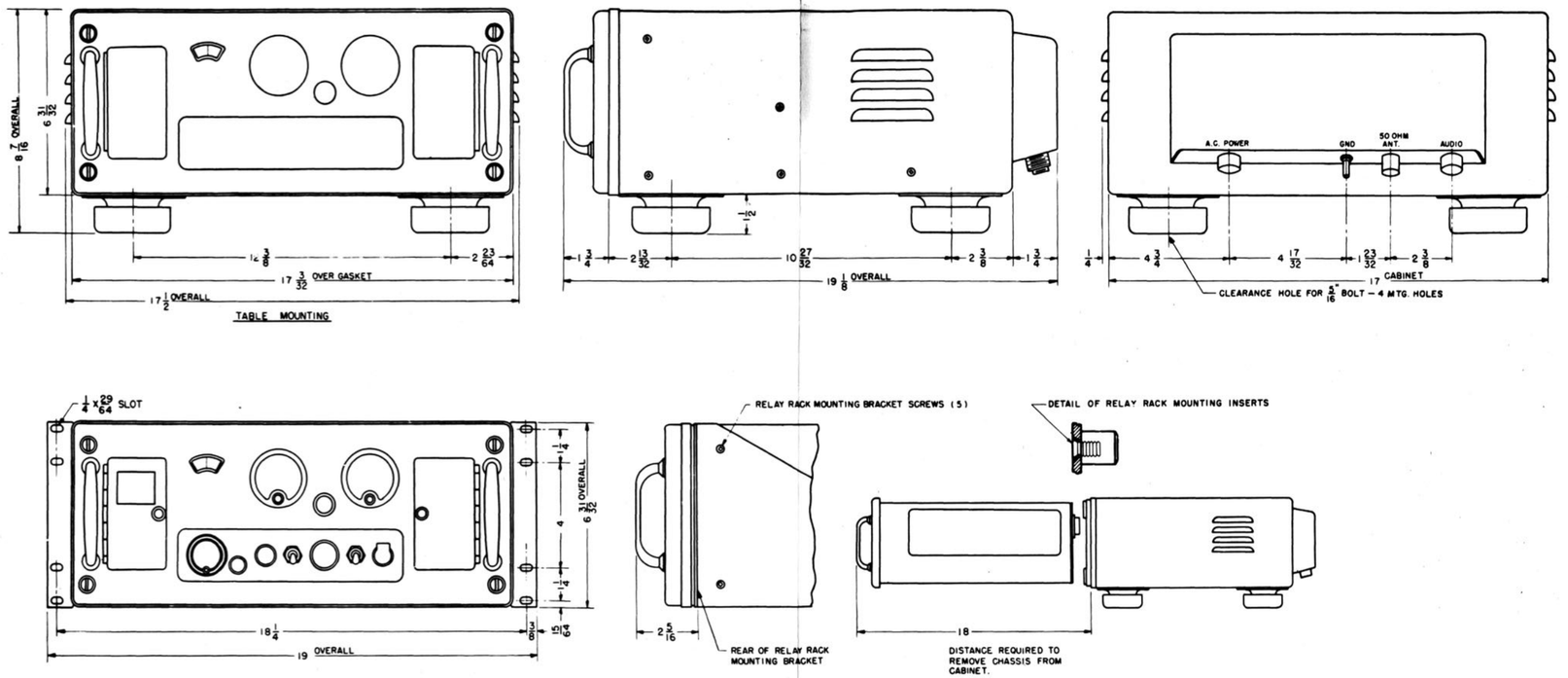


Figure 3–9. Relay-Rack Mounting Bracket, Outline Drawing



NOTE:
RECEIVER IS SUPPLIED WITH SHOCK MOUNTS AND RELAY RACK MOUNTING BRACKETS; SHOCK MOUNTS ATTACHED TO CABINET. FOR RELAY RACK MOUNTING, BRACKETS ARE FASTENED TO SIDES OF CABINET USING SCREWS IN INSERTS.

WEIGHT — 57 POUNDS WITH SHOCK MOUNTS, LESS RELAY RACK MOUNTING BRACKETS.
POWER REQUIRED — 98 WATTS

Figure 3-10. Radio Receiver R-482C/URR-35, Outline Drawing

SECTION 4
OPERATION

1. INTRODUCTION.

It is assumed that Radio Receiver R-482C/URR-35 will have been installed, and that all necessary adjustments will have been made according to the instructions in Section 3, before it has been turned over to operating personnel. It is also assumed that those frequencies to which the receiver is likely to be tuned will have been determined, and that suitable crystals will be ready if crystal-controlled tuning is to be used.

The operator should become familiar with all the controls on the receiver front panel and inside the panel compartments. With these, he will be able to tune the receiver to any channel within the 225 to 400 megacycle range of the receiver.

2. OPERATING CONTROLS.

a. LOCATION OF CONTROLS. — All controls which are required for ordinary operation are located on the front panel and in front panel compartments; see figure 4–1. Those which are used the most are recessed into the lower part of the central portion of the panel. The crystal and the lesser used adjustments are enclosed in the compartments on either side of the panel. The INPUT and OUTPUT meters, the panel lamp which indicates crystal operation, and the viewing window for the calibrated tuning dial are in the central portion of the front panel above the recessed portion.

b. FUNCTIONS OF CONTROLS.—The function of the various front-panel controls are described below. The paragraph number for each control corresponds to the index number in figure 4–1.

(1) "MEGACYCLES" DIAL.—This dial indicates the frequency, in megacycles, to which the receiver is tuned. It is calibrated directly in megacycles.

(2) "INPUT" METER.—The INPUT meter provides a relative indication of the input signal level. It may also be used as a tuning indicator.

(3) "CRYSTAL" INDICATOR LAMP. — This lamp glows whenever the receiver is being operated with crystal control. The receiver must then be tuned to the frequency determined by the crystal in the CRYSTAL holder (19).

(4) "OUTPUT" METER.—The OUTPUT meter is calibrated in decibels (db). It shows the strength of the audio output and has a zero db reference level of 6 milliwatts into a 600-ohm line.

(5) FUSE.–The two line fuses (numbers 5 and 7 in figure 4–1) are mounted in extractor-post holders. They protect the receiver circuits against damages which would be caused by short circuits or by other circuit faults.

(6) "INP. MTR." ADJUSTMENT.—This screwdriver-adjustment controls the sensitivity of the INPUT meter circuit. Use it to set the meter reading at zero when there is no signal being received.

(7) FUSE.–The second line fuse, as mentioned in subparagraph (5) above.

(8) SPARE FUSE.–A spare fuse, which is identical to either of the two operating fuses, is mounted in a fuse clip on the inside of the right-hand compartment door.

(9) "N.L." SWITCH.—The N.L. (noise limiter) switch permits the operator to switch the noise limiter circuit IN or OUT of the receiver circuit. The manner in which it is used will be determined by the amount of noise at the receiver location.

(10) "SILENCER" CONTROL. — This screwdriver-adjust potentiometer is used to set the operating threshold of the silencing circuit. It is normally adjusted just beyond the point which cuts off the audio output in the absence of a received signal.

(11) "A.F. LEVEL" CONTROL. — The A.F. LEVEL control is a screwdriver-adjust potentiometer. It is the gain control for the audio-frequency section in the receiver. Its adjustment will depend on the requirements of the reproducing equipment connected to the AUDIO output on the Low-Pass Filter at the rear of the receiver.

(12) HEADPHONES JACK.–This jack is the contact receptacle into which the plug for any standard headset can be connected. Lift the spring-loaded dust cover for access.

(13) "POWER" SWITCH.—The POWER switch is used to turn the entire receiver ON or OFF.

(14) "PHONES" CONTROL.–This control adjusts the volume of the audio output at the headphones jack. It is used to control the headphones volume level after the A.F. LEVEL control has been preset to some specific gain, as required by the auxiliary listening equipment connected to the AUDIO output connector at the rear of the receiver (see subparagraph (11) above).

(15) "SILENCER" SWITCH.–This control permits the operator to switch the silencer circuit IN or OUT of the receiver circuit. Use of the silencer circuit is determined by operating requirements and con-

ditions at the receiver location.

(16) "DIMMER" CONTROL.—The DIMMER control adjusts the intensity of the tuning dial illuminating lamps.

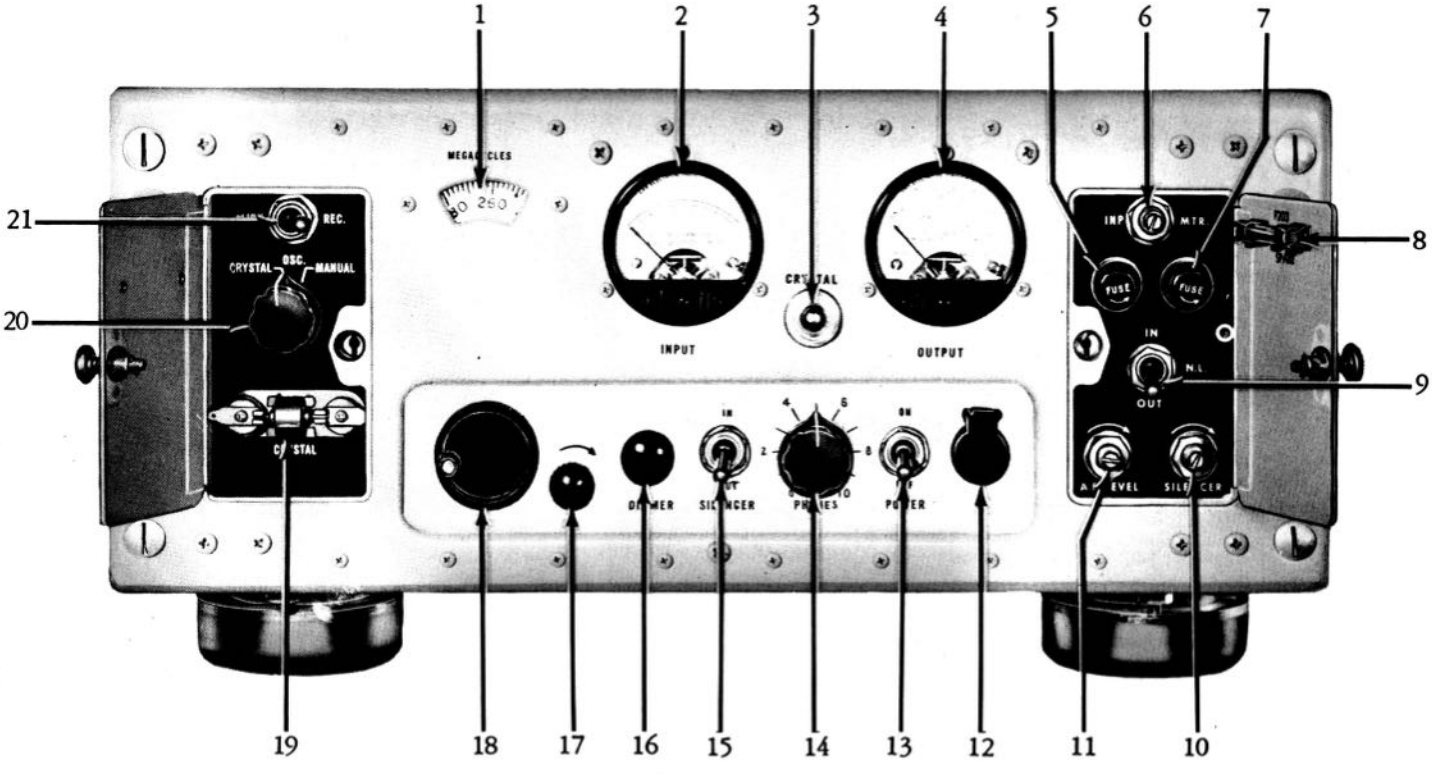
(17) "LOCK".–When this knob is turned to its extreme clockwise position, as indicated by the arrow directly above it, the tuning control is locked at the frequency to which it is tuned. This prevents accidental detuning of the receiver. It releases when it is turned counter-clockwise.

(18) TUNING CONTROL.–This is a knob with a crank handle. It is used to tune the receiver. The crank handle permits rapid tuning, and the larger knob aids fine-tuning after an approximate frequency setting has been made.

(19) "CRYSTAL" HOLDER.—The CRYSTAL holder serves as the mounting for the type CR-24/U crystal which is used for crystal-controlled operation. It is necessary to have a crystal mounted in this holder, even though it is not in use, in order to manually tune the receiver to the frequencies as indicated on the MEGACYCLES dial.

(20) "OSC" SWITCH.–The position to which the OSC. switch is set determines the mode of operation for the receiver. When it is in the CRYSTAL position, the receiver tuning is crystal-controlled. When the switch is in the MANUAL position, the receiver tuning is manually operated.

(21) "ALIGN-REC." SWITCH. — This switch controls the functional operation of the INPUT meter.



1. MEGACYCLES Dial
2. INPUT Meter (M501)
3. CRYSTAL Indicator Lamp (I503)
4. OUTPUT Meter (M502)
5. Fuse (F201)
6. INP. MTR. Adjustment (R218)
7. Fuse (F202)
8. Spare Fuse (F203)
9. N.L. Switch (S202)
10. SILENCER Threshold Control (R247)
11. A.F. LEVEL Control (R255)
12. Headphones Jack (J501)
13. POWER Switch (S502)
14. PHONES Gain Control (R502)
15. SILENCER Switch (S501)
16. DIMMER Control (R501)
17. Tuning LOCK (E502)
18. Tuning Control (C101, C102)
19. CRYSTAL Holder (Y201)
20. OSC. Switch (S203)
21. ALIGN-REC. Switch (S201)

Figure 4–1. Radio Receiver R–482A/URR–35, Operating Controls

When the switch is in the normal REC. position, the meter functions as an input-level meter. When the switch is set to ALIGN, the input meter may be used by maintenance personnel for the purpose of aligning the oscillator, first doubler, second doubler, and tripler grid circuits. For normal receiving operation, this switch should always remain in the REC. position.

3. MODES OF OPERATION.

a. MANUAL TUNING.—With manual tuning, the receiver can be tuned continuously through the 225 to 400 megacycle range in one band, in the manner of any standard superheterodyne receiver. The entire range is covered with 19 complete turns of the tuning control, which stops automatically at each end of the tuning range. As the control is rotated, the frequency to which the receiver is tuned is indicated on the calibrated MEGACYCLES dial, through the viewing window in the panel directly above. No adjustments other than the rotation of this control are necessary, though it may be desirable at times to adjust the volume or to switch the noise limiter and silencer circuits in or out.

b. CRYSTAL-CONTROLLED TUNING.—Crystal-controlled operation allows the receiver to be tuned, at any given time, to only the channel determined by the crystal installed in the CRYSTAL holder in the left-hand compartment. This mode of operation has advantages of stability and freedom from drift, and an inherent ability to produce sharper tuning. The essential difference between manual- and crystal-controlled tuning is that the oscillator frequency is fixed by the crystal during crystal-control, and is free-running to track with the tuning of an incoming r-f signal during manual-control.

4. OPERATING THE RECEIVER.

a. PREPARATION FOR OPERATION.

(1) Insert the plug for a headset into the front-panel jack and position the receiver controls (see figure 4–1) as follows:

(a) ALIGN-REC. switch in the REC. position.
(b) N.L. switch at OUT position.
(c) SILENCER switch at OUT position.
(d) A.F. LEVEL control turned fully clockwise
(e) PHONES gain control at 8.
(f) OSC. switch in position for desired mode of operation. Use the CRYSTAL position for crystal-controlled tuning, or the MANUAL position for tuning.

(2) Set the POWER switch at ON. If the receiver has been prepared for crystal-controlled operation (OSC. switch at CRYSTAL), the CRYSTAL neon lamp should light approximately four seconds after power is applied. Rotate the DIMMER control to adjust the illumination on the MEGACYCLES dial as desired. After about two minutes of warm-up time, loosen the LOCK knob and proceed with the instructions in subparagraph *b* or *c* below, as applicable.

Note

The receiver sensitivity is better than 8 microvolts for a 10-db signal-to-noise ratio, and is the same for either crystal-controlled or manual operation.

b. CRYSTAL-CONTROLLED TUNING.–If it is not already in the holder, insert the crystal required for the desired channel of operation in the CRYSTAL holder. Determine the correct crystal frequency from the formula:

$$\text{Crystal frequency (in mc)} = \frac{\text{selected channel frequency (in mc)} + 18.6 \text{ mc}}{12}$$

Be certain that the OSC. switch is in the CRYSTAL position. Then rotate the tuning control until the selected channel frequency appears through the MEGACYCLES window on the calibrated dial. This frequency will be 18.6 mc less than 12 times the crystal fundamental frequency. Turn the tuning control carefully to the exact setting for a maximum reading on the OUTPUT meter or on the INPUT meter. If no signal is coming into the receiver, the maximum reading on the OUTPUT meter will indicate maximum noise. If no signal is coming into the receiver, the INPUT meter should indicate zero; if it does not, readjust the INP. MTR. control, located in the right-hand compartment, to correct the situation.

Note

Because a harmonic-mode crystal is used to control the oscillator circuit, it is possible to obtain two resonance peaks, at the frequencies mentioned below, at two different points in the tuning range of the receiver when it is tuned for a maximum indication on the OUTPUT meter.

When you tune to a frequency between 225 and 233 mc, the second response would occur at the high-frequency end of the band, between 387 and 400 mc. Conversely, when tuning to a frequency between 387 and 400 mc, the second peak would occur at the low-frequency end of the band, between 225 and 233 mc.

To prevent incorrect tuning of the receiver in these ranges, set the calibrated dial to the approximate frequency of the desired channel, and make the final adjustment for a peak on the OUTPUT meter without tuning to the opposite end of the tuning range.

c. MANUAL TUNING.—When the OSC. switch is in the MANUAL position, the receiver can be tuned to any frequency in the range of 225 to 400 mc by rotating the tuning control on the front panel. The frequency is shown on the MEGACYCLES dial. When there is no signal being received, the indication on the OUTPUT meter should be between −5 and +10 db.

If the indication on the INPUT meter is other than zero, readjust the INP. MTR. control, located in the right-hand compartment. When tuning in a signal, tune for the maximum indication on the INPUT meter.

Note

There must be a type CR-24/U crystal in the CRYSTAL holder in order to obtain correct frequency tuning during manual operation. The crystal frequency will not affect the tuned frequencies other than to track actual tuned frequencies with indications on the MEGACYCLES dial.

d. SILENCER OPERATION.—If desired, the silencer (squelch) circuit may be put into operation by placing the SILENCER switch at its ON position, and then adjusting the SILENCER control in the right hand compartment for the desired silencing level.

Note

In setting the SILENCER control, use extreme care to prevent loss of weak signals.

The silencing level should ordinarily be the point at which noise just becomes inaudible under the conditions of no-signal input, with the A.F. LEVEL control set for maximum and the PHONES gain control set at 8. Further silencing entails the danger of squelching weak signals which it might be desirable to hear. On the other hand, restraint in the use of silencing to less than a complete silencing of noise, in the hope of picking up very weak signals, is useless because signals which do not exceed the noise level will not be intelligible in any case. Silencing beyond the minimum necessary for noise suppression would be permissable in the situation where a known signal is anticipated, and where the signal is known to be strong enough to override the "squelching" effect of the silencer circuit.

e. NOISE-LIMITER CIRCUIT.—If the noise level is excessive when a signal is being received, the N.L. switch in the right hand compartment may be set to its IN position. This circuit acts as a noise-peak limiter and is effective in the reduction of interference or noise peaks of high intensity and short duration. For this reason, it may not always be effective in limiting commutator hum and similar continuous noises, where no large abrupt peaks are present. Because the noise-limiter circuit may cause slight distortion of deeply modulated signals, it should be switched off whenever receiving conditions permit.

Note

Use of the noise-limiter circuit will reduce the OUTPUT meter indication about 3 db.

f. "INPUT" METER.—The INPUT meter provides an approximate indication of the level, in microvolts, of the incoming signal. However, the relation between the level of the incoming signal and the position of the meter pointer is not linear. Furthermore, this relation will vary with the frequency at which the receiver is operated. It will also vary slightly between any two receivers operating at the same frequency. It is therefore desirable that a calibrated chart be prepared, correlating measured values of signal level with corresponding INPUT meter readings. A typical chart is shown in table 4–1.

To prepare such a chart for an individual receiver, disconnect the antenna input cable from the 50 OHM ANT. receptacle and substitute the output of a calibrated r-f signal generator having a 50 ohm output impedance. Tune the receiver and the signal generator to the same frequency. With known values of input, it is only necessary to record the INPUT meter readings as they correspond to various r-f signal strengths.

TABLE 4–1. TYPICAL "INPUT" METER CALIBRATION

INPUT (MICROVOLTS)	"INPUT" METER READING
0.5	.03
1.0	.07
2.5	.29
10	.60
50	.80
100	.86
1,000	.90
10,000	.95

5. DE-ENERGIZING THE RECEIVER.

In order to completely de-energize the receiver, it is only necessary to place the front-panel POWER switch in its OFF position.

SECTION 5
OPERATOR'S MAINTENANCE

1. GENERAL.

Although maintenance of a radio equipment is primarily the responsibility of technical personnel, it is nevertheless essential for the operator to keep watch over the equipment during use in order that minor defects may be discovered, and either corrected or reported before major trouble develops.

It is suggested that the routine operational check outlined below be made at the beginning of each watch, or when operation is resumed after more than six or eight hours of idleness.

2. ROUTINE OPERATIONAL CHECK.

The checks tabulated in table 5–1 should be made hourly during operation, and at the beginning of each watch.

3. EMERGENCY MAINTENANCE.

a. GENERAL.—In addition to making the routine checks outlined in table 5–1, the operator should be sufficiently familiar with the equipment to be able to rectify minor damage during battle or in other periods of emergency when technical aid is not immediately available. Under such conditions, tube and fuse failures will be the most likely and the most frequent causes of trouble. The information in the following paragraphs is provided to enable operating personnel to recognize these symptoms which indicate trouble in these components.

Notice to Operators

Operators shall not perform any of the following emergency maintenance procedures without proper authorization.

b. REPLACEMENT OF FUSES.—The two 2-ampere, 250-volt, type 3AG fuses located in the right hand panel compartment, F201 and F202, are the only fuses used in Radio Receiver R–482C/URR–35; see figure 4–1. These protect the 115-volt, 50/60 cps primary circuit in the power transformer. If one of these fuses blows, replace it with another which has exactly the same rating, and then only after the circuit has been examined to make sure that no obvious fault exists. The Standard Navy Stock Number for these fuses is N17–F–16302–100.

WARNING

Never replace a fuse with one of higher rating unless continued operation of the receiver is more important than the probable damage to it. If a fuse blows out immediately after replacement, do not make a second replacement until the cause of the trouble has been corrected.

A spare fuse, F203, is mounted in clips on the inside of the panel compartment door. Additional spare fuses should be kept at hand for replacement use. If fuse F201 and/or fuse F202 blows following a replacement, it is possible that the rectifier tube, V301, is faulty, and the operator may try replacement of this tube. (Refer to paragraph 3*c* below). However, if this fails to correct the trouble, further servicing must be entrusted to qualified maintenance personnel.

c. REPLACEMENT OF ELECTRON TUBES.—The full complement of electron tubes used in Radio Receiver R-482C/URR-35 is shown in table 1–4. These tubes are all located in either the preselector unit, or in the IF/AF section or the power supply section of the receiver chassis. Their locations are shown in figures 2–2 and 7–4.

Access to tubes in the IF/AF section is gained by

TABLE 5–1. ROUTINE OPERATIONAL CHECK CHART

WHAT TO CHECK	HOW TO CHECK	REMARKS
Dial lamps	Check visually to see that lamps are lighted when DIMMER control is rotated to maximum clockwise position.	Failure of one lamp is fault in lamp. Failure of both probably indicates power failure. Check fuses and A.C. POWER input connection.
CRYSTAL neon glow lamp	Check visually to see that lamp glows when OSC. switch is in CRYSTAL position.	Unlighted lamp indicates loss of plate voltage. Failure of lamp itself very unlikely.
Receiver operation	Turn A.F. LEVEL control to maximum clockwise position and throw SILENCER switch to OUT position. OUTPUT meter should indicate noise output.	A reading of between −5 db and +10 db on OUTPUT meter indicates normal operation of receiver.
External cables and connectors	Check connectors at rear of receiver for looseness or intermittent connection.	Loose connections may cause intermittent operation.

releasing the four fasteners in the corners of the front panel and withdrawing the chassis as far as the mechanical stops will permit. Access to tubes in the power supply section is gained by releasing these stops as shown in figure 3–2, and removing the chassis from the cabinet. To gain access to the tubes in the preselector, the shielding covers at the left side of the chassis must be removed. This is best done with the chassis resting on its right side. If the receiver fails to operate, but the dial lamps remain lighted indicating the presence of primary power, the cause may be attributable to tube failure. Since it will not be known which tube has failed, each tube in the receiver should be replaced with a tube, of the same type and known to be good, in the following order until the defective one is located: first, those in the power supply section; next, those in the IF/AF section; and finally, those in the preselector.

Note

In the receiver, as shipped from the factory, all tubes are of "reliable" construction except for the type 6AK6 audio output tube (V210), When making replacements, use "reliable" tubes wherever possible.

The type 5654/6AK5W pentode utilized in the receiver is similar to a type 6AK5 pentode. Also, the type 5726/6AL5W twin diode is similar to a type 6AL5. In an emergency, a 6AK5 or 6AL5 may be used to replace its counterpart.

SECTION 6
PREVENTIVE MAINTENANCE

1. GENERAL.

While Radio Receiving Set AN/URR–35A has been designed and built to give as continuous and trouble-free operation as possible, a certain amount of wear and deterioration must be expected in any apparatus of this nature. If detected and corrected at an early stage, trouble from these causes can be minimized. However, if nothing is done until trouble actually occurs, a serious shut-down may be necessary at a time when use of the equipment is most needed.

2. ROUTINE MAINTENANCE CHECKS.

Since wear and deterioration, though they represent potential trouble, are not always evident in themselves, it is essential to continued trouble-free operation that certain vital points be inspected periodically, and that necessary replacements and adjustments be made when discovered. Such systematic inspection and adjustment will increase the efficiency and life of the equipment.

Note

THE ATTENTION OF MAINTENANCE PERSONNEL IS INVITED TO THE REQUIREMENTS OF CHAPTER 67 OF THE *BUREAU OF SHIPS MANUAL,* OF THE LATEST ISSUE. PERSONNEL ARE ALSO REQUESTED TO READ THE SAFETY INSTRUCTIONS INCLUDED IN THE FRONT MATTER OF THIS BOOK.

A practical working schedule is outlined in this section. However, it may be found desirable to modify this schedule as experience dictates, since the exact intervals at which certain maintenance procedures must be performed will be determined by such factors as the operating schedule of the station or ship, and prevailing atmospheric conditions.

Suggested routines for periodic electrical and mechanical inspection are given in the routine maintenance check chart, table 6–1.

Note

To gain access to the wiring and components, release the four fasteners in the corners of the front panel and withdraw the chassis as far as the mechanical stops will permit. Then, release the stops as shown in figure 3–2 and remove the chassis from the cabinet.

3. LUBRICATION.

a. GUIDE RAILS AND ALIGNMENT PINS.–To facilitate removal of the chassis from the cabinet, apply a thin coat of ball and roller bearing lubricant, Navy Specification 14-L-3, to the top of each guide rail and to the guide pins in the cabinet. Apply it very sparingly to these parts whenever it is required. The guide rails and pins are shown in figure 3–3.

Note

When ordering lubricant, Navy Specification 14–L–3, refer to Standard Navy Stock Number W14–L–84–900 for 1-lb can, or W14–L–84–910 for 5-lb can.

b. DIAL DRIVE MECHANISM.–If operation of the dial-drive mechanism becomes sluggish due to accumulated dust and grit in the gears, it may be advisable to clean and relubricate the gears, as explained in figure 6–1. To clean the gears, use a small brush generously charged with Dry Cleaning Solvent 140F (FED. SPEC. P-5-661b) and start with the top gear and work down. To relubricate, apply a coating of the above-mentioned lubricant to the teeth of the accessible gears, using a suitable camel's-hair brush (Standard Navy Stock Number 38-B-725).

Note

When ordering Solvent 140F, refer to Federal Stock Number WM6850-274-5421 for a 5-gallon can.

4. RE-TROPICALIZATION.

In manufacture, Radio Receiver R-482C/URR-35 is not tropicalized as a complete assembly, but instead, use is made of materials and parts which are either inherently moisture- and fungus-resistant, or which have been tropicalized individually prior to assembly in the receiver. Since the repair parts provided are identical with the parts used in the equipment, pre-tropicalized parts will be replaced with pre-tropicalized parts and the over-all resistance of the equipment to moisture and fungus should be unaffected.

TABLE 6–1. ROUTINE MAINTENANCE CHECK CHART

WHAT TO CHECK	HOW TO CHECK	PROCEDURE
	Monthly	
Chassis	Remove chassis from case and inspect for loose parts or leads, and for parts damaged due to overheating.	Tighten all loose screws, and all screws on terminal strips. Check all components showing distress for deviation from design values, and replace if necessary; also check circuits involved.
Receiver sensitivity and gain	Check as outlined in par. 3 of Section 7.	If sensitivity or gain is low, receiver will require tube replacement or alignment as outlined in par. 4 of Section 7.
Cables and connectors	Detach cables and examine insulation for possible damage. Examine cable connectors for loose, bent or dirty contacts; also for damaged threads and loose cable clamp screws.	If dirt or grease is present on contacts, clean with Dry Cleaning Solvent 140F (Fed. Stk. No. WM6850-274-5421, Fed. Spec. P-S-661b).
Front panel and sub-panel controls, switches, knobs, etc.	Check for looseness of switch and control mounting nuts. Check for missing or loose knobs.	Tighten loose nuts, replace missing knobs and tighten loose knobs. A Bristol setscrew key for tightening knob setscrews is mounted at rear of sub-panel.
Blower operation	Check blower operation by closing contacts of thermostatic switch S301 (on rear of chassis behind preselector). This can be done by gently probing switch with an insulated rod when receiver is connected up for bench testing. (WARNING: 115v ac is present at S301.)	If closing of contacts fails to start blower, check connections to blower and blower capacitor. If necessary to replace blower, follow removal instructions given in par. *6b* of Section 7. If blower is excessively noisy, replace bearings as outlined in par. *6d* of Section 7.
Electron tubes	Check all electron tubes in mutual-transconductance tube tester, such as Tube Tester TV–3/U series. Replace any tube having transconductance value of less than 75 percent of normal. After test, replace each tube in its original socket.	When making tube replacements, the "reliable" models of all types should be used whenever possible.
	Quarterly	
*Air filters	Remove filter units from inside of cabinet by sliding the snap-slide fasteners and inspect.	Clean with solution of hot water and dishwashing compound (Fed. Stk. No. GT7930-269-1278). Let filters dry thoroughly. Dip in Military Symbol —2190T or —3100 lubricating oil, or equivalent (SAE 30 or 50), using heavier oil (—3100 or SAE 50) at higher operating temperatures. Let excess oil drain off for about one-half hour.
	Semi-Annually	
Receiver chassis and cabinet	Inspect receiver chassis, top and bottom, for loose parts, assemblies and chassis assembly screws. Inspect for dirt on tube sockets and in preselector housing. Inspect cabinet for loose mounting screws on track slides and shock mounts. Check for damage to parts due to overheating, etc.	Use a small brush (SNSN 38-B-375) charged with Dry Cleaning Solvent 140F (Fed. Stk. No. WM6850-274-5421, Fed. Spec. P-S-661b).
Dial-drive mechanism	Observe smoothness of dial operation, and inspect gears in drive mechanism visually for evidence of grit and dirt in teeth.	If operation of dial drive indicates that the gears are sticky or binding, clean and re-lubricate in accordance with par. 3, this section, and figure 6–1.

* In installations at shore stations or in a ship which is tied up at a pier, the dust content of the air may be high. In such cases it is advisable to clean the air filters monthly or weekly, if necessary.

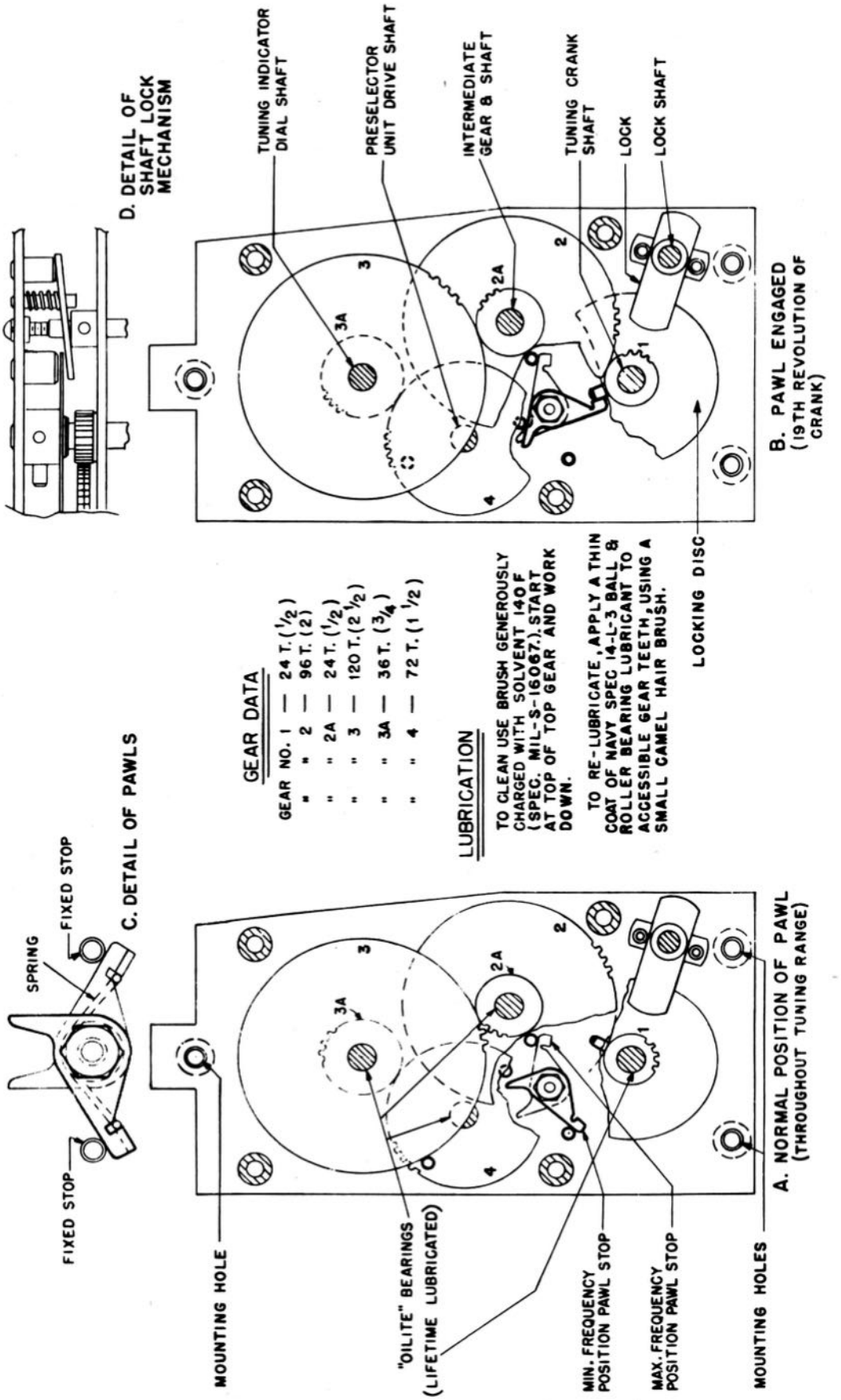


Figure 6–1. Dial-Drive Mechanism, Details and Lubrication

SECTION 7
CORRECTIVE MAINTENANCE

1. LOCALIZATION OF TROUBLE.

Corrective maintenance covers that phase of the care of the equipment dealing with the location and correction of trouble that has already occurred, and which is beyond the province of the operator to attempt to correct. For this work it is assumed that technical personnel with radio training are available.

WARNING

VOLTAGES ARE PRESENT IN THIS EQUIPMENT WHICH ARE DANGEROUS AND WHICH MAY BE FATAL IF CONTACTED. OBSERVE ALL SAFETY PRECAUTIONS; REFER TO THE SAFETY NOTICE INCLUDED IN THE FRONT MATTER OF THIS INSTRUCTION BOOK.

An important part of remedying defective equipment operation lies in the development, and proper use, of a systematic method of localizing the source of trouble to one particular stage or component of the receiver, or to as small a portion of the receiver as possible. Proper isolation of a source of trouble to a definite portion of the circuit is a time saver, in that it becomes possible to avoid the detailed inspection of those parts of the circuit which may be completely trouble-free.

For the most part, localization of the source of trouble can be accomplished by conventional "signal-tracing" methods. This method of trouble shooting entails a stage-by-stage check, starting either at the input of the receiver and tracing ahead, or at the output and checking backward, until a signal interruption is encountered. Regardless of the direction of checking, the defective stage will probably be that in which the signal first was found to be faulty.

2. TROUBLE SHOOTING.

a. GENERAL.—With the equipment properly installed, any irregularities which occur in the performance of the receiver will be attributable either to misadjustment of one or more of the controls, or to the failure of some part.

FAILURE REPORTS

"Report each failure of the equipment, whether caused by a defective part, wear, improper operation, or an external cause. Use ELECTRONIC FAILURE REPORT form DD 787. Each pad of the forms includes full instructions for filling out the forms and forwarding them to the Bureau of Ships. However, the importance of providing complete information cannot be emphasized too much. Be sure that you include the model designation and serial number of the equipment (from the equipment nameplate), the type number of the major unit (from the major unit nameplate), and the type number and reference designation of the particular defective part (from the instruction book). Describe the cause of the failure completely, continuing on the back of the form if necessary. Do not substitute brevity for clarity. And remember – there are two sides to the failure report - - -

"YOUR SIDE"

Every FAILURE REPORT is a boost for you:

1. It shows that you are doing your job.
2. It helps make your job easier.
3. It insures available replacements.
4. It gives you a chance to pass your knowledge to every man on the team.

"BUREAU SIDE"

The Bureau of Ships uses the information to:

1. Evaluate present equipment.
2. Improve future equipment.
3. Order replacements for stock.
4. Prepare field changes.
5. Publish maintenance data.

Always keep a supply of failure report forms on board. You can get them from the nearest District Publications and Printing Office."

In most cases it will be possible to localize a particular fault from the general nature of the trouble encountered. Faulty or abnormal action of a particular control will often indicate the particular section of the receiver, and the specific portion of the circuit in which the trouble lies. Reference to the schematic diagram of figure 7–26, and to the simplified diagrams of figures 2–1 and 2–4 through 2–12 will aid in localizing particular faults.

In the case of the IF/AF chassis, a stage-by-stage test is simplified by the incorporation of several test jacks in the equipment. In the power supply circuits, where the signal to be traced is a supply voltage, the procedure to be used is basically the same, except that the voltage will be traced from the output back to the power transformer, rather than from stage to stage. In the preselector, a stage-by-stage check is relatively difficult to accomplish. However, trouble in the preselector can be verified by means of the sensitivity and gain measurements outlined in paragraph 3 of this section. Thereafter, the trouble can be localized to a particular stage by means of voltage and resistance measurements.

b. TROUBLE-SHOOTING CHART.—In tracing faults, an orderly and systematic procedure should be followed. The trouble-shooting chart, table 7–1, gives the symptoms of troubles commonly encountered in the left-hand column, the possible causes of these symptoms in the middle column and suggested corrective measures in the right-hand column .

Table 7–2 indicates approximate test input-signal levels which are required at the various i-f and a-f stages to produce a specified output. Reference to this table may often provide a rapid means of determining which stage or stages require repair or realignment.

TABLE 7–1. TROUBLE-SHOOTING CHART

SYMPTOM	PROBABLE CAUSE	REMEDY
1. Panel lamps do not light when POWER switch is placed in ON position.	1. *a.* DIMMER control improperly adjusted.	1. *a.* Turn control clockwise.
	b. Panel lamps burned out.	*b.* Replace lamps I501 and I502.
	c. Line fuse(s) blown.	*c.* Replace fuse F201 and/or F202.
	d. No primary power.	*d.* Cable disconnected at J401. Primary power cable defective. Open circuit between J401 and J405 in filter.
2. Line fuses blow repeatedly when replaced.	2. *a.* Replacement fuses of incorrect size.	2. *a.* Use 2-amp fuses.
	b. Rectifier tube defective.	*b.* Replace V301.
	c. Filter capacitor shorted.	*c.* Replace C301 and/or C303.
	d. Short circuit in primary, power supply or filament circuits.	*d.* Check tube-socket and terminal board resistance; replace defective parts.
3. Blower does not operate after receiver has been operating for some time.	3. *a.* Low ambient temperature.	3. *a.* None - normal condition.
	b. Thermostatic switch defective.	*b.* Replace S301.
	c. Blower-motor-capacitor defective.	*c.* Replace C304.
	d. Blower motor defective.	*d.* Repair or replace blower.
4. CRYSTAL panel lamp does not glow with OSC. switch in CRYSTAL position; receiver otherwise operative.	4. *a.* OSC. switch contacts defective.	4. *a.* Clean, repair or replace S203.
	b. Neon lamp burned out.	*b.* Replace lamp I503.
5. Same as symptom 4, except inoperative in either position of OSC. switch.	5. *a.* Rectifier tube defective.	5. *a.* Replace V301.
	b. Defective part or circuit in power supply.	*b.* Check and trouble-shoot power supply.
6. Receiver inoperative with OSC. switch in MANUAL position, inoperative in CRYSTAL position.	6. *a.* Crystal not installed in CRYSTAL holder, or crystal frequency not between 20.1125 and 35.2167 mc.	6. *a.* Install crystal of proper frequency.

TABLE 7-1. TROUBLE-SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	REMEDY
	b. CRYSTAL-holder contacts dirty or sprung.	*b.* Clean, repair or replace holder XY201.
7. INPUT meter cannot be set to zero with INP. MTR. potentiometer	7. *a.* 2nd i-f stage defective.	7. *a.* Replace V204; trouble-shoot circuits.
	b. Meter circuit defective.	*b.* Check meter M501 and circuit resistors.
8. Weak signal, evidenced by low readings on both INPUT and OUTPUT meters.	8. *a.* Defective antenna circuit.	8. *a.* Check antenna, cable, connections in P404, J404, J407, and P101. Replace or repair as required.
	b. I.F. GAIN control set incorrectly.	*b.* Readjust R233; see par. 4*e*, this section.
	c. Defective tube in i-f section.	*c.* Check V201 to V207; replace weak tubes.
	d. Defective tube in preselector.	*d.* Check V101 to V109; replace weak tubes.
	e. I-f stages out of alignment.	*e.* Check IF/AF gain; see par. 3*c*(1), this section. Realign if necessary; see par. 4*c* and 4*d*, this section.
	f. Preselector out of alignment.	*f.* Check preselector gain; see par. 3*c*(2), this section. Realign if necessary; see par. 4*f* and/or 4*g*, this section.
	g. Defective part if i-f section.	*g.* Check voltages and resistances; replace defective part.
	h. Defective part in preselector.	*h.* Same as *g*, above.
9. Intermittent signal, evidenced by erratic indications of both INPUT and OUTPUT meters.	9. *a.* Defective tube in i-f section or preselector.	9. *a.* Tap each tube to locate defective one and replace.
	b. Loose or defective cable or connector.	*b.* Check all cables and connectors in receiver and filter; check external cables.
	c. Defective bypass capacitor.	*c.* Check all bypass capacitors in r-f and i-f stages.
10. No received signal, evidenced by no signal indications on both INPUT and OUTPUT meters.	10. Same as item 8.	10. Same as item 8.
11. No audio output and no-signal indications on OUTPUT meter; normal reading on INPUT meter. (SILENCER switch in OUT position.)	11. *a.* Defective tube in detector, silencer, AGC or noise limiter circuit.	11. *a.* Check V206, V207, and V208; replace faulty tube.
	b. Defective part in silencer or AGC circuit.	*b.* Check voltages and resistances; replace defective part.
12. Same as symptom 11, except SILENCER switch in IN position.	12. SILENCER control set improperly.	12. Readjust SILENCER potentiometer R247; see par. 4*d* of Section 4.

TABLE 7-1. TROUBLE-SHOOTING CHART (Cont)

SYMPTOM	PROBABLE CAUSE	REMEDY
13. No signal indication on OUTPUT meter; normal audio output.	13. Defective part in meter circuit.	13. Check meter M502 and associated chokes and capacitors; replace defective parts.
14. Audio output distorted.	14. *a.* Same as item 11*a.*	14. *a.* Same as item 11*a.*
	b. Defective a-f filter or coupling capacitor; open grid-leak resistor.	*b.* Check voltages and resistances; replace defective part.
	c. AGC circuit defective.	*c.* Check V207 and V208; replace defective tube. Check voltages and resistances at all stages connected to AGC line and check all parts; replace defective parts.
15. Excessive hum in audio output.	15. *a.* Defective filter capacitor in power supply.	15. *a.* Replace C301, C302 and/or C303.
	b. Audio grid return open.	*b.* Check grid resistors in a-f stages.
	c. Defective tube.	*c.* Check V206 and V208 for heater-to-cathode leakage; replace if necessary.
	d. Heater-bias circuit defective.	*d.* Check voltage and resistance at heaters V206 and V208; replace defective part.
16. No audio output with N.L. switch in IN position.	16. *a.* Defective tube.	16. *a.* Replace V206.
	b. Coupling capacitor shorted.	*b.* Replace C223.
17. Noise limiter does not limit noise impulses with N.L. switch in IN position.	17. *a.* Same as item 16.	17. *a.* Same as item 16.
	b. Defective part in limiter or detector circuit.	*b.* Check voltages and resistances; replace defective part.

TABLE 7-2. I-F AND A-F TEST DATA

INPUT TEST POINT	*INPUT SIGNAL		**OUTPUT
	FREQUENCY	AMPLITUDE	
L111, adjusting screw	18.6 mc	21 μv	−4 v at J201
J101	18.6 mc	250 μv	−4 v at J204
V201, pin 1	18.6 mc	4 μv	10 db on OUTPUT meter
V203, pin 7	1.775 mc	95 μv	10 db on OUTPUT meter
J201	1.775 mc	43,000 μv	−4 v at J204
V204, pin 1	1.775 mc	530 μv	10 db on OUTPUT meter
V205, pin 1	1.775 mc	17,000 μv	10 db on OUTPUT meter
V209, pin 7	1000 cps	17 mv	10 db on OUTPUT meter
V209, pin 3	1000 cps	360 mv	10 db on OUTPUT meter
V210, pin 1	1000 cps	2 v	10 db on OUTPUT meter

* 18.6- and 1.755-mc input signals modulated 30 percent at 1000 cps and applied to input test point through 0.01-uf capacitor. (Capacitor not required at J101 and J201.) A-f test signal applied to input test point through 0.1-uf capacitor.

** Output obtained for following receiver conditions: OSC. switch in CRYSTAL position with no crystal installed in holder, ALIGN-REC. switch in REC. position, SILENCER switch in OUT position, N.L. switch in OUT position, A.F. LEVEL control fully clockwise with no audio load connected. Voltages at J204 measured with electronic multimeter (ME-25/U series, Navy Model OBQ series, or equivalent).

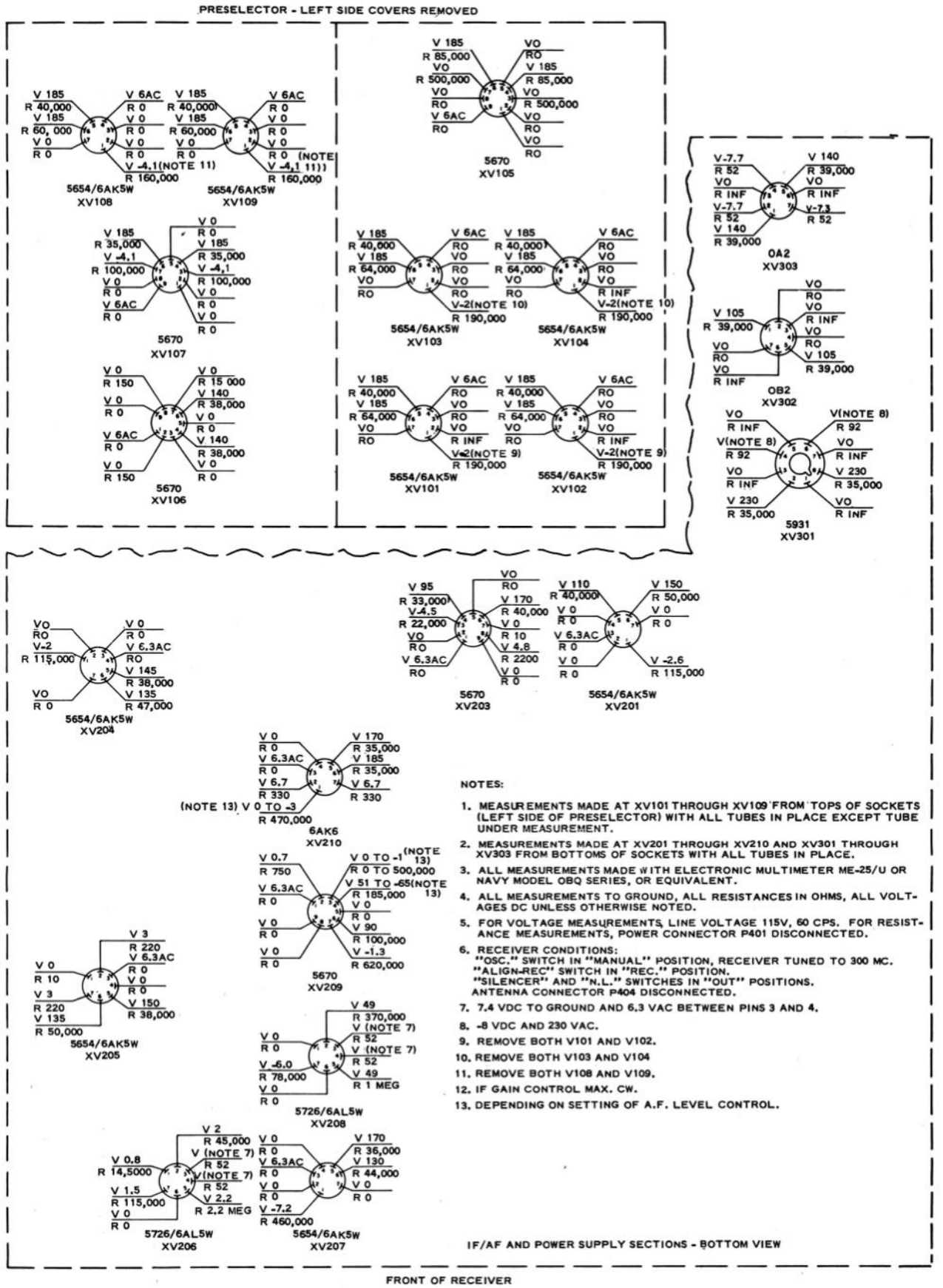


Figure 7-1. Tube Socket Voltage and Resistance Measurements

c. VOLTAGE AND RESISTANCE MEASUREMENTS.—The values of voltage and resistance between the pin of each tube socket and ground for the IF/AF and power supply sections are indicated in figure 7–1. Similar readings at the tube sockets of the preselector are also included in figure 7–1. Because of the physical arrangement of the preselector in the receiver, these measurements must be made from the top of each preselector tube socket after removing the tube from the socket at which the measurements are to be made. Unless otherwise specified in figure 7–1, all other tubes should remain in place. Since tube-socket voltages obtained in that manner are not indicative of operating conditions, the actual operating voltages (and resistances) at other pertinent test points accessible on the preselector assembly are shown in figure 7–2. Similar values, measured at test jacks and from terminal-board terminals to ground and/or other significant points, are given in table 7–3.

The values specified in figures 7–1 and 7–2, and in table 7–3, were obtained by using an electronic multimeter such as Multimeter ME–25/U series, Vacuum Tube Volt-Ohm-Milliammeter Navy Model OBQ series, or equivalent. The conditions under which voltage and resistance measurements were made are as follows: 115-volt, 60-cps line voltage; receiver tuned to 300 megacycles; ALIGN-REC. switch in REC. position; SILENCER switch in OUT position and N.L. switch in OUT position. Resistance measurements were made with the power connector (P401) removed from the A.C. POWER receptacle (J401).

Values of voltage and resistance as measured in the equipment should be within ±20 percent of those specified in this instruction book.

d. ACCESS TO WIRING AND COMPONENTS.—To gain access to the wiring and components, release the four fasteners in the corners of the front panel and withdraw the chassis as far as the mechanical stops will permit. Then release the stops, as shown in figure 3–2, and remove the chassis from the cabinet.

e. OPERATION OF RECEIVER OUT OF CABINET.—If the receiver is to be operated after having been removed from the cabinet, proceed as follows:

(1) Disconnect all external cables from the connectors on Low-Pass Filter F-304/URR-35C, at the rear of the receiver.

(2) Disengage the snap-slide fasteners, shown in figure 3–3, which secure the filter housing to the cabinet and remove the filter through the front of the cabinet.

(3) Plug the filter into the connectors on the rear of the receiver chassis and reconnect the external cables to the connectors on the filter.

3. SENSITIVITY CHECK.

a. GENERAL.—The following procedure for checking the sensitivity of the receiver is provided so that the technician can determine whether or not realign-

NOTES 1. RESISTANCE VALUES SHOWN ARE IN OHMS.
2. VOLTAGE VALUES SHOWN ARE D-C VOLTAGES UNLESS OTHERWISE INDICATED - MEASURED WITH ELECTRONIC VOLTMETER.
3. FOR CONDITIONS OF MEASUREMENT SEE PARAGRAPH 2C OF THIS SECTION.
4. TERMINAL (FEED-THROUGH TYPE) FROM MIXER PLATE.

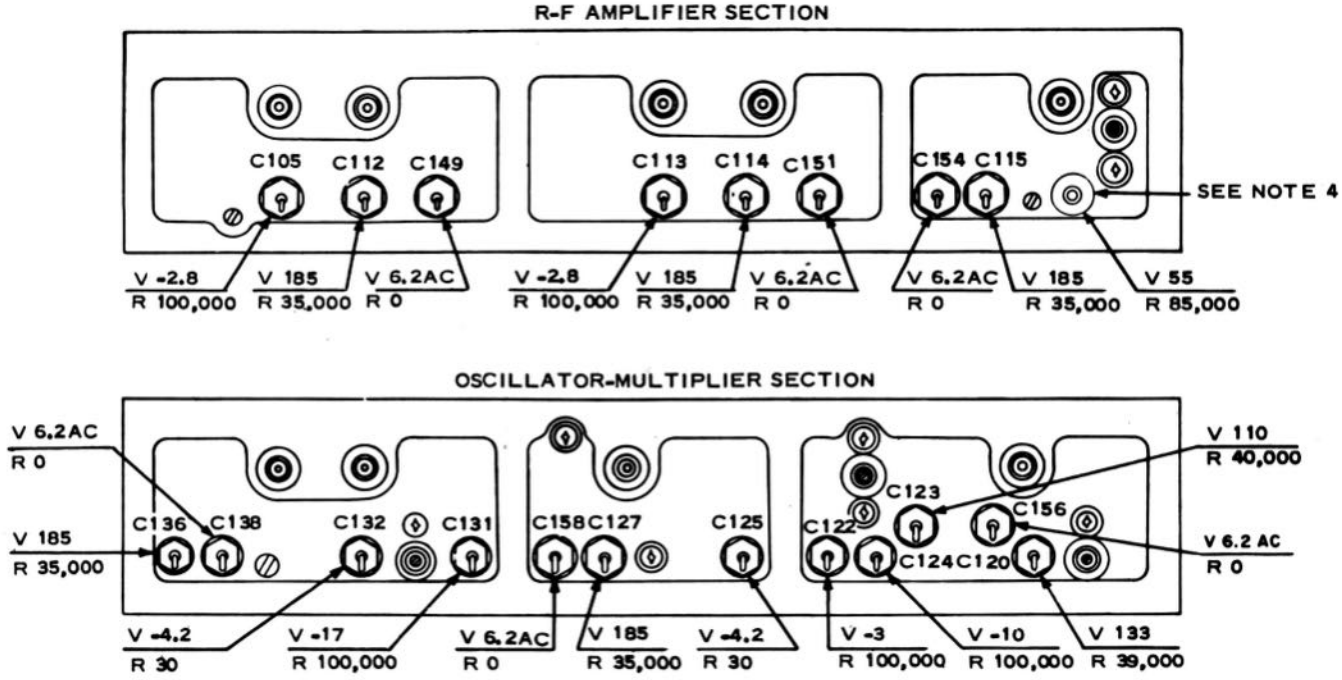


Figure 7–2. Preselector Voltage and Resistance Measurements

ment is necessary.

The procedure outlined is one which does not employ a signal generator, but instead, makes use of tube noise as an indication of sensitivity. This method has been selected because the frequency modulation inherent in most common types of signal generators operating in the 225–400 mc range makes the sensitivity appear to be greater than it actually is. The rated sensitivity of Radio Receiver R-482C/URR-35 is better than 8 microvolts, in series with 50 ohms, for a 10-db signal-to-noise ratio when the carrier is 30-percent modulated with a 1000-cps tone. Checked with any ordinary signal generator, this sensitivity might appear to be better than 4 microvolts because of slope detection of the frequency-modulated test signal.

Note

If the sensitivity and gain measurements outlined in the following paragraphs appear normal, yet receiver performance is poor, it is possible that a "noisy" tube is causing a faulty indication of proper sensitivity. If so, the defective tube may be found by tapping each tube successively while listening to a headset; in nearly all instances, "noisy" tubes are also microphonic. Repeat the sensitivity test after replacing the defective tube or tubes.

b. OVER-ALL SENSITIVITY.

(1) The conditions for making this test are as follows:

(*a*) OSC. switch S203 (in left compartment) in MANUAL position.

(*b*) N.L. switch S202 (in right compartment) in OUT position.

(*c*) SILENCER switch S501 in OUT position.

TABLE 7–3. TEST-JACK AND TERMINAL-BOARD VOLTAGE AND RESISTANCE MEASUREMENTS

TEST JACK OR TERMINAL BOARD	TERMINAL	*D-C VOLTAGE TO GROUND	*RESISTANCE TO GROUND (OHMS)
Osc. test jack J202		−5.0	.....
Diode test jack J203		−1.7	.....
AGC test jack J204		−2.5	.....
180 V test jack J205		185	.....
Terminal board E303 (Power Supply Section)	1	.....	.....
	2 to 3	6.3 ac**	52
	3 to 2	6.3 ac**	52
	4	0	0
	5	6.3 ac	0
	6	−4.35	28
	7	185	35,000
	8	105	35,000
	9	.....	.....
	10	.....	.....
	11	.....	.....
	12	.....	.....
	13	−7.7	52
	14	.....	.....
	15	105	190,000
Terminal board E301 (Power Supply Section)	21	.....	0
	22	185	35,000
	23	140	39,000
	24	.....	.....
	25	0	0
	26	.....	.....
Terminal board E208 (IF/AF Section)	31	133	39,000
	32	.....	.....
	33	140	39,000
	34	−2.6	110,000
	35	−4.3	30
	36	−17	100,000

* Conditions for measurement: Line voltage 115 volts, 60 cps; ALIGN-REC. switch in REC. position; OSC. switch in MANUAL position; SILENCER and N.L. switches in OUT positions; receiver tuned to 300 mc with no signal. All measurements made with electronic multimeter (ME–25/U series, Navy Model OBQ series, or equivalent). Resistance measurements made with power cable disconnected at A.C. POWER receptacle (J401).

** Voltage measured between terminals 2 and 3.

(*d*) A.F. LEVEL screwdriver-adjust control R255 (in right compartment) turned fully clockwise.

(*e*) ALIGN-REC. switch S201 (in left compartment) in REC. position.

(*f*) Antenna input connector P404 disconnected from 50 OHM ANT. receptacle J404.

(*g*) 115-volt, 60-cps line voltage connected at A.C. POWER receptacle J401 and receiver POWER switch in ON position.

(2) Rotate the tuning control through its entire range and note the readings indicated on OUTPUT meter M502. The meter readings should not change more than 5 db over the tuning range, and the average reading should be $+11\pm5$ db.

c. MEASUREMENT OF GAIN.—To determine whether the gain of the preselector and the IF/AF stages is adequate for normal sensitivity, proceed as follows:

(1) IF/AF GAIN MEASUREMENT.

(*a*) Set all controls as in paragraph 3*b*(1), this section, except for OSC. switch S203, which should be set in the CRYSTAL position with *no* crystal inserted.

(*b*) Observe the reading on OUTPUT meter M502. If this is greater than 10 db, the IF/AF gain is satisfactory, and the gain of the preselector should next be checked. If the reading is below 10 db, then all tubes (V201 and V203 to V210) in the IF/AF chassis should be tested and those found to be weak or defective replaced. If all the tubes are normal, the i-f stages should be realigned according to the procedure given in paragraph 4*c* of this section.

(2) PRESELECTOR GAIN MEASUREMENT.

(*a*) Set all controls as in paragraph 3*b*(1), this section (OSC. switch in MANUAL position).

(*b*) Rotate the tuning control back and forth through the frequency range and lock it in the position at which the reading indicated on OUTPUT meter M502 is lowest.

(*c*) If this minimum reading is at least 1 db higher than the reading obtained when measuring IF/AF gain, in paragraph 3*c*(1)(*b*) above, the preselector gain is acceptable.

(*d*) If the reading is not 1 db higher, the voltage between the adjusting screw of L111 (see figure 7–9) and ground should be measured with a d-c electronic voltmeter, first with OSC. switch S203 in the CRYSTAL position (with no crystal inserted), then with the switch in the MANUAL position. If the potential thus measured is at least 0.2 volt more negative with the switch in the MANUAL position, the oscillator-multiplier section of the preselector is operating properly, and the next step should be the testing of the tubes (V101 to V105) in the r-f section. If the potential measured is not 0.2 volt more negative, then the tubes (V106 to V109) in the oscillator-multiplier section should be checked.

(*e*) If all tubes (V101 to V109) in the preselector are normal, r-f alignment should be undertaken according to the procedure given in paragraph 4*f* (or 4*g*) of this section.

4. ALIGNMENT PROCEDURES.

a. EQUIPMENT REQUIRED. — The following equipment is required for proper alignment of the r-f and i-f stages of Radio Receiver R-482C/URR-35:

(1) RF Signal Generator AN/URM–25 series, Navy Model LP series, or equivalent signal generator having output impedance of 50 ohms.

(2) RF Signal Generator AN/URM–26 series, or equivalent.

(3) Multimeter ME–25/U series, Vacuum Tube Volt-Ohm-Milliammeter Navy Model OBQ series, or equivalent.

(4) Insulated alignment tool H201 and alignment and alignment loading tool H203, both mounted in clips on receiver chassis; see figure 7–4.

b. PREPARATION OF RECEIVER FOR ALIGNMENT.

(1) Remove the receiver chassis from the cabinet and stand it on its right side.

(2) Make connections to Low-Pass Filter F-304/URR-35C, following the procedure in paragraph 2*e*, this section.

(3) Set the SILENCER and N.L. switches to their OUT positions.

WARNING

WHEN THE RECEIVER IS SET UP FOR BENCH TESTING, AND THE "POWER" SWITCH IS "OFF", DANGEROUS VOLTAGES

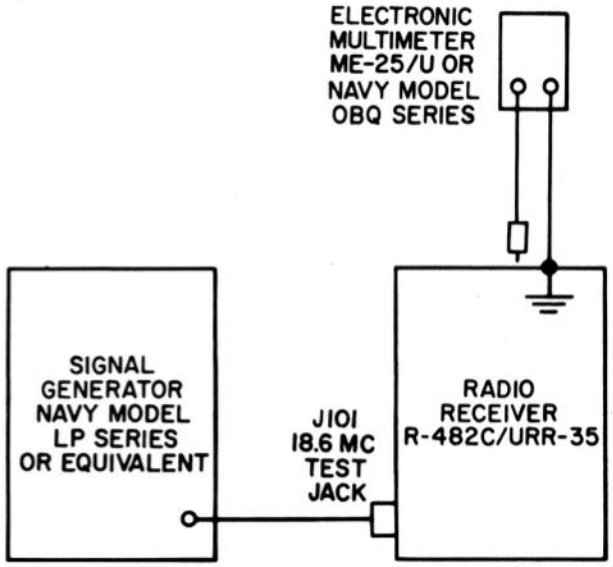


Figure 7–3. Bench Test Set-Up for I-F Alignment

ARE STILL PRESENT AT THE FOLLOWING POINTS:
FUSE HOLDERS XF201 AND XF202 AT THE RIGHT SIDE OF THE FRONT SUB-PANEL; SEE FIGURE 7–4.
TERMINALS 9 AND 10 ON POWER SUPPLY TERMINAL BOARD E303; SEE FIGURE 7–13.

c. ALIGNMENT OF I-F SECTION. (*See figure* 7–3).

(1) Connect the output of RF Signal Generator AN/URM–25, or Navy Model LP, or equivalent, to 18.6-mc test jack J101 (see figure 7–4). Use type RG–58/U cable for connections.

(2) Tune the receiver to 218 megacycles, remove the type CR–24/U crystal from the CRYSTAL holder, set the OSC. switch to CRYSTAL and place the ALIGN-REC. switch in the REC. position.

(3) Set the POWER switch to its ON position and allow the receiver to warm up for about five minutes.

(4) Adjust the signal generator for 30 percent modulation at 1000 cps, and tune it to 18,602 kc.

Note

Refer to figures 7–4 and 7–5 for the locations of test jacks, i-f transformers and their

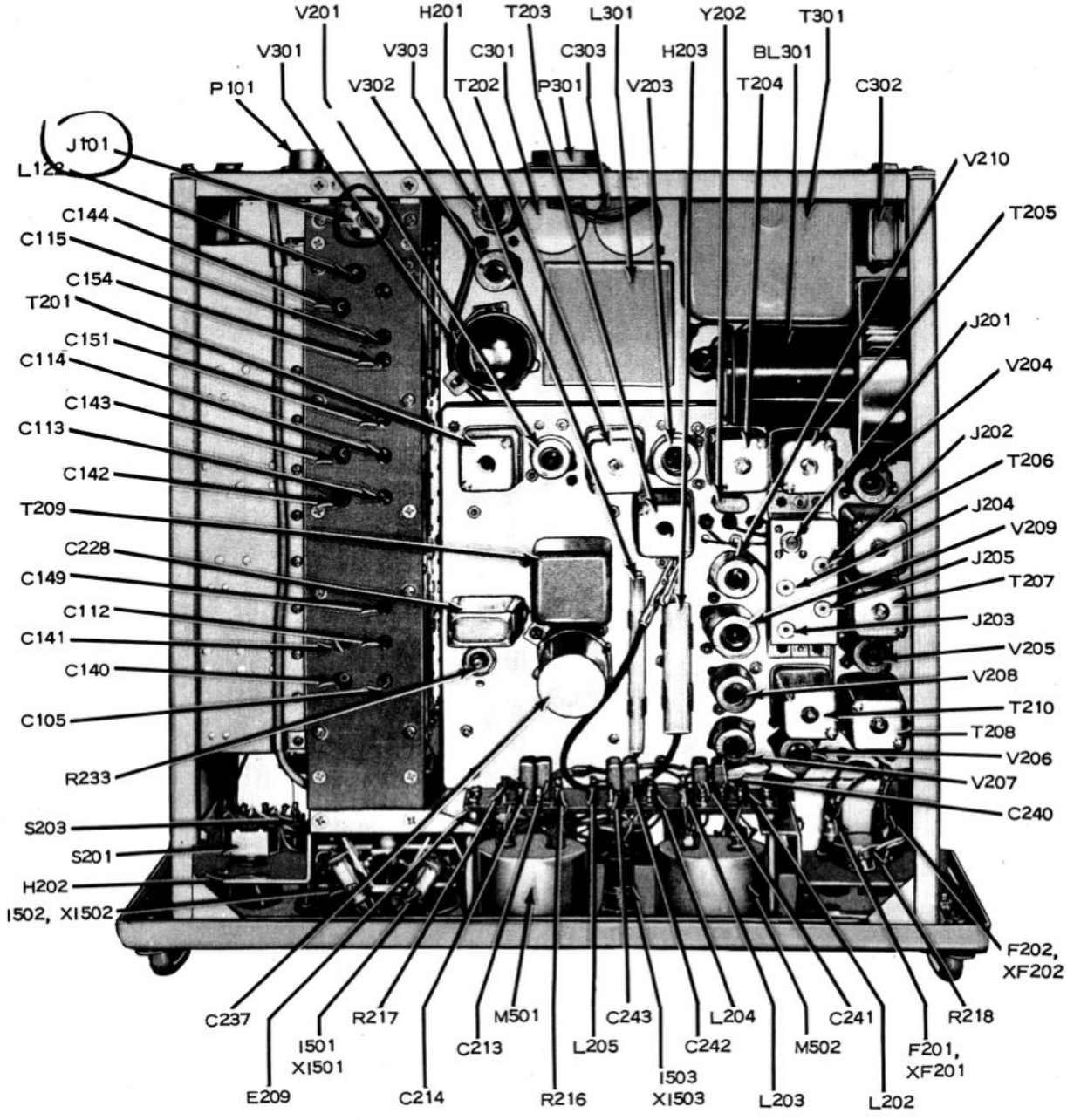


Figure 7–4. Radio Receiver R–482C/URR–35, Top View—Identification of Components

terminals, and controls, as well as for the use and location of alignment tool H203.

(5) Connect the electronic multimeter between AGC test jack J204 and ground.

(6) Adjust the signal generator output for a reading of −3 volts on the electronic multimeter.

(7) Turn I.F. GAIN control R233 fully clockwise.

(8) Connect the electronic multimeter between oscillator test jack J202 and ground. Adjust transformer T203 for a meter indication of −5 volts.

Note

It is possible to mistune transformer T203, since −5 volts is neither a maximum nor a minimum reading. To ensure correct adjustment, first turn the adjusting screw fully counterclockwise. Then turn the adjusting screw clockwise until the first maximum is reached. Turn the screw counterclockwise until a reading of −5 volts is obtained on the multimeter.

(9) Reconnect the electronic multimeter between test jack J204 and ground.

(10) Tune transformer T210 for a maximum indication on the electronic multimeter.

(11) Ground the alligator clip of the alignment loading tool, H203, and set the notch of the hooked probe against terminal 4 of transformer T208. Tune the secondary of transformer T208 for maximum indication on the electronic multimeter by turning the adjusting screw on the bottom of the transformer.

Note

The alignment loading tool, H201, reduces the Q of tuned circuits. In order to avoid misadjust-

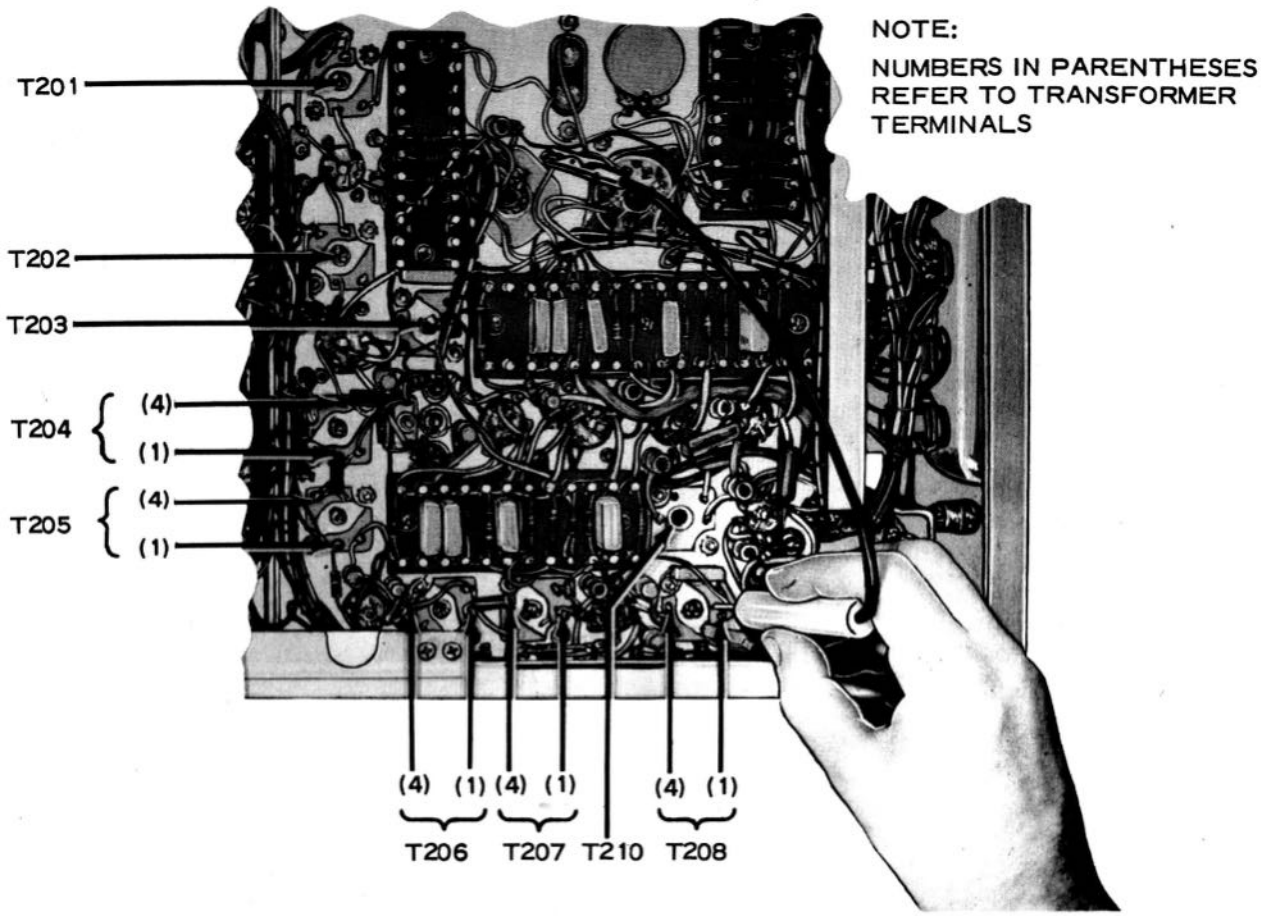


Figure 7–5. Use of Alignment Loading Tool and Identification of I-F Transformers

ment of double-tuned transformers because of mutual inductance between the windings, it is necessary to load the transformer primary when tuning the secondary, and to load the secondary when tuning the primary.

(12) Place the notch of the alignment loading tool on terminal 1 of transformer T208 and tune the primary by turning the adjusting screw at the top of the transformer for maximum indication on the electronic multimeter.

(13) Repeat steps (11) and (12) at transformers T207, T206, T205 and T204, in that order.

Note

While aligning these transformers, reduce the output of the signal generator in order to maintain an indication of approximately —4 volts at the electronic multimeter. This will prevent the development of a strong AGC signal, which might result in mistuning the i-f stages.

(14) Tune the secondary of transformer T202 for maximum indication on the electronic multimeter by turning the adjusting screw at the bottom of the transformer.

(15) Tune the primary of transformer T202 for maximum indication on the electronic multimeter by turning the adjusting screw at the top of the transformer.

(16) Tune the secondary of transformer T201 for maximum indication on the electronic multimeter by turning the adjusting screw at the bottom of the transformer.

(17) Tune the first mixer plate inductance, L122 (located at the top of the preselector, as shown in figure 7–10), for maximum indication on the electronic multimeter.

(18) Repeat steps (10) through (17) until no changes in alignment occur. The over-all i-f selectivity curve appears in figure 7–6.

d. ALIGNMENT OF AGC TRANSFORMER T210. *(See figure 7–3.)*

(1) Perform steps (1) through (5) of paragraph 4*c*, this section.

(2) Turn the output control of the signal generator to zero and note the AGC voltage, as indicated on the electronic multimeter. Increase the signal generator output until the AGC voltage just starts to increase.

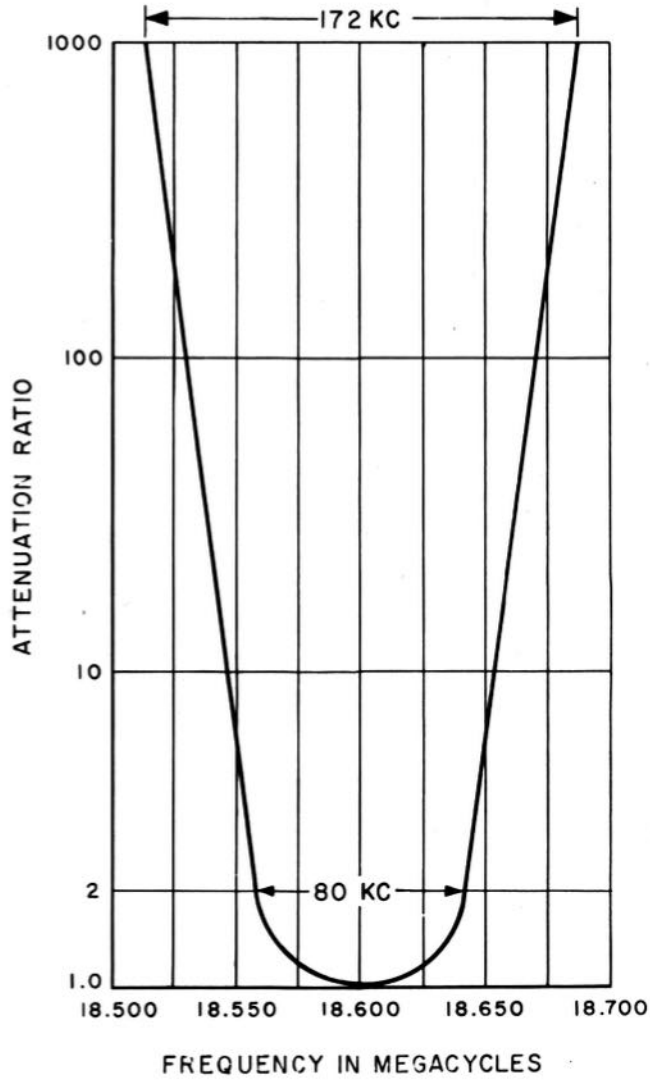


Figure 7–6. Typical I-F Selectivity Characteristic

(3) Tune transformer T210 (see figure 7–4) for minimum indication on the electronic multimeter.

e. I-F GAIN ADJUSTMENT.

(1) Connect the electronic multimeter between AGC test jack J204 (see figure 7–4) and ground.

(2) Set the OSC. switch to its MANUAL position.

(3) Tune the receiver throughout its entire range to find the lowest AGC voltage as indicated by the electronic multimeter.

(4) If the AGC voltage on the electronic multimeter is other than —2.3 volts, adjust it to that value by means of I.F. GAIN control R233, shown in figure 7–4. If it is not possible to adjust the AGC voltage to —2.3 volts, set it to the greatest negative voltage that can be obtained, which should be at least —2.0 volts. A maximum AGC voltage of less than —2.0 volts indicates a faulty receiver.

f. ALIGNMENT OF PRESELECTOR.
(See figure 7–7.)

WARNING

A D-C POTENTIAL OF 180 VOLTS IS PRESENT AT SOME OF THE INDUCTANCE AND CAPACITOR TRIMMER SCREWS AND AT SOME OF THE TRIMMER-INDUCTANCE LOCKING SCREWS (SEE FIGURE 7–10). WHEN LOOSENING OR TIGHTENING THE LOCKING SCREWS BE CERTAIN THAT RECEIVER POWER IS OFF. USE INSULATED ALIGNMENT TOOL H201 (FIGURE 7–4) FOR ALL SPLINED TRIMMER-SCREW ADJUSTMENTS.

(1) De-energize the receiver and remove the shielding covers from the preselector. Loosen the locking screws on trimmer inductances L103, L104, L107, L108, L111, and L112 (see figure 7–8 and 7–9) about one-eight of a turn, using the Bristol wrench H202 (figure 7–4) mounted near the dial-drive assembly. Replace the shielding covers.

(2) Connect the output of RF Signal Generator AN/URM-26, or equivalent, to the 50 OHM ANT. input connector, J404, on the low-pass filter. Adjust the output attenuator of the signal generator for minimum output.

(3) Install a crystal, in the receiver CRYSTAL holder, which corresponds to some channel frequency between 230 and 234 megacycles, as determined by the formula:

$$\text{Crystal frequency (mc)} = \frac{\text{Selected channel frequency (mc)} + 18.6 \text{ mc}}{12}$$

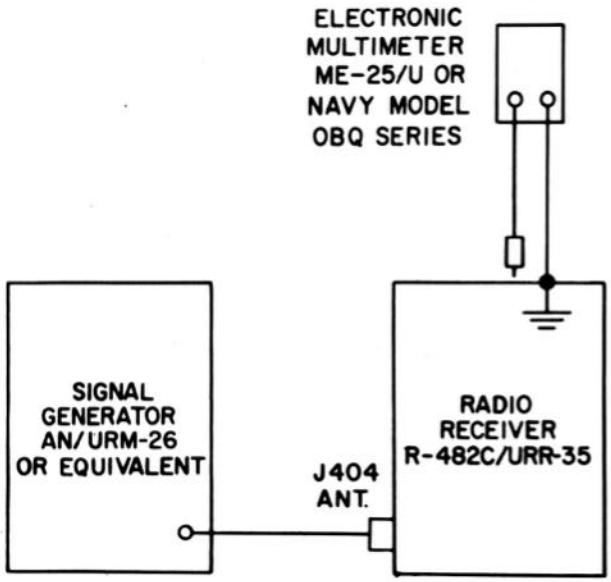


Figure 7–7. Bench Test Set-Up for R-F Alignment

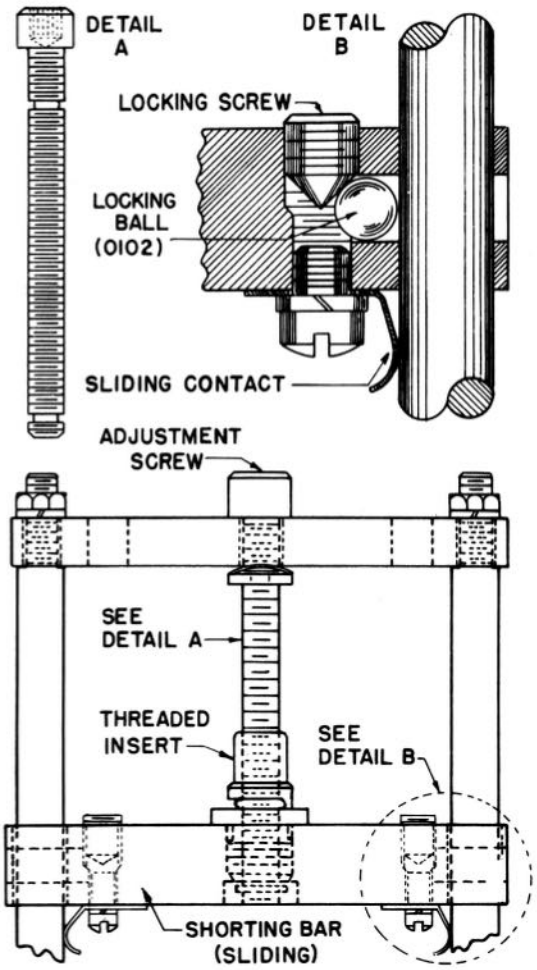


Figure 7–8. Details of Trimmer Inductances L103, L104, L107, L108, L111 and L112

Place the OSC. switch in its CRYSTAL position and tune the receiver to the channel frequency selected. Lock the tuning control.

Note

Refer to figures 7–9, 7–10 and 7–11 for locations of preselector tuning and adjustments and test points referenced in the following procedures.

(4) Connect the electronic multimeter between first-doubler-grid test point C122 and ground. Tune oscillator inductance L114 for maximum indication on the meter.

Note

The oscillator, second doubler and tripler-grid adjustments, steps (4), (5), (6), (13), (14) and (15), may be made by setting the ALIGN-REC. switch to ALIGN and tuning for a maximum indication on the INPUT meter. Use of the electronic multimeter, however, is the preferable procedure.

(5) Place the probe of the electronic multimeter on second-doubler-grid test point C124 and tune second-doubler-grid inductance L115 for a maximum meter reading.

(6) Place the probe of the electronic multimeter on tripler-grid test point C131 and tune tripler-grid inductance L117 for a maximum meter reading.

(7) Place the probe of the electronic multimeter on the trimmer screw of mixer-grid inductance L111 and tune tripler-plate inductance L112 for a maximum meter reading.

(8) Connect the electronic multimeter between AGC test jack J204 and ground; see figure 7–4.

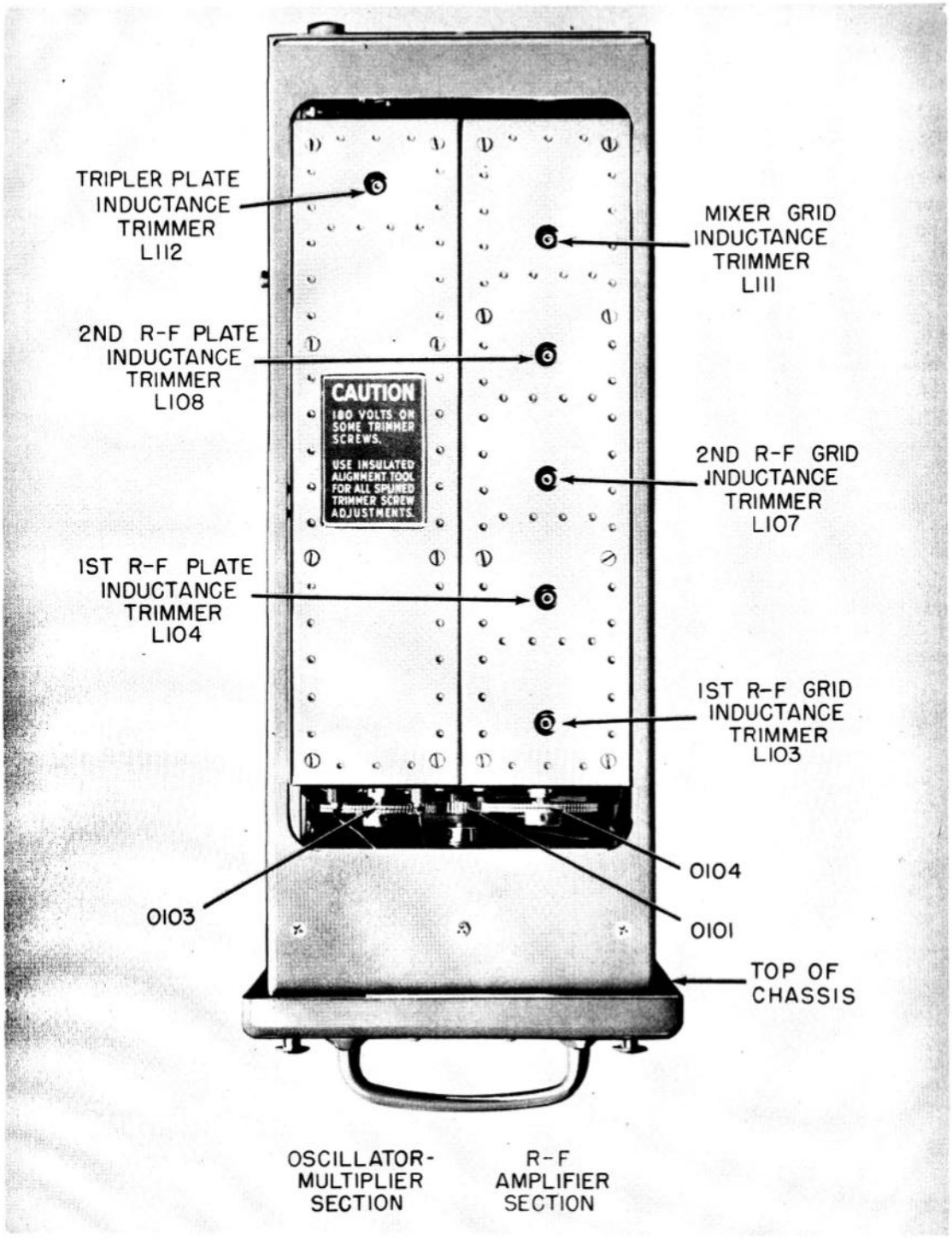


Figure 7–9. Preselector Viewed from Left Side of Chassis, Showing Alignment Adjusting Screws

Note

The adjustments in steps (9), (10), (11), (18), (19), and (20) may also be made by using the INPUT meter (M501), with the ALIGN-REC. switch in the REC. position, instead of an electronic multimeter, for tuning indication.

(9) With its modulation off, tune the signal generator for a maximum reading on the meter. The output attenuator should then be adjusted to give a reading of approximately 4 volts on the multimeter (0.4 on the INPUT meter).

(10) Using alignment tool H201, tune the r-f amplifier and mixer inductance trimmer screws for maximum meter readings, in the following order:

(*a*) Mixer-grid inductance L111.

(*b*) Second r-f plate inductance L108.

(*c*) Second r-f grid inductance L107.

(*d*) First r-f plate inductance L104.

(*e*) First r-f grid inductance L103.

While tuning, reduce the output of the signal generator as necessary to keep the electronic multimeter reading at approximately 4 volts (0.4 on the INPUT meter).

(11) Set the OSC. switch to MANUAL. Notice that when this is done, the electronic multimeter reading may drop to about 2 volts (0.2 on the INPUT meter). Now tune oscillator inductance L114 until the meter reading is a maximum.

(12) Set the OSC. switch to CRYSTAL, install a crystal corresponding to some channel frequency between 391 and 395 mc, set the tuning dial to the crystal channel selected, and lock the tuning dial.

(13) Place the probe of the electronic multimeter on first-doubler-grid test point C122 and tune oscillator trimmer capacitor C148 for a maximum meter reading.

Note

In tuning the trimmer capacitors, a slight amount of capacitance is added to the circuit by the presence of the alignment tool. It is therefore necessary to compensate for this capacitance by tuning the trimmers slightly beyond maximum, in a clockwise direction, so that the electronic multimeter will read a maximum when the alignment tool is removed from the trimmer screw.

(14) Place the probe of the electronic multimeter on second-doubler-grid test point C124 and tune second-doubler-grid trimmer capacitor C147 for a maximum meter reading.

(15) Place the probe of the electronic multimeter on tripler-grid test point C131 and tune tripler-grid trimmer capacitor C145 for a maximum meter reading.

(16) Place the probe of the electronic multimeter on the trimmer screw of mixer-grid inductance L111 and tune tripler-plate trimmer capacitor C146 for a maximum meter reading.

(17) Connect the electronic multimeter between AGC test jack J204 and ground; see figure 7–4.

(18) Tune the signal generator for a maximum reading on the meter. The output attenuator of the signal generator should then be adjusted to give a reading of approximately 4 volts on the electronic

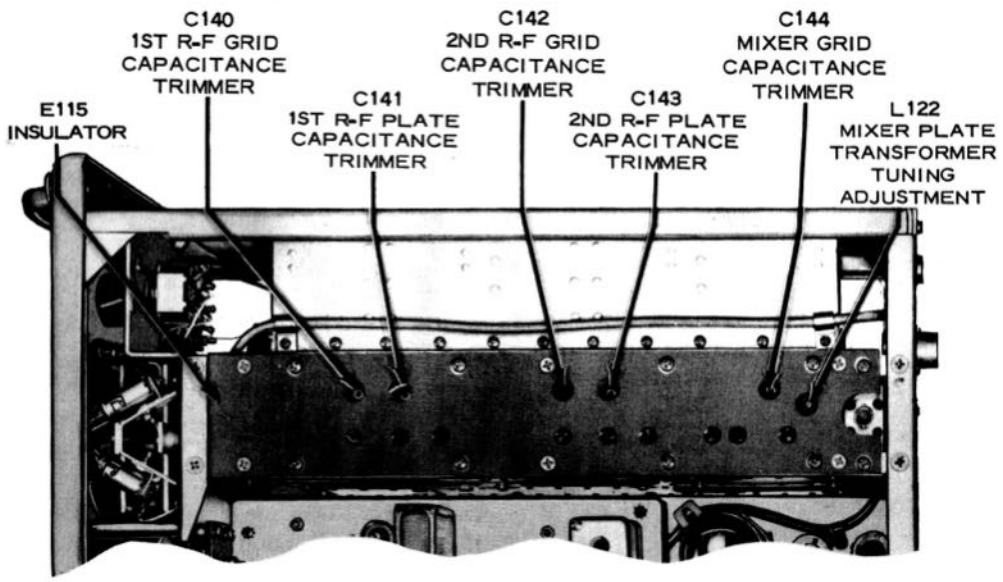


Figure 7–10. Preselector Viewed from Top Side of Chassis, Showing Alignment Adjusting Screws

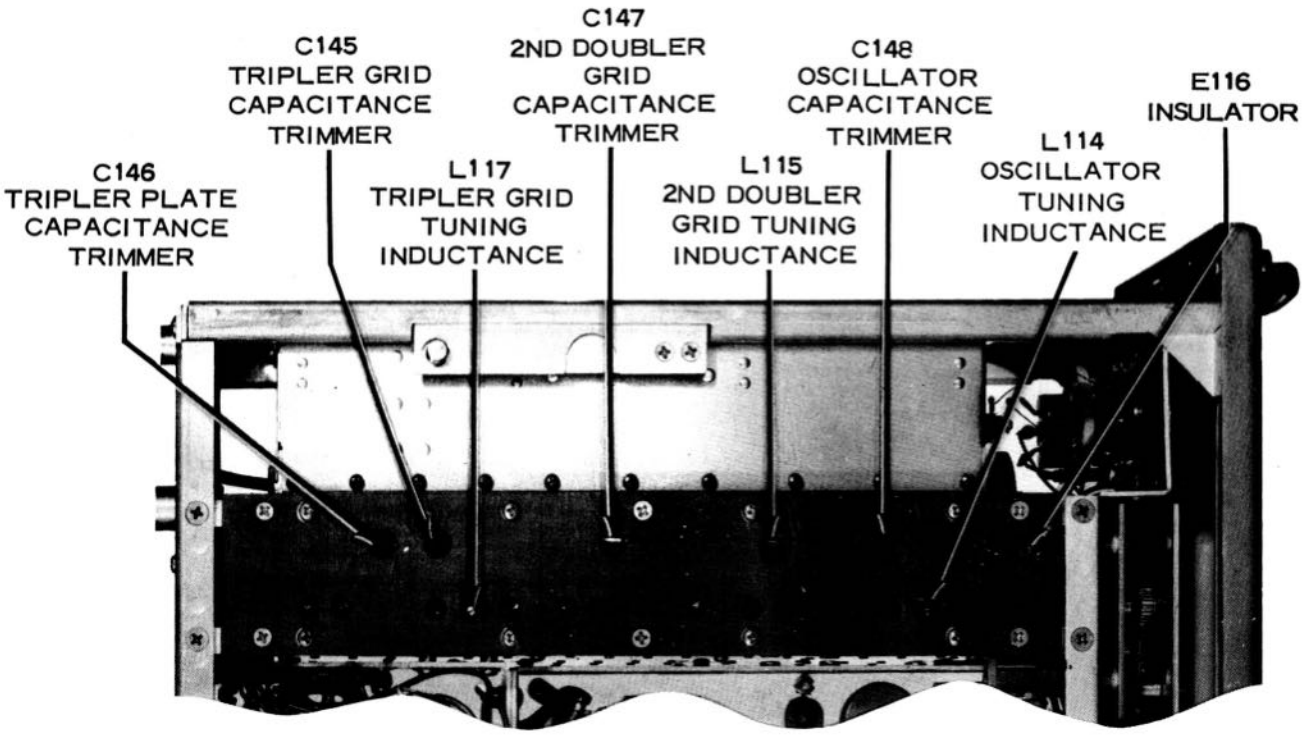


Figure 7–11. Preselector Viewed from Bottom Side of Chassis, Showing Alignment Adjusting Screws

multimeter (0.4 on the INPUT meter).

(19) Using alignment tool H201, tune the r-f amplifier and mixer trimmer capacitors for a maximum reading on the electronic multimeter, in the following order:

(*a*) Mixer-grid capacitor C144.

(*b*) Second r-f plate capacitor C143.

(*c*) Second r-f grid capacitor C142.

(*d*) First r-f plate capacitor C141.

(*e*) First r-f grid capacitor C140.

(20) Set the OSC. switch to MANUAL. Note that when this is done, the electronic multimeter reading may drop to about 2 volts (0.2 on INPUT meter). Now tune oscillator trimmer capacitor C148 until the meter reading is a maximum; refer to the note following step (13).

(21) Repeat steps (4) through (20) until no further adjustment of the trimmer capacitors is necessary to align the high-frequency alignment point.

Note

Always terminate alignment by aligning the preselector at the high-frequency alignment point.

(22) After alignment of the preselector de-energize the receiver and remove the preselector shielding covers. Tighten the trimmer-inductance locking screws carefully, so that the adjustments will not be disturbed.

(23) Check the alignment of the receiver by making the sensitivity and gain measurements outlined in paragraph 3 of this section.

g. ALIGNMENT OF PRESELECTOR IF ALIGNMENT-POINT CRYSTALS ARE NOT AVAILABLE. —The following procedure must be used if crystals which will tune the receiver to the required alignment frequencies are not available. This procedure describes a different method of aligning the oscillator stage only. Alignment of the other stages of the preselector remains as described in paragraph 4*f*, above.

(1) Set up, near the receiver, a heterodyne frequency meter such as a Navy Model LM or LR series, which will cover the range of 10–18 megacycles, or the range 20–35 megacycles, and couple it, through a d-c blocking capacitor, to capacitor C123, located on the oscillator side of the preselector; see figure 7–14.

(2) Set the tuning dial of the receiver to 232 megacycles, throw the CRYSTAL-MANUAL switch to

MANUAL, and install any crystal.

Note

The frequency of the crystal used in this case is immaterial, but a crystal of some frequency must be in the crystal holder for MANUAL operation because of capacity effects.

(3) Tune the frequency meter to 20,883 or 10,441.5 kilocycles.

(4) Tune oscillator inductance L114 until it is adjusted as near as possible to zero beat in the frequency-meter headphones.

(5) Proceed with steps (5) through (10), inclusive, of paragraph 4*f*, this section.

(6) Set the tuning dial of the receiver to 393 megacycles.

(7) Tune the frequency meter to 34,300 or 17,150 kilocycles.

(8) Tune oscillator trimmer capacitor C148 until it is adjusted as near as possible to zero beat in the frequency-meter headphones.

(9) Proceed with steps (14) through (19) and steps (21) through (23) of paragraph 4*f*, this section. When repeating the alignment, in accordance with the instructions of step (21), do not perform steps (4), (11), (12), (13) and (20).

5. AUDIO-FREQUENCY RESPONSE.

The audio-frequency response characteristic for Radio Receiver R-482C/URR-35 appears in figure 7–12. Since there are no adjustments in the a-f stages of the receiver, any significant variation from the response curve must indicate a defective circuit or component.

6. REPAIR AND REPLACEMENT OF PARTS.

a. GENERAL.—The repair and replacement of most of the parts of Radio Receiver R-482C/URR-35 is straightforward, involving only the removal of mounting hardware and the unsoldering of connecting wires.

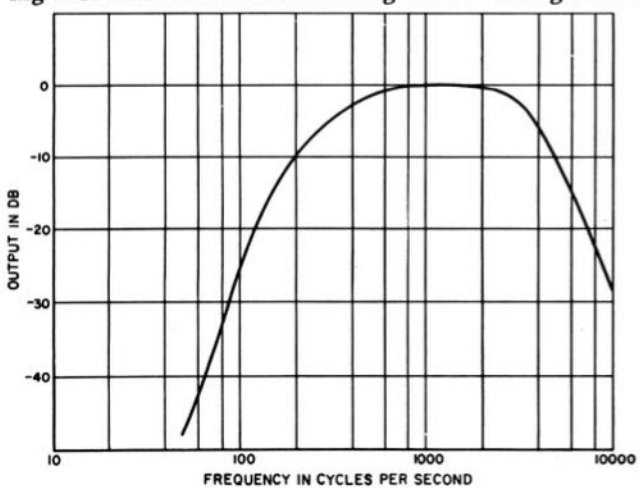


Figure 7–12. Typical Audio Response Characteristic

However, the procedures in this paragraph are included for the parts specified because the parts are so located that special precautions must be taken, and/or preferred repair procedures followed.

The locations of all components in the radio receiver are shown in figures 1–3, 2–2, 2–3, 3–3, 7–4, 7–13, 7–14, and 7–16 through 7–20.

b. BLOWER BL301.—Blower BL301 is located in the right rear corner of the cabinet, as shown in figure 7–4. To remove it, proceed as follows:

(1) Remove the chassis completely from the cabinet (see paragraph 2*a*, Section 3).

(2) Turn the catch on plug P302 counterclockwise to free it from the flange on receptacle J301. Remove the plug from the jack.

(3) Remove the four mounting screws which hold the fan housing to the chassis frame.

(4) Lift the blower assembly out of the chassis frame.

c. BLOWER CAPACITOR C304.—The blower capacitor, C304, is located underneath blower BL301 in the right rear corner of the chassis. To obtain access to the capacitor for any purpose, remove the blower (paragraph 6*b* above) and the capacitor will be exposed.

d. BLOWER-MOTOR BEARINGS.—An exploded view of blower BL301 is shown in figure 7–15. This shows the locations of the two sets of bearings which are located, one at each side of the armature on the motor shaft. When the operation of the blower motor gets noisy, replace these bearings, using the following procedure:

(1) Remove the blower, BL301, from the chassis according to instructions in paragraph 6*b* above.

(2) Use socket head screw wrench H202 (see figure 7–4) to loosen the two setscrews which hold the impeller wheel to the shaft. Remove the impeller wheel from the shaft.

(3) Remove the three tie bolts, accessible from the rear of the end bell.

(4) Withdraw the armature with its associated washers. Do not lose any of the three washers or the retaining ring.

(5) Remove the two ball bearings from the armature shaft, using a bearing puller. If necessary, construct one according to the instructions in figure 7–15.

(6) Fit new ball bearings on the shaft, using an arbor press or other suitable bearing installer tool. Use the proper bearing in each position. Front bearing O308 has a ¼-inch bore and a ¾-inch outside diameter. Rear bearing O309 has a 3/16-inch bore and a ½-inch outside diameter.

(7) Reassemble the blower in the reverse sequence of disassembly. Be certain that the three washers and the retaining ring are properly positioned

at the end of the shaft before it is placed in the housing.

(8) Replace the blower on the receiver chassis, reversing the procedure specified in paragraph 6*b*, this section.

e. POWER TRANSFORMER T301.—Power transformer T301 is located in the right rear corner of the chassis immediately behind blower BL301; see figure 7–4. Its removal entails unfastening the rear panel of the chassis and separating it from the chassis far enough to provide an additional half-inch clearance above the transformer. To accomplish this, proceed as follows:

(1) Unsolder the wiring from the terminals of T301; see figure 7–14. Identify each wire in some manner if there is any likelihood that the preformed arrangement of these wires will be disturbed before connections are restored.

(2) Remove the nuts from the four transformer-mounting studs.

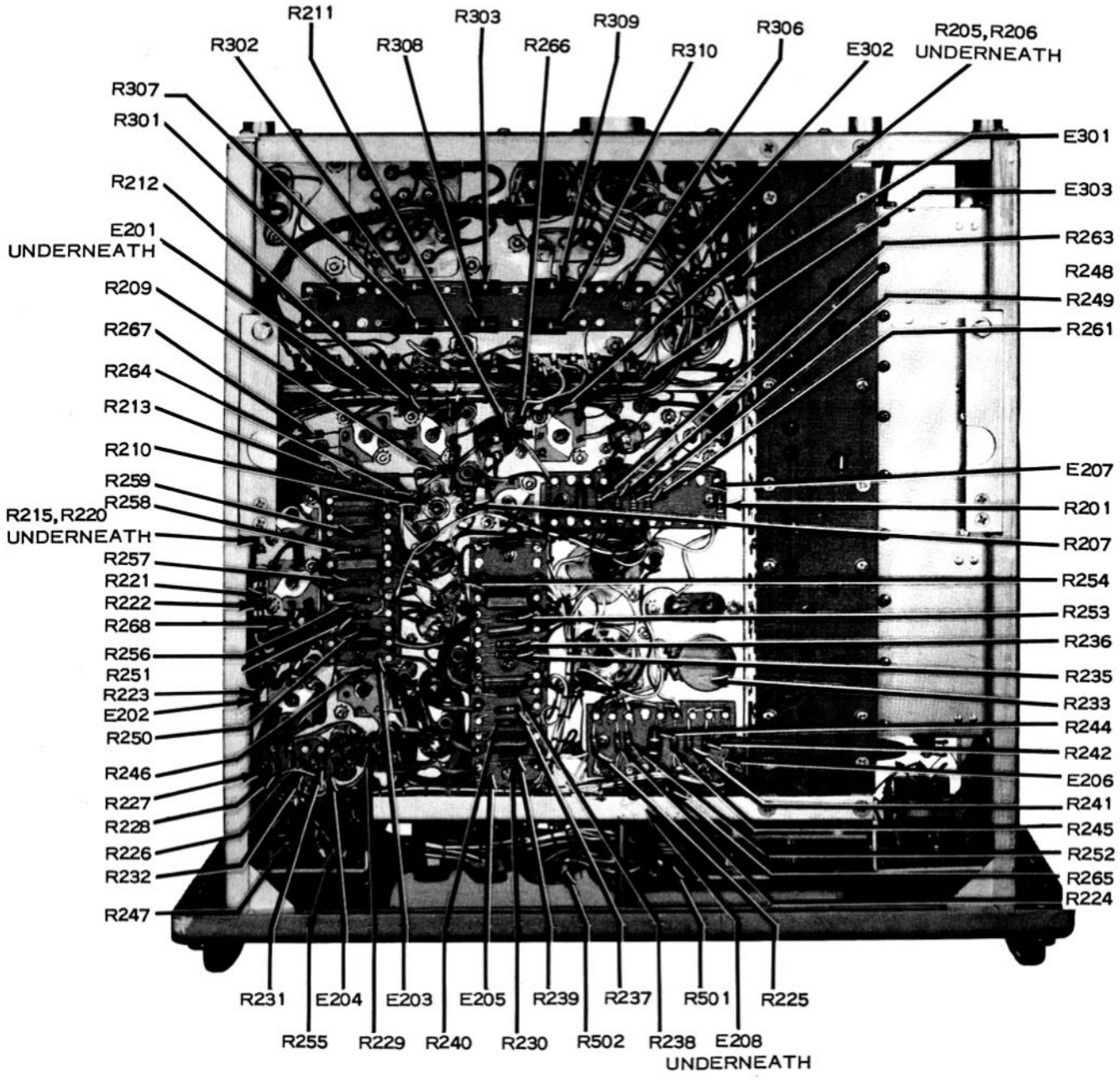


Figure 7–13. Radio Receiver R–482C/URR–35, Bottom View—Identification of All Resistors and Terminal Boards

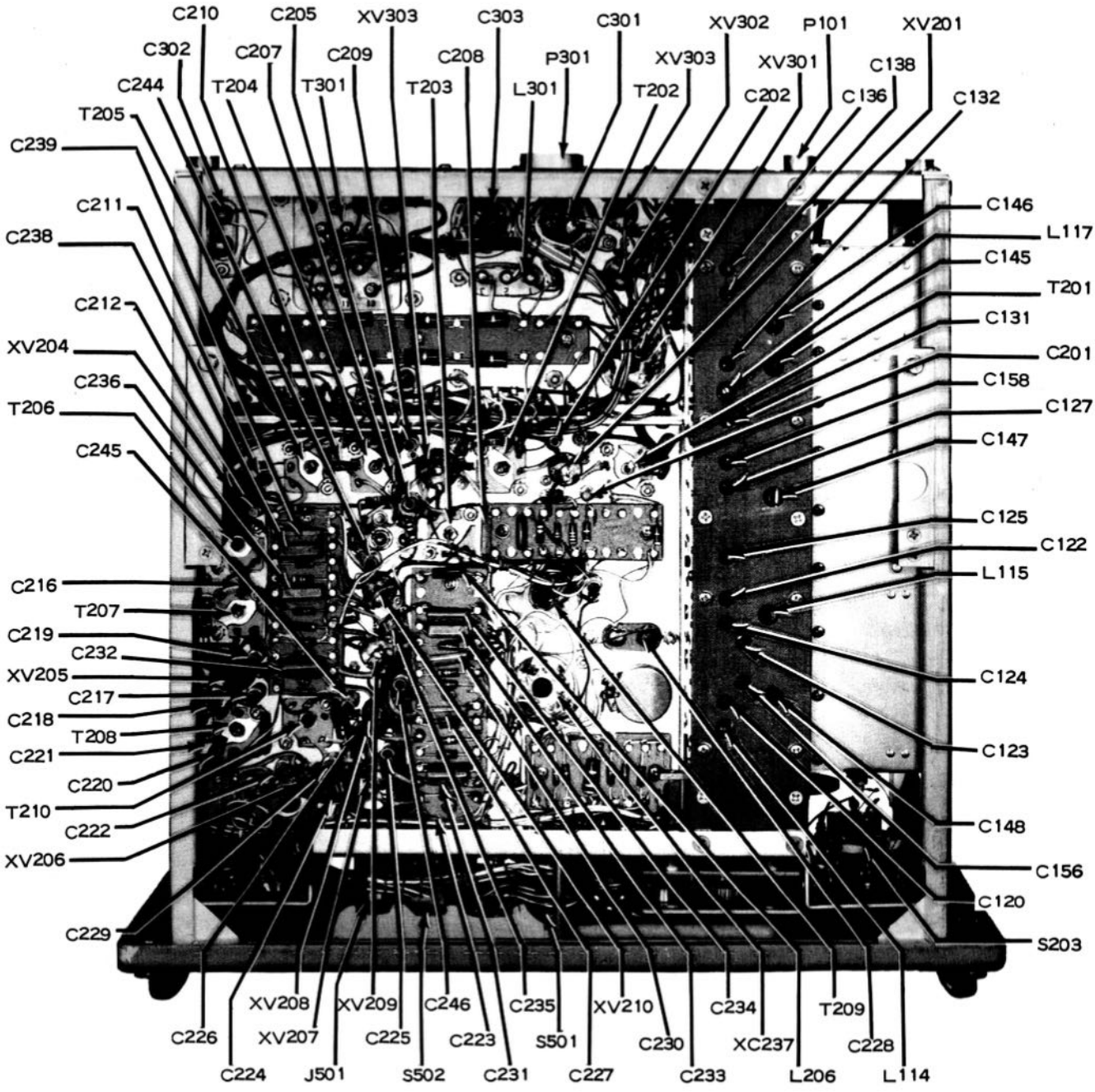


Figure 7–14. Radio Receiver R–482C/URR–35, Bottom View—Identification of All Components Except Resistors and Terminal Boards

(3) Unfasten the rear panel by removing:

(*a*) Three screws connecting the rear panel to the left side panel.

(*b*) Three screws connecting the rear panel to the right side panel.

(*c*) Three screws (horizontal row) connecting the rear panel to the bed of the chassis.

(4) Pull the rear panel away from the chassis far enough to permit removal of transformer T301, but no farther, as excessive displacement will place a strain on the leads to connector P101, and to thermostatic switch S301.

(5) To restore the original transformer, or to substitute a replacement for it, reverse the foregoing procedure, making sure that all transformer leads are reconnected to the proper respective terminals. If the leads have become mixed, consult the color-coding legend on the wiring diagram, figure 7–28.

f. DIAL-DRIVE ASSEMBLY.—The dial-drive assembly is located between the front panel and the front sub-panel of the receiver, as shown in figure 7–4. It is further illustrated in figure 6–1. To remove this assembly, it is necessary to remove the entire front panel, in accordance with the following procedure.

(1) Remove the tuning knob and the knob on the tuning LOCK by using the right-angle portion of the Bristol-type socket wrench provided, H202.

(2) Unsolder the leads to the INPUT and OUTPUT meters (M501 and M502, respectively).

(3) Remove the 11 Phillips-head screws on the front panel which are relatively larger than the remaining 24 similar screws (not including the four large panel fasteners in the corners of the panel), and lower the top of the panel onto the bench.

(4) Remove the dual dial-light assembly from the top of the dial-drive assembly.

(5) Remove the drive arm of the flexible coupling between the dial drive and the preselector, by loosening the setscrews in its hub.

(6) Remove the three mounting screws which secure the dial-drive assembly to the preselector.

(7) The procedure for the installation of a new dial-drive unit or the reinstallation of the old one, and replacement of the front panel, etc. is the reverse of the foregoing procedure, except that after the drive assembly, dial lights and front panel have been replaced, steps must be taken to properly align the calibrated tuning dial with the position of the capacitor plates in the preselector. Proceed as follows:

(8) Turn the dial-drive tuning shaft until 225 is indicated on the MEGACYCLES dial.

(9) Turn the driven member of the flexible coupling, attached to the preselector shaft, until the shorter sides of the rotor plates of the ganged capacitors in the preselector are flush with the stator plates, as viewed from the top. These may be seen by removing the left side shielding covers.

(10) Engage the drive member of the flexible drive with the driven member without disturbing the position of the latter, and tighten the setscrews in the hub of the drive member on the output shaft of the dial-drive mechanism.

g. PRESELECTOR. — Removal of the preselector and the reinstallation of the repaired assembly, or the installation of a replacement assembly, is a relatively simple matter. However, some difficulty may be encountered when an attempt is made to coordinate the performance of the ganged capacitors in the preselector with the indications of the calibrated tuning dial. It is therefore suggested that the receiver be placed on its right side and that the following procedure be followed carefully.

(1) REMOVAL.

(*a*) Unsolder, at terminal board E301 (see figure 7–13), those leads which run from the preselector to the terminal board. Tag each terminal to indicate which lead (of the original assembly or of a substitute assembly) is to be reconnected to it.

(*b*) Unsolder, in similar manner, those leads which run to terminal board E206.

(*c*) Unsolder the two leads which connect the oscillator-multiplier section of the preselector unit to CRYSTAL holder XY201 in the left-hand panel compartment.

(*d*) At terminals 3 and 4 of i-f transformer T201, unsolder the length of coaxial cable which connects to the preselector.

(*e*) Take off the left side of the chassis by removing:

1. Three screws entering the side plate from the rear panel.

2. Three screws connecting the side plate to the front-panel subassembly.

3. Four screws entering the side plate from the front panel.

(*f*) Remove rear-panel connector P101 by removing the four screws which secure it.

CAUTION

When removing the screws in the rails holding the preselector in place, as described in steps (7) and (8) below, care must be taken not to damage the bypass-capacitor terminals on the unit (see figures 7–9 and 7–10) by striking them against other parts of the receiver.

(*g*) On top of the chassis (see figure 7–4), note the two rails under the insulator plate which hold the preselector in place. Detach both rails from the rear panel and from the front-panel subassembly by remov-

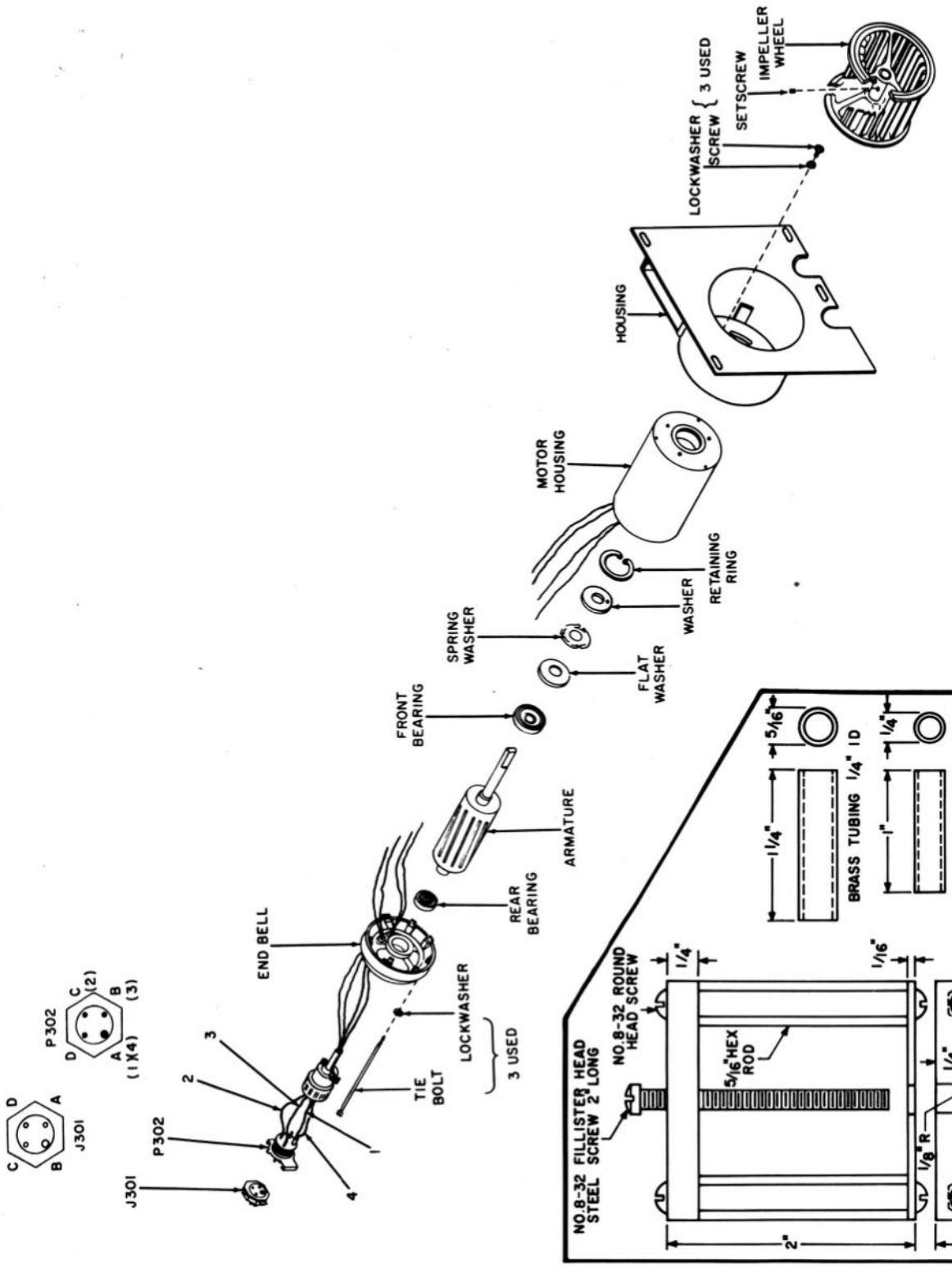


Figure 7-15. Blower BL301, Exploded View

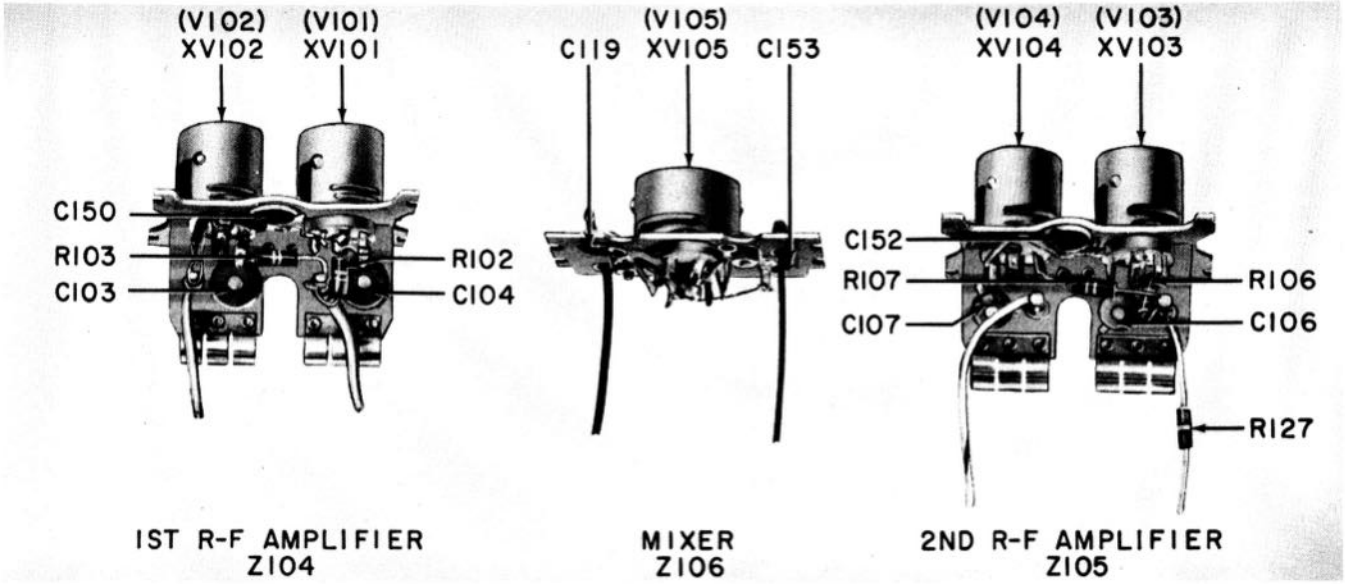


Figure 7–16. Socket Assemblies from R-F Amplifier Section of Preselector

ing two screws from each rail.

(*b*) On the bottom of the chassis (see figure 7–13), note two similar rails under the insulator plate which hold the preselector in place. Detach both rails from the rear panel and front-panel assembly, as outlined in step (*g*). Also remove two screws securing the preselector to the bracket on the power supply chassis.

(*i*) Turn the tuning control until 325 is indicated on the MEGACYCLES dial; this should put the arms of the flexible coupling in a vertical position.

(*j*) Remove the three screws which hold the dial-drive assembly to the preselector and withdraw the preselector from the chassis.

(2) REINSTALLATION OF SAME PRESELECTOR.—To reinstall the same preselector, reverse the sequence of steps (*a*) through (*j*) of preceding subparagraph (1). Be certain that the screws which secure the ganged rotor sections on the capacitor shafts face upward as the preselector is put back in place. This can be checked by removing one of the left side shielding covers.

(3) INSTALLATION OF NEW PRESELECTOR WITH SHAFT LOCK.—To install a new preselector which has a shaft lock clamped to one of the capacitor shafts at the rear of the assembly, proceed as follows:

(*a*) Take the flexible coupling member off the shaft of the original preselector and place it on the

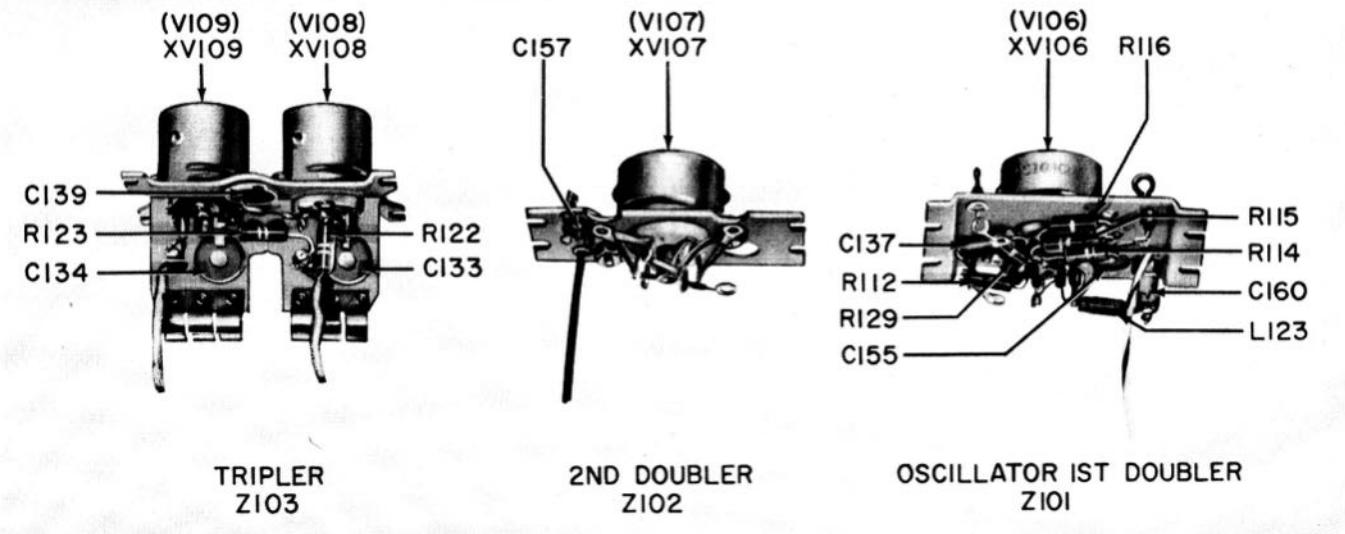


Figure 7–17. Socket Assemblies from Amplifier-Oscillator Section of Preselector

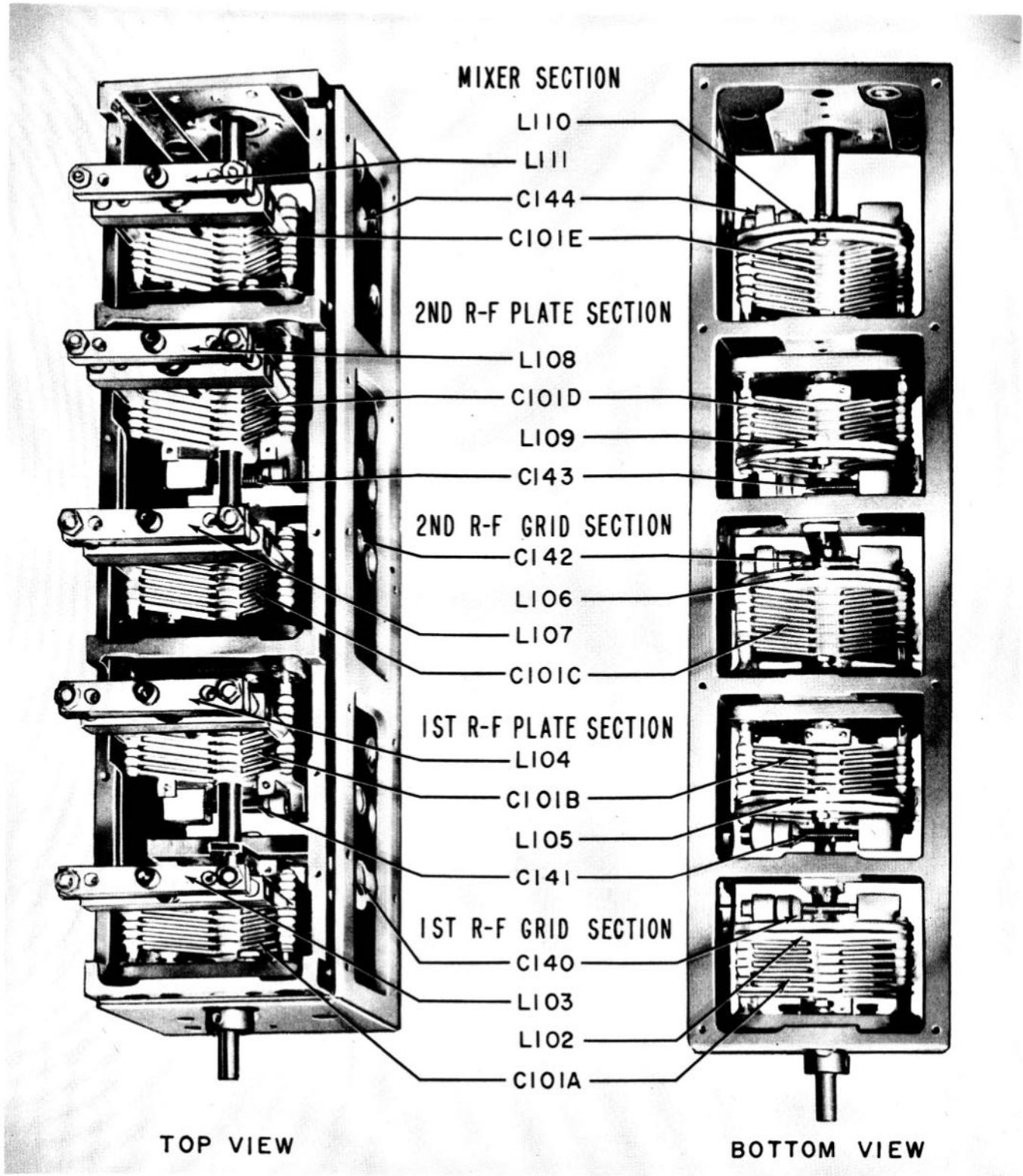


Figure 7-18. Capacitor C101 from R-F Amplifier Section of Preselector

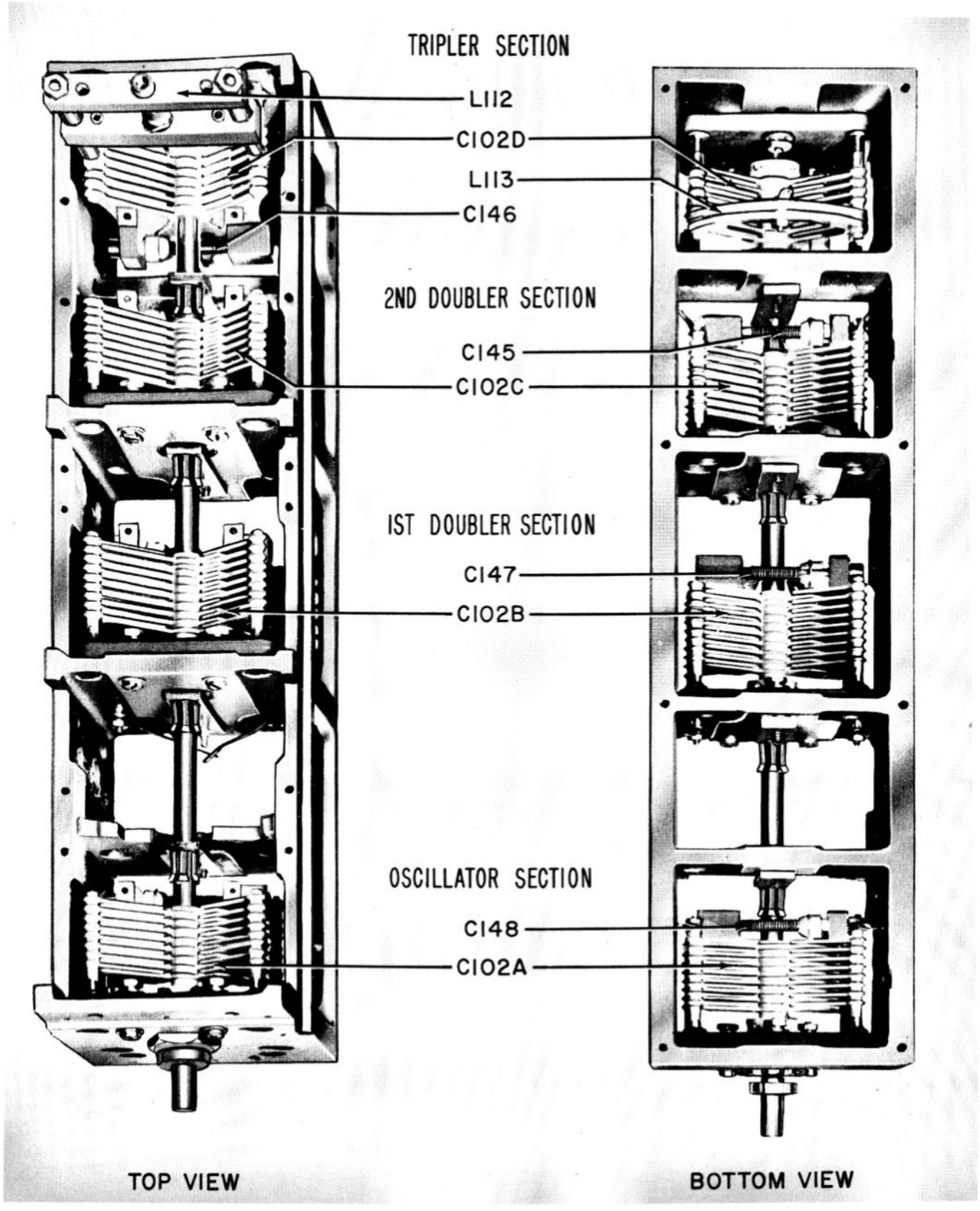


Figure 7-19. Capacitor C102 from Oscillator-Amplifier Section of Preselector

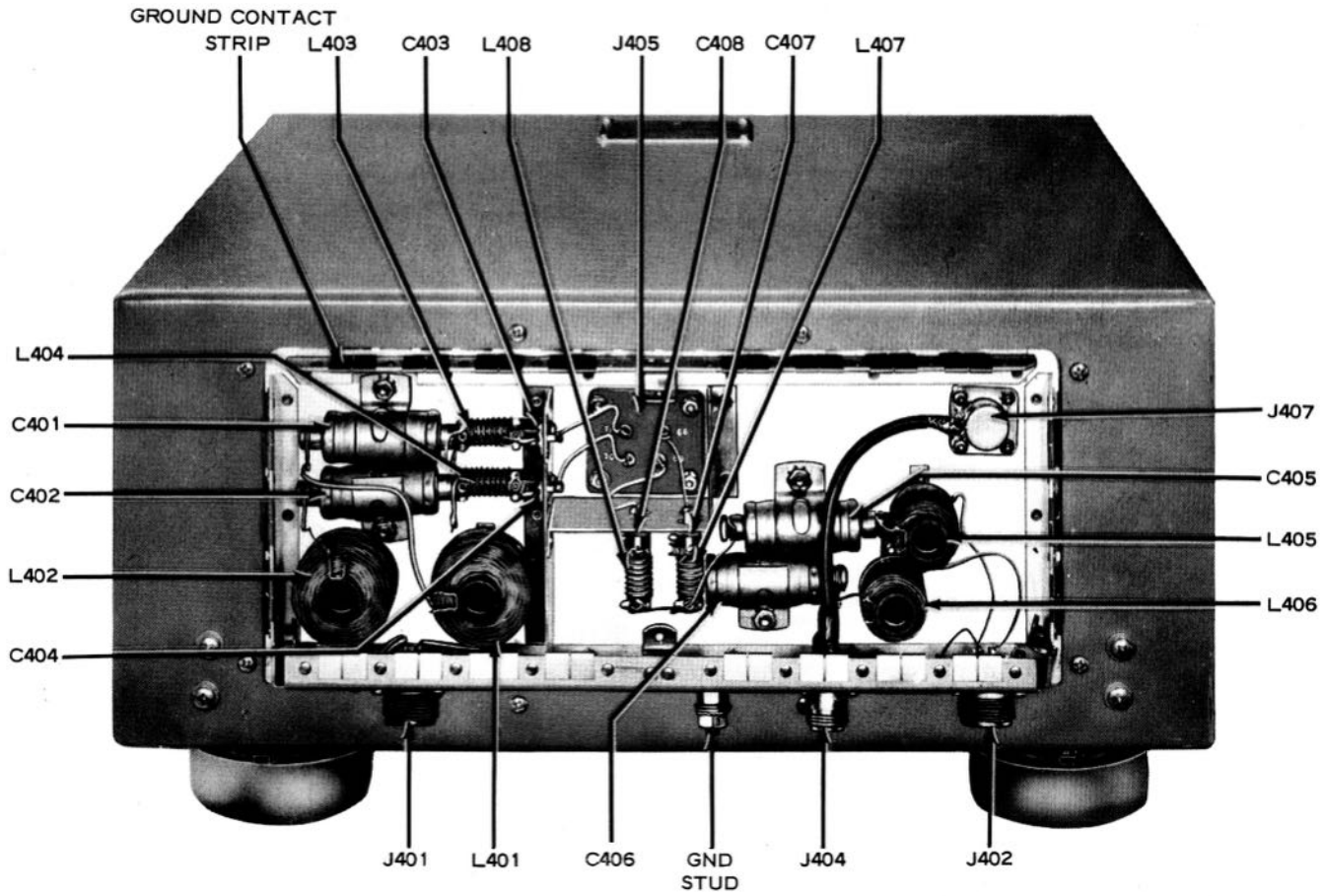


Figure 7–20. Low-Pass Filter F–304/URR–35C, Cover Removed

shaft of the new unit; do not tighten the setscrews in the coupling hub.

(*b*) Install the preselector by reversing the sequence of steps (*a*) through (*j*) of paragraph 6*g*(1).

(*c*) Turn the tuning control until 225 is indicated on the MEGACYCLES dial and lock the tuning control.

(*d*) Rotate the flexible coupling member on the preselector shaft until the two arms of the coupling can be engaged.

(*e*) Tighten the setscrews in the hub of the flexible coupling member on the preselector shaft and remove the shaft lock from the rear of the preselector. *Do not turn the tuning control until this is done,* otherwise the equipment may be damaged.

(4) INSTALLATION OF NEW PRESELECTOR WITHOUT SHAFT LOCK.—To install a new preselector which does not have a shaft lock clamped at the rear of the assembly, proceed as follows:

(*a*) Perform steps (*a*) through (*d*) of preceding subparagraph (3).

(*b*) Remove the left side shielding covers from the preselector and turn the ganged capacitors until the shorter sides of the rotor plates are flush with the stator plates.

(*c*) With the drive and driven members of the flexible coupling properly engaged, tighten the setscrews in the hub of the driven member on the preselector shaft.

b. R-F CABLE ASSEMBLIES.–Several r-f cable assemblies are used in Radio Receiver R-482C/URR-35 and in Low-Pass Filter F-304/URR-35C. Unless subjected to physical abuse or abnormal conditions of operation, these cables should not require repair or replacement. However, in the event that replacement is found necessary, detailed instructions for fabrication of the cable assemblies are included in figures 7–21, 7–22, and 7–23. Fabrication instructions for the external r-f cable used with the receiver appear in figure 3–6.

i. ALIGNMENT TOOL H201.–Alignment tool H201 is made up of a body of white nylon, with a screwdriver tip at one end and a short length of Bristol wrench at the other end; see figure 7–4. The body is four inches long, octagonal in the central section, and cylindrical at each end. In the event of the loss of, or damage to, this tool, caution should be observed in the use of a substitute, since in the alignment procedures contact is made with the tool to parts of the circuit which may be at voltages as high as 180 volts with respect to the chassis. If another alignment tool is not available, repair the damaged tool in accordance with the following procedures.

(1) In the event of damage to the screwdriver end of the alignment tool, a substitute can be made from any piece of hard wood, of approximately the same size as the alignment tool.

(2) If the Bristol-wrench end of the alignment tool is broken, but the length of Bristol wrench is still serviceable, proceed as follows:

(*a*) Square off the broken end of the nylon body and drill a hole one-eighth inch deep into that end, using a No. 40 twist drill.

(*b*) Clean off the wrench insert and mark it at a distance of one-eighth inch from one end.

(*c*) Press the wrench insert into the newly drilled hole in the body. A suggested method of accomplishing this is to place both pieces, end to end, between the jaws of a vise and apply pressure.

(3) If the wrench insert is lost or the nylon body damaged beyond repair, any of the substitute materials listed in table 7–4 may be used. In all cases, the length of wrench used should be one-eighth inch greater than the depth of the drilled hole.

7. COMPONENT DATA.

a. ELECTRON TUBES.—The full complement of electron tubes for Radio Receiver R–482C/URR–35 is listed in table 1–4. The rated characteristics of each type appear in table 7–5. Access to the tubes in the receiver and other information pertinent to tube replacement are described in Section 5, paragraph 3*c*.

b. CRYSTALS.—All pertinent data for Crystal Unit CR–24/U (Y201) and Crystal Unit CR–23/U (Y202), used as frequency-controlling elements in this equipment, are shown in figures 7-24 and 7-25, respectively.

c. TRANSFORMERS AND INDUCTORS.—The inductance, d-c resistance, turns ratio, wire size and number of turns, and other miscellaneous information (as applicable) for all transformers, chokes and coils used in this equipment appear in table 7–6.

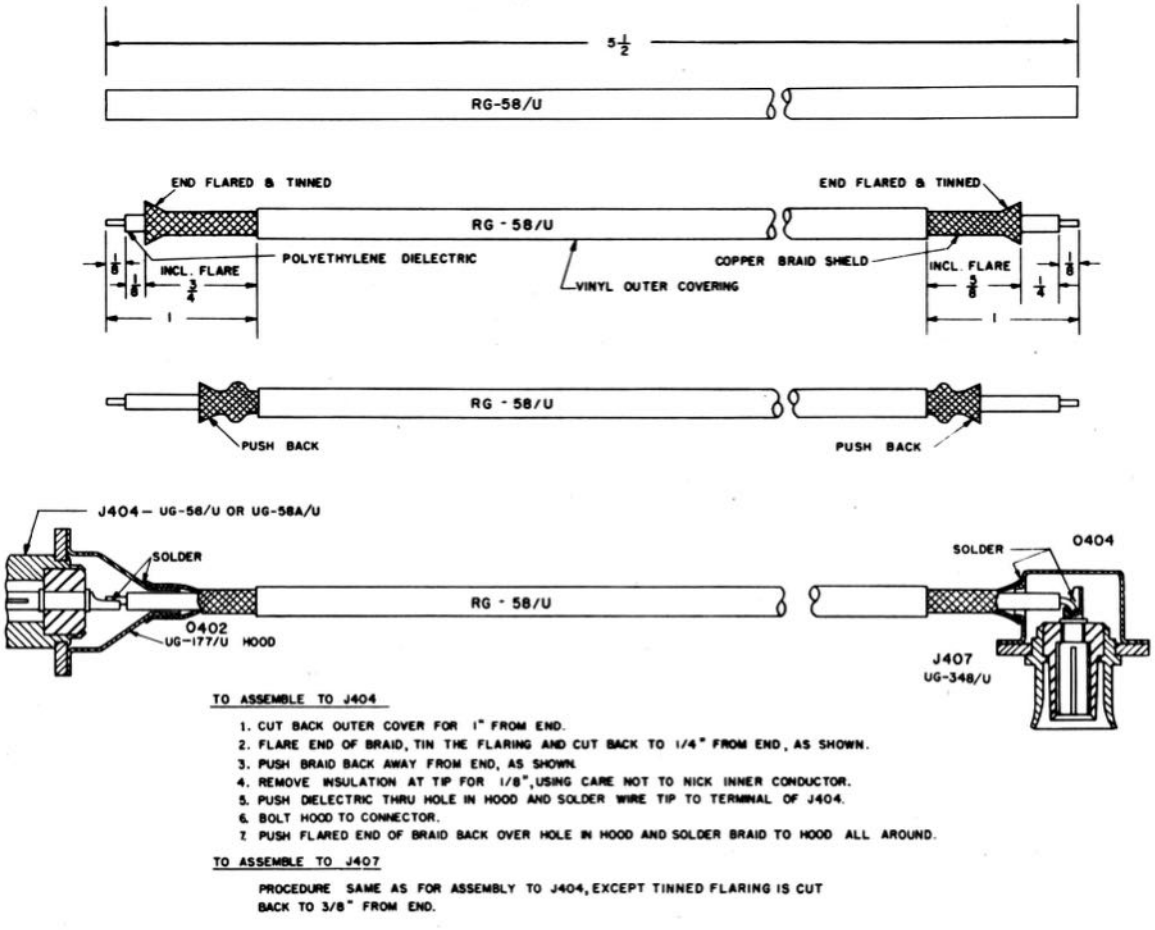
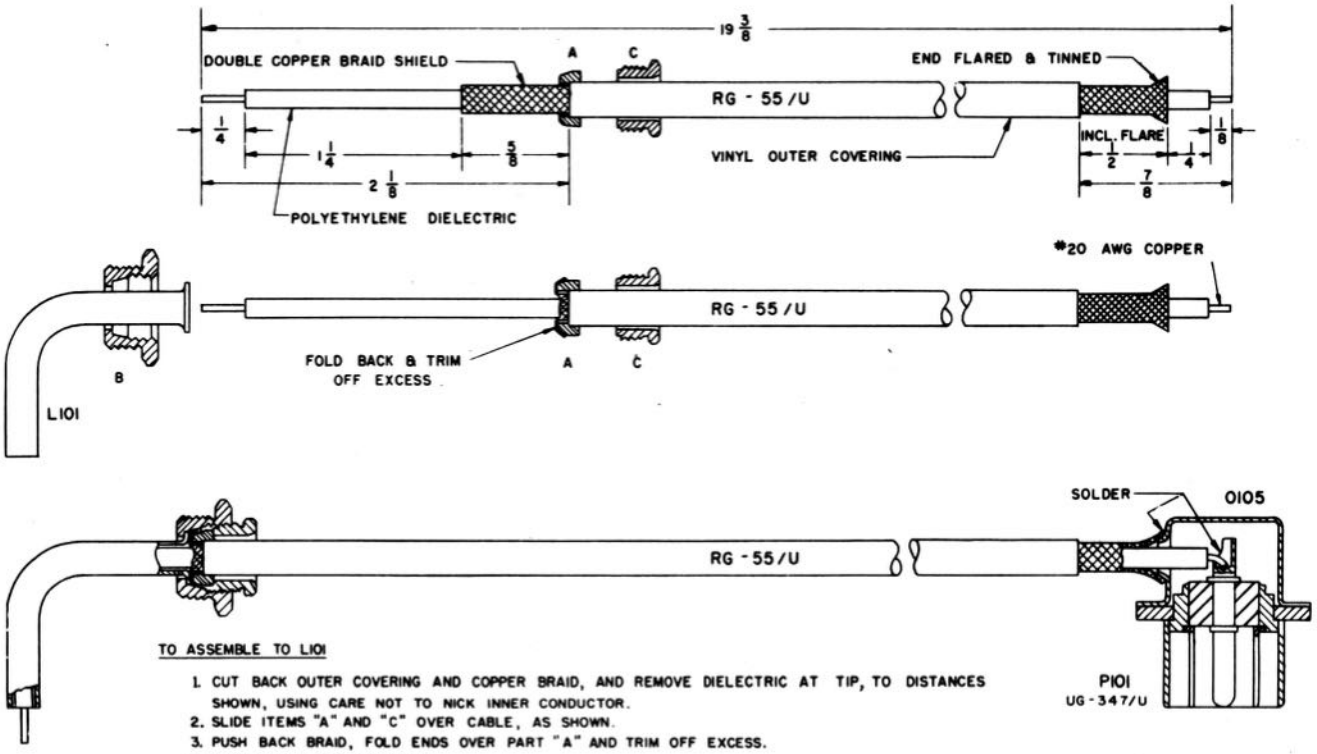


Figure 7–21. Assembling R-F Cable to Connectors J404 and J407

TABLE 7–4. SUBSTITUTE ALIGNMENT-TOOL FABRICATION

BODY MATERIAL	DRILL NO.	DEPTH OF HOLE (INCHES)	WRENCH INSERT
Original nylon body	40	1/2	Allen No. 10–12
Original nylon body	38	1/2	Bristol No. 10–12
Bakelite rod, 1/4 or 5/16 in. diameter	36	1-1/2	Bristol No. 10–12 or Allen No. 10–12
Wood dowel rod, 5/16 in. diameter	42	1-1/2	Bristol No. 10–12 or Allen No. 10–12



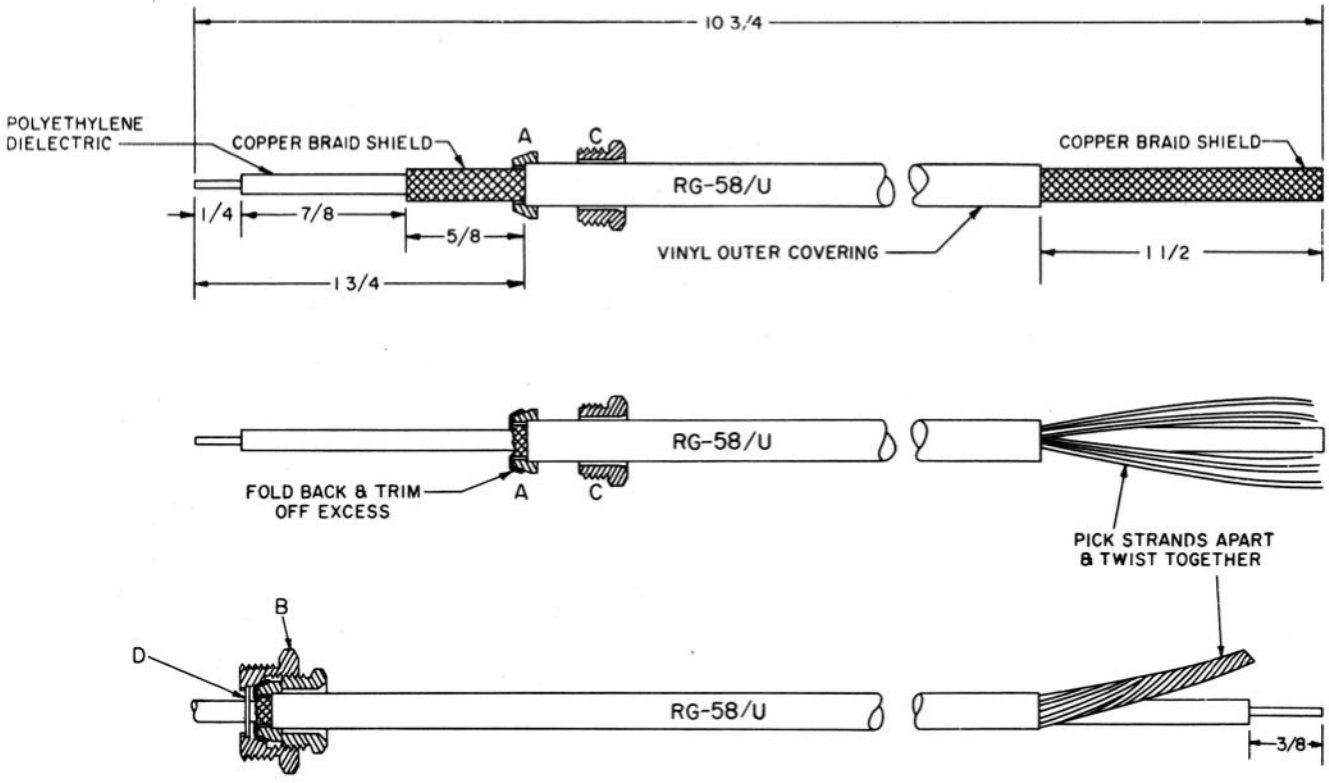
TO ASSEMBLE TO L101

1. CUT BACK OUTER COVERING AND COPPER BRAID, AND REMOVE DIELECTRIC AT TIP, TO DISTANCES SHOWN, USING CARE NOT TO NICK INNER CONDUCTOR.
2. SLIDE ITEMS "A" AND "C" OVER CABLE, AS SHOWN.
3. PUSH BACK BRAID, FOLD ENDS OVER PART "A" AND TRIM OFF EXCESS.
4. PUSH DIELECTRIC THRU L101.
5. SCREW TOGETHER PARTS "B" AND "C" (AFTER INSTALLATION OF PART "B" IN PRESELECTOR).
6. TRIM END SO DIELECTRIC IS FLUSH WITH END OF L101, AND WIRE TIP IS 1/4" LONG.

TO ASSEMBLE TO P101

1. CUT BACK OUTER COVERING FOR 7/8" FROM END.
2. FLARE END OF BRAID, TIN THE FLARING AND CUT BACK TO 3/8" FROM END, AS SHOWN.
3. REMOVE DIELECTRIC AT TIP FOR 1/8" USING CARE NOT TO NICK INNER CONDUCTOR.
4. PUSH DIELECTRIC THRU HOLE INSIDE OF HOOD AND PUSH FLARED END OF BRAID OVER HOLE IN HOOD AND SOLDER BRAID TO HOOD ALL AROUND.
5. SOLDER WIRE TIP TO TERMINAL OF P101.
6. BOLT HOOD TO CONNECTOR.

Figure 7–22. Assembling R-F Cable to Connector P101



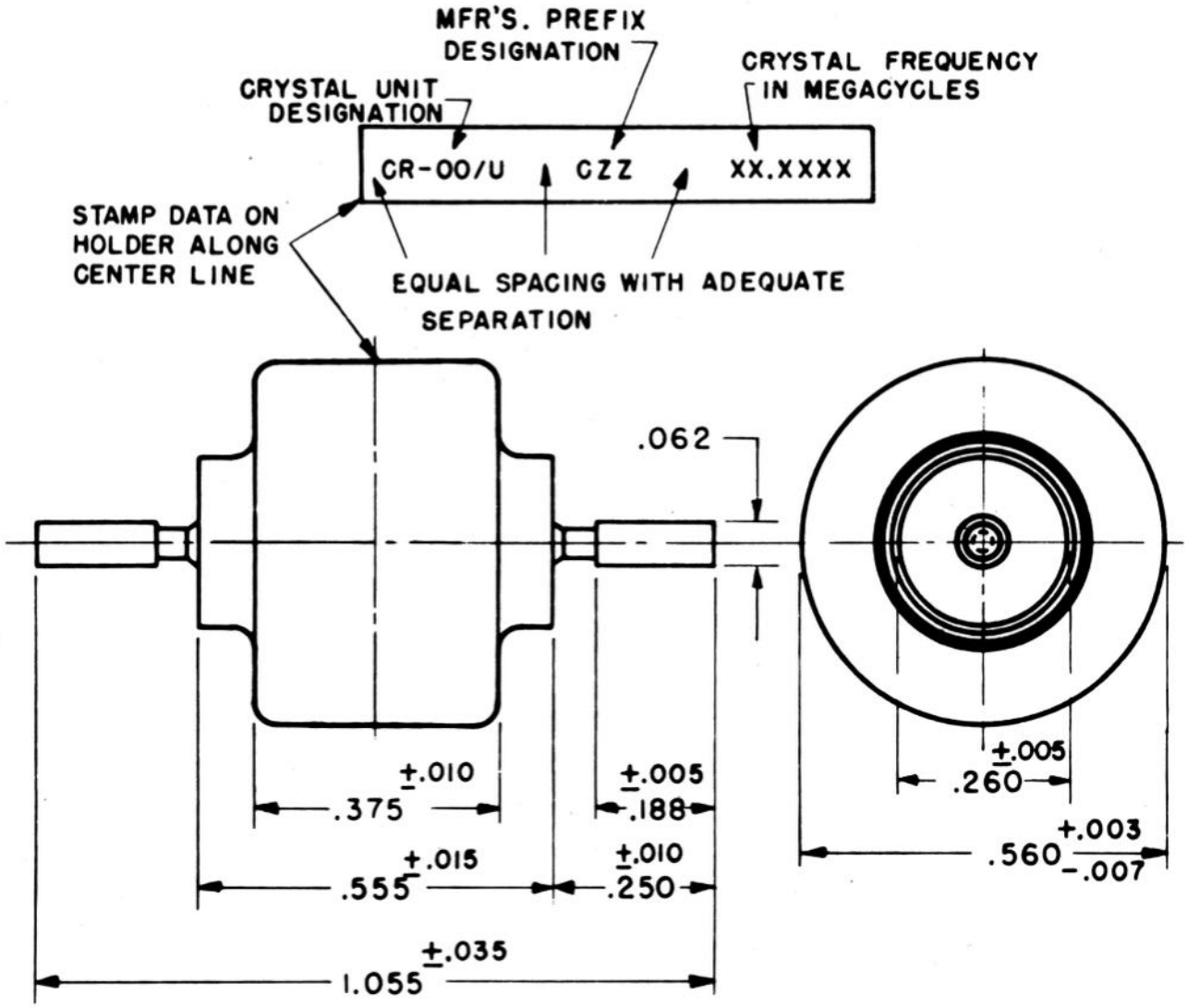
TO PREPARE FREE END

1. CUT BACK OUTER COVERING TO DISTANCE SHOWN.
2. PICK APART STRANDS OF BRAID, PULL THESE TO ONE SIDE OF DIELECTRIC AND TWIST TO FORM SINGLE STRAND, AS SHOWN.
3. REMOVE DIELECTRIC TO DISTANCE SHOWN USING CARE NOT TO NICK INNER CONDUCTOR.

TO ASSEMBLE FITTING

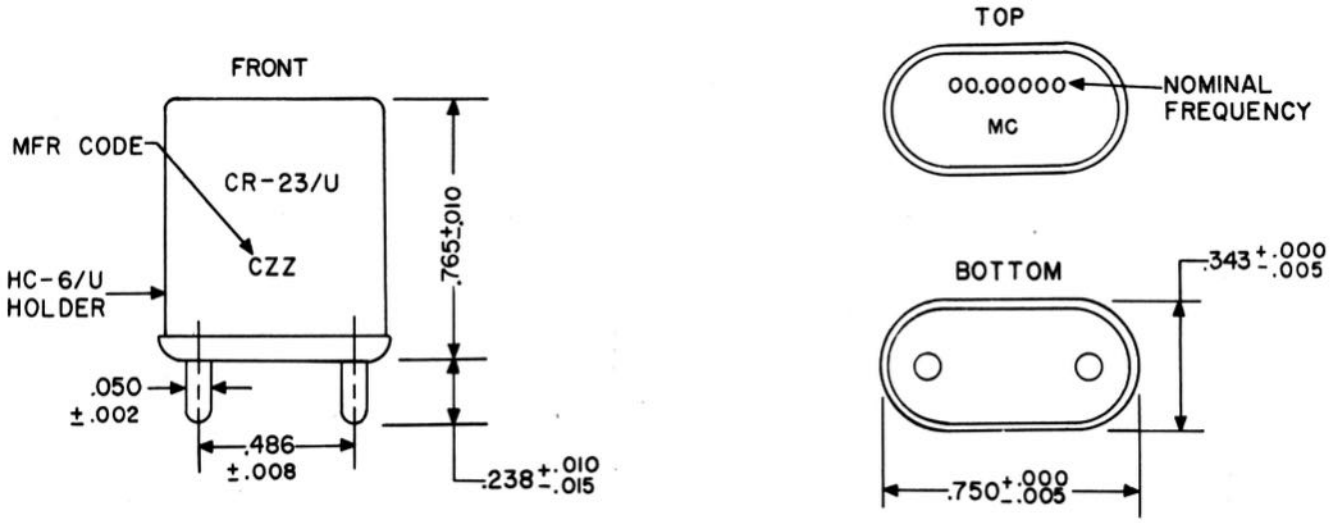
1. CUT BACK OUTER COVERING AND COPPER BRAID, AND REMOVE DIELECTRIC AT TIP, TO DISTANCES SHOWN, USING CARE NOT TO NICK INNER CONDUCTOR.
2. SLIDE ITEMS "A" AND "C" OVER CABLE, AS SHOWN.
3. PUSH BACK BRAID, FOLD ENDS OVER PART "A" AND TRIM OFF EXCESS.
4. PUSH DIELECTRIC THRU PART "B" AND "D".
5. SCREW TOGETHER PARTS "B" AND "C" (AFTER INSTALLATION OF PART "B" IN PRESELECTOR).

Figure 7-23. Connecting R-F Cable between Inductance L122 and Transformer T201



1. FREQUENCY RANGE OF CRYSTALS USED = 20.1125 TO 35.2167 MC.
2. FIRST INTERMEDIATE FREQUENCY OF RECEIVER = 18.6 MC.
3. HETERODYNE FREQUENCY RANGE = 241.35 TO 422.60 MC.
4. METHOD OF MULTIPLICATION = CRYSTAL FREQUENCY X2X2X3; SEE SCHEMATIC DIAGRAM, FIGURE (2-5)
5. TEMP. CHARACTERISTIC = ± 0.005 % DEVIATION BETWEEN − 55° C (−67° F) AND + 90° C (+194° F).
6. TEMPERATURE OF OPERATION AND CALIBRATION = −55° C (−67° F) TO +90° C (+194° F)
7. MODE OF OPERATION = 5 TH MODE FOR 25 − 50 MC.; 3RD MODE FOR 15 − 25 MC.

Figure 7–24. Crystal Unit CR–24/U, Outline and Data



1. FREQUENCY OF CRYSTAL USED = 16.8250 MC.
2. SECOND INTERMEDIATE FREQUENCY OF RECEIVER = 1.775 MC.
3. TEMP. CHARACTERISTIC = ± 0.005% DEVIATION BETWEEN −55°C (−67°F) AND +90°C (+194°F).
4. TEMPERATURE OF OPERATION AND CALIBRATION = −55°C (−67°F) TO +90°C (+194°F).

Figure 7–25. Crystal Unit CR–23/U, Outline and Data

TABLE 7–5. 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 RES. (OHMS)	VOLTAGE AMPL. FACTOR (MU)	NORMAL TRANSCONDUCT. (MICROMHOS)
OA2WA	...	....	150	...	...	5–30	...	....	...	....
OB2WA	...	....	108	...	...	5–30	...	....	...	....
6AK6	6.3	0.15	180	−9	180	15	2.5	200K	...	2300
5654/6AK5W	6.3	0.175	180	−2	120	7.7	2.4	690K	...	5100
5670	6.3	0.3	150	−2	...	8.2*	...	6370	35	5500
			MAX. PEAK INVERSE PLATE VOLTAGE (V)	A-C VOLTS PER PLATE (V)	D-C OUTPUT CURRENT PER PLATE (MA)	PEAK CURRENT PER PLATE (MA)				
5726/6AL5W	6.3	0.3	330	117	9	54				
5931	5	3	1550	550	225	675				

* Plate current per section.

TABLE 7-6. WINDING DATA

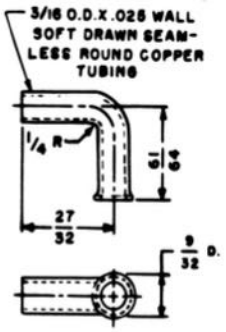
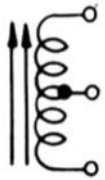
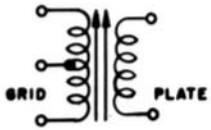
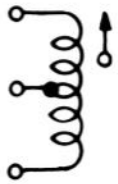
DESIGNATION SYMBOL	PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D-C RESIST. (OHMS)	INDUCTANCE	HIPOT A-C VOLTS	REMARKS
L101	RAQA AG-4667		90° elbow	3/16" O.D. x tube; 0.0005" silver plate 0.025" wall round copper	S.D. seamless 1/4				
L114	RAQA LL-0053		Single-layer solenoid	#20 bare tinned	14, tapped 5-11/16 turns from mtg end		1.4 uh		Wound 0.800" lg on 7/16" D. ceramic form; powdered iron slug
L115	RAQA LW-0100		Grid Plate	#20 bare tinned #20 bare tinned	6, tapped at 2-7/8 turns 5-3/8				Both windings wound 8 turns/in. on 7/8" D. mica-filled bakelite form; powdered iron slug
L116	RAQA LW-0101		Single-layer solenoid	#20 bare tinned	9, tapped 5 turns from mtg end	0.01	0.58 uh at 100 ma dc		Wound 14 turns/in. on 7/16" D. mica-filled bakelite form
L117	RAQA LW-0102		Single-layer solenoid	#20 bare tinned	3 C.T.	0.007	0.09 uh at 25 and 50 mc, and 100 ma dc		Wound 5 turns/in. on 7/16" D. mica-filled bakelite form; brass slug

TABLE 7-6. WINDING DATA (Cont)

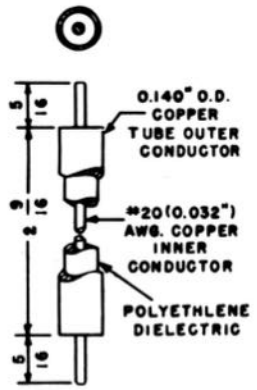
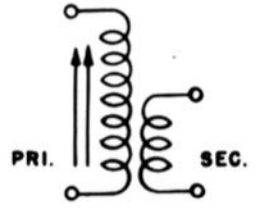
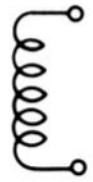
DESIG-NATION SYMBOL	PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D-C RESIST. (OHMS)	INDUCTANCE	HIPOT A-C VOLTS	REMARKS
L118	RAQA JW-0705		Concentric	Coaxial cable 0.140" O.D. x 3-3/16" lg					0.0002" silver plate
L122	RAQA LR-0034		Pri. Sec.	#26 bare tinned #26 bare tinned	7-1/4 5/6				Both windings wound 28 turns/in. on 7/8" D. bakelite form; powdered iron slug
L123	RAQA LC-0219		Single-layer solenoid	#30 E	27	0.133	1.2 uh		Q: 80 at 25 mc Close-wound on 5/32" D. bakelite form
L202 through L206	RAQA LC-0224		Single-layer solenoid	#30 E	45	0.255	3 uh		Q: 50 at 25 mc Close-wound on 13/64" D. phenolic form

TABLE 7-6. WINDING DATA (Cont)

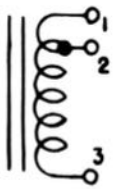
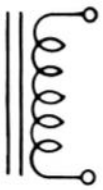
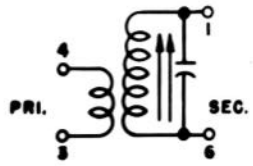
DESIG-NATION SYMBOL	PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D-C RESIST. (OHMS)	INDUCTANCE	HIPOT A-C VOLTS	REMARKS
L301	RAQA LC-0221		Single	#31 E	5700, tapped at 11.4% of total	350	12 h at 145 ma dc and 10 v rms, 60 cps	1600 rms	
L401 L402	RAQA LC-0220		Single universal, 3 pies	#22 DCC	240 (80 per pie)	1.12	1.26 mh at 1.5 amp dc		Q: 25 at 225 kc Wound on 5/8" D. x 1-11/16" lg phenolic tube, with 1" lg iron core cemented inside 9/32" from free end; each pie 1/4" wd x 1-1/2" D. Distributed cap: 4 uuf
L403 L404 L407 L408	RAQA LC-0222		Single-layer solenoid	#22 E	7-1/2	0.013	0.339 uh at 10 and 20 mc, and 2 amp dc		Q:100 at 14 mc Wound 1/2" lg on 3/8" D. phenolic form
L405 L406	RAQA LC-0223		Single universal, 3 pies	#26 DCC	210 (70 per pie)	1.96	1.08 mh at 300 ma dc	100 rms	Wound on 5/8" D. x 1-11/16" lg phenolic tube, with 1" lg iron core cemented inside 9/32" from free end; each pie 1/4" wd x 1" D.
T201	RAQA LR-0035		Pri. Sec.	#28 bare tinned #28 bare tinned	2 8		Resonant at 18.6 mc with 100 uuf		Both windings wound 28 turns/in. on 3/8" D. form and spaced equivalent of 1 turn Powdered iron slug in sec.

TABLE 7-6. WINDING DATA (Cont)

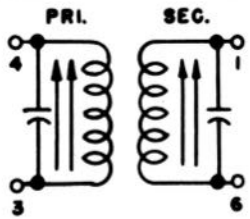
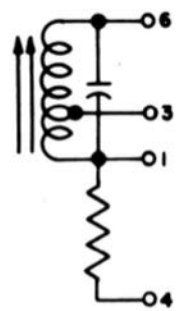
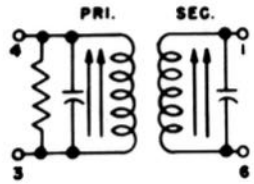
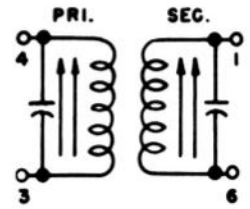
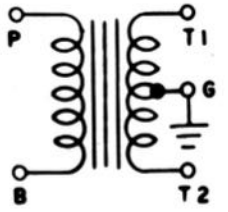
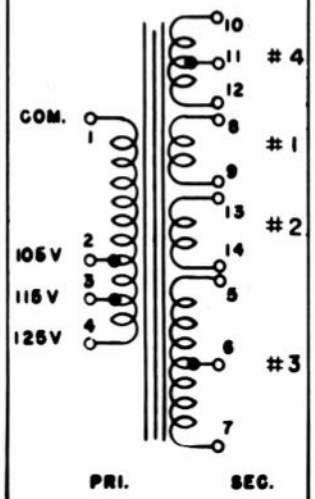
DESIG-NATION SYMBOL	PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D-C RESIST. (OHMS)	INDUCTANCE	HIPOT A-C VOLTS	REMARKS
T202	RAQA LR-0036		Pri. Sec.	#28 bare tinned #28 bare tinned	9 9		Resonant at 18.6 mc with 100 uuf Resonant at 18.6 mc with 100 uuf		Top 7 turns wound 28 turns/in; 2 bottom turns wound in space equal to 8 turns at same rate Bottom 7 turns wound 28 turns/in; 2 top turns wound in space equal to 7 turns at same rate Windings spaced equivalent of 9 turns at 28 turns/in. on 3/8" D. form; 2 powdered iron slugs
T203	RAQA LR-0037		Single-layer solenoid	#28 bare tinned	8, tapped 2 turns from bottom		Resonant at 16.825 mc with 100 uuf		Wound 28 turns/in. on 3/8" D. form; powdered iron slug; 2200-ohm res. between bottom of coil and term. 4
T204 T206 T208	RAQA LR-0038		2 universal, 1 pie each	7/44 D.S. Litz	76 (each winding)		Each winding resonant at 1.775 mc with 100 uuf		Both windings wound on 3/8" D. form and spaced 0.255"; each winding 1/4" wd x 1/2" D; 2 powdered iron slugs Pri. shunted with 12,000-ohm resistor
T205 T207	RAQA LR-0039		2 universal, 1 pie each	7/44 D.S. Litz	76 (each winding)		Each winding resonant at 1.775 mc with 100 uuf		Both windings wound on 3/8" D. form and spaced 0.315"; each winding 1/4" wd x 1/2" D; 2 powdered iron slugs

TABLE 7-6. WINDING DATA (Cont)

DESIG-NATION SYMBOL	PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D-C RESIST. (OHMS)	INDUCTANCE	HIPOT A-C VOLTS	REMARKS
T209	RAQA LO-0140		Pri. Sec.	#40 E #29 E	2600 210 C.T.	710 5.3			Impedance ratio 10,000:60.
T210	RAQA LR-0040		Single universal, 1 pie	#35 Formvar	125		Resonant at 1.775 mc with 10 uuf		Wound 1/4" wd x 1/2" D. on 3/8" D. form; powdered iron slug 1000-ohm resistor between top of coil and term. 1
T301	RAQA LP-0246		Pri. Sec. #1 Sec. #2 Sec. #3 Sec. #4	#22 E #17 E 2-#19 E #30 E #24 E	334 between term. 1 and 4; tapped at 283 turns (term. 2) and 310 turns (term. 3) 14-1/2 18 1320 C.T. 18 C.T.	2.38 between term. 1 and 2 2.48 between term. 1 and 3 2.60 between term. 1 and 4 0.055 0.055 85 0.32		2000 V rms between sec. #1 and #3 1200 V rms between all other windings and/or ground	105/115/125 v, 50/60 cps, 1 ph. 5 v at 3.0 amp 6.3 v at 4.1 amp 470 v C.T. at 145 ma 6.3 v C.T. at 0.6 amp

This page purposely left blank.

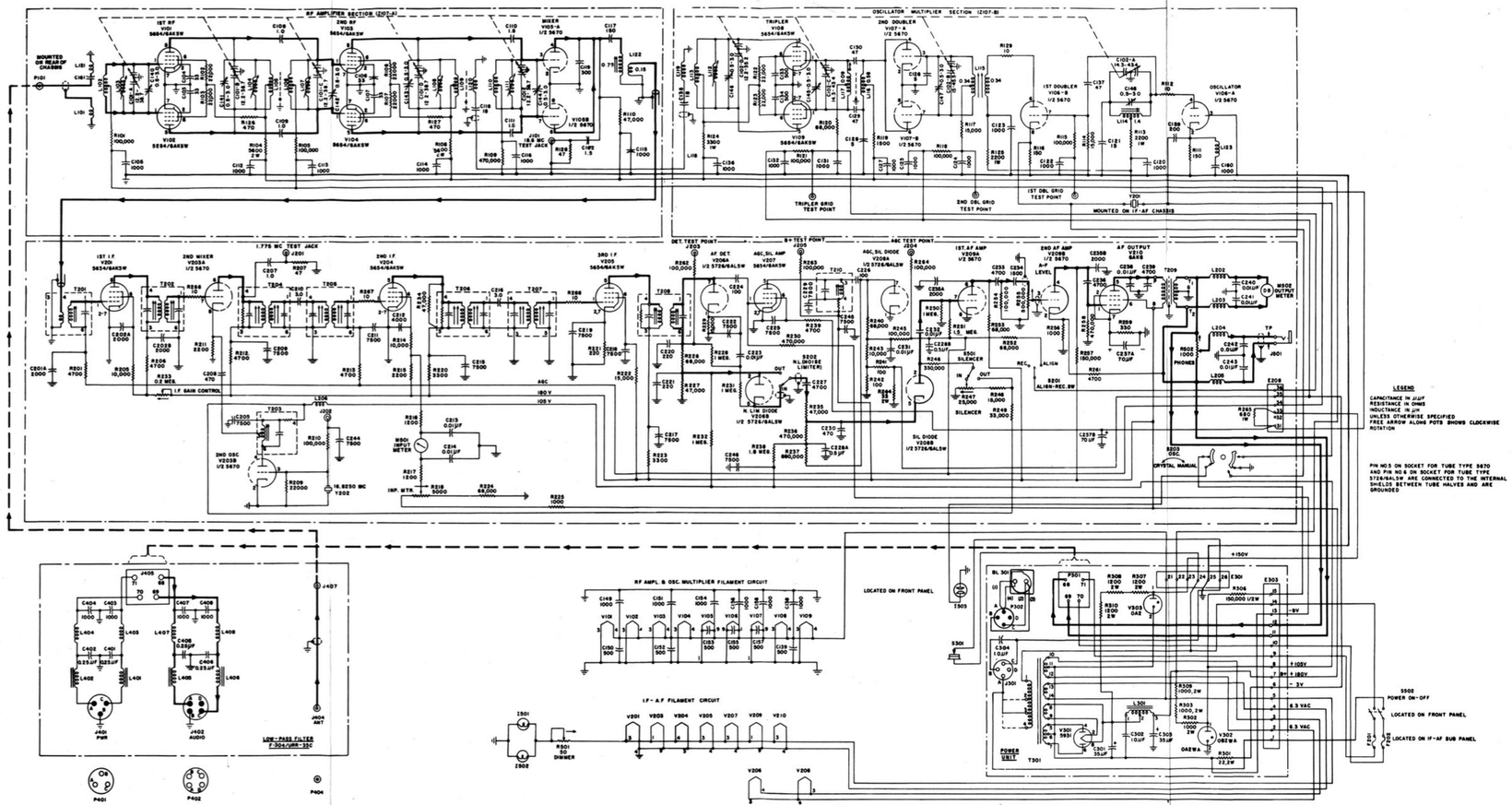
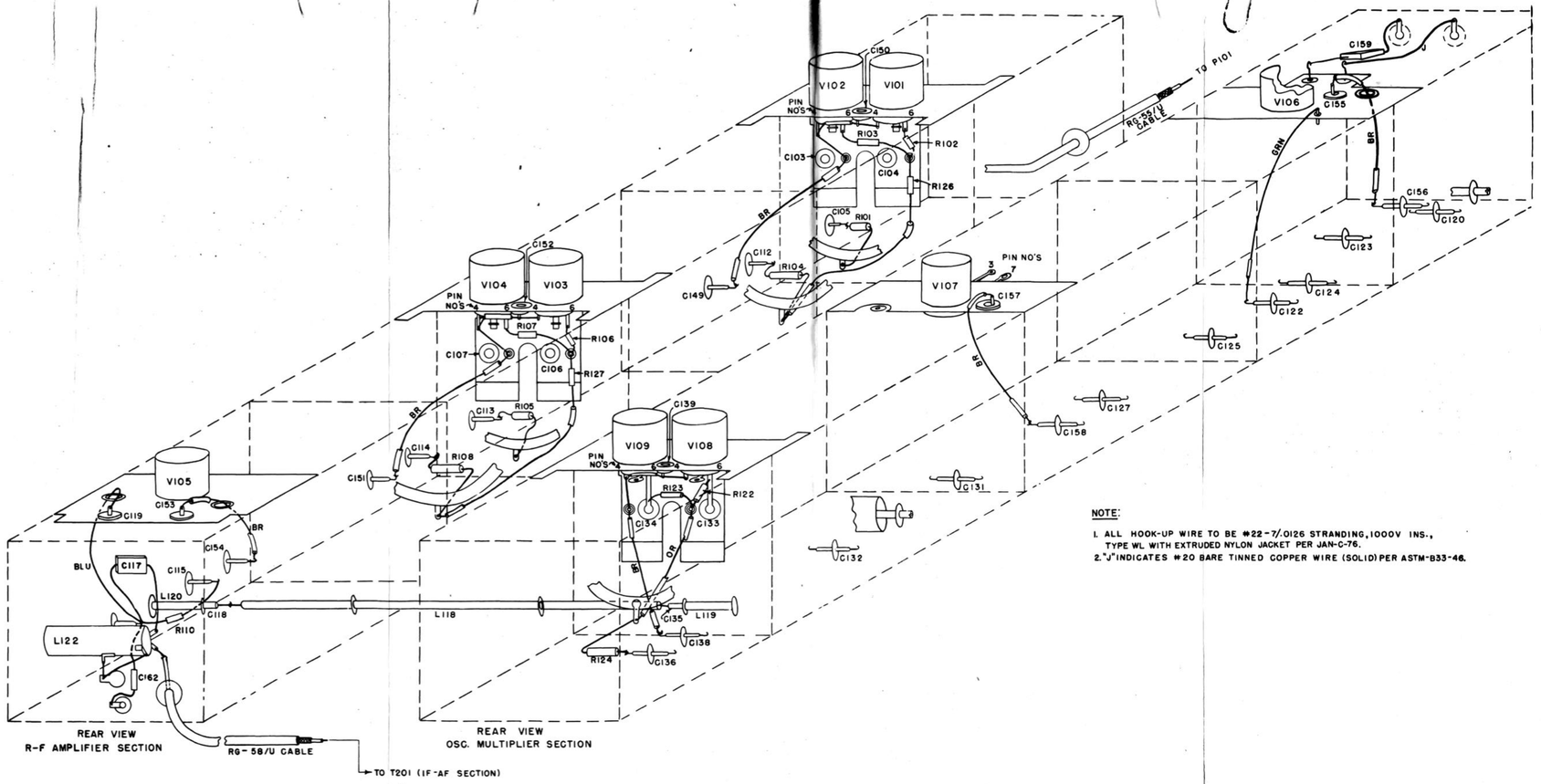


Figure 7–26. Radio Receiver R–482C/URR–35, Schematic Diagram



NOTE:

1. ALL HOOK-UP WIRE TO BE #22-7/.0126 STRANDING, 1000V INS., TYPE WL WITH EXTRUDED NYLON JACKET PER JAN-C-76.
2. "J" INDICATES #20 BARE TINNED COPPER WIRE (SOLID) PER ASTM-B33-46.

Figure 7-27. Preselector Wiring Diagram

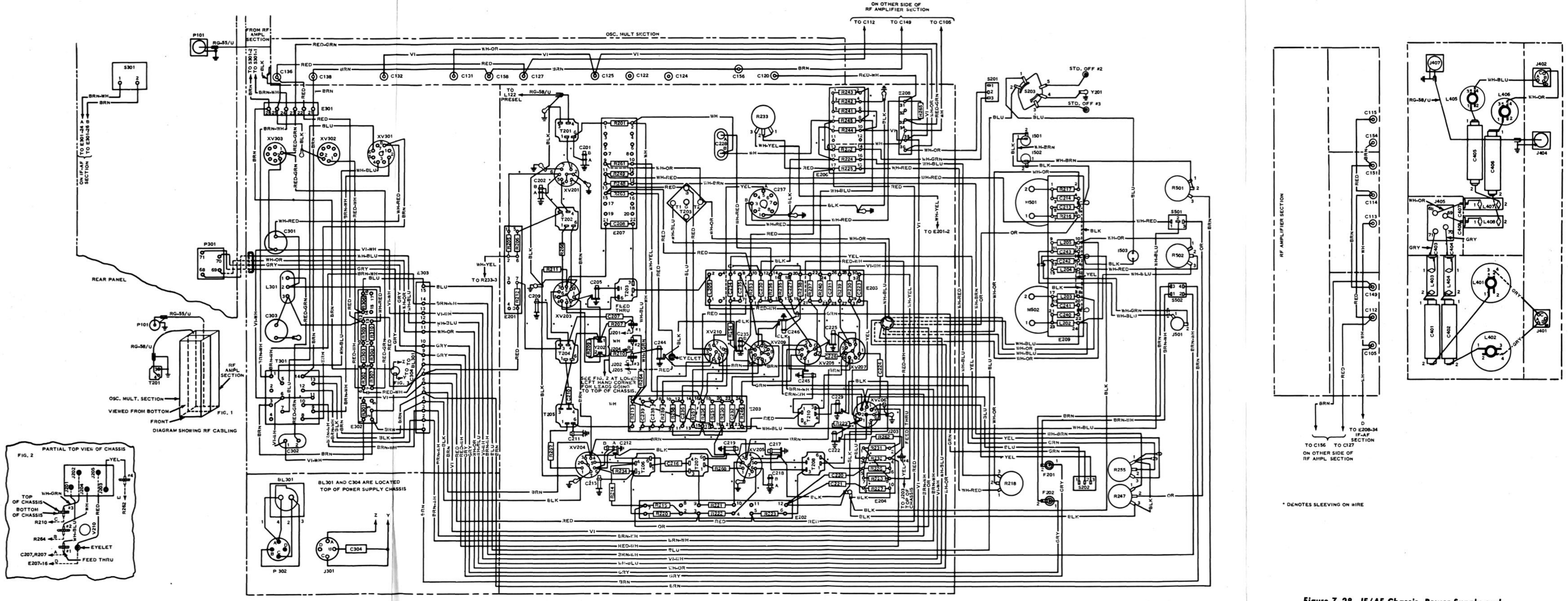


Figure 7–28. IF/AF Chassis, Power Supply and Low-Pass Filter F-304/URR-35C, Wiring Diagram

SECTION 8
PARTS AND SPARE PARTS LISTS
(AND MISCELLANEOUS TABLES)

TABLE 8-1. LIST OF MAJOR UNITS

SYMBOL GROUP	QUANTITY	NAME OF MAJOR UNIT	DESIGNATION	STANDARD NAVY STOCK NUMBER
101-599	1	Receiver, Radio, including	R-482C/URR-35	F16-Q123947-0100
101-199	1	Amplifier-Converter (Preselector)		
201-299	1	IF/AF Section		
301-399	1	Power Supply Section		
401-499	1	Filter, Low-Pass	F-304/URR-35C	
501-599	1	Front Panel Section and Cabinet		

TABLE 8-2. TABLE OF REPLACEABLE PARTS

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
A501	N17-M-75387-1823	MOUNT, RESILIENT: sq mtg; 60-70 lb normal load rating; 3 in. sq x 1½ in. h; rubber cushion; metal sleeve for 5/16 in. dia thru-bolt; four 0.225 in. dia mtg holes 2½ x 2½ in. c to c; metal parts cad plated; CFT dwg A1002059	Shock mtg	CAYU C-2070	VG-3030	A501, A502, A503, A504	4
A502		MOUNT, RESILIENT: (same as A501)	Shock mtg				
A503		MOUNT, RESILIENT: (same as A501)	Shock mtg				
A504		MOUNT, RESILIENT: (same as A501)	Shock mtg				
BL301	N17-B-21189-6949	FAN, CENTRIFUGAL: single unit operating on a common shaft; direct drive connection; rotor wheel BL301B; housing BL301C, single inlet, fabricated, steel, fixed direction of discharge, 1½ in. sq outlet w/deflector; prime mover supplied, BL301A; c/o BL301A, BL301B, BL301C, and P301	Cabinet cooling		VG-3052	BL301	1
BL301A	N17-M054310-6251	MOTOR, ALTERNATING CURRENT: squirrel-cage induction type, capacitor starting, permanent split-capacitor type; 115 v, 60 cycle, single-phase, 0.12 amp full load rating, 0.8 power factor; 0.0036 hp, 3200 rpm; single take-off shaft, ccw rotation, looking at load end; closed frame; 40 deg C rise for continuous operation; flatted shaft, 0.250 in. dia; overall dim., 2.6401 in. lg, excl shaft, 2 in. dia; shaft extends 1.063 in. from end of inclosure; hole mtd w/ 3 6-32 tapped mtg holes spaced 120 deg apart on 1.281 in. dia; incl O308 and O309	p/o BL301	AIRM A15B-23	PG-0010	BL301A	1
BL301B	Low failure item-If required requisition from ESO referencing Nav Ships 900,180A	IMPELLER, FAN, CENTRIFUGAL: multi-blade type; forward curved blades; steel; single w; 28 blades; over-all dim., 2½ in. dia x 1-15/32 in. w; 1 hub, single inside offset, 23/32 in. lg x ¼ in. bore dia	p/o BL301	TOR 216x115	JF-0002	BL301B	1
BL301C	Low failure item-If required requisition from ESO referencing Nav Ships 900,180A	HOUSING, CENTRIFUGAL FAN: welded assembly which contains BL301B, mounts BL301A, and serves as mtg bracket for complete BL301 to chassis; over-all dim., 4-11/16 in. lg x 5-3/8 in. h x 2-9/16 in. d; type no. 6, Ref Dwg Group 71, w/deflector	p/o BL301		VG-3031	BL301C	1
C101	N16-T-98077-2751	TUNER, RADIO FREQUENCY: variable capacitor tuning; 225 to 400 mc, one band; over-all dim. 10-11/32 in. lg x 2-11/16 in. w x 4-19/32 in. h; accessories c/o 5 trimmer capacitors C140 to C144, 5 fixed inductors L102A, L102B, L106C, L109D, L110E, and 5 variable inductors L103, L104, L107, L108, and L111; CNA part SB:2285; CFT dwg D1000230	RF amplifier tuning		VG-2961	C101	1

C102	N16-T-98077-2726	**TUNER, RADIO FREQUENCY:** variable capacitor tuning; 20.3 to 34.8833 mc, 40.6 to 69.766 mc, 81.2 to 139.533 mc, and 243.6 to 418.6 mc, one band; over-all dim. 10-11/32 in. lg x 2-11/16 in. w x 4-19/32 in. h; accessories c/o 4 trimmer capacitors C145, C146, C147, C148, and 2 variable inductors L112 and L113; CNA part SB:2257; CFT dwg D1000232	Oscillator-multiplier tuning		VG-2968	C102	1
C103	N16-C-27186-4675	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 33 uuf p/m 10%; style no. 1-P, Ref Dwg Group 1; ceramic case; dim. data, Ref Dwg Group 1, D - 0.450 in., L - 0.070 in., T - 9/32 in.; schematic diagram no. 2-R, Ref Dwg Group 1; type CB11PX330K per MIL-C-10950	1st RF amplifier, cathode by-pass	CER 370-CA	CM-330A	C103, C104, C106, C107	4
C104		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C103) p/o Z104	1st RF amplifier, cathode by-pass				
C105	N16-C-18659-4509	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 1000 uuf p/m 20%; variable temp coef; style no. 25-K, Ref Dwg Group 1; uninsulated body; dim. data, Ref Dwg Group 1, D - 0.312 in., L - 0.625 in.; schematic diagram no. 1-R, Ref Dwg Group 1	1st RF amplifier AGC by-pass	CER 362H1-K12	CC-102K	C105, C112, C113, C114, C115, C120, C122, C123, C124, C125, C127, C131, C132, C136, C138, C149, C151, C154, C156, C158	20
C106		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C103) p/o Z105	2nd RF amplifier cathode by-pass				
C107		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C103) p/o Z105	2nd RF amplifier cathode by-pass				
C108	N16-C-15368-5888	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 1 uuf p/m 0.25 uuf; zero temp coef; style no. 25-K, Ref Dwg Group 1; insulated; dim. data, Ref Dwg Group 1, D - 0.250 in., L - 0.562 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CC21CK010C per JAN-C-20A	1st RF coupling		CC21CK-010C	C108, C109, C207	3
C109		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C108)	1st RF coupling				
C110	N16-C-15400-5867	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 1.5 uuf p/m 0.25 uuf; zero temp coef; style no. 25-K, Ref Dwg Group 1; insulated; dim. data, Ref Dwg Group 1, D - 0.250 in., L - 0.562 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CC21CK-1R5C per JAN-C-20A	2nd RF coupling		CC21CK-1R5C	C110, C111, C162	3

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
C111		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C110)	2nd RF coupling				
C112		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	1st RF plate by-pass				
C113		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	2nd RF AGC by-pass				
C114		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	2nd RF plate by-pass				
C115		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Mixer plate by-pass				
C116	N16-C-18657-8640	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 350 v dc; 1000 uuf p/m 20%; uninsulated; 0.520 in. lg x ¼ in. across flats; one axial wire lead one end and no. 3-48 x 11/32 in. lg mtg stud on other end; CFT dwg FRE-19954-1-1	Mixer grid by-pass	CER 720BH1-K12	CC-102L	C116, C160	2
C117	N16-C-28975-1601	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 150 uuf p/m 5%; p/m 200 uuf/uf/deg C temp coef p/m 0.5%; style no. 8-B, Ref Dwg Group 1; plastic case; dim. data, Ref Dwg Group 1, D - 7/32 in., H - 15/32 in., W - 51/64 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CM20C151J per JAN-C-5	Mixer plate tank		CM20C151J	C117	1
C118	N16-C-16051-3074	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 18 uuf p/m 5.5%; −150 uuf/uf/deg C temp coef p/m 250 uuf/uf/deg C; style no. 25-K, Ref Dwg Group 1; uninsulated; dim. data, Ref Dwg Group 1, D - 0.187 in., L - 0.500 in.; schematic diagram no. 1-R, Ref Dwg Group 1	Mixer-tripler link resonating	CER 721B	CC-280A	C118, C135	2
C119	N16-C-29660-8801	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 300 uuf p/m 5%; p/m 200 uuf/uf/deg C temp coef; style no. 2-P, Ref Dwg Group 1; dim. data, Ref Dwg Group 1, D - 0.450 in., L - 0.070 in.; schematic diagram no. 1-R, Ref Dwg Group 1; CFT dwg A1000444-1; p/o Z106	Mixer plate tank	CER 370CB	CM-301D	C119	1
C120		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Oscillator and 1st				
			Oscillator and 1st doubler plate by-pass				

C121	N16-C-15997-5682	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 15 uuf p/m 10%; −330 uuf/uf/deg C temp coef; style no. 25-K, Ref Dwg Group 1; insulated; dim. data, Ref Dwg Group 1, D - 0.250 in., L - 0.562 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CC21SH150K per JAN-C-20A	Oscillator tank balancing	CC21SH-150K	C121	1	
C122		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	1st doubler grid test point filter				
C123		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	1st doubler plate by-pass				
C124		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	2nd doubler grid test point filter				
C125		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	2nd doubler holding bias by-pass				
C126	N16-C-15625-4061	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 5 uuf p/m 0.25 uuf; −330 uuf/uf/deg C temp coef p/m 60 uuf/uf/deg C; style no. 25-K, Ref Dwg Group 1; insulated; dim. data, Ref Dwg Group 1, D - 0.250 in., L - 0.562 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CC21SH050C per JAN-C-20A	2nd doubler grid tank balancing		CC21SH050C	C126, C128	2
C127		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	2nd doubler plate by-pass				
C128		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C126)	2nd doubler plate tank balancing				
C129	N16-C-16533-1248	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 47 uuf p/m 5%; −750 uuf/uf/deg C temp coef; style no. 25-K, Ref Dwg Group 1; insulated; dim. data, Ref Dwg Group 1, D - 0.250 in., L - 0.562 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CC21UJ470J per JAN-C-20A	2nd doubler coupling		CC21UJ470J	C129, C130 C137	3
C130		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C129)	2nd doubler coupling				
C131		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Tripler grid bias test point filter				
C132		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Tripler holding bias test point filter				
C133	N16-C-30167-1867	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 500 uuf p/m 10%; style no. 1-P, Ref Dwg Group 1; metal case; dim. data, Ref Dwg Group 1, D - 29/64 in., L - 1/16 in.; schematic diagram no. 2-R, Ref Dwg Group 1; CFT dwg A1000387-1; p/o Z103	Tripler screen by-pass	CER	CM-501H	C133, C134, C139, C150, C152	5

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
C134		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C133) p/o Z103	Tripler screen by-pass				
C135		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C118)	Tripler-mixer resonating link				
C136		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Tripler plate by-pass				
C137		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C129) p/o Z101	Oscillator coupling				
C138		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Tripler filament by-pass				
C139		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C133) p/o Z103	Tripler filament by-pass				
C140	For reference only	CAPACITOR, VARIABLE: (integral with C101A)	1st RF grid tank trimmer				
C141	For reference only	CAPACITOR, VARIABLE: (integral with C101B)	1st RF plate tank trimmer				
C142	For reference only	CAPACITOR, VARIABLE: (integral with C101C)	2nd RF grid tank trimmer				
C143	For reference only	CAPACITOR, VARIABLE: (integral with C101D)	2nd RF plate tank trimmer				
C144	For reference only	CAPACITOR, VARIABLE: (integral with C101E)	Mixer grid tank trimmer				
C145	For reference only	CAPACITOR, VARIABLE: (integral with C102C)	Tripler grid tank trimmer				
C146	For reference only	CAPACITOR, VARIABLE: (integral with C102D)	Tripler plate tank trimmer				
C147	For reference only	CAPACITOR, VARIABLE: (integral with C102B)	2nd doubler grid tank trimmer				
C148	For reference only	CAPACITOR, VARIABLE: (integral with C102A)	Oscillator plate tank trimmer				
C149		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	1st RF filament by-pass				

C150		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C133) p/o Z104	1st RF filament by-pass				
C151		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	2nd RF filament by-pass				
C152		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C133) p/o Z105	2nd RF filament by-pass				
C153	N16-30167-1876	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 500 uuf p/m 10%; p/m 200 uuf/uf/deg C temp coef; style no. 1-P, Ref Dwg Group 1, metal case; dim. data, Ref Dwg Group 1, D - 29/64 in. L 1/16 in.; schematic diagram no. 2-R, Ref Dwg Group 1; CFT dwg 1000444-2; p/o Z106	Mixer filament by-pass	CER 370-CB	CM-501J	C153, C155, C157	3
C154		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Mixer filament by-pass				
C155		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C153) p/o Z101	Oscillator-doubler filament by-pass				
C156		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	Oscillator doubler filament by-pass				
C157		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C153) p/o Z102	2nd doubler filament by-pass				
C158		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C105)	2nd doubler filament by-pass				
C159	N16-C-29265-3006	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 200 uuf p/m 5%; p/m 100 uuf/uf/deg C temp coef p/m 0.3%; style no. 8-B, Ref Dwg Group 1; plastic case; dim. data, Ref Dwg Group 1, D - 7/32 in., H - 15/32 in., 2 - 51/64 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CM20D201J per JAN-C-5	Crystal leads resonating		CM20D201J	C159	1
C160		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C116) p/o Z101	DC blocking				
C161	N16-C-15923-1462	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 10 uuf p/m 1 uuf; —150 uuf/uf/deg C temp coef p/m 30 uuf/uf/deg C; style no. 25-K, Ref Dwg Group 1; uninsulated; dim. data, Ref Dwg Group 1, D - 0.343 in., L - 0.406 in.; schematic diagram no. 1-R, Ref Dwg Group 1; CFT dwg A1002657-2	Antenna tuning	CER 721-B	CC-100G	C161	1
C162		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C110)	J101 decoupling				

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
C201	N16-C-19239-6981	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 350 v dc; 2 x 2000 uuf +30% -20%; uninsulated; dim. data, 0.250 in. dia x 1.187 in. lg; schematic diagram no. 9-R, Ref Dwg Group 1; two radial wire lead terminals; one no. 4-40 thd x 5/16 in. lg mtg stud and ground term on bottom; c/o C201A and C201B; CFT dwg A1003706-1		CASU CST	CC-402B	C201, C202 C212, C235	4
C201A		CAPACITOR, FIXED, CERAMIC DIELECTRIC: p/o C201	1st IF AGC by-pass				
C201B		Not used					
C202		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C201) c/o C202A and C202B					
C202A		CAPACITOR, FIXED, CERAMIC DIELECTRIC: p/o C202	1st IF screen by-pass				
C202B		CAPACITOR, FIXED, CERAMIC DIELECTRIC: p/o C202	1st IF plate by-pass				
C203		Not used					
C204		Not used					
C205	N16-C-19073-8581	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 350 v dc; 7500 uuf p/m 20%; uninsulated; dim. data, 0.312 in. dia x 1.187 in. lg; schematic diagram no. 2-R, Ref Dwg Group Q; one radial wire lead term; one no. 4-40 thd x 5/16 in. lg mtg stud and ground term on bottom	2nd oscillator plate by-pass	CASU CS-4	CC-752	C205, C209, C211, C215, C217, C218, C219, C222, C225, C229, C244, C245, C246	
C206		Not used					
C207		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C108)	J201 de-coupling				
C208	For replacement use SNSN N16-C-30109-3806	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 470 uuf p/m 10%; style no. 8-B, Ref Dwg Group 1; plastic case; dim. data, Ref Dwg Group 1, D - 7/32 in., H - 15/32 in., W - 51/64 in.; schematic diagram no. 1-R, Ref Dwg Group 1, type CM20B471K per JAN-C-5	Oscillator-mixer coupling		CM20B471K	C208, C230	2
C209		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)					

C210	N16-C-15528-5533	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 3 uuf p/m 0.25 uuf; ZERO temp coef, style no. 25-K, Ref Dwg Group 1; insulated body; dim. data, Ref Dwg Group 1, D - 0.150 in., L - 0.562 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CC21CJ030C per JAN-C-20A	Transformer coupling	CC21CJ030C	C210, C216	2
C211		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)				
C212		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C201) c/o C212A and C212B				
		CAPACITOR, FIXED, CERAMIC DIELECTRIC: p/o C212				
C212B		CAPACITOR, FIXED, CERAMIC DIELECTRIC: p/o C212				
C213	N16-C-33622-5222	CAPACITOR, FIXED, MICA DIELECTRIC: 300 v dc; 10,000 uuf p/m 10%; style no. 8-B, Ref Dwg Group 1; plastic case; dim. data, Ref Dwg Group 1; D - 11/32 in., H - 53/64 in., W - 53/64 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CM35B103K per JAN-C-5	Input meter filter	CM35B103K	C213, C214, C223, C231, C232, C238, C240, C241, C242, C243	10
C214		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Input meter filter			
C215		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	2nd IF plate by-pass			
C216		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C210)	Transformer coupling			
C217		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	3rd IF plate by-pass			
C218		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	3rd IF screen by-pass			
C219		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	3rd IF cathode by-pass			
C220	N16-C-29375-8076	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc: 220 uuf p/m 10%; dtyle no. 8-B, Ref Dwg Group 1; plastic body; dim. data, Ref Dwg Group 1, D - 7/32 in., H - 15/32 in., W - 51/64 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CM20B221K per JAN-C-5	AF detector load filter	CM20B221K	C220, C221	2

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
C221		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C220)	AF detector load filter				
C222		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	AF detector cathode by-pass				
C223		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Noise limiter time constant				
C224	N16-C-17085-7060	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 v dc; 100 uuf p/m 10%; −330 uuf/uf/deg C temp coef; style no. 25-K, Ref Dwg Group 1; insulated body; dim. data, Ref Dwg Group 1, D - 0.250 in., L - 0.812 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CC26SL101K per JAN-C-20A	AF detector plate coupling		CC26SL101K	C224, C226	2
C225		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	AGC amplifier screen by-pass				
C226		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C224)	AGC amplifier plate coupling				
C227	For replacement use SNSN N16-C-32641-6338	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 4700 uuf p/m 10%; style no. 8-B, Ref Dwg Group 1; plastic case; dim. data, Ref Dwg Group 1, D - 11/32 in., H - 53/64 in., W - 53/64 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CM35B472K per JAN-C-5	Noise limiter output coupling		CM35B472K	C227, C233 C236, C239	4
C228	For replacement use N16-C-53697-7099	CAPACITOR, FIXED, PAPER DIELECTRIC: 600 v dc; 2 x 500,000 uuf p 20% m 10%; style no. 22-A, Ref Dwg Group 1; schematic diagram no. 9-R; type CP61B6EF504X per JAN-C-5			CP61B6EF-504X	C228	1
C228A		CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C228	Silencer filter				
C228B		CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C228	AGC filter				
C229		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	AGC amplifier plate by-pass				
C230		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C208)	Silencer diode cathode filter				
C231		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	AGC diode plate by-pass				

C232		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Silencer diode plate coupling			
C233		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C227)	1st AF amplifier plate filter			
C234	For replacement use SNSN N16-C-31507-4094	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 1500 uuf p/m 10%; style no. 8-B, Ref Dwg Group 1; plastic case; dim. data, Ref Dwg Group 1, D - 11/32 in., H - 53/64 in., W - 53/64 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CM35B152K per JAN-C-5	Audio filter	CM35B152K	C234	1
C235		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C201) c/o C235A and C235B				
C235A		CAPACITOR, FIXED, CERAMIC DIELECTRIC: p/o C235	Regeneration suppressor			
C235B		CAPACITOR, FIXED, CERAMIC DIELECTRIC: p/o C235	Regeneration suppressor			
C236		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C227)	2nd AF amplifier plate coupling			
C237	N16-C-22137-2611	CAPACITOR, FIXED, ELECTROLYTIC: 250 v dc; 2 x 70 uf; —40 deg to +85 deg C working temp range; style no. 1-N, Ref Dwg Group 1; metal case, insulated; dim. data, Ref Dwg Group 1, D - 1.500 in., L - 3.500 in.; schematic diagram no. 1-N, Ref Dwg Group 1; type CE52C700M per JAN-C-62; c/o C237A and C237B		CE52C700M	C237	1
C237A		CAPACITOR, FIXED, ELECTROLYTIC: p/o C237	AF output cathode by-pass			
C237B		CAPACITOR, FIXED, ELECTROLYTIC: p/o C237	150 volt filter			
C238		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Audio filter			
C239		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C227	Audio filter			
C240		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Output meter filter			
C241		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Output meter filter			
C242		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Phone output filter			

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
C243		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C213)	Phone output filter				
C244		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	J202 by-pass				
C245		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	AGC amp B+ by-pass				
C246		CAPACITOR, FIXED, CERAMIC DIELECTRIC: (same as C205)	105 volt by-pass				
C301	N16-C-19892-7801	CAPACITOR, FIXED, ELECTROLYTIC: 400 v dc; 35 uf; −20 deg to +85 deg C working temp range; style no. 4-J, Ref Dwg Group 1; metal case, insulated; dim. data, Ref Dwg Group 1, D - 1.375 in., L - 2.250 in.; schematic diagram no. 1-R, Ref Dwg Group 1; type CE41B350Q per JAN-C-62	Filter		CE41B350Q	C301, C303	2
C302	For replacement use SNSN N16-C-48817-1090	CAPACITOR, FIXED, PAPER DIELECTRIC: 600 v dc; 1 uf +20%, −10%; style no. 22-A, Ref Dwg Group 1; metal case, insulated; dim. data, Ref Dwg Group 1, D - 0.766 in., H - 2.750 in., W - 1.313 in.; schematic diagram no. 1-K; Ref Dwg Group 1; type CP61B1EF105V per JAN-C-25	Filter		CP61B1EF-105V	C302, C304	2
C303		CAPACITOR, FIXED, ELECTROLYTIC: (same as C301)	Filter				
C304		CAPACITOR, FIXED, PAPER DIELECTRIC: (same as C302)	Blower motor phasing				
C401	N16-C-46371-9609	CAPACITOR, FIXED, PAPER DIELECTRIC: 200 v dc; 250,000 uuf, +20%, −10%; style no. 7-L, Ref Dwg Group 1; metal case; insulated; dim. data, Ref Dwg Group 1; D - 0.750 in., L - 1.813 in.; schematic diagram no. 1-R, Ref Dwg Group 1	AC line filter	CSF 48P2	CP-254E	C401, C402, C405, C406	4
C402		CAPACITOR, FIXED, PAPER DIELECTRIC: (same as C401)	AC line filter				
C403	N16-C-31090-3800	CAPACITOR, FIXED, MICA DIELECTRIC: 500 v dc; 1000 uuf ±10%; −200 to +200 uuf/uf/deg C temp coef ±0.5%; style no. 2-P, Ref Dwg Group 1; metal case; dim. data, Ref Dwg Group 1, D - 0.450 in., L - 0.100 in.; schematic diagram no. 1-R, Ref Dwg Group 1	AC line filter	CER 370-CB	CM-102Q	C403, C404,	4

C404		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C403)	AC line filter			
C405		CAPACITOR, FIXED, PAPER DIELECTRIC: (same as C401)	AC line filter			
C406		CAPACITOR, FIXED, PAPER DIELECTRIC: (same as C401)	AC line filter			
C407		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C403)	AC line filter			
C408		CAPACITOR, FIXED, MICA DIELECTRIC: (same as C403)	AC line filter			
E101	N16-S-34518-5501	SHIELD, ELECTRON TUBE: accommodates two RMA tube envelopes style T5½, straight cylinder shape with flared end, open top; brass, nickel plated; over-all dim. 2.36 in. lg x 0.870 in. w x 2.093 in. h; mounts on tubes and in surrounding chassis frame; CNA part SB:2354; CFT A1000421	Shield for V101 and V102	VG-2957	E101, E103, E108	3
E102		Not used				
E103		SHIELD, ELECTRON TUBE: (same as E101)	Shield for V103 and V104			
E104		Not used				
E105	N16-S-34532-8760	SHIELD, ELECTRON TUBE: accommodates RMA tube envelope style T6½, straight cylinder shape, open top; brass, nickel plated; over-all dim. 1½ in. lg x 1.065 in. dia; mounts on shock shield base; type TS103U01 per JAN-S-28A	Shield for V105	JS-0207	E105, E106, E107, E220, E226	5
E106		SHIELD, ELECTRON TUBE: (same as E105)	Shield for V106			
E107		SHIELD, ELECTRON TUBE: (same as E105)	Shield for V107			
E108		SHIELD, ELECTRON TUBE: (same as E101)	Shield for V108 and V109			
E109		Not used				
E110	N17-B-86841-9336	BRUSH ELECTRICAL CONTACT: no. 34 (0.006 in.) G and S ga hard beryllium copper, heat treated; silver plated; 0.455 in. lg x 0.312 in. wd; one end tapered; one no. 31 (0.120 in.) drill hole 5/32 in. from wider end; CFT dwg FRB5231-1		AG-4696	E110	1
E111	Assemble from Component parts	INSULATOR SET: c/o E111A and E111B	Y201 crystal oscillator lead feedthrough			
E111A	Fabricate locally from bulk material under SNSN G9330-221-2988	INSULATOR, BUSHING: brown molded phenolic; ground finish; rd shank; 13/32 in. lg x 5/16 in. OD x 0.101 in. ID; p/o E111		QP-0346	E111A, E112A	

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
E111B	Fabricate locally from bulk material under SNSN G9330-221-2988	INSULATOR, BUSHING: brown molded phenolic; ground finish; rd shank; 0.118 in. lg x 5/16 in. OD x 0.101 in. ID; CFT dwg A1001093; p/o E111			WL-0245	E111B, R112B, E113A, E113B, E114A, E114B	6
E112	Assemble from Component parts	INSULATOR SET: c/o E112A, E112B	Y201 lead feedthrough				
E112A		INSULATOR, BUSHING: (same as E111A); p/o E112					
E112B		INSULATOR, BUSHING: (same as E111B); p/o E112					
E113	Assemble from Component parts	INSULATOR SET: c/o E113A, E113B	2nd doubler grid testpoint feedthrough				
E113A		INSULATOR, BUSHING: (same as E111B); p/o E113					
E113B		INSULATOR, BUSHING: (same as E111B); p/o E113					
E114	Assemble from Component parts	INSULATOR SET: c/o E114A, E114B	1st doubler B+ feedthrough				
E114A		INSULATOR, BUSHING: (same as E111B); p/o E114					
E114B		INSULATOR, BUSHING: (same as E111B); p/o E114					
E115	Low Failure item-if required requisition from ESO referencing Nav-Ships 900,180A	INSULATOR, PLATE: acrylic heat resistant, MIL-P-5415, transparent, clear sheet, finish A; dim., Ref Dwg Group 9, item 185, J - 1.750 in., K - 1-17/32 in., L - 12-1/8 in., M - 5/32 in. & countersink 82 deg x 9/32 in. dia, N - 5/16 in., O - 10-47/64 in., T - 0.080 in., W - 2-1/4 in.	Top cover for preselector		AC-115	E115	1
E116	Low Failure item-if required requisition from ESO referencing Nav-Ships 900, 180A	INSULATOR, PLATE: acrylic heat resistant, MIL-P-5425, transparent, clear sheet, finish A; dim., Ref Dwg Group 9, item 185, J - 1.750 in., K - 1-17/32 in., L - 12-1/8 in., M - 5/32 in. & countersink 82 deg x 9/32 in. dia, N - 5/16 in., P - 10-7/8 in., T - 0.080 in., W - 2-1/4 in.	Bottom cover for preselector		AC-1419	E116	1
E201	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermo-setting plastic; 8 solder post term; 3-13/16 in. lg x 3/4 in. wd x 3/32 in. thk; two 0.169 in. dia mtg holes 2½ in. c to c; marked E201 and ckt symbols; CNA part SB:2271; CFT dwg A1001281	Terminal board		VT-0331	E201	1

E202	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 11 solder post term; 4½ in. lg x 3/4 in. wd x 3/32 in. thk; two 0.169 in. dia mtg holes 3.187 in. c to c; marked E202 and ckt symbols; one 1/2 in. dia hole in center of board; CNA part SB: 2273; CFT dwg A1001320	Terminal board	VT-0332	E202	1
E203	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 24 solder post term; 3-13/16 in. lg x 1½ in. wd x 3/32 in. thk; two 0.169 in. dia mtg holes 3.187 in. c to c; marked E203 and ckt symbols; CNA part SB:2275; CFT dwg A1001374	Terminal board	VT-0333	E203	1
E204	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 10 solder post term; 1-5/8 in. lg x 1-1/8 in. wd x 3/32 in. thk; two 0.169 in. dia mtg holes 1 in. c to c; marked E204 and ckt symbols; one 7/16 in. lg and 1/8 in. wd cutout at one end; CNA part SB:2277; CFT dwg A1001377	Terminal board	VT-0337	E204	1
E205	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 32 solder post term; 5-1/16 in. lg x 1½ in. wd x 3/32 in. thk; three 0.169 in. dia mtg holes 2.218 in. x 2.218 in. c to c; marked E205 and ckt symbols; CNA part SB:2279; CFT dwg A1001381	Terminal board	VT-0336	E205	1
E206	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 18 solder post term; 2-7/8 in. lg x 1½ in. wd x 3/32 in. thk; two 0.169 in. dia mtg holes 2.250 in. c to c; marked E206 and ckt symbols; CNA part SB:2281; CFT dwg A1001326	Terminal board	VT-0334	E206	1
E207	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 22 solder post term; 3½ in. lg x 1-1/8 in. wd x 3/32 in. thk; two 0.169 in. dia mtg holes 2.875 in. c to c; marked E207 and ckt symbols; CNA part SB:2283; CFT dwg A1001323	Terminal board	VT-0335	E207	1
E208	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 6 solder post term; 2-5/16 in. lg x 1/2 in. wd x 1/8 in. thk; twp 0.169 in. dia mtg holes 2.624 in. c to c; marked E208 and ckt symbols; CNA part SB:2290; CFT dwg A1000636-2	Terminal board	VT-0339	E208	1
E209	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermosetting plastic; 24 solder post term; 6-1/4 in. lg x 1½ in. wd x 1/8 in. thk; four 0.169 in. dia mtg holes 5.875 in. x 1.125 in. c to c; marked E209 and ckt symbols; CNA part SB:2289; CFT dwg A1017333	Terminal board	VT-0338	E209	1
E210		Not used				
E211		Not used				

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
E212	N16-K-700310-977	KNOB: set screw type; over-all dim. 1-1/16 in. dia x 5/8 in. thk; black; w/ white pointer; CFT dwg FRA2874-1D3	T Xtal-manual selector (S203)		QP-0348	E212, E504	2
E213	N17-T-28244-4401	TERMINAL STUD: breakdown voltage 3500 v ac; one solder connection on top, one on bottom; brass hot tin dipped; bakelite body; 7/8 in. lg x 5/16 in. across flats o/a; mounts by ¼ - 24 thd bushing ¼ in. lg; CNA dwg S175-1	J201 feedthrough	WIN FT5	T-0320	E213, E214, E215, E216	4
E214		TERMINAL STUD: (same as E213)	J202 feedthrough				
E215		TERMINAL STUD: (same as E213)	J203 feedthrough				
E216		TERMINAL STUD: (same as E213)	J204 feedthrough				
E217		Not used					
E218	N16-S-34520-3862	SHIELD, ELECTRON TUBE: accomodates RMA tube style envelope T5½, straight cylinder shape, open top; brass, nickel plated; over-all dim. 1-3/8 in. lg x 1.050 IN. dia; mounts on shock shield base; type TS102U01 per JAN-S-28A	Shield for V201		JS-0186	E218, E221, E222, E223, E224, E225	6
E219		Not used					
E220		SHIELD, ELECTRON TUBE: (same as E105)	Shield for V203				
E221		SHIELD, ELECTRON TUBE: (same as E218)	Shield for V204				
E222		SHIELD, ELECTRON TUBE: (same as E218)	Shield for V205				
E223		SHIELD, ELECTRON TUBE: (same as E218)	Shield for V206				
E224		SHIELD, ELECTRON TUBE: (same as E218)	Shield for V207				
E225		SHIELD, ELECTRON TUBE: (same as E218)	Shield for V208				
E226		SHIELD, ELECTRON TUBE: (same as E105)	Shield for V209				
E227	N16-S-34557-8351	SHIELD, ELECTRON TUBE: accomodates RMA tube style envelope style T5½; straight cylindrical shape, open top; brass, nickel plated; over-all dim. 1-3/8 in. lg x 1.050 in. dia; mounts on shock shield base; type TS102U01 per JAN-S-28A	Shield for V210		JS-0181	E227	1

E301	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermo-setting plastic; 6 solder post term; 2-5/16 in. lg x ½ in. w x 1/8 in. thk; two 0.169 in. dia mtg holes 2.625 in. c to c; marked E301 and 21, 22, 23, 24, 25, 26; CNA part SB:2292; CFT dwg A1000636-1	Terminal board	VT-0343	E301	1
E302	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermo-setting plastic; 17 solder post term; 6-11/16 in. lg x 15/16 in. w x 3/32 in. thk; three 0.169 in. dia mtg holes spaced 2.906 in. c to c; marked E302 and ckt symbols; CNA part SB:2291; CFT dwg A1002471	Terminal board	VT-0345	E302	1
E302	Shop manufacture	TERMINAL BOARD: glass cloth laminated thermo-setting plastic; 15 solder post term; 7-7/16 in. lg x ½ in. w x 1/8 in. thk; three 0.169 in. dia mtg holes spaced 3.375 in. apart; marked E303, term numbered from 1 to 15; CNA part SB:2293; CFT dwg A1000634	Terminal board	VT-0342	E303	1
E304	N16-S-34607-6039	SHIELD, ELECTRON TUBE: accomodates RMA tube envelope style T5½ long; straight cylindrical shape, open top; brass, nickel plated; over-all dim. 2¼ in. lg x 0.930 in. dia; mounts on shock shield base; type TS102U03 per JAN-S-28A	Shield for V302	JS-0180	E304, E305	2
E305		SHIELD, ELECTRON TUBE: (same as E304)	Shield for V303			
E401		Not used				
E501	N16-K-700344-505	KNOB: set screw type; over-all dim. 1-7/16 in. dia x 17/32 in. thk; black; no markings; CNA part SB:2397; CFT dwg A1001522	C101/C102 tuning		E501	1
E502	N16-K-700266-740	KNOB: set screw type; over-all dim. 5/8 in. dia x 15/32 in. thk; black; no markings; CFT dwg FRA-4630-1	Dial lock control	QP-0352	E502	1
E503	N16-K-700277-350	KNOB: set screw type; over-all dim. ¾ in. dia x 9/16 in. thk; no markings; CFT dwg FRA2949-1	Dimmer control	QP-0351	E503	1
E504		KNOB: (same as E212)	Phone level control			
E505	N17-C-77415-7611	CONTACT, ELECTRICAL: p/o front panel; beryllium copper contact surfaces; over-all dim. 12 in. lg x 9/16 in. w x 3/8 in. h; CNA part/dwg SB:2395	Grounding contact	VG-2943	E505, E506	2
E506		CONTACT, ELECTRICAL: (same as E505)	Grounding contact			
E507	N17-C-77417-8070	CONTACT, ELECTRICAL: p/o front panel; beryllium copper contact surfaces; over-all dim. 12 in. lg x 9/16 in. w x 3/8 in. h; CNA part/dwg SB:2394	Grounding contact	VG-2944	E507, E508	2

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
E508		CONTACT, ELECTRICAL: (same as E507)	Grounding contact				
F201	G5920-280-4466	FUSE, CARTRIDGE: 2 amp, 250 v; instantaneous; ferrule type term; ¼ in. dia; glass body; one time; over-all dim. 1¼ in. lg x ¼ in. dia	AC power	CFA 3AG	SF-0007	F202, F202, F203	3
F202		FUSE, CARTRIDGE: (same as F201)	AC power				
F203		FUSE, CARTRIDGE: (same as F201)	Spare				
H101	Shop manufacture	WASHER, SPRING TENSION: round; plane of washer bent on 13/16 in. radius; cad plated spring steel 0.016 in. thk; 0.257 in. ID x 7/16 in. OD x 0.047 in. thk; CFT dwg A1000235	Thrust spring for capacitor shaft	CAXO 3544-14 type 3	WK-0053	H101, H102	2
H102		WASHER, SPRING TENSION: (same as H101)	Thrust spring for capacitor shaft				
H201	N16-T-751468-732	ALIGNMENT TOOL, ELECTRONIC EQUIPMENT: combination screwdriver and wrench type; 2 working ends; extended blade, 0.022 in. lg, nonadjustable; splined wrench tip to fit #6 fluted socket head screw; 4 in. lg over-all; plastic body, metal extended blade and wrench; CFT part FRA20347-1	Alignment		AG-4656	H201	1
H202	Procured on demand by nearest Naval Shore Supply Activity	WRENCH, SOCKET HEAD SCREW: splined type, 4 flutes; for #6 fluted socket head screw; one arm 21/32 in. lg, other arm 1-27/32 in. lg; CFT part 49583	Knob set screws		AG-4789	H202	1
H203	N17-L-63201-6626	ALIGNMENT TOOL, ELECTRONIC EQUIPMENT: nylon cast rod, Dupont grade FM10001, prod no. 44 (0.086 in.) brass rod cad plated; 3-25/32 in. lg x 9/16 in. dia; prod on one side; 9 in. lg #20 stranded test lead w/ alligator clip on other side; CNA part SB: 2424; CFT dwg B1021616	Alignment load		VG-2949	H203	1
I501	G6240-155-8706	LAMP, INCANDESCENT: 6.3 v; 0.15 amp; miniature bayonet base; bulb T3¼ clear; white light emitted; 1 filament, C-2	Dial light	CG 47	JL-0004	I501, I502	2
I502		LAMP, INCANDESCENT: (same as I501)	Dial light				
I503	G6240-223-9100	LAMP, GLOW: neon gas; 1/25 w, 105-125 v	Crystal control indicator	CG NE-51	JL-0018	I503	1

J101	N17-C-73108-2878	CONNECTOR, RECEPTACLE, ELECTRICAL: coax; one rd contact; 52 ohms impedance; dim. approx ¾ in. dia x ¾ in. lg; type UG-290A per BuShips dwg REB 49073	18.6 mc input		SF-0261	J101, J201	2
J201		CONNECTOR, RECEPTACLE, ELECTRICAL: (same as J101)	1.775 mc input				
J202	For replacement use SNSN N17-C-73108-1801	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 con-contact; contact data, Ref Dwg Group 206, Section A PART ONE A B C D E F G 1 FL 10 N/A NR NR NR PART TWO H J K L N/A N/A N/A N/A low loss plastic; straight shape; over-all dim., 59/64 in. lg x 5/16 in. hex; nonlocking type; self mtg w/ ¼−32 NEF-2 thd; per MIL-STD-242 (SHIPS)	Oscillator test point		SF-0260	J203, J203, J204, J205	4
J203		CONNECTOR, RECEPTACLE, ELECTRICAL: (same as J202)	Detector test point				
J204		CONNECTOR, RECEPTACLE, ELECTRICAL: (same as J202)	AGC test point				
J205		CONNECTOR, RECEPTACLE, ELECTRICAL: (same as J202)	B+ test point				
J301	N17-C-073498-5937	CONNECTOR, RECEPTACLE, ELECTRICAL: 4 contacts; 1 connector mating end; contact data, Ref Dwg Group 206, Section A PART ONE A B C D E F G 4 FL 10 N/A NR NR 125 PART TWO H J K L N/A N/A N/A N/A low loss plastic; straight shape; over-all dim., 17/32 in. lg x ½ in. hex; locking type, bayonet latch type; self mtg w/ 3/8−24 thd	Blower motor connection	WIN M4S-LRGN	SF-0267	J301	1
J401	N17-C-72604-1522	CONNECTOR, RECEPTACLE, ELECTRICAL: 3 rd male contacts; straight; 3/8 in. max cable opening; insert per MIL-C-5015; cylindrical metal body 3/4 in. dia x 3-5/64 in. lg; mtg flange 1-3/32 in. x 1-3/32 in. w/4 mtg holes 0.120 in. dia spaced 29/32 in c to c; AN type AN 3102A-14S-7P per MIL-C-5015	AC power input		SM-0216	J401	1

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
J402	N17-C-72610-5434	CONNECTOR, RECEPTACLE, ELECTRICAL: 4 rd male contacts; straight; 7/8-20 thd cylindrical metal body 3/4 in. dia x 3-53/64 in. lg; mtg flange 1-3/32 in. x 1-3/32 in. w/4 mtg holes 0.120 in. dia spaced 29/32 in. x 29/32 in. c to c; AN type AN 3102A-14S-2P per MIL-C-5015	Audio output		SM-0217	J402	1
J403		Not used					
J404	N17-C-73108-5906	CONNECTOR, RECEPTACLE, ELECTRICAL: one rd female contact; 1 in. sq x 1-1/8 in. lg o/a; cylindrical metal body; polystyrene insert; sq mtg flange w/four 0.125 in. dia holes 23/32 in. x 23/32 in. c to c; type UG-58A/U per JAN-C-71	Antenna connection		SF-0264	J404	1
J405	N17-C-73194-4231	CONNECTOR, RECEPTACLE, ELECTRICAL: 4 rd female contacts; polarized; straight type; 1-3/4 in. lg x 1½ in. w x 3/4 in. h; contact rated 10 amp; 500 v; rectangular phenolic base; rd aluminum body; anodized; mtd by four holes 0.189 in. dia 1.357 in. x 1-1/8 in. c to c; 4 solder lug term; term marked 68, 69, 70, 71; Caro type 7450S-2; CFT no. FRE21195-1	Power and audio input		SF-0262	J405	1
J406		Not used					
J407	N17-C-73108-5840	CONNECTOR, RECEPTACLE, ELECTRICAL: one female rd contact; straight; 1 in. sq x 0.957 in. lg; 4 mtg holes 0.125 in. dia 0.718 in. x 0.718 in. c to c; type UG-348A/U per BuShips dwg REB 49240	Antenna interunit connector		SF-0265	J407	1
J501	For replacement use SNSN N17-J-39652-5801	JACK, TELEPHONE: spring leaf contact; contact arrangement J-1, Ref Dwg Group 4; over-all dim., 1-3/8 in. lg x 25/32 in. dia; 2 conductors, 1/4 in. dia x 1-7/32 in. lg	Phone output	CBIM 2J-1355	SF-0266	J501	1
L101	N16-S-32841-1004	SHIELD, ANTENNA: coupling 90° elbow 3/16" OD x 0.025" wall seamless rd copper tubing; silver plated; bent on ¼" radius; one end flared to 9/32" dia; 1-2/64" lg to flared end, 15/16" lg to plain end	Antenna coupling		AG-4667	L101	1
L102	For reference only	INDUCTOR: (integral with C101A)	1st RF grid tank				
L103	For reference only	INDUCTOR: (integral with C101A)	1st RF grid tank trimmer				
L104	For reference only	INDUCTOR: (integral with C101B)	1st RF plate tank trimmer				

L105	For reference only	INDUCTOR: (integral with C101B)	1st RF plate tank			
L106	For reference only	INDUCTOR: (integral with C101C)	2nd RF grid tank			
L107	For reference only	INDUCTOR: (integral with C101C)	2nd RF grid tank trimmer			
L108	For reference only	INDUCTOR: (integral with C101D)	2nd RF plate tank trimmer			
L109	For reference only	INDUCTOR: (integral with C101D)	2nd RF plate tank			
L110	For reference only	INDUCTOR: (integral with C101E)	Mixer grid tank			
L111	For reference only	INDUCTOR: (integral with C101E)	Mixer grid tank trimmer			
L112	For reference only	INDUCTOR: (integral with C102D)	Tripler plate tank trimmer			
L113	For reference only	INDUCTOR: (integral with C102D)	Tripler plate tank			
L114	N16-C-76358-3376	COIL, RADIO FREQUENCY: 1 winding, single layer wound, 14 turns, no. 20 AWG bare tinned copper wire, tapped at 5-11/16 turns from mtg base; includes L114A; CNA part SB:2262; CFT dwg B1003799	Oscillator plate tank	LL-0053	L114	1
L114A	N16-C-600701-121	CORE, ADJUSTABLE TUNING: no. 6-32 cad plated brass stud imbedded in 0.309" dia x ½" lg cylinder of grey iron core material; 1-3/8" lg x 1/32" w x 1/64" deep; CFT dwg A1003750-2; p/o L114	L114 tuning adjust	QM-0004-2	L114A	1
L115	N17-T-82216-1516	TRANSFORMER, RADIO FREQUENCY: 40-70 mc frequency range; 2 space wound; single layer wound; one grid coil 6 turns of no. 20 AWG bare tinned soft copper wire tapped at 2-7/8 windings; plate 5-3/8 turns; adj powdered iron core; screwdriver adjustment; unshielded; 1-51/64" lg x 9/16" w x 1-1/16" h; two no. 4-40 mtg holes on ¾" c to c in base of flange; 3 solder lug term; CNA part SB:2259; CFT dwg B1003823; includes L115A	1st doubler RF transformer	LW-0100	L115	1
L115A	N16-C-600701-120	CORE, ADJUSTABLE TUNING: no. 6-32 cad plated brass stud in 0.309" dia x 3/8" lg cylinder of grey iron core material; 1¼" lg x 1/32" w x 1/64" deep slot in one end; 0.075" x 1/16" deep slot in other end; CFT dwg A1003750-1; p/o L115	L115 tuning adjust	QM-0004-1	L115A, L122A	2

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
L116	N16-C-72749-4693	COIL, RADIO FREQUENCY: choke; 1 winding; single layer wound; unshielded; 0.58 uh at 100 ma DC; 0.01 ohm DC resistance; 9 turns no. 20 wire tapped 5 turns from mtg end; 1-51/64" lg x 1-5/16" w x 9/16" h o/a; bakelite form; air core; two no. 4-40 thd mtg holes 3/4" c to c; 2 solder lug and one wire loop term ½" lg; CNA part SB:2260; CFT dwg B1003829	2nd doubler plate coil		LW-0101	L116	1
L117	N16-C-76515-7826	COIL, RADIO FREQUENCY: choke; 1 winding; single layer wound; unshielded; 0.09 uh at 25 and 50 mc, 100 ma DC, 0.007 ohm DC resistance; 3 turns no. 20 wire CT; 2-1/4" h x 1-1/16" wd x 9/16" deep o/a; bakelite form; adjustable brass core; screwdriver adjustment on bottom; two no. 4-40 thd mtg holes ¾" c to c; 2 solder lug term; CNA part SB:2261; CFT dwg B1003851; includes L117A	Tripler grid tank		LW-0102	L117	1
L117A	N16-C-600701-137	CORE, ADJUSTABLE TUNING: 5/16 in. dia x 1-3/8 in. lg brass rod turned to 0.309 in. dia for ½ in. from one end and no. 6-32 x 7/8 in. lg thd from other end; screwdriver slots in both ends; all silver plated; CFT dwg A1003852; p/o L117	L117 tuning adjust		QM-0005	L117A	1
L118	N16-C-71585-4777	COIL, RADIO FREQUENCY: 3-3/16 in. lg x 0.140 in. OD coax cable; 0.032 in. dia inner copper conductor; polyethylene dielectric; insulation stripped 5/16 in. from each end; CFT dwg FRB10087-1	Tripler mixer coupling line		JW-0705	L118	1
L119	N16-C-600701-118	CORE, ADJUSTABLE TUNING: 25/32 in. lg x 3/16 in. dia brass rod silver plated; w/ no. 10-32 x 13/32 in. lg thd on one end; remainder turned to 0.150 in. dia; 1/32 in. w x 1/16 in. deep screwdriver slot in thd end; no. 3-48 x 3/8 in. deep axial hole in other end; CFT dwg A1003746	Tripler mixer link stud		BG-1643	L119, L129 L119, L120, L121	3
L120		CORE, ADJUSTABLE TUNING: (same as L119)	Tripler mixer link stud				
L121		CORE, ADJUSTABLE TUNING: (same as L119)	Antenna coupling stud				
L122	N17-T-68163-6981	TRANSFORMER, INTERMEDIATE FREQUENCY: interstage; 18.6 mc; unshielded; 1-31/64 in. lg x 9/16 in. w x 1-1/16 in. h; bakelite coil form; powdered iron core; primary and secondary tuned by tuning slug; two no. 4-40 tapped mtg holes ¾ in. c to c; 4 solder lug term; CNA part SB:2255; CFT dwg B1003749; includes L122A	Mixer plate coil		LR-0034	L122	1

L122A		CORE, ADJUSTABLE TUNING: (same as L115A) p/o L122	L122 tuning adjust				
L123	N16-C-72793-6430	COIL, RADIO FREQUENCY: choke; single winding; single layer wound; 27 turns no. 30 sc enamel copper magnet wire; 1.2 uh; 0.133 ohm DC resistance; unshielded; 11/64 in. dia x 1/2 in. lg; 1½ in. lg axial wire leads at each end; CFT dwg FRA20493-1; p/o Z101	Heater cathode capacitor resonating		LC-0219	L123	1
L201		Not used					
L202		COIL, RADIO FREQUENCY: 3 uh ±5%; 0.255 ohm ±10% DC resistance; 45 turns no. 30 AWG single enamel copper magnet wire; close aound; unshielded; molded bakelite form; air core; 5/8 in. lg x 13/64 in. dia; 2 axial wire lead term; term mtg; CFT dwg FRA-511-1G	Output meter filter		LC-0224	L202, L203 L204, L205, L206	5
L203		COIL, RADIO FREQUENCY: (same as L202)	Output meter filter				
L204		COIL, RADIO FREQUENCY: (same as L202)	Phone output filter				
L205		COIL, RADIO FREQUENCY: (same as L202)	Phone output filter				
L206		COIL, RADIO FREQUENCY: (same as L202)	B+ filter				
L301	N16-R-29693-5271	REACTOR: filter choke; 12 h; hum-bucking tap at 11.4% of total 5700 turns of no. 31E wire; 145 ma; 320 ohms DC resistance; 1600 v RMS test; enclosed metal case; 2-11/16 in. lg x 2-9/16 in. w x 2-13/16 in. h; four no. 8-32 x 7/16 in. lg mtg studs 2 in. x 1-7/8 in. c to c; CNA part/dwg S160-1	Filter		LC-0221	L301	1
L401	N16-C-74458-4712	REACTOR: choke; 3 pie universal wound; 1 winding; unshielded; 1.26 mh p/m 10% at 1.5 amp DC; 1.12 ohms DC resistance; each pie wound w/ 70 turns total; 1-11/16 in. lg x 1½ in. dia; iron core; form 5/8 in. dia x 1-11/16 in. lg; 2 mtg feet each w/ one no. 6-32 thd mtg hole 15/16 in. c to c; 2 solder lug term; Q max impregnated	AC line filter		LC-0220	L401, L402	2
L402		REACTOR: (same as L401	AC line filter				
L403	N16-C-72730-3773	COIL, RADIO FREQUENCY: choke; 1 winding; single layer wound; unshielded; 0.339 uh at 10 and 20 mc at 2 amp DC; 0.013 ohm DC resistance; 7½ turns no. 22E wire; 1-3/8 in. lg x 3/8 in. dia; phenolic form and core; one no. 6-32 thd mtg hole in one end; 2 solder lug term; CFT dwg FRA2720-1	AC line filter		LC-0222	L403, L404, L407, L408	4
L404		COIL, RADIO FREQUENCY: (same as L403)	AC line filter				

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
L405	N16-C-74411-7351	REACTOR: filter choke; 1 section; 3 pie wound; 1.08 mh p/m 10% at 300 ma DC; 1.96 ohms DC resistance; 100 v RMS test; open frame; 3 pie w/ 70 turns no. 26 AWG DC wire each pie; 1-11/16 in. lg x 1 in. dia; 2 mtg feet each w/ no. 6-32 tapped holes 15/16 in. c to c; 2 solder lug term; Q max impregnated	Audio output filter		LC-0223	L405, L406	2
L406		REACTOR: (same as L405)	Audio output filter				
L407		COIL, RADIO FREQUENCY: (same as L403)	AC line filter				
L408		COIL, RADIO FREQUENCY: (same as L403)	AC line filter				
M501	N17-M-19255-1051	AMMETER: DC type; range 0 to 1.0 ma; rd, plastic flush mtd case; 2.21 in. max dia bbl, 1.60 in. d max behind fl; 2% accuracy for full scale reading; D'Arsonval movement; approx 105 ohms resistance; calibrated for nonmagnetic panel; 50 scale divisions, black numerals on white background; self contained; three mtg holes 0.125 in. dia spaced 120 deg apart on 1.22 in. rad; two stud term 0.69 in. lg x ¼-28 thd; type MR25W001DCMA per MIL-M-6A	Input meter		M-0045	M501	1
M502	N17-M-22724-6701	METER, AUDIO LEVEL: AC rect type; range −10 to 0 to +20 db; rd, plastic flush mtg case; 2.21 in. max dia bbl, 1.6 in. max d behind fl, 2.695 in. dia, rd fl; 5% accuracy for full scale reading; D'Arsonval movement; 0 level is 1.9 v; calibrated for nonmagnetic panel; 30 scale divisions, black numerals on white background; self contained; three mtg holes 0.125 in. dia spaced 120 deg apart on 1.22 in. rad; two stud term 0.69 in. lg x ¼-28 thd; for use across 600 ohm source, reference level 6 mw expanded scale, aluminum shield; CNA part/dwg H344-1; Navy Type No. CV-22427	Output meter		M-0046	M502	1
O101	N16-D-900151-109	DRIVE, CAPACITOR: c/o spur gear on shaft in sand-cast aluminum frame; gear 1.041 in. OD x 1 in. pitch dia; 48 diametrical pitch; 0.187 in. thk; 20 deg pressure angle; hub ss, bearing bronze; ss shaft ¼ in. dia x 1 in. lg; 3¼ in. lg x 1-1/32 in. w x 1-9/16 in. h o/a; three 0.189 in. dia mtg holes located in line 0.500 in. and 2.88 in. c to c; CNA part SB:2386; CFT dwg B1001156	Synchronizing		VG-2953	O101	1
O102	G3110-100-6208	BALL, BEARING: locking; spherical; 1/8 in. dia; type 440, grade 1; ss; CFT dwg A1000244	Inductance trimmer locking		BG-1650	O102	1

O103	N16-G-432816-277	GEAR, SPUR: split gear; spring-loaded non-backlash type; 13/32 in. thk incl hub; aluminum gear, 96 teeth; 48 diametrical pitch; 20 deg pressure angle; 2 in. pitch dia; two no. 6-32 radial set screw holes 90 deg apart; CNA part SB:2385; CFT dwg A1000553	Capacitor drive		VG-2952	O103, O104	2
O104		GEAR SPUR: (same as 0103)	Capacitor drive				
O105	N17-S-38251-1015	SHIELD, ELECTRICAL CONNECTOR: brass, silver plated; rectangular shape; 1 in. lg x 1 in. wd x 1/2 in. h; four no. 18 drill mtg holes 0.718 in. x 0.718 in. c to c; CFT dwg FRB9102-1	Shield for P101		AG-4655	O105, O204, O404	3
O201	N16-C-301129-741	CLAMP, ELECTRICAL: ss; one strap type fastening device; 2.275 in. dia w/strap open, 1.425 in. dia w/ strap closed; dim. 1-3/8 in. ID, 15/16 in. h; one mtg hole for no. 10 screw in mtg bracket; CFT dwg A1000640-3	Tube clamp	CAIS 926C-3	AG-4717	O201	1
O202	N16-M-60906-8018	RETAINER, CAPACITOR: "U" shaped spade bracket; 2-3/4 in. lg x 49/64 in. wd x 1-5/8 in. h; two no. 6-32 thd mtg studs 1-9/16 in. c to c; type CPO6SA6 per JAN-C-25	Capacitor mounting		AG-4719	O202, O301, O302	3
O203	Shop manufacture	CLIP, ELECTRICAL: beryllium copper, nickel plated; 1-3/32 in. lg x 5/16 in. w x 0.020 in. thk; 3/64 in. radius of form; two 0.136 in. drill mtg holes 5/16 in. c to c	Bristol key mounting		JC-0060	O203	1
O204		SHIELD, ELECTRICAL CONNECTOR: (same as 0105)	Shield for P201				
O301		RETAINER, CAPACITOR: (same as 0202)	Capacitor mtg				
O302		RETAINER, CAPACITOR: (same as 0202)	Capacitor mtg				
O303	N16-C-300799-482	CLAMP, ELECTRICAL: ss; one strap type fastening device; 2.5745 in. dia w/strap open; 1.775 in. dia w/ strap closed; 1.625 in. ID, 5/8 in. h; one mtg hole for no. 10 screw in mtg bracket; CFT dwg A1000640-2	Tube clamp for V301	CAIS 926H-4	AG-4721	O303	1
O304		Not used					
O305		Not used					
O306		Not used					
O307		Not used					
O308	G3110-155-9639	BALL, BEARING: single row radial; double shield; 1/4 in. bore, 3/4 in. OD, 9/32 in. w; 6 balls 5/32 in. dia; p/o BL301A	Front bearing for BL301	FAF S1K-DD	BG-1754	O308	1

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
O309	G3110-155-9601	BALL, BEARING: single row radial; double shield; 3/16 in. bore, 1/2 in. OD, 5 mm w; 7 balls 3/32 dia; p/o BL301A	Rear bearing for BL301	FAF 33KDD5	BG-1753	O309	1
O401	N17-S-250051-153	COVER, ELECTRICAL CONNECTOR: brass, silver plated; 3/4 in. lg x 1 in. wd x 1 in. h; four 0.125 in. dia mtg holes 23/32 in. x 23/32 in. c to c; JAN type UG-177/U	Shield for J404	CPH 83-765	AG-4366	O401, O402	2
O402		COVER, ELECTRICAL CONNECTOR: (same as 0401)	Shield for J404				
O403		Not used					
O404		SHIELD, ELECTRICAL CONNECTOR: (same as 0105)	Shield for J407				
O405	N17-C-781366-251	CLAMP, ELECTRICAL: AN type 3057-6 for 1/2 in. max material dia; 1-5/16 in. lg x 15/16 in. dia o/a; 3/4 in.-20 thd; CFT part 383050	u/w P401		SF-0268	O405, O406	2
O406		CLAMP, ELECTRICAL: (same as 0405)	u/w P402				
O501	Shop manufacture	COVER, TELEPHONE JACK: steel, cad plated, dull black enamel finish; 1-1/32 in. lg x 13/16 in. w x 5/16 in. thk; 0.386 in. dia hole in base for mtg on bushing of jack; CNA part/dwg S:163-1	Cover for J501		AG-4653	O501	1
O502	N16-D-46576-1623	DRIVE, DIAL: 1:20 speed reduction drive; w/automatic stop at completion of 19th revolution of dial; w/dial lock; 5-3/8 in. lg x 3 in. wd x 2-1/16 in. d; CFT part A1000513-11, dwg C1000514	Tuning drive for C101		VG-2936	O502	1
O503	N17-C-98378-2225	COUPLING, FLEXIBLE, ELECTRICAL: comprised of driven arm (O503A) w/ hub and a drive arm (O503B) w/ hub; arms each no. 14 (0.064 in.) B and S ga hard nickel plated brass strip	Coupling dial drive to preselector		VG-3049	O503	1
O503A	For reference only	COUPLING, ARM: ¼ in. ID x ½ in. OD hub staked to radial arm carrying drive pin; 1-25/32 in. lg x 9/16 in. w x 19/32 in. h; CNA part SB:2391; CFT dwg no. A1001685; p/o O503			VG-2945	O503A	1
O503B	For reference only	COUPLING, ARM: ¼ in. ID x ½ in. OD hub; staked to radial arm, slotted along center line to receive pin on drive arm; 1-13/16 in. lg x 9/16 in. w x 11/32 in. h; CFT dwg FRA21217-1; p/o O503			VG-2946	O503B	1

O504	N17-C-794001-133	CLEANER ELEMENT, AIR: cartridge type; aluminum screen wetted in oil; 3½ in. h x 4 in. w x ¾ in. thk; aluminum frame, mts in frame; CFT dwg B1002066	Dust filter	CBEN R82A	VG-3022	O504,O505	2
O505		CLEANER ELEMENT, AIR: (same as O504)	Dust filter				
P101	N17-C-73408-7081	CONNECTOR, RECEPTACLE, ELECTRICAL: coax; one rd male contact; 1 in. lg x 1 in. w x 0.958 in. h; JAN type UG-347A/U per BuShips dwg REB-49239	Antenna inter-unit connection		SM-0214	P101	1
P301	N17-C-73487-7175	CONNECTOR, RECEPTACLE, ELECTRICAL: four rd male contacts; polarized; straight type; 1¾ in. lg x 1½ in. w x 11/16 in. h; contacts rated 10 amp, 500 v; rectangular phenolic base; rd aluminum body; anodized; mtd by 4 holes 0.154 in. dia 1.375 in. x 1-1/8 in. c to c; CFT dwg A1003443	Power and audio input		SM-0215	P301	1
P302	N17-C-73470-2804	CONNECTOR, PLUG, ELECTRICAL: 4 contacts; 1 connector mating end; contact data, Ref Dwg Group 206, Section A, PART ONE A B C D E F G 4 ML 10 N/A NR NR 125 PART TWO H J K L N/A N/A N/A N/A low loss plastic; straight shape; over-all dim., excl term and cable clamp, 25/32 in. lg x 9/16 in. dia; locking type, bayonet latch type; w/ cable clamp; p/o BL301; c/o P302A and P302B	Blower motor connection		VG-2931	P302	1
P302A	For Reference only	CONNECTOR, PLUG, ELECTRICAL: plug portion of P302; over-all dim., ¾ in. lg x 11/16 in. dia; one end 3/8 - 24 thd for hood P302B; p/o P302		WIN M4P-LS	SM-0219	P302A	1
P302B	For reference only	SHIELD, ELECTRICAL CONNECTOR: over-all dim., incl cable clamp, 7/8 in. lg x 9/16 in. dia; p/o P302		WIN H10C	QP-0355	P302B	1
P401	N17-C-70328-1515	CONNECTOR, PLUG, ELECTRICAL: AN type 3106A-14S-7S; 3 rd female contacts; straight; metal body; incl cable clamp AN type 3057-6; 2-3/32 in. lg x 1-1/16 in. dia o/a incl clamp; 3/8 in. dia cable opening; CNA part/dwg Q676-1 (connector) and Q675-2 (clamp)	For AC power input cable		SF-0268	P401	1
P402		CONNECTOR, PLUG, ELECTRICAL: type AN-3106A-14S-2S; 4 rd female contacts; straight; metal body; incl cable clamp AN3057-6; 2-3/32 in. lg x 1-1/16 in. dia incl cable clamp; 3/8 in. dia cable opening; CNA part/dwg J138-1 (connector) and Q675-2 (clamp)	Audio output		SF-0269	P402	1

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
P403		Not used					
P404	N17-C-71412-8748	CONNECTOR, PLUG, ELECTRICAL: coax; one rd male contact; straight; metal body; 1-7/8 in. lg x 13/16 in. dia; type UG-21D/U per JAN-C-71	Antenna input		SM-0188	P404	1
R101	N16-R-50633-785	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 100,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2; A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF104K per MIL-R-11A	1st RF AGC filter		RC20GF104K	R101, R105, R115, R118, R121, R210, R245, R254, R262, R263, R264	11
R102	N16-R-50372-833	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 22,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF223K per MIL-R-11A; p/o Z104	1st RF screen dropping		RC20GF223K	R102, R103, R106, R107, R122, R123, R209	7
R103		RESISTOR, FIXED, COMPOSITION: (same as R102) p/o Z104	1st RF screen dropping				
R104	N16-R-50166-512	RESISTORS, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 5600 ohms ±10%; 2 w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.728 in., B - 0.336 in.; uninsulated; type RC42GF562K per MIL-R-11A	1st RF plate voltage dropping		RC42GF562K	R104, R108	2
R105		RESISTOR, FIXED, COMPOSITION: (same as R101)	2nd RF AGC				
R106		RESISTOR, FIXED, COMPOSITION: (same as R102) p/o Z105	2nd RF screen dropping				
R107		RESISTOR, FIXED, COMPOSITION: (same as R102) p/o Z105	2nd RF screen dropping				
R108		RESISTOR, FIXED, COMPOSITION: (same as R104)	2nd RF plate dropping				
R109	N16-R-50822-761	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 470,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF474K per MIL-R-11A	Mixer grid leak		RC20GF 474K	R109, R230, R236, R258	4
R110	N16-R-50479-440	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 47,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF473K per MIL-R-11A	Mixer plate dropping		RC-20GF 473K	R110, R227, R234, R235	4

R111	N16-R-49624-433	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 150 ohms ±5%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF151J per MIL-R-11A	Oscillator cathode	RC20GF151J	R111, R116	2
R112	N16-R-49238-818	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 10 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF100K per MIL-R11A; p/o Z101	Oscillator damping	RC20GF100K	R2 R112, R129 R266, R267, R268	5
R113	N16-R-50013-238	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 2,200 ohms ±10%; 1 w; resistance temp characteristic F; body dim. Ref Dwg Group 2, A - 0.760 in., B - 0.264 in.; uninsulated; type RC30GF222K per MIL-R-11A	Oscillator plate dropping	RC30GF222K	R113, R125	2
R114	N16-R-50336-815	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 15,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF153K per MIL-R-11A; p/o Z101	1st doubler grid leak	RC20GF153K	R114, R117, R222, R229, R248	5
R115		RESISTOR, FIXED, COMPOSITION: (same as R101) p/o Z101	1st doubler grid isolation			
R116		RESISTOR, FIXED, COMPOSITION: (same as R111) p/o Z101	1st doubler cathode resistor			
R117		RESISTOR, FIXED, COMPOSITION: (same as R114)	2nd doubler grid leak			
R118		RESISTOR, FIXED, COMPOSITION: (same as R101)	2nd doubler grid isolation			
R119	N16-R-49967-760	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1500 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF152K per MIL-R-11A	2nd doubler plate dropping	RC20GF152K	R119	1
R120	N16-R-50552-818	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 68,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim. , Ref Dwg 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF683K per MIL-R-11A	Tripler grid leak	RC20GF683K	R120, R224, R226, R240, R252, R253	6
R121		RESISTOR, FIXED, COMPOSITION: (same as R101)	Tripler grid isolation			
R122		RESISTOR, FIXED, COMPOSITION: (same as R102) p/o Z103	Tripler screen dropping			
R123		RESISTOR, FIXED, COMPOSITION: (same as R102) p/o Z103	Tripler screen dropping			

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
R124	N16-R-50067-233	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 3300 ohms ±10%; 1 w; resistance temp characteristic F; body dim., Ref Dwg 2, A - 0.760 in., B - 0.264 in.; uninsulated; type RC30GF332K per MIL-R-11A	Tripler plate dropping		RC30GF332K	R124	1
R125		RESISTOR, FIXED, COMPOSITION: (same as R113)	1st doubler plate resistor				
R126	N16-R-49769-799	RESISTOR, FIXED, COMPOSITION: body style no. 1r, Ref Dwg Group 2; 470 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF471K per MIL-R-11A; p/o Z104	1st RF screen dropping resistor		RC20GF471K	R126, R127	2
R127		RESISTOR, FIXED, COMPOSITION: (same as R126) p/o Z105	2nd RF screen decoupling				
R128	N16-R-49427-730	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 47 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF470K per MIL-R-11A	18.6 mc input termination		RC20GF470K	R128, R207	2
R129		RESISTOR, FIXED, COMPOSITION: (same as R112) p/o Z101	Parasitic suppressor				
R201	N16-R-50129-815	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 4700 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF472K per MIL-R-11A	1st IF AGC decoupling		RC20GF472K	R201, R206, R212, R213, R239, R261	6
R202		Not used					
R203		Not used					
R204		Not used					
R205	N16-R-50282-725	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 10,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF103K per MIL-R-11A	1st RF screen dropping		RC20GF103K	R205, R214, R243	3
R206		RESISTOR, FIXED, COMPOSITION: (same as R201)	1st IF plate dropping				
R207		RESISTOR, FIXED, COMPOSITION: (same as R128)	J201 load				
R208		Not used					

R209		RESISTOR, FIXED, COMPOSITION: (same as R102)	2nd osc grid leak			
R210		RESISTOR, FIXED, COMPOSITION: (same as R101)	J202 decoupling			
R211	N16-R-50012-816	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 2200 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A-0.416 in., B-0.161 in.; uninsulated; type RC20GF222K per MIL-R-11A	2nd mixer cathode resistor	RC20GF222K	R211, R215	2
R212		RESISTOR, FIXED, COMPOSITION: (same as R201)	2nd mixer plate decoupling			
R213		RESISTOR, FIXED, COMPOSITION: (same as R201)	2nd IF AGC decoupling			
R214		RESISTOR, FIXED, COMPOSITION: (same as R205)	2nd IF screen dropping			
R215		RESISTOR, FIXED, COMPOSITION: (same as R211)	Input meter divider			
R216	N16-R-49940-816	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1200 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF122K per MIL-R-11A	Input meter filter	RC20GF122K	R216, R217	2
R217		RESISTOR, FIXED, COMPOSITION: (same as R216)	Input meter filter			
R218	N16-R087519-4918	RESISTOR, VARIABLE: composition; 5000 ohms ±10%; 2 w nom power rating; no switch; type RV4ATSA502A per JAN-R-94	Input meter balancing	RV4ATSA 502A-A	R218	1
R219		Not used				
R220	N16-R-50066-816	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 3300 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.146 in., B - 0.161 in.; uninsulated; type RC20GF332K per MIL-R-11A	2nd RF plate decoupling	RC20GF332K	R220, R223	2
R221	N16-R-49661-818	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 220 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF221K per MIL-R-11A	3rd IF cathode resistor	RC20GF221K	R221	1
R222		RESISTOR, FIXED, COMPOSITION: (same as R115)	3rd IF screen dropping			
R223		RESISTOR, FIXED, COMPOSITION: (same as R220)	3rd IF plate decoupling			
R224		RESISTOR, FIXED, COMPOSITION: (same as R120)	Input meter divider			

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
R225	N16-R-49922-730	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF102K per MIL-R-11A	Input meter balancing		RC20GF102K	R225, R256	2
R226		RESISTOR, FIXED, COMPOSITION: (same as R120)	AF detector load				
R227		RESISTOR, FIXED, COMPOSITION: (same as R110)	AF detector load				
R228	N16-R-50975-725	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1 megohm ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF105K per MIL-R-11A	Noise limiter accelerating		RC20GF105K	R228, R231, R232, R250	4
R229		RESISTOR, FIXED, COMPOSITION: (same as R114)	AF detector cathode				
R230		RESISTOR, FIXED, COMPOSITION: (same as R109)	AGC amp grid leak				
R231		RESISTOR, FIXED, COMPOSITION: (same as R228)	Noise limiter diode cathode				
R232		RESISTOR, FIXED, COMPOSITION: (same as R228)	Noise limiter plate divider				
R233	N16-R088059-4360	RESISTOR, VARIABLE: composition element; 200,000 ohms ±10%; 2 w nom power rating; std A taper, Ref Dwg Group 3; slotted shaft, 1/4 in. dia x 1/2 in. lg; no switch	IF gain control		RP-204B-A	R233	1
R234		RESISTOR, FIXED, COMPOSITION: (same as R110)	T206 primary loading				
R235		RESISTOR, FIXED, COMPOSITION: (same as R110)	Audio filter				
R236		RESISTOR, FIXED, COMPOSITION: (same as R109)	Audio filter				
R237	N16-R-50894-813	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 680,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF684K per MIL-R-11A	Silencer diode decoupling		RC20GF 684K	R237	1
R238	N16-R-51038-818	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1.8 megohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF185K per MIL-R-11A	Silencer B+ divider		RC20GF 185K	R238	1
R239		RESISTOR, FIXED, COMPOSITION: (same as R201)	AGC amp screen dropping				

R240		RESISTOR, FIXED, COMPOSITION: (same as R120)	AGC diode load			
R241	N16-R-49580-766	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 100 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF101K per MIL-R-11A	B– divider	RC20GF101K	R241, R242	2
R242		RESISTOR, FIXED, COMPOSITION: (same as R241)	B– divider			
R243		RESISTOR, FIXED, COMPOSITION: (same as R205)	AGC diode load divider			
R244	N16-R-49365-488	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 33 ohms ±10%; 2 w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.728 in., B - 0.336 in.; uninsulated; type RC42GF330K per MIL-R-11A	B– bleeder	RC42GF330K	R244	1
R245		RESISTOR, FIXED, COMPOSITION: (same as R101)	AGC filter			
R246	N16-R-50759-818	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwf Group 2; 330,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF334K per MIL-R-11A	Silencer diode plate load	RC20GF334K	R246	1
R247	N16-R087749-4836	RESISTOR, VARIABLE: composition element; 25,000 ohms ±10%; 2 w nom power rating; std A taper, Ref Dwg Group 3; slotted shaft; 1/4 in. dia x 1/2 in. lg; no switch; type RV4ATSA253A per JAN-R-94	Silencer control	RV4ATSA 253A-A	R247	1
R248		RESISTOR, FIXED, COMPOSITION: (same as R114)	Silencer plate divider			
R249	N16-R-50417-823	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 33,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF333K per MIL-R-11A	Silencer plate divider	RC20GF333K	R249	1
R250		RESISTOR, FIXED, COMPOSITION: (same as R228)	1st AF grid AGC divider			
R251	N16-R-51020-818	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1.5 megohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF155K per MIL-R-11A	1st AF grid AGC divider	RC20GF155K	R251	1
R252		RESISTOR, FIXED, COMPOSITION: (same as R120)	Align input meter load			
R253		RESISTOR, FIXED, COMPOSITION: (same as R120)	1st AF amp plate load			

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAUL AND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
R254		RESISTOR, FIXED, COMPOSITION: (same as R101)	Audio filter				
R255		RESISTOR, VARIABLE: composition element; 500,000 ohms ±10%; 2 w nom power rating; std C taper, Ref Dwg Group 3; slotted shaft, 1/4 in. dia x 1/2 in. lg; no switch; type RV4ATSA504C per JAN-R-94	AF gain control		RV4ATS A504C-A	R255	1
R256		RESISTOR, FIXED, COMPOSITION: (same as R225)	2nd AF amp cathode resistor				
R257	N16-R-50678-818	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 150,000 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF154K per MIL-R-11A	2nd AF amp plate load		RC20GF 154K	R257, R306	2
R258		RESISTOR, FIXED, COMPOSITION: (same as R109)	AF output grid leak				
R259	N16-R-49706-761	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 330 ohms ±10%; ½ w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.416 in., B - 0.161 in.; uninsulated; type RC20GF331K per MIL-R-11A	AF output cathode resistor		RC20GF 331K	R259	1
R260		Not used					
R261		RESISTOR, FIXED, COMPOSITION: (same as R201)	AF feedback divider				
R262		RESISTOR, FIXED, COMPOSITION: (same as R101)	J203 decoupling				
R263		RESISTOR, FIXED, COMPOSITION: (same as R101)	J205 decoupling				
R264		RESISTOR, FIXED, COMPOSITION: (same as R101)	J204 decoupling				
R265	N16-R-49842-238	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 680 ohms ±10%; 1 w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.760 in., B - 0.264 in.; uninsulated; type RC30GF681K per MIL-R-11A	150 v filter		RC30GF 681K	R265	1
R266		RESISTOR, FIXED, COMPOSITION: (same as R112)	2nd mixer grid parasitic suppressor				
R267		RESISTOR, FIXED, COMPOSITION: (same as R112)	2nd IF grid parasitic suppressor				
R268		RESISTOR, FIXED, COMPOSITION: (same as R112)	3rd IF grid parasitic suppressor				

R301	N16-R-49320-493	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 22 ohms ±10%; 2 w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.728 in., B - 0.336 in.; uninsulated; type RC42GF220K per MIL-R-11A	B– bleeder	RC42GF220K	R301	1
R302	N16R-49923-533	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1000 ohms ±10%; 2 w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.728 in., B - 0.336 in.; uninsulated; type RC42GF102K per MIL-R-11A	Bleeder	RC42GF102K	R302, R303, R309	3
R303		RESISTOR, FIXED, COMPOSITION: (same as R302)	Bleeder			
R304		Not used				
R305		Not used				
R306		RESISTOR, FIXED, COMPOSITION: (same as R257)	Neon lamp series			
R307	N16-R-49941-511	RESISTOR, FIXED, COMPOSITION: body style no. 14, Ref Dwg Group 2; 1200 ohms ±10%; 2 w; resistance temp characteristic F; body dim., Ref Dwg Group 2, A - 0.728 in., B - 0.336 in.; uninsulated; type RC42GF122K per MIL-R-11A	Regulator series	RC42GF122K	R307, R308, R310	3
R308		RESISTOR, FIXED, COMPOSITION: (same as R307)	Regulator series			
R309		RESISTOR, FIXED, COMPOSITION: (same as R302)	Regulator series			
R310		RESISTOR, FIXED, COMPOSITION: (same as R307)	Regulator series			
R501	N16-R-89956-7015	RESISTOR, VARIABLE: wire wound element; 50 ohms ±10%; 2 w nom power rating; std A taper, Ref Dwg Group 3; case dim., Ref Dwg Group 3, B - 1-1/4 in. dia, C - 9/16 in. deep; rd shaft, 1/4 in. dia x 7/8 in. lg; no switch; type RA20A1RD500AK per JAN-R-19	Dial lamp dimmer	RA20A1RD 500AK	R501	1
R502		RESISTOR, VARIABLE: composition element; 1000 ohms ±10%; 2 w nom power rating; std C taper, Ref Dwg Group 3; slotted shaft 1/4 in. dia x 3/4 in. lg; no switch; type RV4ATSC102C per JAN-R-94	PHONES level control	RV4ATSC 102C-A	R502	1
S201	N17-S-71894-1544	SWITCH, TOGGLE: SPDT; electrical ratings per JAN spec; bat type handle; type ST42D per JAN-S-23	ALIGN REC:	X-0281	S201, S202, S501	3
S202		SWITCH, TOGGLE: (same as S201)	Noise limiter on-off			
S203	N17-S-59261-8262	SWITCH, ROTARY: 1 section; 2 positions, max number of witching positions possible; 5 contacts; no poles; rotor shorts and unshorts contacts; physical dim., 1-7/8 in. lg x 1-33/64 in. w x 1-1/16 in. thk; shaft 3/4 in. lg x 1/4 in. dia; CFT dwg FRE-20323-1	OSC. CRYSTAL MANUAL control	X-0314	S203	1

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
S301	N17-S-69903-9979	SWITCH, THERMOSTATIC: bimetal type; SPST normally open; close at 120 deg F ±4 deg F; 10 deg F operating differential; 10 amp 230 v; 2-3/8 in. lg x 1-5/8 in. w x 31/32 in. deep o/a; one 5/32 in. dia mtg hole 5/32 in. from each end on center line; 2 screw term; CFT dwg A1003446	Control for BL301	CSQ C4351-17	D-0095	S301	1
S501		SWITCH, TOGGLE: (same as S201)	Silencer IN-OUT				
S502	N17-S-72828-2605	SWITCH, TOGGLE: DPST; electrical ratings per JAN spec; bat type handle; type ST52K per JAN-S-23	POWER ON OFF		X-0280	S502	1
T201	N17-T-68163-6391	TRANSFORMER, INTERMEDIATE FREQUENCY: 18.6 mc peak frequency; interstage shielded 1-1/8 in. lg x 1-1/8 in. w x 2-31/32 in. h; turned secondary; powdered iron core; ceramic capacitor tuning and adjustable iron core; two 6-32 thd mtg studs 1.125 in. c to c; 4 solder lug term; CNA part/dwg SB:2213	1st IF input		LR-0035	T201	1
T202	N17-T-68163-6393	TRANSFORMER, INTERMEDIATE FREQUENCY: 18.6 mc; interstage; shielded; 1-1/8 in. lg x 1-1/8 in. w x 2-31/32 in. h; double tuned; powdered iron core; ceramic forms; tuned by two 100 uuf ceramic capacitors and adjustable iron cores; two 6-32 thd mtg studs; 1.125 in. c to c; 4 solder lug term; CNA part/dwg SB:2215	Interstage coupling		LR-0036	T202	1
T203	N16-C-76480-2514	TRANSFORMER, INTERMEDIATE FREQUENCY: 16.8250 mc peak frequency; oscillator; shielded; 1-1/8 in. lg x 1-1/8 in. w x 2-31/32 in. h; tuned w/ powdered iron core; ceramic form; ceramic capacitor tuning and adjustable iron core; two 6-32 thd mtg studs, 1.125 in. c to c; 4 solder lug term; CNA part/dwg SB:2217	2nd osc plate transformer		LR-0037	T203	1
T204	N17-T-67775-9755	TRANSFORMER, INTERMEDIATE FREQUENCY: 1.775 mc peak frequency; interstage; shielded; 1-1/8 in. lg x 1-1/8 in. w x 2-15/16 in. h; double tuned; ceramic form; tuned w/ two ceramic capacitors and adjustable iron cores; two 6-32 thd mtg studs, 1.125 in. c to c; 4 solder lug term; CNA part/dwg SB:2219	Interstage coupling		LR-0038	T204, T206, T208	3
T205	N17-T-67775-9761	TRANSFORMER, INTERMEDIATE FREQUENCY: 1.775 mc peak frequency; interstage; 1-1/8 in. lg x 1-1/8 in. w x 2-15/16 in. h; shielded; double tuned; powdered iron core; ceramic form; tuned with 2 ceramic capacitors and adjustable iron cores; two 6-32 thd mtg studs, 1.125 in. c to c; 4 solder lug term; CNA part/dwg SB:2221	Interstage coupling		LR-0039	T205, T207	2

T206		TRANSFORMER, INTERMEDIATE FREQUENCY: (same as T204)	Interstage coupling			
T207		TRANSFORMER, INTERMEDIATE FREQUENCY: (same as T205)	Interstage coupling			
T208		TRANSFORMER, INTERMEDIATE FREQUENCY: (same as T204)	Interstage coupling			
T209	N17-T-65494-3101	TRANSFORMER, AUDIO FREQUENCY: plate coupling type; primary 10,000 ohms; secondary 60 ohms ctr tapped; hermetically sealed case; 1-5/8 in. lg x 1-5/8 in. w x 2-1/2 in. h; 600 milliwatts at 1000 cycles max audio operating level; ±2 db 350 to 3500 cycles; 5 insulated solder term; two no. 6-32 thd mtg studs, 1.593 in. c to c; CNA part/dwg S158-1	AF output	LO-0140	T209	1
T210	N16-C-76520-2303	TRANSFORMER, INTERMEDIATE FREQUENCY: 1.775 mc peak frequency; AGC; shielded; 1-1/8 in. lg x 1-1/8 in. w x 2-15/16 in. h; powdered iron core; ceramic form tuned with one ceramic capacitor and adjustable iron core; two no. 6-32 thd mtg studs 1.125 in. c to c; 4 solder lug term; CNA part/dwg SB:2223	AGC amp plate	LR-0040	T210	1
T301	N17-TO74016-6329	TRANSFORMER, POWER, STEP-DOWN AND STEP-UP: hermetically sealed; metal case; primary windings 105/115/125 v, 50/60 cycle, single phase; secondary windings, #1, 5 v, 3 amp; #2, 6.3 v, 4.1 amp; #3, 470 v ctr tapped, 0.145 amp; #4, 6.3 v ctr tapped, 0.6 amp; 1200 v insulation; dim., Ref Dwg Group 12, H - 4½ in., L - 3-5/16 in., W - 2-13/16 in.; Grade 1, Class B, per MIL-T-27	Filament and plate power	LP-0246	T301	1
V101	N16-T-75654	ELECTRON TUBE: miniature pentode; type 5654/6AK5W per JAN-1A	1st RF amplifier	EG-5654/6AK5W	V101, V102, V103, V104, V108, V109, V201, V204, V205, V207	10
V102		ELECTRON TUBE: (same as V101)	1st RF amplifier			
V103		ELECTRON TUBE: (same as V101)	2nd RF amplifier			
V104		ELECTRON TUBE: (same as V101)	2nd RF amplifier			
V105	N16-T-75670	ELECTRON TUBE: twin triode; type 5670 per JAN-1A	Mixer	EG-5670	V105, V106, V107, V203, V209	5
V106		ELECTRON TUBE: (same as V105)	Osc. and 1st doubler			

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAUL AND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
V107		ELECTRON TUBE: (same as V105)	2nd doubler				
V108		ELECTRON TUBE: (same as V101)	Tripler				
V109		ELECTRON TUBE: (same as V101)	Tripler				
V201		ELECTRON TUBE: (same as V101)	1st IF amp				
V202		Not used					
V203		ELECTRON TUBE: (same as V105)	2nd osc and mixer				
V204		ELECTRON TUBE: (same as V101)	2nd IF amp				
V205		ELECTRON TUBE: (same as V101)	3rd IF amp				
V206	N16-T-75726	ELECTRON TUBE: miniature twin diode; type 5726 per JAN-1A	AF detector noise limiter diode		EG-5726/ 6AL5W	V206, V208	2
V207		ELECTRON TUBE: (same as V101)	AGC silencer amp				
V208		ELECTRON TUBE: (same as V206)	1st & 2nd IF amp				
		ELECTRON TUBE: (same as V105)					
V210	N16-T-56192-85	ELECTRON TUBE: miniature pentode amplifier; type 6AK6WA per JAN-1A	AF output		EG-6AK6	V210	1
V301	N16-T-75931	ELECTRON TUBE: full wave rectifier; type 5931 per JAN-1A	Rectifier		EG-5391	V301	1
V302	N16-T-52001-8	ELECTRON TUBE: miniature type voltage regulator; type OB2WA per JAN-1A	Voltage regulator		EG-OB2WA	V302	1
V303	N16-T-52001-3	ELECTRON TUBE: miniature type voltage regulator; type OA2WA per JAN-1A	Voltage regulator		EG-OA2WA	V303	1
XC237	N16-S-63462-8201	SOCKET, ELECTRON TUBE: octal; ceramic body; 1¼ in. dia x 7/8 in. h; ss mtg plate w/ two no. 6-32 tapped holes 1-5/8 in. c to c; CFT dwg A1000641	Receptacle for C237	CPH 49-816 (300)	ST-800AJ	XC237, XV301	2
XF201	N17-F-74267-5075	FUSEHOLDER: extractor post type; 280 v, 15 amp, max rating; accomodates 1 cartridge type fuse, ferrule term, dim. 1¼ in. lg x ¼ in. dia; over-all dim. 2-9/64 in. lg x 11/16 in. dia; 2 solder lug term	Holder for F201	CFA HKP	SF-0236	XF201, XF202	2

XF202		FUSEHOLDER: (same as XF201)	Holder for F202				
XI501	N17-L-51624-6963	LAMPHOLDER: for miniature bayonet base lamps; 1¼ in. lg x ½ in. w x 1 in. h; mts by no. 6-32 x 5/16 in. lg stud soldered to bracket; 2 solder lug term; CFT dwg FRE2891-1	Receptacle for I501	CAYZ 708	SL-0069	XI501, XI502	2
XI502		LAMPHOLDER: (same as XI501)	Receptacle for I502				
XI503	N17-L-76737-2361	LIGHT, INDICATOR: w/ clear ½ in. effective, 5/8 in. dia lens; for T-¾ miniature bayonet base bulb; brass shell, nickel plated end; 1¾ in. lg w/ lens 13/16 in. across flats; requires 11/16 in. dia mtg hole; 2 solder lug term; RSW	Receptacle for I503	CAYZ 95410-937	SL-0068	XI503	1
XI503A	For reference only	LIGHT, INDICATOR: w/o lens; for ½ in. effective dia lens; for T-3¼ miniature bayonet base bulb; brass shell, nickel plated end; 1-23/32 in. lg x 13/16 in. across flats; p/o XI503		CAYZ 94510-93 w/o lens	SL-0071	XI503A	1
XI503B	N17-L-250181-506	LENS, INDICATOR LIGHT: clear; 5/8 in. dia; hemispherical; plastic; unmounted; 9/16 in. - 27 thd x 3/16 in. lg; p/o XI503		CAYZ 95-937	SL-0072	XI503B	1
XV101	N16-S-62603-6700	SOCKET, ELECTRON TUBE: 7 contacts; miniature; ceramic body; 0.800 in. dia x 5/8 in. h; type TS102-C01 per JAN-S-28A	Receptacle for V101		ST-700Z	XV101, XV102, XV103, XV104, XV108, XV109, XV201, XV204, XV205, XV206, XV207, XV208, XV210, XV302, XV303	15
XV102		SOCKET, ELECTRON TUBE: (same as XV101) p/o Z104	Receptacle for V102				
XV103		SOCKET, ELECTRON TUBE: (same as XV101) p/o Z105	Receptacle for V103				
XV104		SOCKET, ELECTRON TUBE: (same as XV101) p/o Z105	Receptacle for V104				
XV105	N16-S-64063-6734	SOCKET, ELECTRON TUBE: 9 contacts beryllium copper, silver plated; miniature size; incl metal shield base 5/8 in. h x 0.940 in. dia; incl center shield 0.125 in. ID; ceramic body; 1-3/8 in. lg x 0.940 in. w x 25/32 in. h; one piece saddle mtg; two 0.125 in. dia mtg holes 1.125 in. c to c; same as type TS103C01 per JAN-S-28A except that centerline of mtg holes and of term 2 shall coincide; CFT dwg A1011240; p/o Z106	Socket for V105		ST-900H	XV105, XV107, XV203	3

SYMBOL DESIGNATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
XV106	N16-S-64063-6714	SOCKET, ELECTRON TUBE: 9 contacts; miniature; ceramic body; 0.940 in. dia x 5/8 in. h; type TS103-C01 per JAN-S-28A; p/o Z101	Receptacle for V106		ST-900B	XV106, XV209	2
XV107		SOCKET, ELECTRON TUBE: (same as XV105) p/o Z102	Receptacle for V107				
XV108		SOCKET, ELECTRON TUBE: (same as XV101) p/o Z103	Receptacle for V108				
XV109		SOCKET, ELECTRON TUBE: (same as XV101) p/o Z103	Receptacle for V109				
XV201		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V201				
XV202		Not used					
XV203		SOCKET, ELECTRON TUBE: (same as XV105)	Receptacle for V203				
XV204		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V204				
XV205		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V205				
XV206		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V206				
XV207		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V207				
XV208		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V208				
XV209		SOCKET, ELECTRON TUBE: (same as XV106)	Receptacle for V209				
XV210		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V210				
XV301		SOCKET, ELECTRON TUBE: (same as XC237)	Receptacle for V301				
XV302		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V302				
XV303		SOCKET, ELECTRON TUBE: (same as XV101)	Receptacle for V303				
XY201	Assemble from Component parts	HOLDER, QUARTZ CRYSTAL: c/o 2 each XY201A, 1 each XY201B, and 2 each XY201C	Receptacle for Y201 Receptacle for Y201				
XY201A	N17-C-804081-101	CLIP, ELECTRICAL: crystal clip; no. 28 (0.0126) B and S GA beryllium copper, nickel plated and silver plated; 13/16 in. lg x 0.248 in. w x 3/16 in. h; one 1/16 in. (0.062) drill hole 1/16 in. from one end and one no. 30 (0.128) drill hole 3/8 in. from other end; CFT dwg FRB11107-1	Y201 holder		AG-4713	XY201A	2

XY201B	N17-C-812323-101	CLIP, ELECTRICAL: "U" shaped; no. 30 (0.010) B and S GA beryllium copper, nickel plated; 0.406 in. lg x 9/16 in. w x 0.440 in. h; for grounding; CFT dwg FRB11109-1	Y201 grounding		AG-4714	XY201B	1
XY201C	N17-I-49498-7025	INSULATOR, BUSHING: natural mica filled molded phenolic type MTS-E3 per MIL-P-14B; 0.437 in. lg x ½ in. dia; one no. 30 (0.128) drill hole through center, one 0.250 in. w x 0.031 in. deep groove in center on top; CFT dwg FRP11108-1	Insulator for XY201		QP-0347	XY201C	2
XY202	N16-S-54287-5051	SOCKET, CRYSTAL: 2 contact holes for 0.050 in. dia pins 0.406 in. c to c; beryllium copper contact silver plated; oval shape; 55/64 in. lg x 3/8 in. w x 3/8 in. h; steatite body; one 0.125 in. dia mtg hole in center; CNA dwg S173-1	Receptacle for Y202	CEB 9006	SF-0259	XY202	1
Y201***	N16-C-97791-4891	CRYSTAL UNIT: QUARTZ: 5th mode AN type CR-24/U (NOT FURNISHED)	Oscillator control			Y201	1
Y202	N16-C-97791-4891	CRYSTAL UNIT, QUARTZ: one crystal plate; 16.8250 mc nominal frequency; HC-6U holder; oval shape; 1.031 in. lg x 0.750 in. w x 0.345 in. h; ±0.005% tolerance from −55° to 90°C; type CR-23/U per MIL-C-3098	2nd oscillator		JX-0065	Y202	1
Z101	Assembled from component parts	RECEIVER SUBASSEMBLY: c/o RF coil L123, capacitors C137, C155, C160, resistors R111, R112, R114, R115, R116, R129 and XV106; 2-15/32 in. lg x 1-3/8 in. w x 1½ in. h over-all; four open slots 0.130 in. w in ends for mtg screws 7/16 in. x 2-5/16 in. c to c; CNA part/dwg SB:2240	Oscillator and 1st RF doubler socket plate		VG-2979	Z101	1
Z102	Assembled from component parts	RECEIVER SUBASSEMBLY: c/o capacitor C157 and tube socket XV107; 2-7/32 in. lg x 13/16 in. w x 1¼ in. h; four open slots 0.130 in. w in ends 7/16 in. x 2-5/16 in. c to c; CNA part SB:2250; CFT dwg A1000440	2nd RF doubler socket plate		VG-2980	Z102	1
Z103	N16-T-98501-1004	RECEIVER SUBASSEMBLY: c/o capacitors C133, C134, C139, resistors R122, R123, sockets XV108, XV109; 2½ in. lg x 1¼ in. w x 3¼ in. h; four open slots (0.130 in. w) in ends for mtg screws 2-3/8 in. x 1 in. c to c; CNA part SB:2249; CFT dwg A1000416-1	RF tripler socket plate & shield		VG-2981	Z103	1
Z104	Assembled from component parts	RECEIVER SUBASSEMBLY: c/o capacitors C103, C105, C150, resistors R102, R103, R126, and tube sockets XV101, XV102; 2½ in. lg x 1¼ in. w x 2¼ in. h; four open mtg slots in ends 7/16 in. x 2-5/16 in. c to c; CNA part SB:2253; CFT dwg B1000376	1st RF amplifier socket plate		VG-2954	Z104	1

*** Standard Navy Stock Number Assigned by Frequency.

SYMBOL DESIG-NATION	STANDARD NAVY STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	RAULAND-BORG PART AND DWG. NO.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
Z105	Assembled from component parts	RECEIVER SUBASSEMBLY: c/o capacitors C106, C107, C152, resistors R106, R107, R127, tube sockets XV103, XV104; 2½ in. lg x 1¼ in. w x 2¼ in. h; four open mtg slots in ends 7/16 in. x 2-5/16 in. c to c; same as Z104 except for stamping; CNA part SB:2253-2	2nd RF amplifier socket plate		VG-2955	Z105	1
Z106	Assembled from component parts	RECEIVER SUBASSEMBLY: c/o capacitors C153, C119, and socket XV105; 2½ in. lg x 1-1/8 in. w x 1-1/8 in. h; four open mtg slots in ends 11/16 in. x 2-5/16 in. c to c; CNA part SB:2247; CFT dwg A1000418	Mixer socket plate		VG-2956	Z106	1
Z107	N16-S-39230-4329	AMPLIFIER-CONVERTER: frequency range 225—400 mc; incl RF amplifier stage (Z107A) and oscillator-multiplier stage (Z107B); rectangular metal box 11-3/4 in. lg x 4-7/8 in. w x 6 in. h; CNA part/dwg SB:2251	Preselector assembly		VG-2929	Z107	1
Z107A	For reference only	AMPLIFIER-CONVERTER: p/o Z107			VG-2950		
Z107B	For reference only	AMPLIFIER-CONVERTER: p/o Z107			VG-2951		

TABLE 8–3.

MAINTENANCE PARTS KIT

KEY DESIGNATION	QUANTITY
C105	5
C116	1
C118	2
C161	1
C201	2
C401	2
E110	2
L301	1
T201	1
T202	1
T204	1
T205	1
T209	1
T301	1
Y202	1

TABLE 8–4. CROSS REFERENCE PARTS LIST

JAN DESIGNATION	KEY SYMBOL
CB11PX330K	C103
CC21CJ030C	C210
CC21CK010C	C108
CC21CK1R5C	C110
CC21SH050C	C126
CC21SH150K	C121
CC21UJ470J	C129
CC26SL101K	C224
CE52C700M	C237
CM20B221K	C220
CM20B471K	C208
CM20C151J	C117
CM20D201J	C159
CM35B103K	C213
CM35B152K	C234
CM35B472K	C227
CP06SA6	O202
CP61B1EF105V	C302
CP61B6EF504X	C228
CR-23/U	Y202
CR-24/U	Y201
JAN-0A2WA	V303
JAN-0B2WA	V302
JAN-6AK6WA	V210
JAN-5654/6AK5W	V101
JAN-5670	V105
JAN-5726	V206
JAN-5931	V301
MR25W001DCMA	M501
RA20A1RD500AK	R501
RC20GF100K	R112
RC20GF101K	R241
RC20GF102K	R225
RC20GF103K	R205
RC20GF104K	R101
RC20GF105K	R228
RC20GF122K	R216
RC20GF151J	R111
RC20GF152K	R119
RC20GF153K	R114
RC20GF154K	R257
RC20GF155K	R251
RC20GF185K	R238
RC20GF221K	R221
RC20GF222K	R211
RC20GF223K	R102
RC20GF331K	R259
RC20GF332K	R220
RC20GF333K	R249
RC20GF334K	R246
RC20GF470K	R128

JAN DESIGNATION	KEY SYMBOL
RC20GF471K	R126
RC20GF472K	R201
RC20GF473K	R110
RC20GF474K	R109
RC20GF683K	R120
RC20GF684K	R237
RC30GF222K	R113
RC30GF332K	R124
RC30GF681K	R265
RC42GF102K	R302
RC42GF122K	R307
RC42GF220K	R301
RC42GF330K	R244
RC42GF562K	R104
RV4ATSA253A	R247
RV4ATSA502A	R218
RV4ATSA504C	R255
RV4ATSC102C	R502
ST42D	S201
ST52K	S502
TS102CO1	XV101
TS102UO1	E218
TS102UO2	E227
TS102UO3	E304
TS103CO1	XV106
TS103UO1	E105
UG-21D/U	P404
UG-58A/U	J404
UG-177/U	O401
UG-347A/U	P101
AN 3102A-14S-2P	J402
AN 3102A-14S-7P	J401

STANDARD NAVY STOCK NO.	KEY SYMBOL
G-3110-100-6208	O102
G-3110-155-9601	O309
G-3110-155-9639	O308
G-5920-280-4466	F201
G-6240-155-8706	I501
G-6240-223-9100	I503
N16-C-15368-5888	C108
N16-C-15400-5867	C110
N16-C-15528-5533	C210
N16-C-15625-4061	C126
N16-C-15923-1462	C161
N16-C-15997-5682	C121
N16-C-16051-3074	C118
N16-C-16533-1248	C129
N16-C-17085-7060	C224
N16-C-18657-8640	C116

STANDARD NAVY STOCK NO.	KEY SYMBOL
N16-C-18659-4509	C105
N16-C-19073-8581	C205
N16-C-19239-6981	C201
N16-C-19892-7801	C301
N16-C-22137-2611	C237
N16-C-27186-4675	C103
N16-C-28975-1601	C117
N16-C-29265-3006	C159
N16-C-29375-8076	C220
N16-C-29660-8801	C119
N16-C-30167-1867	C133
N16-C-30167-1876	C153
N16-C-31090-3800	C403
N16-C-33622-5222	C213
N16-C-46371-9609	C401
N16-C-71585-4777	L118
N16-C-72730-3773	L403
N16-C-72749-4693	L116
N16-C-72793-6430	L123
N16-C-72909-4533	L202
N16-C-74411-7351	L405
N16-C-74458-4712	L401
N16-C-76358-3376	L114
N16-C-76480-2514	T203
N16-C-76515-7826	L117
N16-C-76520-2303	T210
N16-C-97791-4891	Y202
N16-C-300799-482	O303
N16-C-301129-741	O201
N16-C-600701-118	L119
N16-C-600701-120	L115A
N16-C-600701-121	L114A
N16-C-600701-137	L117A
N16-D-46576-1623	O502
N16-D-900151-109	O101
N16-G-432816-277	O103
N16-K-700266-740	E502
N16-K-700277-350	E503
N16-K-700310-977	E212
N16-K-700344-505	E501
N16-M-60906-8018	O202
N16-R-29693-5271	L301
N16-R-49238-818	R112
N16-R-49320-493	R301
N16-R-49365-488	R244
N16-R-49427-730	R128
N16-R-49580-766	R241
N16-R-49624-433	R111
N16-R-49661-818	R221
N16-R-49706-761	R259
N16-R-49769-799	R126

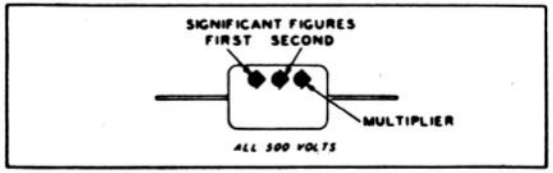
STANDARD NAVY STOCK NO.	KEY SYMBOL
N16-R-49842-238	R265
N16-R-49922-730	R225
N16-R-49923-533	R302
N16-R-49940-816	R216
N16-R-49941-511	R307
N16-R-49967-760	R119
N16-R-50012-816	R211
N16-R-50013-238	R113
N16-R-50066-816	R220
N16-R-50067-233	R124
N16-R-50129-815	R201
N16-R-50166-512	R104
N16-R-50282-725	R205
N16-R-50336-815	R114
N16-R-50372-833	R102
N16-R-50417-823	R249
N16-R-50479-440	R110
N16-R-50552-818	R120
N16-R-50633-785	R101
N16-R-50678-818	R257
N16-R-50759-818	R246
N16-R-50822-761	R109
N16-R-50894-813	R237
N16-R-50975-725	R228
N16-R-51020-818	R251
N16-R-51038-818	R238
N16-R087519-4918	R218
N16-R087749-4836	R247
N16-R-89956-7015	R501
N16-S-32841-1004	L101
N16-S-34518-5501	E101
N16-S-34520-3862	E218
N16-S-34532-8760	E105
N16-S-34557-8351	E227
N16-S-34607-6039	E304
N16-S-39230-4329	Z107
N16-S-54287-5051	XY-202
N16-S-62603-6700	XV101
N16-S-63462-8201	XC237
N16-S-64063-6714	XV106
N16-S-64063-6734	XV105
N16-T-52001-3	V303
N16-T-52001-8	V302
N16-T-56192-85	V210
N16-T-75654	V101
N16-T-75670	V105
N16-T-75726	V206
N16-T-75931	V301
N16-T-98077-2726	C102
N16-T-98077-2751	C101

STANDARD NAVY STOCK NO.	KEY SYMBOL
N16-T-98501-1004	Z103
N16-T-751468-732	H201
N17-B-21189-6949	BL301
N17-B-86841-9336	E110
N17-C-70328-1515	P401
N17-C-70334-5473	P402
N17-C-71412-8748	P404
N17-C-72604-1522	J401
N17-C-72610-5434	J402
N17-C-73108-2878	J101
N17-C-73108-5840	J407
N17-C-73108-5906	J404
N17-C-73194-4231	J405
N17-C-73408-7081	P101
N17-C-73470-2804	P302
N17-C-73487-7175	P301
N17-C073498-5937	J301
N17-C-77415-7611	E505
N17-C-77417-8070	E507
N17-C-98378-2225	O503
N17-C-781366-251	O405
N17-C-794001-133	O504
N17-C-804081-101	XY201A
N17-C-812323-101	XY201B
N17-F-74267-5075	XF201
N17-I-49498-7025	XY-201C
N17-L-51624-6963	XI501
N17-L-63201-6626	H203
N17-L-76737-2361	XI503
N17-L-250181-506	XI503B
N17-M-19255-1051	M501
N17-M-22724-6701	M502
N17-M054310-6251	BL301A
N17-M-75387-1823	A501
N17-S-38251-1015	O105
N17-S-59261-8262	S203
N17-S-69903-9979	S301
N17-S-71894-1544	S201
N17-S-72828-2605	S502
N17-S-250051-153	O401
N17-T-28244-4401	E213
N17-T-65494-3101	T209
N17-T-67775-9755	T204
N17-T-67775-9761	T205
N17-T-68163-6391	T201
N17-T-68163-6393	T202
N17-T-68163-6981	L122
N17-T074016-6329	T301
N17-T-82216-1516	L115

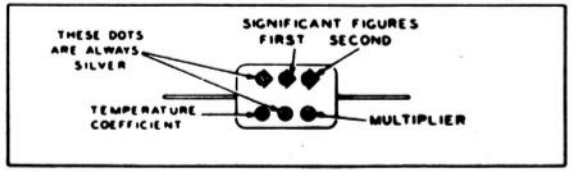
TABLE 8-5. APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

CAPACITOR COLOR CODES

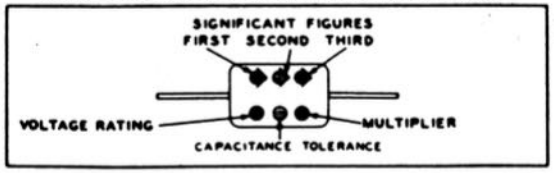
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



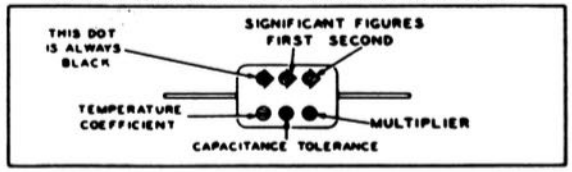
JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



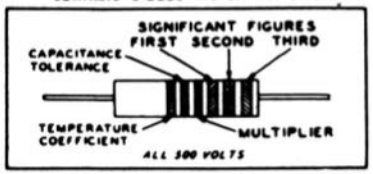
RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

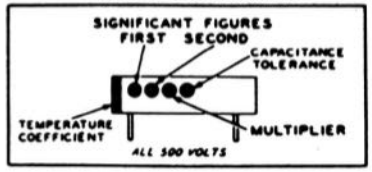


RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS

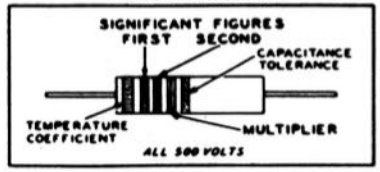


JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS

RADIAL TYPE NON-INSULATED



AXIAL TYPE INSULATED



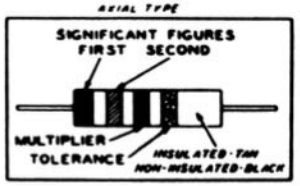
RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY

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	

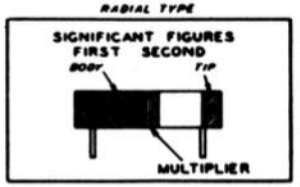
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE

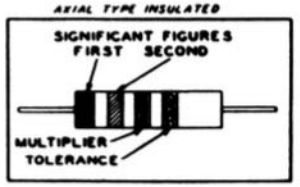


RADIAL TYPE



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE INSULATED



RADIAL TYPE NON-INSULATED

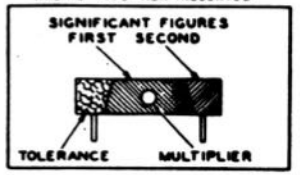


TABLE 8-6. LIST OF MANUFACTURERS

PREFIX	NAME	ADDRESS
AIRM	Air-Marine Motors, Inc.	Amityville, N.Y.
CAIS	The Birtcher Corp.	5087 Huntington Drive, Los Angeles 32, Calif.
CARO	Industrial Products Co.	Brookfield St., Danbury, Conn.
CASU	Electrical Reactance Corp.	Franklinville, N.Y.
CAXO	Shakeproof, Inc.	2573 N. Keeler Ave., Chicago, Ill.
CAYU	The Barry Corp.	700 Pleasant St., Watertown 72, Mass.
CAYZ	Dial Light Co. of America, Inc.	900 Broadway, New York 3, N.Y.
CBEN	Air-Maze Corp.	5200 Harvard Ave., Cleveland, Ohio
CBIM	Switchcraft Co.	1328 N. Halsted St., Chicago, Ill.
CER	Erie Resistor Corp.	644 W. 12th St., Erie, Pa.
CFA	Bussman Mfg. Co.	2538 W. University St., St. Louis, Mo.
CFT	Federal Telephone and Radio Corp.	100 Kingsland Rd., Clifton, N.J.
CG	General Electric Co.	1 River Road, Schenectady 5, N.Y.
CNA	National Co.	Malden, Mass.
CPH	American Phenolic Corp.	1830 S. 54th Ave., Chicago, Ill.
CSF	Sprague Specialties Corp.	North Adams, Mass.
CSQ	Spencer Thermostat Div., Metals and Controls Corp.	34 Forest St., Attleboro, Mass.
FAF	Fafnir Bearing Co.	39 Booth St., New Britain, Conn.
RAQA	Rauland-Borg Corp.	3515 W. Addison, Chicago, Ill.
TOR	The Torrington Manufacturing Co.	Torrington, Conn.
WIN	Winchester Electronics, Inc.	Glenbrook, Conn.

INDEX