NAVSHIPS 91535

INSTRUCTION BOOK

for

RADIO RECEIVING SET AN/URR-13A

CONSISTING OF

RADIO RECEIVER R-266A/URR-13
AND ACCESSORIES

Prime Contractor

FEDERAL TELEPHONE AND RADIO CORPORATION
CLIFTON, N.J., U.S.A.

Subcontractor

THE NATIONAL COMPANY
MALDEN, MASS., U.S.A.

BUREAU OF SHIPS NAVY DEPARTMENT

Contracts: NObsr-52051
NObsr-52304
NObsr-57235

Approved by BuShips:
11 *September* 1951

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Original	4-0 to 4-2	Original
A-C	Original	5-1 to 5-3	Original
i to vii	Original	6-0 to 6-3	Original
1-0 to 1-13	Original	7-0 to 7-40	Original
2-0 to 2-19	Original	8-1 to 8-52	Original
3-0 to 3-13	Original	i-1 to i-6	Original

THIS BOOK IS APPLICABLE TO THE FOLLOWING UNITS OF RADIO RECEIVING SET AN/URR-13A

CONTRACT	SERIAL NOS.	MANUFACTURER	CONTRACTUAL STATUS
NObsr-52051	1-756	Federal Telephone & Radio Corp., 100 Kingsland Road, Clifton, N. J.	Sole Contractor
NObsr-52304	757-2313	Federal Telephone & Radio Corp., 100 Kingsland Road, Clifton, N. J.	Prime Contractor
NObsr-52304	2314-3869	The National Company, 61 Sherman Ave., Malden, Mass.	Subcontractor

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

IN REPLY REFER TO
Code 993-100
11 September 1951

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

Subj: Instruction Book for AN/URR-13A
NAVSHIPS 91535

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

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 When superseded by a later edition, this publication shall be destroyed.

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

4. All Navy requests for NAVSHIPS Electronics publications should be directed to the nearest District Publications and Printing Office. When changes or revised books are distributed, notice will be included in the BUSHIPS ELECTRON and in the INDEX OF BUSHIPS PUBLICATIONS, NAVSHIPS 250-020.

H. N. WALLIN
Chief of Bureau

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION
T-1	19 DEC 1959	Thomas L. McNamara Jr. ETR3
T-3	19 DEC 1959	Same as T-6, exactly T.L. McNamara Jr. ETR3
T-4	19 DEC 1959	Thomas L. McNamara Jr. ETR3
T-5	19 DEC 1959	Thomas L. McNamara Jr. ETR3
T-6	19 DEC 1959	Thomas L. McNamara Jr. ETR3

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF ILLUSTRATIONS

SECTION 1—GENERAL DESCRIPTION

SECTION 2—THEORY OF OPERATION

SECTION 3—INSTALLATION AND INITIAL ADJUSTMENTS

LIST OF ILLUSTRATIONS (Cont'd)

SECTION 4—OPERATION

SECTION 5—OPERATOR'S MAINTENANCE

SECTION 6—PREVENTIVE MAINTENANCE

SECTION 7—CORRECTIVE MAINTENANCE

LIST OF TABLES

SECTION 1—GENERAL DESCRIPTION

SECTION 3—INSTALLATION AND INITIAL ADJUSTMENTS

LIST OF TABLES

CONTRACTUAL GUARANTEE

Applicable to Radio Receiving Set AN/URR-13A, supplied under BuShips Contracts NObsr-52051 dated 24 Oct 1950, and NObsr-52304 dated 12 March 1951.

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

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

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

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

INSTALLATION RECORD

Contract Number: NObsr-52051	Date of Contract: 24 Oct., 1950
Contract Number: NObsr-52304	Date of Contract: 12 March, 1951

Serial Number of Equipment ....

Date of Acceptance by the Navy ....

Date of Delivery to Contract Destination ....

Date of Completion of Installation ....

Date Placed in Service ....

Blank spaces in this book shall be filled in at time of installation.

REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made to the Bureau of Ships in accordance with current regulations using form NAVSHIPS NBS-383 (revised). The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the "Bureau of Ships Manual", or superseding instructions.

ORDERING PARTS

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

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

If the appropriate standard Navy stock number is not available, the following shall be specified.

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

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of Bureau of Ships Manual or superseding instructions on the subject of "Radio-Safety Precautions To Be Observed."

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

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

KEEP AWAY FROM LIVE CIRCUITS.

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

DON'T SERVICE OR ADJUST ALONE.

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

DON'T TAMPER WITH INTERLOCKS.

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

RESUSCITATION

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

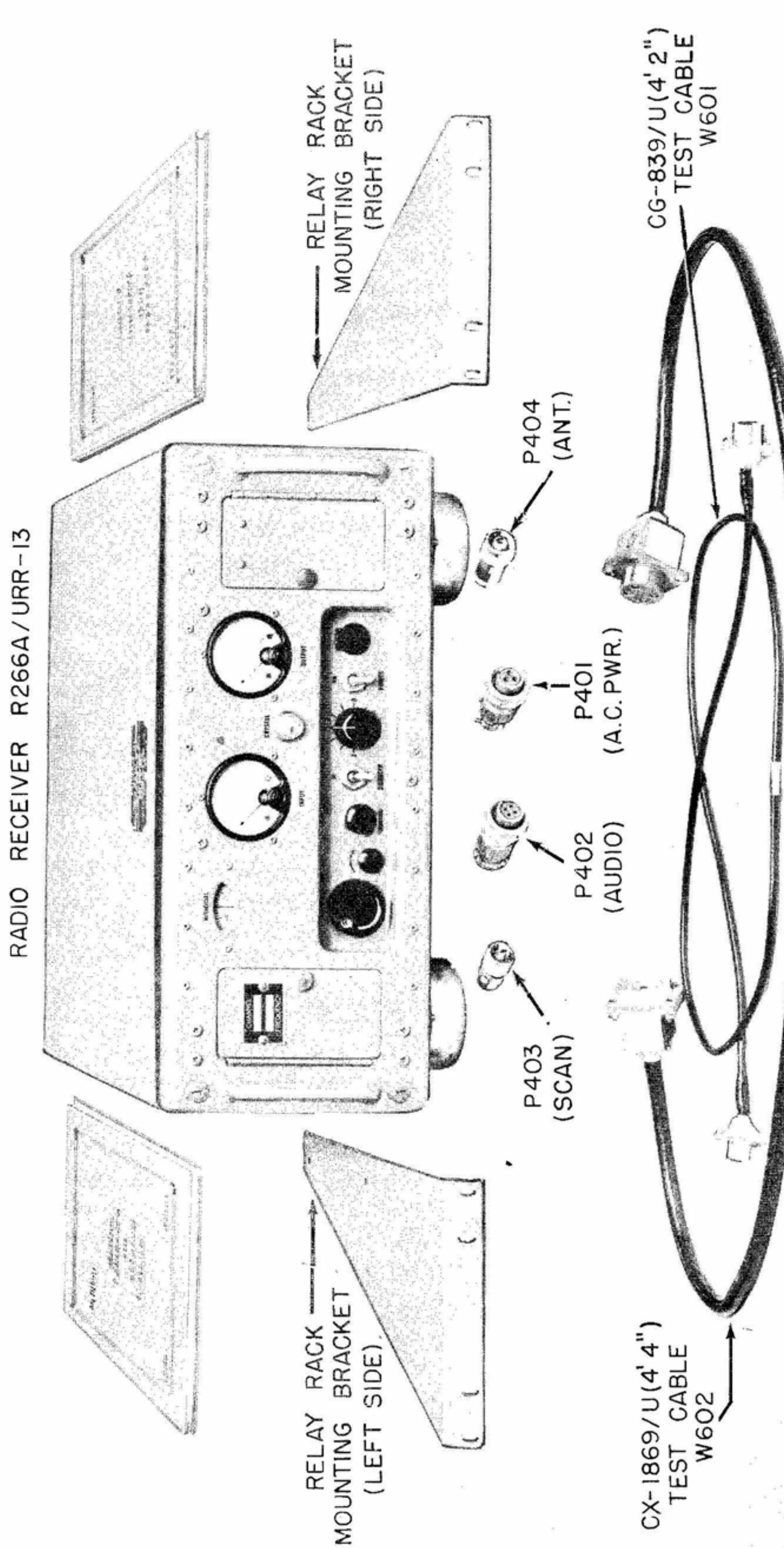


Figure 1—1. Radio Receiving Set AN/URR-13A Complete, Including Radio Receiver R-266A/URR-13, Brackets, Plugs, Test Cables, and Instruction Books

SECTION 1
GENERAL DESCRIPTION

1. INTRODUCTION.

This instruction book describes the circuit theory, installation, operation and maintenance of Radio Receiving Set AN/URR-13A.

2. DESCRIPTION.

a. PURPOSE. — Radio Receiving Set AN/URR-13A is designed to provide means for reception of amplitude modulated (AM) voice and MCW transmission in the 225-400 megacycle frequency range. The receiver may be used on Naval vessels, at Naval air and shore radio stations or at other units of the military establishment.

b. BASIC PRINCIPLES OF OPERATION. — Radio Receiving Set AN/URR-13A is a VHF/UHF superheterodyne type of receiving equipment, designed primarily for operation as a pretuned, single-channel, crystal-controlled receiver. By employing a suitable crystal any channel within the frequency range of the receiver may be selected. Provisions are also made for continuously variable manual tuning. A single tuning control is employed for tuning to any frequency for either crystal-controlled or manual tuning operation. Either one of these two methods of operation may be selected by means of the panel-mounted CRYSTAL-MANUAL switch.

Provisions are made for connecting a panoramic type radio receiver, to provide a visual picture of the received signal. The scanning channel has a band width of 600 kc, flat to within 6 db.

The receiver has a sensitivity of better than 8 microvolts for a 10-db signal-to-noise ratio. An intermediate frequency of 18.6 megacycles is employed. The balanced push-pull circuit arrangement of the r-f amplifier and oscillator-multiplier circuits provides for stable operation and freedom from spurious radiation from the receiver antenna.

All power necessary for operation of the equipment is obtained from a built-in power supply which can be adjusted to operate from a 110-, a 115- or a 120-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-13A is shown complete in figure 1–1. It consists of the receiver proper (Radio Receiver R-266A/URR-13), a pair of auxiliary angle brackets for relay rack mounting, four plugs mating with receptacles on the receiver for use on cords to external connections, two test cables and two copies of the instruction book. The receiver proper consists of a panel, frame and chassis assembly housed in a cabinet fitted with shock mounts. The equipment may be mounted on a bench or other firm horizontal surface, or (by attaching brackets) on a standard 19-inch relay rack.

The circuit components are grouped, on a functional basis, into five major sections, namely: the preselector, IF/AF, power supply, cable filtering and front panel 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 cable filtering section (Band Suppression Filter F-89/URR-13) 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 together 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 on the front panel. The crystal, the fuses and those controls which require only periodic change for operational adjustment are in panel compartments accessible through hinged doors. The locations of the panel-mounted controls are shown in figure 4–1. Trimmer adjustment controls are readily accessible when the chassis assembly is removed from the cabinet. Trimmer adjustments in the r-f amplifier and oscillator-multiplier sections are accessible through holes located in the casting walls and in the top cover shields of the preselector unit. Trimmer adjustments for circuits in the i-f section are located at the top (accessible through holes in the shields) and bottom of the i-f transformer assemblies. Cable connections to and from the receiver are made to connectors on the underside of the cable filtering section attached to the rear of the cabinet. A phone jack is available on the front panel.

The equipment is supplied with full complement of tubes and fuses installed. The tube complement is summarized in table 1–4.

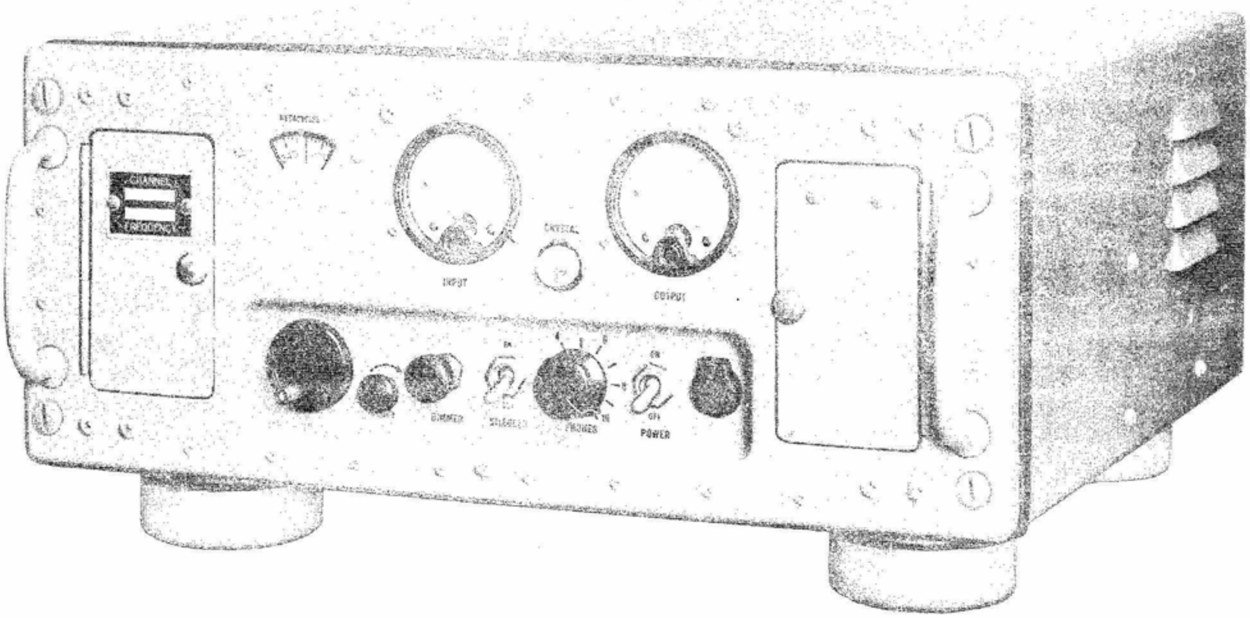


Figure 1—2. Front View, Shock Mounts Attached, Relay Rack Mounting Brackets Removed

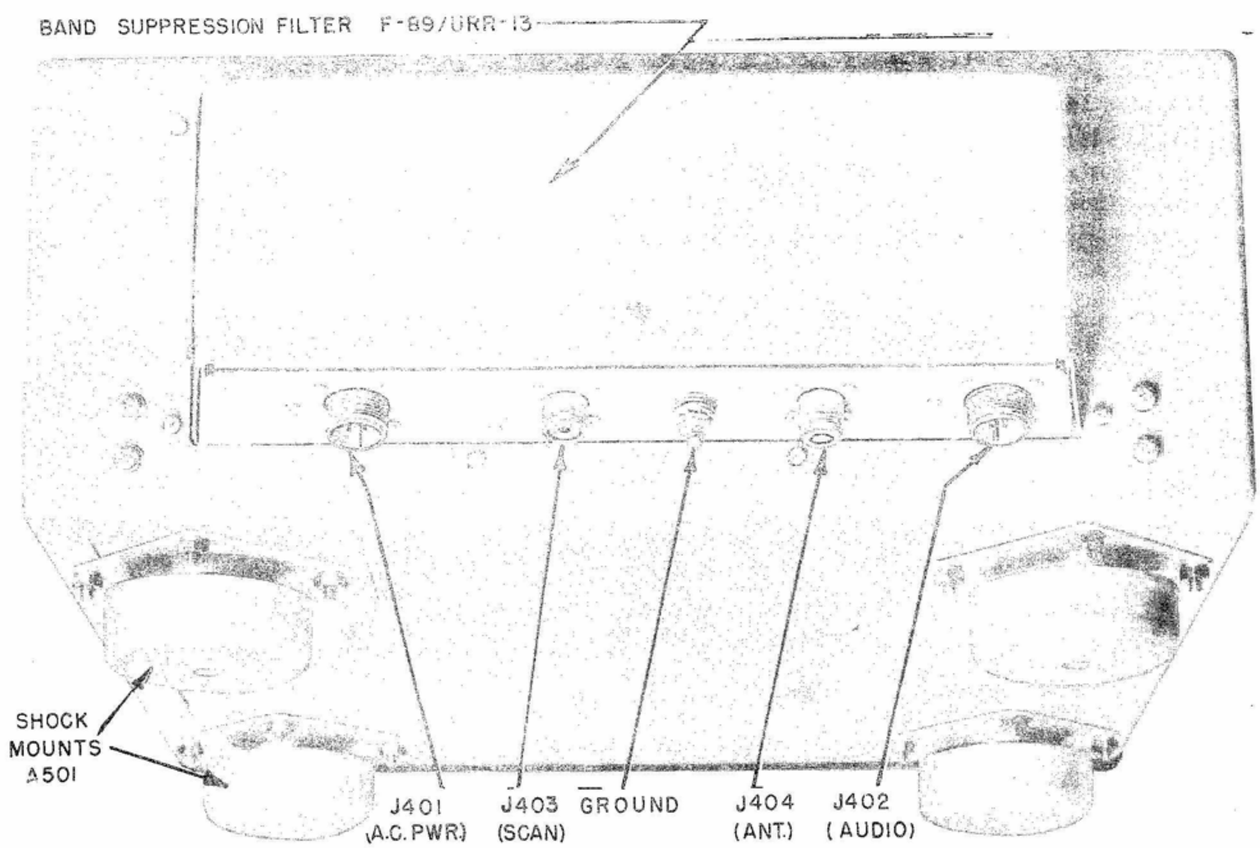


Figure 1—3. Rear View (from below) Showing A.C. POWER, SCAN, ANT and AUDIO Connectors on Underside of Band Suppression Filter F-89/URR-13

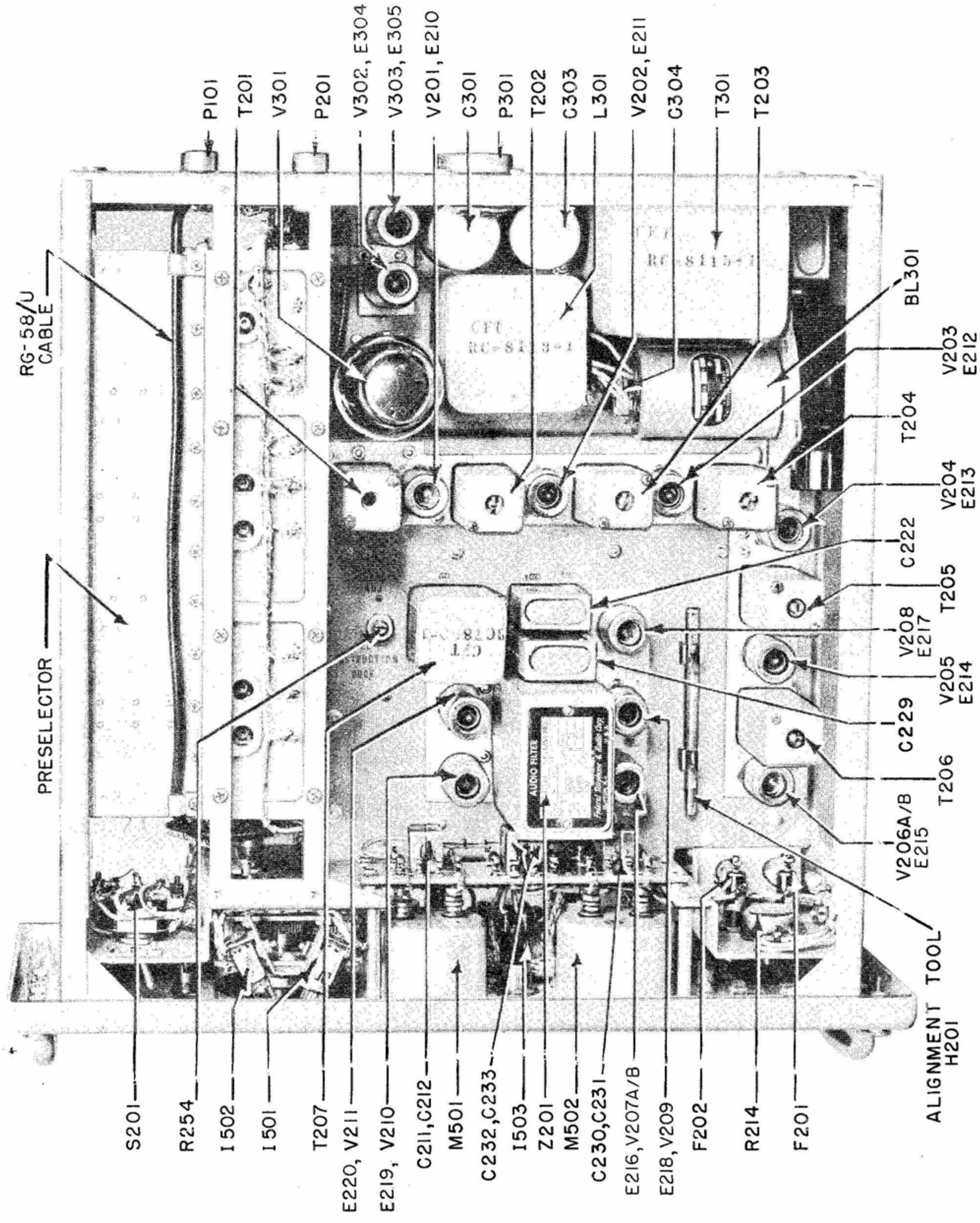


Figure 1—4. Top View of Chassis, Protective shield on preselector removed.

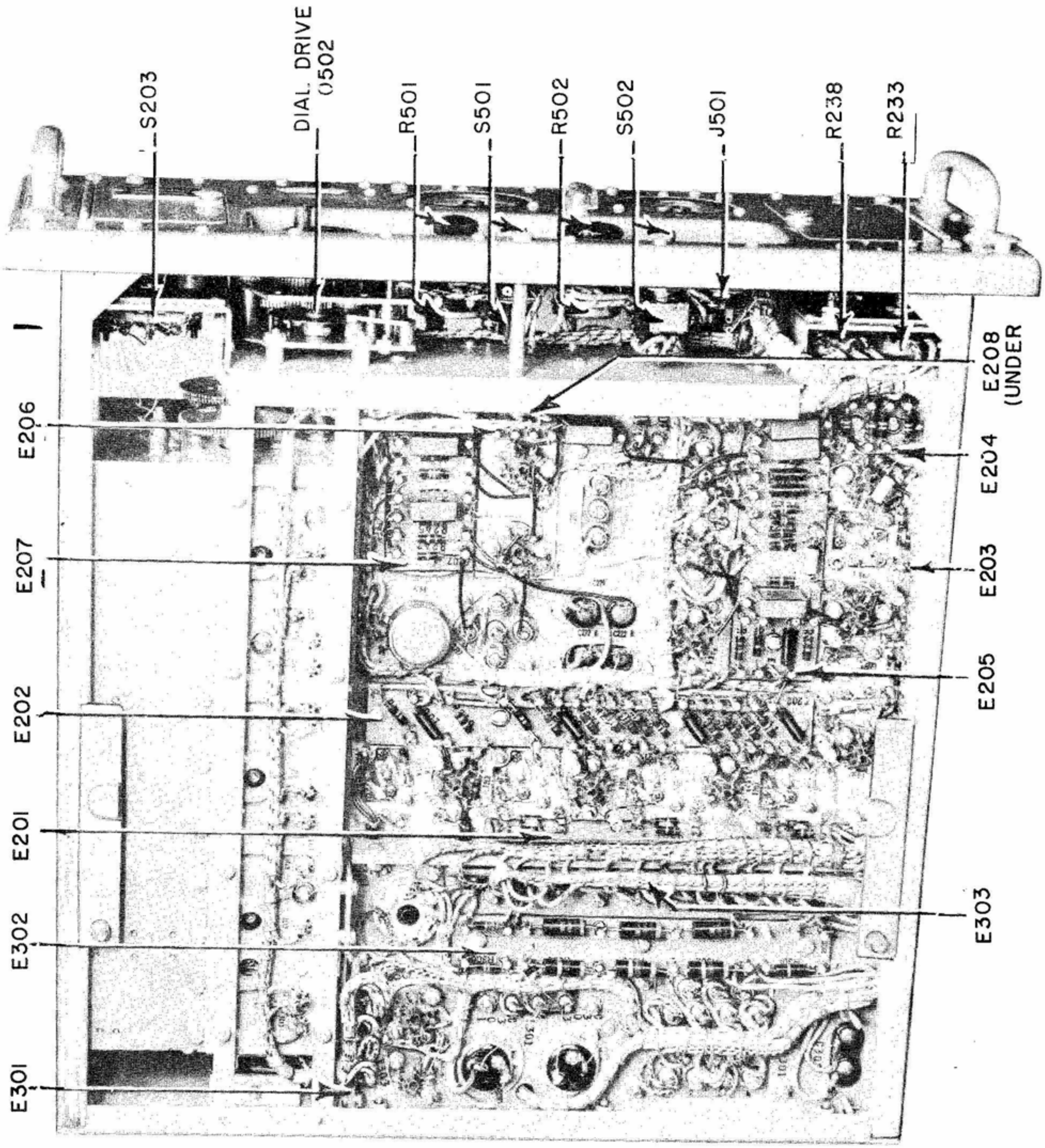


Figure 1—5. Bottom View of Chassis, Protective shields on [illegible] removed.

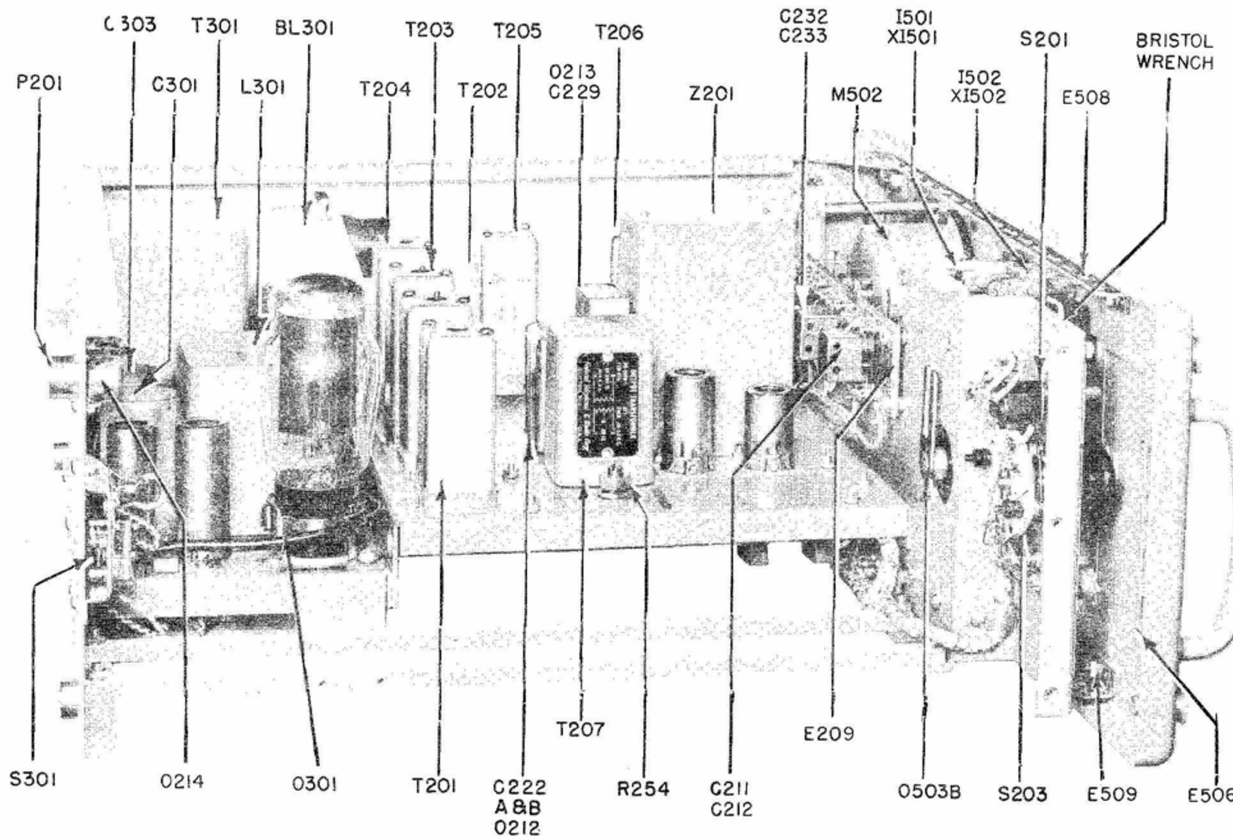


Figure 1–6. Chassis with Preselector (Z107) Removed; Left Side View

3. DESCRIPTION OF MAJOR SUBASSEMBLIES.

a. CABINET. — Figure 3–3 is a view into the cabinet with the panel-and-chassis assembly removed. It is fabricated from an aluminum alloy and finished in a gray enamel. 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 angle brackets used for mounting it are attached to the sides of the cabinet and the four shock mounts are removed. When the cabinet is arranged for table mounting, these brackets are detached and four shock mounts bolted to the bottom of the cabinet in their stead. Ventilation is provided through dust filters and louvers on either side of the cabinet by means of an internal blower.

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 a gray enamel which blends with the color of the cabinet and is fitted with handles to permit withdrawal of the panel-and-chassis assembly from the cabinet. A spring stop mechanism on each side permits nearly complete withdrawal of the chassis from the cabinet but prevents its falling out due to roll, tilt, shock or vibration. When these stop mechanisms are pressed upward by the fingers through holes in the bottom of the chassis frame, the panel-and-chassis assembly may be completely withdrawn. The two hinged doors on either side of the front panel are held closed by knurled-head spring fasteners. These are released by a half-turn to the left giving access to crystals, fuses and the semi-fixed controls or adjustments. The locations of these and the other panel-mounted controls and parts are indicated in figure 4–1.

c. PRESELECTOR SECTION (Z107). — The preselector section is mounted along the left side of the chassis frame, as shown in figures 1–4 and 1–5, and comprises all parts of the r-f amplifier-converter and oscillator-multiplier sections. The r-f amplifier section is above the oscillator-multiplier section, and each consists of an aluminum casting with removable covers. The two r-f amplifier stages and the mixer, or first detector, are mounted in the r-f amplifier-converter section. The basic oscillator, two frequency-doubler stages and a frequency-tripler stage are mounted in the oscillator-multiplier section. Partitions in the castings provide r-f shielding between stages.

The five-section signal-frequency tuning capacitor, C101, in the r-f amplifier converter section and the four-section tuning capacitor, C102, in the oscillator-multiplier section are geared together to synchronize their rotation. Each of these ganged capacitors consists of a number of split stator sections, and of as many 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, and their capacity is maximum when the rotor plates are fully meshed with the split-stator plates.

The tuning inductances for the r-f amplifier sections, and for the multiplier-tripler section, consist of semi-circular strips of invar. The adjustable trimmer inductances consist each of two parallel rods and an adjustable shorting bar. These inductances, and the concentric cylinder type trimmer capacitors, are integral parts of the ganged capacitor sections as shown in figures 1–9 and 1–10. The tuning capacitors for the basic oscillator and for the two doubler stages are similar in construction. The oscillator coil is of ceramic construction to provide a high degree of stability with temperature variations. The doubler coils are space-wound solenoids 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 insure freedom from back-lash. 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, with automatic mechanical stops at each end of the range. With this arrangement 19 complete revolutions of the tuning crank will rotate the calibrated dial through 240 degrees, and will turn the ganged capacitors through their full 85 degrees of rotation, thereby covering the entire 225-400 megacycle frequency band of the receiver.

The main tuning indicator dial is 2⅝ inches in diameter and is calibrated directly in megacycles. Markings appear at each two-megacycle division, with each fifth marking indexed, and each tenth marking identified with the appropriate frequency numerals. Rotation of the tuning crank in a clockwise direction increases the frequency.

The calibrated dial is illuminated by two six-volt pilot lamps mounted behind the panel. A DIMMER control potentiometer mounted on the dial drive assembly, behind the front panel, permits control of the brilliance of the dial lamps.

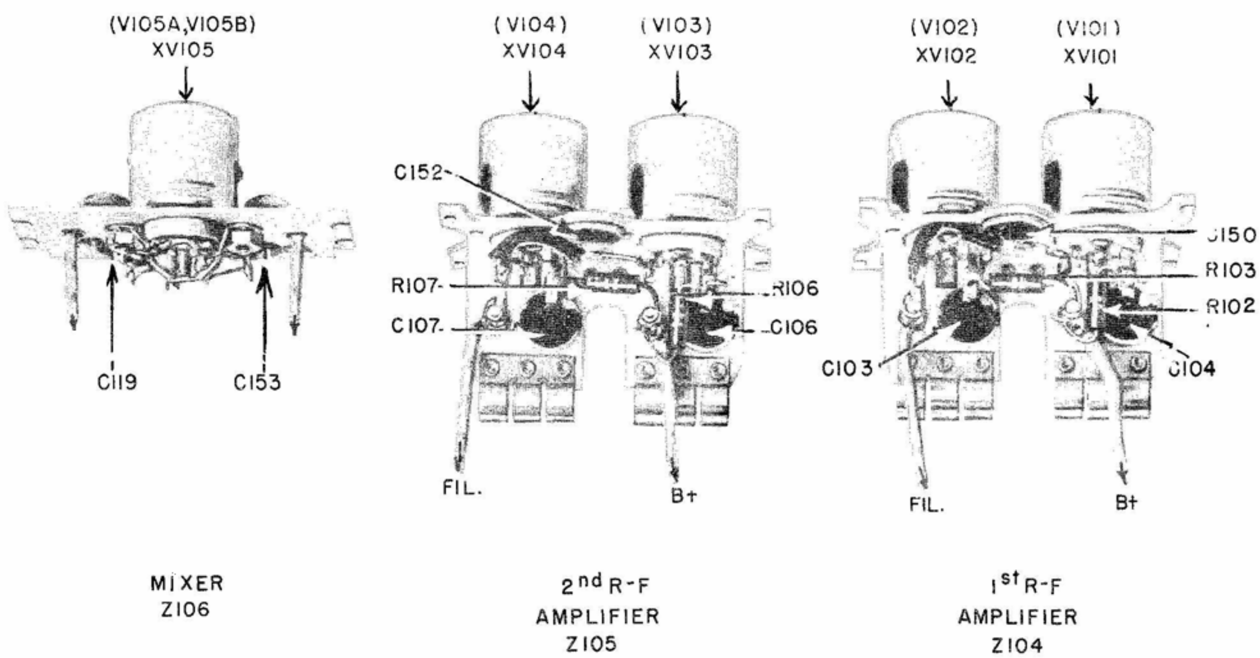


Figure 1–7. Socket Plate and Shield Assemblies (Z104, Z105, Z106) from R-f Amplifier Section of Preselector

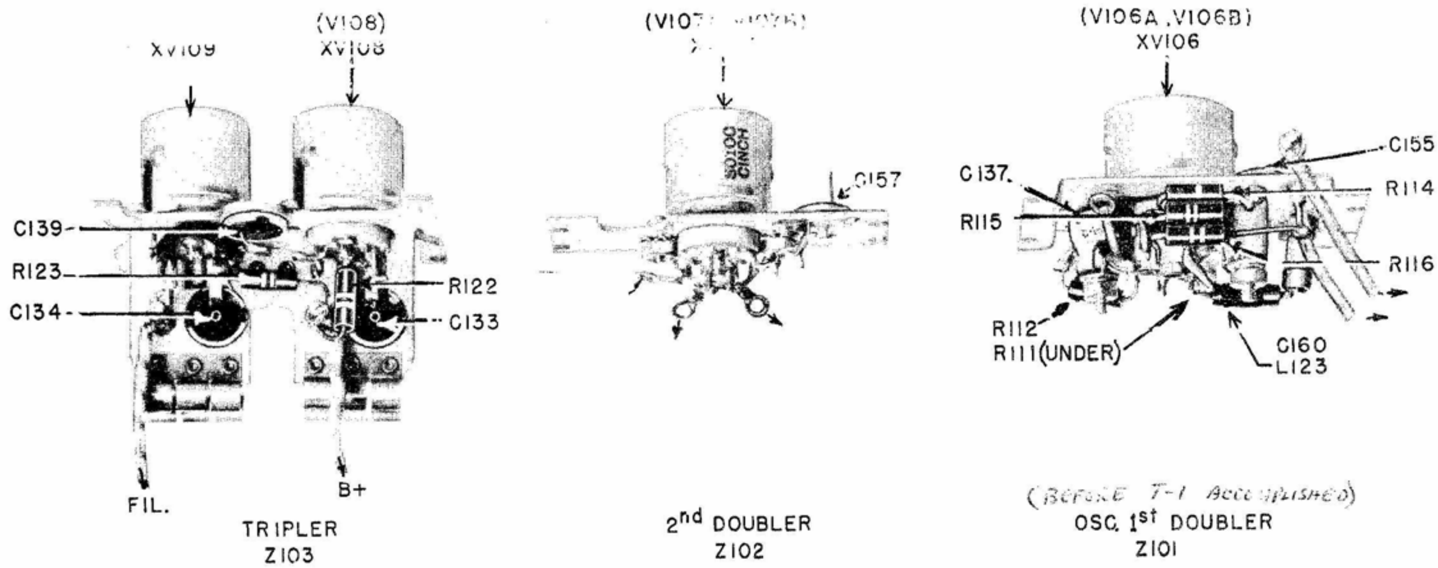


Figure 1–8. Socket Plate and Shield Assemblies (Z101, Z102, Z103) from Oscillator-Multiplier Section of Preselector

A locking device is included to permit locking the tuning drive mechanism at any desired frequency setting.

e. THE IF/AF SECTION. — The IF/AF section of the chassis is shown in figures 1–4, 2–6A and 2–6B. It is located on the right-hand side of the chassis frame, and mounts the circuit parts of the five i-f stages, the second detector, the automatic volume control circuit (AVC), the silencer and the silencer amplifier circuits, the noise limiter circuit and the three stages of audio amplification.

f. POWER SUPPLY SECTION. — The power supply section of the chassis, shown in figures 1–4 and 2–15, is mounted 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 110/115/120 volt, 50-60 cps, single-phase power.

The power transformer and the filter parts are designed to provide a power supply of reduced size and weight in comparison with the power requirements. The blower is also mounted on this chassis.

g. CABLE FILTER ASSEMBLY*.—The cable filter assembly appears in figures 1–3, 1–11 and 3–3. It contains r-f noise filter circuits for the audio output and power input circuits, and provides through connections from the receiver proper to the antenna input and scan channel output circuit connectors. The filter parts are mounted on a base plate which is attached to the rear wall of the receiver cabinet by means of 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, AUDIO output, SCAN channel output and ANTENNA transmission line input connectors (P401-P404), to which all external connections except headphones are made, are mounted on the underside of the filter assembly on an angle bracket attached to the base plate. When the receiver panel-and-chassis assembly is slid into the cabinet, three connectors (plugs) on the rear of the receiver engage mating connectors (receptacles) on the rear of the filter base plate, establishing connections between the external and internal receiver circuits. The filter components are made accessible for servicing by removal of the filter cover, without removing the filter from the receiver cabinet.

4. ASSOCIATED EQUIPMENT.

The components and parts described below are not supplied with the receiver but are required to complete the installation of a type AN/URR-13A radio receiving equipment.

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. The applicable installation plan will indicate the particular type of antenna to be used.

One rod or ground plane is grounded to the supporting tube and the outer conductor of the coaxial transmission line. The "line" radiator extending downward

*Band Suppression Filter F-89/URR-13.

is supported by an insulated stud connected to the center lead of the antenna.

b. ANTENNA TRANSMISSION LINE. — A coaxial transmission line having a characteristic impedance of about 51 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. SCAN CIRCUIT. — The SCAN connector (J403) on the cable filter at the rear of the cabinet can be connected to a panoramic type radio-frequency scanning adapter to provide visual indication of the signals being picked up by the receiver. The scanning channel has a frequency response which is flat within six db over a bandwidth of 600 kilocycles. If scanning equipment is used, a 51-ohm coaxial transmission line such as AN type RG-8/U cable should be employed. However, no such equipment is supplied with Radio Receiving Set AN/URR-13A, and none is required for its satisfactory operation as a receiver. The center frequency of the scan output is 18.6 mc.

d. PHONES AND SPEAKER. — The audio output circuit at the AUDIO receptacle (J402) on the rear of the equipment is designed to operate into any load impedance between 60 and 600 ohms, and to maintain its output voltage constant within three db over this impedance range. Audio output is also wired to a phone jack on the front panel (J501). Any 600-ohm headphones fitted with a Navy type -49109, -49106B or -49034 plug can be connected into this jack.

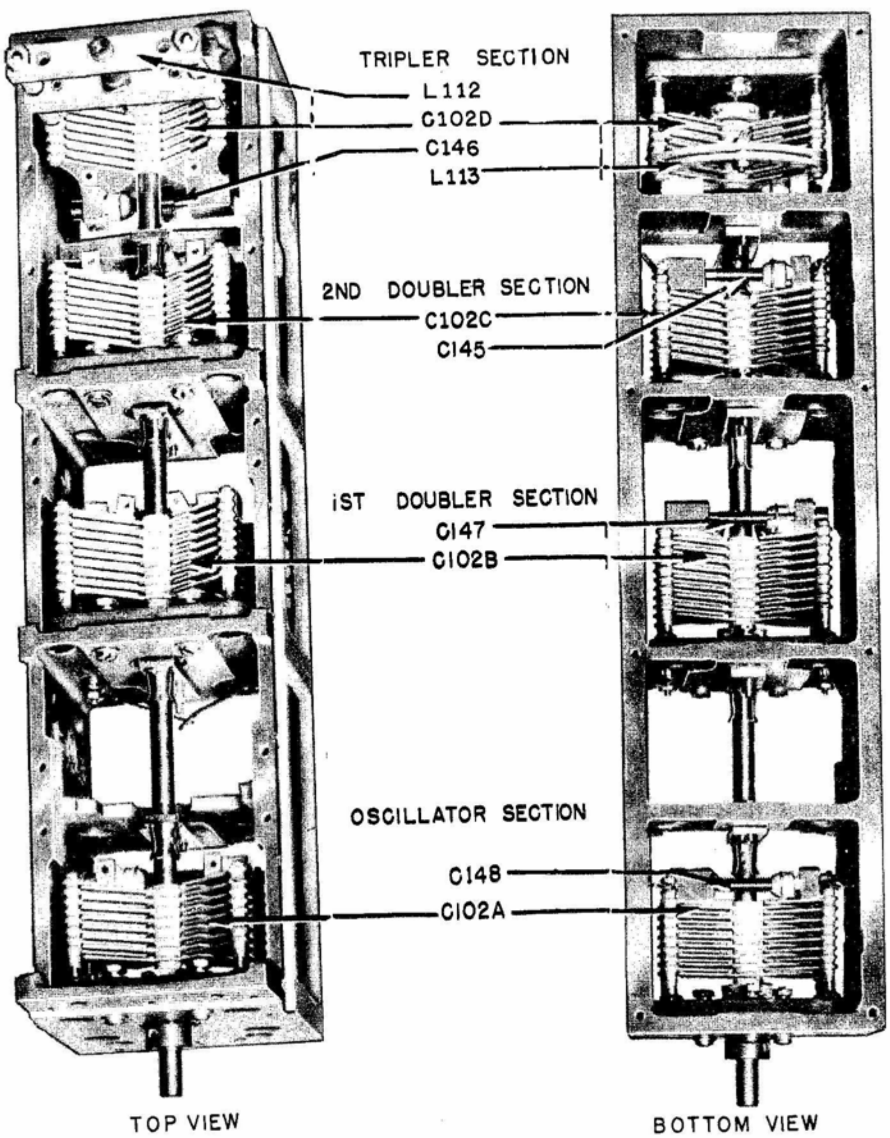


Figure 1—9. Ganged Capacitor (C102) from Oscillator-Multiplier Section of Preselector

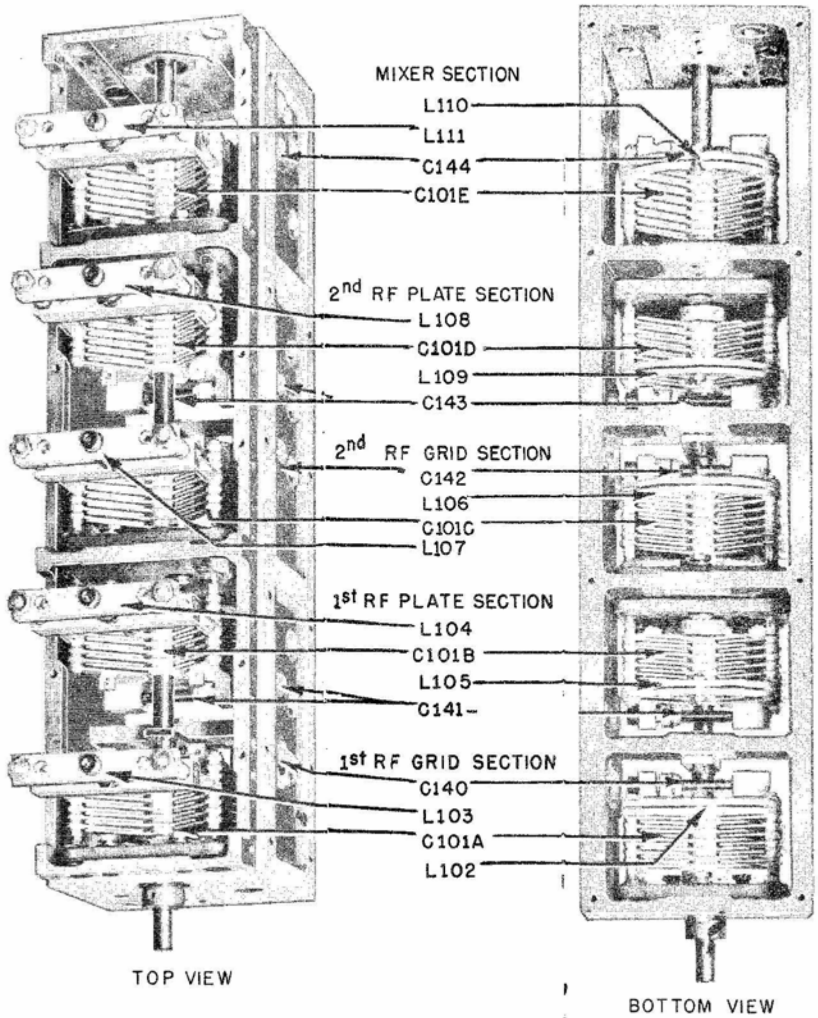


Figure 1—10. Ganged Capacitor (C101) from R-f Amplifier Section of Preselector

e. CRYSTALS. — The equipment is designed for use with a JAN 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. Complete data on this type of crystal unit are given in figure 7–16.

5. REFERENCE INFORMATION.

a. REFERENCE DATA. — Pertinent data concerning Radio Receiving Set AN/URR-13A are given below:

(1) NOMENCLATURE. — Radio Receiving Set AN/URR-13A.

(2) CONTRACT NUMBERS. — NObsr-52051 and NObsr-52304.

(3) DATES OF CONTRACTS. — 24 Oct. 1950 and 12 March 1951.

(4) CONTRACTOR. — Federal Telephone and Radio Corp., 100 Kingsland Rd., Clifton, N. J., U.S.A. (Serial Nos. 1-756* & 757-2313**.)

(5) SUBCONTRACTOR. — The National Co., 61 Sherman Ave., Malden, Mass. (Serial Nos. 2314-3869**.)

(6) COGNIZANT NAVAL INSPECTOR. — AINM, 167 Prospect St., Passaic, N. J.

(7) NUMBER OF PACKAGES. — Complete equipment including equipment repair parts in one wood shipping case. (See figure 3–1.)

*Under contract NObsr-52051
**Under contract NObsr-52304

(8) TOTAL CUBICAL CONTENTS (CRATED). — 12,793 cu. ins.

(9) TOTAL CUBICAL CONTENTS (UNCRATED). — 2824 cu. ins. (Rec'r. only.)

(10) TOTAL WEIGHT (CRATED). — 166 lbs.

(11) TOTAL WEIGHT (UNCRATED). — 57 lbs. (Rec'r. only.)

b. ELECTRICAL CHARACTERISTICS. — The following is a summary of the electrical characteristics of Radio Receiving Set AN/URR-13A.

(1) FREQUENCY RANGE. — Rated: 225-400 mc; max.: 222.75—404.0 mc.

(2) TUNING BANDS. — Complete coverage of frequency range with 19 consecutive turns of tuning control crank.

(3) NUMBER OF PRESET FREQUENCIES. — (a) MANUAL Tuning: None—(b) CRYSTAL Tuning: One, as determined by crystal unit installed.

(4) TYPE OF FREQUENCY CONTROL. — Crystal-controlled Oscillator (CRYSTAL tuning operation only).

(5) TYPE OF RECEIVER. — Superheterodyne.

(6) INTERMEDIATE FREQUENCY. — 18.6 megacycles (center frequency) ±2 kc.

(7) RECEIVER OUTPUT.

(*a*) AUDIO CHANNEL OUTPUT (J402). — 60 milliwatts, max., into a 600-ohm load, with 7% max., distortion, or 600 milliwatts, max., into a 60-ohm load, with 7% max. distortion.

(*b*) PHONE JACK (J501) OUTPUT. — Approximately 60 milliwatts max. into a 600-ohm load.

(*c*) SCANNING CHANNEL OUTPUT. — 10 microvolts, min., across a 50-ohm load for a signal input voltage of 25μv max.

(8) TYPE OF RECEPTION. — Amplitude modulated signals, primarily voice.

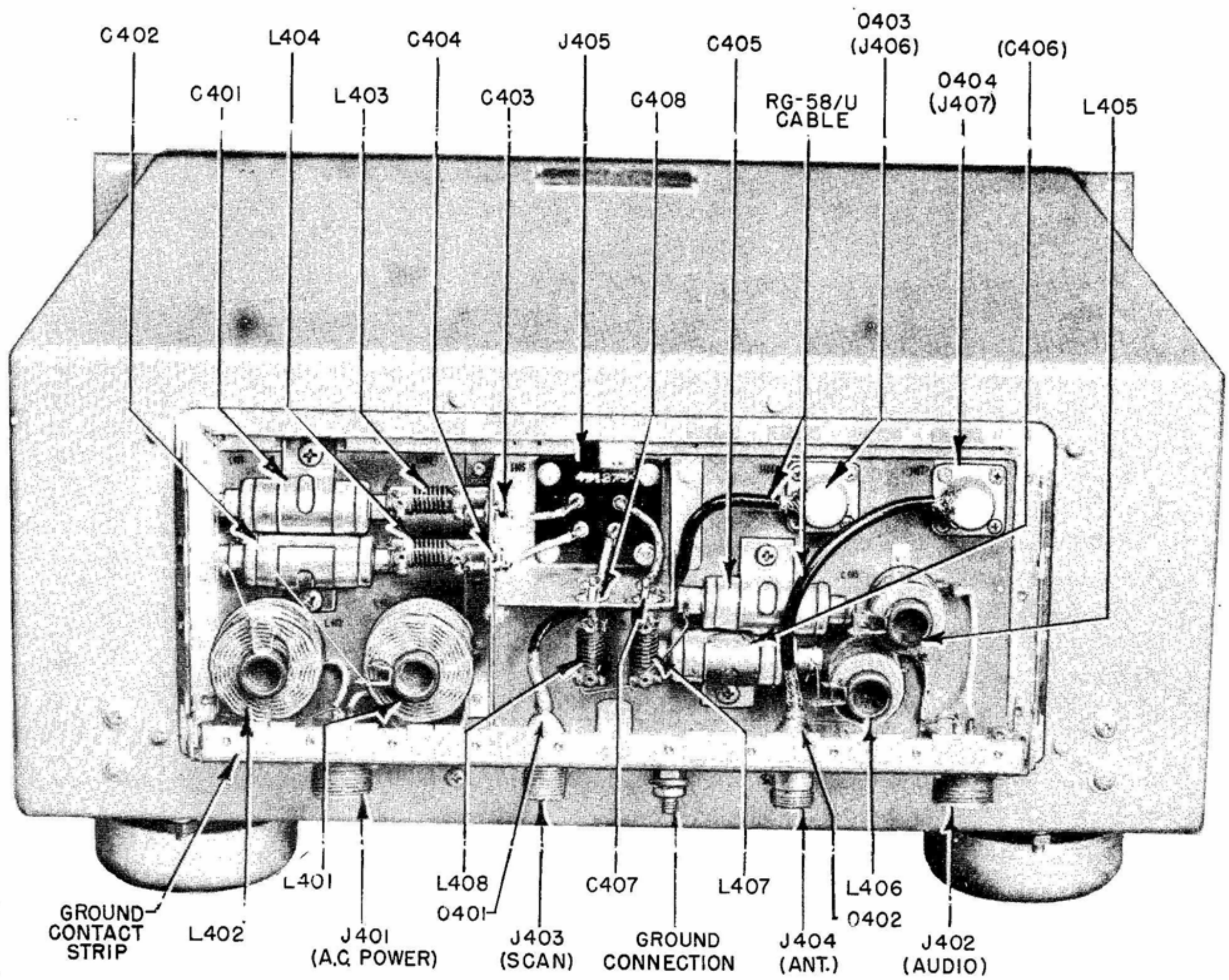


Figure 1—11. Rear View Showing Band Suppression Filter F-89/URR-13, with Filter Housing Removed

(9) Overall stability of receiver for any selected channel in the 225-400 mc range, when operated between 110 and 120 volts (T301 on 115-volt tap), between -20°C (-4°F) and +50°C (+122°F) and between 30% and 95% humidity:

	Crystal-Controlled	*Free-Running*
For voltage variation	Negligible	Negligible
For temperature variation	±0.009%	20 p/m/°C
For humidity variation	±0.009%	30 p/m/% chg.

(10) CRYSTALS.

(*a*) TYPE. — JAN Type CR-24/U. Not supplied by contractor.

(*b*) OSCILLATING FREQUENCY. — Crystal frequencies from 20.3000 to 34.8833 mc cover 225-400 mc tuning range of receiver with total multiplication of 12.

(*c*) HETERODYNE FREQUENCY RANGE. — For 225-400 mc reception: 243.6 to 418.6 mc. For 222.75-404.0 mc reception: 241.35 to 422.6 mc.

(11) SILENCER CIRCUIT CHARACTERISTICS:

(*a*) EFFECTIVE SILENCING RANGE. — Up to minimum of 15,000 microvolts input (100% rotation of control).

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

(*c*) TIME CONSTANT OF CIRCUIT. — Less than 0.5 second.

(12) IMPEDANCES:

(*a*) ANTENNA INPUT. — 51 ohms. Designed for coaxial antenna transmission line.

(*b*) AUDIO CHANNEL OUTPUT:

1. Nominal — 600 ohms.

2. Output load range within which output voltage variation is less than 3 db for constant input adequate to produce output to 1.9 volts (6 milliwatts) at 1000 cps, across a 600-ohm output load — 600-60 ohms.

3. Phone Jack — 600 ohms, nominal.

4. Scan Channel Output — 51 ohms. Designed for coaxial transmission line such as AN type RG-8/U.

(13) ANTENNA SYSTEM. — None supplied. An antenna having 51-ohm terminal impedance is recommended.

(14) POWER SOURCE CHARACTERISTICS:

(*a*) VOLTAGE. — 110/115/120 volts, 60 cps, 1 phase.

(*b*) CURRENT REQUIREMENT. — Nominal, 0.97 amp.; maximum, 1.04 amp.

(*c*) POWER. — Nominal, 112 watts; maximum, 120 watts.

TABLE 1—1. EQUIPMENT SUPPLIED

Quan. Per Equip.	Name of Unit	Designation	Overall Dimensions* Height	Width	Depth	Volume*	Weight*
1	Radio Receiver	R-266A/URR-13	8-7/16	17½	19⅛	2824	57
1	Set of four plugs for external cords (packed in cloth bag)	(See table 3-2)	——	——	——	——	4 oz.
1	Pair relay rack mounting brackets	(See figure 3-7)	7	1⅛	12	——	1 lb., 5 oz.
2	Instruction books	NAVSHIPS 91535	11	8½	¾	68	3 (Est.)
1 1	Repair parts box, containing Set equipment repair parts	(See fig. 3-8) (See parts list table 8-4)	6⅛	19	10	1164	15
1	Antenna test cable	CG-839/U 4'2"	1	50	1	50	4 oz.
1	Power and audio test cable	CX-1869/U 4'4"	1½	52	1¾	136	13 oz.

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

TABLE 1—2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

Quan. Per Equip.	Name of Unit	Designation	Required Use	Required Characteristics
1	Antenna	See applicable installation drawing	Signal pick-up	¼-wave, broad band; to cover 225-400 mc frequency range; 50-ohm terminal impedance
As Required	Antenna transmission line	See applicable installation drawing	Antenna to receiver connection	50-ohm surge impedance; coaxial
1 each Channel	Crystal units	Jan type CR-24/U	Crystal control of tuning	$f_{xtal} = \frac{\text{channel freq.} + 18.6\text{mc}}{12}$
As Required	Power cable	MCOS-2	Power input from 50-60 cps, 110-120 v source	2 wires; #18 or larger
As Required	Audio output cable	TTHFWA-1	Audio output connection to interphone or other audio responsive device	Twisted shielded pair
1	Headphones, with cord and plug (Navy Type -49034, -49106-B or 49109)	Navy Type -49016	Listening	600 ohms impedance
1	Loudspeaker or other audio responsive device		Listening	600 ohms input impedance
As Required	Scan channel output cable (if panoramic tuning indicator is used)	AN Type RG-8/U	Connection to panoramic tuner	Coaxial 50-ohm surge impedance (AN type RG-8/U)

TABLE 1—3. SHIPPING DATA

Shipping Case Number	Contents		Overall Dimensions*			Volume *	Weight *
	Name	Designation	Height	Width	Depth		
1	Radio Receiving Set	AN/URR-13A	15½	35½	23¼	12,793	166¼ (Est.)

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

6. EQUIPMENT SIMILARITIES.

Radio Receiving Set AN/URR-13A is identical with Radio Receiving Set AN/URR-13, except that ruggedized equivalents have been substituted for the type 6AL5 tubes (6AL5W) in some units, and for the type 6AK5 tubes (6AK5W) in all units. This instruction book (NAVSHIPS 91535) is wholly applicable to the earlier equipment and contains all information included in the book for that equipment (NAVSHIPS 91270). It differs essentially only in respect to:

1. Nomenclatures and contractual information.

2. Security classification (declassified vs restricted).

3. Arrangement of Table of Replaceable Parts (alphabetically vs by units).

4. R-f cable to connector assembly instructions (augmented).

TABLE 1–4. ELECTRON TUBE COMPLEMENT

Circuit	Tube Circuit Symbols	Types of Tubes and Quantities of Each Used									
		9003	6J6	GL-5670	6AK5W	6BA6	6AL5W	6AK6	5U4G	OB2	OA2
PRESELECTOR (Z107)											
1st R-F Amplifier	V101	1									
1st R-F Amplifier	V102	1									
2nd R-F Amplifier	V103	1									
2nd R-F Amplifier	V104	1									
Mixer	V105A		½								
Mixer	V105B		½								
Oscillator	V106A			½							
1st Doubler	V106B			½							
2nd Doubler	V107A		½								
2nd Doubler	V107B		½								
Tripler	V108				1						
Tripler	V109				1						
IF/AF SECTION											
1st I-F and Scan Channel Amplr.	V201					1					
2nd I-F Amplr.	V202	1									
3rd I-F Amplr.	V203	1									
4th I-F Amplr.	V204	1									
5th I-F Amplr.	V205	1									
2nd Detector	V206A						½				
AVC Diode	V206B						½				
Noise Limiter Diode	V207A						½				
Silencer Diode	V207B						½				
Silencer Amplr.	V208				1						
1st A-F Amplr.	V209				1						
2nd A-F Amplr.	V210				1						
A-F Output Amplr.	V211							1			
POWER SUPPLY SECTION											
Rectifier (+180v)	V301								1		
Regulator (+105v)	V302									1	
Regulator (+150v)	V303										1

SECTION 2
THEORY OF OPERATION

1. GENERAL PRINCIPLES.

Radio Receiver R-266A/URR-13 is of the superheterodyne type, designed for either manual tuning or crystal-controlled operation over a frequency range of 225 to 400 megacycles. The receiver will provide audio output to headphones or to an external speaker or intercommunication system. Output provisions are also included for an external panoramic (r-f sweep) adapter, as explained below in paragraph 2*b* (1).

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 self-excited circuit, depending on the position of the CRYSTAL-MANUAL 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 and amplified by five stages of i-f amplification. The signal is then rectified by the 2nd detector and by the AVC rectifier. The AVC voltage developed is applied to the grids of both r-f amplifiers, the first four i-f amplifiers and the first a-f amplifier. The audio output of the 2nd detector passes through a series valve type noise limiter (which may be by-passed) into the first a-f voltage amplifier. The output of this amplifier passes through an a-f band-pass filter (Z201), having a pass-band of 350 to 3500 cps, and through a silencer diode into the second a-f amplifier. The amplified audio signal is then applied to the a-f output stage, the output of which drives the headset or external speaker. Output is also monitored by the OUTPUT meter (M502).

The silencer diode between the band-pass filter and second audio amplifier is controlled by the silencer amplifier, which permits the diode to conduct when a signal is present at the 2nd detector. If no signal is present, the diode cuts off, preventing any noise from reaching the second audio stage. The noise silencer may be cut IN or OUT by action of the SILENCER switch.

2. DETAILED CIRCUIT ANALYSIS.

a. PRESELECTOR (Z107).

(1) R-F AMPLIFIER SECTION.

(*a*) ANTENNA INPUT. — The antenna input circuit of Radio Receiver R-266A/URR-13, having a nominal 50-ohm impedance, is to be used with 52-ohm coaxial transmission line. The transmission line connects to the ANT. receptacle (J404), located on the bottom of the Band Suppression Filter F-89/URR-13, at the rear of the receiver.

Note

A male plug (AN type UG-21B/U; P404) designed to mate with receptacle J404 is supplied for attachment to the antenna lead-in cable at the time of installation.

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 series inductances, L101 and L121, and is coupled by them to the input circuit of the first r-f amplifier stage.

Inductances L101 and L121 form an assembly consisting of an outer conductor of bent copper tubing, with an insulated inner conductor. This arrangement serves to transform the unbalanced coaxial input to a balanced circuit.

(*b*) TUNING CAPACITOR ASSEMBLY. — The details of this assembly are shown in figure 1–10. The grid and plate circuit 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 shaft is grounded to the chassis frame by means of wiping contacts located between the sections. The trimmer inductances (L103, L104, L107, L108 and L111) and the trimmer capacitors (C140-C144) are integral parts of the stators and are connected across the split-stator plates. The tank circuit inductors (L102, L105, L106,

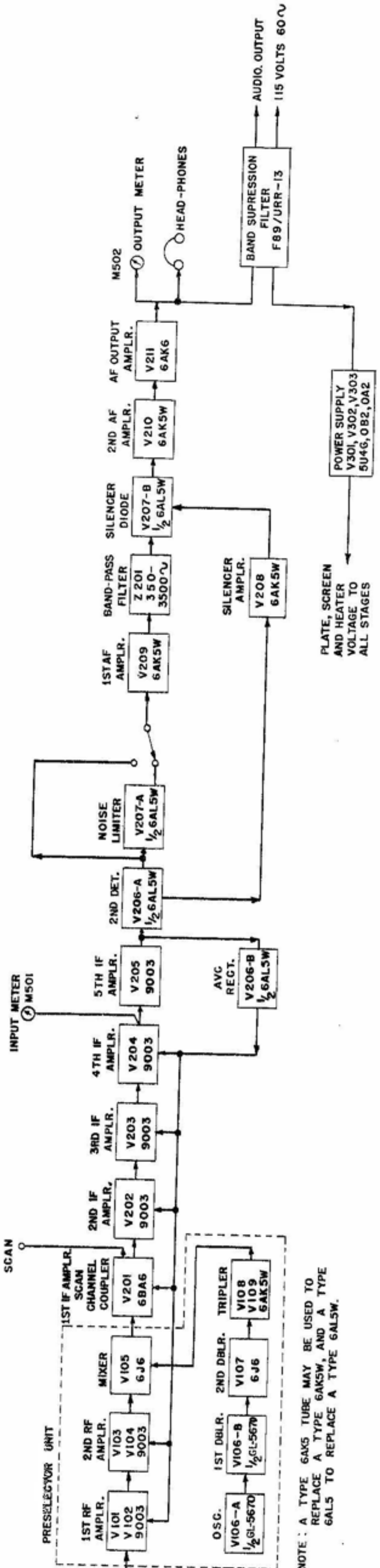


Figure 2–1. Block Diagram—Radio Receiver R-266A/URR-13

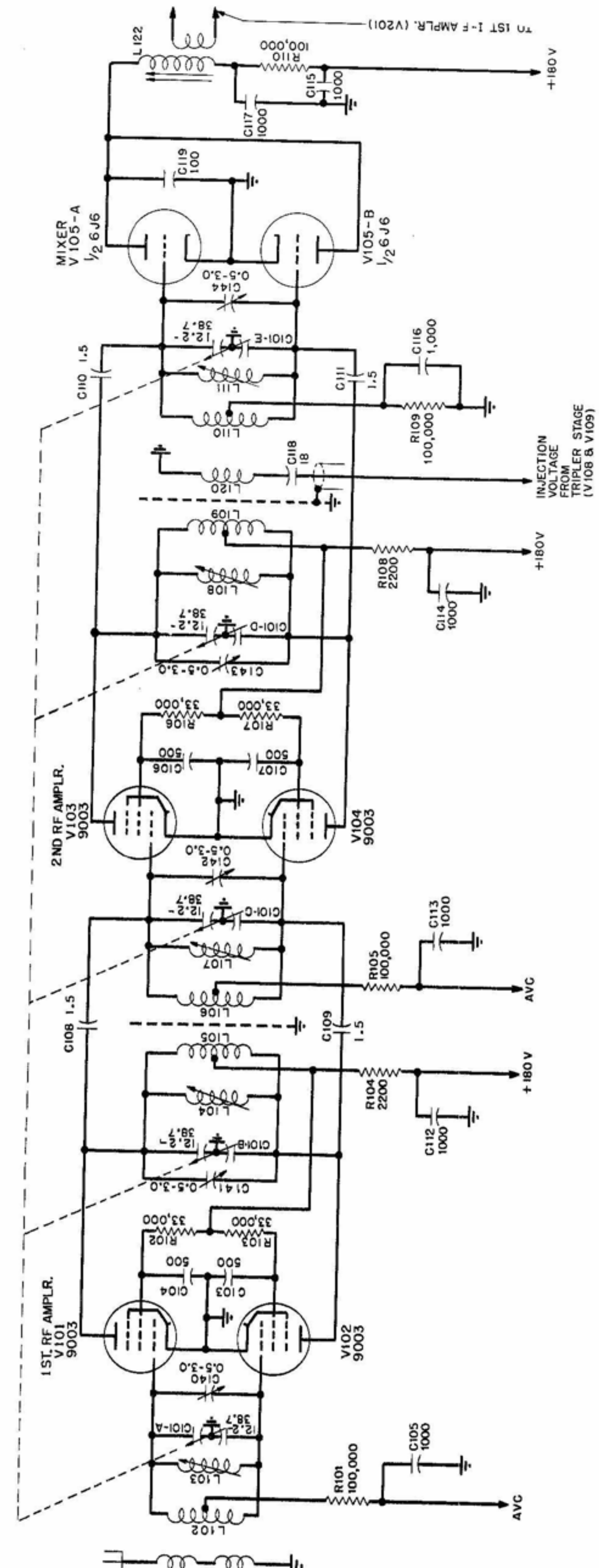


Figure 2–2. Simplified Schematic—R-f Amplifier Section of Preselector

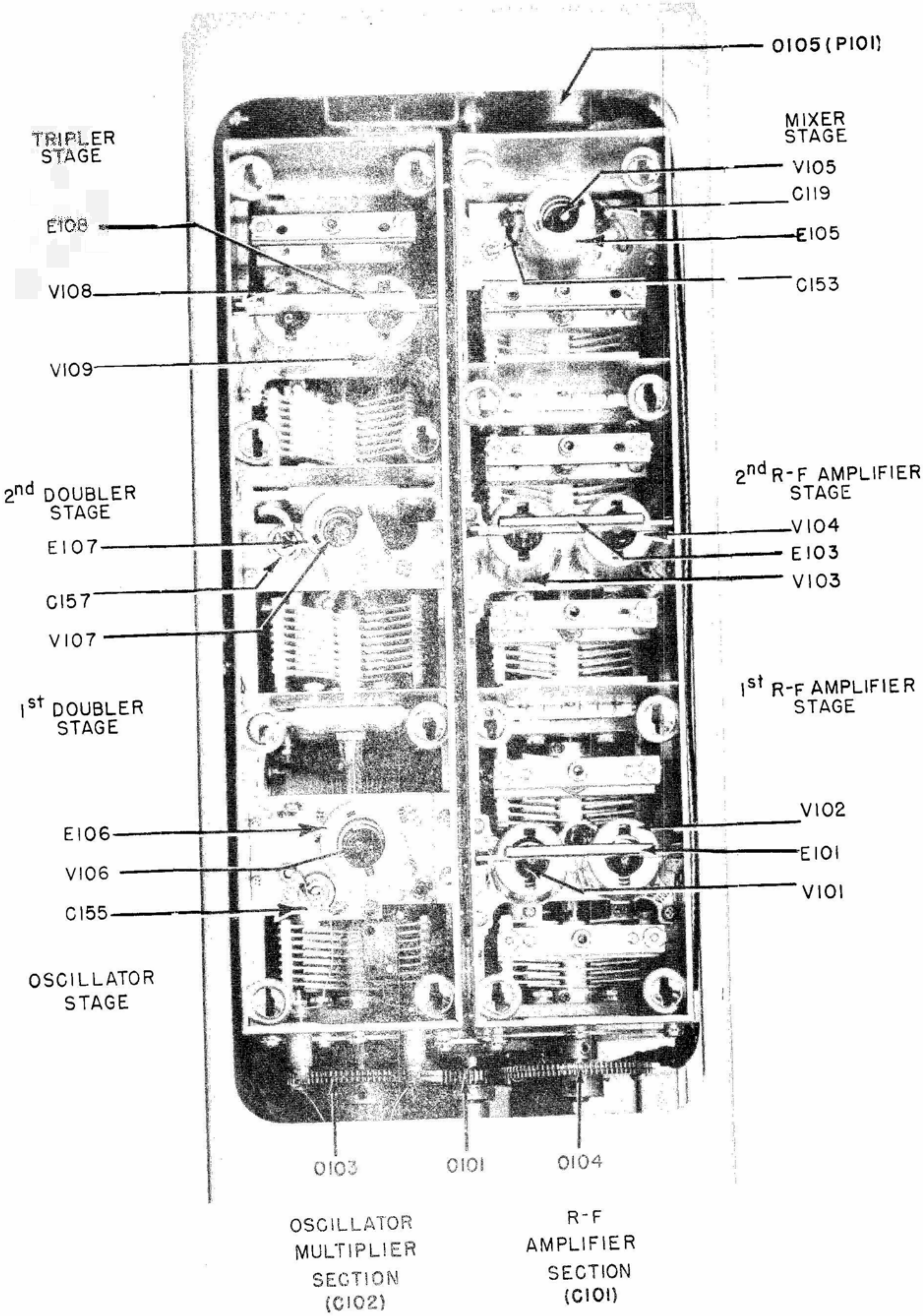


Figure 2–3. Preselector (Z107) from Left Side of Chassis, Shielding Covers Removed

L109 and L110) are horseshoe-type metal strips. The trimmer inductors (figure 7–7) each consists of two parallel, round rods connected by a shorting bar. Positioning of the shorting bar varies the inductances of each coil. The concentric-cylinder type trimmer capacitors each 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 2–2, the antenna circuit is coupled to the grid input circuit of this stage. The grid circuit consists of tank inductance L102, trimmer inductance L103, a section of capacitor C101, and trimmer capacitor C140. Critical coupling is employed at the high end of the band to maintain uniform sensitivity over the entire frequency range. Two type 9003 tubes, V101 and V102, are operated in push-pull. These tubes are remote cut-off pentodes to permit employment of AVC. The push-pull arrangement serves to reduce the lengths of the connecting leads to a minimum and to cancel out spurious radiation of unwanted signals into the antenna. AVC voltage is applied to the grid circuit of this stage through decoupling resistor R101 and the center tap on coil L102. A feed-through type r-f by-pass capacitor (C105) functions to by-pass the AVC line at this point. This capacitor is located in the casting wall. The screen voltage is applied through decoupling resistor R104 and through screen voltage-dropping resistors R102 and R103. The 180-volt supply is by-passed to ground at this point by capacitor C112, while resistors R102 and R103 are by-passed by the button-type silver-mica capacitors, C104 and C103, respectively. The plate circuit is similar in design to the grid circuit and consists of basic inductance L105, a section of C101, trimmer inductance L104, and trimmer capacitor C141. Plate voltage is brought through resistor R104 to the center tap on coil L105. No appreciable inductive coupling exists between the plate circuit of the first r-f stage and the grid circuit of the second r-f stage because coils L105 and L106 are shielded from each other by the wall of the casting. Coupling between these two stages is accomplished by means of capacitors C108 and C109, which are connected directly from the plates of the tubes in the first stage to the grids of the tubes in the second stage. With tubes having a nominal value of transconductance, the gain of the first r-f amplifier is approximately 7 db.

(*d*) SECOND R-F AMPLIFIER. — This stage, employing tubes V103 and V104 in push-pull, is identical in design and in circuit constants to that of the first r-f stage (figure 2–2). The tuned grid circuit consists of a section of capacitor C101, tank inductor L106, trimmer inductor L107, and trimmer capacitor C142. The plate circuit consists of a section of capacitor C101, tank inductor L109, and the trimmers L108 and C143. AVC voltage is brought to the center tap of coil L106 through decoupling resistor R105; the AVC line is by-passed to ground by capacitor C113. Plate and screen voltages are brought through resistor R108; the supply is by-passed to ground at this point by capacitor C114. R107 and R106 are screen voltage-dropping resistors, which are by-passed by capacitors C107 and C106, respectively. The plate voltage is brought to the center tap of coil L109. The output of the second r-f stage is capacitively coupled to the grid circuit of the mixer stage through capacitors C110 and C111. No appreciable inductive coupling exists between L109 and L110 or L120, since L109 is isolated from the mixer grid circuit by the preselector casting wall. The r-f gain of the stage is approximately 7 db.

(*e*) MIXER. — The mixer, or first detector, stage employs a JAN type 6J6 dual triode, V105, in a push-push arrangement (figure 2–2). The grid circuits are connected in push-pull through the resonant circuit consisting of a section of capacitor C101, tank inductor L110, trimmer capacitor C144, and trimmer inductor L111. The plates of the tubes are connected in parallel to plate transformer L122. Capacitor C119, connected between the plate of the mixer tube and ground, serves to tune L122 to resonance at the intermediate frequency. This capacitor is connected directly to ground to provide a low-impedance path for other than intermediate frequency r-f currents. With the push-push arrangement of the mixer a high order of conversion gain is obtained 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 by capacitors C111 and C110, while the output of the oscillator-multiplier circuit is inductively coupled to the grid circuit of the mixer through a coupling loop consisting of coil L119 and capacitor C135 in the oscillator-multiplier unit (figure 2–5), and coil L120 and capacitor C118 on the r-f converter (figure 2–2). This coupling arrangement maintains the mixer injection voltage more uniform over the frequency range of operation. The values of capacitors C118 and C135 are so chosen that, together with the shunt capacity of the short coaxial connecting line and the coupling coils, the loop is ser-

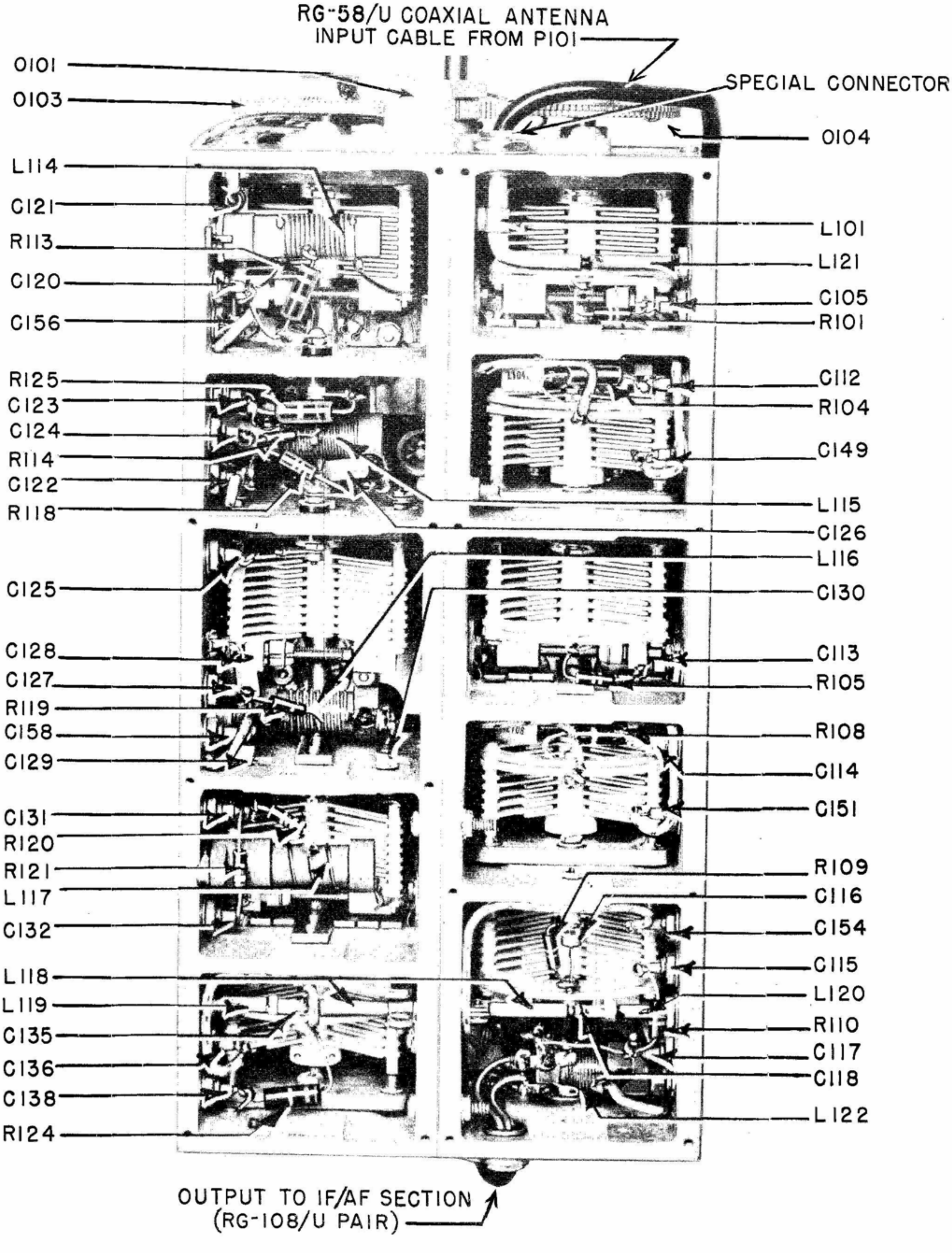


Figure 2—4. Preselector from Bottom, Shielding Covers Removed

ies resonant at a frequency (190 mc) below the low end of the band, and parallel resonant at a frequency (470 mc) above the high end of the band. Consequently, at the low-frequency end, the transfer voltage induced in the converter input tank is increased while at the high end of the band the induced transfer voltage is reduced. If the coupling were not resonant, as described above, the induced voltage would tend to drop off at the low end and increase at the high 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. The type of coupling is made necessary by the physical layout of the equipment. The plate coil 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 dual conductor r-f cable (AN type RG-108/U) joins the secondary winding of transformer L122 on the r-f amplifier chassis and the primary winding of transformer T201 on the IF/AF chassis, thus establishing low impedance inductive coupling between the two circuits.

Plate voltage is supplied to the primary of L122 through resistor R110. Capacitors C115 and C117 by-pass the B+ line and R110, respectively. The grids of V105 are biased by the voltage developed across grid-leak resistor R109, which is by-passed by capacitor C116.

(2) OSCILLATOR - MULTIPLIER SECTION. — The oscillator-multiplier section generates the local injection signal 18.6 mc higher in frequency than the received signal. The basic oscillator frequency is generated in tube V106 and multiplied twelve times in the two doublers and one tripler which follow, as shown in the simplified schematic diagram, figure 2–5. Tuning of the various stages is accomplished by capacitor C102, which is a four-section capacitor, each section being of the 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 by wiping contacts located between the capacitor sections. Since no appreciable r-f currents flow 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 of the receiver. The trimmer inductances and capacitors utilized in the oscillator-multiplier stages are integral parts of the tuning capacitor, similar to those described previously in subparagraph 2 *a* (1) (*b*), this section.

(*a*) OSCILLATOR-FIRST DOUBLER. — The oscillator and first doubler stages utilize a type GL-5670 dual triode (figure 2–5). One half of the tube, V106-A, functions as a grounded-grid oscillator. The second half of the dual triode, V106-B, is arranged as a split-load cathode follower, and serves as both a frequency doubler and a source of feedback to the oscillator cathode.

The oscillator functions as a crystal-controlled circuit when switch S203 is in the CRYSTAL position. The crystal, Y201, is a harmonic-mode type which establishes the feedback 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 by switch S203 in the MANUAL position. V106-A then functions as a free-running oscillator, the frequency of which is determined by the setting of tuning capacitor C102-A. Since the feedback path between the cathodes of the two triode sections is not frequency selective, the stability of the free-running oscillator is not as great as the crystal-controlled circuit.

On MANUAL tuning the receiver may be operated with or without a crystal in the crystal 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 in this same manner during MANUAL operation in the field. 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 attributable 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. Removing the crystal from its socket removes this capacity and so causes a shift in the frequency of the oscillator.

The oscillator tank circuit consists of variable capacitor C102-A, trimmer capacitor C148 and coil L114. The tank circuit is kept balanced by the use of capacitor C121, which equalizes the output capacitance of the tube. Resistor R112 tends to suppress spurious oscillation. Inductance L123 reduces the heater-to-cathode capacitive reactance so that the phase shift of the signal applied from the cathode of the 1st doubler tube to the oscillator cathode is as small as possible, while capacitor C160 keeps L123 from shorting the bias developed across resistor R111 to ground. Plate voltage is fed to the center tap of coil L114 through resistor R113 from a 150-volt regulated source; the B+ line is by-passed for radio frequency by capacitor C120.

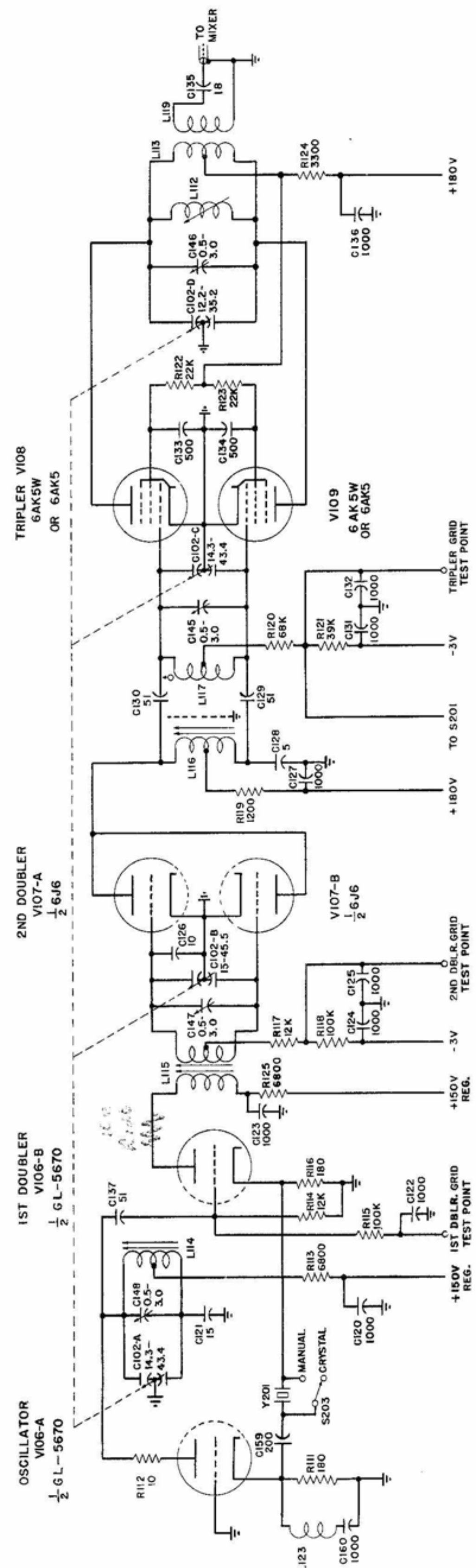


Figure 2–5. Simplified Schematic—Oscillator-Multiplier Section of Preselector

The output of the type V106-A oscillator tube is coupled to the grid of the first doubler through capacitor C137. Grid bias for V106-B is provided by the voltage drop across cathode resistor R116 and by the drop across grid-leak resistor R114. Flate voltage is applied through the untuned primary of bifilar-wound transformer L115; voltage is obtained from a 150-volt regulated source through decoupling resistor R125, which is by-passed for radio frequency by capacitor C123.

SEE 7-1

The first-doubler cathode circuit is not by-passed, so that the r-f voltage drop across resistor R116 may be fed back to cathode resistor R111. The values of R111 and R116 are such that the feedback is limited, preventing oscillations which might occur due to the capacity across the crystal holder.

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

(*b*) SECOND DOUBLER. — The second doubler stage employs the two sections of the type 6J6 dual triode, V107, in a push-push circuit arrangement (figure 2–5). The grid circuit is balanced and is tuned to the 2nd harmonic of the oscillator frequency. The tuned circuit consists of the center-tapped secondary winding of transformer L115, a section of the ganged capacitor C102 and trimmer capacitor C147. 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 holding voltage functions to prevent excessive rise in plate current if driving voltage is removed. Capacitors C124 and C125 function to by-pass 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, thus indicating the relative amount of drive from the first doubler.

The plates are tied in parallel, untuned coil L116 constituting the plate load. This coil is center-tapped to provide a balanced load for coupling to the grids of the tripler stage. Capacitor C128 at the ground side of coil L116 functions to balance the output capacity of the second doubler tubes at the other side of the coil. Plate voltage is applied through decoupling resistor R119 to the center tap of coil L116. C127 functions as an r-f by-pass capacitor. The output of the 2nd doubler stage is coupled to the grid circuit of the tripler stage V108, by means of capacitors C129 and C130. No appreciable inductive coupling exists between L116 and L117, since the two coils are isolated by the preselector casting.

The push-push 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 employs two type 6AK5W pentodes, V108 and V109, in push-pull (figure 2–5). The parallel-resonant grid circuit consists of coil L117, a section of capacitor C102, and trimmer C145, and is tuned to the 4th harmonic of the oscillator frequency. The center tap of coil L117 is returned through resistors R120 and R121 to the –3 volt grid-bias tap on the power supply. This bias holding voltage functions to prevent excessive plate current in the tube if the driving potential is removed. The bias holding circuit is by-passed for rf to ground by means of capacitors C131 and C132. A tap at the junction of resistors R120 and R121 provides a metering point for checking the driving voltage applied to the grids of the tripler tubes, by measuring the grid-leak bias developed across resistor R121. The tap is also connected to the ALIGN position of switch S201 for alignment purposes, as explained in paragraph 2*e* of this section.

The plate circuit of the tripler stage is tuned to resonance at a frequency three times its grid input frequency, which results in a plate-circuit output frequency 18.6 mc higher than the receiver incoming signal frequency. The tripler plate circuit is a parallel-resonant combination of coils L112 and L113, and capacitors C102 and C146. Plate and screen voltages are applied through resistor R124 to the center tap of L113 and the junction of screen-grid-dropping resistors R122 and R123 respectively. Capacitors C136, C133, and C134 provide r-f by-pass to ground, as required.

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

b. I-F AMPLIFIER STAGES. — The mixer output is link-coupled to the receiver i-f section which consists of five stages of amplification tuned to the intermediate frequency, 18.6 mc. The overall i-f selectivity curve is shown in figure 7–6.

(1) FIRST I-F AND SCAN CHANNEL AMPLIFIER. — A type 6BA6 remote cut-off pentode (V201) is arranged as a split-load amplifier; the tube functions as both the first i-f amplifier and as a cathode

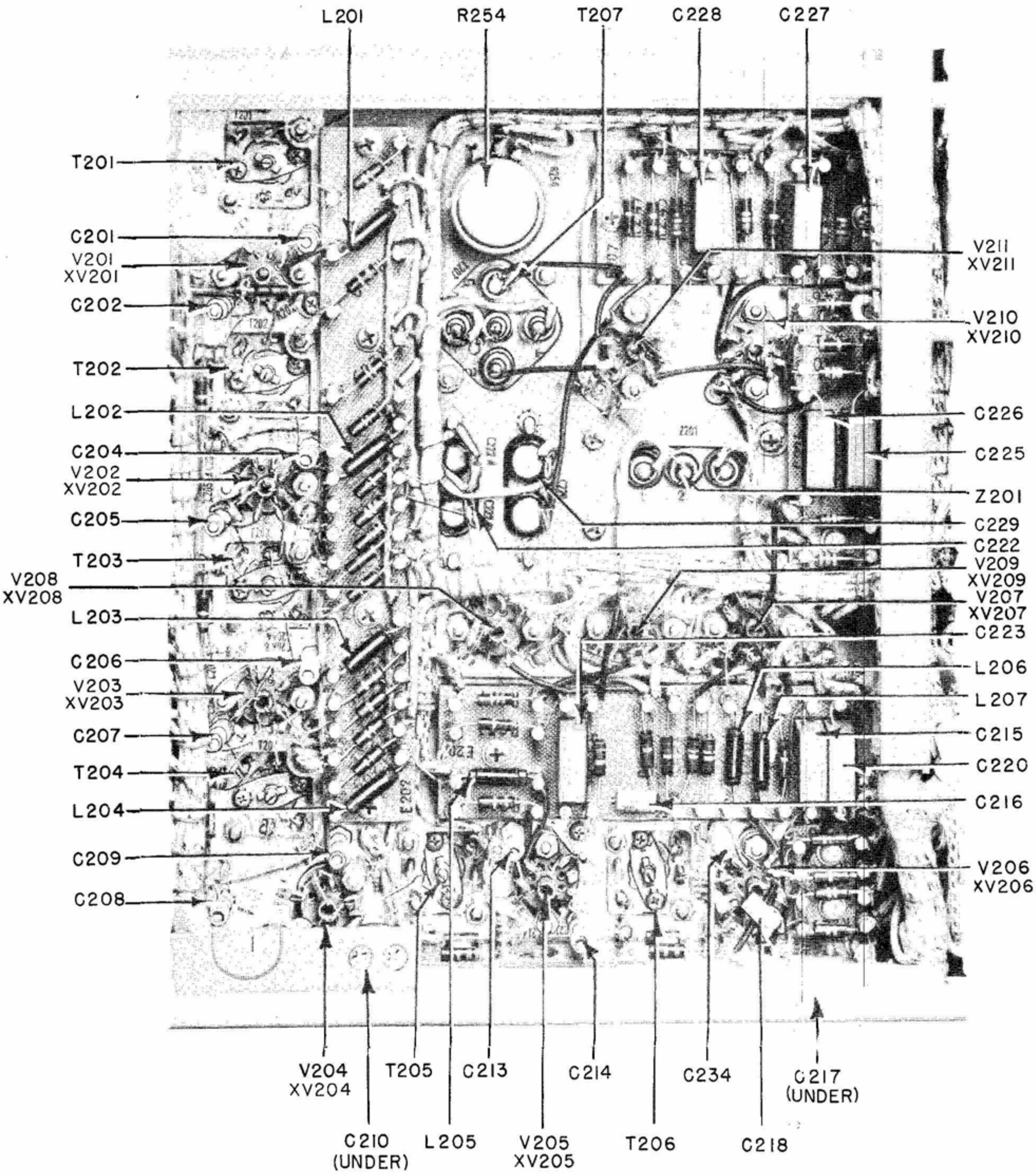


Figure 2–6A. Underside of IF/AF Section (All Parts but Resistors Identified)

follower to provide output for a scanning channel indicator (panoramic adapter). The cathode resistor, R202, is not by-passed, so that the r-f voltage developed across it may be utilized as the scanning channel output (figure 2–7). The scanning output is taken from resistor R202, brought through connector P201 on the IF/AF chassis to jack J406 on the base plate of the cable filter (Band Suppression Filter F-89/URR-13), and then routed through a short piece of coaxial cable to the SCAN output jack (J403) on the rear of the filter.

The signal from the mixer is applied to the grid of V201 through transformer T201. The primary is an untuned, low-impedance winding; the secondary is tuned and is resistance-loaded to provide a scanning bandwidth of 600 kc, flat to within 6 db. AVC voltage is applied to the grid circuit of V201 through decoupling resistor R201, which is by-passed by capacitor C201-A. Screen voltage is obtained from the 105-volt regulated source through decoupling resistor R203, while the 180-volt plate supply is brought through decoupling resistor R204. Resistors R203 and R204 are each by-passed by a separate section of capacitor C202. The i-f output of V201 is coupled to the second i-f amplifier by means of transformer T202.

(2) SECOND, THIRD, FOURTH, AND FIFTH I-F AMPLIFIERS. — The simplified schematic diagram of figure 2–8 is typical of the last four i-f stages. Each amplifier utilizes a type 9003 remote cut-off pentode, with double-tuned transformers used as the interstage coupling device. All transformers used in the i-f section are tuned by means of powdered-iron cores. Screen voltage for all tubes is obtained from the regulated 105-volt tap on the power supply, and plate voltage from the 180-volt tap. Both screen and plate voltages are applied through suitably by-passed decoupling resistors. The grid circuits of the second, third and fourth i-f amplifiers (V202, V203 and V204) are returned to the AVC line through a resistance-capacitance decoupling network. AVC is not applied to the fifth i-f amplifier (V205); instead, terminal No. 6 of transformer T205 is grounded. Grid bias for V205 is developed across cathode resistor R217, which is by-passed by capacitor C213-A.

(3) INPUT METER CIRCUIT. — INPUT meter M501 is provided to indicate 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. A simplified schematic of the meter circuit is shown in figure 2–9. One side of meter M501 is connected to terminal No. 3 of transformer T205 through a low-pass filter consisting of R212 and C211. The other side of the meter is connected through a similar filter (R213 and C212) to the arm of INP. MTR. control R214. Potentiometer R214, along with resistors R249 and R305, is in a voltage divider network connected between the 180-volt supply and ground.

With no signal present in the receiver, pentode V204 conducts heavily, causing a voltage drop across resistor R216. The INP. MTR. control, R214, is then adjusted so that the center-arm potential is equal to the potential at terminal No. 3 of transformer T205. This results in equal potentials at each side of meter M501 and, consequently, no meter indication. When a signal is received, the developed AVC voltage increases the bias on V204, and the reduction in plate current decreases the voltage drop across resistor R216. Since a voltage difference then exists across the meter terminals, an indication is obtained on the meter.

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

c. SECOND DETECTOR. — A simplified schematic diagram of the second detector is shown in figure 2–10. One half (V206-A) of a type 6AL5W dual diode is used in a conventional diode circuit. I-f transformer T206 couples the signal from the fifth i-f stage (V205) to the detector. Resistors R224, R225 and R226 constitute the diode load, which is by-passed for radio frequency by capacitors C216 and C217-A. The audio-frequency output, obtained at the junction of resistors R224 and R225, is coupled through capacitor C220 to the first a-f amplifier grid when noise-limiter switch S202 is in the OUT position.

d. NOISE LIMITER. — When noise-limiter switch S202 is in the N.L. (on) position, a series-valve noise limiter is placed in the circuit between the second detector and first audio stage (see figure 2–10). The limiter, V207-A, is one half of a 6AL5W dual triode which functions as follows:

The negative voltage, developed across second detector resistors R224 and R225, is applied through resistor R221 to capacitor C215, building up on this capacitor a negative potential equal to the total average rectified d-c voltage, as measured between terminal No. 6 of T206 and ground. The audio-frequency component of the rectified voltage is taken from the detector diode circuit at the junction of resistors R224 and R225. The audio-frequency path is then from plate to cathode of V207-A, across switch S202, and through capacitor C220 to the grid of the 1st audio amplifier tube (V209). It will be noted that the cathode of V207-A is at the potential of terminal No. 6 of T206, which is more negative than the plate potential of

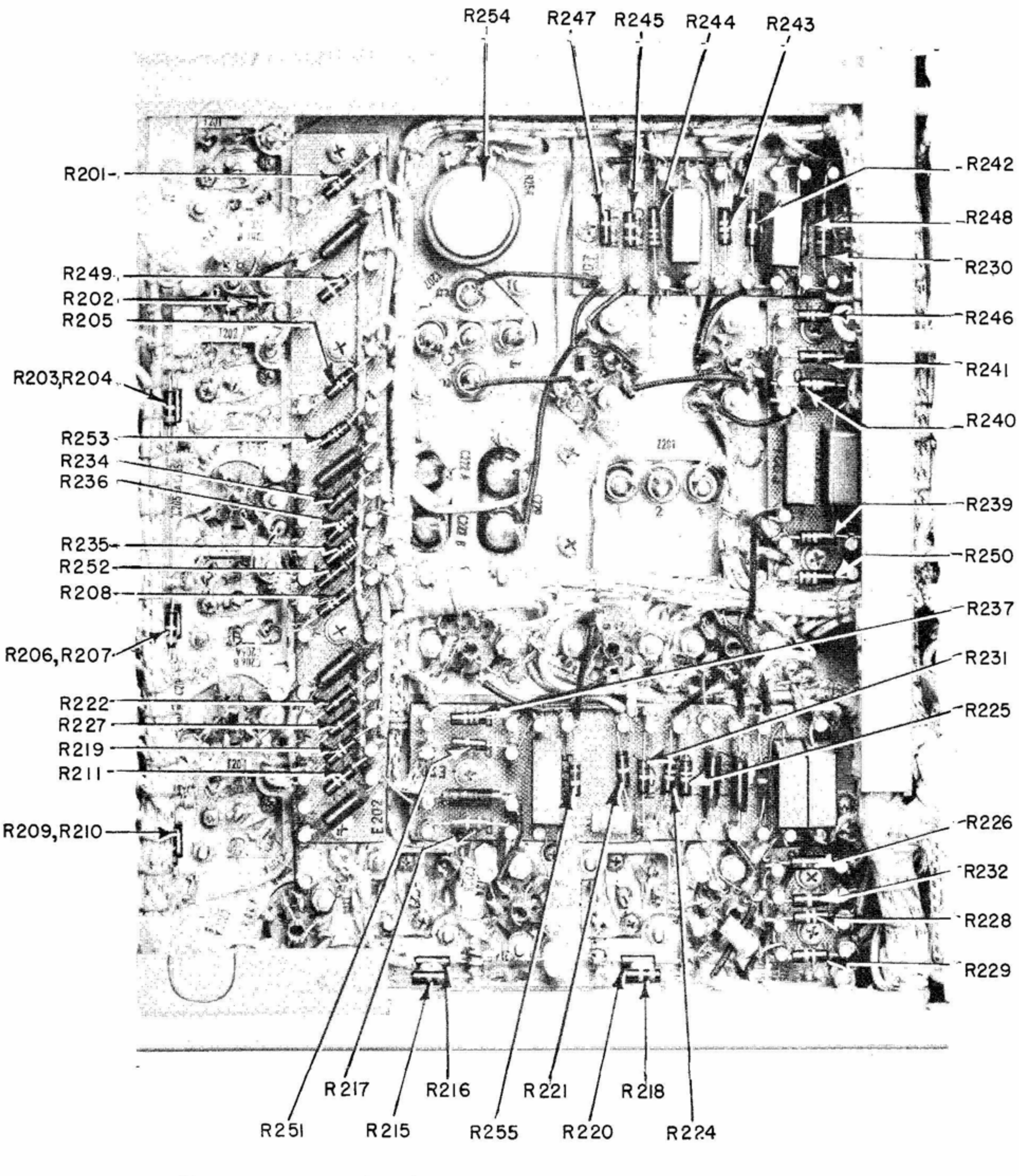


Figure 2—6B. Underside of IF/AF Section (Only Resistors Identified)

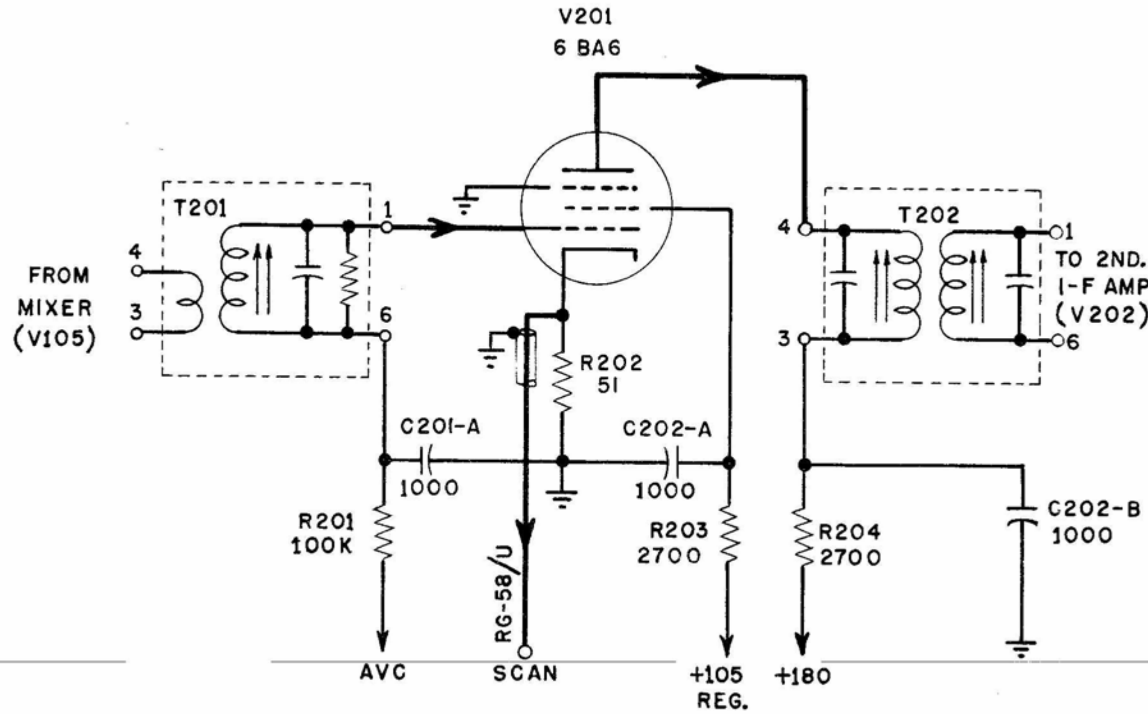


Figure 2—7. Simplified Schematic—First I-F and Scan Channel Amplifier

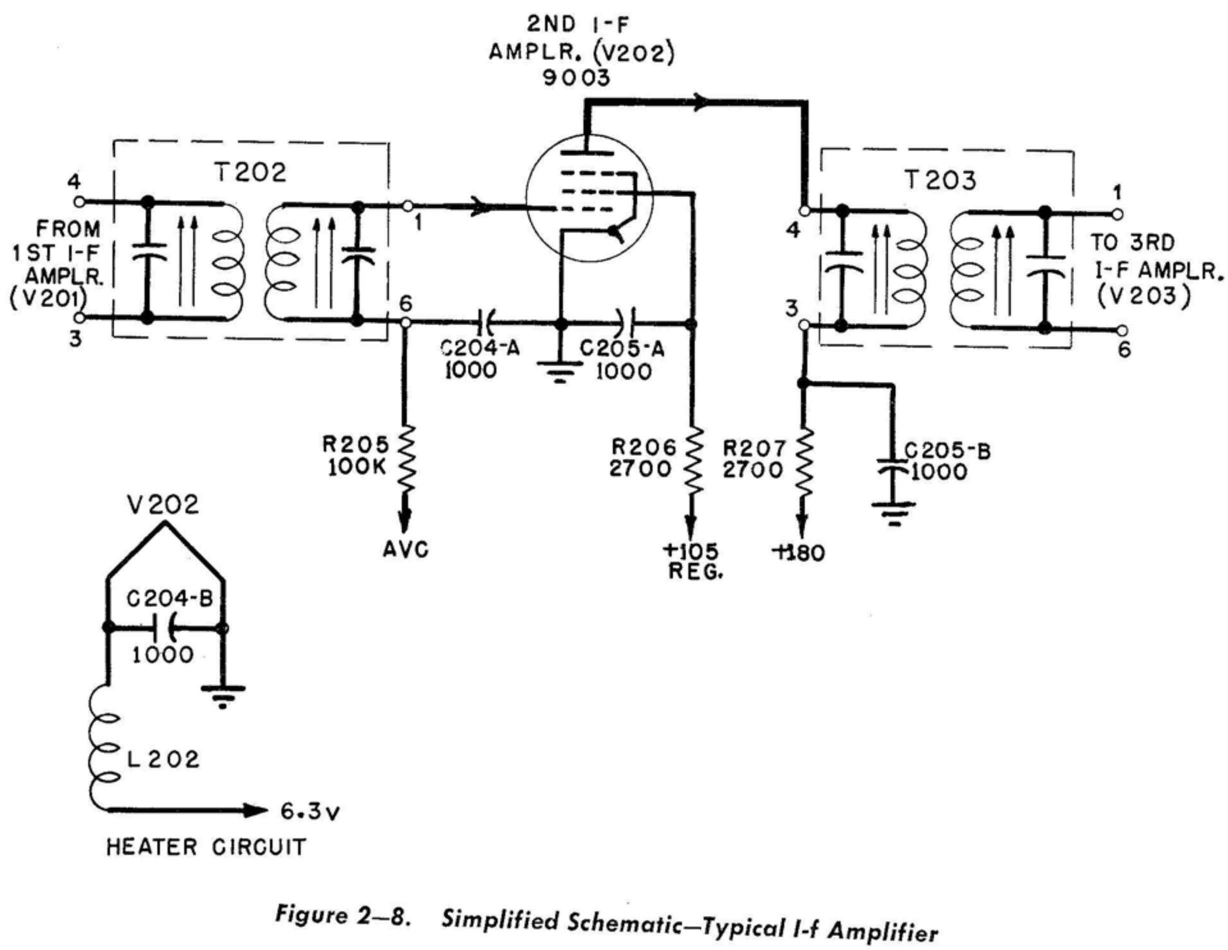


Figure 2—8. Simplified Schematic—Typical I-f Amplifier

V207-A because of the voltage divider action of R224 and R225. Since the diode cathode is at a negative potential with respect to the plate, current flows from plate to cathode and an a-f path is established through this tube. In the event that a sharp pulse of noise is received the long time constant of R221 and C215 does not permit capacitor C215 to become charged to the high transient voltage. However, terminal No. 6 of T206 rapidly follows the change, placing the plate of V207-A at a more negative potential than the cathode, thereby cutting off current flow in the tube for the duration of the noise pulse. Consequently, the noise pulse does not enter the audio-frequency amplifier circuit. Resistor R226 in the cathode of the 2nd detector acts as an accelerating circuit to bring the noise limiter diode V207-A to the condition of non-conduction more quickly, when a noise pulse enters the receiver. A positive pulse from the cathode end of R226 is coupled to the limiter-diode cathode through capacitor C215 and resistor R223. Thus, an additional positive voltage is initially present at the cathode, which aids in cutting off tube V207-A.

Resistors R219 and R227 form a voltage divider across the 105-volt regulated supply, producing a positive voltage of approximately one volt. This is applied through resistor R222 to the cathode of V207-A. The positive bias is required to balance out the contact potential of this tube, permitting operation of the diode as a noise limiter on lower levels of noise. By normally operating the cathode of V207-A considerably more negative than the plate, allowance is made so that clipping does not occur on modulation peaks below a certain level.

e. AVC RECTIFIER. — One half of a 6AL5W dual diode (V206-B) is utilized in the AVC circuit, which is shown in simplified form in figure 2–11. The diode is connected as a shunt rectifier across the secondary of transformer T206; coupling is accomplished through capacitor C218 and capacitors C216 and C217-B in series. With switch S210 in the REC. position, the diode load consists of resistors R229 and R230. The junction of these two resistors is at a potential of three volts negative which places the diode plate at this same voltage. The three-volt negative potential is developed across resistors R230 and R248 by the return plate current which flows through them. The cathode is connected to the junction of resistors R230 and R248, placing it at a potential of approximately two volts negative. Thus, AVC delay is provided by the resultant one-volt bias. AVC voltage is applied to the

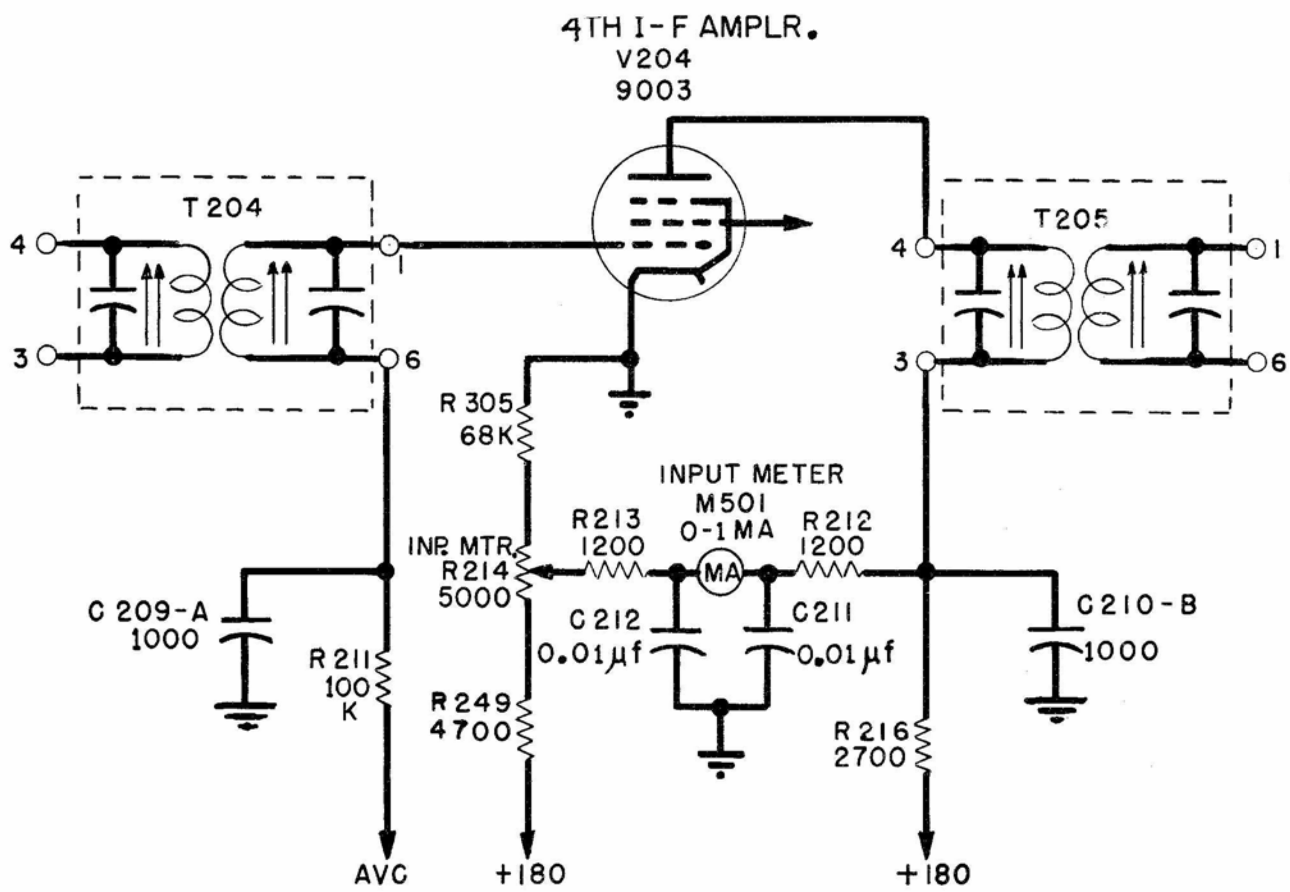


Figure 2–9. Simplified Schematic—INPUT Meter (M501) Circuit

r-f amplifiers, the first four i-f amplifiers and the first a-f amplifier through resistor R228. Suitable R-C decoupling networks are incorporated in the grid circuit of each of the controlled stages. The long time constant of R228 and C222-A prevents the AVC voltage from following rapid variations in carrier level. Capacitor C221 is a dual r-f by-pass unit.

The AVC 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 cathode of V206-B is removed from the voltage divider across the three-volt bias source and is connected to the grid return of the tripler stage (V108, V109). Under this condition, the diode load consists of resistors R229, R230 and R248 in the diode circuit and resistor R121 in the tripler circuit (figure 2–5). Both cathode and plate are at a negative potential of three volts. As the tuned circuits of the oscillator, first and second doublers, and tripler grid are tuned to resonance, the drive to the tripler circuit will increase. The portion of the resultant tripler grid-leak bias developed across resistor R121 is applied to the AVC diode cathode. Diode current will then flow, causing a negative voltage to appear on the AVC bus. This, in turn, will cause a reading on INPUT meter M501, as explained in paragraph 2*b* (3). The greater the meter deflection, the greater the drive and the grid-leak bias at the tripler grid; hence, an indication of alignment is obtained.

f. SILENCER. — The noise silencer (squelch) circuit is used to prevent noise from reaching the audio section of the receiver in the absence of an incoming signal of some predetermined minimum level. A controlled diode (V207B) between the first and second audio stages permits the audio signal to pass during conduction, and cuts off the audio signal when it is not conducting. The simplified schematic diagram of figure 2–12 shows the silencer circuit. Tube V207-B is one half of a type 6AL5W dual diode, and tube V208, the silencer amplifier, is a d-c amplifier which controls the diode.

The audio signal is fed to the cathode of V207-B from filter Z201 (see figure 2–1) through audio gain control R238 and capacitor C225. When the diode conducts, the audio signal reaches the second a-f amplifier through capacitor C226. The silencer circuit functions when the SILENCER switch (S501) is in the IN position. During reception of a signal a negative voltage is developed at terminal No. 6 of the i-f transformer T206. This voltage is applied, through resistor R231, to the grid of the type 6AK5W silencer amplifier tube, V208, as negative bias.

An additional bias voltage is applied to the grid of tube V208 through resistor R251 for the purpose of establishing the threshold of operation of the silencer tube. This voltage, which is positive in potential, is obtained from the regulated 105-volt supply through the voltage divider action of resistors R233 and R253. It can be adjusted from the front panel by means of SILENCER potentiometer R233 located in the right-hand compartment.

When no signal is being received the negative bias developed at the second detector is quite low, and, without silencing, some noise would be present in the audio output of the receiver. The SILENCER control potentiometer acts to silence this no-signal noise output by increasing the positive bias on the grid of tube V208. This causes tube V208 to draw more plate current and increases the voltage drop across resistor R235, thereby making the voltage applied through resistor R236 to the plate of the silencer diode (V207B) lower than the diode cathode voltage. This stops current flow in the diode and prevents the conduction of the audio signal through it.

When an input signal appears, the negative bias previously mentioned will increase, thereby reducing conduction in the silencer amplifier (V208) and raising the plate voltage. This makes the plate of the control diode (V207B) sufficiently positive for conduction and the output from the first audio stage is then allowed to pass to the second audio amplifier via the diode. In this manner noise is prevented from reaching the second audio amplifier when no useful signal is being received.

The level at which the silencer tube (V208) responds can be adjusted with potentiometer R254, the setting of which determines the screen voltage applied to that tube. This adjustment is used to compensate for possible changes in circuit constants occurring when V208 is replaced with a new tube (see paragraph 3*d* of Section 5). The SILENCER switch (S501), when thrown to its OFF position, opens the cathode circuit of V208, thereby stopping conduction in the silencer amplifier tube and rendering the silencer circuit inoperative.

g. AUDIO FREQUENCY CIRCUITS. — The three audio amplifier stages are generally conventional. Refer to the simplified schematic diagram of these circuits, figure 2–13. The first stage is a triode-connected type 6AK5W pentode (V209) subject to AVC. Its output is fed through the 350- to 3500-cycle band-pass filter (Z201) which discriminates against undesired frequency components but transmits the required voice frequencies. The signal passes through the a-f level control, R235, and the control diode (described in paragraph *f,* above) to the grid of the second audio stage (V210). This stage uses a ruggedized resistance-coupled pentode (type 6AK5W voltage am-

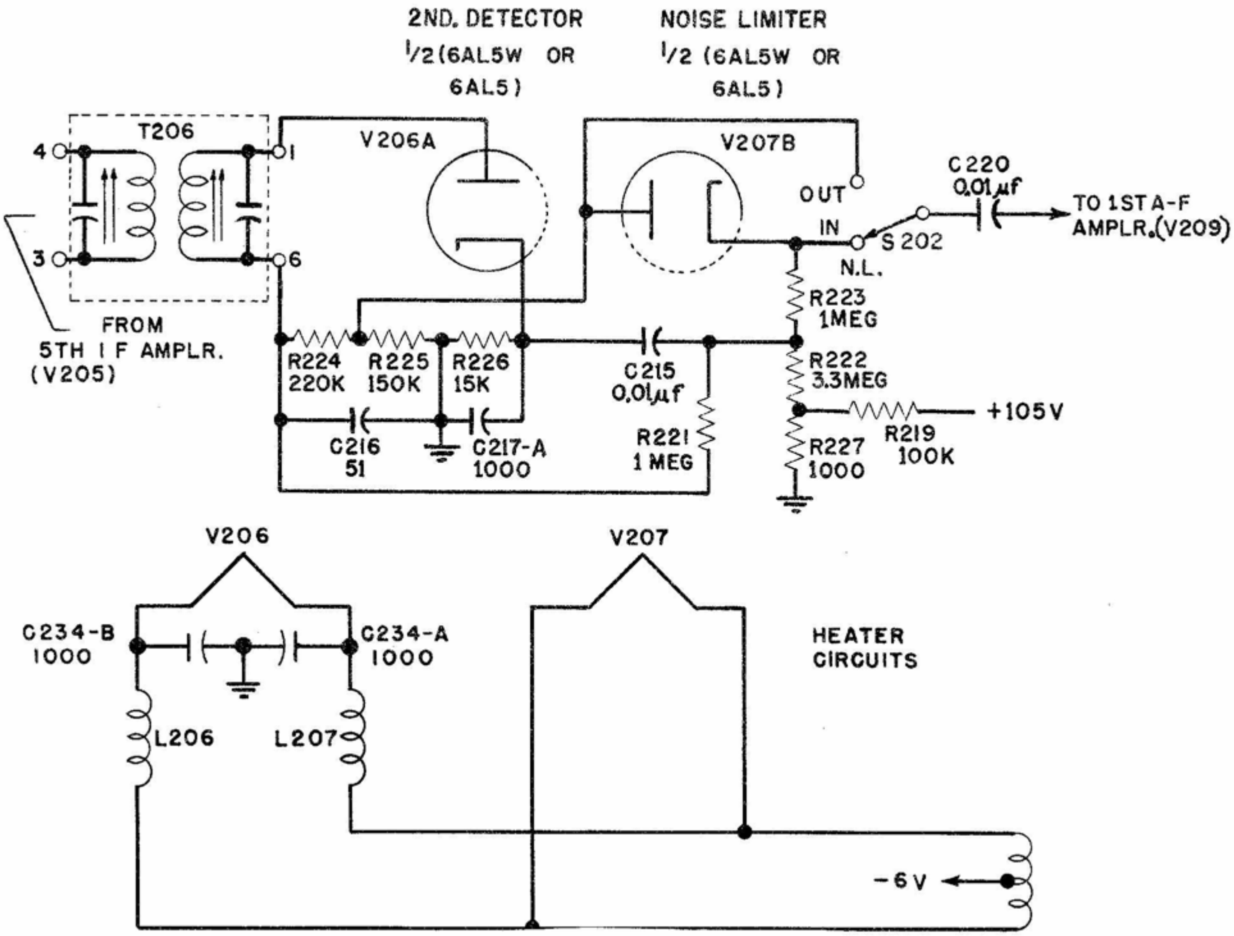


Figure 2—10. Simplified Schematic—Second Detector and Noise Limiter

plifier with an unby-passed cathode-bias resistor. Its output drives the final type 6AK6 pentode power stage (V211) which also operates with an unby-passed cathode-bias resistor. Feedback is used from the plate of the output stage (V211) to the cathode of the preceding stage (V210) in order to maintain a constant output voltage characteristic with a variation of output load impedance, such as would result from the plugging in or withdrawing of headphones, etc.

Audio signal from the amplifier is transmitted, via the electrostatically shielded output transformer T207, to the required output circuits. The impedance step-down of the transformer is 10,000 to 60 and the secondary provides balanced output. Signal from the secondary is fed via the r-f filter composed of L208, L209, C230, and C231 to the OUTPUT meter M502. Similarly it is fed via the PHONES gain control (R502) and associated r-f filter (L210, L211, C232, and C233) to the headphones jack (J501). A third circuit transmits audio output via the connector P301/J405 for external use through the output jack J402 located at the rear of the cabinet. This line is also filtered against external r-f fields by a combination of chokes (L405, L406, L407, L408) and capacitors (C405, C406, C407, C408). This filter is a part of Band Suppression Filter F-89/-URR-13.

For headphones use the front-panel PHONES volume control provides an audio level adjustment auxiliary to the main audio level control R238.

b. POWER SUPPLY. — A single power transformer (T301) supplies heater power for all tubes and, after rectification, high voltage dc for plates and screens, as well as a small negative voltage used for bias. See the power supply explanatory schematic diagram, figure 2–14, and the photograph, figure 2–15.

(1) FILAMENT AND HEATER SUPPLY. — Of the four secondary windings of transformer T301, three are for filament or heater power. One provides filament power at five volts for the type 5U4G rectifier, V301; a second supplies 6.3 volts for the detector, AVC, noise-limiter and noise-silencer diodes V206-A, V206-B, V207-A and V207-B; and a third provides 6.3 volts for all other tube heaters. The center-tap of the diode

heater secondary is connected to a six-volt negative potential instead of to ground. This bias on the heaters minimizes hum.

(2) PLATE AND SCREEN SUPPLY. — The type 5U4G rectifier, V301, provides full-wave rectification of the high voltage from the fourth transformer secondary, which is supplied at +180 volts for plates and at +105 volts for screens. A separate and regulated +150-volt output is provided for use on the local oscillator and first doubler stages of the converter circuit. Filtering is accomplished by capacitors C301, C302, C303, and the reactor L301. The inductance of the coil between terminals No. 1 and No. 2 is such that it is series-resonant at the ripple frequency in conjunction with the one-mf capacitor C302, and thus provides a low impedance path for ripple currents. Hum is therefore minimized. The 35-mf input capacitor C301 and output capacitor C308 are used in the conventional manner. A type OA2 gaseous regulator tube (V303) is used with the required series resistance (R307, R308, R310) to regulate the 150-volt oscillator supply. The type OB2 regulator (V302) operates with its series resistance (R302, R303, R309, R230, R248, and R301) to regulate screen voltage at +105 volts. Plate voltage is sufficiently stable without regulation.

(3) BIAS VOLTAGE. — Biasing voltages are obtained by operating the negative side of the rectifier output at a potential six volts below ground. This negative portion of the rectifier output is divided by resistors R248, R230 and R301 to provide a three-volt negative potential for holding bias. The full six-volt negative potential is applied to the heaters of diodes V206 and V207 to minimize hum.

(4) PRIMARY CIRCUIT. — The primary of power transformer T301 is tapped for operation from a 110-, 115-, or 120-volt, 50-60 cps a-c line. The power supply (and therefore the receiver) is turned on or off by the front-panel POWER switch, S502, which opens both sides of the input power line. Circuit protection is provided by the two fuses, F201 and F202, which are in fuse holders mounted inside the

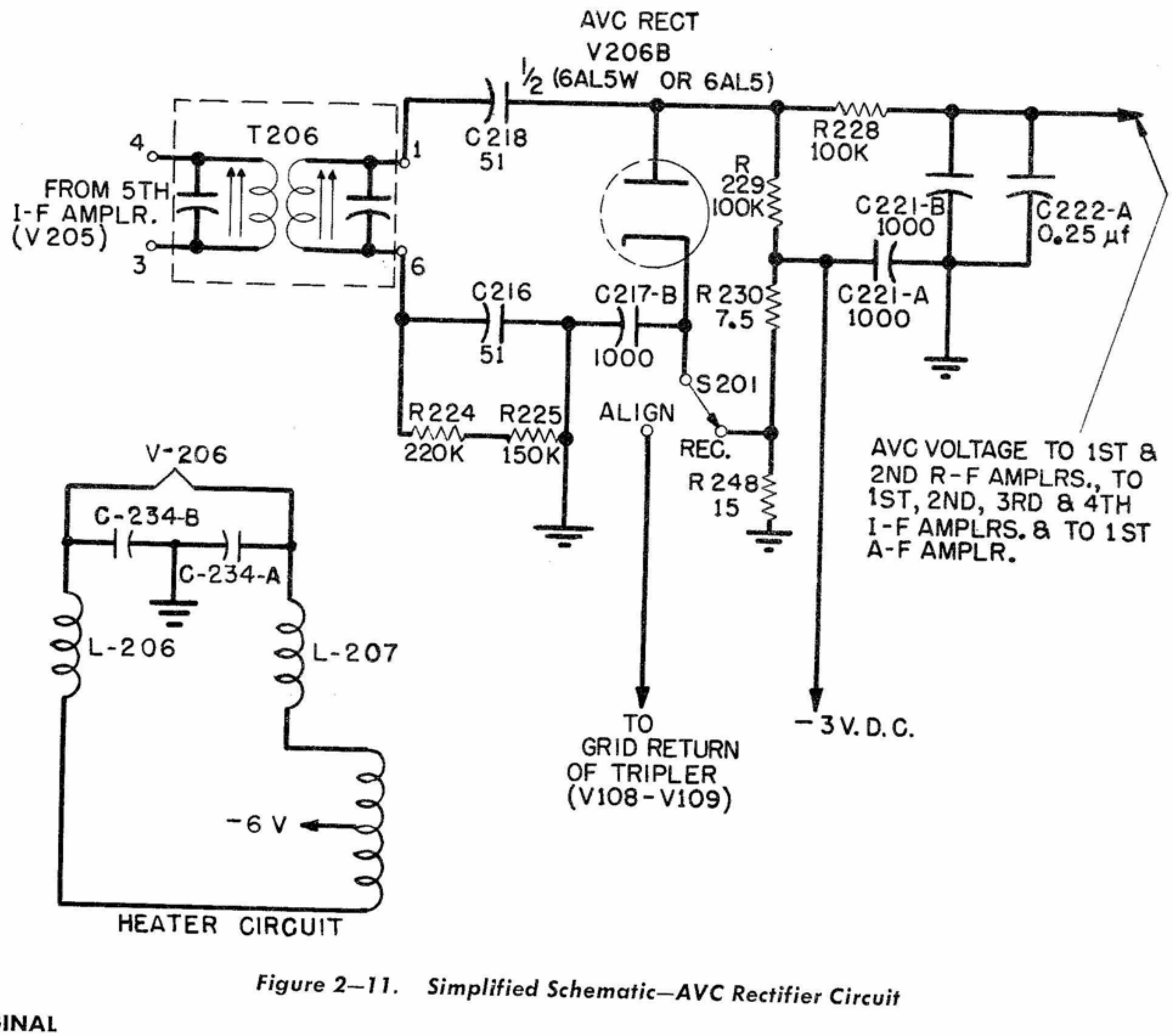


Figure 2—11. Simplified Schematic—AVC Rectifier Circuit

right-hand front-panel compartment. Line power is brought to the power supply via the connector P301/J405 from the filter box (Band Suppression Filter F-89/URR-13) and input receptacle J401 at the rear of the receiver. The circuit is filtered against external r-f fields by the two-section filter composed of chokes L401, L402, L403, and L404, and capacitors C401, C402, C403, and C404. The latter are contained in Band Suppression Filter F-89/URR-13.

(5) BLOWER AND THERMOSTAT. — The blower BL301 is mounted in the power supply section and is used to keep the operating temperature inside the receiver within satisfactory limits. It is controlled by the thermostat S301, which automatically turns on the blower whenever the inside ambient temperature reaches 60°C.

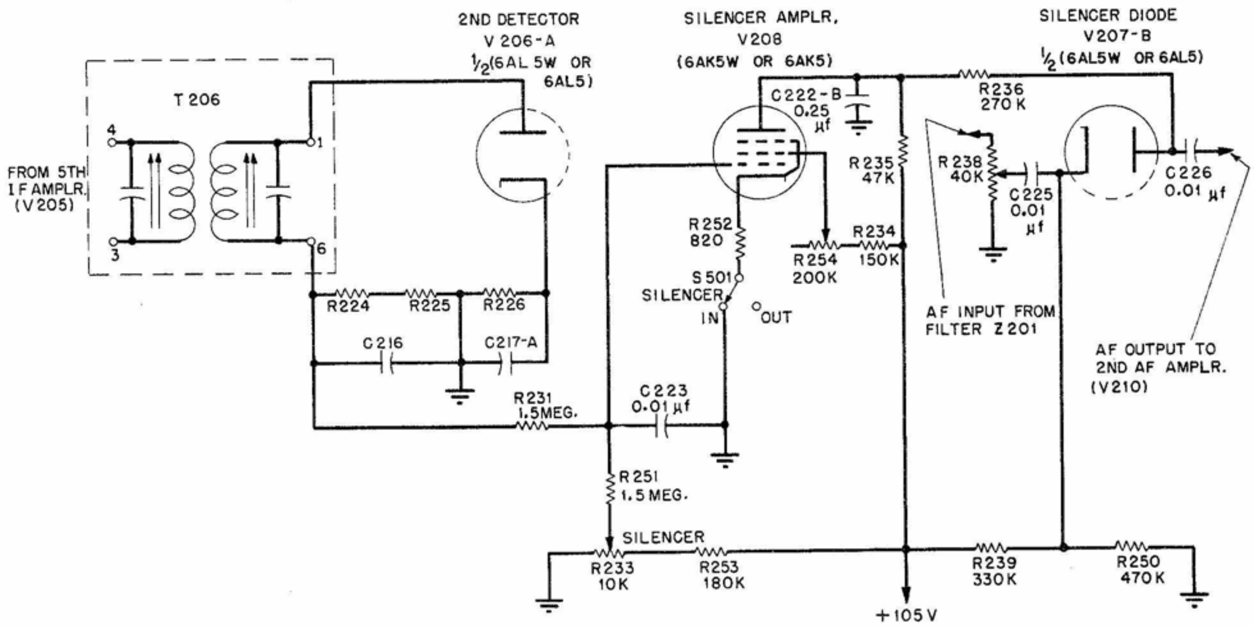


Figure 2—12. Simplified Schematic—Noise Silencer Circuit

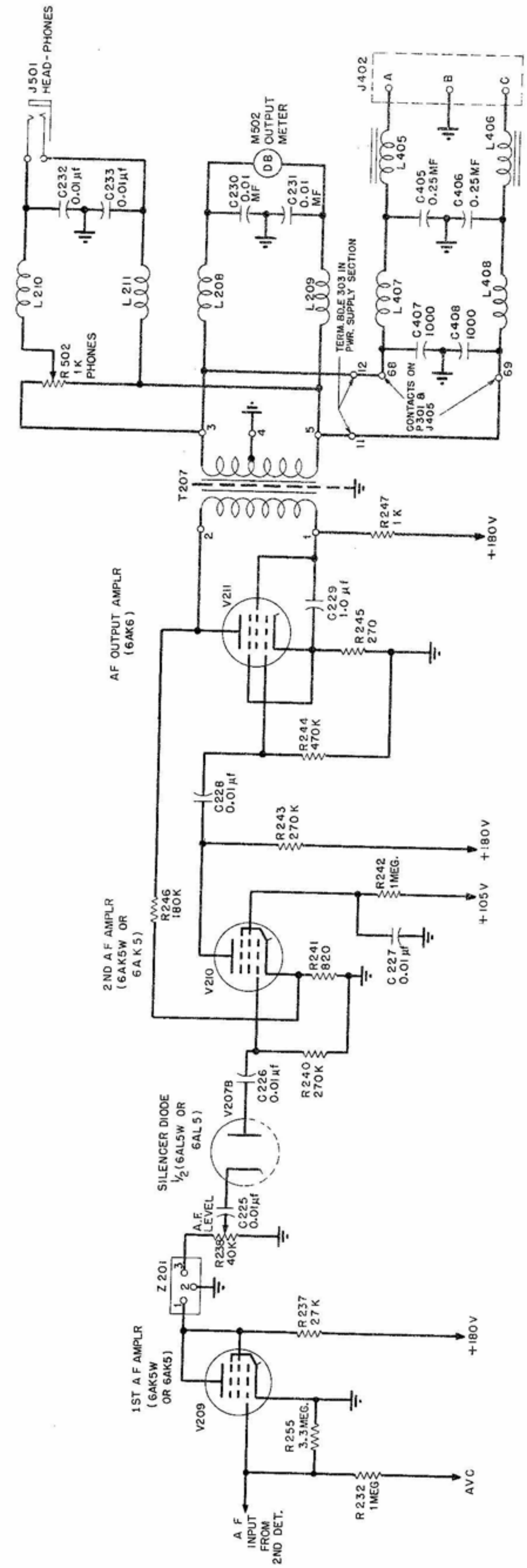


Figure 2–13. Simplified Schematic—Audio Frequency Circuits

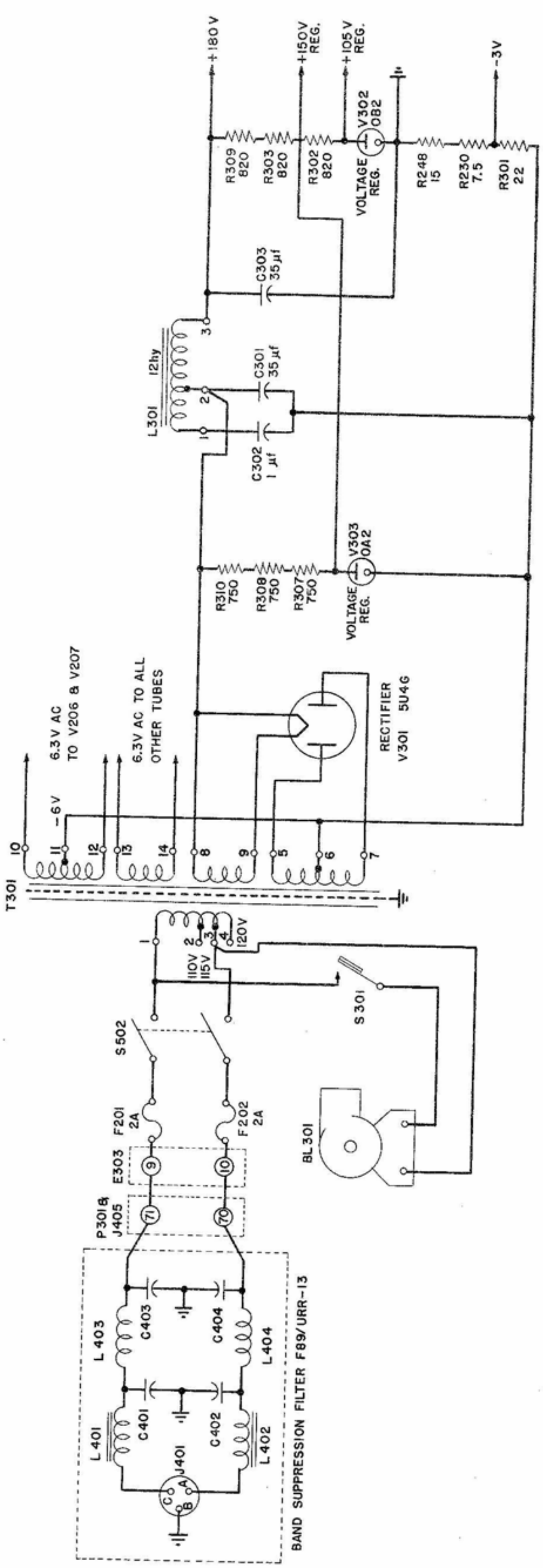


Figure 2–14. Simplified Schematic—Power Supply Section

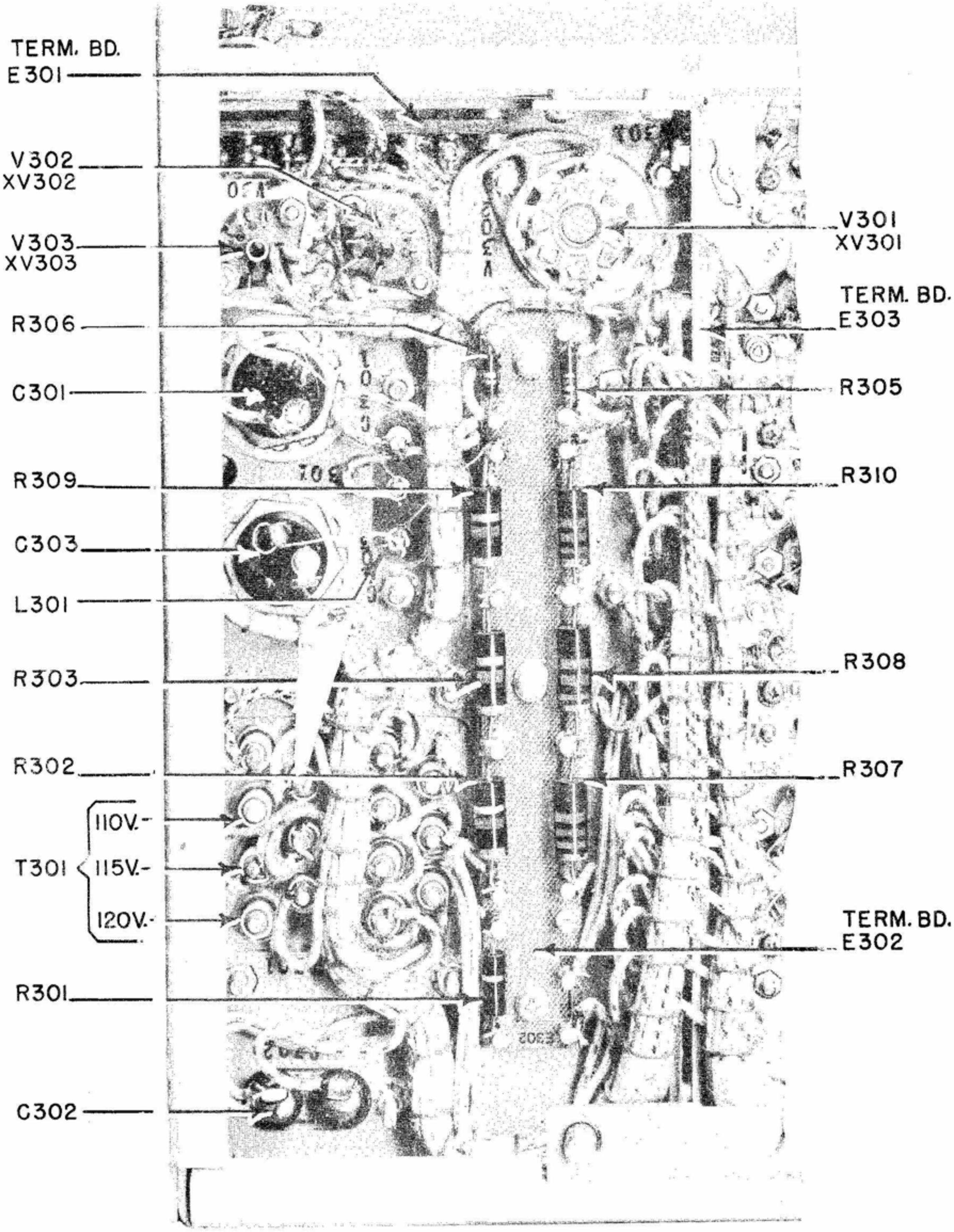


Figure 2–15. Underside of Power Supply Section

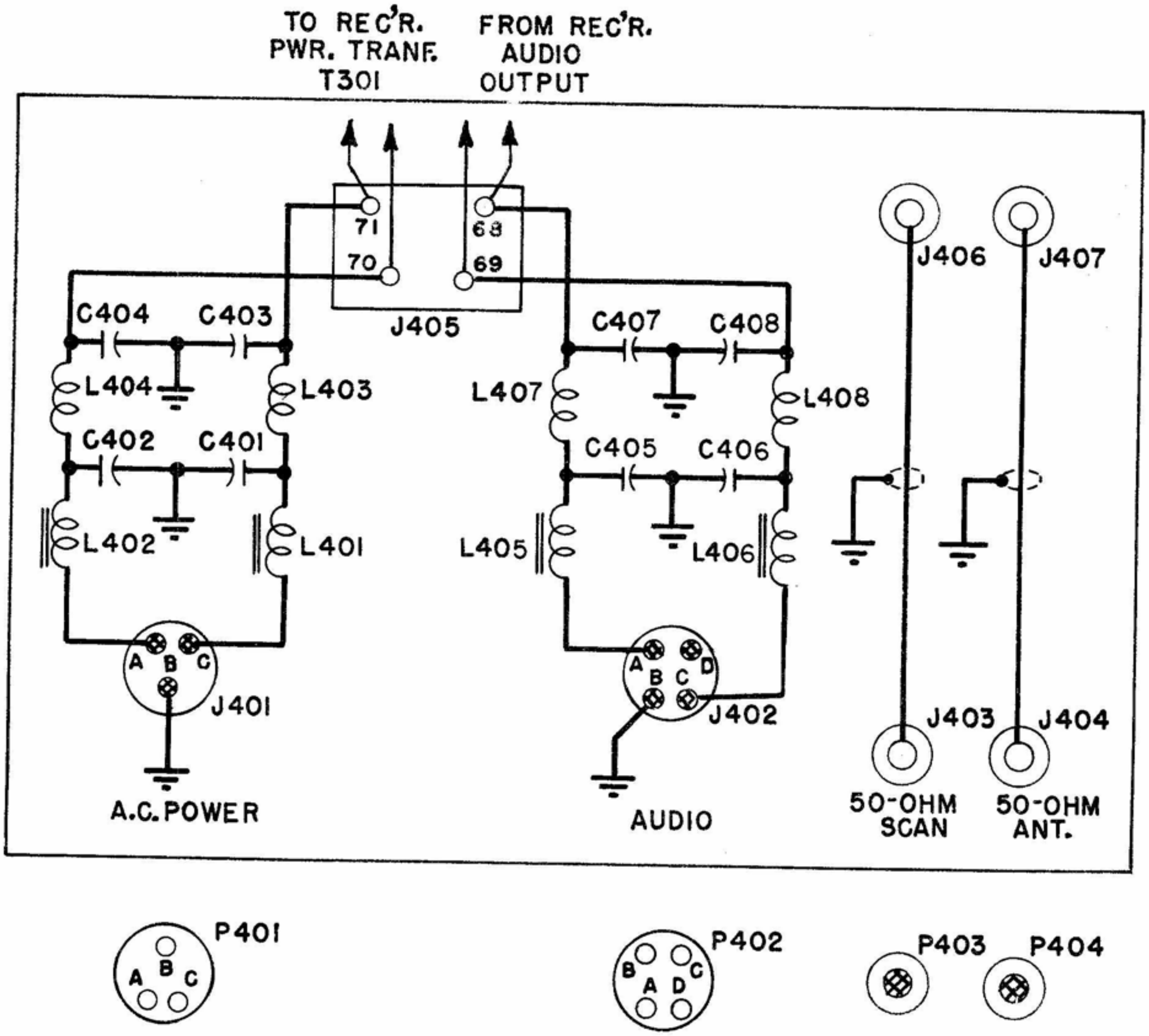
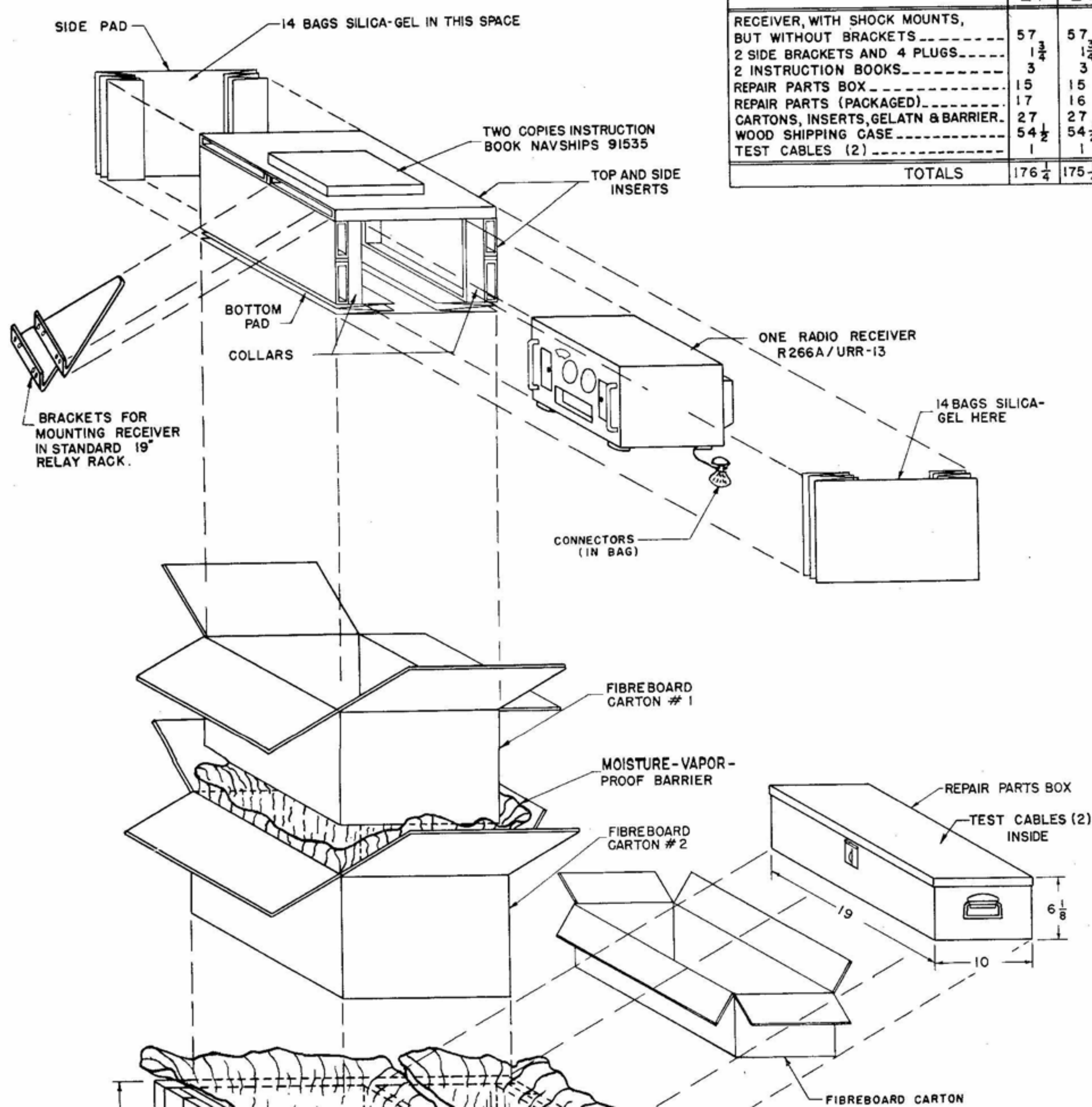


Figure 2–16. Simplified Schematic—Band Suppression Filter F-89/URR-13

TABLE OF WEIGHTS (POUNDS)

ITEM	NOBSR-52051	NOBSR-52304
RECEIVER, WITH SHOCK MOUNTS, BUT WITHOUT BRACKETS	57	57
2 SIDE BRACKETS AND 4 PLUGS	$1\frac{3}{4}$	$1\frac{3}{4}$
2 INSTRUCTION BOOKS	3	3
REPAIR PARTS BOX	15	15
REPAIR PARTS (PACKAGED)	17	16
CARTONS, INSERTS, GELATN & BARRIER	27	27
WOOD SHIPPING CASE	$54\frac{1}{2}$	$54\frac{1}{2}$
TEST CABLES (2)	1	1
TOTALS	$176\frac{1}{4}$	$175\frac{1}{4}$



SECTION 3
INSTALLATION AND INITIAL ADJUSTMENTS

1. INSTALLATION DRAWINGS.

A list of drawings useful in connection with the installation of the equipment, and reproduced in this book, is given in table 3-1 below, together with contractor's drawing numbers and instruction book figure numbers.

2. UNPACKING THE EQUIPMENT.

a. GENERAL. — Each complete Radio Receiving Set AN/URR-13A is shipped in a single wooden crate with the receiver and accessories in one end and the spare parts and spare parts chest in a compartment at the other end. The items comprising a complete AN/-URR-13A equipment are listed in table 1-1.

The method of packing the equipment is shown in figure 3-1. The receiver is separated from the walls of the inner paper carton by suitable paperboard spacers, and paperboard collars are used to protect the dials on the front of the cabinet and the cable filter (Band Suppression Filter F-89/URR-13) on the rear. The two angle brackets provided for use when the receiver is to be mounted on a relay rack are inserted in the voids of the top spacer, and the four connector plugs provided for use on external interconnecting cords are included in a separate cloth bag. The two copies of the instruction book are wrapped in a separate package which is placed on top of the top spacer.

The inner carton is placed inside a second carton and separated from it by a moisture-vapor-proof barrier. The outer carton is placed inside the larger compartment of the wooden crate and separated from it by a water-proof box liner. The moisture-vapor-proof barrier and the water-proof box liner are heat sealed at the time the equipment is packed for shipment.

To unpack the equipment:

(1) Remove the top panel of the crate using a nail puller.

(2) Cut open the water-proof box liner.

(3) Break sealing tape and open the outer cardboard carton.

(4) Cut moisture-vapor-proof barrier between outer and inner carton.

(5) Break sealing tape and open the inner cardboard carton.

(6) Lift out instruction books.

(7) Lift out top paperboard spacer.

(8) Remove relay rack-mounting brackets from void spaces in this piece.

(9) Locate and remove bag containing four connectors (P401-P404).

TABLE 3–1. INSTALLATION DRAWINGS

Item No.	Subject of Drawing	FTRC Drawing No. & Size	Instruction Book Figure Number
1.	Outline Drawing—Radio Receiver R-266A/URR-13	FRE-19942-26	3-9
2.	Outline Drawing—Preselector	FRE-26117-14	3-10
3.	Outline Drawing—Band Suppression Filter F-89/URR-13	FRE-19968-12	3-11
4.	Outline Drawing—Relay Rack Mounting Brackets	FRJ-27474-12	3-7
5.	Outline Drawing—Repair Parts Box	FRE-26630-2	3-8
6.	Interunit Connection Diagram	FRJ-27821-2	3-4
7.	Block Diagram—Complete Receiver	FRJ-27481-3	2-1
8.	Overall Schematic Diagram—Radio Receiver R-266A/URR-13	FRD-21171-26	7-17
9.	Wiring Diagram—Receiver Chassis	FRD-20430-26	7-18
10.	Wiring Diagram—Preselector	FRD-20324-14	7-19

(10) Remove silica gel bags (28) from recesses in side paperboard spaces.

(11) Lift out receiving set.

(12) Discard paperboard collars protecting front and rear of receiver.

(13) Cut waterproof box liner in smaller compartment of shipping crate.

(14) Lift out repair parts chest.

b. RE-INSTALLATION OF RECTIFIER TUBE. — The only part removed from its normal location for shipment is the large type 5U4G rectifier tube (V301). This tube is wrapped in several thicknesses of Kimpak batting and placed on the receiver chassis within the receiver cabinet.

To remove the chassis from the cabinet loosen the four fasteners in the extreme corners of the front panel, by giving each a quarter-turn to the left, and pull the chassis forward until the spring-actuated stops on the bottoms of the side rails prevent further travel; then release these stops (one on each side) by pressing them upward and pull the chassis completely out of the cabinet (figure 5–1). To remove Band Suppression Filter F-89/URR-13 from the rear of the cabinet, reach inside the cabinet to the back (see figure 3–3) and squeeze together the handles of the pairs of snap-slide fasteners located at the top, at the bottom and at each side of the rear wall.

To restore tube V301, loosen the tube clamp (attached to chassis), if in closed position, by flipping toggle; insert the tube, and then tighten the tube clamp toggle, using a screwdriver shaft if the space is too cramped for the fingers.

c. MECHANICAL CHECK. — The equipment should be inspected for possible damage or disarrangement during shipment. Check to see that no nuts, washers, bits of solder or other foreign particles have become lodged where they might cause a short circuit, and tighten any screws or nuts which may have worked loose. A careful search should also be made for broken wires and loose connections since a detailed mechanical inspection at this time may save much inconvenience in the long run. All mechanical controls should be operated in each alternate position, or through their full range of travel, in order to detect any bent shafts or other evidences of abnormal operation. Also check to see that all tubes are well seated in their sockets, that all tube shields are firmly in place, and that fuses F101 and F102 are in their holders, and the holders in place, in the right-hand panel compartment.

Note

The latest approved installation instructions should be followed irrespective of the information given in this section.

3. INSTALLATION.

a. LOCATION OF EQUIPMENT. — In locating the receiver consideration should be given to the accessibility of a suitable source of 110-120-volt, 60-cps power, of the antenna lead-in, and of any supplemental equipment which may be employed. It should be located where adequate fresh clean air is available for ventilation. Also, clearances should be adequate to permit removal of the chassis from the cabinet, and to permit access to tubes and adjustments in the preselector without complete removal of the chassis.

The receiver is shipped with four shock mounts attached ready for installation on a table or bench. These should be removed and the angle brackets attached to the cabinet in their stead if the receiver is to be installed in a standard relay rack.

(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 remove the receiver chassis from the cabinet, locate the cabinet in the desired permanent position and drill four 3/8 inch diameter holes in the bench, in line with the centers of the shock mounts. Next drop a 5/16 inch diameter bolt through the hollow core of each shock mount and the hole in the bench below it, and thread on a nut against a suitable washer from the underside. These nuts should be drawn up tight, but not tight enough to place the shock mounts under compression; then a second nut should be added and jammed tight against the first to prevent loosening.

Before dropping the mounting bolts through the shock mounts make sure that the phosphor-bronze ground strap provided is located in the hollow of one of the shock mounts so that the bolt passing through that shock mount 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 shock mount involved.

(2) RELAY RACK MOUNTING. — If the receiver is to be mounted on a standard relay rack, it will be necessary to remove the four shock mounts from the bottom of the cabinet and to attach the two angle brackets provided to the sides of the cabinet (see figures 3–2 and 3–7). The shock mounts 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 ½ inch long Phillip's head machine screws. Five holes in each bracket line up with five tapped holes in each side of the cabinet. The required screws will be found threaded into the tapped holes in the cabinet. Removal of the shock mounts will also cause detachment of the phosphor-bronze grounding strap which is ordinarily connected between one of the shock-mount mounting screws and the 5/16 inch diameter cabinet mounting bolt which drops through the hollow core of the shock mount. This strap will not be needed for relay rack mounting, but should be put in safe keeping for possible future use.

b. EXTERNAL CONNECTIONS. — External connections are made to suitable connectors on the rear of Band Suppression Filter F-89/URR-13 on the rear

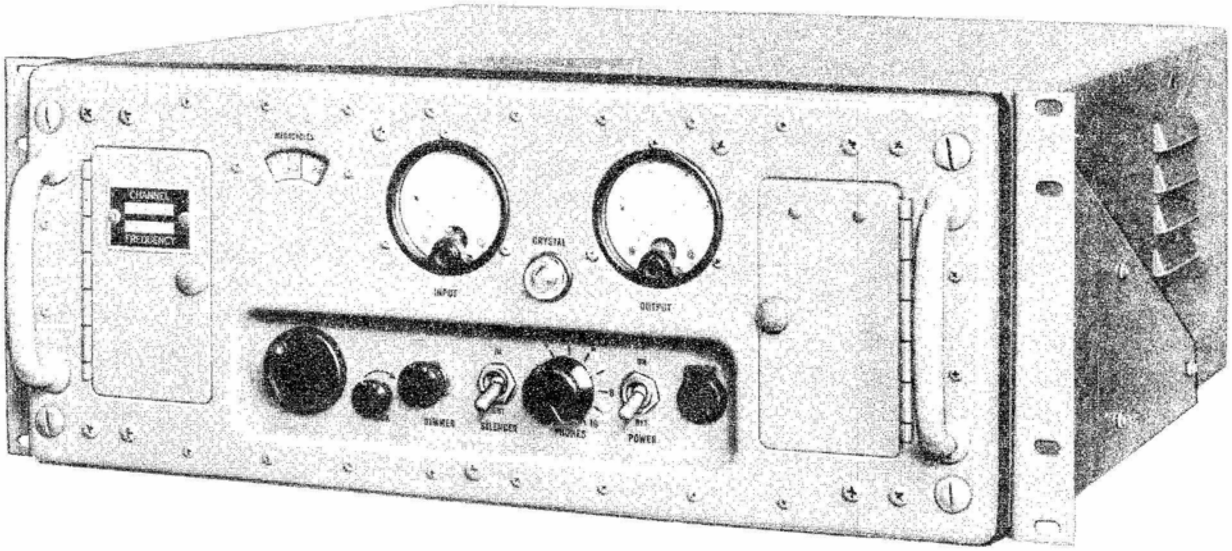


Figure 3—2. Front View, Shock Mounts Removed, Relay Rack Mounting Brackets Attached

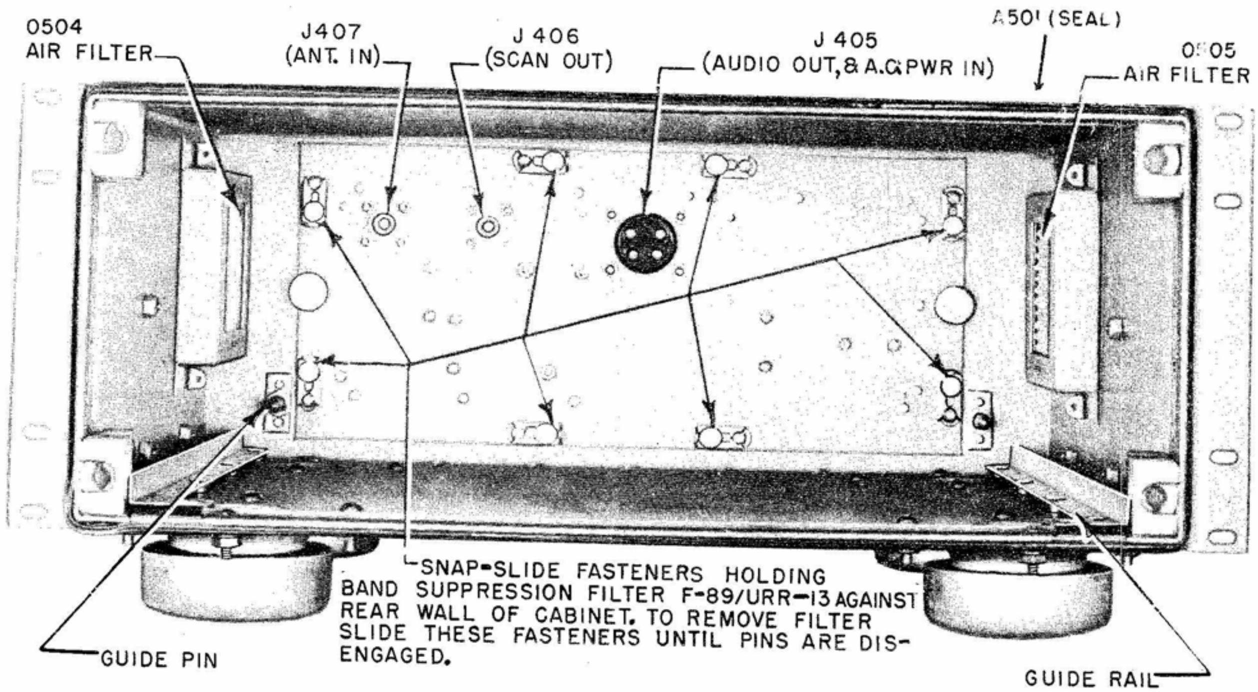


Figure 3—3. View into Cabinet Showing Front of Band Suppression Filter F-89/URR-13, and Method of Attachment of Same to Cabinet

of the receiver chassis. Cables for making external connections to the receiver are not supplied, but connectors (plugs) suitable for use with such cables are provided. The types and functions of these plugs are indicated in figure 3-4, and summarized in table 3-2 below.

Procedures for making up cables from coaxial transmission line and coaxial connectors are shown in figures 3-5 and 3-6.

The plug provided for the power cable (P401) has three female contacts. Contacts A and C connect to the a-c line and contact B to ground. Pins A and C on the 4-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, and Pin D is unused.

The ground lug on the back of the band suppression filter, between receptacles P403 and P404, should be connected to the station ground via a short length of copper braiding, not less than ½ inch wide.

The power input receptacle (J401) is wired to the primary of power transformer T301 through the band suppression filter. The primary of this transformer is tapped to permit operation of the receiver from a 60-cps power source of 110, 115 or 120 volts potential (see figures 2-15 and 2-14). Terminals 1 and 2 should be used for a 110-volt input, terminals 1 and 3 for a 115-volt input and terminals 1 and 4 for 120 volts. In the equipment, as shipped, this transformer is wired for 115-volt operation.

c. PREPARATION FOR OPERATION.

(1) GENERAL.

(*a*) 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. The correct crystal frequency to be used can be determined from this formula:

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

(*b*) Connect one end of the a-c power cable to the A.C. POWER receptacle on the rear of the set, and the other end to a source of 115-volt, 60-cps power (or to a 110-volt or 120-volt source if connection has been made to proper tap on primary of transformer T301, as explained above).

(*c*) Connect cable from transfer panel or speaker-amplifier to AUDIO receptacle on rear of set.

(*d*) Connect antenna lead-in plug to 50-OHM ANT. receptacle on rear of set.

(*e*) Position the receiver controls as follows:

CRYSTAL-MANUAL switch S203 (in left compartment)—in CRYSTAL position.

N. L. (noise limiter) switch S202 (in rt. compartment)—in OUT position.

SILENCER switch S501—in OUT position.

A.F. LEVEL control R238 (screwdriver; rt. compart.)—maximum (full clockwise) position.

TABLE 3-2. CONNECTORS (PLUGS) SUPPLIED WITH AN/URR-13A EQUIPMENT FOR MAKING EXTERNAL CONNECTIONS

Circuit Symbol of Plug	Circuit Symbol of Mating Receptacle	Circuit in Which Used	Type Wire or Cable to be Used with Plug	Plug Type (and/or FTRC Dwg. Number)
P401	J401	110-120 v, 60 cps power input	MCOS-2	AN-3106-14s-7S + AN-3057-6 cable clamp (FRE-24367-1-1)
P402	J402	Audio output to interphone, or other audio listening device(s).	TTHFWA-1	AN-3106-14-s-2S + AN-3057-6 cable clamp (FRE-24367-1-2)
P403	J403	50-ohm scan output (to panoramic adapter, if used)	AN Type RG-8/U or RG-10/U	Navy Type (—49195)
P404	J404	50-ohm antenna input	AN Type RG-10/U	AN Type UG-21B/U

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

PHONES control R502—in position "8".

(*f*) Throw POWER switch S502 to its ON position. After about four seconds the neon panel lamp marked CRYSTAL (I503) should light indicating that the receiver is under crystal control and that plate (B+) power is on. If the panel is not illuminated properly, use DIMMER control R501 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 and proceed to tune for the selected channel frequency.

(2) CRYSTAL CONTROLLED TUNING. — Rotate the tuning control crank until the selected channel frequency appears on the calibrated dial visible through the window above, 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 OUTPUT meter M502. Under this condition INPUT meter M501 should read zero. If it does not it should be so adjusted by means of INP. MTR. potentiometer R214 in the right-hand compartment. The equipment is now ready for operation as a crystal-controlled receiver. If desired, SILENCER switch S501 may now be thrown to its IN position and the SILENCER control (R233) knob in the right compartment adjusted for the desired silencing level. If the noise level is excessive when a signal is being received, the N.L. switch (S202) in the right-hand compartment may be thrown to its IN position. Use of the noise limiter circuit will cause a drop of about three db in the reading on OUTPUT meter M502. With no signal the level indicated on M502 should be between -5db and +10 db.

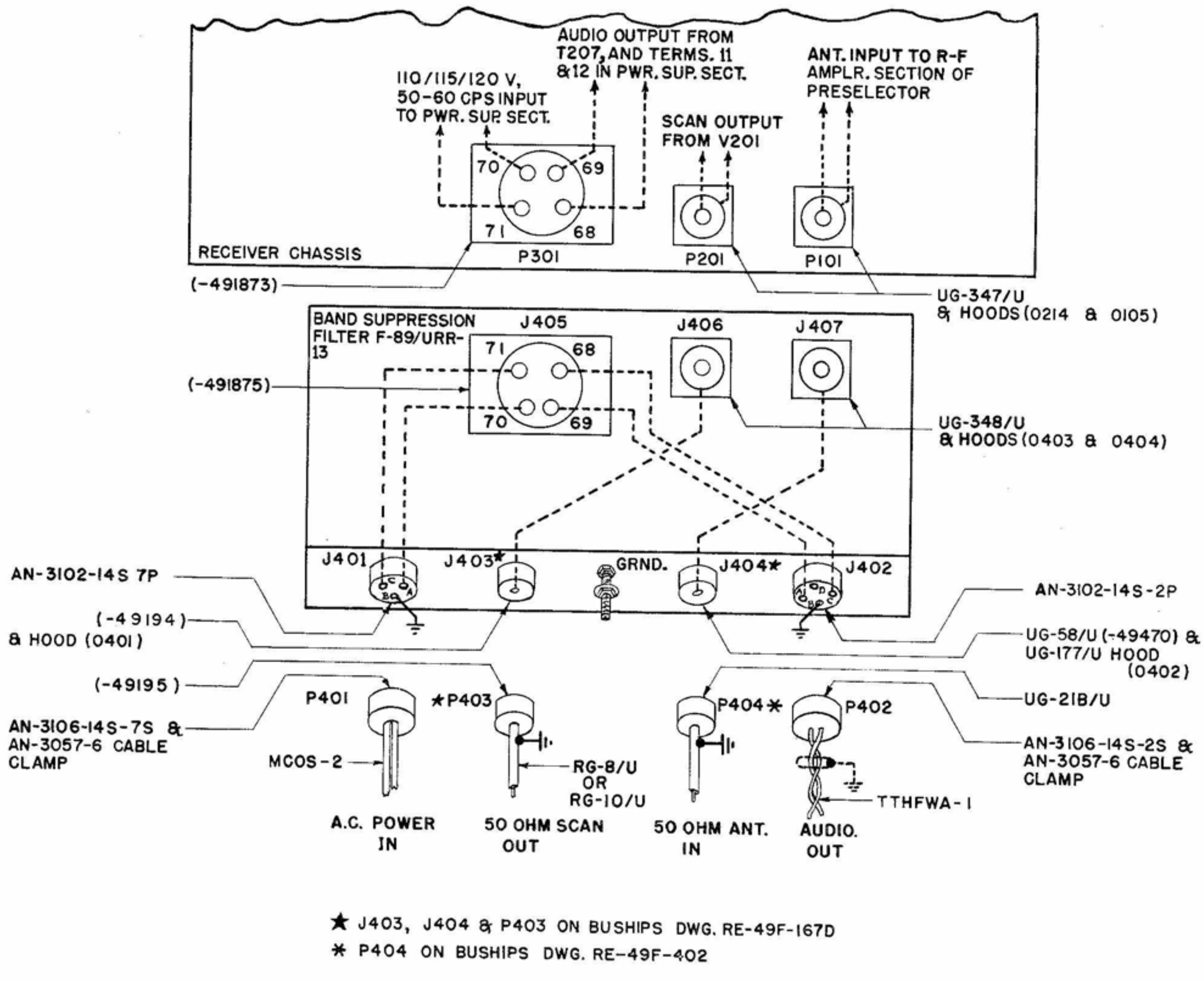


Figure 3—4. Locations of Connectors, and of I-f and R-f Cables

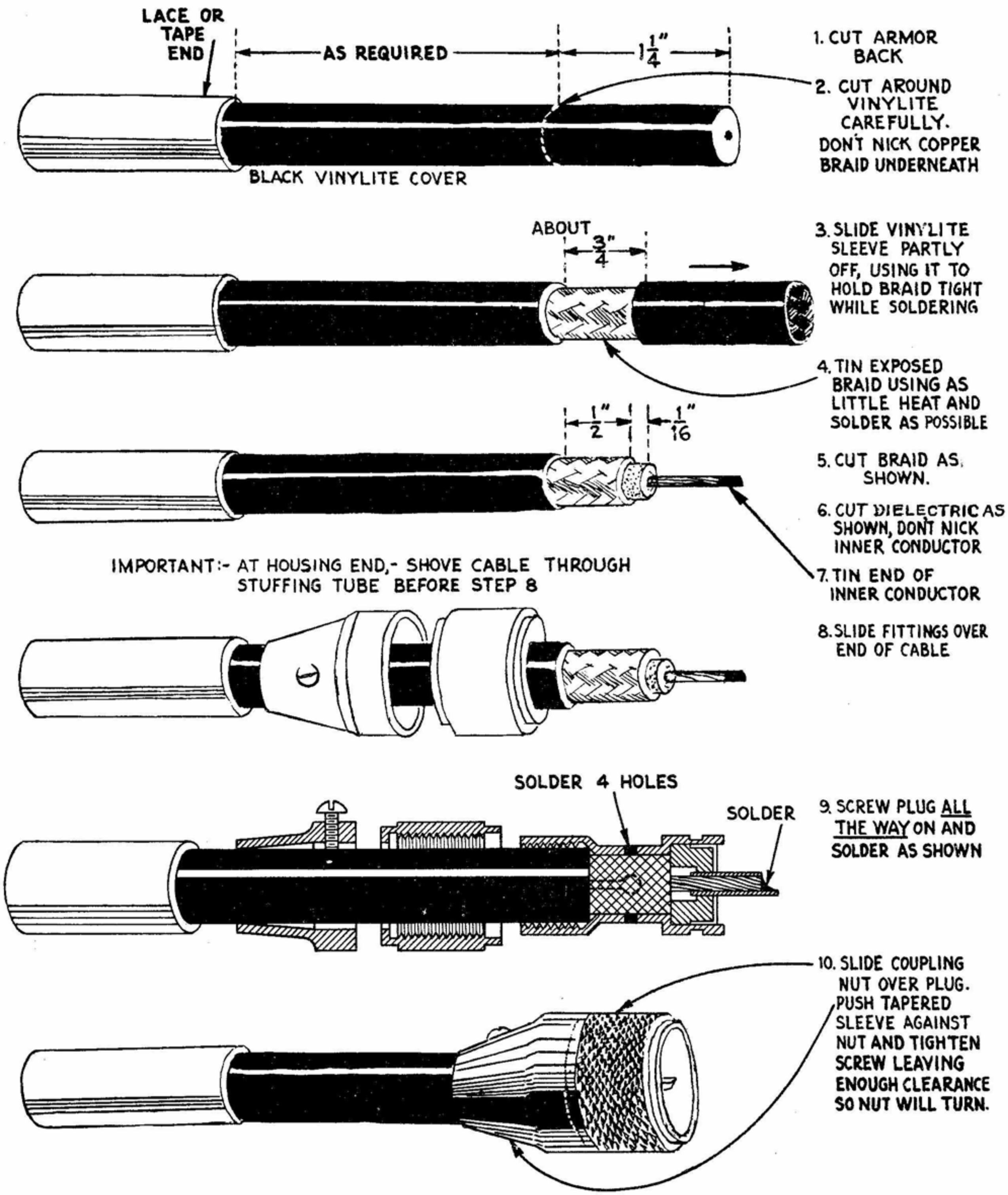
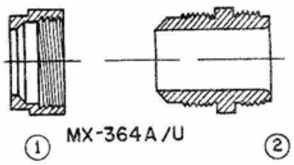


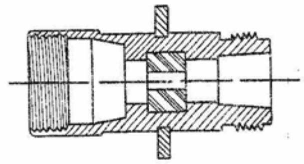
Figure 3–5. Method of Assembling Plug P403 (Navy Type -49195) to AN type RG-8/U or RG-10/U Coaxial Transmission Line to Form SCAN Output Cable

INSTRUCTIONS FOR ASSEMBLY

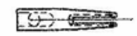
OF AN TYPE UG-21A/U, UG-21B/U, UG-22A/U, UG-22B/U, UG-23A/U OR UG-23B/U CONNECTOR TO AN TYPE RG-10/U COAXIAL CABLE.



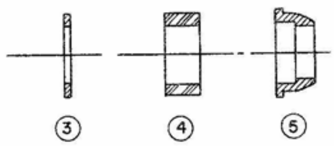
CABLE CLAMPING PARTS

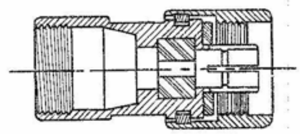


JACK BODY

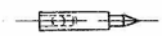


FEMALE CONTACT

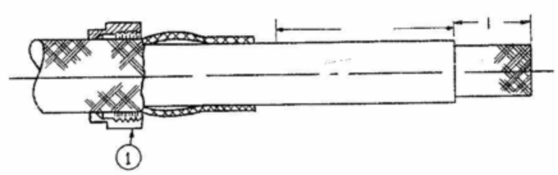




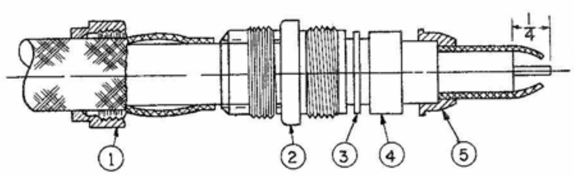
PLUG BODY



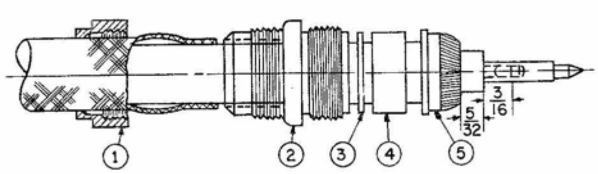
MALE CONTACT



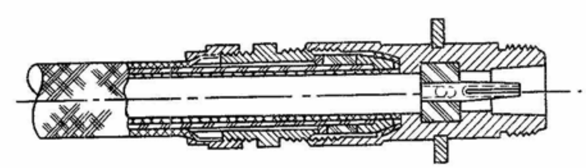
1. SLIDE PART #1 OVER ARMOR AND PUSH ARMOR BACK. CUT VINYLITE OUTER JACKET OFF, SQUARE AND EVEN, ONE INCH FROM END, BEING CAREFUL NOT TO DAMAGE WIRE BRAID.



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. Method of Assembling Plug P404 (AN Type UG-21B/U) to Coaxial Transmission Line (AN Type RG-10/U) to Form Antenna Input Cable

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 (M502).

When tuning to a channel within the frequency range of 225-233 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 within the frequency range of 387-400 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, visually, at the approximate frequency of the desired channel, then the final adjustment made by peaking the output meter for maximum noise indication.

(3) MANUALLY CONTROLLED TUNING. — To operate the equipment as a continuously variable manually tuned receiver throw the CRYSTAL-MANUAL switch (S203) in the left-hand compartment to its MANUAL position. This will cause the neon panel lamp marked CRYSTAL (I503) to go out. The receiver may now be tuned to any frequency within the 225-400 mc range by operation of the single tuning control crank, 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 eight microvolts for a 10-db signal-to-noise ratio over the entire range.

(4) SCAN OUTPUT. — This output is used for operation of a panoramic adapter.

For instructions on the use of such equipment, consult the manual supplied with it.

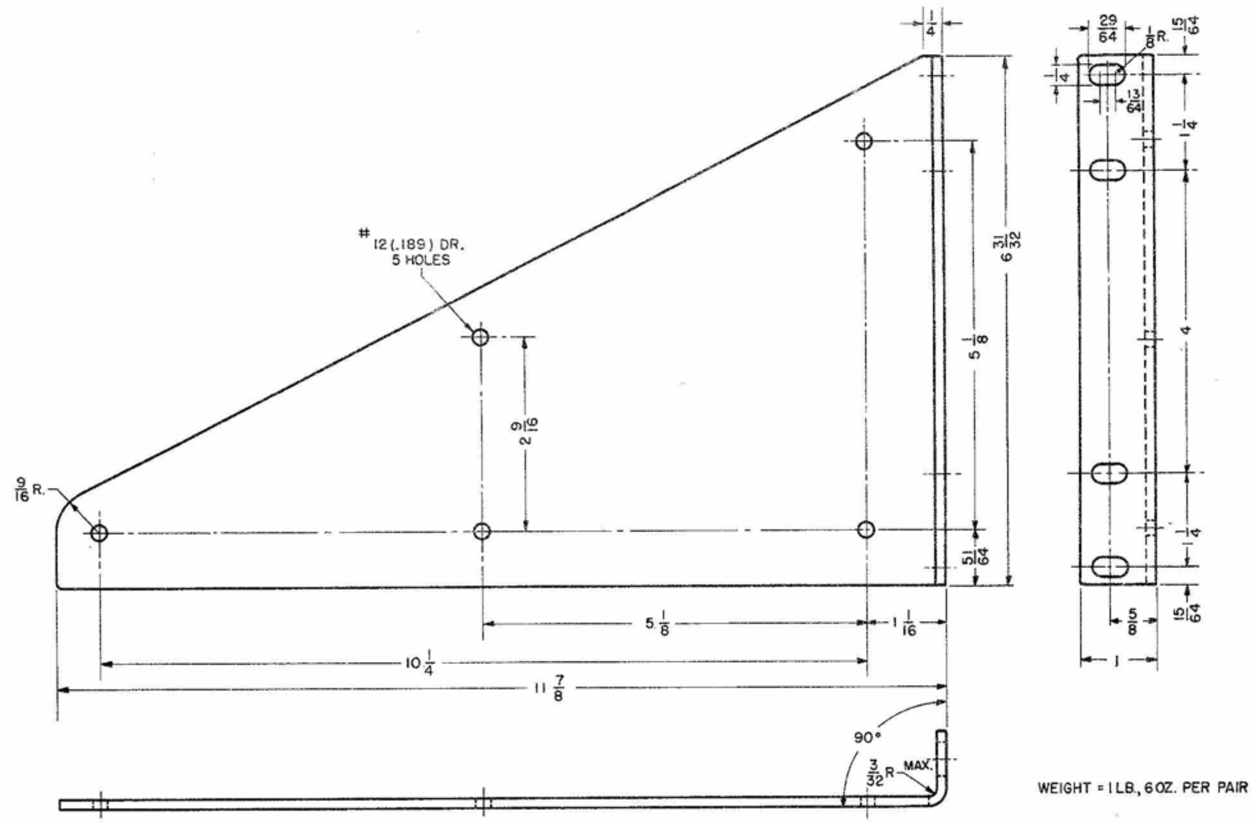
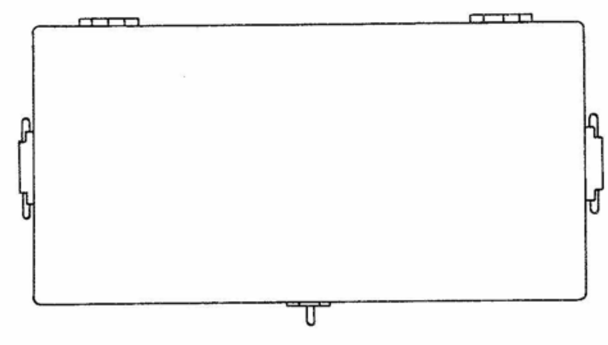


Figure 3—7. Outline Drawing—Relay Rack Mounting Brackets



CONTRACT	WEIGHTS (POUNDS)		
	BOX	CONTENTS	TOTAL
NOBsr - 43176	15	8	23
NOBsr - 52051	15	17	32
NOBsr - 52304	15	16	31

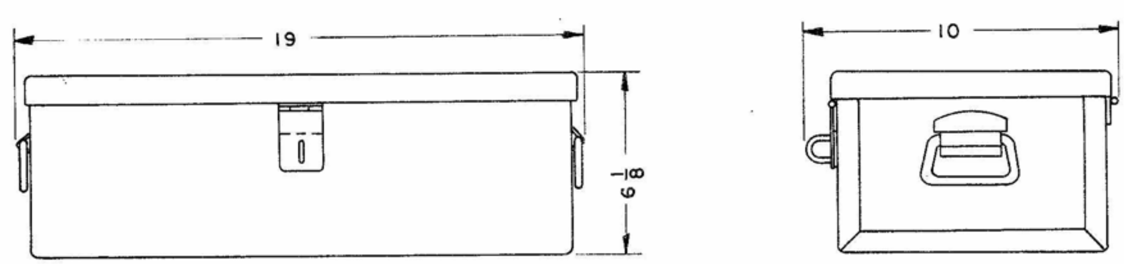


Figure 3—8. Outline Drawing—Repair Parts Box

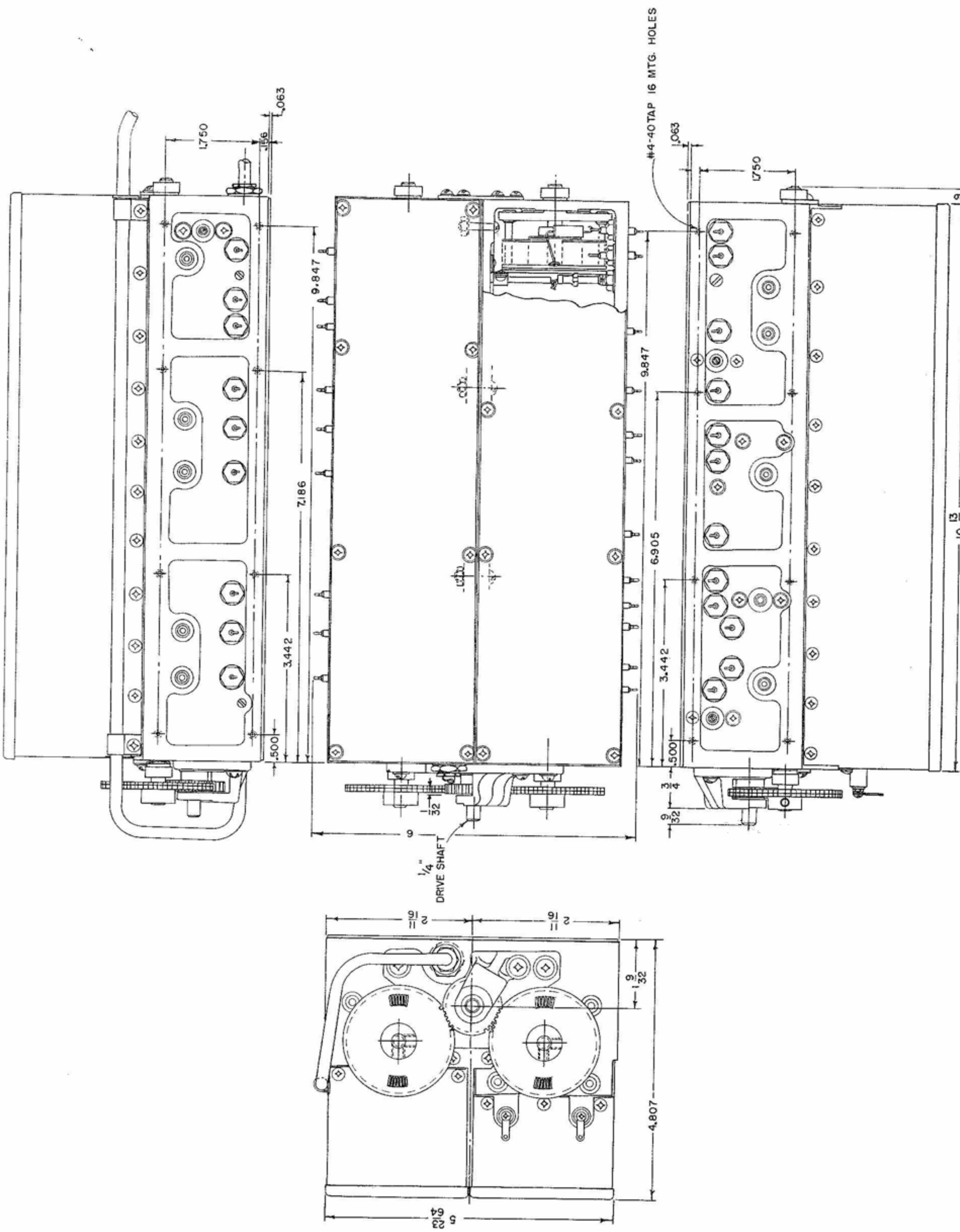


Figure 3–9. Outline Drawing—Preselector (Z107)

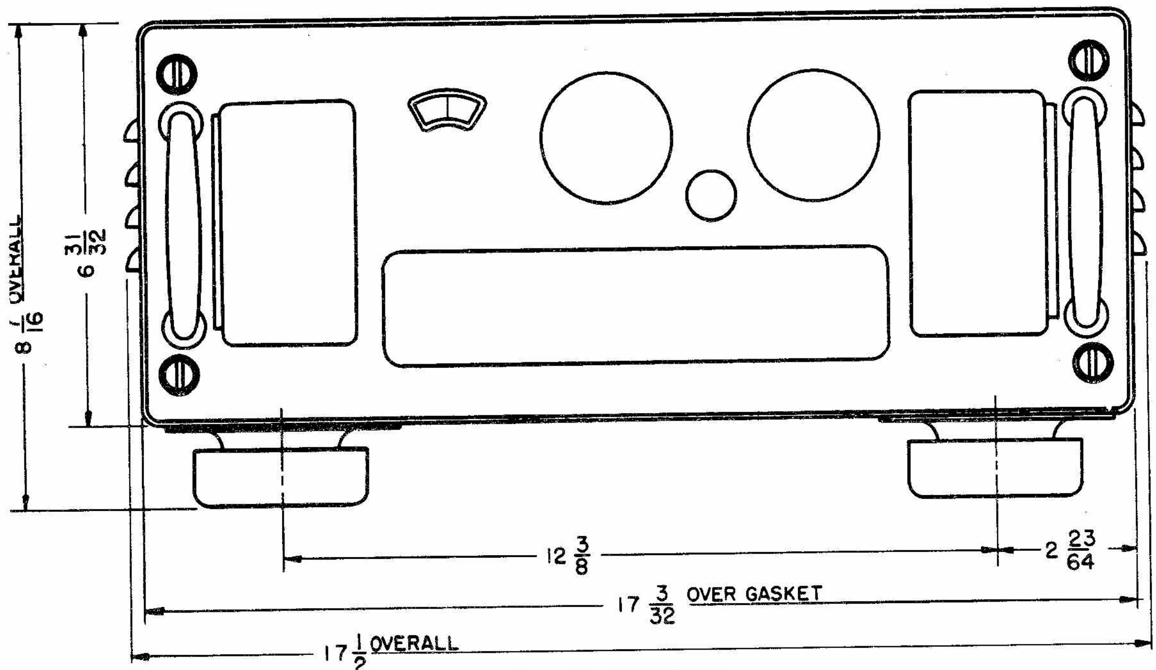
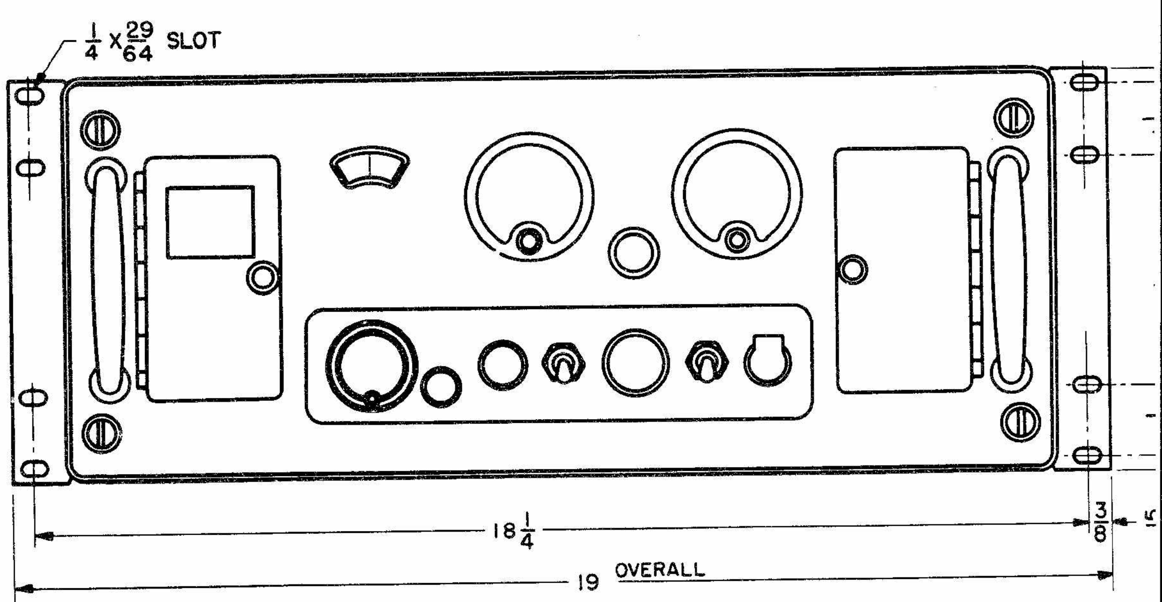
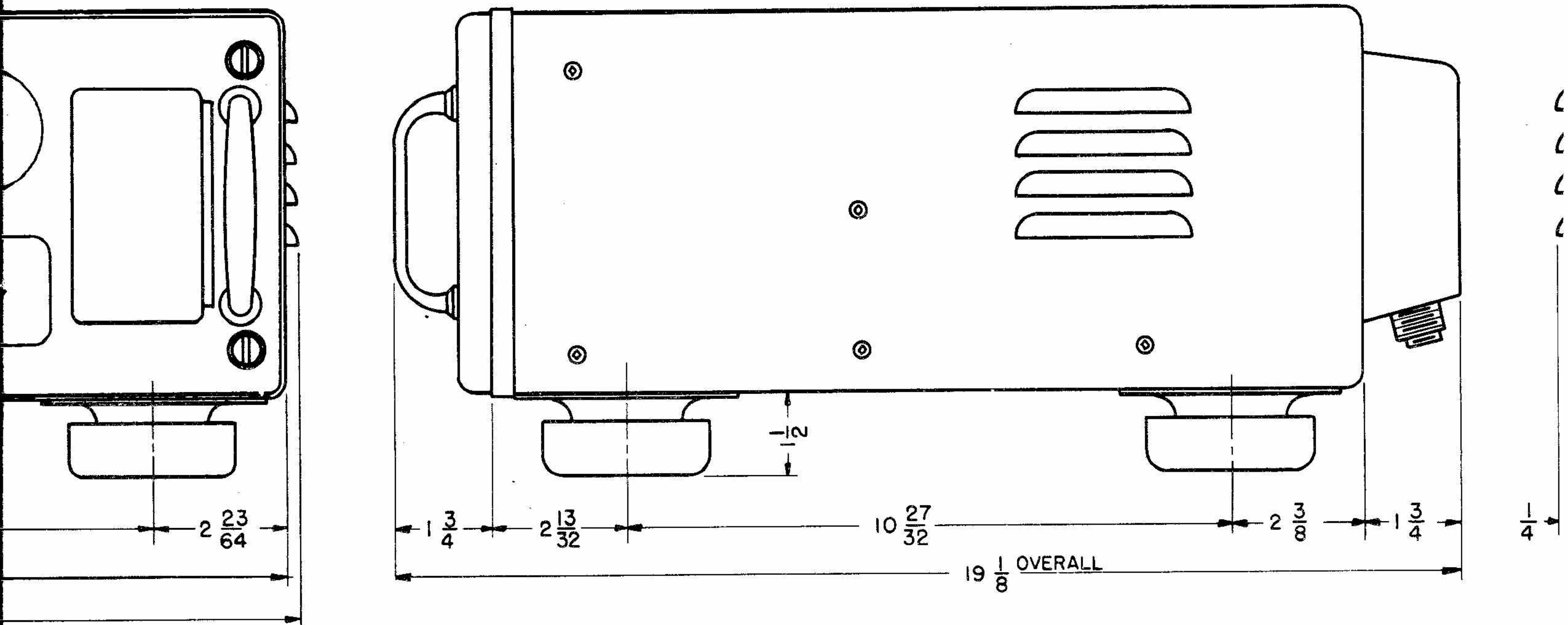


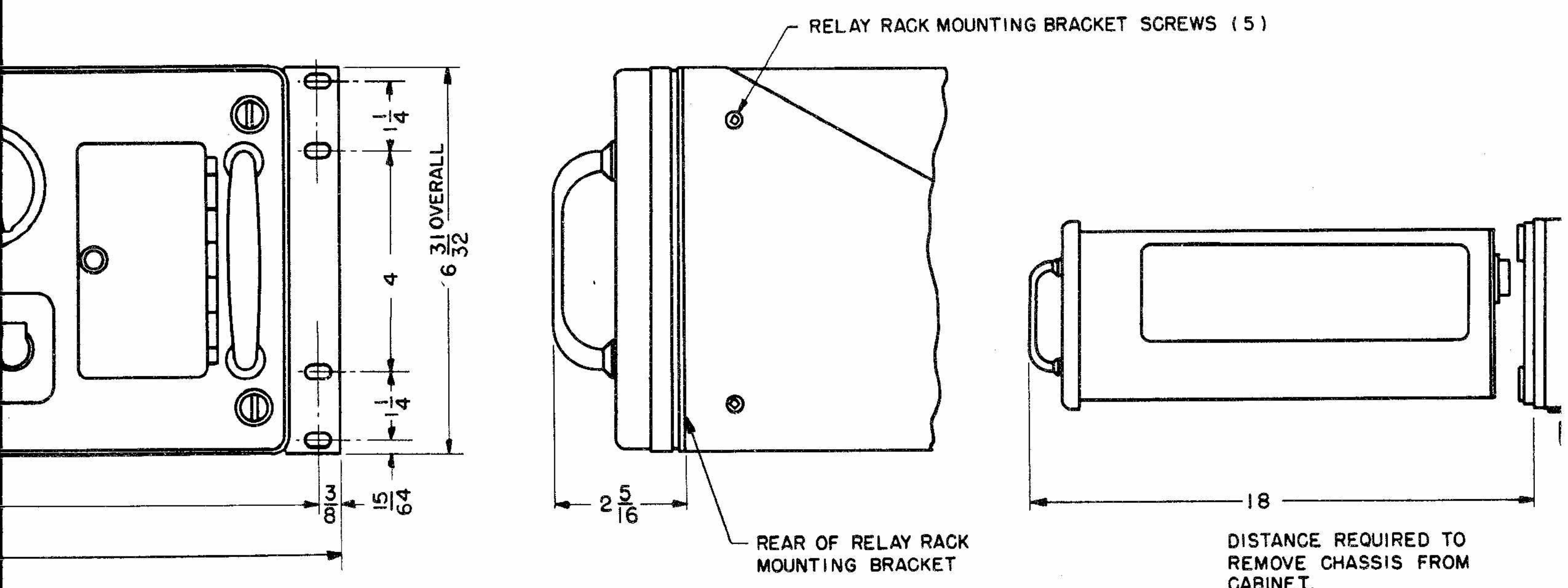
TABLE MOUNTING



RELAY RACK MOUNTING

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 ATTACHED TO CABINET.





BRACKETS; SHOCK
ARE FASTENED TO

WEIGHT — 57 POUNDS WITH SHOCK MOUNTS, LESS RELAY RACK MOUNTIN

POWER REQUIRED — 120 WATTS

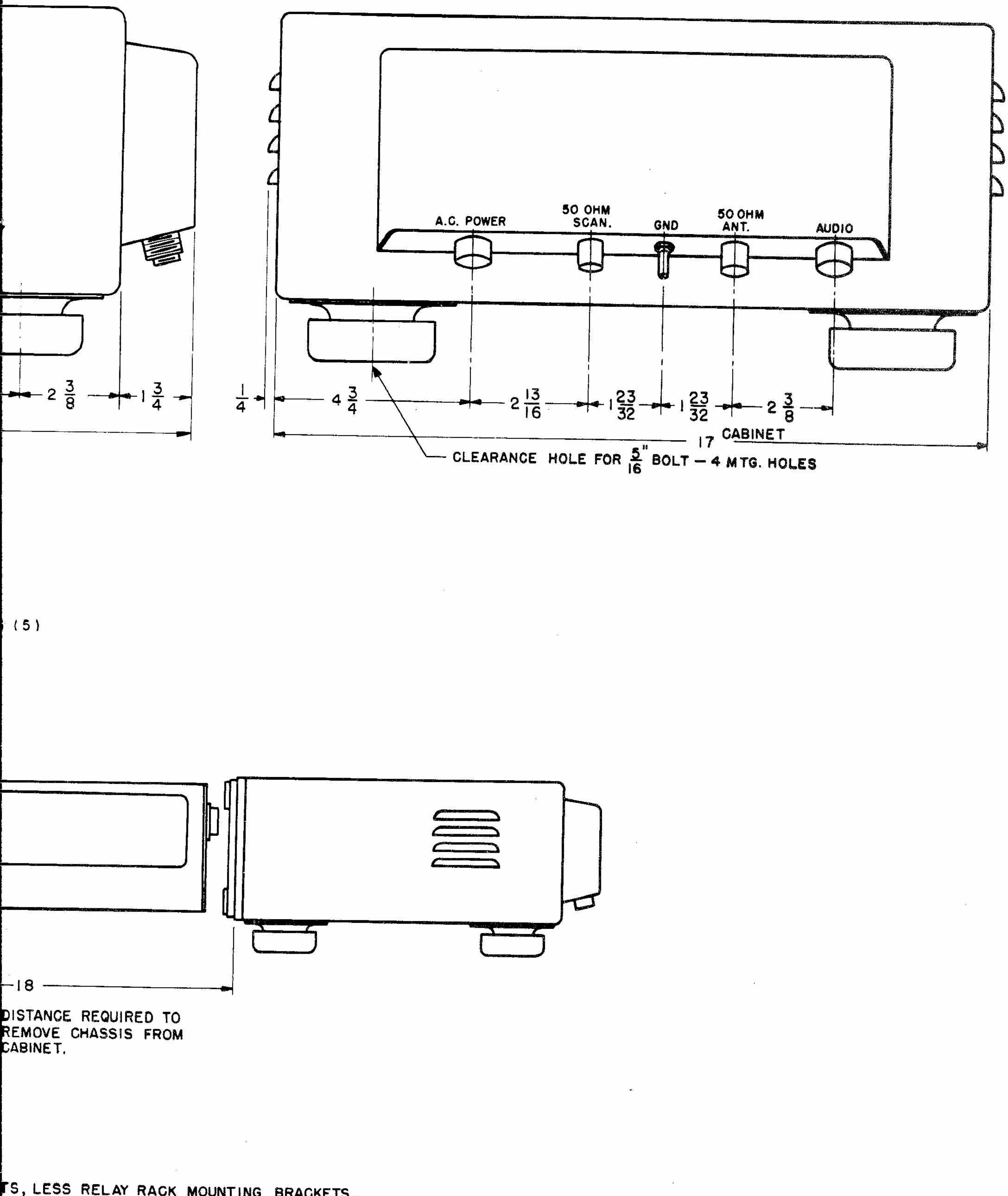


Figure 3—10. Outline Drawing—Radio Receiver R-266A/URR-13

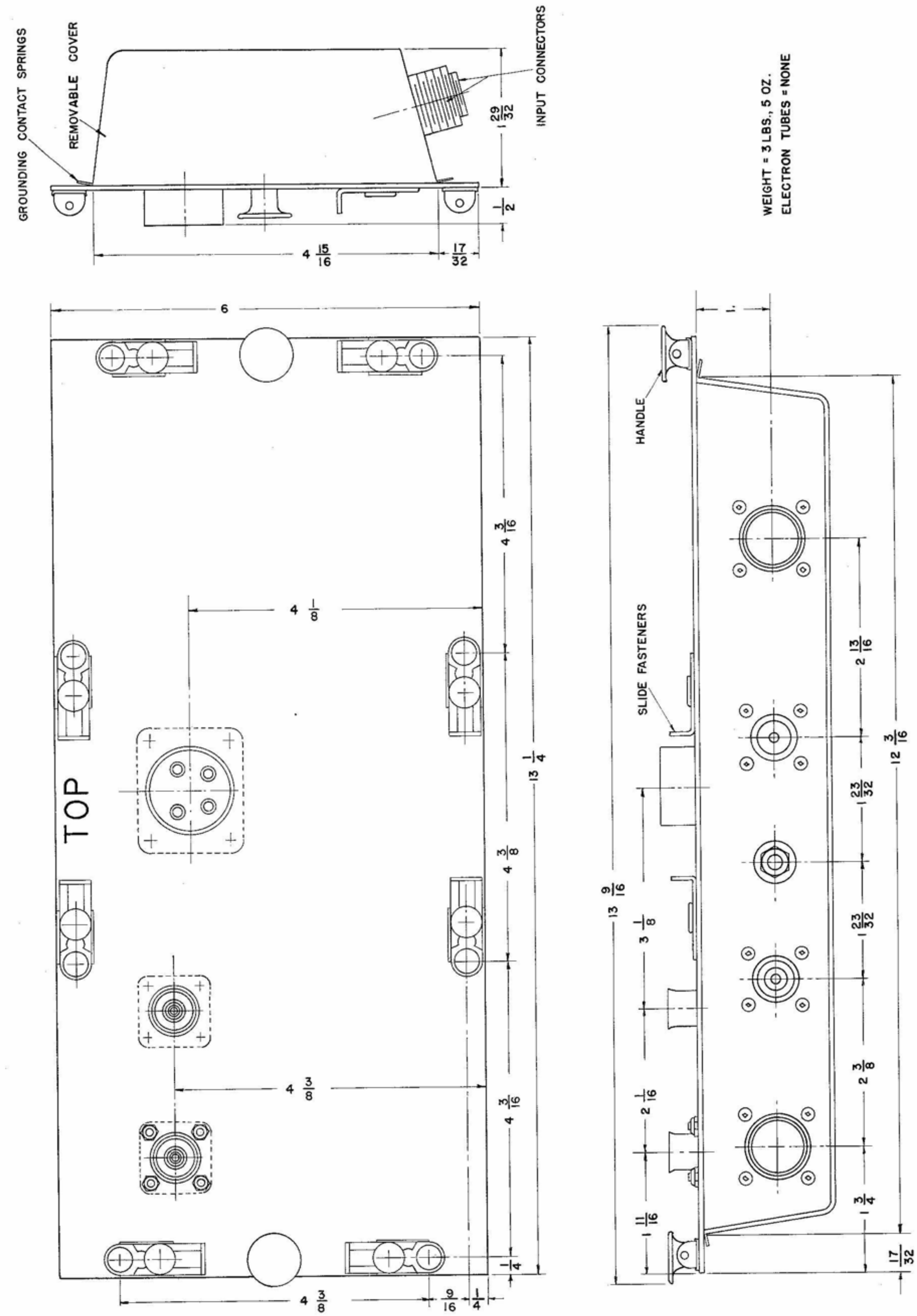


Figure 3—11. Outline Drawing—Band Suppression Filter F-89/URR-13

SECTION 4
OPERATION

1. PRELIMINARY.

It is assumed that before being turned over to the operating personnel the AN/URR-13A equipment will have been installed, and all necessary adjustments made according to instructions given in Section 3. It is also assumed that those frequencies to which the receiver is likely to be tuned will have been determined and that suitable crystals for those frequencies will be ready at hand (if crystal-controlled tuning is to be employed).

The operator should be familiar with all controls on the panel of the receiver, and in the panel compartments, and should be able to tune his receiver to any channel in the 225-400 megacycle range of the equipment.

2. CONTROLS PROVIDED AND THEIR LOCATIONS.

The panel locations of all controls is described in Section 1, and illustrated in figure 4–1. The functions of all controls are described fully in Section 2.

In general, the most used controls are recessed in the lower part of the central portion of the front panel, while the crystal and little used adjustments are enclosed in the two compartments on either side. The input and output meters, the panel lamp which indicates crystal operation, and the viewing window for the calibrated tuning indicator are flush with the front panel above the recessed section.

The primary controls are, from left to right, the tuning crank, and tuning LOCK beside it, the DIMMER control for the tuning indicator lamps, the SILENCER IN-OUT switch, the PHONES audio level control and the POWER ON-OFF switch. The PHONES jack is to the right of all these.

In the left-hand compartment, from bottom to top, are the crystal holder, the CRYSTAL-MANUAL switch used to transfer from crystal-controlled to manually controlled tuning, and, above these, a switch to be thrown by maintenance personnel when aligning the receiver.

In the right-hand compartment, from bottom to top, are the A.F. LEVEL control used to adjust audio level at the AUDIO output connector J402, the SILENCER control used to adjust the threshold at which automatic noise silencing takes place, the noise limiter (N.L.) IN-OUT switch, the fuse-holders for fuses F201 and F202 and the INP. MTR. zero adjustment control. A spare fuse (F203) is mounted in clips on the inside of the compartment door.

3. MODES OF OPERATION.

a. MANUALLY CONTROLLED TUNING. — With manually controlled tuning the receiver can be tuned continuously over the entire 225-400 megacycle range in the manner of any standard superheterodyne receiver. This range is covered by 19 complete turns of the tuning crank which stops automatically at each end of the tuning range. As the crank is rotated, the frequency to which the receiver is tuned is indicated on a calibrated dial which is apparent through the viewing window in the panel above. No adjustments other than rotation of the crank are necessary, though it may be desirable at times to adjust the volume control, or to cut the noise limiter circuit in or out.

b. CRYSTAL-CONTROLLED TUNING.—Crystal-controlled tuning 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. However, this mode of operation has the advantages of stability and freedom from drift, and an inherent capacity for sharper tuning. The essential difference between the two modes of tuning is that the oscillator, instead of being a free-running oscillator which is made to track with the tuning of the incoming r-f signal, is a fixed-frequency oscillator whose frequency is controlled by the crystal employed.

4. OPERATING THE RECEIVER.

a. PREPARATION FOR OPERATION.

(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. The correct crystal frequency to be used can be determined from this formula:

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

(2) Position the receiver controls as follows:

CRYSTAL-MANUAL switch S203 (in left compartment)—in CRYSTAL position.

N.L. (noise limiter) switch S202 (in rt. compartment)—in OUT position.

SILENCER switch S501—in OUT position.

A.F. LEVEL control R238 (screwdriver; rt. compartment)—maximum (full clockwise) position.

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

PHONES control R502—in position "8".

(3) Throw POWER switch S502 to its ON position. After about four seconds the neon panel lamp marked CRYSTAL (I503) should light indicating that the receiver is under crystal control and that plate (B+) power is on. If the panel is not illuminated properly, use DIMMER control R501 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 and proceed to tune for the selected channel frequency.

b. CRYSTAL-CONTROLLED TUNING. — Rotate the tuning control crank until the selected channel frequency appears on the calibrated dial visible through the window above, 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 OUTPUT meter M502. Under this no-signal condition the INPUT meter M501 should read zero, and the level indicated on OUTPUT meter M502 should be between -5 db and + 10 db. If meter M501 does not read zero it should be so adjusted by means of INP. MTR. potentiometer R214 in the right-hand panel 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 (M502).

When tuning to a channel within the frequency range of 225-233 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 within the frequency range of 387-400 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, visually, at the approximate frequency of the desired channel, then the final adjustment made by peaking the output meter for maximum noise indication.

c. SILENCER OPERATION. — If desired, the silencer (squelch) circuit may be put into operation

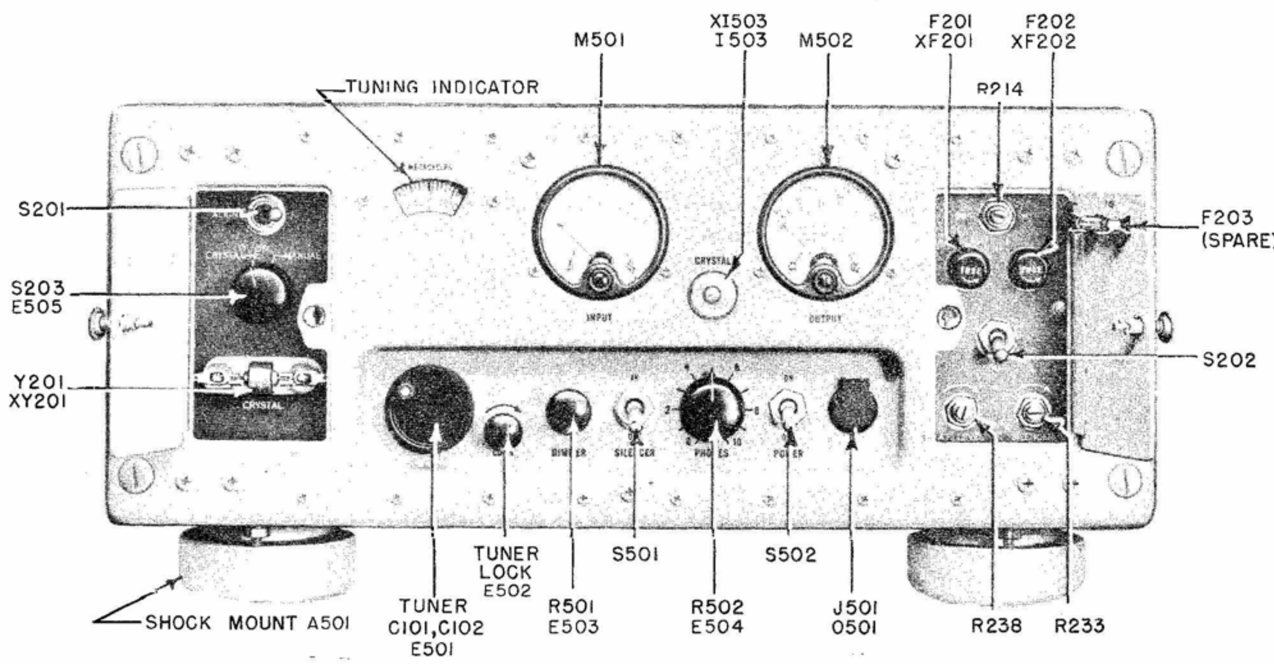


Figure 4—1. Front Panel, Doors Open

by throwing the SILENCER switch (S501) to its IN position and then adjusting the SILENCER control knob (R233) in the right-hand panel compartment for the desired silencing level.

Note

In setting the silencer control extreme care should be exercised at all times in order that weak signals will not be lost.

This level should ordinarily be the point where "noise" just becomes inaudible under the conditions of no signal input, with the A.F. LEVEL control (R238) set for maximum and the PHONES control (R502) in position #8. Further silencing entails the danger of squelching weak signals which might be desirable to hear. On the other hand restraint in the use of silencing to less than 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 be unintelligible in any case. Silencing beyond the minimum necessary for noise suppression would be permissible in the situation where a known signal is anticipated, and where that signal is known to be strong enough to override the "squelching" effect of the silencer circuit.

d. NOISE LIMITER CIRCUIT. — If the noise level is excessive when a signal is being received, the N.L. switch (S202) in the right-hand panel compartment may be thrown 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 where receiving conditions permit. Use of the noise limiter circuit will cause a drop of about three db in the reading on OUTPUT meter M502.

e. MANUALLY CONTROLLED TUNING. — To operate the equipment as a continuously variable manually tuned receiver throw the CRYSTAL-MANUAL switch (S203) in the left-hand panel compartment to its MANUAL position. This will cause the neon panel lamp marked CRYSTAL (I503) to go out.

The receiver may now be tuned to any channel frequency within the 225-400 megacycle range by operation of the single tuning control crank on the front panel. The sensitivity of the receiver is approximately the same for either crystal-controlled or manual tuning, and will be greater than eight microvolts for a 10-db signal-to-noise ratio over the entire range.

f. INPUT METER M501. — INPUT meter M501 is used to give 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 nonlinear. Furthermore, this relation will vary with the frequency (channel) at which the receiver is operated, and also, slightly, between any two R-266A/URR-13 receivers operating at the same frequency. It is therefore desirable that a calibration chart be prepared correlating measured values of signal level with corresponding 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 receptacle J404 and substitute the output of an r-f signal generator. With known values of input it is only necessary to observe the corresponding readings on the meter to complete the chart.

TABLE 4–1. TYPICAL INPUT METER CALIBRATION

Input (Microvolts)	Input Meter Reading
10	.10
30	.20
100	.28
1000	.43
10000	.52
30000	.57
50000	.60

SECTION 5
OPERATOR'S MAINTENANCE

1. GENERAL.

Although maintenance of a radio equipment is primarily the responsibility of technical personnel, it is nevertheless essential that the operator keep watch over his 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 6-8 hours of idleness.

2. ROUTINE OPERATIONAL CHECK CHART.

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 above, the operator should be sufficiently familiar with his equipment to be able, in an emergency, to rectify minor damage or disarrangements which might develop during battle or other periods of emergency when technical aid is not immediately available. Since, under such conditions, tube and fuse failures will be most likely and most frequent causes of trouble, the information in the following paragraphs is provided to enable operating personnel to recognize those 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. FUSE INFORMATION. — The two two-ampere, type 3AG-2, glass tube fuses located in the right-hand panel compartment (F201 and F202) are the only fuses used in Radio Receiver R-266A/URR-13. These protect the 115-volt, 60-cps primary circuit. If one of these blows it should be replaced with one of exactly the same rating, and then only after the circuit has been checked to make certain that no obvious fault exists. The standard Navy stock number for these fuses is given in table 8–4.

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. (See paragraph 3 *c* below.) However, if this fails to correct the trouble, further servicing must be entrusted to qualified maintenance personnel.

TABLE 5—1. ROUTINE OPERATIONAL CHECK CHART

WHAT TO CHECK	HOW TO CHECK	REMARKS
Dial Lamps (I501 and I502)	Check visually to see that lamps are lighted when DIMMER control is rotated to max. clockwise position.	Failure of one lamp is fault in lamp. Failure of both probably indicates power failure. Check fuses, and A.C. PWR. input connection (J401/-P401).
Neon Glow Lamp marked CRYSTAL (I503)	Check visually to see that lamp glows when CRYSTAL-MANUAL switch is in CRYSTAL position.	Indicates loss of plate voltage. Failure of lamp itself very unlikely.
Receiver Operation	Turn A. F. LEVEL control to max. 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.

CAUTION

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 burns out immediately after replacement, do not make a second replacement until the cause of the trouble has been corrected.

c. ELECTRON TUBE INFORMATION. — The full complement of electron tubes used in Radio Receiver R-266A/URR-13 is given 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 relative locations within these areas of the receiver are shown in the tube socket diagrams of figures 7-12, 7-14 and 7-13 respectively, and in the photographs of figures 1-4, 1-6 and 2-15, respectively.

Access to tubes in the IF/AF section (figures 1-4 and 7-14) is gained by 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 (figures 1-6 and 7-13) is gained by releasing these stops in the manner shown in figure 5-1 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 (figures 7-9 and 2-3) must be removed. This is best done with the chassis stood 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 known to be good (and of the same type) 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 unit.

Notes

1. In the equipment as shipped from the factory the tubes listed below are of "ruggedized" construction; the others are not.

6AK5W	6AL5W	6AK5W	6AK5W
V108	V206	V208	V210
V109	V207	V209	

"Ruggedized" and "Non-ruggedized" tubes are electrically interchangeable, but when making replacements the "ruggedized" types should be used whenever possible in order to maintain the high shock-resistance characteristic of the equipment.

2. JAN type 9003 remote cut-off pentodes are used in the single-ended circuits of the 2nd, 3rd, 4th and 5th i-f amplifier stages (V202-V205), and also in the push-pull circuits of the 1st and 2nd r-f amplifier stages (V101-V104). Since either of the latter circuits can be operated on a single tube without appreciable distortion, tubes V101 or V102 and V103 or V104 may be "borrowed" as emergency replacements for V202, V203, V204 or V205.

d. RE-ADJUSTMENT OF SILENCER CIRCUIT POTENTIOMETER R254. — If it should become necessary to replace the silencer amplifier tube (V208) it will be necessary to check, and if necessary re-adjust, the setting of potentiometer R254. Tube V208 and potentiometer R254 are both shown in figure 1-4. To make the adjustment (after tube replacement is completed):

(*a*) With no incoming signal, tune the receiver to the frequency determined by the crystal (R238) in the crystal holder.

(*b*) Set the A.F. LEVEL control (R238) in the right-hand compartment in its maximum (extreme clockwise) position.

(*c*) Turn the SILENCER control (R233) to its extreme left (counterclockwise) position; then re-rotate it clockwise until the screwdriver slot is horizontal.

(*d*) Now set potentiometer R254 at the point where it causes the noise level reading on OUTPUT meter M502 to drop about two db below the maximum.

(*e*) With R254 so adjusted, rotation of the SILENCER control to the left will eliminate all silencing (squelch) effect, while rotating it to the right should increase it to any level required.

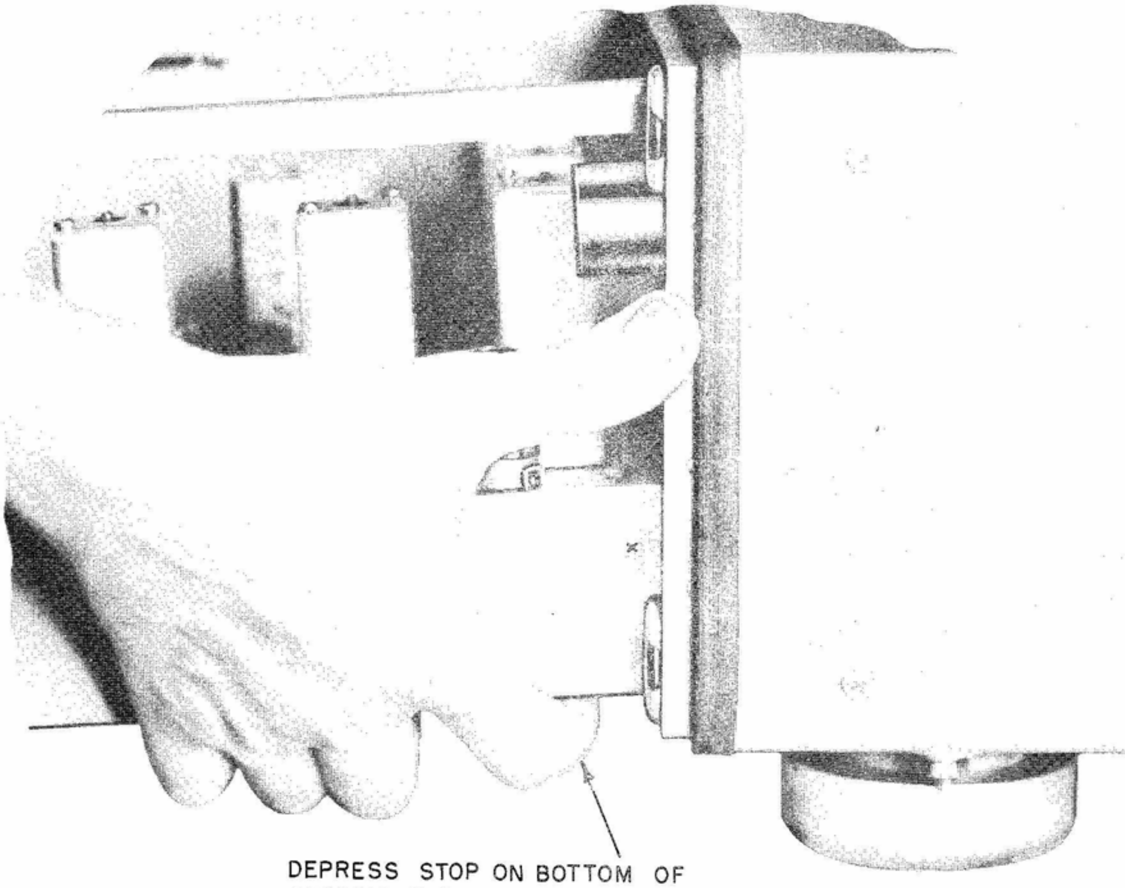


Figure 5–1. Right Side Detail Showing Method of Removal of Chassis from Cabinet

SECTION 6
PREVENTIVE MAINTENANCE

1. GENERAL.

While the AN/URR-13A equipment 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, but 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.

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 insure consistent operation, and will increase the efficiency and life of the equipment.

A practical working schedule is outlined below. 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.

2. OVERALL INSPECTION.

An overall inspection of the equipment is recommended as a precautionary measure immediately before being put into service, and thereafter at monthly intervals.

Such an inspection involves a complete examination of electrical wiring and mechanical details, and of general electrical and mechanical operation. Also any cleaning necessary to remove accumulated dirt.

Suggested routines for periodic electrical and mechanical inspection are given in the routine maintenance check charts shown at the end of this section.

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 5–1 and remove the chassis from the cabinet.

3. ROUTINE MAINTENANCE CHECK CHARTS.

SAFETY NOTICES

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 FOR THIS BOOK.

4. LUBRICATION.

No part of Radio Receiving Set AN/URR-13A will require lubrication at any time as a preventive measure against damage to the equipment. However, a coat of Navy Spec. 14-L-3 ball and roller bearing lubricant*, applied to the tops of the guide rails on either side of the cabinet (figure 3–3) every three or four months, will facilitate removal of the chassis from the cabinet, and its reinsertion. This same grease can be applied sparingly to the alignment pins at the rear of the cabinet and to the four Simmons fasteners which secure the chassis in the cabinet.

Also, 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 carbon tetrachloride, 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 small camel hair brush.

5. RE-TROPICALIZATION.

In manufacture, the AN/URR-13A equipments are not tropicalized as complete assemblies, but instead use is made of materials and parts which are either inherently moisture and fungus resistant, or which

*When ordering, refer to standard Navy stock number W14-L-84-900 for 1 lb can, or W14-L-84-910 for 5 lb can.

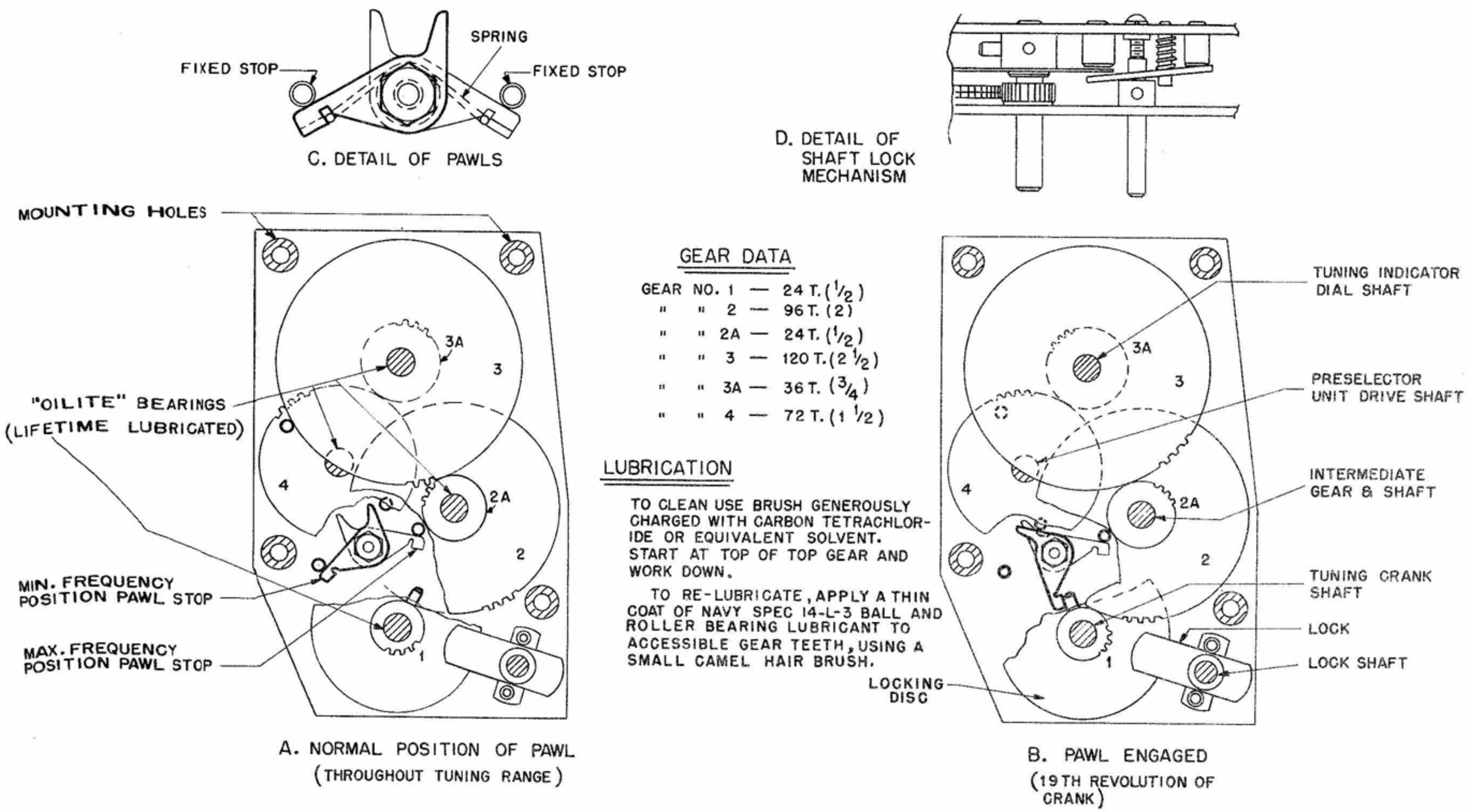


Figure 6—1. Details of Dial Drive Mechanism (O502) for Preselector Unit, Showing Automatic Stop Device

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 overall resistance of the equipment to moisture and fungus should be unaffected. The terminal boards in the AN/URR-13A equipment are made of glass-bonded melanine.

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 reserve gain	Check as outlined in Section 7, Corrective Maintenance	If sensitivity or reserve gain is low receiver will require tube replacement or alignment as outlined in 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 carbon tetrachloride.
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 set-screw key for tightening knob set-screws is mounted at the 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 mechanically by probing the switch with an insulated rod when the receiver is connected up for bench testing. (Paragraph 4*b* and figs. 7-2 and 7-3 of Section 7.)	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 paragraph 5*a* of Section 7.
Electron tubes	Check all electron tubes in a mutual-transconductance type tube tester. Replace any tube having a transconductance value of less than 75 percent of normal.	When making tube replacements, the "ruggedized" models of all types should be used whenever possible.
	QUARTERLY	
~~Air filters~~ SEE T-6	~~Remove filter units from inside of cabinet by sliding the type snap-slide fasteners and inspect.~~	~~If units are clogged with dust, clean with gasoline and recharge with SAE #20 oil.~~
	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 the preselector housing. Inspect cabinet for loose mounting screws on track slides and shock mounts. Check for damage to parts due to overheating, etc.	A small paint brush may be used to remove dirt from tube sockets, etc. It will be necessary to use a compressed air hose to remove dirt from preselector housing and capacitor plates.

TABLE 6–1. ROUTINE MAINTENANCE CHECK CHART (Cont'd)

WHAT TO CHECK	HOW TO CHECK	PROCEDURE
Dial drive mechanism	Observe smoothness of dial operation, and inspect the gears in the drive mechanism visually for evidence of grit and dirt in the teeth.	If operation of the dial drive indicates that the gears are sticky or binding, clean the mechanism with carbon tetrachloride and relubricate with Navy-type 14-L-3, grade II, medium, ball bearing lubricant, as explained in figure 6-1.

FAILURE REPORTS

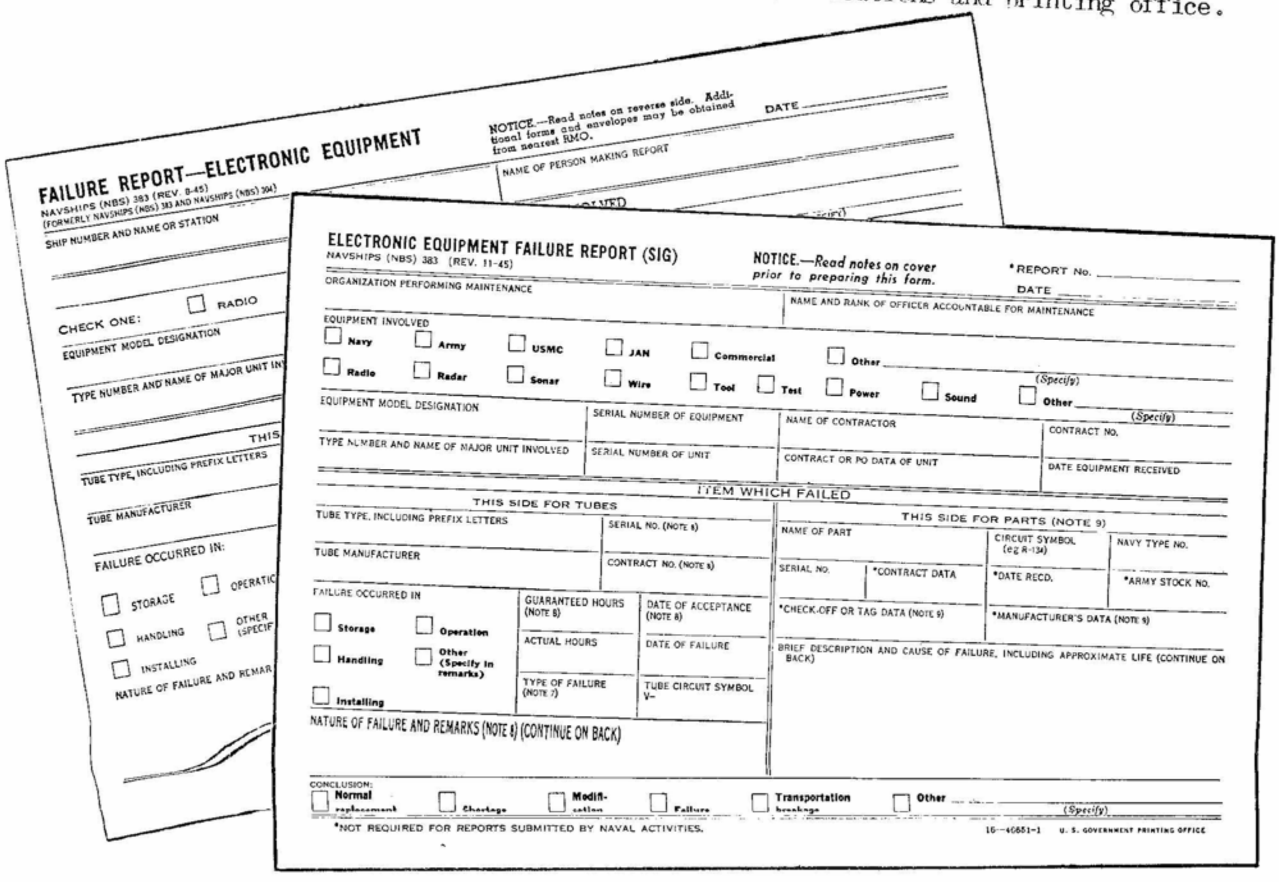
A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example, under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships, furnish a store of information permitting the Bureau to keep in touch with the performance of the equipment of your ship and all other ships of the Navy.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards and envelopes on board. They may be obtained from the nearest district publications and printing office.



ELECTRONIC EQUIPMENT FAILURE REPORT (SIG)
NAVSHIPS (NBS) 383 (REV. 11-45)

NOTICE.—Read notes on cover prior to preparing this form.

*REPORT No.
DATE

ORGANIZATION PERFORMING MAINTENANCE
NAME AND RANK OF OFFICER ACCOUNTABLE FOR MAINTENANCE

EQUIPMENT INVOLVED
Navy / Army / USMC / JAN / Commercial / Other (Specify)
Radio / Radar / Sonar / Wire / Tool / Test / Power / Sound / Other (Specify)

EQUIPMENT MODEL DESIGNATION / SERIAL NUMBER OF EQUIPMENT / NAME OF CONTRACTOR / CONTRACT NO.
TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED / SERIAL NUMBER OF UNIT / CONTRACT OR PO DATA OF UNIT / DATE EQUIPMENT RECEIVED

ITEM WHICH FAILED

THIS SIDE FOR TUBES
TUBE TYPE, INCLUDING PREFIX LETTERS / SERIAL NO. (NOTE 5)
TUBE MANUFACTURER / CONTRACT NO. (NOTE 5)
FAILURE OCCURRED IN: Storage / Operation / Handling / Other (Specify in remarks) / Installing
GUARANTEED HOURS (NOTE 8) / DATE OF ACCEPTANCE (NOTE 8)
ACTUAL HOURS / DATE OF FAILURE
TYPE OF FAILURE (NOTE 7) / TUBE CIRCUIT SYMBOL V–
NATURE OF FAILURE AND REMARKS (NOTE 4) (CONTINUE ON BACK)

THIS SIDE FOR PARTS (NOTE 9)
NAME OF PART / CIRCUIT SYMBOL (eg R-134) / NAVY TYPE NO.
SERIAL NO. / *CONTRACT DATA / *DATE RECD. / *ARMY STOCK NO.
*CHECK-OFF OR TAG DATA (NOTE 5) / *MANUFACTURER'S DATA (NOTE 5)
BRIEF DESCRIPTION AND CAUSE OF FAILURE, INCLUDING APPROXIMATE LIFE (CONTINUE ON BACK)

CONCLUSION: Normal replacement / Shortage / Modification / Failure / Transportation breakage / Other (Specify)

*NOT REQUIRED FOR REPORTS SUBMITTED BY NAVAL ACTIVITIES.

16—40651-1 U. S. GOVERNMENT PRINTING OFFICE

Figure 7—0. Failure Reports Form, NBS-383

SECTION 7
CORRECTIVE MAINTENANCE

1. INTRODUCTION.

Corrective maintenance covers that phase of the care of the equipment which deals with the location and correction of trouble which 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.

SAFETY NOTICES

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 FOR THIS BOOK.

2. TROUBLE SHOOTING.

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

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 7–17, and to the functional diagrams of figures 2–2, 2–5, 2–7 through 2–13, 2–14 and 2–16 will aid in localizing particular faults.

b. TROUBLE-SHOOTING CHARTS. — In tracing faults an orderly and systematic procedure should be followed. The trouble-shooting chart shown in table 7–4 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.

c. VOLTAGE AND RESISTANCE MEASUREMENTS. — The values of voltage and resistance from each tube socket terminal to ground, and/or other significant points, are summarized in table 7–5.

Similar values measured from terminal board terminals to ground, and/or other significant points, are given in table 7–6.

Because it is not feasible to take voltage and resistance readings in the preselector while the receiver is operative, alternate significant voltage measurements are shown in figure 7–15.

The conditions under which the above measurements were made were: line voltage, 115 volts, 60 cps; receiver tuned to 300 megacycles; ALIGN-REC switch in REC position; SILENCER switch in OUT position, and N.L. switch in OUT position. The measurements were made with an electronic multimeter such as Multimeter ME-25/U, Navy Model OBQ series, or equivalent. Resistance measurements were made with the power connector disconnected.

Values of voltage and resistance as measured in the equipment should be within ±20 percent of those given in the tables.

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 5–1 and remove the chassis from the cabinet.

If the receiver is to be operated while removed from the cabinet, the cable filter unit (Band Suppression Filter F-89/URR-13) should be removed from the rear of the cabinet by disengaging the snap-slide fasteners as shown in figure 3–3, and then plugged into the rear of the receiver chassis. Since the filter unit must be removed through the front of the cabinet, care should be taken not to damage the connectors. Finally reconnect the antenna and audio-power cables.

Where installation wiring is too short to permit removal of the cable filter unit, the extension test cables should be connected to the front of the cable filter unit and to the rear of the receiver chassis as shown in figure 7–1.

3. ELECTRON TUBE INFORMATION.

a. TUBE DATA. — The full complement of electron tubes used in Radio Receiver R-266A/URR-13 is given in table 1–4. These tubes are all located in either the preselector section, in the IF/AF section or the power supply section of the receiver chassis. Their relative locations within these areas of the receiver are

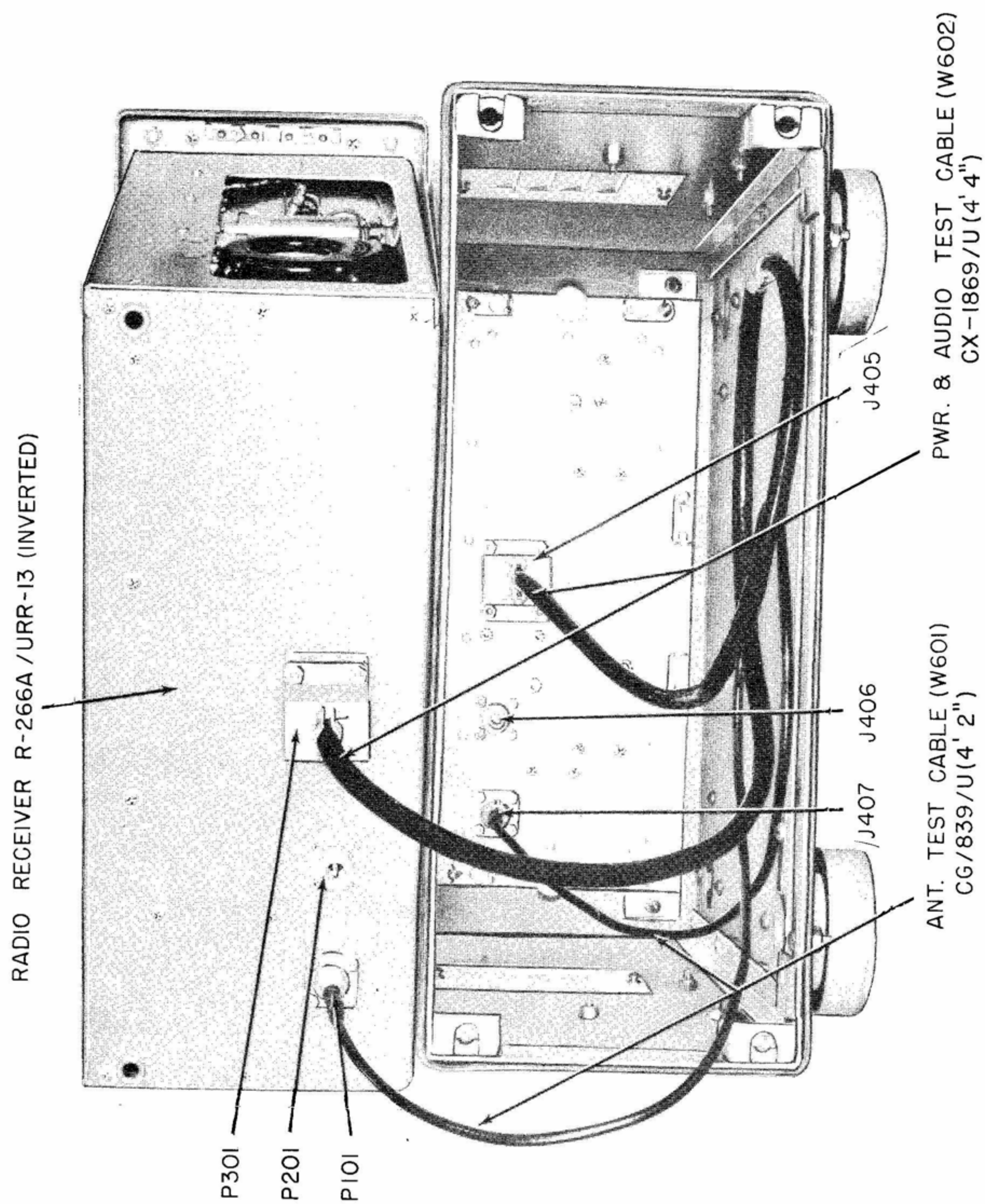


Figure 7–1. View of Rear Chassis and Front of Cabinet, Showing Method of Installation of Test Cables for Servicing

shown in the tube socket diagrams of figures 7–12, 7–14, and 7–13, respectively, and in the photographs of figures 1–4, 1–6 and 2–3, respectively.

Voltage and resistance measurements between each pin of each tube and ground, or other significant point, are given in table 7–5.

The rated operating characteristics of each type of tube employed are listed in table 7–7. Physical dimensions and characteristic curves are not given because this information is readily available, if ever needed, in standard commercial catalogs.

b. TUBE CHECKING. — Access to the tubes in the IF/AF section (figures 1–4 and 7–14) is gained by 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

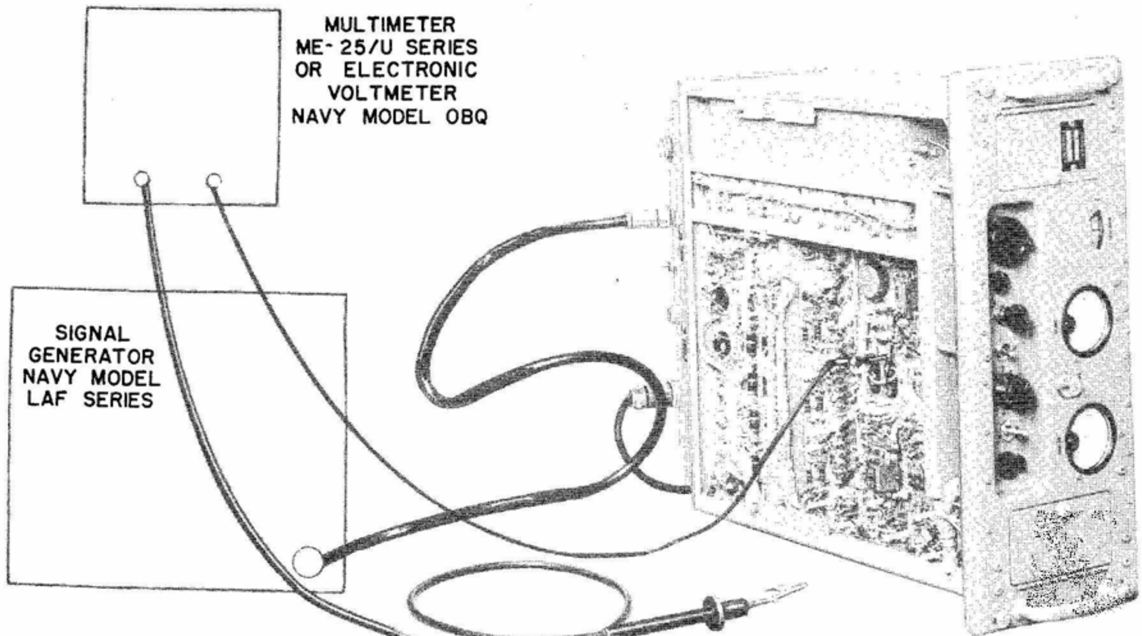


Figure 7—2.—Bench Set-up for Alignment of R-f Section of Receiver, Protective shield on Preselector removed.

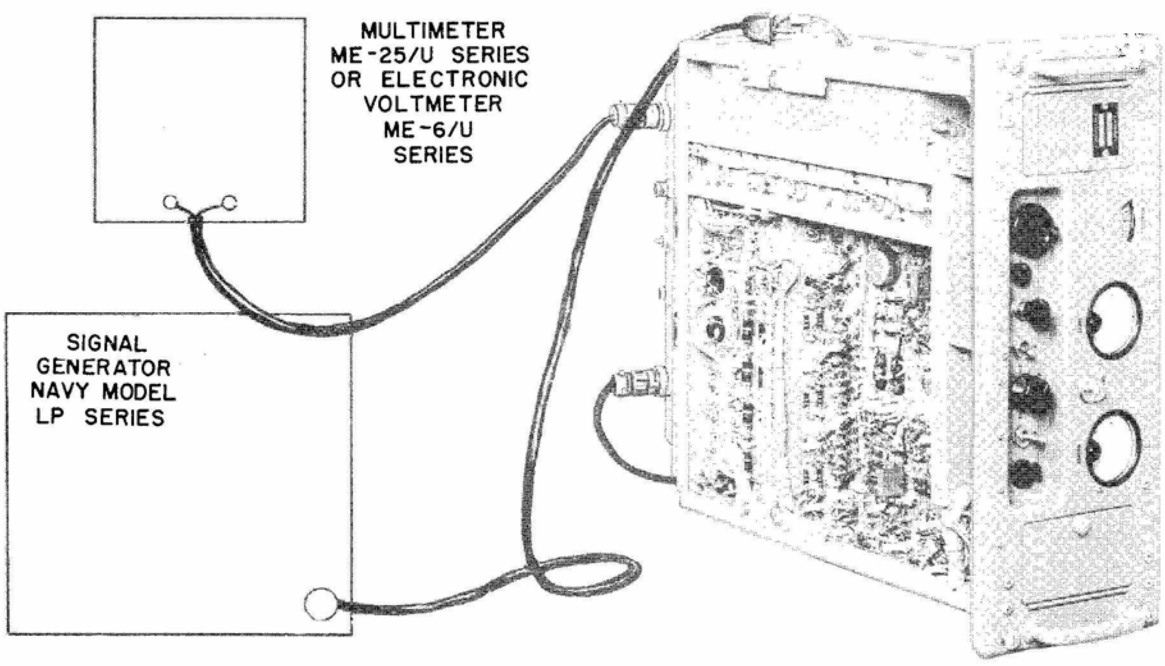


Figure 7—3. Bench Set-up for Alignment of I-f Section of Receiver, Protective shield on Preselector removed.

power supply section (figures 1–6 and 7–13) is gained by releasing these stops in the manner shown in figure 5–1 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 (figures 7–9 and 2–3) must be removed. This is most conveniently done with the chassis standing on its right side.

TUBE REPLACEMENT NOTICE

All tubes of a given type supplied with the equipment shall be consumed prior to employment of tubes from general stock.

If the receiver fails to operate, but the dial lamps remain lighted indicating the presence of primary power, the cause is probably 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 known to be good (and of the same type) 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.

Notes

1. In the equipment as shipped from the factory the tubes listed below are of "Ruggedized" construction; the others are not.

6AK5W	6AL5W	6AK5W	6AK5W
V108	V206	V208	V210
V109	V207	V209	

"Ruggedized' and "Non-ruggedized'" tubes are electrically interchangeable, but when making replacements the "ruggedized" types should be used whenever possible in order to maintain the high shock-resistance characteristic of the equipment.

2. JAN type 9003 remote cut-off pentodes are used in the single-ended circuits of the 2nd, 3rd, 4th and 5th i-f amplifier stages (V202-V205), and also in the push-pull circuits of the 1st and 2nd r-f amplifier stages (V101-V104). Since either of the latter circuits can be operated on a single tube without appreciable distortion, tubes V101 or V102 and V103 or V104 may be "borrowed" as emergency replacements for V202, V203, V204 or V205.

4. 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 realignment 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 all common types of signal generator 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-266A/URR-13 is greater than eight microvolts (paragraph 3*e* of Section 4) for a 10-db signal-to-noise ratio on the output 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 four microvolts.

b. TYPICAL OVERALL SENSITIVITY.

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

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

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

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

(*d*) A.F. LEVEL control R238 (screwdriver adjustment in right compartment) in maximum (full clockwise) position.

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

(*f*) Antenna input (50-OHM ANT) connector J404/P404 disconnected.

(*g*) 115-volt, 60-cps line voltage connected at A.C. POWER IN connector J401/P401.

(2) Listed below are typical output levels to be expected (meter M502) from a properly aligned and adjusted receiver for a variety of frequencies in the range from 225 mc to 400 mc. These values may vary ±5 db.

Carrier Frequency in mc	*Output Level in db*	*Carrier Frequency in mc*	*Output Level in db*
225	0	320	−2
230	+2	340	−2
240	+1	360	−1
260	0	380	0
280	0	395	+2
300	−1	400	+2

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 4*b*(1), except for the CRYSTAL-MANUAL switch 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 in the IF/AF section (V201-V211) should be tested and if all are normal, the i-f stages should be realigned according to the procedure given in paragraph 5*c* below.

(2) PRESELECTOR GAIN MEASUREMENT.

(*a*) Set all controls as in paragraph 4*b*(1) above (CRYSTAL-MANUAL 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 (step 4*c*(1) above), the preselector gain is acceptable.

(*d*) If the reading is not 1 db higher, the voltage between L111 and ground should be measured on a d-c VTVM, first with the CRYSTAL-MANUAL switch 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 in the r-f section (V101-V105). If the potential measured is not 0.2 volts more negative, then the tubes in the oscillator-multiplier section (V106-V109) should be checked.

(*e*) If all tubes in the preselector (V101-V109) are normal, r-f alignment should be undertaken according to the procedure given in paragraph 5*d* (or 5*e*) below.

5. ALIGNMENT PROCEDURES.

a. EQUIPMENT REQUIRED. — The following equipment should be available for proper alignment of the r-f and i-f sections of Radio Receiver R-266A/-URR-13:

(1) An RF Signal Generator Set AN/UPM-25 series or a Navy Model LP series, or equivalent.

(2) A Navy Model LAF series signal generator with 6 db, or equivalent.

(3) A multimeter ME-25/U series, or a Navy Model OBQ series or equivalent electronic voltmeter.

b. PREPARATION OF THE RECEIVER FOR ALIGNMENT.

(1) Remove the receiver chassis from the cabinet and place on bench with right side down.

(2) Remove cable filter (Band Suppression Filter F-89/URR-13) from rear of cabinet by disengaging snap-slide fasteners (figure 3–3); the filter must be removed through front of cabinet.

(3) Plug cable filter into rear of receiver chassis, being careful not to damage the connectors.

(4) Connect power cord.

(5) Turn SILENCER and N.L. switches to their OFF positions.

WARNING

When the receiver is set up for bench testing, as above, and the POWER switch is OFF, dangerous voltages are still present at the following points:

(*a*) Power-audio connector P301 at the rear of the receiver chassis;

(*b*) Power fuses F201 and F202 at the right side of the front sub-panel;

(*c*) Terminals No. 9 and No. 10 on the power supply terminal board E303 (figure 1–5).

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

(1) Connect the output of a Navy model LP series, or equivalent, signal generator to the mixer grid inductance trimmer screw (figure 7–4) through a 0.01-mf mica capacitor.

(2) Turn the receiver tuning dial to 218 megacycles, throw the CRYSTAL-MANUAL switch to CRYSTAL, remove the crystal from the crystal holder and throw the ALIGN-REC. switch to REC.

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

(4) Tune the signal generator to 18,615 kc, ±1 kc, and modulate 30 percent with 1000 cps.

(5) Turn the A.F. LEVEL control clockwise to its maximum position.

(6) Adjust the output of the signal generator until the OUTPUT meter (M502) reads above the noise level, but below 10 db.

Note

An Electronic Voltmeter ME-6/U series, or a Multimeter M-25/U series, may be used to monitor audio output voltage instead of the output meter. In this case connect the electronic voltmeter to the AUDIO output connector (J402) on the cable filter unit or, by means of a suitable phone plug, to the phones jack on the front panel of the receiver. Adjust the signal generator output so that the meter reads below six volts.

(7) Tune for maximum reading on the OUTPUT meter by adjusting the tuning screws of the i-f transformers (top and bottom) with the alignment tool (H201) provided (see figure 1–4), in the following order: T206, T205, T204, T202, and the bottom screw of T201.

Note

While aligning the i-f transformers, reduce the output of the signal generator as necessary to keep the OUTPUT meter reading below 10 db. This prevents overloading of the a-f stages which would obscure the true tuning peak, and also maintains the signal level below or near the threshold of AVC. Excessive AVC operation would result in mistuning of the i-f circuits.

(8) Tune the mixer plate tuning inductance screw (L122, figure 7–4) for a maximum reading on the OUTPUT meter.

The i-f transformers are now aligned. The OUTPUT meter should read 10 db with the signal generator adjusted for about 15 microvolts.

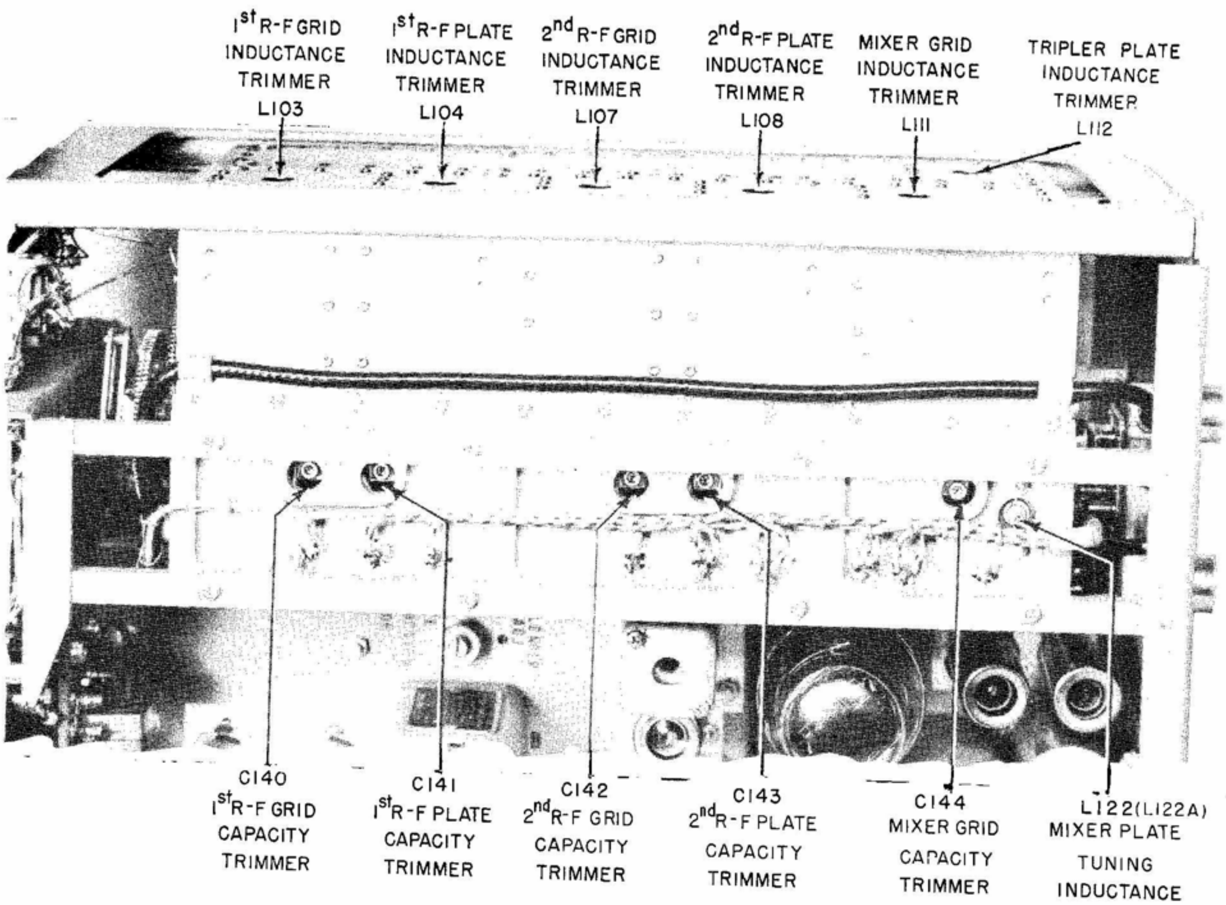


Figure 7–4. ***Preselector from Top of Chassis Showing Alignment Adjusting Screws*** Protective shields on Preselector removed.

d. ALIGNMENT OF THE R-F SECTION OF THE RECEIVER (PRESELECTOR). (*See figure 7–2.*) — The bench set-up for alignment of the preselector unit is shown in figure 7–2. Before beginning alignment remove the preselector shielding covers and loosen the inductance trimmer locking screws (figure 7–7) slightly (about ⅛th turn) by means of the Bristol type wrench mounted on the sub-panel near the dial drive assembly. (See figure 1–6.) Then replace the preselector shielding covers.

(1) Connect the output of the Navy model LAF signal generator through a 6-db pad to the ANT. connector (J404) on the cable filter. Turn the output attenuator on the signal generator to its maximum counterclockwise position.

(2) Install the crystal corresponding to some receiver frequency between 230 and 234 megacycles; turn the CRYSTAL-MANUAL switch to CRYSTAL; set the tuning dial to the crystal channel selected, and lock the tuning dial.

$$\text{Crystal frequency} = \frac{\text{Channel frequency plus 18.6 megacycles}}{12}$$

(3) Refer to figures 7–4, 7–8 and 7–9 for location of preselector tuning adjustments and test points. Place the probe of the electronic multimeter on the 1st doubler grid test point (C122) and tune the oscillator inductance tuning screws (L114) for a maximum meter reading. Connect the return to the chassis of the receiver.

WARNING

A D-C POTENTIAL OF 180 VOLTS IS PRESENT AT SOME OF THE INDUCTANCE TRIMMER SCREWS (SEE FIGURE 7–9). THEREFORE THE INSULATED ALIGNMENT TOOL (H201 IN FIGURE 1–4) SHOULD BE USED FOR ALL THE SPLINED TRIMMER SCREW ADJUSTMENTS.

TABLE 7—1. TYPICAL VOLTAGE READINGS (D.C.) AT ALIGNMENT TEST POINTS

Conditions	Test Points (See figures 7-8, 7-9 and 7-15)			
	C122	C124	C131	L111
L.F. Alignment Check	—2.5	—12.5	—12.5	—1.6
H.F. Alignment Check	—3.2	—13.0	—15.0	—5.0

(4) Place the probe of the electronic multimeter on the 2nd doubler grid test point (C124) and tune the 2nd doubler grid inductance tuning screws (L115) for a maximum meter reading.

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

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

Note

The oscillator, 2nd doubler and tripler grid tuning adjustments may be aligned by turning the ALIGN-REC. switch to the ALIGN position and tuning for a maximum reading on the INPUT meter (M501). However, the foregoing is the preferred procedure.

(7) Connect the probe of the electronic multimeter to the junction of resistors R224 and R225 on the underside of the IF/AF section. (See figure 2-6B.) This point is the 2nd detector diode voltage test point.

Note

The following adjustments 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. If the INPUT meter is used, substitute "INPUT meter" for "multimeter" in steps Nos. 8, 9, 10, 17, 18, and 19. Also substitute "0.07" for "0.6 volt" in No. 8 and No. 9, and "0" for "0.3 volt" in step No. 10.

(8) With modulation OFF tune the Navy model LAF series signal generator for a maximum reading on the electronic multimeter. The output attenuator should be adjusted to give a reading of approximately 0.6 volt on the VTVM.

(9) Using the alignment tool, tune the r-f amplifier and mixer inductance trimmer screws (figure 7–7) for maximum readings on the VTVM, in the following order:

(*a*) Mixer grid inductance trimmer (L111).
(*b*) 2nd r-f plate inductance trimmer (L108).
(*c*) 2nd r-f grid inductance trimmer (L107).
(*d*) 1st r-f plate inductance trimmer (L104).
(*e*) 1st r-f grid inductance trimmer (L103).

While tuning, reduce the output of the signal generator as necessary to keep the multimeter reading at approximately 0.6 volt.

(10) Throw the CRYSTAL-MANUAL switch to MANUAL. Notice that when this is done, the multimeter reading may drop to about 0.3 volt. Now tune the oscillator inductance tuning screw (L114) until the multimeter reading is maximum.

(11) Throw the CRYSTAL-MANUAL switch to CRYSTAL, install the 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.

(12) Place the probe of the electronic multimeter on the 1st doubler grid test point (C122) and tune the oscillator capacity trimmer screw (C148) for a maximum meter reading.

Note

In tuning the capacity trimmers, a slight capacity is added to the circuit by the presence of the alignment tool. It is therefore necessary to compensate for this capacity 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. This capacity effect of the alignment tool will make the adjustment of the oscillator capacity trimmer screw more critical in step No. 19.

(13) Place the probe of the multimeter on the 2nd doubler grid test point (C124) and tune the 2nd doubler grid capacity trimmer screw (C147) for a maximum meter reading.

(14) Place the probe of the multimeter on the tripler grid test point (C131) and tune the tripler grid capacity trimmer screw (C145) for a maximum meter reading.

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

(16) Connect the probe of the multimeter to the junctions of resistors R224 and R225 on the underside of the IF/AF section.

(17) Tune the signal generator for a maximum reading on the multimeter. The output attenuator of the signal generator should be adjusted to give a reading of approximately 0.6 volt on the multimeter.

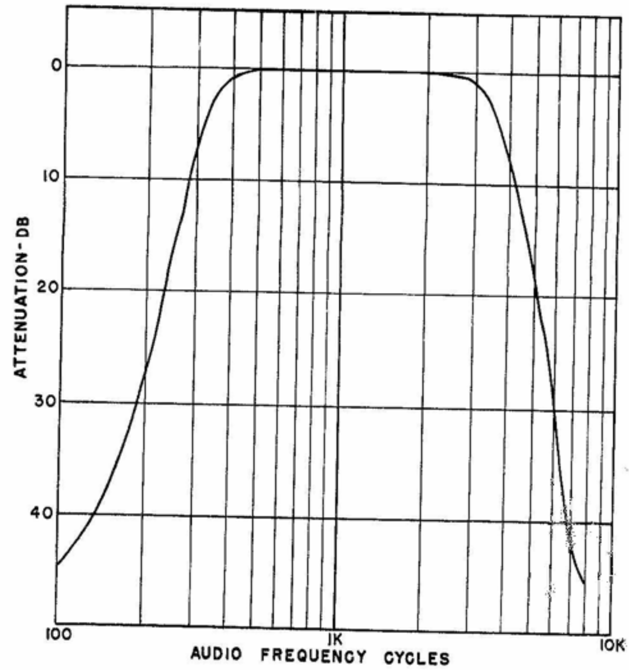


Figure 7–5. Overall Audio Response Characteristic

(18) Using the alignment tool, tune the r-f amplifier and mixer capacity trimmer screws for a maximum reading on the multimeter, in the following order:

(*a*) Mixer grid capacity trimmer (C144).

(*b*) 2nd r-f plate capacity trimmer (C143).

(*c*) 2nd r-f grid capacity trimmer (C142).

(*d*) 1st r-f plate capacity trimmer (C141).

(*e*) 1st r-f grid capacity trimmer (C140).

(19) Throw the CRYSTAL-MANUAL switch to MANUAL. Note that when this is done the electronic multimeter reading may drop to about 0.3 volt. Now tune the oscillator capacity trimmer screw until the multimeter reading is maximum (see note under step No. 12 above).

(20) Repeat steps Nos. 1 through 19 until no further adjustment of the capacity trimmers is necessary to align the high frequency alignment point.

Note

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

(21) After alignment of the preselector, remove the preselector shielding covers and tighten the inductance trimmer locking screws (figure 7–7) carefully, so that the adjustments will not be disturbed.

(22) Check the alignment of the receiver by making sensitivity and reserve gain measurements.

e. 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 will describe a different method of aligning the oscillator stage only. Alignment of the other stages of the preselector will then be as described 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. Then:

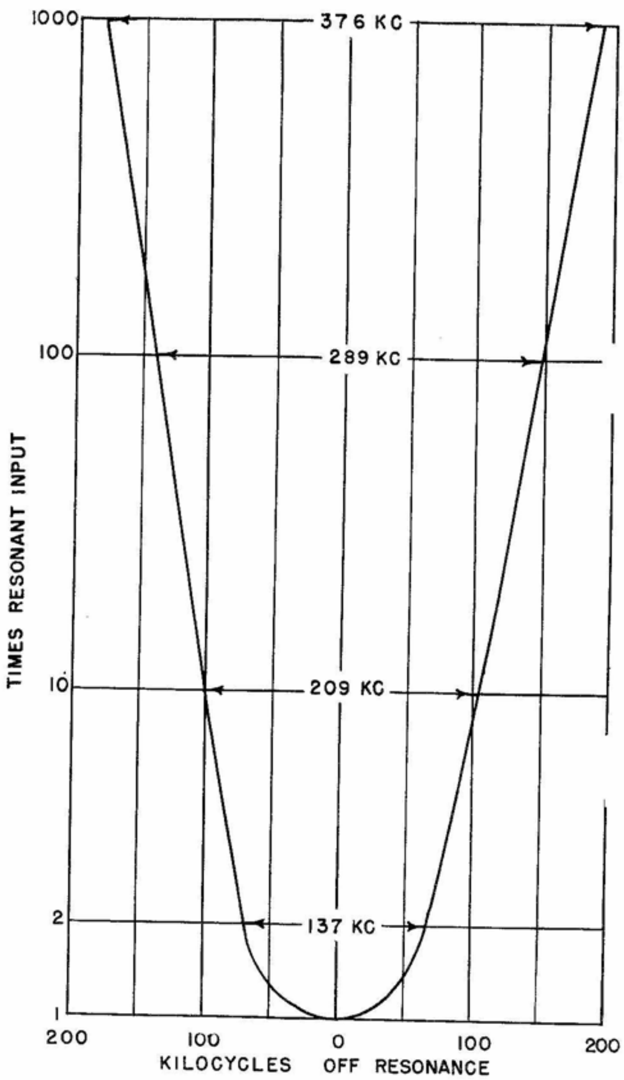


Figure 7—6. Overall I-f Selectivity Characteristic

(*a*) Set the tuning dial of the receiver at "232", 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 during MANUAL operation because of capacity effects.

(*b*) Tune the frequency meter to 20.883 megacycles, or to half of this frequency.

(*c*) Tune the oscillator inductance trimmer screw (L114) until it is adjusted for zero beat (as near as possible) on the frequency meter headphones.

(*d*) Proceed with steps Nos. 4 through 9, inclusive, as given under paragraph *4d* above.

(*e*) Set the tuning dial of the receiver to "393".

(*f*) Tune the frequency meter to 34.300 megacycles, or to half of this frequency.

(*g*) Tune the oscillator capacity trimmer screw (C148) until it is adjusted for zero beat (as near as possible) on the frequency meter headphones.

(*h*) Proceed with steps Nos. 13 through 22, inclusive, as given under paragraph *4d* above, omitting step No. 19.

6. REMOVAL AND REPLACEMENT OF PARTS.

Removal and replacement of most of the parts of Radio Receiver R-266A/URR-13 is a straightforward procedure involving only the removal of mounting bolts and the unsoldering of connecting wires. However, the following five of the parts for which repair parts are provided are so located that special precautions should be taken, and/or preferred procedures followed, when removing them for repair or replacement. SEE 7-6

a. BLOWER BL301. — Blower BL301 is in the right rear corner of the chassis as shown in the top view (figure 1–4). Its removal entails removal of the right side plate of the receiver chassis, and should be undertaken as follows:

DELETE

(1) Take off the right side plate by removing

(*a*) Four screws entering side panel from front panel.

(*b*) Three screws entering side panel from rear panel.

(*c*) Eight screws connecting side panel to chassis, and to front panel subassembly.

(2) Disconnect blower bracket from power supply sub-panel by removal of three screws.

(3) Unsolder the incoming lead which goes to C304 at C304.

(4) Unsolder the incoming lead which is common to the two motor windings at the lug on terminal board E302 (figure 1-5) where it is connected.

(5) Remove the subassembly comprising blower, bracket and capacitor C304.

(6) If a new blower is to be installed in place of the one in the equipment, transfer the bracket and the capacitor to the new part and reverse the above procedure.

b. BLOWER CAPACITOR C304. — The blower capacitor is located underneath blower BL301 in the right rear corner of the chassis (see figure 1-4), and is attached to the same bracket which supports the blower. If there is any reason to remove the blower at the same time, the capacitor can be removed by removing the blower and bracket as explained in paragraph 5*a* above, in which case it will be necessary merely to unbolt the old capacitor from the blower bracket and attach the new one. However, if there is no reason to remove the blower, access to the capacitor is more easily gained by first removing filter choke L301, located between the blower and the large type 5U4G rectifier tube V301, as follows:

(1) Unsolder the wires from the three terminals of choke L301 (underside of chassis — figure 2-15).

(2) Remove the nuts from the four mounting studs on L301 (underside of chassis).

(3) Lift out L301.

(4) Unsolder the wires from two terminals of capacitor C304 (top of chassis).

(5) Remove the nuts from the two mounting studs on C304 (accessible through holes in right side panel of chassis).

(6) Slip out capacitor C304.

(7) To install a new capacitor, reverse the above procedure, making sure that the leads to C304 and to L301 are connected to their proper respective terminals. If in doubt, consult color coding legend on wiring diagram (figure 7-18).

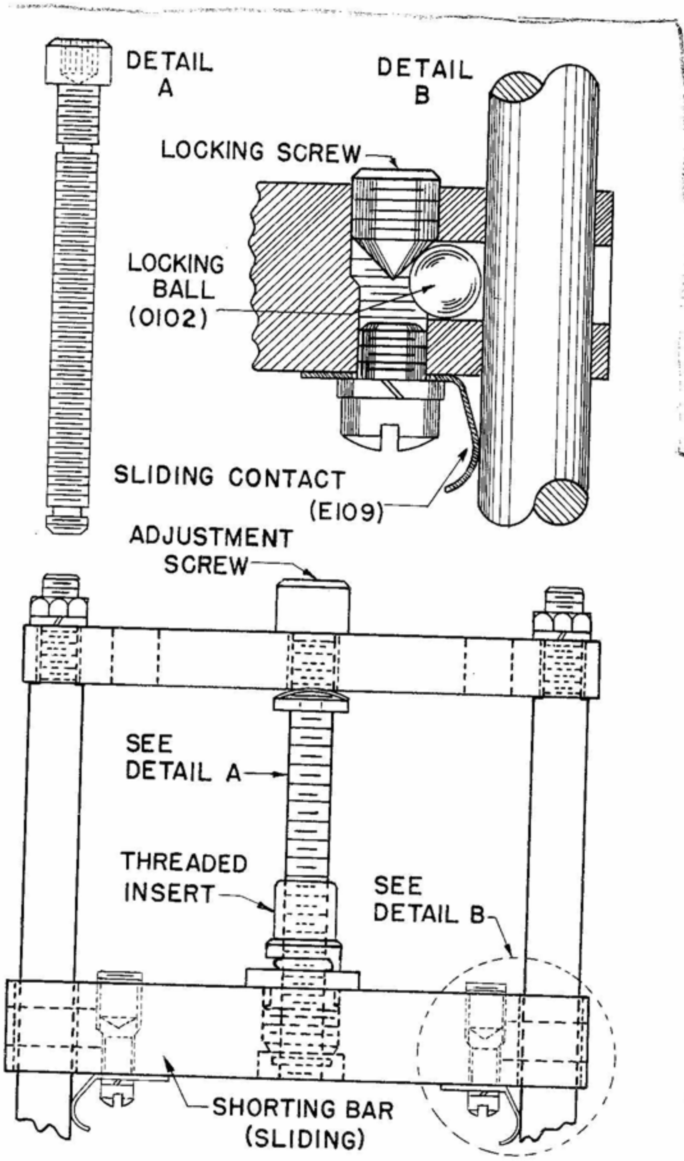


Figure 7-7. Details of Trimmer Inductances L103, L104, L107, L108, L111, and L112 (Preselector)

c. POWER TRANSFORMER T301. — Power transformer T301 is in the right rear corner of the chassis immediately behind blower BL301, as shown in the top view (figure 1-4). Its removal involves unfastening the rear panel of the chassis and separating it from the chassis far enough to provide an additional half-inch clearance above transformer T301. To do this:

(1) Unsolder the wiring from the terminals of T301 (underside of chassis — figure 2-15), and 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 (underside of chassis).

(3) Unfasten the rear panel by removing:

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

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

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

TABLE 7–2. AUDIO TEST DATA

TEST POINT	TEST INPUT VOLTAGE (APPROX.)	OUTPUT METER READING
V209, Pin 1	20 millivolts	10 db
V210, Pin 1	350 millivolts	10 db
V211, Pin 1	1 volt	10 db

CONDITIONS: A.F. LEVEL control max. clockwise, ALIGN-REC. switch in REC. position, SILENCER switch in OUT position, N.L. switch in OUT position, receiver detuned and no audio load connected.

INPUT: 1000 cycles through 0.1 mf or large capacitor.

TABLE 7–3. INTERMEDIATE FREQUENCY DATA

TEST POINT	INPUT TEST VOLTAGE (APPROX.)	OUTPUT METER READING
Mixer grid inductance Trimmer screws (L111)	16 microvolts	10 db
V201, Pin 1	15 microvolts	10 db
V202, Pin 1	60 microvolts	10 db
V203, Pin 1	500 microvolts	10 db
V204, Pin 1	3000 microvolts	10 db
V205, Pin 1	20,000 microvolts	10 db

CONDITIONS: A.F. LEVEL control max. clockwise, ALIGN-REC. switch in REC. position, SILENCER switch in OUT position, N.L. switch in OUT position, receiver detuned and no audio load connected.

INPUT: 18,600 kc modulated 30% with 1000 cycles through a 0.01-mf capacitor.

(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 connectors P101 and P201, and thermostat 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 7–18).

d. DIAL DRIVE ASSEMBLY. (*Reference symbol O502 in parts list.*) — The dial drive assembly is located between the front panel and the front sub-panel of the receiver, as shown in figure 1–5. It is further illustrated in figure 6–1. To remove this assembly it will be necessary to remove the entire front panel, so it is suggested that the following procedure be followed closely.

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

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

(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 down onto the bench.

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

(5) Remove the drive arm O503-B of the flexible coupling between the dial drive and the preselector, by loosening the set screws in its hub.

(6) Remove the four mounting screws which secure the dial drive assembly to the front sub-panel (figure 6–1), making sure that the metal spacers do not get lost.

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 a reversal 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

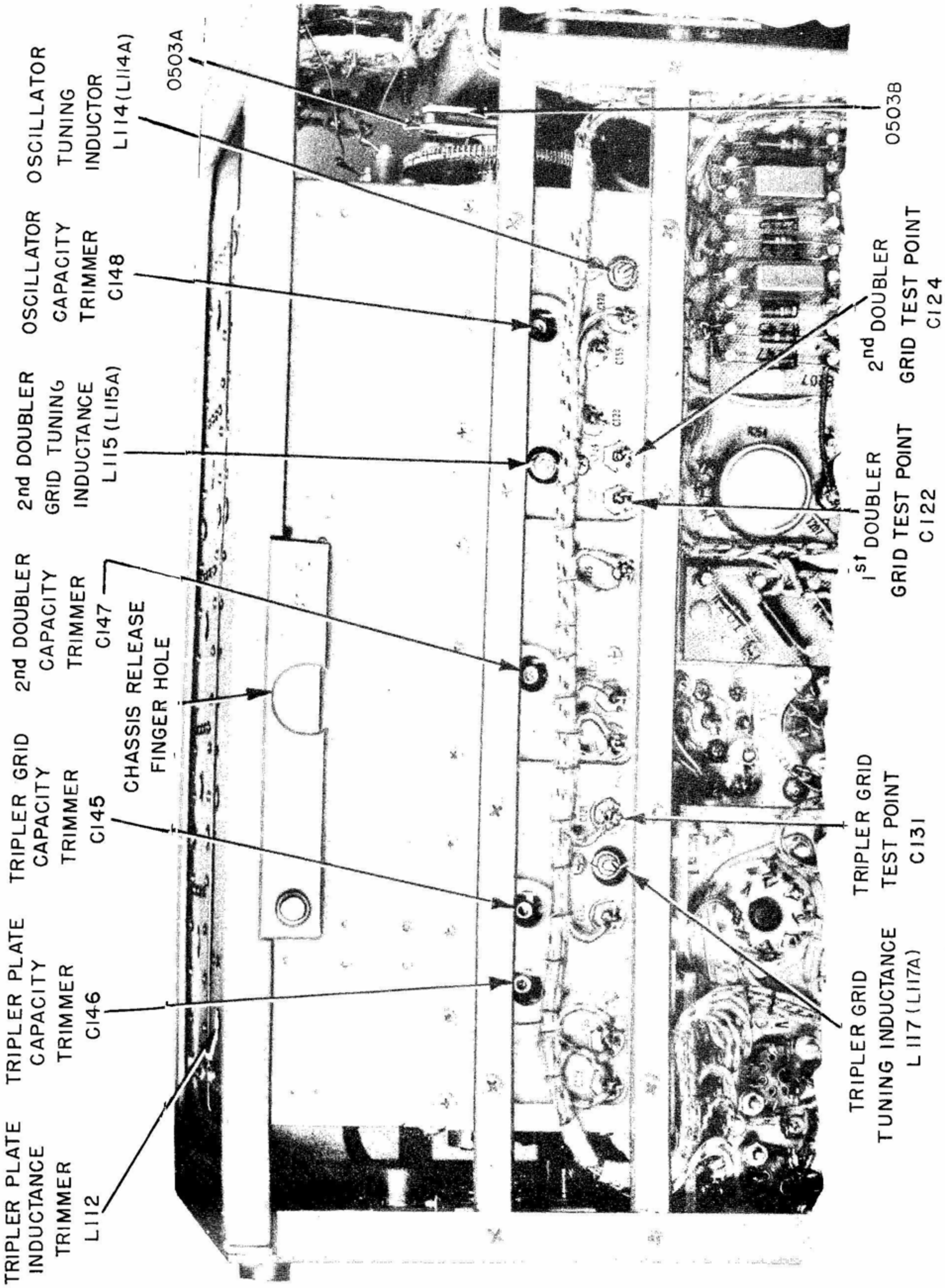


Figure 7—8. Preselector from Bottom of Chassis Showing Alignment Adjusting Screws

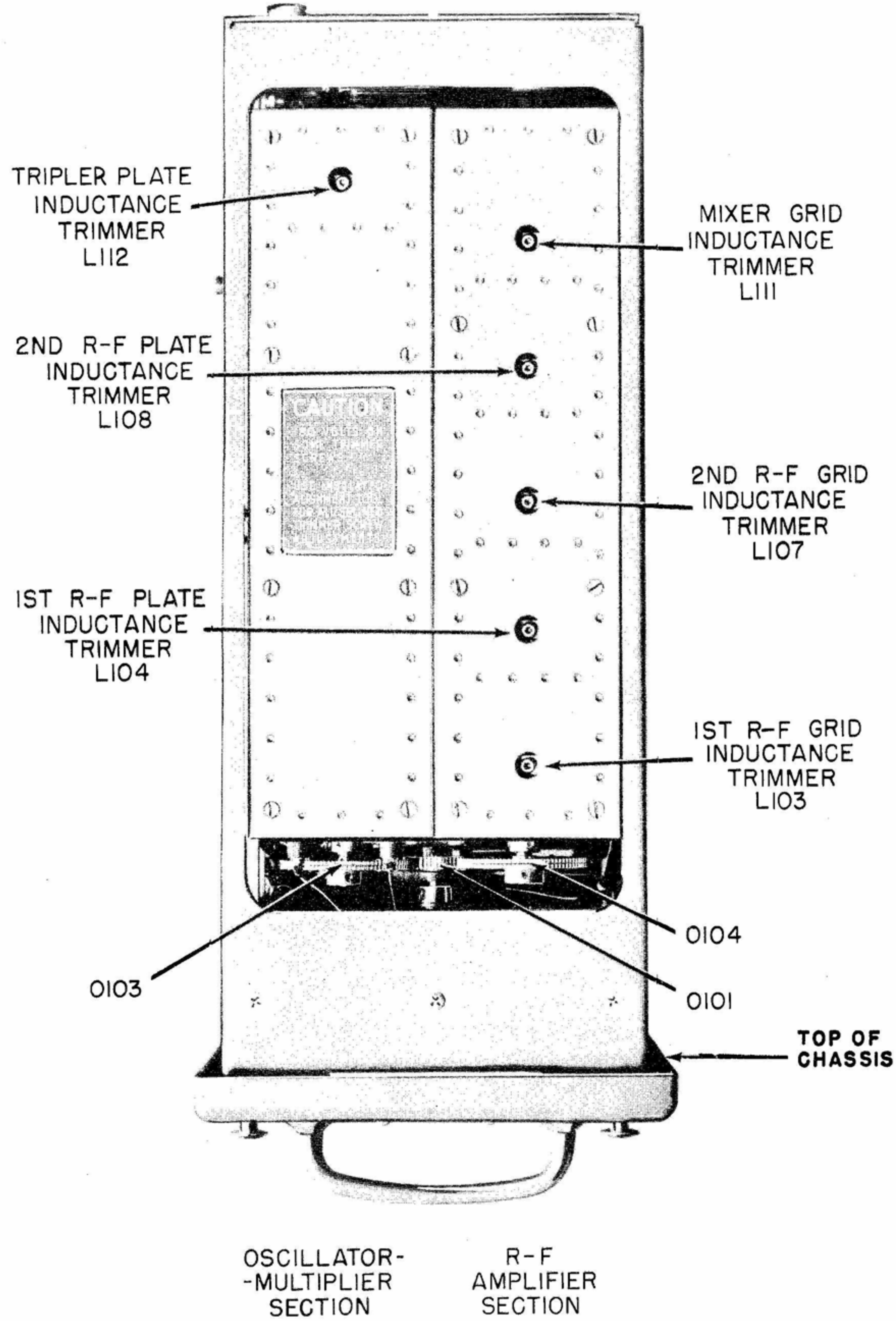


Figure 7—9. Preselector from Left Side of Chassis Showing Alignment Adjusting Screws

tuning dial (window marked MEGACYCLES) with the position of the capacitor plates in the preselector. To make sure this alignment is correct:

(7) Turn the dial drive input shaft to the left until the number "218" is at top of the calibrated dial (approximate extreme left position of shaft).

(8) Turn the driven member of the flexible coupling O503-A (attached to preselector input 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.

(9) Engage the drive member O503-B of the flexible drive with the driven member O503-A, without disturbing the position of the latter, and secure its hub to the output shaft of the dial drive mechanism.

(10) Insert a crystal of known frequency and tune the receiver to the corresponding carrier frequency (crystal frequency x 12, less 18.6 megacycles).

(11) Note the discrepancy, in dial divisions, between the reading on the calibrated tuning dial and this frequency.

(12) Turn the mechanism to a point where the set screw on the drive member of the flexible coupling is accessible, and loosen same.

(13 With one hand hold the gears on the preselector so as to prevent any change in tuning, and with the other hand crank the dial drive through a number of dial divisions equal to the discrepancy.

(14) Tighten the set screw on the drive member of the flexible coupling.

e. PRESELECTOR. — Removal of the body of the preselector and the re-installation 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 following procedure be followed carefully.

(1) Unsolder those leads which run from the preselector to terminal board E301 (figure 1–5), at E301, and tag each terminal to indicate which lead (of the original assembly or of a substitute assembly) is to be reconnected to it.

(2) Unsolder, in similar manner, those leads which run to terminal board E208.

(3) Unsolder the two leads which connect between the oscillator-multiplier section of the preselector unit and the crystal in the left-hand panel compartment.

(4) At transformer T201 (1st i-f transformer) unsolder the two leads of the AN type RG-108/U dual conductor (coupling loop from transformer T122 in the preselector) from terminals Nos. 3 and 4. Also unsolder the braided shielding from the chassis.

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

(*a*) Three screws entering side plate from rear panel.

(*b*) Three screws connecting side plate to front panel subassembly.

(*c*) Four screws entering side plate from front panel.

(6) Remove rear panel receptacles P101 and P201 by removing four screws in each.

(7) On top of chassis (figure 7–4): Note the two rails holding preselector in place and:

(*a*) Detach rail nearer left side of chassis from rear panel and from front panel subassembly by removal of two screws.

(*b*) Detach rail farther from left side of chassis from preselector by removing four screws, but do not remove screws attaching ends to rear panel and front panel subassembly.

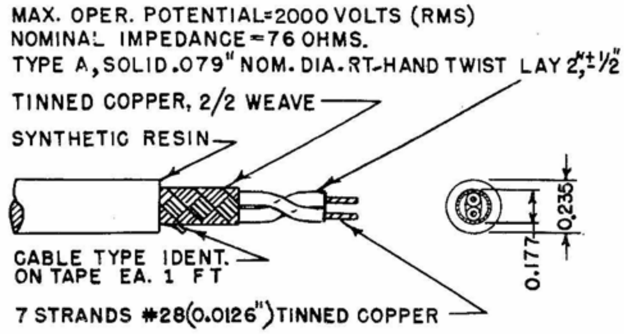
CAUTION

When removing the screws in the rails holding the preselector in place, as described in steps (7) above and (8) below, care must be taken not to damage the by-pass capacitor terminals on the side of the unit (figure 7–15) by striking them against other parts of the receiver. This may happen if the preselector is allowed to settle into the chassis so that these terminals come in contact with the rails which were not detached.

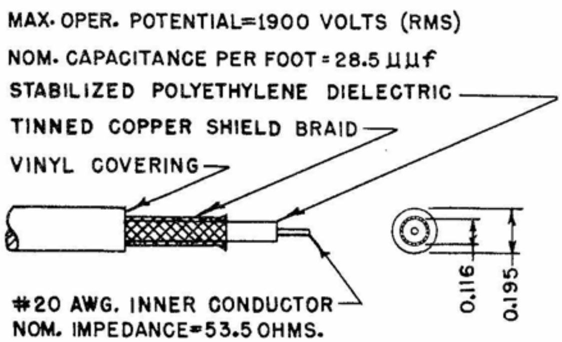
(8) On bottom of chassis (figure 7–8): Note two similar rails holding preselector in place and detach rail nearer left side from rear panel and front panel subassembly, and rail farther from left side from preselector, in similar manner to step No. 6.

(9) Turn tuning crank until "325" appears in window marked MEGACYCLES; this should put the arms of the flexible coupling in a horizontal position.

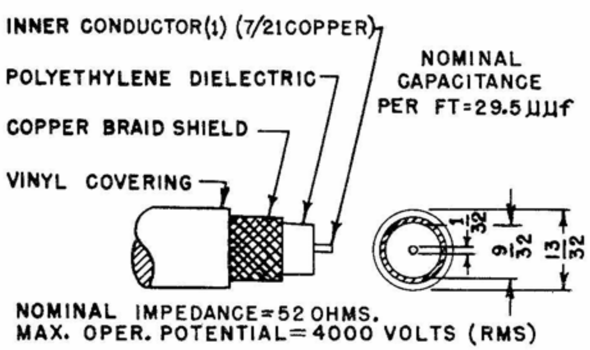
(10) Withdraw preselector from chassis. The procedure for re-installation of the preselector, or for the installation of a substitute assembly, is a reversal of the foregoing procedure, except that, after the preselector is properly in place, it will be necessary



ARMY-NAVY TYPE RG-108/U SHIELDED TWISTED DUAL CONDUCTOR



ARMY-NAVY TYPE RG-58/U GENERAL PURPOSE FLEXIBLE COAXIAL CABLE



ARMY-NAVY TYPE RG-8/U GENERAL PURPOSE FLEXIBLE COAXIAL CABLE

ARMY-NAVY TYPE RG-10/U CABLE SAME AS RG 8/U, EXCEPT ARMORED, AND 0.475" MAX O.D.

Figure 7—10. Details of R-f and I-f Cables Used in or with Radio Receiving Set AN/URR-13A

to coordinate the performance of the preselector with the indications on the calibrated tuning dial. To make sure the latter is correct:

(11) Loosen the set screw in the hub of the driven arm O503-A of the flexible coupling (part on preselector), and turn the ganged capacitors until the shorter sides of the rotor plates are flush with the stator plates.

(12) Rotate tuning crank to the left until the number "218" is at the top of the calibrated dial (approximate left limit of crank rotation).

(13) With drive and driven members of the flexible coupling properly engaged, tighten the set screw in the hub of the driven member O503-A which was loosened in step No. 10.

(14) Insert a crystal of known frequency and tune the receiver to the corresponding carrier frequency (crystal frequency x 12, less 18.6 megacycles).

(15) Note the discrepancy, in dial divisions, between the reading on the calibrated tuning dial, and this frequency.

(16) Crank the mechanism to a point where the set screw on the driven member of the flexible coupling is accessible, and loosen same.

(17) Holding the gears on the preselector with one hand so as to prevent any change in tuning, use the other hand to crank the tuning mechanism through a number of dial divisions equal to the discrepancy.

(18) Tighten the set screws on the driven member of the flexible coupling.

7. REPLACEMENT OF R-F CABLES.

Several lengths of AN type RG-58/U cable are used in the receiver proper and in the cable filter unit, and a single 48-inch length is used to make up the antenna test cable (W601). One length of AN type RG-108/U cable is used in the receiver, as indicated in the wiring diagram of figure 7–18. Unless subjected to physical abuse or abnormal conditions of operation, these cables should require no further attention. However, to assist maintenance personnel in the event that replacement should be necessary, cross-section diagrams of these cables, and of all r-f connectors used, are shown in figures 7–10 and 7–11.

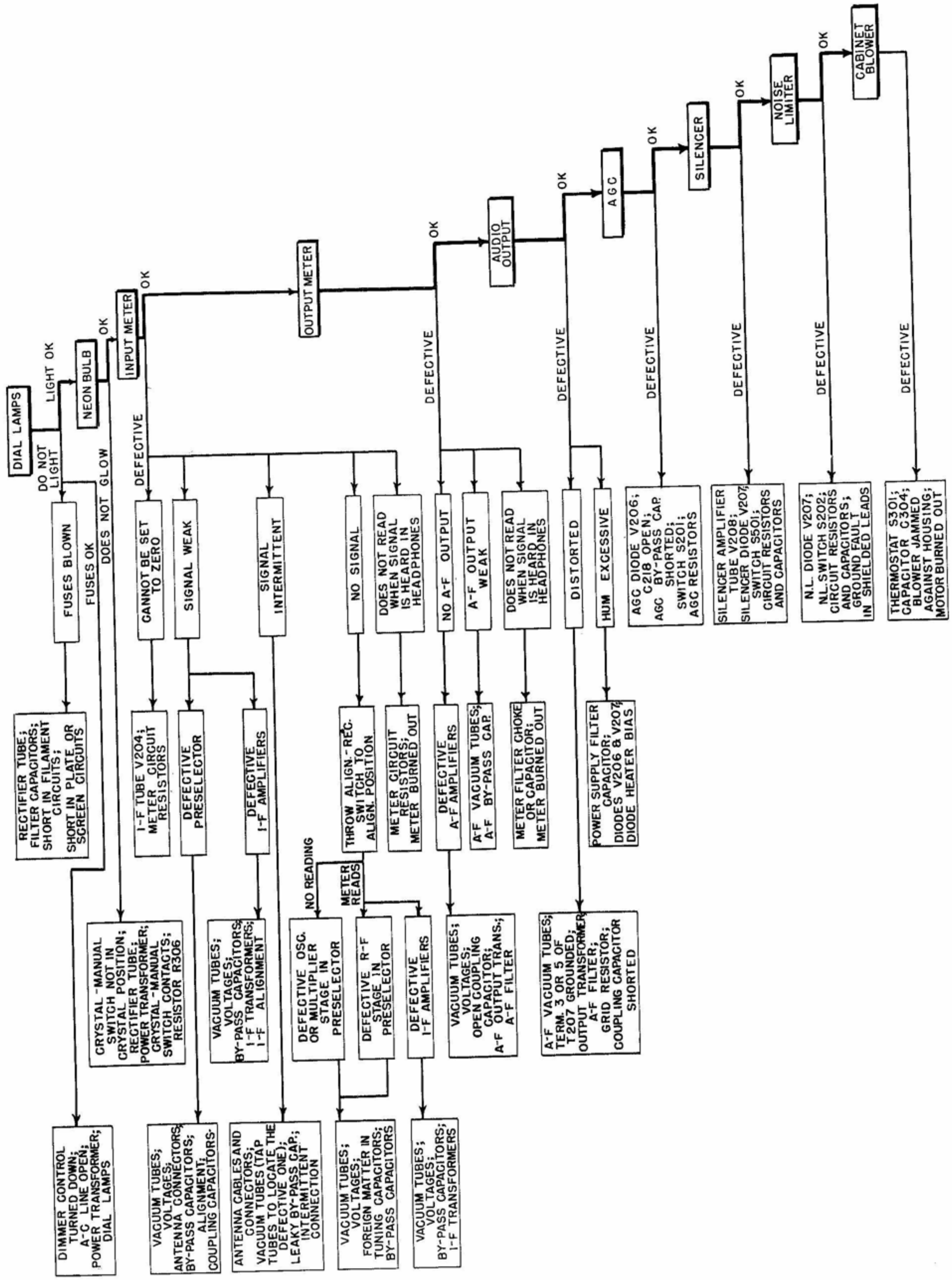


TABLE 7–4. TROUBLE SHOOTING CHART

TABLE 7-5. VOLTAGE AND RESISTANCE MEASUREMENTS* — FROM ELECTRON TUBE TERMINALS TO GROUND AND/OR OTHER SIGNIFICANT POINTS

Symbol and JAN type	Element	Points of Measurement	Potential (volts)	Resistance (ohms)
		Radio Receiver R-266A/URR-13 — R-F Amplifier Section of Preselector		
		Note: Data for tubes in this section not given because tube pins not accessible for making measurements when receiver in operation. For alternate significant measurements see figure 7-15.		
		Radio Receiver R-266A/URR-13 — Oscillator-Multiplier Section of Preselector		
		Note: Data for tubes in this section not given because tube pins not accessible for making measurements when receiver in operation. For alternate significant measurements see figure 7-15.		
		Radio Receiver R-266A/URR-13 — IF/AF Section		
V201 (6BA6)	Control Grid	Pin #1	—3.2	280,000
	Suppressor	2	0	0
	Heater	3	5.8 a.c.	0
	Heater	4	0	0
	Plate	5	157.0	30,000
	Screen Grid	6	98.0	30,000
	Cathode	7	2.5	52
V202 (9003)	Control Grid	Pin #1	—3.2	280,000
	Cathode	2	0	0
	Cathode	7	0	0
	Heater	3	5.8 a.c.	0
	Heater	4	0	0
	Plate	5	150	30,000
	Screen Grid	6	95	30,000
V203 (9003)	Control Grid	Pin #1	—3.2	280,000
	Cathode	2	0	0
	Cathode	7	0	0
	Heater	3	5.8 a.c.	0
	Heater	4	0	0
	Plate	5	150	30,000
	Screen Grid	6	95	30,000
V204 (9003)	Control Grid	Pin #1	—3.2	280,000
	Cathode	2	0	0
	Cathode	7	0	0
	Heater	3	5.8 a.c.	0
	Heater	4	0	0
	Plate	5	145	30,000
	Screen Grid	6	93	30,000
V205 (9003)	Control Grid	Pin #1	0	0
	Cathode	2	3.3	550
	Cathode	7	3.3	550
	Heater	3	5.8 a.c.	0
	Heater	4	0	0
	Plate	5	154	30,000
	Screen Grid	6	98	30,000

*See footnote at end of table, Page 7-19.

TABLE 7–5. VOLTAGE AND RESISTANCE MEASUREMENTS* – FROM ELECTRON TUBE TERMINALS TO GROUND AND/OR OTHER SIGNIFICANT POINTS (Cont'd)

Symbol and JAN type	Element	Points of Measurement	Potential (volts)	Resistance (ohms)
		Radio Receiver R-266A/URR-13 — IF/AF Section (Continued)		
V206 (6AL5W)	#1 Cathode	Pin #1	—	14,000
	#1 Plate	2	—	310,000
	Heater	3	—6	46
	Heater	4	—6	46
	Heater	3 to Pin 4	6.1 a.c.	—
	#2 Cathode	5	0	14,000
	—	6	—	0
	#2 Plate	7	—	95,000
V207 (6AL5W)	#2 Cathode	Pin #1	76	210,000
	#1 Plate	2	—0.3	140,000
	Heater	3	—6	46
	Heater	4	—6	46
	Heater	3 to Pin 4	6.1 a.c.	—
	#1 Cathode	5	+0.3	2,000,000
	—	6	—	∞
	#2 Plate	7	0	330,000
V208 (6AK5W)	Control Grid	Pin #1	0.2	800,000
	Cathode	2	7.5	∞
	Cathode	7	0	0
	Heater	3	5.9	0
	Heater	4	0	0
	Plate	5	92	78,000
	Screen Grid	6	100	280,000
V209 (6AK5W)	Control Grid	Pin #1	—2.25	1,000,000
	Cathode	2	0	0
	Cathode	7	0	0
	Heater	3	5.9 a.c.	0
	Heater	4	0	0
	Plate	5	87	55,000
	Screen Grid	6	87	55,000
V210 (6AK5W)	Control Grid	Pin #1	0	260K
	Cathode	2	0.75	750
	Cathode	7	0.75	750
	Heater	3	5.9 a.c.	0
	Heater	4	0	0
	Plate	5	100	280K
	Screen Grid	6	32	1 meg.
V211 (6AK6)	Control Grid	Pin #1	0	500,000
	Suppressor	2	4.8	250
	Heater	3	5.9 a.c.	0
	Heater	4	0	0
	Plate	5	137	800
	Screen Grid	6	148	28,000
	Cathode	7	4.8	250
		Radio Receiver R-266A/URR-13 — Power Supply Section		
V301 (5U4G)	NC	Pin #1	—	—
	Filament	2	205	28,000
	NC	3	—	—
	#1 Plate	4	—2.1dc; + 228ac	90
	NC	5	—	—
	#2 Plate	6	—2.1dc; + 228ac	90
	NC	7	—	—
	Filament	8	205	28,000

*See footnote at end of table, Page 7-19.

TABLE 7–5. VOLTAGE AND RESISTANCE MEASUREMENTS* — FROM ELECTRON TUBE TERMINALS TO GROUND AND/OR OTHER SIGNIFICANT POINTS (Cont'd)

Symbol and JAN Type	Element	Points of Measurement	Potential (volts)	Resistance (ohms)
Radio Receiver R-266A/URR-13 — Power Supply Section (Continued)				
V302 (OB2)	Anode	Pin #1	105	28,000
	Cathode	3	0	0
	NC	3	—	—
	NC	4	—	—
	NC	5	—	—
	NC	6	—	—
	NC	7	—	—
V303 (OA2)	Anode	Pin #1	150	28,000
	Cathode	2	—6	45
	NC	3	—	—
	NC	4	—	—
	NC	5	—	—
	NC	6	—	—
	NC	7	—	—

*Measurements to ground, and voltage dc, unless otherwise indicated.

Conditions of measurement: line voltage, 115 volts, 60 cps; 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 made with power connector (P401/J401) disconnected. All measurements taken with a Multimeter ME-25/U series, or a Navy Model OBQ series, or equivalent, electronic voltmeter.

TABLE 7–6. VOLTAGE AND RESISTANCE MEASUREMENTS* – TERMINAL BOARD CONNECTIONS TO GROUND, AND/OR OTHER SIGNIFICANT POINTS

Terms. at Which Readings Made		Potential		Resis. (ohms)
From	To	Volts D. C.	Volts A. C.	
The following terminals are located on term. board E303 in Pwr. Supply Section.				
1	Ground			∞
2	Ground	—6.7	15	40
3	Ground	—6.7	15	40
4	Ground	0	0	0
5	Ground	0	5.9	0
6	Ground	—3.4	7.3	20
7	Ground	165	0	28,000
8	Ground	103	0	27,000
9	Ground			∞
10	Ground			∞
11	Ground			3
12	Ground	0	0	3
13	Ground	144	0	28,000
14	Ground			∞
15	Ground	103	0	170,000
The following terminals are located on term. board E301 in Pwr. Supply Section.				
21	Ground	0	5.9	0
22	Ground	165	0	28,000
23	Ground	150	0	28,000
24	Ground			∞
25	Ground	0	0	0
26	Ground			∞

Terms. at Which Readings Made		Potential		Resis. (Ohms)
From	To	Volts D. C.	Volts A. C.	
The following terminals are located on term. board E208 in IF/AF Section.				
31	Ground			
32				
33				
34	Ground	—3.2		180,000
35	Ground	—3.4		20
36	Ground	—7.2		40,000
The following items are located on terminal board E202 in IF/AF Section.				
R253 (Term. near front of chassis)	Ground	103		
R253 (Term. wired to R234)	Ground	5.5		

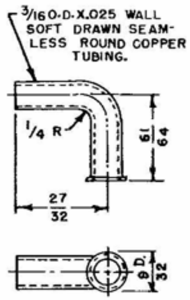
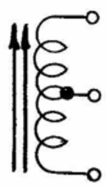
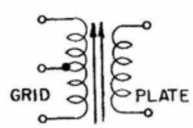
*Conditions of measurement: line voltage 115 volts, 60 cps; receiver tuned to 300 megacycles; ALIGN-REC switch in REC position; SILENCER switch in OUT position; and N.L. switch in OUT position. Resistance measurements made with power connector (P401/J401) disconnected. All measurements made with a Multimeter ME-25/U series, or a Navy Model OBQ, or equivalent, electronic voltmeter.

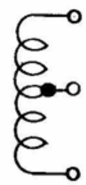
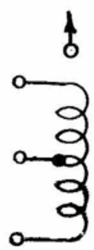
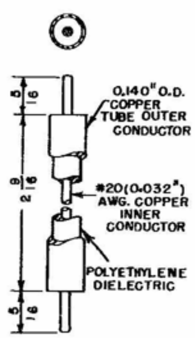
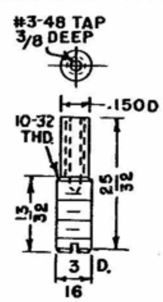
TABLE 7–7. RATED TUBE CHARACTERISTICS

Tube Type	Filament Voltage (v)	Filament Current (amps)	Plate Voltage (v)	Grid Bias Voltage (v)	Screen Voltage (v)	Plate Current (ma)	Screen Current (ma)	A-c Plate Resistance (ohms)	Voltage Amplification Factor	Transconductance (Micromhos)		Emission	
										Normal	Minimum	I_K	Test Volts
OA2	Cold Cathode	—	—	—	—	5-30 cont. 75 max. start	—	—	—	—	—		
OB2	Cold Cathode	—	—	—	—	5-30 cont. 75 max. start	—	—	—	—	—		
5670	6.3	0.35	150 (300 max)	—2.0	—	8.2 per section (18 per sec. max)	—	—	35	5500			
6AK5W	6.3	0.175	150 (180 max)	(330 Cathode Bias)	140 (140 max)	7.0	2.2	420,000	—	4300			
6AK6	6.3	0.15	180 (300 max)	—9.0	180 (250 max)	15	2.5	200,000	—	2300			
6BA6	6.3	0.30	250 (300 max)	—1.0	100	11	4.2	1,500,000	—	4400			
6J6	6.3	0.45	150 (300 max)	—10.0	—	8.5	—	7100	38	5300			
9003	6.3	0.15	(250 max)	—3.0	(100 max)	6.7	2.7	700,000	—	1800			

	Filament Voltage (v)	Filament Current (amps)	Peak Inverse Plate Voltage (v)	Peak Inverse Plate Current (ma)	Max. Plate Voltage (v) per plate	D-c Output Current (ma) per plate	D-c Voltage on Heater Cathode (v)
5U4G	5.0	3.0	1550	675	550	225	
6AL5W	6.3	0.3	420	54		9 max	330

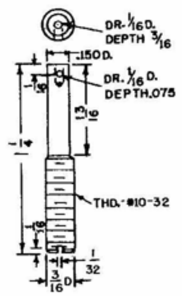
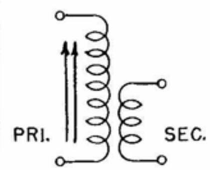
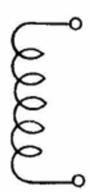
TABLE 7–8. COIL WINDING DATA — ALL WIREWOUND PARTS, EXCEPT RESISTORS

Circuit Symbol	FTRC Drawing Number	Schematic Diagram	Winding	Coil Form	Wire and Size	No. of Turns and Loc. Taps	D-C Resis. (Ohms)	Induc-tance	"Q" (and Freq.)	Remarks
Radio Receiver R-266A/URR-13 — Preselector Z107										
L101	FRB-10086-1			None	3/16" O.D. x 0.025" wall S.D. seamless round copper tube	90° Elbow (5/32" inside radius)				See ass'y diagram. Tube 0.0005" silver plate.
L114	FRA-18729-2			7/16" diam. ceramic tube. FTRC Dwg. FRA-20302-1	#20 AWG bare tinned S.D. copper*	14 Tap at 5-11/16 turns from mtg. base end (incl. term. clip).		1.4 μh		Single layer wound; Powdered iron slug on threaded brass stud for inductance adjustment.
L115	FRA-18730-2		Grid & plate wdgs. inter-spaced in double helix	⅞" diam. mica filled bakelite tube. FTRC Dwg. FRP-17877-14-3	#20 AWG bare* tinned soft copper	Grid: 6 turns, tap at 2⅞; Plate: 5⅜ turns	0.01	0.34 μh at 10 mc & 20 mc, & 100 dcma		Both wdgs. space wound at 8 t.p.i.; Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C; Powdered iron slug on threaded brass stud for inductance adjustment.

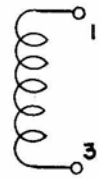
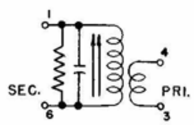
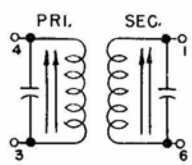
L116	FRA-18731-2			7/16" diam. mica-filled bakelite tube. FTRC Dwg. FRP-17877-14-4	#20 AWG bare tinned soft copper*	9; tap at 5 turns from mtg. base end.	0.01	0.58 μh at 10 mc & 20 mc, & 100 dcma		Wound at 14 t.p.i. Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C. Powdered iron slug on brass stud for inductance adjustment
L117	FRA-18732-2			7/16" diam. mica-filled bakelite tube. FTRC Dwg. FRP-17877-14-5	#20 AWG bare tinned soft copper*	3; Ctr. tap at 1½ turns	0.007	0.09 μh at 25 mc & 50 mc, & 100 dcma		Wound at 5 t.p.i. Movable brass core for inductance adjustment
L118	FRA-10087-1			None	Coaxial: 0.032" diam. inner conductor; polyethylene insulation; copper tube outer conductor; 0.140" O.D.	Straight section 3-3/16" lg, incl. 5/16" stripped ends.				0.0002" silverplate
L119 L120	FRB-18733-1									

*Per A.S.T.M. Spec. B33-46.

TABLE 7–8. COIL WINDING DATA — ALL WIREWOUND PARTS, EXCEPT RESISTORS (Cont'd)

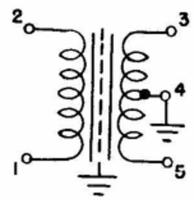
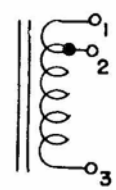
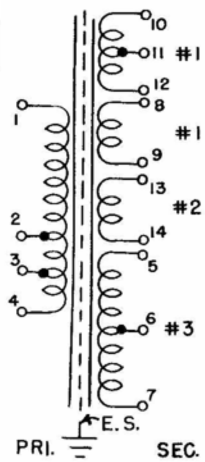
Circuit Symbol	FTRC Drawing Number	Schematic Diagram	Winding	Coil Form	Wire and Size	No. of Turns and Loc. Taps	D-C Resis. (Ohms)	Induc- tance	"Q" (and Freq.)	Remarks
L121	FRB-6204-1									
L122	FRA-18728-2		Primary (at mtg. base end)	7/8" diam. bakelite tube FTRC Dwg. FRP-17877-14-6	#26 AWG bare tinned soft copper*	7¼		0.75h		Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C. Powdered iron slug on threaded brass stud for inductance adjustment.
			Secondary (at free end)		#26 AWG bare tinned soft copper*	1-5/6		0.15h		Both dwgs. at 28 t.p.i.
L123	FRA-20493-1			5/32" diam. x ½" lg. bakelite rod. FTRC Dwg. FRP-20492-1	#30 AWG SC enam. copper magnet	27	0.133 ±10%	1.2 μh ±5%	80, ±10% at 25 mc	Close wound rt. or lt. hand. Preheated (100° C.); dipped in "Q-max A-27" (tropicalized), and baked dry at 60° C.

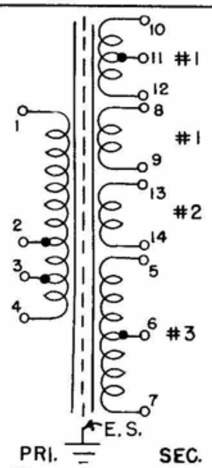
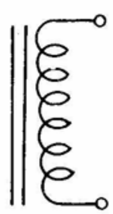
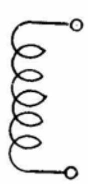
Radio Receiver R-266A/URR-13 — IF/AM Section

L201 thru. L211	FRA-511-1			13/64" diam. x 5/8" lg. phenolic form. FTRC Dwg. FRP-512-1	#30 AWG SC enam. copper magnet	45	0.255, ±10%	3 μh ±5%	50, ±10% at 25 mc	Preheated (100° C.), dipped in "Q-max A-27" (tropicalized), and baked dry at 60° C. Close wound; rt. or lt. hand
T201	FRE-20810-3-2		Sec. Pri.			8, at 28 t.p.i. (starts 1/4" from bottom) 2, at 28 t.p.i. (starts 1 turn from sec., on same form)				Powdered iron core (adjustable from bottom) in secondary 100 μμf capacitor & 4700 ohm, 1/2-watt resistor each in parallel with sec. Nominal tuned freq. = 18.6 mc. Per FTRC Spec. RC-7804-1
T202 T203 T204 T205 T206	FRE-20810-3-1		Sec. Pri.			8, at 28 t.p.i. (8th turn spaced 7 turns from rest) 8, at 28 t.p.i. (turns 2-7 spaced 7 turns from first).			120 120	Start sec. wdg. 1 1/4" from bottom. Leave 9 spaced turns between sec. and pri. wdgs. 100 μμf capacitors in shunt with pri. and sec. wdgs. 18.6 nominal res. Powdered iron cores adjustable one from top and one from bottom. Per FTRC spec. RC-7804-1

*Per A.S.T.M. Spec. B33-46.

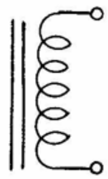
TABLE 7–8. COIL WINDING DATA — ALL WIREWOUND PARTS, EXCEPT RESISTORS (Cont'd)

Circuit Symbol	FTRC Drawing Number	Schematic Diagram	Winding	Coil Form	Wire and Size	No. of Turns and Loc. Taps	D-C Resis. (Ohms)	Induc-tance	"Q" (and Freq.)	Remarks
T207	RC-7899-1		Pri.	Silicon steel core; steel enclosing frame	#40E	2600	710	15h		180 v to grnd. Turns ratio = 12.4/. Freq. response = ±2 db, 350-3500 cps. Electrostatic shield between windings Impedance ratio = 10,000/60
			Sec.		#29E	210	5.3			Per FTRC Spec. RC-7898-1
Radio Receiver R-266A/URR-13 — Power Supply Section										
L301	RC-8113-1					Humbucking tap at 11.4% of turns	350	12h, ±15% at 145 dcma & 10 v, 60 cps, rms.		1600 v rms test Per FTRC spec. RC-8112-1 320 v peak wkg.
T301	RC-8115-1							Voltage & terminals		
	0v		Pri. #1		#22E	297	2.38	110 v at 1 & 2		1 phase, 50/60 cps, 1 amp input
			Pri. #2		#22E	310	2.48	115 v at 1 & 3		Per FTRC spec. RC-8114-1 and FTRC schematic RC-8116-1
	110v 115v 120v		Pri. #3		#22E	324	2.60	120 v at 1 & 4		
			Sec. #4		#24E	18, C.T.	0.32	6.3 v, 0.6 amps at 10, 11 (C.T.) & 12		Electrostatic shield between pri. and sec. wdgs. Shield grnd, to case

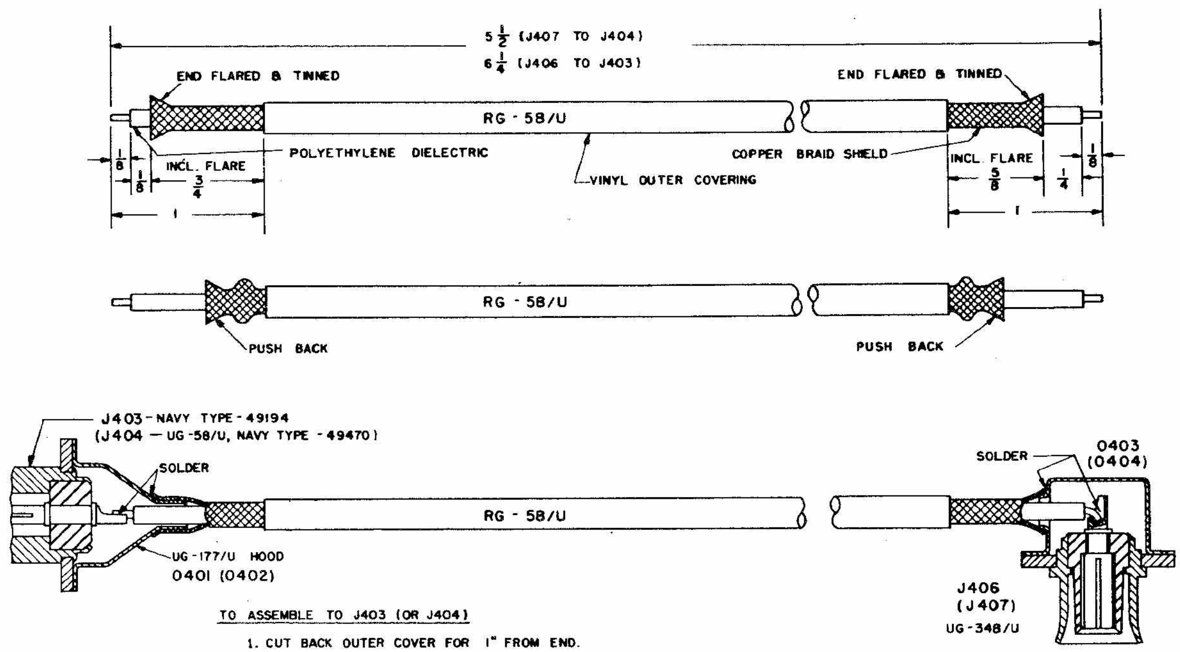
T301 Cont'd			Sec. #1		#17E	14½	0.055	5 v, 3.3 amps at 8 & 9		
			Sec. #2		2X#19E	18	0.055	6.3 v, 3.8 amps at 13 & 14		
			Sec. #3		#30E	1320 C.T.	85	470 v, 0.145 amps at 5, 6 (C.T.) & 7		
Radio Receiving Set, AN/URR-13A — Band Suppression Filter, F-89/URR-13										
L401 L402	FRA-2698-1 (—304682)			⅝" diam. x 1-11/16" lg. phenolic tube. FTRC Dwg. FRP-2700-1	#22 DCC copper magnet	3 pies; 80 turns per pie	1.12	1.26 mh ±10% at 1.5 d-c amps	25 at 225 kc ±10%	Universal wdg. $C_D = 4\ \mu\mu f, \pm 1\ \mu\mu f$ 1" lg. iron core cemented inside coil form at 9/32" from free end
L403 L404 L407 L408	FRA-2720-1 (—472314)			⅜" diam. x 1⅜" lg. phenolic rod form. FTRC Dwg. FRP-2721-1	#22 enam. copper magnet	7½	0.013	0.339 µh ±10% at 10 mc & at 20 mc, at 2 d-c amps	100 ±10% at 14 mc	Preheated (100° C.), dipped in "Q-max A-27" (tropicalized), and baked dry at 60° C.

*Per A.S.T.M. Spec. B33-46.

TABLE 7–8. COIL WINDING DATA — ALL WIREWOUND PARTS, EXCEPT RESISTORS (Cont'd)

Circuit Symbol	FTRC Drawing Number	Schematic Diagram	Winding	Coil Form	Wire and Size	No. of Turns and Loc. Taps	D-C (Ohms) Resis.	Induc-tance	"Q" (and Freq.)	Remarks
L405 L406	FRA-2699-1 (—304681)			⅝" diam. x 1-11/16" lg. phenolic tube. FTRC Dwg. FRP. 2700-1	#26 DCC copper magnet	3 pies; 70 turns per pie	1.96	1.08 mh ±10% at 300 dcma	30 ±10% at 262 kc	Universal wdg. 100 v rms test $C_D = 2\ \mu\mu f \pm 1\ \mu\mu f$ 1" lg. iron core cemented inside coil form 9/32" from free end Preheated (100° C.), dipped in "Q-max A-27" (tropicalized) and baked dry at 60° C.

*Per A.S.T.M. Spec. B33-46.



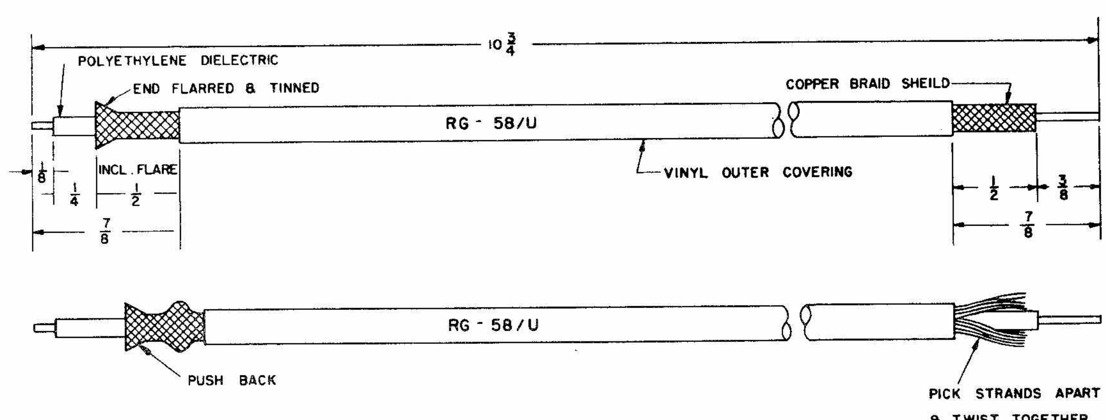
TO ASSEMBLE TO J403 (OR J404)

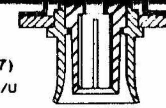
1. CUT BACK OUTER COVER FOR 1" FROM END.
2. FLARE END OF BRAID, TIN THE FLARING AND CUT BACK TO 1/4" FROM END, AS SHOWN.
3. PUSH BRAID BACK AWAY FROM END, AS SHOWN.
4. REMOVE INSULATION AT TIP FOR 1/8", USING CARE NOT TO NICK INNER CONDUCTOR.
5. PUSH DIELECTRIC THRU HOLE IN HOOD AND SOLDER WIRE TIP TO TERMINAL OF J403 (OR J404).
6. BOLT HOOD TO CONNECTOR.
7. PUSH FLARED END OF BRAID BACK OVER HOLE IN HOOD AND SOLDER BRAID TO HOOD ALL AROUND.

TO ASSEMBLE TO J406 (OR J407)

1. PROCEDURE SAME AS FOR ASSEMBLY TO J403 (OR J404), EXCEPT TINNED FLARING IS CUT BACK TO 3/8" FROM END.

Figure 7—11A. Method of Assembling R-f Cable to Antenna Input Receptacles J404 and J407, and/or to Scan Output Receptacles J403 and J406





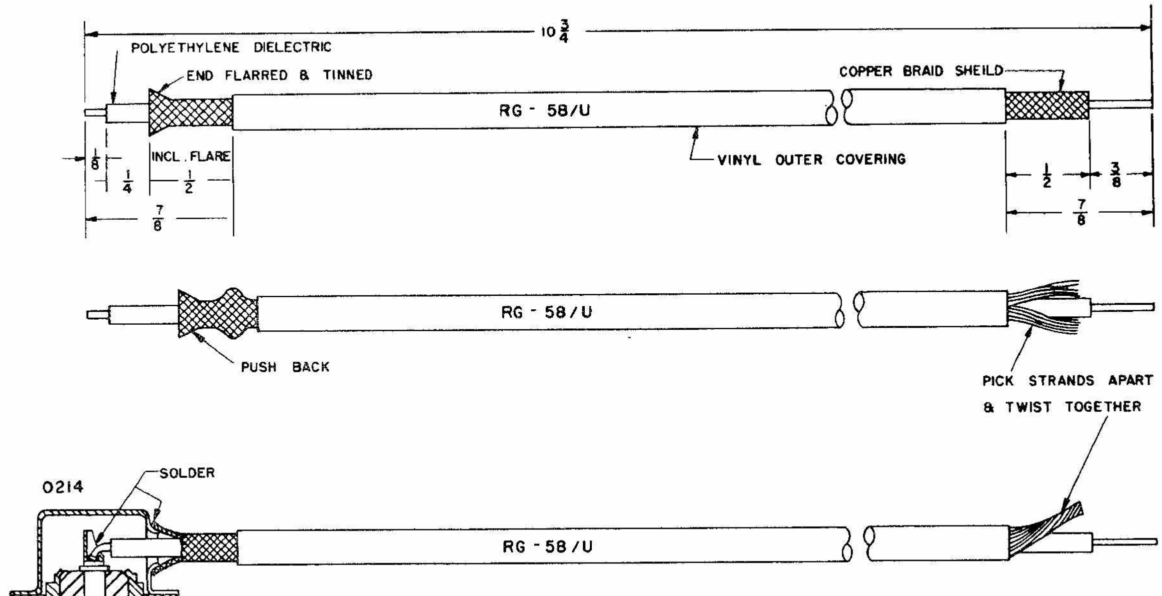
TO ASSEMBLE TO J403 (OR J404)

1. CUT BACK OUTER COVER FOR 1" FROM END.
2. FLARE END OF BRAID, TIN THE FLARING AND CUT BACK TO 1/4" FROM END, AS SHOWN.
3. PUSH BRAID BACK AWAY FROM END, AS SHOWN.
4. REMOVE INSULATION AT TIP FOR 1/8", USING CARE NOT TO NICK INNER CONDUCTOR.
5. PUSH DIELECTRIC THRU HOLE IN HOOD AND SOLDER WIRE TIP TO TERMINAL OF J403 (OR J404).
6. BOLT HOOD TO CONNECTOR.
7. PUSH FLARED END OF BRAID BACK OVER HOLE IN HOOD AND SOLDER BRAID TO HOOD ALL AROUND.

TO ASSEMBLE TO J406 (OR J407)

1. PROCEDURE SAME AS FOR ASSEMBLY TO J403 (OR J404), EXCEPT TINNED FLARING IS CUT BACK TO 3/8" FROM END.

Figure 7—11A. Method of Assembling R-f Cable to Antenna Input Receptacles J404 and J407, and/or to Scan Output Receptacles J403 and J406



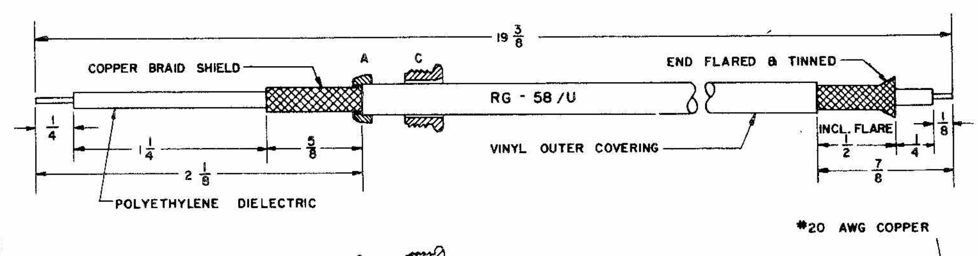
TO ASSEMBLE TO P201

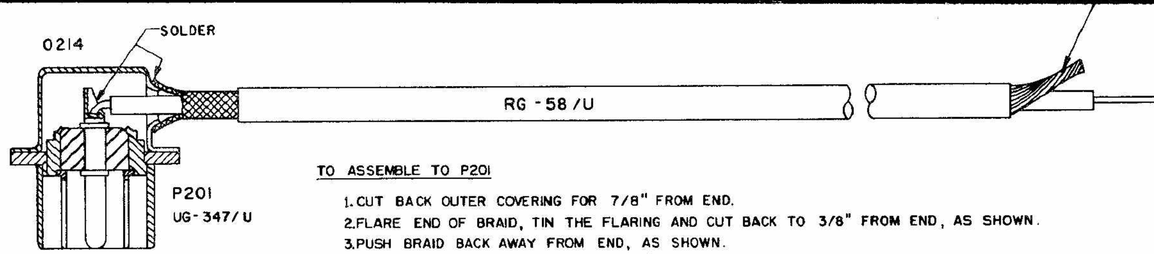
1. CUT BACK OUTER COVERING FOR 7/8" FROM END.
2. FLARE END OF BRAID, TIN THE FLARING AND CUT BACK TO 3/8" FROM END, AS SHOWN.
3. PUSH BRAID BACK AWAY FROM END, AS SHOWN.
4. REMOVE DIELECTRIC AT TIP FOR 1/8", USING CARE NOT TO NICK INNER CONDUCTOR.
5. PUSH DIELECTRIC THRU HOLE IN SIDE OF HOOD AND SOLDER WIRE TIP TO TERMINAL OF P201.
6. BOLT HOOD TO CONNECTOR.
7. PUSH FLARED END OF BRAID BACK OVER HOLE IN HOOD AND SOLDER BRAID TO HOOD ALL AROUND.

TO PREPARE FREE END

1. CUT BACK OUTER COVERING AND COPPER BRAID TO DISTANCES SHOWN, AND REMOVED DIELECTRIC TO EDGE OF BRAID (3/8") USING CARE NOT TO NICK INNER CONDUCTOR.
2. PICK APART STRANDS OF BRAID, PULL THESE TO ONE SIDE OF DIELECTRIC AND TWIST TO FORM SINGLE STRAND, AS SHOWN.

Figure 7—11B. Method of Assembling R-f Cable to Scan Output Receptacle P201 on Receiver Chassis, and of Preparation of Free End for Connection into IF/AF Section





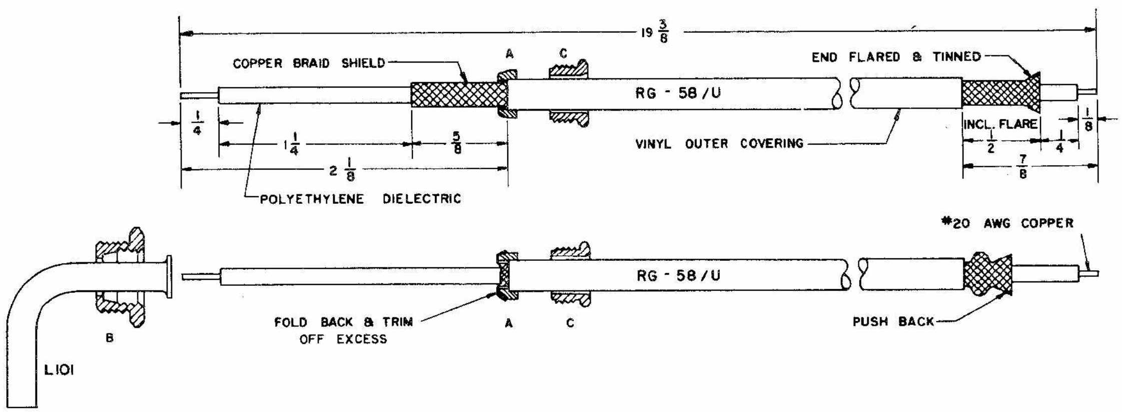
TO ASSEMBLE TO P201

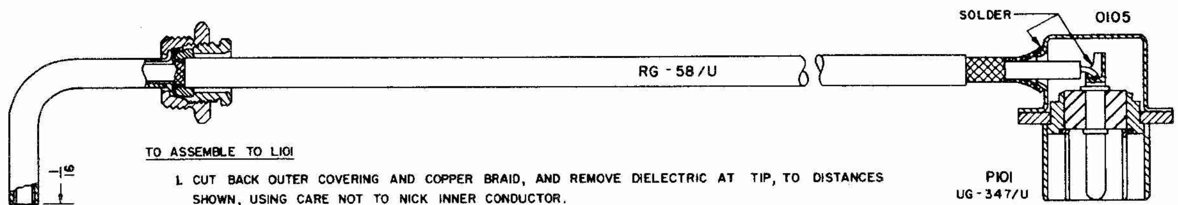
1. CUT BACK OUTER COVERING FOR 7/8" FROM END.
2. FLARE END OF BRAID, TIN THE FLARING AND CUT BACK TO 3/8" FROM END, AS SHOWN.
3. PUSH BRAID BACK AWAY FROM END, AS SHOWN.
4. REMOVE DIELECTRIC AT TIP FOR 1/8", USING CARE NOT TO NICK INNER CONDUCTOR.
5. PUSH DIELECTRIC THRU HOLE IN SIDE OF HOOD AND SOLDER WIRE TIP TO TERMINAL OF P201.
6. BOLT HOOD TO CONNECTOR.
7. PUSH FLARED END OF BRAID BACK OVER HOLE IN HOOD AND SOLDER BRAID TO HOOD ALL AROUND.

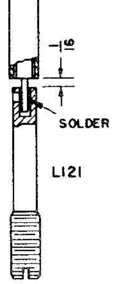
TO PREPARE FREE END

1. CUT BACK OUTER COVERING AND COPPER BRAID TO DISTANCES SHOWN, AND REMOVED DIELECTRIC TO EDGE OF BRAID (3/8") USING CARE NOT TO NICK INNER CONDUCTOR.
2. PICK APART STRANDS OF BRAID, PULL THESE TO ONE SIDE OF DIELECTRIC AND TWIST TO FORM SINGLE STRAND, AS SHOWN.

Figure 7—11B. *Method of Assembling R-f Cable to Scan Output Receptacle P201 on Receiver Chassis, and of Preparation of Free End for Connection into IF/AF Section*







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.
7. SOLDER TIP TO END OF L121.

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. PUSH BRAID BACK AWAY FROM END, AS SHOWN.
4. REMOVE DIELECTRIC AT TIP FOR 1/8", USING CARE NOT TO NICK INNER CONDUCTOR.
5. PUSH DIELECTRIC THRU HOLE IN SIDE OF HOOD AND SOLDER WIRE TIP TO TERMINAL OF P101.
6. BOLT HOOD TO CONNECTOR.
7. PUSH FLARED END OF BRAID OVER HOLE IN HOOD AND SOLDER BRAID TO HOOD ALL AROUND.

Figure 7—11C. *Method of Assembling R-f Cable to Antenna Input Receptacle P101 on Receiver Chassis, and to Shield L101 in R-f Amplifier Section of Preamplifier*

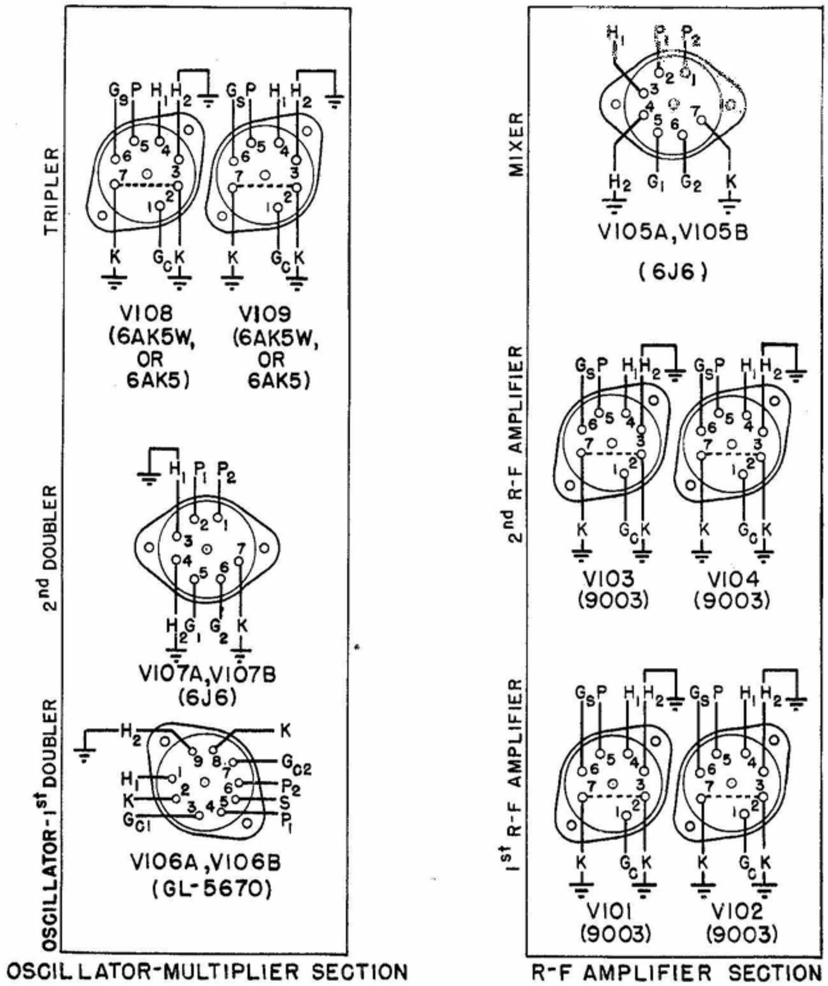


Figure 7—12. Tube Socket Diagrams—Preselector (Z107) (Top Views)

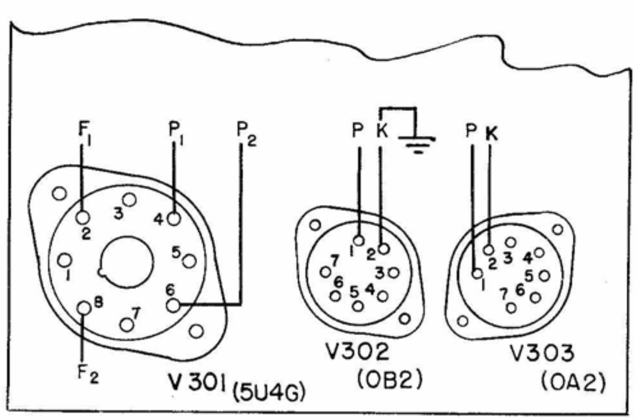


Figure 7—13. Tube Socket Diagrams—Power Supply Section (Bottom View)

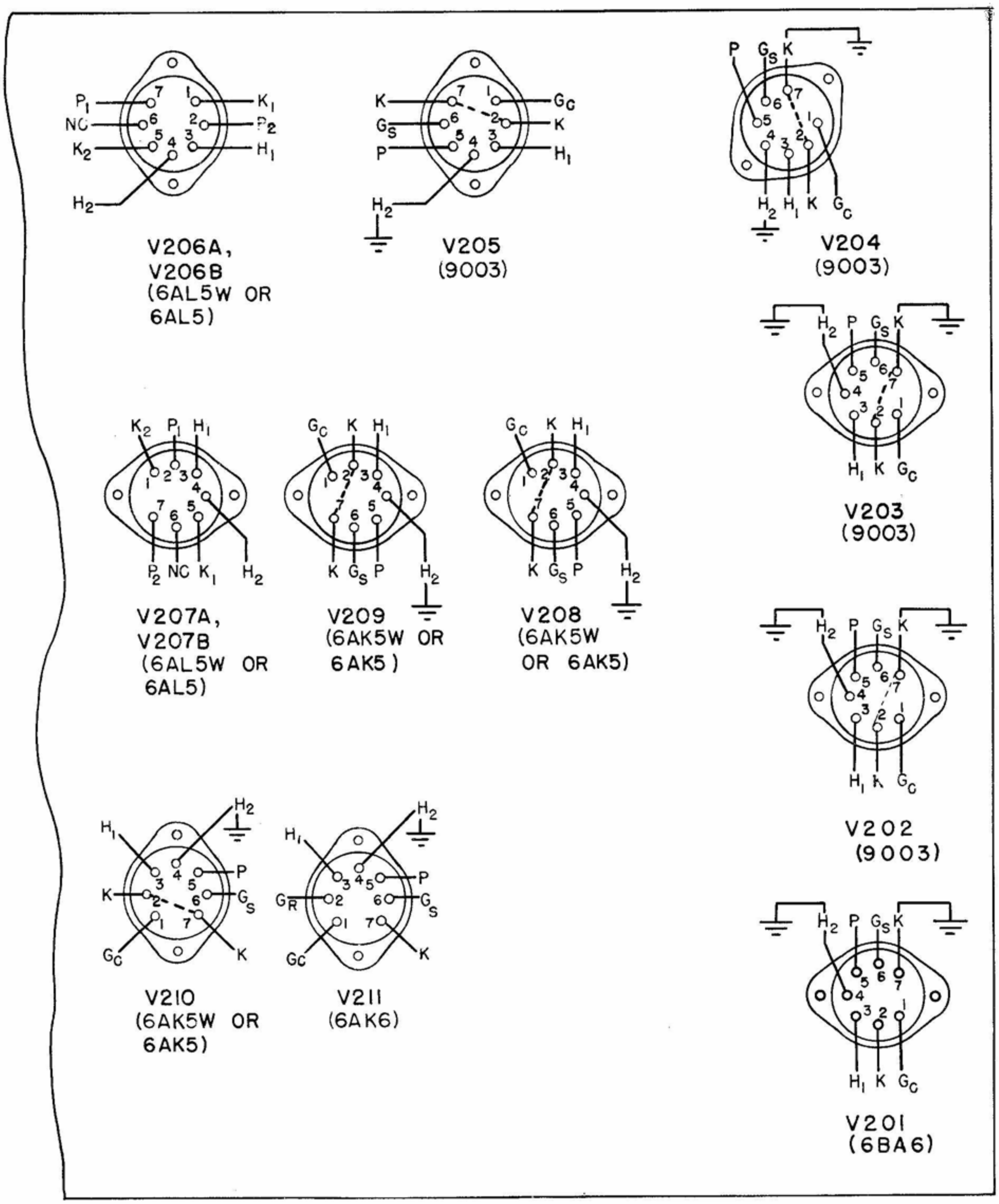


Figure 7—14. Tube Socket Diagrams—IF/AF Section (Bottom View)

NOTE 1: VALUES SHOWN ARE D-C VOLTAGES UNLESS OTHERWISE INDICATED

NOTE 2: FOR CONDITIONS OF MEASUREMENT SEE PARAGRAPH 2C OF THIS SECTION.

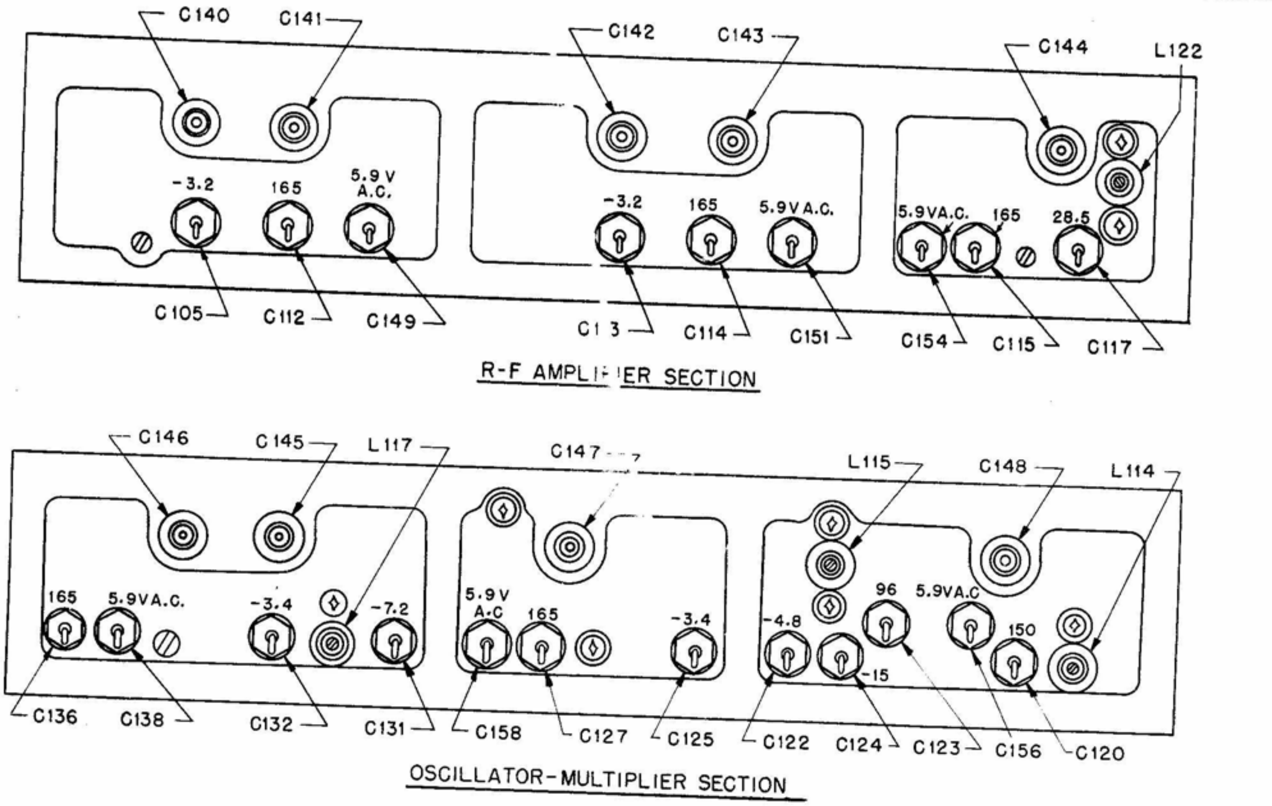
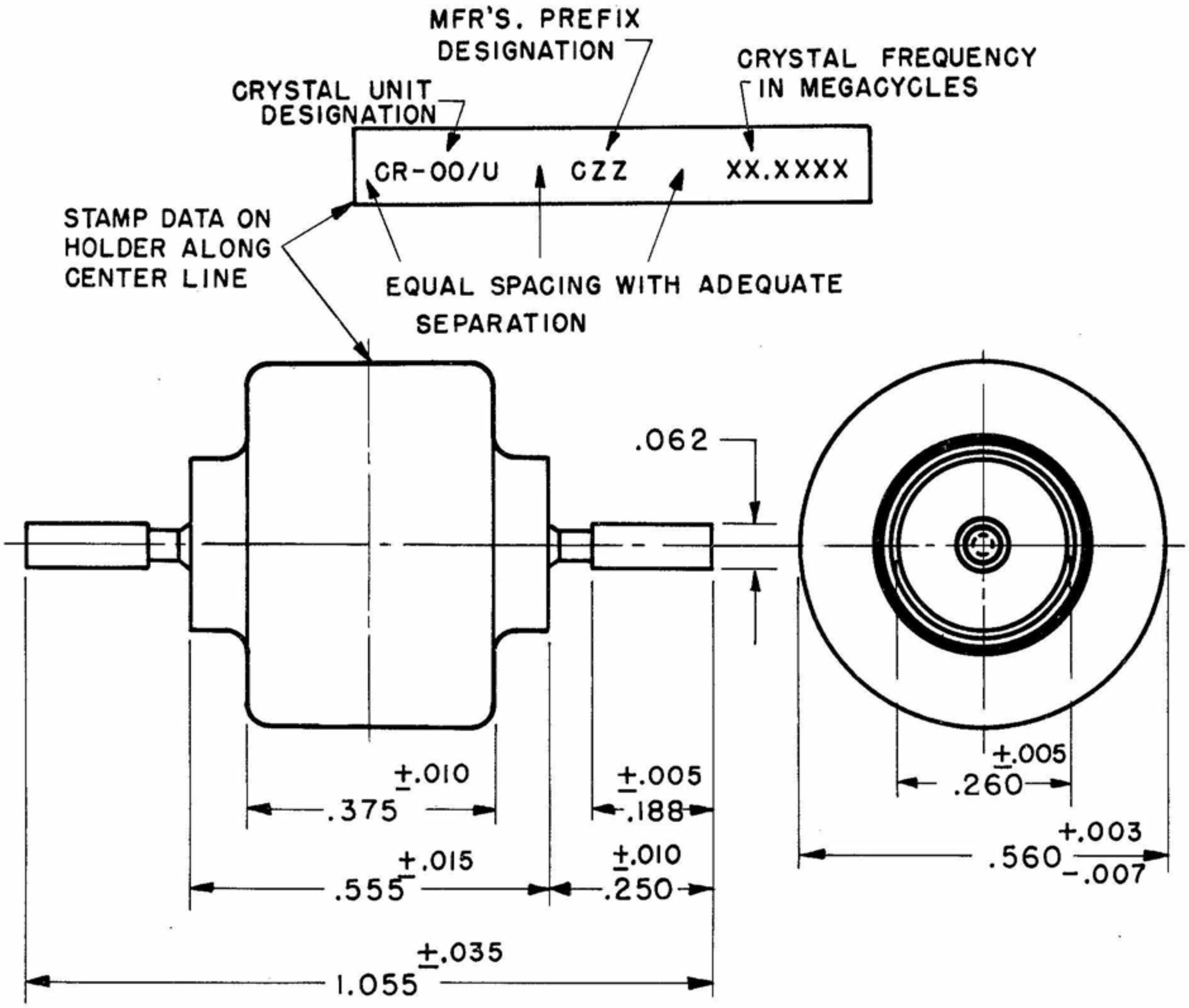
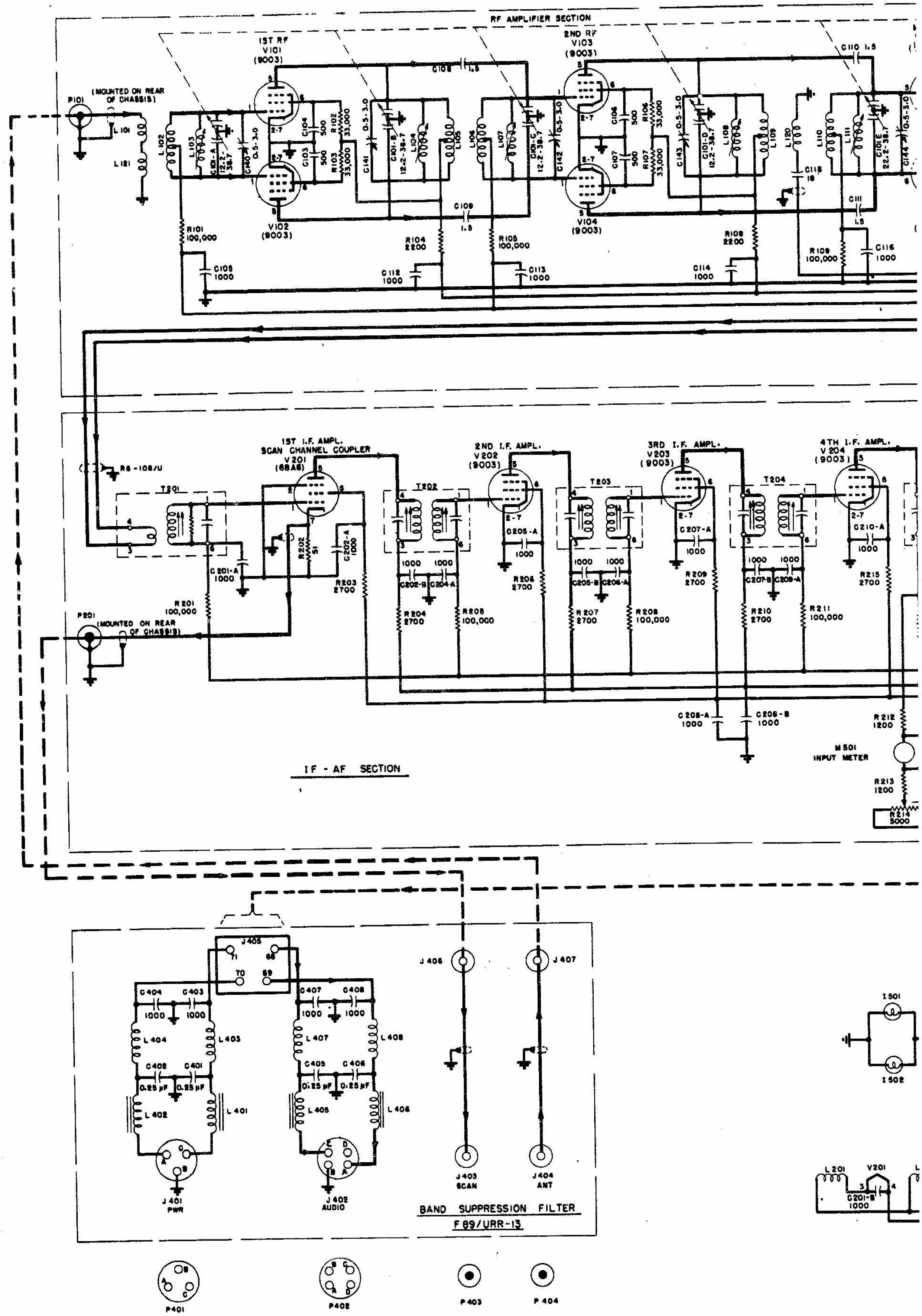


Figure 7–15. **Voltage Diagram—Significant Voltage Measurements at Points on Preselector (Z107)** Protective shield on Preselector removed

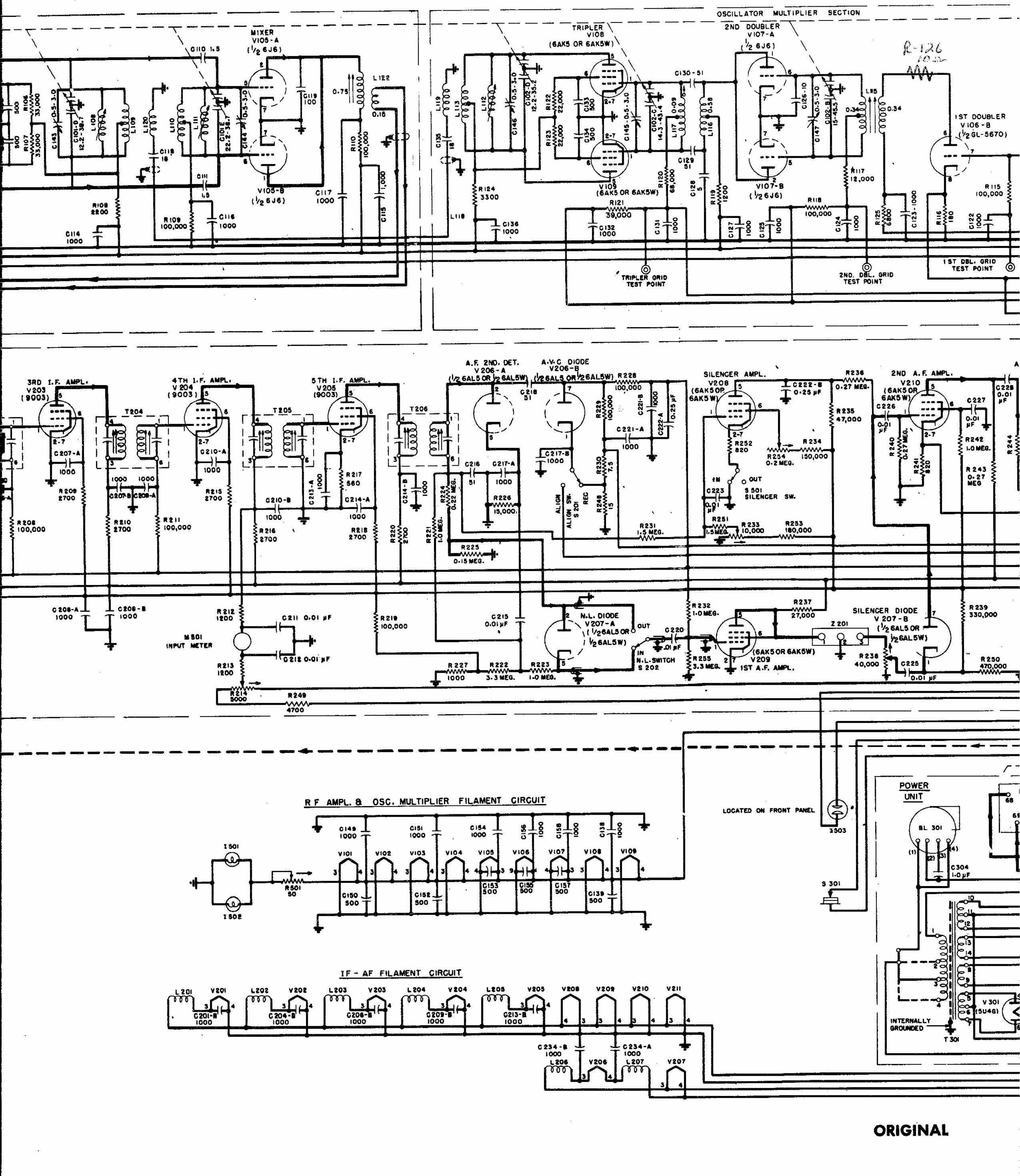


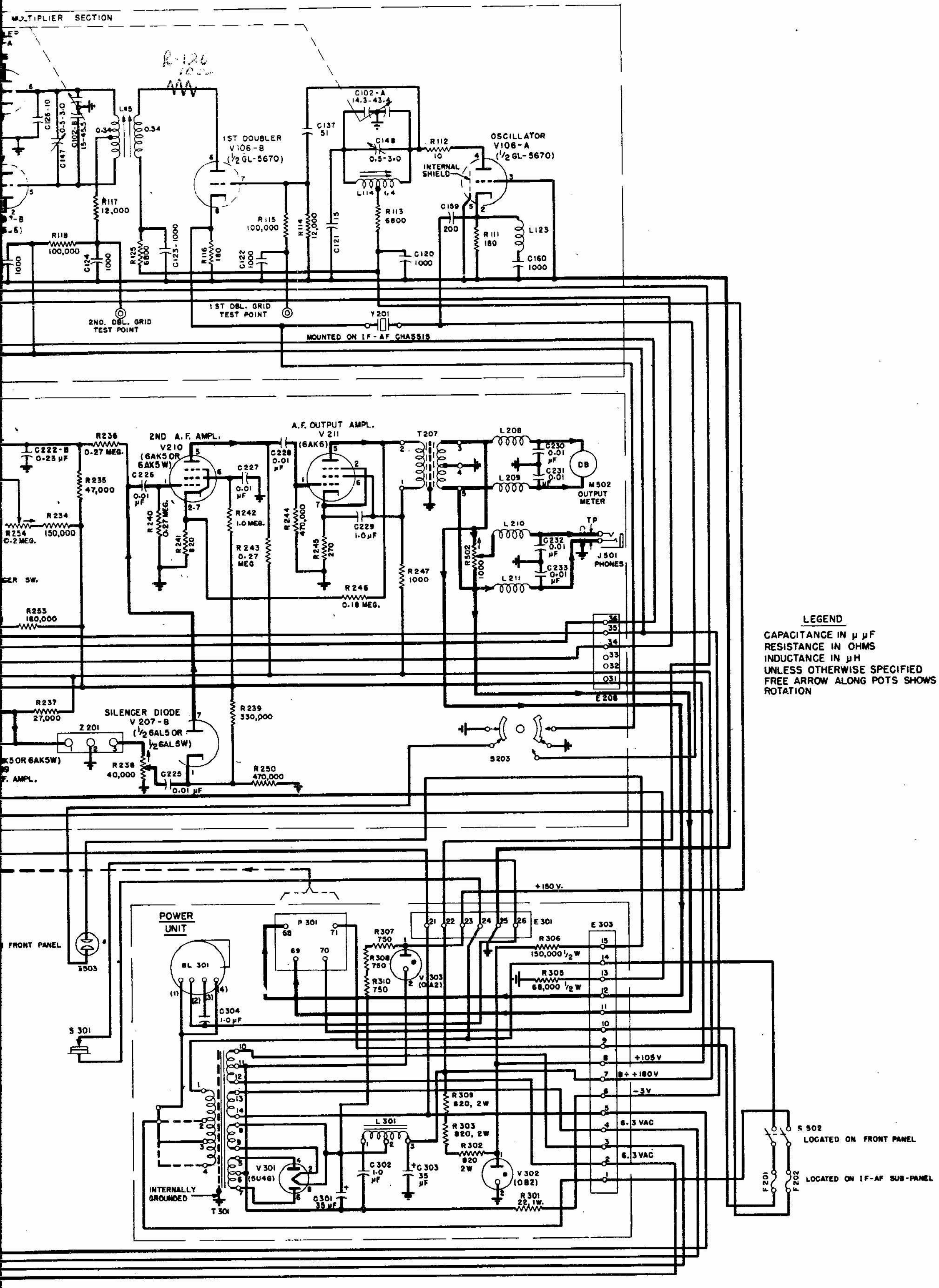
1. FREQUENCY RANGE OF CRYSTALS USED = 20.1125 TO 35.2167 MC.
2. INTERMEDIATE FREQUENCY OF RECEIVER = 18.6 MC.
3. HETERODYNE FREQUENCY RANGE = 241.35 TO 422.60 MC.
4. METHOD OF MULTIPLICATION = CRYSTAL FREQUENCY X2X2X3; SEE SCHEMATIC DIAGRAM, FIGURE (2-5)
5. TEMP. CHARACTERISTIC = ± 0.005 % DEVIATION 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—16. Outline and Data—Crystal Unit CR-24/U



RF AMPLIFIER SECTION
1ST RF
V101
(9003)
V102
(9003)
2ND RF
V103
(9003)
V104
(9003)
P101
(MOUNTED ON REAR OF CHASSIS)
L101
L121
L102
L103
C101-A 12.2-38.7
C140
0.5-3.0
C104 500
C103 500
R102 33,000
R103 33,000
C108 1.5
C141
C101-B 12.2-38.7
L104
L105
L106
L107
C101-C 12.2-38.7
C142
C106 500
C107 500
R106 33,000
R107 33,000
C143
C101-D 12.2-38.7
L108
L109
L120
L110
L111
C101-E 22.2-38.7
C144
C110 1.5
C115 18
C111 1.5
C109 1.5
R101 100,000
C105 1000
R104 2200
R105 100,000
C112 1000
C113 1000
R108 2200
C114 1000
R109 100,000
C116 1000
RG-108/U
1ST I.F. AMPL.
SCAN CHANNEL COUPLER
V201
(6BA6)
T201
C201-A 1000
R201 100,000
R202 51
C202-A 1000
R203 2700
P201
(MOUNTED ON REAR OF CHASSIS)
2ND I.F. AMPL.
V202
(9003)
T202
C202-B
C204-A
R204 2700
R205 100,000
C205-A 1000
R206 2700
3RD I.F. AMPL.
V203
(9003)
T203
C205-B
C206-A
R207 2700
R208 100,000
C207-A 1000
R209 2700
4TH I.F. AMPL.
V204
(9003)
T204
C207-B
C209-A
R210 2700
R211 100,000
C210-A 1000
R215 2700
C208-A 1000
C208-B 1000
R212 1200
M501
INPUT METER
R213 1200
R214 5000
IF - AF SECTION
J405
C404 1000
C403 1000
L404
L403
C402 0.25 µF
C401 0.25 µF
L402
L401
C407 1000
C408 1000
L407
L408
C405 0.25 µF
C406 0.25 µF
L405
L406
J401
PWR
J402
AUDIO
J406
J407
J403
SCAN
J404
ANT
BAND SUPPRESSION FILTER
F89/URR-13
P401
P402
P403
P404
I501
I502
L201
V201
C201-B 1000


OSCILLATOR MULTIPLIER SECTION
MIXER V105-A (1/2 6J6)
TRIPLER V108 (6AK5 OR 6AK5W)
2ND DOUBLER V107-A (1/2 6J6)
1ST DOUBLER V106-B (1/2 GL-5670)
R-126
V109 (6AK5 OR 6AK5W)
V105-B (1/2 6J6)
V107-B (1/2 6J6)
TRIPLER GRID TEST POINT
2ND. DBL. GRID TEST POINT
1ST DBL. GRID TEST POINT
3RD I.F. AMPL. V203 (9003)
4TH I.F. AMPL. V204 (9003)
5TH I.F. AMPL. V205 (9003)
A.F. 2ND. DET. V206-A (1/2 6AL5 OR 1/2 6AL5W)
A.V.C DIODE V206-B (1/2 6AL5 OR 1/2 6AL5W)
SILENCER AMPL. V208 (6AK5 OR 6AK5W)
2ND A.F. AMPL. V210 (6AK5 OR 6AK5W)
S 501 SILENCER SW.
ALIGN SW. S 201
N.L. DIODE V207-A (1/2 6AL5 OR 1/2 6AL5W)
N.L. SWITCH S 202
V209 (6AK5 OR 6AK5W) 1ST A.F. AMPL.
SILENCER DIODE V 207-B (1/2 6AL5 OR 1/2 6AL5W)
M 501 INPUT METER
RF AMPL. & OSC. MULTIPLIER FILAMENT CIRCUIT
IF - AF FILAMENT CIRCUIT
LOCATED ON FRONT PANEL
POWER UNIT
BL 301
S 301
V 301 (5U4G)
INTERNALLY GROUNDED
T 301



LEGEND
CAPACITANCE IN μμF
RESISTANCE IN OHMS
INDUCTANCE IN μH
UNLESS OTHERWISE SPECIFIED
FREE ARROW ALONG POTS SHOWS CLOCKWISE ROTATION

Figure 7—17. Schematic (Overall)—Radio Receiver R-266A/URR-13

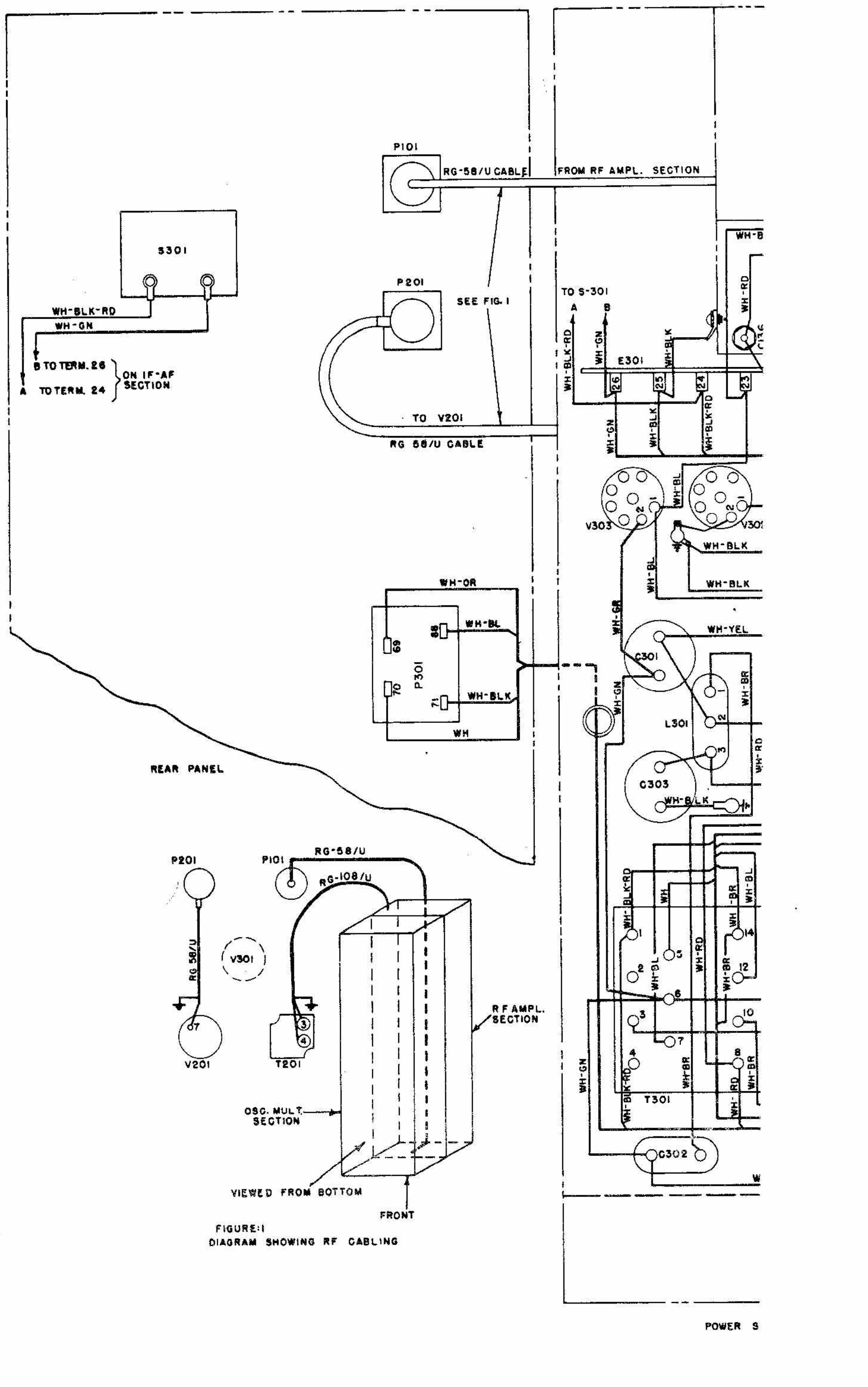
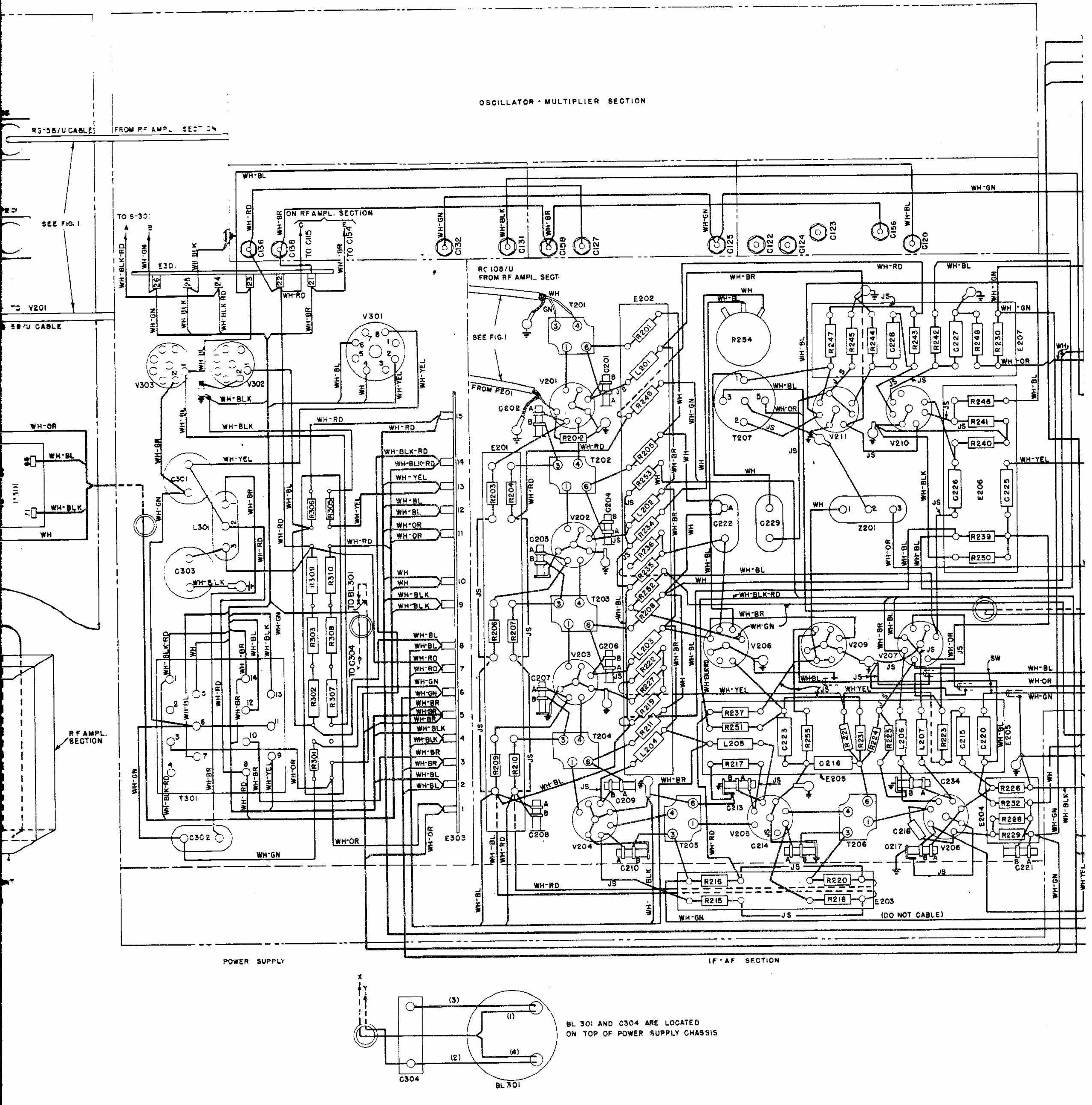
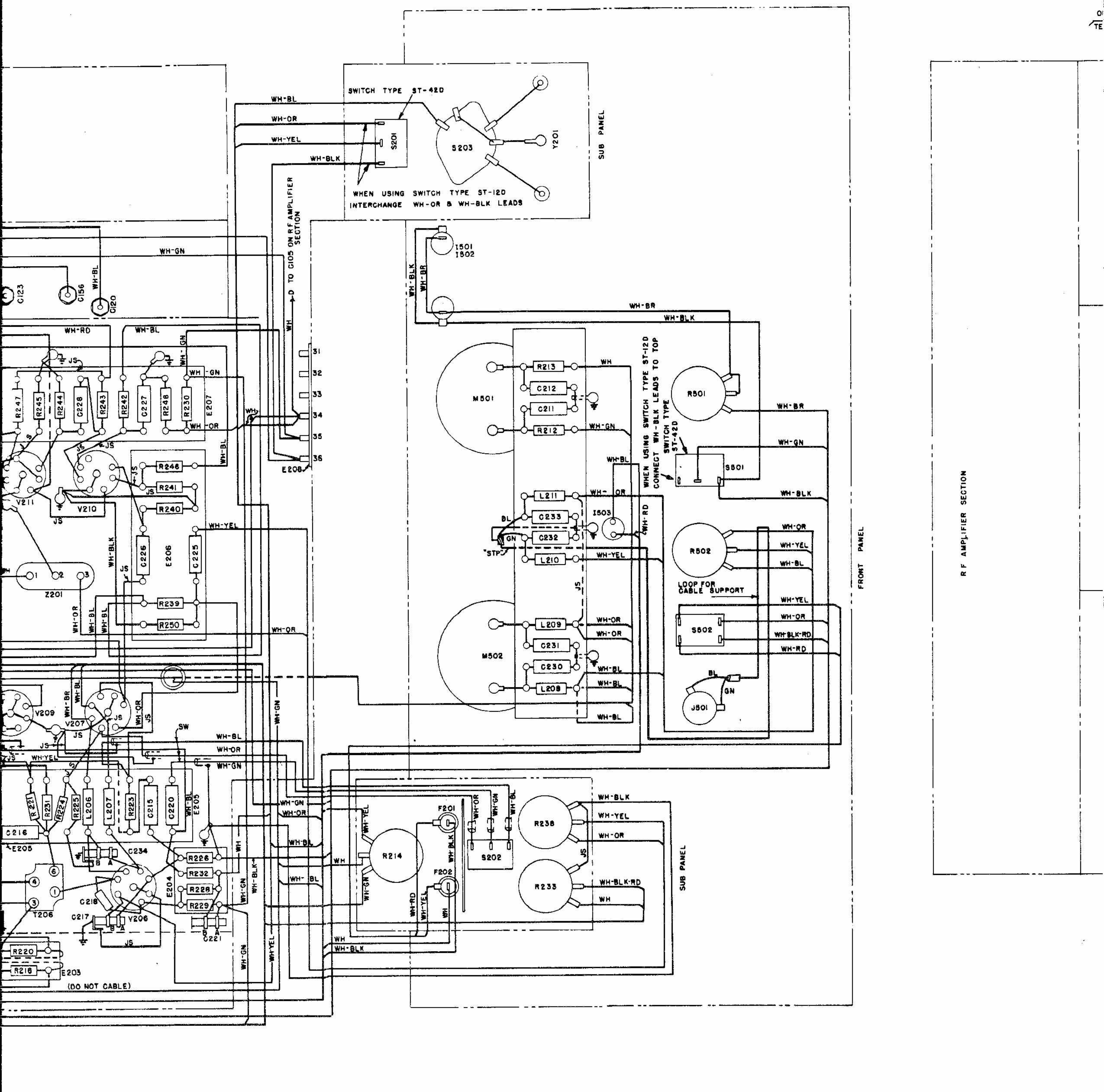
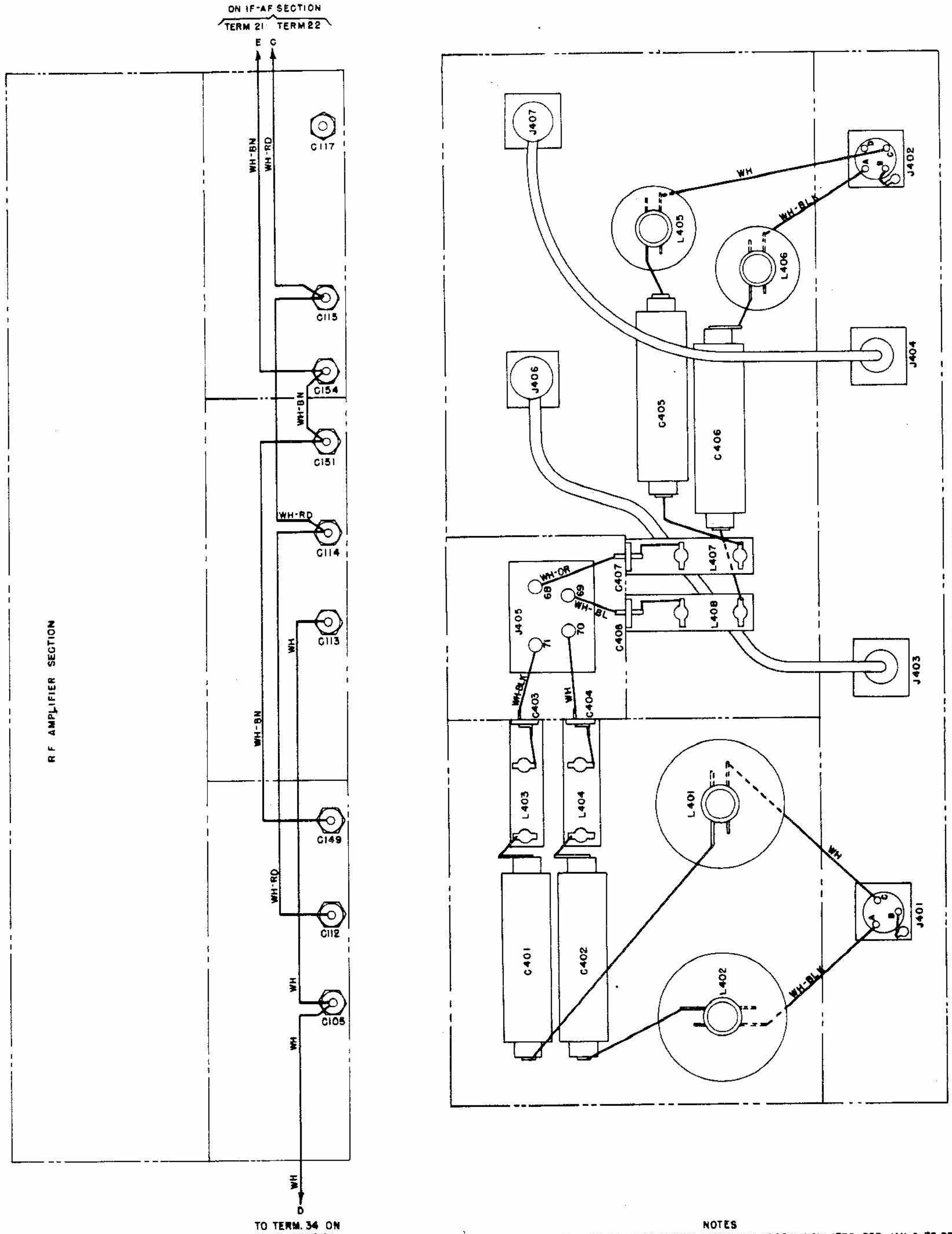


FIGURE: I
DIAGRAM SHOWING RF CABLING


OSCILLATOR - MULTIPLIER SECTION
RG-58/U CABLE
FROM RF AMPL. SECTION
SEE FIG. I
TO S-301
ON RF AMPL. SECTION
RG 108/U
FROM RF AMPL. SECT.
FROM P201
R.F AMPL. SECTION
POWER SUPPLY
IF - AF SECTION
(DO NOT CABLE)
BL 301 AND C304 ARE LOCATED
ON TOP OF POWER SUPPLY CHASSIS
C304
BL 301

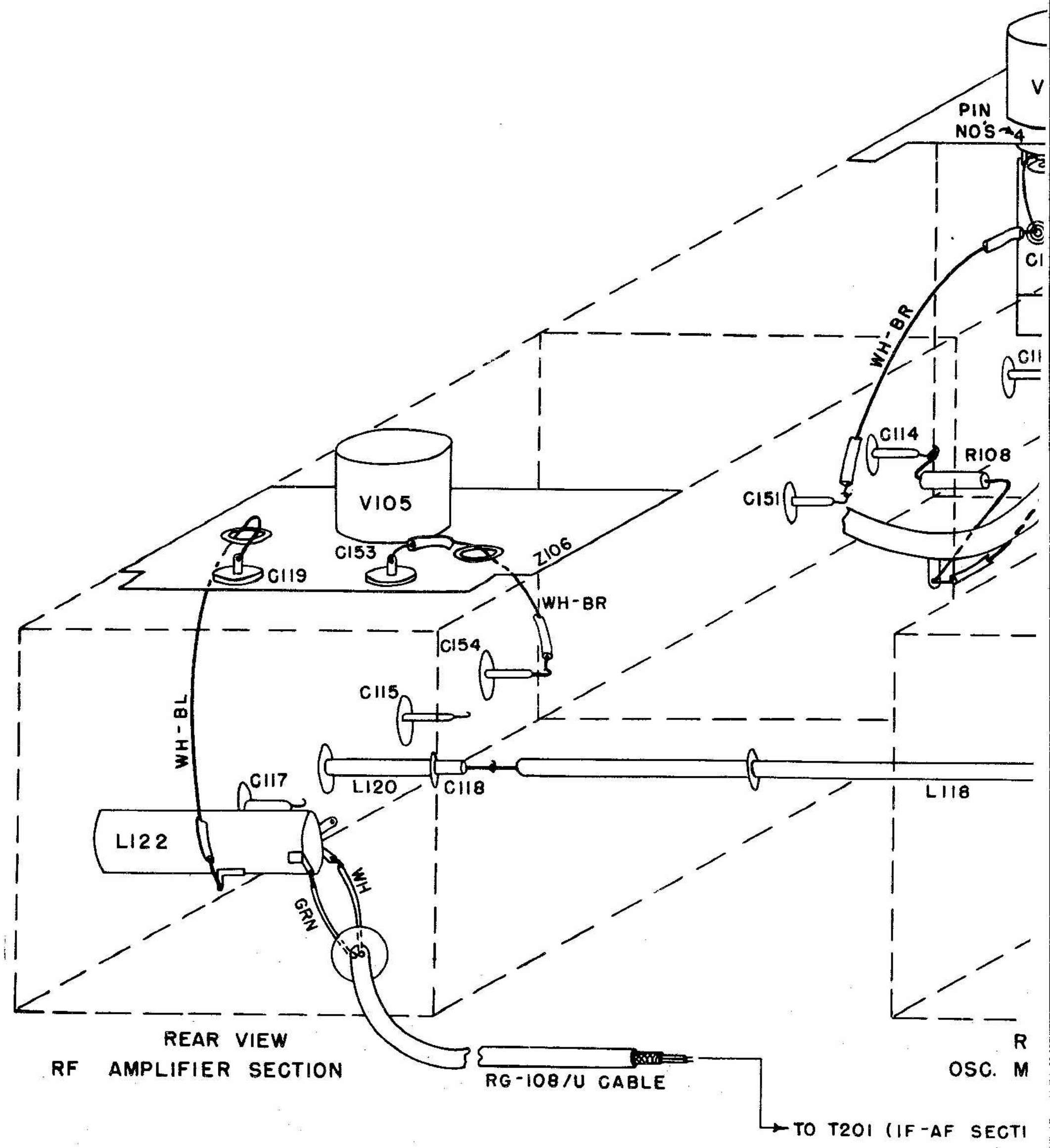




NOTES

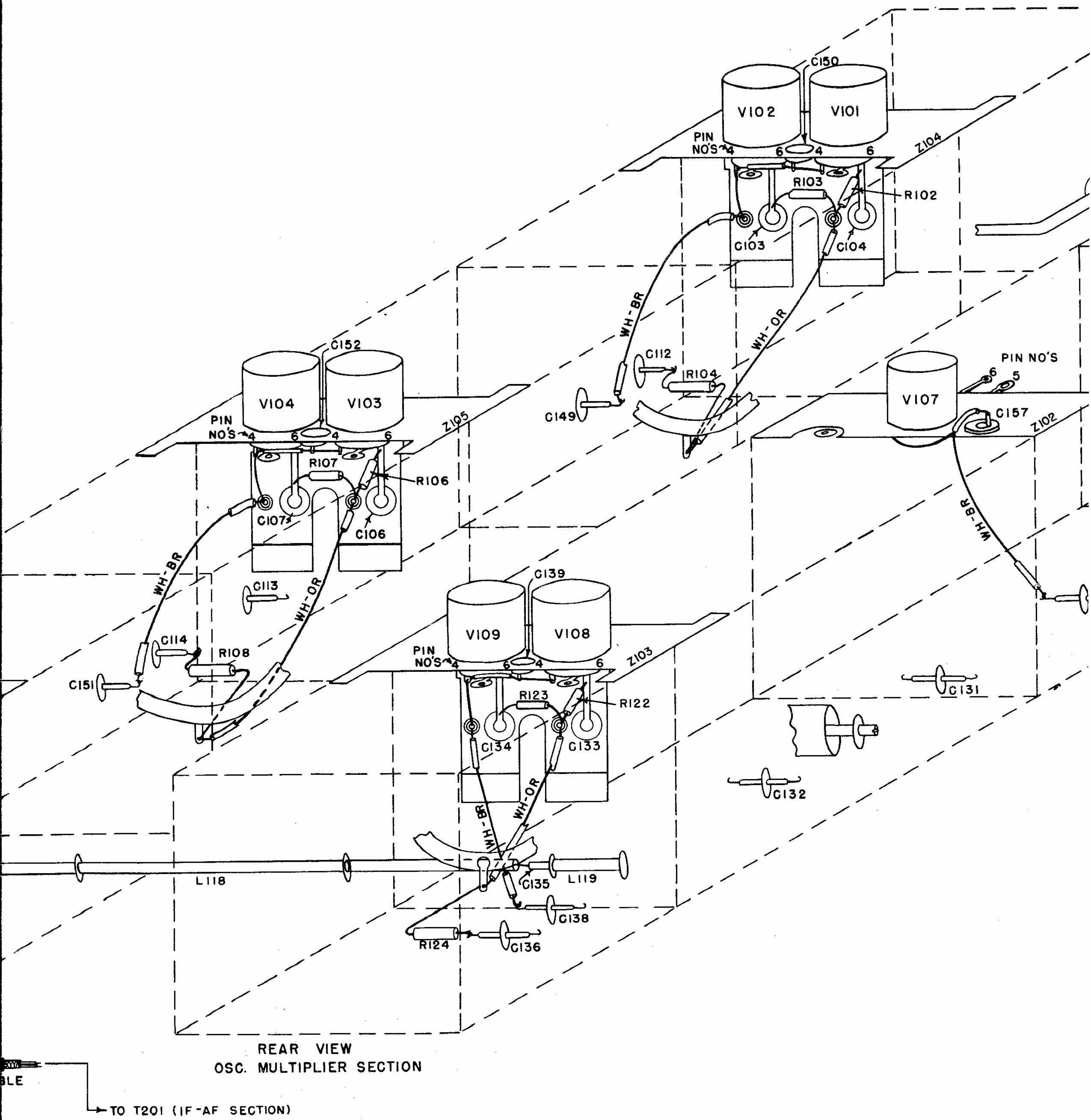
1. ALL HOOK UP WIRES TO BE #20-7/.0126 STRANDING, 1000 V. INSULATED PER. JAN-C-76 SRIR. (RAYON BRAID OUTER COVERING).
2. "SW" INDICATES #20-7/.0126 STRANDING, 1000V. INSULATED, SHIELDED PER. FRS-19821-1.
3. ALL UNMARKED JUMPERS ARE #20 SOLID BARE TINNED COPPER WIRE PER ASTM-B33-46.
4. "JS" INDICATES A JUMPER PER NOTE #3 WITH A #20 FIBERGLASS SLEEVING, DOUBLE SATURATED PER IRVINGTON VARNISH INSULATING COMPANY OR EQUAL.
5. REFER TO DWG. FRD-20324-14 FOR INTERNAL WIRING OF RF AMPLIFIER AND OSCILLATOR MULT. SECTIONS.
6. "STP" INDICATES #20-7/.0126 STRANDING, 1000V. INSULATED, SHIELDED TWISTED PAIR PER FRS-19822-1.

Figure 7—18. Wiring Diagram—Receiver Chassis and Band Suppression Filter F-89/URR-13

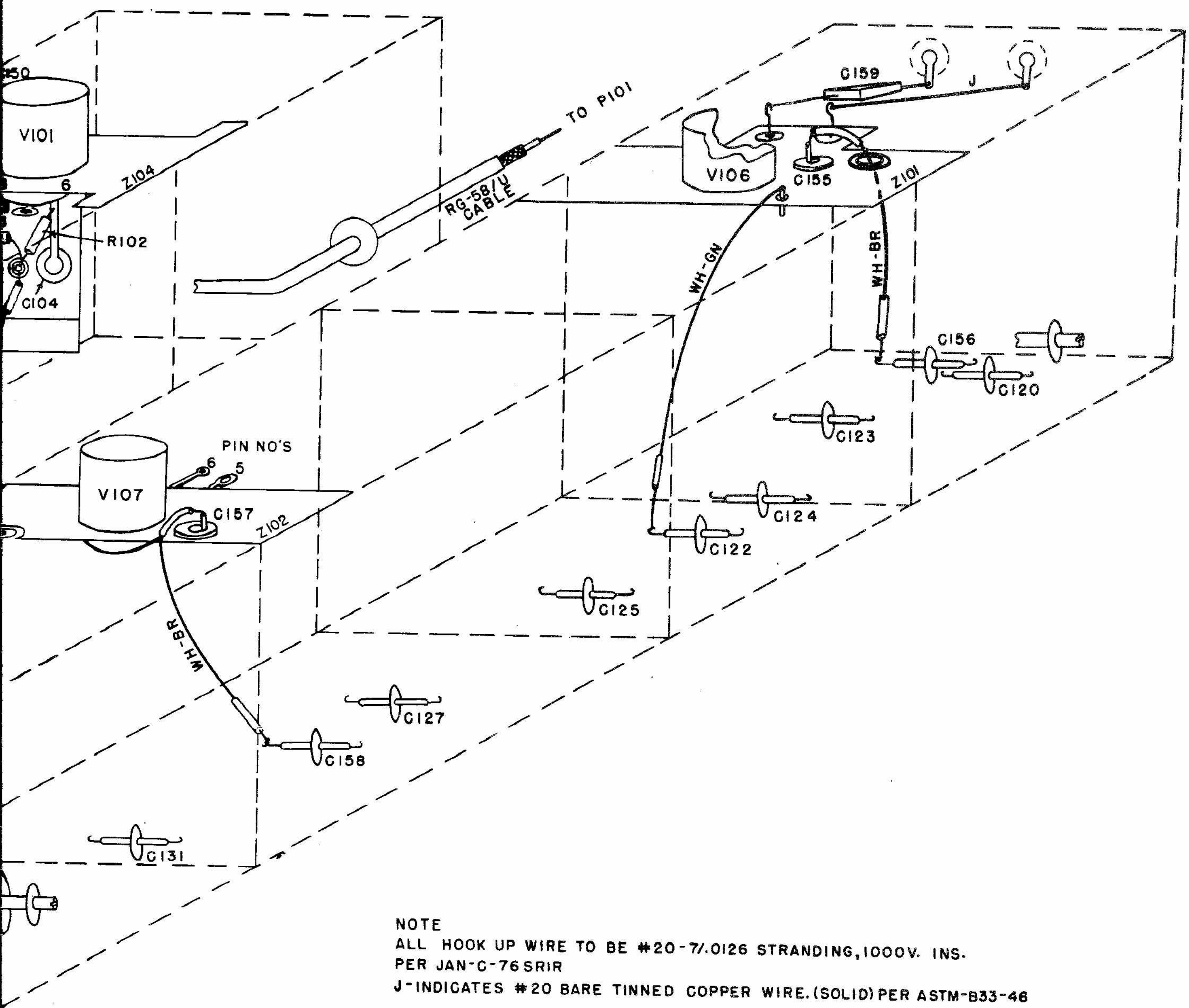


REAR VIEW
RF AMPLIFIER SECTION

R
OSC. M



REAR VIEW
OSC. MULTIPLIER SECTION



NOTE
ALL HOOK UP WIRE TO BE #20-7/.0126 STRANDING, 1000V. INS. PER JAN-C-76 SRIR
J-INDICATES #20 BARE TINNED COPPER WIRE. (SOLID) PER ASTM-B33-46

Figure 7–19. Wiring Diagram—Preselector (Z107)

SECTION 8
PARTS LIST AND MISCELLANEOUS TABLES

TABLE 8–1. WEIGHTS AND DIMENSIONS OF REPAIR PARTS BOXES

EQUIPMENT REPAIR PARTS					
Repair Parts Box	Overall Dimensions			Volume (Cu. Ins.)	Weight (Lbs.)
	Height	Width	Depth		
CONTRACT NObsr-52051					
#1	6⅛″	19″	10″	1164	32
CONTRACT NObsr-52304					
#1	6⅛″	19″	10″	1164	31

TABLE 8–2. SHIPPING WEIGHTS AND DIMENSIONS OF REPAIR PARTS BOXES

The repair parts box is packed in the same shipping case with Radio Receiver R-266A/URR-13, and the mounting brackets, plugs, cables and instruction books comprised in Radio Receiving Set AN/URR-13A. Shipping data for this crate is given in table 1-1. The manner in which this crate is packed is shown in figure 3–1.

TABLE 8–3. LIST OF MAJOR UNITS

Symbol Group	Quantity	Name of Major Unit	Designation
——	1	Radio Receiving Set, including	R-266A/URR-13
101-199	1	Preselector	Z107
201-299	1	IF/AF Section	——
301-399	1	Power Supply Section	——
401-499	1	Band Suppression Filter	F-89/URR-13
501-599	1	Front Panel Section (& Cabinet)	——
601-699	1	Set Test Cables, including	——
(W601)	1	Antenna Test Cable	CG-839/U (4′-2″)
(W602)	1	Power and Audio Test Cable	CX-1869/U (4′-4″)
——	2	Instruction books	NAVSHIP/91535
——	1	Set of 4 Plugs for External Cords	——
——	1	Pair Relay Rack Mounting Brackets	——
——	1	Sparts Parts Box and Contents	——

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
A501	MOUNT, vibration; square mtg; 60-70 lb normal load rating; 3" sq x 1½" h; wt 18 oz; rubber cushion; metal sleeve 0.328" ID (for 5/16" diam through-bolt); 4 mtg holes (0.255") in corners of base, spaced 2½" on ctrs; metal cadmium plated to resist 200 hr salt spray test	Shock absorption		N17-M-75268-6626	CAYU C-2070	FRE-8321-1	A501	4		
A502	SEAL, water: front panel seal (drip proof); extruded synthetic rubber, 45-55 Shore durometer hardness; suitable for −20°C to +50°C ambient; irregular channel type cross-section, 29/64" x 15/16" overall; black; 400% elongation; 1200 psi tensile strength; permanent set 60%	Panel seal		N16-S-150263-107		FRR-4342-1	A502	1		
BL301	BLOWER, air: centrifugal vane; 10 cfm at 3300 rpm; direct drive, clockwise rot (viewed from motor end); horiz oper; outlet (1-11/64" diam opening) toward right, at top; plastic housing; 3 mtg bolts, 120° apart on ⅜" rad from center; motor 115 v (0.11 amps), 50/60 cps, 1 phase, 2700/3300 rpm, capacitor run, replaceable ball bearings; 3-17/32" wd x 3-43/64" h x 4⅛" d, overall	Cabinet cooling		~~N17-B-21188-1075~~ N16B-643 1035	CARB Type J-50C	FRE-20311-2	BL301	1	1	0
BL301A	MOTOR, alternating current: p/o BL301									
BL301B	VANE, centrifugal: p/o BL301									
C101 C101A C101B C101C C101D C101E	TUNER, rf: air dielectric; plate meshing type; 5 sections each 12.2 to 38.7 μμf; SLF characteristic; 0.020" air gap (plates in mesh); 10-11/32" lg x 4-19/32" h x 2-11/16" wd; shaft ¼" diam x ½" lg beyond bushing; split stators and balanced grounded rotors; extens shaft adjustment; 90 Invar plates w copper + nickel + silver plating; 85.5° clockwise rotation; My-	Tuning r-f amplr section	(−484849)	~~F16-T-98077-2751~~ N16T-98077-2751	CFT	FRA-5101-14 and FRE-21204-3 (outline)	C101	1		

SEE T-6

	calex insulation; solder lug term; 8 mtg holes (#6-32) on metal casting; includes 5 capacitor trimmers (C140-144; 0.25-2.7 $\mu\mu$f each); also 5 inductors fixed, L102A, L105B, L106C, L109D, L110E and 5 variable inductors, L103, L104, L107, L108, L111; tunes over 225-400 mc range								
C102 C102A C102B C102C C102D	TUNER, rf: air dielectric, plate meshing type; 4 sections: 43.5-14.3, 45.5-15, 43.4-14.3 and 35.2-12.2 $\mu\mu$f, split stators and balanced grounded rotors; SLF characteristic; 0.017" air gap, except 0.020" in tripler section (in mesh); 10-11/32" lg x 4-19/32" h x 2-11/16" wd; shaft ¼" diam x ½" lg beyond bushing; bushing ½" diam x 5/16" lg; extension shaft adjustment; 63 plates, all Invar with copper + nickel + silver plating except 1 brass plate in osc section; 85.5° clockwise rotation; Mycalex insulation; solder lug term; 8 mtg holes (#8-32) in housing casting; includes 4 trimmer capacitors (C145-C148; 0.25-2.7 $\mu\mu$f each), 1 inductor fixed L113, and 4 inductors variable, L112, L114, L115, L117	Tuning oscillator-multiplier section of Z107	(–484850)	N16-T-98077-2726	CFT	FRA-5102-14 and FRE-21203-3 (outline)	C102	1		
C103	CAPACITOR, fixed: silvered mica dielectric; 500 $\mu\mu$f, ±10%; 500 vdcw; temp coef, not limited; "button" type; 29/64" nom diam x 1/16" thk body; one 9/32" lg rt angle solder lug term (slotted); three 5/32" lg mtg tabs (gnd contacts) spaced 120° apart per BuShips spec 16C41	Screen by-pass (1st r-f amplr)		N16-C-30167-1887	CER 370 CA	FRE-19952-1-1	C103, C104, C106, C107, C133, C134, C150, C139, C152	9		
C104	Same as C103	Screen by-pass (1st r-f amplr)								
C105	CAPACITOR, fixed: "Hi-K" ceramic dielectric; 1000 $\mu\mu$f ±20%; temp coef, 330 (±500) $\mu\mu$f/μf/°C; 500 vdcw; feed-through style; body ⅝" lg x 5/16" betw flats of hex section; #12-28 x 9/32" lg mtg bushing (w/parallel flats) and 3/32" x 5/16" hex nut; one #20 (0.032") x 1¼" lg axial wire lead each end	AVC by-pass (1st r-f amplr)	(–484821-20)	N16-C-18659-4509	CER CBN #362	FRE-19956-1-1	C105, C117, C112-C115, C122-C125, C120, C127, C131, C132, C136, C138, C149, C151, C154, C156, C158	21	5	5

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
C106	Same as C103	Screen by-pass (2nd r-f)								
C107	Same as C103	Screen by-pass (2nd r-f)								
C108	CAPACITOR, fixed: ~~ceramic~~ PLASTIC dielectric; 1-5 μμf, ±20%, temp coef, 50 (±50) μμf/μf/°C; neg, 500 vdcw; body 0.230" lg x 0.160" diam; one #20 (0.032") x 1½" lg axial wire lead each end	Coupling (1st r-f)		N16-C-55551-3119	CSA #GA-3	FRE-21182-1-2	C108, C109, C110, C111	4		
C109	Same as C108	Coupling (1st r-f)								
C110	Same as C108	Coupling (2nd r-f)								
C111	Same as C108	Coupling (2nd r-f)								
C112	Same as C105	Plate voltage by-pass (1st r-f)								
C113	Same as C105	AVC by-pass (2nd r-f)								
C114	Same as C105	Plate voltage by-pass (2nd r-f)								
C115	Same as C105	Plate voltage by-pass (mixer)								
C116	CAPACITOR, fixed: ceramic "Hi-K" dielectric; 1000 μμf ±10%, 350 vdcw; stand-off type; body, 0.520" lg x ¼" betw flats of hex section; one #20 (0.032") x 1¼" lg axial wire lead, one end, and #3-48 x 11/32" lg axial stud other end; uninsulated; capacity change +25% to −50% over range −50° to +85°C	Grid by-pass (mixer)		N16-C-18657-8640	CER Type #720B	FRE-19954-1-1	C116, C160	2	1	1

C117	Same as C105	Plate by-pass (mixer)									
C118	CAPACITOR, fixed: ceramic "Hi-K" dielectric; 18 μμf ±5%; 500 vdcw; temp coef, −150 (±250) μμf/-μf/°C; 0.520" lg x 3/16" across flats of hex nut; axial wire lead at one end and axial #3-48 mtg screw at other end; uninsulated	Link resonating (mixer-tripler)	(−484819-5½)	N16-C-16051-3074	CER Type #721B	FRE-19955-1-1	C118, C135	2	1	2	
C119	CAPACITOR, fixed: silvered mica dielectric; 100 μμf ±5%; temp coef, zero (±200) μμf/μf/°C; 500 vdcw; "button" type; 0.450" nom diam x 0.070" thk body; one 9/32" lg rt angle lug terms (slotted); three 5/32" lg mtg tabs (gnd contacts) spaced 120°	Plate tank (mixer)		N16-C-28553-1000	CER Type #600	FRE-19953-1-1	C119	1			
C120	Same as C105	Plate voltage by-pass (osc & 1st dblr)									
C121	CAPACITOR, fixed: ceramic dielectric; 15 μμf ±10%; temp coef neg 220 (+60, −150) μμf/μf/°C; 500 vdcw; 0.562" lg x 0.250° diam; 2 axial wire leads; ceramic insulation; per spec JAN-C-20	Oscillator tank balancing	CC21RH150K	N16-C-15997-1482			C121	1			
C122	Same as C105	Grid test point filter (1st dblr)									
C123	Same as C105	Plate by-pass (1st dblr)									
C124	Same as C105	Grid test point filter (2nd dblr)									
C125	Same as C105	Holding bias by-pass (2nd dblr)									
C126	CAPACITOR, fixed: ceramic dielectric; 10 μμf ±1 μμf; 500 vdcw; 0.562" lg x 0.250" diam; 2 axial wire leads; ceramic ins; spec JAN-C-20	Grid tank balancing (2nd dblr)	CC21SL100F	N16-C-15933-7014			C126	2			

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
C127	Same as C105	Plate voltage by-pass (2nd dblr)								
C128	CAPACITOR, fixed: ceramic dielectric; 5 $\mu\mu$f, $\pm$1 $\mu\mu$f; 500 vdcw; temp coef −330 (+500, −718) $\mu\mu$f/μf/°C; 0.562" lg x 0.250" diam; 2 axial wire leads; ceramic ins; spec JAN-C-20	Plate tank balancing (2nd dblr)	CC21SL050F	N16-C-15636-2514			C128	1		
C129	CAPACITOR, fixed; ceramic dielectric; 51 $\mu\mu$f, $\pm$10%; 500 vdcw; 0.562" lg x 0.250" diam; 2 axial wire leads; ceramic ins; spec JAN-C-20	2nd doubler coupling	CC21SL510K	N16-C-16605-7014			C129, C130, C137, C216, C218	5		
C130	Same as C129	Coupling (2nd dblr)								
C131	Same as C105	Grid bias test point filter (tripler)								
C132	Same as C105	Holding bias test point filter (tripler)								
C133	Same as C103	Screen by-pass (tripler)								
C134	Same as C103	Screen by-pass (tripler)								
C135	Same as C118	Resonating link (tripler-mixer)								
C136	Same as C105	Plate voltage by-pass (tripler)								

C137	Same as C129	Oscillator coupling								
C138	Same as C105	Filament by-pass (tripler)								
C139	Same as C105	Filament by-pass (tripler)								
*C140	CAPACITOR, variable: (Integral with C101A)	Grid tank trimmer (1st r-f)								
*C141	CAPACITOR, variable: (Integral with C101B)	Plate tank trimmer (1st r-f)								
*C142	CAPACITOR, variable: (Integral with C101)	Grid tank trimmer (2nd r-f)								
*C143	CAPACITOR, variable: (Integral with C101D)	Plate tank trimmer (2nd r-f)								
*C144	CAPACITOR, variable: (Integral with C101E)	Grid tank trimmer (mixer)								
*C145	CAPACITOR, variable: (Integral with C102C)	Grid tank trimmer (tripler)								
*C146	CAPACITOR, variable: (Integral with C102D)	Plate tank trimmer (tripler)								
*C147	CAPACITOR, variable: (Integral with C102B)	Grid tank trimmer (2nd dblr)								
*C148	CAPACITOR, variable: (Integral with C102A)	Plate tank trimmer (oscil-lator)								
C149	Same as C105	Filament by-pass (1st r-f)								
C150	Same as C103	Filament by-pass (1st r-f)								
C151	Same as C105	Filament by-pass (2nd r-f)								

*Not a replaceable part; listed for reference only.

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
C152	Same as C103	Filament by-pass (2nd r-f)								
C153	CAPACITOR, fixed: silvered mica dielectric; 500 μμf, ±10%, temp coef, zero (±200 μμf/μf/°C; 500 vdcw; "button" type; 0.450" nom diam x 0.070" thk body; one 9/32" lg rt angle lug terms (slotted); three 5/32" lg mtg tabs (gnd contacts) spaced 120°C	Filament by-pass (mixer)		N16-C-30167-1876	CER Type #600	FRE-19953-1-2	C153, C155, C157	3		
C154	Same as C105	Filament by-pass (mixer)								
C155	Same as C153	Filament by-pass (osc-dblr)								
C156	Same as C105	Filament by-pass (osc-dblr)								
C157	Same as C153	Filament by-pass (2nd dblr)								
C158	Same as C105	Filament by-pass (2nd dblr)								
C159	CAPACITOR, fixed: mica; 200 μμf ±5%; 500 vdcw; temp coef letter D; 51/64" lg x 15/32" wd x 7/32" thk; molded low loss bakelite case; 2 axial wire leads; per spec JAN-C-5	Crystal leads resonating	CM20D201J	N16-C-29265-3006			C159	1		
C160	Same as C116	D-c blocking								
C201	CAPACITOR ASSEMBLY: stand-off type; consists of 2 fixed capacitors in common housing each 1000 μμf ±20%, "HIK" ceramic dielectric, 350 vdcw, internally grounded body, 1-15/16" lg x ¼" across flats of hex section; single #4-40 x		(–484832-20)	N16-C-19238-3721	CASU Type K1200	FRE-21184-1-1	C201, C202, C204-C210, C213, C214, C217, C221, C234 (parts A and B)	14	3	3

	5/16" lg axial mtg stud one end; radial wire leads 3/8" and 13/16" from stud end; aver temp coef, zero (±142) μμf/μf/°C								
*C201A	Integral part of C201	AVC by-pass (1st i-f)		N16C-19238-3721					
*C201B	Integral part of C201	Filament by-pass (1st i-f)							
C202	Same as C201								
*C202A	Integral part of C202	Screen by-pass (1st i-f)							
*C202B	Integral part of C202	Plate by-pass (1st i-f)							
C203	Not used								
C204	Same as C201								
*C204A	Integral part of C204	AVC by-pass (2nd i-f)							
*C204B	Integral part of C204	Filament by-pass (2nd i-f)							
C205	Same as C201								
*C205A	Integral part of C205	Screen by-pass (2nd i-f)							
*C205B	Integral part of C205	Plate by-pass (2nd i-f)							
C206	Same as C201								
*C206A	Integral part of C206	AVC by-pass (3rd i-f)							
*C206B	Integral part of C206	Filter by-pass (3rd i-f)							
C207	Same as C201								
*C207A	Integral part of C207	Screen by-pass (3rd i-f)							
*C207B	Integral part of C207	Plate by-pass (3rd i-f)							

*Not a replaceable part; listed for reference only.

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
C208	Same as C201									
*C208A	Integral part of C208	Screen supply by-pass								
*C208B	Integral part of C208	Plate supply by-pass								
C209	Same as C201									
*C209A	Integral part of C209	AVC by-pass (4th i-f)								
*C209B	Integral part of C209	Filament by-pass (4th i-f)								
C210	Same as C201									
*C210A	Integral part of C210	Screen by-pass (4th i-f)								
*C210B	Integral part of C210	Plate by-pass (4th i-f)								
C211	CAPACITOR, fixed: mica; 10,000 $\mu\mu$f ±10%; 300 vdcw; temp coef letter B; 53/64" lg x 53/64" wd x 11/32" thk; molded low loss bakelite case; 2 axial wire leads; per spec JAN-C-5	Filter for input meter	CM35B103K	N16-C-33622-5222			C211, C212, C215, C220, C223, C225-C228, C230-C233	13		
C212	Same as C211	Filter for input meter								
C213	Same as C201									
*C213A	Integral part of C213	Cathode by-pass (5th i-f)								
*C213B	Integral part of C213	Filament by-pass (5th i-f)								

C214	Same as C201								
*C214A	Integral part of C214	Screen by-pass (5th i-f)							
*C214B	Integral part of C214	Plate by-pass (5th i-f)							
C215	Same as C211	Noise limiter time constant							
C216	Same as C129	I-f by-pass (2nd detec)							
C217	Same as C201								
*C217A	Integral part of C217	I-f by-pass (2nd detec)							
*C217B	Integral part of C217	AVC diode cathode by-pass							
C218	Same as C129	AVC coupling							
C219	Not used								
C220	Same as C211	1st a-f coupling							
C221	Same as C201								
*C221A	Integral part of C221	AVC i-f by-pass							
*C221B	Integral part of C221	AVC i-f by-pass							
C222	CAPACITOR ASSEMBLY: p/o Radio Receiving Set AN/URR-13A; consists of 2 fixed capacitors ea 250,000 $\mu\mu f$, +20% −10%, in common metal housing; 600 vdcw; case 1-15/16" lg x 2" h max; per spec JAN-C-25	AVC time constant and a-f by-pass for silencer amplr plate; (used with O212)	CP61B6EF254V	N16-C-53448-1001			C222A, B		
C222A				N16-C-53448-1002					
C223	Same as C211	Silencer amplr grid a-f by-pass							
C224	Not used								

*Not a replaceable part; listed for reference only.

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
C225	Same as C211	Silencer diode coupling								
C226	Same as C211	2nd a-f amplr coupling								
C227	Same as C211	2nd a-f amplr screen by-pass								
C228	Same as C211	A-f output amplr coupling								
C229	CAPACITOR, fixed: paper dielectric; 1.0 µf, +20% −10%; 600 vdcw; hermetically sealed metal case; 1-15/16" wd x 1⅜" lg x 2-3/16" h max; two solder lug terms on top; no internal ground connections; per spec JAN-C-25	Plate voltage by-pass; a-f output amplr (used with O213)	CP61B1EF105V	N16-C-48841-9593			C229, C302, C304	3		
C230	Same as C211	Output meter filter								
C231	Same as C211	Output meter filter								
C232	Same as C211	Phone output filter								
C233	Same as C211	Phone output filter								
C234A C234B	Same as C201A	Filament by-pass for 2nd detec & AVC diode								
C301	CAPACITOR, fixed: dry electrolytic dielectric, 35µf, +25% −10%; 400 vdcw; operating temp range −20°C	Filter	CE41B350Q	N16-C-19892-7801			C301, C303	2		

	to +85°C; 3⅜″ diam; tubular metal case; 2 solder lug terms on bottom of case; term insulated from can; mtg hex nut ⅞-16″ thd ⅞″ ID w/lockwasher; per spec JAN-C-62									
C302	Same as C229	Filter								
C303	Same as C301	Filter								
C304	Same as C229	Motor phasing								
C401	CAPACITOR, fixed: paper dielectric; 0.25 μf +20% −10%; 200 vdcw; hermetically sealed metal case; 1-13/16″ lg x ¾″ diam; mineral oil filled and impregnated; #10-32 axial holes in ends are common terms, one term gnd internally; tangential mtg bracket w/0.201″ mtg hole	A-c line filter	(−484822)	N16-C-46371-9609	CSF #48P2	FRE-21181-1	C401, C402, C405, C406	4	2	2
C402	Same as C401	A-c line filter								
C403	CAPACITOR, fixed: silvered mica dielectric; 1000 $\mu\mu$f ±10%; 500 vdcw; temp coef letter C; button type 0.450″ diam x 0.085″ thk; metal case; one 9/32″ lg rt angle lug term, slotted; 3 mtg tabs 5/32″ lg x 1/16″ wd, spaced 120° apart	A-c line filter	(−484818-C10)	N16-C-31090-3800	CER Type #600	FRE-19953-1-3	C403, C404, C407, C408	4		
C404	Same as C403	A-c line filter								
C405	Same as C401	Audio output filter								
C406	Same as C401	Audio output filter								
C407	Same as C403	Audio output filter								
C408	Same as C403	Audio output filter								
E101	SHIELD, electron tube: brass, nickel finish; rectangular; 2.36″ lg x 2.093″ h x 0.870″ wd; friction mtg; twin tube shield	Shield for V101 and V102		N16-S-34518-5501		FRA-8708-1	E101, E103, E108	3	0	1
E102	Not used									

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
E103	Same as E101	Shield for V103 and V104								
E104	Not used									
E105	SHIELD, electron tube: brass, nickel pl; cyl; bayonet mtg; 0.810" ID x 1¾" h x 0.930" lg x 0.838" wd; w/conical spring; ½" diam hole in top; spec JAN-S-28A	Shield for V105	TSFOT102	N16-S-34557-8350			E105, E107	2		
E106	SHIELD, electron tube: steel, cad pl; cyl; bayonet mtg; 1½" lg x 1.050" diam; 19/32" diam hole on top; w/conical spring	Shield for V106		N16-S-34532-8744	CMG #16G126-26-P24-5		E106	1		
E107	Same as E105	Shield for V107								
E108	Same as E101	Shield for V108 and V109								
E109	BRUSH, electrical contact: #34 (.006") B & S ga hard (2 B & S nos) beryllium copper, heat treated for max spring properties, then silver plated; 0.312" wd x 0.455" o/a l; one end tapered symmetrically from point 0.237" from end, to width of 0.187" at end; #31 (.120") drill hole centered 0.156" from wide end; 70° angle	Sliding contact for inductance trimmers in C101, C101A-E, C102, C102-A-D		N17-B-86841-9339	CFT	FRB-5231-1	E109	12		
†E110	INSULATOR SET: consists of E110A and E110B	Y201 lead feed-thru		N17-I-81960-5263			E110, E111	2		
E110A	INSULATOR, bushing: molded phenolic, ground finish; round shank, 13/32" lg x 5/16" OD x 0.101" ID	Part of E110		~~N17-I-49473-1916~~		FRE-6784-1	E110A, E111A			
E110B	INSULATOR, bushing: brown molded phenolic, ground finish; round shank, 0.118" lg x 5/16" OD x 0.101" ID	Part of E110		~~N17-I-49473-1901~~		FRE-6812-1	E110B, E111B			
E111	Same as E110 (consists of E111A and E111B)	Y201 lead feed-thru								

E110A & E110B

LOW FAILURE ITEM - IF REQUIRED, REQUISITION FROM ESO REFERENCING DRAWINGS [illegible]

E111A	Same as E110A	Part of E111								
E111B	Same as E110B	Part of E111								
†E201	TERMINAL BOARD: laminated thermosetting plastic; 12 solder lug term; 6-1/16″ lg x ¾″ wd x 3/32″ thk; three #18 drill holes spaced 2⅜″ apart; marked: "R203, R204, R206, R207, R209, R210, E201"			N17-B-77988-6269	CFT	FRA-19918-2 (less electrical parts)	E201	1		
†E202	TERMINAL BOARD: laminated thermosetting plastic; 34 solder lug term; 7-13/16″ lg x 1-1/16″ wd x 3/32″ thk; four #18 drill holes spaced 2-1/64″ x 3⅛″ x 2-1/64″ c to c; marked: "R201, R205, R208, R219, R222, R227, R234, R235, R236, R249, R252, R253, L201, L202, L203, L204, E202"			N17-B-78242-9559	CFT	FRA-19915-2 (less electrical parts)	E202	1		
†E203	TERMINAL BOARD: laminated thermosetting plastic; 8 solder lug term; 3-11/16″ lg x ¾″ wd x 3/32″ thk; two #18 drill holes 2⅜″ c to c marked: "R215, R216, R218, R220, E203"			N17-B-77840-3015	CFT	FRA-19880-1 (less electrical parts)	E203	1		
†E204	TERMINAL BOARD: laminated thermosetting plastic; 8 solder lug term; 1¼″ lg x 1-1/16″ wd x 3/32″ thk; two #18 drill holes ⅝″ c to c; marked: "R228, R229, R232, E204"			N17-B-77834-2126	CFT	FRA-19906-1 (less electrcial parts)	E204	1		
†E205	TERMINAL BOARD: laminated thermosetting plastic; 27 solder lug term; 4¾″ lg x 1½″ wd x 3/32″ thk; two #18 drill holes 3⅛″ c to c; marked: "C215, C220, C223, R217, R221, R223, R224, R225, R237, R251, R255, L205, L206, L207, E205, R231"			N17-B-78207-2688	CFT	FRA-19889-1 (less electrical parts)	E205	1		
†E206	TERMINAL BOARD: laminated thermosetting plastic, 14 solder lug term; 3-3/16″ lg x 1-1/16″ wd x 3/32″ thk; two #18 drill holes 2-9/16″ c to c; marked: "C225, C226, R239, R240, R241, R246, E206, R250"			N17-B-78034-9760	CFT	FRA-19886-1 (less electrical parts)	E206	1		
†E207	TERMINAL BOARD: laminated thermosetting plastic; 18 solder lug term; 3¼″ lg x 1½″ wd x 3/32″ thk; two #18 drill holes 2⅞″ c to c; marked: "C227, C228, R230, R242, R243, R244, R245, R247, R248, E207"			N17-B-78113-4948	CFT	FRA-19887-1 (less electrical parts)	E207	1		

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

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
†E208	TERMINAL BOARD: laminated thermosetting plastic; 6 solder lug term; 2-15/16" lg x ½" wd x ⅛" thk; two #18 drill holes 2⅝" c to c; marked: "31, 32, 33, 34, 35, 36, E208"			N17-B-77738-3969	CFT	FRA-20275-1-2 (less electrical parts)	E208	1		
†E209	TERMINAL BOARD: laminated thermosetting plastic; 24 solder lug term; 6¼" lg x 1½" wd x ⅛" thk; four #18 drill holes 1⅛" x 5⅞" c to c; marked: "C211, C212, C230, C231, C232, C233, L208, L209, L210, L211, R212, R213, E209"			N17-B-78179-2126	CFT	FRA-21187-1 (less electrical parts)	E209	1		
E210	SHIELD, electron tube: aluminum; cyl; 2-5/32" lg x 1-21/32" diam; bayonet mtg	Shield for V201	BuShips dwg RE49F475 (part 2)	N16-S-34548-6615	CNA XOS-2		E210, E220	2		
E211	SHIELD, electron tube: aluminum; cyl; 2-5/32" lg x 1-9/32" diam bayonet mtg;	Shield for V202	BuShips dwg RE49F475 (part 1)	N16-S-34510-9401	CNA XOS-1		E211 to E219	9		
E212	Same as E211	Shield for V203								
E213	Same as E211	Shield for V204								
E214	Same as E211	Shield for V205								
E215	Same as E211	Shield for V206								
E216	Same as E211	Shield for V207								
E217	Same as E211	Shield for V208								
E218	Same as E211	Shield for V209								
E219	Same as E211	Shield for V210								
E220	Same as E210	Shield for V211								

†E301	TERMINAL BOARD: laminated thermosetting plastic; 6 solder lug term; 2-15/16" lg x ½" wd x ⅛" thk; two #31 drill holes 2⅝" c to c; marked: "21, 22, 23, 24, 25, 26, E301"			N17-B-77738-3974	CFT	FRA-20275-1-1 (less electrical parts)	E301	1		
†E302	TERMINAL BOARD: laminated thermosetting plastic; 17 solder lug term; 6-11/16" lg x 15/16" wd x 3/32" thk; three #18 drill holes 2-29/32" c to c; marked: "R301, R302, R303, R305, R306, R307, R308, R309, R310, E302"			N17-B-78100-8855	CFT	FRA-20296-1 (less electrical parts)	E302	1		
†E303	TERMINAL BOARD: laminated thermosetting plastic; 15 solder lug term; 7-7/16" lg x ½" wd x ⅛" thk; three #18 drill holes 3⅜" x 3⅜" c to c; marked: "E303, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15"			N17-B-78065-3493	CFT	FRA-20280-1	E303	1		
E304	SHIELD, electron tube: aluminum; cyl; 2-5/32" lg x 2-5/32" diam; bayonet mtg	Shield for V302	BuShips dwg RE49F475 (part 3)	N16-S-34599-~~7701~~ 7752	CNA XOS-3		E304, E305	2		
E305	Same as E304	Shield for V303								
E501	KNOB: round; black phenolic; for ¼" rnd shaft; brass insert; 1-7/16" diam x 15/32" lg; w/bakelite handle; two #6-32 Bristo set screws 120° apart	C101/C102 tuning		N16-K-700344-505		FRA-2531-1	E501	1		
E502	KNOB: round; black phenolic; for 3/16" diam shaft; brass insert; ⅝" diam x 17/32" lg; two #6-32 Bristo set screws 120° apart	Dial lock control		N16-K-700266-740	CFT	FRA-4630-1	E502	1		
E503	KNOB: round; black phenolic for ¼" shaft; brass insert; ¾" diam x 9/16" lg; ⅝" diam hub; two #6-32 Bristo set screws 120° apart	Dimmer (R501) control		N16-K-700277-350	CFT	FRA-2949-1	E503	1		
E504	KNOB: round; black bakelite for ¼" shaft, white line, brass insert, ⅝" lg x 1-1/16" diam	Phone level (R502) control		N16-K-700310-977		FRA-2874-1-1	E504, E505	2		
E505	Same as E504	Xtal-manual selector (S203)								

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

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
E506	CONTACT, case: 9/16" wd x 3/8" d x 3" lg rt angle section #14 (0.064) B & S ga 1/2-hard bronze sheet (.0006" nickel plate) with 4 #32 B & S ga hard beryllium copper spring inserts; 2 #30 (.128) mtg holes spaced 1 1/2" on ctrs; one assem mtd vertically each side of chassis, at front edge	Grounding contact between receiver chassis and cabinet		N17-C-77415-7611	CFT	FRA-3079-1-1	E506, E507	2		
E507	Same as E506									
E508	CONTACT, case: 9/16" wd x 3/8" d x 12" lg rt angle section #14 (0.064") B & S ga 1/2 hard bronze sheet (.0006" nickel plate) with 16 #32 B & S ga hard beryllium copper spring inserts; 7 #30 (.128") mtg holes spaced 1 1/2" on ctrs; one assem mtd top and bottom of chassis at front edge	Grounding contact between receiver chassis and cabinet		N17-C-77417-8070	CFT	FRA-3079-1-2	E508, E509	2		
E509	Same as E508									
F201	FUSE, cartridge: 2 amp; 60 min blowing time at 135% load; 250 v; one-time; glass tube body; ferrule terms; 1 1/4" lg x 1/4" diam. overall; type RE28F120	A-c power	RE28F120 (−28032-2)	~~N17-F-16302~~ [illegible]	CLF 3AG2		F201, F202, F203	3		
F202	Same as F201	A-c power								
F203	Same as F201	Spare								
H101	WASHER, spring: round; plane of washer bent on 13/16" radius to produce axial spring thrust; cadmium plated, type 3 spring steel, 0.016" thk; 0.257" (F drill) ID x 7/16" OD x 0.047" thk (incl spring curvature)	Thrust spring for capacitor shaft		N43-W-7520-2400	CAXO 3544-14	FRE-10113-1	H101	2		
H201	TOOL, alignment: insulated; amber transparent molded thermoplastic; 4" o/a lg x 5/16" betw flats of octagonal (maximum) cross-section; tapered (round) to 1/4" diam at each end; 1/8" x 0.022" screw-driver tip molded into one end,	Alignment		N16-T-751468-732		FRA-20347-1	H201	1	1	0

	and spline tip to fit #6 (American std) fluted socket-head cap screw molded into other end; both tips from #303 stainless steel rod annealed									
I501	LAMP, incandescent: 6.3 v, 0.15 amp; bulb T-3¼" clear; 1-3/16" lg overall; miniature s.c. bayonet base; C-2R filament; 3000 hrs	Dial light	TB-14	N17-L-6297	CG #47		I501, I502	2		
I502	Same as I501	Dial light								
I503	LAMP, glow: 105-125 v, 1/25 watt; bulb T-3¼ clear; 13/32" diam x 1-3/16" o/a lg; miniature s.c. bayonet base	Crystal control operative		N17-L-6806-130	CG #NE-51		I503	1		
J401	CONNECTOR, male contact: Type AN-3102-14s 7P, 3 round male contacts; straight ⅞-20 thd cylindrical metal body ¾" diam x 35/64" lg excluding mtg; mtg flange 1-3/32" x 1-3/32" w/4 mtg holes .120" diam spaced 29/32"; per spec AN-C-591	A-c power input	AN-3102-14s-7P	N17-C-72604-1516			J401	1		
J402	CONNECTOR, male contact: Type AN-3102-14s-2P; 4 round male contacts; straight; ⅞-20 thd cylindrical metal body ¾" diam x 35/64" lg excluding mtg; mtg flange diam x 1-3/32" x 1-3/32" w/4 mtg holes .120" diam spaced 29/32"; per spec AN-C-591	Audio output	AN-3102-14s-2P	N17-C-72610-5434			J402	1		
J403	CONNECTOR, coaxial; Type -49194; 1 round female contact; straight; metal body 1-1/16" lg x ⅝" diam overall; thd sleeve w/2 hex nuts mtg; per BuShips dwg RF-49F-167-D	Scan output (used with O401)	(—49194)	N17-C-73108-9753			J403	1		
J404	CONNECTOR, receptacle: coaxial; Type UG-58/U (-49470); 1 round female contact; 1⅛" lg x 1" diam overall; thd sleeve w/2 hex nuts mtg; per spec JAN-C-71	Antenna connection (used with O402)	UG-58/U (—49470) Also BuShips dwg RE-49F-167D	N17-C-~~73109-4976~~ 73108-5965			J404	1		
J405	CONNECTOR, plug: 4 round female contacts; straight type; 10 a, 500 v; cylindrical body, rectangular base; molded phenolic; 1½" wd x 1¾" lg x ¾" d excl term; four 0.189" diam mtg holes on 1⅛" and 1¾" mtg ctrs; term silver plated & tin dipped	Power and audio input (mates with P301)	(—491875)	N17-C-73194-4231	CARO 7450-S-2	FRE-21195-1	J405	1		

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
J406	CONNECTOR, receptacle: coaxial; AN Type UG-348/U; 1 round female contact; straight; metal body 0.625" diam x 0.957" lg; mtg flange 1" x 1"; 4 mtg holds 0.125" diam spaced 0.718" c to c per BuShips dwg RF49F488B	Scan output inter-unit connection (used with O403)	AN type UG-348/U	N17-C-73108-6037	CARO 7350		J406, J407	2		
J407	Same as J406	Antenna inter-unit connection (used with O404)								
J501	JACK, telephone: short frame; tip and sleeves; per BuShips dwg RE-49AA195; incl hex nut, metal washer & phenolic washer; receives Navy type #49109, 49106B or 49034 plug	Phone output	(–49025B)	N17-J-39248-4423			J501	1		
L101	SHIELD, antenna: coupling; 90° elbow; 3/16" OD x 0.025" wall S.D. seamless round copper tubing (0.0005" silver plate) bent on 1/4" radius (inside); one end flared to 9/32" diam; 31/32" o/a lg to flared end; 1-3/64" o/a lg to plain end	Antenna coupling		N16-S-32841-1004	CFT	FRB-10086-1	L101	1		
*L102	INDUCTOR: (Integral with C101A)	Grid tank (1st r-f)								
*L103	INDUCTOR: (Integral with C101A)	Grid tank trimmer (1st r-f)								
*L104	INDUCTOR: (Integral with C101B)	Plate tank trimmer (1st r-f)								
*L105	INDUCTOR: (Integral with C101B)	Plate tank (1st r-f)								
*L106	INDUCTOR: (Integral with C101C)	Grid tank (2nd r-f)								
*L107	INDUCTOR: (Integral with C101C)	Grid tank trimmer (2nd r-f)								

*L108	INDUCTOR: (Integral with C101D)	Plate tank trimmer (2nd r-f)								
*L109	INDUCTOR: (Integral with C101D)	Plate tank (2nd r-f)								
*L110	INDUCTOR: (Integral with C101E)	Grid tank (mixer)								
*L111	INDUCTOR: (Integral with C101E)	Grid tank trimmer (mixer)								
*L112	INDUCTOR: (Integral with C102D)	Plate tank trimmer (tripler)								
*L113	INDUCTOR: (Integral with C102D)	Plate tank (tripler)								
L114	COIL, rf; oscillator; 1 wdg, single layer wound; unshielded; 1-25/32" lg x 17/32" wd; ceramic form; powdered iron core with slotted brass shaft for screwdriver adjustment of permeability; two #4-40 mtg holes in base; 2 solder lug terms; and wire loop at tap; for winding data see table 7–8	Oscillator plate tank		N16-C-76358-3376	CFT	FRA-18729-2	L114	1		
L114A	CORE, adjustable tuning: #6-32 cadmium plated brass stud imbedded, coaxially, in 0.309" diam x ½" lg cylinder of gray iron core material with ⅞ of stud protruding; 1⅜" o/a lg; 1/32" wd x 1/64" d diametral slot in end of core; 0.025" wd x 1/16" d slot in end of stud	Permeability tuning adjustment (used with L114)		N16-C-600701-121	CSA per FTRC dwg	FRE-18772-1-2	L114A	1	1	0
L115	TRANSFORMER, rf: 40-70 mc freq range; 2 space-wound, single layer wdg wound as double helix on mica-filled Bakelite form; adjustable (screwdriver) powdered iron core for permeability tuning; unshielded; 1-51/64" h x 1-1/16" wd x 9/16" d, excl terms & shaft; 2 #4-40 mtg holes on ¾" ctrs in base flanges; 3 solder lug terms & ½" lg hex post term at ends of wdgs; formed loop for connection to tap; for winding data see table 7–8	R-f transformer (1st dblr)	(–472312)	N17-T-82216-1516	CFT	FRA-18730-2	L115	1		
L115A	CORE, adjustable tuning: #6-32 cadmium plated brass stud imbedded, coaxially, in 0.309" diam x ⅜" lg cylinder of gray iron core material with ⅞" of stud protruding; 1¼" o/a lg; 1/32" wd x 1/64" d diametral slot in end of core; 0.025" x 1/16" d slot in end of stud	Permeability tuning adjustment (used with L115)		N16-C-600701-120	CSA per FTRC dwg	FRE-18772-1-1	L115A, L122A	2	1	0

*Not a replaceable part; listed for reference only.

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
L116	COIL, rf; choke; air core; single wdg single layer wound on mica-filled phenolic form; 1-51/64" lg x 1-5/16" wd x 9/16" d; two #4-40 mtg holes on ¾" ctrs in flanges of base; 2 solder lug terms one side; one ½" lg hex post term other side; for winding data see table 7–8	Plate (2nd dblr)	(–472311)	N16-C-72749-4693	CFT	FRA-18731-2	L116	1		
L117	COIL, rf; choke; air core; single wdg, single layer wound on mica-filled Bakelite form; unshielded 1-51/64" h x 1-11/16" lg x 9/16" wd, excl terms; permeability tuned by screwdriver adjustment of brass slug core; 2 solder lug terms at coil ends; 2 #4-40 mtg holes on ¾" ctrs; for winding data see table 7–8	Grid tank (tripler)	(–472315)	N16-C-76515-7826	CFT	FRA-18732-2	L117	1		
L117A	CORE, adjustable tuning: 5/16" diam x 1⅜" lg brass rod turned to 0.309" diam for ½" from one end, and #6-32 x ⅞" lg thd from other end; 1/32" wd x 3/64" d screwdriver slot in large end; 1/64" x 45° chamfer, and 0.025" wd x 1/16" d screwdriver slot in other end; all 0.0005" dull silver plate	Permeability tuning adjustment (used with L117)		N16-C-600701-137	CFT	FRE-18771-1	L117A	1		
L118	INDUCTOR, special: 3-3/16" length 0.140" OD coaxial cable; 0.032" diam copper inner conductor; copper tube (0.0002" silver plate) outer conductor; polyethylene dielectric; insulation stripped 5/16" from each end	Coupling line (tripler-mixer)		N16-C-71585-4777	Precision Tube Mfg. Co. per FTRC dwg	FRB-10087-1	L118	1		
L119	INDUCTOR, special 25/32" length 3/16" diam brass rod with #10-32 x 13/32" lg thd one end & remainder turned to 0.150" diam; 1/32" wd x 1/16" d screwdriver slot in thd end, & #3-48 x ⅜" d axial hole other end; all 0.0005" silver plate	Link stud (tripler-mixer)		N16-C-600701-118	CFT	FRB-18733-1	L119, L120	2		
L120	Same as L119	Link stud (mixer-tripler)								

L121	INDUCTOR, ~~special~~: 1¼" length 3/16" diam brass rod with #10-32 x 7/16" lg thd one end & remainder turned to 0.150" diam; 1/32" wd x 1/16" d screwdriver slot in thd end, and 1/16" diam x 3/16" d axial hole in other end; also 1/16" diam x 0.075" d radial hole centered 1/16" from latter (unthreaded) end; all 0.0005" silver plate	Antenna coupling stud		N16-C-600701-119	CFT	FRB-6204-1	L121	1		
L122	TRANSFORMER, IF: interstage; 18.6 mc; unshielded; 1-31/64" h x 1-1/16" lg x 9/16" wd excl terms & tuning slug; powdered iron core; pri & sec tuned by single tuning slug, two #4-40 mtg holes, ¾" ctrs; 4 solder lug terms; for winding data see table 7–8	Plate coil (mixer)	(–472313)	N17-T-82268-2624	CFT	FRA-18728-2	L122	1		
L122A	Same as L115A	Permeability tuning adjustment (used with L122)								
L123	COIL, rf: choke; single wdg, single layer wound; unshielded: 1.2 μhy ±5% (absolute value); 11/64" diam x ½" lg excl leads; 1½" lg axial wire lead each end; for winding data see table 7–8	Heater-cathode capacity resonating		N16-C-72793-6430	CFT	FRA-20493-1	L123	1		
L201	COIL, rf; choke; single wdg, single layer; unshielded; 3.4 μhys ±5% (absolute); untuned; one 1½" lg axial wire lead each end	Filament choke (1st i-f)		N16-C-72909-4533	CFT	FRA-511-1	L201-L211	11	1	1
L202	Same as L201	Filament choke (2nd i-f)								
L203	Same as L201	Filament choke (3rd i-f)								
L204	Same as L201	Filament choke (4th i-f)								
L205	Same as L201	Filament choke (5th i-f)								

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
L206	Same as L201	Filament choke (2nd detec & AVC diode)								
L207	Same as L201	Filament choke for 2nd detec & AVC diode								
L208	Same as L201	Filter choke for output meter								
L209	Same as L201	Filter choke for output meter								
L210	Same as L201	Filter choke for phone output								
L211	Same as L201	Filter choke for phone output								
L301	REACTOR: filter choke; 12 hys (tap at 11.4% of total turns), 145 ma; 350 ohms d-c resis.; 1600 v rms test; enclosed metal case, 2-11/16" lg x 2-9/16" wd x 2-3/16" h, excl terms; 4 #8-32 x 7/16" lg mtg studs on 2" x 1⅞" mtg ctrs; 3 ceramic-insulated lugs on bottom; per FTRC spec RC-8112-1; for winding data see table 7–8	Filter		N16-R-29693-~~119~~ 5271		RC-8113-1	L301	1	1	1
L401	COIL, rf: filter choke; 1.26 mhy; 1.12 ohms d-c resis.; 1.5 d-c amps; 400 v rms test; "Q" = 25, ±10% at 225 kc; 4 μμf ± 1 μμf distrib capac; 1½" diam x 1-1/16" lg incl	A-c line filter	(–304682)	N16-C-74458-4712	CFT	FRA-2698-1	L401, L402	2		

	two rt angle mtg brackets on one end of tube; #6-32 mtg holes (one each bracket) spaced 15/16" ctrs; 1 radial solder lug term at each end of wdgs, on tube; for winding data see table 7–8									
L402	Same as L401									
L403	COIL, rf: filter choke; 0.339 mhy, ±10%, at 10 mc and at 20 mc; 2 amps d-c; 0.013 ohms d-c resis.; "Q" = 100 ±10% at 14 mc; single wdg; single layer wound; unshielded; 1⅜" lg x ⅜" diam, excl terms; single #6-32 x 5/16" deep axial mtg hole; 2 solder lug terms, at ends of wdg; for winding data see table 7–8	A-c line filter	(–472314)	N16-C-72730-3773	CFT	FRA-2720-1	L403, L404, L407, L408	4		
L404	Same as L403	A-c line filter								
L405	COIL, rf: filter choke; 1.08 mh, ±10%; no case; 1.96 ohms d-c resis; 300 dcma; 100 rms test; "Q" = 30, ±10%, at 262 kc; 2 $\mu\mu f$ ±0.5 $\mu\mu f$ distrib capacity; 1-3/16" wd x 1" d x 1-11/16" h incl 2 rt angle mtg brackets on one end of tube; #6-32 mtg holes (one each bracket) spaced 15/16" on ctrs; 1 radial solder lug term at each end of wdg on tube; for winding data see table 7–8	Audio output filter	(–304681)	N16-C-74411-7351	CFT	FRA-2699-1	L405, L406	2		
L406	Same as L403	Audio output filter								
L407	Same as L403	Audio output filter								
L408	Same as L403	Audio output filter								
M501	METER, d-c milliammeter: scale, C-1; 105 ohms resis.; 2½" diam flush bakelite case w/special static shield, per CV dwg #D-116402; per Spec JAN-1-6	Input meter	MR25W001-DCMA	N17-M-19255-1051	CV		M501	1		
M502	METER, volume level: scale, –10/0/-+20 db; rectifier type zero power level=6mv in 600 ohms; 2½" diam flush bakelite case w/special static shield per CV dwg #D-116-402	Output meter	(–22427)	N17-M-22724-6701	CV		M502	1		

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS

Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Equipment Repair Parts Quantities: Contract NObsr-52051	Equipment Repair Parts Quantities: Contract NObsr-52304
3	Same as O201	Shield base for V303								
1	COVER, electrical connector: brass; silver pl; 3/4" lg x 1" wd x 1" h; four 0.125 diam mtg holes 23/32" x 23/32" c to c	Shield for J403	UG-177/U	N17-C-945001-203			O401, O402	2		
2	Same as O401	Shield for J404								
3	Same as O105	Shield for J406								
4	Same as O105	Shield for J407								
1	COVER, telephone jack: aluminum; semi-gloss black enamel; 27/32" lg x 1/4" wd x 23/32" h; friction mtd	Moisture and dust cover		N17-C-201579-718		FRE-20917-1	O501	1		
2	DRIVE, dial: 1:20 speed reduction drive for preselector section, with automatic precision stop effective at completion of 19th revolution of dial, in each direction; also dial lock; 3" wd x 5 3/8" lg x 2-1/16" d; assem mtd on and between two #11 B & S ga type 52S 1/2-hard aluminum plates; dial calibrated 225-410 megacycles over 340.8° of circumference	Preselector tuning drive (C101, C101A-E)		N16-D-46576-1623		~~FRE-2252-12~~ FRB-2522 and (outline) FRA-19967-2	O502	1		
3	COUPLING, flexible: comprises a driven arm (O503A) with hub and a drive arm (O503B) with hub; arms each #14 (0.064") B & S ga 1/2-hard nickel plated brass strip	Coupling: dial drive to preselector assembly		~~N16-D-98378-2225~~ N17-C-98378-2225			O503	1		
03A	COUPLING, arm: 1/4" ID x 1/2" OD hub (w/two #6-32 set screws) staked to radial arm carrying drive pin (parallel to and 1.344" from axis of hub); 1-25/32" x 9/16" x 19/32"	Part of O503				FRE-21220-1 and FRA-21212-1	O503A			
03B	COUPLING, arm: 1/4" ID x 1/2" OD hub (w/two #6-32 set screws) staked to radial arm slotted along ctr line to receive pin on drive arm; 1-13/16" x 9/16" x 11/32"	Part of O503				FRE-21221-1 and FRE-21217-1	O503B			
04	CLEANER ELEMENT, air: cartridge type; multiple baffles of aluminum	Dust filter		N17-C-794001-133	CBEN R82A	FRE-20375-2	O504, O505	2	2	0

O105	SHIELD, connector: brass, silver pl; rectangular shape; 1" lg x 1" wd x ½" h; four #18 drill mtg holes 0.718" x 0.718" c to c	Shield for P101		N17-S-38251-1015		FRB-9102-1	O105, O214, O403, O404	4	
O201	SHIELD, electron tube: aluminum; cyl; 19/32" lg x 0.900" diam; bayonet mtg	Shield for V201	BuShips dwg RE49F475 (part 4)	N16-[illegible]-151921-134	CNA XO-7		O201 to O211, O302, O303	13	
O202	Same as O201	Shield base for V202							
O203	Same as O201	Shield base for V203							
O204	Same as O201	Shield base for V204							
O205	Same as O201	Shield base for V205							
O206	Same as O201	Shield base for V206							
O207	Same as O201	Shield base for V207							
O208	Same as O201	Shield base for V208							
O209	Same as O201	Shield base for V209							
O210	Same as O201	Shield base for V210							
O211	Same as O201	Shield base for V211							
O212	CLAMP, electrical: steel; cad pl; spade type "U" shaped; 2½" lg x 1-5/16" wd x ⅝" h; two 6-32 thd mtg holes 1-9/16" c to c	Clamp for C222	CPO6SA4	N16-M-60958-3591			O212	1	
O213	CLAMP, electrical: steel; cad pl; spade type "U" shaped; 2¾" lg x 1-5/16" wd x ⅝" h; two 6-32 thd mtg bolts 1-9/16" c to c	Clamp for C229	CPO6SA6	N16-M-60906-8018			O213	1	
O214	Same as O105	Shield for P201							
O301	CLAMP, tube: ⅜" wd x 0.025" thk stainless steel (type 302) strap fitted with toggle clamp to form 1⅜" ID (nominal) band, ½" wd x ¾" & ⅜" lg L-shape mtg clip, having elongated (radially) hole for #10 mach screw, is soldered opposite clamp	Retainer for JAN type 5U4G tube (V301)	(−49680)	N16-C-300798-866	CAIS 926C	FRE-21201-1	O301	1	
O302	Same as O201	Shield base for V302							

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
P403	CONNECTOR, coaxial; Type -49195; 1 round male contact; straight; metal body 1-9/16" lg x ¾" diam overall; includes shielding hood; per BuShips Dwg RE-49F-167D	For scan output cable	(-49195)	N17-C-71413-4752			P403	1		
P404	CONNECTOR, coaxial; Type UG-21B/U; 1 round male contact; straight; metal body 1¾" lg x 13/16" diam overall; per BuShips Dwg RE-49F-402; per Spec JAN-C-71	For antenna input cable	UG-21B/U	N17-C-71416-2550	CARO 4300		P404	1		
R101	RESISTOR, fixed: composition; JAN type RC10BF104K; 100,000 ohms ±10%; ¼ w; F characteristic; 0.406" lg x 0.170 diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	AVC filter (1st r-f)	RC10BF104K	N16-R-50633-491			R101, R105, R109, R115, R118	5		
R102	RESISTOR, fixed: composition; JAN type RC20BF333K; 33,000 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Screen dropping (1st r-f)	RC20BF333K	N16-R-50417-811			R102, R103, R106, R107	4		
R103	Same as R102	Screen dropping (1st r-f)								
R104	RESISTOR, fixed: composition; JAN type RC30BF222K; 22,000 ohms ±10%; 1 w; F characteristic; 0.750" lg x 0.280" diam; insulated; salt water immersion resistant; two axial wire leads; per spec JAN-R-11	Plate voltage dropping (1st r-f)	RC30BF222K	N16-R-50013-231			R104, R108	2		
R105	Same as R101	AVC (2nd r-f)								
R106	Same as R102	Screen dropping (2nd r-f)								

	screen wetted in oil; 3½" h x 4" wd x ¾" d; 0.032" gauge aluminum frame; cleaned with gasoline; rechargeable with SAE-#20 oil; unit supported against cabinet opening by external encasing frame containing pressure springs.									
O505	Same as O504	Dust filter								
P101	CONNECTOR, receptacle: coaxial; 1 round male contact; 1" lg x 1" wd x 0.958" h; per BuShips Dwg RE-49F488B	Antenna inter-unit connection (used with O105)	UG-347/U	N17-C-73408-7101	CARO #7250		P101, P201	2		
P201	Same as P101	Scan output inter-unit connection (used with O214)								
P301	CONNECTOR, receptacle: (consists of P301A and P301B)	Pwr and audio input	(–491873)	N17-C-~~73847~~-7175	CARO		P301	1		
P301A	INSERT: laminated phenolic, 4 male cont; 1¾" lg x 1½" wd x 3/16" thk; four 0.154" diam mtg holes, 1⅜" x 1⅛" c to c	Part of P301			CARO 7450-S-1		P301A			
P301B	SHELL, connector: anodized aluminum; rectangular; 1¾" lg x 1½" wd x 13/32" h	Part of P301		~~N17-S-250051-302~~	CARO 7455	FRE-21189-1	P301B			
P401	CONNECTOR, female contact: Type AN-3106-14S-7S; 3 round female contact; straight; metal body 1-11/32" lg x 1-1/16" diam overall; ¾-20 thd sleeve; includes soldering ferrule and cable clamp AN-3057-6; u/w Navy type MCOS-2 cable Spec 15C1; per Aero Spec AN-C-591	For a-c power input cable	AN-3106-14S-7S	N17-C-70328-1515		FRA-24367-1-1	P401	1		
P402	CONNECTOR, female contact: Type AN-3106-14S-2S; 4 round female contacts; straight; metal body 1-11/32" lg x 1-1/16" diam overall; ¾-20 thd sleeve; includes soldering ferrule and cable clamp AN-3057-6; u/w Navy type TTFHWA-1 cable Spec 15C1; per Aero Spec AN-C-591	For audio output cable	AN-3106-14S-2S	N17-C-70334-5429		FRA-24367-1-2	P402	1		

P301B LOW FAILURE ITEM - IF REQUIRED, REQUISITION FROM ESO REFERENCING NAVSHIPS 900,180A.

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
R118	Same as R101	Grid isolation (2nd dblr)								
R119	RESISTOR, fixed: composition; JAN type RC20BF122K; 1200 ohms; ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Plate dropping (2nd dblr)	RC20BF122K	N16-R-49940-811			R119, R212, R213	3		
R120	RESISTOR, fixed: composition; JAN type RC10BF683K; 68,000 ohms ±10%; ¼ w; F characteristic; 0.406" lg x 0.170" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Grid leak (tripler)	RC10BF683K	N16-R-50552-491			R120	1		
R121	RESISTOR, fixed: composition; JAN type RC10BF393K; 39,000 ohms ±10%; ¼ w; F characteristic; 0.406" lg x 0.170" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Grid isolation (tripler)	RC10BF393K	N16-R-50444-491			R121	1		
R122	RESISTOR, fixed: composition; JAN type RC20BF223K; 22,000 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Screen dropping (tripler)	RC20BF223K	N16-R-50372-811			R122, R123	2		
R123	Same as R122	Screen dropping (tripler)								
R124	RESISTOR, fixed: composition; JAN type RC30BF332K; 3300 ohms ±10%; 1 w; F characteristic; 0.750" lg x 0.280" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Plate dropping (tripler)	RC30BF332K	N16-R-50067-231			R124	1		
R125	Same as R113	Plate (1st dblr)								
R126	Same as R112	Damping (1st dblr)								

R107	Same as R102	Screen dropping (2nd r-f)								
R108	Same as R104	Plate volts dropping (2nd r-f)								
R109	Same as R101	Grid leak (mixer)								
R110	RESISTOR, fixed: composition; JAN type RC20BF104K; 100,000 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Plate dropping (mixer)	RC20BF104K	N16-R-50633-811			R110, R201, R205, R208, R211, R219, R228, R229	8		
R111	RESISTOR, fixed: composition; JAN type RC20BF181J; 180 ohms ±5%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Cathode (oscillator)	RC20BF181J	N16-R-49642-431			R111, R116	2		
R112	RESISTOR, fixed: composition; JAN type R20BF100K; 10 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Damping (oscillator)	RC20BF100K	N16-R-49238-811			R112 R126	2		
R113	RESISTOR, fixed: composition; JAN type RC30BF682K; 6800 ohms ±10%; 1 w; F characteristic; 0.750" lg x 0.280" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Plate voltage dropping (oscillator)	RC30BF682K	N16-R-50202-231			R113, R125	2		
R114	RESISTOR, fixed: composition; JAN type RC10BF123K; 12,000 ohms ±10%; ¼ w; F characteristic; 0.406" lg x 0.170" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Grid leak (1st dblr)	RC10BF123K	N16-R-50309-491			R114, R117	2		
R115	Same as R101	Grid isolation (1st dblr)								
R116	Same as R111	Cathode (1st dblr)								
R117	Same as R114	Grid leak (2nd dblr)								

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
R214	RESISTOR, variable: composition 5000 ohms, ±10%; 2 watts; linear taper; case, 1-1/16" diam x 9/16" d; 3/8-32 x 3/8" lg mtg bushing; slotted shaft, 1/4" diam x 1/8" lg beyond bushing; 3 radial solder lug terms	Input meter balancing	(–636123-K10)	N16-R-87519-4490	CBZ U5021-SD3032	FRE-2529-3-2	R214	1		
R215	Same as R203	Screen dropping (4th i-f)								
R216	Same as R203	Plate dropping (4th i-f)								
R217	RESISTOR, fixed: composition; JAN type RC20BF561K; 560 ohms ±10%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Cathode (5th i-f)	RC20BF561K	N16-R-49805-811			R217	1		
R218	Same as R203	Screen dropping (5th i-f)								
R219	Same as R110	Noise limiter bucking								
R220	Same as R203	Plate dropping (5th i-f)								
R221	RESISTOR, fixed: composition; JAN type RC20BF105K; 1 megohm ±10%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Noise limiter time constant	RC20BF105K	N16-R-50975-811			R221, R223, R232, R242	4		
R222	RESISTOR, fixed: composition; JAN type RC20BF335K; 3.3 megohms, ±10%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Noise limiter bucking voltage coupling	RC20BF335K	N16-R-51110-811			R222, R255	2		

R201	Same as R110	AVC filter (1st i-f)								
R202	RESISTOR, fixed: composition; JAN type RC20BF510J; 51 ohms ±5%; ½ w; F characteristic; 0.468″ lg x 0.249″ diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Cathode output (1st i-f)	RC20BF510J	N16-R-49444-431			R202	1		
R203	RESISTOR, fixed: composition; JAN type RC20BF272K; 2700 ohms; ±10%; ½ w; F characteristic; 0.468″ lg x 0.249″ diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Screen dropping (1st i-f)	RC20BF272K	N16-R-50039-811			R203, R204, R206, R207, R209, R210, R215, R216, R218, R220	10		
R204	Same as R203	Plate dropping (1st i-f)								
R205	Same as R110	AVC filter (2nd i-f)								
R206	Same as R203	Screen dropping (2nd i-f)								
R207	Same as R203	Plate dropping (2nd i-f)								
R208	Same as R110	AVC filter (3rd i-f)								
R209	Same as R203	Screen dropping (3rd i-f)								
R210	Same as R203	Plate dropping (3rd i-f)								
R211	Same as R110	AVC filter (4th i-f)								
R212	Same as R119	Input meter filter								
R213	Same as R119	Input meter filter								

TABLE 8—4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS

Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Equipment Repair Parts Quantities Contract NObsr-52051	Contract NObsr-52304
R232	Same as R221	1st a-f grid								
R233	RESISTOR, variable: composition, 10,000 ohms ±10%; 2 watt, linear taper; case, 1-1/16" diam x 9/16" d; 3/8"-32 x 3/8" lg mtg bushing; slotted shaft 1/4" diam x 1/8" lg beyond bushing; no off position; 3 radial solder lug terms	Silencer control	(−636557-K10)	N16-R-87679-4320	CBZ U1031-SD3032	FRE-2529-3-4	R233	1		
R234	RESISTOR, fixed: composition; JAN type RC20BF154J; 150,000 ohms ±5%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Silencer amplr screen dropping	RC20BF154J	N16-R-50677-431			R234	1		
R235	RESISTOR, fixed: composition; JAN type RC20BF473J; 47,000 ohms ±10%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Silencer amplr load	RC20BF473J	N16-R-50479-431			R235	1		
R236	RESISTOR, fixed: composition; JAN type RC20BF274K; 270,000 ohms ±10%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Silencer diode d-c coupling	RC20BF274K	N16-R-50741-811			R236, R240, R243	3		
R237	RESISTOR, fixed: composition; JAN type RC20BF273K; 27,000 ohms ±10%; 1/2 w; F characteristic; 0.468" lg x 0.219" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	1st a-f plate dropping	RC20BF273K	N16-R-50399-811			R257	1		
**R238	RESISTOR, variable: composition; 40,000 ohms ±10%, 1/3 watt; CIR type "G" taper; resis incr w/clockwise rotation; 1 1/8" diam x 17/32" d phenolic case w/metal cover; 3/8"-32 x 3/8" lg mtg bushing; 1/4" diam x 1/8" (beyond bushing) lg	A-f line level control	(−637008-K-10)	N16-R-87808-4304	CIR DS	FRE-19471-3-1	R238	1		

	slotted shaft; 3 radial solder lug terms; stops at 3 and 9 o'clock									
**R238	RESISTOR, variable: comp; 40,000 ohms ±10%; ¼ w; 3 solder lug term; bakelite case, 15/16" diam x 33/64" lg; slotted shaft, ½" FMS; IRC taper G; ⅜"-32 thd x ⅜" lg mtg bushing	A-f line level control		N16-R-87808-4155	CIR Type "Q"	FRE-19471-3-2	R238	1		
R239	RESISTOR, fixed: composition; JAN type RC20BF334J; 330,000 ohms ±5%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Silencer diode d-c coupling	RC20BF334J	N16-R-50758-431			R239	1		
R240	Same as R236	2nd a-f grid								
R241	RESISTOR, fixed: composition, JAN type RC20BF821K; 820 ohms ±10%; ½ w; F characetristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	2nd a-f cathode	RC20BF821K	N16-R-49877-811			R241	1		
R242	Same as R236	2nd AF a-f screen dropping								
R243	Same as R221	2nd AF a-f plate								
R244	RESISTOR, fixed: composition; JAN type RC20BF474K; 470,000 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	A-f output amplr grid	RC20BF474K	N16-R-50822-0811			R244	1		
R245	RESISTOR, fixed: composition; JAN type RC20BF271K; 270 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	A-f output amplr cathode	RC20BF271K	N16-R-49688-811			R245	1		
R246	RESISTOR, fixed: composition; JAN type RC20BF184J; 180,000 ohms ±5%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	A-f negative feedback	RC20BF184J	N16-R-50695-431			R246, R253	2		

**CIR types "DS" and "Q" are interchangeable, and equally applicable, for this function.

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS										Equipment Repair Parts	
										Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
R247	Same as R227	A-f output amplr plate dropping								
R248	RESISTOR, fixed: wire-wound; JAN type RU3B150J; 15 ohms ±5%; ½ w; 21/32" lg x 15/64" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-184	Delay bias	RU3B150J	N16-R-68320-9426			R248	1		
R249	RESISTOR, fixed: composition; JAN type RC20BF472K; 4700 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Input meter balancing	RC20BF472K	N16-R-50129-0811			R249	1		
R250	RESISTOR, fixed composition; JAN type RC20BF474J; 470,000 ohms ±5%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Voltage divider	RC20BF474J	N16-R-50821-431			R250	1		
R251	Same as R231	Silencer amplr grid filter								
R252	RESISTOR, fixed: composition; JAN type RC20BF821J; 820 ohms ±5%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-11	Silencer amplr cathode bias	RC20BF821J	N16-R-49876-431			R252	1		
R253	Same as R246	Voltage divider								
R254	RESISTOR, variable: composition; 200,000 ohms, ±10%; 2 watt; linear taper; case, 1-1/16" diam. x 9/16" d; ⅜"-32 x ½" lg mtg bushing; slotted shaft ¼" diam x ⅛" lg beyond bushing; 3 radial solder lug terms	Silencer adjustment	(–636009-K10)	N16-R-88009-4390	CBZ U2041-SD4040L	FRE-2529-3-5	R254	1		

R255	Same as R222	Voltage divider								
R301	RESISTOR, fixed: composition; JAN type RC30BF220K; 22 ohms ±10%; 1 w; F characteristic; 0.750" lg x 0.280" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Negative supply	RC30BF220K	N16-R-49320-231			R301	1		
R302	RESISTOR, fixed: composition; JAN type RC40BF821K; 820 ohms ±10%; 2 w; F characteristic; 1.41" lg x 0.405" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Bleeder	RC40BF821K	N16-R-49878-551			R302, R303, R309	3		
R303	Same as R302	Bleeder								
R304	Not used									
R305	RESISTOR, fixed: composition; JAN type RC20BF683K; 68,000 ohms ±10%; ½ w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Input meter balancing	RC20BF683K	N16-R-50552-811			R305	1		
R306	Same as R225	Neon lamp series								
R307	RESISTOR, fixed: composition; JAN type RC40BF751J; 750 ohms ±5%; 2 w; F characteristic; 1.41" lg x 0.405" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11	Regulator series dropping	RC40BF751J	N16-R-49859-171			R307, R309, R310	3		
R308	Same as R307	Regulator series dropping								
R309	Same as R302	Regulator dropping								
R310	Same as R307	Regulator series dropping								
R501	RESISTOR, variable: wire-wound 50 ohms ±10%; 2 w; 3 solder lug term; enclosed molded phenolic case; 0.62" thk x 1.28" diam; round metal shaft 0.250" ±0.001" diam x 1½" lg from mtg surface; linear taper; insulated contact arm; normal torque; bushing ⅜"-32 x ⅜" lg; per Spec JAN-R-19	Dial lamp dimmer		N16-R-89956-7015 (for ¾" shaft)		FRE-27778-1	R501	1		

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
R502	RESISTOR, variable: composition; 1000 ohms, ±10%; 2 watts; JAN type "L" taper; metal case, 1-1/16" diam x 9/16" deep; ⅜-32 x ⅜" lg bushing; slotted shaft, ¼" diam x ⅜" lg beyond bushing; 3 radial solder lug terms	Phone level adjust	(–637009-M10)	N16-R-87349-4515	CBZ A1021-P3048	FRE-2529-3-1	R502	1		
**S201	SWITCH, toggle: SPDT; 3 amps, 125 v; with hex nuts and locking ring; per spec JAN-S-23	ALIGN-REC selector	ST42D	N17-S-71894-1544			S201, S202, S501	3		
**S201	SWITCH, toggle: SPDT; 3 amps, 125 v; with hex nuts and locking ring. Per JAN-S-23	ALIGN-REC selector	ST12D	N17-S-72018-7719			S201, S202, S501	3		
S202	Same as S201	Noise limiter ON-OFF								
S203	SWITCH, rotary: 2 pole, 2 position; single section; silver plated brass contacts (shorting type) on 7/32" thk ceramic wafer; 1⅞" lg x ~~13/32"~~ 1¾" wd x 1-1/16" d excl bushing; three 3/16" solder lug terms on rear; ⅜"-32 x ⅜" lg bushings; ¼" diam x ⅜" lg shaft	CRYSTAL-LC frequency control		N17-S-59261-8262		FRE-20323-1	S203	1	1	0
S301	SWITCH, thermostatic: bimetal type; SPST NO; close at 120° F, ±4° F; 10° F oper differential; 10 amps, 230 v; steel bracket type; 2⅜" lg x 1⅝" wd x 31/32" d overall; one 5/32" diam mtg hole 5/32" from each end on ctr line; 2 screw terms	Control for BL301		N17-S-69903-9979	CSQ C-4351-17	FRE-20497-1	S301	1	1	0
S501	Same as S201	Silencer IN-OUT								
S502	SWITCH, toggle: DPST; JAN #ST-22K; 6 amps, 125 v; metal body 1-9/32" lg x 23/32" wd; 15/32-32 thd sleeve 1⅝" lg w/2 hex nuts; 3 solder lug terms in rear; per spec JAN-S-23	Power	ST-22K	N17-S-73082-9003			S502	1		
T201	TRANSFORMER, IF: 18.6 mc; 1st IF stage; shielded; 1⅛" x 3" h,	1st i-f input		N17-T-68163-6426	CNA	FRE-20810-3-2	T201	1	1	1

	excl terms; powdered iron core (adjustable); tuned sec (100 μμf, mica, fixed); 4 solder lug terms; 2 #6-32 mtg studs at bottom; per FTRC Spec RC-7804-1; for winding data see table 7-8									
T202	TRANSFORMER, IF; 18.6 mc; 2nd IF stage; shielded; 1⅛" sq x 3" h, excl terms; powdered iron core (adjustable) tuned pri and tuned sec (each 100 μμf, mica, fixed); 4 solder lug terms; 2 #6-32 mtg studs at bottom; per FTRC Spec RC-7804-1; for winding data see table 7-8	Interstage coupling (1st-2nd i-f)		N17-T-68163-6451		FRE-20810-3-1	T202-T206	5	1	1
T203	Same as T202	Interstage coupling (2nd-3rd i-f)								
T204	Same as T202	Interstage coupling (3rd-4th i-f)								
T205	Same as T202	4th i-f output								
T206	Same as T202	2nd detector								
T207	TRANSFORMER, AF; plate coupling; pri: 80,000 ohms imped, 710 ohms d-c resis, 15 hys, sec: 60 ohms, imped, 5.3 ohms d-c resis, silicon steel core; steel enclosing frame; 3" h x 1⅝" sq; turns ratio, 12.4:1; freq response, ±2db, 350-3500 cps; electrostatic shield betw wdgs, 5 ceramic-insulated solder terms on bottom of case; two #6-32 mtg studs on 1-19/32" ctrs; hermetically sealed; per FTRC Spec RC-7898-1; for winding data see table 7-8	A-f output		N17-T-65494-3101		RC-7899-1	T207	1	0	1
T301	TRANSFORMER, power: filament and plate type; 3 pri and 4 sec wdgs; input: 110/115/120 v 60 cps, 1 phase, 1 amp; outputs (sec'ds): (1) 6.3 v, C.T. 0.6 amp, (2) 5 v, 3 amp, (3) 6.3 v, 3.8 amp, (4) 470 v, C.T. 0.145 amp; no coolant, hermetically sealed metal case; 4½" x 2-13/16" x 3-5/16" overall, not including terms; 14 ce-	Filament and plate power		N17-T-74016-6329		RC-8115-1	T301	1	1	1

**JAN types ST12D and ST42D interchangeable, and equally applicable, for this function.

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
	ramic-insulated ½" lg terms on top of case; 4 #8-32 mtg holes on bottom of case; per FTRC Spec RC-8114-1, and schematic dwg RC-8116-1; for winding data see table 7-8									
V101	TUBE, electron: JAN-9003	1st r-f amplr	JAN-9003	~~F16-T-79003~~ N16-T-79003			V101-V104, V202-V205	8		
V102	Same as V101	1st r-f amplr								
V103	Same as V101	2nd r-f amplr								
V104	Same as V101	2nd r-f amplr								
V105A V105B	TUBE, electron: JAN-6J6	Mixer	JAN-6J6	N16-T-56360			V105A, B, V107A, B	2		
V106A V106B	TUBE, electron: GL-5670	Osc & 1st doubler	GL-5670	N16-T-52351			V106A, B	1		
V107A V107B	Same as V105A, B	2nd doubler								
V108	TUBE, electron: JAN-6AK5W	Tripler	JAN-6AK5W	N16-T-56191-50			V108, V109, V208-V210	5		
V109	Same as V108	Tripler								
V201	TUBE, electron: JAN-6BA6	1st i-f and scan channel amplr	JAN-6BA6	N16-T-56211			V201	1		
V202	Same as V101	2nd i-f amplr								
V203	Same as V101	3rd i-f amplr								
V204	Same as V101	4th i-f amplr								
V205	Same as V101	5th i-f amplr								

V206A V206B	TUBE, electron: JAN-6AL5W	2nd detector and AVC	JAN-6AL5W	N16-T-56195-50			V206A, B, V207A, B	2		
V207A V207B	Same as V206A, B	Noise limiter and silencer								
V208	Same as V108	Silencer amplifier								
V209	Same as V108	1st a-f amplr								
V210	Same as V108	2nd a-f amplr								
V211	TUBE, electron: JAN-6AK6	A-f output amplr	JAN-6AK6	N16-T-56192			V211	1		
V301	TUBE, electron: JAN-5U4G	Rectifier	JAN-5U4G	N16-T-55467			V301	1		
V302	TUBE, electron: JAN-OB2	Voltage rectifier	JAN-OB2	N16-T-52001-05			V302	1		
V303	TUBE, electron: JAN-OA2	Voltage rectifier	JAN-OA2	N16-T-52001			V303	1		
†W601	CABLE ASSEMBLY, RF: consists of 48″ length RG-58/U cable with JAN type UG-347/U connector one end and JAN type UG-348/U connector other end	Antenna test cable (connects J407 and P101)	CG-839/U (4′-2″)	N16-C-11944-1651		FRW-29940-2-2	W601	1		
†W602	CABLE ASSEMBLY, power: consists of 48″ lg MIL-C-915 (Ships) type FRIP-3 cable with Navy type –491873 female connector one end and Navy type –491875 male connector other end; cable: c/o 4 cond, #16AWG, 7/0.120″ wire; round; 0.430″ OD; 600 v max; syn resin insul; binder and impervious sheath	Pwr and audio test cable (connects J405 and P301)	CX-1869/U (4′-4″)	N17-C-48320-9151		FRW-29939-2-2	W602	1		
XF201	HOLDER, fuse: extractor post type; (receptacle plus cap); for type 3AG glass fuse; bakelite body; 2-9/64″ lg x 11/16″ diam overall; 15 amp, 250 v rating; ½″-24 x ½″ lg bushing & ⅛″ thk x 11/16″ (betw flats) hex nut for single hole panel mtg; 2 solder lug terms at rear; bayonet type removable retainer cover; RSW	Holder for F201		N17-F-74266-9235	CFA Type HKP	FRE-1913-1	XF201 XF202	2		
XF202	Same as XF201	Holder for F202								

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

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Quantities Contract NObsr-52051	Quantities Contract NObsr-52304
XI501	LAMPHOLDER: miniature, bayonet; ½" wd x 1¼" d x 1" h; #6-32 x 5/16" lg binding head screw in 90° angle bracket located beside socket shell; 2 solder-lug terms	Receptacle for I501		N17-L-51624-6963	CAYZ 708 mod per FTRC dwg	FRE-2891-1	XI501 XI502	2		
XI502	Same as XI501	Receptacle for I502								
XI503	LIGHT, indicator: consists of XI503A and XI503B	Receptacle for I503		N17-L-76743-3975	CAYZ PLN-850 mod per FTRC dwg	FRE-1912-1	XI503	1		
XI503A	LIGHT, indicator: w/o lens; for ½" effective diam lens; holds T-3¼ miniature bayonet base bulb; brass shell; nickel pl; encl; 1-23/32" lg x 13/16" diam; requires 11/16" diam mtg hole; 2 solder lug term, ins from shell; RSW, fp and mp	Part of XI503		N17-L-76656-[illegible]	CAYZ 95410 mod		XI503A	1		
XI503B	LENS, light indicator: clear; ⅝" diam; hemispherical; plastic; unmounted; 9/16"-27 thd x 3/16" lg	Part of XI503		N17-L-250181-506	CAYZ 95-937		XI503B	1		
*XV101	SOCKET, electron tube: 7 cont; miniature size; incl metal shock shield base and center shield; oval; 1-9/32" lg x 1⅛" wd x 0.900" h; ceramic body; 2 mtg holes ⅛" diam, ⅞" c to c	Receptacle for V101		N16-S-62603-6703		FRE-29848-1	XV101 to XV105, XV107 to XV109	8		
*XV102	Same as XV101	Receptacle for V102								
*XV103	Same as XV101	Receptacle for V103								
*XV104	Same as XV101	Receptacle for V104								
*XV105	Same as XV101	Receptacle for V105								
*XV106	SOCKET, tube: miniature; 9 radial contacts spaced 36° apart; ceramic body, 0.859" diam (min) x 1.438" diam (max) x 0.393" d; two 0.145" diam (w/parallel flats, each 1/16"	Receptacle for V106		N16-S-64061-6257	CNA per FTRC dwg	FRE-20948-1	XV106			

	from ctr) mtg holes spaced 1⅛" on ctrs on long axis; 13/16" diam chassis cut-out required (under-chassis mtg); tin-plated phosphor bronze contacts									
*XV107	Same as XV101	Receptacle for V107								
*XV108	Same as XV101	Receptacle for V108								
*XV109	Same as XV101	Receptacle for V109								
XV201	SOCKET, electron tube: 7 cont; silver pl; miniature size; incl center shield; oval shape; 1⅛" lg x ¾" wd x 11/32" thk; plastic body; two ⅛" diam mtg holes, ⅞" c to c	Receptacle for V201	(–491675) BuShips dwg RE49AA455E	N16-S-62603-6446	CNA XOA-7		XV201 to XV211, XV302, XV303	13		
XV202	Same as XV201	Receptacle for V202								
XV203	Same as XV201	Receptacle for V203								
XV204	Same as XV201	Receptacle for V204								
XV205	Same as XV201	Receptacle for V205								
XV206	Same as XV201	Receptacle for V206								
XV207	Same as XV201	Receptacle for V207								
XV208	Same as XV201	Receptacle for V208								
XV209	Same as XV201	Receptacle for V209								
XV210	Same as XV201	Receptacle for V210								
XV211	Same as XV201	Receptacle for V211								

*Not a replaceable part; listed for reference only

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
XV301	SOCKET, electron tube: 8 contact medium (octal); ceramic body 1¼" diam x ½" d excl 11/32" phosphor bronze solder lug terms at rear; 2 #6-32 mtg holes spaced 1⅝" on long axis of 1⅜" min diam x 2" max diam stainless steel mtg plate	Receptacle for V301		N16-S-63524-6475	CPH #49-RNSS8M	FRE-20179-1	XV301	1		
XV302	Same as XV201	Receptacle for V302								
XV303	Same as XV201	Receptacle for V303								
XY201	CRYSTAL HOLDER: Consists of XY201A, XY201B and XY201C	Receptacle for Y201					XY201	1		
XY201A	CLIP, crystal mounting: parallel grip for 0.062" diam wire terminal lead of type CR-24/U crystal; #28 (0.126") B & S ga hard (two B & S Nos) Beryllium copper heat treated for maximum spring properties before plating (DWNP + silver); 13/16" lg x 0.248" wd x 3/16" d	Mounting for Y201		N17-C-804081-101	CFT	FRB-11107-1	XY201A	(2)		
XY201B	CLIP, grounding: #30(0.010") B & S ga hard (two B & S Nos) beryllium copper, heat treated for max spring properties before plating (DWNP + silver); 0.426" wd x 9/16" lg x 7/16" d	Grounding clip for Y201		N17-C-812323-101		FRB-11109-1	XY201B	(1)		
†XY201C	INSULATOR, bushing: shoulder; natural mica-filled molded phenolic (JAN type MTS-E-3); 0.128" (#30 drill) ID x ½" max OD x 7/16" o/a lg incl undercut at one end, and recess in other; undercut, 0.373" diam x 1/16" d with parallel flats 0.124" each side of ctr; recess 0.031" deep w parallel sides 0.125" each side of ctr; sides of undercut parallel those of recess	Insulator for XY201		N17-I-49498-7025		FRP-11108-1	XY201C	(1)		
Y201	CRYSTAL, quartz: 5th mode. AN type CR-24/U (NOT FURNISHED)	Oscillator control	CR-24/U	***			Y201	1		

Z101	RADIO RECEIVER OSCILLATOR: Oscillator and 1st r-f doubler socket plate; includes capacitors C137, C155 & C160, inductor L123, resistors R111, R112, & R114-R116 and socket for V106; 1½" wd x 2-15/32" lg x 1⅜" d, overall; 4 open slots (0.130" wd) in ends of assembly plate for mtg screws located 11/16" and 2-5/16" on ctrs			N16-T-98501-1001	CFT	FRA-6770-2-2	Z10	1		
Z102	RADIO RECEIVER SUBASSEMBLY: 2nd r-f doubler socket plate; includes capacitor C157 and socket for V107; 2-7/32" lg x 13/16" wd x 1¼" d; 4 open slots (0.130" wd) in ends of assem plate for mtg screws spaced 7/16" and 2-5/16" on ctrs			N16-T-98501-1002	CFT	FRA-6208-1-2	Z102	1		
Z103	RADIO RECEIVER SUBASSEMBLY: r-f tripler socket plate and shield; includes capacitors C133, C134 & C139, resistors R122 & R123 and sockets for V108 & V109; 1¼" d x 2½" wd x 3¼" h; 4 open slots in ends of assem plate for mtg screws spaced 7/16" and 2-5/16" on ctrs			N16-T-98501-1004	CFT	FRA-6200-2-2	Z103	1		
Z104	RADIO RECEIVER AMPLIFIER: 1st r-f amplifier socket plate and shield; includes capacitors C103, C104 & C150, resistors R102 & R103 and sockets for V101 & V102; 1¼" d x 2½" wd x 2¼" h; 4 open slots (0.130" wd) in ends of assem plate for mtg screws spaced 2⅜" & 1" on ctrs			N16-T-98501-1003	CFT	FRA-4803-2-3	Z104	1		
Z105	RADIO RECEIVER AMPLIFIER: 2nd r-f amplifier socket plate and shield; includes capacitors C107, C106 & C152, resistors R106 & R107 and tube sockets for V103 and V104; 1¼" d x 2½" wd x 2¼" h; 4 open slots (0.130" wd) in ends of assem plate for mtg screws spaced 2⅜" x 1" on ctrs			N16-T-98501-1003	CFT	FRA-4803-2-4	Z105	1		

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

***NOTE: SNSN's assigned, by frequencies.

21.8000 mc = N16-C-97960-1176
23.5000 mc = N16-C-98016-7176
24.7000 mc = N16-C-98056-7176
24.8333 mc = N16-C-98061-2131
25.7000 mc = N16-C-98090-1176
26.7666 mc = N16-C-98126-6061
26.9000 mc = N16-C-98130-1176
27.1667 mc = N16-C-98138-9061
27.3000 mc = N16-C-98143-4176
28.1000 mc = N16-C-98167-1176
29.5667 mc = N16-C-98218-9061
33.7666 mc = N16-C-98356-1301

TABLE 8–4. COMBINED PARTS AND REPAIR PARTS LIST (Cont'd)

PARTS									Equipment Repair Parts	
									Quantities	
Symbol Desig.	Name of Part and Description	Function	JAN and (Navy Type) Number	Standard Navy Stock Number	Mfr. and Mfr's Desig.	Contractor's Drawing and Part Number	All Symbol Designations Involved	Total No. Per Equip.	Contract NObsr-52051	Contract NObsr-52304
Z106	RADIO RECEIVER SUBASSEMBLY: Mixer socket plate; includes capacitors C119 & C153 and socket for tube V105; 1⅛" wd x 2½" lg x 1⅛" d; 4 open slots (0.130" wd) in ends of assem plate for mtg screws spaced 11/16" and 2-5/16" on ctrs			N16-T-98501-1005	CFT	FRA-9496-1-2	Z106	1		
	BOX, repair parts: metal; per Navy spec 42B9	Container for equipment repair parts								
Z107	RADIO RECEIVER PRESELECTOR: tunes over 225-400 mc range; includes r-f amplifier stages one side, and oscillator-multiplier stages on other; rectangular metal box, 4⅞" wd x 6" h x 11¾" d, overall			F16-T-98077-4701	CFT	FRA-2857-14-2	Z107	1		
Z201	FILTER, bandpass: bandspread, 350-3500 cps; peak freq 1925 cps; response, ±2db, within bandspread; 2¾" wd x 1¾" d x 4½" h, overall; output impeds; 10,000 & 40,000 ohms; rectangular metal case, hermetically sealed; three ½" lg insulated solder terms on bottom; 4 #6-32 mtg holes on 2-1/32" & 1-1/32" ctrs. Per FTRC Spec RC-7902-1	A-f bandpass filter		N16-F-32171-3630	CJB	RC-7903-1	Z201	1		
J-302 P-302 P-302A P-302B	SEE T-6									
NONE	TOP SHIELD	Protection of Preselector (top)		NONE		Pcs 71086-31	NONE	1		
NONE	BOTTOM SHIELD	Protection of Preselector (bottom)		NONE		Pcs 71086-32	NONE	1		

TABLE 8–5. CROSS REFERENCE PARTS LIST

JAN (or AWS) Designation	Key Symbol
JAN-C-20	
CC21RH150K	C121
CC21SL050F	C128
CC21SL100F	C126
CC21SL510K	C129
JAN-C-62	
CE41B350Q	C301
JAN-C-5	
CM20D201J	C159
CM35B103K	C211
JAN-C-25	
CP61B1EF105V	C229
CPO6SA6	O213
CPO6SA4	O212
CP61B6EF254V	C222
JAN-I-6	
MR25W001DCMA	M501
JAN-R-19	
RA20A1RD500AK (Except ¾″ shaft)	R501
JAN-R-11	
RC3B37R5J	R230
RC10BF104K	R105
RC10BF123K	R114
RC10BF393K	R121
RC10BF683K	R120
RC20BF100K	R112
RC20BF102K	R227
RC20BF104K	R110
RC20BF105K	R221
RC20BF122K	R119
RC20BF153K	R226
RC20BF154J	R234
RC20BF154K	R225
RC20BF155K	R231
RC20BF181J	R111
RC20BF184J	R246
RC20BF223K	R122
RC20BF224K	R224
RC20BF271K	R245
RC20BF272K	R203
RC20BF273K	R237
RC20BF274K	R236
RC20BF333K	R102
RC20BF334J	R239
RC20BF335K	R222
RC20BF472K	R249
RC20BF473J	R235
RC20BF474J	R250
RC20BF474K	R244

JAN (or AWS) Designation	Key Symbol
RC20BF510J	R202
RC20BF561K	R217
RC20BF683K	R305
RC20BF821J	R252
RC20BF821K	R241
RC30BF220K	R301
RC30BF222K	R104
RC30BF332K	R124
RC30BF682K	R113
RC40BF751J	R307
RC40BF821K	R302
JAN-R-184	
RU3B7R5J	R230
RU3B150J	R248
JAN-S-28A	
TSF0T102	E105
JAN-S-23	
ST-12-D	S201
ST-22-K	S502
ST-42-D	S201
JAN-1A	
OA2	V303
OB2	V302
5670	V106A,B
5U4G	V301
6AK5W	V108
6AK6	V211
6AL5W	V206A,B
6BA6	V201
6J6	V105A,B
9003	V101

BuShips Spec. 16C44 (Ships)	Key Symbol
CR-24/U	Y201*

Military Specification MIL-C-5015	Key Symbol
AN-3102-14S-2P	J402
AN-3102-14S-7P	J401
AN-3106-14S-2S	J402
AN-3106-14S-7S	P401

Armed Services Index of RF Transmission Lines and Fittings ASESA 49-2	Key Symbol
UG-21B/U	P404
UG-58/U	J404

Armed Services Index of RF Transmission Lines and Fittings ASESA 49-2	Key Symbol
UG-177/U	O401
UG-347/U	P101
UG-348/U	J406
RG-8/U	Scan output
RG-10/U	Antenna input
RG-58/U	W601 & internal
RG-108/U	Z107 internal

Bureau of Ships Drawing Number	Key Symbol
RE49AA455E	XV201
RE28F120	F201
RE49F475 (Part 1)	E211
RE49F475 (Part 2)	E210
RE49F475 (Part 3)	E304
RE49F475 (Part 4)	O201

Navy Type Number	Key Symbol
CV-22427	M502
CLF-28032-2	F201
CFT-304681	L405
CFT-304682	L401
CFT-427311	L116
CFT-472312	L115
CFT-472313	L122
CFT-472314	L403
CFT-472315	L117
CER-484818-10	C403
CER-484819-5-1/2	C118
CER-484820-10	C116
CER-484821-20	C105
CSF-484822	C401
CASU-484832-20	C201A,B
CFT-484849	C101
CFT-484850	C102
CSA-484852-20	C108
-49016	Head-phones
-49025B	J501
-491675	XV201
CPH-49373	XV301
CAIS-49680	O301
CARO-491873	P301
CARO-491875	J405

Navy Type Number	Key Symbol
-49194	J403
-49195	P403
-49680	O301
CBZ-636009-K10	R254
CBZ-636557-K10	R233
CBZ-636123-K10	R214
CIR-637008-K10	R238
CBZ-637009-M10	R502
TB-14	I501

Standard Navy Stock Number	Key Symbol
N16-C-11944-1651	W601
N16-C-13866-14	O301
N16-C-15636-2514	C128
N16-C-15933-7014	C126
N16-C-15997-1482	C121
N16-C-16051-3074	C118
N16-C-16605-7014	C129
N16-C-18657-8640	C116
N16-C-18659-4509	C105
N16-C-19238-3721	C201
N16-C-19892-7801	C301
N16-C-28553-1000	C119
N16-C-29265-3006	C159
N16-C-300798-866	O301
N16-C-30167-1876	C153
N16-C-30167-1887	C103
N16-C-31090-3800	C403
N16-C-33622-5222	C211
N16-C-46371-9609	C401
N16-C-48841-9593	C229
N16-C-53448-1001	C222A,B
N16-C-55551-1925	C108
N16-C-600701-118	L119
N16-C-600701-119	L121
N16-C-600701-120	L115A
N16-C-600701-121	L114A
N16-C-600701-137	L117A
N16-C-71585-4777	L118
N16-C-72730-3773	L403
N16-C-72749-4693	L116
N16-C-72795-6430	L123
N16-C-72909-4533	L201
N16-C-74411-7351	L405
N16-C-74458-4712	L401
N16-C-76358-3376	L114
N16-C-76515-7826	L117

*Not furnished.

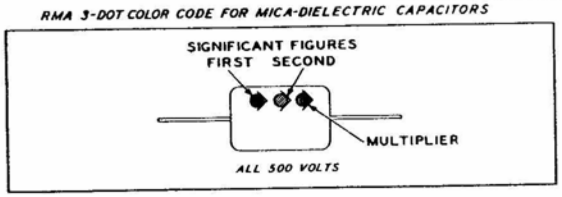
TABLE 8–5. CROSS REFERENCE PARTS LIST (Cont'd)

Standard Navy Stock Number	Key Symbol	Standard Navy Stock Number	Key Symbol	Standard Navy Stock Number	Key Symbol	Standard Navy Stock Number	Key Symbol
N16-C-97960-1176	Y201	N16-R-50633-811	R110	N16-T-98501-1004	Z103	N17-L-76743-3975	XI503
N16-C-98016-7176	Y201	N16-R-50677-431	R234	N16-T-98501-1005	Z106	N17-M-19255-1051	M501
N16-C-98056-7176	Y201	N16-R-50678-811	R225	N16-T-751468-732	H201	N17-M-22724-6701	M502
N16-C-98061-2131	Y201	N16-R-50695-431	R246	N17-B-21188-1075	BL301	N17-M-75268-6626	A501
N16-C-98090-1176	Y201	N16-R-50714-811	R224	N17-B-77738-3969	E208	N17-S-38251-1015	O105
N16-C-98126-6061	Y201	N16-R-50741-811	R236	N17-B-77738-3974	E301	N17-S-250051-302	P301B
N16-C-98130-1176	Y201	N16-R-50758-431	R239	N17-B-77834-2126	E204	N17-S-59261-8262	S203
N16-C-98138-9061	Y201	N16-R-50821-431	R250	N17-B-77840-3015	E203	N17-S-69903-9979	S301
N16-C-98143-4176	Y201	N16-R-50822-0811	R244	N17-B-77988-6269	E201	N17-S-71894-1544	S201
N16-C-98167-1176	Y201	N16-R-50975-811	R221	N17-B-78034-9760	E206	N17-S-72018-7719	S201
N16-C-98218-9061	Y201	N16-R-51020-811	R231	N17-B-78065-3493	E303	N17-S-73082-9003	S502
N16-C-98356-1301	Y201	N16-R-51110-811	R222	N17-B-78100-8855	E302	N17-T-65494-3101	T207
N16-D-46576-1623	O502	N16-R-68307-6666	R230	N17-B-78113-4948	E207	N17-T-68163-6426	T201
N16-D-900151-109	O101	N16-R-68320-9426	R248	N17-B-78179-2126	E209	N17-T-68163-6451	T202
N16-F-32171-3630	Z201	N16-R-87349-4515	R502	N17-B-78207-2688	E205	N17-T-74016-6329	T301
N16-G-432816-277	O103	N16-R-87519-4490	R214	N17-B-78242-9559	E202	N17-T-82216-1516	L115
N16-K-700266-740	E502	N16-R-87679-4320	R233	N17-B-86841-9339	E109	N17-T-82268-2624	L122
N16-K-700277-350	E503	N16-R-87808-4155	R238	N17-C-201579-718	O501	N43-W-7520-2400	H101
N16-K-700310-977	E504	N16-R-87808-4304	R238	N17-C-48320-9151	W602	N77-B-999-75008-0100	O102
N16-K-700344-505	E501	N16-R-88009-4390	R254	N17-C-70328-1515	P401		
N16-M-60906-8018	O213	N16-R-89956-7015	R501	N17-C-70334-5429	P402		
N16-M-60958-3591	O212	N16-S-151921-134	O201	N17-C-71413-4752	P403		
N16-R-20693-119	L301	N16-S-32841-1004	L101	N17-C-71416-2550	P404		
N16-R-49238-811	R112	N16-S-34510-9401	E211	N17-C-72604-1516	J401		
N16-R-49320-231	R301	N16-S-34518-5501	E101	N17-C-72610-5434	J402		
N16-R-49444-431	R202	N16-S-34532-8744	E106	N17-C-73108-9753	J403		
N16-R-49642-431	R111	N16-S-34548-6615	E210	N17-C-73108-6037	J406		
N16-R-49688-811	R245	N16-S-34557-8350	E105	N17-C-73109-4976	J404		
N16-R-49805-811	R217	N16-S-34599-7701	E304	N17-C-73194-4231	J405		
N16-R-49859-171	R307	N16-S-62603-6446	XV201	N17-C-73408-7101	P101		
N16-R-49876-431	R252	N16-S-62603-6703	XV101	N17-C-73487-7175	P301		
N16-R-49877-811	R241	N16-S-63524-6475	XV301	N17-C-77415-7611	E506		
N16-R-49878-551	R302	N16-S-64061-6257	XV306	N17-C-77417-8070	E508		
N16-R-49922-811	R227	N16-S-150263-107	A502	N17-C-794001-133	O504		
N16-R-49940-811	R119	N16-T-52001	V303	N17-C-804081-101	XY201A		
N16-R-50013-231	R104	N16-T-52001-05	V302	N17-C-812323-101	XY201B		
N16-R-50039-811	R203	N16-T-52351	V106A,B	N17-C-945001-203	O401		
N16-R-50067-231	R124	N16-T-55467	V301	N17-C-98378-225	O503		
N16-R-50129-0811	R249	N16-T-56191-50	V108	N17-F-16302	F201		
N16-R-50202-231	R113	N16-T-56192	V211	N17-F-74266-9235	XF201		
N16-R-50309-491	R114	N16-T-56195-50	V206A,B	N17-I-49473-1901	E110B		
N16-R-50336-811	R226	N16-T-56211	V201	N17-I-49473-1916	E110A		
N16-R-50372-811	R122	N16-T-56360	V105A,B	N17-I-49498-7025	XY201C		
N16-R-50399-811	R237	N16-T-79003	V101	N17-I-81960-5263	E110A		
N16-R-50417-811	R102	F16-T-98077-2726	C102	N17-J-38248-4423	J501		
N16-R-50444-491	R121	F16-T-98077-2751	C101	N17-L-250181-506	XI503B		
N16-R-50479-431	R235	F16-T-98077-4701	Z107	N17-L-51624-6963	XI501		
N16-R-50552-491	R120	N16-T-98501-1001	Z101	N17-L-6297	I501		
N16-R-50552-811	R305	N16-T-98501-1002	Z102	N17-L-6806-130	I503		
N16-R-50633-491	R101	N16-T-98501-1003	Z104	N17-L-76656-2457	XI503A		

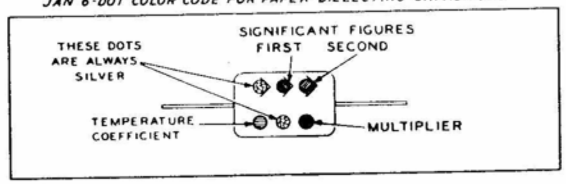
TABLE 8–6. APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

CAPACITOR COLOR CODES

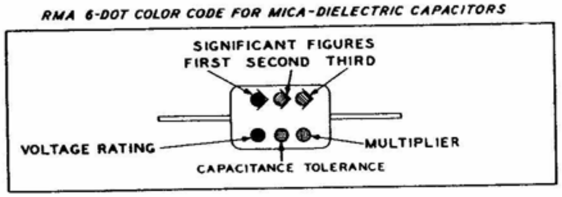
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



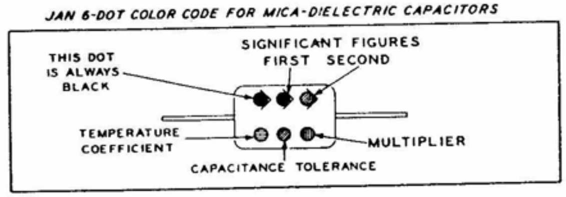
JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



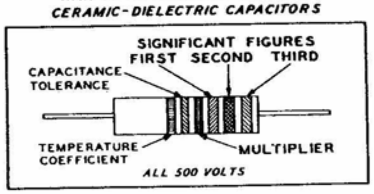
RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

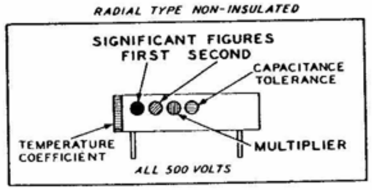


RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS

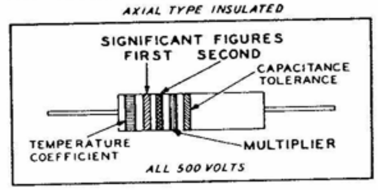


JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS

RADIAL TYPE NON-INSULATED



AXIAL TYPE INSULATED



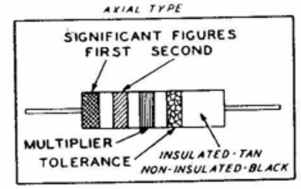
RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY

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
	1000	3	ORANGE	1000	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	

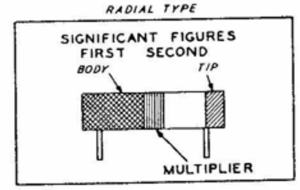
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE

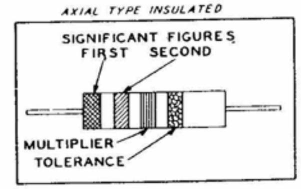


RADIAL TYPE



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE INSULATED



RADIAL TYPE NON-INSULATED

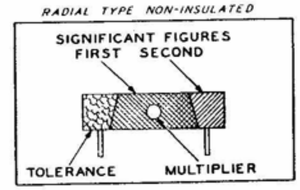


TABLE 8–7. LIST OF MANUFACTURERS.

Code Number	Prefix	Name	Address
1	CBZ	Allen Bradley Co.	118 West Greenfield Ave., Milwaukee 4, Wisconsin
2	CPH	American Phenolic Corp.	1830 South 54th Ave., Chicago 50, Illinois
3	CAYA	Barry Corp., L.N.	489 Main St., Cambridge, Mass.
4	CAIS	Birtcher Corp.	5087 Huntingdon Drive, Los Angeles, Calif.
5	CFA	Bussmann Mfg. Co.	2538 West University St., St. Louis 7, Missouri
6	CMG	Cinch Mfg. Co.	2335 West Van Buren St., Chicago 12, Illinois
7	CAYZ	Dial Light Corp.	900 Broadway, New York 3, N. Y.
8	CARB	Eastern Air Devices, Inc.	285 Dean St., Brooklyn 17, N. Y.
9	CASU	Electrical Reactance Co.	Franklinville, N. Y.
10	CER	Erie Resistor Co.	644 West 12th St., Erie, Pennsylvania
11	CFT	Federal Telephone & Radio Corp.	100 Kingsland Road, Clifton, N. J.
12	CG	General Electric Co.	1 River Road, Schenectady, N. Y.
13	CARO	Industrial Products Co.	Brookfield St., Danbury, Connecticut
14	CIR	International Resistance Co.	401 North Broad St., Philadelphia, Pa.
15	CLF	Littelfuse, Inc.	4765 No. Ravenswood Ave., Chicago 40, Illinois
16	CNA	National Co., Inc.	61 Sherman St., Malden, Mass.
17		Precision Tube Mfg. Co.	3828 Terrace St., Phila. 28, Pa.
18	CAXO	Shakeproof, Inc.	2573 N. Keeler Ave., Chicago 39, Illinois
19	CSQ	Spencer Thermostat Co.	34 Forrest St., Attleboro, Mass.
20	CSF	Sprague Electric Co.	201 Beaver St., North Adams, Mass.
21	CSA	Stackpole Carbon Co.	1942 Tannery St., St. Marys, Pennsylvania
22		Strom Steel Ball Co.	Cicero, Illinois
23	CV	Weston Electrical Instrument Co.	614 Frelinghuysen Ave., Newark 5, N. J.
24	CBEN	Air-Maze, Inc.	5200 Harvard Ave., Cleveland 5, Ohio

INDEX

D 3 8 7 9 7

Date: 16 January 1952

TEMPORARY CORRECTION T-1

to

INSTRUCTION BOOK

for

RADIO RECEIVING SET AN/URR-13A

(NAVSHIPS 91535)

Contracts: NObsr-52051
NObsr-52304

Equipments affected: All serial nos. above 507

CORRECTIONS AND CHANGES

Page	Item
1-7	Resistor R126 has been added, in series with the plate of the first doubler tube, V106, and transformer L115, to suppress a tendency toward spurious oscillation exhibited by some receivers. That portion of figure 1-8 showing oscillator-first doubler assembly Z101 illustrates the assembly before the change was made.
2-6	Add resistor R126 to the Simplified Schematic Diagram, figure 2-5, by showing this 10-ohm resistor connected in series with pin 6 of V106B (the first doubler in the oscillator-multiplier section) and the top end of the primary of its associated transformer, L115.
2-7	Change the third sentence on this page to read: "Plate voltage is applied through the untuned primary of bifilar-wound transformer L115 and parasitic suppression resistor R126; voltage is obtained from a 150-volt regulated source through decoupling resistor R125, which is bypassed for radio frequency by capacitor C123."
7-35	Add resistor R126 to figure 7-17, Overall Schematic Diagram, following the instructions given above for page 2-6.
8-31	Supplement the information given for R112 as follows: Add R126 to the column headed "All Symbol Designations Involved" and change the figure in the "Total No. Per Equip." column from 1 to 2.
8-32	After R125 add information for R126 as follows: Symbol Desig. R126; Name of Part and Description, Same as R112; Function, Damping (1st dblr).

TEMPORARY CORRECTION T-3 TO INSTRUCTION BOOK FOR RADIO RECEIVING SET AN/URR-13A NAVSHIPS 91535

Temporary Correction T-3 does not apply to the Instruction Book UNTIL Field Change No. 2-AN/URR-13A has been accomplished. THEREFORE - DO NOT correct the Instruction Book until the Field Change has been accomplished and tested.

Field Change No. 2-AN/URR-13A applies to all equipments. Its purpose is to (1) Replace impeller and impeller housing of blower BL-301 with one which will provide adequate ventilation of the affected equipments; (2) To add a connector to the blower-motor leads to facilitate removal of motor from the equipment for servicing; (3) To provide replacement bearings for the blower motor; and (4) To short out thermostatically controlled switch S-301.

Make the following pen and ink corrections, insert the new page provided with this Field Change, and then insert this Temporary Correction immediately in the front of the Instruction Book (just before Temporary Correction T-2) as a permanent record.

Page	Action
iv	7-20 Blower BL-301, Exploded View 7-8B
2-16	Delete 2nd sentence of paragraph 2h(5).
6-2	Clean air filters monthly instead of quarterly. In shore station installations or in a ship which is tied to a pier, the dust content may be high, in which case air filters must be cleaned weekly. Use Dry Cleaning solvent No. 140-F, SNSN G51-S-4718-10.
7-8A & 7-8B	This is a new page provided with this Field Change, and is to be inserted between pages 7-8 & 7-9.
7-9	Delete the following paragraphs: paragraph 6a to and including 6a(1)(c).
7-10	Delete the following paragraphs: paragraph 6a(2) to and including 6b(7).

Page 8-2 Change BL-301 to read as follows:

Symb. Desig.	Name of part and description	Function	St'd Navy & Signal Corps Stock No.	Contr. dwg. & part no.	All Symbol Designation Involved	Total No. per Equip.
BL-301	BLOWER, air; centrifugal vane; 35 cfm at 3300 rpm., direct drive, counterclockwise rotation, vertical outlet toward top. Steel housing, 115 v., 60 cyc., 1 phase.	Cabinet Cooling		Motor-Carb type J-50-4C Housing -Rois type 64275-31 Impeller-Rois type 64275-32	BL-301	1

Page 8-48 Add 0-304, 0-305, J-302, and P-302

0-304	BEARING, ball; single row radial; dble. shield; 7mm bore, 22 mm OD, 5 mm wide; 7 balls, 5/32" dia.	BL-301	N77-B-111-00702-8206	New Departure #77037 (Spec)	0-304	1
0-305	BEARING, ball; single row radial: dble. shield; 1/8" dia. bore; 3/8" OD, 5/32" wide; 7 balls, 1/16" dia.	BL-301	N77-B-115-00209-8206	New Departure #77R2 (Spec)	0-305	1
J-302	CONNECTOR, female, with bracket, 2 pin	BL-301		ELCO "Varicon" # F10220-1	J-302 P-302	1
P-302	CONNECTOR, male 2 pin, exposed ends	BL-301		ELCO "Varicon" # M1022	P-302 J-302	1

Page 8-50 Add 0-304, 0-305, J-302, and P-302

Standard Navy Stock Number	Key Symbol
N77-B-111-00702-8206	0-304
N77-B-115-00209-8206	0-305
	J-302
	P-302

The material on this page is to replace the indicated paragraphs in the following instruction books.

AN/URR-13 - NAVSHIPS 91270 - Section 7, paragraph 5a and 5b.

AN/URR-13B - NAVSHIPS 91829 - Section 7, paragraph 5a and 5b.

AN/URR-13A - NAVSHIPS 91535 - Section 7, paragraph 6a and 6b.

AN/URR27 - NAVSHIPS 91771 - Section 7, paragraph 6a and 6b.

AN/URR-35 - NAVSHIPS 91906 - Section 7, paragraph 6b, 6c, and 6d.

AN/URR-35A - NAVSHIPS 92022 - Section 7, paragraph 6b, 6c, and 6d.

BLOWER BL-301. - Blower BL-301 is located in the right rear corner of the chassis. Its removal is simple and should be undertaken as follows:

(1) Remove the receiver chassis from its cabinet and place on work bench with the right side facing technician. In this position the blower assembly will face the operator.

(2) Unplug connector P-302 (motor-lead plug) from jack J-302 in chassis.

(3) Remove the four 8-32 x ⅜" binding head screws, lockwashers, and nuts permitting removal of the entire blower assembly.

BLOWER CAPACITOR C-304. - The blower capacitor is located underneath blower BL-301 in the right rear corner of the chassis, and is attached to the blower housing. If the capacitor C-304 has to be replaced follow these steps:

(1) Remove Blower BL-301 from the chassis.

(2) Uusolder the wires from the two terminals of capacitor C-304.

(3) Remove the nuts from the two mounting studs on C-304.

(4) Slip out capacitor C-304.

(5) To install a new capacitor, reverse the above procedure, making sure that the leads to C-304 are connected to their proper terminals.

BLOWER-MOTOR BEARINGS - The equipments covered by these instruction books may have any one of three completely interchangeable types of blowers, all designated BL-301. However, while the complete blower assemblies are interchangeable, the bearings in each motor are not. The following procedure, which covers the replacement of these bearings, is applicable to all three types of blowers. Refer to figure 7-20 entitled "Blower BL-301, Exploded View," in instruction book for AN/URR-13, 13A, and AN/URR-27. Refer to figure 7-16, in instruction book for AN/URR-35 and AN/URR-35A receivers. Refer to figure 7-32 in instruction book for AN/URR-13B receivers.

(1) Remove Blower BL-301 from the chassis.

(2) Loosen the setscrews, holding the impeller to the motor shaft, by inserting an Allen wrench between the impeller fins, accessible through air discharge.

(3) Remove the motor from the housing by unscrewing the three 6-32 x ¼" steel binding head screws.

(4) Remove the armature as follows.

(a) For Eastern Air Device Model J50-4C and Induction Motor Corporation Model BC-1615B-4, remove the retaining ring with a suitable pair of pliers ("Truarc" or equivalent). Withdraw the armature with its associated washers,being careful not to lose the dust cap.

(b) For Air-Marine Motors Model A15B-5. scribe a line across the motor housing and end bell to show proper alignment. Remove the end bell by removing the three tie bolts and lockwashers which secure it to the housing. Withdraw the armature with its associated washers. Do not lose the spring washer or dust cap.

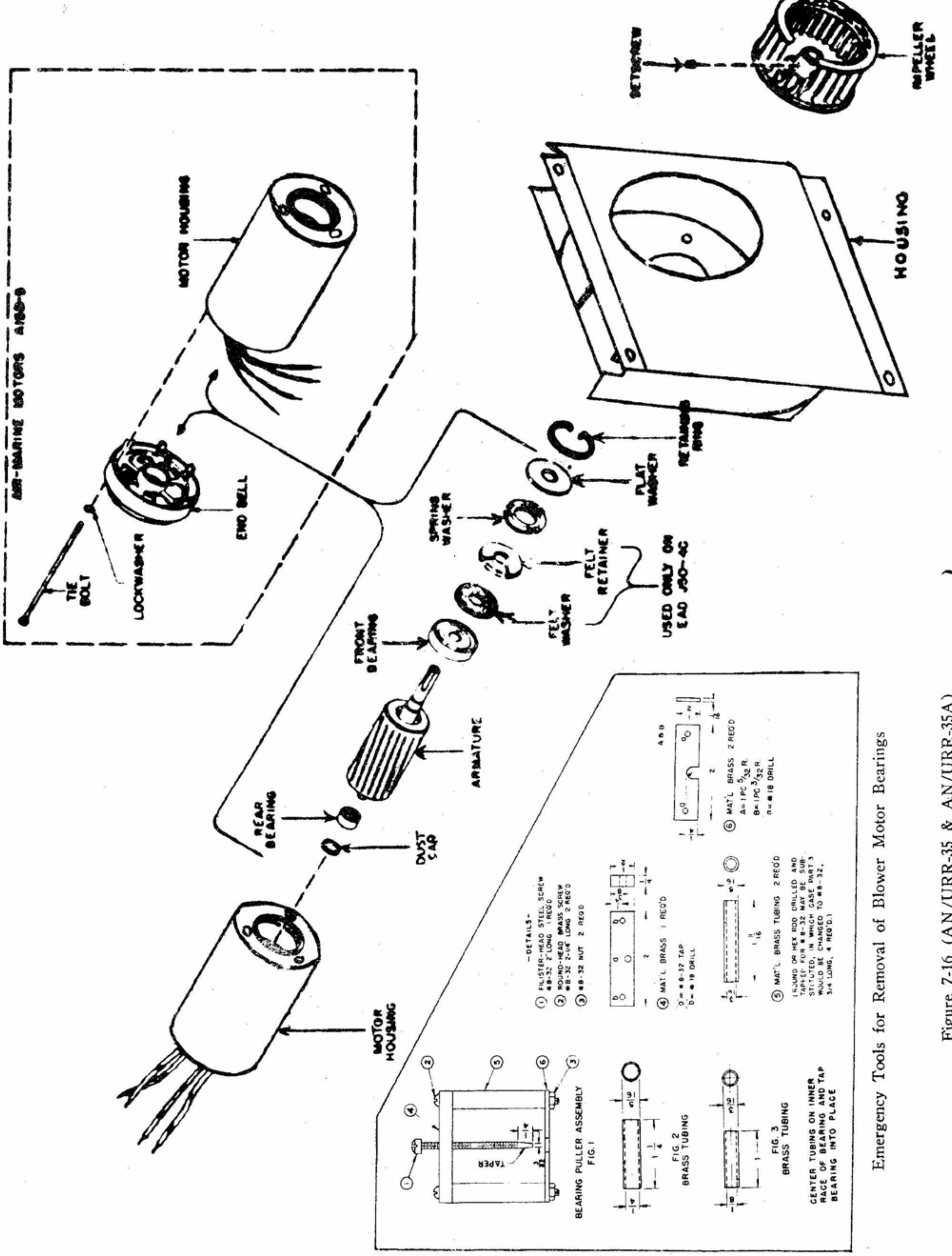
(5) Remove the two bearings from the armature shaft, using the bearing puller. (See Blower, BL-301, Exploded View).

(6) Install new bearings on shaft, using an arbor press or other suitable tool (see step 5). The proper bearings for each type of blower are tabulated below; the front bearing refers to the one on the long shaft end , while the rear bearing is the one on the short shaft end of the motor.

BLOWER MFG. AND MODEL	Bearing Manufacturer, Type, Stk., No., & Symbol — FRONT	REAR
Eastern Air Devices J50-C	New Departure 77R4A (Spec.) N77-B-115-00412-8206	New Departure 77R2 (Spec.) N77-B-115-00209-8206
Eastern Air Devices J50-4C	New Departure 77037 (Spec.) N77-B-111-00702-8206	New Departure 77R2 (Spec.) N77-B-115-00209-8206
Induction Motor Corporation BC-1615B-4	New Departure 77037 (Spec.) N77-B-111-00702-8206	New Departure 77034 (Spec.) N77-B-111-00403-8206
Air Marine Motors A15B-5	New Departure 77R4A (Spec.) N77-B-115-00412-8206	New Departure 77R3 (Spec.) N77-B-115-00319-8206

(7) Reassemble the blower in the reverse sequence of disassembly. Be certain that the dust cap removed in step (4) (a) is properly positioned at the end of the motor.

(8) Replace the blower BL-301 on the receiver chassis following steps as outlined.



Emergency Tools for Removal of Blower Motor Bearings

Figure 7-16 (AN/URR-35 & AN/URR-35A)
Figure 7-20 (AN/URR-13, AN/URR-13A, & AN/URR-27) Blower BL-301, Exploded View
Figure 7-32 (AN/URR-13B)

TEMPORARY CORRECTION T-4 TO INSTRUCTION BOOK FOR RADIO RECEIVING SET AN/URR-13A NAVSHIPS 91535

This Temporary Correction is in effect immediately. It provides the current support and Standard Navy Stock Numbers which were not available when the book was released for publication.

Make the following pen and ink corrections in TABLE 8-4, COMBINED PARTS AND REPAIR PARTS LIST and then insert this Temporary Correction immediately in the front of the book, (just before Temporary Correction T-3) as a permanent record.

PAGE	SYMBOL DESIG.	ACTION
8-2	C101	Correct SNSN to read "N16-T-98077-2751"
8-3	C102	Correct SNSN to read "N16-T-98077-2726"
8-4	C108	Correct item name to read "Plastic Dielectric"
8-5	C126	Correct SNSN to read "N16-C-15933-7014"
8-9	C201A	Add SNSN "N16-C-19238-3721"
8-11	C222	Correct SNSN to read "N16-C-53448-1001"
	C222A	Add SNSN "N16-C-53448-1002"
8-14	E110A	Delete SNSN. At bottom of page add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
	E110B	Delete SNSN. At bottom of page add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
8-17	E304	Correct SNSN to read "N16-S-34599-7750"
8-18	F201	Correct SNSN to read "G17-F-16302-100". Correct description to read "1 1/4 lg x 1/4" diam".
8-19	I501	Correct SNSN to read "G17-L-6297"
	I503	Correct SNSN to read "G17-L-6806-130"
	J404	Correct SNSN to read "N17-C-73108-5905"
8-22	L119	Change item name to read "CORE, Adjustable Tuning"
8-23	L121	Change item name to read "CORE, Adjustable Tuning"
	L201	In description change "3 uhys" to "4.5 uh"
8-24	L301	Correct SNSN to read "N16-R-29693-5271"
8-26	O102	Correct SNSN to read "G77-B-999-75008-100"
	O103	Correct SNSN to read "N16-G-432816-277"

PAGE	SYMBOL DESIG.	ACTION
8-27	O201	Correct SNSN to read "N16-B-151921-134"
8-28	O502	In Contractor's Drawing and Part Number Column, change "FRE-2252-12" to "FRA-2522-12"
	O503	Correct SNSN to read "N17-C-98378-2225"
8-29	P301	Correct SNSN to read "N17-C-73487-7175"
	P301B	Delete SNSN. At bottom of page add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A".
8-40	S203	In description change "1 1/2" wd x 1 1/16" d" to "1 5/8" wd x 1 1/16" d".
8-41	T207	In description change "3" h x 1 5/8" sq" to "2 1/2" h x 1 5/8" sq".
8-42	V101	Correct SNSN to read "N16-T-79003"
8-43	V301	Change JAN number to read "5U4WG"
8-44	X1503A	Correct SNSN to read "N17-L-76656-2460"

NOTE: Correct all JAN Type RC20 Resistor dimensions of .468" lg x .429" dia. to read ".406" lg x .175" dia." in accordance with Amendment 3 to JAN-R-11.

TEMPORARY CORRECTION T-5 TO INSTRUCTION BOOK FOR RADIO RECEIVING SET AN/URR-13A NAVSHIPS 91535

Temporary Correction T-5 does not apply to the Instruction Book UNTIL Field Change No. 4 - AN/URR-13A has been accomplished. THEREFORE - DO NOT correct the Instruction Book until the Field Change has been accomplished and tested.

Field Change No. 4 - AN/URR-13A applies to all equipments. Its purpose is to protect the feed-through capacitors in the preselector when the receiver is removed or replaced in its cabinet.

Make the following pen and ink corrections and then insert this Temporary Correction immediately in the front of the Instruction Book (just before Temporary Correction T-4) as a permanent record.

1. Add the following sentence behind the titles of the listed illustrations.

   "(<u>Protective shield on preselector removed.</u>)"

   Add on pages:

   Page 1-3, fig. 1-4 Page 7-3, fig. 7-2 Page 7-12, fig. 7-8
   Page 1-4, fig. 1-5 Page 7-3, fig. 7-3 Page 7-33, fig. 7-15
   Page 3-10, fig. 3-9 Page 7-6, fig. 7-4

2. Add the following on page 8-48:

Symbol Desig.	Name of part & description	Function	SNSN	Contr.dwg. & part no.	All symb. design. involved	Qty.per equipment
None	Top shield	Protection of Preselector (top)	none	Rois 71086-31	none	1
None	Bottom shield	Protection of Preselector (bottom)		Rois 71086-32	none	1

TEMPORARY CORRECTION T-6 TO TECHNICAL MANUAL FOR RADIO RECEIVING SET AN/URR-13A NAVSHIPS 91535

This temporary correction changes the manual to reflect the equipment changes made by Field Change 5-AN/URR-13A. The field change applies to all equipments and its purpose is to (1) replace Blower BL-301 with one which will provide adequate ventilation of the affected equipments and (2) add a connector to the blower motor leads to facilitate removal of the motor from the equipment for servicing and replacement.

Maintenance Support Activities shall make this correction in the technical manual immediately upon receipt. When this change is included in the manual the manual shall cover the equipment as though Field Change 5-AN/URR-13A had been accomplished on the equipment.

Holders of equipment accompanied by technical manuals shall not make this correction in the manual until accomplishment of Field Change 5-AN/URR-13A. This correction does not supersede any other corrections or changes.

Make the following pen and ink corrections. Insert this temporary correction in the technical manual immediately after the front cover and preceding T-5.

Page	Action
iv	Add: 7-20 Blower Motor Assembly BL-301, Exploded View.
2-16	If the second sentence of paragraph 2h(5) has been deleted, the following should be inserted. "It is controlled by the thermostat S-301, which automatically turns on the blower motor assembly whenever the inside ambient temperature reaches 60°C.
6-2	Delete: Quarterly section, Routine Maintenance Check, Table 6-1; add "See T-6 ". Clean air filters monthly instead of quarterly. In shore stations or in a ship which is tied to a pier, the dust content may be high, in which case air filters must be cleaned weekly. Clean with a solution of hot water and dishwashing compound (Fed. Stk. No. GT7930-269-1278). Let filters dry thoroughly. Dip filters 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 1/2 hour.
7-8A & 7-8B	This is a new page provided with this Field Change, and is to be inserted between pages 7-8 & 7-9.
7-9	Delete the following paragraphs: paragraph 6a to and including 6a(1)(c).
7-10	Delete the following paragraphs: paragraph 6a(2) to and including 6b(7).

Page 8-2 Change BL-301 to read as follows:

SYMBOL DESIG-NATION	FEDERAL STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S DESIG.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
BL-301	N4450-289-5961	Blower motor assembly: centrifugal fan type, single unit operating on a common shaft; direct drive connection; consists of one BL-301A, one BL-301B and one BL-301C.	Cabinet cooling		BL-301	1
BL-301A	N6105-643-1105	Motor, Alternating Current: Squirrel cage induction type, capacitor starting, permanent split-capacitor type; 115V, 60 cycle, single phase, 0.12 amp full load rating, 0.8 power factor; 0.0036hp. 3200 rpm; single take-off shaft, CCW rotation looking at load end; closed frame; 40 deg C rise for continuous operation; flatted shaft, 0.25 in. dia.; overall dim.; 2.6401 in. lg.-excl shaft, 2 in. dia.; shaft extends 1.0625 in. from end of enclosure; hole mtd W/3 6-32 tapped mtg holes spaced 120 deg apart on 1.281 in. dia.	p/o BL-301	AIRM A15B-23	BL-301A	1
BL-301B	Low failure item. If req. requisition from ESO ref. NAVSHIPS 900, 180A.	Impeller, Fan. Centrifugal; Double inlet wheet; multi-blade type; forward curved blades; steel; single W/28 blades; overall dim. 2 1/2 in dia., 1 15/32 in. wide.	p/o BL-301	Torrington 216x115	BL-301B	1
BL-301C	Low failure item. If req. requisition from ESO ref. NAVSHIPS 900, 180A.	Housing, for impeller, fan, centrifugal; welded structure which contains BL-301B, mounts BL-301A, and serves as mtg bracket for mounting complete BL-301 to chassis; overall dim. 4 11/16 in. wide, 5 3/8 in. high, 2 9/16 in. thick, W/ 1 1 1/2 in. sq. outlet W/ deflector; type no. 6, Ref Dwg Gr. 71.	p/o BL-301		BL-301C	1

Page 8-48 Add J-301 and P-302

SYMBOL DESIG-NATION	FEDERAL STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFGR. AND MFGR'S. DESIG.	ALL SYMBOL DESIG. INVOLVED	NO. OF TIMES IN UNIT
J302	N5935-642-695	CONNECTOR, RECEPTACLE, ELECTRICAL: 4 contacts; 1 connector mating end; cont. data, Ref. DWG. GR. 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	J302	1
P-302	N5935-296-7714	CONNECTOR, PLUG, ELECTRICAL: 4 contacts; 1 connector mating end; contact data, ref. dwg. gr. 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; overall 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	WIN M4P-LSHIDC	P302	1
P302A	For ref. only	CONNECTOR, PLUG, ELECTRICAL: plug portion of P302; over-all dim. 3/4 in. lg. x 11/16 in. dia. one end 3/8 -24 thd for hood P302B; p/o P302.		WIN M4P-LS	P302A	1
P302B	For ref. only	SHIELD, ELECTRICAL CONNECTOR: over-all dim. incl cable clamp, 7/8 in. lg x 9/16 in. dia. p/o P302.		WIN H10C	P302B	1

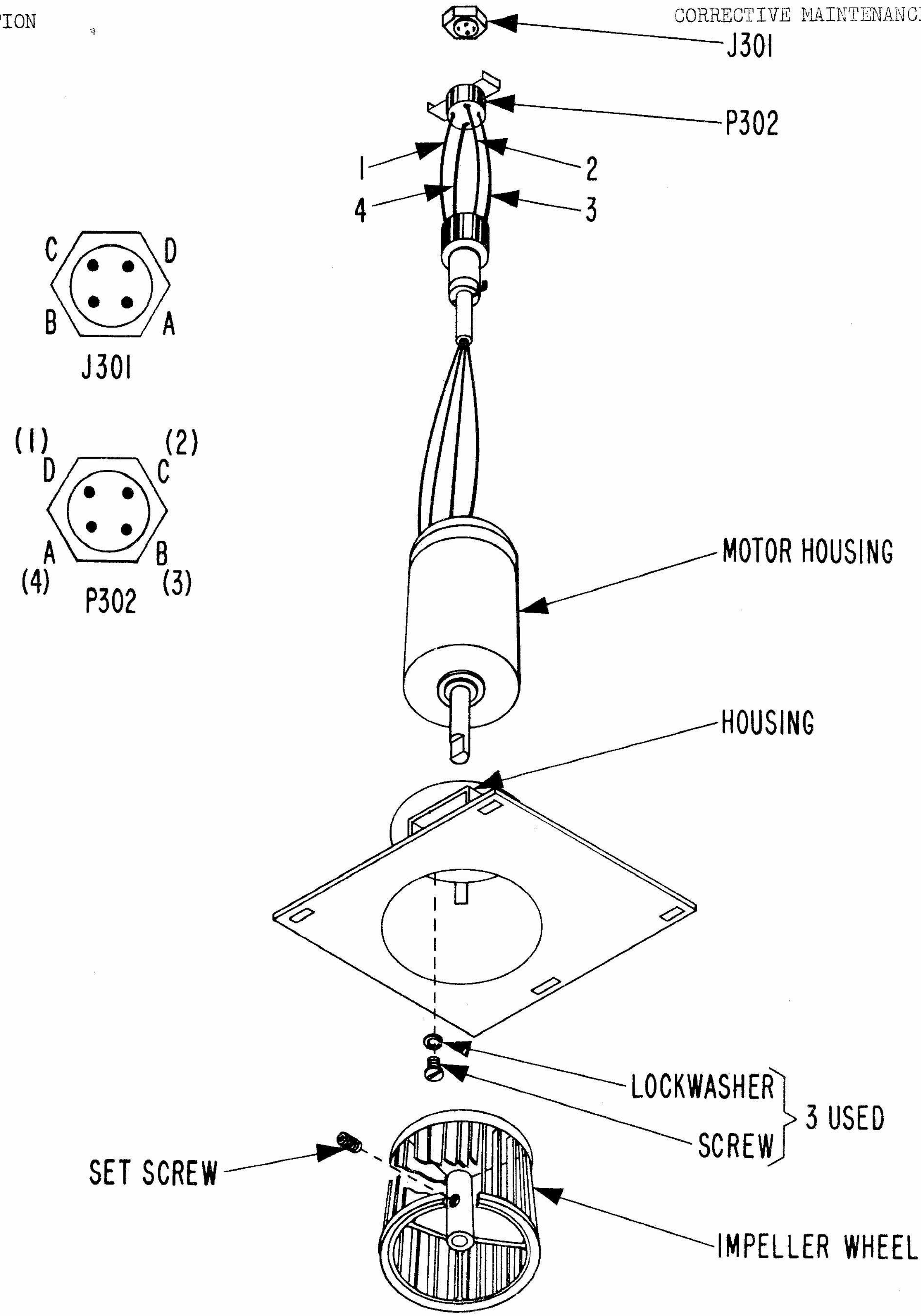


Figure 7-20 BLOWER MOTOR ASSEMBLY - BL 301, Exploded View

The material on this page is to replace the indicated paragraphs in the following technical manual:

AN/URR-13A - NAVSHIPS 91535 - Section 7, paragraph 6a and 6b.

Blower motor assembly BL-301. - Blower motor assembly BL-301 is located in the right rear corner of the chassis. Its removal is simple and should be undertaken as follows:

(1) Remove the receiver chassis from its cabinet and place on the work bench with the right side toward the technician. In this position the blower motor assembly will face the technician.

(2) Unplug connector P-302 (motor lead plug) from jack J-301 in the chassis.

(3) Remove the four 8-32 x 3/8 in. binding head screws, lockwashers, and nuts permitting removal of the entire blower motor assembly.

(4) To replace the blower motor assembly follow steps (1) to (3) in reverse order.

Blower Capacitor C-304. - The blower capacitor is located underneath the blower motor assembly in the right rear corner of the chassis, and is attached to the chassis by means of a right angle mounting bracket. If the capacitor C-304 has to be replaced proceed as follows:

(1) Remove blower motor assembly from the chassis.

(2) Unsolder the wires from the two terminals of capacitor C-304.

(3) Remove the nuts from the two mounting studs on capacitor C-304.

(4) Slip out capacitor C-304.

(5) To install a new capacitor, follow steps (1) to (4) in reverse order. Making sure that the leads to C-304 are connected to their proper terminals.

BLOWER MOTOR BEARINGS- The equipments covered by these instruction books may have any one of three completely interchangeable types of blower motors all designated BL-301A. However, while the complete blower motors are interchangeable, the bearings in each motor are not. The following procedure shall be followed when bearing failure occurs, this procedure is applicable to all three types of blower motors. Refer to figure 7-20 entitled "Blower Motor Assembly BL-301, Exploded View", in technical manual for AN/URR-13A.

(1) Remove blower motor assembly BL-301 from the receiver chassis.

(2) Remove the blower motor BL-301A from the assembly, first disconnecting connector P-302.

(3) Replace defective motor with a new motor BL-301A.

(4) Mount new motor on the assembly, and connect connector P-302 to jack J-301 on the chassis.

(5) Mount the complete assembly to the receiver chassis.

(6) Replace the receiver chassis in its proper cabinet.