AFSD-69-1354-G

NAVSHIPS 91771

# INSTRUCTION BOOK

*for*

# RADIO RECEIVING SET AN/URR-27

CONSISTING OF

RADIO RECEIVER R-516/URR-27
AND ACCESSORIES

NATIONAL COMPANY, INC.
MALDEN 48, MASSACHUSETTS

BUREAU OF SHIPS NAVY DEPARTMENT

*Contract NObsr 52699* *Approved by BuShips: 25 September 1952*

# LIST OF EFFECTIVE PAGES

| PAGE NUMBERS | CHANGE IN EFFECT | PAGE NUMBERS | CHANGE IN EFFECT |
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DEPARTMENT OF THE NAVY
BUREAU OF SHIPS
WASHINGTON 25, D. C.

IN REPLY REFER TO
Code 993-100
25 September 1953

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

Subj: Instruction Book for Radio Receiving Set, AN.URR-27 NAVSHIPS 91771

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

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 When superseded by a later edition, this publication shall be destroyed.

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

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

W. D. LEGGETT, JR.
Chief of Bureau

# RECORD OF CORRECTIONS MADE

| CHANGE NO. | DATE | SIGNATURE OF OFFICER MAKING CORRECTION |
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# GUARANTY

**Contract NObsr-52699**

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

# INSTALLATION RECORD

Contract Number NObsr-52699 Date of Contract 28 June 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 NAVSHIP 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.

# DESTRUCTION OF ABANDONED MATERIAL IN THE COMBAT ZONE

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

*Means:*

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

*Procedure:*

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

**DESTROY EVERYTHING!**

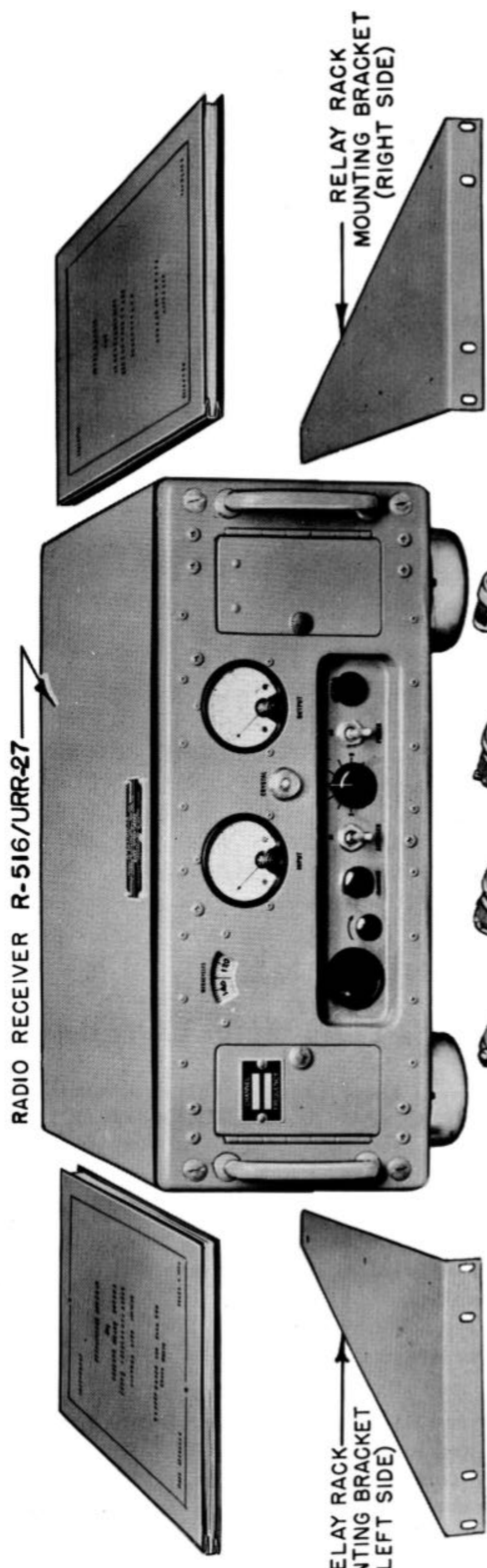



*Figure 1-1. Radio Receiving Set AN/URR-27 Complete, Including Radio Receiver R-516/URR-27, Brackets, Plugs and Instruction Books*

# SECTION 1
# GENERAL DESCRIPTION

## 1. INTRODUCTION.

This instruction book describes the circuit theory, installation, operation and maintenance of Radio Receiving Set AN/URR-27.

## 2. DESCRIPTION.

*a.* PURPOSE.—Radio Receiving Set AN/URR-27 is designed to provide means for reception of amplitude modulated (AM) voice and MCW transmission in the 105-190 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-27 is a VHF 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 adaptor to provide a visual picture of the received signal. The scanning channel has a band width of 600 kc, flat to within 6db.

The receiver has a sensitivity of better than 5 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-27 is shown complete in figure 1-1. It consists of the receiver proper (Radio Receiver R-516/URR-27, 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 and two copies of the instruction book. The receiver proper consists of a front 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 and removing shock mounts) 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) 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 location 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.

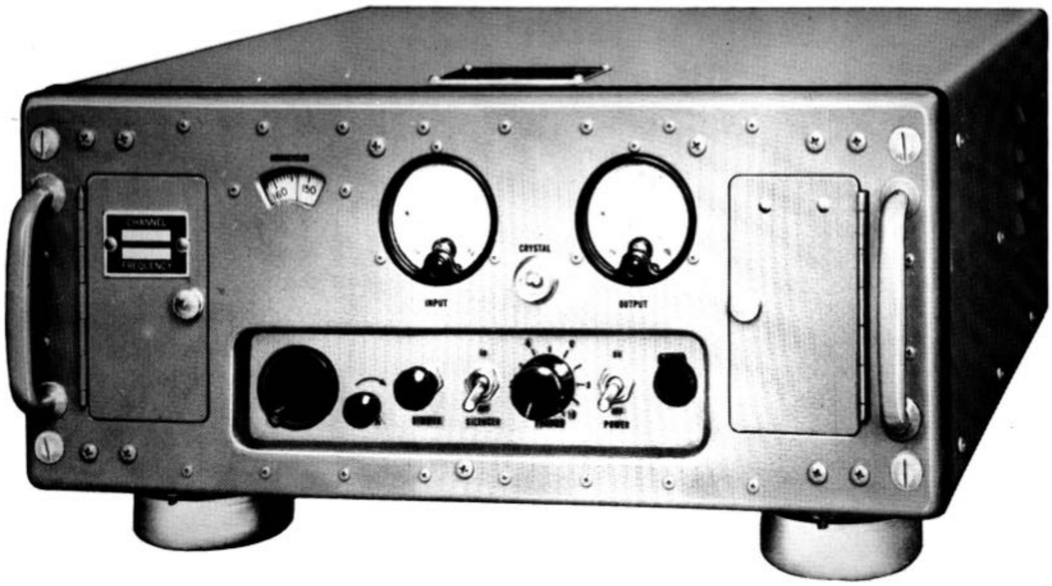


Figure 1-2. Front View, Shock Mounts Attached, Relay Rack Mounting Brackets Removed

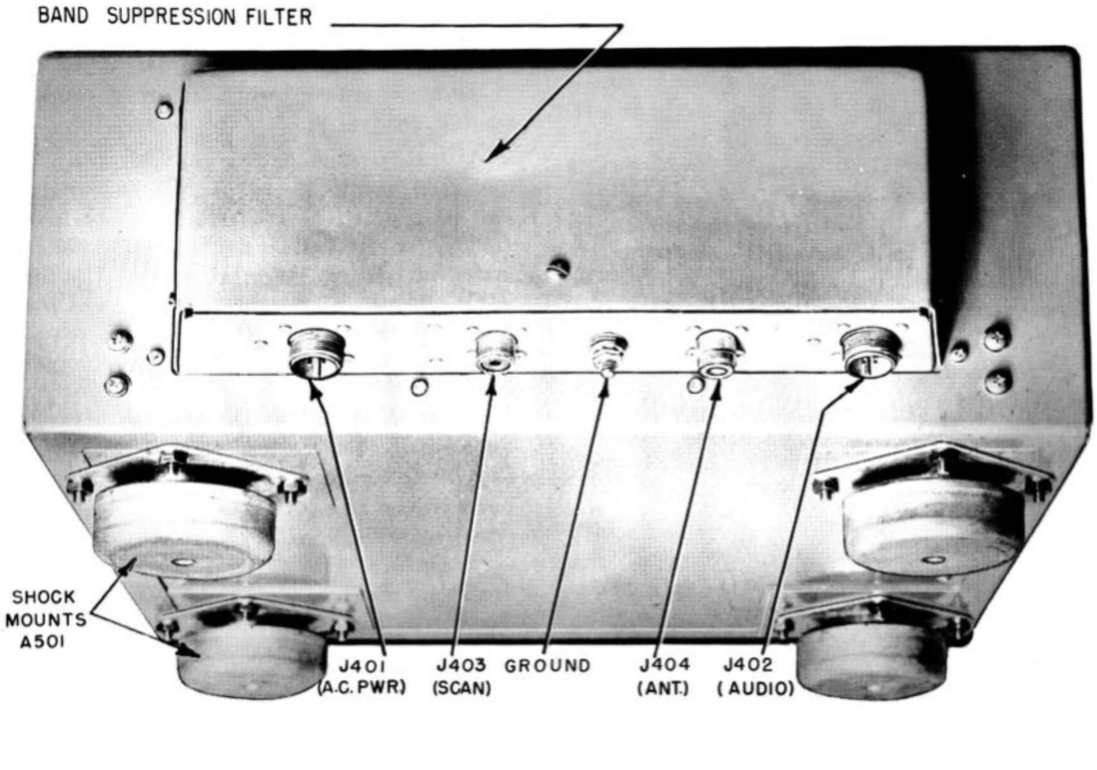



Figure 1-3. Rear View (from below) Showing A.C. POWER, SCAN, ANT, and AUDIO Connectors on Underside of Band Suppression Filter

## TABLE 1-1. EQUIPMENT SUPPLIED.

| Quan. Per Equip. | Name of Unit | Designation | Overall Dimensions* | | | Volume * | Weight * |
|---|---|---|---|---|---|---|---|
| | | | Height | Width | Depth | | |
| 1 | Radio Receiver, including: | R-516/URR-27 | 8-7/16 | 17-1/2 | 19-1/8 | 2817 | 57 |
| | 1 set (4 pc) plugs for external cords (packed in cloth bag) and | (See table 3-2) | — | — | — | — | 4 oz. |
| | 1 pair relay rack mounting brackets | (See figure 3-7) | 7 | 1-1/8 | 12 | — | 1 lb., 5 oz. |
| 2 | Instruction books | Navships 91771 | 11 | 8-1/2 | 3/4 | 68 | 3 |
| 2 | Operator's handbook | Navships 91771.2 | | | | | (Est.) |
| 1 | Maintenance parts catalog | Navships 91771.4 | | | | | |
| 1 | Repair parts box | (See fig. 3-8) | 6-1/8 | 19 | 10 | 1164 | 15 } 23 |
| 1 | Set equipment repair parts | (See parts list table 8-4) | | | | | 8 } |

* 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 | | Signal pick-up | 1/4-wave, broad band; to cover 105-190 mc frequency range; 50-ohm terminal impedance |
| As Required | Antenna transmission line | | Antenna to receiver connection | 50-ohm surge impedance; coaxial |
| 1 each Channel | Crystal units | Jan type CR-24/U | Crystal control of tuning | $f_{xtal} = \frac{\text{channel freq.} + 18.6\text{mc}}{6}$ |
| 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 49016 | Listening | 600 ohms impedance |
| 1 | Loud-speaker or other audio responsive device | LS-195/G or similar | 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-27 | 15-1/2 | 35-1/2 | 23-1/4 | 12,793 | 166-1/4 (Est.) |

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

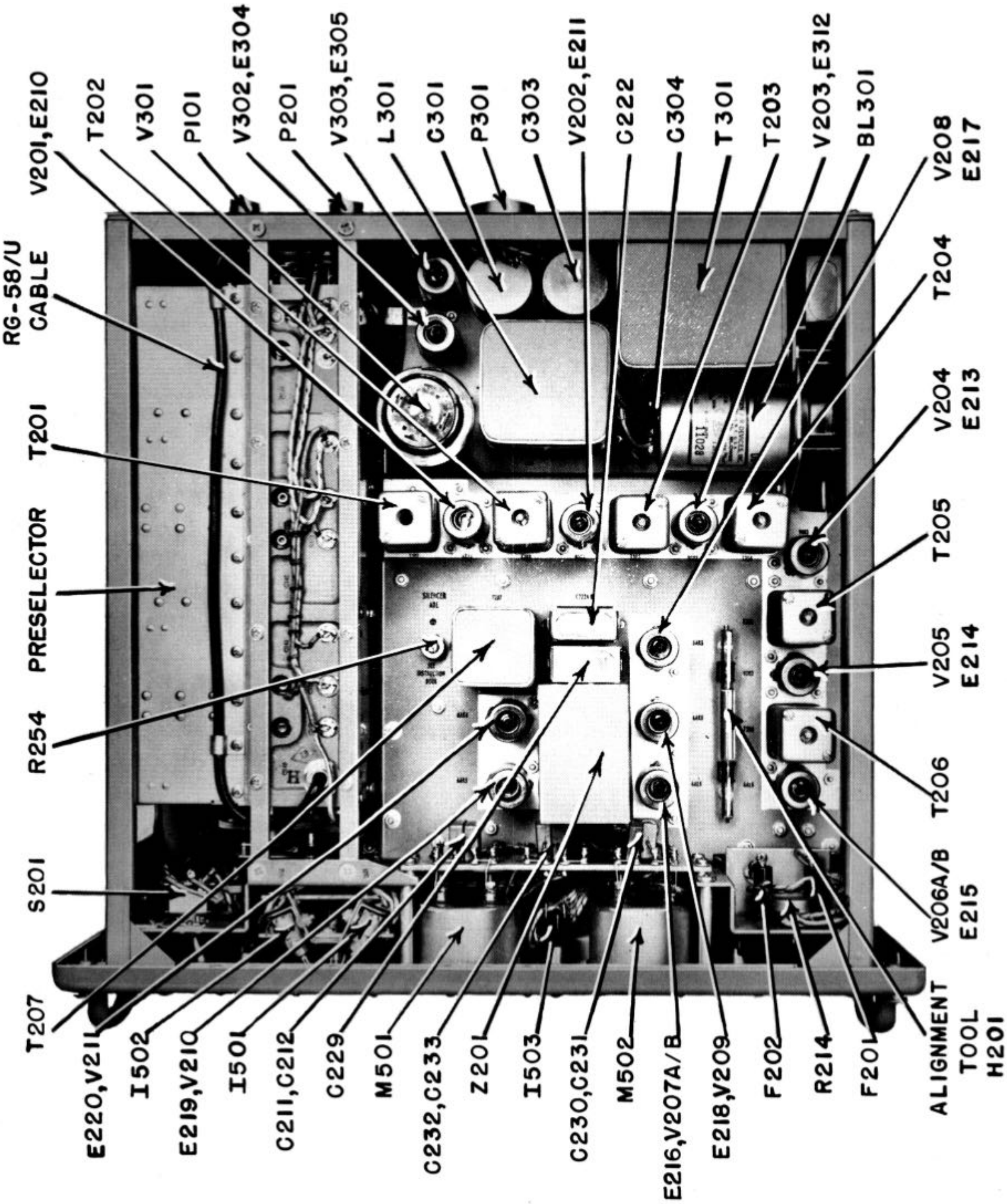



*Figure 1-4. Top View of Chassis*

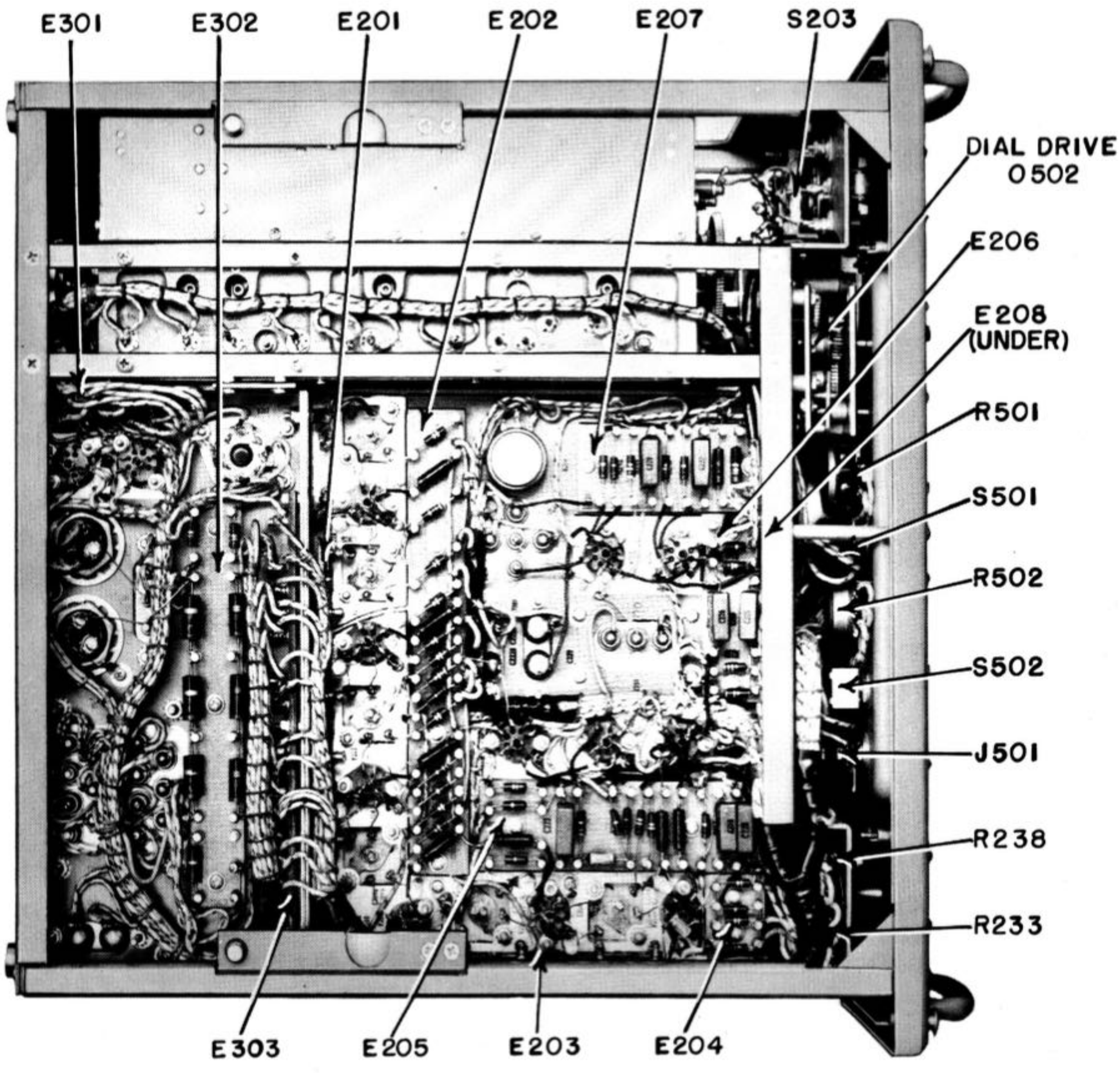



*Figure 1-5. Bottom View of Chassis*

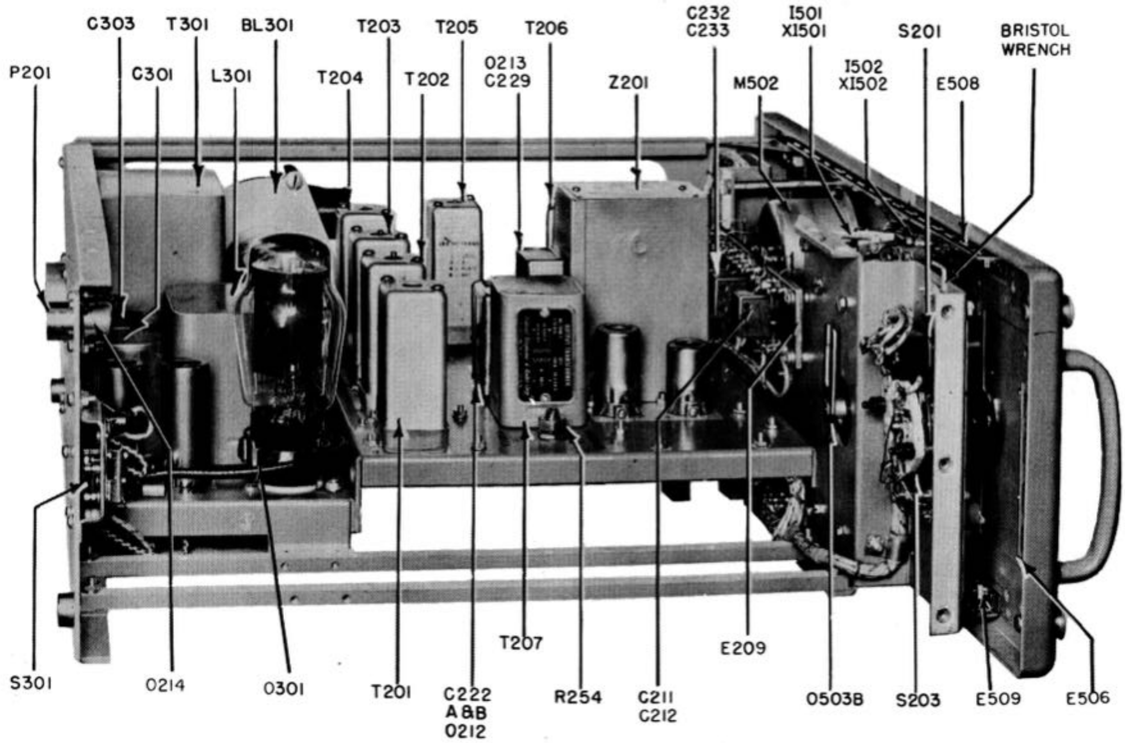



***Figure 1-6. Chassis with Preselector Removed; Left Side View***

## 3. DESCRIPTION OF MAJOR SUB-ASSEMBLIES.

*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. — 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, one frequency-doubler stage, a buffer amplifier stage and a frequency-tripler stage are mounted in the oscillator-multiplier section. Partitions in the castings provide r-f shielding between stages.

TABLE 1-4. ELECTRON TUBE COMPLEMENT.

| Circuit | Circuit Symbols | Quantities of Tubes Used | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 9003 | 6J6W | GL-5670 | 6AK5W | 6BA6 | 6AL5W | 6AK6 | 5U4G | OB2 | OA2 | 5654 |
| **PRESELECTOR** | | | | | | | | | | | | |
| 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 | | 1/2 | | | | | | | | | |
| Mixer | V105B | | 1/2 | | | | | | | | | |
| Oscillator | V106A | | | 1/2 | | | | | | | | |
| Doubler | V106B | | | 1/2 | | | | | | | | |
| Buffer | V107 | | | | | | | | | | | 1 |
| 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 | | | | | | 1/2 | | | | | |
| AVC Diode | V206B | | | | | | 1/2 | | | | | |
| Noise Limiter Diode | V207A | | | | | | 1/2 | | | | | |
| Silencer Diode | V207B | | | | | | 1/2 | | | | | |
| 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 | |

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 the multiplier sections, consist of two inductors in parallel. The adjustable trimmer inductances consist of a 2½ turn coil wound on a ceramic form and mounted on two parallel rods. The other r-f coils are center tapped to provide a balanced circuit. These coils are wound on ceramic forms and mounted below the tuning capacitor. 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, the buffer amplifier stage and multiplier stages are similar in construction. The oscillator coil is of ceramic construction to provide a high degree of stability with temperature variations. The multiplier coils are space-wound solenoids on mica-filled phenolic 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

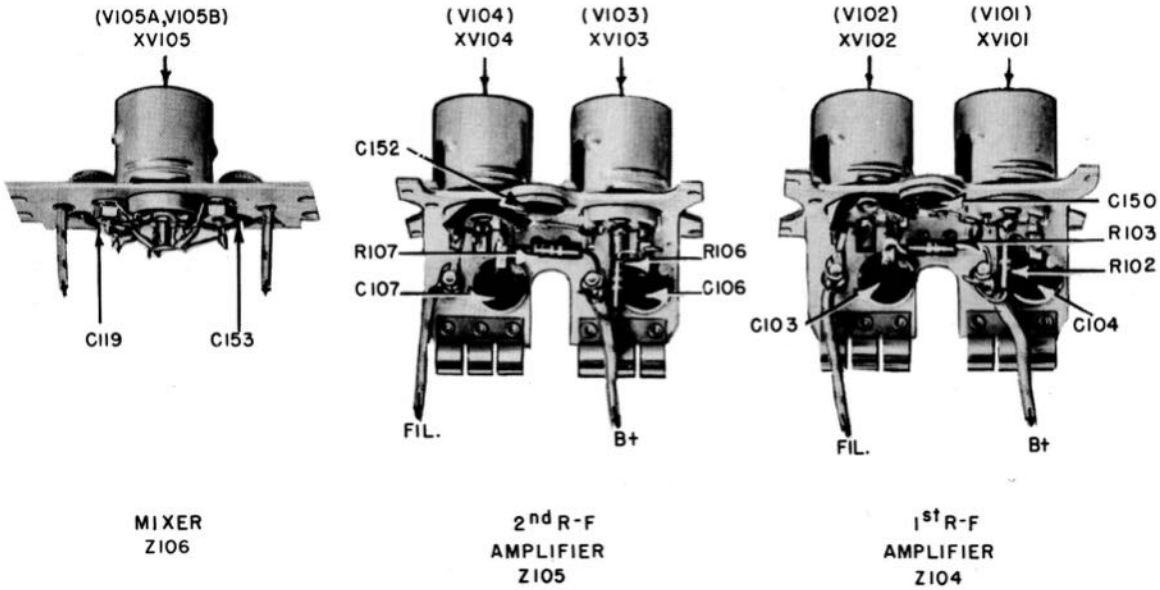



*Figure 1-7. Socket Plate and Shield Assemblies from R-F Amplifier Section of Preselector*

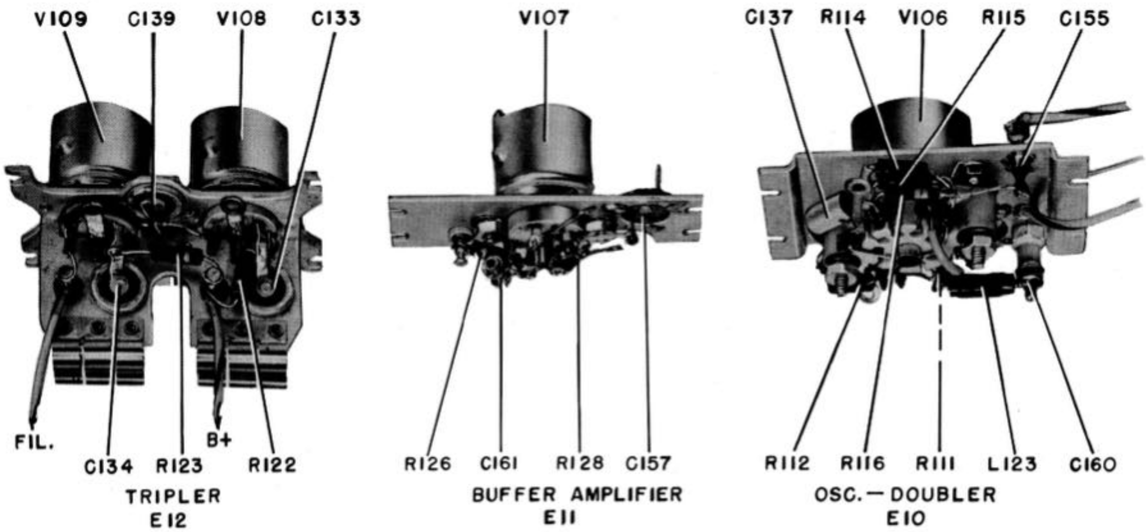



*Figure 1-8. Socket Plate and Shield Assemblies from Oscillator-Multiplier Section of Preselector*

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 105-190 megacycle frequency band of the receiver.

The main tuning indicator dial is 2⅝" in diameter and is calibrated directly in megacycles. Markings appear at each ½-megacycle division, with each 10th marking indexed, and each 20th 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.

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 2-14, 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-P04), 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.

* Band Suppression

## 4. ASSOCIATED EQUIPMENT.

The components and parts described below are not supplied with the receiver but is required to complete the installation of a type AN/URR-27 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 105-190 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 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 50 ohms is required for connection between the antenna and the receiver. The applicable installation drawings indicate the type to be used for this purpose.

*c.* 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 kilocycyes. If scanning equipment is used, a 50-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-27, and none is required for its satisfactory operation as a receiver.

*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.

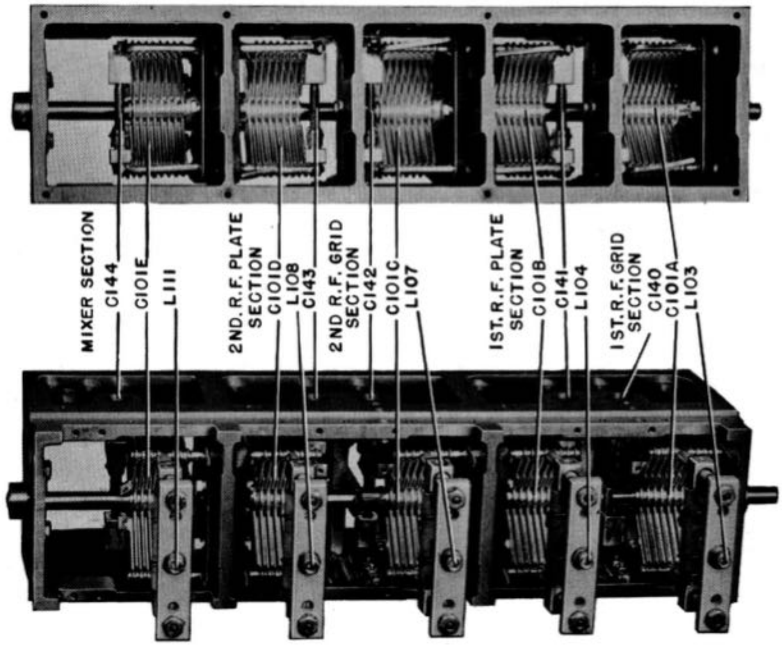



**Figure 1-10. Ganged Capacitor (C101) from R-F Amplifier Section of Preselector**

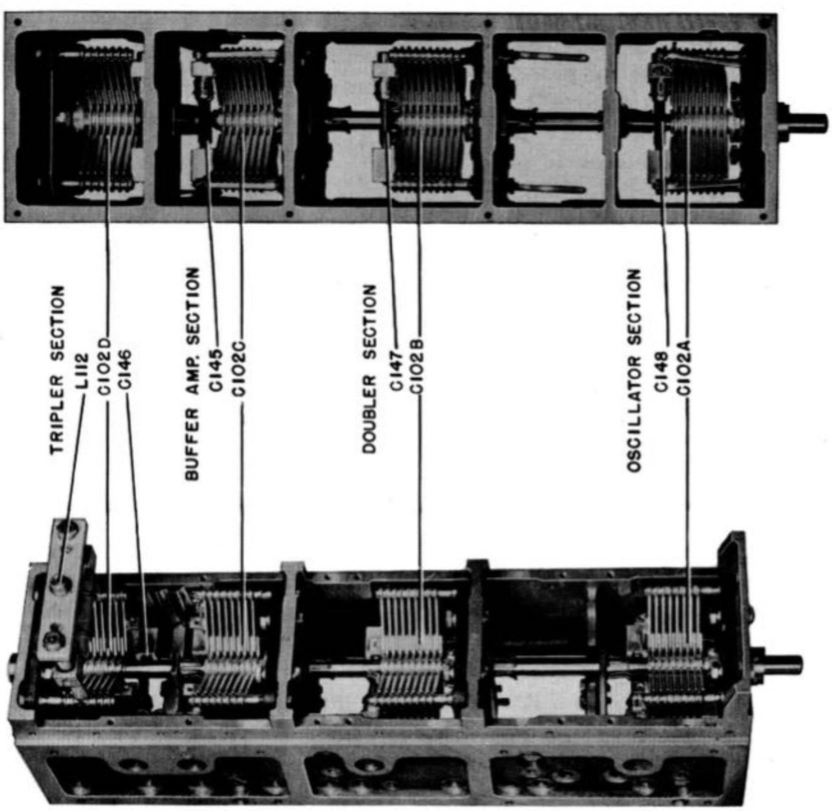



**Figure 1-9. Ganged Capacitor (C102) from Oscillator-Multiplier Section of Preselector**

*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-27 are given below:

(1) Nomenclature — Radio Receiving Set AN/URR-27.

(2) Contract Number—NObsr-52699.

(3) Date of Contract—28 June 1951.

(4) Contractor—National Company, Inc., Malden, Massachusetts, U.S.A.

(5) Cognizant Naval Inspector—Inspector of Naval Material, Boston 10, Massachusetts.

(6) Number of Packages—Complete equipment including equipment repair parts in one wood shipping case. (See figure 3-1).

(7) Total Cubical Contents (crated)—12,793 cu. ins.

(8) Total Cubical Contents (uncrated)—2817 cu. ins.

(9) Total weight (crated)—166 lbs.

(10) Total Weight (uncrated)—57 lbs.

*b.* ELECTRICAL CHARACTERISTICS.—The following is a summary of the electrical characteristics of Radio Receiving Set AN/URR-27.

(1) Frequency Range—Rated: 105-190 mc; max.: 103.95-191.9 mc.

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

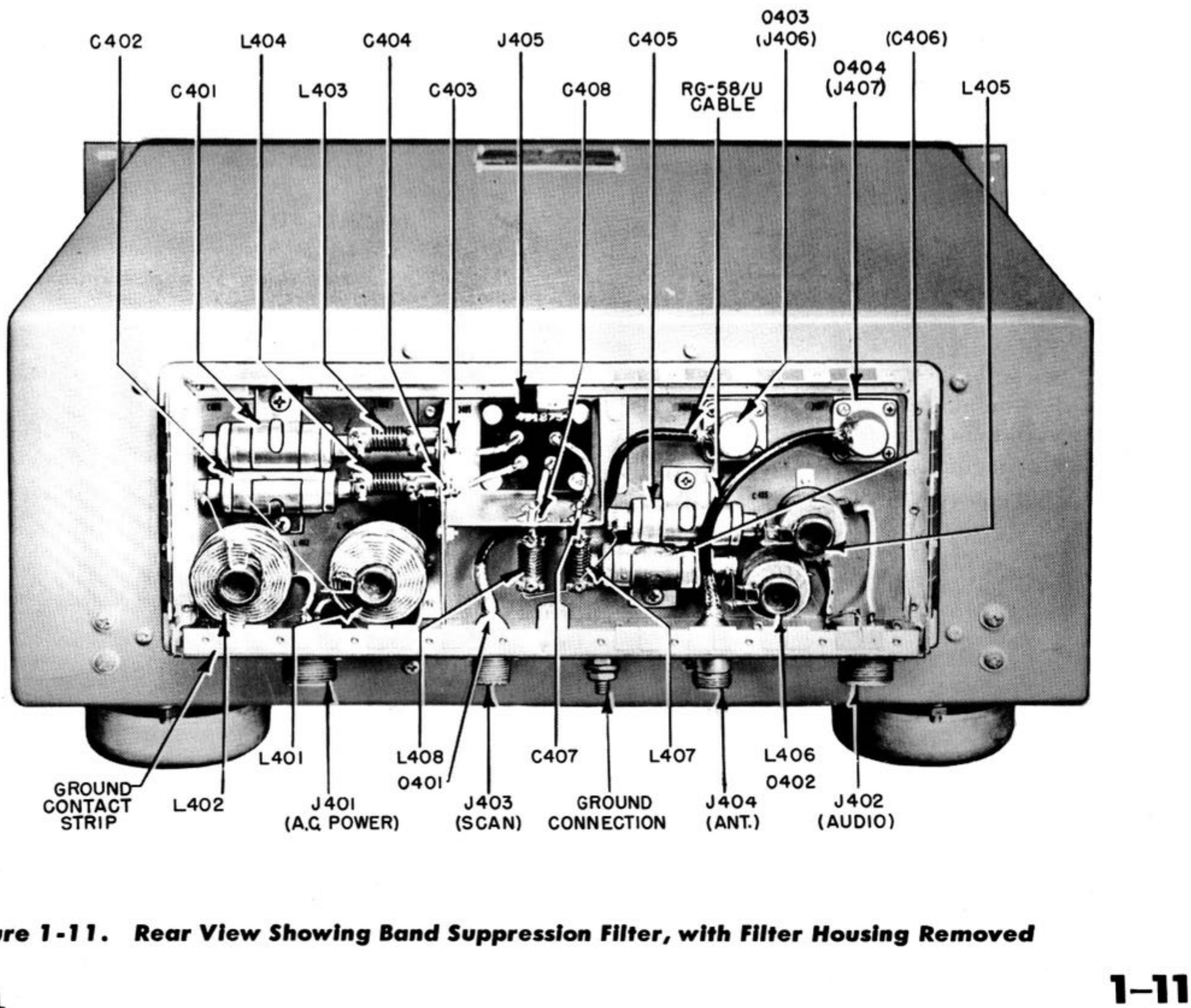



***Figure 1-11. Rear View Showing Band Suppression Filter, with Filter Housing Removed***

(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 10 $\mu$v max.

(8) Type of Reception—Amplitude modulated signals, primarily voice.

(9) Overall stability of receiver for any selected channel in the 105-190 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% | ±0.15% |
| For humidity variation | ±0.009% | |

(10) Crystals—

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

(*b*) Oscillating Frequency—Crystal frequencies from 20.6 to 34.766 mc cover 105-190 mc tuning range of receiver with total multiplication of 6.

(*c*) Heterodyne Frequency Range—For 105-190 mc reception: 123.6 to 208.6 mc. For 103.95-191.9 reception: 122.55 to 210.5 mc.

(11) Silencer Circuit Characteristics:

(*a*) Effective Silencing Range—Up to minimum of 15000 micro-volts R.F. 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 seconds.

(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 out-put 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 50-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 amps.; maximum, 1.04 amps.

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

# SECTION 2
# THEORY OF OPERATION

## 1. GENERAL PRINCIPLES.

Radio Receiver R-516/URR-27 is of the superheterodyne type, designed for either manual tuning or crystal-controlled operation over a frequency range of 105 to 190 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 2b (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 two stages of frequency multiplication and a buffer amplifier. The oscillator functions as 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 preselector sub-assembly.

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.

(1) R-F AMPLIFIER SECTION (figure 2-2).

(*a*) ANTENNA INPUT. The antenna input circuit of Radio Receiver, having a nominal 50-ohm impedance, is to be used with 50-ohm coaxial transmission line. The transmission line connects to the ANT. receptacle (J404), located on the bottom of the Band Suppression Filter, 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 inductance, L101, and is coupled to the input circuit of the first r-f amplifier stage.

Inductance L101 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 circuits of the two r-f amplifier stages and the grid circuit of the mixer stage are arranged in push-pull, and are tuned by means of a balanced type, five-gang capacitor.

Each section of this capacitor consists of a split-stator plate assembly and a rotor plate assembly mounted on a common metal shaft. The 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 through C144) are integral parts of the stators and are connected across the split-stator plates. The tank circuit inductors (L102, L105, L106, L109 and L110) are wire wound inductors mounted on ceramic forms. The adjustable trimmer inductors (figure 7-7) are individually mounted on two parallel, round rods. Positioning of the inductance on the rods varies the total circuit inductance. The concentric-cylinder type trimmer capacitors each consist 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.

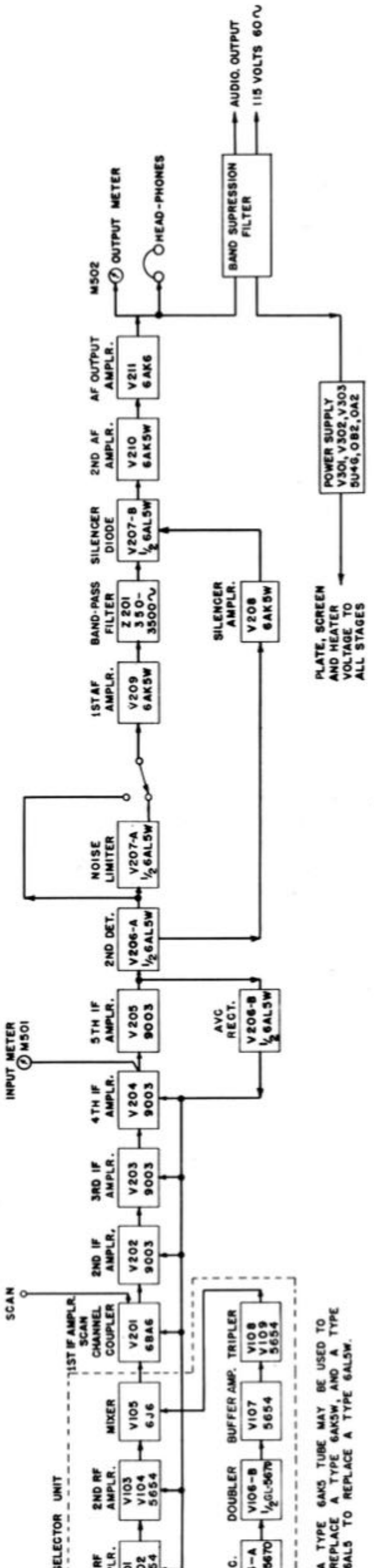



*Figure 2-1.* ***Block Diagram—Radio Receiver***

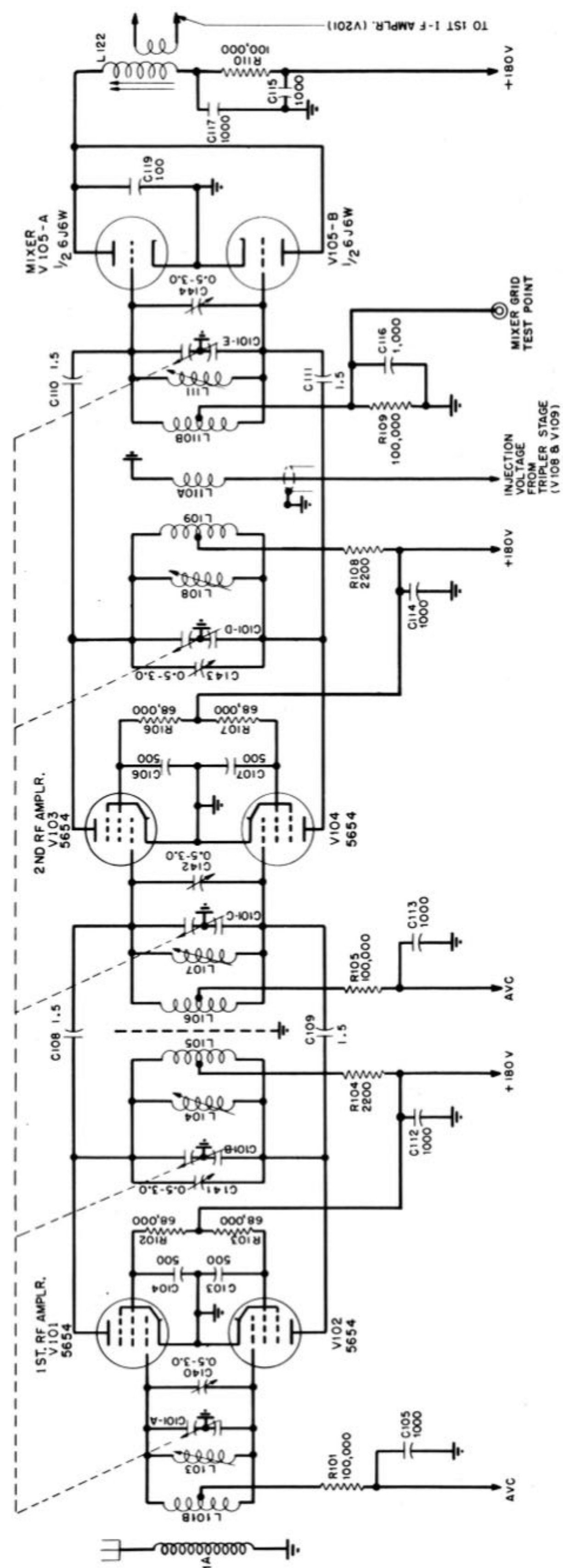



**Figure 2-2. Simplified Schematic—R-f Amplifier Section of Preselector**

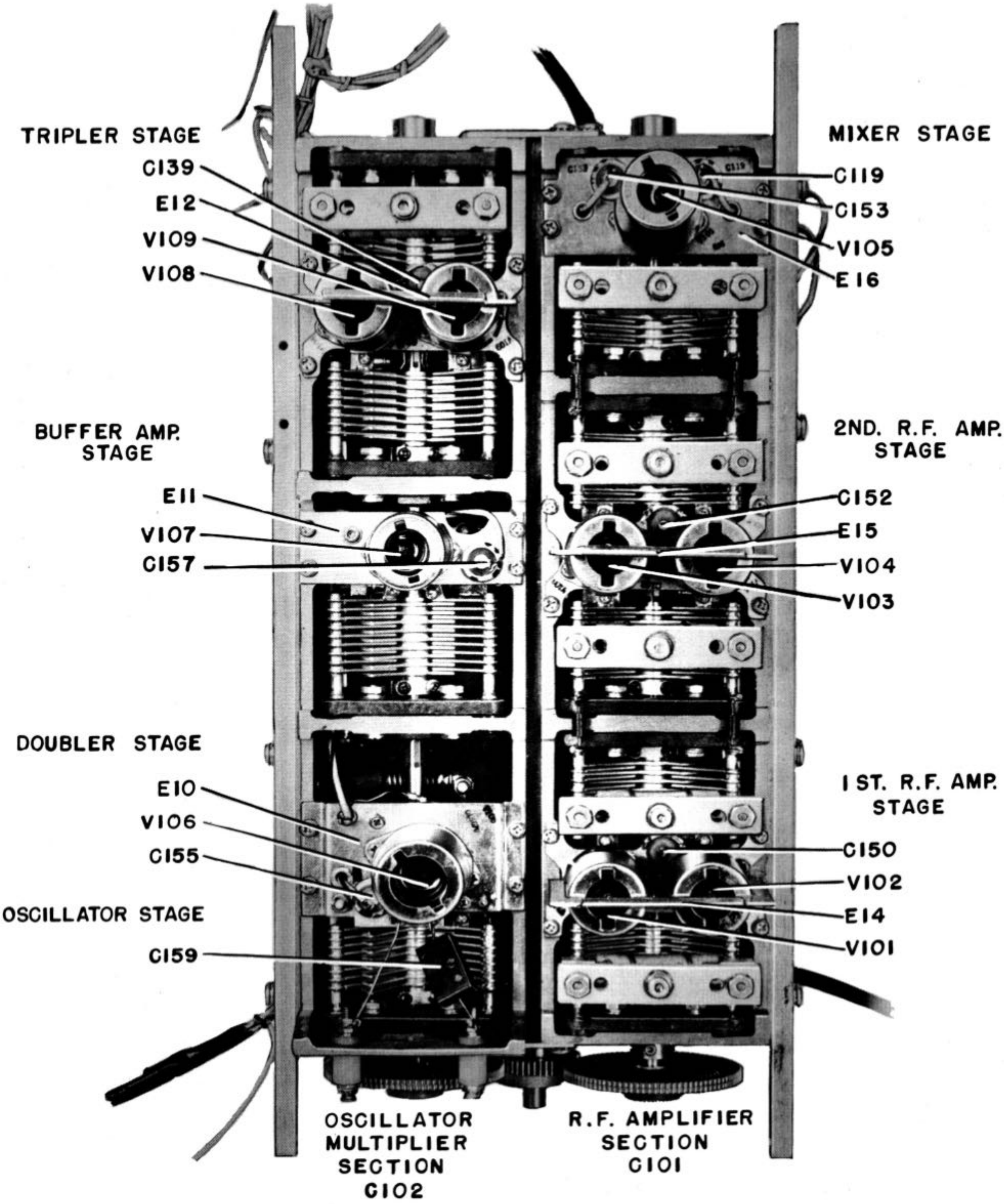



*Figure 2-3. Preselector from Top of Chassis, Shielding Covers Removed*

(*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 C-101, and trimmer capacitor C140. Two type 5654 pentode tubes, V101 and V102, are operated in push-pull. 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 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 10db.

(*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 voltage is brought through resistor R108; screen voltage is connected from the junction of C114, 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 or L110, since L109 is isolated from the mixer grid circuit by the preselector casting wall. The r-f gain of the stage is approximately 10db.

(*e*) MIXER. The mixer, or first detector, stage employs a JAN type 6J6W 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 one 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 link coupled to the grid circuit of the mixer through L113A and L110A and a short length of coaxial cable.

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 link winding of 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 the mixer grid test point.

(2) OSCILLATOR-MULTIPLIER SECTION. (figure 2-5.) The oscillator-multiplier section gener-

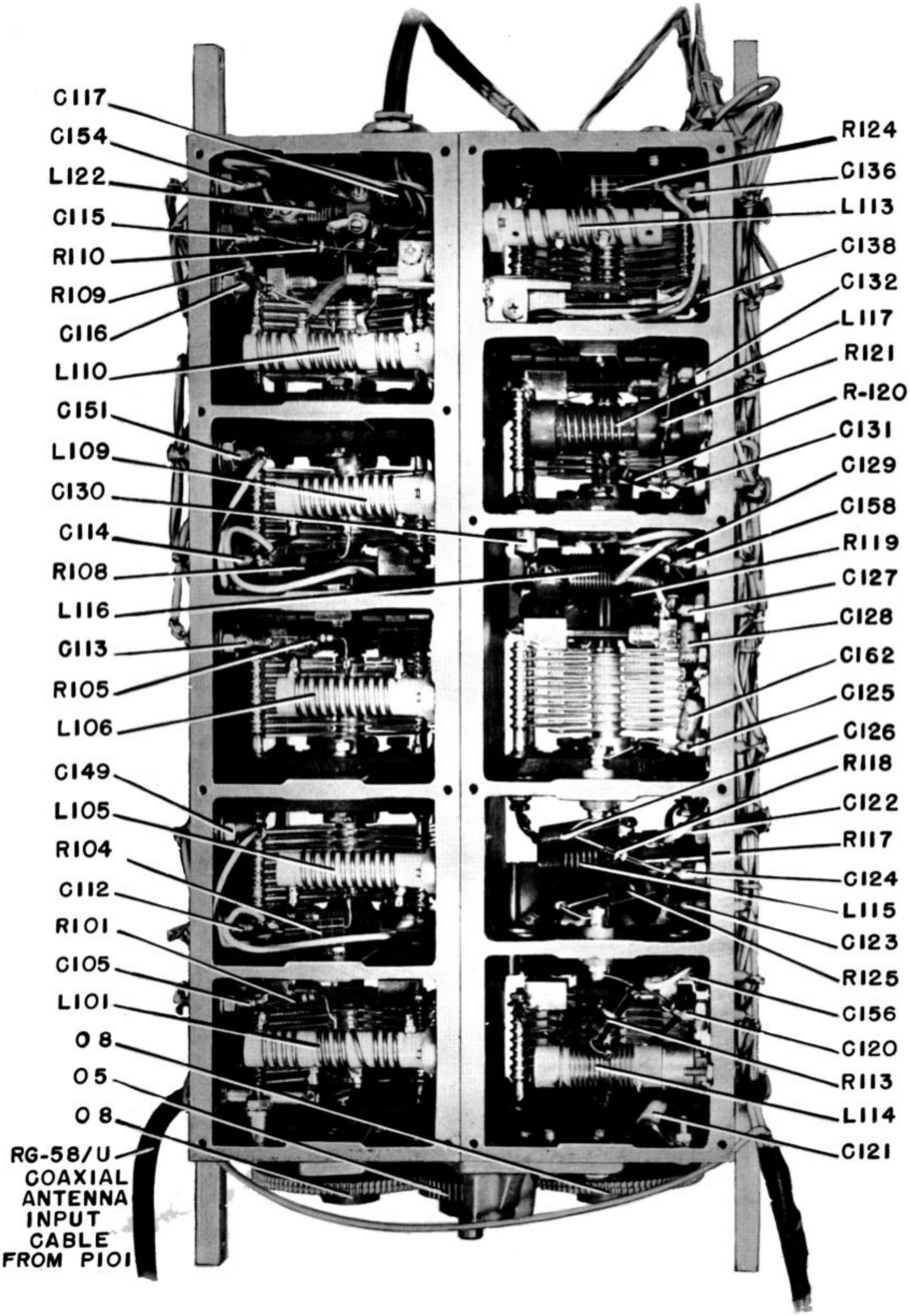



*Figure 2-4. Preselector from Bottom, Shielding Covers Removed*

ates the local injection signal 18.6 mc higher in frequency than the received signal. The basic oscillator frequency is generated in tube V106A and multiplied six times in a doubler and tripler which follow, as shown in the simplified schematic diagram, figure 2-5. A buffer amplifier V107, a type 5654 pentode, is connected between the doubler and tripler stages. 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 intersectional 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 2a (1) (b), this section.

(*a*) OSCILLATOR-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 190 megacycles the resonant frequency of the receiver increases approximately 0.1% when the crystal is removed from the socket; near 105 megacycles the corresponding increase is approximately 0.04%. 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 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.

The output of the type V106-A oscillator tube is coupled to the grid of the 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. Plate 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.

The 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 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*) BUFFER AMPLIFIER. The buffer amplifier stage employs a sharp cut-off pentode V107, a type 5654 in a conventional amplifier circuit. The tuned circuit of V107 consists of the center-tapped secondary winding of 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. Capacitor C162 serves to balance the opposite side of L115 with the input capacity of V107.

The grid is 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 exces-

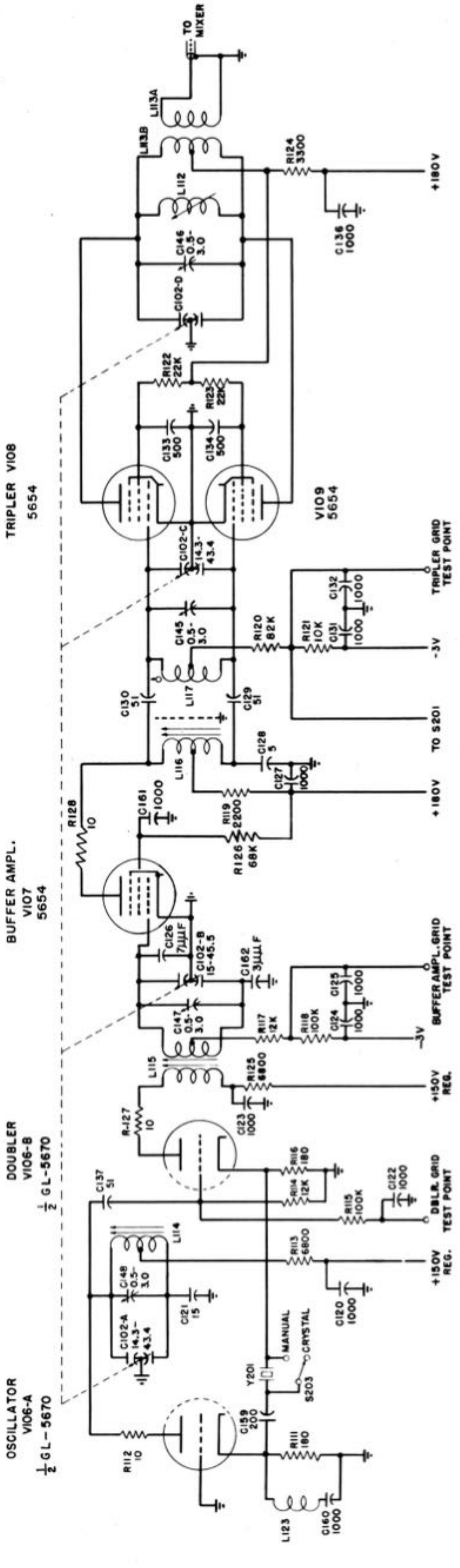



**Figure 2-5. Simplified Schematic—Oscillator-Multiplier Section of Preselector**

sive 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 a means of measuring the amplifier grid-leak bias, thus indicating the relative amount of drive from the doubler stage.

Untuned coil L116 constitutes the plate load of V107. 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 amplifier tube 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 r-f by-pass capacitor. The output of the buffer amplifier stage V107 is coupled to the grid circuit of the tripler stage V108 and V109 by means of capacitor C129 and C130. No appreciable inductive coupling exists between L116 and L117, since the two coils are isolated by the preselector casting.

(*c*) TRIPLER. The tripler stage employs two type 5654 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 2nd 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 r-f 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 2e 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 C102D and C146. Plate voltage is applied through resistor R124 to the center tap of L113. Screen voltage is obtained at the junction of R124, C136 and applied through 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 L113A on the oscillator-multiplier chassis, and through coil L110A on the r-f converter chassis, to the grid circuit of the mixer stage, as described in paragraph 2a(1)(e).

*b.* IF/AF AMPLIFIER.

(1) 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.

(a) FIRST I-F AND SCAN CHANNEL AMPLIFIER (figure 2-7). 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 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), 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 band-width 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.

(b) 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

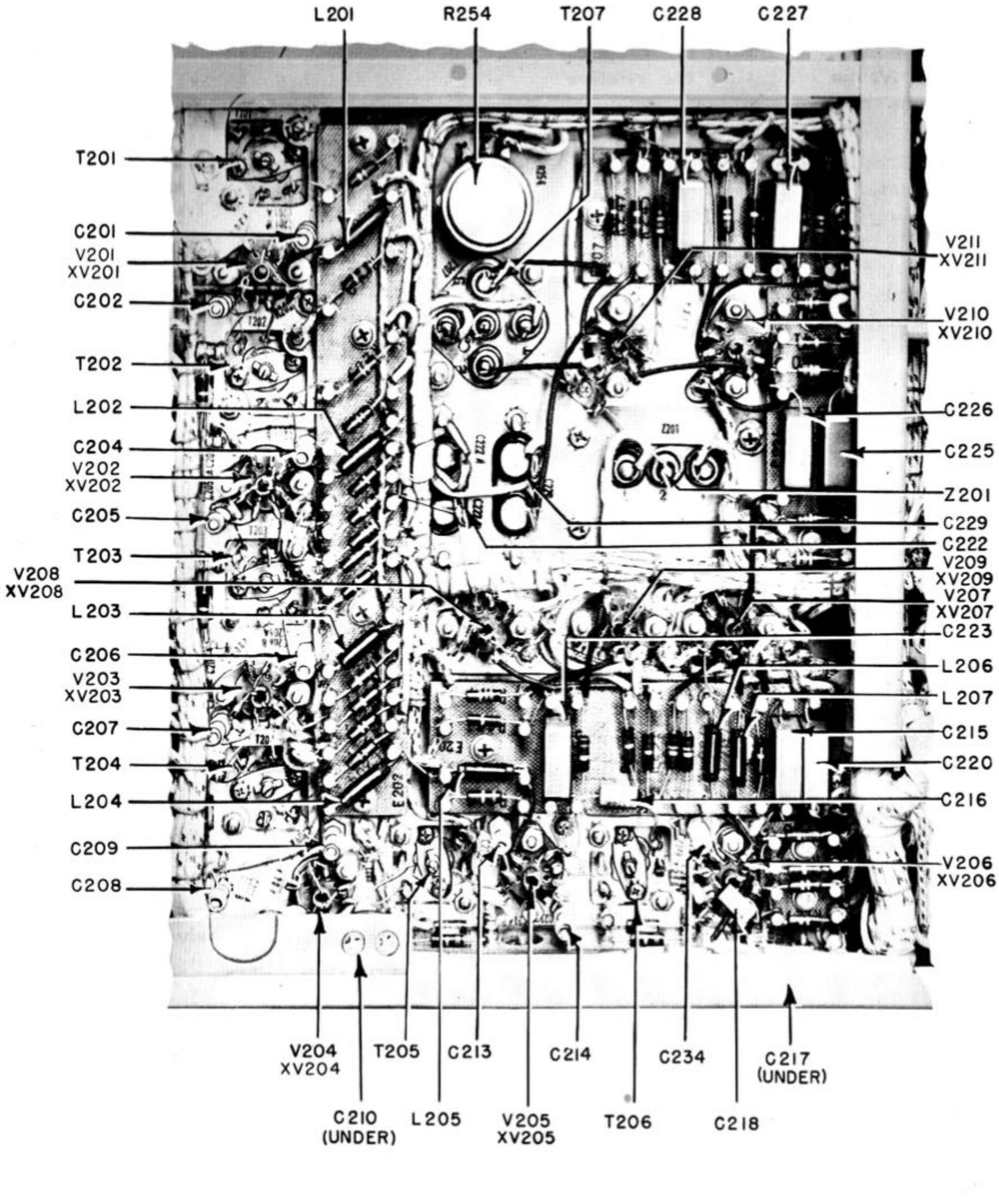



**Figure 2-6A. Underside of IF/AF Section (All Parts but Resistors Identified)**

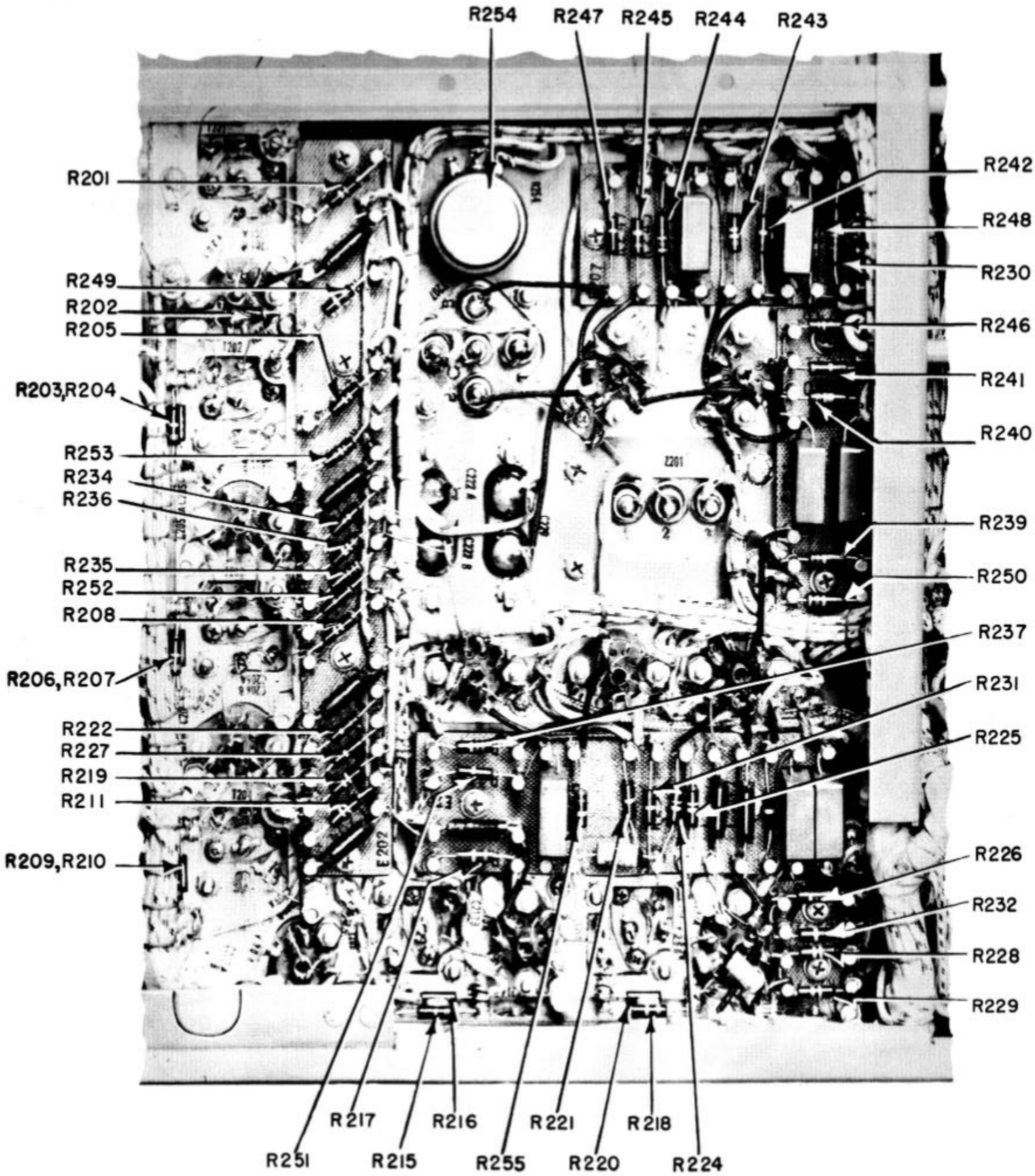



**Figure 2-6B. Underside of IF/AF Section (Only Resistors Identified)**

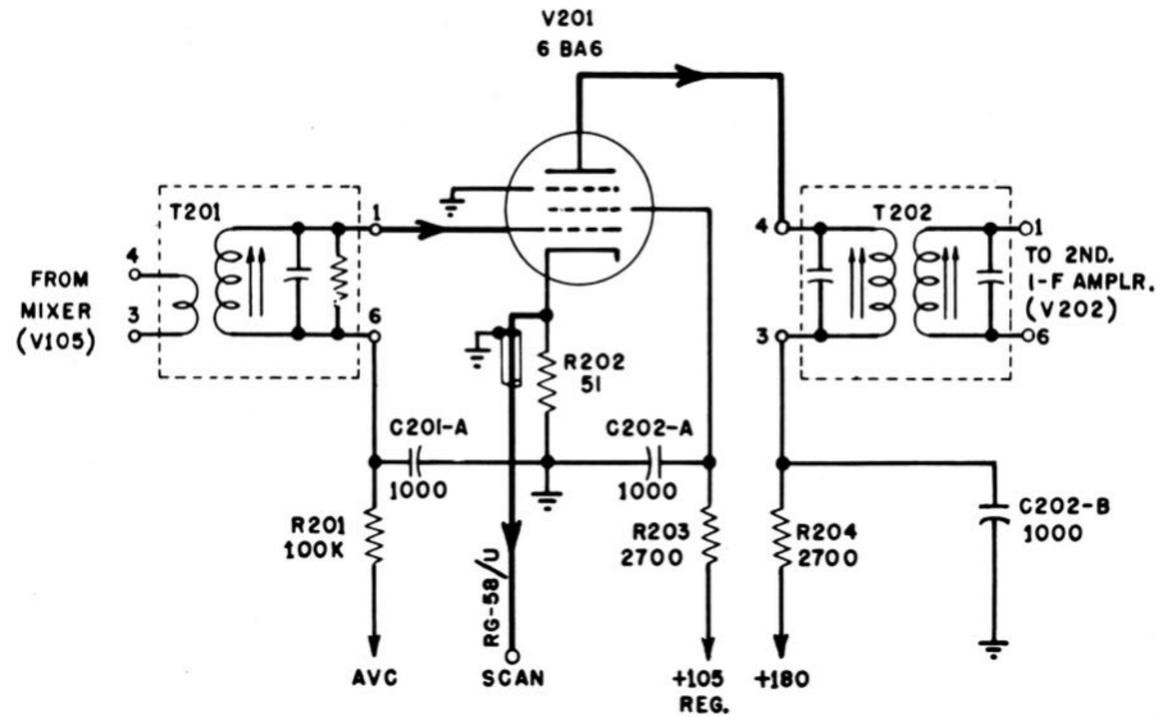



*Figure 2-7. Simplified Schematic—First I-f and Scan Channel Amplifier*

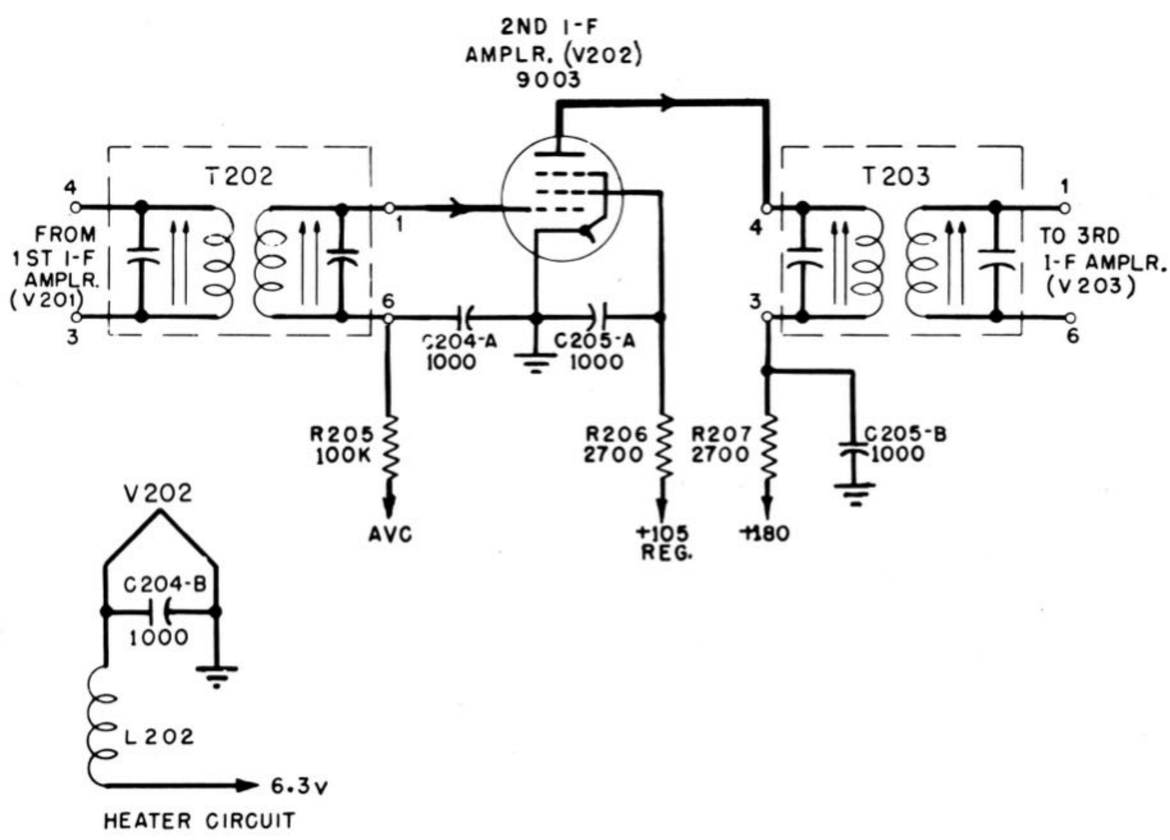



*Figure 2-8. Simplified Schematic—Typical I-f Amplifier*

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.

(c) 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 2e, this section.

(2) AUDIO FREQUENCY CIRCUITS.

(*a*) 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 225, the detector test point, is coupled through capacitor C220 to the first a-f amplifier grid when noise-limiter switch S202 is in the OUT position.

(*b*) 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 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.

(*c*) 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 sec-

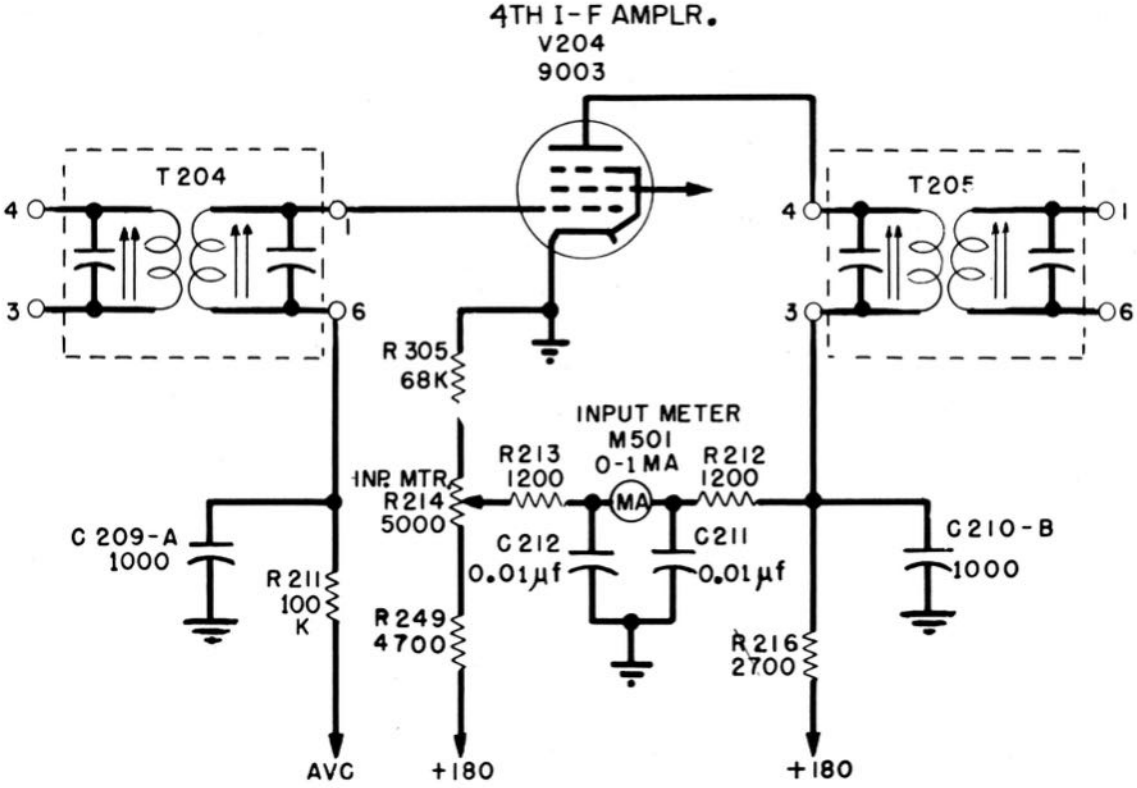



*Figure 2-9. Simplified Schematic—Input Meter (M501) Circuit*

ondary 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 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 (see Paragraph 2*c*(3) 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, doubler, 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 2b(1)(c). 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.

(*d*) SILENCER. The simplified schematic diagram of figure 2-12 shows the silencer circuit. 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. Tube V207B 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 front panel right-hand compartment. (Fig. 4-1.)

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 3d 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.

(*e*) AUDIO FREQUENCY CIRCUITS. The three audio amplifier stages are generally conventional. Refer to the simplified schematic diagram of these

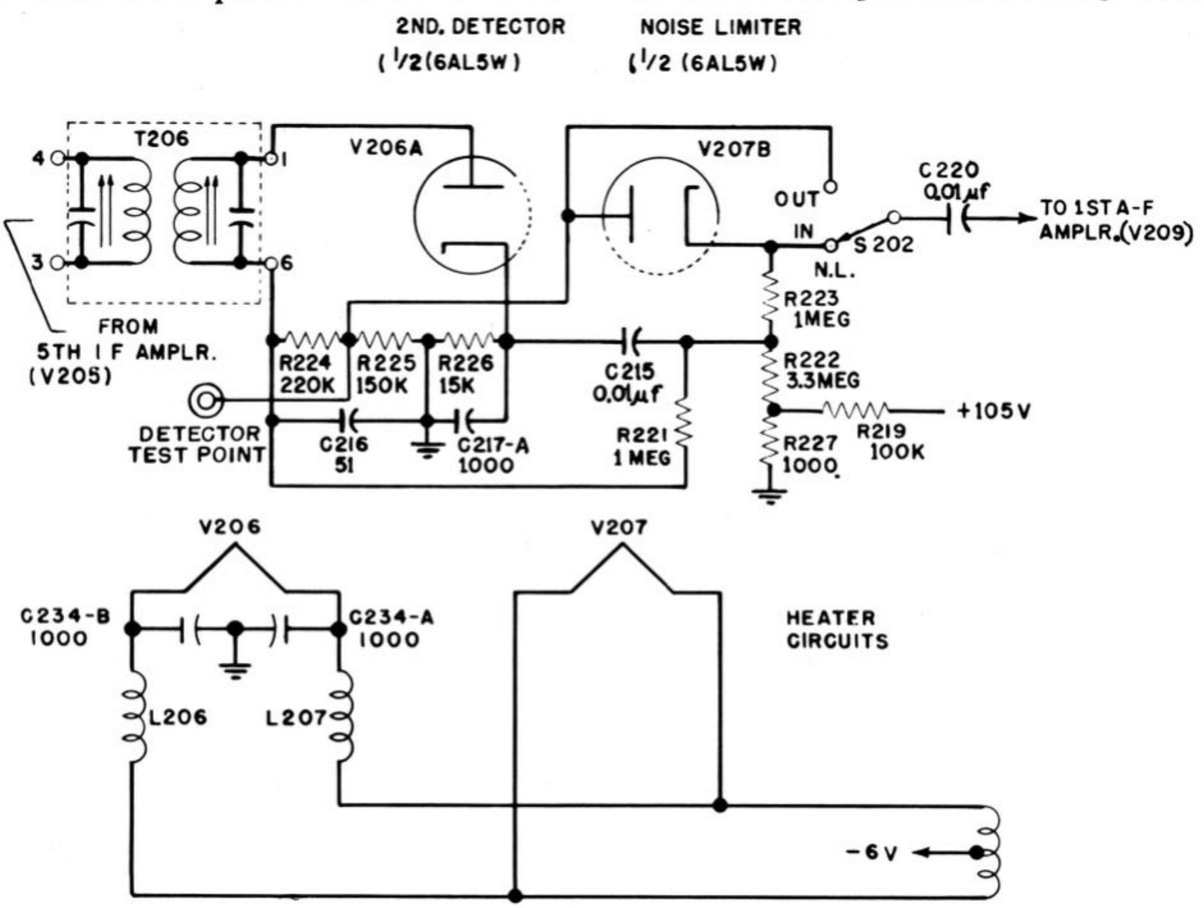



*Figure 2-10. Simplified Schematic—Second Detector and Noise Limiter*

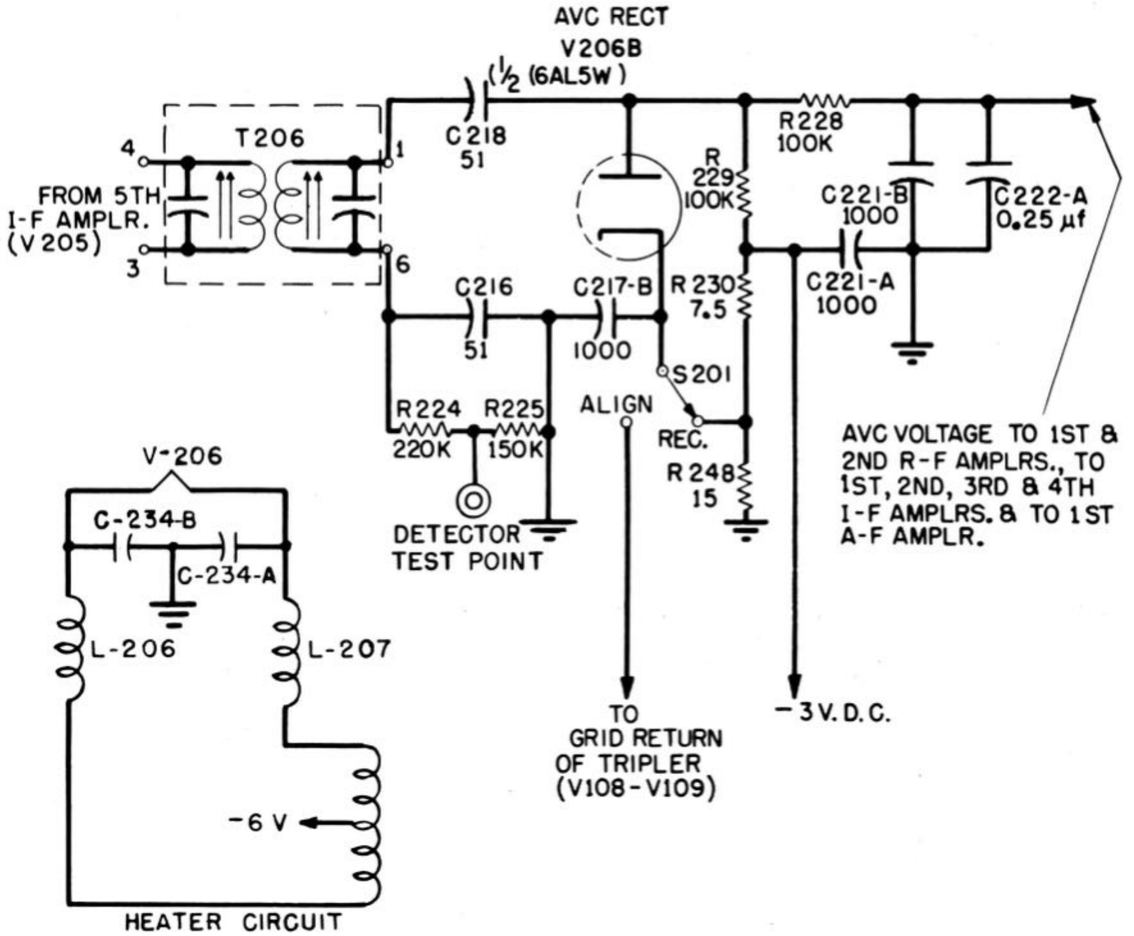



*Figure 2-11. Simplified Schematic—AVC Rectifier Circuit*

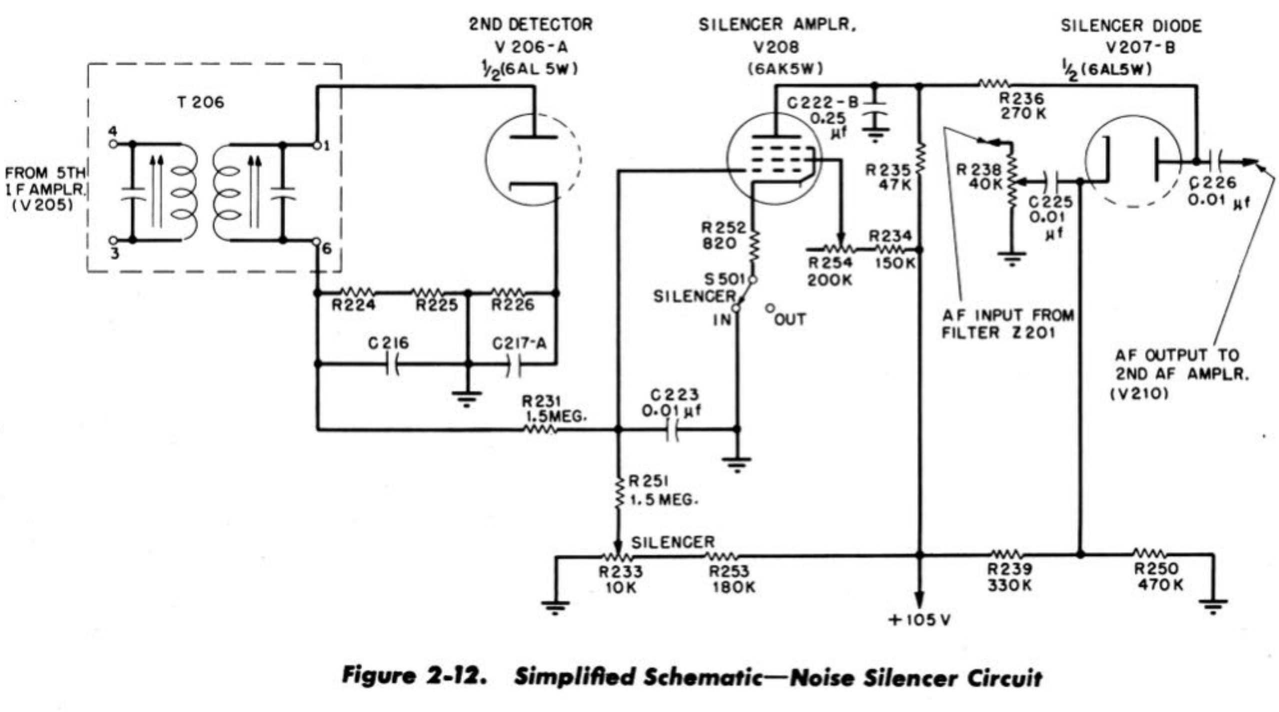



*Figure 2-12. Simplified Schematic—Noise Silencer Circuit*

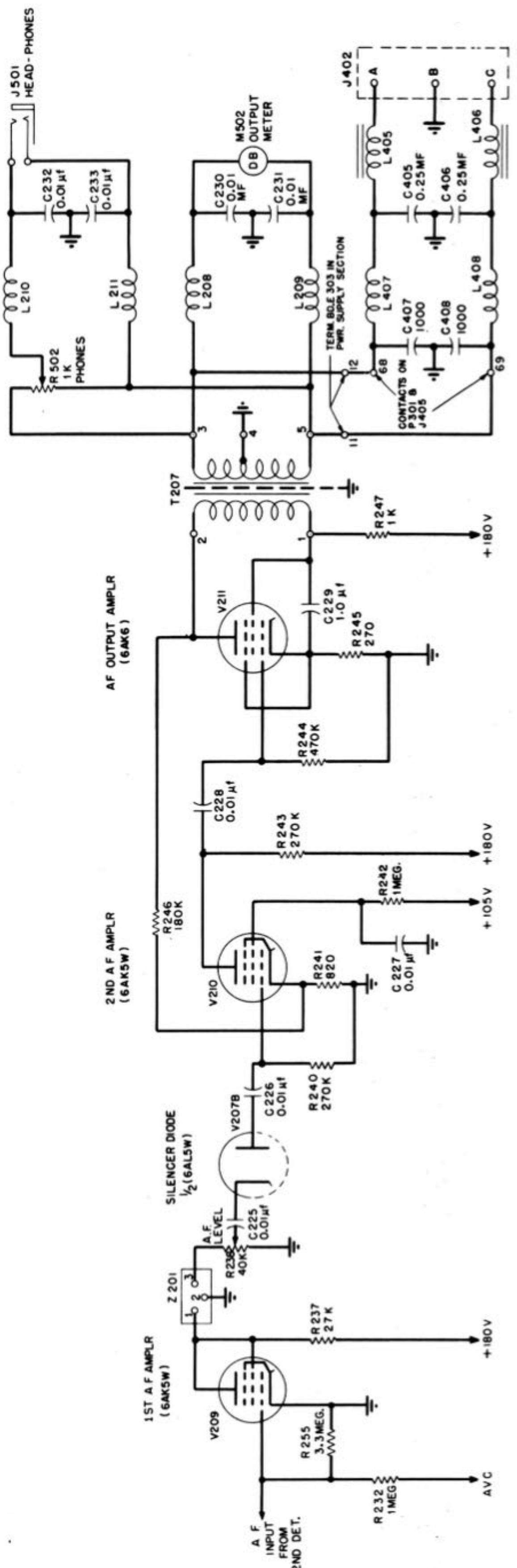



*Figure 2-13. Simplified Schematic—Audio Frequency Circuits*

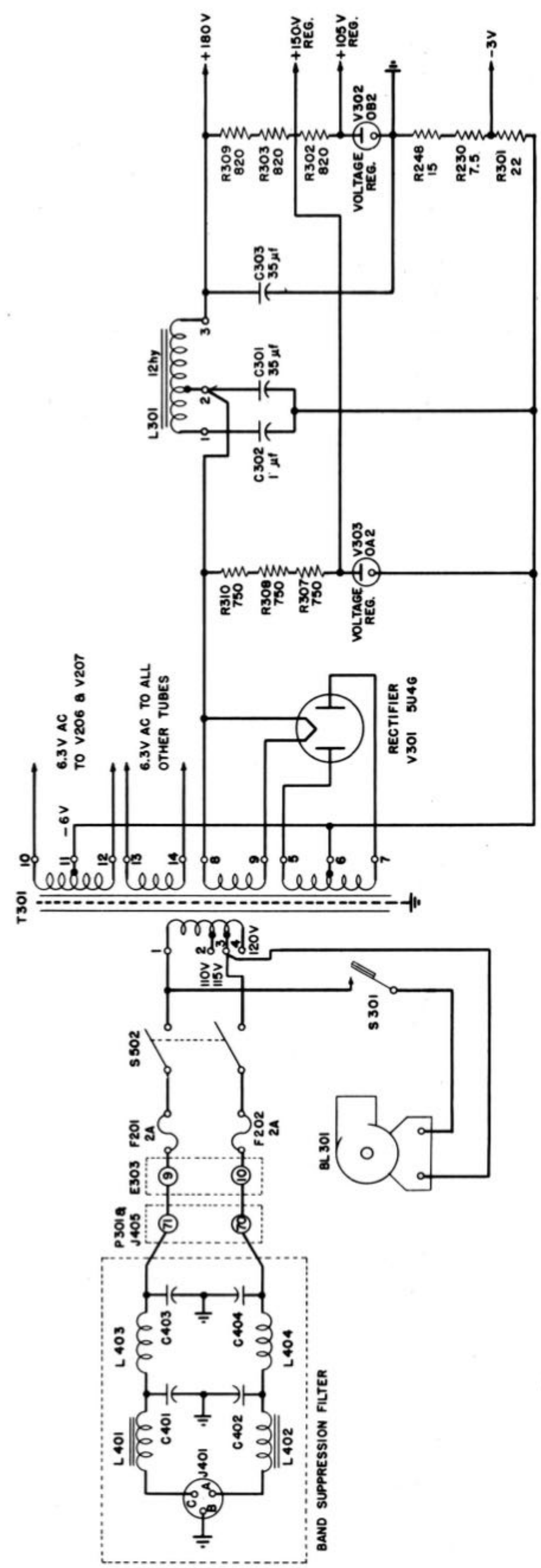



*Figure 2-14. Simplified Schematic—Power Supply Section*

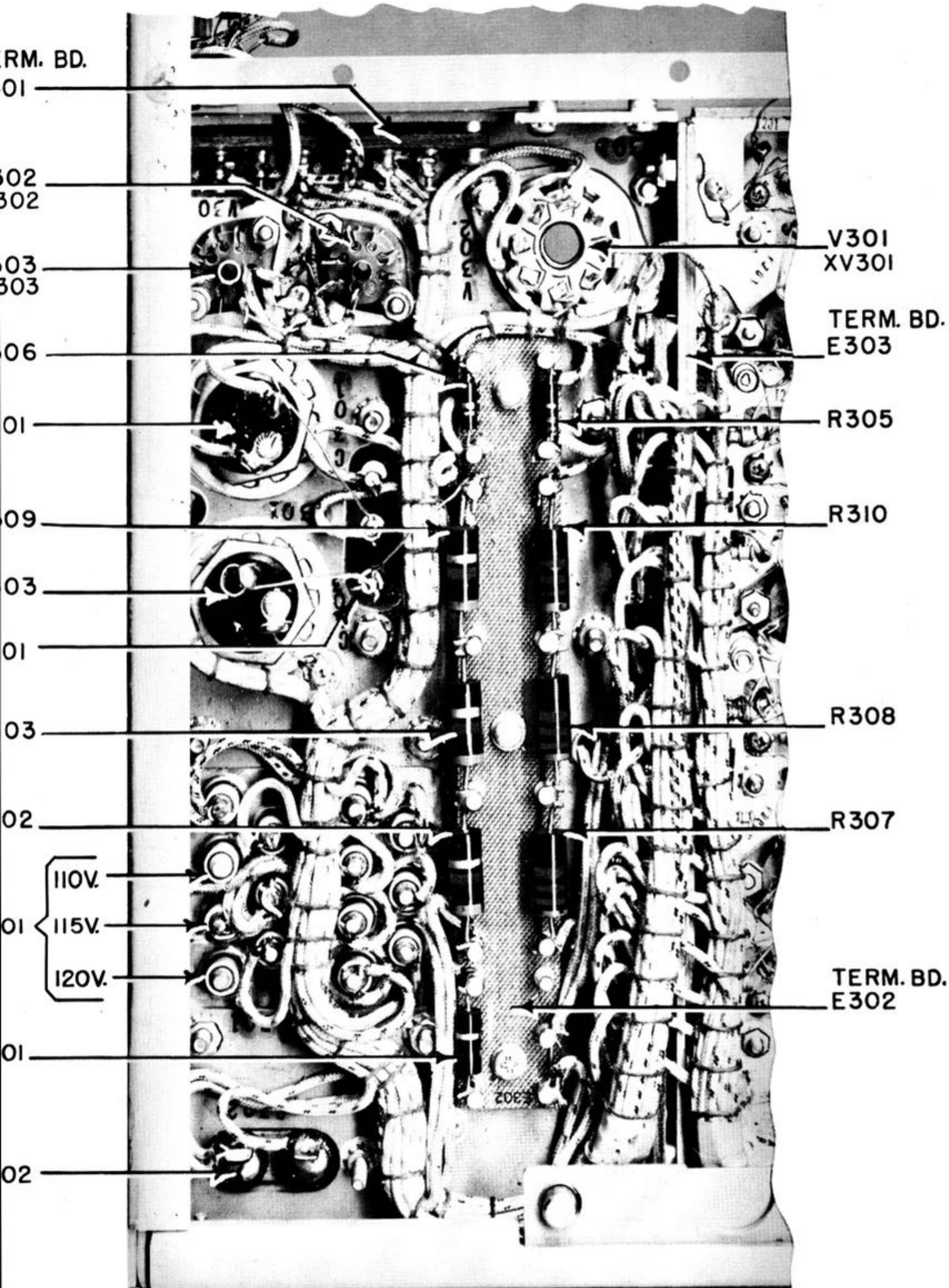



*Figure 2-15. Underside of Power Supply Section*

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, R238, and the control diode (described in paragraph f, above) to the grid of the second audio stage (V210). This stage is a conventional resistance-coupled pentode (type 6AK5W) voltage amplifier 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 the Band Suppression Filter.

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

*c.* **POWER SUPPLY.** A single power transformer (T301) supplies heater power for all tubes and, after rectification, high voltage d.c. 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 V206A, V206B, V207A and V207B; 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 mfd. capacitor C302, and thus provides a low impedance path for ripple currents. Hum is therefore minimized. The 35 mfd. 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 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) 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 the Band Suppression Filter

(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.

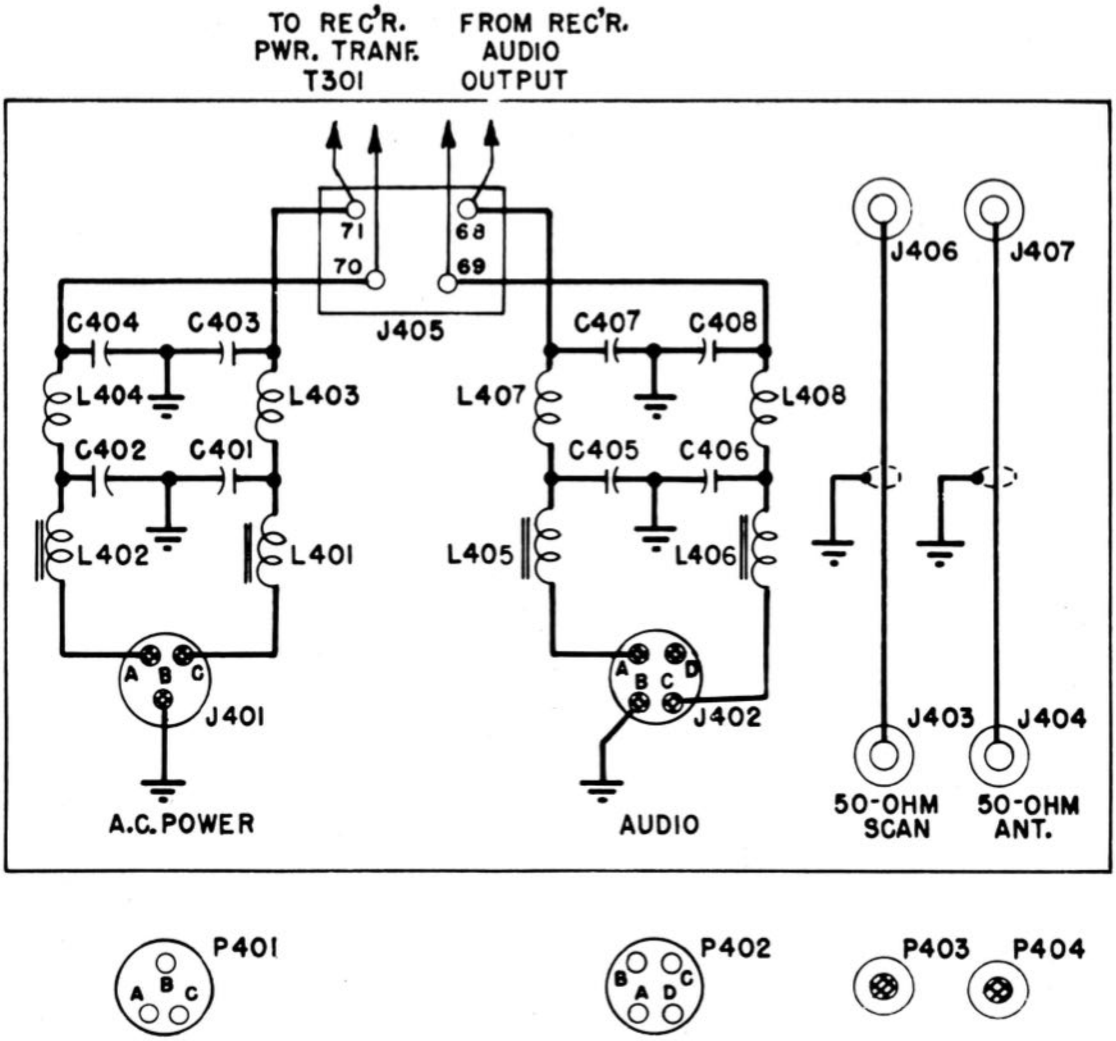



Figure 2-16. Simplified Schematic—Band Suppression Filter

# SECTION 3
# INSTALLATION

## 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.

**TABLE 3-1. INSTALLATION DRAWINGS**

| Item No. | Subject of Drawing | Instruction Book Figure Number |
|---|---|---|
| 1. | Outline Drawing—Radio Receiver R-516/URR-27 | 3-9 |
| 2. | Outline Drawing—Preselector | 3-10 |
| 3. | Outline Drawing—Band Suppression Filter | 3-11 |
| 4. | Outline Drawing—Relay Rack Mounting Brackets | 3-7 |
| 5. | Outline Drawing—Repair Parts Box | 3-8 |
| 6. | Interunit Connection Diagram | 3-4 |
| 7. | Block Diagram—Complete Receiver | 2-1 |
| 8. | Overall Schematic Diagram—Radio Receiver R-516/URR-27 | 7-17 |
| 9. | Wiring Diagram—Receiver Chassis | 7-18 |
| 10. | Wiring Diagram—Preselector | 7-19 |

## 2. UNPACKING THE EQUIPMENT.

*a.* GENERAL.

Each complete Radio Receiving Set AN/URR-27 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-27 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) 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).
10. Remove silica gel bags (28) from recesses in side paperboard spaces.
11. Lift out receiving set.

| TABLE OF WEIGHTS | |
|---|---|
| ITEM | WT.(LBS.) |
| RECEIVER, WITH SHOCK MOUNTS, BUT WITHOUT BRACKETS | 57 |
| 2 SIDE BRACKETS AND 4 PLUGS | $1\frac{3}{4}$ |
| 2 INSTRUCTION BOOKS | 3 |
| REPAIR PARTS BOX | 15 |
| REPAIR PARTS (PACKAGED) | 8 |
| CARTONS, INSERTS, GELATN & BARRIER. | 27 |
| WOOD SHIPPING CASE | $54\frac{1}{2}$ |
| TOTAL | $166\frac{1}{4}$ |

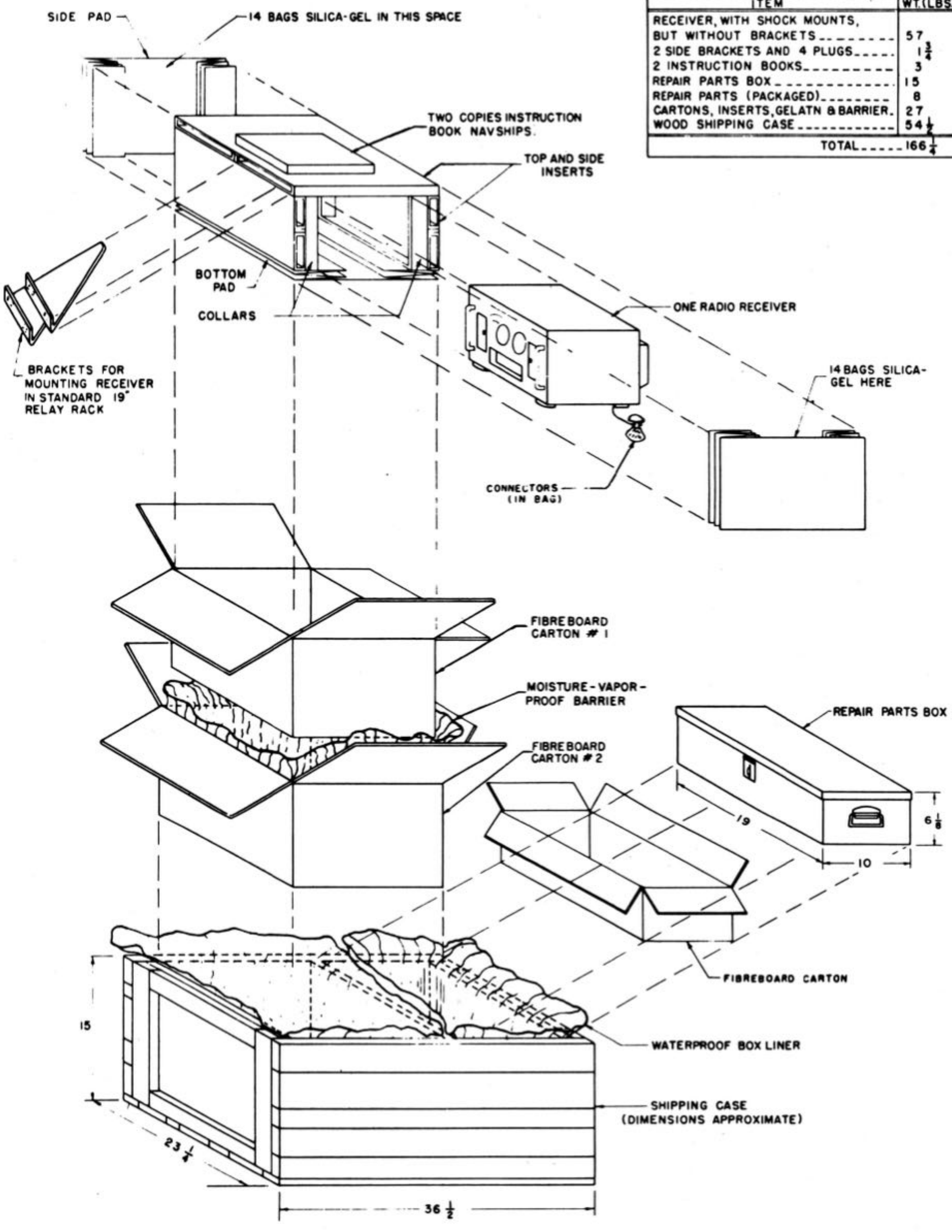



*Figure 3-1. Method of Packing Radio Receiving Set, AN/URR-27*

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 the Band Suppression Filter 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-volts, 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" diameter holes in the bench, in line with the centers of the shock mounts. Next drop a 5/16" diam. 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 1/2" 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" diam. 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 the Band Suppression Filter

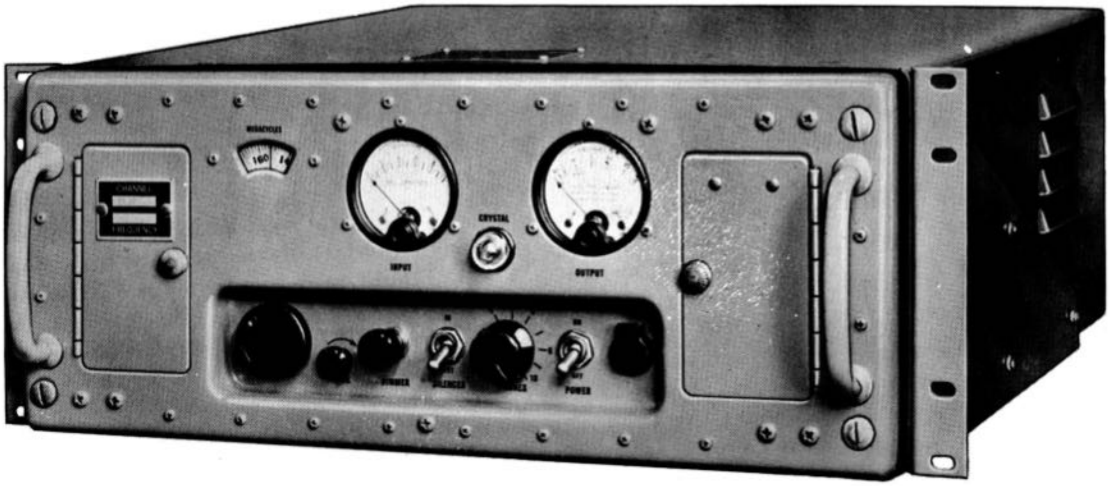


*Figure 3-2. Front View, Shock Mounts Removed, Relay Rack Mounting Brackets Attached*

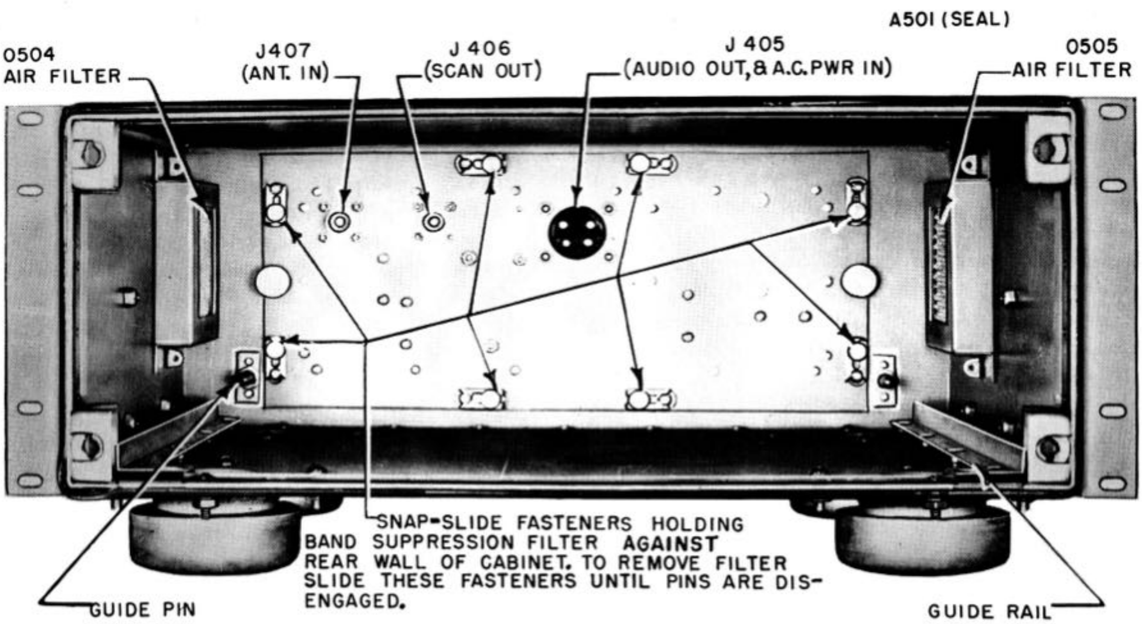



*Figure 3-3. View into Cabinet Showing Front of Band Suppression Filter, and Method of Attachment of Same to Cabinet*

on the rear 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.

## TABLE 3-2. CONNECTORS (PLUGS) SUPPLIED WITH AN/URR-27 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 |
| P402 | J402 | Audio output to interphone, or other audio listening device(s). | TTHFWA-1 | AN-3106-14-s-2S + AN-3057-6 cable clamp |
| P403 | J403 | 50-ohm scan output (to panoramic adapter, if used) | AN Type RG-8/U Coaxial | Navy Type (—49195) |
| P404 | J404 | 50-ohm antenna input | | AN Type UG-21B/U |

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" 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:

$$\text{Crystal frequency (in Mc.)} = \frac{\text{selected channel frequency (in mc.)} + 18.6 \text{ mc.}}{6}$$

(*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 of RF/AF unit 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 postion.

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.

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 6 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 IMP. 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 + 10db

**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).

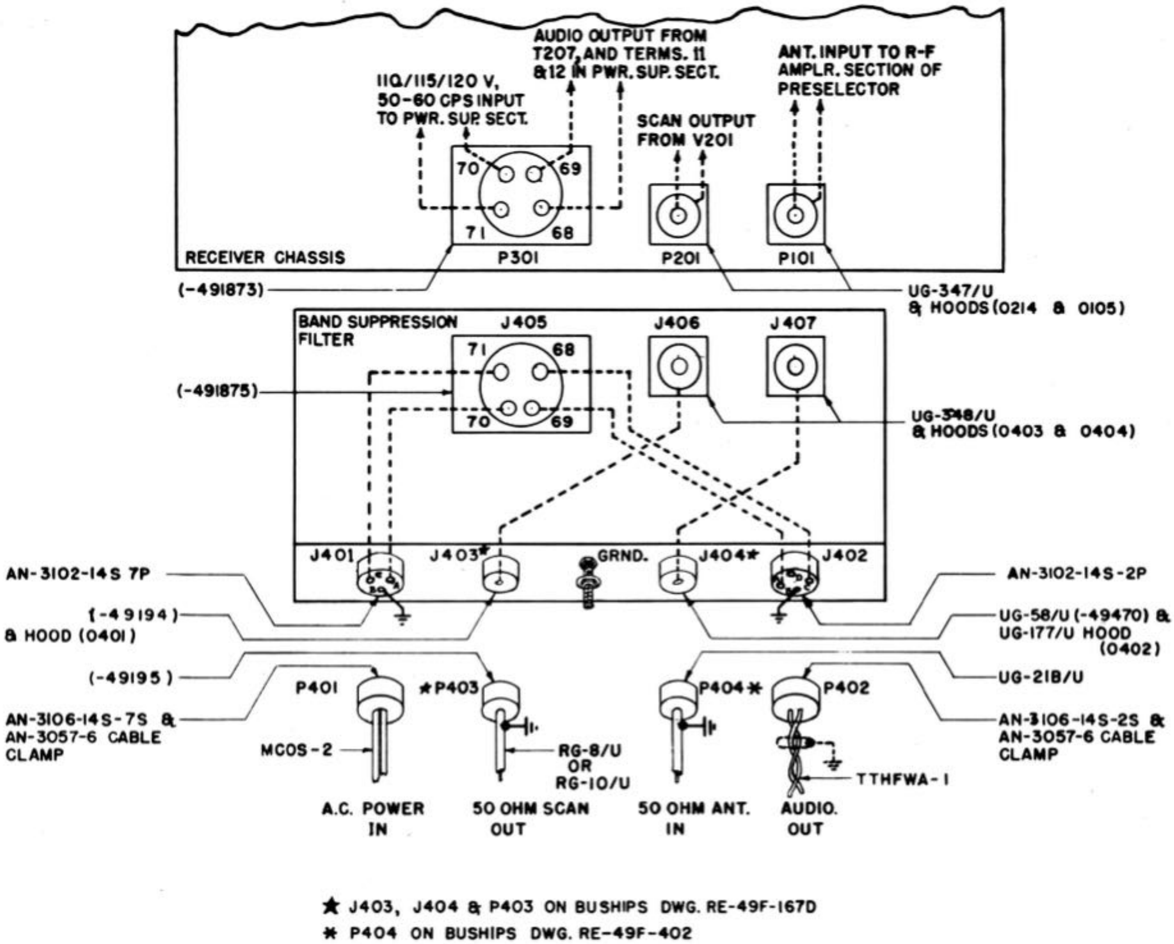



*Figure 3-4. Locations of Connectors, and of I-f and R-f Cables*

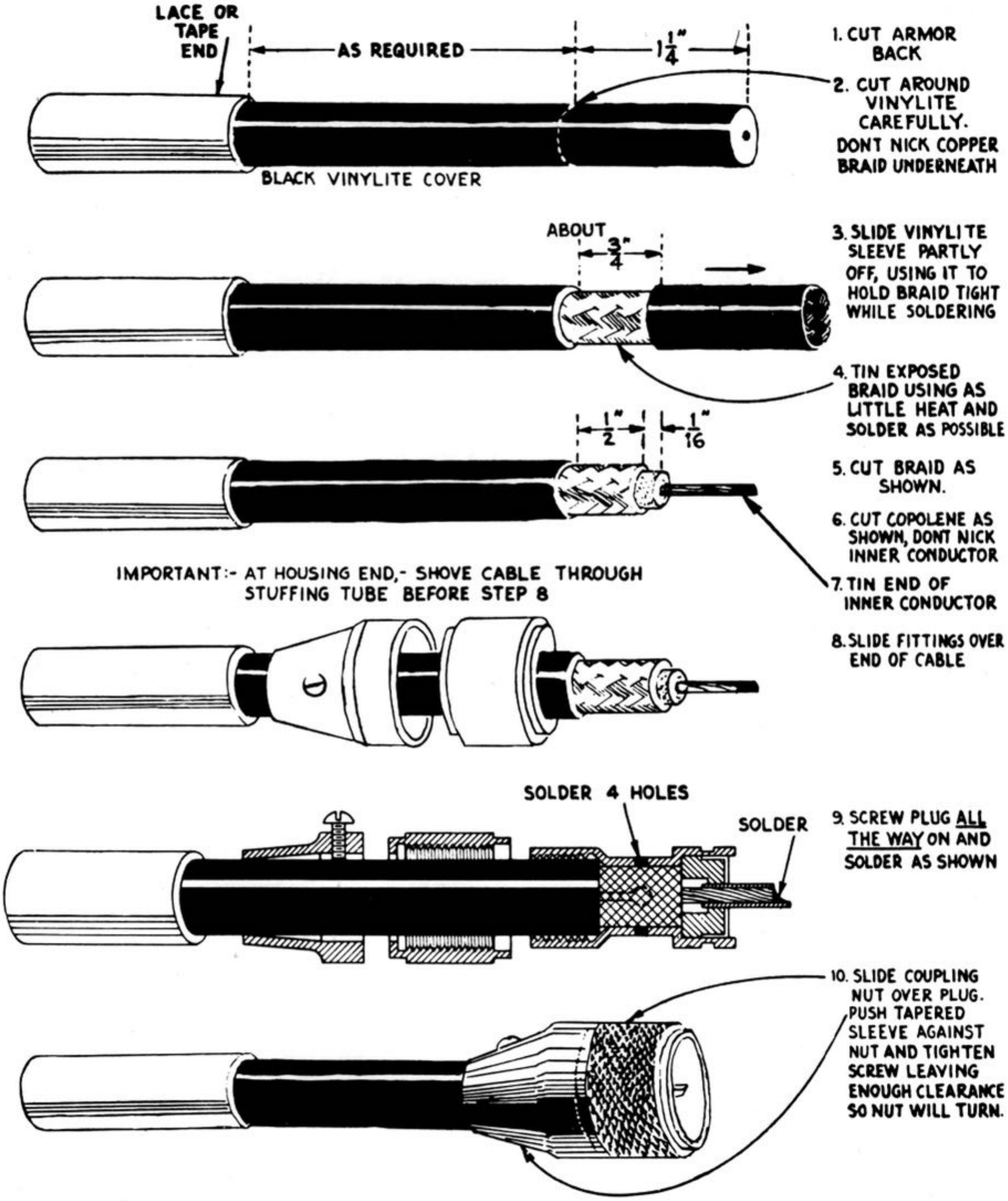
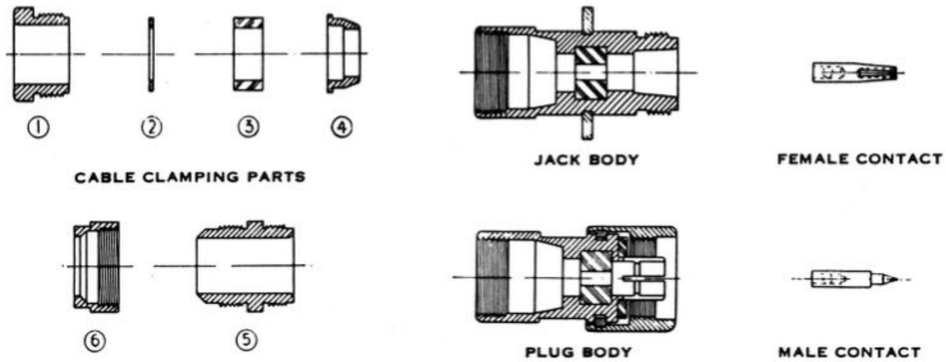
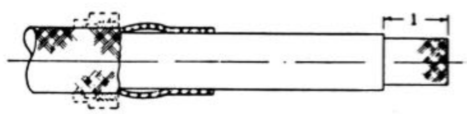


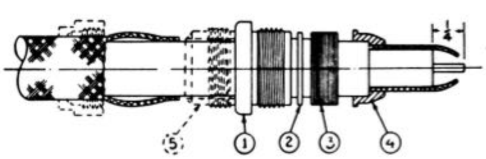

*Figure 3-5. Method of Assembling Plug P403 (Navy Type—49195) to AN Type RG-8/U Coaxial Transmission Line to Form SCAN Output Cable*

# CABLE ASSEMBLY INSTRUCTIONS
## For A and B TYPE CONNECTORS

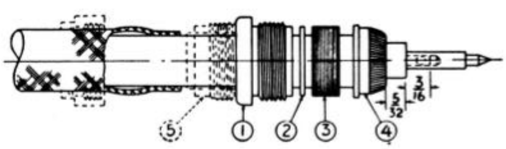


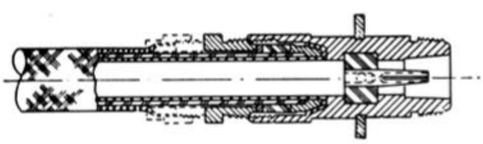

1. For armor cables slide Part 6 over armor and push armor back. Cut Vinylite jacket square and even back 1 inch. Be careful not to nick or cut braid wires.




2. Push back braid and cut off 1/4 of cable dielectric. Pull braid forward and taper toward center conductor. (This operation may not be necessary for single braid cables) Insert Part 1 or Part 5 if cable is armored, and follow with Parts 2, 3 and 4. Be sure Part 4 clears all braid wires and its internal shoulder rests squarely against end of Vinylite jacket.




3. Unbraid shield wires, spread open and lay back on Part 4 without wires crossing each other. Cut off excess braid wire length so that each wire will end before touching shoulder of Part 4. Cut off cable dielectric 5/32 from end of braid wires. Be sure to cut square and even and do not nick center conductor. Cut center conductor 3/16 from end of cable dielectric and tin. Solder male or female contact carefully and remove excess solder. Be careful that solder or flux does not get on end of cable dielectric.



4. Insert cable into plug or jack body as far as it will go. Push Parts 3 and 2 into body and tighten Part 1 or Part 5. Hold body with wrench and tighten Part 1 or Part 5. Do not allow body or cable to rotate during this operation. If cable is armored pull armor forward over tapered portion of Part 5 and cut off excess armor length. Unbraid armor wires for a short distance and bring forward Part 6 and clamp armor between two tapered surfaces. Be careful that loose ends do not extend into threads and jam.

***Figure 3-6. Method of Assembling Plug P404 (AN Type UG-21B/U) to AN Type RG-11/U Coaxial Transmission Line to Form ANTenna Input Cable***

When tuning to a channel within the frequency range of 105-109 megacycles, the second response would occur at the high frequency end of the band, between 187 and 191 megacycles. Conversely, when tuning to a channel within the frequency range of 187-191 megacycles, the second response would occur at the low frequency end of the band, between 105 and 109 megacycles.

To prevent incorrect tuning of the receiver in the 105-109 and 187-191 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 105-190 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 five 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.

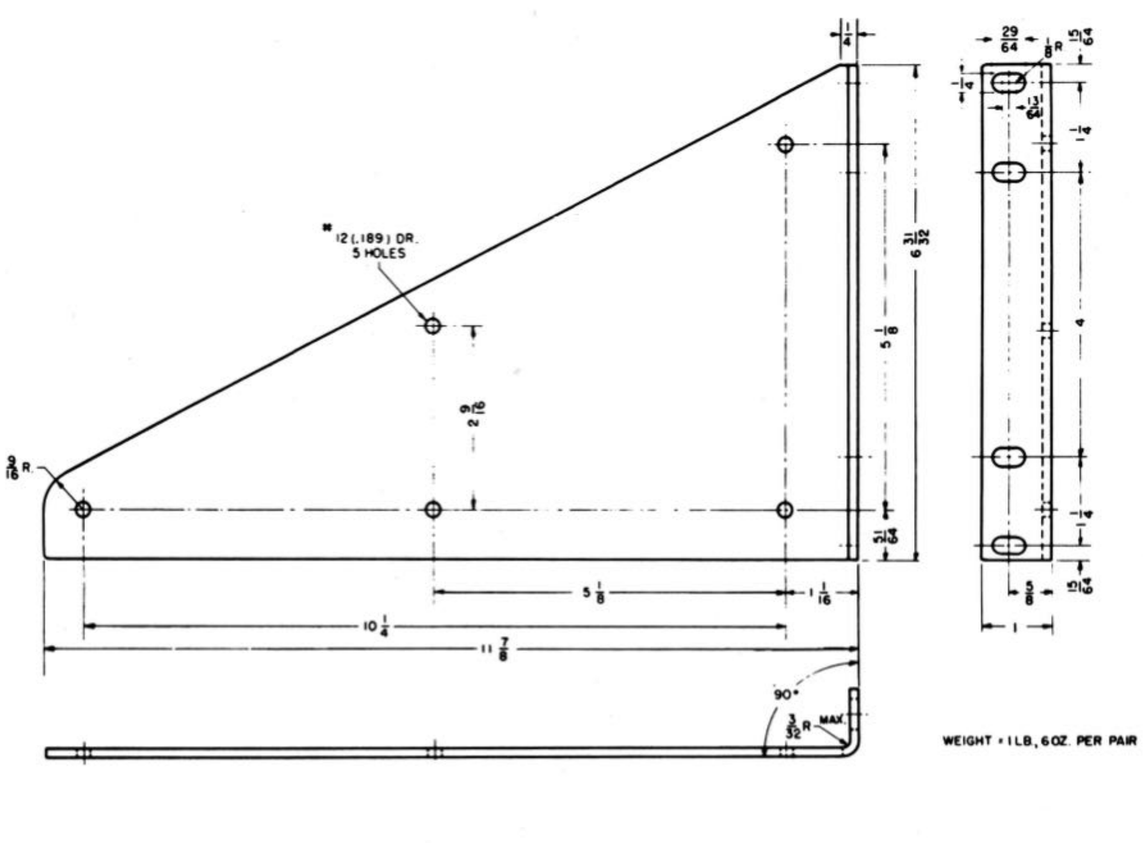
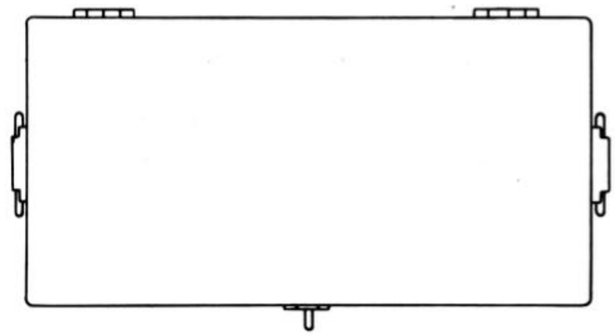



***Figure 3-7. Outline Drawing—Relay Rack Mounting Brackets***



| CONTRACT | WEIGHTS (POUNDS) | | |
|---|---|---|---|
| | BOX | CONTENTS | TOTAL |
| NOBsr -52699 | 15 | 8 | 23 |

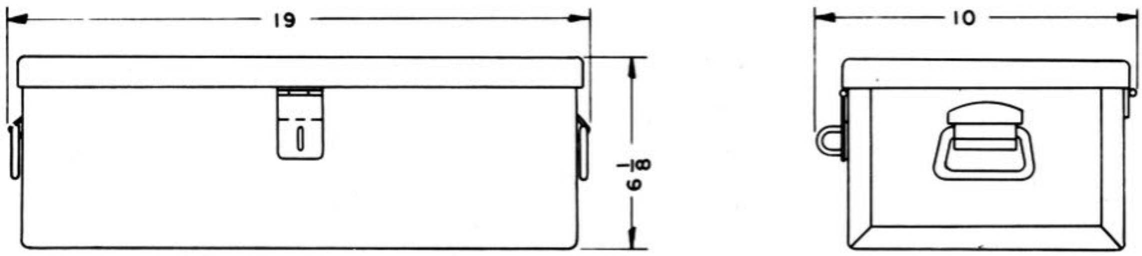
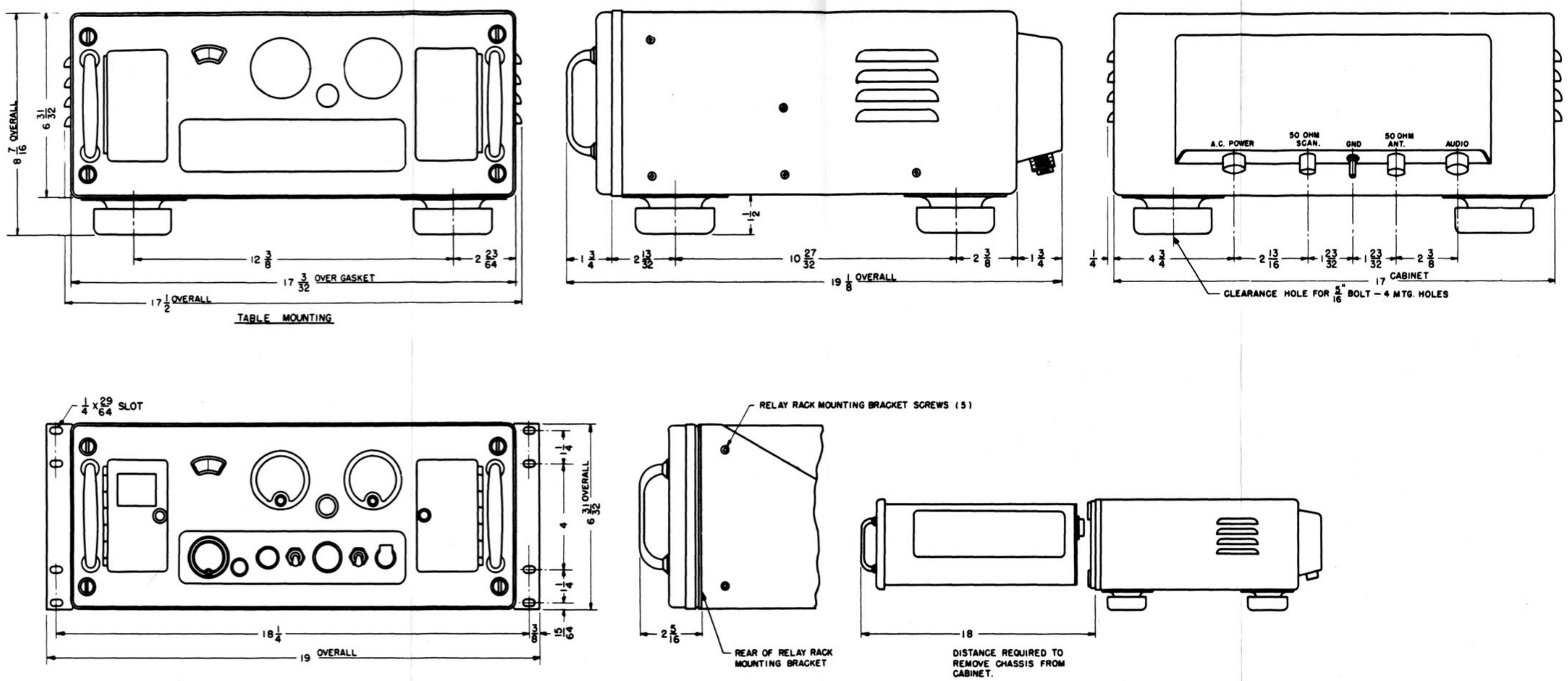



***Figure 3-8. Outline Drawing—Repair Parts Box***




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.

WEIGHT — 57 POUNDS WITH SHOCK MOUNTS, LESS RELAY RACK MOUNTING BRACKETS.
POWER REQUIRED — 120 WATTS

*Figure 3-9. Outline Drawing—Radio Receiver R-516/URR-27*

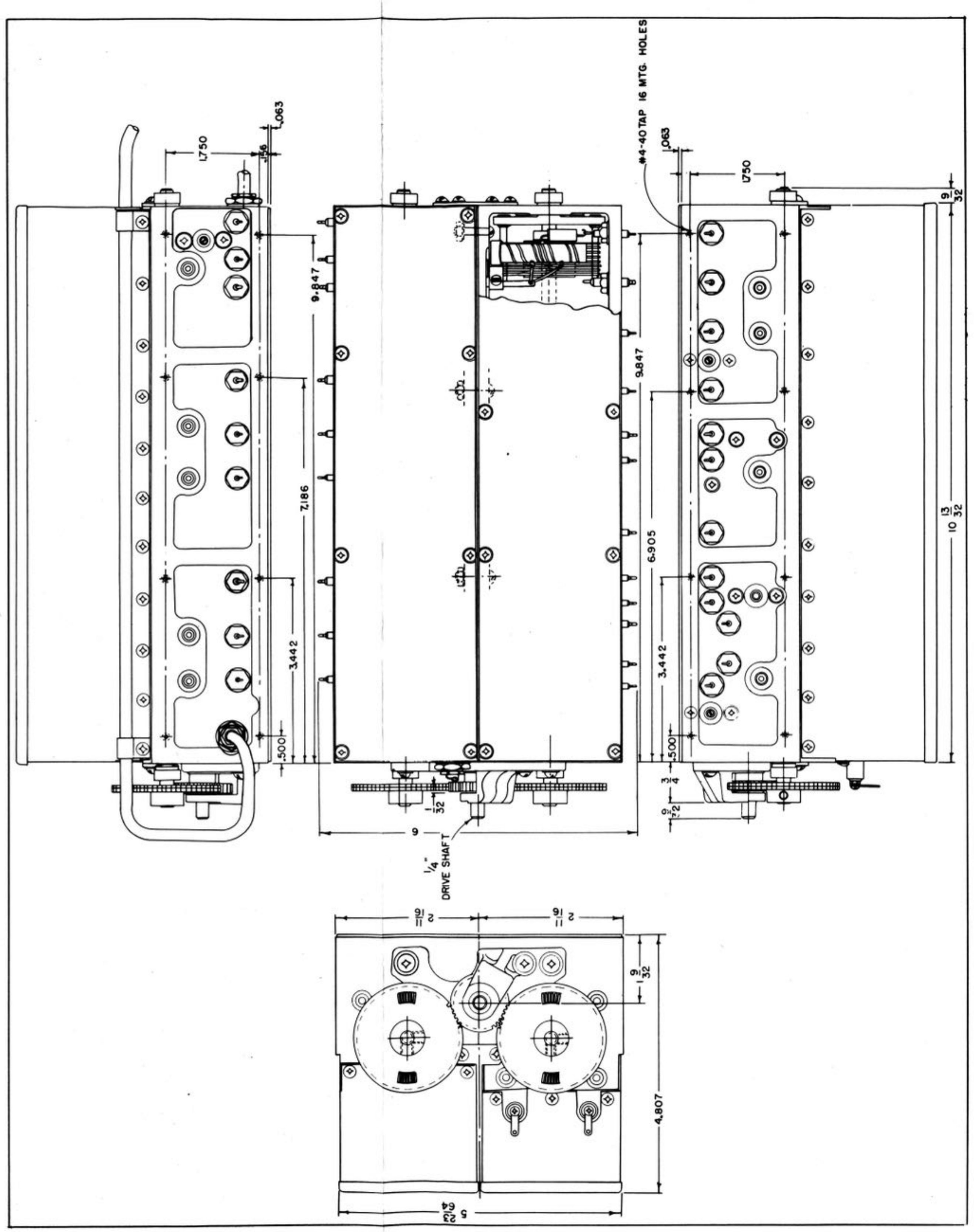



Figure 3-10. Outline Drawing—Preselector

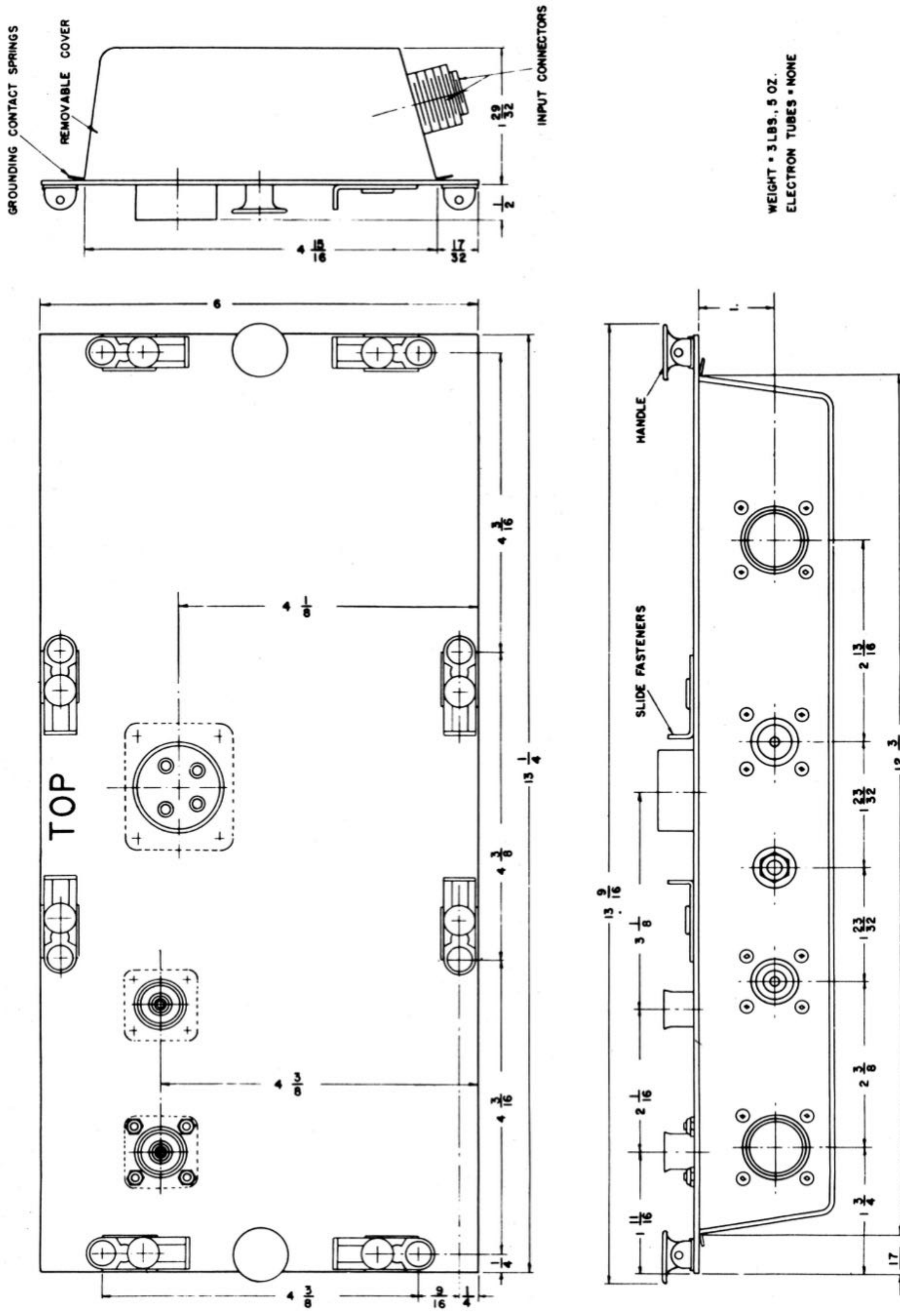



**Figure 3-11. Outline Drawing—Band Suppression Filter**

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 6 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 —5db and +10db. If meter M501 does not read zero it should be so adjusted by means of IMP. 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 105-109 megacycles, the second response would occur at the high frequency end of the band, between 187 and 191 megacycles. Conversely, when tuning to a channel within the frequency range of 187-191 megacycles, the second response would occur at the low frequency end of the band, between 105 and 109 megacycles.

To prevent incorrect tuning of the receiver in the 105-109 and 187-191 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 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

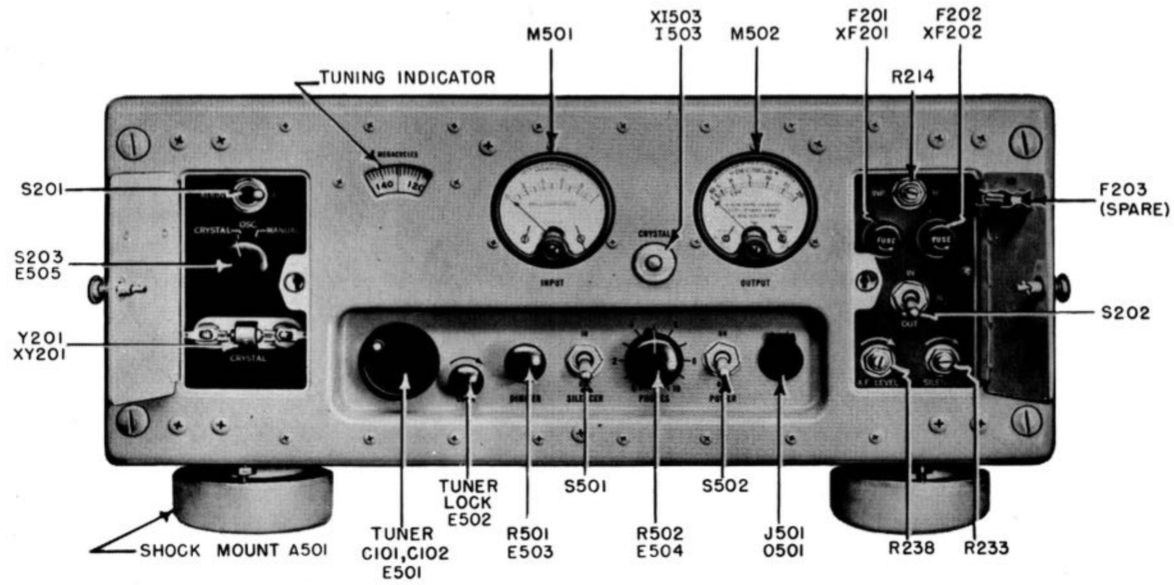



**Figure 4-1. Front Panel, Doors Open**

(R502) in position #8. Further silencing entails the danger of squelching weak signals which it might be desirable to hear. On the other hand restraint in the use of silencing to less than 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 105-190 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 non-linear. Furthermore, this relation will vary with the frequency (channel) at which the receiver is operated, and also, slightly, between any two R-516/URR-27 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 AT APPROXIMATELY 185 MC.**

| Input (Microvolts) | Input Meter Reading |
|---|---|
| .9 | 0.05 |
| 1.8 | 0.1 |
| 4.5 | 0.2 |
| 13 | 0.3 |
| 50 | 0.4 |
| 200 | 0.5 |
| 1,000 | 0.6 |
| 7,000 | 0.7 |
| 70,000 | 0.8 |

# 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 CHARTS.

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

**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. |

## 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.

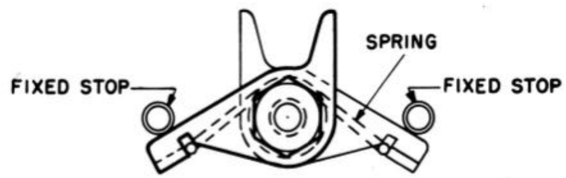
*b.* FUSE INFORMATION.

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-516/URR-27. 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.

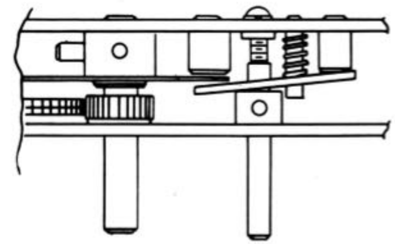
A spare fuse (F203) is mounted in clips on the inside of the panel compartment door. Additional spare fuses should be kept at hand for replacement use. If fuse F201 and/or fuse F202 blows following a replacement, it is possible that the rectifier tube (V301) is faulty, and the operator may try replacement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

**CAUTION**

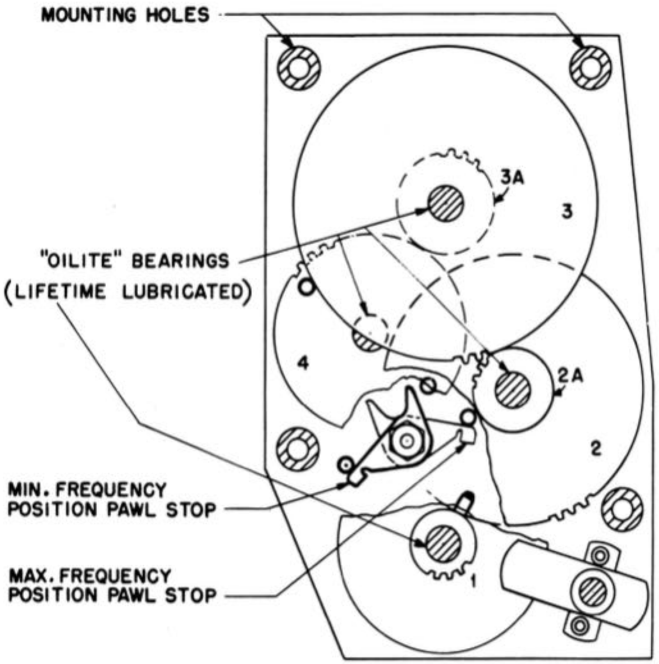
Never replace a fuse with one of higher rating unless continued operation of the receiver is more important than the probable damage to it. If a fuse burns out immediately after replacement, do not make a second replacement until the cause of the trouble has been corrected.




C. DETAIL OF PAWLS



D. DETAIL OF SHAFT LOCK MECHANISM




A. NORMAL POSITION OF PAWL
(THROUGHOUT TUNING RANGE)

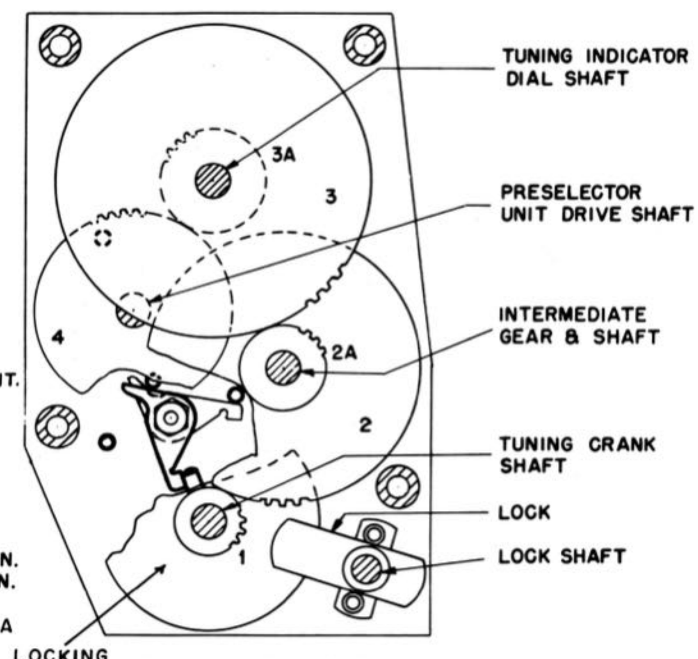
GEAR DATA

| | | | |
|---|---|---|---|
| GEAR | NO. 1 | — | 24 T. (1/2) |
| " | " 2 | — | 96 T. (2) |
| " | " 2A | — | 24 T. (1/2) |
| " | " 3 | — | 120 T. (2 1/2) |
| " | " 3A | — | 36 T. (3/4) |
| " | " 4 | — | 72 T. (1 1/2) |

LUBRICATION

TO CLEAN USE BRUSH GENEROUSLY CHARGED WITH DRY CLEANING SOLVENT. MIL-S-16067
SNSN G51-5-4718-10 FOR 5 GAL.
SNSN G51-5-4718-17 FOR 55 GAL.
START AT TOP OF TOP GEAR AND WORK DOWN.

TO RE-LUBRICATE, APPLY A THIN COATING OF NAVY TYPE 14-L-3
SNSN W14-L-84-900 FOR 1 Lb. CAN.
SNSN W14-L-84-910 FOR 5 Lb. CAN.
BALL BEARING LUBRICANT TO ACCESSIBLE GEAR TEETH, USING A SMALL CAMEL HAIR BRUSH.




B. PAWL ENGAGED
(19TH REVOLUTION OF CRANK)

Figure 6-1. Details of Dial Drive Mechanism for Preselector Unit, Showing Automatic Stop Device

## TABLE 6-2. ROUTINE MAINTENANCE CHECK CHART

| WHAT TO CHECK | HOW TO CHECK | PROCEDURE |
|---|---|---|
| | **DAILY and WEEKLY** | |
| | **See table 6-1** | |
| | **MONTHLY** | |
| 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 Dry Cleaning Solvent MIL-S-16067. |
| 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. | 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 6a of section 7. |
| Circuit components | Check for worn or scorched parts. | Check voltage and resistance measurements in accordance with Tables 7-5 and 7-6. |
| Electron tubes | Check all electron tubes in a mutual-transconductance type tube tester. | Replace as necessary, any tube having a transconductance value of less than 75 percent of normal. |
| | **QUARTERLY** | |
| Air filters | Remove filter units from inside of cabinet by sliding the type snap-slide fasteners and inspect. | If units are clogged with dust, clean with Dry Cleaning Solvent MIL-S-16067 (see Fig. 6-1). |
| 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. |
| | **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. |
| 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 Dry Cleaning Solvent MIL-S-16067 and relubricate with Navy-type 14-L-3, grade II, medium, ball bearing lubricant, as explained in figure 6-1. |

## 4. LUBRICATION.

No part of Radio Receiving Set AN/URR-27 will require lubrication at any time as a preventive measure against damage to the equipment. However, a little Navy type 16-L-3, ball 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 Dry Cleaning Solvent MIL-S-16067, SNSN G51-5-4718-10 or SNSN G51-5-4718-17, 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-27 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 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-27 equipment are made of glass-bonded melamine.

# 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.

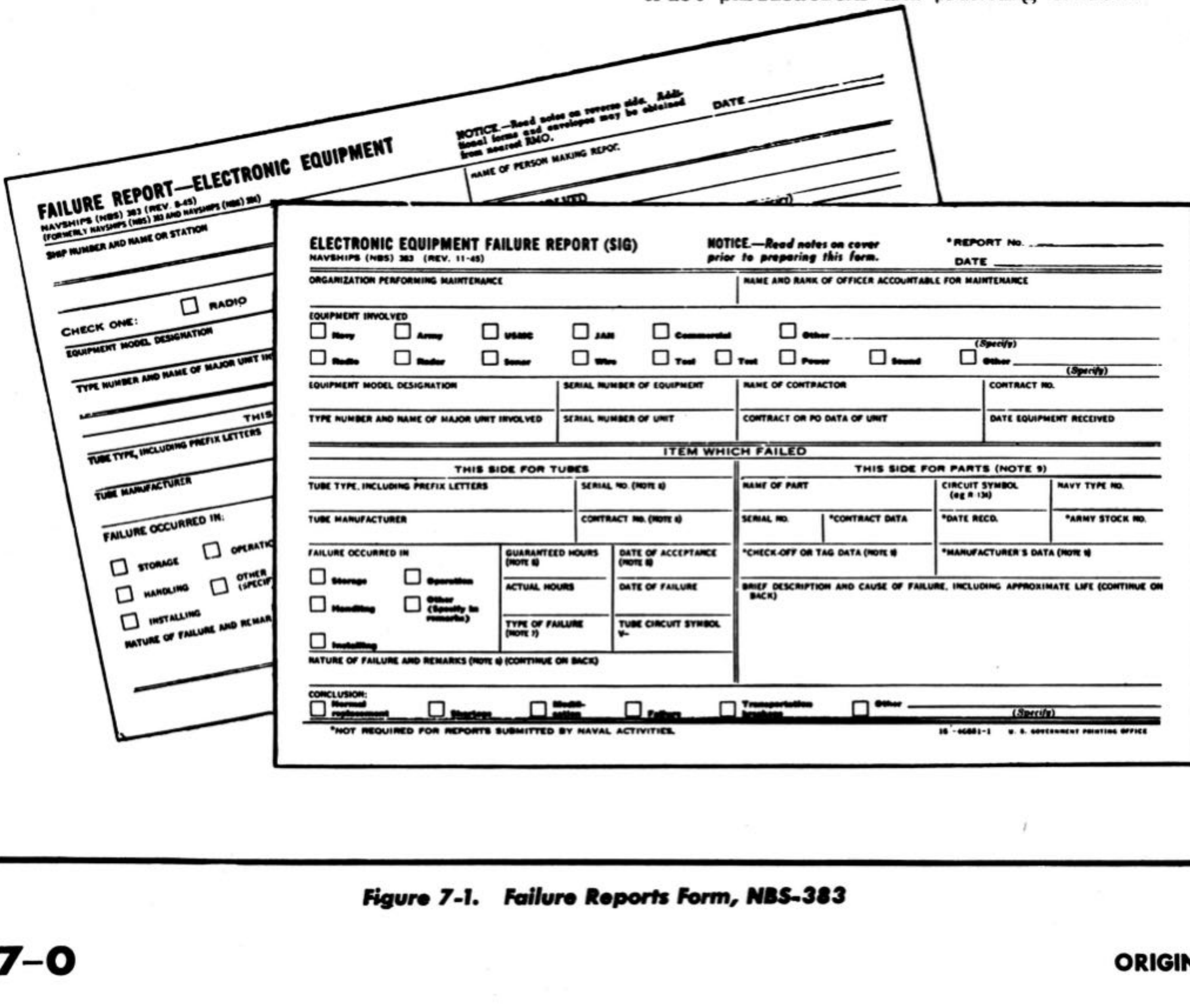



*Figure 7-1. Failure Reports Form, NBS-383*

# 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 it 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 misajustment 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 symptons 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.

Similiar 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 150 megacycles; ALIGN-REC switch in REC position; SILENCER switch in OUT position, and N.L. switch in OUT position. The measurements were made with a multimeter ME-25/U series, or a Navy model OBQ series, or equivalent, electronic voltmeter. Resistance measurements were made with the power connector disconnected.

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

## 3. ELECTRON TUBE INFORMATION.

*a.* TUBE DATA.

The full complement of electron tubes used in Radio Receiver R-516/URR-27 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 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 tube manuals.

*b.* TUBE CHECKING.

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.

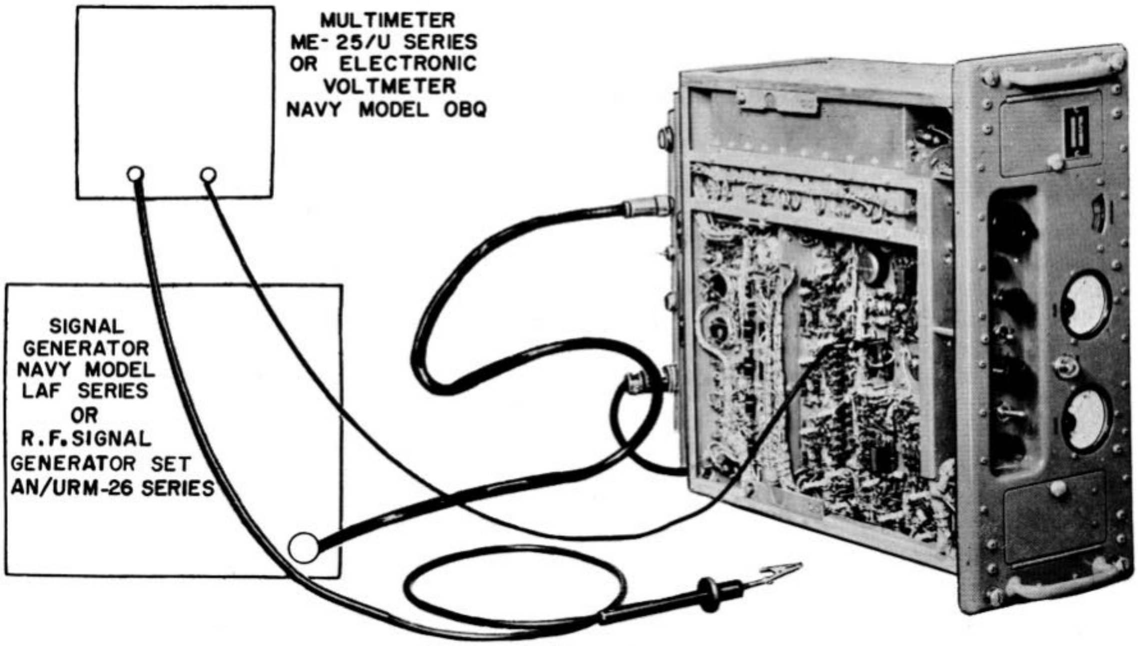



*Figure 7-2. Bench Set-up for Alignment of R-f Section of Receiver*

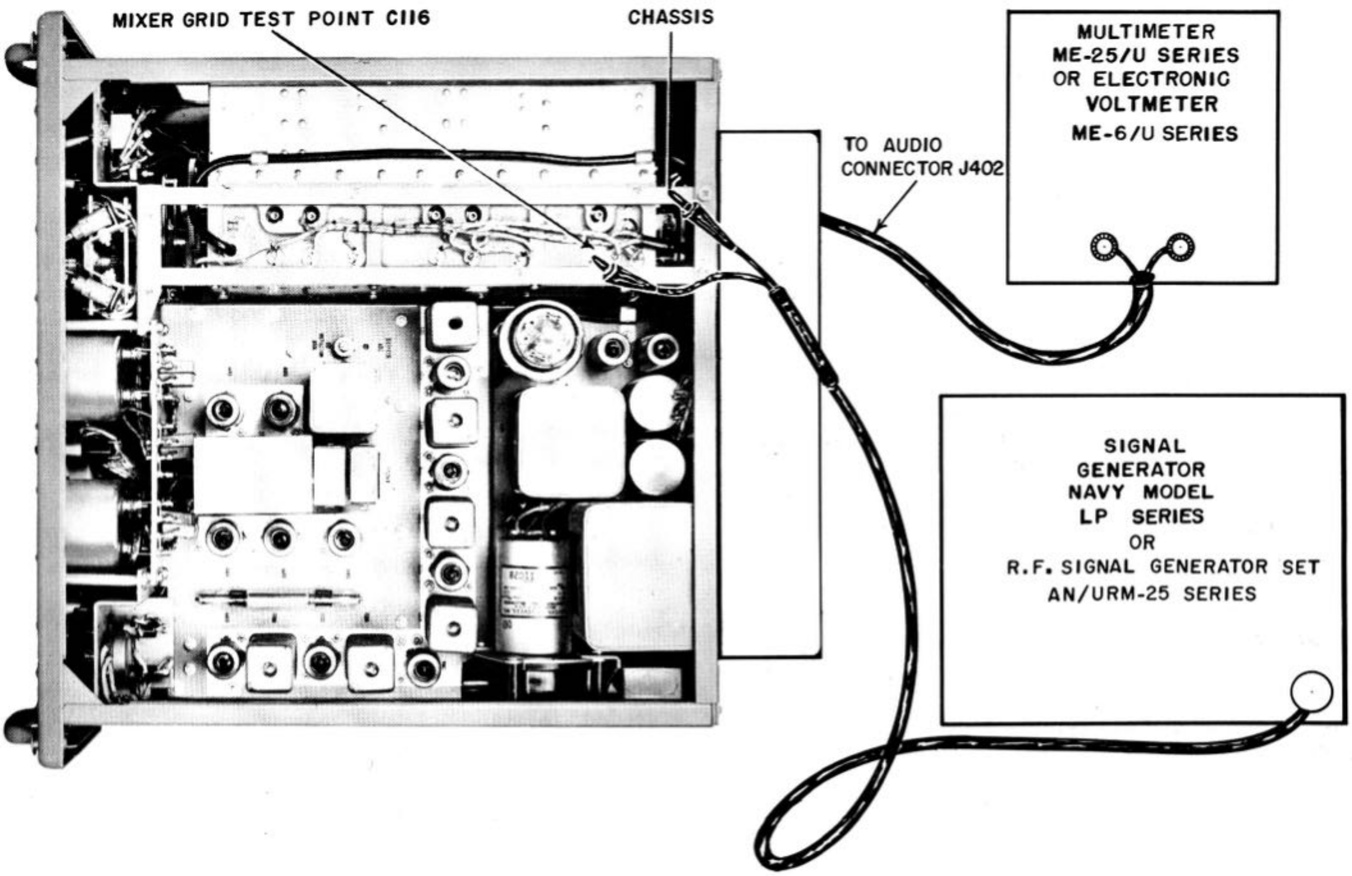



*Figure 7-3. Bench Set-up for Alignment of I-f Section of Receiver*

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 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.

**Notice**

In the equipment as shipped from the factory the oscillator-doubler, buffer amplifier, tripler mixer, r-f amplifier, 2nd detector-AVC, silencer and audio tubes are of "ruggedized" construction; the remainder are not. However, when making replacements "ruggedized" types should be used wherever possible.

## 4. PERFORMANCE TESTS.

The following tests are used to check operation of the receiver section by section. Units of test equipment required to perform these tests are:

R.F. Signal Generator Set AN/URM-25 series
R.F. Signal Generator Set AN/URM-26 series
Multimeter ME-25/U series or Navy Model OBQ Voltmeter series or equivalent
Audio Level Meter AN/URM-38 or equivalent
To perform these tests proceed as follows:

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

(2) Remove the AC cable.

(3) Remove the Band Suppression Filter from rear of the cabinet by disengaging snap slide fasteners (Figure 3-3); the filter must be removed through front of cabinet.

(4) Plug the band suppression filter into rear of receiver chassis.

(5) Connect the AC cord.

(6) Turn the 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).

*a*. I.F. AMPLIFIER PERFORMANCE TEST.

(1) Connect the Audio Level Meter AN/URM-38 or the Multimeter ME-25/U to the audio output connector J402.

(2) Turn the receiver tuning dial to 105 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) Turn the A.F. Level control clockwise to its maximum position. Tune the signal generator AN/URM-25 to 18,615 kc. and modulate 30% at 1000 cps.

(5) Adjust the output of the signal generator until the Output meter (M502) reads above the noise level, but below 10 Db.

The sensitivity measurements listed below are made with the equipment set up as specified.

| TEST POINT | TEST SIGNAL | OUTPUT SIGNAL |
|---|---|---|
| Mixer Grid test point C116, fig. 7-15 | 15 ± 5 Microvolts | 60 milliwatts |
| First IF Grid, pin No. 1, V-201, fig. 2-6A | 15 ± 5 Microvolts | 60 milliwatts |
| Second IF Grid, pin No. 1, V-202, fig. 2-6A | 50 ± 25 Microvolts | 60 milliwatts |
| Third IF Grid, pin No. 1, V-203, fig. 2-6A | 500 ± 200 Microvolts | 60 milliwatts |
| Fourth IF Grid, pin No. 1, V-204, fig. 2-6A | 6000 ± 1000 Microvolts | 60 milliwatts |
| Fifth IF Grid, pin No. 1, V-205, fig. 2-6A | 60,000 ± 10,000 Microvolts | 60 milliwatts |

*b*. R.F. SYSTEM PERFORMANCE TEST.

(1) Keep the Audio Level Meter AN/URM-38 connected in the same manner as shown in IF test Par. 4.a.(1). Connect the signal generator, AN/URM-26 to the antenna input connector P101 through a 50-ohm dummy antenna.

(2) Reinsert the crystal into the crystal holder and adjust the receiver for crystal oscillator operation at 105.7 mc.

(3) Set the signal generator for 105.7 mc. at approximately 10 microvolts output level into the 50-ohm dummy antenna. Adjust the signal generator modulation to 30% at 1000 cps.

(4) Adjust the AF gain control of the receiver

and the output level control of the signal generator until a reading of 6 milliwatts is obtained in the Audio Level Meter AN/URM-38. Set the signal generator modulation control at off. Readjust the receiver AF gain control and the signal generator output level control until a noise reading of 0.6 milliwatts is obtained on the audio level meter. The microvolt input that produces this 10 Db. signal plus noise to noise ratio should be 5 microvolts or less.

(5) Repeat Steps 1 through 4 at approximately every 10 mc. up to 190.7 mc. and also repeat at the same frequencies with the receiver oscillator in the manual position.

## 5. ALIGNMENT PROCEDURE.

*a.* EQUIPMENT REQUIRED.

The following equipment should be available for proper alignment of the r-f and i-f sections of Radio Receiver R-516/URR-27:

(1) A R.F. Signal Generator Set AN/URM-25 Series, Navy Model LP series, or equivalent, signal generator.

(2) A RF Signal Generator Set AN/URM-26 Series, Navy Model LAF series signal generator with 6 db pad, 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 the A.C. cable.

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

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

(5) Connect power cord.

(6) 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 test point C116 (figure 7-15).

(2) Turn the receiver tuning dial to 105 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% with 1000cps.

(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 ME-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 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 mis-tuning 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.

*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

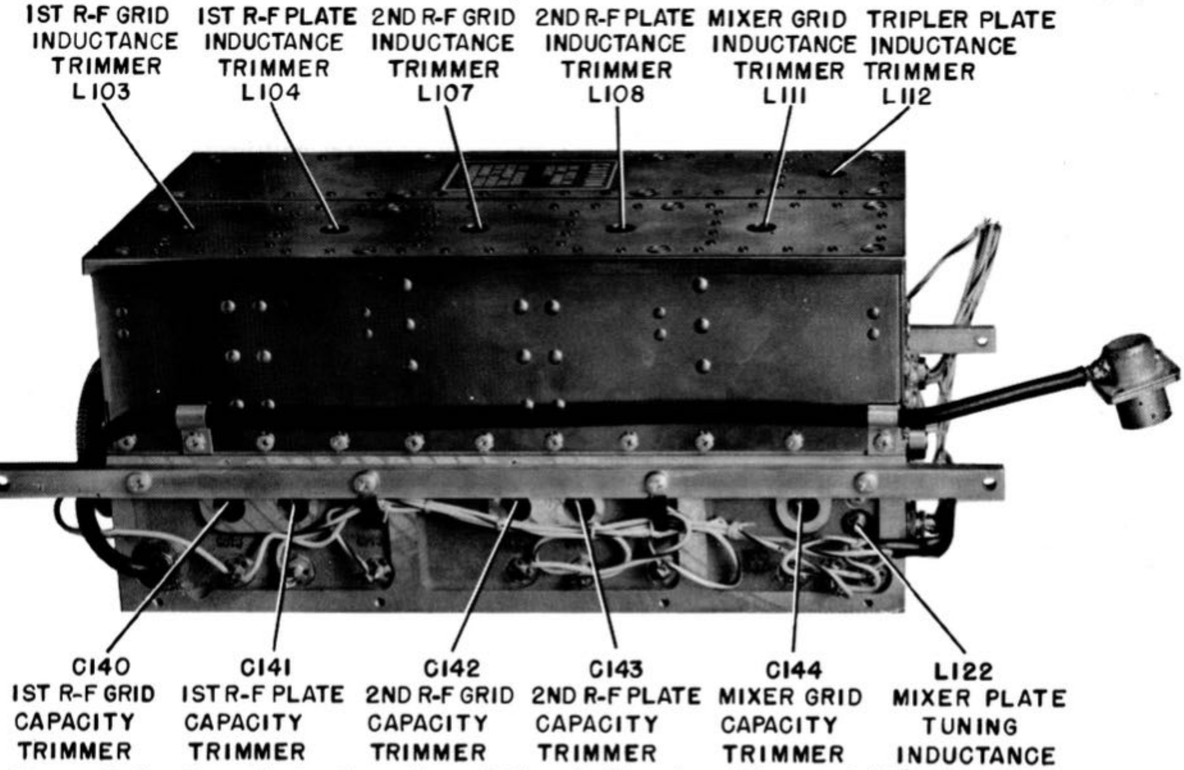



***Figure 7-4. Preselector from Top of Chassis Showing Alignment Adjusting Screws***

Bristol type wrench mounted on the bottom cover of the preselector. 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 counter-clockwise position.

(2) Install the crystal corresponding to some receiver frequency between 110 and 115 megacycles; turn the CRYSTAL-MANUAL switch to CRYSTAL; set the tuning dial to the crystal channel selected, and lock the tuning dial.

$$\text{Crystal frequency} = \frac{\text{Channel frequency plus 18.6 megacycles}}{6}$$

(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 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.

**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 | C116 |
| L.F. Alignment Check | 2.6 | 9.0 | 6.0 | 1.3 |
| H.F. Alignment Check | 4.7 | 10.0 | 7.0 | 2.0 |

(4) Place the probe of the electronic multimeter on the buffer amplifier grid test point (C124) and tune the amplifier 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.

**Note**

The oscillator, doubler, buffer amplifier 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.

(6) Connect the probe of the electronic multimeter to the junction of resistors R224 and R225 on the underside of the IF/AF section. 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 volts" in No. 8 and No. 9, and "0" for "0.3 volts" in step No. 10.

(7) 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 volts on the VTVM.

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

(*a*) Mixer grid inductance trimmer (L111).
(*b*) Tripler plate inductance (L112).
(*c*) 2nd r-f plate inductance trimmer (L108).
(*d*) 2nd r-f grid inductance trimmer (L107).
(*e*) 1st r-f plate inductance trimmer (L104).
(*f*) 1st r-f grid inductance trimmer (L103).
(*g*) Repeat (a), (b), (c).

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

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

(10) Throw the CRYSTAL-MANUAL switch to CRYSTAL, install the crystal corresponding to some channel frequency between 180 and 185 mc, set the tuning dial to the crystal channel selected, and lock the tuning dial.

(11) 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.

(12) Place the probe of the multimeter on the buffer amplifier grid test point (C124) and tune the amplifier grid capacity trimmer screw (C147) for a maximum meter reading.

(13) 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.

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

(15) 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 volts on the multimeter.

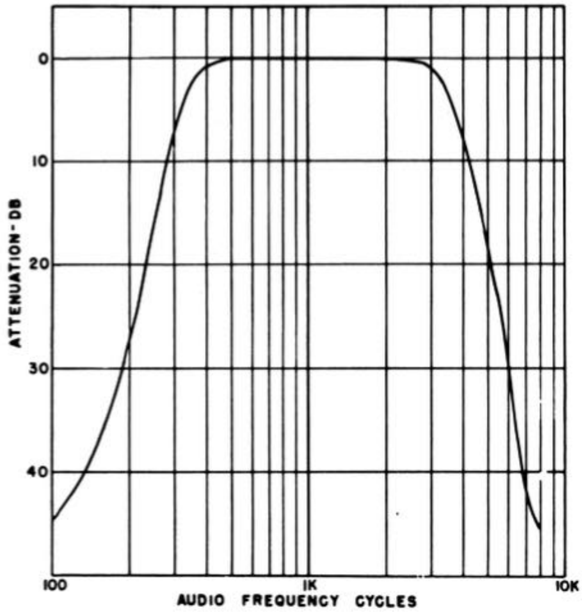



***Figure 7-5. Overall Audio Response Characteristic***

(16) 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*) Tripler plate capacitance trimmer (C-146).
(*c*) 2nd r-f plate capacity trimmer (C143).
(*d*) 2nd r-f grid capacity trimmer (C142).
(*e*) 1st r-f plate capacity trimmer (C141).
(*f*) 1st r-f grid capacity trimmer (C140).

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

(18) 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.

(19) After alignment of the preselector, remove the preselector shielding covers and tighten the in-

ductance trimmer locking screws (figure 7-7) carefully, so that the adjustments will not be disturbed.

(20) 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.

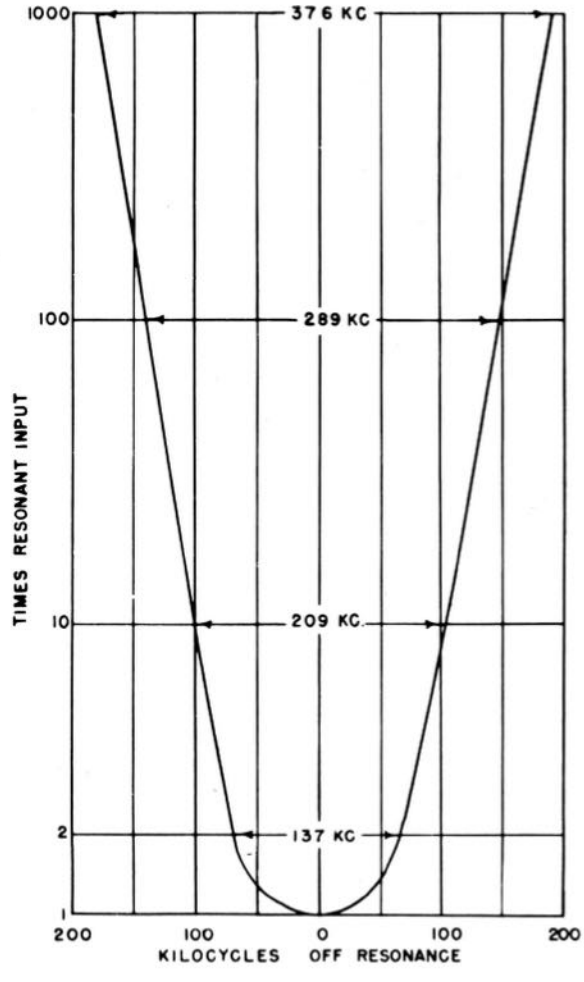



***Figure 7-6. Overall i-f Selectivity Characteristic***

(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 0.01 mf d-c blocking capacitor, to capacitor C123 located on the oscillator side of the preselector. Then:

(*a*) Set the tuning dial of the receiver at 110, 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 21.4 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 5d above.

(*e*) Set the tuning dial of the receiver to "185".

(*f*) Tune the frequency meter to 33.9 megacycles, or to half of this frequency.

(*g*) Tune the oscillator capacity trimmer screw (L114) 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 5d above, omitting step No. 19.

## 6. REMOVAL AND REPLACEMENT OF PARTS.

Removal and replacement of most of the parts of Radio Receiver R-516/URR-27 is a straightforward

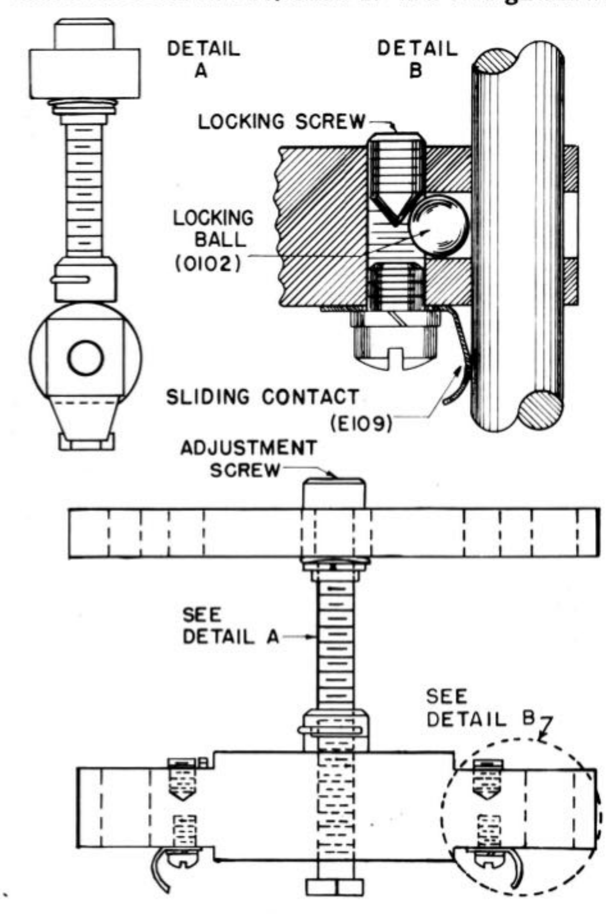



***Figure 7-7. Details of Trimmer Inductances L103, L104, L107, L108, L111, and L112 (Preselector)***

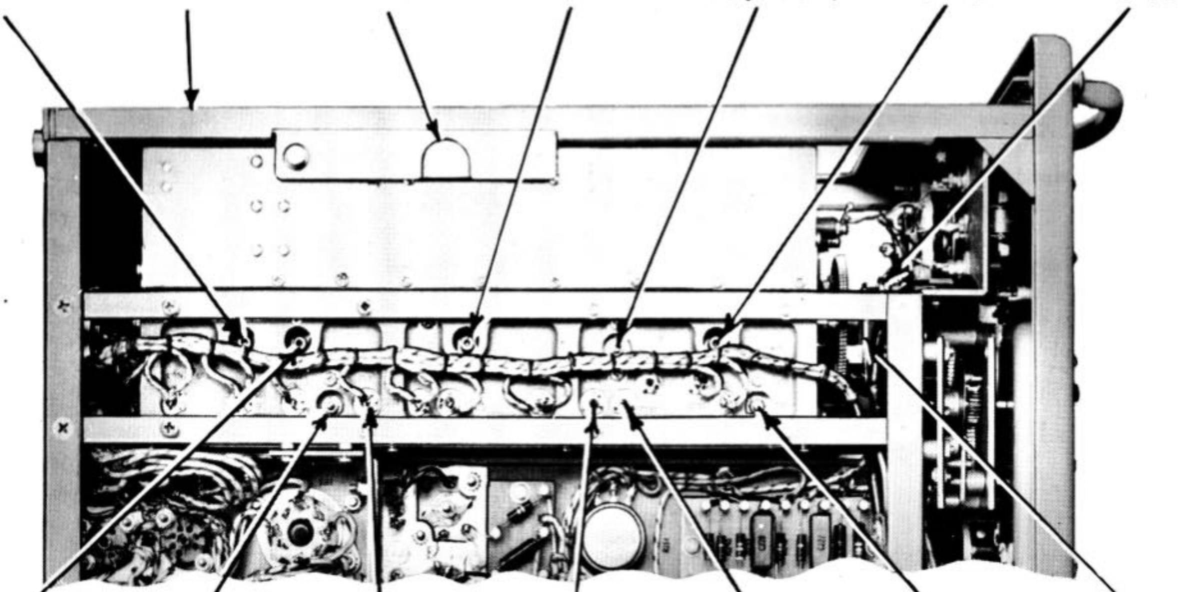



*Figure 7-8. Preselector from Bottom of Chassis Showing Alignment Adjusting Screws*

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.

*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:

(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 sub-assembly.

(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 sub-assembly 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 6a 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).

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: 1,000 cycles through 0.1 mfd or large capacitor.

TABLE 7-3. INTERMEDIATE FREQUENCY DATA

| TEST POINT | INPUT TEST VOLTAGE (APPROX.) | OUTPUT METER READING |
|---|---|---|
| Mixer grid test point C116 | 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 mc modulated 30% with 1000 cycles throught a 0.01 mfd capacitor.

(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).

*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.

(4) Pull the rear panel away from 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

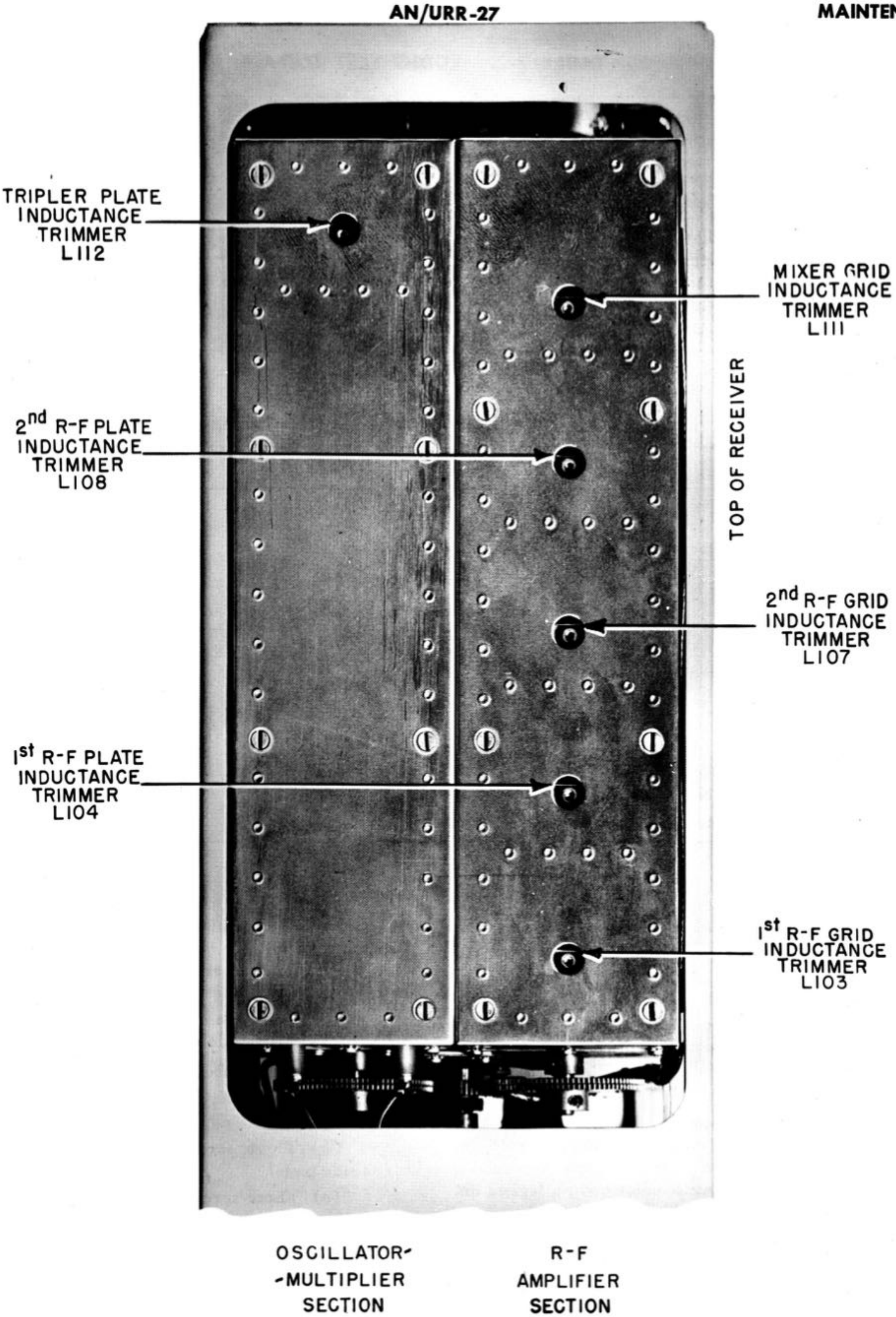



*Figure 7-9. Preselector from Left Side of Chassis Showing Alignment Adjusting Screws*

are re-connected 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 0-1 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 (0-4 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 the calibrated 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 "103" is at top of the calibrated dial (approximate extreme left position of shaft).

(8) Turn the driven member of the flexible coupling (0-4A—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 (0-4B) of the flexible drive with the driven member (0-4A), 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 6, less 18.6 megacycles).

(11) Note the discrepancy, in dial divisions, between the reading on the calibrated tuning dial and 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 on 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 sub-assembly.

(*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 sub-assembly 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 sub-assembly.

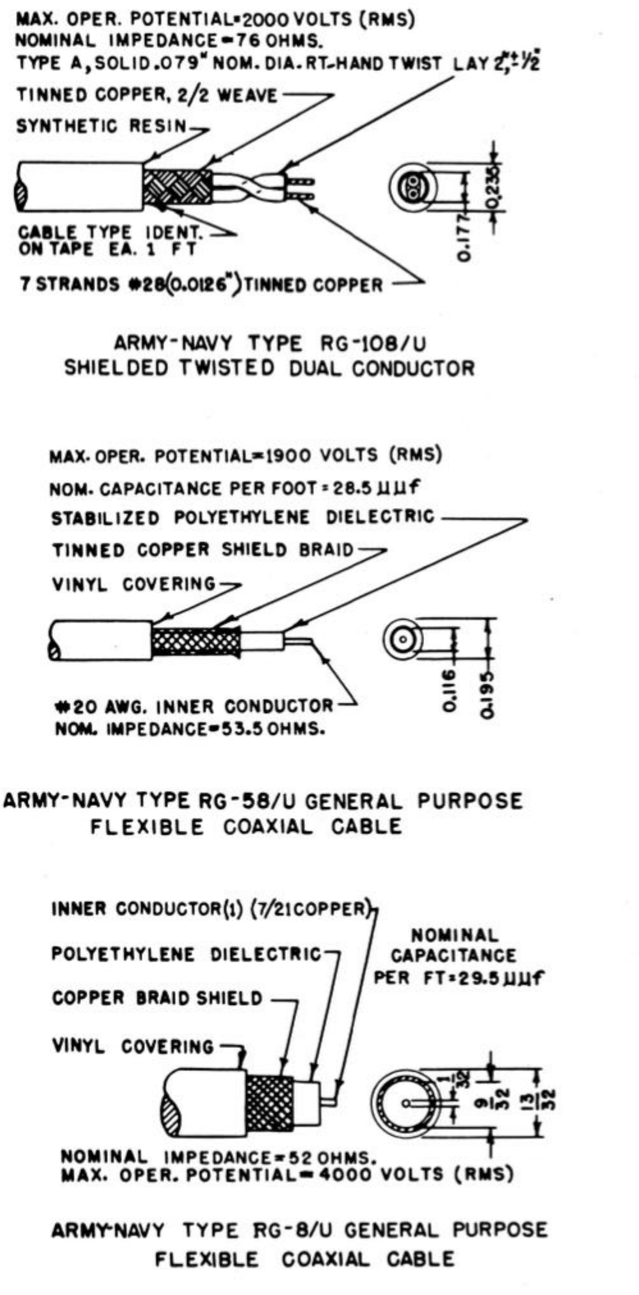



***Figure 7-10. Details of R-f and I-f Cables Used in or with Radio Receiving Set AN/URR-27***

### 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 sub-assembly, and rail farther from left side from preselector, in similar manner to step No. 6.

(9) Turn tuning crank until "150" 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 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 (0-4A) 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 "103" 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 (0-4A) which was loosened in step No. 11.

(14) Insert a crystal of known frequency and tune the receiver to the corresponding carrier frequency (crystal frequency x 6, less 18.6 megacycles).

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

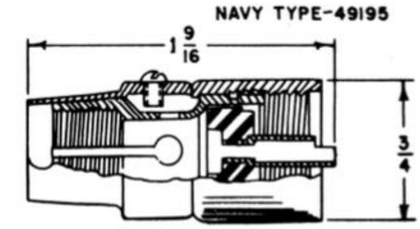
(16) Crank the mechanism to a point where the set screw on the driven member of the flexible coupling is accessible, and loosen same.

(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.

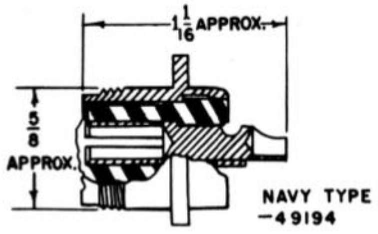
(18) Tighten the set screws on the driven member of the flexible coupling.

## 7. REPLACEMENT OF R-F CABLES.

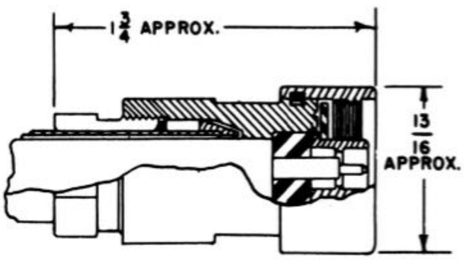
Several lengths of AN type RG-58/U cable are used in the receiver proper and in the cable filter unit, and one length of AN type RG-108/U cable is used in the receiver, as indicated in the wiring diagram of figure 7-18. Unless subjected to physical abuse or abnormal conditions of operation, these cables 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.



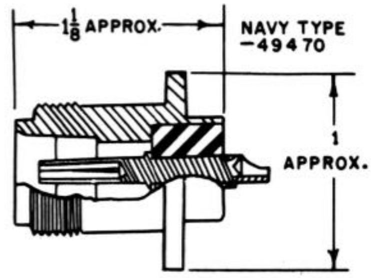

50-OHM SCAN OUTPUT PLUG P403



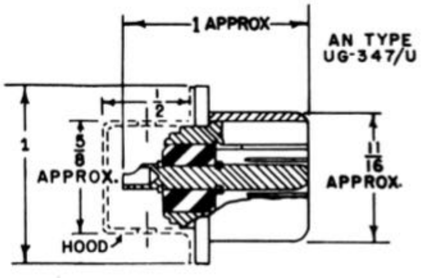

50-OHM SCAN OUTPUT RECEPTACLE
J403



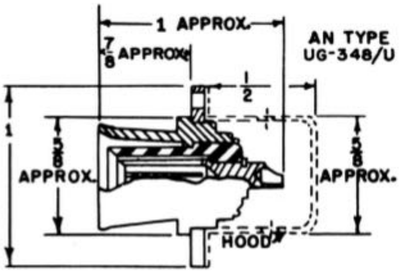

AN TYPE UG-21B/U
50-OHM ANT. INPUT PLUG P404




50-OHM ANT. INPUT RECEPTACLE
J404




ANT. AND SCAN INTERUNIT PLUGS
P101 AND P201




ANT. AND SCAN INTERUNIT RECEPTACLES
J407 AND J406

***Figure 7-11. Details of R-f and I-f Connectors Used in or with Radio Receiving Set AN/URR-27***

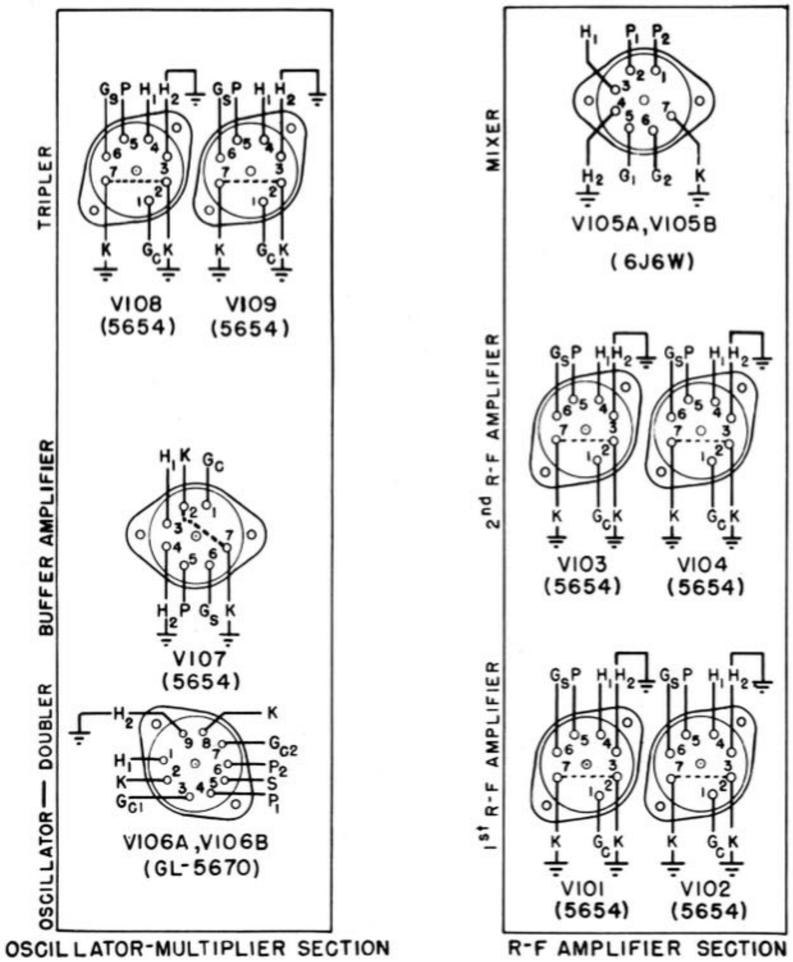



*Figure 7-12. Tube Socket Diagrams—Preselector (Top Views)*

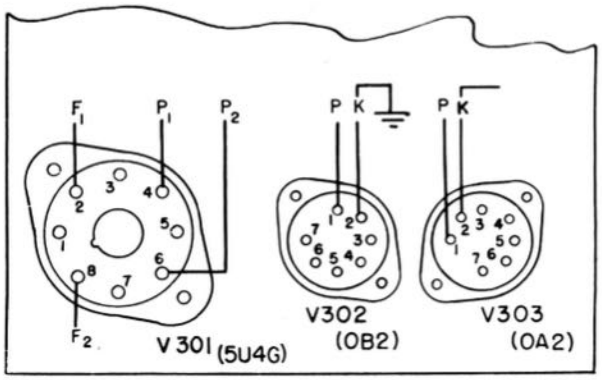



*Figure 7-13. Tube Socket Diagrams—Power Supply (Bottom View)*

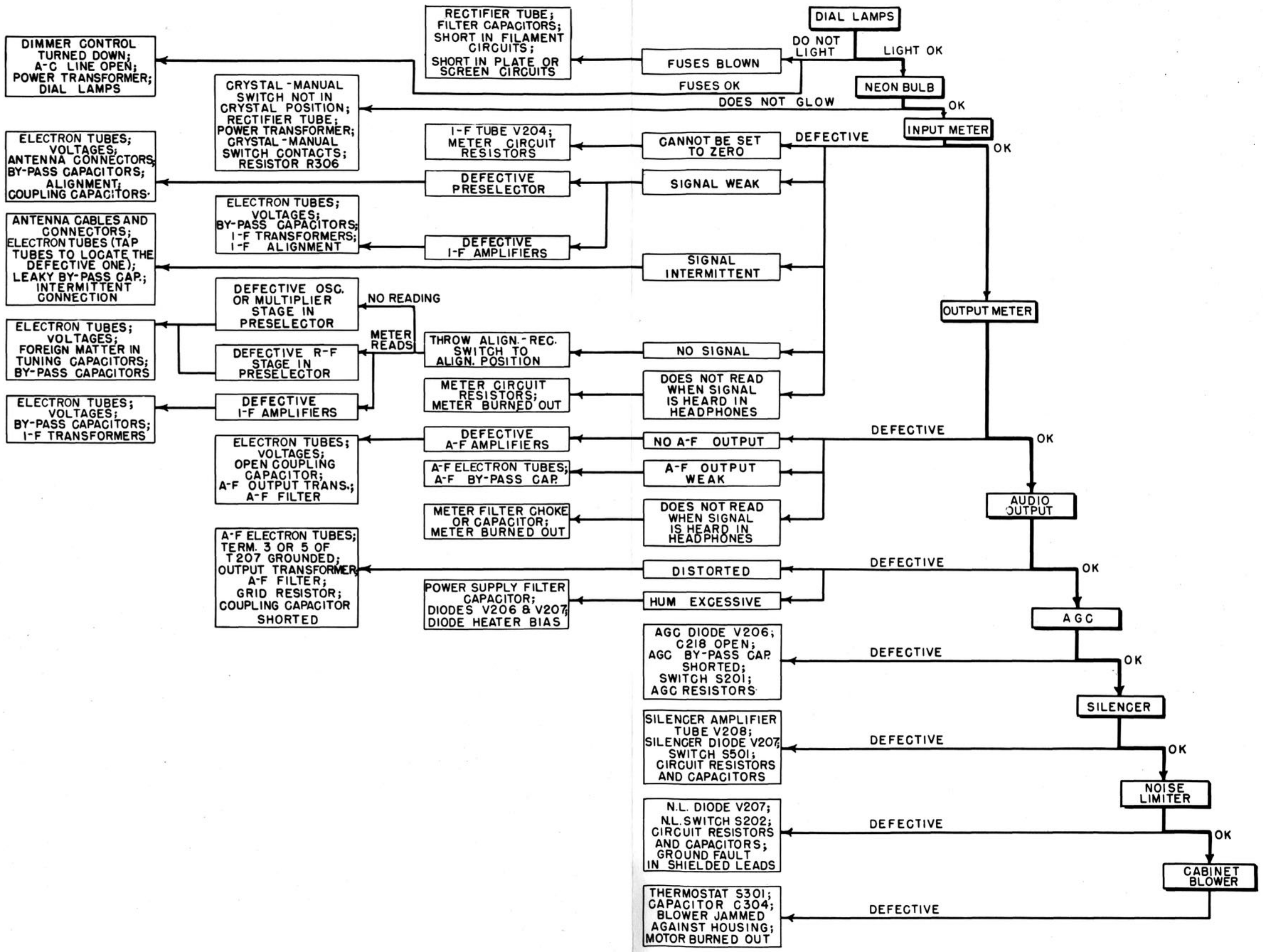



Table 7-4. Trouble Shooting Chart

## 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-516/URR-27 — 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-516/URR-27 — 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-516/URR-27 — 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 |

*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.

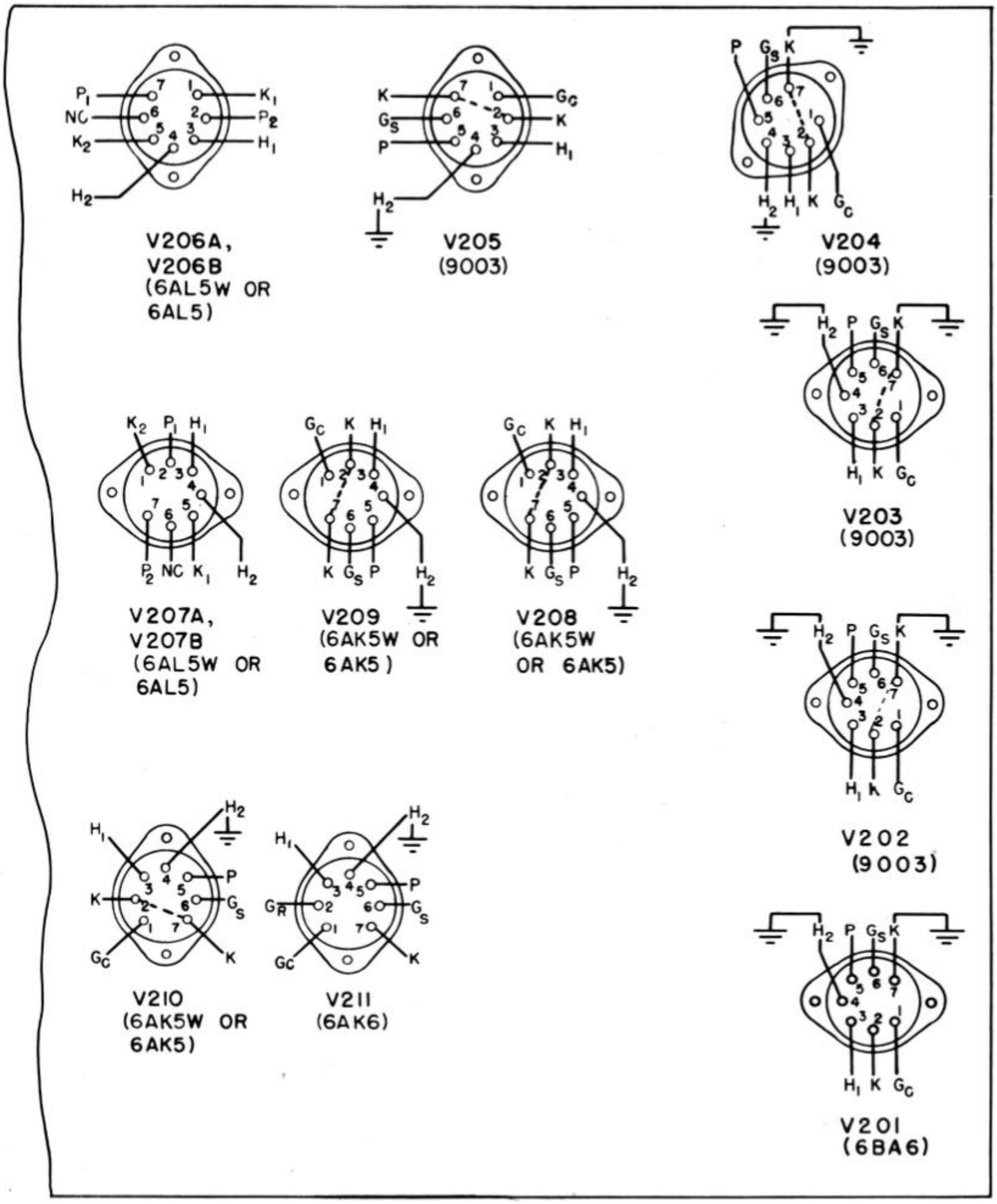



*Figure 7-14. Tube Socket Diagrams—IF/AF Section (Bottom View)*

**TABLE 7-5. (CONT'D.) VOLTAGE AND RESISTANCE MEASUREMENT*—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-516/URR-27 — IF/AF Section (Continued)** | | | | |
| V206 (6AL5) | #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 (6AL5) | #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 (6AK5) | 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 (6AK5) | 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 (6AK5) | 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-516/URR-27 — 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 |

*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 7-5. (CONT'D.) VOLTAGE AND RESISTANCE MEASUREMENT*—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-516/URR-27 — 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.

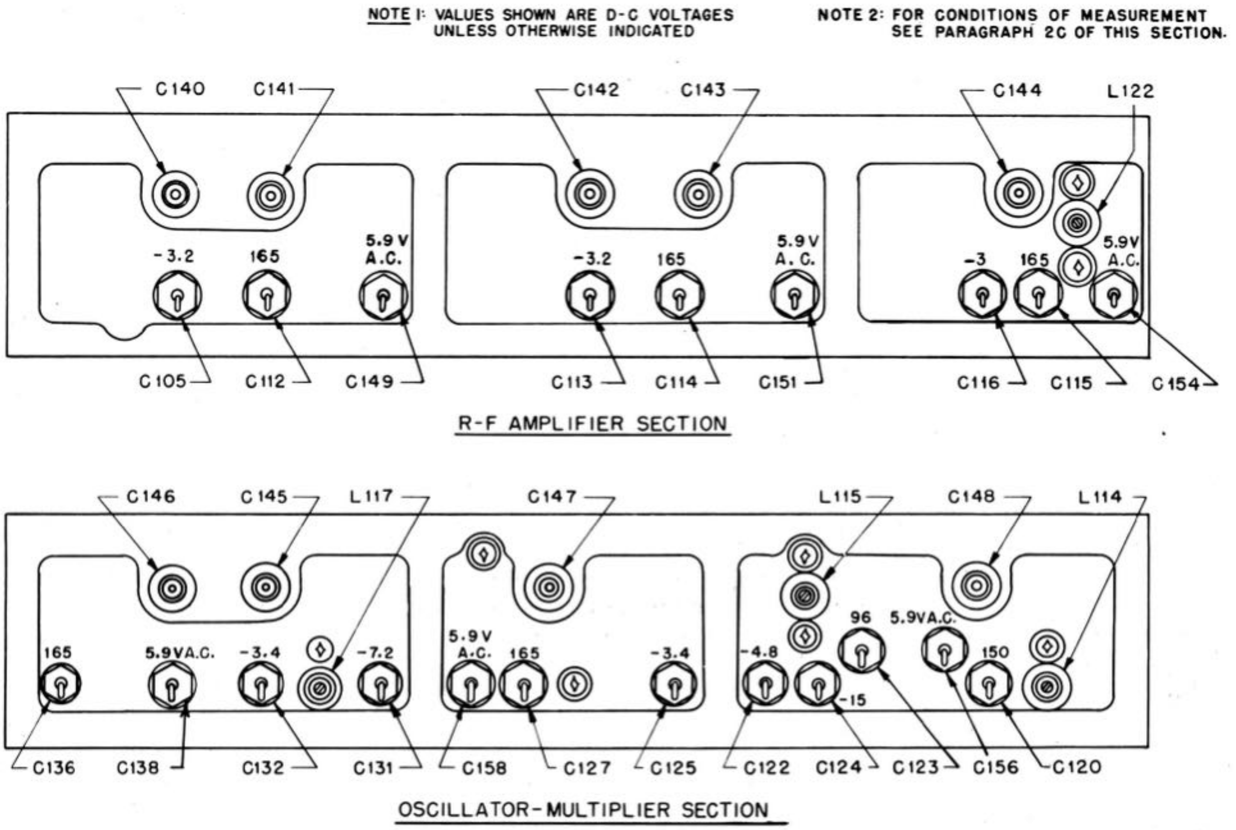


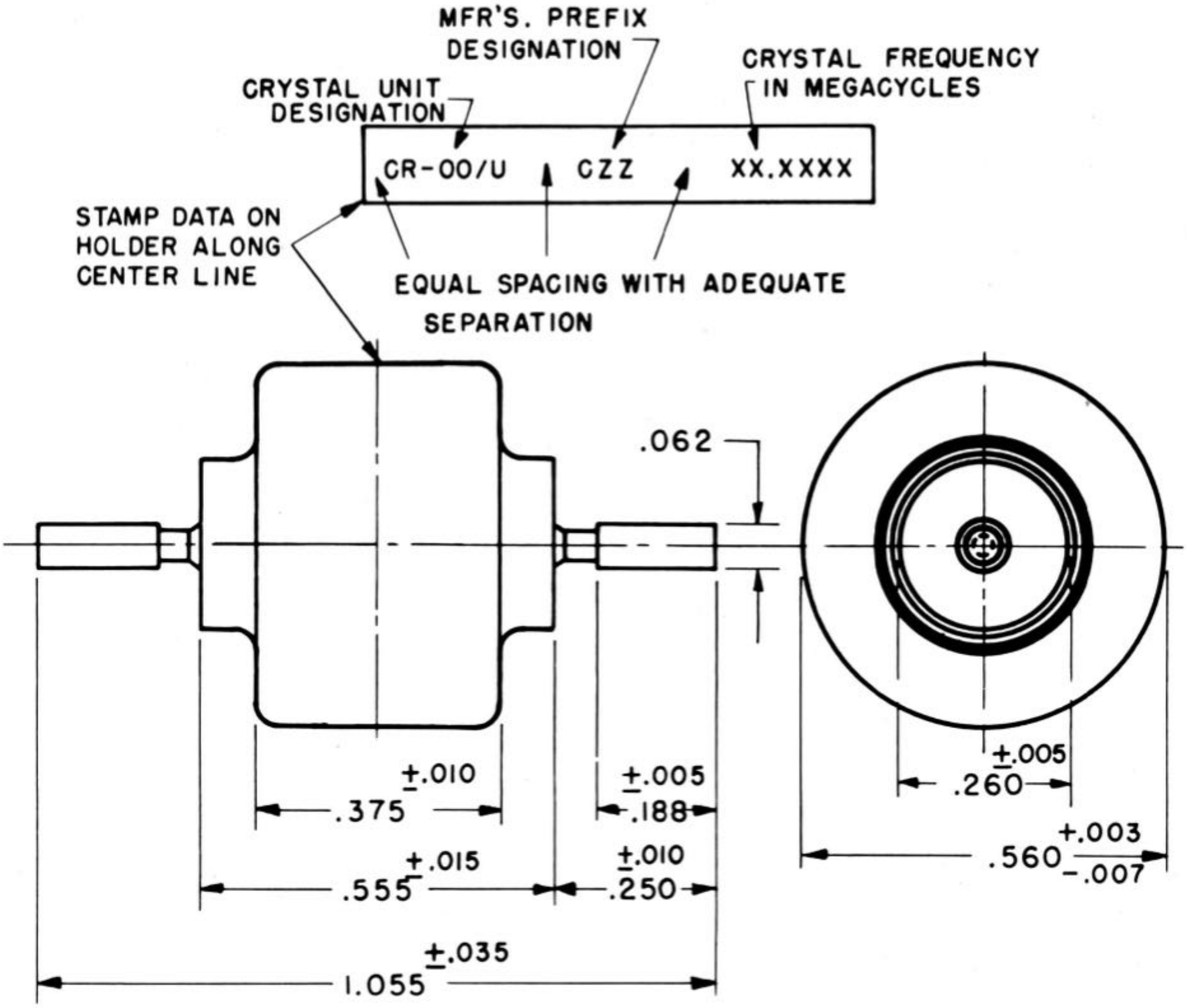

Figure 7-15. Voltage Diagram—Significant Voltage Measurements at Points on Preselector

## 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 | —0.65 | 5.6 | ∞ |
| 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 | 0 | 58 | ∞ |
| 10 | Ground | —6.5 | 0 | ∞ |
| 11 | Ground | | | 3 |
| 12 | Ground | 0 | 0 | 3 |
| 13 | Ground | 144 | 0 | 28,000 |
| 14 | Ground | —0.25 | 54 | ∞ |
| 15 | Ground | 103 | 0 | 170,000 |
| The following terminals are located on terms. board E301 in Pwr. Supply Section. | | | | |
| 21 | Ground | 0 | 5.9 | 0 |
| 22 | Ground | 0 | 5.9 | 28,000 |
| 23 | Ground | 165 | 0 | 28,000 |
| 24 | Ground | 0.25 | 54 | ∞ |
| 25 | Ground | 0 | 0 | 0 |
| 26 | Ground | —0.6 | 57 | ∞ |

| 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.



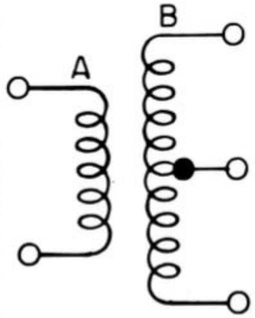
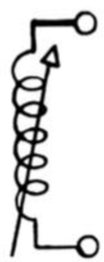
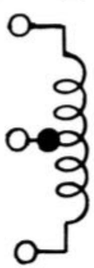

1. FREQUENCY RANGE OF CRYSTALS USED = 20.425 TO 35.0833 MC.
2. INTERMEDIATE FREQUENCY OF RECEIVER = 18.6 MC.
3. HETERODYNE FREQUENCY RANGE = 122.55 TO 210.5 MC.
4. METHOD OF MULTIPLICATION = CRYSTAL FREQUENCY X2X3; SEE SCHEMATIC DIAGRAM, FIGURE(2-5)
5. TEMP. CHARACTERISTIC = ± 0.005% DEVIATION BETWEEN −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.

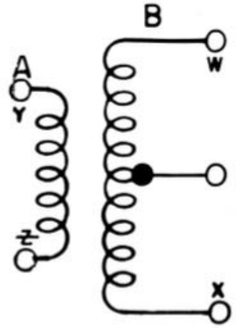
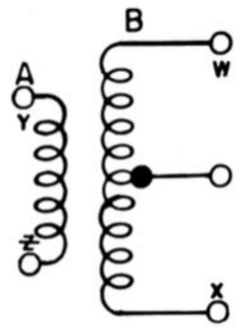
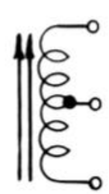
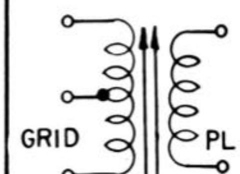
*Figure 7-16. Outline and Data—Crystal Unit CR-24/U*

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 | $I_s$ | Test Volts |
| 5634 | 6.3 | 0.175 | 120 | —2.0 | 120 | 7.5 | 2.5 | 340,000 | — | 5000 | 3500 | — | — |
| OA2 | Cold Cathode | — | 150 | — | — | 5-30 cont. 75 max. start | — | — | — | — | — | — | — |
| OB2 | Cold Cathode | — | 108 | — | — | 5-30 cont. 75 max. start | — | — | — | — | — | — | — |
| 5670 | 6.3 | 0.30 | 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 | 3500 | — | — |
| 6AK6 | 6.3 | 0.15 | 180 (300 max) | —9.0 | 180 (250 max) | 15 | 2.5 | 200,000 | — | 2300 | 1840 | 45 | 30 |
| 6BA6 | 6.3 | 0.30 | 250 (300 max) | —20.0 | 100 | 11 | 4.2 | 150,000 | — | 4400 | 3600 | 60 | 20 |
| 6J6W | 6.3 | 0.45 | 150 (300 max) | —10.0 | — | 8.5 | — | 7100 | 38 | 5300 | 4000 | 40 | 10 |
| 9003 | 6.3 | 0.15 | (250 max) | —3.0 | (100 max) | 6.7 | 2.7 | 700,000 | — | 1800 | 1100 | 60 | 20 |
| | 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 | | | | | 40 | 10 |

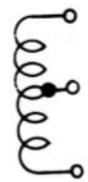
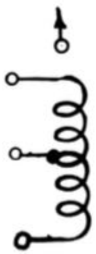
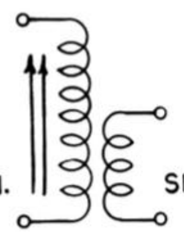
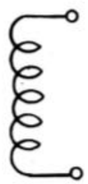
## TABLE 7-8. COIL WINDING DATA—ALL WIREWOUND PARTS, EXCEPT RESISTORS

| Circuit Symbol | FTRC or NATCO. Dwg. No. | 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-516/URR-27—Preselector | | | | | |
| L101 | SA:9520 |  | 2 wdg., single layer wnd. | 3/8″ diam. ceramic form NATCO. Dwg. R233-2 | #18 AWG tinned copper | Wdg. A: 2 turns<br><br>Wdg. B: 10 turns w/loop tap at 5 turns from term. W | Less than 0.1 | Wdg. A: 0.054 μh at 125 mc. (calc)<br><br>Wdg. B: 0.287 μh at 25 mc | 130 (125 mc)<br><br>150 (25 mc) | Wdg. A: term. Y to Z 2 turns at 6 t.p.i.;<br><br>Wdg. B: term. W to X 3-1/2 turns at 10 t.p.i., 1/2 turn at 2-2/3 t.p.i., 2 turns at 6 t.p.i., 1/2 turn at 2-2/3 t.p.i. and 3-1/2 turns at 10 t.p.i.;<br><br>Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C. |
| L103<br>L104<br>L107<br>L108<br>L111<br>L112 | SA:9516 |  | Single wdg., single layer wnd. | 7/16″ diam. ceramic form, NATCO. Dwg. SA:9527 | #18 AWG tinned copper | 2-1/4 turns | Less than 0.1 | 0.112 μh at 25 mc | 50 (25 mc) | Wdg. 2-1/4 t.p.i.;<br><br>Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C. |
| L105<br>L106<br>L109 | SA:9514 |  | Single wdg., single layer wnd. | 3/8″ diam. ceramic form, NATCO. Dwg. R233-4 | #18 AWG tinned copper | 10 turns w/loop tap at 5 turns from term. A | Less than 0.1 | 0.305 μh at 25 mc | 150 (25 mc) | Wdg. 10 t.p.i.;<br><br>Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| L110 | SA:9519 |  | 2 wdg., single layer wnd. | 3/8" diam. ceramic form, NATCO. Dwg. R233-3 | #18 AWG tinned copper | Wdg. A: 3 turns<br><br>Wdg. B: 10 turns w/loop tap at 5 turns from term. W | Less than 0.1 | Wdg. A: 0.075 μh at 105 mc (calc)<br><br>Wdg. B: 0.287 μh at 25 mc | 135 (105 mc)<br><br>150 (25 mc) | Wdg. A: term. Y to Z 3 turns at 10 t.p.i.;<br><br>Wdg. B: term. W to X 3 turns at 10 t.p.i., 1/2 turn at 2-2/3 t.p.i., 3 turns at 6 t.p.i., 1/2 turn at 2-2/3 t.p.i., 3 turns at 10 t.p.i.;<br><br>Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C. |
| L113 | SA:9517 |  | 2 wdg., single layer wnd. | 3/8" diam. ceramic form, NATCO. Dwg. R233-1 | #18 AWG tinned copper | Wdg. A: 2 turns<br><br>Wdg. B: 6 turns w/loop tap at 3 turns from term. W | Less than 0.1 | Wdg. A: 0.054 μh at 125 mc (calc)<br><br>Wdg. B: 0.147 μh at 25 mc | 130 (125 mc)<br><br>120 (25 mc) | Wdg. A: term. Y to Z 2 turns at 6 t.p.i.;<br><br>Wdg. B: term. W to X 1-1/2 turns at 6 t.p.i., 1/2 turn at 2-2/3 t.p.i., 2 turns at 6 t.p.i., 1/2 turn at 2-2/3 t.p.i., 1-1/2 turns at 6 t.p.i.;<br><br>Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C. |
| L114 | FRA-18729-2 |  | | 7/16" diam. ceramic tube. FTRC Dwg. FRA-20302-1 | #20 AWG bare tinned S.D. copper* | 14 turns, tap at 5-11/16 turns from mtg. base end (incl. term. clip). | | 1.4 μh | | Single layer wound;<br><br>Powdered iron slug on threaded brass stud for inductance adjustment. |
| L115 | SA:9714 |  | Grid and plate wdgs. inter-spaced in double helix | 7/16" diam. mica filled phenolic tube. FTRC Dwg. FRP-17877-14-3 | #20 AWG bare* tinned soft copper | Grid: 6 turns, tap at 2-7/8; Plate: 5-3/8 turns | 0.01 | 0.34 μh at 10 mc and 20 mc, and 100 dcma | | Both wdgs. space wound at 8 t.p.i.;<br><br>Coated with "Q-max. A-27" (tropicalized) and baked dry at 60° C.;<br><br>Powdered iron slug on threaded brass stud for inductance adjustment. |

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

TABLE 7-8. (CONT'D). COIL WINDING DATA—ALL WIREWOUND PARTS EXCEPT RESISTORS

| Circuit Symbol | FTRC or NATCO. Dwg. No. | Schematic Diagram | Winding | Coil Form | Wire and Size | No. of Turns and Loc. Taps | D-C Resis. (Ohms) | Induc-tance | "Q" (and Freq.) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| L116 | SA:9529 |  | Single wdg., single layer wnd. | 7/16" diam. mica-filled phenolic tube, NATCO. Dwg. SA:9518 | #24 AWG tinned copper | 25-1/8 turns w/loop tap at 13-1/8 turns from term. S | Less than 0.1 | 2.55 µh at 7.9 mc. | | Wdg. 26 t.p.i.; Coated with "Q-max. A-27" (tropical-ized) and baked dry at 60° C. |
| L117 | SA:9528 |  | Single wdg., single layer wnd. | 7/16" diam. mica-filled phenolic tube, NATCO. Dwg. SA:9515 | #20 AWG tinned copper | 8 turns w/ loop tap at 4-1/4 turns from term. S | Less than 0.1 | 0.29 µh −0.43 µh at 25 mc | Q = 160 | Wdg. 14 t.p.i.; Coated with "Q-Max. A-27" (tropical-ized) and baked dry at 60° C. Powdered iron slug on threaded brass stud for inductance adjustment. |
| L122 | FRA-18728-2 |  | Primary (at mtg. base end) | 7/16" diam. phenolic tube | #26 AWG bare tinned soft copper* | 7-1/4 | | 0.75 h | | Coated with "Q-max. A-27" (tropical-ized) and baked dry at 60° C. |
| | | | | FTRC Dwg. FRF-17877-14-6 | | | | | | Powdered iron slug on threaded brass stud for inductance adjustment. |
| | | | Secondary (at free end) | | #26 AWG bare tinned soft copper* | 1-5/6 | | 0.15 h | | Both dwgs. at 28 t.p.i. |
| L123 | FRA-20493-1 |  | | 5/32" diam. x 1/2" lg. phenolic 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" (tropical-ized), and baked dry at 60° C. |

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

Radio Receiver R-516/URR-27—I/F/AF Section

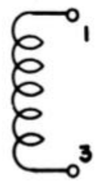
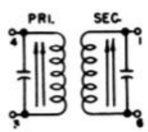
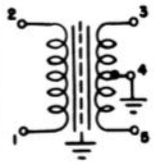
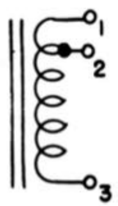
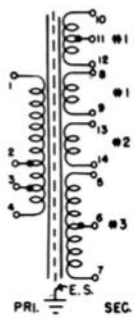
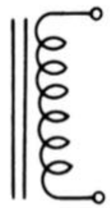
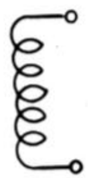
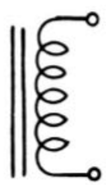
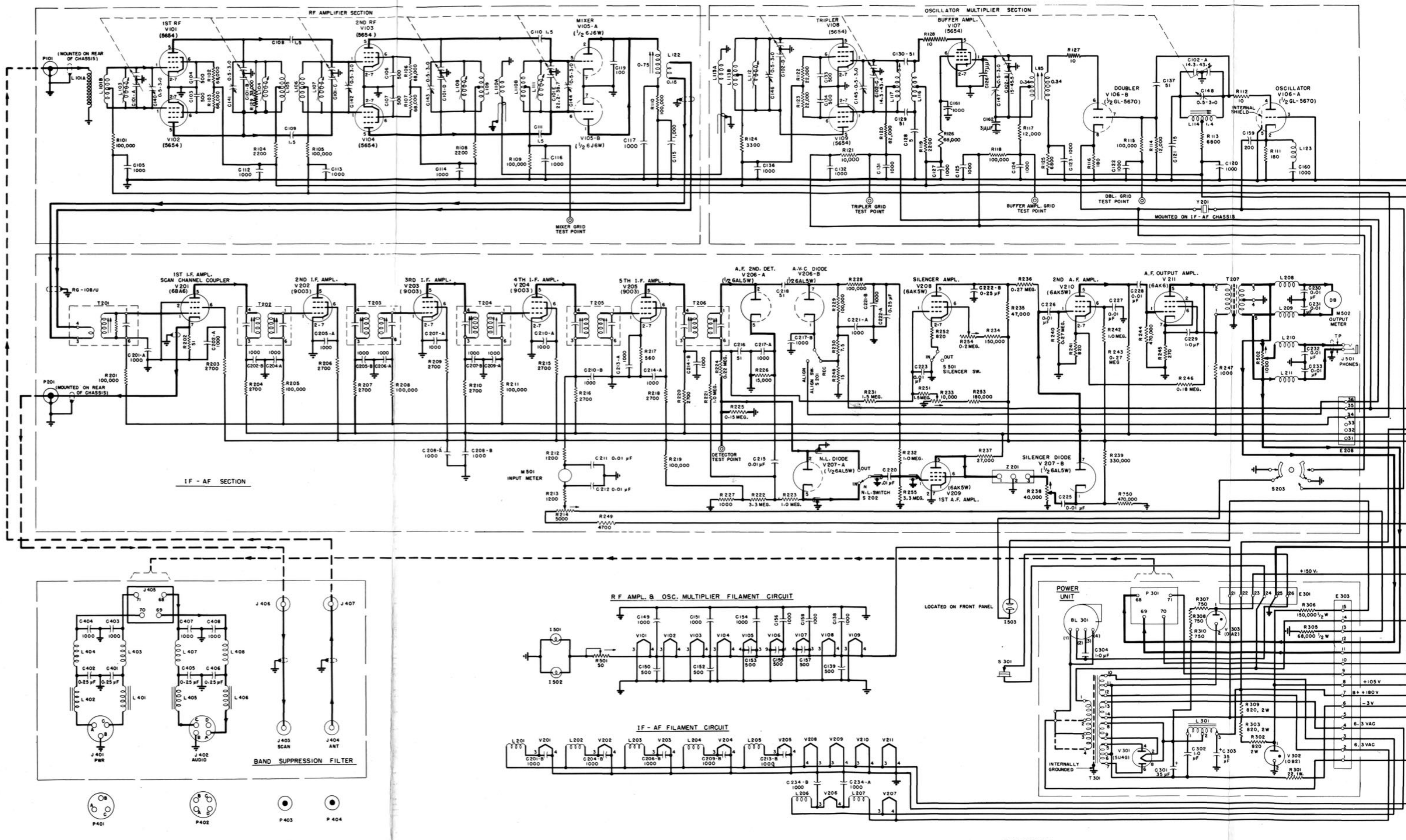
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| L201 thru. L211 | FRA-511-1 |  | | 13/64" diam. x 5/8" lg. phenolic form. FTRC Dwg. FRP-512-1 | #30 AWG SC enam, copper magnet | 45 0.255, ±10% | 3 μh ±5% | 50, ±10% at 25 mc | Preheated (100° C.), dipped in "Q-max A-27" (tropicalized),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

TABLE 7-8. (CONT'D.) COIL WINDING DATA—ALL WIREWOUND PARTS EXCEPT RESISTORS

| Circuit Symbol | FTRC or NATCO. Drawing Number | Diagram | Schematic 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 en-closing frame | #40E | 2600 | 710 | 15h | | 180 v. to grnd. Turns ratio = 12.4/. Freq. response = ±2 db, 350-3500 cps.<br>Electrostatic shield be-tween windings<br>Impedance ratio=100,-000/60 |
| | | | Sec. | | #29E | 210 | 5.3 | | | Per FTRC Spec. RC-7898-1 |
| Radio Receiver R-516/URR-27 —Power Supply Section | | | | | | | | | | |
| L301 | RC-8113-1 |  | | | | Humbuck-ing tap at 11.4% of turns | 350 | 12 h, ±15% at 145 dcma & 10 v, 60 cps, rms. | | 1600 v rms test<br>Per FTRC spec. RC-8112-1<br>320 v peak wkg. |
| T301 | RC-8115-1<br>0v<br>110v<br>115v<br>120v |  | | | | | | Voltage & ter-minals | | |
| | | | 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 |
| | | | Pri. #3 | | #22E | 324 | 2.60 | 120 v at 1 & 4 | | Electrostatic shield be-tween pri. and sec. wdgs. Shield grndd. to case |
| | | | Sec. #4 | | #24E | 18, C.T. | 0.32 | 6.3 v, 0.6 amps at 10, 11 (C.T.) & 12 | | |
| | | | Sec. #1 | | #17E | 14-1/2 | 0.055 | 5 v, 3.3 amps at 8 & 9 | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Radio Receiver R-516/URR-27-Power Supply Section | | | | | | | | | | | |
| T301 Cont'd | | | Sec. #2<br>Sec. #3 | | 2 X#19E<br>#30E | 18<br>1320 C.T. | 0.055<br>85 | 6.3 v, 3.8 amps at 13 & 14<br>470 v, 0.145 amps at 5, 6 (C.T.) & 7 | | |
| Radio Receiving Set, AN/URR-27—Band Suppression Filter | | | | | | | | | | | |
| L401<br>L402 | FRA-2698-1 (—304682) |  | | 5/8" 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 225kc ±10% | Universal wdg.<br>Cp=4 μμf, ±1 μμf<br>1" lg. iron core cemented inside coil form at 9/32" from free end |
| L403<br>L404<br>L407<br>L408 | FRA-2720-1 (—472314) |  | | 3/8" diam. x 1-3/8" lg. phenolic rod form. FTRC Dwg. FRP-2721-1 | #22 enam. copper magnet | 7-1/2 | 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. |
| L405<br>L406 | FRA-2699-1 (—304681) |  | | 5/8" 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.<br>100 v rms test<br>Cp=2 μμf ±0.5 μμf<br>1" lg. iron core cemented inside coil form 9/32" from free end<br>Preheated (100° C.), dipped in "Q-max A-27" (tropicalized) and baked dry at 60° C. |

# NOTES

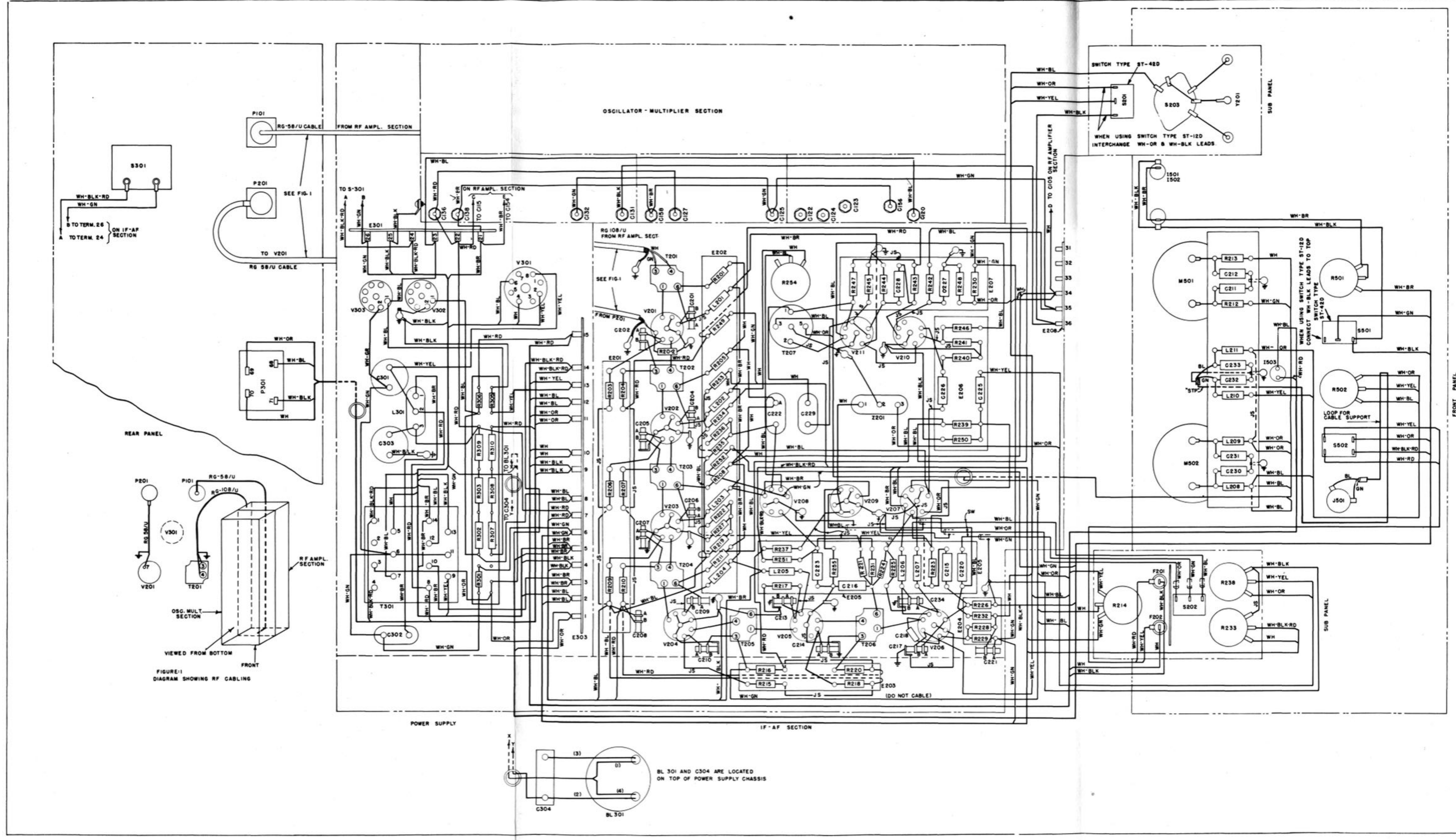


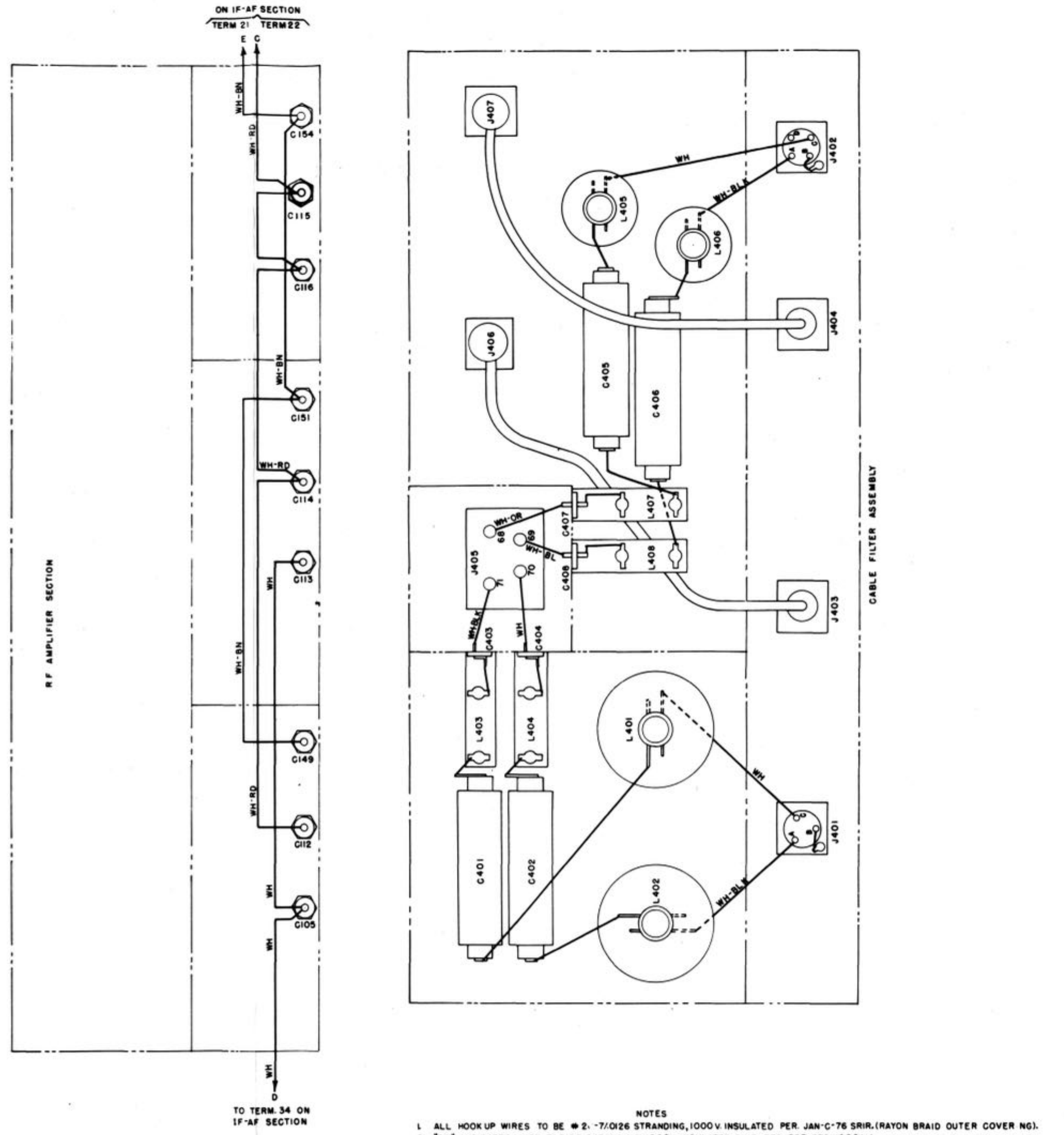

LEGEND
CAPACITANCE IN $\mu\mu$F
RESISTANCE IN OHMS
INDUCTANCE IN $\mu$H
UNLESS OTHERWISE SPECIFIED
FREE ARROW ALONG POTS SHOWS CLOCKWISE ROTATION

Figure 7-17. Schematic (Overall)—Radio Receiver R-516/URR-27

NAVSHIPS 91771
AN/URR-27







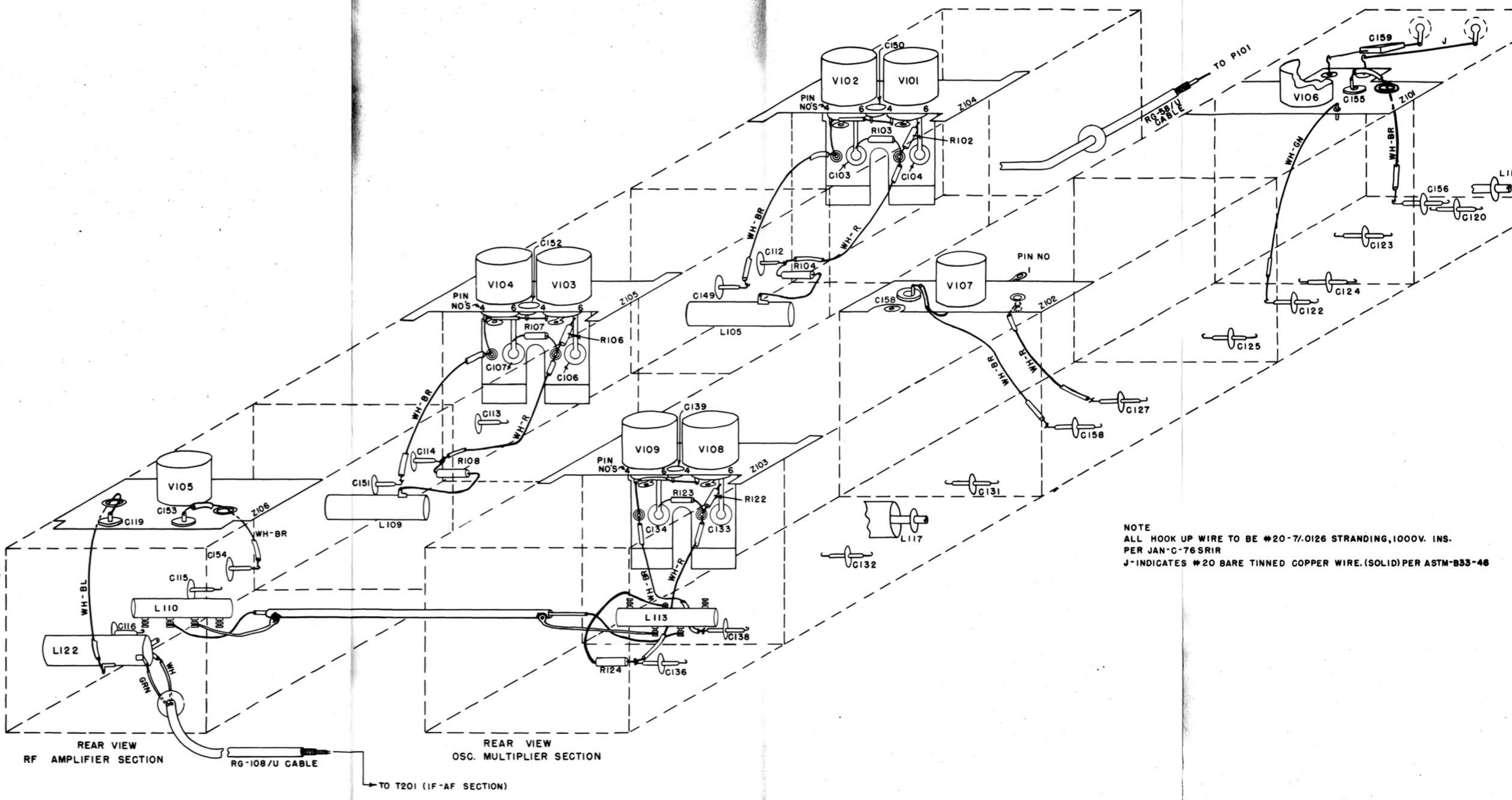
NOTES

1. ALL HOOK UP WIRES TO BE #2 -7/.0126 STRANDING, 1000 V. INSULATED PER JAN-C-76 SRIR. (RAYON BRAID OUTER COVER NG).
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.

REFERENCE DRAWINGS

1. OVERALL SCHEMATIC DIAGRAM-FRD-21171-26
2. ELECTRICAL PARTS LIST-FRL-3985-1
3. WIRE REQUIREMENTS LIST-FRL-5307-2

Figure 7-18. Wiring Diagram—Receiver Chassis and Band Suppression




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

# SECTION 8
# PARTS LISTS

## 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 | | |
| #1 | 6-1/8" | 19" | 10" | 1164 | 23 |

## 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-516/URR-27, and the mounting brackets, plugs and instruction books comprised in Radio Receiving Set AN/URR-27. 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, | AN/URR-27 |
| 101-399, 501-599 | | including one Radio Receiver | R-516/URR-27 |
| 401-499 | | including one Band Suppression Filter | |
| — | 1 | Repair Parts Box | — |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| RADIO RECEIVING SET AN/URR-27 – PRESELECTOR | | | | | | | | | | |
| C101<br>C101A<br>C101B<br>C101C<br>C101D<br>C101E | TUNER, r-f: air dielectric, plate meshing type; 5 sections; 12.2 uuf min, 38.7 uuf max capacity, each section; SLF tuning characteristic; 750 v A.C. peak voltage; 10 11/32" lg x 2 11/16" wd x 4 33/64" h, excl shaft and bushing; 5/16" lg x 1/2" diam bushing; 1/2" lg x 1/4" diam shaft beyond bushing; extension shaft adjustment; 85.5° CW rotation; mycalex base insulation; 35 solder lug term; eight no. 6-32 tapped, irregularly spaced, mtg holes on metal casting; includes 5 variable inductors L103, L104, L107, L108, L111; includes 5 trimmer capacitors C140 through C144; tunes over 105-190 mc range; split stators w/balanced grounded rotors; 90 invar plates w/ copper, nickel and silver plated finish | RF tuning assembly | | F16-T-98076-1601** | CNA; type SA:9544 | SA:9544 | C101 | 1 | | |
| C102<br>C102A<br>C102B<br>C102C<br>C102D | TUNER, r-f: variable air capacitor tuning; one band, designed for 123.6 to 208.6 mc range; cast aluminum frame; caustic etched finish w/water dip lacquer; 14 | Oscillator multiplier tuning assembly | | ** | CNA; type SA:9545 | SA:9545 | C102 | 1 | | |
| ** | This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned in to the activity from which the replacement is received. | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C102 (cont'd) | solder lug terminals located on bottom; o/a dim 10 11/32'' lg x 2 11/16'' wd x 4 33/64'' h; eight no. 6-32 tapped mtg holes irregularly spaced in aluminum casting; tuning inductances not included | | | | | | | | | |
| C103 | CAPACITOR, fixed: silver mica dielectric; 500 uuf, ±10%; 500 vdcw temp coef, not limited; ''button'' type; 29/64'' nom diam x 1/16'' th body; one 9/32'' lg rt angle solder lug term (slotted); three 5/32'' lg mtg tabs (grnd 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 uuf ±20%; temp coef, 330 (±500) uuf/uf/°C; 500 vdcw; feed-through style; body 5/8'' lg x 5/16'' betw flats of hex section; no. 12-28 x 9/32'' lg mtg bushing (w parallel flats) and 3/32'' x 5/16'' hex nut; one no. 20 (0.032'') x 1 1/4'' lg axial wire lead each end | A.V.C. by-pass (1st, r-f amplr) | (-484821-20) | N16-C-18659-4509 | CER 362 | FRE-19956-1-1 | C105, C112 thru C116, C120, C122 thru C125, C127, C131, C132, C136, C138, C149, C151, C154, C156, C158, C160 | 22 | | 5 |
| C106 | Same as C103 | Screen by-pass (2nd r-f) | | | | | | | | |
| C107 | Same as C103 | Screen by-pass (2nd r-f) | | | | | | | | |
| C108 | CAPACITOR, fixed: composition dielectric; 1.5 uuf, ±20%, temp coef, 50 (±50) uuf/uf/°C; neg, 500 vdcw; body 0.230'' lg x 0.160'' diam; one no. 20 (0.032'') x 1 1/2'' 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 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| 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 | A.V.C. 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 | Same as C105 | Grid test point filter (Mixer) | | | | | | | | |
| C117 | CAPACITOR, fixed: ceramic dielectric; 1000 uuf, -0 +70%; variable temp coef; 300 vdcw; 0.460" lg x 0.156" diam; 2 radial wire lead term; uninsulated | Plate by-pass (Mixer) | (-485002) | N16-C-18660-9901 | CBN; DA505-014 | L478-1 | C117, C161 | 2 | | |
| C118 | Not Used | | | | | | | | | |
| C119 | CAPACITOR, fixed: silvered mica dielectric; 100 uuf ±5%; temp coef, zero (±200) uuf/uf/°C; 500 vdcw; "button" type; 0.450" nom diam x 0.070" th body; one 9/32" lg rt angle lug terms (slotted); three 5/32" lg mtg tabs (grnd contacts) spaced 120°; Per BuShips Spec 16C41 | Plate tank (Mixer) | CB11EG101J | N16-C-28553-1000 | CER type 600 | FRE-19953-1-1 | C119 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C120 | Same as C105 | Plate volts by-pass (Osc and 1st Dblr) | | | | | | | | |
| C121 | CAPACITOR, fixed: ceramic dielectric; 15 uuf ±10%; temp coef neg 220 (+60 -158) uuf/uf/°C; 500 vdcw; 0.562" lg x 0.250" diam; 2 axial wire leads; ceramic insulation per Spec JAN-C-20 | Osc tank balancing | CC21RH150K | N16-C-15997-1482 | CASU | H872-33 | 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 (Buffer Amp) | | | | | | | | |
| C125 | Same as C105 | Holding bias by-pass (Buffer Amp) | | | | | | | | |
| C126 | CAPACITOR, fixed: ceramic dielectric; 7 uuf ±0.5 uuf; 500 vdcw; negative temp coef 330 (tol +500 -718) uuf/uf/°C; 0.562" lg x 0.250" diam; 2 axial wire leads; ceramic ins; Spec JAN-C-20 | Grid tank balancing (Buffer Amp) | CC21SL070D | N16-C-15756-9001 | CASU | H872-30 | C126 | 1 | | |
| C127 | Same as C105 | Plate volts by-pass (Buffer Amp) | | | | | | | | |
| C128 | CAPACITOR, fixed: ceramic dielectric; 5 uuf, ±1 uuf; 500 vdcw; temp coef -330 (+500, -718) uuf/uf/°C; 0.562" lg x 0.250" diam; 2 axial wire leads; ceramic ins; Spec JAN-C-20 | Plate tank balancing (Buffer Amp) | CC21SL050F | N16-C-15636-2514 | CASU | H872-32 | C128 | 1 | | |
| C129 | CAPACITOR, fixed: ceramic dielectric; 51 uuf, ±10%; 500 vdcw; 0.562" lg x 0.250" diam; 2 axial wire leads; ceramic ins; Spec | Buffer coupling | CC21SL510K | N16-C-16605-7014 | CASU | H872-31 | C129, C130, C137, C216, C218 | 5 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| C129 (cont'd) | JAN-C-20 | | | | | | | | | |
| C130 | Same as C129 | Buffer coupling | | | | | | | | |
| 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 | Not Used | | | | | | | | | |
| C136 | Same as C105 | Plate volts by-pass (Tripler) | | | | | | | | |
| C137 | Same as C129 | Oscillator coup-ling | | | | | | | | |
| C138 | Same as C105 | Filament sup by-pass (Tripler) | | | | | | | | |
| C139 | Same as C103 | 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 | Grid tank trimmer | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C142 (cont'd) | with C101C | (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 (Buffer Amp) | | | | | | | | |
| C148 | CAPACITOR, variable: (Integral with C102A) | Plate tank trimmer (Oscillator) | | | | | | | | |
| C149 | Same as C105 | Filament supply by-pass (1st r-f) | | | | | | | | |
| C150 | Same as C103 | Filament by-pass (1st r-f) | | | | | | | | |
| C151 | Same as C105 | Filament sup by-pass (2nd r-f) | | | | | | | | |
| C152 | Same as C103 | Filament by-pass (2nd r-f) | | | | | | | | |
| C153 | CAPACITOR, fixed: silvered mica dielectric; 500 uuf, ±10%, temp coef, zero (±200) uuf/uf/°C; 500 vdcw; "button" type; 0.450" nom diam x 0.070" th, body; one 9/32" lg rt angle lug terms (slotted); three 5/32" lg mtg tabs (grnd contacts) spaced 120°; Per BuShips Spec 16C41 | Filament by-pass (Mixer) | | N16-C-30167-1876 | CER type 600 | FRE-19953-1-2 | C153, C155, C157 | 3 | | |
| C154 | Same as C105 | Filament sup by-pass (Mixer) | | | | | | | | |
| C155 | Same as C153 | Filament by-pass (Osc-Dblr) | | | | | | | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| C156 | Same as C105 | Filament sup by-pass (Osc-Dblr) | | | | | | | | |
| C157 | Same as C153 | Filament by-pass (Buffer Amp) | | | | | | | | |
| C158 | Same as C105 | Filament sup.by-pass (Buffer Amp) | | | | | | | | |
| C159 | CAPACITOR, fixed mica: 200 uuf ±5%; 500 vdcw; temp coef letter D; 51/64'' lg x 15/32'' wd x7/32'' thk; molded low loss bakelite case; 2 axial wire leads; Per Spec JAN-C-5 | Crystal leads re-sonating | CM20D201J | N16-C-29265-3006 | CMF | D925-42 | C159 | 1 | | |
| C160 | Same as C105 | D.C. blocking | | | | | | | | |
| C161 | Same as C117 | Buffer Amp screen by-pass | | | | | | | | |
| C162 | CAPACITOR, fixed: ceramic di-electric; 3 uuf ±0.5 uuf; 500 vdcw; negative temp coef 330 (Tol +500 -718) uuf/uf/°C; 0.562'' lg x 0.250'' diam; 2 axial wire leads; ceramic ins; Spec JAN-C-20 | Grid tank balan-cing (Buffer Amp) | CC21SL030D | N16-C-15532-9005 | CER | H872-4 | C162 | 1 | | |
| L101 | TRANSFORMER, Radio Frequency: 0.287 uh inductance at 25 mc (winding B); 0.054 uh (winding A); less than 0.1 ohm DC resistance; 10 turns (winding B), 2 turns (winding A), no. 18 AWG tinned copper conductor; 2 windings, single layer wnd; loop tap at 5 | Ant coupling coil | | N17-T-81819-2010 | CNA; type SA:9520 | SA:9520 | L101 | 1 | | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| L101 (cont'd) | turns from term W in winding B; unshielded; ceramic form; coil 3/8'' dia x 1 13/16'' lg; form 1 13/16'' lg x 3/8'' diam no adjustable tuning; 4 solder type terminals located axially along circumference; two no. 4-40 mtg holes, 3/4'' c to c | | | | | | | | |
| L101A | Part of L101 | Ant link | | | | | | | |
| L101B | Part of L101 | Part of 1st r-f grid tank | | | | | | | |
| L102 | Not Used | | | | | | | | |
| L103 | COIL, r-f: 0.112 uh inductance at 25 mc, less than 0.1 ohm DC resistance; 2 1/4 turns no. 18 AWG tinned copper conductor; 1 winding single layer wnd; not tapped; unshielded; ceramic form; coil 1/2'' diam x 1'' lg; form 1'' lg x 1/2'' diam; no adjustable tuning; 2 phosphor-bronze spring contact terminals; located on bottom ends of coil form; mts w/two 3/16'' diam brass rods by means of two 1/8'' diam mtg holes spaced 1.696'' c to c in upper ceramic spacer-bar mtg and by means of two 0.192'' diam mtg holes spaced 1.696'' c to c in brass inserts at ends of lower ceramic coil form | Grid tank trimmer (1st r-f) | | N16-C-72695-6893 | CNA; type SA:9516 | SA:9516 | L103, L104, L107, L108, L111, L112 | 6 | | |
| L104 | Same as L103 | Plate tank trimmer (1st r-f) | | | | | | | |
| L105 | COIL, r-f: 0.305 uh inductance at 25 mc, less than 0.1 ohm DC resistance; 10 turns no. 18 AWG tinned copper conductor; 1 winding, single layer wnd; loop tap at 5 turns from term A; unshielded; | Plate tank (1st r-f) | | N16-C-72726-1001 | CNA; type SA:9514 | SA:9514 | L105, L106 L109 | 3 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| L105 (cont'd) | ceramic form; coil 3/8'' diam x 1 1/2'' lg; form 1 1/2'' lg x 3/8'' OD; no adjustable tuning; two solder turret type term located axially along circumference; two no. 4-40 mtg holes, 3/4'' c to c | | | | | | | | | |
| L106 | Same as L105 | Grid tank (2nd r-f) | | | | | | | | |
| L107 | Same as L103 | Grid tank trimmer (2nd r-f) | | | | | | | | |
| L108 | Same as L103 | Plate tank trimmer (2nd r-f) | | | | | | | | |
| L109 | Same as L105 | Plate tank (2nd r-f) | | | | | | | | |
| L110 | TRANSFORMER, Radio Frequency 0.287 uh inductance at 25 mc (winding B); 0.075 uh (winding A); less than 0.1 ohm DC resistance; 10 turns (winding B), 3 turns (winding A) no. 18 AWG tinned copper conductor; 2 windings, single layer wnd; loop tap at 5 turns from term A in winding B; unshielded; ceramic form; coil 3/8'' diam x 1 13/16'' lg; form 1 13/16'' lg x 3/8'' diam; no adjustable tuning; 4 swaged stud term located axially along circumference; two no. 4-40 mtg holes 3/4'' c to c | | | N17-T-81891-3001 | CNA; type SA:9519 | SA:9519 | L110 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| L110A | Part of L110 | Oscillator injection link | | | | | | | | |
| L110B | Part of L110 | Grid tank (Mixer) | | | | | | | | |
| L111 | Same as L103 | Grid tank trimmer (Mixer) | | | | | | | | |
| L112 | Same as L103 | Plate tank trimmer (Tripler) | | | | | | | | |
| L113 | TRANSFORMER, Radio Frequency: 0.147 uh inductance at 25 mc (winding B); 0.054 uh (winding A); less than 0.1 ohm D.C. resistance; 6 turns (winding B), 2 turns (winding A) no. 18 AWG tinned copper conductors; 2 windings, single layer wnd; loop tap at 3 turns from term A in winding B; unshielded; ceramic form; coil 3/8'' diam x 1 19/32'' lg; form 1 19/32'' lg x 3/8'' diam; no adjustable tuning; 4 solder turret type term located axially along circumference; two no. 4-40 mtg holes, 3/4'' c to c | | | N17-T-81891-2001 | CNA; type SA:9517 | SA:9517 | L113 | 1 | | |
| L113A | Part of L113 | Tripler output link | | | | | | | | |
| L113B | Part of L113 | Plate tank (Tripler) | | | | | | | | |
| L114 | COIL, r-f: 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 no. 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 | CNA; type FRA-18-729-2 | FRA-18729-2 | L114 | 1 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| L115 | TRANSFORMER, r-f: 40-70 mc freq range; 2 space-wound, single layer wdgs 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 term and shaft; 2 no. 4-40 mtg holes on 3/4'' ctrs in base flanges; 3 solder lug terms and 1/2'' lg hex post term at ends of wdgs; formed loop for connec to tap; for winding data see table 7–8 | R-f transformer (1st Dblr) | | N17-T-82216-1516 | CNA; type SA:9714 | SA:9714 | L115 | 1 | | |
| L116 | COIL, r-f: 2.55 uh inductance at 7.9 mc; less than 0.1 ohm DC resistance; 25 1/8 turns, no. 24 AWG tinned copper conductor; 1 winding, single layer winding; loop tap at 13 1/8 turns from mtg end; unshielded; mica filled phenolic form; air core; coil 0.437'' diam x 1 17/32'' lg; form 1 17/32'' lg x 9/16'' diam; no adjustable tuning; 2 solder lug type term located axially along circumference, one brass hex-post type term at top of form; two no. 4-40 mtg holes, 3/4'' c to c | Buffer Amp plate choke | | N16-C-72887-5666 | CNA; type SA:9529 | SA:9529 | L116 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| L117 | COIL, r-f: 0.29 uh-0.43 uh inductance at 25 mc; less than 0.1 ohm DC resistance; 8 turns no. 20 AWG tinned copper conductors; 1 winding, single layer wnd; loop tap at 4 1/4 turns from mtg end; unshielded; phenolic form, silver plated brass core; coil 0.437" diam x 1 17/32" lg; form 1 17/32" lg x 9/16" diam x 1 51/64" h; adjustable brass silver plated, tuning core w/screwdriver adjustment located at bottom of coil mtg form; 2 solder lug term located axially on circumference; two no. 4-40 mtg holes, 3/4" c to c | Grid tank (Tripler | | N16-C-76520-6551 | CNA; type SA:9528 | SA:9528 | L117 | 1 | | |
| L118 | Not Used | | | | | | | | | |
| L119 | Not Used | | | | | | | | | |
| L120 | Not Used | | | | | | | | | |
| L121 | Not Used | | | | | | | | | |
| L122 | TRANSFORMER, IF: interstage; 18.6 mc; unshielded; 1 31/64" h x 1 1/16" lg x 9/16" wd excl terms and tuning slug; powdered iron core; pri and sec tuned by single tuning slug, two no. 4-40 mtg holes 3/4" ctrs; 4 solder lug terms; for winding data see table 7–8 | Plate coil (Mixer) | (-472313) | N17-T-68163-6371 | CNA; FRE-18728-2 | FRE-18728-2 | L122 | 1 | | |
| L123 | COIL, r-f: choke; single wdg, single layer wound; unshielded; 1.2 uh ±5% (absolute value); 11/64" diam x 1/2" lg excl leads 1 1/2" lg axial wire lead each end; for winding data see table 7–8 | Heater cathode capacity resonating | | N16-C-72793-6430 | CNA; FRA-20493-1 | FRA-20493-1 | L123 | 1 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| P101 | CONNECTOR, receptacle: coaxial; 1 round male contact 1" lg x 1" wd x 0.958" h; per BuShips Dwg RE49F4883 | Antenna inter-unit connection | UG-347-U | N17-C-73408-7101 | CARO 7250 | R263-1 | P101, P201 | 2 | | |
| R101 | RESISTOR, fixed: composition; JAN type RC20BF104K; 100,000 ohms ±10%; 1/2 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) | RC20BF104K | N16-R-50633-811 | CIR | M828-30 | R101, R105, R109, R110, R115, R118, R201, R205, R208, R211, R219, R228, R229 | 13 | | |
| R102 | RESISTOR, fixed, composition: body style no. 14 MBCA ref dwg group 2; 68,000 ohms +10% tolerance; 1/2 watt power dissipation; F temp characteristic; 0.406" lg x 0.175" diam, max; insulated; resistant to humidity and salt water immersion; 2 wire lead terminals; JAN-R-11 spec | Screen dropping (1st r-f) | RC20BF683K | N16-R-50552-811 | CBZ | M828-74 | R102, R103, R106, R107, R126 | 5 | | |
| R103 | Same as R102 | Screen dropping (1st r-f) | | | | | | | | |
| R104 | RESISTOR, fixed: composition; JAN type RC30BF222K; 2200 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 volts dropping (1st r-f) | RC30BF222K | N16-R-50013-231 | CBZ | | R104, R108 | 2 | | |
| R105 | Same as R101 | AVC (2nd r-f) | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| R106 | Same as R102 | Screen dropping (2nd r-f) | | | | | | | | |
| 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 | Same as R101 | Plate dropping (Mixer) | | | | | | | | |
| R111 | RESISTOR, fixed: composition; JAN type RC20BF181J; 180 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 | Cathode (Oscillator) | RC20BF181J | N16-R-49642-431 | CBZ | | R111, R116 | 2 | | |
| R112 | RESISTOR, fixed: composition; JAN type RC20BF100K; 10 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 | Damping (Oscillator) | RC20BF100K | N16-R-49238-811 | CBZ | M828-44 | R112, R127, R128 | 3 | | |
| 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 volts dropping (oscillator) | RC30BF682K | N16-R-50202-231 | CBZ | M828-40 | R113, R125 | 2 | | |
| R114 | RESISTOR, fixed: composition; JAN type RC20BF123K; 12,000 ohms ±10%; 1/2 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 (Dblr) | RC20BF123K | N16-R-50309-811 | CIR | | R114, R117 | 2 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| R115 | Same as R101 | Grid isolation (Dblr) | | | | | | | | |
| R116 | Same as R111 | Cathode (Dblr) | | | | | | | | |
| R117 | Same as R114 | Grid leak (Buffer Amp) | | | | | | | | |
| R118 | Same as R101 | Grid isolation (Buffer Amp) | | | | | | | | |
| R119 | RESISTOR, fixed, composition; body style no. 14 MBCA ref dwg group 2; 2200 ohms ±10% tolerance; 1/2 watt power dissipation; F temp characteristic; 0.406'' lg x 0.175'' diam, max; insulated; resistant to humidity and salt water immersion; 2 wire lead terminals; JAN-R-11 spec | Plate dropping (Buffer Amp) | RC20BF222K | N16-R-50012-811 | CBZ | M828-38 | R119 | 1 | | |
| R120 | RESISTOR, fixed, composition; body style no. 14 MBCA ref dwg group 2; 82,000 ohms ±10% tolerance; 1/2 watt power dissipation; F temp characteristic; 0.406'' lg x 0.175'' diam, max; insulated; resistant to humidity and salt water immersion; 2 wire lead terminals; JAN-R-11 spec | Grid leak (Tripler) | RC20BF823K | N16-R-50588-0811 | CBZ | M828-12 | R120 | 1 | | |
| R121 | RESISTOR, fixed, composition: body style no. 14, MBCA ref dwg group 2; 10,000 ohms ±10% tolerance; 1/2 watt power dissipation; F temp characteristic; 0.406''lg x | Grid isolation (Tripler) | RC20BF103K | N16-R-50282-811 | CBZ | M828-9 | R121 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| R121 (cont'd) | 0.175" diam, max; insulated; resistant to humidity and salt water immersion; 2 wire lead terminals; JAN-R-11 spec | | | | | | | | | |
| R122 | RESISTOR, fixed: composition; JAN type RC20BF223K; 22,000 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 | Screen dropping (Tripler) | RC20BF223K | N16-R-50372-811 | CIR | | 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 | CBZ | | R124 | 1 | | |
| R125 | Same as R113 | Plate (Dblr) | | | | | | | | |
| R126 | Same as R102 | Screen dropping (Buffer Amp) | | | | | | | | |
| R127 | Same as R112 | V106B plate sup | | | | | | | | |
| R128 | Same as R112 | V107 plate sup | | | | | | | | |
| R129 | RESISTOR, fixed: composition; JAN type RC20BF333K; 33,000 ohms ±10%; 1/2 w; F characteristic; 0.406" lg x 0.175" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11 | L104 loading | RC20BF333K | N16-R-50417-811 | CBZ | | R129 | 1 | | |
| V101 | TUBE, electron: JAN-5654 | 1st r-f amplr | JAN-5654 | N16-T-75654 | | | V101, V102, V103, V104, V107, V108, V109 | 7 | | |
| 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,B | TUBE, electron: JAN-6J6W | Mixer | JAN-6J6W | N16-T-56365 | | | V105A, B | 1 | | |
| V106A,B | TUBE, electron: GL-5670 | Osc and doubler | GL-5670 | N16-T-52351 | | | V106A, B | 1 | | |
| V107 | Same as V101 | Buffer Amp | | | | | | | | |

## TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| V108 | Same as V101 | Tripler | | | | | | | | |
| V109 | Same as V101 | Tripler | | | | | | | | |
| RADIO RECEIVING SET AN/URR-27 – IF/AF SECTION | | | | | | | | | | |
| C201A<br>C201B | CAPACITOR ASSEMBLY: stand-off type; consists of 2 fixed capacitors in common housing each 1000 uuf ±20%; "HIK" ceramic dielectric, 350 vdcw, internally grounded; body, 1 15/16" lg x 1/4" across flats of hex section; single no. 4-40 x 5/16" lg axial mtg stud one end; radial wire leads 3/8" and 13/16" from stud end; aver temp coef, zero (±142) uuf/uf/°C | A.V.C. by-pass (1st I.F. and filament by-pass (1st I.F.) | (-484832-20) | N16-C-19238-3721 | CASU type K1200 | FRE-21184-1-1 | C201, C202, C204-C210 C213, C214, C221, C217, C234 (parts A and B) | 14 | | |
| C202A<br>C202B | Same as C201A, B | Screen by-pass (1st I.F.) – and – Plate by-pass (1st I.F.) | | | | | | | | |
| C203 | Not Used | | | | | | | | | |
| C204A<br>C204B | Same as C201A, B | A.V.C. by-pass (2nd I.F.) – and – Filament by-pass (2nd I.F.) | | | | | | | | |
| C205A<br>C205B | Same as C201A, B | Screen by-pass (2nd I.F.) – and – Plate by-pass (2nd I.F.) | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C206A<br>C206B | Same as C201A, B | A.V.C. by-pass (3rd I.F.) – and – Filter by-pass (3rd I.F.) | | | | | | | | |
| C207A<br>C207B | Same as C201A, B | Screen by-pass (3rd I.F.) – and – Plate by-pass (3rd I.F.) | | | | | | | | |
| C208A<br>C208B | Same as C201A, B | Screen supply by-pass – and – Plate supply by-pass | | | | | | | | |
| C209A<br>C209B | Same as C201A, B | A.V.C. by-pass (4th I.F.) – and – Filament by-pass (4th I.F.) | | | | | | | | |
| C210A<br>C210B | Same as C201A, B | Screen by-pass (4th I.F.) – and – Plate by-pass (4th I.F.) | | | | | | | | |
| C211 | CAPACITOR, fixed: mica; 10,000 uuf ±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 | CAW | | C211, C212, C215, C220, C223, C225-C228, C230-C233 | 13 | | |
| C212 | Same as C211 | Filter for input meter | | | | | | | | |
| C213A<br>C213B | Same as C201A, B | Cathode by-pass (5th I.F.) – and – Filament by-pass (5th I.F.) | | | | | | | | |
| C214A<br>C214B | Same as C201A, B | Screen by-pass (5th I.F.) – and – Plate by-pass (5th I.F.) | | | | | | | | |
| C215 | Same as C211 | Noise limiter time constant | | | | | | | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| C216 | Same as C129 | IF by-pass (2nd Detec) | | | | | | | | |
| C217A<br>C217B | Same as C201A, B | IF by-pass (2nd Detec) – and – A.V.C. Diode Cathode by-pass | | | | | | | | |
| C218 | Same as C129 | A.V.C. Coupling | | | | | | | | |
| C219 | Not Used | | | | | | | | | |
| C220 | Same as C211 | 1st A.F. Coupling | | | | | | | | |
| C221A<br>C221B | Same as C201A, B | A.V.C. I.F. by-pass | | | | | | | | |
| C222A<br>C222B | CAPACITOR ASSEMBLY: p/o Radio Receiving Set AN/URR-27; consists of 2 fixed capacitors ea 250,000 uuf, +20% -10%, in common metal housing; 600 vdcw; case 1 15/16" lg x 2" h max; spade mtg bracket type CP06SA4; per Spec JAN-C-25 | A.V.C. time constant – and – Silencer amplifier plate A.F. by-pass | CP61B6EF-254V and (Bracket) CP06SA4 | N16-C-53448-1001<br><br>N16-M-60958-3591 | CSF | | C222A, B | 1 | | |
| C223 | Same as C211 | Silencer amplifier grid A.F. by-pass | | | | | | | | |
| C224 | Not Used | | | | | | | | | |
| C225 | Same as C211 | Silencer diode coupling | | | | | | | | |
| C226 | Same as C211 | 2nd A.F. amplifier coupling | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C227 | Same as C211 | 2nd A.F. amplifier screen by-pass | | | | | | | | |
| C228 | Same as C211 | A.F. output amplifier coupling | | | | | | | | |
| C229 | CAPACITOR, fixed: paper dielectric; 1.0 uf, +20% -10% 600 vdcw; hermetically sealed metal case; 1 15/16'' wd x 1 3/8'' lg x 2 3/16'' h max; two solder lug terms on top; no internal ground connections; spade mtg bracket type CP06SA6; per Spec JAN-C-25 | Plate volts by-pass (A.F. output amplr) | CP61B1EF105V | N16-C-48841-9593 | CSF | | C229, C302, C304 | 3 | | |
| C229A | Mounting, capacitor: non-magnetic; 3 3/16'' h o/a x 49/64'' wd, two no. 6-32 spadebolts 1 9/16'' between/c; for capacitors 2 3/4'' h x 49/64'' wd excluding terminals; U shape; JAN-C-25 spec | C229 mounting | CP06SA6 | N16-M-60906-8018 | CSF | L896-3 | C229A | 1 | | |
| 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 (2nd Detec and AVC diode) | | | | | | | | |
| F201 | FUSE, cartridge: 2 amp; 60 min blowing time at 135% load; 250 v; one-time; glass tube body; ferrule terms; 1 1/2'' lg x 1/4'' diam overall; type RE28F120 | A-c power | RE28F120 (-28032-2) | N17-F-16302-100 | CFA 3AG2 | | F201, F202 F203 | 3 | | |

## TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| F202 | Same as F201 | A-c power | | | | | | | | |
| F203 | Same as F201 | Spare | | | | | | | | |
| L201 | COIL, r-f: choke; single wdg, single layer; unshielded; 4. 5 uhys ±5% (absolute); untuned; one 1 1/2" lg axial wire lead each end | Filament choke (1st I.F.) | | N16-C-72909-4533 | CFT | FRA-511-1 | L201-L211 | 11 | | 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.) | | | | | | | | |
| L206 | Same as L201 | Filament choke (2nd Detec. and A.V.C. Diode) | | | | | | | | |
| L207 | Same as L201 | Filament choke (2nd Detec and A.V.C. Diode) | | | | | | | | |
| L208 | Same as L201 | (Output meter) filter choke | | | | | | | | |
| L209 | Same as L201 | (Output meter) filter choke | | | | | | | | |
| L210 | Same as L201 | (Phone output) filter choke | | | | | | | | |
| L211 | Same as L201 | (Phone output) filter choke | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| P201 | Same as P101 | Scan output interunit connection | | | | | | | | |
| R201 | Same as R101 | A.V.C. filter (1st I.F.) | | | | | | | | |
| R202 | RESISTOR, fixed: composition; JAN type RC20BF510J; 51 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 | Cathode output 1st I.F. | RC20BF510J | N16-R-49444-431 | CBZ | | R202 | 1 | | |
| R203 | RESISTOR, fixed: composition; JAN type RC20BF272K; 2700 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 | Screen dropping (1st I.F.) | RC20BF272K | N16-R-50039-811 | CIR | | R203, R204, R206, R207, R209, R210, R215, R216, R218, R220 | 10 | | |
| R204 | Same as R203 | Plate dropping (1st I.F.) | | | | | | | | |
| R205 | Same as R101 | A.V.C. 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 R101 | A.V.C. 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 R101 | A.V.C. filter (4th I.F.) | | | | | | | | |
| R212 | RESISTOR, fixed: composition; JAN type RC20BF122K; 1200 | Input meter filter | RC20BF122K | N16-R-49940-811 | CBZ | | R212, R213 | 2 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| R212 (cont'd) | 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 | | | | | | | | | |
| R213 | Same as R212 | Input meter filter | | | | | | | | |
| 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 | CIR | | R217 | 1 | | |
| R218 | Same as R203 | Screen dropping (5th I.F.) | | | | | | | | |
| R219 | Same as R101 | N.L. 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 | N.L. time constant | RC20BF105K | N16-R-50975-811 | CIR | | 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 | N.L. bucking voltage coupling | RC20BF335K | N16-R-51110-811 | CIR | | R222, R255 | 2 | | |
| R223 | Same as R221 | N.L. Diode load | | | | | | | | |
| R224 | RESISTOR, fixed: composition; JAN type RC20BF224K; 220,000 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 | AF-2nd detector load | RC20BF224K | N16-R-50714-811 | CIR | | R224 | 1 | | |
| R225 | RESISTOR, fixed: composition; JAN type RC20BF154K; 150,000 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 | AF-2nd detector load | RC20BF154K | N16-R-50678-811 | CIR | | R225, R306 | 2 | | |
| R226 | RESISTOR, fixed: composition; JAN type RC20BF153K; 15,000 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 | AF-2nd detector load | RC20BF153K | N16-R-50336-811 | CIR | | R226 | 1 | | |
| R227 | RESISTOR, fixed: composition; JAN type RC20BF102K; 1000 ohms ±10%; 1/2 w; F characteris- | N.L. bucking voltage divider | RC20BF102K | N16-R-49922-811 | CBZ | | R227, R247 | 2 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| R227 (cont'd) | tic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11 | | | | | | | | | |
| R228 | Same as R101 | A.V.C. diode filter | | | | | | | | |
| R229 | Same as R101 | A.V.C. diode load | | | | | | | | |
| R230 | RESISTOR, fixed: wire-wound; JAN type RU3B7R5J; 7.5 ohms ±5%; 1/2 w; F characteristic; 21/32" lg x 15/64" diam; insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-184 | Fixed bias supply | RU3B7R5J | N16-R-68307-6666 | CIR | | R230 | 1 | | |
| R231 | RESISTOR, fixed: composition; JAN type RC20BF155K; 1.5 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 | Silencer amplr grid filter | RC20BF155K | N16-R-51020-811 | CIR | | R231, R251 | 2 | | |
| R232 | Same as R221 | 1st AF 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 U1031-3D3032 | 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 | CIR | | R234 | 1 | | |
| R235 | RESISTOR, fixed: composition; JAN type RC20BF473J ; 47,000 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 load | RC20BF473J | N16-R-50479-431 | CIR | | 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 | CIR | | R236, R240, R243 | 3 | | |
| R237 | RESISTOR, fixed: composition; JAN type RC20BF273K; 27,000 ohms ±10%; 1/2 w; F characteristic; 0.468'' lg x 0.249'' diam insulated; salt water immersion resistant; two axial wire leads; per Spec JAN-R-11 | 1st AF plate dropping | RC20BF273K | N16-R-50399-811 | CBZ | | R237 | 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 slotted shaft; 3 radial solder lug terms; stops at 3 and 9 o'clock | AF line level control | (-637008-K10) | N16-R-87808-4304 | CIR | FRE-19471-3-1 | R238 | 1 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| R239 | RESISTOR, fixed: composition; JAN type RC20BF334J; 330,000 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 diode d-c coupling | RC20BF334J | N16-R-50758-431 | CIR | | R239 | 1 | | |
| R240 | Same as R236 | 2nd AF grid | | | | | | | | |
| R241 | RESISTOR, fixed: composition; JAN type RC20BF821K; 820 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 | 2nd AF cathode | RC20BF821K | N16-R-49877-811 | CBZ | | R241 | 1 | | |
| R242 | Same as R236 | 2nd AF screen dropping | | | | | | | | |
| R243 | Same as R221 | 2nd AF plate | | | | | | | | |
| R244 | RESISTOR, fixed: composition JAN type RC20BF474K; 470,000 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 | AF output amplr grid | RC20BF474K | N16-R-50822-0811 | CIR | | R244 | 1 | | |
| R245 | RESISTOR, fixed: composition; JAN type RC20BF271K; 270 ohms ±10%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion | AF output amplr cathode | RC20BF271K | N16-R-49688-811 | CBZ | | R245 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| R245 (cont'd) | resistant; two axial wire leads; per Spec JAN-R-11 | | | | | | | | | |
| R246 | RESISTOR, fixed: composition; JAN type RC20BF184J; 180,000 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 | AF negative feedback | RC20BF184J | N16-R-50695-431 | CBZ | | R246,R253 | 2 | | |
| R247 | Same as R227 | AF output amplr plate dropping | | | | | | | | |
| R248 | RESISTOR, fixed: wire-wound JAN type RU3B150J; 15 ohms ±5%; 1/2 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 | CIR | | R248 | 1 | | |
| R249 | RESISTOR, fixed: composition; JAN type RC20BF472K; 4700 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 | Input meter balancing | RC20BF472K | N 16-R-50129-0811 | CBZ | | R249 | 1 | | |
| R250 | RESISTOR, fixed: composition; JAN type RC20BF474J; 470,000 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 | Voltage divider | RC20BF474J | N16-R-50821-431 | CIR | | R250 | 1 | | |
| R251 | Same as R231 | Silencer amplr grid filter | | | | | | | | |
| R252 | RESISTOR, fixed: composition; JAN type RC20BF821J; 820 ohms ±5%; 1/2 w; F characteristic; 0.468" lg x 0.249" diam; insulated; salt water immersion resistant; two axial wire leads; per | Silencer amplr cathode bias | RC20BF821J | N16-R-49876-431 | CIR | | R252 | 1 | | |

## TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| R252 (cont'd) | Spec JAN-R-11 | | | | | | | | | |
| 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; 3/8''-32 x 1/2'' lg mtg bushing; slotted shaft 1/4'' diam x 1/8'' lg beyond bushing; 3 radial solder lug terms | Silencer adjustment | (-636009-K10) | N16-R-88059-4470 | CBZ U2041-SD4040L | FRE-2529-3-5 | R254 | 1 | | |
| R255 | Same as R222 | Voltage divider | | | | | | | | |
| S201 | SWITCH, toggle: SPDT; 5 amps, 125 v; with hex nuts and locking ring; per JAN-S-23 | Align-Rec | ST12D | N17-S-72018-7719 | CHH | | S201,S501 | 2 | | |
| S202 | SWITCH, toggle: SPDT; 15 amps; 125 v; phenolic body; 1 1/16'' lg x 41/64'' wd x 1 9/64'' h, max excl bushing and handle; bat type handle; 11/16'' lg; 3 solder lug term; located on back; single hole mtg type w/15/32''-32 thd bushing, 15/32'' lg FMS; dull white nickel handle; JAN-S-23 spec | Noise limiter ON-OFF | ST42D | N17-S-71894-1544 | CHH | H340-8 | S202 | 1 | | |
| S203 | SWITCH, rotary: 2 pole, 2 position; single section; silver plated brass contacts (shorting type) on 7/32'' th ceramic wafer; 1 7/8'' lg x 1 1/2'' wd x 1 1/16'' d excl bushing; three 3/16'' solder lug terms on rear; 3/8''-32 x | Crystal-LC frequency control | | N17-S-59261-8262 | CUF | FRE-20323-1 | S203 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S203 (cont'd) | 3/8'' lg bushing; 1/4'' diam x 3/8'' lg shaft | | | | | | | | | |
| T201 | TRANSFORMER, IF: 18.6 mc; 1st IF stage; shielded; 1 1/8'' x 3'' h, excl terms; powdered iron core (adjustable); tuned sec (100 uuf, mica, fixed); 4 solder lug terms; 2 no. 6-32 mtg studs at bottom; per FTRC Spec RC-7804-1; for winding data see table 7-8 | 1st I.F. | | N17-T-68163-6426 | CNA | FRE-20810-3-2 | T201 | 1 | | 1 |
| T202 | TRANSFORMER, IF: 18.6 mc; 2nd IF stage; shielded; 1 1/8'' sq x 3'' h, excl terms; powdered iron core (adjustable) tuned pri and tuned sec (each 100 uuf mica, fixed); 4 solder lug terms; 2 no. 6-32 mtg studs at bottom; per FTRC Spec RC-7804-1; for winding data see table 7-8 | 2nd I.F. | | N17-T-68163-6451 | CNA | FRE-20810-3-1 | T202–T206 | 5 | | 1 |
| T203 | Same as T202 | 3rd IF | | | | | | | | |
| T204 | Same as T202 | 4th IF | | | | | | | | |
| T205 | Same as T202 | 5th IF | | | | | | | | |
| T206 | Same as T202 | 2nd detector | | | | | | | | |
| T207 | TRANSFORMER, AF: plate coupling; pri: 100,000 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 1 5/8'' sq; turns ratio, 12.4:1; freq response, ±2 db, 350-3500 cps; electrostatic shield betw wdgs, 5 ceramic-insulated solder terms on bottom of case; two no. 6-32 mtg studs on 1 19/32'' ctrs; hermetically sealed; per FTRC Spec RC-7898-1; for winding data see table 7-8 | AF output | | N17-T-65494-3101 | CHS | RC-7899-1 | T207 | 1 | | 1 |

**TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27**

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| V201 | TUBE, electron: JAN-6BA6 | 1st I.F. and scan channel amplr | JAN-6BA6 | N16-T-56211 | | | V201 | 1 | | |
| V202 | TUBE, electron: JAN-9003 | 2nd I.F. amplr | JAN-9003 | N16-T-79003 | | | V202, V203, V204, V205 | 4 | | |
| V203 | Same as V202 | 3rd I.F. amplr | | | | | | | | |
| V204 | Same as V202 | 4th I.F. amplr | | | | | | | | |
| V205 | Same as V202 | 5th I.F. amplr | | | | | | | | |
| V206 A V206B | TUBE, electron: JAN-6AL5W | 2nd detector and A.V.C. | JAN-6AL5W | N16-T-56195-50 | | | V206A, B V207A, B | 2 | | |
| V207A V207B | Same as V-206A, B | N.L. and silencer | | | | | | | | |
| V208 | TUBE, electron: JAN-6AK5W | Silencer amplr | JAN-6AK5W | N16-T-56191-50 | | | V208, V209, V210 | 3 | | |
| V209 | Same as V208 | 1st AF amplr | | | | | | | | |
| V210 | Same as V208 | 2nd AF amplr | | | | | | | | |
| V211 | TUBE, electron: JAN-6AK6 | AF output amplr | JAN-6AK6 | N16-T-56192 | | | V211 | 1 | | |
| Y201 | CRYSTAL, quartz; 5th mode; AN type CR-24/U (NOT FURNISHED) | Oscillator control | CR-24/U | | | | Y201 | 1 | | |
| Z201 | FILTER, bandpass: bandspread 350-3500 cps; peak freq 1925 cps; response, ±2db, within bandspread; 2 3/4" wd x 1 3/4" d x 4 1/2" h, overall; output impeds; 10,000 and 40,000 ohms, rectangular metal case, hermetically sealed; three 1/2" lg insulated | AF bandpass filter | | N16-F-32171-3630 | CBIS | RC-7903-1 | Z201 | 1 | | 1 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Z201 (cont'd) | solder terms on bottom; 4 no. 6-32 mtg holes on 2 1/32'' and 1 1/32'' ctrs; per FTRC Spec RC-7902-1 | | | | | | | | | |
| | RADIO RECEIVING SET AN/URR-27 – POWER SUPPLY SECTION | | | | | | | | | |
| 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 3/8'' 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 4 1/8'' d, overall | Cabinet cooling | | N17-B-21188-1075 | CARB Type J-50C | FRE-20311-2 | BL301 | 1 | | |
| C301 | CAPACITOR, fixed: dry electrolytic dielectric, 35 uf, +25% -10%; 400 vdcw; operating temp range -20°C to +85°C; 3 5/8'' diam; tubular metal case; 2 solder lug terms on bottom of case; terms insulated from can; mtg hex nut 7/8-16'' thd 7/8'' ID w/lockwasher; per Spec JAN-C-62 | Filter | CE41B350Q | N16-C-19892-7801 | CSF | | C301,C303 | 2 | | |
| C302 | Same as C229 | Filter | | | | | | | | |
| C303 | Same as C301 | Filter | | | | | | | | |
| C304 | Same as C229 | Motor phasing | | | | | | | | |
| 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 no 8-32 x 7/16'' lg mtd studs on 2'' x 1 7/8'' mtg ctrs; 3 ceramic insu- | Filter | | N16-R-29693-5271 | CYC | RC-8113-1 | L301 | 1 | | 1 |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| L301 (cont'd) | lated lugs on bottom; per FTRC Spec RC-8112-1; for winding data see table 7–8 | | | | | | | | | |
| P301 | CONNECTOR: receptacle; 2 piece thru-panel mtg type; comprises (1) 3/16'' th phenolic base carrying 4 round male contacts in polarizing arrangement and (2) 1.350'' diam x 13/32'' d aluminum shell with mtg flange; shell flange and phenolic base each 1 3/4'' lg x 1 1/2'' wd with four 0.154'' mtg holes on 1 3/8'' and 1 1/8'' centers; requires 1.350'' cutout and four 0.154'' diam mtg bolt holes in panel; 1/2'' lg solder lug terms on rear; contact ratings; 10 amps, 500 v | Power and audio input | (-491873) | N17-C-73487-7175 | CARO 7450-S-1 (Base) and 7455 (Shell) | FRE-21189-1 | P301 | 1 | | |
| 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 | CBZ | | 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- | Bleeder | RC40BF821K | N16-R-49878-551 | CBZ | | R302, R303 R309 | 3 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| R302 (cont'd) | R-11 | | | | | | | | | |
| R303 | Same as R302 | Bleeder | | | | | | | | |
| R304 | Not used | | | | | | | | | |
| R305 | RESISTOR, fixed: composition; JAN type RC20BF683K; 68,000 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 | Input meter balancing | RC20BF683K | N16-R-50552-811 | CBZ | | 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 | CBZ | | R307, R309, R310 | 3 | | |
| R308 | Same as R307 | Regulator series dropping | | | | | | | | |
| R309 | Same as R302 | Regulator dropping | | | | | | | | |
| R310 | Same as R307 | Regulator series dropping | | | | | | | | |
| T301 | TRANSFORMER, power: filament and plate type; 3 pri and 4 sec wdgs; inputs: 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, 4.1 amp, (4) 470 v, C.T. 0.145 amp; no coolant, hermetically sealed metal case; 4 1/2" x 2 13/16" x 3 5/16" overall, not including terms; 14 ceramic-insulated 1/2" lg terms on top of | Filament and plate power | | N17-T-74016-6329 | CSN | RC-8115-1 | T301 | 1 | | 1 |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| T301 (cont'd) | case; 4 no. 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 | | | | | | | | | |
| S301 | SWITCH, thermostatic: bimetal type; SPST NO; close at 120°F, ±4°F; 10°F oper differential; 10 amps, 230 v; steel bracket type; 2 3/8'' lg x 1 5/8'' wd x 31/32'' d overall; one 5/32'' diam mtg hole 5/32'' from each end of ctr line; 2 screw terms | Control for BL301 | | N17-S-69903-9979 | CSQ C-4351-17 | FRE-20497-1 | S301 | 1 | | |
| V301 | TUBE, electron: JAN-5U4WG | Rectifier | JAN-5U4WG | N16-T-55467 | | | | 1 | | |
| V302 | TUBE, electron: JAN-OB2 | Voltage rectifier | JAN-OB2 | N16-T-52001-05 | | | | 1 | | |
| V303 | TUBE, electron: JAN-OA2 | Voltage rectifier | JAN-OA2 | N16-T-52001 | | | | 1 | | |
| RADIO RECEIVING SET AN/URR-27 – BAND SUPPRESSION FILTER | | | | | | | | | | |
| C401 | CAPACITOR, fixed: paper dielectric; 0.25 uf +20% -10%; 200 vdcw; hermetically sealed metal case; 1 13/16'' lg x 3/4'' diam; mineral oil filled and impregnated; no. 10-32 axial holes in ends are common terms, one term grnd'd 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 |
| C402 | Same as C401 | A-c line filter | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C403 | CAPACITOR, fixed: silvered mica dielectric; 1000 uuf ±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 | | | | | | | | |
| J401 | CONNECTOR, male contact: Type AN-3102-14S-7P, 3 round male contacts; straight; 7/8-20 thd cylindrical metal body 3/4" diam x 35/64" lg excluding mtg; mtg flange 1 3/32" x 1 3/32" w/4 mtg holes 0.120" diam spaced 29/32"; per Spec AN-C-591 | A-c power input | AN-3102-14S-7P | N17-C-72604-1516 | CED | | J401 | 1 | | |
| J402 | CONNECTOR, male contact: Type AN-3102-14S-2P; 4 round male contacts; straight 7/8-20 thd cylindrical metal body 3/4" 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 | Audio output | AN-3102-14S-2P | N17-C-72610-5434 | CED | | J402 | 1 | | |
| J403 | CONNECTOR, coaxial: Type -49194; 1 round female contact; straight; metal body 1 1/16" lg x 5/8" diam overall; thd sleeve w/2 | Scan output | (-49194) | N17-C-73108-5890 | CARO | | J403 | 1 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| J403 (cont'd) | hex nuts mtg; per BuShips Dwg RE-49F-167-D | | | | | | | | | |
| J404 | CONNECTOR, coaxial: Type UG-58/U (-49470); 1 round female contact; 1 1/8" lg x 1" diam overall; thd sleeve w/2 hex nuts mtg | Antenna connection | UG-58/U (-49470) | N17-C-73108-5905 | CARO | | J404 | 1 | | |
| J404A | HOOD: brass silver plated; cone shape; type UG-177/U per BuShips Dwg RE-49F-167-D; per Spec JAN-C-71 | | UG-177/U | N17-C-945001-203 | CARO | | J404A | 1 | | |
| J405 | CONNECTOR, plug: 4 round female contacts; straight type; 10 a, 500 v; cylindrical body; rectangular base; molded phenolic; 1 1/2" wd x 1 3/4" lg x 3/4" d excl terms; four 0.189" diam mtg holes on 1 1/8" and 1 3/4" mtg ctrs; terms silver plated and tin dipped; mates with Navy -491873 (P301) | Power and audio input | (-491875) | N17-C-73194-4231 | CARO 7450-S-2 | FRE-21195-1 | J405 | 1 | | |
| J406 | CONNECTOR, 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 holes 0.125" diam spaced 0.718" c to c per BuShips Dwg RF49F488B | Scan output inter-unit connection | AN type UG-348/U | N17-C-73108-6037 | CARO 7350 | | J406, J407 | 2 | | |
| J407 | Same as J406 | Antenna inter-unit connection | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| L401 | COIL, r-f: 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 uuf ±1 uuf distrib capac; 1 1/2" diam x 1 1/16" lg incl two rt angle mtg brackets on one end of tube; no. 6-32 mtg holes (one each bracket) spaced 15/16" ctrs; 1 radial solder lug at each end of wdgs, on tube; for winding data see table 7-8 | A-c line filter | (-304682) | N16-C-74458-4712 | CFT | FRA-2698-1 | L401, L402 | 2 | | |
| L402 | Same as L401 | | | | | | | | | |
| L403 | COIL, r-f: 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; 1 3/8" lg x 3/8" diam, excl terms; single no. 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, r-f: 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 uuf ±0.5 uuf 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; no. 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 L405 | Audio output filter | | | | | | | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| L407 | Same as L403 | Audio output filter | | | | | | | | |
| L408 | Same as L403 | Audio output filter | | | | | | | | |
| P401 | CONNECTOR, female contact: Type AN-3106-14S-7S; 3 round female contacts; straight; metal body 1 11/32" lg x 1 1/16" diam overall; 3/4-20 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 | AC power input | AN-3106-14S-7S | N17-C-70328-1515 | CARC | 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; 3/4-20 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 | Audio output | AN-3106-14S-2S | N17-C-70334-5429 | CARO | FRA-24367-1-2 | P402 | 1 | | |
| P403 | CONNECTOR, coaxial: Type -49195; 1 round male contact; straight; metal body 1 9/16" lg x 3/4" diam overall; includes shielding hood; per BuShips Dwg RE-49F-167D | Scan output cable | (-49195) | N17-C-71414-2800 | CARO | | P403 | 1 | | |
| P404 | CONNECTOR, coaxial: Type UG-21B/U; 1 round male contact; | Antenna cable | UG-21B/U | N17-C-71416-2550 | CARO 4300 | | P404 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| P 404 (cont'd) | straight; metal body 1 3/4" lg x 13/16" diam overall; per BuShips Dwg RE-49F-402; per Spec JAN-C-71 | | | | | | | | | |
| RADIO RECEIVING SET AN/URR-27 – FRONT PANEL SECTION | | | | | | | | | | |
| I501 | LAMP, incandescent: 6.3 v, 0.15 amps; bulb T-3 1/4 clear; 1 3/16" lg overall; miniature s.c. bayonet base; C-2R filament; 3000 hrs | Dial light | TB-14 | G17-L-6297 | CG 47 | | I501, I502 | 2 | | |
| I502 | Same as I501 | Dial light | | | | | | | | |
| I503 | LAMP, glow: 105-125 v, 1/25 watt; bulb T-3 1/4 clear; 13/32" diam x 1 3/16" o.a.l.; miniature s.c. bayonet base | Crystal control operative | | G17-L-6806-130 | CG NE-51 | | I503 | 1 | | |
| J501 | JACK, telephone: short frame; tip and sleeves; per BuShips Dwg RE49AA195; incl hex nut, metal washer and phenolic washer; receives Navy type no. 49109, 49106B or 49034 plug | Phone output | (-49025B) | N17-J-39248-4423 | | | J501 | 1 | | |
| M501 | METER, d-c milliammeter: scale 0-1; 105 ohms resis; 2 1/2" diam flush bakelite case w/special static shield, per CV dwg D-116-402; per Spec JAN-I-6 | Input meter | MR25W001DCMA | N17-M-19255-1051 | CV | | M501 | 1 | | |
| M502 | METER, volume level: scale -10/0/+20; db; rectifier type; zero power level = 6 mv in 600 ohms; 2 1/2" diam flush bakelite case w/spec static shield per CV dwg D-116402 | Output meter | (-22427) | N17-M-22724-6701 | CV | | M502 | 1 | | |
| 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 1 1/2" lg from mtg sufrace; linear taper; insu- | Dial lamp dimmer | | N16-R-89956-7015 | CBZ | | R501 | 1 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| R501 (cont'd) | lated contact arm; normal torque; bushing 3/8"-32 x 3/8" lg; per Spec JAN-R-19 | | | | | | | | | |
| R502 | RESISTOR, variable: composition; 1000 ohms, ±10%; 2 watts; CBZ type A taper; metal case, 1 1/16" diam x 9/16" deep; 3/8"-32 x 3/8" lg bushing; slotted shaft, 1/4" diam x 3/8" 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 | | |
| S501 | Same as S201 | Silencer IN-OUT | | | | | | | | |
| S502 | SWITCH, toggle: DPST; JAN no. ST-22K; 6 amps, 125 v; metal body 1 9/32" lg x 23/32" wd; 15/32-32 thd sleeve 1 5/8" lg w/2 hex nuts; 3 solder lug terms in rear; per Spec JAN-S-23 | Power | ST-22K | N17-S-73082-9028 | CHH | | S502 | 1 | | |
| A-1 | MOUNT, vibration: square mtg; 60-70 lb normal load rating; 3" sq x 1 1/2" h; wt 18 oz; rubber cushion; metal sleeve 0.328" ID (for 5/16" diam through-bolt); 4 mtg holes (0.255") in corner of base, spaced 2 1/2" on ctrs; metal cadmium plated to resist 200 hr salt spray test | Shock absorption | | N17-M-75268-6626 | CAYU C-2070 | FRE-8321-1 | A-1 | 4 | | |
| A-2 | SEAL, water: front panel seal (drip proof); extruded synthetic rubber, 45-55 Shore Durometer hardness; suitable for -20°C to | Panel seal | | N16-S-150263-107 | | FRR-4342-1 | A-2 | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| A-2 (cont'd) | +50°C ambient; irregular channel type cross-section, 29/64" x 15/16" overall; black; 400% elongation; 1200 psi tensile strength; permanent set 60% | | | | | | | | | |
| E-1 | BRUSH, electrical contact: no. 34 (.006") B and 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.1; one end tapered symmetrically from point 0.237" from end, to width of 0.187" at end; no. 31 (0.120") drill hole centered 0.156" from wide end; 70° angle | Sliding contact for inductance trimmers in C101, C101A-E, C102, C-102-A-D | | N17-B-86841-9339 | CFT | FRB-5231-1 | E-1 | 12 | | |
| E-2 | CONTACT, case: 9/16" wd x 3/8" d x 3" lg rt angle section no. 14 (0.064) B and S ga 1/2-hard bronze sheet (0.0006" nickel plate) with 4 no. 32 B and S ga hard beryllium copper spring inserts; 2 no. 30 (0.128) mtg holes spaced 1 1/2" on ctrs; one ass'y 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 | E-2 | 2 | | |
| E-3 | CONTACT, case: 9/16" wd x 3/8" d x 12" lg rt angle section no. 14 (0.064") B and S ga 1/2 hard bronze sheet (0.0006" nickel plate) with 16 no. 32 B and S ga hard beryllium copper spring inserts; 7 no. 30 (0.128") mtg holes spaced 1 1/2" on ctrs; one ass'y 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 | E-3 | 2 | | |
| E-4 | CORE, adjustable tuning: no. 6-32 cadmium plated brass stud imbedded, coaxially in 0.309" diam x | Permeability tuning adjustment; used with L115 | | N16-C-600701-120 | CSA per FTRC dwg | FRE-18772-1-1 | E-4 | 2 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| E-4 (cont'd) | 3/8'' lg cylinder of gray iron core material with 7/8'' of stud protruding; 1 1/4'' o.a.l, 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 | | | | | | | | | |
| E-5 | CORE, adjustable tuning: no. 6-32 cadmium plated brass stud imbedded, coaxially, in 0.309'' diam x 1/2'' lg cylinder of gray iron core material with 7/8 of stud protruding; 1 3/8'' o.a.l; 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 | E-5 | 1 | | |
| E-6 | CORE, adjustable tuning: 5/16'' diam x 1 3/8'' lg brass rod turned to 0.309'' diam for 1/2'' from one end, and no. 6-32 x 7/8'' lg thrd 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 | E-6 | 1 | | |
| E-7 | HOLDER, fuse: extractor post type; (receptacle plus cap); for type 3AG glass fuse; bakelite body; 2 13/32'' lg x 25/32'' diam overall; 8 amp, 125 v rating; 1/2'' -24 x 1/2'' lg bushing and 1/8'' | Holder for F201, F202 and F203 | | N17-F-74266-9235 | CFA type HKP | FRE-1913-1 | E-7 | 3 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| E-7 (cont'd) | th x 11/16" (betw flats) hex nut for single hole panel mtg; 2 solder lug terms at rear | | | | | | | | | |
| E-8A E-8B | INSULATOR SET: cylindrical; comprising shoulder bushing E-8A and shoulder bushing E-8B; both natural paper base phenolic; first is 5/16" max OD x 0.101" (no. 38DR) ID x 13/32" o.a.l. incl 0.185" diam x 1/32" d bushing at one end; second is 5/16" max OD x 0.101" (no. 38 Dr) ID x 0.118" o.a.l. incl 0.185" diam x 1/40" d shank at one end | Crystal lead feed-through | | N17-I-81960-5263 | Insulating Fabs | (E-8A) FRE-6784-1 and (E-8B) FRE-6812-1 | E-8A, E-8B | | | |
| E-9 | INSULATOR, bushing: shoulder natural mica-filled molded phenolic (JAN type MTS-E-3); 0.128" (no. 30 drill) ID x 1/2" max OD x 7/16" o.a.l. 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 | Crystal clip insulator | | N17-I-49498-7025 | John R. Sloane | FRP-11108-1 | E-9 | | | |
| E-10 | RADIO RECEIVER OSCILLATOR: Oscillator and doubler socket plate; includes capacitors C137, C155 and C160, inductor L123, resistors R111, R112 and R114-R116 and socket for V106; 1 1/2" wd x 2 15/32" lg x 1 3/8" 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 | Osc Doubler socket plate | | N16-T-98501-1001 | CFT | FRA-6770-2-2 | E-10 | 1 | | |
| E-11 | TUNING UNIT, SUB-ASSEMBLY: includes 1 resistor, 2 capacitors, 1 tube socket; 2 15/32" lg x | Buffer Amp. socket plate | | N16-T-98501-1017 | CNA; Type SA:9526 | SA:9526 | E-11 | 1 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| E-11 (cont'd) | 13/16" wd x 1 5/32" d; four 0.130" wd open slots on ends of ass'y plate, on 2 5/16" x 7/16" mtg/c; marked C157, C161, R126, 5654 | | | | | | | | | |
| E-12 | RADIO RECEIVER SUB-ASSEMBLY: tripler socket plate and shield; includes capacitors C133, C134 and C139, resistors R122 and R123 and sockets for V108 and V109; 1 1/4" d x 2 1/2" wd x 3 1/4" h; 4 open slots in ends of ass'y plate for mtg screws spaced 7/16" and 2 5/16" on ctrs | Tripler socket ass'y | | N16-T-98501-1004 | CFT | FRA-6200-2-2 | E-12 | 1 | | |
| E-13 | TUNER, RF: includes r-f amplifier stages (one side), oscillator-multiplier stages (other side); 4 3/4" wd x 6" h x 11 3/4" d; sixteen no. 6-32 tapped, irregularly spaced, mtg holes; rectangular metal box housing | Preselector tuning unit for 103-195 mc range | | N16-T-98076-1001 | CNA; Type SA:9548 | SA:9548 | E-13 | 1 | | |
| E-14 | TUNING UNIT, SUB-ASSEMBLY: includes 3 capacitors, 2 resistors, 2 tube sockets w/shields; 2 27/64" lg x 1 3/8" wd x 2 1/8" d; four 0.130" wd open slots on ends of ass'y plate, on 2.310" x 1.094" mtg/c | RF amp socket plate and shield | | N16-T-98501-1018 | CNA; Type SA:9541 | SA:9541 | E-14, E-15 | 2 | | |
| E-15 | Same as E-14 | RF amp socket and plate shield | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| E-16 | RADIO RECEIVER SUB-ASSEMBLY: Mixer socket plate; includes capacitors C119 and C153 and socket for tube V105; 1 1/8" wd x 2 1/2" lg x 1 1/8" d; 4 open slots (0.130" wd) in ends of ass'y plate for mtg screws spaced 11/16" and 2 5/16" on ctrs | Mixer socket plate ass'y | | N16-T-98501-1005 | CFT | FRA-9496-1-2 | E-16 | 1 | | |
| H-1 | 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 0.046" th (incl spring curvature) | Thrust spring (capacitor shaft) | | N43-W-7520-2400 | CAXO 3544-14 | FRE-10113-1 | H-1 | | | |
| H-2 | TOOL, alignment: insulated; amber transparent molded thermoplastic; 4" o.a.l. x 5/16" betw flats of octagonal (maximum) cross-section; Tapered (round) to 1/4" diam at each end; 1/8" x 0.022" screwdriver tip molded into one end, and spline tip to fit no. 6 (American std) fluted sockethead cap screw molded into other end; both tips from no. 303 stainless steel rod, annealed | Alignment | | N16-T-751468-732 | John R. Sloane | FRA-20347-1 | H-2 | 1 | | |
| H-3 | WRENCH: for Bristo setscrew; distance across splines 0.060"; 1 9/16" lg x 3/8" wd approx; steel; 90° offset; for no. 4 Bristo setscrew | Multispline key wrench | | N41-W-2459-915 | CTB | J301-1 | H-3 | 1 | | |
| O-1 | DIAL, control: moveable scale type; 'MC' scale w/103-192 left to right range scale, graduated in increments of 0.5 units; index line mark at each end of scale; 340.8° arc; 1:20 gear drive ratio w/1/4" diam shaft coupling; 5 3/8" lg x 3" wd x 2 1/16" d; 11/16" lg | Preselector tuning drive (C101) | | N16-D-46576-1961 | CNA; Type SA:9550 | SA:9550 | O-1 | 1 | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| O-1 (cont'd) | shaft extension; 2 27/64" extension depth behind panel; ass'y mtd between two no. 11 B and S ga type type 52S 1/2 hard aluminum plates, rear plate mts to IF-AF unit by four 0.189" diam mtg holes on 4 1/8" x 1 7/16" mtg/c; dial illuminated; automatic precision stop effective at completion of 19th revolution of dial in each direction w/dial lock | | | | | | | | | |
| O-2 | CLIP, crystal mounting: parallel grip for 0.062" diam wire terminal lead of type CR-24/U crystal; no. 28 (0.126") B and S ga hard (two B and 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 | O-2 | | | |
| O-3 | CLIP, grounding: no. 30 (0.010") B and S ga hard (two B and 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 type CR-24/U crystal | | N17-C-812323-101 | A. Ludwig and Co. | FRB-11109-1 | O-3 | | | |
| O-4A<br>O-4B | COUPLING, flexible: comprises a driven arm (O-4A) with hub and a driven arm (O-4B) with hub; arms each no. 14 (0.064") B and S ga 1/2 hard nickel plated brass | Coupling: dial drive to preselector assembly | | N17-C-98378-2225 | CNA | (O-4A) FRE-21220-1 FRA-21212-1 | O-4A, B | 1 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| O-4A O-4B (cont'd) | strip; driven arm; 1/4" ID x 1/2" OD hub (w/two no. 6-32 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"; drive arm: 1/4" ID x 1/2" OD hub (w/two no. 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" | | | | | (O-4B) FRE-21221-1 FRE-21217-1 | | | | |
| O-5 | DRIVE, capacitor: comprising spur gear on short shaft supported in sand-cast aluminum alloy (Alcoa 195-T4) frame; Gear: 1.041" OD x 1.00" pitch diam x 48 diametral pitch x 0.187" th; involute teeth, 20° pressure angle; CR stainless steel; 1/2" OD x 0.2506" ID x 0.155" deep hub; Bearing: oil-retaining porous bronze; Shaft: 1/4" diam x 1" lg with 1/32" x 45° chamfer; type 303 stainless steel; Taper pin: no. 18-8 stainless steel; no. 5/0 x 1/2" lg 3 1/4" lg x 1 1/32" d x 1 9/16" h overall; three 0.189" diam holes in casting located in line and spaced 0.500" and 2.688" on centers | Synchronizing drive for oscillator and r-f tuning sections of preselector | | N16-D-900151-109 | CFT | FRE-21206-1 (outline) and FRA-7117-2 | O-5 | 1 | | |
| O-6 | BALL, locking: spherical; 1/8" diam, ±0.0001"; sphericity, 0.0001; type 440, grade 1, stainless steel hardened to Rockwell scale ('C' scale) value of 50-58 | Inductance trimmer locking | | G77-B-999-75008-0100 | Strom Steel Ball Co. | FRE-19585-1 | O-6 | | | |
| O-7 | CLEANER ELEMENT, air: cartridge type; multiple baffles of aluminum screen wetted in oil; 3 1/2" h x 4" wd x 3/4" d; 0.032" gauge aluminum frame; cleaned with gasoline; recharge- | Dust filter | | N17-C-794001-133 | CBEN R82A | FRE-20375-2 | O-7 | | | |

**TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27**

| PARTS | | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | | BOX | QUAN. |
| O-7 (cont'd) | able with SAE-no. 20 oil; unit supported against cabinet opening by external encasing frame containing pressure springs | | | | | | | | | | |
| O-8 | GEAR, spur: split-gear; spring-loaded, non-backlash type; 13/32" thick incl hub; Gears (each section): no. 14 (0.064") S-T aluminum, 96 straight teeth; 48 diametral pitch, 20° pressure angle; 2" pitch diam; Hub: 1/4" ID x 5/8" OD x 13/32" lg; incl 0.3745" diam x 0.093" lg, and 0.4994" diam x 0.068" lg shoulders for gears; two no. 6-32 radial set-screws holes 90° apart; Springs (2): 0.150" ID x 7/16" free length; compression; 7 turns no. 11 (0.026") music wire; ends squared (rt or lt hand wound) | Preselector ganged capacitor drive | | N16-G-432816-277 | CNA | FRA-7189-1 and FRA-21207-1 (outline) | O-8 | | | | |
| O-9 | CLAMP, tube: 3/8" wd x 0.025" th stainless steel (type 302) strap fitted with toggle clamp to form 1 3/8" ID (nominal) band; 1/2" wd x 3/4" and 3/8" lg L-shape mtg clip, having elongated (radially) hole for no. 10 mach screw, is soldered opposite clamp | Retainer for JAN type 5U4G tube (V301) | (-49680) | N16-C-300798-866 | CAIS 926C | FRE-21201-1 | O-9 | | | | |
| X-1 | SOCKET, tube: miniature; 9 radial contacts spaced 36° apart; | Receptacle for type GL-5670 | | N16-S-64061-6257 | 1; SA:6212 | SA:6212 | X-1 | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X-1 (cont'd) | 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" from ctr) mtg holes spaced 1 1/8" on ctrs on long axis; 13/16" diam chassis cut-out required (under-chassis mtg); tin-plated phosphor bronze contacts, for reference only | tube (V106A, V106B) | | | | | | | | |
| X-2 | SOCKET, electron tube: miniature; 7 contacts (spaced 45°); molded plastic (type MTS-E-4 per JAN-P-14) body; axial solder-lug terms; 1 1/8" max diam x 11/32" d, excl 5/32" diam x 5/16" lg ctr shield extension; two 1/8" diam mtg holes spaced 7/8" ctrs on long axis; per BuShips dwg RE49AA-455A | Receptacle for JAN types 6BA6 (V201), 9003 (V202-V205), 6AL5 (V206A,B and V207A,B) 6AK5 (V208-V210) and 6AK6 (V211) tubes | (-491675) | N16-S-62603-6446 | 1; SA:3846 | SA:3846 | X-2 | | | |
| X-3 | SOCKET, electron tube: miniature; 7 contacts (spaced 45°) ceramic body; solder terms; 1 1/8" max diam x 0.800" min diam x 1 9/32" o.a.l.; for reference only | Receptacle for JAN types 9003 (V101-V104), 6J6 (V105A, B and V107A, B) and 6AK5 (V108 and V109) tubes | | N16-S-62603-6703 | CMG | FRE-29848-1 | X-3 | | | |
| X-4 | SOCKET, electron tube: 8 contact medium (octal); ceramic body 1 1/4" diam x 1/2" d excl 11/32" phosphor bronze solder lug terms at rear; 2 no. 6-32 mtg holes spaced 1 5/8" on long axis of 1 3/8" min diam x 2" max diam stainless steel mtg plate | Receptacle for JAN type 5U4G (V301) tube | | N16-S-63524-6475 | CPH no. 49-RNSS8M | FRE-20179-1 | X-4 | | | |
| X-5 | LAMPHOLDER: miniature, bayonet; 1/2" wd x 1 1/4" d x 1" h; no. 6-32 x 5/16" lg binding head screw in 90° angle bracket located beside socket shell; 2 solder lug terms | Receptacle for lamps 1501 and 1502 | | N17-L-51624-6963 | CAYZ 708 mod per FTRC dwg | FRE-2891-1 | X-5 | | | |

TABLE 8-4. COMBINED PARTS AND REPAIR PARTS LIST FOR RADIO RECEIVING SET AN/URR-27

| PARTS | | | | | | | | | EQUIP. REPAIR PARTS | |
|---|---|---|---|---|---|---|---|---|---|---|
| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | JAN AND (NAVY TYPE) NO. | STANDARD NAVY AND (SIGNAL CORPS) STOCK NO. | MFGR. AND MFGR'S. DESIG-NATION | CON-TRACTOR DRAW-ING & PART NO. | ALL SYMBOL DESIG. INVOLVED | TOT. NO. PER EQ. | BOX | QUAN. |
| X-6 | LIGHT, indicator: miniature, bayonet, s.c.; T-2 bulb; nickel plated brass shell; panel hole mtg; 13/16" max diam x 2 3/32" lg incl 5/8" diam plastic head and 9/32" lg axial solder lug terms (2) at rear; head protrudes 7/16" and has hemispherical (5/16" rad) end; shell threaded to form 11/16" -27 x 1/2" lg mtg bushing; hex nut, 3/32" th x 13/16" betw flats; lockwasher | Receptacle for type NE-51 neon lamp (1503) | | N17-L-76743-3975* | CAYZ PLN-850 mod per FTRC dwg | FRE-1912-1 | X-6 | | | |
| X-6A | LIGHT, indicator: w/o lens; accommodates 5/8" diam screw-in lens; accommodates T-3 1/4 miniature bayonet base lamp, MBCA Ref Dwg Group 7; brass bright nickel plated shell; 13/16" diam x 1 23/32" lg incl term; one 11/16" diam mtg hole required; accommodates up to 3/8" thick panel; horizontally mtd w/lamp replaceable from front of panel; 2 solder lug terminals located on end of lampholder; both terminals insulated from frame; treated to resist fungus and moisture | Receptacle for 1503 | | N17-L-76656-2460 | CAYZ 95410 | R897-2 | X-6A | 1 | | |
| X-6B | LENS, light: 5/8" diam x 5/8" h; non-focusing; clear plastic; screw-in mtg | X-6A lens | | N17-L-250181-506 | CAYZ 95-937 | R897-3 | X-6B | | | |
| * | Not furnished as a maintenance part. If failure occurs do not request replacement unless the item cannot be repaired or fabricated. | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | BOX, repair parts: Metal; per Navy Spec 42B9 | Container for equipment repair parts | | | | FRB-26880-12 | | | | |

TABLE 8–5. CROSS REFERENCE PARTS LIST

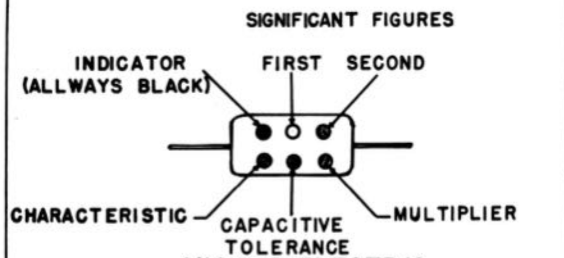
| JAN DESIGNATIONS | KEY SYMBOL | JAN DESIGNATIONS | KEY SYMBOL | JAN DESIGNATIONS | KEY SYMBOL | STANDARD NAVY STOCK NO. | KEY SYMBOL | STANDARD NAVY STOCK NO. | KEY SYMBOL |
|---|---|---|---|---|---|---|---|---|---|
| AN-3102-14S-2P | J402 | RC20BF153K | R226 | ST42D | S202 | N16-C-72909-4533 | L201 | N16-R-50372-811 | R122 |
| AN-3102-14S-7P | J401 | RC20BF154J | R234 | UG-21B/U | P404 | N16-C-74411-7351 | L405 | N16-R-50399-811 | R237 |
| AN-3102-14S-2S | P402 | RC20BF154K | R225 | UG-58/U | J404 | N16-C-74458-4712 | L401 | N16-R-50479-431 | R235 |
| AN-3102-14S-7S | P401 | RC20BF155K | R231 | UG-177/U | J404A | N16-C-76358-3376 | L114 | N16-R-50552-811 | R102 |
| CB11EG101J | C119 | RC20BF181J | R111 | UG-347/U | P101 | N16-C-76520-6551 | L117 | N16-R-50588-811 | R120 |
| CC21RH150K | C121 | RC20BF184J | R246 | UG-348/U | J406 | N16-C-300798-866 | O-9 | N16-R-50633-811 | R101 |
| CC21SL030D | C162 | RC20BF222K | R119 | **STANDARD NAVY STOCK NO.** | **KEY SYMBOL** | N16-C-600701-120 | E-4 | N16-R-50677-431 | R234 |
| CC21SL050F | C128 | RC20BF223K | R122 | F16-T-98076-1601 | C101 | N16-C-600701-121 | E-5 | N16-R-50678-811 | R225 |
| CC21SL070D | C126 | RC20BF224K | R224 | G17-L-6297 | I501 | N16-C-600701-137 | E-6 | N16-R-50695-431 | R246 |
| CC21SL510K | C129 | RC20BF271K | R245 | G17-L-6806-130 | I503 | N16-D-46576-1961 | O-1 | N16-R-50714-811 | R224 |
| CE41B350Q | C301 | RC20BF272K | R203 | G77-B-999-75008-0100 | O-6 | N16-D-900151-109 | O-5 | N16-R-50741-811 | R236 |
| CM20D201J | C159 | RC20BF273K | R237 | N16-C-15532-9005 | C162 | N16-F-32171-3630 | Z202 | N16-R-50758-431 | R239 |
| CM35B103K | C211 | RC20BF274K | R236 | N16-C-15636-2514 | C128 | N16-G-432816-277 | O-8 | N16-R-50821-431 | R250 |
| CP06SA4 | C222B | RC20BF334J | R239 | N16-C-15756-9001 | C126 | N16-M-60906-8018 | C229A | N16-R-50822-811 | R244 |
| CP06SA6 | C229A | RC20BF 335K | R222 | N16-C-15997-1482 | C121 | N16-R-28693-5271 | L301 | N16-R-50975-811 | R221 |
| CP61B1EF105V | C229 | RC20BF472K | R249 | N16-C-16605-7014 | C129 | N16-R-49238-811 | R112 | N16-R-51110-811 | R222 |
| CP61B6EF254V | C222A | RC20BF473J | R235 | N16-C-18659-4509 | C105 | N16-R-49320-231 | R301 | N16-R-68307-6666 | R230 |
| CR-24/U | Y201 | RC20BF474J | R250 | N16-C-18660-9901 | C117 | N16-R-49444-431 | R202 | N16-R-68320-9426 | R248 |
| OA2 | V303 | RC20BF474K | R244 | N16-C-19892-7801 | C301 | N16-R-49642-431 | R111 | N16-R-87349-4515 | R502 |
| OB2 | V302 | RC20BF510J | R202 | N16-C-28553-1000 | C119 | N16-R-49688-811 | R245 | N16-R-87519-4490 | R214 |
| 5U4WG | V301 | RC20BF561K | R217 | N16-C-29265-3006 | C159 | N16-R-49805-811 | R217 | N16-R-87679-4320 | R233 |
| 6BA6 | V201 | RC20BF683K | R102 | N16-C-30167-1876 | C153 | N16-R-49859-171 | R307 | N16-R-87808-4304 | R238 |
| 6AK5W | V208 | RC20BF821J | R252 | N16-C-30167-1887 | C103 | N16-R-49876-431 | R252 | N16-R-88059-4470 | R254 |
| 6AK6 | V211 | RC20BF821K | R241 | N16-C-31090-3800 | C403 | N16-R-49877-811 | R241 | N16-R-89956-7015 | R501 |
| 6AL5W | V206 | RC20BF823K | R120 | N16-C-33622-5222 | C211 | N16-R-49878-551 | R302 | N16-S-62603-6446 | X-2 |
| 6J6W | V105 | RC30BF220K | R301 | N16-C-46371-9609 | C401 | N16-R-49922-811 | R227 | N16-S-62603-6703 | X-3 |
| 5654 | V101 | RC30BF222K | R104 | N16-C-48841-9593 | C229 | N16-R-49940-811 | R212 | N16-S-63524-6475 | X-4 |
| 9003 | V202 | RC30BF332K | R124 | N16-C-53448-1001 | C222 | N16-R-50012-811 | R119 | N16-S-64061-6257 | X-1 |
| MR25W001-DCMA | M501 | RC30BF682K | R113 | N16-C-55551-3119 | C108 | N16-R-50013-231 | R104 | N16-S-150263-107 | A-2 |
| RC20BF100K | R112 | RC40BF751J | R307 | N16-C-72695-6893 | L103 | N16-R-50039-811 | R203 | N16-T-52001 | V303 |
| RC20BF102K | R227 | RC40BF821K | R302 | N16-C-72726-1001 | L105 | N16-R-50067-231 | R124 | N16-T-52001-05 | V302 |
| RC20BF103K | R121 | RE28F120 | F201 | N16-C-72730-3773 | L403 | N16-R-50129-811 | R249 | N16-T-52351 | V106 |
| RC20BF104K | R101 | RU3B7R5J | R230 | N16-C-72793-6430 | L123 | N16-R-50202-231 | R113 | N16-T-55467 | V301 |
| RC20BF105K | R221 | RU3B150J | R248 | N16-C-72887-5666 | L116 | N16-R-50282-811 | R121 | N16-T-56191-50 | V208 |
| RC20BF122K | R212 | ST12D | S201 | | | N16-R-50309-811 | R114 | N16-T-56192 | V211 |
| RC20BF123K | R114 | ST22K | S502 | | | N16-R-50336-811 | R226 | N16-T-56195-50 | V206 |

TABLE 8–5. CROSS REFERENCE PARTS LIST (CONT'D)

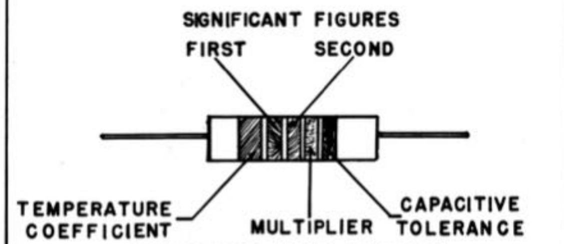
| STANDARD NAVY STOCK NO. | KEY SYMBOL | STANDARD NAVY STOCK NO. | KEY SYMBOL |
|---|---|---|---|
| N16-T-56211 | V201 | N17-C-804081-101 | O-2 |
| N16-T-56365 | V105 | N17-C-812323-101 | O-3 |
| N16-T-75654 | V101 | N17-C-945001-203 | J404A |
| N16-T-751468-732 | H-2 | N17-F-16302-100 | F201 |
| N16-T-79003 | V202 | N17-F-74266-9235 | E-7 |
| N16-T-98076-1001 | E-13 | N17-J-39248-4423 | J501 |
| N16-T-98501-1001 | E-10 | N17-I-49498-7025 | E-9 |
| N16-T-98501-1004 | E-12 | N17-I-81960-5263 | E-8 |
| N16-T-98501-1005 | E-16 | N17-L-51624-6963 | X-5 |
| N16-T-98501-1017 | E-11 | N17-L-76743-3975 | X-6 |
| N16-T-98501-1018 | E-14 | N17-M-19255-1051 | M501 |
| N17-B-21188-1075 | BL301 | N17-M-22724-6701 | M502 |
| N17-B-86841-9339 | E-1 | N17-M-75268-6626 | A-1 |
| N17-C-70328-1515 | P401 | N17-S-59261-8262 | S203 |
| N17-C-70334-5429 | P402 | N17-S-69903-9979 | S301 |
| N17-C-71414-2800 | P403 | N17-S-71894-1544 | S202 |
| N17-C-71416-2550 | P404 | N17-S-72018-7719 | S201 |
| N17-C-72604-1516 | J401 | N17-S-73082-9028 | S502 |
| N17-C-72610-5434 | J402 | N17-T-65494-3101 | T207 |
| N17-C-73108-5890 | J403 | N17-T-68163-6426 | T201 |
| N17-C-73108-5905 | J404 | N17-T-68163-6451 | T202 |
| N17-C-73108-6037 | J406 | N17-T-74016-6329 | T301 |
| N17-C-73194-4231 | J405 | N17-T-81819-2010 | L101 |
| N17-C-73408-7101 | P101 | N17-T-81891-2001 | L113 |
| N17-C-73487-7175 | P301 | N17-T-81891-3001 | L110 |
| N17-C-77415-7611 | E-2 | N17-T-82216-1516 | L115 |
| N17-C-77417-8070 | E-3 | N41-W-2459-915 | H-3 |
| N17-C-98378-2225 | O-4 | N43-W-7520-2400 | H-1 |
| N17-C-794001-133 | O-7 | | |

## TABLE 3-6. COLOR CODES

### CAPACITOR COLOR CODE

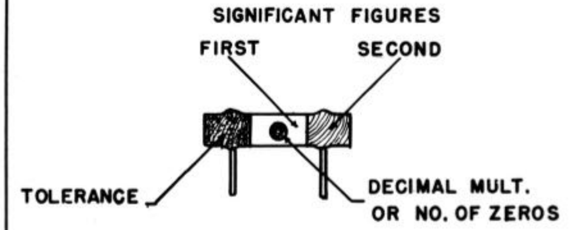



*MICA-DIELECTRIC*

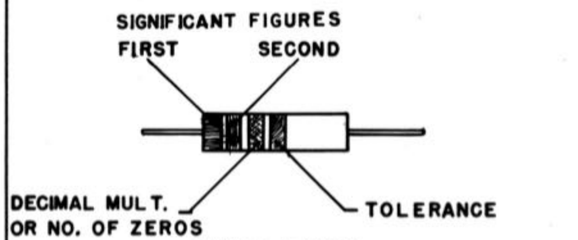



*CERAMIC-DIELECTRIC*

### RESISTOR COLOR CODE

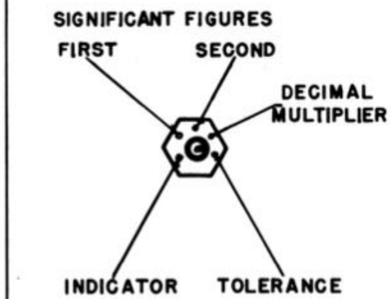



*RADIAL TYPE*




*AXIAL TYPE*

### FEED-THRU TYPE CAPACITOR




*CERAMIC-DIELECTRIC*

| RESISTORS | | | | CAPACITORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *MICA - DIELECTRIC* | | | *CERAMIC - DIELECTRIC* | | | |
| | | | | | | | | | | TOLERANCE | |
| DECIMAL MULTIPLIER OR NO. OF ZEROS | TOLERANCE | SIGNIFICANT FIGURE | COLOR | SIGNIFICANT FIGURE | MULTIPLIER | CAPACITIVE TOL. IN % | CHARAC-TERISTIC | MULTIPLIER | TEMP. COEF. IN PARTS/MEG/°C | > 10 UUF IN % | < 10 UUF IN UUF |
| 0 | | 0 | BLACK | 0 | 1 | 20 | A | 1 | 0 | 20 | 2 |
| 1 | | 1 | BROWN | 1 | 10 | | B | 10 | −30 | 1 | |
| 2 | | 2 | RED | 2 | 100 | 2 | C | 100 | −80 | 2 | |
| 3 | | 3 | ORANGE | 3 | 1000 | | D | 1000 | −150 | | |
| 4 | | 4 | YELLOW | 4 | | | E | | −220 | | |
| 5 | | 5 | GREEN | 5 | | | F | | −330 | 5 | .5 |
| 6 | | 6 | BLUE | 6 | | | G | | −470 | | |
| 7 | | 7 | VIOLET | 7 | | | | | −750 | | |
| 8 | | 8 | GRAY | 8 | | | | .01 | +30 | | .25 |
| 9 | | 9 | WHITE | | | | | .1 | −330 ± 500 | 10 | 1.0 |
| .1 | ±5 | | GOLD | | .1 | 5 | | | | | |
| .01 | ±10 | | SILVER | | .01 | 10 | | | | | |
| | ±20 | | NO COLOR | | | | | | | | |

TABLE 8-7. LIST OF MANUFACTURERS

| MFR'S PREFIX | NAME | ADDRESS |
|---|---|---|
| CAW | Aerovox Wireless Corp. | 742 Belleville Ave., New Bedford, Mass. |
| CBN | Central Radio Laboratory | 900 E. Keefe Avenue, Milwaukee, Wis. |
| CBZ | Allen-Bradley Co. | 118 W. Greenfield Ave., Milwaukee, Wis. |
| CED | Cannon Elec. Development Co. | 3291 Humboldt St., Los Angeles 31, Calif. |
| CER | Erie Resistor Co. | 644 W. 12th St., Erie, Pa. |
| CFT | Federal Telephone and Radio Corp. | 100 Kingsland Rd., Clifton, N.J. |
| CFA | Bussman Mfg. Co. | 2538 W. University St., St. Louis, Mo. |
| CG | General Electric Co. | 1 River Road, Schenectady 5, N.Y. |
| CHH | Arrow-Hart and Hegeman Elec. Co. | 102 Hawthorne St., Hartford, Conn. |
| CHS | Hygrade Sylvania Corp. | 62 Boston St., Salem, Mass. |
| CIR | International Resis. Corp. | 401 N. Broad St., Philadelphia, Pa. |
| CLF | Littlefuse Laboratories, Inc. | 4765 Ravenswood Ave., Chicago 40, Ill. |
| CMF | Electro-Motive Mfg. Co. | Willimantic, Conn. |
| CMG | Cinch Mfg. Co. | 2339 W. Van Buren St., Chicago, Ill. |
| CNA | National Company, Inc. | 61 Sherman St., Malden, Mass. |
| CPH | American Phenolic Corp. | 1830 S. 54th Ave., Chicago, Ill. |
| CSA | Stackpole Carbon Co. | 1942 Tannery St., St. Mary's, Pa. |
| CSF | Sprague Electric Co. | N. Adams, Mass. |
| CSN | Standard Transformer Corp. | 1500 N. Halstead, Chicago, Ill. |
| CSQ | Spencer Thermostat Co. | 34 Forrest St., Attleboro, Mass. |
| CTB | The Bristol Company | 117 Bristol Road, Waterbury, Conn. |
| CUF | United Carr Fastener Co. | 450 Main St., Cambridge, Mass. |
| CV | Weston Elec. Instr. Co. | 619 Frelinghuysen Ave., Newark, N.J. |
| CYC | Merit Coil Mfg. Co. | 311 N. Desplaines, Chicago, Ill. |
| CAIS | The Birtcher Corp. | 5087 Huntington Drive, Los Angeles, Calif. |
| CARB | Eastern Air Devices, Inc. | 285 Dean St., Brooklyn, N.Y. |

TABLE 8–7. LIST OF MANUFACTURERS (CONT'D)

| MFR'S PREFIX | NAME | ADDRESS |
|---|---|---|
| CARO | Industrial Products Co. | Brookfield St., Danbury, Conn. |
| CASU | Electrical Reactance Corp. | Franklinville, N.Y. |
| CAXO | Shakeproof, Inc. | 2573 N. Keeles Ave., Chicago, Ill. |
| CAYU | L.N. Barry | 179 Sidney St., Cambridge, Mass. |
| CAYZ | Dial Light Corp. | 900 Broadway, N.Y., N.Y. |
| CBEN | Air-Maze Corp. | 5200 Harvard Ave., Cleveland, Ohio |
| CBIS | Burnell and Company | 10-12 Van Cortland Ave., Bronx, N.Y. |
| | A. Ludwig and Co. | c/o Black and Weinberg, 60 E. 42nd St., New York, N.Y. |
| | Insulation Fabs | 69 Grove St., Watertown, Mass. |
| | John R. Sloane | 21 Depot Square, Lexington, Mass. |
| | Pauling Rubber Co. | Pauling, New York |

# INDEX

# SECTION 4
# OPERATION

## 1. PRELIMINARY.

It is assumed that before being turned over to the operating personnel the AN/URR-27 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 105-190 megacycle range of the equipment.

## 2. CONTROLS PROVIDED AND THEIR LOCATIONS.

The panel location 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 IMP 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 105-190 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:

$$\text{Crystal frequency (in Mc.)} = \frac{\text{selected channel frequency (in mc.)} + 18.6 \text{ mc.}}{6}$$

(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.