T.O. 12R2-3SCR274-2
(Formerly 16-40SCR274-5)

HANDBOOK

MAINTENANCE INSTRUCTIONS

RADIO SET SCR-274-N

REVISION NOTICE

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Destruction of Abandoned Materiel 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 arms.
5. Burying all debris or disposing of it in streams or other bodies of water, where possible and when time permits.

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!

★

Unsatisfactory Report

For U. S. Army Air Force Personnel:

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Radio model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

For U. S. Navy Personnel:

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Materiel (location to be specified) and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes—no).
7. Remedy used or proposed to prevent recurrence.

For British Personnel:

Form 1022 procedure shall be used when reporting failure of radio equipment.

SAFETY NOTICE

●

DYNAMOTOR DM-33-A, ON THE MODULATOR UNIT OF THIS RADIO SET, GENERATES 600 VOLTS, D. C. THIS IS SUFFICIENT TO CAUSE SEVERE SHOCK, OR EVEN DEATH. MAKE ABSOLUTELY CERTAIN THAT THE DYNAMOTOR IS NOT RUNNING BEFORE MAKING ANY ADJUSTMENT WHATEVER WITH THE EXCEPTION OF TUNING UP THE TRANSMITTERS.

Opening up the tube covers on the transmitters and modulator unit exposes the high voltage plate connections to the top caps of Tubes VT-136. *Do not attempt to connect or disconnect a transmitter or a power plug while Dynamotor DM-33-A is running.* Do not depend alone upon hearing the dynamotor or upon observing the several switch positions to determine whether the dynamotor is running—feel it.

In tuning up the antenna circuit of the transmitters, be careful to avoid touching the antenna when the power is on as severe, irritating burns will result. Warn anyone who may be working near the antenna of your intention to turn on the power.

FIRE: If the radio compartment has been exposed to gasoline vapor, make certain that it is aired out well before turning on the power. The antenna must be installed as far as possible from any inflammable material, such as fabric covering, canvas baggage compartments, etc., because of the possibility of sparking through this material to a grounded metal member beyond and setting fire to the material.

Dynamotor DM-32-A, on each of the receivers, generates 250 volts d. c. The danger of exposure to this voltage must not be ignored. Make certain that all control switchs are OFF before performing any adjustment to the equipment other than antenna alignment.

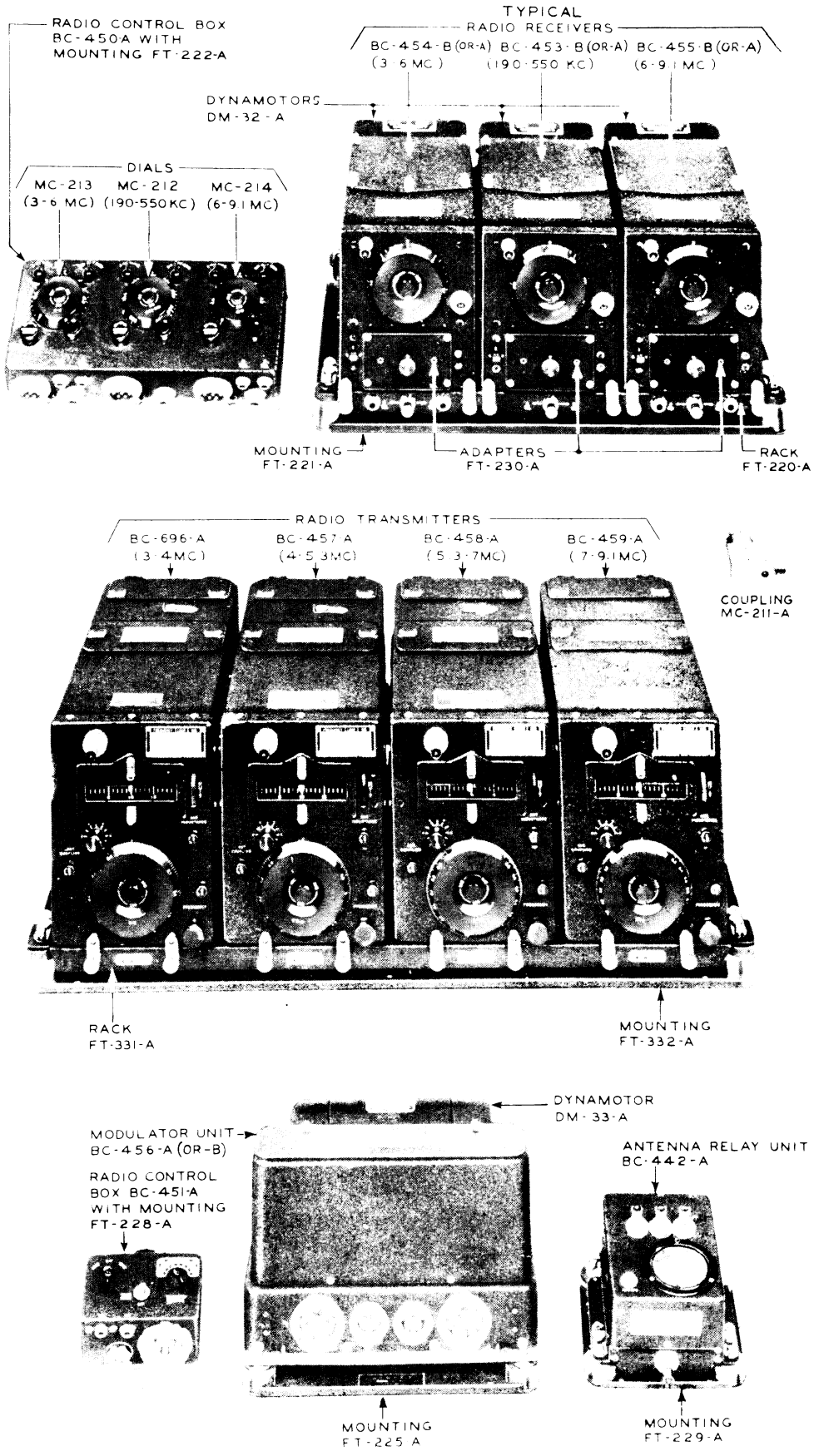

FIGURE 1 — PRINCIPAL COMPONENTS OF RADIO SET SCR-274-N

INSTRUCTION BOOK
for
OPERATION AND MAINTENANCE
of
RADIO SET SCR-274-N

SECTION I.

GENERAL DESCRIPTION

1. INTRODUCTION

Radio Set SCR-274-N is a multi-channel aircraft radio receiving and transmitting equipment, the major components of which are identified in Figure 1. Although some of these components are not furnished on each order of equipment, similar units are operatively interchangeable regardless of order number. Table 1, Paragraph 8, lists components.

2. RECEIVING EQUIPMENT

a. *Components*

The receiving equipment consists of Radio Receivers BC-453-A (or -B) (190-550 kc), BC-454-A (or -B) (3.0-6.0 mc) and BC-455-A (or -B) (6.0-9.1 mc), three Dynamotors DM-32-A, and either Radio Control Box BC-450-A (for three receivers) or Radio Control Boxes BC-473-A (or -B) (for one receiver) and BC-496-A (for two receivers) or Control Panel C570A/A or C570B/A. In addition, there are the racks, mountings, plugs and cordage listed in Table 1, Paragraph 8.

b. *Antenna Requirements*

A single antenna may be used for all receivers and transmitters, providing it is suitable for each unit. It may be desirable to use a long fore and aft inverted L or T antenna for all receivers and transmitters.

c. *Power*

Primary power is obtained from the 24-28 volt d-c supply on the airplane. The current drain is 1.6 amperes per receiver for a normal input of 28 volts. (See Table 2, SECTION V, for further details on current drain.) The receiver is designed for satisfactory operation over a range of 22 to 30 volts.

d. *Tuning*

The receiving equipment may be installed for either local or remote control by use of suitable adapters and tuning controls which are supplied as parts of this radio set. All tuning dials are calibrated in kilocycles (kc) or megacycles (mc).

e. *Receiver Output*

The output of each receiver may be paralleled on one line to a single headset or separated and fed to two lines for reception by more than one operator. Several Headsets HS-23 (8000 ohms impedance per headset) may be used with either -A or -B type radio receivers. The -B type radio receivers may be converted to supply low impedance (600 ohms) headsets by changing taps on the output transformers.

f. *Sensitivity Control*

Continuous wave (CW) or amplitude modulated (MCW) radio signals may be received. Manual control of sensitivity is employed, aided by a built-in auxiliary control circuit which prevents strong radio signals from blocking reception. No provision is made for complete automatic gain control.

g. *Electrical Circuits*

The electrical circuits of the receiving equipment are shown in Figure 26. All the receivers are of the superheterodyne type and, except for elements forming the r-f and i-f tuned circuits, they are essentially alike, electrically and physically. Each receiver

employs six 12-volt tubes performing the following functions: r-f amplifier, mixer, first i-f amplifier, second i-f amplifier, diode detector — CW heterodyne oscillator and audio amplifier.

h. *Weights and Dimensions*

The weight of the receiving equipment, comprising the component units required for a three-receiver installation but not including control boxes, cords or external wiring, is 35.3 pounds. Figure 28 shows the overall dimensions and lists the weights of the component units. Figure 30 shows similar information on the radio control boxes and associated mountings.

3. TRANSMITTING EQUIPMENT

a. *Apparatus*

The transmitting equipment consists of Radio Transmitters BC-696-A (3.0-4.0 mc), BC-457-A (4.0-5.3 mc), BC-458-A (5.3-7.0 mc) and BC-459-A (7.0-9.1 mc) (certain installations use only one or two of these transmitters while others use three or four); Dynamotor DM-33-A and Modulator Unit BC-456-A (or -B) which supply the high voltage d-c and the modulating power for the transmitters; Radio Control Box BC-451-A for remote control of the transmitting equipment and Antenna Relay Unit BC-442-A for switching a single antenna between the receivers and the transmitters. In addition, there are the racks, mountings, cords, etc., listed in Table 1, Paragraph 8.

In installations that do not include Radio Transmitter BC-459-A, Antenna Relay Unit BC-442-AM may be used in place of Antenna Relay Unit BC-442-A.

b. *Antennas*

A single antenna may be used for all transmitters, providing it has characteristics at each operating frequency within the following limits:

(1) A reactance not greater than that of 50 micromicrofarads or of 4.5 microhenries.

(2) A resistance up to 12 ohms.

The peak power output of each transmitter under optimum antenna loading conditions exceeds 40 watts (on CW) for 28 volts input to the equipment. Considerably less power will be obtained when using short built-on antennas whose capacitance may be as low as 50 micromicrofarads and whose total resistance may be one ohm or less. Under these conditions a reduction of as much as 10 to 1 in power may be expected. Typical test data on the transmitters are given in Table 8, SECTION V.

c. *Power*

Primary power is obtained from the 24-28 volt d-c supply on the airplane. The current drain in a two-transmitter installation at 28 volts input is 9 amperes at maximum power output, and 2.5 amperes when not transmitting (vacuum tube heater current). (The primary supply current for various conditions of operation is shown in Table 2, SECTION V.) Satisfactory operation will be obtained if the d-c input voltage lies within a range of 22 to 30 volts.

d. *Control Box*

The position of the TONE - CW - VOICE switch on Radio Control Box BC-451-A determines the type of emission, and the four-position switch on the same box selects a pretuned transmitter.

e. *Frequency Calibration*

A piezo-electric crystal and an electron resonance indicator are provided in each transmitter to check the accuracy of the calibration at one frequency. The transmitter dials are calibrated in megacycles (mc).

f. *Sidetone*

Sidetone is furnished to the headsets from the modulator unit to permit listening to the transmission on the interphone system. Either Modulator Unit BC-456-A or BC-456-B may be used with high impedance headsets. Modulator BC-456-B may be converted for use with low impedance headsets.

g. *Electrical Circuits*

The electrical circuits are shown in Figure 27. A master-oscillator excites a pair of beam tetrode power amplifier tubes connected in parallel. The master-oscillator and the r-f power amplifier tuning capacitors

are ganged for simplification of controls. Continuously variable magnetic coupling between the power amplifier tank circuit and the antenna circuit is controlled by the ANT. COUPLING knob on the front panel. The antenna circuit is tuned by a continuously adjustable series inductor. Two Tubes VT-136 in parallel are used as r-f power amplifiers and are screen-grid modulated by audio voltage from Modulator Unit BC-456-A (or -B). The modulation capability exceeds 85 per cent.

h. *Weights and Dimensions*

The weight of the transmitting equipment with two transmitters, less cords, is 41.2 pounds. Figure 29 lists the weights of the transmitter and its associated racks and mountings and shows the overall dimensions of the equipment. Figure 30 contains similar information on the radio control boxes and antenna relay units and associated mountings.

4. SERIAL NUMBERS

a. *Application*

Serial numbers appear on all major units of Radio Set SCR-274-N.

b. *Dynamotors*

A nameplate bearing Signal Corps nomenclature is located on the base of each Dynamotor DM-32-A and Dynamotor DM-33-A and is hidden from view when the dynamotor is mounted on the equipment. In order to aid in checking the serial number without dismounting the dynamotor, an additional serial-number plate has been provided on the top of the dynamotor. This plate is of the write-in type, so that the proper number may be recorded if a new dynamotor is mounted on the dynamotor base. The number engraved on the nameplate is the permanent serial number of that unit.

c. *Radio Receiver*

A serial number on the rear of the receiver chassis corresponds to the serial number appearing on the receiver nameplate on the side of the outer shield. Serial numbers for manufacturing record only are rubber-stamped on each gang capacitor and are steel-stamped on the side of each dynamotor. These apply to the gang capacitor and dynamotor and not to the receiver.

5. REFERENCE AND PART NUMBERS

a. *Reference Numbers*

The reference numbers used in the following discussion refer to parts shown in the photographs and drawings and are referenced in the Table of Replaceable Parts in SECTION V of this book.

b. *Part Numbers*

A reference number has been assigned to each component. For example, "Z-5" is the r-f coil set assembly. This assembly is different for each of the three receivers in this equipment, hence, three "Western Electric Company Drawing Numbers" will be found for Z-5. These numbers are also Western Electric Company "Part Numbers." Many parts will be found common to all three receivers or to all four transmitters, but wherever this is not true, a separate listing for each unit will indicate the correct number.

6. BRIEF DESCRIPTION OF THE PRINCIPAL COMPONENTS OF THE RECEIVING EQUIPMENT

(See Figure 1 and outline drawings in Figures 28 and 30)

a. *Radio Receivers*

This item includes Radio Receivers BC-453-A (or -B), BC-454-A (or -B) and BC-455-A (or -B), with Dynamotors DM-32-A, Adapters FT-230-A, Couplings MC-211-A, Rack FT-220-A and Mounting FT-221-A (for three receivers). Other racks and mountings are also available as follows: Rack FT-233-A with Mounting FT-231-A (for one receiver), Rack FT-277-A with Mounting FT-279-A (for two receivers) and Rack FT-264-A with Mounting FT-278-* (for four receivers).

For the 3-receiver arrangement the weight and dimensions are as follows:

Weight: 32.6 pounds.

Overall Dimensions: $16\frac{9}{16}$ inches wide, $7\frac{11}{32}$ inches high and $13\frac{1}{8}$ inches deep.

*Mountings and racks with no letter suffix were not manufactured at the time of publication of this instruction book.

This group of components comprises three complete radio receivers, each with its own high-voltage dynamotor, adapter and coupling, and Rack FT-220-A with three stalls for the three radio receivers and shock-proof Mounting FT-221-A for vibration protection of all of these units.

The weight of a single receiver with its rack and mounting and with Dynamotor DM-32-A is 11.2 pounds. The overall dimensions are $6\frac{11}{16}$ inches wide, $7\frac{11}{32}$ inches high and $13\frac{1}{8}$ inches deep.

b. *Radio Control Boxes*

This item includes Radio Control Boxes BC-450-A, BC-496-A and BC-473-A (or -B) with Mounting FT-222-A, FT-240-A and FT-235-A (or -B) respectively.

The overall dimensions of Radio Control Box BC-450-A with Mounting FT-222-A are $9\frac{1}{2}$ inches wide, $5\frac{15}{32}$ inches high and $2\frac{15}{16}$ inches deep. The weight of this unit, including Mounting FT-222-A, is 2.7 pounds.

Radio Control Box BC-450-A contains three completely independent groups of controls for remote control of the three radio receivers. It is equipped with Dials MC-212 (190-550 kc), MC-213 (3-6 mc) and MC-214 (6-9.1 mc) which are mechanically interchangeable.

The overall dimensions of Radio Control Box BC-496-A with Mounting FT-240-A are $6\frac{3}{8}$ inches wide, $5\frac{15}{32}$ inches high and $2\frac{15}{16}$ inches deep. The weight of this unit, including its mounting, is 1.7 pounds.

Radio Control Box BC-496-A differs from Radio Control Box BC-450-A in that there are only two sets of controls. This box is normally equipped with Dials MC-213 (3 - 6 mc) and MC-214 (6 - 9.1 mc).

The overall dimensions of Radio Control Box BC 473-A (or -B) with Mounting FT-235-A (or -B) are $3\frac{1}{4}$ inches wide, $5\frac{15}{32}$ inches high and $2\frac{15}{16}$ inches deep. The weight of this unit, including its mounting, is 0.9 pound.

Radio Control Box BC-473-A (or -B) differs from Radio Control Box BC-450-A in that there is but one set of controls. This box is normally equipped with Dial MC-212 (190-550 kc).

A one-section and a two-section control box may be used instead of the three-section control box described above whenever it is desired to split the controls between two operators.

Radio Control Panel C570A/A or C570B/A is used in some installations. It is furnished with cables attached. The wires are labeled with numbers which match terminal boards in these installations. The overall dimensions of the panel are 5 inches wide, 2-5/8 inches high and 3-3/8 inches deep.

The weight of this unit is 0.7 lbs. An extra control panel may be installed in cockpit which is to be used for sole flight missions.

c. *Adapter FT-260-A and Control Unit MC-237-A*

Adapter FT-260-A, containing local control for one receiver, fits into the same socket on the receiver as Adapter FT-230-A and adds 0.1 pound to the weight of each receiver so equipped above the weight including Adapter FT-230-A.

Control Unit MC-237-A is a crank used to replace the tuning shaft when local tuning of the receiver is desired. To install Control Unit MC-237-A, proceed as follows:

Remove the tuning shaft by unscrewing the knurled nut which holds the shaft to the sleeve on the front of the receiver. Place Control Unit MC-237-A on the sleeve, making sure that the splined shaft on the adapter slides into the splined socket. Secure in place by screwing the rear flange of the adapter on the sleeve.

Control Unit MC-237-A, when attached to a receiver, adds 0.1 pound to the weight and 1.0 inch to the depth

7. BRIEF DESCRIPTION OF THE PRINCIPAL COMPONENTS OF THE TRANSMITTING EQUIPMENT

(See Figure 1 and outline drawings in Figures 29 and 30.)

*Mountings and racks with no letter suffix were not manufactured at the time of publication of this instruction book.

a. *Radio Transmitters*

This item includes Radio Transmitters BC-696-A, BC-457-A, BC-458-A and BC-459-A; Rack FT-234-A and Mounting FT-232-A (for one transmitter); Rack FT-226-A and Mounting FT-227-A (for two transmitters), Rack FT-276-* and Mounting FT-262-* (for three transmitters) and Rack FT-331-A and Mounting FT-332-A (for four transmitters).

This group of components comprises the four transmitters, racks with stalls for any one, two, three or all four transmitters and shock-proof mountings for vibration protection of these units. Each of the transmitters contains a master-oscillator and the r-f power-amplifier components of the transmitting equipment.

Weight: 10.5 pounds (one transmitter, Rack FT-234-A and Mounting FT-232-A).

Dimensions: 7¼ inches wide, 8 13/16 inches high and 15 1/32 inches deep (one transmitter, Rack FT-234-A and Mounting FT-232-A).

Weight: 20.4 pounds (two transmitters, Rack FT-226-A and Mounting FT-227-A).

Dimensions: 12¾ inches wide, 8 13/16 inches high and 15 1/32 inches deep (two transmitters, Rack FT-226-A and Mounting FT-227-A).

Weight: 30.3 pounds (three transmitters, Rack FT-276-* and Mounting FT-262-*).

Dimensions: 18¼ inches wide, 8 13/16 inches high and 15 1/32 inches deep (three transmitters, Rack FT-276-* and Mounting FT-262-*).

Weight: 40.2 pounds (four transmitters, Rack FT-331-A and Mounting FT-332-A).

Dimensions: 23¾ inches wide, 8 13/16 inches high and 15 1/32 inches deep (four transmitters, Rack FT-331-A and Mounting FT-332-A).

*Mountings and racks with no letter suffix were not manufactured at the time of publication of this instruction book.

**Discontinued on the later models of Radio Set SCR-274-N

†Not included in Antenna Relay Unit BC-442-AM.

b. *Control Box*

This item includes Radio Control Box BC-451-A and Mounting FT-228-A.

Weight: 0.9 pound.

Dimensions: 4 1/8 inches wide, 4 3/8 inches high and 2¾ inches deep.

Radio Control Box BC-451-A contains all controls for the operation of any of one to four transmitters. (Tuning controls on the front of each transmitter are differentiated from operating controls.) This box contains a built-in telegraph key, a jack for connection to an external key, a microphone jack, an emission selector switch, a transmitter selection switch, a primary power source switch and a switch (inside the box) for short-circuiting a microphone series resistor. This resistor normally is short-circuited.

c. *Modulator Unit*

This item includes Modulator Unit BC-456-A (or -B), Dynamotor DM-33-A and Mounting FT-225-A.

Weight: 18 pounds.

Dimensions: 10 3/16 inches wide (facing receptacles), 7 11/16 inches high and 8 7/8 inches deep.

This group of components comprises the high-voltage d-c power supply, all of the voice and tone modulating circuit components and a shock-proof mounting for vibration protection of these units.

d. *Antenna Relay Unit*

This item includes Antenna Relay Unit BC-442-A (or BC-442-AM) and Mounting FT-229-A.

Weight: 2.2 pounds for Antenna Relay Unit BC-442-A or 2.0 pounds for Antenna Relay Unit BC-442-AM.

Dimensions: 5 5/8 inches wide (facing the unit so that the meter reads right side up), 4 21/32 inches high and 6 9/16 inches deep.

This unit consists of a switching relay, an antenna current indicator (with current transformer and thermocouple), a REMOTE - LOCAL antenna current indicator switch,** a 50 micromicrofarad antenna series condenser† and a shock-proof mounting for vibration protection of the unit.

8. APPARATUS UNITS WHICH MAY BE USED AS COMPONENT PARTS OF RADIO SET SCR-274-N

The first column of the following table assumes that the radio set may include any number of transmitters from one to four but that it will include three receivers.

TABLE 1

Quantity Per Radio Set	**PRINCIPAL COMPONENTS OF RADIO SET SCR-274-N** *Name of Major Unit or Accessory*	*Western Electric Co. Dwg. No.*
3	Adapter FT-230-A (receiver, remote control)	6433
*	Adapter FT-260-A (receiver, local control)	6434
1	Antenna Relay Unit BC-442-A	5017
▌	or Antenna Relay Unit BC-442-AM	BO-40205
*	Control Unit MC-237 (local, tuning) (formerly coded MC-236)	6743
3	Coupling MC-211-A (right angle, for tuning shaft)	6357
3	Dynamotor DM-32-A (receiver)	7351
1	Dynamotor DM-33-A (modulator unit)	5168
2	Ferrule M-231 (used on primary power supply cords)	6780
1	Instruction Book for Radio Set SCR-274-N	.....
1	Modulator Unit BC-456-A (or -B)	7591
1	Mounting FT-225-A (for Modulator Unit BC-456-A or BC-456-B)	7058
▌ 1	Mounting FT-229-A (for Antenna Relay Unit BC-442-A or BC-442-AM)	7056
*	Mounting FT-235-A (or -B) (for one-receiver Radio Control Box BC-473-A (or -B))	7053
*	Mounting FT-240-A (for two-receiver Radio Control Box BC-496-A)	6831
1	Mounting FT-222-A (for three-receiver Radio Control Box BC-450-A)	7054
1	Mounting FT-228-A (for transmitter Radio Control Box BC-451-A)	7083
*	Mounting FT-231-A (for one-receiver Rack FT-233-A)	7059
*	Mounting FT-279-A (for two-receiver Rack FT-277-A)	5694
1	Mounting FT-221-A (for three-receiver Rack FT-220-A)	7060
*	Mounting FT-278- (for four-receiver Rack FT-264-A)	5696
*	Mounting FT-232-A (for one-transmitter Rack FT-234-A)	7061
*	Mounting FT-227-A (for two-transmitter Rack FT-226-A)	7062
*	Mounting FT-262- (for three-transmitter Rack FT-276-)***	7063
*	Mounting FT-332-A (for four-transmitter Rack FT-331-A)	7064
2	Nut M-232 (used on primary power supply cords)	7546
1	Plug PL-147 (2-contact, for cable) or Plug PL-147-A (2-contact, for open wire)	6578 9127
1	Plug PL-148 (3-contact, for cable) or Plug PL-148-A (3-contact, for open wire)	6965 9126

TABLE 1 (Cont'd)

Quantity Per Radio Set	*Name of Major Unit or Accessory*	*Western Electric Co. Dwg. No.*
2	Plug PL-151 (6-contact, for cable) or Plug PL-151-A (6-contact, for open wire)	6784 9123
6	Plug PL-152 (8-contact, for cable) or Plug PL-152-A (8-contact, for open wire)	6577 9125
2	Plug PL-153 (18-contact, for cable) or Plug PL-153-A (18-contact, for open wire)	6963 9121
2	Plug PL-154 (12-contact, for cable) or Plug PL-154-A (12-contact, for open wire)	6964 9122
2	Plug PL-156 (5-contact, for cable) or Plug PL-156-A (5-contact, for open wire)	6967 9124
*	Plug PL-157 (2-contact) (discontinued in later models)	3146
*	Plug PL-158 (2-contact) (discontinued in later models)	7543
*	Plug PL-192 (used in receiver rack when receiver is equipped with Adapter FT-260-A for local control)	6787
*	Rack FT-233-A (for one receiver)	7509
*	Rack FT-277-A (for two receivers)	5018
1	Rack FT-220-A (for three receivers)	7537
*	Rack FT-264-A (for four receivers)	5019
*	Rack FT-234-A (for one transmitter)	7507
*	Rack FT-226-A (for two transmitters)	5020
*	Rack FT-276 (for three transmitters)***	7638
*	Rack FT-331-A (for 4 transmitters)	6090
*	Radio Control Box BC-473-A (or -B) (for 1 receiver) Includes: Dial MC-212 (190-550 kc)	7043
*	Radio Control Box BC-496-A (for 2 receivers) Includes: Dial MC-213 (3.0-6.0 mc) Dial MC-214 (6.0-9.1 mc)	6546
1	Radio Control Box BC-450-A (for three receivers) Includes: 1 Dial MC-212 (190-550 kc) I Dial MC-213 (3.0-6.0 mc) 1 Dial MC-214 (6.0-9.1 mc)	5014
2	Radio Control Panel C570A/A or C570B/A Includes: 1 Dial MX-1089/U (190-550 kc) 1 Dial MX-1090/U (3.0-6.0 mc)	
1	Radio Control Box BC-451-A (one to four transmitters)	7095
1	Radio Receiver BC-453-A (or -B) (190-550 kc) Includes: 1 Adapter FT-230-A (for remote control)	7594

TABLE 1 (Cont'd)

Quantity Per Radio Set	*Name of Major Unit or Accessory*	*Western Electric Co. Dwg. No.*
1	Radio Receiver BC-454-A (or -B) (3.0-6.0 mc) Includes: 1 Adapter FT-230-A (for remote control)	7595
1	Radio Receiver BC-455-A (or -B) (6.0-9.1 mc) Includes: 1 Adapter FT-230-A (for remote control)	7596
*	Radio Transmitter BC-696-A (3.0-4.0 mc)	ESR-681991
*	Radio Transmitter BC-457-A (4.0-5.3 mc)	7632
*	Radio Transmitter BC-458-A (5.3-7.0 mc)	7633
*	Radio Transmitter BC-459-A (7.0-9.1 mc)	7634
1	Tube Set (for Modulator Unit BC-456-A or BC-456-B) Includes: 1 Tube VT-135 (RMA type 12J5-GT) 1 Tube VT-136 (RMA type 1625) 1 Tube VT-139 (RMA type VR-150-30)	
3	Tube Set (for a receiver) Includes: 3 Tube VT-131 (RMA type 12SK7) 1 Tube VT-132 (RMA type 12K8) 1 Tube VT-133 (RMA type 12SR7) 1 Tube VT-134 (RMA type 12A6)	
*	Tube Set (for a transmitter) Includes: 2 Tube VT-136 (RMA type 1625) 1 Tube VT-137 (RMA type 1626) 1 Tube VT-138 (RMA type 1629)	
**	Tuning Shaft MC-215	6151

Test Set RC-54-A (for receiver testing). This is used with, but is not a part of, Radio Set SCR-274-N. See Figure 33.

Test Set RC-55-A (for transmitter testing). This is used with, but is not a part of, Radio Set SCR-274-N. See Figures 34 and 35.

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* Variable, depending upon operating requirements.

** Cordage and Tuning Shaft are supplied in bulk.

*** Mountings and Racks with no letter suffix were not manufactured at the time of publication of this instruction book.

SECTION II

EMPLOYMENT

9. INITIAL PROCEDURE

a. *Preliminary Check*

Check the supply of component units against the list in Table 1, aided by the group photograph in Figure 1 and, if necessary, by the cording diagram, Figure 31. It is advisable to make a visual inspection of each component to determine that no obvious mechanical fault exists. Such an examination should include checking the operation of controls and dials, checking the threads of receptacles and plugs, examination of pin plug assemblies for bent or otherwise unserviceable units, and other components. Remove the dust covers which are attached by means of snapslides. Proper fuses should be in place in the modulator unit and receiver rack. Vacuum tubes should be inserted firmly in the sockets identified for the particular type of tube. The type designations will be found marked on the edges of the case nearest the socket in which that particular type of tube should be placed or on a chart on the under side of the tube compartment cover. Grid clips should be firmly attached.

b. *Bench Test*

It is strongly recommended that an electrical "bench test" be made of each component item before it is installed in an airplane. This will insure normal operation of the equipment after installation with the minimum number of man-hours of work in and about the airplane. Trouble-shooting on installed radio equipment is difficult and should be avoided. Where a considerable amount of installation work is to be done, it is recommended that a permanent bench test installation be made, consisting of:

(1) 1 Test Set RC-54-A (for tests on receiving equipment). See Figure 33 for information regarding the use of this test set. Control Unit MC-237-A may be used for local tuning of the receiver.

(2) 1 Test Set RC-55-A (for tests on transmitting equipment). See Figures 34 and 35 for information regarding the use of this test set.

(3) 1 Storage battery, 28 volts, preferably at least 100 ampere-hour capacity.

(4) 1 Headset HS-23 or equal.

(5) 1 Microphone T-17 or equal.

c. *A TEL.—B TEL. Switch*

The functional diagram, Figure 8, indicates that each A TEL.—B TEL. toggle switch, directly under the front of each receiver, must be in its center position, covered by a screw cap. These switches are never operated when the receivers are remotely controlled. If one of these switches is thrown to A or B, the A-B switch on the control box corresponding to this receiver will not function properly.

d. *Use of A TEL. Line*

Normally all receivers will be connected to the A TEL. line; if an interphone is used, it will be connected to the "Command" channel thereof. When the receiver controls are split, as mentioned in Paragraph 6b, and two interphone channels are available, as in airplanes without a liaison set or compass or both, the A TEL. outlet can be connected to one interphone channel and the B TEL. outlet to the other channel.

e. *Sidetone Relay*

A relay behind each receiver in Rack FT-220-A operates with the transmitter keying relay to switch the headset circuit of that receiver to the transmitter sidetone circuit. If one receiver is connected to a separate antenna, it may be desirable to disconnect the sidetone relay associated with this receiver so that reception on it will not be interrupted during keying of one of the transmitters. If this is necessary, the proper relay may be made inoperative by placing a wedge under the armature. If Plug PL-151 is disconnected from Rack FT-220-A, sidetone is removed from all receivers.

f. *Resistor in Radio Control Box BC-451-A*

The toggle switch, S-53 (Figure 27), inside Radio Control box BC-451-A, should be in

the R-OUT position. This short-circuits a 510-ohm resistor in the microphone line. To gain access to the toggle switch, use a screwdriver to pry off the snap cap near the red designation plate. The same screwdriver may be used to check the position of the toggle switch. Radio Control Box BC-451-A is set at the factory with the resistor short-circuited by the switch, but a check as just indicated should be made to insure this fact. Microphone T-17 will not operate satisfactorily with the resistor in the circuit.

g. *Microphone Control*

If the transmitters are to be controlled by the button on Microphone T-17, or equal, turn the knurled nut on the microphone jack as far counter-clockwise as possible. If "throttle-switch" control is required, turn the knurled nut as far clockwise as possible and permanently close the press - to - talk switch on Microphone T-17.

10. INSTALLATION

a. *Antenna*

The antenna will vary in length with the airplane and frequency range employed. The longest antenna will be approximately 50 feet and the shortest approximately 18 feet, both lengths including the external and internal lead-in wire. The external part of the antenna should be placed as far away from the fuselage as possible. Transverse antennas are to be avoided because of the increased drag they cause and the possibility of failure due to icing. The exact layout of the antenna is dictated by the design of the airplane. The lead-in inside the fuselage shall be kept as short as possible, especially the one to the transmitter. Antenna Wire W-106-A provides the best internal lead-in connector. When internal antenna leads require support, ceramic stand-off insulators should be used, and when protection against accidental contact with the aircraft structure is necessary, ceramic beads should be strung on the wire. If necessary, insulated stranded wire such as is used in the airplane wiring may be used for the antenna lead to the receiver but the use of this wire is not recommended.

b. *Location of Receivers and Transmitters*

The radio set consists basically of a group of three receivers and a group of two or four transmitters, each group with its special rack and mounting. This apparatus, together with an antenna relay unit, should be located near the antenna lead-in bushing in order to keep the interior portion of the antenna lead-in as short as possible. Since it will be necessary to change the receivers and transmitters occasionally and to tune the transmitters, the chosen location should facilitate these operations. The location for the transmitters must permit a view of the reflection, seen in the mirror on the under side of the hinged rear cover on each unit, of the entire electron resonance indicator screen in tube V-53 (Tube VT-138). This view is essential in checking the calibration of each transmitter. Allow enough clearance around the units so that under the maximum amplitude of vibration they will not strike against anything.

c. *Location of Other Equipment*

In addition to the apparatus mentioned in the preceding paragraph, there is a modulator unit (with a high-voltage dynamotor) and separate control boxes for the group of receivers and group of transmitters. The modulator unit should be located near the 24-28 volt d-c supply in order to reduce the voltage drop in the battery cable and it should also be near the radio equipment in order to reduce the weight of the interconnecting cables. The radio control boxes should be installed near the pilot or operator. The location of the receiver radio control box (or boxes) should be such that the dials may be easily read day or night. (All dials are etched or engraved in aluminum and have a black background). The location of the transmitter radio control box should be such that the three switches and built-in key can be easily operated. Space must be left under this box and the receiver radio control box for inserting the plugs.

d. *Weights and Dimensions*

Figures 28, 29 and 30 show the installation dimensions and weights of all units of Radio Set SCR-274-N. The weight of the cables may be kept low by a careful group-

ing of the units. A cording diagram showing the interconnection of units is shown in Figure 31 and notes associated with this illustration are included in Paragraph 10m.

e. *Ground Connections*

In order to secure a good ground connection to the receivers and transmitters, connect a short flexible lead from the airplane frame to one of the G binding posts on each of the racks. If open-wire cables are employed, it may be necessary also to ground the case of Antenna Relay Unit BC-442-A (or -AM) in order to eliminate circulating radio frequency currents. The knurled nuts which clamp the receivers and transmitters in the racks must be securely hand-tightened and safety-wired. This holds the units solidly in place and at the same time provides an electrical connection between the chassis and racks. Noisy receivers and reduced antenna current from the transmitters will result if this precaution is not observed.

f. *Vacuum Tubes*

See that all tubes are securely in place in their proper sockets and that the tube compartment covers are in place and locked before the power is turned on. The following vacuum tube sets are required:

Set of tubes for each receiver

3 Tube VT-131
1 Tube VT-132
1 Tube VT-133
1 Tube VT-134

Set of tubes for the modulator unit

1 Tube VT-135
1 Tube VT-136
1 Tube VT-139

Set of tubes for each transmitter

2 Tube VT-136
1 Tube VT-137
1 Tube VT-138

The location of each type of tube is indicated by the Signal Corps type number engraved on the outer dust cover adjacent to the tube or is shown on a chart attached to the under side of the tube compartment cover.

g. *Mounting of Receivers and Transmitters*

Each of the receivers and transmitters must be carefully slid as far as it will go into its proper rack compartment. When this is done, it will be possible to slip the locking lugs located on the rack below the front of each unit over the conical studs on the receivers and transmitters. Radio Receiver BC-453-A (or -B) (190 - 550 kc) should be installed in the center compartment of Rack FT-220-A. This will physically separate Radio Receivers BC-454-A (or -B) (3.0-6.0 mc) and BC-455-A (or -B) (6.0-9.1 mc) and reduce electrical interference between them. The knurled nuts which hold the locking lugs in place should be hand-tightened and then safety-wired. A safety wire, not larger than 0.032 inch diameter, may be threaded through one of the four holes on the front of the nut and out through one of the three holes near the knurling. It is essential that these instructions be followed carefully in order that the several units will be held securely in place and that a good electrical connection will exist between these units and the racks on which the ground binding posts are located.

h. *Tuning Shafts*

Flexible tuning shafts should be kept short and have as few sharp bends as possible. Additional length and sharp bends increase the friction and consequent backlash in tuning. Also, since the only mechanical stop on the receiver tuning control consists of the tie plates on the receiver gang condenser rotors, it is possible to turn the tuning crank at the low-frequency end of the range with sufficient force to spring the stators from their ball-type supporting insulators. The likelihood of this mechanical damage increases with increased intricacy of tuning shaft layout, since increased friction gives less "feel" of the stop points. In this connection, it is well to observe the tuning dial of the receiver control box or boxes and not to tune beyond the end calibration marks on the dials.

i. *Slack in Connectors*

Allow plenty of slack in all connectors near the points of attachment to the units. Reduction in the shock-proofing of the units

and, at the same time, damage to the connectors and tuning shafts may result if this precaution is not observed.

j. *Safety Wiring on Snapslides*

Refer to Air Corps instructions relative to safety wiring of snapslides on radio equipment. Safety - wire the snapslides which lock the several units to their mountings.

k. *Receiver Control Box Dial*

Set each control box dial to correspond with the dial of the receiver to which it is connected. Each radio control box dial may be adjusted to a predetermined position by first loosening the knurled screw in the center and then rotating the dial to the desired reading. The knurled screw must then be hand-tightened. Do not use pliers for this operation. Control Panel dial has identical means of changing the position of the dial.

l. *Attachment of Plugs*

To attach plugs, "feel" for the proper orientation before using any considerable pressure on the plugs. The locking rings must be hand-tightened.

m. *Special Notes to be Read in Connection with the Cording Diagram, Figure 31*

Interconnection of units can be accomplished by any one of three methods of wiring. First, by use of plugs and shielded cordage as shown on Figure 31 (use for temporary installation). Second, by use of plugs and individual wires run in rigid and/or flexible conduit. Third, by the use of plugs and individual wires without shielding. The second and third methods shall be accomplished in accordance with Air Corps Specifications 32300-A, 32310-A and other Air Corps instructions, including wiring diagrams, that may be issued from time to time. If it becomes necessary to alter or fabricate a cord, refer to the illustrations on Figure 32.

The following notes are to be read in connection with the cording diagram, Figure 31:

(1) Radio Control Box BC-473-A (or -B) (for one receiver) and Radio Control Box BC-496-A (for two receivers) may be substituted for Radio Control Box BC-450-A (for three receivers).

(2) Radio Receiver BC-453-A (or -B) (190-550 kc) should be in the middle section. The relative location of the others is immaterial, but unless otherwise indicated by special instructions, install them as shown in Figure 31.

(3) Coupling MC-211-A (right angle) may be used as a link between Tuning Shaft MC-215 and a receiver if necessary. This coupling can be used within certain limits at the control-box end of the tuning shaft but it should be omitted altogether if a satisfactory installation can be made without it.

(4) Plug PL-151 may be plugged into either one of the side receptacles on the receiver racks.

(5) The ground leads should be as short as possible.

(6) Use W-106-A Antenna Wire for antenna leads. Support on high quality ceramic insulators. All transmitter antenna leads must be carefully spaced away from grounded surfaces, and the ends of the wires must be bent in close to the metal shells of the binding posts. If any sharp wire ends are allowed to project away from the binding post surface, corona and spark breakdown will occur, particularly at high altitude. There may be occasions when the liaison transmitter frequency is very near one of the command receiver listening frequencies or when atmospherics are exceptionally strong. Therefore, it is recommended that an International Resistance Company Type F-2, 5 megohm, 2 watt, metallized resistor, or equal, be connected between the antenna and ground at some convenient point between the antenna binding posts on the receivers and Antenna Relay Unit BC-442-A (or -AM). This prevents the building up of extremely high voltages which might damage the antenna series capacitor. This high shunt impedance will have no perceptible effect on the sensitivity of the receivers.

(7) Radio Transmitter BC-457-A, BC-458-A or BC-696-A may be installed here instead of Radio Transmitter BC-459-A. The 50 micromicrofarad series capacitor, connected between posts C on Antenna Relay Unit BC-442-A, is supplied for use when the antenna capacitance is so large that a transmitter cannot be properly tuned. The capacitor may be connected in series with any one or all of the transmitters as necessary. It may not be necessary to use the antenna series capacitor with the lower-frequency transmitters. If it is possible to resonate the antenna circuit of a transmitter without the use of the antenna series capacitor, this should be done in order to avoid increased circuit losses.

(8) The antenna lead of Radio Receiver BC-453-A (or -B) may be permanently connected to a separate antenna for reception of airways radio range signals.

n. *Shielding, Filtering and Bonding*

The airplanes in which Radio Sets SCR-274-N are to be installed must be suitably prepared for radio use by shielding the ignition system and the generator voltage regulator circuit, installing radio frequency filters and by bonding the airplane structure in accordance with Air Corps instructions (Handbook of Instructions for Airplane Designers, Air Corps Specifications 32300-A, 32310-A, etc.). When the radio shielding, filtering and bonding are properly accomplished, the radio frequency noise voltage at the receiver end of the antenna will not exceed 2½ microvolts, and the noise voltage on the battery cables will not exceed 50 microvolts.

11. PREPARATION FOR USE

a. *Precautions and Preliminary Procedure*

Precautions preparatory to turning on the power to this equipment have been covered in the Safety Notice on page v of this book and in Paragraphs 9 and 10 of SECTION II. The final adjustments to the equipment prior to normal use are: (1) antenna circuit alignment of the receivers and (2) tuning up the transmitters. Before making these adjustments, read carefully SECTION III, FUNCTIONING OF PARTS, and make certain that the functions of the controls are thoroughly understood. All receivers and transmitters should be connected, as indicated in Figure 31, to the antenna through Antenna Relay Unit BC-442-A (or -AM) before making the following tuning adjustments.

b. *Antenna Circuit Alignment of the Receivers*

(All receivers must be connected to the antenna or antennas with which they are to be used.)

(1) Set the CW-OFF-MCW power switch controlling the first receiver to CW.

(2) Set the A TEL.—B TEL. switch of the same control box section to A TEL.

(3) Connect a headset into any A TEL. jack or into a corresponding interphone jack box.

(4) Set the INCREASE OUTPUT knob for maximum output.

(5) Rotate the TUNING knob until the dial indicates the highest frequency. Do not attempt to rotate the dial beyond the boundary calibration marks.

(6) Align the antenna circuit for maximum background noise, using the ALIGN INPUT knob on the front of the receiver.

(7) Switch this receiver OFF.

(8) Perform a similar operation with each of the other receivers in turn.

(9) It is good practice to repeat the alignment operation on all receivers for optimum results, even though the improvement may seem small.

c. *Transmitter Tuning Controls*

There are three controls on the front of each transmitter: (1) the frequency control knob in the lower right corner marked FREQUENCY, (2) the antenna tuning inductance control in the upper right section marked ANT. INDUCTANCE and (3) the coupling control in the middle left section marked ANT. COUPLING. Each transmitter is supplied with a special frequency checking circuit which includes a plug-in

ing the ANT. INDUCTANCE for maximum antenna current. (Maximum inductance is in series with the antenna when the contact button behind the transparent window is in the extreme right-hand position.) This adjustment should be made with the ANT. COUPLING at a lower setting than that which gives highest antenna current.

(10) Vary the ANT. COUPLING until the maximum CW antenna current reading is obtained on the r-f current indicator on Antenna Relay Unit BC-442-A

Transmitters must be tuned up with the emission switch on Radio Control Box BC-451-A in the CW position and must not be readjusted in any way after switching to TONE or VOICE. Such retrimming will result in greater antenna current in either position, but the transmitter cannot be properly modulated.

To tune up a transmitter:

(1) Set the calibrated dial to the desired transmitting frequency.

(2) Set the ANT. COUPLING control to about 3 on its scale.

(3) Operate the toggle switch on Antenna Relay Unit BC-442-A to LOCAL.

(4) Set emission switch, S-50, on Radio Control Box BC-451-A to CW.

(5) Set the TRANSMITTER SELECTION switch on Radio Control Box BC-451-A to the number corresponding to the rack position of the transmitter which is being tuned.

(6) After making sure that neither the microphone button nor the key is closed, operate the TRANS. POWER switch to ON. Dynamotor DM-33-A should start.

(7) Allow a minimum of 15 seconds for the tubes to heat up.

(8) Lock the "built-in" telegraph key on top of Radio Control Box BC-451-A by rotating it clockwise.

(9) Resonate the antenna circuit by adjust-

crystal resonator. This crystal circuit used for checking the frequency at or point on the dial; it does not control th frequency. The frequencies of the crysta supplied with the different transmitte are as follows:

Radio Transmitter	*Crystal Frequen*
BC-696-A (3-4 mc)	3.5 mc
BC-457-A (4-5.3 mc)	4.6 mc
BC-458-A (5-7.3 mc)	6.2 mc
BC-459-A (7-9.1 mc)	8.0 mc

d. *Tuning the Transmitters*

(switch S-54 in the LOCAL position if used). This setting must be carefully made. If an Antenna Relay Unit BC-442-AM or a late model of Antenna Relay Unit BC-442-A is used, there is no switch S-54 and the thermocouple is connected directly to the current indicator.

(11) Retrim the ANT. INDUCTANCE tuning for maximum CW antenna current.

(12) Observe the antenna current on VOICE and TONE. Antenna current readings will vary widely with the antenna and the choice of frequency. For a short "built-on" fore and aft antenna, the reading on CW probably will be greater than half scale. On VOICE it will be considerably less than for CW, and for TONE it will be between the values for CW and VOICE.

(13) The other transmitters in the rack should be tuned up, following the same routine as for the first. It is then good practice to return to the first transmitter and retrim the ANT. INDUCTANCE control on CW.

(14) Lock the three controls of each transmitter by rotating the LOCK knobs one-half turn clockwise to a stop, in which position the engraving, "LOCK," on the knob will read right side up.

(15) Mark the frequency to which each transmitter has been tuned in soft pencil in the appropriate blank space on the plate above the TRANSMITTER SELECTION switch. Record the trans-

mitter data on the "write-in" plate on the front of each transmitter.

e. *Transmitter Resonance Indicator*

Tube V-53 (Tube VT-138) in each transmitter is used as an indicator of resonance between the frequency calibration crystal and the transmitting frequency. When a transmitter is operated at or near the frequency of the crystal in that transmitter, a dark three-cornered shadow appears in the round spot of green light on the screen of tube V-53 (Tube VT-138). This shadow "opens" as the transmitting frequency approaches the frequency of the crystal; operation at exact resonance with the crystal frequency is indicated by a sharp maximum in the width of this shadow. When properly calibrated, the transmitter carrier-frequency output will be within ± 0.05% of the frequency indicated on the dial.

f. *Calibrating the Transmitters*

Always recheck the frequency calibration in the following manner after any tube is replaced in the transmitter. This is particularly important when a new master-oscillator tube V - 54 (Tube VT - 137) is installed:

(1) Open the hinged cover (at top rear of transmitter) to such an angle that the reflection of the entire resonance indicator screen of tube V-53 (Tube VT-138) may be seen.

(2) Tune the transmitter to the lowest frequency which will open the shadow on the resonance indicator. (Spurious responses will sometimes be observed but they are always higher than the nominal frequency of the crystal; the lowest response frequency can be most easily found by approaching the calibration point on the dial from the low frequency direction.) The indicated dial frequency should now correspond with that of the crystal. If it does not, set the dial exactly on the nominal frequency of the crystal and trim the master-oscillator capacitor to make it so. This trimmer may be adjusted with a small metal screwdriver inserted through the hole, covered by snapslide H-52 (Figure 11), in the top of the transmitter. A clockwise rotation of this trimming control lowers the transmitter frequency. Adjust the FREQUENCY control again to make certain that no "opening" of the resonance indicator is observed for any indicated dial frequency below the one corresponding to the value shown on the crystal holder. The calibration engraved on the frequency dial of the transmitter will then be correct at other parts of the dial.

12. OPERATION

a. *Remote Operation of the Receivers*

(1) Accessories are provided as a part of this radio set for remote control of the three receivers. One, two and three-unit receiver radio control boxes are listed in Table 1. The three-unit Radio Control Box BC-450-A is shown in Figure 1, and the one and two-unit Radio Control Boxes BC-473-A (or -B) and BC-496-A are shown in Figure 10. These radio control boxes provide for control in one location of all three receivers, or for control in one location of two receivers, and in another of the third receiver. When the remote control boxes are used, each receiver so controlled must be equipped with an Adapter FT-230-A.

(2) Each receiver radio control box contains one, two or three of the following groups of controls: (a) CW-OFF-MCW switch, (b) TUNING knob, (c) gain control marked INCREASE OUTPUT and (d) A-B switch. Each group of controls is used to control one receiver independently of the other receivers. Receiver control boxes of all types contain headset jacks marked A TEL. and B TEL. These jacks are connected to two separate headset lines for use by two operators, if desired. The audio signal output from any receiver is switched either to the A TEL. jacks or to the B TEL. jacks throughout the radio set by means of the A-B switch which is in the control group operating that particular receiver. The signals

from any receiver may be cut off from the headset lines by operating the A-B switch of that particular receiver to its mid-position. For example, if the pilot is given Radio Control Box BC-473-A (or -B), connected to Radio Receiver BC-453-A (or -B), he may operate its A-B switch to A and turn his interphone switch to the corresponding position, set the CW-OFF-MCW switch to MCW and tune in a radio range signal, using the INCREASE OUTPUT control to adjust the volume. If, at the same time, the radio operator or observer is given Radio Control Box BC-496-A, connected to Radio Receivers BC-454-A (or -B) and BC-455-A (or -B), he may switch each of his A-B switches to B, set the CW-OFF-MCW switches to CW or MCW and tune in signals on both receivers simultaneously. The gain controls of these two receivers may be used to fade the signal from one, in or out, with respect to the signal from the other. When two or more receiving frequencies are to be guarded simultaneously, the receivers which are tuned to these frequencies should be "opened up" by advancing their gain controls. If the pilot wishes to receive the signals being heard by the operator, he must turn his interphone switch to the position connected to the B TEL. output circuit, and vice versa for the operator. When the radio set is operated by one individual only, all receivers shall be switched to A TEL. Other combinations will suggest themselves in practice. In a single-place airplane, the pilot's headset will be plugged into the A TEL. jack (through the radio range filter, if used). In all other airplanes, the headset connections will be made through the interphone system.

(3) In each group of controls, the CW-OFF-MCW switch performs the functions of: (1) battery power switch and (2) a heterodyne oscillator switch (for the reception of CW signals) in the receiver which is controlled by that particular group. Remote tuning is accomplished for each receiver by Tuning Shaft MC-215. Tuning dials on both the receivers and the radio control boxes are calibrated in kilocycles or megacycles. The gain control (with knob marked INCREASE OUTPUT) is a variable resistor in the cathode-to-ground circuits of the r-f and first i-f amplifier tubes of each receiver; its setting determines the sensitivity of the receiver. The design of the receivers is such that a 2-volt signal in the antenna circuit will not overload the r-f or i-f amplifiers. For reception of airways radio range signals, it is important that the volume be kept well below the maximum; this avoids overloading the receiver which would give incorrect indications of the off-course signals.

(4) Control Panel C570A/A or C570-B/A is similar in operation to the control boxes but does not include the receiver headset jack or the A-B switch and the gain control is marked VOLUME instead of INCREASE OUTPUT. Otherwise the functional description of the control boxes applies to the panels also.

b. *Local Operation of Receivers*

(1) The accessories necessary for local control of the receivers are: (a) Adapter FT-260-A which takes the place of Adapter FT-230-A and supplies facilities for control of vacuum tube heaters, output volume and the CW oscillator, (b) Control Unit MC-237-A which is a tuning crank and spline assembly and attaches to the condenser drive spline in the same manner as does the flexible shaft used for remote tuning and (c) Plug PL-192 which must be inserted in the receiver rack instead of Plug PL-152 which is used for remote control.

c. *Operation of the Transmitters*

Facilities are provided for the operation of one, two, three or four transmitters as a part of this radio set. Each transmitter is preset on a particular frequency. Transmission is possible on any of the preset frequencies but on only one at a time. The operator has a choice of TONE, CW and VOICE types of emission on each of the frequencies. All transmitter controls are associated with Radio Control Box BC-451-A. Assuming that the equipment has

been installed, tested and tuned according to instructions in previous parts of the book, the operator need learn only the following few directions:

(1) Set the TRANSMITTER SELECTION switch to the desired preset transmitting frequency indicated on the write-in plate.

(2) Set the emission switch to TONE, CW or VOICE, as required.

(3) Operate the TRANS. POWER toggle switch to ON and wait 15 seconds to allow all the transmitter tube filaments to reach their operating temperature.

(4) If on VOICE, press the press-to-talk button on the microphone and talk clearly and distinctly into the microphone. In the VOICE position, the transmitting dynamotor will not start until the press-to-talk button has been closed. Antenna current will be indicated by the ammeter on Antenna Relay Unit BC-442-A (or -AM) whenever the press-to-talk button is closed. Sidetone should be heard distinctly whenever transmitting.

NOTE: When transmitting voice with a microphone which does not have a keying switch, the equipment must be switched between "receive" and "transmit" by means of the built-in telegraph key (K-56 in Figure 19) on Radio Control Box BC-451-A or by a remote switch plugged into the KEY jack.

(5) The TRANS. POWER toggle switch should be left ON throughout the flight in order to avoid repetition of the 15 second warm-up time.

(6) To transmit on TONE or CW, turn the emission switch to the appropriate position. Dynamotor DM-53-A will start and continue to run as long as this switch is in either of these positions, but the transmitter will not be "on the air" until either the built-in key or the external key is pressed. Antenna current will be indicated by the ammeter on Antenna Relay Unit BC-442-A (or -AM). A tone of approximately 1000 cycles per second should be heard while transmitting on either TONE or CW.

(7) To reduce battery drain and to increase dynamotor life, the emission selector switch should be left on VOICE unless continued use on TONE or CW is expected.

13. PRECAUTIONS

CAUTION: VOLTAGES GENERATED IN THIS RADIO SET ARE DANGEROUS. READ THE SAFETY NOTICE ON PAGE v OF THIS BOOK.

a. *Primary Voltage Limits*

The equipment should not be operated when the primary source voltage is outside the limits of 22-30 volts. Lower voltages will result in improper functioning of the circuit components (such as poor sensitivity of the receivers and improper modulation of the transmitters, or even failure to oscillate on the part of the r-f and CW oscillators of the receivers and of the master-oscillator of the transmitters). Higher voltages may cause damage to the tubes or dynamotors or may cause voltage breakdowns within the equipment.

b. *Transmitter Tuning*

Under Paragraph 11, Preparation For Use, it was directed that tuning of the transmitters must be done with the emission selector switch of Radio Control Box BC-451-A on CW and that the ANT. TUNING must not be retrimmed after switching to TONE or VOICE, even though it results in higher antenna current. This precaution must be observed or considerable distortion on VOICE will result.

c. *Transmitter Calibration*

In tuning up a transmitter for the first time to check the calibration accuracy against the built-in piezo-electric crystal, the operator must make certain that he is resonating the lowest frequency to which the crystal will respond. A spurious resonance will often be found but it will be higher in frequency than the nominal frequency of the crystal.

d. *Transmitter Keying*

Do not key the transmitter with the controls in the VOICE position with the built-in key, an external key or the microphone switch, because the dynamotor is started and stopped with such keying. The heavy starting current involved will reduce the life of the dynamotor and starting relay K-50 in Modulator Unit BC-456-A (or -B). In the CW and TONE positions, the dynamotor is constantly running, and the effect of pressing the key is to operate relays controlling the transmission of telegraph signals (see Figure 24).

e. *Switching of Transmitters*

Do not switch from one transmitter to another while transmitting as there is a possibility of an arc being formed across the contacts of selector relay K-53 (see Figure 24).

f. *Limit on Range of Antenna Tuning Control*

Do not rotate the ANT. INDUCTANCE control (with transmitter power on) so near to either end of L-52 that there is danger of the contactor slipping off the coil and causing an arc.

g. *Overloading of Dynamotors*

Dynamotor DM-33-A has a continuous duty as well as an intermittent duty rating (see Table 18). It is essential that no operating requirement be placed on the transmitting equipment which exceeds these ratings. There is no time limit to operation on CW so long as the transmitter is being keyed for the ordinary transmission of messages. The dynamotor high-voltage load current in the TONE and VOICE positions is low enough to be drawn continuously without fear of damage to the equipment.

h. *Adjustment of R-F Coils in Receiver*

Tuned coils in the r-f coil set in each receiver contain small iron cores which are used to adjust each of these coils to a precise value of inductance. This is a laboratory adjustment and alterations in the settings of any of these should not be attempted without proper equipment and authority. The result may be mistracking of the r-f circuits.

i. Adjustment of R-F Coils in Transmitter

The master-oscillator and power-amplifie coils in the transmitters are also adjusted to a predetermined value of inductance at the factory by means of adjustable iron cores. The screw, E-58 in Figure 13, controlling the location of the iron core in the master-oscillator coil, is located over master-oscillator coil T-53. The screw, E-59 in Figure 13, controlling the location of the iron core in power-amplifier coil T-54, is mounted on a bracket attached to the top of the isolantite coil form of T-54. After proper adjustment of the inductanee of each of these coils, the screws are sealed and the tops painted blue. Subsequent alteration in the setting of these screws will affect the calibration precision and the tracking of the two ganged tuned circuits of the transmitter. The adjustment should be carried out only under controlled laboratory conditions.

j. Electrical Interference Within the Airplane

It will be useless to attempt to receive radio signals unless the r-f disturbances set up within the airplane, due to an imperfectly shielded ignition system, generator system, motors, or other equipment on the airplane, have been reduced to a reasonable level. Refer to Paragraph 10n.

k. Limit on Range of Tuning Dials

The receivers and transmitters are calibrated directly on the tuning dials. Operators should be careful not to tune beyond the normal end-frequencies in such a manner as to strain the gears or capacitors. End stops are provided, but if an unreasonable amount of force is applied, damage can be done to the equipment.

l. Switch in Thermocouple Circuit

Switch S-54 in the antenna relay unit is in a low resistance thermocouple circuit. It is recommended that this switch be thrown back and forth several times if trouble is experienced in obtaining a stable reading on M-50.

SECTION III.

FUNCTIONING OF PARTS

14. RECEIVING EQUIPMENT

a. *Radio Receivers BC-453-A (or -B),* BC-454-A (or -B) and BC-455-A (or -B) with Dynamotor DM-32-A, Adapters FT-230-A and FT-260-A and Racks FT-233-A, FT-277-A, FT-220-A and FT-264-A.*

(1) Radio Receivers BC-453-A (or -B), BC-454-A (or -B) and BC-455-A (or -B) are basically alike, as may be seen in the schematic wiring diagrams of Figures 37, 38 and 39 and each has the same complement of tubes performing identical functions. Any one of these receivers may be installed on Rack FT-233-A, any two on Rack FT-277-A or all three on Rack FT-220-A. Rack FT-264-A provides for installation of four receivers. Figure 26 is a schematic diagram of the receiving equipment of Radio Set SCR-274-N, including only Radio Receiver BC-455-B, Adapters FT-230-A and FT-260-A, Dynamotor DM-32-A, Rack FT-220-A and a cord for attachment to the primary source.

*See Paragraph 14a(11) for differences between Radio Receivers BC-453-A and BC-453-B, etc.

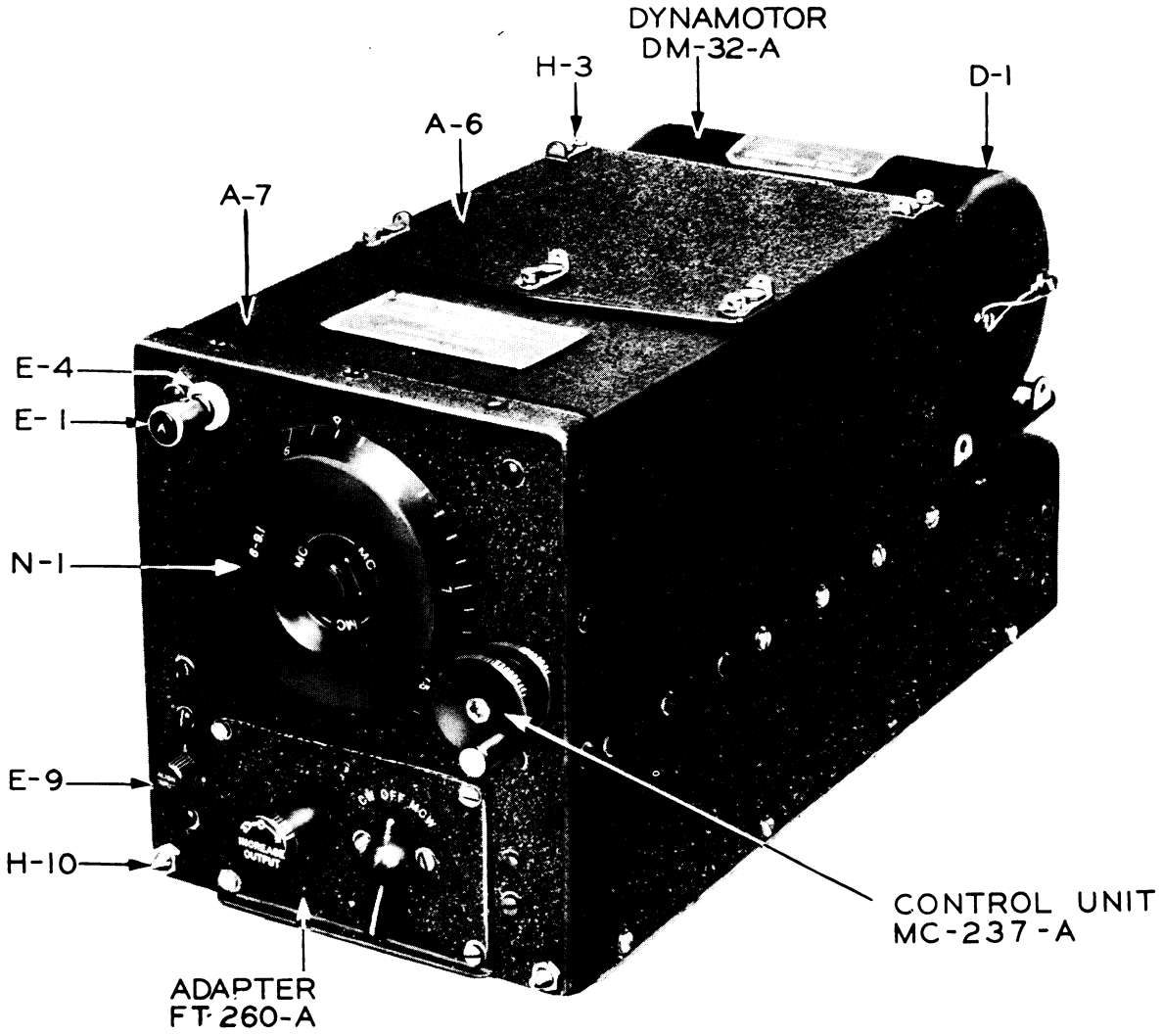


FIGURE 2 — TYPICAL RADIO RECEIVER WITH ADAPTER FOR LOCAL CONTROL

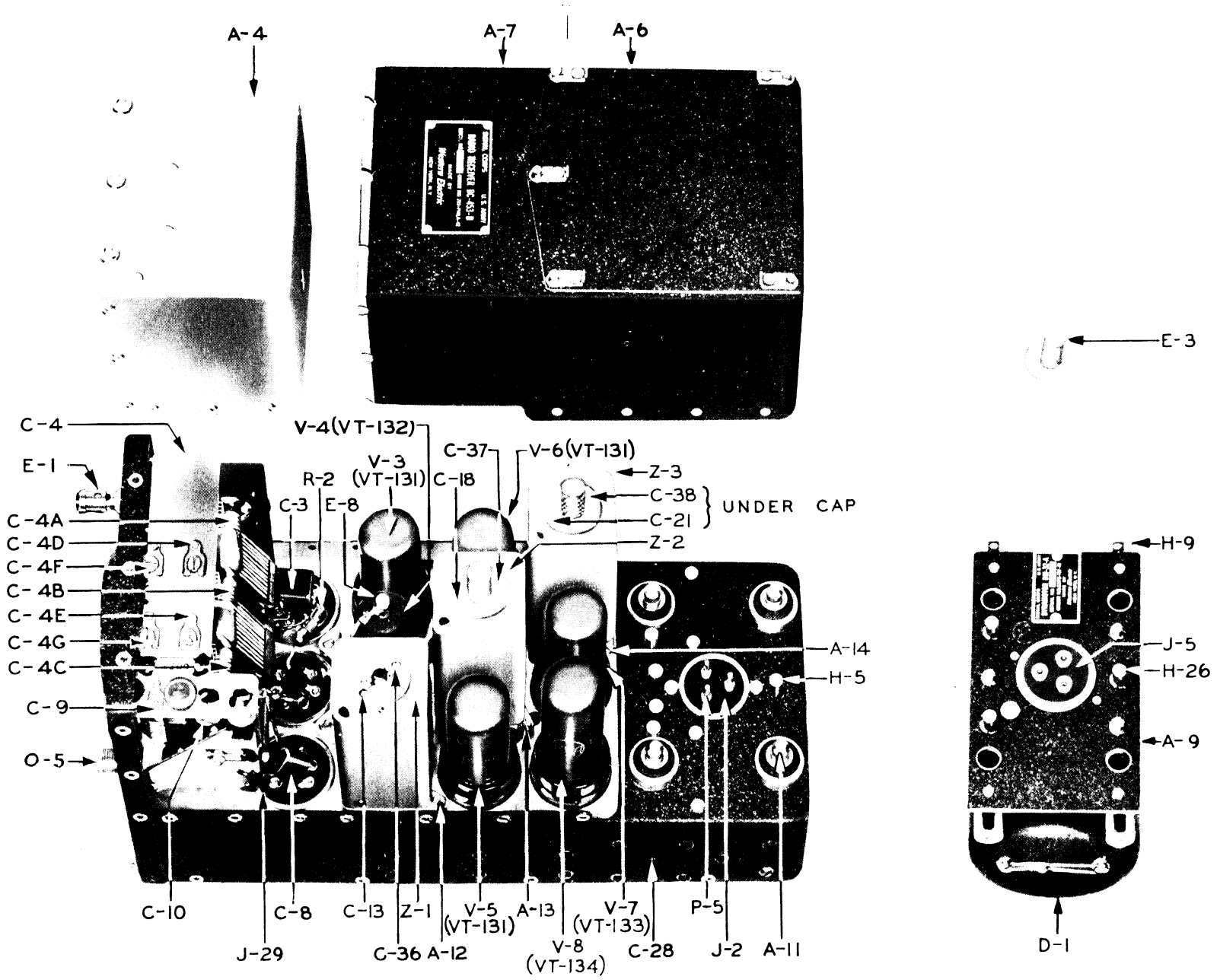


FIGURE 3 — TYPICAL RADIO RECEIVER, TOP INSIDE VIEW, AND BOTTOM VIEW OF DYNAMOTOR DM-32-A

The schematic circuit diagrams of Radio Receivers BC-453-B and BC-454-B (with adapters and dynamotors) were not included on this diagram because all circuits connecting with the rack are identical in all three units. For completeness, however, Figures 37, 38 and 39 show the schematic circuits and the practical wiring diagrams of the three receivers. Photographs of a typical receiver may be seen in Figures 2, 3 and 4.

(2) The radio frequency (r-f) part of these radio receivers consists of the following circuits and vacuum tubes, starting at the antenna: a tuned antenna input circuit, an r-f amplifier tube V-3 (Tube VT-131), a tuned r-f amplifier circuit, a mixer tube V-4 (Tube VT-132), and an r-f oscillator circuit. The antenna, the r-f amplifier and the r-f oscillator circuits are tuned by equal sections of a three-section gang capacitor C-4 (A, B, C). The plate current of mixer tube V-4 contains a frequency component which is equal to the difference between the frequency of the applied signal and that of the r-f oscillator voltage.

(3) Antenna coil L-1 is contained in Z-5A which is a unit of plug-in r-f coil set assembly Z-5 (Figure 4). Z-5B contains the r-f amplifier coils L-2 and L-3. Z-5C contains L-4, L-5, R-3 and R-6 of the r-f oscillator. L-1 of Z-5A, L-3 of Z-5B and L-5 of Z-5C contain iron cores which are used to adjust each coil to a particular value of inductance. After this adjustment at the factory, the iron cores are sealed in position. A subsequent change in the setting of any of these will upset the tracking of that circuit.

(4) C-1 is a small fixed capacitor which couples the antenna to the input tuned circuit. The capacitances of C-1 and C-2 are so designed that for any capacitive antenna it is possible to resonate the antenna circuit by tuning C-2.

(5) C-39 (across L-2 in Radio Receiver BC-453-A (or -B) only) serves to tune L-2 to a frequency lower than 190 kc, and by so doing, to increase the amplification of signals at the low frequency end of the tuning range. This assists in producing a reasonably uniform receiver sensitivity over the tuning range. The plate-to-screen capacitance of r-f amplifier tube V-3 (Tube VT-131) and the capacitance of the wiring to L-2 perform a corresponding function in Radio Receivers BC-454-A (or -B) and BC-455-A (or -B).

(6) L-5 of the r-f oscillator has a lower inductance than L-3 of the r-f amplifier circuit. This lower value of L-5, aided by the insertion of C-10 between L-5 and ground, results in an r-f oscillation which is higher in frequency than the signal frequency. By design, this difference is equal to the intermediate frequency throughout the tuning range of the receiver. L-4 and L-5 are the grid and plate coils of the r-f oscillator. C-4C, with trimmers C-4E and C-4G, and C-10 with trimmer C-9, together determine the tuning capacitance across L-5. C-8 is a grid blocking capacitor, and R-3 is a grid resistor. R-6 is a series resistor in the plate circuit which not only serves to drop the dynamotor voltage to the proper value for the r-f oscillator, but also acts as an r-f filter in conjunction with C-10 to isolate this circuit from others connected to the high-voltage supply line. C-11 is a compensating capacitor connected across the r-f oscillator tuning capacitor to reduce the frequency drift during the first half hour of operation.

(7) The intermediate frequency (i-f) part of these receivers consists of three i-f coupling units, Z-1, Z-2 and Z-3 (Figure 3), following the V-4 (Tube VT-132) mixer tube, V-5 (Tube VT-131) first i-f amplifier tube and the V-6 (Tube VT-131) second i-f amplifier tube, respectively. In Radio Receivers BC-453-A (or -B) and BC-454-A (or -B), each i-f coupling unit contains two tuned circuits which are magnetically coupled. Z-1 which is representative of the three coupling units consists of coils

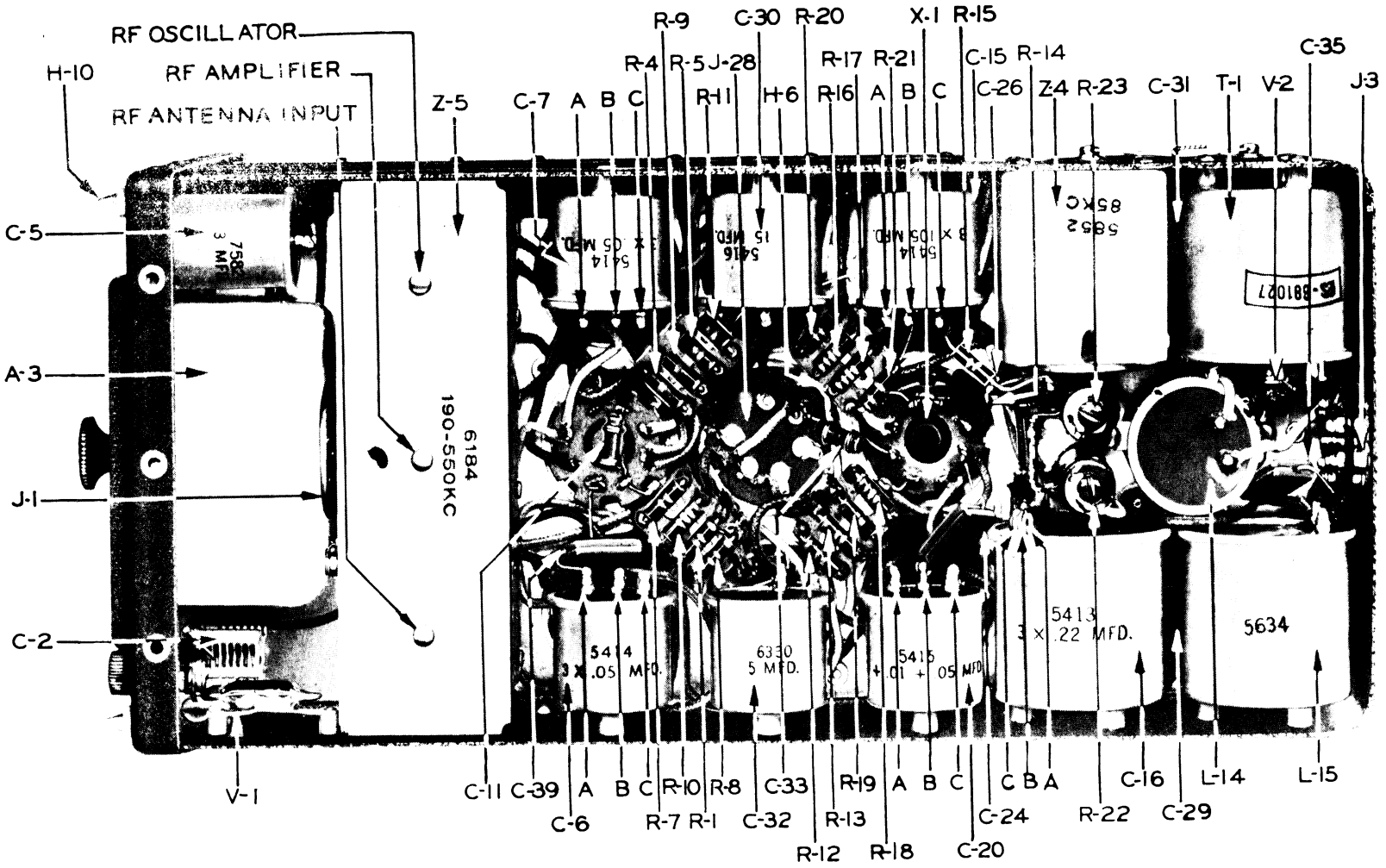


FIGURE 4 — TYPICAL RADIO RECEIVER, BOTTOM INSIDE VIEW

L-6 and L-7, fixed tuning capacitors C-12 and C-14 and trimming tuning capacitors C-13 and C-36. The coils and capacitors are designed so that each circuit may be tuned precisely to the intermediate frequency. In Radio Receiver BC-453-A (or -B), the magnetic coupling between the coils in each i-f coupling unit is adjustable to either of two values, namely, an over-coupled value (bakelite rod, protruding through the top of the i-f coupling unit, "down") or an under-coupled value (bakelite rod up). The position for these rods during alignment is up, but for operation, the rod of the second i-f coupling unit Z-2 remains up while those of Z-1 and Z-3 must be down. With the couplings so adjusted, a flat-top selectivity curve is obtained, accompanied by better audio fidelity up to 2000 cycles per second. The selectivity 10 kilocycles or more away from resonance is little affected by the position of these rods. The magnetic coupling between coils in Z-1, Z-2 and Z-3 of Radio Receiver BC-454-A (or -B) is fixed.

(8) There is but one tuned circuit in each of the i-f coupling units of Radio Receiver BC-455-A (or -B). Each of these tuned circuits consists of a coil (for example, L-6 in Z-1) with fixed tuning capacitor C-12 and trimming tuning capacitor C-13. The single i-f tuned circuit is capacitively coupled (for example, C-14 in Z-1) to the following vacuum tube input circuit. L-7, L-9 and L-11 act only as r-f chokes.

(9) The rotors of trimming capacitors C-13, C-18 and C-21 are grounded, but the rotors of trimming capacitors C-36, C-37 and C-38 (reached through the holes numbered "2" in Z-1, Z-2 and Z-3 of Radio Receivers BC-453-A (or -B) and BC-454-A (or -B)) are not grounded, hence it is necessary to use a screwdriver with an insulated shank to adjust them. Figure 25 shows an external view of each of the three types of i-f coupling units.

(10) The detector and audio frequency (a-f) parts of these radio receivers consist of a diode section of tube V-7 (Tube VT-133) acting as a detector, resistance coupled to the input of tube V-8 (Tube VT-134), and a 2.2 to 1 step-down output transformer. C-24 is an r-f by-pass capacitor and R-18 is the diode load resistor across which the rectified audio voltage is developed. R-19 and C-24 act to prevent the intermediate frequency from appearing across the input to the audio amplifier tube. C-29 is a blocking capacitor, and R-20 is the audio grid resistor. C-31, across the primary of T-1, assists C-35, across the secondary, in reducing the output of high audio frequencies. The design of transformer T-1 is such that the leakage reactance, with the aid of C-31 and C-35, attenuates frequencies above 3000 cycles per second.

(11) Radio Receivers BC-453-B, BC-454-B and BC-455-B are exactly like Radio Receivers BC-453-A, BC-454-A and BC-455-A except that the secondary winding of T-1 has a tap to which the output wire may be connected, thereby converting the sets for use with low impedance (600 ohms) headsets. If it is desired to make this change, remove the two wires on terminal 3, and connect them to terminal 6.

(12) V-1 and V-2 are small neon lamps acting to protect the equipment when exceptionally strong signals are received. These lamps glow at approximately 80 volts. As soon as the glow starts, any increase in voltage across the lamp terminals causes a relatively large increase in current. In this manner, the voltage is limited to 80 volts across L-1 and likewise across half of the primary winding of T-1.

(13) Gain or volume is manually controlled by a 0-50,000-ohm variable resistor located in Radio Control Box BC-450-A. (This may be R-25, R-26 or R-27, depending upon which control section is being considered.) The cathode circuits of the r-f amplifier and first i-f amplifier are completed to ground through R-25. As this resistor is increased from 0 to 50,000 ohms, the voltage between ground and each cathode increases, and since the grids of these

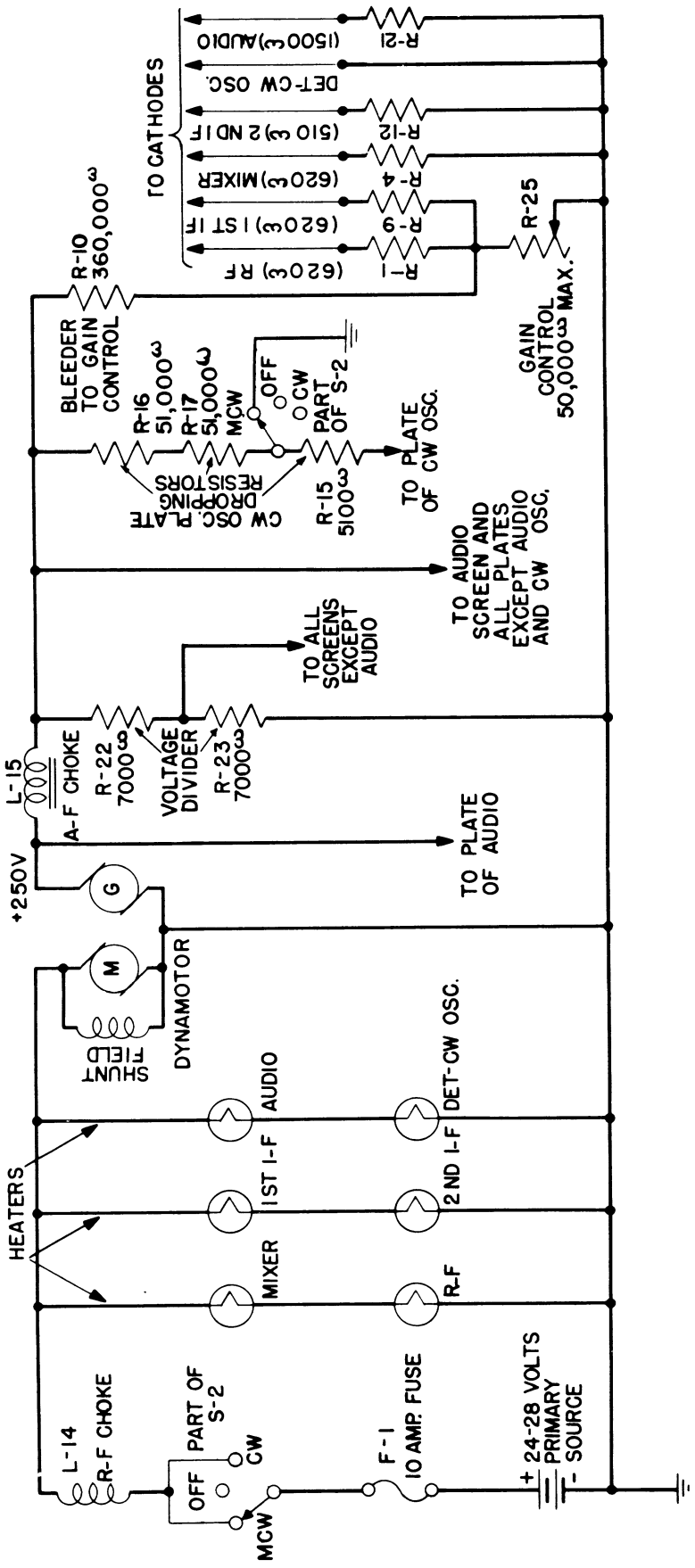


FIGURE 5 — FUNCTIONAL DIAGRAM OF THE D-C CIRCUITS OF A TYPICAL RADIO RECEIVER

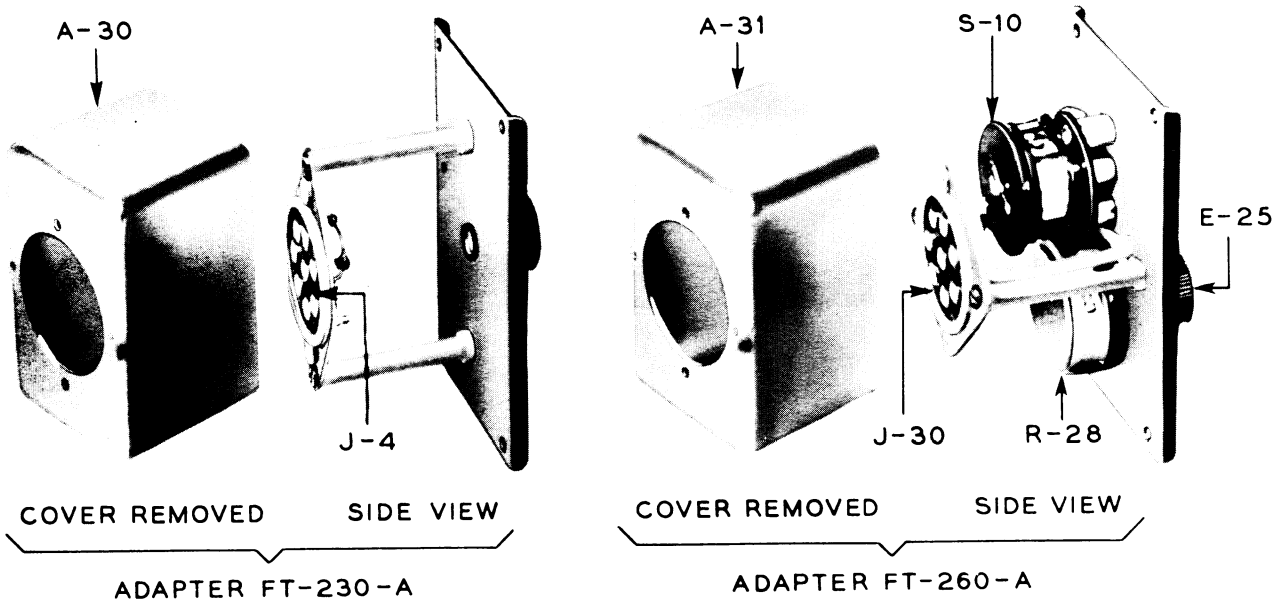


FIGURE 6 — ADAPTERS FT-230-A AND FT-260-A

tubes are at ground potential for direct current; the grids become increasingly negative with respect to the cathodes. This results in a reduction of amplification in each of the controlled tubes, and in an overall reduction in the gain of the receiver by a factor exceeding 50,000 to 1 as R-25 reaches its maximum resistance. About 0.6 of a milliampere of direct current is conducted from the +250-volt dynamotor line through R-10 and R-25 to ground. The voltage across R-25 is thus greater than it would be if only cathode current flowed through it. In the minimum gain position of R-25 (50,000 ohms), there is a difference of potential of approximately 30 volts even though the cathode current is negligible. From this, it may be seen that R-10 acts to make the control voltage developed across R-25 less dependent upon the cathode current of the tubes being controlled.

(14) The control grid of r-f amplifier tube V-3 (Tube VT-131) and of the first i-f amplifier tube V-5 (Tube VT-131) are returned to ground through a common resistor, R-11, in the control grid circuit of the second i-f amplifier tube V-6 (Tube VT-131). The object of this auxiliary gain control circuit is to prevent overload of the r-f or i-f amplifier by signals producing as much as 2 volts in the antenna circuit. In effect, it is an automatic gain control which is operative only on signals so strong that they would otherwise overload the receiver. When an overload condition arises, the second i-f amplifier grid current flows through R-11, making the grid side of R-11 negative with respect to ground. By connecting the grid circuits of the r-f and first i-f amplifier to this potential, the gain of these tubes will be reduced to the point where overload in these stages is prevented. This circuit does not limit the maximum volume that can be obtained from the receiver. The output will be essentially uniform for r-f input signals stronger than 100 microvolts (and up to 2 volts). *Manual gain control resistor R-25 (marked INCREASE VOLUME) should always be adjusted to a value such that the receiver output is well below the maximum, to avoid spurious effects such as an apparent reversal of course on the airways radio range signals.*

(15) Current from the primary source enters Rack FT-220-A at J-24 (Figure 26), passes through fuse F-1 (or F-2

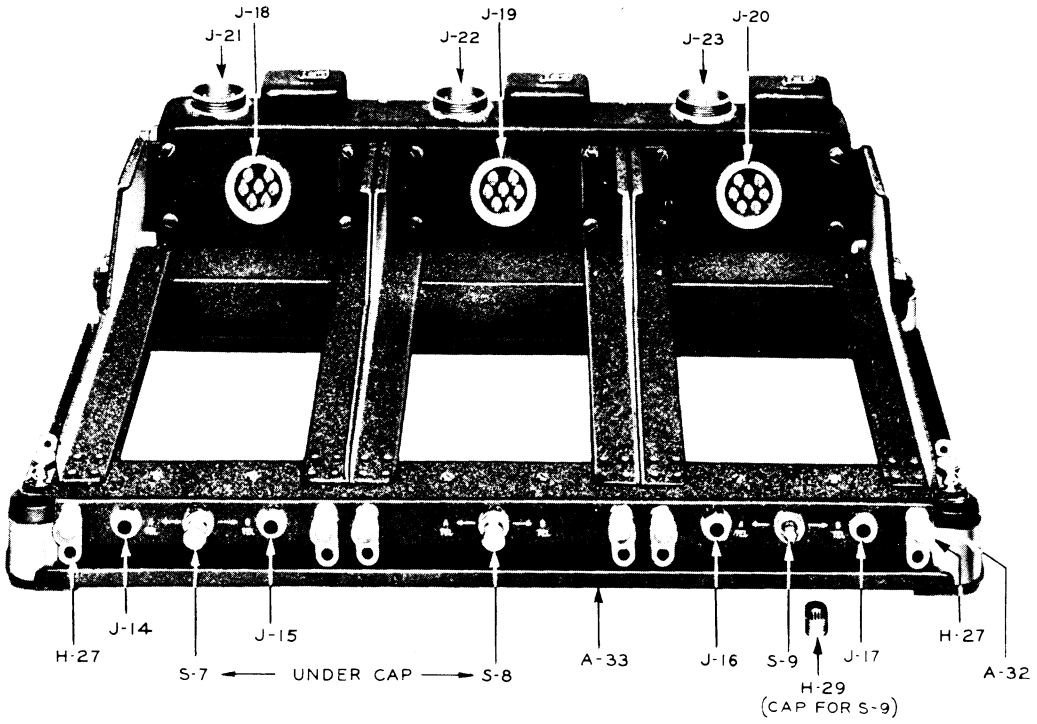


FIGURE 7A — RACK FT-220-A AND MOUNTING FT-221-A, FRONT VIEW

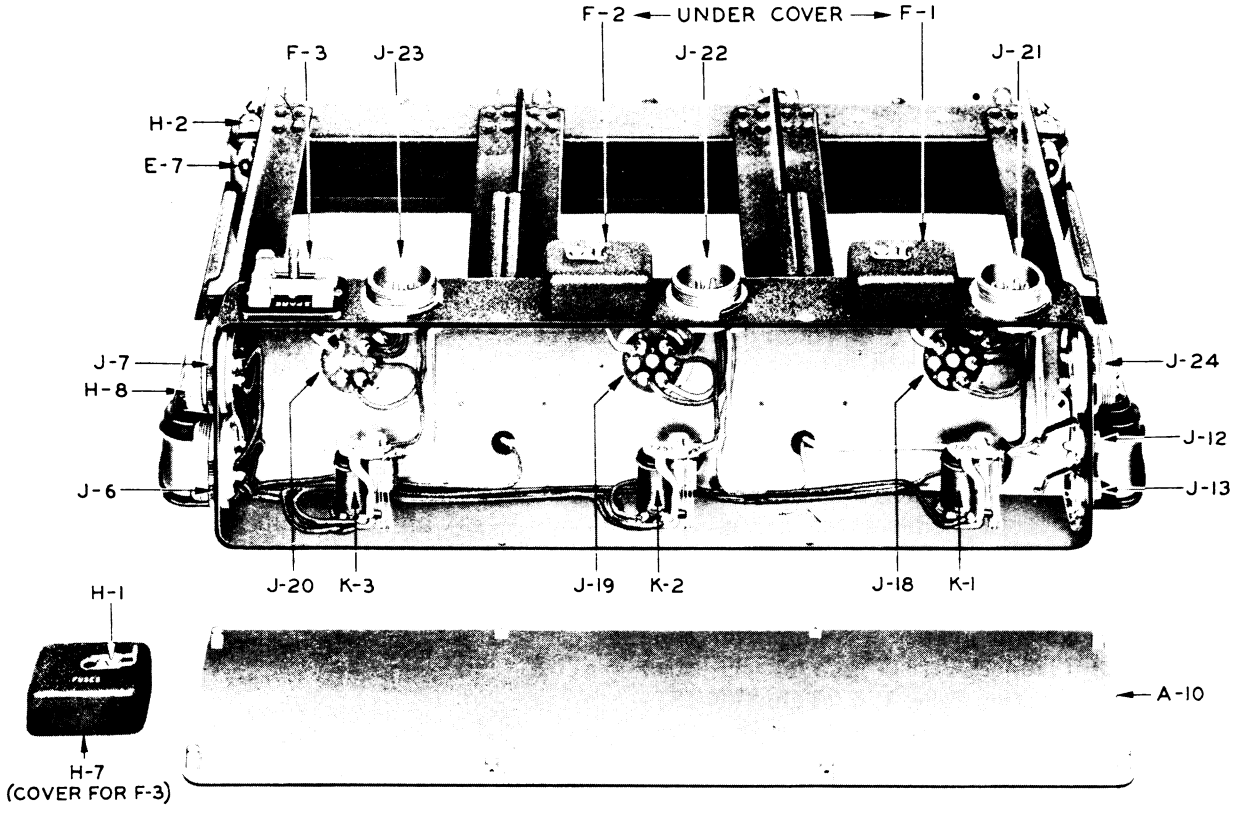


FIGURE 7B — RACK FT-220-A AND MOUNTING FT-221-A, REAR VIEW WITH COVER OF RACK REMOVED

or F-3) to switch S-2 (or S-4 or S-6) in Radio Control Box BC-450-A, back to the rack and thence to the +L.V. line of the receiver. Adapter FT-230-A completes the circuit to terminal 2 on J-2 and to the vacuum tube heater circuits. The negative side of the dynamotor and of the primary source is grounded. The dynamotor frame, receiver chassis, framework of the rack, all covers and shielding are carefully bonded to insure good ground connections. When local control of the receivers is required, it is necessary only to replace Adapter FT-230-A with Adapter FT-260-A, which contains the equivalent of S-2 and R-25, and to insert Plug PL-192 in J-21 (or J-22 or J-23) of the receiver rack. The operation of all controls may then be accomplished locally. Control Unit MC-237-A, when substituted for the flexible shaft, permits local tuning of the receiver.

(16) The cathode of detector-CW oscillator tube V-7 (Tube VT-133) is connected directly to ground, and capacitors C-6C, C-7B, C-15B, C-20A and C-30 are cathode resistor by-pass capacitors for the r-f and audio amplifier tubes. All of these capacitors are of the foil-paper type except C-30 (a 15-microfarad electrolytic unit) which must possess high capacitance in order to prevent audio degeneration in the output amplifier.

(17) All control grids have a d-c path to ground. R-2 and R-20 are each 2 megohms, but the resistance to ground of all other control grids is 100,000 ohms or less.

(18) The screen grid circuits of tubes V-3, V-4, V-5 and V-6 connect to the junction of a voltage divider, formed by R-22 and R-23 across the high-voltage side of the dynamotor. Resistor R-8, with capacitors C-7A and C-16A, act as a filter to isolate r-f and i-f tube screen circuits. The screen grid of audio amplifier tube V-8 connects to the high voltage filtered plate supply line.

(19) The suppressor-grids of tubes V-3, V-5 and V-6 are connected to their respective cathodes at the tube sockets.

(20) The plates of all tubes connect either directly or through decoupling resistors to the high-voltage dynamotor line. R-7 with C-6A and R-13 with C-20C act as r-f filters. C-10 is the fixed series capacitance in the r-f oscillator circuit and with R-6 it serves, incidentally, as an r-f filter. R-15, R-16 and R-17 act in the dual capacity of reducing the plate supply voltage for tube V-7 to the proper value and, with C-15C and C-25, as a filter. The plate of the output tube is connected through the primary of T-1 to the dynamotor side of L-15 which isolates this circuit from the other high-voltage circuits and reduces the possibility of "motorboating." "Motorboating" results when two circuits are coupled by a common impedance, and condenser C-32 would function in that manner if the plate of tube V-8 were connected to it.

(21) The CW heterodyne oscillator circuit is composed of a tuned-plate oscillator using the triode section of tube V-7. L-12 and L-13 are the grid and plate coils. C-27 and trimmer C-28 are tuning capacitors. C-26 and R-14 are the oscillator grid capacitor and resistor. C-33 is connected between the plate of the CW oscillator and the control grid of second i-f amplifier tube V-6. In the 190-550 kc receiver, C-33 is a 3 mmf capacitor outwardly resembling a small composition resistor. In other receivers, C-33 is a capacitance, formed by the proximity of pin plugs in the second i-f receptacle, and has a capacitance of less than 2 micromicrofarads. The amplitude of oscillation in the CW oscillator and the capacitance of C-33 are designed to produce the correct heterodyne voltage at the control grid of the second i-f amplifier for reception of CW signals. A connection at the junction of R-15 and R-17 goes to a contact on switch S-2. The MCW position of S-2 connects this line to ground, thus cutting off the CW oscillator plate supply. In the CW position, the ground is removed, and normal plate supply for the CW oscillator is obtained from the dynamotor through dropping resistors R-16, R-17 and R-15.

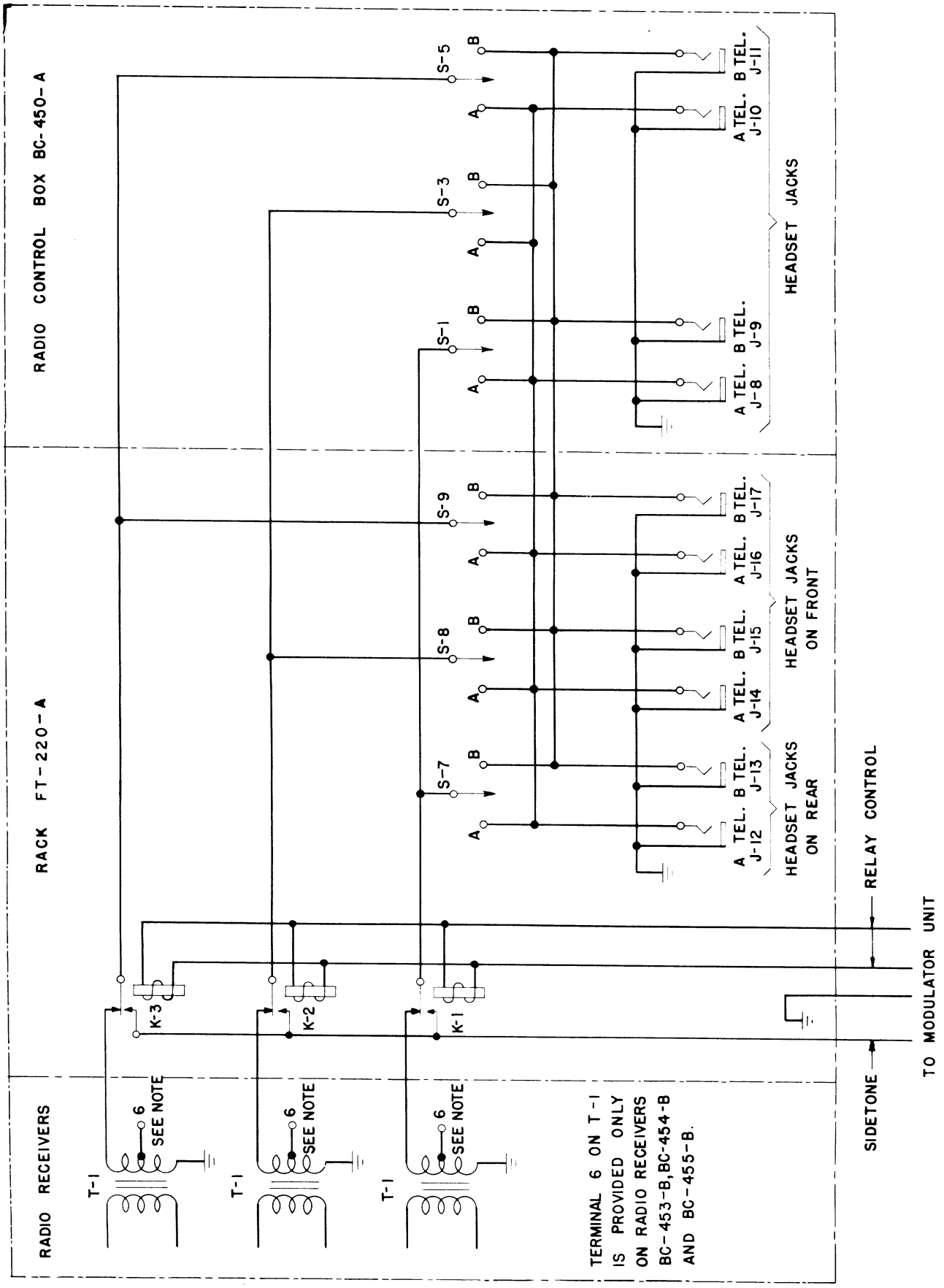


FIGURE 8 — FUNCTIONAL DIAGRAM OF RECEIVER OUTPUT CONNECTIONS

(22) The audio frequency filter circuit in the high-voltage supply consists of C-16B, a 0.22 microfarad foil-paper capacitor; C-32, a 5-microfarad electrolytic capacitor; and L-15, a 3-henry choke. This circuit suppresses all but a negligible audio frequency ripple on the high-voltage supply.

(23) C-16C is an r-f filter capacitor designed to reduce r-f dynamotor disturbances. (C-34 is a 0.001 microfarad capacitor which is connected across the dynamotor low-voltage brushes as an additional suppressor of r-f disturbances.)

(24) L-14 is an r-f choke designed to prevent r-f disturbances of any type from getting out of the receiver onto the primary source line where it might radiate enough energy to be picked up by a receiving antenna.

(25) Rack FT-220-A (shown in Figure 7) fulfills three functions: (1) it provides compartments into which the receivers may be slid and locked in place; (2) it provides a convenient electrical junction box for essential interconnections and (3) it contains a "sidetone-receiver output" relay, an A TEL.—B TEL. toggle switch, a fuse and set of A TEL.—B TEL. headset jacks for each of three receivers. The three receivers connect to receptacles J-18, J-19 and J-20, and the three cords to Radio Control Box BC-450-A connect to J-21, J-22 and J-23. A cord from the primary source connects to J-24, and a cord from Modulator Unit BC-456-A* connects to J-6 or J-7.

b. *Radio Control Boxes BC-473-A (or -B), BC-496-A and BC-450-A*

(1) Radio Control Box BC-450-A provides for three radio receivers. It is shown in Figures 1 and 9, and a schematic circuit diagram of the electrical connections is shown in Figure 26. Radio Control Boxes BC-496-A and BC-473-A (or -B) provide for two and one receivers, respectively. They are shown in Figure 10. Practical wiring diagrams for the three units are shown in Figure 45. Electrically and mechanically, except for the calibration markings on the dials, each section of these radio control boxes is like every other section. Each section is used independently **to tune and control one receiver. Radio Control Panel C570A/A or C570B/A is similar in function but does not include A-B switch or headset jacks. A practical wiring diagram of this Control Panel is shown in Figure 26.**

Radio Control Panel C570A/A or C570B/A does not require plugs or cords as the attached wires connect directly to the terminal boards in the installations.

(2) Refer to Figure 26 in connection with the following: When S-2 is turned to MCW, primary voltage is applied to one receiver and 7 on J-25 is connected to ground in order to disable the heterodyne oscillator in that receiver. With S-2 on CW the heterodyne oscillator is used for the reception of unmodulated signals. R-25 is a 0-50,000-ohm (variable) gain control resistor in the r-f and first i-f amplifier cathode circuits. S-1 is a three-position switch which isolates the receiver output or connects it to either of the headset lines A and B. Figure 8 is a functional diagram showing the receiver output connections. An examination of this will show that when S-1 is thrown to A, the output of the receiver connected thereto is connected to line A, providing that switch S-7 on Rack FT-220-A is in the center position. S-1 may be switched to B if desired or it may be left in the center as a standby position. The output of all receivers may be switched to A or to B, or one may be on A while the others are on B. The object of the A TEL.—B TEL. system is to provide two separate listening channels which may be reduced to one when the occasion demands.

15. TRANSMITTING EQUIPMENT

a. *Radio Transmitters BC-457-A, BC-458-A, BC-459-A and BC-696-A with Racks FT-234-A, FT-226-A, FT-276-** and FT-331-A*

(1) Four transmitters are available for use as parts of Radio Set SCR-274-N. Any one of these transmitters may be in-

*See Paragraph 15d for difference between Modulator Units BC-456-A and BC-456-B.

**Rack FT-276- was not manufactured at the time of publication of this instruction book.

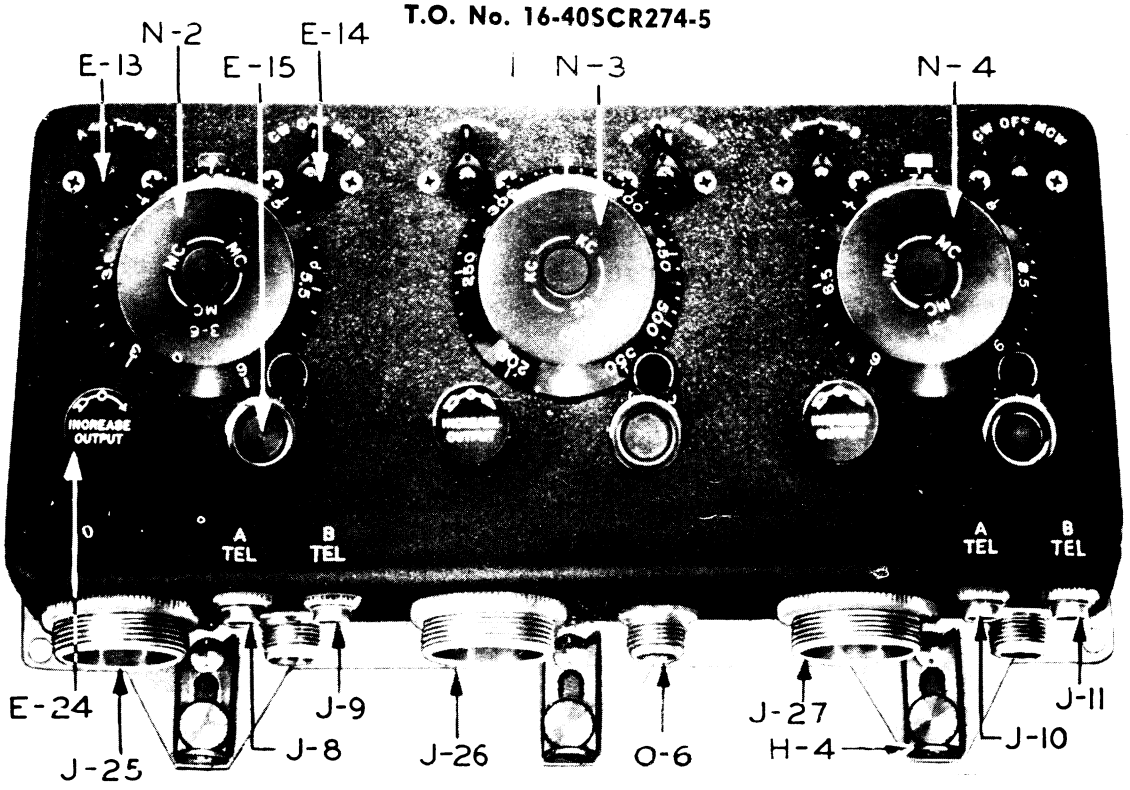


FIGURE 9A — RADIO CONTROL BOX BC-450-A, FRONT VIEW

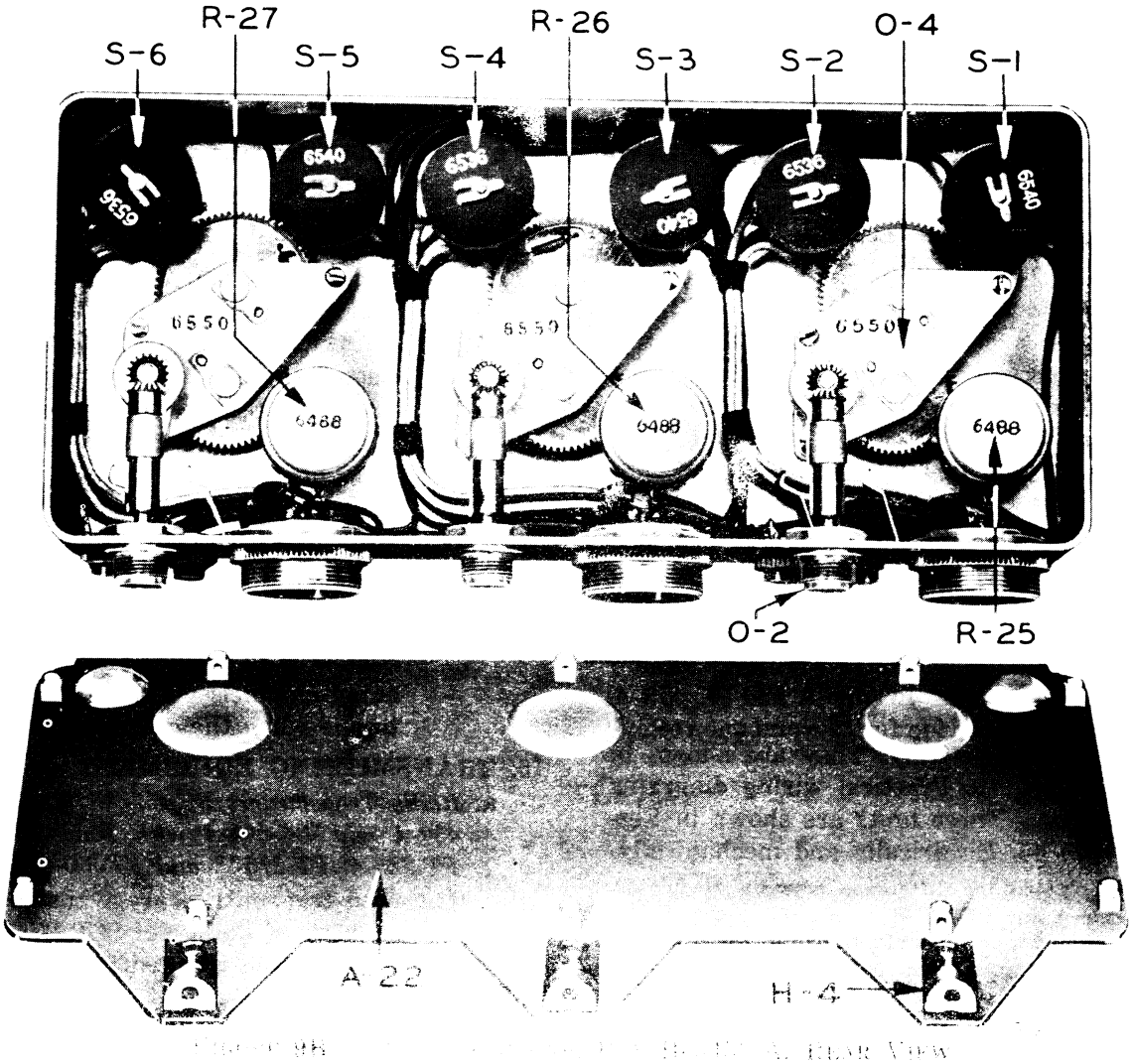


FIGURE 9B — [illegible] BC-450-A, REAR VIEW

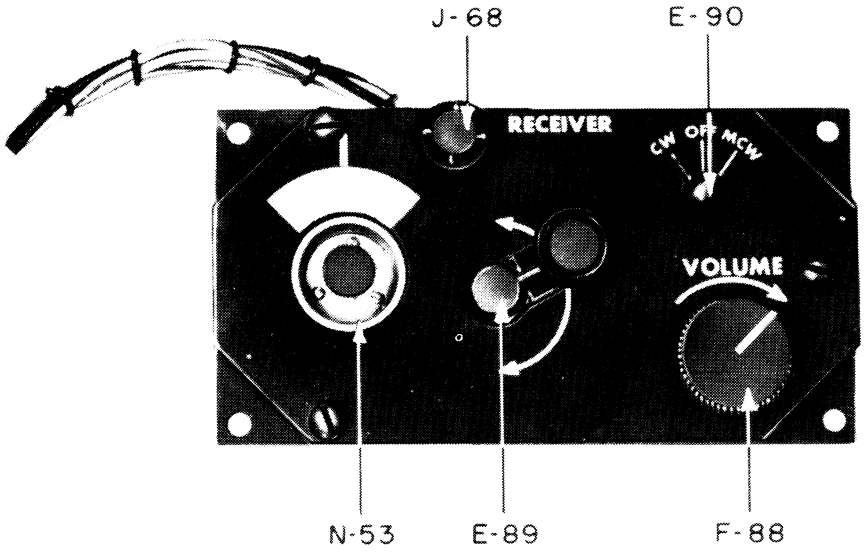


FIGURE 9C—RADIO CONTROL PANEL C-570A/A or C-570B/A, FRONT VIEW

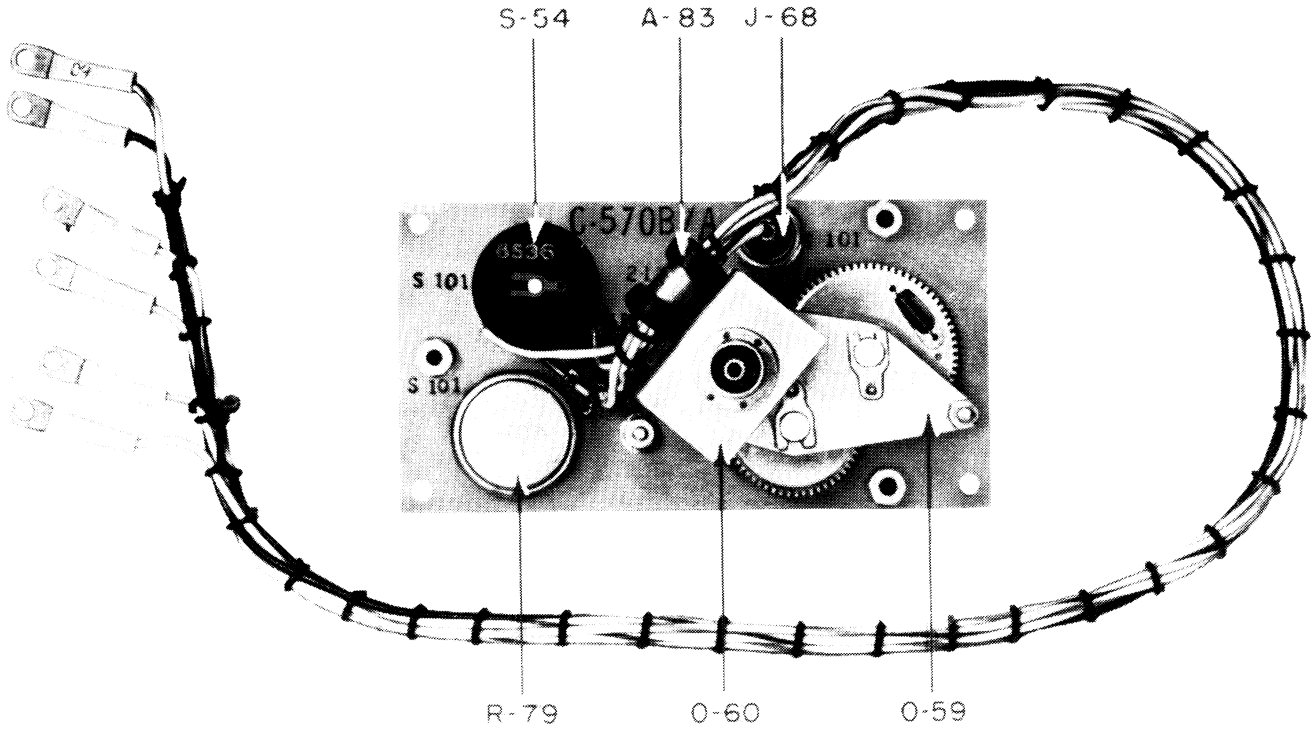


FIGURE 9D—RADIO CONTROL PANEL C-570A/A or C-570B/A, REAR VIEW

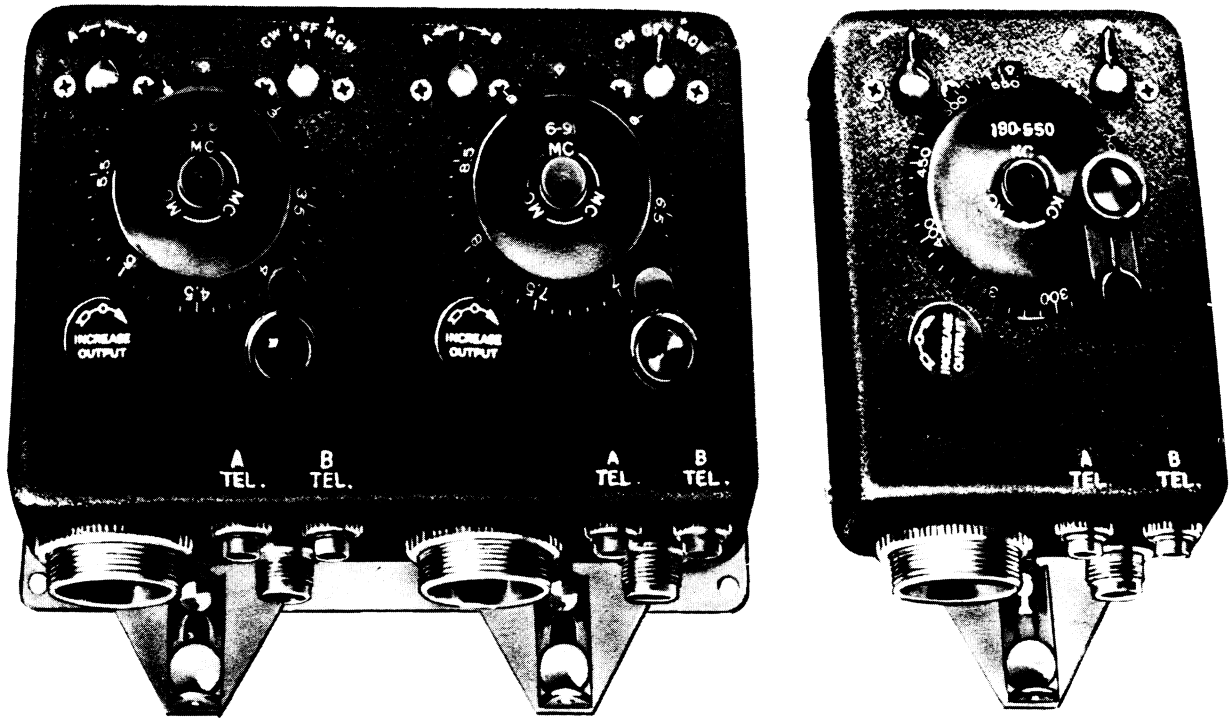


FIGURE 10 — LEFT, RADIO CONTROL BOX BC-496-A (FOR TWO RECEIVERS; RIGHT, RADIO CONTROL BOX BC-473-A (OR -B) (FOR ONE RECEIVER)

stalled on Rack FT-234-A, any two on Rack FT-226-A, any three on Rack FT-276-** or all four on Rack FT-331-A. Each of the transmitters contains a separate set of master-oscillator, r-f-power-amplifier and resonance indicator tubes with their associated circuits. However, each transmitter obtains its d-c high voltage from a common Dynamotor DM-33-A and the proper modulating voltages from a common Modulator Unit BC-456-A (or -B)*. The necessary remote controls are provided by a common Radio Control Box BC-451-A.

(2) Figure 27 shows the schematic circuit diagram of a typical transmitter. Schematically, the four units are alike although they differ in the inductance and capacitance values in the r-f circuits and in the values of R-70 and R-73 which are associated with resonance indicator tube V-53 (Tube VT-138). Figure 47 shows practical wiring diagrams of the four transmitters. Symbol numbers and terminal numbers shown on this drawing corresponds with those on the schematic circuit diagram of Figure 27.

(3) Tube V-53 (Tube VT-138) is the resonance indicator, and tube V-54 (Tube VT-137) is the master oscillator. Tubes V-55 and V-56 (both Tube VT-136) are r-f power amplifiers connected in parallel. The electrical characteristic ratings of each of these tubes are given in Table 16.

(4) T-53A is the master-oscillator coil which is tuned by capacitor C-63. Fixed capacitor and trimmer C-60 and compensating capacitor C-68 are connected in parallel with C-63. R-72 and C-59 are the grid-leak and grid capacitor elements of the master-oscillator circuit. T-53B is a bifilar winding wound with the master-oscillator coil, from the ground to the cathode tap, in order that variations of cathode-to-heater capacitance within the tube will not affect the frequency of oscillation. It is essentially an r-f choke. The plate of tube V-54 (VT-137) is

* The difference between Modulator Units BC-456-A and BC-456-B is described in Paragraph 15d.

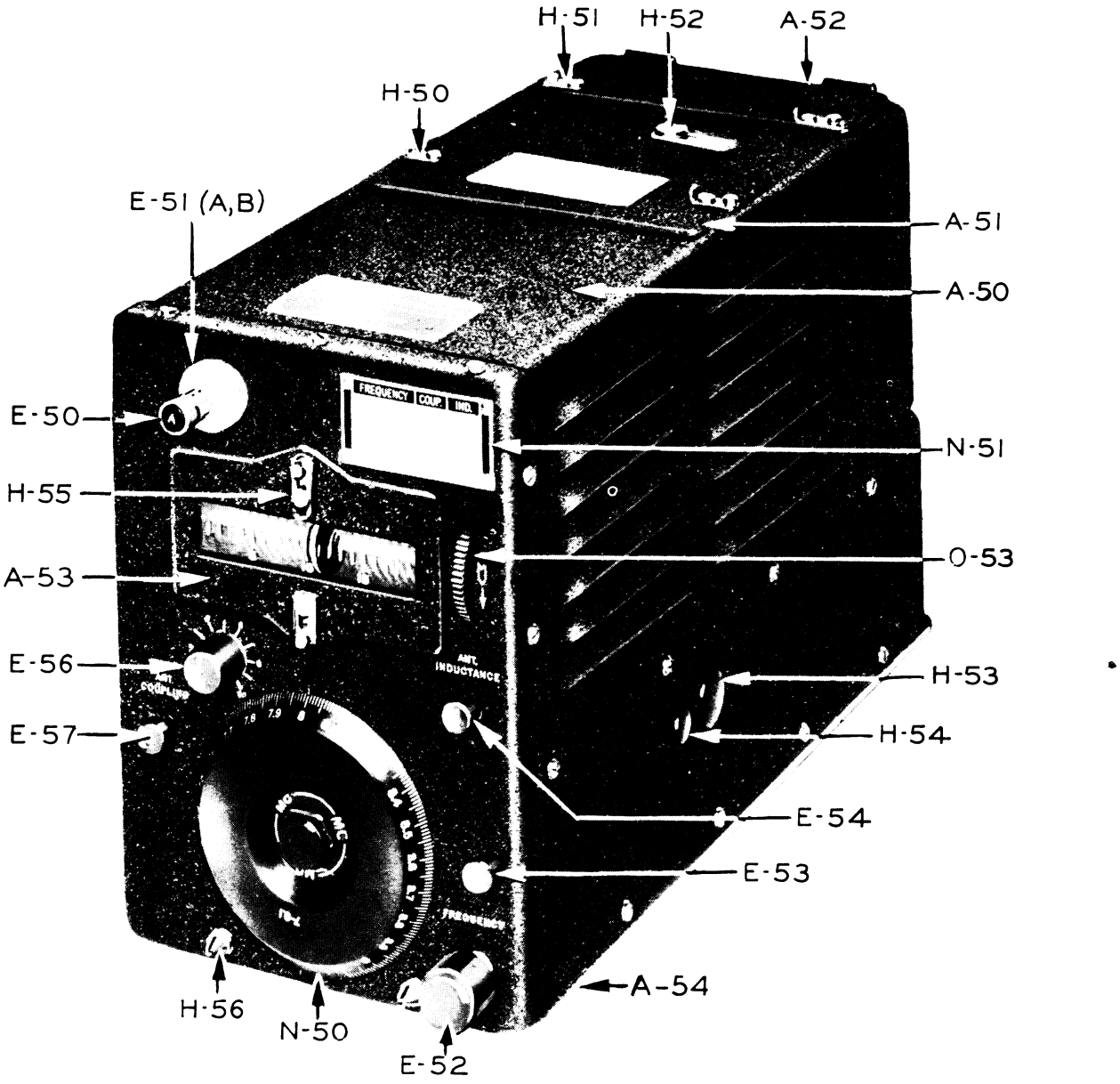


FIGURE 11 — TYPICAL RADIO TRANSMITTER

grounded for r-f by capacitor C-58A, hence the plate is essentially connected to the ground end of T-53A. The cathode is connected several turns above ground, and the grid is connected to the top of the coil. T-53C has a dual function: (a) it excites the grids of the r-f power amplifier tubes and (b) it provides a neutralizing voltage which is applied to the high voltage side of C-65 through the fixed neutralizing capacitor C-62. R-68 is a filter resistor which, with the aid of C-58A, isolates the plate circuit of tube V-54 (Tube VT-137) from other r-f circuits. C-61 and C-58C are r-f by-pass capacitors designed to keep the low side of T-53B and the tapped point of T-53C at ground potential for radio frequency. R-74 is a resistor in the grid circuit of the r-f power amplifier tubes. Grid current in these tubes (which increases with greater excitation from the master-oscillator) flows through R-74. The sense of the grid current flow is such as to make the grids of the r-f power amplifier tubes more negative with respect to ground as the

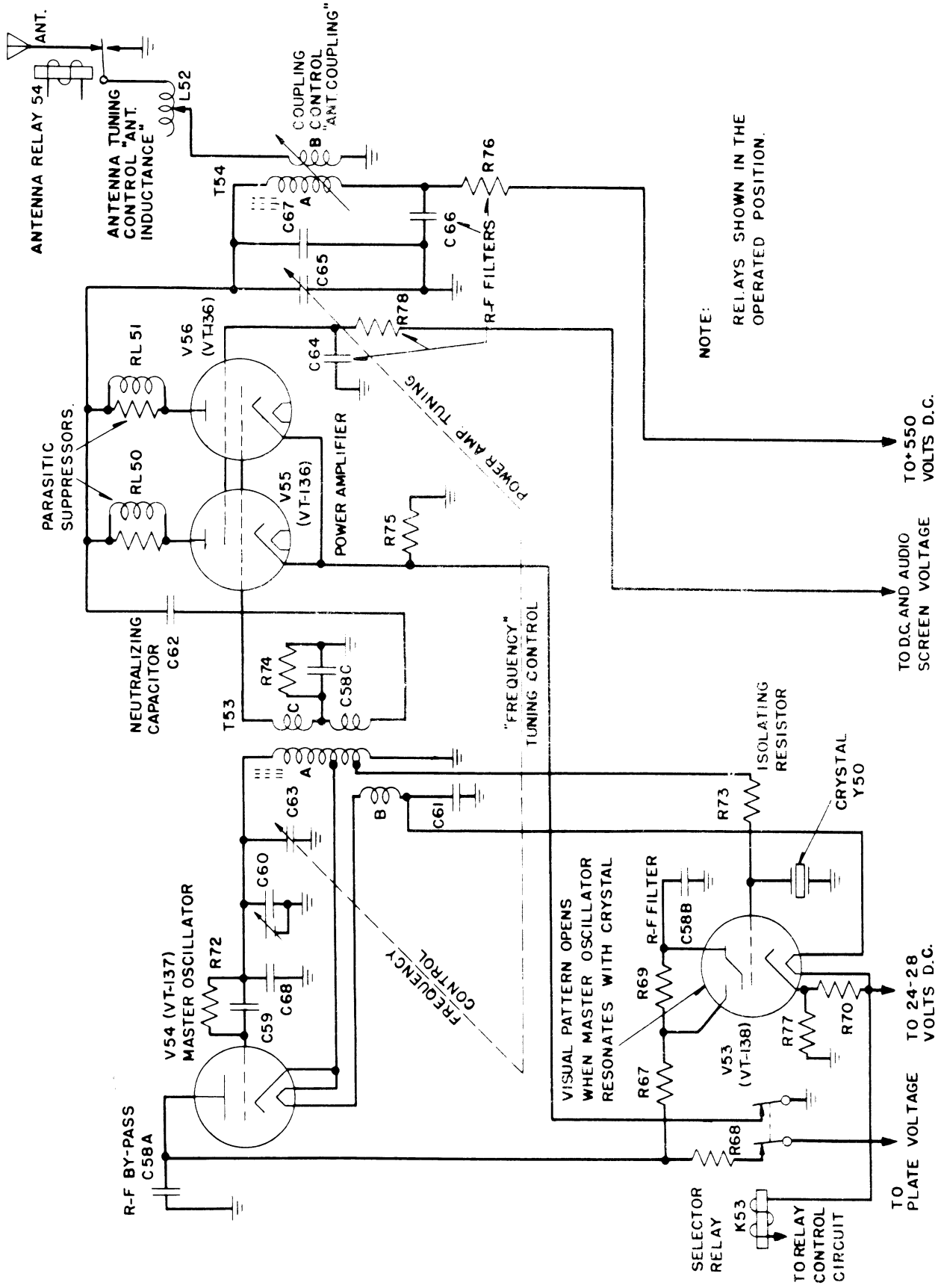


FIGURE 12 — FUNCTIONAL DIAGRAM OF THE R-F CIRCUITS OF A TYPICAL RADIO TRANSMITTER

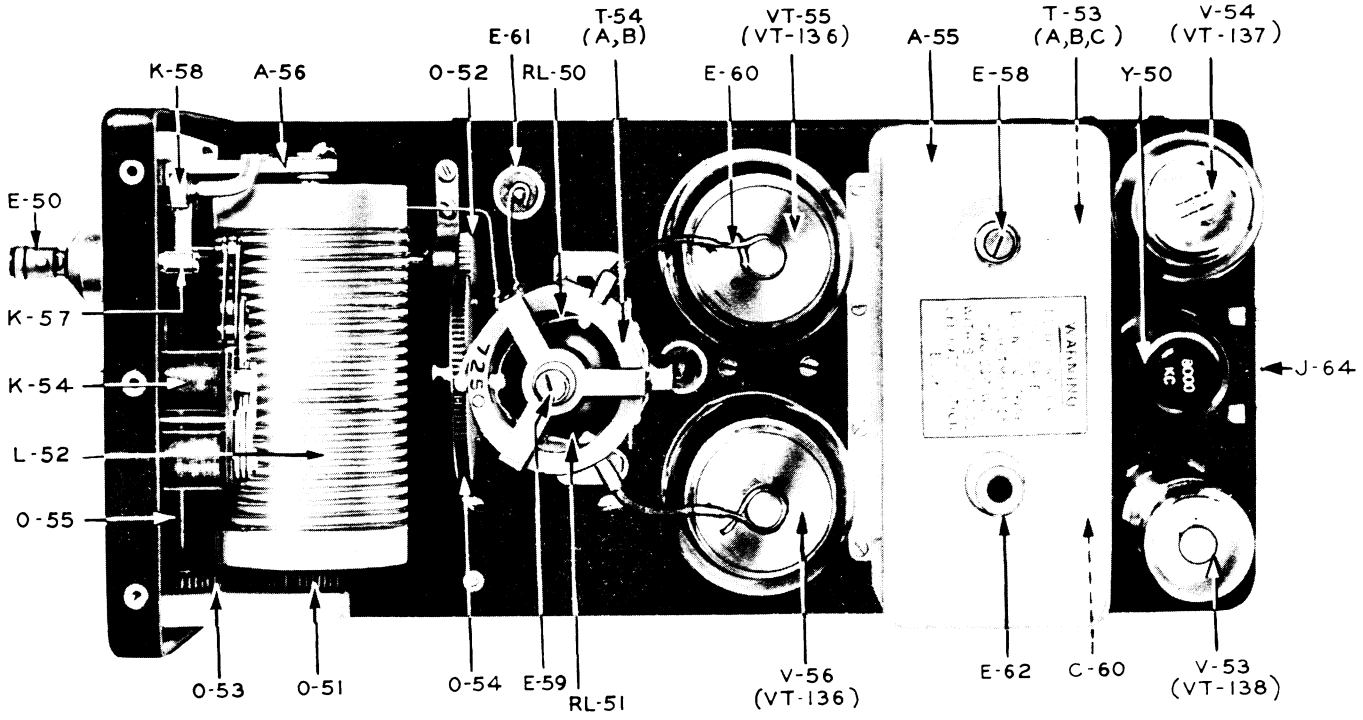


FIGURE 13 — TYPICAL RADIO TRANSMITTER, TOP VIEW, SHIELD REMOVED

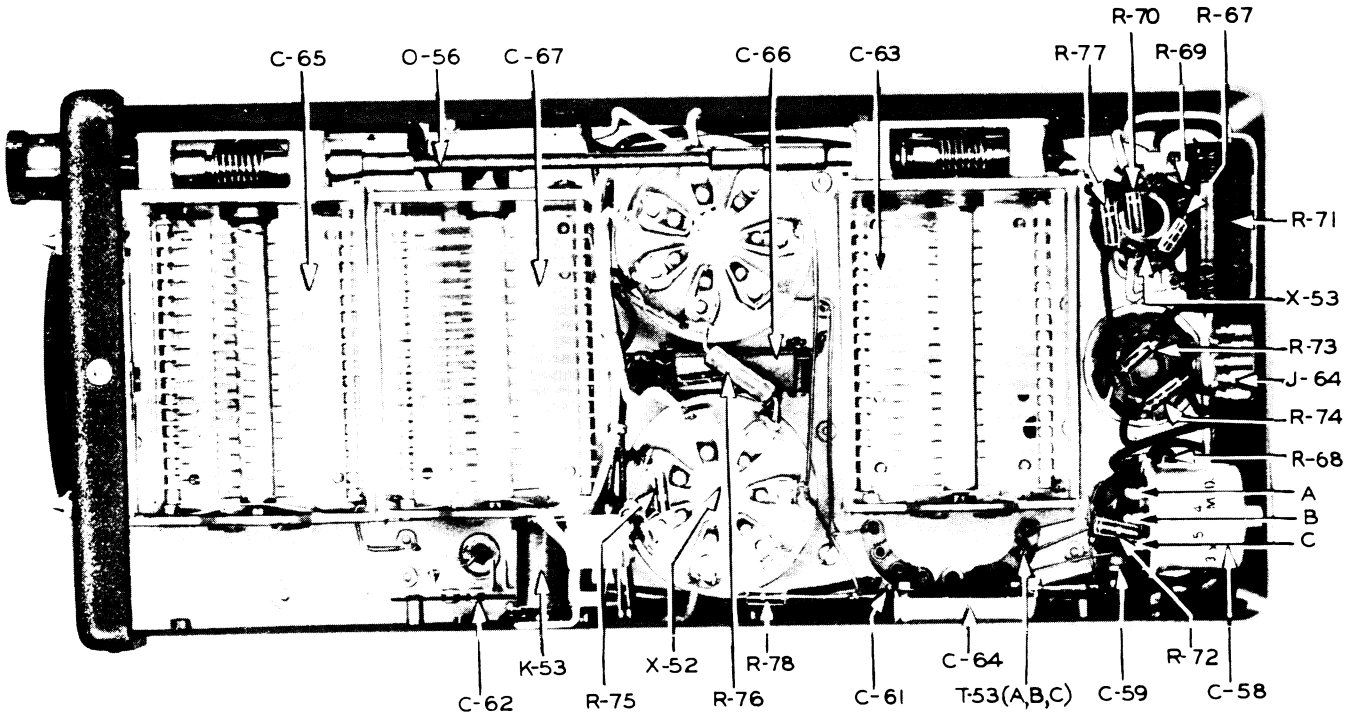


FIGURE 14 — TYPICAL RADIO TRANSMITTER, BOTTOM VIEW, COVER REMOVED

grid current increases. The high - voltage side of R-74 is connected to terminal 2 on receptacle J-64 to provide a convenient point in Racks FT-234-A, FT-226-A, FT-276-* and FT-331-A (terminal 2 on J-62) where the d-c grid bias, or excitation, may be measured.

(5) The two r-f power amplifier Tubes VT-136 are connected in parallel (except for an isolation of the two plates by separate parasitic suppressors RL-50 and RL-51). The power amplifier tuned circuit consists of coil T-54A shunted by fixed capacitor C-67 and tuning capacitor C-65. R-76, together with C-66, and R-78 with C-64, isolate the plates and screens of the amplifier tubes. T-54B is an antenna coupling coil mounted within T-54A. The amount of coupling to T-54A is controlled from the front of the radio transmitter by the ANT. COUPLING knob. L-52 is a continuously adjustable inductor in the antenna circuit; its inductance is adjusted from the front of the radio transmitter by the ANT. INDUCTANCE knob. This is the only antenna tuning control.

(6) Y-50 is a piezo-electric crystal mounted in a metal - tube envelope having a standard octal base. The crystal may be reached through an opening, having a hinged cover, in the top-rear of the radio transmitter. If desired, a similar crystal, but of a different nominal frequency, may be substituted for the crystal normally supplied. The electrical circuits associated with tube V-53 (Tube VT-138) are such that any crystal whose nominal frequency falls within the range of the radio transmitter may be used. R-77 and R-70 are bias resistors for tube V-53. R-73 is an isolating resistor which separates Y-50 from the tap on the master-oscillator tuning coil, T-53A. (This prevents an interaction between the crystal and master-oscillator which would affect the frequency of the master - oscillator.) R-F voltage at this tap is applied through R-73 to Y-50 and to the grid of tube V-53. This tube acts as a grid circuit detector whose plate current increases as its grid voltage becomes more positive. When the crystal and master-oscillator frequencies differ appreciably, the impedance of the crystal is negligible as compared with the resistance of R-73, and practically all of the r-f voltage from T-53A appears across R-73. As the master - oscillator frequency approaches that of the crystal (within 200-300 cycles), the r-f voltage on the grid of tube V-53 increases, because the impedance of Y-50 increases with respect to R-73. The resulting plate current flowing through R-69 produces a difference in potential between the target and plate, and a shadow appears on the target. The shadow angle is greatest when the master-oscillator and crystal frequencies are exactly equal since this is the condition where the crystal impedance is highest and, therefore, the r-f voltage from T-53A impressed on the grid of tube V-53 is maximum. R-67 is used to decrease the plate voltage for tube V-53 and C-58B is an r-f by-pass capacitor connected to the plate of that tube.

(7) Relays K-53 and K-54 are closed in one of the transmitters when switch S-52 on Radio Control Box BC-451-A is set for that transmitter and TRANS. POWER switch S-51 in the same box is ON. (The transmitters are numbered from left to right in Racks FT-226-A, FT-276-* and FT-331-A. These numbers correspond to the numbers on switch S-52.) K-53 closes the plate supply to the master-oscillator and resonance indicator tubes and also short-circuits R-75, a 51,000-ohm resistor in the cathode-to-ground circuit of the r-f power amplifier tubes. Plate and screen voltages are constantly supplied to power amplifier tubes V-55 and V-56 (both Tube VT-136) in all transmitters, but only one transmitter, whose R-75 is short-circuited, is operative. The bias voltage developed

*Mountings and racks with no letter suffix were not manufactured at the time of publication of this instruction book.

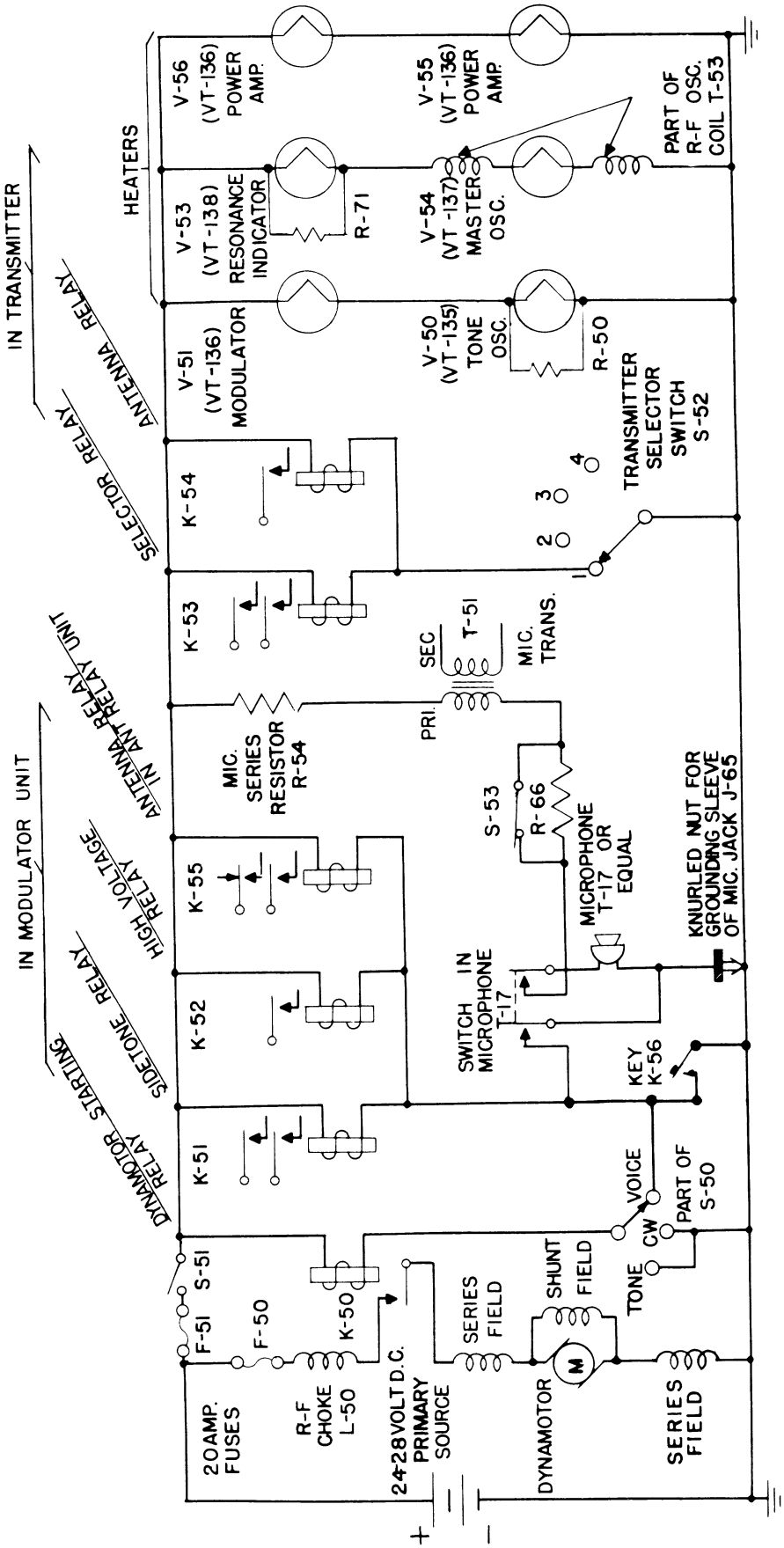


FIGURE 15 — FUNCTIONAL DIAGRAM OF THE LOW VOLTAGE D-C CIRCUITS OF THE TRANSMITTING EQUIPMENT

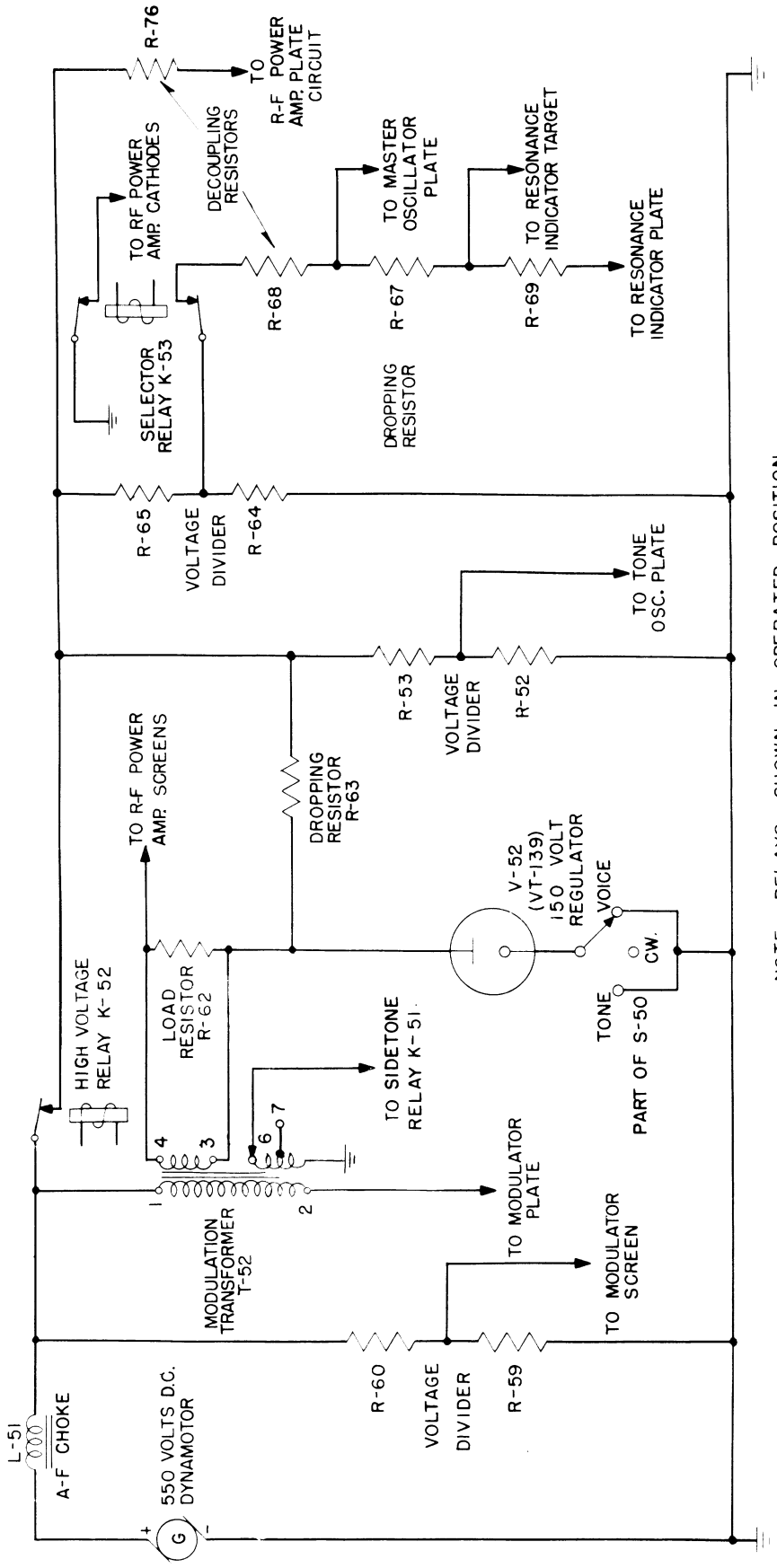


FIGURE 16 — FUNCTIONAL DIAGRAM OF THE HIGH VOLTAGE D-C CIRCUITS OF THE TRANSMITTING EQUIPMENT

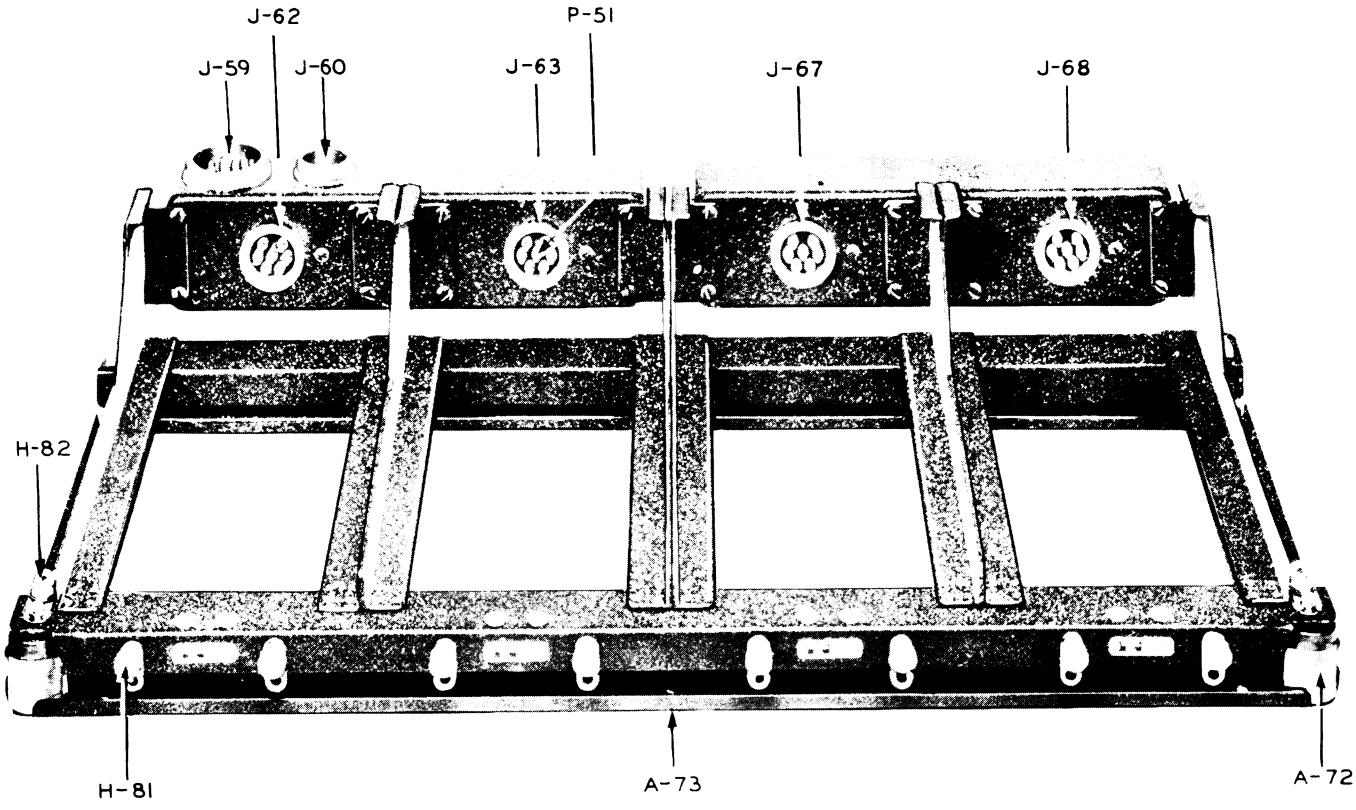


FIGURE 17A — RACK FT-331-A AND MOUNTING FT-332-A, FRONT VIEW

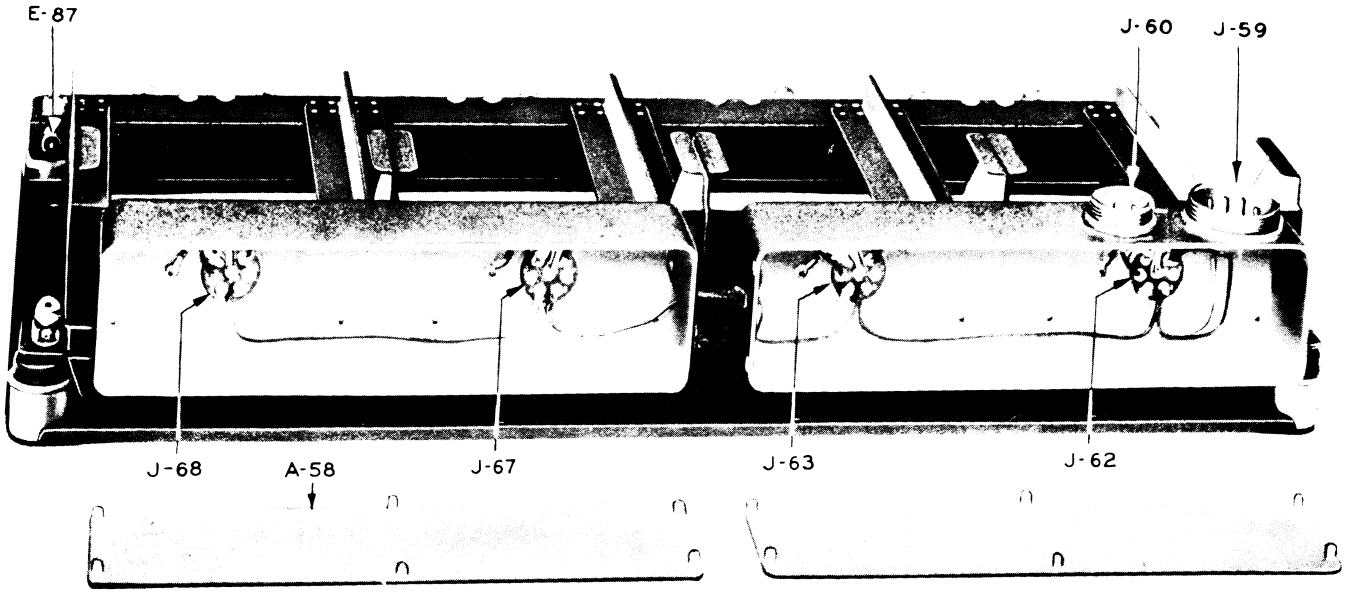


FIGURE 17B — RACK FT-331-A AND MOUNTING FT-332-A, REAR VIEW WITH COVER OF RACK REMOVED

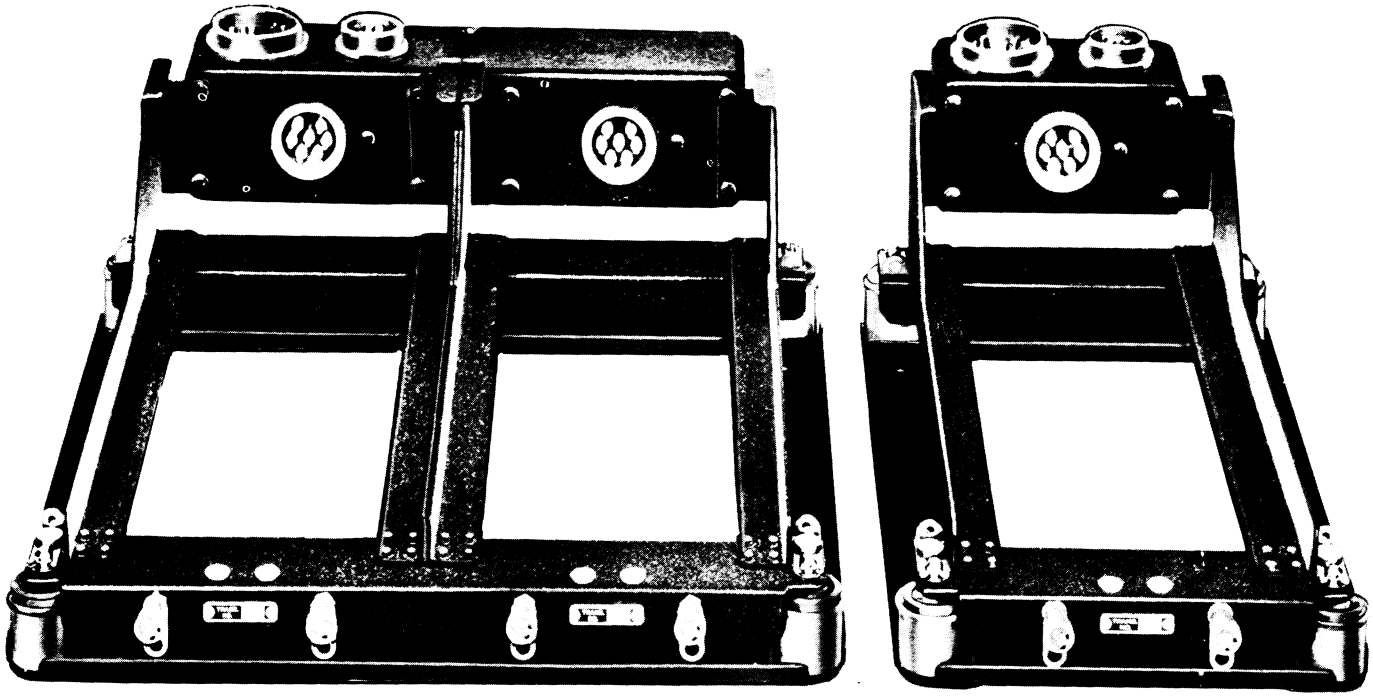


FIGURE 18 — LEFT, RACK FT-226-A (FOR TWO TRANSMITTERS); RIGHT, RACK FT-234-A (FOR ONE TRANSMITTER)

across R-75, when it is not short-circuited, is sufficient to reduce the plate and screen current to nearly zero. There is no excitation on the grids of the power amplifier tubes except in the *one* transmitter selected, because the plate supply to the master-oscillator tube V-54 (Tube VT-137) is closed only for that unit.

(8) Relay K-54 transfers the high potential end of the antenna tuning inductor L-52 from ground to the antenna binding post.

(9) The vacuum tube heater circuits are connected in series-parallel and remain energized as long as TRANS. POWER Switch S-51 is ON. The arrangement may be seen best in Figure 15.

(10) Racks FT-234-A, FT-226-A, FT-276-* and FT-331-A each contain two ground binding posts and circuits interconnecting Modulator Unit BC-456-A (or -B) with the transmitters and with Antenna Relay Unit BC-442-A.

*Mountings and racks with no letter suffix were not manufactured at the time of publication of this instruction book.

b. *Radio Control Box BC-451-A*

(1) Radio Control Box BC-451-A contains a three-position switch S-50 which controls the circuits determining the type of emission, a four-position switch S-52 which controls the circuits determining the choice of transmitter, microphone jack J-65, external key jack J-66, built-in key K-56, a microphone series resistor R-66 (shunted by a switch S-53) and toggle switch, S-51, in the line direct from the primary source. This box contains receptacle J-55 for connection to Modulator Unit BC-456-A (or -B).

(2) Microphone jack J-65 is constructed in such a manner that the sleeve may or may not be grounded to the box, by turning the protruding knurled nut counter-clockwise or clockwise, respectively, as far as it will go by hand. In the counter-clockwise position, the sleeve is grounded and the "push-to-talk" button on the microphone will close the microphone and relay circuits to ground. With the nut in the maximum clockwise sense, the "push-to-talk" button may be permanently clos-

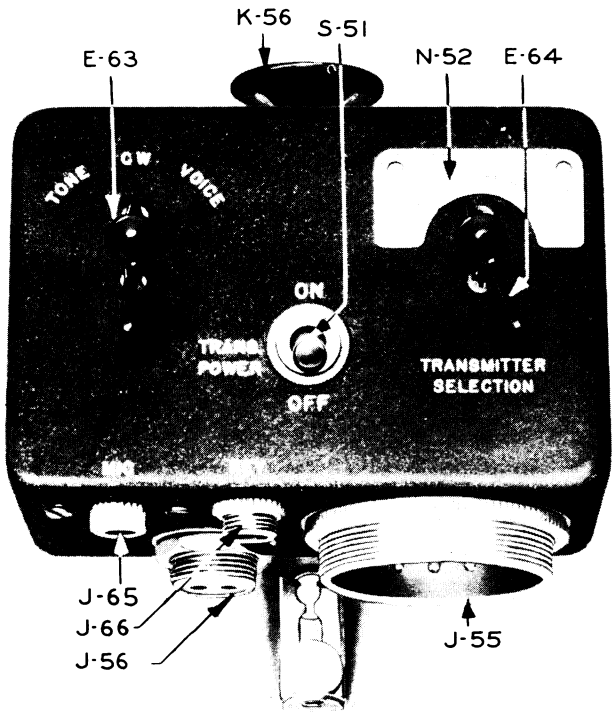


FIGURE 19A — RADIO CONTROL BOX BC-451-A, FRONT VIEW

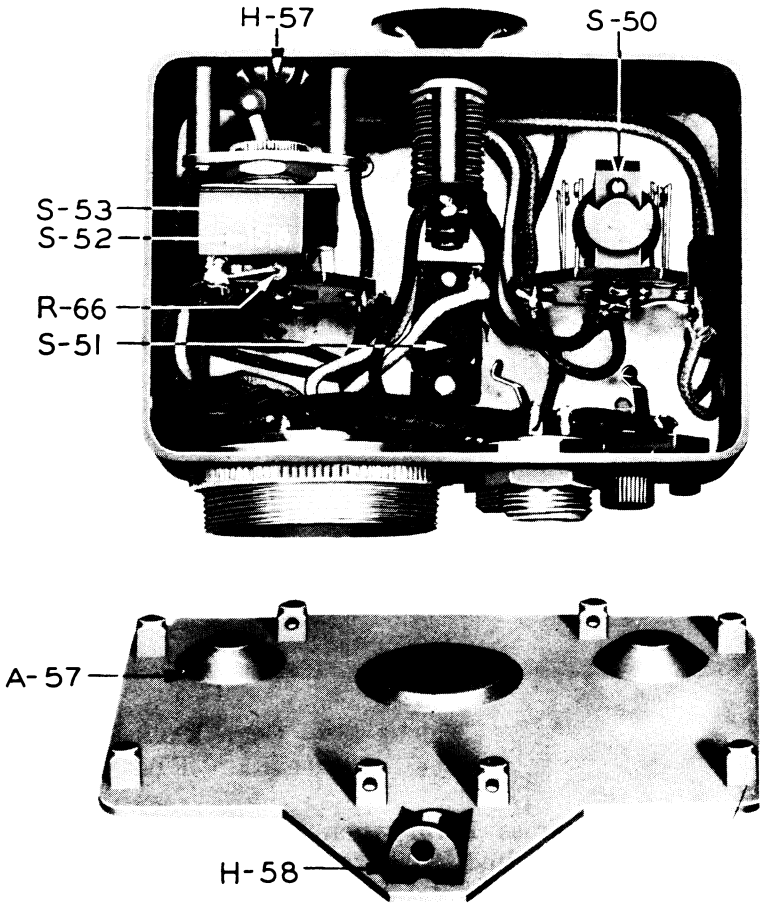


FIGURE 19B — RADIO CONTROL BOX BC-451-A, REAR VIEW WITH COVER REMOVED

ed, and the pressing of the built-in key, external key or throttle switch will perform the functions of the "press-to-talk" button.

(3) Although S-52 on Radio Control Box BC-451-A is a four-position switch designed to select one of four transmitters, only position 1 is used with Rack FT-234-A. Positions 1 and 2 are used with Rack FT-226-A and positions 1, 2 and 3 with Rack FT-276-*. Positions 3 and 4 are used if a second modified FT-226-A is installed or if Rack FT-331-A is used. The modification of Rack FT-226-A consists of transferring the connections that go to terminals 8 and 9 on receptacle J-59 to terminals 6 and 7. It will then be necessary to add a junction box into which the cord from Modulator Unit BC-456-A (or -B) connects with two identical cords, one going to each of the racks.

*Mountings and racks with no letter suffix were not manufactured at the time of publication of this instruction book.

c. *Modulator Unit BC-456-A with Dynamotor DM-33-A*

(1) Modulator Unit BC-456-A contains tone oscillator tube V-50 (Tube VT-135), speech-amplifying and modulator tube V-51 (Tube VT-136), 150-volt voltage regulator tube V-52 (Tube VT-139), transformers, relays, chokes and other elements, to be described later, which are necessary to provide the audio-frequency power requirements of the transmitters. Dynamotor DM-33-A, mounted on the modulator unit, supplies d-c high voltage requirements of the transmitters and the modulator

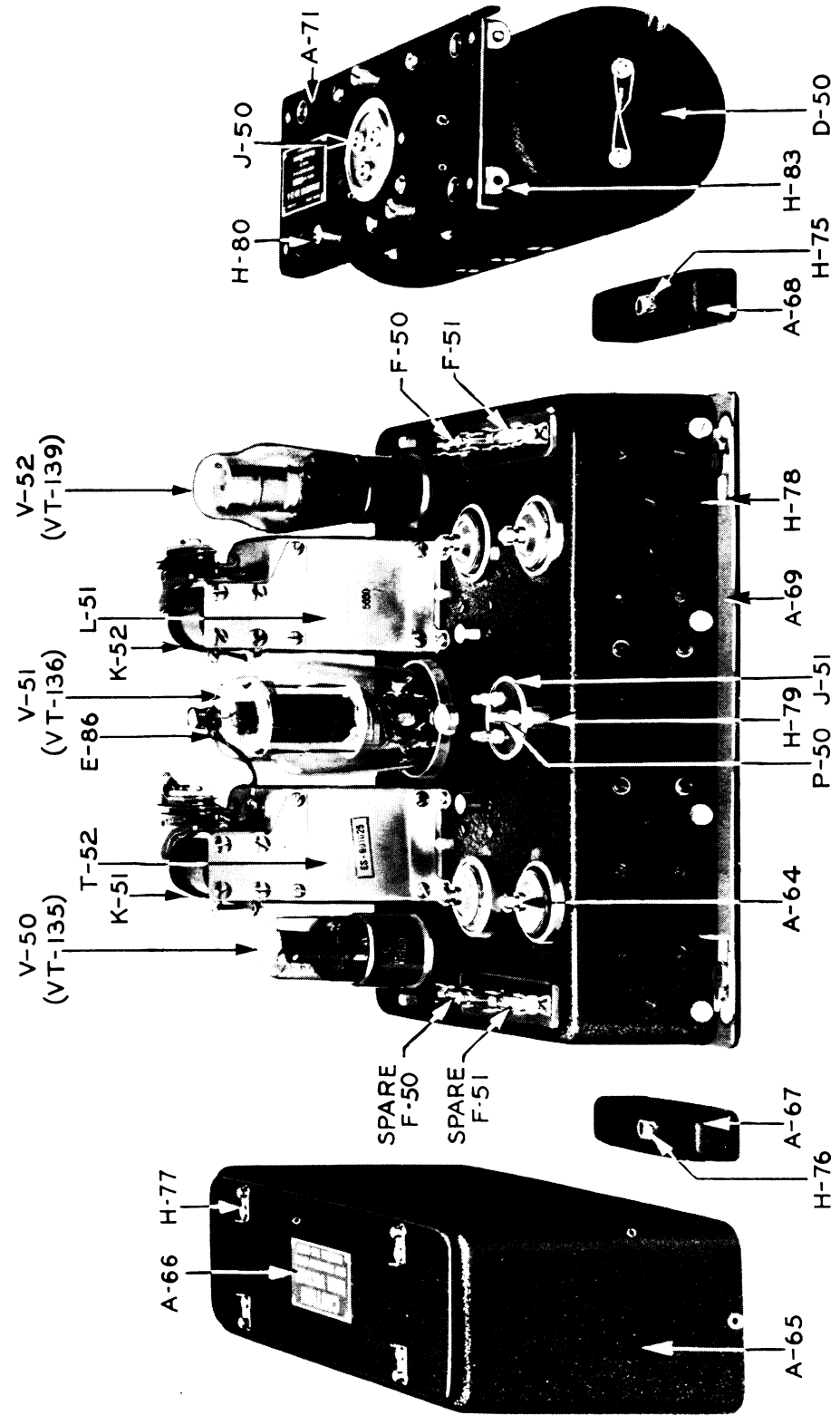


FIGURE 20 — MODULATOR UNIT BC-156-B, TOP VIEW WITH SHIELD REMOVED, AND BOTTOM VIEW OF DYNAMOTOR DM-33-A

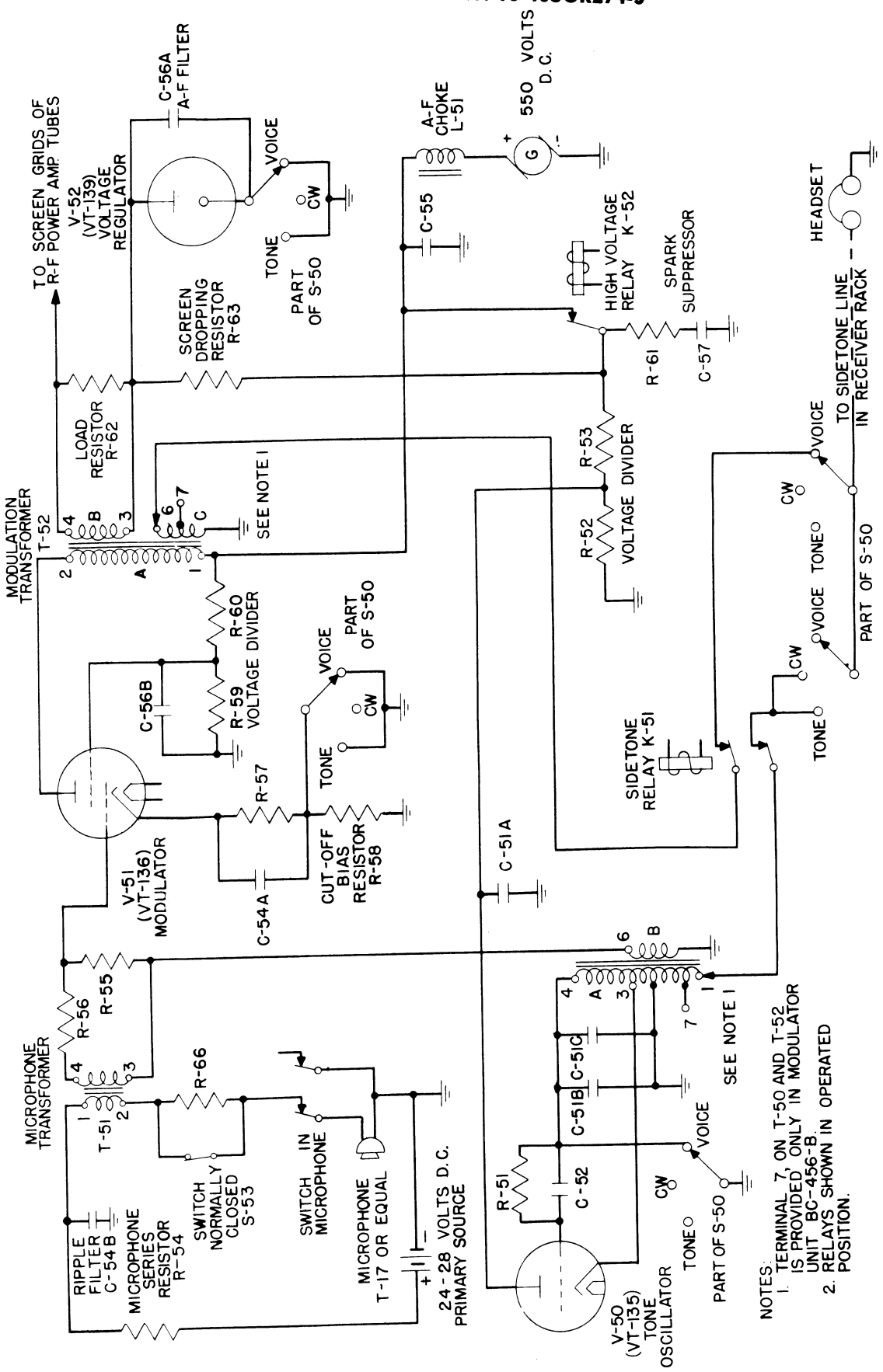


FIGURE 21 — FUNCTIONAL DIAGRAM OF THE A-F CIRCUITS OF THE TRANSMITTING EQUIPMENT

unit. A schematic circuit diagram is shown in Figure 27.

(2) Tube V-50 (Tube VT-135) is the tone oscillator tube. T-50A with capacitors C-51B and C-51C in parallel form the tuned circuit of this oscillator. R-51 and C-52 are the grid leak and grid capacitor. R-53 and R-52 form a voltage divider across the high-voltage dynamotor supply line; they determine the plate voltage on the tube V-50 (Tube VT-135). T-50A is an autotransformer with the section from the ground tap to the bottom acting as the secondary winding. When switch S-50 on Radio Control Box BC-451-A is set to either CW or MCW, this winding has a sidetone output of about 7 volts. Refer to Table 8 for further details. The audio-frequency voltage developed across the second winding T-50B is applied to the grid of modulator tube V-51 (Tube VT-136). The magnitude of this voltage is such that under average conditions, the resulting modulation will be about 90 per cent.

(3) T-51 is a transformer, the primary of which is in the microphone circuit. The control grid of tube V-51 (Tube VT-136) is connected to the junction of R-55 and R-56 which, together, act as a voltage divider and as a load across the secondary of the microphone transformer. These resistors are so chosen that the voltage applied to the modulator tube while transmitting on VOICE is sufficient to produce 85% average modulation with from 1.2 to 1.7 volts rms input. Circuit elements throughout the voice modulation circuits have been designed on the basis of the maximum output from an average microphone T-17. The direct current through microphone T-17 is approximately 62 milliamperes (assuming that R-66 is short-circuited by S-53 in Radio Control Box BC-451-A). Switch S-53 is opened only when using microphones not now supplied to the United States Army Air Corps.

(4) The screen grid supply to the modulator tube V-51 (Tube VT-136) is obtained through voltage dividers R-59 and R-60. C-56B is a by-pass capacitor to reduce the a-f impedance from screen-grid to ground. R-57 and R-58 are bias resistors in the cathode circuit of modulator tube V-51 (Tube VT-136). While transmitting TONE or VOICE, the junction of these resistors is grounded, leaving only R-57 (390 ohms) as a cathode bias resistor. In the CW position, cathode current flows through R-57 (390 ohms) and R-58 (51,000 ohms) to ground, producing a bias which reduces the plate current of V-51 to less than 1 milliampere. In this way, the modulator tube V-51 is effectively shut off in the CW position, and power is conserved at a time when the functioning of the modulator tube is not required.

(5) T-52 (A, B, C) is the modulation transformer, the primary winding of which is in the plate circuit of modulator tube V-51 (Tube VT-136). Two secondary windings are provided, T-52C providing about 15 volts of VOICE sidetone (refer to Table 8 for further details) and T-52B providing the modulating voltages. The latter is in series with the high voltage screen-grid supply to r-f power amplifier tubes V-55 and V-56 (both Tube VT-136) in the transmitters. R-62 is a load resistor designed to keep the load impedance of tetrode modulator tube V-51 (Tube VT-136) reasonably constant. R-63 is a series voltage dropping resistor in the screen-grid circuit of the r-f power amplifier tubes.

(6) Tube V-52 (Tube VT-139) is a gaseous voltage-regulator tube designed to maintain the d-c voltage between its plate and ground at 150 volts; this is the normal d-c voltage applied to the screen-grid of the r-f power amplifier in the TONE and VOICE positions. C-56A, across the voltage regulator tube, acts as an a-f by-pass capacitor.

(7) R-64 and R-65 together act as a voltage-divider for the master-oscillator d-c plate supply.

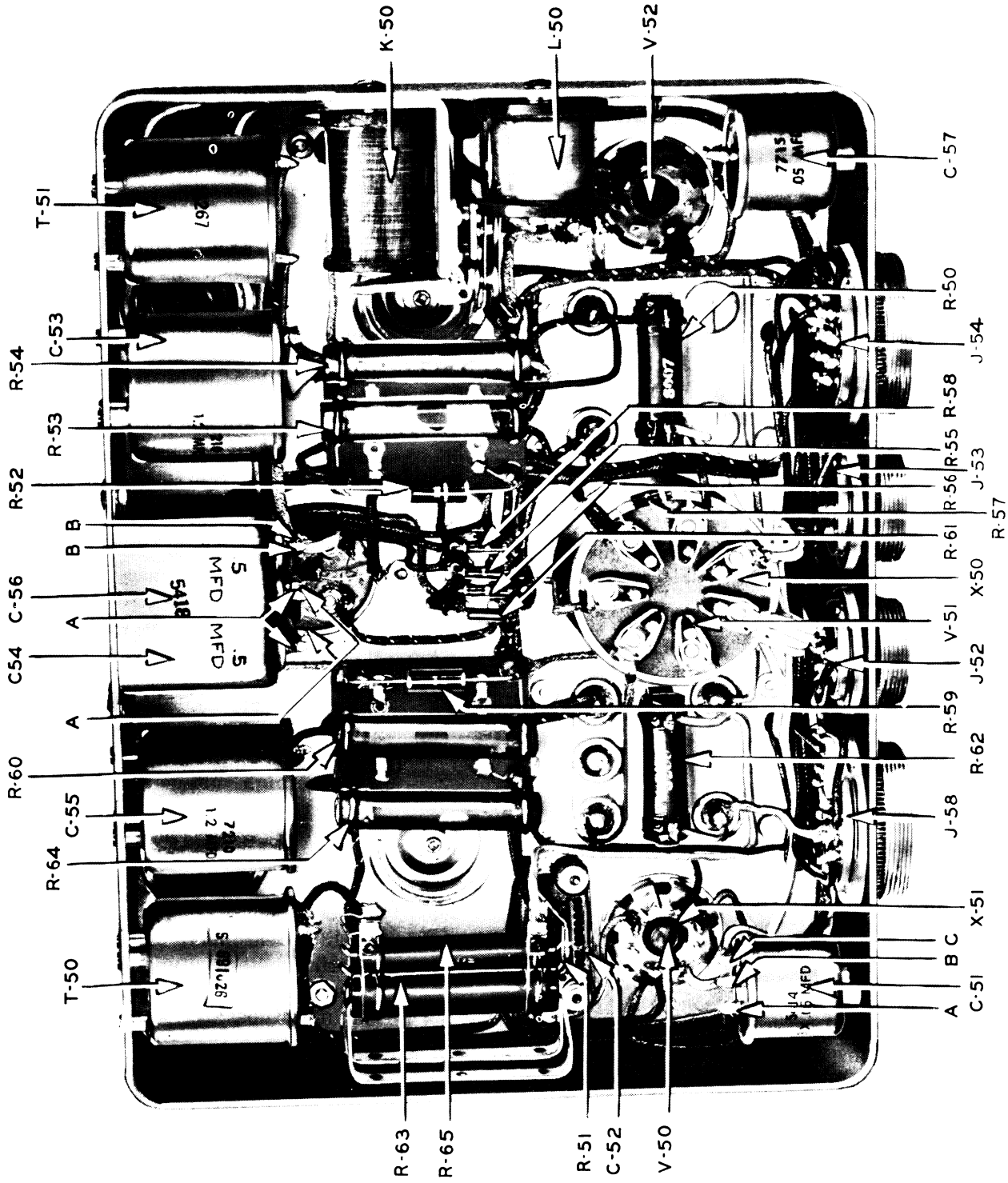


FIGURE 22 — MODULATOR UNIT BC-456-B, BOTTOM VIEW WITH COVER REMOVED

(8) F-50 and L-50 are a fuse and r-f choke, respectively, in the input circuit to Dynamotor DM-33-A. This circuit is closed by the contacts on relay K-50 whenever the "push-to-talk" button on the microphone is closed (or a similar operation by the throttle switch or special switch) in the VOICE position. Relay K-50 is also actuated, and the dynamotor starts when switch S-50 in Radio Control Box BC-451-A is thrown to the TONE or CW position. The dynamotor will continue to run as long as S-50 remains in either of these positions, but the high-voltage keying relay, K-52, will not close until the built-in key, external key, microphone button or the throttle switch is closed. Relay K-51 closes the sidetone circuits from the TONE or VOICE sidetone windings to the emission switch, S-50. (The setting of S-50 determines which of these circuits is connected to the headsets.) The coils of K-51 and K-52 are in parallel and the relays operate together.

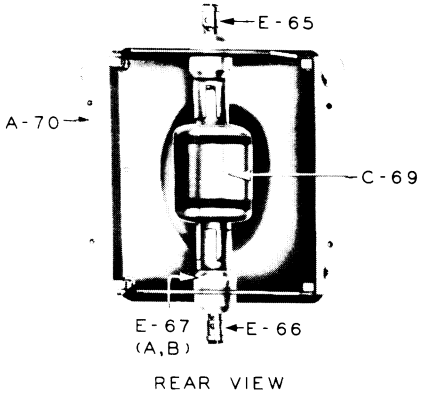
(9) R-50 is a 42-ohm resistor connected across the heater terminals of tube V-50 (Tube VT-135) so that the heater of this tube can be connected in series with the heater of tube V-51 (Tube VT-136) across the 28-volt primary source. The heater current is 0.45 ampere.

*Mountings and racks with no letter suffix were not manufactured at the time of publication of this instruction book.

(10) Dynamotor DM-33-A generates the high voltage d-c for the transmitting equipment. Connections from the dynamotor to the modulator unit are made through couplings J-51 and J-50. The plate in J-50 is designed to be loose in order to reduce the strain on the pin plugs of J-51 during vibration of the units. The motor is compound wound. C-50, across the motor brush terminals, attenuates r-f disturbances set up at the brushes. C-53 is a filter capacitor, across the 28-volt line to the motor, performing a function similar to C-50.

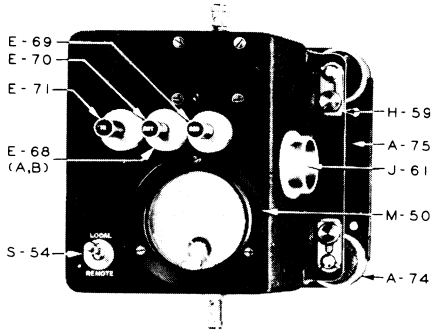
(11) Dynamotor DM-33-A has a continuous duty and an intermittent duty rating which may be found in Table 18.

(12) The four cords entering the Modulator Unit BC-456-A are the primary source voltage at J-53, the connections to Radio Control Box BC-451-A at J-54, the connections to Rack FT-234-A (or Rack FT-226-A, Rack FT-276-* or Rack FT-331-A) at J-58 and the connections to Rack FT-220-A (or other radio receiver racks) at J-52. The last of these connections is not essential to the operation of the transmitting equipment; it exists to control the three relays in Rack FT-220-A and to complete the sidetone circuit from the modulator unit to the headset lines in Rack FT-220-A and Radio Control Box BC-450-A.

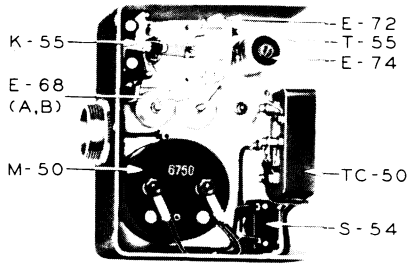


REAR VIEW

NOTE: In Antenna Relay Unit BC-442-AM, parts C-69, E-65, E-66, E-67A, E-67B and the end plates supporting them are deleted.



FRONT VIEW
WITH MOUNTING FT-229-A



INTERIOR VIEW

FIGURE 23 - ANTENNA RELAY UNIT BC-442-A, FRONT VIEW, AND REAR VIEWS

d. *Modulator Unit BC-456-B*

Modulator Unit BC-456-B is exactly like Modulator Unit BC-456-A except that the sidetone windings on T-50 and T-52 have an additional tap to which the sidetone leads may be connected if the radio equipment is to be used with low impedance headsets.

e. *Antenna Relay Unit BC-442-A*

(1) Antenna Relay Unit BC-442-A consists of an antenna switching relay K-55 designed to switch a single antenna either to the radio transmitters or to the receivers of this equipment. This relay is operated simultaneously with the high-voltage keying relay in Modulator Unit BC-456-A (or -B). In addition to switching the antenna, relay K-55 connects to ground the antenna lead to the receivers during transmission. T-55 is an r-f current-transformer whose primary is in the antenna circuit and whose secondary is connected to a thermocouple TC-50. Switch S-54 has two positions, LOCAL and REMOTE, and it connects the output of thermocouple TC-50 to meter M-50. A schematic circuit diagram is shown in Figure 27.

(2) C-69 is a high voltage capacitor of 50 micromicrofarads capacity. This capacitor was formerly supplied with all Antenna Relays BC-442. Since this capacitor is not required in fighter aircraft installations, or with any of the radio transmitters except Radio Transmitter BC-459-A, these capacitors will be packed only with Radio Transmitter BC-459-A, instead of with Antenna Relays BC-442. Capacitor C-69 is to be installed in Antenna Relay BC-442 when Radio Transmitter BC-459-A is required. (See fig. 23.)

f. *Antenna Relay Unit BC-442-AM*

This is a modified version of Antenna Relay Unit BC-442-A intended for use where the assigned frequencies are below 7.0 megacycles or where the antenna is very small so that the antenna series capacitor C-69 is not needed. This capacitor with its mountings, bending posts, and supporting end plates is not included in this unit.

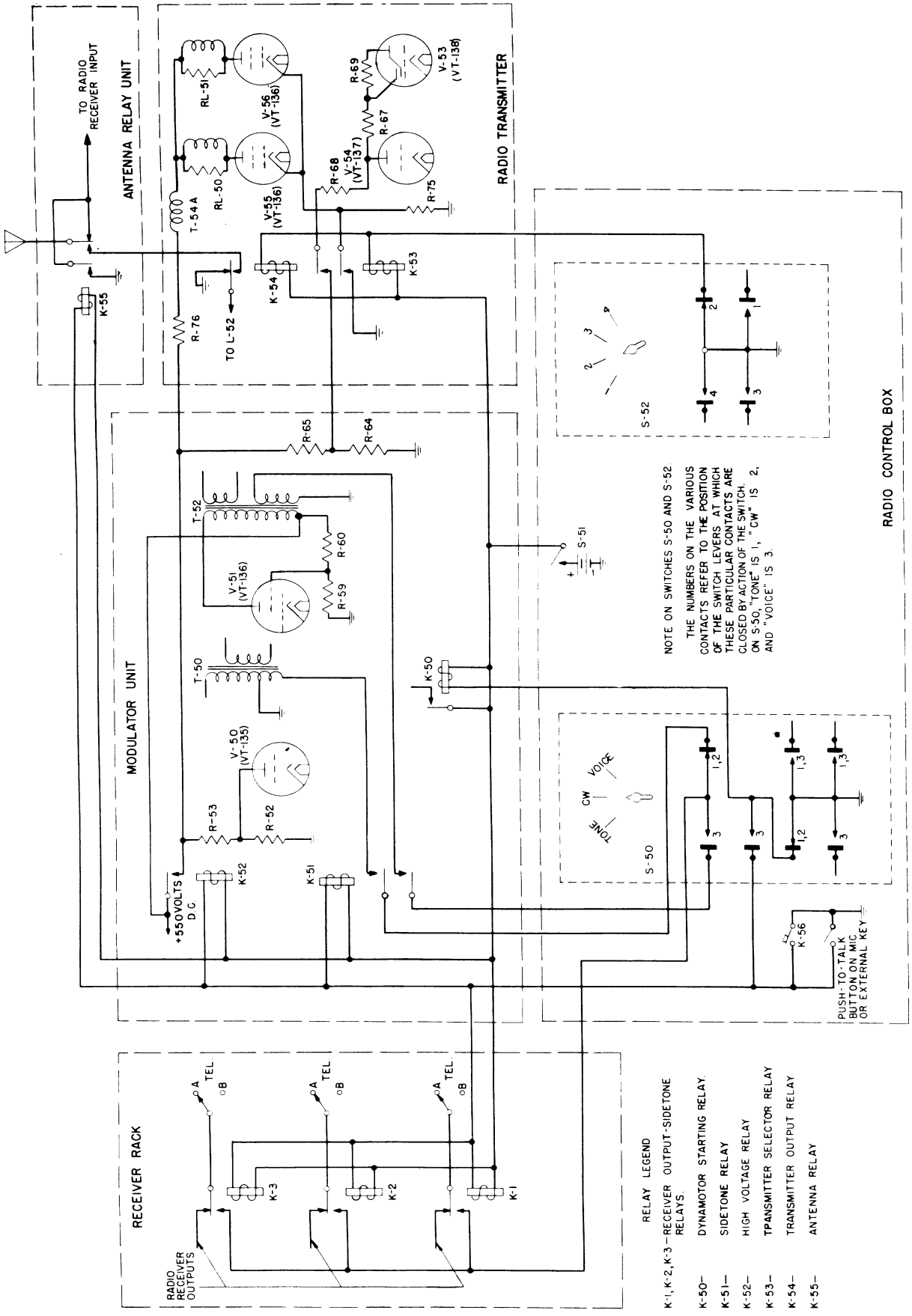


FIGURE 24 — FUNCTIONAL DIAGRAM OF THE RELAY CONTROL CIRCUITS

SECTION IV

MAINTENANCE

16. PRE-FLIGHT INSPECTION

a. *Procedure*

The radio set should be given an inspection before each flight in accordance with the following:

(1) See that the proper receivers and transmitters are installed for operation on the scheduled frequencies.

(2) Check the operation of all receiver controls and make certain that the receivers are operating. An aural check on the operation of each receiver should be made by listening to signals on CW at maximum gain while tuning through the entire band. All receivers except the one being tested should be turned off.

(3) Check the input alignment of each receiver by readjusting knob E-9 for maximum receiver output while listening to a weak signal.

(4) Advance each INCREASE OUTPUT control to maximum and listen for electrical noise produced by each receiver dynamotor. The noise should be negligible.

(5) Turn up the airplane engine past the speed at which the battery charging generator cuts in and listen for electrical noises produced by the engine ignition system, generator or voltage regulator.

(6) Check each headset cord and plug for open or intermittent contacts. Check each headset.

(7) Check the operation of all transmitter controls and note the antenna current. The antenna currents on MCW and VOICE should be approximately equal, and a higher current should be obtained on CW. A sidetone signal of about 1000 cycles should be heard on CW and MCW. With switch S-50 on VOICE, speech signals impressed on the microphone should be heard in the headset.

b. *Caution*

Never operate the equipment on the ground longer than is necessary to complete the above inspection. Never leave the airplane without setting the TRANS. POWER and all CW-OFF-MCW switches at their OFF positions.

17. SERVICE INSPECTION

A detailed inspection of the equipment should be made at periods set up by the Army Air Forces for inspection and overhaul of the airplane. The following points should be covered in addition to those which experience and local conditions indicate to be necessary or desirable:

(1) Check all tubes on a tube checker.

(2) Measure the voltages tabulated in Tables 9 and 10. Use a high resistance voltmeter for the measurements.

18. ISOLATION OF FAULTY UNITS

a. *Preliminary Check*

During the preceding operating checks on the equipment, if any receiver or transmitter fails to perform in a normal manner, proceed as follows to discover the faulty part of the equipment.

LOOK FOR SIMPLE CAUSES OF FAILURE FIRST

Check to see that (1) all switches are in their proper positions, (2) all plugs are attached and all cords appear to be in good condition, (3) battery voltage is satisfactory, (4) dynamotors operate properly, (5) antenna is in good condition and properly connected and (6) ground connections are properly made to the receiver and transmitter racks.

b. *Substitution Methods*

After making the foregoing checks, if improper operation is still present, proceed to isolate it by substituting units known to be in operating condition for those whose operation is in doubt. For example, if one of the receivers does not operate

properly while the other two are normal, interchange Plugs PL-152 connecting the receivers to their respective control units, and see whether the fault is in the receiver or in the control unit. In like manner, proper operation of one transmitter but abnormal operation of another indicates a fault in that transmitter or its control circuit; proper operation of one transmitter is sufficient evidence that the modulator and power supply circuits are in good condition. Interchange the two transmitters on the rack to determine whether the fault is in the control circuits, rack connections or in the transmitter itself. If neither transmitter performs properly, it is quite possible that the fault may lie in the modulator unit. Interchange this with one that is known to be good to prove whether or not this is so.

19. SERVICING FAULTY RECEIVERS

a. *Disassembly of such Parts as May be Required for Servicing Faulty Receivers*

(1) *Receiver from Rack*

Disconnect the antenna lead from the receiver antenna binding post, remove the safety wires and unscrew the two knurled nuts far enough to allow the lugs to be disengaged from the pointed studs. Slide the receiver out of the rack.

(2) *Cover from Bottom of Chassis*

Remove the fourteen bright screws around the bottom edge of the chassis and front panel.

(3) *R-F Coil Set Assembly*

After removing the bottom cover of chassis, as indicated above, remove the two black screws (one at each side of the chassis) at approximately the center of the r-f coil set assembly and then lift the coil set assembly out squarely so as not to damage the pin plugs.

(4) *Receiver Outer Shield*

First unfasten the four dynamotor snapslides and lift out the dynamotor. Remove the eight bright screws (four rearmost screws along the top edge of the tie strap on each side of the chassis) and slide the outer shield back and off. This outer shield is NOT fastened by the three foremost black screws along the top edge of the tie strap on each side of the chassis, nor by the black screws around the outer edge of the front panel.

(5) *I-F Coupling Unit Assemblies and Tubes*

These components may be removed without taking off the outer receiver shield. Each i-f coupling unit assembly is secured by two bright screws at its base. Remove these screws and pull the assembly out squarely so as not to damage the pin plugs.

b. *Location of Faults in the Receiving Equipment*

One or both of the following methods may be used to locate trouble in a receiver after a failure has been definitely traced to a particular unit by the method outlined in Paragraph 18.

(1) First Method

After removal of the chassis bottom cover, connect the receiver to Test Set RC-54-A as shown in Figure 33. Meters should read as indicated in the table on this figure. Following this, a systematic measurement of the voltages at each of the tube terminals listed in Table 9 will determine which of the d-c circuits, if any, is defective. This measurement will also check continuity or short circuit in the r-f and i-f plate circuits. If the trouble is not located at the conclusion of the above tests, use an ohmmeter to check the continuity of all circuits (See Table 11).

(2) Second Method

A second method of locating faults in a receiver is to measure the microvolts required at each of several points to produce a receiver output of 10 milliwatts (6.3 volts across 4000 ohms). (The output of a receiver will decrease to almost half of its maximum value when connected in parallel with two

other receivers in Rack FT-220-A.) Table 6 lists the test points and shows a value in microvolts which may be considered normal at each of these points. By systematically applying a signal generator to the points indicated, the stage in which the fault lies may be quickly determined. Specific instructions follow: Note the general precautions to observe in the application of Table 6. This table is meant merely as a guide, and departures of 2 to 1 from these figures do not necessarily indicate a fault. Even though the antenna trimmer was adjusted when using Test Set RC-54-A, it must be readjusted when the receiver is installed in the airplane due to the effect of different antenna characteristics.

(3) Equipment Required for Test

(*a*) A standard signal generator which covers the tuning range of the receivers and which may be modulated 30% at 400 cps.

(*b*) An output meter of the copper oxide rectifier type such as "Output Meter Weston Model 571 Type 3A," part of Test Set I-56-A, or a vacuum tube voltmeter.

(*c*) A resistor of such value that when combined with the headset and the voltage measuring instrument across it, the effective load resistance will be close to 4000 ohms.

(*d*) Test Set RC-54-A consisting of necessary cables, meter, jacks, gain control and power switch.

(*e*) A crystal-controlled frequency standard for accurately determining test frequencies. (The variable portion of the alignment tuning capacitors in this equipment is so small that unless the signal generator frequency is precise it may not be possible to find a resonant point within the range of the aligning capacitor.) The receiver may be connected to this equipment in any position for convenient inspection and adjustment. In place of this special equipment, a bench test of a receiver may be made by connecting the positive terminal of the battery to terminal 6 (see Figure 26) and the negative terminal to the chassis. The battery voltage should be close to that indicated in Table 9. The headset, output meter and load resistor may be connected in parallel to terminal 2 and the chassis. It is not necessary to remove the outer receiver shield for these tests. See Table 6 for the intermediate frequency and normal sensitivity values for all receivers.

(4) Test Procedure

(*a*) Connect the ground lead from the signal generator output to the receiver chassis and connect the other lead from the signal generator output direct to the antenna binding post. See that both leads from the signal generator are no longer than necessary (less than one foot) and that these leads are kept close together (twisted).

(*b*) Set the signal generator for an output of 200 microvolts, modulated 30 per cent at 400 cycles. Set the receiver frequency dial to the highest calibrated value and set the CW-OFF-MCW switch to the MCW position and turn the INCREASE OUTPUT control to maximum.

(*c*) Vary the signal generator frequency through the indicated receiver frequency and far enough on either side to avoid errors in signal generator frequency calibration. Use a headset in the receiver output circuit. If a 400 cycle output is heard, retune the signal generator through this frequency. Keep the signal generator output adjusted for a receiver output of not more than 10 milliwatts while adjusting the signal generator frequency and the ALIGN INPUT knob for maximum receiver output. The receiver sensitivity for MCW operation may be considered satisfactory, providing the r-f input required to produce 10 milliwatts output does not exceed twice the tabulated value (See Table 6) and any serious defect apparent in MCW operation

must be found elsewhere. If the MCW sensitivity is satisfactory, check the sensitivity with the CW - OFF - MCW switch on the CW position. Consider the CW sensitivity satisfactory if the unmodulated r-f input required to produce an audio output of 10 milliwatts is one-half the tabulated value or less.

(*d*) If the receiver sensitivity on the MCW is abnormally low when measured at the antenna post, determine whether the fault lies ahead of, within, or following the mixer stage by checking the sensitivity at the grid (top cap) of mixer tube V-4 (Tube VT-132). Do not remove the grid clip.

(*e*) Set the signal generator modulation to 30% at 400 cps, and adjust the generator frequency for the indicated receiver frequency as before. If the r-f input required to obtain 10 milliwatts is less than twice the tabulated value, the fault lies between the antenna binding post and the output of the r-f amplifier stage. If three or four times the number of microvolts indicated in the table is required in this r-f test, change the signal generator frequency to the intermediate frequency for this receiver and progressively vary the generator frequency and r-f output to obtain a maximum receiver output of 10 milliwatts. If the normal number of microvolts is now required, the fault lies in the oscillator tube elements or oscillator circuit of the mixer stage. Check the mixer tube voltages and if these are normal, replace the mixer tube with one known to be satisfactory.

(*f*) If an intermediate frequency input considerably greater than normal is required of the mixer grid, the fault lies in the i-f amplifier or in the hexode elements of the mixer tube. With the signal generator frequency set at the receiver intermediate frequency, connect the generator to the control grid of the first i-f tube. Wrap a wire around the control grid terminal (fourth terminal clockwise from the locating pin, as viewed from the bottom) for connection to the signal generator. Determine the r-f input required for a receiver output of 10 milliwatts.

(*g*) If this test shows faulty sensitivity, repeat the measurement in a similar manner on the control grid of the second i-f tube. Abnormally low sensitivity at the second i-f grid indicates trouble between this point and the audio output circuit. The signal generator is not useful beyond the second i-f grid.

(*h*) Using this test procedure, the source of the trouble may be quickly narrowed down. It is then possible to use an ohmmeter to check the components between the tube which was found to give correct sensitivity, and the first one toward the antenna which failed to do so.

(*i*) After the fault has been removed, recheck the CW operation at the intermediate frequency with the signal generator (unmodulated) connected to the mixer grid (top cap). Determine whether the r-f input required to produce 10 milliwatts audio output is less than one-half the tabulated value. The signal generator frequency which produces zero beat on CW should agree closely with the frequency required to produce maximum MCW output.

(*j*) An ohmmeter, part of Test Set I-56-A, is the only equipment necessary to locate faults in the radio control boxes, dynamotors, racks and adapters. Refer to the schematic diagram of these units, Figure 26, for the circuits of this equipment.

c. *Alignment of Receiver R-F and I-F Circuits*

NOTICE:— THIS OPERATION SHOULD NOT BE ATTEMPTED WITHOUT PROPER EQUIPMENT AND AUTHORITY.

If the sensitivity of a receiver is found to be low, and the tubes, dynamotor and circuit elements are normal, it may be necessary to realign the r-f and i-f amplifiers. The test equipment required is the same as indicated in Paragraph 19b(3) plus a small screw driver. If a screw driver having a metal shank is used, cover the shank with "spaghetti" tubing or with a tough coating

of lacquer. The maximum diameter of the shank and width of blade must not exceed 5/32 inch. Insulation is required to avoid accidental short-circuits on resistors R-11 and R-18 while aligning the secondary circuits of the i-f coupling units in Radio Receivers BC-453-A (or -B) and BC-454-A (or -B).

There are two holes (numbered 1 and 2) in the top of each i-f coupling unit in Radio Receivers BC-453-A (or -B) and BC-454-A (or -B) and one hole (numbered 1) per unit in Radio Receivers BC-455-A (or -B) (See Figure 25). A variable capacitor under hole 1 tunes the input (plate) circuit and the capacitor under hole 2 (when provided) tunes the output (grid or diode input) circuit. A small rod actuator, as shown in the views of the coupling unit assemblies in Figure 25, protrudes through the top of the shield on each i-f coupling unit in Radio Receiver BC-453-A (or -B). These rods control the coupling between the input and output circuits in each unit. Normally, the rods in the first and third units are pushed down (over-coupled position), and the rod in the second i-f unit is left in its upper (loose-coupled) position. A strong detent action indicates the two positions which are about 1/4 inch apart. These coupling controls are omitted in Radio Receivers BC-454-A (or -B) and BC-455-A (or -B). Figures 40, 41 and 42 show the details of the construction of the i-f coupling units.

Each variable capacitor (except padding capacitors C-4F and C-4G under the gang capacitor shield) in the equipment is set at maximum capacitance when the top of the cross mark on the rotor shaft is lined up with the reference mark on the dust shield or chassis. The capacitance is reduced to minimum by a 180 degree rotation in either direction. When a circuit requires readjustment, turn the rotor in a counter-clockwise direction from the maximum capacitance setting. This will always result in a setting of the trimmer such that a clockwise rotation increases the capacitance. Uniform practice in this operation is desirable.

Padding capacitors C-4F and C-4G may be tuned only after removal of the gang capacitor shield. They are adjusted at the factory to maximum, half or minimum capacitance, depending upon the receiver and capacitor, and they should not be changed. The correct settings of these capacitors for each receiver are shown below.

Radio Receiver	Settings of cross-marks on padding capacitors as seen from front of receiver	
	C-4F	G-4G
BC-453-A (or -B), 190 - 550 kc	Min.	Half
BC-454-A (or -B), 3 - 6 mc	Half	Max.
BC-455-A (or -B), 6 - 9.1 mc	Half	Max.

Table 6 shows average values of r-f input, in microvolts, for each receiver to obtain an output of 10 milliwatts with a 4,000-ohm load (two 8,000-ohm head sets in parallel). These values are to be used as a guide in determining the condition of the receiver under test.

Alignment of the receivers must not be attempted without using a standard signal generator and crystal-controlled frequency standard except in a real emergency and providing a modulated signal is available. The operations listed below shall be followed in the order given when a receiver is to be aligned:

(1) Connect the signal generator to the chassis and hexode grid (top cap) of the mixer tube V-4 (Tube VT-132). Do not remove the grid clip. Set the generator frequency for the intermediate frequency of the receiver, using a crystal-controlled frequency standard to obtain a precise adjustment, with 30 per cent modulation at 400 cycles per second. Set the CW-OFF-MCW switch to MCW and set the INCREASE OUTPUT control for maximum receiver output.

If Radio Receiver BC-453-A (or -B) (190-550 kc) is being aligned, *reduce the magnetic coupling in each i-f coupling unit assembly by raising the protruding rod (see Figure 25) until it snaps into its upper (loose-coupled) position.*

(2) Adjust the r-f output of the signal generator to obtain a convenient reading on the output meter; for example, 10 milliwatts or 6.3 volts across 4,000 ohms.

(3) Adjust the capacitor under hole 1 on the third (Z-3) i-f coupling unit and the capacitor under hole 2 (if it is provided) for maximum receiver output.

(4) Reduce the signal generator output until the receiver output is the same as in (2) above and then adjust the capacitors under holes 1 and 2 on the second (Z-2) i-f coupling unit for maximum receiver output.

(5) Reduce the signal generator output again and adjust the capacitors in the first (Z-1) i-f coupling unit for maximum receiver output.

(6) Reduce the signal generator output until the receiver output is the same as in (2) above and then readjust the capacitors in Z-3, Z-2 and Z-1 in that order for maximum receiver output.

(7) Operate the CW-OFF-MCW switch to CW and turn off the signal generator audio-frequency modulation. Do not change the frequency of the signal generator. Adjust the CW oscillator trimmer capacitor C-28 for zero beat, as indicated by listening with a headset to the receiver output. This capacitor is accessible through the hole in the right rear side of the chassis.

(8) If the r-f circuits require realignment, remove the outer shield on the receiver to gain access to capacitors C-4D, C-4E and C-9. Refer to Paragraph 19a(4). Capacitor C-4D is accessible through the left hole in the gang capacitor shield (as viewed from the front of the receiver). Capacitor C-4E is accessible through the center hole, and C-9 through the remaining hole.

(9) Transfer the signal generator output to the antenna post and ground. Set the generator frequency for the high-end alignment frequency as indicated in the table below, using a crystal-controlled frequency standard to obtain a precise adjustment with 30 per cent modulation at 400 cycles per second. Operate the CW-OFF-MCW switch to MCW, set the INCREASE OUTPUT control for maximum receiver output and set the receiver tuning dial at the high-end alignment frequency.

R-F ALIGNMENT FREQUENCIES

Radio Receiver	High-End Alignment Frequency Align C-4D C-4E and C-2 at	Low-End Alignment Frequency Align C-9 at
BC-453-A (or -B), 190-550 kc	520 kc	210 kc
BC-454-A (or -B), 3-6 mc	5.8 mc	3.1 mc
BC-455-A (or -B), 6-9.1 mc	8.9 mc	6.1 mc

INTERMEDIATE FREQUENCIES

Radio Receiver	*Frequency*
BC-453-A	85 kc
BC-454-A	1415 kc
BC-455-A	2830 kc

(10) Adjust the r-f output of the signal generator as in (2) above and then adjust r-f oscillator trimmer capacitor C-4E for maximum receiver output.

If two different settings of C-4E are found at which maximum output is obtained, be sure to use the setting corresponding to the higher capacitance.

(11) Reduce the generator output until the receiver output is the same as in (2) above and then adjust capacitors C-4D and C-2 (ALIGN INPUT knob) for maximum receiver output.

(12) Operate the CW-OFF-MCW switch to CW, turn off the signal generator modulation and adjust capacitor C-4E for zero beat (determined by listening with a headset to the receiver output). Only a small change in the setting of C-4E should be required.

(13) Set the generator frequency for the low-end alignment frequency (see Table, above), using a crystal-controlled frequency standard to obtain a precise adjustment with 30 per cent modulation at 400 cycles per second. Operate the CW-OFF-MCW switch to MCW, set the receiver tuning dial at the low-end

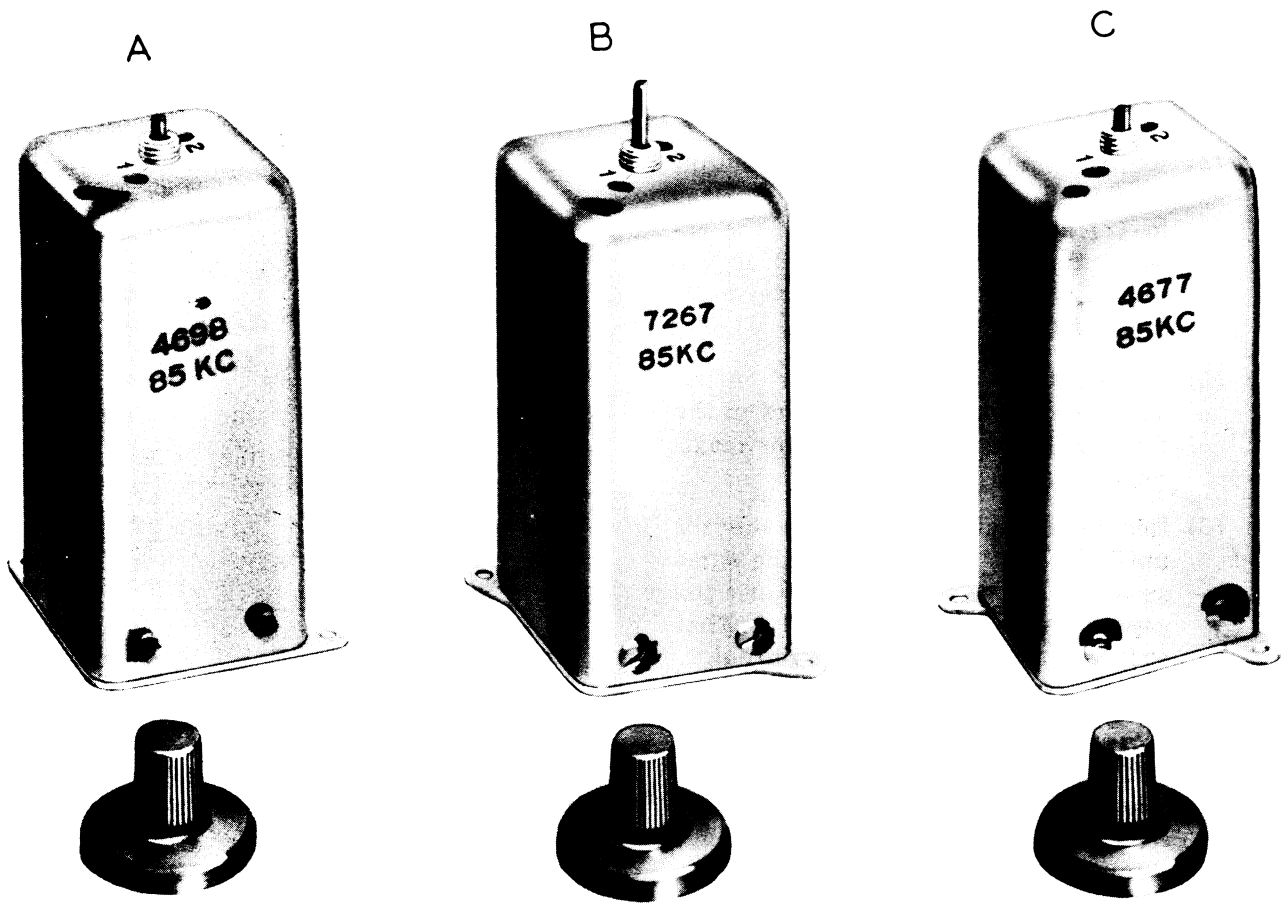


FIGURE 25 — TYPICAL I-F COUPLING UNIT ASSEMBLIES

alignment frequency and adjust the generator output as in (2) above. Make alternate adjustments in the settings of capacitor C-9 and the receiver tuning dial until maximum receiver output is obtained.

(14) Set the generator frequency for the high-end alignment, using a crystal-controlled frequency standard to obtain a precise adjustment without modulation. Operate the CW - OFF - MCW switch to CW, set the receiver tuning dial for the high-end alignment frequency and adjust capacitor C-4E for zero beat (determined by listening with a headset to the receiver output). The change in the setting of C-4E should be very small.

(15) The operations described in the preceding 14 paragraphs complete the alignment of Radio Receivers BC-454-A (or -B) and BC-455-A (or -B).

The final operation on Radio Receiver BC-453-A (or -B) is to return the first (Z-1) and third (Z-3) i-f coupling units to their overcoupled condition by pushing down the protruding rod on each of these units. When the rods are all up, the receiver selectivity is increased to such an extent that the audio response is penalized for frequencies as low as 1500 cycles per second.

Replace and securely tighten all screws holding shields, covers, etc. These screws serve to reduce undesired electrical currents as well as to assemble the units.

20. SERVICING FAULTY TRANSMITTERS

a. ***Disassembly of Such Parts as May be Required for Servicing Faulty Transmitters***

(1) *Transmitter from the Rack*

Disconnect the antenna lead from the transmitter antenna binding post and

unscrew the two knurled nuts far enough to allow the lugs to be disengaged from the pointed studs. Slide the transmitter out of the rack.

(2) *Cover from Bottom of Chassis*

Remove the twelve bright screws around the bottom edge of the chassis and front panel.

(3) *Outer Shield*

Remove the nineteen bright screws around the edge of the shield. Lift the rear end up and slide it backward and off.

(4) *Shield over Master Oscillator Coil T-53 and Capacitor C-60*

The serial number and frequency range of the transmitter should be marked on the shield before it is removed. This is to make certain that it goes back onto the same unit, because the position of the screw on the left side (with blue paint) determines the inductance of the master - oscillator coil. The shield may be lifted off after the removal of twelve bright screws.

b. *Location of Faults in Transmitting Equipment*

(See Tables 8, 10, 12, 13 and 14 for normal conditions.)

After an operational failure has been traced to a particular transmitter or modulator unit, it should be removed from the equipment and given a bench test to discover the reason for failure. Test Set RC-55-A, shown on Figures 34 and 35, is very useful in servicing faulty transmitters, modulator units or other components of the radio set. The faulty unit and the test equipment should be connected as shown on Figures 34 and 35 and to a power supply which can be regulated to 28 volts ± 0.1 volt under the normal load conditions.

c. *Modulator Unit Faults*

Use a transmitter that is known to be in good condition. Tune it to one of the frequencies listed in Table 8 and attempt to obtain proper adjustments of the antenna inductance and coupling in the manner prescribed in Paragraph 11d. If it is impossible to obtain normal antenna current, look for the following indications of fault: (1) Subnormal input voltage. (2) Dynamotor not operating or running slowly. (3) Subnormal plate voltage. (4) Subnormal screen voltage. (5) Unusual oscillator plate current.

(1) If there is no input voltage, check the position of switch S-51 and test fuse F-51. If the input voltage is low, check the condition of the power source.

(2) If the dynamotor fails to run, test its supply circuit fuse F-50. If this is found to be good, exchange the dynamotor for one known to be in good condition. If it still does not operate, remove the bottom plate of the modulator unit and examine the contacts on relay K-50. If the dynamotor runs at low speed, try exchanging it with one known to be in good condition.

(3) If the plate voltage is low, it is possible that the dynamotor is at fault even though it appeared satisfactory in the foregoing tests. Try exchanging it with one known to be good. If plate voltage is entirely absent while the dynamotor runs in a normal manner, the fault may be due to an open plate supply circuit. Remove the dynamotor, close the telegraph key and check the continuity of the circuit between 3 on dynamotor receptacle J-51 and 10 on receptacle J-58. Check the operation of high-voltage relay K-52.

(4) Zero screen voltage indicates the necessity of a continuity check between terminals 10 and 12 on jack J-58.

(5) Unusual oscillator plate current may be due to faults in the voltage divider made up of resistors R-64 and R-65. A continuity check on J-58 between terminals 10 and 11 and between ground and terminal 11 will test these elements.

If normal voltages and currents and normal operation of the transmitter are found when operating on CW, try switching to TONE as a further check of the condition of the modulator unit. If normal sidetone is observed on TONE operation but the antenna current is below normal, the trouble is probably due to a fault in the modula-

tor tube or its associated circuits made up of T-52, R-59, R-60, C-54A, C-56A and C-56B. Try a new modulator tube and, if trouble still exists, make a continuity check of the modulator circuit elements.

If the transmitter operates normally on TONE but the voice sidetone is weak or absent and the antenna current on VOICE does not increase during speech, investigate the microphone circuit including T-51, R-54, R-55 and R-56. Check for a short-circuit in the sidetone circuit including sidetone winding T-52C.

d. *Transmitter Faults*

Test a faulty transmitter with Test Circuit RC-55-A shown on Figure 34, using dynamotor and modulator units known to be in good condition. Normal voltages but low plate currents probably indicate faulty transmitter tubes. If the oscillator plate current is low, it is probable that the amplifier plate current will also be low. Replace the oscillator tube before doing anything to the amplifier tubes.

CAUTION:— DO NOT OPEN THE COVER ABOVE THE AMPLIFIER TUBES WITHOUT FIRST SHUTTING DOWN THE EQUIPMENT. BE CERTAIN THAT THE DYNAMOTOR HAS STOPPED RUNNING. LOOK AT THE PLATE AND SCREEN VOLTMETERS.

If the antenna and plate currents are still low with a new oscillator tube and the amplifier tube voltages are normal, it is possible that one or both of the amplifier tubes is faulty. After shutting down the equipment, exchange these tubes for new ones. If the trouble still persists, remove the external connections to the transmitter and test the circuits for continuity in accordance with Table 12. Also check the continuity from terminal 7 of J-64 to the plate caps on tubes V-55 and 56 (Tube VT-136) and the circuit from terminal 4 of J-64 to the screen terminals of these same tubes.

e. *Transmitter Alignment Procedure*

The frequency dial of each transmitter is geared to both the oscillator variable capacitor and the power amplifier tank capacitor. The oscillator and amplifier circuits must therefore have exactly the proper inductance and capacitance for each frequency indicated by the dial. When the transmitters are manufactured, each of the inductances is properly adjusted by means of a movable iron dust core, and each of the capacitors is adjusted by means of a variable trimmer. An additional small trimmer capacitor, in parallel with the oscillator circuit, is available for service adjustment whenever new vacuum tubes are installed in the equipment. When such tube changes are made, the transmitter frequency dial should be set at its calibration frequency point, and this trimmer capacitor varied until the resonance indicator shows that the transmitter is in resonance with the calibration crystal.

After this procedure has been completed, if precision measurements indicate that certain transmitter frequencies are not within the limits of ± 0.05% of their indicated values, it may be necessary to realign the transmitter. There is little likelihood that this condition will arise unless a major replacement of transmitter parts has been necessary.

(1) Adjusting the Master-Oscillator Circuit

This adjustment can only be made in a properly equipped laboratory provided with precision frequency measuring equipment (such as a crystal oscillator and multivibrator coupled with a selective receiver, the output frequency of which will be the difference frequency between the transmitter and one of the multivibrator harmonics). In addition to the measuring equipment, a test circuit similar to that shown on Figure 34 should be employed for operating the transmitter.

First, remove outer shield A-50. Next, remove the oscillator shield A-55. Inspect the position of the rotor of capacitor C-60 and be sure that it is in the angular position indicated on the Practical Wiring Diagram for the transmitter in question when the adjusting arm is in its mid-position. With this capacitor rotor properly positioned, replace shield A-55.

CAUTION: — BEFORE APPLYING POWER TO THE TRANSMITTER, OBSERVE EXTREME CAUTION AS THE VOLTAGE BETWEEN THE PLATE CAPS OF TUBES VT-136 AND GROUND IS APPROXIMATELY 600 VOLTS. TO INSURE SAFETY, PROVIDE A SPECIAL SHIELD SIMILAR TO A-50 BUT WITH HOLES FOR ADJUSTING INDUCTANCE SCREWS E-58 AND E-59 AND ALSO FOR ADJUSTING THE ROTOR AND TRIMMER OF C-60.

Tune the transmitter at its highest indicated frequency and operate on CW for a warm up period of 5 minutes.

To align the oscillator circuit, proceed as follows:

(*a*) Be certain that the dial is set exactly on the highest operating frequency.

(*b*) Adjust the oscillator trimmer through guide E-62 to produce zero beat between the transmitter frequency and the appropriate multivibrator harmonic.

(*c*) If zero beat cannot be obtained in this manner, reset this trimmer to its mid-position and adjust the main rotor of C-60 until approximately zero beat is obtained. This may be done by loosening the screw in the slotted hole at the end of the adjusting arm and by carefully turning the rotor by means of a screwdriver inserted thru the hole in shield A-55. This must be very carefully done as only a slight movement of the rotor is sufficient to cause a relatively large frequency change.

(*d*) If necessary, readjust the trimmer to obtain zero beat.

(*e*) Set the transmitter dial near the low frequency end of the scale and tune it until zero beat is obtained with the standard frequency harmonic corresponding to the lowest dial frequency. Adjust the antenna to resonance.

(*f*) Observe the *exact* dial reading for this zero beat position.

(*g*) Change the position of the dial to the other side of the lowest frequency mark at a point about 1½ times as far from that mark as the position observed in step (f).

(*h*) Readjust *inductance* adjustment E-58 to obtain zero beat between the transmitter and the standard frequency.

(*i*) Reset the dial to the lowest frequency mark and restore zero beat by adjusting the trimmer portion of capacitor C-60.

(*j*) Retune the transmitter to the highest frequency and see if the beat note between the transmitter and the standard is less than 200 to 300 cycles.

(*k*) If this beat frequency exceeds the above limit, reset to zero beat by varying the trimmer portion of capacitor C-60 and proceed as before, using steps (b), (e), (f), (g), (h), (i) and (j).

(*l*) When the end frequencies have been adjusted in the above manner, set the dial at the calibration frequency and adjust to the calibration crystal as indicated by resonance indicator V-53 (Tube VT-138). (See Paragraph 11f(2).)

(2) Alignment of the Power Amplifier Circuit

With the oscillator properly aligned with the dial, check the oscillator and the amplifier tuned circuits for tracking in the following manner:

(*a*) Remove phantom antenna A-61-A.

(*b*) Tune the transmitter on CW to the highest frequency indicated on the dial and adjust C-67 (accessible under snap covers H-53 and H-54) until the amplifier plate current reaches its minimum value.

(*c*) Tune the transmitter to the low frequency end of the dial and note whether the amplifier plate current increases appreciably.

(*d*) If this current has risen more than 2 or 3 milliamperes, try adjusting the inductance of T-54A by means

of screw E-59 to find the position which provides minimum amplifier plate current.

(*e*) If the minimum current is within 5 milliamperes of the current first observed in step (d) reset the iron core (E-59) to its first position.

(*f*) If the amplifier plate current is decreased more than 5 or 6 milliamperes as the minimum is approached, continue moving the iron core in the same direction to a point the other side of the minimum, using about 1½ times as many turns of the adjusting screw as were necessary to obtain the minimum plate current.

(*g*) Readjust capacitor C-67 for minimum plate current.

(*h*) Return to the high frequency end of the dial and repeat step (b). This procedure should cause the plate current to be within 3 or 4 milliamperes of its minimum value at both ends of the frequency band.

21. MAINTENANCE OF DYNAMOTORS

a. *General*

(1) The dynamotors used in the transmitters and receivers of Radio Set SCR-274-N are manufactured by the General Electric Co., the Westinghouse Electric and Manufacturing Co. or by the Continental Electric Co. These machines are of the two bearing type and are totally enclosed. Ball bearings of the single shielded type are used which contain enough lubricant for long periods of operation. Each machine is electrically and dynamically balanced and is therefore quiet in operation. The weights of the dynamotors are given in Figures 28 and 30 and the ratings are given in Table 18.

(2) No special tools are required for ordinary care of the dynamotors. A 3½ inch cabinet screw driver and small pliers are enough for most maintenance or repair. Machines should be removed from service before attempting any maintenance.

b. *Routine Inspection*

If the equipment is operating satisfactorily, the dynamotor should rarely be touched. (In the case of the receiving equipment, one indication of unsatisfactory operation would be a high level of dynamotor noise.) Frequent sanding of commutators, manipulation of brushes, or excessive greasing is likely to do more harm than good. A uniform band of brown discoloration is an indication of normal operation and should not be removed. The dynamotors supplied with this equipment are provided with sealed ball bearings containing sufficient lubricant for 1,000 hours of operation. Hence, the routine inspection should consist of a check as to whether or not the brushes are free in their holders and of the removal of carbon or copper dust which may have accumulated in the vicinity of the commutators. For the receiving equipment, the inspection should include a check on the r-f and a-f noise attributable to the dynamotor.

c. *Transmitter Voltage Below Normal*

If the voltage of the transmitter dynamotor is below normal (see Table 10) remove the brushes and check each coil winding of the armature for an open circuit. This is accomplished by placing the prods of an ohmmeter on adjacent high-voltage commutator bars and continuing the test around the commutator. Ohmmeter prods must not be applied to that section of the commutator which normally comes in contact with the brushes. Similarly the field winding should be tested for a possible open circuit. Also tests should be made between the commutator and frame to be sure no grounds exist.

d. *Noise From Receiver Dynamotor*

The test for radio-frequency noise may be made by listening to the output of a receiver operated at maximum gain and comparing the noise output with that obtained with a dynamotor known to be satisfactory. After a little experience, it will be possible to distinguish dynamotor noise from other types, and a comparison dynamotor will not be necessary. If the equipment is not properly grounded to the metal fuselage, noise may be experienced even when the

dynamotor is operating satisfactorily. The test for audio-frequency noise may be made by operating the receiver at a minimum gain. If a loud low pitched tone is heard, it is indicative of commutator or armature trouble. In a normal dynamotor, the ripple will be so low that it can barely be noticed when a small amount of radio frequency noise is present. If the audio-frequency noise is loud, make certain that all brushes make good contact with the commutators and that the brushes slide easily in their slots. If the noise still persists, remove the brushes and check each coil winding of the armature for an open circuit. This is accomplished by placing the terminals of an ohmmeter on adjacent high-voltage commutator bars and continuing the test around the commutator. Ohmmeter prods must not be applied to that section of the commutator which ordinarily comes in contact with the brushes.

e. *Bearings and Lubrication*

(1) The single shielded bearings (0-1 on Figure 46 or 0-50 on Figure 51) are designed for long life but should be replaced if excessively noisy, loose on the shaft or not giving satisfactory operation. If the machines are normally overhauled after each 300 hours of operation, no lubrication should be required between overhauls.

(2) To lubricate bearings remove the end cover (A-17 or A-62) by cutting the safety wire on the end of the machine and removing two screws (H-19 or H-72), being careful not to lose the washers (H-21 or H-73). With the cover removed, first blow out loose dust and then take out the screws (H-11 or H-61) holding the end shield bearing retainer (H-12 or H-60). Remove the retainer, being careful not to lose any washers from the end of the shaft. Wipe out all available old and hardened grease with a toothbrush or other similar small brush and a clean cloth. Apply three or four drops of a light machine oil to the balls and repack the outer side of the bearing with a small amount of AN-G-15 grease. (Use AN-G-5 grease when high temperatures are encountered;) Add only enough grease to cover the bearing. Do not pack the bearing full. Keep dirt from entering the housing and do not allow grease or oil to get on the commutators. Replace any washers and then the end shield bearing retainer and cover. (Lubrication instructions are also printed on the inside of each end cover of the dynamotors.)

(3) If there is grit in the bearings and immediate replacement of the bearing is impracticable, the bearing may be left on the shaft and cleaned temporarily by removing the armature as outlined in Paragraph 21g, "Removal of Armature," which follows, and swishing the bearing back and forth in cleaning fluid, such as petroleum spirits, kerosene, gasoline or carbon tetrachloride, being careful not to insert the armature far enough into the fluid to permit the windings to become wet. After cleaning in this manner, shake off as much cleaning fluid as possible and then insert the bearing into a bath of light machine oil. Remove and allow to drain before repacking with grease as outlined above. Where this temporary cleaning method is employed the bearing should be replaced as soon as practicable thereafter

CAUTION:— FUMES FROM GASOLINE AND CARBON TETRACHLORIDE ARE HARMFUL WHEN BREATHED. OBSERVE THE USUAL PRECAUTIONS AGAINST FIRE IF GASOLINE IS USED.

(4) If bearings are to be replaced it will be necessary to remove the armature assembly (E-2 or E-85) as outlined in Paragraph 21g, "Removal of Armature." If a puller is not available to remove the bearing assembly (0-1 or 0-50), clamp the outer race firmly in a vice and drive the bearing off by holding a nail set or similar tool against the end of the shaft and tapping lightly with a hammer. Do not reuse a bearing that has been removed from the shaft. Note the position of the oil thrower (H-25 or H-70) and washers. If washers or oil thrower are in bad

condition, replace, omitting all washers behind the bearing. Place a spring washer (H-27 or H-86, neither shown) between bearing and bearing retainer at the H. V. end of the machine. Take up excessive end play by using the larger diameter washers (H-26 or H-85, furnished with all replacing bearings) between the outer ball race and retainer. Any shimming should be done by using washer shims in both ends and not putting all washer shims in one end. End play of approximately 0.015 inch maximum is permissible. Whenever a bearing is removed from its housing, the housing should be wiped with a clean dry cloth, the housing lubricated sparingly with light machine oil or ball bearing grease and both the housing and the bearing kept clean. The inner race goes on the shaft with a light press fit and some selection of bearings may be necessary to find one that is not loose on the shaft. The outer race should have a sliding fit in its housing. A small piece of pipe whose end is smooth and slightly larger than the shaft is useful in pressing a new inner race onto the shaft. In pressing the inner race on the shaft, be sure the race goes on the shaft squarely and does not bind. Do not exert pressure on the outer race of a bearing that is being put on the shaft. After replacing a bearing, reassemble and note that the armature revolves readily without binding.

(5) The tachometer shaft, used for remote tuning of the receiver, normally is not greased for the purpose of lubrication but is greased as a preventative measure against corrosion. There is no necessity for regular greasing of the shaft during maintenance procedure, as the original grease applied upon assembly should protect it for the life of the equipment. However, if the shaft should be difficult to turn from the control box, disconnect it from the receiver to determine whether the difficulty lies within the receiver or the shaft. If the trouble lies in the shaft, remove the shaft from the casing. Clean and inspect both the shaft and casing. If the shaft is not worn, apply a light coating of AN-G-25 grease to it, then reassemble. Also apply a light coating of grease on the gears associated with the shaft. CAUTION: DO NOT FILL THE CASING WITH GREASE.

f. *Commutator*

(1) A highly polished commutator surface is very desirable and a dark color should not be mistaken for a burned condition. If the surface is smooth and polished and the commutation satisfactory, it should be left alone. Slight sparking is not necessarily evidence of poor commutation. If the surface of a commutator becomes dirty, wipe with a clean cloth. If necessary, wipe with a cloth moistened with cleaning fluid such as petroleum spirits, kerosene or gasoline, followed by a dry cloth. Keep bearings and housing clean. It is recommended that the covers be removed and the dust and dirt blown out for each 300 hours of operation. This cleaning should include removing the brushes and wiping the inside of the brush holders (E-17, E-22 or E-76, E-77) and the external surfaces of the brushes (E-18, E-19, E-20, E-21 or E-29, E-30, E-81, E-82).

(2) If any mica of the undercut commutators extends up to the commutating surface, it should again be undercut. For turning down the commutator in a lathe or for extensive undercutting, the armature must be removed from the machine as outlined below.

g. *Removal of Armature*

Removal of the armature is accomplished as follows: Remove covers (A-17 or A-62) on both ends. Remove the brush holder caps (E-16, E-75 or E-78) and brushes (E-18, E-19, E-20, E-21 or E-79, E-80, E-81, E-82) on both the high voltage and low voltage ends of the machine, noting that each brush is marked so that it may be replaced in the same holder and in the same position in the holder. Blow loose dust and dirt from the end brackets and windings. Disconnect the leads from the field coils (L-16, L-53A, or L-53B) to the brush holders on the high voltage end at the brush holder terminal (E-22 or E-77). Remove the nuts (H-17 or H-63) on the clamp bolts (H-15 or H-65) at the high voltage end and remove the end brackets (A-15 or A-61) from that end. The armature (E-2 or E-85) may now be removed, if desired, after removing connections from the brush holder terminals. The end brackets are so arranged that they cannot be interchanged or replaced incorrectly.

h. *Brushes*

(1) Each brush is equipped with a flexible pigtail and spring of such design as to limit the rotation of the spring and pigtail to a minimum when replacing a brush cap. Brushes should be replaced when less than ¼ inch long, measured to the spring. The brush pressure is considered satisfactory if ¼ inch or more of the spring extends out of the holder when the brush hold-

er screw cap is removed and the end of the brush is touching the commutator. If the commutator is not too badly grooved, new brushes may be sanded in with a small strip of 4/0 sand paper slipped under the brush and pulled back and forth over a suitable arc of the commutator. The under surface of paper should be in contact with the end of the brush. To obtain proper fit, new brushes should be run in for several hours at no load or, preferably, at light load in the neighborhood of quarter load. It is desirable that the brushes be so seated that they have a 100% arc and at least 75% of their area in contact with the commutator. This requirement will be considered met if the electrical requirements are met.

(2) When brushes are removed for any reason, they should be put back in the same holder and in the same position in the holder. Brushes with polarity marks should be replaced so that polarity mark faces upward. Brushes may be removed or replaced by removing the cover and brush holder caps.

(3) It is very important that brush resistance be kept as low as possible, and in this connection it is necessary that the brush pigtails be in good condition and that the brushes be of the grade recommended by the manufacturer. If a brush pigtail is broken or loose in the brush or end cap, the current will have a tendency to go through the brush spring which will cause the spring to overheat, lose its temper and not give the proper brush pressure. A voltage drop due to resistance in the input side will result in a proportional voltage drop in the output of the machine.

i. *Tests of the Armature Windings*

A short circuit or open in the armature windings may be indicated in a number of different ways, such as the dynamotor not operating or operating at reduced speed, low output voltage, overheating, excessive arcing at the brushes, rapid wearing of the brushes or noise in the receiver. If facilities are available for making resistance measurements, a comparison of readings of the resistance between pairs of adjacent commutator bars, particularly on the high voltage end, would be of advantage. A reading between one pair of bars which is more than 7% higher or lower than the average of readings between other pairs of bars would indicate an open or short respectively.

SECTION V

SUPPLEMENTARY DATA

TABLE I

TROUBLE LOCATION AND REMEDY

Possible Cause	Correction
Dynamotor Stops or Fails to Start	
No d-c supply: Open or loose connection, condenser shorted.	Tighten connections, replace shorted condenser.
Brushes not seating properly: Dirty, sticking, worn.	Remove brushes from holders and clean thoroughly. Seat brushes with 4/0 sandpaper, replace worn brushes.
Poor commutation: Dirty commutator, oily, rough, high mica.	Clean commutator and brushes; if rough, turn commutator and undercut mica.
Worn bearings: Armature strikes pole faces, or connections.	Replace bearings.
Defective armature: Short, or open. (See Paragraph 21, i.)	Replace defective armature.
Excessive Arcing at Brushes	
Poor commutation: Rough, worn commutator, high mica.	Clean commutator and brushes; if rough, turn commutator and undercut mica.
Brushes not seating properly: Dirty, sticking, worn, twisted pigtail.	Remove brushes from holder, clean, untwist pigtail or replace brush assembly.
Brush spring defective: Weak.	Replace brush assembly.
Short between bars: Dirty (see Paragraph 21, i).	Clean slots or replace armature.
Open in armature coil: (See Paragraph 21, i).	Replace armature.
Rapid Wearing of Brushes	
Excessive arcing:	See "Excessive Arcing at Brushes" above.
High mica:	Turn commutator and undercut mica.
Dirty commutator: Grit.	Clean commutator and brushes.
Electrical Noise in Receiver	
Sparking at commutator:	See "Excessive Arcing at Brushes" above.
Loose connections:	Tighten connections.
Condenser shorted:	Replace condenser.
Excessive Noise and Vibration	
Armature striking internal wiring:	Rearrange internal wiring.
Armature striking pole faces:	Replace bearings.
Worn bearings:	Replace bearings.

TABLE 2

PRIMARY SUPPLY CURRENT

(Connect equipment as shown in cording diagram on Fig. 31)

	Amperes at 24 Volts	*Amperes at 28 Volts*
(1) Four transmitters and three receivers energized, one transmitter operating on TONE	13.2	14.7
(2) Same as (1) except one transmitter operating on CW	13.7	15.6
(3) Same as (1) except with emission switch on VOICE (Dynamotor DM-33-A not running)	8.0	8.8
(4) Two transmitters and three receivers energized, one transmitter operating on TONE	11.8	13.1
(5) Same as (4) except one transmitter operating on CW	12.3	14.0
(6) Same as (4) except with emission switch on VOICE (Dynamotor DM-33-A not running)	6.6	7.2
(7) Same as (4) but with telegraph key open	8.0	8.8
(8) Three receivers only, all energized	4.5	5.0
(9) Four transmitters only, all energized and one operating on TONE	8.6	9.7
(10) Same as (9) but with one operating on CW	9.1	10.4
(11) Heater current of four transmitters and modulator unit	3.6	4.1
(12) Two transmitters only, all energized and one operating on TONE	7.2	8.1
(13) Same as (12) but with one operating on CW	7.7	8.8
(14) Heater current of two transmitters and modulator unit	2.2	2.5

A variation of ± 10% in the above values may be expected due to differences in dynamotors, vacuum tubes, relay resistances and measuring equipment. See Table 18 for ratings of Dynamotors DM-32-A and DM-33-A.

TABLE 3

RESISTOR COLOR CODE

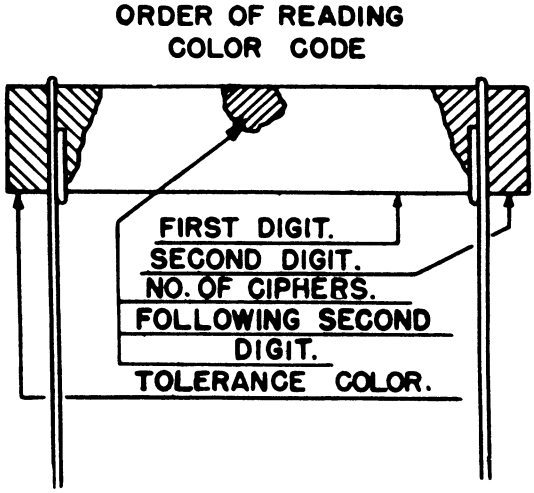
Carbon resistors are color coded by one of two methods to indicate the nominal resistance in ohms and the tolerance.

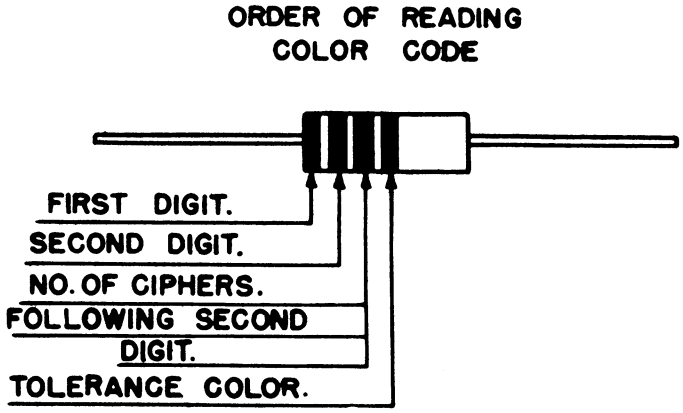
The first method is as follows: first digit is indicated by the body color, second digit by tip color, and the number of ciphers after the second digit by a dot painted on the body. A gold or silver colored tip, when used, indicates a tolerance of ± 5% and ± 10%, respectively.

The second method is as follows: four narrow rings are painted around the body, starting at one end. The color of the ring at the end represents

the first digit, the second ring the second digit, the third ring the number of ciphers after the second digit. The fourth ring indicates the tolerance, gold for ± 5% and silver for ± 10%.

0—Black	3—Orange	6—Blue
1—Brown	4—Yellow	7—Violet
2—Red	5—Green	8—Gray
		9—White





EXAMPLE: 360,000 ohms ± 5%: First method: orange body, blue tip, yellow dot, and a gold colored tip to represent the tolerance. Second method: orange, blue, yellow, and gold rings, starting at one end.

NOTE: These resistors increase in resistance with time and with the application of heat. Table 4 gives the acceptable operating tolerances for the carbon resistors used in this equipment.

TABLE 4

OPERATING TOLERANCES FOR CARBON RESISTORS

These resistors increase in resistance with time and temperature rise. The equipment will operate satisfactorily if the resistors are within the following tolerance ranges:

± 20%—R-1, R-3, R-4, R-6, R-9, R-12, R-15, R-16, R-17, R-21, R-52, R-53, R-54, R-55, R-56, R-57, R-58, R-59, R-60, R-64, R-66, R-67, R-68, R-69, R-70, R-72, R-73, R-74, R-75, R-77.

± 30%—R-5, R-10, R-11, R-14, R-18, R-51, R-61. R-76, R-78.

± 50%—R-2, R-7, R-8, R-13, R-19, R-20.

TABLE 5

CAPACITOR COLOR CODE

Molded mica capacitors of fixed capacitance, which are too small to be conveniently marked with capacitance values are color coded by the use of three dots. The colors represent the numbers listed below. Reading from left to right in the direction of the arrow, the capacitance in micromicrofarads is indicated by the following: first color, first digit; second color, second digit; third color, the number of ciphers after the second digit.

0—Black	3—Orange	6—Blue
1—Brown	4—Yellow	7—Violet
2—Red	5—Green	8—Gray
		9—White

EXAMPLE: 200 micromicrofarads: a red dot, a black dot, and a brown dot, reading from left to right.

When a tolerance is indicated, it is done by

means of a fourth colored dot, gold for ± 5% and silver for ± 10%.

Mica capacitors C-10, C-12, C-14, C-17, C-19, C-22, C-23, C-27, C-36, C-37, C-38 and C-59 are coded by means of colored lacquer to show their nominal capacitance. One long colored line or spot followed by two small colored lines or spots, arranged clockwise as seen from the top of the nut, indicate the nominal capacitance in micromicrofarads. Colors represent the numbers listed above except that the third line or spot represents the third digit instead of the number of ciphers after the second digit.

EXAMPLE: 180 micromicrofarads: a long brown line or spot followed clockwise on the nut by a gray line and a black line or spot. Each of these capacitors is subject to a manufacturing tolerance of ± 2.5 micromicrofarads; a capacitor coded as 180 may have any value between 177.5 and 182.5 micromicrofarads.

Silvered mica fixed capacitors enclosed in a small bell-shaped housing are used in many of the units in place of the assembled condensers described above. On these units, the color code consists of three paint spots arranged about 45° apart on the periphery of the housing on the side opposite the mounting screw. The significance of these spots is the same as those just described when read in the clockwise direction.

TABLE 6

SENSITIVITY

The r-f input required from a directly connected signal generator to obtain 10 milliwatts output (6.3 volts) with a 4,000 ohm resistive load is shown for six points in each of the radio receivers. The load resistance shall be connected to the test receiver only, and the output circuit of this receiver shall be isolated from the headsets and output circuits of other receivers. The frequencies at which the measurements must be made are in parenthesis. Input voltage, 28 volts. Sensitivity values are in microvolts, modulated 30 per cent at 400 cps.

Radio Receiver	*Ant. Bind. Post*	*R-F Control Grid, Socket Term. #4*	*Mixer Control Grid, Top cap*	*Mixer Control Grid, Top cap*	*First I-F Control Grid, Socket Term. #4*	*Second I-F Control Grid, Socket Term. #4*
BC-453-A (or -B) (190-550 kc)	20 (550 kc)	90 (550 kc)	600 (550 kc)	470 (85 kc)	11,000 (85 kc)	117,000 (85 kc)
BC-454-A (or -B) (3-6 mc)	20 (6 mc)	140 (6 mc)	550 (6 mc)	430 (1415 kc)	3,000 (1415 kc)	110,000 (1415 kc)
BC-455-A (or -B) (6-9.1 mc)	25 (9.1 mc)	180 (9.1 mc)	670 (9.1 mc)	550 (2830 kc)	3,000 (2830 kc)	88,000 (2830 kc)

This table of sensitivities is for use as a guide in servicing the receivers. It applies to undamaged and perfectly aligned receivers under reasonable climatic conditions. Microvolt values shown are to be regarded as average; they are to be approximated when adjusting the equipment after overhaul or long service. Departures from these values are not necessarily cause for major operations on the equipment. The values should be employed with caution and discretion, particularly in the case of measurements carried out under extreme conditions of temperature or humidity. A signal generator whose accuracy is not definitely known and a set of vacuum tubes which are not average may produce results varying considerably from those shown in the table.

TABLE 7

SELECTIVITY

The selectivity of a radio receiver is that characteristic which determines the extent to which it is capable of differentiating between the desired signal and disturbances of other frequencies. To measure this characteristic, proceed as follows:

1—With Radio Receiver BC-453-A (or -B) and a signal generator, both tuned to 190 kc, adjust the generator output to obtain a receiver output of 10 milliwatts into a 4000-ohm resistive load. Use 30 percent modulation, 400 cycles.

2—Increase the voltage of the signal generator to twice (2X) the value obtained above.

3—Increase the generator frequency until the receiver output decreases to 10 milliwatts. Record the frequency change.

4—Without changing the generator output, decrease the generator frequency, passing through 190 kc, until the receiver output is again 10 milliwatts. Record the difference between this frequency and 190 kc.

5—The average value of the two values obtained in steps 3 and 4 should approximate 1.7 kc, as indicated in the following table. Additional data on the selectivity characteristic of Radio Receiver BC-453-A (or -B) may be obtained by using generator outputs of 10 times (10X), 100 times (100X), 1000 times (1000X), etc., the value obtained in step 1 and repeating steps 3, 4 and 5.

Data on Radio Receivers BC-454-A (or -B) and BC-455-A (or -B) are obtained as outlined above, using the proper reference frequencies as given below.

Radio Receiver	Ref. Freq.	MCW Selectivity			
		2X	10X	100X	1000X
BC-453-A (or -B) (190-550 kc)	190 kc	1.7 kc	3.1 kc	4.3 kc	5.5 kc
BC-454-A (or -B) (3-6 mc)	3 mc	7.5	12.5	18.6	25.8
BC-455-A (or -B) (6-9.1 mc)	6 mc	9.8	24.2	42.2	70.6

The above table is presented for use as a guide in servicing receivers. It applies to undamaged and perfectly aligned receivers, under reasonable climatic conditions. These values are to be regarded as average, to be approximated when adjusting the equipment after overhaul or long service. Departures from these values are not necessarily cause for major operations on the equipment. The values should be employed with caution and discretion, particularly in the case of measurements carried out under extreme conditions of temperature or humidity, or with a signal generator whose accuracy is not definitely known.

TABLE 8

TYPICAL TEST DATA ON TRANSMITTERS

Input Voltage 28.0 volts, Antenna A-61-A (5 ohms, 100 mmf.), transmitter tuning and coupling adjusted for maximum antenna current on CW. The transmitter must not be readjusted for TONE or VOICE measurements:

Transmitter	*Frequency (mc)*	*Emission*	*Plate Voltage to R-F Power Amp. Tubes*	*Screen Voltage to R-F Power Amp. Tubes*	*Plate Current to R-F Power Amp. Tubes*	*Plate Current To M.O. Tube*	*Antenna Current Into Antenna A-61-A*	*Setting of ANT. INDUCT-ANCE Control*	*Setting of ANT. COUP-LING Control*
	3.0	CW	518	265	165	19.5	2.2	11.4	5.7
	3.0	TONE	535	150	95	20.5	1.5	11.4	5.7
BC-696-A	3.0	VOICE	535	150	92	20.5	1.1	11.4	5.7
	4.0	CW	515	262	175	17.8	2.5	7.0	6.0
	4.0	TONE	530	150	102	18.5	1.6	7.0	6.0
	4.0	VOICE	530	160	100	18.5	1.4	7.0	6.0
	4.0	CW	530	267	165	20	2.5	10.8	5.8
	4.0	TONE	547	154	95	21	1.8	10.8	5.8
BC-457-A	4.0	VOICE	547	154	91	21	1.4	10.8	5.8
	5.3	CW	520	262	170	18	2.8	6.8	6.0
	5.3	TONE	545	154	98	19	2.0	6.8	6.0
	5.3	VOICE	545	154	98	19	1.6	6.8	6.0
	5.3	CW	530	275	167	20	2.7	10.7	3.8
	5.3	TONE	552	154	94	21	1.9	10.7	3.8
BC-458-A	5.3	VOICE	552	154	91	21	1.5	10.7	3.8
	7.0	CW	522	270	177	18	3.0	6.1	3.9
	7.0	TONE	545	154	103	19	2.2	6.1	3.9
	7.0	VOICE	545	154	100	19	1.8	6.1	3.9
	7.0	CW	525	273	167	19	2.8	6.5	4.5
	7.0	TONE	547	154	97	20	2.0	6.5	4.5
BC-459-A	7.0	VOICE	547	154	94	20	1.6	6.5	4.5
	9.1	CW	520	274	179	18	3.1	3.4	4.6
	9.1	TONE	545	154	102	19	2.2	3.4	4.6
	9.1	VOICE	545	154	98	19	1.8	3.4	4.6

TABLE 8 (Cont'd)

TYPICAL TEST DATA ON TRANSMITTERS

Transmitter sidetone voltage across 4,000 ohms (Use Output Meter Model 571, Type 3A, part of Test Set I-56-A).

TONE and CW: 7 to 9 volts.

VOICE: 15 volts for loud sustained tone in Microphone T-17 or approximately 20 volts with maximum modulation at 1,000 cycles per second.

Microphone T-17 current: 60 to 62 milliamperes dc.

If the test conditions specified above this table are followed precisely, variations of ± 5% in voltages and ± 10% in currents may be considered satisfactory. If the test conditions have been carefully met, and the results fall outside of these limits, important consideration should be given to the seriousness of the discrepancy or discrepancies before the equipment is considered unsatisfactory.

It is recommended that one or more sets of tubes, specially marked "average" or "standard," be set aside for checking units found to be outside the specified limits.

An example of the results of testing a normal Radio Transmitter BC-459-A under a different set of conditions follows: Input voltage 27.6, frequency 8 mc, antenna resistance 1 ohm, antenna capacitance 108 mmf., the transmitter tuning and coupling adjusted for maximum antenna current on CW and not readjusted for TONE or VOICE measurements. Antenna current in CW, TONE and VOICE positions 4.8, 3.4 and 2.8 amperes, respectively. The r-f power amplifier plate current is 212, 122, and 118 milliamperes, respectively, for the three positions. A comparison of these figures with those in the above table will demonstrate the importance of observing standard test conditions.

TABLE 9

VACUUM TUBE TERMINAL VOLTAGES IN THE RECEIVERS

(Use Test Set RC-54-A and d-c voltmeter from Test Set I-56-A)

Input voltage, 28 volts. Receiver operating on CW, maximum gain condition. Variations of ± 10% from the following values may be expected due to differences in tubes, resistors, dynamotors and measuring equipment. Some terminals are accessible only with a bent voltmeter prod. Points which connect directly to inaccessible terminals may be located by referring to the wiring diagrams, Figures 37, 38 and 39. Plate and screen voltages in the following table must be measured with a voltmeter having a resistance of 600,000 ohms. The voltage at terminal 6 on tube V-7 (Tube VT-133) is zero while operating on MCW; all other voltages remain the same.

*Terminal	V-3 (Tube VT-131) R-F Amp.	V-4 (Tube VT-132) Mixer	V-5 (Tube VT-131) First I.F.	V-6 (Tube VT-131) Second I.F.	V-7 (Tube VT-133) Detector CW Osc.	V-8 (Tube VT-134) Audio Amp.
1	0	0	0	0	0	0
2	0	14	14	0	**No Test	28
3	4	240	4	3.7	0	240
4	0	85	0	0	0	240
5	4	**No Test	4	3.7	0	0
6	85	***30-50	85	85	***50-80	.....
7	14	28	28	14	14	14
8	240	4	240	240	0	17
Top cap	.....	0	.....	.....	.....	.....

* The tube terminals are numbered clockwise when viewed from the bottom, beginning with the locating pin.

** A small d-c voltage exists between this terminal and ground under oscillating conditions, but application of the voltmeter may stop oscillations, resulting in unreliable voltmeter readings.

*** The voltage between this terminal and ground will vary with the frequency range of the receiver.

TABLE 10

VACUUM TUBE TERMINAL VOLTAGES IN THE MODULATOR UNIT AND TRANSMITTERS

(Use Test Set RC-55-A and d-c voltmeter from Test Set I-56-A)

Input voltage, 28 volts. Variations of ± 10% from the following values may be obtained due to differences in tubes, transmitters, dynamotors, and measuring equipment. Transmitter connected to Antenna A-61-A and tuned according to instructions on Figure 34.

Socket *Terminal	V-50 (Tube VT-135) Tone Osc.			V-51 (Tube VT-136) Modulator			V-52 (Tube VT-139) Voltage Regulator			Crystal			***V-53 (Tube VT-138) Resonance Indicator			V-54 (Tube VT-137) Master Osc.			V-55 (Tube VT-136) R-F Amp.			V-56 (Tube VT-136) R-F Amp.		
	Tone	CW	Voice	Tone	CW	Voice	Tone	CW	Voice	Tone	CW	Voice	Tone	CW	Voice	Tone	CW	Voice	Tone	CW	Voice	Tone	CW	Voice
1	..	..	..	28	28	28	..	..	..	0	0	0	0	0	0	..	..	..	14	14	14	28	28	28
2	14	14	14	..	..	..	0	0	0	..	..	..	28	28	28	14	14	14	545	525	545	..	..	..
3	115	115	55	124	137	130	..	125	..	0	0	0	50	50	50	193	190	193	150	270	150	150	270	150
4	..	..	..	0	0	0	..	..	..	..	..	..	128	128	128	193	190	193	-50	-50	-50	-50	-50	-50
5	**	**	0	0	23	0	150	270	150	-50	-50	-50	0	0	0	**	**	**	150	270	150	545	525	545
6	..	..	..	10	25	10	..	..	..	..	..	..	193	190	193	..	..	..	0	0	0	0	0	0
7	0	0	0	14	14	14	..	..	..	0	0	0	14	14	14	0	0	0	0	0	0	14	14	14
8	0	0	0	..	..	..	..	..	..	0	0	0	****	****	****	0	0	0	..	..	..	..	..	..
Top Cap	..	..	..	520	525	520	..	..	..	..	..	..	..	..	..	..	..	..	545	525	545	545	525	545

*The tube terminals on all tubes except V-51, V-55 and V-56 (Tube VT-136) are numbered clockwise when viewed from the bottom, beginning with the locating pin. Base connections on tubes V-51, V-55 and V-56 (Tube VT-136) are numbered clockwise when viewed from the bottom, beginning with the more clockwise of the two large pins.

**A small d-c voltage exists between terminal 5 and ground under oscillating conditions. The application of the voltmeter may stop oscillations, resulting in unreliable voltmeter readings. The application of the voltmeter to either heater terminal (2 and 7) on tube V-54 (Tube VT-137) may stop oscillations; the test should be made quickly to avoid damage to the equipment.

***Plate voltage (terminal 3) measured on 600 volt scale of the 600,000-ohm voltmeter. Master-oscillator frequency is not equal to crystal frequency for these measurements; when it is, the voltage at terminal 3 is approximately 20 volts.

****8 volts for Radio Transmitters BC-457-A, and BC-458-A; 6.2 volts for Radio Transmitters BC-459-A and BC-696-A.

TABLE 11

RESISTANCE TO GROUND FROM RECEIVER TERMINALS

Resistance to ground in ohms from all socket and receptacle terminals in the receivers. Use ohmmeter in Selective Analyzer Model 665, Type 2, part of Test Set I-56-A. Disconnect the receiver from the rack. Remove adapter and dynamotor.

Terminal	V-3 (Tube VT-131) R-F Amp.	V-4 (Tube VT-132) Mixer	V-5 (Tube VT-131) 1st I.F.	V-6 (Tube VT-131) 2nd I.F.	V-7 (Tube VT-133) Det.-CW Osc.	V-8 (Tube VT-134) Audio Amp.	J-1	J-2	J-3
1	0	0	0	0	0	0	300,000	0	0
2	0	8	8	0	51,000* 100,000*	8	0	8	330
3	300,000	14,000	300,000	510	0	15,000	H	14,000	300,000
4	H	7,000	100,000	100,000	510,000	14,000	330	—	314,000* 116,000*
5	300,000	52,000	300,000	510	0	2,000,000	314,000* 116,000*	—	7,000
6	7,000	520,000* 210,000*	7,000	7,000	334,000* 121,000*	H	8	—	H
7	8	8	8	8	8	8	H	—	14,000
8	14,000	620	14,000	14,000	0	1,500	H	—	—
Top Cap	—	**	—	—	—	—	—	—	—

*Upper value is for Radio Receiver BC-453-A (or -B), and lower is for Radio Receivers BC-454-A (or -B) and BC-455-A (or -B).

**Not over 20 ohms (the resistance of L-3).

NOTES: H signifies over 2 megohms, the practical limit of the ohmmeter. The value of 300,000 appears in several places; this is the leakage resistance of C-5. Apply positive lead of ohmmeter to C-5 and negative to ground for consistent results.

The resistance to ground from each terminal in Radio Control Boxes BC-450-A, BC-496-A and BC-473-A (or -B) (all switches in mid-position), the receiver rack, and Adapter FT-230-A is either 0 or H as follows:

J-4, all H; J-6, J-7, all H except 3; J-18, J-19, J-20, all H except 1; J-21, J-22, J-23, all H except 4; J-24, all H except 2, and J-25, J-26, J-27, all H except 3 and 4 (INCREASE OUTPUT control at maximum).

TABLE 12

RESISTANCE TO GROUND FROM TRANSMITTER TERMINALS

Resistance to ground in ohms from all socket and receptacle terminals in the transmitters. Use ohmmeter in Selective Analyzer Model 665, Type 2, part of Test Set I-56-A. Remove transmitter from rack.

Terminal	*Crystal*	*V-53 (Tube VT-138) Res. Ind.*	*V-54 (Tube VT-137) Master Osc.*	*V-55 (Tube VT-136) R-F Amp.*	*V-56 (Tube VT-136) R-F Amp.*	*J-64*	
1	0	0	H	4.7	7	0	
2	H	7	7	H	H	15,000	
	5,100						
						10,000	
H	H	H	H		3	*15,000	H
						5,100	
H	15,000	15,000	H		4	H	H
							5,100
							10,000
51,000	H	H	119		5	15,000	*15,000
							5,100
H	51,000	51,000	7		6	H	H
0	0	4.7	H		7	0	7
0	—	—	—		8	0	300
—	H	H	—		Top Cap	—	—

dio Transmitters BC-696-A, BC-457-A, BC-458-A and

*Values shown correspond to Ra
BC-459-A, respectively.

ıms, the practical limit of the ohmmeter. The resistance
Radio Control Box BC-451-A, Antenna Relay Unit BC-
442-A and the transmitter rack is either 0 or H as follows:

NOTES: H signifies over 2 megol
to ground from each terminal in

J-55, all H except 2, 7, 12; J-56, both H; J-59, all H except 5; J-60, all H except 3; J-61, all H except 3; J-62, all H except 1; J-63, all H except 1.

TABLE 13

RESISTANCE TO GROUND FROM MODULATOR UNIT TERMINALS

Resistance to ground in ohms from all socket and receptacle terminals in the modulator unit. Use ohmmeter in Selective Analyzer Model 665, Type 2, part of Test Set I-56-A. Remove dynamotor and all plugs before testing.

Terminal	V-50 (Tube VT-135) Tone Osc.	V-51 (Tube VT-136) Mod.	V-52 (Tube VT-139) Volt. Reg.	J-51	J-52	J-53	J-54	J-58
1	H	17	H	0	H	H	H	H
2	12	H	H	H	H	0	H	H
3	125,000	30,000	H	105,000	0	H	H	220

TABLE 13 (Cont'd)

RESITANCE TO GROUND FROM MODULATOR UNIT TERMINALS (Cont.)

Terminal	V-50 (Tube VT-135) Tone Osc.	V-51 (Tube VT-136) Mod.	V-52 (Tube VT-139) Volt. Reg.	J-51	J-52	J-53	J-54	J-58
4	H	900	H	—	H	—	H	17
5	100,000	52,000	120,000	—	200	—	H	0
6	H	52,000	H	—	17	—	H	H
7	0	12	H	—	—	—	0	H
8	23	—	H	—	—	—	400	H
9	—	—	—	—	—	—	220	H
10	—	—	—	—	—	—	H	90,000
11	—	—	—	—	—	—	H	82,000
12	—	—	—	—	—	—	212	110,000
13	—	—	—	—	—	—	51,000	—
14	—	—	—	—	—	—	50	—
15	—	—	—	—	—	—	17	—
16	—	—	—	—	—	—	H	—
17	—	—	—	—	—	—	H	—
18	—	—	—	—	—	—	H	—
Top Cap	—	106,000	—	—	—	—	—	—

NOTE: H signifies over 2 megohms, the practical limit of the ohmmeter.

TABLE 14

CONTINUITY TESTS

Dynamotors, Relays, Chokes and Transformers

Use Ohmmeter in Selective Analyzer Model 665, Type 2, part of Test Set I-56-A. Disconnect each major unit under test from the remaining equipment before making the following continuity tests.

Continuity Through	*Approximate Resistance in ohms*
Adjacent commutator segments, L.V. side of Dynamotor DM-32-A	0.3
Adjacent commutator segments, H.V. side of Dynamotor DM-32-A	22
Shunt field coil of Dynamotor DM-32-A	200
Adjacent commutator segments, L.V. side of Dynamotor DM-33-A	0.04
Adjacent commutator segments, H.V. side of Dynamotor DM-33-A	10
Shunt field coil of Dynamotor DM-33-A	80
Series field coil, L.V. side of Dynamotor DM-33-A	less than 0.1

TABLE 14 (Continued)

CONTINUITY TESTS

Continuity Through	*Approximate Resistance in ohms*
K-1, K-2, K-3 in parallel, as measured between terminals 5 and 6 on J-6 or J-7, is 107 ohms	321, each coil
K-50, terminals 12 to 15 on J-54	200
K-51, K-52 in parallel, as measured between terminals 9 and 15 on J-54, is 200 ohms	400 each coil
K-53, K-54 in parallel, as measured between terminals 5 and 6 on J-64, is 112 ohms	(300 for K-53 coil (180 for K-54 coil
K-55, terminals 1 to 4 on J-61	180
L-14, terminal 7 on J-1 to 6 on J-3	less than 0.1
L-15, terminal 3 on J-2 to 7 on J-3	325
L-50, terminal 1 or 3 on J-53 to 2 on J-51 (hold K-50 closed)	less than 0.1
L-51, terminal 3 on J-51 to terminal on C-55	67
RL-50, RL-51, across each unit	less than 1
T-1, primary, terminals 1 to 2 on T-1	1200
T-1, secondary, terminal 3 on T-1 to ground	330
T-50, terminals 1 to 4 on T-50. Same as C-51A to terminal 11 on J-54 with K-51 closed	70
T-50, terminal 6 to ground	5.5
T-51, terminals 1 to 2 on T-51. Same as C-54B to terminal 8 on J-54	25
T-51, terminals 3 to 4 on T-51. R-56 must be disconnected or test will show 300 ohms	327
T-52, terminals 1 to 2 on T-52	1000
T-52, terminals 3 to 4 on T-52 (R-62 may be left across this coil with little effect)	208
*T-52, terminal 6 to ground (the resistance of this winding was altered during production from 70 ohms to 48 ohms)	48 or 70

*In Modulator Unit BC-456-B, the resistance is 60 ohms.

TABLE 15

CAPACITOR TESTS

Use Capacity Unit Model 666, Type 2, with Selective Analyzer Model 665, Type 2, from Test Set I-56-A. Disconnect major unit (receiver, transmitter, etc.) under test from remaining equipment. The following table gives the normal "apparent" capacitance of each paper or electrolytic capacitor in the equipment. The apparent capacitance will be different from the nominal in those cases where the capacitor is shunted by a resistor or inductor. To obtain the true capacitance, it will be necessary to disconnect all leads to the capacitor. The values shown must be considered as approximations only because of production variations in the elements, and line voltage variations which affect the measuring equipment.

Capacitor	*Apparent Capacitance (mf)*	*Capacitor*	*Apparent Capacitance (mf)*	*Capacitor*	*Apparent Capacitance (mf)*
C-5	3.0	C-16B	2.0	C-53	1.2
C-6A	3.3	C-16C	greater than 10	C-54A	4.2
C-6B	3.0	C-20A	2.3	C-54B	greater than 10
C-6C	1.8	C-20B	0.01	C-55	1.3
C-7A	0.7	C-20C	3.1	C-56A	0.6
C-7B	2.3	C-30	greater than 10	C-56B	0.6
C-7C	0.06	C-32	3.0	C-57	0.08
C-15A	0.08	C-51A	0.07	C-58A	0.05
C-15B	1.8	C-51B	greater than 10	C-58B	0.05
C-15C	0.07	C-51C	greater than 10	C-58C	0.15
C-16A	0.4				

TABLE 16

VACUUM TUBE DATA

Values shown are "Characteristic Ratings" for the type of tube; these are not necessarily the values used in this equipment.

Type	*Tube VT-131*	*Tube VT-132*	*Tube VT-133*	*Tube VT-134*	*Tube VT-135*	*Tube VT-136*	*Tube VT-137*	*Tube VT-138*	*Tube VT-139*
Function in this equipment	*R-F and I-F Amp.*	*Mixer*	*Det. & CW Osc.*	*Audio Amp.*	*Tone Osc.*	*Mod. & R-F Power Amplifier*	*Master Osc.*	*Resonance Indicator*	*Voltage Regulator*
Heater Voltage	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	—
Heater Current	0.15	0.15	0.15	0.15	0.15	0.45	0.25	0.15	—
Control Grid Voltage	—3.0	—3.0	—9.0	—12.5	—8.0	—29.0	—32.0	—	—
Plate Voltage	250	250	250	250	250	600	250	200	—
Screen Grid Voltage	100	100	—	250	—	300	—	—	—
Plate Current	9.2	2.5	9.5	30	9.0	42	25	—	—
Screen Grid Current	2.4	6.0	—	3.5	—	Approx. 1.0	—	—	—
Transconductance (micromhos)	2000	3000 (Triode)	1900	3000	2600	—	2000	—	—
Plate Resistance	0.8 megohm	0.6 megohm (hexode)	—	70,000	7700	—	2500	—	—
Amplification Factor	1600	Conversion conductance, 350 micromhos	16	210	20	8 (G-Gs)	5	0.19 ma with target - to - plate resistor of one megohm, 3 ma to target. Shadow angle 90° for grid bias of 0 volts and 0° for grid bias of —6.5 volts.	Starting voltage 180 dc. volts, operating 150 dc. volts (approximately). Operating current 5 ma dc. min. and 30 ma dc. max.
				2.8 watts power output into 7500 ohms, 7% total harmonic distortion		25 watts on plate and 3.5 watts on screen grid, max. allowable dissipation			
*Base Connections #1	Shell (S)	Shell (S)	Shell (S)	Shell (S)	—	Heater (H)	—	—	—
#2	Heater (H)	Heater (H)	Control Grid (G)	Heater (H)	Heater (H)	—	Heater (H)	Heater (H)	Cold Cathode (K)

TABLE 16 (Continued)

VACUUM TUBE DATA

Type		*Tube VT-131*	*Tube VT-132*	*Tube VT-133*	*Tube VT-134*	*Tube VT-135*	*Tube VT-136*	*Tube VT-137*	*Tube VT-138*	*Tube VT-139*
Function in this equipment		*R-F and I-F Amp.*	*Mixer*	*Det. & CW Osc.*	*Audio Amp.*	*Tone Osc.*	*Mod. & R-F Power Amplifier*	*Master Osc.*	*Resonance Indicator*	*Voltage Regulator*
*Base Connections	#3	Suppressor Grid (Su)	Plate (hexode) (P)	Cathode (K)	Plate (P)	Plate (P)	Screen grid (Gs)	Plate (P)	Plate (P)	Jumper to 7
	#4	Control Grid (G)	Screen Grid (hexode) (Gs)	Diode Plate (2) (Dp2)	Screen Grid (Gs)	—	Control Grid (G)	—	Target (TA)	—
	#5	Cathode (K)	Control Grid (osc) and grid #1 hexode (Go)	Diode Plate (1) (Dpl)	Control Grid (G)	Control Grid (G)	—	Control Grid (G)	Control Grid (G)	Anode (AN)
	#6	Screen Grid (Gs)	Plate (osc) (Po)	Plate (Triode) (P)	—	—	Cathode (K)	—	—	—
	#7	Heater (H)	Heater (H)	Heater (H)	Heater (H)	Heater (H)	Heater (H)	Heater (H)	Heater (H)	Jumper to 3
	#8	Plate (P)	Cathode (K)	Heater (H)	Cathode (K)	Cathode (K)	—	Cathode (K)	Cathode (K)	—
Top Cap		—	Control grid (hexode) (G)	—	—	—	Plate (P)	—	—	—
**R.M.A. Type		12SK7	12K8	12SR7	12A6	12J5-GT	1625	1626	1629	VR-150-30
**Bulb		Metal Shell MT-8	Metal Shell MT-8	Metal Shell MT-8	Metal Shell MT-8	T-9	ST-16	ST-12	T-9	ST-12
**Cap		—	Miniature	—	—	—	Small metal	—	—	—
**Base		Small wafer octal 8-pin	Small wafer octal 8-pin	Small wafer octal 8-pin	Small wafer octal 7-pin	Interme-diate Shell octal 6-pin	Medium 7-pin	Small shell octal 8-pin	Small shell octal 7-pin	Small shell octal 6-pin

TABLE 16 (Continued)

VACUUM TUBE DATA

*Base connections are numbered clockwise when viewed from the bottom, beginning with the locating pin, except for Tube VT-136. This tube has a medium 7-pin base on which the numbering proceeds clockwise from the embossed arrow (clockwise from the more clockwise of the two large pins when viewed from the bottom).

**Radio Manufacturer's Association standard designation.

NOTE: Keys on the tube bases vary somewhat in size, with the result that occasionally a tube may be found which can be jammed part way down into the socket with incorrect pin orientation. Line up, visually or by feel, the key on the tube base with the keyway of the socket before exerting any considerable pressure on the tube.

TABLE 17

EMISSION TESTS ON VACUUM TUBES

An emission test may be made on all tubes in Radio Set SCR-274-N, except Tube VT-139, with Tube Checker Model 685, Type 2, part of Test Set I-56-A.

Tube	*Filament Selector*	*Tube Selector*	*IN Position*
VT-131	8	42	B, C, F, G
VT-132	8	44	B, C, D, E, F
VT-133 Triode	8	41	B, F Use Adapter D-70180
Diode	8	0	C, D Use Adapter D-70180
VT-134	8	42	B, C, D
VT-135	8	42	B, D
VT-136	8	43	C, D, E
VT-137	8	41	B, D
VT-138	8	37	B, C, D. Screen will not light.
VT-139	Cannot be tested on this tube checker. An operating test would consist of measuring the screen grid voltage on R-F power amplifier Tubes VT-136 with VOICE emission. It should be 150 + 10 volts or − 5 volts.		

NOTE: All tubes should be given an operating test under working conditions in Radio Set SCR-274-N. There are many possible faults in tubes which a simple emission test will not discover.

TABLE 18

DYNAMOTOR RATINGS

Dynamotor	*Duty*	*Input*		*Output*	
		Amperes	*Volts*	*Milliamperes*	*Volts*
DM-32-A	*Continuous	1.1	28	60	250
DM-33-A	*Continuous	5.0	28	160	575
DM-33-A	**Intermittent	7.0	28	250	540

*60° C. temperature rise by change-in-resistance method.

**40 seconds on and 20 seconds off.

TABLE 19

PLUGS AND CORDAGES REQUIRED TO ASSEMBLE CORDS FOR RADIO SET SCR-274-N

(See Figure 31 for Cording Diagram and Figure 32 for Drawings of Cord Assemblies)

Cord		*Plugs*			*Cordage*		*W. E. Co. Assembly Dwg. No.**
Use	*Stock Number*	*Designation*	*Stock Number*	*W. E. Co. Part No.*	*Designation*	*W. E. Co. Part No.*	
Primary power supply to receiver Racks FT-233-A, FT-227-A, FT-220-A or FT-264- (1 required)	3E2204	PL-147 or PL-147-A Nut M-232 Ferrule M-231 (1 each req'd per cord)	2Z7226-147 2Z3261-232 2Z3259-231	6578 9127 7546 6780	CO-204	6712	7547
Primary power supply to Modulator Unit BC-456-A (or -B) (1 required)	3E2204	PL-148 or PL-148-A Nut M-232 Ferrule M-231 (1 each req'd per cord)	2Z7226-148 2Z3259-232 2Z3259-231	6965 9126 7546 6780	CO-204	6712	7548
Modulator Unit BC-456-A (or -B) to receiver Racks FT-233-A, FT-227-A, FT-220-A or FT-264- (1 required)	3E2205	PL-151 or PL-151-A (2 required per cord)	2Z7226-151	6784 9123	CO-205	6794	5808
Receiver radio control box to Racks FT-233-A (1 req'd.), FT-227-A (2 req'd.), FT-220-A (3 req'd.) or FT-264- (4 required)	3E2206	PL-152 or PL-152-A (2 required per cord)	2Z7226-152	6577 9125	CO-206	6711	6693
Modulator Unit BC-456-A (or -B) to transmitter Radio Control Box BC-451-A (1 required)	3E2207	PL-153 or PL-153-A (2 required per cord)	2Z7226-153	6963 9121	CO-207	6796	7538

TABLE 19 (Continued)

PLUGS AND CORDAGES REQUIRED TO ASSEMBLE CORDS FOR RADIO SET SCR-274-N

Cord		*Plugs*			*Cordage*		*W. E. Co. Assembly Dwg. No.**
Use	*Stock Number*	*Designation*	*Stock Number*	*W. E. Co. Part No.*	*Designation*	*W. E. Co. Part No.*	
Modulator Unit BC-456-A (or -B) to transmitter Racks FT-234-A, FT-226-A, FT-276- or FT-331-A (1 required)	3E2210	PL-154 or PL-154-A (2 required per cord)	2Z7226-154	6964 9122	CO-210	6795	5804
Antenna Relay Unit BC-442-A (or -AM) to Racks FT-234-A, FT-226-A, FT-276- or FT-331-A (1 req'd.)	3E2205	PL-156 or PL-156-A (2 req'd. per cord)	2Z7226-156	6967 9124	CO-205	6794	5810
Radio Control Box BC-451-A to Ammeter I-71-B** (1 req'd.)	3E2211	PL-157** (1 req'd. per cord) and PL-158** (1 req'd. per cord) PL-192***	2Z7226-157 2Z7226-158	3146 7545 and 7639	CO-211	3251	7543 6787

*Figure 32 shows the details of assembly of the cords and plugs.

**Discontinued in later models.

***One as required per receiver when Adapter FT-260-A for local control is used.

NOTE: An assembly (W.E. Co. Drawing No. 6151) of Tuning Shaft MC-215 is shown on Figure 32. One tuning shaft per receiver is required for remote control.

TABLE 20

TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			ADAPTER FT-230-A				
A-30	2Z3403	Cover	Formed Aluminum	Protection of J-4	ES-691339	WECO	
J-4	2Z7227-6	Plug	Plug assembly, 8-contact (Later models are equipped with only 2 contacts)	Connects to receiver	3929	WECO	
			ADAPTER FT-260-A (2Z200-260A)				
A-31	2Z3403	Cover	Formed Aluminum	Protection of J-4	ES-690806	WECO	
E-25	2Z5790	Knob	Knob, INCREASE OUTPUT	For gain control	ES-690538 or 6749	WECO	
E-26	2Z5789	Lever	Lever, CW-OFF-MCW	Switch lever	3912	WECO	
J-30	2Z7227-5	Plug	Plug assembly, 5-contact	Connects to receiver	6062	WECO	
R-28	3Z6650-44	Resistor	Variable, 0-50,000 ohms	Gain control	6310	AB	J
S-10	2C3328A/S3	Switch	CW-OFF-MCW switch	CW-OFF-MCW switching	6536	WECO	
			ANTENNA RELAY UNIT BC-442-A (2C492-442A) AND ANTENNA RELAY UNIT BC-442-AM (2C492-442AM)				
			(Parts of Mounting FT-229-A are at the end of the ANTENNA RELAY UNIT section of this list.)				
A-70		Base	Base, containing C-69	Container for C-69	7801	WECO	
†C-69	3D9050-44	Capacitor	50 mmf ± 10%, 3 amperes at 3 mc, 5 amperes at 9 mc	Ant. series	ES-693954 or 8047	GE	ZA-38
†E-65, E-66	2C492-442A/B1	Binding post	C binding post	To C-69	7805	WECO	
†E-67A †E-67B	2C6497A/J3	Insulator	Insulator for binding post (A and B sections form 7659)	H.V. insulation	7659	WECO	
E-68A E-68B		Insulator	Same as E-67A and E-67B				
E-69	3Z509-3	Binding post	REC binding post	To receiver	7665	WECO	
E-70	3Z509-2	Binding post	ANT binding post	To antenna	7664	WECO	
E-71	3Z509-4	Binding post	TR binding post	To transmitter	7666	WECO	
E-72	2C492-442A/J1	Insulator	Ceramic insulator assembly with contacts, part of antenna relay assembly 7735	H.V. insulation	7732	WECO	

*See Table 21, Index to Suppliers.

†Not included in Antenna Relay Unit BC-442-AM.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			ANTENNA RELAY UNIT BC-442-A (2C492-442A) (Continued)				
E-74	2Z9976/J1	Iron core	Iron core, part of transformer assembly 7501	To increase coupling in T-55	7739	WECO	
H-59	2Z8609	Snapslide	Formed snapslide. Parts of mechanism include:	Fastener			
	2Z8609/S1		Snapslide		2540	WECO	
	2Z8609/G1		Guide (on base)		4750	WECO	
	2Z8609/W1		Washer (on base) (2 required)		5171	WECO	
	2Z8609/S2		Button (on box)		2116	WECO	
	2Z8609/S3		Stud (on base)		7072	WECO	
J-61	2Z7412-9	Receptacle	Receptacle assembly, 5-circuit	To transmitter rack	7023	WECO	
K-55	2Z7674	Relay	Antenna switching relay assembly, SPDT plus SPST	Ant. switching	7735	WECO	
M-50	3F3332-1	Meter	LOCAL antenna current indicator. Expanded scale millivolt meter, open circuit rating 19.5 ± 1.5 millivolts, d-c resistance of meter 3 ohms ± 15%. Designed for use with thermocouple, Drawing 7499, see item TC-50 below.	Antenna current	6750 6750	WESTON GE	507 DW-52
S-54	3Z9845-9	Switch	SPDT toggle switch	Ant. current meter selector	3280	WECO	
T-55	2Z9976	Transformer	R-F current transformer assembly	To supply R-F for TC-50	7501	WECO	
TC-50	3F4507	Thermocouple	Thermocouple, external bridge type. Designed for use with antenna current indicator, Drawing 6750, see item M-50 above.	To supply d-c for ant. current indicator	7499 7499	WESTON GE	CD-68348 Form 7
			MOUNTING FT-229-A (2Z6721-229A)				
A-74	2Z8497-2	Shock absorber	Shock absorber assembly, part of Mounting FT-229-A	Vibration protection	7065	WECO	
A-75	2Z8497-2/F1	Frame	Frame to hold shock absorber cups	Holds shock absorber cups	6913	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			DYNAMOTOR DM-32-A (3H1632A)				
A-9	3H1632A/B4	Base	Base assembly	Holds dynamotor and fittings	5722	WECO	
	2S274N/B3	Base casting	Base, die-cast part of above		5208	WECO	
A-15	3H1632A/E2	End shield	Bearing bracket, L.V. and H.V. ends	Holds bearing		CONT	26201
	3H1632A/E2		Bracket assembly, L.V. end	Holds bearing		GE	K-8128685AB2
			Bracket assembly, L.V. end	Holds bearing		WSTH	1-C-5435 Assembly 1, includes brush holders
A-15	3H1632A/E2		Bracket assembly, H.V. end	Holds bearing		GE	K-8128685AB3
			Bracket assembly, H.V. end	Holds bearing		WSTH	1-C-5433 Assembly 1, includes brush holders
A-16	3H1632A/F1	Yoke	Stator shell	Holds A-20		CONT GE WSTH	22944 K-8100672AA1 1-C-5431 Assembly 1
A-17	3H1632A/B5	End cover	Cover	Covers, brushes, etc.		CONT GE WSTH	19964-1 K-5859161AD-PT2 5-D-7098 Item 2
A-20	3H1632A/P3	Pole	Field pole assembly	Part of magnetic path		CONT GE WSTH	21667 K-8100682AA1 5-D-7113 Assembly 1
C-34	3DA1-63	Capacitor	Fixed, 0.001 mf, 500 volts, +20% or −10%, mica	R-F filter	4251	AV CONT GE WSTH	1465 (Describe) K-8104077AA-PT1 93-D-287 Item 3
D-1	3H1632A/D1	Dynamotor machine	Dynamotor machine. (See TABLE 18 for rating.)	H.V. for receiver		WECO CONT GE WSTH	KS-5572 25926-WS-7610 M-5845839 (5DY82AB1) 957972A
E-2	3H1632A/1	Armature	Armature assembly	Rotor		CONT GE WSTH	27829-WS-7610 K-8128612AA3 6-B-9580 Assembly 2

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			DYNAMOTOR DM-32-A (Continued)				
E-16	3H1632A/C4	Cap	Screw cap for L.V. and H.V. brush holders	Keeps brush in holder		CONT GE WSTH	23607-2 K-8100698AA1 4-D-9423 Assembly 1
E-17	3H1632A/H1	Holder	Brush holder L.V.	For L.V. brushes		CONT GE WSTH	23610-X K-8100707AA3 1-C-5434 Assembly 2
E-18	3H1632A/B2	Brush	Brush assembly, L.V. (+), Morganite CM5H, Stackpole WMP3 or approved equal	Collects current from armature		CONT GE WSTH	23609-3(+) +K-8100699AA1 7-D-8603 Assembly 1
E-19		Brush	Brush assembly, L.V. (−), Morganite CM5H, Stackpole WMP3 or approved equal (E-18 and E-19 are alike except for + and − marking)	Collects current from armature		CONT GE WSTH	23609-3(−) −K-8100699AA1 7-D-8603 Assembly 2
E-20	3H1632A/B1	Brush	Brush assembly, H.V. (+), NCC-AY, Morganite 6782, Morganite EGO or approved equal	Collects current from armature		CONT GE WSTH	23609-4(+) +K-5893583AB3 7-D-8603 Assembly 3
E-21		Brush	Brush assembly, H.V. (−), NCC-AY, Morganite 6782, Morganite EGO or approved equal (E-20 and E-21 are alike except for + and − marking)	Collects current from armature		CONT GE WSTH	23609-4(−) −K-5893583AB3 7-D-8603 Assembly 4
E-22	3H1632A/H2	Holder	Brush holder, H.V.	For H.V. brushes		CONT GE WSTH	23610-2-X K-8100708AB3 1-C-5434 Assembly 1
E-23	3H1632A/G4	Slot Wedge	Insulation (wire guard)	Prevents chafing of lead wires		CONT GE WSTH	12077 K-8100729AA-PT2 6-D-6418 Item 1
H-9	2Z8609-1	Snapslide	Formed snapslide. Parts of the mechanism include:	Fastener			
	2Z8609/S1		Snapslide		2540	WECO	
	2Z8609/G1		Snapslide guide (on base)		4750	WECO	
	2Z8609/S2		Snapslide button (on base)		2116	WECO	
	2Z8609/W1		Washer (on base) (2 required)		5171	WECO	
	2Z8609-1/S1		Stud (on receiver)		4682	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			DYNAMOTOR DM-32-A (Continued)				
H-11	3H1632A/S2	Screw	Screw for bearing retainer (M.S.F.H. 2-56 x ¼, steel, nickel plated)	Holds H-12		CONT GE WSTH	25926-23 (Describe) 6-B-9601 Item 4
H-12	3H1632A/C4	Retainer	Bearing retainer	Protects O-1		CONT GE WSTH	26207 K-8100689AA-PT2 5-D-7097 Item 2
H-13	3H1632A/P1	Pin	Lock pin for brush holder, L.V. and H.V.	Locks E-17 and E-22 to A-15		CONT GE WSTH	25926-19 K-5869298AE-PT3 836146 Item 15
**H-14	3H1632A/D4	Dowel	Dowel pin for locking end shield	Locks end shield A-15		CONT GE	25926-26 K-8127844AA-PT1
H-15	3H1632A/R3	Bolt	Clamp bolt	Connects end shields		CONT GE WSTH	25926-13 K-8100685AA-PT10 5-D-7104 Item 1
H-16	3H1632A/W2	Washer	Lock washer for clamp bolt	Locks H-15		CONT GE WSTH	25926-25 K-5852837AB-PT11 2-D-743 Item 12
H-17	3H1632A/N4	Nut	Nut for clamp bolt, hex. 6-32 x 7/64, brass, nickel plated	Holds H-15		CONT WSTH GE	25926-24 6-B-9601 Item 6 (Describe)
H-18	3H1632A/G1	Grommet	Grommet, circular	Prevents chafing of lead wires		CONT GE WSTH	25926-18 K-8104169AA-PT1 5-D-7168 Item 1
H-19	3H1632A/S3	Screw	Screw, cover holding	Holds end cover		CONT GE WSTH	25926-14 K-5863363AB-PT4 4-D-9508 Item 1
**H-20	3H1632A/W3	Washer	Lock washer for cover screw	Locks H-19		CONT GE	25926-28 K-5852837AB-PT10
H-21	3H1632A/W1	Washer	Plain washer for cover screw	Used with H-20		CONT GE WSTH	25926-27 K-5863757AA-PT7 93-D-397 Item 2

*See Table 21, Index to Suppliers.
**Not shown in Figure 46.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			DYNAMOTOR DM-32-A (Continued)				
H-22	3H1632A/S5	Screw	Screw, connects L.V. and H.V. leads	Holds leads to connecting lug		CONT GE WSTH	25926-20 K-5828728AA-PT5 23-D-531 Item 15
H-23	3H1632A/W4	Washer	Lock washer for connecting screw	Used with H-22		CONT GE WSTH	25926-21 K-5855039AA-PT21 2-D-743 Item 12
H-24	3H1632A/S6	Screw	Screw for field pole (M.S.F.H. 8-32 x 3/8 steel, nickel plated)	Holds pole A-20		CONT WSTH GE	25926-17 1-C-5493 Item 5 (Describe)
H-25	3H1632A/S9	Thrower	Oil thrower	Prevents oil from reaching commutators		CONT GE WSTH	21666 K-8100691AA1 4-D-4769 Item 7
H-26	3H1632A/S4	Stud	Stud (on dynamotor base)	Dynamotor orientation	5219	WECO	
**H-31A		Washer	Washer, 0.002" shim	Shim for bearing		GE	K-5852841AB-PT4
**H-31B		Washer	Washer, 0.003" shim	Shim for bearing		GE	K-5852841AB-PT5
**H-32		Washer	Spring washer	End play spring		GE WSTH	K-5852841AC-PT1 6-D-6780 Item 1
J-5	2Z7227-10	Plug	Plug assembly, 3-contact	Connects to receiver	5211	WECO	
L-16	3H1632A/C2	Coil	Field coil (2 sections)	Field coil		CONT GE WSTH	21668-WS-7610 V-5872743 1-C-2150 Assembly 3
O-1	3H1632A/B3	Ball bearing	Ball bearing assembly	Anti-friction		CONT GE WSTH	25926-10 K-5893658AC-PT2 5-D-7158 Item 2
W-1	3H1632A/L1	Grounding strip	Ground lead and terminals, L.V.(−) and H.V.(−) (tinned copper)	Ground connection for L.V.(−) and H.V.(−)		CONT GE WSTH	25926-33 K-8132438AA-PT1 6-D-6538 Item 1
W-2	3H1632A/L2	Wire	Connecting lead and terminal L.V. (+) (No. 20 AWG, white)	L.V.(+)		CONT GE WSTH	25926-31 K-8100716AA3 5-D-7125 Assembly 1

*See Table 21, Index to Suppliers.
**Not shown in Figure 46.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			DYNAMOTOR DM-32-A (Continued)				
W-3	3H1632A/L3	Wire	Connecting lead and terminal H.V.(+) (No. 20 AWG, red)	H.V.(+)		CONT GE WSTH	25926-32 K-8100716AA1 5-D-7125 Assembly 2
		Insulation	Insulation wire guard	Prevents chafing of leads		GE	K-5855318CJ-PT1
			DYNAMOTOR DM-33-A				
A-59	3H1633A/B6	End shield	Bearing bracket, L.V. end	Holds bearing, L.V. end		CONT GE WSTH	23371-3 M-5845877AA-PT2 1-C-5413 Assembly 1 (with brushes)
A-60	3H1633A/F1	Yoke	Stator shell	Holds A-63		CONT GE WSTH	27825 K-8100599AA1 6-B-9595 Assembly 1
A-61	3H1633A/B7	End shield	Bearing bracket, H.V. end	Holds bearing, H.V. end		CONT GE WSTH	23371-1 M-5845877AB-PT2 1-C-5414 Assembly 1 (with brushes)
A-62	3H1633A/E1	End cover	Cover	Covers, brushes, etc.		CONT GE WSTH	16576-1 K-8100677AA1 5-D-7117 Assembly 1
A-63	3H1633A/P1	Pole	Field pole assembly	Part of magnetic circuit		CONT GE WSTH	24284 K-8109891VA1 5-D-7110 Assembly 1
A-71	3H1633A/B8	Base	Base, including casting	Holds dynamotor and fittings	5723	WECO	
	2S274N/B2	Base casting	Base, die cast, part of above		5174	WECO	
C-50	3DA6-30	Capacitor	Fixed, 0.006 mf, 400 volts, +20% or −10%, mica	R-F filter	8052	CONT GE WSTH CD	27824-32 K-8104076AA-PT1 5-D-7140 Item 1 3L
D-50	3H1633A/D1	Dynamotor machine	Dynamotor machine (See TABLE 18 for rating)	H.V. for transmitter		WECO CONT GE WSTH	KS-5571 27824-WS-7666 M-5845843 (5DY83AB1) 957971-A

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			DYNAMOTOR DM-33-A (Continued)				
E-75	3H1633A/C2	Cap	Screw cap for L.V. brush holder	Keeps L.V. brush in holder		CONT GE WSTH	23607-1 K-8100712AA1 5-D-7005 Assembly 1
E-76	3H1633A/H2	Holder	Brush holder, L.V.	For L.V. brushes		CONT GE WSTH	23610-7-X K-8100700AA3 5-B-8277 Assembly 2
E-77	3H1633A/H1	Holder	Brush holder, H.V.	For H.V. brushes		CONT GE WSTH	23610-4-X K-8100708AA3 6-B-9568 Assembly 2
E-78	3H1632A/C4	Cap	Screw cap for H.V. brush holder	Keeps H.V. brush in holder		CONT GE WSTH	23607-2 K-8100698AA1 4-D-9423 Assembly 1
E-79	3H1633A/B4	Brush	Brush assembly, L.V.(+), Morganite CM5H, Stackpole WP-85 or approved equal	Collects current from armature		CONT GE WSTH	23609-9(+) +K-5859146AB1 7-D-8601 Assembly 3
E-80		Brush	Brush assembly, L.V.(−), Morganite CM5H, Stackpole WP-85 or approved equal (E-79 and E-80 are alike except for + and − marking)	Collects current from armature		CONT GE WSTH	23609-9(−) −K-5859146AB1 7-D-8601 Assembly 4
E-81	3H1633A/B3	Brush	Brush assembly, H.V.(+), Morganite 6782, NCC-AY, Stackpole WAC18 or approved equal	Collects current from armature		CONT GE WSTH	23609-6(+) +K-5893583AB4 7-D-8601 Assembly 1
E-82		Brush	Brush assembly, H.V.(−), Morganite 6782, NCC-AY, Stackpole WAC18 or approved equal. (E-81 and E-82 are alike except for + and marking)	Collects current from armature		CONT GE WSTH	23609-6(−) −K-5893583AB4 7-D-8601 Assembly 2
E-83	3H1633A/G2	Slot wedge	Insulation (wire guard)	Prevents chafing of lead wires		CONT GE WSTH	12061-424 K-8100729AA-PT1 53-D-923 Item 19
E-84	3H1633A/G1	Grommet	Grommet, circular	Prevents chafing of lead wires		CONT GE WSTH	27824-19 K-8104169AA-1 5-D-7168 Item 1

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Designation Supplier's
			DYNAMOTOR DM-33-A (Continued)				
E-85	3H1633A/A1	Armature	Armature assembly	Rotor		CONT GE WSTH	12836-WS-7666 K-8128609AA3 6-B-9598 Assembly 2 (with ball bearing)
H-60	3H1633A/C6	Retainer	Bearing retainer	Protects O-50		CONT GE WSTH	23100 K-8100680AA-PT2 5-D-7042 Item 2
H-61	3H1633A/S4	Screw	Screw for bearing retainer (M.S.F.H. 4-40 x 1/4, steel, nickel plated)	Holds H-60		CONT GE CONT	27824-24 6-B-9605 Item 4 (Describe)
**H-62	3H1633A/D5	Dowel	Dowel pin for locking end shield	Locks end shields A-59 and A-61		CONT GE	27824-27 K-8127844AA-PT1
H-63	3H1633A/N4	Nut	Nut for clamp bolt, hex. 6-32 x 7/64 thick brass, nickel-plated	Holds H-65		CONT WSTH GE	27824-25 6-B-9605 Item 6 (Describe)
H-64	3H1633A/W2	Washer	Lock washer for clamp bolt	Locks H-63		CONT GE WSTH	27824-26 K-5852837AB-PT11 2-D-743 Item 12
H-65	3H1633A/R5	Bolt	Clamp bolt	Connects end shields		CONT GE WSTH	17042-424 K-8100685AA-PT13 5-D-7064 Item 1
H-66	3H1633A/S5	Screw	Screw, connects L.V. and H.V. leads	Holds leads		CONT GE WSTH	27824-21 K-5828728AA-PT5 23-D-531 Item 9
H-67	3H1633A/W4	Washer	Lock washer for connecting screw	Used with H-66		CONT GE WSTH	27824-22 K-5855029AA-PT21 2-D-743 Item 12
**H-68	3H1633A/S6	Screw	Set screw for brush holder	Locks brush holder		CONT	27824-20
H-68		Pin	Lock pin for brush holder	Locks brush holder		WSTH	836146 Item 4
H-70	3H1633A/S12	Thrower	Oil thrower	Prevents oil from reaching commutator		CONT GE WSTH	25230 K-8100719AA-PT1 5-D-7139 Item 3

*See Table 21, Index to Suppliers.
**Not shown in Figure 51.

[06]

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			DYNAMOTOR DM-33-A (Continued)				
**H-71	3H1633A/W3	Washer	Lock washer for cover screw	Used with H-72		CONT GE	27824-29 K-5852837AA-PT10
H-72	3H1633A/S9	Screw	Screw, cover holding	Holds end cover		CONT GE WSTH	17043-400 K-5863363AB-PT4 4-D-9508 Item 1
H-73	3H1633A/W1	Washer	Plain washer for cover screw	Used with H-72		CONT GE WSTH	27824-28 K-5863757AA-PT7 93-D-397 Item 2
H-74	3H1633A/S8	Screw	Screw for field pole (10-24 x 1/2, steel, plated)	Holds pole A-63		CONT WSTH GE	27824-18 1-C-5455 Item 4 (Describe)
H-85A		Washer	Washer, 0.002" shim	Shim for bearing		GE	K-8132367AA-PT1
H-85B		Washer	Washer, 0.003" shim	Shim for bearing		GE	K-8132367AA-PT2
**H-86		Washer	Spring washer	End play spring		GE WSTH	K-8132367AB-PT1 6-D-6780 Item 2
H-80	3H1633A/S3	Stud	Stud	Dynamotor orientation	5182	WECO	
H-83	2Z8609-2	Snapslide	Formed snapslide. Parts of the mechanism include:	Fastener			
	2Z8609/S1		Snapslide		2540	WECO	
	2Z8609/G1		Snapslide guide (on base)		4750	WECO	
	2Z8609/S2		Snapslide button (on base)		2116	WECO	
	2Z8609/W1		Washer (on base) (2 required)		5171	WECO	
	2Z8609-2/S1		Stud (on modulator unit)		5277	WECO	
J-50	2Z7250	Plug	Plug assembly, three-contact	Connects to modulator unit	5173	WECO	
L-53	3C400	Coil	Field coil A — left B — right	Field coil (two sections)		CONT GE WSTH	26210-3 & 26210-4 V-5872740 1-C-5443 Assembly 3

*See Table 21, Index to Suppliers.
**Not shown in Figure 51.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Designation Supplier's
			DYNAMOTOR DM-33-A (Continued)				
O-50	3H1633A/B5	Bearing	Ball bearing assembly	Anti-friction		CONT GE WSTH	27824-11 K-5893659AC-PT2 5-D-7158 Item 1
W-50	3H1633A/L2	Grounding strip	Ground lead and terminals, L.V.(−) and H.V.(−) (tinned copper)	Ground connection for L.V.(−) and H.V.(−)		CONT GE WSTH	27824-30 K-8132438AA-PT2 6-D-6538 Item 2
W-51	3H1633A/L1	Wire	Connecting lead and terminal, H.V. (+) (No. 20 AWG, red)	H.V.(+)		CONT GE WSTH	27824-31 K-8100716AA4 5-D-7180 Assembly 1
W-52	3H1633A/L3	Wire	Connecting lead and terminal, L.V.(+) (No. 20 AWG, white), part of L-53B	L.V.(+)		CONT GE WSTH	(See L-53) (See L-53) 5-D-7180 Assembly 2
		Wire	Wire for screw	Locks screw		GE	K-5855123AA-PT1
		Insulation	Insulation under coil	Protects coil L-53 from yoke A-60		GE	K-5855318CJ-PT2
			MODULATOR UNITS BC-456-A (2C2500-456A.1) AND BC-456-B (2C2500-456B.1) **(Parts of Mounting FT-225-A are at the end of the MODULATOR UNIT section of this list)**				
A-64	2Z8496-1	Shock absorber	Dynamotor shock absorber assem.	Reduces effects of dyn. vibration on modulator unit	5285	WECO	
A-65	2C2500-456A.1/S3	Shield	Shield over tubes and relays	Protects tubes and relays	7590	WECO	
A-66	2C2500-456A.1/C2	Cover	Cover over tubes	Cover over opening for changing tubes	7144	WECO	
A-67, A-68	2C2500-456A.1/C3	Cover	Covers over spare and regular fuses	Protects fuses	7142	WECO	
A-69	2C2500-456A.1/B1	Base	Base over bottom of chassis	Base over bottom of chassis	7126	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Designation Supplier's
			MODULATOR UNITS BC-456-A AND BC-456-B (Continued)				
A-76	2S274/NP5	Panel assembly	Mounting for resistors R-52, R-53 and R-54 or for resistors R-59, R-60 and R-64		7215	WECO	
A-77	2C4373A/P1	Panel assembly	Panel assembly resistor, includes mounting feet and terminal strips for mounting resistors R-55, R-56, R-58 and R-61.		5452	WECO	
C-51 (A, B, C)	3DA50-32	Capacitor	0.05/0.05/0.05 mf ± 15%, 300 volts, paper, special (same as C-6 in receiver)		ES-692644 or 5414	CD, PRM, SPRAGUE	
			A section	Tone osc. plate by-pass			
			B section	Tone osc. tuning			
			C section	Tone osc. tuning			
C-52	3DA6-29	Capacitor	Fixed, 0.006 mf ± 5%, 400 volts, mica	Tone osc. grid	4091	AV	1461
C-53	3DB1A2	Capacitor	1.2 mf ± 30%, 600 volts, paper, special	R-F filter on L.V. (+) line	ES-692650 or 7210	CD, PRM, SPRAGUE	
C-54 (A, B)	3DB5-6	Capacitor	5/20 mf, 35 volts, dry electrolytic, polarized, special. Tolerance rating as follows: Impedance at 60 cycles not over 265 ohms for 20 mf section and not over 1050 ohms for 5 mf section. The 20 mf section has negative terminal grounded. Both terminals of 5 mf section are insulated.		ES-692647 or 5417	CD, PRM, SPRAGUE	
			A section, 5 mf	Mod. cathode by-pass			
			B section, 20 mf	A-F filter on mic. supply			
C-55	3DB2A2	Capacitor	Same as C-53	A-F filter on H.V. +	ES-692650 or 7210	CD, PRM, SPRAGUE	
C-56 (A, B)	3DA500-44	Capacitor	0.5/0.5 mf −10%, +20%, 300 volts, paper, special		ES-692648 or 5418	CD, PRM, SPRAGUE	
			A section, both terminals insulated	A-F by-pass			
			B section, one terminal grounded	Screen by-pass			

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			MODULATOR UNITS BC-456-A AND BC-456-B (Continued)				
C-57	3DA50-29	Capacitor	0.05 mf ± 15%, 600 volts, paper, special	Spark suppressor	ES-692652 or 7715	CD, PRM, SPRAGUE	
E-86	2S274N/C6	Clip assembly	Plate clip assembly	Connector	6107	WECO	
F-50	3Z1911	Fuse	20 ampere cartridge fuse, interchangeable with Signal Corps Fuse FU-11	L.V. line to dyn.	4004	LTLF	3AG
F-51	3Z1911	Fuse	Same as F-50	L.V. line to heaters	4004	LTLF	3AG
H-75, H-76	2Z8609-3	Snapslide	Formed Snapslide. Parts of the mechanism include:	Fastener			
	2Z8609-3/S1		Snapslide (on cover)		3888	WECO	
	2Z8609-3/G1		Guide (on cover)		3887	WECO	
	2Z8609-3/S2		Stud (on modulator unit)		5134	WECO	
	2Z8609-3/S3		Button (on cover)		3890	WECO	
	2Z8609-3/W1		Washer (on cover)		3889	WECO	
H-77	2Z8609-4 2Z8609-4/S1 (Stud)	Snapslide	Formed Snapslide. Same as H-75 except stud (on A-65) is 4708	Fastener			
H-78	2Z8609-5		Formed Snapslide. Parts of the mechanism include:	Fastener			
	2Z8609/S1		Snapslide (on base)		2540	WECO	
	2Z8609/G1		Guide (on base)		4750	WECO	
	2Z8609-5/S1		Stud (on mounting), part of shock absorber 7067		5113	WECO	
	2Z8609/S2		Button (on base)		2116	WECO	
	2Z8609/W1		Washer (on base) (2 required)		5171	WECO	
H-79	2C2500-456A.1/S1	Stud	Stud	Dyn. orientation	5450	WECO	
J-51	2Z7412-6	Receptacle	Receptacle assembly, 3 contacts	To dynamotor	5844	WECO	
J-52	2Z7412-4	Receptacle	Receptacle assembly, 6 circuits	To rec. rack	5577	WECO	
J-53	2Z7412-10	Receptacle	Receptacle assembly, 2 circuits	To pri. source	7024	WECO	
J-54	2Z7412-12	Receptacle	Receptacle assembly, 18 circuits	To trans. cont. box	7027	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			MODULATOR UNITS BC-456-A AND BC-456-B (Continued)				
J-58	2Z7412-11	Receptacle	Receptacle assembly, 12 circuits	To trans. rack	7025	WECO	
K-50	2C2500-456A.1/R1	Relay	Dynamotor starting relay, 2 contacts	Dyn. starting	ES-694391 or 6385	WECO	
	2C2500-456A.1/C4		Contact and armature assembly. (Use this assembly on all K-50 relays when replacing contacts.)		ES-690691	WECO	
	2C2500-456A.1/C5		Coil winding, 5450 turns No. 33 enamelled copper wire, d-c resistance 200 ohms		ES-691233	WECO	
K-51	2Z7675-2	Relay	Sidetone relay, 4 contacts. Coil winding, approx. 7200 turns No. 35 enamelled copper wire, d-c resistance 400 ohms	Sidetone switching	5587 ES-691232	WECO WECO	
K-52	2Z7675-1	Relay	H.V. relay, 2 contacts. Coil winding, approx. 7200 turns No. 35 enamelled copper wire, d-c resistance 400 ohms	Keying H.V.	5586 ES-691232	WECO WECO	
	2Z7675-1/1	Contact spring assembly	Contact spring assembly (two used on K-51 and one used on K-52)		ES-691280	WECO	
	2Z7675-1/2	Contact spring assembly	Contact spring assembly (one used on K-51 and one used on K-52)		ES-691281	WECO	
	2Z7675-2/1	Contact spring assembly	Contact spring assembly (one used on K-51)		ES-691282	WECO	
L-50	3F2997-4	Inductor	R-F choke, approx. 15 microhenries, 47 turns #14 D.S.C., d-c resistance not over 0.1 ohm	In L.V. (+) line to dyn.	2092	WECO	
L-51	3F2997-3	Inductor	A-F choke, inductance not less than 1.7 henries with 3 volts, 60 cycles across the winding and 160 milliamperes d-c through the coil. D-C resistance limits 59 to 75 ohms.	In H.V. (+) line from dynamotor	5659	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			MODULATOR UNITS BC-456-A AND BC-456-B (Continued)				
P-50	2Z7067	Plug	Large pin plug (as on J-51)	Connector	5542	WECO	
P-52	2Z7066	Plug	Small pin plug (as on J-52)	Connector	4629	WECO	
R-50	3Z4842	Resistor	42 ohms ± 2%, 7 watts, wire wound, special	Heater current equalizer	8007	WL	
R-51	3Z6700-48	Resistor	100,000 ohms ± 10%, ⅓ watt, carbon	Tone osc. grid	4501	AB	E
R-52	3Z6730-5	Resistor	300,000 ohms ± 10%, 1 watt, carbon	Tone osc. volt div.	8002	AB	G
R-53	3Z6691	Resistor	91,000 ohms ± 10%, 2 watts, carbon	Tone osc. plate dropping	8001	AB	
R-54	3Z6036	Resistor	360 ohms ± 10%, 2 watts, carbon	Mic. series	8031	AB	
R-55	3Z6200-35	Resistor	2,000 ohms ± 10%, ⅓ watt, carbon	Mic. transf. volt div.	4499	AB	
R-56	3Z6130	Resistor	1,300 ohms ± 10%, ⅓ watt, carbon	Mic. transf. volt div.	6003	AB	
R-57	3Z6039-3	Resistor	390 ohms ± 10%, ⅓ watt, carbon	Cathode bias on VT-136	6006	AB	E
R-58	3Z6651-3	Resistor	51,000 ohms ± 10%, ⅓ watt, carbon	Cathode cut off bias	4569	AB	E
R-59	3Z6630-15	Resistor	30,000 ohms ± 10%, 1 watt, carbon	Screen volt div.	8006	AB	G
R-60	3Z6675-12	Resistor	75,000 ohms ± 10%, 2 watts, carbon	Screen dropping	8003	AB	F
R-61	3Z6002-13	Resistor	20 ohms ± 10%, ⅓ watt, carbon	Part of spark suppressor	8033	AB	E
R-62	3Z5510-3	Resistor	10,000 ohms ± 2%, 7 watts, wire wound, special	Tetrode loading	3238	WL	
R-63	3Z5600-3	Resistor	20,000 ohms ± 2%, 15 watts, wire wound, special	PA screen dropping	5987	WL	
R-64	3Z6700-49	Resistor	100,000 ohms ± 10%, 2 watts, carbon	M.O. voltage divider	8004	AB	F
R-65	3Z5550-3	Resistor	15,000 ohms ± 2%, 15 watts, wire wound, special	M.O. voltage divider	5986	WL	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			MODULATOR UNITS BC-456-A AND BC-456-B (Continued)				
**T-50	2Z9947	Transformer	Tone osc. transformer (A) Primary, approx. 1207 turns #33 enamelled wire, d-c resistance (terminals 1-4) 54-67.5 ohms. Lead #1 to case 227 turns; case to #3, 490 turns; lead #3 to #4, 490 turns (B) Secondary, 89 turns #33 enamelled wire, d-c resistance (terminal 6-case) 4.6-5.8 ohms	1000-cycle modulation	6307	WECO	
***T-50	2Z9947-1	Transformer	Tone osc. transformer (A) Primary, approx. 1207 turns #33 enamelled wire, d-c resistance (terminals 1-4) 54-67.5 ohms. Lead #1 to #7, 165 turns; lead #7 to case, 62 turns; case to lead #3, 490 turns; lead #3 to #4, 490 turns (B) Secondary, 89 turns #33 enamelled wire, d-c resistance (terminal 6-case) 4.6-5.8 ohms	1000-cycle modulation	ES-691026	WECO	
T-51	2Z9947-2	Transformer	Microphone transformer Primary, approx. 283 turns #36 enamelled wire, d-c resistance 21 to 28 ohms Secondary, approx. 2830 turns #36 enamelled wire, d-c resistance 288 to 365 ohms	Microphone input	6261	WECO	

*See Table 21, Index to Suppliers.
**Used in Modulator Unit BC-456-A only.
***Used in Modulator Unit BC-456-B only.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
MODULATOR UNITS BC-456-A AND BC-456-B (Continued)							
**T-52	2Z9947-3	Transformer	Modulation transformer (A) Primary, approx. 4760 turns #38 enamelled wire, d-c resistance (terminals 1-2), 887-1117 ohms (B) Secondary, approx. 2424 turns #33 enamelled wire, d-c resistance (terminals 3-4), 186-234 ohms (C) Tertiary, approx. 430 turns #33 enamelled wire, d-c resistance (terminal 6-case), 43-49 ohms. (Early production units were wound with smaller wire, resulting in a d-c resistance of approx. 70 ohms. Replacements should be made with the lower resistance winding.)	Modulation and voice sidetone	6306	WECO	
***T-52	2Z9947-3.2	Transformer	Modulation transformer (A) Primary, approx. 4760 turns #38 enamelled wire, d-c resistance (terminals 1-2), 887-1117 ohms (B) Secondary, approx. 2424 turns #33 enamelled wire, d-c resistance (terminals 3-4), 186-234 ohms (C) Tertiary, approx. 430 turns #34 enamelled wire, d-c resistance (terminal 6-case) 55-62 ohms. Lead #6—#7, 307 turns; lead #7—case, 123 turns	Modulation and voice sidetone	ES-691025	WECO	
V-50	2T135	Tube VT-135	Triode	Tone osc.	—	RCA, KEN	12J5GT
V-51	2T136	Tube VT-136	Beam tetrode	Modulator	—	RCA, KEN	1625
V-52	2T139	Tube VT-139	Voltage regulator	Voltage regulator	—	RCA, KEN	VR-150-30

*See Table 21, Index to Suppliers.
**Used in Modulator Unit BC-456-A only.
***Used in Modulator Unit BC-456-B only.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			MODULATOR UNITS BC-456-A and BC-456-B (Continued)				
X-50	2Z8683	Socket	Socket assembly, large, 7-contact	For tube VT-136	5068	WECO	
X-51	2C2500-456A.1/S1	Socket	Socket assembly, small, octal, special. Amphenol #4 retainer ring is part of this assembly.	For any of the octal tubes in the modulator unit	6559	CINCH, AMPH	
			MOUNTING FT-225-A (2Z6721-225A)				
A-78	2Z8497-1	Shock absorber	Shock absorber assembly	Vibration protection	7067	WECO	
A-79	2Z8497-1/F1	Frame	Frame to which shock absorber cups are attached	Holds shock absorber cups	7037	WECO	
			RECEIVER RACKS				
	2Z7380-220A		FT-233-A (SINGLE UNIT)		7509	WECO	
			FT-277-A (DOUBLE UNIT)		5018	WECO	
			FT-220-A (TRIPLE UNIT)		7537	WECO	
			FT-264- (QUADRUPLE UNIT)		5019	WECO	
			(Parts of the mountings for these racks are at the end of the RECEIVER RACK section of this list)				
A-10		Cover	Rear cover	Closes rear opening			
			FT-233-A		7121	WECO	
			FT-277-A		6415	WECO	
	2Z7380-220A/C1		FT-220-A		7122	WECO	
			FT-264-		7123	WECO	
E-7	2Z7380-220A/B1	Binding Post	Ground binding post	Ground binding post, G	6067	WECO	
F-1, F-2, F-3, F-4	3Z1921	Fuse	10-ampere cartridge type fuse, interchangeable with Signal Corps Fuse FU-21.	In L.V. (+) line	4414	LTLF	3AG
H-1	2Z8609-3	Snapslide	Formed Snapslide. Parts of the mechanism include:	Fastener			
	2Z8609-3/S1		Snapslide (on fuse cover)		3888	WECO	
	2Z8609-3/G1		Guide (on fuse cover)		3887	WECO	
	2Z8609-3/S2		Button (on fuse cover)		3890	WECO	
	2Z8609-3/S3		Stud (on rack)		5134	WECO	
	2Z8609-3/W1		Washer (on fuse cover)		3889	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RECEIVER RACKS (Continued)				
H-2	2Z8609-6	Snapslide	Formed Snapslide. Parts of the mechanism include:	Fastener			
	2Z8609/S1		Snapslide (on rack)		2540	WECO	
	2Z8609/G1		Guide (on rack)		4750	WECO	
	2Z8609/S2		Button (on rack)		2116	WECO	
	2Z8609/S3		Stud — on Mounting FT-231-A		7072	WECO	
			on Mounting FT-279-A		5113	WECO	
	2Z8608-6/S1		on Mounting FT-221-A		5189	WECO	
			on Mounting FT-278		5116	WECO	
	2Z8609/W1		Washer (on rack) (2 required)		5171	WECO	
H-7	2Z7380-220A/C2	Cover	Fuse cover assembly	Protects fuses	6414	WECO	
H-8	2Z7380-220A/S3	Cap	Cap to cover J-6 or J-7	Protects J-6 or J-7	5319	WECO	
H-27	2Z7380-220A/S4	Screw	Locking screw and strap assembly	Locks receiver in rack	5912	WECO	
H-29	2Z1608	Cap	Cap for A TEL.-B TEL. switch	To keep A TEL.-B TEL. switches in center position	7581	WECO	
J-6, J-7	2Z7412-4	Receptacle	Receptacle assembly, 6-circuit	To modulator unit	5577	WECO	
J-12, J-13, J-14, J-15, J-16, J-17	2Z7380-220A/J1	Jack	Headset jack	To headset	4691	WECO	
J-18, J-19, J-20, J-31	2Z7412-5	Receptacle	Receptacle assembly, 7-circuit	To receiver	5842	WECO	
J-21, J-22, J-23, J-32	2Z7412-7	Receptacle	Receptacle assembly, 8-circuit	To rec. cont. box	6418	WECO	
J-24	2Z7412-8	Receptacle	Receptacle assembly, 2-circuit	To pri. source	6485	WECO	
K-1, K-2, K-3, K-4	2Z7675	Relay	Sidetone-receiver output relay, d-c resistance 300 ohms ± 10%	Switches headset from rec. output to trans. sidetone	7251	WECO	
S-7, S-8, S-9, S-11	2Z7380-220A/S1	Switch	A TEL.-B TEL. switch, SPDT	A TEL.-B TEL. switching	6575	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			MOUNTINGS (RECEIVER)				
	2Z6721-231A	Mounting	FT-231-A (SINGLE UNIT)		7059	WECO	
		Mounting	FT-279-A (DOUBLE UNIT)		5694	WECO	
	2Z6721-221A	Mounting	FT-221-A (TRIPLE UNIT)		7060	WECO	
		Mounting	FT-278 (QUADRUPLE UNIT)		5696	WECO	
A-32		Shock absorber	Shock absorber cup assembly	Vibration protection			
	2Z8497		FT-231-A		7068	WECO	
	2Z8497-4		FT-279-A		5185	WECO	
	2Z8496-2		FT-221-A		5195	WECO	
	2Z8497-3		FT-278-		5184	WECO	
A-33		Frame	Frame, holds shock absorber cups	Holds shock absorber cups			
			FT-231-A		7030	WECO	
			FT-279-A		5695	WECO	
			FT-221-A		7031	WECO	
			FT-278-		5697	WECO	
			TRANSMITTER RACKS				
	2Z7380-234A	Mounting	FT-234-A (SINGLE UNIT)		7507	WECO	
	2Z7380-226A	Mounting	FT-226-A (DOUBLE UNIT)		5020	WECO	
		Mounting	FT-276- (TRIPLE UNIT)		7638	WECO	
	2Z7380-331A	Mounting	FT-331-A (QUADRUPLE UNIT)		6090	WECO	
			(Parts of the mountings for these racks are at the end of the TRANSMITTER RACK section of this list)				
A-58		Cover	Rear cover	Cover over rear opening			
			FT-234-A		7124	WECO	
			FT-226-A		6269	WECO	
			FT-276-		7125	WECO	
			FT-331-A		6269	WECO	
E-87	2Z7380-220A/B1	Binding post	Ground binding post	Ground binding post, G	6067	WECO	
H-81	2Z7380-220A/S4	Screw	Locking screw and strap assembly	For locking trans. in rack	5912	WECO	
H-82	2Z8609-7	Snapslide	Formed snapslide. Parts of the mechanism include:	Fastener			
	2Z8609/S1		Snapslide (on rack)		2540	WECO	
	2Z8609/G1		Guide (on rack)		4750	WECO	
	2Z8609/W1		Washer (on rack) (2 required)		5171	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			TRANSMITTER RACKS (Continued)				
H-82 (Continued)							
	2Z8609/S2		Button (on rack)		2116	WECO	
	2Z8609/S3		Stud — on Mounting FT-232-A		7072	WECO	
	2Z8609-5/S1		on Mounting FT-227-A		5113	WECO	
			on Mounting FT-262-		5189	WECO	
	2Z8609-7/S1		on Mounting FT-332-A		5116	WECO	
J-59	2Z7412-11	Receptacle	Receptacle assembly, 12-contact	To mod. unit	7025	WECO	
J-60	2Z7412-9	Receptacle	Receptacle assembly, 5-contact	To ant. relay unit	7023	WECO	
J-62, J-63, J-67, J-68	2Z7412-5	Receptacle	Receptacle assembly, 7-contact	To trans.	5842	WECO	
P-51	2Z7066-1	Plug	Pin plug assembly	Connector	4630	WECO	
			MOUNTINGS (TRANSMITTER)				
	2Z6721-232A	Mounting	FT-232-A (SINGLE UNIT)		7061	WECO	
	2Z6721-227A	Mounting	FT-227-A (DOUBLE UNIT)		7062	WECO	
		Mounting	FT-262- (TRIPLE UNIT)		7063	WECO	
	2Z6721-332A	Mounting	FT-332-A (QUADRUPLE UNIT)		7064	WECO	
A-72		Shock absorber	Shock absorber cup assembly	Vibration protection			
	2Z8497		FT-232-A		7068	WECO	
	2Z8497-4		FT-227-A		5185	WECO	
	2Z8496-2		FT-262		5195	WECO	
	2Z8497-3		FT-332-A		5184	WECO	
A-73		Frame	Frame, holds shock absorber cups	Hold shock absorber cups			
			FT-232-A		7033	WECO	
			FT-227-A		7034	WECO	
			FT-262-		7035	WECO	
			FT-332-A		7036	WECO	
			RADIO CONTROL BOXES (FOR RADIO RECEIVERS)				
	2C3330B	Radio Control Box	BC-473-A (SINGLE UNIT)				
		Radio Control Box	BC-473-B (SINGLE UNIT)				
	2C3328A	Radio Control Box	BC-496-A (DOUBLE UNIT)				
		Radio Control Box	BC-450-A (TRIPLE UNIT)				

(Parts of the mountings for these control boxes are at the end of this section of the list)

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO CONTROL BOXES (FOR RADIO RECEIVERS) (Continued)				
A-22	2C3328A/B1	Base	Base	Base over rear opening			
			For Radio Control Box BC-473-A (or -B)		7050	WECO	
			For Radio Control Box BC-496-A		6833	WECO	
			For Radio Control Box BC-450-A		7051	WECO	
E-13	2C3328A/L1	Lever	Lever A-B	Switch lever	5444	WECO	
E-14		Lever	Lever, CW-OFF-MCW, same as E-13	Switch lever		WECO	
E-15	2C3328A/K1	Knob	Knob	For remote tuning	7955	WECO	
E-24	2Z5790	Knob	Knob, INCREASE OUTPUT	For gain control	ES-690538 or 6749	WECO	
H-4	2Z8609-8	Snapslide	Formed snapslide. Parts of the mechanism include:	Fastener			
	2Z8609/S1		Snapslide (on base)		2540	WECO	
	2Z8609/G1		Guide (on base)		4750	WECO	
	2Z8609-8/S2		Button (on base)		5172	WECO	
	2Z8609/W1		Washer (on base) (2 required)		5171	WECO	
	2Z8609-8/S1		Stud (on mounting)		1450	WECO	
J-8, J-9, J-10, J-11	2Z7380-220A/J1	Jack	Headset jack	To headset	4691	WECO	
J-25, J-26, J-27	2Z7412-7	Receptacle	Receptacle assembly, 8-circuit	To rec. rack	6418	WECO	
N-2	2Z3762-13	Dial	Dial MC-213, 3-6 mc	Directly calibrated dial for remote tuning	6053	WECO	
N-3	2Z3762-12	Dial	Dial MC-212, 190-550 kc	Same as N-2	6051	WECO	
N-4	2Z3762-14	Dial	Dial MC-214, 6-9.1 mc	Same as N-2	6054	WECO	
O-2	2C3328A/S5	Spline	Spline, part of O-4 assembly	Connects with Tuning Shaft MC-215	6403	WECO	
O-4	2C3328A/G1	Gearing unit	Gearing unit assembly	To remote tuning	6550	WECO	
	2C3328A/G1/1	Gear	Gear, bevel, part of above	Tuning shaft drive	6392	WECO	
O-6	2S274N/S2	Sleeve	Sleeve, 1/2 x 27 thread	Fastening for tuning shaft	6397	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO CONTROL BOXES (FOR RADIO RECEIVERS) (Continued)				
R-25, R-26, R-27	3Z6650-44	Resistor	Variable, 0-50,000 ohms	Gain control	6488	AB	J
S-1, S-3, S-5	2C3328A/S4	Switch	A-B switch	A TEL.-B TEL. switching	6540	WECO	
S-2, S-4, S-6	2C3328A/S3	Switch	CW-OFF-MCW switch	CW-OFF-MCW switching	6536	WECO	
			RADIO CONTROL BOX MOUNTINGS (FOR RADIO RECEIVERS)				
		Mounting	FT-235-A (SINGLE UNIT)				
	2Z6721-235B	Mounting	FT-235-B (SINGLE UNIT)				
	2Z6721-240A	Mounting	FT-240-A (DOUBLE UNIT)				
	2Z6721-222A	Mounting	FT-222-A (TRIPLE UNIT)				
H-30	2Z8609-8/S1	Stud	Snapslide stud	For snapslide locking	1450	WECO	
			RADIO CONTROL BOX BC-451-A (FOR RADIO TRANSMITTERS) (2C3329A)				
			(Parts of Mounting FT-228-A are at the end of this section of the list)				
A-57	2C3329A/B1	Base	Base	Base, over rear opening	7084	WECO	
E-63	2Z5789	Lever	Lever for TONE-CW-VOICE switch	Switching lever	3912	WECO	
E-64	2Z5789	Lever	Lever for TRANSMITTER SELECTION	Switching lever	3912	WECO	
H-57	2C3329A/C1	Snap cap	Snap cap	Covers hole in top of box	4192	WECO	
H-58	2Z8609-8	Snapslide	Formed snapslide. Parts of the mechanism include:	Fastener			
	2Z8609/S1		Snapslide (on base)		2540	WECO	
	2Z8609/G1		Guide (on base)		4750	WECO	
	2Z8609-8/S2		Button (on base)		5172	WECO	
	2Z8609/W1		Washer (on base) (2 required)		5171	WECO	
	2Z8609-8/S1		Stud (on mounting)		1450	WECO	
J-55	2Z7412-12	Receptacle	Receptacle assembly, 18-contact	To mod. unit	7027	WECO	
J-56	2Z7412	Receptacle	Receptacle assembly, 2-contact	To Ammeter I-71-B	2674	WECO	
J-65	2Z5579	Jack	Microphone jack. This jack is designed so that the sleeve connection may be disconnected from ground by unscrewing the knurled nut.	To Microphone T-17 or equal	6061	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
RADIO CONTROL BOX BC-451-A (FOR RADIO TRANSMITTERS) (Continued)							
J-66	2C3329A/J1	Jack	Key jack	To external key or throttle switch	7565	WECO	
K-56	2C3329A/K1	Key	Built-in key assembly	Telegraph key	5562	WECO	
N-52	2C3329A/P1	Data plate	Data plate. A write-in plate where exact frequencies of transmitters are shown	To indicate transmitter frequency	6802	WECO	
R-66	3Z6051-1	Resistor	510 ohms ± 10%, 1/3 watt, carbon	Mic. line series normally short-circuited, see Paragraph 9f in this book.	6005	AB	E
S-50	2C3329A/S2	Switch	TONE-CW-VOICE switch, 3 position, multi-circuit	TONE-CW-VOICE selector switch	7104	WECO	
S-51	3Z9845-8	Switch	SPST ON-OFF switch	Main L. V. power switch for trans. equip.	1516	WECO	
S-52	2C3329A/S1	Switch	TRANSMITTER SELECTION switch, 4-position, multi-circuit	Trans. selector switch	7097	WECO	
S-53	3Z9845-8	Switch	SPST toggle for short-circuiting R-66	Connected across R-66	1516	WECO	
RADIO CONTROL BOX MOUNTING FT-228-A (2Z6721-228A)							
	2Z8609-8/S1	Stud	Snapslide stud	For snapslide locking	1450	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO CONTROL PANEL C570B/A (FOR RADIO RECEIVERS)				
A80		PANEL	Aluminum Panel 2-5/8" x 5"	Mounting Base		Stratford	50B13057
A81		PLATE	Plastic Plate	Lighting Legend		Supreme	50B13067
A82		BRACKET	Bracket for 0-58	Remote Tuning		Stratford	49B13330
A83		CLAMP	Clamp, Cable	Clamp, Cable		Stratford	AN742-5C
057		COUPLING	Coupling, Part of 0-59	Assembly connects to Spline		Stratford	49A13337
V57		LAMP	Light, 28 Volt	Panel Lighting		GE	327
J68		RECEPTACLE	Receptacle, Light	Panel Lighting		Grimes	NS25010-1
N53		DIAL	Dial MX-1089/U (190-550KC)	Remote Tuning		Stratford	50B13215
N54		DIAL	Dial MX-1090/U (3-6MC)	Remote Tuning		Stratford	50B13059
E88	292241703	KNOB	Knob, Volume	Gain Control		Dimco Gray	50B13038
058		SPLINE	Spline, part of 0-59 Assembly	Connects to Tuning Shaft		Stratford	49A13336
059		GEARING UNIT	Gearing Unit Assembly	To Remote Tuning		Stratford	49B13335
060	25274N/S2	SLEEVE	Sleeve 1/2 x 27 thread	Fastening For Tuning Shaft		Stratford	6397
E89	2C3328A/KL	KNOB	Knob	For Remote Tuning		Stratford	7955
E90	2C3328A/LI	LEVER	Lever, Switch	CW-OFF-MCW		WECO	5444
A84		SPACER	Spacer, 1/4" Dia X 5/10" lg.	Gearing Unit Spacer		Stratford	NAS42DD4-20
S54		SWITCH	CW-OFF-MCW Switch	CW-OFF-MCW Switching		Stratford	6536
R79		RESISTOR	Variable 0-50,000 ohms	Gain Control		IRC	6488

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS				
	2C4373A.1	Radio Receiver	BC-453-A (190-550 KC)				
	2C4373B.1	Radio Receiver	BC-453-B (190-550 KC)				
	2C4374A.1	Radio Receiver	BC-454-A (3.0-6.0 MC)				
	2C4374B.1	Radio Receiver	BC-454-B (3.0-6.0 MC)				
	2C4375A.1	Radio Receiver	BC-455-A (6.0-9.1 MC)				
	2C4375B.1	Radio Receiver	BC-455-B (6.0-9.1 MC)				
A-3	2C4373A/S1	Shield	Shield over coupling receptacle J-1	Protection of J-1	5691	WECO	
A-4	2C4373A/S2	Shield	Shield over gang capacitor	R-F shield and dust protection	5738	WECO	
A-6	2C4373A/C1	Cover	Cover over tube compartment	Covers tube compartment	6266	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
A-7	2C4373A/S3	Shield	Shield over chassis	R-F shield and dust protection	7629	WECO	
A-11	2Z8496	Shock absorber	Shock absorber assembly for dynamotor	Prevents dyn. vibration from affecting receiver	4681	WECO	
A-12	2C4373A/P2	Plate	Mounting plate, on 1st I-F	Mounting of 1st I-F	4638	WECO	
A-13	2C4373A/P3	Plate	Mounting plate, on 2nd I-F	Mounting of 2nd I-F	5220	WECO	
A-14	2C4373A/P2	Plate	Same as A-12 but assembled to 3rd I-F with different orientation	Mounting of 3rd I-F	4638	WECO	
A-18	2C4373A/C2	Cover	Cover (under side of chassis)	Covers bottom of chassis	5508	WECO	
A-34	2C4373A/P1	Panel assembly	Panel assembly, includes mounting feet and terminal strips	Mounting for ⅓ watt resistors in any one group as follows: R-1, R-7, R-8, R-10 R-4, R-5, R-9, R-11 R-12, R-13, R-18, R-19 R-16, R-17, R-20, R-21			
C-1		Capacitor	For 190-550 kc and 3-6 mc receivers	Ant. series			
	3D9011-1		Fixed, ceramic, 11 ± 0.5 mmf, 1000 volts, zero mmf/mmf/°C		9046	CL	807
			or				
	3D9011-1		Fixed, mica, 11 ± 1 mmf		5603	WECO	
			For 6-9.1 mc receivers				
	3D9008E5.2		Fixed, ceramic, 8.5 ± 0.5 mmf, 1000 volts, zero mmf/mmf/°C		9045	CL	807
			or				
	3D9008E5.2		Fixed, mica, 8.5 ± 0.7 mmf		5603	WECO	
C-2	3D9015V-6	Capacitor	Variable, air, △C approximately 15 mmf	Input alignment	5676	WECO	
C-3		Capacitor	Fixed, ceramic, 100 mmf ± 20%, 500 volts, temperature coefficient negative 750 x 10^{-6} mmf/mmf/°C	R-F amp. grid blocking	ES-694953	ERIE	B or L
			or				
			Fixed, ceramic, 100 mmf ± 20%, 500 volts, temperature coefficient negative 750 x 10^{-6} mmf/mmf/°C		ES-694953	CL	D
			or				
	3D9100-59		Fixed, mica, 100 mmf ± 20%, 400 volts		4520	CD	5

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
C-4 (A to G)		Capacitor	Equal-section three-gang capacitor with trimmers	Preselector and r-f oscillator			
	3D9346		For 190-550 kc receivers, △C approximately 346 mmf		3936	WECO	
	3D9147-1		For 3-6 mc receivers, △C approximately 147 mmf		4601	WECO	
	3D9062		For 6-9.1 mc receivers, △C approximately 62 mmf		6558	WECO	
C-5	3DB3.4	Capacitor	3 mf dry electrolytic, 300 volts, impedance at 60 cycles not over 1750 ohms, special	Gain control line filter	ES-692651 or 7582	CD, PRM, SPRAGUE	
C-6 (A, B, C)	3DA50-32	Capacitor	0.05/0.05/0.05 mf ± 15%, 300 volts, paper, special		ES-692644 or 5414	CD, PRM, SPRAGUE	
			A section	Mixer plate by-pass			
			B section	Gain control line by-pass			
			C section	1st r-f cathode by-pass			
C-7 (A, B, C)	3DA50-32	Capacitor	Same as C-6		ES-692644 or 5414	CD, PRM, SPRAGUE	
			A section	Mixer screen by-pass			
			B section	Mixer cathode by-pass			
			C section	AVC line by-pass			
C-8		Capacitor	Fixed, ceramic, 200 mmf ± 20%, 500 volts, temperature coefficient negative 750 x 10-6 mmf/mmf/°C	R-F osc. grid blocking	ES-694955	ERIE	M or C
			or				
			Fixed, ceramic, 200 mmf ± 20%, 500 volts, temperature coefficient negative 750 x 10-6 mmf/mmf/°C		ES-694955	CL	C
			or				
	3D9200-29		Fixed, mica, 200 mmf ± 20%, 400 volts		4513	CD	5
C-9	3D9040V-2	Capacitor	Variable, air, △C approximately 40 mmf	R-F osc. series trimmer	3865	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
C-10		Capacitor	Fixed, mica, 400 volts For 190-550 kc receivers	R-F osc. fixed series			
			690 ± 5 mmf in two units		ES-694722 (2 req'd)	WECO	
			or				
			690 ± 5 mmf		ES-694724 (1 req'd)	WECO	
			or				
			690 ± 5 mmf in two units. These units may be 340 mmf, 345 mmf or 350 mmf, each ± 2.5 mmf, provided the sum is equal to 690 ± 5 mmf		6701 (2 req'd)	WECO	
			For 3-6 mc receivers				
			365 ± 7.5 mmf		ES-694723	WECO	
			or				
			365 ± 7.5 mmf (obtained from nominal 360, 365 and 370 mmf units, each ± 2.5 mmf)		6701	WECO	
			For 6-9.1 mc receivers				
			240 ± 7.5 mmf		ES-694721	WECO	
			or				
			240 ± 7.5 mmf (obtained from nominal 235, 240 or 245 mmf units, each ± 2.5 mmf)		7352	WECO	
C-9 and C-10		Capacitor unit assembly	Capacitor unit assembly, mounting fixed capacitor C-10 on frame of variable capacitor C-9				
	2S274N/C4		For 190-550 kc receivers		6075	WECO	
	2S274N/C3		For 3-6 mc receivers		5203	WECO	
	2S274N/C5		For 6-9.1 mc receivers		6077	WECO	
C-11	3D9003-9	Capacitor	Fixed, ceramic, 3 ± 0.5 mmf, temperature coefficient negative 750 x 10^{-6} mmf/mmf/°C ± 15%	R-F osc. temp. compensation	7020	CL	807
C-12	3D9180	Capacitor	Fixed, mica, 180 ± 2.5 mmf, 400 volts, part of assembly Z-1	Fixed part of 1st i-f tuning	ES-694719 or 5145	WECO	
C-13	3D9017V	Capacitor	Variable, air, △C approximately 17 mmf, part of assembly Z-1	1st i-f trimmer	3877, 4651 and 4653	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)

TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
C-14	3D9180	Capacitor	Fixed, mica, 400 volts, part of assembly Z-1	Coupling capacitor in 1st i-f coupling unit			
			For 190-550 kc and 3-6 mc receivers, 180 ± 2.5 mmf		ES-694719 or 5145	WECO	
			For 6-9.1 mc receivers 175 (+12.5 or −2.5) mmf or 180 ± 7.5 mmf (obtained from nominal 175, 180 or 185 mmf units, each ± 2.5 mmf)		ES-694718 5145	WECO WECO	
C-15	3DA50-32	Capacitor	Same as C-6		ES-692644 or 5414	CD, PRM, SPRAGUE	
			A section	Grid return by-pass, 1st and 2nd i-f			
			B section	1st i-f cathode by-pass			
			C section	CW osc. plate line filter			
C-16	3DA220	Capacitor	0.22/0.22/0.22 mf ± 20%, 300 volts, paper, special		ES-692643 or 5413	CD, PRM, SPRAGUE	
			A section	2nd i-f screen by-pass			
			B section	Dyn. H.V. filter			
			C section	Dyn. L.V. filter			
C-17	3D9180	Capacitor	Same as C-12, but part of assembly Z-2	Fixed part of 2nd i-f tuning	ES-694719 or 5145	WECO	
C-18	3D9017V	Capacitor	Same as C-13, but part of assembly Z-2	2nd i-f trimmer	3877, 4651 and 4653	WECO	
C-19	3D9180	Capacitor	Same as C-14, but part of assembly Z-2	Coupling capacitor in 2nd i-f coupling unit	ES-694718, ES-694719 or 5145	WECO	
C-20	3DA50-33	Capacitor	0.05/0.01/0.05 mf ± 20%, paper, 300 volts, special		5415	CD, PRM, SPRAGUE	
			A section	2nd i-f amp. cathode by-pass			
			B section	Not used			
			C section	2nd i-f amp. plate by-pass			
			or				
			0.05/0.05 mf ± 20%, paper, 300 volts, special		ES-692645	CD, PRM, SPRAGUE	
			A section	2nd i-f amp. cathode by-pass			
			B section	2nd i-f amp. plate by-pass			

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
C-21	3D9017V	Capacitor	Same as C-13, but part of assembly Z-3	3rd i-f trimmer	3877, 4651 and 4653	WECO	
C-22	3D9017V	Capacitor	Same as C-12, but part of assembly Z-3	Fixed part of 3rd i-f tuning	ES-694719 or 5145	WECO	
C-23	3D9180	Capacitor	Same as C-14, but part of assembly Z-3	Coupling capacitor in 3rd i-f coupling unit	ES-694718, ES-694719 or 5145	WECO	
C-24	3D9200-29	Capacitor	Same as C-8	Diode series res. by-pass	ES-694955 ES-694955 4513	ERIE CL CD	M or C C 5
C-25	3DA1-60	Capacitor	Fixed, mica, 0.001 mf ± 5%, 400 volts, part of CW osc. assembly Z-4	CW osc. plate by-pass	4157	CD	5
C-26		Capacitor	For 190-550 kc receivers	CW osc. grid blocking			
			Fixed, ceramic, 200 mmf ± 20% 500 volts, temperature coefficient negative 750 x 10-6 mmf/mmf/°C		ES-694955	ERIE	M
			or				
			Fixed, ceramic, 200 mmf ± 20% 500 volts, temperature coefficient negative 750 x 10-6 mmf/mmf/°C		ES-694955	CL	C
			or				
	3D9200-29		Fixed, mica, 200 mmf ± 20% 400 volts		4513	CD	5
			For 3-6 mc and 6-9.1 mc receivers				
			Fixed, ceramic, 100 mmf ± 20% 500 volts, temperature coefficient 750 x 10-6 mmf/mmf/°C		ES-694953	ERIE	B or L
			or				
			Fixed, ceramic, 100 mmf ± 20% 500 volts, temperature coefficient 750 x 10-6 mmf/mmf/°C		ES-694953	CL	D
			or				
	3D9100-59		Fixed, mica, 100 mmf ± 20% 400 volts		4520	CD	5

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)

TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
C-27		Capacitor	Fixed, mica, 400 volts, part of CW osc. assembly Z-4	Fixed part of CW osc. tuning			
			For 190-550 kc receivers				
			345 ± 2.5 mmf		ES-694722	WECO	
					or 6701	WECO	
			For 3-6 mc receivers		ES-694718	WECO	
			175 (+12.5 or −2.5) mmf				
			or				
			180 ± 7.5 mmf (obtained from nominal 175, 180 or 185 mmf units, each ± 2.5 mmf)		5145	WECO	
			For 6-9.1 mc receivers				
			193 ± 7.5 mmf		ES-694720	WECO	
			or				
			185 ± 2.5 mmf		5145	WECO	
C-28	3D9035V-5	Capacitor	Variable, air, △C approximately 34 mmf, part of CW osc. assembly Z-4	CW osc. trimmer	6696	WECO	
C-29	3DA6-29	Capacitor	Fixed, mica, 0.006 mf ± 5%, 400 volts	Audio coupling	4091	AV	1461
C-30	3DB15-7	Capacitor	15 mf, dry electrolytic, 35 volts, impedance at 60 cycles not greater than 350 ohms, special	Audio amp. cathode by-pass	ES-692646 or 5416	CD, PRM, SPRAGUE	
C-31	3DA1-61	Capacitor	Fixed, mica, 0.001 mf ± 20%, 400 volts	Output filter	4114	AV	1461
C-32	3DB5-7	Capacitor	5 mf, dry electrolytic, 300 volts, impedance at 60 cycles not greater than 1050 ohms, special	Dyn. H.V. filter	ES-692649 or 6350	CD, PRM, SPRAGUE	
C-33	3D9003-9	Capacitor	Fixed, ceramic, 3 ± 0.5 mmf, temperature coefficient negative 750 x 10^{-6} mmf/mmf/°C ± 15%, used only in the 190-550 kc receivers. In other receivers, C-33 is formed by the capacitances between pin plugs in the 2nd i-f receptacle and is less than 2 mmf.	CW osc. coupling	7020	CL	807
C-35	3D9750-4	Capacitor	Fixed, mica, 750 mmf ± 5%, 400 volts	Rec. output audio filter	4522	CD	5

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
C-36	3D9017V	Capacitor	Same as C-13, but part of assembly Z-1	Output circuit trimmer in Z-1	3877, 4651 and 4653	WECO	
C-37	3D9017V	Capacitor	Same as C-13, but part of assembly Z-2	Output circuit trimmer in Z-2	3877, 4651 and 4653	WECO	
C-38	3D9017V	Capacitor	Same as C-13, but part of assembly Z-3	Output circuit trimmer in Z-3	3877, 4651 and 4653	WECO	
C-39		Capacitor	Used in 190-550 kc receivers only	Across pri. of r-f amp.			
			Fixed, ceramic, 120 mmf ± 2.5%, 500 volts, temperature coefficient zero mmf/mmf/°C		ES-694954	ERIE	D
			or				
			Fixed, ceramic, 120 mmf ± 2.5%, 500 volts, temperature coefficient zero mmf/mmf/°C		ES-694954	CL	C
			or				
	3D9120-3		Fixed, mica, 120 mmf ± 2.5%, 400 volts		8013	CD	5RS
E-1	3Z509	Binding Post	Antenna binding post	Ant. connection	4667	WECO	
E-3	2C4373A/C5	Cap	Screw cap, top of assemblies Z-1, Z-2, Z-3	Covers opening on top of i-f coupling units	ES-690532 or 4664	WECO	
E-4	2C4373A/J1	Insulator	Insulators for antenna binding post	Insulation			
			A section, outside		3485	WECO	
			B section, inside		6597	WECO	
			(1 washer 6481 and 1 washer 5727 required to complete assembly)				
E-8	2C4373A/C3	Clip	Grid clip assembly	Connects to control grid of mixer	4754	WECO	
E-9	2Z5853	Knob	ALIGN INPUT control knob	For ant. input alignment	ES-690856 or 4713	WECO	
H-3	2Z8609-4	Snapslide	Formed snapslide. Parts of the mechanism include:	Fastener			
	2Z8609-3 S1		Snapslide (on cover)		3888	WECO	
	2Z8609-3 G1		Snapslide guide (on cover)		3887	WECO	
	2Z8609-3 S3		Snapslide button (on cover)		3890	WECO	
	2Z8609-4 S1		Snapslide stud (on shield)		4708	WECO	
	2Z8609-3 W1		Washer (on cover)		3889		

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
H-5	2C4373A/S4	Stud	Stud	Dyn. orientation	5480	WECO	
H-6	2C4373A/P1	Panel	Typical resistor panel assembly	For carbon resistors	ES-695384 or 5452	WECO	
H-10	2C4373A/S5	Stud	Conical stud	For rec. locking	4710	WECO	
J-1	2Z7412-13	Receptacle	Coupling receptacle assembly, 8-circuit	To adapter	4724	WECO	
J-2	2Z7412-1	Receptacle	Coupling receptacle assembly, 3-circuit	To dynamotor	4718	WECO	
J-3	2Z7251	Plug	Plug assembly, 7-circuit	To rec. rack	5488	WECO	
J-28	2Z7412-3	Receptacle	Typical i-f coupling unit receptacle assembly	To i-f coupling unit	4723	WECO	
J-29	2Z7412-2	Receptacle	Typical r-f coil receptacle assembly	To r-f coil	4722	WECO	
L-1	2C4373A/J2	Inductor	The inductance is set, with the coil in the shield can, by means of an adjustable iron core. This core is subsequently locked in place and sealed. Part of r-f coil set assembly Z-5	Input tuning			
			For 190-550 kc receivers		6187	WECO	
			For 3-6 mc receivers		6229	WECO	
			For 6-9.1 mc receivers		6236	WECO	
L-2, L-3	2C4373A/J2	Inductors	The inductance of L-3 is set, with the coils in the shield can, by means of an adjustable iron core. This core is subsequently locked in place and sealed. Part of r-f coil set assembly Z-5	Mixer input r-f transformer			
			For 190-550 kc receivers		6189	WECO	
			For 3-6 mc receivers		6231	WECO	
			For 6-9.1 mc receivers		6238	WECO	

*See Table 21, Index to Suppliers.

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TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
L-4, L-5	2C4373A/J2	Inductors	The inductance of L-5 is set, with the coils in the shield can, by means of an adjustable iron core. This core is subsequently locked in place and sealed. Part of coil set assembly Z-5	R-F osc.			
			For 190-550 kc receivers		6192	WECO	
			For 3-6 mc receivers		6233	WECO	
			For 6-9.1 mc receivers		6240	WECO	
L-6, L-7	2C4373A/J3	Inductors	Part of 1st i-f coupling unit assembly Z-1	1st I-F			
			For 190-550 kc receivers		4639 for L-6, 4703 for L-7.	WECO WECO	
			For 3-6 mc receivers		5084 (2 req'd)	WECO	
			For 6-9.1 mc receivers		7350	WECO	
L-8, L-9	2C4373A/J4	Inductors	Part of 2nd i-f coupling unit assembly Z-2	2nd I-F			
			For 190-550 kc receivers		7334 for L-8, 4640 for L-9.	WECO WECO	
			For 3-6 mc receivers		5084 (2 req'd)	WECO	
			For 6-9.1 mc receivers		7350	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
L-10, L-11	2C4373A/J5	Inductors	Part of 3rd i-f coupling unit assembly Z-3	3rd I-F			
			For 190-550 kc receivers		7334 for L-10, 4640 for L-11.	WECO	
			For 3-6 mc receivers		7345 (2 req'd)	WECO	
			For 6-9.1 mc receivers		7348	WECO	
L-12, L-13	2C4373A/J6	Inductors	Part of CW osc. assembly Z-4	CW Osc.			
			For 190-550 kc receivers		7314	WECO	
			For 3-6 mc receivers		7317	WECO	
			For 6-9.1 mc receivers		7333	WECO	
L-14	3F2997-1	Inductor	R-F choke, 112 microhenries ± 10%, d-c resistance not over 0.15 ohm	R-F choke	5546	WECO	
L-15	3F2997-2	Inductor	A-F choke, 3 henries with 0.05 ampere d-c, d-c resistance 325 ohms ± 15%	A-F choke	5634	WECO	
N-1		Dial	Dial	Receiver tuning dial			
	2C4373A/D1		For 190-550 kc receivers		5613	WECO	
	2C4374A/D1		For 3-6 mc receivers		5622	WECO	
	2C4375A/D1		For 6-9.1 mc receivers		5608	WECO	
O-5	2S274N/S2	Sleeve	Sleeve, 1/2 x 27 thread	Fastening for tuning shaft	6397	WECO	
P-5	2Z7066-2	Plug	Pin plug assembly (on dynamotor receptacle assembly) Note: Make replacements of Pin Plug Assembly 3995 with Pin Plug and Terminal Assembly 7949 consisting of a special pin plug assembly, nut and soldering terminal.	Connector	3995 (See note regarding replacement)	WECO	
R-1	3Z6062-1	Resistor	620 ohms ± 10%, ⅓ watt, carbon	1st r-f cathode bias	6004	AB	E
R-2	3Z6802-7	Resistor	2 megohms ± 5%, ⅓ watt, metallized	R-F amp. grid	4439	IRC	F ⅓

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
R-3	3Z6651-3	Resistor	51,000 ohms ± 10%, ⅓ watt, carbon, part of r-f osc. Z-5C	R-F osc. grid	4569	AB	E
R-4	3Z6062-1	Resistor	Same as R-1	Mixer cathode bias	6004	AB	E
R-5	3Z6715-16	Resistor	150,000 ohms ± 10%, ⅓ watt, carbon	AVC line decoupling	4571	AB	E
R-6		Resistor	⅓ watt, carbon, part of R-F osc. Z-5C	R-F osc. series plate			
	3Z6751-1		For 190-550 kc receivers, 510,000 ohms ± 10%		4570	AB	E
			For 3-6 mc receivers, 200,000 ohms ±10%		4502	AB	E
	3Z6715-16		For 6-9.1 mc receivers, 150,000 ohms ±10%		4571	AB	E
R-7	3Z6020-21	Resistor	200 ohms ± 10%, ⅓ watt, carbon	Mixer plate decoupling	4497	AB	E
R-8	3Z6020-21	Resistor	Same as R-7	R-F amp. and mixer screen decoupling	4497	AB	E
R-9	3Z6062-1	Resistor	Same as R-1	1st i-f cathode bias	6004	AB	E
R-10	3Z6736	Resistor	360,000 ohms ± 10%, ⅓ watt, carbon	H.V. bleeder to gain control	8032	AB	E
R-11	3Z6700-48	Resistor	100,000 ohms ± 10%, ⅓ watt, carbon	AVC resistor	4501	AB	E
R-12	3Z6051-1	Resistor	510 ohms ± 10%, ⅓ watt, carbon	2nd i-f cathode bias	6005	AB	E
R-13	3Z6020-21	Resistor	Same as R-7	2nd i-f plate decoupling	4497	AB	E
R-14		Resistor	Same as R-3 for 190-550 kc receivers and same as R-11 for 3-6 mc and 6-9.1 mc receivers	CW osc. grid		AB	E
R-15		Resistor	⅓ watt, carbon	CW osc. plate decoupling and dropping			
	3Z6620-45		For 190-550 kc receivers, 20,000 ohms ± 10%		4510	AB	E
	3Z6501-1		For 3-6 mc and 6-9.1 mc receivers, 5,100 ohms ± 10%		6001	AB	E

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
R-16, R-17		Resistor	⅓ watt, carbon	CW osc. plate dropping			
	3Z6715-16		For 190-550 kc receivers, 150,000 ohms ± 10%		4571	AB	E
	3Z6651-3		For 3-6 mc and 6-9.1 mc receivers, 51,000 ohms ± 10%		4569	AB	E
R-18	3Z6757-1	Resistor	510,000 ohms ± 10%, ⅓ watt, carbon	Diode series	4570	AB	E
R-19	3Z6700-48	Resistor	Same as R-11	R-F decoupling	4501	AB	E
R-20	3Z6802-8	Resistor	2 megohms ± 10%, ⅓ watt, carbon	Grid resistor audio amp.	4503	AB	E
R-21	3Z6150-24	Resistor	1500 ohms ± 10%, ⅓ watt, carbon	Audio amp. cathode bias	4506	AB	E
R-22, R-23	3Z6570-9	Resistor	7000 ohms ± 2%, 7 watts, wire wound, special	High-voltage bleeder	5895	WL	
**T-1	2Z9947-4	Transformer	Primary, 4000 turns #40 enamelled wire, d-c resistance 1028-1300 ohms (terminals 1-2), center-tapped (terminal 5). Secondary, 1800 turns #38 enamelled wire, d-c resistance 292-370 ohms (terminal 3-case)	Receiver output	6308	WECO	
***T-1	2Z9947-4.1	Transformer	Primary, 4000 turns #40 enamelled wire, d-c resistance 1028-1300 ohms (terminals 1-2), center-tapped (terminal 5). Secondary, 1800 turns #38 enamelled wire, d-c resistance 292-370 ohms (terminal 3-case), secondary tapped (terminal 6), 1325 turns, d-c resistance 86-110 ohms (terminal 6-case)	Receiver output	ES-691027	WECO	
V-1	2Z5889	Neon lamp	Neon lamp	R-F input voltage limiter	5913	GE	NE-9
V-2	2Z5889	Neon lamp	Same as V-1	A-F output voltage limiter	5913	GE	NE-9
V-3	2T131	Tube VT-131	Triple grid super-control r-f amp.	R-F amp.	—	RCA, KEN	12SK7

*See Table 21, Index to Suppliers.

**Used only in Radio Receivers BC-453-A, BC-454-A and BC-455-A.

***Used only in Radio Receivers BC-453-B, BC-454-B and BC-455-B.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
V-4	2T132	Tube VT-132	Triode-hexode mixer	Mixer	—	RCA, KEN	12K8
V-5	2T131	Tube VT-131	Same as V-3	1st i-f amp.	—	RCA, KEN	12SK7
V-6	2T131	Tube VT-131	Same as V-3	2nd i-f amp.	—	RCA, KEN	12SK7
V-7	2T133	Tube VT-133	Duo-diode-triode used as diode detector and triode CW osc.	Det.-CW osc.	—	RCA, KEN	12SR7
V-8	2T134	Tube VT-134	Beam tetrode audio power amplifier	Audio amp.	—	RCA, KEN	12A6
X-1	2C2500-456A.1/S1	Socket	Octal-base tube socket assembly, special. Amphenol #4 retainer ring is part of this assembly.	For all octal-base tubes in radio receiver	6559	AMPH, CINCH	
		Washer	Washer, Bakelite, 1.171 I.D., 1.312 O.D., 0.020 thick, required in assembly of each octal-base tube socket in receiver		6566	WECO	
Z-1		Coupling unit	1st i-f coupling unit, complete assembly including shield can and mounting plate	1st I-F			
	2Z3296		For 190-550 kc receivers		4698	WECO	
	2Z3296-1		For 3-6 mc receivers		7274	WECO	
	2Z3296-2		For 6-9.1 mc receivers		7277	WECO	
Z-2		Coupling unit	2nd i-f coupling unit, complete assembly including shield can and mounting plate	2nd I-F			
	2Z3297		For 190-550 kc receivers		7267	WECO	
	2Z3297-1		For 3-6 mc receivers		7275	WECO	
	2Z3297-2		For 6-9.1 mc receivers		7278	WECO	
Z-3		Coupling unit	3rd i-f coupling unit, complete assembly including shield can and mounting plate	3rd I-F			
	2Z3298		For 190-550 kc receivers		4677	WECO	
	2Z3298-1		For 3-6 mc receivers		7276	WECO	
	2Z3298-2		For 6-9.1 mc receivers		7279	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO RECEIVERS (Continued)				
Z-4		CW osc.	CW osc., complete assembly including shield can	CW osc.			
	2C4373A/P4		For 190-550 kc receivers		5852	WECO	
	2C4374A/P1		For 3-6 mc receivers		5855	WECO	
	2C4375A/P1		For 6-9.1 mc receivers		5856	WECO	
Z-5 (A, B, C)		R-F coil set	R-F coil set, complete assembly including antenna coil, Z-5A, r-f amp. Z-5B, and r-f osc. Z-5C, in shield cans, mounted on a cover	R-F coil set			
	2C4373A/C4		For 190-550 kc receivers		6184	WECO	
	2C4374A/C1		For 3-6 mc receivers		6227	WECO	
	2C4375A/C1		For 6-9.1 mc receivers		6234	WECO	
			RADIO TRANSMITTERS				
	2C6596A.1	Radio Transmitter	BC-696-A (3.0-4.0 mc) Equipped with 3,500 kc crystal unit (DC-8-C, DC-8-D or DC-8-K) and set of tubes.				
	2C6397A.1	Radio Transmitter	BC-457-A (4.0-5.3 mc) Equipped with 4,600 kc crystal unit (DC-8-C, DC-8-D or DC-8-K) and set of tubes.				
	2C6398A.1	Radio Transmitter	BC-458-A (5.3-7.0 mc) Equipped with 6,200 kc crystal unit (DC-8-C, DC-8-D or DC-8-K) and set of tubes.				
	2C6399A.1	Radio Transmitter	BC-459-A (7.0-9.1 mc) Equipped with 8,000 kc crystal unit (DC-8-C, DC-8-D or DC-8-K) and set of tubes.				
A-50	2C6397A/S1	Shield	Shield over chassis	R-F shield and mechanical protection	7592	WECO	
A-51	2C6397A/C1	Cover	Cover over P.A. tubes	Cover over tube compartment	7398	WECO	
A-52	2C6397A/C2	Cover	Hinged cover with metallic mirror on under side for viewing resonance indicator tube	Cover over tube and crystal compartment	7459	WECO	
A-53	2C6397A/C3	Cover	Cover with calibrated window, P.A. tuning coil opening	Covers opening to ant. tuning coil	ES-695549 or 7303	WECO	
A-54	2C6397A/C4	Cover	Cover over bottom of chassis	Covers bottom of chassis	7397	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO TRANSMITTERS (Continued)				
A-55	2C6397A/S2	Shield	Shield over M.O. coil and capacitor	R-F shield and mechanical protection	5501	WECO	
A-56	2C6397A/J1	Insulator	Ceramic insulator and support for ant. tuning coil	Support for L-52	7704	WECO	
C-58 (A, B, C)	3DA50-32	Capacitor	0.05/0.05/0.05 mf ± 15%, paper, 300 volts, special		ES-692644 or 5414	CD, PRM, SPRAGUE	
			A section	M.O. plate by-pass			
			B section	Res. ind. plate by-pass			
			C section	R-F amp. grid by-pass			
C-59	3D9175	Capacitor	Fixed, mica, 175, 180, or 185 mmf, ± 2.5 mmf, 400 volts	M.O. grid	5145	WECO	
			or				
			Fixed, mica, 175 mmf plus 12.5 mmf or minus 2.5 mmf, 1000 volts, special		ES-694718	CL, ERIE	
	2S274N/C9	Capacitor assembly	One of above capacitors assembled to mounting		7494	WECO	
C-60	2C6397A/C5	Capacitor	Adjustable air capacitor	M.O. padding	4990	WECO	
C-61	3DA6-29	Capacitor	Fixed, mica, 0.006 mf ± 5%, 400 volts	M.O. heater line	4091	AV	1461
C-62	2C6397A/C7	Capacitor	Fixed neutralizing capacitor assembly	Neutralizing	7193	WECO	
C-63	2C6397A/C6	Capacitor	Variable air capacitor (This capacitor assembled with flexible shaft O-56, drawing No. 7309, and variable air capacitor C-65, drawing No. 7321, may be obtained in one unit per drawing No. ES-692806)	M.O. tuning	5032	WECO	
C-64	3DA2-64	Capacitor	Fixed, mica, 0.002 mf ± 5%, 1000 volts	P.A. screen by-pass	4190	CD	
C-65	2C6397A/C8	Capacitor	Variable air capacitor (See Description C-63)	P.A. tuning	7321	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO TRANSMITTERS (Continued)				
C-66	3DA10-103	Capacitor	Fixed, mica, 0.01 mf ± 5%, 1200 volts	R-F amp. plate by-pass	7012	CD	4
	2S274N/C8	Capacitor Assembly	Above capacitor assembled to mounting bracket		7202	WECO	
C-67	2C6397A/C9	Capacitor	Adjustable air capacitor	P.A. padding	7324	WECO	
C-68	3D9003-9	Capacitor	Fixed, ceramic, 3 ± 0.5 mmf, temperature coefficient negative 0.00075 mmf/mmf/°C, ± 15%	M.O. temp. compensating	7020	CL	807
E-50	3Z509-1	Binding post	Ant. binding post	Ant. binding post	ES-694806 or 7663	WECO	
E-51 (A, B)	2C6397A/J3	Insulator	Ant. binding post insulator, 2 sections	Insulation	7659	WECO	
E-52	2Z5852	Knob	FREQUENCY tuning knob	For FREQUENCY tuning	ES-690852 or 7389	WECO	
E-53	2Z5852-2	Knob	LOCK knob	For locking FREQUENCY control	ES-690854 or 7199	WECO	
E-54	2Z5790-2	Knob	LOCK knob	For locking ANT. INDUCTANCE control	ES-690854 or 7199	WECO	
E-56	2Z5790-1	Knob	ANT. COUPLING control knob	For ANT. COUPLING control	ES-690859 or 7178	WECO	
E-57	2Z5790-2	Knob	LOCK knob	For locking ANT. COUPLING control	ES-690854 or 7199	WECO	
E-58	2C6397A/S4	Screw	M.O. inductance adjusting screw, with iron core attached, part of A-55	For adjusting inductance of M.O. coil	—		
E-59	2C6397A/S5	Screw	P.A. inductance adjusting screw, with iron core attached, part of T-54	For adjusting inductance of P.A. coil	—		
E-60	2C2500-456A.1/C1	Clip	P.A. plate clip	Connects to plate of Tube VT-136	2313	WECO	
E-61		Insulator	Mica insulator assembly in chassis	Insulation	7152	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO TRANSMITTERS (Continued)				
E-62	2C6397A/G1	Guide	Guide to M.O. trimmer	Screw driver guide for trimming M.O. capacitors	7290	WECO	
H-50, H-51	2Z8609-4	Snapslide	Formed snapslide assembly. Parts of the mechanism include:	Fastener			
	2Z8609-3/S1		Snapslide (on cover)		3888	WECO	
	2Z8609-3/G1		Guide (on cover)		3887	WECO	
	2Z8609-3/S3		Button (on cover)		3890	WECO	
	2Z8609-4/S1		Stud (on shield)		4708	WECO	
	2Z8609-3/W1		Washer (on cover)		3889	WECO	
H-52	2Z8609-9	Snapslide	Formed snapslide cover assembly. Parts of the mechanism include:	Slide cover over hole to M.O. trimmer			
	2Z8609-9/C1		Snapslide cover (on shield)		5687	WECO	
	2Z8609-9/G1		Guide (on shield)		5496	WECO	
	2Z8609-9/S1		Button (on shield)		5498	WECO	
	2Z8609-9/W1		Washer (on shield)		5171	WECO	
H-53	2C3329A/C1	Snap cap	Large snap cap	Covers chassis hole to fine adjustment arm of P.A. capacitor	4192	UNCAR	
H-54	2C3329A/C10	Snap cap	Small snap cap	Covers chassis hole to shaft of P.A. capacitor	8018	UNCAR	
H-55	2Z8609-10	Snapslide	Formed snapslide assembly. Same as H-50 except stud on chassis is 7293	Fastener			
H-56	2C4373A/S5	Stud	Conical locking stud	For locking trans. in rack	4710	WECO	
J-64	2Z7251	Plug	Plug assembly, 7-contact	To trans. rack	5488	WECO	
K-53	2Z7669	Relay	Relay assembly. Includes:	Selector relay	7252	WECO	
	2Z7669/A1		Contact unit assembly		7255	WECO	
	2Z7669/C1		Coil winding, 4200 turns #38 enamelled wire d-c resistance 300 ohms		7254	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO TRANSMITTERS (Continued)				
K-54	2Z7668	Relay	Relay assembly. Includes:	Trans. output	7703	WECO	
	2Z7668/A1		Special arm assembly		7694	WECO	
	2Z7668/C1		Coil winding, 2500 turns #35 enamelled wire, d-c resistance 90 ohms		7702 (2 req'd)	WECO	
			Spring		7690	WECO	
K-57	2Z9038	Stud	Relay contact to ant. binding post E50(7663)	Ant. connection	7698	WECO	
	2Z9038/N1		Cap nut for above, relay contact to ant. binding post E50 (ES694806)		7689 ES-694806	WECO WECO	
K-58	2C6397A/C11	Contact	Spring contact unit assembly, includes arm with spring and contactor	Ant. coil connection	7706	WECO	
L-52		Inductor	Single layer coil	Ant. tuning			
	2C6596A/J1		For 3-4 mc transmitter		6033	WECO	
	2C6397A/J2		For 4-5.3 mc transmitter		6034	WECO	
	2C6398A/J1		For 5.3-7 mc transmitter		6035	WECO	
	2C6398A/J1		For 7-9.1 mc transmitter		6035	WECO	
N-50		Dial	Dial	Frequency calibration			
	2C6596A/D1		For 3-4 mc transmitter		7522	WECO	
	2C6397A/D1		For 4-5.3 mc transmitter		7524	WECO	
	2C6398A/D1		For 5.3-7 mc transmitter		7526	WECO	
	2C6399A/D1		For 7-9.1 mc transmitter		7528	WECO	
N-51	2C6397A/C12	Chart	Chart for recording tuning data	Data plate	6801	WECO	
O-51	2C6397A/G2	Gear	Gear for ant. tuning control	Ant. tuning	7479	WECO	
O-52	2C6397A/G3	Gear	Driving gear for ant. coupling control	Coupling control	7174	WECO	
O-53	2C6397A/G4	Gear	Driving gear for ant. tuning control	Ant. tuning	7156	WECO	
O-54	2C6397A/G5	Gear	Gear for ant. coupling control, part of T-54 assembly	Ant. coupling	7239	WECO	
O-55		Contact unit assembly	Assembly of rod, contact roller, supporting springs and Bakelite base	Adjustable contact on ant. tuning coil L-52			
	2S274N/C10		For 3-4 mc and 4-5.3 mc transmitters		7145	WECO	
			For 5.3-7 mc and 7-9.1 mc transmitters		ES-692364	WECO	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO TRANSMITTERS (Continued)				
O-56	2C6397A/S3	Flexible shaft	Flexible shaft for tuning of M.O. capacitor (See Description C-63)	Tuning M.O.	7309	WECO	
R-67	3Z6651-3	Resistor	51,000 ohms ± 10%, ⅓ watt, carbon	Resonance indicator dropping res. to target and plate	4569	AB	E
R-68	3Z6002-13	Resistor	20 ohms ± 10%, ⅓ watt, carbon	M.O. plate decoupling	8033	AB	E
R-69	3Z6801-28	Resistor	1,000,000 ohms ± 10%, ⅓ watt, carbon	Resonance indicator plate	4170	AB	E
R-70		Resistor	⅓ watt, carbon	Resonance indicator cathode bias voltage divider			
	3Z6100-50		For 4-5.3 mc transmitter and 5.3-7 mc transmitter, 1000 ohms ± 10%		4136	AB	E
	3Z6150-24		For 7-9.1 mc transmitter, and 3-4 mc transmitter, 1500 ohms ± 10%		4506	AB	E
R-71	3Z4926	Resistor	126 ohms ± 2%, 7 watts, wire wound, special	Heater current equalizer	7010	WL	
R-72	3Z6651-3	Resistor	51,000 ohms ± 10%, ⅓ watt, carbon	M.O. grid	4569	AB	E
R-73		Resistor	⅓ watt, carbon	Crystal decoupling			
	3Z6501-1		For 3-4 mc and 7-9.1 mc transmitters, 5,100 ohms ± 10%		6001	AB	E
	3Z6610-51		For 4-5.3 mc transmitter, 10,000 ohms ± 10%		4491	AB	E
	3Z6615-28		For 5.3-7 mc transmitter, 15,000 ohms ± 10%		4492	AB	E
R-74	3Z6615-28	Resistor	15,000 ohms ± 10%, ⅓ watt, carbon	P.A. grid bias	4492	AB	E
R-75	3Z6651-3	Resistor	51,000 ohms ± 10%, ⅓ watt, carbon	P.A. cathode cut-off bias	4569	AB	E
R-76	3Z6002-14	Resistor	20 ohms ± 10%, special, wire wound and treated. Must carry ¼ ampere continuously without deterioration, and must open circuit in not more than 2 seconds at a current of 1 ampere	P.A. plate decoupling and fuse	8044	SPRAGUE	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO TRANSMITTERS (Continued)				
R-77	3Z6039-3	Resistor	390 ohms ± 10%, ⅓ watt, carbon	Resonance indicator cathode bias voltage divider	6006	AB	E
R-78	3Z6005A1	Resistor	51 ohms ± 10%, ⅓ watt, carbon	P.A. screen decoupling	8035	AB	E
RL-50, RL-51	2C6397A/S6	Parasitic suppressor	R-F choke, consisting of a 51-ohm resistor (Allen-Bradley, Type E) with 9 turns of #32 enamelled copper wire wound over the resistor.	Prevents parasitic oscillations	7515	WECO	
T-53 (A, B, C)		M.O. coil	Master oscillator coil assembly.	M.O.			
	2C6596A/C1		For 3-4 mc transmitter		6029	WECO	
	2C6397A/C15		For 4-5.3 mc transmitter		6030	WECO	
	2C6398A/C1		For 5.3-7 mc transmitter		6031	WECO	
	2C6399A/C1		For 7-9.1 mc transmitter		6032	WECO	
T-54 (A, B)		P.A. coil	Power amplifier coil assembly	P.A.			
	2C6596A/C2		For 3-4 mc transmitter		7247	WECO	
	2C6397A/C14		For 4-5.3 mc transmitter		7248	WECO	
	2C6398A/C2		For 5.3-7 mc transmitter		7249	WECO	
	2C6399A/C2		For 7-9.1 mc transmitter		7250	WECO	
V-53	2T138	Tube VT-138	Electron ray	Resonance indicator	—	RCA, KEN	1629
V-54	2T137	Tube VT-137	Triode	Master-oscillator	—	RCA, KEN	1626
V-55, V-56	2T136	Tube VT-136	Beam tetrode	R-F power amp.	—	RCA, KEN	
X-52	2Z8683	Socket	Large 7-contact, special for Tube VT-136	For Tubes VT-136	5068	WECO	
X-53	2C2500-456A.1/S1	Socket	Octal-base tube socket, special. Amphenol #4 retainer ring is part of this assembly.	For all octal-base tubes in the radio transmitter	6559	AMPH, CINCH	

*See Table 21, Index to Suppliers.

TABLE 20 (Continued)
TABLE OF REPLACEABLE PARTS

Reference No.	Stock No.	Name of Part	Description	Function	Western Electric Company Dwg. No.	Supplier*	Supplier's Designation
			RADIO TRANSMITTERS (Continued)				
Y-50		Crystal Unit DC-8-C	Crystal in metal container with octal base	Resonator	7716	GE	32C401 G-19
			Transmitters Frequency				
	2Z3501-8C3500		3-4 mc 3500 kc				
	2Z3501-8C4600		4-5.3 mc 4600 kc				
	2Z3501-8C6200		5.3-7 mc 6200 kc				
	2Z3501-8C8000		7-9.1 mc 8000 kc				
		or DC-8-D	(Same as above)		7716	WECO	
		or DC-8-K	(Same as above)		ES-696017	WECO	

*See Table 21, Index to Suppliers.

TABLE 21

INDEX TO SUPPLIERS

Code Letters in Table 20	*Name of Supplier*	*Address*
AB	Allen-Bradley Company	Milwaukee, Wisconsin
AMPH	American Phenolic Corporation	Chicago, Illinois
AV	Aerovox Corporation	New Bedford, Massachusetts
CD	Cornell-Dubilier Corporation	South Plainfield, New Jersey
CL	Centralab	Milwaukee, Wisconsin
CINCH	Cinch Manufacturing Corporation	Chicago, Illinois
CONT	Continental Electric Company	Newark, New Jersey
ERIE	Erie Resistor Corporation	Erie, Pennsylvania
GE	General Electric Company	Schenectady, New York
IRC	International Resistance Company	Philadelphia, Pennsylvania
KEN	Ken-Rad Tube and Lamp Corporation	Owensboro, Kentucky
LTLF	Littelfuse Laboratories, Inc.	Chicago, Illinois
PRM	P. R. Mallory & Co.	Indianapolis, Indiana
RCA	RCA Manufacturing Company	Harrison, New Jersey
SPRAGUE	Sprague Specialties Company	North Adams, Massachusetts
UNCAR	United-Carr Fastener Company	Cambridge, Massachusetts
WL	Ward-Leonard Electric Company	Mount Vernon, New York
WECO	Western Electric Company	120 Broadway, New York, N. Y.
WSTH	Westinghouse Electric and Manufacturing Company	Pittsburgh, Pennsylvania
TECO	Thomson Equipment Corporation	Mineola, New York
	Stratford Pen Corporation	New York City, New York

TABLE 22

SCREWS, WASHERS, NUTS, ETC. LIKELY TO BE REQUIRED IN SERVICING RADIO SET SCR-274-N

Description	*Western Elec. Co. Dwg. No.*	*Signal Corps Stock No.*
SCREWS		
Special, brass, #2-52 x 2, nickel plated	5077	
Binding head, brass, #2-56 x 1/8, nickel plated	4378	6L6256-2.9
Binding head, brass, #2-56 x 5/32, nickel plated	8041	
Phillips, flathead, steel, #2-56 x 3/32, cadmium plated	7003	
Binding head, brass, #3-48 x 1/8, nickel plated	4134	6L6348-2.9
Binding head, brass, #3-48 x 5/32, black	6020	6L6348-2-1.57
Flathead, brass #3-48 x 3/16, nickel plated	8039	6L6348-3.7
Phillips, flathead, steel #3-48 x 3/16, cadmium plated	8050	6L6348-3.47S
Binding head, brass, #3-48 x 7/32, black	6017	6L6348-3-1.57
Phillips, flathead, steel #3-48 x 1/4, cadmium plated	8051	6L6348-4.47S
Binding head, brass, #3-48 x 3/16, nickel plated	4058	6L6348-3.9
Phillips, flathead, brass, #3-48 x 3/16, black	6010	6L6348-3.P59
Binding head, brass, #3-48 x 1/4, nickel plated	4168	6L6348-4.9
Binding head, brass, #3-48 x 9/32, black	8010	6L6348-4-1.57
Binding head, brass, #3-48 x 7/16, nickel plated	6018	6L6348-7.9
Binding head, brass, #3-48 x 15/32, black	8009	6L6348-7-1.57
Binding head, brass, #3-48 x 17/32, black	8017	6L6348-8-1.4B
Binding head, brass, #4-40 x 5/32, nickel plated	8008	6L6440-2-1.9
Binding head, brass, #4-40 x 3/16, nickel plated	7008	6L6440-3-9
Binding head, brass, #4-40 x 3/16, black	6019	6L6440-3.57
Flathead, brass, #4-40 x 3/16, nickel plated	7017	6L6440-3.37
Binding head, brass, #4-40 x 7/32, black	7014	6L6440-3-1.98
Binding head, brass, #4-40 x 1/4, nickel plated	6008	6L6440-4.9
Binding head, brass, #4-40 x 1/4, black	7007	6L6440-4.57
Binding head, brass, #4-40 x 3/4, black	8042	6L6440-12.57
Set screw, Bristo, cup pointed #6-32 x 5/32	4140	6L6632-2SC
Binding head, brass, #6-32 x 5/32, nickel plated	4285	6L6632-2-1.9
Binding head, brass, #6-32 x 3/16, nickel plated	4284	6L6632-3.9
Binding head, brass, #6-32 x 3/16, black	4047	6L6632-3.57
Binding head, brass, #6-32 x 7/32, black	4318	6L6632-3.1.57
Binding head, brass, #6-32 x 5/16, black	4289	6L6632-5.57

TABLE 22 (Continued)

SCREWS, WASHERS, NUTS, ETC. LIKELY TO BE REQUIRED IN SERVICING RADIO SET SCR-274-N

Description	*Western Elec. Co. Dwg. No.*	*Signal Corps Stock No.*
SCREWS (Continued)		
Binding head, brass, #6-32 x 5/16, nickel plated	4073	6L6632-5.9
Binding head, brass, #6-32 x 3/8, nickel plated	4038	6L6632-6.9
Round head, brass, #6-32 x 5/8, nickel plated	4099	6L6632-10.5
Binding head, brass, #6-32 x 1 7/16, black	4562	6L6632-23.9B
Fillister head, steel, #8-32 x 7/32, cadmium plated	6016	6L6832-3-1.12S
Fillister head, steel, #10-32 x 9/32, cadmium plated	4178	6L7032-4-1.12S
WASHERS		
Washer, Phosphor Bronze, .219″ O.D. x .140″ I.D. x .020, nickel plated	5520	2S274N/W1
Washer, brass, 0.250 O.D. x 0.104 I.D. x 0.016, nickel plated	4644	
Washer, beryllium copper, 0.281 O.D. x 0.116 I.D. x 0.016	5727	2S274N/W3
Washer, beryllium copper, 0.250 O.D. x 0.116 I.D. x 0.016	7730	
Washer, 1113X2B Hard rubber, .312 O.D. x .116″ I.D. x .008″ with key way radius .023″	6481	2S274N/W4
Shakeproof lock washer #1804, phosphor bronze, nickel plated	4212	6L72804
Shakeproof lock washer #1806, nickel plated	4211	6L72806
Shakeproof lock washer #1902, phosphor bronze, nickel plated	7001	6L72902
Shakeproof lock washer #1903, phosphor bronze, nickel plated	4558	6L72903
Shakeproof lock washer #1904, phosphor bronze, nickel plated	4242	6L72904
Shakeproof lock washer #1906, phosphor bronze, nickel plated	4042	6L72906
NUTS		
Hexagonal, brass, #2-56 x 0.156 x 0.050, cadmium plated	4376	
Hexagonal, brass, #3-48 x 3/16 x 0.062, nickel plated	4561	6L3103-48.3
Hexagonal, brass, #4-40 x 3/16 x 0.062, nickel plated	8040	
Hexagonal, brass, #4-40 x 7/32 x 0.078, nickel plated	6009	6L3104-40-3.1
Hexagonal, brass, #6-32 x 1/4 x 0.078, nickel plated	4041	6L3106-32.4
Hexagonal, brass, #10-32 x .312 x .094, nickel plated	4180	6L3110-32.3
Hexagonal, #17 aluminum 1/2″-27 x 1 1/16″ x .125″	1285	6L3508-27.11
Hexagonal cap, aluminum 1/2″-27 x .625″ x .250″, black	5863	2S274N/N1

TABLE 22 (Continued)

SCREWS, WASHERS, NUTS, ETC. LIKELY TO BE REQUIRED IN SERVICING RADIO SET SCR-274-N

Description	*Western Elec. Co. Dwg. No.*	*Signal Corps Stock No.*
PINS		
Groov, steel, 3/64″ x 3/16″, zinc plated	4166	6L3903-3
Groov, steel, 3/64″ x 1/4″, zinc plated	4156	6L3903-4
Groov, steel, 3/64″ x 9/32″, zinc plated	4174	6L3903-4.1
Groov, steel, 1/16″ x 1/4″, zinc plated	4541	6L3904-4
Groov, steel, 1/16″ x 7/16″, zinc plated	4158	6L3904-7
RIVETS		
Tubular, brass, .062″ x 5/64″, nickel plated	4567	2S274N/R1
TERMINALS		
Half hard brass, 90° bend, hole at either end, .204″ dia. and .093″ dia., silver plated	5170	2S274N/T5
Yellow brass, 90° bend, hole at either end, .136″ dia. and .062″ dia., silver plated	5216	2S274N/T2
Brass, 45° bend, hole at either end, .144″ dia. and .081″ dia., tin dipped	5837	2S274N/T3
Brass, 90° bend, hole at either end, .144″ dia. and .081″ dia., tin dipped	5838	2S274N/T4

TABLE 23

PIN PLUGS AND JACKS USED IN RECEPTACLE AND PLUG ASSEMBLIES OF RADIO SET SCR-274-N

Part	Dwg. No.	Stock No.	Additional Parts Required in Assembly with Pin Plug or Jack			Where Used			
						Sub-Assembly		Equipment Unit	Circuit Symbol
			Name of	Dwg. No.	No. Req.	Type of Assembly	Dwg. No.		
Pin Plug	*3995		Terminal	3873	1	Receptacle	4718	Radio Receiver	J-2
	*3995		Terminal	3873	1	Receptacle	4723	Radio Receiver	Z-1, Z-2, Z-3
	*3995		Terminal	3873	1	Receptacle	4724	Radio Receiver	J-1
	*3995		Terminal	3873	1	Receptacle	ES-691845	Radio Receiver	Z-1, Z-3
	4628	2S274N/P2	Terminal	3873	2	Receptacle	4722	Radio Receiver	Z-5 (A, B, C)
	4628		Terminal	3873	2	Receptacle	ES-691848	Radio Receiver	Z-5 B
	4628		Terminal	3873	2	Receptacle	ES-691849	Radio Receiver	Z-5 A
	4628		Terminal	3873	2	Receptacle	ES-695640	Radio Receiver	Z-5 C
	4629	2Z7066				Receptacle	5577	Mod. Unit, Rec. Racks	J-6, J-7, J-52
	4629					Receptacle	6418	Rec. Racks, Radio Control Boxes (Rec.)	J-21, J-22, J-23, J-25, J-26, J-27
	4629					Receptacle	7023	Trans. Racks, Ant. Relay Unit	J-60, J-61
	4629					Receptacle	7025	Mod. Unit, Trans. Racks	J-58, J-59
	4629					Receptacle	7027	Mod. Unit, Radio Control Box (Trans.)	J-54, J-55
	4630	2Z7066-1				Receptacle	5842	Rec. Racks, Trans. Racks	J-18, J-19, J-20, J-62, J-63, J-67, J-68
	4688	2S274N/P3				Receptacle	6485	Rec. Rack	J-24
						Receptacle	7024	Mod. Unit	J-53
	5542		††Terminal	5837 or	1	Receptacle	5844	Mod. Unit	J-51
				5838	1	Receptacle			
	*7949	2S274N/P4				Receptacle	4718	Radio Receiver	J-2
	*7949					Receptacle	4723	Radio Receiver	Z-1, Z-2, Z-3
	*7949					Receptacle	4724	Radio Receiver	J-1
	*7949					Receptacle	ES-691845	Radio Receiver	Z-1, Z-3

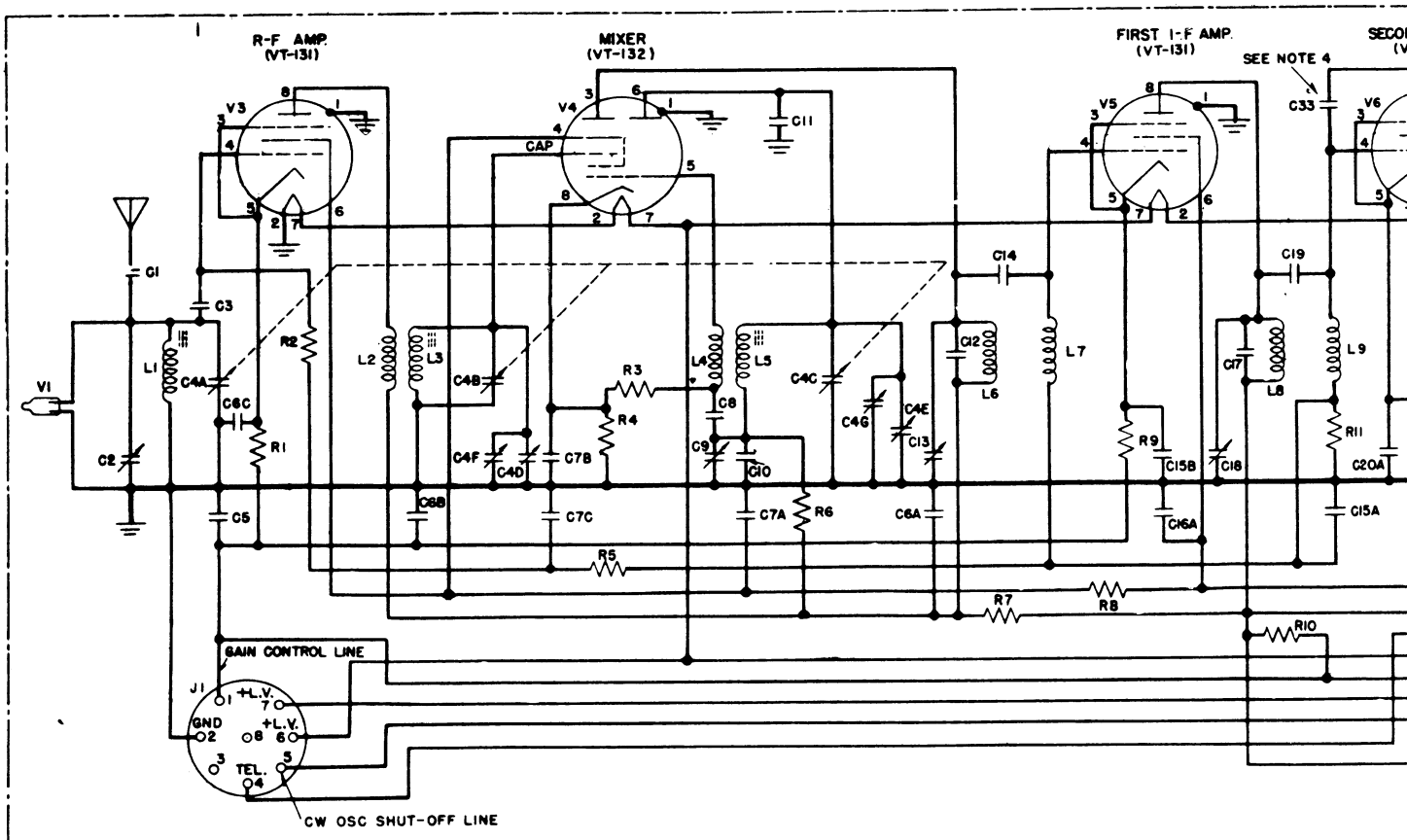
NOTES: *Pin plug 3995 and terminal 3873 are used in the receptacle assemblies indicated in the manufacture of new units. Pin plug 7949 includes terminal 3873. This assembly therefore is used as the field replacement part for pin plug 3995 and terminal 3873.
††For each 5844 receptacle assembly three pin plugs 5542, one terminal 5837 and two terminals 5838 are required.

TABLE 23 (Continued)

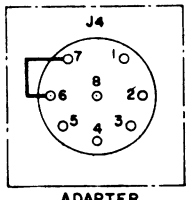
PIN PLUGS AND JACKS USED IN RECEPTACLE AND PLUG ASSEMBLIES OF RADIO SET SCR-274-N

Part	Dwg. No.	Stock No.	Additional Parts Required in Assembly with Pin Plug or Jack			Where Used			
						Sub-Assembly		Equipment Unit	Circuit Symbol
			Name of Part	Dwg. No.	No. Req.	Type of Assembly	Dwg. No.		
Jack	4637		Spacer	4636 and	1	Plug	4635	Radio Receiver	Z-1, Z-2, Z-3
			**Washer	4679	1	Plug	4721	Radio Receiver	Z-5 (A, B, C)
						Plug	ES-691847	Radio Receiver	Z-1, Z-3
						Plug	ES-691852	Radio Receiver	Z-5 B
						Plug	ES-691853	Radio Receiver	Z-5 A
	4637		Washer	4679 and	1	Plug	3929	Adapter (FT-230-A)	J-4
			Spacer	4636	1	Plug	†ES-690687	Adapter (FT-260-A)	J-30
	5169	2S274N/J1	Terminal	5170	1	Plug	5173	Dyn. (DM-33-A)	J-50
	5215	2S274N/J2	Terminal	5216	1	Plug	5211	Dyn. (DM-32-A)	J-5
	5228	2S274N/J3	Washer	5520	1	Plug	5488	Radio Rec., Radio Trans.	J-3, J-64

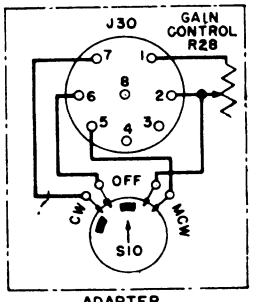
NOTES: **On later models, washer 4679 was discontinued and spacer 4636 was placed on side of insulating plate opposite to the terminal connection.
†Plug ES-690687 assembled to a mounting plate is part No. 6062.



TYPICAL RADIO RECEIVER BC-455-B (6-9.1 MC).



ADAPTER FT-230-A (REMOTE CONTROL)



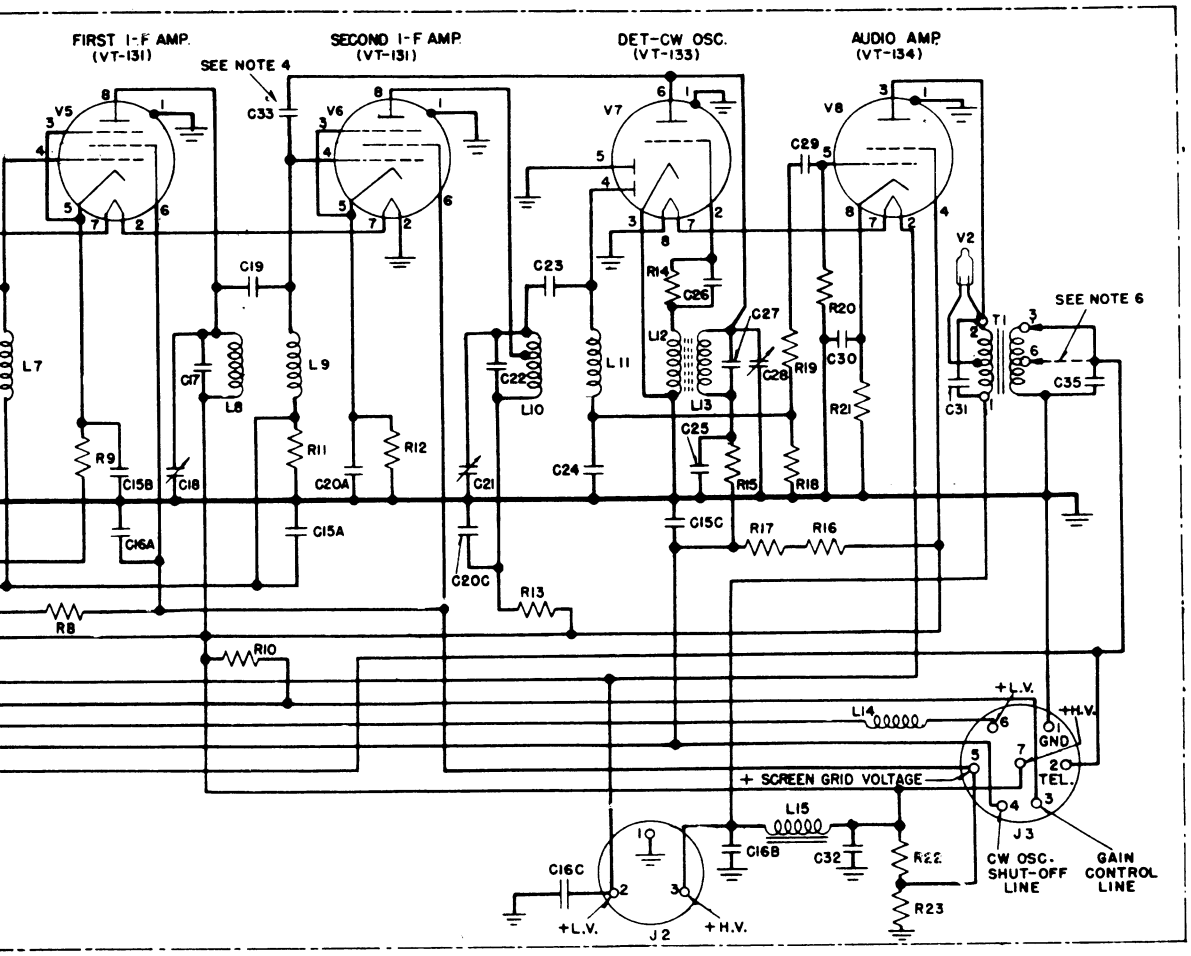
ADAPTER FT-260-A (LOCAL CONTROL)

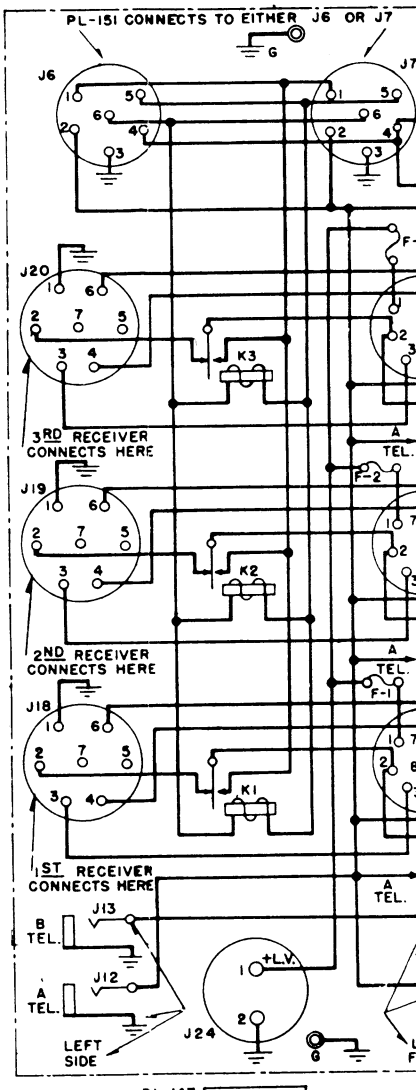
NOTES:

1. CAPACITOR ABBREVIATIONS:
   MMF - MICROMICROFARADS
   MF - MICROFARADS
2. ALL PLUGS AND RECEPTACLES ARE SHOWN AS VIEWED FROM THE OUTSIDE.
3. ALL RELAYS ARE SHOWN IN THE NON-ENERGIZED POSITION.
4. THE CAPACITANCE BETWEEN PIN PLUGS IN THE 2ND I-F RECEPTACLE CONSTITUTES C-33.
5. TERMINAL NUMBERS APPEARING ON RECEPTACLES OF JACKS IN RECEIVERS AND ADAPTERS AND ALL CIRCUIT SYMBOLS ARE FOR REFERENCE PURPOSES ONLY. THEY DO NOT APPEAR ON THE EQUIPMENT.
6. TRANSFORMER T1 IN BC-453-B, BC-454-B AND BC-455-B RECEIVERS IS PROVIDED WITH A TAP (TERM.6) FOR LOW IMPEDANCE HEADSETS. THESE THREE RECEIVERS AND RADIO RECEIVERS BC-453-A, BC-454-A AND BC-455-A ARE NORMALLY FURNISHED WITH CONNECTION SHOWN IN SOLID LINES FOR USE WITH HIGH IMPEDANCE (8000 OHMS) HEADSETS. RADIO RECEIVERS BC-453-B, BC-454-B, AND BC-455-B CAN BE CHANGED FOR USE WITH LOW IMPEDANCE HEADSETS BY REMOVING THE TWO WIRES ON TERMINAL 3 AND CONNECTING THEM TO TERMINAL 6 AS SHOWN IN DASHED LINES. SEE FIG. 39.

CAPACITORS						INDUCTORS		RESISTORS				MISC
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS	SYMBOL	OHMS	SYMBOL
* C-1	8.5 MMF	C-15(ABC)	.05/.05/.05 MF	C-29	.006 MF	L-1	ANT. INPUT	R-1	620	* R-15	5,100	T-1
C-2	15 MMF	C-16(ABC)	.22/.22/.22 MF	C-30	15 MF	L-2, L-3	RF AMP	R-2	2,000,000	* R-16	51,000	
C-3	100 MMF	C-17	180 MMF	C-31	.001 MF	L-4, L-5	RF OSC	R-3	51,000	* R-17	51,000	V-1, V-2
C-4 (A TO G)	GANG 62 MMF	C-18	17 MMF	C-32	5 MF	L-6, L-7	IN 1ST IF	R-4	620	R-18	510,000	K-1, K-2, K-
C-5	3 MF	C-19	180 MMF	* C-33	LESS THAN	L-8, L-9	IN 2ND IF	R-5	150,000	R-19	100,000	
C-6 (ABC)	.05/.05/.05 MF	C-20(ABC)	.05/.01/.05 MF		2 MMF	L-10, L-11	IN 3RD IF	* R-6	150,000	R-20	2,000,000	
C-7 (ABC)	.05/.05/.05 MF	C-21	17 MMF	C-34	.001 MF	L-12, L-13	CW OSC	R-7	200	R-21	1,500	F-1, F-2, F-
C-8	200 MMF	C-22	180 MMF	C-35	750 MMF	L-14	RF CHOKE	R-8	200	R-22	7,000	
C-9	40 MMF	C-23	180 MMF				112 μH	R-9	620	R-23	7,000	
* C-10	240 MMF	C-24	200 MMF			L-15	AF CHOKE	R-10	360,000			
C-11	3 MMF	C-25	.001 MF				3H	R-11	100,000	R-25	0-50,000	
C-12	180 MMF	* C-26	100 MMF					R-12	510	R-26	0-50,000	
C-13	17 MMF	* C-27	185 MMF					R-13	200	R-27	0-50,000	
C-14	180 MMF	C-28	34 MMF					* R-14	100,000	R-28	0-50,000	

* VALUES SHOWN WITH AN ASTERISK VARY WITH THE RADIO RECEIVER. THOSE SHOWN IN THIS TABLE APPLY TO RADIO RECEIVER BC-455-B (6-9.1 MC) ONLY. ADDITIONAL CIRCUIT ELEMENTS WHICH MAY BE REQUIRED IN THE OTHER RADIO RECEIVERS ARE NOT SHOWN IN THE TABLE OR IN THE ABOVE SCHEMATIC CIRCUIT OF RADIO RECEIVER BC-455-B.



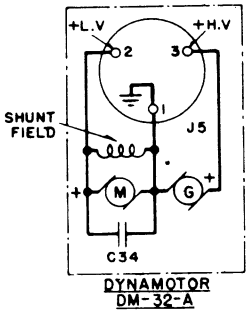


AL RADIO RECEIVER BC-455-B (6-9.1 MC). I-F = 2830 KC

FROM THE OUTSIDE.
OSITION.
RECEPTACLE CONSTITUTES

JACKS IN RECEIVERS AND
ERENCE PURPOSES ONLY.

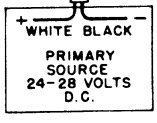
55-B RECEIVERS IS PROVIDED
THESE THREE RECEIVERS
455-A ARE NORMALLY
ES FOR USE WITH HIGH
RS BC-453-B, BC-454-B,
IMPEDANCE HEADSETS
CONNECTING THEM TO TERMINAL 6

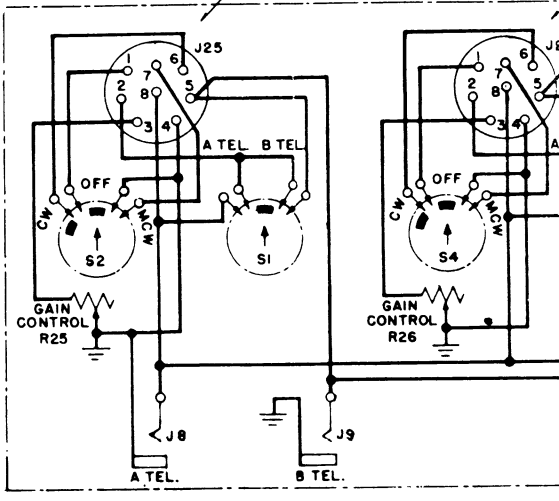


DYNAMOTOR
DM-32-A

RESISTORS			MISCELLANEOUS	
MS	SYMBOL	OHMS	SYMBOL	DESCRIPTION
20	* R-15	5,100	T-1	OUTPUT TRANSFORMER
0,000	* R-16	51,000		
000	* R-17	51,000	V-1, V-2	NEON TUBES
20	R-18	510,000	K-1, K-2, K-3	REC. OUTPUT-TRANS. SIDE-TONE RELAYS
,000	R-19	100,000		
,000	R-20	2,000,000		
00	R-21	1,500	F-1, F-2, F-3	10 AMP. FUSES
00	R-22	7,000		
20	R-23	7,000		
,000				
,000	R-25	0-50,000		
10	R-26	0-50,000		
00	R-27	0-50,000		
,000	R-28	0-50,000		

RECEIVER
E NOT





RADIO CONTROL BOX
OC-450-A

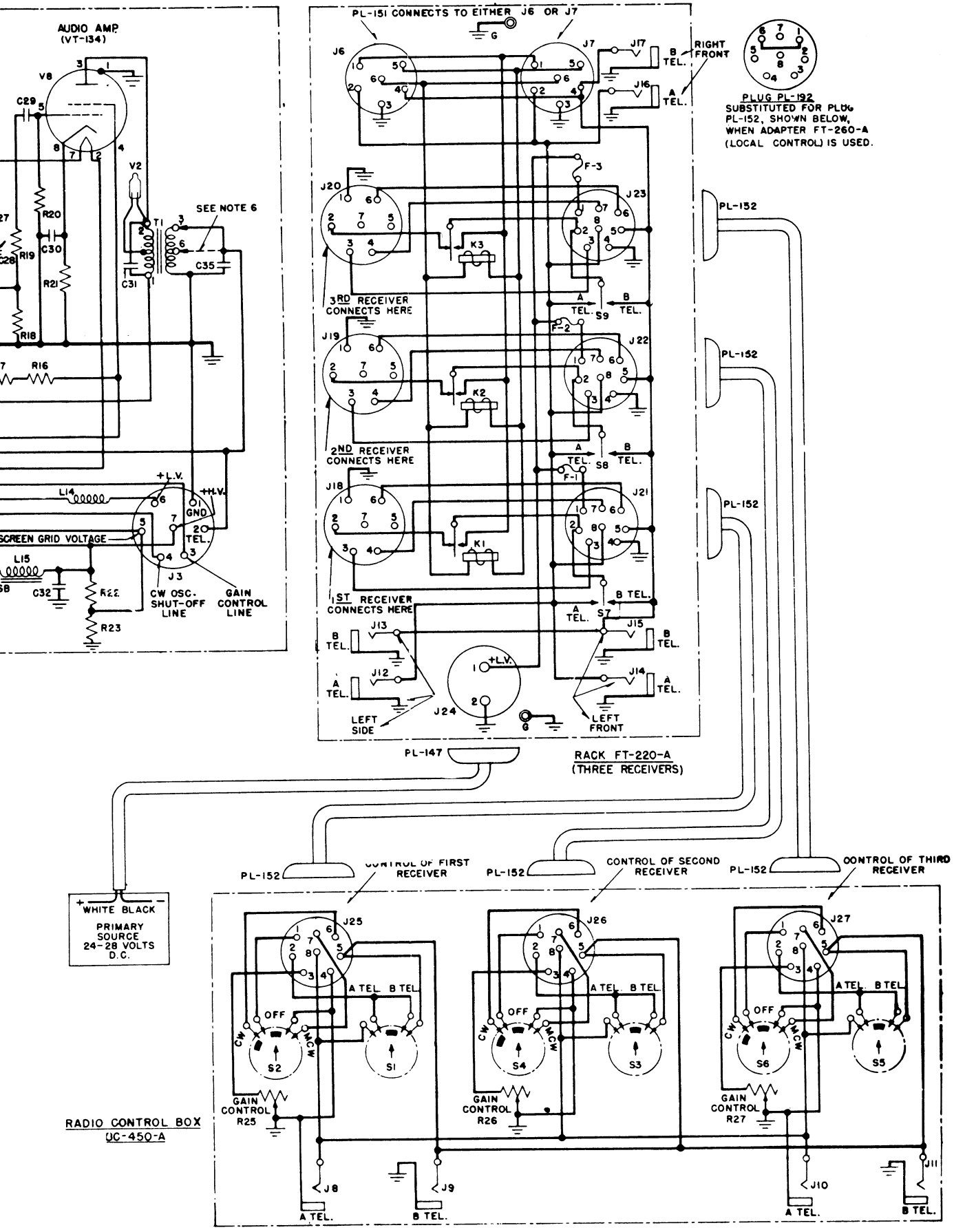


FIGURE 26 — RADIO SET SCR-274-N RECEIVING EQUIPMENT, SCHEMATIC CIRCUIT DIAGRAM

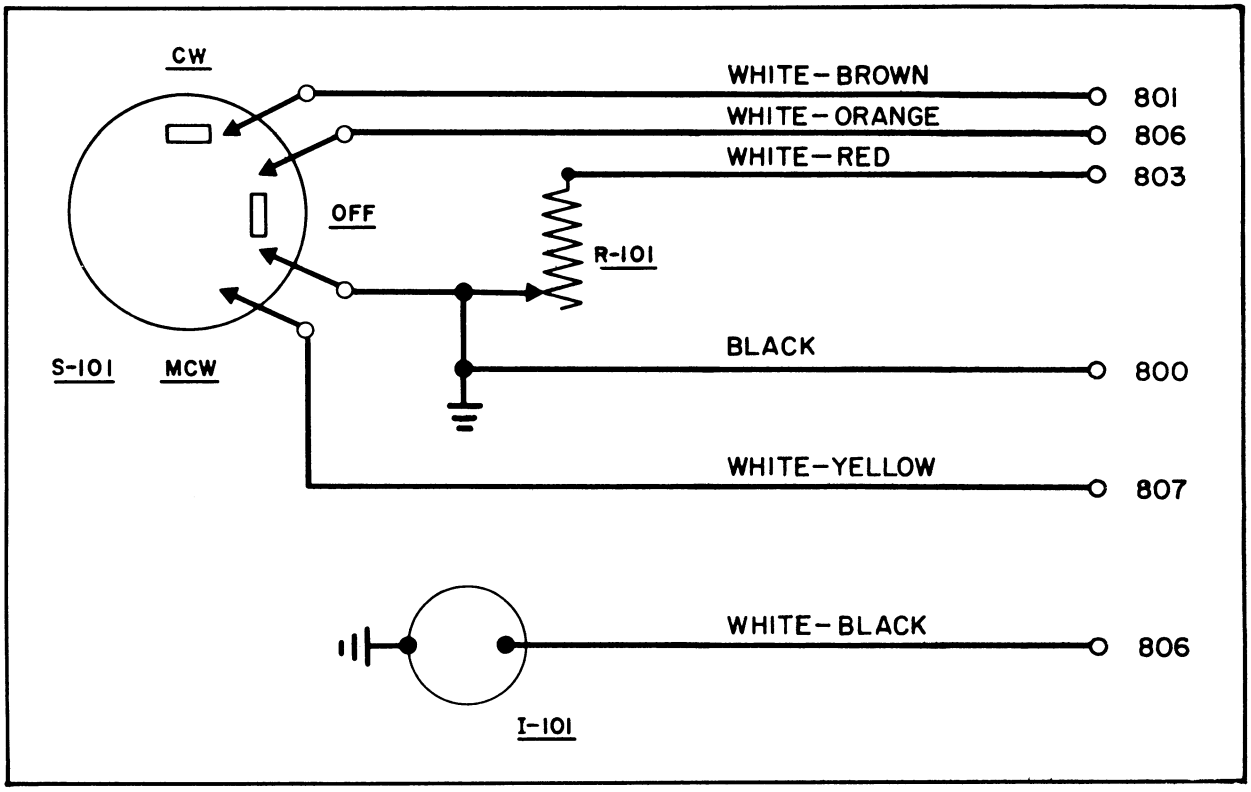
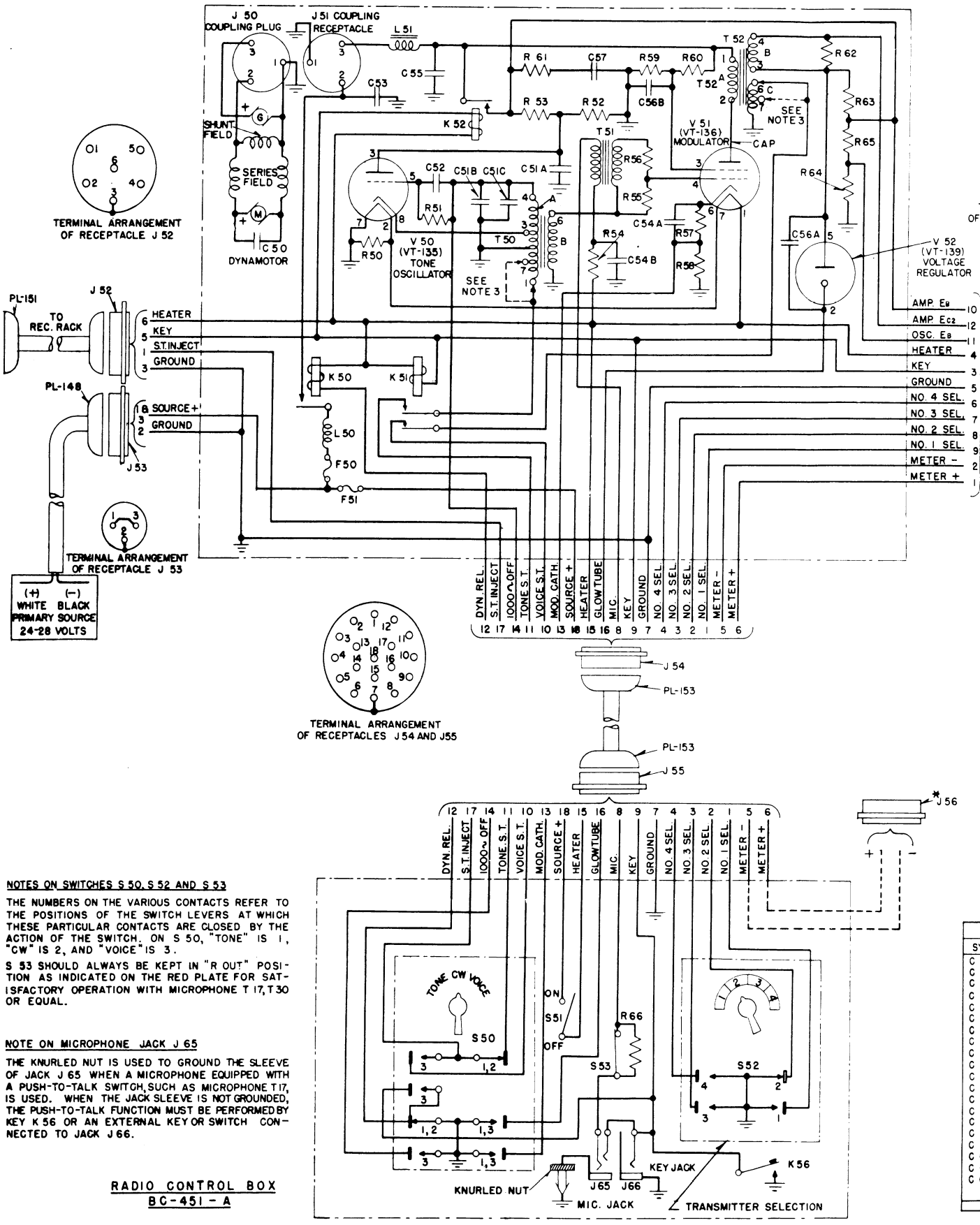


FIGURE 26A—RADIO SET SCR-274-N RECEIVER CONTROL PANEL C-570A/A or C-570B/A, PRACTICAL WIRING DIAGRAM

MODULATOR UNIT BC-456-A (OR-B) WITH DYNAMOTOR DM-33-A



NOTES ON SWITCHES S 50, S 52 AND S 53

THE NUMBERS ON THE VARIOUS CONTACTS REFER TO THE POSITIONS OF THE SWITCH LEVERS AT WHICH THESE PARTICULAR CONTACTS ARE CLOSED BY THE ACTION OF THE SWITCH. ON S 50, "TONE" IS 1, "CW" IS 2, AND "VOICE" IS 3.

S 53 SHOULD ALWAYS BE KEPT IN "R OUT" POSITION AS INDICATED ON THE RED PLATE FOR SATISFACTORY OPERATION WITH MICROPHONE T 17, T 30 OR EQUAL.

NOTE ON MICROPHONE JACK J 65

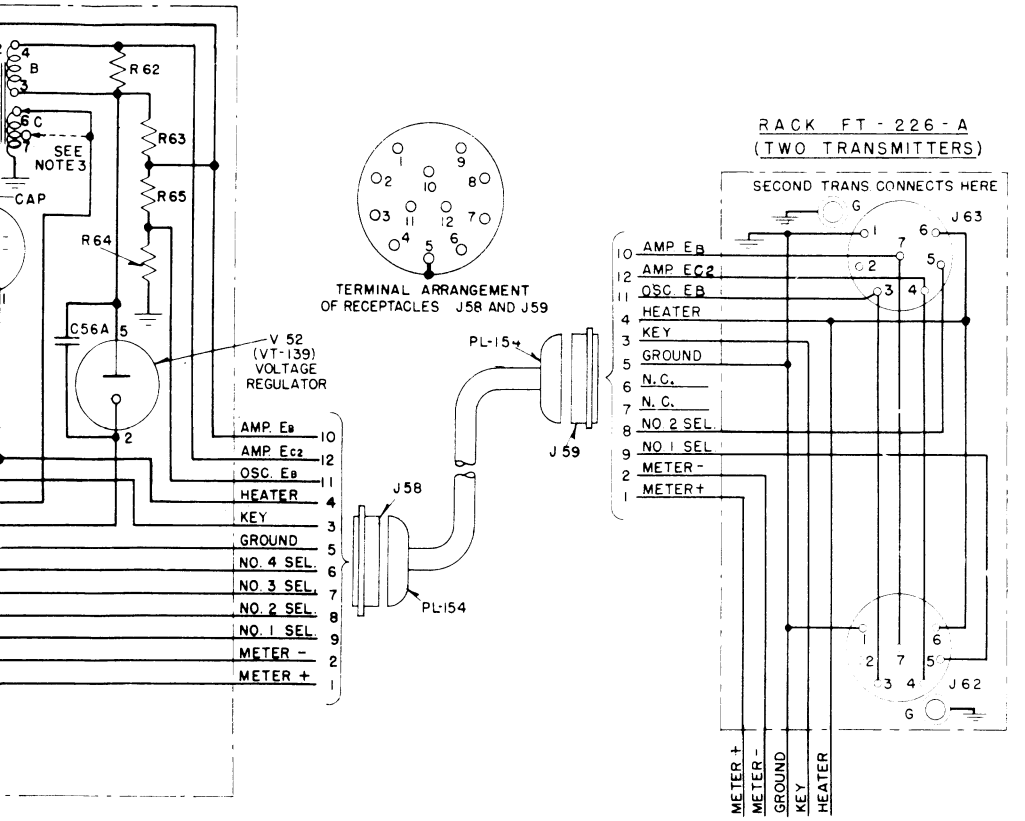
THE KNURLED NUT IS USED TO GROUND THE SLEEVE OF JACK J 65 WHEN A MICROPHONE EQUIPPED WITH A PUSH-TO-TALK SWITCH, SUCH AS MICROPHONE T 17, IS USED. WHEN THE JACK SLEEVE IS NOT GROUNDED, THE PUSH-TO-TALK FUNCTION MUST BE PERFORMED BY KEY K 56 OR AN EXTERNAL KEY OR SWITCH CONNECTED TO JACK J 66.

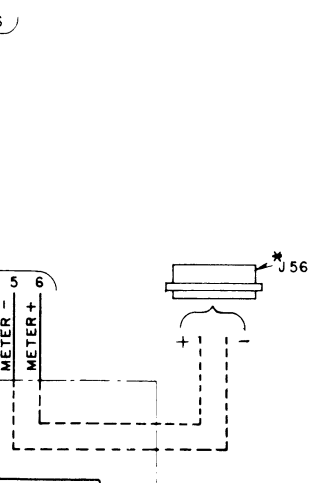
CAP	
SYMBOL	
C 50	
C 51 (A,B,C	
C 52	
C 53	
C 54 (A,B	
C 55	
C 56 (A,B	
C 57	
C 58 (A,B,C	
C 59	
C 60	
C 61	
C 62	
C 63	
C 64	
C 65	
C 66	
C 67	
C 68	
C 69	

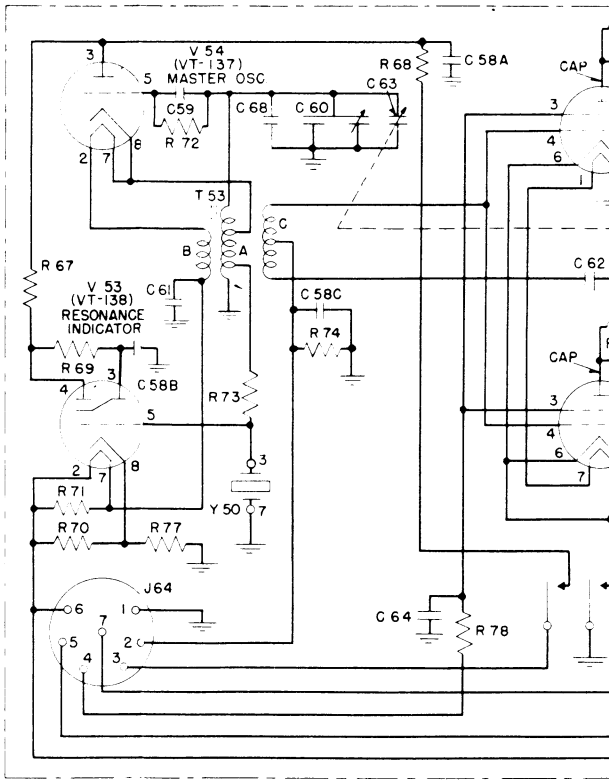
RADIO CONTROL BOX BC-451-A

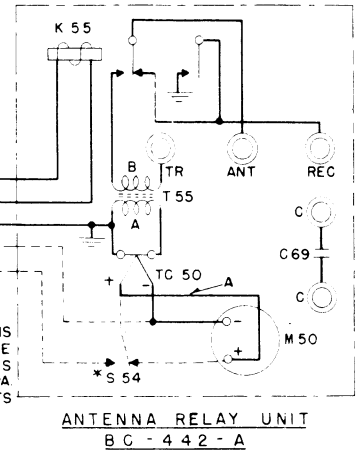
TYPICAL RADIO TRANSMITTER

BC-696-A(3-4 MC), BC-457-A(4-5.3 MC), BC-458-A(









* NOTE ON SWITCH S 54

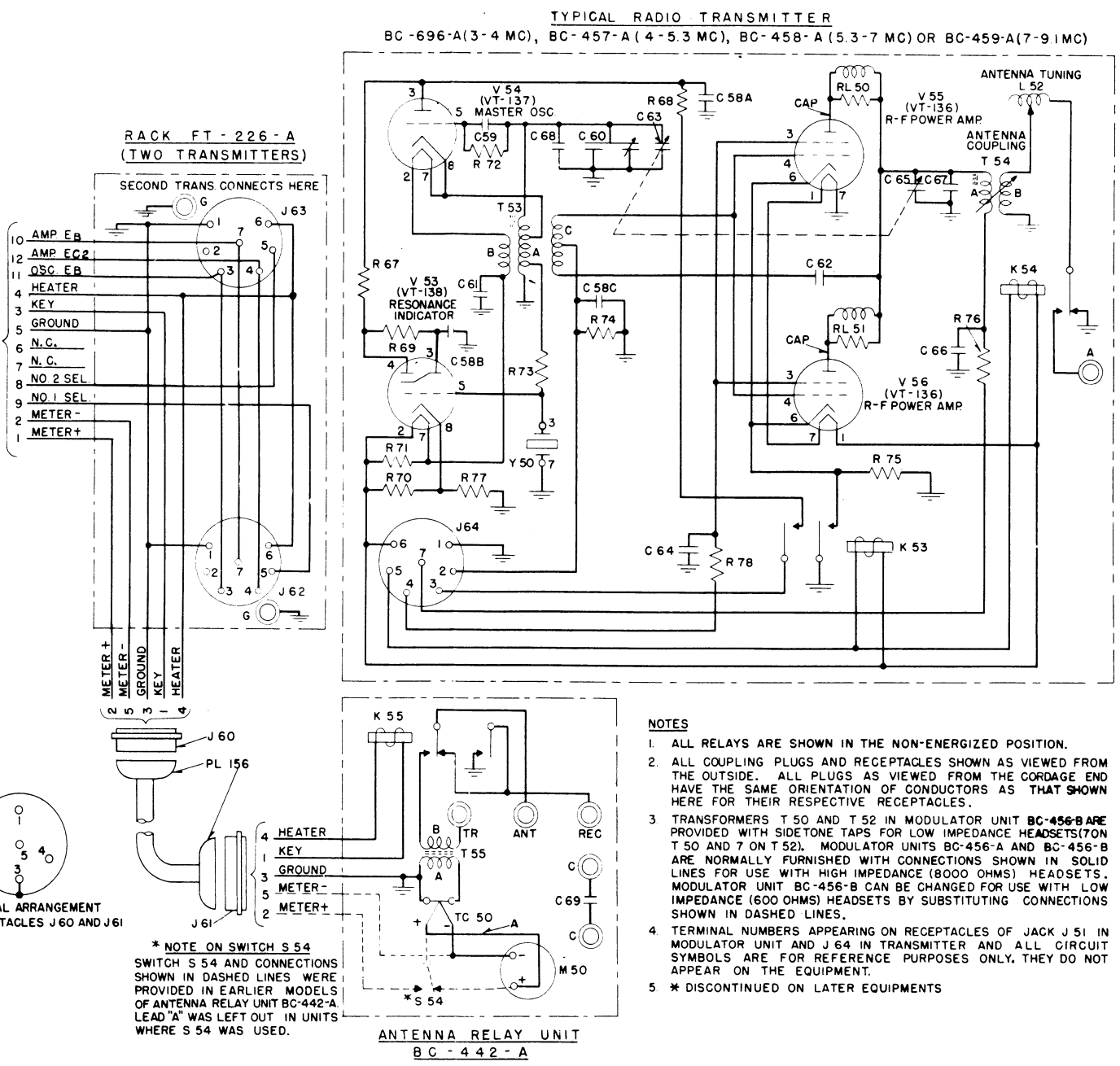
SWITCH S 54 AND CONNECTIONS SHOWN IN DASHED LINES WERE PROVIDED IN EARLIER MODELS OF ANTENNA RELAY UNIT BC-442-A. LEAD "A" WAS LEFT OUT IN UNITS WHERE S 54 WAS USED.

ANTENNA RELAY UNIT BC-442-A

NOTES

1. ALL RELAYS ARE SHOWN
2. ALL COUPLING PLUGS AN THE OUTSIDE. ALL PLU HAVE THE SAME ORIENT HERE FOR THEIR RESPEC
3. TRANSFORMERS T 50 AN PROVIDED WITH SIDETONE T 50 AND 7 ON T 52). MC ARE NORMALLY FURNISH LINES FOR USE WITH HI MODULATOR UNIT BC-45 IMPEDANCE (600 OHMS) H SHOWN IN DASHED LINES
4. TERMINAL NUMBERS APPE MODULATOR UNIT AND J SYMBOLS ARE FOR REF APPEAR ON THE EQUIP
5. * DISCONTINUED ON LAT

CAPACITORS		INDUCTORS		RELAYS & KEYS		RESISTORS				SWITCHES		TRAN
SYMBOL	MICROFARADS	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS	SYMBOL	OHMS	SYMBOL	DESCRIPTION	SYMBOL
C 50	.006	L 50	R.F. CHOKE APPR. 15 MICROHENRIES	K 50	DYNAMOTOR INPUT	R 50	42	R 70	1000 FOR BC-457-A	S 50	CHOICE OF EMISSION	T 50
C 51 (A,B,C)	.05/.05/.05			K 51	SIDETONE, VOICE AND TONE	R 51	100,000	R 70	1000 FOR BC-458-A			T 51
C 52	.006	L 51	1.7 HENRIES			R 52	300,000	R 70	1500 FOR BC-459-A	S 51	MAIN "ON-OFF"	T 52
C 53	1.2	L 52	ANT. TUNING INDUCTOR	K 52	DYNAMOTOR HIGH VOLTAGE (KEYING)	R 53	91,000	R 70	1500 FOR BC-696-A		BATTERY LINE	T 53
C 54 (A,B)	5/20.					R 54	360	R 71	126	S 52	TRANSMITTER SELECTION	T 54
C 55	1.2			K 53	TRANSMITTER SELECTOR	R 55	2000	R 72	51,000			T 55
C 56 (A,B)	.5/.5					R 56	1300	R 73	10,000 FOR BC-457-A	S 53	SHUNTS MIC. SERIES RESISTOR	
C 57	.05			K 54	TRANSMITTER OUTPUT	R 57	390	R 73	15,000 FOR BC-458-A			
C 58 (A,B,C)	.05/.05/.05					R 58	51,000	R 73	5100 FOR BC-459-A	*S 54	ANT. CURRENT METER SWITCHING	
C 59	.00018			K 55	ANTENNA SWITCHING REC. TO TRANS.	R 59	30,000	R 73	5100 FOR BC-696-A			
C 60	MO. PADDING					R 60	75,000	R 74	15,000			
C 61	.006			K 56	BUILT-IN KEY	R 61	20	R 75	51,000			
C 62	FIXED NEUTR.					R 62	10,000	R 76	20			
C 63	MO. TUNING					R 63	20,000	R 77	390			
C 64	.002					R 64	100,000	R 78	51			
C 65	PA. TUNING					R 65	15,000					
C 66	.01					R 66	510					
C 67	PA. PADDING					R 67	51,000					
C 68	.000003					R 68	20					
C 69	.00005					R 69	1,000,000					



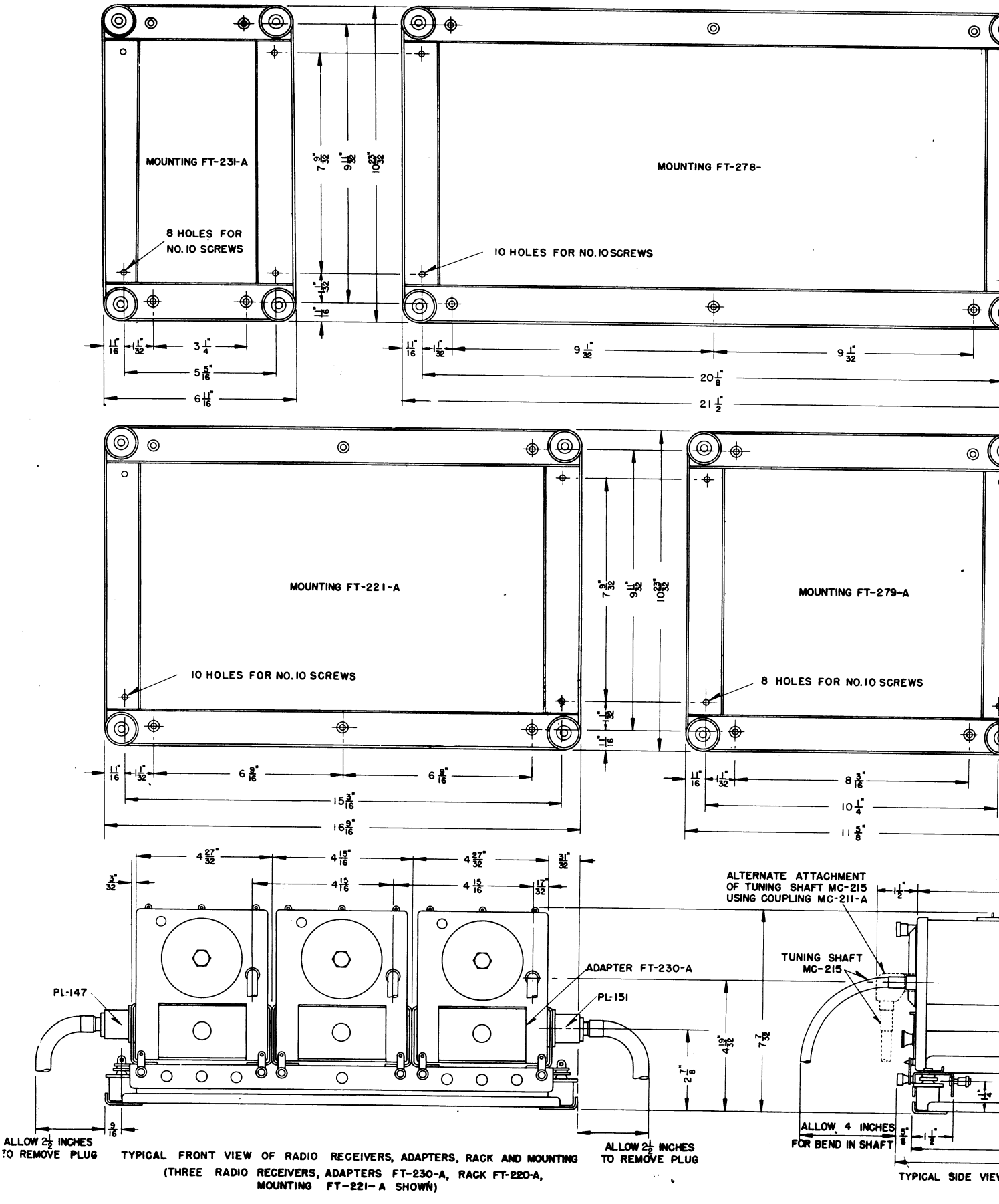
* NOTE ON SWITCH S 54
SWITCH S 54 AND CONNECTIONS SHOWN IN DASHED LINES WERE PROVIDED IN EARLIER MODELS OF ANTENNA RELAY UNIT BC-442-A. LEAD "A" WAS LEFT OUT IN UNITS WHERE S 54 WAS USED.

NOTES

1. ALL RELAYS ARE SHOWN IN THE NON-ENERGIZED POSITION.
2. ALL COUPLING PLUGS AND RECEPTACLES SHOWN AS VIEWED FROM THE OUTSIDE. ALL PLUGS AS VIEWED FROM THE CORDAGE END HAVE THE SAME ORIENTATION OF CONDUCTORS AS THAT SHOWN HERE FOR THEIR RESPECTIVE RECEPTACLES.
3. TRANSFORMERS T 50 AND T 52 IN MODULATOR UNIT BC-456-B ARE PROVIDED WITH SIDETONE TAPS FOR LOW IMPEDANCE HEADSETS(7 ON T 50 AND 7 ON T 52). MODULATOR UNITS BC-456-A AND BC-456-B ARE NORMALLY FURNISHED WITH CONNECTIONS SHOWN IN SOLID LINES FOR USE WITH HIGH IMPEDANCE (8000 OHMS) HEADSETS. MODULATOR UNIT BC-456-B CAN BE CHANGED FOR USE WITH LOW IMPEDANCE (600 OHMS) HEADSETS BY SUBSTITUTING CONNECTIONS SHOWN IN DASHED LINES.
4. TERMINAL NUMBERS APPEARING ON RECEPTACLES OF JACK J 51 IN MODULATOR UNIT AND J 64 IN TRANSMITTER AND ALL CIRCUIT SYMBOLS ARE FOR REFERENCE PURPOSES ONLY. THEY DO NOT APPEAR ON THE EQUIPMENT.
5. * DISCONTINUED ON LATER EQUIPMENTS

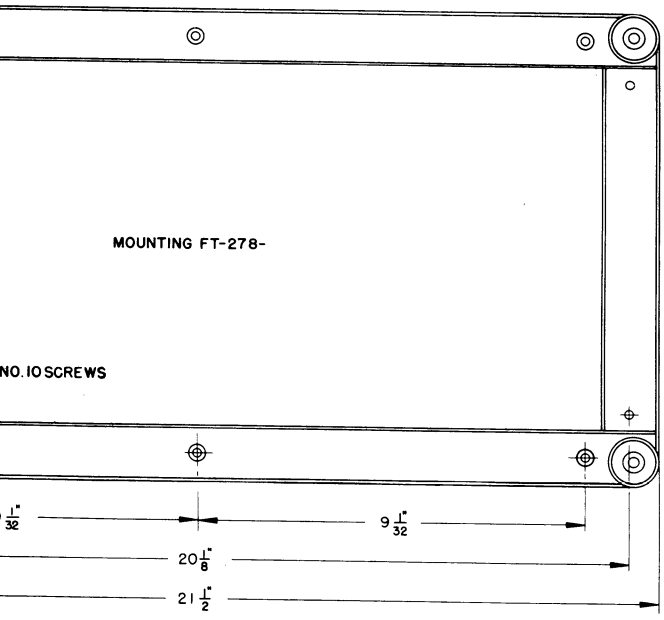
FIGURE 27 — RADIO SET SCR-274-N TRANSMITTING EQUIPMENT (INCLUDING MODULATOR), SCHEMATIC CIRCUIT DIAGRAM

INDUCTORS		RELAYS & KEYS		RESISTORS				SWITCHES		TRANSFORMERS		MISCELLANEOUS	
DESCRIPTION		SYMBOL	DESCRIPTION	SYMBOL	OHMS	SYMBOL	OHMS	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
RF CHOKE APPR. 15 MICROHENRIES		K 50	DYNAMOTOR INPUT	R 50	42	R 70	1000 FOR BC-457-A	S 50	CHOICE OF EMISSION	T 50	TONE OSC.	TC 50	THERMOCOUPLE
1.7 HENRIES		K 51	SIDETONE, VOICE AND TONE	R 51	100,000	R 70	1000 FOR BC-458-A			T 51	MICROPHONE	M 50	ANT. CURRENT INDICATOR(LOCAL)
ANT. TUNING INDUCTOR		K 52	DYNAMOTOR HIGH VOLTAGE(KEYING)	R 52	300,000	R 70	1500 FOR BC-459-A	S 51	MAIN "ON-OFF" BATTERY LINE	T 52	MODULATION		
		K 53	TRANSMITTER SELECTOR	R 53	91,000	R 70	1500 FOR BC-696-A			T 53	MASTER OSC.		
		K 54	TRANSMITTER OUTPUT	R 54	360	R 71	126	S 52	TRANSMITTER SELECTION	T 54	TRANS. OUTPUT	Y 50	CRYSTAL UNIT
		K 55	ANTENNA SWITCHING REC. TO TRANS.	R 55	2000	R 72	51,000			T 55	ANT. CURRENT	F 50	20 AMP. FUSE
		K 56	BUILT-IN KEY	R 56	1300	R 73	10,000 FOR BC-457-A	S 53	SHUNTS MIC. SERIES RESISTOR			F 51	20 AMP. FUSE
				R 57	380	R 73	15,000 FOR BC-458-A					RL 50	PARASITIC SUPPRESSOR
				R 58	51,000	R 73	5100 FOR BC-459-A	*S 54	ANT.CURRENT METER SWITCHING				
				R 59	30,000	R 73	5100 FOR BC-696-A					RL 51	PARASITIC SUPPRESSOR
				R 60	75,000	R 74	15,000						
				R 61	20	R 75	51,000						
				R 62	10,000	R 76	20						
				R 63	20,000	R 77	390						
				R 64	100,000	R 78	51						
				R 65	15,000								
				R 66	510								
				R 67	51,000								
				R 68	20								
				R 69	1,000,000								



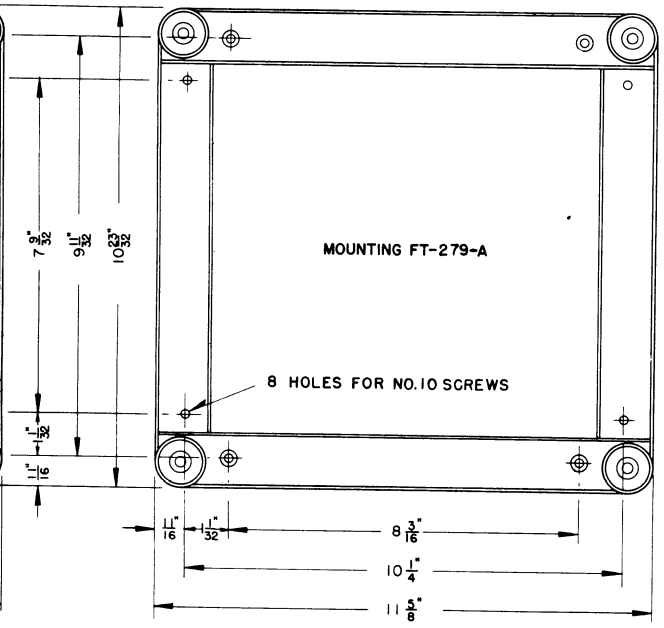
TYPICAL FRONT VIEW OF RADIO RECEIVERS, ADAPTERS, RACK AND MOUNTING (THREE RADIO RECEIVERS, ADAPTERS FT-230-A, RACK FT-220-A, MOUNTING FT-221-A SHOWN)

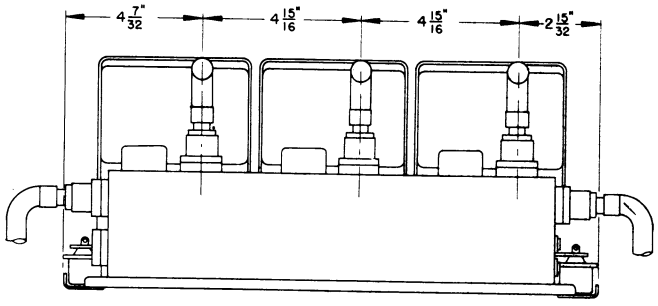
TYPICAL SIDE VIEW



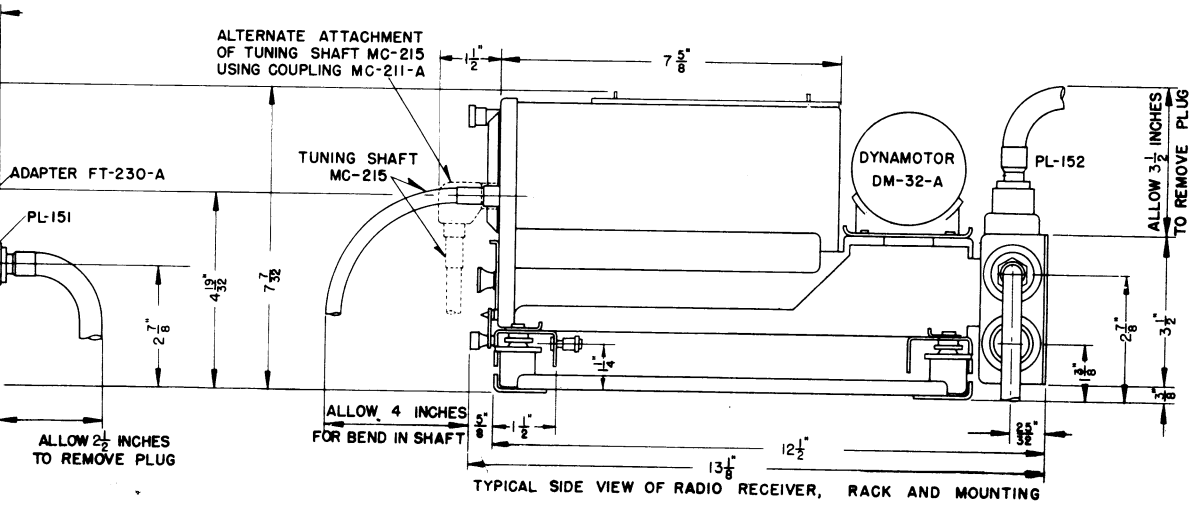
COMPONENT PARTS	RECEIVER UNITS TO BE INSTALLED	WEIGHT OF COMPONENT PARTS
ONE RECEIVER, LESS TUBES, DYNAMOTOR AND ADAPTER		5.7 LBS.
ONE SET TUBES		0.3 "
ONE DYNAMOTOR DM-32-A		3.0 "
ADAPTER FT-230-A		0.1 "
ADAPTER FT-260-A		0.1 "
MOUNTING FT-231-A	1	0.7 "
RACK FT-233-A	1	1.3 "
MOUNTING FT-279-A	2	0.8 "
RACK FT-277-A	2	2.5 "
MOUNTING FT-221-A	3	1.0 "
RACK FT-220-A	3	4.0 "
*MOUNTING FT-278-	4	1.2 "
*RACK FT-264-	4	5.5 "
COUPLING MC-211-A		0.25 "
AVERAGE WEIGHT OF PLUG	-	0.13 "
SHIELDED CORDS, AVERAGE WEIGHT PER FOOT	-	0.17 "
TUNING SHAFT MC-215, WEIGHT PER FOOT	-	0.12 "

*NOTE: THESE ITEMS HAVE NOT BEEN PROCURED UP TO THE TIME OF WRITING THIS INSTRUCTION BOOK.



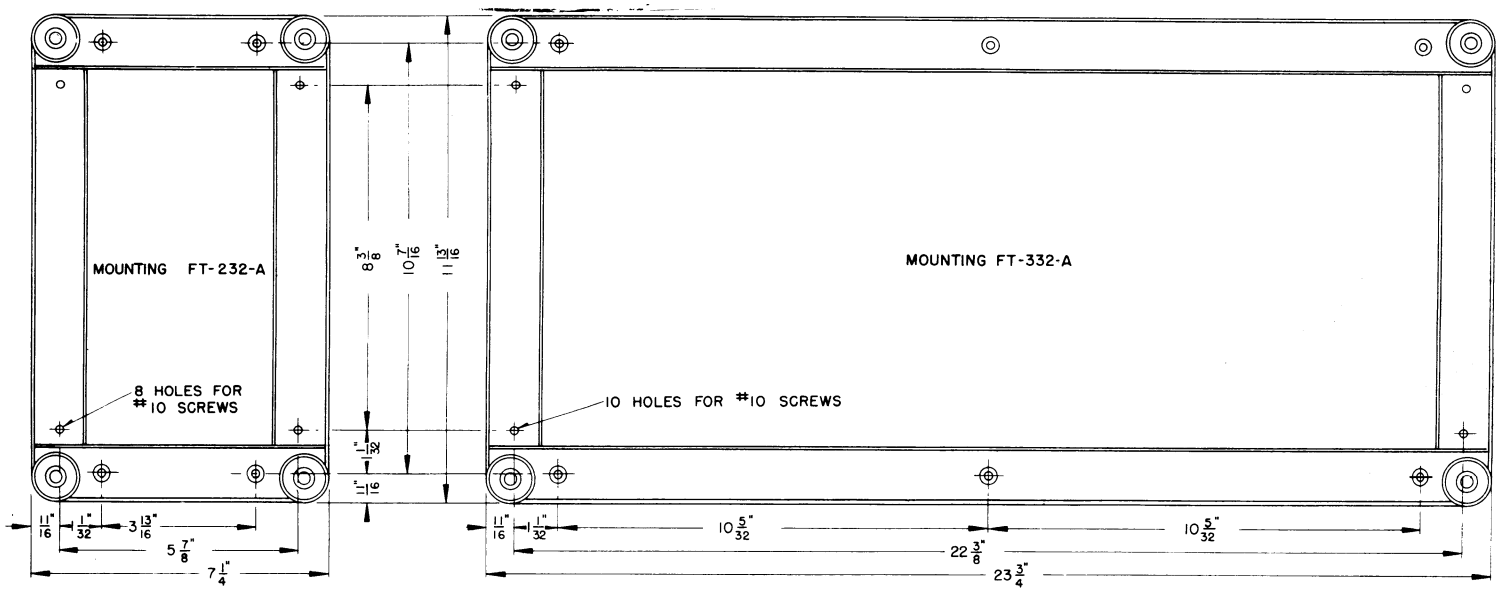


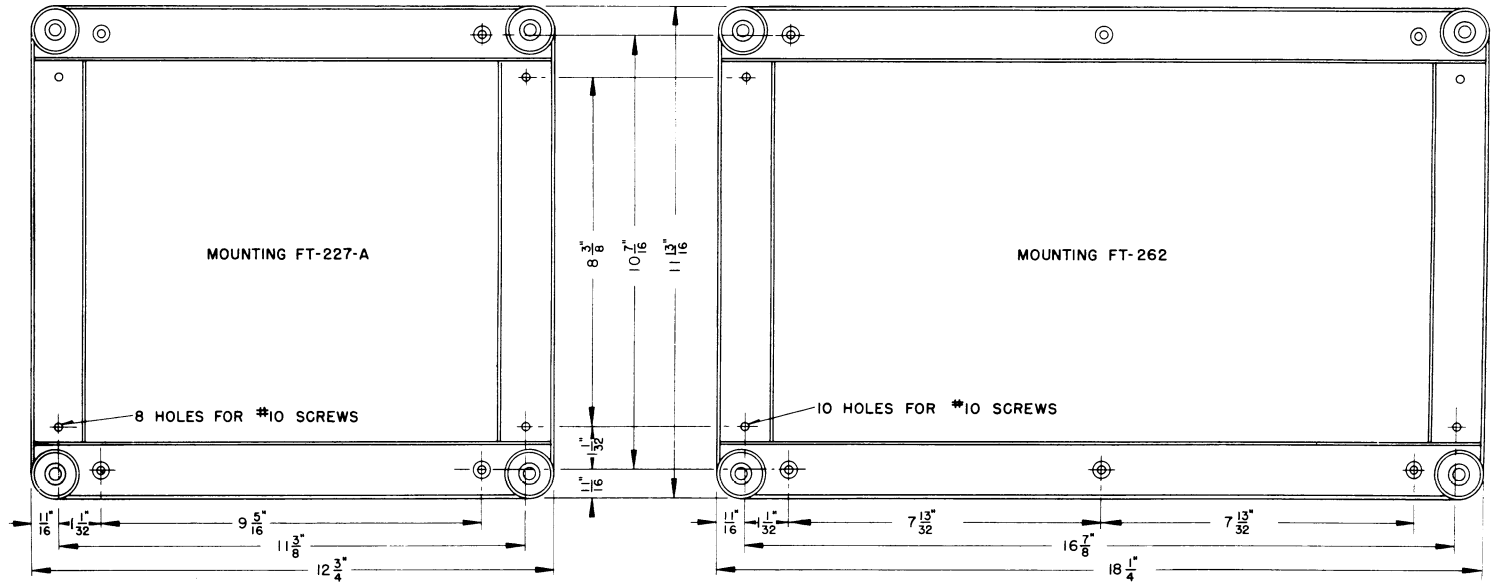
TYPICAL REAR VIEW OF RADIO RECEIVERS, RACK AND MOUNTING
(NOT TO SAME SCALE AS FRONT VIEW)

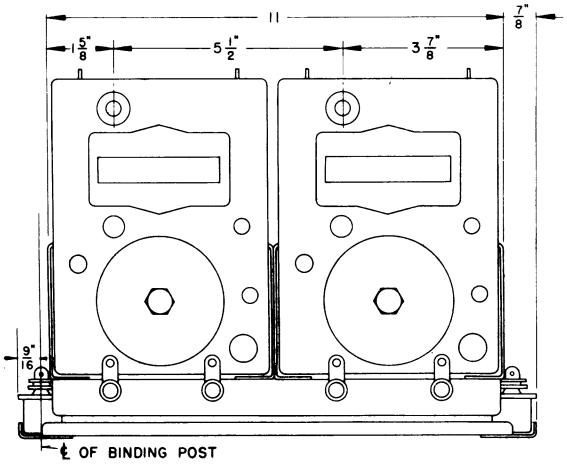


TYPICAL SIDE VIEW OF RADIO RECEIVER, RACK AND MOUNTING

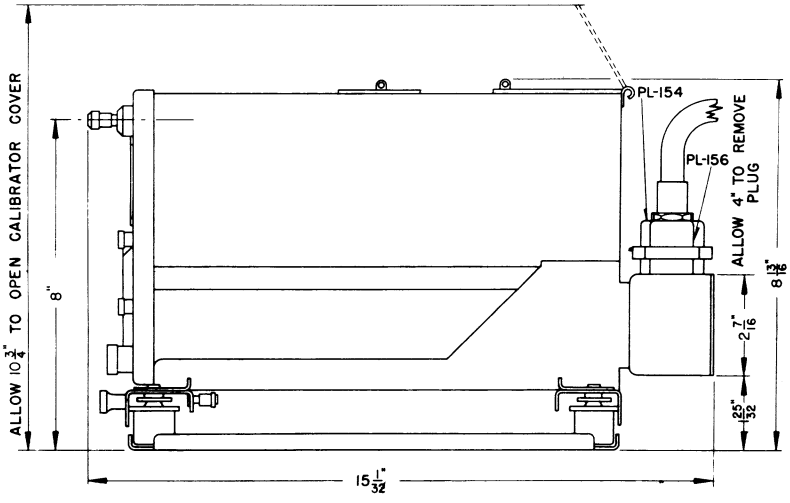
FIGURE 28 — RADIO SET SCR-274-N — INSTALLATION DIMENSIONS AND WEIGHTS OF RECEIVERS, RACKS AND MOUNTINGS



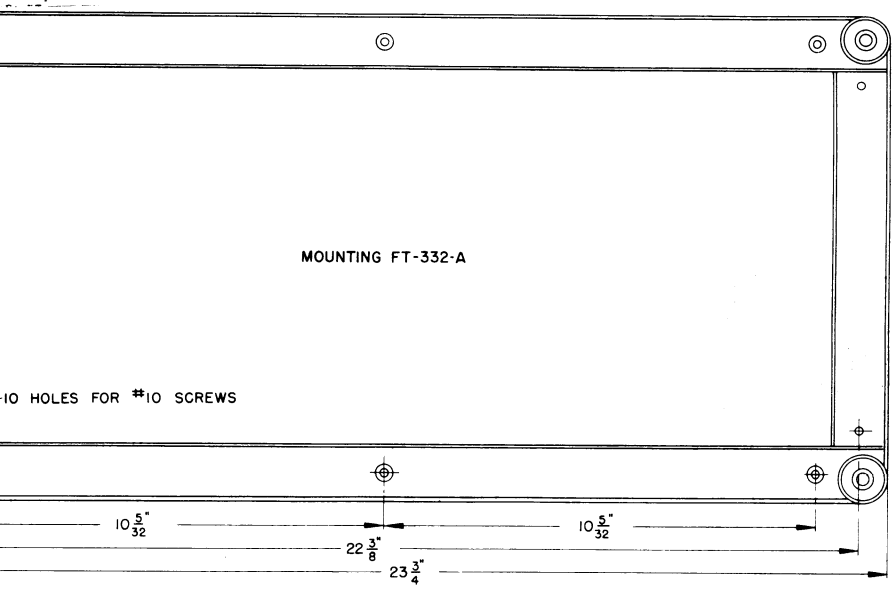


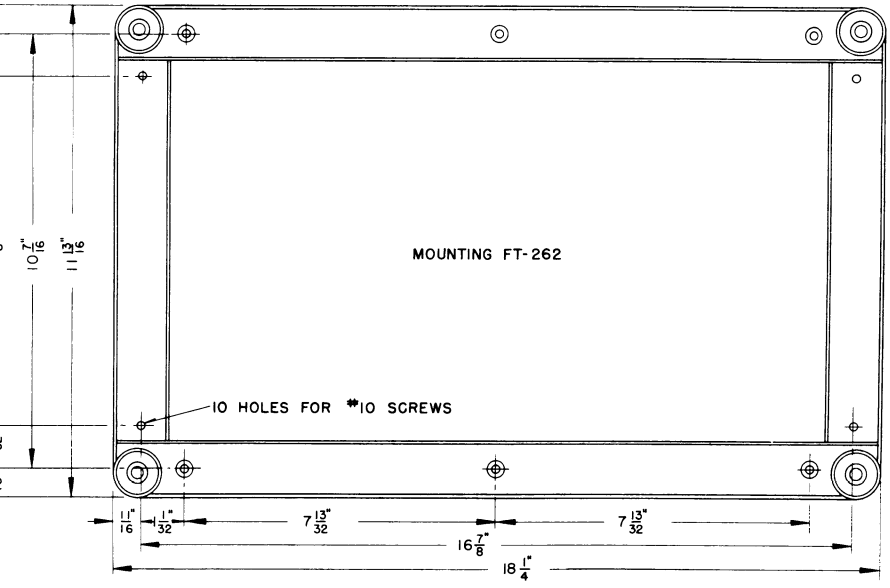


TYPICAL FRONT VIEW OF TRANSMITTERS, RACK AND MOUNTING (TWO TRANSMITTERS, RACK FT- 226- A AND MOUNTING FT-227-A SHOWN)



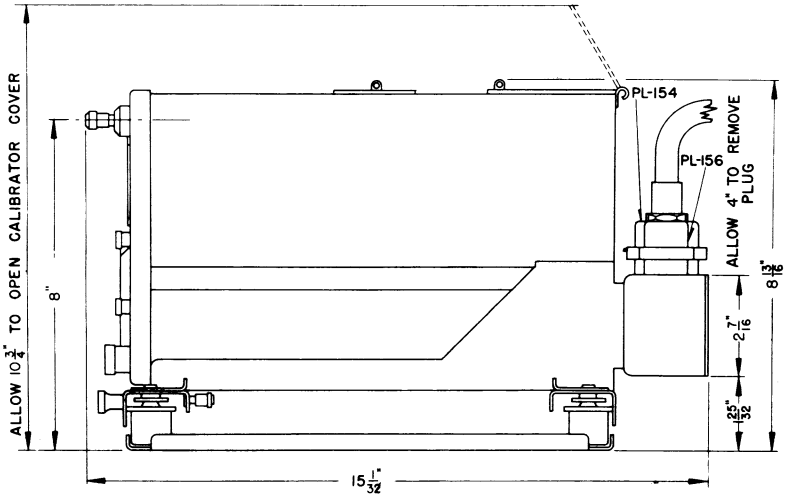
SIDE VIEW OF TRANSMITTER, RACK AND MOUNTING



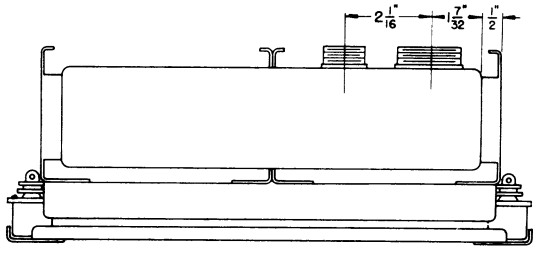


COMPONENT PARTS		TRANSMITTER UNITS TO BE INSTALLED	WEIGHT OF COMPONENT PARTS
ONE SET TUBES			0.5 LB.
ONE TRANSMITTER LESS TUBES			8.3 "
MOUNTING	FT-232-A	1	0.7 "
RACK	FT-234-A	1	1.0 "
MOUNTING	FT-227-A	2	0.8 "
RACK	FT-226-A	2	2.0 "
* MOUNTING	FT-262-	3	0.9 "
* RACK	FT-276-	3	3.0 "
MOUNTING	FT-332-A	4	1.0 "
RACK	FT-331-A	4	4.0 "
AVERAGE WEIGHT OF PLUG		-	0.13 "
SHIELDED CORDS AVERAGE WEIGHT PER FOOT		-	0.17 "

*NOTE: THESE ITEMS HAVE NOT BEEN PROCURED UP TO THE TIME OF WRITING THIS INSTRUCTION BOOK.

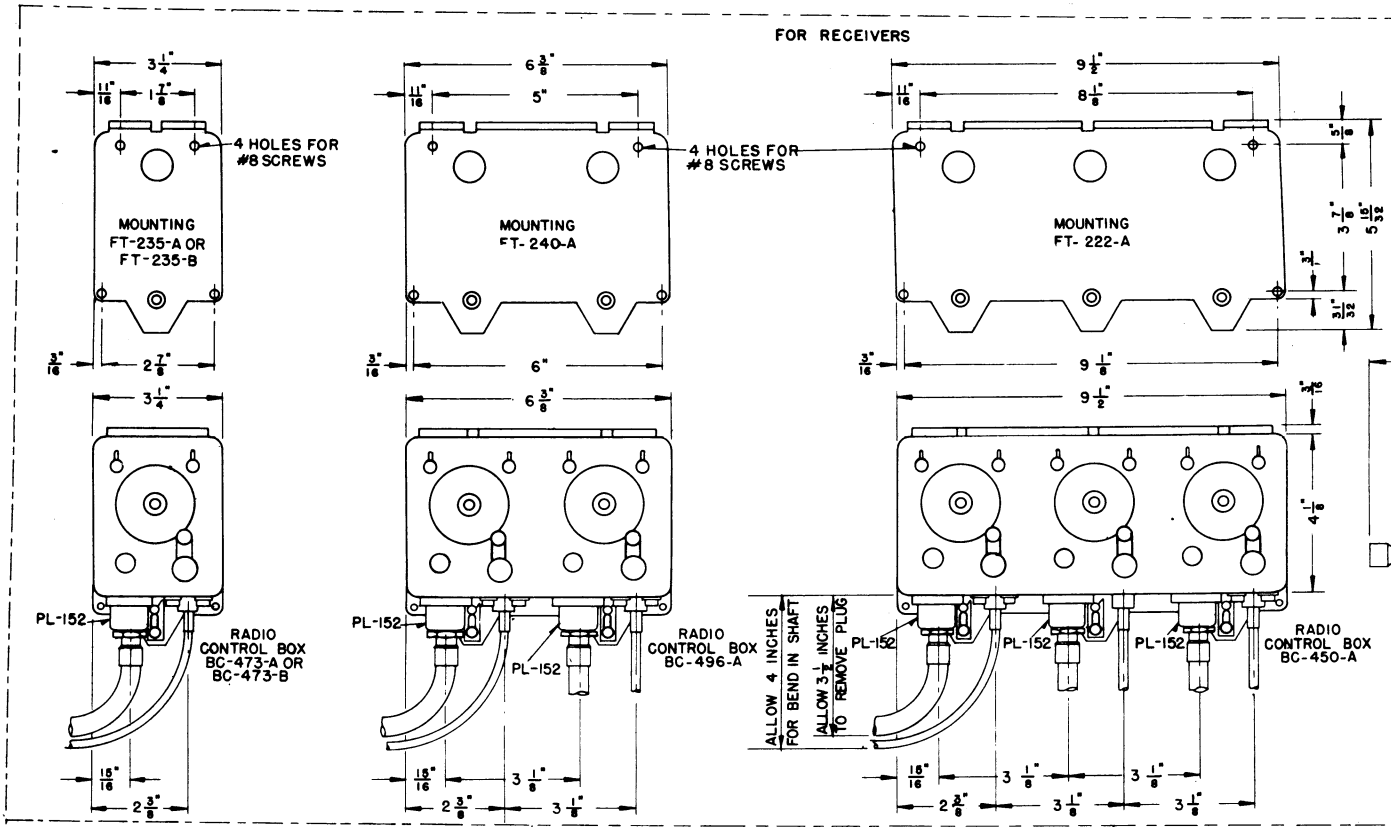


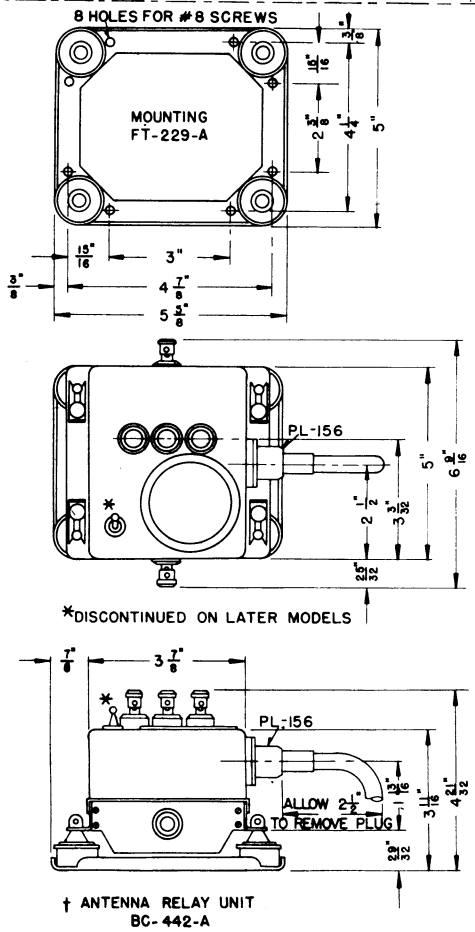
SIDE VIEW OF TRANSMITTER, RACK AND MOUNTING

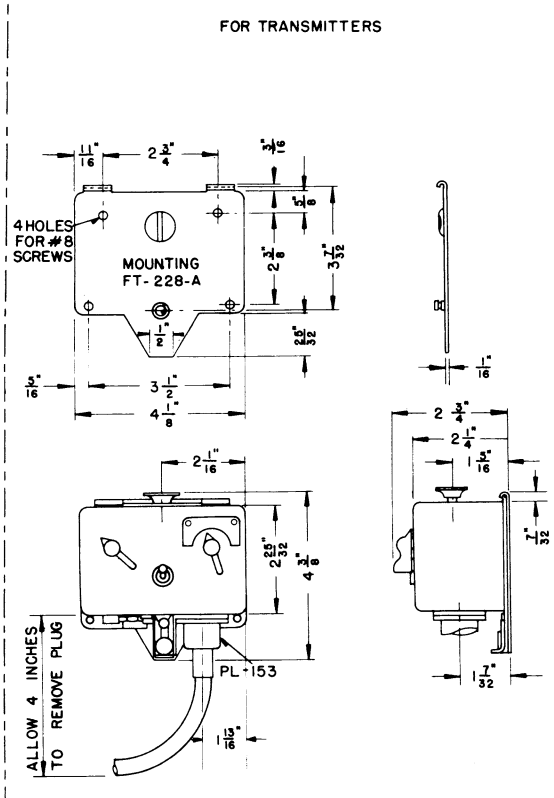


TYPICAL REAR VIEW OF RACK AND MOUNTING
(RACK FT-226-A AND MOUNTING FT-227-A SHOWN)

FIGURE 29 — RADIO SET SCR-274-N — INSTALLATION DIMENSIONS AND WEIGHTS OF TRANSMITTERS, RACKS AND MOUNTINGS





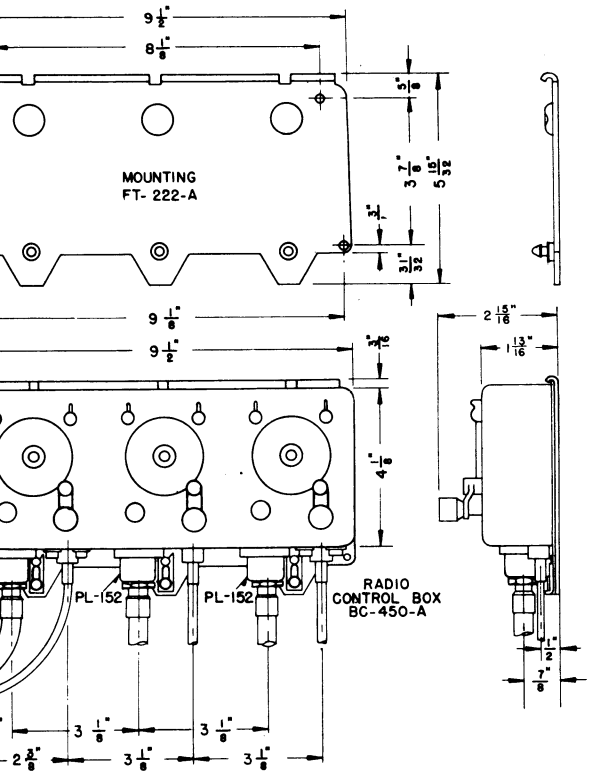


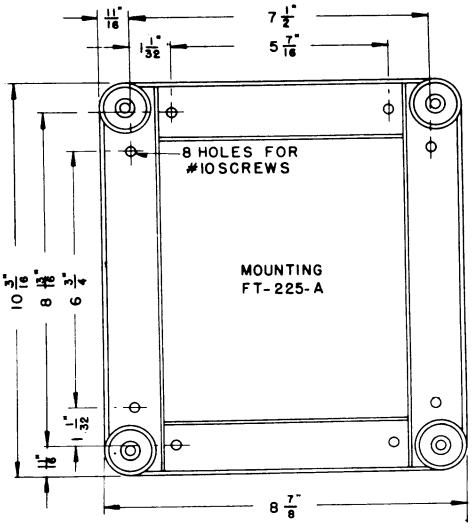
WEIGHT OF COMPONI

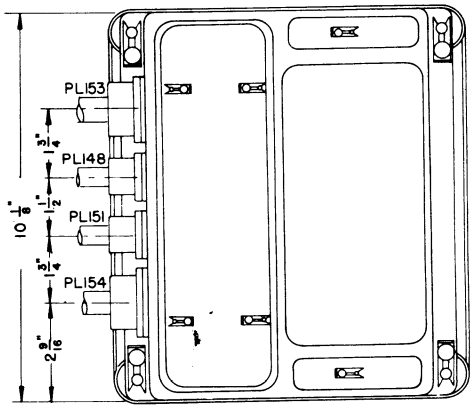
RADIO CONTROL BOX AND MOUNTING	BC-4 FT-2
RADIO CONTROL BOX AND MOUNTING	BC-4 FT-2
RADIO CONTROL BOX AND MOUNTING	BC-4 FT-2
RADIO CONTROL BOX AND MOUNTING	BC-4 FT-2
ANTENNA RELAY UNIT AND MOUNTING	BC-4 FT-2
MODULATOR UNIT (LESS TUBES AND DYNAMOTOR)	BC-4 BC-4
MOUNTING (MODULATOR UNIT)	FT-2
ONE SET TUBES (MODULATOR UNIT)	
DYNAMOTOR	DM-
AVERAGE WEIGHT OF PLUG	
SHIELDED CORDS AVERAGE WEIGHT PER FOOT	
TUNING SHAFT MC-215 WEIGHT PER FOOT	
COUPLING MC-211A	

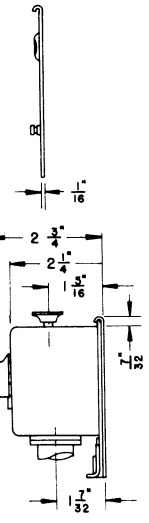
ANTENNA RELAY UNIT BC-442-AM AND MOUNTING FT-229-A

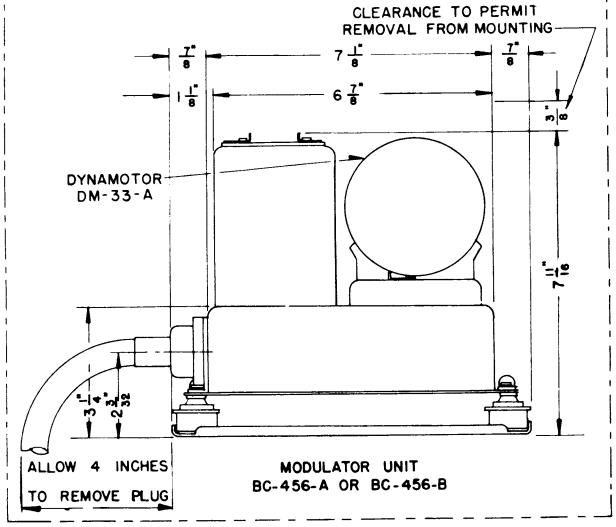
†Antenna Relay Unit BC-442-AM dir shown for Antenna Relay Unit BC dimension is deleted as the bindi are not included.











WEIGHT OF COMPONENT UNITS

RADIO CONTROL BOX AND MOUNTING	BC-450-A FT-222-A	2.7	LBS.
RADIO CONTROL BOX AND MOUNTING	BC-473-B FT-235-B	0.9	"
RADIO CONTROL BOX AND MOUNTING	BC-496-A FT-240-A	1.7	"
RADIO CONTROL BOX AND MOUNTING	BC-451-A FT-228-A	0.9	"
ANTENNA RELAY UNIT AND MOUNTING	BC-442-A FT-229-A	2.2	"
MODULATOR UNIT (LESS TUBES AND DYNAMOTOR)	BC-456-A OR BC-456-B	9.0	"
MOUNTING (MODULATOR UNIT)	FT-225-A	0.7	"
ONE SET TUBES (MODULATOR UNIT)		0.3	"
DYNAMOTOR	DM-33-A	8.0	"
AVERAGE WEIGHT OF PLUG		0.13	"
SHIELDED CORDS AVERAGE WEIGHT PER FOOT		0.17	"
TUNING SHAFT MC-215 WEIGHT PER FOOT		0.12	"
COUPLING MC-21HA		0.25	"

ANTENNA RELAY UNIT BC-442-AM
AND MOUNTING FT-229-A 2.0 "

†Antenna Relay Unit BC-442-AM dimensions are the same as shown for Antenna Relay Unit BC-442-A except the 6 9/16" dimension is deleted as the binding posts so dimensioned are not included.

FIGURE 30 — RADIO SET SCR-274-N — INSTALLATION DIMENSIONS AND WEIGHTS OF RADIO CONTROL BOXES, ANTENNA RELAY UNIT AND MODULATOR UNIT

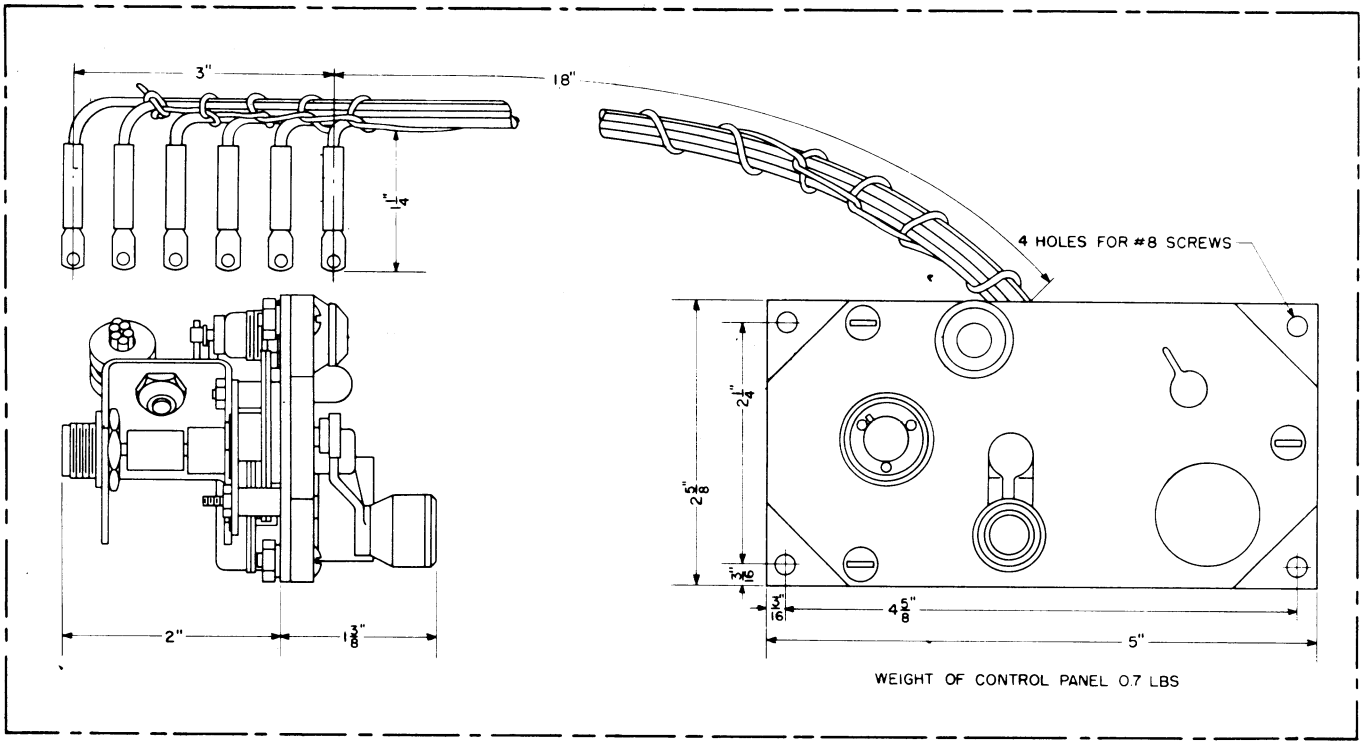
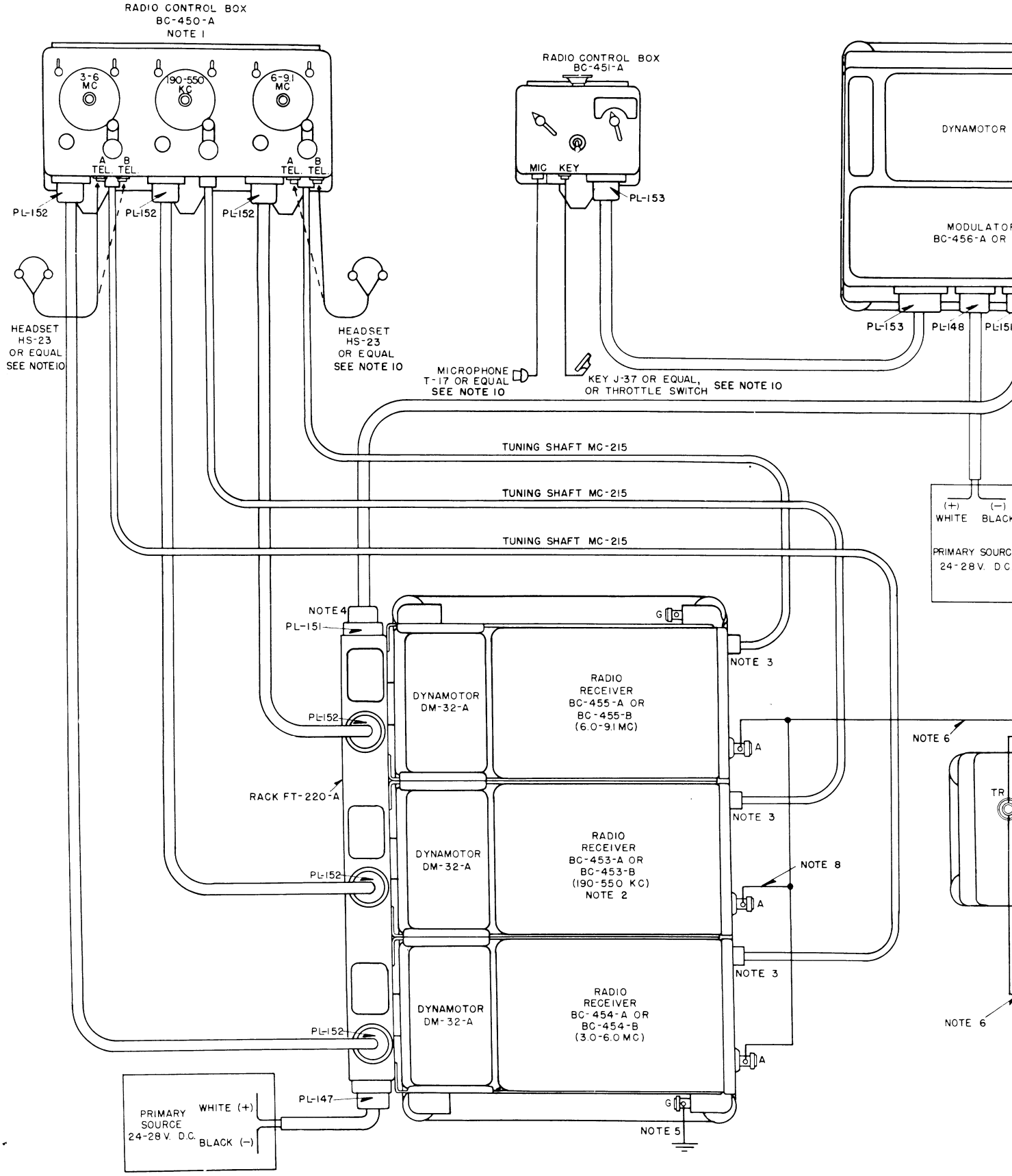
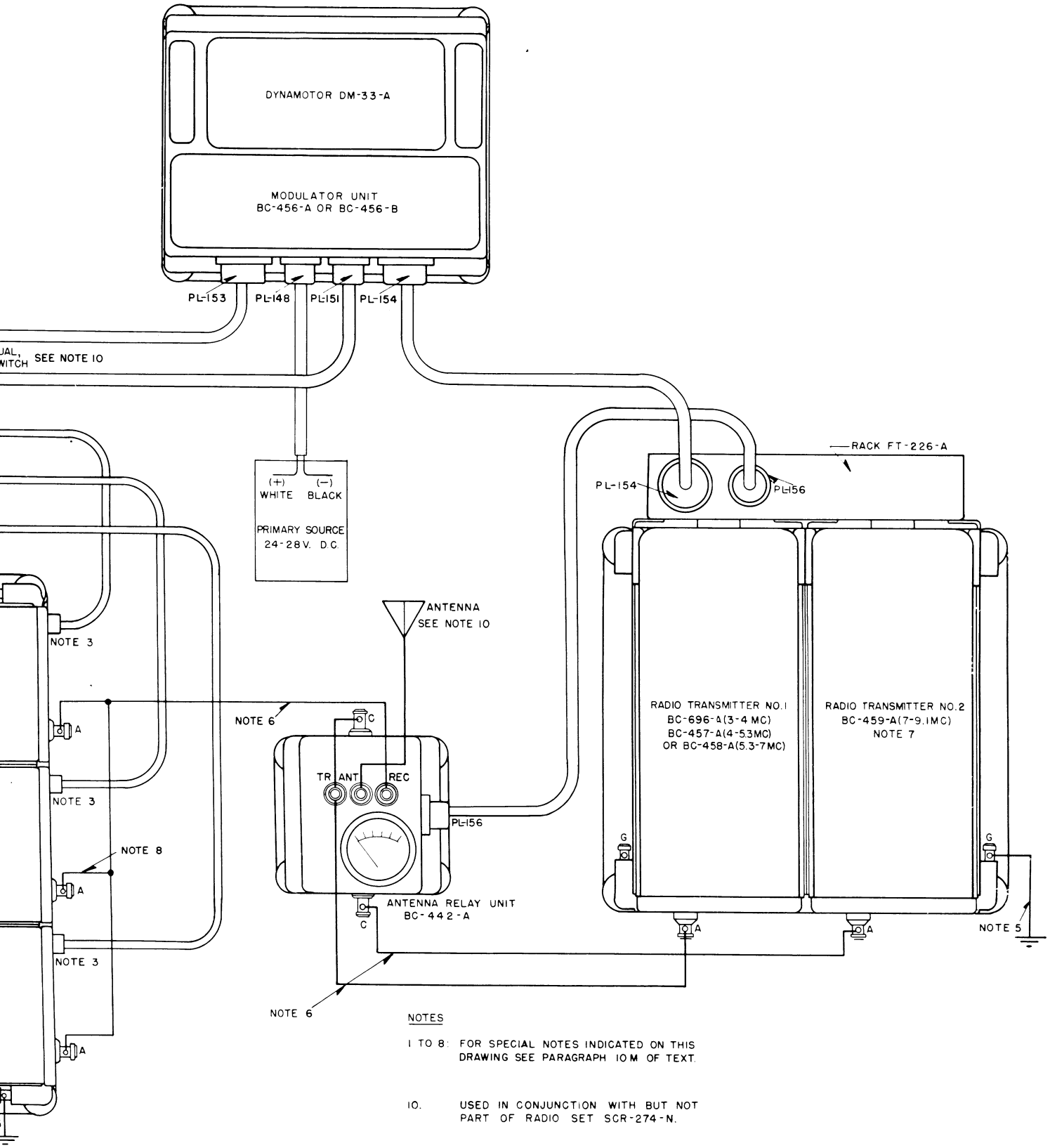


FIGURE 30A—RADIO SET SCR-274-N—INSTALLATION DIMENSIONS AND WEIGHT OF RADAR CONTROL PANEL C-570A/A or C-570B/A


RADIO CONTROL BOX
BC-450-A
NOTE 1
3-6 MC
190-550 KC
6-9.1 MC
A TEL.
B TEL.
A TEL.
B TEL.
PL-152
PL-152
PL-152
RADIO CONTROL BOX
BC-451-A
MIC
KEY
PL-153
DYNAMOTOR
MODULATOR
BC-456-A OR
PL-153
PL-148
HEADSET
HS-23
OR EQUAL
SEE NOTE10
HEADSET
HS-23
OR EQUAL
SEE NOTE 10
MICROPHONE
T-17 OR EQUAL
SEE NOTE 10
KEY J-37 OR EQUAL,
OR THROTTLE SWITCH
SEE NOTE 10
TUNING SHAFT MC-215
TUNING SHAFT MC-215
TUNING SHAFT MC-215
(+) WHITE
(-) BLACK
PRIMARY SOURCE
24-28 V. D.C.
NOTE 4
PL-151
G
NOTE 3
DYNAMOTOR
DM-32-A
RADIO
RECEIVER
BC-455-A OR
BC-455-B
(6.0-9.1 MC)
PL-152
A
NOTE 6
RACK FT-220-A
NOTE 3
DYNAMOTOR
DM-32-A
RADIO
RECEIVER
BC-453-A OR
BC-453-B
(190-550 KC)
NOTE 2
NOTE 8
PL-152
A
NOTE 3
DYNAMOTOR
DM-32-A
RADIO
RECEIVER
BC-454-A OR
BC-454-B
(3.0-6.0 MC)
PL-152
A
NOTE 6
PRIMARY
SOURCE
24-28 V. D.C.
WHITE (+)
BLACK (-)
PL-147
G
NOTE 5

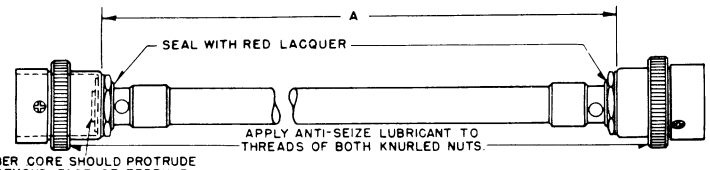


NOTES

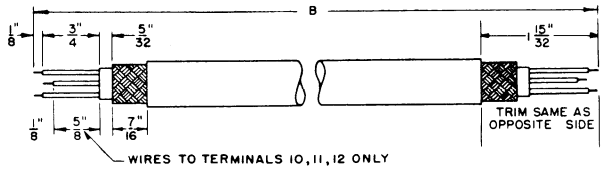
1 TO 8: FOR SPECIAL NOTES INDICATED ON THIS DRAWING SEE PARAGRAPH 10M OF TEXT.

10. USED IN CONJUNCTION WITH BUT NOT PART OF RADIO SET SCR-274-N.

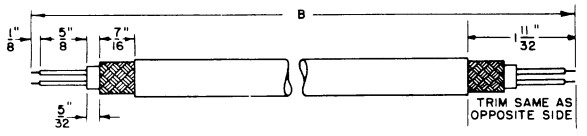
FIGURE 31 — RADIO SET SCR-274-N — CORDING DIAGRAM



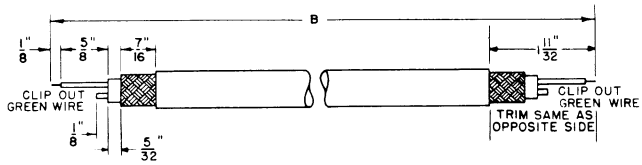
ASSEMBLY VIEW OF CORDS



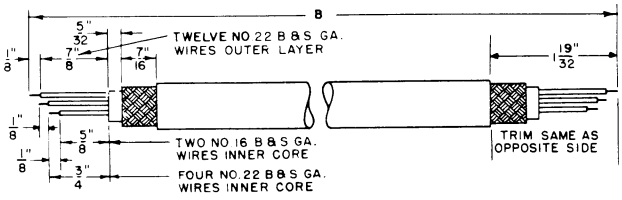
METHOD OF TRIMMING CABLE CO-210 FOR CORD ASSEMBLY 5804



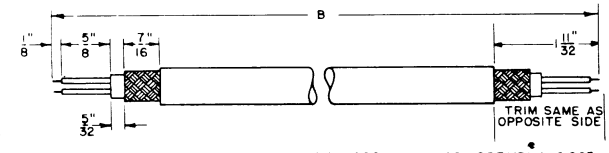
METHOD OF TRIMMING CABLE CO-205 FOR CORD ASSEMBLY 5808



METHOD OF TRIMMING CABLE CO-205 FOR CORD ASSEMBLY 5810



METHOD OF TRIMMING CABLE CO-207 FOR CORD ASSEMBLY 7538



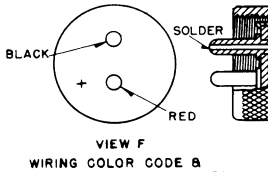
METHOD OF TRIMMING CABLE CO-206 FOR CORD ASSEMBLY 6693

INSTALLATION NOTES FOR CORD ASSEMBLIES

ALL CABLES HAVE CONSIDERABLE TORSIONAL RIGIDITY SO THAT WHEN INSTALLED APPRECIABLE TORSIONAL STRESS MAY BE SET UP IF THE RELATIVE ANGULAR POSITION OF THE PLUGS TO THE CABLES IS UNFAVORABLE. THIS CONDITION SHOULD BE RELIEVED BY TWISTING THE CABLE, A SHORT LENGTH AT A TIME, UNTIL AN ANGULAR PLUG RELATION IS OBTAINED WHICH RESULTS IN NEGLIGIBLE TORQUE.

CAUTION - DO NOT GRIP PLUGS TO TWIST THE CABLE SINCE THE JOINT BETWEEN CABLE AND PLUG MAY FAIL.

NOTE: CABLING IS NOT USED IN ARMY AIR FORCES INSTALLATIONS.

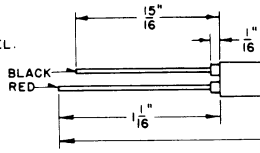


VIEW F

WIRING COLOR CODE & END VIEW OF PLUG PL-157

ASSEMBLY VIE

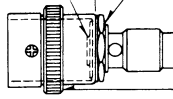
* ALL ITEMS IN THIS BLOCK DISCONTINUED ON LATER MODEL.

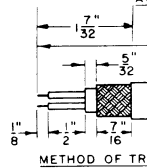


METH

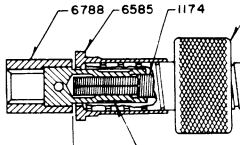
RUBBER CORD SHOULD PROTRUDE 1/32" BEYOND FACE OF FERRULE

SE

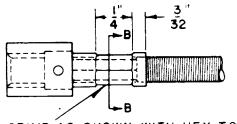




METHOD OF TR



SEE CRIMPIN

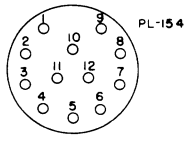


CRIMP AS SHOWN WITH HEX. TO
FLATS CRIMPED ON HUB MUST
PARALLEL WITH FLATS ON SHA

CRIMPING DETAIL (CAS

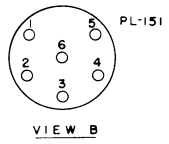
NOTES:
1. CUT SHAFTING TO
2. WITH CASING STR
SHAFTING REQUIR
3. LUBRICATE SHAF
4. LUBRICATE THRE

1. OUTER WHITE
2. OUTER BLACK
3. RED
4. INNER LARGE WHITE
5. INNER LARGE BLACK (GROUND)
6. BLUE
7. GREEN
8. YELLOW
9. BROWN
10. ORANGE
11. INNER SMALL WHITE
12. INNER SMALL BLACK



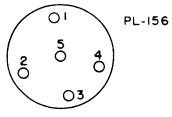
VIEW A

1. BLUE
2. RED
3. BLACK (GROUND) (NO.16)
4. GREEN
5. YELLOW
6. WHITE (NO.16)



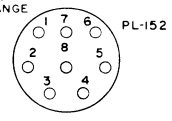
VIEW B

1. YELLOW
2. RED
3. BLACK (GROUND) (NO.16)
4. WHITE (NO.16)
5. BLUE (GREEN NOT USED)



VIEW C

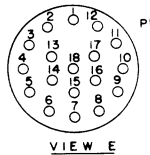
1. WHITE
2. RED
3. BLUE
4. GREEN (GROUND)
5. YELLOW
6. BLACK
7. BROWN
8. ORANGE



VIEW D

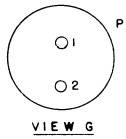
OUTER LAYER
1. WHITE (BETWEEN BR. & RD.)
2. WHITE (BETWEEN RD & OR)
3. RED
4. GREEN
5. WHITE (BETWEEN OR. & YEL.)
6. BLUE
7. WHITE (BETWEEN GR. & YEL.)
8. ORANGE
9. WHITE (BETWEEN BL. & GR.)
10. YELLOW
11. BROWN
12. WHITE (BETWEEN BR. & BL.)

INNER CORE
13. YELLOW
14. BLUE
15. BLACK (NO.16)
16. GREEN
17. RED
18. WHITE (NO.16) (NO.7 GROUNDED BY SCREW)



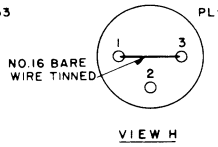
VIEW E

1. WHITE
2. BLACK (GROUND)



VIEW G

1. WHITE & JUMPER
2. BLACK (GROUND)
3. JUMPER



VIEW H

WIRING COLOR CODES, TERMINAL DESIGNATIONS AND REAR VIEWS OF PLUGS

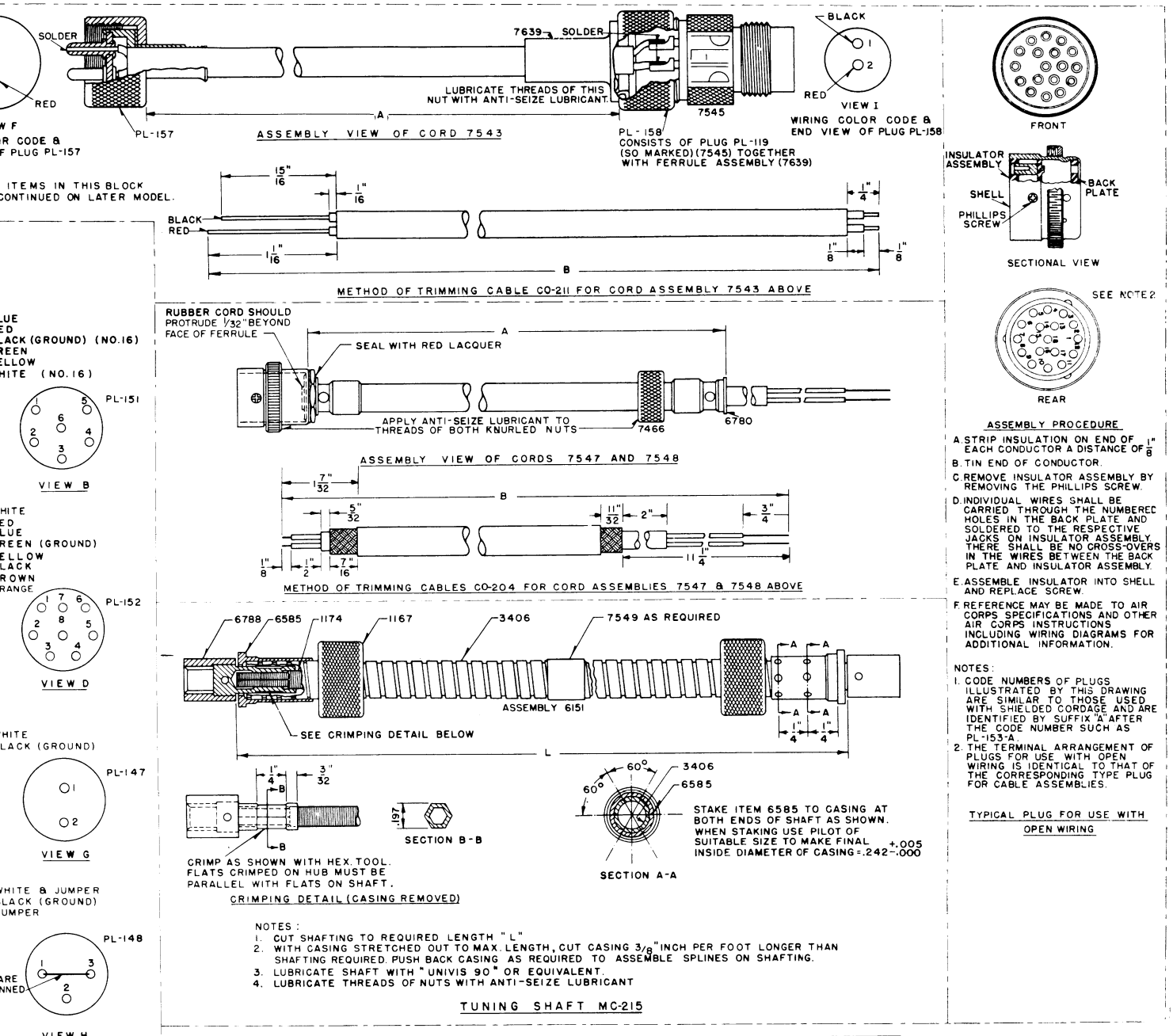
ASSEMBLY PROCEDURE FOR CO TYPE CABLE

A. STRIP CABLE ENDS TO DIMENSIONS INDICATED.
B. TIN ENDS OF CONDUCTORS.
C. INSERT CABLES INTO PLUG ASSEMBLIES.
D. BACK OFF NUTS, WASHERS AND SHELLS.
E. SOLDER WIRES TO RESPECTIVE JACKS PER WIRING COLOR CODE WITH MINIMUM CROSSOVERS OF CABLE CONDUCTORS.
F. ALIGN FERRULE PIN WITH JACK ON PLUG HAVING TAPPED HOLE AND SOLDER FERRULES THOROUGHLY TO SHEATH THROUGH 4 SIDE HOLES OF EACH PLUG.
G. ASSEMBLE PLUGS WITH FERRULE PIN IN SLOT IN SHELL. FASTEN THE INSULATOR ASSEMBLY IN THE SHELL WITH SCREW AND THEN TIGHTEN AND SEAL NUT.

	PIECE	
	5804 CORD ASSEMBLY	P
	5808 " "	P
	5810 " "	P
	6693 " "	P
	7538 " "	P
*	7543 " "	P
	7547 " "	P
	7548 " "	P

* NOTE: DISCONTINUE

TA

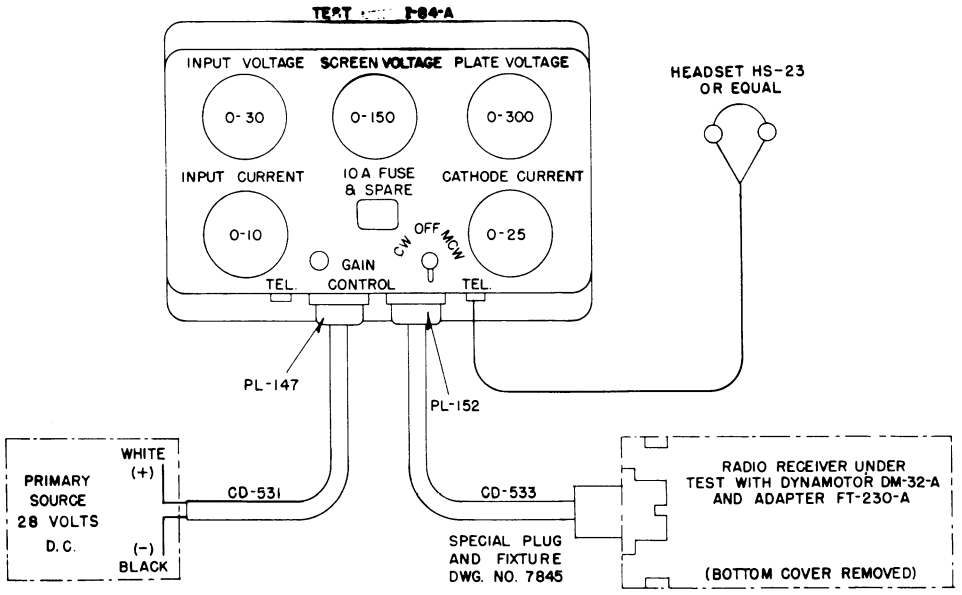


PIECE	FROM			TO			DIM. A	DIM. B
	PLUG		UNIT	PLUG		UNIT		
5804 CORD ASSEMBLY	PL-154 VIEW A		MODULATOR UNIT	PL-154 VIEW A		TRANSMITTER RACK	AS REQUIRED	A+2 1/16"
5808 " "	PL-151 " B		MODULATOR UNIT	PL-151 " B		RECEIVER RACK		A+1 13/16"
5810 " "	PL-156 " C		TRANSMITTER RACK	PL-156 " C		ANTENNA RELAY UNIT		
6693 " "	PL-152 " D		RECEIVER RACK	PL-152 " D		REC. CONTROL BOX		
7538 " "	PL-153 " E		MODULATOR UNIT	PL-153 " E		TRANS. CONTROL BOX		A+2 5/16"
* 7543 " "	PL-157 " F		TRANS. CONTROL BOX	PL-158 " I		ANT. CUR. INDICATOR		A+1 9/16"
7547 " "	PL-147 " G		RECEIVER RACK			BATTERY		A+12"
7548 " "	PL-148 " H		MODULATOR UNIT			BATTERY		

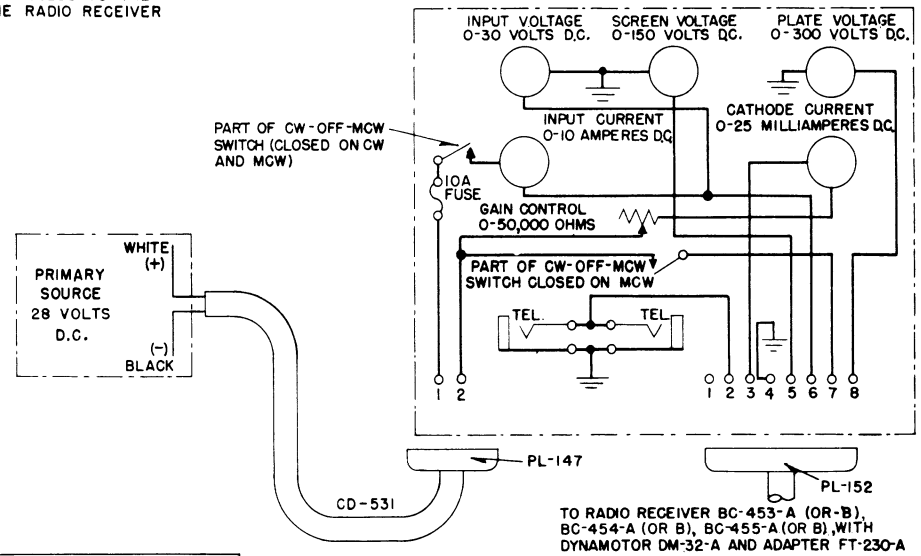
* NOTE: DISCONTINUED ON LATER MODELS.

TABLE A - CORD ASSEMBLY AND CABLE TRIMMING DATA

FIGURE 32 — ASSEMBLY DRAWINGS OF CORDS, PLUGS AND TUNING SHAFT USED IN RADIO SET SCR-274-N



CONNECTIONS FOR SERVICING RADIO RECEIVERS
(THIS ARRANGEMENT PROVIDES FOR ACCESS TO THE ELECTRICAL COMPONENTS INSIDE THE RADIO RECEIVER UNDER TEST)

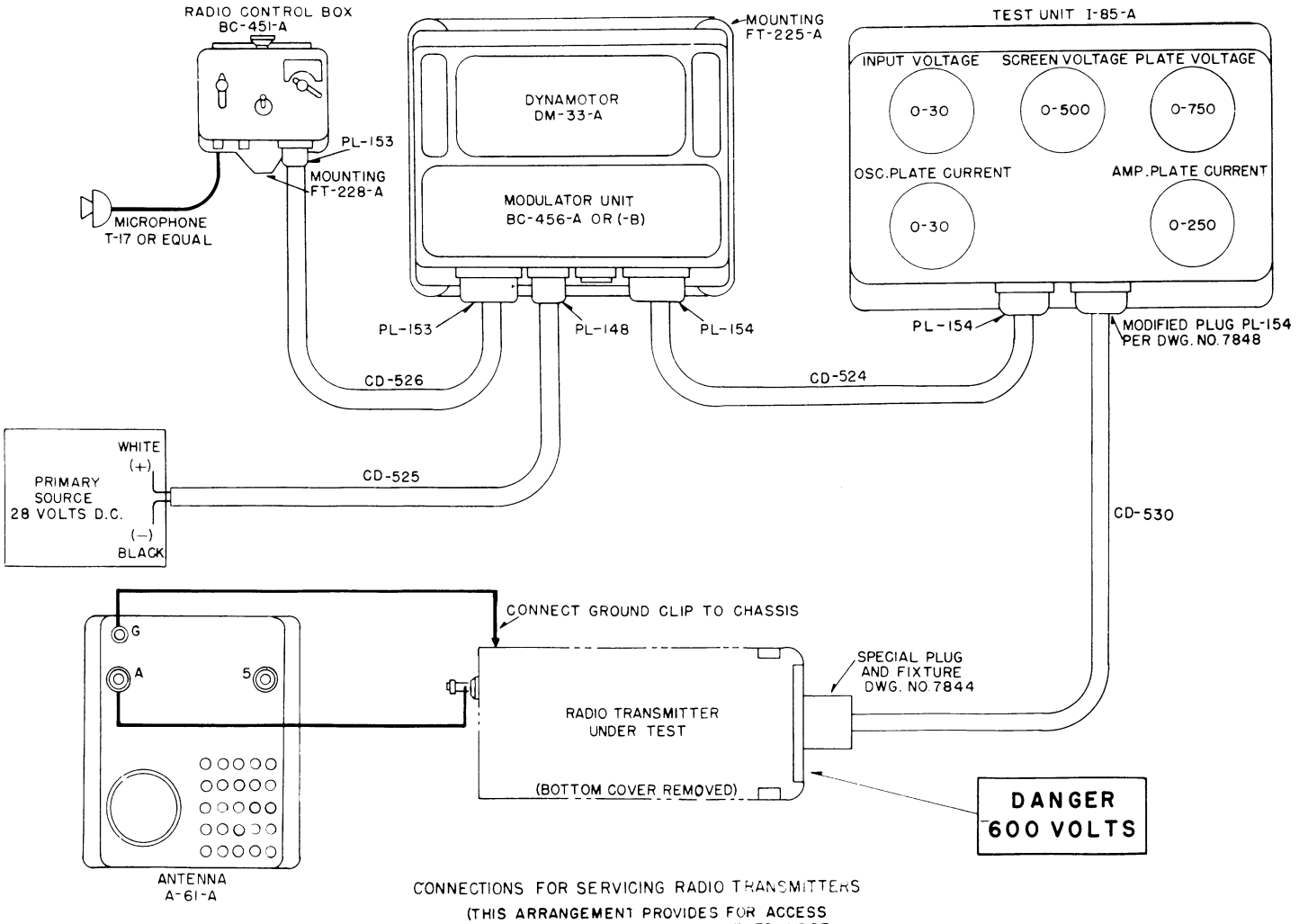


SCHEMATIC CIRCUIT DIAGRAM OF TEST UNIT I-84-A

PARTS LIST FOR TEST SET RC-54-A (FOR TESTING COMPONENTS OF RECEIVING EQUIPMENT)		
QUAN.	DESCRIPTION	W.E. DWG. NO.
1	*CORD CD-531 (RACK FT-233-A OR TEST UNIT I-84-A TO PRIMARY SOURCE, TWO CONDUCTOR, ONE PLUG PL-147)	7547
1	*CORD CD-532 (RACK FT-233-A TO RADIO CONTROL BOX BC-450-A, BC-473-B OR BC-496-A, EIGHT CONDUCTOR, PLUGS PL-152	6693
1	*CORD CD-533 (TEST UNIT I-84-A TO RADIO RECEIVER ONE PLUG PL-152 AND ONE SPECIAL PLUG PER DRAWING NUMBER 7845)	7382
2	INSTRUCTION DIAGRAMS FOR TEST SETS RC-54-A AND RC-55-A	ES-692031
1	MOUNTING FT-222-A (FOR RADIO CONTROL BOX BC-450-A)	7054
1	MOUNTING FT-231-A (FOR RACK FT-233-A)	7059
1	RACK FT-233-A (FOR ONE RECEIVER)	7509
1	TEST UNIT I-84-A	7369
1	SET OF TOOLS AS FOLLOWS: 3 - BRISTO WRENCHES 3 - PHILLIPS SCREWDRIVERS 3 - TUBE EXTRACTORS	8021 8020 7489
3	CONTROL UNIT MC-237 (LOCAL) (FORMERLY MC-236)	6743
1	**HEADSET HS-23 (OR HS-23-A)	-
1	**CD-307 (OR CD-307-A) HEADSET EXTENSION CORD	-
	* CORDS CD-531, CD-532 AND CD-533 ARE FURNISHED IN FIVE FT. LENGTHS UNLESS OTHERWISE SPECIFIED. ** HEADSET HS-23 AND CORD CD-307 ARE NOT FURNISHED BY WESTERN ELECTRIC COMPANY AS PARTS OF THIS TEST SET.	

METER LABELLED	READS	METER READINGS FOR CW OR MCW POSITIONS. GAIN CONTROL AT MAXIMUM
INPUT VOLTAGE	PRIMARY SOURCE (VOLTS)	28.0
SCREEN VOLTAGE	SCREEN GRID SUPPLY TO TUBES VT-131 AND VT-132 (VOLTS)	78-92
PLATE VOLTAGE	PLATE SUPPLY TO TUBES VT-131, VT-132 AND SCREEN GRID SUPPLY TO TUBE VT-134 (VOLTS)	230-250
INPUT CURRENT	TOTAL CURRENT FROM PRIMARY SOURCE (AMPERES)	1.4-1.7
CATHODE CURRENT	CATHODE CURRENT OF R F AMP. AND FIRST I F AMP. TUBES VT-131 (MILLIAMPERES)	11-15

FIGURE 33 — TEST SET RC-54-A — INSTRUCTION DIAGRAM FOR RECEIVER TESTING



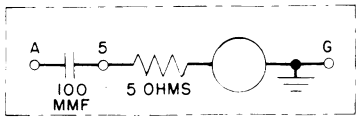
CONNECTIONS FOR SERVICING RADIO TRANSMITTERS

(THIS ARRANGEMENT PROVIDES FOR ACCESS TO THE ELECTRICAL COMPONENTS INSIDE THE RADIO TRANSMITTER UNDER TEST)

METER LABELLED	READS	*METER READINGS FOR THE THREE POSITIONS OF RADIO CONTROL BOX BC-451-A		
		TONE	CW	VOICE
INPUT VOLTAGE	HEATER CIRCUIT VOLTAGE	**27.0	**27.0	**27.0
SCREEN VOLTAGE	SCREEN GRID SUPPLY TO TUBES VT-136, RF POWER AMPLIFIERS (VOLTS)	145-160	250-300	145-160
PLATE VOLTAGE	PLATE SUPPLY TO TUBES VT-136, RF POWER AMPLIFIERS (VOLTS)	520-560	500-540	520-560
OSC. PLATE CURRENT	PLATE CURRENT, TUBE VT-137, MASTER OSCILLATOR (MILLIAMPERES)	17-22	17-22	17-22
AMP. PLATE CURRENT	PLATE CURRENT, TUBES VT-136, RF POWER AMPLIFIERS (MILLIAMPERES)	90-110	160-190	90-110
AMPERES RF (ON ANTENNA A-61-A)	ANTENNA CURRENT (AMPERES)	1.7-2.4	2.4-3.3	1.3-2.0

* RADIO TRANSMITTER MUST BE ACCURATELY TUNED FOR MAXIMUM ANTENNA CURRENT INTO ANTENNA A-61-A, WITH EMISSION SWITCH OF RADIO CONTROL BOX BC-451-A ON CW, AND "ANT. COUPLING" ADJUSTED FOR MAXIMUM ANTENNA CURRENT. RADIO TRANSMITTERS MUST NOT BE RETUNED AFTER SWITCHING TO TONE OR VOICE.

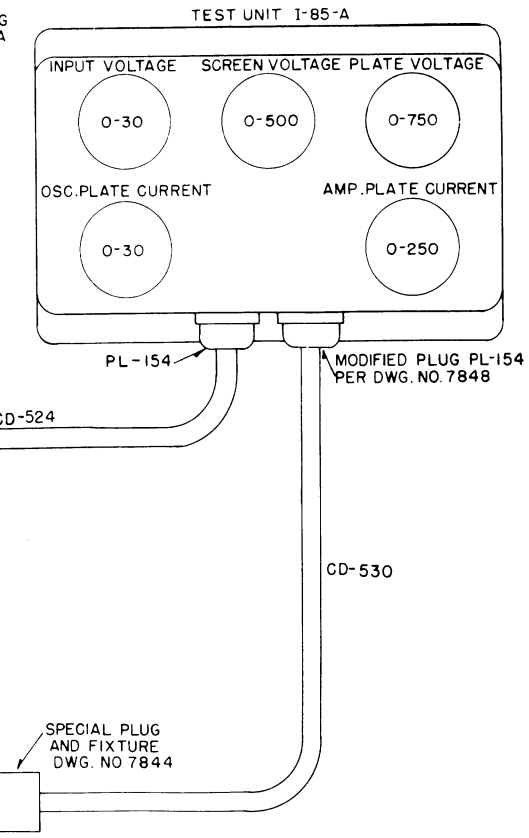
** WITH THE MODULATOR UNIT AND RADIO TRANSMITTER ENERGIZED, THERE WILL BE APPROXIMATELY ONE VOLT DROP IN THE LEADS FROM THE PRIMARY SOURCE TO THE POINT OF MEASUREMENT OF THE HEATER CIRCUIT VOLTAGE AND THE READING ON THE METER LABELED INPUT VOLTAGE WILL THEREFORE BE ABOUT ONE VOLT LESS THAN THE VOLTAGE OF THE PRIMARY SOURCE.

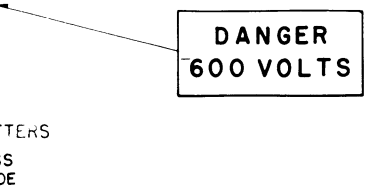


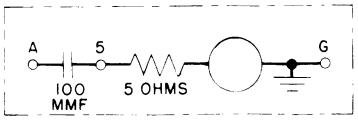
SCHEMATIC CIRCUIT DIAGRAM
ANTENNA A-61-A

WARNING

DYNAMOTOR DM-33-A GENERATES 600 VOLTS D.C. DO NOT ATTACH OR DETACH PLUGS WHILE DYNAMOTOR IS RUNNING

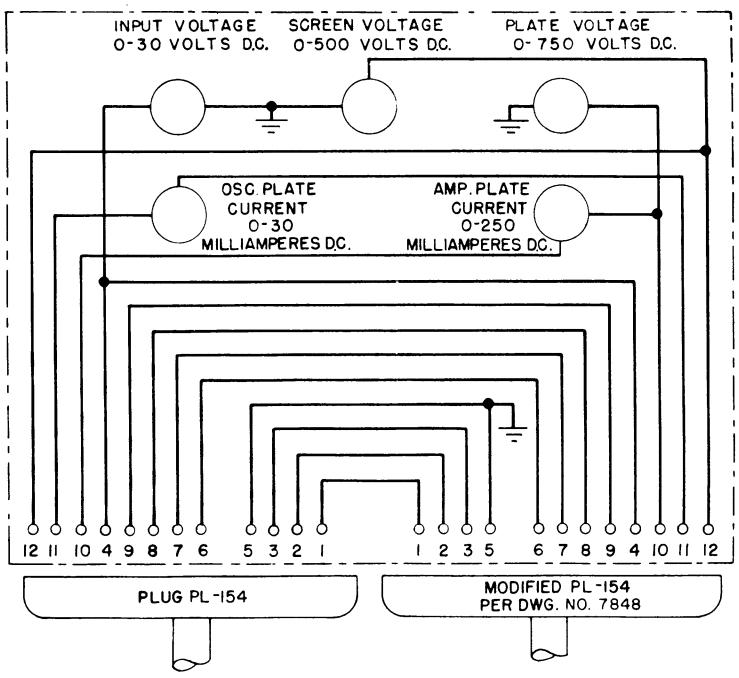






SCHEMATIC CIRCUIT DIAGRAM
ANTENNA A-61-A

WARNING
DYNAMOTOR DM-33-A
GENERATES 600 VOLTS D.C.
DO NOT ATTACH OR DETACH
PLUGS WHILE DYNAMOTOR IS
RUNNING

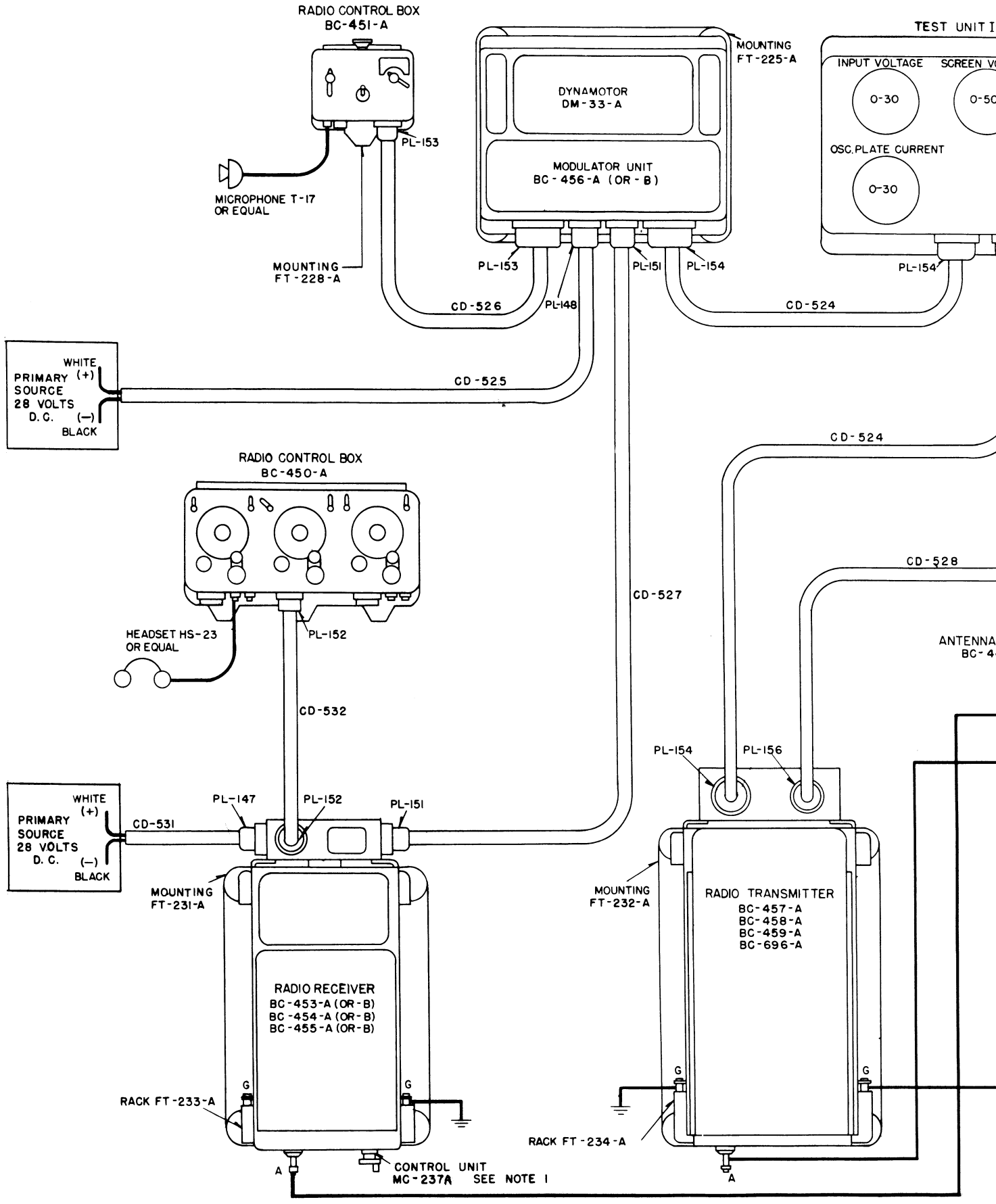


SCHEMATIC CIRCUIT DIAGRAM OF TEST UNIT I-85-A

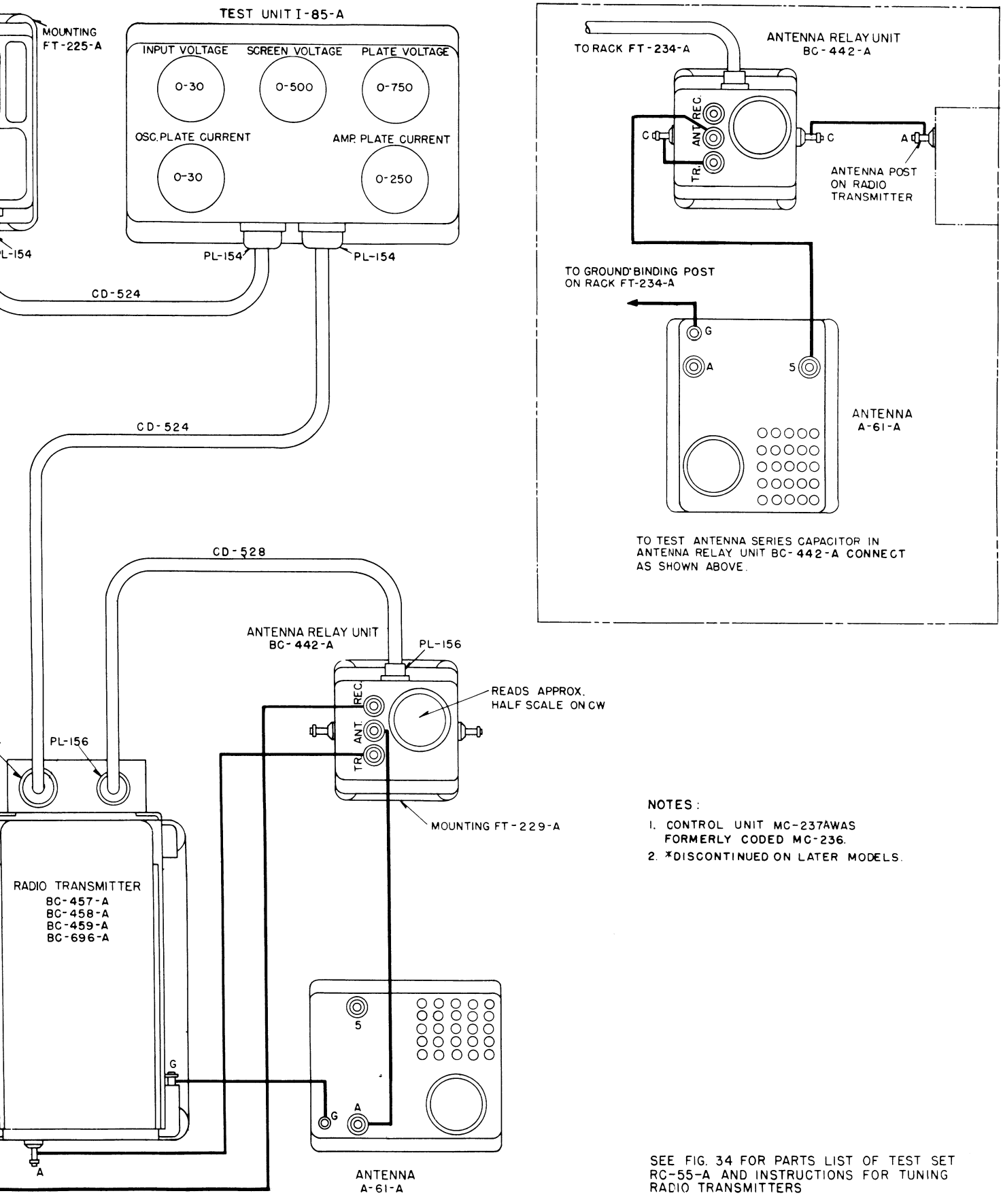
QUAN.	PARTS LIST FOR TEST SET RC-55-A (FOR TESTING COMPONENTS OF TRANSMITTING EQUIPMENT) DESCRIPTION	W.E.CO. DWG. NO.
2	*CORDS CD-524 (MODULATOR UNIT BC-456-A OR (-B) TO TEST UNIT I-85-A AND TEST UNIT I-85-A TO RACK FT-234-A, 12 CONDUCTOR, PLUGS PL-154)	5804
1	*CORD CD-525 (MODULATOR UNIT BC-456-A OR (-B) TO PRIMARY SOURCE, TWO CONDUCTOR, ONE PLUG PL-148)	7548
1	*CORD CD-526 (MODULATOR UNIT BC-456-A OR (-B) TO RADIO CONTROL BOX BC-451-A 18 CONDUCTORS, PLUGS PL-153)	7538
1	*CORD CD-527 (MODULATOR UNIT BC-456-A OR (-B) TO RACK FT-233-A, SIX CONDUCTORS, PLUGS PL-151)	5808
1	*CORD CD-528 (RACK FT-234-A TO ANTENNA RELAY UNIT BC-442-A, FIVE CONDUCTORS, PLUGS PL-156)	5810
1	*CORD CD-530 (TEST UNIT I-85-A TO RADIO TRANSMITTER, ONE MODIFIED PLUG PL-154 PER DWG. NO. 7848 AND ONE SPECIAL PLUG PER DWG. NO. 7844)	7843
1	ANTENNA A-61-A	7777
1	DYNAMOTOR DM-33-A	5168
2	INSTRUCTION DIAGRAMS FOR TEST SETS RC-54-A AND RC-55-A	ES-69203I
1	MODULATOR UNIT BC-456-A OR (-B)	7591
1	MOUNTING FT-225-A (FOR MODULATOR UNIT BC-456-A OR (-B)	7058
1	MOUNTING FT-228-A (FOR RADIO CONTROL BOX BC-451-A)	7083
1	MOUNTING FT-229-A (FOR ANTENNA RELAY UNIT BC-442-A)	7056
1	MOUNTING FT-232-A (FOR RACK FT-234-A)	7061
1	RACK FT-234-A (FOR ONE TRANSMITTER)	7507
1	RADIO CONTROL BOX BC-451-A	7095
1	TEST UNIT I-85-A	7544
1	SET OF TOOLS AS FOLLOWS: 3-BRISTO WRENCHES 3-PHILLIPS SCREWDRIVERS	8021 8020
1	**MICROPHONE T-17 OR EQUAL	—

*CORDS CO-524 TO 530, INCLUSIVE, ARE FURNISHED IN FIVE FT. LENGTHS UNLESS OTHERWISE SPECIFIED.
**MICROPHONE T-17 IS NOT FURNISHED BY WESTERN ELECTRIC CO. AS PART OF THIS TEST SET.

FIGURE 34 — TEST SET RC-55-A — INSTRUCTION DIAGRAM FOR TRANSMITTER TESTING



CONNECTIONS FOR TESTING ALL ACCESSORIES OF RADIO SET SCR-274



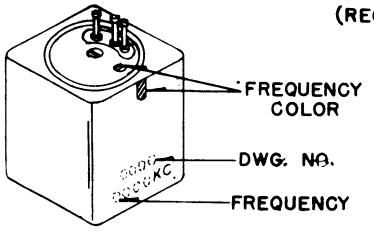
NOTES:

1. CONTROL UNIT MC-237A WAS FORMERLY CODED MC-236.
2. *DISCONTINUED ON LATER MODELS.

SEE FIG. 34 FOR PARTS LIST OF TEST SET RC-55-A AND INSTRUCTIONS FOR TUNING RADIO TRANSMITTERS

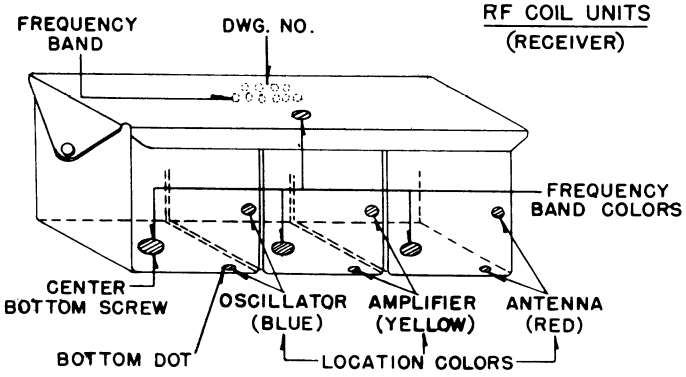
FIGURE 35 — INSTRUCTION DIAGRAM FOR TESTING ACCESSORIES OF RADIO SET SCR-274-N

CW OSCILLATOR
(RECEIVER)



FREQUENCY COLOR CODE		
COLOR	FREQUENCY	CW OSCILLATOR DWG. NO.
BROWN	85 KC	5852
YELLOW	1415 KC	5855
GREEN	2830 KC	5856

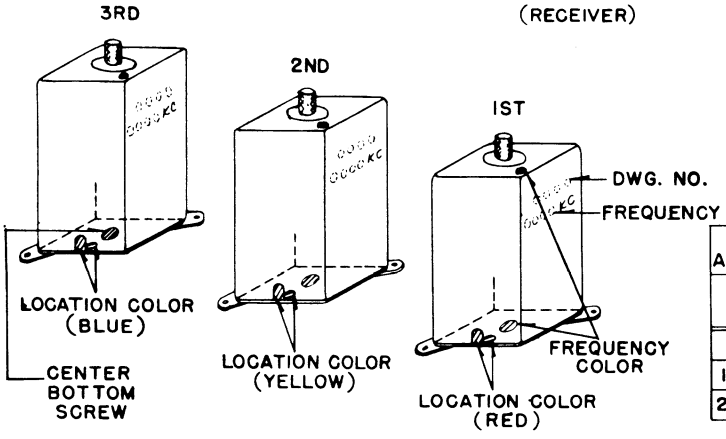
RF COIL UNITS
(RECEIVER)



LOCATION COLOR CODE	
RED	ANTENNA
YELLOW	AMPLIFIER
BLUE	OSCILLATOR

FREQUENCY BAND COLOR CODE		
COLOR	BAND	COIL SET DWG. NO.
BROWN	190-550 KC	6184
YELLOW	3-6 MC	6227
GREEN	6-9.1 MC	6234

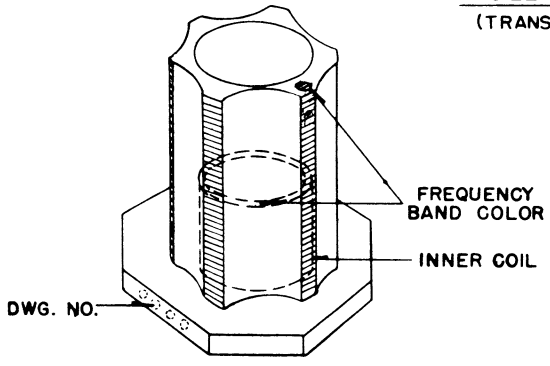
IF COUPLING UNITS
(RECEIVER)



FREQUENCY COLOR CODE	
I.F.	COLOR
85 KC	BROWN
1415 KC	YELLOW
2830 KC	GREEN

LOCATION COLOR CODE AND COUPLING UNIT DRAWING NUMBERS			
I.F.	IST (RED)	2ND (YELLOW)	3RD (BLUE)
85 KC	4698	7267	4677
1415 KC	7274	7275	7276
2830 KC	7277	7278	7279

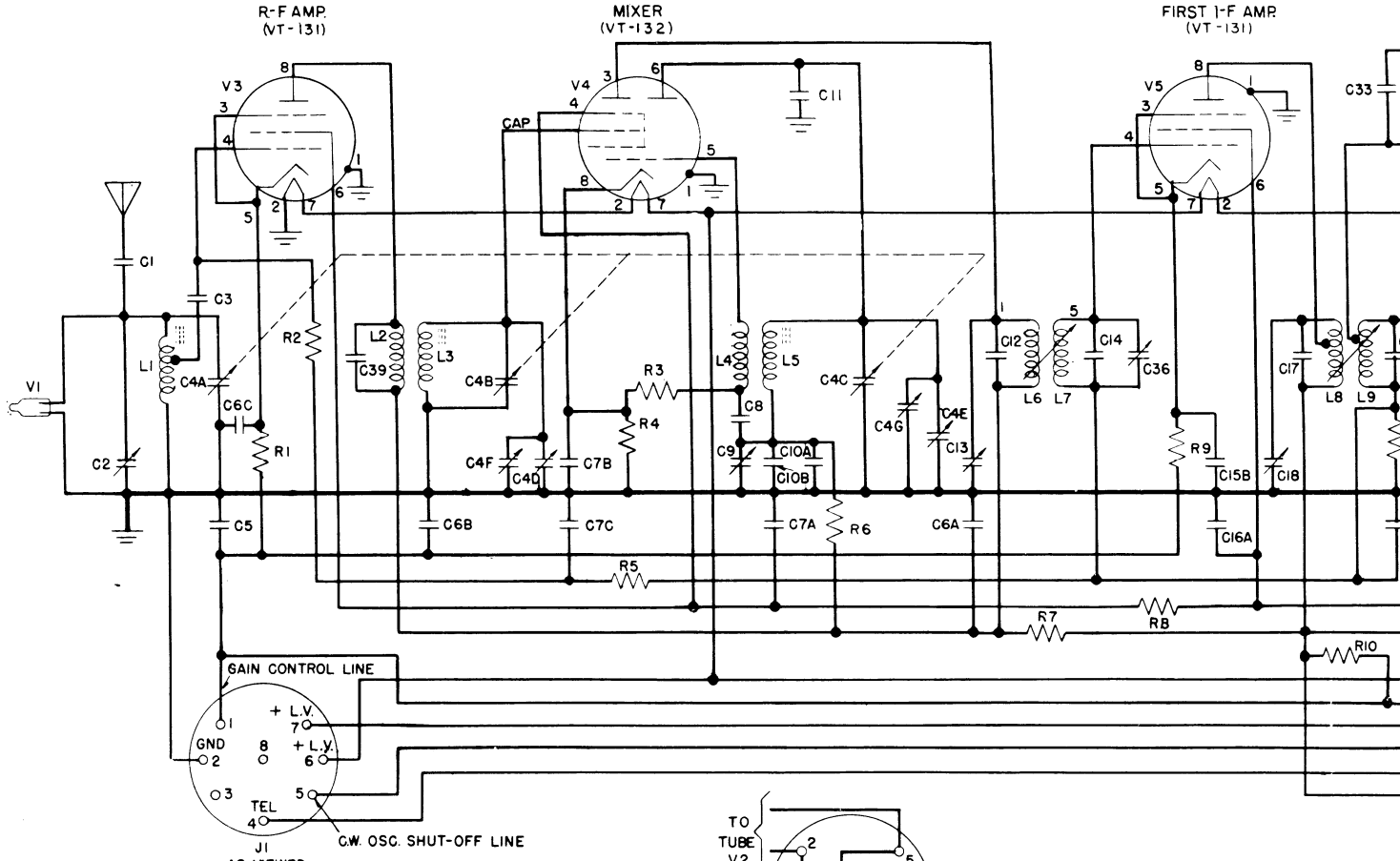
OSCILLATOR COIL
(TRANSMITTER)



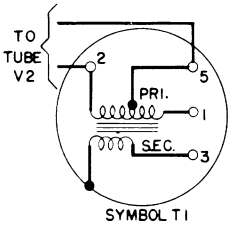
COLOR	BAND	OSCILLATOR COIL DWG. NO.
BROWN	3-4 MC	6029
RED	4-5.3 MC	6030
ORANGE	5.3-7 MC	6031
YELLOW	7-9.1 MC	6032

NOTE:
INNER COILS MARKED WITH TWO COLORS MAY BE USED IN EITHER OF THE TWO BANDS REPRESENTED.

FIGURE 36 — COLOR CODES FOR RECEIVER AND TRANSMITTER COILS

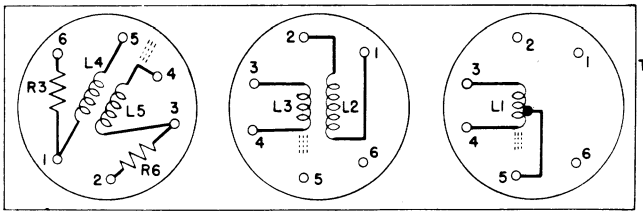


SEE SCHEMATIC DIAGRAM OF RECEIVING EQUIPMENT FOR JACK CONNECTIONS.



SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-453-A

DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS

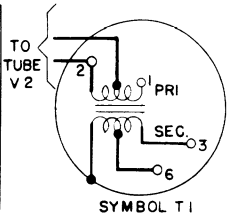


SYMBOL Z5C
R-F OSCILLATOR

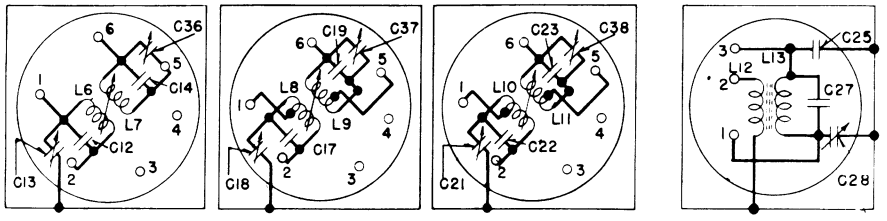
SYMBOL Z5B
R-F AMPLIFIER

SYMBOL Z5A
R-F ANTENNA

R-F COIL UNIT (190-550KC) SYMBOL Z5



SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-453-B



SYMBOL Z1
IST I-F
(85 KC)

SYMBOL Z2
2ND I-F
(85 KC)

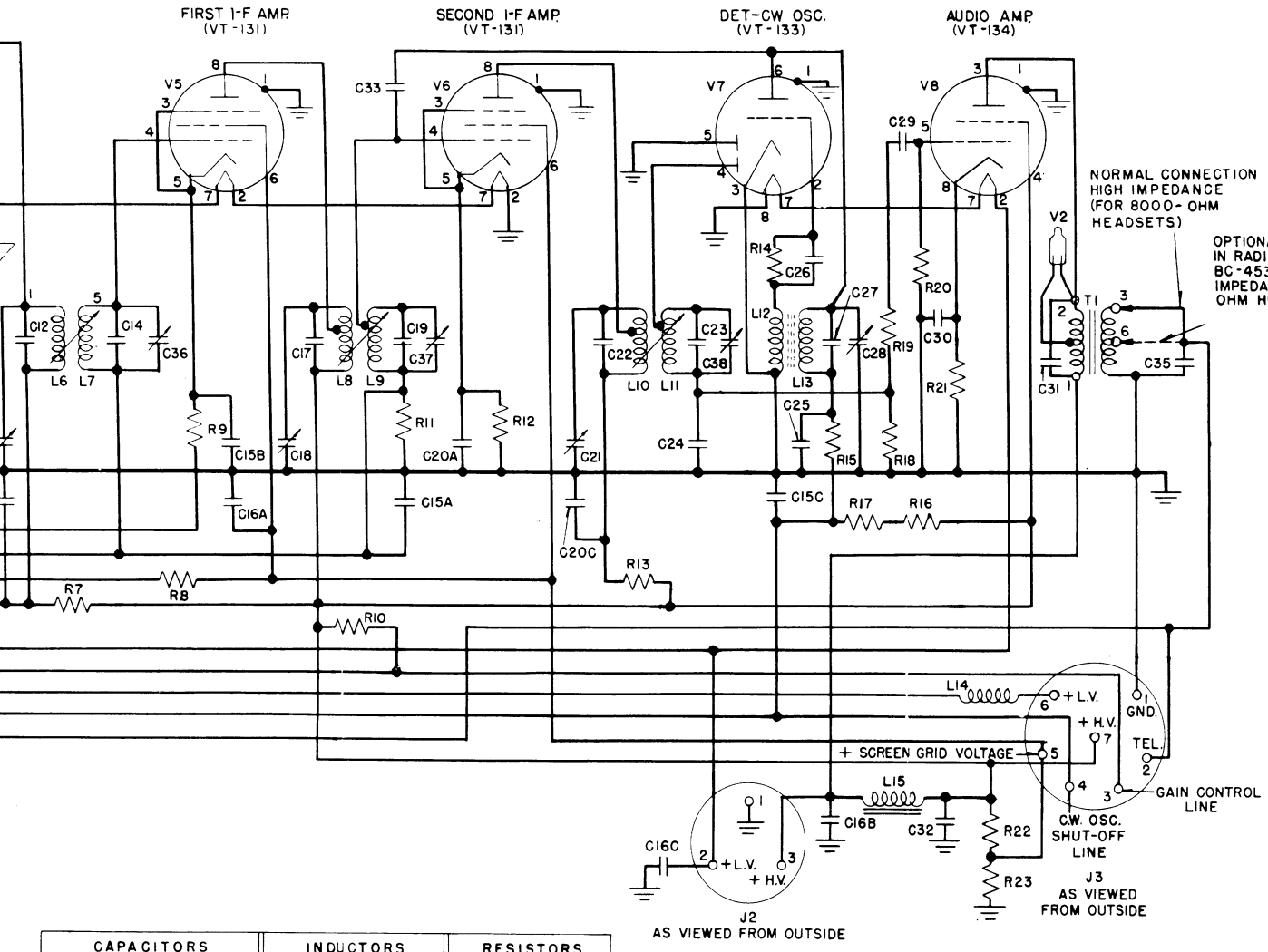
SYMBOL Z3
3RD I-F
(85 KC)

SYMBOL Z4
C W OSCILLATOR
(85 KC)

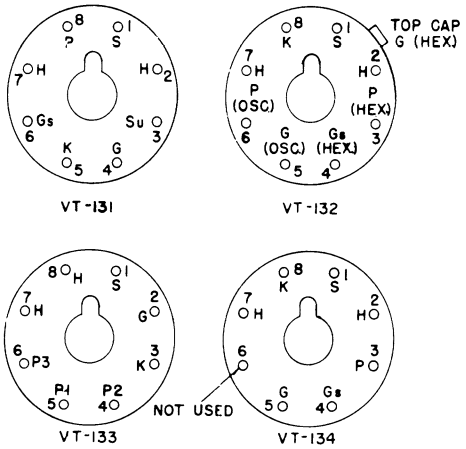
I-F COUPLING UNITS

CIRCUITS IN R-F COIL SET, I-F COUPLING UNITS, CW OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPT
C1	11 MMF.	L1	ANT. INPUT
C2	15 MMF.	L2, L3	RF AMP.
C3	100 MMF.	L4, L5	RF OSC.
C4 (A TO G)	GANG (346 MMF.)	L6, L7	IN IST IF
C5	3 MFD.	L8, L9	IN 2ND IF
C6 (A,B,C)	.05/.05/.05 MF.	L10, L11	IN 3RD IF
C7 (A,B,C)	.05/.05/.05 MF.	L12, L13	CW OSC.
C8	200 MMF.	L14	RF CHOKE, MICRO-HEN
C9	40 MMF.		
C10 (A,B)	690 MMF. TOTAL	L15	AF CHOKE 3 HENRIES
C11	3 MMF.		
C12	180 MMF.		
C13	17 MMF.		
C14	180 MMF.		
C15 (A,B,C)	.05/.05/.05 MF.		
C16 (A,B,C)	.22/.22/.22 MF.		
C17	180 MMF.		
C18	17 MMF.		
C19	180 MMF.		
C20 (A,B,C)	.05/.01/.05 MF.		
C21	17 MMF.		
C22	180 MMF.		
C23	180 MMF.		
C24	200 MMF.		
C25	.001 MF.		
C26	200 MMF.		
C27	345 MMF.		
C28	34 MMF.		
C29	.006 MF.		
C30	15 MF.		
C31	.001 MF.		
C32	5 MF.		
C33	3 MMF.		
C35	750 MMF.		
C36	17 MMF.		
C37	17 MMF.		
C38	17 MMF.		
C39	120 MMF.		



CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF.	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO G)	GANG (346 MMF.)	L6, L7	IN 1ST IF	R4	620
C5	3 MFD.	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF.	L10, L11	IN 3RD IF	R6	510,000
C7 (A,B,C)	.05/.05/.05 MF.	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES	R8	200
C9	40 MMF.			R9	620
C10 (A,B)	690 MMF. TOTAL	L15	AF CHOKE 3 HENRIES	R10	360,000
C11	3 MMF.			R11	100,000
C12	180 MMF.			R12	510
C13	17 MMF.			R13	200
C14	180 MMF.			R14	51,000
C15 (A,B,C)	.05/.05/.05 MF.			R15	20,000
C16 (A,B,C)	.22/.22/.22 MF.			R16	150,000
C17	180 MMF.			R17	150,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF.			R20	2,000,000
C21	17 MMF.			R21	1500
C22	180 MMF.			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF.				
C26	200 MMF.				
C27	345 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF.				
C31	.001 MF.				
C32	5 MF.				
C33	3 MMF.				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				
C39	120 MMF.				



TUBE SOCKET TERMINALS-AS VIEWED FROM BOTTOM

G = CONTROL GRID
G (HEX.) = CONTROL GRID, HEXODE SECTION
G (OSC.) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX.) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX.) = PLATE, HEXODE SECTION
P (OSC.) = PLATE, OSC. SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

FIGURE 37A — RADIO RECEIVER BC-453-A (OR -B) (190-550-KC), SCHEMATIC

Revised 5 February

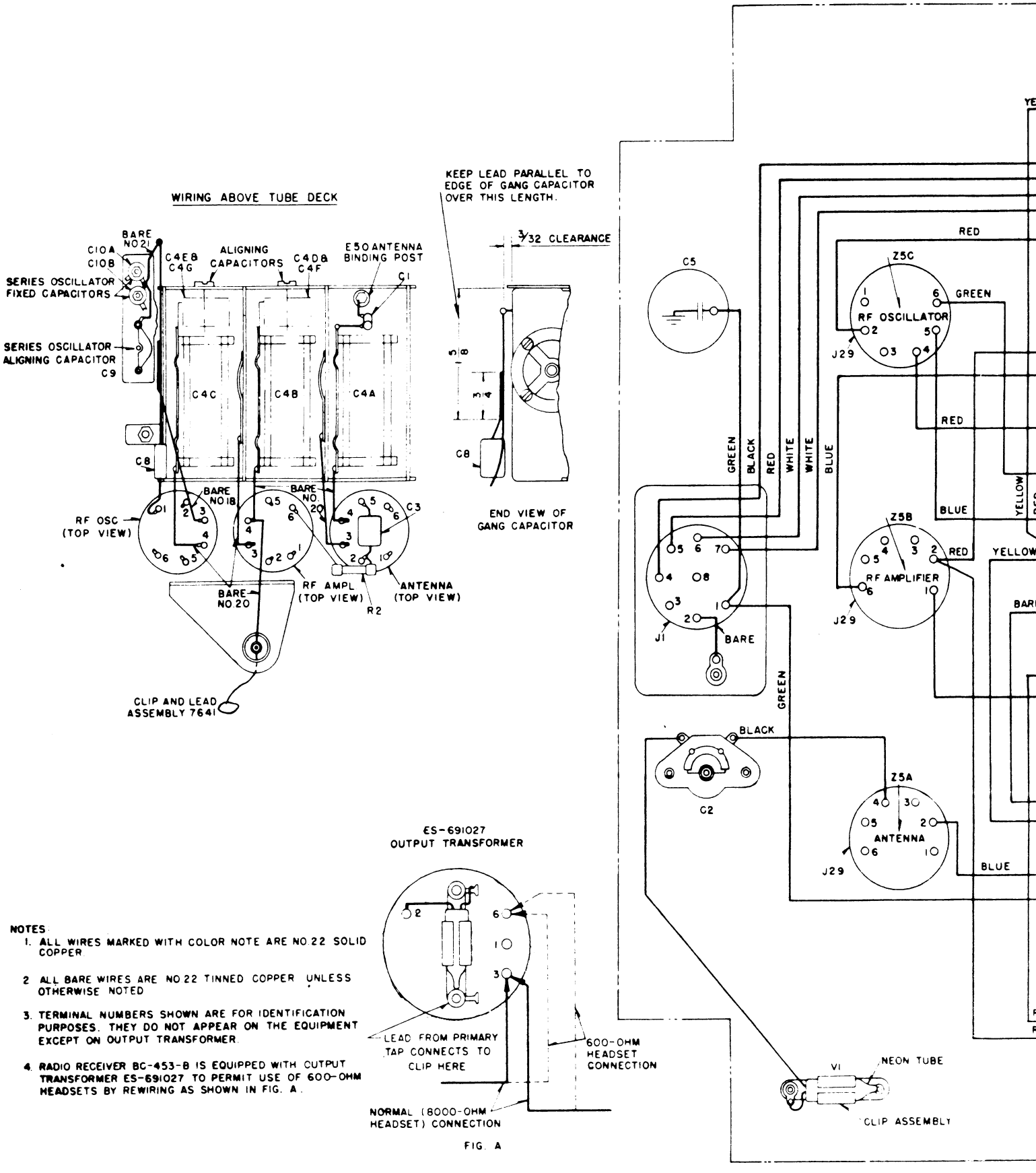
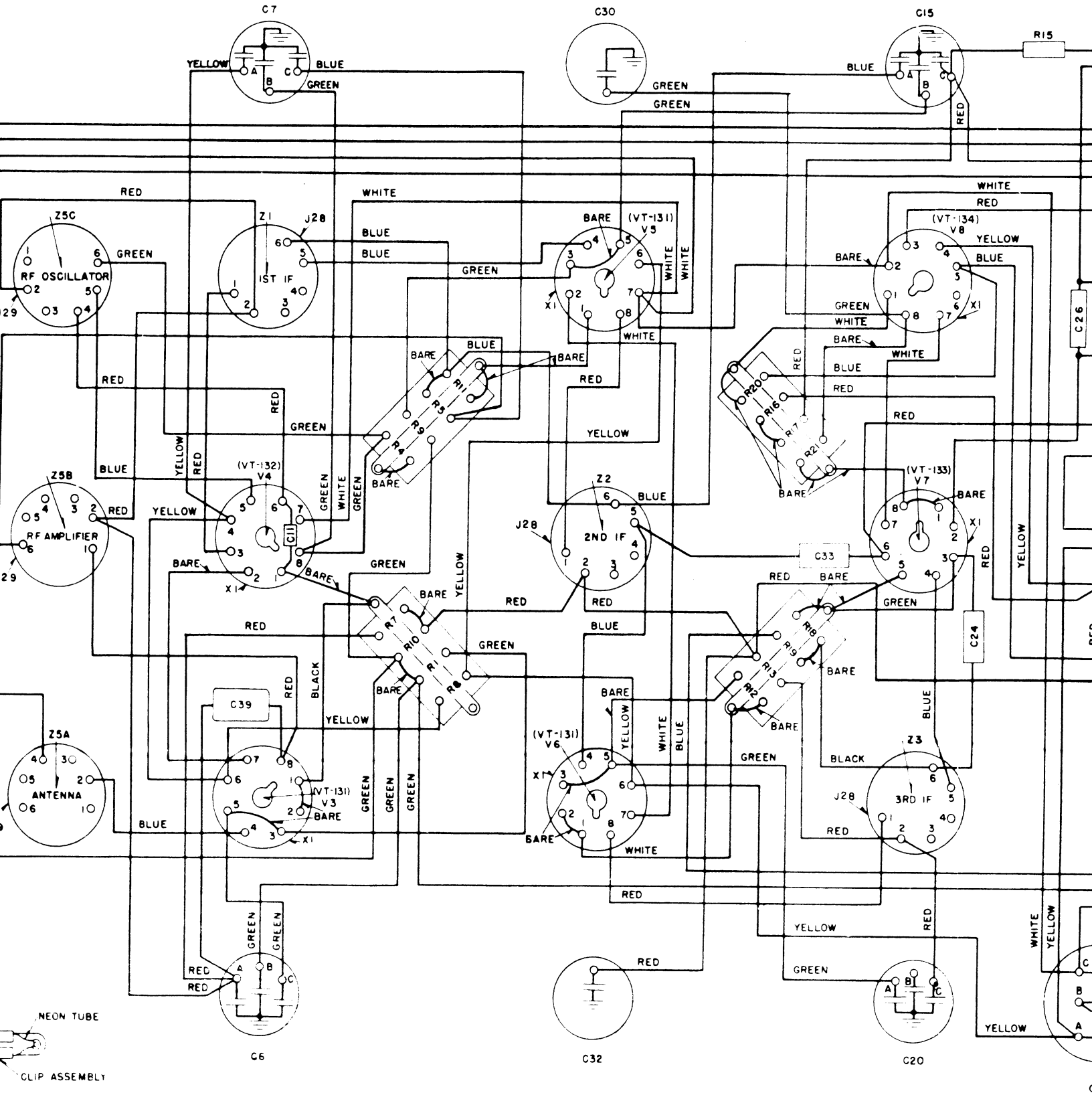
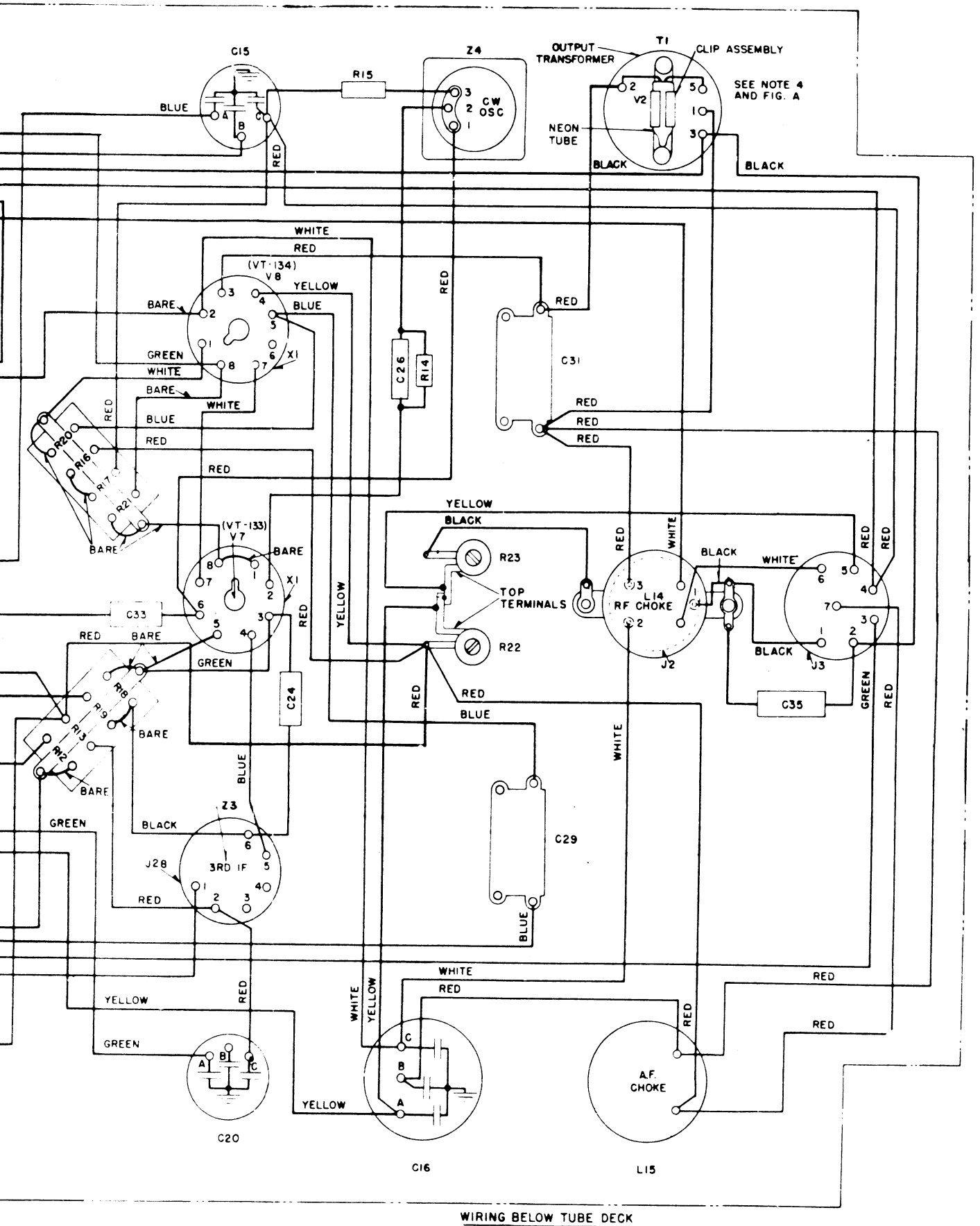


FIG. A

NOTES:

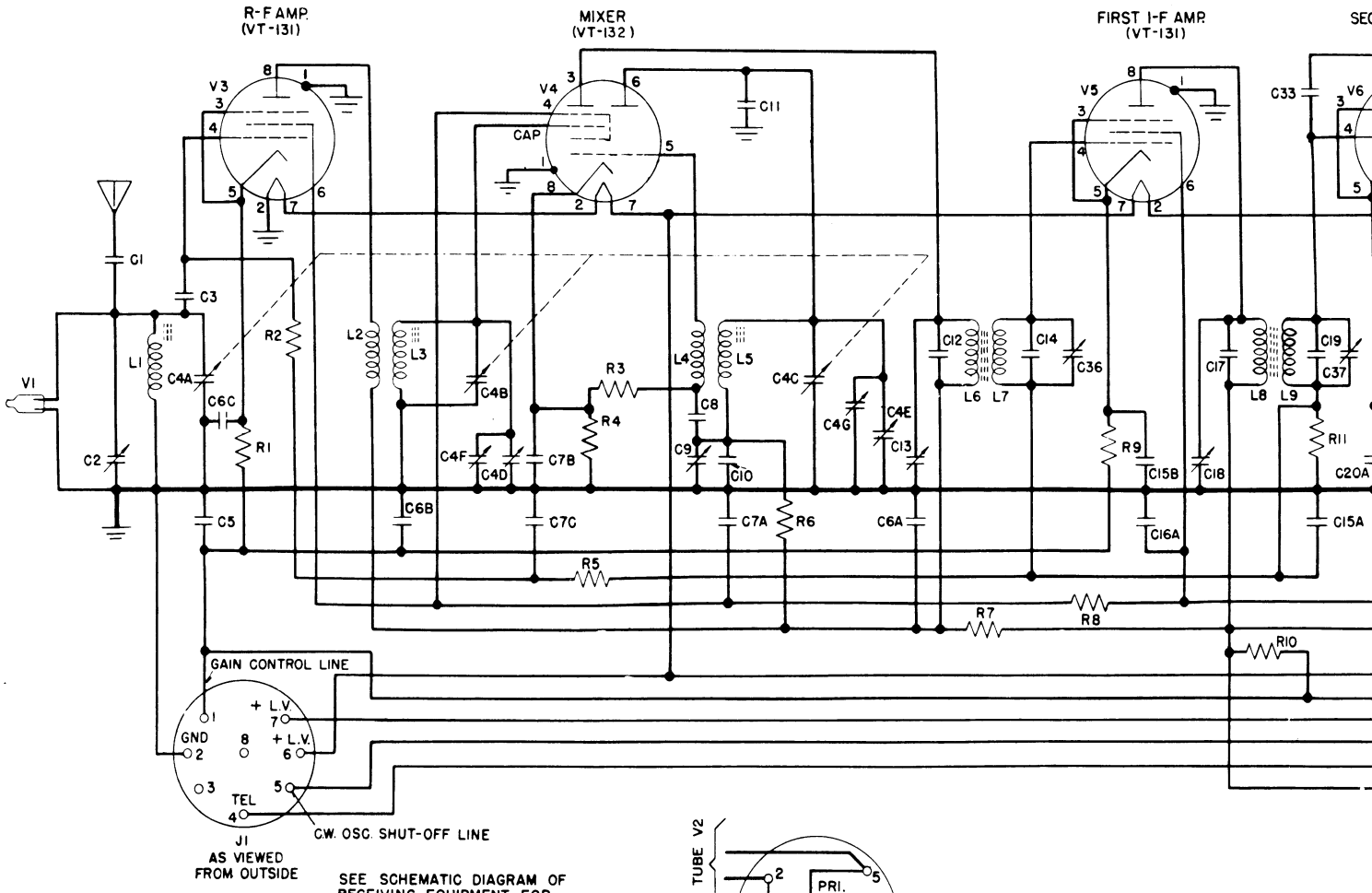
1. ALL WIRES MARKED WITH COLOR NOTE ARE NO.22 SOLID COPPER.
2. ALL BARE WIRES ARE NO.22 TINNED COPPER UNLESS OTHERWISE NOTED.
3. TERMINAL NUMBERS SHOWN ARE FOR IDENTIFICATION PURPOSES. THEY DO NOT APPEAR ON THE EQUIPMENT EXCEPT ON OUTPUT TRANSFORMER.
4. RADIO RECEIVER BC-453-B IS EQUIPPED WITH OUTPUT TRANSFORMER ES-691027 TO PERMIT USE OF 600-OHM HEADSETS BY REWIRING AS SHOWN IN FIG. A.


C7
C30
C15
R15
Z5C
RF OSCILLATOR
Z1
J28
IST IF
(VT-131)
V5
(VT-134)
V8
Z5B
RF AMPLIFIER
(VT-132)
V4
Z2
2ND IF
(VT-133)
V7
C33
C24
C26
C39
Z5A
ANTENNA
(VT-131)
V3
(VT-131)
V6
Z3
3RD IF
NEON TUBE
CLIP ASSEMBLY
C6
C32
C20
RED
WHITE
BLUE
GREEN
YELLOW
BARE
BLACK

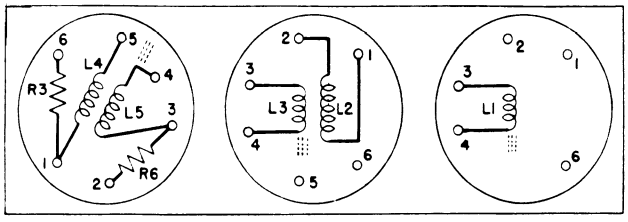


WIRING BELOW TUBE DECK

Figure 37B—Radio Receiver BC-453-A (or -B) (190-550KC) Practical Wiring Diagram



DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS

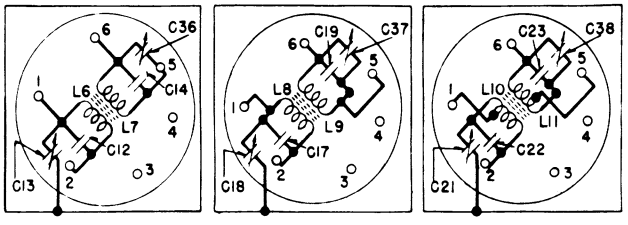


SYMBOL Z5C
R-F OSCILLATOR

SYMBOL Z5B
R-F AMPLIFIER

SYMBOL Z5A
R-F ANTENNA

R-F COIL UNIT (3-6 MC) SYMBOL Z5

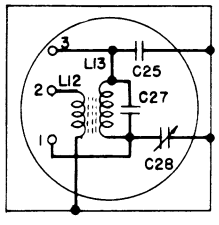


SYMBOL Z1
1ST I-F
1415 KC

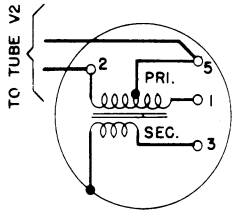
SYMBOL Z2
2ND I-F
1415 KC

SYMBOL Z3
3RD I-F
1415 KC

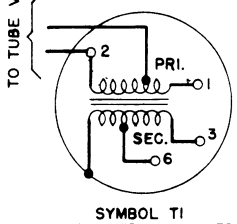
I-F COUPLING UNITS



SYMBOL Z4
C.W. OSCILLATOR
1415 KC.



SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-454-A

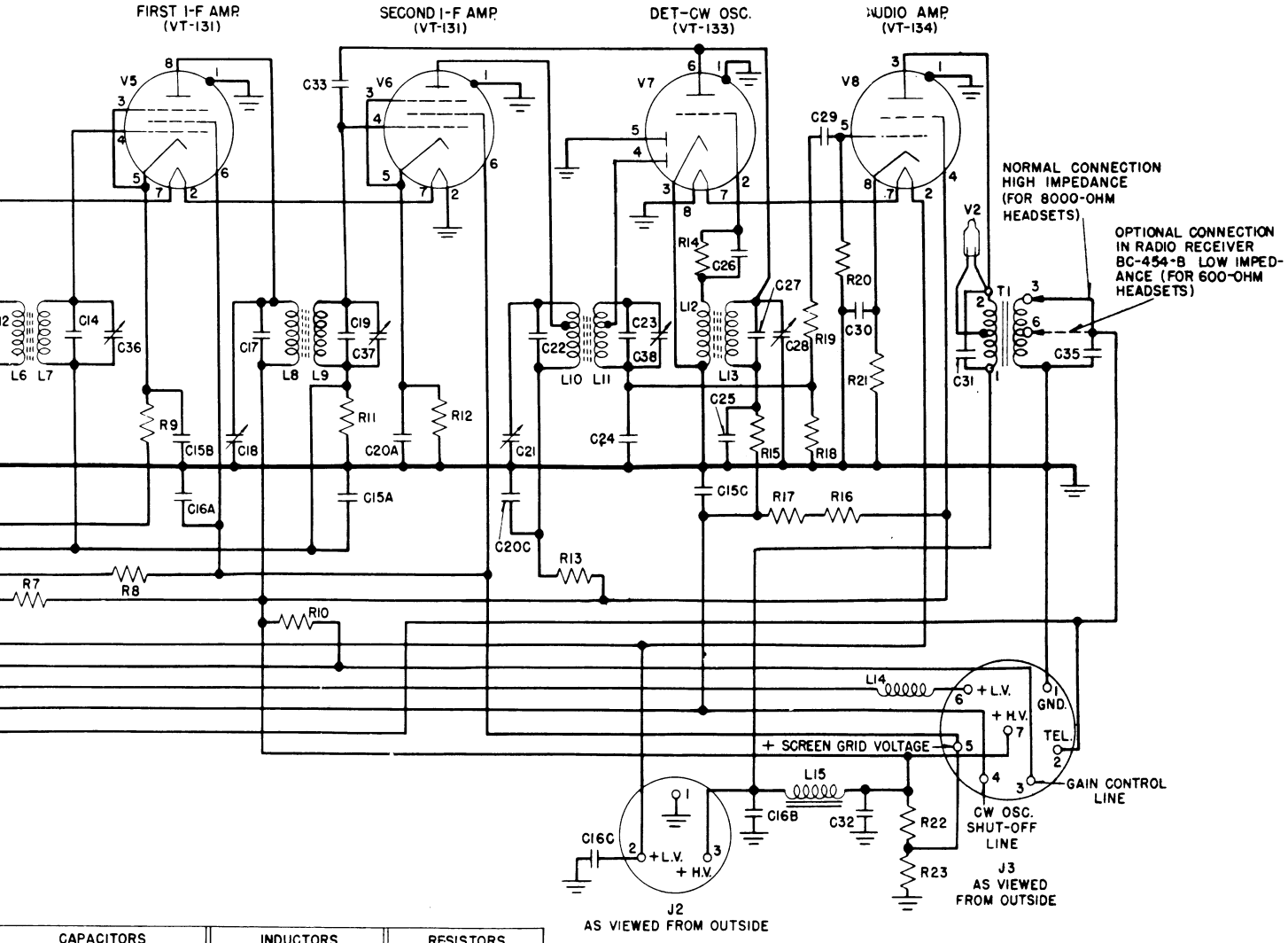


SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-454-B

CIRCUITS IN R COIL SET, I-F COUPLING UNITS, C.W. OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

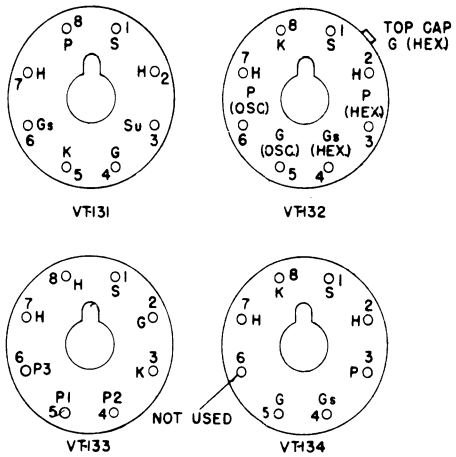
CAPACITORS		INDUCTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
C1	11 MMF.	L1	ANT. INPUT
C2	15 MMF.	L2, L3	RF AMP.
C3	100 MMF.	L4, L5	RF OSC.
C4 (A TO G)	GANG (147 MMF)	L6, L7	IN IST IF
C5	3 MF.	L8, L9	IN 2ND IF
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	C.W. OSC.
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES
C9	40 MMF.	L15	AF CHOKE 3 HENRIES
C10	365 MMF.		
C11	3 MMF.		
C12	180 MMF.		
C13	17 MMF.		
C14	180 MMF.		
C15 (A,B,C)	.05/.05/.05 MF		
C16 (A,B,C)	.22/.22/.22 MF		
C17	180 MMF.		
C18	17 MMF.		
C19	180 MMF.		
C20 (A,B,C)	.05/.01/.05 MF		
C21	17 MMF.		
C22	180 MMF.		
C23	180 MMF.		
C24	200 MMF.		
C25	.001 MF		
C26	100 MMF.		
C27	180 MMF.		
C28	34 MMF.		
C29	.006 MF.		
C30	15 MF.		
C31	.001 MF		
C32	5 MF.		
C33	*		
C35	750 MMF.		
C36	17 MMF.		
C37	17 MMF.		
C38	17 MMF.		

* WIRING CAPACITANCE (LESS THAN 2 MMF.).



CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF.	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO G)	GANG (147 MMF.)	L6, L7	IN 1ST IF	R4	620
C5	3 MF.	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES	R8	200
C9	40 MMF.			R9	620
C10	365 MMF.	L15	AF CHOKE 3 HENRIES	R10	360,000
C11	3 MMF.			R11	100,000
C12	180 MMF.			R12	510
C13	17 MMF.			R13	200
C14	180 MMF.			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF.			R21	1500
C22	180 MMF.			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF.				
C27	180 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF.				
C31	.001 MF				
C32	5 MF.				
C33	*				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

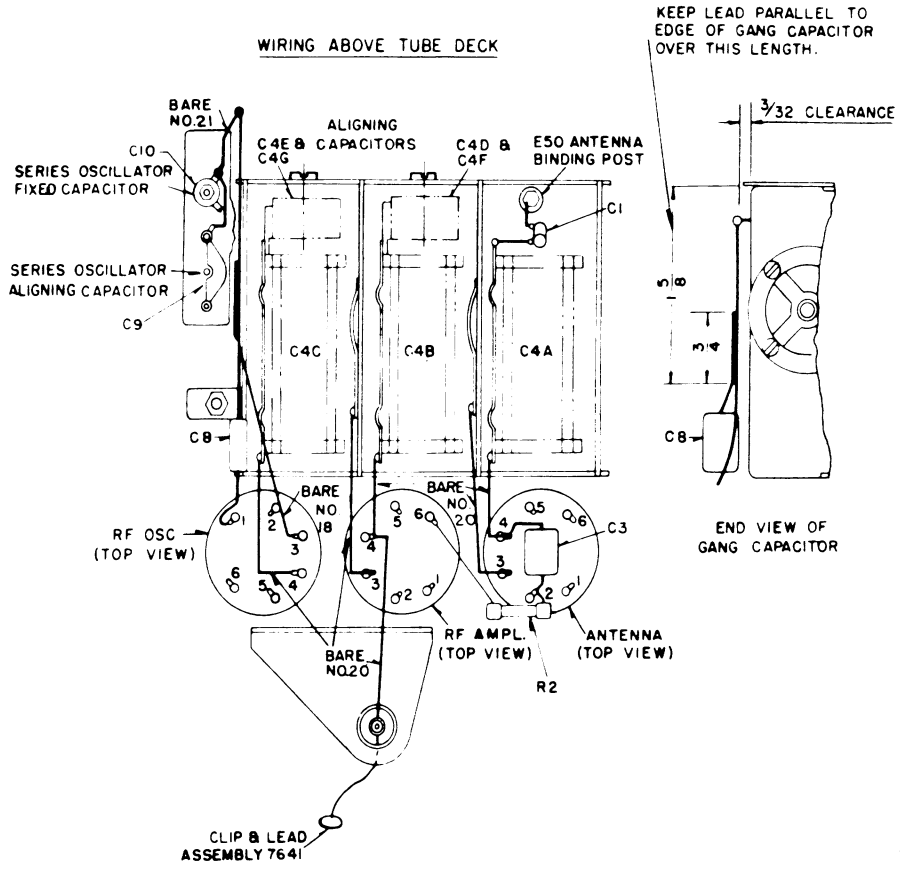
* WIRING CAPACITANCE (LESS THAN 2 MMF.).

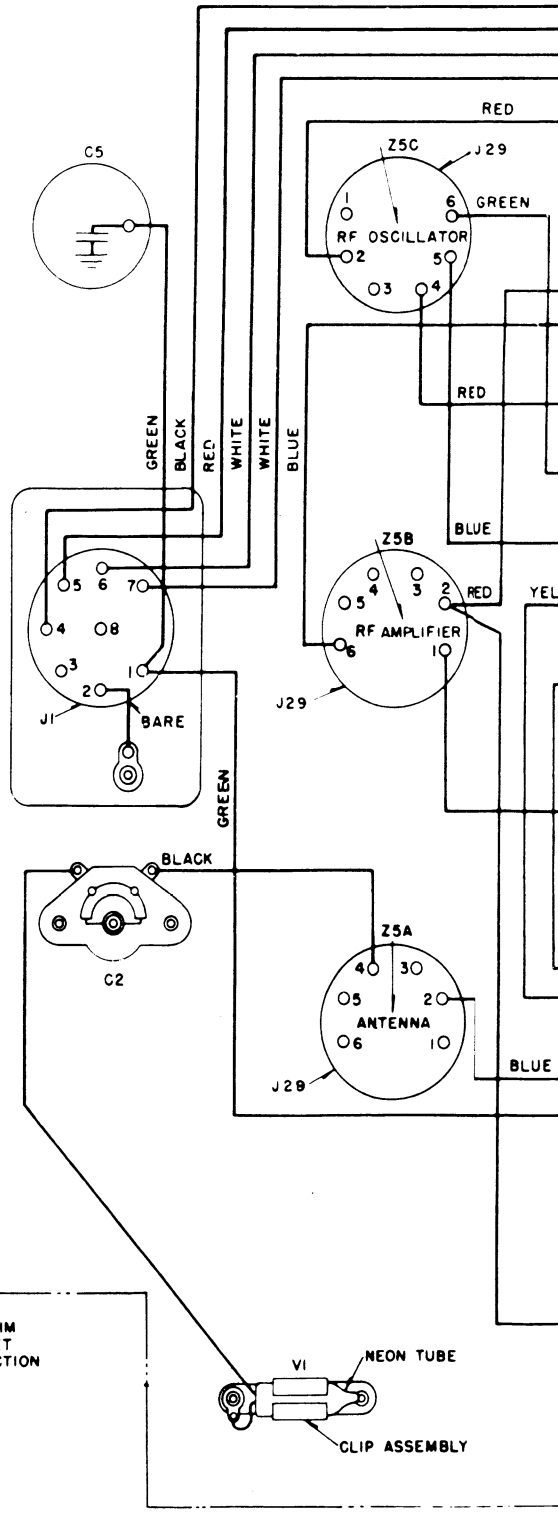


TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

G = CONTROL GRID
G (HEX.) = CONTROL GRID, HEXODE SECTION
G (OSC.) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX.) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX.) = PLATE, HEXODE SECTION
P (OSC.) = PLATE, OSC. SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

FIGURE 38A — RADIO RECEIVER BC-454-A (OR -B) (3-6 MC), SCHEMATIC





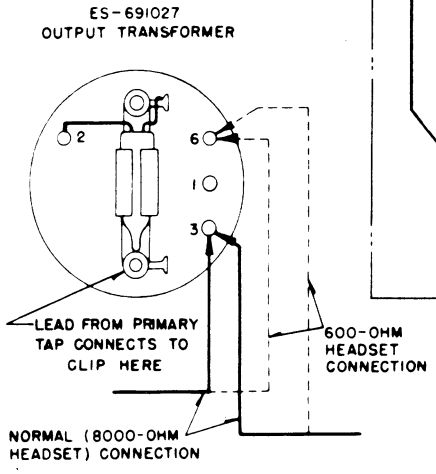
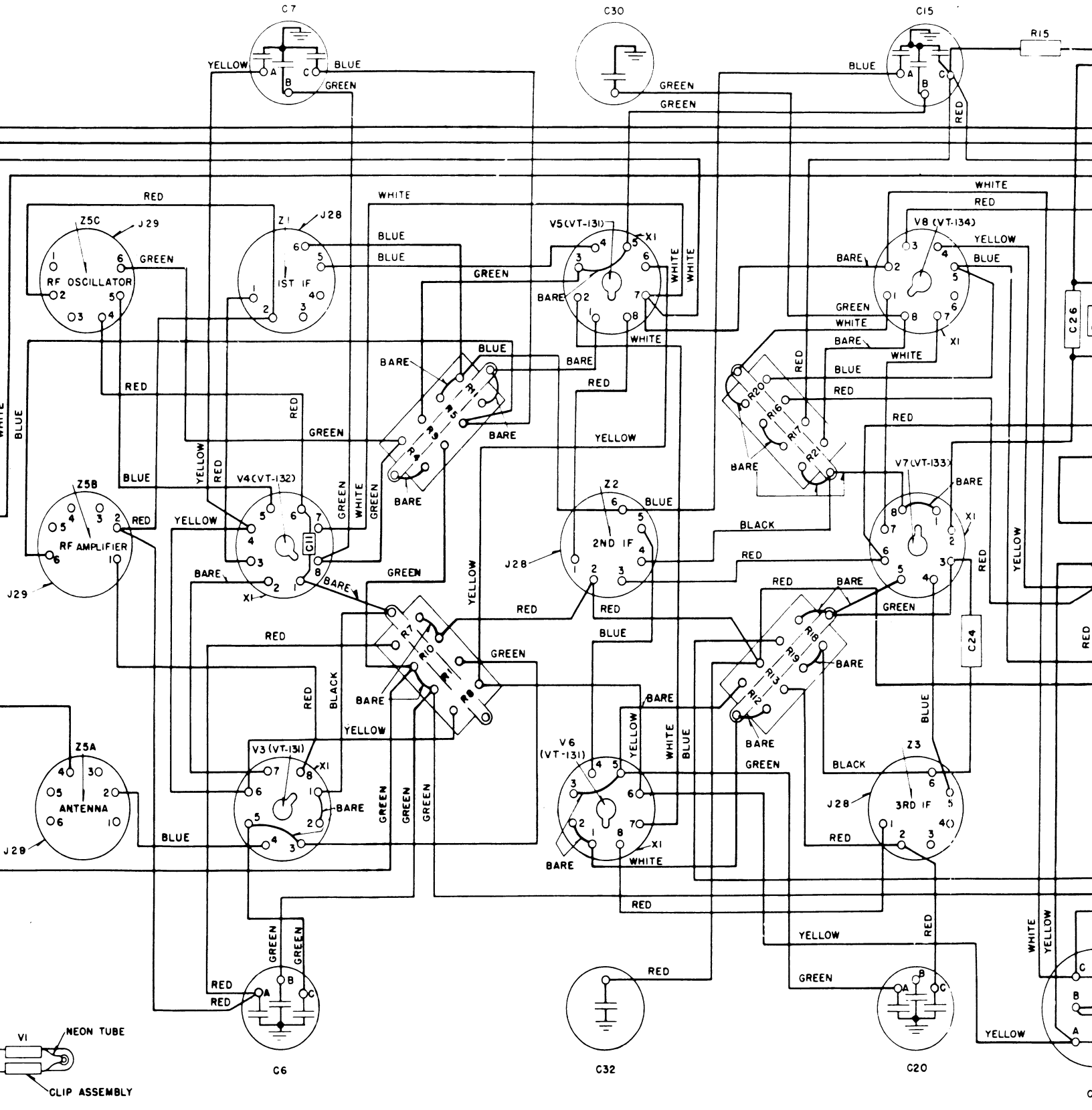
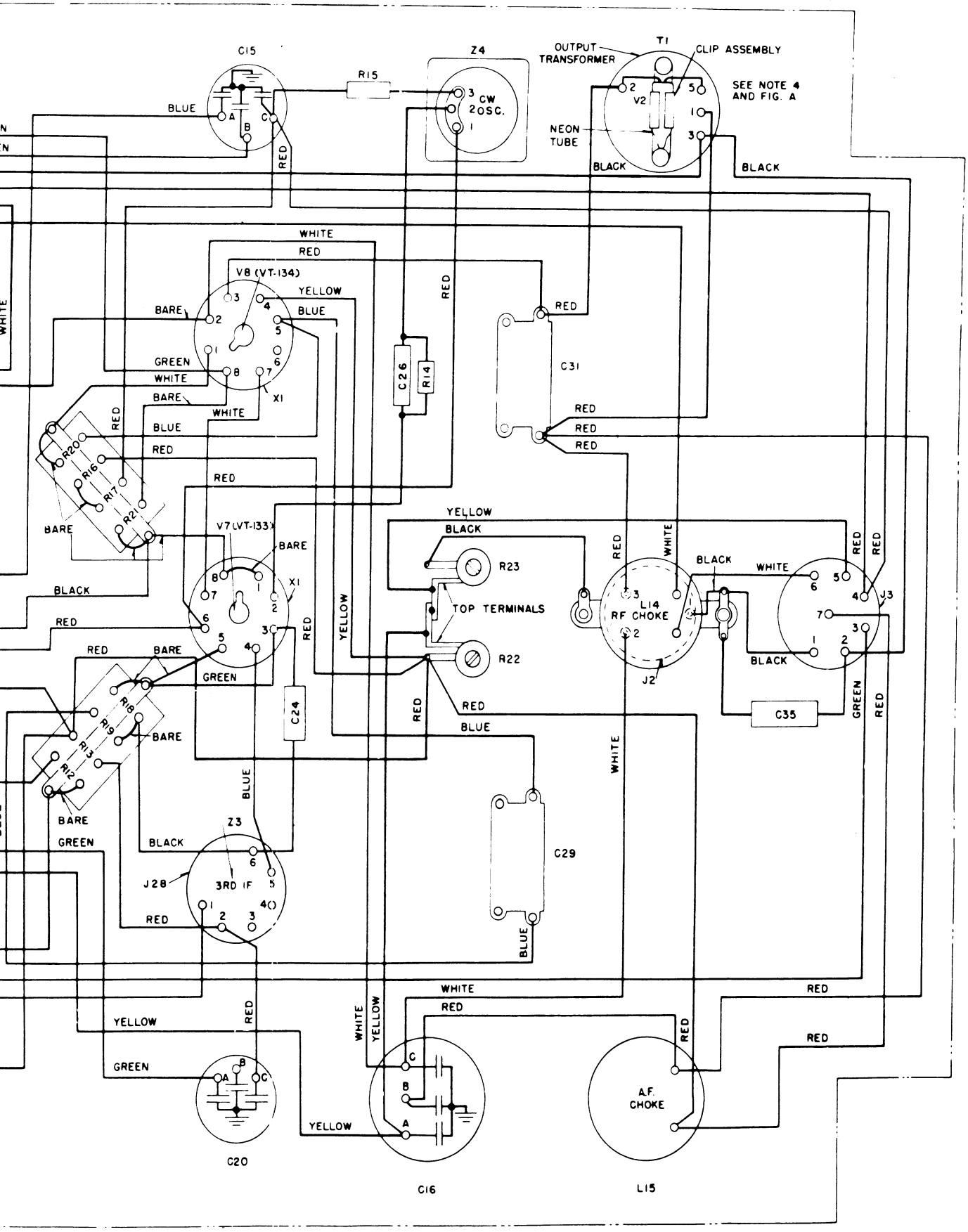


FIG. A

NOTES:

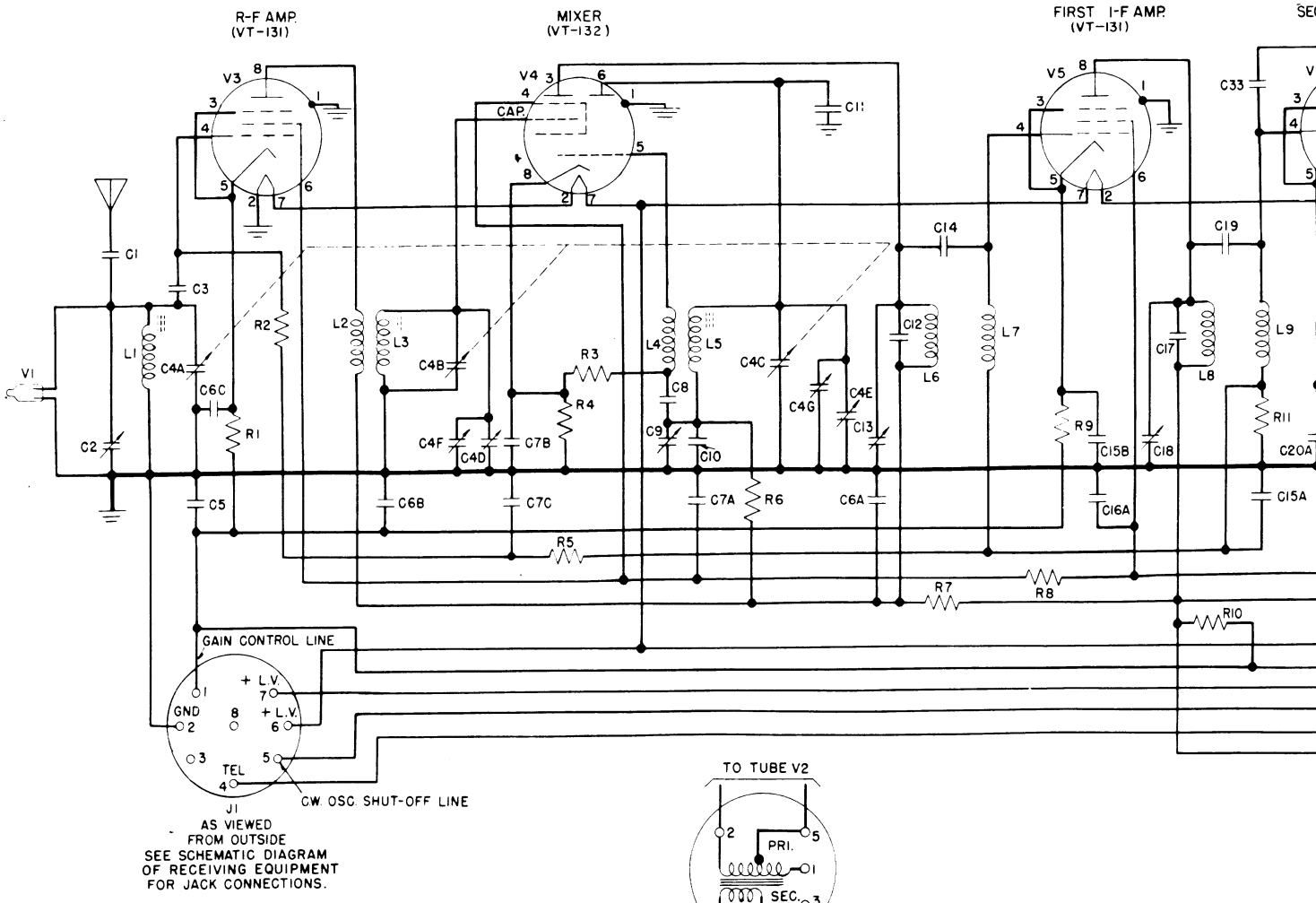
1. ALL WIRES MARKED WITH COLOR NOTE ARE NO.22 SOLID COPPER.
2. ALL BARE WIRES ARE NO.22 TINNED COPPER UNLESS OTHERWISE NOTED.
3. TERMINAL NUMBERS SHOWN ARE FOR IDENTIFICATION PURPOSES. THEY DO NOT APPEAR ON THE EQUIPMENT EXCEPT ON OUTPUT TRANSFORMER.
4. RADIO RECEIVER BC-454-B IS EQUIPPED WITH OUTPUT TRANSFORMER ES-691027 TO PERMIT USE OF 600-OHM HEADSETS BY REWIRING AS SHOWN IN FIG. A.

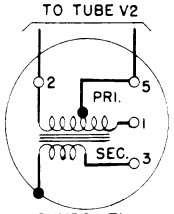

C7
C30
C15
R15
Z5C
J29
RF OSCILLATOR
Z1
J28
1ST IF
V5(VT-131)
V8 (VT-134)
C26
Z5B
RF AMPLIFIER
V4(VT-132)
C11
Z2
2ND IF
V7(VT-133)
C24
Z5A
ANTENNA
V3 (VT-131)
V6
(VT-131)
Z3
3RD IF
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R16
R17
R20
R21
X1
C6
C32
C20
V1
NEON TUBE
CLIP ASSEMBLY



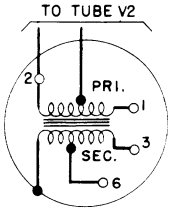
WIRING BELOW TUBE DECK

Figure 38B—Radio Receiver BC-454-A (or -B) (3-6 MC) Practical Wiring Diagram



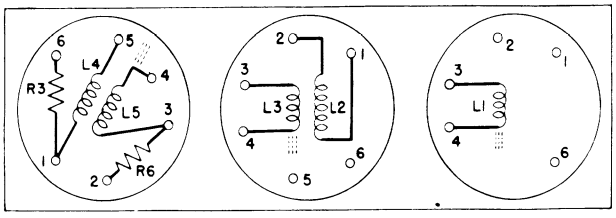


SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-455-A



SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-455-B

DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS

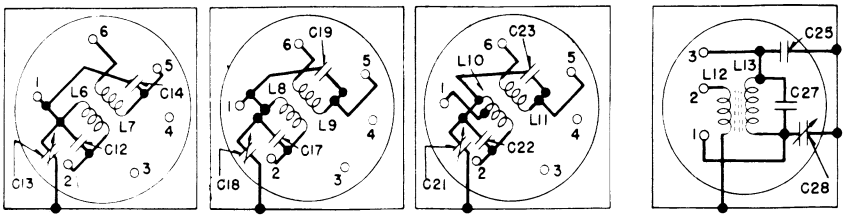


SYMBOL Z5C
R-F OSCILLATOR

SYMBOL Z5B
R-F AMPLIFIER

SYMBOL Z5A
R-F ANTENNA

R-F COIL UNIT (6-9.1 MC) SYMBOL Z5



SYMBOL Z1
IST I-F
2830 KC

SYMBOL Z2
2ND I-F
2830 KC

SYMBOL Z3
3RD I-F
2830 KC

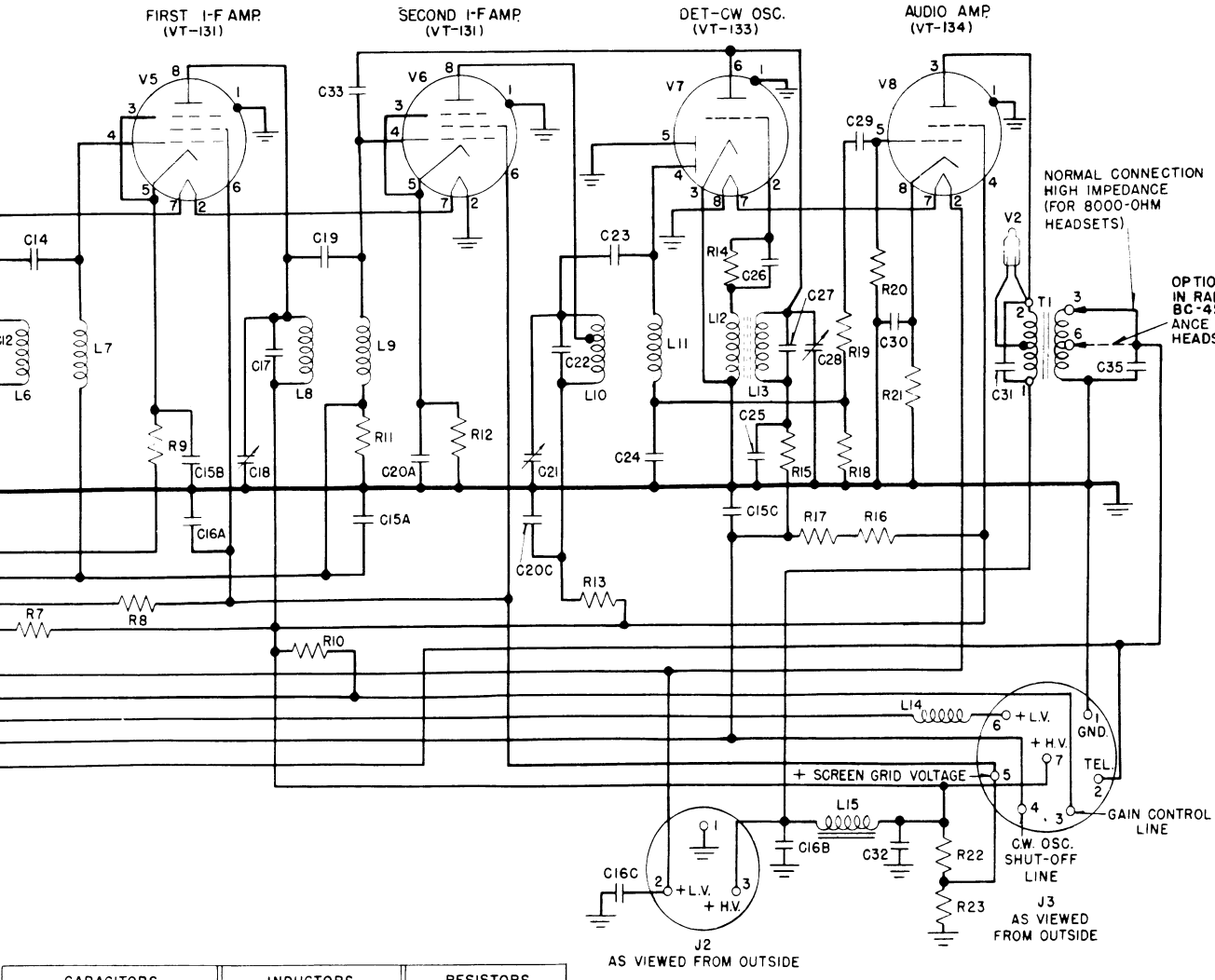
SYMBOL Z4
C W OSCILLATOR
2830 K C

I-F COUPLING UNITS

CIRCUITS IN R-F COIL SET, I-F COUPLING UNITS, CW OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

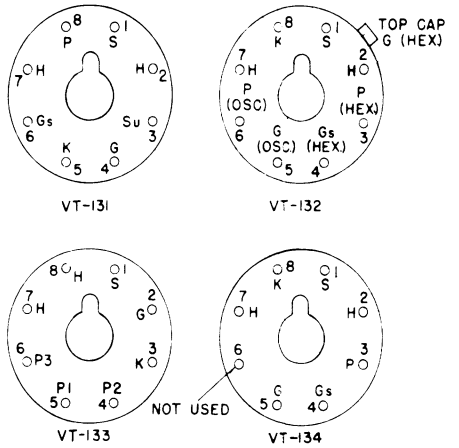
CAPACITORS		INDUCTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
C1	8.5 MMF.	L1	ANT. INPUT
C2	15 MMF.	L2, L3	RF AMP.
C3	100 MMF.	L4, L5	RF OSC.
C4 (A TO G)	GANG (62 MMF.)	L6, L7	IN IST IF
C5	3 MF.	L8, L9	IN 2ND IF
C6 (A,B,C)	.05/.05/.05 MF.	L10, L11	IN 3RD IF
C7 (A,B,C)	.05/.05/.05 MF.	L12, L13	CW OSC.
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES
C9	40 MMF.		
C10	240 MMF.	L15	AF CHOKE 3 HENRIES
C11	3 MMF.		
C12	180 MMF.		
C13	17 MMF.		
C14	180 MMF.		
C15 (A,B,C)	.05/.05/.05 MF.		
C16 (A,B,C)	.22/.22/.22 MF.		
C17	180 MMF.		
C18	17 MMF.		
C19	180 MMF.		
C20 (A,B,C)	.05/.01/.05 MF.		
C21	17 MMF.		
C22	180 MMF.		
C23	180 MMF.		
C24	200 MMF.		
C25	.001 MF.		
C26	100 MMF.		
C27	185 MMF.		
C28	34 MMF.		
C29	.006 MF.		
C30	15 MF.		
C31	.001 MF.		
C32	5 MF.		
C33	*		
C35	750 MMF.		

* WIRING CAPACITANCE (LESS THAN 2 MMF.).



CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	8.5 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF.	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO G)	GANG (62 MMF.)	L6, L7	IN 1ST IF	R4	620
C5	3 MF.	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF.	L10, L11	IN 3RD IF	R6	150,000
C7 (A,B,C)	.05/.05/.05 MF.	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES	R8	200
C9	40 MMF.			R9	620
C10	240 MMF.	L15	AF CHOKE 3 HENRIES	R10	360,000
C11	3 MMF.			R11	100,000
C12	180 MMF.			R12	510
C13	17 MMF.			R13	200
C14	180 MMF.			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF.			R15	5100
C16 (A,B,C)	.22/.22/.22 MF.			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF.			R20	2,000,000
C21	17 MMF.			R21	1500
C22	180 MMF.			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF.				
C26	100 MMF.				
C27	185 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF.				
C31	.001 MF.				
C32	5 MF.				
C33	*				
C35	750 MMF.				

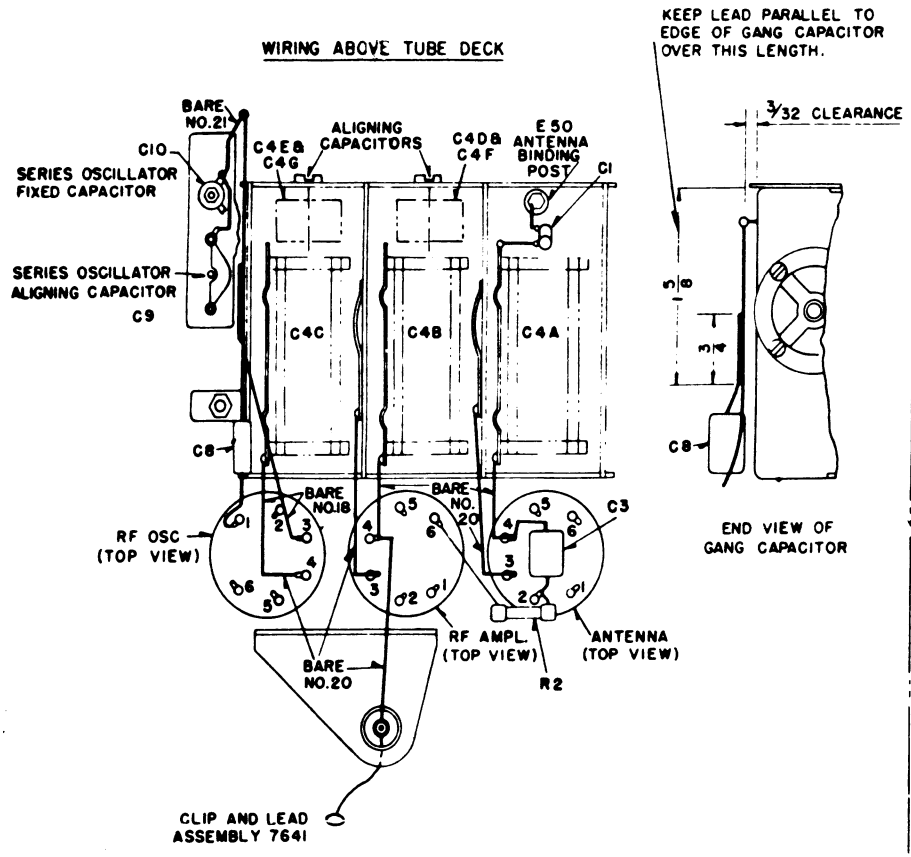
* WIRING CAPACITANCE (LESS THAN 2 MMF.).

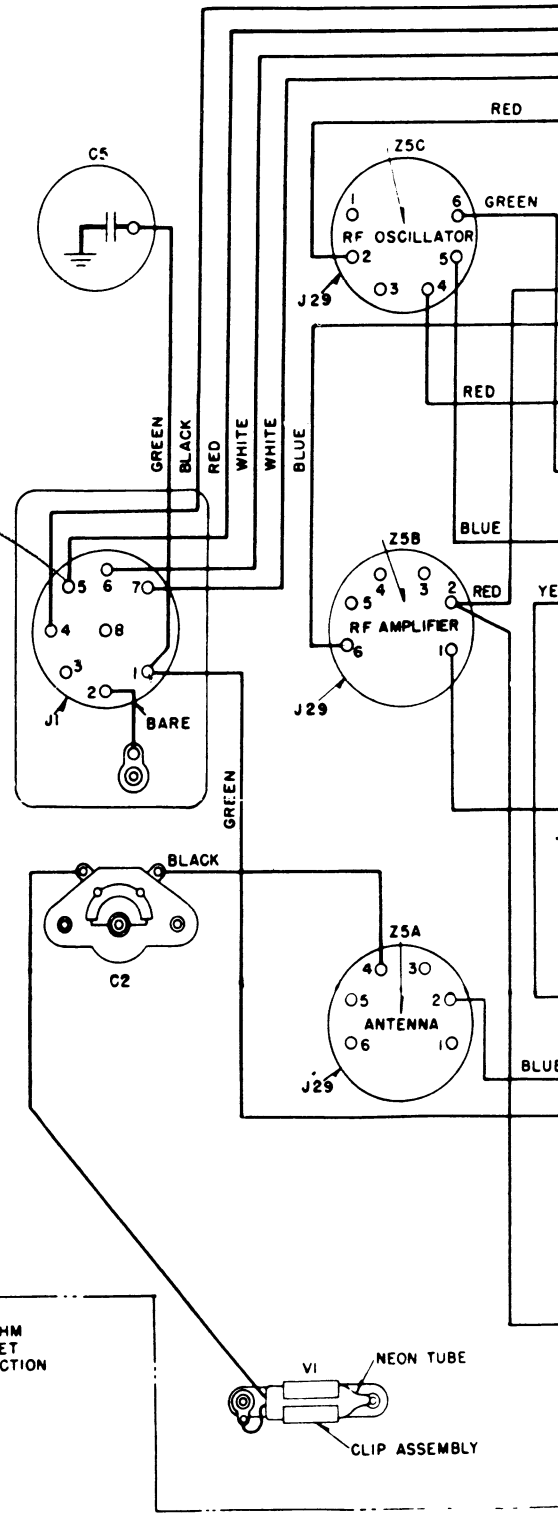


TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

G = CONTROL GRID
G (HEX) = CONTROL GRID, HEXODE SECTION
G (OSC) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC. SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

FIGURE 39A — RADIO RECEIVER **BC-455-A** (OR -B) (6-9.1 MC), SCHEMATIC





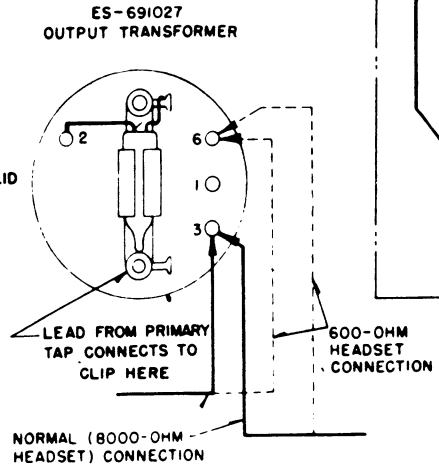
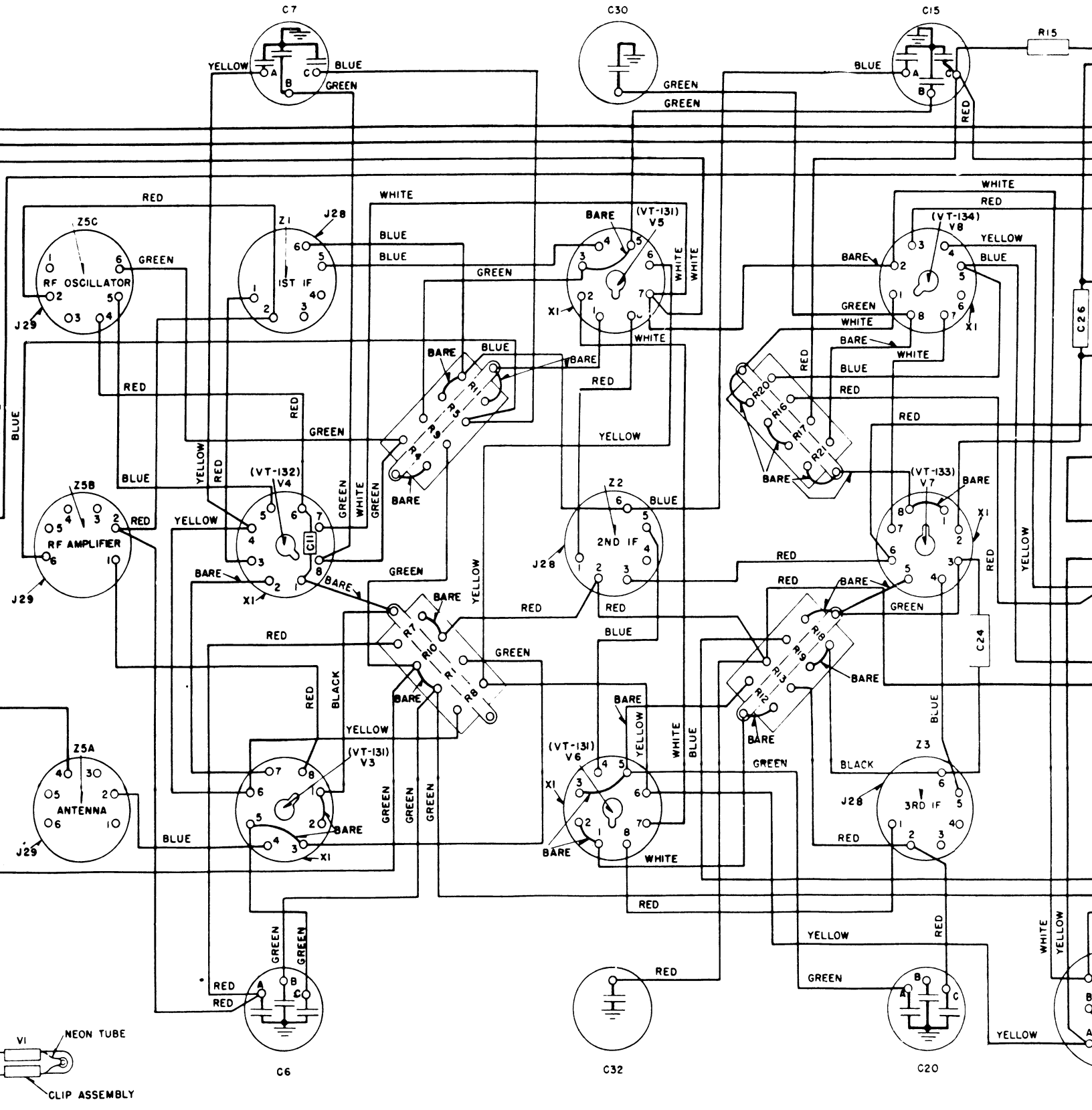
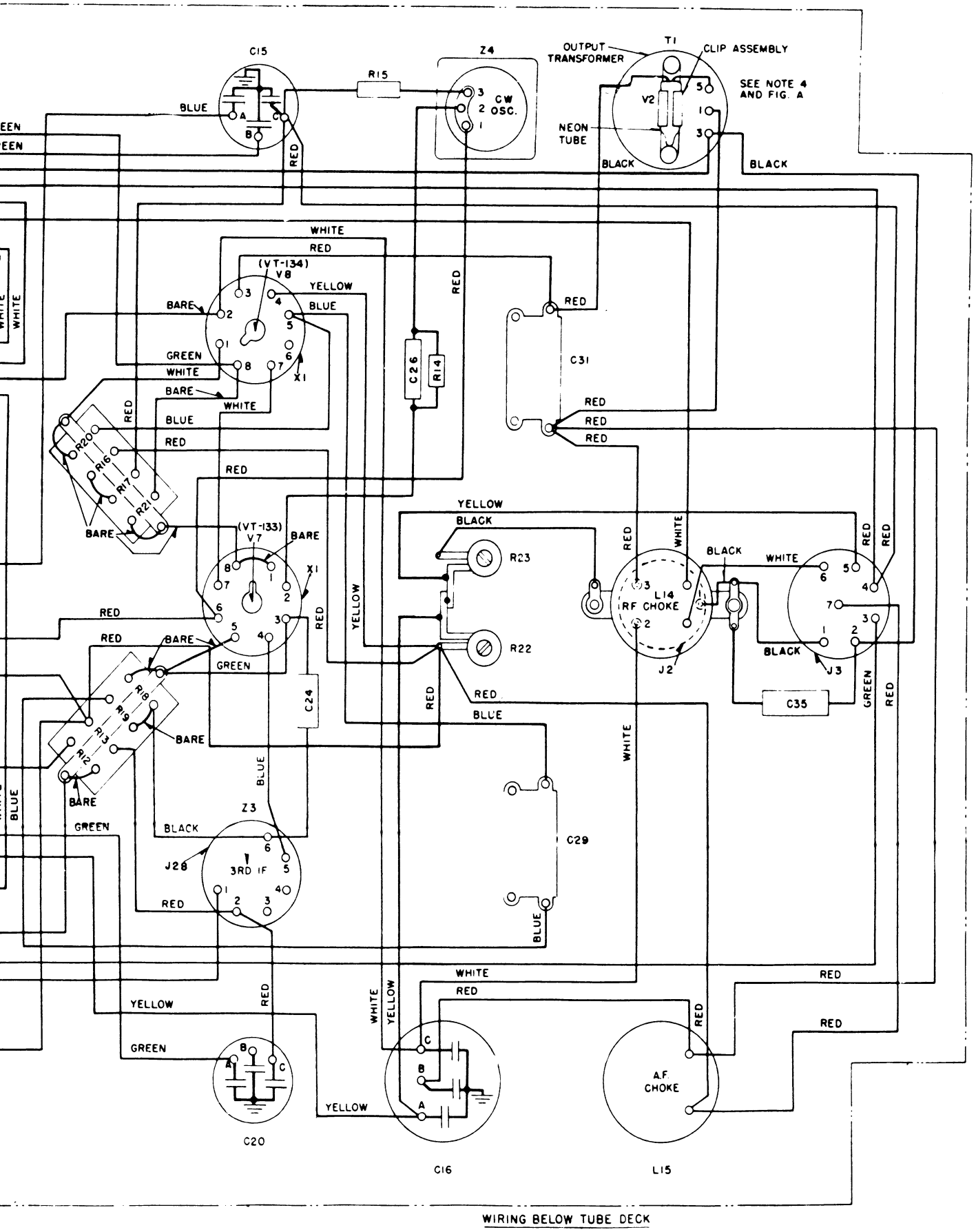


FIG. A

NOTES:

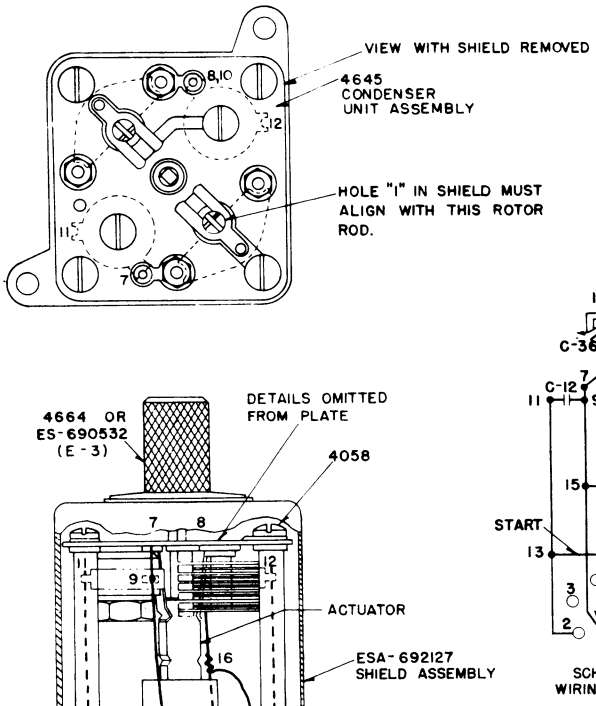
1. ALL WIRES MARKED WITH COLOR NOTE ARE NO.22 SOLID COPPER.
2. ALL BARE WIRES ARE NO.22 TINNED COPPER UNLESS OTHERWISE NOTED.
3. TERMINAL NUMBERS SHOWN ARE FOR IDENTIFICATION PURPOSES. THEY DO NOT APPEAR ON THE EQUIPMENT EXCEPT ON OUTPUT TRANSFORMER.
4. RADIO RECEIVER BC-453-B IS EQUIPPED WITH OUTPUT TRANSFORMER ES-691027 TO PERMIT USE OF 600-OHM HEADSETS BY REWIRING AS SHOWN IN FIG. A.


C7
C30
C15
R15
YELLOW
BLUE
GREEN
RED
WHITE
BLACK
BARE
Z5C
RF OSCILLATOR
J29
Z1
J28
IST IF
(VT-131) V5
(VT-134) V8
(VT-132) V4
(VT-133) V7
(VT-131) V3
(VT-131) V6
Z5B
RF AMPLIFIER
Z2
2ND IF
Z5A
ANTENNA
Z3
3RD IF
X1
C11
C24
C26
R1
R5
R9
R10
R7
R8
R16
R17
R20
R21
R18
R13
R12
C6
C32
C20
V1
NEON TUBE
CLIP ASSEMBLY

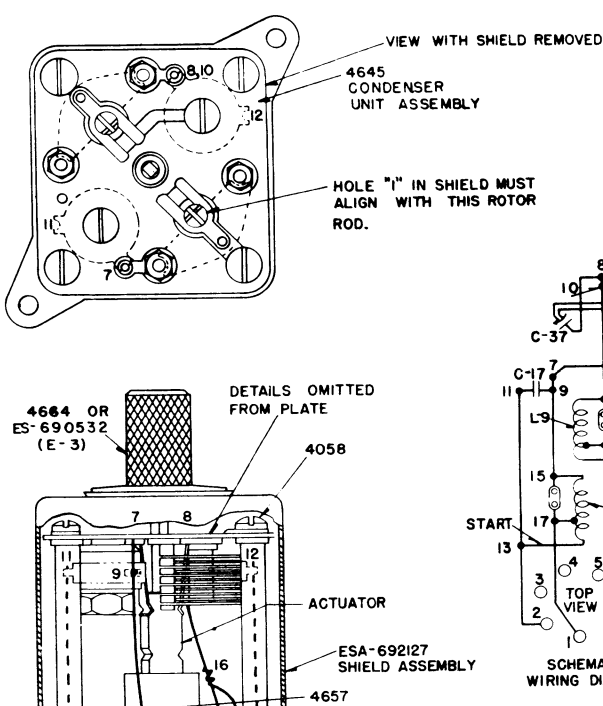


WIRING BELOW TUBE DECK

FIGURE 39B — RADIO RECEIVER BC-455-A (OR -B) (6-9.1 MC) PRACTICAL WIRING DIAGRAM



1 ST. I.F.
4698



2 ND. I.F.
7267

NOTES

1. ASSEMBLE MOUNTING PLATES TO BASE ASSEMBLIES BEFORE MOUNTING COILS AND CONDENSERS.
2. USE NO. 21 TINNED COPPER WIRE FOR CONNECTIONS BETWEEN TERMINALS.
3. SEAL ALL NUTS AND SCREWS WITH RED LACQUER EXCEPT AS OTHERWISE NOTED.
4. LEADS FROM L-7, L-9 AND L-11 SHOULD BE SO DRESSED AS TO PREVENT UNDUE BENDING STRAINS AND TO PROVIDE ADEQUATE INSULATION CLEARANCES FOR THE FULL ACTUATOR RANGE.
5. PLACE COILS L-6, L-8 AND L-10 WITH THEIR LEADS IN ANGULAR POSITION M. PLACE COI
LEADS IN ANGULAR POSITIO
6. BASE ASSEMBLY 4699 F
POSITIONS 3 AND 4. JACKS
PROVIDED IN ESL-691846

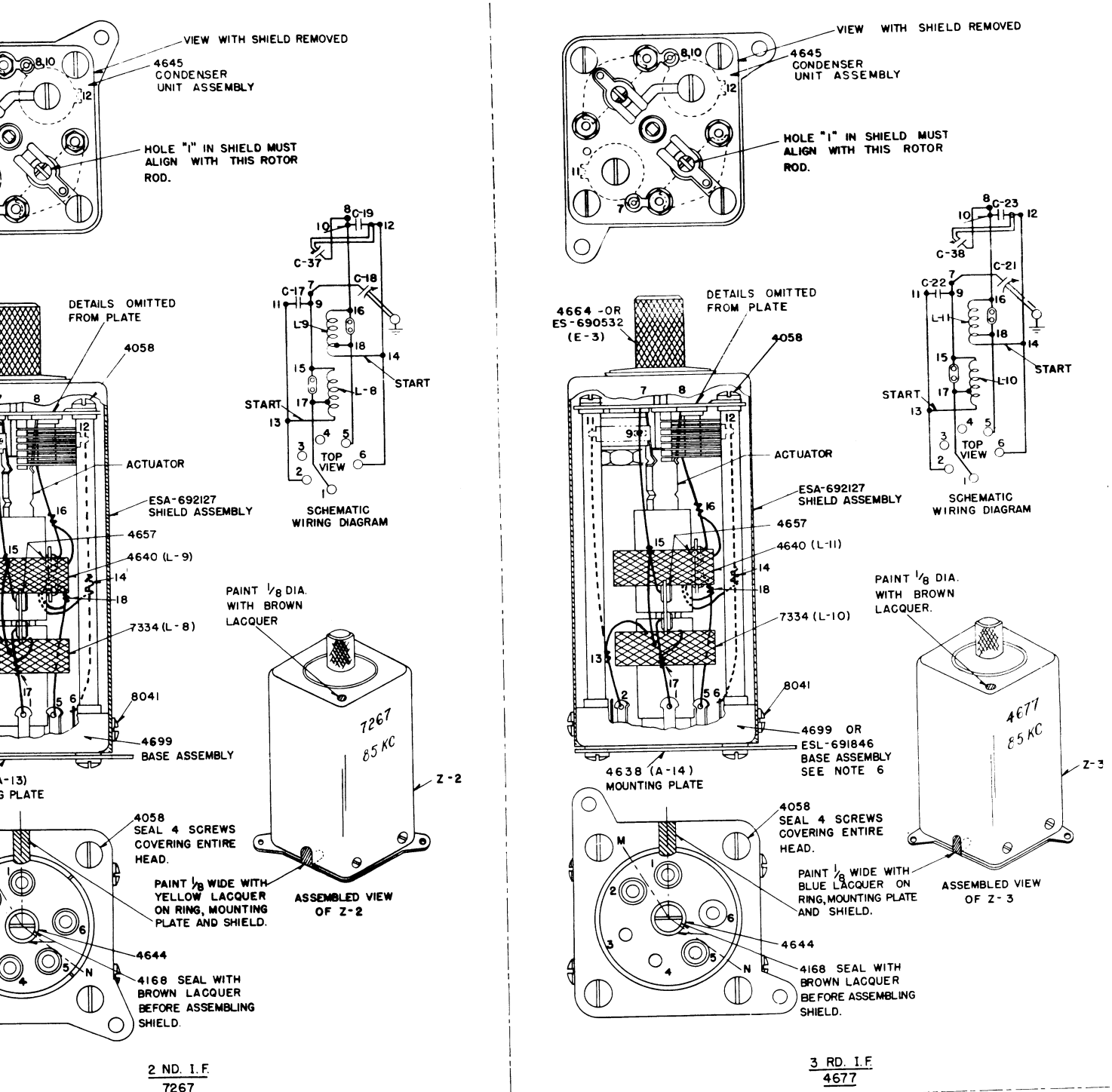


FIGURE 40 — 85 KC I-F COUPLING UNIT ASSEMBLIES USED IN RADIO RECEIVER BC-453-A (OR -B)

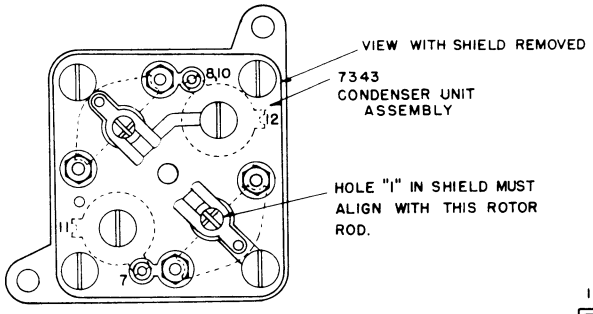
SO DRESSED AS TO PROVIDE ADEQUATE ACTUATOR RANGE. EADS IN ANGULAR

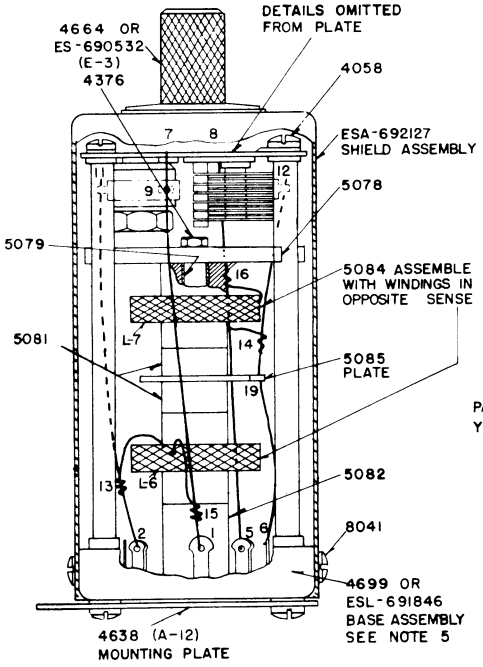
NOTES

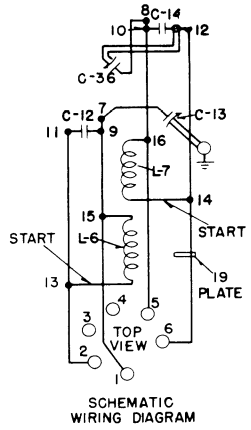
POSITION M. PLACE COILS L-7, L-9 AND L-11 WITH THEIR LEADS IN ANGULAR POSITION N.

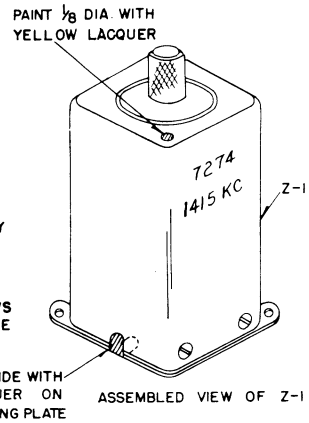
6. BASE ASSEMBLY 4699 PROVIDES JACKS IN TERMINAL POSITIONS 3 AND 4. JACKS IN THESE POSITIONS ARE NOT PROVIDED IN ESL-691846 USED IN LATER MODELS OF THIS EQUIPMENT.

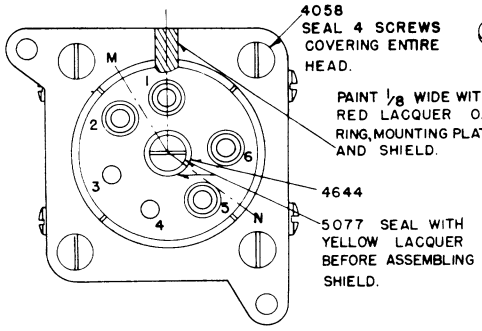
7. TERMINAL NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON APPARATUS



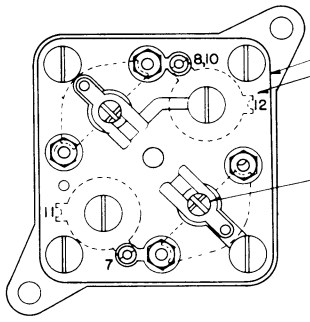


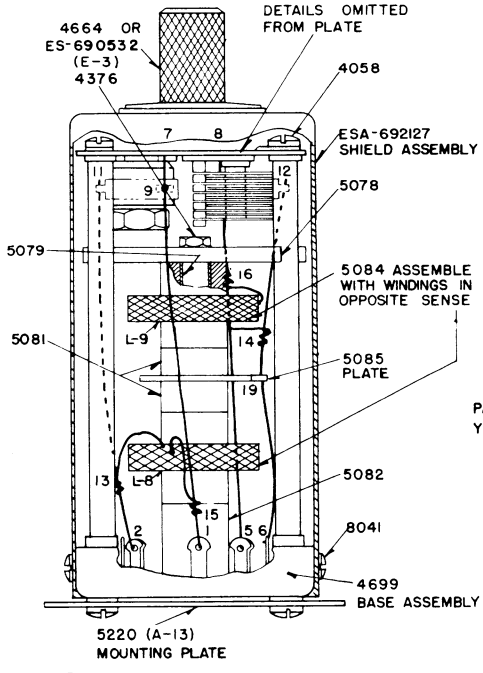


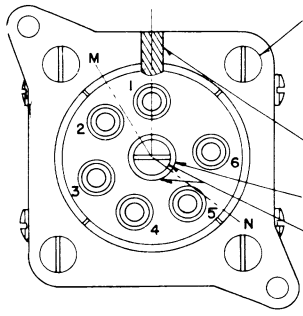




1 ST. I. F.
7274







2 ND. I. F.
7275

NOTES

1. ASSEMBLE MOUNTING PLATES TO BASE ASSEMBLIES BEFORE MOUNTING COILS AND CONDENSERS.
2. USE NO. 21 TINNED COPPER WIRE FOR CONNECTIONS BETWEEN TERMINALS.
3. SEAL ALL NUTS AND SCREWS WITH RED LACQUER EXCEPT AS OTHERWISE NOTED.
4. PLACE COILS L-6, L-8 AND L-10 WITH THEIR LEADS IN ANGULAR POSITION M. PLACE COILS L-7, L-9 AND L-11 WITH THEIR LEADS IN ANGULAR POSI
5. BASE ASSEMBLY 4699 POSITIONS 3 AND 4. JACKS IN IN ESL-691846 USED IN LA

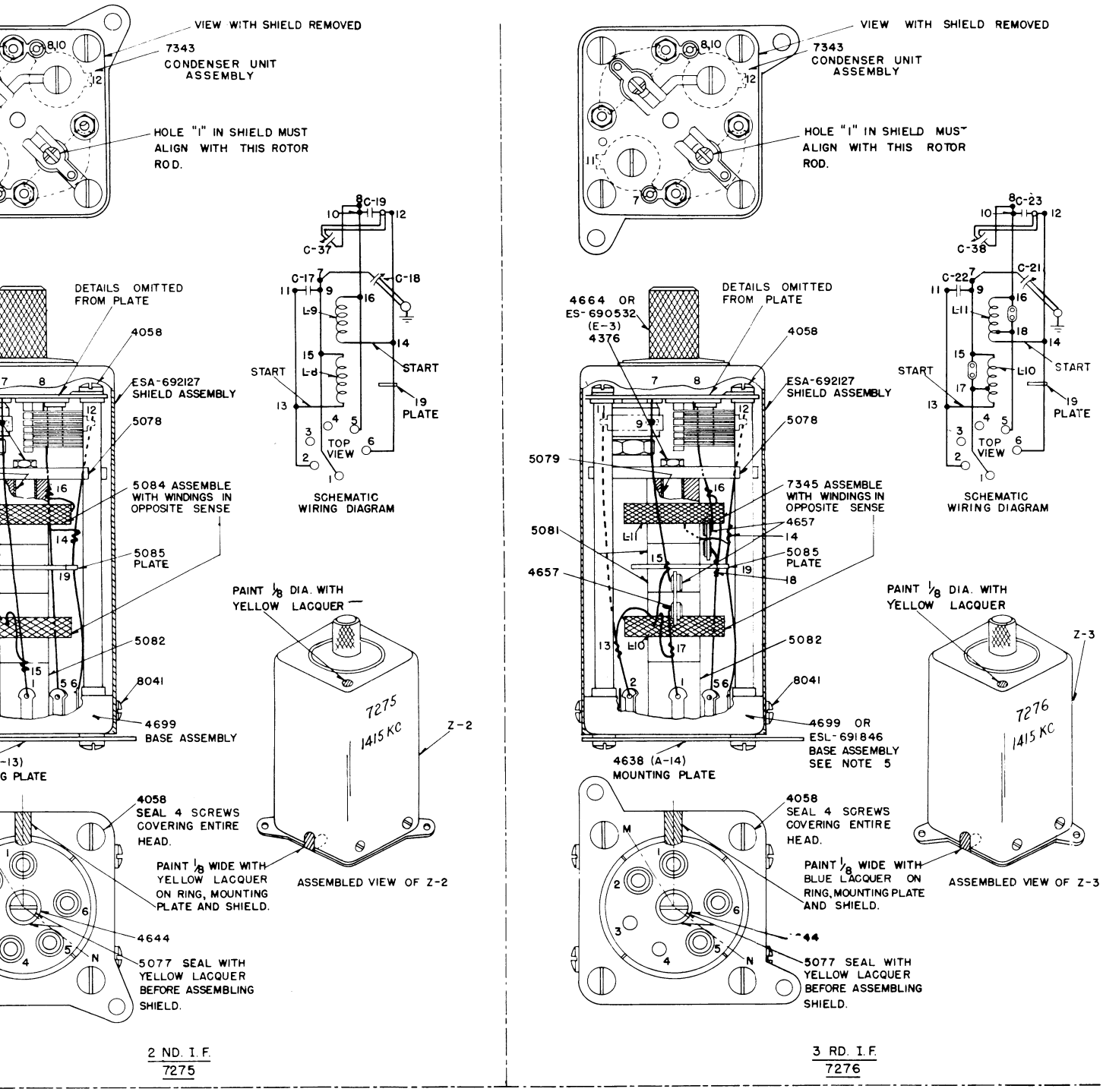


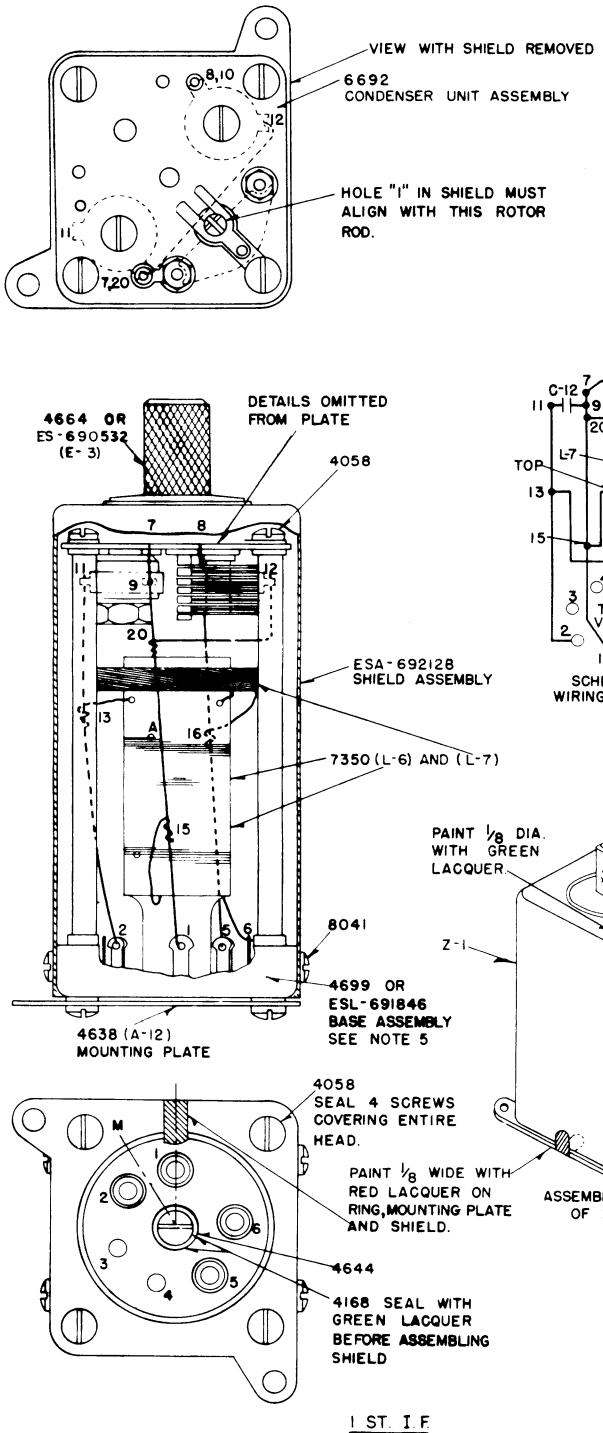
FIGURE 41 — 1415 KC I-F COUPLING UNIT ASSEMBLIES USED IN RADIO RECEIVER BC-454-A (OR -B)

NOTES

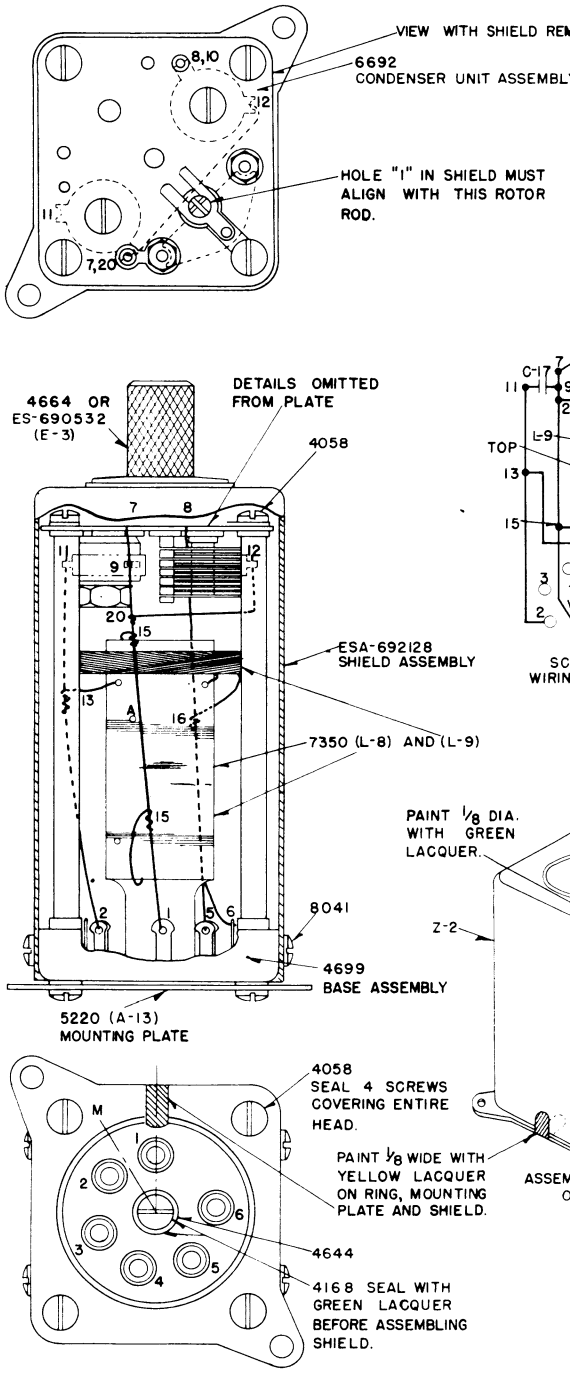
) LACQUER EXCEPT
EADS IN ANGULAR
-11 WITH THEIR
LEADS IN ANGULAR POSITION N.

5. BASE ASSEMBLY 4699 PROVIDES JACKS IN TERMINAL POSITIONS 3 AND 4. JACKS IN THESE POSITIONS ARE NOT PROVIDED IN ESL-691846 USED IN LATER MODELS OF THIS EQUIPMENT.

6. TERMINAL NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON APPARATUS.



1 ST. I F
7277



2 ND. I. F.
7278

NOTES

1. ASSEMBLE MOUNTING PLATES TO BASE ASSEMBLIES BEFORE MOUNTING COILS AND CONDENSERS.
2. USE NO 21 TINNED COPPER WIRE FOR CONNECTIONS BETWEEN TERMINALS.
3. SEAL ALL NUTS AND SCREWS WITH RED LACQUER EXCEPT AS OTHERWISE NOTED.
4. PLACE HOLE A ON COILS IN ANGULAR POSITION M.
5. BASE ASSEMBLY 4699 PROVIDES JACKS IN TERMINAL POSITIONS 3 AND 4 NOT PROVIDED IN ES OF THIS EQUIPMENT.
6. TERMINAL NUMBERS ARE

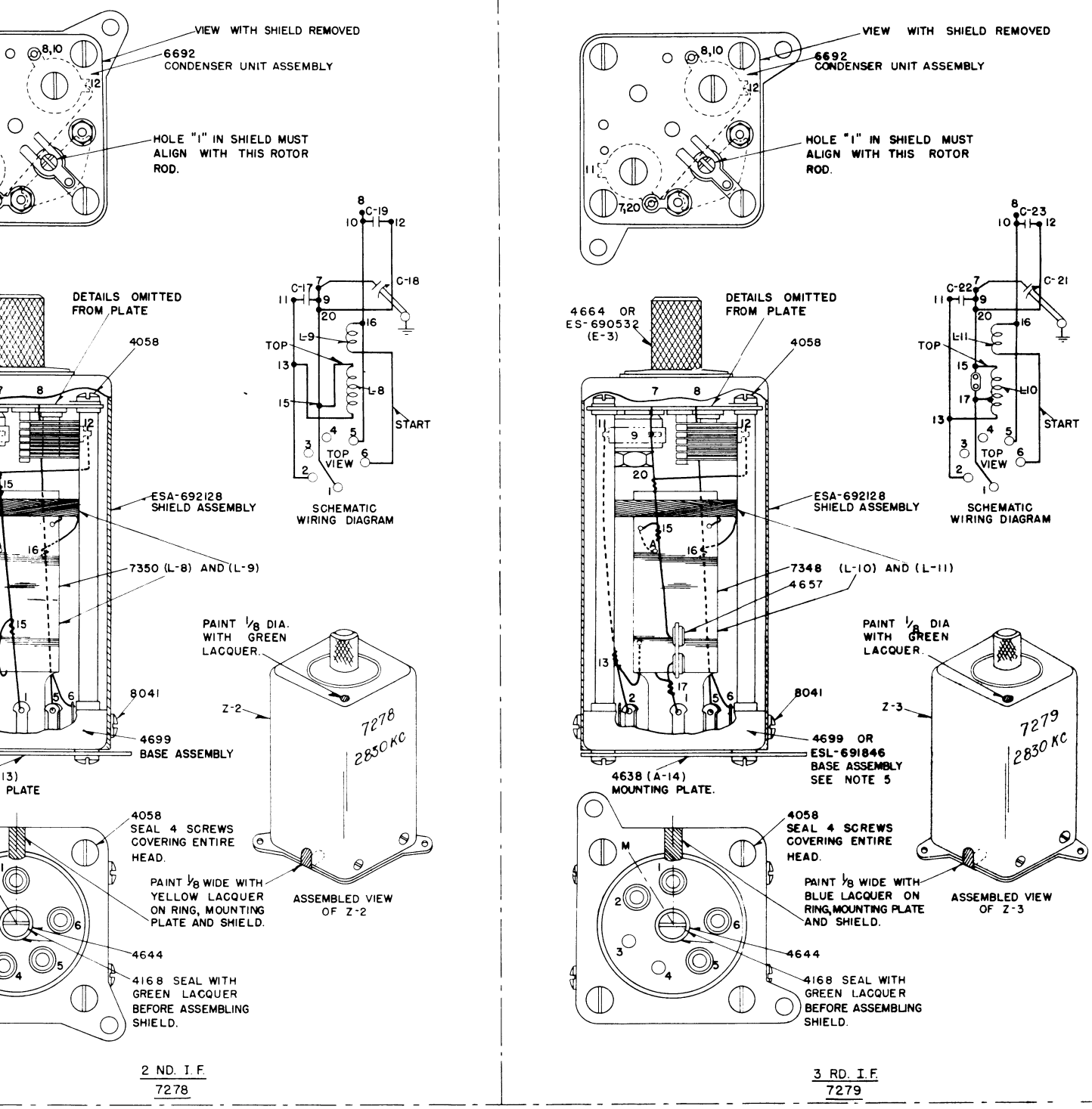


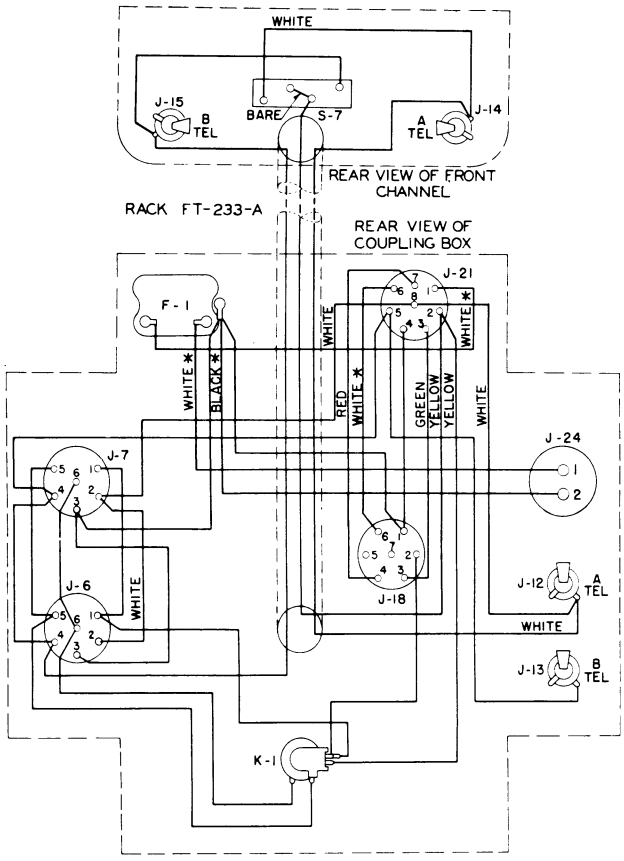
FIGURE 42 — 2830 KC I-F COUPLING UNIT ASSEMBLIES USED IN RADIO RECEIVER BC-455-A (OR -B)

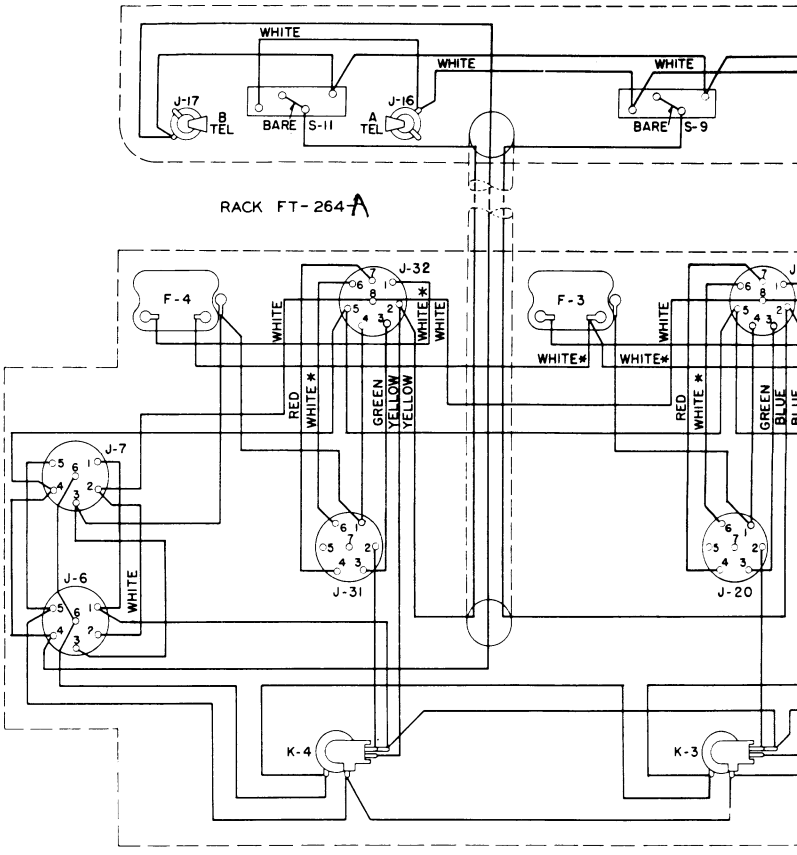
NOTES

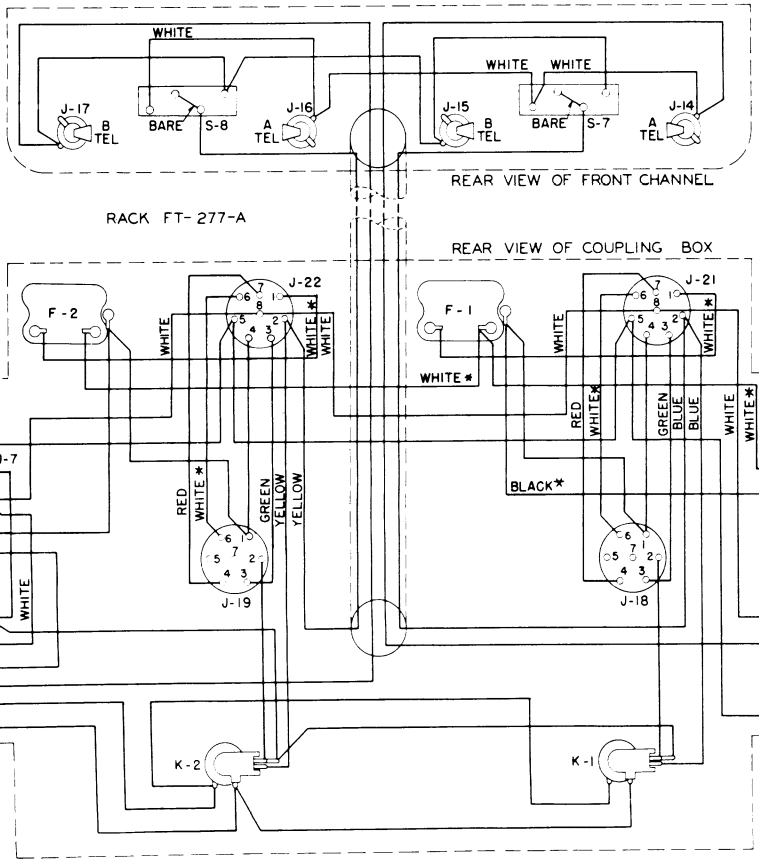
LACQUER EXCEPT POSITION M. IN TERMINAL

POSITIONS 3 AND 4. JACKS IN THESE POSITIONS ARE NOT PROVIDED IN ESL-691846 USED IN LATER MODELS OF THIS EQUIPMENT.

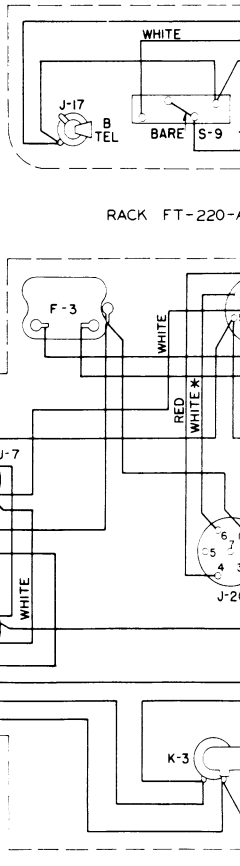
6. TERMINAL NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON APPARATUS.







1. ALL WIRES MARKED (*) TO BE NO. 18 STRANDED COPPER.
2. ALL BARE WIRES TO BE NO22 TINNED COPPER
3. ALL OTHER WIRES TO BE NO 22 SOLID COPPER.
4. ALL WIRES TO BE BLACK EXCEPT AS OTHERWISE INDICATED.
5. BIND LEADS IN GROUPS WHERE REQUIRED FOR MECHANICAL STABILITY.



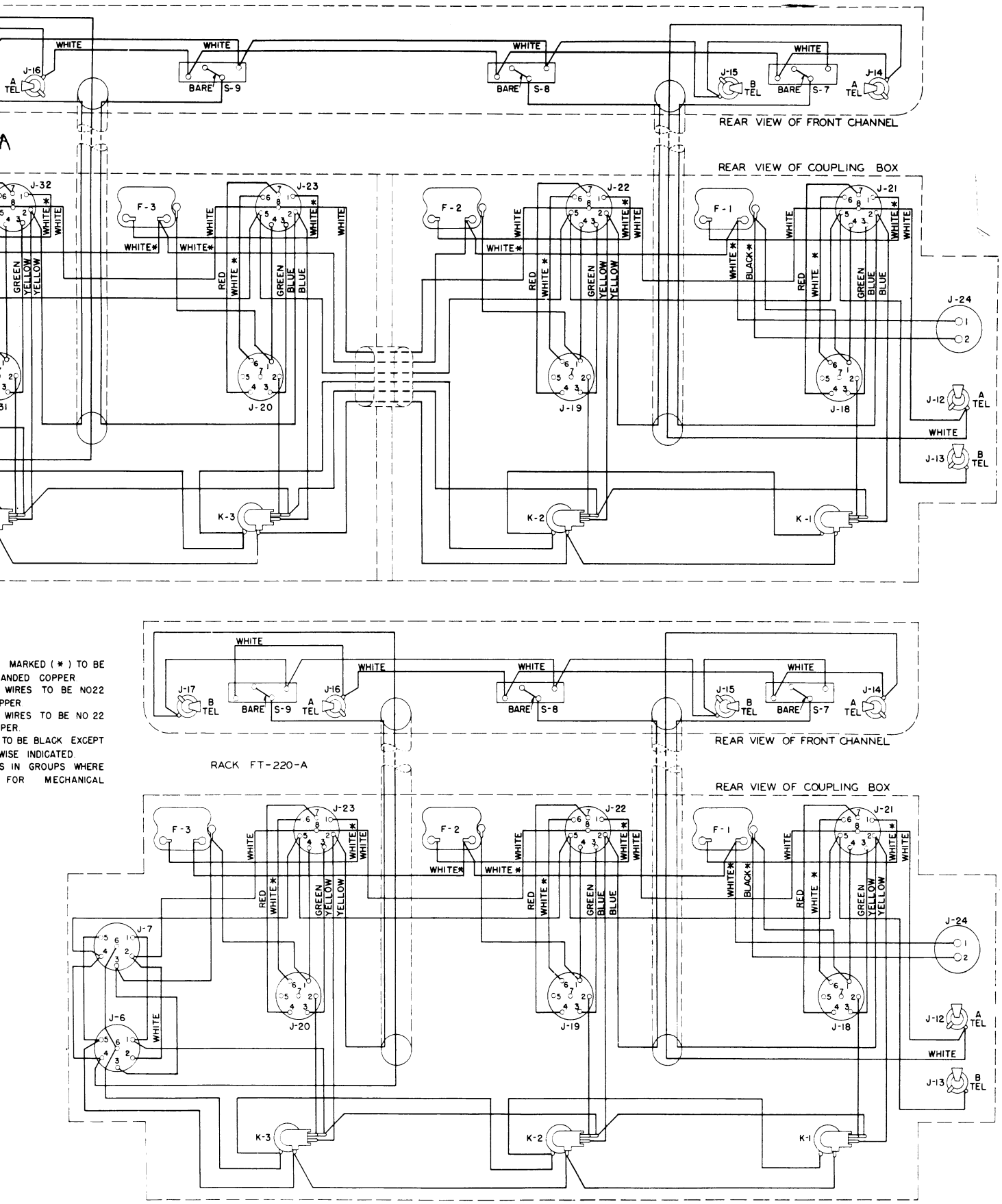
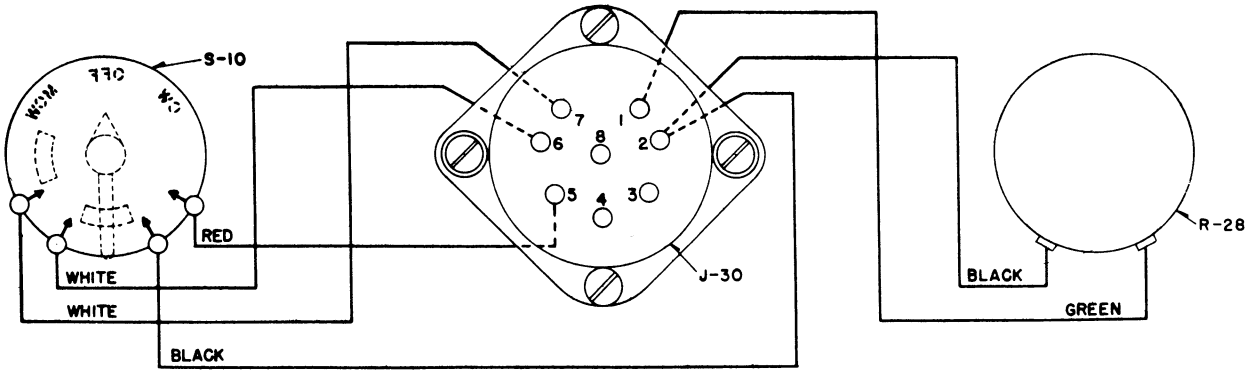
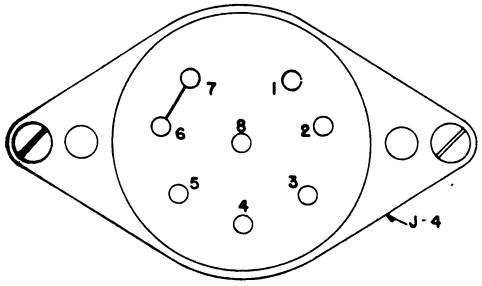


FIGURE 43 — RADIO RECEIVER RACKS FT-233-A, FT-277-A, FT-220-A AND FT-264-A, PRACTICAL WIRING DIAGRAMS



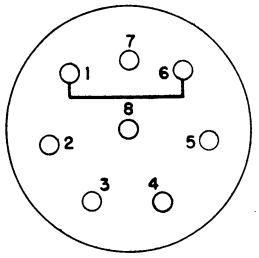
ADAPTER FT-260-A

VIEW FROM REAR OF UNIT. TERMINAL NUMBERS ON J-30 ARE FOR REFERENCE ONLY. ALL WIRES ARE NO.22 SOLID INSULATED WIRES.



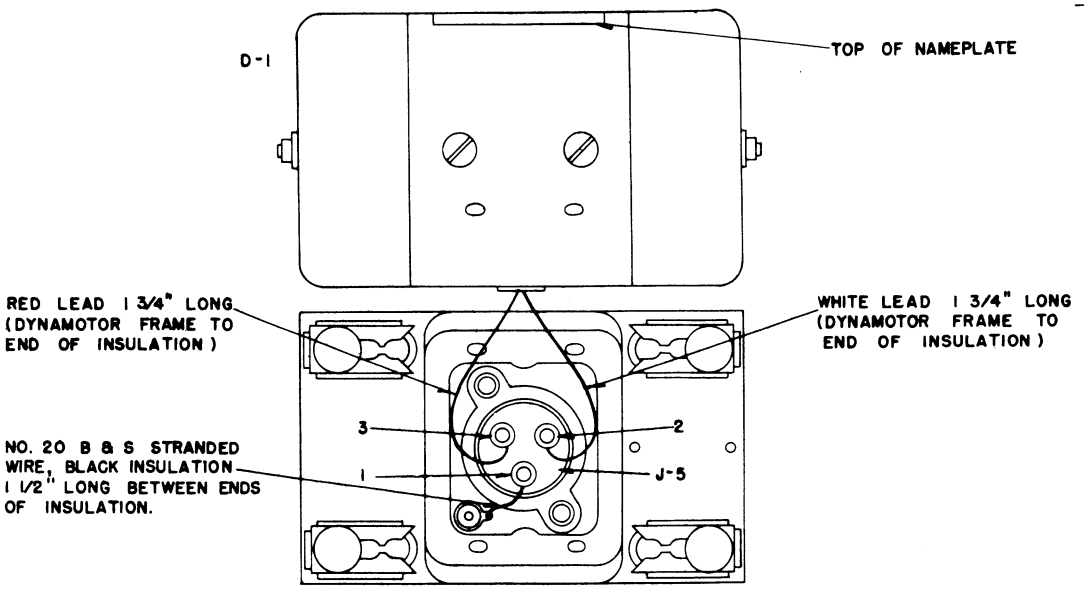
ADAPTER FT-230-A

VIEW FROM REAR OF UNIT. TERMINAL NUMBERS ON J-4 ARE FOR REFERENCE ONLY.



PLUG PL-192

VIEW FROM REAR OF PLUG.



DYNAMOTOR DM-32-A

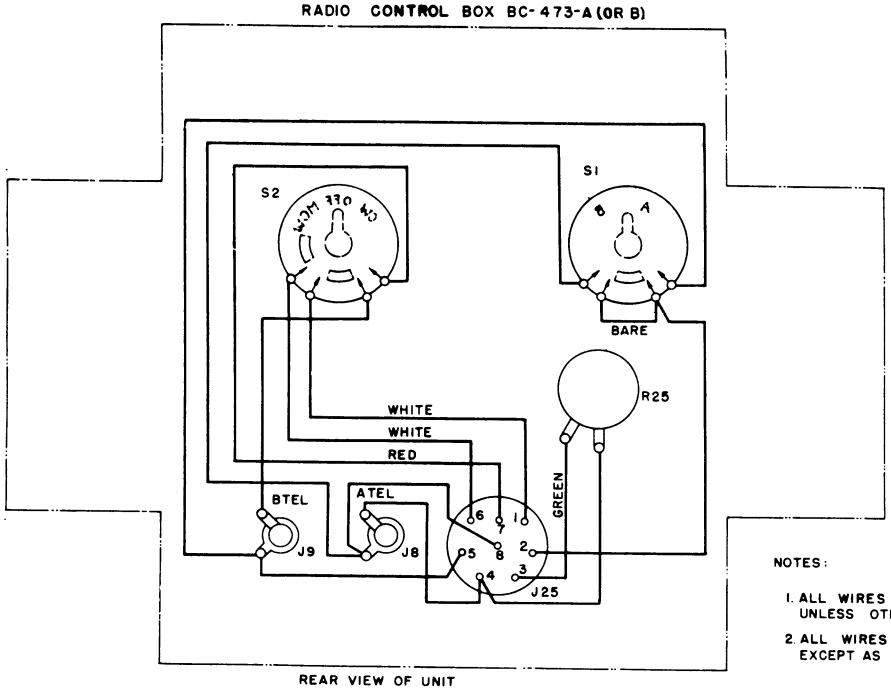
VIEW SHOWING DYNAMOTOR WIRING

NOTES ON DYNAMOTOR UNIT DM-32-A

1. KEEP LEAD INSULATION CLOSE TO TERMINALS. PAINT BETWEEN ENDS OF LEAD INSULATION AND TERMINALS WITH THICK RED LACQUER FOR REENFORCEMENT.
2. TOPS OF TERMINALS MUST BE FREE FROM SHARP METALLIC POINTS.
3. TERMINAL NUMBERS SHOWN ARE FOR REFERENCE ONLY.

FIGURE 44 — DYNAMOTOR DM-32-A, ADAPTER FT-230-A, ADAPTER FT-260-A AND PLUG PL-192, PRACTICAL WIRING DIAGRAMS

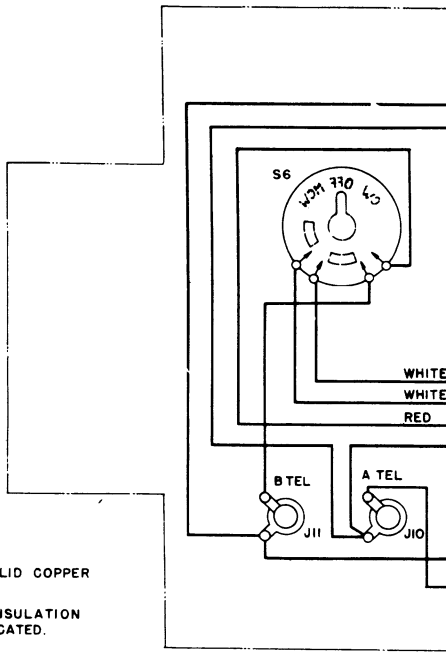
RADIO CONTROL BOX BC-473-A (OR B)



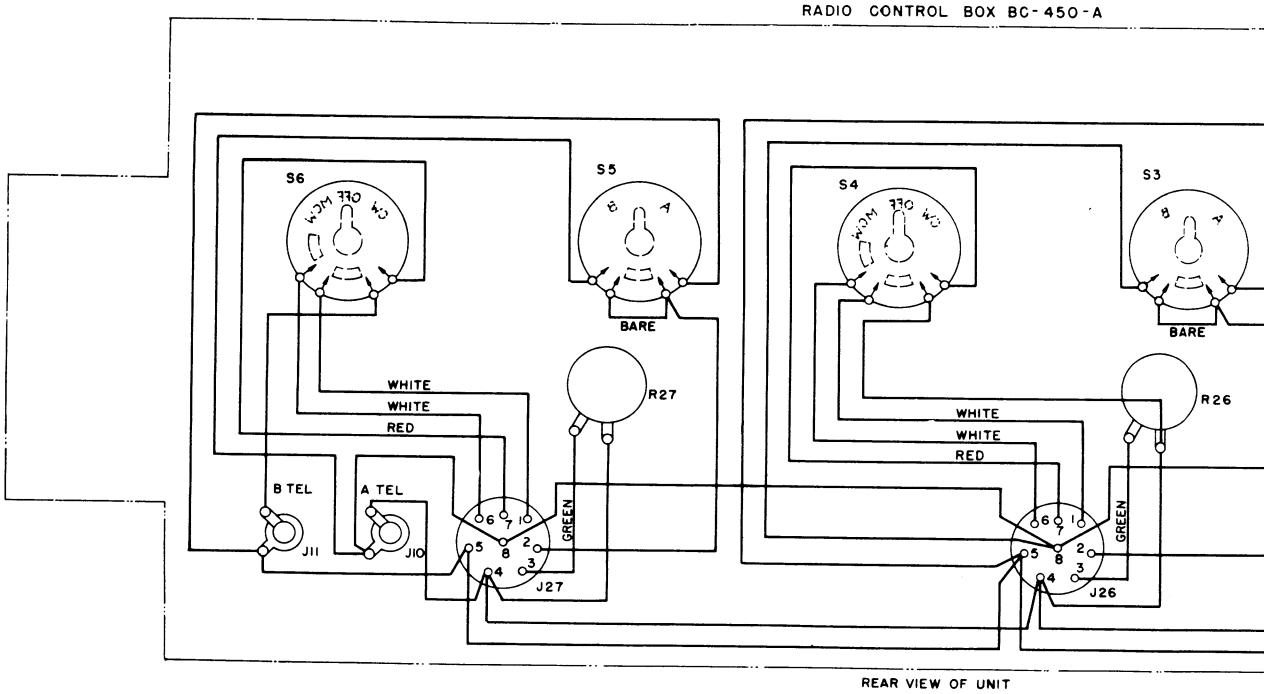
REAR VIEW OF UNIT

NOTES:

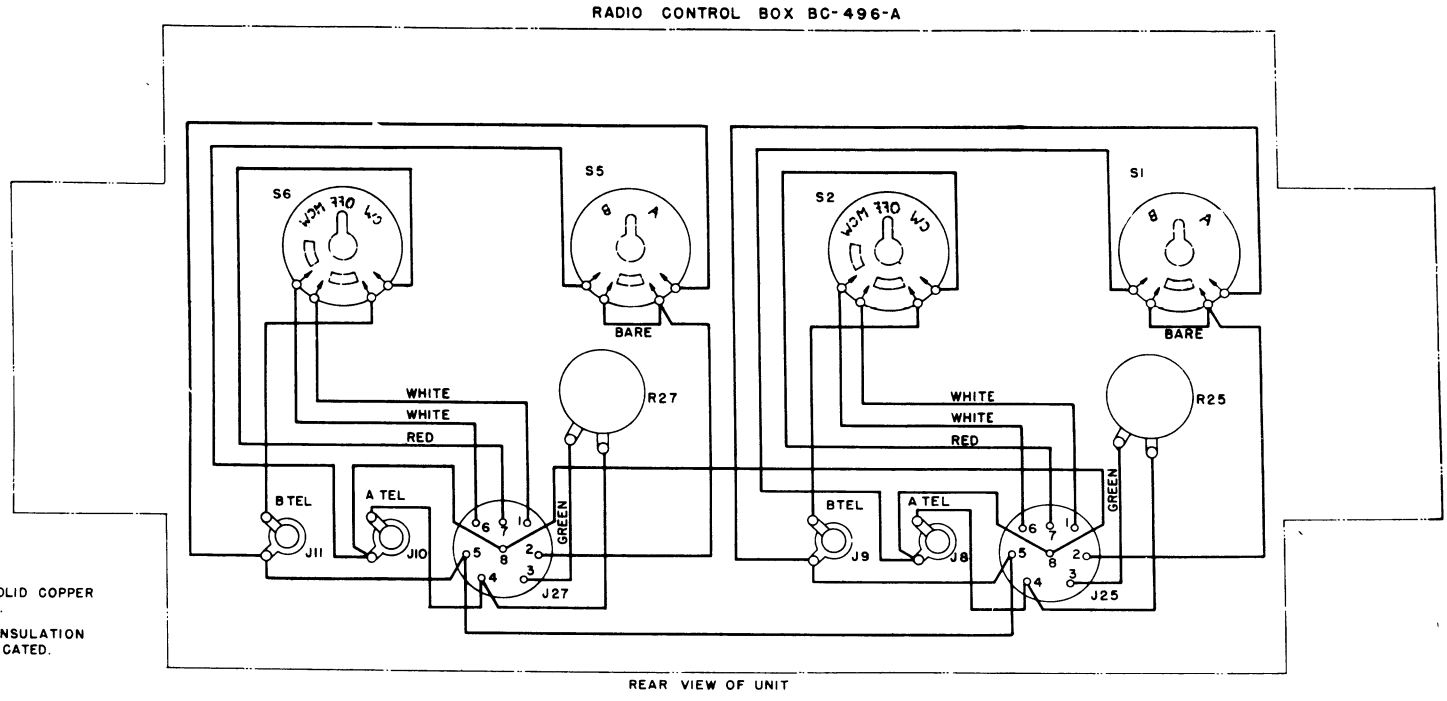
1. ALL WIRES TO BE №22 SOLID COPPER UNLESS OTHERWISE NOTED.
2. ALL WIRES TO BE BLACK INSULATION EXCEPT AS OTHERWISE INDICATED.



RADIO CONTROL BOX BC-450-A



REAR VIEW OF UNIT



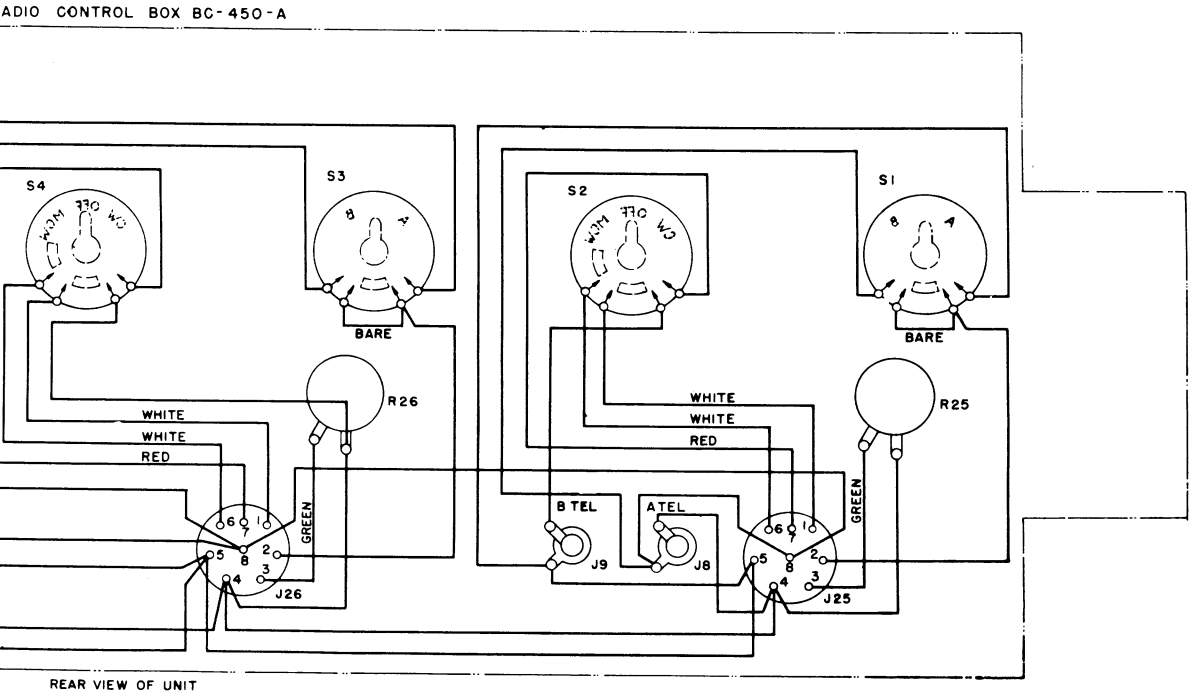
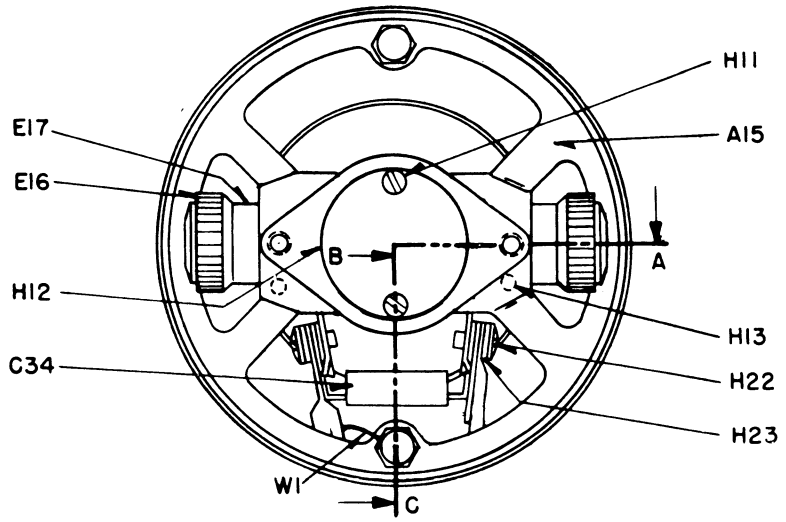
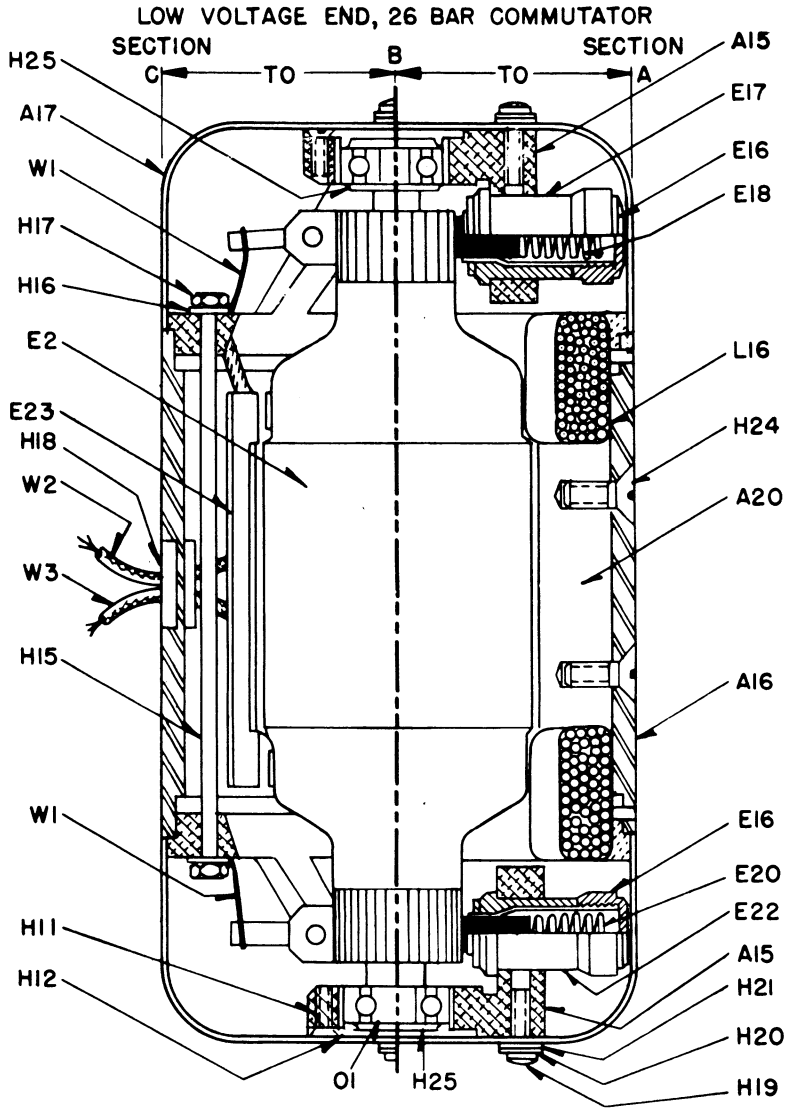


FIGURE 45 — RADIO CONTROL BOXES BC-496-A, BC-473-A (OR -B) AND BC-450-A, PRACTICAL WIRING DIAGRAMS



INSIDE END VIEW WITH COVER A17 REMOVED



HIGH VOLTAGE END, 39 BAR COMMUTATOR

FIGURE 46A — LINE DRAWING OF DYNAMOTOR MACHINE USED IN DYNAMOTOR DM-32-A

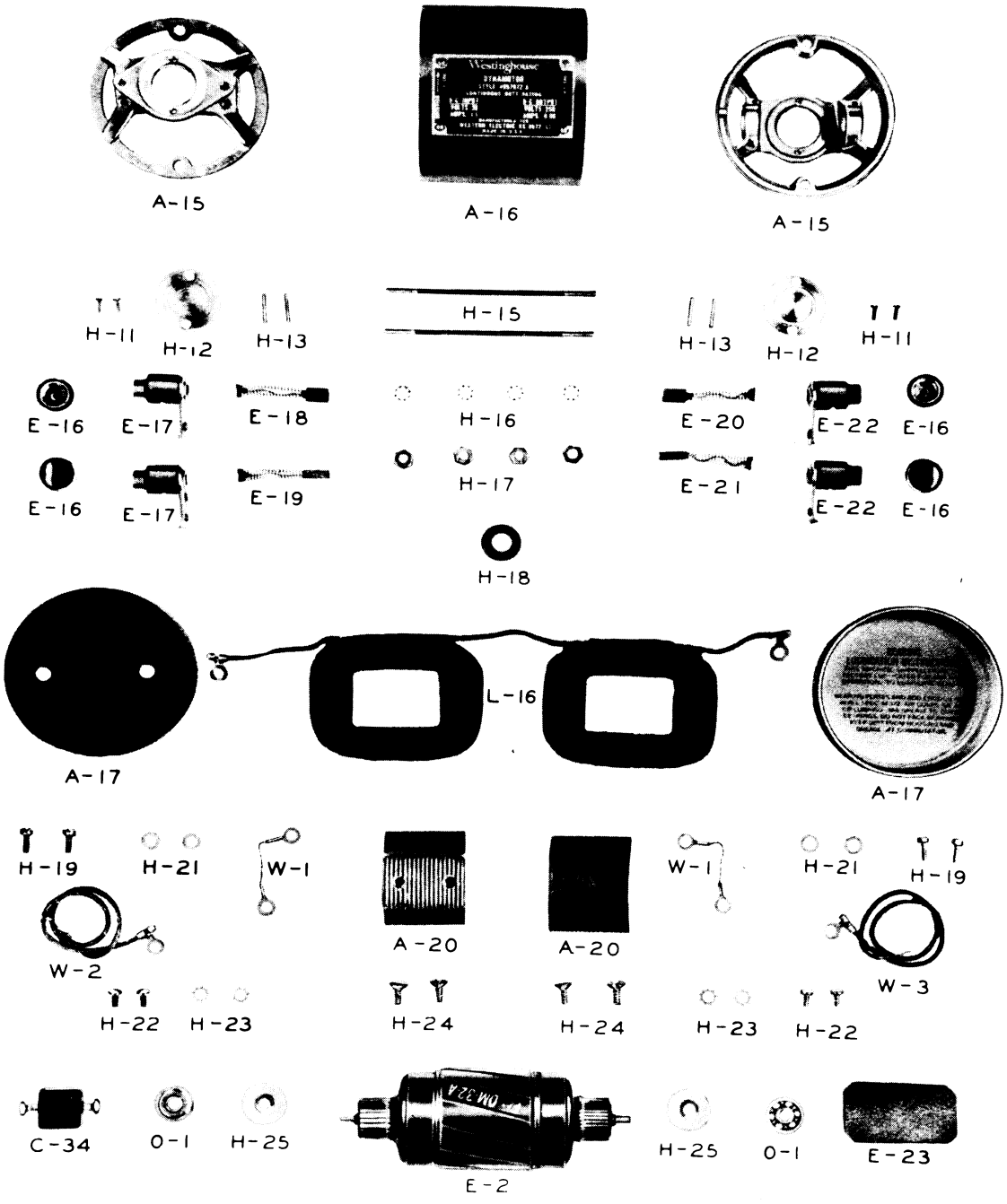


FIGURE 46B — PHOTOGRAPH OF PARTS AND DYNAMOTOR MACHINE USED IN DYNAMOTOR DM-32-A

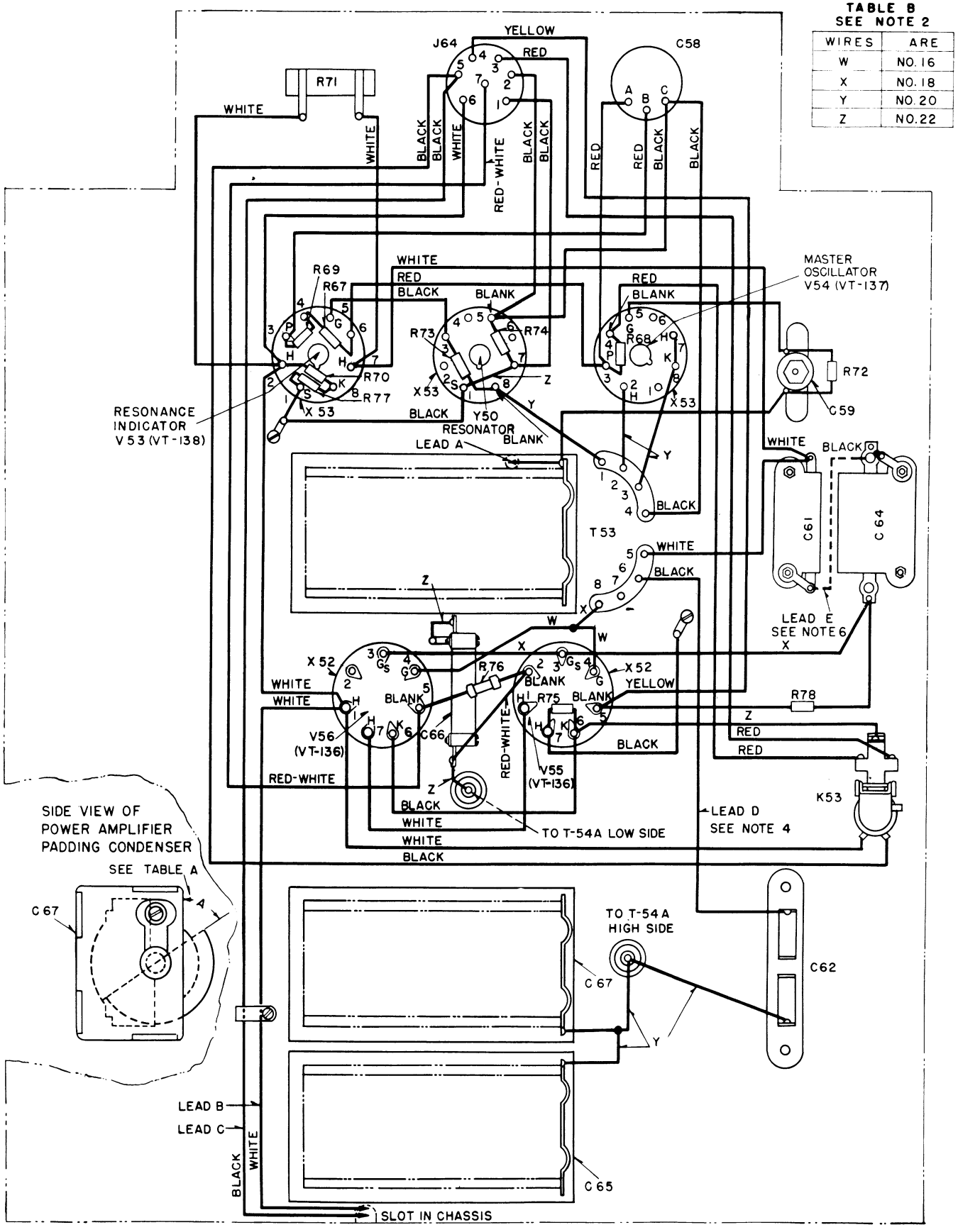
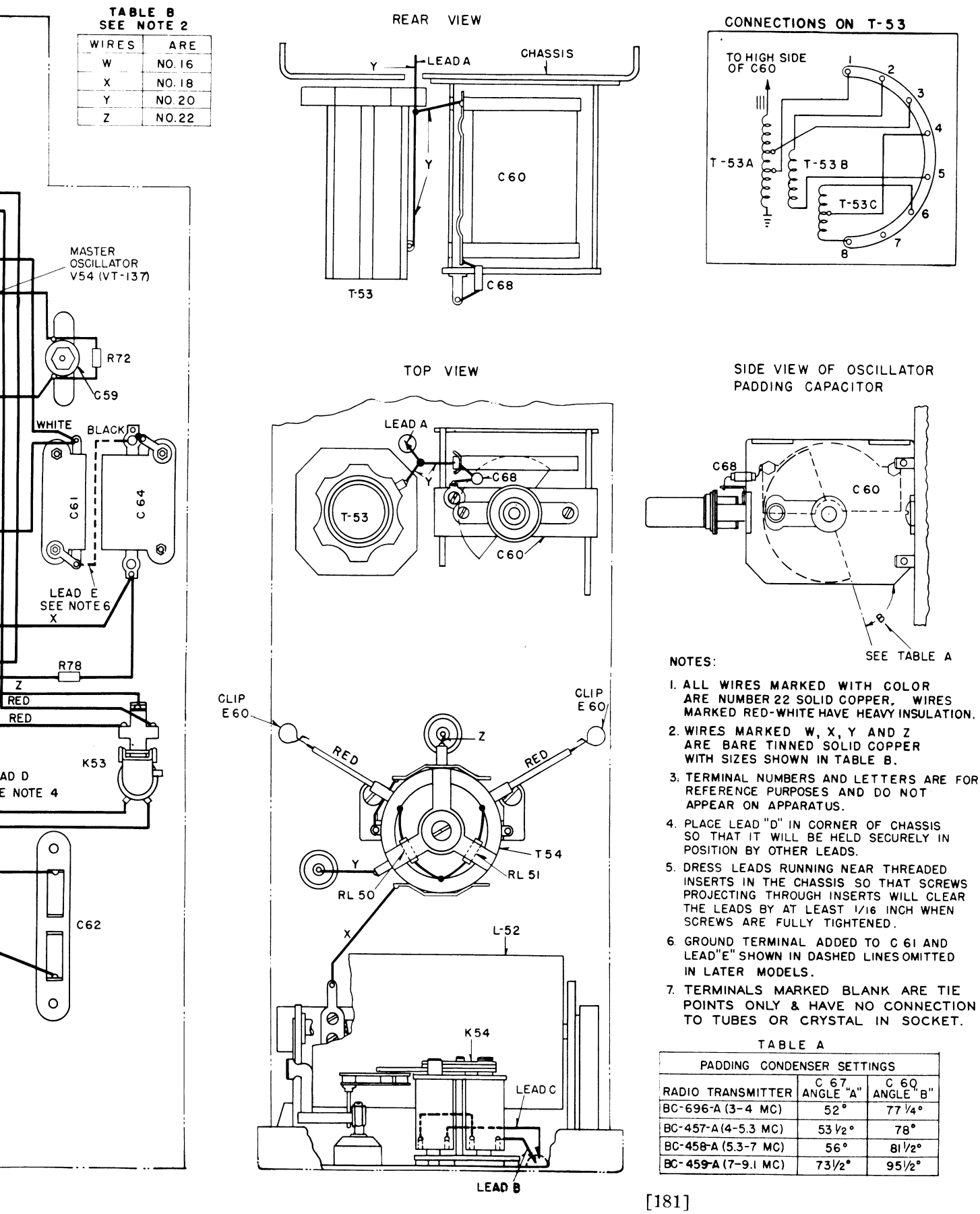


TABLE B
SEE NOTE 2
WIRES ARE
W NO. 16
X NO. 18
Y NO. 20
Z NO. 22
J64
YELLOW
RED
C58
R71
WHITE
BLACK
RED-WHITE
R69
R67
R70
R77
R73
R74
R68
R72
C59
MASTER OSCILLATOR V54 (VT-137)
RESONANCE INDICATOR V53 (VT-138)
X53
Y50
RESONATOR
BLANK
LEAD A
T53
C61
C64
LEAD E SEE NOTE 6
X52
R76
R75
R78
V56 (VT-136)
V55 (VT-136)
C66
K53
CLIP E60
LEAD D SEE NOTE 4
TO T-54A LOW SIDE
SIDE VIEW OF POWER AMPLIFIER PADDING CONDENSER
SEE TABLE A
C67
TO T-54A HIGH SIDE
C62
C65
LEAD B
LEAD C
SLOT IN CHASSIS

BOTTOM VIEW



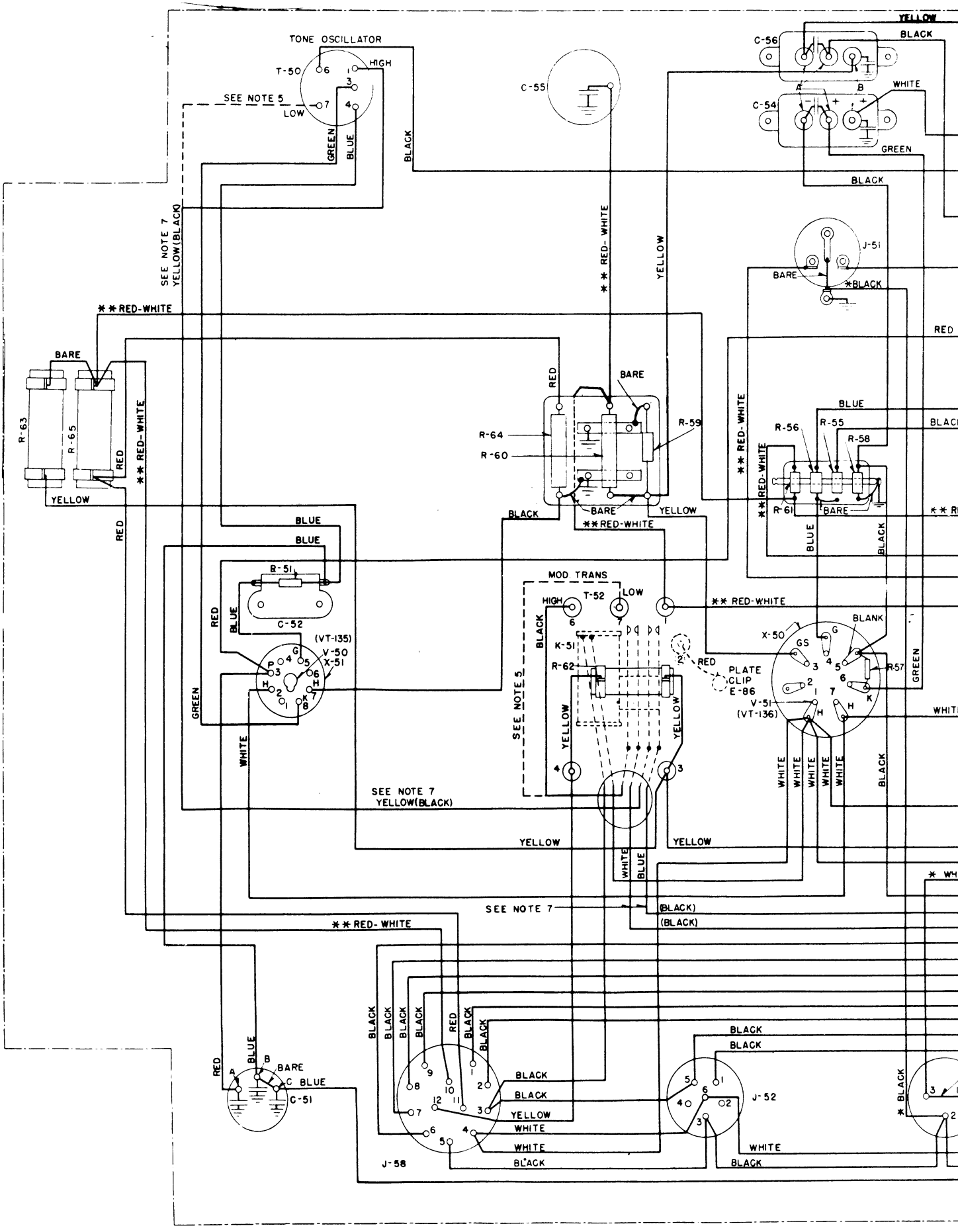
NOTES:

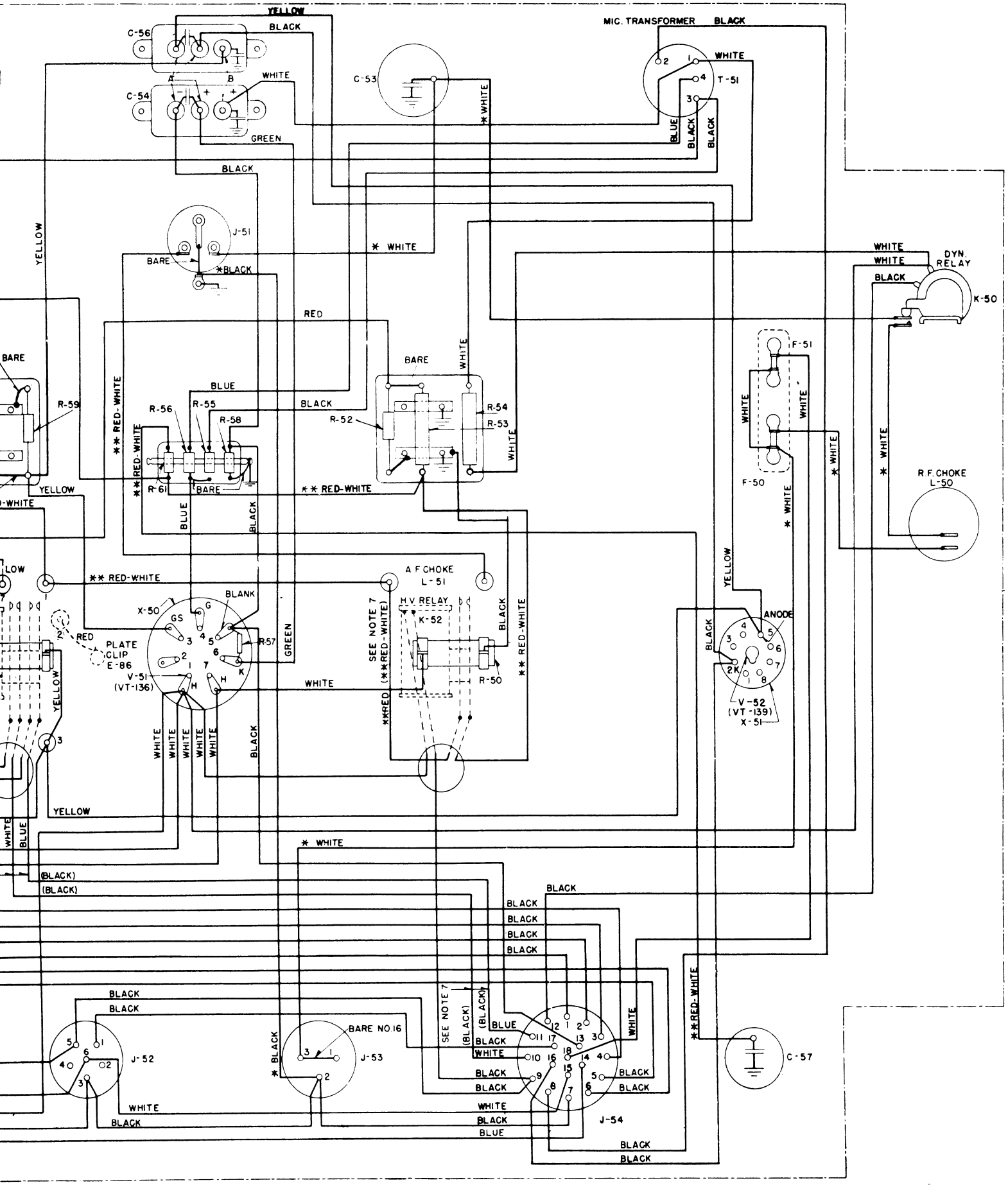
1. ALL WIRES MARKED WITH COLOR ARE NUMBER 22 SOLID COPPER, WIRES MARKED RED-WHITE HAVE HEAVY INSULATION.
2. WIRES MARKED W, X, Y AND Z ARE BARE TINNED SOLID COPPER WITH SIZES SHOWN IN TABLE B.
3. TERMINAL NUMBERS AND LETTERS ARE FOR REFERENCE PURPOSES AND DO NOT APPEAR ON APPARATUS.
4. PLACE LEAD "D" IN CORNER OF CHASSIS SO THAT IT WILL BE HELD SECURELY IN POSITION BY OTHER LEADS.
5. DRESS LEADS RUNNING NEAR THREADED INSERTS IN THE CHASSIS SO THAT SCREWS PROJECTING THROUGH INSERTS WILL CLEAR THE LEADS BY AT LEAST 1/16 INCH WHEN SCREWS ARE FULLY TIGHTENED.
6. GROUND TERMINAL ADDED TO C 61 AND LEAD "E" SHOWN IN DASHED LINES OMITTED IN LATER MODELS.
7. TERMINALS MARKED BLANK ARE TIE POINTS ONLY & HAVE NO CONNECTION TO TUBES OR CRYSTAL IN SOCKET.

TABLE A

PADDING CONDENSER SETTINGS		
RADIO TRANSMITTER	C 67 ANGLE "A"	C 60 ANGLE "B"
BC-696-A (3-4 MC)	52°	77 1/4°
BC-457-A (4-5.3 MC)	53 1/2°	78°
BC-458-A (5.3-7 MC)	56°	81 1/2°
BC-459-A (7-9.1 MC)	73 1/2°	95 1/2°

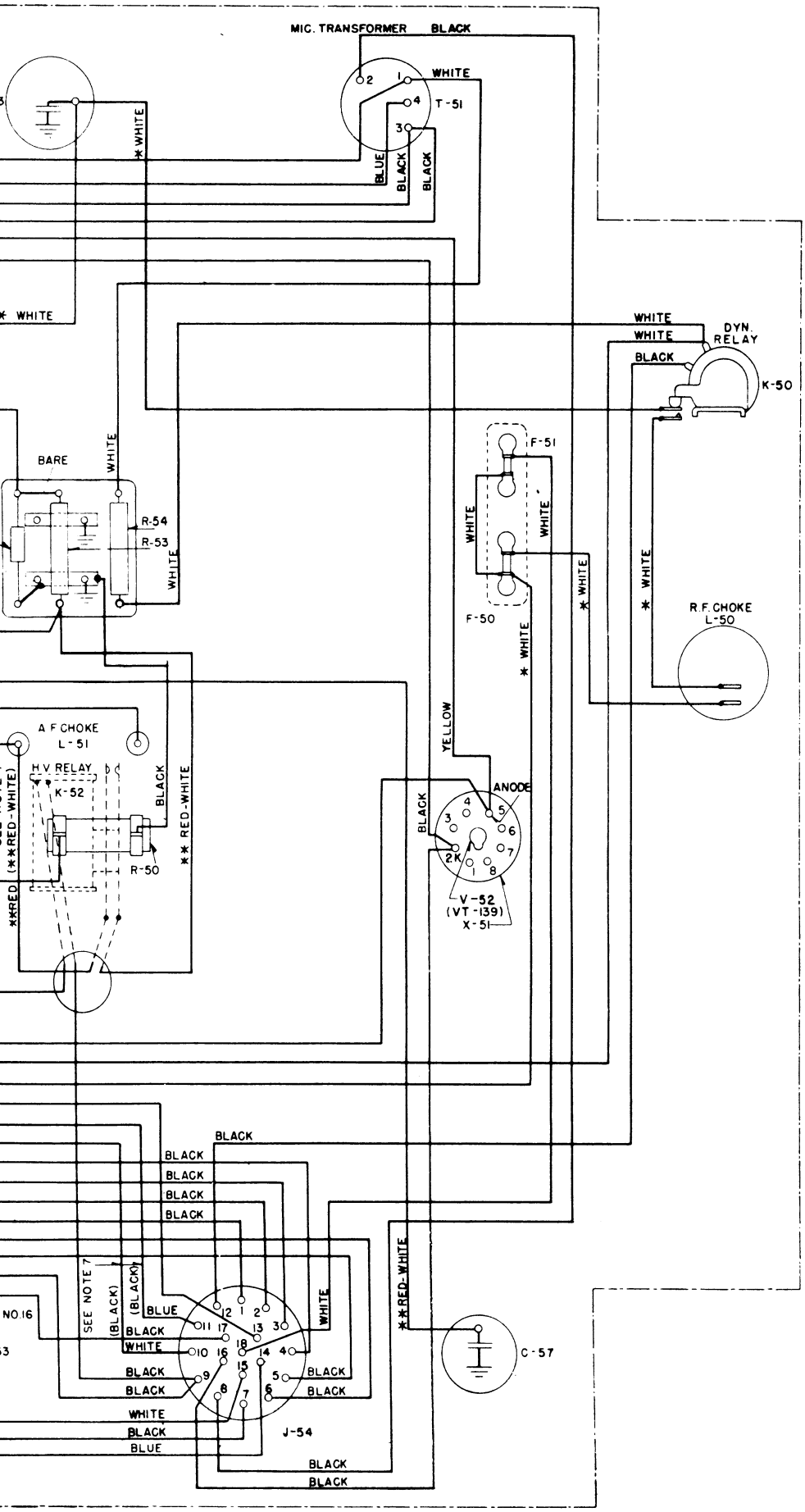
FIGURE 47 — RADIO TRANSMITTERS BC-696-A, BC-457-A, BC-458-A and BC-459-A, PRACTICAL WIRING DIAGRAM

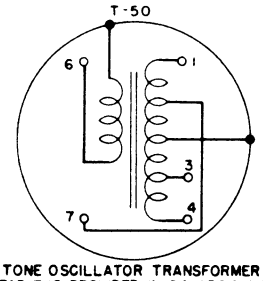

TONE OSCILLATOR
T-50
HIGH
LOW
SEE NOTE 5
GREEN
BLUE
BLACK
C-55
C-56
C-54
YELLOW
BLACK
WHITE
GREEN
J-51
BARE
*BLACK
** RED-WHITE
YELLOW
SEE NOTE 7
YELLOW(BLACK)
R-63
R-65
R-64
R-60
R-59
R-56
R-55
R-58
R-61
RED
BLUE
R-51
C-52
(VT-135)
V-50
X-51
MOD TRANS
T-52
K-51
R-62
SEE NOTE 5
PLATE CLIP E-86
X-50
BLANK
R-57
V-51
(VT-136)
WHITE
SEE NOTE 7
YELLOW(BLACK)
C-51
J-58
J-52



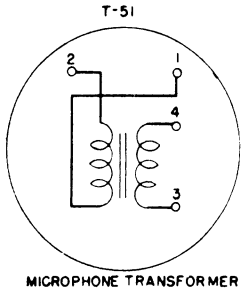
NOTES:

1. ALL W... COPP...
2. ALL W... CONDU... INSUL...
3. ALL ... EXCE...
4. ALL ... SOLID...
5. MODU... WITH ... AND ... INCLU... HEADS ... UNITS ... HIGH ... WIRIN... OSCIL... MOD... THE ...
6. TERM... SOCK... REFE... ON A...
7. WIRE ... USED ... AND ...

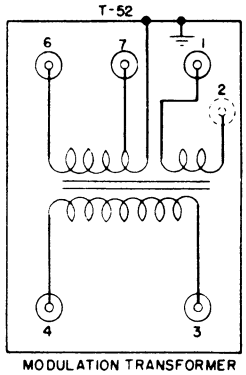




TONE OSCILLATOR TRANSFORMER
TAP 7 IS PROVIDED IN BC-456-B ONLY
SEE NOTE 5



MICROPHONE TRANSFORMER

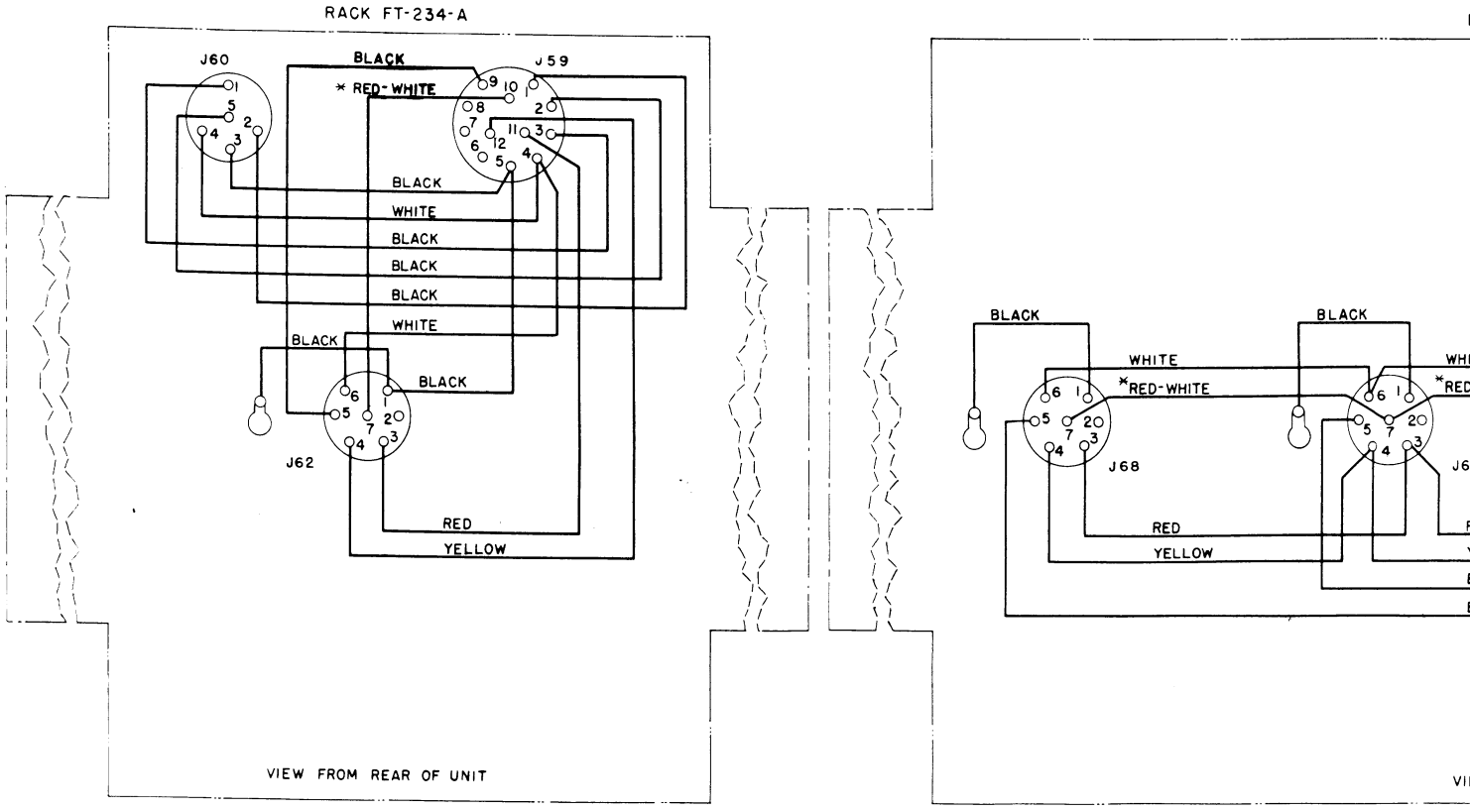


MODULATION TRANSFORMER
TAP 7 PROVIDED IN BC-456-B ONLY
SEE NOTE 5

NOTES:

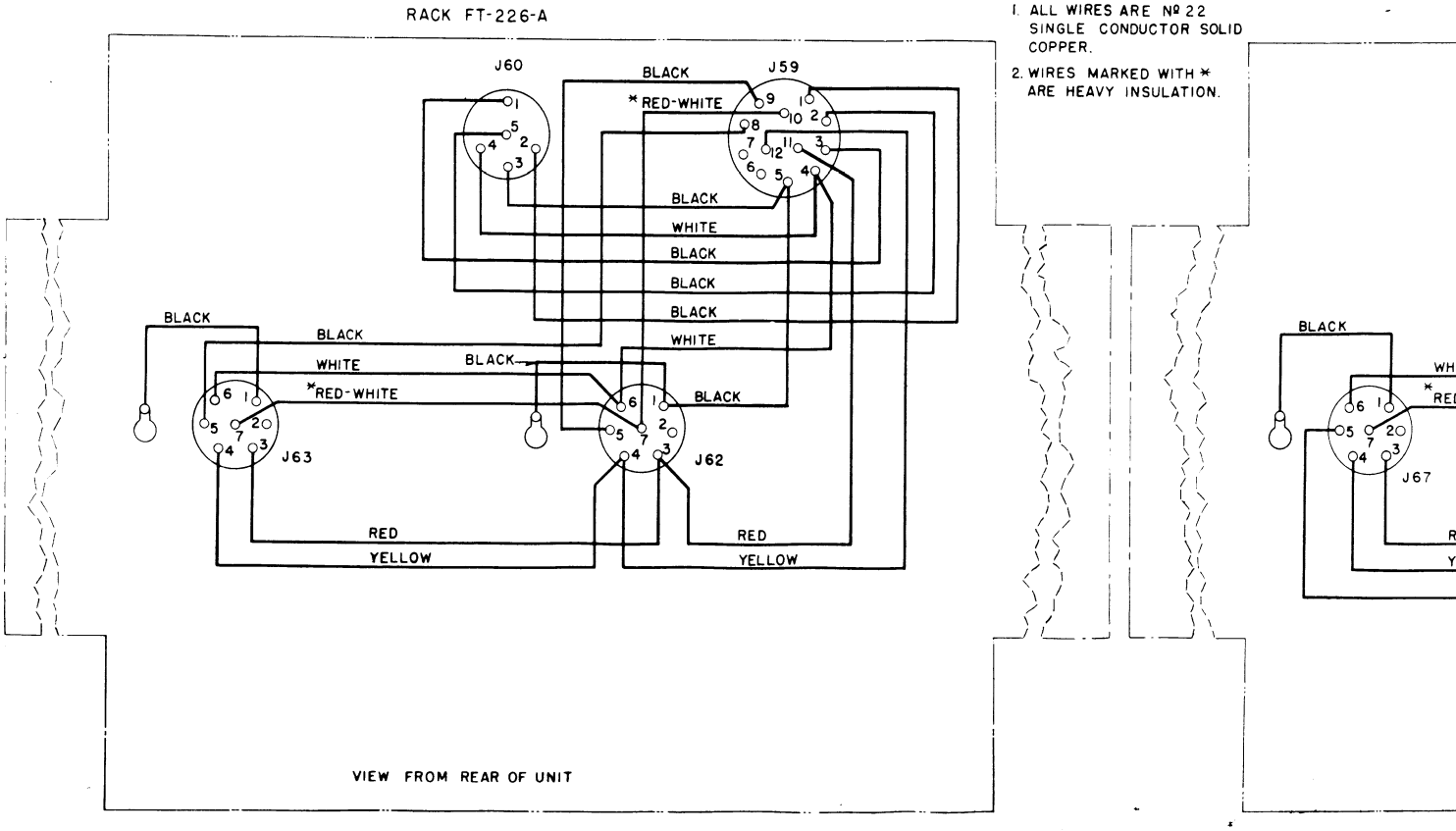
1. ALL WIRES MARKED (*) TO BE NO.18 STRANDED COPPER.
2. ALL WIRES MARKED (**) TO BE NO.22 SINGLE CONDUCTOR TINNED COPPER, HEAVY INSULATION.
3. ALL BARE WIRES ARE NO.22 TINNED COPPER EXCEPT AS NOTED.
4. ALL OTHER INSULATED WIRES TO BE NO.22 SOLID COPPER.
5. MODULATOR UNIT BC-456-B IS EQUIPPED WITH TRANSFORMERS DESIGNATED "MOD. TRANS." AND "TONE OSCILLATOR" EACH OF WHICH INCLUDES TAP 7 FOR MAKING A LOW IMPEDANCE HEADSET CONNECTION. BC-456-B MODULATOR UNITS AS SUPPLIED ARE WIRED FOR THE HIGH IMPEDANCE CONNECTION. CHANGES IN THE WIRING FROM TAP 1 TO TAP 7 ON TONE OSCILLATOR AND FROM TAP 6 TO TAP 7 ON MOD TRANS. AS INDICATED ARE REQUIRED FOR THE LOW IMPEDANCE HEADSET CONNECTION.
6. TERMINAL NUMBERS AND LETTERS AT TUBE SOCKETS AND MOD. TRANS. ARE FOR REFERENCE PURPOSES AND DO NOT APPEAR ON APPARATUS.
7. WIRE COLORS SHOWN IN PARENTHESIS ARE USED IN MODULATOR UNITS BC-456-A AND IN EARLY PRODUCTION UNITS BC-456-B.

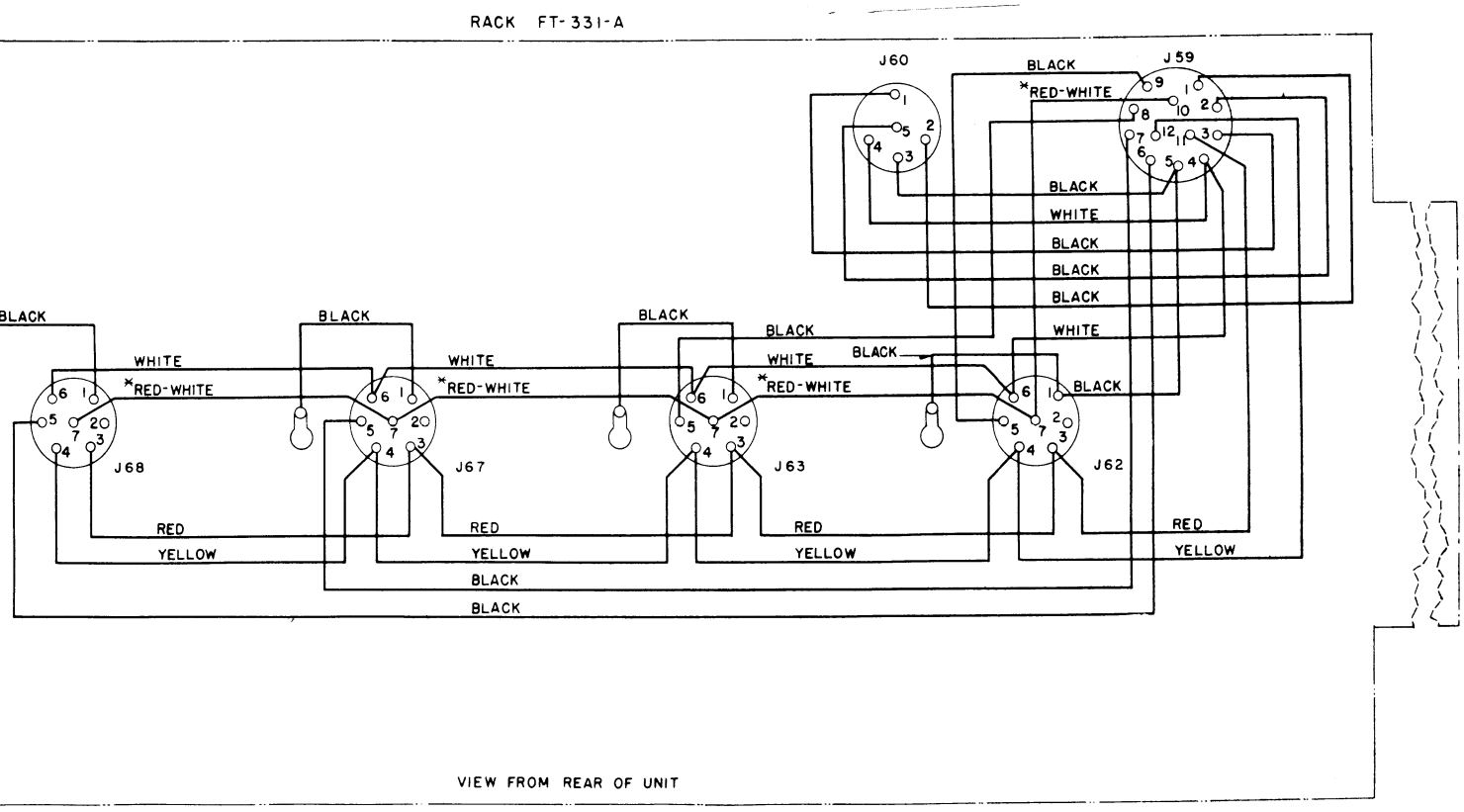
FIGURE 48 — MODULATOR UNIT BC-456-A (OR -B), PRACTICAL WIRING DIAGRAM



NOTES:

1. ALL WIRES ARE Nº 22 SINGLE CONDUCTOR SOLID COPPER.
2. WIRES MARKED WITH * ARE HEAVY INSULATION.





NOTES:

1. ALL WIRES ARE Nº 22 SINGLE CONDUCTOR SOLID COPPER.
2. WIRES MARKED WITH * ARE HEAVY INSULATION.

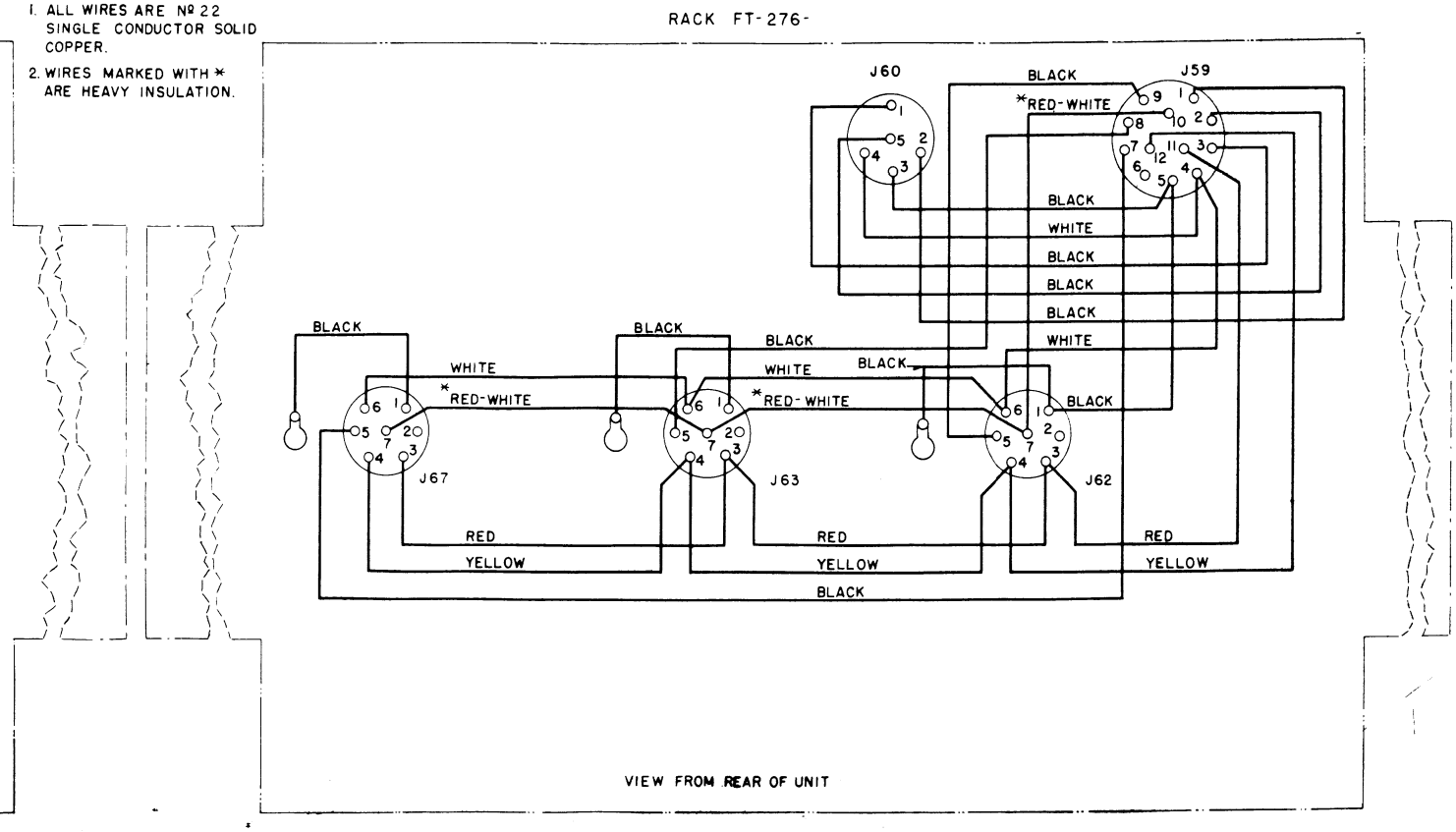
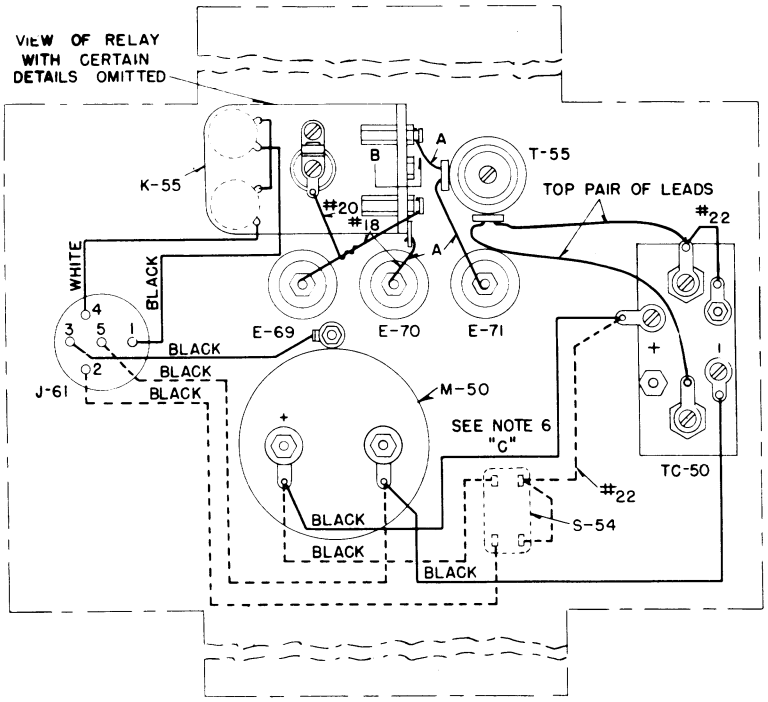
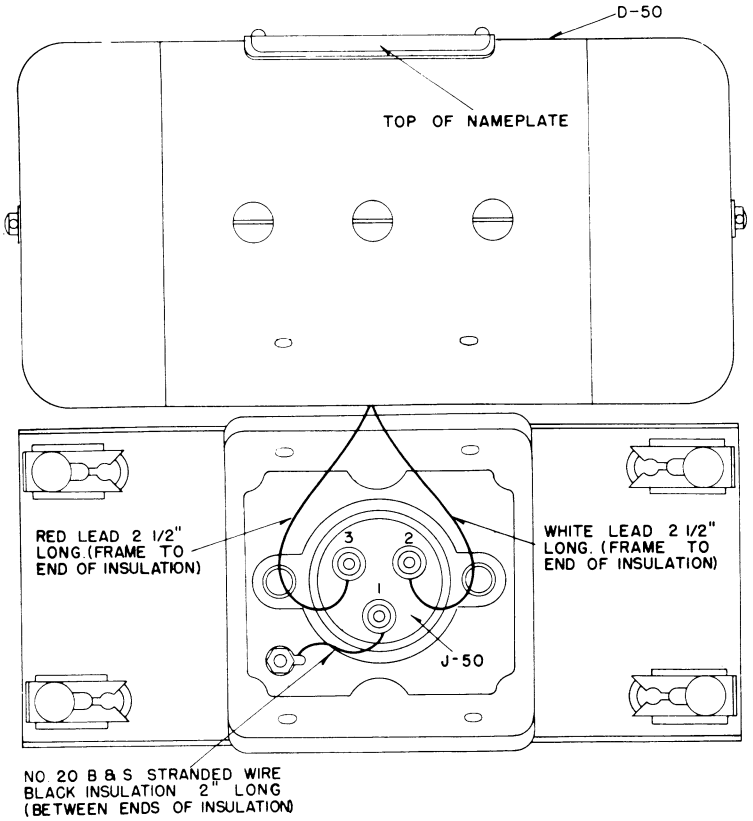


FIGURE 49 — RADIO TRANSMITTER RACKS FT-234-A, FT-226-A, FT-276- AND FT-331-A, PRACTICAL WIRING DIAGRAM



ANTENNA RELAY UNIT BC-442-A (OR -AM)
VIEW FROM REAR OF UNIT



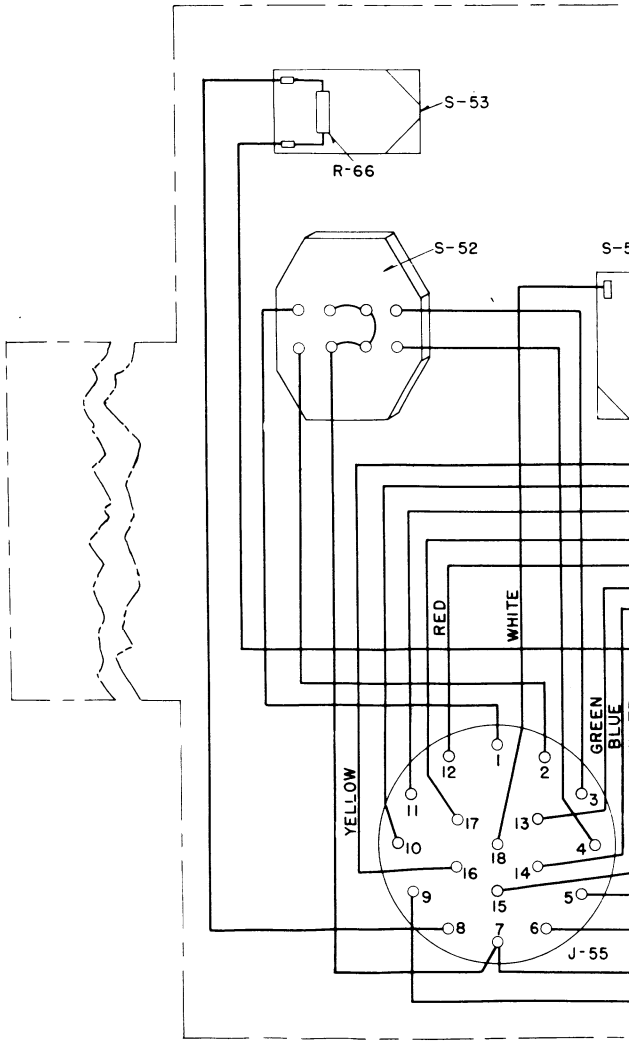
DYNAMOTOR DM-33-A

NOTES

1. KEEP LEAD INSULATION CLOSE TO TERMINALS. PAINT BETWEEN ENDS OF LEAD INSULATION AND TERMINALS WITH THICK RED LACQUER FOR REENFORCEMENT.
2. TOPS OF TERMINALS MUST BE FREE FROM SHARP METALLIC POINTS.
3. TERMINAL NUMBERS SHOWN ARE FOR REFERENCE PURPOSES. THEY DO NOT APPEAR ON THE UNIT.

NOTES ON ANTENNA

1. LEADS MARKED "A" MUST BE SO DRESSE TO OTHER CONDUCTORS AND TO GROUND EXCEED 1/8".
2. NO. 18, 20 OR 22 SHOWN ON WIRING DIA USED.
3. SOLDER TERMINATION OF BARE LEADS SHARP PROJECTIONS. BARE LEADS MU LEAVE SHARP EDGES OR POINTS.
4. ALL LEADS INDICATED BY COLOR ARE
5. AFTER WIRING IS COMPLETED, APPLY A HE COIL TURNS AND INSULATORS OF THE RELAY ASSEMBLY AND THE HIGH VOLT
6. SWITCH S-54 AND ASSOCIATED WIRING AS INDICATED BY THE DASHED LINES. IS USED.

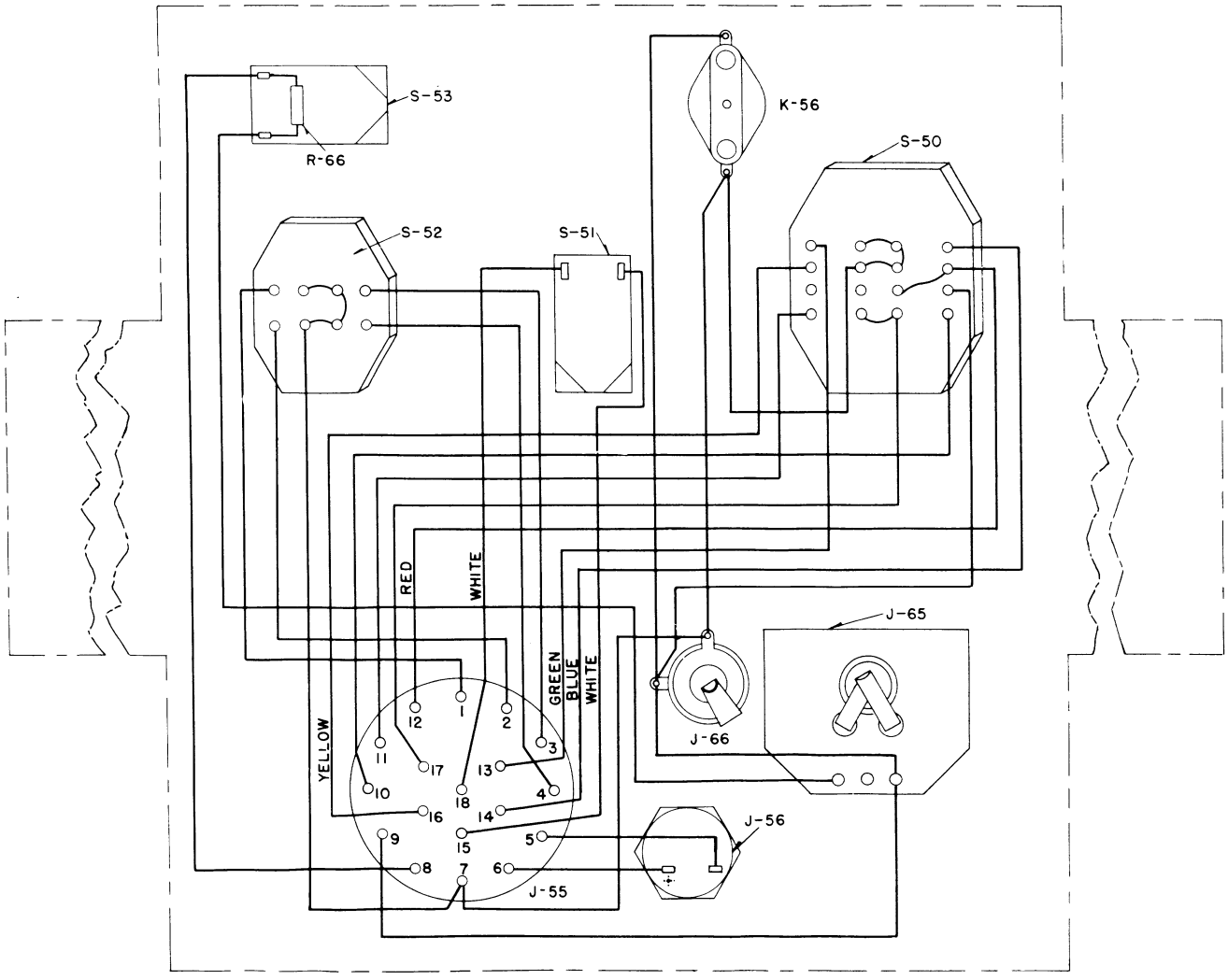


RADIO CONTR
VIEW FROM

1. ALL WIRES NO. 22 SOLI EXCEPT AS NOTED.
2. JUMPERS ON SWITCHES A WIRE, TINNED.

NOTES ON ANTENNA RELAY UNIT BC-442-A (OR -AM)

1. LEADS MARKED "A" MUST BE SO DRESSED AS TO MAINTAIN AT LEAST 5/16" CLEARANCE TO OTHER CONDUCTORS AND TO GROUNDED PARTS, EXCEPT THAT GAP "B" NEED NOT EXCEED 1/8".
2. NO. 18, 20 OR 22 SHOWN ON WIRING DIAGRAM INDICATES THE SIZE OF BARE COPPER WIRE USED.
3. SOLDER TERMINATION OF BARE LEADS "A" MUST BE SMOOTHLY ROUNDED TO AVOID ALL SHARP PROJECTIONS. BARE LEADS MUST NOT BE MARRED IN SUCH A WAY AS TO LEAVE SHARP EDGES OR POINTS.
4. ALL LEADS INDICATED BY COLOR ARE NO. 22 SOLID INSULATED WIRE.
5. AFTER WIRING IS COMPLETED, APPLY A HEAVY COAT OF G. E. GLYPTOL NO.1202 LACQUER OVER COIL TURNS AND INSULATORS OF THE COIL ASSEMBLY, HIGH VOLTAGE TERMINALS ON THE RELAY ASSEMBLY AND THE HIGH VOLTAGE BUSHINGS.
6. SWITCH S-54 AND ASSOCIATED WIRING ARE PROVIDED ON EARLY MODELS OF THIS UNIT, AS INDICATED BY THE DASHED LINES. LEAD "C" IS LEFT OUT IN UNITS WHERE S-54 IS USED.



RADIO CONTROL BOX BC-451-A
VIEW FROM REAR OF UNIT

NOTES

1. ALL WIRES NO. 22 SOLID COPPER WITH BLACK INSULATION EXCEPT AS NOTED.
2. JUMPERS ON SWITCHES ARE TO BE NO. 22 BARE COPPER WIRE, TINNED.

FIGURE 50 — RADIO CONTROL BOX BC-451-A, ANTENNA RELAY UNIT BC-442-A AND DYNAMOTOR DM-33-A, TYPICAL WIRING DIAGRAMS

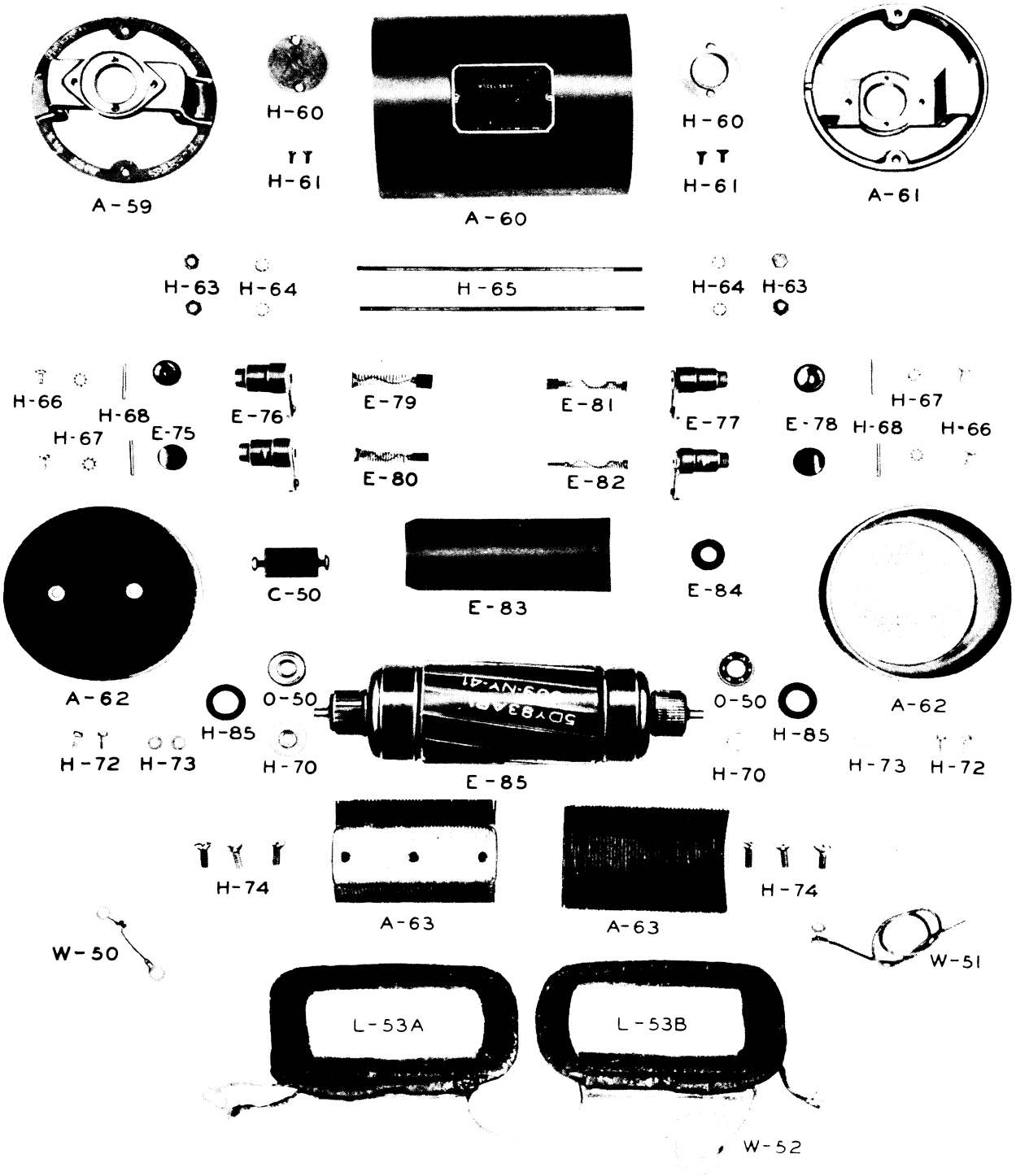
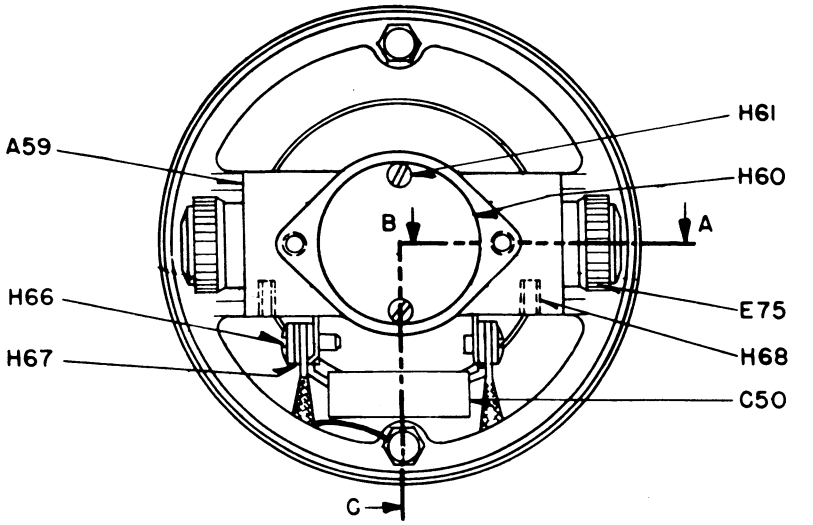
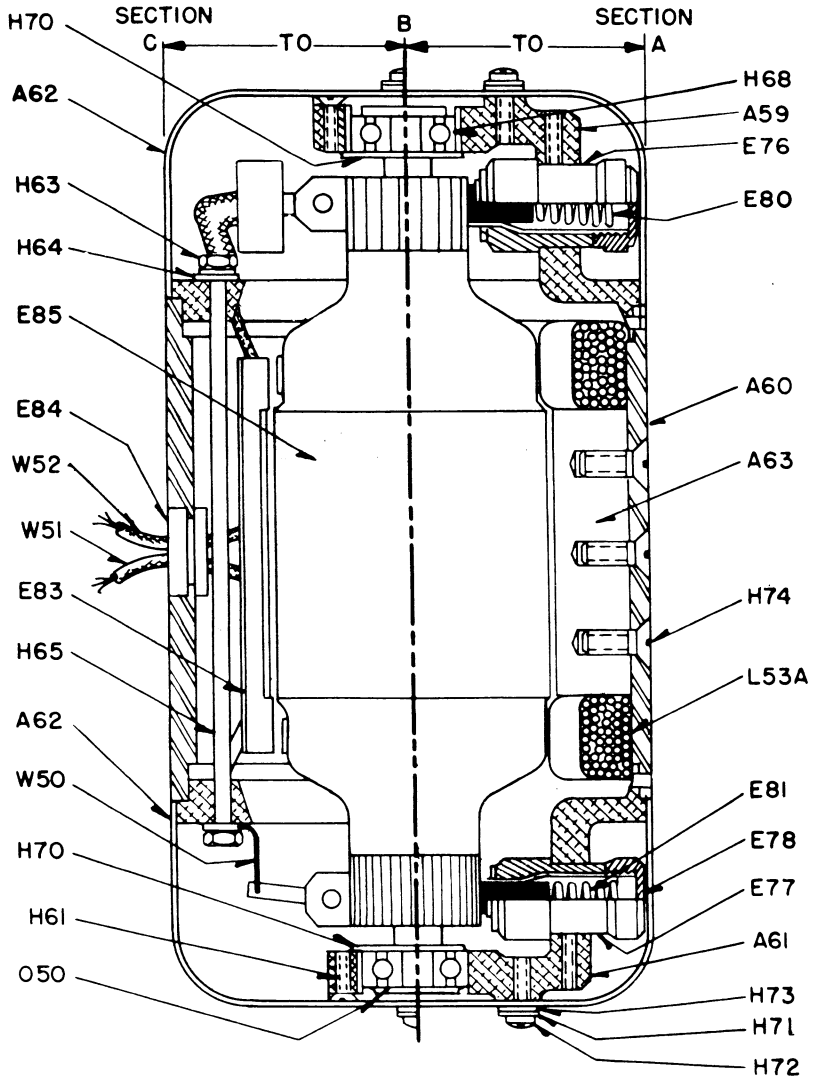


FIGURE 51A — PHOTOGRAPH OF PARTS AND DYNAMOTOR MACHINE USED IN DYNAMOTOR DM-33-A



INSIDE END VIEW WITH COVER A62 REMOVED

LOW VOLTAGE END, 26 BAR COMMUTATOR

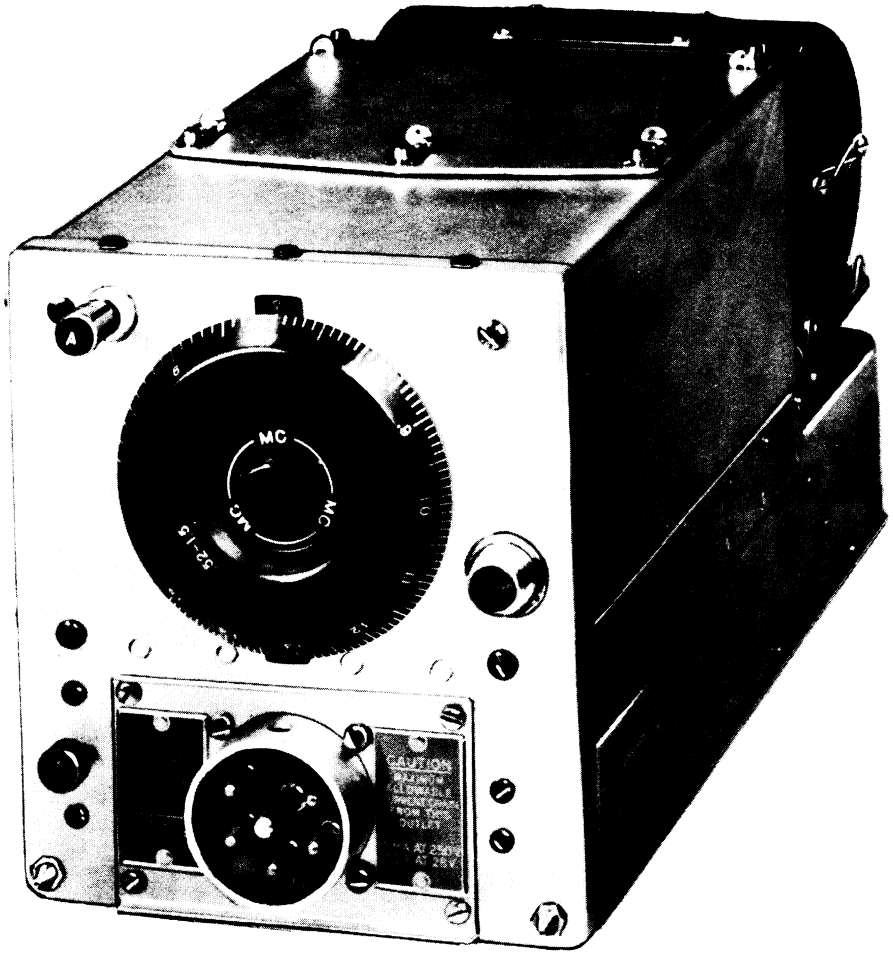


HIGH VOLTAGE END, 52 BAR COMMUTATOR

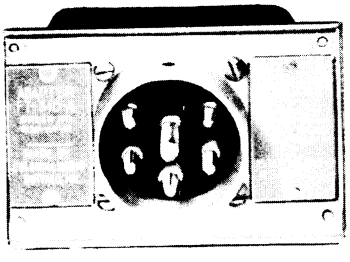
FIGURE 51B — LINE DRAWING OF DYNAMOTOR MACHINE USED IN DYNAMOTOR DM-33-A

ADDENDUM

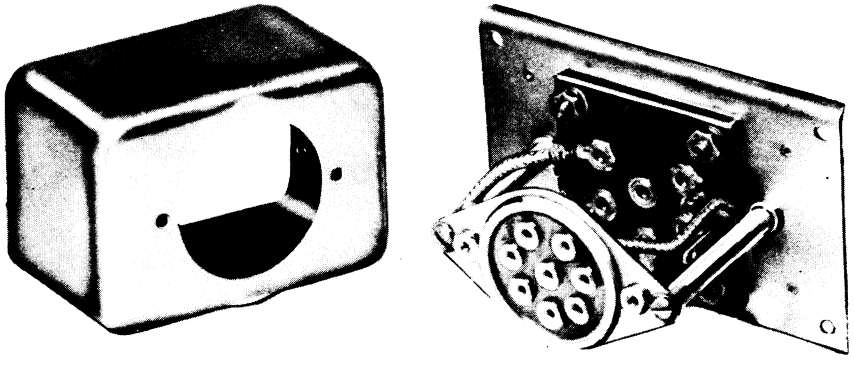
RADIO RECEIVER BC-946-B



RADIO RECEIVER BC-946-B



ADAPTER
FT-310-A
FRONT VIEW



ADAPTER FT-310-A
INTERIOR VIEW

FIGURE A1 — RADIO RECEIVER BC-946-B

ADDENDUM

RADIO RECEIVER BC-946-B

1. DESCRIPTION

a. *General*

Radio Receiver BC-946-B is identical in mechanical design with other receivers, such as Radio Receiver BC-453-B, of Radio Set SCR-274-N, and uses the same tube complement, variable condenser, control box, etc. The radio frequency coil units are externally the same, although the coil details are different internally. Adapter FT-310-A may be used with Radio Receiver BC-453-B and other receivers of Radio Set SCR-274-N. The following instructions will cover the differences between Radio Receiver BC-946-B and Radio Receiver BC-453-B.

b. *Frequency Range*

The frequency range of Radio Receiver BC-946-B is .52 mc to 1.5 mc.

c. *Intermediate Amplifier Frequency*

The intermediate frequency of Radio Receiver BC-946-B is 239 kc.

d. *Dial MC-415*

Dial MC-415 is interchangeable with any of the other dials used on Radio Control Box BC-450-A. The calibration is identical with that of the dial for Radio Receiver BC-946-B.

e. *Adapter FT-310-A*

Adapter FT-310-A, which is a part of Radio Receiver BC-946-B, provides both high and low voltage outlet. It is mechanically interchangeable with Adapter FT-230-A.

CAUTION:—The current drawn by equipment connected to Adapter FT-310-A must not exceed 15 milliamperes at 250 volts and .5 ampere at 28 volts, because the performance of the radio receiver will be adversely affected and the life of the dynamotor reduced.

2. INSTALLATION

a. *Radio Receiver BC-946-B*

The receiver may be used interchangeably with any of the other receivers of Radio Set SCR-274-N by following instructions given for them.

b. *Dial MC-415*

Dial MC-415 is used on the radio control box.

3. OPERATION

The operation of Radio Receiver BC-946-B is the same as that given for Radio Receiver BC-453-B.

4. PERFORMANCE

The performance of the receiver is the same as that for Radio Receiver BC-453-B except as tabulated below. (For test conditions see Instruction Book for Operation and Maintenance of Radio Set SCR-274-N.)

Sensitivity

Circuits	*Locations*	*Micro-volts*	*Kc*
Antenna	Antenna Binding Post	8	1500
R-F	R-F Control Grid at Terminal 4	120	1500
Mixer	R-F Control Grid at Top Cap	600	1500
Mixer	I-F Control Grid at Top Cap	470	239
1st I-F	I-F Control Grid at Terminal 4	8600	239
2nd I-F	I-F Control Grid at Terminal 4	100,000	239

Selectivity (520 kc)

MCW Selectivity Factor

2X	10X	100X	1000X
4.5	14.0	20.0	30.0

5. ALIGNMENT

a. *Procedure*

The alignment procedure, symbol numbers and trimmer position views are the same as those given for Radio Receiver BC-453-B.

b. *Alignment Frequencies*

Intermediate Frequency ..... 239 kc

High-end alignment frequency for C4E, C4D, and C2 ..... 1.40 mc

Low-end alignment frequency for C9 .57 mc

c. *Setting of Cross Mark*

The setting of cross mark on auxiliary gang trimmers is indicated below:

6. OUTPUT IMPEDANCE

To change from a 4,000 ohm output connection to 300 ohm, proceed as follows:

(1) Remove capacitor C35

(2) Disconnect the black lead from terminal 3 on output transformer T-1 and connect it to terminal 6

(3) Connect a new lead from X on C20B to terminal 6 on output transformer, or to the same terminal from which C35 was disconnected on the power plug.

7. SCHEMATIC DIAGRAM

The schematic diagram (Figure A2) is similar to the one for Radio Receiver BC-453-B, and the same symbol numbers are used. The principal differences between the two receivers are as follows:

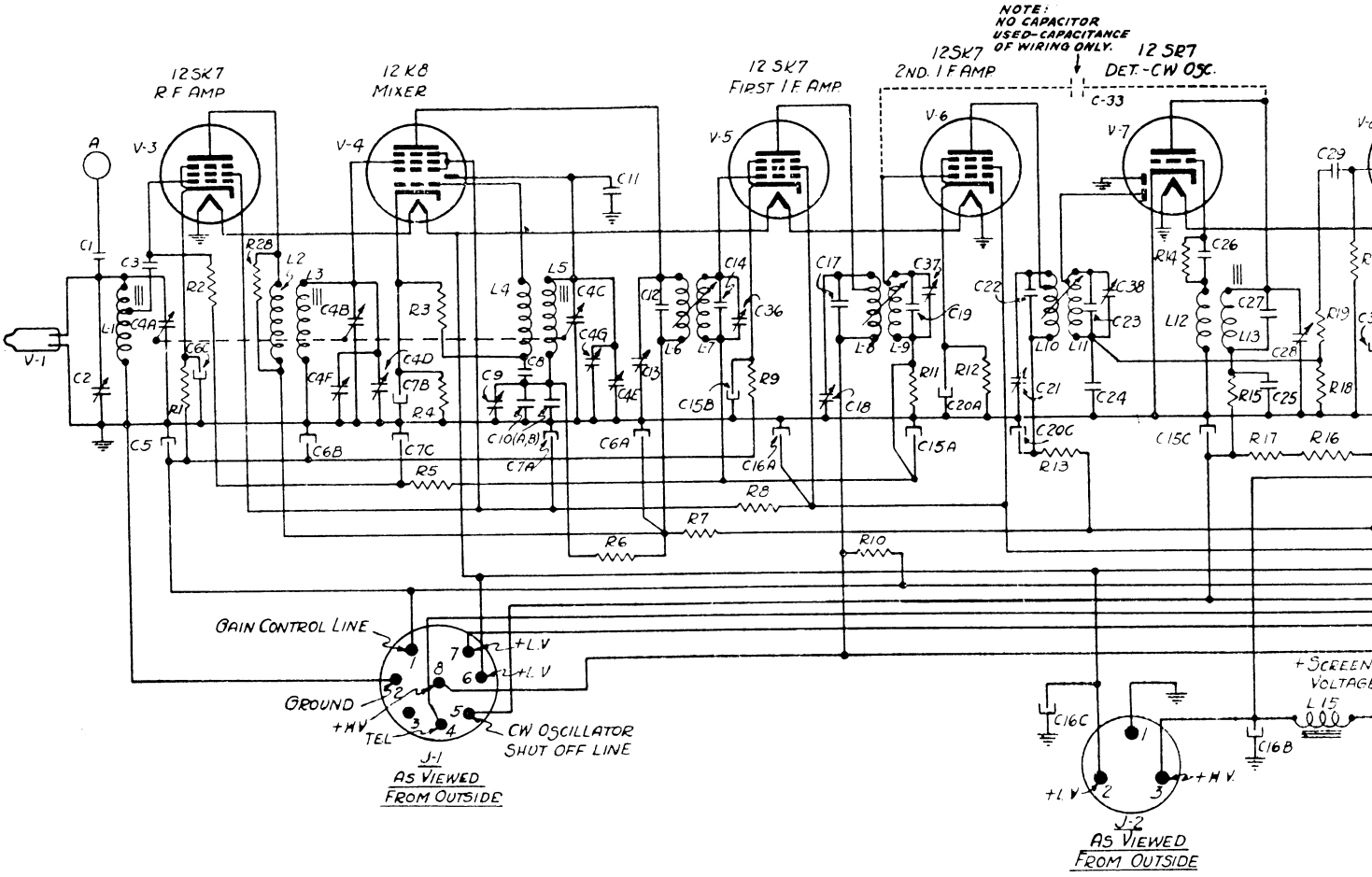
C 10A and C 10B ..... slightly different capacity

C 33 ..... is capacitance of wiring only instead of 3 mmf

R 16 and R 17 ..... are 100,000 ohms instead of 150,000 ohms

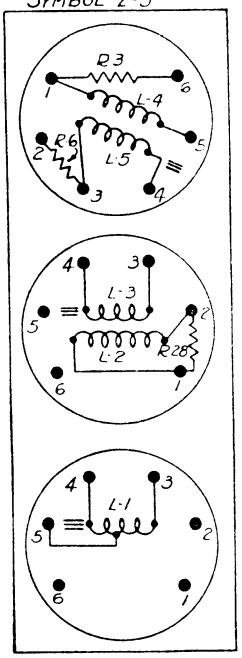
C 39 ..... is omitted

Add wire from high side of R 10 to terminal 8 on J-1.



CIRCUITS IN RF COIL SET, IF COUPLING UNITS, CW OSCILLATOR, & OUTPUT TRANSFORMER
THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE
CORRESPONDING LOCATIONS ON THE WIRING DIAGRAM

RF COIL SET
SYMBOL Z-5

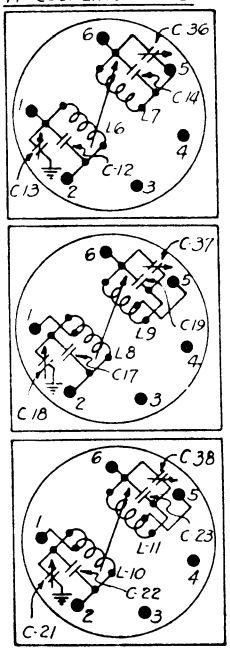


SYMBOL Z-5C
RF OSCILLATOR

SYMBOL Z-5B
RF AMPLIFIER

SYMBOL Z-5A
RF ANTENNA

IF COUPLING UNITS

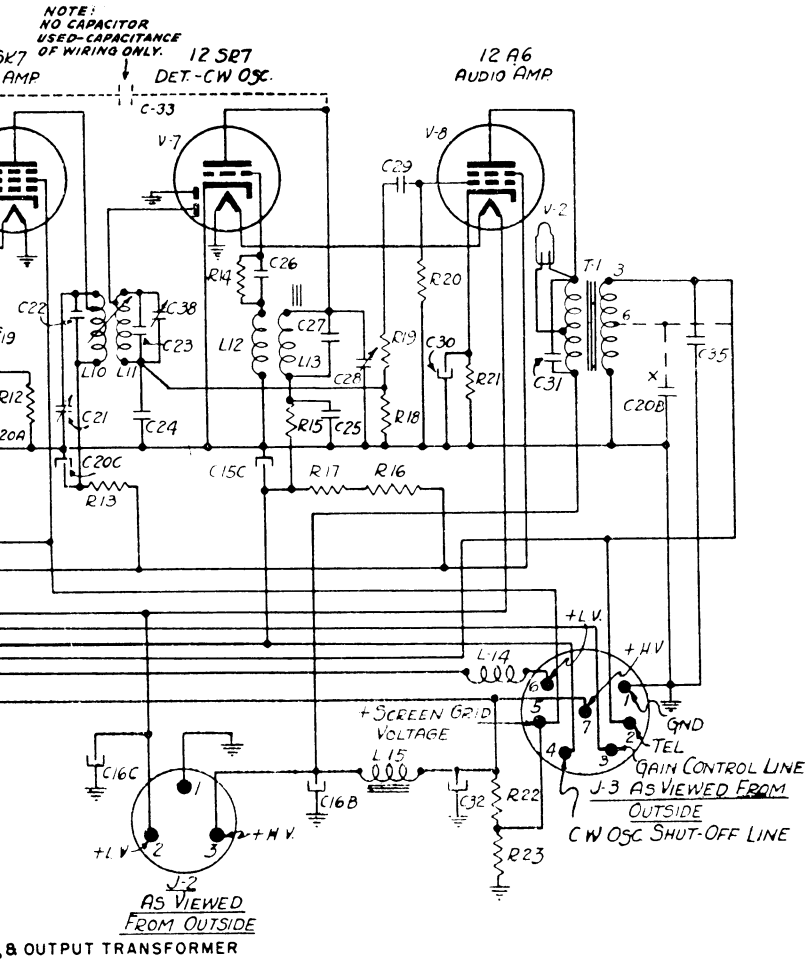


SYMBOL Z-1
1ST I F
(239 KC)

SYMBOL Z-2
2ND I F
(239 KC)

SYMBOL Z-3
3RD I F
(239 KC)

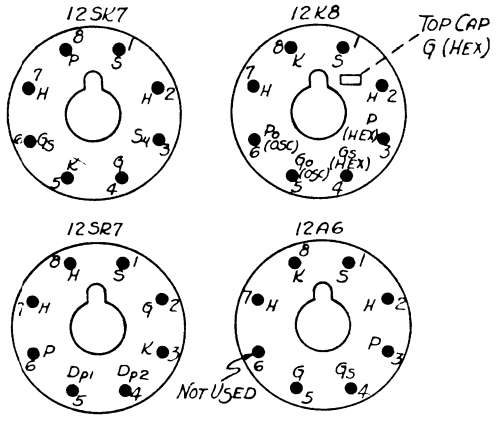
Ⓐ
C 35 & TERMINAL 3
C 20B & TERMINAL



& OUTPUT TRANSFORMER
OSE SHOWN AT THE

CAPACITANCES		INDUCTANCES		RESISTANCES	
REF. No.	DESCRIPTION	REF. No.	DESCRIPTION	REF. No.	OHMS
C-1	11 MMF	L-1	ANT. INPUT	R-1	620
C-2	15 MMF	L-2, L-3	RF AMP	R-2	2,000,000
C-3	100 MMF	L-4, L-5	RF OSC	R-3	51,000
C-4 (A TO G)	GANG (346 MMF)	L-6, L-7	IN FIRST IF	R-4	620
C-5	3 MFD	L-8, L-9	IN 2ND IF	R-5	150,000
C-6 (A,B,C)	.05/05/05 MFD.	L-10, L-11	IN 3RD IF	R-6	300,000
C-7 (A,B,C)	05/05/05 MFD	L-12, L-13	CW OSC	R-7	200
C-8	200 MMF	L-14	RF CHOKE	R-8	200
C-9	40 MMF		112 MICRO-	R-9	620
C-10 (A B)	670 MMF TOTAL		HENRIES	R-10	360,000
C-11	3 MMF	L-15	AF CHOKE	R-11	100,000
C-12	180 MMF		3 HENRIES	R-12	510
C-13	17 MMF			R-13	200
C-14	180 MMF			R-14	100,000
C-15 (A,B,C)	05/05/05 MFD			R-15	20,000
C-16 (A,B,C)	.22/.22/.22 MFD			R-16	100,000
C-17	180 MMF			R-17	100,000
C-18	17 MMF			R-18	510,000
C-19	180 MMF			R-19	100,000
C-20 (A,B,C)	05/01/05 MFD			R-20	2,000,000
C-21	17 MMF			R-21	1500
C-22	180 MMF			R-22	7000
C-23	180 MMF			R-23	7000
C-24	200 MMF			R-28	51,000
C-25	.001 MFD				
C-26	100 MMF				
C-27	335 MMF				
C-28	34 MMF				
C-29	.006 MFD				
C-30	15 MFD				
C-31	.001 MFD				
C-32	5 MFD				
C-33	WIRING CAPACITANCE LESS THAN 2 MMF				
C-35	750 MMFD (SEE NOTE BELOW) (A)				
C-36	17 MMF				
C-37	17 MMF				
C-38	17 MMF				

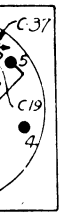
TUBE SOCKET TERMINALS
AS VIEWED FROM BOTTOM



TUBE TERMINAL CODE

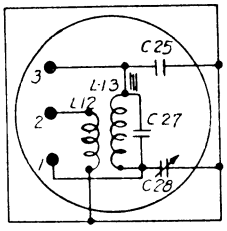
S = SHELL	G_5 = SCREEN GRID
H = HEATER	G_5 (HEX) = SCREEN GRID, HEXODE SECTION
K = CATHODE	G_0 (OSC) = CONTROL GRID, OSC SECTION.
S_4 = SUPPRESSOR GRID	P = PLATE
D_{P1} = FIRST DIODE PLATE	P (HEX) = PLATE, HEXODE SECTION
D_{P2} = SECOND DIODE PLATE	P_0 (OSC) = PLATE, OSC. SECTION.
G = CONTROL GRID	G (HEX) = CONTROL GRID, (HEXODE SECTION)

SYMBOL Z-1
1ST I.F
(239 KC)

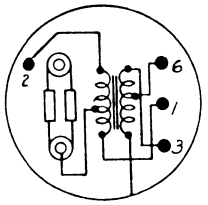


SYMBOL Z-2
2ND I.F
(239 KC)

SYMBOL Z-3
3RD I.F
(239 KC)



SYMBOL Z-4
CW OSCILLATOR
(239 KC)



SYMBOL T-1
OUTPUT TRANSFORMER

(A)
C 35 & TERMINAL 3 TO BE USED FOR 4000 OHM OUTPUT
C 20B & TERMINAL 6 TO BE USED FOR 300 OHM OUTPUT

FIGURE A2 — RADIO RECEIVER BC-946-B, SCHEMATIC WIRING DIAGRAM

TABLE 1

DIFFERENCES IN REPLACEABLE PARTS BETWEEN RADIO RECEIVER BC-453-B and RADIO RECEIVER BC-946-B

Ref. No.	*Name of Part*	*Stock No.*	*Description*	*Function*	*Drawing Numbers* BC-453-B	BC-946-B
C-9	Capacitor	2S274N/C6	Variable, air, △ C approx. 40 mmfd. and	R-F osc. series capacitor.		
C-10		2S274N/C6	fixed mica 400 v., 690 ± 5 mmfd.		6075	———
	Capacitor		Variable, air, △ C approx. 40 mmfd. and fixed mica 400 v., 670 ± 5 mmfd.	R-F osc. series capacitor.	———	6076
C-26	Capacitor	3B9100-59	Fixed 400 volts mica			
			200 mmfd. ± 5%	CW osc. blocking.	4513	———
			100 mmfd. ± 5%	CW osc. blocking.	———	4520
C-27	Capacitor		Fixed, 400 v., mica ± 2.5 mmfd. from nominal. Part of CW osc. assembly Z-4	Fixed capacitor part of CW osc. Tuning		
			Nominal 345 mmfd.		6701	———
			335 mmfd.		———	49143
C-33	Capacitor		Fixed, 3 mmfd. ± ½ mmfd. (Wiring capacity only for BC-946-B)	CW osc. coupling.	7020	———
					———	None
C-39	Capacitor		Fixed, 120 mmf., 2½% 400 v. mica	Across pri. of R. F.	8013	None
J-1	Receptacle		Coupling receptacle assembly; 7 circuit.	To adapter.	4724	49129
	Plug	2Z7251	Plug assembly; 4 circuit.	Adapter to receiver.	———	48930
	Receptacle		Receptacle plate assembly.	Adapter receptacle.	———	2226
N-1	Dial		Dial.	Receiver tuning dial.	5613	5610
R-6	Resistor		510000 ohms ± 10% ⅓w carbon.	R-F osc. series.	4570	———
	Resistor		300000 ohms ± 10% ⅓w carbon.	R-F osc. series.	———	4530
R-14	Resistor	3Z6700-48	51000 ohms ± 10% ⅓w carbon.	CW osc. grid.	4569	———
	Resistor		100000 ohms ± 10% ⅓w carbon.	CW osc. grid.	———	4501
R-16	Resistor		150000 ohms ± 10% ⅓w carbon.	CW osc. plate dropping.	4571	———
	Resistor		100000 ohms ± 10% ⅓w carbon.	CW osc. plate dropping.	———	4501

TABLE 1 (Continued)

DIFFERENCES IN REPLACEABLE PARTS
BETWEEN RADIO RECEIVER BC-453-B and RADIO RECEIVER BC-946-B

Ref. No.	*Name of Part*	*Stock No.*	*Description*	*Function*	*Drawing Numbers* BC-453-B	BC-946-B
R-17	Resistor		Same as R-16.	CW osc. plate dropping.		
R-28	Resistor	3Z6651-3	51000 ohms ± 10% 1/3w carbon.	R-F primary load.	None	4569
Z-1	Coupling unit		1st i-f coupling unit, complete assembly including shield can and mtg. plate.	1st i-f	4698	7268
Z-2	Coupling unit		2nd i-f coupling unit, complete.	2nd i-f	7267	7269
Z-3	Coupling unit		3rd i-f coupling unit, complete.	3rd i-f	4677	7270
Z-4	CW osc.		CW osc. complete assembly.	CW osc.	5852	5853
Z-5	R-F coil set		R-F coil set assembly including ant. Z-5A, r-f amp. Z-5B, r-f osc. Z-5C in shield cans mounted on a cover.	R-F coil set.	6184	7975

TABLE 2

REPLACEABLE PARTS FOR RADIO RECEIVER BC-946-B

Quan.	*Ref. No.*	*Stock No.*	*Name of Part*	*Description*	*Function*	**Mfr.*	*Dwg. No.*
2	C-1	3D9011-1	Capacitor	Ceramic—11 mmf ± ½ mmf.	Ant. series	A, B	9046
2	C-2	3D9015V-6	Capacitor-Shunt	Variable, air, △ C. Approximately 15 mmf.	Input alignment.	C	5676
2	C-3	3D9100-59	Capacitor	Fixed mica—.0001 mfd ±5% 400v—C D Type 5 or equivalent.	R-F amp. grid blocking.	D, E, F	4520
1	C-4	3D9346	Capacitor	Three equal—section gang with trimmers.	Preselector and r-f oscillator.	G	3936
3	C-5	3DB3.4	Capacitor	3 mfd dry electrolytic. Impedance at 60 cycles not over 1750 ohms.	Gain control. Line filter.	F, H, D	7582 or ESL692651
2	C-6	3DA50-32	Capacitor	.05/.05/.05 mfd ± 15%. 300 volts paper. A section. B section. C section.	 Mixer plate by-pass. Gain control line by-pass. 1st r-f cathode by-pass.	F, H, D	5414 or ESL692644
2	C-7		Capacitor	Same as C-6. A section. B section. C section.	 Mixer screen by-pass. Mixer cathode by-pass. AGC line by-pass.	F, H, D	
2	C-8	3D9200-29	Capacitor	Fixed mica—.0002 mfd ± 5%, 400v CD Type 5 or equivalent.	R-F osc. grid blocking.	D, E, F	4513
2	C-9 & C-10	2S274N C6	Capacitor	Variable, air AC. Approximately 40 mmf—and fixed mica 400 volts 670 ± 5 mmf.	R-F osc. series capacitor.	C	6076
2	C-11	3D9003-9	Capacitor	Ceramic—compensator, 3 mmf ± ½ mmf with temperature coefficient of—.00075 mmf per mmf per degree centigrade ± 15%, Centralab Co., Type 807 or equivalent.	R-F osc. temperature compensation.	A, B	7020

*See Table 3, Index to Manufacturers.

TABLE 2 (Continued)

REPLACEABLE PARTS FOR RADIO RECEIVER BC-946-B

Quan.	*Ref. No.*	*Stock No.*	*Name of Part*	*Description*	*Function*	**Mfr.*	*Dwg. No.*
2	C-15	3DA50-32	Capacitor	Same as C-6. A section. B section. C section.	Grid return by-pass. 1st and 2nd i-f. 1st i-f cathode by-pass. CW osc. plate line filter.		
2	C-16	3DA220	Capacitor	.22/.22/.22 mfd ± 20%, 300 volts, paper. A section. B section. C section.	 2nd i-f screen by-pass. Dyn. H. V. filter. Dyn. L. V. filter.	F, H, D	5413 or ESL692643
2	C-20	3DA50-33	Capacitor	.05/.01/.05 mfd ± 15%, 300 volts, paper. A section. B section. C section.	 2nd i-f amp. cathode by-pass. Not used. 2nd i-f amp. plate by-pass.	F, H, D	5415
1	C-29	3DA6-29	Capacitor	Fixed mica—.006 mfd ± 5%, 400 volts, Aerovox Type 1461 or equivalent.	Audio coupling.	D, E, F	4091
3	C-30	3DB15-7	Capacitor	15 mfd, dry electrolytic impedance at 60 cycles not greater than 350 ohms.	Audio amp. cathode by-pass.	F, H, D	5416 or ESL692646
1	C-31	3DF2027	Capacitor	Fixed mica—.001 mfd, ± 5%, 400 volts, Aerovox 1461 or equivalent.	Output filter.	D, E, F	4114
3	C-32	3DB5-7	Capacitor	5 mfd, dry electrolytic. Impedance at 60 cycles not greater than 1050 ohms.	Dyn. H. V. filter.	F, H, D	6350 or ESL692649
1	C-35	3D9750-4	Capacitor	Fixed mica—750 mmf, ± 5% 400 volts.	Rec. output audio filter.	D, E, F	4522

*See Table 3, Index to Manufacturers.

TABLE 2 (Continued)

REPLACEABLE PARTS FOR RADIO RECEIVER BC-946-B

Quan.	*Ref. No.*	*Stock No.*	*Name of Part*	*Description*	*Function*	**Mfr.*	*Dwg. No.*
2	E-1		Binding post	Antenna binding post "A."	Ant. binding post.		4667
2		2S274N/C7	Clip	Neon lamp.	Mounting for neon lamp.	J	ESA691038
1	E-8	2C4373A/C3	Clip	Grid.	Connects to mixer control grid.	J	4754
1	E-4		Insulator	Insulators for antenna. Binding post.	Insulation.		
		2C4373A/J1		A section, outside.			3485
				B section, inside.			6597
				1 washer 6481, and 1 washer 5727 req'd. to complete assembly.			
1	E-9	2Z5853	Knob	Input alignment control knob.	Ant. input alignment.	J	ESA690856
5	H-3		Snapslide	Formed snapslide. Parts of the mechanism includes:	Fastener.		
				Snapslide (on cover)		J	3888
		2Z8609-3/G1		Snapslide guide (on cover).		J	3887
		2Z8609-3/S3		Snapslide button (on cover).		J	3890
				Snapslide stud (on shield).		J	4708
				Washers (on cover).		J	3889
4	H-6		Panel	Typical resistor panel assembly.	For carbon resistors.	J	Col. 48861
2	H-10	2C4373A/S5	Stud	Conical stud.	For rec. locking.	J	4710
1	J-1	2S274N/P10	Receptacle	Coupling receptacle assembly, 7 circuit.	To adapter.	J	Col. 49129
1	J-2	2Z7412-1	Receptacle	Coupling receptacle assembly, 3 circuit.	To dynamotor.	J	4718
1	J-3		Plug	Plug assembly, 7 circuit.	To rec. rack.	J	5488
1			Plug	Plug assembly, 4 circuit.	Adapter to rec.	J	Col. 48930
1		2S274N/9	Receptacle	Receptacle plate assembly.	Adapter receptacle.	J	2226

*See Table 3, Index to Manufacturers.

TABLE 2 (Continued)

REPLACEABLE PARTS FOR RADIO RECEIVER BC-946-B

Quan.	*Ref. No.*	*Stock No.*	*Name of Part*	*Description*	*Function*	**Mfr.*	*Dwg. No.*
3	J-28	2Z7412-3	Receptacle	Typical i-f coupling unit receptacle assembly.	To i-f coupling unit.	J	4723
3	J-29	2Z7412-2	Receptacle	Typical r-f coil receptacle assembly.	To r-f coil.	J	4722
7		2S274N/J3	Jack				5228
1	L-14	3F2997-1	Inductor	R-F choke, 112 microhenries ± 10%, d-c resistance not over .15 ohms.	R-F choke.	C	5546
1	L-15	3F2997-2	Inductor	A-F choke, 3 henries with .05 amperes d.c., d-c resistance 325 ohms, ± 15%.	A-F choke.	K	5634
1	N-1	2S274N/Q7	Dial	Dial.	Rec. tuning dial.		5610
23	P-5	2S274N/P4	Plug	Pin plug assembly (on dyn. receptacle assembly.)	Connector.		7949
2	R-1		Resistor	620 ohms, ± 10%, ⅓w carbon, A-B Type E.	1st r-f cathode auto-bias.	L	6004
2	R-2	3Z680Z-7	Resistor	2 megohms, ± 10%, ⅓w, metalized, Int. Resistance Co., Type F ⅓.	R-F amp grid.	M	4439
2	R-4		Resistor	Same as R-1.	Mixer cathode auto-bias.	L	
2	R-5	3Z6715-16	Resistor	150m ohms ± 10%, ⅓w carbon, A-B Type E.	AGC line decoupling.	L	4571
2	R-7		Resistor	200 ohms, ± 10%, ⅓w carbon, A-B Type E.	Mixer plate decoupling.	L	4497
2	R-8		Resistor	Same as R-7.	R-F amp. and mixer screen decoupling.	L	
2	R-9		Resistor	Same as R-1.	1st i-f cathode auto-bias.	L	
2	R-10	3Z6736	Resistor	360m ohms, ± 10%, ⅓w carbon, A-B Type E.	H. V. bleeder to gain control.	L	8032

*See Table 3, Index to Manufacturers.

TABLE 2 (Continued)

REPLACEABLE PARTS FOR RADIO RECEIVER BC-946-B

Quan.	*Ref. No.*	*Stock No.*	*Name of Part*	*Description*	*Function*	**Mfr.*	*Dwg. No.*
2	R-11	3Z6700-48	Resistor	100M ohms. ± 10%, ⅓w carbon. A-B Type E.	AGC resistor.	L	4501
2	R-12	2Z6051-1	Resistor	510M ohms. ± 10%, ⅓w carbon. A-B Type E.	2nd i-f cathode auto-bias.	L	6005
2	R-13		Resistor	Same as R-7.	2nd i-f plate decoupling.	L	
2	R-14		Resistor	Same as R-11.	CW osc. grid.	L	
2	R-15	3Z6620-45	Resistor	20M ohms, ± 10%, ⅓w carbon, A-B Type E.	CW osc. plate decoupling and dropping.	L	4510
2	R-16		Resistor	Same as R-11.	CW osc. plate dropping.	L	
2	R-17		Resistor	Same as R-11.	Same as R-16.	L	
2	R-18	3Z6751-1	Resistor	510M ohms, ± 10%, ⅓w carbon, A-B Type E.	Diode series.	L	4570
2	R-19		Resistor	Same as R-11.	R-F decoupling.	L	
2	R-20	3Z6802-8	Resistor	2 megohms, ± 10%, ⅓w carbon, A-B Type E.	Grid resistor auto amp.	L	4503
2	R-21	3Z6150-24	Resistor	1500M ohms, ± 10%, ⅓w carbon, A-B Type E.	Audio amp. cathode auto-bias.	L	4506
2	R-22	3Z6570-9	Resistor	7M ohms, ± 2%, 7w wire wound, vitreous.	High voltage bleeder.	N, O	5895
2	R-23		Resistor	Same as R-22.	Same as R-22.	N, O	
2	T-1		Transformer	Primary, 4000 turns #40 E. wire, secondary, 1800 turns #38 E. wire. Primary d-c resistance 1028-1300 ohms. Secondary d-c resistance 272-350 ohms.	Rec. output.	K	ESL691027
3	V-1	2Z5889	Neon lamp	Neon lamp, G.E. Co., Type T-2, modified.	R-F input voltage limiter.	I	5913

*See Table 3, Index to Manufacturers.

TABLE 2 (Continued)

REPLACEABLE PARTS FOR RADIO RECEIVER BC-946-B

	Ref. No.	*Stock No.*	*Name of Part*	*Description*	*Function*	**Mfr.*	*Dwg. No.*
3	V-2		Neon lamp	Same as V-1.	A-F output voltage limiter.	I	
6	X-1	2C2500-456A/S1	Socket	Octal base tube socket. Does not include bakelite washer 6566 which should be specified if required. American Phenolic Corp., Type S-8, modified, or equivalent. Amphenol #4 retainer ring is part of assembly.	For all octal-base tubes in rec.	P, R	6559
2	Z-1	2ZF4934	Coupling unit	1st i-f coupling unit, complete assembly, including shield can and mounting plate.	1st i-f.	C	7268
2	Z-2	2ZF4935	Coupling unit	2nd i-f coupling unit, complete assembly, including shield can and mounting plate.	2nd i-f.	C	7269
2	Z-3	2ZF4936	Coupling unit	3rd i-f coupling unit, complete assembly, including shield can and mounting plate.	3rd i-f.	C	7270
1	Z-4	2ZF4933	CW osc.	CW osc. complete assembly, including shield can.	CW osc.	C	5853
1	Z-5 (A, B, C)	3CF19	R-F coil set	R-F coil set assembly, complete, including ant. coil Z-5A, r-f amp Z-5B, and r-f osc. Z-5C, in shield cans, mounted on a cover.	R-F coil set.	C	7975
1		6LF600	Groov-pin	Groov-Pin $\frac{3}{64}$ x $\frac{1}{8}$		S	4160
2		6L3903-3	Groov-pin	Groov-Pin $\frac{3}{64}$ x $\frac{3}{16}$		S	4166
13		2S274N/P2	Pin-Plug			G	4628
5		2ZF3614	Pin-Plug			G	9081

*See Table 3, Index to Manufacturers.

TABLE 2 (Continued)

REPLACEABLE PARTS FOR RADIO RECEIVER BC-946-B

Miscellaneous Parts Apt To Be Required In Servicing Radio Receiver BC-946-B

Quantity	*Stock No.*	*Description*	*Dwg. No.*
26	6L6348-3.9	Screw, Binding Head, #3-48 x 3/16 Nickle Plated	4058
2	6L6348-2.9	Screw, Binding Head, #3-48 x 1/8 Nickle Plated	4134
4	6LF1002	Screw, Fillister Head, #6-32 x 3/8 Black Nickle Plated	4138
16	6L6348-4.9	Screw, Binding Head, #3-48 x 1/4 Nickle Plated	4168
2	6L6440-49	Screw, Binding Head, #4-40 x 1/4 Nickle Plated	6008
2	6L6348-3.P59	Screw, Phillips Flathead, #3-48 x 3/16 Black Nickle Plated	6010
19	6L6348-1.57	Screw, Binding Head, #3-48 x 7/32 Black Nickle Plated	6017
4	6L6348-7.9	Screw, Binding Head, #3-48 x 7/16 Nickle Plated	6018
4	6L6440-3.57	Screw, Binding Head, #4-40 x 3/16 Black Nickle Plated	6019
33	6L6348-2-1.57	Screw, Binding Head, #3-48 x 5/32 Black Nickle Plated	6020
2	6LF1003	Screw, Binding Head, #3-48 x 5/32 Nickle Plated	7002
6	6LF1004	Screw, Binding Head, #3-48 x 3/16 Black Nickle Plated	Col. 48920
2	6LF3102	Washer—Flat	5402
7	2S274N/W1	Washer—Flat	5520
6	6LF3103	Washer—Flat (Bakelite)	6566
2	6L72906	Washer—Shakeproof #6 Int. Tooth	4042
100	6L72903	Washer—Shakeproof #3 Int. Tooth	4558
4	6L72904	Washer—Shakeproof #4 Int. Tooth	4242
1	2S274N/W4	Washer—Special (Hard Rubber)	6481
1	2S274N/W3	Washer—Spring	5727
2	6L3106-32.4	Nut—Hex.—#6-32 x 5/64 Nickle Plated	4041
1	6L3508-27.11	Nut—Hex.—1/2-27 x 1/8 Cadmium Plated	1285
1	2S274N/N1	Nut—Hex.—1/2 x 27	5863
4	6L3103-48.3	Nut—Hex.—3-48 x 1/16 Nickle Plated	4561
1	6L3104-40-3.1	Nut—Hex.—4-40 x 5/64 Nickle Plated	6009
1	2S274N/S2	Sleeve	6397

TABLE 3

INDEX TO MANUFACTURERS

Code Letters in Table 1	*Name*	*Address*
A	The Muter Company	Chicago, Illinois
B	Centralab	Milwaukee, Wisconsin
C	F. W. Sickles Co.	Chicopee, Massachusetts
D	Cornell-Dubilier Electric Corp.	So. Plainfield, N. J.
E	Solar Mfg. Co.	Bayonne, N. J.
F	Aerovox Corp.	New Bedford, Mass.
G	Eastman Kodak	Rochester, New York
H	Sprague Specialties Co.	North Adams, Mass.
I	General Electric Co.	Schenectady, N. Y.
J	Colonial Radio Corp.	Buffalo, N. Y.
K	The Rola Co.	Cleveland, Ohio
L	Allen-Bradley	Milwaukee, Wisconsin
M	International Resistance Co.	Philadelphia, Pa.
N	Ward-Leonard Electric Co.	Mount Vernon, N. Y.
O	Ohmite Mfg. Co.	Chicago, Illinois
P	American Phenolic Corp.	Chicago, Illinois
R	Cinch Mfg. Co.	Chicago, Illinois
S	Groov-Pin Corp.	Long Island City, N. Y.