

HANDBOOK OF
OPERATING INSTRUCTIONS

for

RADIO SET
SCR-274-N

RESTRICTED
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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.

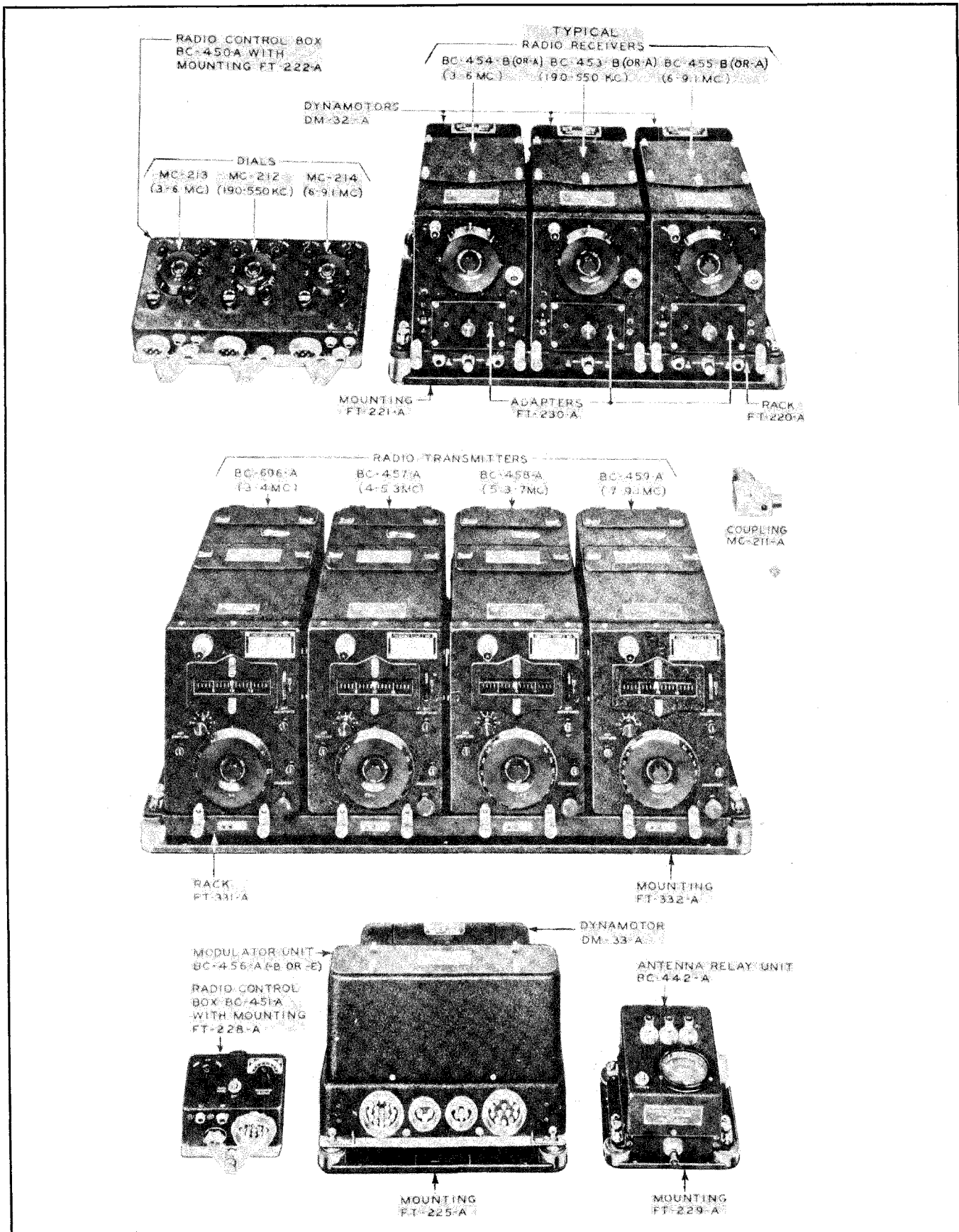


Figure 1-1. Radio Set SCR-274-N—Components

SAFETY NOTICE

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

**SECTION I
GENERAL DESCRIPTION**

I. GENERAL.

(See figure 1-1.)

a. Radio Set SCR-274-N is a multichannel aircraft radio receiving and transmitting equipment. 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. The set can be remotely or locally controlled.

b. The frequency ranges of the radio receivers (fig. 1-2) of Radio Set SCR-274-N are as follows:

Receiver	Frequency
Radio Receiver BC-453-A or BC-453-B	190-550 kilocycles
Radio Receiver BC-454-A or BC-454-B	3.0-6.0 megacycles
Radio Receiver BC-455-A or BC-455-B	6.0-9.1 megacycles
Radio Receiver BC-946-B	0.52-1.5 megacycles

c. The frequency ranges of the radio transmitters (fig. 1-3) of Radio Set SCR-274-N are as follows:

Transmitter	Frequency (in megacycles)
Radio Transmitter BC-696-A	3.0-4.0
Radio Transmitter BC-457-A	4.0-5.3
Radio Transmitter BC-458-A	5.3-7
Radio Transmitter BC-459-A	7.0-9.1

d. The receivers receive continuous wave (cw), or amplitude modulated continuous waves (mcw), while the transmitters transmit on tone or voice.

e. Primary power is obtained from the 24- to 28-volt d-c supply on the airplane. The current drain is 1.6 amperes per receiver for a normal input of 28 volts. 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. (The peak power output of each transmitter under optimum antenna loading conditions exceeds 40 watts on cw for 28 volts input.)

2. EQUIPMENT SUPPLIED.

The following table lists the equipment supplied:

a. RECEIVING EQUIPMENT. (See figures 1-1 to 1-11.)

(1) FOR THREE-RECEIVER INSTALLATION. The following parts are supplied for this type of installation:

Quantity per Equipment	Name of Unit	Army Type Designation	Navy Type Designation	Overall Dimensions (inches)	Weight (pounds)
1 each	Radio Receivers	BC-453-A* (BC-453-B)		4 ²⁷ / ₃₂ x 7 ⁵ / ₈ x 5 ²⁷ / ₃₂	5.7
		BC-454-A (BC-454-B)		4 ²⁷ / ₃₂ x 7 ⁵ / ₈ x 5 ²⁷ / ₃₂	5.7
		BC-455-A (BC-455-B)		4 ²⁷ / ₃₂ x 7 ⁵ / ₈ x 5 ²⁷ / ₃₂	5.7
3	Dynamotor	DM-32-A			3.0

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<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Overall Dimensions (inches)</i>	<i>Weight (pounds)</i>
3	Adaprer (for remote control)	FT-230-A†			0.1
	or				
	Adapter	FT-260-A			0.1
	Control Unit	MC-237-A			0.1
	and				
	Plug (for local control)	PL-192			0.13
3	Coupling	MC-211-A			0.25
1	Rack	FT-220-A			4.0
1	Mounting	FT-221-A		16 ⁹ / ₁₆ x 10 ²³ / ₃₂ x 1 ³ / ₈	1.0
6	Plug	PL-152-A			0.13
1	Plug	PL-147-A			
1	Plug	PL-151-A			
1	Radio Control Box (Three-receiver) includes:	BC-450-A		9 ¹ / ₂ x 5 ¹⁵ / ₃₂ x 2 ¹⁵ / ₁₆	2.7
1	Dial	MC-212§			
1	Dial	MC-213			
1	Dial	MC-214			
1	Mounting	FT-222-A		9 ¹ / ₂ x 5 ¹⁵ / ₃₂ x 1 ¹ / ₂	0.7
3	Tube Set includes:				
3	Tube	JAN-12SK7	JAN-12SK7		
1	Tube	JAN-12K8Y	JAN-12K8Y		
1	Tube	JAN-12SR7	JAN-12SR7		
1	Tube	JAN-12A6	JAN-12A6		

(2) FOR ONE-RECEIVER INSTALLATION.—Includes one receiver, tube set, dynamotor, adapter, plug, and coupling as listed in paragraph 2a(1) this section,, plus:

<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Overall Dimensions (inches)</i>	<i>Weight (pounds)</i>
	Rack	FT-233-A			1.3
†	Mounting	FT-231-A		6 ¹¹ / ₁₆ x 10 ²³ / ₃₂ x 1 ³ / ₈	0.7
†	Radio Control Box includes:	BC-473-A (BC-473-B)		3 ¹ / ₄ x 5 ¹⁵ / ₃₂ x 2 ¹⁵ / ₁₆	0.9
	Dial	MC-212			
	Mounting	FT-235-A (FT-235-B)		3 ¹ / ₄ x 5 ¹⁵ / ₃₂ x 1 ¹ / ₂	0.7

(3) FOR TWO-RECEIVER INSTALLATION.—Includes two receivers, tube sets, dynamotors, adapters, plugs, and couplings as listed in paragraph 2a(1) above, plus:

<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Overall Dimensions (inches)</i>	<i>Weight (pounds)</i>
†	Rack	FT-277-A			2.5
†	Mounting	FT-279-A		11 ⁵ / ₈ x 10 ²³ / ₃₂ x 1 ³ / ₈	0.8
†	Radio Control Box	BC-496-A		6 ³ / ₈ x 5 ¹⁵ / ₃₂ x 2 ¹⁵ / ₁₆	1.7
	Dial	MC-213			
	Dial	MC-214			
	Mounting	FT-240-A		6 ³ / ₈ x 5 ¹⁵ / ₃₂ x ¹ / ₂	0.7

*Radio Receiver BC-946-B (.52-1.5 mc) may be substituted for anyone of the receivers.

†Variable, depending upon operating requirements.

‡Adapter FT-310-A used for Radio Receiver BC-946-B.

§Dial MC-415.

b. TRANSMITTING EQUIPMENT.

(1) The following equipment is supplied for all transmitter installations:

<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Overall Dimensions (inches)</i>	<i>Weight (pounds)</i>
1	Radio Control Box	BC-451-A		4 ¹ / ₈ x 4 ³ / ₈ x 2 ³ / ₄	.9
1	Mounting	FT-228-A		4 ¹ / ₈ x 3 ⁷ / ₃₂ x ¹ / ₁₆	.7
1	Plug	PL-153-A			.13
1	Modulator Unit	BC-456-A (BC-456-B, BC-456-E)		10 ³ / ₁₆ x 7 ¹ / ₁₆ x 8 ⁷ / ₈	9.
1	Dynamotor	DM-33-A			8.
1	Mounting	FT-225-A		10 ³ / ₁₆ x 2 ²⁹ / ₃₂ x 8 ⁷ / ₈	.7
1	Tube Set including:				.3
1	Tube	JAN-12J5GT	JAN-12J5GT		
1	Tube	JAN-1625	JAN-1625		
1	Tube	JAN-OD3/VR150	JAN-OD3/VR150		
1	Plug	PL-153-A			
1	Plug	PL-148-A			
1	Plug	PL-151-A			
1	Plug	PL-154-A			
1	Antenna Relay Unit	BC-442-A or BC-442-AM		5 ⁵ / ₈ x 4 ²¹ / ₃₂ x 6 ⁹ / ₁₆ 5 ⁵ / ₈ x 4 ²¹ / ₃₂ x 5	2.2 2.0
1	Mounting	FT-229-A		5 ⁵ / ₈ x 2 ²⁹ / ₃₂ x 5	.7
1	Plug	PL-156-A			.13
*	Tuning Shaft	MC-215			0.12 per ft.
*	Cord				0.17 per ft.

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(2) FOR FOUR-TRANSMITTER INSTALLATION.

<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Overall Dimensions (inches)</i>	<i>Weight (pounds)</i>
1 each	Radio Transmitter	BC-696-A		7¼ x 8 ¹³ / ₁₆ x 15 ¹ / ₃₂	8.3
		BC-457-A		7¼ x 8 ¹³ / ₁₆ x 15 ¹ / ₃₂	8.3
		BC-458-A		7¼ x 8 ¹³ / ₁₆ x 15 ¹ / ₃₂	8.3
		BC-459-A		7¼ x 8 ¹³ / ₁₆ x 15 ¹ / ₃₂	8.3
†	Rack	FT-331-A			4.
†	Mounting	FT-332-A		23¾ x 12 ⁵ / ₃₂ x 11 ¹³ / ₁₆	1.
4	Tube Set includes:				.5
2	Tube	JAN-1625	JAN-1625		
1	Tube	JAN-1626	JAN-1626		
1	Tube	JAN-1629	JAN-1629		
1	Plug	PL-154-A			.13
1	Plug	PL-156-A			.13

(3) FOR ONE-TRANSMITTER INSTALLATION.—Includes one transmitter, two plugs, and one tube set as in paragraph 2b(2) of this section, plus:

<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Overall Dimensions (inches)</i>	<i>Weight (pounds)</i>
1	Rack	FT-234-A			1.
1	Mounting	FT-232-A		7¼ x 11 ¹³ / ₁₆ x 12 ⁵ / ₃₂	.7

(4) FOR TWO-TRANSMITTER INSTALLATION.—Includes two transmitters, two plugs, and two tube sets as in paragraph 2b(2) of this section, plus:

<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Overall Dimensions (inches)</i>	<i>Weight (pounds)</i>
	Rack	FT-226-A			2.
	Mounting	FT-227-A		12¾ x 12 ⁵ / ₃₂ x 11 ¹³ / ₁₆	.8

*Cordage and tuning shaft are supplied in bulk.
†Variable, depending upon operating requirements.

3. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

The following table lists the equipment required but not supplied:

<i>Quantity per Equipment</i>	<i>Name of Unit</i>	<i>Army Type Designation</i>	<i>Navy Type Designation</i>	<i>Required Characteristics</i>
1	Microphone	T-17 (or T-17-B, T-17-C, T-17-D)		For low impedance.
1	Headset	HS-33 (or equal)		
1	Headset Adapter	MC-385-()*		
1	Storage Battery			
1	Test Set	RC-54-A (RC-54-B, or RC-54-C)		28-volt battery, preferably 100-ampere-hour capacity.
1	Test Set	RC-55-A (RC-55-B, or RC-55-C)		

*Any issue may be used.

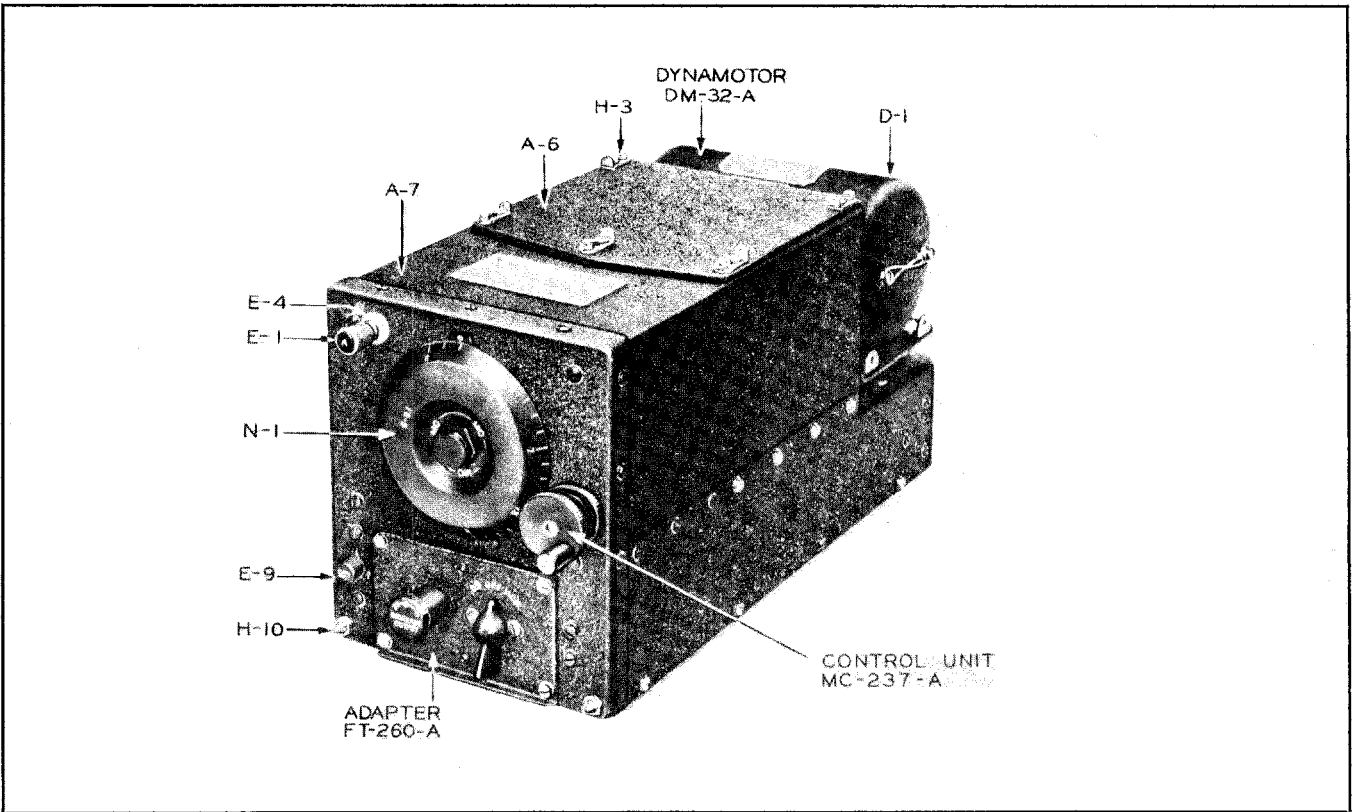


Figure 1-2. Typical Radio Receiver with Adapter for Local Control

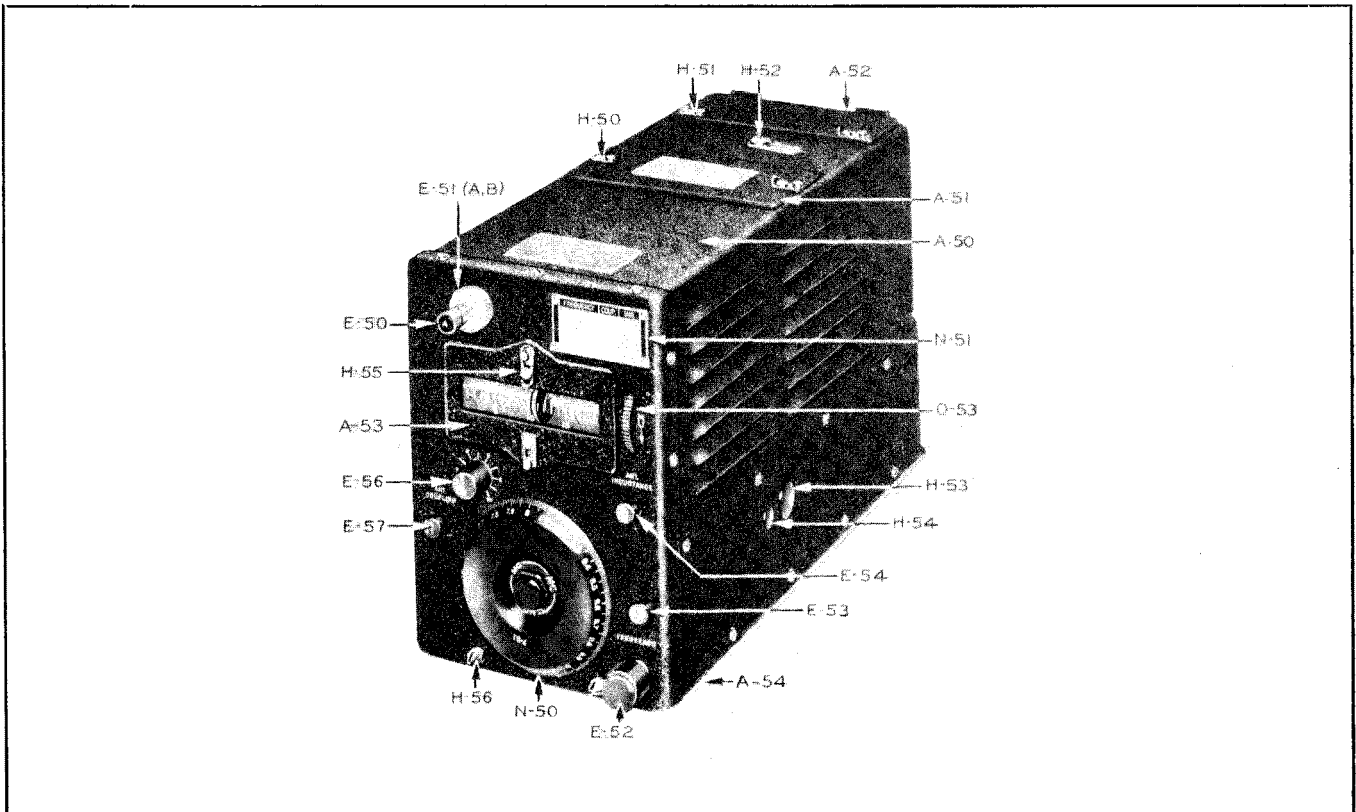


Figure 1-3. Typical Radio Transmitter—Front Panel

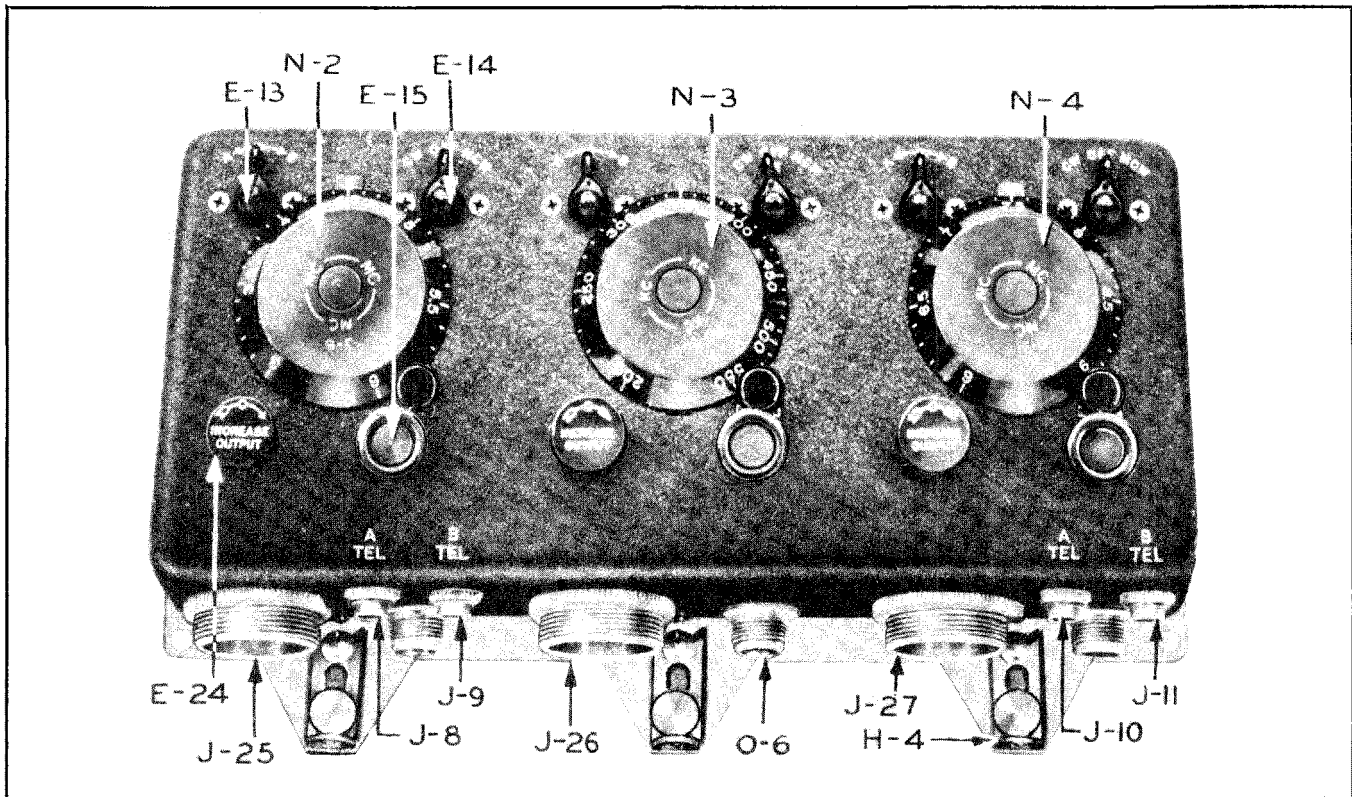


Figure 1-4. Radio Control Box BC-450-A For Three Receivers—Front View

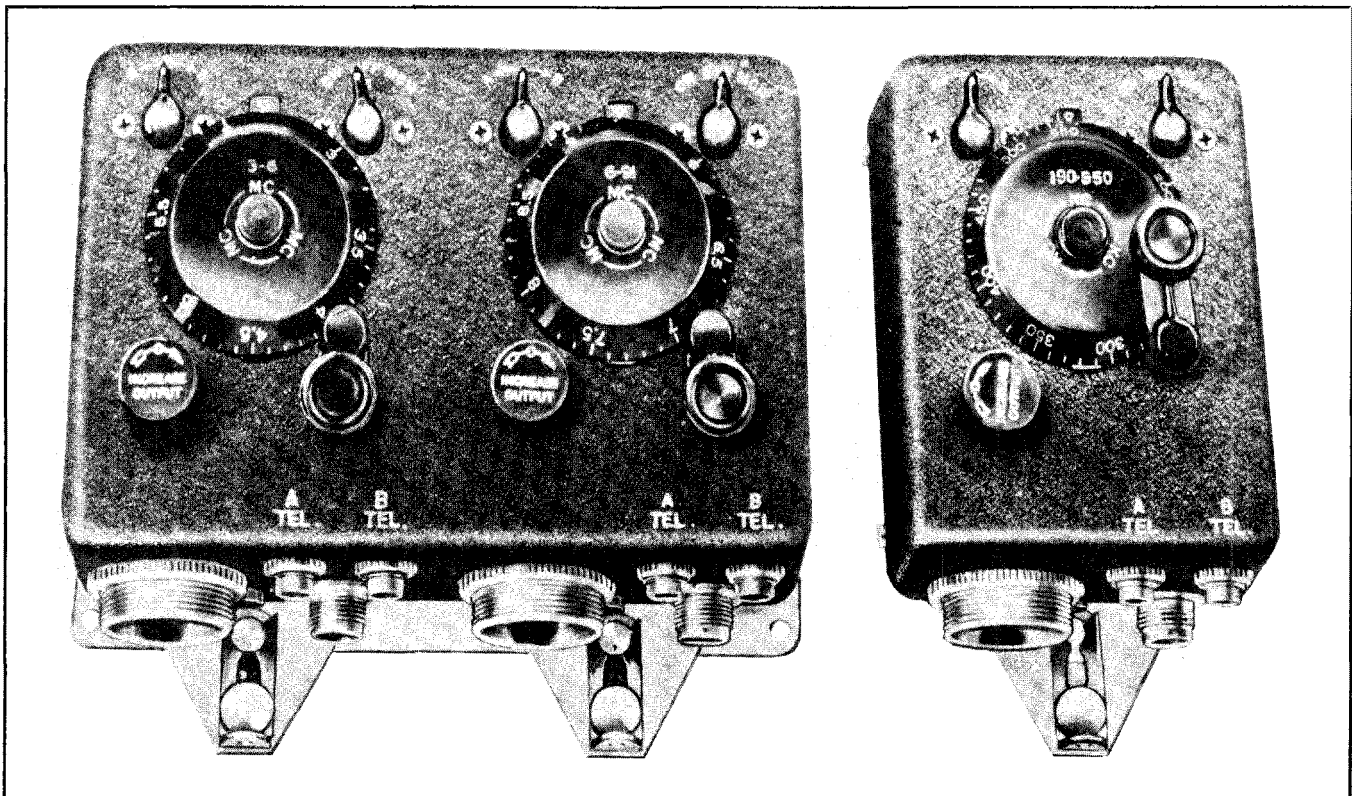


Figure 1-5. Radio Control Box BC-496-A for Two Receivers—Front View (Left);
Radio Control Box BC-473-A for one Receiver—Front View (Right)

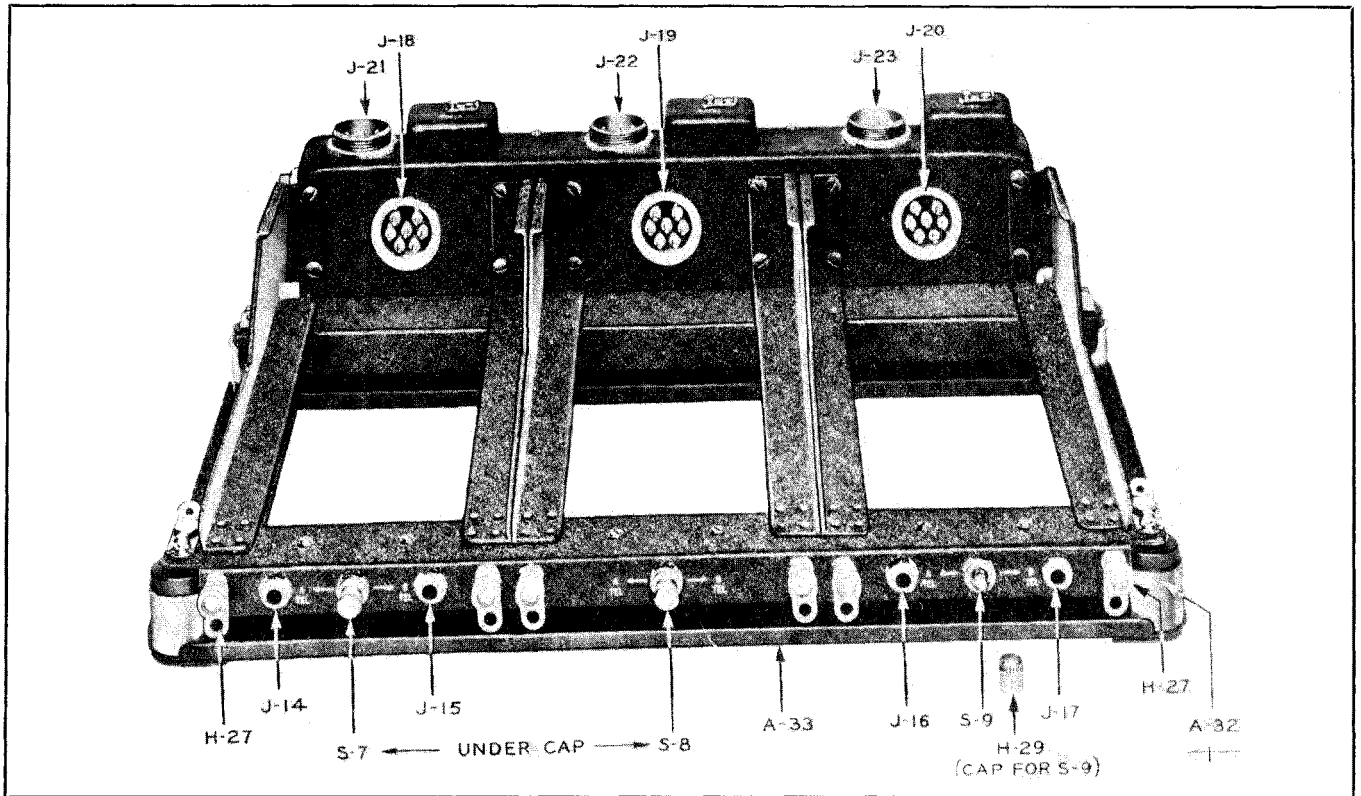


Figure 1-6. Rack FT-220-A and Mounting FT-221-A for Receivers—Front View

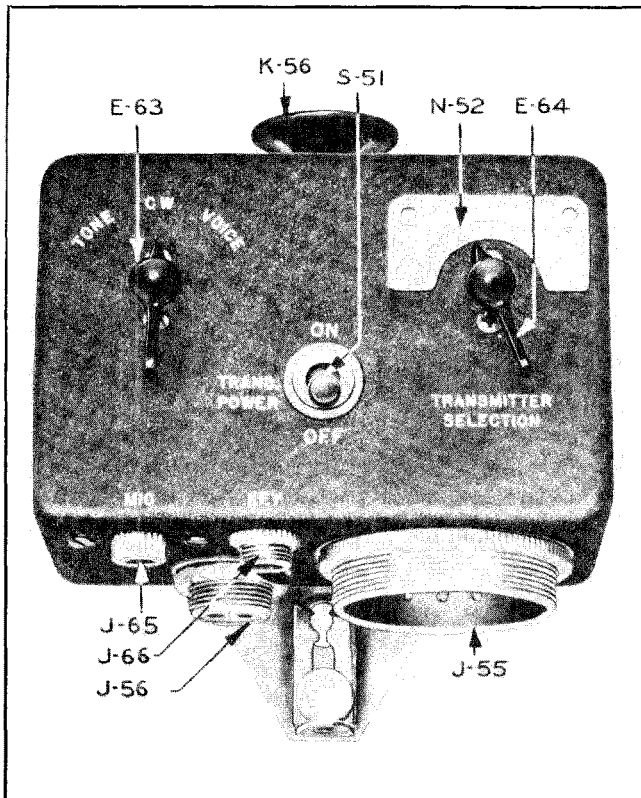


Figure 1-7. Radio Control Box BC-451-A for Transmitters—Front View

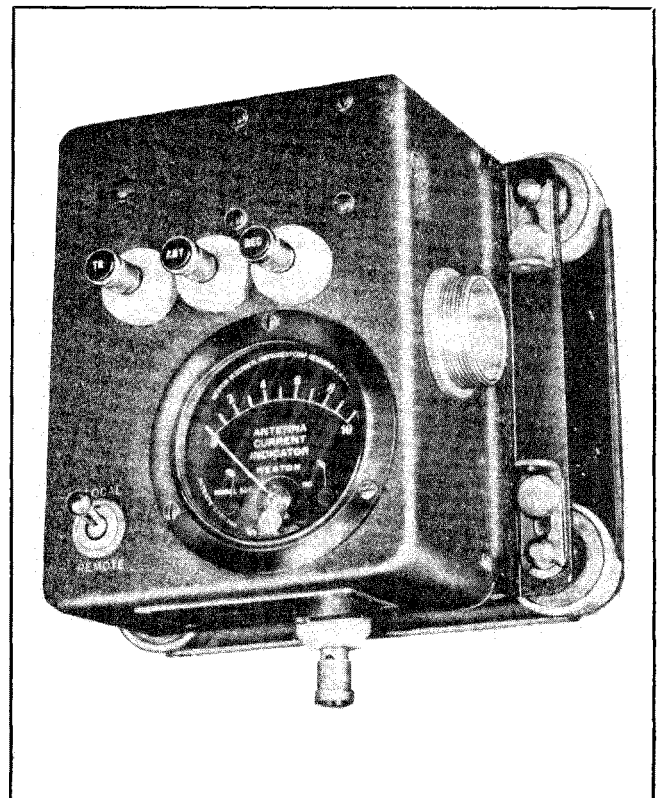


Figure 1-8. Antenna Relay Unit BC-442-A

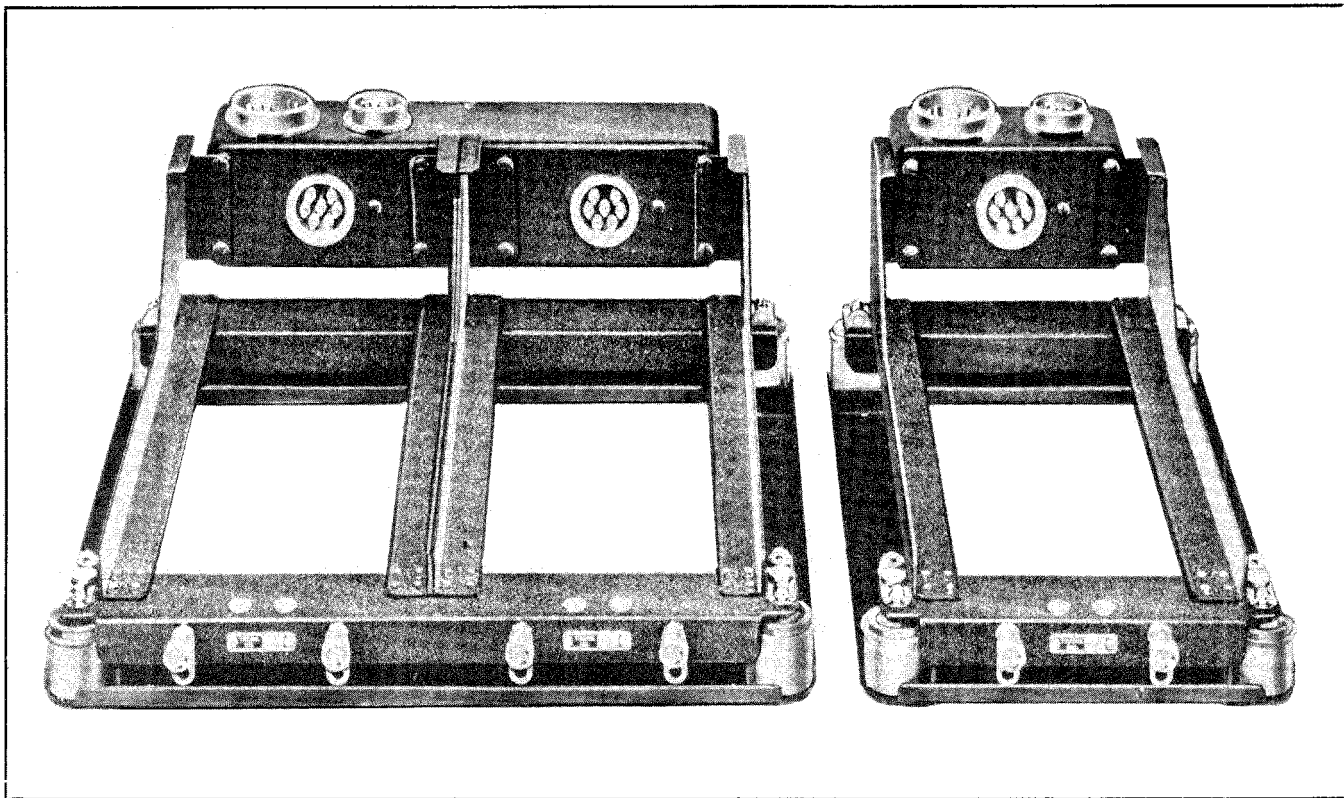


Figure 1-9. Rack FT-226-A and Mounting FT-227-A, for Two Transmitters (Left); Rack FT-234-A and Mounting FT-232-A for One Transmitter (Right)

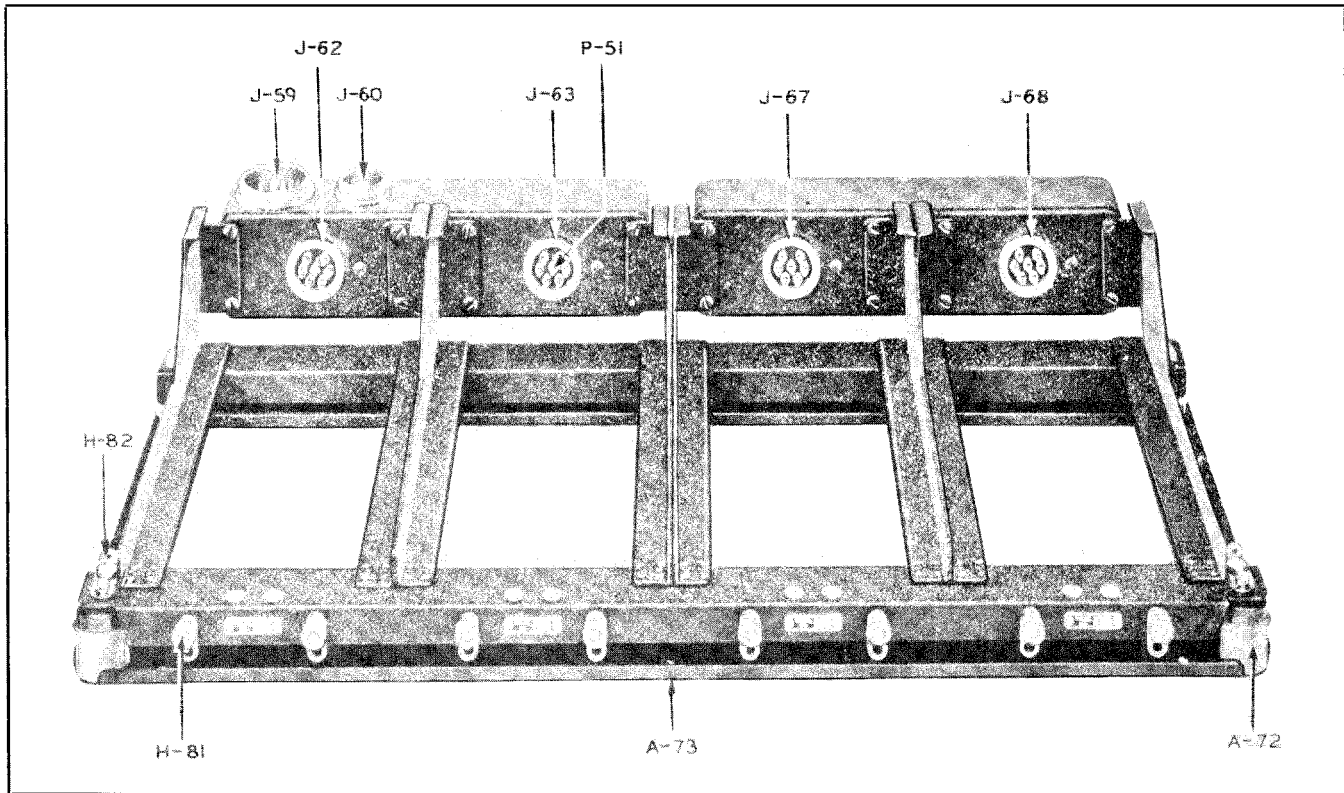


Figure 1-10. Rack FT-331-A and Mounting FT-332-A for Four Transmitters

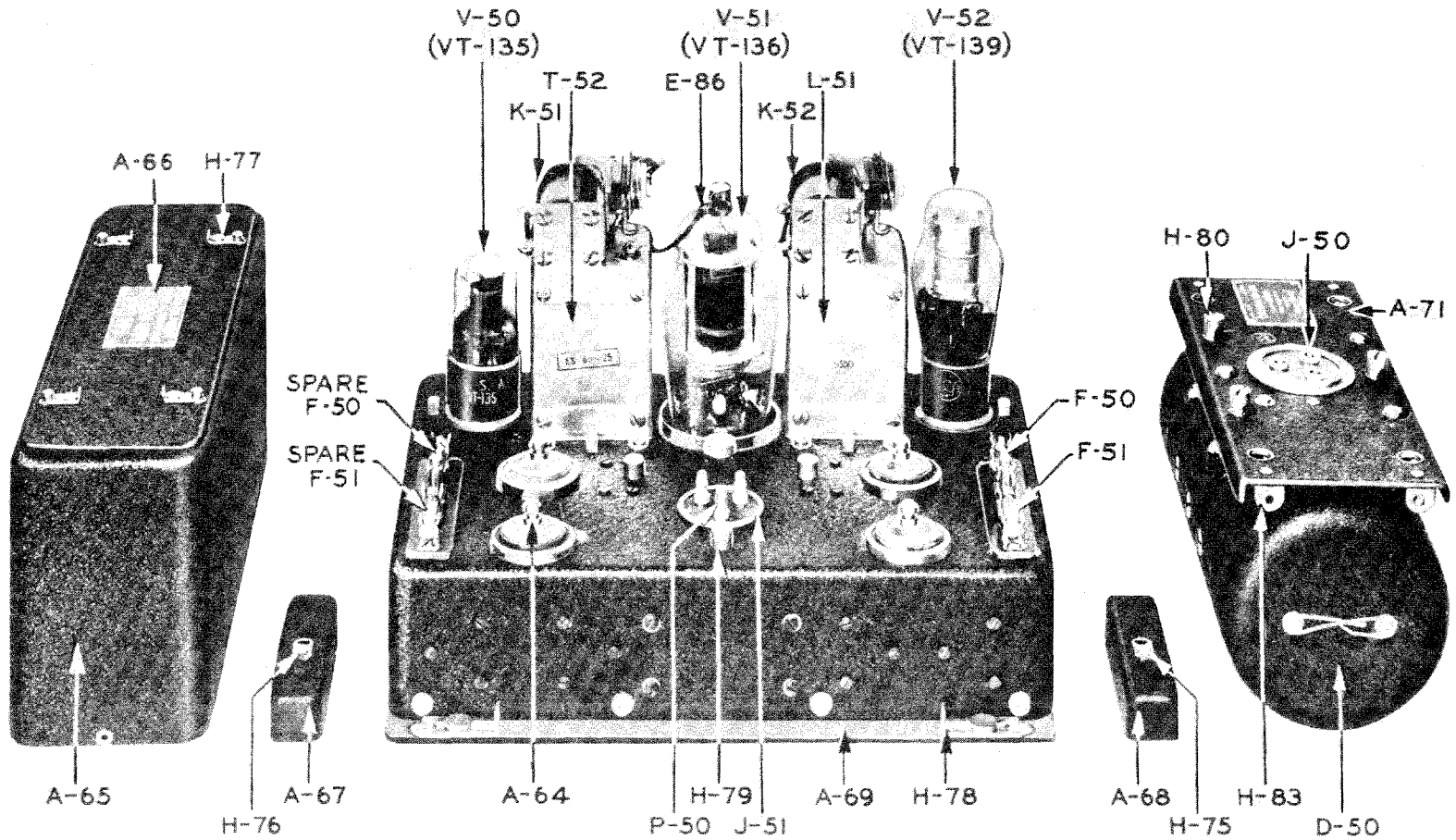


Figure 1-11. Modulator Unit BC-456-B (Top View with Shield Removed)—Also Bottom View of Dynamotor DM-33-A

SECTION II

INSTALLATION AND ADJUSTMENT

I. INSTALLATION.

a. PRELIMINARY PROCEDURE.

(1) COMPONENTS.—Check the list of components supplied.

(2) MECHANICAL INSPECTION.—Make the following checks for obvious mechanical faults.

(a) Check the operation of controls and dials.

(b) Check the threads of receptacles and plugs.

(c) Examine the pin plug assemblies of connectors for bent or otherwise unserviceable units.

(d) See that proper fuses are in the modulator unit and receiver rack.

(e) See that all tubes are securely in place in their proper sockets.

(f) Test the grid clips for firmness.

(3) BENCH TEST.—Make an electrical "bench test" of each component before installation in an airplane to insure normal operation of the equipment after installation. (See fig. 5-4.)

(4) PERMANENT BENCH TEST.—When a considerable amount of installation work is to be done, make a permanent bench test installation which consists of:

(a) Test Set RC-54-A, (RC-54-B or RC-54-C), to test the receiving equipment. (See fig. 5-1 for information regarding the use of this test set). Control Unit MC-237-A may be used for local tuning of the receiver.

(b) Test Set RC-55-A (RC-55-B or RC-55-C), to test the transmitting equipment. (See fig. 5-2 for information regarding the use of this set).

(c) Other items required are Cords (see fig. 5-3.), one storage battery (28-volt), one Headset HS-33 (low impedance), one Headset Adapter MC-385-(), and one Microphone T-17 or equal.

b. INSTALLATION.

(1) ANTENNA.—The exact layout of the antenna is dictated by the design of the airplane. However, consider the following general principals:

(a) Place the external part of the antenna as far away from the fuselage as possible.

(b) Keep the lead-ins inside the fuselage as short as possible, especially the one to the transmitter. Use Wire W-106-A for the internal lead-in. (Insulated stranded wire may be used for the lead between the receivers and the antenna relay.)

(c) Support the leads on ceramic stand-off insulators. When protection against accidental contact with the aircraft structure is necessary, ceramic beads should be strung on the wire. The ends of wire must be bent in close to the metal shells of the bending posts to prevent corona and spark breakdown.

(d) It is recommended that an IRC type, 5 to 25-megohm, 2-watt metalized resistor, or equal be connected from antenna to ground at a convenient point between the antenna binding posts on the receiver and Antenna Relay Unit BC-442-A or Antenna Unit BC-442-AM. This will assist in reducing static interferences.

(2) RECEIVERS AND TRANSMITTERS.

(a) Locate the receivers and transmitters, together with an antenna relay unit, near the antenna lead-in bushing, in order to keep the interior antenna lead-in as short as possible. Choose a location that will permit changing of the receivers and transmitters. The location for the transmitter must permit a view of the reflection seen in the mirror on the under side of the hinged rear cover. Allow enough clearance around the units (See figs. 5-5, 5-6, and 5-7.) so that under strenuous vibration they will not strike against anything.

(b) Mount the receivers and transmitters by carefully sliding them as far back in their proper rack compartments as they will go. Slip the locking lugs over the conical studs and hand screw and safety wire the knurled nuts which hold the locking lugs in place.

Note

Radio Receiver BC-453-A (or BC-453-B) should always be placed in the middle section of Rack FT-220-A. This receiver may be permanently connected to a separate antenna for reception of airways radio range signals.

(c) Radio Transmitter BC-457-A, BC-458-A, or BC-696-A may be installed instead of Radio Transmitter BC-459-A. If the antennas' capacitance is so large that a transmitter cannot be properly tuned, a 50-micro-microfarad capacitor should be connected in series between posts "C" on Antenna Relay Unit BC-442-A.

When Antenna Relay Unit BC-442-AM is furnished the capacitor can be added if necessary by the use of the "Kit for conversion of Antenna Relay Unit BC-442-AM to Antenna Relay Unit BC-442-A".

(3) MODULATOR UNIT.—Locate the modulator unit near the 24-28 volt d-c supply and the radio equipment. Use a minimum of connecting cable.

(4) RADIO CONTROL BOXES.

(a) Install the radio control boxes so that they are accessible to the pilot and co-pilot.

1. Locate the receiver radio control box so that the dial can be easily read day or night. Use Radio Control Box BC-473-A or BC-473-B for one receiver, Radio Control Box BC-496-A for two receivers, or Radio Control Box BC-450-A for three receivers.

2. Locate the transmitter radio control box so that the three switches and built-in key can be easily operated.

(b) Allow clearance below the boxes for insertion of plugs.

(5) TUNING SHAFTS, CONNECTORS, ETC. (See figure 5-8.)

(a) Keep the flexible tuning shafts short, as straight as possible, and avoid all sharp bends. Be sure that the receiver radio control box dial corresponds with the dial of the receiver to which it is connected.

(b) 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.

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

(d) Make ground leads as short as possible. Connect a short flexible lead from the airplane frame to one of the "G" binding posts on each of the racks, in order to secure a good ground connection to the receivers and transmitters.

(e) Provide bonding across at least two shock mounts at each mounting.

(f) Safety-wire the snap-slides which lock the several units to their mountings.

(6) ANTENNA RELAY UNIT BC-442-A (or BC-442-AM).—In general Antenna Relay Unit BC-442-AM will be furnished and will provide satisfactory operation for most antennas. If proper tuning of the transmitter is not possible due to large antenna capacitance or inductance, series capacity may be added in series with the antenna by the use of Antenna Relay Unit BC-442-A or by the use of the "Kit for Conversion of Antenna BC-442-AM to BC-442-A".

c. CABLE CONNECTIONS. (See fig. 5-9.)

(1) Interconnection of the units can be accomplished by any one of three methods of wiring:

(a) By use of plugs and individual wires run in both rigid and flexible conduit.

(b) By use of plugs and individual wires run in flexible conduit only.

(c) By use of plugs and individual wires without shielding. (See fig. 5-10.)

(2) These methods should be accomplished accordance with Air Corps Specifications 32300-A, 32310-A and other Air Corps instructions, including wiring diagrams which may be issued from time to time.

2. ADJUSTMENTS.

WARNING

Dynamotor DM-33-A, on the modulator unit of this radio set, generates 600 volts direct current, which 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 transmitter.

a. EQUIPMENT REQUIRED.—A small screw driver or alignment tool is required.

b. ANTENNA CIRCUIT ALIGNMENT OF THE RECEIVERS.—All receivers must be connected to the antennas or antennas with which they are to be used.

(1) Set the "CW-OFF-MCW" switch on the control box controlling the first receiver, to "CW" position.

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

(3) Connect Headset HS-33 and Adapter MC-385-(*) into any "A TEL." jack or into a corresponding interphone jack box.

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

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

(6) Turn "ALIGN INPUT" knob on the front of the receiver for maximum background noise.

(7) Set "CW-OFF-MCW" switch to "OFF" position.

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

(9) Repeat the alignment operation on all receivers for optimum results even though the improvement may seem small.

c. TUNING THE TRANSMITTERS.—Transmitters must be tuned up with the "TONE-CW-VOICE" switch on Radio Control Box BC-451-A in "CW" position and must not be readjusted in any way after switching to "TONE" or "VOICE". To tune-up a transmitter proceed as follows:

(1) Set the "FREQUENCY" dial to the desired transmitting frequency.

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

(3) Turn the "LOCAL-REMOTE" switch on Antenna Relay Unit BC-442-A or BC-442-AM to "LOCAL"

(4) Set "TONE-CW-VOICE" switch on Radio Control Box BC-451-A to "CW".

(5) Set "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) Make sure that neither the microphone button nor the key is closed. Turn "TRANS. POWER" switch to "ON", Dynamotor DM-33-A should start.

(7) Allow a minimum of 15 seconds for 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) Adjust "ANT. INDUCTANCE" for maximum antenna current reading on Antenna Relay Unit BC-442-A or BC-442-AM. Make this adjustment with "ANT. COUPLING" at a lower setting than that which gives highest antenna current.

(10) Vary "ANT. COUPLING" until the maximum cw antenna current reading is obtained on Antenna Relay Unit BC-442-A or BC-442-AM. This setting must be carefully made.

(11) Adjust "ANT. INDUCTANCE" 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) Tune-up the other transmitters in the rack, following the same routine as for the first. It is 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) Release the built-in telephone key by rotating it in a counterclockwise direction.

(16) 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 transmitter data on the "write-in" plate on the front of each transmitter.

d. CALIBRATING THE TRANSMITTERS.

(1) Each transmitter is supplied with a special frequency checking circuit which is used for checking the frequency at one point on the dial; it does not, however, control the frequency.

(2) The frequency of the crystals supplied with the different transmitters are as follows:

<i>Radio Transmitter</i>	<i>Crystal Frequency</i>
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

Note

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 which is part of the circuit.

(3) Always recheck the frequency calibration in the following manner after any tube is replaced in the transmitter:

(a) Open the hinged cover (at the top back of transmitter) to such an angle that the reflection of the entire tube V-53 may be seen.

(b) Tune the transmitter to the lowest frequency which will open the shadow in the tube. (Most easily done by starting from the lower frequency end of the dial.) The indicated dial frequency should now correspond with that of the crystal, if the dial and crystal frequency do not correspond, manipulate the "FREQUENCY" knob so that the dial is set exactly to the crystal frequency.

(c) Adjust (with a small screw driver) the capacitor, (covered by a snapslide between the two covers, on the top of the transmitter) to a point where maximum shadow angle is noted on the screen of tube V-53. Clockwise rotation of the screw on the capacitor lowers the transmitter frequency.

(d) Turn the "FREQUENCY" control to make certain that no *opening* of the tube is *observed* for any indicated dial frequency below the one corresponding to the value shown on the crystal holder.

SECTION III OPERATION

WARNING

Dynamotor DM-33-A on the modulator unit of this radio set generates 600 volts direct current. 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 the transmitter. Do not remove the transmitter tube covers while the set is operating as this exposes the high voltage. The receiver and transmitters are calibrated directly on the tuning dials. The operator should be careful not to tune beyond the normal end frequency. End stops are provided, but if an unreasonable amount of force is supplied damage can be done to the equipment. Never leave the airplane without setting the "TRANS. POWER" and the "CW-OFF-MCW" switches to their "OFF" position.

I. STARTING AND STOPPING EQUIPMENT.

a. TO START EQUIPMENT.

(1) To start the receiver equipment place the "CW-OFF-MCW" switch on the receiver radio control box to "CW" or "MCW." All receivers may be operated at once.

(2) To start the transmitter equipment place the "TRANS. POWER" toggle switch on the transmitter radio control box to "ON" position. Only *one* transmitter may be operated at a time.

b. TO STOP EQUIPMENT.

(1) To stop the receiver equipment place the "CW-OFF-MCW" switch on the control box to "OFF" position.

(2) To stop the transmitter equipment place the "TRANS. POWER" toggle switch to "OFF" position.

2. OPERATION.

a. RECEIVER OPERATION.—Operation of the receivers of Radio Set SCR-274-N may be accomplished by local and remote control or just by remote control, by either one or two operators, and with any or all of the four receivers. The type of installation determines whether control is to be remote or local or both.

(1) REMOTE CONTROL.—Radio control boxes are provided as part of this radio set for remote control of the receivers. These radio control boxes provide for control in one location of all the receivers, or for control in one location of part of the receivers and in another location of the remaining receivers. When remote control boxes are used, each receiver so controlled

must be equipped with an Adapter FT-230-A. For remote control proceed as follows:

(a) Set the "A-B" switches to "A" position.

(b) Plug the headsets in the "A-TEL." head jack.

(c) Set the "CW-OFF-MCW" switches to either "CW" or "MCW".

(d) Turn the "TUNING" controls to the desired frequencies on each of the receivers.

(e) Use the "INCREASE OUTPUT" controls to adjust the volume. The gain controls of these receivers may be used to amplify the signal from one receiver by advancing the "INCREASE OUTPUT" knob of that receiver, and feeding the signals from the others at the same time so that only the one receiver signal is heard.

Note

For airways radio range signals keep the volume to a minimum usable level by manipulation of the "INCREASE OUTPUT" control on the receiver control box, to avoid incorrect indications of the off course signals.

(f) In case the radio control boxes are split between two operators, both should follow the above directions. In case the operator wishes to receive the other operator's signal, he must turn his "A-B" switch to the "B" position (presuming that the interphone system is connected to the "B-TEL." jacks.)

(g) Turn the "A-B" control to midposition to cut off the signal.

(2) LOCAL OPERATION. — Adapter FT-260-A and Control Unit MC-237-A are provided with this radio set for local control of the receivers. The same directions apply for local operation as for remote controls. The "A-B" switch for local operation is under the front of each receiver, and must be in the center position when the receiver is remotely operated.

b. TRANSMITTER OPERATION. — Transmission may be accomplished by using any of the four transmitters of Radio Set SCR-274-N, however, only one may transmit at a time. Radio Control Box BC-451-A is provided for the selection and control of the transmitters.

CAUTION

Do not switch from one transmitter to another while transmitting and *do not operate* Dynamotor DM-33-A for extended periods of time if the transmitter in use is not properly tuned to the antenna.

(1) FOR TONE OR CW OPERATION.

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

(b) Set the "TONE-CW VOICE" switch to either "TONE" or "CW".

(c) Turn the "TRANS. POWER" switch to "ON" position.

(d) Wait 15 seconds for the transmitter to warm up. Leave switch on throughout the flight to avoid repetition of the 15 second warm-up.

(e) Press either the built-in key or the external key to transmit. A tone of approximately 1000 cycles per second should be heard while transmitting in either the "TONE" or "CW" position.

(2) For "VOICE" operation.

CAUTION

Do not key the transmitter with the built-in key, an external key, or the microphone switch when the controls are the "VOICE" position.

(a) Set the "TRANSMITTER SELECTION" switch to the desired pre-set transmitting frequency indicated on the write-in plate.

(b) Set the "TONE-CW-VOICE" switch to "VOICE" position.

(c) Turn the "TRANS. POWER SWITCH" to "ON" position and let it warm up for 15 seconds.

(d) Press the "press-to-talk" button on the microphone and talk clearly and distinctly into the microphone. The transmitting dynamotor will not start until the press-to-talk button has been closed. Sidetone should be heard distinctly when transmitting.

(3) Leave the "TONE-CW-VOICE" switch on "VOICE" unless controlled use on "TONE" or "CW" is expected.

SECTION IV EMERGENCY OPERATION AND REPAIR

I. FUSE REPLACEMENT.**a. FUSE IN RECEIVER RACK.****WARNING**

Dynamotor DM-32-A, on each of the receivers, generates 250 volts direct current. The danger of exposure to the voltage must not be ignored. Make certain that all control switches are "OFF" before performing any adjustment to the equipment.

(1) Make sure the "CW-OFF MCW" switch is on "OFF" position.

(2) Remove the fuse cover located on the top end of the receiver rack. It is held in place by a snapslide and stud.

(3) Replace the bad fuse by a good 10 ampere fuse.

(4) Replace the fuse cover.

(5) Place the "CW-OFF-MCW" switch to either CW or MCW" position, if further operation is desired.

b. FUSE IN MODULATOR UNIT.**WARNING**

Dynamotor DM-33-A, on the modulator unit generates 600 volts direct current. This is sufficient to cause severe shock or even death. Make certain that the dynamotor is not running before making any adjustment.

(1) Remove Plug PL-148 from Modulator Unit BC-456-()*, or if this is difficult because of the location of the equipment, exercise extreme caution to prevent the metal fuse end from coming in contact with the fuse cover central locking stud.

(2) Remove the fuse cover from the spare fuses located to the right of the dynamotor.

(3) Remove the fuse cover from the fuses in service, located to the left of the dynamotor. Fuse covers are held in place by a snapslide and stud.

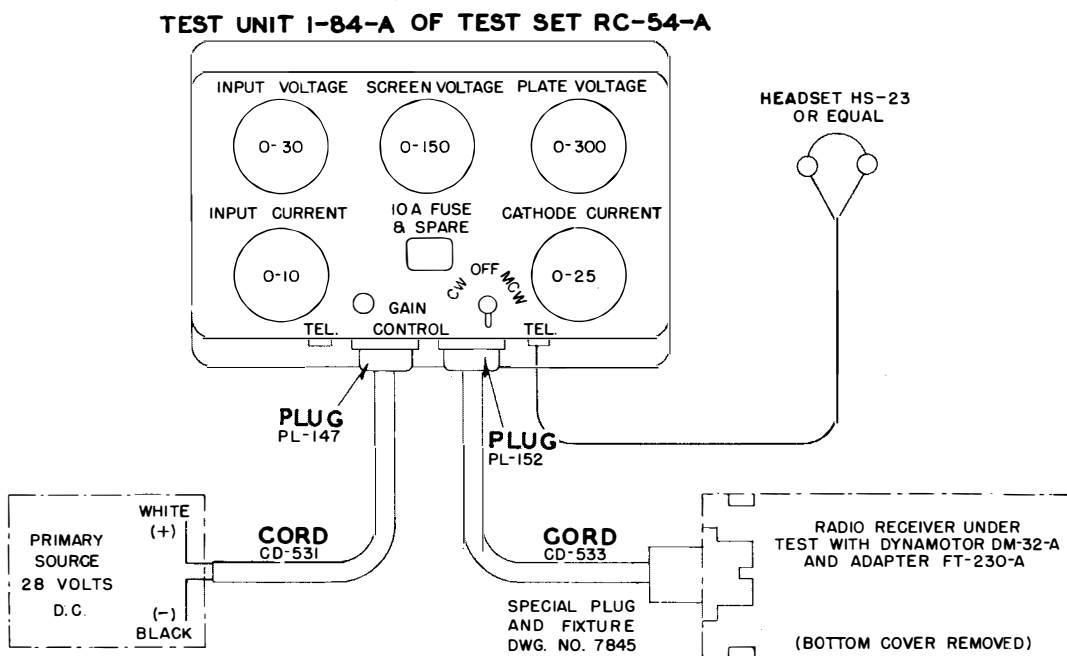
(4) Replace the bad fuse with one of the spare fuse 20 ampere fuses.

(5) Replace the fuse covers.

(6) Place the "TRANS. POWER" switch to "ON" position, if further operation is desired.

*Any issue may be used.

SECTION V
SUPPLEMENTARY
DATA

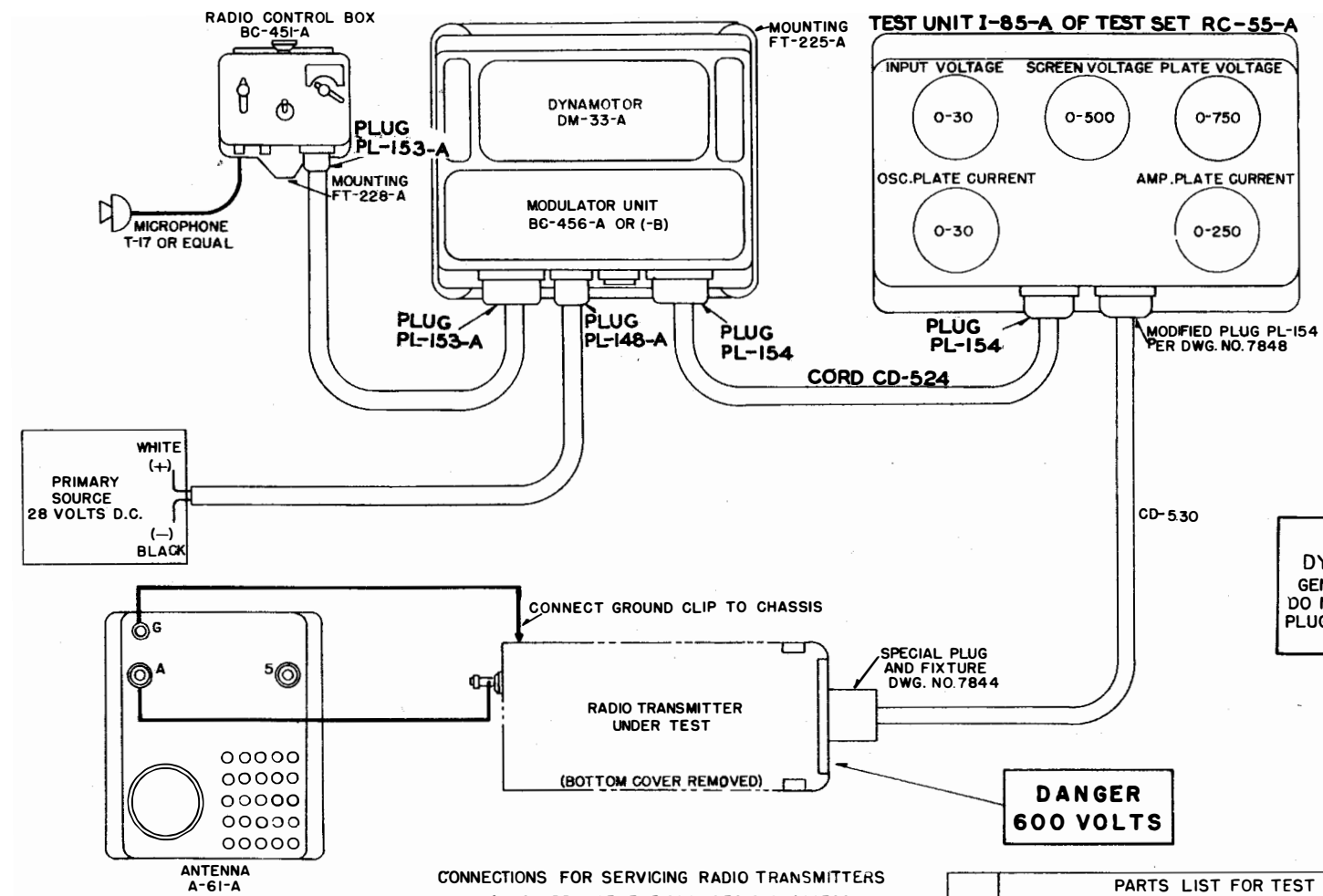


CONNECTIONS FOR SERVICING RADIO RECEIVERS
(THIS ARRANGEMENT PROVIDES FOR ACCESS TO THE ELECTRICAL COMPONENTS INSIDE THE RADIO RECEIVER UNDER TEST)

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

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-A (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.	

Figure 5-1. 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)

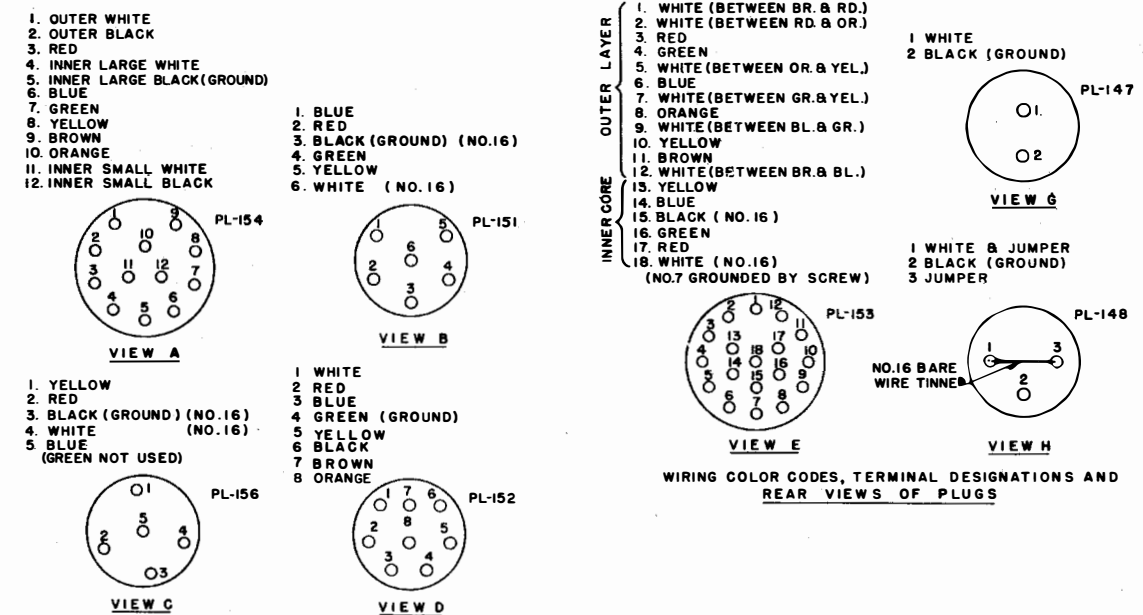
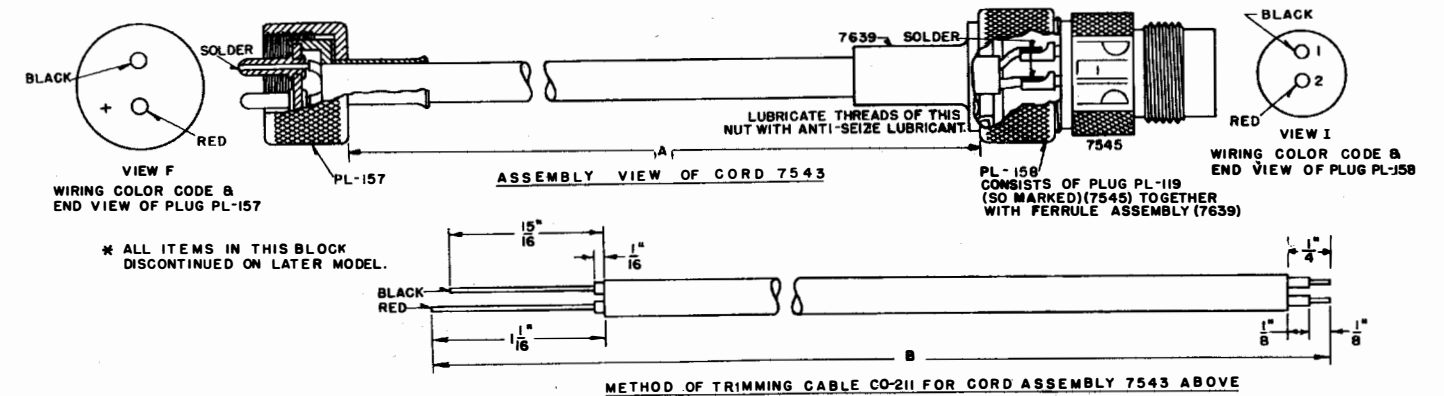
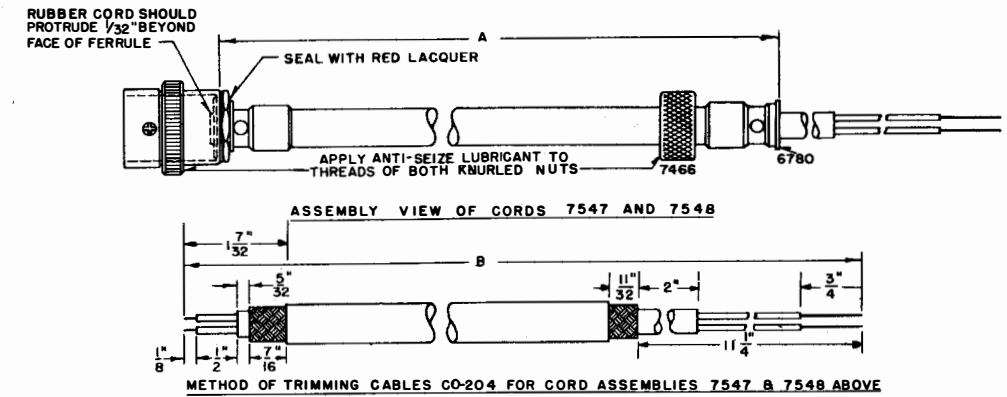
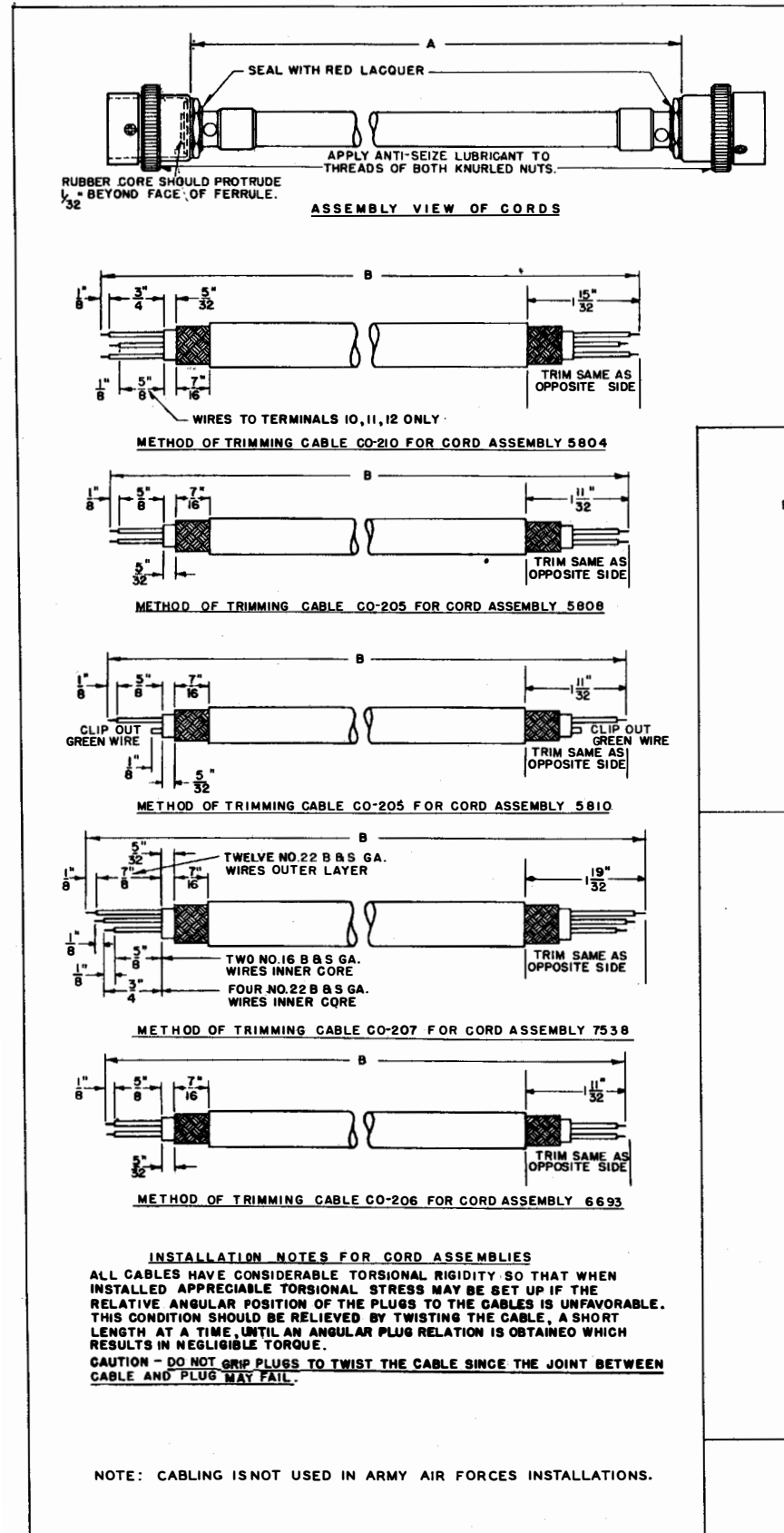
METER LABELLED	READS	*METER READINGS FOR THE THREE POSITIONS OF RADIO CONTROL BOX BC-451-A		
		-tone	CW	VOICE
INPUT VOLTAGE	HEATER CIRCUIT VOLTAGE	**27.0	**27.0	**27.0
SCREEN VOLTAGE	SCREEN GRID SUPPLY TO TUBES VT-136, RF POWER AMPLIFIERS (VOLTS)	145-160	250-300	145-160
PLATE VOLTAGE	PLATE SUPPLY TO 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.

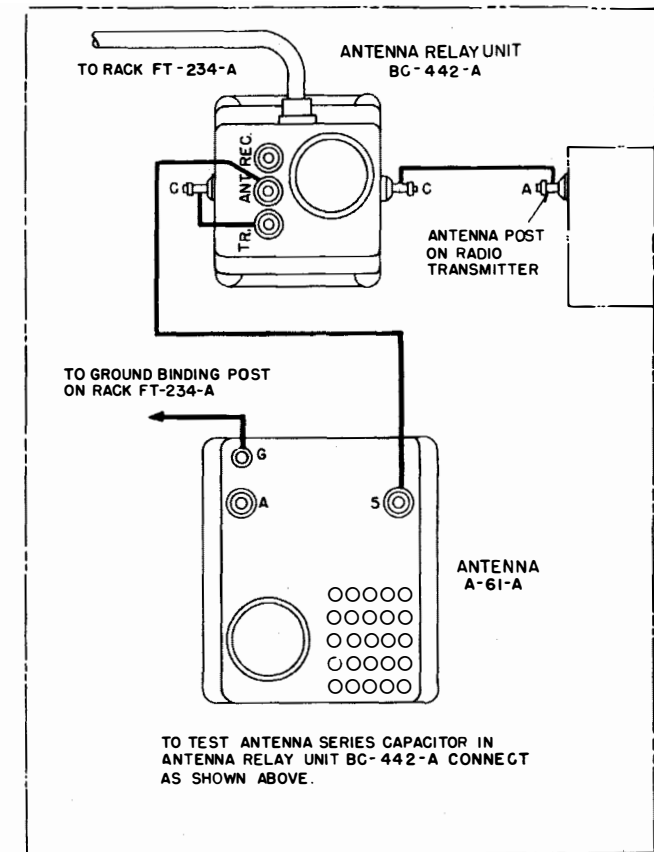
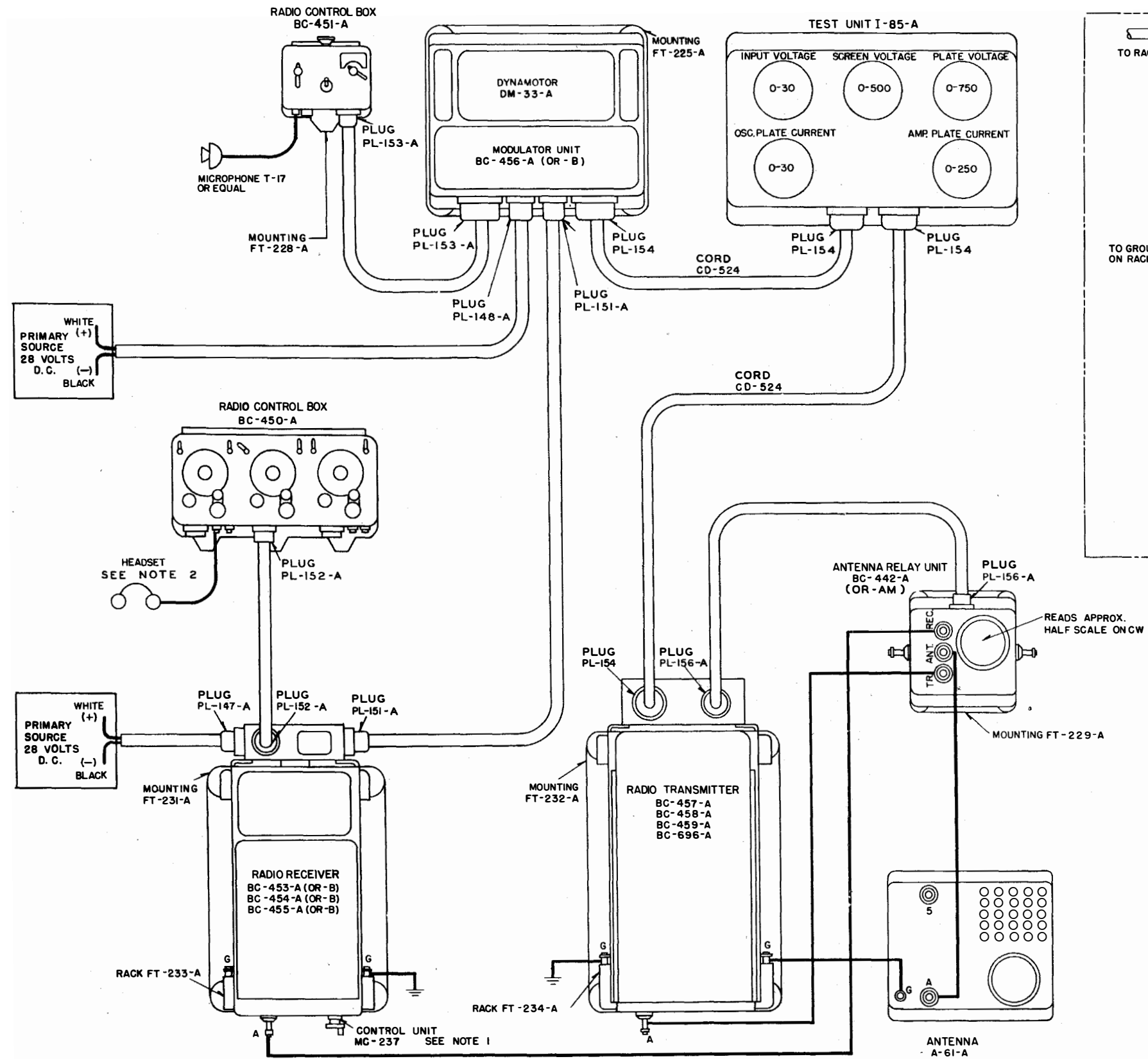
PARTS LIST FOR TEST SET RC-55-A (FOR TESTING COMPONENTS OF TRANSMITTING EQUIPMENT)			W.E.CO. DWG. NO.
QUAN.	DESCRIPTION		
2	*CORDS CD-524 (MODULATOR UNIT BC-456-A (-B OR E) TO TEST UNIT I-85-A AND TEST UNIT I-85-A TO RACK FT-234-A, 12 CONDUCTOR, PLUGS PL-154)		5804
1	*CORD CD-525 (MODULATOR UNIT BC-456-A (-B OR E) TO PRIMARY SOURCE, TWO CONDUCTOR, ONE PLUG PL-148)		754B
1	*CORD CD-526 (MODULATOR UNIT BC-456-A (-B OR E) TO RADIO CONTROL BOX BC-451-A 18 CONDUCTORS, PLUGS PL-153)		7538
1	*CORD CD-527 (MODULATOR UNIT BC-456-A (-B OR E) 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, OR BC-442-AM, 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-69203	
1	MODULATOR UNIT BC-456-A (B OR E)		7591
1	MOUNTING FT-225-A (FOR MODULATOR UNIT BC-456-A (B OR E))		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) DRAM		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		8021
1	3-PHILLIPS SCREWDRIVERS		8020
1	**MICROPHONE T-17 OR EQUAL		-

*CORDS CD-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 5-2. Test Set RC-55-A—Instruction Diagram for Transmitter Testing



- 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.



- NOTES:
1. CONTROL UNIT MC-237 WAS FORMERLY CODED MC-236.
 2. USE HEADSET HS-23 FOR HIGH IMPEDANCE AND HEADSET HS-33 FOR LOW IMPEDANCE.

CONNECTIONS FOR TESTING ALL ACCESSORIES OF RADIO SET SCR-274-N

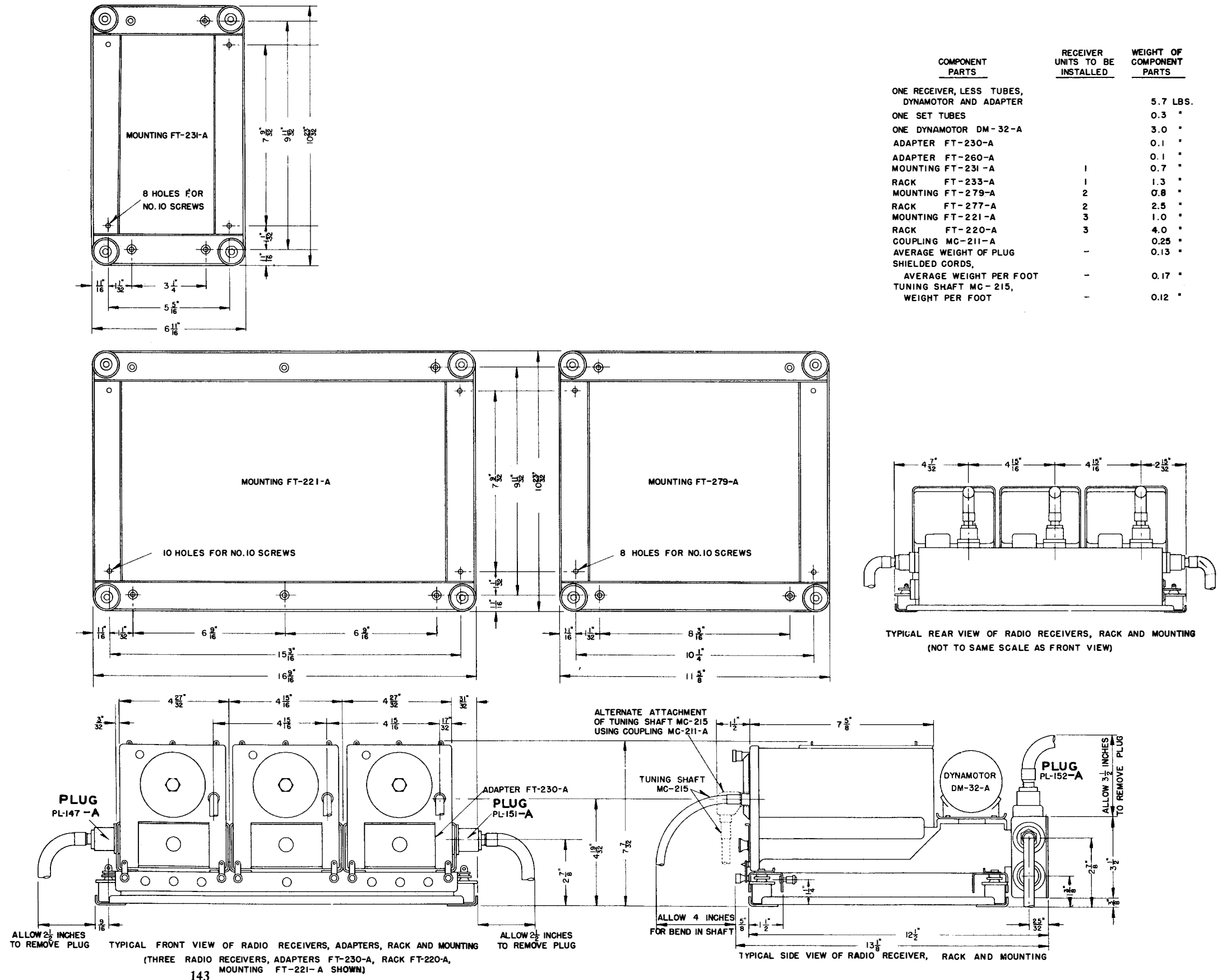
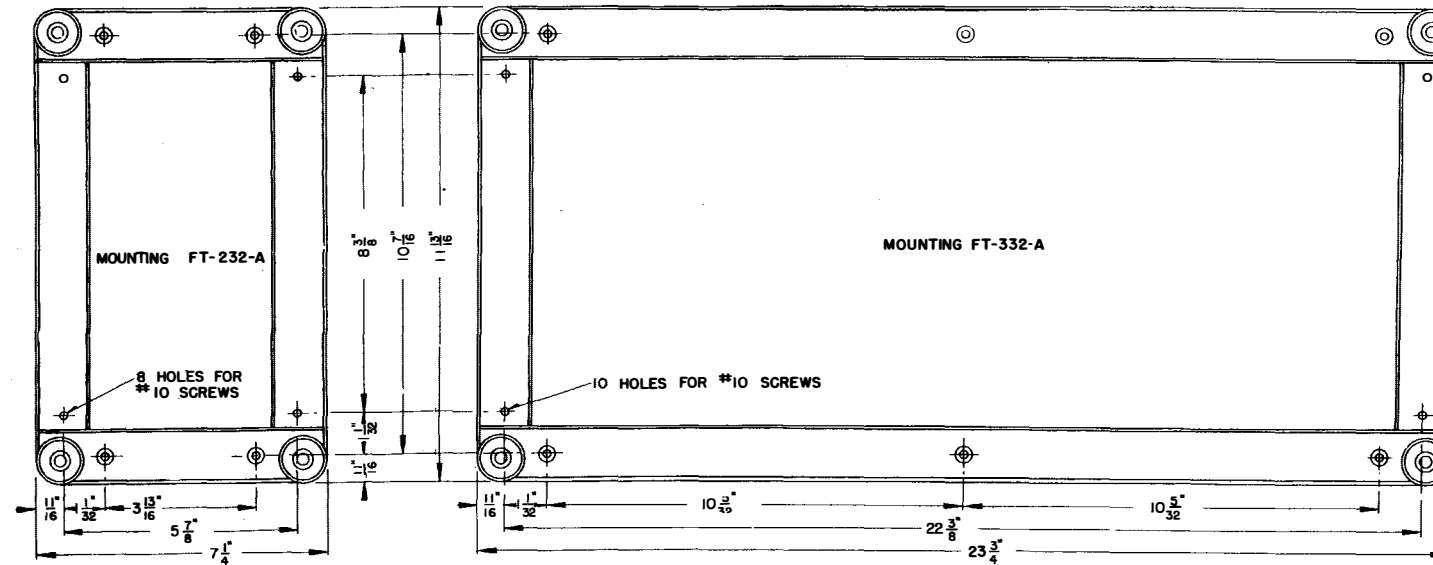
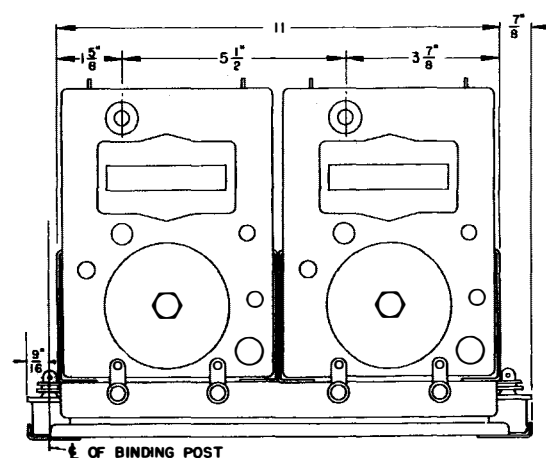
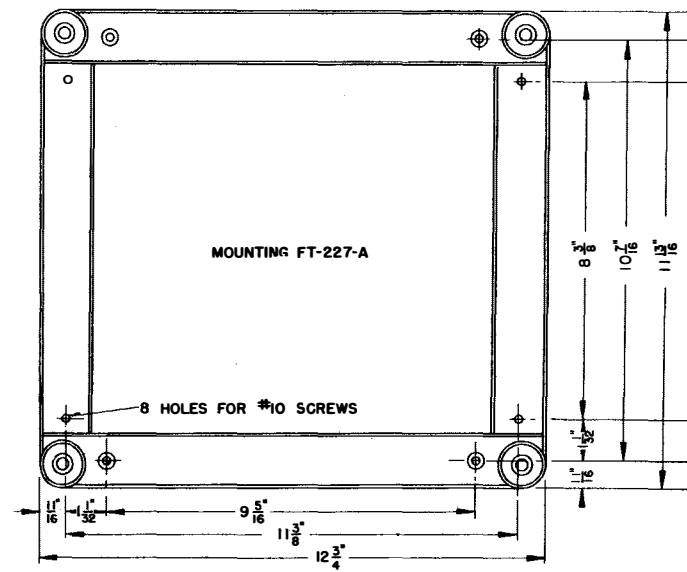


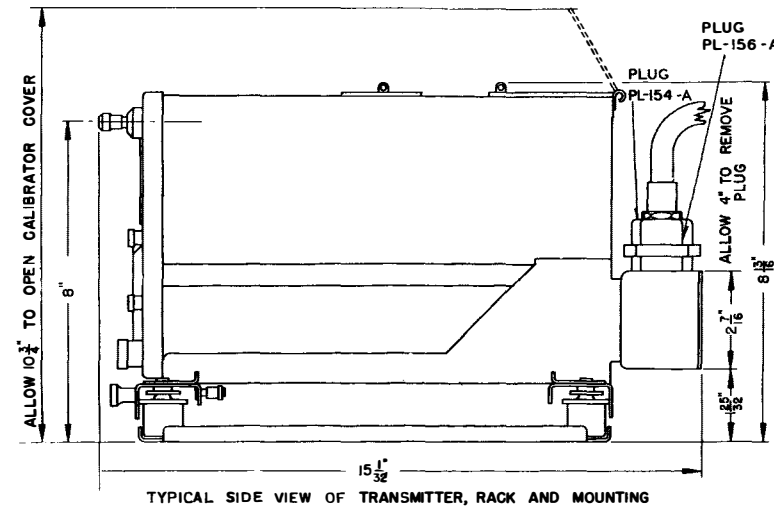
Figure 5-5. Radio Set SCR-274-N—Installation Dimensions and Weights of Receivers, Racks and Mountings



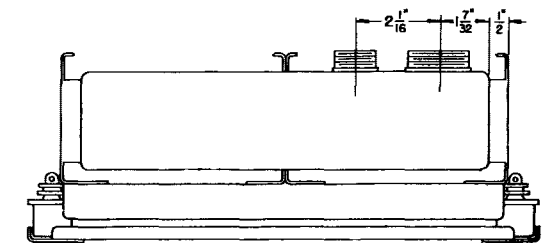
COMPONENT PARTS	TRANSMITTER UNITS TO BE INSTALLED	WEIGHT OF COMPONENT PARTS
ONE SET TUBES		0.5 LB
ONE TRANSMITTER LOSS TUBES		8.3 "
MOUNTING FT-232-A	1	0.7 "
RACK FT-234-A	1	1.0 "
MOUNTING FT-227-A	2	0.8 "
RACK FT-226-A	2	2.0 "
MOUNTING FT-332-A	4	1.0 "
RACK FT-331-A	4	4.0 "
AVERAGE WEIGHT OF PLUG -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



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



TYPICAL 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 5-6. Radio Set SCR-274-N—Installation Dimensions and Weights of Transmitters, Racks and Mountings

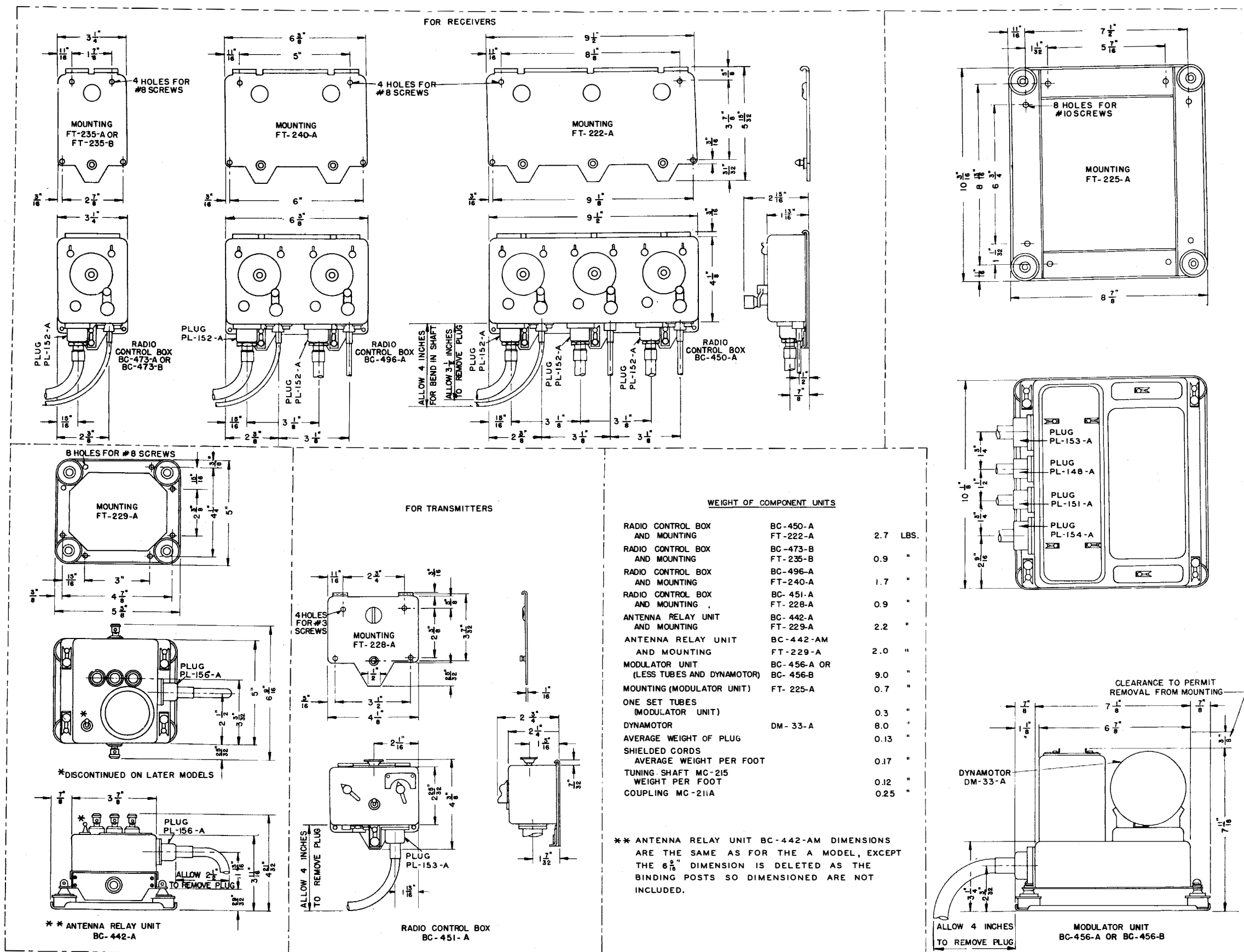
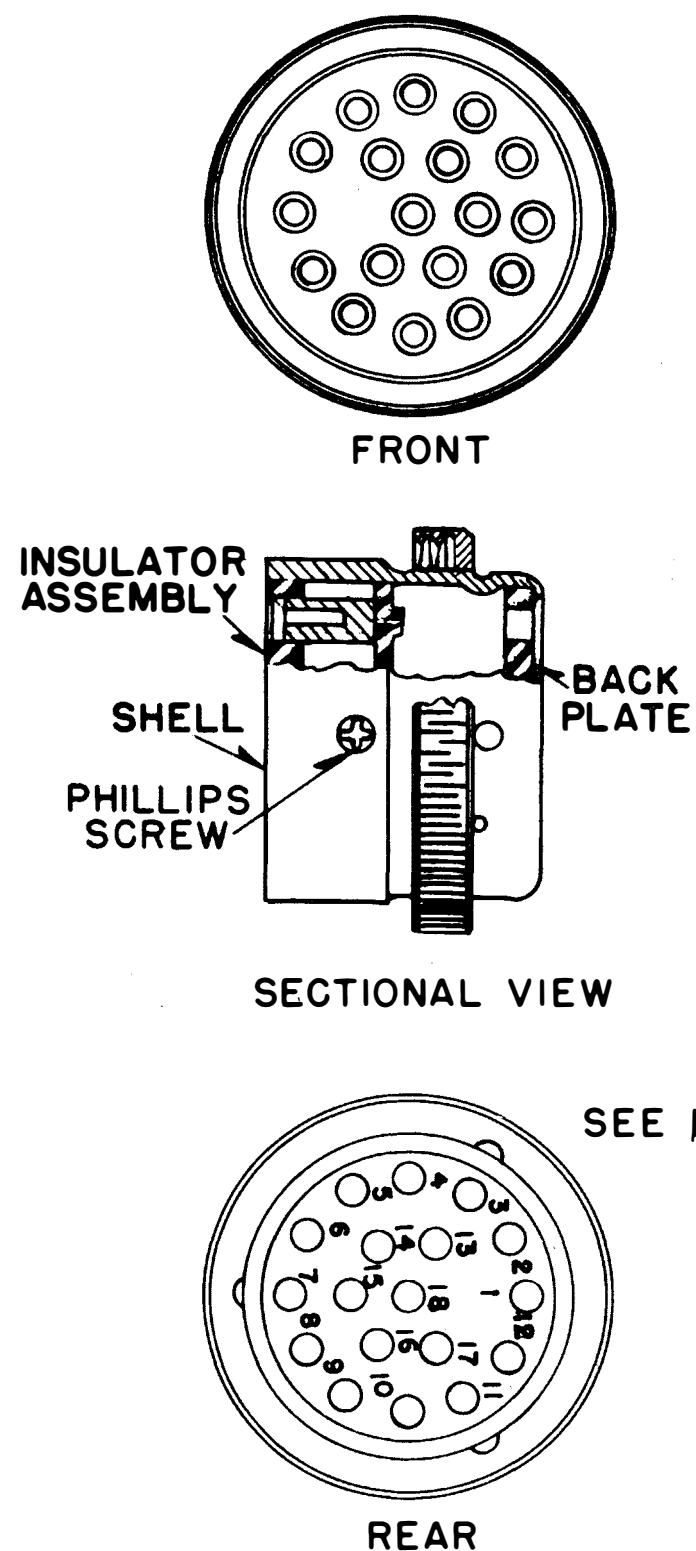


Figure 5-7. Radio Set SCR-274-N—Installation, Dimensions, and Weights of Radio Control Boxes, Antenna Relay Unit and Modulator Unit



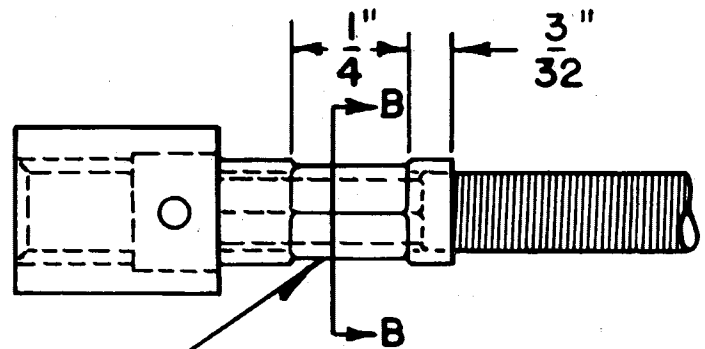
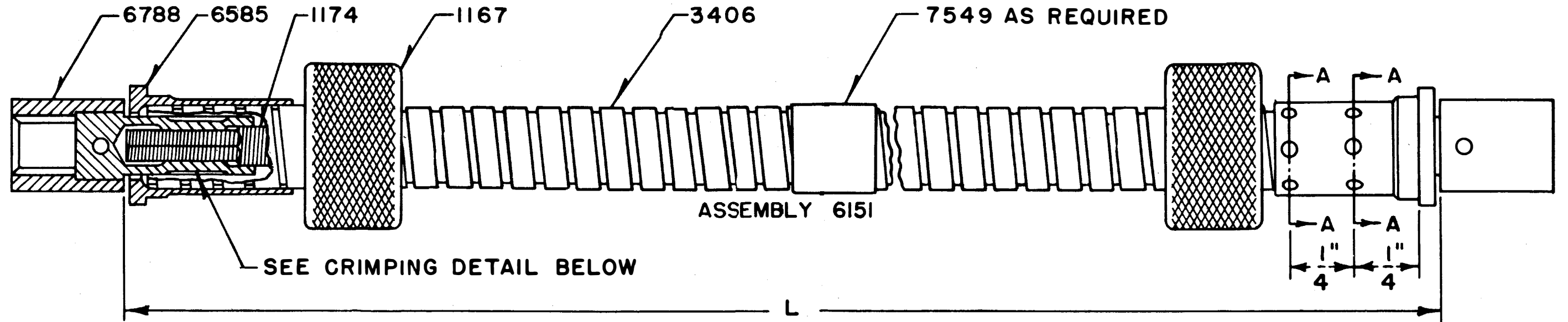
ASSEMBLY PROCEDURE

- A. STRIP INSULATION ON END OF EACH CONDUCTOR A DISTANCE OF $\frac{1}{8}$ "
- B. TIN END OF CONDUCTOR.
- C. REMOVE INSULATOR ASSEMBLY BY REMOVING THE PHILLIPS SCREW.
- D. INDIVIDUAL WIRES SHALL BE CARRIED THROUGH THE NUMBERED HOLES IN THE BACK PLATE AND SOLDERED TO THE RESPECTIVE JACKS ON INSULATOR ASSEMBLY. THERE SHALL BE NO CROSS-OVERS IN THE WIRES BETWEEN THE BACK PLATE AND INSULATOR ASSEMBLY.
- E. ASSEMBLE INSULATOR INTO SHELL AND REPLACE SCREW.
- F. REFERENCE MAY BE MADE TO AIR CORPS SPECIFICATIONS AND OTHER AIR CORPS INSTRUCTIONS INCLUDING WIRING DIAGRAMS FOR ADDITIONAL INFORMATION.

NOTES:

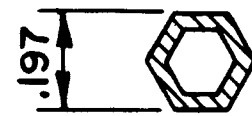
- 1. CODE NUMBERS OF PLUGS ILLUSTRATED BY THIS DRAWING ARE SIMILAR TO THOSE USED WITH SHIELDED CORDAGE AND ARE IDENTIFIED BY SUFFIX "A" AFTER THE CODE NUMBER SUCH AS PL-153-A.
- 2. THE TERMINAL ARRANGEMENT OF PLUGS FOR USE WITH OPEN WIRING IS IDENTICAL TO THAT OF THE CORRESPONDING TYPE PLUG FOR CABLE ASSEMBLIES.

Figure 5-8. Assembly Drawing of Plugs and Tuning Shaft

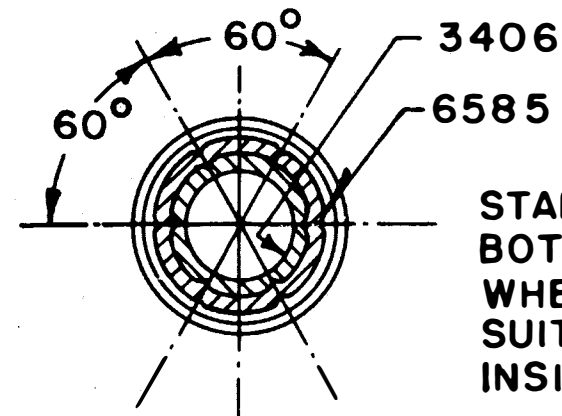


CRIMP AS SHOWN WITH HEX. TOOL.
FLATS CRIMPED ON HUB MUST BE
PARALLEL WITH FLATS ON SHAFT.

CRIMPING DETAIL (CASING REMOVED)



SECTION B-B



SECTION A-A

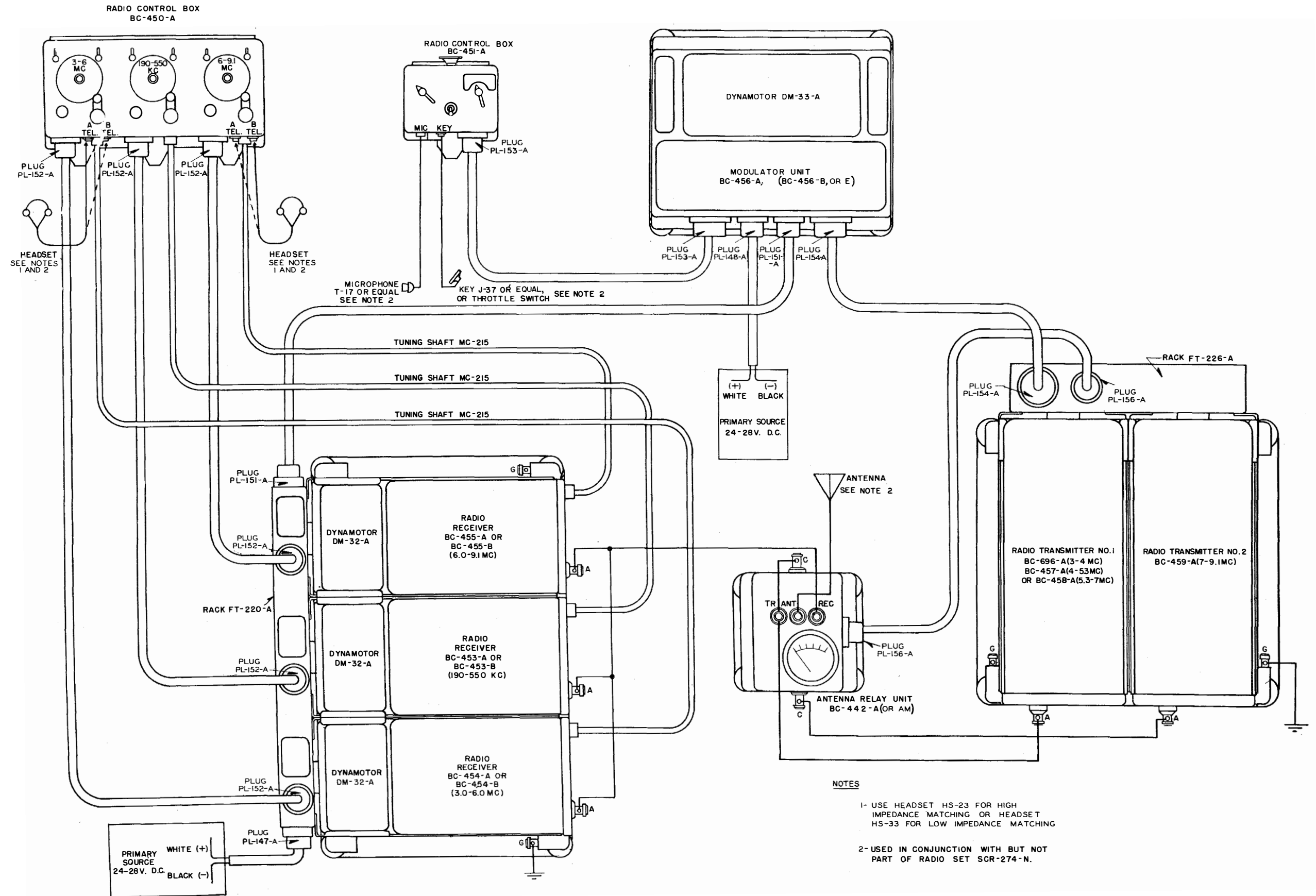
STAKE ITEM 6585 TO CASING AT
BOTH ENDS OF SHAFT AS SHOWN.
WHEN STAKING USE PILOT OF
SUITABLE SIZE TO MAKE FINAL
INSIDE DIAMETER OF CASING = $.242^{+.005}_{-.000}$

NOTES :

1. CUT SHAFTING TO REQUIRED LENGTH "L".
2. WITH CASING STRETCHED OUT TO MAX. LENGTH, CUT CASING $\frac{3}{8}$ " INCH PER FOOT LONGER THAN SHAFTING REQUIRED. PUSH BACK CASING AS REQUIRED TO ASSEMBLE SPLINES ON SHAFTING.
3. LUBRICATE SHAFT WITH "UNIVIS 90" OR EQUIVALENT.
4. LUBRICATE THREADS OF NUTS WITH ANTI-SEIZE LUBRICANT

TUNING SHAFT MC-215

Figure 5-8. Assembly Drawing of Plugs and Tuning Shaft



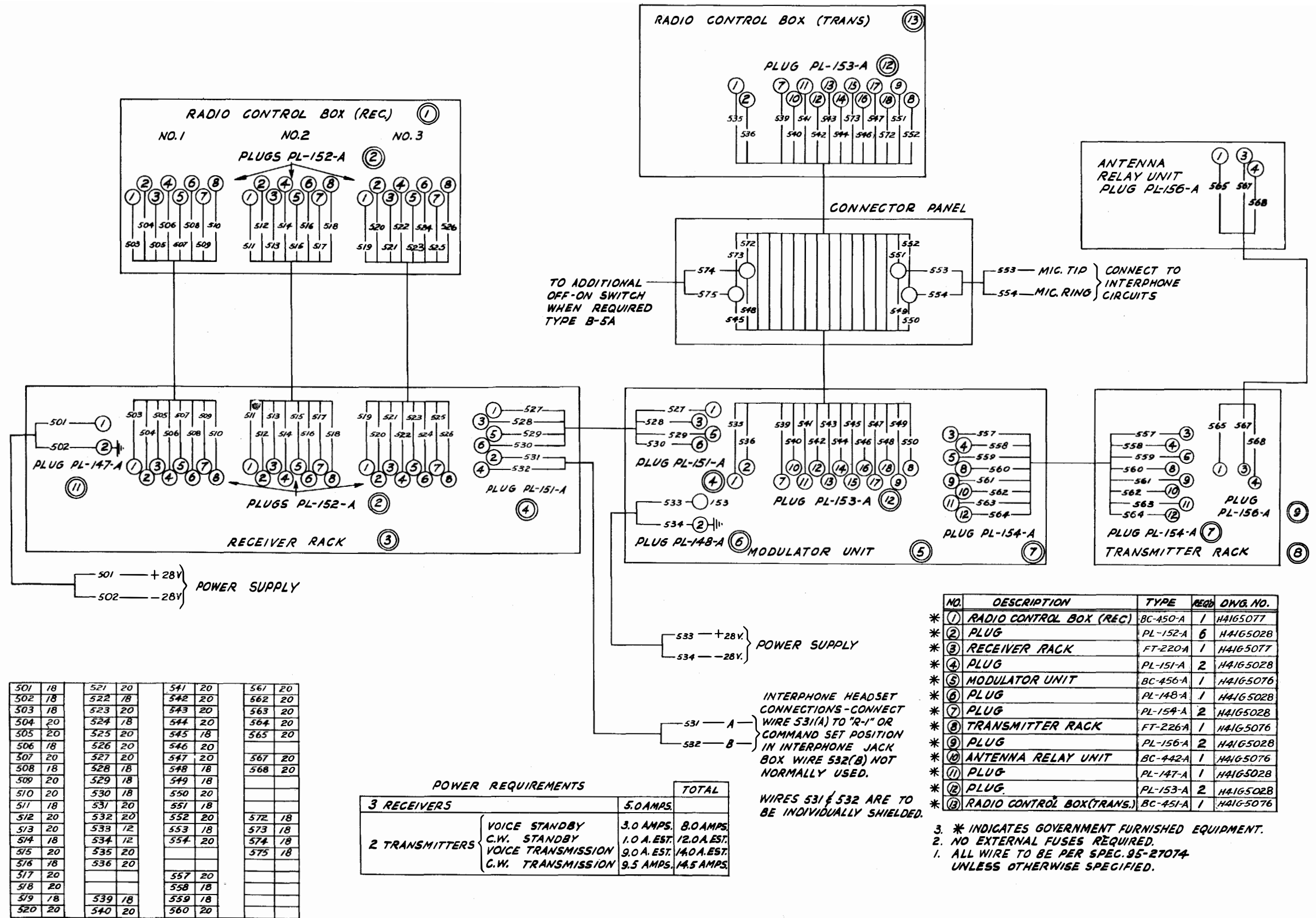


Figure 5-10. Radio Set SCR-274-N—Typical Interconnecting Wiring Diagram