

**RADIO SET  
AN / URC - 51  
SINGLE - SIDEBAND  
COMPATIBLE - AM  
TRANSCEIVER**

**HAMMARLUND**

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## TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>	<u>Section</u>	<u>Title</u>	<u>Page</u>
I	GENERAL INFORMATION . . . . .	1-1	IV	ALIGNMENT PROCEDURES (Cont'd.)	
1-1	System Definition . . . . .	1-1	4-1.4.3	IF Trap . . . . .	4-6
1-1.1	General . . . . .	1-1	4-1.4.4	Audio Adjustment . . . . .	4-7
1-1.2	Remote Control C-4826/ URC-51 . . . . .	1-1	4-1.4.5	Attenuation Adjustment . . . . .	4-7
1-1.3	Receiver-Transmitter RT-710/URC-51 . . . . .	1-1	4-1.4.6	AME/SSB Programming . . . . .	4-7
1-1.3.1	General . . . . .	1-1	4-1.4.7	Receiver Postalignment Procedures . . . . .	4-7
1-1.3.2	Receiver . . . . .	1-3	4-1.5	Transmitter . . . . .	4-7
1-1.3.3	Transmitter . . . . .	1-3	4-1.5.1	General . . . . .	4-7
1-1.3.4	Local Control Panel . . . . .	1-3	4-1.5.2	Audio Adjustment and RF Channel Alignment . . . . .	4-7
1-1.4	Power Supply PL-9015- 02-00006 . . . . .	1-3	4-1.5.3	Final-Amplifier Neutralization . . . . .	4-10
1-1.5	Antenna Coupler CU-1208/ URC-51 . . . . .	1-3	4-1.5.4	Power Adjustment . . . . .	4-10
1-2	Specifications . . . . .	1-3	4-1.5.5	Indicated Power Adjustment . . . . .	4-12
1-3	Vacuum-Tube and Semicon- ductor Complement . . . . .	1-5	4-1.5.6	Displays . . . . .	4-13
1-4	Equipment Nameplates . . . . .	1-7	4-2	Antenna Coupler . . . . .	4-14
II	INSTALLATION . . . . .	2-1	V	CIRCUIT DESCRIPTION . . . . .	5-1
2-1	General . . . . .	2-1	5-1	General . . . . .	5-1
2-2	System Cables and Connec- tors . . . . .	2-1	5-2	Remote Control C-4826/ URC-51 . . . . .	5-1
III	OPERATING INSTRUCTIONS . . . . .	3-1	5-3	Receiver-Transmitter RT-710/URC-51 . . . . .	5-1
3-1	Remote Operation . . . . .	3-1	5-3.1	Receiver . . . . .	5-1
3-1.1	Controls and Indicators . . . . .	3-1	5-3.2	Transmitter . . . . .	5-2
3-1.2	Procedures . . . . .	3-1	5-4	Antenna Coupler CU-1208/ URC-51 . . . . .	5-4
3-2	Local Operation . . . . .	3-1	VI	MAINTENANCE . . . . .	6-1
3-2.1	Controls and Indicators . . . . .	3-1	6-1	General Maintenance . . . . .	6-1
3-2.2	Procedures . . . . .	3-1	6-2	Troubleshooting . . . . .	6-1
IV	ALIGNMENT PROCEDURES . . . . .	4-1	6-2.1	General . . . . .	6-1
4-1	Receiver and Transmitter . . . . .	4-1	6-2.2	Test Equipment Required . . . . .	6-1
4-1.1	General . . . . .	4-1	6-2.3	Component Locations . . . . .	6-1
4-1.2	Worksheet Preparation . . . . .	4-1	6-2.4	Test Procedures and Fault Isolation . . . . .	6-14
4-1.3	Prealignment Procedures . . . . .	4-2	VII	PARTS LIST . . . . .	7-1
4-1.3.1	General . . . . .	4-2	VIII	DIAGRAMS . . . . .	8-1
4-1.3.2	Procedures . . . . .	4-4	APPENDIX A	PROGRAMMING WORKSHEETS	
4-1.4	Receiver Alignment . . . . .	4-4			
4-1.4.1	IF Stages . . . . .	4-4			
4-1.4.2	RF Alignment . . . . .	4-6			

## LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Title</u>	<u>Page</u>	<u>Figure</u>	<u>Title</u>	<u>Page</u>
1-1	Radio Set AN/URC-51 . . . . .	Frontspiece	4-13	Reactance Chart for Unloaded 24-Foot, Fiberglass, Whip Antenna . . . . .	4-16
1-2	System Block Diagram . . . . .	1-1	4-14	Reactance Chart for Unloaded, 35-Foot, Vertical, Whip Antenna . . . . .	4-17
1-3	Equipment Nameplates . . . . .	1-7	4-15	Reactance Chart for 24-Foot, Center-Loaded, Whip Antenna . . . . .	4-18
2-1	Interior of Receiver-Transmitter Cabinet Assembly PL-9015-02-00007, Receiver and Transmitter Chassis Removed . . . . .	2-1	4-16	Antenna-Coupler Reactance Chart . . . . .	4-20
2-2	Outline, Receiver-Transmitter Cabinet Assembly PL-9015-02-00007 . . . . .	2-2	4-17	Tap-versus-Inductance Chart. . . . .	4-21
2-3	Outline, Remote-Control C-4826/URC-51 . . . . .	2-2	4-18	Antenna-Coupler Capacitance Chart . . . . .	4-22
2-4	Outline, Antenna Coupler CU-1208/URC-51 . . . . .	2-3	4-19	Antenna-Coupler Programming Diagram, Top View . . . . .	4-23
2-5	System Interconnections . . . . .	2-3	5-1	Receiver Block Diagram . . . . .	5-1
2-6	Test-Cable Connector Nomenclature . . . . .	2-8	5-2	Transmitter Block Diagram . . . . .	5-3
3-1	Operating Controls, Indicators, and Connectors Remote Control C-4826/URC-51. . . . .	3-4	5-3	Simplified Schematic Diagram of Antenna Coupler . . . . .	5-4
3-2	Operating Controls, Indicators, and Connectors Local Control Panel, Receiver Transmitter RT-710/URC-51 . . . . .	3-6	6-1	Receiver-Transmitter Component and Internal-Adjustment Locations, Top View (Sheet 1) . . . . .	6-2
4-1	Example of Worksheet with Data for One Channel Entered . . . . .	4-1	6-1	Receiver-Transmitter Component and Internal-Adjustment Locations, Bottom View (Sheet 2) . . . . .	6-5
4-2	Tap Chart for Final-Amplifier Output Coils L508 and L509 . . . . .	4-3	6-2	Remote-Control Component and Internal-Adjustment Locations . . . . .	6-7
4-3	Neutralizing Plug P503 (Index No. 40, Figure 6-1). . . . .	4-4	6-3	Antenna-Coupler Component and Internal-Adjustment Locations . . . . .	6-8
4-4	Program-Board Nomenclature for Transmitter Final Amplifier . . . . .	4-5	6-4	Power-Supply Component and Internal-Adjustment Locations . . . . .	6-10
4-5	Slug-Tuning Arrangement in Receiver Coils . . . . .	4-6	6-5	Oscilloscope Display of Carrier Oscillator (V601) Output during Proper Operation . . . . .	6-23
4-6	Cap for TONE Control (R531) . . . . .	4-8	6-6	Oscilloscope Display of Local Oscillator (V603) Output during Proper Operation . . . . .	6-23
4-7	RF Power Output Sampled in Final-Amplifier Area (Example 1) . . . . .	4-13	8-1	Schematic Diagram, Receiver-Transmitter RT-710/URC-51 (Hammarlund 9015-04-00009) . . . . .	8-2
4-8	RF Power Output Sampled in Final-Amplifier Area (Example 2) . . . . .	4-13	8-2	Schematic Diagram, Remote Control C-4826/URC-51 (Hammarlund 9015-04-00012) . . . . .	8-3
4-9	RF Power Output Sampled in Final-Amplifier Area (Example 3) . . . . .	4-13	8-3	Schematic Diagram, Antenna Coupler CU-1208/URC-51 (Hammarlund 9015-04-00002) . . . . .	8-4
4-10	RF-Power Output Sampled at 50-ohm Load with Panalyzer (Example 1). . . . .	4-13	8-4	Schematic Diagram, Power Supply (Hammarlund 9015-04-00011) . . . . .	8-5
4-11	RF-Power Output Sampled at 50-ohm Load with Panalyzer (Example 2). . . . .	4-14			
4-12	RF-Power Output Sampled at 50-ohm Load with Panalyzer (Example 3). . . . .	4-14			

## LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>	<u>Table</u>	<u>Title</u>	<u>Page</u>
1-1	Equipment Supplied Radio Set AN/URC-51 . . . . .	1-2	6-1	Receiver-Transmitter Component and Internal-Adjustment Locations . . .	6-3
1-2	Equipment Required But Not Supplied Radio Set AN/URC-51 . . . . .	1-2	6-2	Remote-Control Component and Internal-Adjustment Locations . . .	6-7
1-3	Technical Specifications for Receiver- Transmitter RT-710/URC-51 . . . .	1-4	6-3	Antenna-Coupler Component and Internal-Adjustment Locations . . .	6-9
1-4	Technical Specifications for Remote Control C-4826/URC-51 . . . . .	1-5	6-4	Power-Supply Component and Internal-Adjustment Locations . . .	6-11
1-5	Technical Specifications for Antenna Coupler CU-1208/URC-51 . . . . .	1-5	6-5	Summary of Test-Point Outputs . . . .	6-12
1-6	Vacuum-Tube Complement Radio Set AN/URC-51 . . . . .	1-5	6-6	Capacitor Color Code . . . . .	6-13
1-7	Crystal Complement Radio Set AN/URC-51 . . . . .	1-6	6-7	Resistor Color Code . . . . .	6-13
1-8	Semiconductor Complement Radio Set AN/URC-51 . . . . .	1-6	6-8	Remote-Control Maintenance Test Procedures . . . . .	6-14
2-1	System Connectors . . . . .	2-4	6-9	Remote-Control Resistance Chart . . .	6-15
2-2	External Cable Data Radio Set AN/URC-51 . . . . .	2-5	6-10	Transmitter Maintenance Test Pro- cedures . . . . .	6-15
2-3	Summary of Wire Runs . . . . .	2-8	6-11	Transmitter Resistance Chart . . . . .	6-16
3-1	Operating Controls, Indicators, and Connectors Remote Control C-4826/URC-51 . . . . .	3-4	6-12	Transmitter Voltage Chart . . . . .	6-17
3-2	Operating Controls, Indicators, and Connectors Receiver-Transmitter RT-710/URC-51 . . . . .	3-7	6-13	Receiver Maintenance Test Pro- cedures . . . . .	6-18
4-1	Color Code for AME/SSB Channel Programming . . . . .	4-1	6-14	Receiver Resistance Chart . . . . .	6-18
4-2	Plug-in Coil Color Codes . . . . .	4-2	6-15	Receiver Voltage Chart . . . . .	6-19
4-3	Carrier Power versus DB Level Below 125 Watts . . . . .	4-11	6-16	Power-Supply Troubleshooting Procedures (Meter M701 Shows No Output) . . . . .	6-20
4-4	L-Network Formula Determination . .	4-19	6-17	Power Supply Resistance Chart . . . .	6-21
5-1	Receiver Circuit Operation . . . . .	5-2	6-18	Antenna-Coupler Maintenance Test Procedures . . . . .	6-22
5-2	Transmitter Circuit Operation . . . .	5-3	6-19	Antenna-Coupler Resistance Chart . .	6-22
			6-20	Antenna-Coupler Voltage Chart . . .	6-23
			7-1	Parts List . . . . .	7-1
			7-2	Parts Index by Number and Manu- facturer . . . . .	7-18
			7-3	Index of Manufacturers . . . . .	7-22

SECTION I

GENERAL INFORMATION

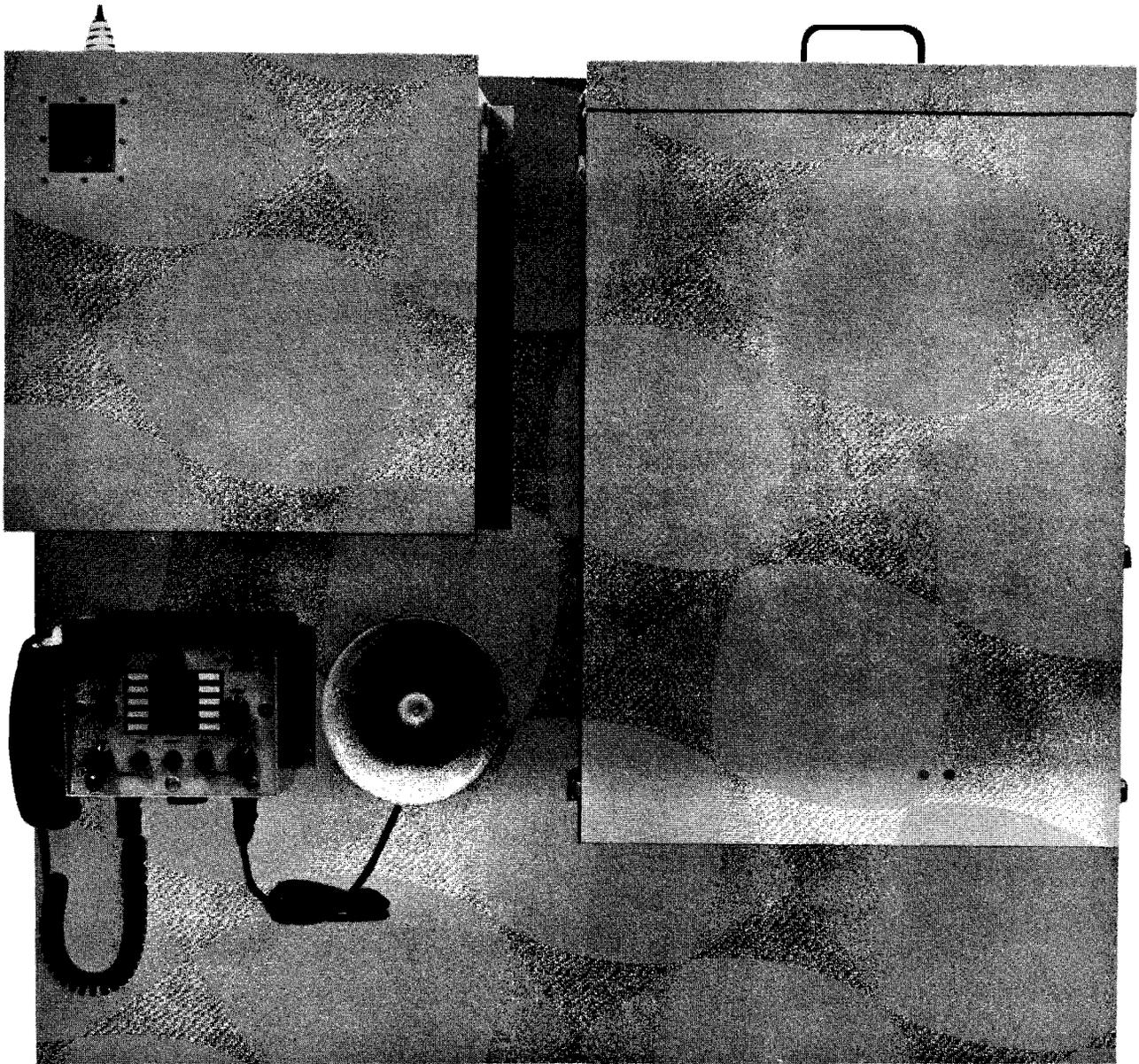


Figure 1-1. Radio Set AN/URC-51

## SECTION I

## GENERAL INFORMATION

## 1-1 SYSTEM DEFINITION

## 1-1.1 General

The AN/URC-51 Radio Set (see Figure 1-1) is a single-side-band (SSB), compatible amplitude-modulated (AM) transceiving system that provides short- and medium-range simplex radio telephone communications on 10 pretuned, crystal-controlled, remotely selected channels in the 2- to 18-Mc range. The set consists of Remote Control C-4826/URC-51, Antenna Coupler CU-1208/URC-51, Receiver-Transmitter RT-710/URC-51, and Power Supply PL-9015-02-00006 (see Figure 1-2, System Block Diagram). The Receiver-Transmitter cabinet assembly has provisions for connecting to both the C-1138B/UR Remote Control and the C6513/URC Remote Control. Table 1-1 lists the equipment supplied. Table 1-2 lists the equipment required but not supplied. Tables 2-2 and 2-3 in Section II contain interconnection information.

## 1-1.2 Remote Control C-4826/URC-51

The Remote Control is contained in a watertight aluminum enclosure designed for bulkhead mounting. It includes all the necessary operating controls, a separate loudspeaker, a handset, and handset hanger.

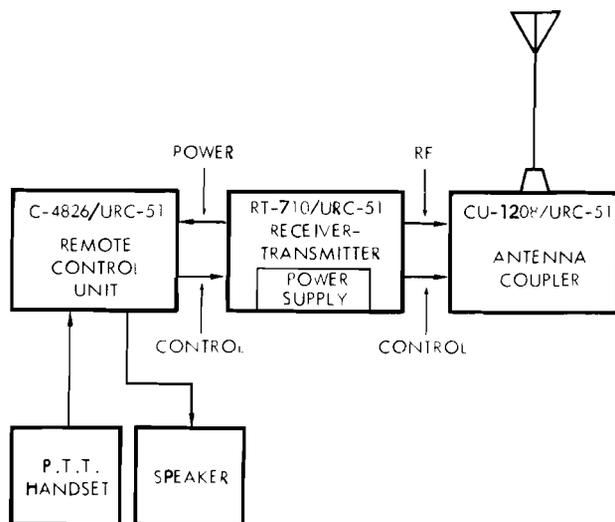


Figure 1-2. System Block Diagram

The loudspeaker is spraytight and of the re-entrant type; it is supplied with an adjustable mounting for either bulkhead or horizontal attachment. The handset is a carbon type with noise-cancelling features and a push-to-talk switch.

## 1-1.3 Receiver-Transmitter RT-710/URC-51

## 1-1.3.1 General

The Receiver and Transmitter sections are located in the same cabinet and draw their power from a common supply. They operate independently, but share such circuits as crystal filters, IF amplifiers, and the local oscillator. Any frequency within the range of 2 to 18 Mc may be used in any channel position regardless of sequence, provided that the proper plug-in coils are used.

A channel is selected by means of a rotary solenoid-driven switch. The CHANNEL SELECTOR switch, S105, and the control wafer, S201A, of the rotary solenoid assembly in the Receiver-Transmitter unit are tabbed and notched in such a manner that the solenoid continues to run until there is an open circuit. When the open circuit is reached and the solenoid stops, it can be restarted only by closing the circuit. Changing the position of the CHANNEL SELECTOR switch, S105, and pressing the SEARCH-DIMMER knob accomplishes this, and the rotary solenoid continues to run until it reaches the location of the new open circuit. When this takes place, the ON CHANNEL lamp lights. Remove pressure from the SEARCH-DIMMER knob and the lamp will go out. Each position of the CHANNEL SELECTOR switch has its own position of the rotary solenoid where it is an open circuit. For the 10 positions of the CHANNEL SELECTOR switch, there are 10 different positions of the rotary solenoid. When the rotary solenoid turns, it also turns other switch wafers. One wafer, S201-B, is the master wafer, which is the same as the CHANNEL SELECTOR switch, S105; it causes the rotary solenoid unit in the Antenna Coupler to follow the same operation and change its channels in step with the Receiver-Transmitter unit. Also rotated with the rotary solenoid in the Receiver-Transmitter unit is another wafer, S201-C. This wafer is connected through the system wires to the stepper switch in the optional Remote Control unit, C6513/URC. The C6513/URC operates from signals received over a telephone line, and the stepper switch acts as a channel selector master switch similar in action to the CHANNEL SELECTOR switch, S105. Their electrical operation is similar, except that the stepper switch uses 10 wires and a common feed and the C-4826, URC-51 uses four wires and a common feed. A toggle switch located on the Transmitter chassis (Figure 6-1,

TABLE 1-1

EQUIPMENT SUPPLIED  
RADIO SET AN/URC-51

QUANTITY	DESCRIPTION
1	<u>Basic Receiver-Transmitter Assembly</u>
1	Receiver-Transmitter chassis with tubes, coils, and crystals.
1	Power Supply chassis.
1	Cabinet Assembly with cover containing terminal strips, pigtails and space heater.
1	Connector, coaxial, UHF Type PL259.
1	Test Cable.
2	Test Records.
2	Technical Manuals.
1	Instruction Plate.
1	<u>Remote Control Assembly</u>
1	Remote Control Unit with Handset Hanger.
1	Handset with connector.
1	Speaker Assembly.
1	Connector, speaker, 2 pin, male.
1	Connector, control, 26 pin, female.
1	<u>Antenna Coupler Assembly</u>
1	Antenna Coupler chassis.
1	Cabinet Assembly with cover.
1	Connector, coaxial, N Type UR-21D/U.
1	Connector, control, 14 pin, female.
1	Set of Servicing Diagrams, plastic enclosed.

TABLE 1-2

EQUIPMENT REQUIRED BUT NOT SUPPLIED  
RADIO SET AN/URC-51

QUANTITY	DESCRIPTION
1	External antenna and suitable length of wire to connect the antenna to the Antenna Coupler.
1	Length of coaxial cable, not to exceed 50 ft of 50-ohm impedance, to run between the Antenna Coupler and the Receiver-Transmitter.
1	Control cable of 22 No. 20 wires to connect the Remote Control to the Receiver-Transmitter.
1	Control cable of 10 No. 20 wires to connect the Antenna Coupler to the Receiver-Transmitter.
1*	Control cable of 12 No. 20 wires to connect the C-1138B/UR Remote Control to the Receiver-Transmitter.
1*	Control cable of 17 No. 20 wires to connect the C-6513/URC Remote Control to the Receiver-Transmitter.
1	Line cord of 3 No. 14 wires to connect a source of 115-volt, 60-cps, single-phase power to the Receiver-Transmitter.
1*	Control cable of 3 No. 18 wires to connect a spare set of form "C" relay contacts inside the Receiver-Transmitter to any external use desired.
1*	Spare parts group is available.

\*Options, not required but available for use where desired.

Index No. 24) permits selection of either the C6513/URC or the C-4826/URC-51. This switch transfers the operating voltage to the proper channel selector.

Overload relay K501 is activated when the final-amplifier tube starts to show color on its plates. The resultant increase in light activates a cadmium sulfide photoconductive cell. The cell changes resistance and allows current to flow in the relay coil, thus operating the relay. This relay has four sections, each of form "C" or SPDT configuration. One section interlocks the relay coil and holds it in the overload condition until the reset button is pushed, one section opens the B+ line going to the screen grid of the final amplifier, and the other two sections transfer the ON CHANNEL lamp to a flasher circuit (FLASH FOR OVERLOAD) to alert the operator that the transmitter is in the overload condition.

AME/SSB PROGRAMMING controls the action of relays K505, K601 and K602. Relay K505 is activated in AME

transmit only, and it connects the output of the 1650-kc oscillator to the CARRIER LEVEL ADJ control (Figure 6-1, Index No. 29). The CARRIER LEVEL ADJ control is part of a divider network and has a range of control such that the carrier can be reinserted to a power level of 3 to 6 db below the sideband PEP power output level.

There are two space heaters, one in the Antenna Coupler and one in the Receiver-Transmitter cabinet. When the unit is connected to the ac mains and the power switch is in the OFF position, the space heaters are on and heating the air in their respective enclosures. When the power switch is in either RCVR ONLY or RCVR/XMTR the space heaters are turned off. A fan cools the final audio tube and the final amplifier tube; it circulates air through the final-amplifier area. When the fan is plugged into the receptacle on the power supply, it will operate when the unit is turned on in the RCVR ONLY and the RCVR XMTR conditions and not when in the OFF condition.

### 1-1.3.2 Receiver

The Receiver is a single-side-band, compatible-AM unit containing 14 tubes. It is a single-conversion unit and has an intermediate frequency (IF) of 1650 kc. It can be operated on any one of 10 preset channels in the 2- to 18-Mc frequency range. The local-oscillator frequency is controlled by a switch-selected crystal, which determines the channel in use. The Receiver contains separate crystal filters in the IF section for AM or SSB selectivity. They are switched by relay in accordance with the programming connections made during alignment. Also included is a noise blanker to reduce ignition interference, an audio squelch system, wide-range automatic gain control (agc), and an rf-attenuation circuit to reduce overload from nearby transmitters.

The Receiver has two audio outputs. One output is for a loudspeaker and handset. The other is available to supply audio to a 600-ohm telephone line.

### 1-1.3.3 Transmitter

The Transmitter provides crystal-controlled single-side-band or compatible-AM operation on any one of 10 preset channels in the 2- to 18-Mc frequency range. In the SSB mode the rf output consists of upper side-band, suppressed-carrier signals. In the AME mode the rf output consists of upper side-band signals with reinserted carrier. The Transmitter is a single-conversion unit with an IF of 1650 kc. It contains 14 tubes.

This Transmitter is rated at 125 watts, PEP, on SSB and 40 watts of AM power into a 50-ohm resistive load. The Transmitter's power may be reduced without retuning.

The unit may be modulated from the microphone, which is supplied with the system, or from a 600-ohm telephone line. The audio input circuitry contains a compressor to raise the effective power output.

The main power ON-OFF control activates a relay in the power supply which operates on 12 volts, dc. When the cover is on the Receiver-Transmitter unit cabinet, the ON-OFF function is controlled at the Remote Control unit. The power switch is a two-pole, three-position toggle switch labeled OFF, RCVR ONLY, and RCVR/XMTR. In the OFF position the relay in the power supply is not energized and the ac mains are directed to the space heaters through the normally closed contacts. The 12 volt, ac, power which operates the crystal ovens is on at all times that the unit is connected to the ac mains; it is rectified and filtered and used to operate the power relay. When the power switch is moved to the RCVR ONLY position, the relay is energized and the ac mains are removed from the space heaters and directed to the power-supply circuitry. When the power switch is moved to the RCVR/XMTR position, the keying circuitry is completed to the push-to-talk and TEST switches. The power-supply circuitry remains as in RCVR ONLY.

### 1-1.3.4 Local Control Panel

The Local Control Panel is part of the front panel of the Receiver-Transmitter unit; it is covered during normal operation. It has duplicates of those controls on the Remote Control that are necessary for testing and a meter for monitoring power-supply voltages and the power-amplifier output voltage into a 50-ohm load. The screw-driver-adjusted power-amplifier loading capacitors are available at the panel.

### 1.4 Power Supply PL-9015-02-00006

The Power Supply is self-contained and mounted on a chassis within the Receiver-Transmitter enclosure. It provides all the voltages required to operate the set.

The chassis is equipped with captive screws for mounting in the Receiver-Transmitter enclosure and has a handle for ease of removal. The two toggle switches that are located on the top of the power supply are for safety during maintenance on the Receiver-Transmitter unit. When the cover of the Receiver-Transmitter unit is removed, the spring-return switch labeled REMOTE-LOCAL moves to the LOCAL position. The ON-OFF switch is already in the OFF position. The ON-OFF function is now removed from the Remote Control unit and transferred to the ON-OFF switch on the Power Supply. The person at the Receiver-Transmitter unit may now turn the equipment ON or OFF with complete assurance that no one can turn the equipment on while he is working on it. To restore control to the Remote Control unit, replace the cover on the Receiver-Transmitter cabinet. The bracket on the cover will push the two toggle switches to the OFF and REMOTE positions.

### 1-1.5 Antenna Coupler CU-1208/URC-51

Antenna Coupler CU-1208/URC-51 is of the reversible L type and matches the input impedance of the Receiver and the 50-ohm output impedance of the Transmitter power-amplifier pi network to an end-fed antenna at any of the 10 preset frequencies. It uses a Type-N shielded connector.

The Antenna Coupler is remotely controlled from the Receiver-Transmitter by a four-wire and common, open-circuit-seeking system that employs a Ledex solenoid.

A jumper selects a 50-ohm, 100-watt dummy load for Transmitter tuning. TONE and TEST switches located in the enclosure facilitate local tuning.

## 1-2 SPECIFICATIONS

Tables 1-3, 1-4, and 1-5 contain the technical specifications for the Receiver-Transmitter, the Remote Control, and the Antenna Coupler.

TABLE 1-3

TECHNICAL SPECIFICATIONS FOR  
RECEIVER-TRANSMITTER RT-710/URC-51

## GENERAL:

Frequency Coverage -	2 through 18 Mc
Frequency Stability -	±20 cps after 24 hours
Frequency Trimming -	0.01%
Crystals -	CR-36/U
Modes of Operation -	Transmit, 3A3J, 3A3A, and 3A3H Receive, 3A3J, 6A3, 3A3A, and 3A3H
Control System -	Ledex Rotary Solenoid
Input Power* -	
OFF	260 watts + 10% maximum
RCVR ONLY	220 watts + 10% maximum
RCVR/XMTR	345 watts + 10% maximum
Input Power Tolerance -	±10% voltage, ± 5% frequency
Temperature -	-15° C to +50° C
Humidity -	95% at +50° C
Vibration -	Harmonic Motion 0.030 inch, 10 to 30 cps 0.015 inch, 30 to 60 cps
Duty Cycle -	Continuous
Conducted Noise -	Less than 5 mv peak
Radiated Noise -	Less than 400 picowatts
Size -	Less than 3.5 cu. ft.
Weight -	Less than 120 lb.

## RECEIVER:

Sensitivity -	5 microvolts for 10-db signal-plus-noise-to-noise (S+N)/N, ratio
Selectivity -	
SSB	6 db > 3.3 kc 60 db < 6.6 kc
AM	6 db > 5.0 kc 60 db < 26.0 kc

TABLE 1-3 (Continued)

TECHNICAL SPECIFICATIONS FOR  
RECEIVER-TRANSMITTER RT-710/URC-51

RECEIVER:  
(Continued)

Image Rejection -	60 db down
IF Rejection -	60 db down
Audio Output at 1 kc -	+9 dbm at 600 ohms 2 watts at 8 ohms
Distortion, Harmonic and Intermodulation -	<10% at 2-watt output
Automatic Gain Control -	Audio Output <6-db rise with signal 10 to 100k microvolts
Quieting -	> 40-db (S+N)/N ratio at 1 mv input
Audio Response -	±3 db from 300 to 3300 cps 1000-cps reference

## TRANSMITTER:

Power Output -	
High	125 watts PEP 40 watts AM
Low	20 watts PEP 6.4 watts AM
Audio Response -	8 db/octave, 0 to 350 cps ±2 db, 350 to 2700 cps 8 db/octave, 2700 cps to ∞ 1000-cps reference
Audio Input -	600 ohms at -5 to +15 dbm
Carrier Suppression -	50 db below PEP level
Carrier Reinsertion -	3 to 6 db below PEP level
Unwanted Sideband -	50 db below PEP level
Spurious Emissions -	2 to 6 kc, 25 db down 6 to 10 kc, 35 db down 10 kc to ∞, 50 db down Third Order, 30 db down

\*as controlled by Switch S102A

TABLE 1-4

TECHNICAL SPECIFICATIONS FOR  
REMOTE CONTROL C-4826/URC-51

24 volts, dc	Handset-keying circuitry, pins D and G
12 volts, dc	Control and lamp circuitry
12 volts, ac	High/Low Output lamps
75 volts, dc	ATTEN circuitry
110 volts, dc	High/Low Output switch
115 volts, dc	Ledex control circuitry

TABLE 1-5

TECHNICAL SPECIFICATIONS FOR  
ANTENNA COUPLER CU-1208/URC-51

ELECTRICAL:

Power Handling -	150 watts PEP
Efficiency -	50% with 6-j 500-ohm load
Dummy Load -	50-ohm, 100-watt noninductive
Matching -	
at 2 to 3 Mc	4- to 100-ohm R, 0 to j - 700 ohm X
at 3 to 18 Mc	4- to 700-ohm R, j - 700 to j + 700 ohm X < 2000 volts, rms, and > 10-ohm R while matching + X

PHYSICAL:

Size -	2 cu. ft.
Weight -	45 lb.

1-3 VACUUM-TUBE AND SEMICONDUCTOR  
COMPLEMENT

Table 1-6 is an index of the vacuum tubes used in Radio Set AN/URC-51. Tables 1-7 and 1-8 list the crystals and semiconductors, respectively, used in the set.

TABLE 1-6

VACUUM-TUBE COMPLEMENT  
RADIO SET AN/URC-51

SYMBOL	TYPE	FUNCTION
V501	OA2	150-volt regulator
V502	12AT7	Keying
V503	12AT7	Microphone amplifier
V504	12AT7	Tone oscillator, agc amplifier
V505	6BJ6	Compressor
V506	12AU7	Audio amplifier
V507	7360	Transmitter mixer
V508	6CL6	Driver amplifier
V509	8117	Final power amplifier
V601	6AU6	Carrier oscillator
V602	12AT7	RF amplifier
V603	6CL6	Local oscillator
V604	12AT7	Receiver mixer
V605	6BA6	First IF amplifier
V606	6BA6	Second IF amplifier
V607	6BA6	Third IF amplifier
V608	6BA6	AGC amplifier
V609	6JU8	AGC and squelch detector
V610	12AY7	Product detector
V611	12AY7	First audio and squelch amplifier
V612	12AY7	Second audio and 600-ohm amplifier
V613	6BQ5	Power (500-ohm) amplifier

TABLE 1-7

CRYSTAL COMPLEMENT  
RADIO SET AN/URC-51

SYMBOL	TYPE	FUNCTION
Y601	CR-36/U	Carrier oscillator (1650 kc)
Y602 through Y611	CR-36/U	Local oscillator (channels 1 through 10; crystal frequency is channel frequency plus 1650 kc)
ZF601	WC12	AM crystal filter (crystal integral with assembly)
ZF602	FC11L	SSB crystal filter (crystal integral with assembly)

TABLE 1-8 (Continued)

SEMICONDUCTOR COMPLEMENT  
RADIO SET AN/URC-51

SYMBOL	TYPE	FUNCTION
Receiver-Transmitter (Continued)		
CR602	1N34A	Noise limiter
CR603	1N34A	Noise limiter
CR604	TS4	AGC rectifier
CR605	1N634	AM detector
CR606	1N634	Audio metering
CR715	TS4	Meter rectifier, 6.3 volts, ac
CR716	1N34A	Meter rectifier, rf power
CR717	TS4	Meter rectifier, 12 volts, ac
Power Supply		
CR701	TS4	Ledex rectifier
CR702	TS4	Ledex rectifier
CR703	TS4	Ledex rectifier
CR704	TS4	Ledex rectifier
CR705	TS4	Bias rectifier
CR706	CER73	+300-volt supply rectifier
CR707	CER73	-300-volt supply rectifier
CR708	CER73	High-voltage supply rectifier
CR709	CER73	High-voltage supply rectifier
CR710	CER73	High-voltage supply rectifier
CR711	CER73	High-voltage supply rectifier
CR712	CER73	High-voltage supply rectifier
CR713	CER73	High-voltage supply rectifier
CR714	3AF1	-12-volt supply rectifier

TABLE 1-8

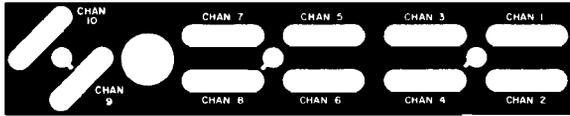
SEMICONDUCTOR COMPLEMENT  
RADIO SET AN/URC-51

SYMBOL	TYPE	FUNCTION
Antenna Coupler		
CR201	VR200	Zener diode (Ledex)
Receiver-Transmitter Cabinet		
CR301	TS4	Keying
Receiver-Transmitter		
CR501	VR200	Zener diode (Ledex)
CR502	TS4	AGC isolation
CR503	1N634	AGC speech
CR504	1N634	AGC speech
CR505	1N916	Balanced modulator
CR506	1N916	Balanced modulator
CR507	1N634	RF metering
CR601	1N4009	Carrier oscillator

1-4 EQUIPMENT NAMEPLATES

Equipment nameplates are used throughout the Radio Set for nomenclature, important operation and alignment

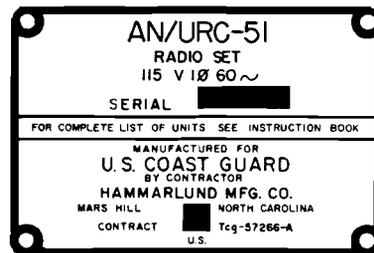
instructions, warnings, and channel-frequency notation. Figure 1-3 identifies these nameplates.



This label is located on the crystal oven clamp and is a locating guide for the channel crystals. The frequency may be written in the blank area above each crystal with a soft-lead pencil.



This label is located in three positions around the final amplifier



Main equipment nameplate

**LOCAL OPERATING INSTRUCTIONS, AN/URC-51 RADIO SET**

1. **ATTENTION:** Before attempting to operate, refer to Local Control Section of the manual.
2. **TURNING ON AND SETTING OF CONTROLS:**
  - A. Connect the handset to the local connector.
  - B. Switch "REMOTE-LOCAL" lever switch to the "LOCAL" position.
  - C. Select "HIGH" or "LOW" power with "OUTPUT" toggle switch.
  - D. Switch "POWER CONTROL" "ON/OFF" toggle switch on the power supply to the "ON" position.
  - E. Adjust "VOLUME" to suit.
3. **OPERATING PROCEDURE:** Reception and transmission is controlled by the handset pushbutton.
  - A. Press-to-talk. Talk close to the mouthpiece, speak up, do not shout.
  - B. Release pushbutton to receive.
4. **TURN OFF PROCEDURE:**
  - A. Switch "POWER CONTROL" "ON/OFF" toggle switch on the power supply to the "OFF" position.
5. **CONTROL TRANSFER:**
  - A. Remove the handset from the local connector.
  - B. Switch "REMOTE-LOCAL" Lever switch to "REMOTE" position.
  - C. Replace lid on the transceiver cabinet. This transfers power control to Remote Control Unit.

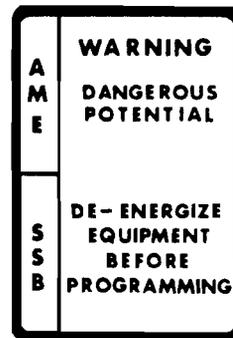
CHANNEL

**CAUTION**

ROTATE CCW ONLY

Turn "LEDEX" "ON/OFF" switch at rear of chassis to "OFF" position before rotating shaft manually.

This nameplate, located on the covered panel for the Receiver-Transmitter, contains local operating instructions.



This label is located on the clear-plastic protective cover on the AME/SSB programming strip on the Receiver-Transmitter chassis.

Figure 1-3 (sheet 1). Equipment Nameplates

Operating Instructions  
AN/URC-51 Radio Set

1. Attention: Before attempting to operate-refer to Remote Control Section of the Manual.
2. Turning On & Setting Controls
  - A. Switch "OFF-RCVR ONLY-RCVR/XMTR" Toggle Switch to "RCVR/XMTR" Position.
  - B. Adjust dimmer on Green Lamp & "SEARCH/DIMMER" knob for panel lamp to meet the lighting requirements.
  - C. Select proper channel with center knob & press "SEARCH/DIMMER" knob until the red "ON CHANNEL/FLASH FOR OVERLOAD" light comes on.
  - D. Adjust "VOLUME" & "SQUELCH" controls to suit.
  - E. Select high or low power with "OUTPUT" Toggle Switch.
  - F. Press "ATTEN" knob to reduce strong signals when required.
3. Operating Procedures
  - A. Reception & Transmission is controlled by Handset pushbutton.
    1. Press-to-talk. Talk close to mouthpiece, speak up, do not shout.
    2. Release pushbutton to receive.
4. Turn Off Procedure
  - A. Switch "OFF-RCVR ONLY-RCVR/XMTR" Toggle Switch to "OFF" position.

This label is located on the top of the Remote-Control enclosure. It contains normal operating instructions for the AN/URC-51 Radio Set.

Figure 1-3 (sheet 2). Equipment Nameplates

SECTION II

INSTALLATION

## SECTION II

## INSTALLATION

## 2-1 GENERAL

The AN/URC-51 Radio Set is packaged in three aluminum enclosures designed for bulkhead mounting. These are: (1) Receiver-Transmitter Cabinet Assembly, PL-9015-02-00007; (2) Remote Control, C-4826/URC-51; and (3) Antenna Coupler, CU-1208/URC-51.

The Receiver-Transmitter Cabinet Assembly contains the Receiver and Transmitter chassis, the Power Supply (PL-9015-02-00006), the Line Filter (PL-9015-03-00016), and Terminal Strips TB301 through TB306. The Receiver-Transmitter Cabinet Assembly also houses the auxiliary Test Cable PL-9015-03-00011 (see Figure 2-1).

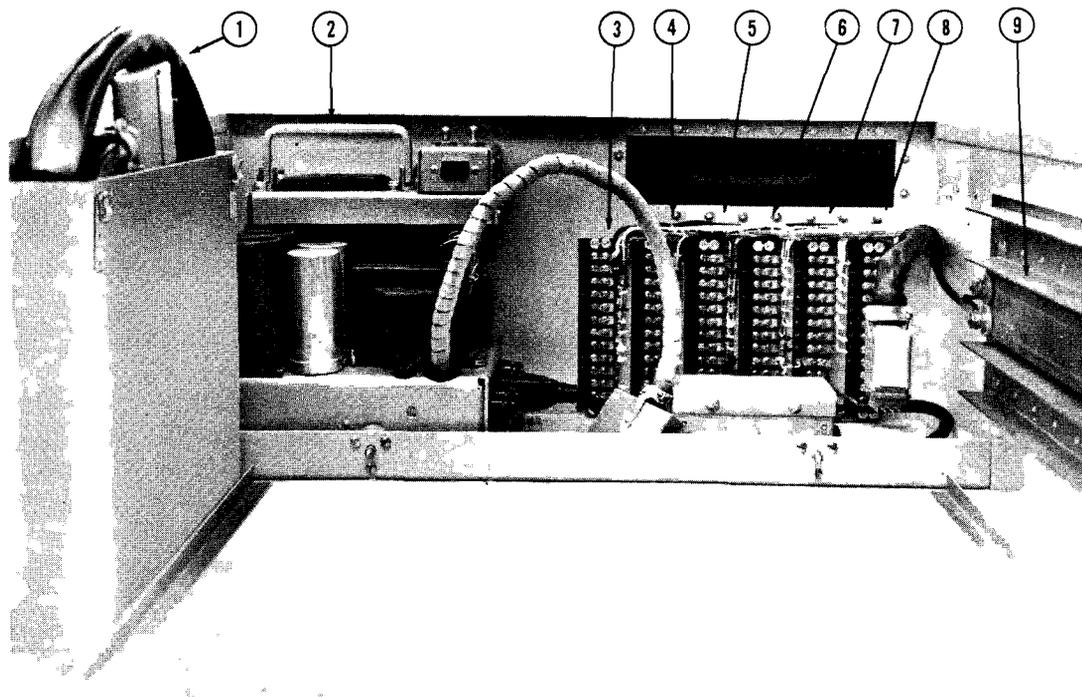
Included with the Remote Control is Handset P-1309-01-00002 and Horn Speaker P-1313-01-00001.

All enclosures have mounting holes that accommodate 1/4-20 machine screws. Figures 2-2 through 2-4 show the mounting-hole locations. The Remote Control is light

enough for direct bulkhead mounting with tapped holes; with tapped-hole mounting, use lockwashers under the heads of the screws. The Transceiver enclosure mounting holes are in dimples and require binding-head screws. The Antenna-Coupler mounting is not critical as long as lockwashers and nuts are used. The mounting hardware should be steel. It is advisable to use a nut with nylon or fiber inserts, such as elastic stopnuts, when it is possible to get at the back of the bulkhead.

## 2-2 SYSTEM CABLES AND CONNECTORS

Figure 2-5 shows the main system cables and connectors. Table 2-1 is a list of the system connectors and Table 2-2 defines the wire groups within each cable. Table 2-3 is a summary of wire runs. Test-cable connector nomenclature is shown by Figure 2-6.



- |                 |                 |
|-----------------|-----------------|
| 1. TEST CABLE   | 6. TB303        |
| 2. POWER SUPPLY | 7. TB302        |
| 3. TB306        | 8. TB301        |
| 4. TB305        | 9. SPACE HEATER |
| 5. TB304        |                 |

Figure 2-1. Interior of Receiver-Transmitter Cabinet Assembly, PL-9015-02-00007, Receiver and Transmitter Chassis Removed

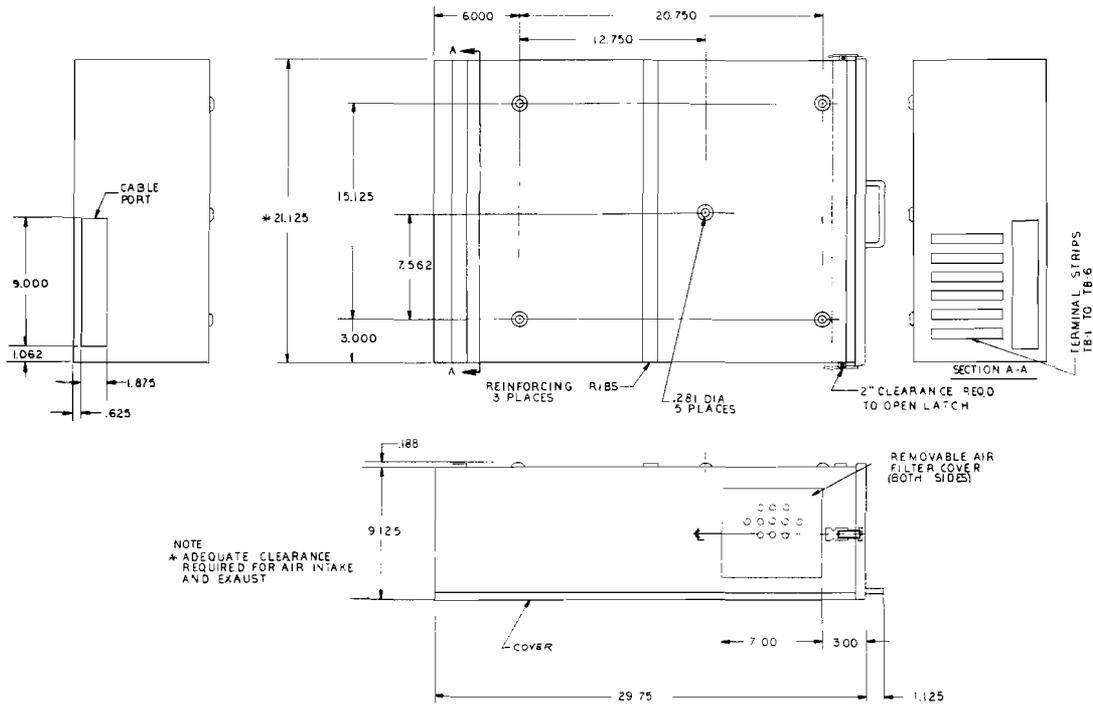


Figure 2-2. Outline, Receiver-Transmitter Cabinet Assembly PL-9015-02-00007

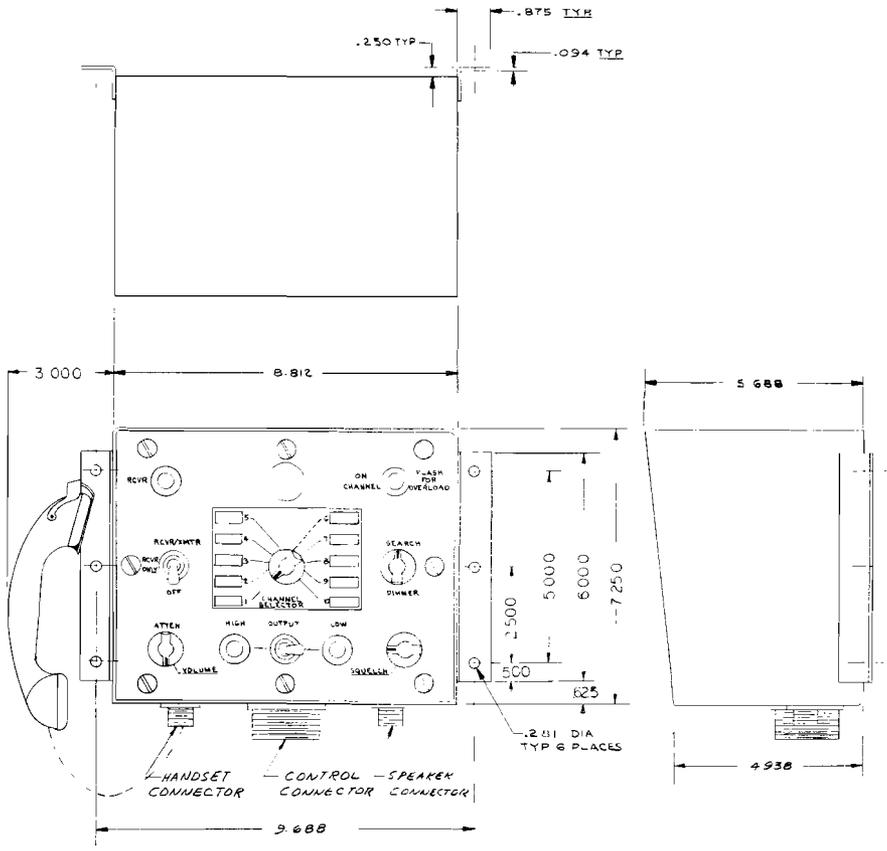


Figure 2-3. Outline, Remote Control C-4826/URC-51

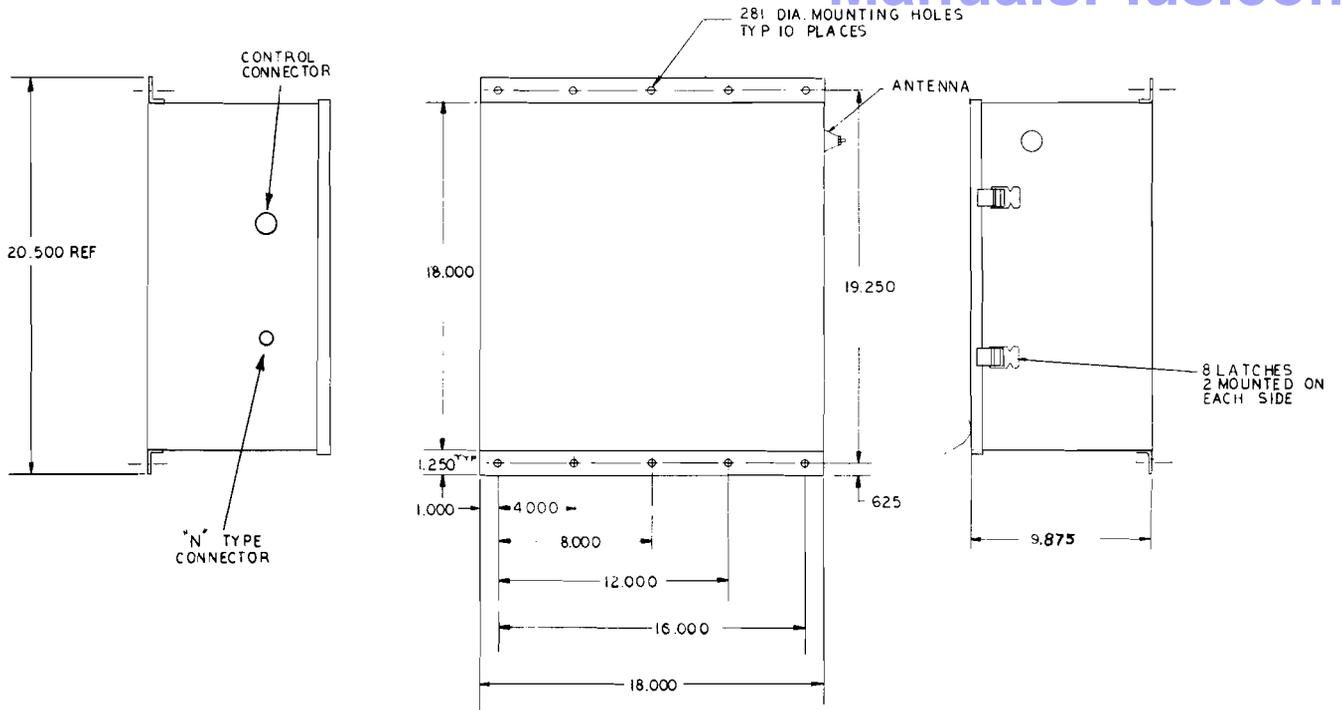


Figure 2-4. Outline, Antenna Coupler CU-1208/URC-51

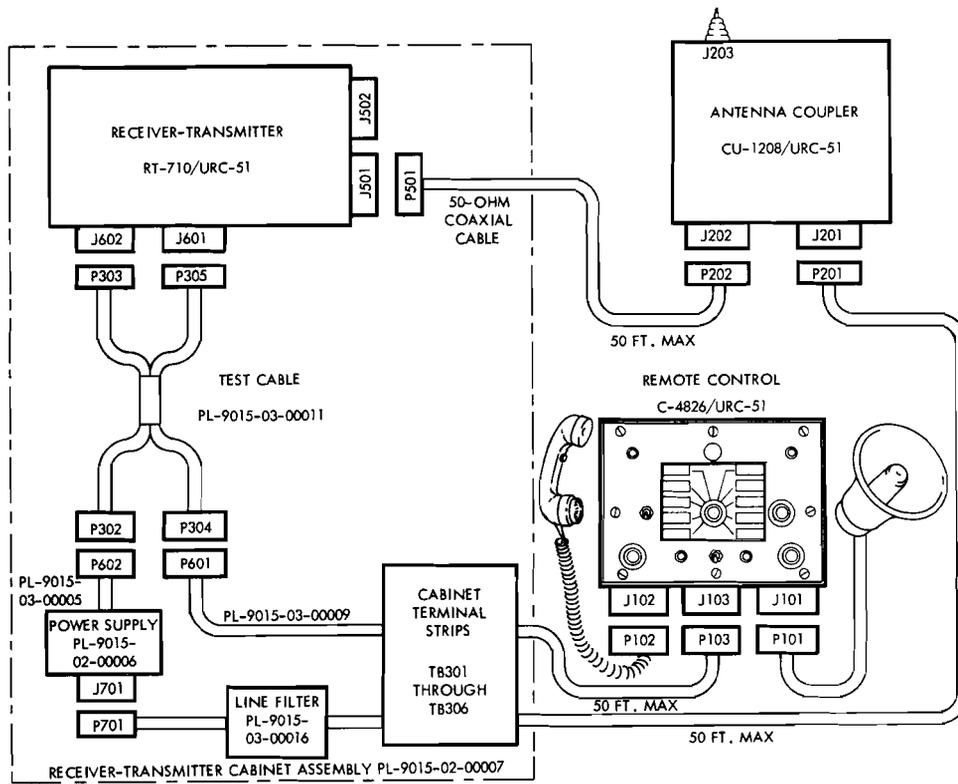


Figure 2-5. System Interconnections

TABLE 2-1  
SYSTEM CONNECTORS

CONNECTOR	QTY OF PINS	DESCRIPTION
		<u>Remote Control</u>
J101	2	Speaker, chassis mount, waterproof, female
J102	7	Microphone, chassis mount, waterproof, female
J103	26	Control, chassis mount, waterproof, male
P101	2	Speaker, cable mount, waterproof, male
P102	7	Microphone, cable mount, waterproof, male
P103	26	Control, cable mount, waterproof, female
		<u>Antenna Coupler</u>
J201	14	Control, chassis mount, waterproof, male
J202	1	RF, chassis mount, coaxial-type N, female
J203	1	Cone insulator, feedthrough
P201	14	Control, cable mount, waterproof, female
P202	1	RF, cable mount, coaxial-type N, male
		<u>Receiver-Transmitter</u>
J501	1	RF, chassis mount, coaxial-type UHF, female
J502	7	Microphone, chassis mount, waterproof, female
J601	50	Control, chassis mount, female

TABLE 2-1 (Continued)  
SYSTEM CONNECTORS

CONNECTOR	QTY OF PINS	DESCRIPTION
		<u>Receiver-Transmitter (Cont'd)</u>
J602	15	Power, chassis mount, male
P501	1	RF, cable mount, coaxial-type UHF, male
		<u>Test Cable</u>
P302	15	Power, cable mount, male
P303	15	Power, cable mount, female
P304	50	Control, cable mount, female
P305	50	Control, cable mount, male
		<u>Power Supply</u>
P602	15	Power, cable mount, female
J701	3	AC power, chassis mount, male
		<u>Line Filter</u>
P701	3	AC power, cable mount (molded), female
		<u>Cabinet Assembly</u>
P601	50	Control, cable mount, male
TB 301	12	Terminal barrier strip
TB 302	12	Terminal barrier strip
TB 303	12	Terminal barrier strip
TB 304	12	Terminal barrier strip
TB 305	12	Terminal barrier strip
TB 306	12	Terminal barrier strip

TABLE 2-2

EXTERNAL CABLE DATA  
RADIO SET AN/URC-51

FROM	TO	FUNCTION	CURRENT (amperes)	VOLTAGE (volts)	WIRE SIZE
TB301-1	C6513 remote P1-A	Channel 1 select	0.15	115, dc	20
TB301-2	C6513 remote P1-B	Channel 2 select	0.15	115, dc	20
TB301-3	C6513 remote P1-C	Channel 3 select	0.15	115, dc	20
TB301-4	C6513 remote P1-D	Channel 4 select	0.15	115, dc	20
TB301-5	C6513 remote P1-E	Channel 5 select	0.15	115, dc	20
TB301-6	C6513 remote P1-F	Channel 6 select	0.15	115, dc	20
TB301-7	C6513 remote P1-G	Channel 7 select	0.15	115, dc	20
TB301-8	C6513 remote P1-H	Channel 8 select	0.15	115, dc	20
TB301-9	C6513 remote P1-S	Channel 9 select	0.15	115, dc	20
TB301-10	C6513 remote P1-J	Channel 10 select	0.15	115, dc	20
TB301-11	C6513 remote P1-V	Channel-select common	0.15	115, dc	20
TB301-12	Not used	...	...	...	...
TB302-1	URC-51 remote P103-D	Channel search	0.15	115, dc	20
TB302-2	URC-51 remote P103-F	Channel select	0.15	115, dc	20
TB302-3	URC-51 remote P103-G	Channel select	0.15	115, dc	20
TB302-4	URC-51 remote P103-H	Channel select	0.15	115, dc	20
TB302-5	URC-51 remote P103-a	Channel select	0.15	115, dc	20
TB302-6	URC-51 remote P103-Z	On-channel lamp	0.10	115, dc	20
TB302-7	URC-51 remote P103-b	On-channel lamp	0.10	115, dc	20
TB302-8	URC-51 remote P103-E	Channel-select common	0.15	115, dc	20
TB302-9	C1138 remote E102-7	Negative 12 volts	1.5	12, dc	20
TB302-10	Line Filter	AC mains	5.0	115, ac	14
TB302-11	Line Filter	Ground	...	...	14
TB302-12	Line Filter	AC mains	5.0	115, ac	14
TB303-1	Antenna Tuner P201-A	Channel select	0.15	115, dc	20
TB303-2	Antenna Tuner P201-B	Channel select	0.15	115, dc	20

TABLE 2-2 (Continued)

EXTERNAL CABLE DATA  
RADIO SET AN/URC-51

FROM	TO	FUNCTION	CURRENT (amperes)	VOLTAGE (volts)	WIRE SIZE					
TB303-3	Antenna Tuner P201-C	Channel select	0.15	115, dc	20					
TB303-4	Antenna Tuner P201-D	Channel select	0.15	115, dc	20					
TB303-5	Antenna Tuner P201-E	Channel-select common	0.15	115, dc	20					
TB303-6	Antenna Tuner P201-H	Tone, On/Off	0.02	5, dc	20					
TB303-7	Antenna Tuner P201-J	Test, On/Off	0.01	20, dc	20					
TB303-8	Antenna Tuner P201-K	Test/Tone Ground	0.03	20, dc	20					
TB303-9	URC-51 remote P103-J	Negative 12 volts	1.5	12, dc	20					
TB303-10	These three positions are reserved for external use. The relay contacts									
TB303-11						are one form "C" and are rated at 3 amperes for 30 volts dc or 115 volts				
TB303-12										
TB304-1	C1138 remote E102-5	Key to ground	0.01	20, dc	20					
TB304-2	C1138 remote E102-6	Keying ground	0.01	20, dc	20					
TB304-3	Not used	...	...	...	...					
TB304-4	C1138 remote E102-8	Positive 12 volts	1.5	12, dc	20					
TB304-5	C1138 remote E102-9	600-ohm transmitter audio	...	...	20					
TB304-6	C1138 remote E102-10	600-ohm transmitter audio	...	...	20					
TB304-7	C1138 remote E103-14	600-ohm receiver audio	...	...	20					
TB304-8	C1138 remote E103-13	600-ohm receiver audio	...	...	20					
TB304-9	C1138 remote E103-E	Carrier-on hot	0.01	115, dc	20					
TB304-10	C1138 remote E103-D	Carrier-on ground	0.01	...	20					
TB304-11	C1138 remote E103-B	600-ohm receiver audio	...	...	20					
TB304-12	C1138 remote E103-A	600-ohm receiver audio	...	...	20					
TB305-1	C6513 remote P1-R	600-ohm receiver audio	...	...	20					
TB305-2	C6513 remote P1-T	600-ohm receiver audio	...	...	20					
TB305-3	C6513 remote P1-P	600-ohm transmitter audio	...	...	20					
TB305-4	C6513 remote P1-U	600-ohm transmitter audio	...	...	20					

TABLE 2-2 (Continued)

EXTERNAL CABLE DATA  
RADIO SET AN/URC-51

FROM	TO	FUNCTION	CURRENT (amperes)	VOLTAGE (volts)	WIRE SIZE
TB305-5	C6513 remote P1-M	Key to ground	0.01	20, dc	20
TB305-6	C6513 remote P1-N	Keying ground	0.01	...	20
TB305-7	URC-51 remote P103-S	System ground	0.50	...	20
TB305-8	URC-51 remote P103-R	RF attenuation	0.01	150, dc	20
TB305-9	URC-51 remote P103-A	Squelch	0.01	5, dc	20
TB305-10	URC-51 remote P103-B	Squelch	0.01	5, dc	20
TB305-11	Not used	...	...	...	...
TB305-12	Not used	...	...	...	...
TB306-1	Antenna Tuner P201-F	Space heater	1.0	115, ac	20
TB306-2	Antenna Tuner P201-G	Space heater	1.0	115, ac	20
TB306-3	URC-51 remote P103-L	Power switch	1.0	-12, dc	20
TB306-4	URC-51 remote P103-P	Key to ground	0.01	20, dc	20
TB306-5	URC-51 remote P103-T	Key to ground	0.01	20, dc	20
TB306-6	URC-51 remote P103-K	High/Low switch	0.01	150, dc	20
TB306-7	URC-51 remote P103-M	High/Low lamps	0.10	12, ac	20
TB306-8	URC-51 remote P103-X	500-ohm receiver audio	...	...	20
TB306-9	URC-51 remote P103-W	500-ohm receiver audio	...	...	20
TB306-10	Not used	...	...	...	...
TB306-11	URC-51 remote P103-V	Microphone ground	0.01	15, dc	20
TB306-12	URC-51 remote P103-U	Microphone hot	0.01	15, dc	20

TABLE 2-3  
SUMMARY OF WIRE RUNS

FROM	TO	MINIMUM RECOMMENDED	
		WIRE QUANTITY	WIRE SIZE
TB301 and TB305	C6513/URC Remote Control	17	20
TB302, TB303, TB305, and TB306	C4826/URC-51 Remote Control	22	20
TB303 and TB306	CU-1208/URC-51 Antenna Coupler	10	20
TB302 and TB304	C-1138B/UR Remote Control	12	20
TB302	115 Volts, AC, Mains	3	14
TB303	Spare Form "C"	3	18

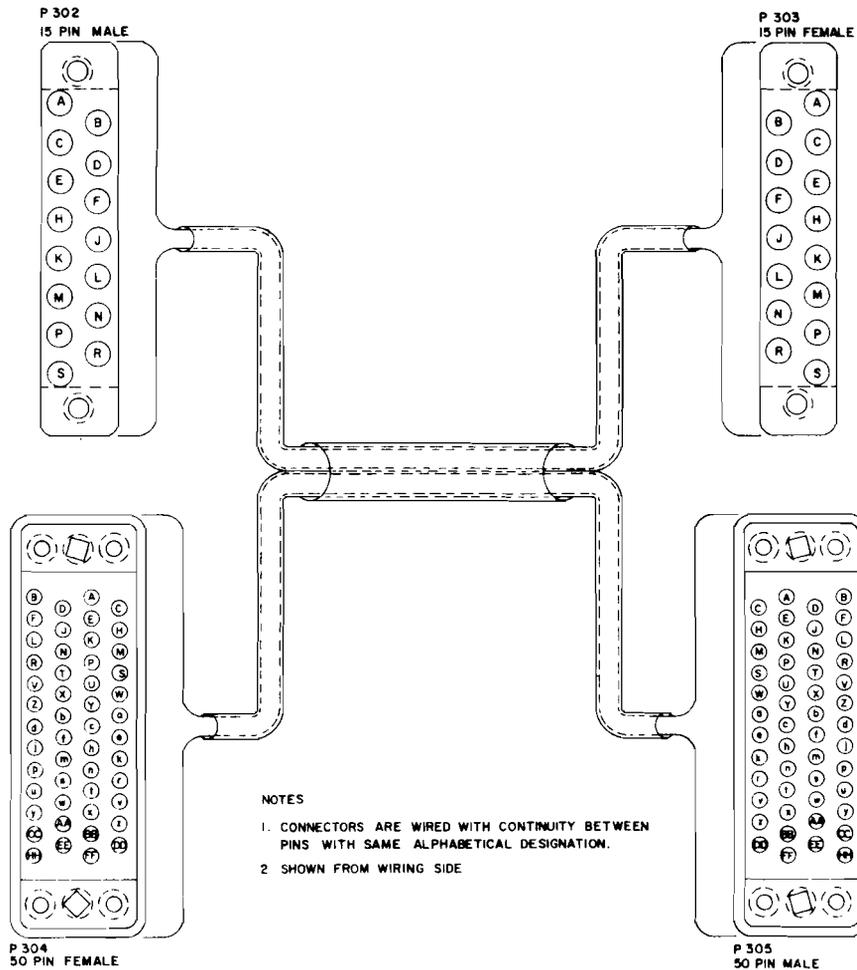


Figure 2-6. Test-Cable Connector Nomenclature

SECTION III

OPERATING INSTRUCTIONS

## SECTION III

## OPERATING INSTRUCTIONS

## 3-1 REMOTE OPERATION

## 3-1.1 Controls and Indicators

Radio Set AN/URC-51 is usually operated from a remote position by means of the operating controls and indicators located on Remote Control C-4826/URC-51. The controls and indicators are identified in Figure 3-1 and described in Table 3-1.

## 3-1.2 Procedures

## NOTE

Before attempting to operate, assure that set is aligned and checked for operation on the specified channels (see Section IV for alignment instructions if necessary).

## a. Preliminary Procedures

1. Switch OFF-RCVR ONLY-RCVR/XMTR toggle switch to RCVR/XMTR position.
2. Adjust dimmer on green lamp and SEARCH/DIMMER knob for panel lamp to meet the lighting requirements.
3. Select proper channel with center knob and press SEARCH/DIMMER knob until the red ON CHANNEL/FLASH FOR OVERLOAD light comes on.
4. Adjust VOLUME and SQUELCH controls to suit.
5. Select high or low power with OUTPUT toggle switch.
6. Press ATTN knob to reduce strong signals when required.

## b. Operating Procedures

1. Press Handset pushbutton to talk. Talk close to mouthpiece, speak up, but do not shout.
2. Release pushbutton to receive.

## c. Shutdown Procedure

Switch OFF-RCVR ONLY-RCVR/XMTR toggle switch to OFF position.

## 3-2 LOCAL OPERATION

## 3-2.1 Controls and Indicators

During adjustment, the Radio Set may be operated locally from the panel (normally covered) in the Receiver-Transmitter enclosure. The controls for local operation are identified and described in Figure 3-2 and Table 3-2.

## 3-2.2 Procedures

## NOTE

Before attempting to operate, assure that set is aligned and checked for operation on the specified channels (see Section IV for alignment instructions if necessary).

## a. Preoperational Procedures

1. Connect the Handset to the local HANDSET connector.
2. Switch the REMOTE, LOCAL level switch to the LOCAL position.
3. Select HIGH or LOW power with the OUTPUT toggle switch.
4. Switch the POWER CONTROL ON/OFF toggle switch on the power supply to the ON position.
5. Adjust the VOLUME control to suit.

## b. Operating Procedures

1. Use the Handset pushbutton to control reception and transmission.
2. Press to talk. Talk close to the mouthpiece; speak up, but do not shout.
3. Release pushbutton to receive.

## c. Turn-off Procedure

Switch POWER CONTROL ON/OFF toggle switch on the power supply to the OFF position.

## d. Control Transfer

1. Remove the Handset from the local connector.
2. Switch the REMOTE/LOCAL lever switch to the REMOTE position.
3. Replace the lid on the Receiver-Transmitter cabinet. Lid replacement transfers power control to the Remote-Control unit.

## e. Manual Operation of Rotary Solenoids

To operate the rotary solenoids manually, use the following procedure:

1. Remove the cover of the Receiver-Transmitter cabinet and turn the LEDEX ON/OFF switch on the Transmitter chassis (Figure 6-1, Index No. 32) to OFF.
2. Open the Antenna Coupler and turn the numbered coupling wheel in the direction of progressively higher numbers to reach the desired channel.
3. When the desired channel number is at the top, rotate the wheel in the opposite direction slightly to engage the ratchet.
4. Replace the cover of the Antenna Coupler.
5. Refer to the front panel of the Receiver-Transmitter unit, read the instructions and, using a screwdriver, rotate the shaft counterclockwise until the desired channel number appears in the hole above the shaft.
6. Rotate the shaft counterclockwise until the number is slightly past the center of the hole and then rotate it clockwise to the ratchet stop.
7. Leave the LEDEX ON/OFF switch in the OFF position until the trouble is located and corrected.
8. Turn the CHANNEL SELECTOR on the Remote Control to the desired channel to indicate where the rotary solenoids were positioned.

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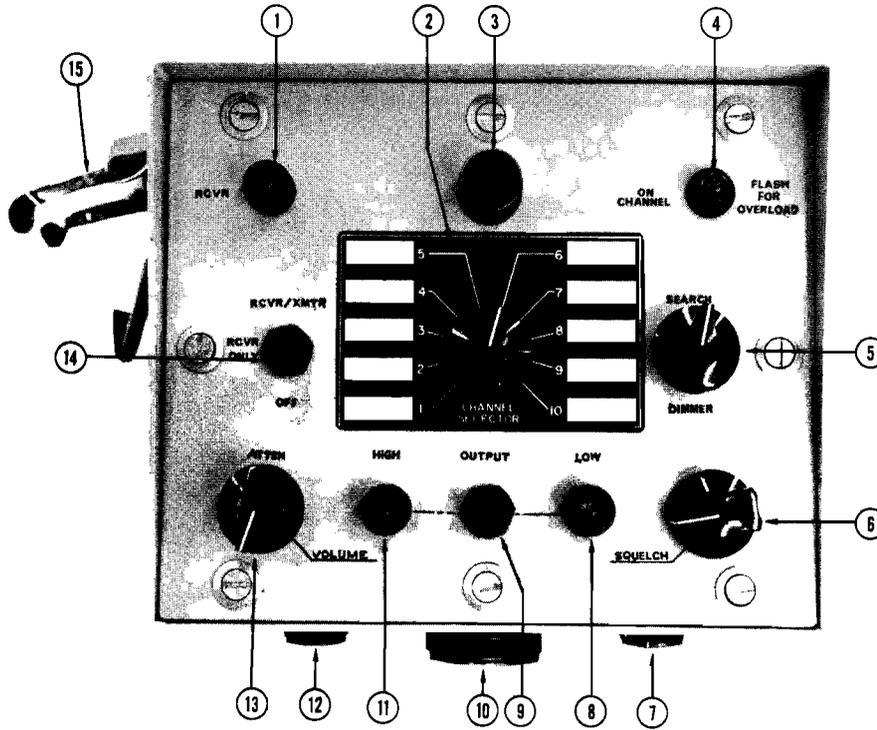


Figure 3-1. Operating Controls, Indicators, and Connectors, Remote Control C-4826/URC-51

TABLE 3-1

OPERATING CONTROLS, INDICATORS, AND CONNECTORS  
REMOTE CONTROL C-4826/URC-51

FIGURE 3-1 INDEX NO.	PANEL MARKING	SYMBOL	DESCRIPTION
1	RCVR (green jewel)	PL101	Lamp indicates power-on condition. Lamp operates in RCVR ONLY and RCVR/XMTR positions of control listed under 14, below. To dim, turn clockwise; to brighten, turn counterclockwise.
2	CHANNEL SELECTOR	S105	Control selects channel desired. There is an area near each position in which frequency may be written, using a soft lead pencil.
3	Panel light (clear jewel)	PL102	Lamp lights panel and channel selector. To control brightness, turn SEARCH knob. Light is out when knob is fully counterclockwise.
4	ON CHANNEL/ FLASH FOR OVERLOAD (red jewel)	PL105	Lamp indicates that unit is on channel. SEARCH knob must be pushed to create this condition. When light is flashing, final amplifier is in overload condition and must be reset inside transceiver enclosure before unit can be keyed.
5	SEARCH/DIMMER	R105/ S102	Turn knob to control brightness of panel lamp. Push knob to change channels (after selecting with CHANNEL SELECTOR control). The SEARCH/DIMMER knob on the Remote Control panel performs two different functions. When the knob is pressed in towards the panel, a three-pole

TABLE 3-1 (Continued)

OPERATING CONTROLS, INDICATORS, AND CONNECTORS  
REMOTE CONTROL C-4826/URC-51

FIGURE 3-1 INDEX NO.	PANEL MARKING	SYMBOL	DESCRIPTION
5 (Continued)	SEARCH/DIMMER	R105/ S102	switch is activated which operates the Ledex rotary solenoid to change channels, opens the keying line so that the unit cannot be keyed while changing channels, and shorts out the speaker so that the make/break contact arcing cannot be heard. When the knob is released, a spring returns the switch to its normal position. When the knob is rotated clockwise, the panel illuminating lamp is brightened. When the knob is rotated counterclockwise, the panel lamp is dimmed. At the extreme counterclockwise position, the control opens like a switch and the lamp goes out completely.
6	SQUELCH	R106	Squelch partially quiets Receiver during no-signal periods. Maximum quieting occurs with control in maximum counterclockwise position.
7	Speaker connector	J101	Connector for Loudspeaker.
8	LOW (amber jewel)	PL104	Indicates that final amplifier is in low-power condition. To brighten, turn clockwise; to dim, turn counterclockwise.
9	OUTPUT	S103	Selects high or low power output. The HIGH/LOW OUTPUT switch on the Remote Control panel has two functions. It selects the correct lamp to be lit when the unit is keyed and it selects the proper bias voltage for the second IF tube (which is directly responsible for the drive to the final-amplifier stage).
10	Control connector	J103	Connector for P103 on control cable to Receiver-Transmitter.
11	HIGH (red jewel)	PL103	Indicates that final amplifier is in high-power condition. To brighten, turn clockwise; to dim, turn counterclockwise.
12	Handset connector	J102	Connector for Handset.
13	VOLUME/ATTEN	R103/ S104	Audio volume control for Loudspeaker and Handset earpiece level. When knob is pushed in, Receiver sensitivity is reduced to eliminate overload from nearby transmitters. The VOLUME/ATTEN control on the Remote Control panel performs two different functions. When the knob is rotated, it controls the level of audio fed to the speaker. When the knob is pressed in toward the panel, it activates a SPST normally closed switch. In the normally closed position, the Receiver is controlled by its own agc voltage. Diode CR502 keeps the agc bus isolated from the ATTEN circuit. In the ATTEN position (knob pressed in toward the panel), a preadjusted value of negative voltage is applied to the agc bus through Diode CR502 and controls the gain of the Receiver.
14	OFF RCVR ONLY RCVR/XMTR	S101	OFF: Power is supplied to crystal ovens, -12 volts, and space heaters only. RCVR ONLY: Space heaters are off; Receiver is on, and keying line is open so that unit cannot transmit. RCVR/XMTR: System is ready to transmit, Receiver is on when set is not keyed.
15	Handset hanger	...	Stowage for Handset. To remove Handset, pull lower end of Handset away from side of Remote Control enclosure and pull down.

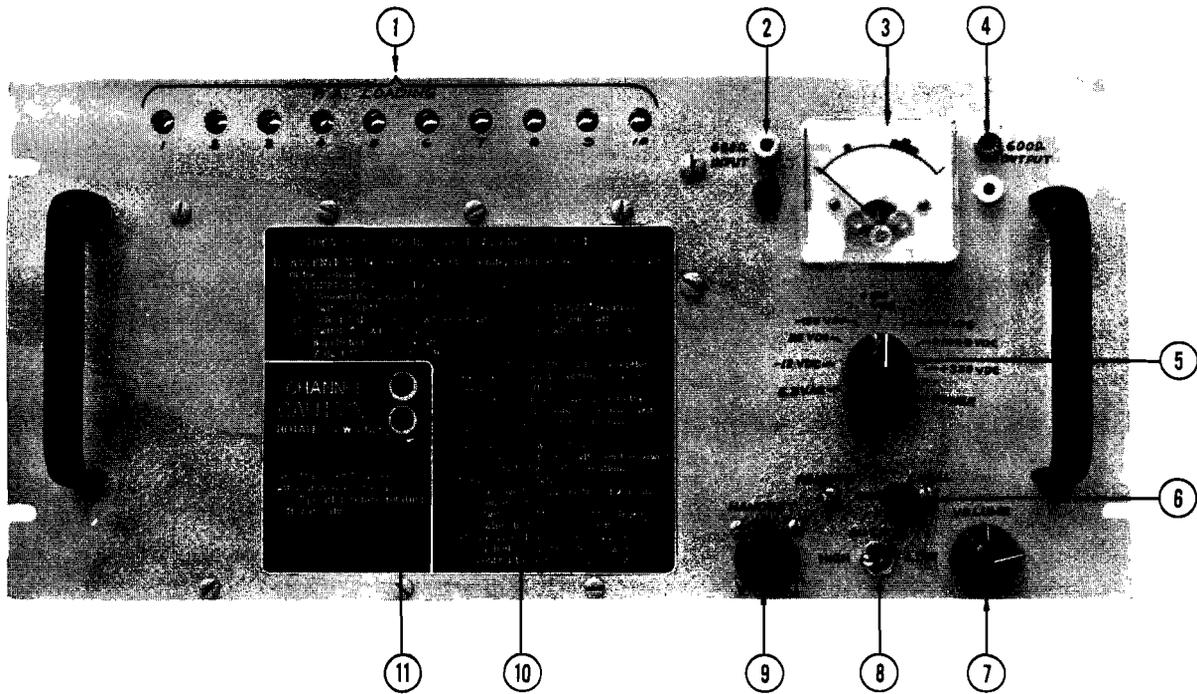


Figure 3-2. Operating Controls, Indicators, and Connectors, Receiver-Transmitter RT-710/URC-51

TABLE 3-2

OPERATING CONTROLS, INDICATORS, AND CONNECTORS  
RECEIVER-TRANSMITTER RT-710/URC-51

FIGURE 3-2 INDEX NO.	PANEL MARKING	SYMBOL	DESCRIPTION
1	P.A. LOADING	C582 through C591	Final amplifier loading capacitors for all channels, 1 through 10.
2	600 $\Omega$ INPUT	TP504/ TP505	Audio input at 600-ohm impedance from remote telephone lines. Level is from -5 to +15 dbm.
3	METER	M701	Meter indicates normal operating voltages as selected by METER switch. Upper red area is for all readings except for LOW power indication. LOW power indication is on red area at approximately 1/4 scale.
4	600 $\Omega$ OUTPUT	TP608/ TP609	Audio output from Receiver at 600-ohm impedance and +9 dbm level are available at these connections for use with the TS-2174/U Test Set during netting.
5	METER switch	S701	Switch selects voltage to be indicated on meter.
6	LOCAL/REMOTE	S506	Switch transfers HIGH/LOW output control, keying, and speech input to Transmitter.
7	VOLUME	R503	Audio volume control for local Handset earpiece level.
8	OUTPUT/HIGH/ LOW	S507	When LOCAL/REMOTE switch is in LOCAL position, OUTPUT/HIGH/LOW switch selects either HIGH or LOW power output.
9	HANDSET	J502	Connector for local Handset. Push-to-talk switch on Handset keys Transmitter only when LOCAL/REMOTE switch is in LOCAL position.
10	CHANNEL	...	Dial is visible through hole and indicates channel in use.
11	Shaft end	...	Slotted shaft end is for mechanically changing channels when the Ledex system has failed or when the electronic technician desires to change channels locally. Use a screwdriver and turn the shaft counterclockwise only. It is advisable to turn off the Ledex voltage at the rear of the transceiver chassis before rotating the shaft.

SECTION IV

ALIGNMENT PROCEDURES

**SECTION IV**  
**ALIGNMENT PROCEDURES**

**4-1 RECEIVER AND TRANSMITTER**

**4-1.1 General**

This section contains all the instructions necessary for the initial alignment of a set that has never been aligned. These procedures are therefore organized so that they can be performed in sequence (paragraph 4-1.3, Prealignment Procedures; 4-1.4, Receiver Alignment; 4-1.4.1, IF Alignment; 4-1.4.2, RF Alignment; etc.) without disturbing the test equipment. However, each procedure begins and ends with test-equipment connection and removal instructions for use when only certain procedures are performed on previously aligned sets.

Under normal conditions, a previously aligned Radio Set will need only the following adjustments during channel-frequency changes:

- a. Prealignment Procedures (paragraph 4-1.3).
- b. Receiver RF Alignment (paragraph 4-1.4.2).
- c. Transmitter Audio Adjustment and RF Channel Alignment (paragraph 4-1.5.2); the audio gain adjustments in this procedure may be eliminated.
- d. Power Adjustment (paragraph 4-1.5.4).
- e. Antenna Coupler (paragraph 4-2.).

**4-1.2 Worksheet Preparation**

Before attempting to align the Receiver or Transmitter, whether for one channel or for all 10, it is necessary to fill out one of the worksheets in the back of the manual. As an example, assume that it is desired to operate on Channel 6 at a frequency of 2182 kc in the AME mode.

- a. Go down the first column of the worksheet to CHAN POS'N 6 (see Figure 4-1).

b. Column 2 of the worksheet indicates that all the wires used to program the final amplifier for Channel 6 and the locknut on the proper final amplifier tuning capacitor are colored blue. Table 4-1 is the channel color guide.

TABLE 4-1  
COLOR CODE FOR AME/SSB CHANNEL PROGRAMMING\*

CHANNEL	COLOR
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray
9	White
10	Black

\*Locknuts on final-amplifier tuning capacitors C582 through C591, wires in the final amplifier, and terminals and wires in the Antenna Coupler.

CHAN POS'N	COLOR	CHAN FREQ (KC)	XTAL FREQ (KC)	COIL COLORS			PB501 C595 X or Z NOTE 2	PB502 C578-81 E-F-G-H NOTE 2	PB502 1508 TAP # NOTE 3	PB502 C592-3-4 A-B-C-D NOTE 2	PB503 L509 TAP # NOTE 3	PB601 SSB AME
				4TH	DOT	NOTE 1						
				1ST	2ND	3RD						
6	BLU	2182	3832	RED	BLK	GRN	X	E	5	A	5	AME

Figure 4-1. Example of Worksheet with Data for One Channel Entered

c. Enter the channel frequency (2182 kc) in the CHAN FREQ (KC) column.

d. Enter the crystal frequency in the XTAL FREQ (KC) column (2182 + 1650 = 3832).

e. From Table 4-2 (coil chart), enter the first three color dots for the 2182-kc frequency in the DOT COLORS column. The range is 2 to 3 Mc; therefore, the colors are red, black, and green, respectively.

f. From the capacitor program chart on the bottom of the worksheet, note that the X tap is used in the 2.0- to 16-Mc range for Program Board PB501, E for Program Board PB502, and A for Program Board PB502. Enter these letters in the appropriate columns.

g. Use Figure 4-2 to locate the taps for L508 and L509 for 2182 kc. Note that the tap is No. 5 for both coils.

h. Enter "AME" in the last column.

The Programming Boards, in conjunction with gang Switch S501, add capacitors or inductance to the Transmitter Final-Amplifier output circuit to obtain resonance at the selected channel frequency. Their functions are defined as follows:

a. PB501 - Places a 25-pf capacitor (C595) in series with the plate-tuning capacitors for the higher frequencies.

b. PB502 (A, B, C, D) - Adds parallel capacitance (1200 pf for C592, 800 pf for C593, and 400 pf for C594) to the antenna-loading capacitors for the lower frequencies.

NOTE

Capacitors C592, C593, and C594 are not adjustable.

c. PB502 (E, F, G, H) - Adds parallel capacitance (150 pf, each, for capacitors C578 through C581) to the plate-tuning capacitors for the lower frequencies.

d. PB502 (L508) - Selects taps on Final-Amplifier-plate, pi-network coil L508, for the desired channel.

e. PB503 (L509) - Selects taps on Final-Amplifier-plate, L-network coil L509 for the desired channel.

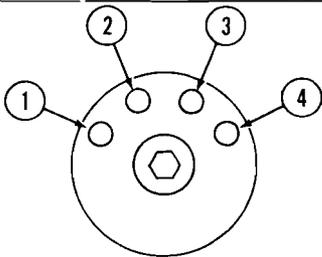
4-1.3 Prelignment Procedures

4-1.3.1 General

The prealignment procedures involve selecting the Receiver antenna and mixer coils and making the proper connections on the Programming Boards in the Transmitter Final-Amplifier tank circuits for the desired channels.

TABLE 4-2

PLUG-IN COIL COLOR CODES

CONFIGURATION	COIL FREQUENCY RANGES (MC)	DOT COLOR			
		1	2	3	4
 <p>PLUG-IN COILS, TOP VIEW. The first three color dots combine to indicate the low-frequency end of the range in cycles per second. The fourth color dot is the function indicator.</p>	2 to 3	Red	Black	Green	See Note 1
	2.5 to 4	Red	Green	Green	
	3.5 to 6	Orange	Green	Green	
	5.5 to 9	Green	Green	Green	
	8.5 to 14	Gray	Green	Green	
	13.0 to 18	Brown	Orange	Blue	
<p>Note 1. Colors for Dot 4:</p> <ul style="list-style-type: none"> <li>Brown - Receiver Antenna</li> <li>Red - Receiver Mixer</li> <li>Orange - Transmitter Mixer</li> <li>Yellow - Transmitter Driver</li> </ul>					

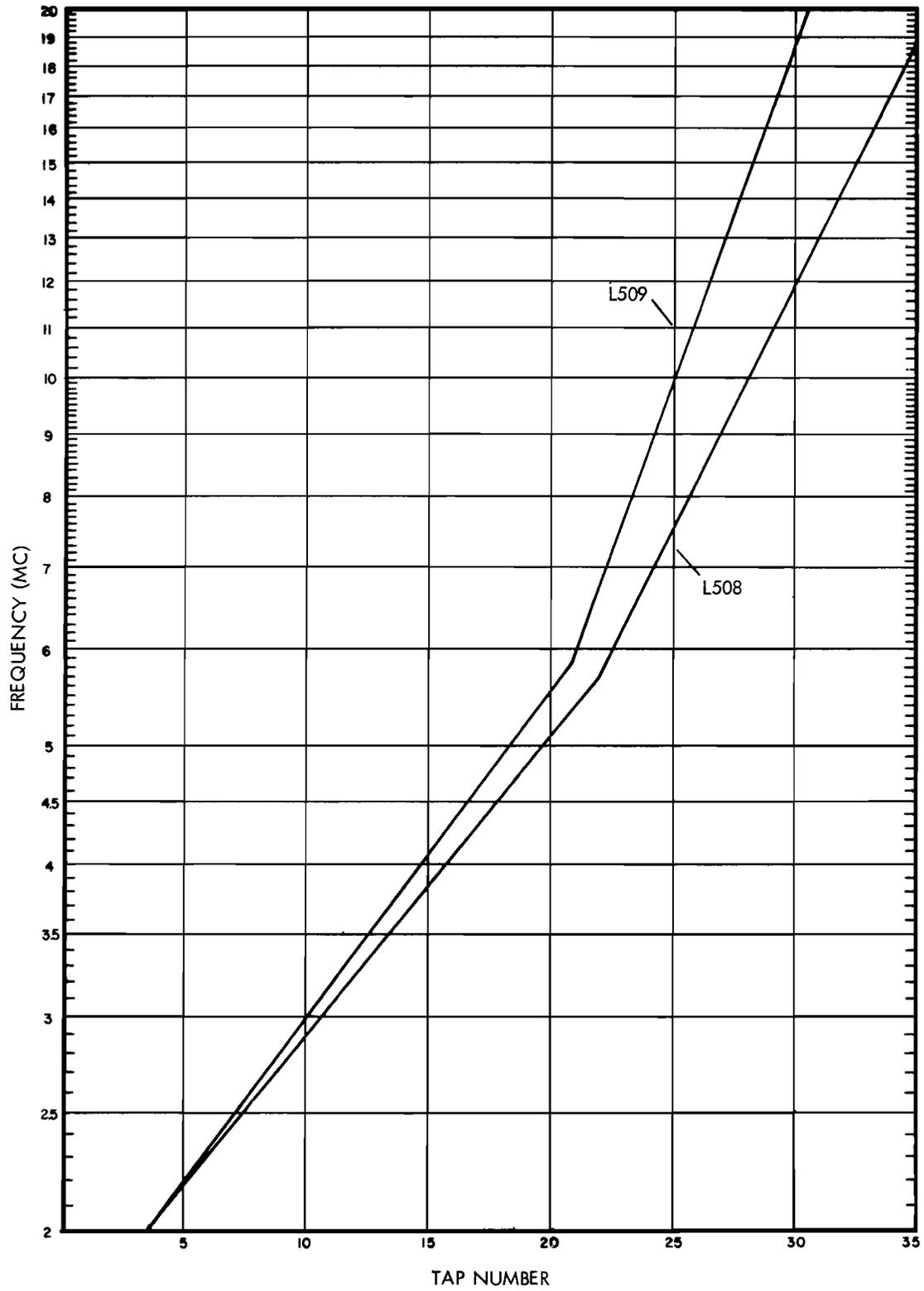
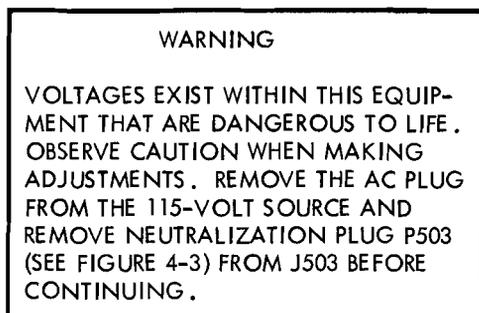


Figure 4-2. Tap Chart for Final-Amplifier Output Coils L508 and L509

### 4-1.3.2 Procedures

Use the completed worksheet as a guide while preparing the Receiver and Transmitter for alignment. All figure index numbers in the following paragraphs refer to callouts in Figure 6-1 and Table 6-1.



a. Select the proper crystal and install it in the proper oven holder. Refer to the illustration of the label (Figure 1-3 in Section I), which is on the crystal oven bracket, for the location of each crystal socket. Mark the frequency on the label and on the front panel of the Remote Control, using a soft lead pencil.

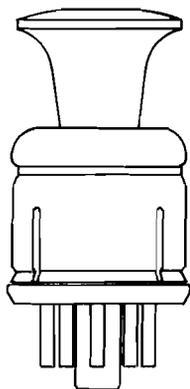


Figure 4-3. Neutralization Plug P503  
(Index No. 40, Figure 6-1)

b. Select the proper coils in accordance with the color code and install them in the proper sockets. Refer to the DOT COLOR columns in the worksheet and to Table 4-2. Refer to Figure 6-1 and Table 6-1 to locate these coils; Index No. 17 for the Receiver mixer coils, 14 for the Transmitter mixer coils, and 11 for the Transmitter driver coils. Note that the Figure Index Number indicates the Channel 1 coil, which is on the end of the entire line

of 10 coils; the Channel 10 coil is the coil nearest the IF chassis. The same is true of the drive-adjustment controls (Index No. 12) and the channel frequency trimmers (Index No. 15).

c. Locate Program Board PB501 from Figure 4-4 and connect the 10 colored wires from Switch S501S (Ledex-controlled) to either the four X posts or the single Z post. Spread the wires among the X posts evenly.

d. Locate Program Board PB502 on Figure 4-4 and connect the 10 colored wires from S501T to E, F, G, or H as required.

e. Locate terminals 1 through 40 on Program Board PB502 and connect the 10 colored wires from S501U to the proper terminals.

f. Connect the 10 colored wires from Switch S501W to Program Board PB502 A, B, C, or D as required.

g. Locate Program Board PB503 on Figure 4-4 and connect the 10 colored wires from Switch S501V to terminals 1 through 30 as required.

h. Remove the clear plastic cover from AME/SSB Program Board PB601 (Index No. 22). Program all 10 wires for SSB temporarily by lifting them from the terminals and leaving them in midair.

### 4-1.4 Receiver Alignment

#### 4-1.4.1 IF Stages

All index numbers referred to in the following paragraphs are callouts in Table 6-1 and Figure 6-1 in Section VI unless otherwise stated.

a. Connect a voltmeter to TP606 (Index No. 50), which monitors the agc bus. Set the voltmeter at the -3 volts, dc, scale for a VTVM or at the -2.5 volts, dc, scale for a VOM.

b. Connect an audio wattmeter to the 600 OUTPUT terminals, TP608 and TP609, on the front panel (Figure 3-2, Index No. 7) and set the impedance for 600 ohms. (This may be metered with a VOM at the second audio amplifier plate at TP607, Index No. 54).

c. Connect the equipment to the 115-volt, ac, source and turn the power switch to ON at the Power Supply.

d. Set the CHANNEL SELECTOR on the Remote Control to the lowest frequency channel in use. Press the SEARCH knob until the ON CHANNEL light comes on.

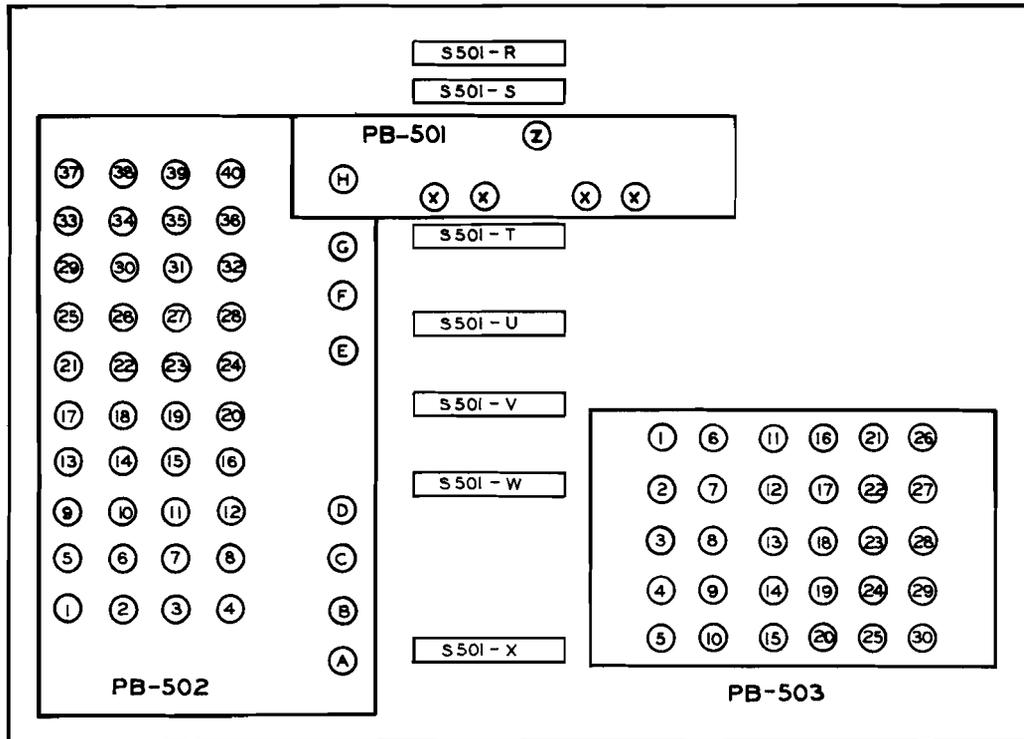


Figure 4-4. Program-Board Nomenclature for Transmitter Final Amplifier

e. Using a signal generator (HP 606 or equivalent), inject a 1650-kc signal at approximately a one-volt level into the first IF plate at TP 603 (Index No. 47). Adjust the frequency of the signal generator for an audio signal at the speaker of approximately 1,000 cps, then peak IF transformers T623, T624, and T626 (Index Nos. 65, 56, and 62) for a maximum voltage reading on the voltmeter, reducing the level of the signal from the generator to maintain approximately -2 volts, dc, on a VTVM and -0.25 volt, dc, on a VOM, at TP 606.

f. Transfer the output of the generator from TP603 to TP602, the rf injection point (BNC connector, Index No. 22). Peak IF transformers T621, T622, T623, T624, and T626 (Index Nos. 30, 32, 65, 49, and 62) as in step e, above.

g. Transfer the output of the generator from TP602 to the Antenna Connector, which is located on the rear of the Receiver-Transmitter behind the IF chassis. Peak T621, T622, T623, T624, and T626 as in step f, above, maintaining the generator output for approximately -2 volts, dc, on a VTVM and -0.25 volt, dc, on a VOM, at TP606.

Note that these IF transformers are all tuned both top and bottom, with the exception of T623, which is tuned from the bottom only.

There may be some interaction between the tuning of the

bottom slug of T621 and the top slug of T622. If there is interaction, repeat the tuning for minimum interaction while maintaining the peak on the voltmeter connected to TP606.

h. Adjust the third-IF output at T625 (Index No. 37), for a maximum audio output as monitored on the audio wattmeter connected to the 600-ohm audio output terminals, TP608 and TP609, on the front panel (Figure 3-2, Index No. 4); this output may be monitored with a VOM at the second-audio output plate, TP607 (Index No. 54). Peak both the top and bottom slugs (Index Nos. 51 and 57, respectively).

i. Deenergize the equipment by means of the Power Supply switch.

j. Connect a wire from ground to the AME/SSB Program Board (Index No. 21). The point where the three sections of the terminal strip closest to the center of the chassis are jumpered together is the proper place. Loosen one screw, slip the ground lead underneath, and tighten the screw. All channels are now in AME.

k. Energize the equipment by means of the Power Supply switch.

l. With the generator still at the same settings as in step h, turn on the 400-cps modulation and set the level at 30-percent modulation.

m. Adjust T625 (Index Nos. 51 and 62) for maximum audio output as monitored on the audio wattmeter connected to TP608 and TP609 (or VOM at TP607). Peak both the top and bottom slugs.

n. Because of the possibilities for uneven loading at T625 by the two detector circuits, the audio output must be balanced so that the same reading is observed at the audio wattmeter connected to TP608 and TP609 (or on the voltmeter at TP607) for both AME and SSB. In order to do this, tune the top slug of T625 only while alternately grounding and ungrounding the AME/SSB Program Board, PB601. It will not be necessary to remove the 400 cps at 30-percent-modulated tone when going to SSB.

#### 4-1.4.2 RF Alignment

a. With the equipment deenergized (Power Supply switch off), connect a signal generator (HP 606 or equivalent) to the Antenna Connector, which is located on the rear of the Receiver-Transmitter behind the IF chassis.

b. Connect a voltmeter to TP606 (Index No. 50), which monitors the agc bus. Set the voltmeter at the -3-volts, dc, scale for a VTVM or at the -2.5-volts, dc, scale for a VOM.

c. Remove the AME/SSB Program Board (Index No. 21) grounding wire and leave all program leads disconnected for operation in SSB.

d. Energize the equipment by means of the Power Supply switch.

e. Set the signal generator on CW at the frequency of the channel being aligned and then move off-frequency slightly to obtain a 1000-cps note in the Speaker. Adjust the level of the generator for a voltage reading of approximately -2 volts, dc, on a VTVM and -0.25 volt, dc, on a VOM, at TP606.

f. Connect a frequency counter to the balanced mixer grid at TP509 (Index No. 16) and adjust the channel frequency trimmer (Index No. 15) to the proper frequency for the channel being aligned.

g. Transfer the frequency counter to the product-detector test point, TP604 (Index No. 2), and adjust the 1650-kc oscillator trimmer (Index No. 20) for 1650 kc.

h. Disconnect the frequency counter.

i. Tune the associated antenna coils, T601 through T610 (Index No. 18), and the associated mixer coils, T611 through T620 (Index No. 17), for a maximum voltage reading on a voltmeter connected to TP606.

Note that there are two slugs in each of these two coils. They should be tuned as shown in Figure 4-5.

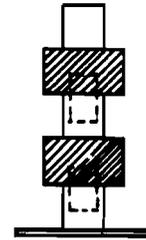


Figure 4-5. Slug-Tuning Arrangement in Receiver Coils

Start tuning with the slugs fully apart, the top slug all the way up and the bottom slug all the way down. Tune the top slug first, down into the coil until the second peak. Tune the bottom slug up into the coil until the first peak. Go back to the top slug and repeak. A small amount of touchup may be required to eliminate interaction. It should be possible to obtain -2 volts, dc, on a VTVM and -0.25 volt, dc, on a VOM, at TP606 from an input signal level of between 0.5 and 2  $\mu$ v below 10 Mc and up to 5  $\mu$ v at the higher frequencies above 10 Mc.

#### 4-1.4.3 IF Trap

a. With the equipment deenergized (Power Supply switch off), connect a signal generator (HP 606 or equivalent) to the Antenna Connector, which is located on the rear of the Receiver-Transmitter behind the IF chassis.

b. Connect a voltmeter to TP606 (Index No. 50), which monitors the agc bus. Set the voltmeter at the -3-volts, dc, scale for a VTVM or at the -2.5-volts, dc, scale for a VOM.

c. Energize the equipment by means of the Power Supply switch.

d. Tune the signal generator to 1650 kc and tune off frequency slightly to obtain a 1000-cps note in the Speaker. Increase the level for a voltage reading of -2 volts, dc, on a VTVM and -0.25 volt, dc, on a VOM, at TP606. Adjust the 1650-kc trap, Z601 (Index No. 25) for a minimum reading. Increase the generator output level and readjust Z601 to hold the voltage indication at -2 volts, dc, on a VTVM and -0.25 volt, dc, on a VOM, when Z601 is in dip.

e. See Paragraph 4-1.4.7, Receiver Post-alignment Procedures.

**4-1.4.4 Audio Adjustment**

a. With the equipment deenergized (Power Supply switch off), connect a signal generator (HP 606 or equivalent) to the Antenna Connector, which is located on the rear of the Receiver-Transmitter behind the IF chassis.

b. Connect an audio wattmeter to the 600  $\Omega$  OUTPUT terminals, TP608 and TP609, on the front panel (Figure 3-2, Index No. 4) and set the impedance for 600 ohms.

c. Energize the set by means of the Power Supply switch.

d. Tune the signal generator (CW) to the channel frequency and adjust the level to 1000  $\mu\text{v}$ . Adjust the 600-ohm level control (Index No. 53) for +9 dbm on the audio wattmeter.

e. Disconnect the audio wattmeter from the 600-ohm output terminals, and reconnect it to J101 on the Remote Control in place of the Speaker. Set the audio wattmeter for 8-ohms impedance. With the signal generator still producing 1000  $\mu\text{v}$  of CW "on-channel" signal, set the 500-ohm level control (Index No. 48) for two watts on the audio wattmeter when the VOLUME control (Figure 3-1, Index No. 13) on the Remote Control is set in the maximum clockwise position.

f. See Paragraph 4-1.4.7, Receiver Post-alignment Procedures.

**4-1.4.5 Attenuation Adjustment**

a. With the equipment deenergized (Power Supply switch off), connect a signal generator (HP 606 or equivalent) to the Antenna Connector, which is located on the rear of the Receiver-Transmitter behind the IF chassis.

b. Connect an audio wattmeter to J101 on the Remote Control in place of the Speaker; set the audio wattmeter for 8-ohms impedance.

c. Energize the set by means of the Power-Supply switch.

d. Adjust the signal-generator level to 1  $\mu\text{v}$  and adjust the VOLUME control on the Remote Control for 100 mw on the audio wattmeter. Press the ATTEN/VOLUME knob on the Remote Control (Figure 3-1, Index No. 13) toward the panel, raise the level of the signal generator to 1000  $\mu\text{v}$ , and adjust the RCVR ATTN ADJ control (Index No. 27) for 100 mw on the audio wattmeter.

e. See Paragraph 4-1.4.7, Receiver Post-alignment Procedures.

**4-1.4.6 AME/SSB Programming**

a. Assure that the equipment is deenergized (Power Supply switch off).

b. Program the channels to AME or SSB as required by placing the appropriate colored wires on PB601. Refer to Index No. 22 and label illustration, Figure 1-3 in Section I. The six screw terminals toward the center of the chassis are for AME. Replace the clear plastic cover with the label on it on the studs provided.

c. See Paragraph 4-1.4.7, Receiver Post-alignment Procedures.

**4-1.4.7 Receiver Postalignment Procedures**

a. Remove test equipment.

b. If removed for the particular procedure, reconnect the Speaker to the Remote Control.

c. Replace the Neutralizing Plug P503. The unit is now ready to receive signals.

d. Connect the system antenna to Antenna Connector J501 located at the rear of the IF chassis.

**4-1.5 Transmitter****4-1.5.1 General**

The Receiver must be aligned before the Transmitter can be aligned. Unless otherwise defined, all index numbers referred to in this subsection are for Figure 6-1, Section VI.

**4-1.5.2 Audio Adjustment and RF-Channel Alignment**

Use the following steps to prepare the Transmitter for audio adjustment and rf-channel alignment.

a. Deenergize the equipment by disconnecting it at the ac source and removing Neutralizing Plug P503 (Index No. 40).

b. Connect an rf dummy load of 50-ohm impedance and 100-watt rating to Antenna Connector J501, located at the rear of the IF chassis.

c. Connect a voltmeter to the audio compressor plate at TP507 (Index No. 37).

d. Place the REMOTE/LOCAL switch on the front panel to LOCAL (Index No. 6, Figure 3-2).

e. Place the OUTPUT switch on the front panel to HIGH (Index No. 8, Figure 3-2).

Use the following procedures to adjust to adjust the audio gain.

- a. Energize the equipment by replacing the plug in the ac source. Turn on at the Power Supply.
- b. Place the TONE switch on the chassis to ON (Index No. 34).
- c. Place the TEST switch on the chassis to ON (Index No. 33).
- d. While monitoring the voltmeter, which is in TP507, set the level of the tone oscillator with the TONE control (Index No. 38) for a meter reading of 0.4 volt, ac, using a 5000-ohm-per-volt VOM or 1.5 volts, ac, using a VTVM. Note that the TONE control is protected against accidental adjustment by a plastic cap (see Figure 4-6). Be sure to replace this cap after adjusting the TONE control.



Figure 4-6. Cap for TONE Control (R531)

- e. Transfer the voltmeter from TP507 to the audio cathode follower at TP508 (Index No. 42).
- f. While monitoring the voltmeter, which is in TP508, set the level of the audio with the AUDIO GAIN control (Index No. 41) for a meter reading of 0.2 volt, ac, using a VTVM. The voltage is too low at this point to use a low-resistance VOM.
- g. Transfer the voltmeter from TP508 to the agc voltage at TP606 (Index No. 50). The meter will read approximately -0.15 volt, dc, on a VOM and -1.1 volts, dc, on a VTVM.
- h. Unkey with the TEST switch on the chassis (Index No.33).

Transfer the voltmeter from TP606 to the balanced mixer grid at TP509 (Index No. 16). This check is for channel-oscillator activity, and it will not be necessary to key the unit to make this check. The meter will read greater than 1 volt, ac, on a VOM and greater than 2 volts, ac, on a VTVM.

The rf circuits may now be tuned to the desired channel frequencies and the drive to the first amplifier adjusted.

- a. Transfer the voltmeter from TP509 to the final drive level test point, TP510 (Index No. 13).

- b. Turn the DRIVE/ADJ controls, R575 through R584, for the associated channels to the maximum clockwise position (Index No. 12).

- c. Place the TEST switch on the chassis to ON (Index No. 33).

- d. Tune the associated mixer coils, T502 through T511 (Index No. 14), and the associated driver coils, Z501 through Z510 (Index No. 11), for a maximum voltage reading on the meter connected to TP510. When the coils are all peaked, the meter should read greater than -1.3 volts, dc, on a VOM and -30 volts, dc, on a VTVM for frequencies below 10 Mc; a VOM should read -0.25 volt and a VTVM should read -5 volts for frequencies above 10 Mc.

- e. Unkey with the TEST switch on the chassis (Index No. 33).

- f. Turn off the tone oscillator at the TONE switch on the chassis (Index No. 34).

- g. Replace the Neutralizing Plug, P503 (Index No. 40).

- h. Turn the DRIVE ADJ controls R575 through R584 for the associated channels to their maximum counter clockwise position (Index No. 12).

- i. Transfer the voltmeter from TP510 to monitor the final amplifier cathode current at TP501 (Index No. 36).

- j. Place the TEST switch on the chassis to ON (Index No.33).

- k. While monitoring the final cathode current with the voltmeter in TP501, set the final bias with the FINAL BIAS ADJ control on the chassis (Index No. 26) for a reading of 0.7 volt, dc (VOM or VTVM), which is equal to 70 milliamperes of cathode current.

- l. Place the TONE switch on the chassis to ON (Index No.34).

- m. While monitoring the final cathode current with the voltmeter, which is on TP501, turn the associated DRIVE ADJ controls, R575 through 584 (Index No. 12) for a reading of -2 volts, dc.

The next steps describe the tuning and loading procedures for the final-amplifier plate pi network.

- a. Unlock and adjust the final-amplifier air variable capacitors, C568 through C577 (Index No. 10), for the associated channels for maximum power output as observed on the rf dummy load.

b. Unlock and adjust the final-amplifier compression trimmer loading capacitors, C582 through C591 (Index No. 6), for the associated channels for maximum power output as observed on the rf dummy load.

c. Repeat the adjustments in steps l and m, above, several times to make sure of the maximum output.

Note that a pronounced dip will occur in the final cathode current (as monitored by the meter at TP501) during the first adjustment of the plate capacitor. This voltage reading will increase as the loading capacitor is adjusted. Each successive dip and peak will be small in change, but higher in voltage reading. Use the voltmeter as a guide only; the final reading on the wattmeter is approximately 50 watts when the voltmeter reads approximately 1.75 volts. This is equal to 175 milliamperes of cathode current.

d. Turn off the tone oscillator at the TONE switch on the chassis (Index No. 34).

e. Unkey with the TEST switch on the chassis (Index No. 33).

f. Connect the 600-ohm output of a two-tone generator to the 600-ohm audio input terminals, TP504 and TP505 (Figure 3-2, Index No. 8). Set the tone frequencies to 1500 cps and 2500 cps, respectively, and set the level at +15 dbm. The two tones must be equal in level. The resultant voltage will be 4.4 volts, ac, across TP504 and TP505.

g. Connect a voltmeter to the agc level for the audio compressor at TP506 (Index No. 39).

h. Place the TEST switch on the chassis to ON (Index No. 33). The voltmeter will read approximately 1.0 volt, ac, on a VTVM. Do not connect a low-resistance VOM to this test point.

i. Unkey with the TEST switch on the chassis (Index No. 33).

j. Deenergize the equipment by disconnecting at the ac source.

k. Remove the clear plastic cover from the AME/SSB Program Board, PB601 (Index No. 22). Program all 10 wires for SSB temporarily by lifting them from the terminals and leaving them in midair.

l. Energize the equipment by replacing the plug in the ac source.

m. The object of the next series of alignment steps is to get the most power output with the least cathode current.

**WARNING**  
**HIGH VOLTAGE**

THE NEXT FEW STEPS OF ALIGNMENT REQUIRE ENTRY TO THE FINAL AMPLIFIER AND CONTACT WITH THE PROGRAM BOARDS TO ADJUST THE TAPS ON THE COILS. THE FINAL AMPLIFIER TUBE AREA, THE PARASITIC-SUPPRESSOR BOARD, THE TOP CAPS OF THE TUBE, AND ALL OTHER PARTS IN THE IMMEDIATE VICINITY HAVE LETHAL VOLTAGE ON THEM. REMOVE NEUTRALIZING PLUG P503 BEFORE ENTERING THIS AREA. REPLACE P503 IN ORDER TO CONTINUE ALIGNMENT AFTER EACH CHANGE.

Since the taps on the final amplifier coils, L508 and L509, were programmed initially from a graph, they can be in error by one or two turns because of stray capacitances. A group of wires in the vicinity can add enough capacitance to make a large difference, especially on the higher frequencies.

n. Place the TEST switch on the chassis to ON (Index No. 33).

o. Unlock and adjust the final-amplifier air variable capacitors, C568 through C577 (Index No. 10) to obtain maximum power output on each channel as observed on the dummy load. Simultaneously, observe the final tube cathode current at TP501.

p. Place the TEST switch on the chassis to OFF (Index No. 33).

q. Remove Neutralizing Plug P503 (Index No. 40).

r. On the final coil, L508, programmed by PB502 (see Figure 4-4), move the associated wire one tap higher for those frequencies above 6 Mc and two taps higher for those frequencies below 6 Mc.

s. Replace Neutralizing Plug P503 (Index No. 40).

t. Place the TEST switch on the chassis to ON (Index No. 33).

u. Repeat steps n, o, and p, above.

v. An increase in the power output and reduction in the cathode current indicates an improvement in efficiency.

w. Repeat steps q, r, and s, and then n, above.

x. An increase in the power output and reduction in the cathode current indicates another improvement in efficiency. Continue in this direction until no further gain is apparent.

If the efficiency does not improve in step u, above, move the taps lower and continue tuning for more efficiency. Eventually, the best tap for the desired frequency will be found.

After finding the best tap for all of the channels being aligned, repeat the whole process for antenna coil, L509, on PB503. The final-amplifier loading capacitors are compression trimmers mounted on the front-panel bracket; they are designated C582 through C591 (Index No. 6). The DRIVE ADJ controls R575 through R584 (Index No. 12) should be adjusted during tuning so that the voltmeter connected to TP501 indicates approximately -2 volts, dc, on a VTVM or on a VOM at all times.

#### 4-1.5.3 Final-Amplifier Neutralization

When Neutralizing Plug P503 (see Figure 4-3) is removed from its socket, the plate and screen-grid voltages are removed from the final-amplifier tube V509.

Use the following neutralizing procedures:

a. Remove Neutralizing Plug P503 (Index No. 40).

b. Set the equipment on the highest frequency by selecting the correct channel at the Remote Control and pressing the SEARCH switch until the ON-CHANNEL light comes on.

c. Set the fine-tuning neutralizing piston trimmer (Index No. 4) at half mesh. This trimmer is located on the parasitic-suppressor board.

d. Connect a VTVM with an rf probe capable of reading 0.001 volt, full-scale, to the rf output at the antenna relay. Use the highest range first and, as the neutralization procedures continue, increase the sensitivity of the meter to keep the reading on scale.

e. Set the TEST switch on the chassis to ON (Index No. 33).

f. Set the VTVM for an on-scale reading and Coarse-Tuning Neutralizing Capacitor C558 (Index No. 55) for a minimum reading. This capacitor is a mica compression trimmer. It is located on the final-amplifier tube assembly and must be adjusted from the underside of the chassis.

g. After reaching what appears to be a low reading, retune the plate-tuning capacitors C568 through C577 (Index No. 10) for maximum readings on their respective channels. If necessary, increase the drive to the final amplifier by means of the XMTR DRIVE ADJ controls (R575 through R584, Index No. 12) on the 10 channels. Also retune the driver coils (Z501 through Z510, Index No. 11) for maximum signal at the final amplifier grid.

h. Adjust the fine-tuning neutralizing capacitor, piston trimmer C559 (Index No. 4), for a minimum reading.

i. Alternately tune the plate capacitor for a maximum reading and the piston trimmer for a minimum reading until no further reduction is possible. A typical reading for a properly neutralized final amplifier will be less than 0.003 volt, ac.

j. Unkey by placing the TEST switch on the chassis to OFF (Index No. 33).

k. Remove the VTVM probe from the Antenna relay.

l. Insert Neutralizing Plug P503 into J503 (Index No. 40).

m. Place the TEST switch on the chassis to ON (Index No. 33) and check for power output.

n. Retune the plate-tuning capacitors, if necessary.

o. Lock the tuning capacitor with the colored nut, being careful not to turn the shaft.

p. Unkey by placing the TEST switch on the chassis to OFF (Index No. 33).

This completes the neutralization procedures.

#### 4-1.5.4 Power Adjustment

Unless otherwise defined, all index numbers referred to in this subsection are for Figure 6-1 in Section VI.

From the preceding alignment procedures, note that some channels are more efficient than others. To set the individual channels to 125 watts PEP output, follow the procedures outlined below:

a. Select the channel that produced the least power output of those below 9 Mc.

b. Set the DRIVE ADJ control (Index No. 12) for that channel to its maximum clockwise position.

c. Set the TEST switch on the chassis to ON (Index No. 33).

d. Adjust the AUDIO GAIN control in the IF chassis (Index No. 41) for 125 watts PEP output.

e. Set the DRIVE ADJ controls for the remaining channels (below 9 Mc) for 125 watts PEP output.

It is not necessary to unkey and key each time the channels are changed because the SEARCH switch unkeys when the rotary solenoid is running. It rekeys when the SEARCH knob is released.

Since most commercially available wattmeters are average-reading devices that are calibrated in rms power, they only read correctly when connected to a CW signal. The presence of complex waveforms changes the meter reading and it is impossible to predict the true power. The measurement of SSB power with commercially available wattmeters can be made only if the signal consists of two tones of equal level.

Multiply the indicated power by 2.47 to find PEP. Therefore, an indicated power of 50.6 watts is equal to 125 watts PEP. Multiplying the desired PEP by 0.405 will determine the indicated power.

f. Place the OUTPUT switch on the front panel to LOW (Index No. 2, Figure 3-2).

g. Adjust the LOW POWER ADJ control on the chassis (Index No. 28) for 20-watts PEP output.

h. Place the OUTPUT switch on the front panel to HIGH (Index No. 2, Figure 3-2).

i. Place the TEST switch on the chassis to OFF (Index No. 33).

j. Deenergize the equipment at the Power Supply.

k. Program the unit for AME by connecting a wire from ground to the three terminals that are jumpered together on the AME/SSB Program Board, PB601 (Index No. 22).

l. Remove the two-tone signal from the 600-ohm audio input terminals TP504 and TP505. Do not disturb the settings as this signal will be used again.

m. Energize the equipment at the Power Supply.

n. Place the TEST switch on the chassis to ON (Index No. 33).

o. Adjust the CARRIER LEVEL ADJ control (Index No. 29) for 40 watts as indicated on the dummy

load. The approximate range of the CARRIER LEVEL ADJ control is from 1 watt to 120 watts. Table 4-3 shows carrier power in watts for different values of db below 125 watts, PEP.

TABLE 4-3

CARRIER POWER VERSUS DB LEVEL BELOW 125 WATTS

CARRIER POWER IN WATTS	DB BELOW 125W PEP
125.00	0
111.50	0.5
99.00	1
79.00	2
62.50	3
49.80	4
39.60	5
31.30	6
25.00	7
19.80	8
15.70	9
12.50	10
3.96	15
1.25	20

p. Place the TEST switch on the chassis to OFF (Index No. 33)

q. Deenergize the equipment at the Power Supply.

r. Program the unit for SSB by removing the ground wire from AME/SSB Program Board PB601 (Index No. 22).

s. Energize the equipment at the Power Supply.

t. Rotate the AUDIO GAIN control on the IF chassis (Index No. 41) to its maximum counterclockwise position.

u. Place the TEST switch on the chassis to ON (Index No. 33).

v. The two carrier balance controls are Index No. 44, which is the capacitive control, and Index No. 43, which is the resistive control. These two controls must be adjusted until the carrier is 50 db or more below 125 watts PEP. This is 0.158 volt across the 50-ohm dummy

load. Since the scale on the usual wattmeter does not read below one watt, the carrier suppression cannot be read in power (0.0005 watt); therefore, connect an rf VTVM to the same place as in step d of the neutralizing procedure on page 4-10. The resistive control (Index No. 43) must be adjusted first, carefully, for a pronounced dip in output. The capacitive control (Index No. 44) must be adjusted next for a minimum reading. The capacitive control has less effect than the resistive control, and it will only show its effect when the resistive control is adjusted properly.

Alternate between the two controls until no further reduction is possible.

- w. Remove the rf VTVM and its probe.
- x. Connect the two-tone signal generator to the 600-ohm audio input terminals, TP504 and TP505, at the same level as before.
- y. Adjust the AUDIO GAIN control (Index No. 41) for 125 watts PEP (50.6 watts on a Bird wattmeter).
- z. Place the TEST switch on the chassis to OFF (Index No. 33).

#### 4-1.5.5 Indicated Power Adjustment

Calibration of the front panel Meter M701 to indicate output power properly will not normally require field adjustment. These adjustments, R735, the "low-frequency set level," and C717, the "high-frequency compensation adjust," were factory adjusted so that M701 will read in the upper red portion of the meter scale when the transmitter is delivering 125 watts PEP (50.6 watts indicated) to a 50-ohm load. These controls are mounted on a bracket behind the front panel to the left of the meter switch.

In order for this adjustment to be accurate, it is required that one channel be operating between 2 and 3 Mc and one channel operating between 17 and 18 Mc.

To calibrate the meter for proper indication of power, proceed as follows:

- a. Select the channel that is closest to 2 Mc (must be between 2 and 3 Mc).
- b. Place the TEST switch on the chassis to ON (Index No. 33).
- c. While the wattmeter is indicating 50.6 watts (125 watts PEP), adjust the low-frequency set level (R735) control for the center of the upper red portion of the front-panel meter M701.
- d. Place the TEST switch on the chassis to OFF (Index No. 33).

- e. Select the channel closest to 18 Mc (must be between 17 and 18 Mc).

- f. Place the TEST switch on the chassis to ON (Index No. 33).

- g. While the wattmeter is indicating 50.6 watts (125 watts PEP), adjust the high-frequency compensation trimmer (C717) for the center of the upper red portion of the front-panel meter M701.

- h. Place the TEST switch on the chassis to OFF (Index No. 33).

- i. It will be necessary to repeat steps a through g due to the interaction among these adjustments. This procedure should be repeated until no significant difference is noted in the meter reading when changing from one channel to the others.

- j. Remove the two-tone signal from the 600-ohm audio input terminals TP504 and TP505.

- k. Remove the protective cap from the TONE control (Index No. 38).

- l. Set front-panel meter switch (Index No. 5) to read POWER.

- m. Place the TONE switch on the chassis to ON (Index No. 34).

- n. Place the TEST switch on the chassis to ON (Index No. 33).

- o. Adjust the TONE control (Index No. 38) while observing the front-panel meter (Index No. 3, Figure 3-2) for a reading in the center of the upper red mark.

- p. Place the TEST switch on the chassis to OFF (Index No. 33).

- q. Place the TONE switch on the chassis to OFF (Index No. 34).

- r. Replace the protective cap on the TONE control (Index No. 38).

- s. Deenergize the equipment at the Power Supply.

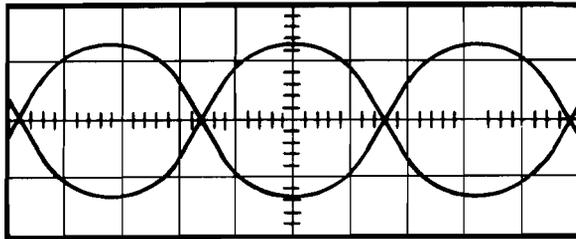
- t. Program the 10 wires to AME or SSB, as required, at PB601 (Index No. 22).

This concludes the alignment procedures

4-1.5.6 Displays

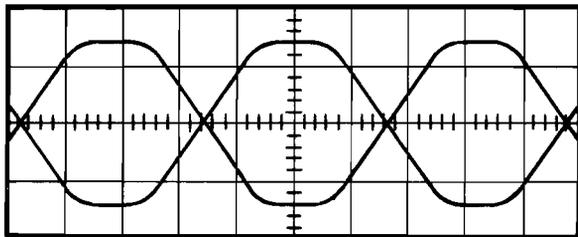
Both an oscilloscope and a panoramic adapter will provide

aid in alignment if they are available. Figures 4-7 through 4-12 are typical displays of both types of instruments.



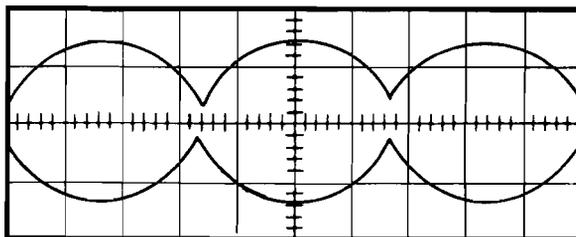
Measured on: 2705 kc  
 Output power: 125w PEP  
 Two-Tone frequencies: 1500 and 2500 cps  
 Third-order distortion: > -35 db  
 Carrier suppression: > -50 db  
 Oscilloscope set for:  
 Horizontal - 0.2  $\mu$ sec per cm  
 Vertical - 0.1 volt per cm

Figure 4-7. RF Power Output Sampled in Final-Amplifier Area (Example 1)



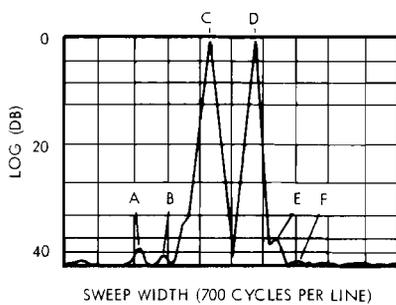
Measured on: 2705 kc  
 Output power: 170w PEP  
 Two-tone frequencies: 1500 and 2500 cps  
 Third-order distortion: -28 db  
 Carrier suppression: > -50 db  
 Oscilloscope set for:  
 Horizontal - 0.2  $\mu$ sec per cm  
 Vertical - 0.1 volt per cm

Figure 4-8. RF Power Output Sampled in Final-Amplifier Area (Example 2)



Measured on: 2705 kc  
 Output power: 125w PEP  
 Two-tone frequencies: 1500 and 2500 cps  
 Third-order distortion: > -35 db  
 Carrier Suppression: -20 db

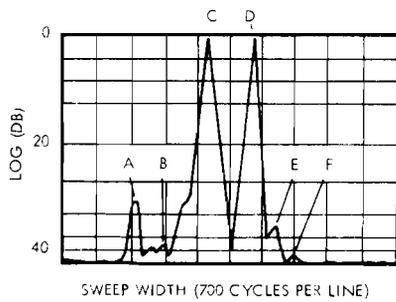
Figure 4-9. RF Power Output Sampled in Final-Amplifier Area (Example 3)



Measured on: 2182 kc  
 Output power: 125w PEP  
 Third-order distortion: > -35 db  
 Carrier reinserted at -38 db to be used as an indicator.  
 Display: Logarithmic with 7-kc bandwidth.  
 20 db in Panalyzer probe.

- |    |             |    |                                  |
|----|-------------|----|----------------------------------|
| A. | Carrier     | E. | Second harmonic of 1500-cps tone |
| B. | Third order | F. | Third order                      |
| C. | 1500 cps    |    |                                  |
| D. | 2500 cps    |    |                                  |

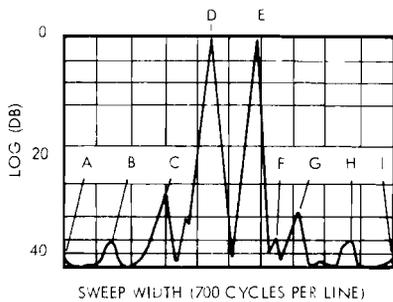
Figure 4-10. RF-Power Output Sampled at 50-ohm Load with Panalyzer (Example 1)



Measured on: 2182 kc  
 Output power: 125w PEP  
 Third-order distortion: > -35 db  
 Carrier reinserted at -25 db to be used as an indicator.  
 Display: Logarithmic with 7-kc bandwidth.  
 20 db in Panalyzer probe.

- |    |             |    |                                  |
|----|-------------|----|----------------------------------|
| A. | Carrier     | E. | Second harmonic of 1500-cps tone |
| B. | Third order | F. | Third order                      |
| C. | 1500 cps    |    |                                  |
| D. | 2500 cps    |    |                                  |

Figure 4-11. RF-Power Output Sampled at 50-ohm Load with Panalyzer (Example 2)



Measured on: 2182 kc  
 Output power: 170w PEP  
 Two-tone frequencies: 1500 and 2500 cps  
 Third-order distortion: -23 db  
 Carrier suppression: -38 db  
 Display: Created by overdriving audio to show the frequency relationships between the two tones and the harmonic distortion products.  
 20 db in Panalyzer probe.

- |    |               |    |                                  |
|----|---------------|----|----------------------------------|
| A. | Seventh order | F. | Second harmonic of 1500-cps tone |
| B. | Fifth order   | G. | Third order                      |
| C. | Third order   | H. | Fifth order                      |
| D. | 1500 cps      | I. | Seventh order                    |
| E. | 2500 cps      |    |                                  |

Figure 4-12. RF-Power Output Sampled at 50-ohm Load with Panalyzer (Example 3)

**4-2 ANTENNA COUPLER**

To program the Antenna Coupler, it is necessary to know something about the antenna to be matched. Three charts (Figures 4-13 through 4-15) are given with this alignment procedure, each for a different antenna commonly used on small boats.

- a. Determine the antenna to be matched (24- and 35-foot unloaded whips and 24-foot loaded whip).
- b. Refer to the chart (Figures 4-13, 4-14, and 4-15) for the desired antenna.
- c. Locate the frequency of operation on the bottom of the chart.
- d. Locate the values of antenna resistance ( $R_A$ ) and antenna reactance ( $X_A$ ) on a line perpendicular to the frequency line.
- e. Refer to the L network formula (Table 4-4). Locate the formula that fits antenna resistance ( $R_A$ ) and antenna reactance ( $X_A$ ) indicated by the antenna chart.
- f. Compute the values of series reactance ( $X_S$ ) and parallel reactance ( $X_P$ ) required and determine which side the capacitance will be programmed to.

g. Determine the values of L and C required from the reactance chart (Figure 4-16).

h. Determine the coil tap to be used from the tap-versus-inductance chart (Figure 4-17). This tap number will be the maximum inductance value required. If all 10 channels are programmed to the coil the resultant stray inductance may move the tap as much as three turns lower.

i. Determine the correct capacitors to use from Figure 4-18. Locate the total required capacitance on the vertical scale on the left side. Locate the individual capacitors (as identified in Figure 4-19) necessary to form the total capacitance along the scale at the top. The required capacitance value should be made up of 100 pf for the variable and 50 pf per channel in use for the strays. Subtract this value from the total required and use Figure 4-18 for the remainder.

j. Make the connections to the coil and to the capacitor programming block, being sure to follow the color code for the channel in use (see Table 4-1). When connecting the wires from the switch wafers to the capacitor programming block, be sure to place the unused wires from any one wafer on a dummy post that is not in use by any of the other wafers.

k. Connect a voltage-standing-wave-ratio (vswr) indicator, two-way coupler or Thru-Line wattmeter

in the coaxial line between the Receiver-Transmitter and the Antenna Coupler at the Antenna Coupler end.

- l. Connect the input jumper to the 50-ohm dummy load.
- m. Tune the Transmitter to the dummy load.
- n. Check the vswr, it should read 50 watts forward and 0 watt reflected.
- o. Change the input jumper from the dummy load to the Antenna Coupler input.
- p. With the vswr meter in the reverse-power position, key the Transmitter and observe the antenna current meter and the reverse-power meter.
- q. Place the Transmitter in the low-power output condition.
- r. Tune the variable capacitor associated with that channel for maximum antenna current and minimum reverse power.
- s. Move the coil tap and/or capacitor values in small steps for maximum efficiency.
- t. Power output can be determined by the formula  $I^2R$ . When  $I$  is the antenna current in amperes and  $R$  is the antenna resistance ( $R_A$ ) in ohms, the power is in watts.
- u. Divide the power output by the power input and multiply by 100 for percent efficiency.
- v. When using the internal tone oscillator, high output is 50 watts and low output is 8 watts from the Receiver-Transmitter unit.
- w. When loading an antenna with a large value of  $R_A$ , it is difficult to see the antenna current meter reading when tuning with low power. It is advisable to use high power in these cases. For example, assume the antenna to be matched is the 35-foot whip at a frequency of 11 Mc. Figure 4-14 shows the  $R_A$  to be approximately 650 ohms. With a power input to the antenna coupler of 8 watts and an efficiency of 50%, the antenna current is 78 milliamperes. At 80% efficiency, the current is 100 milliamperes. With the input at 50 watts, an efficiency of 50% yields 200 milliamperes of antenna current. At 80% efficiency, the current is 240 milliamperes.

The following paragraphs give an example of the Antenna-Coupler setup procedures.

Assume that it is desired to match the Receiver-Transmitter to the 24-foot unloaded fiberglass whip at 5 Mc and to program the frequency on Channel 4.

- a. Refer to Figure 4-13; note that  $R_A = 15$  ohms and  $X_A = j-370$  ohms at 5 Mc.
- b. Turn to the L-network formula (Table 4-4). Since antenna impedance  $Z_A = (R_A - jX_A)$ , use the right-hand column under  $Z_A = (R_A - jX_A)$ .  $R_S > R_A$ ,  $R_S = 50$  ohms, and  $R_A = 15$  ohms; therefore, the formula for  $X_S$  is No. 9 and the formula for  $X_p$  is No. 10, which puts  $X_p$  on the input side of the network.
- c. Compute formula No. 9;  $X_S = 270$  ohms.
- d. Compute formula No. 10;  $X_p = 37.5$  ohms.
- e. Refer to the reactance chart (Figure 4-16) and find that the value of inductance for  $X_S = 270$  at 5 Mc = 9  $\mu$ h.
- f. On the same chart, find that the value of capacitance for  $X_p = 37.5$  at 5 Mc = 860 pf.

These values are approximate. To find the exact values, the following formula may be used:

$$C = \frac{160000}{X_p f}$$

and

$$L = 0.16 \frac{X_S}{f}$$

From these formulas,  $C = 853$  pf and  $L = 8.64$   $\mu$ h.

- g. Refer to Figure 4-17 and find that 8.64  $\mu$ h is tap No. 8. Always use the next lowest tap because of lead inductance being added to the total. Connect the Channel-4 wire (yellow) to that tap.
- h. Refer to the capacitor chart (Figure 4-18) and find that 750 pf is made up of 50 pf, 100 pf, 200 pf, and 400 pf. The other 100 pf is made up of stray capacitance and the variable capacitor.
- i. Refer to Figure 4-19, which shows the coupler programming section in detail. Use the wafers for the capacitors as shown; do not use any dummy post for more than one wafer.
- j. Connect the yellow wires from the wafers to the posts that are connected to the capacitors called out in step h, above.
- k. Follow steps k through w of the general procedure (which starts at the bottom of page 4-14) to complete the programming on Channel 4.

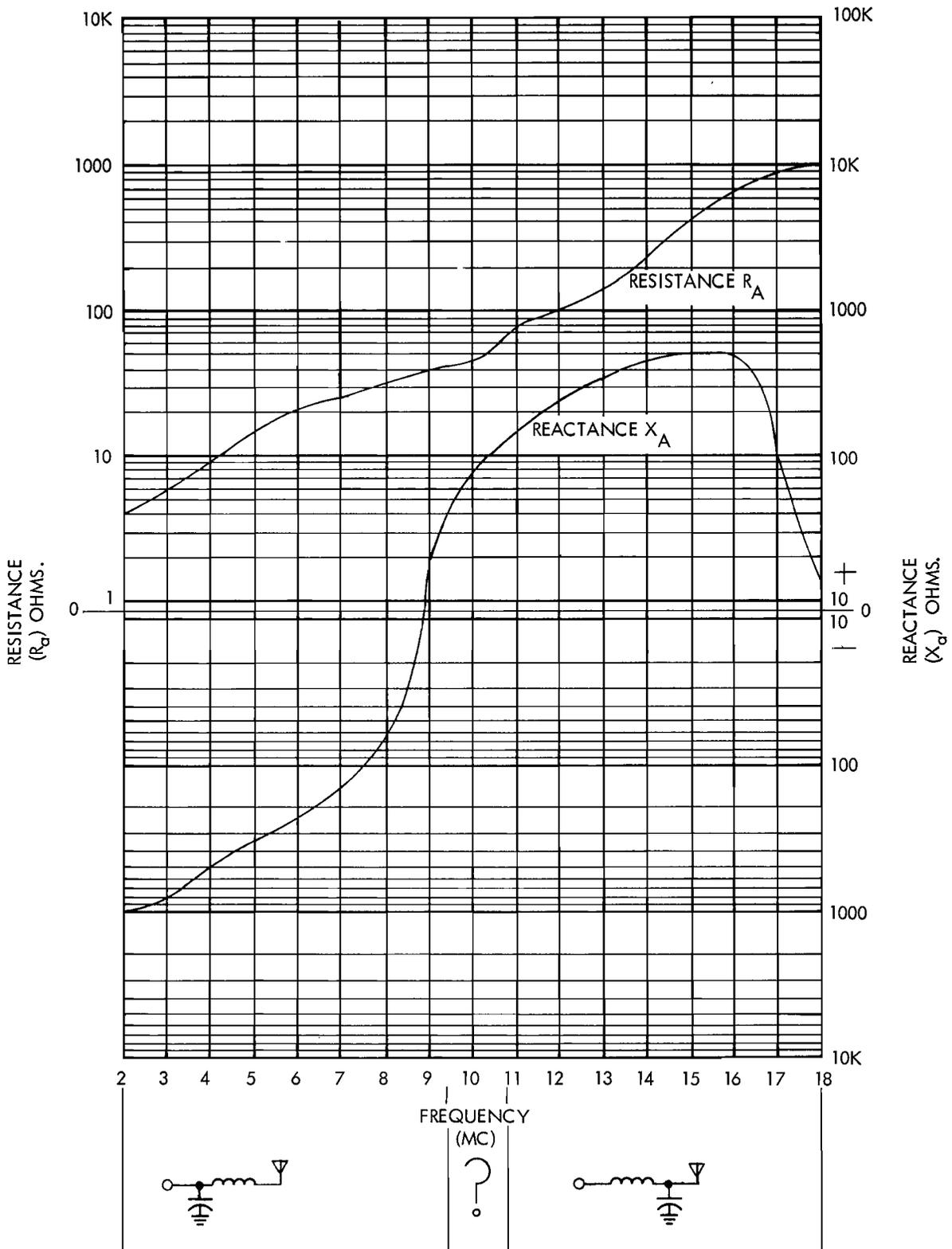


Figure 4-13. Reactance Chart for Unloaded 24-Foot, Fiberglass, Whip Antenna

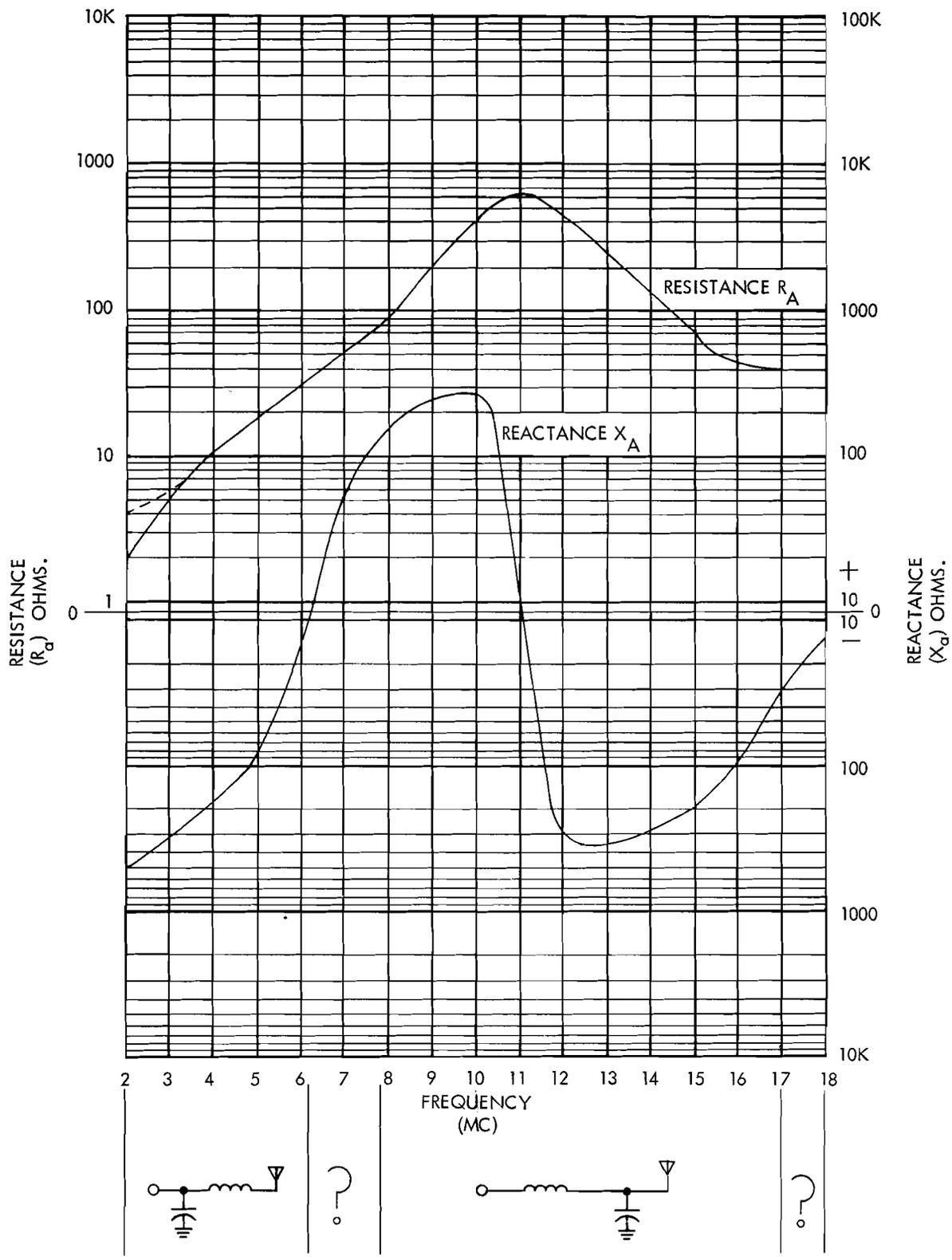


Figure 4-14. Reactance Chart for Unloaded, 35-Foot, Vertical, Whip Antenna

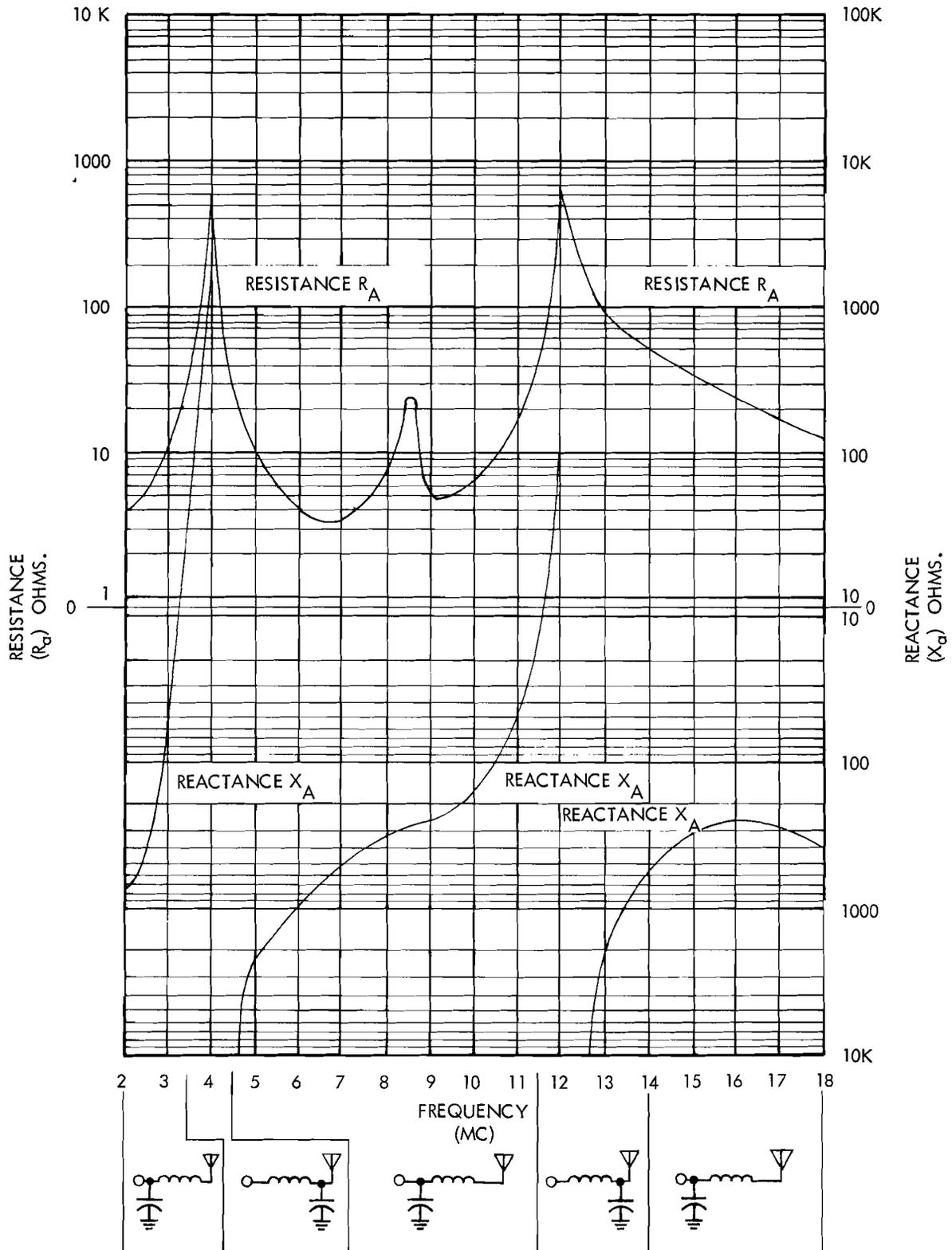


Figure 4-15. Reactance Chart for 24-Foot, Center-Loaded, Whip Antenna

TABLE 4-4  
L-NETWORK FORMULA DETERMINATION

SHUNT CAPACITOR	L-NETWORK $X_p$ AND $X_S$	LOAD		
		$Z_A = R_A$	$Z_A = (R_A + iX_A)$	$Z_A = (R_A - iX_A)$
INPUT	CONDITION	$R_S > R_A$	$X_A < \sqrt{R_A (R_S - R_A)}$ , $R_S > R_A$	$R_S > R_A$
	$X_S$	1. $\sqrt{R_A (R_S - R_A)}$	5. $\sqrt{R_A (R_S - R_A)} - X_A$	9. $\frac{\sqrt{(QR_A + X_A) [Q (R_S - R_A) - X_A]}}{Q} + X_A$
	$X_p$	2. $R_S \sqrt{\frac{R_A}{(R_S - R_A)}}$	6. $R_S \sqrt{\frac{R_A}{(R_S - R_A)}}$	10. $R_S \sqrt{\frac{(QR_A + X_A)}{Q (R_S - R_A) - X_A}}$
OUTPUT	CONDITION	$R_S < R_A$	$Z_A > R_S$	$R_A > R_S$
	$X_S$	3. $\sqrt{R_S (R_A - R_S)}$	7. $\sqrt{\frac{R_S}{R_A} (Z_A^2 - R_S R_A)}$	11. $\sqrt{\frac{R_S}{R_A} (Z_A^2 - R_S R_A)}$
	$X_p$	4. $R_A \sqrt{\frac{R_S}{(R_A - R_S)}}$	8. $\frac{R_S Z_A^2}{(X_S R_A + X_A R_S)}$	12. $\frac{R_S Z_A^2}{(X_S R_A - X_A R_S)}$

$Q = 125$   
 $Z_A = \sqrt{R_A^2 + X_A^2}$   
 $R_A =$  Antenna Resistance (from appropriate antenna chart)  
 $X_A =$  Antenna Reactance (from appropriate antenna chart)  
 $X_S =$  Series Inductive Reactance ( $X_L$  of coupler coil)  
 $X_p =$  Parallel Capacitive Reactance ( $X_C$  of coupler capacitance)  
 $R_S =$  Source Resistance (50 ohms)

NOTE: All quantities entered into the formulas are positive numbers.

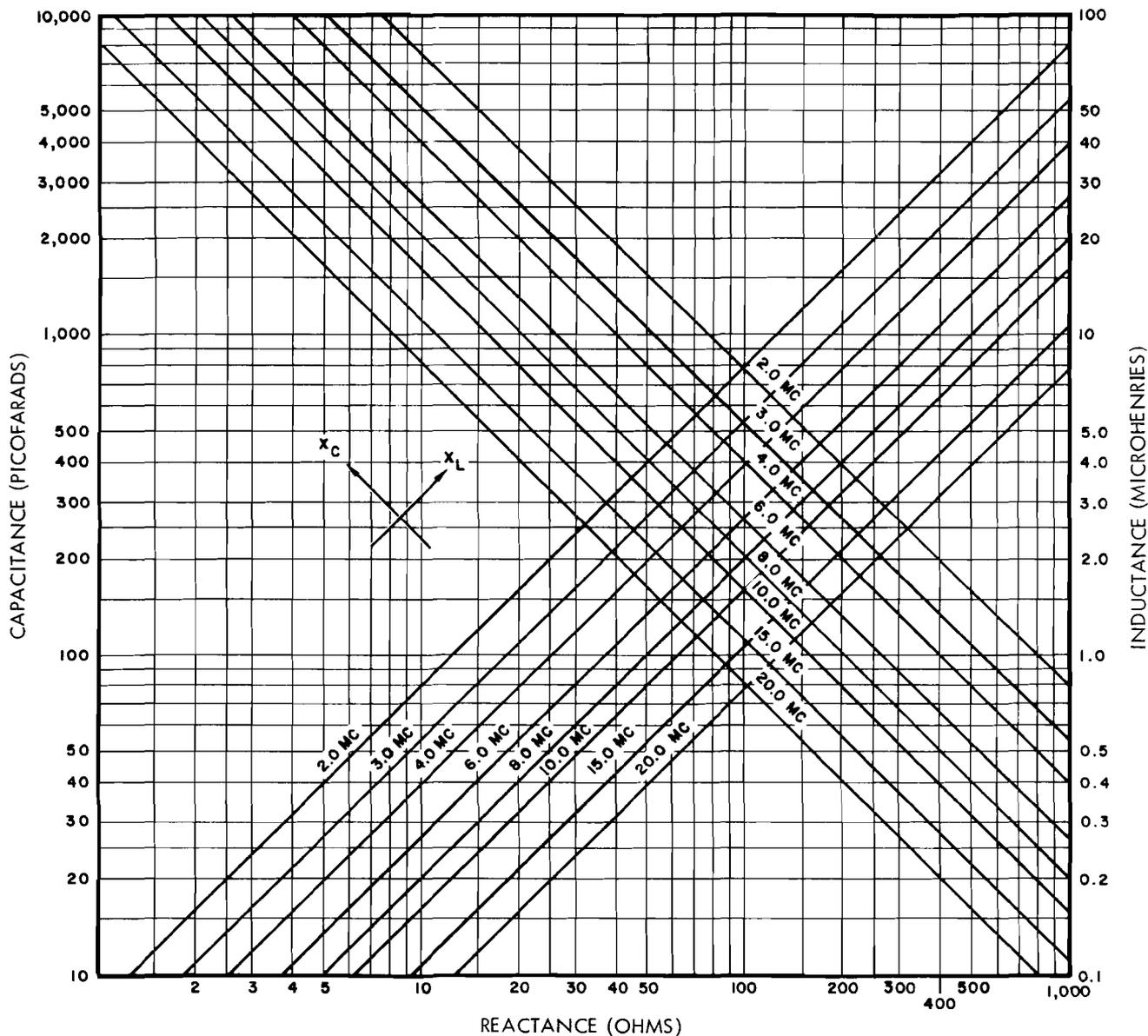


Figure 4-16. Antenna-Coupler Reactance Chart

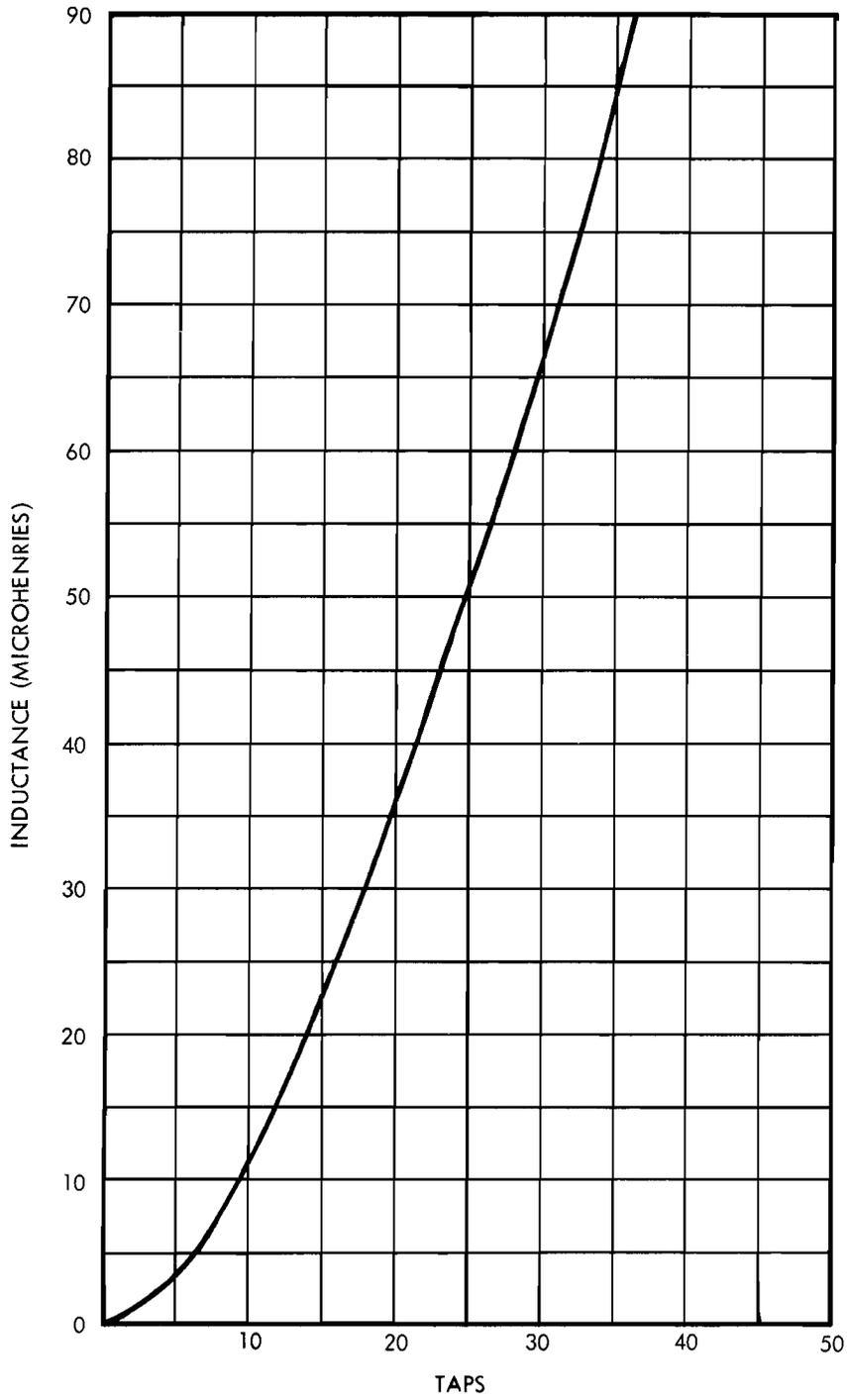


Figure 4-17. Tap-versus-Inductance Chart

TOTAL CAP (PF)	INDIVIDUAL CAPACITANCES (PF) FOR PROGRAMMING (IDENTIFY ON FIGURE 4-19)						
	50	100	200	400	800	1600	2400
50	X						
100		X					
150	X	X					
200			X				
250	X		X				
300		X	X				
350	X	X	X				
400				X			
450	X			X			
500		X		X			
550	X	X		X			
600			X	X			
650	X		X	X			
700		X	X	X			
750	X	X	X	X			
800					X		
850	X				X		
900		X			X		
950	X	X			X		
1000			X		X		
1050	X		X		X		
1100		X	X		X		
1150	X	X	X		X		
1200				X	X		
1250	X			X	X		
1300		X		X	X		
1350	X	X		X	X		
1400			X	X	X		
1450	X		X	X	X		
1500		X	X	X	X		
1550	X	X	X	X	X		
1600						X	
1650	X					X	
1700		X				X	
1750	X	X				X	
1800			X			X	
1850	X		X			X	
1900		X	X			X	
1950	X	X	X			X	
2000				X		X	
2050	X			X		X	
2100		X		X		X	
2150	X	X		X		X	
2200			X	X		X	
2250	X		X	X		X	
2300		X	X	X		X	
2350	X	X	X	X		X	
2400							X
2450	X						X
2500		X					X
2550	X	X					X
2600			X				X
2650	X		X				X
2700		X	X				X
2750	X	X	X				X

TOTAL CAP (PF)	INDIVIDUAL CAPACITANCES (PF) FOR PROGRAMMING (IDENTIFY ON FIGURE 4-19)						
	50	100	200	400	800	1600	2400
2800				X			X
2850	X			X			X
2900		X					X
2950	X	X		X			X
3000			X	X			X
3050	X		X	X			X
3100		X	X	X			X
3150	X	X	X	X			X
3200					X		X
3250	X				X		X
3300		X			X		X
3350	X	X			X		X
3400			X		X		X
3450	X		X		X		X
3500		X	X		X		X
3550	X	X	X		X		X
3600				X	X		X
3650	X			X	X		X
3700		X		X	X		X
3750	X	X		X	X		X
3800			X	X	X		X
3850	X		X	X	X		X
3900		X	X	X	X		X
3950	X	X	X	X	X		X
4000						X	X
4050	X					X	X
4100		X				X	X
4150	X	X				X	X
4200			X			X	X
4250	X		X			X	X
4300		X	X			X	X
4350	X	X	X			X	X
4400				X		X	X
4450	X			X		X	X
4500		X		X		X	X
4550	X	X		X		X	X
4600			X	X		X	X
4650	X		X	X		X	X
4700		X	X	X		X	X
4750	X	X	X	X		X	X
4800					X	X	X
4850	X				X	X	X
4900		X			X	X	X
4950	X	X			X	X	X
5000			X		X	X	X
5050	X		X		X	X	X
5100		X	X		X	X	X
5150	X	X	X		X	X	X
5200				X	X	X	X
5250	X			X	X	X	X
5300		X		X	X	X	X
5350	X	X		X	X	X	X
5400			X	X	X	X	X
5450	X		X	X	X	X	X
5500		X	X	X	X	X	X
5550	X	X	X	X	X	X	X

Figure 4-18. Antenna-Coupler Capacitance Chart

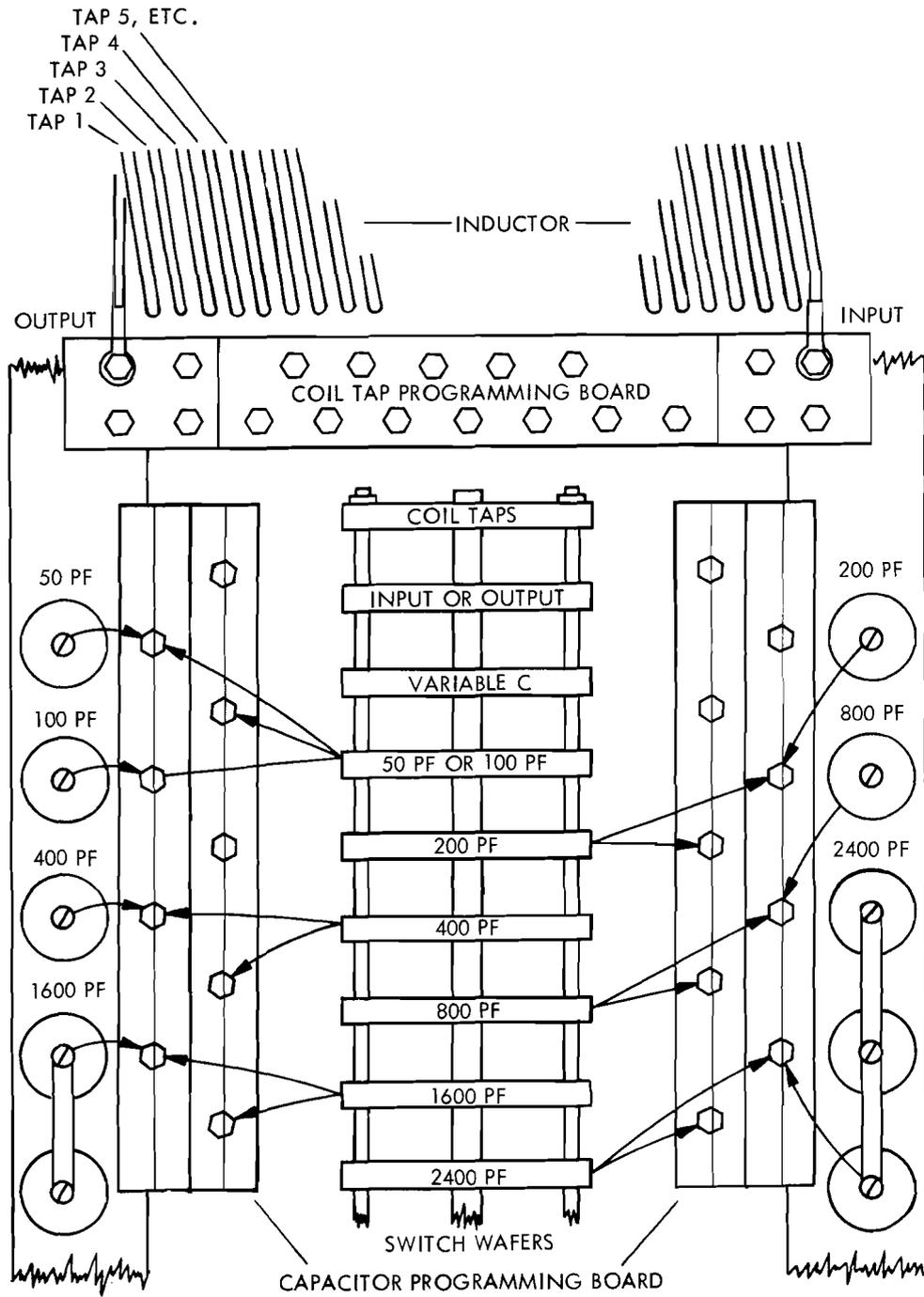


Figure 4-19. Antenna-Coupler Programming Diagram, Top View

SECTION V

CIRCUIT DESCRIPTION

SECTION V

CIRCUIT DESCRIPTION

5-1 GENERAL

The main operational groups within the AN/URC-51 Radio Set are the Remote Control C-4826/URC-51, Receiver-Transmitter RT-710/URC-51, Power Supply PL-9015-02-00006 and Antenna Coupler CU-1208/URC-51. These groups are designed for operation in the 2- to 18-Mc range at any of 10 preset frequencies. Figure 8-1 is a schematic diagram of the entire AN/URC-51 Radio Set.

5-2 REMOTE CONTROL C-4826/URC-51

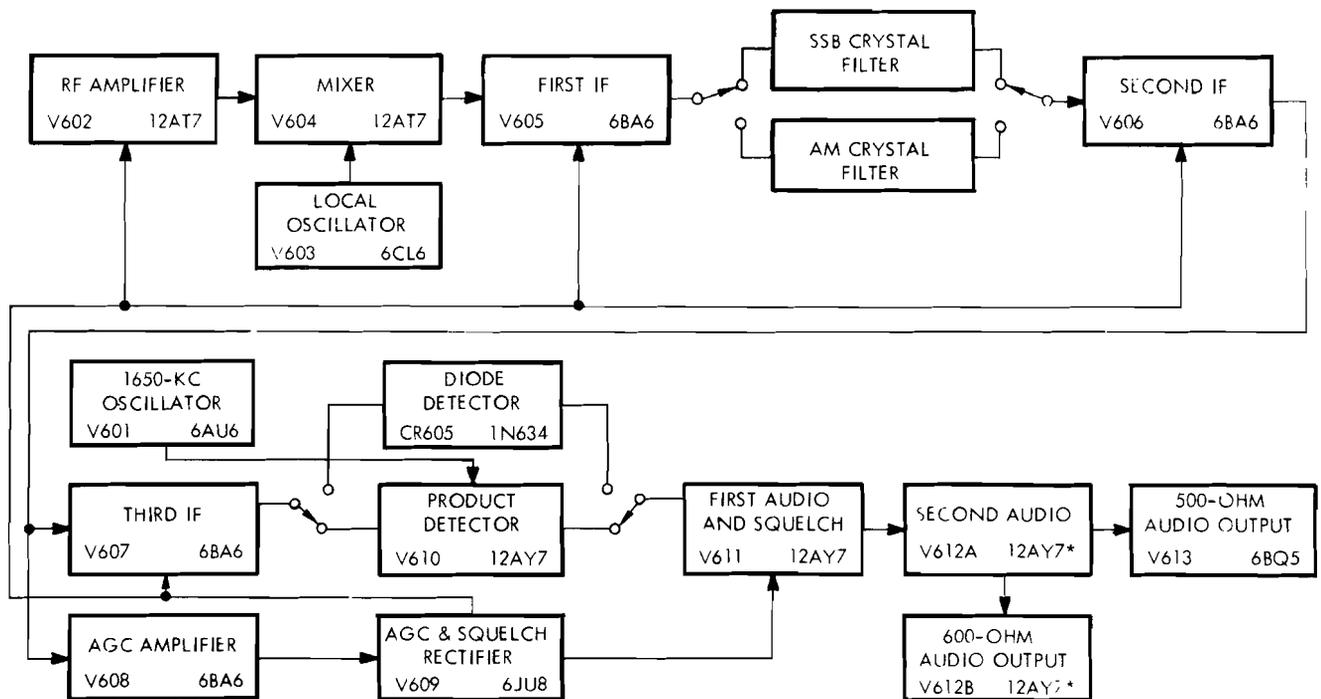
Remote Control C-4826/URC-51 contains outputs for a Handset and Horn Speaker, transmit-receive switching,

and other control circuits. Figure 8-2 is a schematic diagram of the Remote Control.

5-3 RECEIVER-TRANSMITTER RT-710/URC-51

5-3.1 Receiver

The receiver has provisions for both SSB and compatible-AM reception (see Figure 5-1). It has a 1650-kc IF strip, automatic gain control (agc) and squelch circuits, and provision for both product and conventional AM detection. Table 5-1 provides a description of the various stages and their functions.



\*ONE SECTION ONLY OF DUAL TRIODE.

Figure 5-1. Receiver Block Diagram

TABLE 5-1  
RECEIVER CIRCUIT OPERATION

COMPONENT		FUNCTION	DESCRIPTION
SYMBOL	TYPE		
V602	12AT7	RF Amplifier	Amplifies signal received from antenna.
V604	12AT7	Mixer	Stage is supplied with amplified signal from V602 and the local oscillator signal from V603. It produces an IF signal at 1650 kc containing the same information as the received signal with local oscillator signal suppressed.
V603	6CL6	Local Oscillator	Ten-channel, crystal-controlled oscillator with relatively constant output.
V605	6BA6	First IF Amplifier	Amplifies 1650-kc IF signal.
ZF601	WC12	Crystal Filter	Shapes passband for AM.
ZF602	FC11L	Crystal Filter	Shapes passband for SSB.
V606	6BA6	Second IF Amplifier	Amplifies 1650-kc signal.
V607	6BA6	Third IF Amplifier	Amplifies 1650-kc signal.
V608	6BA6	AGC Amplifier	Amplifies IF signal to level sufficient to operate V609.
V609	6JU8	AGC and Squelch Amplifier	Rectifies IF signal for use as agc.
V610	12AY7	Product Detector	When programmed for SSB this detector accepts 1650-kc IF signal from V607 and 1650-kc signal from V601 and produces audio with 1650-kc signal suppressed.
CR606	1N634	AM Detector	When programmed for AME, this diode detector produces audio from the IF signal.
V611	12AY7	First Audio and Squelch	Amplifies audio signal from either detector and supplies it to V612. The squelch section controls the operating condition of the first audio section according to the voltages received from V609.
V612	12AY7	Second Audio Amplifier	Amplifies audio and supplies it to both V612 (second section) and V613.
V612	12AY7	Audio Output Amplifier	Amplifies audio and supplies it to 600-ohm telephone line.
V613	6BQ5	Audio Power Amplifier	Amplifies audio and supplies it to remote speaker and Handset via 500-ohm line.

NOTE: K601 and K602 are used to switch the filters. The four-section relays use two sections each to switch the filters, one section is grounded for shielding and the fourth section of K601 is used to turn off the 1650-kc oscillator during operation on AME; the fourth section of K602 is used to turn off the product detector during operation on AME.

### 5-3.2 Transmitter

The transmitter is rated at 125 watts, PEP, on SSB and 40 watts of AM power with a 50-ohm resistive load. The unit may be modulated from a microphone, which is supplied

with the system, or from a 600-ohm telephone line. The audio input circuitry contains a compressor to raise the effective power output. Figure 5-2 is a block diagram of the transmitter; Table 5-2 provides a description of the various stages and their functions.

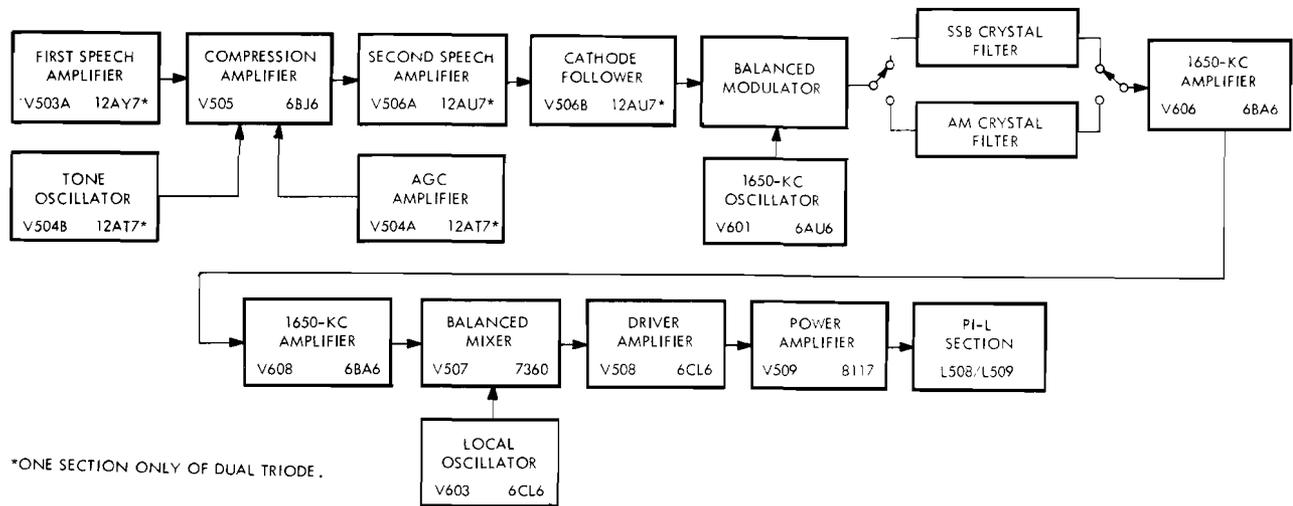


Figure 5-2. Transmitter Block Diagram

TABLE 5-2

TRANSMITTER CIRCUIT OPERATION

COMPONENT		FUNCTION	DESCRIPTION
SYMBOL	TYPE		
V503A	12AT7	First Speech Amplifier	Amplifies audio from microphone to level sufficient to operate V504A and V505.
V504A	12AT7	AGC Amplifier	Amplifies audio and supplies it to rectifier and filter which, along with output of V503, make up grid signal at V505.
V505	6BJ6	Compression Amplifier	Maintains steady output due to agc voltage supplied in conjunction with audio input.
V504B	12AT7	Tone Oscillator	Supplies 1000-cps audio tone for alignment purposes.
V506A	12AU7	Second Speech Amplifier	Amplifies audio from compressor to level sufficient to operate V506B.
V506B	12AU7	Cathode Follower	Supplies balanced modulator with low-impedance signal.
CR505 CR506	1N916	Balanced Modulator	Receives audio from V506B and 1650-kc signal from V601 and produces audio sidebands at 1650 kc with carrier balanced out.
ZF602	FC11L	Crystal Filter	Eliminates the unwanted upper sideband.
V606	6BA6	IF Amplifier (fixed bias)	Amplifies 1650-kc lower-sideband signal.
V608	6BA6	IF Amplifier (self bias)	Amplifies 1650-kc lower-sideband signal.
V507	7360	Balanced Mixer	Receives lower-sideband signal from V608 and local-oscillator signal from V603 and produces an upper-sideband signal on channel frequency.
V508	6CL6	Driver Amplifier	Amplifies upper-sideband, on-channel frequency to level sufficient to operate V509.
V509	8117	Power Amplifier	Amplifies signal to full power level.
...	...	Pi-L Section	L508 and L509 tuned circuits match low-impedance antenna and eliminate spurious and harmonic signals.

#### 5-4 ANTENNA COUPLER CU-1208/URC-51

The Antenna Coupler is of the reversible L type with a type-N coaxial input and single-wire output. It has a power-handling capability of 150 watts PEP. Programmable taps are available to set the inductance and capacitance for the 10 preselected channel frequencies. After alignment, the Antenna Coupler is switched remotely to the desired channel.

Figure 5-3 is a simplified schematic diagram of the system without the control switching and tuning arrangement; refer to Figure 8-3 in Section VIII for a complete schematic diagram of the Antenna Coupler.

Other features of the unit are a 50-ohm, 100 watt, non-inductive dummy load for off-the-air tuning and a 0- to 5-ampere rf meter.

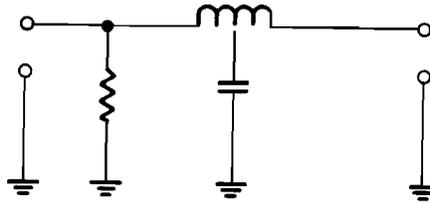


Figure 5-3. Simplified Schematic Diagram of Antenna Coupler

SECTION VI

MAINTENANCE

## SECTION VI

## MAINTENANCE

## 6-1 GENERAL MAINTENANCE

To keep electronic units operating at peak performance, it is desirable to set up a routine inspection and maintenance schedule. The frequency of such inspections depends upon the installation of the unit and the condition of operation. In general, shipboard installations require more frequent service than shore-station installations. For these inspections, clean all dust and dirt from the unit, using a light air blast or soft brush. Be sure dust is removed from air capacitors and terminal strips. Compare the performance of the unit with the specifications in Section I. Often, a gradual degradation in performance is not noted in daily operation and, finally, the equipment stops operating completely. In the design of this equipment, care has been taken to use the proper tubes for the application desired and to rate them so that considerable weakening can take place before replacement is necessary. While checking tubes is desirable, a tube should be replaced only when it actually causes a degradation in unit performance. A simple tube check is to insert a tube known to be good and to look for an improvement in performance.

## 6-2 TROUBLESHOOTING

## 6-2.1 General

Troubleshooting electronic equipment is very simple with the proper procedure and the proper test equipment. One must perform various tests and make certain observations. Proper interpretation of the results of these tests will indicate the problem area. Additional tests in the problem area will then locate the bad component or assembly.

**WARNING**

VOLTAGES EXIST WITHIN THIS EQUIPMENT THAT ARE DANGEROUS TO LIFE. OBSERVE CAUTION WHEN MAKING TAP CHANGES. REMOVE NEUTRALIZING PLUG P503 BEFORE ENTERING FINAL-AMPLIFIER AREA FOR PROGRAMMING OR SERVICING.

In the event of a component failure, assume that the defective part is the cause of the trouble, not a symptom of a more serious problem. For example, a burned resistor may result from a shorted tube or capacitor, while a defective tube may be caused by a shorted capacitor or a resistor that has changed in value.

The meter on the Receiver-Transmitter gives a good indication of operating voltages and power output and should be used often in troubleshooting.

Shown below are the approximate voltage variations for the various positions of the meter switch. The black area covers  $\pm 14.3\%$  from the center reading. Indications of  $\pm 10\%$  of these values are normal. The low-power red mark covers approximately 3 watts and the high-power red mark covers approximately 7 watts.

Switch Position	Low end of black area	High end of black area
6.3 VAC	5.4	7.2
-12 VDC	10.3	13.7
+115 VDC	98.6	131.4
-150 VDC	128.8	171.2
+150 VDC	Regulated Voltage	
+310 VDC	265.7	354.3
+1000 VDC	857	1143
+320 VDC	274.3	365.7

The internal tone oscillator will read in the center of the red line when adjusted in accordance with the alignment procedures on page 4-12. Any subsequent change in reading will indicate a change in performance in the Transmitter.

## 6-2.2 Test Equipment Required

- Frequency Counter, Hewlett-Packard, Model 5245-L.
- RF Signal Generator, AN/URM-25 Series.
- VTVM, AN/USM-116.
- Reflected Power Meter, TS-2182/U.
- Oscilloscope AN/USM-117 or Tektronix-Model 516.
- VOM, AN/USM-162.
- Two-Tone Generator, TS-2174/U.

## 6-2.3 Component Locations

Figures 6-1 through 6-4 and Tables 6-1 through 6-4 identify the test points and other components. This information may be used with the data given in Table 6-5, which is a quick-reference index to the normal test point outputs in the Receiver-Transmitter. Standard resistor and capacitor color codes are given in Tables 6-6 and 6-7.

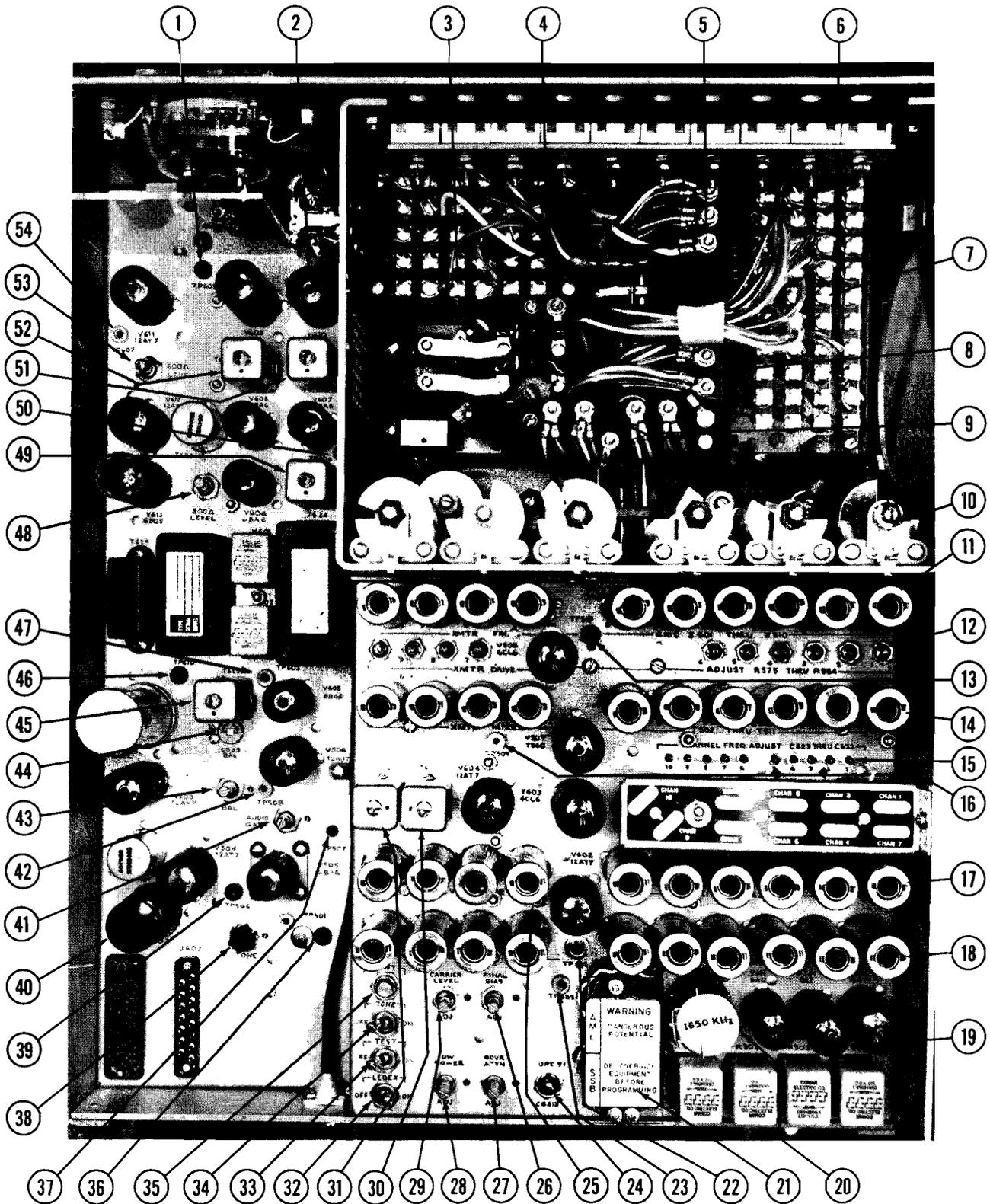


Figure 6-1 (Sheet 1). Receiver-Transmitter Component and Internal-Adjustment Locations, Top View

TABLE 6-1  
RECEIVER-TRANSMITTER COMPONENT AND INTERNAL-ADJUSTMENT LOCATIONS

FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY	FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY
1	TP605	Monitor for audio from AM detector or product detector (agc only).	Receiver	15	C623 through C632 CHANNEL FREQUENCY ADJ (Top)	Frequency trimmers for channel.	Transmitter
2	TP604	Monitor for 1650-kc injection to product detector. Use oscilloscope only.	Receiver	16	TP509, XMTR OSC INJECTION	Used to monitor level of injection. 0.14 to 0.17 volt rf, depending on channel frequency. This point is used for operating a frequency counter for trimming channel frequencies.	Receiver-Transmitter
3	L509 (PB503)	Program board.	Transmitter	17	T611 through T620	Receiver-mixer tune.	Receiver
4	C559	Neutralizing capacitor (fine).	Transmitter	18	T601 through T610	Receiver-antenna tune.	Receiver
5	C592, 593, 594 (PB502)	Program board.	Transmitter	19	TP601	+150-volt-regulated test point.	Receiver
6	C582 to C591	Final loading capacitors.	Transmitter	20	C608	Frequency trimmer for 1650-kc oscillator	Receiver
7	L508 (PB502)	Program board.	Transmitter	21	PB601, AME/SSB	Program board to select AM or SSB.	Receiver-Transmitter
8	C578, 579, 581 (PB502)	Program board.	Transmitter	22	TP602	Alternate injection point for rf preliminary alignment.	Receiver
9	C595 (PB501)	Program board.	Transmitter	23	TP503	Monitor for final amplifier bias.	Transmitter
10	C568 to C577	Final plate tuning capacitors.	Transmitter	24	S502, URC51-C6513 (Top)	Control-source switch, channel-selection only.	Receiver
11	Z501 through Z510	Transmitter driver tune.	Transmitter	25	Z601	Trap, 1650 kc.	Receiver-Transmitter
12	R575 through R584, XMTR DRIVE ADJ (Top)	Set level of drive for equal power output.	Transmitter				
13	TP510	Monitor drive to final amplifier.	Transmitter				
14	T502 through T510	Transmitter mixer tune.	Transmitter				

TABLE 6-1 (Cont'd.)

## RECEIVER-TRANSMITTER COMPONENT AND INTERNAL-ADJUSTMENT LOCATIONS

FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY	FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY
26	R604, FINAL BIAS ADJ (Top)	Bias adjustment for final amplifier tube.	Transmitter	38	R531, TONE (Top)	Level adjustment for tone insertion.	Transmitter
27	R512, RCVR ATTN ADJ (Top)	Establishes agc level.	Receiver	39	TP506	Monitor for audio at agc grid.	Transmitter
28	R602, LOW POWER ADJ (Top)	Adjustment for bias on second IF tube.	Transmitter	40	P503	Neutralizing plug.	Transmitter
29	R514, CAR- RIER LEVEL ADJ (Top)	Adjustment for amount of carrier for AM reinsertion.	Receiver- Transmitter	41	R553, AUDIO GAIN (Top)	Sets level into cathode follower.	Transmitter
30	T621 (Top)	Mixer-output (V604) peaking.	Receiver	42	TP508	Monitor for audio at cathode follower.	Transmitter
31	T622 (Top)	First-IF input (V605) peaking.	Receiver	43	R559, BAL (Top)	Resistive-balance control for balanced modulator.	Transmitter
32	S508, LEDEX ON- OFF (Top)	Switch to turn off Ledex voltage.	Transmitter	44	C539, BAL	Capacitive-balance control for balanced modulator.	Transmitter
33	S504, TEST ON- OFF (Top)	Local keying switch.	Transmitter	45	T623 (Top)	First-IF output (V606) peaking.	Receiver
34	S505, TONE ON- OFF (Top)	Switch for tone oscillator.	Transmitter	46	TP610	Chassis ground.	Receiver- Transmitter
35	S503, RESET (Top)	Deenergizes over- load relay.	Transmitter	47	TP603	Monitor for IF level from receiver. Use oscilloscope only (Receiver).  Monitor for IF level for balanced-mod- ulator coarse ad- justments (Trans- mitter).	Receiver- Transmitter
36	TP501	Monitor for dc- plate current of V509.	Transmitter	48	R675, 500 $\Omega$ LEVEL (Top)	Level adjustment for audio supplied to Remote-Control for Speaker and Handset.	Receiver
37	TP507	Monitor for audio at last amplifier (V506A) grid.	Transmitter	49	T624 (Top)	Second-IF output (V606) peaking.	Receiver
				50	TP606	Monitor for agc bus.	Receiver
				51	T625 (Top)	Third-IF output (V607) peaking.	Receiver
				52	T626 (Top)	AGC amplifier output.	Receiver
				53	R672, 600 $\Omega$ LEVEL (Top)	Adjustment for audio output to the 600- ohm telephone line.	Receiver

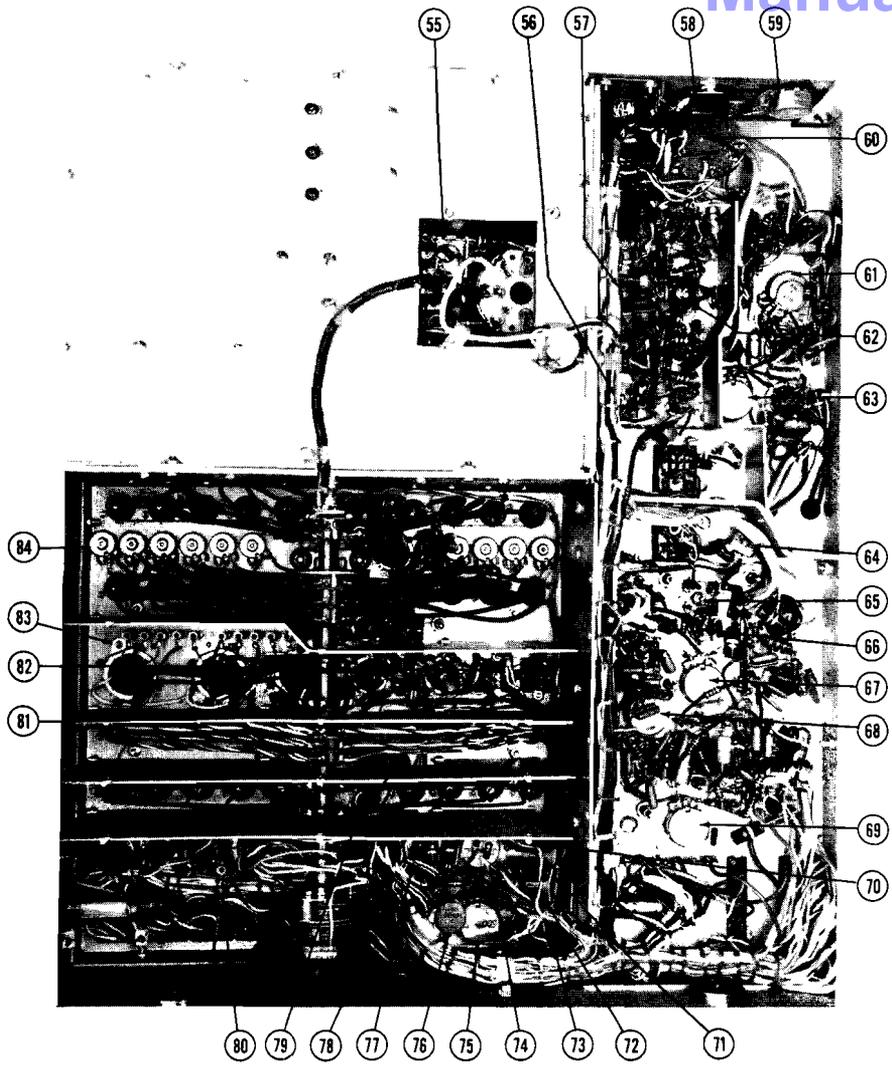


Figure 6-1 (sheet 2). Receiver-Transmitter Component and Internal-Adjustment Locations, Bottom View

TABLE 6-1 (Cont'd.)

RECEIVER-TRANSMITTER COMPONENT AND INTERNAL-ADJUSTMENT LOCATIONS

FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY	FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY
54	TP607	Monitor for relative audio available for 600-ohm and 500-ohm outputs.	Receiver	58	S507	OUTPUT HIGH-LOW power switch.	Transmitter
55	C558	Final-amplifier neutralization (coarse).	Transmitter	59	R503	VOLUME control.	Receiver
56	T624 (Bottom)	Second-IF output (V606) peaking.	Receiver	60	S506	REMOTE-LOCAL switch	Receiver-Transmitter
67	T625 (Bottom)	Third-IF output (V607)	Receiver	61	R672 (Bottom)	600Ω LEVEL adjust. Adjusts audio output to the 600-ohm telephone line.	Receiver
				62	T626 (Bottom)	AGC amplifier output peaking.	Receiver

TABLE 6-1 (Cont'd.)

## RECEIVER-TRANSMITTER COMPONENT AND INTERNAL-ADJUSTMENT LOCATIONS

FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY	FIGURE 6-1 INDEX NO.	ITEM	DESCRIPTION	ASSEMBLY
63	R675 (Bottom)	500 $\Omega$ LEVEL adjust. Adjusts level of audio supplied to Remote Control for Speaker and Handset.	Receiver	75	R602, LOW POWER ADJ (Bottom)	Bias adjustment for second-IF amplifier tube.	Transmitter
64	C653	AM filter trim capacitor.	Receiver	76	R512, RCVR ATTN ADJ (Bottom)	Establishes agc level.	Receiver
65	T623 (Bottom)	First-IF output (V606) peaking.	Receiver	77	R604, FINAL BIAS ADJ (Bottom)	Bias adjustment for final-amplifier tube.	Transmitter
66	C539	Capacitive balance control for balanced modulator.	Transmitter	78	S502, URC- 51- C6513 (Bottom)	Selects control source for channel selection only.	Receiver- Transmitter
67	R559 (Bottom)	Resistive balance control for balanced modulator.	Transmitter	79	. . .	Trap, 1650 kc.	Receiver- Transmitter
68	R553 (Bottom)	Sets audio level into cathode follower.	Transmitter	80	C608	Frequency trimmer for 1650-kc carrier oscillator.	Receiver- Transmitter
69	R531, TONE (Bottom)	Adjusts level of tone input signal.	Transmitter	81	T622 (Bottom)	First-IF input (V605) peaking.	Receiver
70	S503, RESET (Bottom)	Deenergizer overload relay.	Transmitter	82	T621 (Bottom)	Mixer output (V604) peaking.	Receiver
71	S505 TONE ON- OFF (Bottom)	On-off switch for tone oscillator.	Transmitter	83	C623 through C632 (Bottom)	CHANNEL FRE- QUENCY ADJ; channel frequency trimmers.	Transmitter
72	S504, TEST ON- OFF (Bottom)	Local keying switch.	Transmitter	84	R575 through R584 (Bottom)	XMTR DRIVE ADJ; drive level adjust- ment for equal power output throughout channels.	Transmitter
73	S508, LEDEX ON- OFF (Bottom)	On-off switch for Ledex voltage	Transmitter				
74	R514, CAR- RIER LEVEL ADJ (Bottom)	Adjustment of carrier level for AM reinsertion.	Receiver- Transmitter				

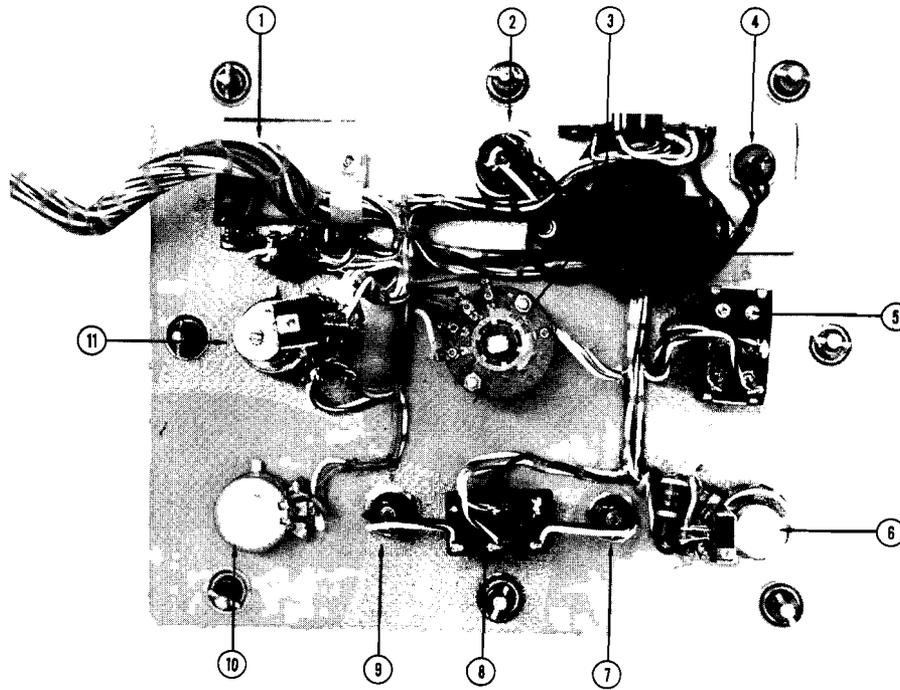


Figure 6-2. Remote-Control Component and Internal-Adjustment Locations

TABLE 6-2

REMOTE-CONTROL COMPONENT AND INTERNAL-ADJUSTMENT LOCATIONS

FIGURE 6-2 INDEX NO.	ITEM	DESCRIPTION	FIGURE 6-2 INDEX NO.	ITEM	DESCRIPTION
1	PL105	ON CHANNEL, FLASH FOR OVERLOAD indicator.	6	R103	VOLUME control.
2	PL102	White panel lamp. Brightness is controlled by DIMMER R105.	7	PL103 (red)	HIGH output indicator. Illuminates when output switch is in high position.
3	S105	CHANNEL SELECTOR switch.	8	S103	OUTPUT switch. Permits selection of high or low Transmitter output.
4	PL105	ON CHANNEL indicator. Will illuminate after CHANNEL SELECTOR switch is changed and Ledex control switches have switched.	9	PL104 (amber)	LOW output indicator. Illuminates when output switch is in low position.
5	S101	RCVR/XMTR, RCVR ONLY, OFF switch. RCVR/XMTR is a standby position during key-up; Transmitter operates during key-down condition.	10	R106	SQUELCH control. Sets quieting level of Receiver.
			11	R105	DIMMER potentiometer.

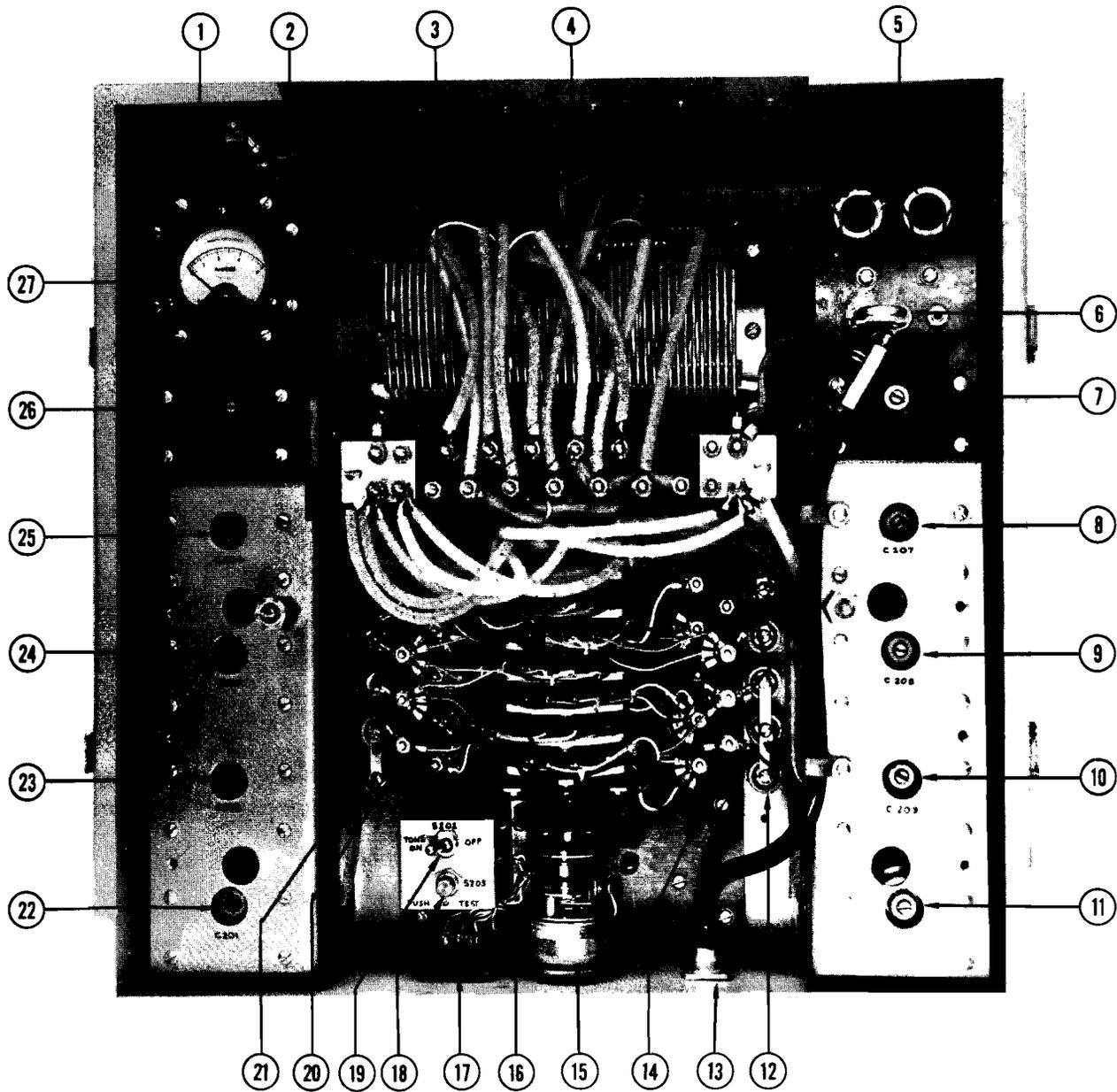
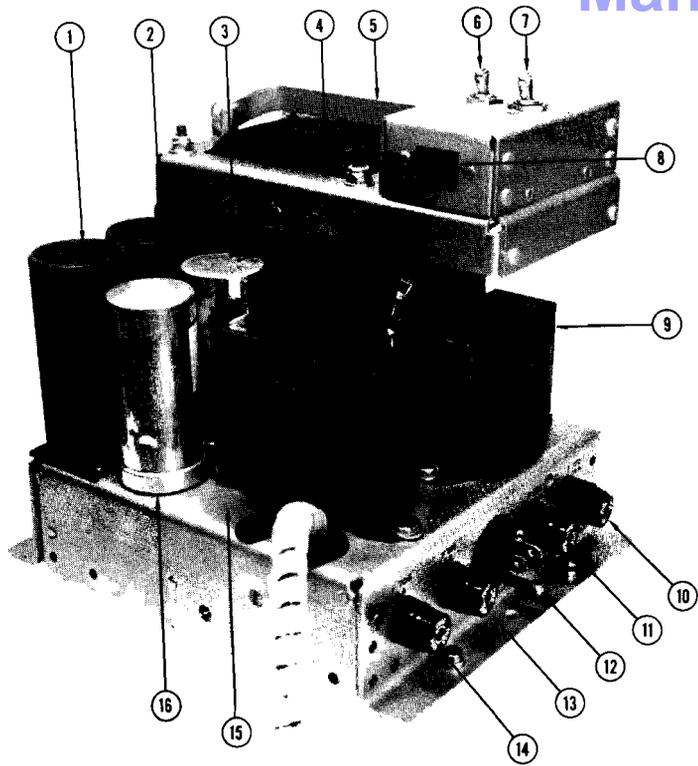


Figure 6-3. Antenna-Coupler Component and Internal-Adjustment Locations

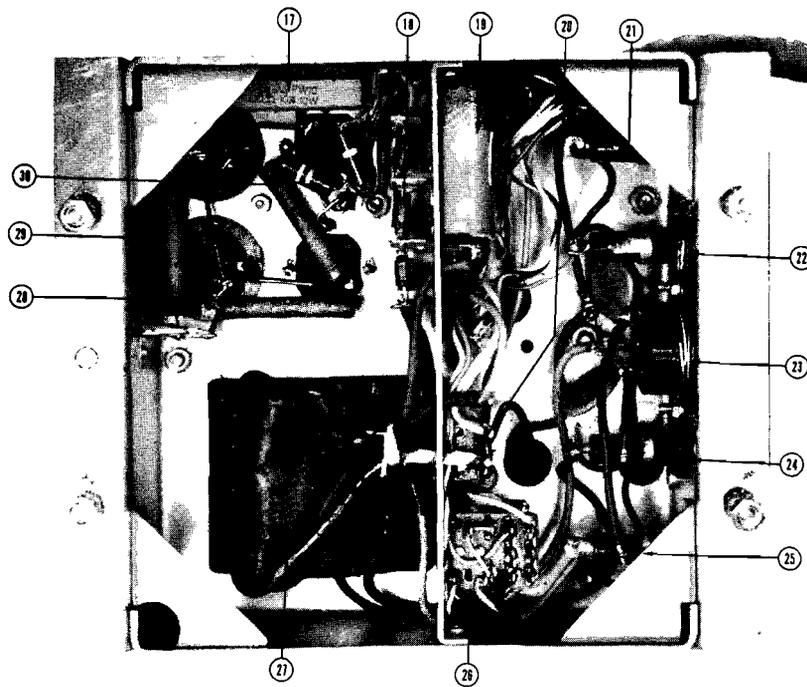
TABLE 6-3

## ANTENNA-COUPLER COMPONENT AND INTERNAL-ADJUSTMENT LOCATIONS

FIGURE 6-3 INDEX NO.	ITEM	DESCRIPTION	FIGURE 6-3 INDEX NO.	ITEM	DESCRIPTION
1	SG201, spark gap	Adjustable gap for overvoltage discharge.	13	J202, connector	50-ohm type N.
2	J203, connector	Antenna connects to conductor in insulator.	14	Capacitor program board.	Board contains connections to capacitor group used for matching. It also contains open terminals for securing unused wires.
3	Program board	Board contains input, output, and coil-tap programming.	15	RS201, Ledex motor and switch assembly	Switch is used to choose channels.
4	L201, inductor	Coil is tapped inductance used for matching.	16	Channel indicator and manual control of Ledex switch	...
5	R202 and R203, dummy load	Load is composed of two resistors in parallel. Each resistor is 100 ohms at 50 watts. They are capable of dissipating 250 watts PEP.	17	Control connector	Connector contains all circuitry necessary to change channels and control tone and keying remotely.
6	Input jumper	Shorting plug for connecting the input to the 50-ohm dummy load. In the other position, it connects the input to the coupler.	18	S203, TEST switch	Switch may be used to key the transmitter.
7	C206	Variable capacitor, Channel 6 fine-tuning control.	19	S202, TONE switch	Switch may be used to turn on the tone oscillator.
8	C207	Variable capacitor, Channel 7 fine-tuning control.	20	Capacitor program board	Same as 14, above.
9	C208	Variable capacitor, Channel 8 fine-tuning control.	21	Capacitor group	Same as 12, above.
10	C209	Variable capacitor, Channel 9 fine-tuning control.	22	C201	Variable capacitor, Channel 1 fine-tuning control.
11	C210	Variable capacitor, Channel 10 fine-tuning control.	23	C202	Variable capacitor, Channel 2 fine-tuning control.
12	Capacitor group	One-half of the capacitors used for matching.	24	C203	Variable capacitor, Channel 3 fine-tuning control.
			25	C204	Variable capacitor, Channel 4 fine-tuning control.
			26	C205	Variable capacitor, Channel 5 fine-tuning control.
			27	M201, output meter	Range 0 to 5 amperes, rf.



TOP VIEW



BOTTOM VIEW

Figure 6-4. Power-Supply Component and Internal-Adjustment Locations

TABLE 6-4

## POWER-SUPPLY COMPONENT AND INTERNAL-ADJUSTMENT LOCATIONS

FIGURE 6-4 INDEX NO.	ITEM	DESCRIPTION	FIGURE 6-4 INDEX NO.	ITEM	DESCRIPTION
1	C701	Part of high-voltage filter	17	R708	Low-voltage filter
2	C702	Part of high-voltage filter	18	...	Rectifier board, CER73 diodes
3	C703	Part of high-voltage filter	19	C704	Bias filter
4	T701	High- and low-voltage transformer	20	CR701, 2, 3, and 4	Ledex bridge
5	...	Handle	21	F704	Fuse, 2.0 amperes
6	S702	REMOTE/LOCAL ac-select switch	22	F701	Fuse, 1.0 ampere
7	S701	ON/OFF POWER CONTROL-local ac switch	23	J701	Power connector, 115 volts, ac
8	J702	Fan outlet, 115 volts, ac	24	F703	Fuse, 6.25 amperes
9	T702	Transformer, 12 volts, ac	25	F702	Fuse, 6.25 amperes
10	F702	Fuse, 6.25 amperes	26	K701	Power-control relay
11	F703	Fuse, 6.25 amperes	27	T702	Transformer, 12 volts, ac
12	J701	Power connector, 115 volts, ac	28	R705	High-voltage equalizing resistor
13	F701	Fuse, 1.0 ampere	29	R704	High-voltage equalizing resistor
14	F704	Fuse, 2.0 amperes	30	R706	High-voltage equalizing resistor
15	L701	Filter choke, 10 henry			
16	C706 A, B, C,	Part of low-voltage filter			

TABLE 6-5  
SUMMARY OF TEST-POINT OUTPUTS

SYMBOL	COLOR	OUTPUT	SIMPSON 260 TYPICAL VOM	HP 410B TYPICAL VTVM
TP501	Brown	Final cathode current Idle Full output	+0.7 volt, dc +1.75 volts, dc	+0.7 volt, dc +1.75 volts, dc
TP502	...	Not used	...	...
TP503	Orange	Final bias voltage	-43 volts, dc	-43 volts, dc
TP504	Yellow	600-ohm input	Note 1	Note 1
TP505	Green	600-ohm input	Note 1	Note 1
TP506	Blue	Audio-level, compressor agc amplifier	Note 2	1.6 volts, ac (with +15-dbm input)
TP507	Violet	Audio-level, compressor plate Tone oscillator +15-dbm two-tone input	0.4 volt, ac 0.65 volt, ac	1.75 volts, ac 3 volts, ac
TP508	Gray	Audio level, cathode follower	Note 2	1 volt, ac
TP509	White	Frequency of local oscillator at balanced- mixer grid	1 to 2 volts, ac	5 to 9 volts, ac
TP510	Black	Drive level to final	-1 to -2 volts, dc	-20 to -40 volts, dc
TP601	Brown	+150 volts, dc, regulated	+150 volts, dc	+150 volts, dc
TP602	...	BNC, alternate rf injection	Note 1	Note 1
TP603	Orange	Plate of first IF	Note 3	Note 3
TP604	Yellow	Frequency (1650 kc) at product detector	Note 4	Note 4
TP605	Green	Audio level, first audio amplifier	Note 2	0.12 volt, ac
TP606	Blue	AGC voltage	-0.6 to -2 volts, dc	-3 to -8 volts, dc
TP607	Violet	Audio level, plate of second audio amplifier	+0.6 volt, dc	+7 volts, dc
TP608	Gray	600-ohm output	Note 5	Note 5
TP609	White	600-ohm output	Note 5	Note 5
TP610	Black	Ground	...	...

Note 1. Signal input point.

Note 2. Level too low for VOM.

Note 3. Use oscilloscope only.

Note 4. Use frequency counter or oscilloscope.

Note 5. Audio output may be measured with wattmeter.

TABLE 6-6  
CAPACITOR COLOR CODE

COLOR	CAPACITANCE VALUE		MULTIPLYING FACTOR, III	TOLERANCE, IV	WORKING VOLTAGE, V
	I	II			
Black	...	0	1	±20%	...
Brown	1	1	10	...	...
Red	2	2	10 <sup>2</sup>	...	250V
Orange	3	3	10 <sup>3</sup>	...	...
Yellow	4	4	10 <sup>4</sup>	...	400V
Green	5	5	...	...	...
Blue	6	6	...	...	630V
Violet	7	7	...	...	...
Gray	8	8	...	...	...
White	9	9	...	±10%	...

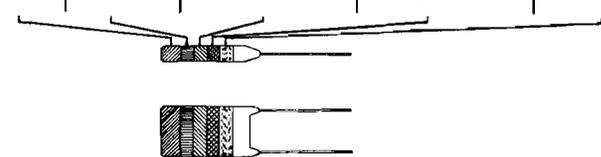
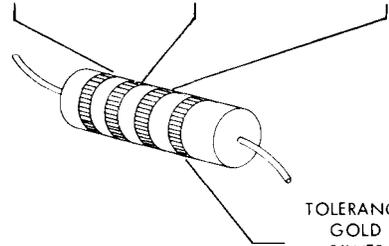


TABLE 6-7  
RESISTOR COLOR CODE

COLOR	FIRST DIGIT	SECOND DIGIT	MULTIPLIER
Black	0	0	1
Brown	1	1	10
Red	2	2	100
Orange	3	3	1,000
Yellow	4	4	10,000
Green	5	5	100,000
Blue	6	6	1,000,000
Violet	7	7	10,000,000
Gray	8	8	100,000,000
White	9	9	1,000,000,000
Gold	...	...	00.1
Silver	...	...	00.01



TOLERANCE  
GOLD ±5%  
SILVER ±10%  
NO BAND ±20%

**6-2.4 Test Procedures and Fault Isolation**

The tables in this subsection are arranged in a general-to-specific order to guide the electronic technician to the problem area. A test-procedure chart for each major assembly is presented along with voltage and resistance tables. The following list is a quick-reference index to these tables.

	<u>Page</u>
Table 6-8. Remote-Control Maintenance Test Procedures	6-14
Table 6-9. Remote-Control Resistance Chart	6-15
Table 6-10. Transmitter Maintenance Test Procedures	6-15
Table 6-11. Transmitter Resistance Chart	6-16
Table 6-12. Transmitter Voltage Chart	6-17

Table 6-13. Receiver Maintenance Test Procedures	6-18
Table 6-14. Receiver Resistance Chart	6-18
Table 6-15. Receiver Voltage Chart	6-19
Table 6-16. Power-Supply Maintenance Test Procedures	6-20
Table 6-17. Power-Supply Resistance Chart	6-21
Table 6-18. Antenna-Coupler Maintenance Test Procedures	6-22
Table 6-19. Antenna-Coupler Resistance Chart	6-22
Table 6-20. Antenna-Coupler Voltage Chart	6-23

Typical oscilloscope displays for the 1650-kc carrier oscillator (V601) and local oscillator (V603) are shown in Figures 6-5 and 6-6.

TABLE 6-8

REMOTE-CONTROL MAINTENANCE TEST PROCEDURES

NO.	SYMPTOM DESCRIPTION	POSSIBLE CAUSE	CORRECTION	TESTS TO MAKE
1	RCVR lamp does <b>not</b> light in RCVR ONLY or RCVR/XMTR switch positions	PL101 burned out.	Replace	If Panel Lamp PL102 lights with the SEARCH/DIMMER control in the maximum clockwise position, check for burned out lamp, PL101.
2	No. 1 good, but panel lamp does not light.	Power Supply PL102 burned out.	Troubleshoot Replace	Turn DIMMER control to maximum cw position.
3	No. 1 and No. 2 good, but no receiver noise in Speaker or Handset.	Receiver	Troubleshoot	Turn SQUELCH and VOLUME controls to maximum cw position.
4	No. 1 through No. 3 good, but no receiver noise in Handset; noise in Speaker.	Handset	Replace	Replace Handset with new unit.
5	No. 1 through No. 3 good, but no receiver noise in speaker; noise in Handset.	Speaker	Replace	Check for resistance between A and B of P101.
6	No. 1 through No. 5 good, but HIGH and LOW OUTPUT indicators do not light when unit is keyed.	Receiver-Transmitter REMOTE-LOCAL switch may be in LOCAL position.	Troubleshoot	Power switch must be in RCVR/XMTR position. Pull up on SEARCH switch knob. Assume that keying relays are working.
7	No. 1 through No. 6 good, but ON-CHANNEL lamp does light and audio output indicates that channels are not changing.	URC-51/C6513 switch may be in C6513 position.	Throw switch to URC-51 position.	...
8	No. 1 through No. 7 good, but no SQUELCH action.	V611	Replace	Check for resistance from A to B of P103.

TABLE 6-9

## REMOTE-CONTROL RESISTANCE CHART

CONDITIONS: All controls maximum clockwise. Power switch in RCVR/XMTR position. Output switch in HIGH power position. Channel selector switch at Channel 1.			
PIN	COMMON LEAD ON	RESISTANCE	NOTES
A	B	16k ohms	...
D	E	0	1
F	E	Infinite	...
G	E	Infinite	...
H	E	0	...
J	L	0	...
K	S	0	...
P	T	0	2
R	S	0	3
T	S	0.4 ohm	4
U	V	150 ohms	5
W	X	80 ohms	...
Z	b	35 ohms	...
a	E	0	...

Note 1. Press SEARCH switch.

Note 2. Infinite to T, press SEARCH switch.

Note 3. Infinite to S, press ATTN switch.

Note 4. Depress microphone button.

Note 5. Depress microphone button and whistle into mouthpiece. Resistance should rise to 450 ohms, approx.

TABLE 6-10

## TRANSMITTER MAINTENANCE TEST PROCEDURES

SYMPTOM		POSSIBLE CAUSE	CORRECTION	TESTS TO MAKE
NO.	DESCRIPTION			
1	Will not key.	V502	Replace	Check K502, K503, and K504 for possible open windings.
2	No. 1 good; SSB output with TONE ON, but not with speech; no modulation on AM.	V503	Replace	...
3	No. 1 good; no SSB output with speech or TONE; set has AM power but no modulation.	V505, V506	Replace	...
4	No. 1 good; no power output on AM or SSB.	V606, V608, V603, V507, V508 and V509	Replace	...
5	No. 1 through No. 4 good; HIGH-LOW power switch has no effect.	R601 and R602 and associated circuitry	Troubleshoot	...

TABLE 6-11

## TRANSMITTER RESISTANCE CHART

CONDITIONS: Complete system connected and programmed for Channel 1; ac plug disconnected. Readings taken with Hewlett-Packard 410B.										
SYMBOL	TYPE	TUBE PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V501	OA2	15k	G	G	G	15k	nc	nc	X	X
V502	12AT7	21k	19k	G	G	G	21k	19k	G	Fil
V503	12AT7	nc	nc	nc	G	G	420k	1 Meg	3.3k	Fil
V504	12AT7	160k	330k	820	G	G	350k	18k	Inf	Fil
V505	6BJ6	350k	G	G	Fil	170k	270k	G	X	X
V506	12AU7	260k	1 Meg	1.2k	G	G	15k	415k	15k	Fil
V507	7360	1.2k	220k	470k	Fil	G	190k	190k	14k	14k
V508	6CL6	G	100k*	nc 150k	Fil	G	130k	G	150k	100k*
V509	8117	G	6k	Inf	20	Fil	6k	G	X	X

Abbreviations

G	Pin connected to chassis ground.	Inf	Infinite
nc	No connections to pin.	k	1,000
X	No such pin.	*	Variable according to setting of associated control.
Fil	Connected to the filament string.		

TABLE 6-12  
TRANSMITTER VOLTAGE CHART

CONDITION: Standby (RCVR/XMTR)										
SYMBOL	TYPE	TUBE PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V501	OA2	+146	G	G	G	+146	nc	nc	X	X
V502	12AT7	+320	-20	G	G	G	+320	-20	G	Fil
V503	12AY7	nc	nc	nc	G	G	*	*	0	Fil
V504	12AT7	*	*	0	G	G	*	0	*+35	Fil
V505	6BJ6	*	G	G	Fil	*	*	G	X	X
V506	12AU7	*	*	0	G	G	+148	+69	+72	Fil
V507	7360	*	*	*	Fil	G	*	*	0	*
V508	6CL6	G	*	nc	Fil	G	*	G	*	nc
V509	8117	G	-45	*	0	Fil	-45	G	X	X
CONDITION: Transmit (Key Down)										
V501	OA2	+146	G	G	G	+146	nc	nc	X	X
V502	12AT7	+100	0	G	G	G	+100	0	G	Fil
V503	12AY7	nc	nc	nc	G	G	+125	0	+2.4	Fil
V504	12AT7	+225	0	+3.6	G	G	+320	0	+44	Fil
V505	6BJ6	-20	G	G	Fil	+250	+220	G	X	X
V506	12AU7	+76	0	+2.6	G	G	+150	+70	+64	Fil
V507	7360	+5.6	+200	-4.8	Fil	G	+172	+182	+30	+30
V508	6CL6	G	-2.7	nc +150	Fil	G	+230	G	+150	nc -2.7
V509	8117	G	-45	+320	+4.2	Fil	-45	G	X	X

ABBREVIATIONS

G	Pin connected to chassis ground.	Inf	Infinite
nc	No connections to pin.	k	1,000
X	No such pin.	*	Variable according to setting of associated control.
Fil	Connected to the filament string.		

TABLE 6-13

## RECEIVER MAINTENANCE TEST PROCEDURES

SYMPTOM		POSSIBLE CAUSE	CORRECTION
NO.	DESCRIPTION		
1	No reception, but good when injecting 1650 kc into antenna.	V603	Replace
2	No reception, but good when injecting 1650 kc into TP602	V602	Replace
3	Good when injecting 1650 kc into TP603.	V604 and V605	Replace
4	Good when injecting audio into TP605.	V606, V607, and V610	Replace
5	Reception of SSB good, but no AM.	CR605	Replace
6	Reception of AM good, but no SSB.	V610 and V601	Replace
7	Reception good, but no output from 600-ohm line.	V612	Replace
8	Reception good, but no output from speaker.	V613	Replace

TABLE 6-14

## RECEIVER RESISTANCE CHART

SYMBOL	TYPE	TUBE PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V601	6AU6	100k	12	G	Fil	26k	130k	12	X	X
V602	12AT7	Inf	1.1 Meg	G	G	G	160k	Inf	Inf	Inf
V603	6CL6	12	100k	18k	Fil	G	16k	G	18k	100k
V604	12AT7	75k	500k	12	G	G	75k	500k	12	Fil
V605	6BA6	1.25 Meg	G	G	Fil	7k	100k	G	X	X
V606	6BA6	1.1 Meg	G	G	Fil	7k	100k	G	X	X
V607	6BA6	1.1 Meg	G	G	Fil	7k	100k	G	X	X
V608	6BA6	1.0 Meg	G	G	Fil	7k	100k	220	X	X
V609	6JU8	100k	Inf	G	Fil	G	G	2.7 Meg	Inf	17k
V610	12AY7	260k	47k	2.2k	G	G	720k	15k	2.2k	Fil
V611	12AY7	200k	1.0 Meg	6.8k	G	G	60k	2.8 Meg	22k	Fil
V612	12AY7	500k	470k	3.9k	G	G	6.5k	50k*	1k	Fil
V613	6BQ5	nc* 65k	65k*	120	G	Fil	nc	5k	nc	15k

## Abbreviations

G	Pin connected to chassis ground.	X	No such pin.
nc	No connections to pin.	Fil	Connected to the filament string.
*	Variable according to setting of associated control.	Inf	Infinite
		k	1,000

TABLE 6-15  
RECEIVER VOLTAGE CHART

CONDITION: Standby (RCVR/XMTR)										
SYMBOL	TYPE	TUBE PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V601	6AU6	-14	0	G	Fil	+130	+78	0	X	X
V602	12AT7	+72	-1.0	G	G	G	+215	+70	+72	Fil
V603	6CL6	+0.06	-10	+140	Fil	G	+140	G	+135	-10
V604	12AT7	+78	-1.7	+0.06	G	G	+78	-1.7	+0.06	Fil
V605	6BA6	-0.96	G	G	Fil	+310	+74	G	X	X
V606	6BA6	-1.0	G	G	Fil	+310	+72	G	X	X
V607	6BA6	-1.0	G	G	Fil	+310	+86	G	X	X
V608	6BA6	0	G	G	Fil	+310	+110	+2.6	X	X
V609	6JU8	-0.74	-0.48	G	Fil	G	G	+4.5	+4.9	+4.6
V610	12AY7	+115	0	+2.5	G	G	+96	0	+2.5	Fil
V611	12AY7	+240	0	+5.7	G	G	+310	+4.6	+12	Fil
V612	12AY7	+85	0	+2.0	G	G	+320	0	+4.8	Fil
V613	6BQ5	nc	0	+7.5	G	Fil	nc	+320	nc	+285
CONDITION: Transmit (Key Down)										
V601	6AU6	-15	+0.03	G	Fil	+130	+80	+0.03	X	X
V602	12AT7	*	*	G	G	G	*	*	*	Fil
V603	6CL6	+0.025	-12	+140	Fil	G	+140	G	+140	-12
V604	12AT7	*	*	0	G	G	*	*	0	Fil
V605	6BA6	*	G	G	Fil	*	*	G	X	X
V606	6BA6	-11	G	G	Fil	+315	+170	G	X	X
V607	6BA6	*	G	G	Fil	*	*	G	X	X
V608	6BA6	0	G	G	Fil	+320	+115	+2.7	X	X
V609	6JU8	*	*	G	Fil	G	G	*	*	0
V610	12AY7	*	*	*	G	G	*	*	*	Fil
V611	12AY7	*	*	0	G	G	*	*	0	Fil
V612	12AY7	*	*	0	G	G	*	*	*	Fil
V613	6BQ5	*nc	*	0	G	Fil	nc	*	nc	*

ABBREVIATIONS

G	Pin connected to chassis ground.	Inf	Infinite
nc	No connections to pin.	k	1,000
X	No such pin.	*	Variable according to setting of associated control.
Fil	Connected to the filament string.		

TABLE 6-16

POWER-SUPPLY TROUBLESHOOTING PROCEDURES  
(METER M701 SHOWS NO OUTPUT)\*

SWITCH S703		TEST	POSSIBLE CAUSE
POSITION	PANEL ENGRAVING		
1	6.3 VAC	Check for unlit filaments.	Fuses F702 or F703
2	-12 VDC	Check operation of K701  Check to assure that ovens are hot.  Check to assure that PL101 and PL102 lamps operate.	Fuse F701  CR714 if ovens are hot but PL101 or PL102 do not light.  ...
3	115	Check to assure that rotary solenoid switches operate.	ON-OFF switch S508; fuses F702 and F703.
4	-150 VDC	Check to assure that overload system operates.  Try to key set.	K701, CR705, F702, F703.  ...
5	+150 VDC	Check for unlit VR tube (V501).  Check for +150 volts at TP601.	K701  ...
6	+310 VDC	...	K701, F702, F703, CR706, CR707
7	+1000 VDC	...	K701, F702, F703, CR708
8	+320 VDC	Check for unlit VR tube.	K701, F702, F703, CR706, CR707
9	POWER (rf output)	Connect wattmeter to output, key to read; check HIGH/LOW OUTPUT switch position.	...

\* Determine the problem area, then check out the problem circuits thoroughly. In the case of the Power Supply, disconnect all plugs to isolate the supply; then use Table 6-17 to check resistances. Check for broken pins and other bad connections. Do not overlook the meter circuit.

TABLE 6-17  
POWER SUPPLY RESISTANCE CHART

CONDITIONS: Local Control, Power switch ON, AC plug disconnected, P602 disconnected. Measure at P602 with the AN/USM-162 Test Meter.				
PIN LETTER P602		AN/USM-162 SCALE	RESISTANCE IN OHMS	NOTES
COMMON LEAD	HOT LEAD			
B and C	A	x 1	0.2	1, 2
A	D	x 10,000	Infinite	
D	A	x 1	100	
Chassis	E and F	x 1	0.1	1
Chassis	H	x 1,000	50k	
H	Chassis	x 1,000	115k	
Chassis	J	x 1,000	115k	
J	Chassis	x 1,000	11k	
Chassis	K	x 1,000	8k	
K	Chassis	x 1,000	100k	
Chassis	L	x 1,000	10k	
L	Chassis	x 1,000	100k	
Chassis	M	x 10,000	Infinite	
M	Chassis	x 10,000	Infinite	
Chassis	N	x 10,000	Infinite	
N	Chassis	x 10,000	Infinite	
M	N	x 10,000	450k	
N	M	x 10,000	Infinite	
Chassis	P	x 1	Infinite	3
J701	R	x 1	0	4, 6
J701	S	x 1	0	5, 7

- Note 1. Filament windings, very low resistance.  
 Note 2. B and C are chassis ground.  
 Note 3. Turn S702 to Remote and read 48 ohms.  
 Note 4. Press relay closed for infinite.  
 Note 5. Remove F703 or F704 for infinite.  
 Note 6. Left side or brass colored.  
 Note 7. Right side or nickel colored.

TABLE 6-18

## ANTENNA-COUPLER MAINTENANCE TEST PROCEDURES

SYMPTOM	POSSIBLE CAUSE	CORRECTION	TESTS TO MAKE
RF power from transmitter, but reports of no reception.	Open tap wire; open input jumper; Ledex not on channel.	Open and investigate	Install through-line wattmeter between Transmitter and Coupler.
	Shorted turn.	Open and investigate	Inspect coils.
Power forward with no reflections when in dummy load, but high reflection from Antenna Coupler.	Mismatch or open connection	Open and investigate	Make continuity measurements. Look for loose connections or open capacitors.
Antenna Coupler is programmed properly, but still has high standing wave.	Antenna	Open and investigate	Investigate antenna for possible open or short.

TABLE 6-19

## ANTENNA-COUPLER RESISTANCE CHART

CONNECTOR PIN	RESISTANCE IN OHMS	NOTES
A	Infinite	1
B	Infinite	1
C	30	1
D	30	1
E	...	...
F	...	...
G	200	2
H	0	3 and 4
J	0	3 and 5
K	...	...

Note 1. Common lead connected to E

Note 2. Common lead connected to F

Note 3. Common lead connected to K

Note 4. TONE switch ON

Note 5. TEST switch depressed

TABLE 6-20

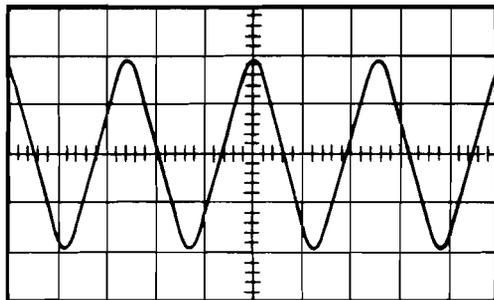
ANTENNA-COUPLER VOLTAGE CHART

CONDITION: Channel 1.

CONNECTOR PIN	VOLTAGE AC/DC	NOTES
A	+100 volts, dc	1
B	+100 volts, dc	1
F to G	115 volts, ac	2

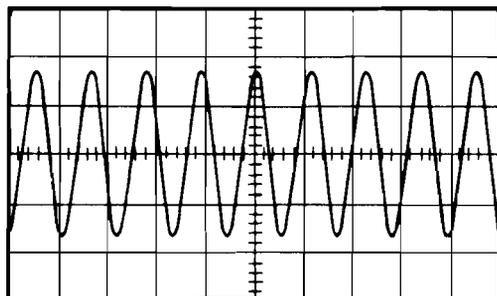
Note 1. Common lead connected to E.

Note 2. POWER switch off.

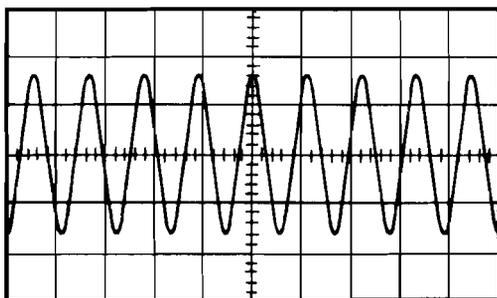


Frequency: 1650 kc  
 Measured at junction of C693  
 and the coaxial cable adjacent  
 to product detector V610  
 Horizontal - 0.2  $\mu$ sec per cm  
 Vertical - 1 volt per cm

Figure 6-5. Oscilloscope Display of Carrier Oscillator (V601) Output during Proper Operation



Frequency: 2182 kc  
 Measured at TP509  
 Oscilloscope setting:  
 Horizontal - 0.2  $\mu$ sec per cm  
 Vertical - 5 volts per cm



Frequency: 16,976 kc  
 Measured at TP509  
 Oscilloscope setting:  
 Horizontal - 0.2  $\mu$ sec per cm  
 Vertical - 1 volt per cm

Figure 6-6. Oscilloscope Displays of Local Oscillator (V603) Outputs during Proper Operation

SECTION VII

PARTS LIST

## SECTION VII

## PARTS LIST

This section contains parts information arranged in three forms. Components are listed in Table 7-1 by schematic symbol in alphabetical order. Table 7-2 is an index of

the part numbers and manufacturers, and Table 7-3 defines the manufacturers' abbreviations. The notes referenced in Table 7-1 are given at the end of the table.

TABLE 7-1

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
BL701	Blower	B2604-02-00004	C217	Capacitor, transmitting, 3 x 800 pf, 5 kv (see Note 2)	A1544-02-00008
C201	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C218	Capacitor, Dura-Paper, 0.047 mfd, 400 volts	K1523-01-01001
C202	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C301	Capacitor, disc ceramic, 0.001 mfd, 1 kv	B1509-01-01038
C203	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C302	Capacitor, disc ceramic, 0.001 mfd, 1 kv	B1509-01-01038
C204	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C303	Capacitor, disc ceramic, 0.01 mfd, 1.4 kv	B1509-01-01015
C205	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C304	Capacitor, disc ceramic, 0.01 mfd, 1.4 kv	B1509-01-01015
C206	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C501	Capacitor, Dura-Paper, 0.047 mfd, 400 volts	M1523-01-01001
C207	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C503	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018
C208	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C504	Capacitor, Dur-Mica, 2 pf, DM-15	K1519-01-00024
C209	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C505	Capacitor, Dur-Mica, 24 pf, DM-15	M1519-01-00005
C210	Capacitor, air-variable, 15 to 100 pf	P9460-00-00007	C506	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018
C211	Capacitor, transmitting, 50 pf, 7.5 kv	A1544-02-00005	C507	Capacitor, Dur-Mica, 100 pf, DM-15	M1519-01-00043
C212	Capacitor, transmitting, 100 pf, 5 kv	A1544-02-00006	C508	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C213	Capacitor, transmitting, 200 pf, 5 kv	A1544-02-00007	C509	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018
C214	Capacitor, transmitting, 400 pf, 5 kv	A1544-02-00003	C510	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C215	Capacitor, transmitting, 800 pf, 5 kv	A1544-02-00008	C511	Capacitor, plastic, 0.033 mfd, 500 volts	B1528-01-01007
C216	Capacitor, transmitting, 2 x 800 pf, 5 kv (see Note 1)	A1544-02-00008			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
C512	Capacitor, Dur-Mica, 6800 pf, DM-30	M1519-01-06002	C533	Capacitor, Dur-Mica, 1500 pf, DM-19	M1519-01-03022
C513	Capacitor, plastic, 0.033 mfd, 500 volts	B1528-01-01007	C534	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006
C514	Capacitor, disc ceramic, 0.001 mfd, 1 kv	M1509-01-01038	C535	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006
C515	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C536	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018
C516	Capacitor, electrolytic, 20 mfd, 25 volts	K1515-02-04003	C537	Capacitor, flat foil, 0.47 mfd, 250 volts	K1528-01-03005
C517	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C539	Capacitor, variable, 5 to 25 pf	K1513-01-00001
C518	Capacitor, electrolytic, 4 mfd, 100 volts	M1515-01-02003	C540	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006
C519	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C541	Capacitor, Dur-Mica, 10 pf, DM-15	M1519-01-00015
C520	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C542	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C521	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C543	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C522	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C544	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C523	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C545	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C524	Capacitor, Dur-Mica, 1000 pf, DM-19	M1519-01-03005	C546	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C525	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C547	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C526	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C548	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1519-01-01017
C527	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C549	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C528	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C550	Capacitor, Dur-Mica, 22 pf, DM-15	M1519-01-00050
C529	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C552	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C530	Capacitor, disc ceramic, 0.001 mfd, 1 kv	M1509-01-01038	C553	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C531	Capacitor, flat foil, 0.1 mfd, 400 volts	A1528-01-03006	C554	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C532	Capacitor, Dur-Mica, 1500 pf, DM-19	M1519-01-03022			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
C555	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C578	Capacitor, transmitting, 150 pf, 5 kv	K1544-02-00001
C556	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C579	Capacitor, transmitting, 150 pf, 5 kv	K1544-02-00001
C557	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C581	Capacitor, transmitting, 150 pf, 5 kv	K1544-02-00001
C558	Capacitor, variable, 265 to 880 pf	K1521-02-01010	C582	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C559	Capacitor, variable, 0.8 to 13 pf	A1536-02-00001	C583	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C562	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C584	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C563	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017	C585	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C564	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017	C586	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C565	Capacitor, disc ceramic, 0.001 mfd, 3 kv	M1509-01-01021	C587	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C566	Capacitor, disc ceramic, 0.01 mfd, 1.4 kv	M1509-01-01015	C588	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C567	Capacitor, disc ceramic, 0.001 mfd, 3 kv	M1509-01-01021	C589	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C568	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C590	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C569	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C591	Capacitor, variable, 100 to 500 pf	K1521-02-01009
C570	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C592	Capacitor, 1200 pf (See Note 3)	K1521-02-01008
C571	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C593	Capacitor, 800 pf (See Note 3)	K1521-02-01007
C572	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C594	Capacitor, 400 pf (See Note 3)	K1521-02-01006
C573	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C595	Capacitor, transmitting, 25 pf, 7.5 kv	K1544-02-00004
C574	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C601	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C575	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C602	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C576	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C603	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C577	Capacitor, variable, 10 to 150 pf	M9404-11-40014	C604	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
C605	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C626	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004
C606	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C627	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004
C607	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C628	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004
C608	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004	C629	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004
C609	Capacitor, Dur-Mica, 15 pf, DM-15	M1519-02-00022	C630	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004
C610	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C631	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004
C611	Capacitor, Dur-Mica, 100 pf, DM-15	M1519-01-00043	C632	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004
C612	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C633	Capacitor, Dur-Mica, 27 pf, DM-15	M1519-02-00076
C613	Capacitor, Dur-Mica, 100 pf, DM-15	M1519-01-00043	C634	Capacitor, Dur-Mica, 25 pf, DM-15	M1519-02-00028
C614	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C635	Capacitor, Dur-Mica, 100 pf, DM-15	M1519-01-00043
C615	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C636	Capacitor, Dur-Mica, 180 pf, DM-15	M1519-01-00089
C616	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C637	Capacitor, Dur-Mica, 100 pf, DM-15	M1519-01-00043
C617	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C638	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C618	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C639	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C619	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C641	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C620	Capacitor, Dur-Mica, 10 pf, DM-15	M1519-01-00006	C642	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C621	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C643	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C622	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C644	Capacitor, Dur-Mica, 47 pf, DM-15	M1519-01-00042
C623	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004	C645	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C624	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004	C646	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C625	Capacitor, variable, 0.9 to 12 pf	K1526-01-00004	C647	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
C648	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041	C668	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018
C649	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C669	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C650	Capacitor, Dur-Mica, 100 pf, DM-15	M1519-01-00001	C671	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C651	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C672	Capacitor, Dur-Mica, 150 pf, DM-15	M1519-02-00034
C652	Capacitor, Dur-Mica, 470 pf, DM-15	M1519-01-00092	C673	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018
C653	Capacitor, trimmer, 2 to 35 pf	M1521-01-00002	C674	Capacitor, Dur-Mica, 31 pf, DM-15	M1519-01-00008
C654	Capacitor, Dur-Mica, 10 pf, DM-15	M1519-01-00015	C675	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C655	Capacitor, Dur-Mica, 5 pf, DM-15	M1519-01-00047	C676	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C656	Capacitor, Dur-Mica, 20 pf, DM-15	M1519-01-00010	C677	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C657	Capacitor, Dur-Mica, 5 pf, DM-15	M1519-01-00047	C678	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C658	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C679	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C659 A-B-C	Capacitor, electrolytic, three-section, 80-40-20 mfd, 450 volts	M1517-01-00003	C681	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C660	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C682	Capacitor, electrolytic, 4 mfd, 100 volts	M1515-01-02003
C661	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C683	Capacitor, electrolytic, 20 mfd, 25 volts	M1515-01-02001
C662	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C684	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C663	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C685	Capacitor, electrolytic, 1 mfd, 40 volts	M1515-02-04004
C664	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C686	Capacitor, Dur-Mica, 51 pf, DM-15	M1519-02-00080
C665	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C687	Capacitor, Dur-Mica, 51 pf, DM-15	M1519-02-00080
C666	Capacitor, disc ceramic, 0.001 mfd, 1 kv	M1509-01-01038	C688	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C667	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C689	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
			C691	Capacitor, Dur-Mica, 39 pf, DM-15	M1519-02-00063

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
C692	Capacitor, Dur-Mica, 390 pf, DM-15	M1519-01-00091	C713	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017
C693	Capacitor, Dur-Mica, 2 pf, DM-15	M1519-01-00024	C714	Capacitor, electrolytic, 250 mfd, 25 volts	K1515-02-04017
C694	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C715	Capacitor, disc ceramic, 0.01 mfd, 1.4 kv	B1509-01-01015
C695	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	C716	Capacitor, disc ceramic, 0.01 mfd, 1.4 kv	B1509-01-01015
C696	Capacitor, disc ceramic, 0.1 mfd, 100 volts	M1509-01-01018	C717	Capacitor, variable, 1 to 8 pf	K1527-01-00001
C697	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041	C6001	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017
C698	Capacitor, electrolytic, 20 mfd, 25 volts	M1515-01-02001	C6002	Capacitor, disc ceramic, 0.001 mfd, 3 kv	M1509-01-01021
C699	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017	C6003	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C701	Capacitor, electrolytic, 100 mfd, 450 volts	M1515-01-00001	C6005	Capacitor, electrolytic, 20 mfd, 25 volts	M1515-01-02001
C702	Capacitor, electrolytic, 100 mfd, 450 volts	M1515-01-00001	C6006	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C703	Capacitor, electrolytic, 100 mfd, 450 volts	M1515-01-00001	C6007	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C704	Capacitor, electrolytic, 20 mfd, 250 volts	K1515-02-05002	C6008	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C705	Capacitor, electrolytic, 20 mfd, 250 volts	K1515-02-05002	C6009	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C706 A-B-C	Capacitor, electrolytic, three-section, 80-40-20 mfd, 450 volts	M1517-01-00003	C6010	Capacitor, disc ceramic, 0.02 mfd, 500 volts	M1509-01-01041
C707	Capacitor, electrolytic, 250 mfd, 25 volts	K1515-02-04017	C6011	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C708	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017	C6012	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C709	Capacitor, electrolytic, 20 mfd, 25 volts	M1515-01-02001	C6013	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C710	Capacitor, Dur-Mica, 2 pf, DM-15	M1519-01-00024	C6014	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C711	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017	C6015	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020
C712	Capacitor, Dur-Mica, 2 pf, DM-15	M1519-01-00024	C6016	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
C6017	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR702	Diode, TS4, Ledex rectifier	M4805-02-00102
C6018	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR703	Diode, TS4, Ledex rectifier	M4805-02-00102
C6019	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR704	Diode, TS4, Ledex rectifier	M4805-02-00102
C6021	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR705	Diode, TS4, Bias rectifier	M4805-02-00102
C6022	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR706	Diode, CER73, 300-volt rectifier	M4808-02-00002
C6023	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR707	Diode, CER73, 300-volt rectifier	M4808-02-00002
C6024	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR708	Diode, CER73, high-voltage rectifier	M4808-02-00002
C6025	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR709	Diode, CER73, high-voltage rectifier	M4808-02-00002
C6026	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR710	Diode, CER73, high-voltage rectifier	M4808-02-00002
C6027	Capacitor, disc ceramic, 0.005 mfd, 500 volts	M1509-01-01020	CR711	Diode, CER73, high-voltage rectifier	M4808-02-00002
C6028	Capacitor, disc ceramic, 0.01 mfd, 500 volts	M1509-01-01017	CR712	Diode, CER73, high-voltage rectifier	M4808-02-00002
CR201	Diode, Zener, VR200 (Ledex)	K4833-01-00008	CR713	Diode, CER73, high-voltage rectifier	M4808-02-00002
CR301	Diode, TS4	B4805-02-00102	CR714	Diode, 3AF1, 12-volt ac rectifier	K4812-01-00001
CR501	Diode, Zener, VR200 (Ledex)	K4833-01-00008	CR715	Diode, TS4	M4805-02-00102
CR502	Diode, TS4	M4805-02-00102	CR716	Diode, 1N34A	K4823-02-00001
CR503	Diode, 1N634	K4823-02-00002	CR717	Diode, TS4	M4805-02-00102
CR504	Diode, 1N634	K4823-02-00002	CR718	Diode, CER73, 300-volt rectifier	M4808-02-00002
CR505	Diode, 1N916	A4803-01-00001	CR719	Diode, CER73, 300-volt rectifier	M4808-02-00002
CR506	Diode, 1N916	A4803-01-00001	F701	Fuse, 1 ampere, Slo-Blo	K5134-02-00002
CR507	Diode, 1N634	K4823-02-00002	F702	Fuse, 6.25 ampere, Slo-Blo	K5134-01-00301
CR601	Diode, 1N4009	A4826-02-00001	F703	Fuse, 6.25 ampere, Slo-Blo	K5134-01-00301
CR602	Diode, 1N34A	K4823-02-00001	F704	Fuse, 2 ampere, Slo-Blo	K5134-02-00009
CR603	Diode, 1N34A	K4823-02-00001	FL501	Flasher	A5907-02-00001
CR604	Diode, TS4	M4805-02-00102	HR201	Heater, space	A4715-01-00015
CR605	Diode, 1N634	K4823-02-00002	HR301	Heater, space	A2607-02-00001
CR606	Diode, 1N634	K4823-02-00002			
CR701	Diode, TS4, Ledex rectifier	M4805-02-00102			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
HR601	Oven, Crystal	K2315-01-00003	L504	Choke, 3 hy	K5627-01-00001
HR602	Oven, Crystal	K2315-01-00003	L505	Choke, 2.5 mh	K1802-01-00001
HR603	Oven, Crystal	K2315-01-00001	L506	Choke, 100 $\mu$ h	K1809-02-00011
HR604	Oven, Crystal	K2315-01-00001	L507	Choke, 1.8 $\mu$ h	K1805-01-00005
HS101	Handset	P1309-01-00002	L508	Coil, pi network	P1804-02-00063
J101	Connector, speaker, 2-pin, female	A2102-02-00023	L509	Coil, L network	P1804-02-00064
J102	Connector, handset, 7-pin, female	A2102-02-00022	L510	Choke, 2.5 mh	K1802-01-00001
J103	Connector, control, 26-pin, male	A2101-02-00038	L511	Choke, 2.5 $\mu$ h	K1802-01-00001
J201	Connector, 14-pin	K2101-02-00039	L601	Choke, 100 $\mu$ h	K1803-01-00107
J202	Connector, RF	K2111-02-00016	L602	Choke, 430 $\mu$ h	K1803-01-00052
J203	Connector, feedthrough insulator	A3101-02-00002	L603	Choke, 430 $\mu$ h	K1803-01-00052
J501	Connector, antenna (SO239)	A2111-01-00001	L604	Choke, 430 $\mu$ h	K1803-01-00052
J502	Connector, mike, 7-pin	A2102-02-00022	L605	Choke, 430 $\mu$ h	K1803-01-00052
J601	Connector, control, 50-pin, female	A2102-02-00021	L701	Choke, 10 hy	M5626-02-00006
J602	Connector, power, 15- pin, male	A2101-02-00040	LR501	Photoconductive cell	A5740-02-00001
J701	Connector, three-wire, ac	K2132-05-00010	M201	Meter, rf current	A2902-02-00013
J702	Connector, fan, two-wire, ac	K2102-01-00001	M701	Meter	A2902-02-00014
K501	Relay, overload	K4515-02-00001	P101	Connector, 2-pin (speaker)	A2103-02-00020
K502	Relay, transmit-receive	K4515-02-00001	P102	Connector, 7-pin (handset)	A2103-02-00019
K503	Relay, transmit-receive	K4515-02-00001	P103	Connector, cable, 26-pin, female	A2104-02-00050
K504	Relay, antenna	B4531-02-00002	P201	Connector, cable, 14-pin, female	A2104-02-00051
K505	Relay, carrier reinsertion	K4515-02-00001	P202	Connector, cable, type-N, UR-21D/U	A2112-02-00008
K601	Relay, filter input	K4515-02-00001	P302	Connector, cable mounting, 15-pin, male	A2103-02-00018
K602	Relay, filter output	K4515-02-00001	P303	Connector, cable mounting, 15-pin, female	A2104-02-00053
K701	Relay, ac power	K4512-01-00001	P304	Connector, cable mounting, 50-pin, female	A2104-02-00052
L201	Coil, antenna matching, 140 $\mu$ h	P1804-02-00065	P305	Connector, cable mounting, 50-pin, male	P2103-02-00017
L202	Choke, 0.325 $\mu$ h	A1806-02-00132	P501	Connector, cable, UHF type, PL259	A2112-01-00001
L301	Choke, bifilar	A1822-02-00002	P503	Plug, neutralizing	PL9015-03-00014
L501	Choke, 2.5 mh	K1802-01-00001	P601	Connector, cable mounting, 50-pin, male	A2103-02-00017
L502	Choke, 3 hy	K5627-01-00001			
L503	Choke, 3 hy	K5627-01-00001			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
P602	Connector, cable mounting, 15-pin, female	A2104-02-00053	R511	Resistor, 510k, $\pm 5\%$ , 1/2w	K4703-02-00512
P701	Cable, three-wire with molded female plug	A6070-02-00011	R512	Resistor, variable, 500k, $\pm 10\%$ , 1/2w	A4735-03-00016
PL101	Lamp, pilot, 330	K3902-01-00001	R514	Resistor, variable, 500k $\pm 10\%$ , 1/2w	A4735-03-00016
PL102	Lamp, pilot, 1813	K3901-01-00002	R515	Resistor, 10k $\pm 10\%$ , 1/2w	K4703-01-00344
PL103	Lamp, pilot, 330	K3902-01-00001	R516	Resistor, 120k $\pm 10\%$ , 2w	K4705-01-00957
PL104	Lamp, pilot, 330	K3902-01-00001	R517	Resistor, 10k $\pm 10\%$ , 1/2w	K4703-01-00344
PL105	Lamp, pilot, 330	K3902-01-00001	R518	Resistor, 1k $\pm 10\%$ , 1/2w	K4703-01-00332
R101	Resistor, 10k $\pm 10\%$ , 1w	K4704-01-00644	R519	Resistor, 270k $\pm 10\%$ , 1/2w	K4703-01-00361
R102	Resistor, 470 ohms, $\pm 10\%$ , 2w	K4705-01-00928	R521	Resistor, 3.3k $\pm 10\%$ , 1/2w	K4703-01-00338
R103	Resistor, variable, 3k $\pm 10\%$ , 1/2w	K4735-02-17010	R522	Resistor, 470k $\pm 10\%$ , 1/2w	K4703-01-00364
R104	Resistor, 47 ohms, $\pm 10\%$ , 1w	K4704-01-00616	R523	Resistor, 10k $\pm 10\%$ , 1/2w	K4703-01-00344
R105	Resistor, variable, 150 ohms, $\pm 10\%$ , 1/2w	A4735-02-17011	R524	Resistor, 270k $\pm 10\%$ , 1/2w	K4703-01-00361
R106	Resistor, variable, 10k, $\pm 10\%$ , 1/2w	A4735-02-00001	R525	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356
R107	Resistor, 91 ohms, $\pm 10\%$ , 2w	K4705-02-01022	R526	Resistor, 330k $\pm 10\%$ , 1/2w	K4703-01-00362
R201	Resistor, 100k, $\pm 10\%$ , 2w	K4705-01-00956	R527	Resistor, 180k $\pm 10\%$ , 1/2w	K4703-01-00359
R202	Resistor, 100 ohms, $\pm 10\%$ , 50w	A4706-02-00001	R528	Resistor, 18k $\pm 10\%$ , 1/2w	K4703-01-00347
R203	Resistor, 100 ohms, $\pm 10\%$ , 50w	A4706-02-00001	R529	Resistor, 820 ohms $\pm 10\%$ , 1/2w	K4703-01-00331
R501	Resistor, 1.5k, $\pm 10\%$ , 1/2w	K4703-01-00334	R531	Resistor, variable, 50k $\pm 10\%$ , 1/2w	A4735-03-00014
R502	Resistor, 1.8k, $\pm 10\%$ , 2w	K4705-01-00935	R532	Resistor, 2.2 Meg $\pm 10\%$ , 1/2w	K4703-01-00372
R503	Resistor, variable, 20k $\pm 10\%$ , 1/2w	A4735-01-00005	R533	Resistor, 330k $\pm 10\%$ , 1/2w	K4703-01-00362
R505	Resistor, 150k, $\pm 10\%$ , 1/2w	K4703-01-00358	R534	Resistor, 22k $\pm 10\%$ , 1/2w	K4703-01-00348
R506	Resistor, 22k, $\pm 10\%$ , 1/2w	K4703-01-00348	R535	Resistor, 820 ohms $\pm 10\%$ , 1/2w	K4703-01-00331
R507	Resistor, 8.2k, $\pm 10\%$ , 7w	K4714-02-00500			
R508	Resistor, 150k, $\pm 10\%$ , 1/2w	K4703-01-00358			
R510	Resistor, 500 ohms, $\pm 10\%$ , 25w	A4714-02-00011			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
R536	Resistor, 100k $\pm$ 10%, 1/2w	K4703-01-00356	R561	Resistor, 270 ohms $\pm$ 10%, 1/2w	K4703-01-00325
R537	Resistor, 330k $\pm$ 10%, 1/2w	K4703-01-00362	R562	Resistor, 3.9k $\pm$ 10%, 1w	K4704-01-00639
R538	Resistor, 390k $\pm$ 10%, 1/2w	K4703-01-00363	R563	Resistor, 100k $\pm$ 10%, 1/2w	K4703-01-00356
R539	Resistor, 33k $\pm$ 10%, 1/2w	K4703-01-00350	R564	Resistor, 2.7k $\pm$ 10%, 1/2w	K4703-01-00337
R541	Resistor, 33k $\pm$ 10%, 1/2w	K4703-01-00350	R565	Resistor, 2.7k $\pm$ 10%, 1/2w	K4703-01-00337
R542	Resistor, 33k $\pm$ 10%, 1/2w	K4703-01-00350	R566	Resistor, 100k $\pm$ 10%, 1/2w	K4703-01-00356
R543	Resistor, 150k $\pm$ 10%, 1/2w	K4703-01-00358	R567	Resistor, 68k $\pm$ 10%, 1/2w	K4703-01-00354
R544	Resistor, 1 Meg $\pm$ 10%, 1/2w	K4703-01-00368	R568	Resistor, 68k $\pm$ 10%, 1/2w	K4703-01-00354
R545	Resistor, 33k $\pm$ 10%, 1/2w	K4703-01-00350	R569	Resistor, 2.7k $\pm$ 10%, 1/2w	K4703-01-00337
R546	Resistor, 120k $\pm$ 10%, 1/2w	K4703-01-00357	R571	Resistor, 1.2k $\pm$ 10%, 1/2w	K4703-01-00333
R548	Resistor, 8.2k $\pm$ 10%, 1/2w	K4703-01-00343	R572	Resistor, 470k $\pm$ 10%, 1/2w	K4703-01-00364
R549	Resistor, 1 Meg $\pm$ 10%, 1/2w	K4703-01-00368	R573	Resistor, 12k $\pm$ 10%, 1/2w	K4703-01-00345
R550	Resistor, 62k $\pm$ 5%, 1/2w	K4703-02-00490	R574	Resistor, 2.7k $\pm$ 10%, 1/2w	K4703-01-00337
R551	Resistor, 1.2k $\pm$ 10%, 1/2w	K4703-01-00333	R575	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R552	Resistor, 100k $\pm$ 10%, 1/2w	K4703-01-00356	R576	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R553	Resistor, variable, 150k $\pm$ 10%, 1/2w	A4735-03-00013	R577	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R554	Resistor, 220k $\pm$ 10%, 1/2w	K4703-01-00360	R578	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R555	Resistor, 180k $\pm$ 10%, 1/2w	K4703-01-00359	R579	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R556	Resistor, 220 ohms $\pm$ 10%, 1/2w	K4703-01-00324	R580	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R557	Resistor, 15k $\pm$ 10%, 1/2w	K4703-01-00346	R581	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R558	Resistor, 270 ohms $\pm$ 10%, 1/2w	K4703-01-00325	R582	Resistor, variable, 50k $\pm$ 10%, 1/2w	A4735-01-00625
R559	Resistor, variable, 250 ohms $\pm$ 10%, 1/2w	A4735-03-00012			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
R583	Resistor, variable, 50k $\pm 10\%$ , 1/2w	A4735-01-00625	R612	Resistor, 6.8k $\pm 10\%$ , 1/2w	K4703-01-00342
R584	Resistor, variable, 50k $\pm 10\%$ , 1/2w	A4735-01-00625	R613	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356
R585	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356	R614	Resistor, 330k $\pm 10\%$ , 1/2w	K4703-01-00362
R586	Resistor, 2.2 Meg $\pm 10\%$ , 1/2w	K4703-01-00372	R615	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356
R587	Resistor, 4.7 Meg $\pm 10\%$ , 1/2w	K4703-01-00376	R616	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356
R588	Resistor, 3.5k $\pm 10\%$ , 5w	K4713-01-00008	R617	Resistor, 1.5k $\pm 10\%$ , 1/2w	K4703-01-00334
R589	Resistor, 24k $\pm 10\%$ , 1w	K4704-02-00780	R618	Resistor, 1k $\pm 10\%$ , 1w	K4704-01-00632
R591	Resistor, 1 Meg $\pm 10\%$ , 1/2w	K4703-01-00368	R619	Resistor, 1 Meg $\pm 10\%$ , 1/2w	K4703-01-00368
R592	Resistor, 4.7k $\pm 10\%$ , 1/2w	K4703-01-00340	R621	Resistor, 1 Meg $\pm 10\%$ , 1/2w	K4703-01-00368
R593	Resistor, 100k $\pm 10\%$ , 2w	K4705-01-00956	R622	Resistor, 47k $\pm 10\%$ , 1/2w	K4703-01-00352
R594	Resistor, 1k $\pm 10\%$ , 1w	K4704-01-00632	R623	Resistor, 10k $\pm 10\%$ , 1/2w	K4703-01-00344
R595	Resistor, 10 ohms $\pm 10\%$ , 1w	K4704-01-00608	R624	Resistor, 220k $\pm 10\%$ , 1/2w	K4703-01-00360
R596	Resistor, 10 ohms $\pm 10\%$ , 1w	K4704-01-00608	R625	Resistor, 68k $\pm 10\%$ , 1w	K4704-01-00654
R597	Resistor, 10 ohms $\pm 10\%$ , 2w	K4705-01-00908	R626	Resistor, 1.5k $\pm 10\%$ , 1/2w	K4703-01-00334
R599	Resistor, 10 ohms $\pm 10\%$ , 2w	K4705-01-00908	R627	Resistor, 22k $\pm 10\%$ , 1/2w	K4703-01-00348
R601	Resistor, 6.2k $\pm 5\%$ , 1w	K4704-02-00766	R628	Resistor, 24k $\pm 5\%$ , 1/2w	K4703-02-00480
R602	Resistor, variable, 500k $\pm 10\%$ , 1/2w	A4735-03-00016	R629	Resistor, 24k $\pm 5\%$ , 1/2w	K4703-02-00480
R603	Resistor, 10k $\pm 10\%$ , 2w	K4705-01-00944	R631	Resistor, 10k $\pm 10\%$ , 2w	K4705-01-00944
R604	Resistor, variable, 3.5k $\pm 10\%$ , 1/2w	A4735-03-00015	R632	Resistor, 68k $\pm 10\%$ , 1w	K4704-01-00654
R605	Resistor, 4.7k $\pm 10\%$ , 2w	K4705-01-00940	R633	Resistor, 1.5k $\pm 10\%$ , 1/2w	K4703-01-00334
R606	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356	R634	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356
R608	Resistor, 100k $\pm 10\%$ , 1/2w	K4703-01-00356	R635	Resistor, 68k $\pm 10\%$ , 1w	K4704-01-00654
R609	Resistor, 82k $\pm 10\%$ , 1/2w	K4703-01-00355			
R611	Resistor, 1.5k $\pm 10\%$ , 1/2w	K4703-01-00334			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
R636	Resistor, 560k $\pm$ 10%, 1/2w	K4703-01-00365	R664	Resistor, 2.2 Meg $\pm$ 10%, 1/2w	K4703-01-00372
R637	Resistor, 1.5k $\pm$ 10%, 1/2w	K4703-01-00334	R665	Resistor, 220k $\pm$ 10%, 1/2w	K4703-01-00360
R638	Resistor, 1 Meg $\pm$ 10%, 1/2w	K4703-01-00368	R666	Resistor, 27k $\pm$ 10%, 1/2w	K4703-01-00349
R639	Resistor, 220 ohms $\pm$ 10%, 1/2w	K4703-01-00324	R667	Resistor, 470k $\pm$ 10%, 1/2w	K4703-01-00364
R640	Resistor, 1 Meg $\pm$ 10%, 1/2w	K4703-01-00368	R668	Resistor, 470k $\pm$ 10%, 1/2w	K4703-01-00364
R641	Resistor, 68k $\pm$ 10%, 1w	K4704-01-00654	R669	Resistor, 3.9k $\pm$ 10%, 1/2w	K4703-01-00339
R642	Resistor, 1.5k $\pm$ 10%, 1/2w	K4703-01-00334	R670	Resistor, 10k $\pm$ 10%, 1/2w	K4703-01-00344
R643	Resistor, 10k $\pm$ 10%, 1/2w	K4703-01-00344	R671	Resistor, 1k $\pm$ 10%, 1/2w	K4703-01-00332
R644	Resistor, 100k $\pm$ 10%, 1/2w	K4703-01-00356	R672	Resistor, variable, 500k $\pm$ 10%, 1/2w	A4735-03-00017
R646	Resistor, 150k $\pm$ 10%, 1/2w	K4703-01-00358	R673	Resistor, 100k $\pm$ 10%, 1/2w	K4703-01-00356
R647	Resistor, 47k $\pm$ 10%, 1/2w	K4703-01-00352	R674	Resistor, 1 Meg $\pm$ 10%, 1/2w	K4703-01-00368
R648	Resistor, 4.7 Meg $\pm$ 10%, 1/2w	K4703-01-00376	R675	Resistor, variable, 500k $\pm$ 10%, 1/2w	A4735-03-00017
R649	Resistor, 330k $\pm$ 10%, 1/2w	K4703-01-00362	R676	Resistor, 6.8k $\pm$ 10%, 1w	K4704-01-00642
R651	Resistor, 330k $\pm$ 10%, 1/2w	K4703-01-00362	R677	Resistor, 120 ohms $\pm$ 10%, 2w	K4705-01-00921
R652	Resistor, 2.2 Meg $\pm$ 10%, 1/2w	K4703-01-00372	R678	Resistor, 1 Meg $\pm$ 10%, 1/2w	K4703-01-00368
R653	Resistor, 47k $\pm$ 10%, 1/2w	K4703-01-00352	R679	Resistor, 100k $\pm$ 10%, 1/2w	K4703-01-00356
R654	Resistor, 220k $\pm$ 10%, 1/2w	K4703-01-00360	R680	Resistor, 33k $\pm$ 10%, 1/2w	K4703-01-00350
R655	Resistor, 2.2k $\pm$ 10%, 1/2w	K4703-01-00336	R701	Resistor, 680k $\pm$ 10%, 1/2w	K4703-01-00366
R656	Resistor, 15k $\pm$ 10%, 1/2w	K4703-01-00346	R702	Resistor, 680k $\pm$ 10%, 1/2w	K4703-01-00366
R657	Resistor, 15k $\pm$ 10%, 1/2w	K4703-01-00346	R703	Resistor, 680k $\pm$ 10%, 1/2w	K4703-01-00366
R658	Resistor, 680k $\pm$ 10%, 1/2w	K4703-01-00366	R704	Resistor, 40k $\pm$ 10%, 5w	K4727-02-00001
R661	Resistor, 1 Meg $\pm$ 10%, 1/2w	K4703-01-00368	R705	Resistor, 40k $\pm$ 10%, 5w	K4727-02-00001
R662	Resistor, 150k $\pm$ 10%, 1/2w	K4703-01-00358	R706	Resistor, 40k $\pm$ 10%, 5w	K4727-02-00001
R663	Resistor, 6.8k $\pm$ 10%, 1/2w	K4703-01-00342	R707	Resistor, 180 ohms $\pm$ 10%, 2w	K4705-01-00923

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
R708	Resistor, 220 ohms $\pm 10\%$ , 10w	K4714-02-01007	R734	Resistor, 5.1k $\pm 5\%$ , 1/2w	K4703-02-00464
R709	Resistor, 1k $\pm 10\%$ , 2w	K4705-01-00932	R735	Resistor, variable, 50k $\pm 10\%$ , 1/2w	A4735-01-00625
R711	Resistor, 680k $\pm 10\%$ , 1/2w	K4703-01-00366	R736	Resistor, 100k $\pm 10\%$ , 1w	K4704-01-00656
R712	Resistor, 680k $\pm 10\%$ , 1/2w	K4703-01-00366	R737	Resistor, 100k $\pm 10\%$ , 2w	K4705-01-00956
R713	Resistor, 680k $\pm 10\%$ , 1/2w	K4703-01-00366	R738	Resistor, 680k $\pm 10\%$ , 1/2w	K4703-01-00366
R714	Resistor, 100k $\pm 5\%$ , 1/2w	A4703-02-00495	R739	Resistor, 680k $\pm 10\%$ , 1/2w	K4703-01-00366
R715	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	R740	Resistor, 680k $\pm 10\%$ , 1/2w	K4703-01-00366
R716	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	R741	Resistor, 680k $\pm 10\%$ , 1/2w	K4703-01-00366
R717	Resistor, 10k $\pm 10\%$ , 1/2w	K4703-01-00344	RS201	Solenoid, rotary	P5106-05-00032
R718	Resistor, 240k $\pm 5\%$ , 1w	K4704-02-00804	RS501	Solenoid, rotary	P5110-02-00005
R719	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	S101	Switch	A5104-01-00001
R721	Resistor, 3830 ohms $\pm 1\%$ , 1/8w	A4723-01-00002	S102A	Switch (SEARCH)	Included in R105
R722	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	S102B	Switch (SEARCH)	Included in R105
R723	Resistor, 750k $\pm 10\%$ , 2w	K4705-02-01116	S102C	Switch (SEARCH)	Included in R105
R724	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	S103	Switch DPDT (HIGH/ LOW OUTPUT)	A5102-01-00004
R725	Resistor, 220k $\pm 5\%$ , 1w	K4704-02-00803	S104	Switch (ATTEN)	Included in R103
R726	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	S105	Switch (CHANNEL SELECTOR)	B5106-02-00029
R727	Resistor, 100k $\pm 5\%$ , 1/2w	A4703-02-00495	S201	Switch	P5110-02-00007
R728	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	S201A	Switch wafer (on Ledex unit)	Part of RS201
R729	Resistor, 68k $\pm 5\%$ , 1/2w	K4703-02-00491	S201B	Switch wafer (on Ledex unit)	Part of RS201
R731	Resistor, 3920 ohms $\pm 1\%$ , 1/8w	A4723-01-00001	S201C	Switch wafer (on Ledex unit)	Part of RS201
R732	Resistor, 4.3k $\pm 5\%$ , 1/2w	K4703-02-00462	S201D	Switch wafer (on Ledex unit)	Part of RS201
R733	Resistor, 10k $\pm 10\%$ , 1/2w	K4703-01-00344	S201E	Switch wafer (on Ledex unit)	Part of RS201

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
S201F	Switch wafer (on Ledex unit)	Part of RS201	T504	Transformer, transmitter, balanced mixer, Channel 3 (see Note 4)	P1823-02-xxxxx
S201G	Switch wafer (on Ledex unit)	Part of RS201	T505	Transformer, transmitter, balanced mixer, Channel 4 (see Note 4)	P1823-02-xxxxx
S201H	Switch wafer (on Ledex unit)	Part of RS201	T506	Transformer, transmitter, balanced mixer, Channel 5 (see Note 4)	P1823-02-xxxxx
S201J	Switch wafer (on Ledex unit)	Part of RS201	T507	Transformer, transmitter, balanced mixer, Channel 6 (see Note 4)	P1823-02-xxxxx
S201K	Switch wafer (on Ledex unit)	Part of RS201	T508	Transformer, transmitter, balanced mixer, Channel 7 (see Note 4)	P1823-02-xxxxx
S202	Switch, toggle (TONE)	K5101-02-00002	T509	Transformer, transmitter, balanced mixer, Channel 8 (see Note 4)	P1823-02-xxxxx
S203	Switch, push (PUSH TO TEST)	K5125-02-00003	T510	Transformer, transmitter, balanced mixer, Channel 9 (see Note 4)	P1823-02-xxxxx
S501	Switch	P5110-02-00006	T511	Transformer, transmitter, balanced mixer, Channel 10 (see Note 4)	P1823-02-xxxxx
S502	Switch SPDT (REMOTE-SELECT)	K5102-02-00001	T601	Transformer, receiver, antenna, Channel 1 (see Note 5)	P1823-02-xxxxx
S503	Switch SPDT (RESET)	K5125-02-00002	T602	Transformer, receiver, antenna, Channel 2 (see Note 5)	P1823-02-xxxxx
S504	Switch SPST (TEST)	K5101-02-00002	T603	Transformer, receiver, antenna, Channel 3 (see Note 5)	P1823-02-xxxxx
S505	Switch SPST (TONE)	K5101-02-00002	T604	Transformer, receiver, antenna, Channel 4 (see Note 5)	P1823-02-xxxxx
S506	Switch (REMOTE-LOCAL)	A5128-02-00001	T605	Transformer, receiver, antenna, Channel 5 (see Note 5)	P1823-02-xxxxx
S507	Switch (HIGH/LOW OUTPUT)	K5101-02-00002	T606	Transformer, receiver, antenna, Channel 6 (see Note 5)	P1823-02-xxxxx
S508	Switch (LEDEX ON-OFF)	K5102-02-00005	T607	Transformer, receiver, antenna, Channel 7 (see Note 5)	P1823-02-xxxxx
S701	Switch ON-OFF (LOCAL)	K5101-02-00002			
S702	Switch ON-OFF (SELECT)	K5102-02-00006			
S703	Switch, meter	M5108-02-00005			
SG201	Spark-gap assembly	PL9015-03-00013			
SP101	Speaker, horn	P1313-01-00001			
T101	Transformer, audio	M5618-02-00011			
T501	Transformer, transmitter, 600-ohm input	M5615-02-00002			
T502	Transformer, transmitter, balanced mixer, Channel 1 (see Note 4)	P1823-02-xxxxx			
T503	Transformer, transmitter, balanced mixer, Channel 2 (see Note 4)	P1823-02-xxxxx			

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
T608	Transformer, receiver, antenna, Channel 8 (see Note 5)	P1823-02-xxxxx	T624	Transformer, second-IF plate	K1810-01-00004
T609	Transformer, receiver, antenna, Channel 9 (see Note 5)	P1823-02-xxxxx	T625	Transformer, third-IF plate	K1810-01-00004
T610	Transformer, receiver, antenna, Channel 10 (see Note 5)	P1823-02-xxxxx	T626	Transformer, AGC-amplifier plate	K1810-01-00004
T611	Transformer, receiver, balanced mixer, Channel 1 (see Note 6)	P1823-02-xxxxx	T627	Transformer, 600-ohm output	M5615-02-00002
T612	Transformer, receiver balanced mixer, Channel 2 (see Note 6)	P1823-02-xxxxx	T628	Transformer, 500-ohm output	M5615-02-00003
T613	Transformer, receiver, balanced mixer, Channel 3 (see Note 6)	P1823-02-xxxxx	T701	Transformer, power	P5606-02-00004
T614	Transformer, receiver, balanced mixer, Channel 4 (see Note 6)	P1823-02-xxxxx	T702	Transformer, 12 volts	M5602-02-00007
T615	Transformer, receiver, balanced mixer, Channel 5 (see Note 6)	P1823-02-xxxxx	TB301	Terminal block (12 terminals)	A2887-02-04003
T616	Transformer, receiver, balanced mixer, Channel 6 (see Note 6)	P1823-02-xxxxx	TB302	Terminal block (12 terminals)	A2887-02-04003
T617	Transformer, receiver, balanced mixer, Channel 7 (see Note 6)	P1823-02-xxxxx	TB303	Terminal block (12 terminals)	A2887-02-04003
T618	Transformer, receiver, balanced mixer, Channel 8 (see Note 6)	P1823-02-xxxxx	TB304	Terminal block (12 terminals)	A2887-02-04003
T619	Transformer, receiver, balanced mixer, Channel 9 (see Note 6)	P1823-02-xxxxx	TB305	Terminal block (12 terminals)	A2887-02-04003
T620	Transformer, receiver, balanced mixer, Channel 10 (see Note 6)	P1823-02-xxxxx	TB306	Terminal block (12 terminals)	A2887-02-04003
T621	Transformer, receiver-mixer plate	K1810-02-00019	TP501	Jack, tip, brown	M2120-01-00014
T622	Transformer, first-IF grid	K1810-01-00004	TP503	Jack, tip, orange	M2120-01-00012
T623	Transformer, first-IF plate	K1810-02-00020	TP504	Jack, banana, 600-ohm input, yellow	M2120-01-00026
			TP505	Jack, banana, 600-ohm input, green	M2120-01-00023
			TP506	Jack, tip, blue	M2120-01-00016
			TP507	Jack, tip, violet	M2120-01-00018
			TP508	Jack, tip, gray	M2120-01-00019
			TP509	Jack, tip, white	M2120-01-00007
			TP510	Jack, tip, black	M2120-01-00009
			TP601	Jack, tip, brown	M2120-01-00014
			TP602	Jack, BNC, UG-1094	A2111-02-00015
			TP603	Jack, tip, orange	M2120-01-00012
			TP604	Jack, tip, yellow	M2120-01-00013
			TP605	Jack, tip, green	M2120-01-00010

TABLE 7-1 (Continued)

## PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.	SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
TP606	Jack, tip, blue	M2120-01-00016	Y606	Crystal, Channel 5 (see Note 7)	Reference only
TP607	Jack, tip, violet	M2120-01-00018	Y607	Crystal, Channel 6 (see Note 7)	Reference only
TP608	Jack, banana, 600-ohm output, gray	M2120-01-00032	Y608	Crystal, Channel 7 (see Note 7)	Reference only
TP609	Jack, banana, 600-ohm output, white	M2120-01-00020	Y609	Crystal, Channel 8 (see Note 7)	Reference only
TP610	Jack, tip, black	M2120-01-00009	Y610	Crystal, Channel 9 (see Note 7)	Reference only
V501	Tube, electron, 0A2	K5745-01-00001	Y611	Crystal, Channel 10 (see Note 7)	Reference only
V502	Tube, electron, 12AT7	K5705-01-00001	Z501	Coil assembly, transmitter driver, Channel 1 (see Note 8)	P1823-02-xxxxx
V503	Tube, electron, 12AY7	K5705-01-00007	Z502	Coil assembly, transmitter driver, Channel 2 (see Note 8)	P1823-02-xxxxx
V504	Tube, electron, 12AT7	K5705-01-00001	Z503	Coil assembly, transmitter driver, Channel 3 (see Note 8)	P1823-02-xxxxx
V505	Tube, electron, 6BJ6	K5721-02-00004	Z504	Coil assembly, transmitter driver, Channel 4 (see Note 8)	P1823-02-xxxxx
V506	Tube, electron, 12AU7	K5705-01-00002	Z505	Coil assembly, transmitter driver, Channel 5 (see Note 8)	P1823-02-xxxxx
V507	Tube, electron, 7360	K5738-02-00001	Z506	Coil assembly, transmitter driver, Channel 6 (see Note 8)	P1823-02-xxxxx
V508	Tube, electron, 6CL6	K5720-02-00007	Z507	Coil assembly, transmitter driver, Channel 7 (see Note 8)	P1823-02-xxxxx
V509	Tube, electron, 8117	K5735-02-00004	Z508	Coil assembly, transmitter driver, Channel 8 (see Note 8)	P1823-02-xxxxx
V601	Tube, electron, 6AU6	K5720-02-00001	Z509	Coil assembly, transmitter driver, Channel 9 (see Note 8)	P1823-02-xxxxx
V602	Tube, electron, 12AT7	K5705-01-00001	Z510	Coil assembly, transmitter driver, Channel 10 (see Note 8)	P1823-02-xxxxx
V603	Tube, electron, 6CL6	K5720-02-00007	Z511	Suppressor, parasitic	K1806-02-00090
V604	Tube, electron, 12AT7	K5705-01-00001	Z512	Suppressor, parasitic	K1806-02-00090
V605	Tube, electron, 6BA6	K5721-01-00001			
V606	Tube, electron, 6BA6	K5721-01-00001			
V607	Tube, electron, 6BA6	K5721-01-00001			
V608	Tube, electron, 6BA6	K5721-01-00001			
V609	Tube, electron, 6JU8	K5727-02-00001			
V610	Tube, electron, 12AY7	K5705-01-00007			
V611	Tube, electron, 12AY7	K5705-01-00007			
V612	Tube, electron, 12AY7	K5705-01-00007			
V613	Tube, electron, 6BQ5	K5715-02-00001			
Y601	Crystal, 1650 kc	K2305-02-00091			
Y602	Crystal, Channel 1 (see Note 7)	Reference only			
Y603	Crystal, Channel 2 (see Note 7)	Reference only			
Y604	Crystal, Channel 3 (see Note 7)	Reference only			
Y605	Crystal, Channel 4 (see Note 7)	Reference only			

TABLE 7-1 (Continued)

PARTS LIST

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
Z513	Suppressor, parasitic	K1806-02-00091
Z514	Suppressor, parasitic	K1806-02-00091
Z601	Trap, 1650 kc	A1804-02-00165

SYMBOL	DESCRIPTION	HAMMARLUND PART NO.
ZF601	Crystal filter, AM	K2714-02-00002
ZF602	Crystal filter, SSB	K2714-02-00003

Note 1. Capacitor C216 (1600 pf) is composed of two 800-pf capacitors A1544-02-00008.

Note 2. Capacitor C217 (2400 pf) is composed of three 800-pf capacitors, A1544-02-00008.

Note 3. This capacitor is preset and locked; it is not adjustable.

Note 4. To determine part number for transformers T502 through T511, channel frequency must be known.

<u>Channel Frequency</u>	<u>Use Part Number</u>
2 Mc - 3 Mc	P1823-02-00021
2.5 Mc - 4 Mc	P1823-02-00022
3.5 Mc - 6 Mc	P1823-02-00023
5.5 Mc - 9 Mc	P1823-02-00024
8.5 Mc - 14 Mc	P1823-02-00025
13 Mc - 18 Mc	P1823-02-00026

Note 5. To determine part number for transformers T601 through T610, channel frequency must be known.

<u>Channel Frequency</u>	<u>Use Part Number</u>
2 Mc - 3 Mc	P1823-02-00001
2.5 Mc - 4 Mc	P1823-02-00002
3.5 Mc - 6 Mc	P1823-02-00003
5.5 Mc - 9 Mc	P1823-02-00004

<u>Channel Frequency</u>	<u>Use Part Number</u>
8.5 Mc - 14 Mc	P1823-02-00005
13 Mc - 18 Mc	P1823-02-00006

Note 6. To determine part number for transformers T611 through T620, channel frequency must be known.

<u>Channel Frequency</u>	<u>Use Part Number</u>
2 Mc - 3 Mc	P1823-02-00011
2.5 Mc - 4 Mc	P1823-02-00012
3.5 Mc - 6 Mc	P1823-02-00013
5.5 Mc - 9 Mc	P1823-02-00014
8.5 Mc - 14 Mc	P1823-02-00015
13 Mc - 18 Mc	P1823-02-00016

Note 7. Crystal frequency in kilocycles is equal to channel frequency in kilocycles plus 1650 kc.

Note 8. To determine part numbers for coil assemblies Z501 through Z510, channel frequency must be known.

<u>Channel Frequency</u>	<u>Use Part Number</u>
2 Mc - 3 Mc	P1823-02-00031
2.5 Mc - 4 Mc	P1823-02-00032
3.5 Mc - 6 Mc	P1823-02-00033
5.5 Mc - 9 Mc	P1823-02-00034
8.5 Mc - 14 Mc	P1823-02-00035
13 Mc - 18 Mc	P1823-02-00036

TABLE 7-2

## PARTS INDEX BY NUMBER AND MANUFACTURER

PART NO.	MANUFACTURER
1309-01-00002	R.O.C.
1313-01-00001	A.T.S.
1509-01-01015	R.M.C.
1509-01-01017	R.M.C.
1509-01-01018	R.M.C.
1509-01-01020	R.M.C.
1509-01-01021	R.M.C.
1509-01-01038	R.M.C.
1509-01-01041	R.M.C.
1509-02-04001	S.T.C.
1513-01-00001	E.T.P.
1514-01-06002	E.M.M.
1515-01-00001	C.D.E.
1515-01-02001	S.E.C.
1515-01-02003	S.E.C.
1515-02-04003	A.E.C.
1515-02-04004	A.E.C.
1515-02-04017	A.E.C.
1515-02-05002	G.I.C.
1517-01-00003	S.E.C.
1519-01-00001	E.M.M.
1519-01-00005	E.M.M.
1519-01-00006	E.M.M.
1519-01-00008	E.M.M.
1519-01-00010	E.M.M.
1519-01-00015	E.M.M.
1519-01-00024	E.M.M.
1519-01-00042	E.M.M.
1519-01-00043	E.M.M.
1519-01-00047	E.M.M.
1519-01-00050	E.M.M.
1519-01-00089	E.M.M.
1519-01-00091	E.M.M.
1519-01-00092	E.M.M.
1519-01-03022	E.M.M.
1519-02-00028	E.M.M.
1519-02-00034	E.M.M.

PART NO.	MANUFACTURER
1519-02-00063	E.M.M.
1519-02-00074	E.M.M.
1519-02-00076	E.M.M.
1519-02-00080	E.M.M.
1521-01-00002	E.M.M.
1521-02-01004	E.M.M.
1521-02-01006	E.M.M.
1521-02-01007	E.M.M.
1521-02-01008	E.M.M.
1521-02-01009	E.M.M.
1523-01-01001	E.M.M.
1526-01-00004	A.E.C.
1528-01-01007	A.E.C.
1528-01-03005	A.E.C.
1528-01-03006	A.E.C.
1536-02-00001	J.F.D.
1544-02-00001	C.R.L.
1544-02-00003	C.R.L.
1544-02-00004	C.R.L.
1544-02-00005	C.R.L.
1544-02-00006	C.R.L.
1544-02-00007	C.R.L.
1544-02-00008	C.R.L.
1802-01-00001	A.R.T.
1803-01-00052	S.W.C.
1803-01-00107	W.I.C.
1804-02-00063	I.E.C.
1804-02-00064	I.E.C.
1804-02-00065	I.E.C.
1804-02-00165	A.R.T.
1805-01-00005	O.H.M.
1806-02-00090	H.M.M.
1806-02-00091	H.M.M.
1806-02-00132	H.M.M.
1809-02-00011	S.W.C.
1810-01-00004	A.R.T.

TABLE 7-2 (Continued)

## PARTS INDEX BY NUMBER AND MANUFACTURER

PART NO.	MANUFACTURER	PART NO.	MANUFACTURER
1810-02-00019	A.R.T.	2103-02-00018	U.S.C.
1810-02-00020	A.R.T.	2103-02-00019	A.M.P.
1822-02-00002	H.M.M.	2103-02-00020	A.M.P.
1823-02-00001	A.R.T.	2104-02-00050	A.M.P.
1823-02-00002	A.R.T.	2104-02-00051	A.M.P.
1823-02-00003	A.R.T.	2104-02-00052	W.I.N.
1823-02-00004	A.R.T.	2104-02-00053	U.S.C.
1823-02-00005	A.R.T.	2111-01-00001	A.M.P.
1823-02-00006	A.R.T.	2111-02-00015	A.M.P.
1823-02-00011	A.R.T.	2111-02-00016	A.M.P.
1823-02-00012	A.R.T.	2112-01-00001	A.M.P.
1823-02-00013	A.R.T.	2112-02-00008	A.M.P.
1823-02-00014	A.R.T.	2120-01-00004	E.F.J.
1823-02-00015	A.R.T.	2120-01-00007	E.F.J.
1823-02-00016	A.R.T.	2120-01-00009	E.F.J.
1823-02-00021	A.R.T.	2120-01-00010	E.F.J.
1823-02-00022	A.R.T.	2120-01-00012	E.F.J.
1823-02-00023	A.R.T.	2120-01-00013	E.F.J.
1823-02-00024	A.R.T.	2120-01-00014	E.F.J.
1823-02-00025	A.R.T.	2120-01-00016	E.F.J.
1823-02-00026	A.R.T.	2120-01-00018	E.F.J.
1823-02-00031	A.R.T.	2120-01-00019	E.F.J.
1823-02-00032	A.R.T.	2120-01-00020	E.F.J.
1823-02-00033	A.R.T.	2120-01-00023	E.F.J.
1823-02-00034	A.R.T.	2120-01-00026	E.F.J.
1823-02-00035	A.R.T.	2120-01-00032	E.F.J.
1823-02-00036	A.R.T.	2132-05-00010	A.M.P.
2101-02-00038	A.M.P.	2305-02-00091	H.U.C.
2101-02-00039	A.M.P.	2315-01-00001	O.V.I.
2101-02-00040	U.S.C.	2315-01-00003	O.V.I.
2102-01-00001	A.P.C.	2604-02-00004	R.O.M.
2102-02-00021	W.I.N.	2607-02-00001	T.O.P.
2102-02-00022	A.M.P.	2714-02-00002	M.I.W.
2102-02-00023	A.M.P.	2714-02-00003	M.I.W.
2103-02-00017	W.I.N.	2887-02-04003	C.I.J.

TABLE 7-2 (Continued)

## PARTS INDEX BY NUMBER AND MANUFACTURER

PART NO.	MANUFACTURER	PART NO.	MANUFACTURER
2902-02-00013	S.I.M.	4703-01-00361	M.N.C.
2902-02-00014	H.E.I.	4703-01-00362	M.N.C.
3101-02-00002	E.F.J.	4703-01-00363	M.N.C.
3901-01-00002	G.E.C.	4703-01-00364	M.N.C.
3902-01-00001	G.E.C.	4703-01-00365	M.N.C.
4512-01-00001	C.O.E.	4703-01-00366	M.N.C.
4515-02-00001	C.O.E.	4703-01-00368	M.N.C.
4531-02-00002	F.A.S.	4703-01-00372	M.N.C.
4703-01-00324	M.N.C.	4703-01-00376	M.N.C.
4703-01-00325	M.N.C.	4703-02-00462	M.N.C.
4703-01-00331	M.N.C.	4703-02-00464	M.N.C.
4703-01-00332	M.N.C.	4703-02-00480	M.N.C.
4703-01-00333	M.N.C.	4703-02-00490	M.N.C.
4703-01-00334	M.N.C.	4703-02-00491	M.N.C.
4703-01-00336	M.N.C.	4703-02-00496	M.N.C.
4703-01-00337	M.N.C.	4703-02-00512	M.N.C.
4703-01-00338	M.N.C.	4704-01-00608	M.N.C.
4703-01-00339	M.N.C.	4704-01-00616	M.N.C.
4703-01-00340	M.N.C.	4704-01-00632	M.N.C.
4703-01-00342	M.N.C.	4704-01-00639	M.N.C.
4703-01-00343	M.N.C.	4704-01-00642	M.N.C.
4703-01-00344	M.N.C.	4704-01-00644	M.N.C.
4703-01-00345	M.N.C.	4704-01-00654	M.N.C.
4703-01-00346	M.N.C.	4704-01-00656	M.N.C.
4703-01-00347	M.N.C.	4704-02-00766	M.N.C.
4703-01-00348	M.N.C.	4704-02-00780	M.N.C.
4703-01-00349	M.N.C.	4704-02-00803	M.N.C.
4703-01-00350	M.N.C.	4704-02-00804	M.N.C.
4703-01-00352	M.N.C.	4705-01-00908	M.N.C.
4703-01-00354	M.N.C.	4705-01-00921	M.N.C.
4703-01-00355	M.N.C.	4705-01-00923	M.N.C.
4703-01-00356	M.N.C.	4705-01-00928	M.N.C.
4703-01-00357	M.N.C.	4705-01-00932	M.N.C.
4703-01-00358	M.N.C.	4705-01-00935	M.N.C.
4703-01-00359	M.N.C.	4705-01-00940	M.N.C.
4703-01-00360	M.N.C.	4705-01-00944	M.N.C.

TABLE 7-2 (Continued)

## PARTS INDEX BY NUMBER AND MANUFACTURER

PART NO.	MANUFACTURER	PART NO.	MANUFACTURER
4705-01-00956	M.N.C.	5102-02-00006	A.H.H.
4705-01-00957	M.N.C.	5104-01-00001	S.G.E.
4705-02-01022	M.N.C.	5106-02-00029	O.A.K.
4705-02-01116	M.N.C.	5106-02-00032	L.E.X.
4706-02-00001	C.A.R.	5108-02-00005	O.A.K.
4713-01-00008	C.M.C.	5110-02-00005	L.E.X.
4714-02-00011	O.H.M.	5110-02-00006	L.E.X.
4714-02-00500	I.R.C.	5110-02-00007	R.S.C.
4714-02-01007	M.N.C.	5125-02-00002	C.E.I.
4715-01-00015	E.L.W.	5125-02-00003	C.E.I.
4723-01-00001	D.A.E.	5128-02-00001	P.R.M.
4723-01-00002	D.A.E.	5134-01-00301	B.M.F.
4727-02-00001	I.R.C.	5134-02-00002	L.I.F.
4735-01-00005	C.T.S.	5134-02-00009	L.I.F.
4735-01-00625	C.T.S.	5602-02-00007	M.A.G.
4735-02-00001	C.T.S.	5606-02-00004	M.A.G.
4735-02-17010	S.T.C.	5615-02-00002	F.T.C.
4735-02-17011	S.T.C.	5615-02-00003	M.A.G.
4735-03-00012	C.T.S.	5618-02-00011	M.A.G.
4735-03-00013	C.T.S.	5626-02-00006	M.A.G.
4735-03-00014	C.T.S.	5627-01-00001	S.W.C.
4735-03-00015	C.T.S.	5705-01-00001	R.C.A.
4735-03-00016	C.T.S.	5705-01-00002	R.C.A.
4735-03-00017	C.T.S.	5705-01-00007	R.C.A.
4803-01-00001	G.E.C.	5715-02-00001	R.C.A.
4805-02-00102	D.I.C.	5720-02-00001	R.C.A.
4808-02-00002	S.D.I.	5720-02-00007	R.C.A.
4812-01-00001	S.T.I.	5721-01-00001	R.C.A.
4823-02-00001	S.E.P.	5721-02-00004	R.C.A.
4823-02-00002	S.E.P.	5727-02-00001	R.C.A.
4826-02-00001	G.E.C.	5735-02-00004	A.E.C.
4833-01-00008	P.R.M.	5738-02-00001	R.C.A.
5101-02-00002	C.E.I.	5740-02-00001	G.E.C.
5102-01-00004	C.E.I.	5745-01-00001	R.C.A.
5102-02-00001	A.H.H.	5907-02-00001	T.S.E.
5102-02-00005	C.H.I.	6070-02-00011	P.H.A.

TABLE 7-2 (Continued)

## PARTS INDEX BY NUMBER AND MANUFACTURER

PART NO.	MANUFACTURER
9015-03-00013	H.M.M.
9015-03-00014	H.M.M.

PART NO.	MANUFACTURER
9404-11-40014	H.M.M.
9460-00-00007	H.M.M.

TABLE 7-3

## INDEX OF MANUFACTURERS

ABBREV.	NAME AND ADDRESS	ABBREV.	NAME AND ADDRESS
A.P.C.	Alden Products Co., 263 N. Main St., Brockton, Mass., 02401	D.I.C.	Diodes Inc., 9261 Independence Ave., Chatsworth, Calif., 91311
A.E.C.	Amperex Electronic Corp., 230 Duffy Ave., Hicksville, N. Y., 11802	E.M.M.	Electro Motive Mfg. Co., Inc., S. Park and John Sts., Willimantic, Conn., 06226
A.M.P.	Amphenol/Connector Div., 1830 S. 54th Ave., Chicago, Ill., 60650	E.T.P.	Erie Technological Prod. Inc., 644 W. 12th St., Erie, Pa., 16512
A.H.H.	Arrow Hart & Hegeman Co., 103 Hawthorn St., Hartford, Conn., 06106	F.T.C.	Florida Transformer Co., Munny Airport, Deland, Fla., 32028
A.R.T.	Artted Co., Inc., 367 Worthington St., Springfield 3, Mass., 01107	G.E.C.	General Electric Co., 570 Lexington Ave., N. Y., N. Y., 10022
A.T.S.	Atlas Sound, 1419-51 39th St., Brooklyn, N. Y., 11218	G.I.C.	General Instrument Corp., 65 Gouverneur St., Newark, N. J., 07104
B.M.F.	Bussman Manufacturing, 2536 W. University St., St. Louis 7, Mo., 63107	H.M.M.	Hammarlund Mfg. Co., Mars Hill, N. C., 28754
C.A.R.	Carborundum Co., Box 311, Latrobe, Pa., 15650	H.E.I.	Hoyt Electrical Instrument Works, Inc., 42 Carleton St., Cambridge, Mass., 02142
C.E.I.	Carling Electric Inc., 505 New Park Ave., W. Hartford, Conn., 06110	H.U.C.	Hunt Corp., 453 Lincoln St., Carlisle, Pa., 17013
C.R.L.	Centralab Inc., 900 E. Keefe Ave., Milwaukee, Wisc., 53201	I.E.C.	Illumitronics Eng. Co., 680 E. Taylor Ave., Palo Alto, Calif., 94086
C.I.J.	Cinch Jones, 1026 S. Homan Ave., Chicago, Ill., 60624	I.R.C.	International Resistance Co., 401 N. Broad St., Phila, Pa., 19108
C.M.C.	Clarostat Mfg. Co., Inc., Washington St., Dover, N. H., 03820	J.F.D.	J.F.D. Electronics Co., 15th Ave. and 16th St., Brooklyn, N. Y., 11219
C.O.E.	Comar Electric, 3349 W. Addison St., Chicago, Ill., 60618	E.F.J.	Johnson, E. F., Co., 299 10th Ave., S.W., Waseca, Minn., 56093
C.D.E.	Cornell Dubilier Electronics, 50 Paris St., Newark, N. J., 07101	L.E.X.	Ledex Inc., 124 Webster, Dayton, Ohio, 45402
C.T.S.	Chicago Telephone Supply Corp., 1142 W. Beardsley, Elkhart, Ind., 46514	L.I.F.	Littlefuse, 800 E. Northwest Highway, Des Plaines, Ill., 60016
C.H.I.	Cutler-Hammer Inc., 419 N. 12th St., Milwaukee, Wisc., 53201	M.A.G.	Magnetic Winding, Freemansburg and Hobson Sts., Easton, Pa., 18042
D.A.E.	Dale Electronics, 1324 28th Ave., Columbus, Nebraska, 68601	P.R.M.	Mallory, P. R. and Co., Box 231, Frankfort, Ind., 46041

TABLE 7-3 (Continued)

## INDEX OF MANUFACTURERS

<u>ABBREV.</u>	<u>NAME AND ADDRESS</u>	<u>ABBREV.</u>	<u>NAME AND ADDRESS</u>
M.I.W.	Midland Wright, 3155 Fibreglas Rd., Kansas City, Kansas, 66115	F.A.S.	Scherma, F.A., Mfg. Co., Inc., 424 Broome St., N. Y., N. Y., 10013
M.N.C.	Molded National Co., 3135 E. 12th St., Los Angeles, Calif., 90023	S.I.M.	Simpson Electric Co., 5200 W. Kinzie St., Chicago, Ill., 60644
O.A.K.	Oak Manufacturing, Crystal Lake, Ill., 60014	S.D.I.	Solitron Devices Inc., 256 Oak Tree Rd., Tappan, N. Y., 10983
O.H.M.	Ohmite Mfg. Co., 3601 Howard St., Skokie, Ill., 60076	S.E.C.	Sprague Electric Co., 335 Marshall St., North Adams, Mass., 01247
O.V.I.	Ovenaie Inc., 706 Forrest St., Charlottesville, Va., 22901	S.T.C.	Stackpole Carbon, St. Mary's, Pa., 15857
P.H.A.	Phalo, 530 Boston Tpke., Shrewsbury, Mass., 01546	S.W.C.	Stanwyck Winding Co., Inc., 137 Walsh Ave., Newburgh, N. Y., 12550
R.M.C.	Radio Materials Co., 4242 W. Bryn Mawr Ave., Chicago, Ill., 60646	S.E.P.	Sylvania Electric Prod. Inc., 730 3rd Ave., N. Y., N. Y., 10017
R.S.C.	Radio Switch Corp., Route 79, Marlboro, N. J., 07746	T.O.P.	Tru-Ohm Products, 3426 W. Diversey, Chicago, Ill., 60647
R.C.A.	R.C.A., 30 Rockefeller Plaza, N. Y., N. Y., 10020	T.S.E.	Tung-Sol Electric, 1 Summer St., Newark, N. J., 07104
R.O.C.	Roanwell Corp., 180 Varick St., N. Y., N. Y., 10014	U.S.C.	U. S. Components Inc., 1320 Zerega Ave., Bronx, N. Y., 10462
R.O.M.	Rotron Mfg. Co., Inc., Hasbrouck Lane, Woodstock, N. Y., 12498	E.L.W.	Wiegand, Edwin L., 7500 Thomas Blvd., Pittsburgh, Pa., 15208
S.G.E.	Sargent Electric, 23-16 40th Ave., Long Island City, N. Y., 11101	W.I.C.	Wilco Corp., 4030 W. Tenth St., Indianapolis, Ind., 46222
S.T.I.	Sarkes-Tarzian Inc., 415 N. College Ave., Bloomington, Ind., 47401	W.I.N.	Winchester Electronics, Main St. and Hillside Ave., Oakville, Conn., 06779

SECTION VIII

DIAGRAMS

**SECTION VIII**

**DIAGRAMS**

This section contains the following figures.

Figure 8-1. Schematic Diagram, Receiver-Transmitter  
RT-710/URC-51 (Hammarlund 9015-04-  
00009)

Figure 8-2. Schematic Diagram, Remote Control  
C-4826/URC-51 (Hammarlund 9015-04-  
00012)

Figure 8-3. Schematic Diagram, Antenna Coupler  
CU-1208/URC-51 (Hammarlund 9015-  
04-00002)

Figure 8-4. Schematic Diagram, Power Supply  
(Hammarlund 9015-04-00011)

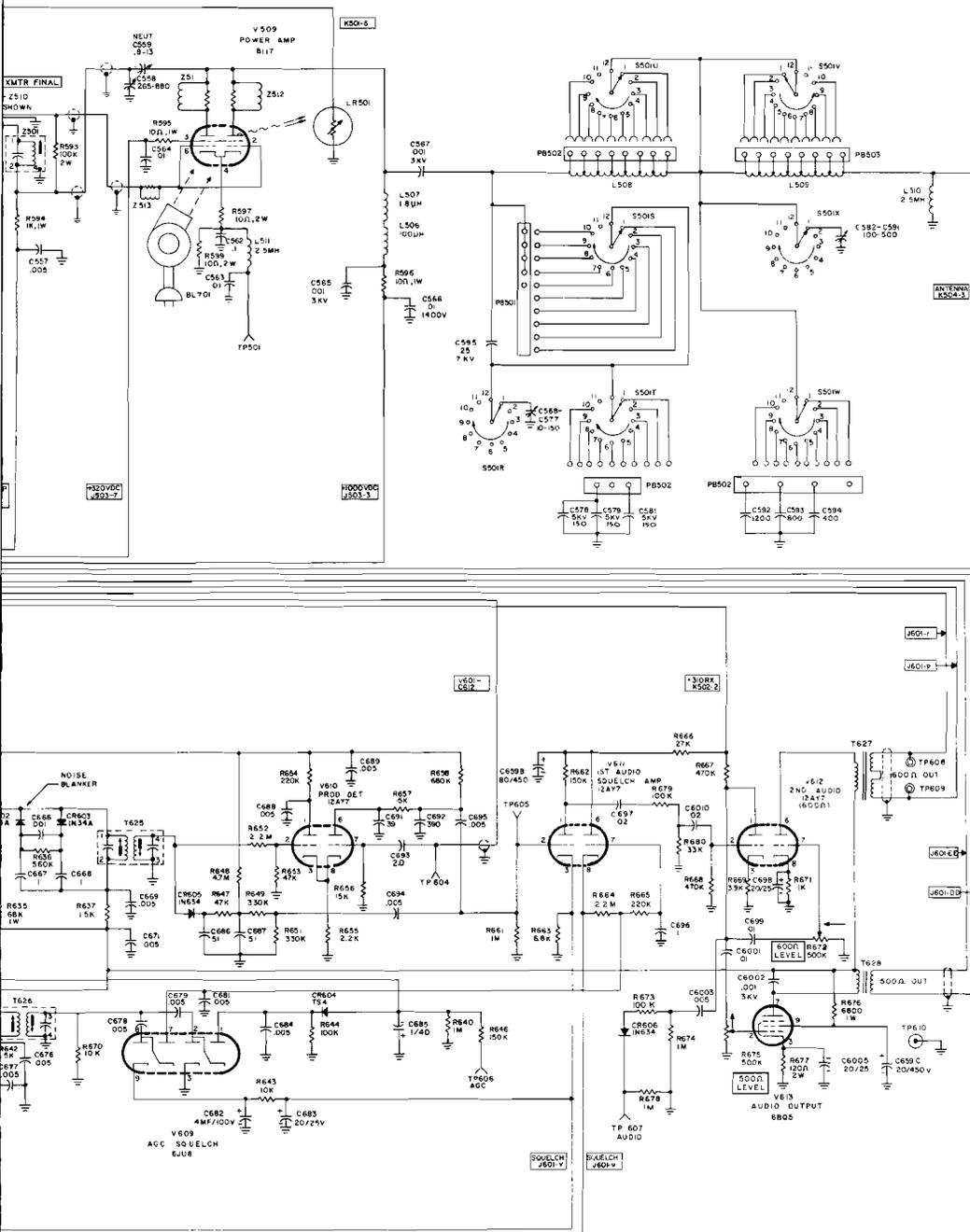
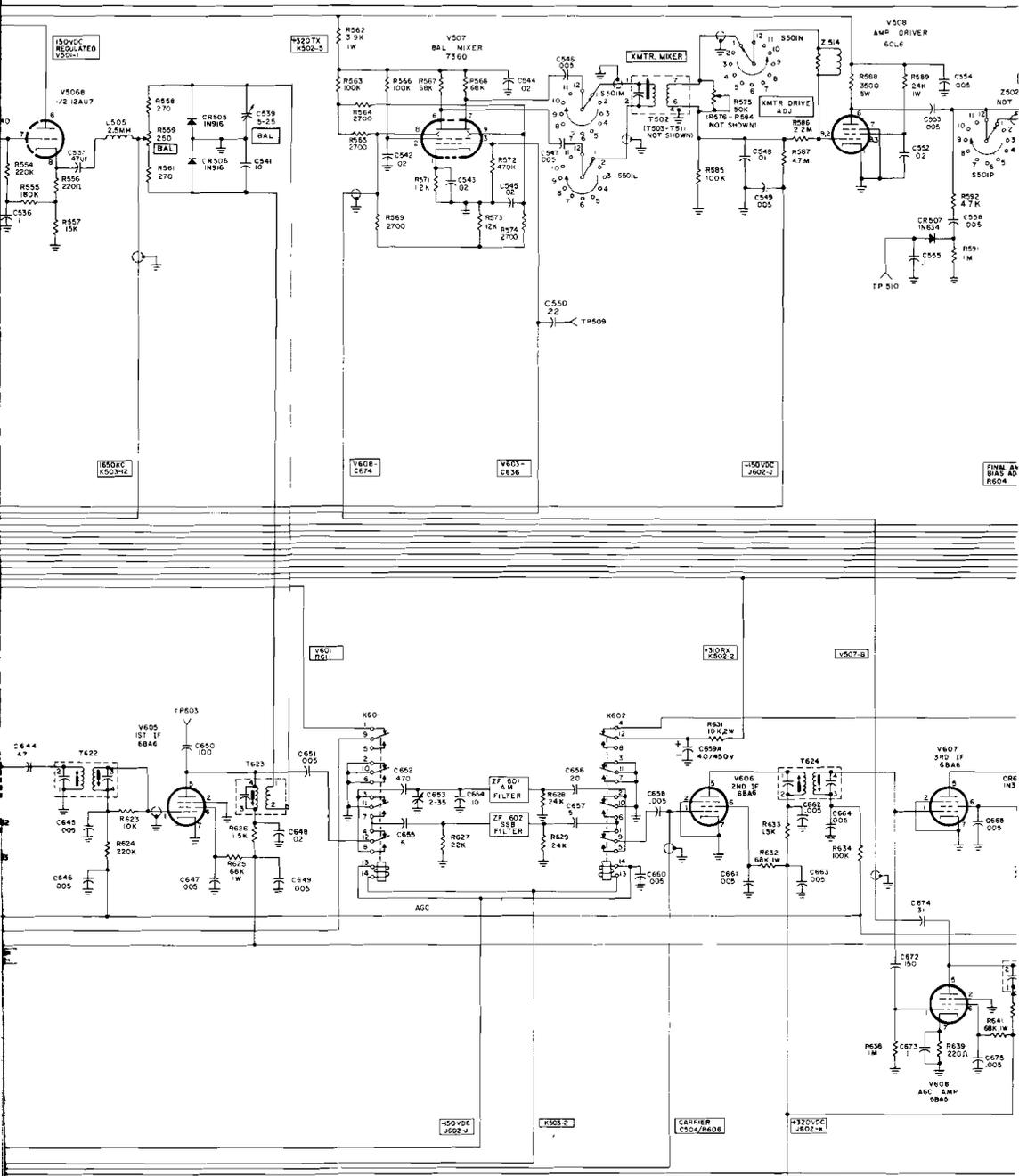
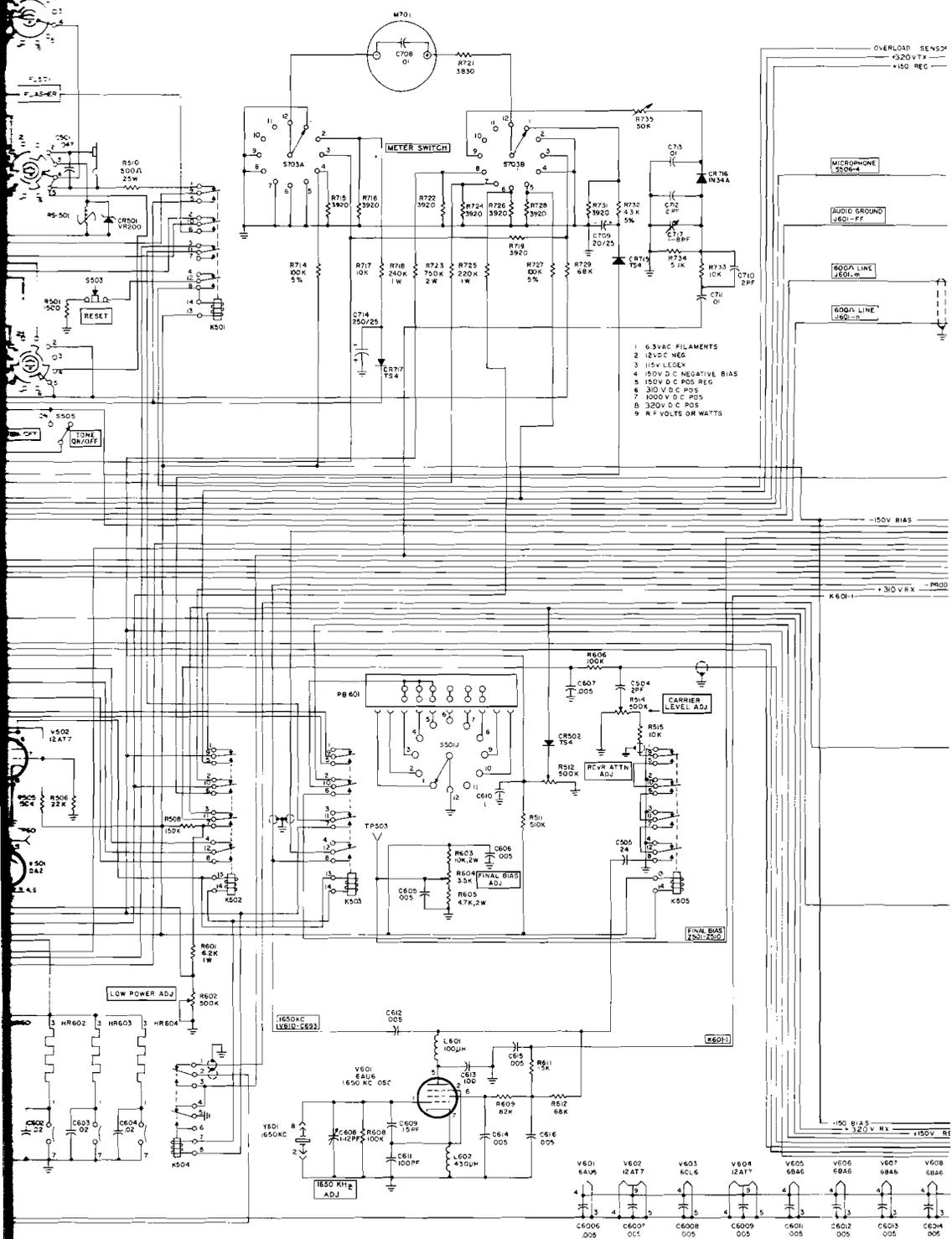


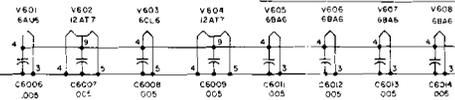
Figure 8-1. Schematic Diagram, Receiver-Transmitter RT-710/URC-51 (Hammarlund 9015-04-00009)







- 1 6.3VAC FILAMENTS
- 2 12V D.C. NEG.
- 3 115V LEDEX
- 4 150V D.C. NEGATIVE BIAS
- 5 150V D.C. POS. REG.
- 6 310 V.D.C. POS.
- 7 1000V D.C. POS.
- 8 320V D.C. POS.
- 9 R F VOLTS OR WATTS







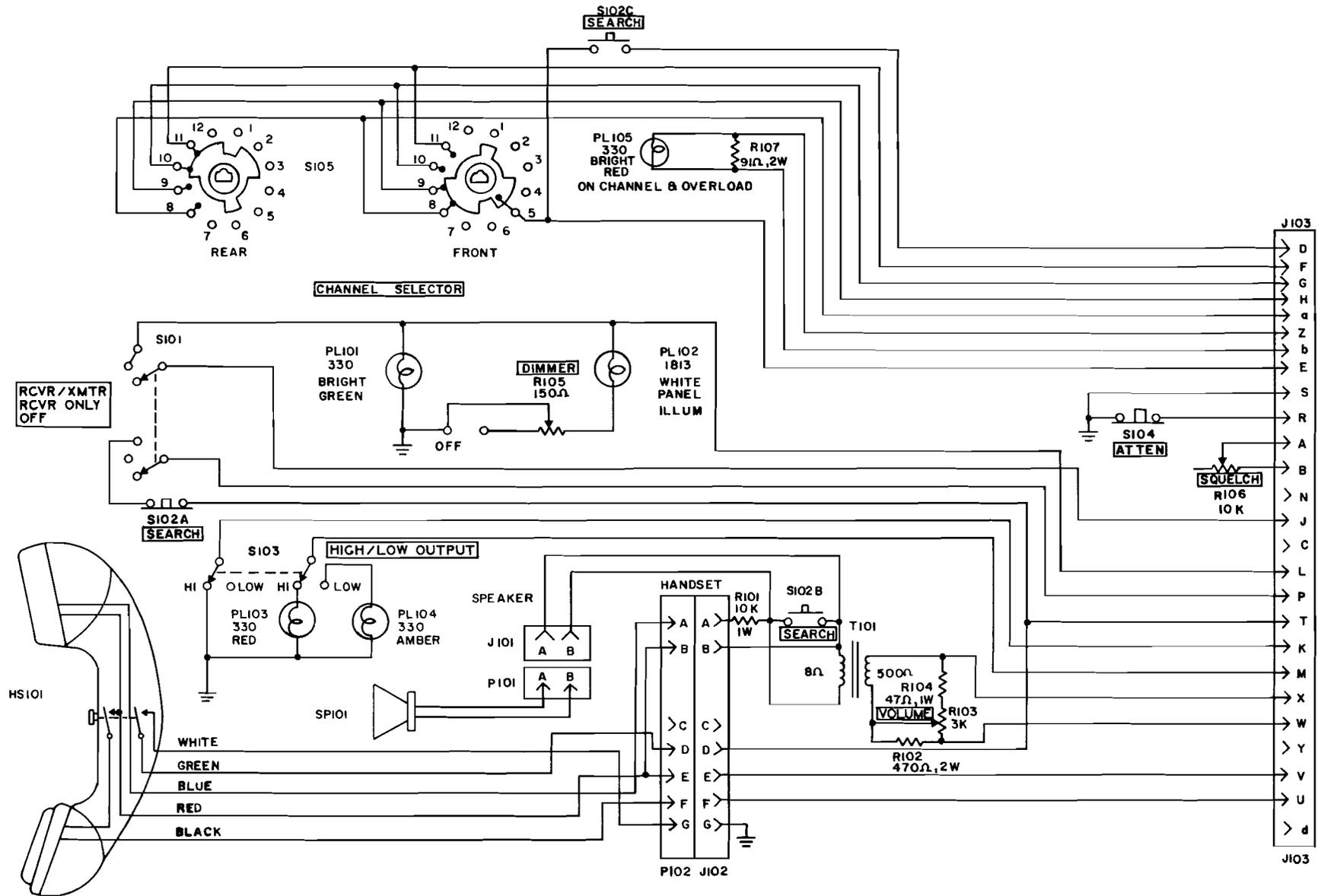
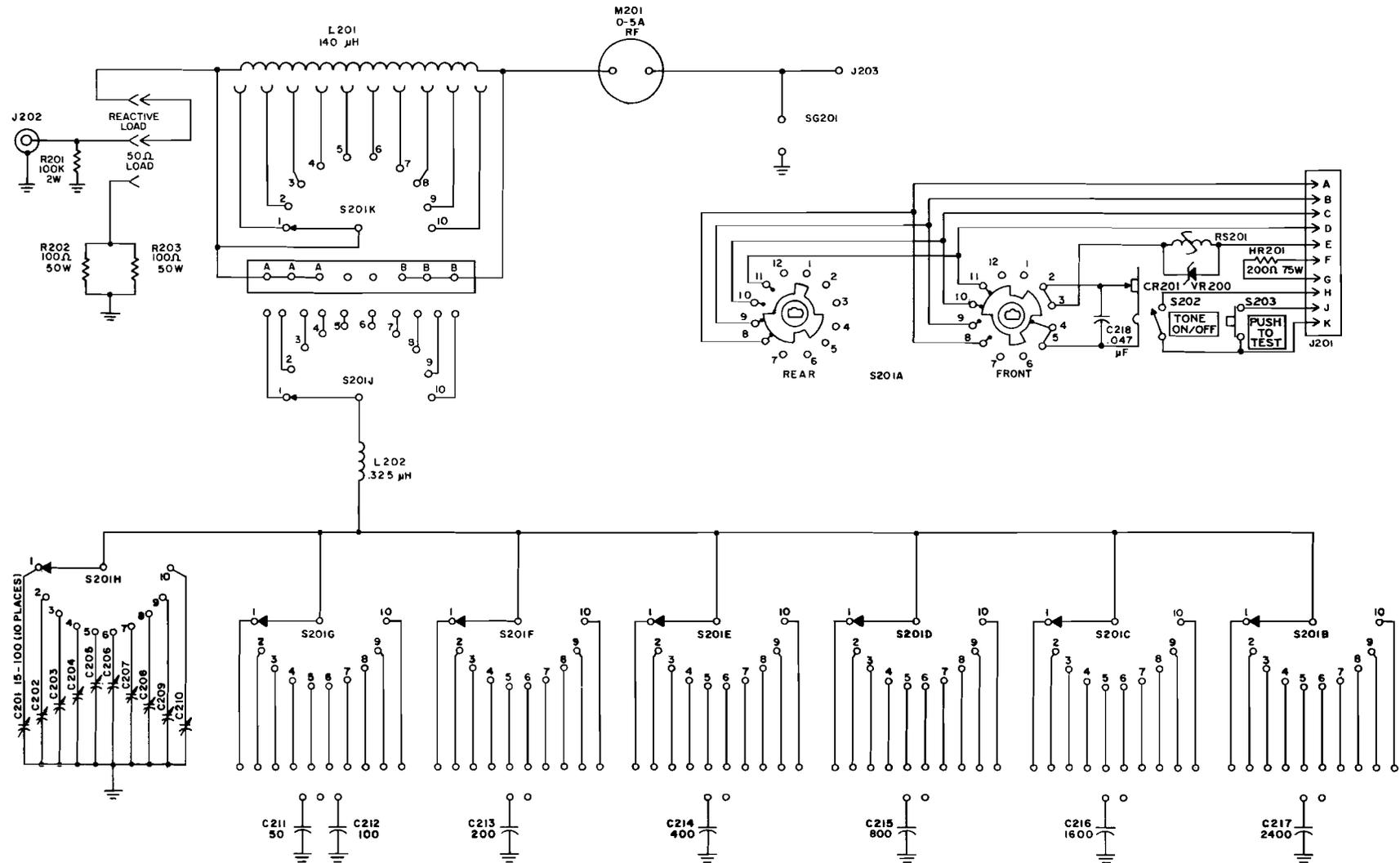


Figure 8-2. Schematic Diagram, Remote Control C-4826/URC-51 (Hammarlund 9015-04-00012)



NOTES:  
 1. UNLESS OTHERWISE SPECIFIED, CAPACITORS ARE MICRO-MICRO FARADS.

Figure 8-3. Schematic Diagram, Antenna Coupler CU-1208/URC-51 (Hammarlund 9015-04-00002)

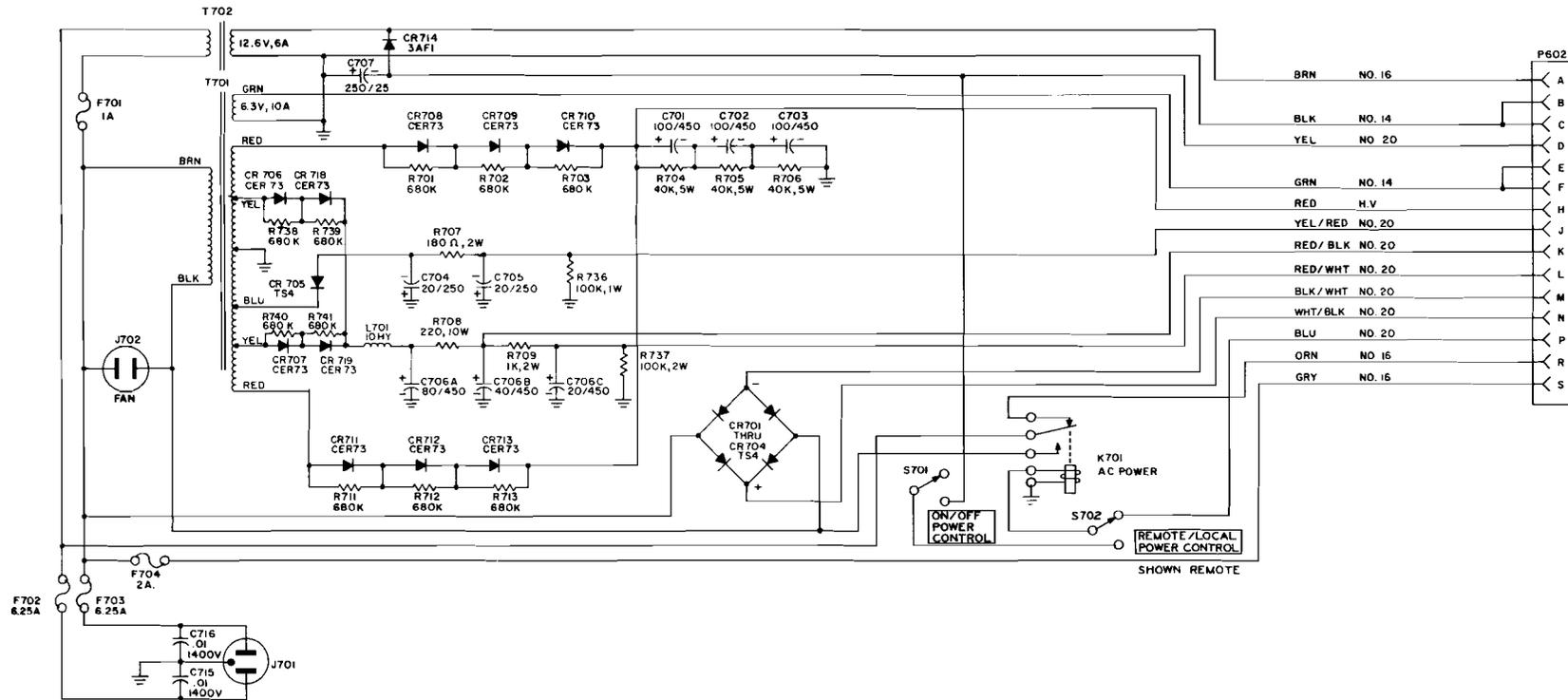


Figure 8-4. Schematic Diagram, Power Supply (Hammarlund 9015-04-00011)

APPENDIX A

PROGRAMMING WORKSHEETS

CHAN. POS'N.	CHAN. COLOR	CHAN. FREQ. IN KC	XTAL. FREQ. IN KC	COIL COLORS 4TH DOT NOTE 1			PB 501 C595 X OR Z NOTE 2	PB 502 C578-81 E-F-G-H NOTE 2	PB 502 L508 TAP# NOTE 3	PB 502 C592-3-4 A-B-C-D NOTE 2	PB 503 L509 TAP# NOTE 3	PB 601 SSB OR AME
				1ST	2ND	3RD						
1	BRN.											
2	RED											
3	ORG.											
4	YEL.											
5	GRN.											
6	BLU.											
7	VIO.											
8	GRY.											
9	WHT.											
10	BLK.											

NOTE 1 - 4TH DOT COIL COLORS: BRN - RX ANT; RED - RX MIXER; ORG - TX MIXER; YEL - TX DRIVER.

NOTE 2 - CAPACITOR TAPS ARE PROGRAMMED AS FOLLOWS:

X - 2.0 to 16 MC	}	PB501 C595
Z - 16 to 18 MC		
A - 2.0 to 2.5 MC	}	PB502 C592, C593, C594
B - 2.5 to 3.0 MC		
C - 3.0 to 7.0 MC		
D - 7.0 to 18 MC		
E - 2.0 to 2.5 MC	}	PB502 C578, C579, C581
F - 2.5 to 3.5 MC		
G - 3.5 to 16 MC		
H - 16 to 18 MC		

NOTE 3 - REFER TO FIGURE 4-2  
IN THE MANUAL FOR  
COIL TAPS.

CHAN. POS'N.	CHAN. COLOR	CHAN. FREQ. IN KC	XTAL. FREQ. IN KC	COIL COLORS 4TH DOT NOTE 1			PB 501 C595 X OR Z NOTE 2	PB 502 C578-81 E-F-G-H NOTE 2	PB 502 L508 TAP# NOTE 3	PB 502 C592-3-4 A-B-C-D NOTE 2	PB 503 L509 TAP# NOTE 3	PB 601 SSB OR AME
				1 ST	2 ND	3 RD						
1	BRN.											
2	RED											
3	ORG.											
4	YEL.											
5	GRN.											
6	BLU.											
7	VIO.											
8	GRY.											
9	WHT.											
10	BLK.											

NOTE 1 - 4TH DOT COIL COLORS: BRN - RX ANT; RED - RX MIXER; ORG - TX MIXER; YEL - TX DRIVER.

NOTE 2 - CAPACITOR TAPS ARE PROGRAMMED AS FOLLOWS:

X - 2.0 to 16 MC	}	PB501 C595
Z - 16 to 18 MC		
A - 2.0 to 2.5 MC	}	PB502 C592, C593, C594
B - 2.5 to 3.0 MC		
C - 3.0 to 7.0 MC		
D - 7.0 to 18 MC		
E - 2.0 to 2.5 MC	}	PB502 C578, C579, C581
F - 2.5 to 3.5 MC		
G - 3.5 to 16 MC		
H - 16 to 18 MC		

NOTE 3 - REFER TO FIGURE 4-2  
IN THE MANUAL FOR  
COIL TAPS.