War Department Technical Manual

TM 11-310

SCHEMATIC DIAGRAMS FOR MAINTENANCE OF GROUND RADIO COMMUNICATION SETS

WAR DEPARTMENT • OCTOBER 1943

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G. C. MARSHALL,
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J. A. ULIO,
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The Adjutant General.

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SCHEMATIC DIAGRAMS FOR MAINTENANCE OF GROUND RADIO COMMUNICATION SETS

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BY ORDER OF THE SECRETARY OF WAR:

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Chief of Staff.

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SCHEMATIC DIAGRAMS FOR MAINTENANCE OF GROUND RADIO COMMUNICATION SETS

This manual contains a condensation of information for the maintenance of Signal Corps ground radio communication sets. It is presented as a supplement to the information given in various technical manuals of the TM 11– series for particular sets. The manual is in loose-leaf form, so that additional sheets or revisions of old sheets can be added. The material is divided into two sections:

Section I contains reference data which should be of value to all maintenance personnel. The lists of radio symbols and special abbreviations in this section are those used in all diagrams in section II of the manual.

Section II is made up of maintenance sheets on particular units of radio equipment. The sheets are arranged numerically by RC–, PE–, and SCR–, etc., numbers. For example, Radio Set SCR–510–A consists of Radio Transmitter and Receiver BC–620–A and Plate Supply Unit PE–97–A. Information on the complete radio set is found under SCR–510–(*). (The symbol (*) is used to denote equipments which bear different suffix letters, such as SCR–510–A, 510–B, etc., but which are so similar that one set of maintenance sheets covers them.)

Changes, which are issued at frequent intervals, include additional listings. Any necessary revisions of previously published sheets are included in such changes. A new master table of contents is issued with each supplement to replace the old table.

Modifications which will prevent equipment from being readily converted back to standard characteristics will not be made without authority of the Chief Signal Officer or the Commanding General of a theater of operations.

The time between requests for repair and compliance or replacement of item, if necessary, should be minimized.

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Supersedes pages marked Issue No. 3

Issue No. 4

Number of pages per equipment

SECTION II. MAINTENANCE SHEETS FOR SIGNAL CORPS GROUND RADIO EQUIPMENT (Cont'd)

SECTION I. REFERENCE DATA

REPAIR OF GROUND RADIO EQUIPMENT

GENERAL MAINTENANCE PROCEDURE

1. PREVENTIVE MAINTENANCE.--It has often been said that, "an ounce of prevention is worth a pound of cure." This old adage particularly applies to communication equipment. Many hours of trouble-free operation of the equipment will be added by daily care in the use of any of the component parts of a communication system to insure that the equipment is not neglected or abused, that it is kept clean, and that the cables and connector plugs tying it into other parts of the system do not become loose or damaged. From time to time, inspections to determine the operating state of the equipment should be made, and followed up by the necessary minor repairs and adjustments.

2 TEST AND REPAIR PROCEDURE.--Faults will develop in the service life of any piece of radio equipment, and as a radio repairman you must follow a logical testing procedure, in order to locate the cause of trouble as quickly as possible. The proper method to follow can be divided into five parts: physical inspection, electrical tests, repairs and replacements, final inspection, and test run.

3. PHYSICAL INSPECTION.--In making the physical inspection, use the senses of sight, smell, hearing, and touch. First, check for smell of burning insulation. An odor of burning insulation may indicate a short circuit. Attempt to locate it by visual inspection. Use your ears to check for any unusual sounds when the equipment is turned on. Sounds, such as humming, sputtering, or crackling often indicate trouble. Follow up these checks with an inspection using sight and touch. Check plugs, cables, fuses, microphones, headsets, and all other parts which may be examined without removing the set from its case. If no fault is located in this external check, continue the inspection inside the equipment. Check glass tubes for filament burnouts; examine wiring for damage, loose connections, and insulation breakdown; make a rapid examination of parts and controls. Check metal tubes for open filaments by touching their envelopes after the set has warmed up, or use an ohmmeter to check heater continuity; a cold envelope indicates an open filament. If the visual inspection fails to locate the fault, an electrical inspection must be made.

4. ELECTRICAL TESTS.--*a. Method.*--Any radio transmitter circuit can be reduced to several interrelated sections. Figures 1, 2, and 3 illustrate the principal sections of a superheterodyne receiver, a continuous wave (c-w) transmitter and a phone transmitter. Any testing procedure should be designed for section-by-section testing of radio equipment in order to locate the faulty circuit in the shortest possible time.

Fig. 1.—Functional block diagram of a superheterodyne receiver.

b. Power supply.--The first test is to check power supply equipment, (batteries, dynamotor or vibrator) to see that it is functioning properly. If cordage is used to connect the equipment to the power supply, test it at the same time for open or short circuits. If the power supply equipment is fused, inspect fuses for burn-outs. Never replace blown fuses until the reason for the burn-out has been determined by testing and the fault has been repaired. Make a measurement to determine whether current is above normal.

c. Vacuum tube tests.--If the power supply is functioning properly, test the receiver or transmitter circuits. Before starting, remove the vacuum tubes one by one and test them in a tube checker. Make a heater or filament continuity test with an ohmmeter on metal tubes which fail to give a reading on the tube checker. In glass tubes the lighted filament or heater gives a visible check for burn-outs. If this test indicates an open heater or filament burn-out, do not replace the faulty tube with a new one until you have made a resistance test of the filament or heater circuit from which the tube was removed to determine if it is functioning normally. If this precaution is not taken a new tube may be destroyed if placed in a faulty circuit.

d. Tube replacement.--If tube testing indicates that one or more tubes are faulty, *but not burned out*, replace the faulty ones with new or normal tubes, and immediately make a careful voltage and resistance test of the equipment, even if the replacement of defective tubes apparently restores normal operation. This precaution is necessary because tube failure can be caused by tube defects such as age or poor construction, or by improper operating voltages in the radio equipment. Testing the equipment after replacing faulty tubes will show whether or not the equipment is responsible for tube failure.

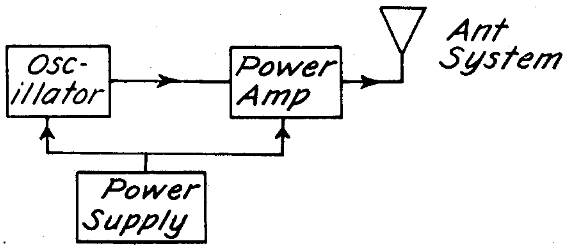


Fig. 2.—Functional block diagram of a continuous wave (c-w) transmitter.

e. Socket inspection.--If, however, all tubes test normal, it is a reasonable assumption that the trouble is in the radio equipment itself. Before proceeding with a section-by-section test of the equipment, inspect the underside of all vacuum tube sockets to see that they are not corroded and are making good contact with the vacuum tube base pins. After this inspection and any necessary repair, make another operating test of the equipment. If it still fails to function properly, proceed to the detailed section-by-section testing.

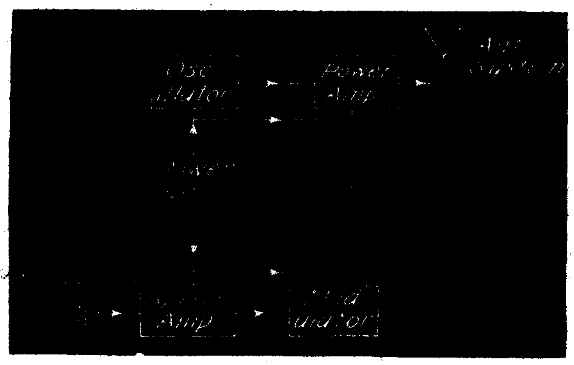


Fig. 3.—Functional block diagram of a voice transmitter.

5. SECTION TESTING.--Section-by-section testing can be divided into four parts: voltage tests, current tests, resistance tests, and operational (dynamic) tests, which are performed in that order.

a. Voltage, current and resistance tests.--Voltage and current tests are usually made with all vacuum tubes in operation and normal power applied. Resistance tests are made with power supply disconnected and tubes removed. The voltage, current, and resistance readings given as maintenance data are measured at VT socket pins, or at some other specified terminal points on the equipment. Voltage, current, and resistance readings which differ greatly from those indicated in the maintenance data for each set generally indicate the presence of defective parts. Current tests can be omitted in testing receivers unless all other tests fail to locate the trouble. Current tests are very important, however, in checking transmitters. When testing a transmitter using expensive tubes, great care must be taken. In this case resistance tests should be made *before* voltage or current tests. This will reduce the danger of damaging tubes if the transmitter circuits are so damaged that improper voltages are applied to the tubes when the power is on. In the event that these three tests fail to show any irregular condition, the next step is the operational, or dynamic test.

b. Operational tests (signal tracing).--(1) To make an operational test of a superheterodyne receiver similar to figure 4, use a signal generator connected to the antenna and ground terminals of the set, and a VTVM (vacuum tube voltmeter) for making output signal measurements at successive stages in the set. The VT voltmeter must be sufficiently sensitive to give readings at the input end of the set. It should have a low range of 0 to .5 volt or even less. The input impedance should be at least 2 or 3 megohms. If the tester starts at the 1st radio frequency (r-f) amplifier (V-1) and works toward the audio-frequency (a-f) amplifier, the stage where the signal ceases is the one causing the trouble.

(2) In the absence of a sensitive electronic or VT voltmeter, it is possible to vary the procedure by connecting the signal generator successively to the input circuits of the a-f amp stage, detector, i-f amp stages, mixer and r-f amp stages. The receiver loudspeaker or headset will give an audible indication of the stage at which the signal ceases. In using the signal generator with this second method, it is essential to adjust it to generate a signal of the same frequency as that to which the stage under test is tuned. For example, in superheterodyne receivers the i-f amplifier stages always are tuned to a different frequency from the mixer and r-f stages. In this manual the maintenance data sheets for a particular receiver indicate the frequency which should be used for testing and aligning both i-f and r-f stages.

(3) Figure 4 shows a typical superheterodyne receiver. Starting at the antenna, we will go through a stage-by-stage analysis using the first method of testing with a signal generator (such as an I-72-B) and a sensitive VT voltmeter. It is assumed that tubes already have been tested, and resistance, current, and voltage checks made. Test the signal generator and VT voltmeter before using to be certain that they are operating properly. This can be done by connecting them to a receiver which operates perfectly and noting whether a meter deflection occurs when the signal generator and receiver are properly adjusted. After connecting the signal generator to the receiver antenna post and chassis, adjust both generator and receiver to the proper frequency (the frequency must be within the tuning range of the receiver r-f stage when using this first method of testing).

(4) Set the OUTPUT control of the signal generator to give unmodulated output and the attenuator STEP and VERNIER controls to 1 and 0 respectively. Connect the VT voltmeter prods to the receiver chassis and to point ① of the receiver shown in figure 4. Adjust the meter for its lowest range. Now *carefully* adjust the two attenuator controls on the signal generator until a deflection is observed on the VT voltmeter. If no reading can be obtained, there is either a short circuit to ground through the primary of the antenna coil (L_1), or, if the receiver has a band switch arrangement, the trouble may be in the switching mechanism.

The amount of gain between points ② and ③ will depend upon the characteristics of the receiver. A satisfactory signal at point ③ indicates normal functioning of the r-f stage and the primary of L_2.

(7) With a normal signal at point ③, move the VT voltmeter to point ④ at the control grid of V-2. *Note: Always use a low voltage range of the VT voltmeter. Each time the VT voltmeter is moved to the next test point, reduce the output of the signal generator to the minimum necessary to maintain a low meter reading.* No signal at point ④ indicates a possible open in the secondary of L_2, or a short

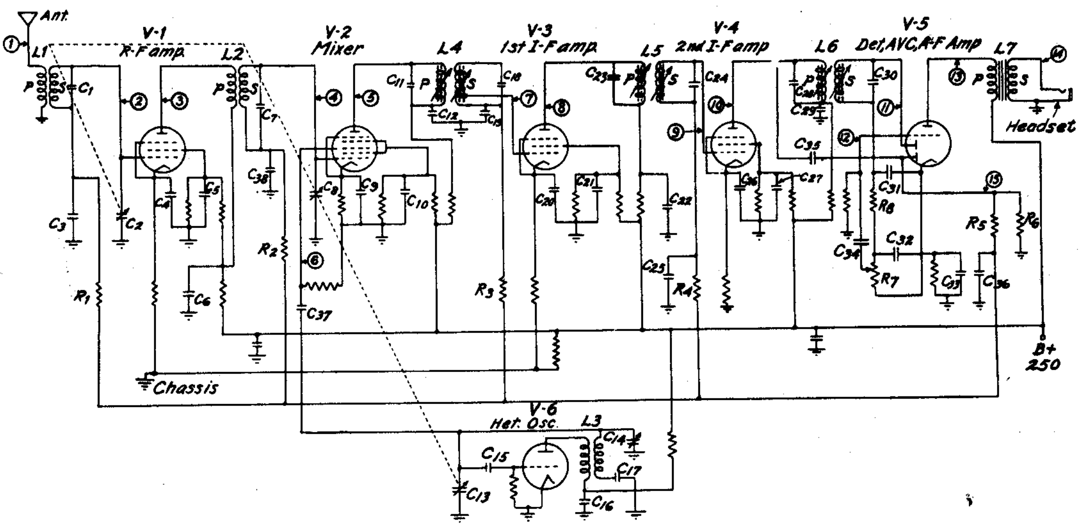


Fig. 4.—Schematic diagram of a superheterodyne receiver, showing test points.

(5) With a satisfactory signal at this point, move the VT voltmeter prod to point ② at the grid of the r-f amplifier V-1. No signal at this point is indicative of a shorted tuning capacitor C_1 or C_2, an open secondary of the antenna coil L_1, or an open capacitor C_3. Capacitor C_3 can be checked for an open circuit by measuring the signal across it. There should be none unless it is open. A weak signal can be caused by a partial short in the tuning capacitor C_1 or C_2, or by high resistance connections in the antenna coil L_1. If the receiver tuning dial is calibrated, a weak signal at this point can be caused by misalignment of the tuning capacitor C_1.

(6) If the signal is normal, the VT voltmeter prod can be moved to the plate of the r-f amplifier tube at point ③. No signal or a weak signal at point ③ indicates either that tube V-1 is defective or the primary of L_2 is shorted. If automatic volume control (AVC) is used in the set, too high a signal level from the signal generator may cause the AVC to function, increasing the grid bias on V-1 and reducing gain. This condition may give a false impression of trouble in stages controlled by the AVC. Signal input should be the minimum which will still permit measurements with the VT voltmeter.

in C_7 or C_8. Weak signals at this point may be caused by a high resistance in the secondary of L_2, a partial short across C_7 or C_8, an open in C_{38}, or misalignment of the tuned circuits. To check the first two points, use an ohmmeter. Check C_{38} with the VT voltmeter. If C_{38} is in good condition, little, if any signal voltage will appear across it. Check alignment by adjusting C_7.

(8) Having established a normal signal at point ④, move the VT voltmeter prod to point ⑤ at the plate of the mixer tube V-2. The signal at this point consists of a number of different frequencies: the original r-f signal, the heterodyne oscillator frequency, and the sum and difference frequencies of these two. In addition, harmonics of these frequencies will be present. The VT voltmeter is not selective as to frequency so it is impossible to tell which frequencies are present. However, if the signal generator is disconnected temporarily there should still be a signal indication at point ⑤ due to the output of the heterodyne oscillator V-6. If there is no signal, check for a signal at point ⑥. If the signal is present the trouble is in V-2. If there is no signal at point ⑥, check the coil L_3 and capacitors C_{37}, C_{13}, C_{14}, C_{15}, and C_{17} for opens or shorts. If C_9, C_{10},

or C_{12} is open, oscillation and weak signals may result. A short in C_{11} will cause lack of signal.

(9) If the signal is present at point ⑤ proceed to point ⑦ at the grid of the 1st i-f amplifier V-3. No signal at this point may be due to an open or short circuit in the secondary of L_4 or in C_{18}, or to misalignment of the stage. If C_{19} is open the signal will be weakened.

(10) With a normal signal at point ⑦ move the VT voltmeter prod to point ⑧ at the plate of V-3. No signal at this point may be caused by an open or short circuit in L_5 or C_{22}. Open-circuited grid return, screen grid, plate, and cathode bypass capacitors C_{19}, C_{20}, C_{21}, and C_{22}, can cause weak signals, oscillation and distortion. This condition can also occur in the r-f and mixer stages.

(11) If the signal is normal at point ⑧, make similar tests at points ⑨, ⑩ and ⑪. These tests are the same as for V-3 at points ⑦ and ⑧. When these points produce normal signals move the VT voltmeter prod to point ⑫. At this point the signal will be of audio-frequency, requiring a modulated signal from the signal generator. Change its output control to MOD. Advance volume control R_7 all the way. No signal at point ⑫ may be due to a short in C_{31} or C_{32}, an open in C_{34} or R_8 or a short or open in R_7. Weak signals may be due to an open in C_{33} or a short in C_{34}.

(12) If the signal is normal at point ⑫ move the VT voltmeter prod to point ⑬ at the plate of V-5. No signal at this point can be caused by a shorted primary or secondary in L_7.

(13) With a normal signal at point ⑬, move to point ⑭. No signal at this point indicates an open in the secondary of L_7 or a short or open in the output jack.

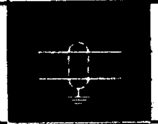
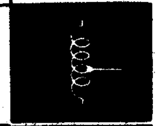
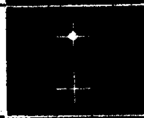
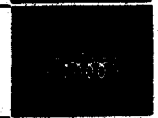
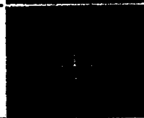
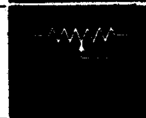
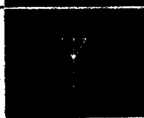
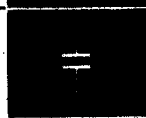
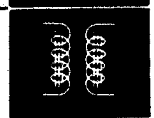
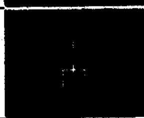
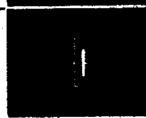
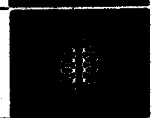
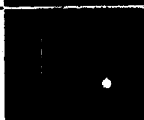
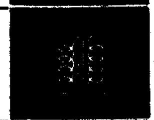
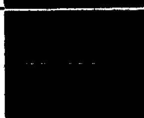
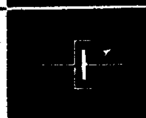
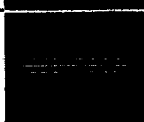
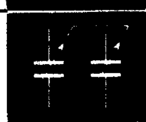
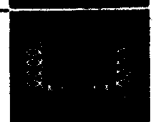
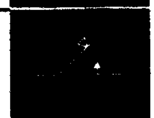
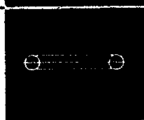
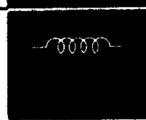
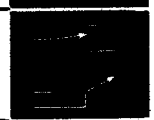
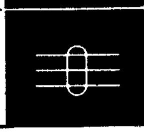
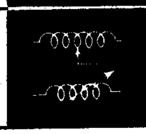
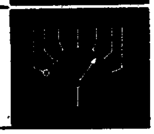
(14) If point ⑭ tests normal, check the action of the AVC system by a combination of resistance and signal tracing tests. First check the resistance of resistors R_1, R_2, R_3, R_4, R_5, and R_6. If these are normal, check C_{35} for a short or open circuit. Check for a short circuit by disconnecting the signal generator and measuring the d-c voltage from point ⑮ to chassis, using an electronic voltmeter. The voltage should be negative (-) by several volts. If it is a positive (+) value, replace C_{35}. To check C_{35} for an open, reconnect the signal generator and again connect the electronic d-c voltmeter to point ⑮. Increase the signal generator output. The d-c voltage should increase in a negative direction as the signal is increased. If no increase in d-c voltage occurs, capacitor C_{35} is probably open and should be replaced. As a further check on whether it is open, connect, the VT voltmeter prod to point ⑮. If no deflection occurs with the signal generator on, C_{35} is open.

6. REPAIRS AND REPLACEMENTS.--After the trouble has been definitely located, make any repairs or replacements found necessary. In all repairs and replacements, make every attempt to duplicate the original condition of the equipment. Use only standard replacement parts. Take particular care to run any replacement wiring in the same position and manner as the original wiring. Do soldering with rosin-core solder only; use the smallest amount of solder necessary for a good mechanical and electrical joint. In the event of emergency repairs where it is impossible to make exact replacement of parts, the same care in workmanship must be taken. Conspicuously mark or tag the temporarily repaired set to indicate the temporary nature of the repair, and restore to its original condition at the first possible opportunity.

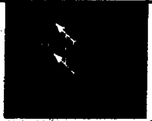
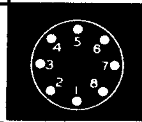
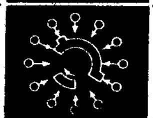
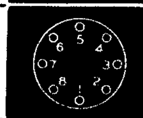
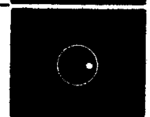
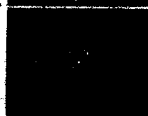
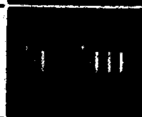
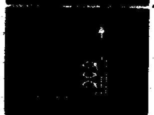
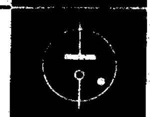
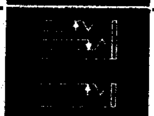
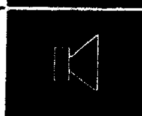
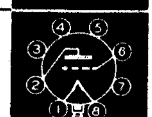
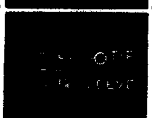
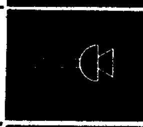
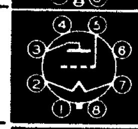
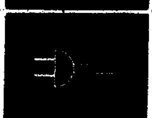
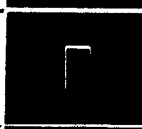
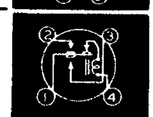
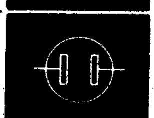
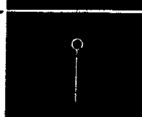
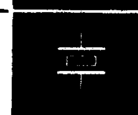
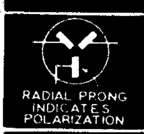
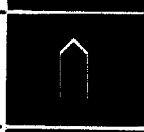
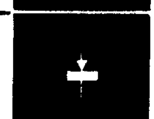
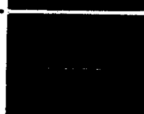
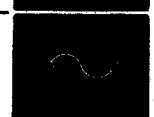
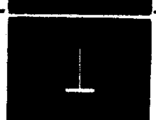
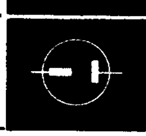
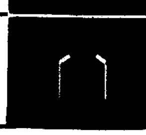
7. FINAL INSPECTION.--Upon completion of all repairs and replacements, carefully inspect the equipment to insure that no defect has been overlooked, that the workmanship on all repairs is neat and correct, and that all components have been correctly reassembled. In this final inspection, make a check of the operating characteristics of the equipment, such as sensitivity, volume, and calibration accuracy of dials, to determine whether the repairs have restored the equipment to a satisfactory operating state.

8. TEST RUN.--After the final inspection has proven the equipment satisfactory from an operational standpoint, make a test run under conditions which resemble as closely as possible those of actual operation of the equipment. This test should be of sufficient duration to determine whether the set will stand up to long periods of operation without overheating or breaking down in any way. If the equipment under test has calibrated controls, check the calibration accuracy at the completion of the test run to insure that the set is not drifting in frequency.

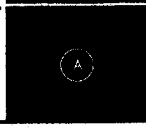
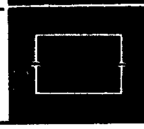
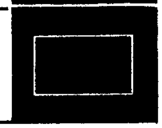
Tabulation of Common Radio Symbols

Device	Symbol	Device	Symbol	Device	Symbol
Conductor or Wire		Cable, Shielded		Coil or Inductor, Tapped	
Crossed wires — top, connection; bottom, no connection		Resistor, Fixed		Coil or Inductor, Iron Core	
Ground		Resistor, Variable		Coil or Inductor, Powdered Iron Core	
Antenna		Capacitor, Fixed		Transformer, Powdered Iron Core	
Counterpoise		Capacitor, Fixed, Shielded		Transformer, Air Core	
Antenna, Loop		Capacitor, Variable		Transformer, Variable Coupling, moving coil shown	
Terminals		Capacitor, Variable, moving plates shown		Transformer, Iron Core	
Shielding		Capacitor, Variable, Shielded		Transformer, Air Core, Tuned	
Wire, Shielded		Capacitors, Variable, Ganged		Inductors, Link Coupled	
Wire, Twisted Pair		Capacitor, Dual Section		Key	
Cable, Coaxial		Coil or Inductor		Switch, Single Pole, Double Throw	
Wire in cable		Coil or Inductor, Variable		Switch, Rotary	

Tabulation of Common Radio Symbols

Device	Symbol	Device	Symbol	Device	Symbol
Switch, Double Pole, Double Throw		Connector, Male (typical)		Envelope or Shell	
Selector Switch (typical)		Connector, Female (typical)		Envelope, Gas Filled	
Switch, Power		Dry Cell or Battery		Beam Tetrode Vacuum Tube	
Relay (typical contact arrangement)		Headset		Vacuum Tube, Voltage Regulator	
Jacks		Loud Speaker		Vacuum Tube, Triode, Loctal Base	
Plug, Microphone, Headset or Speaker		Microphone		Vacuum Tube, Triode, Octal Base	
Plug for power outlet		Cathode, Thermionic		Vibrator	
Power Receptacle or Outlet		Cathode, Cold Discharge		Crystal	
Connector, Polarized, Male		Filament		Oxide Rectifier	
Connector, Polarized, Female		Grid		Fuse	
Connector, Twistlock, Female		Plate or Anode		Lamp or Pilot Light	
Connector, Polarized, 2-Wire, Male		Beam Forming Electrodes		Voltmeter	

Tabulation of Common Radio Symbols

Device	Symbol	Device	Symbol	Device	Symbol
Galvanometer		**Milliammeter**		**Unit Section Detail**	
Ammeter		**Casing, Unshielded**		**Panel**	

METRIC PREFIXES

μ	$\frac{1}{1,000,000}$	one-millionth	micro-
m	$\frac{1}{1,000}$	one-thousandth	milli-
c	$\frac{1}{100}$	one-hundredth	centi-
k	1,000	one thousand	kilo-
M	1,000,000	one million	mega-

MULTIPLES AND SUB-MULTIPLES

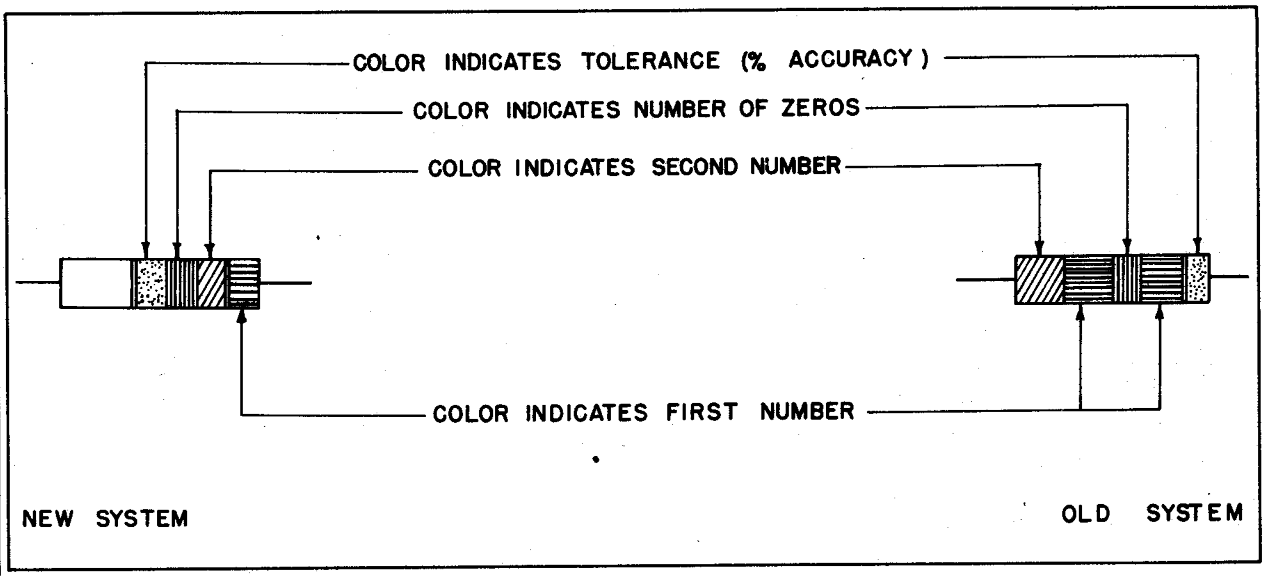
Ampere	=	1,000,000 microamperes
Ampere	=	1,000 milliamperes
Cycle	=	0.000,001 megacycle
Cycle	=	0.001 kilocycle
Farad	=	1,000,000,000,000 micromicro-farads
Farad	=	1,000,000 microfarads
Farad	=	1,000 millifarads
Henry	=	1,000,000 microhenrys
Henry	=	1,000 millihenrys
Kilocycle	=	1,000 cycles
Kilovolt	=	1,000 volts
Kilowatt	=	1,000 watts
Megacycle	=	1,000,000 cycles
Megohm	=	1,000,000 ohms
Mho	=	1,000,000 micromhos
Mho	=	1,000 millimhos
Microampere	=	0.000,001 ampere
Microfarad	=	0.000,001 farad
Microhenry	=	0.000,001 henry
Micromho	=	0.000,001 mho
Micro-ohm	=	0.000,001 ohm
Microvolt	=	0.000,001 volt
Microwatt	=	0.000,001 watt
Micromicrofarad	=	0.000,000,000,001 farad
Micromicro-ohm	=	0.000,000,000,001 ohm
Milliampere	=	0.001 ampere
Millihenry	=	0.001 henry
Millimho	=	0.001 mho
Milliohm	=	0.001 ohm
Millivolt	=	0.001 volt
Milliwatt	=	0.001 watt
Volt	=	1,000,000 microvolts
Volt	=	1,000 millivolts
Watt	=	1,000,000 microwatts
Watt	=	1,000 milliwatts
Watt	=	0.001 kilowatt

SPECIAL ABBREVIATIONS

Alternating current	A-C
Ampere	AMP
Amplifier	
Antenna	ANT
Audio frequency	A-F
Automatic	AUTO
Automatic volume control	AVC
Battery	BATT
Black	BLK
Blue	BLU
Brown	BRN
Capacitor	C
Center tap	CT
Choke coil (reactor)	CH
Coil	L
Continuous wave	C-W
Crystal	XTAL
Cycles (per second)	∿
Direct current	D-C
Electrical (electrolytic)	ELECT
Filament	FIL
Frequency modulation	F-M
Fuse	FU (F) (FS)
Green	GRN
Ground	GND
Gray	GRY
Henry (henries)	h
High voltage	H-V
Inductance (coil)	L
Intermediate frequency	I-F
Jack	J
Kilocycles (1000 cycles)	kc
Kilovolt (1000 volts)	kv
Kilowatt (1000 watts)	kw
Lamp	Lm
Loudspeaker	SPKR
Low voltage	L-V
Manual	MAN
Master oscillator	MO
Megacycles (1,000,000 cycles)	mc
Megohm (1,000,000 ohms)	meg
Meter	M (M_1, M_2, etc.)

Microampere $\left(\frac{\text{amp}}{1,000,000}\right)$	μa
Microfarad $\left(\frac{\text{farad}}{1,000,000}\right)$	μf
Micromicrofarad $\left(\frac{\text{farad}}{1,000,000,000,000}\right)$	μμf
Microphone	MIC
Microvolt $\left(\frac{\text{volt}}{1,000,000}\right)$	μv
Milliampere $\left(\frac{\text{ampere}}{1,000}\right)$	ma
Millihenry $\left(\frac{\text{henry}}{1,000}\right)$	mh
Millivolt $\left(\frac{\text{volt}}{1,000}\right)$	mv
Modulator	MOD
Ohm	Ω
Orange	ORG
Oscillator	OSC
Plug	Pl
Power	PWR
Plate	PLT
Radio frequency	R-F
Reactor (reactance)	REACT
Receiver	RCVR
Rectifier	RECT
Relay	Ry
Resistor	R
Socket	So
Speaker or loudspeaker	SPKR
Starting turn	ST
Switch	SW
Terminal strip	TS
Tracer	TR
Transformer	T
Transmitter	TRANS
Vacuum tube	V
Vibrator	VB
Volt	v
Watt	w
White	WHT
Yellow	YEL

RESISTOR COLOR CODE

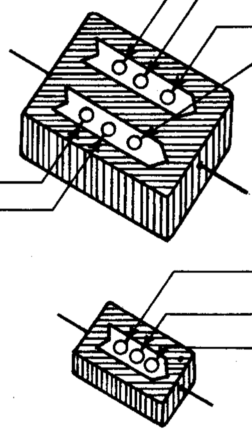


Color	Number
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9
Gold (green)	5% tolerance
Silver (blue)	10% tolerance

Note: If no gold or silver marking appears (to indicate tolerance) accuracy is 20% (standard tolerance). (Green and blue are used instead of gold and silver to indicate tolerance on some resistors.)

Example: A 50,000-ohm resistor, of standard tolerance, would be indicated by a green ring (5), a black ring (0), and an orange ring (000), as shown in new system of marking above. In the old system of marking, shown above on the right hand side of the page, the resistor would be painted green (5), with a black end (0), and an orange dot or ring in the center (000).

CAPACITOR COLOR CODE



Color	Number	Voltage
Black	0	
Brown	1	100
Red	2	200
Orange	3	300
Yellow	4	400
Green	5	500
Blue	6	600
Violet	7	700
Gray	8	800
White	9	900
Gold (green)	5% tolerance	1000
Silver (blue)	10% tolerance	2000
None	20% tolerance	

Example: A 56,300 $\mu\mu$f (0.0563 μf) capacitor of 10% tolerance and 500 volts rating would be indicated by a green dot (5), a blue dot (6) and an orange dot (3), on the top row; a red dot (00), a silver dot (10% tolerance) and a green dot (500 volts) on the bottom row arranged in the order shown in the illustration.

Note: All values of capacitance are given in micromicrofarads ($\mu\mu$f). Small capacitors often use a 3 dot color code as shown in the second illustration above.

VACUUM-TUBE CROSS-REFERENCE GUIDE

SIGNAL CORPS TYPE TO COMMERCIAL TYPE

Signal Corps Type	*Commercial Type*	*Name*
VT-1	None	Triode detector-amplifier
VT-2	CW-931	Triode transmitting tube
VT-4-B	211	Triode transmitting tube
VT-4-C	211 spl	Triode transmitting tube
VT-5	WE-215-A	Triode detector-amplifier
VT-6	WE-212-A	Triode transmitting tube
VT-7	WX-12	Triode detector-amplifier
VT-17	860	Tetrode transmitting tube
VT-19	861	Tetrode transmitting tube
VT-22	204-A	Triode transmitting tube
VT-24	864 spl	Triode amplifier
VT-25	10, 210	Triode transmitting tube
VT-25-A	10 spl	Triode transmitting tube
VT-26	22	Tetrode r-f amplifier
VT-27	30	Triode detector-amplifier
VT-28	24, 24-A	Tetrode r-f amplifier
VT-29	27	Triode detector-amplifier
VT-30	01-A, Q1	Triode detector-amplifier
VT-31	31	Triode power amplifier
VT-33	33	Pentode power amplifier
VT-34	207	Triode transmitting tube
VT-35	35, 51	Variable-mu tetrode amplifier
VT-36	36, 36A 64, 64A	Tetrode detector-amplifier
VT-37	37, 37-A 67, 67-A	Triode detector-amplifier
VT-38	38, 38-A 68, 68-A	Pentode power amplifier
VT-39-A	869, 869A	Half-wave mercury-vapor rectifier
VT-40	40	Triode voltage amplifier
VT-41	851	Triode transmitting tube
VT-42	872	Half-wave mercury-vapor rectifier
VT-42-A	872-A	Half-wave mercury-vapor rectifier
VT-43	845	Triode power amp/modulator
VT-44	32	Tetrode r-f amplifier
VT-45	45	Triode power amplifier
VT-46-A	866, 866-A	Half-wave mercury vapor rectifier
VT-47	47	Pentode power amplifier
VT-48	41	Pentode power amplifier
VT-49	39, 39A, 44, 65, 65-A	Variable-mu r-f pentode
VT-50	50, 585, 586	Triode amplifier
VT-51	841	Triode transmitting tube
VT-52	45 spl	Triode power amplifier
VT-53	WL-436	
VT-54	34	Variable-mu r-f pentode
VT-55	865	Transmitting tetrode
VT-56	56	Triode detector-amplifier
VT-57	57	Pentode detector-amplifier
VT-58	58	Variable-mu r-f pentode
VT-60	850	Transmitting tetrode
VT-62	801, 801-A	Transmitting triode
VT-63	46	Tetrode power amplifier
VT-64	800	Transmitting triode
VT-65	6C5	Triode detector-amplifier
VT-65-A	6C5-G	Triode detector-amplifier
VT-66	6F6	Pentode power amplifier
VT-66-A	6F6G	Pentode power amplifier
VT-67	30 spl	Triode detector-amplifier
VT-68	6B7	Duo-diode pentode
VT-69	6D6	Variable-mu r-f pentode
VT-70	6F7	Triode-pentode
VT-72	842	Triode power amp/modulator
VT-73	843	Transmitting triode
VT-74	5Z4	Full-wave rectifier
VT-75	75	Duo-diode triode
VT-76	76	Triode detector-amplifier
VT-77	77	Pentode detector-amplifier
VT-78	78	Variable-mu r-f pentode
VT-80	80	Full-wave rectifier
VT-83	83	Full-wave mercury-vapor rectifier
VT-84	84, 98, 624, 6Z4, KR-28	Full-wave rectifier
VT-86	6K7	Variable-mu r-f pentode
VT-86-A	6K7-G	Variable-mu r-f pentode
VT-86-B	6K7-GT	Variable-mu r-f pentode
VT-87	6L7	Pentagrid mixer
VT-87-A	6L7-G	Pentagrid mixer
VT-88	6R7	Duo-diode triode
VT-88-A	6R7-G	Duo-diode triode
VT-88-B	6R7-GT	Duo-diode triode
VT-89	89	Pentode power amplifier
VT-90	6H6	Duo-diode
VT-90-A	6H6-GT, G	Duo-diode
VT-91	6J7	Pentode detector-amplifier
VT-91-A	6J7-GT	Pentode detector-amplifier
VT-92	6Q7	Duo-diode triode
VT-93	6B8	Duo-diode pentode
VT-93-A	6B8-G	Duo-diode pentode
VT-93-B	6B8-GT	Duo-diode pentode
VT-94	6J5	Triode detector-amplifier
VT-94-A	6J5-G	Triode detector-amplifier
VT-94-B	6J5	Triode detector-amplifier
VT-94-C	6J5G	Triode detector-amplifier
VT-94-D	6J5-GT	Triode detector-amplifier
VT-95	2A3	Triode power amplifier
VT-96	6N7	Class B twin triode
VT-96-B	6N7	Class B twin triode
VT-97	5W4	Full-wave rectifier
VT-98	6U5, 6G5	Cathode-ray indicator
VT-99	6F8-G	Twin triode
VT-100	807	Transmitting tetrode
VT-100-A	807-A	Transmitting tetrode
VT-101	837	Transmitting tetrode
VT-103	6SQ7	Duo-diode triode
VT-104	12SQ7	Duo-diode triode
VT-105	6SC7	Twin triode
VT-106	803	Transmitting pentode
VT-107	6V6	Beam-power amplifier
VT-107-A	6V6-GT	Beam-power amplifier
VT-107-B	6V6-G	Beam-power amplifier
VT-108	EIMAC-450 TH	Triode transmitting tube
VT-109	2051	Gas tetrode (thyratron)

VACUUM-TUBE CROSS-REFERENCE GUIDE — SIGNAL CORPS TYPE TO COMMERCIAL TYPE (CONT.)

Signal Corps Type	*Commercial Type*	*Name*
VT-111	5BP4/1802-P4	Cathode-ray picture tube
VT-112	6AC7/1852	H-f pentode amplifier
VT-114	5T4	Full-wave rectifier
VT-115	6L6	Beam-power amplifier
VT-115-A	6L6-G	Beam-power amplifier
VT-116	6SJ7	Pentode detector-amplifier
VT-116-B	6SJ7 spl	Pentode detector-amplifier
VT-117	6SK7	Variable-mu r-f pentode
VT-117-A	6SK7-GT	Variable-mu r-f pentode
VT-118	832	U-h-f dual beam-power amplifier
VT-119	879, 2X2	Half-wave vacuum rectifier
VT-120	954	U-h-f pentode detector-amplifier
VT-121	955	U-h-f triode detector-amplifier
VT-122	WL-530	Triode transmitting tube
VT-123	A-5586	
VT-124	1A5-GT	Pentode power amplifier
VT-125	1C5-GT	Pentode power amplifier
VT-126	6X5	Full-wave rectifier
VT-126-A	6X5-G	Full-wave rectifier
VT-126-B	6X5-GT	Full-wave rectifier
VT-127	EIMAC-100-TS	Triode transmitting tube
VT-127-A	EIMAC-100-TS	Triode transmitting tube
VT-128	1630, A-5588	
VT-129	EIMAC-304TL	Triode transmitting tube
VT-130	EIMAC-250TL	Triode transmitting tube
VT-131	12SK7	Variable-mu r-f pentode
VT-132	12K8	Triode-hexode converter
VT-133	12SR7	Duo-diode triode
VT-134	12A6	Pentode power amplifier
VT-135	12J5-GT	Triode detector-amplifier
VT-135-A	12J5	Triode detector-amplifier
VT-136	1625	Transmitting beam tetrode
VT-137	1626	Triode transmitting tube
VT-138	1629	Cathode-ray indicator
VT-139	VR-150-30	Voltage regulator
VT-141	WL-531	Half-wave vacuum rectifier
VT-143	805	Triode transmitting tube
VT-144	813	Transmitting beam-power amplifier
VT-145	5Z3	Full-wave rectifier
VT-146	1N5-GT	Pentode r-f amplifier
VT-147	1A7-GT	Pentagrid converter
VT-148	1D8-GT	Diode-triode-pentode power amplifier
VT-149	3A8-GT	Diode-triode r-f pentode
VT-150	6SA7	Pentagrid converter
VT-150-A	6SA7-GT	Pentagrid converter
VT-151	6A8-G	Pentagrid converter
VT-151-B	6A8-GT	Pentagrid converter
VT-152	6K6-GT	Pentode power amplifier
VT-152-A	6K6-G	Pentode power amplifier
VT-153	12C8 spl	Duo-diode pentode
VT-154	814 (GL)	Transmitting beam tetrode
VT-161	12SA7	Pentagrid converter
VT-162	12SJ7	Pentode detector-amplifier
VT-163	6C8-G	Twin triode
VT-164	1619	Transmitting beam tetrode
VT-165	1624	Transmitting beam tetrode
VT-166	WE-371-A	
VT-167	6K8	Triode-hexode converter
VT-167-A	6K8-G	Triode-hexode converter
VT-168-A	6Y6G	Beam-power amplifier
VT-169	12C8	Duo-diode pentode
VT-170	1E5-GP	Pentode r-f amplifier
VT-171	1R5	Pentagrid converter
VT-171-A	1R5 (loctal)	Pentagrid converter
VT-172	1S5	Diode-pentode
VT-173	1T4	Pentode r-f amplifier
VT-174	3S4	Pentode power amplifier
VT-175	1613	Transmitting pentode
VT-176	6AB7/1853	H-f pentode amplifier
VT-177	1LH4	Diode-triode
VT-178	1LC6	Pentagrid converter
VT-179	1LN5	Pentode r-f amplifier
VT-180	3LF4	Beam-power amplifier
VT-181	7Z4	Full-wave rectifier
VT-182	1291	Twin-triode amplifier
VT-183	1294	U-h-f diode rectifier
VT-184	VR-90-30	Voltage regulator
VT-185	1299	Beam-power amplifier
VT-187	575A	Half-wave mercury-vapor rectifier
VT-188	7E6	Duo-diode triode
VT-189	7F7	Twin triode
VT-190	7H7	Variable-mu r-f amplifier
VT-191	WE-316-A	U-h-f transmitting triode
VT-192	7A4	Triode detector-amplifier
VT-193	7C7	Pentode detector-amplifier
VT-194	7J7	Triode-hexode converter
VT-195	QMG-159, CK-1005	Full-wave gas rectifier
VT-196	6W5G	Full-wave rectifier
VT-197-A	5Y3-GT/G	Full-wave rectifier
VT-198-A	6G6-G	Pentode power amplifier
VT-199	6SS7	Variable-mu r-f pentode
VT-200	VR-105-30	Voltage regulator
VT-201	25L6	Beam-power amplifier
VT-201C	25L6-GT	Beam-power amplifier
VT-202	9002	U-h-f triode detector-amplifier
VT-203	9003	U-h-f variable-mu r-f pentode
VT-204	HK24G	U-h-f transmitting triode
VT-205	6ST7	Duo-diode triode
VT-206-A	5V4-G	Full-wave rectifier
VT-207	12AH7-GT	Twin triode
VT-208	7B8	Pentagrid converter
VT-208-A	7B8-LM	Pentagrid converter
VT-209	12SG7	Semi-variable-mu r-f pentode
VT-210	1S4	Pentode power amplifier
VT-211	6SG7	Semi-variable-mu r-f pentode
VT-212	958	Triode a-f amp-oscillator
VT-213-A	6L5-G	Triode detector-amplifier
VT-214	12H6	Duo-diode
VT-215	6E5	Cathode-ray indicator
VT-216	816	Half-wave mercury-vapor rectifier

VACUUM-TUBE CROSS-REFERENCE GUIDE — SIGNAL CORPS TYPE TO COMMERCIAL TYPE (CONT.)

Signal Corps Type	*Commercial Type*	*Name*
VT-217	811	Transmitting triode
VT-218	EIMAC-100TH	Transmitting triode
VT-219	8007	Beam-power amplifier
VT-220	EIMAC-250TH	Transmitting triode
VT-221	3Q5-GT	Beam-power amplifier
VT-222	884	Gas triode (thyratron)
VT-223	1H5-GT	Diode-triode
VT-224	RK-34	Transmitting twin triode
VT-224-A	RK-34 spl	Transmitting twin triode
VT-225	WE-307-A	Transmitting pentode
VT-226	3EPI/1806/PI	Cathode-ray tube
VT-227	KR-7184	Tetrode beam power amplifier
VT-228	8012	U-h-f transmitting triode
VT-229	6SL7-GT	Twin triode
VT-230	WE-350-A	
VT-231	6SN7-GT	Twin triode
VT-232	HY-E1148	U-h-f transmitting triode
VT-233	6SR7	Duo-diode triode
VT-234	HY-114B	U-h-f transmitting triode
VT-235	HY-615	U-h-f transmitting triode
VT-236	836	Half-wave rectifier
VT-237	957	U-h-f triode detector-amplifier
VT-238	956	U-h-f variable-mu r-f pentode
VT-239	1LE3	Triode detector-amplifier
VT-240	WE-710-A	
VT-241	1201	U-h-f triode detector-amplifier
VT-243	1203-A	U-h-f diode rectifier
VT-244	5U4G	Full-wave rectifier
VT-245	2050	
VT-246	918	Gas photocell
VT-247	6AG7	Beam-power amplifier
VT-249	CK-1006	Full-wave vacuum rectifier
VT-250	Sylvania EF-50	H-f pentode amplifier
VT-252	923	Vacuum photocell
VT-254	304TH	Triode transmitting tube
VT-255	WE-705-A	
VT-256	ZP-486	
VT-259	829	U-f-h transmitting twin-beam power amplifier
VT-260	VR-75-30	Voltage regulator
VT-264	3Q4	Pentode beam-power amplifier
VT-266	1616	Half-wave rectifier
VT-267	WL-578	
VT-268	12SC7	Twin triode
VT-269	WE-717-A	
VT-277	WL-417	
VT-280	RCA C-7063	
VT-281	HY-145Z	
VT-286	832A	U-h-f transmitting twin beam-power amplifier
VT-287	815	Transmitting twin beam-power amplifier
VT-288	12SH7	H-f pentode amplifier
VT-289	12SL7-GT	Twin triode

VACUUM-TUBE CROSS-REFERENCE GUIDE

COMMERCIAL TYPE TO SIGNAL CORPS TYPE

Commercial Type	*Signal Corps Type*	*Name*
01-A	VT-30	Triode detector-amplifier
1A3		H-f diode
1A5-GT	VT-124	Pentode power amplifier
1A7-GT	VT-147	Pentagrid converter
1C5-GT	VT-125	Pentode power amplifier
1D8-GT	VT-148	Diode-triode pentode power amplifier
1E5-GP	VT-170	Pentode r-f amplifier
1G4-GT		Triode detector-amplifier
1G6-GT		Twin triode
1H5-GT	VT-223	Diode-triode
1L4		Pentode r-f amplifier
1LC6	VT-178	Pentagrid converter
1LE3	VT-239	Triode detector-amplifier
1LH4	VT-177	Diode-triode
1LN5	VT-179	Pentode r-f amplifier
1N5-GT	VT-146	Pentode r-f amplifier
1R5	VT-171	Pentagrid converter
1R5 (loctal)	VT-171-A	Pentagrid converter
1S4	VT-210	Pentode power amplifier
1S5	VT-172	Diode-pentode
1T4	VT-173	Pentode r-f amplifier
2A3	VT-95	Triode power amplifier
2AP1		Cathode-ray tube
2X2, 879	VT-119	Half-wave vacuum rectifier
3A4		Pentode power amplifier
3A5		H-f twin triode
3A8-GT	VT-149	Diode-triode r-f pentode
3BP1		Cathode-ray tube
3CP1-S1	VT-248	Cathode-ray tube
3EP1/1806-P1	VT-226	Cathode-ray tube
3LF4	VT-180	Beam-power amplifier
3Q4	VT-264	Pentode beam-power amplifier
3Q5-GT	VT-221	Beam-power amplifier
3S4	VT-174	Pentode power amplifier
5BP4/1802-P4	VT-111	Cathode-ray tube
5CP1		Cathode-ray tube
5R4GY		Full-wave rectifier
5T4	VT-114	Full-wave rectifier
5U4G	VT-244	Full-wave rectifier
5V4-G	VT-206-A	Full-wave rectifier
5W4	VT-97	Full-wave rectifier
5Y3GT/G	VT-197-A	Full-wave rectifier
5Z3	VT-145	Full-wave rectifier

VACUUM-TUBE CROSS-REFERENCE GUIDE — COMMERCIAL TYPE TO SIGNAL CORPS TYPE (CONT.)

Commercial Type	*Signal Corps Type*	*Name*
5Z4	VT-74	Full-wave rectifier
6A7		Pentagrid Converter
6A8-G	VT-151	Pentagrid Converter
6A8-GT	VT-151-B	Pentagrid Converter
6AB7/1853	VT-176	H-f pentode amplifier
6AC7/1852	VT-112	H-f pentode amplifier
6AG5		Triode power amplifier
6AG7	VT-247	Beam-power amplifier
6B4-G		Triode power amplifier
6B7	VT-68	Duo-diode pentode
6B8	VT-93	Duo-diode pentode
6B8-G	VT-93-A	Duo-diode pentode
6C5	VT-65	Triode detector-amplifier
6C5-G	VT-65-A	Triode detector-amplifier
6C8-G	VT-163	Twin triode
6D6	VT-69	Variable-mu r-f pentode
6E5	VT-215	Cathode-ray indicator
6F6	VT-66	Pentode power amplifier
6F6-G	VT-66-A	Pentode power amplifier
6F7	VT-70	Triode-pentode
6F8-G	VT-99	Twin triode
6G5, 6U5	VT-98	Cathode-ray indicator
6G6-G	VT-198-A	Pentode power amplifier
6H6	VT-90	Duo-diode
6H6-GT/G	VT-90-A	Duo-diode
6J5	VT-94	Triode detector-amplifier
6J5-G	VT-94-A	Triode detector-amplifier
6J5-GT	VT-94-D	Triode detector-amplifier
6J7	VT-91	Pentode detector-amplifier
6J7-GT	VT-91-A	Pentode detector-amplifier
6K6-GT	VT-152	Pentode power amplifier
6K6-G	VT-152-A	Pentode power amplifier
6K7	VT-86	Variable-mu r-f pentode
6K7-G	VT-86-A	Variable-mu r-f pentode
6K7-GT	VT-86-B	Variable-mu r-f pentode
6K8	VT-167	Triode-hexode converter
6K8-G	VT-167-A	Triode-hexode converter
6L5-G	VT-213-A	Triode detector-amplifier
6L6	VT-115	Beam-power amplifier
6L6-G	VT-115-A	Beam-power amplifier
6L7	VT-87	Pentagrid mixer
6L7-G	VT-87-A	Pentagrid mixer
6N7	VT-96	Class B twin triode
6N7-GT/G		Twin triode
6Q7	VT-92	Duo-diode triode
6Q7-G	VT-92-A	Duo-diode triode
6R7	VT-88	Duo-diode triode
6R7-G	VT-88-A	Duo-diode triode
6R7-GT	VT-88-B	Duo-diode triode
6SA7	VT-150	Pentagrid converter
6SA7-GT	VT-150-A	Pentagrid converter
6SC7	VT-105	Twin triode
6SG7	VT-211	Semi-variable-mu r-f pentode
6SH7		Pentode h-f amplifier
6SH7-GT		Pentode h-f amplifier
6SJ7	VT-116	Pentode detector-amplifier
6SJ7 spl	VT-116-B	Pentode detector-amplifier
6SK7	VT-117	Variable-mu r-f pentode
6SK7-GT	VT-117-A	Variable-mu r-f pentode
6SL7-GT	VT-229	Twin triode
6SN7-GT	VT-231	Twin triode
6SQ7	VT-103	Duo-diode triode
6SQ7-GT		Duo-diode triode

Commercial Type	*Signal Corps Type*	*Name*
6SR7	VT-233	Duo-diode triode
6SR7-GT		Duo-diode triode
6SS7	VT-199	Variable-mu r-f pentode
6ST7	VT-205	Duo-diode triode
6V6	VT-107	Beam-power amplifier
6V6-GT	VT-107-A	Beam-power amplifier
6V6-G	VT-107-B	Beam-power amplifier
6W5-G	VT-196	Full-wave rectifier
6X5	VT-126	Full-wave rectifier
6X5-G	VT-126-A	Full-wave rectifier
6X5-GT	VT-126-B	Full-wave rectifier
6Y6-G	VT-168-A	Beam-power amplifier
6Z4/84	VT-84	Full-wave rectifier
K-7	VT-257	
7A4	VT-192	Triode detector-amplifier
7B8	VT-208	Pentagrid converter
7C7	VT-193	Pentode detector-amplifier
7E6	VT-188	Duo-diode triode
7F7	VT-189	Twin triode
7H7	VT-190	Variable-mu r-f amplifier
7J7	VT-194	Triode-hexode converter
7Z4	VT-181	Full-wave rectifier
9EP1		Cathode-ray tube
10 spl	VT-25-A	Triode transmitting tube
10, 210	VT-25	Triode transmitting tube
12A6	VT-134	Pentode power amplifier
12AH7-GT	VT-207	Twin triode
12C8 spl	VT-153	Duo-diode pentode
12C8	VT-169	Duo-diode pentode
WX-12	VT-7	Triode detector-amplifier
12H6	VT-214	Duo-diode
12J5-GT	VT-135	Triode detector-amplifier
12J5	VT-135-A	Triode detector-amplifier
12K8	VT-132	Triode-hexode converter
12SA7	VT-161	Pentagrid converter
12SC7	VT-268	Twin triode
12SG7	VT-209	Semi-variable-mu r-f pentode
12SH7	VT-288	Pentode h-f amplifier
12SJ7	VT-162	Pentode detector-amplifier
12SK7	VT-131	Variable-mu r-f pentode
12SL7-GT	VT-289	Twin triode
12SN7-GT		Twin triode
12SQ7	VT-104	Duo-diode triode
12SQ7-GT		Duo-diode triode
12SR7	VT-133	Duo-diode triode
22	VT-26	Tetrode r-f amplifier
24	VT-28	Tetrode r-f amplifier
24-A	VT-28	Tetrode r-f amplifier
HK24G	VT-204	U-h-f transmitting triode
HK24G	VT-204	U-h-f transmitting triode
25L6	VT-201	Beam-power amplifier
25L6-GT	VT-201-C	Beam-power amplifier
27	VT-29	Triode detector-amplifier
30	VT-27	Triode detector-amplifier
30 spl	VT-67	Triode detector-amplifier
31	VT-31	Triode power amplifier
32	VT-44	Tetrode r-f amplifier
33	VT-33	Pentode power amplifier
34	VT-54	Variable-mu r-f pentode
RK-34	VT-224	Transmitting twin triode
35, 51	VT-35	Variable-mu tetrode amplifier
36-A, 36	VT-36	Tetrode detector-amplifier

VACUUM-TUBE CROSS-REFERENCE GUIDE — COMMERCIAL TYPE TO SIGNAL CORPS TYPE (CONT.)

Commercial Type	*Signal Corps Type*	*Name*
37, 37-A	VT-37	Triode detector-amplifier
38, 38-A	VT-38	Pentode power amplifier
39	VT-49	Variable-mu r-f pentode
40	VT-40	Triode voltage amplifier
41	VT-48	Pentode power amplifier
44	VT-49	Variable-mu r-f pentode
45	VT-45	Triode power amplifier
46	VT-63	Tetrode power amplifier
47	VT-47	Pentode power amplifier
50	VT-50	Triode amplifier
EF-50	VT-250	H-f pentode amplifier
51, 35	VT-35	Variable-mu tetrode amplifier
56	VT-56	Triode detector-amplifier
57	VT-57	Pentode detector-amplifier
58	VT-58	Variable-mu r-f pentode
59	VT-59	Pentode power amplifier
75	VT-75	Duo-diode triode
VR-75-30	VT-260	Voltage regulator
76	VT-76	Triode detector-amplifier
77	VT-77	Pentode detector-amplifier
78	VT-78	Variable-mu r-f pentode
80	VT-80	Full-wave rectifier
83	VT-83	Full-wave mercury-vapor rectifier
84/6Z4	VT-84	Full-wave rectifier
89	VT-89	Pentode power amplifier
VR-90-30	VT-184	Voltage regulator
98	VT-84	Full-wave rectifier
100TH	VT-218	Triode transmitting tube
100TS	VT-127	Triode transmitting tube
100TS mod	VT-127-A	Triode transmitting tube
VR-105-30	VT-200	Voltage regulator
HY-114B	VT-234	U-h-f transmitting triode
F-128-A		Triode transmitting tube
VR-150-30	VT-139	Voltage regulator
207	VT-34	Triode transmitting tube
211 spl	VT-4-C	Triode transmitting tube
211	VT-4-B	Triode transmitting tube
WE-215-A	VT-5	Triode detector-amplifier
Eimac 250TH	VT-220	Triode transmitting tube
Eimac 250TL	VT-130	Triode transmitting tube
Eimac 304TH	VT-254	Triode transmitting tube
Eimac 304TL	VT-129	Triode transmitting tube
WE-307-A	VT-225	Transmitting pentode
WE-316-A	VT-191	U-h-f transmitting triode
WE-350-A	VT-230	
WE-371-A	VT-166	
WL-441	VT-251	
Eimac 450TH	VT-108	Transmitting triode
ZP-486	VT-256	
WL-530	VT-122	Transmitting triode
WL-531	VT-141	Half-wave vacuum rectifier
575-A	VT-187	Half-wave mercury-vapor rectifier
WL-578	VT-267	
585, 586	VT-50	Triode amplifier
HY-615	VT-235	U-h-f transmitting triode
WE-705-A	VT-255	
WE-710-A	VT-240	
WE-717-A	VT-269	
800	VT-64	Transmitting triode
801, 801-A	VT-62	Transmitting triode
803	VT-106	Transmitting pentode
805	VT-143	Transmitting triode
807, 807-A	VT-100-A	Transmitting tetrode beam-power amplifier
811	VT-217	Transmitting triode
813	VT-144	Transmitting beam power amplifier
814 (GL)	VT-154	Transmitting beam tetrode
815	VT-287	Transmitting twin beam-power amplifier
816	VT-216	Half-wave mercury vapor rectifier
829	VT-259	Transmitting twin beam-power amplifier
832	VT-118	U-f-h dual beam-power amplifier
832-A	VT-286	U-h-f transmitting twin beam-power amplifier
833-A		Transmitting triode
836	VT-236	Half-wave rectifier
837	VT-101	Transmitting tetrode
838		Transmitting triode
841	VT-51	Transmitting triode
842	VT-72	Triode power amp/modulator
843	VT-73	Transmitting triode
845	VT-43	Triode power amp/modulator
850	VT-60	Transmitting tetrode
851	VT-41	Transmitting triode
860	VT-17	Transmitting tetrode
861	VT-19	Transmitting tetrode
864 spl	VT-24	Triode amplifier
865	VT-55	Transmitting tetrode
866, 866-A	VT-46-A	Half-wave mercury-vapor rectifier
869-A	VT-39-A	Half-wave mercury-vapor rectifier
872-A	VT-42-A	Half-wave mercury-vapor rectifier
879, 2X2	VT-119	Half-wave vacuum rectifier
884	VT-222	Gas triode (thyratron)
918	VT-246	Gas photocell
923	VT-252	Vacuum photocell
CW-931	VT-2	Transmitting triode
954	VT-120	U-h-f pentode detector-amplifier
955	VT-121	U-h-f triode detector-amplifier
956	VT-238	U-h-f variable-mu r-f pentode
957	VT-237	U-h-f triode detector-amplifier
958	VT-212	Triode a-f amp-oscillator
CK-1005	VT-195	Full-wave gas rectifier
CK-1006	VT-249	Full-wave vacuum rectifier
HY-E-1148	VT-232	U-h-f transmitting triode
1201	VT-241	U-h-f triode detector-amplifier
1203-A	VT-243	U-h-f diode rectifier
1291	VT-182	Twin-triode amplifier
1294	VT-183	U-h-f diode rectifier
1299	VT-185	Beam-power amplifier
1613	VT-175	Transmitting pentode
1616	VT-266	Half-wave rectifier

REFERENCE DATA

VACUUM-TUBE CROSS-REFERENCE GUIDE — COMMERCIAL TYPE TO SIGNAL CORPS TYPE (CONT.)

Commercial Type	*Signal Corps Type*	*Name*	*Commercial Type*	*Signal Corps Type*	*Name*
1619	VT-164	Transmitting beam tetrode	2050	VT-245	
1624	VT-165	Transmitting beam tetrode	2051	VT-109	Gas tetrode (thyratron)
1625	VT-136	Transmitting beam tetrode	A5586	VT-123	
1626	VT-137	Transmitting triode	A5588	VT-128	
1629	VT-138	Cathode-ray indicator	KR7184	VT-227	Tetrode beam-power amplifier
1630, A-5588	VT-128		8007	VT-219	Beam-power amplifier
1802-P4	VT-111	Cathode-ray picture tube	8012	VT-228	U-h-f transmitting triode
1806-P1	VT-226	Cathode-ray tube	9002	VT-202	U-h-f triode detector-amplifier
1852, 6AC7	VT-112	H-f pentode amplifier			
1853, 6AB7	VT-176	H-f pentode amplifier	9003	VT-203	U-h-f variable-mu r-f pentode

SECTION II

MAINTENANCE SHEETS

FOR SIGNAL CORPS

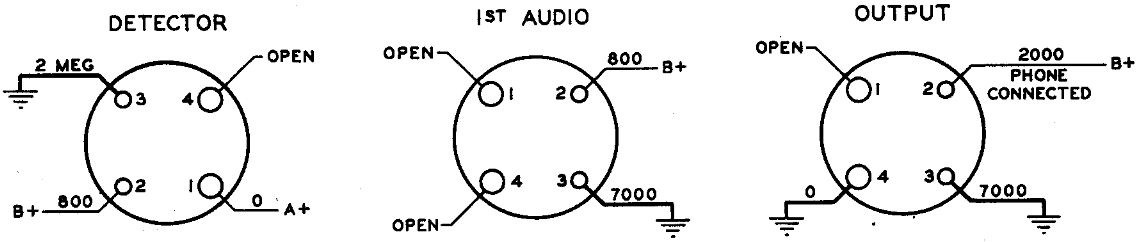
GROUND RADIO EQUIPMENT

RADIO RECEIVER AND TRANSMITTER BC-148, BC-151, AND BC-156

Part of: SCR-131, 161, and 171.

Reference: TM 11-237

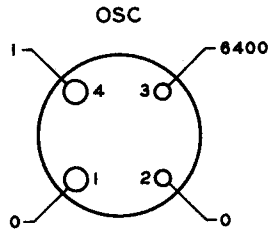
RESISTANCE MEASUREMENTS
RECEIVER



All measurements (except to ground), are from point indicated to battery connection panel, tubes and batteries removed. All values are ohms. Bottom view of socket.
All measurements and adjustments apply to BC-148, BC-151, and BC-156. Frequencies shown in parenthesis apply to the equipment whose BC numbers follow. All other frequencies shown apply to the BC-148.

TRANSMITTER

All values are ohms measured between point indicated and socket SO-22, tube and Cord CD-103 removed and relay closed by hand. Top view of socket.



ADJUSTMENTS

RECEIVER COMPENSATING ADJUSTMENT.

1. Set up receiver for operation, turn on Frequency Meter Set SCR-211-(*) and receiver. Allow them to warm up.
2. Set frequency meter and receiver dial to 3960 kc (4370 kc for BC-151 and 2640 kc for BC-156).
3. Remove screw plug at back of apparatus box marked RECEIVER COMPENSATING and adjust C_4 to zero beat signal from frequency meter.
4. Set frequency meter and receiver dial to 4360 kc (5100 kc for BC-151 and 3040 kc for BC-156), and adjust C_4 for zero beat.
5. Repeat 3 and 4 until receiver dial setting is correct at both 3960 and 4360 kc (4370 kc and 5100 kc for BC-151, 2640 kc and 3040 kc for BC-156).
6. Replace screw plug at back of apparatus box.

BALANCING ADJUSTMENT.

1. Remove the metal screw plug at the back of the apparatus box marked BALANCING.
2. Turn on receiver and set dial to 4360 kc (5100 kc for BC-151 and 3040 kc for BC-156).
3. Connect a vacuum tube voltmeter capable of reading 0.05 volts alternating current across the loop terminals (across antenna coil in BC-156), receiver in oscillating condition.
4. Adjust loop (antenna for BC-156) tuning capacitor C_3 for maximum on VTVM.
5. Adjust C_5 for minimum on VTVM.
6. Repeat steps 4 and 5 until no further change is noted in VTVM reading.
7. Replace metal screw plug and remove VTVM. The receiver is now adjusted for minimum radiation from the oscillating detector.

TRANSMITTER COMPENSATING ADJUSTMENT.

1. Remove screw plug marked TRANSMITTER COMPENSATING near the top at right-hand side of the apparatus box.
2. Turn on receiver and transmitter, carefully tune receiver to 4360 kc (5100 kc for BC-151 and 3040 kc for BC-156).
3. Depress key and turn adjusting screw C_2 to zero beat transmitter with receiver. The loop (antenna for BC-156) circuit is now compensated for loss of capacitance caused by disconnecting the receiver while transmitting.

GENERATOR GN-35.

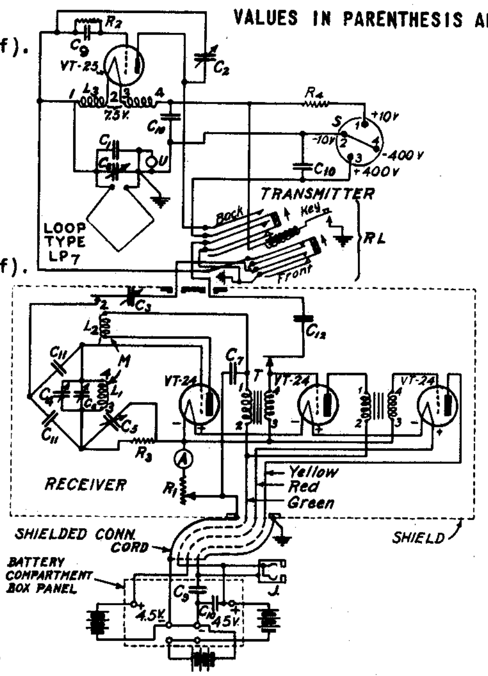
1. Adjustment.--Check the rating on the name plate before connecting the generator to the BC-148, BC-151, or BC-156. The name plate rating which is uppermost should be for 10 volts and 400 volts. If the rating is different, reverse the name plate and adjust the generator as follows:
   a. Connect the generator to the set with Cord CD-103.
   b. Connect a d-c voltmeter capable of reading 400 volts between pins 3 and 4 at generator socket.
   c. Crank the generator at normal speed and turn the VOLTAGE REGULATOR armature screw clockwise to increase or counterclockwise to decrease the voltage until voltmeter indicates 400 volts with transmitting key closed.
2. Care.--Grease bearings with WB grease, general purpose No. 2, every 1024 operating hours. Bearings are accessible by removing the five screws holding the projection on right side of generator housing, also the screws holding the two diamond-shaped plates on left side of the generator.

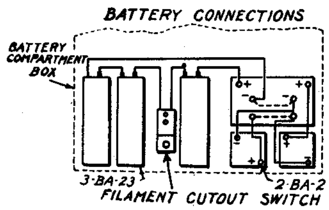
SCHEMATIC BC-148, BC-151

VALUES IN PARENTHESIS APPLY TO BC-151

APPARATUS LEGEND

C1 - CAPACITOR 300 μμf (150 μμf).
C2 - CAPACITOR 2 - 35 μμf.
C3 - CAPACITOR 2 - 35 μμf.
C4 - CAPACITOR 2 - 35 μμf.
C5 - CAPACITOR 2 - 35 μμf.
C6 - CAPACITOR 90 μμf.
C7 - CAPACITOR 0.001 μf.
C8 - CAPACITOR 230 μμf.
C9 - CAPACITOR 0.0025 μf.
C10 - CAPACITOR 0.01 μf.
C11 - CAPACITOR 200 μμf (150 μμf).
C12 - CAPACITOR 0.1 μf.
J - JACK.
L1 - GRID INDUCTOR.
L2 - PLATE INDUCTOR.
L3 - TRANSMITTING REACTOR.
R1 - RHEOSTAT, 10 OHMS.
R2 - RESISTOR, 6400 OHMS.
R3 - RESISTOR, 2 MEGOHMS.
R4 - RESISTOR, 1.1 OHMS.

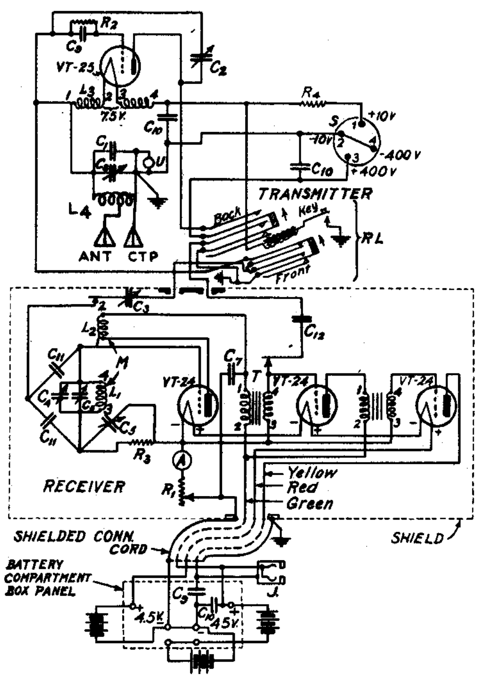


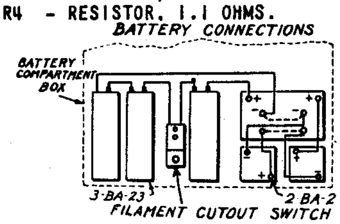


SCHEMATIC BC-156

APPARATUS LEGEND

C1 - CAPACITOR, 350 μμf.
C2 - CAPACITOR, 2 - 35 μμf.
C3 - CAPACITOR, 2 - 35 μμf.
C4 - CAPACITOR, 2 - 35 μμf.
C5 - CAPACITOR, 2 - 35 μμf.
C6 - CAPACITOR, 90 μμf.
C7 - CAPACITOR, 0.001 μf.
C8 - CAPACITOR, 330 μμf.
C9 - CAPACITOR, 0.0025 μf.
C10 - CAPACITOR, 0.01 μf.
C11 - CAPACITOR, 200 μμf.
C12 - CAPACITOR, 0.1 μf.
J - JACK.
L1 - GRID INDUCTOR.
L2 - PLATE INDUCTOR.
L3 - TRANSMITTING REACTOR.
L4 - ANTENNA INDUCTOR.
R1 - RHEOSTAT, 10 OHMS.
R2 - RESISTOR, 6400 OHMS.
R3 - RESISTOR, 2 MEGOHMS.
R4 - RESISTOR, 1.1 OHMS.





RADIO RECEIVER BC-186

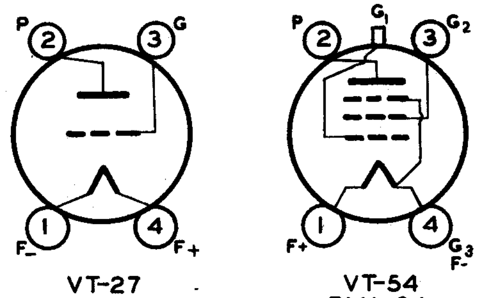
Part of: SCR-178, 179

Reference: TM 11-231

VOLTAGE MEASUREMENTS

Filament current is 0.25 amp; Plate is 7 ma. Voltages are to chassis, except for fil. Voltages are as follows:

Tube	Use	Fil. Pins 1 to 4	Plate Pin 2	Bias Pin 3 or Cap	Sc. Grid Pin 3
VT-54	R-F Stage	2.0	90	-3.0	67½
VT-54	Detector	2.0	varies	----	---
VT-27	1st Audio	2.0	90	-4.5	---
VT-27	2nd Audio	2.0	90	-4.5	---



Tube socket terminals, bottom view

ALIGNMENT : The radio frequency circuits of the receiver may be aligned on any incoming signal, but adjustment of the detector circuit requires an accurately calibrated signal generator. Set regeneration control at its optimum point (according to received signal). Set FREQUENCY dial at highest frequency and adjust the trimmer capacitor C_3 (mounted inside the radio frequency coil shield) by turning the screw at the top of coil T_1 (see fig. 1) for maximum signal. The adjustment of the detector trimmer capacitor C_2 at the top of coil T_2 must be performed carefully and with a signal whose frequency is accurately known. Adjustments should be made with the input to the receiver connected to its normal antenna through the shielded cables provided in Chest CH-38. Use a nonmetallic screw driver, otherwise incorrect alignment may result at the higher frequencies. Adjust C_2 for max. signal.

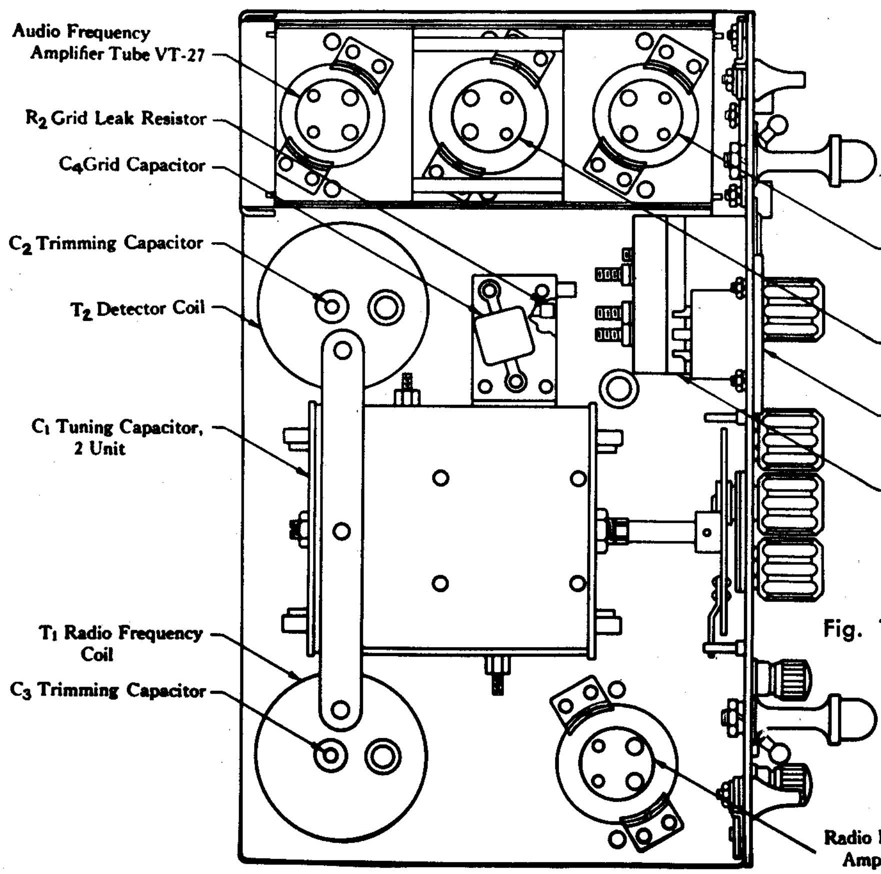


Fig. 1.—Receiver chassis, top.

LOCATING TROUBLE

Since this receiver is operated from batteries, in any case of defect all batteries should be checked and replaced if 25 percent under rated voltages. Batteries should again be checked after receiver trouble is eliminated and normal operating conditions are restored. If the complaint is a short which runs batteries down quickly, do not replace batteries until short is located and remedied. The following are major symptoms with possible causes:

NO SIGNAL:

1. Check tubes.
2. Check audio transformer T_3 for open or short.
3. Check capacitor C_5 for possible open.
4. Check resistor R_8 for open circuit.
5. Check R_3 (volume control) for open circuit.
6. Check capacitors C_6 and C_{10} for possible short.
7. Check slider contact in regeneration control R_4 for open or poor contact.
8. Check primary winding in coil T_1 for possible open circuit.
9. Check capacitor C_8 for possible shorted .1 μf section.

WEAK RECEPTION; NO REGENERATION:

1. Check capacitor C_6 for possible open circuit.
2. Check resistance of regeneration control R4 for open circuit.
3. Check R_5 and R_6 for possible open circuit.
4. Check capacitor C_7 for possible short.

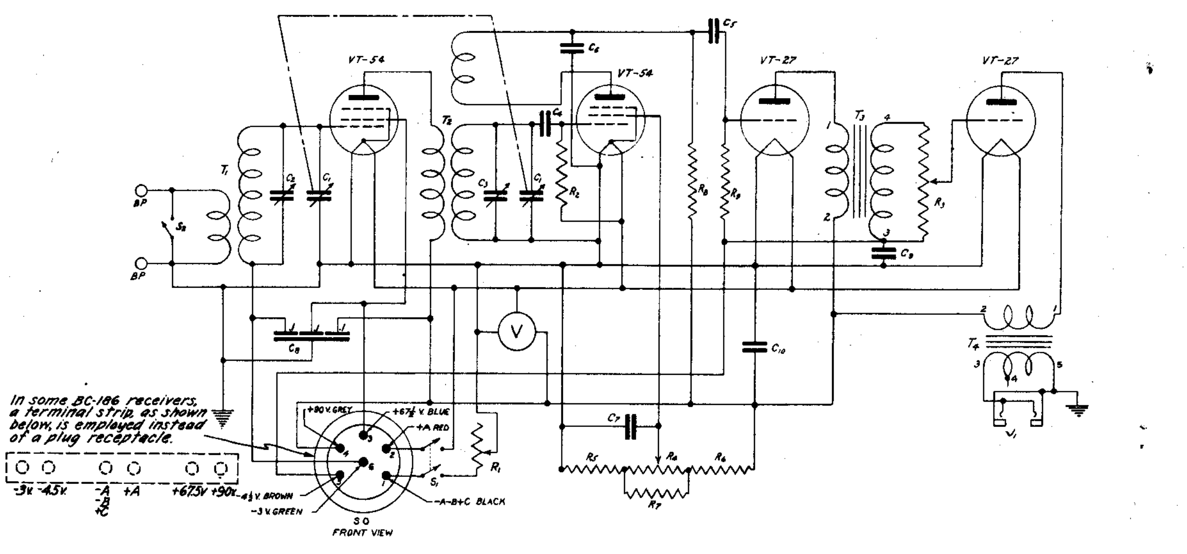
NOISY RECEPTION; DISTORTION:

1. Check resistor R_9 for possible open, when signals are distorted.
2. When reception is noisy, check slider contact in volume control R_3. Also, check regeneration control R_4 contact.
3. Check capacitors C_7, C_8, and C_{10} for partial or intermittent breakdown.

FADING SIGNALS:

1. Make sure that condition is not due to location or faulty antenna.
2. Check slider contact in regeneration control R_4.
3. Check slider contact in volume control R_3.

SCHEMATIC DIAGRAM



APPARATUS LEGEND

C_1 CAPACITOR	CA-233, TUNING, 2 UNIT, 138$\mu\mu$f EA	T_1 COIL	C-135, 1ST R.F.	R_4 POTENTIOMETER,	RS-107, REG CONTROL, 100000 Ω
C_2 CAPACITOR	CA-253, TRIMMING, 75$\mu\mu$f MAX	T_2 COIL	C-134, DETECTOR	R_5 RESISTOR	RS-129, 10000 Ω
C_3 CAPACITOR	CA-253, TRIMMING, 75$\mu\mu$f MAX	T_3 TRANSFORMER	C-65, A.F.	R_6 RESISTOR	RS-148, 200000 Ω
C_4 CAPACITOR	CA-218, GRID, 150$\mu\mu$f	T_4 TRANSFORMER	C-124, OUTPUT	R_7 RESISTOR	RS-149, 40000 Ω
C_5 CAPACITOR	CA-197, COUPLING, .01μf	S_1 SWITCH	SW-116, FIL	R_8 RESISTOR	RS-150, 100000 Ω
C_6 CAPACITOR	CA-153, BY-PASS, 250$\mu\mu$f	S_2 SWITCH	SW-105, ANT	R_9 RESISTOR	RS-134, 1 MEG
C_7 CAPACITOR	CA-234, BY-PASS, 1μf	S_0 SOCKET	SO-34,	J_1 JACK	JK-30, HEADSET
C_8 CAPACITOR	CA-184, BY-PASS, 3 UNIT, .1μf EA	R_1 RHEOSTAT	RS-106	BP BINDING POST	TM-152
C_9, C_{10} CAPACITORS	CA-243, BY-PASS, .5μf	R_2 RESISTOR	RS-142, GRID LEAK, 2 MEG	V VOLTMETER	IS-117
		R_3 POTENTIOMETER,	RS-144, VOL CONTROL, 500000 Ω		

RADIO TRANSMITTER BC-187-(*)

BC-187-(*) = BC-187, BC-187-A

Part of: SCR-178, 179

VOLTAGE AND CURRENT MEASUREMENTS

Reference: TM 11-231

Measurements are made with switch in TONE, CW or VOICE positions. Refer to Fig. 4 and note position of resistor R_6. High voltage to the pwr. amp. may be measured across this resistor. Measure screen voltage between ground and #2 terminal of the VT-55 socket. Measure oscillator voltage between R_4 (side connecting to tap on osc. inductor) and ground. Use 1000 ohm/volt voltmeter for measurements. *Measure current* with the meters in the transmitter. Be sure the meter switch is in I_p position, for current readings, and the transmitter is adjusted properly for TONE, CW (key shorted), or VOICE operation.

Switch Posit.	M.O. Plate	Pwr. Amp. Plate	Pwr. Amp. Sc. G.	Plate Current	R.F. Amps.
CW	450V	500V	125V	75ma	1.0 amp.
TONE	450V	500V		70ma	.85 amp.
VOICE	450V	500V		65ma	.83 amp.

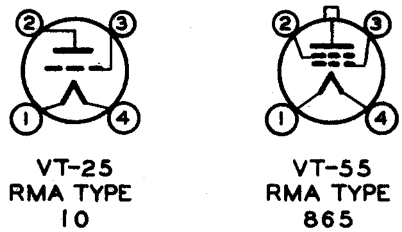


Fig. 1.
Tube socket terminals, bottom view

CALIBRATION DATA. A frequency calibration chart mounted on the cover of the operating chest is supplied for setting the transmitter at the desired operating frequency. If recalibration should be necessary, adjust the transmitter with Frequency Meter SCR-211-(*) set to a frequency near high end so that its output beats against the transmitter's output in a nearby receiver. Adjust trimmer C_{12} (fig. 2) for zero beat.

LOCATING TROUBLE

For further servicing notes, see data given for the BC-188 Modulator.

NO PLATE VOLTAGE.
1. Check generator output.
2. Check connector contacts and cables.
3. Check bypass capacitor C_{11}.

NO FILAMENT VOLTAGE.
1. Check generator output.
2. Check filament bypass capacitor.

NO RADIO FREQUENCY OUTPUT: ALL VOLTAGES PROPER.
1. Poor tubes (low emission).
2. Check SEND-REC Switch for contact failure.
3. Damaged capacitor. Check C_1 and C_6 (refer to schematic).
4. Check RF meter for possible damage.
5. Check for defective key circuit.
6. Check for poor or no contact through plate current cord (from Modulator).

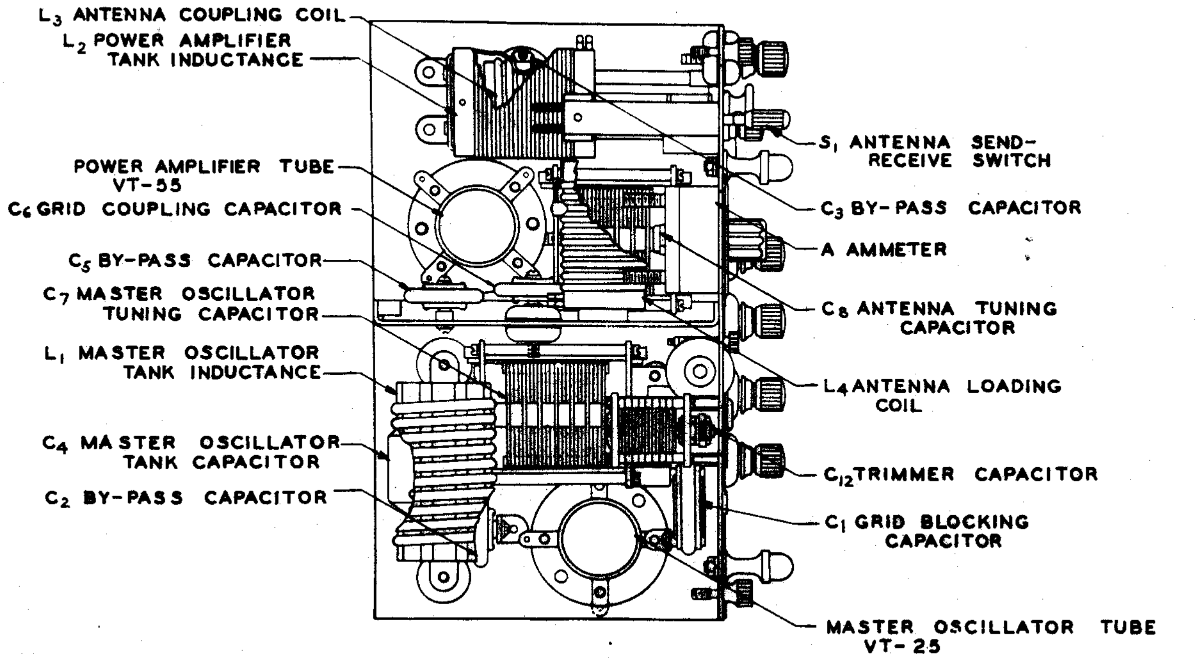


Fig. 2.—Transmitter chassis, top.

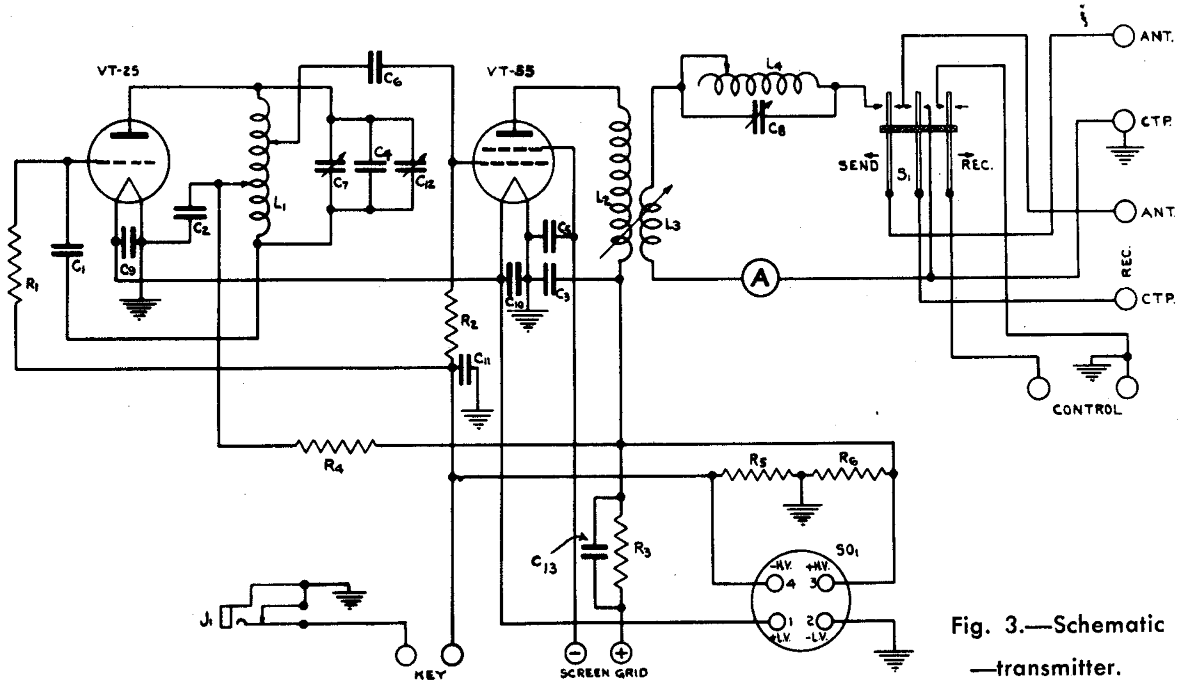


Fig. 3.—Schematic—transmitter.

APPARATUS LEGEND

A AMMETER IS-84
C_1 CAPACITOR CA-206, 0.0001 μf.
C_2 CAPACITOR CA-208, 0.01 μf.
C_3 CAPACITOR CA-208, 0.01 μf.
C_4 CAPACITOR CA-227, 0.000175 μf.
C_5 CAPACITOR CA-176, 0.005 μf.
C_6 CAPACITOR CA-207, 0.00025 μf.
† C_6 CAPACITOR CA-334, 0.00025 μf.
C_7 CAPACITOR CA-228, 385 $\mu\mu$f. max.
† C_7 CAPACITOR CA-260, 395 $\mu\mu$f. max.
C_8 CAPACITOR CA-229, 285 $\mu\mu$f. max.
C_9 CAPACITOR CA-183, 0.01 μf.
C_{10} CAPACITOR CA-183, 0.01 μf.
C_{11} CAPACITOR CA-183, 0.01 μf.
C_{12} CAPACITOR CA-230, 10-70 $\mu\mu$f.
† C_{12} CAPACITOR CA-363, 6-75 $\mu\mu$f.
C_{13} CAPACITOR CA-245, 1.0 μf.
L_1 M.O. TANK INDUCTANCE.
L_2 P.A. TANK INDUCTANCE.
L_3 ANT. COUPLING COIL.
L_4 ANT. LOADING COIL.
R_1 RESISTOR RE-137, 25,000 ohms.
R_2 RESISTOR RS-137, 25,000 ohms.
R_3 RESISTOR RS-137, 25,000 ohms.
R_4 RESISTOR RS-136, 3,000 ohms.
R_5 RESISTOR RS-136, 25,000 ohms.
† R_5 RESISTOR RS-234, 15,000 ohms.
R_6 RESISTOR RS-88, 250,000 ohms.
S_1 SWITCH, ANT. SEND-REC.
SO_1 SOCKET, SO-22, POWER.
J_1 JACK JK-24, PLATE CURRENT

† BC-187-A only

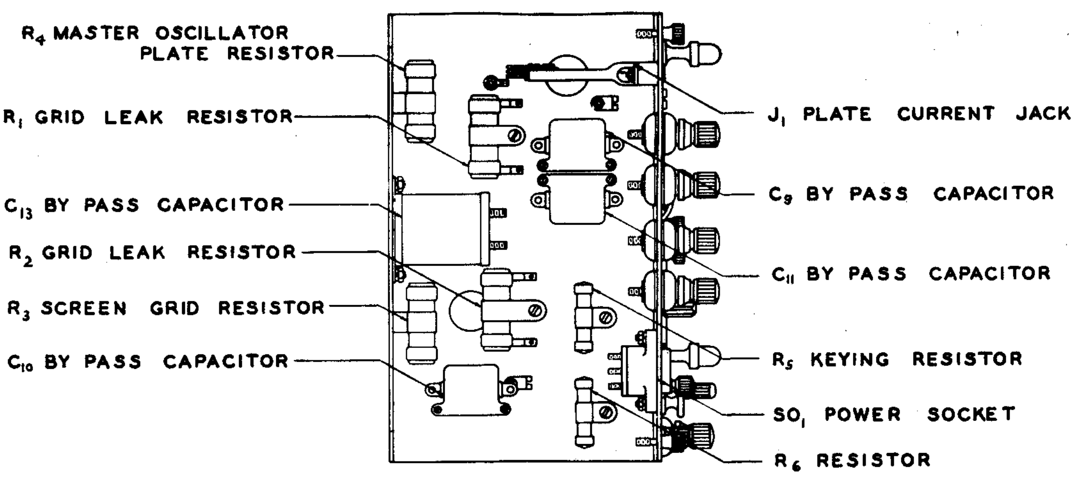


Fig. 4.—Transmitter chassis, bottom.

RADIO MODULATOR BC-188-(*)

BC-188-(*) = BC-188, BC-188-A

Part of: SCR-178, 179

Reference: TM 11-231

VOLTAGE AND CURRENT MEASUREMENTS

Since this modulator is a departure from the conventional in that the modulator tubes are employed as a varying resistance in series with the screen grid of the power amplifier stage, specific values of plate voltage and current for the modulator tubes cannot be given. When the transmitter is operated on CW, the modulator is not employed. When on VOICE or TONE, a 1000 ohm per volt voltmeter (0-300 volts) may be employed for determining whether a varying (more constant on TONE) voltage appears across the terminals marked " - SCREEN GRID + "

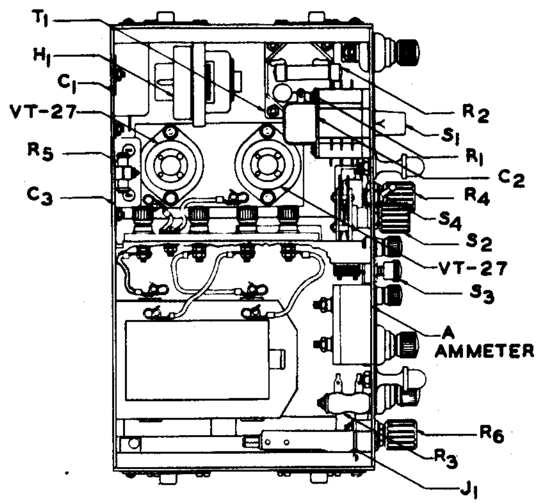
MODULATION ADJUSTMENT

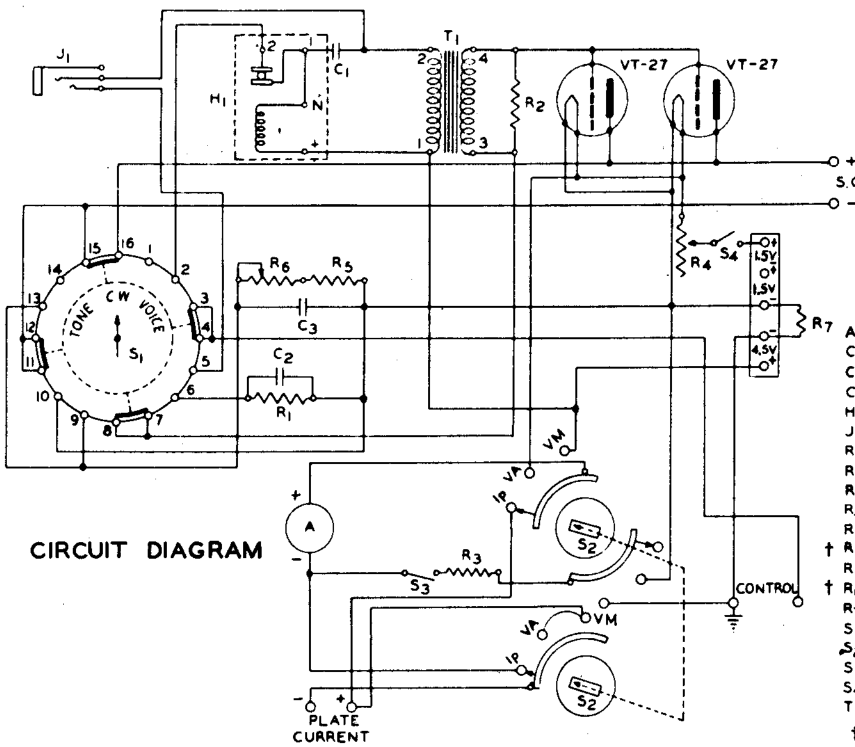
To minimize voice distortion, and to insure maximum percentage modulation the following procedure is followed: First, adjust ANT. COUPLING and ANT. TUNING controls, with selector switch in CW position and key depressed, for maximum RF output. The antenna meter should indicate between 0.5 and 1.0 ampere, and the meter on the modulator between 70 and 90 milliamperes. Then set the selector switch for VOICE, slide the button on the transmitting key to VOICE position and plug the microphone into the jack on the modulator. By turning the MOD BIAS knob on the modulator, reduce the ANT CURRENT to about one-half the value obtained on CW. Do not retune antenna controls. This adjustment applies for VOICE and TONE modulation.

LOCATING TROUBLE

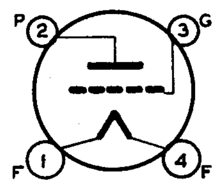
NO TONE/VOICE MODULATION:

(a) Damaged buzzer.
(b) Improper input voltages (check batteries).
(c) Shorted or open resistor or capacitor; check R1, C1, and C2. Check R3, C5, and C13.
(d) Open (T1) microphone transformer.
(e) Defective switch contacts.





CIRCUIT DIAGRAM



VT-27 RMA TYPE 30

Tube socket terminals, bottom view

APPARATUS LEGEND

A - AMMETER	IS-118	PLATE CURRENT
C_1 - CAPACITOR	CA-209	1.9µf
C_2 - CAPACITOR	CA-177-A	.5µf
C_3 - CAPACITOR	CA-177-A	.5µf
H_1 - INTERRUPTER	BZ-7-( )	AUDIO TONE
J_1 - JACK	JK-23	MICROPHONE
R_1 - RESISTOR	RS-88	250,000 Ω
R_2 - RESISTOR	RS-88	250,000 Ω
R_3 - RESISTOR	RS-145	90 Ω
R_4 - RHEOSTAT	RS-106	FILAMENT 10 Ω
R_5 - RESISTOR	RS-146	4000 Ω
† R_5 RESISTOR	RS-235	3000 Ω
R_6 RESISTOR	RS-147	3000 Ω
† R_6 - POTENTIOMETER	RS-229	5000 Ω
R_7 - RESISTOR	RS-230	25,000 Ω
S_1 - SWITCH	SW-117	TONE C.W. VOICE
S_2 - SWITCH	SW-160	METER
S_3 - PUSH BUTTON	SW-115	METER
S_4 - SWITCH	SW-105	FILAMENT
T_1 - TRANSFORMER	C-107	MICROPHONE

† BC-188-A ONLY

RADIO RECEIVER BC-189-(*)

BC-189-(*) = BC-189 and BC-189-A

Part of: SCR-177, 177-A, 180, 188, 193, 209 and SCR-210.

VOLTAGE MEASUREMENTS

Measured with a 1,000 ohms/v voltmeter. Variations of 10% from values given may be tolerated. All measurements made with tubes in sockets. Asterisk (*) preceding a value indicates measurement made with switch set for CW operation. All other values secured with switch on MANUAL.

Stage	Plate to ground		Screen grid to ground		Cathode to ground (control grid bias)		Filament	
Supply voltage	12.0 V	14.0 V	12.0 V	14.0 V	12.0 V	14.0 V	12.0 V	14.0 V
1st r-f amp. VT-49	194	227	84	96	2.8	3.5	5.6	6.5
1st det. VT-49	190	221	81	94	6.8	8.3	5.8	6.7
HF osc. VT-36	80	92	80	92	5.1	6.2	5.4	6.5
1st i-f amp. VT-49	194	227	84	96	2.8	3.4	5.8	6.7
2nd i-f amp. VT-49	194	227	84	96	2.8	3.4	5.4	6.4
2nd det. VT-36	58	64	-	-	0.10	0.13	5.9	6.9
B.F.O. VT-36	*93	*108	*93	*108	*4.4	*5.4	5.8	6.9
Audio amp. VT-38	184	213	195	227	24.0	27.0	5.4	6.4

ALIGNMENT

EQUIPMENT NECESSARY

Signal Generator I-72-(*) or equivalent
Cord with Plug PL-55
Output meter
Dummy antenna, 100$\mu\mu$f fixed capacitor
Carbon resistor, 100,000 ohms
Set of alignment tools
Pair headphones

INTERMEDIATE FREQUENCY AMPLIFIER

Before aligning the i-f or any other portion of this receiver, check the accuracy of the I-72-(*) signal generator by "zero-beating" its output against that of an SCR-211-(*). (This calibration test is outlined in previous pages.) Allow the signal generator (and SCR-211-(*), when using for calibration check) to warm up for at least 10 minutes before use.

1. Disconnect grid cap connector from 1st detector tube. Connect signal generator to the grid cap of this tube through the 100 $\mu\mu$f fixed capacitor. Also, connect the 100,000 ohm resistor from the grid cap of the tube to chassis. Connect output meter to one of the audio jacks by means of cord and plug.
2. Set the signal generator to 470 kc for the BC-189; 850 kc for the BC-189-A.
3. Adjust signal generator output control for lowest level which will provide a satisfactory reading on the output meter. Use *modulated output* from signal generator.
4. Set receiver selector switch to MANUAL and the VOL control to maximum.
5. Using proper alignment tool, adjust trimmers on 2nd detector transformer L6 (figure 2) for maximum response on output meter. Output meter should be set to scale which will produce half-scale deflection, and signal generator's output reduced as i-f stages are brought into alignment and receiver's output increases. Align 2nd i-f transformer (L5) in a similar manner. Finally, adjust 1st i-f (L4) trimmers. Repeat this procedure, as outlined, beginning with L-6 and terminating with L-4, to insure proper peaking.

BEAT FREQUENCY OSCILLATOR ADJUSTMENT

1. Switch signal generator from modulated output to c-w output and set receiver selector switch to CW.

ALIGNMENT (cont)

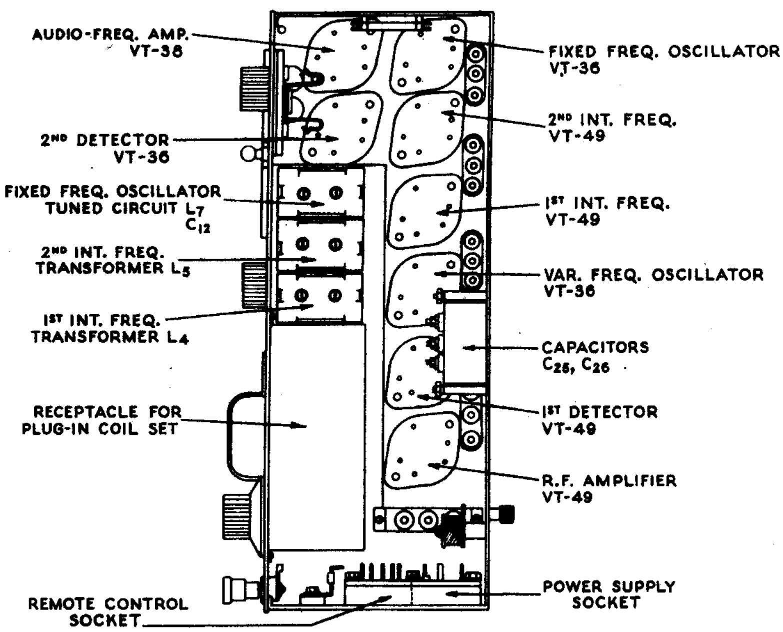
2. Adjust capacitor C12 until a satisfactory beat note (approximately 800 cycles) is heard in the phones.
3. Remove signal generator lead from grid cap of 1st detector tube, also dummy capacitor and resistor. Restore grid cap lead to grid of tube.

H-F OSCILLATOR AND 1ST DETECTOR ALIGNMENT

1. Connect signal generator to antenna post through a 100$\mu\mu$f capacitor. Ground signal generator output cable to ground of receiver. Remove both screw plugs on the coil set. Output meter remains as connected for i-f alignment.
2. Set the receiver tuning dial to a calibrated frequency on the high end of the coil range. For example, using coil set C-148-A, - 4400 kc.
3. Set signal generator to this same frequency (4400 kc) *with modulated output*.
4. Adjust h-f oscillator trimmer C_6 for maximum peak in output meter. This trimmer is to the right of the coil set handle.
5. Adjust 1st detector trimmer C_5 for peak in output meter. This trimmer is located behind the coil set handle.
6. Repeat these adjustments to insure maximum peaking on each.
7. Retune receiver to a calibrated frequency just inside low range of coil set. For example, with coil set C-148-A, 2700 kc.
8. Set signal generator for modulated output on this same frequency.
9. Modulated signal should be heard in the phones plugged into the receiver. Vary frequency of signal generator 2 kc each side of original setting. If note is heard within this variation, alignment is satisfactory; if heard beyond 2 kc extremes - alignment process should be checked.

PARTS DIFFERENCES IN BC-189

C13, C14, C15	Capacitor CA-195 -0.15 μf, 0.05 μf per section.
C16, C17, C18	Capacitor CA-195 -0.15 μf, 0.05 μf per section.
C19, C20, C21	Capacitor CA-195 -0.15 μf, 0.05 μf per section.
C22, C23, C24	Capacitor CA-195 -0.15 μf, 0.05 μf per section.
C25, C26	Capacitor CA-248. C25 -0.05 μf, C26-0.2μf. C26 = C34 (in 189-A) in circuit.
C33, C34	Capacitor CA-248, C33-0.2 μf, C34-0.05μf. C34 = C35 (in 189-A) in circuit diagram.



BOTTOM VIEW
LOCATION OF PRINCIPAL COMPONENT UNITS

Fig. 1

LOCATING TROUBLE

All troubles listed pertain to receiver proper. It is assumed that power supply, cord connectors, plugs and all tubes have been checked and found satisfactory.

Receiver "Dead" - No Signals.--First, attempt to localize stage where defect exists and which may cause complete receiver to be inoperative. For quick approximate locating of the trouble, touch the grid caps of the various tubes in successive stages beginning with the power or VT-38 stage and down to the first r-f stage. A distinct click or thud should be heard when the grid cap is touched. When a stage is reached where this procedure does not produce the desired click, further checks should be made of the circuit components within that stage. Voltage and resistance tests will then rapidly indicate whether a defective resistor or capacitor is at fault.

If no click or life is indicated when the VT-38 power tube grid is touched, check the following:

1. Open or short-circuited output transformer T_1.
2. No plate supply to receiver tubes due to shorted capacitors C_{34} and/or C_{35}.
3. R_6 open circuited, removing plate voltage to h-f oscillator tube and making this stage (and complete receiver) dead.

Weak Signals:

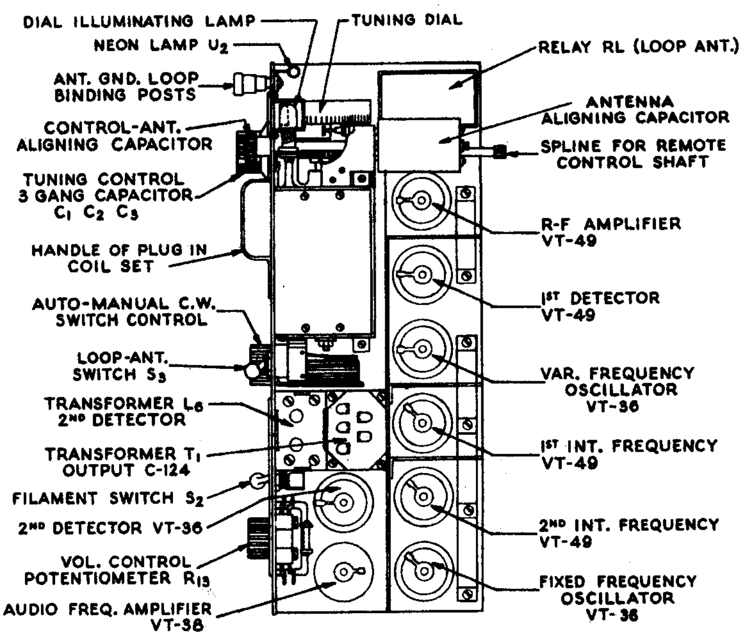
1. Check all cathode biasing resistors, and cathode by-pass capacitors.
2. Check grid-return decoupling capacitors C_{13} and C_{14} for possible open circuit.

Distorted Signals:

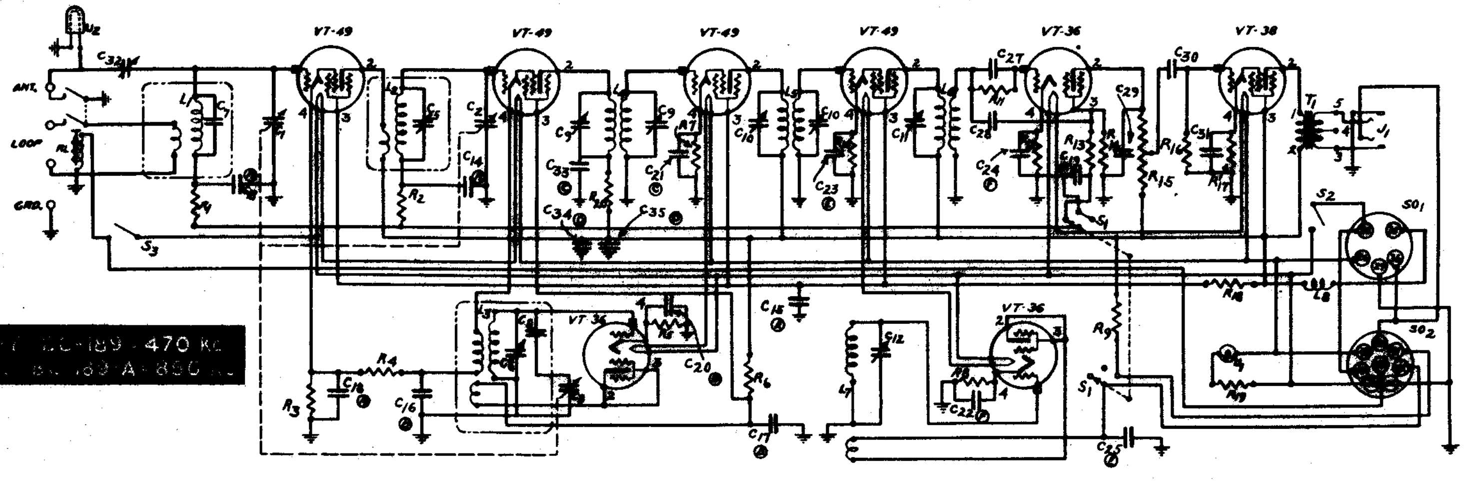
1. Check for possible leaky C_{30} capacitor.
2. Check for open-circuited resistor, either R_{16} or R_{17}.

Noisy and Fading Reception:

1. If location and antenna installation are not at fault, check volume control R_{15} for bad wiping contact or worn resistance element.
2. Check capacitors in stage in which noise is localized for possible intermittent circuit or for leakage tendencies.



TOP VIEW
LOCATION OF PRINCIPAL COMPONENT UNITS
Fig. 2



APPARATUS LEGEND (BC-189-A)

FOR PART DIFFERENCES BETWEEN BC-189 & BC-189-A, SEE PAGE 2

R1 - RESISTOR RS-129 10000 Ω
R2 - RESISTOR RS-129 10000 Ω
R3 - RESISTOR RS-123 350 Ω
R4 - RESISTOR RS-127 3000 Ω
R5 - RESISTOR RS-125 1000 Ω
R6 - RESISTOR RS-122 20000 Ω
R7 - RESISTOR RS-124 500 Ω
R8 - RESISTOR RS-127 3000 Ω
R9 - RESISTOR RS-122 20000 Ω
R10 - RESISTOR RS-124 500 Ω
R11 - RESISTOR RS-131 50000 Ω
R12 - RESISTOR RS-140 30000 Ω
R13 - RESISTOR RS-141 75000 Ω
R14 - RESISTOR RS-134 1 MEG
R15 - POTENTIOMETER RS-144 0.5 MEG
R16 - RESISTOR RS-134 1 MEG
R17 - RESISTOR RS-126 2000 Ω
R18 - RESISTOR RS-139 30000 Ω
R19 - RESISTOR RS-143 60 Ω
R20 - RESISTOR RS-125 1000 Ω
C1-, C2-, C3- } CAPACITOR CA-225 3 SECTIONS 13-138 $\mu\mu f$ PER SECTION

C5 -, C6 -, C7 -, C8 - } CAPACITOR - FOR VALUES SEE COIL SET
C9 - CAPACITOR CA-247 2 SECTS. 35-90 $\mu\mu f$ PER SECT.
C10 - CAPACITOR CA-247 2 SECTS. 35-90 $\mu\mu f$ PER SECT.
C11 - CAPACITOR CA-246 35-90 $\mu\mu f$
C12 - CAPACITOR CA-246 35-90 $\mu\mu f$
(A) {C13-, C14-, C18-} CAPACITOR CA-255 0.3 μf 0.1 μf PER SECTION
(B) {C16-, C17-, C20-} CAPACITOR CA-255 0.3 μf 0.1 μf PER SECTION
(C) {C21-, C33-} CAPACITOR CA-262 {0.1 μf, 0.2 μf} 0.3 μf
(D) {C34-, C35-} CAPACITOR CA-262 {0.2 μf, 0.1 μf} 0.3 μf
(E) {C15-, C23-, C25-} CAPACITOR CA-255 0.3 μf 0.1 μf PER SECTION
(F) {C19-, C22-, C24-} CAPACITOR CA-255 0.3 μf 0.1 μf PER SECTION
C27 CAPACITOR CA-196 250 $\mu\mu f$

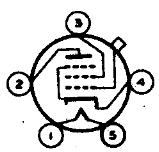
C28 - CAPACITOR CA-196 250 $\mu\mu f$
C29 - CAPACITOR CA-193 500 $\mu\mu f$
C30 - {CAPACITOR CA-197, CAPACITOR CA-197} TWO IN PARALLEL } 0.02 μf
C31 - CAPACITOR CA-177A 0.5 μf
C32 - CAPACITOR CA-226 20-180 $\mu\mu f$
L1 - 1ST RF TRANSFORMER
L2 - 1ST DET TRANSFORMER
L3 - 1ST OSC TRANSFORMER
L4 - 1ST INT FREQ TRANSFORMER
L5 - 2ND INT FREQ TRANSFORMER
L6 - 2ND DET TRANSFORMER
L7 - 2ND OSC TRANSFORMER
L8 - CHOKE COIL
J1 - JACK JK-30
SO1 - SOCKET POWER
SO2 - SOCKET REMOTE CONTROL
S1 - SWITCH SW-110 (CW-AUTO-MANUAL)
S2 - SWITCH SW-105 (FILAMENT)
S3 - SWITCH SW-105 (RELAY)
RL - RELAY BK-8 (LOOP-ANT)
U1 - LAMP LM-25 (PILOT)
U2 - LAMP NEON
T1 TRANSFORMER C-124 (OUTPUT)

Fig. 3.

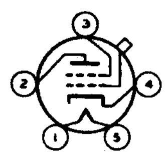
Schematic diagram.

Tube socket terminals

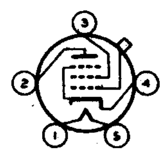
bottom view



VT-49
RMA TYPE
39/44



VT-36
RMA TYPE
36



VT-38
RMA TYPE
38

RADIO TRANSMITTER BC-AA-191

Part of: SCR 177-B, 187-A, 188-A, 193-(*).

VOLTAGE MEASUREMENTS

Reference: TM 11-800

VOLTAGE CHART
(Using 1,000 ohms/volt, or higher, voltmeter)

	Volts approx.	Where measured	Ground polarity	Sel. Switch position	Notes
Sp. Amp. plate	425	At VT-25 plate; socket 41	Minus	VOICE	
Sp. Amp. grid bias	35-40	Across capacitor 53	Plus	VOICE	
Mod. grid bias	72-75	Across capaciter 35	Plus	VOICE	
Plate supply	1,000-1,100	Terminal 61 of Socket SO-39 and ground	Minus	TONE or VOICE	
Keying	150	Across resistor 20	Plus	Any	Keying relay 24 open.
Side tone: Position 1 Position 4	3-9 17.5-30	Arm of Sw. 55 to ground, across an 8,000 ohm resistor	---	TONE or C.W.	Voltage is a.c.; frequency should be 600-1200 cycles. Voltage is higher on C.W. than on TONE. Use output meter.
Microphone supply	10	From terminal 22 of PL-64 to ground	Minus	VOICE	Measure with microphone disconnected from circuit. PL-59 disconnected. OFF-ON switch at ON.

RESISTANCE MEASUREMENTS

The first two charts below give resistance measurements from the various pins on the connector board located at the top of the tuning unit receptacle on the front of the transmitter. The tuning unit must be removed for access to the board. Pin numbers are counted from left to right, starting with No. 1. (See fig. 1 BC-191-(*).) The third chart gives resistance to ground from tube socket pins (see fig. 4 BC-191-(*) for pin locations). Resistance values within 15% of these indicated are satisfactory.

RESISTANCE TO GROUND

Pin No.	1	2	3	4	5	6	7	8
Ohms	Open	1 meg	Open	0.1 or 0.03 meg	Open	0.13 or .055 meg	Open	1 meg

NOTE: Some sets issued give readings of 0.1 meg from pin No. 4 to ground, others give 0.03 meg due to use of a different size resistor 20. Likewise, resistance to ground from pin No. 6 is 0.13 meg on some sets and 0.055 meg on others.

PIN TO PIN RESISTANCE (Ohms unless otherwise indicated)

Pin to pin	1	2	3	4	5	6	7	8
1	0	Open	Open	Open	Open	Open	Open	Open
2	Open	0	Open	1 meg	Open	1 meg	Open	190
3	Open	Open	0	Open	Open	Open	Open	Open
4	Open	1 meg	Open	0	Open	35,000	Open	1 meg
5	Open	Open	Open	Open	0	Open	Open	Open
6	Open	1 meg	Open	35,000	Open	0	Open	1 meg
7	Open	Open	Open	Open	Open	Open	0	Open

RESISTANCE MEASUREMENTS (cont.)

RESISTANCE FROM TUBE SOCKET PINS TO GROUND

	Tube	Socket pin marking			
		P	Fl	G*	F
M.O.	VT-4-B	1 meg	160 ohms	0.11 or 0.04 meg	0. ohms
P.A.	VT-4-B	1 meg	160 ohms	0.13 or 0.055 meg	0. ohms
Mods.	VT-4-B	1 meg	160 ohms	108,000 ohms	0. ohms
Sp. Amp.	VT-25	1 meg	2 ohms	0.1 or 0.03 meg	155 ohms

*The alternate values indicated depend on the resistance of resistor 20 (see note above).

CURRENT MEASUREMENTS

MODULATOR PLATE CURRENT. Observe TOTAL PL. CURRENT reading when changing from C.W. to VOICE and impressing normal speech modulation. An average of 100 to 125 ma. should be obtained for sustained speech tones. With no modulation, a 20 ma. higher reading should be obtained than for C.W. operation. First adjust MOD. BIAS control 7 to secure correct current reading for no modulation. Then adjust INPUT LEVEL control for proper current reading on sustained modulation.

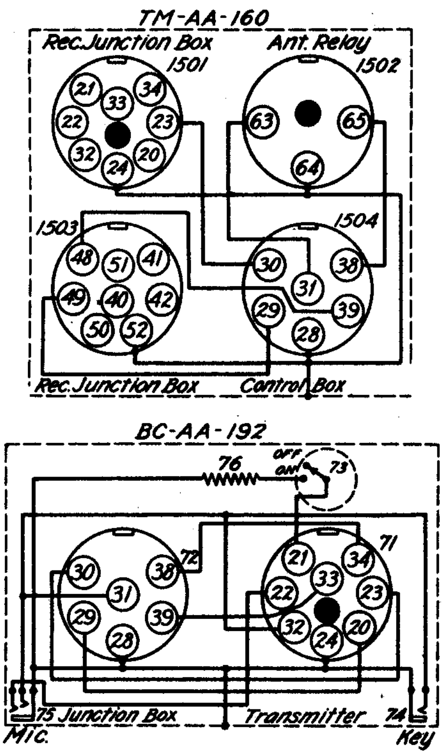
M.O. PLATE CURRENT. Obtained by reading TOTAL PL. CURRENT meter *with power amplifier and speech amplifier tubes removed*. Set selector switch to C.W. Meter reading should be 30-75 milliamperes, depending on frequency of operation.

POWER AMPLIFIER PLATE CURRENT. Determined by subtracting the sum of the currents drawn by the master oscillator and speech amplifier from the total plate current on C.W. Result should be 100 to 150 milliamperes, with full antenna loading.

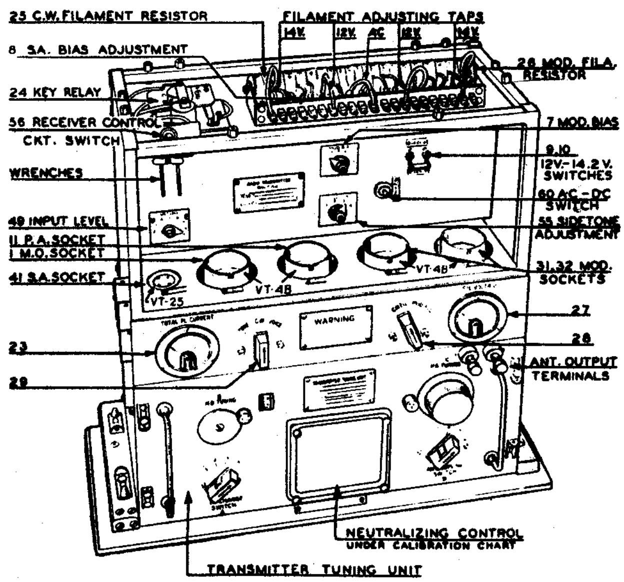
M.O. GRID CURRENT. Measured by connecting a d-c milliammeter in series with resistor 4. Reading should be between 20 and 35 milliamperes.

P.A. GRID CURRENT. Measured by inserting a d-c milliammeter in series with resistor 12. Correct value is 6.5 to 9.0 milliamperes when control C PA TUNING is resonated properly.

For notes on LOCATING TROUBLES, refer to BC-191-(*) which is similar in electrical design. When referring to these notes, be careful of reference numbers given, since the reference numbers for the BC-AA-191 are different.

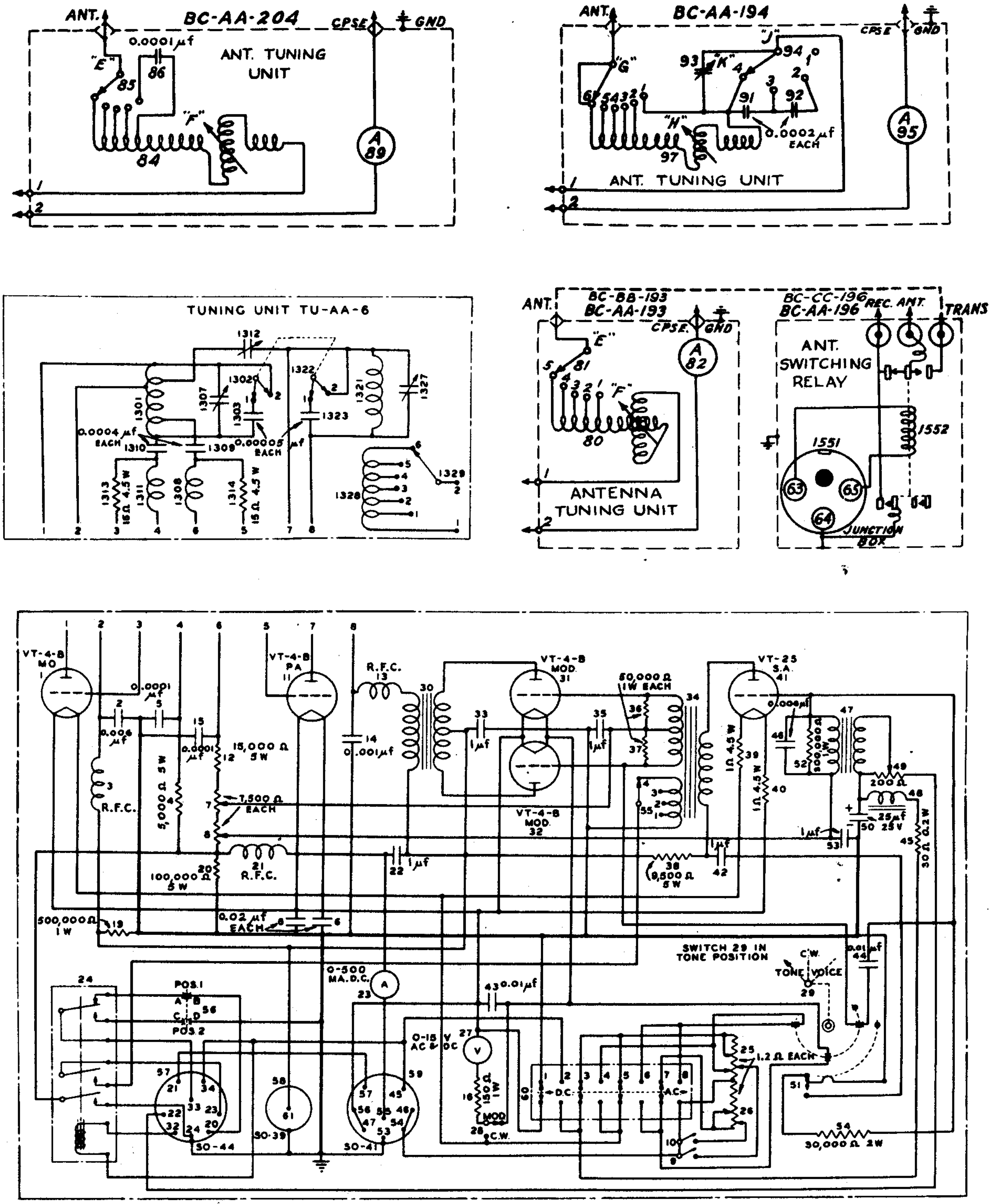


SCHEMATIC DIAGRAM, RADIO CONTROL BOX BC-AA-192 AND JUNCTION BOX TM-AA-160



LOCATION OF MAIN CONTROLS, AND FILAMENT ADJUSTING CONNECTION BOARD

SCHEMATIC


BC-AA-204
ANT.
CPSE
GND
0.0001 μf
ANT. TUNING UNIT
BC-AA-194
0.0002 μf EACH
ANT. TUNING UNIT
TUNING UNIT TU-AA-6
0.0004 μf EACH
0.00005 μf EACH
15 Ω 4.5 W
BC-BB-193
BC-AA-193
ANTENNA TUNING UNIT
BC-CC-196
BC-AA-196
REC. ANT.
TRANS
ANT. SWITCHING RELAY
JUNCTION BOX
VT-4-B MO
VT-4-B PA
VT-4-B MOD.
VT-25 S.A.
R.F.C.
0.006 μf
0.0001 μf
15,000 Ω 5 W
5,000 Ω 5 W
7,500 Ω EACH
100,000 Ω 5 W
0.001 μf
1 μf
50,000 Ω 1 W EACH
9,500 Ω 5 W
200 Ω
25 μf 25 V
30 Ω 0.2 W
500,000 Ω 1 W
0.02 μf EACH
SWITCH 29 IN TONE POSITION
C.W.
TONE
VOICE
0-500 MA. D.C.
0.01 μf
0-15 V AC & DC
150 Ω 1 W
MOD
C.W.
D.C.
AC
1.2 Ω EACH
30,000 Ω 2W
POS. 1
POS. 2
SO-44
SO-39
SO-41

RADIO TRANSMITTER BC-191-(*)

BC-191-(*) = BC-191-A, B, C, D, E, F, N

Part of: SCR-177-B, SCR-187-A, SCR-188-A, SCR-193-(*)

Reference: TM 11-800

RESISTANCE AND VOLTAGE MEASUREMENTS

(Using 1000 ohms per volt, or higher, voltmeter)

	VOLTAGE (Approx.)	WHERE MEASURED	GROUND POLARITY	SELECTOR SW. POSITION	NOTES
S.A. plate	425	At plate of VT-25 (Socket 1154)	-	VOICE	Measured with tube in circuit. Use adapter if possible.
S.A. grid bias	35-40	Across capacitor 1144	+	VOICE	
Mod. grid bias	72-75	Across capacitor 1160	+	VOICE	
Plate supply	1,000-1,100	Terminal of sockets SO-39 and ground	-	TONE or VOICE	
Keying	200	Across resistor 1115	+	Any	Keying relay 1165 open
Side tone: Position 1. Position 4.	 17.5-30 3-9	Arm of switch 1179 to ground across an 8000-ohm resistor		TONE or C.W.	Voltage is a-c. Frequency should be 600-1200 cycles. Voltage is higher on C.W. than on TONE. Use output meter
Microphone supply	4.5-5.3	Across resistor 1145	-	VOICE	Microphone plugged in. PL-59 disconnected. Filaments on. OFF-ON switch at ON. Microphone button switch closed

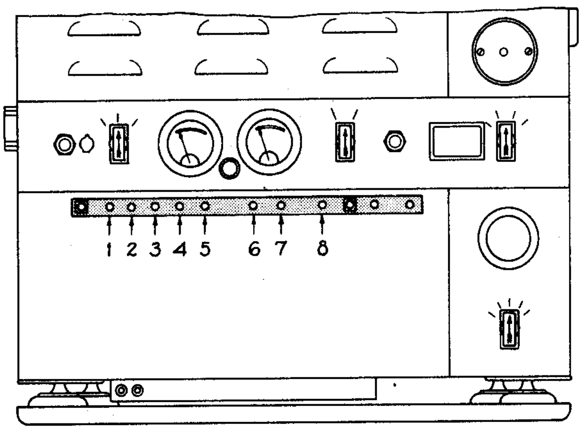


Fig. 1.—Location of tuning unit terminal pins.

RESISTANCE TUNING UNIT TERMINAL PINS TO GROUND

Pin number	1	2	3	4	5	6	7	8
Resistance	open	1 meg	open	225,000	open	225,000	open	1 meg

PIN TO PIN RESISTANCE

Pin	1	2	3	4	5	6	7	8
1	0	open	open	open	open	open	open	open
2	open	0	open	1.2 meg	open	1.2 meg	open	115
3	open	open	0	open	open	open	open	open
4	open	1.2 meg	open	0	open	18,000	open	1.2 meg
5	open	open	open	open	0	open	open	open
6	open	1.2 meg	open	18,000	open	0	open	1.2 meg
7	open	open	open	open	open	open	0	open

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RESISTANCE AND VOLTAGE MEASUREMENTS (CONT.)

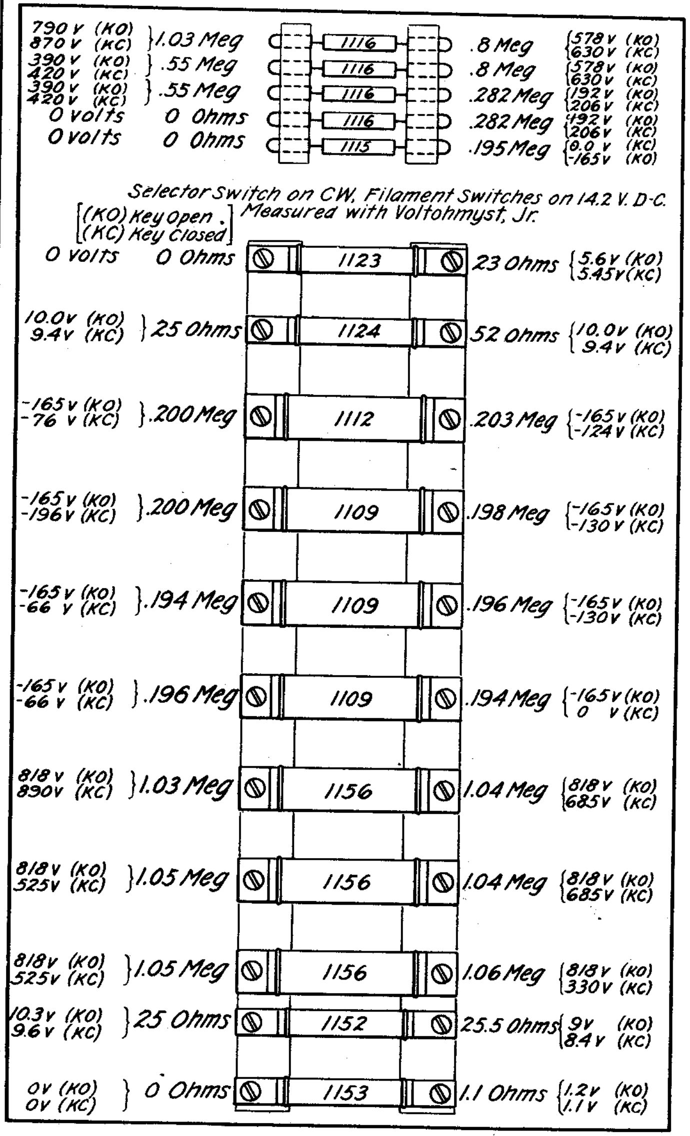


Fig. 2.—Voltage and resistance to chassis on resistor strip on rear of transmitter.

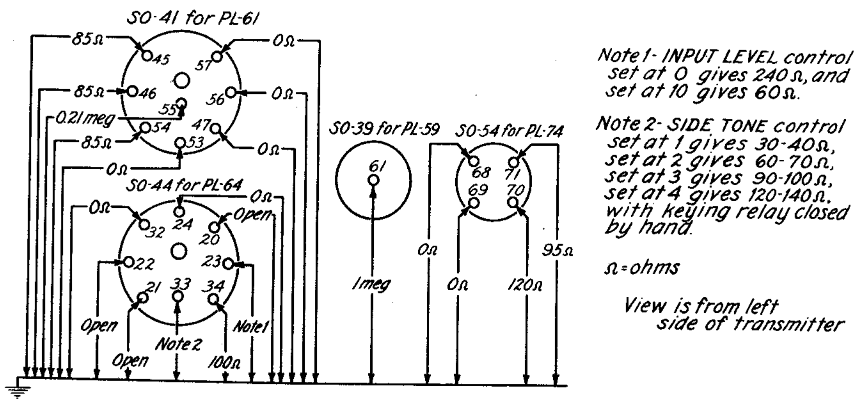


Fig. 3.—Pin to ground resistance, cording sockets.

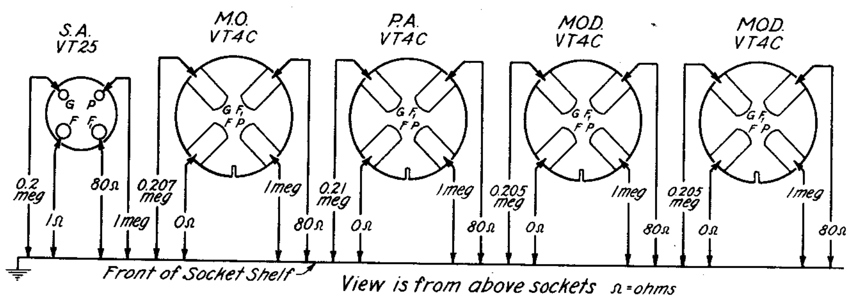


Fig. 4.—Pin to ground resistance, vacuum tube sockets. Conditions of measurement as follows: tubes and cords removed; Sel. switch on VOICE; Tuning Unit (TU) 5 or 6-A (B) inserted; Power switch at ON; FU-12-A inserted; A-C D-C switch set at D-C; Meter switch at C.W. Fil.

TRANSMITTER NEUTRALIZATION

1. Cover one filament pin of power amplifier tube VT-4-C with paper and readjust the filament resistor connection board for 10 volts.
2. Tune to mid-frequency of transmitter tuning unit and, with dummy antenna connected as shown in diagram, unlock neutralizing capacitor control with screw driver. (Neutralizing capacitor is located behind Calibration Chart. See fig. 6.)
3. Press test key and adjust capacitor for *minimum* current indication on r-f meter in dummy antenna circuit.
4. Adjust power amplifier and antenna controls for *maximum* current on r-f meter.
5. Readjust neutralization capacitor for *minimum* current.

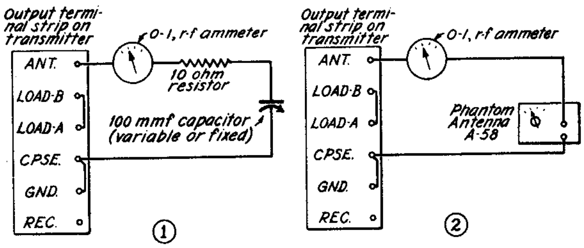


Fig. 5.—Connecting phantom antenna.

TRANSMITTER ADJUSTMENTS

1. Accomplished at high frequency end of highest frequency transmitter tuning unit supplied with set. Check calibration if operation frequency is more than 2.5 kc off Calibration Chart figures.
2. Adjust calibration control 1104 with screw driver.
3. Make this adjustment with transmitter warmed up and tube compartment cover in place.

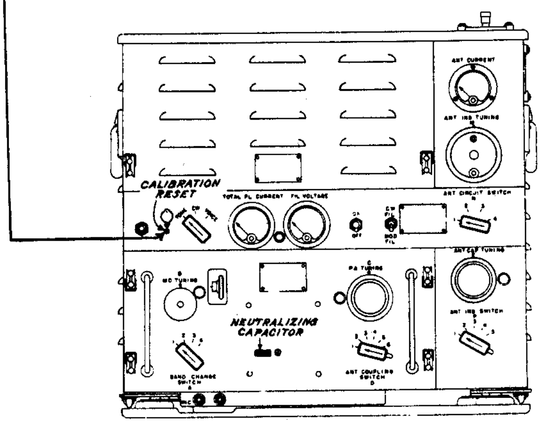


Fig. 6.—Calibration and neutralization controls.

LOCATING TROUBLE

Below are listed a number of typical troubles which are likely to occur in this equipment. The "Diagnosis" for each are given in their relative order of probability. Characteristic troubles for this equipment are given below this listing.

SYMPTOM 1. No pronounced plate current dip when control C is tuned. TOTAL PL. CURRENT reading is high. Tuning of control C shifts somewhat as antenna controls are tuned. ANT. CURRENT meter reading normal.
DIAGNOSIS. Check P. A. tube. Check grid bias voltage on this tube; if low or lacking, check resistance from pin G of P. A. socket to frame (see resistance chart, page 1); check especially grid biasing resistor indicated as 1115 on the schematic diagram. Be sure antenna loading control "D" is not set too high.

SYMPTOM 2. Very high plate current on C.W. operation. No radio frequency output on any position of control "D". Control "C" will not resonate.
DIAGNOSIS. M. O. tube not functioning; replace, if defective. Check high voltage and filament circuits of master oscillator.

SYMPTOM 3. No plate current. Filament voltage normal.
DIAGNOSIS. Burned out high voltage fuse in power supply or in transmitter. Fuse failure is caused by improper tuning procedure, or by defective high voltage filter capacitors 1120, 1163, 1105. Check keying relay 1165, be sure contacts are not burned away. Check resistor 1115 for open. Check for defective plate current meter.

SYMPTOM 4. No filament voltage. Cording properly connected.
DIAGNOSIS. Open fuse or breaker in power supply. Short in power cord. Open power cord. TONE C. W. VOICE switch defective. Filament resistor 1138 defective.

SYMPTOM 5. Filament voltage normal on C.W., high on TONE and VOICE.
DIAGNOSIS. Modulator tubes burned out. Filament resistor connection board connected improperly.

SYMPTOM 6. Total plate current 150 milliamperes on continuous wave operation at resonance of control C. Control D set at 1. Antenna circuit detuned. TOTAL PL. CURRENT meter dips sharply at resonance of control C. Resonance setting of C is off calibration chart figures. Filament voltage and other checks are normal.
DIAGNOSIS. Power amplifier probably requires neutralization. To check, replace transmitter tuning unit with one for another frequency band and tune up M.O. and P.A. controls at a point near middle of frequency band covered by tuning unit. If operation is normal with the second tuning unit, replace first unit and neutralize.

LOCATING TROUBLE

SYMPTOM 7. Total plate current high on continuous wave operation at all settings of control D. Low radio frequency output on ANT. CURRENT meter. Plate current dip at resonance of control C is very small. P.A. tube checks perfect. Condition exists with all transmitter tuning units supplied with set.
DIAGNOSIS. M.O. tube is oscillating weakly, indicating worn out tube or trouble in master oscillator circuit. Check tube by replacement. If trouble continues, make resistance check of tube socket 1101 with power turned off. See resistance values in page 1.

SYMPTOM 8. Tuning of control C normal. No radio frequency current indication on ANT. CURRENT meter. Transmitter inoperative by report from another station. Antenna correctly installed. Antenna switch N set at 1. Control D on any position. Operating frequency is above 3,000 kilocycles. Plate current about 110 milliamperes.
DIAGNOSIS. Check for burned out ANT. CURRENT ammeter 1166 and disconnected antenna or counterpoise. If meter is operative try working with control N on 2 or 3. With N on 1 at frequencies above 2,700 kilocycles the ANT. CURRENT meter can be easily burned out by high current surges if the antenna or counterpoise is disconnected from the transmitter. Always be sure that antenna system is properly connected.

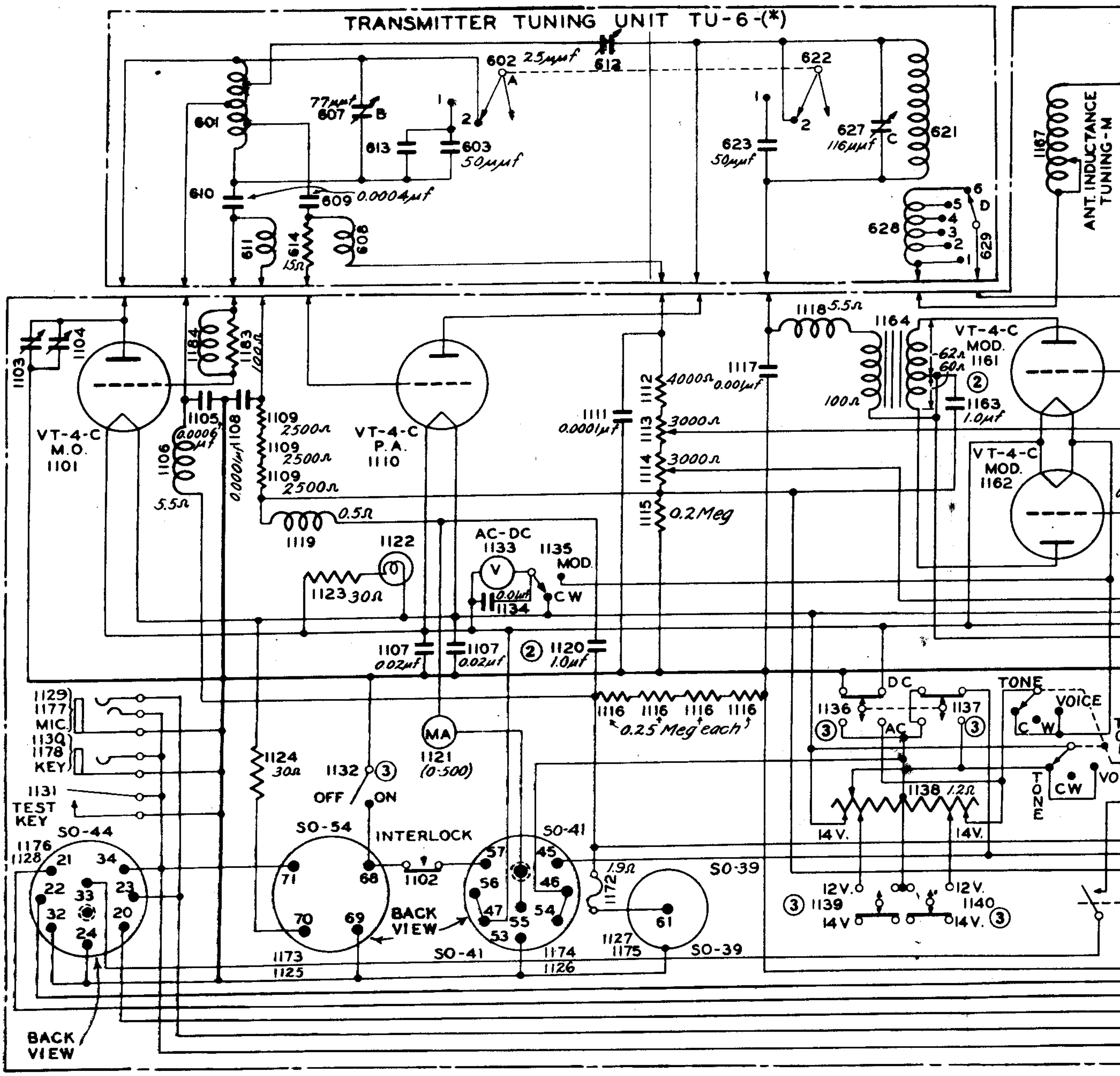
SYMPTOM 9. Badly distorted signals on voice. Interference on adjacent channels reported when transmitting on tone.
DIAGNOSIS. Improper modulator or speech amplifier grid bias adjustment, or defective modulator tubes. Bad P.A. tube will cause modulator and speech amplifier bias to be of improper value. Check resistance of resistors 1112, 1113, and 1114.

SYMPTOM 10. No modulation on voice. Modulation satisfactory on tone. Plate current normal on tone.
DIAGNOSIS. Check INPUT LEVEL adjustment. If correct, check microphone, cord, and plug by replacement. Remove high voltage by disconnecting cord and Plug PL-59. Place high resistance a-c voltmeter of test set across terminals 3 and 4 of transformer 1149 with tube filaments on. Speak into microphone, with microphone push button switch closed. On loud speech a reading of 1 or 2 volts is normal. Check microphone d-c voltage with d-c voltmeter between terminal 2 of transformer 1149 and transmitter frame. 4.5 to 5.3 volts (microphone plugged in) is normal.

COMMON FAULTS

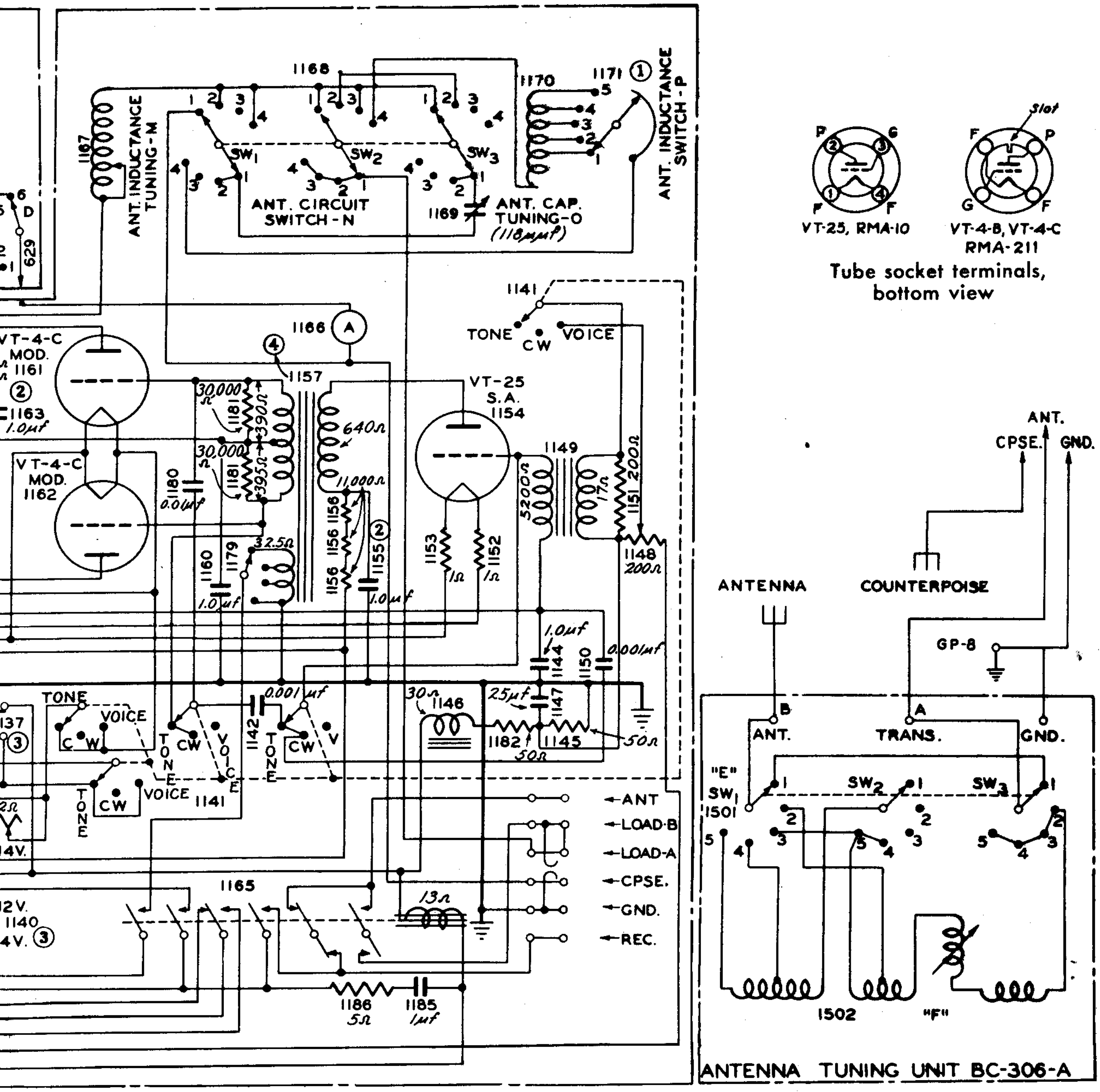
1. Biasing resistor, indicated as 1115 in schematic diagram, burns out. Very high plate current meter reading is a symptom, and an immediate check on this resistor should be made when this symptom occurs.
2. Bypass capacitor 1120 (1.0 μf, 1,200 v, d-c) becomes shorted. It is a filtering capacitor in the high voltage circuit. Off-scale plate current meter deflection should immediately result in a check of this capacitor.
3. In early models, the keying relay may give trouble due to burning away of contacts. No signals. when keying, is the symptom.

SCHEMATIC



① On BC-191-D, E, F and N, Switch 1171 is replaced by 1198.
② On BC-191-E, F and N, Capacitors 1120, 1155 and 1163 are replaced by 3-Section Capacitor 1197a,b,c.
③ On BC-191-C, D, E, F and N, Switch 1132 is replaced by 1194; 1136-1137 by 1195; 1139-1140 by 1190.
④ On BC-191-F, Transformer 1157 is replaced by 1199.

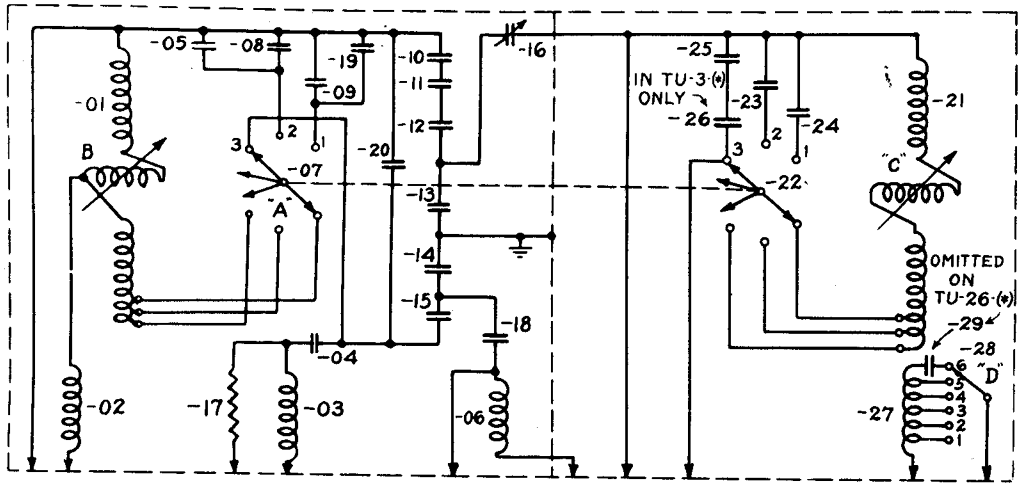
SCHEMATIC



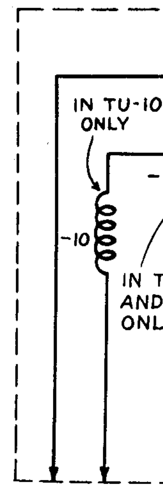
or 1197 a,b,c.
0 by 1190.

SAFETY NOTICE

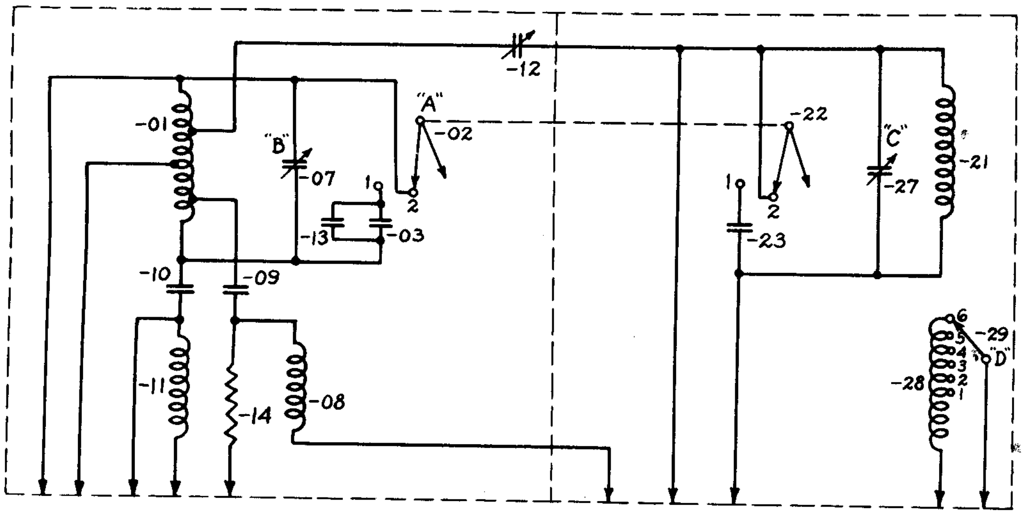
Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.



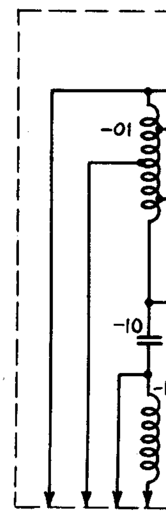
WIRING OF TU-3-(*), TU-22-(*), AND TU-26-(*)



WIRING OF



WIRING OF TU-6-(*)



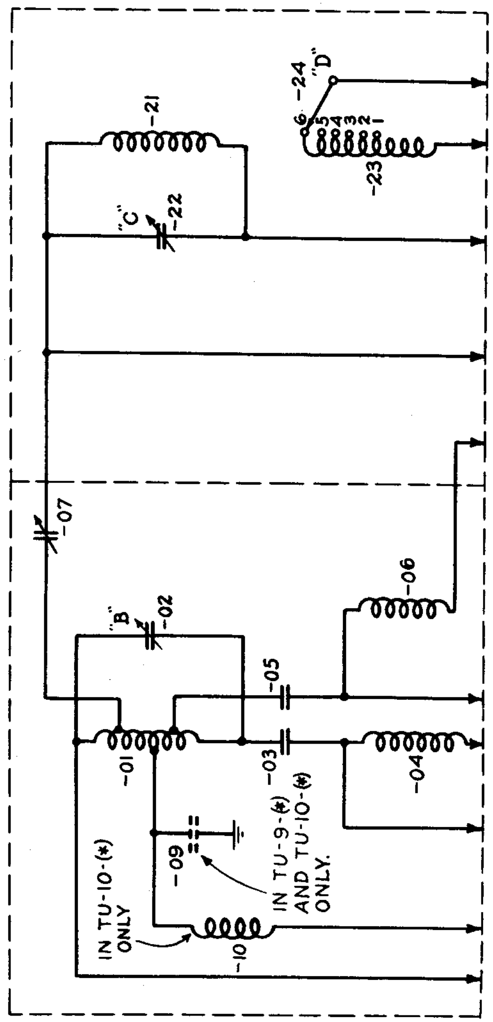
Reference No.	Description
301,2201,2601	Variometer
501,601,701, 801,901,1001	R.f. inductance
302,1010,2202,2602	R.f. choke
502,602	Rotary switch
702,802,902,1002	Variable capacitor
303,511,611,2203,2603	R.f. choke
603,623	.00005 μf, 3000V.
703,705,803,805, 903,905,1003,1005	.0004 μf, 5000V.
704,804,904,1004	R.f. choke
305,2205,2605	Capacitor
506	.00003 μf, 2000V.
307,2207,2607	3 pos. switch
507	20-135 $\mu\mu$f
607	15-77 $\mu\mu$f
707,807,907,1007	8-26 $\mu\mu$f
308,503,504,505, 2208,2223,2623	.0001 μf, 3000V.

TUNING UNIT PART VALUES

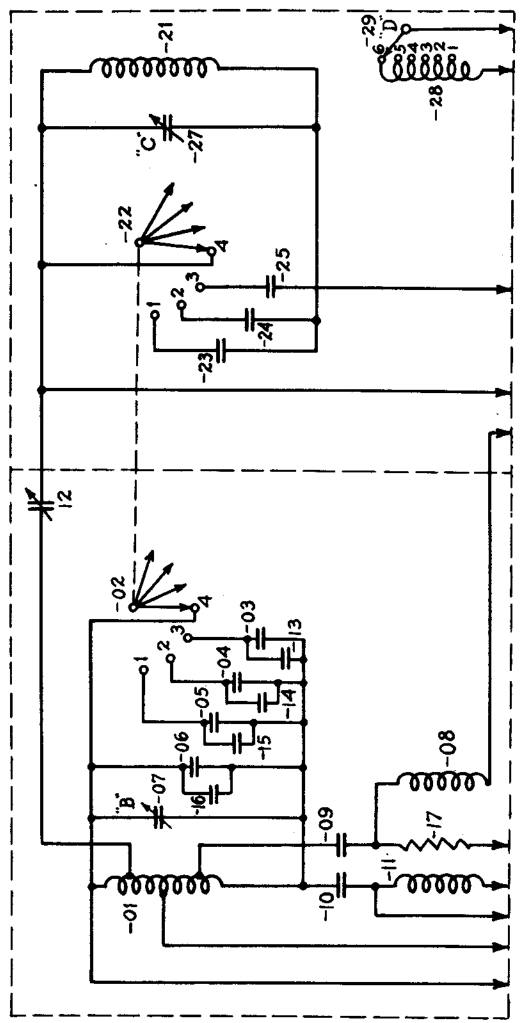
306,508,608,706,806, 906,1006,2206,2606	R.f. cho
309,324,2209,2609, 2224,2624	.0002 μf
509,510,609,610, 909,1009	.0004 μf
311,2210, 2211,2610,2611	.003 μf,
310,312,315	.005 μf,
2212,2612,2215,2615	.0035 μf,
316,512,612,2216,2616	8-26 $\mu\mu$f
304,313,314,318, 329,2204,2218,2229, 2604,2618,2629	.002 μf,
2213,2214,2613,2614	.0024 μf,
513,514,515,516	Thermal c
317,517,2217,2617	15 ohm, 4

TUNING UNITS

FOR COMPLETE REF. NUMBER IN ANY OF TUNING UNITS BELOW, SUBSTITUTE NUMBER FOR DASH PRECEDING NUMBER INDICATED FOR A GIVEN PART. FOR EXAMPLE, PART-17" WOULD BE "317" FOR TU-3-(*) AND "2217" FOR TU-22-(*)



WIRING OF TU-7-(*), TU-8-(*), TU-9-(*), AND TU-10-(*)



WIRING OF TU-5-(*)

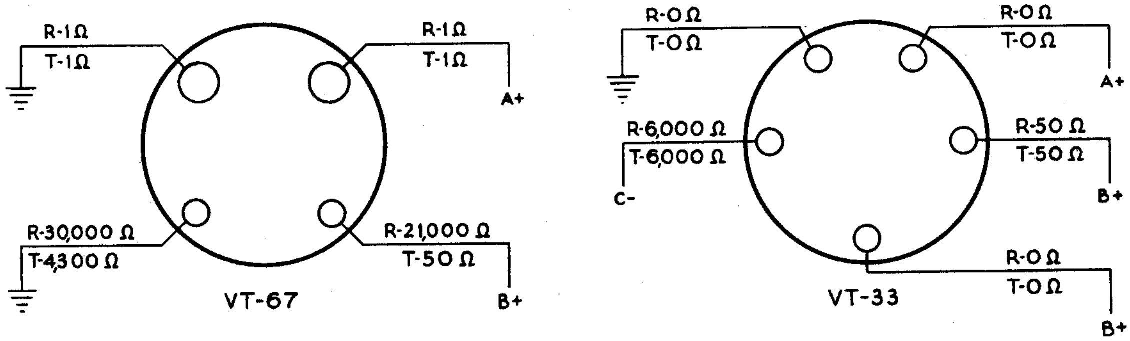
PART VALUES	319,320,2219, 2220,2619,2620	Thermal compensator
	321,2221,2621	Variometer
R.f. choke	521,621,721, 821,921,1021	R.f. coil
.0002 μf, 3000V.	322,622,2222,2622	Switch
	522	4 pos. switch (ganged to 502)
.0004 μf, 5000V.		
.003 μf, 5000V.	627,722,922,1022	19-116 $\mu\mu f$
	822	15-81 $\mu\mu f$
.005 μf, 5000V.	323	.0001 μf, 3000V.
.0035 μf, 5000V.	523,524,525	.00009 μf, 3000V.
8-26 $\mu\mu f$	327,528,628,723,823, 923,1023,2227,2627	Coil
.002 μf, 5000V.	328,529,629,724,824, 924,1024,2228,2628	6 pos. rotary
.0024 μf, 5000V.	325,326	.001 μf, 3000V.
Thermal compensator	2225,2625	.0008 μf, 3000V.
15 ohm, 4.5 watts	527	20-156 $\mu\mu f$

RADIO RECEIVER & TRANSMITTER BC-222

Part of: SCR-194

Reference: TM 11-238

RESISTANCE MEASUREMENTS



NOTE:
RESISTANCES WITH PREFIX "R" MEASURED IN RECEIVE POSITION.
RESISTANCES WITH PREFIX "T" MEASURED IN TRANSMIT POSITION.
MEASUREMENTS, EXCEPT TO GROUND, MADE FROM POINT SHOWN TO PINS ON P_1, TUBES AND BATTERY REMOVED AND FILAMENT RHEOSTAT ON FULL.
BOTTOM VIEW OF SOCKETS.

VOLTAGE AND CURRENT MEASUREMENTS

The following values (approximate) of current and voltage for operating conditions are normal for the BC-222.

Receiver plate current	21.5 ma	Microphone current	35-60 ma
Transmitter plate current modulated	45 ma	Plate volts (at P_1)	135
Transmitter plate current unmodulated	35 ma		
Relay current	18.5 ma		

A variation of plus or minus 10 percent is permissible.

ADJUSTMENTS

Turn ON-OFF sw and CALIBRATOR sw to ON. Turn the tuning control back and forth over one of the red lines on the dial. As the control passes the line, there should be a marked decrease in the rushing sound in the earpiece of the handset. If this "null point" occurs at the red line, the calibration is correct. If it does not coincide exactly, adjust the CALIBRATOR until it does. Use red line nearest upper range of dial and one section of antenna for this adjustment.

LOCATING TROUBLE

Check battery under load after several minutes operation and replace if any section drops below minimum which follows:

MIC - 3.6V, A - 2.0V, B - 115V, and C - 10.8V.

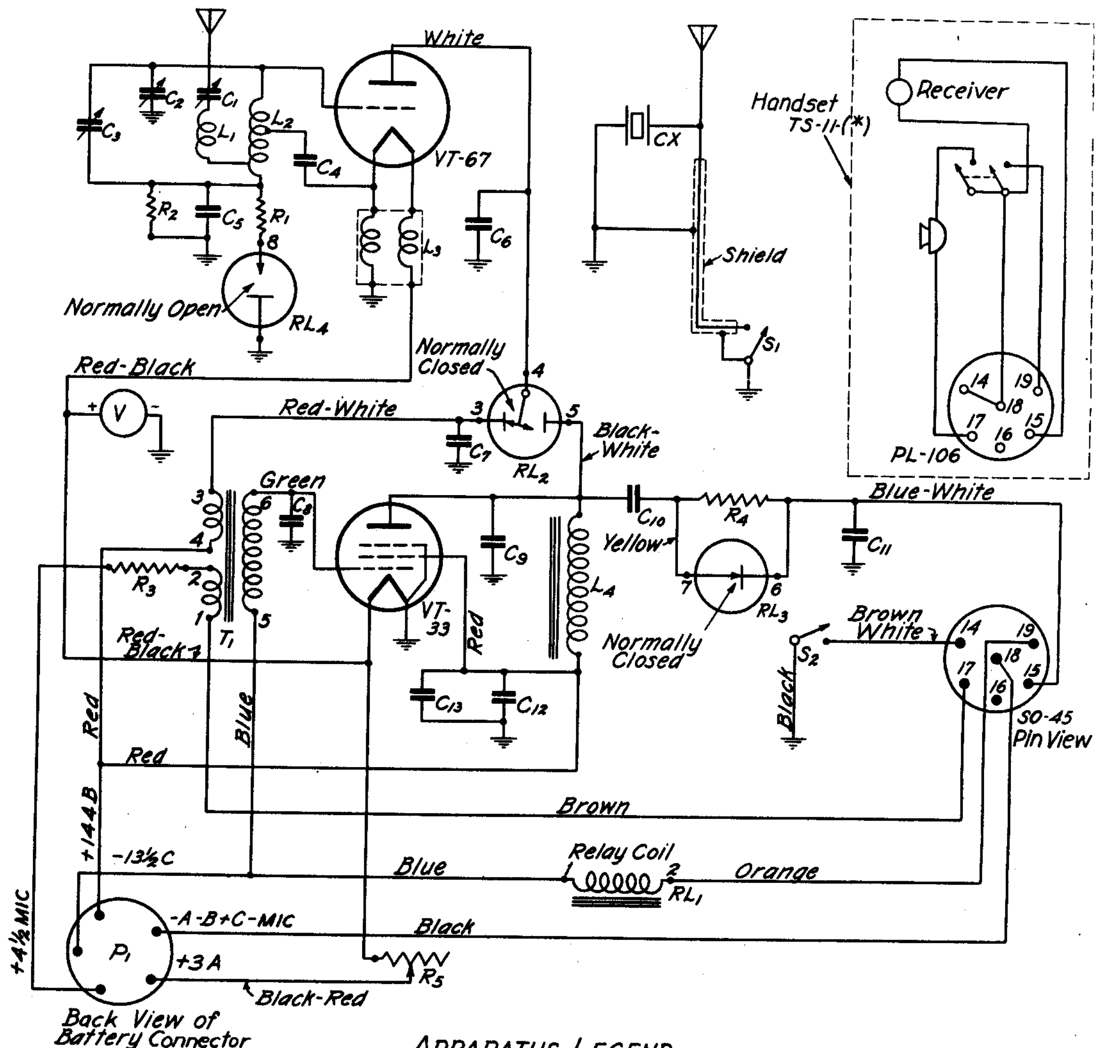
If BA-32 is not available the following batteries may be substituted by connecting them to the set through Box BX-13. NOTE: To use this box without connecting meters, connect a jumper wire between each pair of binding posts marked MICRO CUR, RELAY CUR, and PLATE CUR. Do not use a jumper between binding posts marked PLATE VOLTS.

Circuit	Normal open circuit voltage	Suggested substitute battery
A (filament)	3	2 BA-17 or BA-23
B (plate)	144	6 BA-8
C (grid)	13.5	3 BA-27
MIC (microphone)	4.5	1 BA-27

Inspect and clean set, and test tubes regularly. The efficiency of the antenna is likely to become impaired by corrosion in the joints of the sections. Disassemble the antenna and clean the sections inside and outside with fine steel wool. Do not use oil.

RESTRICTED

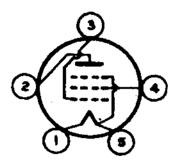
SCHEMATIC



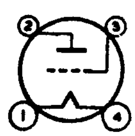
APPARATUS LEGEND

C_1 - Capacitor - 10 μμf
C_2 - Capacitor, Trimmer
C_3 - Capacitor - 5-21 μμf
C_4 - Capacitor - 50 μμf
C_5 - Capacitor - 0.001 μf
C_6 - Capacitor - 0.003 μf
C_7 - Capacitor - 0.002 μf
C_8 - Capacitor - 250 μμf
C_9 - Capacitor - 0.001 μf
C_{10} - Capacitor - 0.001 μf
C_{11} - Capacitor - 0.01 μf
C_{12} - Capacitor - 0.5 μf
C_{13} - Capacitor - 0.5 μf
CX - Crystal
L_1)- Coil, Tuning
L_2)

L_3 - Coil, Filament Choke
L_4 - Coil
P_1 - Plug, Battery
R_1 - Resistor - 5,000 ohms
R_2 - Resistor - 30,000 ohms
R_3 - Resistor - 40 ohms
R_4 - Resistor - 200,000 ohms
R_5 - Rheostat - 10 ohms
RL_1 - RL_2 - RL_3 - RL_4 - Relay BK-10
S_1 - Switch
S_2 - Switch
SO - Socket
T_1 - Transformer
V - Voltmeter



VT-33
RMA TYPE 33



VT-67
RMA TYPE 30

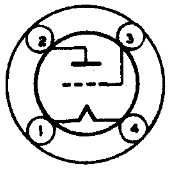
RADIO TRANSMITTER BC-223-(*)

BC-223-(*) = BC-223, 223-A, 223-AX

Part of: SCR-245-(*)

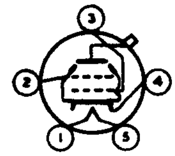
VOLTAGE AND CURRENT MEASUREMENTS

Reference: TM 11-272



VT-62
(RMA TYPE-801)

The following tables give Voltage and Current readings for Radio Transmitters BC-223, BC-223-A, and BC-233-AX. Current readings are taken from the PLATE CURRENT meter for c-w and voice operation (no modulation). Voltage measurements are made on voice operation (no mod.), at the points indicated under VOLTAGE MEASUREMENTS. A 1000 ohm/volt voltmeter is used for all voltage measurements.



VT-63
(RMA TYPE-46)

VOLTAGE MEASUREMENTS (VOICE, NO MOD.)

Oscillator	Power Amp.	A-F Amp.	1st Modulator	2d Modulator	Supply
2(+) and 15(-) of tuning unit terminal strip.	14(+) and 15(-) of tuning unit terminal strip.	6(+) of transformer 29 (C-224) and ground.	4(+) of transformer 28 (C-223) and ground.	1(+) of transformer 28 (C-223) and ground.	Voltage*
275	385	255	400	400	400
305	435	285	450	450	450
340	480	320	500	500	500
375	530	340	550	550	550

* In BC-223, the high voltage is measured at terminals 33 and 20 of transmitter power connection panel. In BC-223-A, or 223-AX, the high voltage is measured between terminal 2 (pos.) of transformer 28 and terminal 53 (neg.) of SO-79.

CURRENT (MILLIAMPERES)

When high Voltage Supply is	CW (Key Depressed)			Voice	
	Oscillator	Power Amp.*	Total Plate	Oscillator	Total Plate
400	35	60	95	35	138
450	40	70	110	40	145
500	48	72	120	48	165
550	50	85	135	50	185

* Total plate current minus Osc. current = Power Amp. current.

LOCATING TROUBLE

The following causes of trouble may be present in the event that the transmitter fails to function properly:

NO FILAMENT VOLTAGE, check for:

1. Defective TONE-VOICE-CW switch.
2. Broken or unsoldered connections from terminal strip in BC-223 or connector in BC-223-A or BC-223-AX.

NO PLATE VOLTAGE, check for:

1. Defective dynamotor. If Vibrator Pack PE-125-AX is used, check fuses, tubes, vibrators, etc. for possible defect. See further service notes under PE-125-AX, for possible source of trouble.
2. Loose or unsoldered connection in transmitter.
3. Open PLATE CURRENT meter (39), if no plate voltage reading is obtained between chassis and some high voltage positive terminal.
4. Shorted 0.01 μf bypass capacitor (12-1) connecting from terminal 2 to ground.
5. Shorted 0.5 μf Pyranol bypass capacitors (14-4, 14-1) connecting from ground to terminals 2 and 3 of transformer (28).

NO R-F OUTPUT, check for:

1. Damaged master oscillator or power amplifier tubes.
2. Defective TONE-VOICE-CW switch.
3. Inoperative keying relay.
4. Open 3,500-and/or 11,500-ohm biasing resistors (20, 21) in power amplifier return circuit.
5. Damaged antenna ammeter (38).

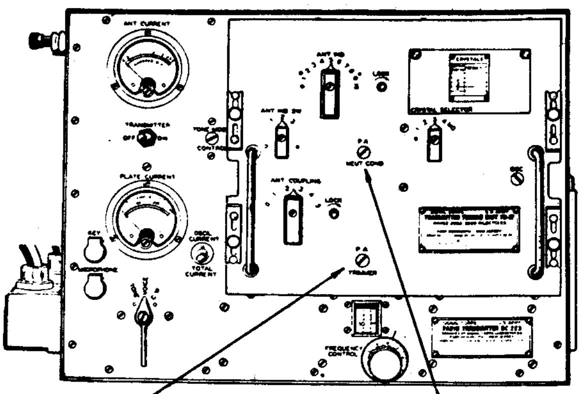
NO MODULATION, check for:

1. Damaged audio amplifier or modulator tubes.
2. Inoperative interrupter BZ-7.
3. Poor microphone.
4. Damaged input or output modulation transformers (28, 29).
5. Improper or excessive bias in modulator stages. Check all resistors and bypass capacitors in these stages.

NEUTRALIZATION

EQUIPMENT NECESSARY. The following auxiliary apparatus must be used to properly adjust the BC-223 series of transmitters:

1. One Frequency Meter Set SCR-211.
2. One r-f milliammeter, 0-100 full scale.
3. One a-c voltmeter, 1 or 2 volts full scale-1,000 ohms/volt.



NEUTRALIZATION. When necessary, neutralization can be checked and readjusted by the following procedure:

1. For Transmitter Tuning Units TU-17, TU-17-A, set transmitter FREQUENCY CONTROL for 3,000 kc; for Tuning Units TU-18, TU-18-A, and TU-18-B, set for 4,500 kc; for Tuning Unit TU-25-A, set for 5,250 kc.
2. Place the TONE-VOICE-C.W. switch on C.W.
3. Place the TRANSMITTER OFF-ON switch to ON and tune the antenna circuit for maximum r-f current into the vehicular antenna, or a dummy antenna, if available. A satisfactory dummy or phantom antenna can be made of a 100 $\mu\mu$f fixed mica capacitor (5,000 volt rating) connected across the ANT. and GND. terminals of the transmitter.
4. Turn the transmitter OFF and insert a 0-100 r-f milliammeter in series with the antenna.

WARNING: Before again turning the transmitter ON, the plate current switch must be moved up to the OSCIL CURRENT position *and held there*, during the entire time the r-f milliammeter is in the antenna circuit and the transmitter is ON with the key closed. Failure to observe this precaution may result in burning out the r-f milliammeter.

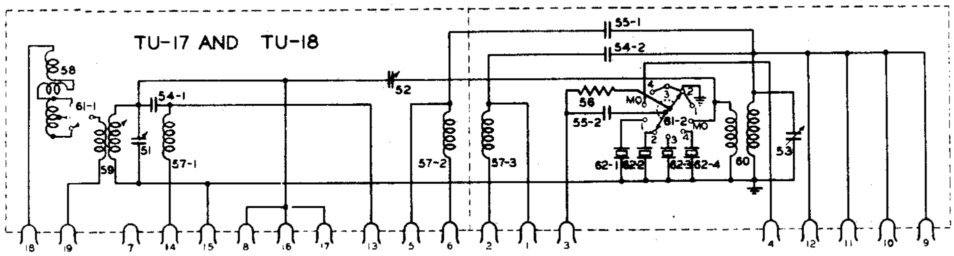
5. With the key up, turn the transmitter ON.
6. Hold the plate-current switch in the OSCIL CURRENT position, and depress the key. If the r-f milliammeter indicates less than a 20 ma antenna current, the power amplifier is properly neutralized. If it reads more than this figure, the panel screw cap, marked P.A. NEUT. COND., should be removed and an insulated-shank screw driver used to adjust this control to give a minimum current on the r-f milliammeter. Retune ANT. IND. through resonance to make sure that no higher reading is obtainable at any other point.
7. If the r-f milliammeter is not available, the self-contained antenna ammeter of the transmitter may be utilized, employing the dummy capacitor of 100 $\mu\mu$f connected across the ANT. and GND. terminals. The antenna circuit is first adjusted to give maximum r-f current, with the plate-current switch in TOTAL CURRENT position. After this is done, follow the procedure outlined in 6 above, with plate-current switch in OSCIL CURRENT position, and P.A. NEUT. COND. adjusted for minimum current on transmitter ANT. CURRENT meter.

CALIBRATION AND ALIGNMENT DATA. If the calibration of the transmitter (M.O. position) is more than 1/10 of one percent inaccurate at the highest frequency to which the transmitter tuning unit will tune -- for example, 3 kc error for the TU-17, 17-A, and 17-B; 4.5 kc error for the TU-18, 18-A, and 18-B; 5.25 kc error for the TU-25-A tuning unit, readjustment of the master oscillator trimmer will be required. Adjustment frequencies for each of the aforementioned tuning units are specified in step 1 of NEUTRALIZATION above. The following procedure for calibration correction will be followed:

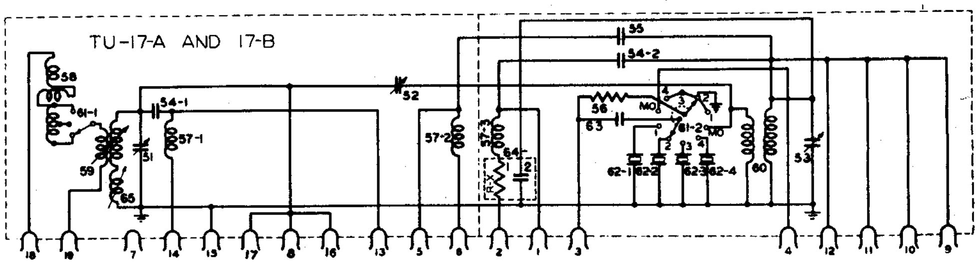
1. Prior to making adjustments warm up the transmitter for at least 10 minutes, with the antenna tuned for rated output.
2. Set the frequency meter (SCR-211) to 3,000, 4,500, or 5,250 kc, according to the tuning unit installed in the transmitter. Place the FREQUENCY CONTROL of the transmitter so that the dial indicates the above frequency for the corresponding tuning unit. Couple the Frequency Meter by placing in close proximity to the transmitter, so that a heterodyne note is heard in the phones.
3. Adjust the OSC. TRIMMER with a screw driver (remove panel screw cap) until the transmitter zero beats with the frequency meter.

TRACKING ADJUSTMENT. The tracking of the power amplifier is checked by placing the transmitter in operation on C.W. with the antenna disconnected. Close the key and observe the plate current meter as the FREQUENCY CONTROL knob is rotated through the calibrated range. The power amplifier is tracking satisfactorily if plate current does not vary more than 10 ma. If the plate current variation is greater than 10 ma, the FREQUENCY CONTROL should be set to 3,000, 4,500, or 5,250 kc, depending upon the transmitter tuning unit in use, and the P.A. TRIMMER adjusted to give minimum plate current. Recheck the tracking as above. The plate current during these tests will normally be between 60 and 70 ma.

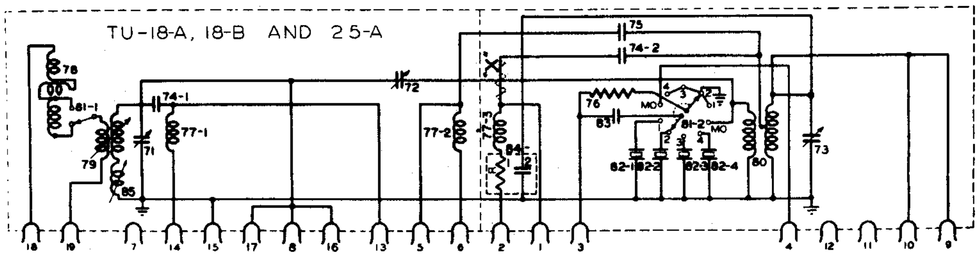
TUNING UNITS



11 AND 12 TERMINALS ARE BLANK IN TU-18



RESISTOR R-X IS OMITTED IN TU-17-A



THE R-F SUPPRESSOR RESISTOR "R" IS AT POSITION "X" IN TU-25-A

PARTS LEGEND

TU-17, TU-17-A, TU-17-B, Ref. No.	TU-18-A and TU-18-B Ref. No.	TU-25-A Ref. No.	Description
51	71	91	35 $\mu\mu$f capacitor
52	72	92	50 $\mu\mu$f capacitor
53	73		200 $\mu\mu$f capacitor
		93	100 $\mu\mu$f capacitor
54	74	94	0.01 μf capacitor
55	75	95	0.002 μf capacitor
56	76	96	25000 ohm resistor
57	77	97	R-f choke
58	78	98	Variometer
59	79	99	Variocoupler
60	80	100	Osc. Inductance
61	81	101	Switch
62	82	102	Crystal Holder & Crystals

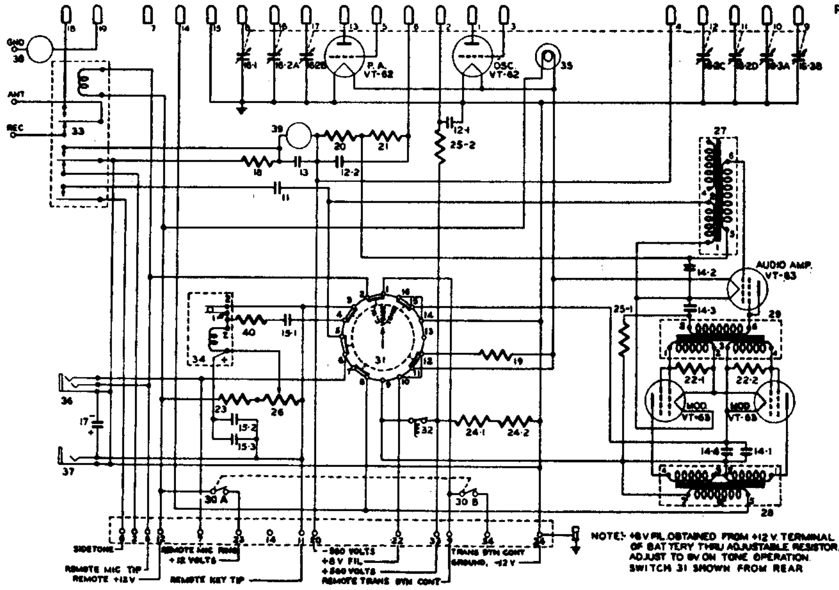
TUNING UNIT DATA

Clean off all traces of corrosion, on plug-in contacts, to ensure good electrical contact and high operating efficiency. This procedure should also be followed in regards to the plug-in tip jacks, in the transmitter tuning unit compartment, which holds the tuning unit.

CAUTION: *The serial numbers of transmitter and tuning units must be identical. Do not release tuning units, after servicing, without observing this precaution.*

SCHEMATIC

RADIO TRANSMITTER BC-223



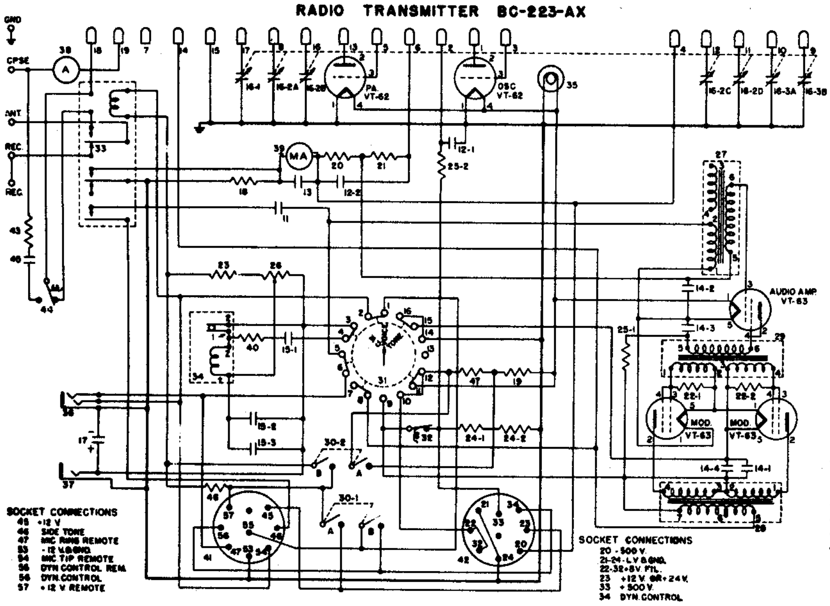
APPARATUS LEGEND

PART	TYPE			QUAN.
11	CA-177A	CAPACITOR	.5MF.	(1)
12	CA-183	CAPACITOR	.01 MF.	(2)
13	CA-211	CAPACITOR	.002 MF.	(1)
14	CA-321	CAPACITOR	.5MF. 1000V.	(4)
15	CA-322	CAPACITOR	1.0 MF.	(3)
16	CA-325	CAPACITOR	-1 1X80MMF. -2 4X100MMF. -3 2X200MMF.	(1)
17	CA-337	CAPACITOR	16 MF.	(1)
18	RS-137	RESISTOR	25000 OHMS	(1)
19	RS-202	RESISTOR	.75 OHMS	(1)
20	RS-204	RESISTOR	3500 OHMS	(1)
21	RS-205	RESISTOR	11500 OHMS	(1)
22	RS-206	RESISTOR	1000 OHMS	(2)
23	RS-212	RESISTOR	100 OHMS 1W	(1)
24	RS-208	RESISTOR	100000 OHMS	(2)
25	RS-70	RESISTOR	5000 OHMS	(2)
26	RS-152	POTENTIOMETER	0-100 OHMS	(1)
27	C-159	TRANSFORMER (INPUT)		(1)
28	C-223	TRANSFORMER (OUTPUT)		(1)
29	C-224	TRANSFORMER (INTERSTAGE)		(1)
30	SW-116	SWITCH (2 POLE)		(1)
31	SW-132	SWITCH.		(1)
32	SW-133	SWITCH		(1)
33	BK-16	RELAY		(1)
34	BZ-7-( )	INTERRUPTER		(1)
35	LM-33	LAMP		(1)
36	JK-43	JACK		(1)
37	JK-44	JACK		(1)
38	IS-128	AMMETER	0-3 AMPS. R.F.	(1)
39	IS-129	AMMETER	0-300 MA. D.C.	(1)
40	RS-207	RESISTOR	750 OHMS	(1)

Transmitter BC-223-A is the same as above diagrammed for BC-223, except for the use of connectors, instead of a terminal strip, for power supply and control connections. For internal transmitter wiring of the connectors, refer to diagram for the BC-223-AX illustrated below.

SCHEMATIC

RADIO TRANSMITTER BC-223-AX



APPARATUS LEGEND

PART	TYPE	DESCRIPTION		QUAN.
11	CA-243	CAPACITOR	.5 µf	1
12	CA-183	CAPACITOR	.01 µf	2
13	CA-211	CAPACITOR	.002 µf	1
14	CA-321	CAPACITOR	.5 µf 1000 V.	4
15	CA-322	CAPACITOR	1.0 µf	3
16-1	CA-325-B	CAPACITOR	1-80 µµf	1
16-2	"	"	4-100 µµf	
16-3	"	"	2-200 µµf	
17	CA-337	CAPACITOR	16 µf	1
18	RS-137	RESISTOR	25000 OHMS	1
19	RS-202	RESISTOR	.75 OHMS	1
20	RS-204	RESISTOR	3500 OHMS	1
21	RS-205	RESISTOR	11500 OHMS	1
22	RS-206	RESISTOR	1000 OHMS	2
23	RS-212	RESISTOR	100 OHMS 1W	1
24	RS-208	RESISTOR	100000 OHMS	2
25	RS-70	RESISTOR	5000 OHMS	2
26	RS-152	POTENTIOMETER	0-100 OHMS	1
27	C-159	TRANSFORMER (INPUT)		1
28	C-223	TRANSFORMER (OUTPUT)		1
29	C-224	TRANSFORMER (INTERSTAGE)		1
30	SW-116	SWITCH (2 POLE)		2
31	SW-132	SWITCH (REAR VIEW SHOWN)		1
32	SW-133	SWITCH		1
33	BK-16	RELAY		1
34	BZ-7-D	INTERRUPTER		1
35	LM-33	LAMP		1
36	JK-33-A	JACK		1
37	JK-34-A	JACK		1
38	IS-128	AMMETER	0-3 AMPS. R.F.	1
39	IS-129	AMMETER	0-300 MA. D.C.	1
40	RS-207	RESISTOR	750 OHMS	1
41	SO-79	SOCKET (REAR VIEW SHOWN)		1
42	SO-80	SOCKET (REAR VIEW SHOWN)		1
43	RS-261	RESISTOR	6.4 OHMS	1
44	SW-189	SWITCH		1
45	CA-421	CAPACITOR	107 µf 3000 V.	1
46	RS-271	RESISTOR	35 OHMS 10 W.	1
47	RS-273	RESISTOR	2 OHMS 20 W	1

RADIO RECEIVER BC-312-(*) & BC-342-(*)

Part of: SCR-177-B, SCR-188-A, SCR-193-(*), SCR-197-(*), SCR-210-(*), SCR-245-(*), and SCR-299-(*).

MODELS AND DESIGN DIFFERENCES

Reference: TM 11-850

The following is a tabulation of Radio Receivers BC-312-(*) and BC-342-(*) with design changes that have taken place, specified for each. All of the changes listed are chronologically cumulative; for example, *a design change on a given model applies also to all subsequent models.* The BC-342-(*) models are identical to their counterparts in the 312-(*) series (for example, BC-312-J and BC-342-J) except, of course, for the power supply (120 volt, a-c operation for BC-342-(*)), and that *all BC-342-(*) models employ a crystal filter.*

It should be noted that these changes have not affected interchangeability, with the exception of the elimination of the first audio jack. This change affects only certain models of Radio Set SCR-299-(*), in which minor modifications of the cords have been made to eliminate any difficulty.

Model	*Major Design Change*
BC-312, BC-342	Original
BC-312-A	1. Thermostatically controlled heater circuit in oscillator compartment removed. See Fig. 1. 2. Glass inclosed i-f transformers replaced by conventional design. 3. Alternate shielded Antenna Post eliminated. 4. Dynamotor DM-17-A replaced by DM-21-A.
BC-312-B	None procured.
BC-312-C, BC-342-C	1. Tube shelf mounted at an angle. 2. Fast tuning dial assembly modified. 3. Non-shielded antenna binding post added in addition to shielded post.
BC-312-D, BC-342-D BC-312-E BC-312-F, BC-342-F BC-312-G BC-312-J, BC-342-J	1. Antenna noise suppression circuit eliminated.
BC-312-HX (24-volt operation)	1. VT-66 replaced by VT-134. (This change only in BC-312-HX and BC-312-NX, not in models following.) 2. First audio jack eliminated; 3 jacks for second audio. 3. Antenna disabling relay also disables first audio circuit. See schematic diagram.
BC-312-L, BC-342-L BC-312-M BC-312-N, BC-342-N BC-312-NX (24-volt operation)	1. Crystal filter circuit removed (except in BC-342-(*)). 2. Pilot light rheostat added (except in BC-342-(*)). 3. Steel substituted for aluminum in chassis and boxes. 4. Paper and ceramic capacitors substituted for mica. 5. Oscillator compartment heat insulator removed.

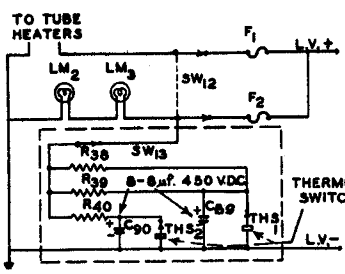


Fig. 1.—Connections for thermostatically controlled heater are in dotted section (in oscillator compartment of BC-312 and BC-342 only).

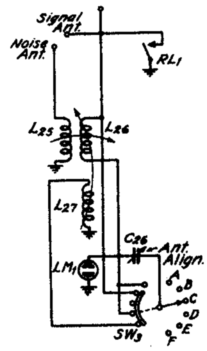


Figure 2.—

Antenna noise suppression circuit, BC-312, BC-312-A, BC-312-C, BC-342, and BC-342-C only.

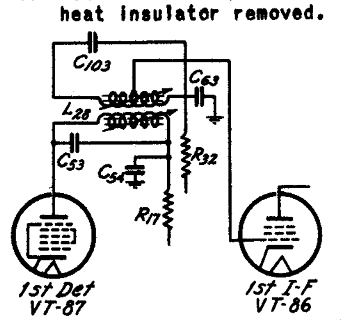
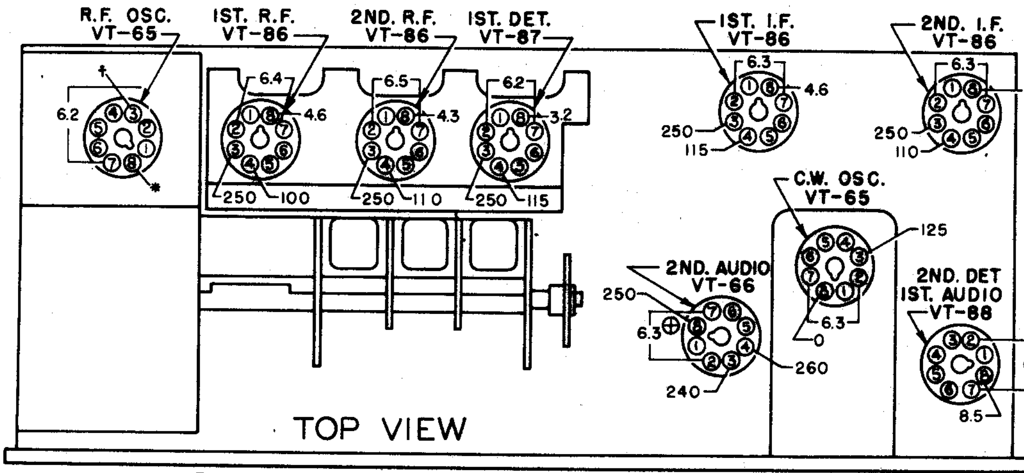


Figure 3.—

Connections from first-detector to first i-f stage, without Crystal Filter. Used in BC-312-L, M, N, and NX only.

RESISTANCE AND VOLTAGE MEASUREMENTS

The following voltages are measured at the tube prongs by means of a 1000 ohm per volt meter. Because of the inaccessibility of socket terminals under the sub-chassis base, it will be necessary to remove the receiver chassis and unhinge and move out the various shielded compartments under the chassis, so that the socket terminals are exposed to view. Measurements shown below are for TOP VIEW of sockets. The readings indicated were obtained under the following conditions: Input battery voltage - 14 volts (BC-312-(*)); 120 volts a-c (BC-342-(*)); OFF-MVC-AVC switch in the MVC position; VOL control on full; C.W.-OSC. ON-OFF switch OFF for all readings except when measuring c-w oscillator stage. A 10 to 15 percent deviation in voltage readings, from that given below, is permissible.



*R.F. OSC. CATHODE TO GROUND
BAND "A" 34 BAND "D" 0
BAND "B" 22 BAND "E" 0
BAND "C" 13 BAND "F" 0

†R.F. OSC. PLATE TO GROUND
BAND "A" 115 BAND "D" 85
BAND "B" 120 BAND "E" 90
BAND "C" 115 BAND "F" 95

Fig. 4. NOTE:- ⊕ INDICATES 12.6 VOLTS FOR HX AND NX MODELS.
ALL VOLTAGES SHOWN ARE TO GROUND FROM THE POINTS INDICATED, EXCEPT HEATER VOLTAGE WHICH IS BETWEEN POINTS INDICATED.
MVC POSITION, VOLUME CONTROL MAXIMUM.

Measurements given in the resistance chart below are made from socket pins designated, to chassis ground. These measurements are for the BC-312-(*) series, and are typical for all models including the BC-342-(*). Conditions for making these measurements are: Remove tubes and *power cord* from receiver; set BAND CHANGE switch to band A; set SEND REC switch on REC; set OFF-MVC-AVC to MVC (only last column under "Control grid cap" is taken with switch in AVC position), set C.W.-OSC. OFF ON switch to ON, and VOL control to maximum, and then minimum positions, to obtain readings under both conditions as indicated under Pin 8. "X" in chart spaces indicates "do not measure". A deviation of 10% from measurements given is permissible. Readings are in ohms. M = 1000 ohms.

Stage	VT	Plate Pin 3	Pin 4	Pin 5	Pin 8** VOL Max.	Pin 8** VOL Min.	Control grid cap MVC	Control grid cap AVC
1st R-f	86	18M	32M	500	500	35M	2.4 meg.	3.3 meg.
2d R-f	86	18M	30M	520	520	35M	2.4 meg.	3.3 meg.
1st Det	87	18M	22M	50M	340	340	2.4 meg.	3.3 meg.
R-f Osc	65	50M	X	40M	8M	7.5M	40M	40M
1st I-f	86	18M	30M	520	520	35M	350M	1.6 meg.
2d I-f	86	18M	30M	520	520	520	350M	1.6 meg.
2d Det	88	17.5M	1 meg.	0	700	700	240M	240M
A-f	66	17.5M	16M	50M	950	950	X	X
C-w Osc	65	120M	6	200M	5	5	X	X

**NOTE: With VOL control at max. position - switch should be in AVC position; when VOL control is at min. position switch should be in MVC position.

ALIGNMENT

ALIGNMENT EQUIPMENT

The following apparatus is required for satisfactory alignment of Radio Receivers BC-312-(*) and BC-342-(*).

a. Signal Generator I-72-(*) or equivalent (check accuracy of signal generator against Frequency Meter Set SCR-211-(*)).
b. Output meter.
c. Headset or loudspeaker.
d. Dummy antennas: 50 or 100 $\mu\mu$f capacitor for r-f alignment above 1500 kilocycles, 250 $\mu\mu$f for alignment below 1500 kilocycles, 300 ohm ½ or 1 watt resistor for i-f alignment.
e. Insulated alignment tools.

PROCEDURE

Turn ON signal generator power switch. Turn receiver power ON. Leave power ON both units for approximately 30 minutes to permit warming up to insure frequency stability. On the receiver, turn the OFF-MVC-AVC knob to MVC; the VOL knob to maximum; the CRYSTAL PHASING knob to OUT; the C.W.-OSC. switch to OFF; SEND-REC switch to REC. The positions of the remaining controls will depend upon the alignment frequency to be employed, but is unimportant for i-f alignment which is to be the first step.

I-F ALIGNMENT

1. Clip the dummy antenna from the signal generator (see fig. 5) to the grid cap of the 1st detector tube without removing the clip now on it.
2. Set output meter initially to the 150-volt scale. Connect the meter to the PHONES 2D AUDIO jack.
3. Set output controls of the signal generator to about mid-position.
4. Loosen lock nuts on i-f transformer screws.
5. Set signal generator to 470 kc, and *using a modulated signal*, begin adjustments on the 2d i-f transformer, then the 1st i-f transformer, and finally the 1st detector transformer. Adjust both aligning screws on each transformer for peak output as indicated by the output meter. *Use the lowest signal generator output* that will produce an appreciable reading on the output meter, switching to progressively lower scales on output meter as the generator output is reduced.

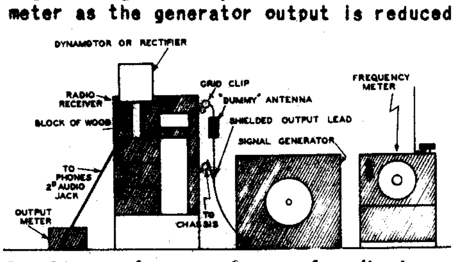


Fig. 5.—Set up of test equipment for aligning, using output meter. Frequency Meter SCR-211-(*) is used to check accuracy of calibration of signal generator.

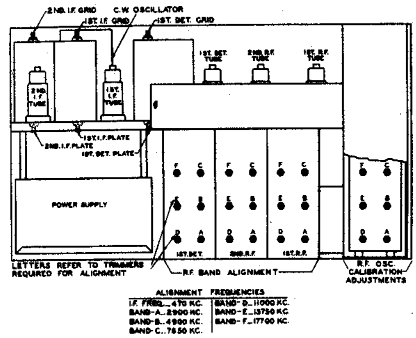


Fig. 6.—Location of adjusting trimmers, and aligning frequencies.

6. Tighten locking nuts on adjusting screws, taking care not to disturb the position of screws themselves.

R-F OSCILLATOR ALIGNMENT

1. Remove the plugs on the back of the oscillator (see fig. 6), and loosen all the r-f oscillator lock nuts.
2. Turn receiver BAND CHANGE knob to the band A position. Set receiver dial to 2900 kc.
3. Connect the generator's output or "hot" lead through a 50 or 100 $\mu\mu$f capacitor to the grid cap of the 1st detector tube. Do not remove grid clip on tube. Be sure ground lead is still connected to the receiver chassis. Leave output meter connected as for i-f alignment.
4. Set signal generator dial for 2900 kc (see fig. 6 for aligning frequencies) and use a modulated signal for alignment.
5. Adjust band A oscillator trimmer for maximum output, rocking the tuning dial a bit at the same time to make certain that the circuit is responding to the 2900 kc signal. When adjusting, it will be found that two settings of the trimmer will produce identical peaking. One is the image frequency, the other the desired frequency. To avoid a setting at the image frequency, carefully observe the position of the red dot on the trimmer screw. With the receiver in a normal upright position, when the adjusting screw center line is in a horizontal plane, the stator plates are located below the center line, and the position of the red dot above the line indicates that the rotor plates are meshed. *On bands A, B, and C, the position of the red dot, when peaking for the desired frequency, should be at the second peaking point obtained as the screw is slowly rotated from complete mesh.* For bands D, E, and F, the red dot should be at the *first peaking point* obtained, for the desired frequency, as the screw is slowly rotated from complete mesh.
6. Tighten all lock nuts.

ALIGNMENT OF RADIO-FREQUENCY STAGES

1. Remove shield plate on the back of the receiver covering the r-f trimmers, loosen r-f band-adjusting screw lock nuts.

ALIGNMENT (cont'd)

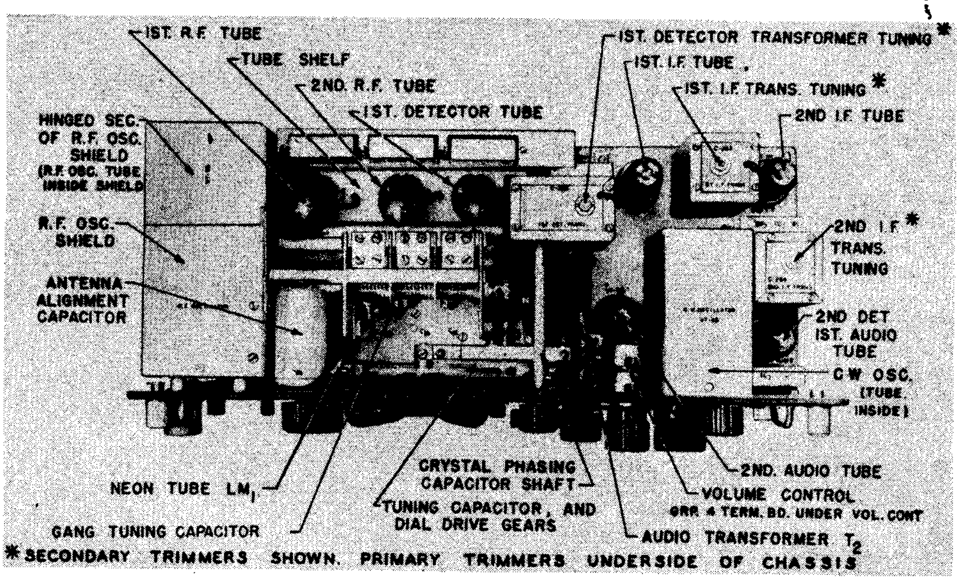


Fig. 7.—Top view illustrating locations of i-f transformer trimmers and parts location. Additional i-f trimmers will be found below chassis.

2. Connect the signal generator output or "hot" lead to the ALT SIG ANT post.
3. Set the ALIGN INPUT knob to mid position.
4. Using the alignment frequencies of figure 6, adjust the trimmers for each band for peak output in sequence from the Ist detector stage to the Ist r-f stage. Use lowest signal generator output possible. When working on trimmers of one band, do not touch trimmers of other bands. Be sure to change BAND CHANGE switch, signal generator frequency, and receiver tuning dial band when changing from one band to the next.
5. Tighten lock nuts of adjusting screws.

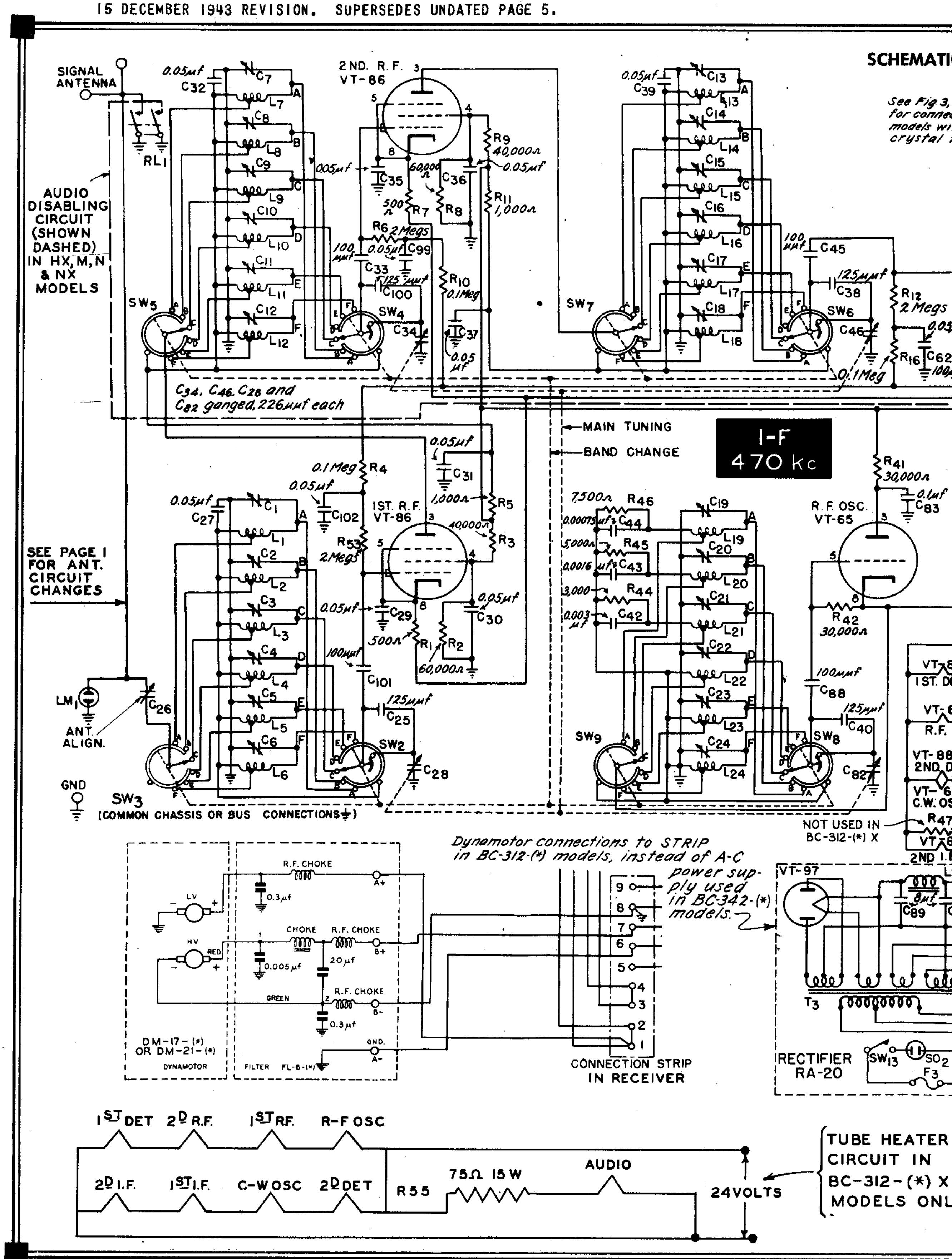
ADJUSTMENT OF C-W OSCILLATOR

1. Turn C.W.-OSC. switch ON.
2. Connect signal generator "hot" lead to grid of Ist detector as in previous steps, *with modulation "off"*.
3. Set generator for 470 kc.
4. Turn C.W. ADJUST knob so that arrow is in vertical position.
5. Unscrew plug above oscillator switch; behind it is the beat oscillator trimmer screw. Adjust this for zero beat. Turn the receiver tuning knob to make sure that no incoming signals are interfering with the adjustment.
6. Turn C.W. OSC. switch OFF, replace plug over trimmer screw.

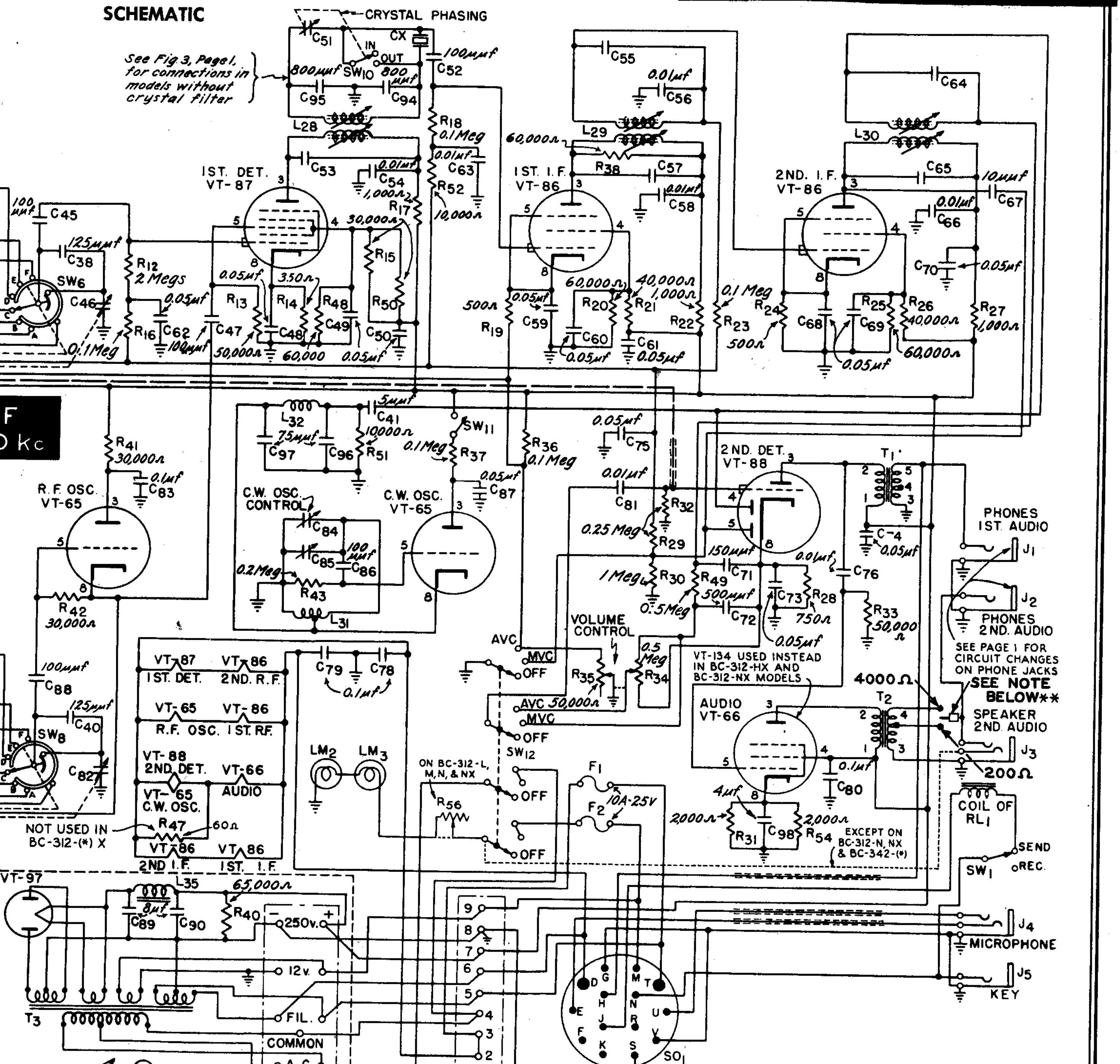
CHECKING AND ALIGNING CRYSTAL FILTER CIRCUIT

When all previously described alignment adjustments have been made, the crystal filter circuit may then be checked in the following manner:

1. Turn CRYSTAL PHASING control from OUT position and adjust for *minimum* background noise. Make sure receiver CW oscillator is OFF.
2. Set signal generator for an unmodulated r-f signal.
3. Turn the tuning dial of the receiver back and forth across the frequency for which the signal generator is set. A musical chirp should be heard in the headset or loudspeaker. This indicates that the quartz crystal is being excited by the varying i-f signal produced by the above tuning operation. The effect will be more pronounced for one direction of tuning.
4. To align the crystal filter circuit, refer back to directions given for i-f alignment. In this instance turn CRYSTAL PHASING knob from OUT position and set for *minimum* background noise.
5. Connect signal generator, with modulation "on", through 300 ohm dummy antenna to the grid cap of the Ist detector tube leaving set grid lead connected.
6. Carefully vary the generator frequency above and below 470 kc to bring the output to exact coincidence with the frequency of the crystal. This is indicated by peak reading on the output meter. When the exact peak is obtained, readjust the trimmer of the secondary of the Ist detector i-f transformer for max. on output meter. These adjustments will be critical. (If a signal generator with a modulation frequency of 60 or 100 cycles is available, instead of 400 cycles modulation, better crystal filter alignment can be performed.)
7. Repeat the i-f stages, after the crystal filter has been adjusted, as outlined previously. NOTE: If maximum sensitivity is desired with crystal filter OUT, then align the i-f's with filter OUT. If maximum sensitivity is desired with crystal filter IN, then align i-f transformers with crystal filter in operation.


SCHEMATI
SIGNAL ANTENNA
RL1
AUDIO DISABLING CIRCUIT (SHOWN DASHED) IN HX, M, N & NX MODELS
2ND. R.F. VT-86
See Fig 3, for conne models wi crystal
C34, C46, C28 and C82 ganged, 226μμf each
MAIN TUNING
BAND CHANGE
I-F 470 Kc
1ST. R.F. VT-86
R.F. OSC. VT-65
SEE PAGE I FOR ANT. CIRCUIT CHANGES
LM1
ANT. ALIGN.
GND
SW3 (COMMON CHASSIS OR BUS CONNECTIONS)
NOT USED IN BC-312-(*) X
Dynamotor connections to STRIP in BC-312-(*) models, instead of A-C power supply used in BC-342-(*) models.
DM-17-(*) OR DM-21-(*) DYNAMOTOR
FILTER FL-6-(*)
R.F. CHOKE
CHOKE
CONNECTION STRIP IN RECEIVER
VT-97
RECTIFIER RA-20
1ST DET 2D R.F. 1ST R.F. R-F OSC
2D I.F. 1ST I.F. C-W OSC 2D DET
R55 75Ω 15 W
AUDIO
24VOLTS
TUBE HEATER CIRCUIT IN BC-312-(*) X MODELS ONL

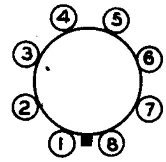
SCHEMATIC



TUBE HEATER CIRCUIT IN BC-312-(*) X MODELS ONLY

NOTE: * *

THIS CHANGE INITIATED IN MIDDLE OF 312-M & N AND 342-N PRODUCTIONS. MODELS WITH THIS CHANGE MAY BE IDENTIFIED BY A REVERSIBLE PLATE UNDER HEAD OF SPEAKER-PHONE 2ND. AUDIO JACK. CHANGING OF OUTPUT IMPEDANCE IS ACCOMPLISHED AT TRANSFORMER T2 BY PIN JACKS ON FARNSWORTH MODELS, AND BY SOLDERED TERMINALS ON RCA MODELS.



TUBE SOCKET TERMINALS, BOTTOM VIEW

LOCATING TROUBLE

THE SERVICE NOTES FOLLOWING ARE APPLICABLE AS WELL TO RADIO RECEIVERS BC-314-(*) AND BC-344-(*). The following possible causes of trouble are suggested in the event that a receiver becomes inoperative. These causes, given for various symptoms, are listed in the order of their probability, and this sequence of examination for trouble should be followed, in order to localize the defect and remedy it as quickly as possible:

Symptom	Cause
No high voltage (D.C.)	Open fuse in panel.
	Open fuse in rectifier.
	Defective (shorted) filter capacitor; check C-89, C-90 (in RA-20), C-80, and C-74.
	Defective rectifier tube (VT-97) in case of BC-342-(*), BC-344-(*).
	Defective dynamotor in BC-312-(*) and 314-(*).
No plate voltage	Shorted by-pass capacitor, check by-pass capacitors in plate return circuit of stage.
	Open resistor; check all resistors in plate return lead of stage.
	Open plate circuit component; in i-f stage, check i-f transformer primary, in r-f stage check coil primary (also band-changing switch for poor contact); in a-f stage check audio transformer primary winding.
No screen voltage.	Check for open screen resistor in particular stage where screen voltage is lacking.
	Check for shorted screen by-pass capacitor in this stage.
No signal at output	Check all tubes.
	Check each stage for plate, screen and cathode bias voltages - compare with measurements given under "Voltage Measurements". Examine band-change switch for possible defect.
	Inspect chassis wiring for unsoldered or loose connections.
	Check primary and secondary windings of T_1 and T_2 for continuity.
	Check capacitor C-81 for possible open circuit.
	Check volume control R-34 for possible open slider contact.

COMMON FAULTS AND CORRECTIVE MEASURES

Inoperative BC-342-(*) (also BC-344-(*)), due in many instances to failure (short circuit) of filter capacitor C80. This capacitor, with C79 and C78 is encased in one unit to form CA-276. The failure of this capacitor is due to overheating as a result of the small clearance between CA-276 and RA-20 (power supply).

The remedy is to relocate CA-276 to a position on the receiver sub-panel where air can circulate around it. Complete relocation details of this modification are shown in Fig. 8. More complete data can be obtained from OCSigO Maintenance Letter No. 10, 20 Jan 1943.

FREQUENCY DRIFT, BC-312-L,M,N,and NX; BC-342-L and N.

These models were manufactured without heat insulation in the oscillator compartment, causing a varying temperature in the compartment, which causes frequency drift.

Remedy by installing heat insulation in oscillator compartment as in other models.

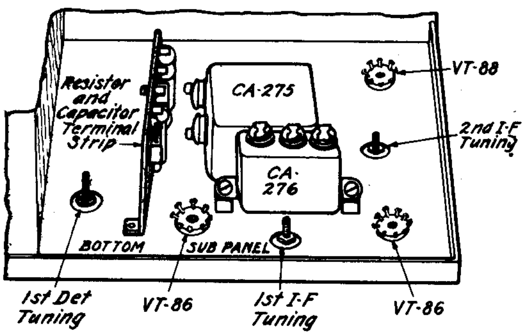


Fig. 8.—Recommended new location of capacitor CA-276 on receiver sub-panel to minimize heat effect from Rectifier RA-20.

RADIO RECEIVER BC-314-(*) & BC-344-(*)

Part of: SCR-177-B

Reference:
TM 11-850

MODELS AND DESIGN DIFFERENCES

The following major differences exist between models of Radio Receivers BC-314-(*) and BC-344-(*). BC-314 & BC-344 employ: (1) a thermostatically controlled heater circuit (with switch for ON or OFF on front panel) in the r-f oscillator compartment, (2) a SELECTIVITY control, manipulated from the front panel, shown as "C-79" in the schematic diagram. In all subsequent BC-344-(*) models these two items were omitted.

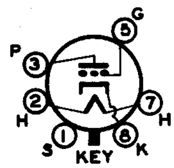
The BC-314-E and BC-314-G have no first audio jack, but employ two jacks for 2d audio. Also, these two models employ an audio disabling circuit, operating along with antenna disabling relay, as in BC-312-HX, L, M, N, and NX.

BC-314-(*) and BC-344-(*) are identical except for power supply. The BC-314-(*) employs a dynamotor for power supply, to operate from 12 to 14 volts d.c. The BC-344-(*) employs an a-c power supply, to operate from 110-120 volts a.c.

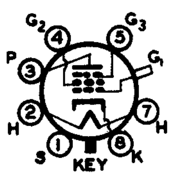
VOLTAGE MEASUREMENTS

Because of varying conditions under which voltage measurements might be made, a deviation of 10 to 15% is permissible from the readings indicated. The conditions under which these readings are obtained are as follows:

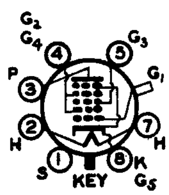
1. For BC-314-(*) receivers, input - 14 volts d.c. For BC-344-(*) receivers, 120 volts 60 cycles a.c.
2. Readings taken at tube contacts with 1000 Ohms per volt voltmeter.
3. Manual volume control on full.
4. For the c-w oscillator reading, the C.W.-OSC. OFF ON switch is turned to ON. For all other readings it is turned to OFF.



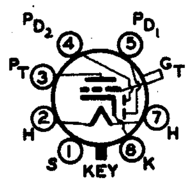
VT-65-6C5



VT-86-6K7

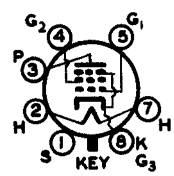


VT-87-6L7



VT-88-6R7

Tube socket terminals.



VT-66-6F6

Tube	Filament BC-344-(*)	Filament BC-314-(*)	Cathode to Ground	Screen Grid to Ground	Plate to Ground
1st r-f Amplifier (VT-86)	6.5 a-c	7.0 d-c	3.8 d-c	98.0 d-c	235.0 d-c
2d r-f Amplifier (VT-86)	6.5 a-c	7.0 d-c	3.6	98.0	235.0
1st Detector (VT-87)	6.5 a-c	7.0 d-c	4.8	128.0	235.0
1st i-f Amplifier (VT-86)	6.5 a-c	7.0 d-c	4.5	95.0	235.0
2d i-f Amplifier (VT-86)	6.5 a-c	7.0 d-c	4.2	96.0	235.0
C-w Oscillator (VT-65)	6.5 a-c	7.0 d-c	0.0	-	30.0
Diode, 1st Audio (VT-88)	6.5 a-c	7.0 d-c	8.0	-	235.0
2d Audio Amplifier (VT-66)	6.5 a-c	7.0 d-c	21.0	240.0	235.0
R-f Oscillator (VT-65)	6.5 a-c	7.0 d-c	0.0	-	100.0

Rectifier RA-20 Output (in BC-344-(*) models only).
(Volume control set to maximum.) B+ to ground........265 V, d.c.
Average current........92 ma.

ALIGNMENT

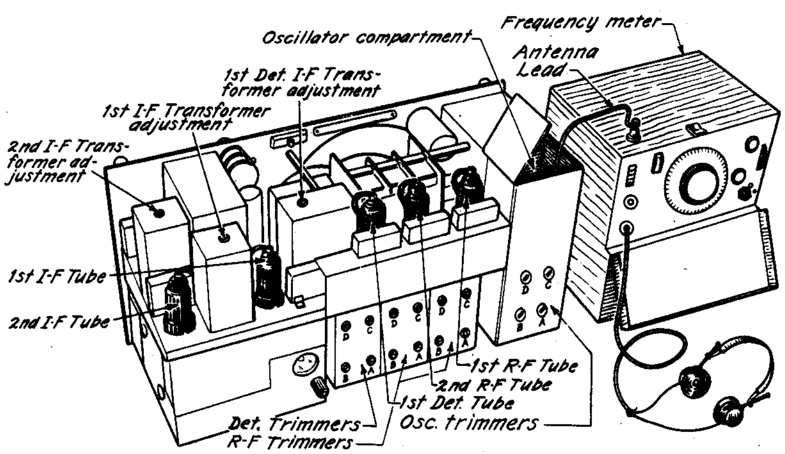


Fig. 1.—Coupling the antenna from Frequency Meter SCR-211-(*) to oscillator compartment for i-f alignment. See text. Also, location of r-f alignment trimmers.

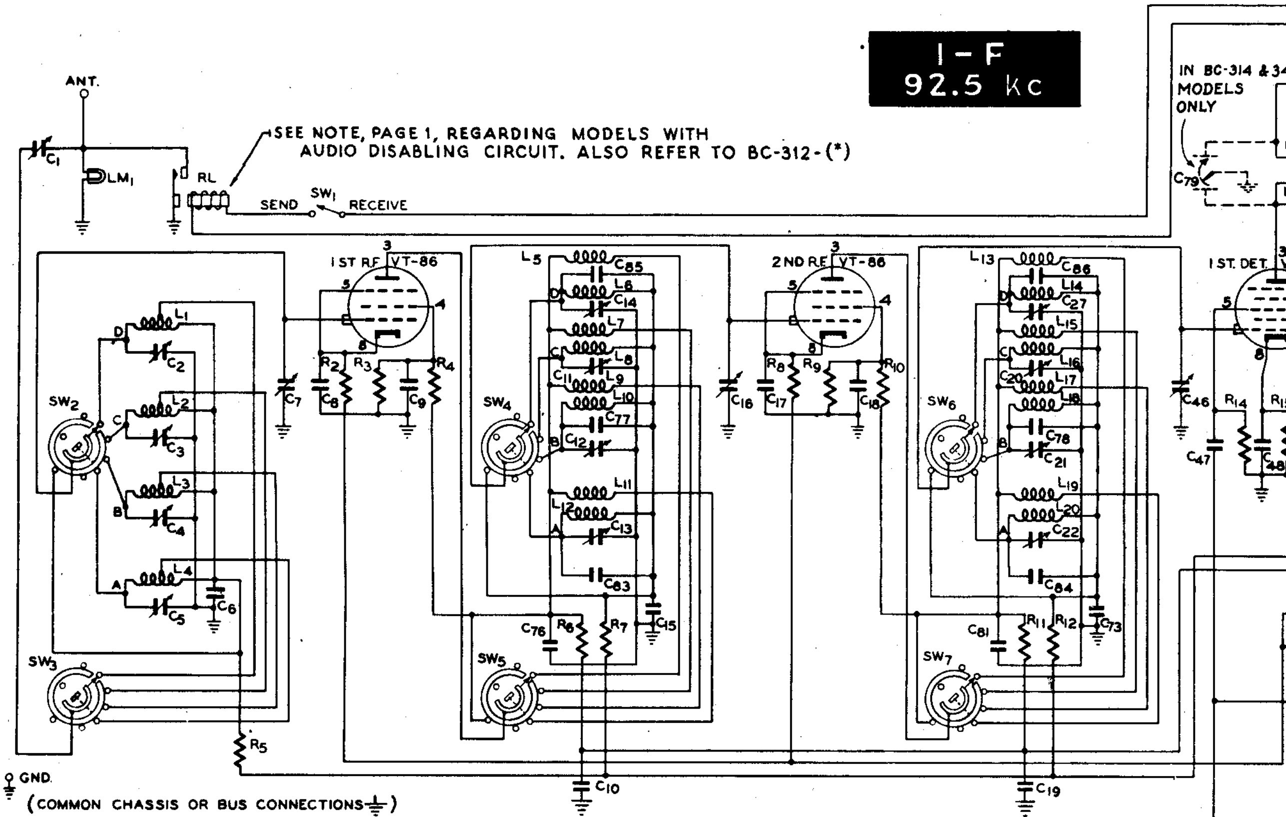
The following apparatus is required for satisfactory alignment of the BC-314-(*) and 344-(*) receivers:

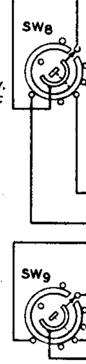
a. Signal Generator I-72-(*) or, preferably, one whose lowest frequency band goes to 50 or 75 kilocycles.
b. Frequency Meter Set SCR-211-(*).
c. Output meter.
d. Headset.
e. Dummy antennas: 50 or 100 $\mu\mu f$ capacitor for r-f alignment above 1500 kilocycles, 250 $\mu\mu f$ for alignment below 1500 kilocycles, 300 ohm 1/2 or 1 watt resistor for i-f alignment.
f. Insulated aligning tools.

Since the intermediate frequency of these receivers is 92.5 kilocycles, and since the I-72-(*) signal generator reaches only as low as 100 kilocycles, use the following procedure of i-f alignment - unless another signal generator whose low frequency band includes 92.5 kilocycles is available:

1. Turn receiver and frequency meter SCR-211-(*) "on" and let them warm up for 15 minutes, to insure frequency stability.
2. In BC-314 and BC-344 models which have a selectivity control, set this control at MAX during all alignment work. Set C.W.-OSC. to OFF position.
3. Set FREQUENCY dial of receiver to any frequency of any band, for example - 200 kilocycles.
4. Plug phones into frequency meter, and insert the end of antenna lead from the frequency meter into receiver oscillator compartment (open hinged cover) so that its end (no conductors exposed) lies close to the stator plates of the oscillator tuning capacitor section. See figure 1.
5. Tune frequency meter to 92.5 kc *above* the frequency at which the receiver dial is set for (if 200 kc, 200 + 92.5 or 292.5 kc), then slowly tune the frequency meter dial back and forth, about 15 kc, until a varying beat frequency note is heard in the phones. When zero beat is heard in the phones, cease tuning, and note the point on the frequency meter dial at which zero beat is heard. Consult the frequency meter calibration book for the frequency. If the frequency obtained is not 92.5 kc more than the frequency indicated by the receiver dial, adjust the receiver oscillator trimmer (see fig. 1) in small steps until a zero beat is heard in the frequency meter headset *exactly 92.5 kc* above receiver dial setting.
6. When the oscillator trimmer is finally adjusted to the desired frequency, tighten the locknut on this adjustment so that it cannot change. Disconnect and turn "off" frequency meter. Do not change receiver dial.
7. Connect the I-72-(*), through a 250 $\mu\mu f$ capacitor dummy antenna, to the receiver ant post. Connect the output meter to the receiver's (final) output jack, as shown in figure 5 in notes covering the BC-312-(*) and 342-(*) receivers.
8. Set the dial of the signal generator to the same frequency as that indicated on the receiver dial. Use a modulated signal from the signal generator, and align the i-f transformers for peak output in the output meter as described in "ALIGNMENT PROCEDURE" for the BC-312-(*) and 342-(*) receivers.
9. Align remaining stages, as described for the BC-312-(*), using the following r-f alignment frequencies instead: Band A - 255 kc; Band B- 440 kc; Band C - 800 kc; Band D - 1450 kc.

SCHEMATIC OF RECEIVER





GND.
(COMMON CHASSIS OR BUS CONNECTIONS ⏚)

CAPACITORS

C_1	CA-293	10-210 μμf
C_2	CA-290	10-50 μμf
C_3	"	10-50 μμf
C_4	"	10-50 μμf
C_5	CA-290	10-50 μμf
C_6	CA-277	0.1 μf
C_7	CA-340	13-256 μμf
C_8	CA-255	0.1 μf
C_9	CA-255	0.1 μf
C_{10}	CA-255	0.1 μf
C_{11}	CA-290	10-50 μμf
C_{12}	"	10-50 μμf
C_{13}	"	10-50 μμf
C_{14}	CA 290	10-50 μμf
C_{15}	CA 277	0.1 μf
C_{16}	CA-340	13-256 μμf
C_{17}	CA-255	0.1 μf
C_{18}	CA-255	0.1 μf
C_{19}	CA-255	0.1 μf
C_{20}	CA-290	10-50 μμf
C_{21}	"	10-50 μμf
C_{22}	"	10-50 μμf
C_{23}	"	10-50 μμf
C_{24}	"	10-50 μμf
C_{25}	"	10-50 μμf
C_{26}	"	10-50 μμf
C_{27}	CA 290	10-50 μμf
C_{28}	CA-346	2500 μμf
C_{29}	CA-347	2000 μμf
C_{30}	CA-348	900 μμf
C_{31}	CA-345	800 μμf
C_{32}	CA-343	125 μμf
C_{33}	CA-281	.01 μf
C_{34}	CA-342	100 μμf
C_{35}	CA-281	.01 μf
C_{36}	CA-344	400 μμf
C_{37}	CA-277	0.1 μf
C_{38}	CA-352	1000 μμf
C_{39}	CA-277	0.1 μf
C_{40}	CA-344	400 μμf
C_{41}	CA-344	400 μμf
C_{42}	CA-281	.01 μf
C_{43}	CA-353	.01 μf
C_{44}	CA-279	10 μμf
C_{45}	CA-350	25 μμf
C_{46}	CA-340	13-256 μμf
C_{47}	CA-349	150 μμf
C_{48}	CA-255	0.1 μf
C_{49}	CA-255	0.1 μf
C_{50}	CA-255	0.1 μf
C_{51}	CA-339	0.1 μf
C_{52}	CA-339	0.1 μf
C_{53}	CA-339	0.1 μf
C_{54}	CA-338	0.1 μf
C_{55}	CA-338	0.1 μf
C_{56}	CA-338	0.1 μf
C_{57}	CA-338	0.1 μf
C_{58}	CA-338	0.1 μf
C_{59}	CA-338	0.1 μf
C_{60}	CA-275	4 μf
C_{61}	CA-276	0.1 μf
C_{62}	CA-276	0.1 μf
C_{63}	CA-276	0.1 μf
C_{64}	CA-281	.01 μf
C_{65}	CA-277	0.1 μf
C_{66}	CA-238	250 μμf
C_{67}	CA-340	13-256 μμf
C_{68}	CA-253	10-75 μμf
C_{69}	CA-291	10-100 μμf
C_{70}	CA-211	0.002 μf
C_{71}	CA-211	0.002 μf
C_{72}	CA-277	0.1 μf
C_{73}	CA-277	0.1 μf
C_{74}	CA-266	100 μμf
C_{75}	CA-193	500 μμf
C_{76}	CA-277	0.1 μf
C_{77}	CA-341	25 μμf
C_{78}	CA-341	25 μμf
C_{79}	CA-351	30 μμf
C_{80}	CA-297	1600 μμf
C_{81}	CA-277	0.1 μf
C_{82}	CA-346	900 μμf
C_{83}	CA-341	25 μμf
C_{84}	CA-341	25 μμf

J_1	JK-34-A	1ST AUD PH. JK.
J_2	JK-34-A	2ND AUD PH. JK.
J_3	JK-33-A	SPEAKER JACK
J_4	JK-33-A	MICROPHONE JK
J_5	JK-34-A	KEY JACK.
F_1	FU 21	10 A FUSE
F_2	FU-21	10 A FUSE

COILS

L_1	C-250	1ST R.F. COILS
L_2	C-249	1ST R.F. COILS
L_3	C-248	1ST R.F. COILS
L_4	C-247	1ST R.F. COILS
L_5, L_6	C-246	2ND R.F. COILS
L_7, L_8	C-245	2ND R.F. COILS
L_9, L_{10}	C-244	2ND R.F. COILS
L_{11}, L_{12}	C-243	2ND R.F. COILS
L_{13}, L_{14}	C-242	1ST. DET. COILS
L_{15}, L_{16}	C-241	1ST. DET. COILS
L_{17}, L_{18}	C-240	1ST. DET. COILS
L_{19}, L_{20}	C-239	1ST. DET. COILS
L_{21}, L_{22}	C-238	OSC. COILS
L_{23}, L_{24}	C-237	OSC. COILS
L_{25}, L_{26}	C-236	OSC. COILS
L_{27}, L_{28}	C-235	OSC. COILS
L_{29}, L_{30}	C-232	1ST DET. TRANSF.
L_{31}	C-233	1ST I.F. TR.
L_{32}, L_{33}	C-234	2ND I.F. TR.
L_{34}		BEAT OSC.

RESISTORS

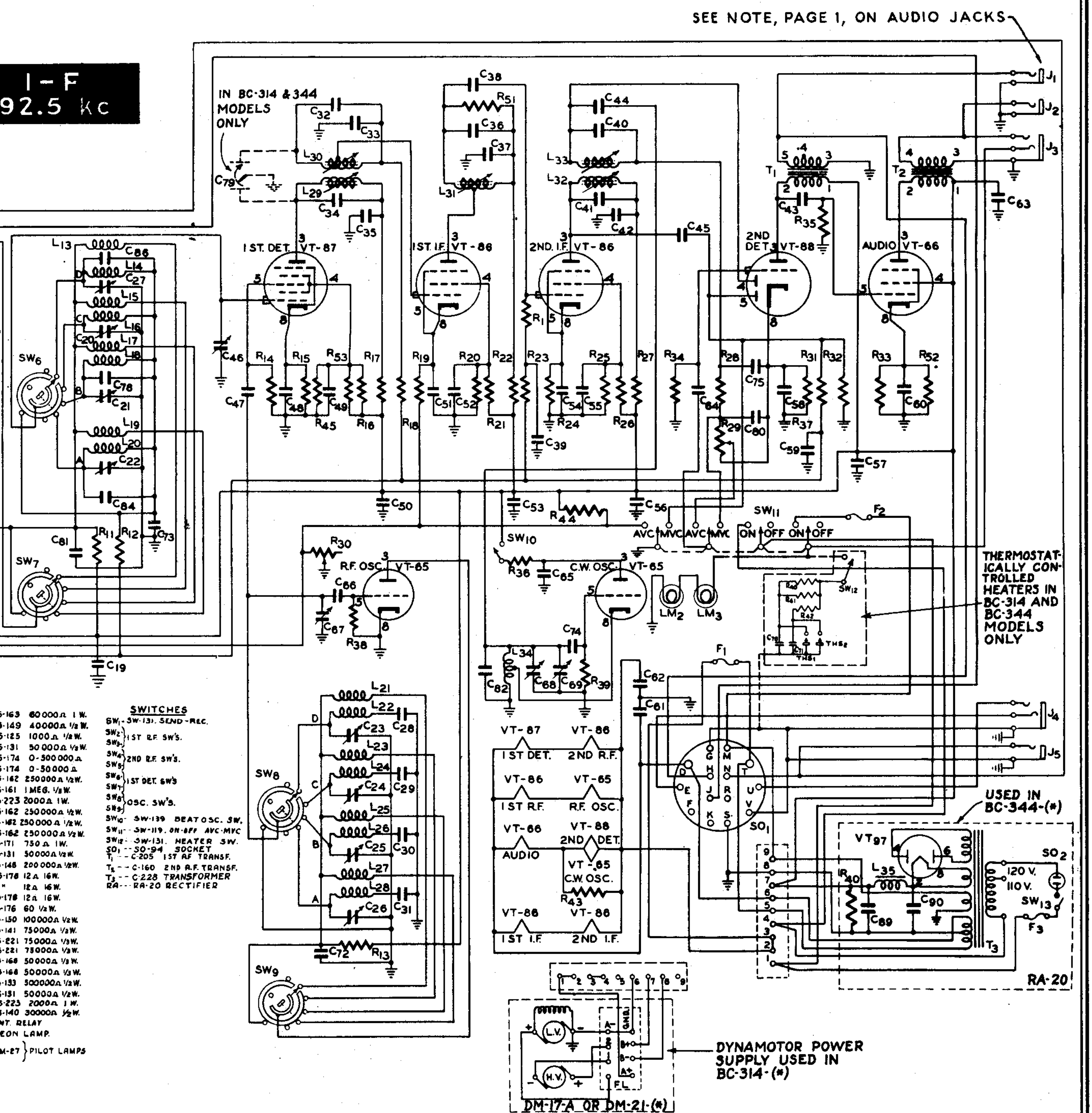
R_1	RS-161	1 MEG. 1/3 W.
R_2	RS-166	350 Ω 1 W.
R_3	RS-141	75000 Ω 1/2 W.
R_4	RS-149	40000 Ω 1/2 W.
R_5	RS-150	100000 Ω 1/2 W.
R_6	RS-167	1000 Ω 1/3 W.
R_7	RS-150	100000 Ω 1/2 W.
R_8	RS-166	350 Ω 1 W.
R_9	RS-141	75000 Ω 1/2 W.
R_{10}	RS-149	40000 Ω 1/2 W.
R_{11}	RS-167	1000 Ω 1/3 W.
R_{12}	RS-150	100000 Ω 1/2 W.
R_{13}	RS-139	50000 Ω 1 W.
R_{14}	RS-168	50000 Ω 1/3 W.
R_{15}	RS-164	500 Ω 1 W.
R_{16}	RS-140	30000 Ω 1/2 W.
R_{17}	RS-125	1000 Ω 1/2 W.
R_{18}	RS-150	100000 Ω 1/2 W.
R_{19}	RS-164	500 Ω 1 W.
R_{20}	RS-163	60000 Ω 1 W.
R_{21}	RS-149	40000 Ω 1/2 W.
R_{22}	RS-125	1000 Ω 1/2 W.
R_{23}	RS-150	100000 Ω 1/2 W.
R_{24}	RS-164	500 Ω 1 W.
R_{25}	RS-163	60000 Ω 1 W.
R_{26}	RS-149	40000 Ω 1/2 W.
R_{27}	RS-125	1000 Ω 1/2 W.
R_{28}	RS-131	50000 Ω 1/2 W.
R_{29}	RS-174	0-500000 Ω
R_{30}	RS-174	0-50000 Ω
R_{31}	RS-162	250000 Ω 1/2 W.
R_{32}	RS-161	1 MEG. 1/3 W.
R_{33}	RS-223	2000 Ω 1 W.
R_{34}	RS-162	250000 Ω 1/2 W.
R_{35}	RS-162	250000 Ω 1/2 W.
R_{36}	RS-162	250000 Ω 1/2 W.
R_{37}	RS-171	750 Ω 1 W.
R_{38}	RS-131	50000 Ω 1/2 W.
R_{39}	RS-148	200000 Ω 1/2 W.
R_{40}	RS-178	12 Ω 16 W.
R_{41}	"	12 Ω 16 W.
R_{42}	RS-178	12 Ω 16 W.
R_{43}	RS-176	60 1/2 W.
R_{44}	RS-150	100000 Ω 1/2 W.
R_{45}	RS-141	75000 Ω 1/2 W.
R_{46}	RS-221	75000 Ω 1/3 W.
R_{47}	RS-221	75000 Ω 1/3 W.
R_{48}	RS-168	50000 Ω 1/3 W.
R_{49}	RS-168	50000 Ω 1/3 W.
R_{50}	RS-133	500000 Ω 1/2 W.
R_{51}	RS-131	50000 Ω 1/2 W.
R_{52}	RS-223	2000 Ω 1 W.
R_{53}	RS-140	30000 Ω 1/2 W.

RL_1 - ANT. RELAY
LM_1 - NEON LAMP.
LM_2, LM_3 - LM-27 PILOT LAMPS

SWITCHES

SW_1	SW-131. SEND-REC.
SW_2, SW_3	1ST R.F. SW'S.
SW_4, SW_5	2ND R.F. SW'S.
SW_6, SW_7	1ST DET. SW'S
SW_8, SW_9	OSC. SW'S.
SW_{10}	SW-139 BEAT OSC. SW.
SW_{11}	SW-119. ON-OFF AVC-MVC
SW_{12}	SW-131. HEATER SW.
SO_1	SO-94 SOCKET
T_1	C-205 1ST A.F. TRANSF.
T_2	C-160 2ND A.F. TRANSF.
T_3	C-228 TRANSFORMER
RA	RA-20 RECTIFIER

SCHEMATIC OF RECEIVER

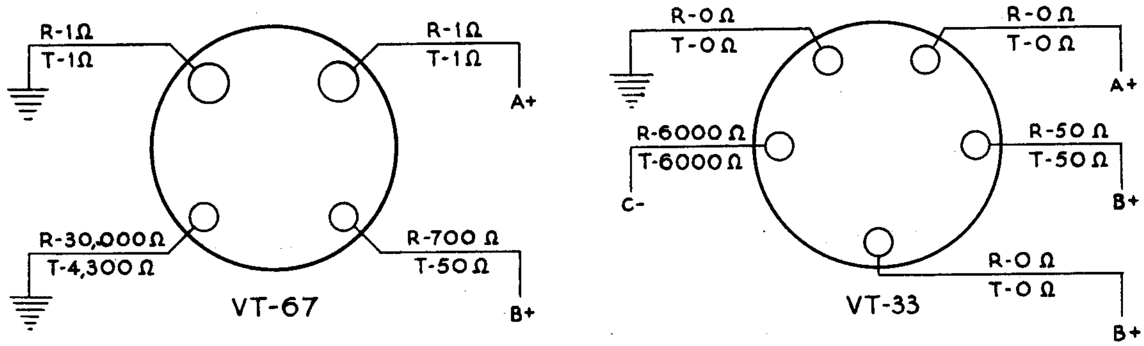


RADIO RECEIVER & TRANSMITTER BC-322

Part of: SCR-195

Reference: TM 11-238

RESISTANCE MEASUREMENTS



NOTE:
RESISTANCES WITH PREFIX "R" MEASURED IN RECEIVE POSITION.
RESISTANCES WITH PREFIX "T" MEASURED IN TRANSMIT POSITION.
MEASUREMENTS, EXCEPT TO GROUND, MADE FROM POINT SHOWN TO PINS ON P_1, TUBES AND BATTERY REMOVED AND FILAMENT RHEOSTAT ON FULL.
BOTTOM VIEW OF SOCKETS

VOLTAGE AND CURRENT MEASUREMENTS

The following values (approximate) of current and voltage for operating conditions are normal for the BC-322.

Receiver plate current		21.5	ma
Transmitter plate current	modulated	45	ma
Transmitter plate current	unmodulated	35	ma
Relay current		18.5	ma

Microphone current	35-60 ma
Plate volts (at P_1)	135

A variation of plus or minus 10 percent is permissible.

ADJUSTMENTS

Turn ON-OFF sw and CALIBRATOR sw to ON. Turn the tuning control back and forth over one of the red lines on the dial. As the control passes the line, there should be a marked decrease in the rushing sound in the earpiece of the handset. If this "null point" occurs at the red line, the calibration is correct. If it does not coincide exactly, adjust the CALIBRATOR until it does. Use red line nearest upper range of dial and one section of antenna for this adjustment.

LOCATING TROUBLE

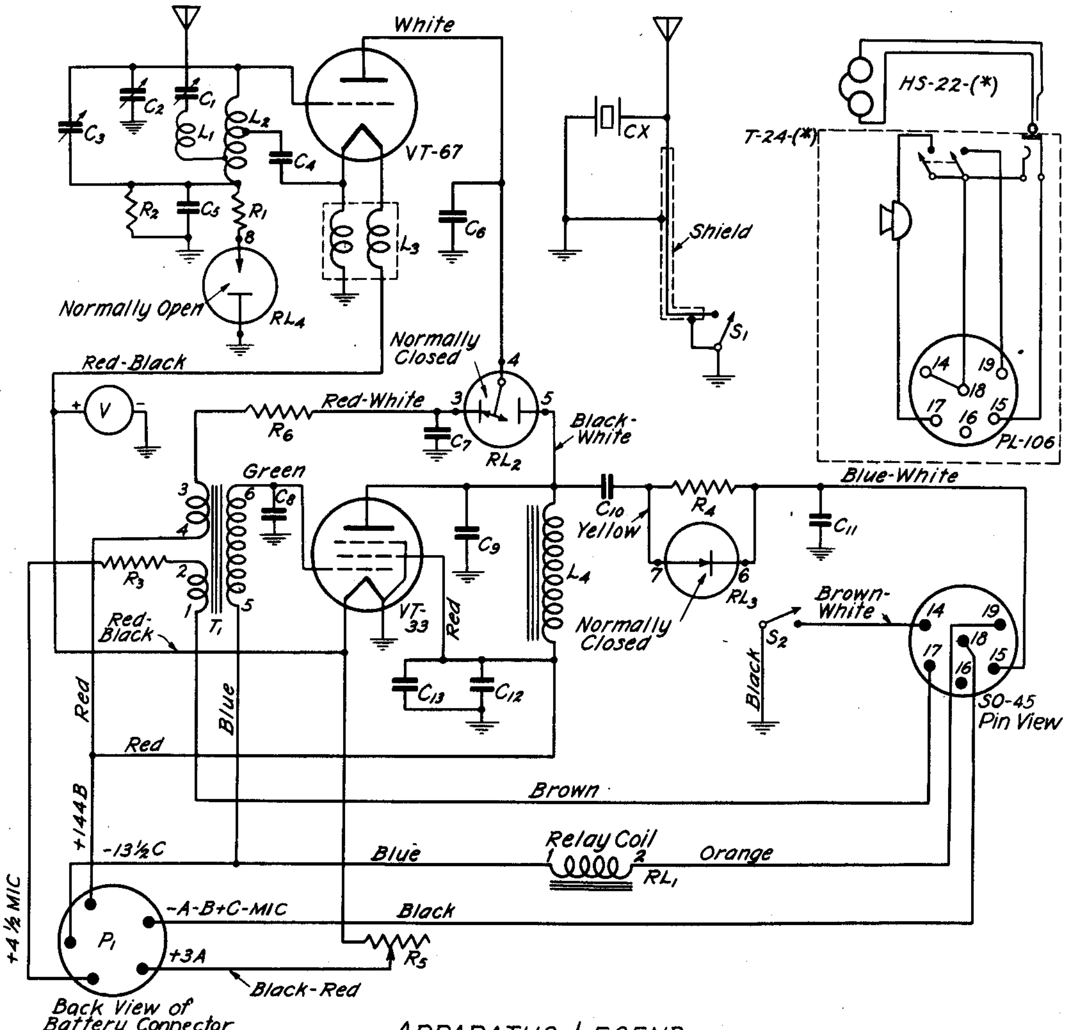
Check battery under load after several minutes operation and replace if any section drops below minimum which follows:
MIC - 3.6V, A - 2.0V, B - 115V, and C - 10.8V.

If BA-32 is not available the following batteries may be substituted by connecting them to the set through Box BX-13. NOTE: To use this box without connecting meters, connect a jumper wire between each pair of binding posts marked MICRO CUR, RELAY CUR, and PLATE CUR. Do not use a jumper between binding posts marked PLATE VOLTS.

Circuit	Normal open circuit voltage	Suggested substitute battery
A (filament)	3	2 BA-17 or BA-23
B (plate)	144	6 BA-8
C (grid)	13.5	3 BA-27
MIC (microphone)	4.5	1 BA-27

Inspect and clean set, and test tubes regularly. The efficiency of the antenna is likely to become impaired by corrosion in the joints of the sections. Disassemble the antenna and clean the sections inside and outside with fine steel wool. Do not use oil.

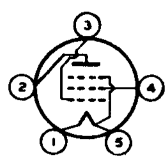
SCHEMATIC



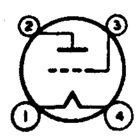
APPARATUS LEGEND

C_1 - Capacitor - 10 μμf
C_2 - Capacitor, Trimmer
C_3 - Capacitors 6-32 μμf
C_4 - Capacitor - 100 μμf
C_5 - Capacitor - 0.001 μf
C_6 - Capacitor - 0.003 μf
C_7 - Capacitor - 0.002 μf
C_8 - Capacitor - 250 μμf
C_9 - Capacitor - 0.001 μf
C_{10} - Capacitor - 0.003 μf
C_{11} - Capacitor - 0.01 μf
C_{12} - Capacitor - 0.5 μf
C_{13} - Capacitor - 0.5 μf
CX - Crystal
L_1, L_2 - Coil, Tuning

L_3 - Coil, Filament Choke
L_4 - Coil
P_1 - Plug, Battery
R_1 - Resistor - 5,000 ohms
R_2 - Resistor - 30,000 ohms
R_3 - Resistor - 40 ohms
R_4 - Resistor - 200,000 ohms
R_5 - Rheostat - 10 ohms
R_6 - Resistor - 20,000 ohms
RL_1 - RL_2 - RL_3 - RL_4 - Relay BK-10
S_1 - Switch
S_2 - Switch
SO - Socket
T_1 - Transformer
V - Voltmeter



VT-33
RMA TYPE 33



VT-67
RMA TYPE 30

RADIO TRANSMITTER BC-325-(*)

BC-325-(*) = BC-325-B, BC-325-C

Part of: SCR-197-(*)

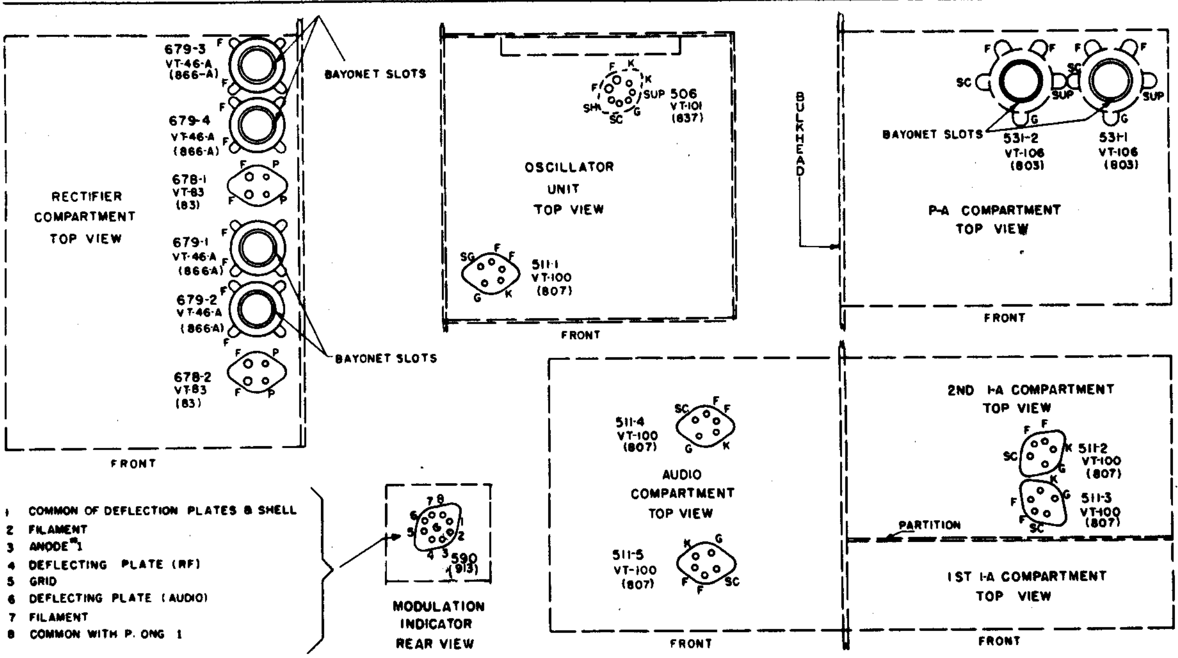
VOLTAGE MEASUREMENTS

Reference: TM 11-805

THIS EQUIPMENT EMPLOYS HIGH VOLTAGES THAT ARE DANGEROUS AND MAY BE FATAL IF CONTACTED BY PERSONNEL. IT IS IMPERATIVE THAT SAFETY REGULATIONS BE OBSERVED AT ALL TIMES.

NOTE: Measurements given below are for full power output, unless otherwise noted.

Tube element	Voltage	Where measured	Current	Where measured
Osc. Tube VT-101 (675):				
Plate	460 v d-c	Terminal "12" osc. term. board 556 to chassis.	10-40 ma	Transmitter panel meter.
Screen	250 v d-c	Terminal "6" of osc. term. board 556 to chassis.	8 ma (d-c)	Series with cable lead to "6" of osc. term. board 556.
Filament	12.6 v a-c	Across "4" and "5" of osc. term. board 556.	0.7 a (a-c)	Series with cable lead "4" of osc. term. board 556.
1st Intermed. Amplifier Tube VT-100 (676-1):				
Plate	500 v d-c	Rotor of 1st int. amp. plate tuning capacitor 513-2 to chassis.	20-40 ma	Transmitter panel
Screen	170 v d-c	"11" of osc. term. board to chassis.	12 ma (d-c)	Series with cable lead to "11" of terminal board 556.
Grid	-100 v d-c	"7" osc. term. board 556 to chassis.	1-5 ma	Transmitter panel meter.
Filament	6.3 v a-c	Across 9 and 10 of osc. term. board 556.	0.9 a (a-c)	Series with cable lead to "9" of term. board 556.



Top view illustrating location tube sockets and terminals

VOLTAGE MEASUREMENTS

Tube element	Voltage	Where measured	Current	Where measured
2d Intermed. Amplifier Tubes VT-100 (676-2,3):				
Plate	600 v d-c	"1" on resistor 620-2 to chassis.	40-90 ma	Transmitter panel meter.
Screen	185 v d-c	"3" on resistor 620-2 to chassis.	30 ma (d-c)	Series with lead "3" on resistor 620-2.
Grid	-170 v d-c	"7" osc. term. board to chassis.	1-5 ma	Transmitter panel meter.
Filaments	6.3 v a-c	Across fil. contacts 2d int. amp. tube socket.	1.8 a (a-c)	Series with lead at term. 20 of filament transformer 602.
Power Amplifier Tubes VT-106's (677-1, 2):				
Plate (CW)	2000 v d-c	Transmitter panel meter.	300 ma	Transmitter panel meter.
Plate (tone-voice)	2000 v d-c	Transmitter panel meter.	150 ma	Transmitter panel meter.
Suppressor (CW)	80 v d-c	From lead "6" on resistor 621 to chassis.	5 ma (d-c)	Series with lead "6" on resistor 620-2.
Suppressor (tone-voice)	-110 v d-c	From lead "3" on resistor 621 to chassis.	0 ma (d-c)	Series with lead "3" on resistor 621.
Screen	400 v d-c	From lead at junction of resistors 660, 660-1 to chassis.	140 ma (d-c)	Series with lead to resistors 660, 661-1.
Grid (CW)	-150 v d-c	From tap "1" on bleeder resistor 621 to chassis.	50 ma (d-c)	Transmitter panel meter.
Grid (tone-voice)	-150 v d-c	Same as above.	25 ma	Transmitter panel meter.
Filament	10 v a-c	Across terms. "14" and "16" of transformer 602.	10 a (a-c)	Series with lead to "14" of transformer 602.
Keyer Tube VT-100 (676-4):				
Plate	14 v d-c	Plate cap of tube to chassis.	20-50 ma (d-c)	Series with lead to plate of keyer tube.
Screen	110 v d-c	From lead "5" on resistor 620-2 to chassis.	22 ma (d-c)	Series with lead "5" on resistor 620-2.
Grid (key up)	197-C -85 v d-c	From voltage end of resistor 583 to chassis.	0	- - -
	197-D -115 v d-c	From voltage end of resistor 584 to chassis.	- - -	- - -
Filament	6.3 v a-c	Across terminals "6" and "7" of transformer 602.	0.9 a (a-c)	Series with lead on "6" of transformer 602.

VOLTAGE AND CURRENT MEASUREMENTS (cont.)

Tube element	Voltage	Where measured	Current	Where measured
Audio Tube VT-100 (676-5):				
Plate	300 v d-c	From tube plate cap to chassis.	15 ma (d-c)	Series with lead "3" on resistor 620-1.
Screen	85 v d-c	From lead "2" on resistor 620-1 to chassis.	5 ma (d-c)	Series with lead "2" on resistor 620-1.
Cathode	5 v d-c	Cathode socket contact to chassis.		
Filament	6.3 v a-c	Across "6" and "7" of transformer 602.	0.9 a (a-c)	Series with lead on "3" of transformer 602.
Oscillator Rectifier Tube VT-83 (678-1):				
Plates (2)	500 v a-c	From "6" to "7" and "7" to "8" of transformer 605.		
Bias Rectifier Tube VT-83 (678-2):				
Plates (2)	210 v a-c	From "3" to "4", and "4" to "5" on transformer 605.		
Low Voltage Rectifier Tubes VT-46A's (679-1, 2):				
Plate, each	675 v a-c	Across terminals "3" and "4", and "4" to "5" transformer 606.		
High Voltage Rectifier Tubes VT-46A's (679-3, 4):				
Plate, each	2250 v a-c	Across "3" to "4", and "4" to "5" of transformer 607.		

RESISTANCE MEASUREMENTS

Data for Checking Transformers, Chokes, and Inductors.
Resistances less than 1 ohm are given as 0.

Component	Part No.	Winding Terminals	D.C. Resistance
Audio cathode choke	576	----	280 ohms
Audio attenuating choke	566	----	55 "
Audio tone freq. choke	569	----	55 "
Audio plate transformer	567	1,2	250 "
		3,4	650 "
		5,6	100 "
Audio input transformer	574	1,4	70 "
		5,6	100 "
		7,8	12,500 "
Filter choke	617	----	40 "
Filter choke	614	----	55 "
Filter choke	612	----	32 "
Filter choke	610	----	28 "
Power transformer	607	1,2	0 "
		3,5	150 "
Power transformer	606	1,2	0 "
		3,5	90 "
Power transformer	605	1,2	0 "
		3,5	50 "
		6,8	75 "

Filament transformers 604, 603, and 602, all have windings measuring less than 1 ohm.

LOCATING TROUBLES

Trouble in any of the transmitting components is most easily localized by carefully noting all symptoms such as incorrect panel meter readings, blown fuses, incorrect operation of control circuits, etc. After localizing the trouble, a systematic investigation of voltages, currents, circuit elements, and tubes in the circuit involved will generally reveal the fault. In general, the meters most useful in trouble shooting are an ohmmeter that measures up to one megohm in several ranges, a voltmeter (1000 ohms per volt) that also has several ranges to read up to 1000 volts ac and dc, and a milliammeter to measure up to 500 ma.

The following is a chart of possible troubles and their causes. It covers the BC-325-B and 325-C transmitters only. Supplementary or auxiliary equipment such as the Power Control Panel or the Control Unit (RM-7-B) are covered in pages following.

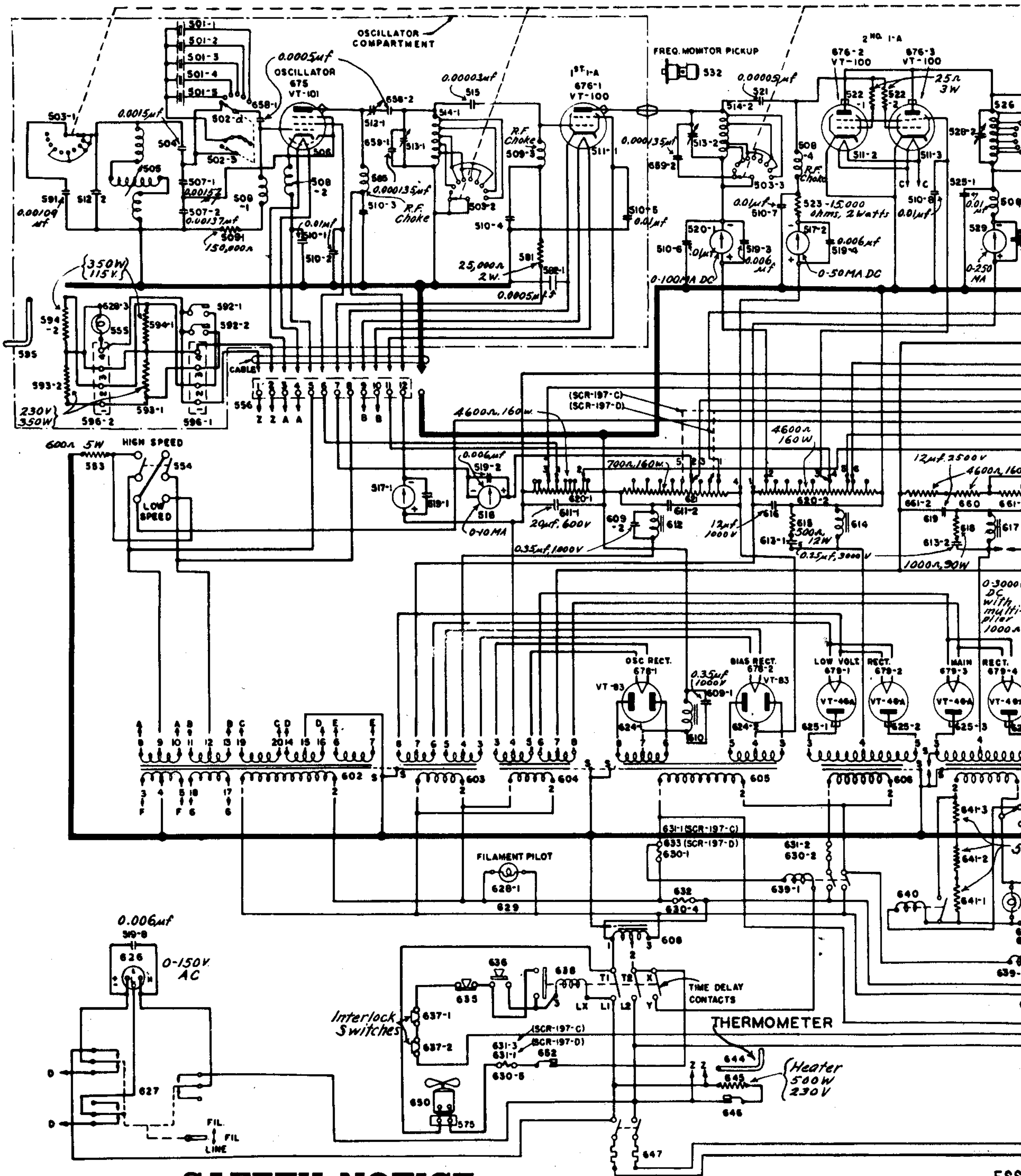
SYMPTOM	LIKELY CAUSE
(1) Contactor 638 does not click in when input power and start switches on panel are engaged.	Door interlocks are open.
(2) Contactor 638 closes but no filament voltage present on any stage.	Fuse 632 blown.
(3) Filament voltage on every stage but no plate, screen, or bias voltage.	Fuse 631-2 blown.
(4) No P-A plate voltage indicated on panel meter when plate stand-by switch is thrown to ON position.	Fuse 634 blown.
(5) Radio transmitter ventilating fan does not operate when ambient temperature is above 30 degrees C.	Fuse 631-3 is blown.
(6) Failure of any R-F stage to tune to a plate current dip.	Tuning of some stage is not according to tuning charts (tuned "off" frequency). Range switch not set to correct range.
(7) Phantom antenna will not load.	One or several of phantom antenna elements 548, 524-1, or 524-2, are blown. Improper tuning of loading circuit.
(8) Antenna will not load.	Tuning of loading circuit improper. Follow charts.
(9) Will not modulate from microphone plugged into transmitter panel jack.	CW-TONE-VOICE switch on panel not thrown to VOICE. LOCAL-REMOTE switch not thrown to LOCAL.
(10) Will not key from panel Test Key.	Interlock contacts on one or several of range switch, antenna transfer switch, antenna inductor tap switch, or antenna tuning switch are dirty or not making proper contact.
(11) Will not key with key plugged into radio transmitter panel jack.	Same as above. LOCAL-REMOTE switch not thrown to LOCAL position.

SPECIAL NOTES

(Reference: OCSigO Supply Letter No. 130, 1942.) According to reports received, the impedance of the keying circuit of BC-325-(B) is high enough to simulate a keyed condition with long control lines having low leakage resistance; for instance, when the lines are on the ground in humid climates. This is possible only with BC-325-B transmitters which now contain the 250,000 ohm keyer tube resistor (No. 583 in schematic), and modification to prevent possible faulty operation, under conditions such as aforementioned, is accomplished as follows:

1. Replace 250,000 ohm resistor (No. 583) with stock no. 3Z4589 (No. 584), 10,000 ohm, 10 watt resistor.

2. Alter voltage supply to this resistor by detaching the proper lead on resistor 621. This lead bears a metal tag with the number "5", and is fastened to the 6th terminal of resistor 621. Attach this lead to the third terminal of 621, counting the end terminal of 621 at the outside of the transmitter as the first terminal. It will be necessary to shunt the left side door-operated interlock in order to turn on the power with the door open.



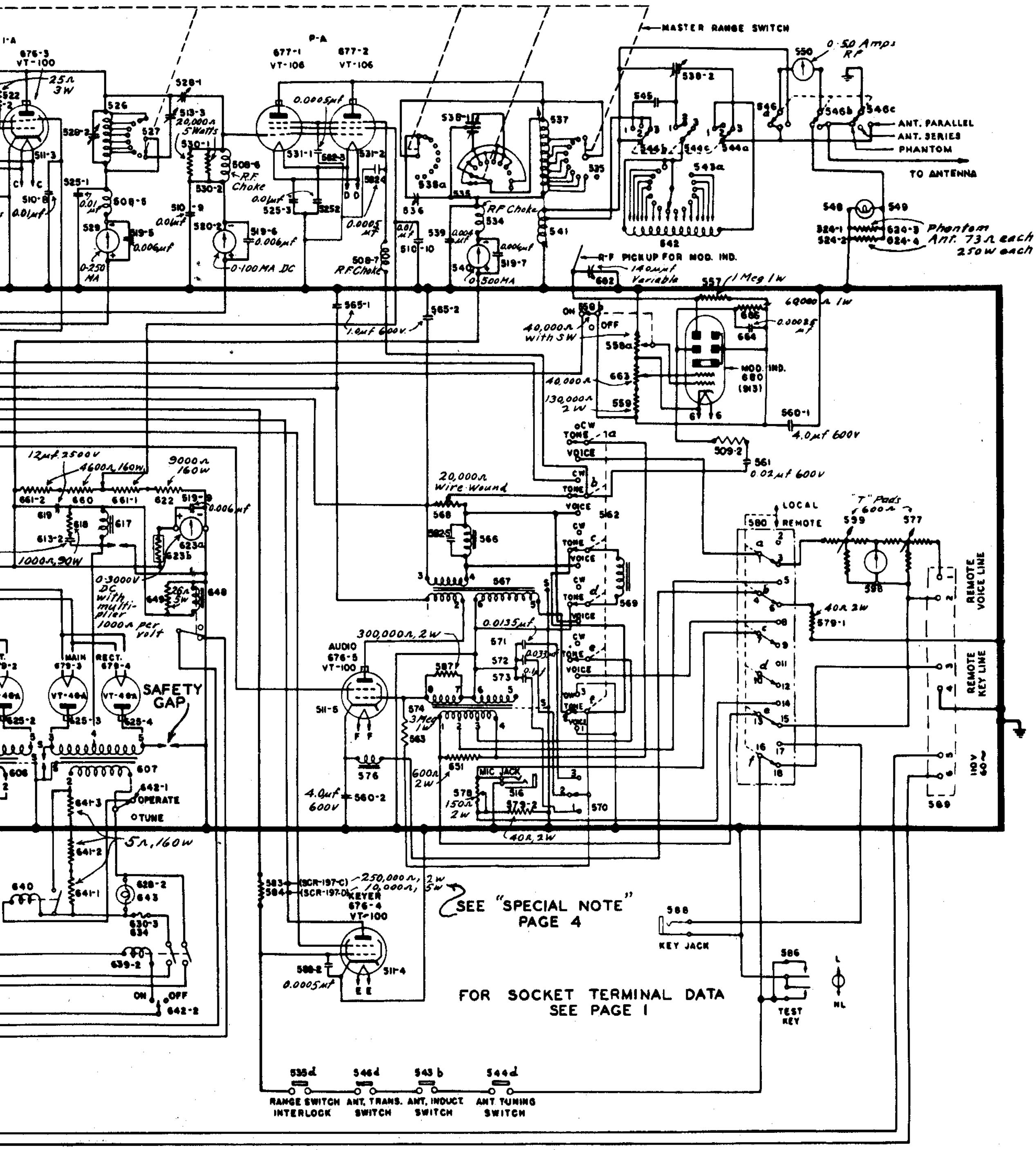
ESS

SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

(1) Fuses have been replac
cuit breakers.

(2) Thermostats used in o
fier compartments ar
type.



ESSENTIAL DIFFERENCES BETWEEN BC-325-B and BC-325-C:

ve been replaced by magnetic cir-
akers.
ats used in oscillator and recti-
mpartments are of an adjustable

(3) Phenolic Crystal Holders FT-171-B are used.
(4) An additional factory-adjusted trimmer capacitor has been added in the oscillator circuit. These changes are incorporated in the BC-325-C.

RADIO RECEIVER & TRANSMITTER BC-441-(*)

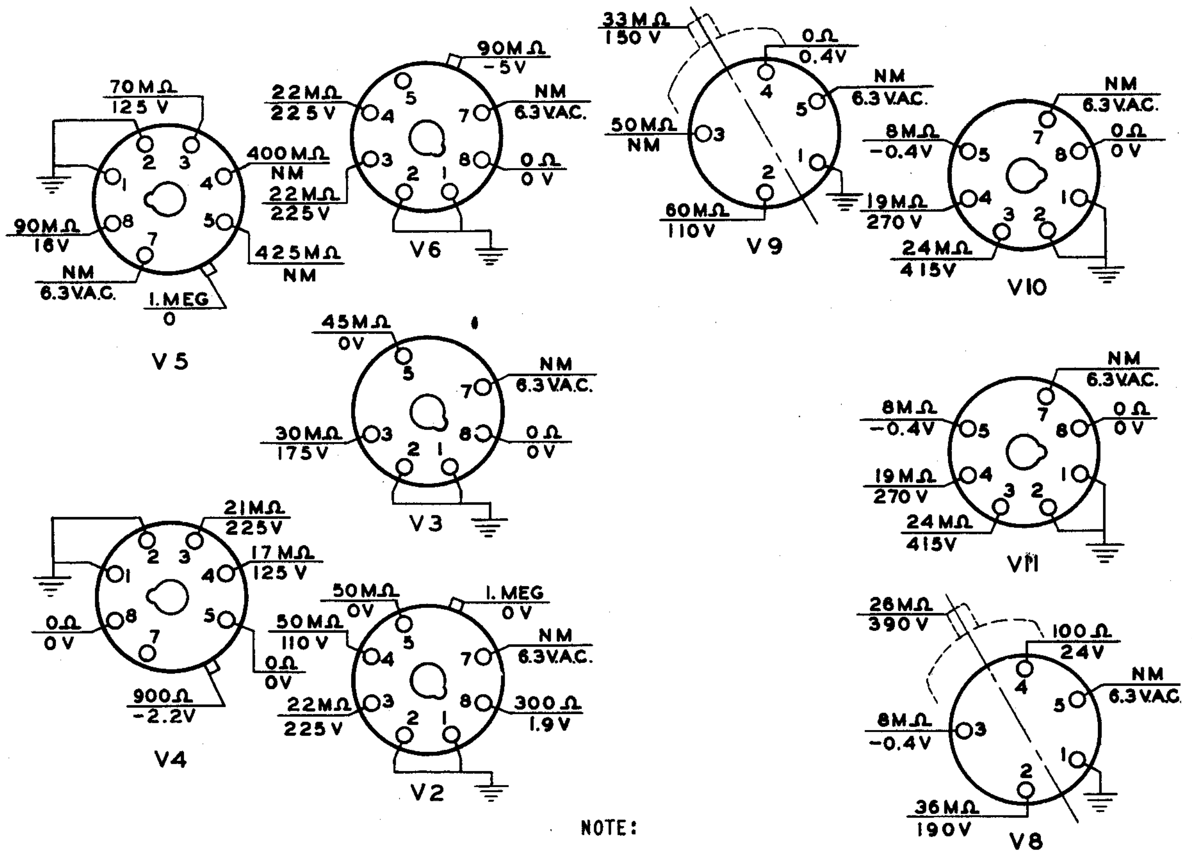
BC-441-(*)=BC-441-A
BC-441-B

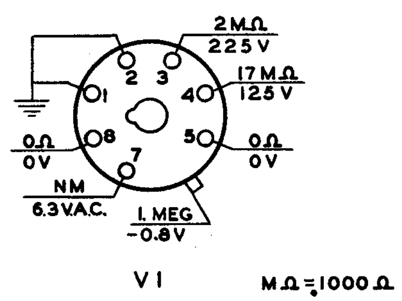
Part of: SCR-281-(*)

RESISTANCE AND VOLTAGE MEASUREMENTS

Reference:
TM 11-244

RECEIVER SECTION OF CHASSIS TRANSMITTER SECTION OF CHASSIS

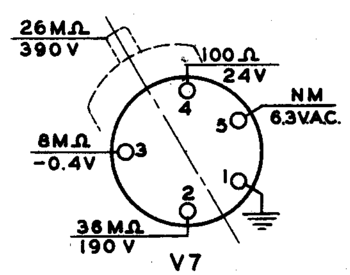




MΩ=1000Ω

NOTE:

All measurements are from point indicated to chassis.
Resistance measurements made with power source disconnected, tubes removed, CRYSTAL-MANUAL sw at MANUAL, SPEAKER sw OFF and transmitting relays closed by hand.
Voltage measurements made with 1,000 ohms/v voltmeter at input of 115 volts a.c. with no signal on receiver, transmitter operating on channel 1, loaded.



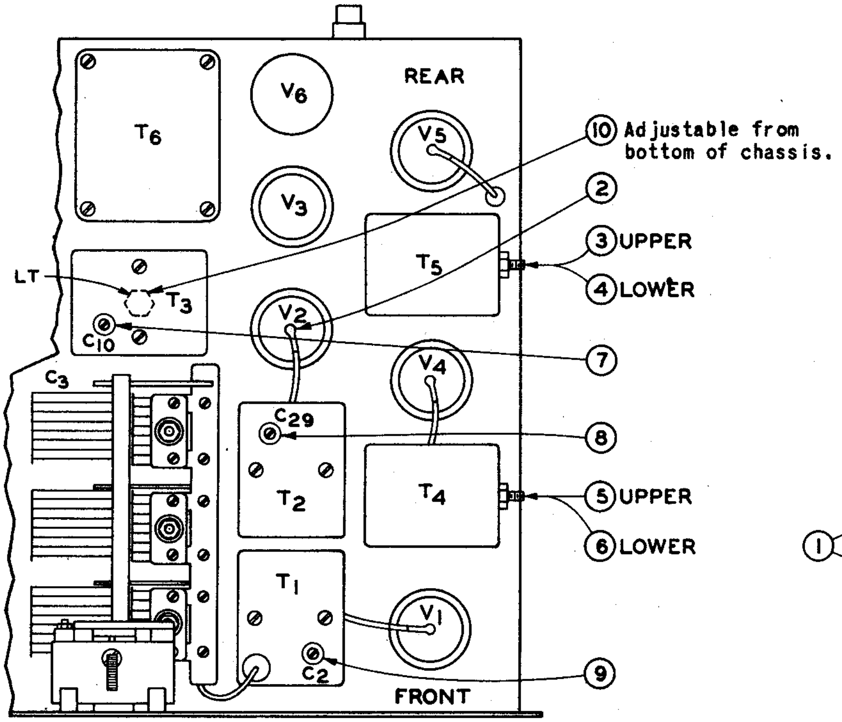
TRANSMITTER CURRENT MEASUREMENTS

Oscillator plate and screen current	35 ma d.c.	Antenna current	.94 amp r.f.
P. A. plate current (2 tubes)	102 ma d.c.	Modulator plate current (2 tubes)	98 ma d.c.
P. A. screen current	20 ma d.c.	Modulator screen grid current	6 ma d.c.
P. A. grid current	4.5 ma d.c.	Microphone current	46 ma d.c.

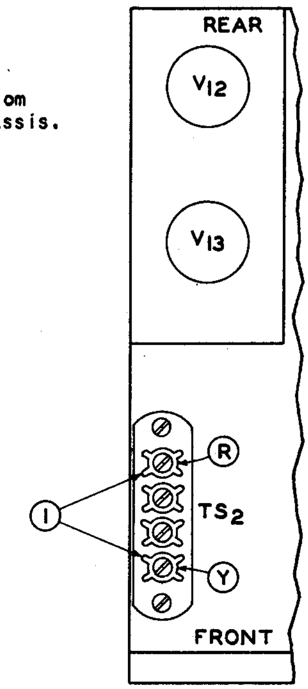
RECEIVER ALIGNMENT

All frequencies set on sig gen are to be checked with freq meter.
Sig gen is modulated.
VOLUME CONTROL full on.
CRYSTAL-MANUAL sw to MANUAL.
SPEAKER sw OFF.
Connect "low" side of sig gen to chassis.
Connect output meter to terminals Y and R of TS_2 (1).

TOP VIEW RECEIVER SECTION
R-F CHASSIS



TOP VIEW, END SECTION
POWER CHASSIS



I-F ALIGNMENT

1. Set sig gen to 385 kc.
2. Remove grid cap of V_2 (2) and connect grid to chassis through a 10,000 ohm resistor.
3. Connect high side of sig gen to grid of V_2 through a 0.01 μf capacitor.
4. Adjust sec (3) and pri (4) of T_5 for max on output meter.
5. Adjust sec (5) and pri (6) of T_4 for max on output meter.
6. Repeat 4 and 5.
7. Remove resistor and replace grid cap of V_2.

R-F ALIGNMENT

8. Connect sig gen to antenna terminal through a series 30 ohm resistor and a 0.0005 μf capacitor and set to 2700 kc.
9. Set RECEIVER TUNING DIAL to 2700 kc.
10. Adjust C_{10} in T_3 (7), C_{29} in T_2 (8) and C_2 in T_1 (9) for max on output meter.
11. Set sig gen and RECEIVER TUNING dial to 1800 kc.
12. Adjust screw LT at bottom of T_3 (10) for max on output meter.
13. Repeat 10, 11, and 12.

RECEIVER PRESETTING

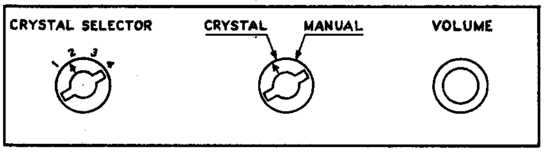
Check that crystals for all channels are installed. Receiving and transmitting crystals are contained in the same holder. Turn CRYSTAL-MANUAL sw to CRYSTAL, CRYSTAL SELECTOR sw to desired channel and set RECEIVER TUNING dial to the channel frequency. No further adjustment is necessary for crystal controlled reception at transmitter frequency.

The frequency of each receiving crystal is 385 kc higher than the associated transmitting crystal, except for transmitting frequencies above 2365 kc, in which case the receiving crystals are 385 kc lower.

TRANSMITTER ADJUSTMENT

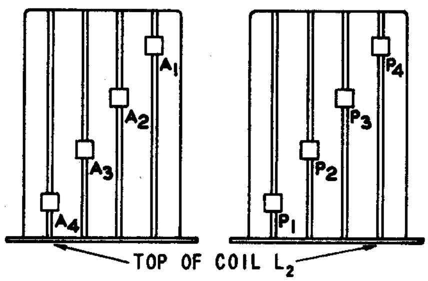
1. Set CRYSTAL SELECTOR sw to channel 1, release and pull out front panel.

FRONT PANEL SECTION



2. Install crystals, for frequencies to be used, in any desired order in channel sockets and record channel frequencies on tuning chart on front panel.
3. Set slider A_1 at bottom of tank coil L_2 and slider P_1 near top of coil for channel 1. The initial position of P_1 is best determined by experiment but in general will be near top of the coil for the lowest frequency and about 1/3 to 1/2 the way down the coil for the highest frequency.

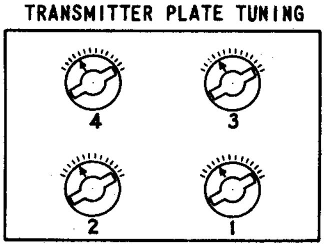
Set sliders to engage one turn only.



POSITION OF SLIDERS "A" POSITION OF SLIDERS "P"

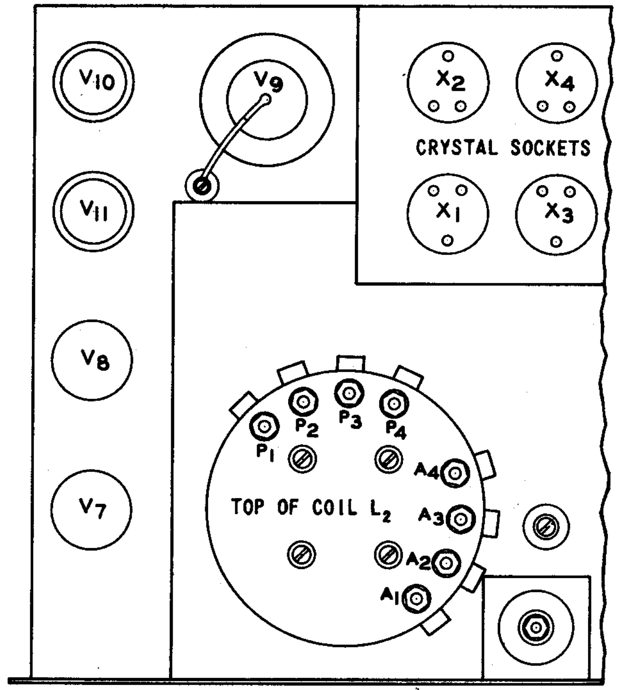
4. Close front panel, connect an antenna, open the small tuning door at left center of panel.
5. Turn on transmitter and receiver and depress handset button.
6. Through tuning door, rotate knob of PLATE TUNING capacitor for channel 1, capacitor C_{28}, until a dip in reading of P. A. PLATE CURRENT meter is obtained.

TRANSMITTER PLATE TUNING



TUNING DOOR

TOP VIEW TRANSMITTER SECTION
R-F CHASSIS



FRONT

7. If no dip is obtained, reset slider P_1 up or down the coil a few turns and retune PLATE TUNING capacitor. The minimum reading should occur near center of tuning scale and meter should read between 30 ma and 50 ma.
8. Open the front panel and move slider A_1 up a few turns from the bottom of coil.
9. Close panel, press handset button, and retune PLATE TUNING capacitor for min on P.A. PLATE CURRENT meter.
10. Repeat this procedure, moving slider A_1 up the coil a few turns at a time until plate current at resonance is 130 ma. If antenna is less than 85 ft long, shifting slider A_1 up the coil will require an equal relocation of slider P_1 down the coil to keep the resonance setting near center of tuning scale.
11. Repeat the procedure 3 to 10 for channels 2, 3, and 4.
12. Check PLATE TUNING controls on all bands and retune if necessary.
13. Adjustment of transmitter should be checked every 3 to 6 months after this initial adjustment and when major changes have been made in the antenna system.

LOCATING TROUBLE

General- The most common source of trouble is either a blown fuse or a defective tube, and these should be checked first. If fuses continue to blow, the source of trouble might be high line voltage, a defective tube, a defective bypass or filter capacitor, a short circuit due to loose foreign material or a broken connection in the equipment, a defective resistor, or a defective transformer, in the order named.

Receiver

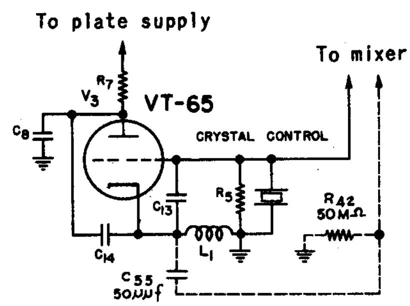
1. If receiver howls or clicks intermittently, remove and check Tubes VT-152-A, and VT-92.
2. In case of serious distortion on strong signals which disappears when antenna is disconnected, check between secondary return of antenna transformer and chassis. Resistance should be over 500,000 ohms. Low resistance indicates a short circuit to chassis in A.V.C. circuit.
3. If receiver operates intermittently, check Tube VT-87 for gas and replace if necessary.

Transmitter

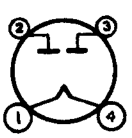
1. If no antenna tuning points are found, check that proper crystals are plugged in and also try a new crystal for this channel.
2. Check for proper oscillation by noting plate current reading. Pull out crystal, and again note reading, which should drop to about 150 ma.
3. Replace V_9 and note results, if no oscillation is obtained.
4. If plate current falls off after several seconds of operation, replace all Tubes VT-100, one at a time, and note results. Recheck antenna tuning.
5. If modulation is weak, has a loud hum, or is badly distorted, replace Tubes VT-115.

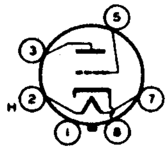
DESIGN DIFFERENCES

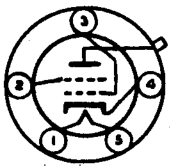
The circuit difference between the Radio Receiver and Transmitter BC-441-A and BC-441-B is in the method of coupling the r-f oscillator to the mixer in the receiver. The method used in the BC-441-A is shown on the following drawing in solid lines, that used in the BC-441-B is shown in broken lines. There is no operational difference.

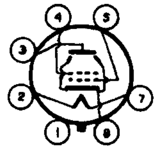


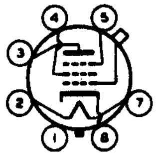
TUBE SOCKET TERMINALS, BOTTOM VIEW

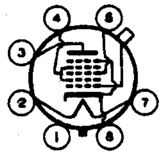

VT-145
RMA TYPE 5Z3

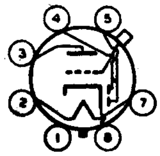

VT-65
RMA TYPE 6C5

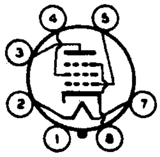

VT-100
RMA TYPE 807

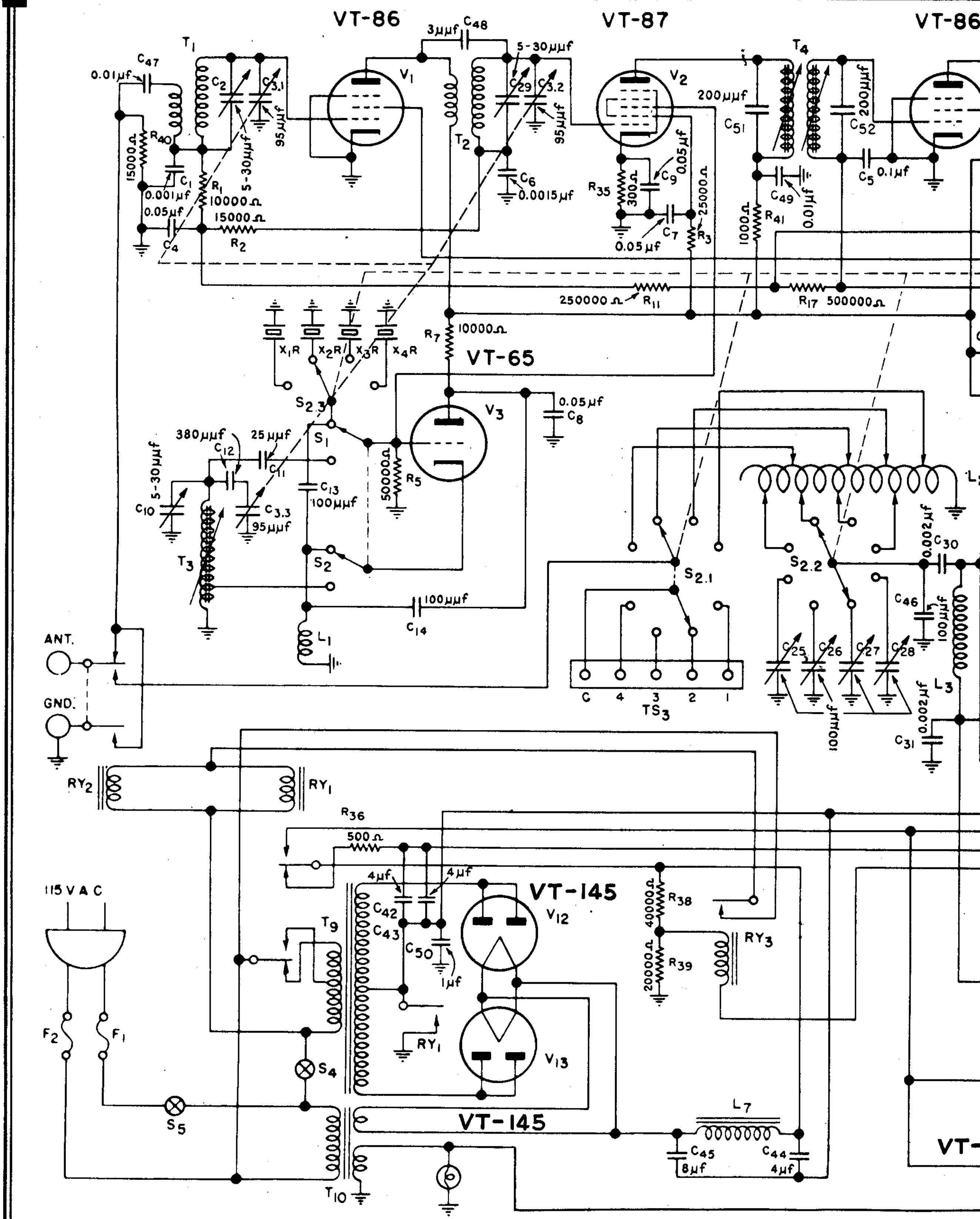

VT-115
RMA TYPE 6L6


VT-86
RMA TYPE 6K7

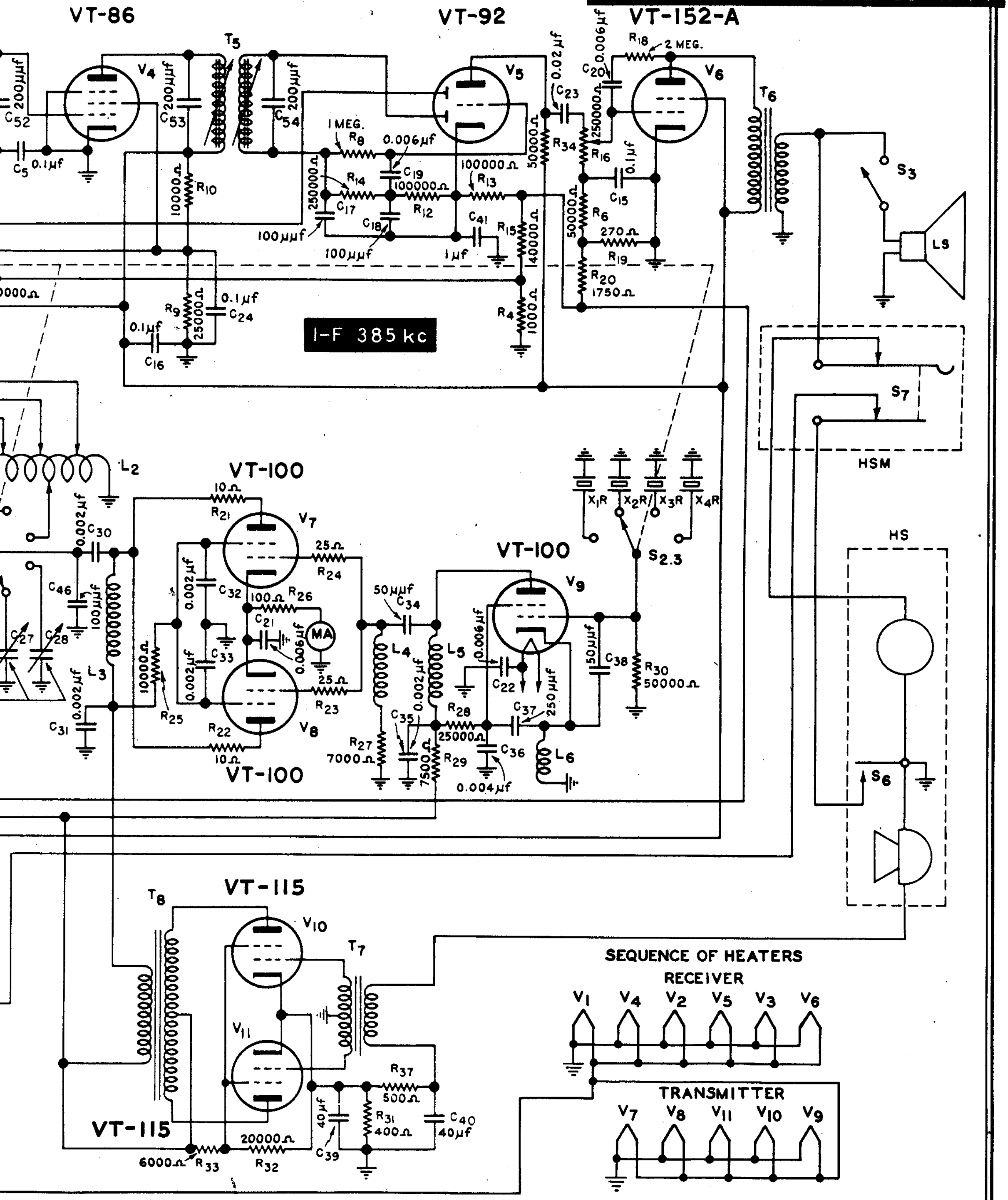

VT-87
RMA TYPE 6L7


VT-92
RMA TYPE 6Q7


VT-152-A
RMA TYPE 6K6G



Schematic—BC-4



chematic—BC-441-A

See page 4 for circuit differences between BC-441-A and BC-441-B.

RADIO RECEIVER & TRANSMITTER BC-474

Part of: SCR-288

Reference: TM 11-250

RESISTANCE AND VOLTAGE MEASUREMENTS

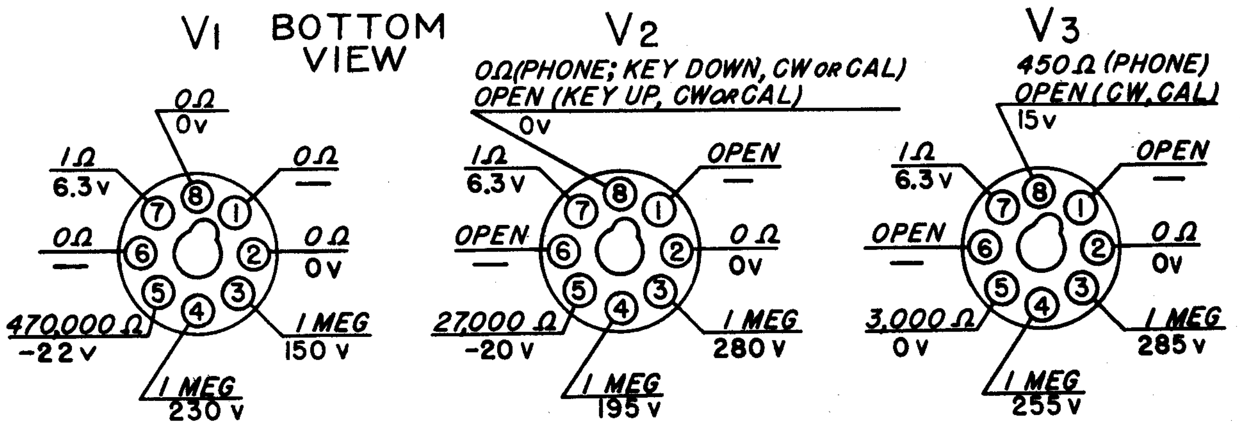


Fig. 1.—Voltages and resistances—transmitter tube sockets.

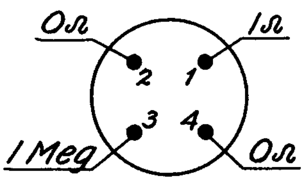


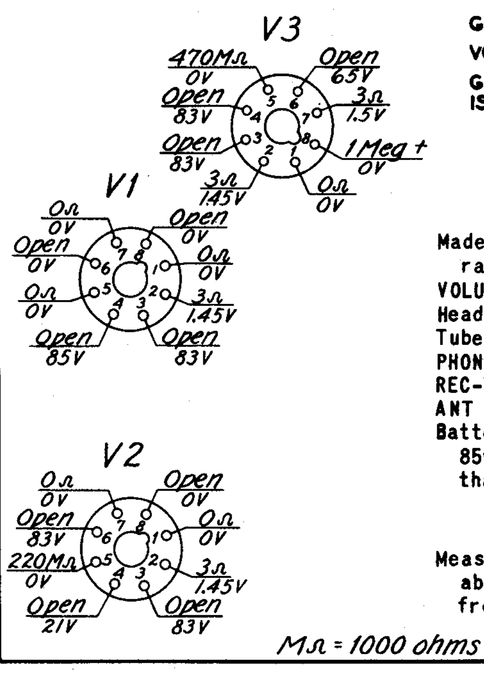
Fig. 2.—Resistances—generator cable plug pins.

RESISTANCE MEASUREMENTS

Measurements are to chassis
REC-TRANS switch at TRANS.
EMISSION SELECTOR switch at PHONE, CW, or CAL except as noted.
Cable plug removed from generator.
Tubes in place.
Key plugged in; open except as noted.

VOLTAGE MEASUREMENTS

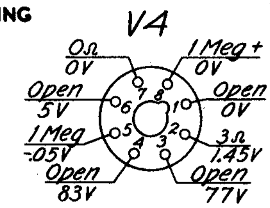
Made to chassis on lowest suitable range of 1000 ohms/volt meter.
REC-TRANS switch at TRANS.
EMISSION SELECTOR at PHONE.
Ant and cpse disconnected.
OSC TUNING at 3500kc, PA TUNING at resonance dip (35ma).
Generator voltage (B+ to B-), 295v.



GRID CAP-TO-GROUND VOLTAGE READING IS ZERO FOR ALL TUBES

VOLTAGE ACROSS R 25 IS 8v

GRID CAP-TO-GROUND RESISTANCE READING IS OVER 1 MEG FOR ALL TUBES



VOLTAGE MEASUREMENTS

Made to chassis on lowest suitable range of 1000 ohms/volt meter.
VOLUME control full on.
Headset plug in PHONES jack.
Tubes in place.
PHONE-CW switch at PHONE.
REC-TRANS switch at REC.
ANT and GND binding posts shorted.
Battery voltages (rec on), 1.45v and 85v. Replace battery pack if lower than 1.1v and 66v.

BOTTOM VIEW

RESISTANCE MEASUREMENTS

Measured under same conditions as above except remove battery plug from battery pack or filter.

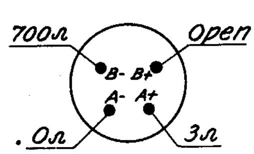


Fig. 3.—Voltages and resistances—receiver tube sockets.

Fig. 4.—Resistances—receiver battery plug pins.

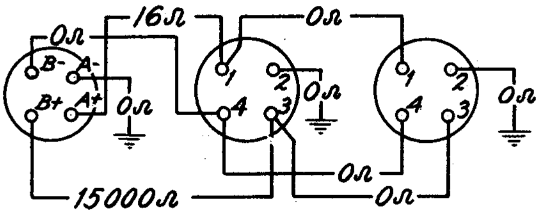


Fig. 5.—Resistances—filter unit sockets.

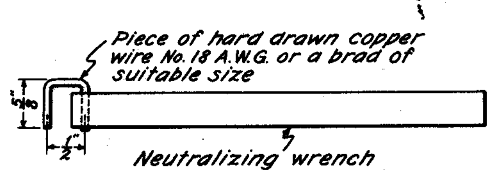


Fig. 6.—Alignment tool for C_{23} - C_{25}.

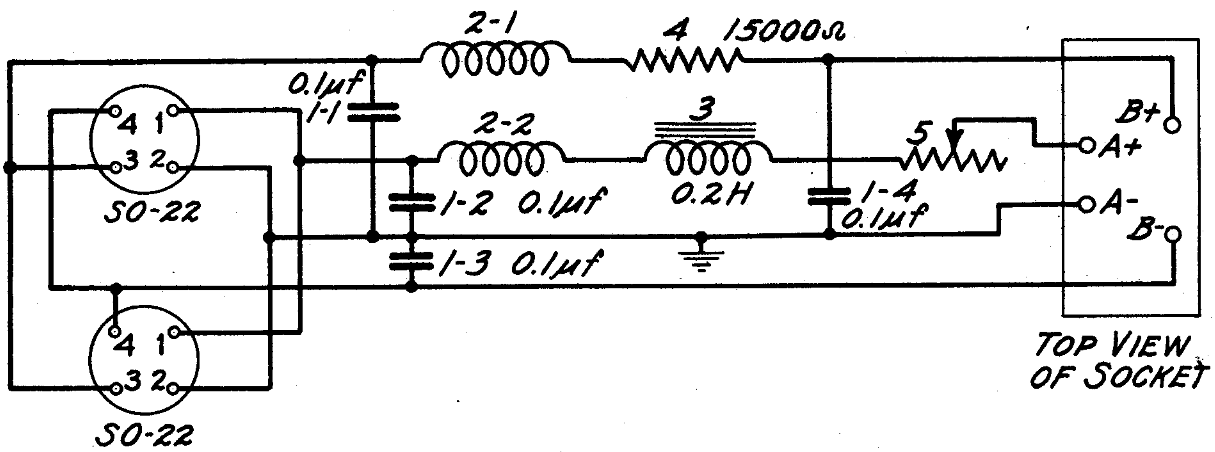


Fig. 7.—Schematic—Filter FL-10.

RECEIVER ALIGNMENT

OPERATION	Signal Generator: Connect to	Signal Generator: Series Capacitor	Signal Generator: Setting	Rec. Dial	Adjust ¢
(a) 2nd I-F *	V_3 cap	0.1 μf	455kc#	2500kc	T_3 sec, pri
(b) 1st I-F *	V_2 cap	0.1 μf	455kc	2500kc	T_2 sec, pri
(c) C-W Osc $ *	V_2 cap	0.1 μf	455kc	2500kc	L_1 $
(d) R-F, Det, Osc	Ant post	150 μμf	6300kc#	6300kc	%C_{23}, C_{24}, C_{25}
(e) R-F, Det, Osc	Ant post	150 μμf	2500kc#	2500kc	T_6, T_4, T_5
(f) Repeat (d) and (e) as necessary for fine adjustment.					

VOLUME control full on.
PHONE-CW switch at CW.
Allow ½ hr warm-up period for rcvr, sig gen, and freq meter.
Use modulated output from sig gen: connect "low" side to chassis, GND binding post, and ground; connect "high" side thru a series capacitor to points as indicated.
Adjust for max on output meter plugged in EXTRA PHONES jack.

* Using a short wire, ground terminal B of T_6 for operations (a), (b), (c) only.
¢ Adjust in the order listed. See figures 8 and 9 for adjustment locations.
$ For operation (c) *only*, turn sig gen modulation OFF, and PHONE-CW switch to CW. Adjust L_1 for zero beat, then turn clockwise for 1000 cycle note.
\# Use frequency meter to set signal generator frequency accurately.
% If two peaks appear at C_{23}, use one with plunger farthest out.

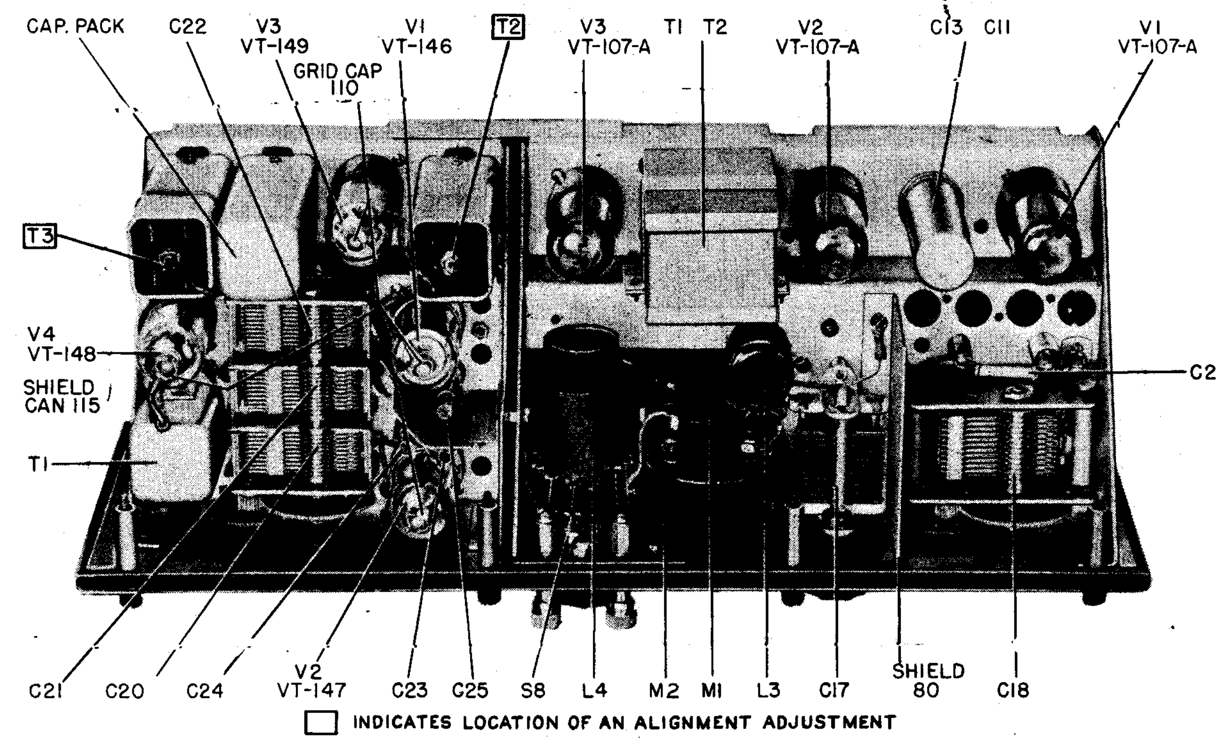


Fig. 8.—Chassis—top view.

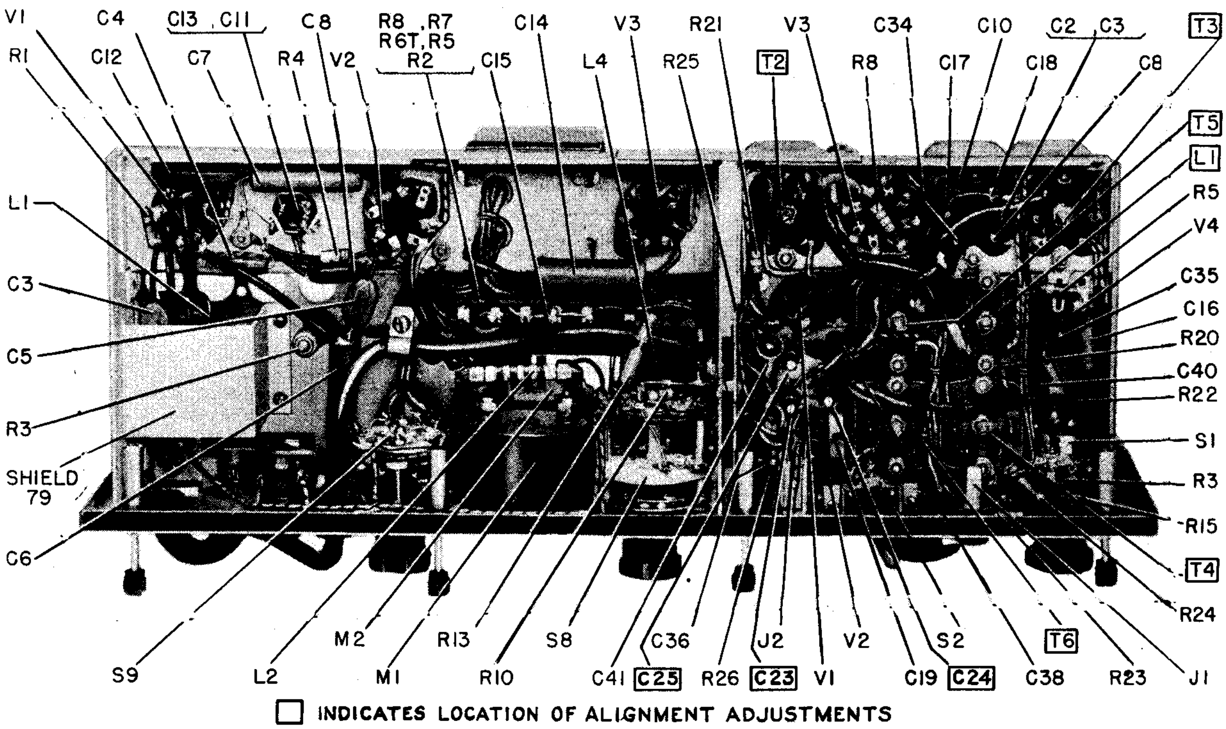


Fig. 9.—Chassis—bottom view.

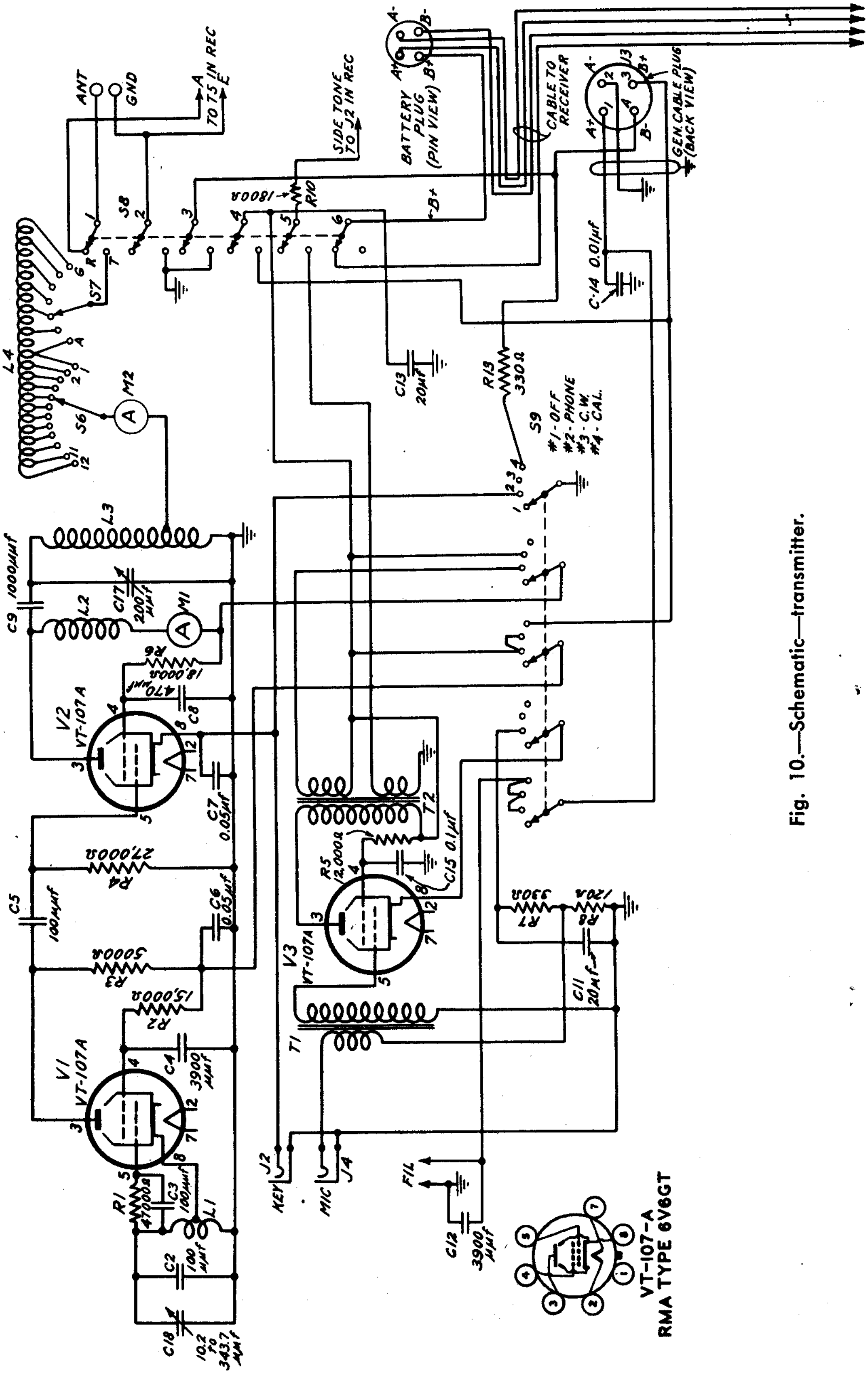


Fig. 10.—Schematic—transmitter.

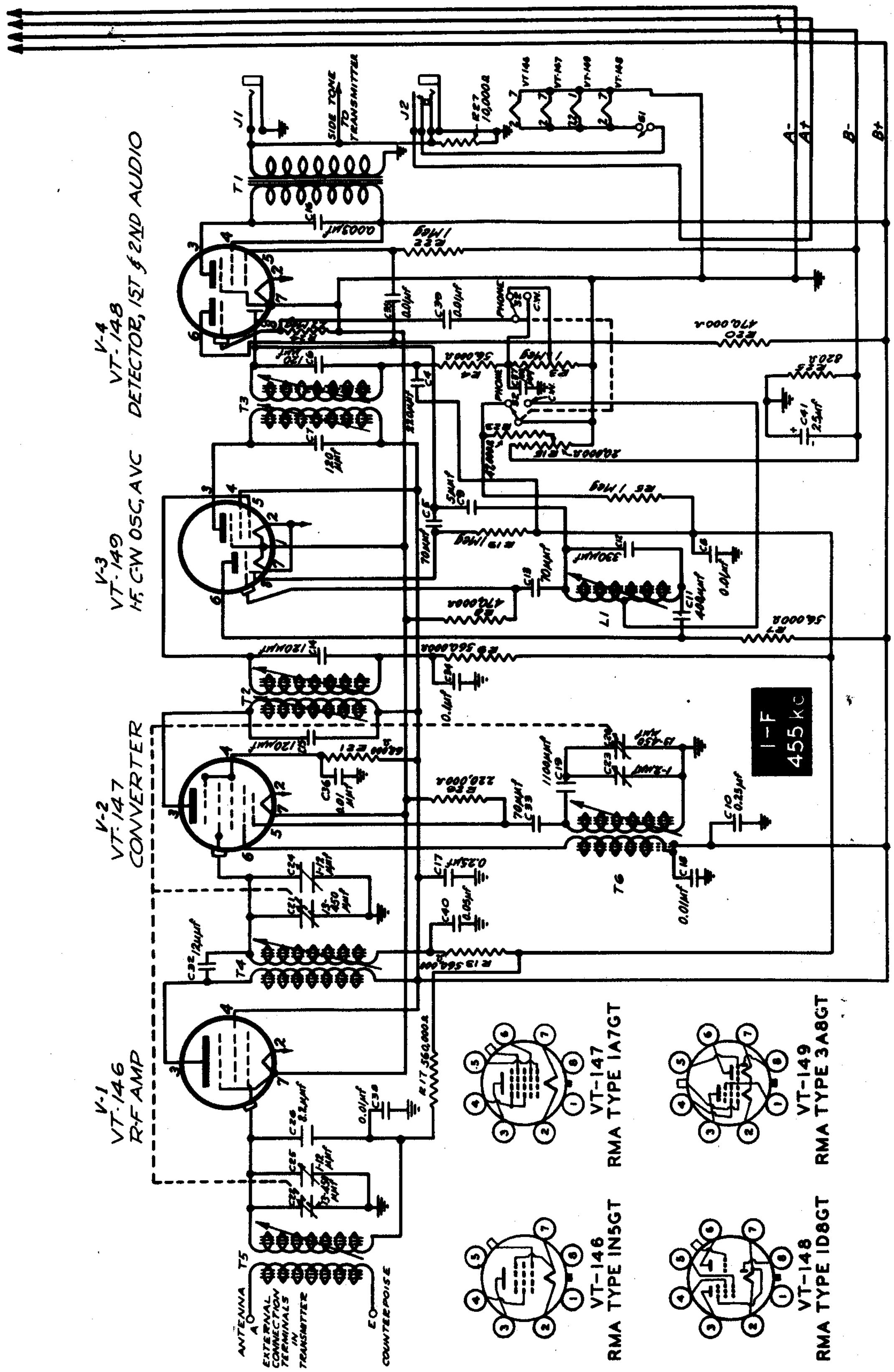


Fig. 11.—Schematic—receiver.

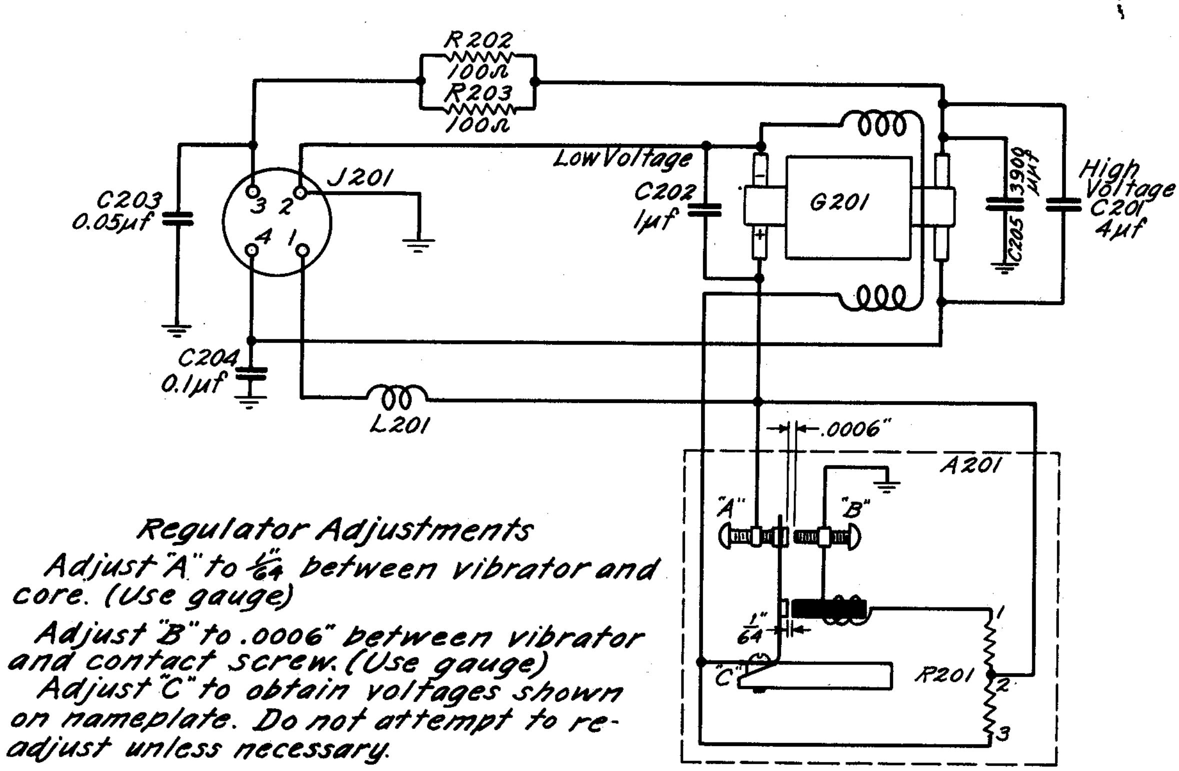


Fig. 12.—Schematic—Generator GN-44-A.

COMMON FAULTS AND CORRECTIVE MEASURES

OSCILLATION OR FRINGE HOWL IN RECEIVER OUTPUT STAGE

1. Information has been received from the field concerning the output stage oscillations or fringe howl in Radio Receiver BC-474 after only a relative short period of service.

2. This condition has been investigated and recommendations for remedying are made as follows:

   a. Shield the Tube VT-148 with Tube Shield #1727, less grid cap as manufactured by the Insuline Corporation of America, used in conjunction with accompanying ground clip.

   b. Ground the No. 1 pin of the VT-148 through its socket to the chassis using the shortest possible connection. This will result in the Tube Shield #1727 being grounded through its clip to Tube Pin No. 1, and through the corresponding socket connection to the chassis.

3. Tube Shields #1727, (Stock Number 2Z8308) may be obtained by requisitioning through the usual supply channels.

Ref: Maintenance Letter No. 34 (1943)

RADIO RECEIVER BC-603-(*)

BC-603-(*)=BC-603- A , BC-603- B , BC-603- C , and BC-603- D

Part of: SCR-508-(*)
SCR-528-(*)
SCR-538-(*)

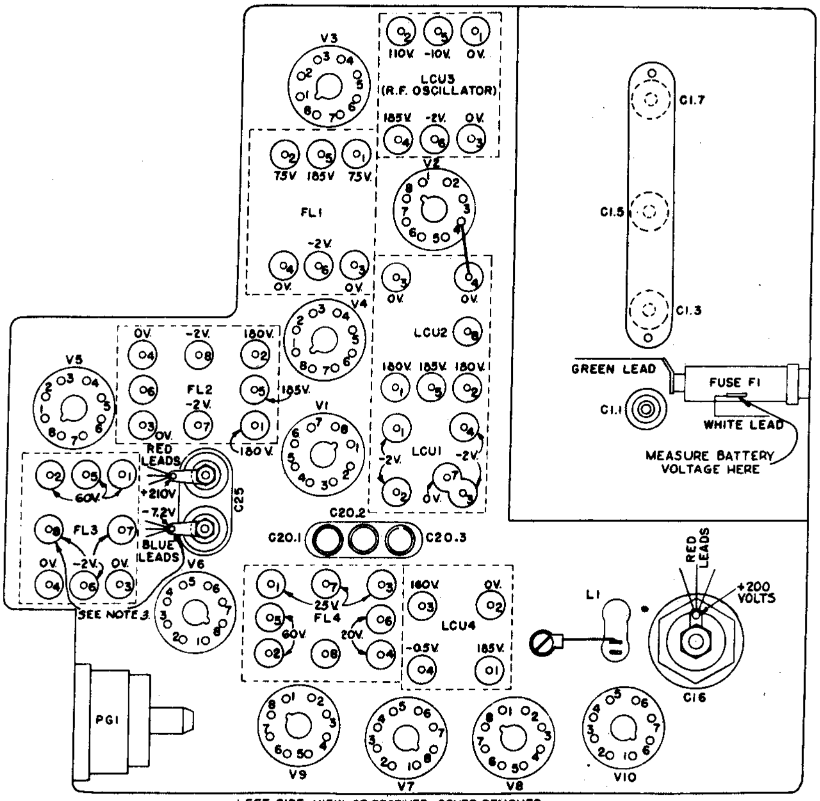
Reference: TM 11-600

VOLTAGE MEASUREMENTS

NOTES:

1. Voltages listed on this diagram are for a battery voltage of 12 volts. All voltages listed will change by approximately the same ratio as the actual battery voltage is to 12 volts for normal operation.
2. All voltages should be measured between designated terminal and the receiver chassis. All switches except the TUNE-OPERATE and the ON-OFF should be in the downward position.
3. SQUELCH sw ON and SENSITIVITY control at minimum for measurement at this point only.

Indicated voltages read with a electronic voltmeter



LEFT SIDE VIEW OF RECEIVER, COVER REMOVED

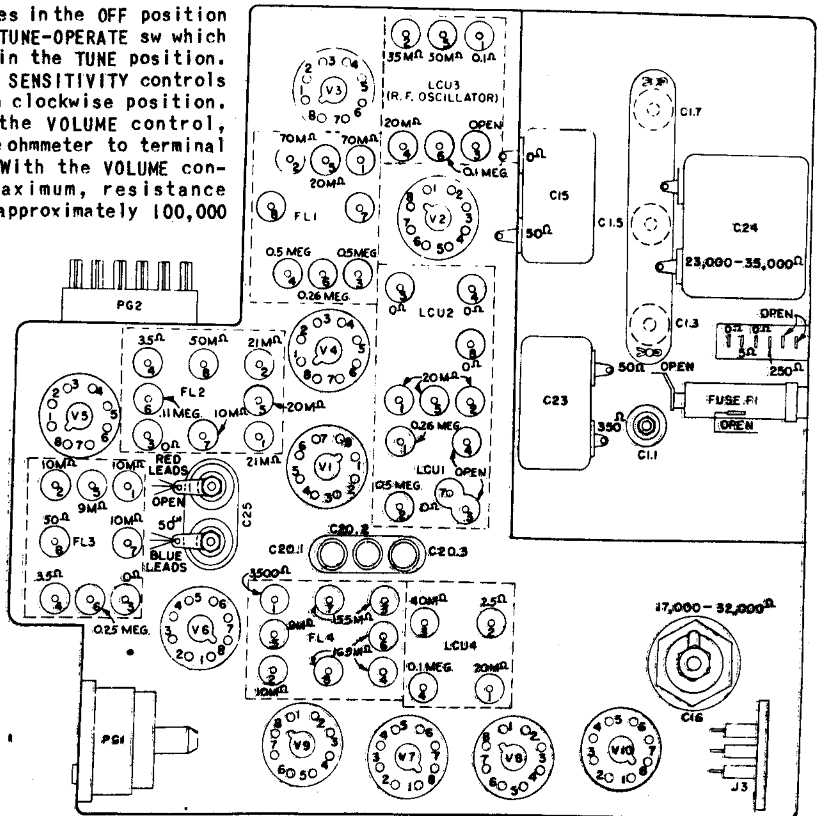
VOLTAGES AT VACUUM TUBE SOCKET TERMINALS
USING AN ELECTRONIC VOLTMETER
12 VOLTS INPUT

TERM. NOS.	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1	0	0	0	0	0	0	0	0	15	0
2	0	12	0	12	12	6	12	6	0	75
3	0	-2	110	0	0	0.5	20	190	15	1
4	-2	0	0	-2	-2	-2	25	180	-2	-0.5
5	0	1.3	-10	0	0	0.5	20	-2	-2	160
6	155	55	0	120	90	60	0	0	20	0
7	6	6	6	0	0	12	6	0	6	6
8	180	75	0	180	60	60	25	6	0	12

RESISTANCE MEASUREMENTS

NOTES

1. Resistance values are measured between chassis and designated terminals.
2. A variation of 20% from indicated values need not be considered as cause for a defective receiver.
3. Certain discrepancies may be observed between the schematic drawings contained in these instructions and the circuit label appearing on the receiver.
4. The dynamotor must be removed for these measurements.
5. All switches in the OFF position except the TUNE-OPERATE sw which should be in the TUNE position.
6. VOLUME AND SENSITIVITY controls at maximum clockwise position.
7. To check the VOLUME control, connect the ohmmeter to terminal 5 of V8. With the VOLUME control at maximum, resistance should be approximately 100,000 ohms and should decrease to zero as the VOLUME control is turned to its extreme counterclockwise position.
8. To check the SENSITIVITY control, turn the SQUELCH switch ON and measure the resistance from the terminal of C25 to which the blue leads are attached. The resistance at C20.2 should be 6,000 ohms with the SQUELCH switch ON.



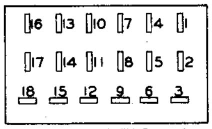
LEFT SIDE VIEW OF RECEIVER – COVER REMOVED

RESISTANCES AT VACUUM TUBE SOCKET TERMINALS (OHMS)
RECEIVER WHICH INCLUDES R21, R95, ETC. (MODIFIED) See Schematic

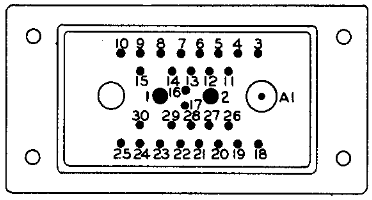
Terminal	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1	0	0	0	0	0	0	0	0	2 meg	1.25 meg
2	0	4**	0	9**	9**	5**	5**	5**	0.25 meg	2 meg
3	0	100M	35M	0	0	800	165M	Open	6,700	2M
4	500M	0	Open	460M	120M	260M	155M	25M	250M	100M
5	0	500	50M	0	0	800	165M	100M	250M	48M
6	48M	280M	Open	50M	90M	10M	Open	Open	165M	0
7	2.5**	2.5**	4**	0	5**	4**	5**	5**	5**	4**
8	21M	70M	0	21M	10M	10M	155M	350	5**	5**

**Tube filament resistance subject to large variation with heat. M indicates thousand ohms.

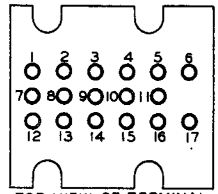
RESISTANCE MEASUREMENTS



TOP VIEW OF TERMINAL SIDE OF PG2.



VIEW OF PIN SIDE OF PG1



TOP VIEW OF TERMINAL SIDE OF J3.

RESISTANCES AT TERMINALS OF PG2 (OHMS)

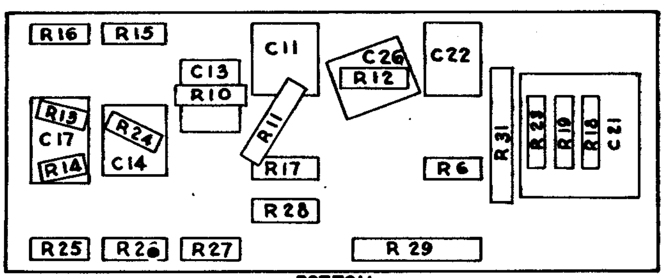
Terminal	Resistance Values
1	0
2	4.5-7.0
3,4,5,6	Open
7	40-60
8	Open
9	4.5-7.0
10,11	Open
12	3.6-5.4
13	17M-32M
14	Open
15	7.0-10.6
16,17,18	Open

RESISTANCE AT TERMINALS OF PG1 (OHMS)

Terminal	Resistance Values
1	Open
2	0
A1	Open
3	800
4,5	Open
6	3600
7	250
8,9	Open
10	155M
18	400M
19,20,21	Open
22	50
23	Open
24	260M
25	Open

RESISTANCES AT TERMINALS OF J3 (OHMS)

Terminal	Resistance Values
1,2	Open
3	17M-32M
4	2 Meg
5	100M
6	50
7,8	Open
9	6M
10	100M
11	50
12	250
13	0
14	10M
15	17M-32M
16,17	Open



BOTTOM
RESISTANCE STRIP

RESISTANCES AT RESISTANCE STRIP

Unit	Left side (or bottom)	Right side (or top)
R16	2 meg	1 meg
R13	0.25 meg	0.25 meg
C17	0	1 meg
R14	50	0.25 meg
R25	0	2,500
R15	1 meg	0.2 meg
R24	50	0
C14	0.25 meg	0
R26	2,500	3,700
R10	0.2 meg	0.5 meg
C13	0	1.2 meg
R27	3,700	6,200
C11	0.5 meg	1.2 meg
R11	0.25 meg	1.2 meg
R17	0.25 meg	0
R28	6,200	8,700
C26	1.2 meg	150M
R12	0	2M
R29	8,700	21M
C22	Open	Open
R6	150M	45M
R31	21M x	25M x
R23	30M x	25M x
R19	2 meg	25M x
R18	2 meg	2 meg
C21	0.1 meg	2 meg

x AVERAGE VALUES

ALIGNMENT

ALIGNMENT OF I-F AMPLIFIER

1. Remove dust cover, connect a short lead between pin 5 of V3 and C25 (1) (to which blue tracer wires are connected).
2. Release all selector buttons and connect receiver for operation. Set SPEAKER sw to ON, SENSITIVITY and VOLUME control on max, TUNE-OPERATE sw on OPERATE, RADIO and INT-INT ONLY sw on RADIO and INT, and SQUELCH sw to OFF.
3. Connect the d-c lead of an electronic or vacuum-tube voltmeter to pin 4 of V6 (2) and common lead to chassis. Use 3-volt scale and set meter to zero.
4. Connect an I-72-(*) sig gen through a 0.1 μf capacitor between pin 4 of V2 (3) and chassis. Set sig gen frequency to 2.65 mc. Use an unmodulated signal throughout procedure.
5. Turn on receiver and sig gen and allow them to warm up. Check sig gen setting with a Frequency Meter Set SCR-211-(*). Adjust output to give less than 1-volt indication on meter.
6. Connect a 1,000 ohm resistor between terminals 3 and 4 of FL3 (4) and adjust primary of FL3 (5) for max on meter.
7. Move resistor to terminals 1 and 2 of FL3 (6) and adjust secondary (7) for max on meter.
8. Adjust FL2 (8) and (9), (10) and (11) and FL1 (12) and (13), (14) and (15) in like manner. Remove resistor from FL1.

ALIGNMENT OF DISCRIMINATOR AND I-F OSC

1. Connect voltmeter between pins 4 and 8 of V7 (16). Use 3-volt scale and set to zero.
2. Connect sig gen as for I-F alignment (3). Adjust output to give about 1-volt deflection on meter.
3. Adjust secondary of FL4 (17) for zero on meter. Meter should reverse as adjustment is varied either side of zero indication point.
4. Lower sig gen frequency from 2.65 mc for max on meter. Note sig gen dial setting and meter reading.
5. Raise sig gen frequency above 2.65 mc by same amount it was lowered in 4. Note meter reading.
6. Adjust primary of FL4 (18) to obtain equal meter readings at both frequency settings.
7. Place TUNE-OPERATE sw on TUNE and adjust LCU4 (19) for zero beat.
8. Remove short lead from C25 and V3 (1).

NOTE:

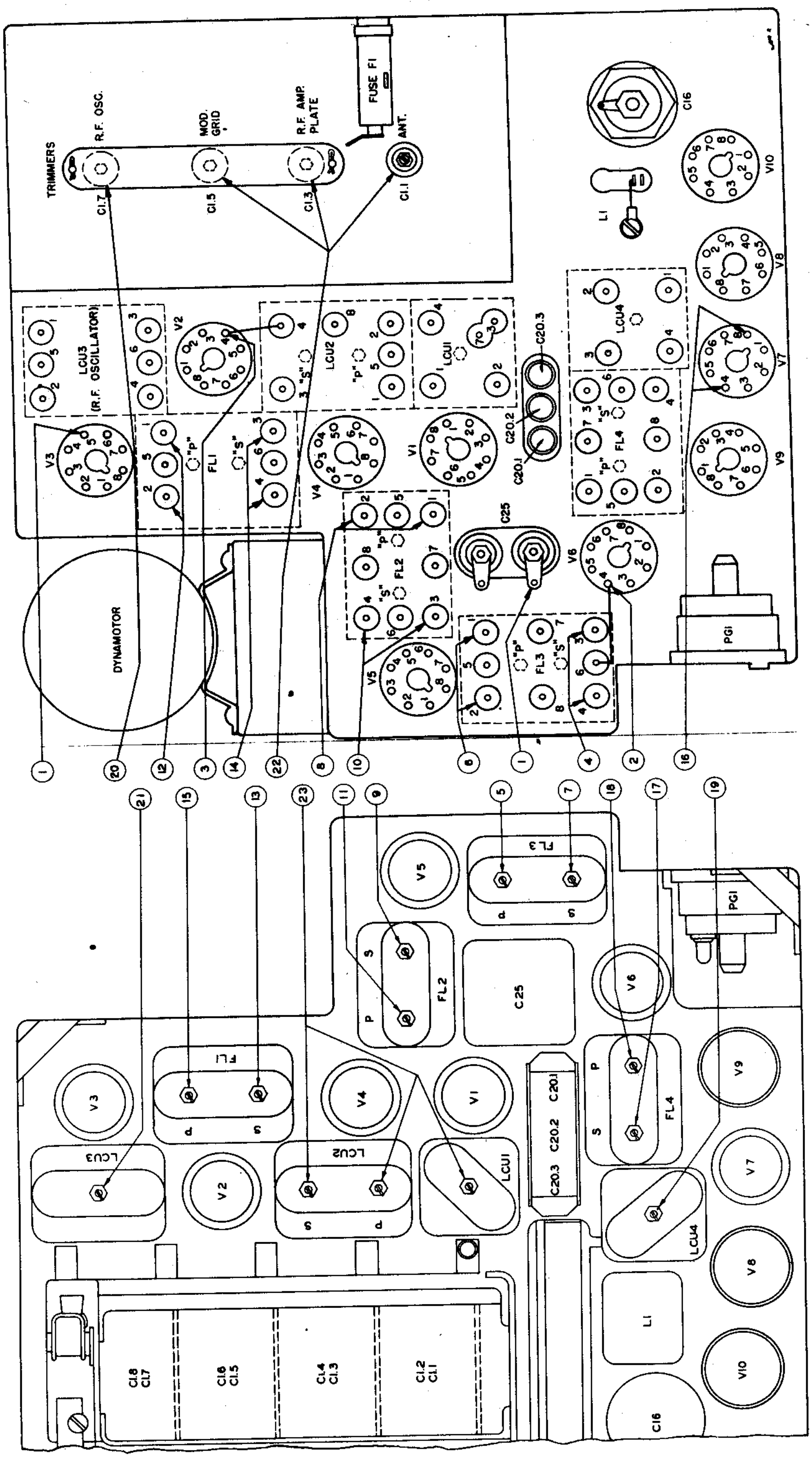
Use harmonics of sig gen output for all steps of r-f alignment procedure in which the frequency exceeds the fundamental range of the sig gen.

ALIGNMENT OF R-F OSCILLATOR AND AMPLIFIER

1. Connect sig gen to "A" and "G" posts of receiver and set receiver and sig gen dials to 27 mc. Check frequency with SCR-211-(*).
2. Connect voltmeter as in discriminator alignment (16).
3. Set TUNE-OPERATE sw on TUNE and adjust C1.7 (20) for zero beat in speaker. Meter should read zero at zero beat.
4. Set sig gen and receiver dial to 21 mc (check with frequency meter) and adjust LCU3 (21) for zero beat in speaker. Voltmeter should read zero at zero beat.
5. Repeat steps 3 and 4 until receiver dial calibration is correct at both frequencies.
6. Check dial calibration at 26.0, 24.0, and 22.0 mc. Zero beat should be obtained within ½-dial division at each of these points.
7. Move voltmeter connection to pin 4 of V6 (2) and chassis.
8. Tune receiver to zero beat with 27.0 mc signal from sig gen and turn TUNE-OPERATE sw to OPERATE.
9. Adjust in turn C1.5, C1.3, and C1.1 (22) for max on meter. Sig gen output must be reduced to give less than 1-volt indication on meter.
10. Adjust sig gen and receiver dial to 21.0 mc and adjust LCU2 and LCU1 (23) for max on meter.
11. Restore receiver to normal.

Numbers in circles refer to LOCATION OF ALIGNMENT ADJUSTMENTS

LOCATION OF ALIGNMENT ADJUSTMENTS



LEFT SIDE VIEW

RIGHT SIDE VIEW

561384 O - 43 - 2

PRESETTING

1. Use an amplitude or frequency modulated signal generator, a remote or adjacent BC-604-(*) transmitter as a signal source. In case of an adjacent transmitter, operate it with RECEIVER TUNE-OPERATE sw at RECEIVER TUNE. Signal source should be unmodulated.

2. Turn on receiver and allow it to warm up for 15 min. Release all push buttons. While pressing PUSH TO TUNE button, turn dial by means of TUNING Control to LOCK, at high frequency end of dial. Release selector locking screw.

3. Turn on transmitter and tune to highest frequency channel to be preset. Using PUSH TO TUNE button and TUNING Control, tune receiver to zero beat with this signal.

4. While holding PUSH TO TUNE button and TUNING Control, depress selector button corresponding to channel being preset, retune slightly if necessary. Still holding the receiver to zero beat, release channel button by partially depressing another. Repeat the adjustment if beat note is higher than 1,000 cycles.

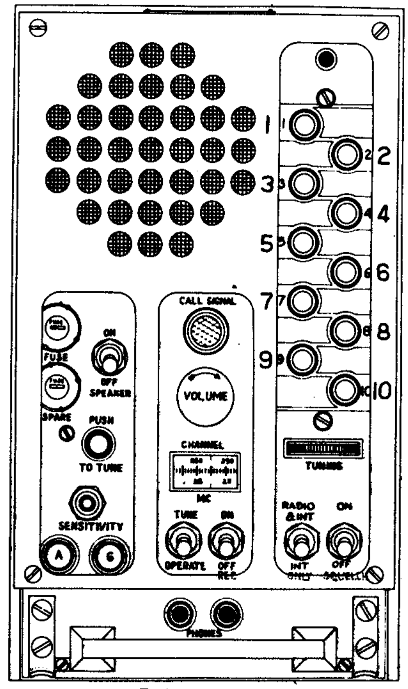
5. Repeat steps 3 and 4, retuning transmitter, for other channels to be preset, going from a higher to the next lower channel until all selector buttons have been set.

6. Rotate dial to LOCK and tighten selector locking screw.

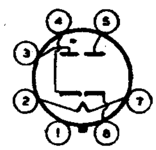
7. Depress each channel button and check that an audible beat note can be heard without moving dial more than ± one-tenth dial division with transmitter tuned to same channel.

8. Write channel numbers beside buttons in space provided.

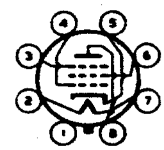
9. Install set in vehicle and connect receiver to the antenna with which it will be operated. Turn SQUELCH sw ON, SENSITIVITY Control to max, receiver ON-OFF sw ON, and tune in a weak signal near high frequency end of band. Reduce SENSITIVITY control setting until CALL SIGNAL lamp flickers. Adjust antenna trimmer capacitor (C1.1 Page 5) for slowest possible rate of flicker of CALL SIGNAL lamp. Should CALL SIGNAL lamp be brought to steady illumination during adjustment of capacitor, reduce SENSITIVITY Control setting until lamp flickers again. Continue these adjustments until no further change is noted.



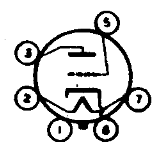
FRONT PANEL



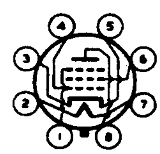
VT-90
(RMA TYPE 6H6)



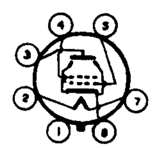
VT-112
(RMA TYPE 6AC7)



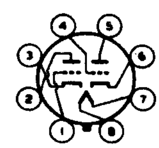
VT-94
(RMA TYPE 6J5)



VT-209
(RMA TYPE 12SG7)

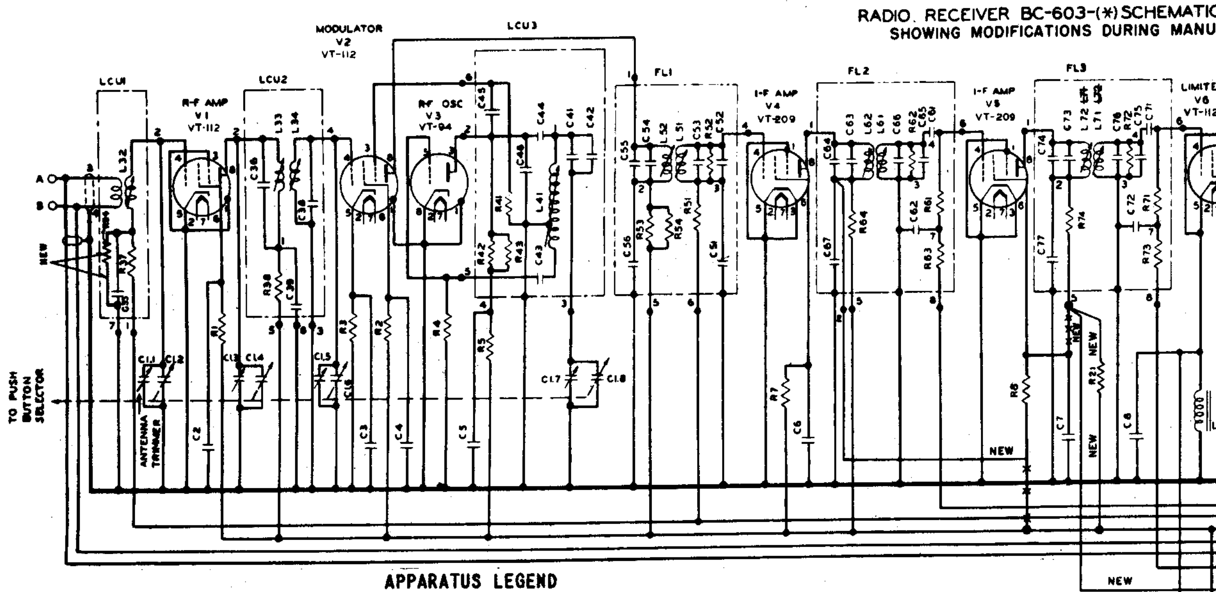


VT-107A
(RMA TYPE 6V6GT)



VT-229
(RMA TYPE 6SL7GT)

RADIO. RECEIVER BC-603-(*) SCHEMATIC
SHOWING MODIFICATIONS DURING MANU



APPARATUS LEGEND

CAPACITORS

C1.1 16μμf MAX
C1.3 16μμf MAX
C1.5 16μμf MAX
C1.7 16μμf MAX
C1.2 62μμf MAX
C1.4 62μμf MAX
C1.6 62μμf MAX
C1.8 62μμf MAX
C2 0.006μf 300V
C3 0.006μf 300V
C4 0.006μf 300V
C5 0.006μf 300V
C6 0.006μf 300V
C7 0.006μf 300V
C8 500μμf 500V
C9 0.006μf 300V
C10 0.75μμf 500V
C11 ~~0.01~~ .006μf 300V
C12 0.01μf 300V
C13 500μμf 500V
C14 0.006μf 300V
C15 0.5μf 600V
C16 2μf 600V
C17 0.01μf 300V
C18 0.01μf 300V
C19 0.002μf 500V
C20.1 0.1μf 600V
C20.2 0.1μf 600V
C20.3 0.1μf 600V
C21 0.01μf 300V
C22 0.005μf 300V
C23 40μf 25V
C24 1μf 600V
C25 2μf 600V
C26 ~~0.001~~ 0.0005μf 500V
C35 ~~0.01~~ 0.006μf 300V
C36 10μμf 500V
C38 10μμf 500V
C39 0.006μf 300V
C41 700μμf 500V
C42 200μμf 500V
C43 ~~100~~ 250μμf 500V
C44 30μμf 500V
C45 100μμf 500V
C46 20μμf 500V
C51 0.006μf 300V
C52 10μμf OR 60μμf 500V
C53 50μμf SEE NOTE 2
C54 50μμf OR 60μμf 500V
C55 10μμf SEE NOTE 2
C56 0.006μf 300V
C61 ~~25~~ 100μμf 500V
C62 ~~0.006~~ 0.001μf 500V
C63 50μμf OR 60μμf 500V
C64 10μμf SEE NOTE 2
C65 10μμf OR 60μμf 500V
C66 50μμf SEE NOTE 2
C67 0.006μf 300V
C71 ~~25~~ 50μμf 500V
C72 ~~0.006~~ 0.001μf 500V
C73 50μμf OR 60μμf 500V
C74 10μμf SEE NOTE 2
C75 10μμf OR 60μμf 500V
C76 50μμf SEE NOTE 2
C77 0.006μf 300V
C81 250μμf 500V
C82 ~~0.01~~ 0.006μf 300V
C83 0.006μf 300V
C84 5μμf 500V
C85 50 OR 60μμf 500V SEE
C86 50 OR 60μμf 500V NOTE 1
C87 25μμf OR 35μμf 500V
C88 10μμf SEE NOTE 2
C91 50μμf 500V
C92 50μμf 500V
C93 100μμf 500V
C94 50μμf 500V

POTENTIOMETERS

P1 100,000Ω
P2 200Ω

RESISTORS

R1 ~~20,000~~ 30,000Ω 1/2W
R2 250,000Ω 1/2W
R3 500Ω 1/2W
R4 50,000Ω 1/2W
R5 300Ω 1/2W
R6 100,000Ω 1/2W
R7 30,000Ω 1W
R8 ~~20,000~~ 70,000Ω 1/2W
R9 1,000Ω 1/2W
R10 250,000Ω 1/2W
R11 1,000,000Ω 1/2W
R12 2,000Ω 1/2W
R13 10,000Ω 1/2W
R14 250,000Ω 1/2W
R15 1,000,000Ω 1/2W
R16 1,000,000Ω 1/2W
R17 ~~1,000,000~~ 250,000Ω 1/2W
R18 100,000Ω 1/2W
R19 ~~1,000,000~~ 2,000,000Ω 1/2W
R20 300Ω 1W
R21 30,000Ω 2W ADDED
R22 30,000Ω 1/2W
R23 5,000Ω 1/2W
R24 50Ω 1/2W
R25 2,500Ω 1/2W
R26 1200Ω 1/2W
R27 2,500Ω 1/2W
R28 2,500Ω 1/2W
R29 13,000 Ω 2W
R30 5Ω 4W
R31 6,800Ω 1W
R32 30,000Ω 1/2W
R33 30,000Ω 1/2W
R37 250,000Ω 1/2W
R38 1,000Ω 1/2W
R41 100,000Ω 1/2W
R42 30,000Ω 1W
R43 30,000Ω 1W
R51 250,000Ω 1/2W
R52 30,000Ω 1/2W
R53 100,000Ω 1/2W
R54 100,000Ω 1/2W
R61 ~~250,000~~ 100,000Ω 1/2W
R62 ~~30,000~~ 43,000Ω 1/2W
R63 ~~250,000~~ 10,000Ω 1/2W
R64 1,000Ω 1/2W
R71 250,000Ω 1/2W
R72 30,000Ω 1/2W
R73 ~~250,000~~ 10,000Ω 1/2W
R74 ~~10,000~~ 1000Ω 1/2W
R81 70,000Ω 1/2W
R82 250,000Ω 1/2W
R83 70,000Ω 1/2W
R84 250,000Ω 1/2W
R85 1,000Ω 1/2W
R91 100,000Ω 1/2W
R92 40,000Ω 1/2W
R93 40,000Ω 1/2W
R94 2,000,000Ω 1/2 NEW
R95 5,000Ω 1/2W NEW
R96 30,000Ω 1/2W NEW

DYNAMOTORS

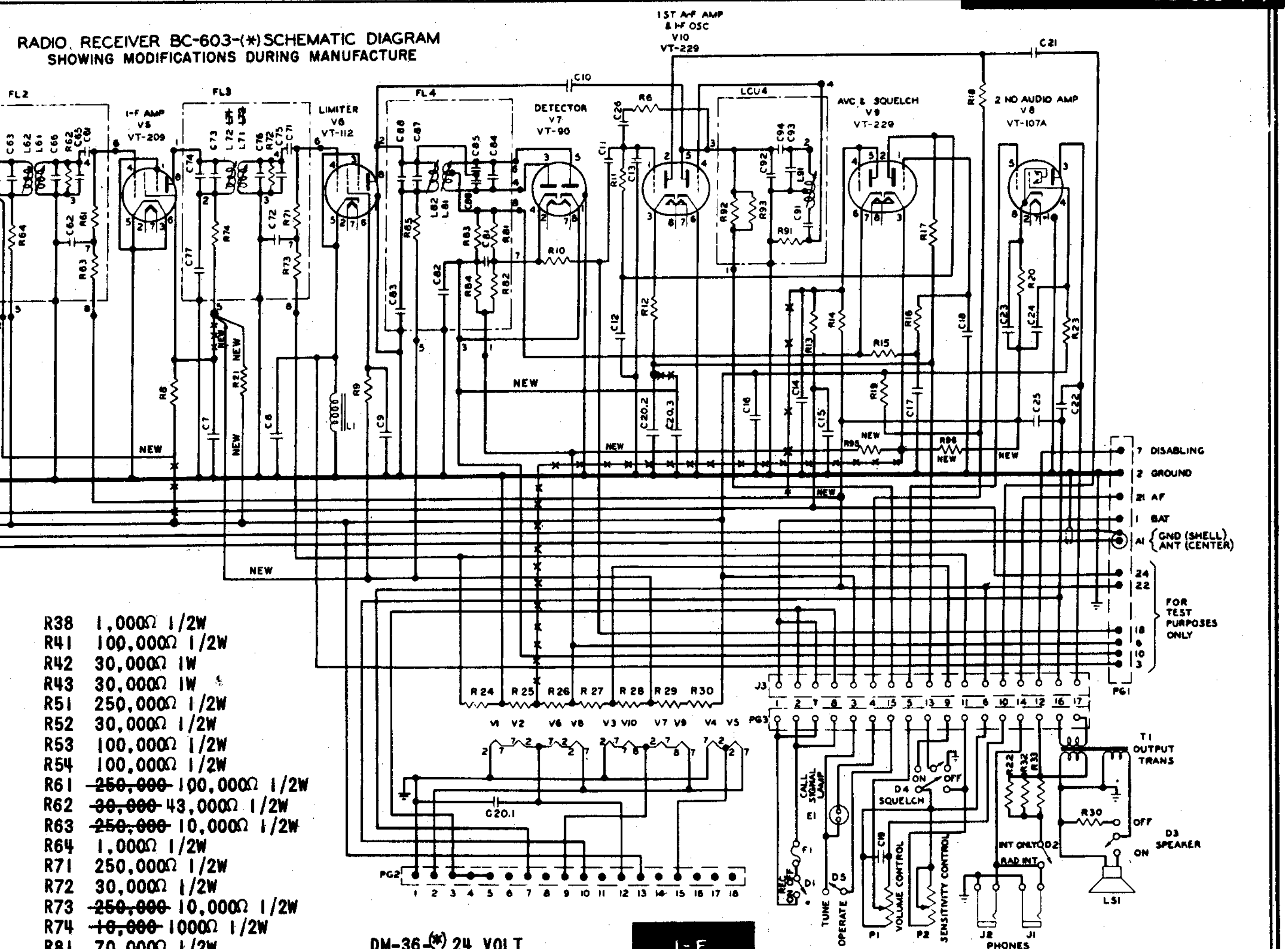
DM-34-(*) 12 VOLT

CAPACITORS

C701 ~~0.005~~ 0.003μf 800V
C702 ~~0.005~~ 0.003μf 800V
C703 ~~0.005~~ 0.003μf 500V
C704 ~~0.005~~ 0.003μf 500V
C705 ~~0.005~~ 0.003μf 800V
C706 ~~0.005~~ 0.003μf 800V

Schematic

RADIO RECEIVER BC-603-(*) SCHEMATIC DIAGRAM
SHOWING MODIFICATIONS DURING MANUFACTURE



R38 1,000Ω 1/2W
R41 100,000Ω 1/2W
R42 30,000Ω 1W
R43 30,000Ω 1W
R51 250,000Ω 1/2W
R52 30,000Ω 1/2W
R53 100,000Ω 1/2W
R54 100,000Ω 1/2W
R61 ~~250,000~~ 100,000Ω 1/2W
R62 ~~30,000~~ 43,000Ω 1/2W
R63 ~~250,000~~ 10,000Ω 1/2W
R64 1,000Ω 1/2W
R71 250,000Ω 1/2W
R72 30,000Ω 1/2W
R73 ~~250,000~~ 10,000Ω 1/2W
R74 ~~10,000~~ 1000Ω 1/2W
R81 70,000Ω 1/2W
R82 250,000Ω 1/2W
R83 70,000Ω 1/2W
R84 250,000Ω 1/2W
R85 1,000Ω 1/2W
R91 100,000Ω 1/2W
R92 40,000Ω 1/2W
R93 40,000Ω 1/2W
R94 2,000,000Ω 1/2 NEW
R95 5,000Ω 1/2W NEW
R96 30,000Ω 1/2W NEW

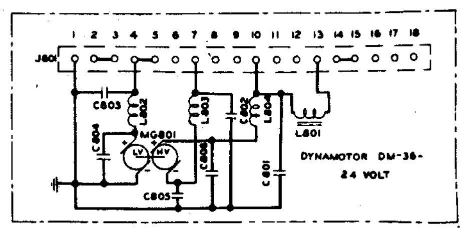
DYNAMOTORS
DM-34-(*) 12 VOLT

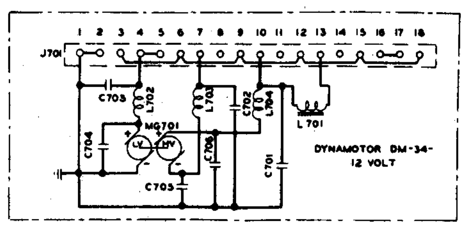
CAPACITORS
C701 ~~0.005~~ 0.003μf 800V
C702 ~~0.005~~ 0.003μf 800V
C703 ~~0.005~~ 0.003μf 500V
C704 ~~0.005~~ 0.003μf 500V
C705 ~~0.005~~ 0.003μf 800V
C706 ~~0.005~~ 0.003μf 800V

DM-36-(*) 24 VOLT

CAPACITORS
C801 ~~0.005~~ 0.003μf 800V
C802 ~~0.005~~ 0.003μf 800V
C803 ~~0.005~~ 0.003μf 500V
C804 ~~0.005~~ 0.003μf 500V
C805 ~~0.005~~ 0.003μf 800V
C806 ~~0.005~~ 0.003μf 800V

I-F
2.65 mc





NOTES:

1 - WHEN CAPACITORS C85 AND C86 ARE 60μμf, CAPACITOR C84 IS OMITTED. (OPTIONAL METHOD NOT SHOWN IN DIAGRAM.)

2 - TWO CAPACITORS REPLACED BY ONE HAVING A CAPACITY EQUAL TO THE TOTAL OF THE REPLACED TWO. (OPTIONAL METHOD NOT SHOWN IN DIAGRAM.)

X = ELIMINATED IN LATER UNITS.

NEW = ADDED IN LATER UNITS.

Schematic

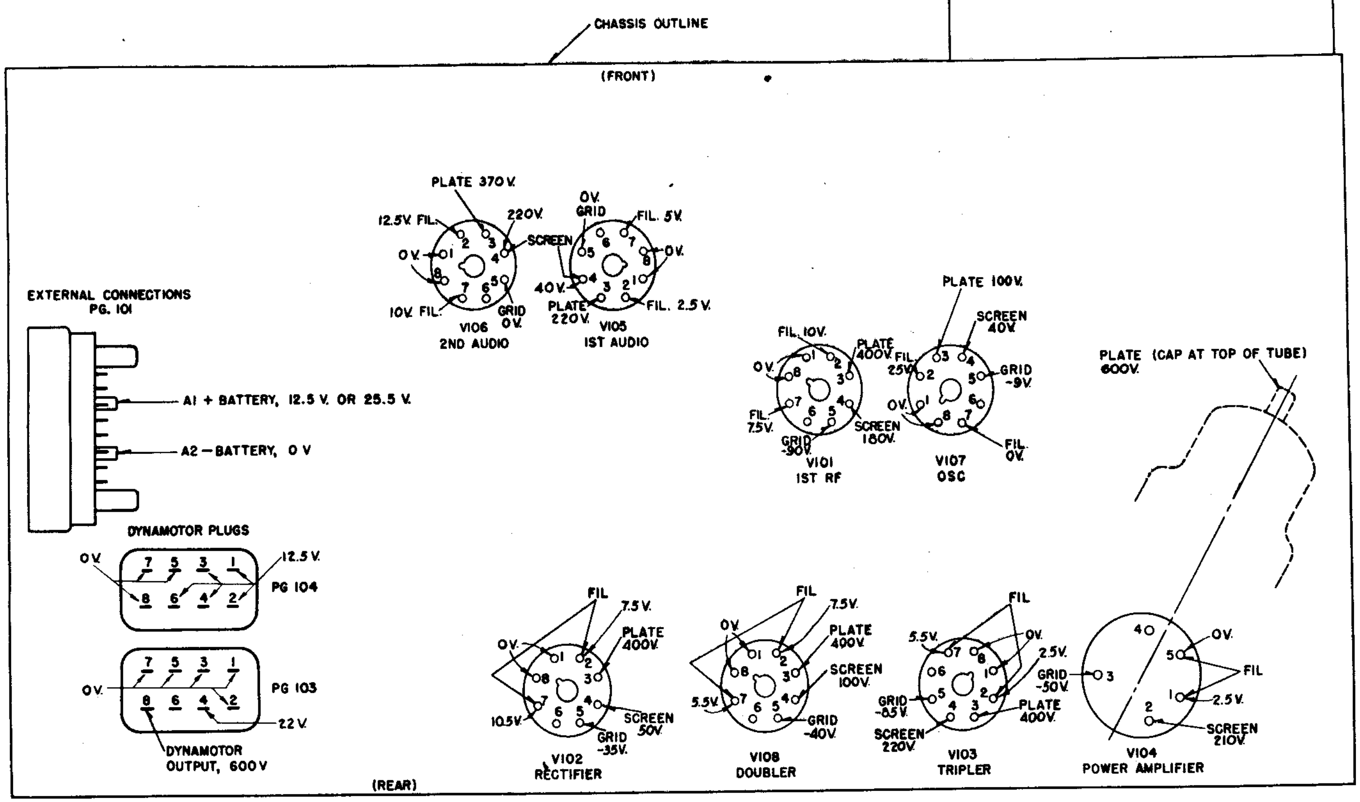
RADIO TRANSMITTER BC-604-(*)

BC-604-(*)=BC-604- A , BC-604- B ,
BC-604- C , and BC-604- D

Part of: SCR-508-(*)
SCR-528-(*)

Reference:
TM 11-600

VOLTAGE MEASUREMENTS

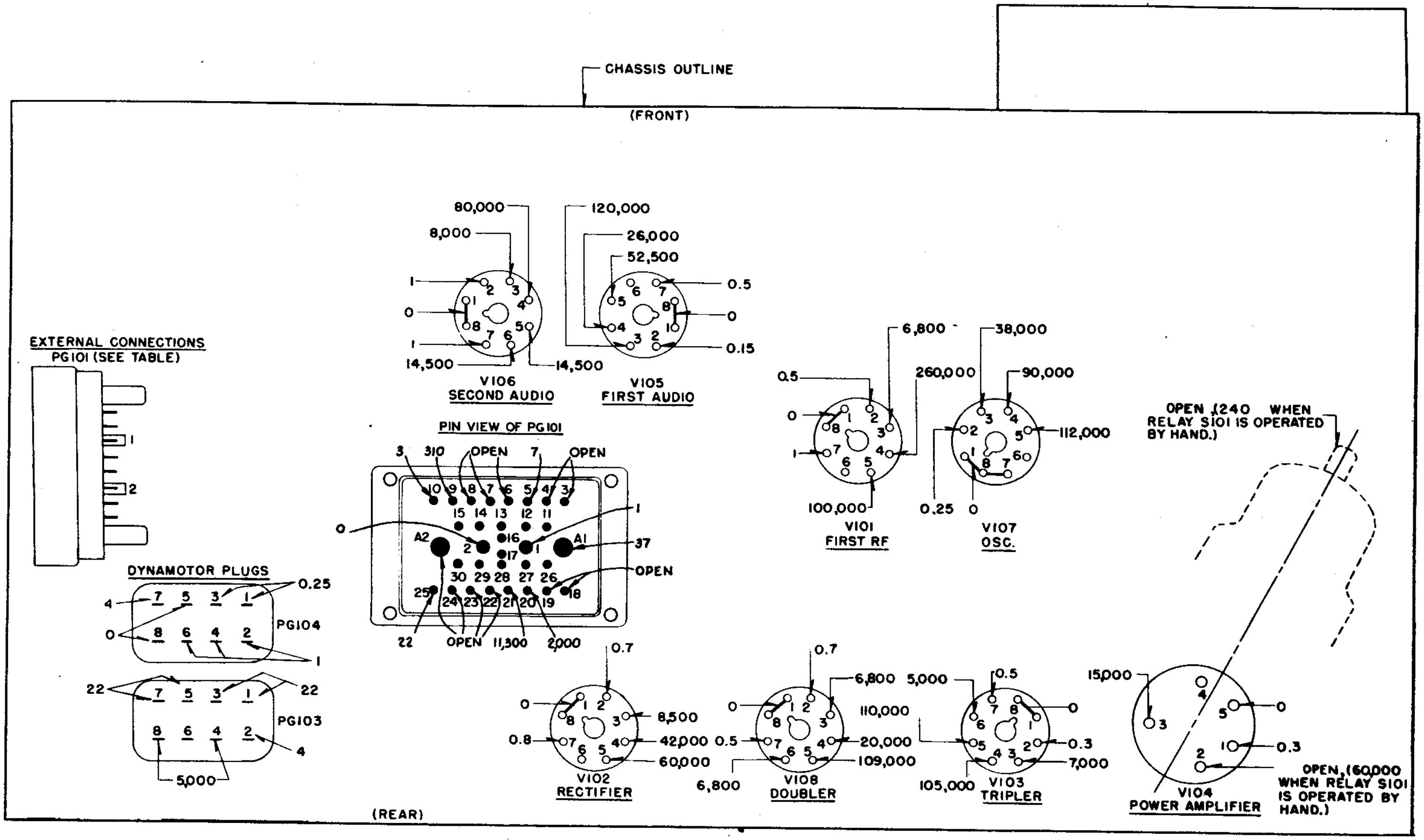


CAUTION: DANGEROUS VOLTAGES ARE EXPOSED.

NOTES:

1. LAYOUT CORRESPONDS WITH BOTTOM OF TRANSMITTER. DATA TAKEN WHILE TRANSMITTER IS OPERATING ON CHANNEL 79 INTO A PHANTOM ANTENNA. ALL VOLTAGES ARE MEASURED FROM DESIGNATED POINTS TO FRAME OF TRANSMITTER. MEASUREMENTS WITH ELECTRONIC VOLTMETER
2. OBSERVED METER READINGS MAY EXCEED THE VALUES SHOWN BECAUSE OF RF VOLTAGE SUPERIMPOSED ON DC VOLTAGE AT SOME TERMINALS.
3. MEASUREMENTS TO BE MADE WITH CRYSTAL OVEN THERMOSTAT UNOPERATED.
4. FOR VOLTAGE MEASUREMENTS, USE VOLTMETER SCALES AS FOLLOWS: 0-3 V., 3 VOLT SCALE
3-30V., 30 VOLT SCALE
30-300V., 300 VOLT SCALE
300-600V., 600 VOLT SCALE

RESISTANCE MEASUREMENTS

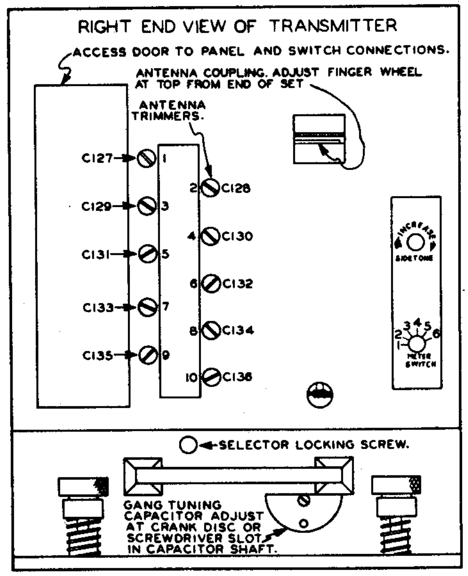


CAUTION: REMOVE BATTERY BEFORE MEASURING RESISTANCE

BOTTOM VIEW OF TRANSMITTER WITH COVER PLATE REMOVED. ALL VALUES SHOWN ARE OHMS BETWEEN POINT INDICATED AND FRAME OF SET. NO BATTERY CONNECTED. DYNAMOTOR IN PLACE. ON-OFF SWITCH ON. ALL VACUUM TUBES IN PLACE. RECEIVER TUNE-OPERATE SWITCH IN OPERATE POSITION.

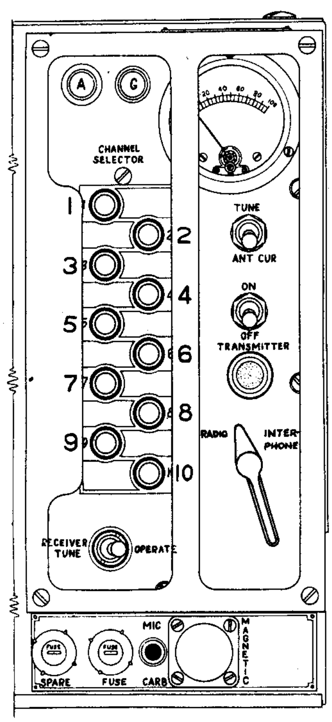
PRESETTING

1. Install required crystals in order of channel numbers; lowest frequency in socket 1, highest in 10. Print channel numbers in space beside buttons.
2. Free all buttons, turn tuning gang capacitor to max clockwise position and release selector locking screw.
3. Turn METER SW to 3 and TUNE-ANT CUR sw to TUNE.
4. Depress selector button for highest frequency to be set. Turn RECEIVER TUNE-OPERATE sw to RECEIVER TUNE.
5. Slowly tune gang capacitor for maximum (max) meter deflection. If two max are found, tune to the higher.
6. Change METER SW to 5 and retune gang capacitor for max. (Return RECEIVER TUNE-OPERATE sw to OPERATE between adjustments.)
7. Depress selector button for next lower channel. Keep a finger on button being released to prevent it snapping out and altering the adjustment. Repeat steps 5 and 6 for all channels being set, going from a higher to next lower channel.
8. Release last button, carefully keeping a finger on it and depressing an adjacent button slightly. Turn gang capacitor to max clockwise position and tighten selector locking screw.



9. Check setting of each button by slightly "rocking" the gang capacitor. Retune any channel on which max meter deflection is not obtained at the setting determined by its push button.
10. Throw TUNE-ANT CUR sw to ANT CUR. Adjust antenna coupling to min (clockwise rotation). Connect a regular or dummy antenna. Turn METER SW to 6 and RECEIVER TUNE-OPERATE sw to OPERATE.
11. Depress any channel button, start transmitter by pressing microphone sw, and adjust corresponding antenna trimmer for max on panel meter. Repeat for all channels.
12. Using any channel, adjust antenna coupling for a max meter deflection, then reduce coupling until reading drops to half of max.
13. Throw TUNE ANT CUR sw to TUNE and determine which channel has greatest meter reading. Restore TUNE ANT CUR sw to ANT CUR. Using this channel, adjust antenna coupling for max on meter.
14. Recheck adjustment of all antenna tuning capacitors as in 11.
15. Place TUNE-ANT CUR sw at TUNE and check meter readings against the following table.

METER SWITCH POSITION	1	2	3	4	5	6
CIRCUIT	Tripler Grid Cur	1st RF Grid Cur	Rect. Grid Cur	Doubler Grid Cur	P.A. Grid Cur	Total Plate & Screen Cur
METER READING (20mc)	20	80	20	25	15	60
METER READING (27.9mc)	30	45	25	40	20	60



FRONT PANEL

ALIGNMENT

ALIGNMENT OF 1st R-F AMPLIFIER

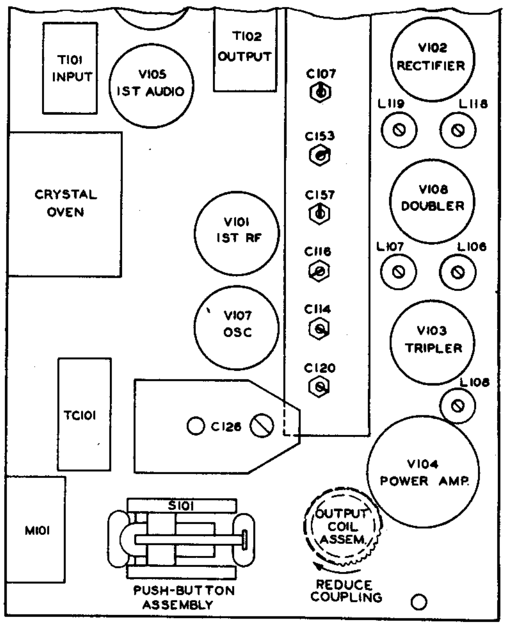
1. Remove top and bottom cover plates, lay transmitter on its back, and connect for operation.
2. Install crystals for channels 0 and 79, sockets 1 and 10.
3. Turn RECEIVER TUNE-OPERATE sw to RECEIVER TUNE, RADIO-INT sw to RADIO, ON-OFF sw to ON, TUNE-ANT CUR sw to TUNE, and METER SW to 2.
4. Depress button 10. Meter deflection shows that oscillator is operating.
5. Turn C107 to minimum (min) capacitance position.
6. Turn METER SW to 3 and accurately set channel selector buttons 1 and 10. (See presetting procedure.)

ALIGNMENT OF RECTIFIER

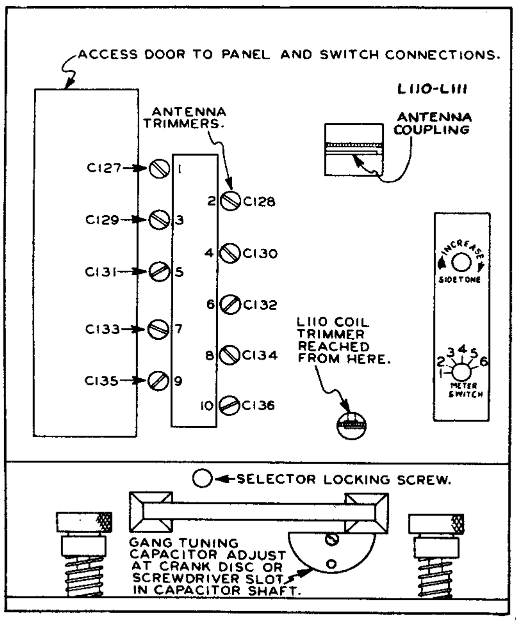
1. Set METER SW to 4 and depress button 10.
2. Adjust C153 and C157 for max on meter.
3. Loosely couple wavemeter of Frequency Meter Set I-129-(*) to L118 and L119.
4. Tune wavemeter for resonance dip on panel meter. Wavemeter setting at dip should be 1/6 of channel frequency (4.65 mc for channel 79).
5. Depress button 1 and adjust L118 and L119 for max.
6. Check frequency as in step 4. Panel meter dip on button 1 should occur at a wavemeter setting of 3.33 mc.

ALIGNMENT OF DOUBLER

1. Set METER SW to 1 and depress button 10.
2. Adjust C114 and C116 for max on panel meter.
3. Loosely couple wavemeter to L106 and L107.
4. Tune wavemeter for dip on panel meter. The wavemeter setting at dip should be 1/3 of channel frequency (9.30 mc for channel 79).
5. Depress button 1 and adjust L106 and L107 for max on panel meter.
6. Check frequency on button 1 as in step 4 with wavemeter setting of 6.67 mc.



TOP VIEW



RIGHT END VIEW

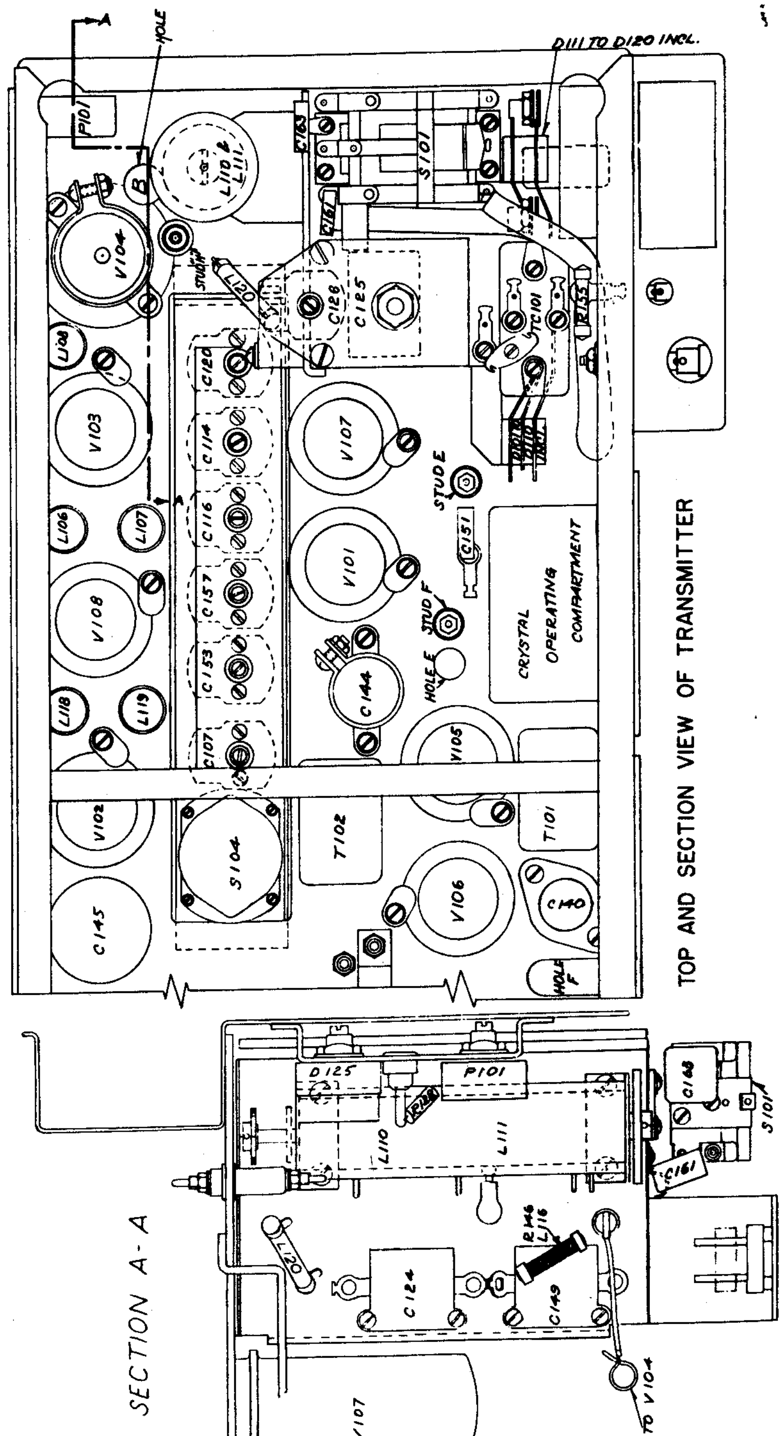
ALIGNMENT OF TRIPLER

1. Set METER SW to 5 and depress button 10.
2. Adjust C120 for max on panel meter.
3. Depress button 1 and adjust L108 for max on panel meter.
4. Replace bottom cover plate and repeat all previous adjustments.

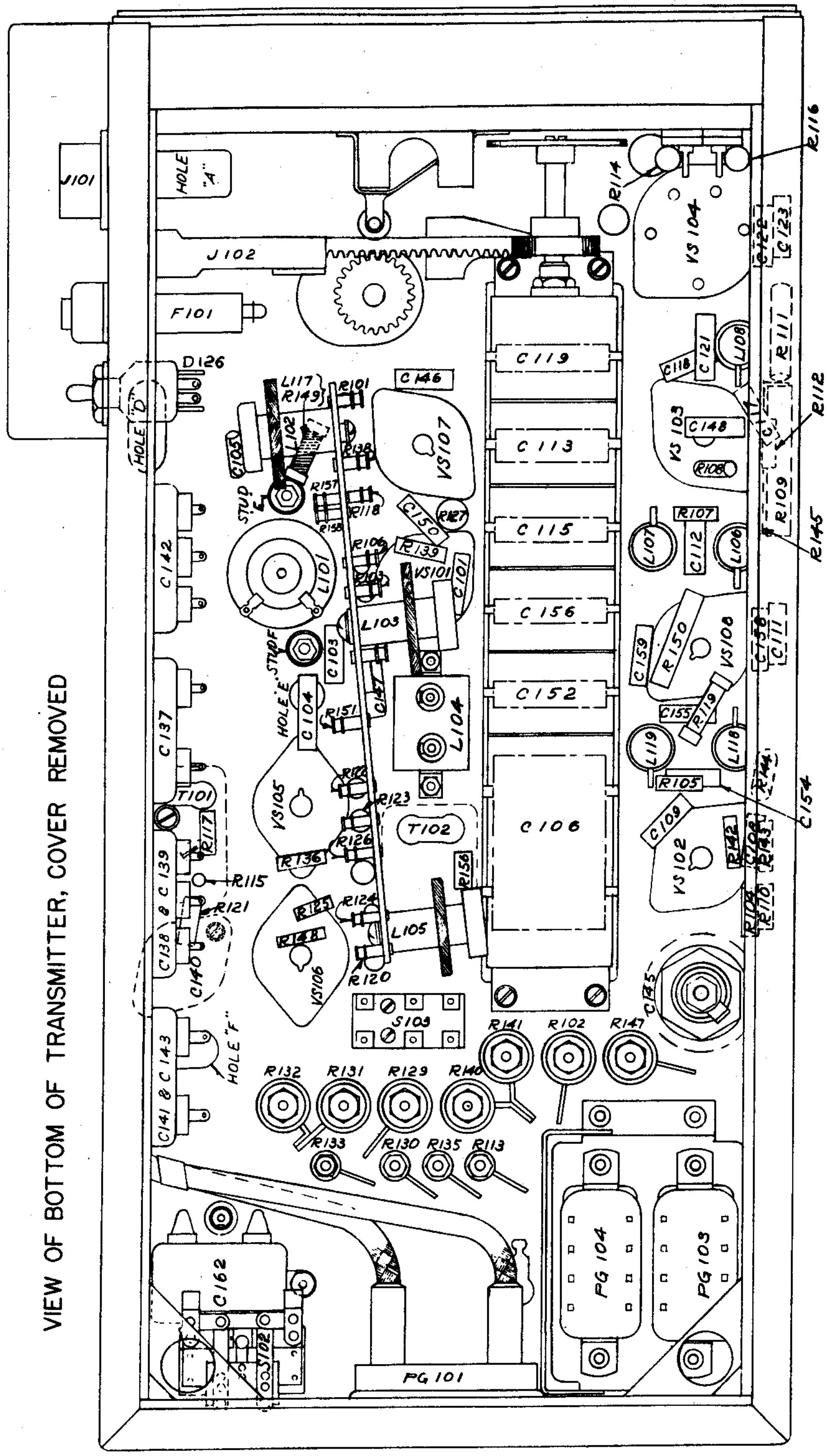
ALIGNMENT OF POWER AMP.

1. Set METER SW to 6, REC TUNE-OPERATE sw to OPERATE and depress button 10.
2. Adjust coupling L110 to L111 to min setting.
3. Connect an antenna to the transmitter.
4. Plug in microphone and depress mic sw. Mic sw must be depressed for steps 5 to 13. Release between steps.
5. Adjust C126 for min on panel meter.
6. Depress button 1 and adjust L110 for min on meter.
7. Depress button 10 and turn TUNE-ANT CUR sw to ANT CUR.
8. Adjust antenna coupling for max on meter.
9. Reduce coupling until meter reading is halved.
10. Adjust C136 for max on meter.
11. Depress button 1 and adjust C127 for max on meter.
12. Turn TUNE-ANT CUR sw to TUNE.
13. Shift alternately between buttons 10 and 1, making adjustments to C126 on button 10 and L110 on button 1 for min on meter until setting of C126 is the same for min on both buttons.

PARTS LAYOUT



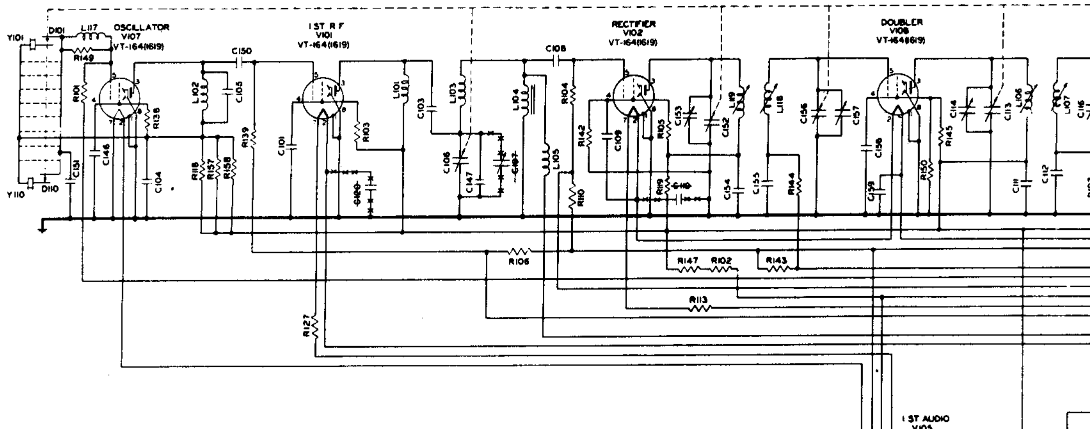
TOP AND SECTION VIEW OF TRANSMITTER



PARTS LAYOUT

VIEW OF BOTTOM OF TRANSMITTER, COVER REMOVED

RADIO TRANSMITTER BC-604-(*)-SCHEMAT
SHOWING MODIFICATIONS DURING M



APPARATUS LEGEND

CAPACITORS
C101 0.003 µF 800
~~C102~~ ELIMINATED IN LATER UNITS
C103 0.0001 µF 800V
C104 0.0005 µF 800V
C105 15 µµF 500 V
GANGED:
C106 350 µµF MAX AIR GAP 0.025"
C113 60 µµF MAX AIR GAP 0.025"
C115 60 µµF MAX AIR GAP 0.025"
C119 80 µµF MAX AIR GAP 0.025"
C152 60 µµF MAX AIR GAP 0.025"
C156 60 µµF MAX AIR GAP 0.025"
~~C107~~ ELIMINATED IN LATER UNITS.
C108 0.0005 µF 800 V
~~C110~~ ELIMINATED IN LATER UNITS
C111 0.003 µF 800 V
C112 0.003 µF 800 V
C114 20 µµF MAX AIR GAP 0.025"
C116 20 µµF MAX AIR GAP 0.025"
C117 0.003 µF 800 V
C118 0.003 µF 800 V
C120 20 µµF MAX AIR GAP 0.025"
C121 0.003 µF 800 V
C122 0.003 µF 800 V
C123 0.01 µF 300 V
C124 0.001 µF 1200 V
C125 60 µµF MAX AIR GAP 0.030"
C126 20 µµF MAX AIR GAP 0.025"
C127 100 µµF MAX AIR GAP 0.0195"
C128 100 µµF MAX AIR GAP 0.0195"
C129 100 µµF MAX AIR GAP 0.0195"
C130 100 µµF MAX AIR GAP 0.0195"
C131 100 µµF MAX AIR GAP 0.0195"
C132 100 µµF MAX AIR GAP 0.0195"
C133 100 µµF MAX AIR GAP 0.0195"
C134 100 µµF MAX AIR GAP 0.0195"
C135 100 µµF MAX AIR GAP 0.0195"
C136 100 µµF MAX AIR GAP 0.0195"
C137 0.5 µF 800 V
C138.1 0.1 µF 600 V
C138.2 0.1 µF 600 V
C139 0.5 µF 600 V
C140 30 µF-60 V
C141 0.5 µF 600 V
C142.1 0.1 µF 600 V
C142.2 0.1 µF 600 V
C143 0.5 µF 600 V
C144 100 µF 50 V
C145 2 µF 1000 V
C146 0.003 µF 800 V
C147 175 µµF 800 V
C148 0.003 µF 800 V
C149 0.001 µF 1200 V
C150 0.001 µF 800 V
C151 50 µµF 800 V
C153 20 µµF MAX AIR GAP 0.025"
C154 0.003 µF 800 V
C155 0.003 µF 800 V
C157 20 µµF MAX AIR GAP 0.025"
C158 0.003 µF 800 V
C159 0.01 µF 300 V
~~C160~~ ELIMINATED IN LATER UNITS
C161 0.0001 µF 800 V
C162 4 µF 50 V
C163 0.003 µF 1000 V
~~C503~~ ELIMINATED IN LATER UNITS
~~C603~~ ELIMINATED IN LATER UNITS

SWITCHES
D101 TO D110 PUSH BUTTON ASSEMBLY CRYSTAL SELECTORS
D111 TO D120 PUSH BUTTON ASSEMBLY ANT CAP SELECTORS
D121 ANT CUR-TUNE
D122 RECEIVER TUNE-OPERATE
D123 RADIO-INTERPHONE
D124 ON-OFF POWER SUPPLY
D125 METER SWITCH
D126 TANK-OTHER USE-ADDED
E101 PILOT LAMP

F101 1/2 AMPERE FUSE

JACKS
J101 MAGNETIC MICROPHONE
J102 CARBON MICROPHONE

COILS
L101 1 ST RF PLATE CHOKE
L102 OSC PLATE
L103 1 ST RF PLATE TUNING
L104 MODULATION
L105 RF CHOKE
L106 DOUBLER PLATE TUNING
L107 TRIPLER GRID TUNING
L108 TRIPLER PLATE TUNING
L110 POWER AMP TUNING
L111 ANTENNA COUPLING
L116 POWER AMP ANTI-SING
L117 OSC GRID ANTI-SING
L118 DOUBLER GRID TUNING
L119 RECTIFIER PLATE TUNING

M101 ANT CUR-TUNE METER

P101 50,000 Ω SIDETONE CONTROL

PLUGS
PG101 TRANSMITTER
PG103 DYNAMOTOR
PG104 DYNAMOTOR

RESISTORS
R101 100,000 Ω 1/2 W
R102 1,000 Ω 20 W
R103 250,000 Ω 1W
R104 50,000 Ω 1/2 W
R105 250,000 Ω 1/2 W
R106 ~~1000~~ 100 Ω 2 W
R107 100,000 Ω 1/2 W
R108 50 Ω 1/2 W
R109 100,000 Ω 2 W
R110 1,000 Ω 1/2 W
R111 10,000 Ω 1W
R112 10 Ω 1/2 W
R113 1.0 Ω 10 W
R114 30,000 Ω 2 W
R115 100,000 Ω 1/2 W
R116 30,000 Ω 2 W
R117 50,000 Ω 1/2 W
R118 ~~50,000~~ 100,000 Ω 2 W
R119 1,200 Ω 1/2 W
R120 200 Ω 1W
R121 100 Ω 1/2 W
R122 250,000 Ω 1W
R123 10,000 Ω 1W
R124 10,000 Ω 1/2 W
R125 40,000 Ω 1/2 W
R126 75,000 Ω 2 W
R127 1.0 Ω 10 W
R128 10,000 Ω 1/2 W
R129 5,000 Ω 25 W
R130 100 Ω 10 W
R131 12 Ω 25 W
R132 12 Ω 25 W
R133 80 Ω 10 W
R134 30,000 Ω 1/2 W
R135 30 Ω 10 W
R136 30,000 Ω 1/2 W
R137 100 Ω 1/2 W
R138 50,000 Ω 1/2 W
R139 100,000 Ω 1/2 W
R140 12 Ω 25 W
R141 12 Ω 25 W
R142 50,000 Ω 1/2 W
R143 1,000 Ω 1/2 W
R144 100,000 Ω 1/2 W
R145 100,000 Ω 2 W
R146 50 Ω 1/2 W
R147 1,000 Ω 20 W
R148 5,000 Ω 1/2 W
R149 50 Ω 1/2 W
R150 25,000 Ω 1W
R151 100,000 Ω 1W
R152 2,000 Ω 8W
R153 8.3 Ω 17.9 W
R154 8.3 Ω 17.9 W
R155 100,000 Ω 1/2 W
R156 40 Ω 1W
R157 100,000 Ω 2W (ADDED)
R158 100,000 Ω 2W (ADDED)

RELAYS
S101 ANTENNA SWITCHING
S102 DYNAMOTOR STARTING
S103 RECEIVER DISABLING
S104 RADIO-INTERPHONE

TRANSFORMERS
T101 AF INPUT
T102 AF OUTPUT

TC101 ANT CUR THERMOCOUPLE

TD101 OVEN THERMOSTAT

VACUUM TUBES
V101 VT-164(1619)
V102 VT-164(1619)
V103 VT-164(1619)
V104 VT-165(1624)
V105 VT-164(1619)
V106 VT-164(1619)
V107 VT-164(1619)
V108 VT-164(1619)

Y101 TO Y110 CRYSTAL HOLDERS FT-241-A

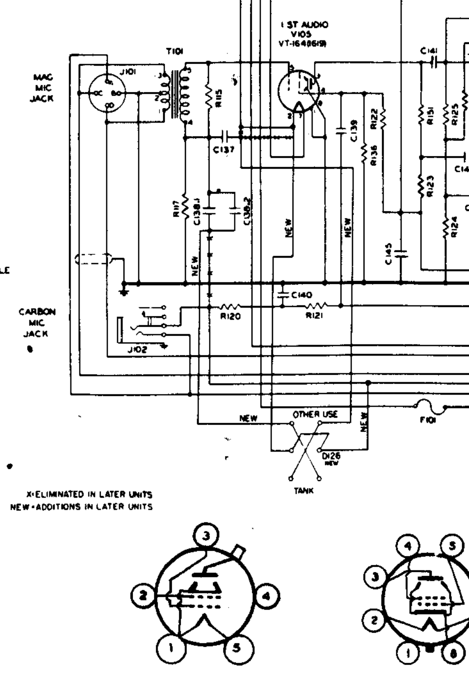
DYNAMOTOR DM-35- 12V
CAPACITORS
C501 0.003 µF 800 V
C502 0.003 µF 800 V
~~C503~~ 0.003 µF 800 V

JACKS
J501 DYNAMOTOR
J502 DYNAMOTOR

DYNAMOTOR DM-37- 24V
CAPACITORS
C601 0.003 µF 800 V
C602 0.003 µF 800 V
~~C603~~ 0.003 µF 800 V

JACKS
J601 DYNAMOTOR
J602 DYNAMOTOR

X-ELIMINATED IN LATER UNITS
NEW-ADDITIONS IN LATER UNITS

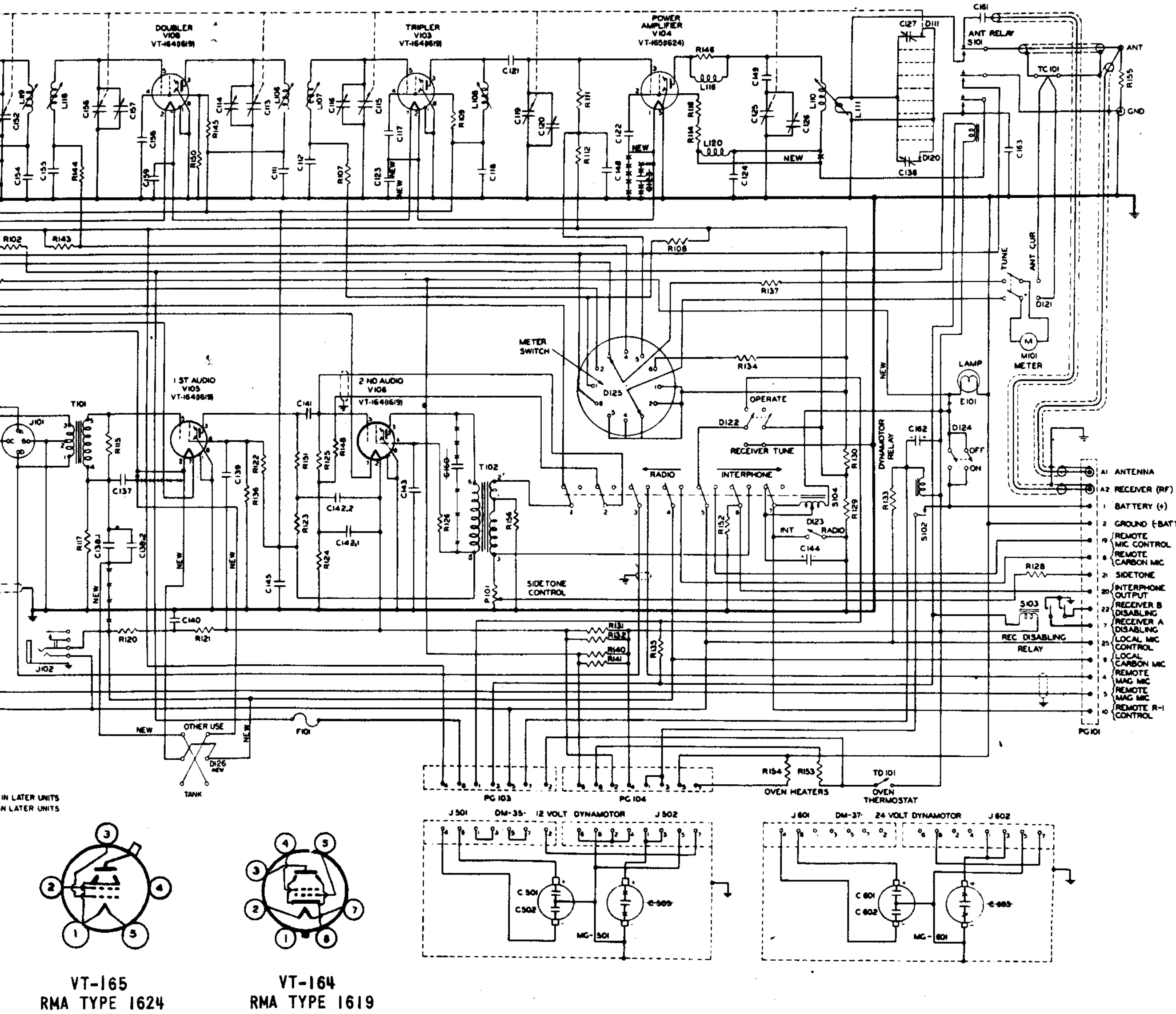


VT-165
RMA TYPE 1624

VT-164
RMA TYPE

Schematic

RADIO TRANSMITTER BC-604-(*)-SCHEMATIC DIAGRAM
SHOWING MODIFICATIONS DURING MANUFACTURE



Schematic

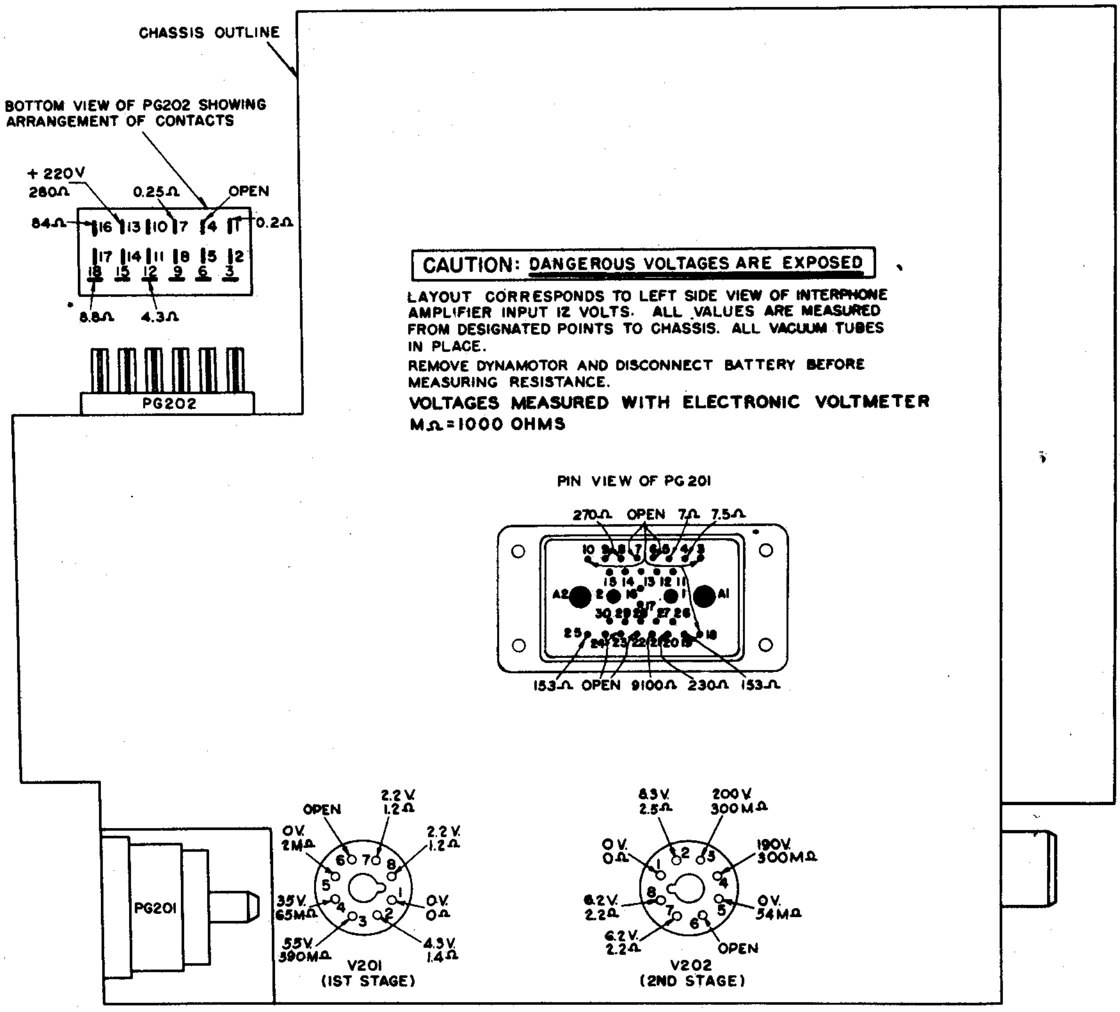
INTERPHONE AMPLIFIER BC-605-(*)

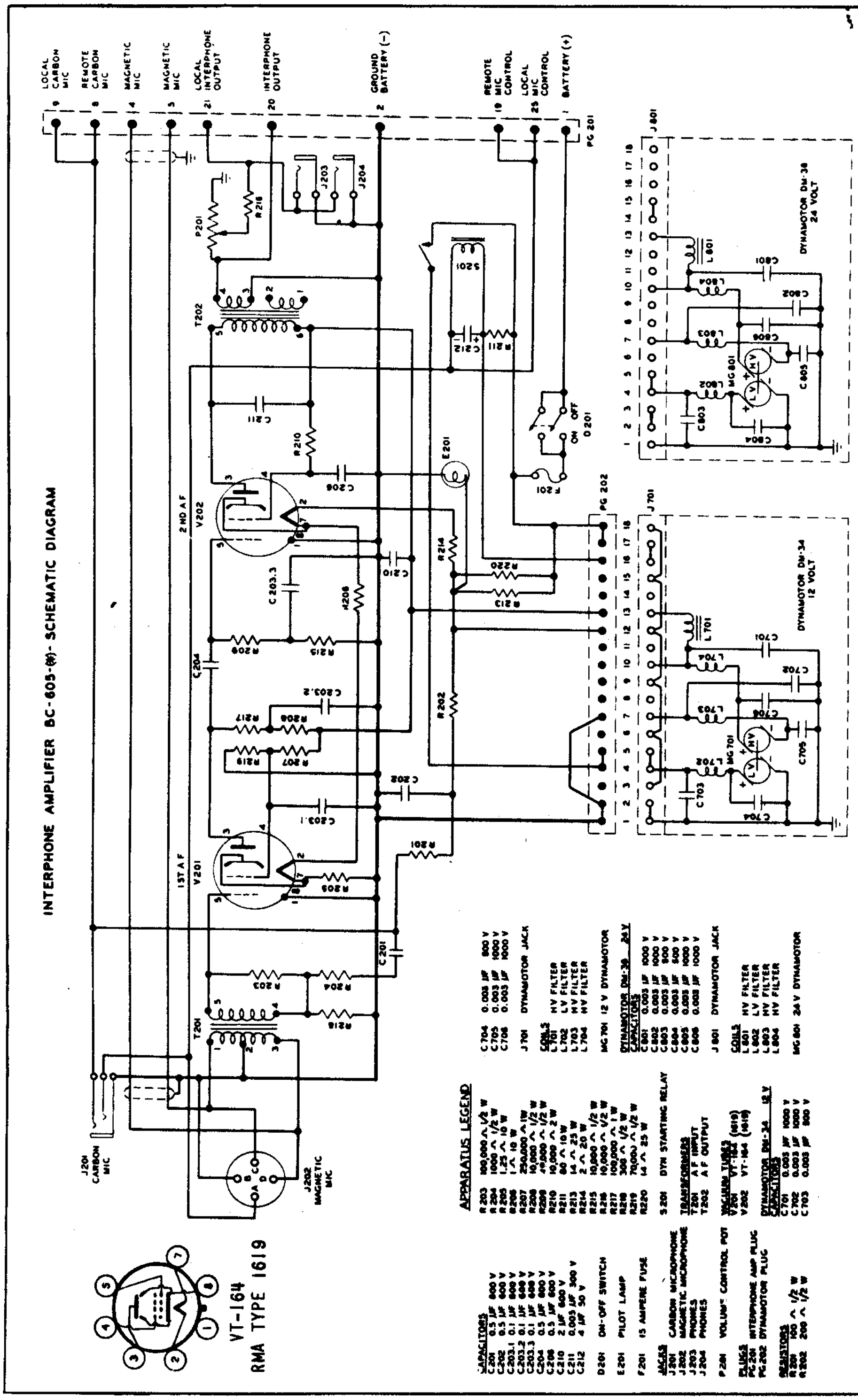
BC-605-(*) = BC-605-A, BC-605-B, BC-605-C, BC-605-D

Part of SCR-538-(*)

Reference:
TM 11-600

RESISTANCE AND VOLTAGE MEASUREMENTS





Schematic

RADIO TRANSMITTER BC-610-(*)

Part of: SCR-299-(*)

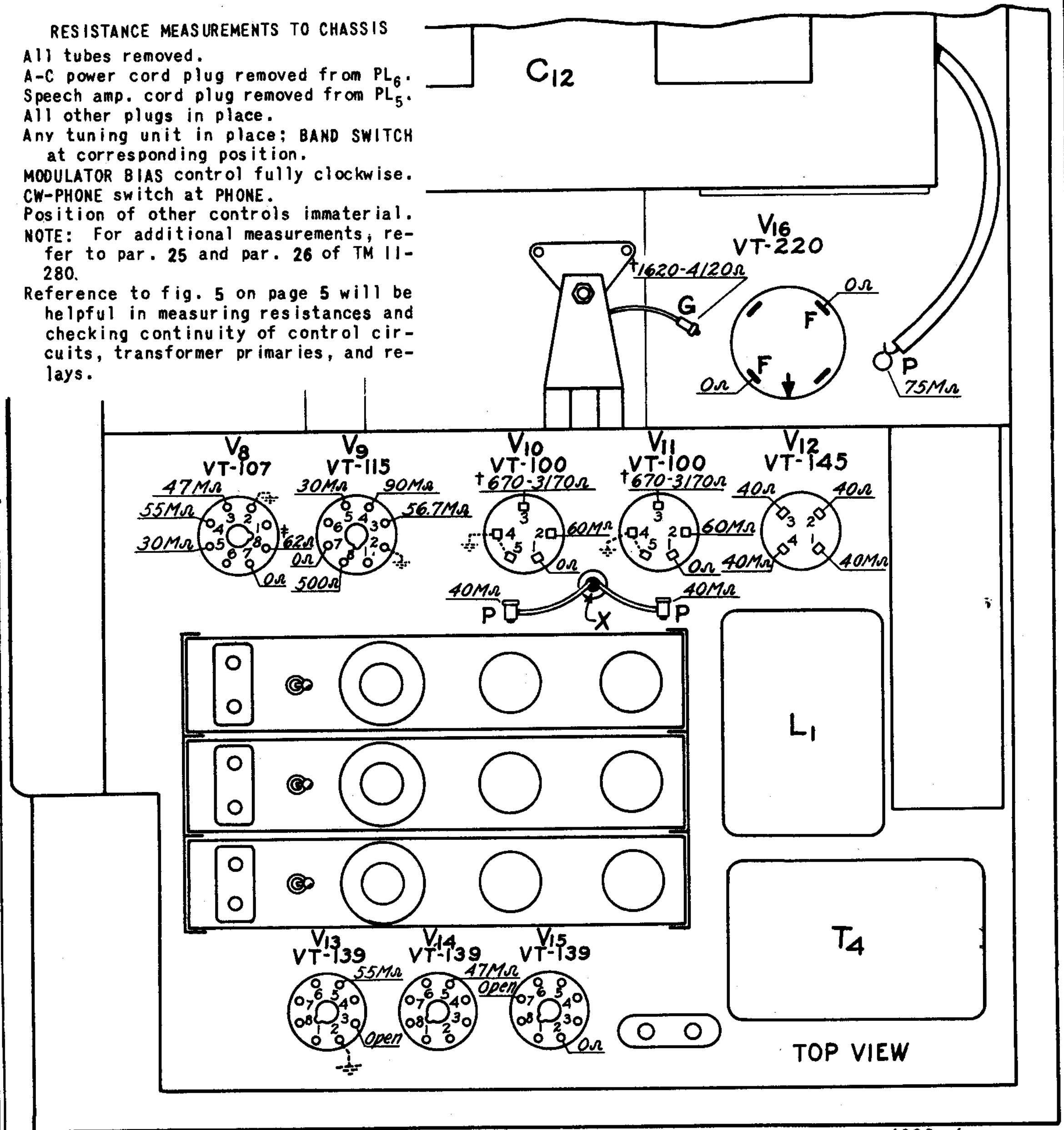
BC-610-(*)= BC-610-A, BC-610-B, BC-610-C, BC-610-D

Reference: TM 11-280

RESISTANCE MEASUREMENTS OF TRANSMITTER R-F SECTION

RESISTANCE MEASUREMENTS TO CHASSIS

All tubes removed.
A-C power cord plug removed from PL_6.
Speech amp. cord plug removed from PL_5.
All other plugs in place.
Any tuning unit in place; BAND SWITCH at corresponding position.
MODULATOR BIAS control fully clockwise.
CW-PHONE switch at PHONE.
Position of other controls immaterial.
NOTE: For additional measurements, refer to par. 25 and par. 26 of TM 11-280.
Reference to fig. 5 on page 5 will be helpful in measuring resistances and checking continuity of control circuits, transformer primaries, and relays.



†*Depends on position of tap on R_{11}*
‡*Measured to pin 2 of PL_6 on BC-610-D*

MΩ = 1000 ohms

Fig. 1.—Resistance measurements—r-f Deck.

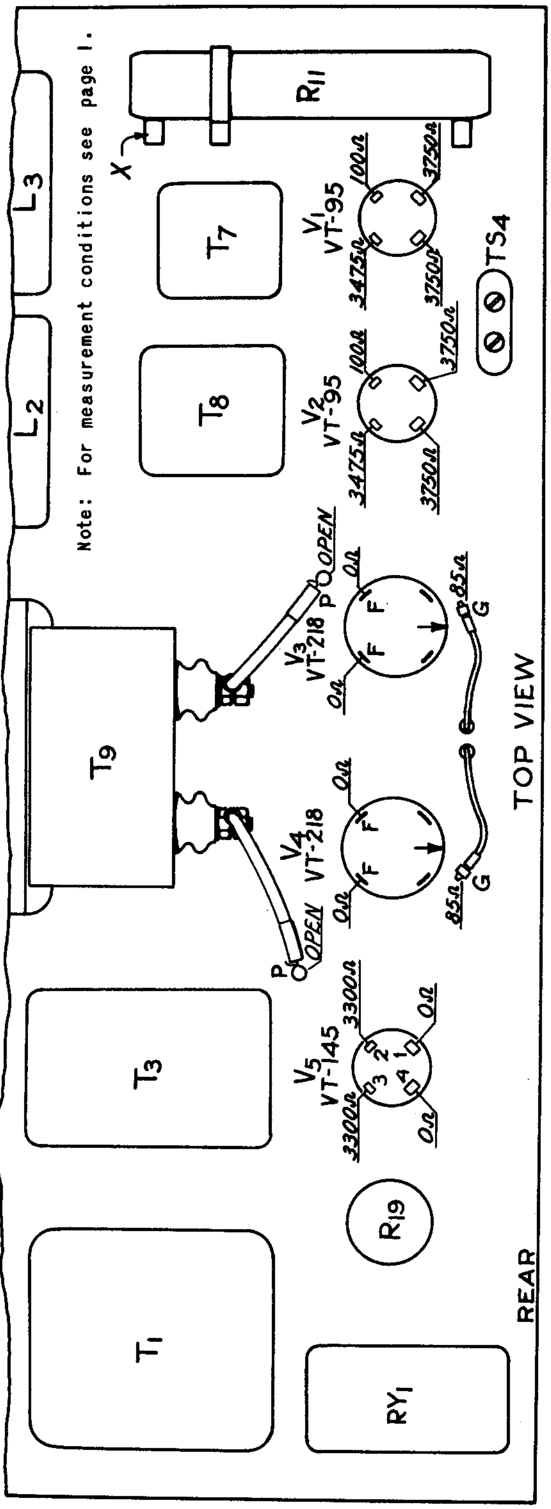


Fig. 2.—Resistance measurements—Mod. Deck.

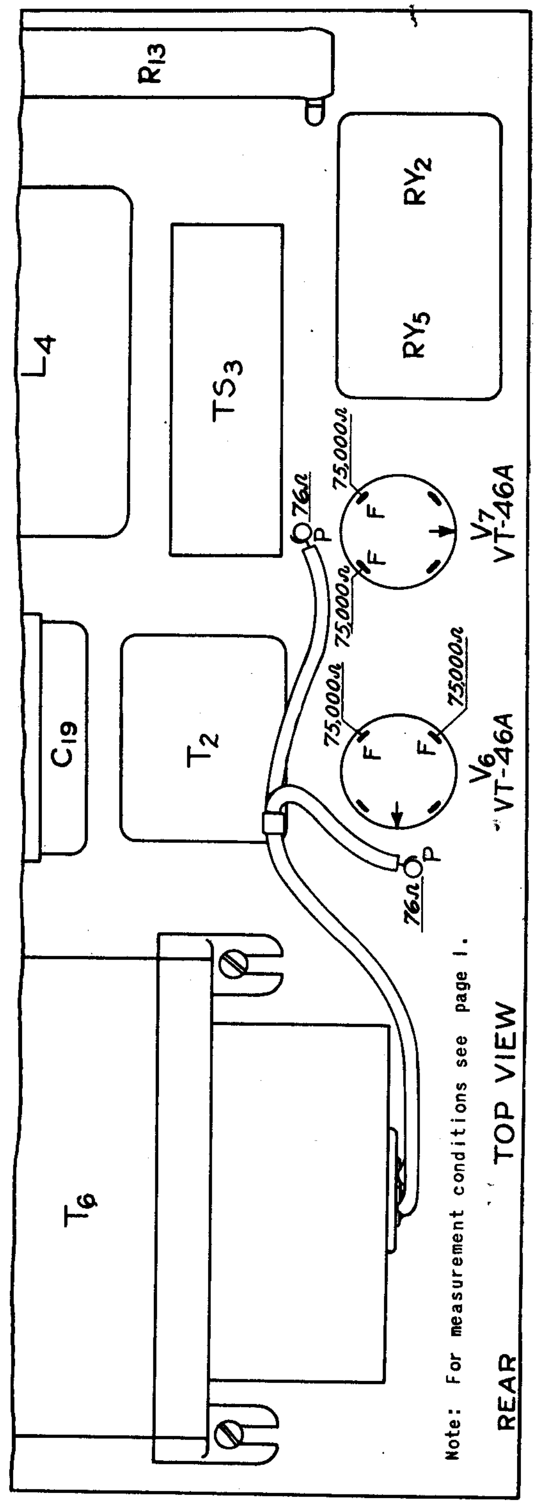


Fig. 3.—Resistance measurements—Power Deck.

CAUTION

The voltages in BC-610 are DEADLY, and extremely high voltages are also present in the antenna circuit when transmitting.

Never tape down the interlock switches, or by any other means seek access to the interior with power applied to the transmitter. *Always* remove the A-C power cord from PL_6 before working on the interior of the transmitter.

Also since bleeder resistors DO burn out, it is smart to check that the high voltage charge in the filter capacitors is discharged. To do this, proceed *exactly* as follows:

1. Connect a length of insulated wire securely to the chassis. The wing nuts will be found convenient.

2. Touch the free bare end of the wire to:
   a. Either of the vacuum capacitor clips which are located on top of the large tuning capacitor (C_{12}) on the R-F deck.
   b. The terminal lug at top of the feed-thru insulator between V_{10} and V_{11} on the R-F deck. (Point "X" on fig. 1.)
   c. Front terminal of large tubular resistor (R_{11}) at end of Modulator deck near T_7. (Point "X" on fig. 2.)

Because of the hazard to life no voltage measurements have been indicated in this manual and it is strongly recommended that none be attempted. However, paragraph 24*c* of TM 11-280 contains instructions for a safe procedure in checking the high voltage supply for operation. Any other measurements are not only dangerous but impractical due to inaccessibility of pertinent points of measurement.

Tracing of any source of trouble should be possible from resistance measurements as given on pages 1 and 2 and in paragraph 25 of TM 11-280. Any departure of panel meter readings from the normal values shown in the table below can also serve as a guide in localizing trouble.

TRANSMITTER NEUTRALIZATION

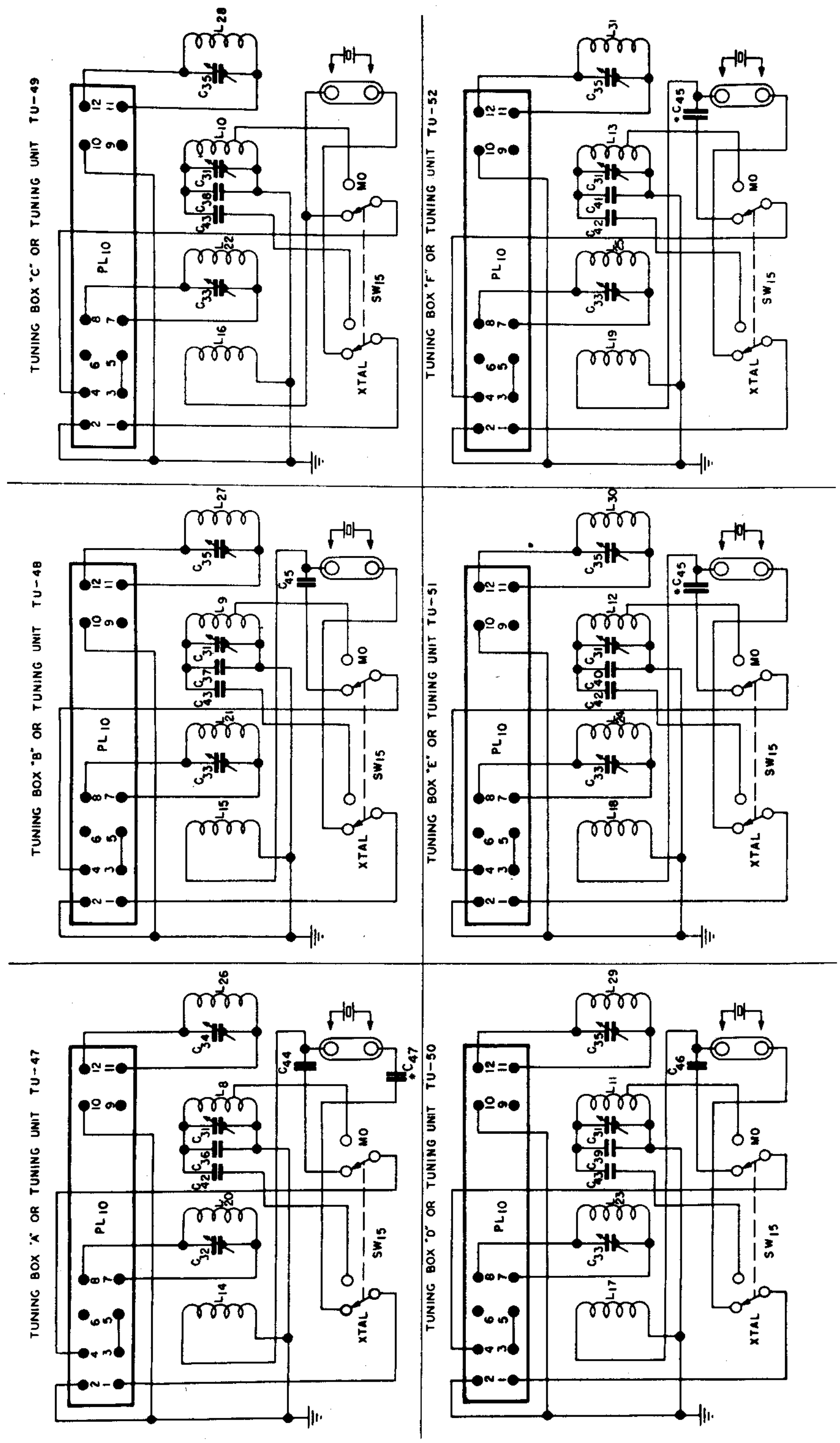
The final amplifier neutralizing condenser C_{18} has been adjusted at the factory. In the event that its setting has been disturbed, readjustment may be made as follows:

1. Insert tuning unit and associated tank coil for highest frequency band.
2. Disconnect the two leads from transmitter to the Antenna Tuning Unit, BC-729.
3. Be sure PLATE POWER switch is at OFF.
4. Set PA GRID-INT AMP switch to PA GRID.
5. Set PHONE-CW switch to CW.
6. On speech amplifier BC-614, set NORMAL REMOTE PHONE switch to NORMAL (applies to BC-614-D only).
7. Open covers on top of transmitter. This operates the interlock switches so that high voltage cannot be applied to the power amplifier during the neutralizing operation.
8. Turn FILAMENT POWER switch to ON, and allow 30 seconds for warm-up.
9. Turn EXCITER PLATE POWER switch to ON.
10. On speech amplifier BC-614, set transmitter control switch to TRANS ON.
11. Depress key and adjust tuning unit controls to resonance at some frequency near the high frequency end of range.
12. Slowly tune PLATE TUNING thru resonance with key depressed, and observe dip on GRID CURRENT meter. This dip should not exceed 3 ma.
13. If dip exceeds 3 ma; adjust C_{18} in small steps, checking as in 12 after each adjustment until minimum dip is obtained.

OPERATING CHARACTERISTICS

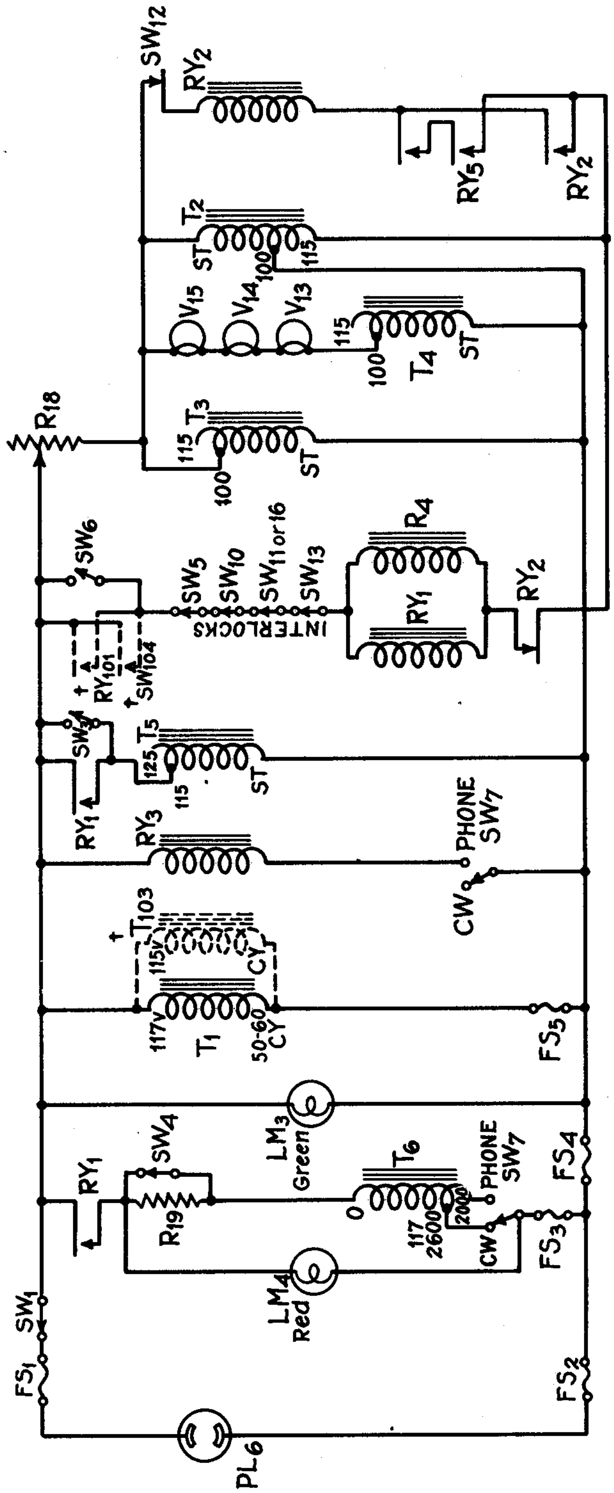
Measurement	Meter	Meter switch position	Normal reading	Limits Max.	Limits Min.
Filament voltage	FIL. VOLTAGE		5.0v	5.3v	4.9v
Buffer-Doubler plate current	EXCITATION PLATE	BUFFER-DOUBLER*	35 ma		25 ma
Int. Amp. grid current	GRID CURRENT	INT. AMP. GRID	3 ma	8 ma	2 ma
Int. Amp. plate current	EXCITATION PLATE	INTERMEDIATE AMPLIFIER	150 ma	175 ma	
P. A. grid current	GRID CURRENT	P. A. GRID	65-80 ma		50 ma
P. A. plate current (PHONE)	P. A. PLATE		250 ma	260 ma	200 ma
P. A. plate current (CW)	P. A. PLATE		290 ma	300 ma	200 ma
Mod. plate current (no mod.)	MOD. PLATE		40 ma	50 ma	35 ma
Mod. plate current (100% mod.)	MOD. PLATE		200 ma		
Line voltage			115v	125v	105v

*Some sets were erroneously marked OSCILLATOR.



NOTES:-
*BC-610-C AND BC-610-D ONLY.
ALL PLUG STRIPS PL10 SHOWN PIN VIEW.

Fig. 4.—Schematic—tuning units.



Switch positions shown for CW operation

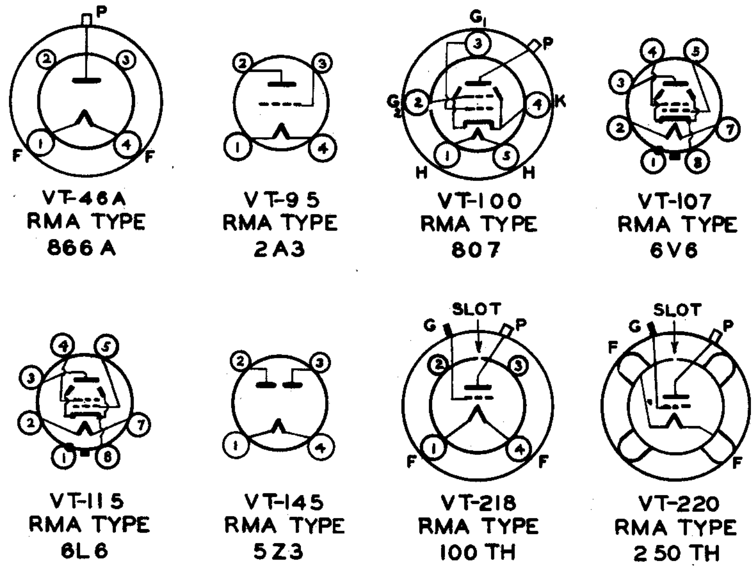
SW1 - Filament
SW3 - Exciter
SW4 - Low Power
SW6 - Plate Power
SW7 - PHONE/CW
†SW104 - TRANS ON/OFF/REC TO EE-8

RY1 - Main Power
RY2 - Overload lockout
RY3 - Modulator
RY4 - Tank Coil link shorting
RY5 - Overload
†RY101 - Receiver disabling

T1 - Bias
T2 - High voltage rectifier filaments
T3 - 100TH Mod Filaments
T4 - R-F Filaments
T5 - Exciter plate power
T6 - High voltage plate power

† Part of BC-614-( )

Fig. 5.—Schematic—control circuits.



BC-610-(*) TUBE BASES, BOTTOM VIEW

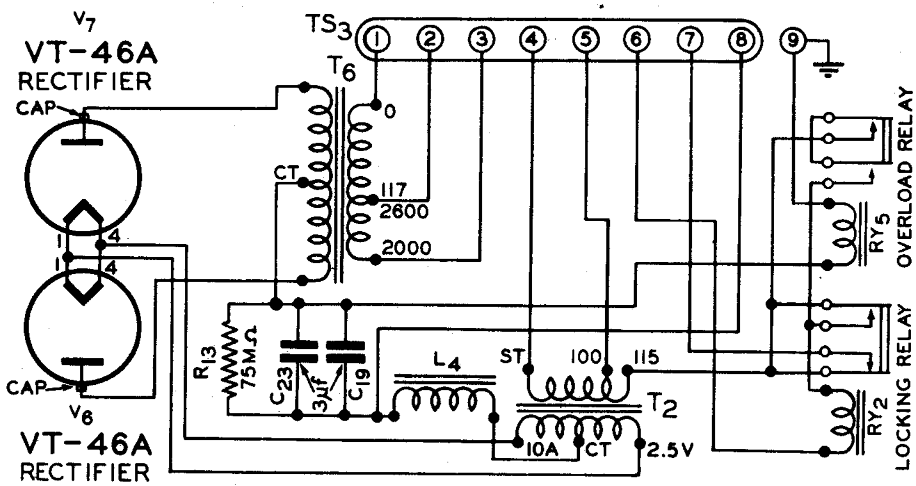
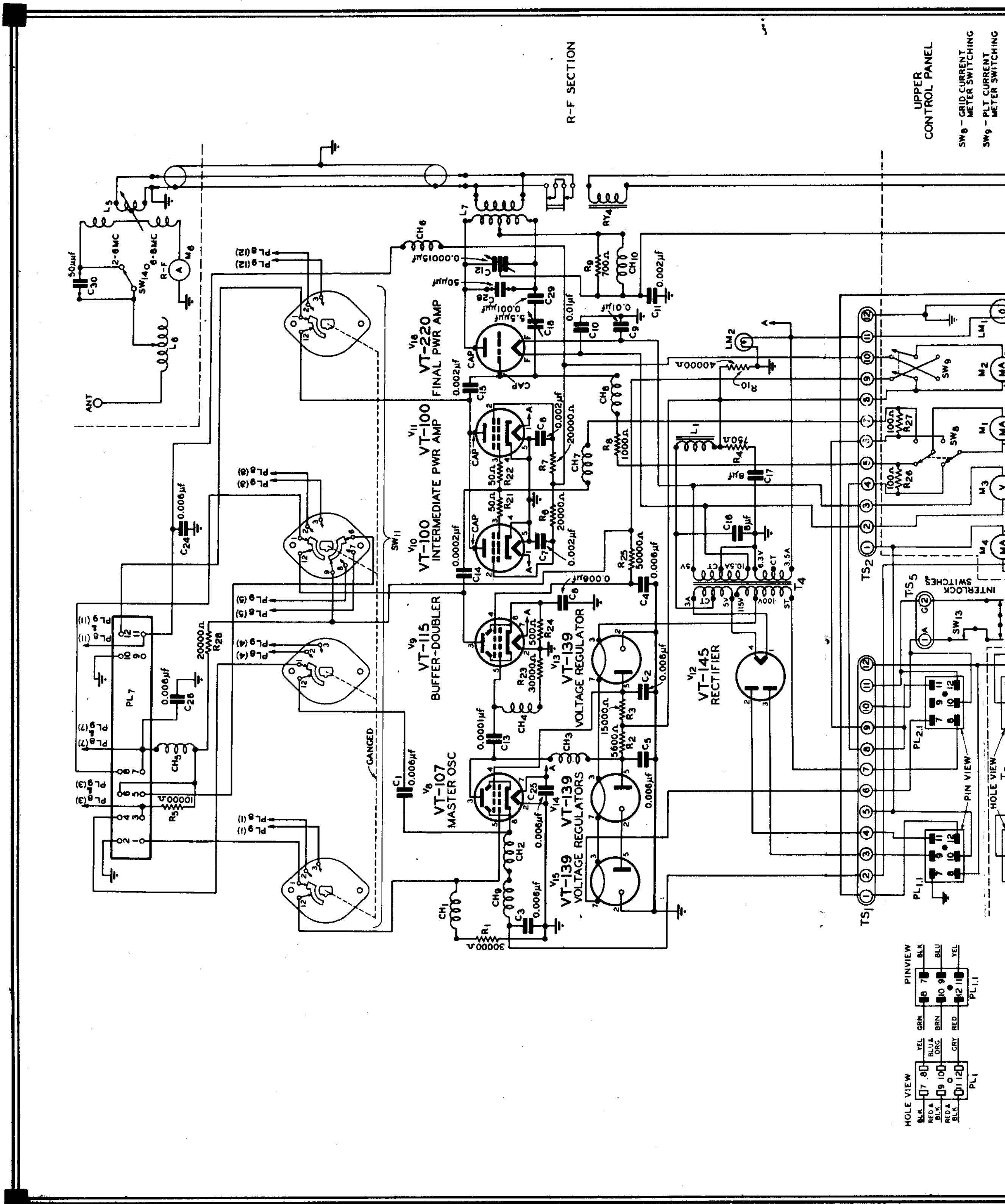


Fig. 6.—Schematic—h-v power supply.


R-F SECTION
UPPER CONTROL PANEL
SW8 - GRID CURRENT METER SWITCHING
SW9 - PLT CURRENT METER SWITCHING
V16 VT-220 FINAL PWR AMP
V11 VT-100 INTERMEDIATE PWR AMP
V10 VT-100
V9 VT-115 BUFFER-DOUBLER
V8 VT-107 MASTER OSC
V13 VT-139 VOLTAGE REGULATOR
V14 VT-139 VOLTAGE REGULATORS
V15 VT-139 VOLTAGE REGULATOR
V12 VT-145 RECTIFIER
INTERLOCK SWITCHES
GANGED
ANT
PIN VIEW
HOLE VIEW
PINVIEW
PL1.1
PL1

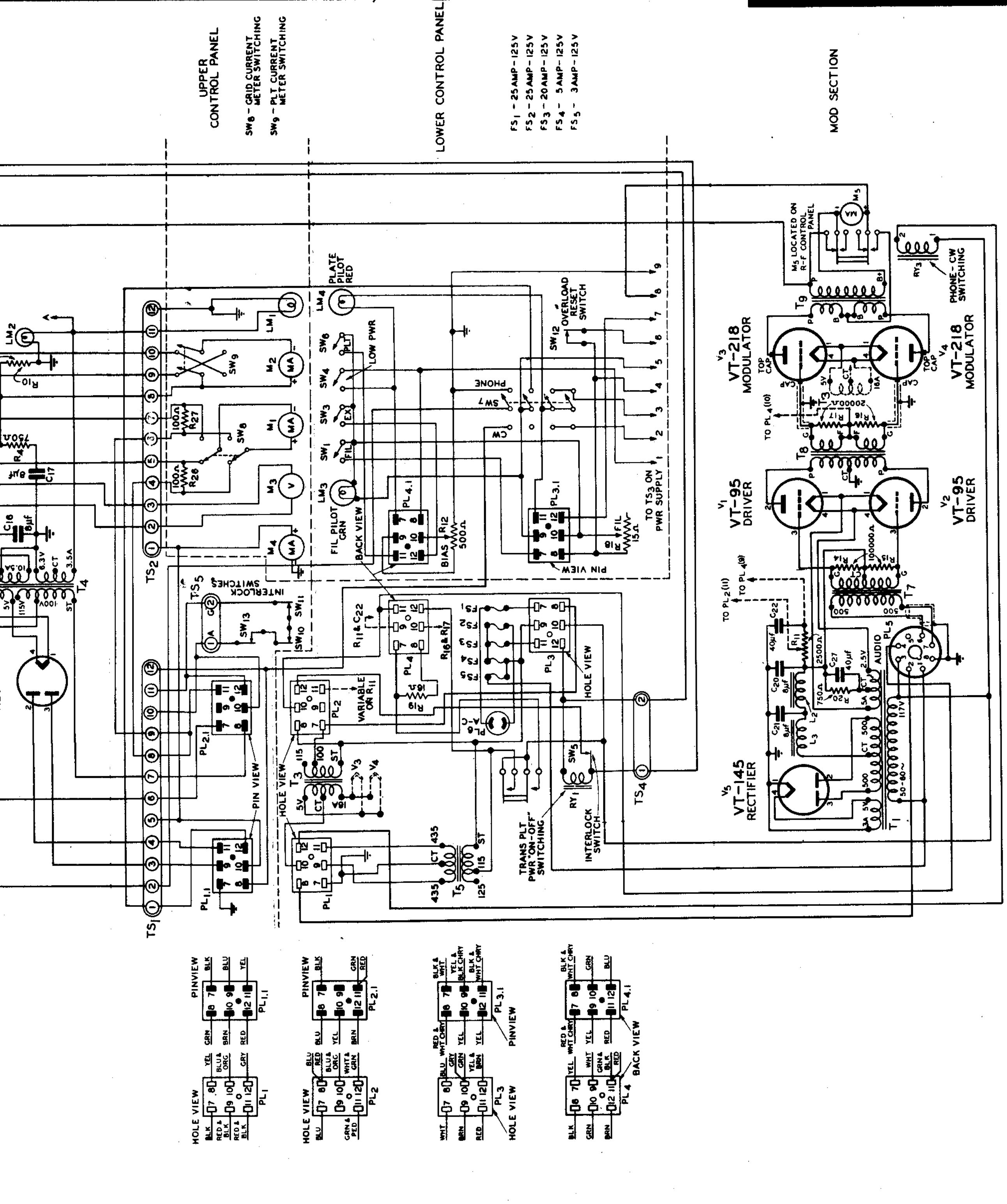
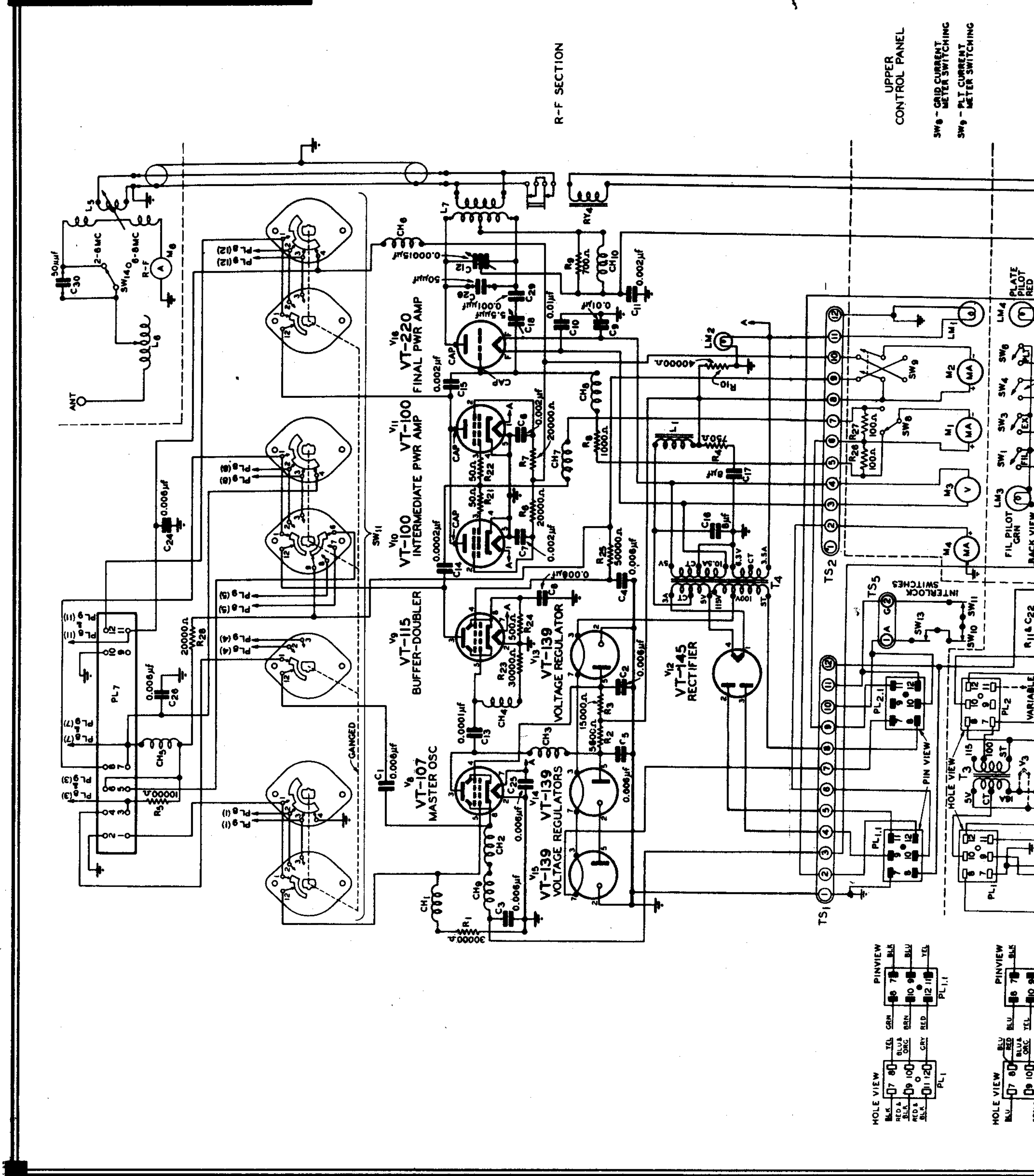


Fig. 7.—Schematic BC-610-A, BC-610-B


R-F SECTION
UPPER CONTROL PANEL
SW_8 - GRID CURRENT METER SWITCHING
SW_9 - PLT CURRENT METER SWITCHING
V_{16} VT-220 FINAL PWR AMP
V_{11} VT-100 INTERMEDIATE PWR AMP
V_{10} VT-100 INTERMEDIATE PWR AMP
V_9 VT-115 BUFFER-DOUBLER
V_8 VT-107 MASTER OSC
V_{13} VT-139 VOLTAGE REGULATOR
V_{14} VT-139 VOLTAGE REGULATORS
V_{15} VT-139 VOLTAGE REGULATORS
V_{12} VT-145 RECTIFIER
GANGED
ANT
INTERLOCK SWITCHES
PIN VIEW
HOLE VIEW
PLATE PILOT RED
FIL PILOT GRN
TS_1
TS_2
TS_5
T_3
T_4
PL_7
$PL_{1.1}$
$PL_{2.1}$
PL_1
PL_2
VARIABLE

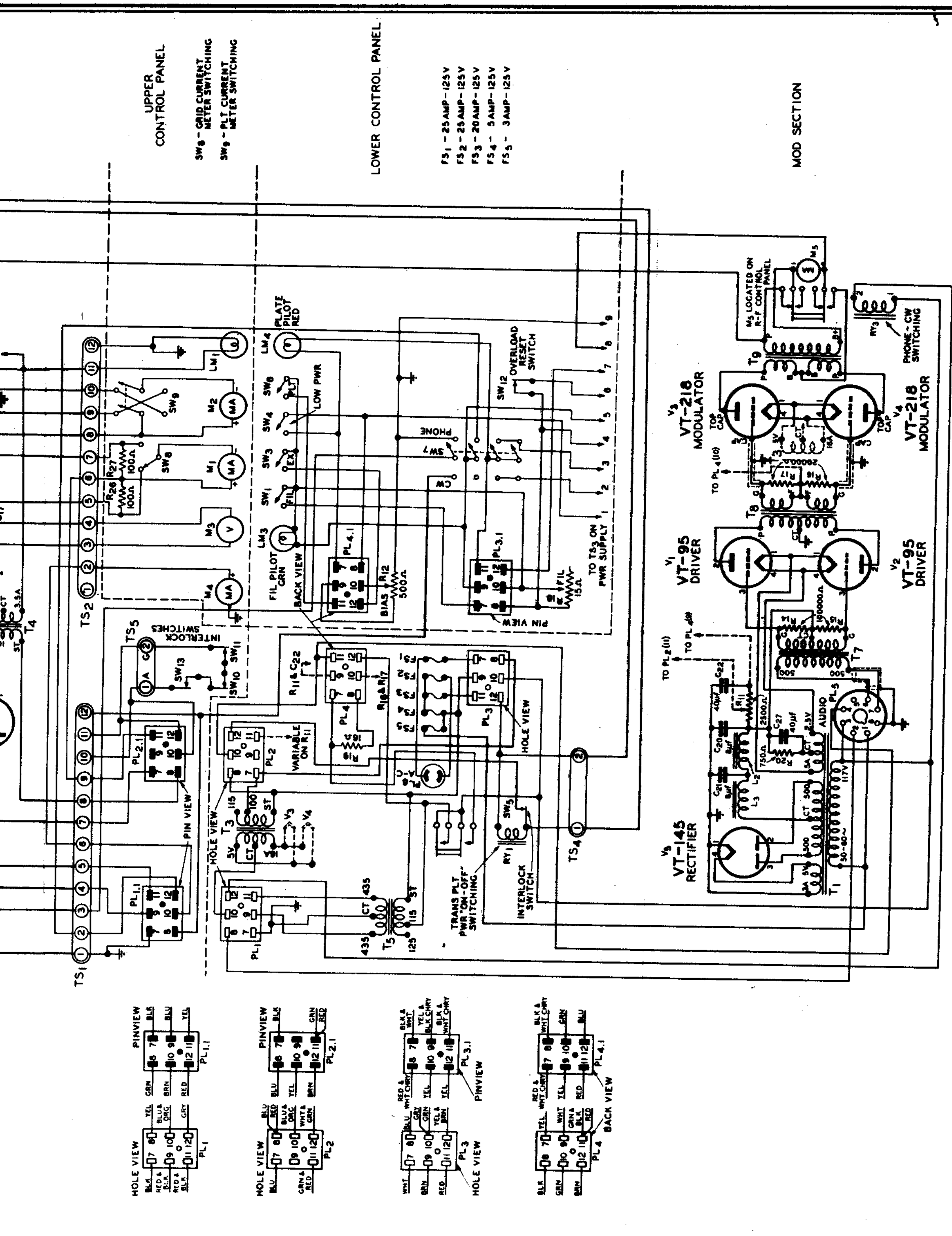
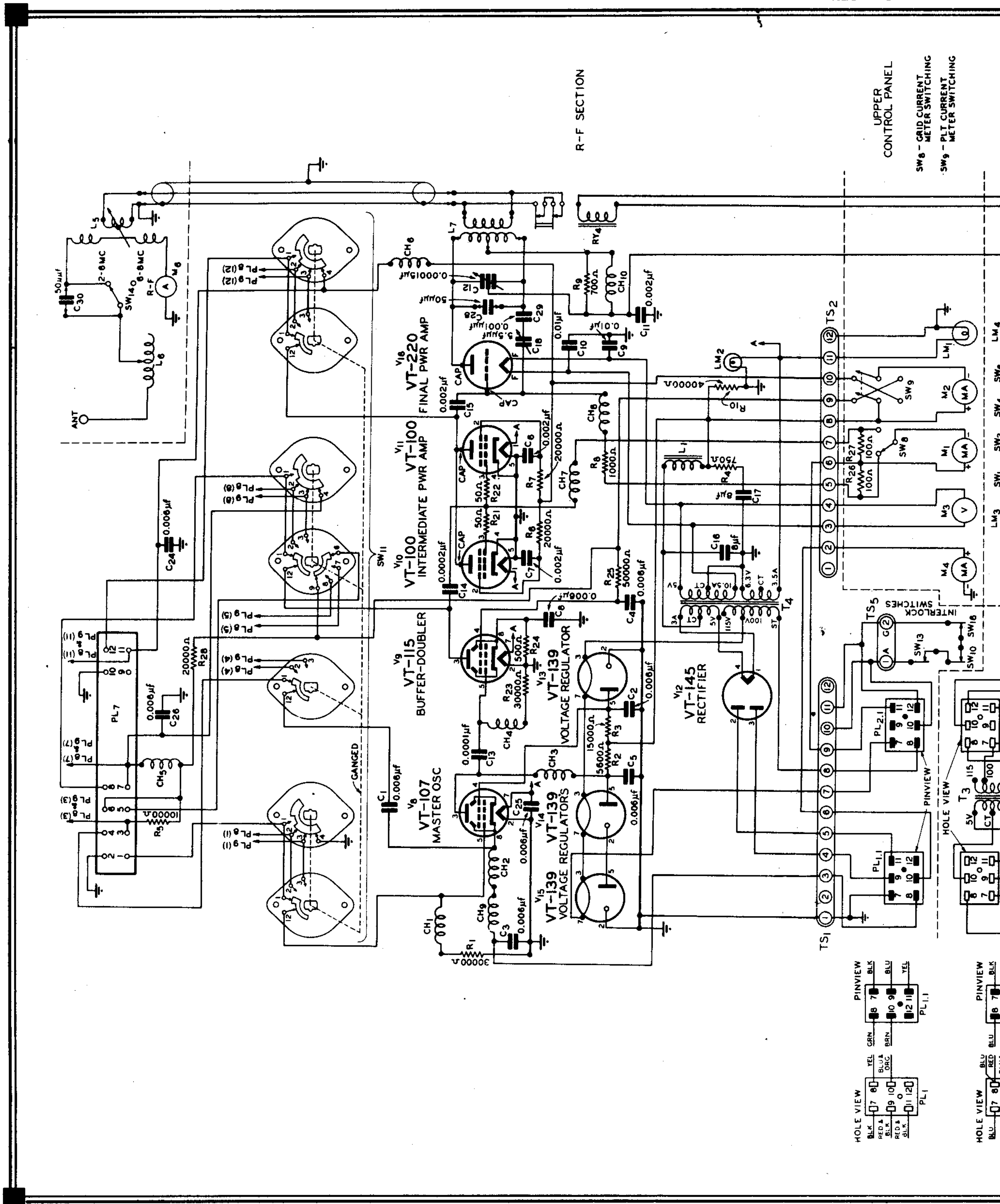


Fig. 8.—Schematic BC-610-C


R-F SECTION
UPPER CONTROL PANEL
SW8 - GRID CURRENT METER SWITCHING
SW9 - PLT CURRENT METER SWITCHING
V16 VT-220 FINAL PWR AMP
V11 VT-100 INTERMEDIATE PWR AMP
V10 VT-100 INTERMEDIATE PWR AMP
V9 VT-115 BUFFER-DOUBLER
V8 VT-107 MASTER OSC
V13 VT-139 VOLTAGE REGULATOR
V14 VT-139 VOLTAGE REGULATORS
V15 VT-139 VOLTAGE REGULATOR
V12 VT-145 RECTIFIER
INTERLOCK SWITCHES
GANGED
ANT
PL7
TS1
TS2
PINVIEW
HOLE VIEW

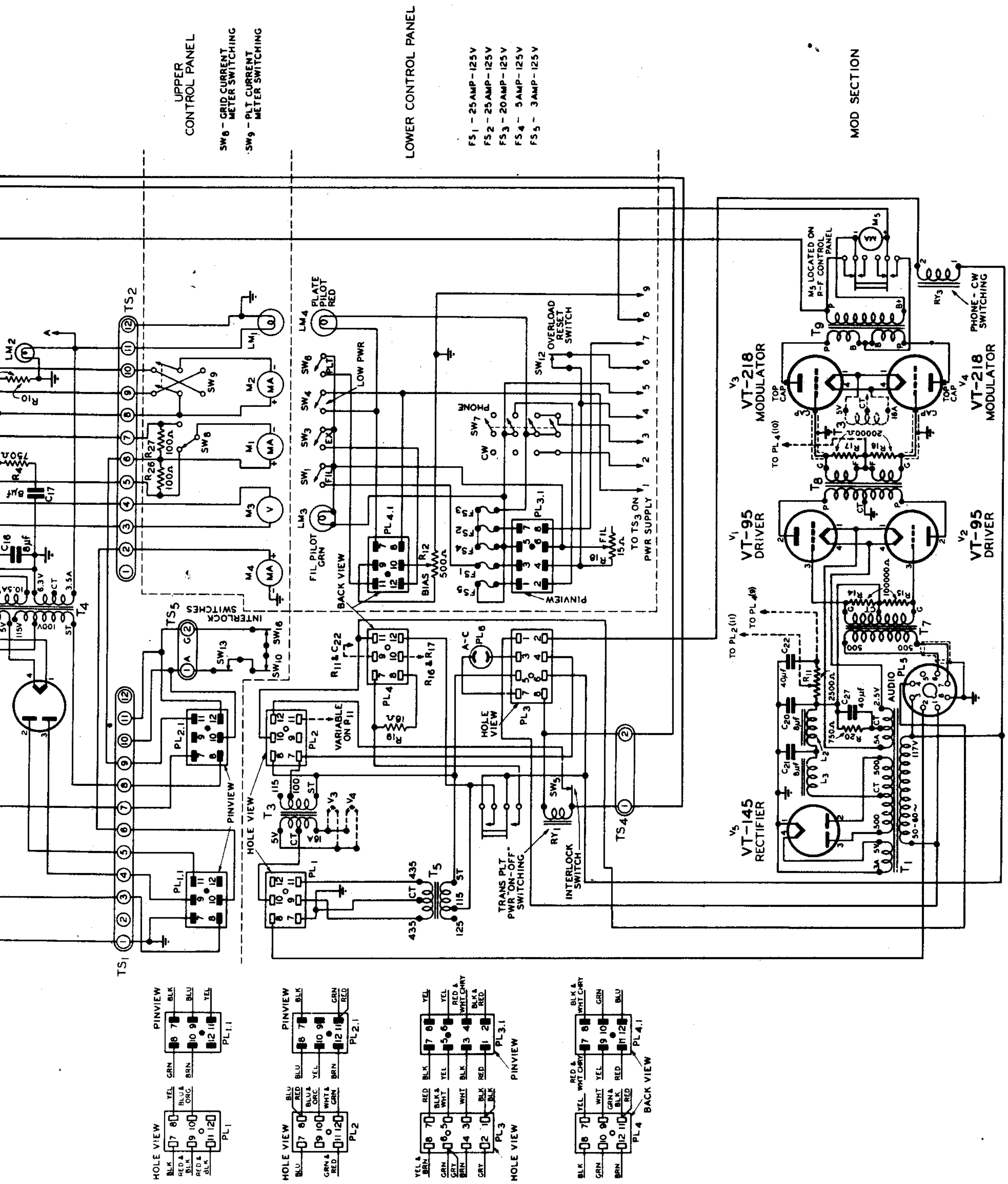


Fig. 9.—Schematic BC-610-D

RADIO RECEIVER & TRANSMITTER BC-611-(*)

BC-611-(*) = BC-611-A, BC-611-B, BC-611-C

Part of: SCR-536-(*)

Reference:
TM 11-235

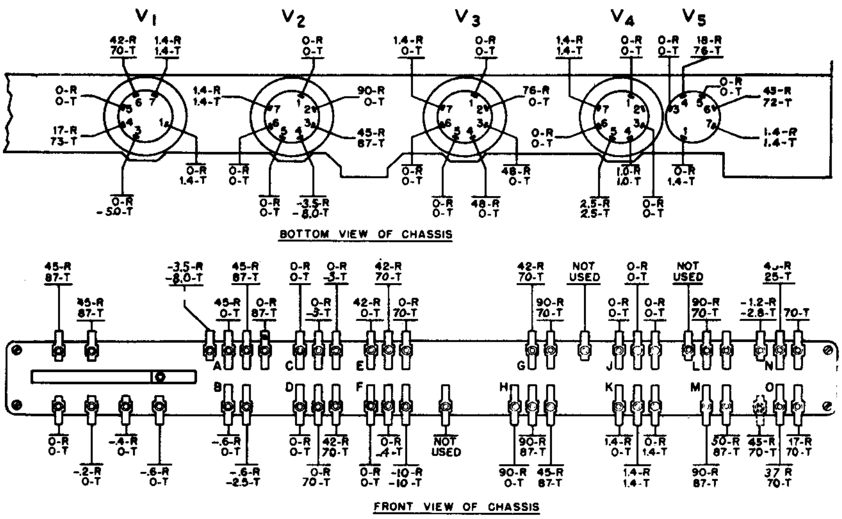


Fig. 1.—Voltage readings.

Readings with "A" batt voltage 1.4v, "B" batt voltage 90v under load.

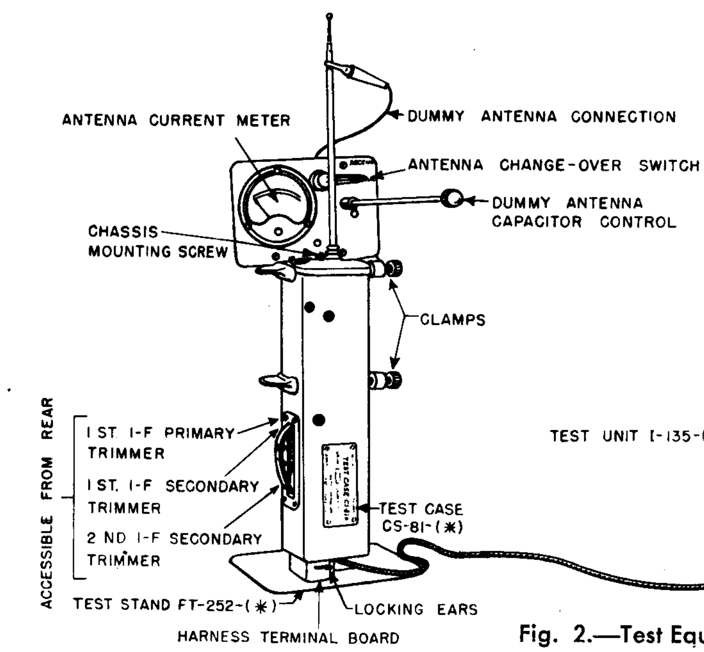
Measurements above taken between point indicated and chassis, using 1000 ohms/volt meter. Filament and bias voltage read on 30v range, all others on 300v range.

Measurements in point-to-point chart at right taken across the part, using meter range indicated.
NOTE: Do not attempt to take measurements across parts not listed because of likely damage to circuit or tubes.

VOLTAGES - POINT TO POINT

PART	REC.	TRANS.	V.M. RANGE
R_1, R_2	0	0	3
R_3	0.2	0.5	3
R_4	0.2	0.7	3
R_5	0.1	0	3
R_6	15	90	300
R_7	0.2	0	3
R_8, R_9	0	0	3
R_{10}, R_{11}	18	0	30
R_{12}	28	0	30
R_{13}, R_{14}	0	0	3
R_{15}	10	0	30
R_{16}	65	0	300
R_{17}	45	0 (5)¹	300
R_{18}	15	15	30
R_{19}	18	0	30
R_{20}	0	0	3
R_{21}	65	60	300
R_{22}	5	5	30
R_{23}	0	0	3
R_{24}	0	1	3
R_{25}	0.1	0	3
R_{26}, R_{27}	0	0	3
C_1	0	0	3
C_2	5	80	300
C_3	24	80	300
C_5	0.2	2	3
C_6	0	2	3
C_7	0	0	3
C_8	0	1.3	3
C_{11}	50	90	300
C_{12}	0	75	300
C_{13}-C_{16}	0	0	3
C_{17}	27	0	30
C_{18}	80	0	300
C_{19}-C_{21}	0	0	3
C_{23}	*0.2	0	3
C_{25}	0.2	0.2	3
C_{26}	0.1	0.1	3
C_{28}	85	80	300
C_{29}	40	85	300
C_{30}	80	90	300
C_{31}	95	0	300
L_6	0	10	30

* Depends on bias connection.
¹ -Late BC-611-C.



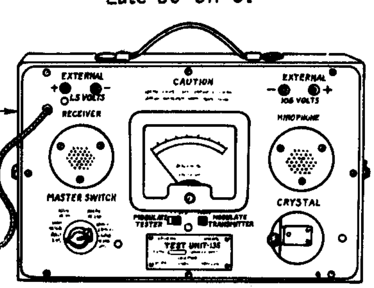


Fig. 2.—Test Equipment IE-17-(*)

PRESETTING AND ALIGNMENT

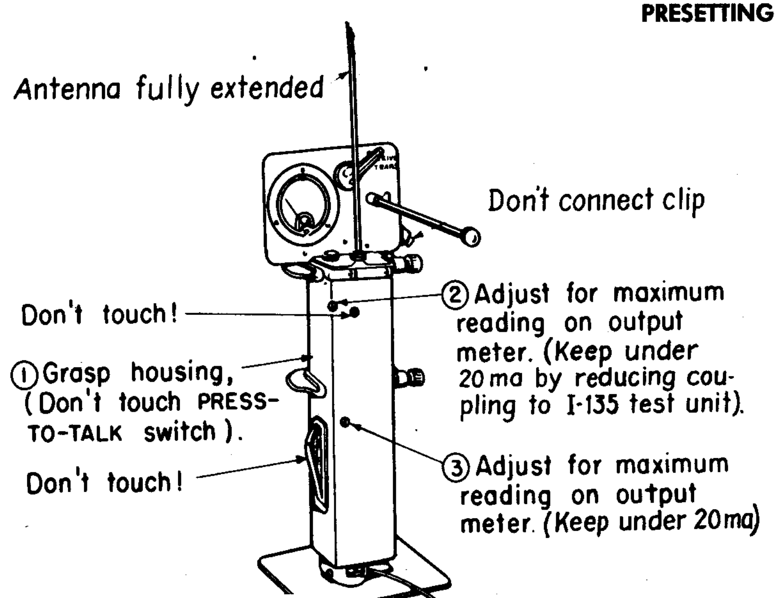


Fig. 3.—Receiver presetting.

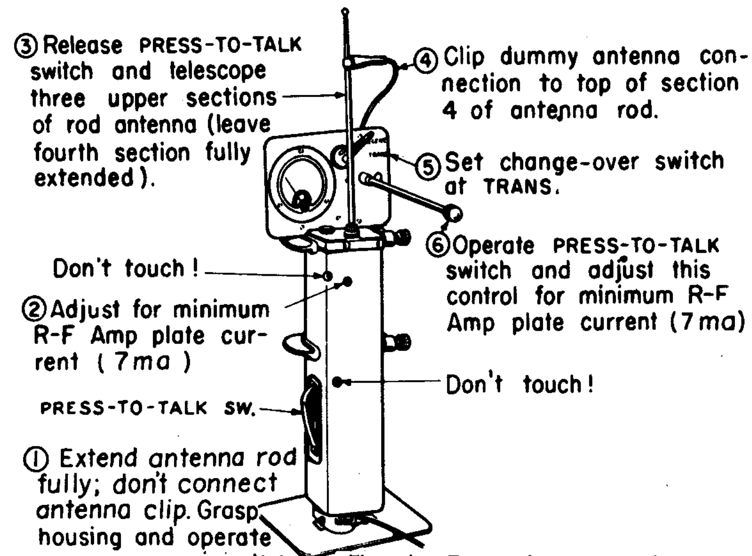


Fig. 4.—Transmitter presetting.

Using I-135-(*) test unit as shown in Fig. 2 (with external heavy duty batteries, if available).
Remove BC-611 plate current jumper before attaching harness, and REPLACE after tests.

TEST OR ADJUSTMENT	Trans Crystal in	Rec Crystal in	I-135 SWITCH POSITIONS [1]Master Switch	Mod Tester	Mod Trans	PRESS TO TALK SWITCH	I-135 METER READING	REMARKS
Crystal Activity Check	↓ Tester	↓ Tester	Crystal Activity	OFF			0.3 (min)	Test one at a time. Check that rec crystal is 455 kc higher than trans crystal.
Receiver Operation Check	Tester	Set	BA-37 0-3v BA-37 0-600ma BA-38 0-150v BA-38 0-60ma	OFF			1.35 (min) 250 85 (min) 5-11	
[2] Receiver Presetting	Tester	Set	OUTPUT	ON			Keep under 20	See Fig. 3 above for steps.
[2] I-F Alignment (if needed)	Tester	Set	OUTPUT	ON				See Fig. 2. Adjust in order for max. Repeat.
Transmitter Operation Check	Set	Tester	BA-37 0-3v BA-37 0-600ma BA-38 0-150v BA-38 0-60 ma	OFF		Press	1.35 (min) 275-300 75 (min) 26-30	Antenna fully extended. Test clip off.
Transmitter Presetting	Set	Tester	PWR AMP	OFF		Press	7	See Fig. 4 for steps. Ant current 15ma or more.
Modulation Check	Set	Tester	PWR AMP	ON	Press	Press	7	Ant current should increase at least 6 percent.
BA-37, BA-38 Battery Test	Set	Set	BA-37 0-3v BA-38 0-150v	OFF			[3]1.35-1.5 [3]75-103.5	Disconnect internal batteries, install BA-37 and BA-38 in I-135. Ant fully extended. Test clip off.

[1]Always turn to OFF when changing crystals, batteries, or connections, and when not in use.
[2]Crystal slide cover of I-135 open. Attach short wire for additional radiation if needed.
[3]Both batteries should be replaced if either is low. Lower limits - 1.25v and 70v.

IMPORTANT

DON'T FORGET TO REPLACE PLATE CURRENT JUMPER!

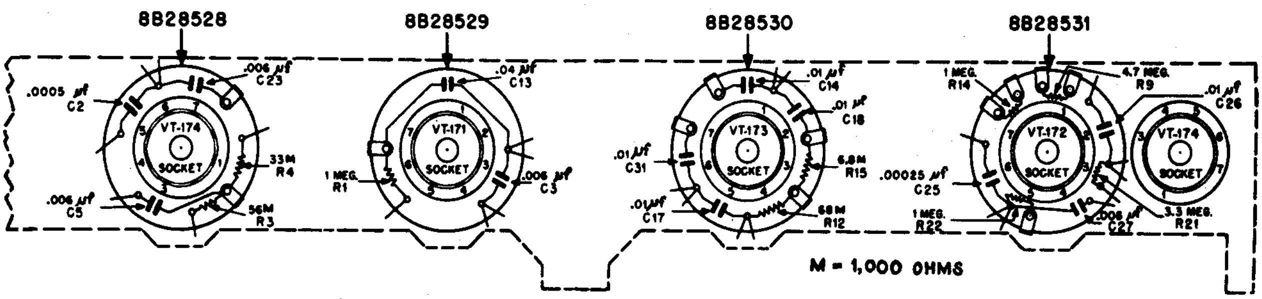


Fig. 5.—Resistor-capacitor cup schematic.

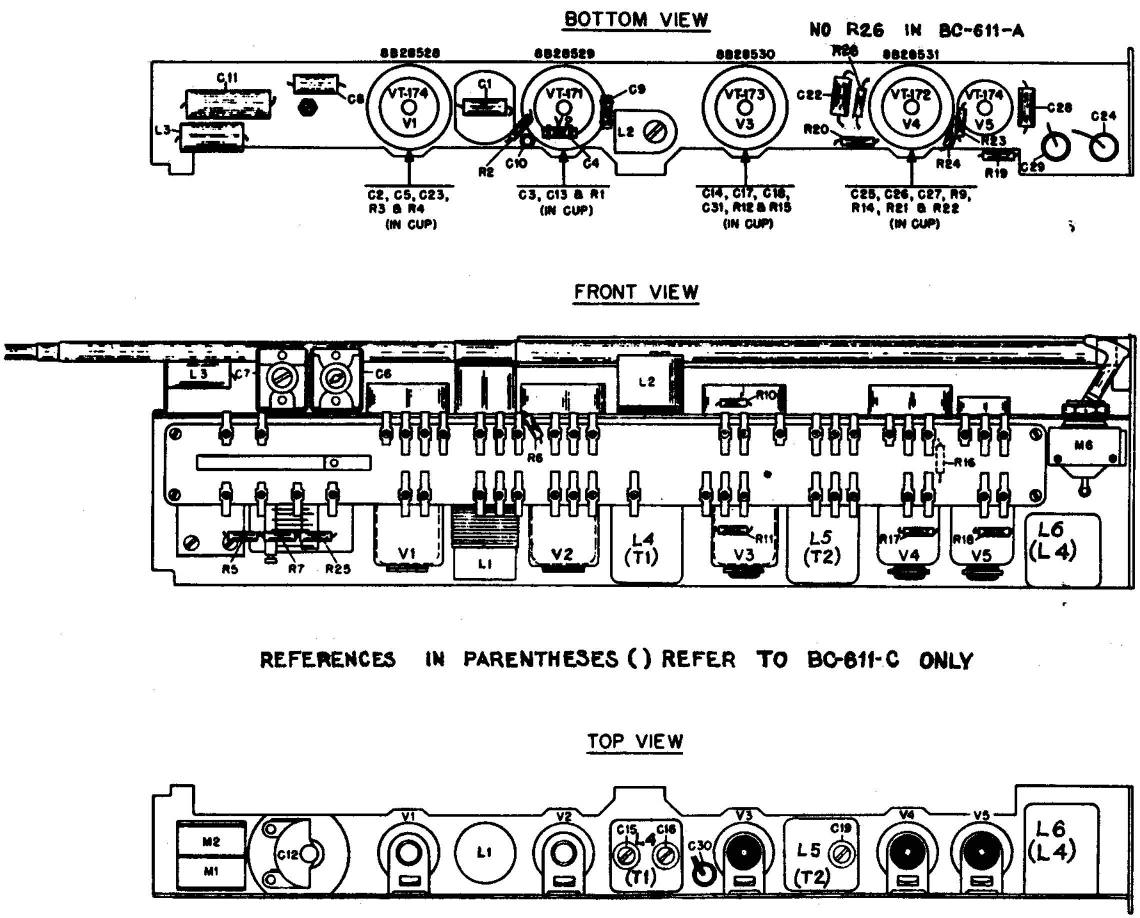


Fig. 6.—Parts layout.

COMMON FAULTS AND CORRECTIVE MEASURES

WATERPROOFING BC-611-(*)

1. The following method is recommended in cases where trouble is encountered due to moisture seepage.
   - *a.* Spread a small quantity of Permatex, aviation type, Permatex Co., N.Y., or equal, over the sealing rubber of both bottom and top covers.
   - *b.* Close bottom cover and press it firmly in place while tightening the hinged thumb screw. Be sure this screw is tight.
   - *c.* Insert a fiber washer under the screw which holds the top cover to the chassis. Close cover and tighten screw.
   - *d.* Remove cover of "Press to Talk" switch assembly. Spread a thin coating of Permatex over the rubber surface (side making contact with case) and replace the cover. Be sure the metal frame is snugly screwed down.
   - *e.* Remove bakelite cover from both mouth and ear pieces. Squeeze a small quantity of Duco cement, DuPont de Nemours Co., or equal, on the diaphragm of both pieces (dynamic type only) and spread out evenly with finger. Allow to dry several minutes and repeat with a second coat. Allow the cement to dry one-half (½) hour before replacing bakelite covers.
   - *f.* Remove the neoprene grommet from the antenna insulator. Fill the inside of the grommet with petroleum jelly, Chesebrough, or equal, and place back on the insulator.
2. Steps have been taken to procure and stock, at various Signal Corps Depots, kits comprised of the following materials suitable for the above outlined modification, which may be requisitioned through the regular channels:
   - 1 gross Washers, fiber, 5/16" O.D., 3/16" I.D., 1/16" thick, Pennsylvania Fiber & Specialty Co., or equal.
   - 8 ounce Permatex, aviation type, Permatex Co., N.Y., or equal.
   - 1 tube Cement, household, 5¼ fluid ounce, DuPont de Nemours Co., or equal.
   - 8 ounce Jelly, petroleum, Chesebrough Mfg. Co., or equal.
3. The above kit of materials is sufficient for maintenance of fifty (50) sets for one year.

OCSigO Maintenance Letter No. 13.

FAILURE OF C_{29}

Capacitor C_{29} frequently short circuits. Remedy is replacement. If replacement is necessary, also check for damage to resistors R_{16} and R_{24}. Replace them if necessary.

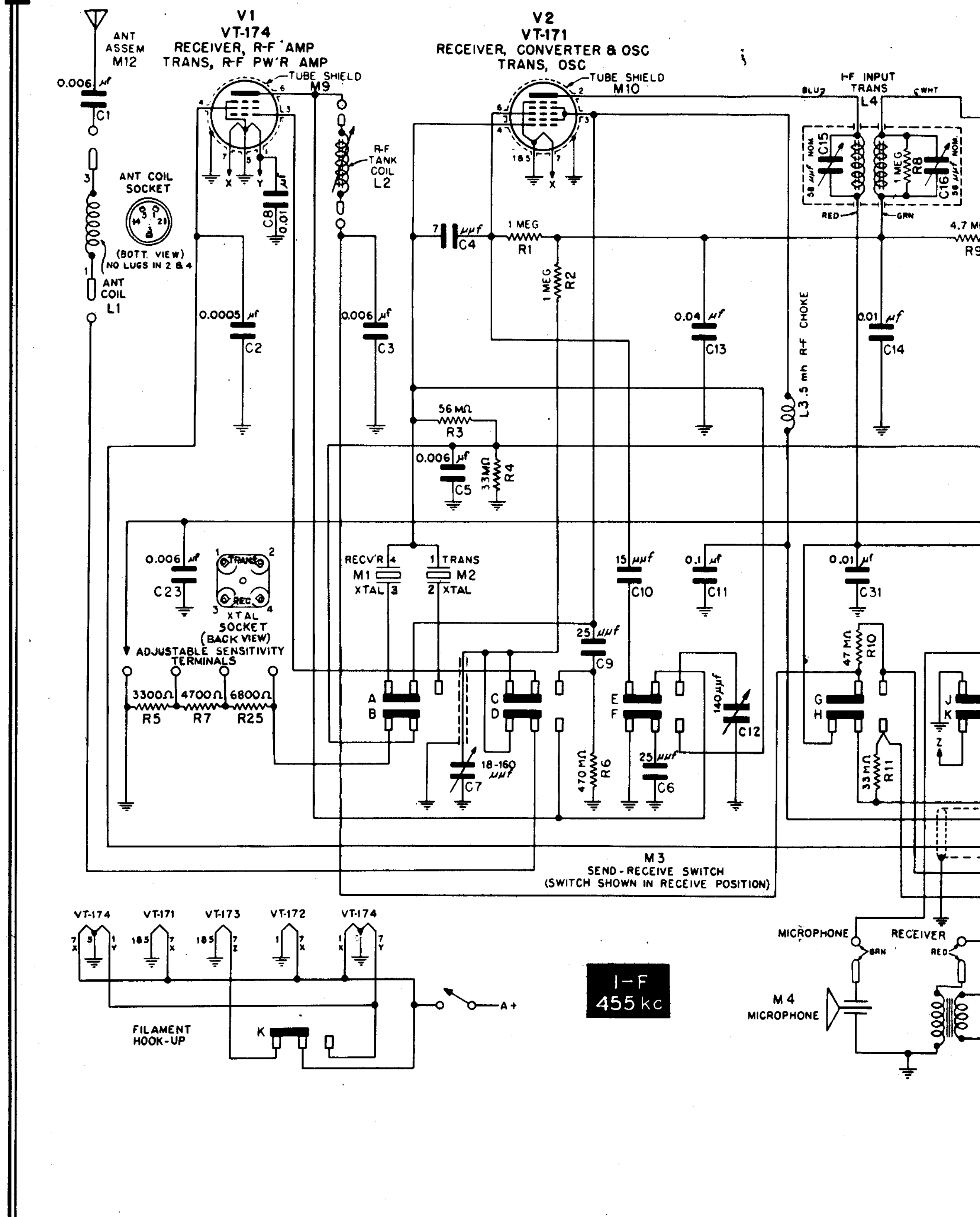
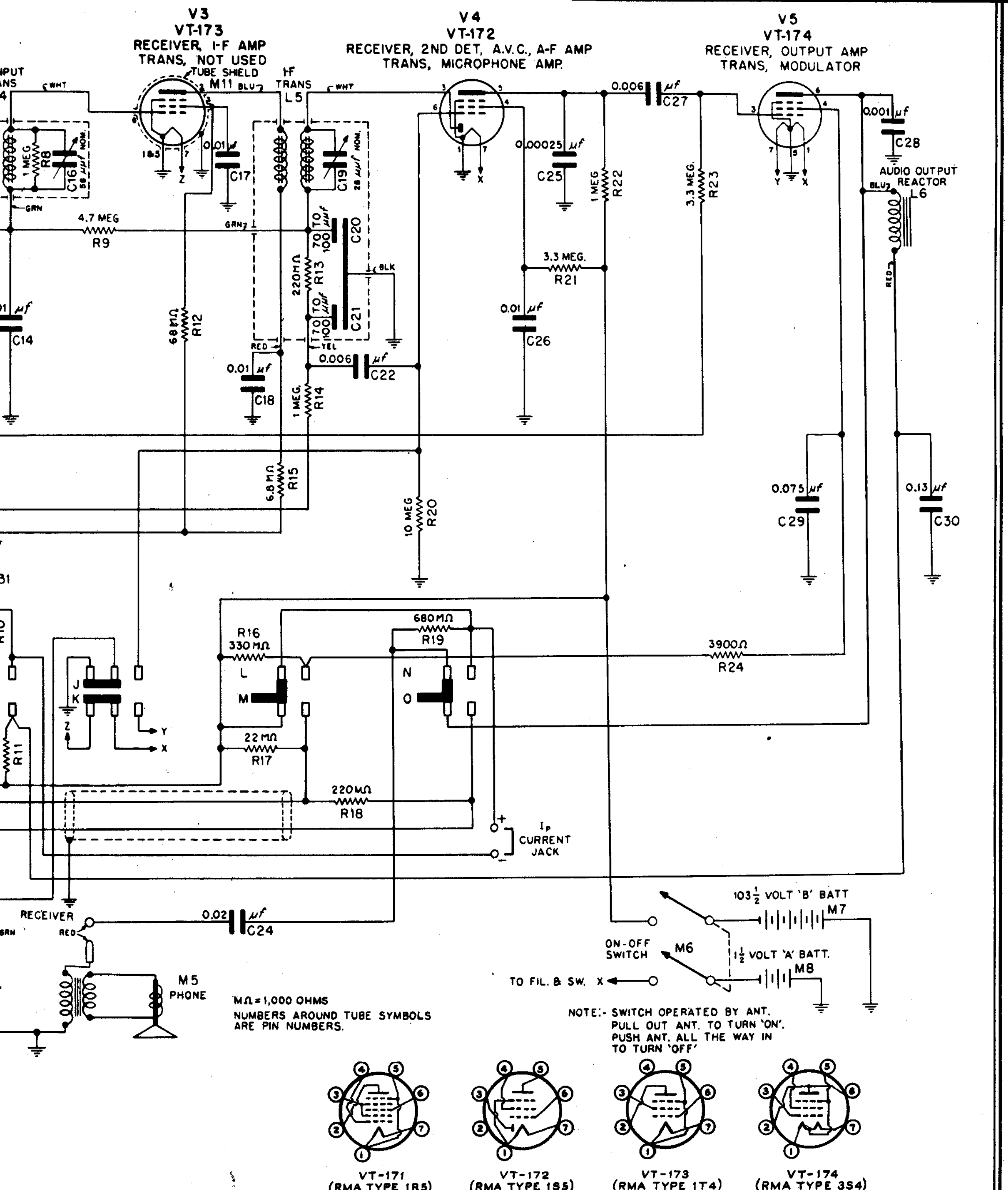


Fig. 7.—Schematic-



—Schematic—BC-611-A.

RADIO RECEIVER & TRANSMITTER BC-611-(*)

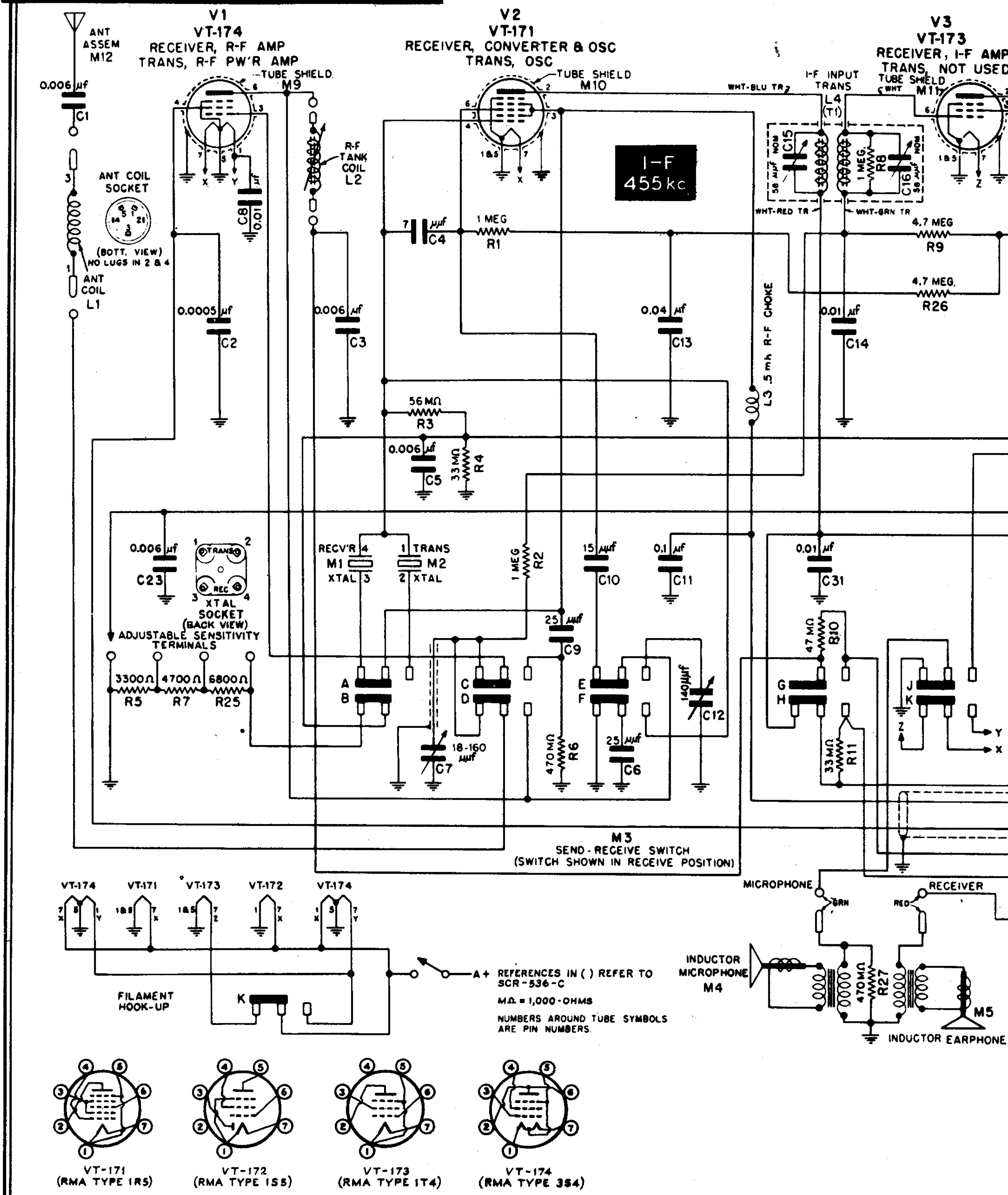
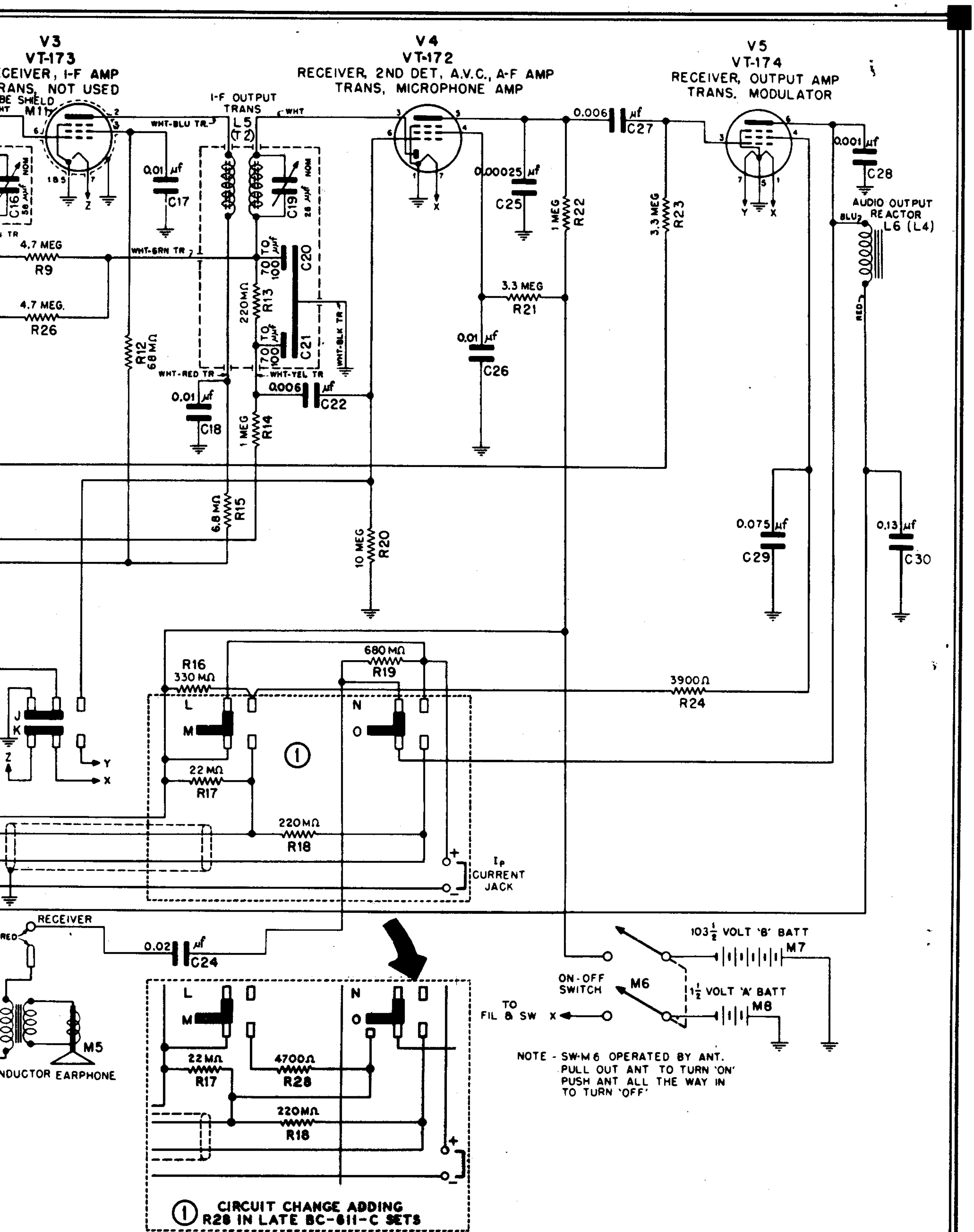


Fig. 8.—Schematic—BC-611-B,



—BC-611-B, BC-611-C.

SPEECH AMPLIFIER BC-614-(*)

BC-614-(*)= BC-614-A, BC-614-B, BC-614-C, BC-614-D

Reference: TM 11-280

Part of: SCR-299-(*)

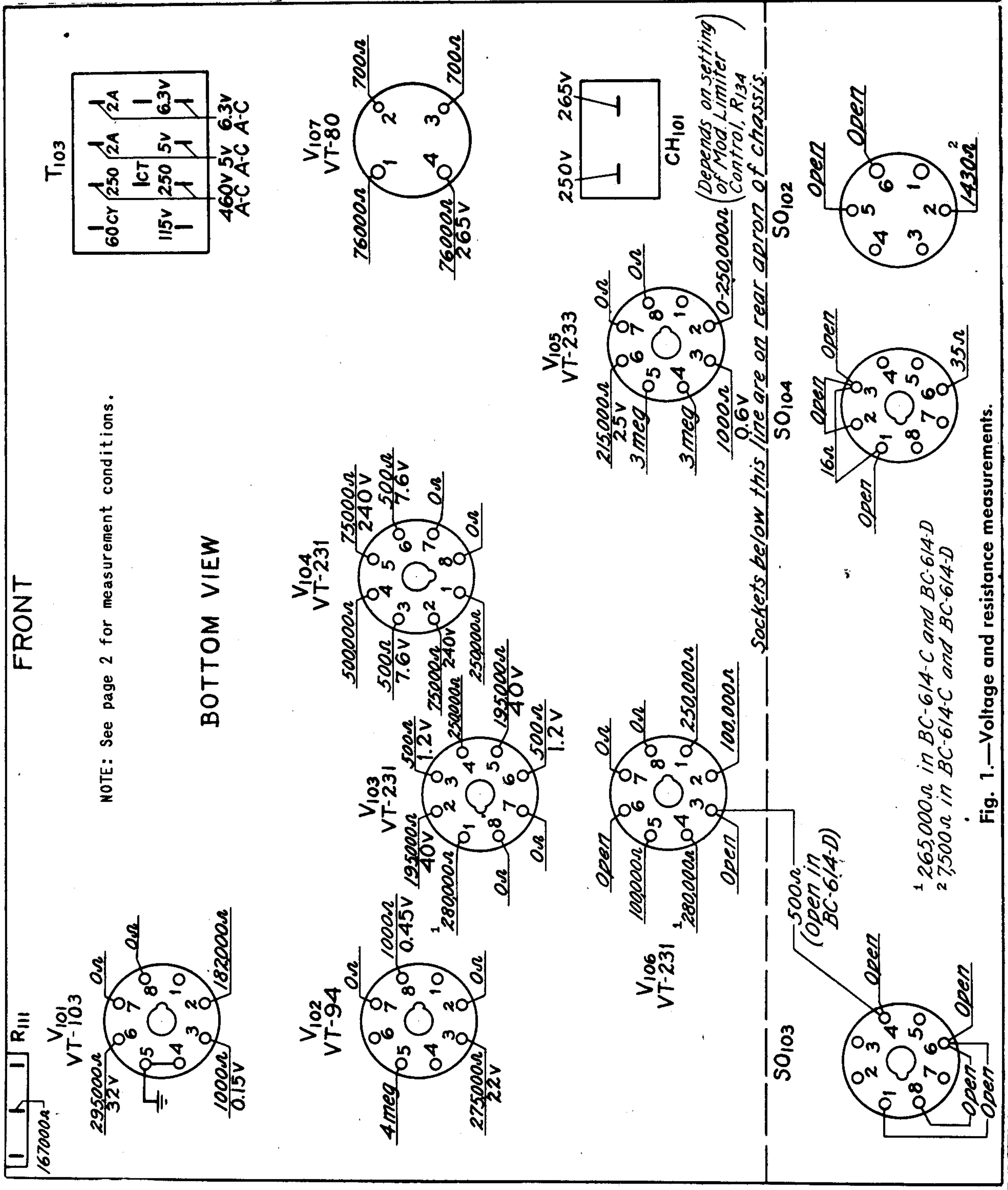


Fig. 1.—Voltage and resistance measurements.

RESISTANCE MEASUREMENTS

All plugs and tubes removed.
Transmitter control switch set at TRANS. OFF.
SIDETONE switch set at ON BC-342.
NORMAL-REMOTE PHONE switch set at NORMAL.(Applies to BC-614-D only.)
Both GAIN controls full on.
Both RECEIVER CONTROL switches set at AUTO.

Measurements are to chassis unless otherwise indicated.

VOLTAGE MEASUREMENTS

Readings taken on lowest suitable range of 1000 ohms/volt voltmeter.
Voltages are nominal D-C to chassis unless otherwise indicated.
Line voltage approximately 117v A-C
BC-614 connected as for operation in SCR-299-(*), but with transmitter PLATE POWER switch OFF and transmitter control switch at TRANS OFF.
SIDETONE switch to ON BC-312 or ON BC-342.
Turn transmitter FILAMENT POWER switch to ON.

MODULATION LIMITER ADJUSTMENT

Readjustment should be made only in the event that MOD LIMITER control has been disturbed; no adjustment in the field is recommended unless an audio oscillator is available. If necessary, adjustment is accomplished as follows:

1. With BC-614 connected to transmitter BC-610, set transmitter control switch at TRANS OFF and SIDETONE switch at OFF. (In the case of BC-614-D, also set REMOTE-NORMAL switch at NORMAL.)
2. Turn FILAMENT POWER switch (on transmitter) ON.
3. Remove metal plate on front panel covering MOD LIMITER control (R_{134}) screw adjustment.
4. Turn this MOD LIMITER control to the extreme counterclockwise position.
5. Turn transmitter control switch to ON, and make sure that the transmitter is completely tuned and loaded (250 ma on PA PLATE meter) for high-power phone operation. Adjust MOD PLATE current to 40 ma without modulation.
6. Feed output of 400-cycle audio oscillator into DYNAMIC MIC jack SO_{101}. The "hot" lead should be connected to No. 3 terminal of this jack, and the ground lead to No. 1 terminal or chassis. CAUTION--*Output of the oscillator must be sufficiently attenuated at all times to prevent overloading the first A-F stage (V_{101}).*
7. Adjust mic gain control and/or audio oscillator output control until MOD PLATE meter reads 225 ma.
8. Turn MOD LIMITER control clockwise until MOD PLATE meter reading decreases to 160 ma. This completes the adjustment.

OUTPUT LEVEL METER (M_{101}) ADJUSTMENT

Early models of BC-614 were equipped with this meter, and a screwdriver adjustment (R_{122}) is provided on the rear apron of the chassis. Adjust for midscale deflection (0db) at 100% speech modulation of transmitter. 200 ma on MOD PLATE meter of transmitter BC-610 indicates 100% modulation.

COMMON FAULTS AND CORRECTIVE MEASURES

PROTECTION OF OUTPUT LEVEL METER (M_{101})

To prevent excessive deflection of OUTPUT LEVEL meter when keying with sidetone, the following change should be made on equipments having this meter.

Remove the brown ground lead between the meter and ground at the ground end. Connect this end to the unused center contact, or OFF position of SIDETONE switch section 101-B. This part of the switch is the right section as viewed from the front of the speech amplifier.

Readjust OUTPUT LEVEL meter.

Ref: OCSigO Maintenance Letter No. 30 (1943)

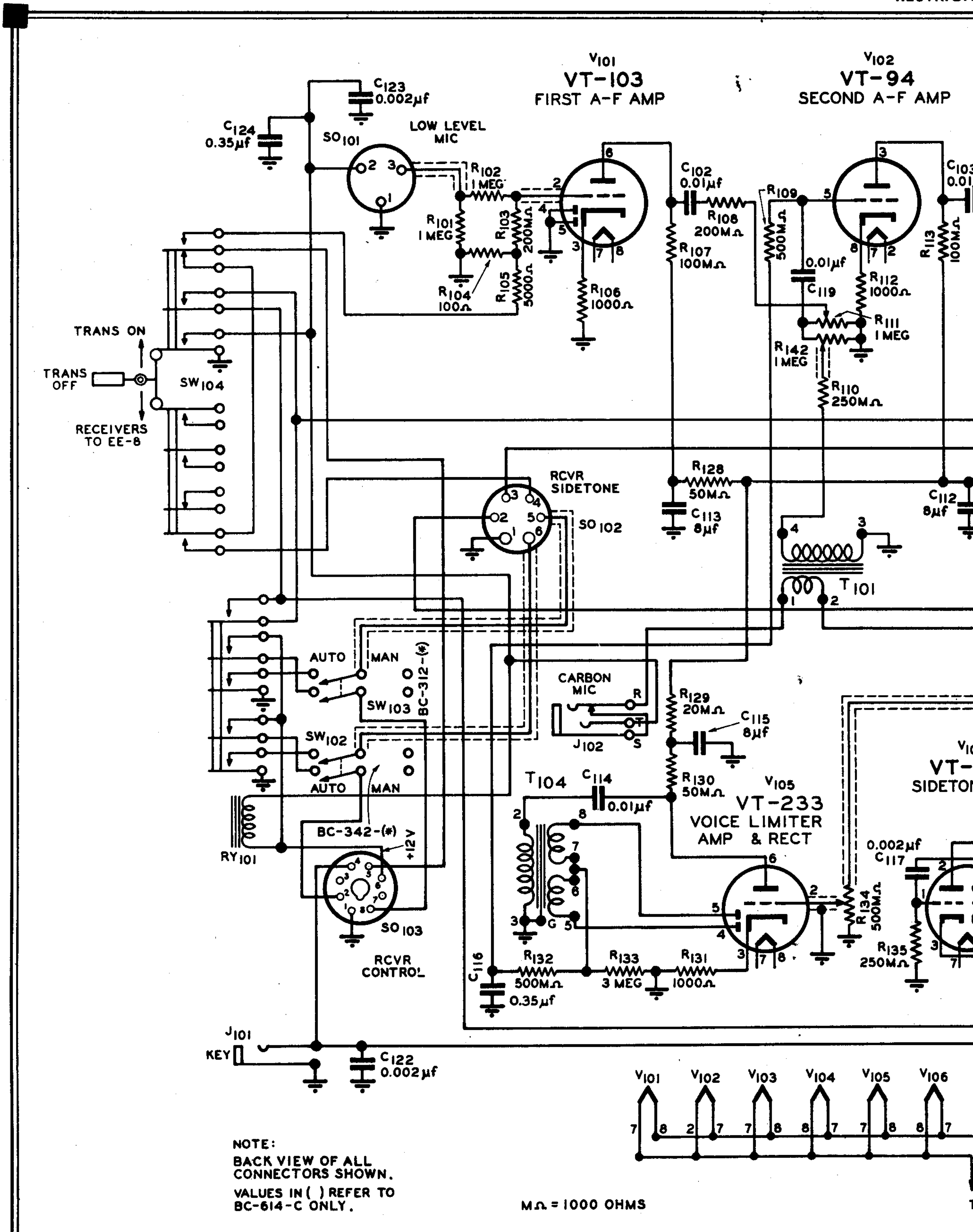
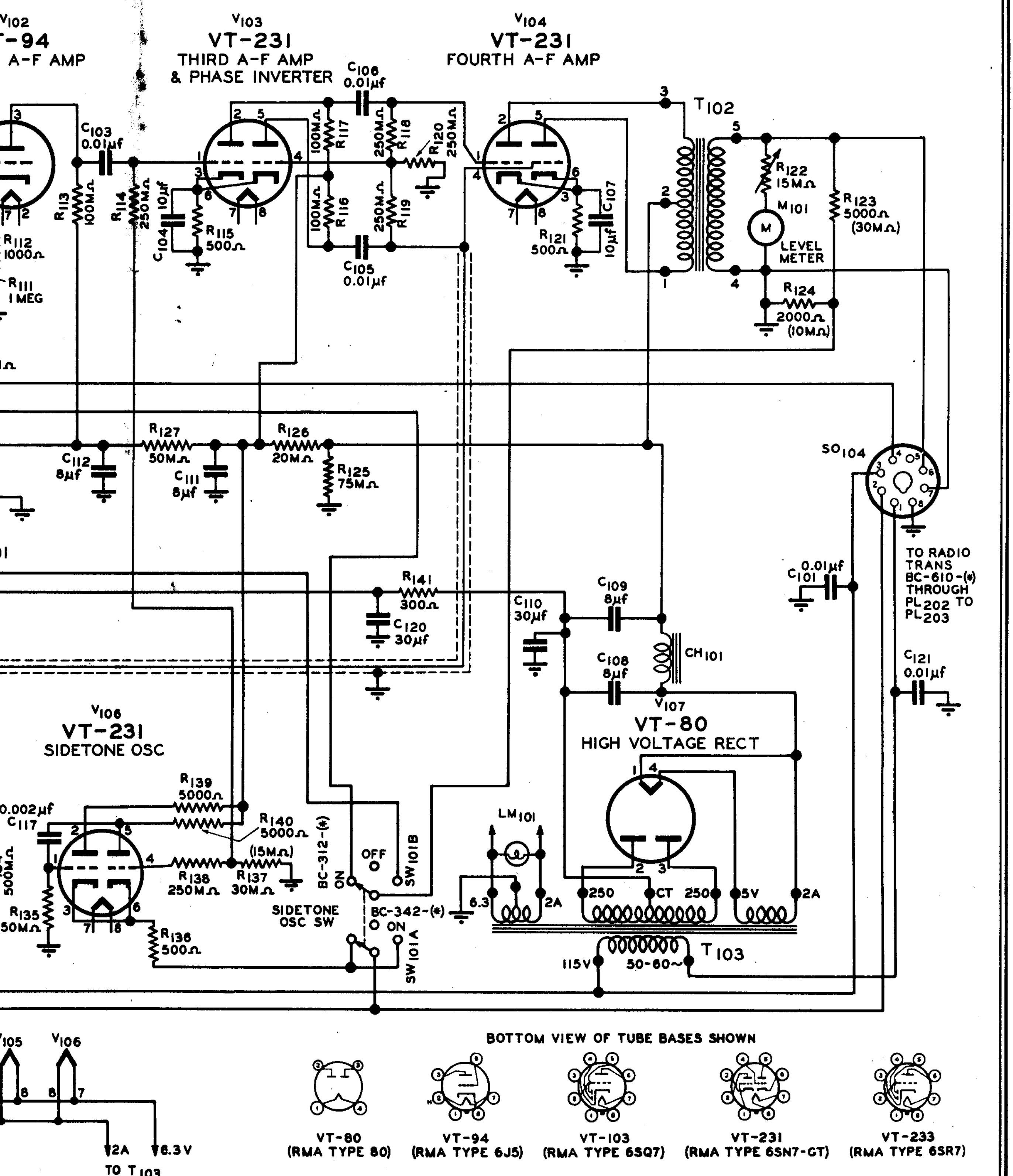


Fig. 4.—Schematic BC-614-A,



ic BC-614-A, BC-614-B, BC-614-C.

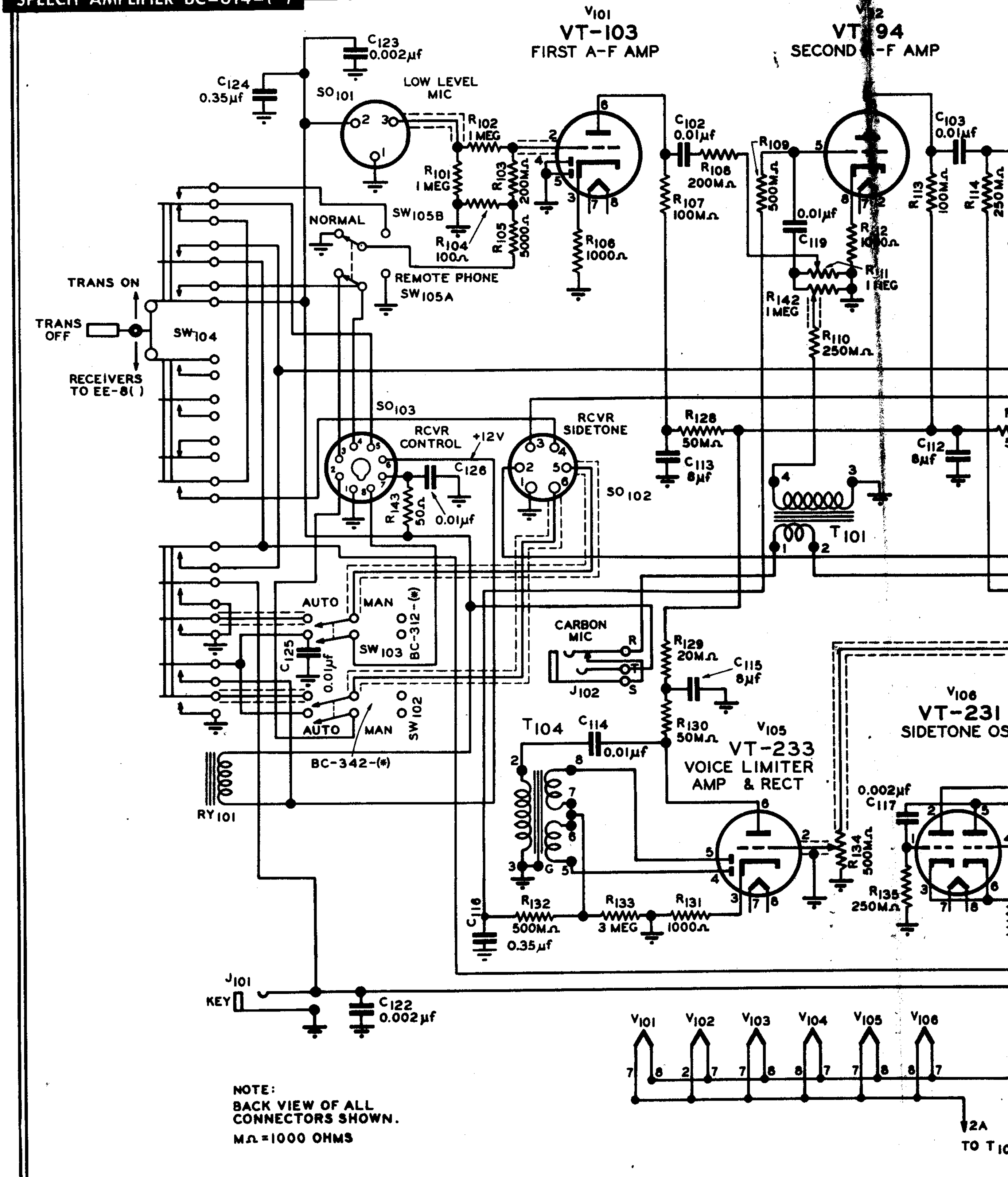
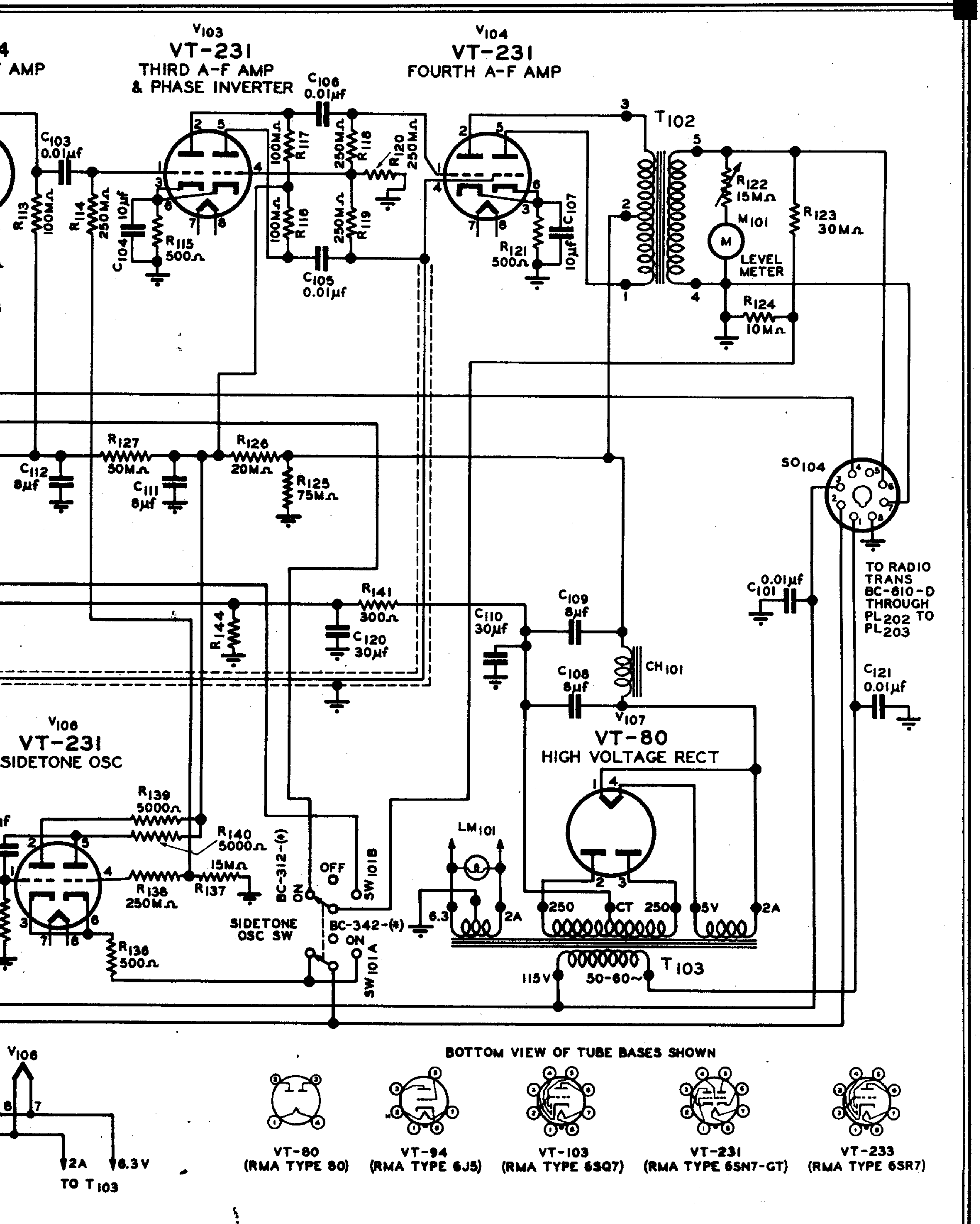


Fig. 3.—Schematic BC-



chematic BC–614–D.

RADIO RECEIVER & TRANSMITTER BC-620-A

Part of: SCR-509-(*)
SCR-510-(*)

RESISTANCE AND VOLTAGE MEASUREMENTS

Reference:
TM 11-605

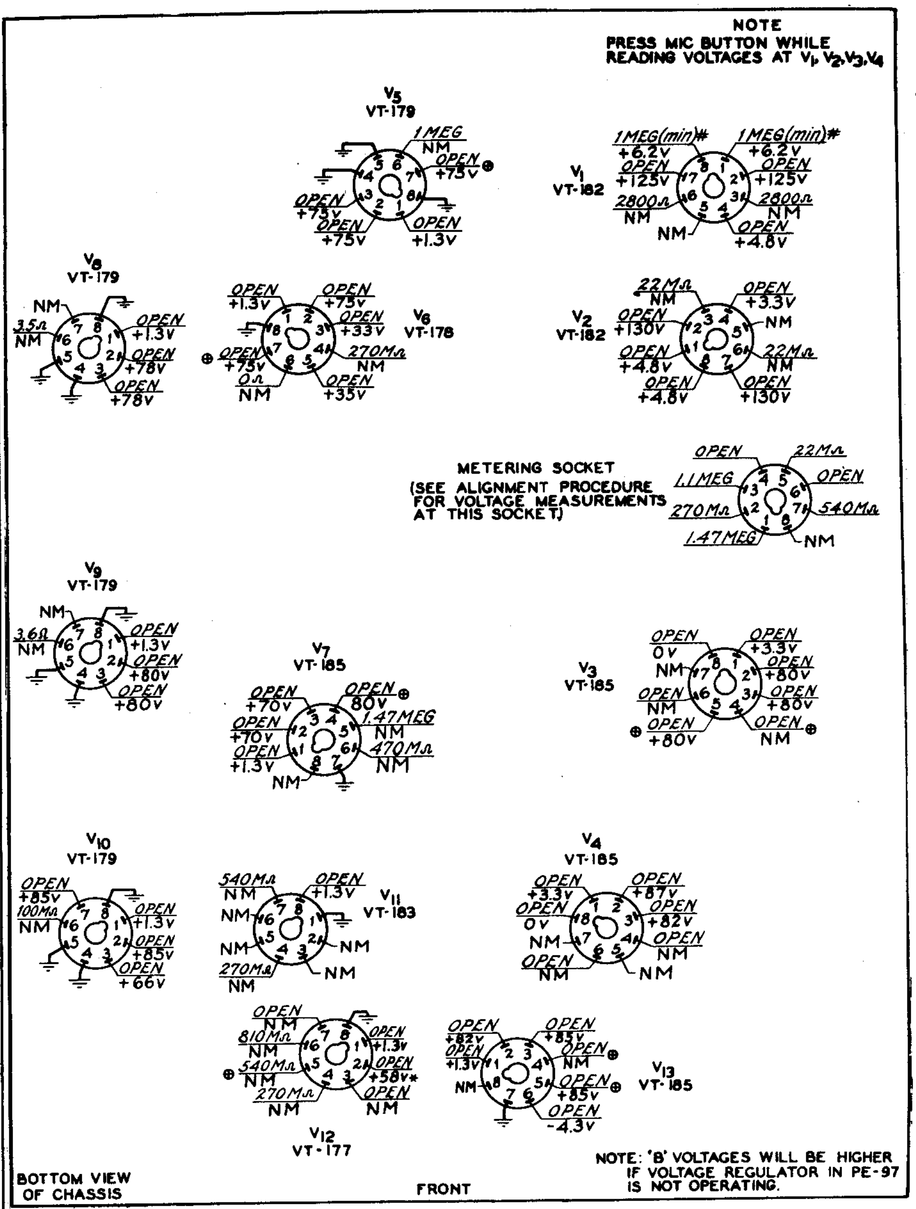


Fig. 1.—Voltages and resistances—tube socket terminals.

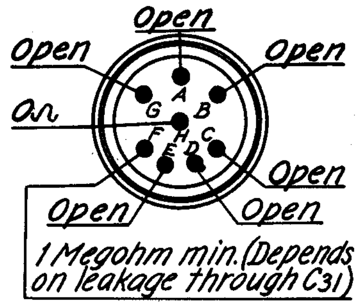


Fig. 2.—Resistances—power cable plug.

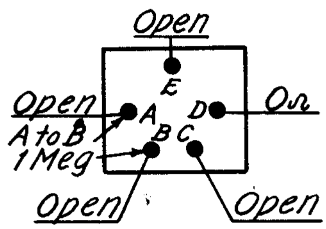


Fig. 3.—Resistances—Internal Battery (BA-41) plug.

KEY TO SYMBOLS ON FIG. 1

*-WITH ZERO VOLTS AT PIN 7 OF METERING SOCKET.

NM-NOT MEASURED

⊕-SOCKET TERMINAL USED AS TIE OR DUMMY LUG ONLY. NO TUBE ELEMENT CONNECTS TO THIS LUG.

#-DEPENDS ON LEAKAGE THROUGH C_{31}

MΩ = 1000 OHMS

RESISTANCE MEASUREMENTS

Volume control full on.
Meter switch at OPERATE.
Channel switch at A or B.
SW-10 and SW-11 ON.
All tubes and BA-41 removed.
Handset and power cable disconnected.
Values are nominal and are measured between point indicated and chassis, except where noted.

[1]VTVM = ELECTRONIC VOLTMETER

VOLTAGE MEASUREMENTS

Use PE-97 with fully charged 12v storage battery.
Fresh battery BA-41 installed. Tubes in sockets.
VOLUME control full on.
Meter switch at OPERATE.
Channel switch at A or B.
SW-10 and SW-11 ON. Handset plugged in.
Voltages measured in "RECEIVE" position except at transmitter tubes V_1, V_2, V_3, V_4.
Voltages are nominal DC and are measured with [1]VTVM between point indicated and chassis.

RECEIVER ALIGNMENT AND TRANSMITTER NEUTRALIZATION

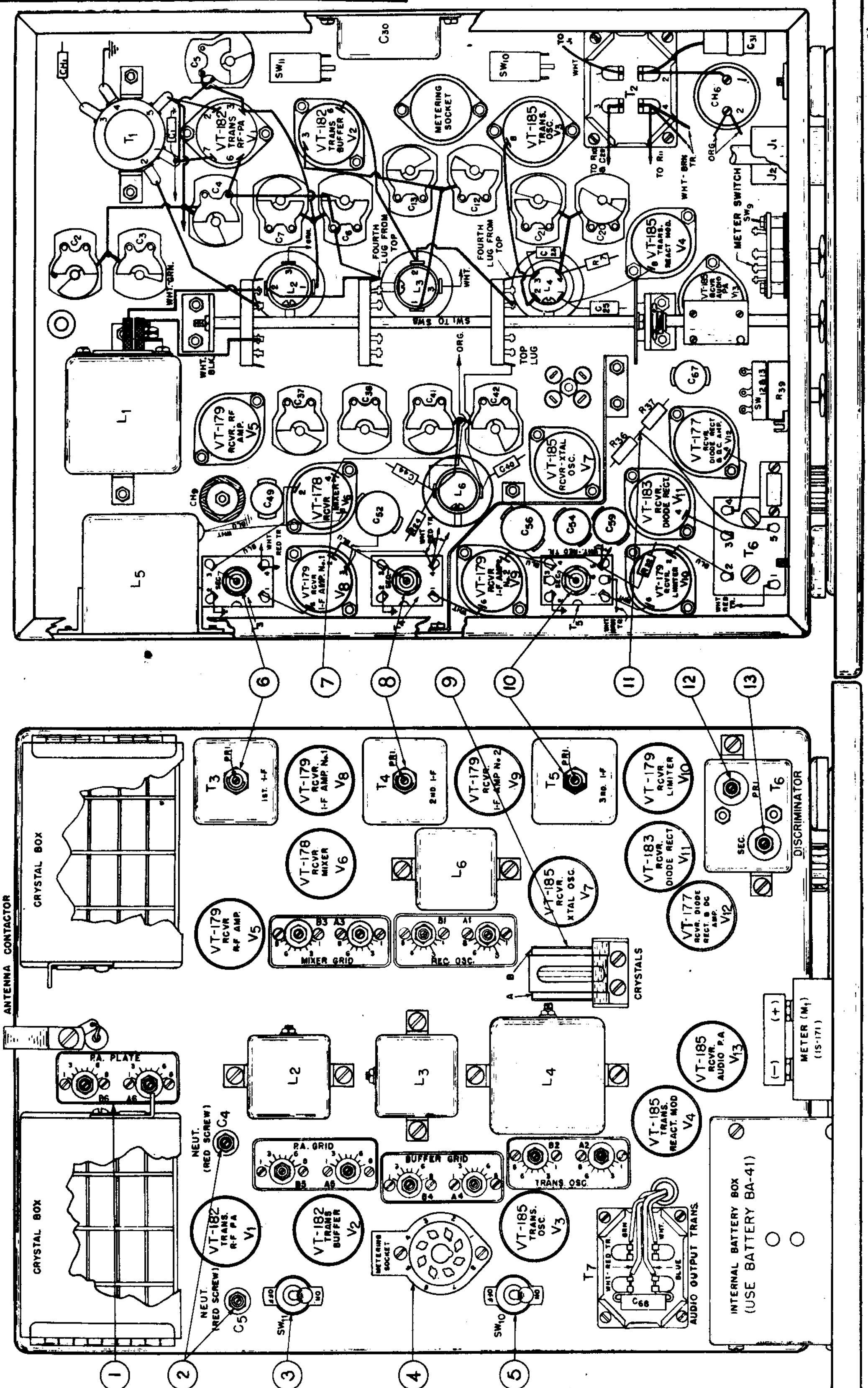


Fig. 4.—Parts layout and location of alignment adjustments.

NOTE: Circled numbers refer to fig. 4:

I-F AND DISCRIMINATOR ALIGNMENT

A signal source of *exactly* 2.88 mc is required. This may be: (a) 2.88 mc crystal from ME-73; (b) Oscillator VO-4 from ME-13; (c) SCR-211 *if accurately calibrated.*

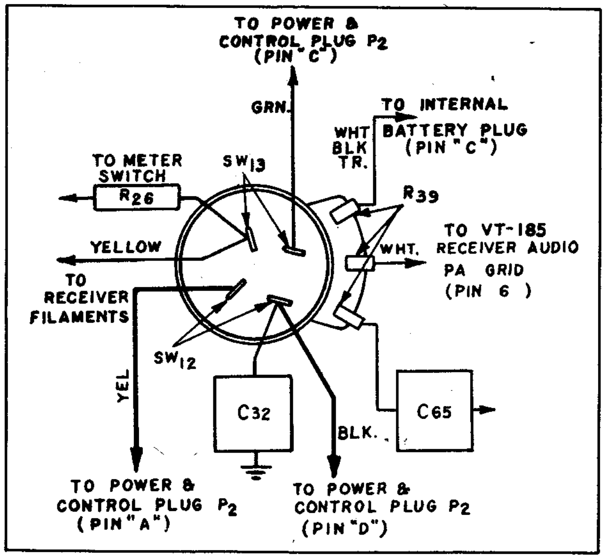
1. Remove both crystals from their sockets, 9.
2. Plug 2.88 mc crystal in either socket and set CHAN switch to the corresponding channel.
   or:
   Connect output of VO-4 to *chassis* and pin 4 of V_6, 7. Set VO-4 switch to 2.88 mc. Turn VO-4 on by rotating the ATTENUATION control clockwise only enough to operate the switch.
   Note: During alignment it is desirable, whenever possible, to reduce the signal by further clockwise rotation of the ATTENUATION control. Work with as weak a signal as possible.
   or:
   If SCR-211 is used, do not connect directly to its antenna binding post. Use a 0.001 μf capacitor in series or wrap an insulated wire from 7 around SCR-211 binding post.
3. Turn set on (VOLUME control). Connect ground lead of an electronic voltmeter (may be I-107 of ME-13) to *chassis* of set.
4. Insert probe of electronic voltmeter in #3-MS (pin jack No. 3 of metering Socket, 4). Adjust sec, then pri of T_5, T_4, and T_3 (10, 8, 6 in that order) for max. Go over the adjustments again in reverse order. I-F is now aligned.
5. Insert probe in #7-MS. Reading should be zero (±0.25 v.). If not, adjust T_6 sec, 13, to obtain a reading within these limits, *with alignment tool removed.*
6. Connect probe with a 1 meg resistor in series to the junction of R_{36} and R_{37}, 11. Adjust T_6 pri, 12, for max.
7. Repeat steps 5 and 6 until the readings of zero and max, respectively, coincide. Discriminator is now aligned.

NEUTRALIZATION OF TRANSMITTER POWER AMPLIFIER

A set which is properly aligned and preset can be checked for neutralization (and adjusted if necessary) as follows:

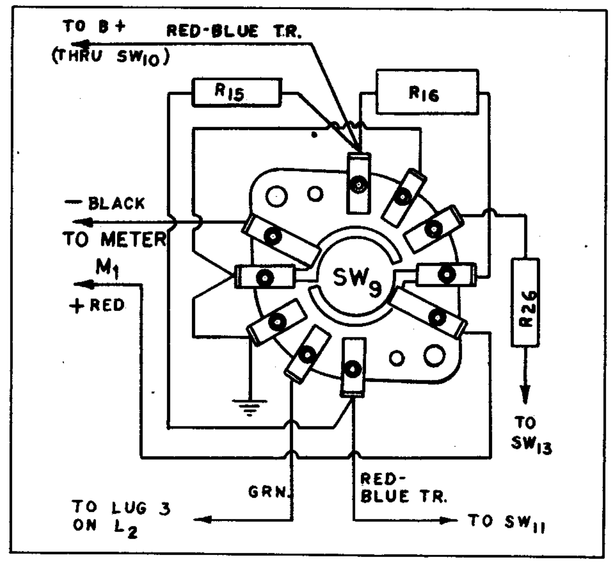
1. Turn panel meter switch to CHECK, SW 10 5 ON, SW 11 3 OFF, press mic switch and tune A6 (B6) 1 through resonance. Panel meter should not dip more than one division.
2. If dip is more than one division, adjust C_4 and C_5, 2. Settings must be kept approximately equal (check by observing mesh of plates), and must serve for both channels.
3. Reset SW11 at ON when through.

CAUTION: Adjustment lock nuts should be set up just enough to provide a fairly heavy "drag" on the alignment screw and not changed thereafter. Tightening the lock nut after an adjustment has been made tends to change the adjustment. Excessive tightening also will damage the trimmer.
Ref: Maintenance Letter No. 35 (1943).



WIRING DIAGRAM, R_{39} VOLUME CONTROL & SW_{12} & SW_{13} SWITCHES

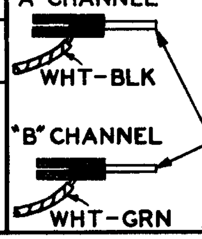
(VIEWED FROM REAR)



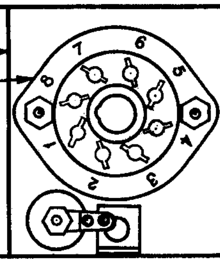
WIRING DIAGRAM, SW_9 METER SWITCH

FREQUENCY PRE-SETTING PROCEDURE

APPROXIMATE SETTINGS							
CHANNEL NO.	A1 B1	A2 B2	A3 B3	A4 B4	A5 B5	A6 B6	POSITION OF PINS IN L_1
0-19	3.0	2.0	2.0	2.0	1.5	3.0	8
20-29	5.0	2.8	4.0	2.5	2.0	3.8	6
30-39	5.5	5.0	4.5	4.5	4.5	5.0	4
40-54	6.0	5.8	5.5	5.2	5.2	5.8	3
55-74	6.9	6.8	6.5	6.0	6.2	6.5	2
75-80	7.4	7.8	7.2	7.0	7.8	7.2	1



LOADING COIL SOCKET L_1 UNDER CHASSIS



NOTES:

SET A&B ADJUSTMENTS AS SHOWN IN TABLE OF APPROXIMATE SETTINGS.

TURN POWER OFF WHILE ADJUSTING LOCKNUTS. READ "CAUTION" ON PAGE 2.

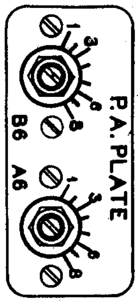
TURN SW.-10 & SW.-11 TO 'OFF' & PANEL METER CONTROL SWITCH TO 'CHECK'.

*STEPS ① TO ③ MADE WITHOUT MIC. BUTTON PRESSED.
STEPS ④ TO ⑨ MADE WITH MIC. BUTTON PRESSED.

CONNECT VTVM COMMON LEAD TO CHASSIS (NOT PANEL). CONNECT PROBE AS INDICATED.

PRESET LOWER FREQ. CHANNEL FIRST.

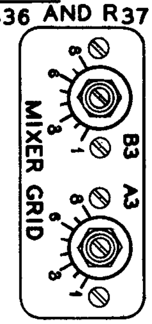
⑨ TURN PANEL METER SW. TO 'OPER'; SW.-11 TO 'ON'. QUICKLY ADJ. A6 (B6) FOR MIN. IF A6 (B6) IS NOT STILL NEAR APPROX. SETTING, GO BACK TO STEP ④.

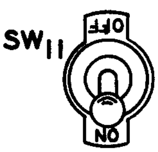


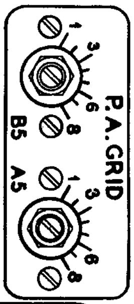
⑩ REPLACE SET IN CASE (SW.-10 & SW.-11 'ON'), RETUNE A6 (B6) FOR MIN. WITH ANTENNA.

*③ ADJ. A6 (B6) FOR MAX. AS IN ②. IF NO MAX. IS FOUND NEAR APPROX. SETTING, RETURN A6 (B6) TO APPROX. SETTING.

*② ADJ. A3 (B3) FOR MAX. NOISE IN HANDSET; OR TUNE FOR MAX. ON VTVM BY CONNECTING PROBE THRU A 1 MEG RESISTOR TO JUNCTION OF R36 AND R37.

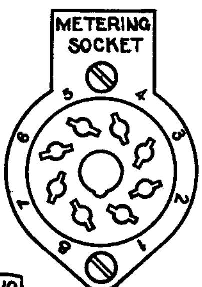


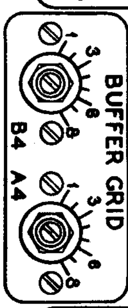




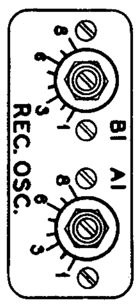
⑧ TURN SW.-10 TO 'ON'. ADJ. A5 (B5) FOR MAX. ON PANEL METER ('CHECK' POSITION).

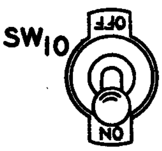
⑦ CHECK VOLTAGE AT PIN #3 OF 'MS. IF GREATLY LESS THAN IN ④, GO BACK TO ④.



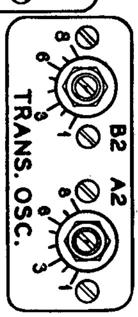


⑥ ADJ. A4 (B4) FOR MAX. AT PIN #5 OF 'MS.





⑤ CAREFULLY AND SLOWLY READJUST A2 (B2) SLIGHTLY TO -6V AT PIN #4 OF 'MS. VOICE SHOULD BE HEARD IN HANDSET ON SPEAKING INTO MIC.



④ ADJ. A2 (B2) FOR MAX. AT PIN #3 OF 'MS. ON LARGEST PEAK NEAR APPROX. SETTING. NOTE READING.

*① ADJ. A1 (B1) FOR MAX. AT PIN #2 OF 'MS.

ABBREVIATIONS:

'MS.=METERING SOCKET.

VTVM=ELECTRONIC VOLTMETER.

NOTE:- BEFORE STEP ①, CHECK CRYSTALS. READING SHOULD BE APPROX. -15 V AT PIN #1 OF 'MS.

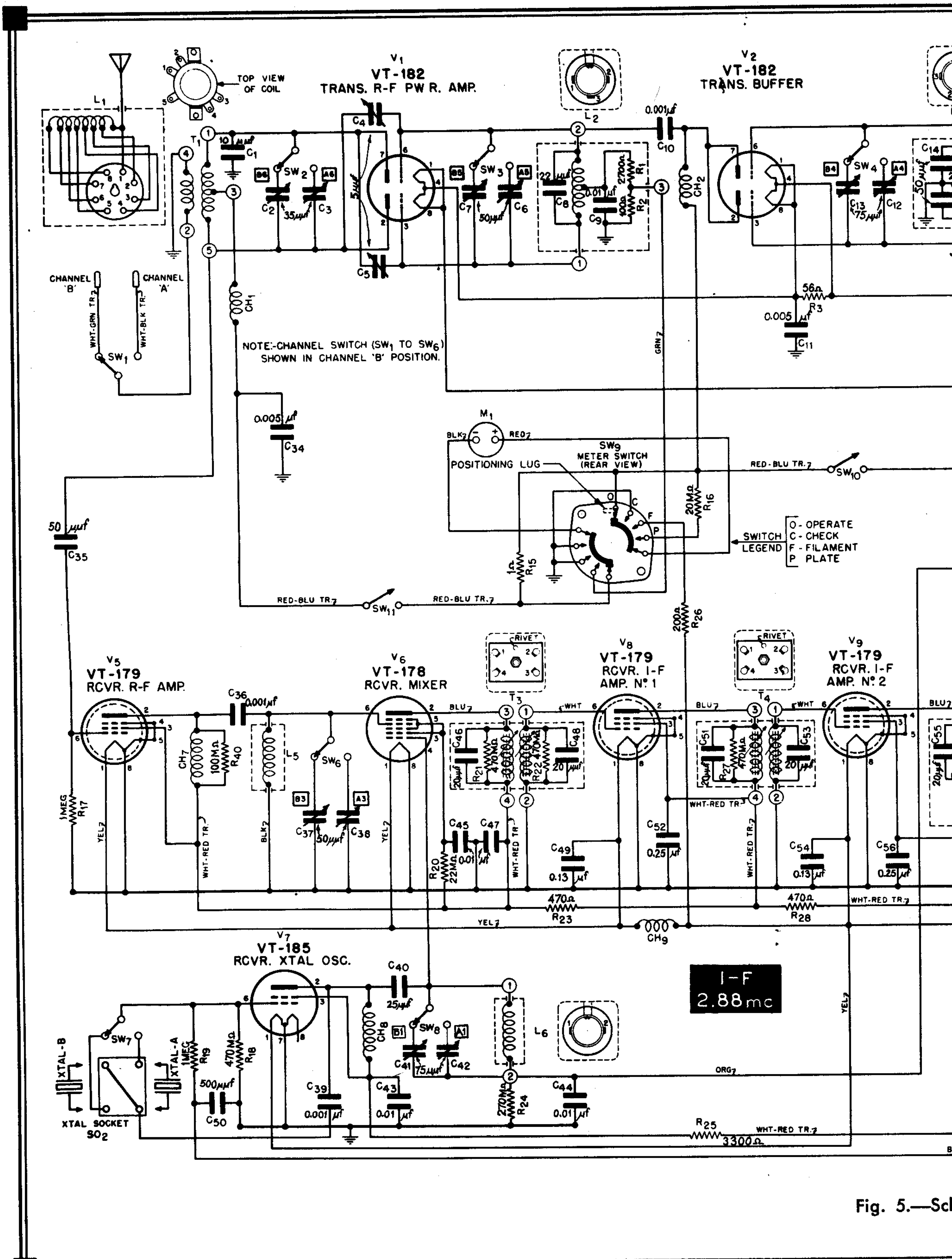
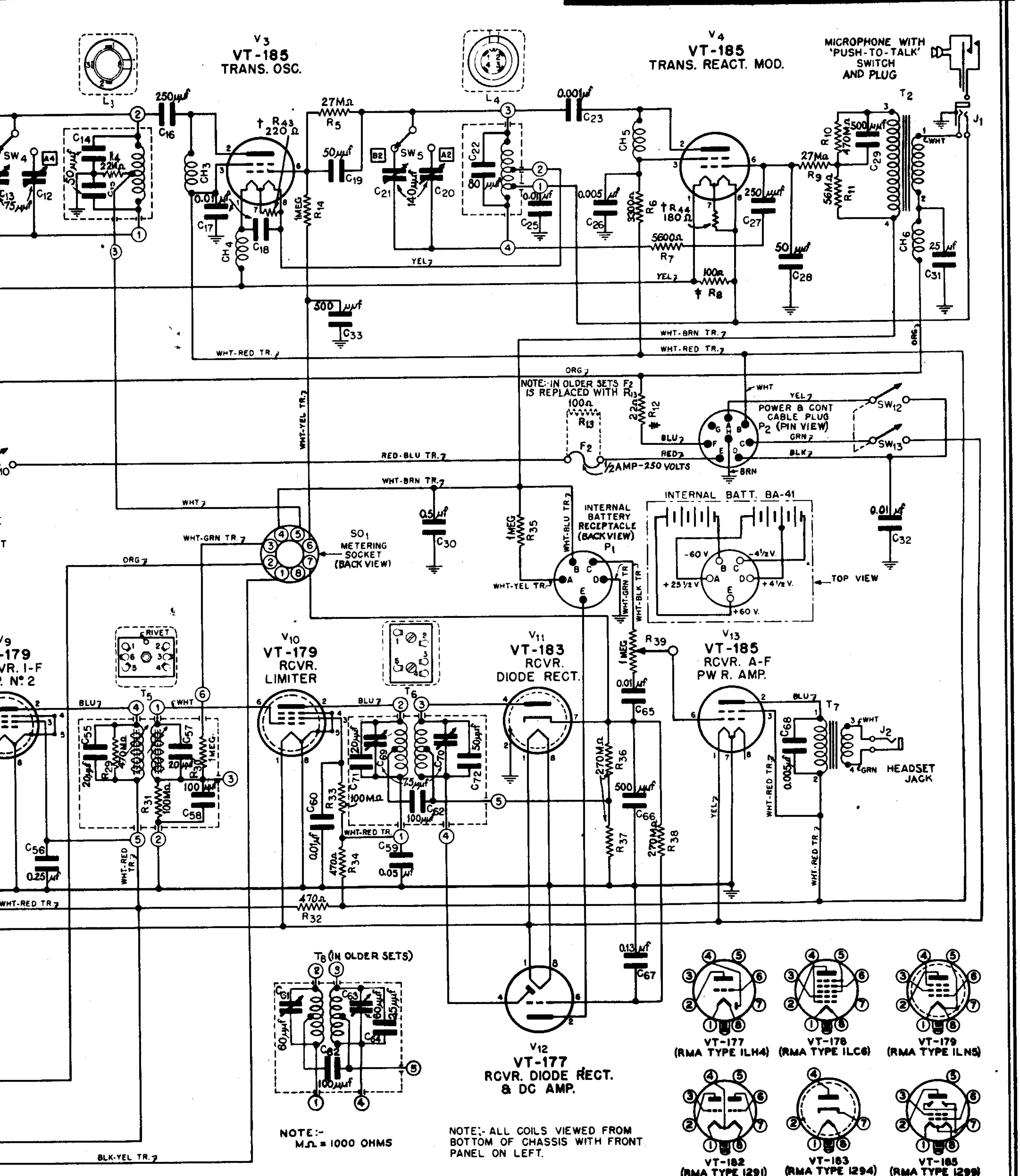

V1
VT-182
TRANS. R-F PWR. AMP.
V2
VT-182
TRANS. BUFFER
TOP VIEW OF COIL
NOTE:-CHANNEL SWITCH (SW1 TO SW6) SHOWN IN CHANNEL 'B' POSITION.
M1
SW9
METER SWITCH (REAR VIEW)
POSITIONING LUG
SWITCH LEGEND
O - OPERATE
C - CHECK
F - FILAMENT
P PLATE
V5
VT-179
RCVR. R-F AMP.
V6
VT-178
RCVR. MIXER
V8
VT-179
RCVR. I-F AMP. No. 1
V9
VT-179
RCVR. I-F AMP. No. 2
V7
VT-185
RCVR. XTAL OSC.
I-F
2.88mc
XTAL SOCKET
SO2
XTAL-B
XTAL-A
RIVET
CHANNEL 'B'
CHANNEL 'A'

Fig. 5.—Sc



NOTE:-
MΩ = 1000 OHMS

NOTE:- ALL COILS VIEWED FROM BOTTOM OF CHASSIS WITH FRONT PANEL ON LEFT.

TUBE BASES SHOWN IN BOTTOM VIEW.

CHANGES MADE AFTER SET SERIAL NO. 535 ON ORDER NO. 19917-PHILA.-43:
† R_{43} AND R_{44} ADDED
‡ R_8 REPLACED BY R_{42} (56 Ω)
‡ R_{12} REPLACED BY R_{41} (3.3 Ω)

Fig. 5.—Schematic.

COMMON FAULTS AND CORRECTIVE MEASURES

CORDING

The power and control cord and its connectors are subject to failure due to vibration and twisting. Be sure to check the cording and connectors, both electrically and mechanically, before looking for trouble in other parts of the set.

Refer to COMMON FAULTS AND CORRECTIVE MEASURES under SCR-509-510-(*) in this manual for an authorized method of supporting this cording.

SPECIAL NOTES

MOISTURE PROTECTION

A waterproof canvas cover to protect BC-620-A and its associated power supply (PE-97-A or CS-79-(*)) has been added to the parts list of SCR-509-(*) and SCR-510-(*). Organizations having Radio Sets SCR-509-(*) and SCR-510-(*) which lack Cover BG-153, Stock No. 2Z3400-153, should requisition them in the usual manner. This cover is not removed when the equipment is in operation.

Ref: Supply Letter No. 179 (1943)

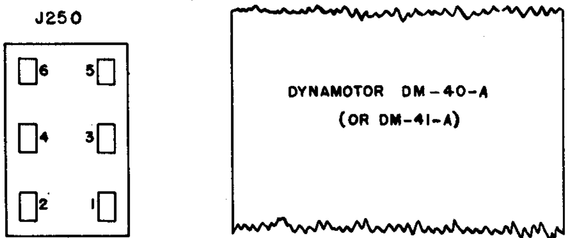
RADIO RECEIVER BC-652-A

Part of: SCR-506-A

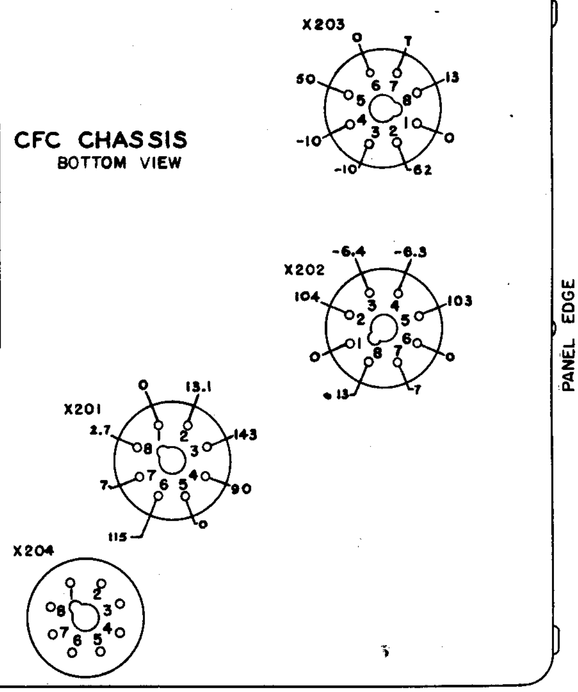
Reference: TM 11-630

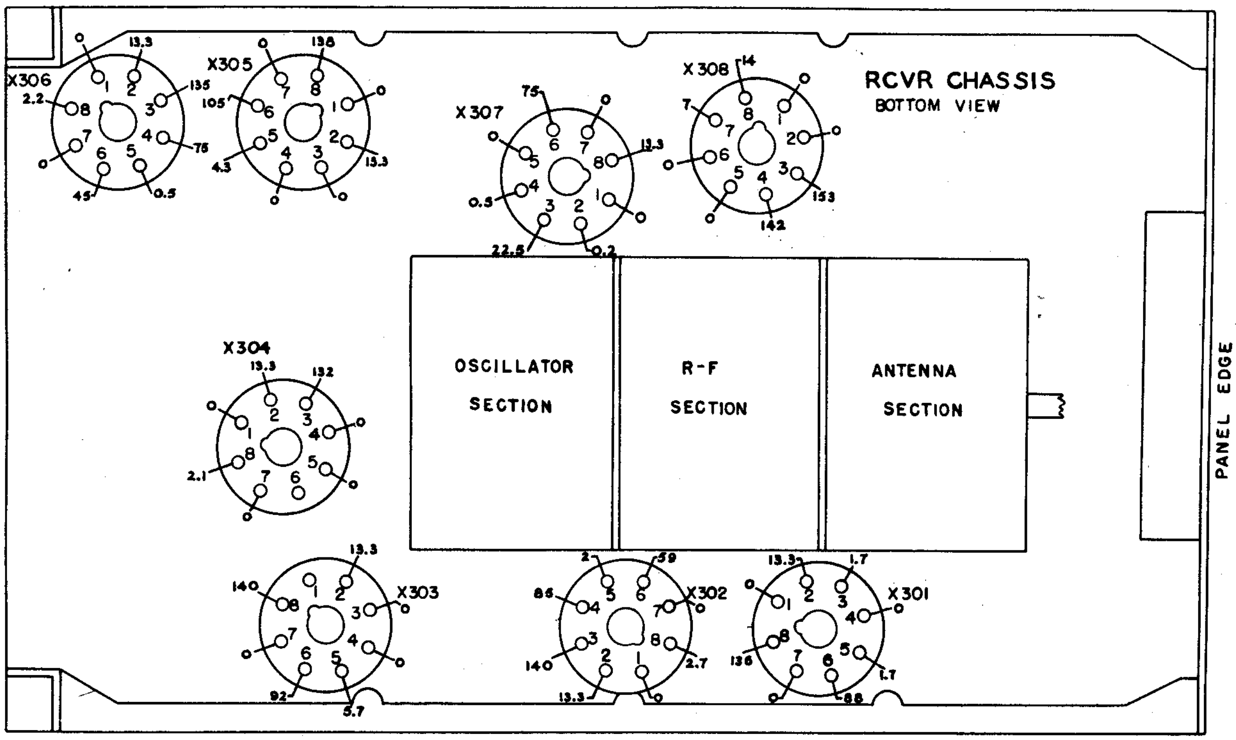
VOLTAGE MEASUREMENTS

Remove receiver chassis from case.
Remove crystal-frequency-calibrate chassis (loosen connection to antenna post). Leave units connected electrically.
Remove bottom cover of each chassis.

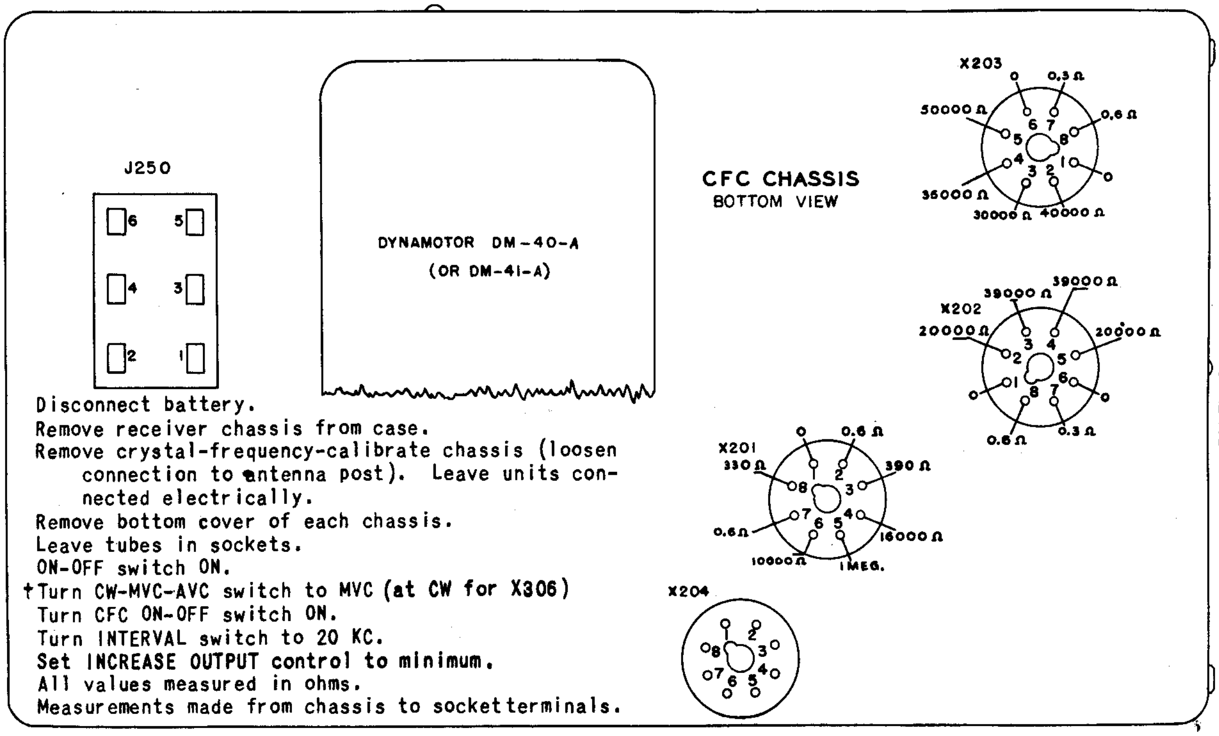


Connect proper battery (12 or 24 volts) to binding posts rear of dynamotor. Receiver is turned off by unscrewing fuse, FU-42, on the front panel.
Ground pin 8 on Plug P302 to chassis.
Turn CW-MVC-AVC switch to MVC.
Turn CFC ON-OFF switch ON.
Turn INTERVAL switch to 20 KC.
Set INCREASE OUTPUT control to minimum.
Tune receiver to 2.0 mc.
Measurements made from socket terminals to chassis.
Values indicated are for supply voltage of 14 volts.
All values are measured in positive volts.
Measurements made with 1000 ohm-per-volt voltmeter.

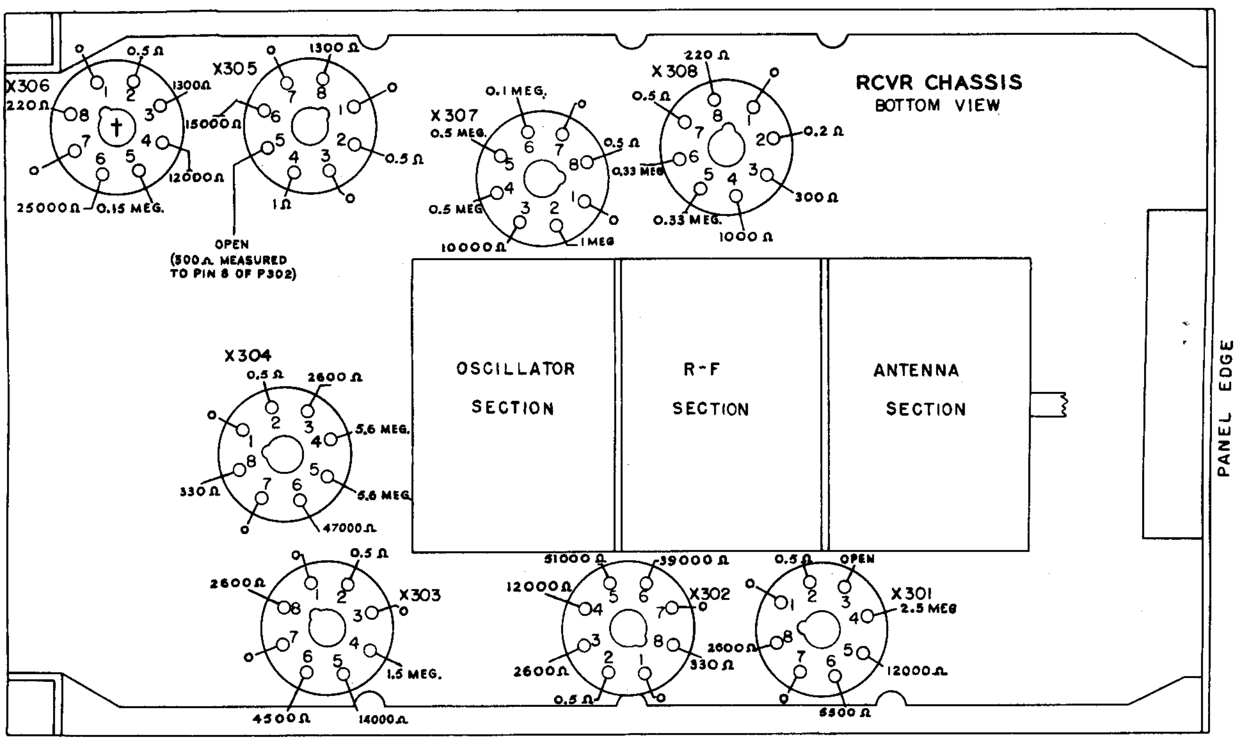




RESISTANCE MEASUREMENTS

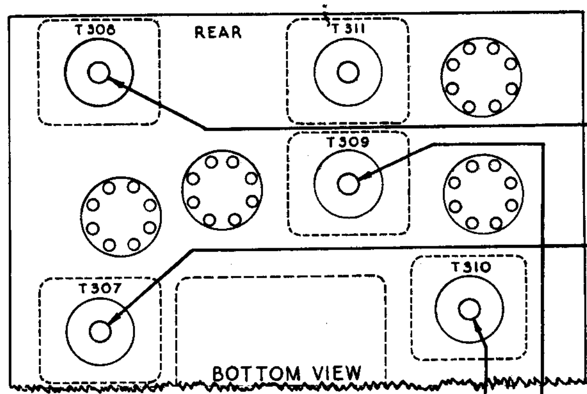


Disconnect battery.
Remove receiver chassis from case.
Remove crystal-frequency-calibrate chassis (loosen connection to antenna post). Leave units connected electrically.
Remove bottom cover of each chassis.
Leave tubes in sockets.
ON-OFF switch ON.
†Turn CW-MVC-AVC switch to MVC (at CW for X306)
Turn CFC ON-OFF switch ON.
Turn INTERVAL switch to 20 KC.
Set INCREASE OUTPUT control to minimum.
All values measured in ohms.
Measurements made from chassis to socket terminals.



ALIGNMENT

Remove receiver chassis from case.
Remove crystal-frequency-calibrate chassis (Loosen connection to antenna post). Leave units connected electrically.
Remove bottom cover of receiver chassis.
Connect proper battery (12 or 24 volts) to binding posts rear of dynamotor. Receiver is turned off by unscrewing fuse on front panel.
Ground pin 8 on P302 to chassis.
Turn INCREASE OUTPUT knob full on.
Connect output meter to SPEAKER jack.
Turn CW-MVC-AVC switch to MVC.
Turn CFC ON-OFF switch OFF.
Connect "low" side of sig gen to chassis.
Check sig gen with frequency meter at each setting



I. WAVE TRAP TUNING

1. Sig gen modulated and set for 915 kc. Output of sig gen high.
2. Connect "high" side in series with 0.001 μf capacitor to Antenna post.
3. Tune receiver to 2.2 mc.
4. Adjust L303 and L302 for minimum output.

II. I-F ALIGNMENT

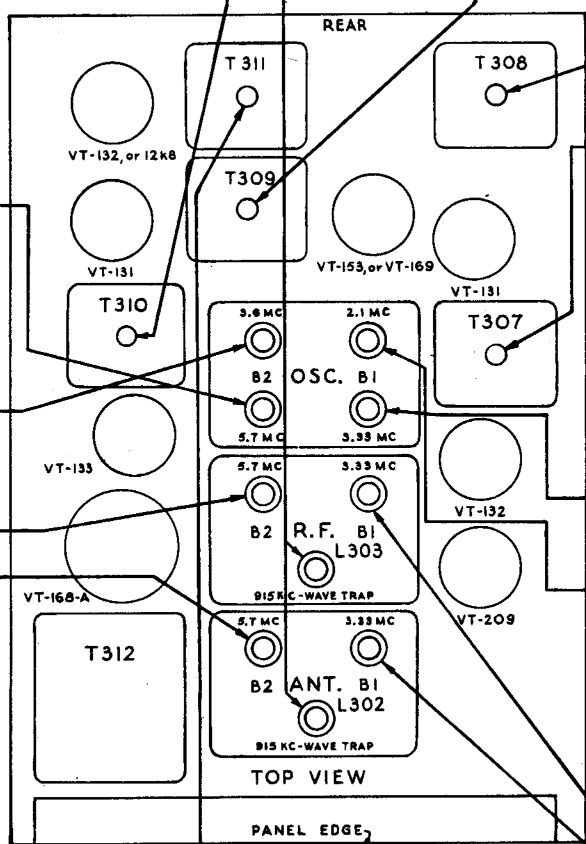
In the following keep output of sig gen so that output meter does not exceed 25 volts.

5. Connect sig gen in series with 0.001 μf capacitor to grid cap of V302.
6. Adjust sec T310 to maximum output.
7. Adjust pri T310 to maximum output.
8. Adjust sec T309 to maximum output.
9. Adjust pri T309 to maximum output.
10. Adjust sec T308 to maximum output.
11. Adjust pri T308 to maximum output.
12. Adjust sec T307 to maximum output.
13. Adjust pri T307 to maximum output.

I-F's now aligned.

III. R-F ALIGNMENT BAND 1.

14. Connect sig gen in series with 0.001 μf capacitor and antenna post.
15. Set sig gen to 3.33 mc, modulated.
16. Tune receiver to 3.33 mc on BAND 1.
17. Adjust C328 for maximum output.
18. Set sig gen to 2.1 mc.
19. Check receiver calibration at 2.1 mc. If it is appreciably off, adjust slug at B1 for maximum output. Repeat steps 15 to 19.
20. Set sig gen to 3.33 mc and tune set to 3.33 mc.
21. Adjust C314 for maximum output.
22. Adjust C302 for maximum output.



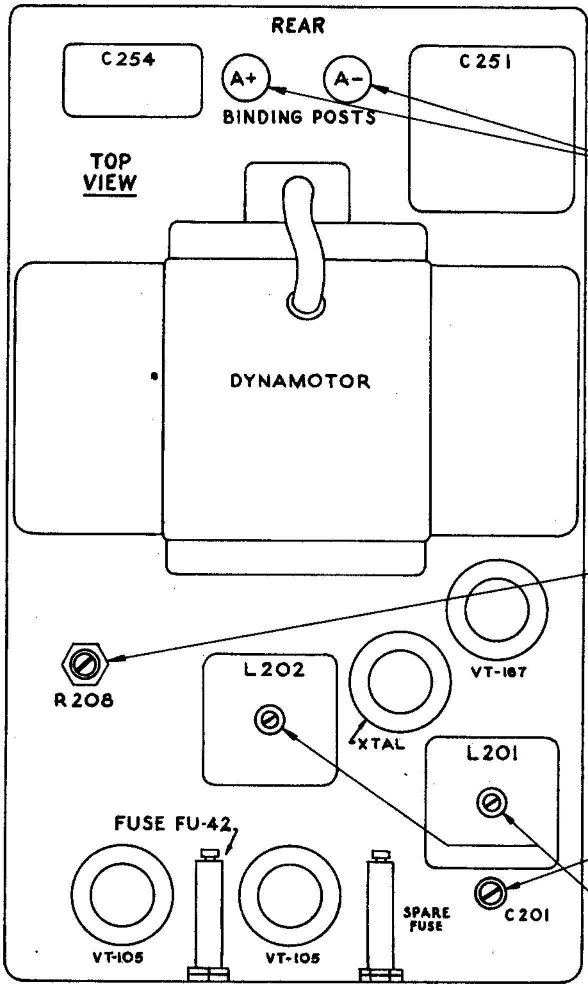
IV. R-F ALIGNMENT BAND 2

23. Set sig gen to 5.7 mc, modulated.
24. Tune receiver to 5.7 mc on BAND 2.
25. Adjust C330 for maximum output.
26. Set sig gen to 3.6 mc.
27. Check receiver calibration at 3.6 mc. If it is appreciably off, adjust slug at B2 for maximum output. Repeat steps 23 to 27.
28. Set sig gen to 5.7 mc and tune set to 5.7 mc.
29. Adjust C315 for maximum output.
30. Adjust C303 for maximum output.

V. BFO ALIGNMENT

31. With set operating at maximum output as in 30, operate sig gen unmodulated.
32. Turn CW-MVC-AVC switch to CW.
33. Adjust C356 in T311 for desirable output tone. Either side of I-F frequency may be used.

ADJUSTMENTS OF CRYSTAL FREQUENCY CALIBRATOR



When a tube is changed in the Crystal-Frequency-Calibrator it will be necessary to make the following adjustment of R208

SETTING OF R208

1. Remove receiver from case.
2. Connect proper battery (12 or 24 volts) to binding posts in rear of dynamotor. Receiver is turned off by unscrewing fuse, FU-42, on front panel.
3. Turn CFC INTERVAL switch to 100 KC.
4. Turn CW-MVC-AVC switch to CW.
5. Ground pin 8 of P302.
6. Check receiver at 2 mc and 2.1 mc crystal harmonics.
7. Throw CFC INTERVAL switch to 20 KC.
8. Tune receiver from 2 mc to 2.1 mc and count the number of beats. There should be 4, one every 20 kc.
9. If more or less than 4 are obtained adjust R208 until 4 are obtained, one every 20 kc.
10. Next tune receiver to one of these 4 beats and adjust R208 each way until the beat falls out. Correct adjustment is midway between the fall out points. When operating region is less than 120 degrees a check for faulty tubes should be made.

SETTING OF C201

1. When Crystal Unit DC-15-A is used, adjust C201 until crystal frequency is exactly 200 kc. Connect frequency meter to antenna post for 200 kc pickup.
2. When Crystal Unit FT-241-A is used, adjust C201 to maximum capacity (red portion of adjusting screw toward rear of chassis).

ADJUSTMENT L201 AND L202

1. Turn adjustment screws on L201 and L202 out to stop (extended), then turn each in 6 complete turns.

SPECIAL NOTES

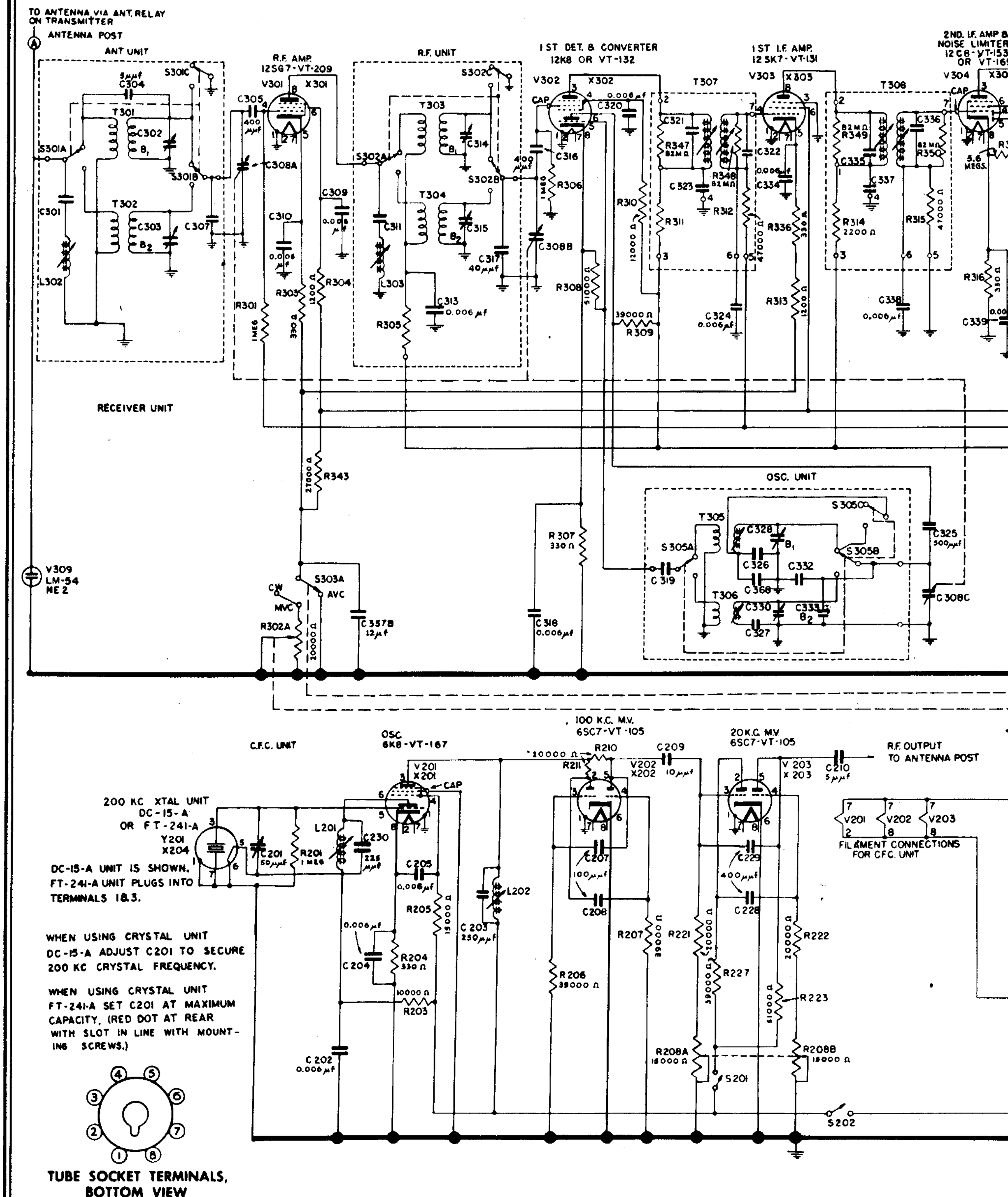
LUBRICATION and DYNAMOTOR SERVICING

Refer to TM 11-630 for detailed information.

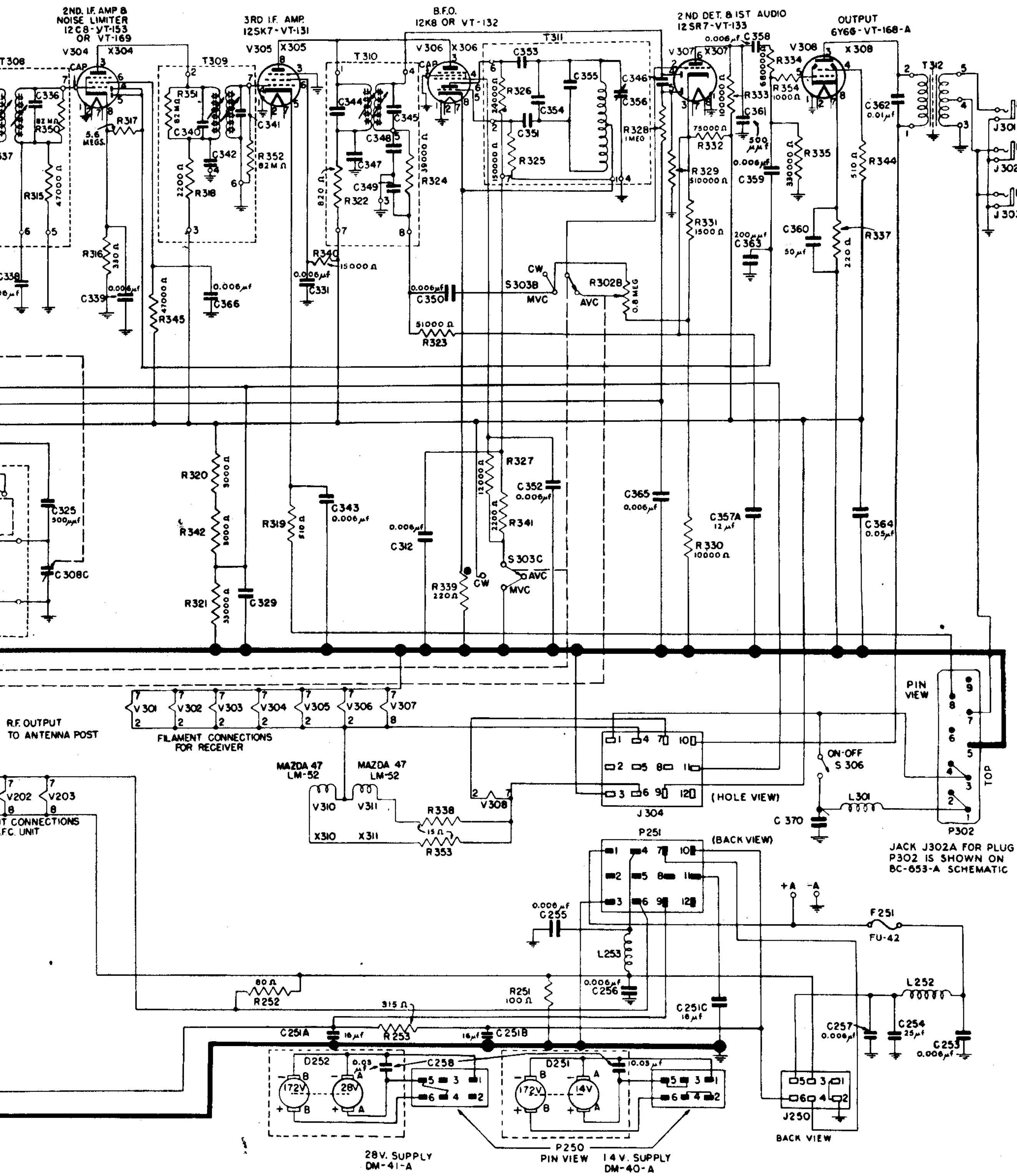
GROUNDING OF MOUNTING FT-253-A

It is very important that the feet of Mounting FT-253-A make good electrical contact with the vehicle in order to avoid noisy reception during motion. Thoroughly clean the surface of the vehicle upon which the mounting feet rest, using emery cloth or sandpaper; then draw the mounting bolts down securely.

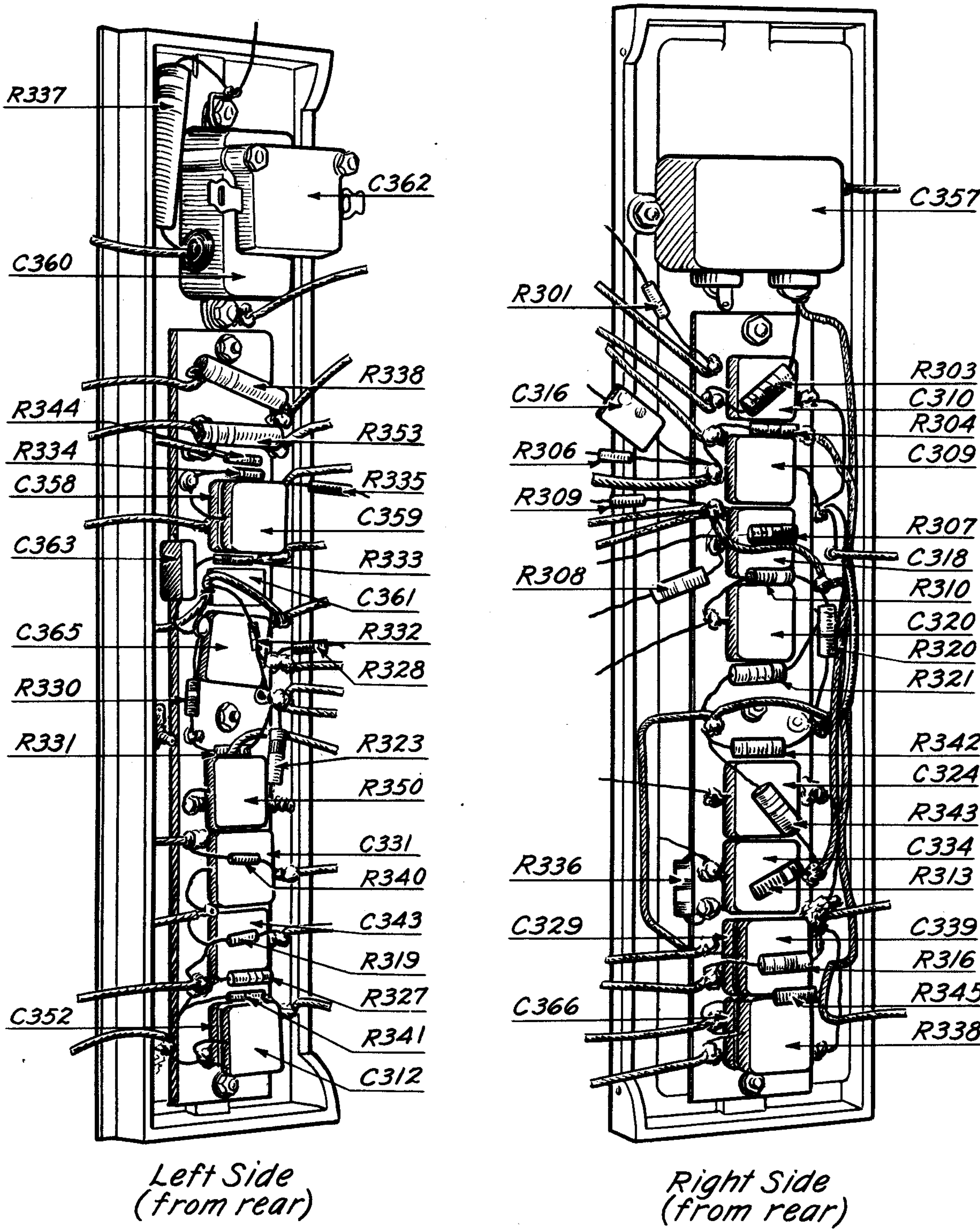
SCHEMATI


TO ANTENNA VIA ANT. RELAY ON TRANSMITTER
ANTENNA POST
ANT UNIT
R.F. AMP. 12SG7-VT-209
R.F. UNIT
1 ST DET. & CONVERTER 12K8 OR VT-132
1 ST I.F. AMP. 12SK7-VT-131
2ND. I.F. AMP &
NOISE LIMITER
RECEIVER UNIT
OSC. UNIT
V309 LM-54 NE 2
CW
MVC
AVC
C.F.C. UNIT
OSC 6K8-VT-167
100 K.C. M.V. 6SC7-VT-105
20 K.C. M.V. 6SC7-VT-105
R.F. OUTPUT TO ANTENNA POST
FILAMENT CONNECTIONS FOR C.F.C. UNIT
200 KC XTAL UNIT DC-15-A OR FT-241-A
DC-15-A UNIT IS SHOWN. FT-241-A UNIT PLUGS INTO TERMINALS 1 & 3.
WHEN USING CRYSTAL UNIT DC-15-A ADJUST C201 TO SECURE 200 KC CRYSTAL FREQUENCY.
WHEN USING CRYSTAL UNIT FT-241-A SET C201 AT MAXIMUM CAPACITY. (RED DOT AT REAR WITH SLOT IN LINE WITH MOUNTING SCREWS.)
TUBE SOCKET TERMINALS, BOTTOM VIEW

SCHEMATIC


2ND. I.F. AMP & NOISE LIMITER 12C8-VT-153 OR VT-169
3RD I.F. AMP. 12SK7-VT-131
B.F.O. 12K8 OR VT-132
2 ND DET. & 1ST AUDIO 12SR7-VT-133
OUTPUT 6Y6G-VT-168-A
R.F. OUTPUT TO ANTENNA POST
FILAMENT CONNECTIONS FOR RECEIVER
MAZDA 47 LM-52
(HOLE VIEW)
(BACK VIEW)
ON-OFF S 306
PIN VIEW
TOP
JACK J302A FOR PLUG P302 IS SHOWN ON BC-653-A SCHEMATIC
F251 FU-42
BACK VIEW
28V. SUPPLY DM-41-A
P250 PIN VIEW
14 V. SUPPLY DM-40-A

PARTS LAYOUT



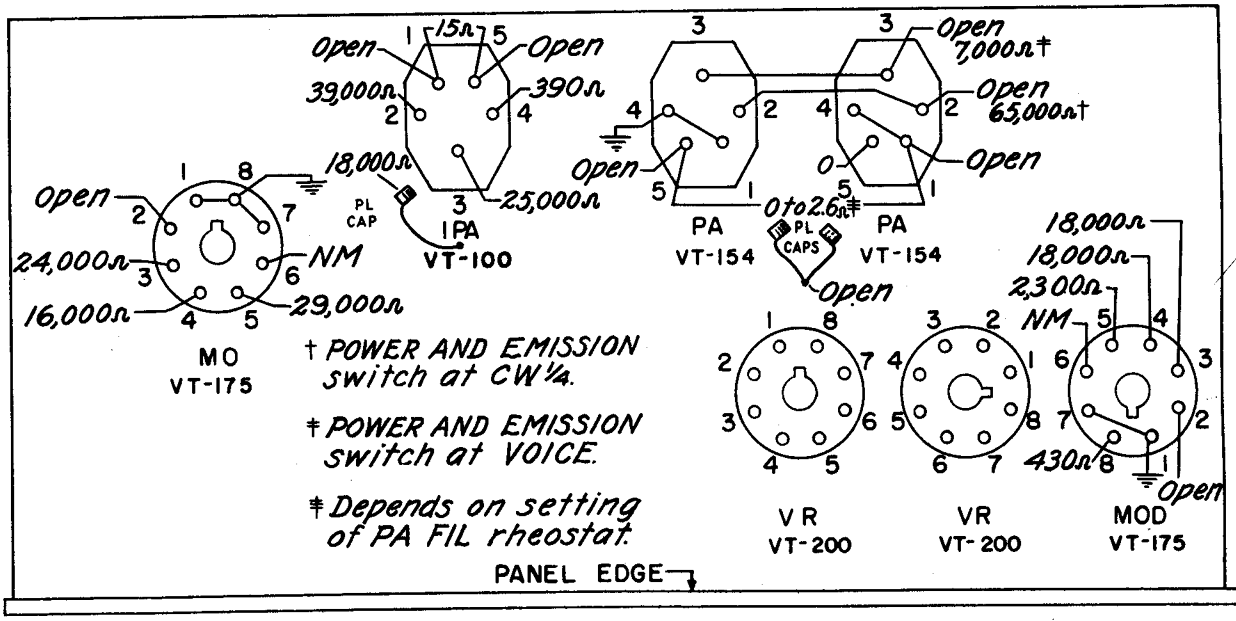
Lower side panels

RADIO TRANSMITTER BC-653-A

Part of:
SCR-506-A

Reference:
TM 11-630

RESISTANCE MEASUREMENTS



Tube socket terminals, top view

See schematic on page 5 for resistances of transformer and relay coils.

VOLTAGE MEASUREMENTS

WARNING

THESE VOLTAGES ARE DEADLY. OBSERVE ALL SAFETY PRECAUTIONS. GROUND THE CHASSIS. THROW POWER AND EMISSION SWITCH OFF WHILE MAKING CONNECTIONS.

Remove all shields from transmitter and stand on its right end.
Remove Fuse F-163 (upper FU-12-A) and replace cover plate.
Plug in key and microphone.
Connect 12v battery to pins 10 (+) and 11 (-) of Plug P161.

Connect pins 1 and 10 of Plug P161.
Connect voltmeter to chassis (-) and points indicated (+). Use well insulated leads. POWER AND EMISSION switch at OFF while connecting leads! Put one hand in your pocket, and stand clear of meter and leads.
Turn POWER AND EMISSION switch to position indicated, press key, and read meter.

Voltage checks using 1000 ohm/volt meter

POWER AND EMISSION	F163 Left	F164	L102	‡ L120	V120-2	L142	T180-1	T180-3
CAL & NET	1090	480	213	325	155	-46	0	-30
CW ¼	1010	510	214	340	155	30	0	0
CW FULL	1096	500	214	335	150	220	0	0
VOICE †	1060	445	213	310	135	150	300	-60

† Press mic button instead of key for these readings.
‡ Connect voltmeter (+) lead to "cold" end of coil to prevent damage to meter.

PRESETTING

PRESETTING CHANNELS A, B, C, & D.

1. Connect proper battery (12 or 24 volts).
2. Turn ON-OFF switch on receiver ON.
3. Remove the two large cover plates from front of transmitter. Remove plate marked MO COILS PRESET FREQUENCIES and arrange the eight links according to engraving on plate and frequencies desired on each channel A, B, C, & D. There are two links for each channel. Replace plate.
4. Remove plate marked IPA COILS PRESET FREQUENCIES and arrange the 4 links so that each channel is set for the band into which its frequency falls. Replace plate.
5. Set BAND CHANGE switch to A.
6. Set METER SW switch to PA FIL and adjust rheostat INCREASE PA FIL with screw driver until meter needle points to white triangle.
7. Tune receiver on CW to desired channel to be set on A. Check receiver setting against crystal frequency calibrator by turning CFC ON-OFF switch ON and INTERVAL switch to 20 kc and zero beating receiver. Turn CFC ON-OFF switch OFF.
8. Set meter switch to IPA PL and turn POWER AND EMISSION switch to CAL & NET.
9. Zero beat transmitter to receiver by adjusting PRESET FREQUENCIES control A.
10. Tune PRESET FREQUENCIES IPA TUNING control A to dip FIL & PL CURRENT meter.
11. Repeat steps 5 through 10 for band B, C, & D.
12. Connect 15 foot vertical antenna or Phantom Antenna A-27-(*) to antenna post.
13. Set BAND CHANGE switch at A.
14. Remove p-a coil cover & set taps marked A, B, C, & D to approximate setting indicated on back of cover for the frequencies involved.

   CAUTION: Be sure all taps fit exactly on wires and that no short-circuiting occurs.

15. Set POWER AND EMISSION switch to CW 1/4 and replace p-a coil cover.
16. Set METER SW switch to PA PL.
17. Press Key J-45 and tune PRESET FREQUENCIES ANTENNA COUPLING marked A for dip in meter reading. If no dip is obtained remove p-a coil cover and move tap on A slide one turn either way and retune. Repeat this procedure until a dip is obtained.
18. Turn POWER AND EMISSION switch to CW FULL. Press Key J-45. FIL & PL CURRENT meter should read above 4.5 but not over 5.5. If reading is low remove p-a coil cover plate and move A tap one turn "higher" at a time, if reading is high move A tap one turn "lower" at a time, until proper reading is obtained. ANTENNA COUPLING control must be retuned each time as in 17.
19. Repeat steps 13 to 18 for bands B, C, and D.

TUNABLE FREQUENCY OPERATION

1. Set BAND CHANGE switch to LF if desired channel lies between 0 and 50, or to HF if desired channel lies between 50 and 125. Rotate TUNING LF-HF control to 40 or 120 depending on band chosen.
2. With receiver set to CW, CFC ON-OFF switch ON, and INTERVAL switch set to 100 kc, zero beat receiver at channel 40 or 120 as the case may be. Turn CFC ON-OFF switch OFF.
3. Turn POWER AND EMISSION switch to CAL & NET and adjust MO RESET LF-HF control to zero beat. The transmitter is now calibrated for channels throughout the band selected above.
4. Rotate TUNING LF-HF control to desired channel. Remove p-a coil cover plate. Set central slider, T, to setting corresponding to the chart on the p-a coil cover plate and replace cover plate.
5. Turn POWER AND EMISSION switch to CW FULL and METER SW switch to PA PL. Press Key J-45 and adjust ANT COUP'G LF-HF for dip in meter reading. Meter should read between 4.5 to 5.5. If not, readjust slider T and retune ANT COUP'G LF-HF control.

ALIGNMENT

ALIGNMENT OF MASTER-OSCILLATOR

1. Set BAND CHANGE switch to LF, POWER AND EMISSION switch to CAL & NET, and rotate TUNING LF-HF control to channel 10.
2. Tune Radio Receiver BC-652-A to channel 10 (2.2 mc). With AVC-MVC-CW switch set to AVC, CFC ON-OFF switch ON, INTERVAL switch set to 100 kc and ON-OFF switch ON, adjust MO RESET LF-HF control to zero beat.
3. Rotate TUNING LF-HF control and receiver TUNING control to channel 40 (2.8 mc). If zero beat is obtainable by moving TUNING LF-HF index within 1/8 inch, then no further alignment is required. If error is greater than 1/8 inch proceed as in steps 4 to 7.
4. Disconnect battery and remove transmitter BC-653-A from Mounting FT-253-A. Remove bottom shield and inner shield covering coils L100 and L101. Inner shield is nearest center towards the front.
5. If zero beat occurred in 3 at channel setting less than 40, turn adjusting screw in L100 one full revolution counterclockwise. If zero beat occurs at a channel setting more than 40, turn adjusting screw in L100 one full revolution clockwise.

ALIGNMENT (contd)

6. Replace inner and outer bottom shields temporarily and slide transmitter back on Mounting FT-253-A.

7. Repeat steps 1 through 3. If error is still in excess of 1/8 inch repeat 5 through 7.

8. Check HF band in same manner as steps 1 to 7 except BAND CHANGE must be set at HF, coil L101 adjusted, and channels 65 and 120 used in place of channels 10 and 40.

9. Replace all shields, mount transmitter in permanent manner and give MO RESET LF-HF control a final adjustment.

NOTE: If MO RESET LF-HF control has to be turned more than plus or minus 20 divisions from 50, C106 should be adjusted to bring its operation back to center. To gain access to C106 the back and lower right inner shield must be removed. It is located at the lower right-hand corner.

ALIGNMENT OF INTERMEDIATE-POWER-AMPLIFIER

1. Turn METER SW switch to IPA PL, POWER AND EMISSION switch to CAL & NET, calibrate with MO RESET LF-HF control as outlined above, BAND CHANGE switch to HF, and rotate TUNING LF-HF control from channel 50 to 125 noting the PA & PL CURRENT meter. If reading is substantially constant and below 3.5 intermediate power amplifier is aligned. If meter reads appreciably more than 3.5 follow steps 2 through 6.

2. Rotate TUNING LF-HF control to channel 80 and note the meter reading. Disconnect battery. Remove back and adjust C126 located at upper right 1/8 turn either direction. Replace back shield temporarily, connect battery, and note i-p-a current.

3. Repeat 2 until i-p-a current is at a minimum for channel 80.

4. Observing the meter, rotate the TUNING LF-HF control toward higher channel numbers. If reading is constant or lower than 3.5 no further adjustment is required. If the meter reading begins to increase above 3.5 the copper slug in L121 will have to be adjusted. Cease rotating control and adjust C126 again for minimum reading noting whether C126 is increased or decreased.

5. Rotate TUNING LF-HF control to channel 80. Remove top cover and adjust slug in L121 for minimum reading. L121 is at rear of panel behind IPA coil links. If C126 was increased in 4 turn slug screw in counterclockwise direction and vice versa. Repeat 4 and 5 until i-p-a plate current is substantially constant over channels 50 to 125.

6. Replace all shields permanently and slide transmitter into Mounting FT-253-A.

NOTE: If C126 is of the two plate type, set it at maximum and adjust L121 slug for minimum IPA plate current. Disregard steps 2 through 6.

MODULATION ADJUSTMENTS

POWER-AMPLIFIER BIAS ADJUSTMENT

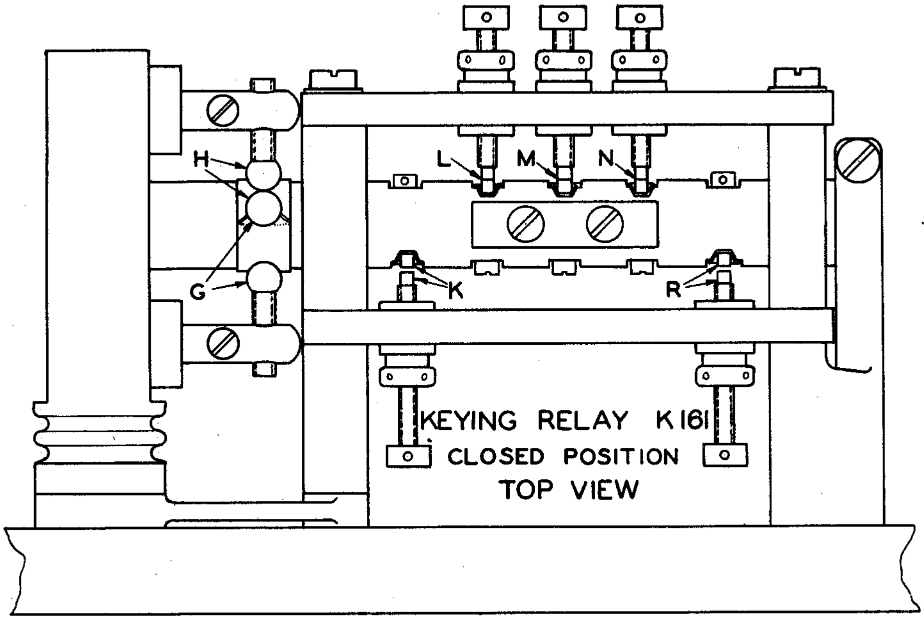
1. Tune and properly load transmitter on CW FULL with either a vehicular antenna or Phantom Antenna A-27-(*). Note ANT CURRENT meter reading.

2. Turn POWER AND EMISSION switch to VOICE and press microphone control switch. Note ANT CURRENT meter and adjust R177 until meter reads 1/2 reading noted in 1. R177 is right hand screw driver adjustment behind fuse plate.

AUDIO INPUT POTENTIOMETER

1. With transmitter loaded and operating on VOICE as in 2 above, adjust R190 while talking loudly so that the antenna current increases 20% over the non-talking value. A sufficiently accurate setting can be obtained by turning R190 counterclockwise to stop and then 1/3 turn clockwise. R190 is left hand screw driver adjustment behind fuse plate.

SPECIAL NOTES



RELAY, K161
In cleaning dirty contacts, use crocus cloth or other fine abrasive. *Never use a file.*

Sequence of contact operation as relay closes:

1- G, K, R open

2- H, L, N close

3- M closes.

METER M120 MULTIPLIERS

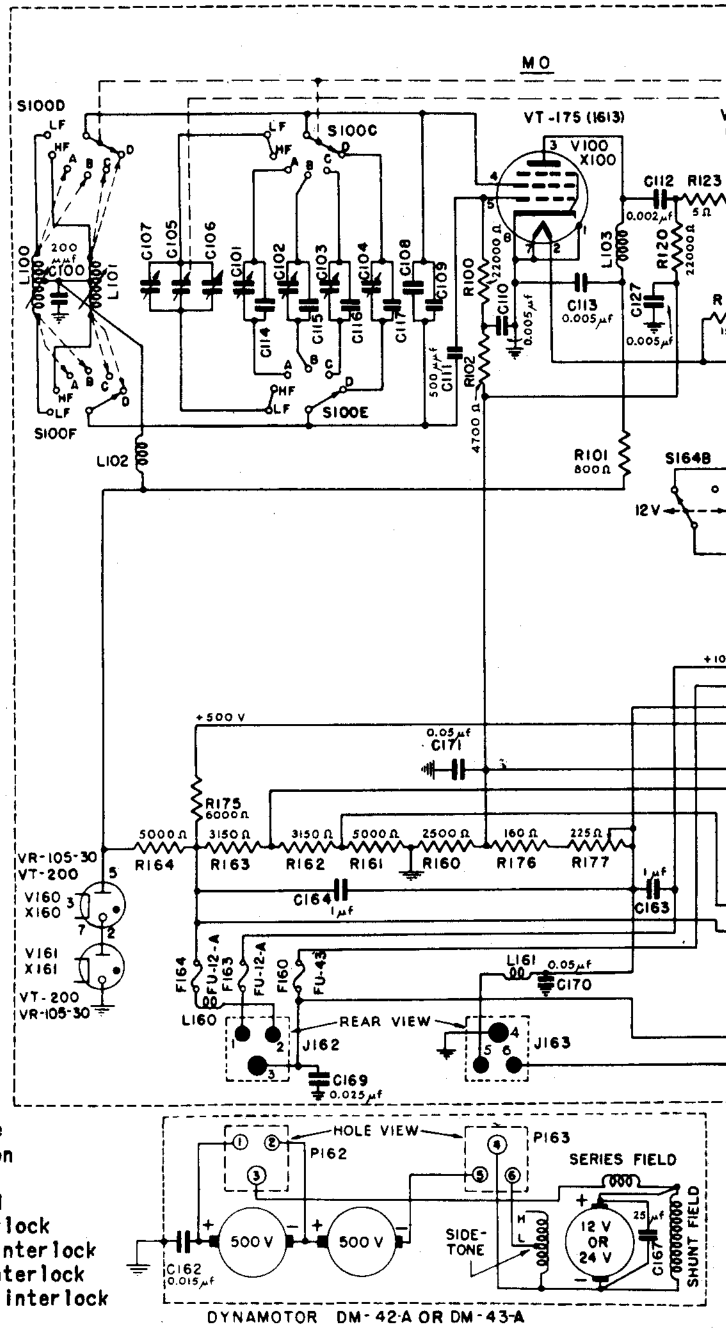
PA FIL	x1 volts
IPA PL	x7 ma
PA PL	x40 ma

LUBRICATION and DYNAMOTOR SERVICING
Refer to TM 11-630 for detailed information.

POSITIONING PA COIL TAPS

When adjusting slider taps on p-a coil, make certain that the tap rests exactly on a wire of the coil. Loss of efficiency and overheating will result if the tap rests between turns.

SCHEMATI



PARTS LEGEND

CAPACITORS

C100	0.0002μf	1000v
C108	28μμf	1000v
C109	70μμf	250v
C110	0.005μf	600v
C111	0.0005μf	5000v
C112	0.002μf	1000v
C113	0.005μf	1000v
C114	25μμf	500v
C115	25μμf	500v
C116	25μμf	500v
C117	25μμf	500v
C120	0.005μf	1000v
C125	0.005μf	1000v
C127	0.005μf	1000v
C128	0.005μf	1000v
C130	40μμf	1000v
C140	0.0005μf	2500v
C146	0.005μf	600v
C147	0.005μf	600v
C148	0.005μf	1000v
C149	45μμf	1000v
C150	0.005μf	5000v
C151	0.005μf	5000v
C152	45μμf	1000v
C162	0.015μf	5000v
C163	1.0μf	2400v
C164	1.0μf	2400v
C165	1.0μf	600v
C166	25μf	50v
C167	25μf	50v
C168	0.02μf	1000v
C169	0.025μf	800v
C170	0.05μf	800v
C171	0.05μf	800v
C172	0.005μf	600v
C173	0.1μf	1200v
C180	1.0μf	1000v
C182	25μf	50v
C183	0.0001μf	1000v
C184	25μf	50v

RESISTORS

R100	22000Ω	2w
R101	8000Ω	4w
R102	4700Ω	1w
R120	22000Ω	2w
R121	5Ω	5w
R122	22000Ω	2w
R123	5Ω	5w
R124	390Ω	2w
R140	4000Ω	4w
R143	56000Ω	2w
R144	15Ω	½w
R160	2500Ω	25w
R161	5000Ω	25w
R162	3150Ω	25w
R163	3150Ω	25w
R164	5000Ω	25w
R165	15Ω	8w
R166	7Ω	20w
R168	1.3Ω	25w
R169	1.3Ω	25w
R170	2400Ω	1w
R171	25Ω	8w
R172	160Ω	1w
R173	16Ω	20w
R174	4.7Ω	1w
R175	6000Ω	20w
R176	160Ω	35w
R177	225Ω	35w
R178	39Ω	2w
R179	5Ω	5w
R184	2000Ω	20w
R185	18000Ω	12w
R186	430Ω	2w
R187	330000Ω	½w
R189	7500Ω	2w
R190	200Ω	4w

FUSES

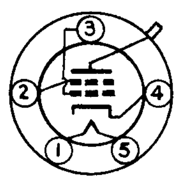
FU-43	10Amp	25v
FU-44	70Amp	250v
FU-12-A	0.5Amp	1000v

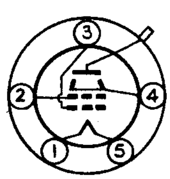
RELAYS

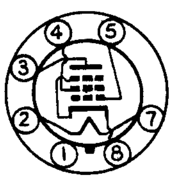
K160 Dynamotor
K161 Keying

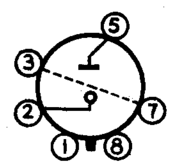
SWITCHES

S100, S140 Band change
S160 Power and emission
S161 Metering
S164 12/24v link-board
S165 Band switch interlock
S166 IPA cover plate interlock
S167 PA cover plate interlock
S168 Fuse cover plate interlock

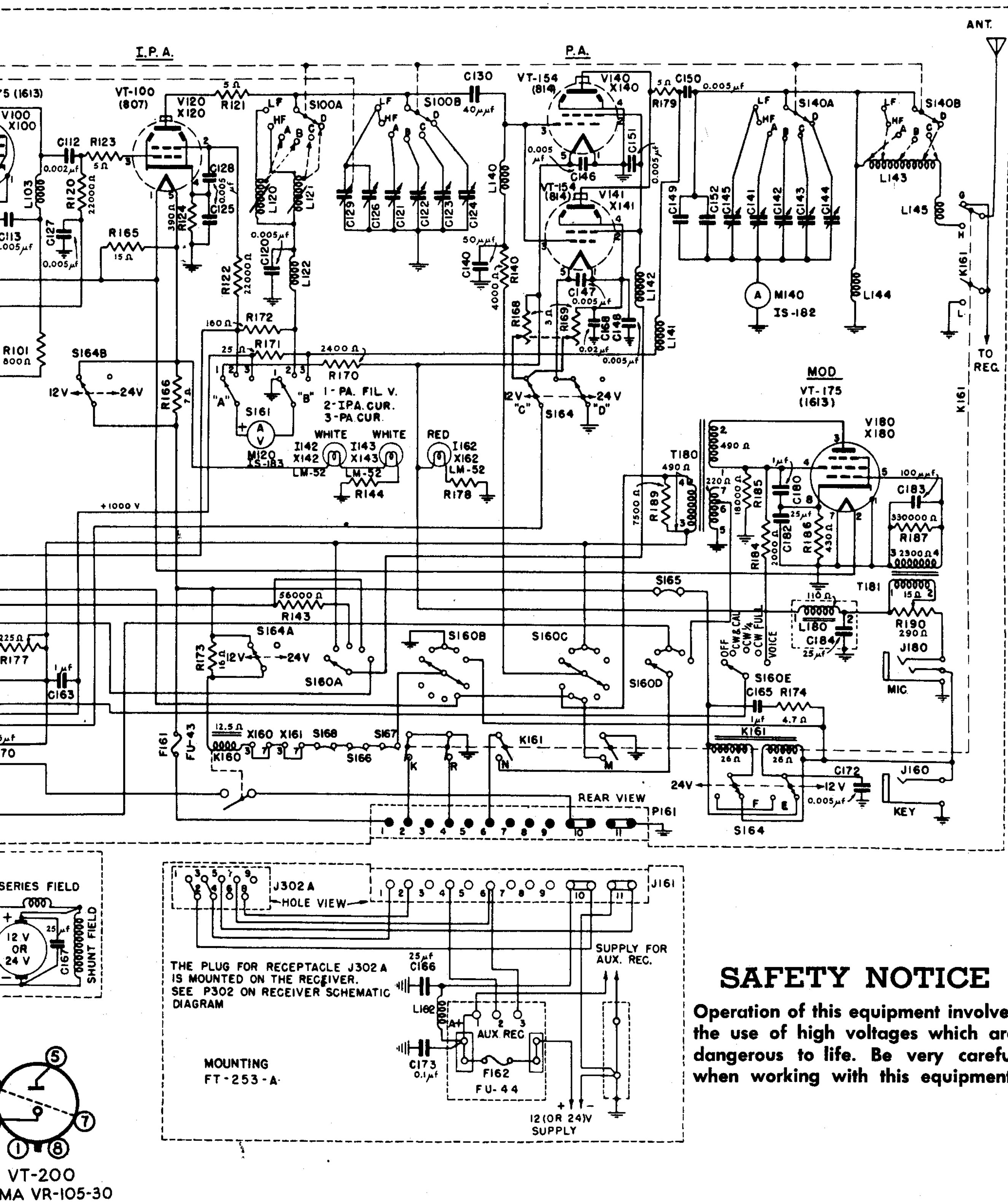

VT-100
RMA-807


VT-154
RMA-814


VT-175
RMA 1613


VT-200
RMA VR-105-30

SCHEMATIC



SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

MAINTENANCE HINTS

BALLAST RESISTOR MODIFICATION KIT. Normal fluctuations in the 24-volt supply available to the SCR-506-A equipment are sufficient to cause a possible material reduction in tube life, with the fixed series dropping resistor R166 currently being used. Ballast Resistor R167 (type no. CL-583), part of this modification kit, which replaces R166, is a specially designed resistor which holds the voltage across the master oscillator, intermediate power amplifier and modulator tubes within a range which will insure long tube life on 24-volt operation of the transmitter.

This ballast resistor and associated octal socket X-163 is installed in the int. power amplifier compartment adjacent to the i-p-a tuning capacitor, as shown in Fig. 1. Fixed resistor R166 is effectively eliminated from the circuit by merely clipping one wire, as explained in the complete modification procedure given below.

When ordering this modification kit, specify stock no. 2S506A/K1.

1. Remove top, back and bottom covers of transmitter.
2. Remove back cover plate from oscillator compartment and remove small bottom cover plate from i-p-a socket compartment.
3. Remove larger bottom cover plate from oscillator compartment and remove small bottom cover plate from i-p-a socket compartment.
4. Remove the four screws which hold the oscillator trimmer capacitor C106 in place. Mount the socket X-163 with four of the 7/16" long screws provided. Clamp the two laced leads with the cleat and 7/16" screw furnished, as shown in Figs. 1 & 2.
5. Connect the red and black wire from the socket X-163 to #5 pin on socket X-120, the i-p-a tube socket, as indicated in Fig. 3. This is the pin to which a red and black wire is already connected.
6. If the serial no. of the transmitter is lower than 2097 then connect the 39 ohm 2 watt resistor to pins 1 and 5 of the i-p-a socket X-120, as indicated in Fig. 3. If the serial number of the transmitter is 2097 or higher than this resistor is already installed.
7. Route the brown lead from the ballast tube socket X-163 up and over the shield between the i-p-a and p-a tubes, then under the frame tubing, along the cable into the modulator compartment and thence to fuse F161. This routing is illustrated in Figs. 1 & 2.
8. The orange-black wire which connects to section A of switch S-164 (12-24 volt changeover switch) must be clipped free from the terminal and an approx. 1/4" section removed, as shown in Fig. 1. This effectively removes R166 from the circuit.
9. Replace covers, completing the modification.

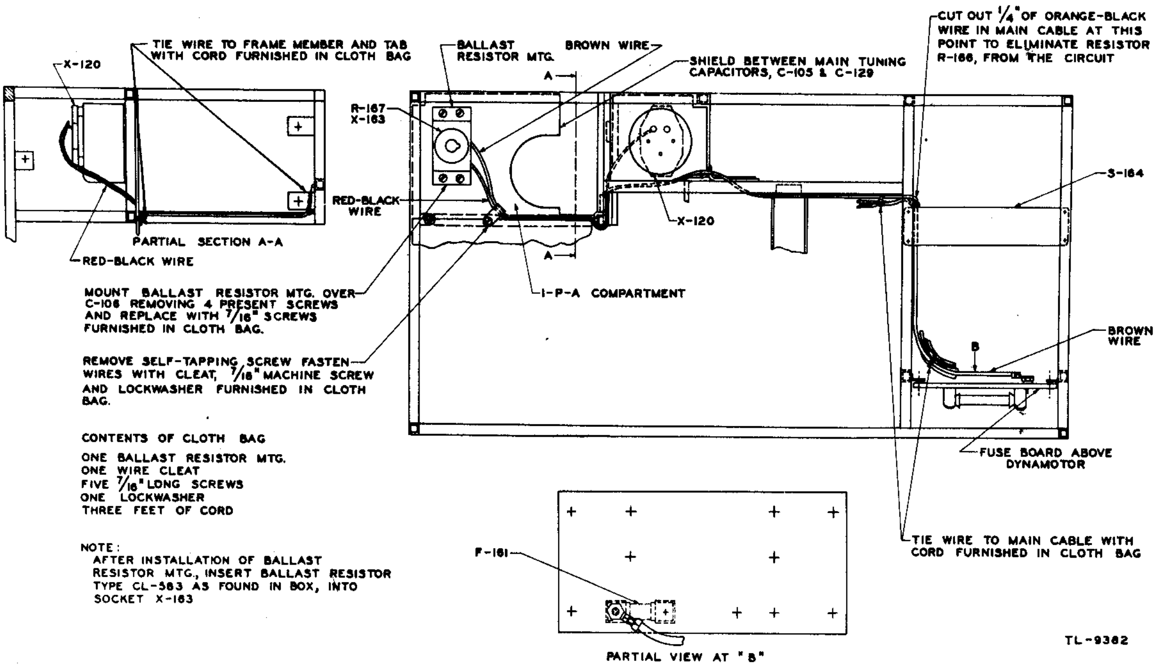


FIG. 1-DETAILS OF BALLAST RESISTOR MODIFICATION, TO IMPROVE TUBE LIFE ON 24-VOLT OPERATION.

MAINTENANCE HINTS (cont)

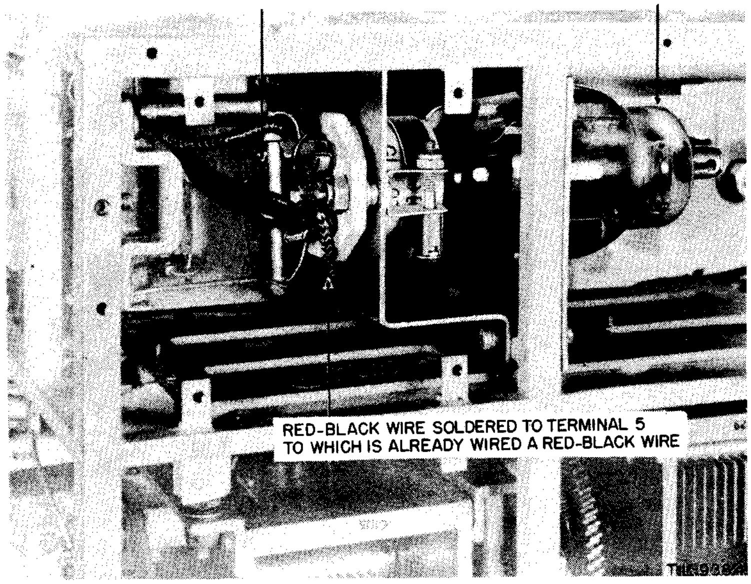


Fig. 2. —Closeup view, showing resistor R165A and new i-p-a socket wiring.

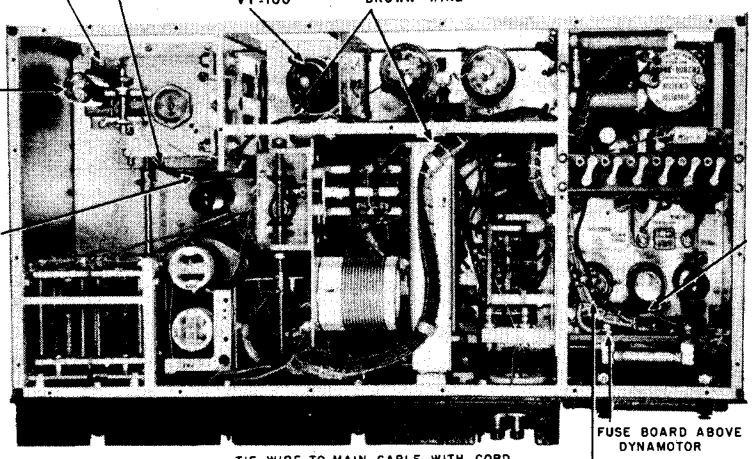


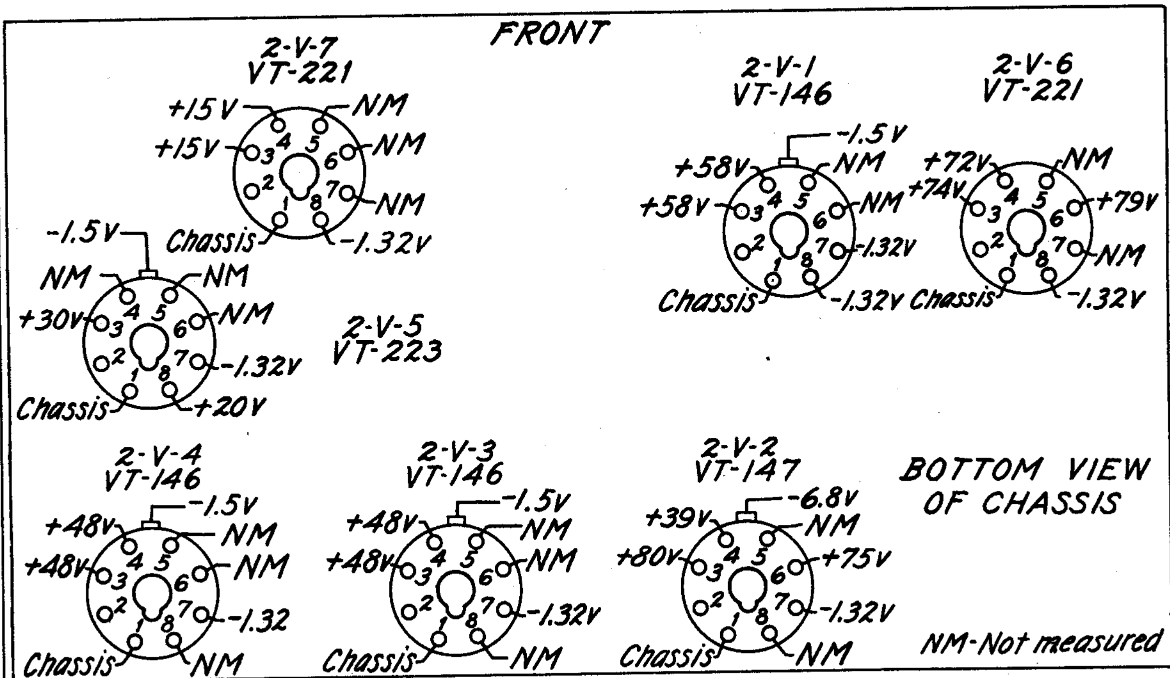
Fig. 3. —Top view of transmitter with shields removed, showing location of Ballast Resistor in i-p-a compartment.

RADIO RECEIVER & TRANSMITTER BC-654-A

Reference:
TM 11-275

Part of: SCR-284-A

RECEIVER RESISTANCE AND VOLTAGE MEASUREMENTS



RECEIVER VOLTAGE MEASUREMENTS

Set removed from case. Interlocks tied down.

MAIN SWITCH at CW. VOLUME control full on.

Measurements taken to No. 2 socket pins (+6v) with 1000 ohms/volt meter.

Readings may vary 15%.

RECEIVER RESISTANCE MEASUREMENTS

Chassis removed from case. Interlocks left open.
Tubes and battery (or PE-104) removed.
Mic, phones, key, and power cord (CD-501) disconnected.
Controls at any position; except AVC switch (early sets) ON.
Measurements made between points indicated at tube sockets (top) and Terminal Strip 2-K-1.

Socket	Pin No.	2-K-1 Term	Resistance
2-V-1 1st I-F	Grid cap 3 & 4	2 7	1.22 meg 30000 ohms
2-V-2 Mixer	Grid cap 3 4 5 6	2 7 7 11 7	2 meg 4700 ohms 6800 ohms 220000 ohms 4400 ohms
2-V-3 1st I-F	*Grid cap Grid cap *Grid cap 3 & 4	8 2 11 7	1 meg 2 meg 1.039 meg 68000 ohms

Socket	Pin No.	2-K-1 Term	Resistance
2-V-4 2d I-F	Grid cap 3 & 4	11 7	6 ohms 68000 ohms
2-V-5 Det- 1st I-F	Grid cap 3 5	11 7 11	2.2 meg 470000 ohms 1.68 meg
2-V-6 2d A-F	5 3 4	9 7 7	2.22 meg 1000 ohms 10000 ohms
2-V-7 Osc	5 3 & 4	11 7	220000 ohms 220000 ohms

* Additional measurements for all sets over Serial #17,692.

561384 O - 43 - 3

RECEIVER ALIGNMENT

Numbers in circles refer to locations shown on figures 2 and 3.

1. Remove from case, separate receiver from transmitter. Remove receiver bottom plate. Tie down interlocks. Install new battery and check voltage (85-90). Check all tubes.
2. Connect "hot" lead of signal generator to grid cap of mixer tube (2V2) through a 0.01 - to 0.05- μf capacitor; connect "cold" lead to chassis. Set signal generator on 455 kc *, and turn to modulated signal. Plug output meter and headset into PHONES jacks. Set MAIN SWITCH to voice; AVC to on: VOLUME full on; TUNING at 5800 kc. Always work with as weak a signal from signal generator as practicable.
3. Adjust secondary 1 then primary 2 of 3d I-F transformer for maximum on output meter.
4. Adjust sec 3 then pri 4 of 2d I-F trans for max on output meter.
5. Adjust sec 5 then pri 6 of 1st I-F trans for max on output meter.
6. Turn off modulation in signal generator. Set MAIN SWITCH to CW. Tune BFO 7 to zero beat.
7. Set TUNING at 5800 kc; MAIN SWITCH to VOICE. Set signal generator on 5800 kc* and turn to modulated signal. Connect "hot" lead to antenna lead through a 50-$\mu\mu$f capacitor; connect "cold" lead to chassis.
8. Adjust osc trimmer 8 for max on output meter.
9. Adjust R-F trimmer 9 for max on output meter.
10. Adjust ant trimmer 10 for max on output meter.
11. Set TUNING at 3800 kc; set sig gen at 3800 kc.*
12. Adjust R-F coil slug 11 for max on output meter.
13. Adjust ant coil slug 12 for max on output meter.
14. Repeat steps 7 to 13 inclusive at least once.

* Check signal generator frequency (unmodulated) against SCR-211 frequency meter.

CAUTION

BEFORE REPLACING SET IN THE CASE *ALWAYS* BE SURE RECEIVER ANTENNA PLUG IS REPLACED IN JACK ON RELAY SHELF.

COMMON FAULTS AND CORRECTIVE MEASURES

ARCING IN POWER CORD CONNECTORS

On sets having the +500v lead connected to terminal No. 3 in the cording, trouble has been experienced with arc-over to ground in connectors. Late sets have the +500v connected to the No. 8 (center) terminal. On these sets the connectors are marked with a yellow arrow.

This change should be effected on all sets not already changed over. Simply interchange No. 3 and No. 8 leads in *all* connectors, viz:

Transmitter and Receiver BC-654-A
Power Unit PE-103-A
Generator GN-45-( )

Ref.: Supply Letter No. 151 (1942)

AUDIO HOWL IN RECEIVERS BELOW SERIAL NO. 3501

1. Dicsonnect blue wire from plate lug (pin 3) of 2-V-6.
2. Pull from cable. Reuse if not damaged.
3. Relocate as far as possible from cable and No. 8 terminal of AVC switch.
4. Reconnect and check receiver performance.

Ref.: Maintenance Letter No. 9 (1943)

BREAKING OF CONDUCTORS IN CORD CD-501-A

Due to insufficient clamping action of the cable connector clamps, it may be found that the cable is free to turn. Wrap a few layers of friction tape around the portion of the cable under the clamp, being sure to leave the sheath grounding tab outside the tape for grounding.

Ref.: Maintenance Letter No. 22 (1943)

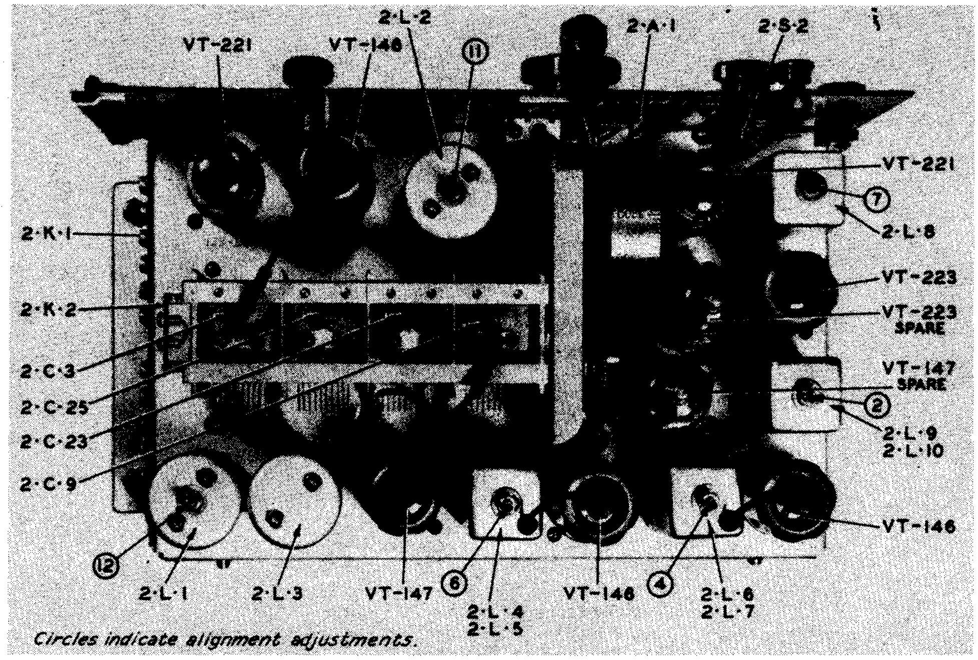
SPECIAL NOTES

MOISTURE PROTECTION

A waterproof canvas cover to protect BC-654-A has been added to the parts list of SCR-284-A. Organizations having Radio Sets SCR-284-A which lack Cover, BG-154, Stock No. 2Z3400-154, should requisition them in the usual manner. This cover is not removed when the equipment is in operation.

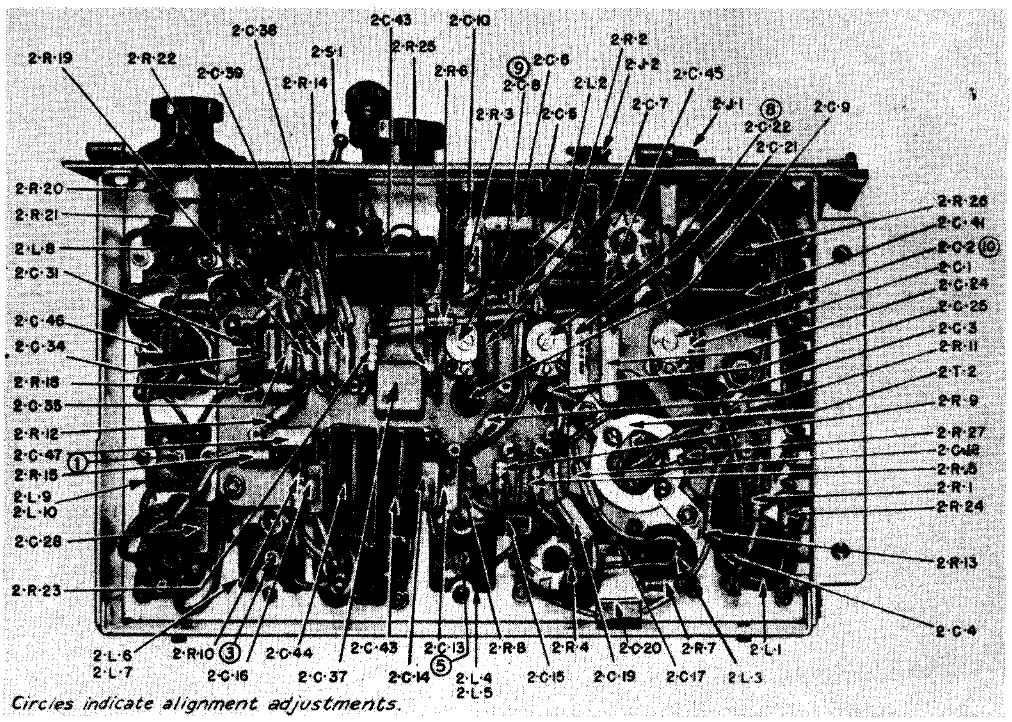
Refer also to PE-103-A in this manual for information on a protective cover for that unit.

Ref: Supply Letter No. 179 (1943)



Circles indicate alignment adjustments.

Fig. 2.—Receiver chassis, top.



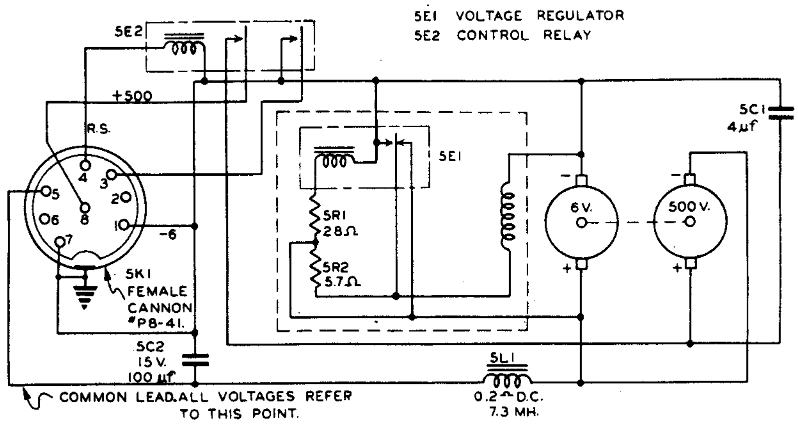
Circles indicate alignment adjustments.

Fig. 3.—Receiver chassis, bottom.

SPECIAL NOTES

DISASSEMBLY OF TRANSMITTER AND RECEIVER

1. Remove front cover and battery (or PE-104-A).
2. Loosen the six knurled panel nuts and withdraw the set from the case.
3. Remove receiver antenna lead connector plug from jack on keying relay shelf and tilt receiver forward.
4. Disconnect bonding strap and lever arm. Disengage hinges by sliding receiver to the left.
5. Loosen wiring harness from its two supports at the side of the battery compartment.
6. Remove one screw from the left side of the receiver chassis and two from the right. Receiver may now be lifted free.



Schematic—Generator GN-45-A.

TRANSMITTER VOLTAGE MEASUREMENTS

Reference point for all voltage measurements is terminal No. 10 (+6v) of terminal strip 2-K-1.

Readings taken using fully charged 12v battery with transmitter adjusted to feed 1 amp into dummy antenna (when STANDBY sw is at HIGH).

Interlock switches behind battery door and at rear of chassis closed by temporary means.

Readings may vary 10 to 15% from those shown.

A suitable dummy antenna is a 6 foot length of Field Wire W-110-B connected to ANTENNA and GROUND posts at one end and with the other end shorted by twisting the bared conductors together. To reduce radiation it is advisable to roll the field wire into a small coil. Set ANTENNA SELECTOR at position 4 and adjust ANTENNA COUPLING until ANTENNA CURRENT meter reads 1 amp with ANTENNA TUNING at resonance and STANDBY sw at HIGH.

Grid and Plate voltages measured with 1000 ohms/volt meter

Voltage	Measured	VOICE LOW	VOICE HIGH	CW LOW	CW HIGH	Where Measured
1-V-1	Plate & Screen	84	84	84	84	Center tap of Coil 1-L-1
1-V-2	Plate	115	115	115	115	Junction of 1-L-3 and 1-R-20
	Grid	-10	-10	-10	-10	Junction of 1-R-14 and 1-R-16
	Screen	Approximately 95v				Socket lug #4
1-V-3 and 1-V-4	Plate	520	510	525	515	Junction of 1-L-6 and 1-C-43
	Grid	-50	-50	-50	-50	Junction of 1-L-5 and 1-R-14
	Screen	Approximately 200v*				Socket lug #2
	Suppr.	-50	-48	0	0	Socket lug #4
1-V-5	Plate	85	80	0	0	Junction of 1-R-5 and 1-R-24
	Screen	Approx 75v		0	0	Socket lug #4
1-V-6	Plate & Screen	83	83	83	83	Junction of 1-L-2 and 1-C-22

Grid Voltages measured with VTVM (Volt-ohmyst)

Voltage	Measured	VOICE LOW	VOICE HIGH	CW LOW	CW HIGH	Where Measured
1-V-1	Grid	-22	-20	-22	-20	Socket lug #5
1-V-2	Grid	-23	-20	-23	-20	Socket lug #5
1-V-3, 1-V-4	Grid	-53	-50	-53	-50	Socket lug #3
1-V-5	Grid	-5	-6	-6	-5	Socket lug #5
1-V-6	Grid	-1.5	-1.5	-1.5	-1.5	Socket lug #5
		-30 with CRYSTAL sw out				

* Subject to wide variations.

TRANSMITTER RESISTANCE MEASUREMENTS

From Socket	From Pin No.	To Socket or connector	To Pin No.	Resistance ohms	Remarks
1-V-1	3 & 4	1-V-4	5	32000	
	5	1-V-4	5	1 meg	
1-V-2	3	1-K-3	8*	31000	
	4	1-V-4	5	37500	
	4	1-K-3	8*	45000	
	5	1-V-4	5	1 meg	
1-V-3 or 1-V-4	2	1-K-3	8*	36500$	Relay 1-E-1 closed by hand.
	2	1-K-2	8	470000	MAIN SWITCH at CW or VOICE.
	3	1-V-4	5	44000	Check No. 3 pin of *both* sockets.
	4	1-K-2	8	2100	MAIN SWITCH at VOICE.
	4	1-K-3	5	1000	MAIN SWITCH at CW; rear interlock closed
1-V-5	3	1-K-3	8*	41000	MAIN SWITCH at CW or VOICE.
	4	1-V-5	3	5300	
	4	1-V-4	5	47000	

Cord, mic, key, headset disconnected.

Transmitter tubes and rec battery removed.

Switch positions unless otherwise noted are:
STANDBY at OFF
MAIN at OFF
CRYSTAL at OFF

$ May be 56000 or 61000 in some sets.
Values of 1-R-25 and 1-R-26 differ.

* Indicates +500 volt pin which may be No. 3 in some sets. See page 2.

TRANSMITTER ALIGNMENT AND NEUTRALIZATION

1. Calibrate the master oscillator against the crystal before aligning. To conserve battery BA-43 it is recommended that PE-104-A be installed in the battery compartment during the alignment and neutralizing operation.

2. Remove the power cord and the crystal. In order to remove the crystal from its socket it will be necessary to loosen the spare tube socket that is mounted directly above on the electrolytic capacitor and slide it around out of the way.

3. Since the crystal-oscillator circuit is to be used as a vacuum-tube voltmeter, it is necessary to light the filament of the tube without having to pull the CRYSTAL switch out. This is done by connecting a piece of wire between points 5T and 6T of the CRYSTAL switch, 1-S-2.

4. Remove the red wire 5-1-C-43 from post 1. Open the circuit between points 7 and 8 on junction block 3. These two operations remove the plate voltage from the intermediate and final power amplifiers.

5. Connect a piece of wire from pin 2 of the crystal socket 1-A-1 to the jack marked R X 100 in the lower right-hand corner of the Weston type 3-C voltohmmeter, and a piece of wire from pin 4 of the crystal socket to the jack marked R X 1000 in the lower right-hand corner of the same instrument. Place the toggle switch of the voltohmmeter in the RES position.

   NOTE: If the voltohmmeter available is the Triplett type 666-SC, a component part of the test set 1-56-C, connect the two wires to the two jacks marked V- and V+Ω in the lower left-hand corner of the instrument. Turn the selector switch to the position marked 1 Meg Ω. Any d-c vacuum-tube voltmeter, as the Voltohmyst, may be used in place of the voltohmmeter in this method of neutralization.

6. Connect a length of wire from xtal osc plate (point 6 of junction block 4) to the caps (plates) of the final power-amplifier tubes VT-225. This provides an input lead for the crystal-oscillator circuit which now serves as a vacuum-tube voltmeter.

7. Set the transmitter TUNING dial for the reading corresponding to a frequency of 5000 kilocycles. Place the ANTENNA SELECTOR switch in position 1, and the ANTENNA COUPLING control at 50. Plug the key into its jack and lock it in a closed position. Make certain that the interlock switches 1-S-5 and 1-S-6 are still closed.

8. Plug the power cord into its socket on the transmitter. Place the MAIN SWITCH in the CW position and the STANDBY SWITCH in the HIGH position.

9. Adjust the intermediate-amplifier neutralizing capacitor 1-C-17 for approximately one-third scale deflection on the meter.

10. Adjust the intermediate power-amplifier trimmer capacitor 1-C-32 for *maximum* deflection on the meter. This tunes the intermediate power amplifier tank circuit to resonance with the master-oscillator frequency.

11. Adjust the capacitor 1-C-17 for *minimum* reading on the meter. At this point the intermediate power amplifier is neutralized.

12. To tune and neutralize the final power amplifier turn the MAIN SWITCH to the OFF position and remove the power cord from the transmitter.

13. Reconnect points 7 and 8 on junction block 3 to restore plate voltage to the intermediate power amplifier.

14. Disconnect the wire that was connected to the plate caps of the final power-amplifier tubes and connect it to the antenna post.

15. Place the power cord in its socket on the transmitter. Turn the MAIN SWITCH to the CW position and adjust the ANTENNA TUNING control for *maximum* reading on the meter.

16. Adjust the final power-amplifier trimmer 1-C-40 for *maximum* reading on the meter. This tunes the final power-amplifier tank circuit to resonance.

17. Adjust the final power-amplifier neutralizing capacitor 1-C-39 for *minimum* reading on the meter.

18. Turn the MAIN SWITCH to the OFF position, the STANDBY SWITCH to the OFF position, and remove the power cord from the transmitter.

19. Replace the red wire 5-1-C-43 on post 1. Remove the wire that was connected to point 6 of junction block 4. Remove both wires that connect the meter to the crystal socket 1-A-1. Remove the connection between points 5T and 6T of the CRYSTAL SWITCH 1-S-2, and replace the crystal.

20. Mount the receiver on the transmitter and replace the brace. Replace the bonding strap.

COMMON FAULTS AND CORRECTIVE MEASURES

See page 2—ARCING IN POWER CORD CONNECTORS and BREAKING OF CONDUCTORS IN CORD CD-501-A

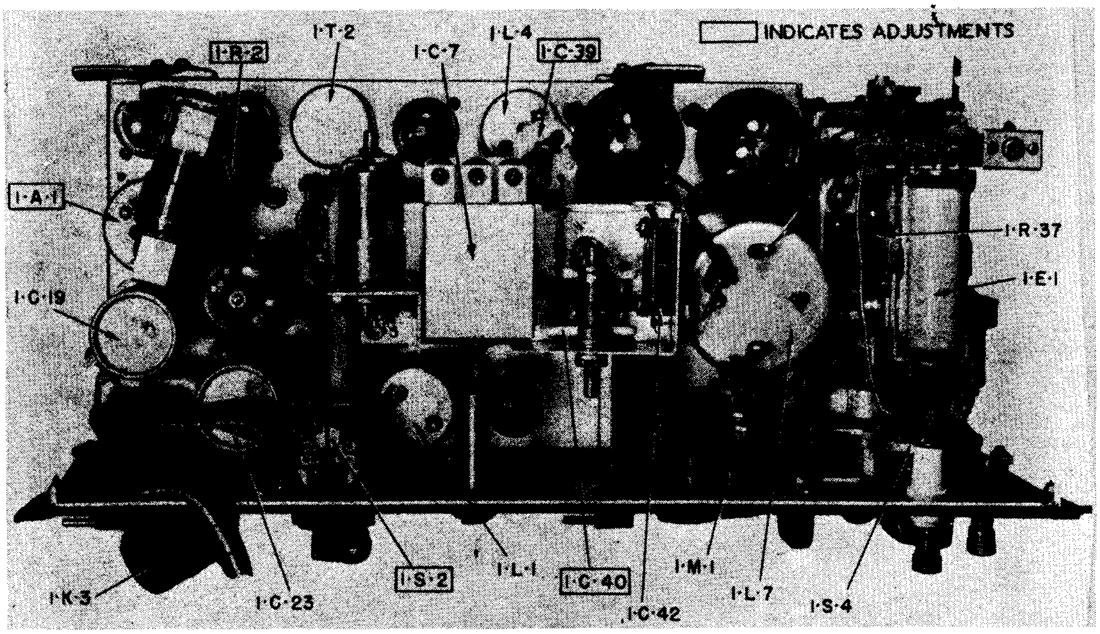


Fig. 4.—Transmitter chassis, top.

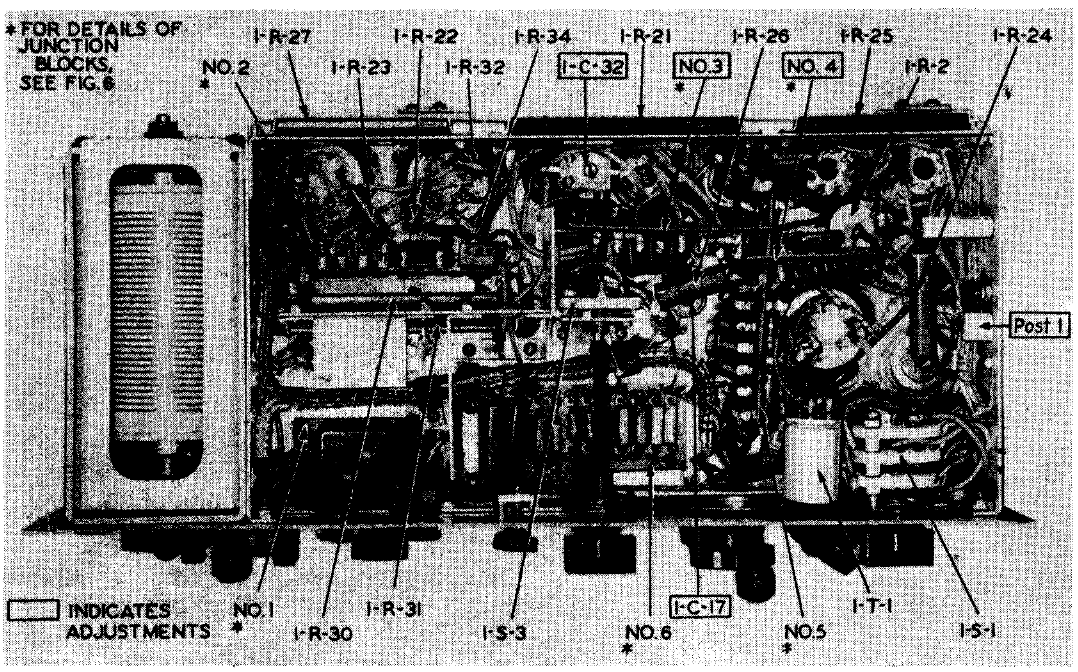


Fig. 5.—Transmitter chassis, bottom.

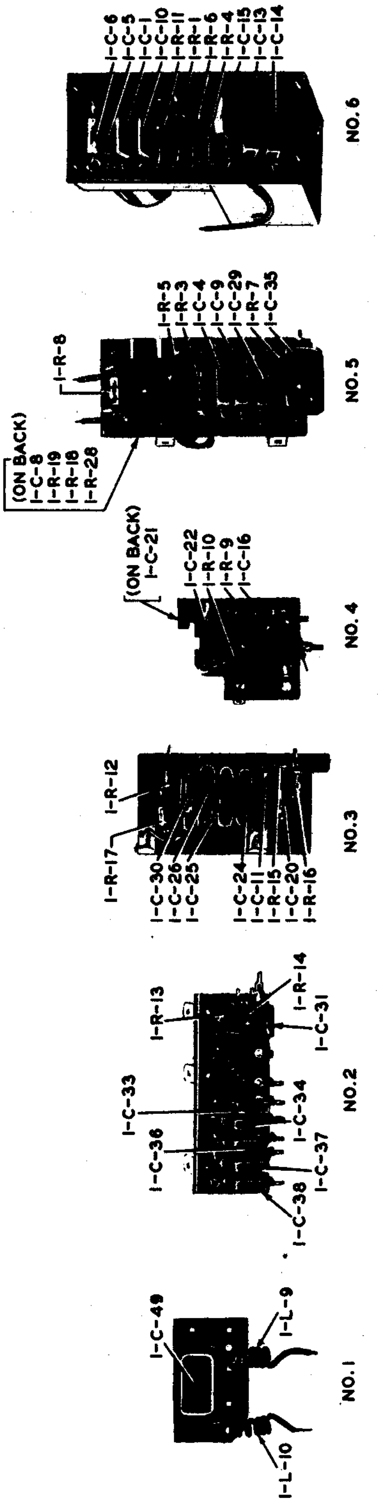


Fig. 6.—Transmitter junction blocks.

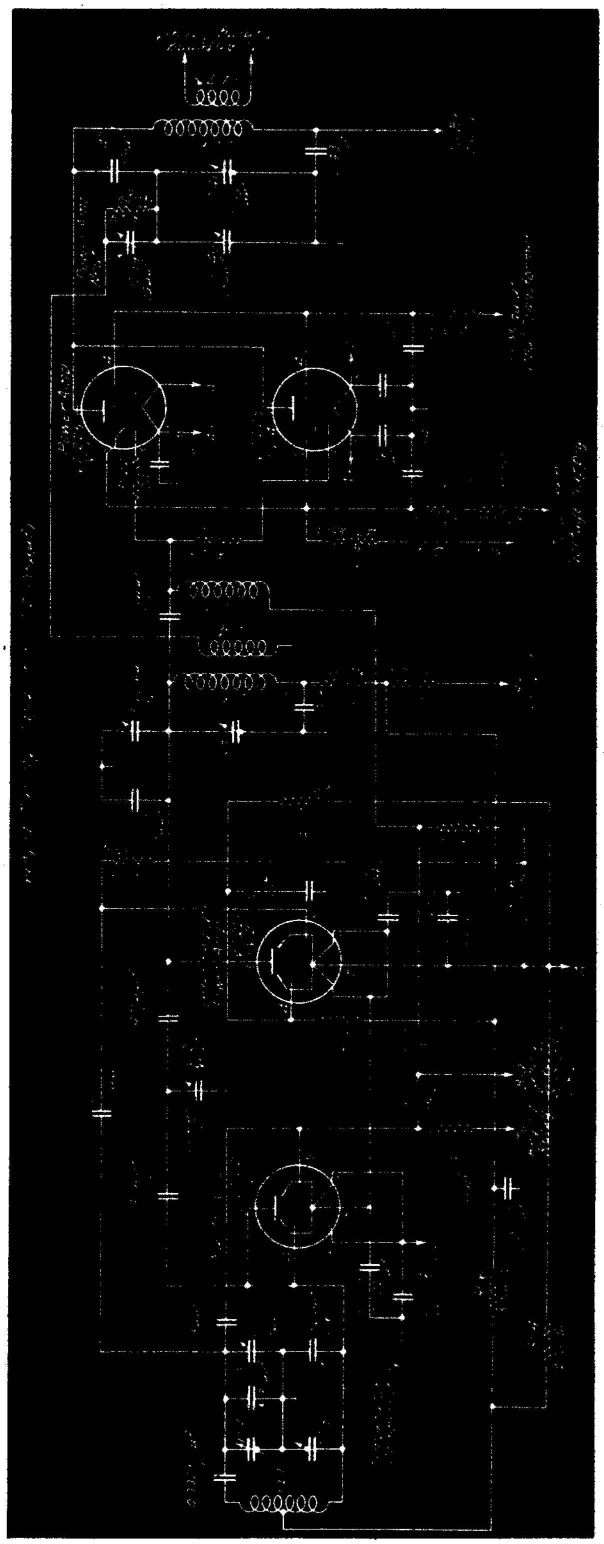
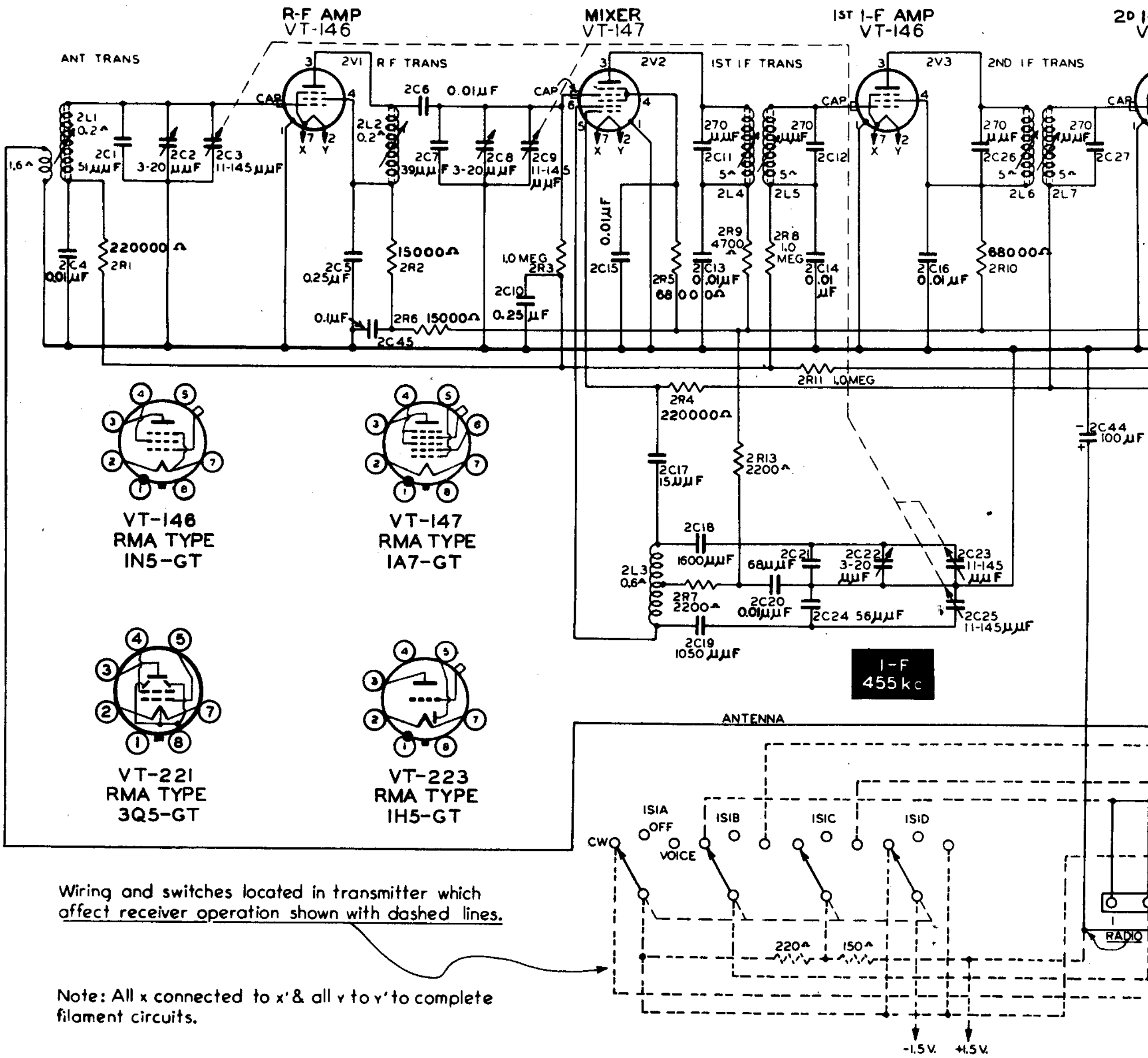
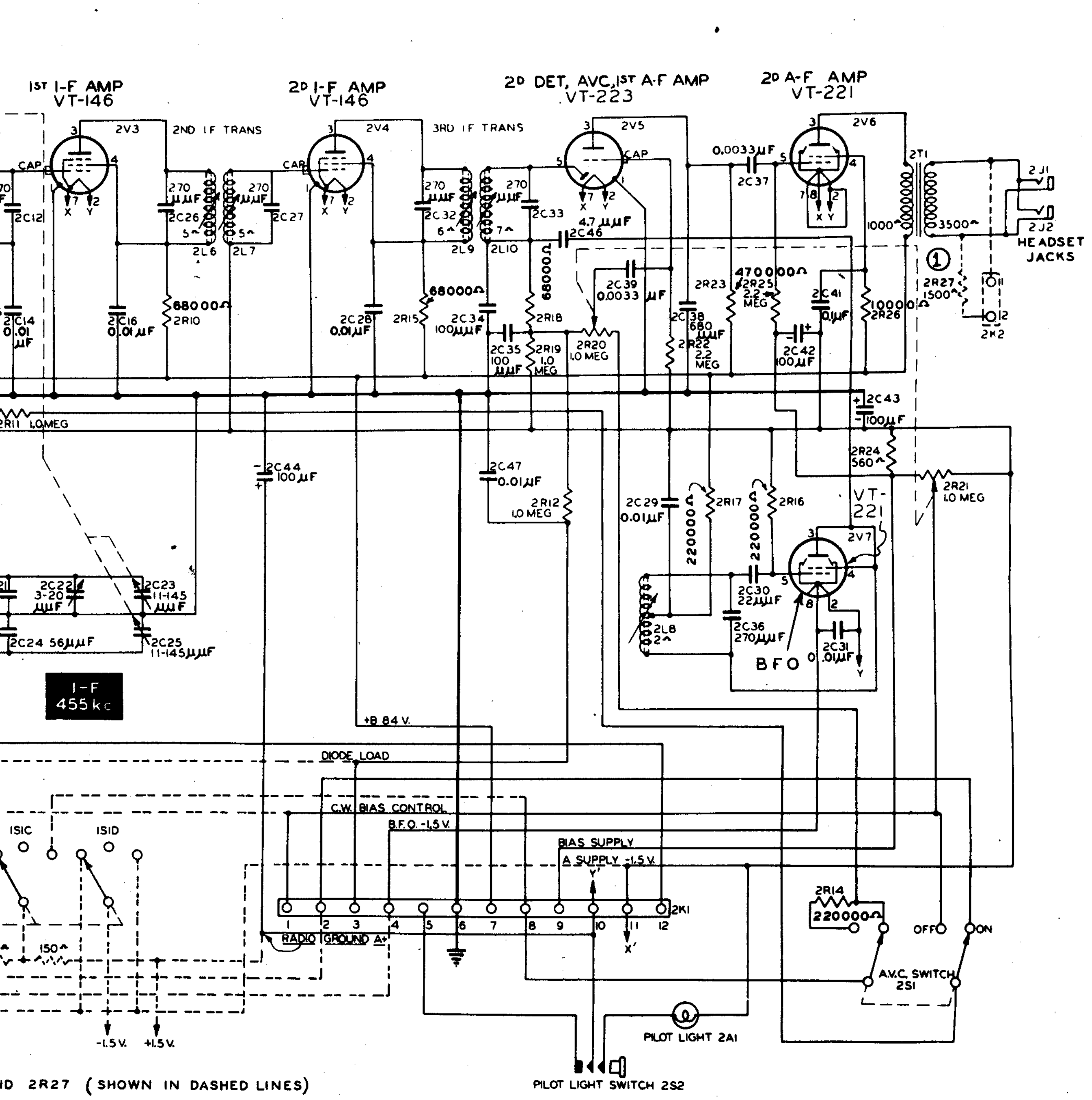


Fig. 7.—Transmitter functional diagram.



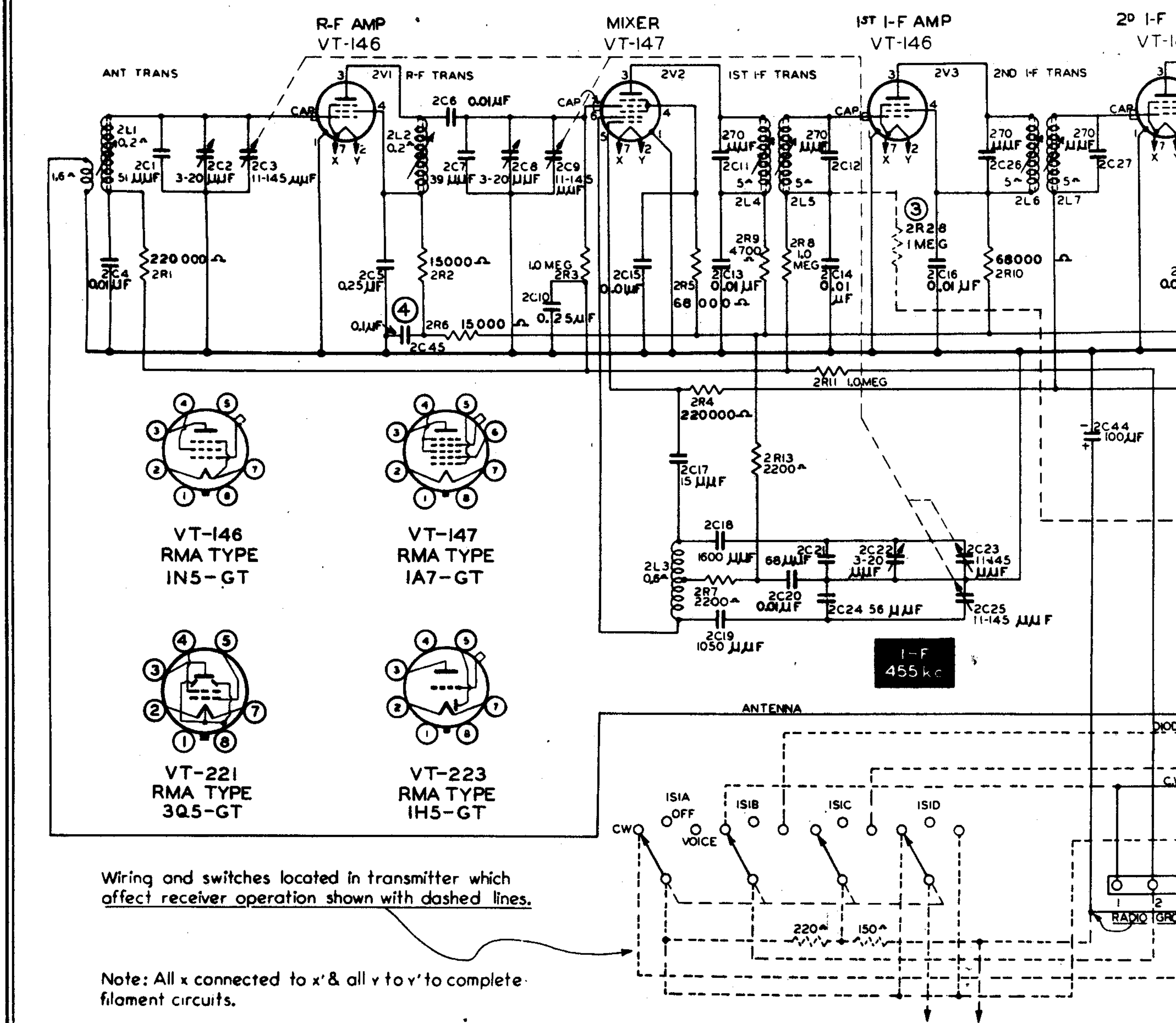
(1) SETS ABOVE SERIAL NO 3500 HAVE ADDITIONAL CIRCUIT ELEMENTS 2K2 AND 2R27 (SHOWN IN DASHED LINES)

Fig. 8.—Receiver schematic—Sets serial Nos. 1



ID 2R27 (SHOWN IN DASHED LINES)

Receiver schematic—Sets serial Nos. 1 to 9500 incl.

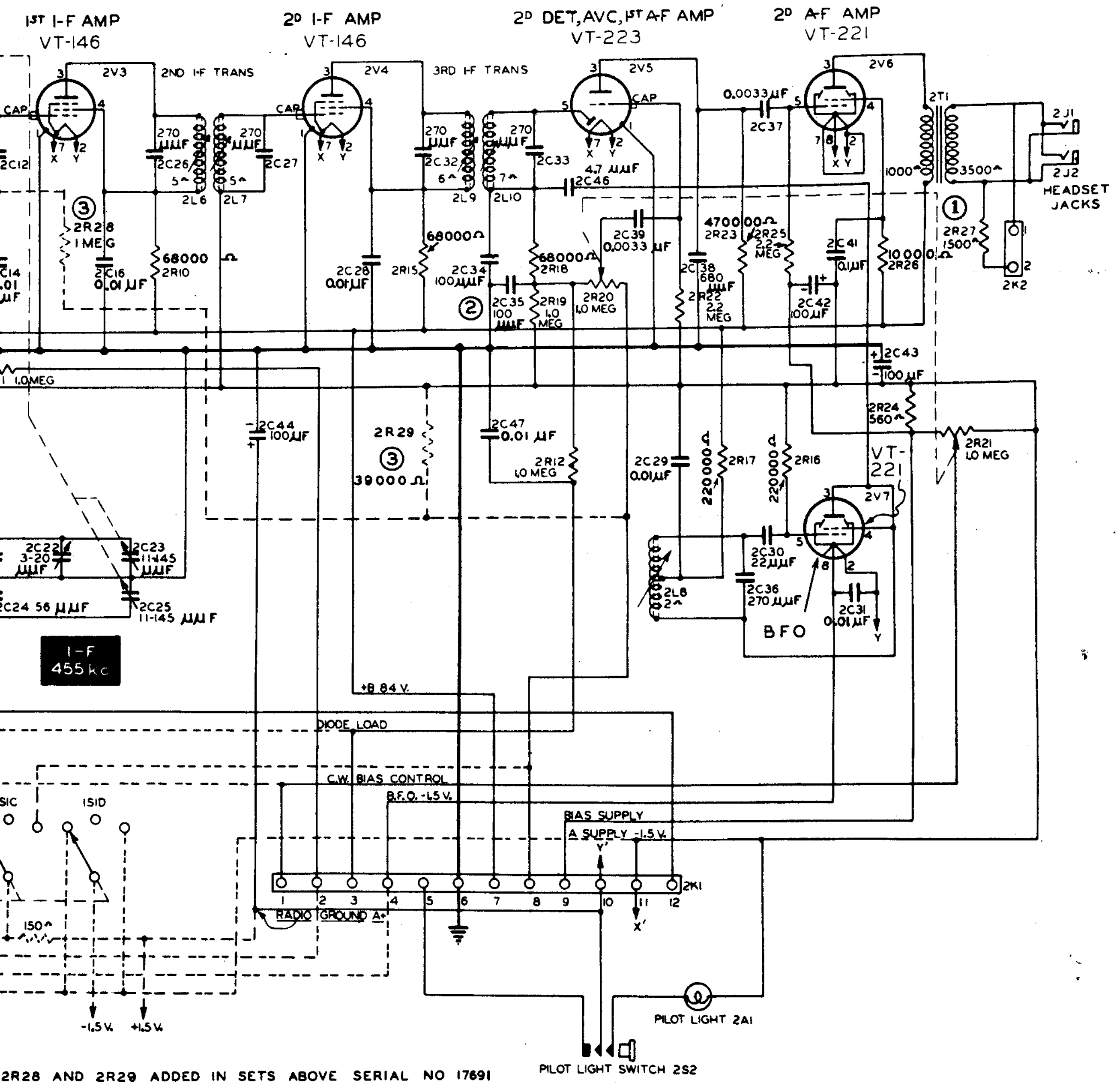


Wiring and switches located in transmitter which affect receiver operation shown with dashed lines.

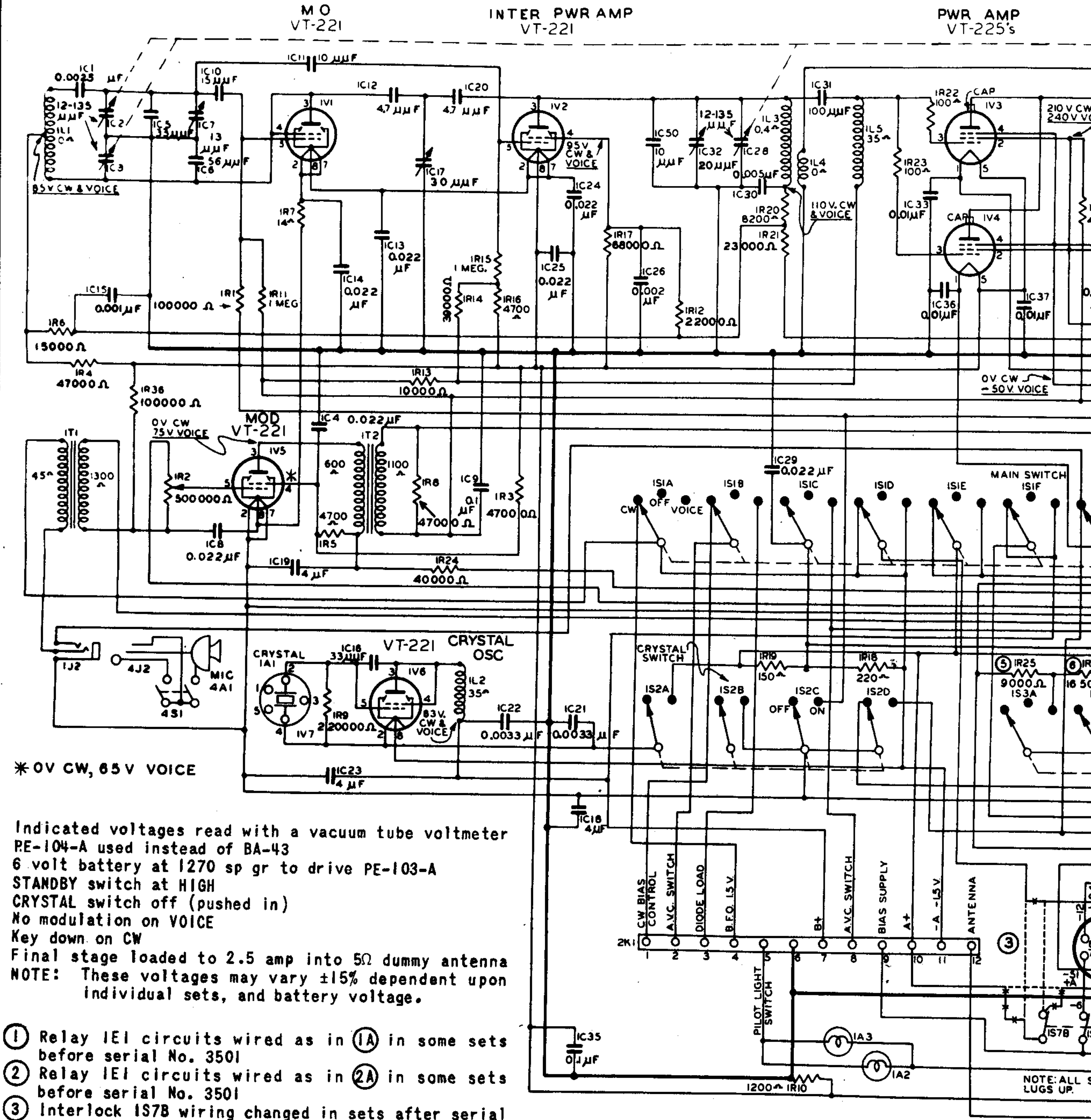
Note: All x connected to x' & all y to y' to complete filament circuits.

① 2R27 IS 15000Ω IN SETS ABOVE SERIAL NO 17691
② 2C35 IS 680μμF IN SETS ABOVE SERIAL NO 17691
③ AVC CIRCUIT MODIFIED AS SHOWN BY DASHED LINES AND ADDITIONAL PARTS 2R28 AND 2R29 ADDED IN SETS ABOVE
④ 2C45 IS 12μf IN SETS ABOVE SERIAL NO. 24733

Fig. 9.—Receiver schematic—Sets serial Nos. 9501



ver schematic—Sets serial Nos. 9501 and above.

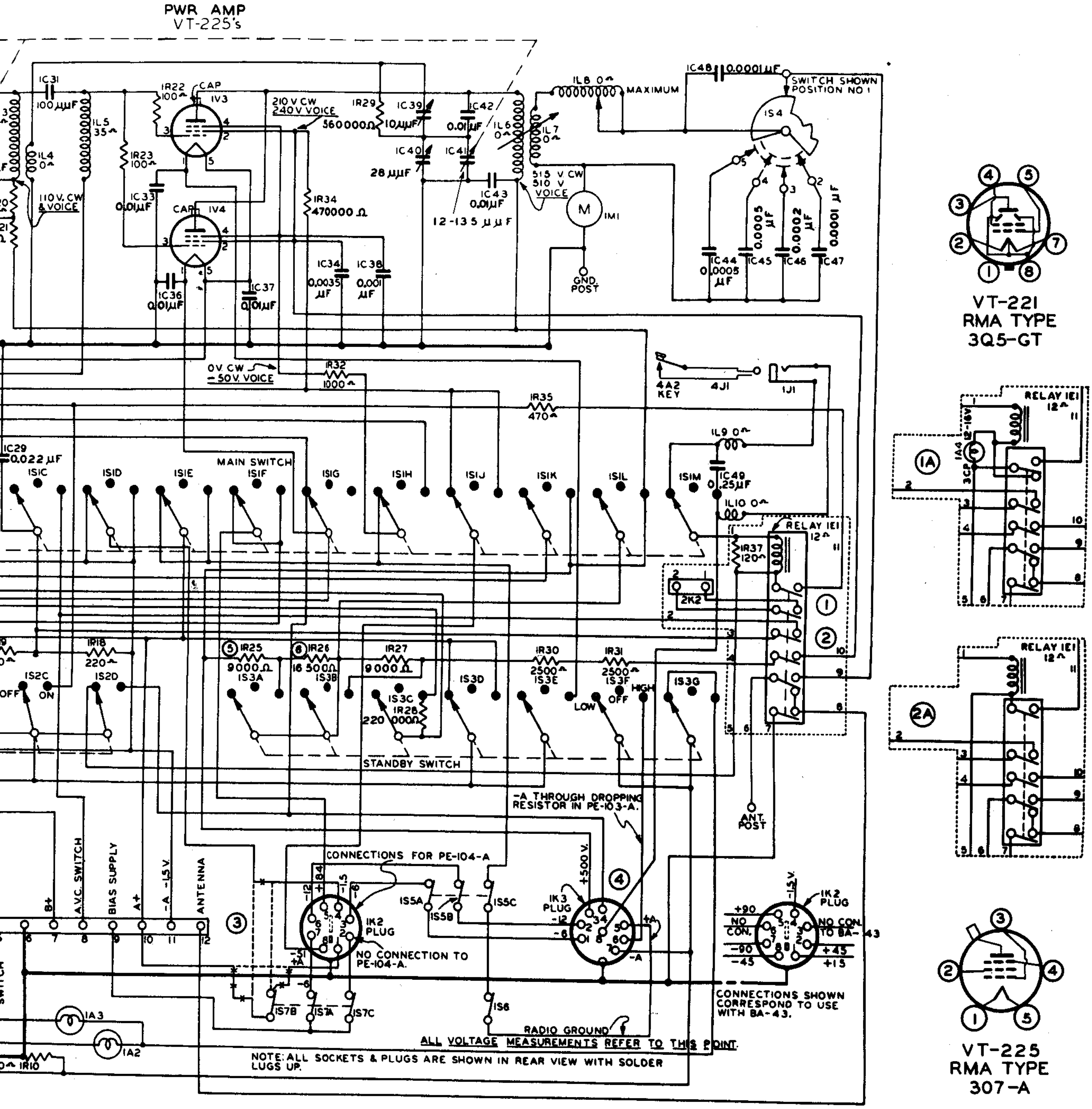


✱ OV CW, 65 V VOICE

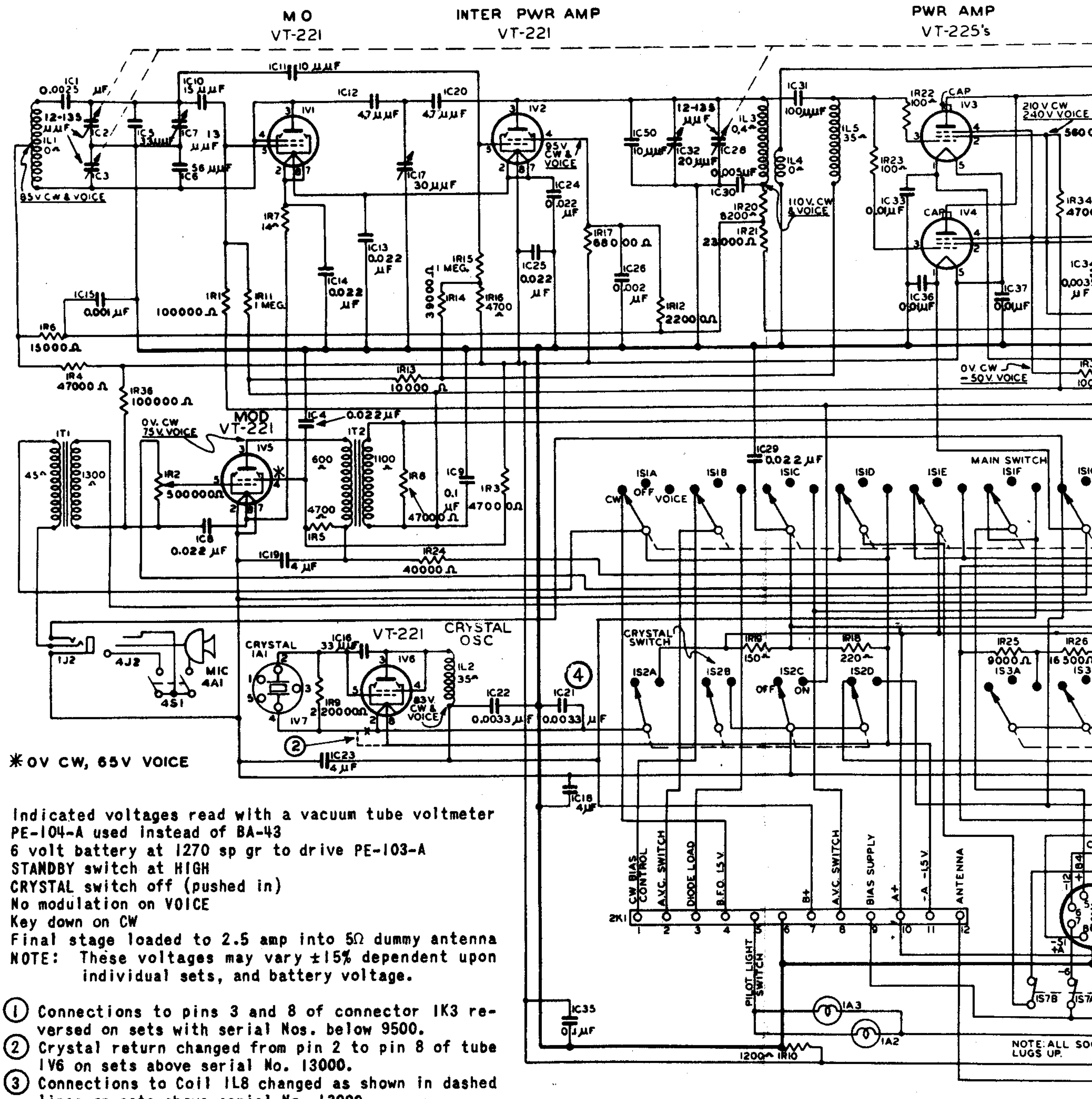
Indicated voltages read with a vacuum tube voltmeter PE-104-A used instead of BA-43
6 volt battery at 1270 sp gr to drive PE-103-A
STANDBY switch at HIGH
CRYSTAL switch off (pushed in)
No modulation on VOICE
Key down on CW
Final stage loaded to 2.5 amp into 5Ω dummy antenna
NOTE: These voltages may vary ±15% dependent upon individual sets, and battery voltage.

1. Relay 1E1 circuits wired as in (1A) in some sets before serial No. 3501
2. Relay 1E1 circuits wired as in (2A) in some sets before serial No. 3501
3. Interlock 1S7B wiring changed in sets after serial No. 3500. (Dashed lines indicate new wiring, -x-x-x- indicates old wiring.)
4. Connections to pins 3 and 8 of connector 1K3 reversed on sets after serial No. 9500. (Old circuit shown.)
5. 1R25 is 16000Ω in some sets.
6. 1R26 is 39000Ω in some sets.

Fig. 10.—Transmitter schematic—Sets serial Nos



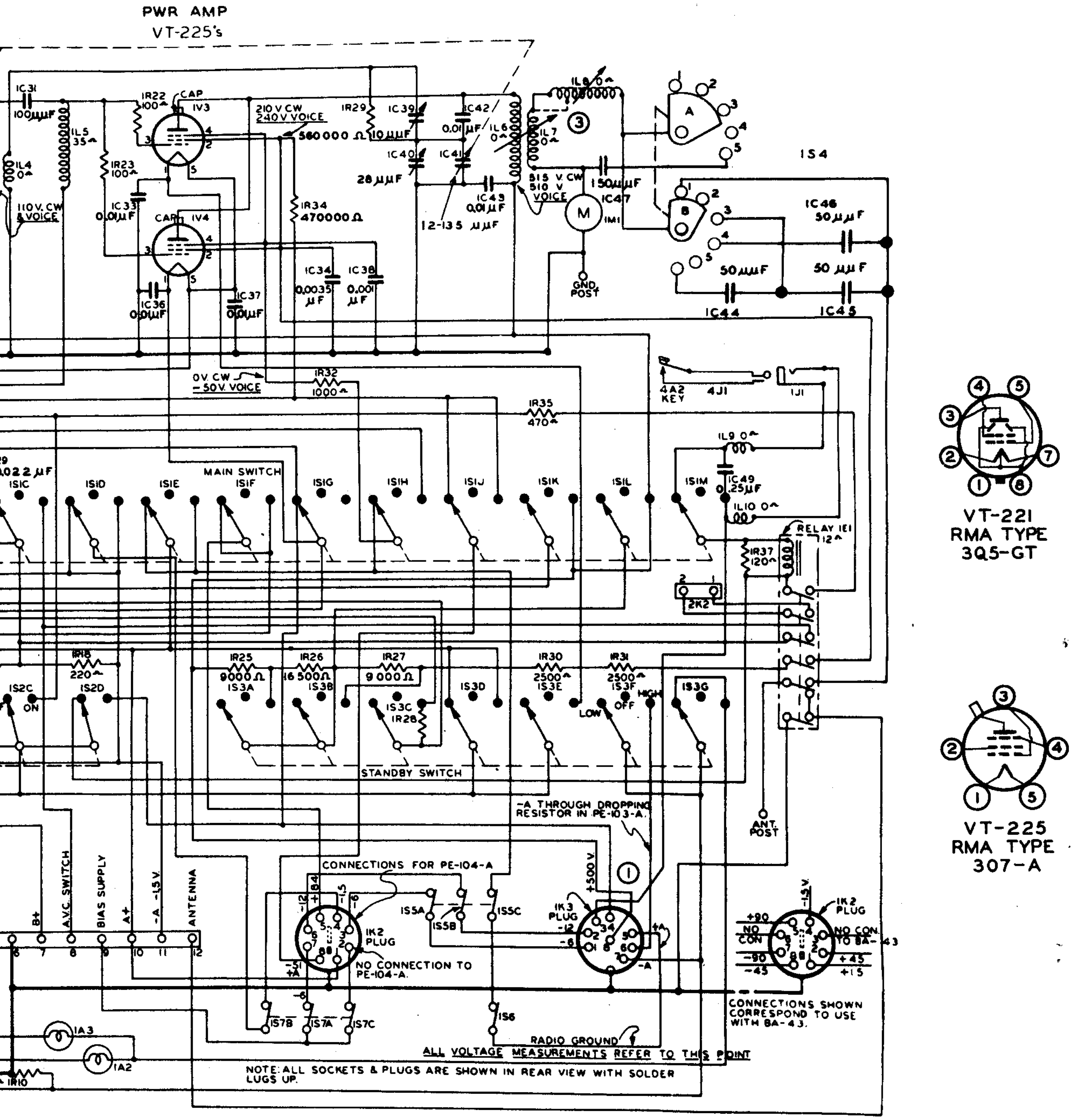
ansmitter schematic—Sets serial Nos. 1 to 9500 incl.



Indicated voltages read with a vacuum tube voltmeter
PE-104-A used instead of BA-43
6 volt battery at 1270 sp gr to drive PE-103-A
STANDBY switch at HIGH
CRYSTAL switch off (pushed in)
No modulation on VOICE
Key down on CW
Final stage loaded to 2.5 amp into 5Ω dummy antenna
NOTE: These voltages may vary ±15% dependent upon individual sets, and battery voltage.

1. Connections to pins 3 and 8 of connector IK3 reversed on sets with serial Nos. below 9500.
2. Crystal return changed from pin 2 to pin 8 of tube IV6 on sets above serial No. 13000.
3. Connections to Coil IL8 changed as shown in dashed lines on sets above serial No. 13000.
4. IC21 is 0.1 μf in sets above serial No. 19819

Fig. 11.—Transmitter schematic—Sets serial Nos. 95



itter schematic—Sets serial Nos. 9501 and above.

RADIO RECEIVER & TRANSMITTER BC-659-(*)

Part of: SCR-609-(*)
SCR-610-(*)

BC-659-(*) = BC-659-A and BC-659-B

Reference:
TM 11-615

RESISTANCE AND VOLTAGE MEASUREMENTS

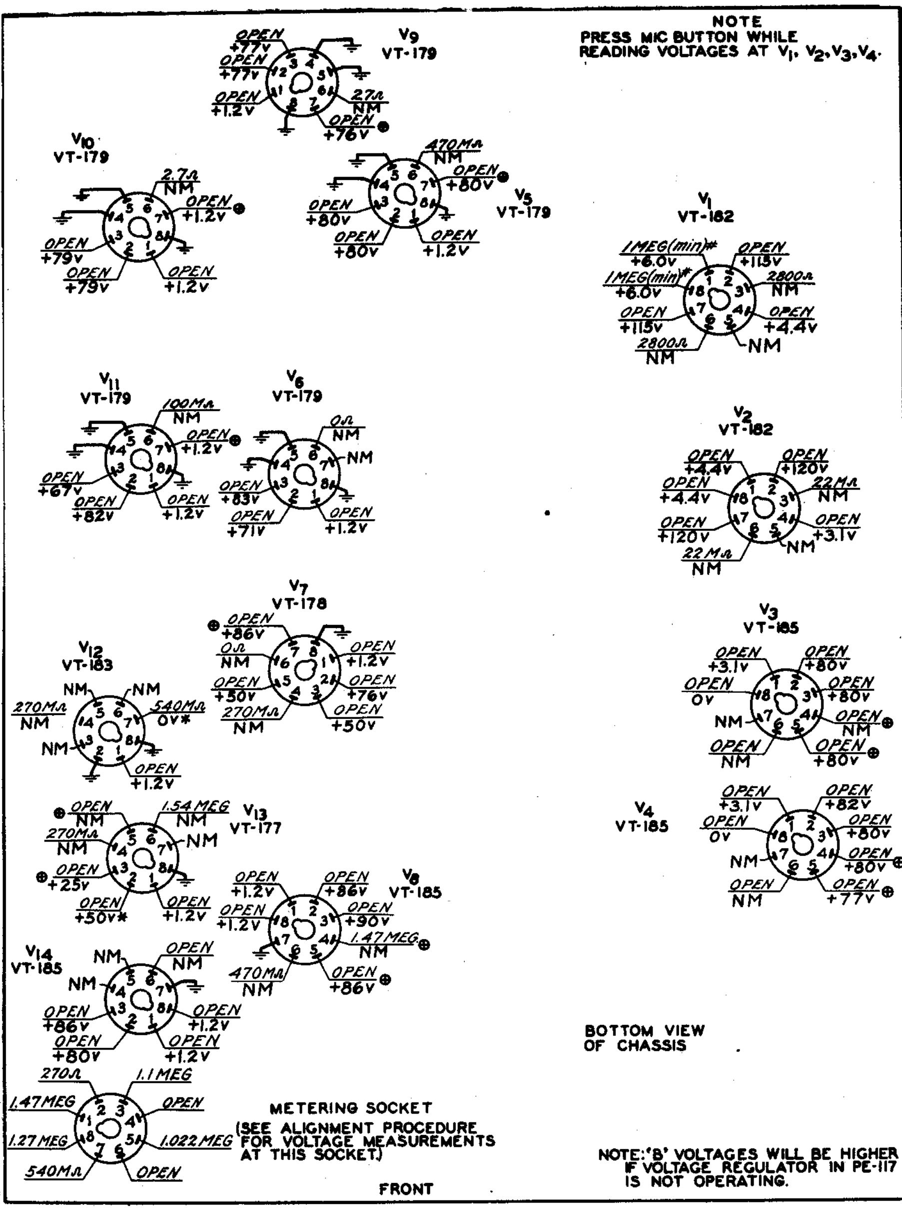


Fig. 1.—Voltages and resistances—tube socket terminals.

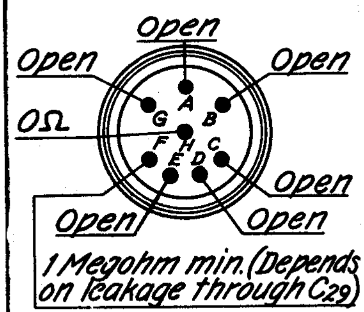


Fig. 2.—Resistances—power cable plug.

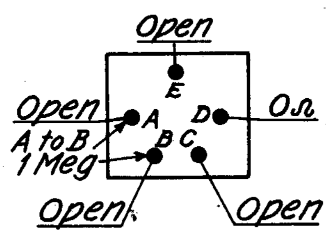


Fig. 3.—Resistances—Internal Battery (BA-41) plug.

KEY TO SYMBOLS ON FIG. 1.

* - WITH ZERO VOLTS AT PIN 7 OF METERING SOCKET.

NM - NOT MEASURED.

⊕ - SOCKET TERMINAL USED AS TIE OR DUMMY LUG ONLY. NO TUBE ELEMENT CONNECTS TO THIS LUG.

\# - DEPENDS ON LEAKAGE THROUGH C_{29}

MΩ = 1000 OHMS

RESISTANCE MEASUREMENTS

Volume control full on.
Meter switch at OPERATE.
Channel switch at A or B.
SW-1 and SW-2 ON.
All tubes and BA-41 removed.
Handset and power cable disconnected.
Values are nominal and are measured between point indicated and chassis, except where noted.

[1]VTVM = ELECTRONIC VOLTMETER

VOLTAGE MEASUREMENTS

Use PE-117 with fully charged 12v storage battery.
Fresh battery BA-41 installed. Tubes in sockets.
VOLUME control full on.
Meter switch at OPERATE.
Channel switch at A or B.
SW-1 and SW-2 ON. Handset plugged in.
Voltages measured in "RECEIVE" position except at transmitter tubes V_1, V_2, V_3, V_4.
Voltages are nominal DC and are measured with [1]VTVM between point indicated and chassis.

RECEIVER ALIGNMENT AND TRANSMITTER NEUTRALIZATION

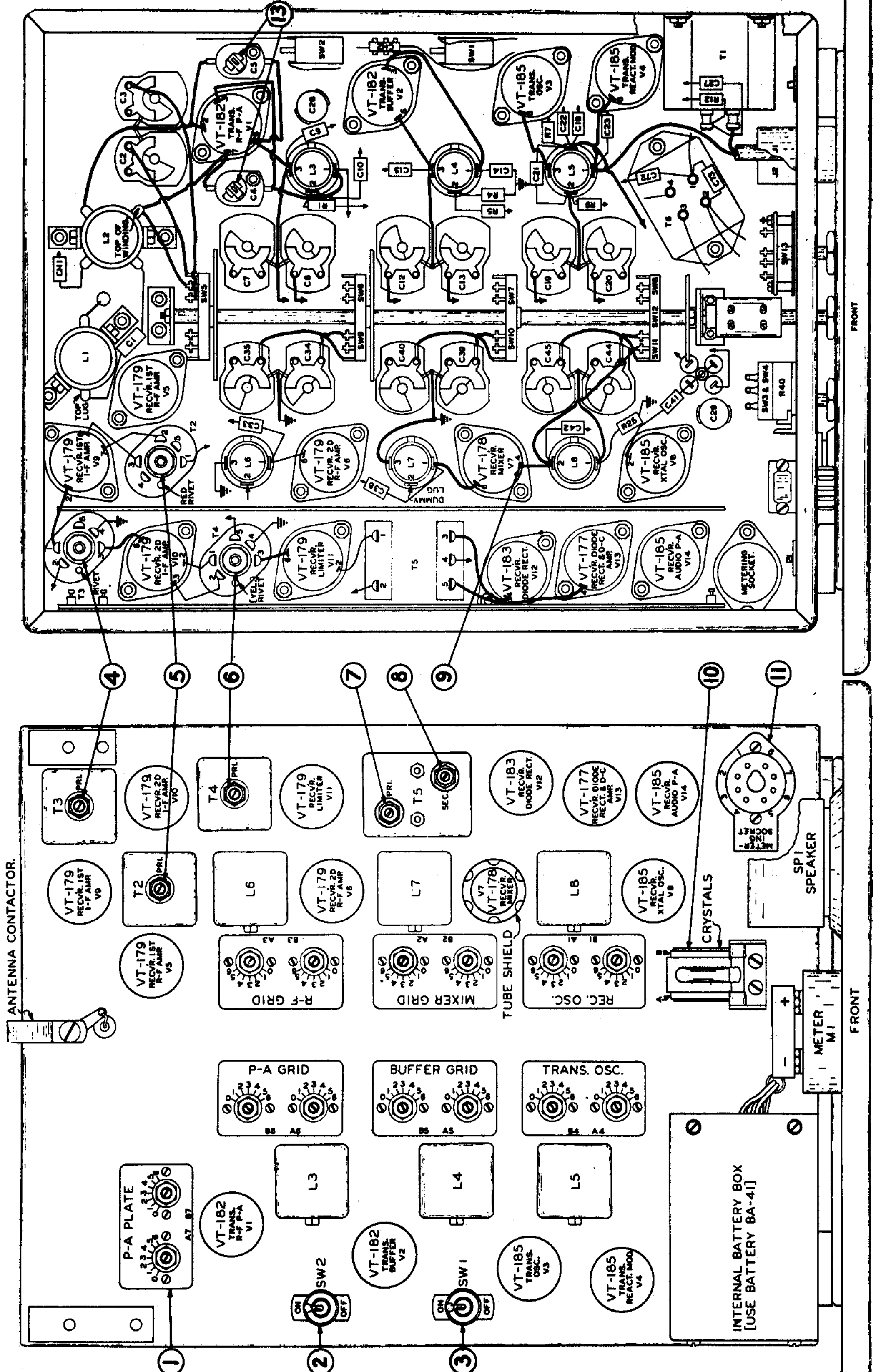


Fig. 4.—Parts layout and location of alignment adjustments.

I-F AND DISCRIMINATOR ALIGNMENT

A signal source of *exactly* 4.3 mc is required. This may be: (a) 4.3 mc crystal from ME-73; (b) Oscillator VO-4 from ME-13; (c) SCR-211 *if accurately calibrated*.

1. Remove both crystals from their sockets, 10.
2. Plug 4.3 mc crystal in either socket and set CHAN switch to the corresponding channel.

or:

Connect output of VO-4 to *chassis* and pin 4 of V_7, 9. Set VO-4 switch to 4.3 mc. Turn VO-4 on by rotating the ATTENUATION control clockwise only enough to operate the switch.

Note: During alignment it is desirable, whenever possible, to reduce the signal by further clockwise rotation of the ATTENUATION control. Work with as weak a signal as possible.

NOTE: Circled numbers refer to fig. 4.

or:

If SCR-211 is used, do not connect directly to its antenna binding post. Use a 0.001 μf capacitor in series or wrap an insulated wire from 9 around SCR-211 binding post.

3. Turn set on (VOLUME control). Connect ground lead of an electronic voltmeter (may be I-107 of ME-13) to *chassis* of set.
4. Insert probe of electronic voltmeter in #3-MS (pin jack No. 3 of metering Socket, 12). Adjust sec. then pri of T_4, T_3, and T_2 (6, 4, 5, in that order) for max. Go over the adjustments again in reverse order. I-F is now aligned.
5. Insert probe in #7-MS. Reading should be zero (±0.25 v.). If not, adjust T_5 sec, 8, to obtain a reading within these limits, *with alignment tool removed.*
6. Connect probe to #8-MS. Adjust T_5 pri, 7, for max.
7. Repeat steps 5 and 6 until the readings of zero and max, respectively, coincide. Discriminator is now aligned.

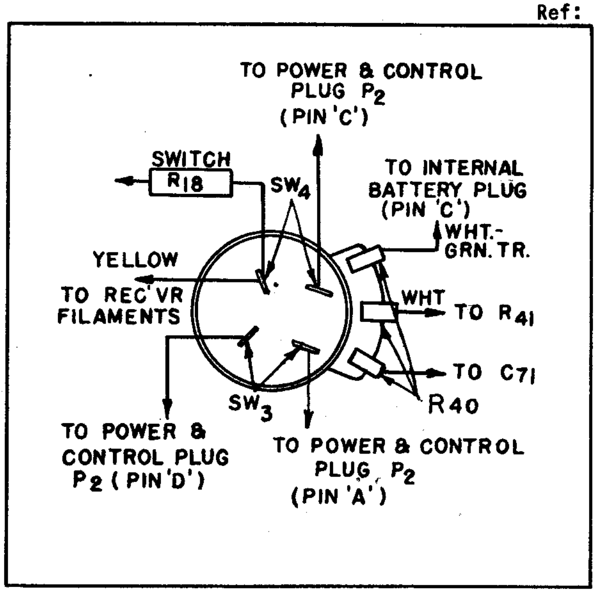
NEUTRALIZATION OF TRANSMITTER POWER AMPLIFIER

A set which is properly aligned and preset can be checked for neutralization (and adjusted if necessary) as follows:

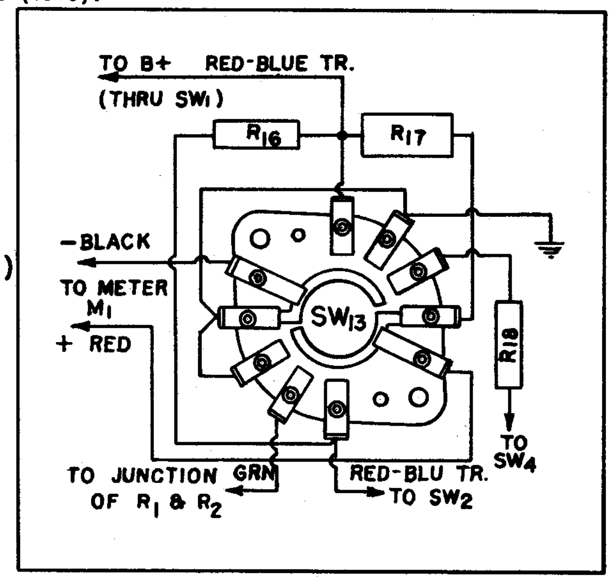
1. Turn panel meter switch to CHECK, SW 1 3 ON, SW 2 2 OFF, press mic switch and tune A7 (B7) 1 through resonance. Panel meter should not dip more than one division.
2. If dip is more than one division, adjust C_4 and C_5, 13. Settings must be kept approximately equal (check by observing mesh of plates), and must serve for both channels.
3. Reset SW2 at ON when through.

CAUTION: Adjustment lock nuts should be set up just enough to provide a fairly heavy "drag" on the alignment screw and not changed thereafter. Tightening the lock nut after an adjustment has been made tends to change the adjustment. Excessive tightening also will damage the trimmer.

Ref: Maintenance Letter No. 35 (1943).



(VIEWED FROM REAR)



WIRING DIAGRAM-R_{40} VOLUME CONTROL, SW_3 & SW_4 SWITCHES.

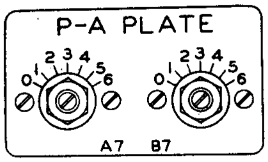
WIRING DIAGRAM-SW_{13} METER SWITCH

FREQUENCY PRE-SETTING PROCEDURE

APPROXIMATE SETTINGS							
Channel	A1-B1	A2-B2	A3-B3	A4-B4	A5-B5	A6-B6	A7-B7
270-79	0.0	1.0	0.8	0.2	0.4	0.0	1.0
280-89	0.6	1.9	1.4	1.1	1.2	0.7	1.8
290-99	1.4	2.4	2.0	1.7	1.7	1.3	2.4
300-09	2.2	3.0	2.4	2.3	2.2	1.8	2.8
310-19	2.9	3.6	3.1	2.8	2.7	2.3	3.1
320-29	3.6	4.1	3.8	3.5	3.3	3.0	3.8
330-39	4.0	4.2	4.2	3.9	3.7	3.4	3.9
340-49	4.1	4.6	4.5	4.2	3.9	3.7	4.0
350-59	4.6	5.0	4.7	4.5	4.0	3.9	4.1
360-69	4.9	5.2	4.8	4.8	4.5	4.2	4.2
370-79	5.4	5.5	5.2	5.2	4.9	4.6	4.7
380-85	5.6	5.6	5.3	5.6	5.0	4.8	4.8
386-89	5.8	5.8	5.4	5.9	5.1	5.0	5.0

NOTES: PRESET LOWER FREQUENCY CHANNEL FIRST.
TURN POWER OFF BEFORE ADJUSTING TRIMMER LOCKNUTS. READ 'CAUTION' ON PAGE 2.
CONNECT VTVM COMMON LEAD TO CHASSIS [NOT PANEL].
SET A & B CONTROLS TO APPROXIMATE CALIBRATION SETTING PRIOR TO PRE-TUNING.
PLACE SW.-1 & SW.-2 TO 'OFF' & PANEL METER CONTROL SWITCH TO 'CHECK'.
* STEPS 1 TO 4 MADE WITHOUT MIC. BUTTON PRESSED.
STEPS 5 TO 11 MADE WITH MIC. BUTTON PRESSED.

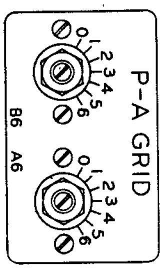
ABBREVIATIONS:
'MS. INDICATES METERING SOCKET IN THE FOLLOWING STEPS.
VTVM INDICATES ELECTRONIC VOLTMETER.

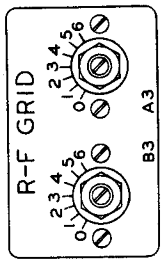


*(4) ADJ. A7 [B7] FOR MAX. AT PIN #8 OF 'MS.

(10) TURN PANEL METER SW. TO 'OPER'. SW.-2 TO 'ON'. QUICKLY ADJ. A7[B7] FOR MIN. IF A7[B7] IS NOT STILL NEAR APPROX. SETTING, GO BACK TO STEP (5).

(11) LEAVE SW1 & SW2 'ON'. REPLACE SET IN CASE. THEN RETUNE A7 [B7] FOR MIN. WITH ANTENNA.



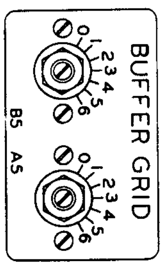


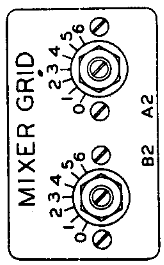
*(3) ADJ. A3 [B3] FOR MAX. AT PIN #8 OF 'MS.
NOTE: REPEAT (2) & THEN REPEAT (3).

(9) TURN SW.-1 TO 'ON'. ADJ. A6 [B6] FOR MAX. ON PANEL METER. ['CHECK' POSITION]

SW2

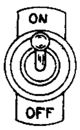
(8) CHECK VOLTAGE AT PIN #3 OF 'MS. IF GREATLY LESS THAN IN (5), GO BACK TO (5).



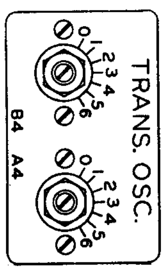


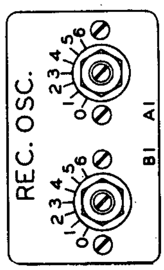
*(2) ADJ. A2 [B2] FOR MAX. AT PIN #8 OF 'MS.

(7) ADJ. A5 [B5] FOR MAX. AT PIN #5 OF 'MS.



SW1



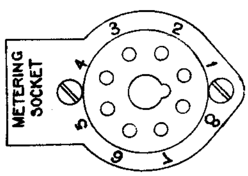


*(1) ADJ. A1 [B1] FOR MAX. AT PIN #2 OF 'MS.
SEE NOTE "a" BELOW.

(6) CAREFULLY AND SLOWLY READJUST A4[B4] SLIGHTLY TO -6V AT PIN #4 OF 'MS. VOICE SHOULD BE HEARD IN HANDSET ON SPEAKING INTO MIC.

(5) ADJ. A4[B4] FOR MAX. AT PIN #3 OF 'MS. ON LARGEST PEAK NEAR APPROX. SETTING. NOTE READING.

NOTE "a": CHECK BOTH CRYSTALS BEFORE STEP (1) VTVM SHOULD READ APPROX. -15 V AT PIN #1 OF 'MS. ON POSITION A OR B OF CHANNEL SWITCH.



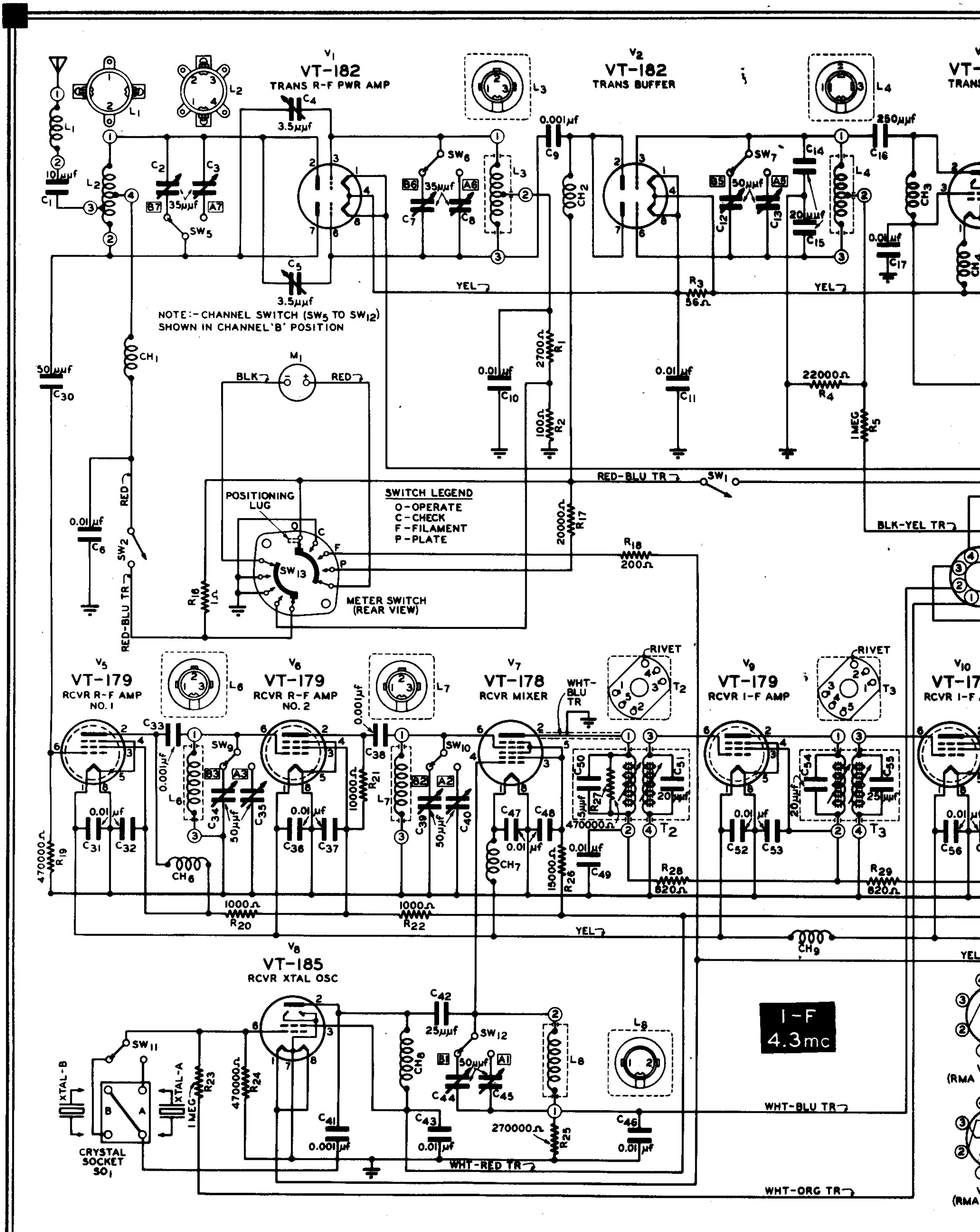

V1
VT-182
TRANS R-F PWR AMP
V2
VT-182
TRANS BUFFER
VT-
TRANS
NOTE:- CHANNEL SWITCH (SW5 TO SW12) SHOWN IN CHANNEL 'B' POSITION
M1
BLK
RED
POSITIONING LUG
SWITCH LEGEND
O-OPERATE
C-CHECK
F-FILAMENT
P-PLATE
METER SWITCH (REAR VIEW)
RED-BLU TR
BLK-YEL TR
YEL
V5
VT-179
RCVR R-F AMP NO. 1
V6
VT-179
RCVR R-F AMP NO. 2
V7
VT-178
RCVR MIXER
WHT-BLU TR
RIVET
V9
VT-179
RCVR I-F AMP
V10
VT-17
RCVR I-F
V8
VT-185
RCVR XTAL OSC
XTAL-B
XTAL-A
CRYSTAL SOCKET SO1
WHT-RED TR
WHT-BLU TR
WHT-ORG TR
I-F
4.3mc
(RMA
(RMA

Fig. 5.—Sche

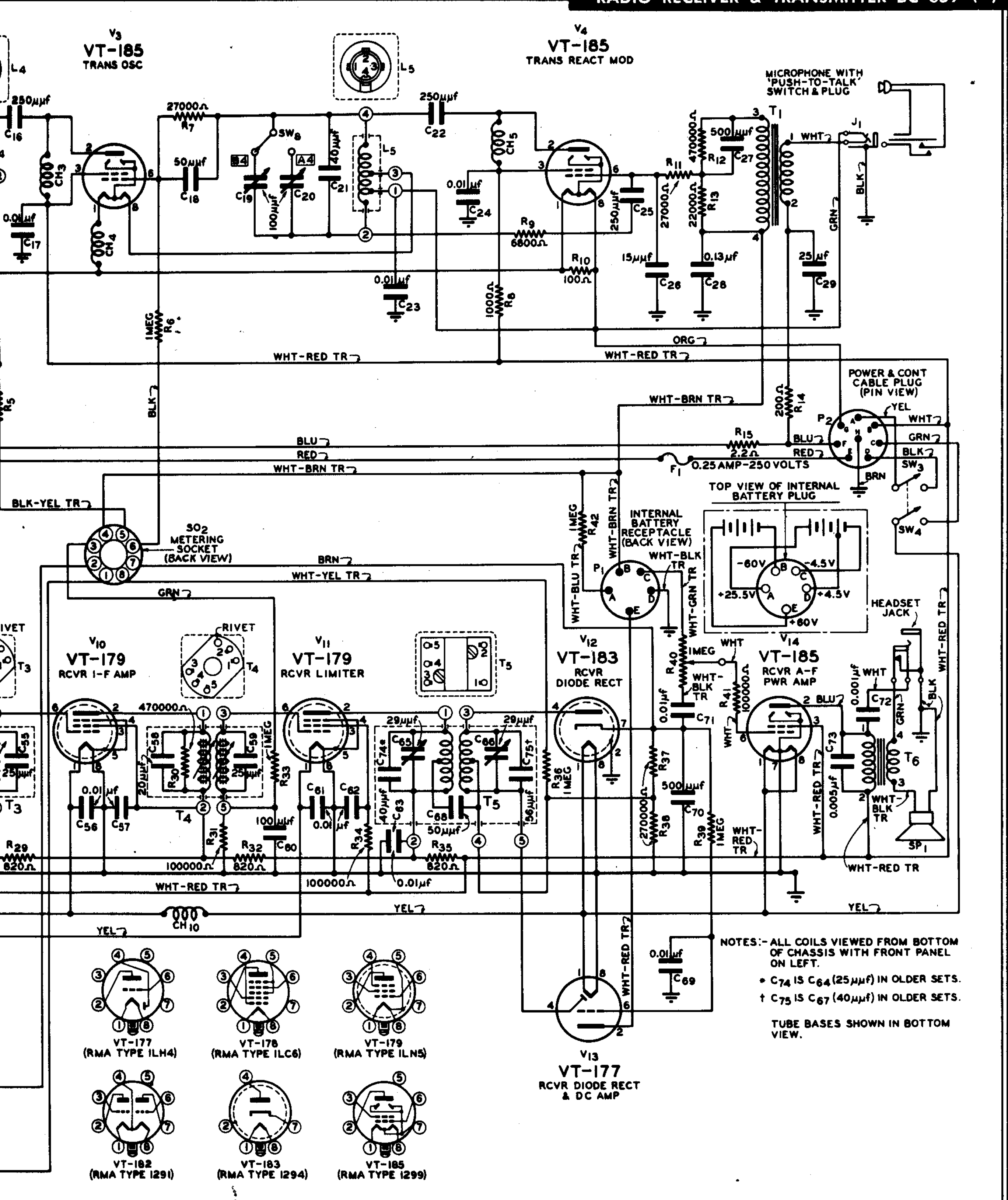


Fig. 5.—Schematic.

COMMON FAULTS AND CORRECTIVE MEASURES

CORDING

The power and control cord and its connectors are subject to failure due to vibration and twisting. Be sure to check the cording and connectors, both electrically and mechanically, before looking for trouble in other parts of the set.

Refer to COMMON FAULTS AND CORRECTIVE MEASURES under SCR-609-610-(*) in this manual for an authorized method of supporting this cording.

SPECIAL NOTES

MOISTURE PROTECTION

A waterproof canvas cover to protect BC-659-(*) and its associated power supply (PE-117-C or CS-79-(*)) has been added to the parts list of SCR-609-(*) and SCR-610-(*). Organizations having Radio Sets SCR-609-(*) and SCR-610-(*) which lack Cover, BG-153, Stock No. 2Z3400-153, should requisition them in the usual manner. This cover is not removed when the equipment is in operation.

Ref: Supply Letter No. 179 (1943)

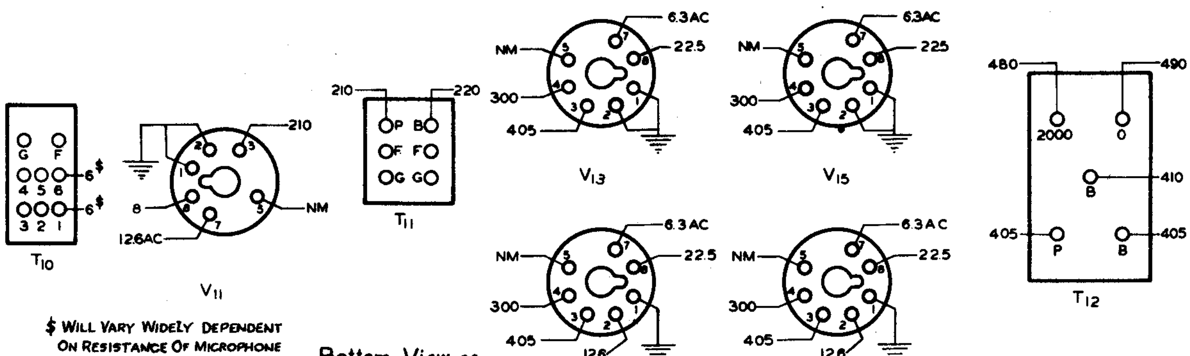
RADIO RECEIVER & TRANSMITTER BC-669-(*)

Part of: SCR-543-(*) BC-669-(*)=BC-669-A, BC-669-B Reference: TM 11-625B

VOLTAGE MEASUREMENTS OF MODULATOR SECTION

All tubes of BC-669-(*) in place.
All cording properly connected.
SPEAKER ON.
Power supply connected.
PE-110-(*) power switch ON.
If transmitter is operable, tune and load it.
Push press-to-talk switch momentarily to make d-c voltage measurements.
A-c filament voltage available without operating press-to-talk switch.

Measurements from tube socket terminals and transformer terminals to chassis.
All values indicated are positive volts.
Values marked AC are a-c voltages; all others are d-c voltages.
Use 1000 ohms/volt meter to read d-c volts.
All values are average, actual readings may vary.
NM -- Not measured.

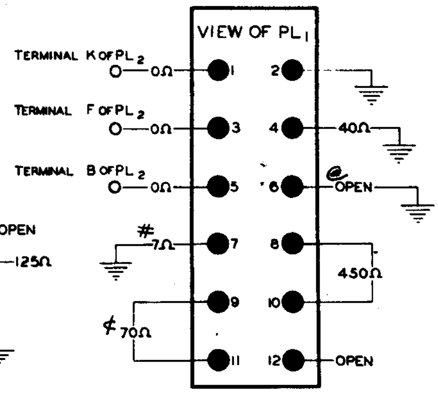


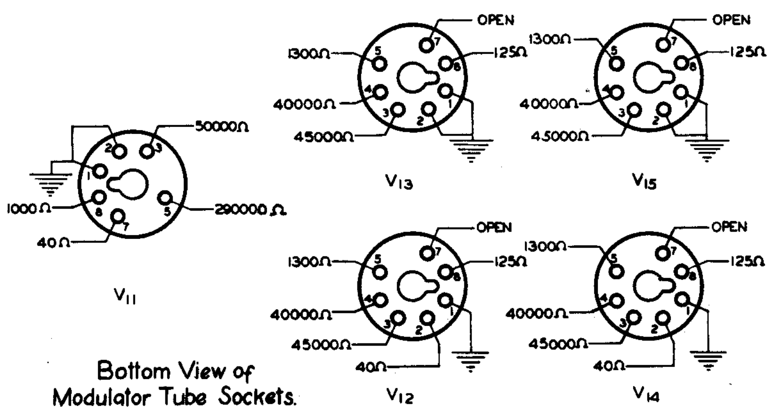
Bottom View of Modulator Chassis.

RESISTANCE MEASUREMENTS OF MODULATOR SECTION

SIDETONE VOLUME CONTROL full on.
All tubes removed from sockets.
All cording disconnected.
PL_1 disconnected from SO_1.
Measurements from tube sockets to chassis.
All values are average, actual readings may vary.

Resistance measurements from PL_1 to points indicated





Bottom View of Modulator Tube Sockets.

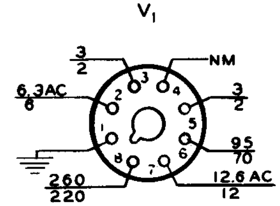
\# METER SWITCH at PA GRID
¢ METER SWITCH at PA PLATE
@ RY_2 held closed by hand

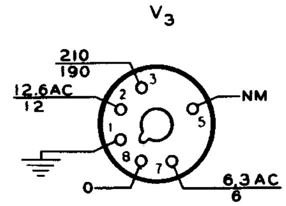
VOLTAGE MEASUREMENTS OF RECEIVER AND TRANSMITTER R-F SECTION

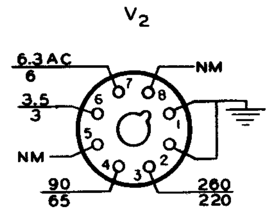
TRANSMITTER R-F SECTION (V_8, V_9, V_{10})
Connect to 110-volt supply.
PE-110-(*) power switch ON.
If transmitter is operable, tune and load it.
Push press-to-talk switch momentarily for d-c measurements.
A-c filament voltage available without operating press-to-talk switch.

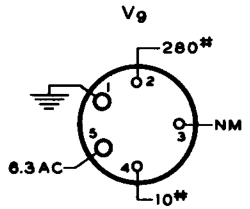
PRELIMINARY INSTRUCTIONS
All tubes of BC-669-(*) in place.
All cording properly connected.
SPEAKER ON.
Measurements made from tube socket terminals to chassis.
All values indicated are positive volts.
Values suffixed AC are a-c voltages, all others are d-c voltages.
Use 1000 ohms/volt meter to read voltages.
All values are average.
NM -- Not measured.

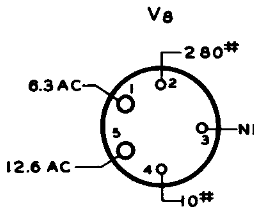
RECEIVER SECTION (V_1, V_2, V_3, V_4, V_5, V_6, V_7)
Turn PE-110-(*) power switch ON.
Values above line indicate average voltages for 110-volt a-c operation.
Values below line indicate average voltages for 12-volt battery operation. Voltage of battery to be 12 volts under load



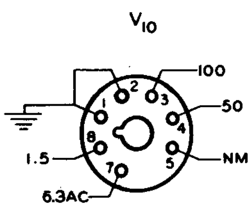


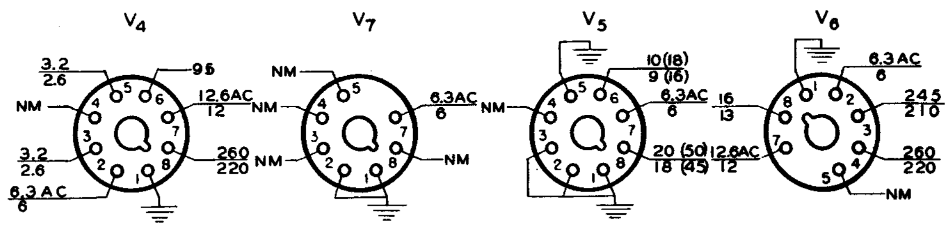






AVERAGE VALUES; FOR FULLY LOADED ANTENNA CONDITION MAY BE CONSIDERABLY LESS FOR UNLOADED CONDITION



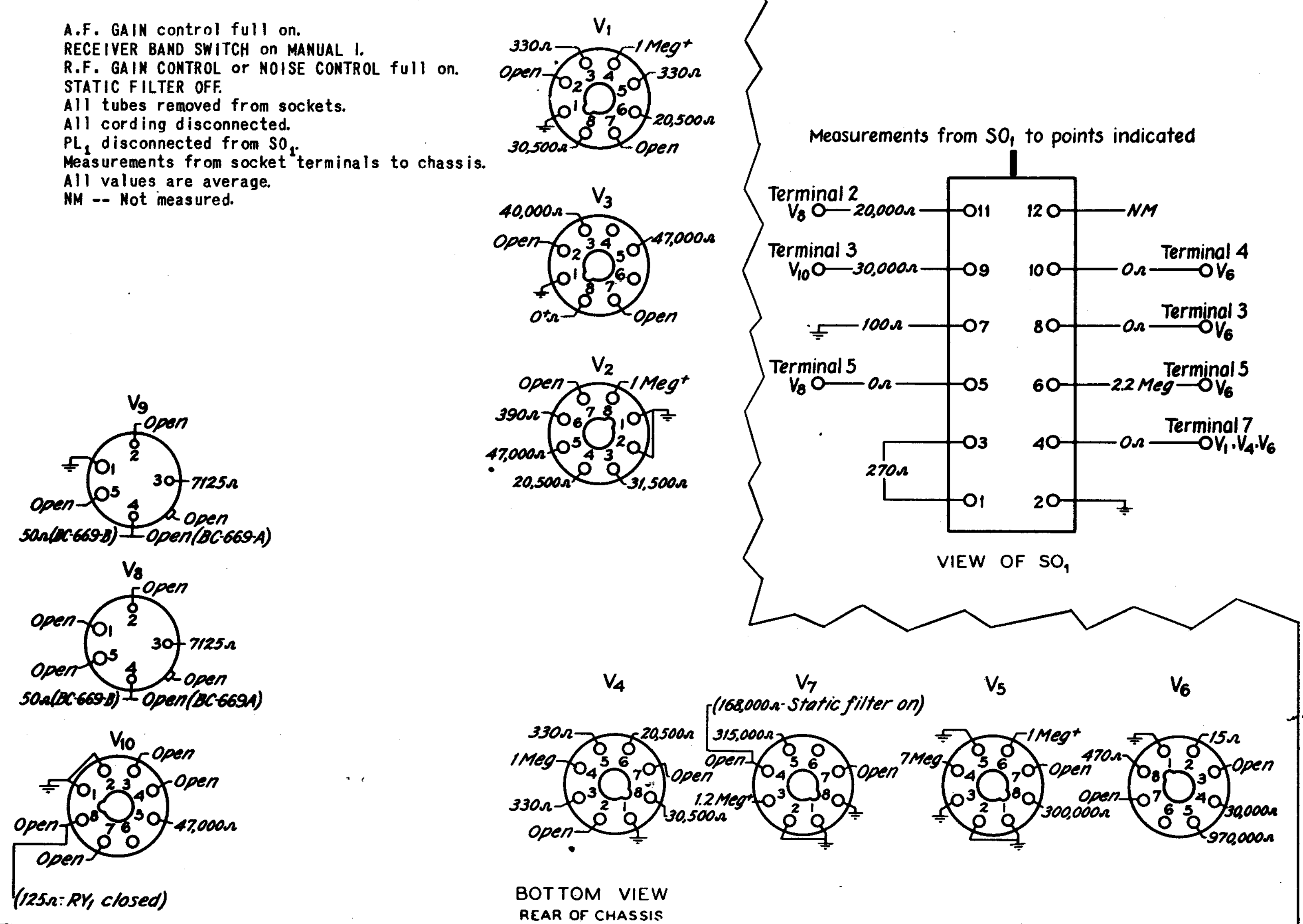


BOTTOM VIEW
REAR OF CHASSIS

VALUES IN ( ) ARE VTVM READINGS

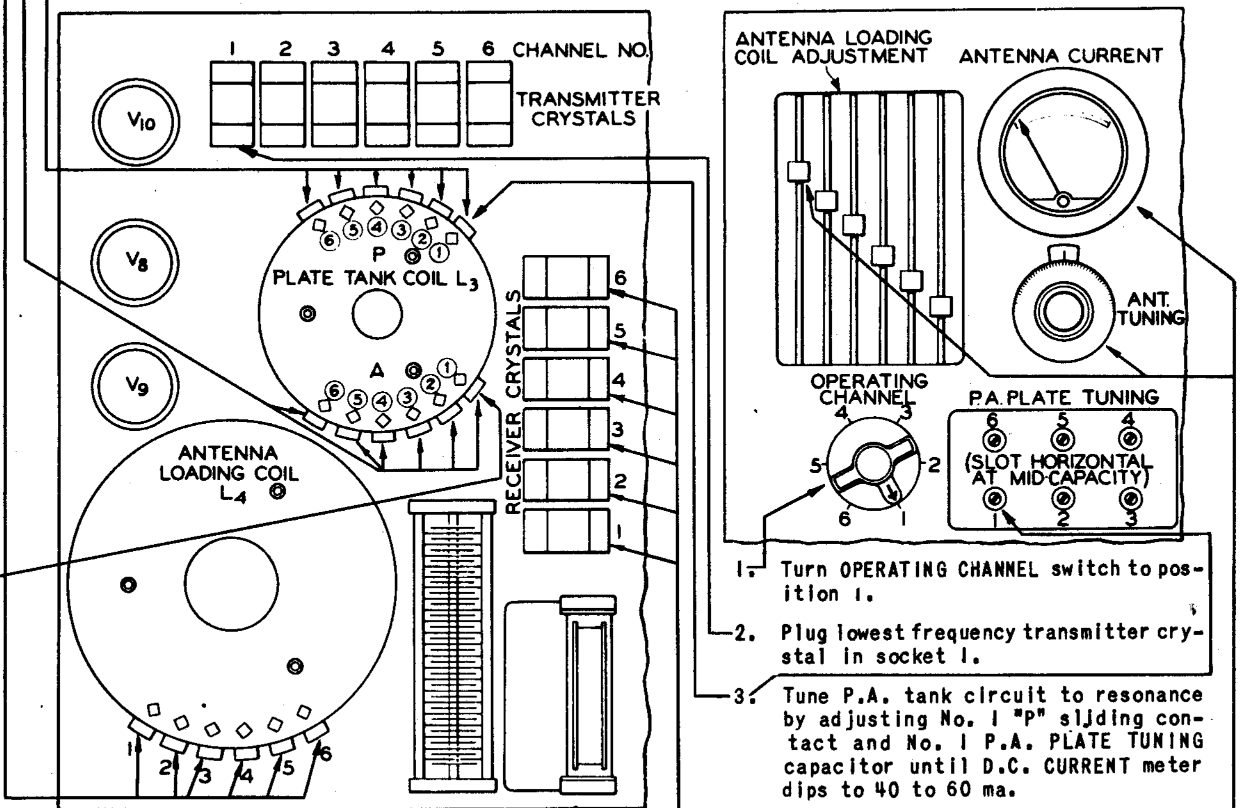
RESISTANCE MEASUREMENTS OF RECEIVER AND TRANSMITTER R-F SECTION

A.F. GAIN control full on.
RECEIVER BAND SWITCH on MANUAL I.
R.F. GAIN CONTROL or NOISE CONTROL full on.
STATIC FILTER OFF.
All tubes removed from sockets.
All cording disconnected.
PL_1 disconnected from SO_1.
Measurements from socket terminals to chassis.
All values are average.
NM -- Not measured.



TRANSMITTER PRESETTING

Remove plate under P.A. PLATE TUNING; connect antenna.
Remove plate over METER SWITCH and set to P.A. PLATE.
Open ANTENNA LOADING COIL ADJUSTMENT door.
Set all ANTENNA LOADING COIL sliding contacts to mid-position.
Set all "A" sliding contacts to bottom position.
Set all "P" sliding contacts to mid-position.



1. Turn OPERATING CHANNEL switch to position I.
2. Plug lowest frequency transmitter crystal in socket I.
3. Tune P.A. tank circuit to resonance by adjusting No. I "P" sliding contact and No. I P.A. PLATE TUNING capacitor until D.C. CURRENT meter dips to 40 to 60 ma.

CAUTION: Make sure sliding contacts do not short-circuit turns. Erratic behavior indicates improper sliding contact setting.

4. Repeat I to 3 above for channels 2 to 6, turn OPERATING CHANNEL switch to corresponding positions in turn.
5. Reset OPERATING CHANNEL switch to position I.
6. Set No. I "A" sliding contact 5 turns up from bottom.
7. Tune antenna circuit to resonance, by adjusting ANTENNA TUNING knob and No. I sliding contact on antenna loading coil until maximum ANTENNA CURRENT meter reading is obtained.
8. If necessary adjust No. I "A" sliding contact and retune antenna circuit as in 7 above until D.C CURRENT meter reads between 150 to 210 ma. ANTENNA CURRENT meter should read from 1.2 to 1.5 amperes.
9. Repeat 5 to 8 above for channels 2 to 6, turn OPERATING CHANNEL switch to corresponding positions in turn.
10. Repeat 3 through 8 on all channels making slight readjustments where necessary.

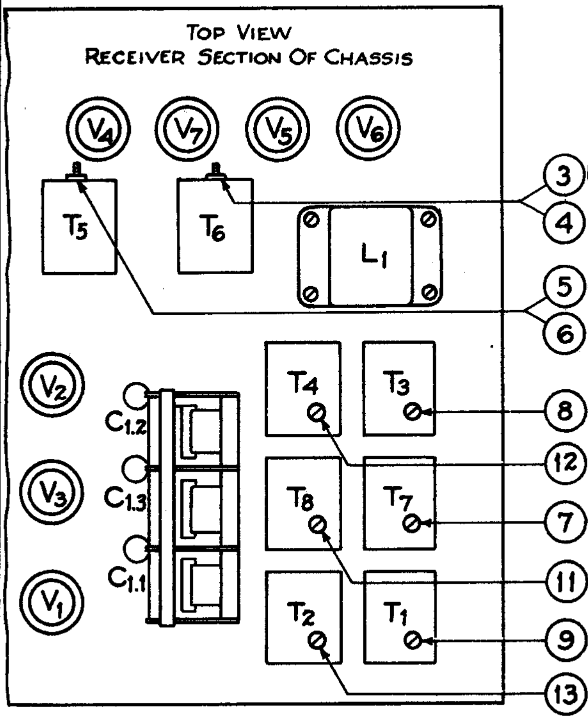
RECEIVER PRESETTING

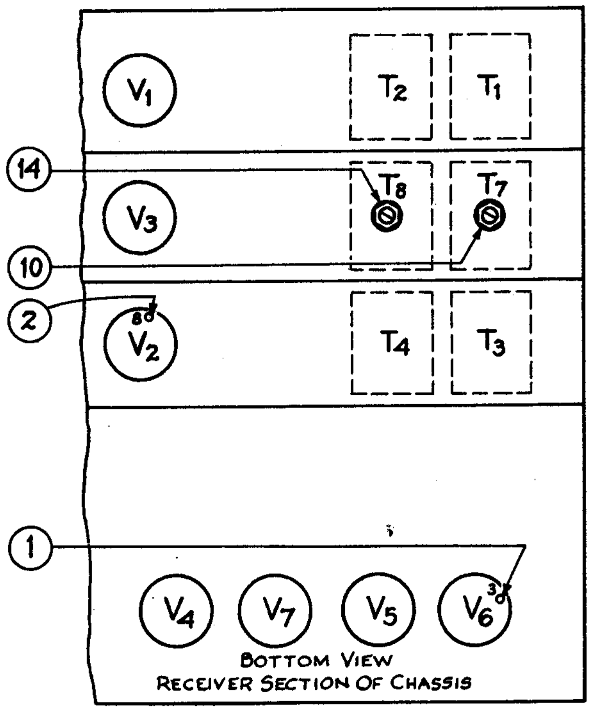
Plug receiving crystals into receiving crystal sockets. This is all that is required for operation on CRYSTAL I or CRYSTAL 2.

Each receiving crystal is 385 kc higher than the corresponding transmitting crystal of the same channel number.

RECEIVER ALIGNMENT

All frequencies set on sig gen are to be checked with freq meter.
Sig gen is modulated.
A.F. GAIN control full on.
SPEAKER ON.
STATIC FILTER OFF.
R.F. GAIN or NOISE CONTROL full on.
Connect "low" side sig gen to chassis.
Connect output meter through series capacitor to V_6 plate (1) and chassis.





I-F ALIGNMENT
1. Set sig gen to 385 kc.
2. Connect "high" side sig gen to grid V_2 (2). Use 0.001 - μf capacitor in series.
3. Adjust sec (3) and pri (4) of T_6 for maximum output.
4. Adjust sec (5) and Pri (6) of T_5 for maximum output.
5. Repeat 3 and 4.

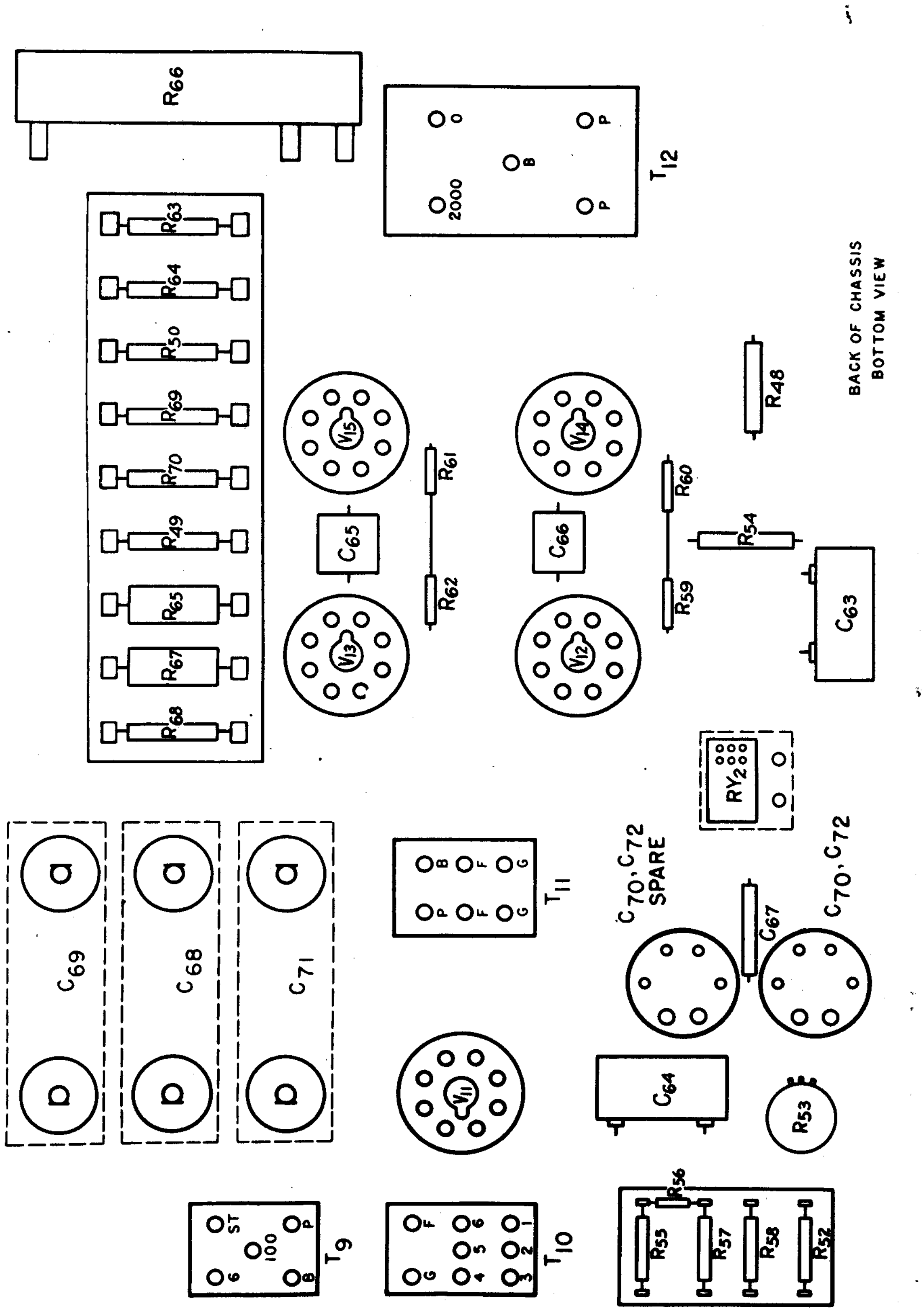
I-F is now aligned.

1700 - 2700 kc R-F ALIGNMENT
6. Set RECEIVER BAND SWITCH on MANUAL 1. Tuning dial at 2700 kc.
7. Set sig gen to 2700 kc and connect high side to antenna post with 150-$\mu\mu$f capacitor in series.
8. Adjust C_{37} in T_7 (7), C_{10} in T_3 (8), and C_3 in T_1 (9) for maximum output.
9. Set sig gen to 1700 kc and receiver tuning dial to 1700 kc.
10. Check receiver calibration and sensitivity If there is appreciable loss of sensitivity or miscalibration follow steps 11 and 12.
11. Adjust slug T_7 (10) for maximum output.
12. Repeat steps 6 to 8 and then steps 9 to 11 if necessary.

The 1700 - 2700 kc band is now aligned.

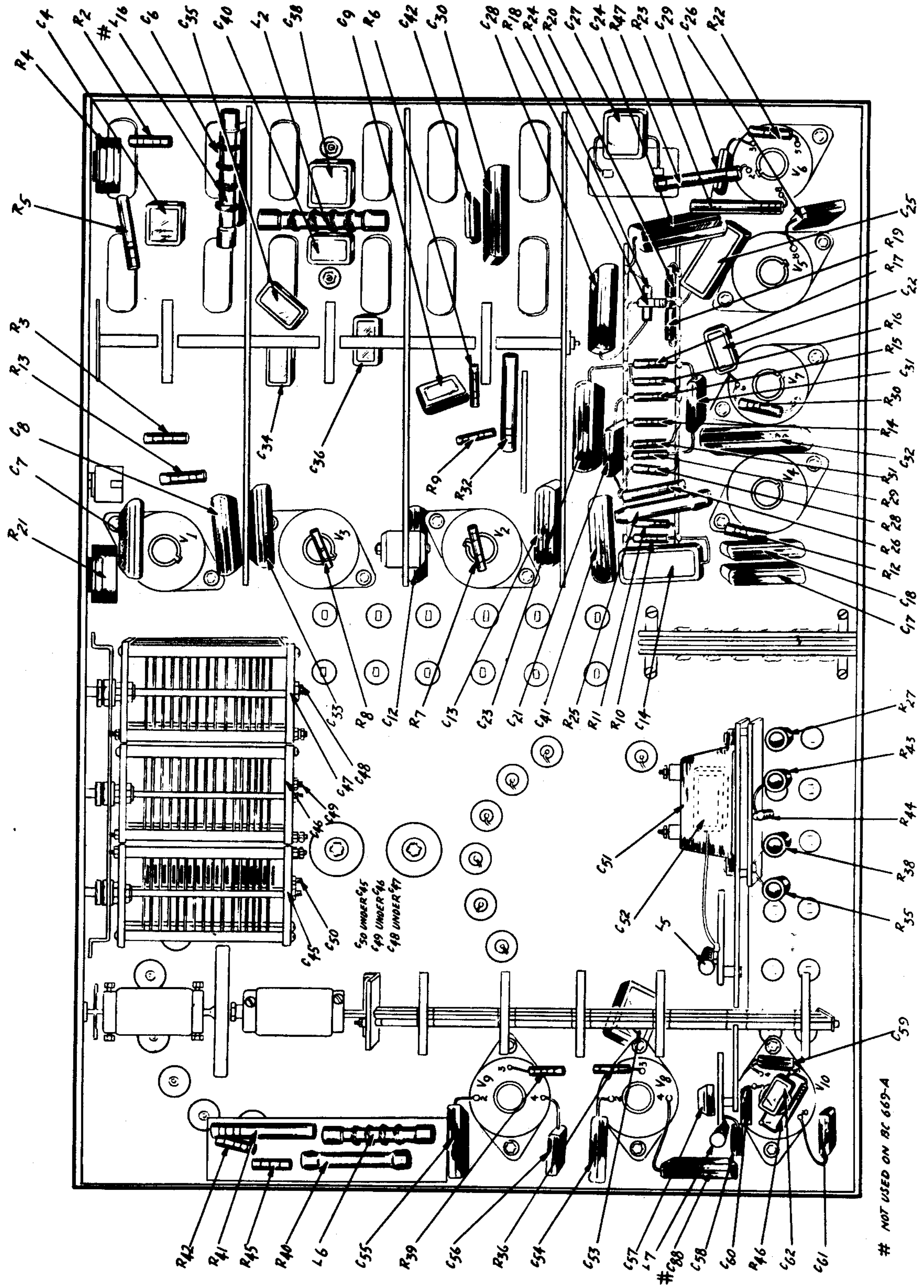
2700 - 4400 kc R-F ALIGNMENT
13. Set RECEIVER BAND SWITCH on MANUAL 2, the tuning dial to 4400 kc, and sig gen to 4400 kc.
14. Adjust C_{39} in T_8 (11), C_{11} in T_4 (12), and C_5 in T_2 (13), for maximum output.
15. Set receiver tuning dial to 2700 kc and the sig gen to 2700 kc.
16. Check receiver calibration and sensitivity. If there is appreciable loss of sensitivity or miscalibration, follow steps 17 and 18.
17. Adjust slug in T_8 (14), for maximum output.
18. Repeat steps 13 to 15 and 16 to 17 if necessary.

The receiver is now aligned.



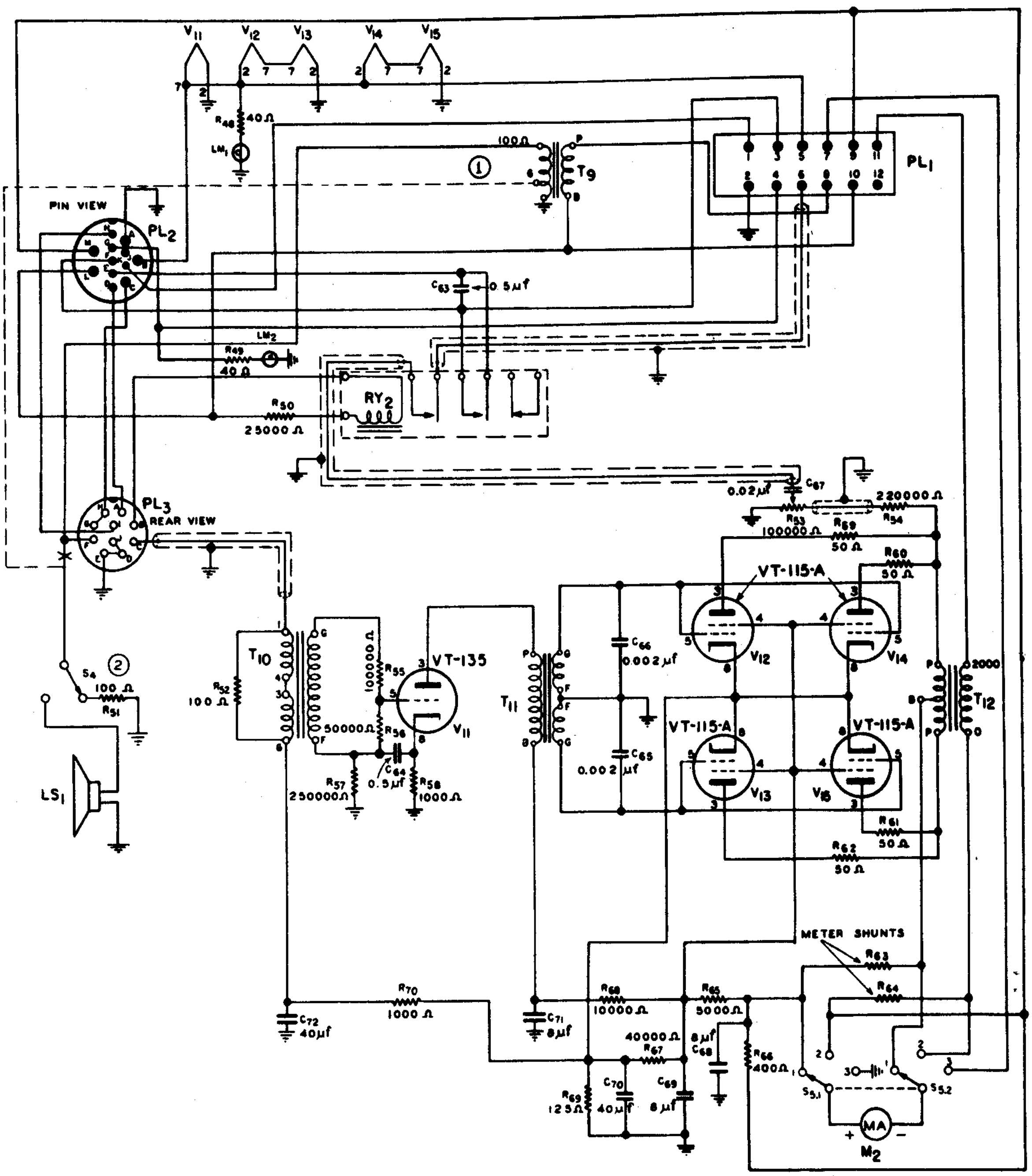
PARTS LAYOUT OF MODULATOR

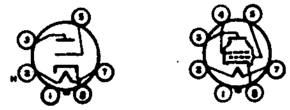
PARTS LAYOUT OF RECEIVER AND TRANSMITTER R-F SECTION



BOTTOM VIEW OF CHASSIS

SCHEMATIC OF MODULATOR





VT-135 RMA TYPE 12J5-GT

VT-115A RMA TYPE 6L6-G

(1) ON BC-669-B 6 OHM TAP ON T9 IS ADDED AND CONNECTED AS SHOWN BY DASHED LINE. —✕— INDICATES WHERE CIRCUIT IS BROKEN TO ACCOMMODATE ABOVE CONNECTION.

(2) ON BC-669-B R51 IS 6 OHMS.

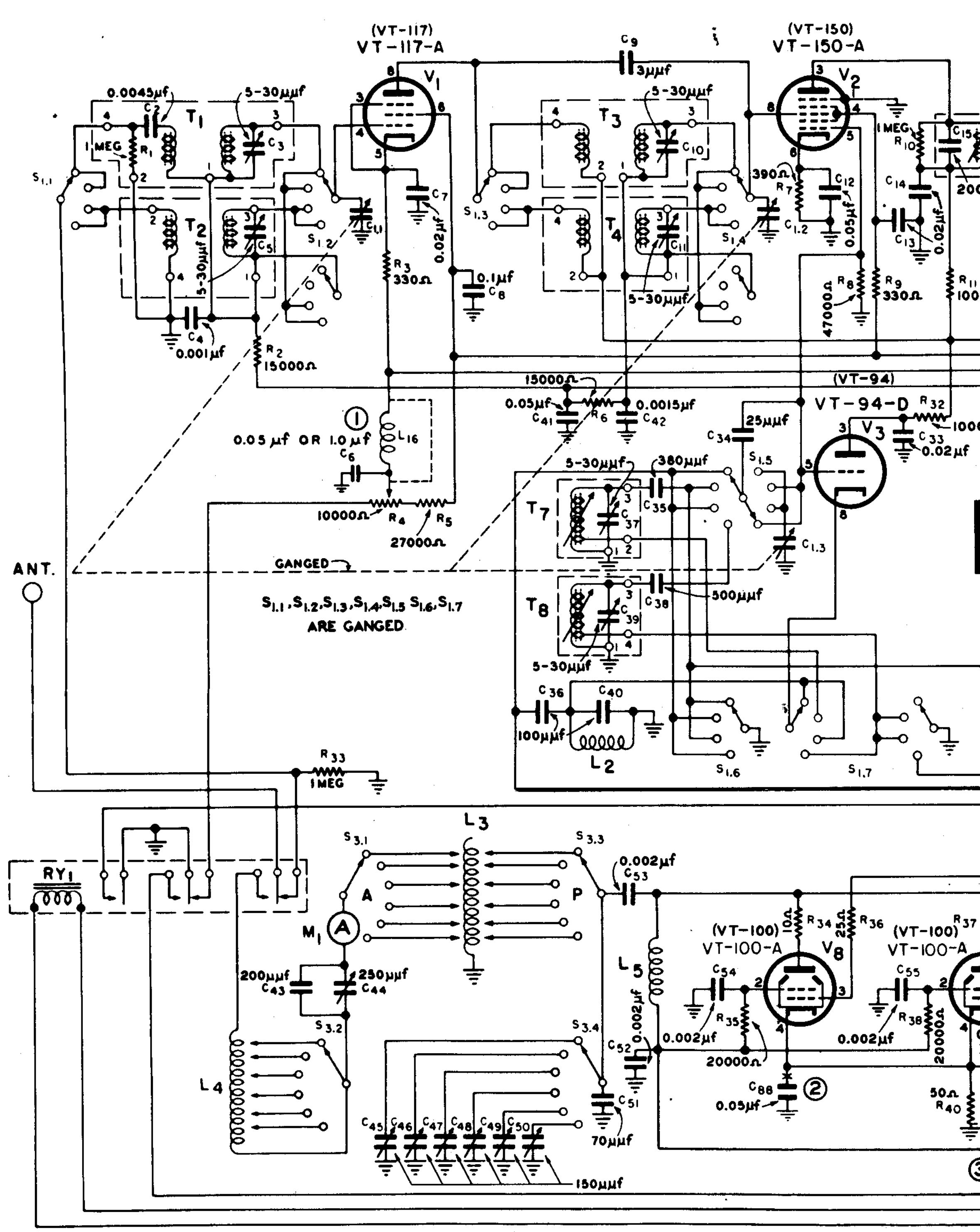
S5.1, S5.2:

POSITION 1—MODULATOR PLATE CURRENT.

POSITION 2—P.A. PLATE CURRENT.

POSITION 3—PA GRID CURRENT.

SCHEMATIC OF RECEIVER AND T

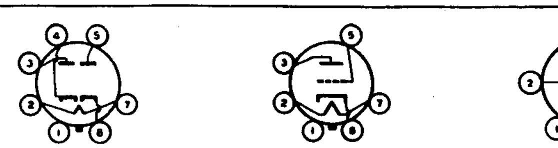


① ON BC-669-A, L_{16} IS NOT USED. DASHED LINE SHOWS THE CONNECTION.

② ON BC-669-A, C_{88} IS NOT USED.

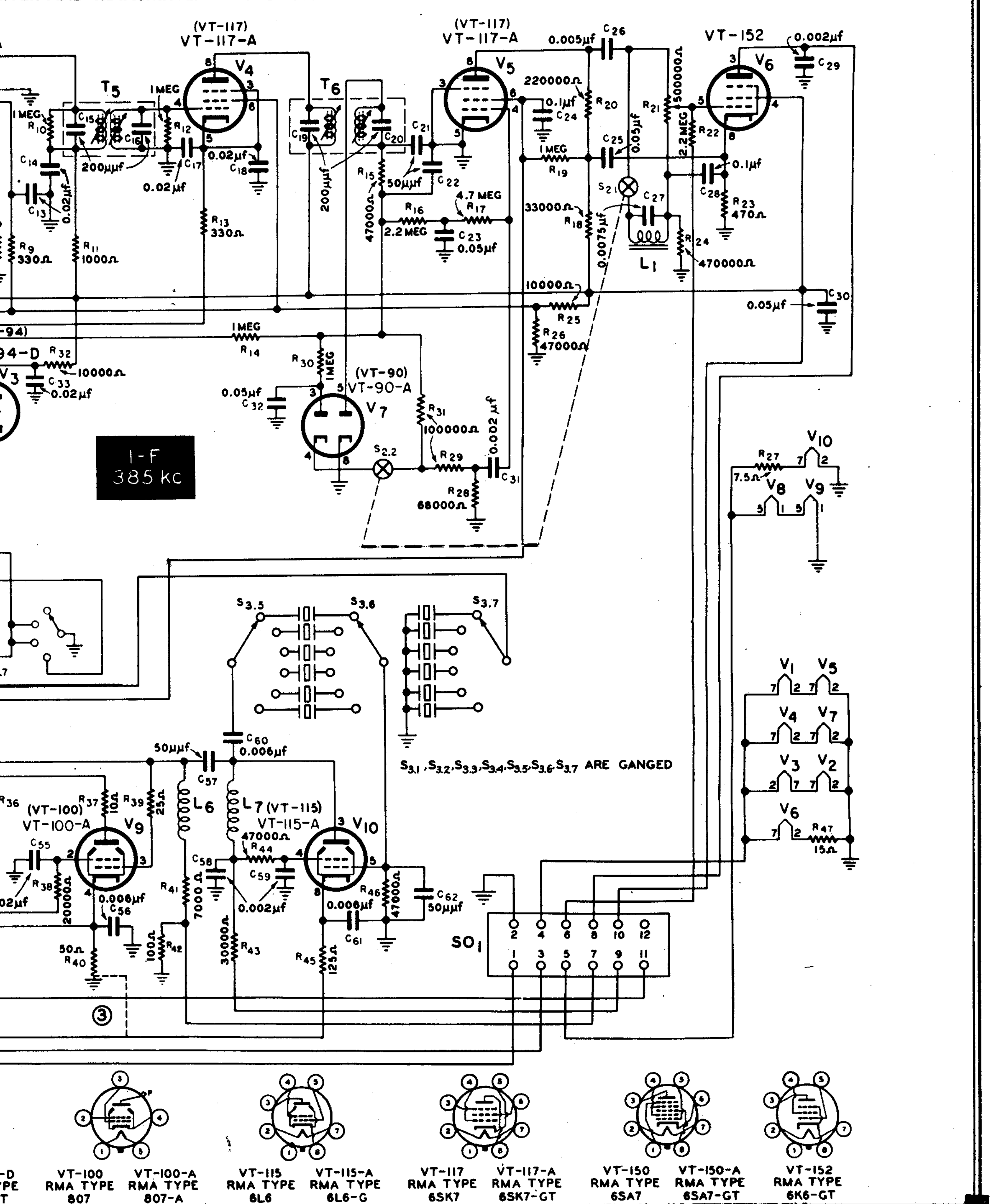
③ ON BC-669-A, R_{40} IS DISCONNECTED FROM GROUND AND CONNECTED TO R_{45} AS SHOWN BY DASHED LINE.

TUBES DESIGNATED IN ( ) ARE USED IN BC-669-A ONLY.



VT-90 RMA TYPE 6H6. VT-90-A RMA TYPE 6H6-GT VT-94 RMA TYPE 6J5 VT-94-D RMA TYPE 6J5-GT VT-100 RMA TYP 807

EIVER AND TRANSMITTER R-F SECTION



RADIO RECEIVER BC-683-(*)

BC-683-(*)=BC-683- A

Part of: SCR-608-(*)
SCR-628-(*)

VOLTAGE MEASUREMENTS

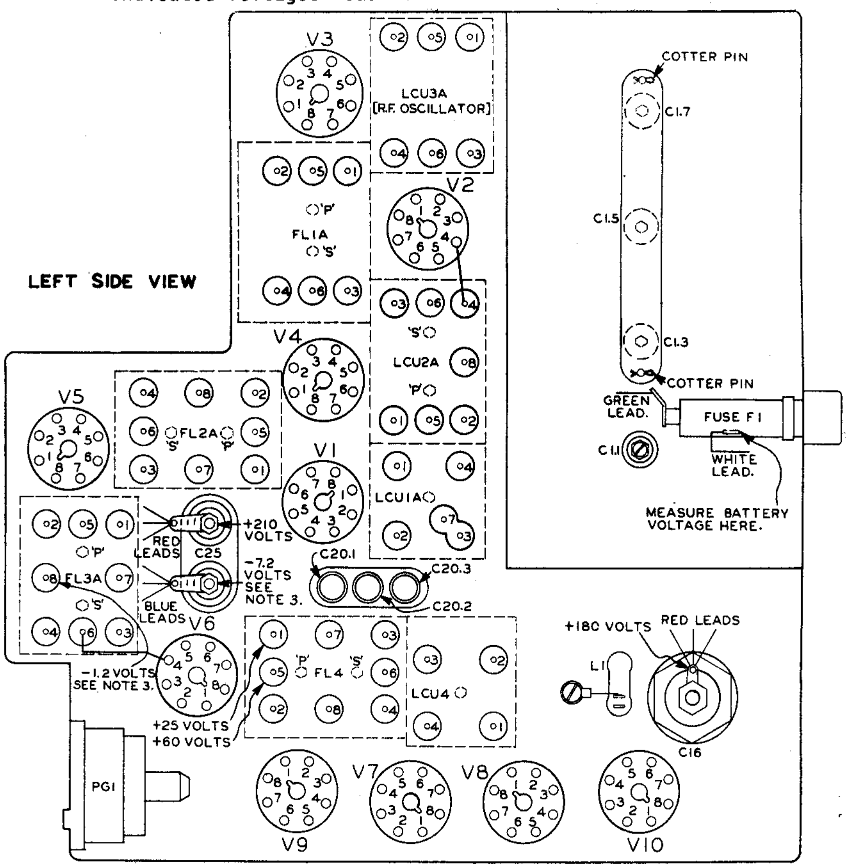
Reference:
TM 11-620

NOTES:

1. Voltages listed on this diagram are for a battery voltage of 12 volts. All voltages listed will change by approximately the same ratio as the actual battery voltage is to 12 volts for normal operation.
2. All voltages should be measured between designated terminal and the receiver chassis. All switches except the TUNE-OPERATE and the ON-OFF should be in the downward position.
3. SQUELCH sw ON and SENSITIVITY control at minimum for measurement at this point only.

x Subject to variation in excess of - 10%.
□ With TUNE-OPERATE sw in TUNE position.

Indicated voltages read with an electronic voltmeter



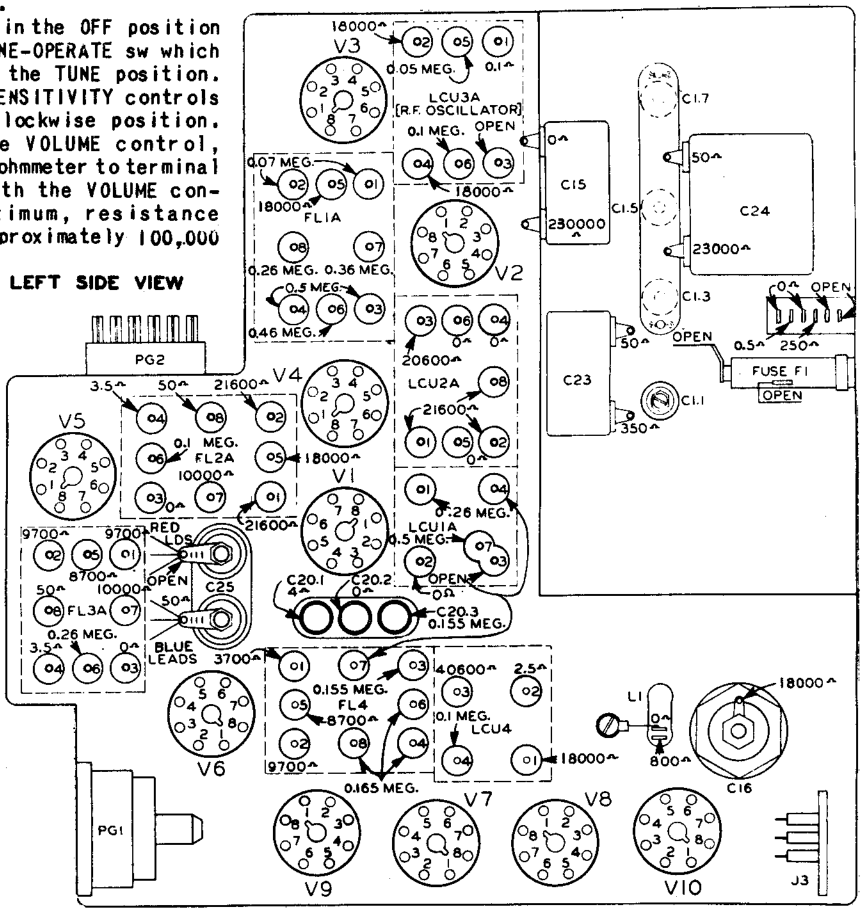
VOLTAGES AT VACUUM TUBE SOCKET TERMINALS AT
12 VOLTS INPUT
USING AN ELECTRONIC VOLTMETER.

TERM NO.	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1	0	0	0	0	0	0	0	*15	0	0
2	0	12	0	12	12	6	12	6	0	85
3	0	3x	155	0	0	0.5	20	195	15	1
4	-2.2	0	0	-2.2	-2.2	2.2	25	175	2.2	-0.7
5	0	1.5	-12x	0	0	0.5	20	-2.2	2.2	150□
6	160	50	0	125	90	65	0	0	20	0
7	6	6	6	0	0	12	6	0	6	6
8	185	85	0	185	60	60	25	7	0	12

RESISTANCE MEASUREMENTS

NOTES

1. Resistance values are measured between chassis and designated terminals.
2. A variation of 20% from indicated values need not be considered as cause for a defective receiver.
3. Certain discrepancies may be observed between the schematic drawings contained in these instructions and the circuit label appearing on the receiver.
4. The dynamotor must be removed for these measurements.
5. All switches in the OFF position except the TUNE-OPERATE sw which should be in the TUNE position.
6. VOLUME AND SENSITIVITY controls at maximum clockwise position.
7. To check the VOLUME control, connect the ohmmeter to terminal 5 of V8. With the VOLUME control at maximum, resistance should be approximately 100,000 ohms and should decrease to zero as the VOLUME control is turned to its extreme counterclockwise position.
8. To check the SENSITIVITY control, turn the SQUELCH switch ON and measure the resistance from the terminal of C25 to which the blue leads are attached. The resistance at C20.2 should be 6,000 ohms with the SQUELCH switch ON.



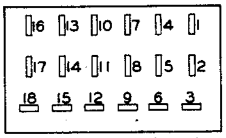
LEFT SIDE VIEW

RESISTANCES AT VACUUM TUBE SOCKET TERMINALS (OHMS)

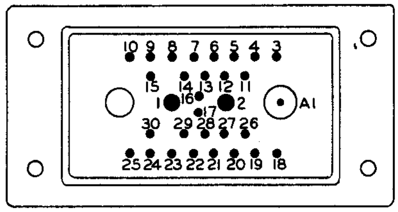
Terminal	1	2	3	4	5	6	7	8
V1	0	0	0	0.5 meg	0	41M	2.5*	22M
V2	0	4*	100M	0	500	271M	2.5*	71M
V3	0	0	26M	Open	50M	Open	4*	0
V4	0	9*	0	460M	0	51M	0	22M
V5	0	9*	0	110M	0	92M	5*	17M
V6	0	5*	800	450M	800	9700	4*	9700
V7	0	5*	165M	155M	165M	Open	5*	155M
V8	0	5*	Open	26M	57M	Open	5*	350
V9	2 meg	0.25 meg	6700	0.25 meg	0.25 meg	165M	5*	5*
V10	1.25 meg	2 meg	2M	100M	41M	0	4*	5*

* Tube filament resistance subject to considerable variation with heat. M indicates thousand ohms.

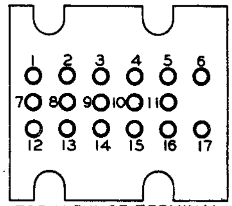
RESISTANCE MEASUREMENTS



TOP VIEW OF TERMINAL SIDE OF PG2.



VIEW OF PIN SIDE OF PG1



TOP VIEW OF TERMINAL SIDE OF J3.

RESISTANCES AT TERMINALS OF PG2 (OHMS).

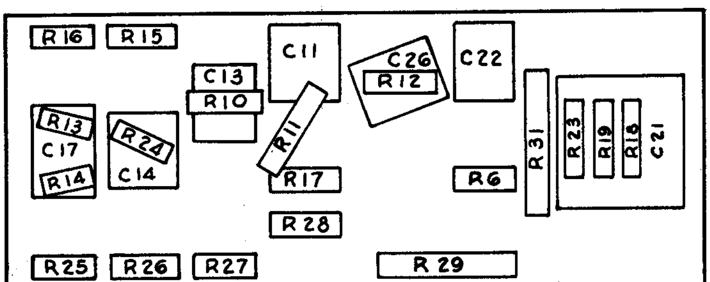
Terminal	Resistance values
1	0
2	4.5 to 7.0
3, 4, 5, 6	Open Circuit
7	40 to 60
8	Open Circuit
9	4.5 to 7.0
10, 11	Open Circuit
12	3.6 to 5.4
13	16M to 26M
14	Open Circuit
15	7.0 to 10.6
16, 17, 18	Open Circuit

RESISTANCES AT TERMINALS OF PG1 (OHMS).

Terminal	Resistance values
1	Open Circuit
2	0
A1	Open Circuit
3	800
4, 5	Open Circuit
6	3700
7	250
8, 9	Open Circuit
10	155M
18	400M
19, 20, 21	Open Circuit
22	50
23	Open Circuit
24	260M
25	Open Circuit

RESISTANCES AT TERMINALS OF J3 (OHMS).

Terminal	Resistance values
1,2	Open Circuit
3	18M
4	2 Meg.
5	100M
6	50
7, 8	Open Circuit
9	6M
10	100M
11	50
12	250
13	0
14	Open Circuit
15	18M
16, 17	Open Circuit



BOTTOM
RESISTANCE STRIP

TABLE 1
RESISTANCES AT RESISTANCE STRIP

Unit	Left side (or bottom)	Right side (or bottom)
R16	2 meg	1 meg
R13	0.25 meg	0.25 meg
C17	0.25 meg	50
R14	40	0.25 meg
R25	0	2500
R15	1 meg	0.25 meg
R24	50	0
C14	0.25 meg	0
R26	2500	3700
R10	0.25 meg	0.5 meg
C13	0	1.5 meg
R27	3700	6200
C11	0.5 meg	1.5 meg
R11	0.5 meg	1.5 meg
R17	0.25 meg	0
R28	6200	8500
C26	1.5 meg	Open
R12	0	2M
R29	8500	21M
C22	Open	Open
R6	Open	Open
R31	21M	28M
R23	33M	28M
R19	2 meg	28M
R18	2 meg	2 meg
C21	0.1 meg	2 meg

TABLE 2
RESISTANCES AT RESISTANCE STRIP

Unit	Left Side (or bottom)	Right Side (or bottom)
C17	0	1. meg
R11	0.25 meg	1 .2meg
C26	1.2 meg	150M
R12	0	M
R29	8700	17 M
R6	150M	40 M
R31	17 M	19 M
R23	23 M	19 M
R19	2. meg	19 M
C21	65 M	2. meg

Values given in Table 1 are for older receivers. Values given in Table 2 cover changes during manufacture. All values are ohms measured from indicated point to chassis M =1,000.

ALIGNMENT

ALIGNMENT OF I-F AMPLIFIER

1. Remove dust cover, connect a short lead between pin 5 of V3 and C25 (1) (to which blue tracer wires are connected).
2. Release all selector buttons and connect receiver for operation. Set SPEAKER SW to ON, SENSITIVITY and VOLUME control on max, TUNE-OPERATE SW on OPERATE, OUTPUT TO PHONES SW to ON, and SQUELCH SW to OFF.
3. Connect the d-c lead of an electronic or vacuum-tube voltmeter to pin 4 of V6 (2) and common lead to chassis. Use 3 volt scale and set meter to zero.
4. Connect an I-72-(*) sig gen through a 0.1 μf capacitor between pin 4 of V2 (3) and chassis. Set sig gen frequency to 2.65 mc. Use an unmodulated signal throughout procedure.
5. Turn on receiver and sig gen and allow them to warm up. Check sig gen setting with a Frequency Meter Set SCR-211-(*). Adjust output to give less than 1-volt indication on meter.
6. Connect a 1,000 ohm resistor between terminals 3 and 4 of FL3A (4) and adjust primary of FL3A (5) for max on meter.
7. Move resistor to terminals 1 and 2 of FL3A (6) and adjust secondary (7) for max on meter.
8. Adjust FL2A (8) and (9), (10) and (11) and FL1A (12) and (13), (14) and (15) in like manner. Remove resistor from FL1A.

ALIGNMENT OF DISCRIMINATOR AND I-F OSC

1. Connect voltmeter between pins 4 and 8 of V7 (16). Use 3 volt scale and set to zero.
2. Connect sig gen as for I-F alignment (3). Adjust output to give about 1-volt deflection on meter.
3. Adjust secondary of FL4 (17) for zero on meter. Meter should reverse as adjustment is varied either side of zero indication point.
4. Lower sig gen frequency from 2.65 mc for max on meter. Note sig gen dial setting and meter reading.
5. Raise sig gen frequency above 2.65 mc by same amount it was lowered in 4. Note meter reading.
6. Adjust primary of FL4 (18) to obtain equal meter readings at both frequency settings.
7. Place TUNE-OPERATE sw on TUNE and adjust LCU4 (19) for zero beat.
8. Remove short lead from C25 and V3 (1)

NOTE:

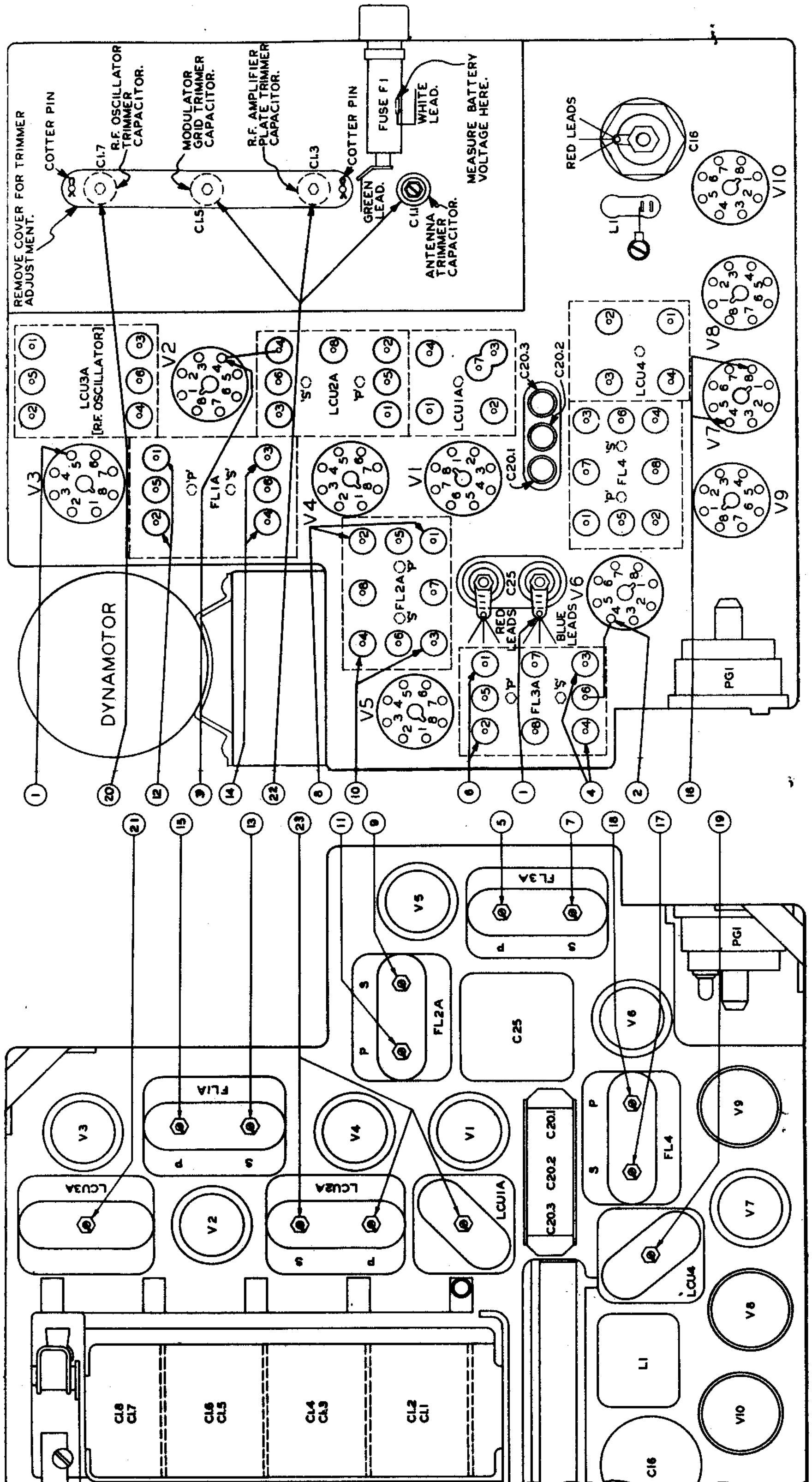
Use harmonics of sig gen output for all steps of r-f alignment procedure in which the frequency exceeds the fundamental range of the sig gen.

ALIGNMENT OF R-F OSCILLATOR AND AMPLIFIER

1. Connect sig gen to "A" and "G" posts of receiver and set receiver and sig gen dials to 39.0 mc. Check frequency with SCR-211-(*).
2. Connect voltmeter as in discriminator alignment (16).
3. Set TUNE-OPERATE sw on TUNE and ADJUST C1.7 (20) for zero beat in speaker. Meter should read zero at zero beat.
4. Set sig gen and receiver dial to 27.0 mc (check with frequency meter) and adjust LCU3A (21) for zero beat in speaker. Meter should read zero at zero beat.
5. Repeat steps 3 and 4 until receiver dial calibration is correct at both frequencies.
6. Check dial calibration at 30.0, 33.0, and 36.0 mc. Zero beat should be obtained within ½-dial division at each of these points.
7. Move voltmeter connection to pin 4 of V6 (2) and chassis.
8. Tune receiver to zero beat with 39.0 mc signal from sig gen and turn TUNE-OPERATE sw to OPERATE.
9. Adjust in turn C1.5, C1.3, and C1.1 (22) for max on meter. Sig gen output must be reduced to give less than 1-volt indication on meter.
10. Adjust sig gen and receiver dial to 27.0 mc and adjust LCU2A and LCU1A (23) for max on meter.
11. Restore receiver to normal.

Numbers in circles refer to LOCATION OF ALIGNMENT ADJUSTMENTS.

LOCATION OF ALIGNMENT ADJUSTMENTS



PRESETTING

1. Use an amplitude or frequency modulated signal generator, a remote or adjacent BC-684-(*) transmitter as a signal source. In case of an adjacent transmitter, operate it with RECEIVER TUNE-OPERATE sw at RECEIVER TUNE. Signal source should be unmodulated.

2. Turn on receiver and allow it to warm up for 15 min. Release all push buttons. While pressing PUSH TO TUNE button, turn dial by means of TUNING Control to LOCK, at high frequency end of dial. Release selector locking screw.

3. Turn on transmitter and tune to highest frequency channel to be preset. Using PUSH TO TUNE button and TUNING Control, tune receiver to zero beat with this signal.

4. While holding PUSH TO TUNE button and TUNING Control, depress selector button corresponding to channel being preset, retune slightly if necessary. Still holding the receiver to zero beat, release channel button by partially depressing another. Repeat the adjustment if beat note is higher than 1,000 cycles.

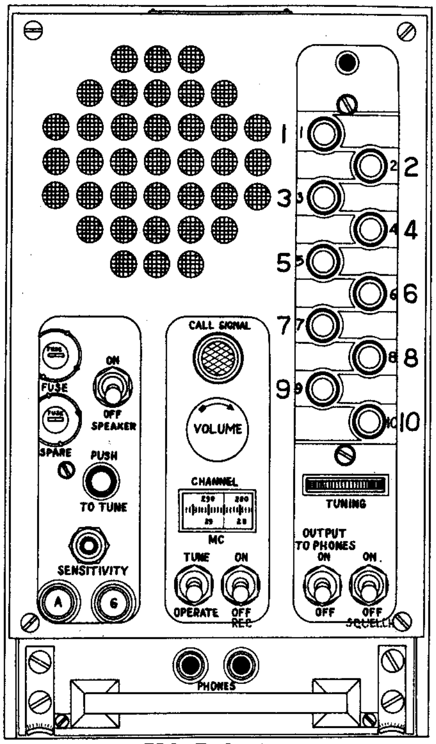
5. Repeat steps 3 and 4, retuning transmitter, for other channels to be preset, going from a higher to the next lower channel until all selector buttons have been set.

6. Rotate dial to LOCK and tighten selector locking screw.

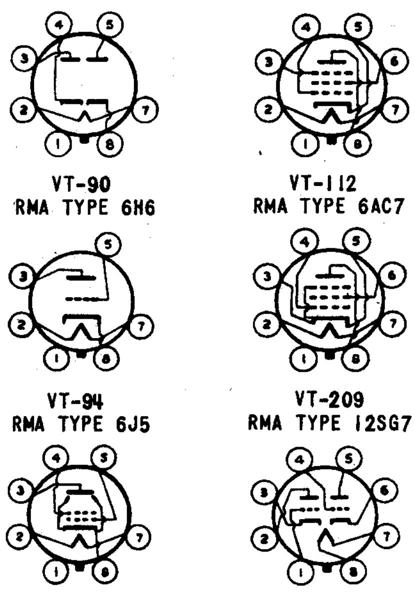
7. Depress each channel button and check that an audible beat note can be heard without moving dial more than ± one-tenth dial division with transmitter tuned to same channel.

8. Write channel numbers beside buttons in space provided.

9. Install set in vehicle and connect receiver to the antenna with which it will be operated. Turn SQUELCH sw ON, SENSITIVITY Control to max, receiver ON-OFF sw ON, and tune in a weak signal near high frequency end of band. Reduce SENSITIVITY control setting until CALL SIGNAL lamp flickers. Adjust antenna trimmer capacitor (C1.1 Page 5) for slowest possible rate of flicker of CALL SIGNAL lamp. Should CALL SIGNAL lamp be brought to steady illumination during adjustment of capacitor, reduce SENSITIVITY Control setting until lamp flickers again. Continue these adjustments until no further change is noted.



FRONT PANEL



VT-90
RMA TYPE 6H6

VT-112
RMA TYPE 6AC7

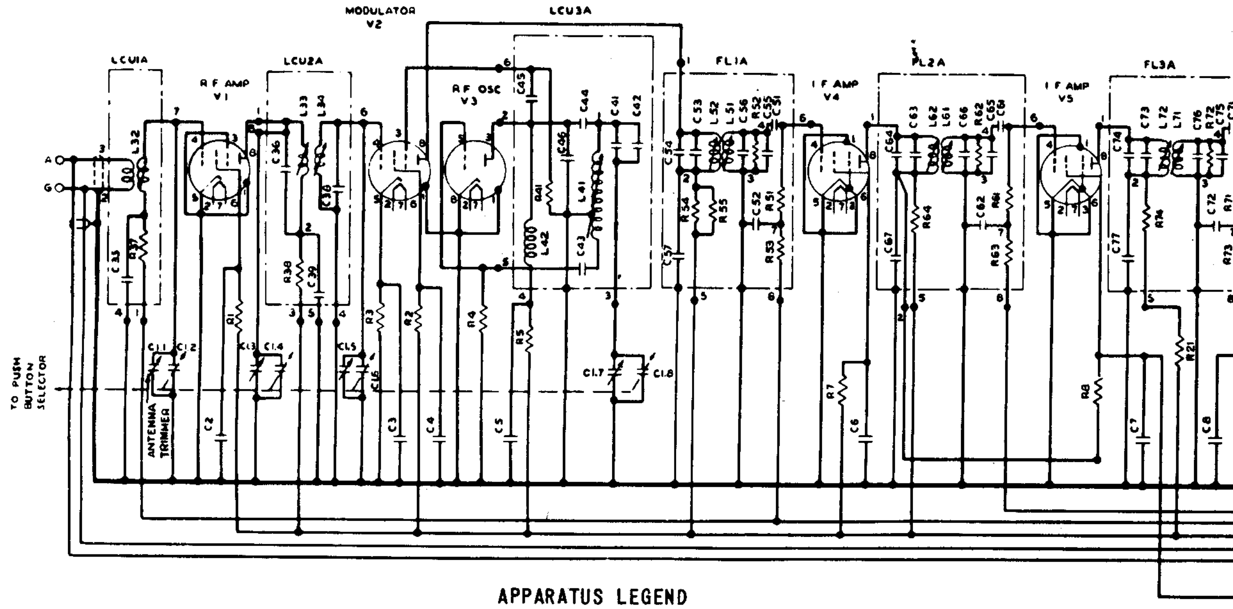
VT-94
RMA TYPE 6J5

VT-209
RMA TYPE 12SG7

VT-107-A
RMA TYPE 6V6GT

VT-229
RMA TYPE 6SL7GT

Tube socket terminals, bottom view



APPARATUS LEGEND

CAPACITORS
C1.1 16 µµf MAX
C1.3 16 µµf MAX
C1.5 16 µµf MAX
C1.7 16 µµf MAX
C1.2 62 µµf MAX
C1.4 62 µµf MAX
C1.6 62 µµf MAX
C1.8 62 µµf MAX
C2 0.006 µf 300 V
C3 0.006 µf 300 V
C4 0.006 µf 300 V
C5 0.006 µf 300 V
C6 0.006 µf 300 V
C7 0.006 µf 300 V
C8 500 µµf 500 V
C9 0.006 µf 300 V
C10 0.75 µµf 500 V
C11 0.006 µf 300 V
C12 0.01 µf 300 V
C13 500 µµf 500 V
C14 0.006 µf 300 V
C15 0.5 µf 600 V
C16 2 µf 600 V
C17 0.01 µf 300 V
C18 0.01 µf 300 V
C19 0.002 µf 500 V
C20.1 0.1 µf 600 V
C20.2 0.1 µf 600 V
C20.3 0.1 µf 600 V
C21 0.01 µf 300 V
C22 0.005 µf 300 V
C23 40 µf 25 V
C24 1 µf 600 V
C25 2 µf 600 V
C26 0.001 µf 500 V
C35 0.006 µf 300 V
C36 10 µµf 500 V
C38 5 µµf 500 V
C39 0.006 µf 300 V
C41 700 µµf 500 V
C42 200 µµf 500 V
C43 100 µµf 500 V
C44 30 µµf 500 V
C45 100 µµf 500 V
C46 20 µµf 500 V
C51 100 µµf 500 V
C52 0.001 µf 500 V
C53 50 µµf 500 V
C54 10 µµf 500 V
C55 10 µµf 500 V
C56 50 µµf 500 V
C57 0.006 µf 300 V
C61 100 µµf 500 V
C62 0.001 µf 500 V
C63 50 µµf 500 V
C64 10 µµf 500 V
C65 10 µµf 500 V
C66 50 µµf 500 V
C67 0.006 µf 300 V
C71 50 µµf 500 V
C72 0.001 µf 500 V
C73 50 µµf 500 V
C74 10 µµf 500 V
C75 10 µµf 500 V
C76 50 µµf 500 V
C77 0.006 µf 300 V
C81 250 µµf 500 V
C82 0.006 µf 300 V
C83 0.006 µf 300 V
C84 5 µµf 500 V
C85 50 µµf 500 V
C86 50 µµf 500 V
C87 25 µµf 500 V
C88 10 µµf 500 V
C91 50 µµf 500 V
C92 50 µµf 500 V
C93 100 µµf 500 V
C94 50 µµf 500 V

FUSE
F1 FUSE 15 AMP

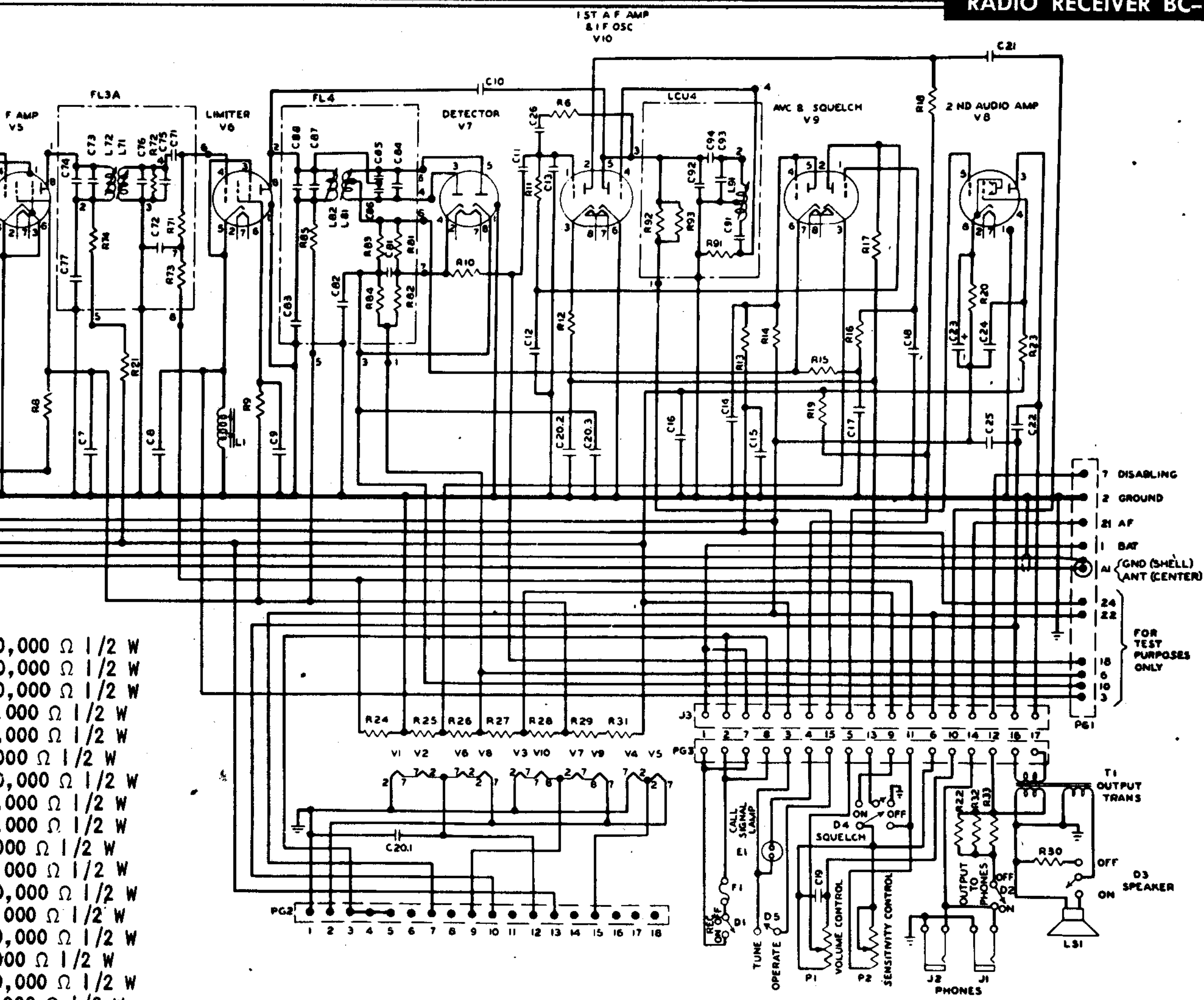
POTENTIOMETERS
P1 100,000 Ω
P2 200 Ω

RESISTORS
R1 20,000 Ω 1/2 W
R2 250,000 Ω 1/2 W
R3 500 Ω 1/2 W
R4 50,000 Ω 1/2 W
R5 5,000 Ω 1 W
R6 100,000 Ω 1/2 W
R7 30,000 Ω 1 W
R8 70,000 Ω 1/2 W
R9 1,000 Ω 1/2 W
R10 250,000 Ω 1/2 W
R11 1,000,000 Ω 1/2 W
R12 2,000 Ω 1/2 W
R13 10,000 Ω 1/2 W
R14 250,000 Ω 1/2 W
R15 1,000,000 Ω 1/2 W
R16 1,000,000 Ω 1/2 W
R17 250,000 Ω 1/2 W
R18 100,000 Ω 1/2 W
R19 2,000,000 Ω 1/2 W
R20 300 Ω 1 W
R21 30,000 Ω 2 W
R22 30,000 Ω 1/2 W
R23 5,000 Ω 1/2 W
R24 50 Ω 1/2 W
R25 2,500 Ω 1/2 W
R26 1,200 Ω 1/2 W
R27 2,500 Ω 1/2 W
R28 2,500 Ω 1/2 W
R29 13,000 Ω 2 W
R30 5 Ω 4 W
R31 6,800 Ω 1 W
R32 30,000 Ω 1/2 W
R33 30,000 Ω 1/2 W
R37 250,000 Ω 1/2 W
R38 1,000 Ω 1/2 W
R41 100,000 Ω 1/2 W
R51 100,000 Ω 1/2 W
R52 43,000 Ω 1/2 W
R53 100,000 Ω 1/2 W
R54 100,000 Ω 1/2 W
R55 100,000 Ω 1/2 W
R61 100,000 Ω 1/2 W
R62 43,000 Ω 1/2 W
R63 10,000 Ω 1/2 W
R64 1,000 Ω 1/2 W
R71 250,000 Ω 1/2 W
R72 30,000 Ω 1/2 W
R73 10,000 Ω 1/2 W
R74 1,000 Ω 1/2 W
R81 70,000 Ω 1/2 W
R82 250,000 Ω 1/2 W
R83 70,000 Ω 1/2 W
R84 250,000 Ω 1/2 W
R85 1,000 Ω 1/2 W
R91 100,000 Ω 1/2 W
R92 40,000 Ω 1/2 W
R93 40,000 Ω 1/2 W

VACUUM TUBES
V1 VT-112 (6AC7)
V2 VT-112 (6AC7)
V3 VT-94 (6J5)
V4 VT-209 (12SG7)
V5 VT-209 (12SG7)
V6 VT-112 (6AC7)
V7 VT-90 (6H6)
V8 VT-107-A (6V6GT)
V9 VT-229 (6SL7GT)
V10 VT-229 (6SL7GT)

DYNAMOTOR DM-34-(*)12V
CAPACITORS
C701 0.005 µf 800 V
C702 0.005 µf 800 V
C703 0.005 µf 800 V
C704 0.005 µf 800 V
C705 0.005 µf 800 V
C706 0.005 µf 800 V

Schematic



,000 Ω 1/2 W
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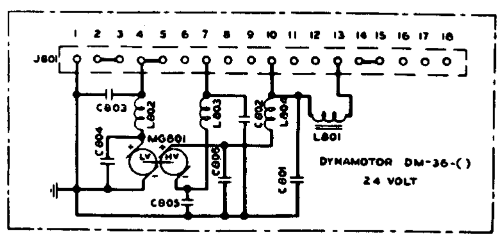
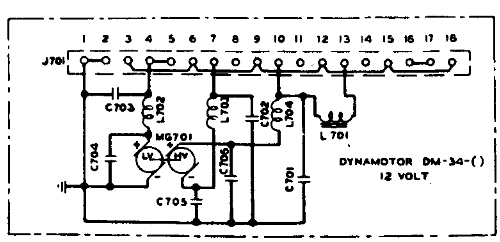
UBES
12 (6AC7)
12 (6AC7)
4 (6J5)
09 (12SG7)
09 (12SG7)
12 (6AC7)
0 (6H6)
07-A (6V6GT)
29 (6SL7GT)
29 (6SL7GT)

I-F 2.65 mc



R DM-34-(*)12V
ORS
005 μf 800 V
005 μf 800 V
005 μf 800 V
005 μf 800 V
005 μf 800 V
005 μf 800 V

DYNAMOTOR DM-36-(*)24V
CAPACITORS
C801 0.005 μf 800 V
C802 0.005 μf 800 V
C803 0.005 μf 800 V
C804 0.005 μf 800 V
C805 0.005 μf 800 V
C806 0.005 μf 800 V



Schematic

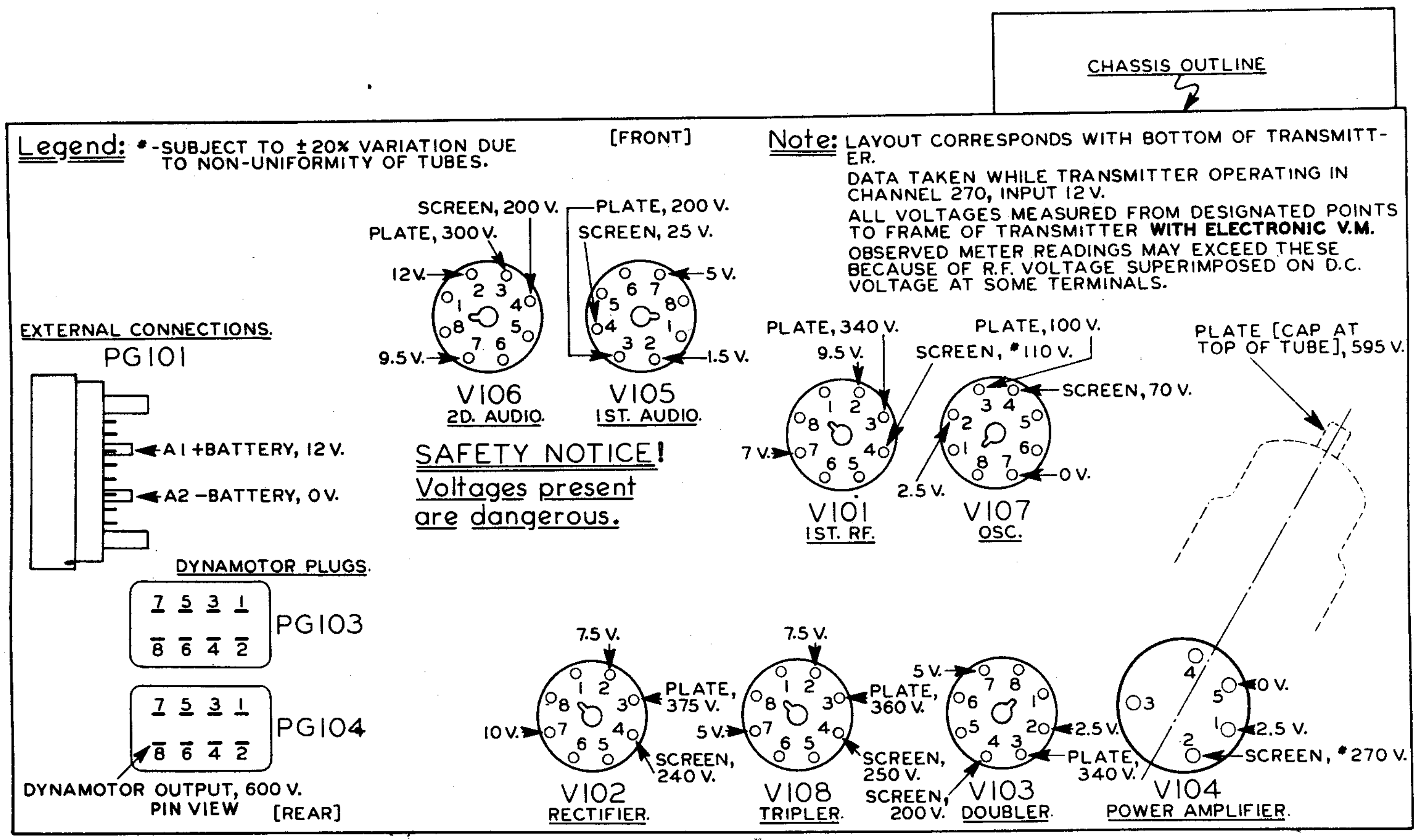
RADIO TRANSMITTER BC-684-(*)

BC-684-(*)=BC-684- A

Part of: SCR-608-(*)
SCR-628-(*)

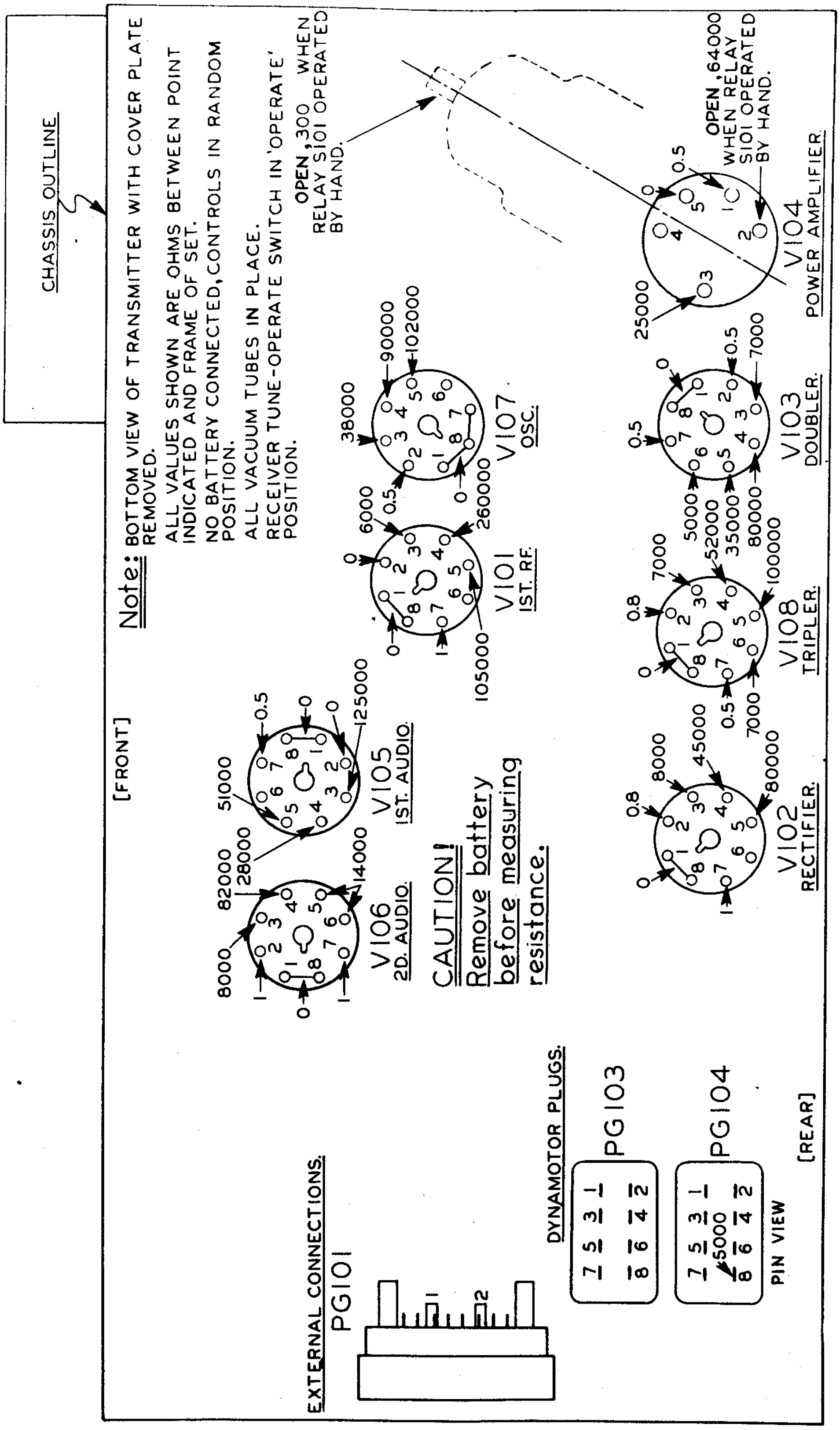
Reference:
TM 11-620

VOLTAGE MEASUREMENTS



Transmitter chassis, bottom.

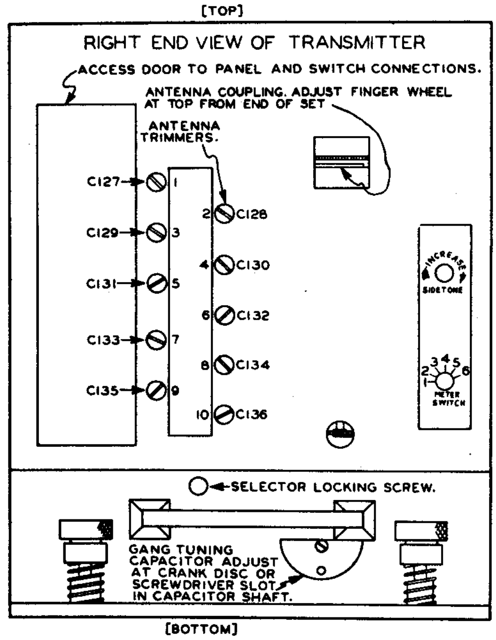
RESISTANCE MEASUREMENTS

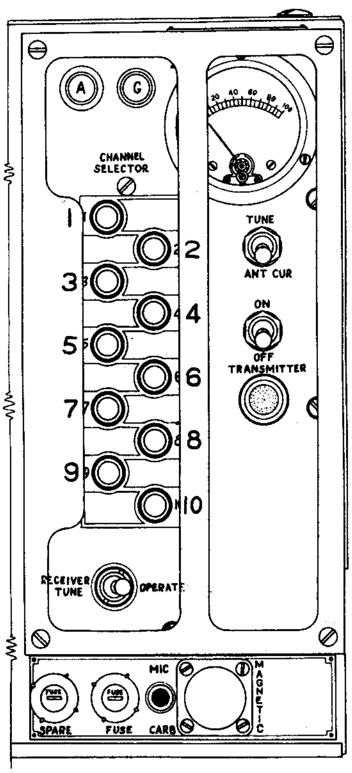


Transmitter chassis, bottom.

PRESETTING

1. Install required crystals in order of channel numbers; lowest frequency in socket 1, highest in 10. Print channel numbers in space beside buttons.
2. Free all buttons, turn tuning gang capacitor to max clockwise position and release selector locking screw.
3. Turn METER SW to 3 and TUNE-ANT CUR sw to TUNE.
4. Depress selector button for highest frequency to be set. Turn RECEIVER TUNE-OPERATE sw to RECEIVER TUNE.
5. Slowly tune gang capacitor for maximum (max) meter deflection. If two max are found, tune to the higher.
6. Change METER SW to 5 and retune gang capacitor for max. (Return RECEIVER TUNE-OPERATE sw to OPERATE between adjustments.)
7. Depress selector button for next lower channel. Keep a finger on button being released to prevent it snapping out and altering the adjustment. Repeat steps 5 and 6 for all channels being set, going from a higher to next lower channel.
8. Release last button, carefully keeping a finger on it and depressing an adjacent button slightly. Turn gang capacitor to max clockwise position and tighten selector locking screw.





FRONT PANEL

9. Check setting of each button by slightly "rocking" the gang capacitor. Retune any channel on which max meter deflection is not obtained at the setting determined by its push button.
10. Throw TUNE-ANT CUR sw to ANT CUR. Adjust antenna coupling to min (clockwise rotation). Connect a regular or dummy antenna. Tune METER SW to 6 and RECEIVER TUNE-OPERATE sw to OPERATE.
11. Depress any channel button, start transmitter by pressing microphone sw, and adjust corresponding antenna trimmer for max on panel meter. Repeat for all channels.
12. Using any channel, adjust antenna coupling for a max meter deflection, then reduce coupling until reading drops to half of max.
13. Throw TUNE ANT CUR sw to TUNE and determine which channel has greatest meter reading. Restore TUNE ANT CUR sw to ANT CUR. Using this channel, adjust antenna coupling for max on meter.
14. Recheck adjustment of all antenna tuning capacitors as in 11.
15. Place TUNE-ANT CUR sw at TUNE and check meter readings against the following table.

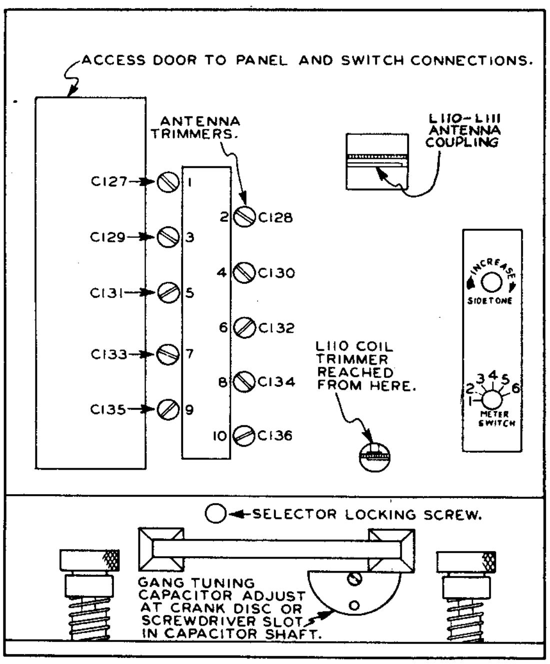
METER SWITCH POSITION	1	2	3	4	5	6
CIRCUIT	Doubler Grid Cur	1st R-F Grid Cur	Rect. Grid Cur	Tripler Grid Cur	P.A. Grid Cur	Total Pl & Screen Cur
METER READING (27mc)	35	40	15	20	30	70
METER READING (38.9mc)	50	10	15	35	35	70

ALIGNMENT

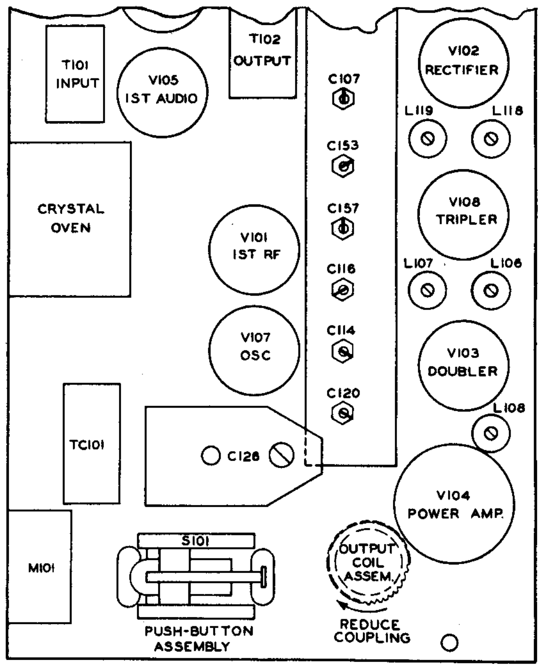
ALIGNMENT OF 1st R-F AMPLIFIER
1. Remove top and bottom cover plates lay transmitter on its back, and connect for operation.
2. Install crystals for channels 270 and 389, sockets 1 and 10.
3. Turn RECEIVER TUNE-OPERATE sw to RECEIVER TUNE, ON-OFF sw to ON, TUNE-ANT CUR sw to TUNE, and METER SW to 2.
4. Depress button 10. Meter deflection shows that oscillator is operating.
5. Turn C107 to minimum (min) capacitance position.
6. Turn METER SW to 3 and accurately set channel selector buttons 1 and 10. (See presetting procedure.)

ALIGNMENT OF RECTIFIER
1. Set METER SW to 4 and depress button 10.
2. Adjust C153 and C157 for max on meter.
3. Loosely couple wavemeter of Frequency Meter Set I-129-(*) to L118 and L119.
4. Tune wavemeter for resonance dip on panel meter. Wavemeter setting at dip should be 1/6 of channel frequency (6.48 mc for channel 389).
5. Depress button 1 and adjust L118 and L119 for max.
6. Check frequency as in step 4. Panel meter dip on button 1 should occur at a wavemeter setting of 4.50 mc.

ALIGNMENT OF TRIPLER
1. Set METER SW to 1 and depress button 10.
2. Adjust C114 and C116 for max on panel meter.
3. Loosely couple wavemeter to L106 and L107.
4. Tune wavemeter for dip on panel meter. Wavemeter setting at dip should be ½ of channel frequency (19.45 mc for channel 389).



RIGHT END VIEW



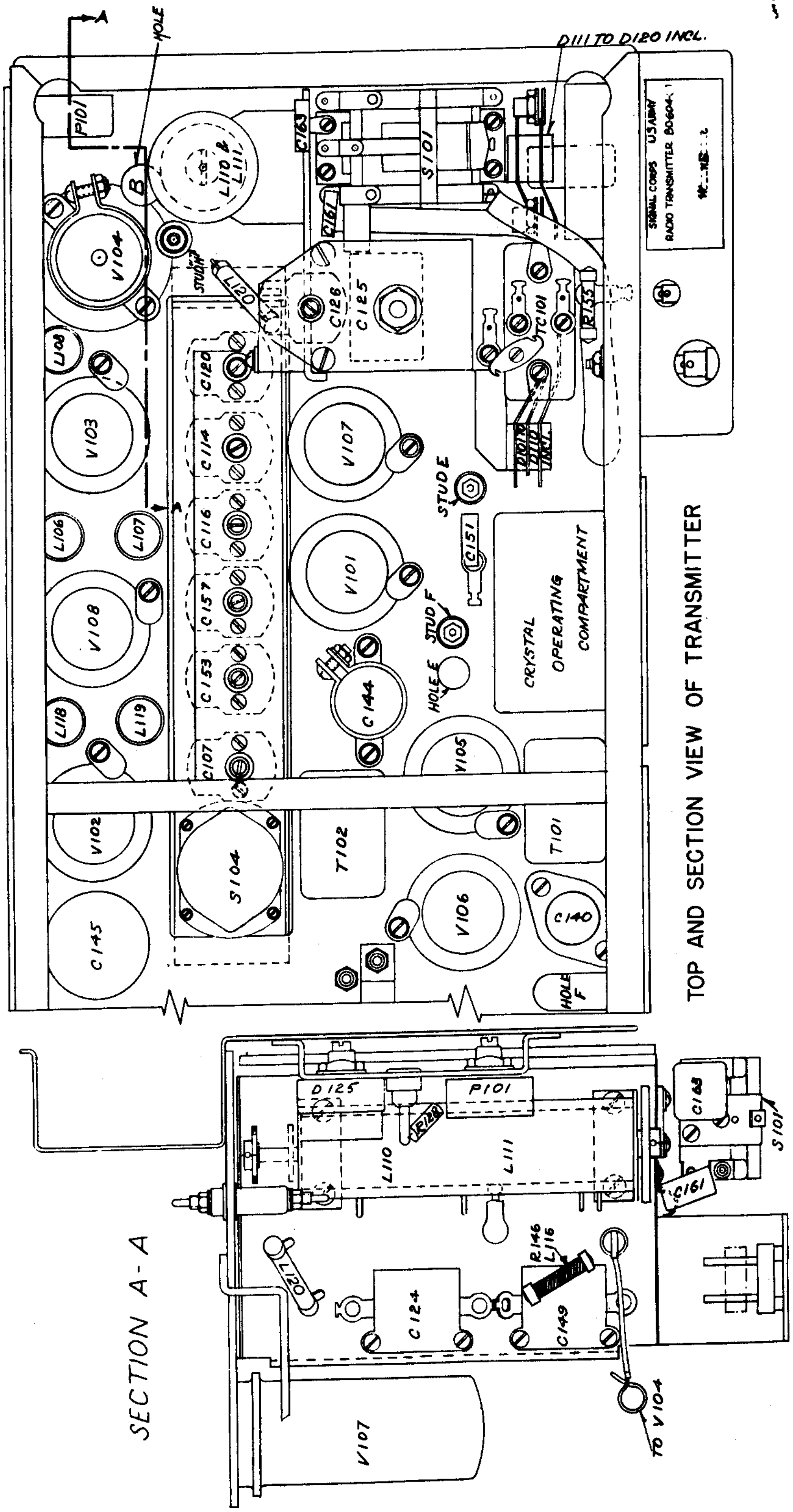
TOP VIEW

5. Depress button 1 and adjust L106 and L107 for max on panel meter.
6. Check frequency on button 1 as in step 4 with a wavemeter setting of 13.5 mc.

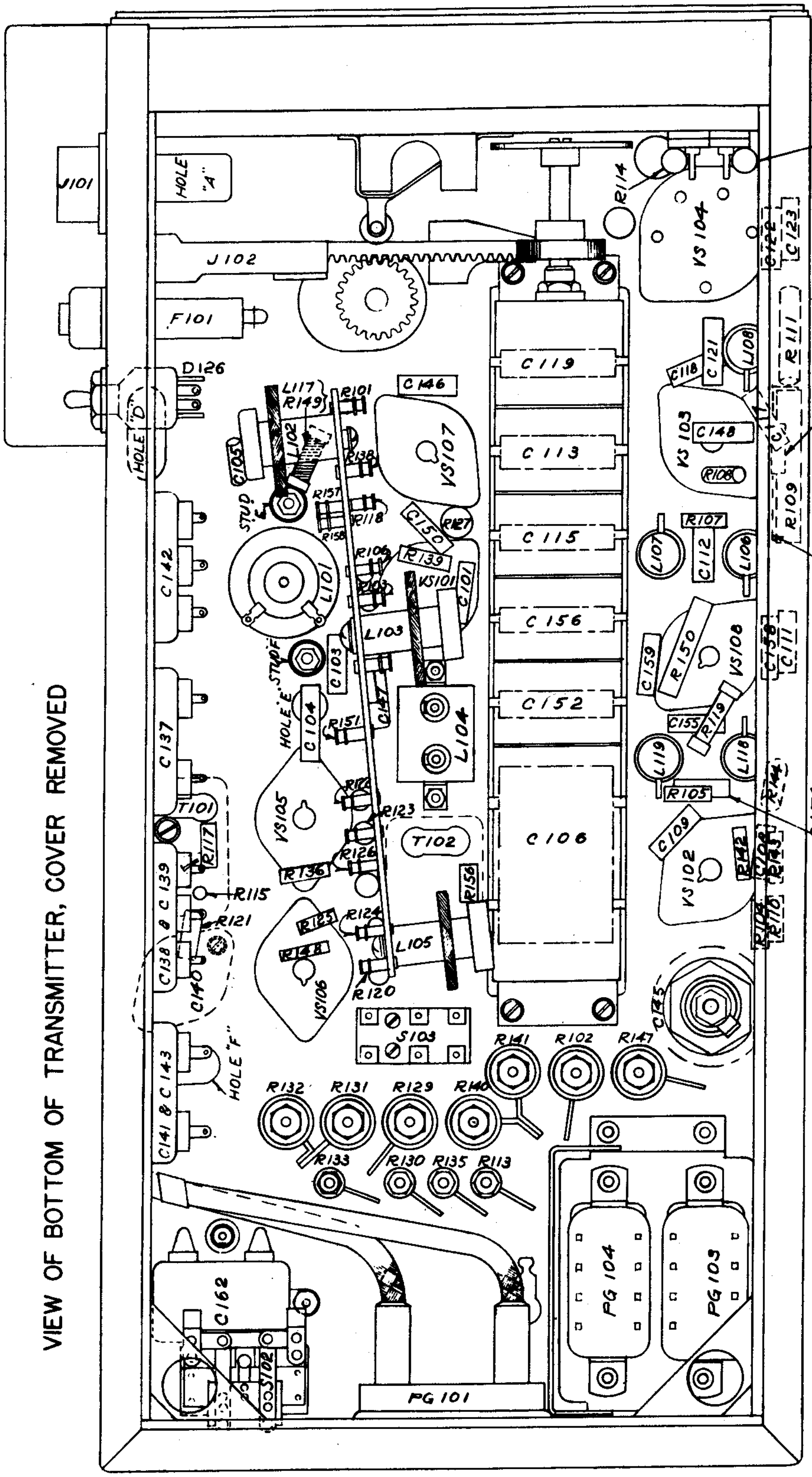
ALIGNMENT OF DOUBLER
1. Set METER SW to 5 and depress button 10.
2. Adjust C120 for max on panel meter.
3. Depress button 1 and adjust L108 for max on meter.
4. Replace bottom cover plate and repeat all previous adjustments.

ALIGNMENT OF POWER AMP.
1. Set METER SW to 6, turn REC TUNE-OPERATE sw to OPERATE, and depress button 10.
2. Adjust coupling L110 to L111 to min setting.
3. Connect an antenna to the transmitter.
4. Plug in microphone and depress mic sw. Mic sw must be depressed for steps 5 to 13. Release between steps.
5. Adjust C126 for min on panel meter.
6. Depress button 1 and adjust L110 for min on meter.
7. Depress button 10 and turn TUNE-ANT CUR sw to ANT CUR.
8. Adjust antenna coupling for max on meter.
9. Reduce coupling until meter reading is halved.
10. Adjust C136 for max on meter.
11. Depress button 1 and adjust C127 for max on meter.
12. Turn TUNE-ANT CUR sw to TUNE.
13. Shift alternately between button 10 and 1, making adjustments to C126 on button 10, and to L110 on button 1 for min on meter until setting of C126 is the same for min on both buttons.

PARTS LAYOUT

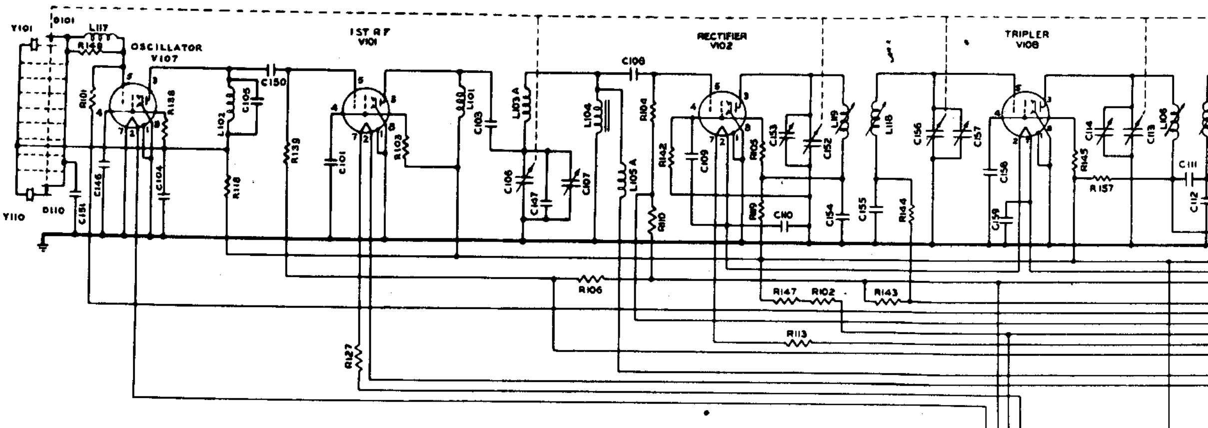


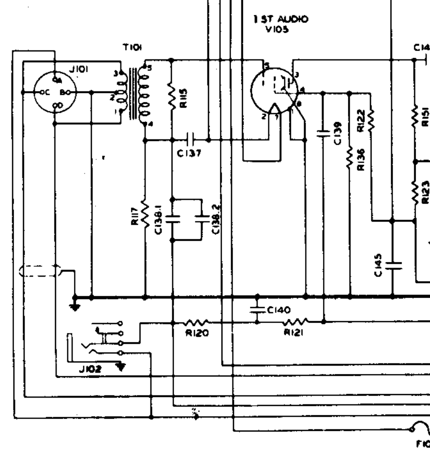
TOP AND SECTION VIEW OF TRANSMITTER



VIEW OF BOTTOM OF TRANSMITTER, COVER REMOVED

PARTS LAYOUT





APPARATUS LEGEND

CAPACITORS

C101	0.003 μf 500 V
C103	100 μμf 800 V
C104	500 μμf 800 V
C105	15 μμf 500 V
C106 (GANGED)	350 μμf MAX-AIR GAP 0.025"
C113 (GANGED)	60 μμf MAX-AIR GAP 0.025"
C115 (GANGED)	60 μμf MAX-AIR GAP 0.025"
C119 (GANGED)	80 μμf MAX-AIR GAP 0.025"
C152 (GANGED)	60 μμf MAX-AIR GAP 0.025"
C156 (GANGED)	60 μμf MAX-AIR GAP 0.025"
C107	20 μμf MAX-AIR GAP 0.025"
C108	500 μμf 800 V
C109	0.003 μf 500 V
C110	0.01 μf 300 V
C111	0.003 μf 800 V
C112	0.003 μf 500 V
C114	20 μμf MAX-AIR GAP 0.025"
C116	20 μμf MAX-AIR GAP 0.025"
C117	0.003 μf 500 V
C118	0.003 μf 800 V
C120	20 μμf MAX-AIR GAP 0.025"
C121	0.003 μf 500 V
C122	0.003 μf 500 V
C123	0.01 μf 300 V
C124	0.002 μf 1200 V
C125	60 μμf MAX-AIR GAP 0.030"
C126	20 μμf MAX-AIR GAP 0.025"
C127	100 μμf MAX-AIR GAP 0.0195"
C128	100 μμf MAX-AIR GAP 0.0195"
C129	100 μμf MAX-AIR GAP 0.0195"
C130	100 μμf MAX-AIR GAP 0.0195"
C131	100 μμf MAX-AIR GAP 0.0195"
C132	100 μμf MAX-AIR GAP 0.0195"
C133	100 μμf MAX-AIR GAP 0.0195"
C134	100 μμf MAX-AIR GAP 0.0195"
C135	100 μμf MAX-AIR GAP 0.0195"
C136	100 μμf MAX-AIR GAP 0.0195"
C137	0.5 μf 600 V
C138.1	0.1 μf 600 V
C138.2	0.1 μf 600 V
C139	0.5 μf 600 V
C140	30 μf 50 V
C141	0.5 μf 600 V
C142.1	0.1 μf 600 V
C142.2	0.1 μf 600 V
C143	0.5 μf 600 V
C145	2 μf 1000 V
C146	0.003 μf 500 V
C147	175 μμf 500 V
C148	0.003 μf 500 V
C149	0.001 μf 1200 V
C150	0.001 μf 500 V
C151	50 μμf 500 V
C153	20 μμf MAX-AIR GAP 0.025"
C154	0.003 μf 500 V
C155	0.003 μf 500 V
C157	20 μμf MAX-AIR GAP 0.025"
C158	0.003 μf 500 V
C159	0.01 μf 300 V
C161	100 μμf 500 V
C162	4 μf 50 V

FUSE

F 101 1/2 AMPERE FUSE

POTENTIOMETER

P 101 50,000 Ω SIDETONE CONTROL

RESISTORS

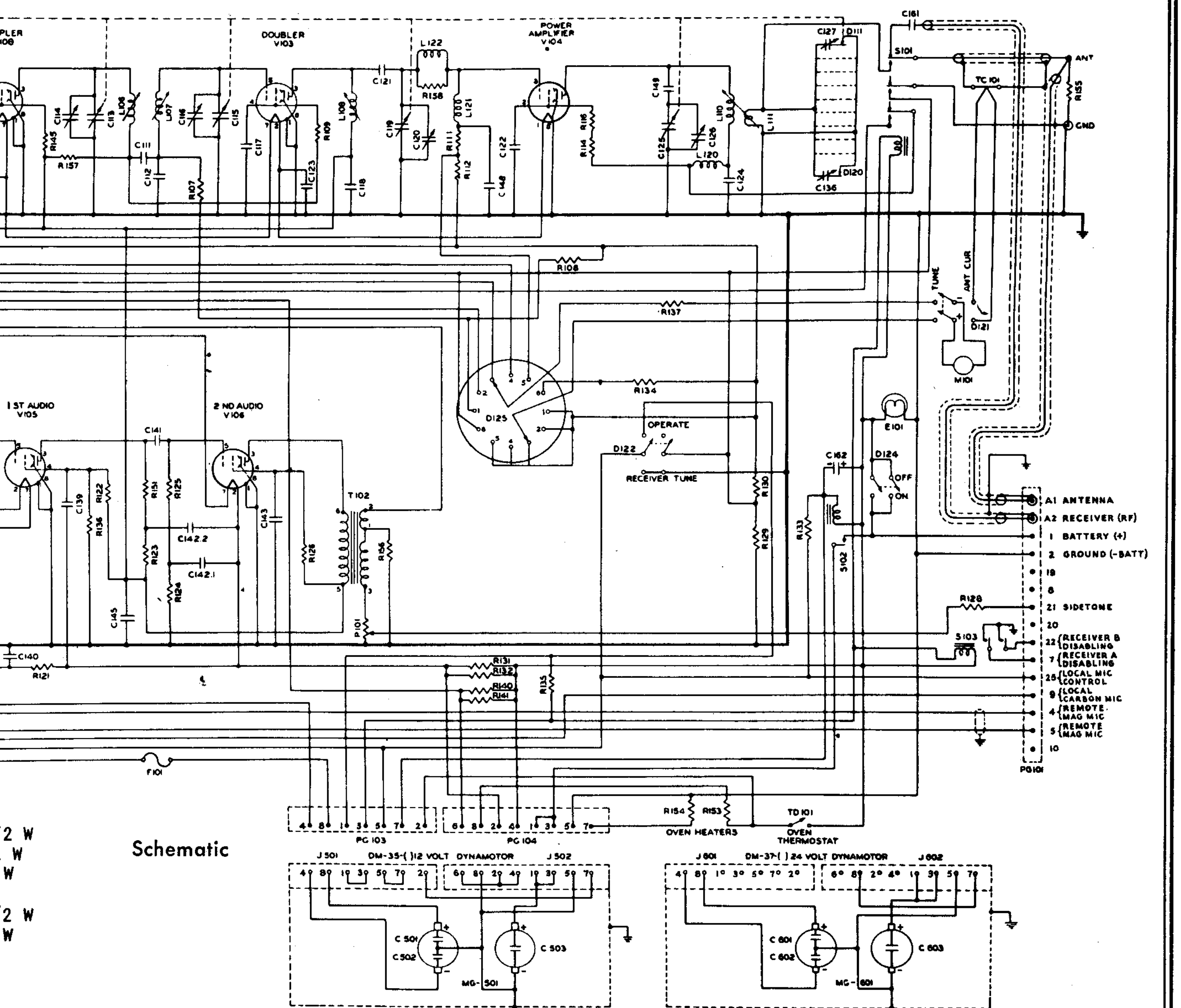
R101	100,000 Ω 1/2 W
R102	1,000 Ω 20 W
R103	250,000 Ω 1 W
R104	70,000 Ω 1/2 W
R105	50,000 Ω 1/2 W
R106	100 Ω 1/2 W
R107	30,000 Ω 1/2 W
R108	30 Ω 1/2 W
R109	75,000 Ω 1/2 W
R110	1,000 Ω 1/2 W
R111	15,000 Ω 1 W
R112	10 Ω 1/2 W
R113	1.0 Ω 10 W
R114	30,000 Ω 2 W
R115	100,000 Ω 1/2 W
R116	30,000 Ω 2 W
R117	50,000 Ω 1/2 W
R118	30,000 Ω 2 W
R119	1,200 Ω 1/2 W
R120	200 Ω 1W
R121	100 Ω 1/2 W
R122	250,000 Ω 1 W
R123	10,000 Ω 1 W
R124	10,000 Ω 1/2 W
R125	5,000 Ω 1/2 W
R126	75,000 Ω 2 W
R127	1.0 Ω 10 W
R128	10,000 Ω 1/2 W
R129	5,000 Ω 25 W
R130	100 Ω 10 W
R131	12 Ω 25 W
R132	12 Ω 25 W
R133	80 Ω 10 W
R134	30,000 Ω 1/2 W
R135	30 Ω 10 W
R136	30,000 Ω 1/2 W
R137	100 Ω 1/2 W
R138	50,000 Ω 1/2 W
R139	100,000 Ω 1/2 W
R140	12 Ω 25 W
R141	12 Ω 25 W
R142	180,000 Ω 1 W
R143	100 Ω 1/2 W
R144	100,000 Ω 1/2 W
R145	50,000 Ω 2W
R147	1,000 Ω 20 W
R149	50 Ω 1/2 W
R151	100,000 Ω 1 W
R153	8.3 Ω 17.9 W
R154	8.3 Ω 17.9 W
R155	100,000 Ω 1/2 W
R156	30 Ω 1 W
R157	
R158	

Sc

THERMOC
TC 101

THERMOST
TD 101

VACUUM T
V101 VT
V102 VT
V103 VT
V104 VT
V105 VT
V106 VT
V107 VT
V108 VT



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Schematic

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R157 300 Ω 1 W
R158 50 Ω 1/2 W

THERMOCOUPLE
TC 101 ANT CUR THERMOCOUPLE

THERMOSTAT
TD 101 OVEN THERMOSTAT

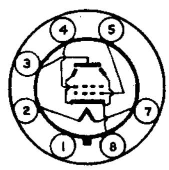
VACUUM TUBES
V101 VT-164 (1619)
V102 VT-164 (1619)
V103 VT-164 (1619)
V104 VT-165 (1624)
V105 VT-164 (1619)
V106 VT-164 (1619)
V107 VT-164 (1619)
V108 VT-164 (1619)

DYNAMOTOR DM-35-(*)12 V
CAPACITORS
C501 0.003 μf 800 V
C502 0.003 μf 800 V
C503 0.003 μf 800 V

JACKS
J501 DYNAMOTOR
J502 DYNAMOTOR

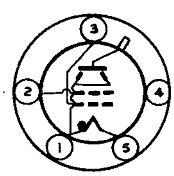
DYNAMOTOR DM-37-(*)24 V
CAPACITORS
C601 0.003 μf 800 V
C602 0.003 μf 800 V
C603 0.003 μf 800 V

JACKS
J601 DYNAMOTOR
J602 DYNAMOTOR



VT-164
RMA TYPE 1619

VT-165
RMA TYPE 1624



Tube socket terminals, bottom view

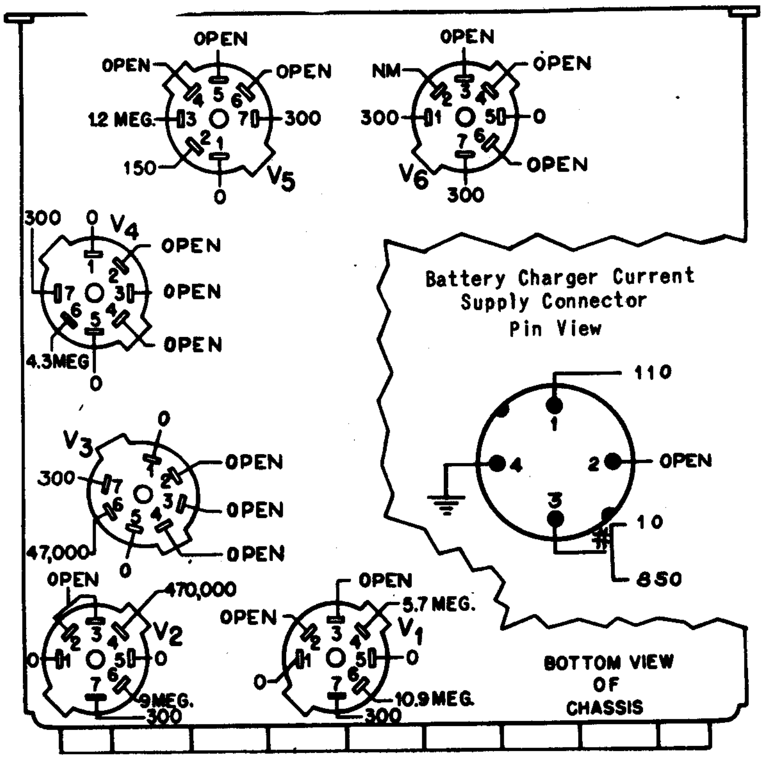
RADIO RECEIVER BC-728-(*)

Part of: SCR-593-(*) BC-728-(*) BC-728-A, BC-728-C

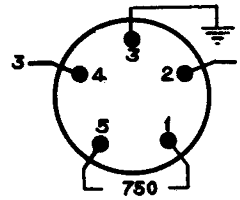
Reference
TM 11-859

RESISTANCE MEASUREMENTS

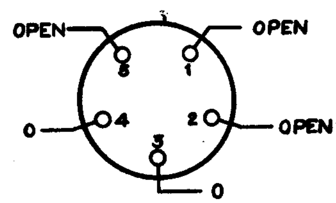
Remove all tubes and vibrators.
Turn switch OFF.
Disconnect Battery BB-54-A.
Remove cover from chassis.
Disconnect speaker plug.
Disconnect power plug.
Measurements from socket and connector terminals to chassis in ohms.
All values are average.



Speaker Male
Connector
Pin View

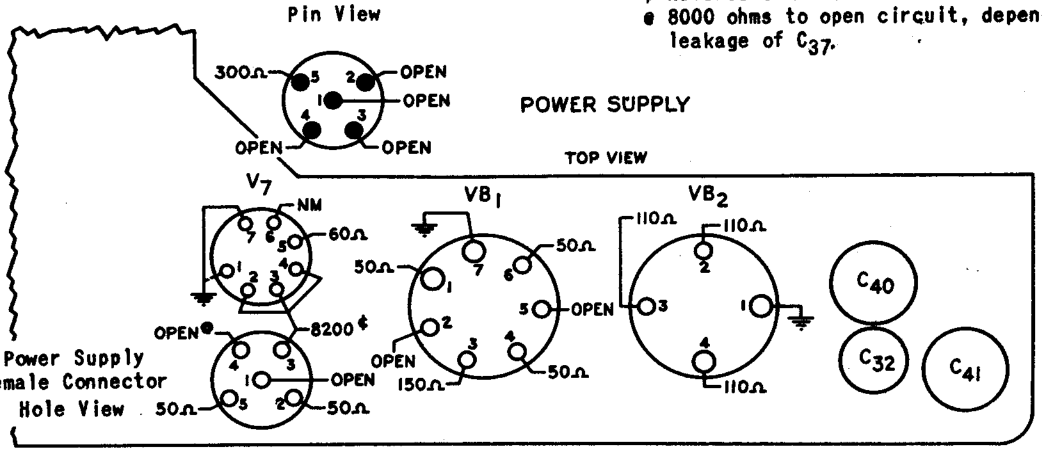


Speaker Female
Connector
Hole View



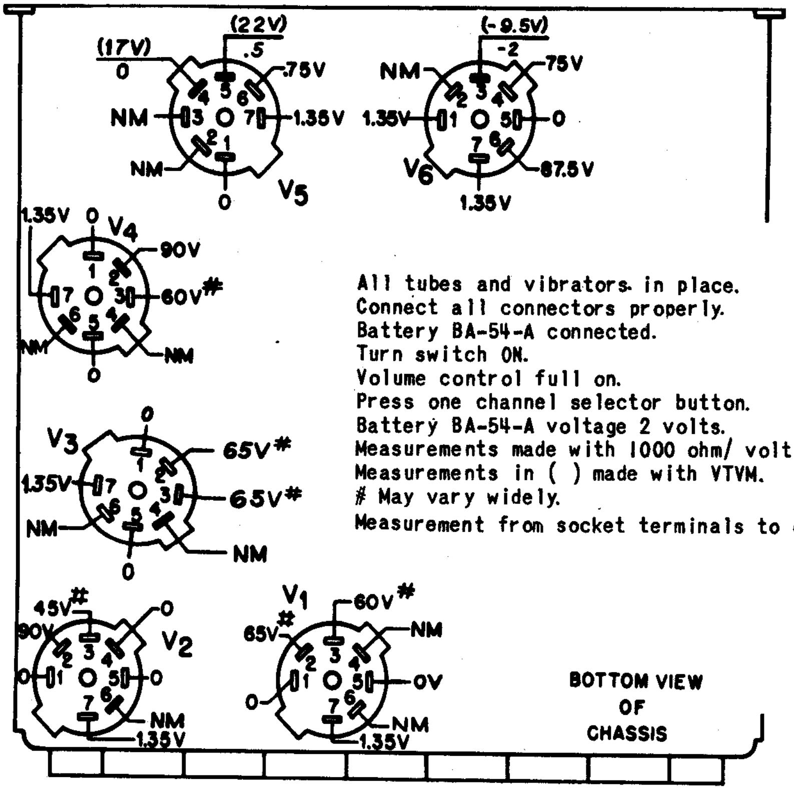
\# Two readings, depends on polarity of ohmmeter and $RECT_1$ and $RECT_2$.
¢ Reverse ohmmeter leads if reading wrong.
● 8000 ohms to open circuit, depends on leakage of C_{37}.

Power Supply
Male Connector
Pin View



Power Supply
Female Connector
Hole View

VOLTAGE MEASUREMENTS



All tubes and vibrators in place.
Connect all connectors properly.
Battery BA-54-A connected.
Turn switch ON.
Volume control full on.
Press one channel selector button.
Battery BA-54-A voltage 2 volts.
Measurements made with 1000 ohm/ volt meter.
Measurements in ( ) made with VTVM.
May vary widely.
Measurement from socket terminals to chassis.

RECEIVER PRESETTING

Setting up push-buttons with transmitter on air

1. Extend antenna.
2. Turn volume control full on.
3. Push channel selector button, A.
4. Adjust A_2 and A_3 for maximum sensitivity determined by noise level.
5. Rotate A_1 no more than 1 turn, or until station is heard.
6. Rotate A_2 and A_3 in step with A_1, or for maximum volume.
7. VERY CAREFULLY GO OVER THESE THREE ADJUSTMENTS SEVERAL TIMES, ALWAYS TUNING FOR GREATEST VOLUME AND CLEAREST RECEPTION.
8. Repeat 3 through 7 for the other channels.

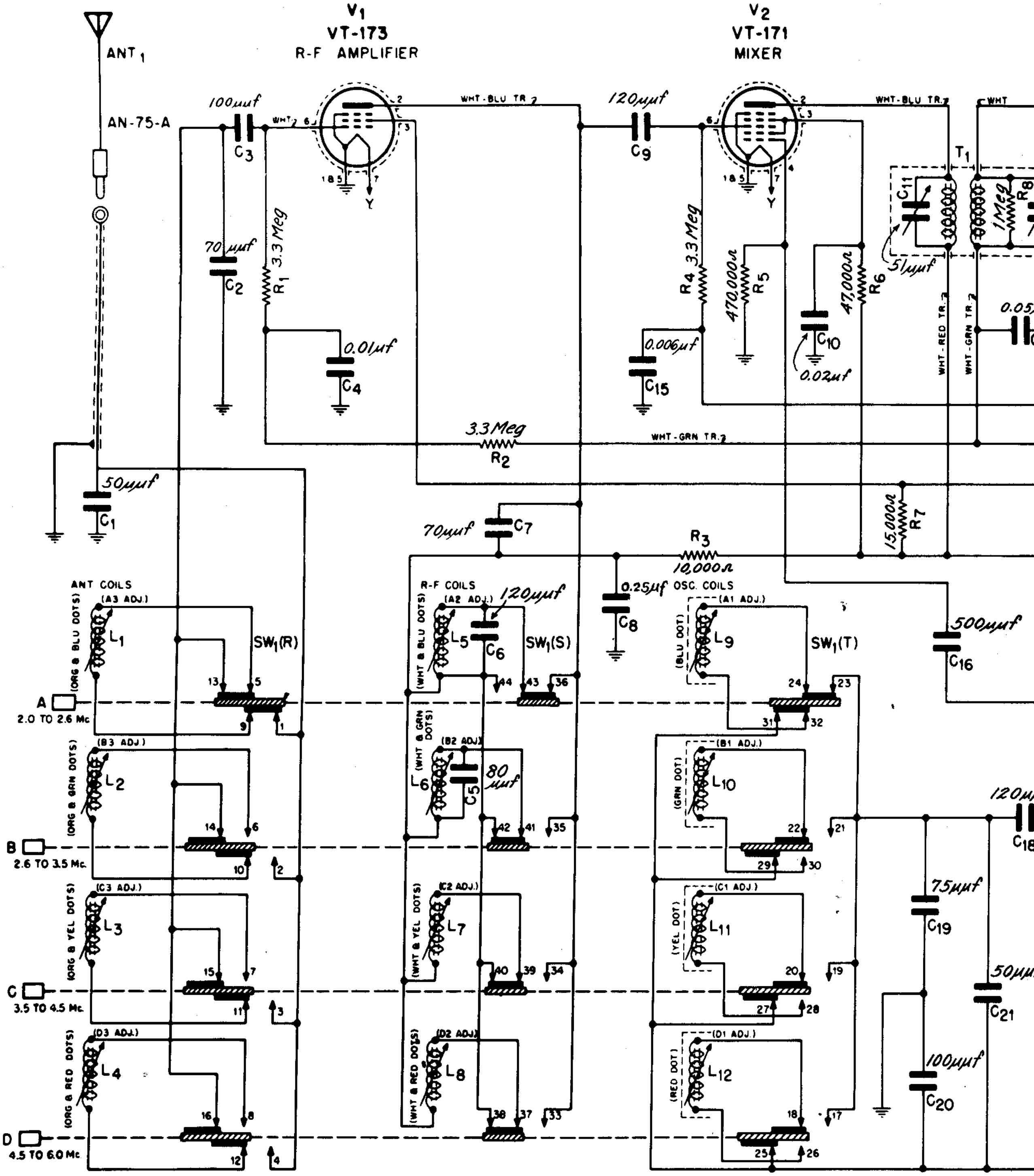
Setting up push-buttons with sig gen

9. Set sig gen on modulation and to exact frequency desired.
10. Connect 100 μμf capacitor in series with "high" side of sig gen to case.
11. Connect low side sig gen to case.
12. Tune as in 3 to 8 above for maximum signal.

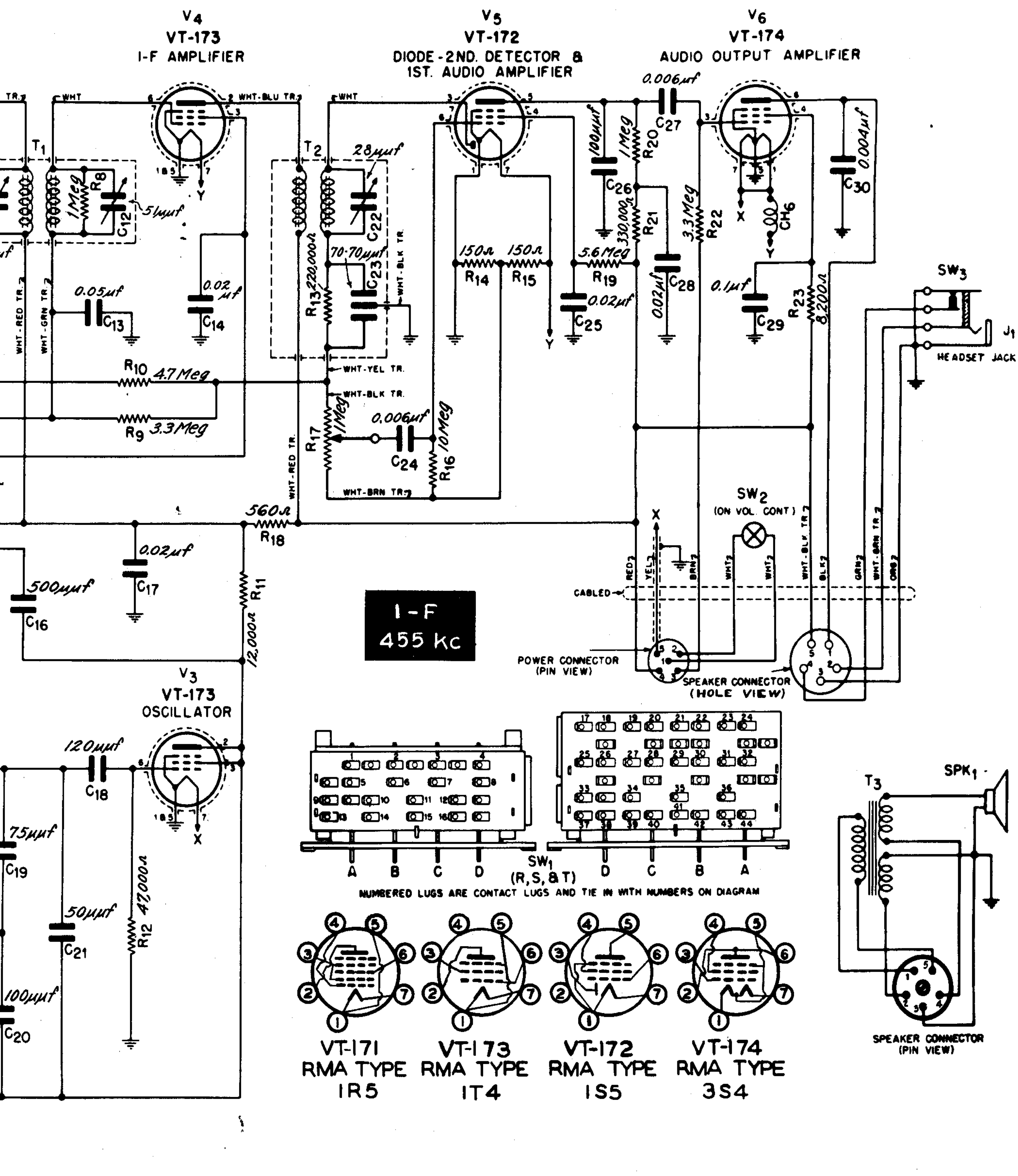
I-F ALIGNMENT

1. Set sig gen to freq meter on 455 kc.
2. Sig gen modulated and set for 50,000 μv output. Sig gen should be adjusted to give not more than 0.4v reading on output meter during alignment.
3. Disconnect antenna.
4. Volume control full on.
5. Connect "low" side sig gen to chassis.
6. Connect 0.1 μf capacitor in series with "high" side of sig gen and antenna post.
7. Connect output meter to voice coil leads of loudspeaker.
8. Press "A" channel selector button.
9. Tune C_{22} by adjusting slotted screw in top of T2 for maximum output.
10. Tune C_{11} and C_{12} by adjusting slotted screws in top of T1 for maximum output.
11. Repeat steps 9 and 10.

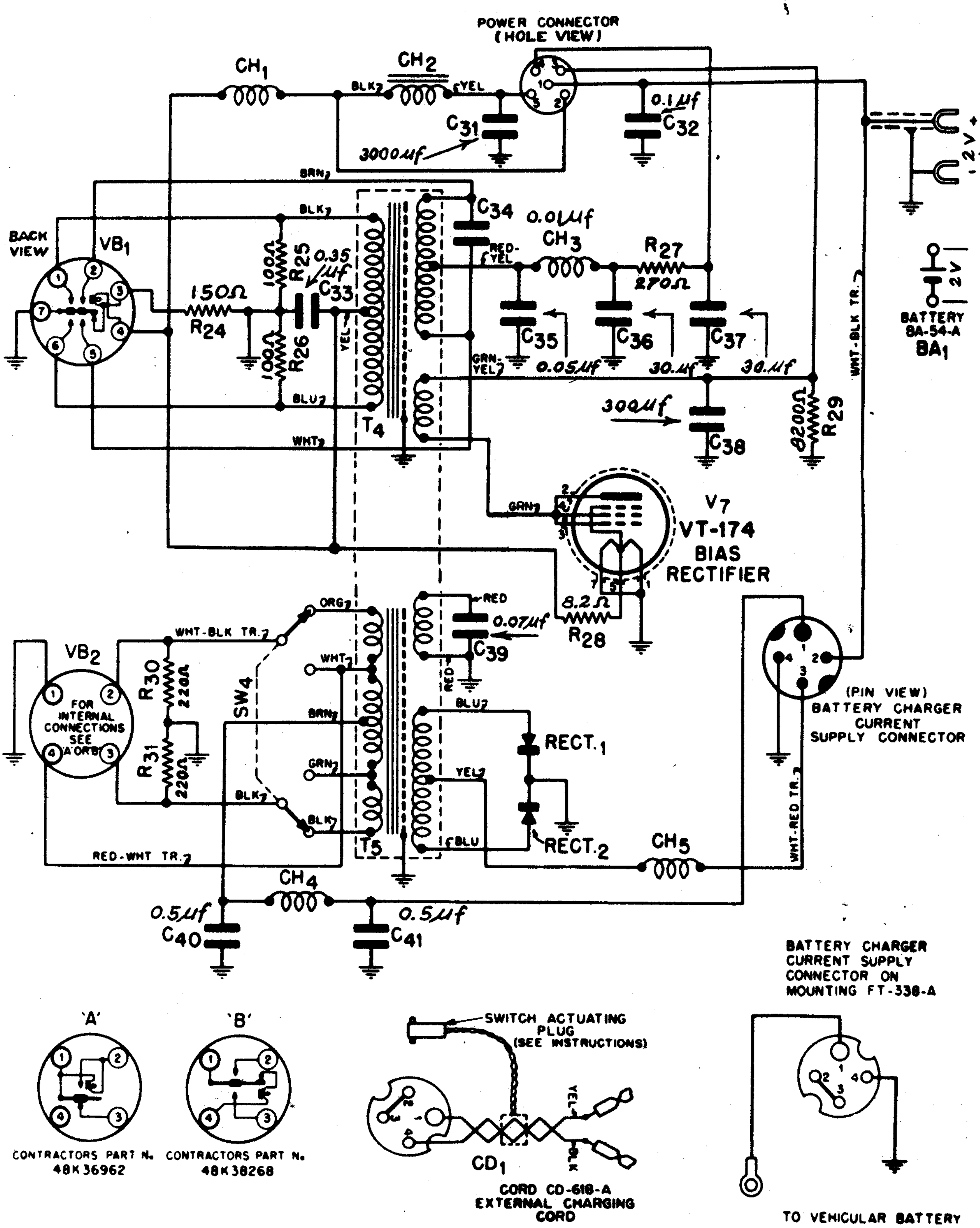
SCHEMATIC OF



IEMATIC OF RECEIVER



POWER SUPPLY SCHEMATIC



RADIO RECEIVER & TRANSMITTER BC-745-(*)

Also included: Tuning Unit BC-746-(*) and Chest Unit T-39-(*)
BC-745-(*) = BC-745-A, BC-745-B

Part of: SCR-511-(*)

Reference:
TM 11-245

SPECIAL NOTE

A few early BC-745-A sets differ in minor circuit details from other BC-745-A sets. Consequently some readings on these sets may not agree with those shown. A schematic diagram of these early sets with a list of their serial numbers appears on page 6.

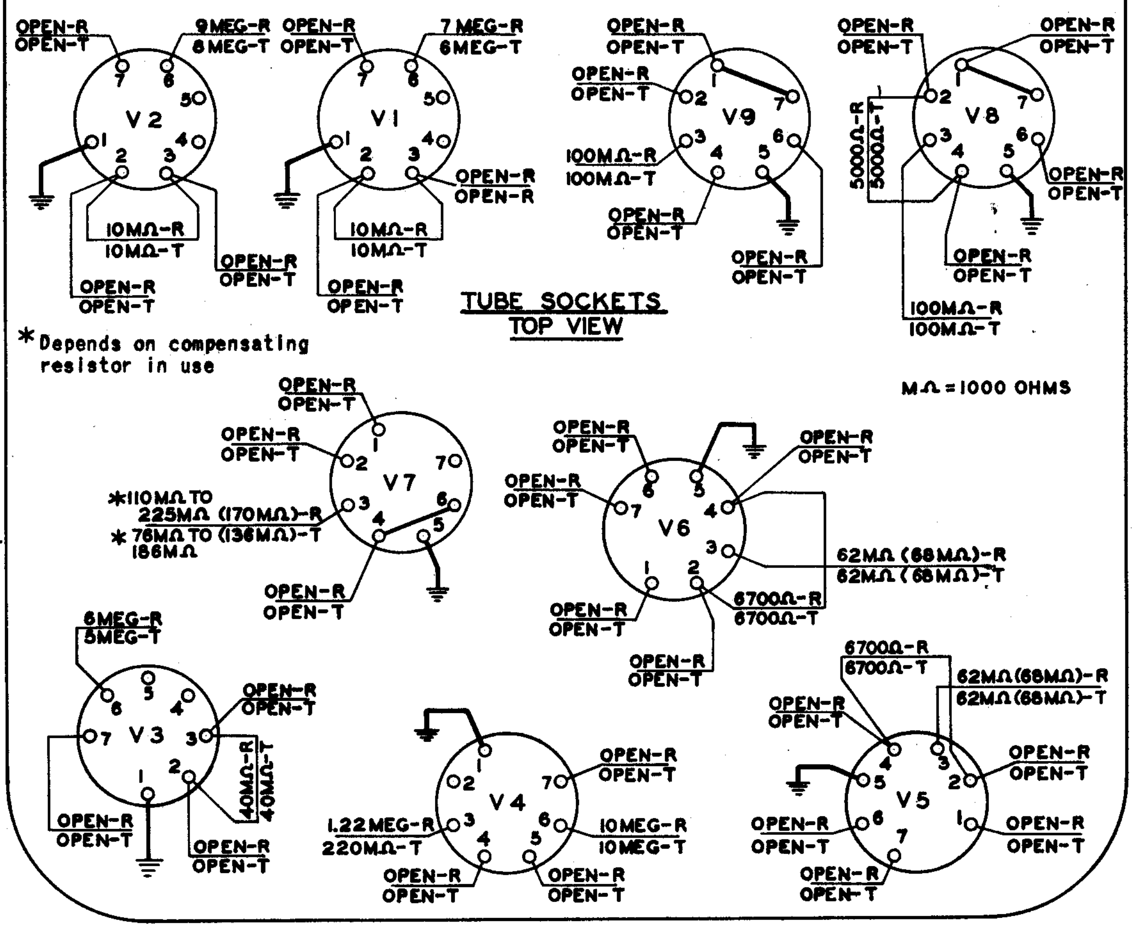
RESISTANCE MEASUREMENTS

Measurements made from point to chassis except where shown point to point

Values in parentheses apply only to BC-745-A

All tubes and battery removed   Cord CD-571 disconnected   Tuning unit BC-746 in place.

R indicates receive position
T indicates transmit position



VOLTAGE MEASUREMENTS

See SPECIAL NOTE on page 1

See SPECIAL NOTE on page 1

Measurements made to chassis using 1000 ohm/volt meter.

Fil volts read on 3v range.

Bias volts read on 30v range.

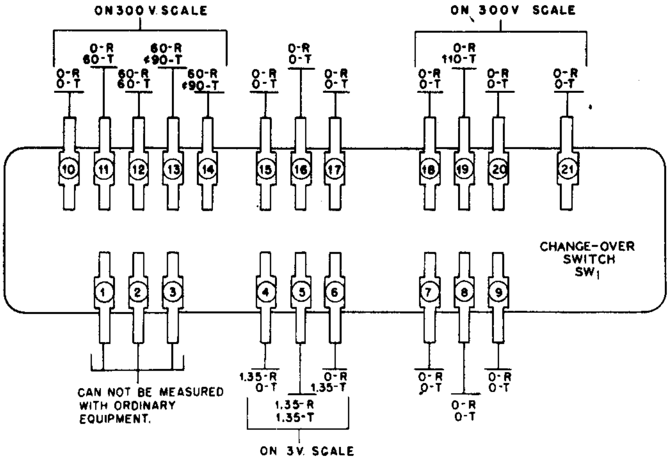
All others read on 300v range.

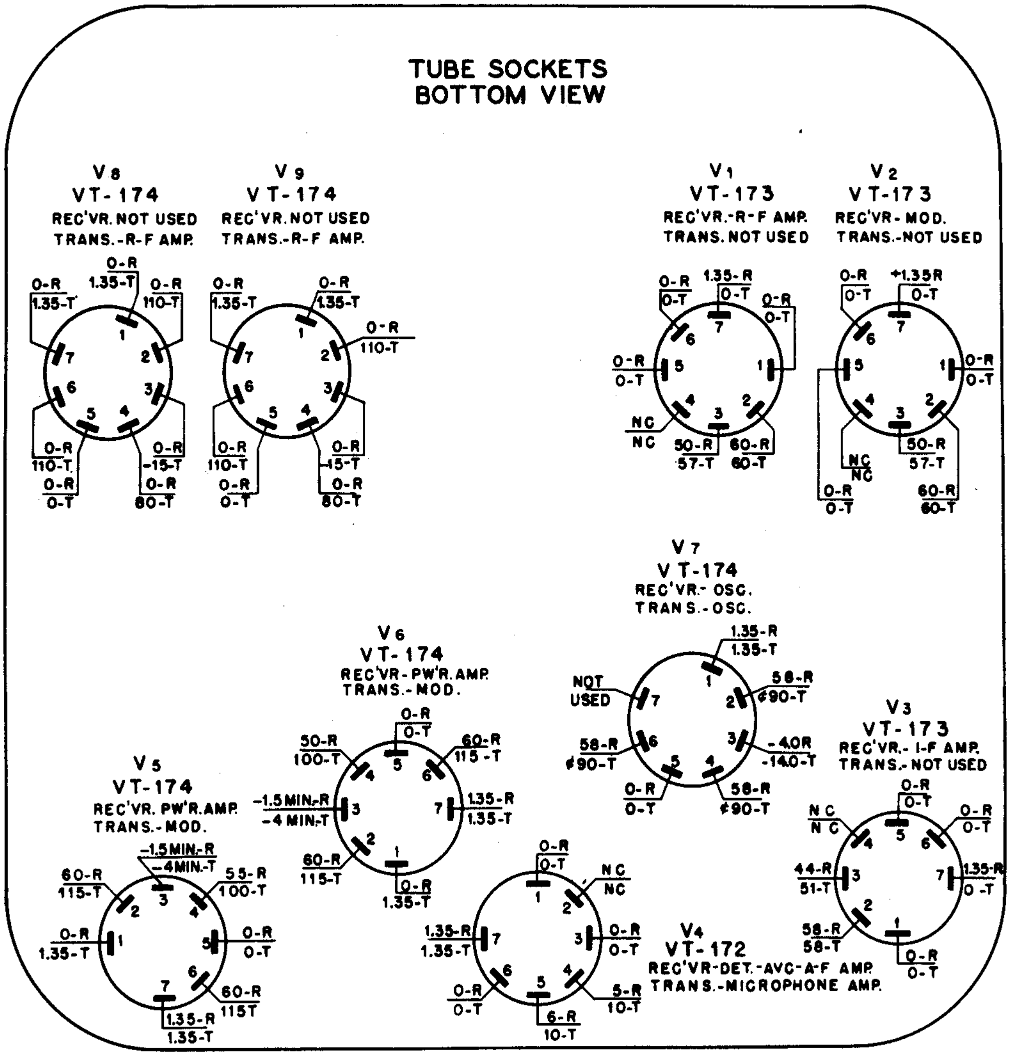
R indicates receive position.

T indicates transmit position.

NC indicates not connected.

¢ 120v in BC-745-A





ALIGNMENT

A signal generator must first be set *exactly* to the channel frequency of the tuning unit in use. This frequency is marked on the transmitter crystal and is visible through the window of Tuning Unit BC-746-(*).

The signal generator may be set to this frequency by means of an *accurately calibrated* Frequency Meter Set SCR-211. However, the following method is recommended as being more convenient and reliable:

1. Turn on Radio Set SCR-511-(*) in transmit position. This set may be the one to be aligned, or any other transmitting on the same channel (frequency).
2. Pick up this signal on any receiver that is capable of being tuned to the channel frequency. This receiver may be any available SCR-511 that operates on the same channel.
3. Turn on signal generator (unmodulated) and set to same frequency as receiver.
4. Adjust signal generator frequency to zero beat with transmitter. Signal generator is now accurately set, but should be checked for drift from time to time.
5. Connect an output meter through a Plug PL-55 inserted into jack J_1 on top of Chest Unit T-39.

I-F ALIGNMENT

1. Connect signal generator to antenna through a 0.1 μf capacitor and work with as weak a signal as practicable.
2. Adjust trimmers C_8, C_9, and C_{12} in transformers T_1 and T_2 for max on output meter.

R-F ALIGNMENT

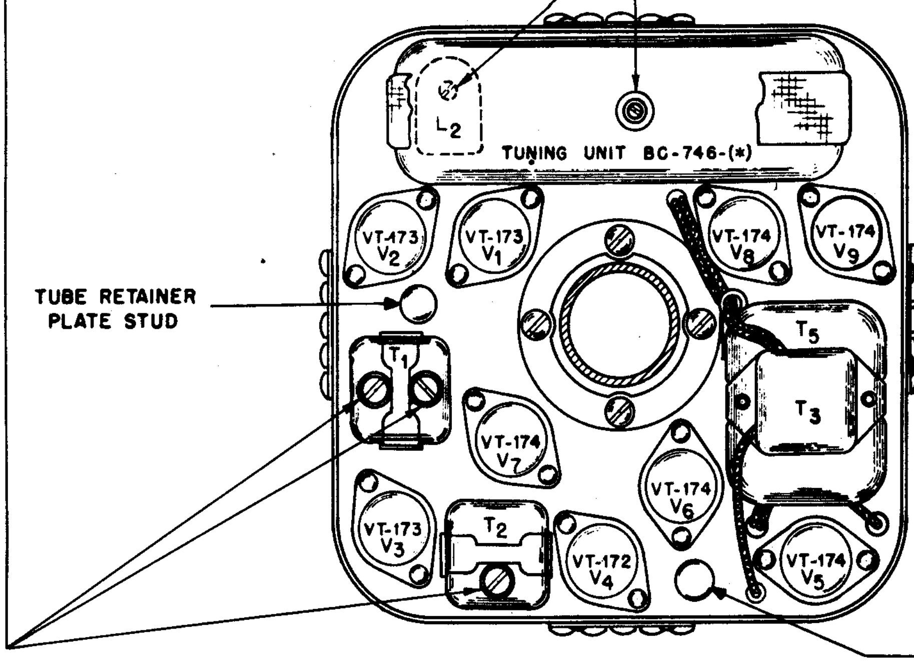
1. With signal generator connected as above, adjust its output to give about a 1.5-volt reading on output meter.
2. Rotate r-f coil L_2 tuning screw for maximum response while pressing inward on tuning screw.

NOTE: Fiber case of Tuning Unit BC-746 must be removed for this adjustment.

ANTENNA ALIGNMENT

1. Attach a short piece of wire to the signal generator as an antenna. Adjust its output and/or location to prevent too strong a signal input to SCR-511.
2. Fully extend the antenna of SCR-511. Since antenna capacity forms part of the tuned circuit, any abnormal capacities existing during alignment will detune this circuit and imperfect alignment will result. Therefore, place the set where the antenna will be well clear of all objects, preferably out doors or in a large high room without wiring or other metallic objects overhead.
3. With the set in the receive position, adjust the antenna capacitor C_{29}(C_{22} in BC-746-A) for max on output meter. This setting is also the correct adjustment for transmitter operation.

NOTE: An alternate signal source may be another set operating on the same channel at a distance of 2 to 3 miles instead of the signal generator.



NOTE:
TUBE RETAINER PLATE (NOT SHOWN) MUST BE IN PLACE WHEN MAKING ALIGNMENT ADJUSTMENTS.

COMMON FAULTS AND CORRECTIVE MEASURES

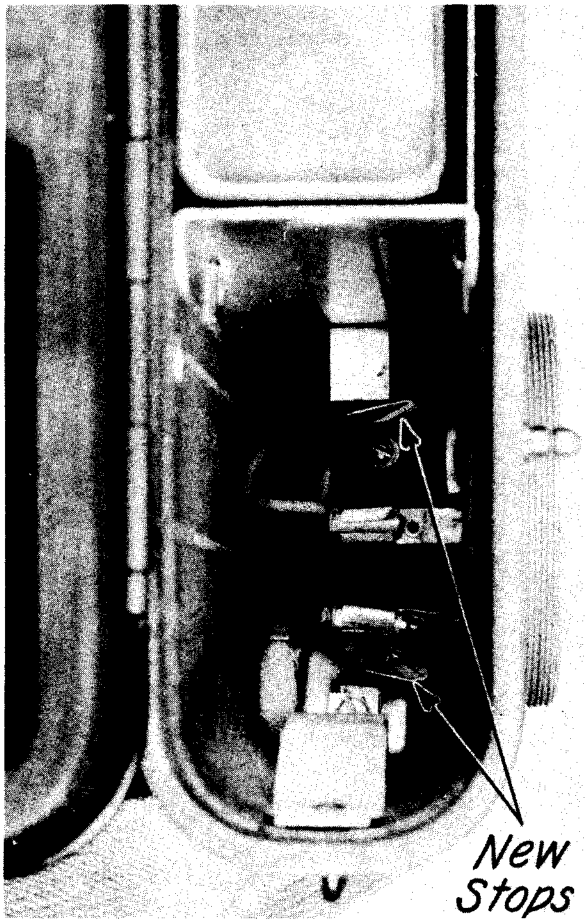
BROKEN CHASSIS STAFF SUPPORT CASTING

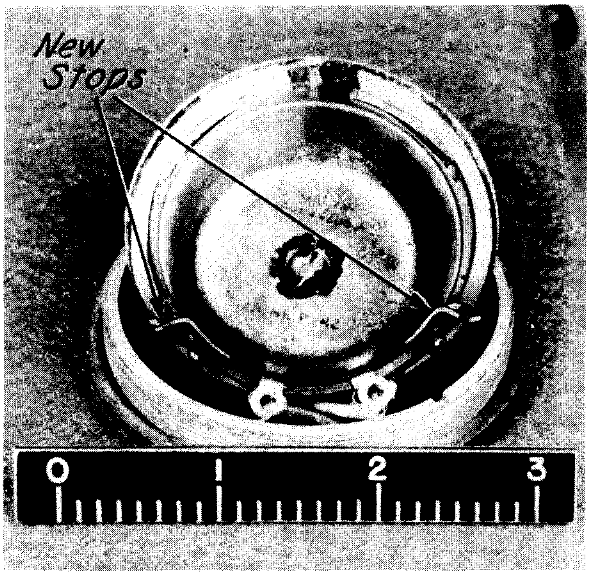
1. Frequent cases have been reported of the breaking of the chassis staff support casting in Radio Set SCR-511-A.
2. A new die casting of stronger construction has been designed and will be available for requisition when procurement is completed.
3. In every case of breakage of this support casting, replacement should be made with a casting of the new design if available.
4. If a casting of the new design is not available, the broken casting should be welded in the manner outlined in OCSigO Maintenance Letter No. 28 (1943). This will provide a support of greater strength than the original casting.

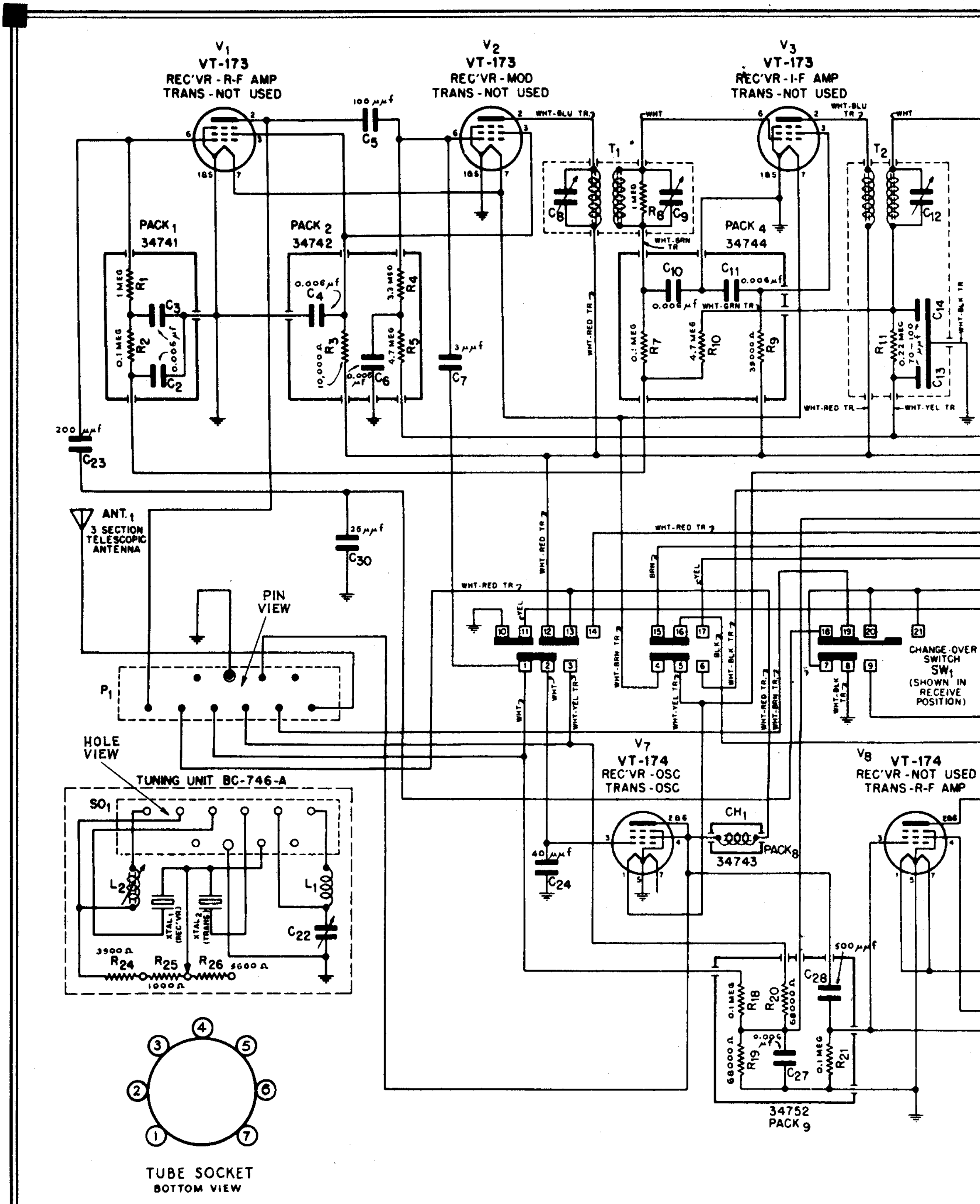
TURNING OF SPEAKER MICROPHONE IN CHEST UNIT T-39

1. A number of failures in the Chest Unit T-39-A, a part of Radio Set SCR-511-A, have been experienced because of turning of speaker-microphone when mouthpiece is adjusted, with consequent shorting of lugs.
2. Stops, which are essentially projections, have been designed to prevent turning of the speaker-microphone. A stop is fastened next to the shell of the speaker-microphone by each of the two fiber terminal strip mounting screws. When in place the two stops prevent turning by abutting other parts in the speaker-microphone compartment. See the attached photographs.
3. Those stops can be made from available material such as a ½ inch strap of #21 galvanized steel. To make a stop, cut off a piece about 3/4 inch long from the metal strap, bend ¼ inch from one end to form an "L", and round off sharp corners. A #27 hole centered in the long leg of the stop provides for fastening.
4. It is recommended that all Chest Units T-39-A, whenever in the repair shop, be provided with stops.
5. On future procurement all Chest Units T-39-A will be provided with stops.

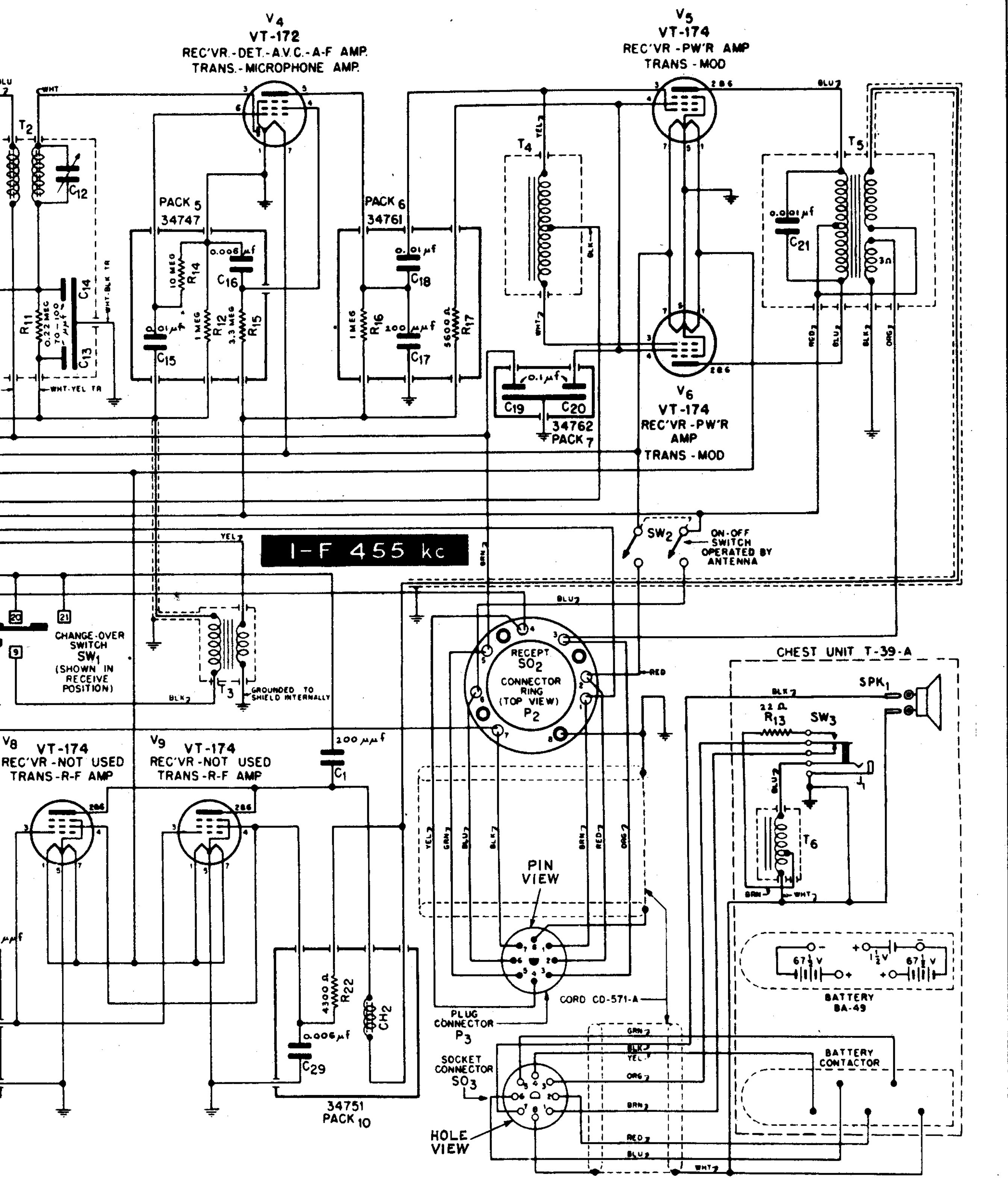
Ref: OCSigO Maintenance Letter No. 27 (1943)



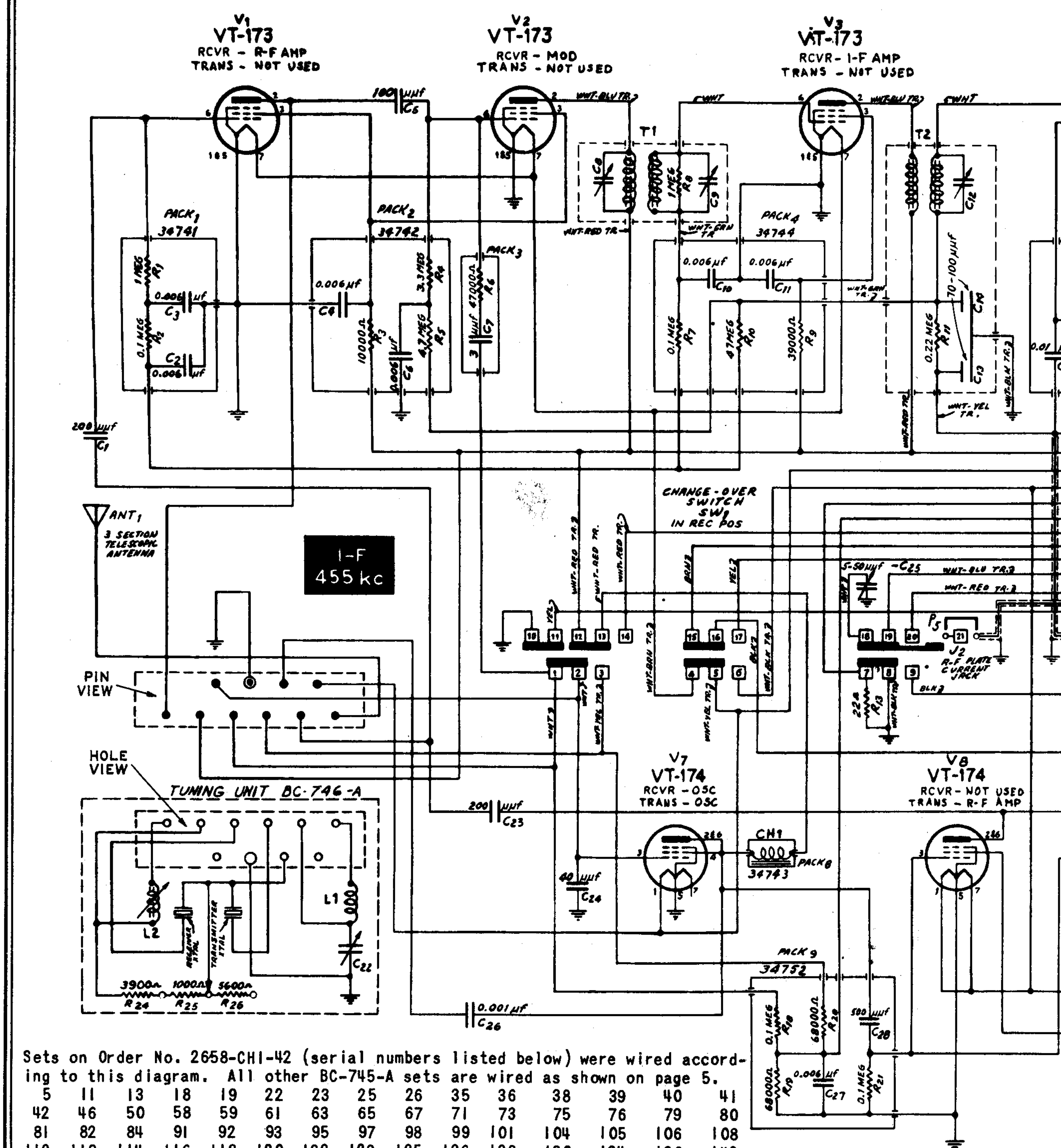




Schematic—BC-745-A (Late) including Tuning U



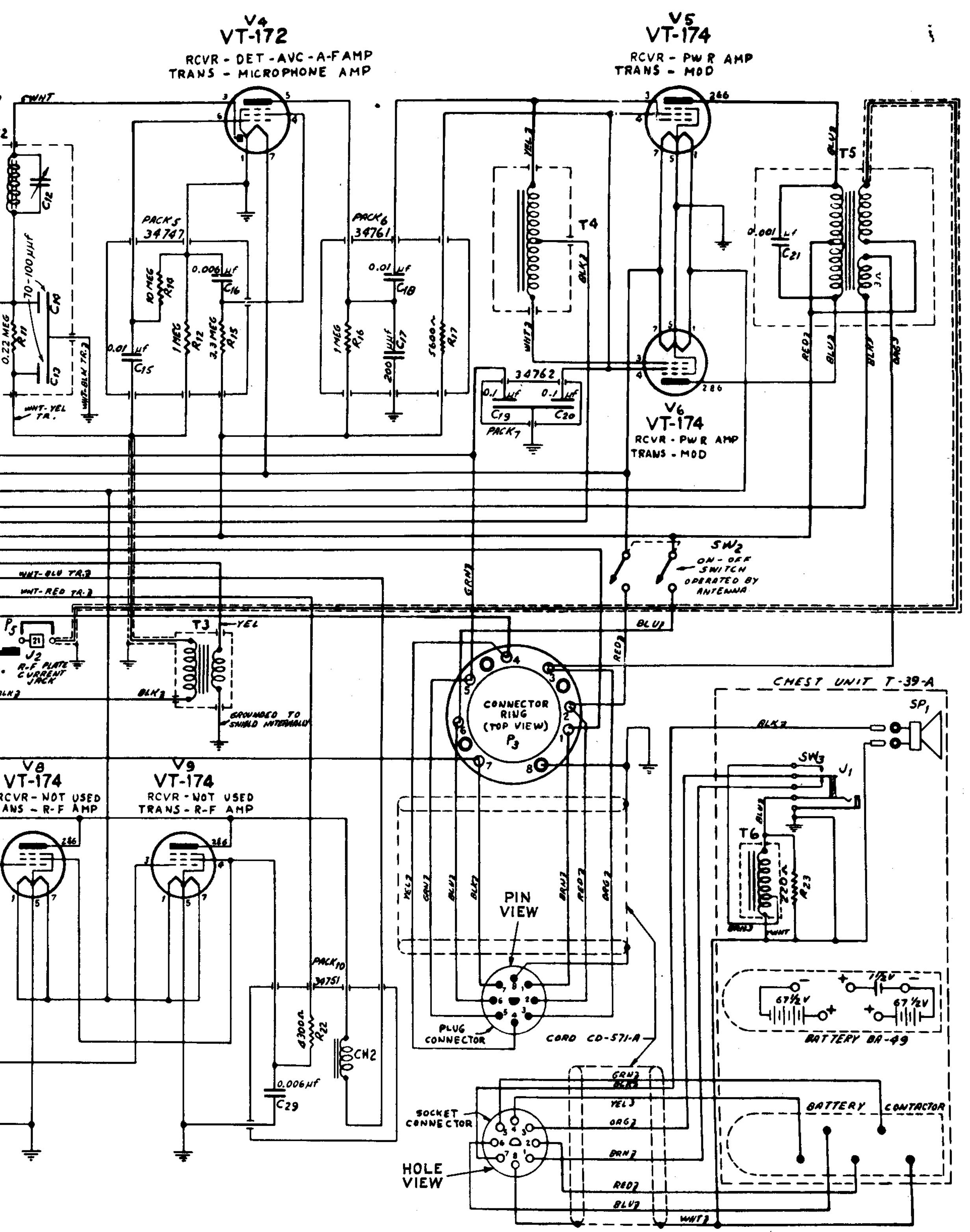
luding Tuning Unit BC-746-A and Chest Unit T-39-A.



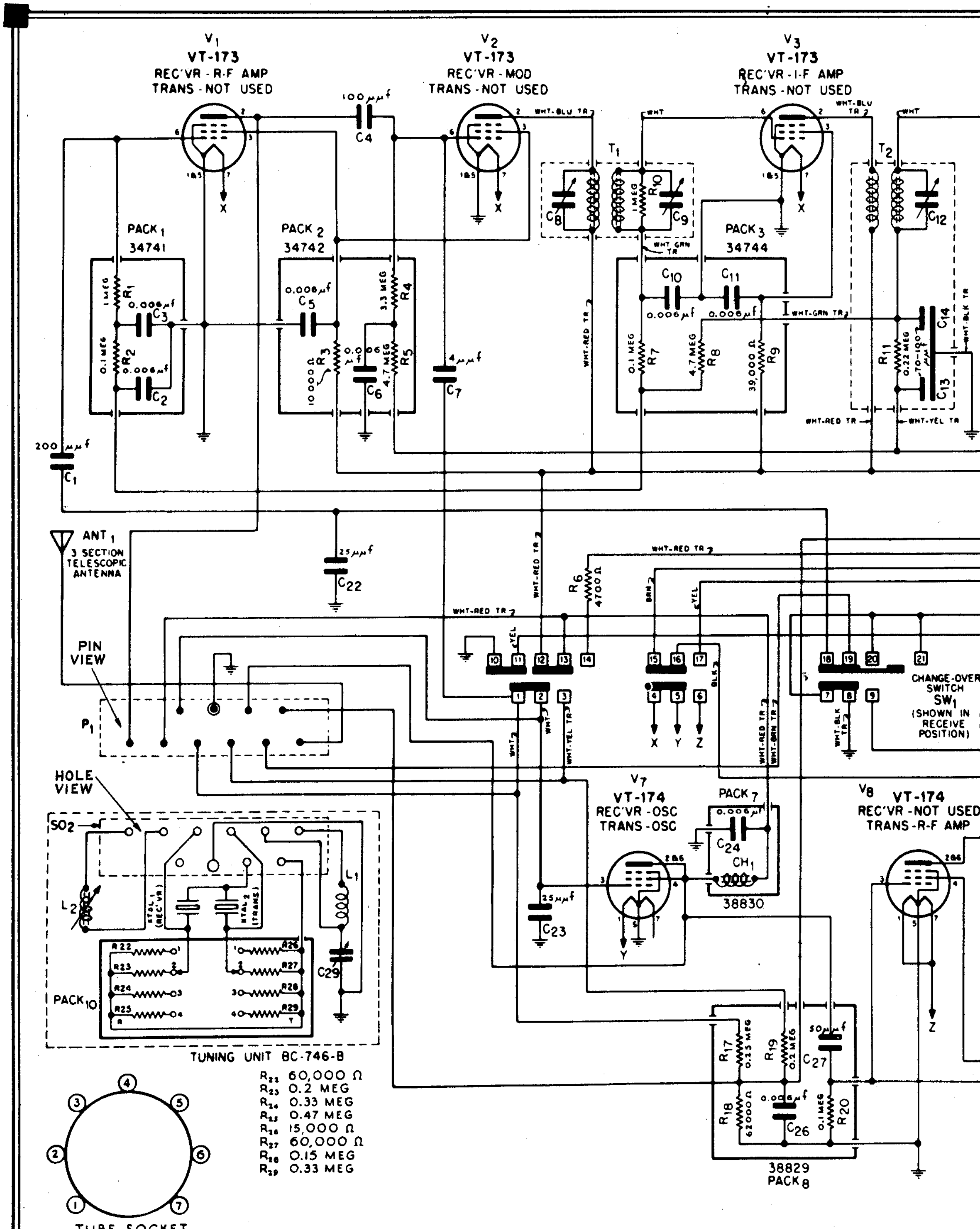
Sets on Order No. 2658-CHI-42 (serial numbers listed below) were wired according to this diagram. All other BC-745-A sets are wired as shown on page 5.

5	11	13	18	19	22	23	25	26	35	36	38	39	40	41
42	46	50	58	59	61	63	65	67	71	73	75	76	79	80
81	82	84	91	92	93	95	97	98	99	101	104	105	106	108
112	113	114	116	118	120	122	123	125	126	128	130	134	136	142
148	151	152	154	161	164	167	168	170	181	182	185	186	187	188
192	193	194	200	246	269	272	275	276	277	279	280	287	294	296
297	303	310	359	362	365	370	379	386	388	2415	2417	2423	2425	2436

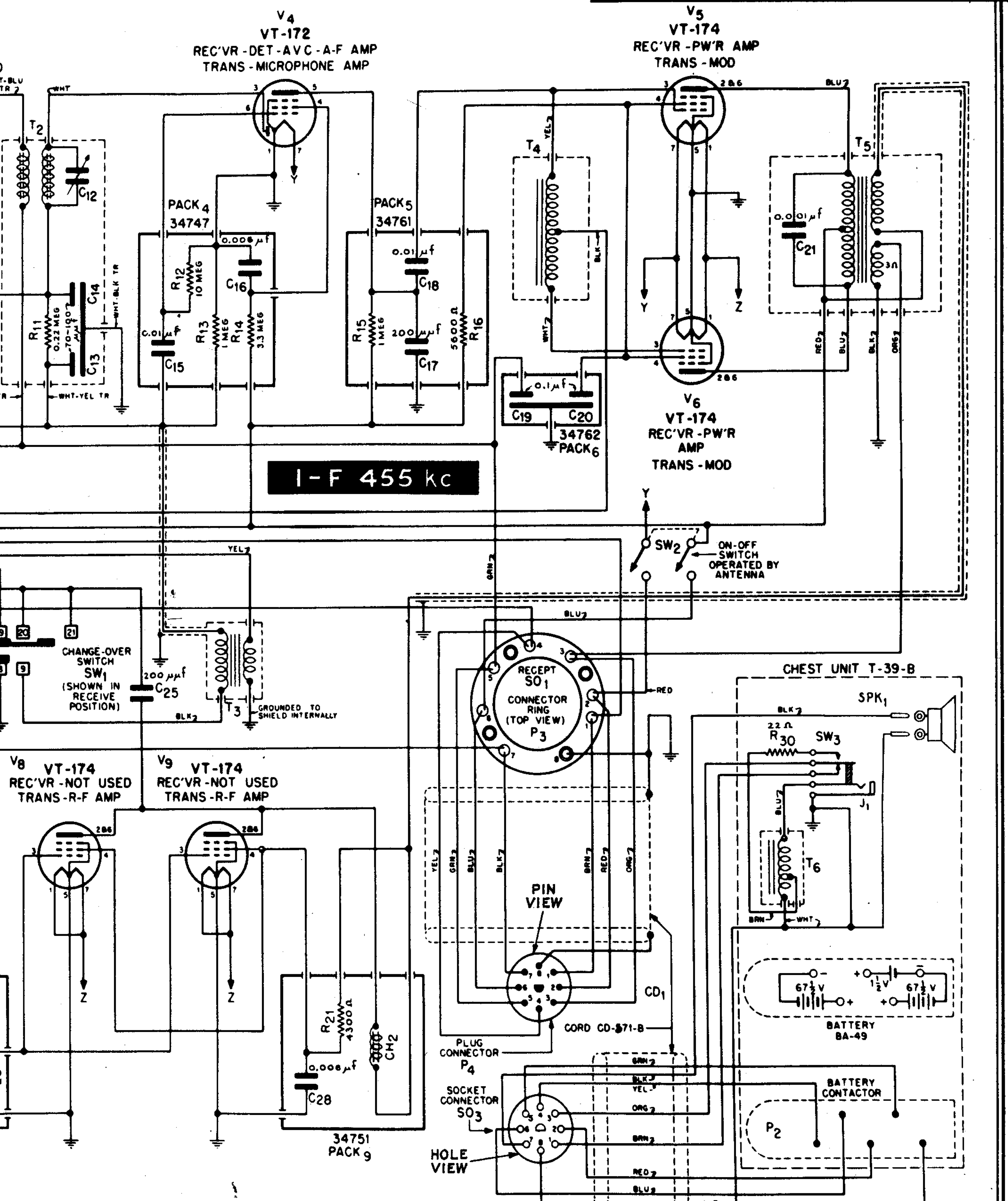
Schematic—BC-745-A (Early) including Tuning Unit



ing Tuning Unit BC–746–A and Chest Unit T–39–A.



Schematic—BC-745-B including Tuning Unit



...ding Tuning Unit BC-746-B and Chest Unit T-39-B.

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RADIO RECEIVER BC-764, BC-779, BC-794, BC-1004-(*), & SUPER-PRO

MODELS AND DESIGN DIFFERENCES

The following are major differences in design in the various models of Super Pro receivers. Manufacturer's nomenclature and means of distinguishing these models are included, since Signal Corps "BC--" designations have been given only to late procurements of these sets.

SP-10 SERIES, EARLY ISSUE: The following items distinguish this model from other models.

1. Name plate with order no. and NY-35 on front panel.
2. Two gain (sensitivity) controls; 1 for r-f, 1 for i-f.
3. Output transformer with single (600 ohm) secondary winding; phone or speaker terminals at rear of set. See schematic wiring diagram.
4. "Phone-Speaker" switch on front panel.
5. No crystal filter.
6. 5Z3 and 1V rectifier tubes in power supply.
7. Tubes used - all glass types, as follows: 1st r-f--6D6, 2d r-f--6D6, 1st det.--6A7, h-f osc.--6C6, 1st i-f--6D6, 2d i-f--6D6, 3d i-f--6D6, 2d det.--6B7, 1st a-f--76, driver a-f--42, p.p. output--2-42's beat osc.--6C6, and avc amp. -- 6B7.
8. Frequency bands - 5.

SP-10 SERIES, LATER ISSUE: These models may be identified by:

1. Name plate on front panel with order no. plus NY-37.
2. Output transformer with two secondary windings, one high-impedance (8000 ohms) and one low-impedance (600 ohms). Terminals for phones and speaker at rear of set.
3. *No "Phone-Speaker" switch* on front panel.

All remaining design features same as that given for "early issue" SP-10 model.

SP-110 SERIES RECEIVER. Has all the features given for the "late" issue of SP-10 model, excepting for differences listed below which distinguish it from its predecessors.

1. *No name plate.* All have name etched in front panel.
2. Supplied in 3 models; SP-110-LX (long-wave), SP-110-X (standard), and SP-110-SX (short-wave).
3. Crystal filter circuit employed, except in LX model. See schematic wiring diagram.
4. Glass and metal tubes used, as follows: 1-6J7--h-f osc., 2-6K7--r-f amplifiers, 3-6D6--i-f amplifiers, 1-6L7--1st det., 1-6C6--beat osc., 2-6B7--2d det. and AVC, 1-6C5--1st a-f amp., 3-6F6--driver and class AB push-pull output, 1-5Z3--h-v (plate) rectifier, 1-80--grid bias rectifier.
5. A few early production models of this series, employ electrolytic filter capacitors. Remainder use dykanol oil filtering capacitors.

SUPER PRO-200 SERIES: This is the current series to which the Signal Corps has applied the following nomenclature to three receiver models and 3 types of power supplies.

a. BC-779, which covers the frequency ranges of 100 to 400 kc and 2.5 to 20.0 mc.
b. BC-794, which covers a continuous range of from 1250 kc to 40.0 mc.
c. BC-1004-(*), which covers a continuous range of from 540 kc to 20.0 mc.
d. RA-74-(*), power supply for any above, to operate from 115/230 volts AC, 25-60 cycles.
e. RA-84-(*), power supply for any above, to operate from 115 volts AC, 50-60 cycles.
f. RA-94-(*), power supply, for any above, to operate from 115/230 volts AC, 50-60 cycles.

In all other respects, except for differences noted, the BC-779, the BC-794, and the BC-1004-(*) are basically similar to the models in the SP-110 series. The differences are:

1. Metal type tubes employed in these models.
2. Crystal filter circuit used in all models.

The BC-764 model, part of SCR-244-A, is identical to and replaced by BC-1004-A.

VOLTAGE MEASUREMENTS

Measurements given below are for the SP10, SP-110, and SP-220 (BC-779, 794 and 1004) models. Measurements for the SP-10 and SP-110 were made on a 120-volt a-c power supply line with line voltage adjustment (power transformer primary tap) set at the 125 volt tap. R-F, I-F and AUDIO GAIN controls should be set at minimum; AVC-MANUAL should be in the MANUAL position, the CW-MOD switch in the CW position; SEND-RECEIVE switch in the RECEIVE position. D-c voltage readings were obtained with a 1,000 ohms/volt voltmeter, *using the chassis as a common terminal*. The 6.3 volt a-c filament reading is obtained between chassis and terminal no. 2 on the receiver terminal strip (see fig. 1). Terminal no. 10 on strip is blank except when used for battery operation in which case it provides a short to chassis with power switch ON, and open circuit when power switch is OFF. Voltages within ± 10% of values given are considered satisfactory.

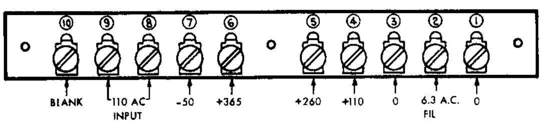


FIG. 1- VOLTAGES AT TERMINAL STRIP OF RECEIVER (Rear Of Chassis)

VOLTAGE MEASUREMENTS (cont'd)

SP-10 MODEL

Tube VT	RMA	Function	Plate Voltage	Screen Voltage	Cathode Voltage	Plate Current Milliamps.
None	6A7	Ist Detector	260	80	0	3.0
None	6C6	H-f Oscillator	275	110	0	2.5
VT-69	6D6	Ist r-f	275	110	0	1.5
VT-69	6D6	2d r-f	275	110	0	1.5
VT-69	6D6	Ist i-f	275	110	0	2.0
VT-69	6D6	2d i-f	275	110	0	2.0
VT-69	6D6	3d i-f	275	110	0	2.0
VT-68	6B7	2d Detector	260	100	0	3.0
VT-68	6B7	A. V. C.	230	145	45	7.0
None	6C6	Beat Osc.	150	30	0	0.4
VT-76	76	Ist Audio	175	0	0	2.5
None	42	Driver	260	260	0	23.0
None	42	Class AB Audio	360	360	35	21.0
None	42	Class AB Audio	360	360	35	21.0

SP110 and 210 Models

Tube VT	RMA	Function	Plate Voltage	Screen Voltage	Cathode Voltage
VT-87	6L7	Ist Detector	240	100	0
VT-91	6J7	H-f Oscillator	225	150	0
VT-86	6K7	Ist r-f	250	100	0
VT-86	6K7	2d r-f	250	110	0
VT-67	6D6	Ist i-f	250	110	0
VT-69	6D6	2d i-f	250	100	0
VT-69	6D6	3d i-f	250	100	0
VT-68	6B7	2d Detector	225	100	0
VT-68	6B7	A.V.C.	230	140	30
None	6C6	Beat Osc.	105	110	0
VT-65	6C5	Ist Audio	150	0	0
VT-66	6F6	Driver	250	250	0
VT-66	6F6	Class AB Audio	360	360	35
VT-66	6F6	Class AB Audio	360	360	35

The voltage measurements below are based on a line voltage exactly equal to the primary tap on the power transformer. Higher or lower line voltage should result in corresponding variations in measurements. All controls should be set as specified for models above. The LIMITER switch, in these models, should be ON. Measurements are made to socket terminal number indicated and chassis. A meter having a resistance of 1000 ohms/volt should be used.

BC-779, BC-794 and BC-1004 (SP200 series).

Tube VT	RMA	Socket No.	Volts at Socket 3	4	Terminal 5	Number 6	* 7	8
VT-86	6K7	X1A	+250	+135	---	+135	6.3AC	0
VT-86	6K7	X2A	+250	+135	---	+135	6.3AC	0
VT-87	6L7	X3A	+250	+115	---	---	6.3AC	0
VT-91	6J7	X4A	+150**	+150**	+150**	---	6.3AC	---
VT-86	6K7	X5A	+250	+135	0	---	6.3AC	0
VT-117	6SK7	X6A	0	-43	0	+135	6.3AC	+250
VT-117	6SK7	X7A	0	-1.5	0	+100	6.3AC	+240
VT-90	6H6	X8A	-0.2	+0.4	-0.2	---	6.3AC	+0.4
VT-96	6N7	X9A	+0.4	0	0	+0.4	6.3AC	-0.2
VT-116	6SJ7	X10A	0	---	0	+40	6.3AC	+155
VT-117	6SK7	X11A	0	-1.5	0	+110	6.3AC	+240
VT-90	6H6	X12A	-3.2	-3.2	-3.2	---	6.3AC	-3.2
VT-65	6C5	X13A	+110	---	---	-3.2	6.3AC	0
VT-66	6F6	X14A	+240	+240	---	-20	6.3AC	0
VT-66	6F6	X15A	+380	+380	0	---	6.3AC	+38
VT-66	6F6	X16A	+380	+380	0	---	6.3AC	+38

* Terminals 1 and 2 of all sockets are at zero potential with respect to chassis.
** Varies widely with different tubes; also with dial setting.

ALIGNMENT

The alignment instruction which follows applies to all Super Pro models previously listed. Alignment frequencies for the various bands, and the location of the trimmers for each band, are shown in figure 2 below.

NECESSARY EQUIPMENT. The following apparatus is required for satisfactory alignment of these receivers:

Signal Generator I-72-(*) or equivalent.
Frequency Meter Set SCR-211-(*).
Output meter.
Insulated screw driver, to fit trimmer screws.
1 Mica fixed capacitor 100 or 250 $\mu\mu$f.
1 100-ohm 1/2-watt carbon resistor.

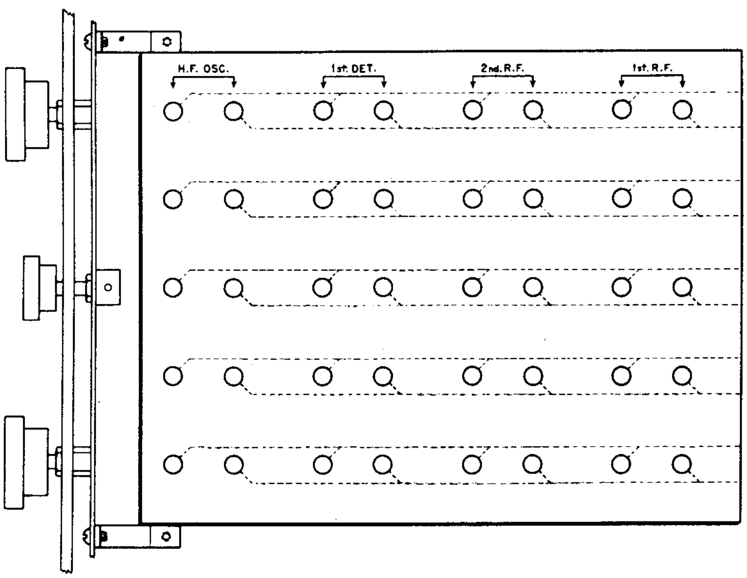
PROCEDURE:

1. Using Frequency Meter Set SCR-211-(*), and any operating receiver, check the accuracy of the calibration of the I-72-(*) signal generator. It is important that an accurately calibrated signal generator producing tone modulated signals be employed for this alignment work.
2. Turn receiver "on" and allow to warm up for at least 30 minutes before beginning adjustments.
3. Connect output meter to SPKR terminals located at rear of receiver chassis.

I-F ALIGNMENT

1. Set signal generator for 465 kc and connect output to the control grid cap of the 6L7 first detector through the mica fixed capacitor. Do not remove grid lead to tube.
2. Set receiver front panel controls as follows: SENSITIVITY to 10, AVC-MANUAL to AVC, MOD-CW to MOD, SEND-REC to REC, BAND SWITCH to 2.5-5.0 mc band, AUDIO GAIN to 10 (maximum), CRYSTAL SELECTIVITY to 3, CRYSTAL PHASING to arrow (approx. 5), BAND WIDTH to 3, Band Spread Dial to 100. The main tuning dial should be set near 2.5 mc, but care must be taken to avoid tuning in any local signal.
3. With modulation "off" on signal generator, tune generator slightly until maximum deflection of "S" meter is obtained. Do not disturb the setting of the tuning dial on the signal generator once this is obtained until the i-f's are completely aligned. This will insure exact agreement of i-f adjustment with the resonant frequency of the quartz crystal in the crystal filter circuit.
4. Turn modulation "on" on signal generator. Reset receiver controls: CRYSTAL SELECTIVITY to OFF, AVC-MANUAL to MANUAL, and SENSITIVITY advanced until a suitable output meter (5 or 10 volts) reading is obtained. Adjust upper (grid) and lower (plate) trimmers in i-f transformer T2A and T3A, and the single trimmer in T4A, for peak reading of the output

R.F and H.F. OSC.
ALIGNMENT FREQUENCIES



BC-1004-(*)	BC-794-(*)	BC-779-(*)
20.0 MC.	20.0 MC.	20.0 MC.
10.0 MC.	10.0 MC.	10.0 MC.
10.0 MC.	10.0 MC.	10.0 MC.
5.0 MC.	5.0 MC.	5.0 MC.
5.0 MC.	40.0 MC.	5.0 MC.
2.5 MC.	20.0 MC.	2.5 MC.
2500 KC.	5.0 MC.	380 KC.
1200 KC.	2.5 MC.	220 KC.
1100 KC.	2500 KC.	190 KC.
590 KC.	1260 KC.	110 KC.

Fig. 2.—Location of adjusting trimmers, and aligning frequencies.

ALIGNMENT (cont'd)

meter. Reduce SENSITIVITY control as output meter increases beyond half-way mark. Adjust lower trimmer screw only in T1A; the upper screw can only be properly adjusted by "visual" method employing a frequency modulated oscillator and oscilloscope.

AVC ALIGNMENT CHECK

1. Leave all controls as set for i-f alignment, including setting of signal generator.
2. Reduce AUDIO GAIN to 0, switch to AVC and increase SENSITIVITY to 10 (maximum).
3. Slowly increase AUDIO GAIN until half-scale output meter reading is obtained, then adjust single trimmer screw in T6A for *minimum* output meter reading. The "S" meter reading should "peak" at the same time the output meter reading "dips".

B-F OSCILLATOR ALIGNMENT CHECK

1. Continue with controls as above, leaving signal generator tuned to same frequency but modulation switch "off".
2. Disconnect output meter and replace with loudspeaker, or employ pair of headphones plugged into receiver.
3. Throw SIGNAL switch to CW, BEAT OSCILLATOR knob to exactly zero.
4. If tone in headphones (or speaker) is not very low in pitch, readjust trimmer screw at bottom of T5A until suitable low tone, or zero beat is obtained. Turning BEAT OSCILLATOR knob off 0, either side, should result in audible tone rising in pitch as knob is turned away from 0.

H-F OSCILLATOR ADJUSTMENT

This adjustment should only be performed when it has been determined that the receiver dial calibration is sufficiently in error to require correction. Refer to figure 2 for location of h-f oscillator adjustments and aligning frequencies. Employ the following procedure:

1. Set BAND SWITCH to band requiring correcting; for purposes of illustration, let us assume the 2.5 to 5.0 mc band. Set signal generator for 2.5 mc, MOD-CW switch to CW, BEAT OSCILLATOR knob to 0, AUDIO GAIN TO 10, AVC-MANUAL switch to MANUAL, Band Spread at 100, and BAND WIDTH at 16. The output meter is disconnected, and headphones or loudspeaker used to make adjustments by the "zero beat" method. The signal generator is connected to the ANT. terminals through the mica fixed capacitor, and set for an unmodulated r-f signal.
2. With the signal generator set at 2.5 mc, tune the receiver dial towards approximately 5.0 mc, the 2nd harmonic of the generator's signal. At zero beat note the approximate dial error. Now rotate the receiver's tuning dial further towards 5.0 mc, until the pitch of the beat note rises to a high frequency. Adjust the trimmer capacitor designated "HF OSC 5.0 mc", until the beat note returns to zero. Continue this procedure until zero beat is obtained exactly at 5.0 mc on the receiver's dial. When this is accomplished, retune the receiver dial (do not disturb signal generator dial setting) towards 2.5 mc, and tune in the fundamental from the signal generator. Repeat the step-by-step process as before, but adjusting the inductance trimmer designated "HF OSC 2.5 mc", until zero beat is obtained exactly at 2.5 mc on the receiver dial.
3. Recheck the calibration at 5.0 mc, and make any further adjustments necessary. Repeat at 2.5 mc. This may be required, since the adjustment at one end of the dial affects to some degree the adjustment at the other end.
4. During the above process, carefully adjust the SENSITIVITY control to avoid overloading or spurious response due to excessive signal input.

R-F AND 1ST DETECTOR ALIGNMENT

1. Connect output meter to SPKR terminals at rear of receiver chassis. Connect signal generator output, through a 100 ohm resistor, to antenna terminals on receiver. Set signal generator for a modulated r-f signal, and dial for aligning frequency. Refer to figure 2 for aligning frequencies for each band. Set receiver controls as follows: MOD-CW switch to MOD; BAND SWITCH to band being aligned; AVC-MANUAL to MANUAL; SENSITIVITY adjusted to give half-scale deflection on output meter (CAUTION: Care should be given to this adjustment, so that at no time the output is much in excess of half-scale, or about 5 to 10 volts); AUDIO GAIN at 10; CRYSTAL SELECTIVITY at OFF; BAND WIDTH at 3; Band Spread dial at 100.
2. Adjust the higher frequency trimmer of each band first, for maximum output meter indication, then the lower frequency trimmer. For example, on the 2.5 to 5.0 mc band - the two aligning frequency trimmers are "2.5 mc" and "5.0 mc"; begin with the "5.0" mc trimmer. Start with trimmers in the 1st detector section, then repeat with trimmers in 2nd r-f, then 1st r-f.
3. After the alignment of each band, check the tuning of the receiver to make sure that its calibration is still correct. Some slight interaction between the 1st det and h-f osc circuits may cause a slight change in the latter's adjustment and require some slight readjustment. Repeat this check for each band aligned.
4. For maximum efficiency with a particular antenna, align the 1st r-f stage with the antenna connected to the receiver, and the signal generator's output *loosely coupled* to the antenna wire leading to the antenna terminals on the receiver. The 100 ohm resistor is not necessary, in this instance.

LOCATING TROUBLE

GENERAL: When a receiver becomes inoperative, or performs poorly, the following hints will aid greatly in localizing the defect in rapid time. Employ the sense of smell, observation, and hearing first to determine and localize all defects. (See Reference Data, this manual). A preliminary examination, using the aforementioned senses, will save much time in most instances. After determining stage in which defect is located, employ voltage and resistance measurements to isolate defect.

SYMPTOM 1.--Receiver inoperative. Tuning ("S") meter dips and rises as receiver tuning dial is rotated.
DIAGNOSIS.--Defect exists between 2d detector and final audio output. Use headphones, with .1 µf capacitor in series with one lead, on successive audio stages to localize stage.

SYMPTOM 2.--Receiver inoperative. Tuning ("S") meter does not deflect as receiver is tuned. Fuse in power supply is okay.
DIAGNOSIS.--Defect exists between antenna post and 2d detector stage of receiver, or voltage supply has failed. For check on latter, measure voltages at terminal strip for readings shown in fig. 1, page 1.

SYMPTOM 3.--Reception weak. Tuning meter does not rise to customary peaks for reception of given stations.
DIAGNOSIS.--(It is presumed that all tubes have been checked and found satisfactory). Check plate and screen voltages of r-f, 1st det., and i-f stages. Materially lowered screen or plate voltage in any given stage is usually traceable to a shorted bypass capacitor in screen or plate return circuits. Check SENSITIVITY control R41A for open circuit.

SYMPTOM 4.--Reception distorted.
DIAGNOSIS.--Use headphones with .1 µf capacitor in series with one lead, to localize in audio stages. When stage is localized, check for either open grid resistor or partially shorted (leaky) coupling capacitor.

SYMPTOM 5.--Noisy and fading reception.
DIAGNOSIS.--Make sure condition is not attributable to antenna or weather conditions. Check slider contact in SENSITIVITY control (R41A) and AUDIO GAIN control (R26A).

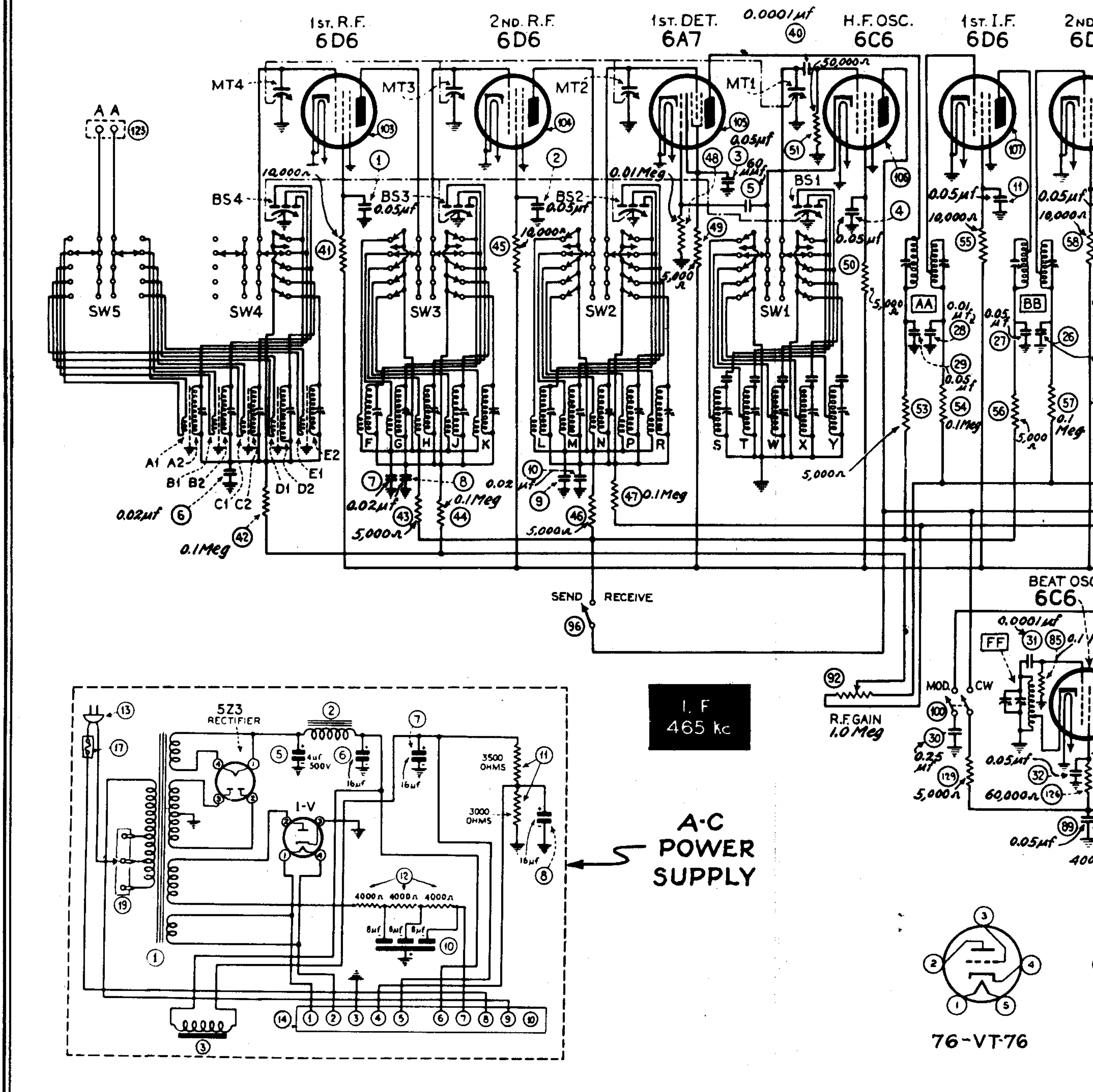
SYMPTON 6.--Objectionable hum in output.
DIAGNOSIS.--Check all voltages on terminal strip. See fig. 1. Check filtering capacitors in power supply by disconnecting positive lead from each section and charging each, then discharging by shorting with insulated handle screw driver to chassis. Capacitors in filter which do not seem to store sufficient charge, indicated by size of discharge, might be the offenders. Connect new equivalent capacitor for comparison. Check chokes in power supply for possible shorted turns or short of winding to core. Correct d-c resistances for each are given in the schematic diagram.

COMMON FAULTS AND CORRECTIVE MEASURES

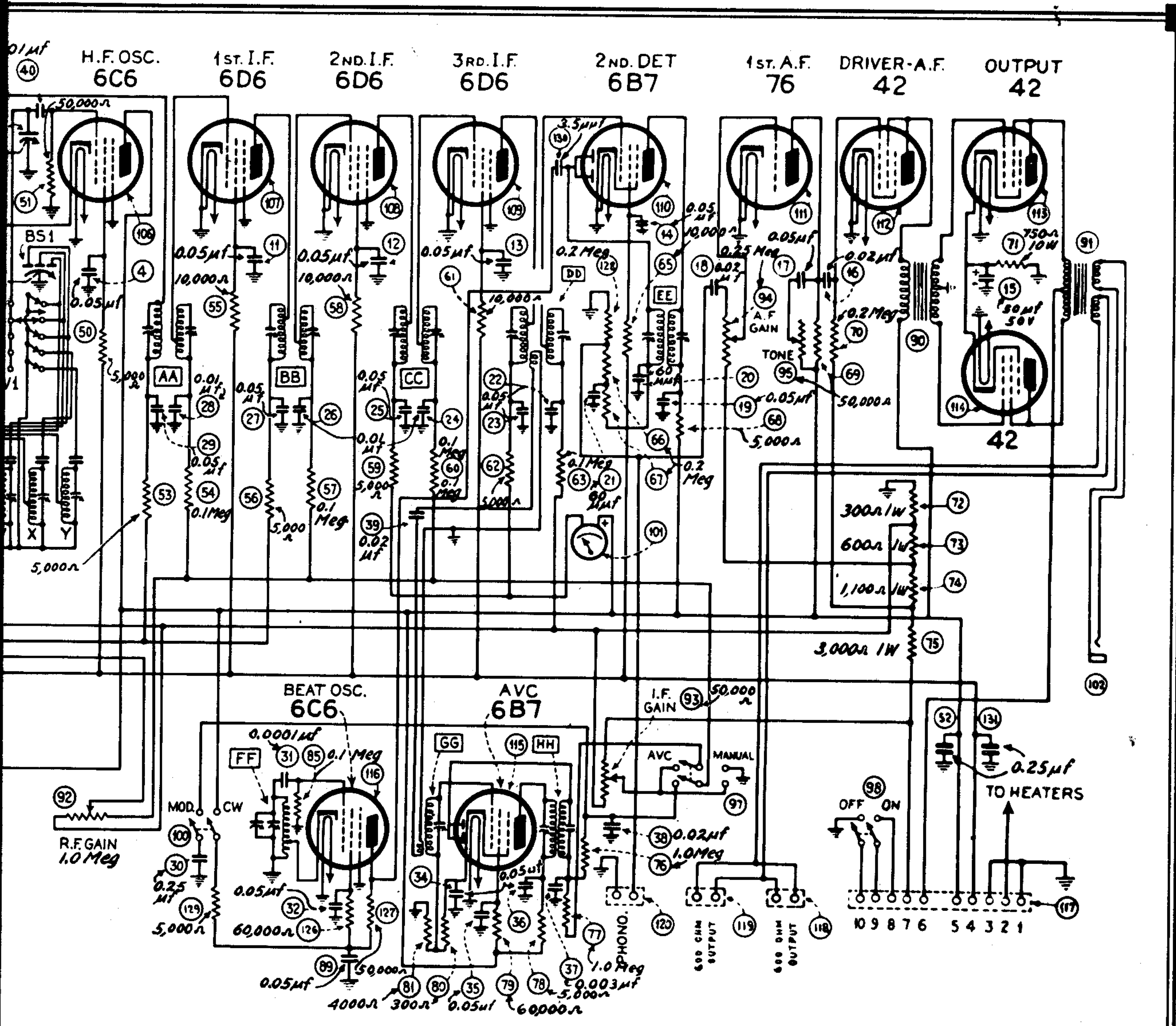
SP10 MODEL.--1. Electrolytic filter capacitors in Power Supply require replacement due to breakdown or loss of capacity due to age. In case of power supply failure, repeated burning out of fuses, check electrolytic capacitors first.

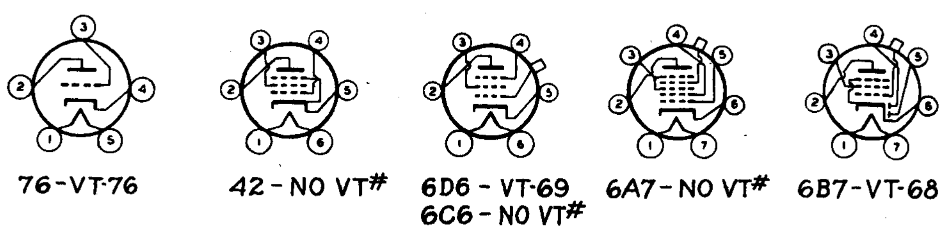
SP110 MODEL.--1. Some of the early production units of this series employ electrolytics in the filter section of the power supply. The data given above applies also to these units.

SP210 (BC-779-(*), BC-794-(*), AND BC-1004-(*) - 1. Fuse holder frequently works loose, due to forceful unscrewing of fuse-holder cap. This, in turn, twists off the connecting leads to fuse holder, removing power to power transformer. The remedy is to tighten the hex nut which clamps the fuse holder to power supply chassis, and apply a bit of vaseline to cap threads so that force will not be necessary to unscrew it. 2. Filter choke L2B (in power supply) in a few instances developed a short between some of the turns and the choke's iron core. A reduction in voltage output and objectionable hum are the symptoms. To test, it is necessary to disconnect the two wires connecting to it, and check for a resistance measurement between either filter choke terminal and case or core. If a reading is obtained, replace choke.



SCHEMATIC OF SUPER-PRO RECEIVER (SP-10 SERIES

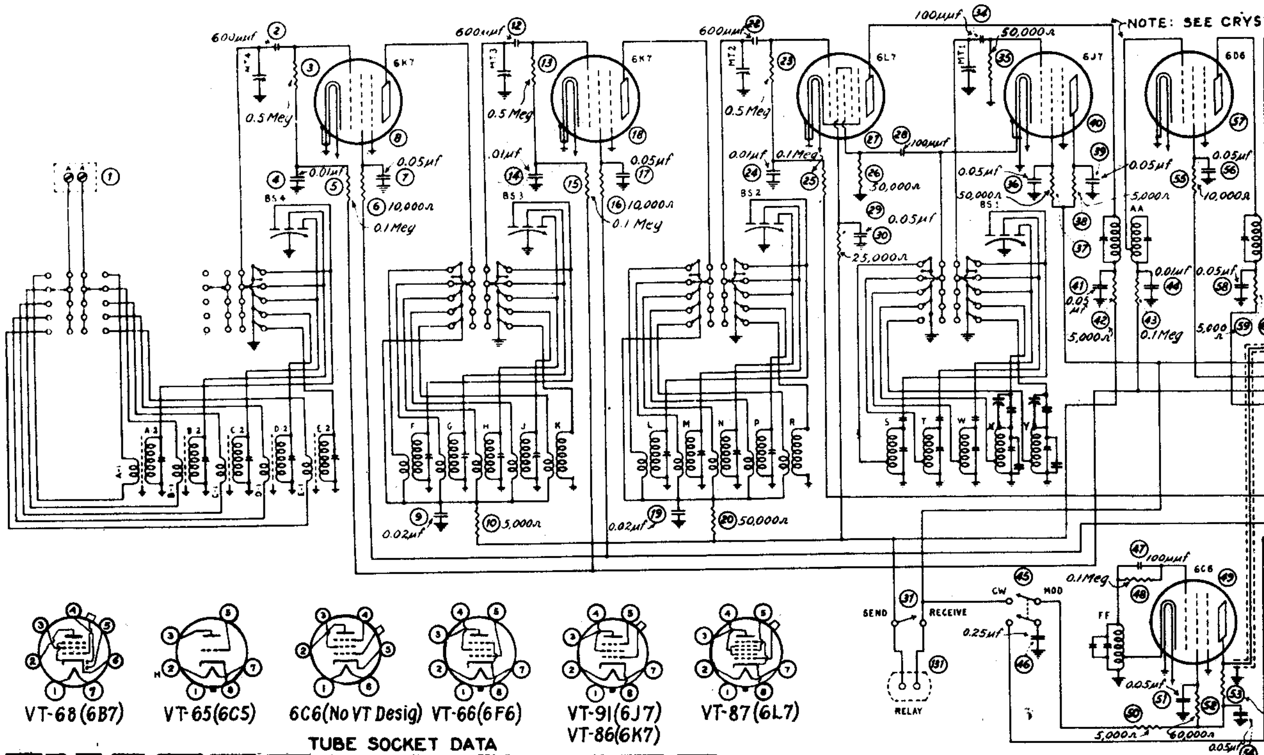


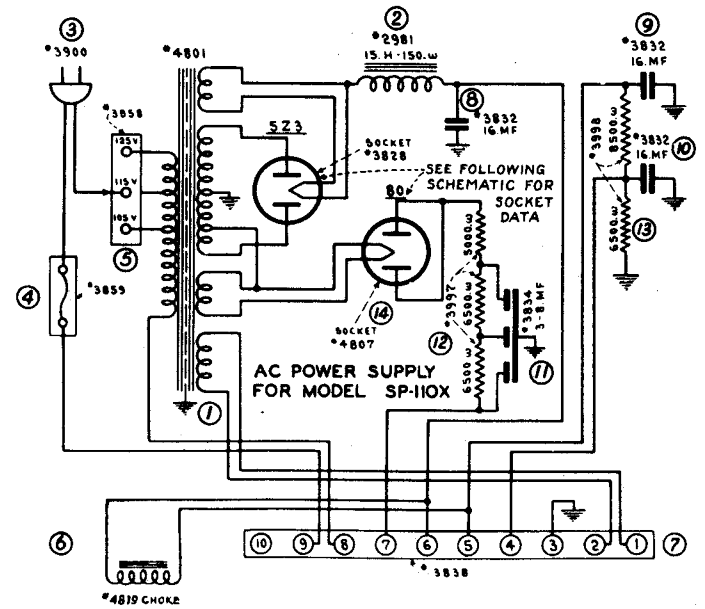


Tube socket terminals.

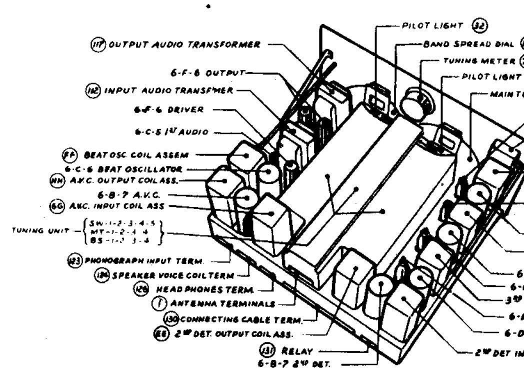
SUPER-PRO RECEIVER (SP-10 SERIES)

SCHEMATIC OF SUPER-PRO RECEIVER (SP-1

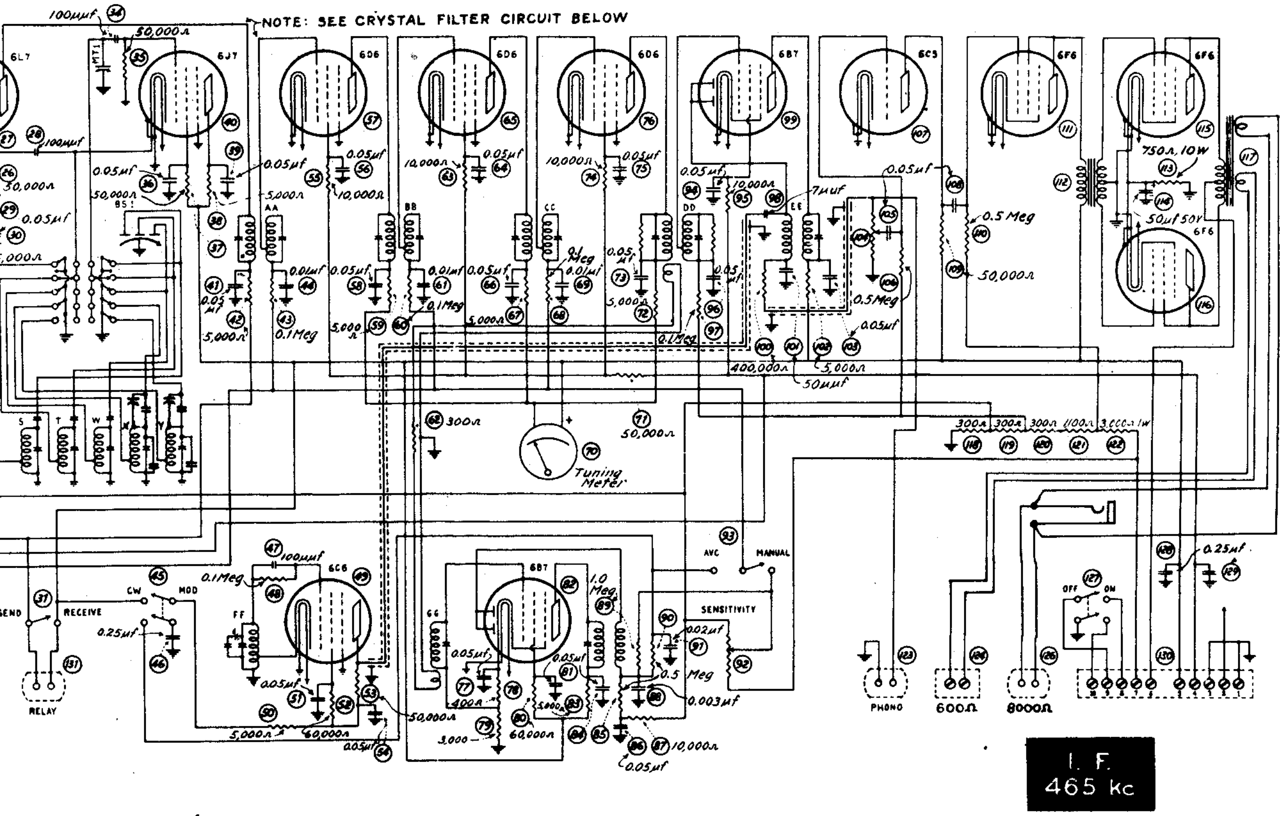




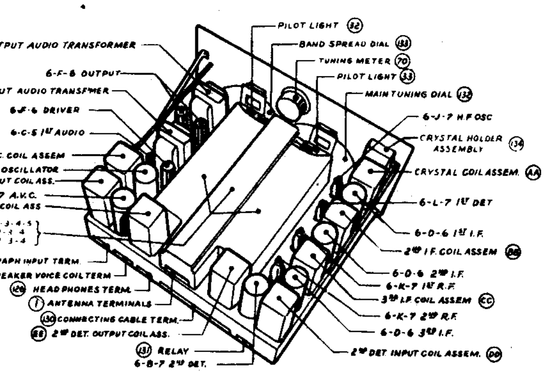
TOP CHASSIS VIEW, SP-110 & SP 120 M



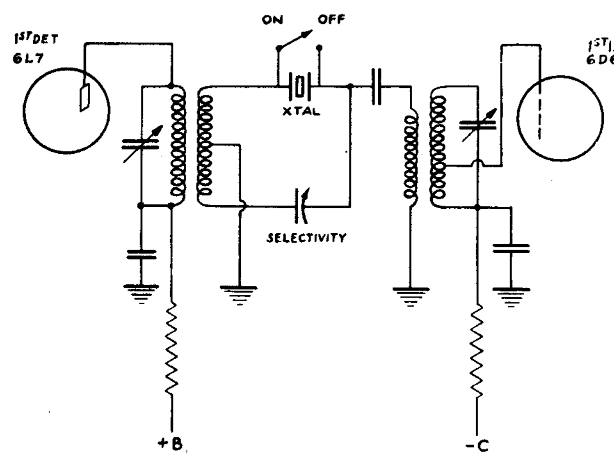
IC OF SUPER-PRO RECEIVER (SP-110 SERIES)

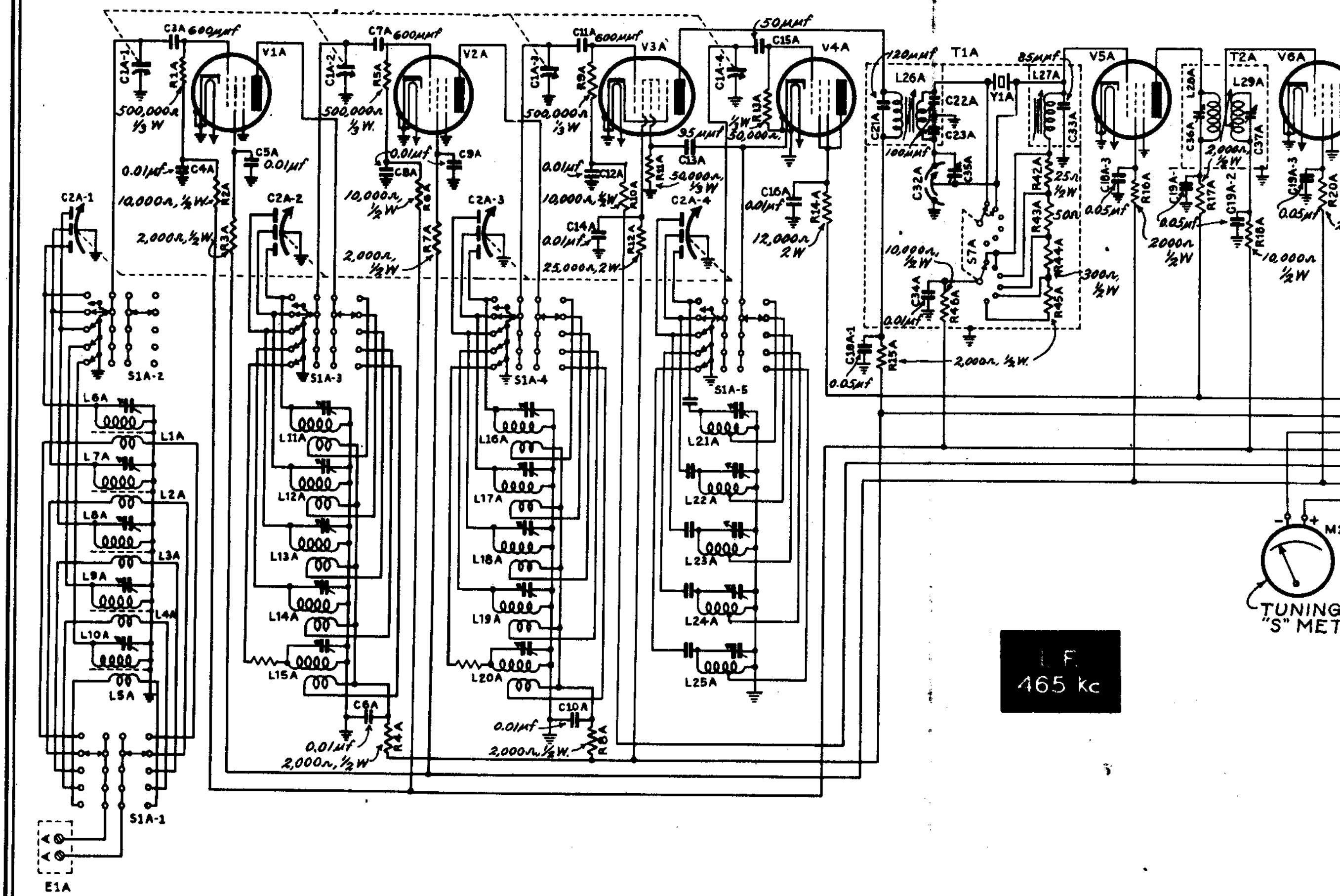


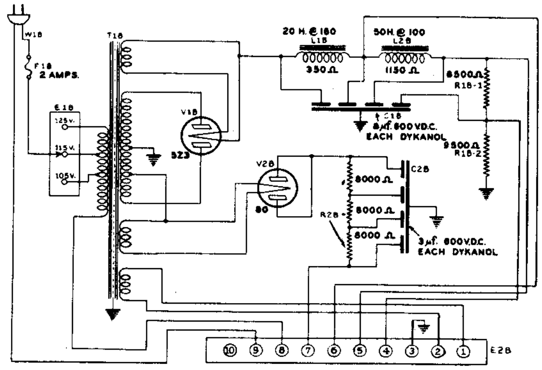
TOP CHASSIS VIEW, SP-110 & SP 120 MODELS



CRYSTAL FILTER CIRCUIT INCLUDED IN SP-110X

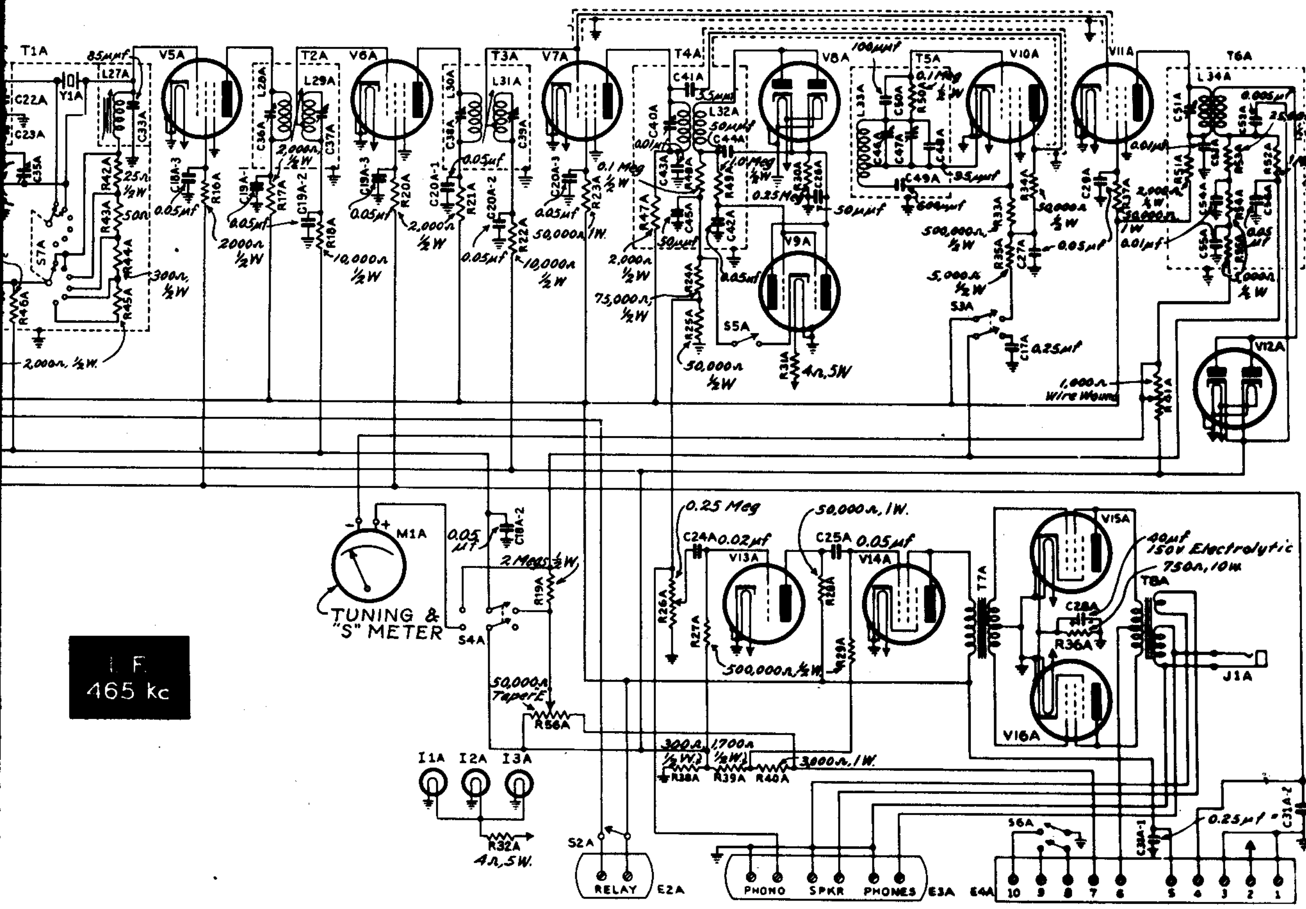




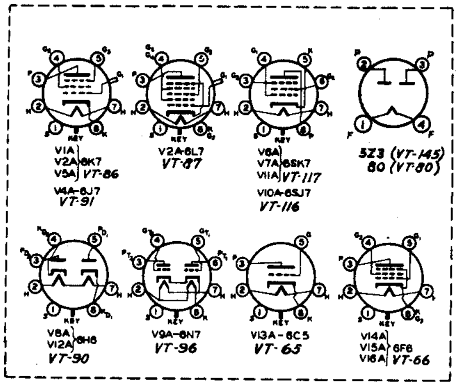


CIRCUIT DIAGRAM — POWER SUPPLY

SCHEMATIC OF SUPER-PRO RECEIVER (SP-200 SERIES) BC-764, BC-779, BC-794, & BC-1004-(*)



ATIC OF SUPER-PRO RECEIVER
00 SERIES) BC-764, BC-779,
,& BC-1004-(*)



Tube socket terminals.

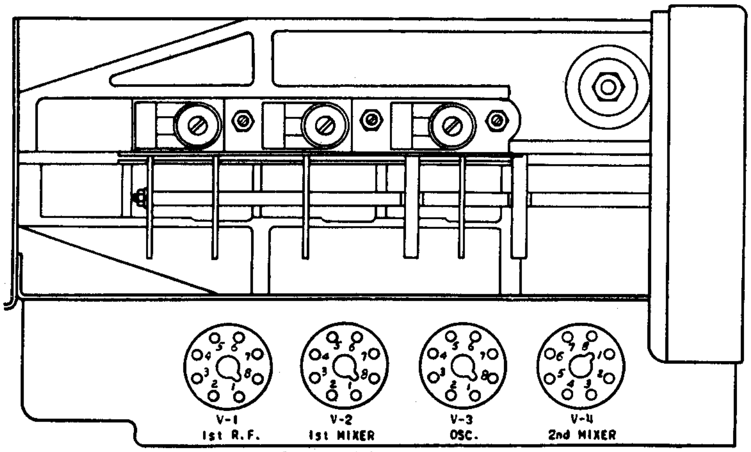
RADIO RECEIVER BC-923-(*)

BC-923-(*)= BC-923-A

Part of: SCR-808-(*)
SCR-828-(*)

VOLTAGE MEASUREMENTS

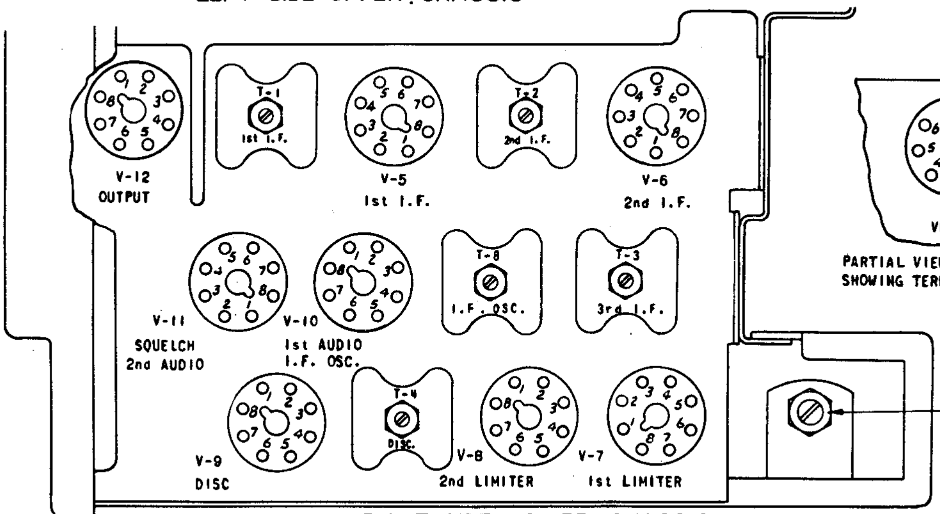
Reference:
TM 11-601



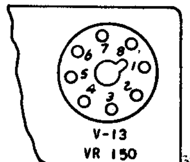
LEFT SIDE UPPER CHASSIS

NOTE: (UPPER CHASSIS)
Tune Set to approximately 33 mc
No signal input
OPERATE-TUNE sw in TUNE position
CALIBRATOR VOLUME control OFF
SQUELCH sw OFF
VOLUME control at maximum
SPEAKER sw OFF
Bottom view of sockets.

NOTE: (LOWER CHASSIS)
No signal input
SQUELCH sw ON
SQUELCH adjustments at center of ranges
SENSITIVITY control at max clockwise position
BIAS control (R-79) set to-2 volts
Bottom view of sockets.



RIGHT SIDE LOWER CHASSIS



PARTIAL VIEW OF MOUNTING PLATE SHOWING TERMINAL SIDE.

VOLTAGES AT VACUUM TUBE SOCKET TERMINALS MEASURED WITH ELECTRONIC VOLTMETER AT 12.5 VOLTS INPUT

PIN NO.	V-1	V-2	V-3	V-4	V-5	V-6	V-7	V-8	V-9	V-10	V-11	V-12	V-13
1	0	0	0	0	0	0	0	0	0	42	3.5	0	-
2	0	6	0	12	0	12	12	12	0	108	4.9	12	0
3	0	0	0	239	0	0	0	0	-1.1	50	3.5	231	150
4	-2	0	-6.3	54	-2	-0.2	0	0	0	0.65x	0	242	-
5	0	3.7	0	-12	0	0	1.5	0.27	-1.1	186x	160	-1.8	150
6	136	103	132	0	115	31	66	20	0	0	0	-2	-
7	6	12	6	0	12	0	0	0	6	12	6	6	150
8	227	234	150	-2.3	228	178	11	2.3	0	6	12	11	-

x OPERATE-TUNE switch in TUNE position   Voltages shown in table are from pin indicated to chassis

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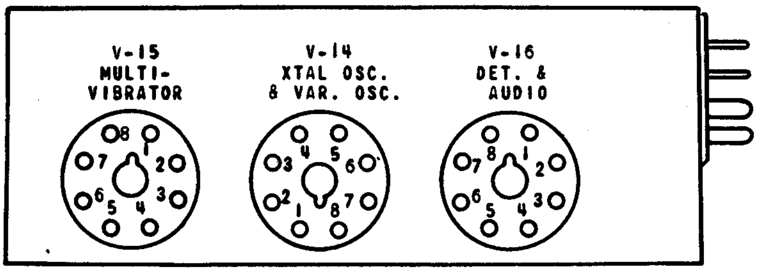
VOLTAGE MEASUREMENTS CRYSTAL FREQUENCY CALIBRATOR

VOLTAGES AT VACUUM TUBE SOCKET TERMINALS MEASURED WITH ELECTRONIC VOLTMETER AT 12.5 VOLTS INPUT

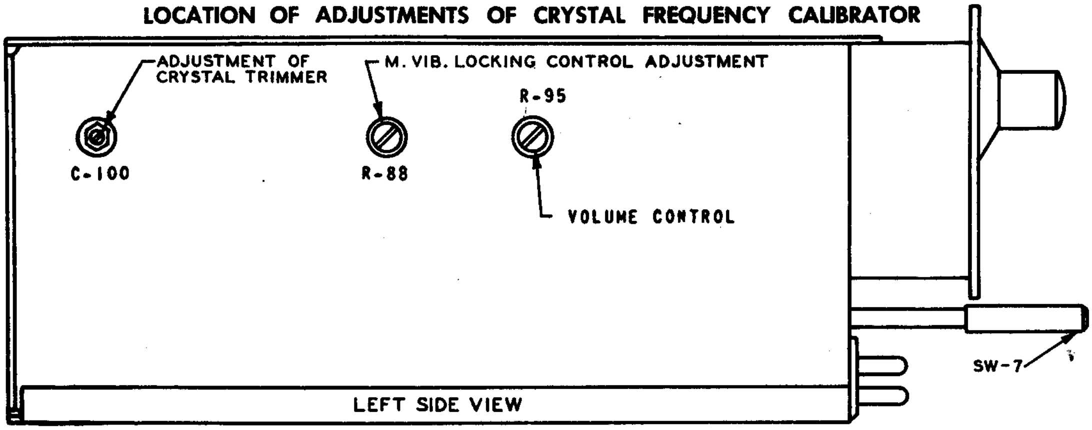
PIN NO.	V-14	V-15		V-16
		SW-7 IN	SW-7 OUT	
1	0	0	0	0
2	138	112	44	107
3	-20	-24	-7	-1.4
4	-2.6	-8.2	-4.6	-0.9
5	125	104	36	63
6	0	0	0	0
7	0	0	0	0
8	12	12	12	12



BOTTOM VIEW SHOWING TERMINAL SIDE OF TUBE SOCKETS.

NOTE:
Voltages shown in table are from pin indicated to chassis
Set frequency at approximately 33 mc: sw-6 ON

LOCATION OF ADJUSTMENTS OF CRYSTAL FREQUENCY CALIBRATOR



CRYSTAL CALIBRATOR ALIGNMENT

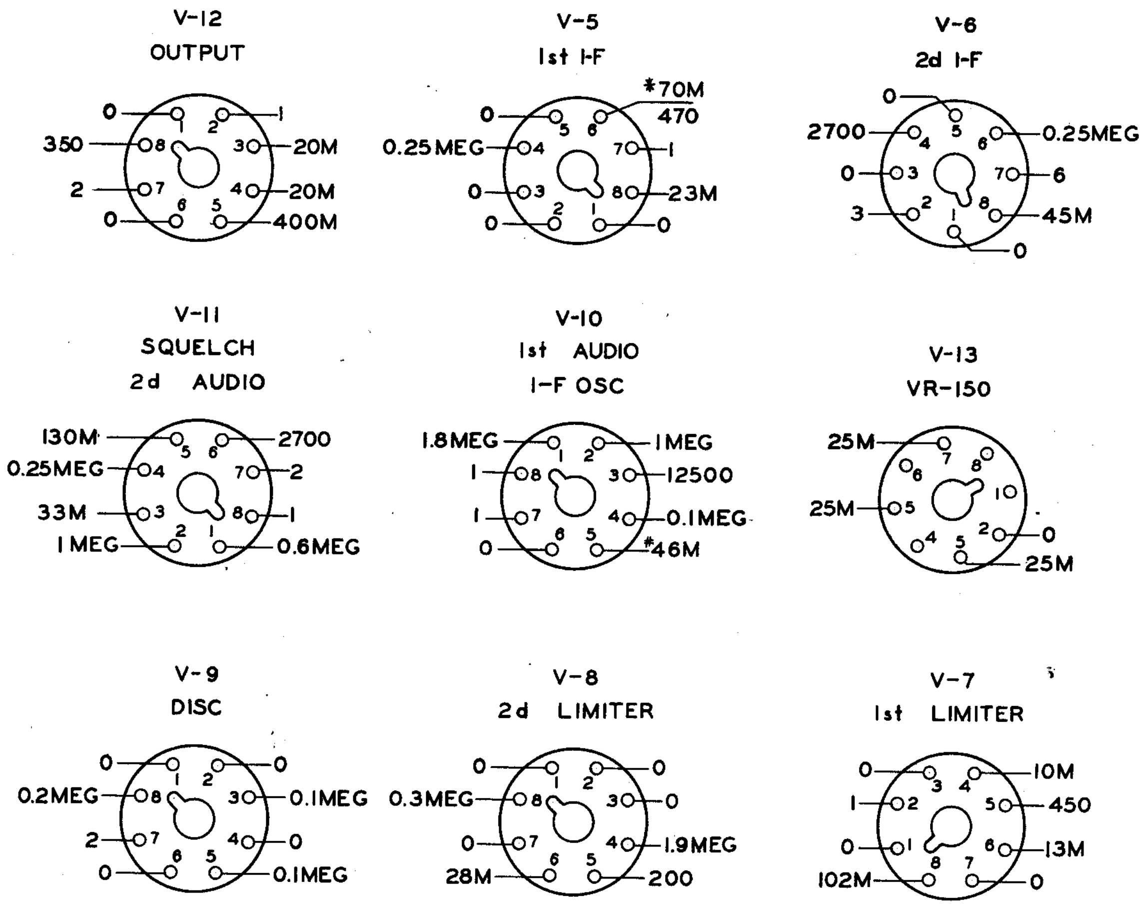
1. Turn on Frequency Meter Set SCR-211-(*) and crystal calibrator unit, allow them to warm up for at least 10 minutes.
2. Remove pin from the jack in rear of crystal calibrator and connect a wire from antenna post of SCR-211-(*) to this jack.
3. Check SCR-211-(*) with its corrector and accurately set to 4,000 kc. Make these adjustments at a room temperature of about 70° F.
4. Rotate tuner of crystal calibrator unit to 32.0 mc on dial, then tune so that a beat note is heard in the SCR-211-(*) phones. Carefully tune to zero beat. The dial setting should be exactly 32.0 mc at zero beat.
5. In case the pointer is badly misadjusted, rotate the tuner to the left as far as possible, with pointer removed, then rotate small tuning knob 15 turns to the right and set pointer to 32.0 mc.
6. Turn SPEAKER sw OFF and advance CALIB VOL control so that a beat note is heard in the receiver phones.
7. Carefully adjust the crystal trimmer capacitor (C-100) for zero beat.
8. Check for zero beat in the SCR-211-(*) phones. If this condition is not obtained, readjust calibrator crystal trimmer C-100 until zero beat is obtained.

MULTI-VIBRATOR ADJUSTMENT

1. Press the PUSH FOR MC ONLY sw and find a megacycle (MC) beat by rotating calibrator dial. Release sw and rotate calibrator dial, counting the number of beats to and including the next MC beat. The count should be 10.
2. If the count is 9, tune to a beat which is not a MC beat and rotate multi-vibrator control R-88 to the "left" until beat disappears.
3. If count is 11, tune to a beat which is not a MC beat and rotate multi-vibrator control R-88 to the "right" until beat disappears.
4. Repeat step 1, the count should be 10.
5. Tune to a beat which is not a MC beat and set multi-vibrator control R-88 midway between the two points on control at which beat disappears.

RESISTANCE MEASUREMENTS

LOWER CHASSIS

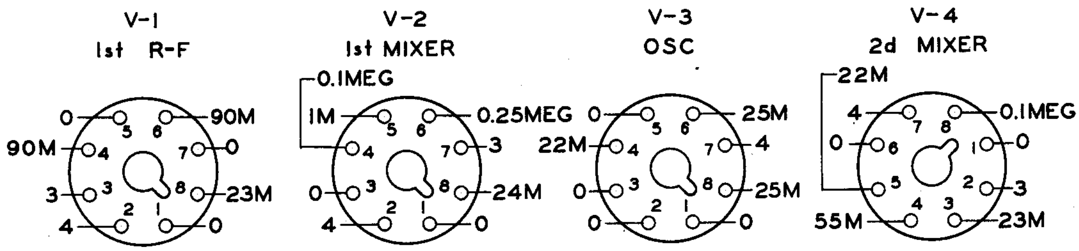


M=1000 BOTTOM VIEW OF TUBE SOCKETS

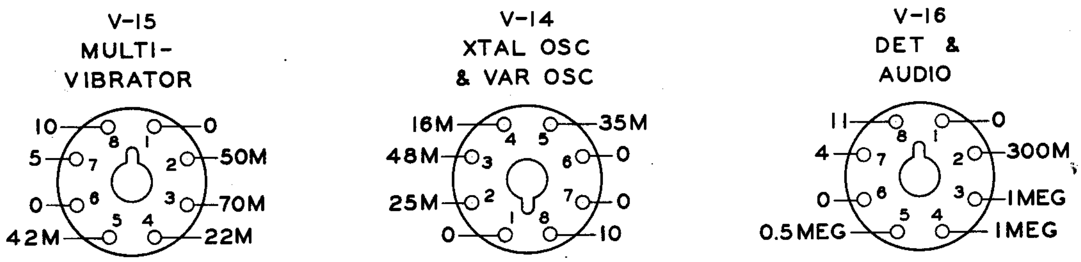
NOTE:
All values shown are ohms between point indicated and chassis. Dynamotor removed, all tubes in place and SPEAKER-PHONES sw on PHONES. SQUELCH sw OFF. CALIB VOL sw ON and control at minimum, and OPERATE-TUNE sw at OPERATE. All other controls at random setting.
OPERATE-TUNE sw at TUNE
* CALIB VOL. control sw OFF

RESISTANCE MEASUREMENTS

UPPER CHASSIS



CRYSTAL FREQUENCY CALIBRATOR



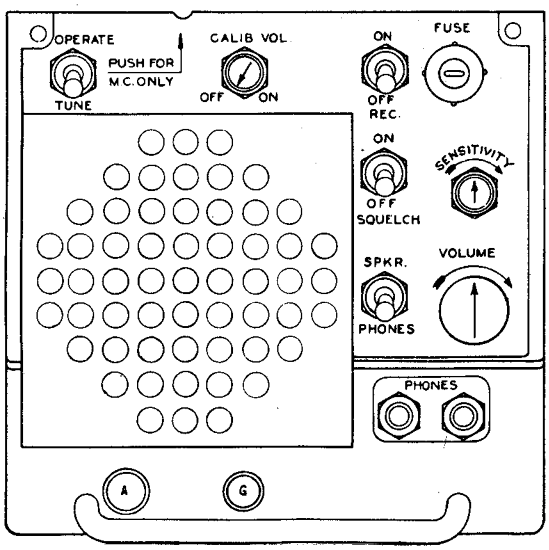
M=1000 BOTTOM VIEW OF TUBE SOCKETS

NOTE:
All values shown are ohms between point indicated and chassis. Dynamotor and crystal removed, all tubes in place, and SPEAKER-PHONES sw on PHONES. SQUELCH sw OFF, CALIB VOL sw ON and control at minimum and OPERATE-TUNE sw on OPERATE. All other controls at random setting.

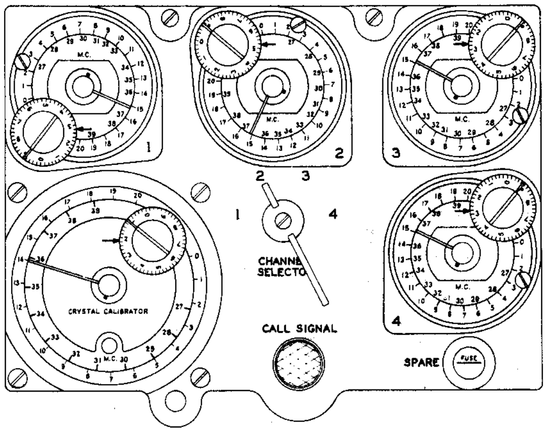
PRESETTING

1. Connect receiver for operation on Mounting FT-237-(*) or with Cord CD-786, dust cover in place. Connect an antenna to the receiver. (Use Antenna A-83-(*) if available.)
2. Throw REC ON-OFF and crystal calibrator CALIB VOL ON-OFF switch to ON. Allow 10 to 20 minutes for crystal calibrator oscillator to reach stability.
3. Turn SQUELCH ON-OFF sw to OFF, receiver VOLUME control to extreme left position, and SPEAKER-PHONES sw to PHONES.
4. Rotate crystal calibrator CALIB VOL control to the right until a beat note or noise is heard in receiver phones.
5. Press the PUSH FOR MC ONLY sw and rotate crystal calibrator dial knob to obtain a loud beat note at megacycle point nearest the desired frequency. Release the PUSH FOR MC ONLY sw when this beat is obtained. Use this megacycle point as a reference from which to rotate the dial pointer toward the desired frequency, counting 100 kc beats until the desired beat note is heard. When the beat note is tuned to zero beat, the calibrator is set to the desired frequency.

   EXAMPLE: To set up on an operating frequency of 36.3 mc, press the PUSH FOR MC ONLY sw and rotate the crystal calibrator dial knob until a beat note is heard at 36.0 mc. Release the PUSH FOR MC ONLY sw and turn the calibrator dial knob to the right. Count the 100 kc beat notes until the third one is heard, and adjust it to zero beat. The calibrator is now set at 36.3 mc.



FRONT VIEW LOWER CHASSIS



FRONT VIEW UPPER CHASSIS

6. Turn the crystal calibrator CALIB VOL control to the left to its min point.
7. Throw receiver OPERATE-TUNE sw to TUNE and advance the receiver VOLUME control to two-thirds max.
8. Turn CHANNEL SELECTOR sw to the desired channel, release channel locking screw, and set dial pointer to approximate channel frequency.
9. Set crystal calibrator to channel frequency as in step 5.
10. Rotate receiver dial pointer each side of its setting until a loud beat note is heard, disregarding any weak beat notes. If more than one loud beat note is heard, ground the antenna post of the receiver and retune.
11. Tune this loud beat note to zero beat and tighten channel locking screw. Reset to zero beat if the frequency changes after locking.
12. Repeat procedure 8 through 11 for each additional channel being preset.

NOTE:
When two receivers are operating on the same mounting base there will be interference between the receiver oscillators if the frequencies to which the receivers are tuned differ by 2.8 mc, 2.9 mc, or 5.7 mc. The interference resulting will reduce the communication range of the equipment. Avoid operation on these combinations of frequencies.

EXAMPLE: Receiver No. 1 is operating on 33.0 mc. Do not operate receiver No. 2 on 27.3, 30.1, 30.2, or 38.7 mc.

When two receivers are used on the same mounting base, one crystal calibrator may be used to make frequency adjustments for both receivers.

ALIGNMENT

All frequencies set on sig gen are to be checked with freq meter.
Low side of sig gen connected to chassis.
Common lead of electronic voltmeter (VTVM) connected to chassis. Use d-c scale only.
SQUELCH ON-OFF sw OFF
SPEAKER-PHONES sw at PHONES
CALIB VOL sw OFF
Use unmodulated signals throughout alignment.

ALIGNMENT OF I-F CIRCUITS

1. Remove dust cover from receiver. Remove crystal calibrator with its dial pointer set at high frequency end of range.
2. Turn on receiver and Signal Generator I-72-(*) and allow them to warm up at least 10 minutes. Set OPERATE-TUNE sw to OPERATE and VOLUME control to mid-range.
3. Check bias voltage by connecting electronic voltmeter to center tap of R-79. Adjust R-79 (1) for -3-volt indication on meter.
4. Connect electronic voltmeter (VTVM) to pin 8 of tube V-8 (2). Use 100-volt scale and set to zero.
5. Connect "high" side of sig gen to pin 8 of V-4 (3) (upper chassis).
6. Set sig gen dial to 2.85 mc.
7. Adjust sig gen output to give 50-volt indication on VTVM. Reduce sig gen output as needed to keep this value.
8. Adjust top (4) and bottom (5) trimmers of T-3 for max on VTVM.
9. Adjust top (6) and bottom (7) trimmers of T-2 for max on VTVM.
10. Adjust top (8) and bottom (9) trimmers of T-1 for max on VTVM. Remove VTVM.

ADJUSTMENT OF B.F.O.

1. Connect sig gen as in i-f alignment (3). Set dial to 2.85 mc.
2. Set receiver OPERATE-TUNE sw at TUNE. Turn on receiver and sig gen.
3. Adjust trimmer in top of T-8 (10) for zero beat in receiver phones.

ALIGNMENT OF DISCRIMINATOR

1. Connect VTVM between pin 8 of V-9 (11) and chassis. Use 3-volt scale and set to zero. Use 1-meg resistor in series with voltmeter.
2. Connect sig gen as in i-f alignment (3). Set dial to 2.85 mc.
3. Set receiver OPERATE-TUNE sw at OPERATE.
4. Turn on receiver and sig gen. VTVM should read zero for correct adjustment. Should adjustment be required, remove cap from top of T-4 (12) and adjust trimmer for zero on meter.
5. Increase sig gen frequency above 2.85 mc until VTVM indicates max positive. Note voltmeter reading and sig gen frequency.
6. Decrease sig gen frequency below 2.85 mc by same amount as increased in 5. Note voltmeter reading and sig gen frequency. The difference in frequency between these points should be not less than 120 kc and the difference in voltage should be not over 0.5 volts.
7. Adjust primary of T-4 (13) for equal max voltage peaks at both of these frequency settings.
8. Remove sig gen and VTVM.

ALIGNMENT OF R-F OSCILLATOR

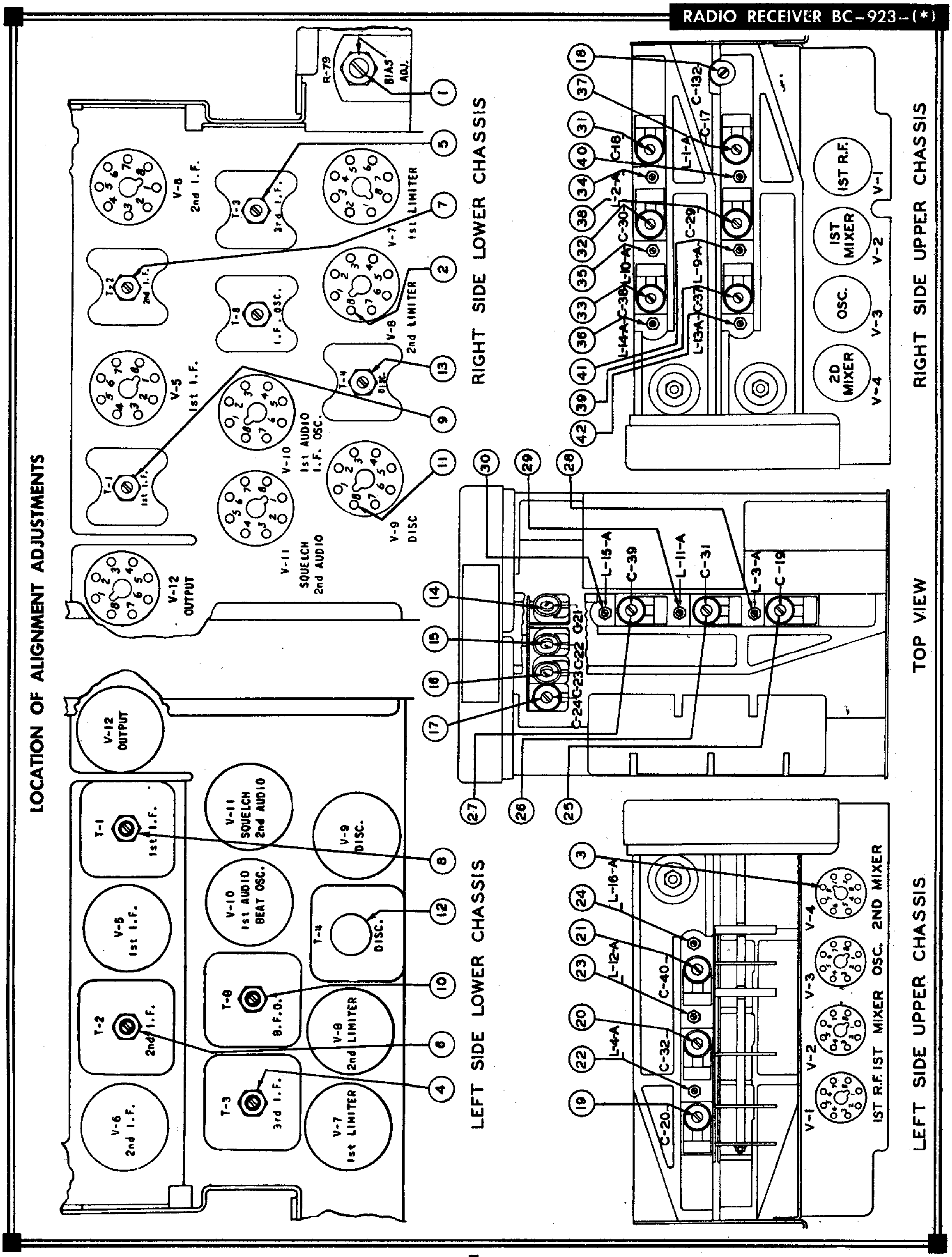
1. Set receiver OPERATE-TUNE sw at TUNE.
2. Connect sig gen to antenna post "A" of receiver with a 50-$\mu\mu f$ capacitor in series with lead.
3. Place the CHANNEL SELECTOR sw in position 1 and turn receiver VOLUME control on full.
4. Loosen pointer and set channel tuner to its lowest frequency position. Do not force the knob.
5. Turn on receiver and sig gen and tune both to zero beat at point of lowest frequency of receiver. Tighten dial pointer and knob in 00 position.
6. Set sig gen at 33 mc and rotate channel tuner control to 10.9 turns and tune C-21 (14) for zero beat in receiver phones.
7. Check with sig gen that end points of band, 27.0 and 38.9, can be reached.
8. Turn CHANNEL SELECTOR sw to channel 2 and repeat steps 4 through 7, making adjustment to C-22 (15) for zero beat.
9. Turn CHANNEL SELECTOR sw to channel 3 and repeat steps 4 through 7, making adjustment to C-23 (16) for zero beat.
10. Turn CHANNEL SELECTOR sw to channel 4 and repeat steps 4 through 7, making adjustment to C-24 (17) for zero beat.

ALIGNMENT OF R-F AMPLIFIER

1. Connect VTVM as in i-f alignment (2). Use 3-volt scale and set to zero.
2. Adjust common antenna trimmer C-132 (18) to 1/4 way closed. Connect sig gen to "A" post through a 50-$\mu\mu f$ capacitor. Throw OPERATE-TUNE sw to OPERATE
3. Set sig gen and receiver to 38.9 mc and adjust C-20 (19), C-32 (20), and C-40 (21) for max on VTVM. Reduce sig gen output to keep meter on scale.
4. Set sig gen and receiver to 33.0 mc. Using special Bristo wrench, unlock inductance adjustments L-4-A (22), L-12-A (23), and L-16-A (24) and peak these adjustments for max on VTVM.
5. Turn CHANNEL SELECTOR sw to channel 2 and repeat steps 1, 3, and 4 (do not repeat step 2), making adjustments to C-19 (25), C-31 (26), and C-39 (27) in step 3 and L-3-A (28), L-11-A (29), and L-15-A (30) in step 4.
6. Turn CHANNEL SELECTOR sw to channel 3 and repeat steps 1, 3, and 4 (do not repeat step 2), making adjustments to C-18 (31), C-30 (32), and C-38 (33) in step 3 and L-2-A (34), L-10-A (35), and L-14-A (36) in step 4.
7. Turn CHANNEL SELECTOR sw to channel 4 and repeat steps 1, 3, and 4 (do not repeat step 2), making adjustments to C-17 (37), C-29 (38), and C-37 (39) in step 3 and L-1-A (40), L-9-A (41), and L-13-A (42) in step 4.
8. Restore receiver to normal.

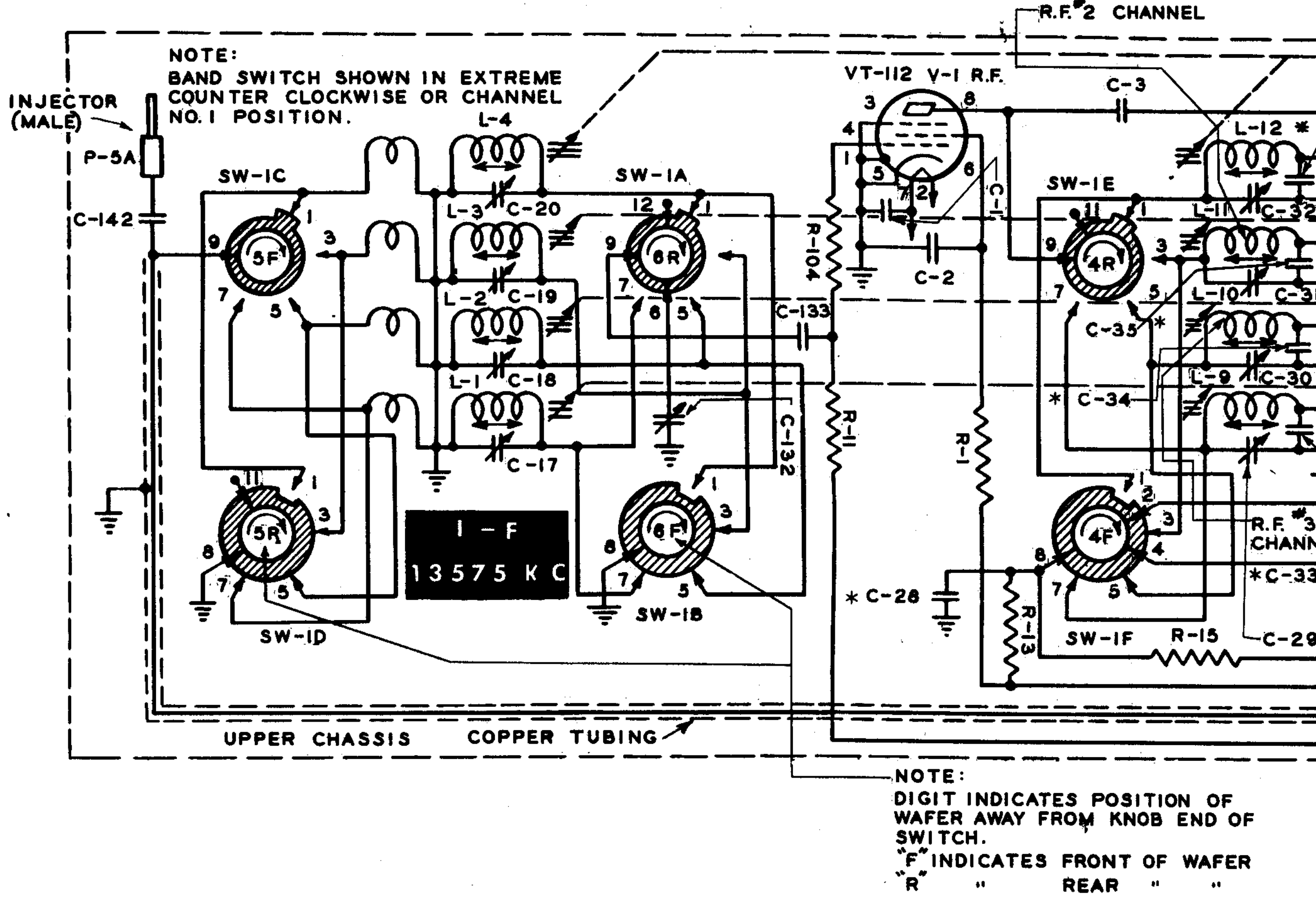
Use harmonics of sig gen output for frequencies above its fundamental range.

Numbers in circles refer to LOCATION OF ALIGNMENT ADJUSTMENTS



LOCATION OF ALIGNMENT ADJUSTMENTS

SCHEMATIC DIAGRAM



PARTS LEGEND

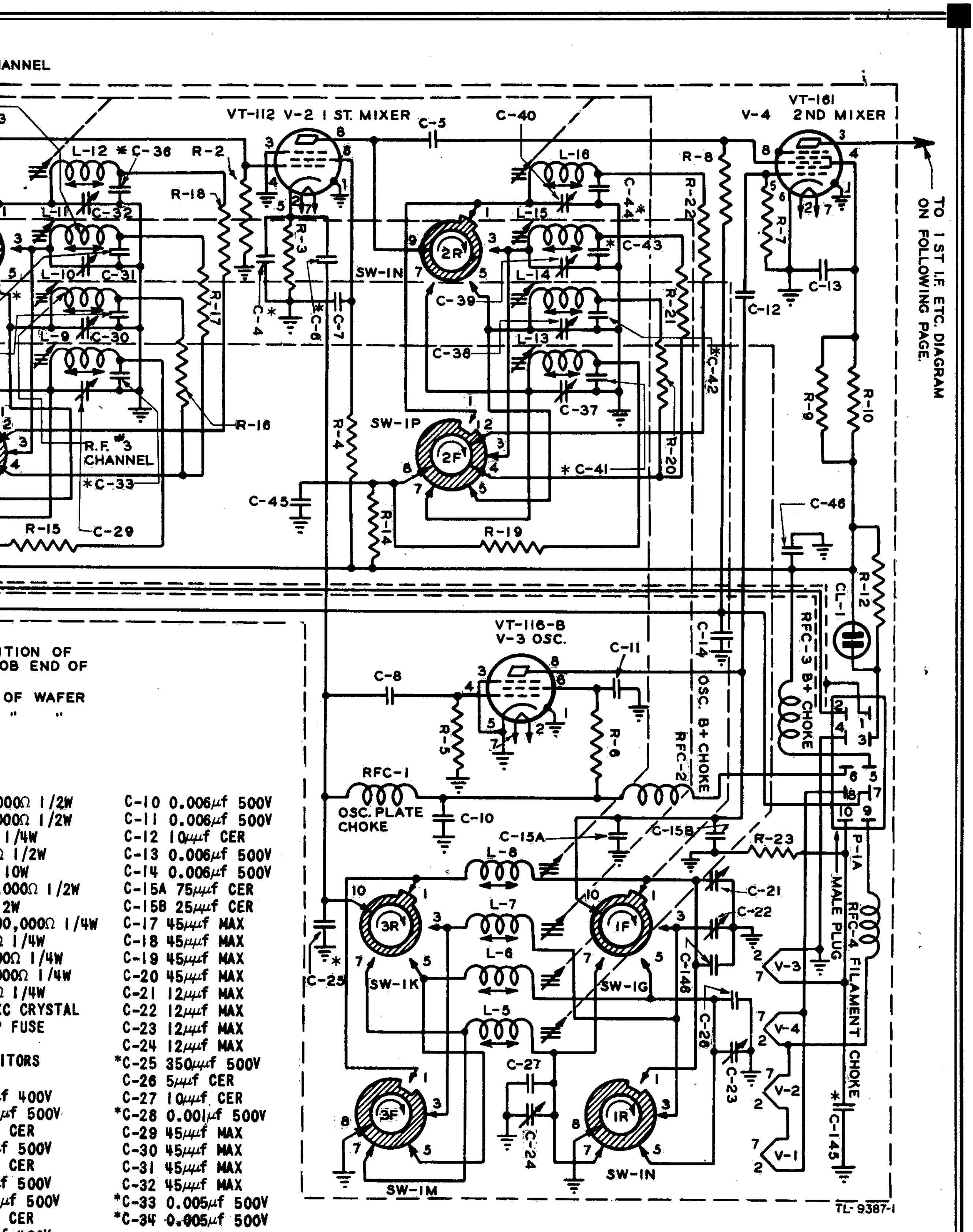
RESISTORS

R-1 88,000 Ω 1/2W
R-2 100,000 Ω 1/4W
R-3 1,000 Ω 1/4W
R-4 220,000 Ω 1/2W
R-5 22,000 Ω 1/2W
R-6 10,000 Ω 1/2W
R-7 22,000 Ω 1/2W
R-8 100,000 Ω 1/4W
R-9 68,000 Ω 1/2W
R-10 68,000 Ω 1/2W
R-11 100,000 Ω 1/4W
R-12 1,000,000Ω 1/4W
R-13 1,000Ω 1/4W
R-14 1,000Ω 1/4W
R-15 1,000Ω 1/4W
R-16 1,000Ω 1/4W
R-17 1,000Ω 1/4W
R-18 1,000Ω 1/4W
R-19 1,000Ω 1/4W
R-20 1,000Ω 1/4W
R-21 1,000Ω 1/4W
R-22 1,000Ω 1/4W
R-23 19Ω 2W
R-24 1,000Ω 1/4W
R-25 220,000Ω 1/2W
R-26A 100,000Ω 1/2W
R-26B 100,000Ω 1/2W
R-27 1,000Ω 1/4W
R-28 2,700Ω 1/2W
R-29 390,000Ω 1/2W
R-30 220,000Ω 1/2W
R-31 22,000Ω 1/2W
R-32 22,000Ω 1/2W
R-33 470Ω 1/2W
R-34 1,000Ω 1/2W
R-35 15,000Ω 1/2W
R-36 15,000Ω 1/2W
R-37 15,000Ω 1/2W
R-38 100,000Ω 1/2W
R-39 1,800,000Ω 1/4W
R-40 250Ω 1/4W
R-41 33,000Ω 1/2W
R-42 220,000Ω 1/2W
R-43 330,000Ω 1/2W
R-44 1,000,000Ω 1/4W
R-45 33,000Ω 1/2W
R-46 390,000Ω 1/2W
R-47 390,000Ω 1/2W
R-48 100,000Ω 1/2W
R-49 100,000Ω 1/2W
R-50 100,000Ω 1/2W
R-51 10,000,000Ω 1/4W
R-52 1,000,000Ω 1/4W
R-53 2,700Ω 1/2W
R-54 100,000Ω 1/4W
R-55 1,000,000Ω 1/4W
R-56 500,000Ω POT
R-57 100,000Ω 1/4W
R-58 22,000Ω 1/2W
R-59 1,800,000Ω 1/4W
R-60 1,000,000Ω 1/4W
R-61 1,000,000Ω 1/4W
R-62 2,700Ω 1/2W
R-63 100,000Ω 1/2W
R-64 390,000Ω 1/2W
R-65 330Ω 1W
R-66 800Ω POT
R-67 33,000Ω 1/2W
R-68 33,000Ω 1/2W
R-69 33,000Ω 1/2W
R-70 5Ω 5W
R-71 500,000Ω POT
R-72 390,000Ω 1/2W
R-73 3,000Ω 5W
R-74 500,000Ω POT
R-75 47,000Ω 1W
R-76 10,000Ω 1/2W
R-77 800Ω POT
R-78 18Ω 1W
R-79 60Ω POT
R-80A 85Ω 5W
R-80B 60Ω 5W
R-81 40Ω 2W
R-82 47,000Ω 1/2W
R-83 4,700 Ω 1/2 W
R-84 22,000 Ω 1/2W
R-86 22,000Ω 1/2W
R-87 47,000Ω 1/2W
R-88 50,000Ω POT
R-89 22,000Ω 1/2W
R-90 80Ω 2W
R-91 15,000Ω 1/2W
R-92 1,000Ω 1/4W
R-93 1,000Ω 1/4W
R-94 1,500Ω 1/4W
R-95 500,000Ω POT
R-96 1,000,000Ω 1/4W
R-97 1,000,000Ω 1/4W
R-98 100,000Ω 1/4W
R-99 330,000Ω 1/4W
R-100 220,000Ω 1/2W
R-101 100,000Ω 1/4W
R-102 15,000Ω 1/2W
R-103 10,000Ω 1/2W
R-104 15Ω 1/4W
R-105 470Ω 1/2W
R-106 20Ω 10W
R-107 100,000Ω 1/2W
R-108 40Ω 2W
R-109 1,800,000Ω 1/4W
R-110 820Ω 1/4W
R-111 1,500Ω 1/4W
R-112 82,000Ω 1/4W
R-113 120Ω 1/4W
X-1 1,000KC CRYSTAL
F-1 15 AMP FUSE

CAPACITORS

C-1 0.01µf 400V
C-2 0.006µf 500V
C-3 50µµf CER
*C-4 500µµf 500V
C-5 50µµf CER
*C-6 200µµf 500V
C-7 0.006µf 500V
C-8 50µµf CER
C-9 0.05µf 400V

CONT



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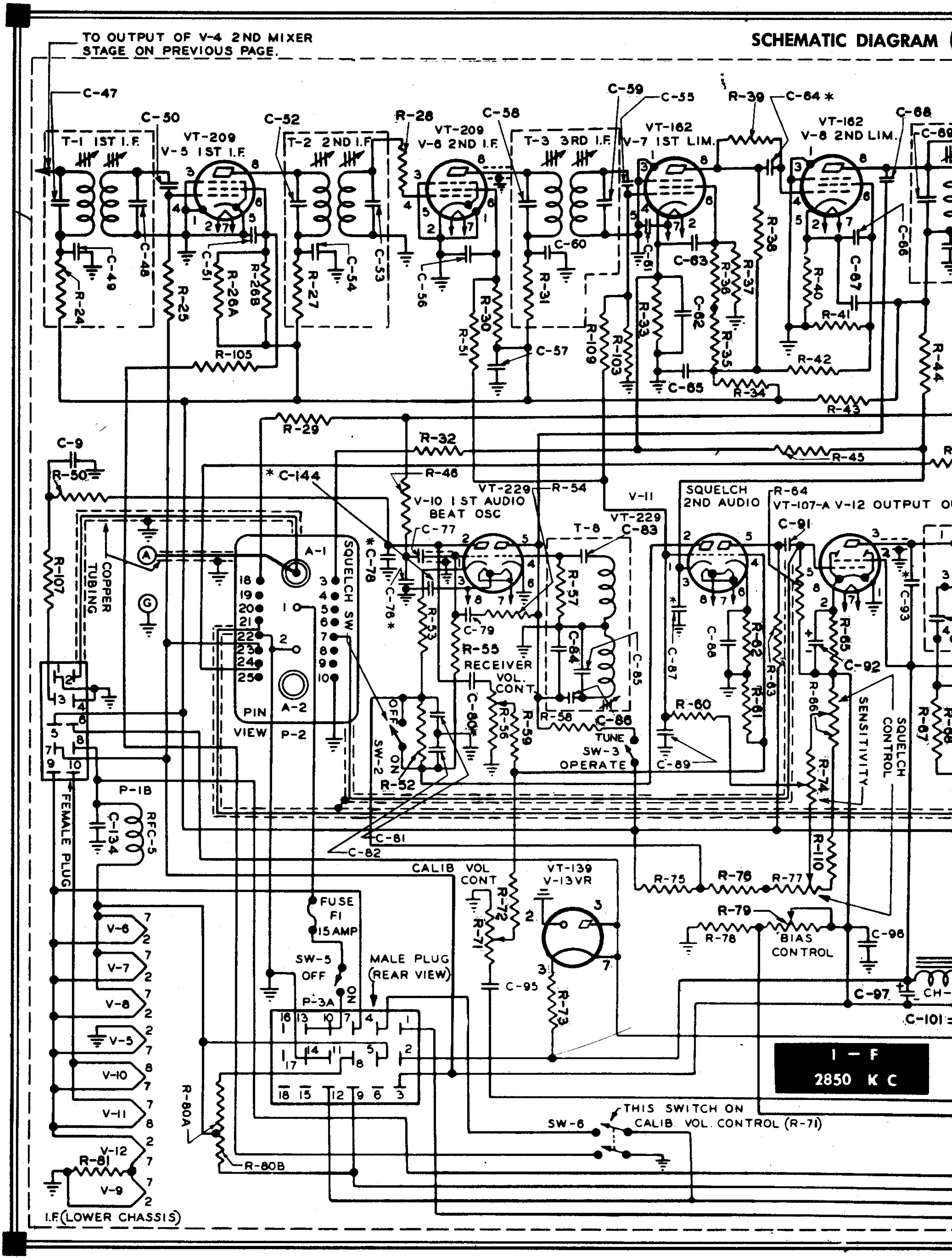
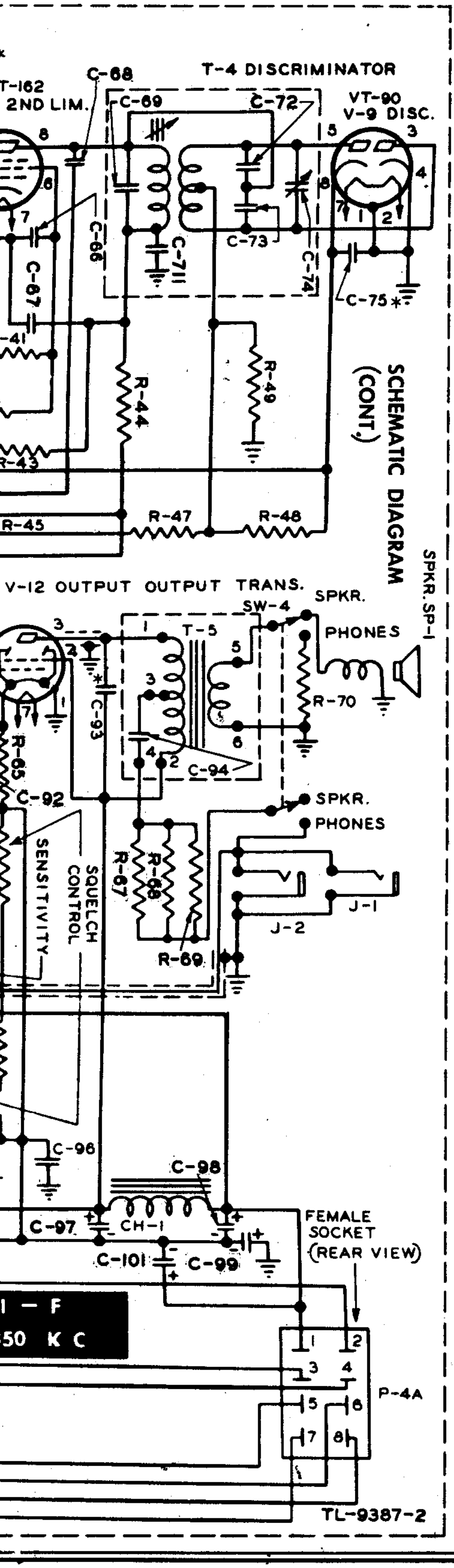
000Ω 1/2W	C-10 0.006μf 500V
000Ω 1/2W	C-11 0.006μf 500V
1/4W	C-12 10μμf CER
Ω 1/2W	C-13 0.006μf 500V
10W	C-14 0.006μf 500V
,000Ω 1/2W	C-15A 75μμf CER
2W	C-15B 25μμf CER
00,000Ω 1/4W	C-17 45μμf MAX
Ω 1/4W	C-18 45μμf MAX
00Ω 1/4W	C-19 45μμf MAX
000Ω 1/4W	C-20 45μμf MAX
Ω 1/4W	C-21 12μμf MAX
KC CRYSTAL	C-22 12μμf MAX
P FUSE	C-23 12μμf MAX
	C-24 12μμf MAX
ITORS	*C-25 350μμf 500V
	C-26 5μμf CER
f 400V	C-27 10μμf CER
μf 500V	*C-28 0.001μf 500V
CER	C-29 45μμf MAX
f 500V	C-30 45μμf MAX
CER	C-31 45μμf MAX
f 500V	C-32 45μμf MAX
μf 500V	*C-33 0.005μf 500V
CER	*C-34 0.005μf 500V
f 400V	

CONT ON FOLLOWING PAGE

SCHEMATIC DIAGRAM (



IC DIAGRAM (CONT.)

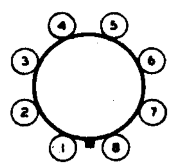


CONTINUED FROM PRECEEDING PAGE

*C-35 0.005µf 500V
*C-36 0.005µf 500V
C-37 45µµf MAX
C-38 45µµf MAX
C-39 45µµf MAX
C-40 45µµf MAX
*C-41 0.005µf 500V
*C-42 0.005µf 500V
*C-43 0.005µf 500V
*C-44 0.005µf 500V
C-45 0.006µf 500V
C-46 0.01µf 400V
C-47 35µµf CER
C-48 35µµf CER
C-49 0.01µf 400V
C-50 25µµf CER
C-51 0.006µf 500V
C-52 35µµf CER
C-53 35µµf CER
C-54 0.01µf 400V
C-55 10µµf CER
C-56 0.01µf 400V
C-57 0.01µf 400V
C-58 35µµf CER
C-59 35µµf CER
C-60 0.01µf 400V
C-61 0.006µf 500V
C-62 0.01µf 400V
C-63 0.01µf 400V
*C-64 25µµf 500V
C-65 0.006µf 500V
C-66 0.01µf 400V
C-67 0.01µf 400V
C-68 0.75µµf CER
C-69 35µµf CER
C-71 0.01µf 400V
C-72 70µµf CER
C-73 70µµf CER
C-74 18µµf MAX
*C-75 250µµf 500V
*C-76 500µµf 500V
C-77 0.01µf 400V
*C-78 250µµf 500V
C-79 0.006µf 600V
*C-80 0.001µf 300V
C-81 0.05µf 120V
C-82 0.01µf 400V
C-83 50µµf CER
C-84 50µµf CER
C-85 100µµf CER
C-86 50µµf CER
*C-87 0.001µf 300V
C-88 0.5µf 120V
C-89 0.01µf 400V
C-91 0.01µf 400V
C-92 10µf 25V
*C-93 0.005µf 500V
C-94 0.05µf 600V
C-95 0.01µf 400V
C-96 0.05µf 400V
C-97 10µf 450V
C-98 10µf 450V
C-99 10µf 25V
C-100 35µµf MAX
C-101 10µf 450V
C-102 0.006µf 600V
C-103 100µµf CER
C-104 100µµf CER
C-105 0.006µf 600V
C-107 5µµf CER
C-108 33µµf CER
C-109 88µµf CER
C-110 10µµf CER
C-111 50µµf CER
C-112 7µµf CER
C-113 5µµf CER
C-114 0.006µf 600V
C-115 0.006µf 600V
*C-116 500µµf 500V
C-117 0.006µf 600V
*C-118 0.001µf 300V
*C-119 0.01µf 500V
*C-120 0.005µf 500V
*C-121 0.005µf 500V
*C-122 0.005µf 500V
*C-123 0.01µf 500V
*C-124 0.01µf 500V
*C-125 0.01µf 500V
*C-126 0.005µf 500V
*C-127 0.005µf 500V
*C-128 0.005µf 500V
*C-129 0.01µf 500V
*C-130 0.01µf 500V
*C-131 0.001µf 300V
C-132 30µµf MAX
C-133 50µµf CER
C-134 0.006µf 500V
*C-135 100µµf 500V
*C-136 0.001µf 300V
*C-137 0.001µf 300V
*C-138 0.001µf 500V
*C-139 500µµf 500V
C-141 0.05µf 500V
C-142 0.75µµf CER
C-143 10µµf CER
*C-144 0.001µf 300V
*C-145 0.001µf 300V
C-146 3µµf CER

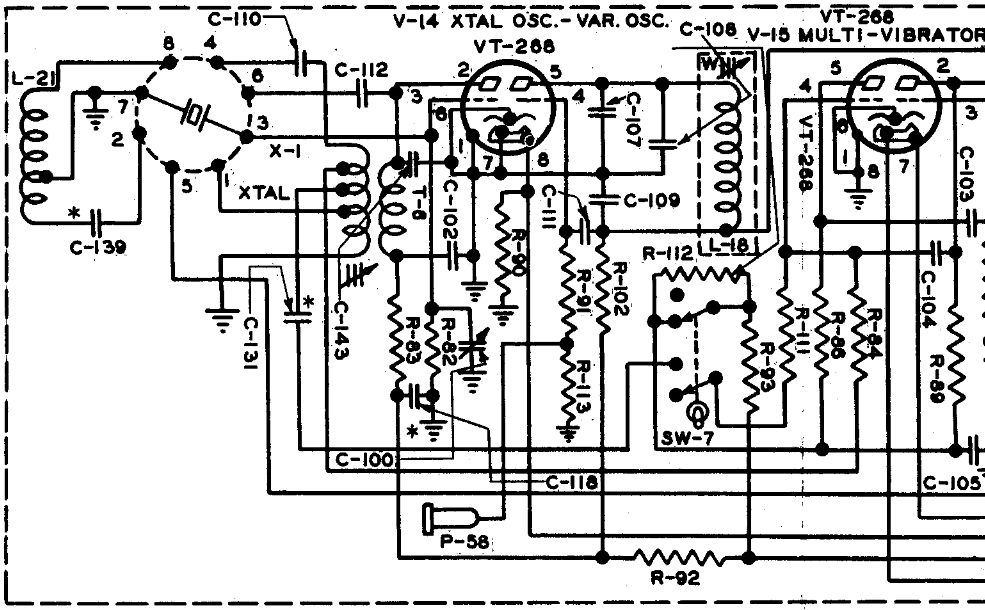
NOTES:
* THESE CAPACITORS MUST BE MICA DIELECTRIC OR("CER." IF SO MARKED.) ALL OTHER MOULDED TYPE CAPACITORS MAY BE EITHER MICA OR PAPER DIELECTRIC. CAPACITORS NO. C-15A & C-15B MUST BE REPLACED AS A UNIT.

TUBE SOCKET TERMINALS

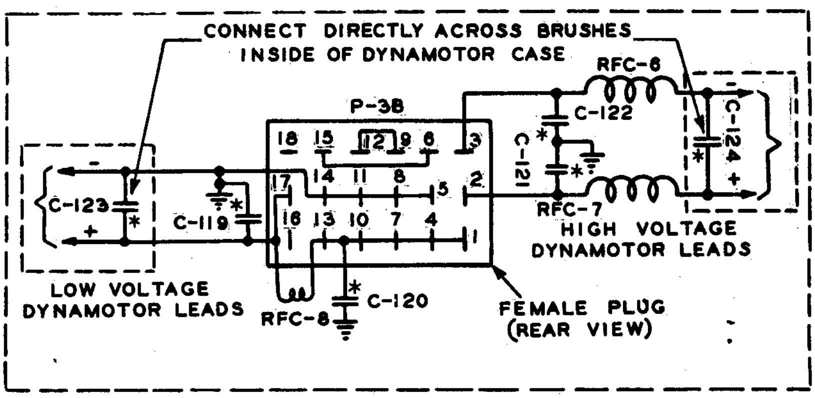


BOTTOM VIEW

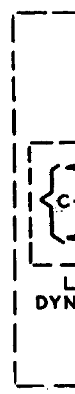
SCHEMATIC DIAGRAM



CRYSTAL CALIBRATOR

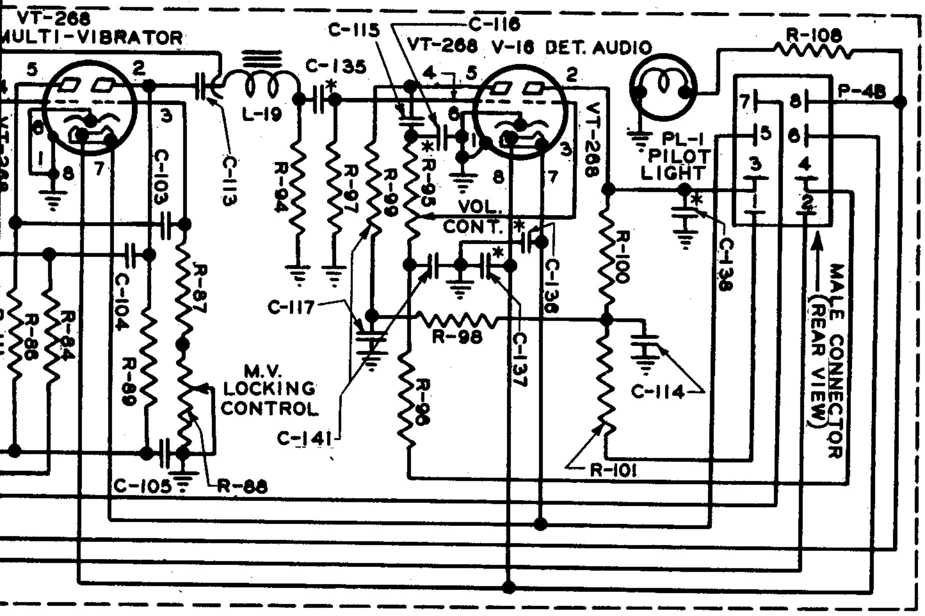


DYNAMOTOR DM-64-A 12 VOLT



FOR PARTS VALUES SEE

IC DIAGRAM (CONT.)



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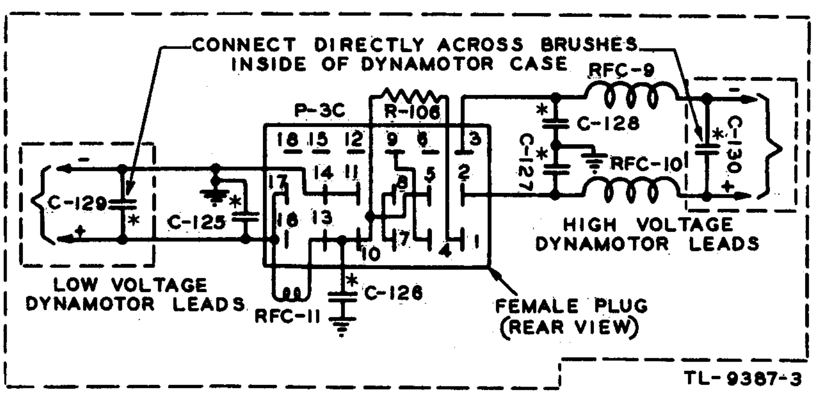


DYNAMOTOR DM-66-A 24 VOLT

LUES SEE PAGES 8 & 9

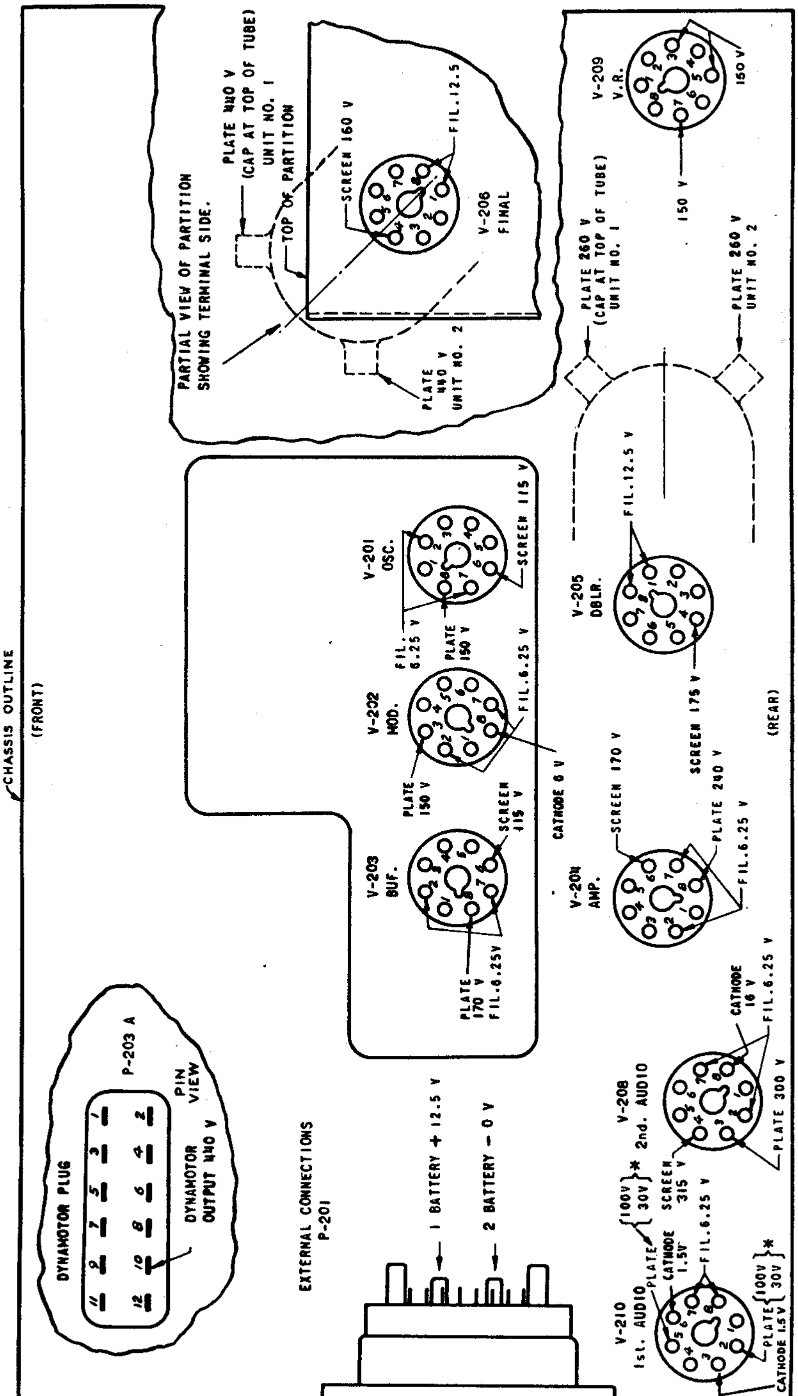
RADIO TRANSMITTER BC-924-(*)

BC-924-(*)= BC-924-A

Part of: SCR-808-(*)
SCR-828-(*)

Reference:
TM 11-601

VOLTAGE MEASUREMENTS



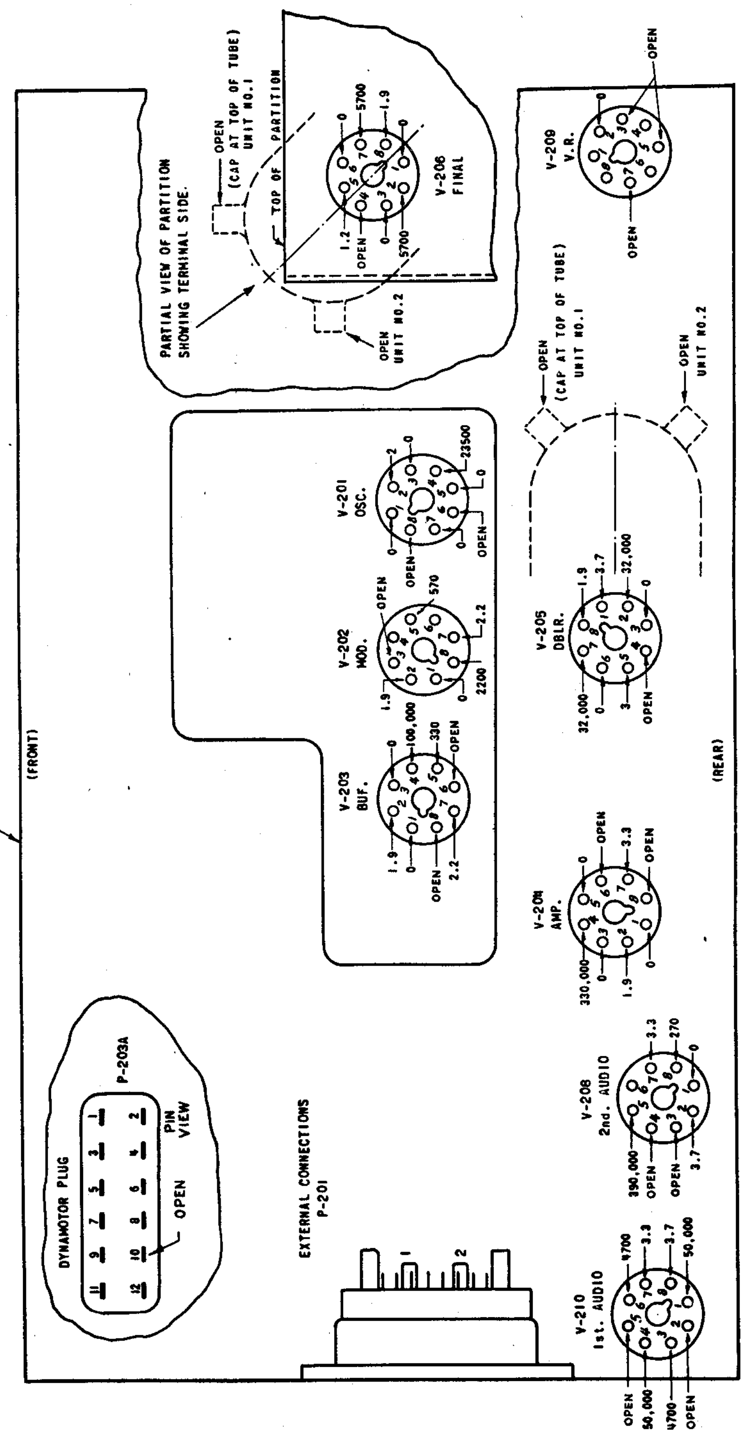
LAYOUT CORRESPONDS WITH BOTTOM OF TRANSMITTER AND PARTITION. DATA TAKEN WITH TRANSMITTER FULLY LOADED AND OPERATING ON 27 MC. INPUT 12.5 VOLTS. ALL VOLTAGES MEASURED FROM DESIGNATED POINTS TO FRAME OF TRANSMITTER, EXCEPT FILAMENT VOLTAGES WHICH ARE MEASURED BETWEEN SOCKET TERMINALS.

*THE HIGHER VALUE IS OBTAINED USING AN ELECTRONIC VOLTMETER. THE LOWER VALUE IS OBTAINED USING A 1000 OHMS PER VOLT VOLTMETER. WHERE ONLY ONE VALUE IS GIVEN THE READINGS ARE THE SAME FOR EITHER TYPE METER.

SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

RESISTANCE MEASUREMENTS

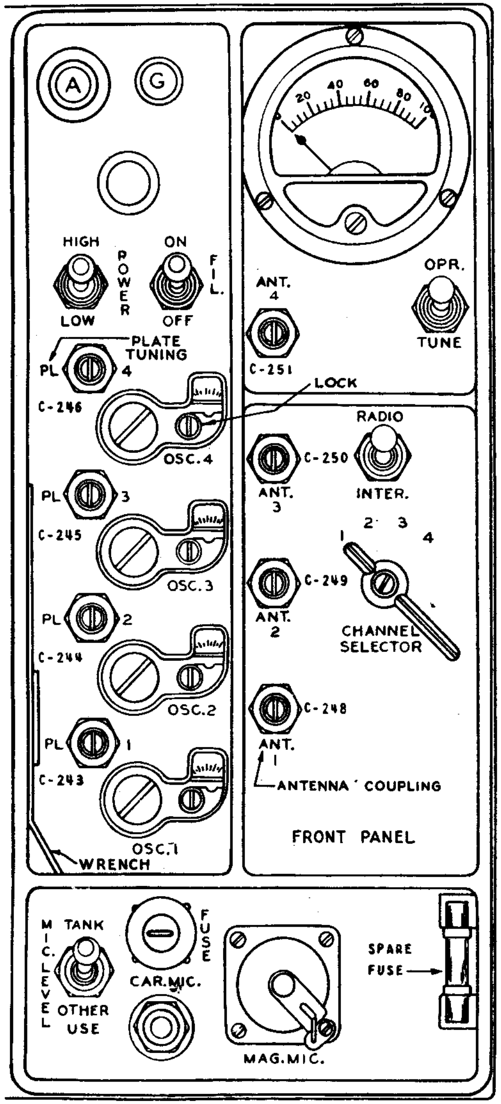


REMOVE BATTERY BEFORE MEASURING RESISTANCE.

BOTTOM VIEW OF TRANSMITTER WITH COVER AND DYNAMOTOR REMOVED. ALL VALUES SHOWN ARE OHMS BETWEEN POINT INDICATED AND FRAME OF TRANSMITTER. NO BATTERY CONNECTED, HIGH-LOW POWER SWITCH IN HIGH POSITION, ALL OTHER CONTROLS IN RANDOM POSITION, AND ALL VACUUM TUBES IN PLACE.

PRESETTING

1. Install transmitter and a receiver, which has been preset, on Mounting FT-237-(*), receiver in right end position.
2. Set transmitter METER SW to position 1 and connect Antenna A-83-(*).
3. Throw transmitter FIL ON-OFF and receiver REC ON-OFF switches to ON and allow them to warm up for at least 10 minutes. Check that all pilot lights are burning.
4. Throw SQUELCH sw to OFF, receiver OPERATE-TUNE sw to TUNE, and turn VOLUME control two-thirds max.
5. Set receiver and transmitter CHANNEL SELECTOR switches to the same channel, turn transmitter OPERATE-TUNE sw to TUNE, and HIGH-LOW POWER sw to LOW.
6. Release transmitter OSC tuning control locking screw for channel being preset and set the OSC tuner dial to approximate reading corresponding to receiver dial setting on outer scale.
7. Rotate transmitter OSC tuning control to either side of its setting until a loud beat note is heard in receiver phones.
8. Tune transmitter to zero beat this signal, disregarding any weak beat notes that might be present.
9. Tighten tuning control locking screw for this channel. Reset to zero beat if frequency changes after locking.
10. Throw transmitter OPERATE-TUNE sw to OPERATE and HIGH-LOW POWER sw to HIGH.
11. Set the antenna coupling capacitor (marked ANT) in center of its range by turning screw driver slot vertical. Use the combination wrench and screw driver from front panel to unlock, lock, and adjust these controls.
12. Press microphone sw and adjust PL, plate tuning control, for min reading on panel meter. If min reading is substantially less than 50 on scale of meter, rotate antenna coupling capacitor slightly to increase reading and readjust PL for min on panel meter.
13. If min reading is more than 50 or if no min is found, rotate antenna coupling capacitor to decrease reading and readjust PL for min on panel meter. PL must be the last adjustment.
14. Lock PL and ANT adjustments in position, making sure that reading on panel meter is still between 45 and 50.
15. Repeat procedure 5 through 14 for each other channel being preset. Shift both receiver and transmitter CHANNEL SELECTOR switches to the same channel before attempting adjustments.
16. Turn receiver OPERATE-TUNE sw to OPERATE before attempting communication.



NOTE:

To prevent overloading and decrease in power output, the battery must be under charge at the rate of at least 20 amperes when antenna loading adjustments in steps 12 and 13 are made. Do not attempt to reload the transmitter to 50 on meter scale when battery voltage is low.

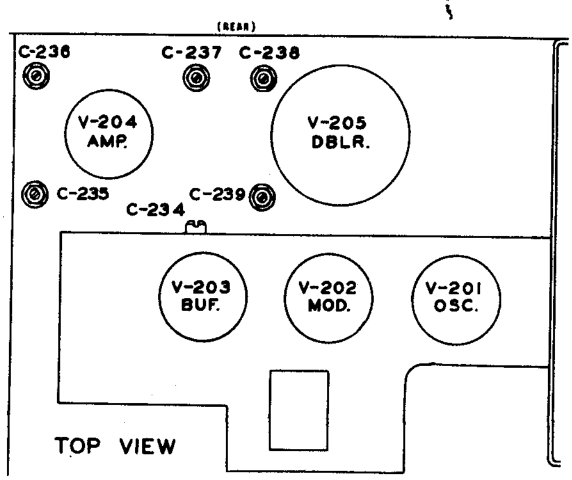
ALIGNMENT

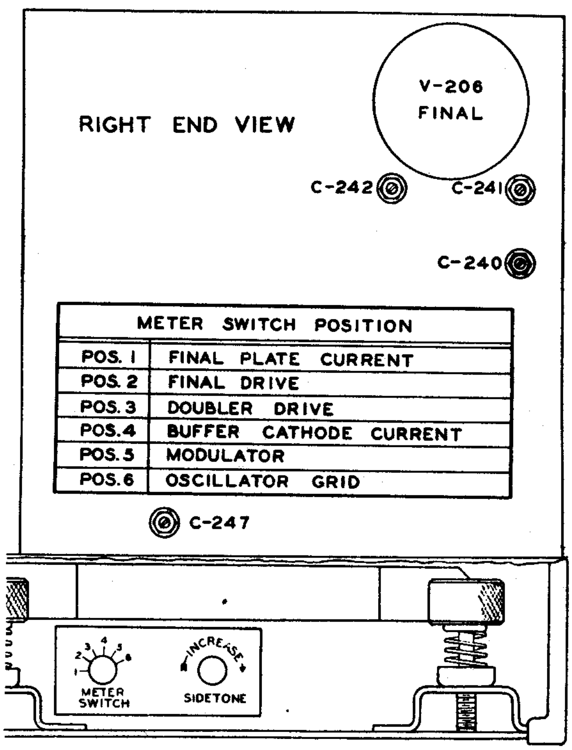
PRELIMINARY

1. Remove covers, connect a battery which will furnish 12 to 12.5 volts when transmitter OPERATE-TUNE sw is in TUNE position during alignment.
2. Use an insulated screw driver such as TL-150 for adjustments and a d-c electronic voltmeter (VTVM) for measurements.
3. Preset channels 1, 2, 3, and 4 on 27.0, 30.5, 34.5, and 38.5 mc respectively (see presetting procedure). Leave OPERATE-TUNE sw in TUNE position and HIGH-LOW POWER sw on LOW.
4. Clean the glyptol from capacitors C-234 to C-242 and loosen locking adjustments with a socket wrench.

FIRST STAGE

1. Connect a VTVM from junction of R-211 and R-212 to chassis. Use 30-volt scale. See page 5.
2. Turn CHANNEL SELECTOR sw to 4. Adjust C-234 for both max and min on VTVM, then adjust C-234 for average of these two readings.
3. Turn CHANNEL SELECTOR sw to 1 and adjust C-236 to equalize voltages on channels 1 and 4.
4. Repeat steps 2 and 3 if equal readings cannot be obtained.
5. Read voltage on channels 2 and 3. Adjust C-235 to equalize these readings.
6. Read voltage on all four channels. Readings should be between 6 and 7 volts and within 0.5 volts of each other.
7. Repeat steps 2 through 5 if correct values are not obtained in 6.





METER SWITCH POSITION	
POS. 1	FINAL PLATE CURRENT
POS. 2	FINAL DRIVE
POS. 3	DOUBLER DRIVE
POS. 4	BUFFER CATHODE CURRENT
POS. 5	MODULATOR
POS. 6	OSCILLATOR GRID

SECOND STAGE

1. Connect VTVM from junction of R-213 and R-215 to chassis. Use 100-volt scale. See page 5.
2. Set CHANNEL SELECTOR sw on 4. Adjust C-237 for both max and min on VTVM, then adjust C-237 for average of these two readings.
3. Read voltage on channel 1 and adjust C-239 to equalize voltages on channels 1 and 4.
4. Repeat steps 2 and 3 if these results cannot be obtained.
5. Read voltage on channels 2 and 3. Adjust C-238 to equalize these readings.
6. Read voltage on all four bands. The voltage should be between 30 and 34, with not more than 0.5 volt difference between any readings.
7. Repeat steps 2 through 5 if correct values are not obtained in 6.

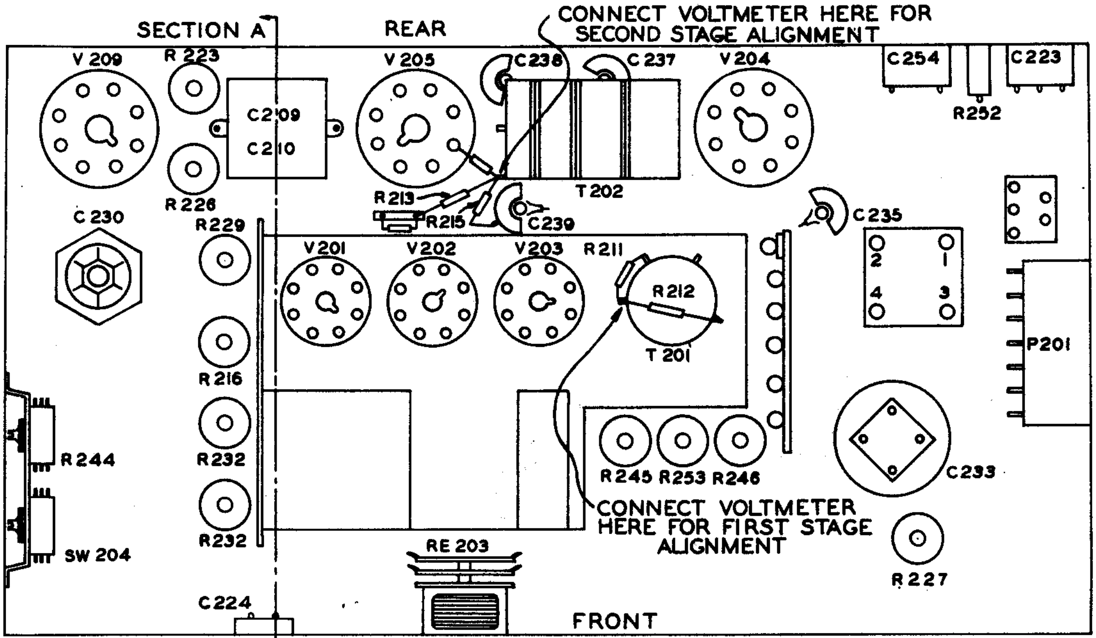
THIRD STAGE

1. Connect VTVM from junction of R-218 and R-219 to chassis. Use 100-volt scale. See page 5.
2. Set CHANNEL SELECTOR sw to 4. Adjust C-240 for 20 volts on VTVM. Adjust for max if 20 volts cannot be obtained.
3. Read voltage on channel 1. Adjust C-242 to equalize voltages on channels 1 and 4.
4. Repeat steps 2 and 3 if these results are not obtained.
5. Read voltage on channels 2 and 3. Adjust C-241 to equalize these readings.
6. Read voltage on all four channels. Voltage on channels 1 and 4 should be equal and between 20 and 24 volts. Voltage on channels 2 and 3 should be equal and between 18 and 22 volts.
7. Repeat steps 2 through 5 if these results are not obtained.
8. Release any channel mechanism and rotate dial pointer from 27.0 to 38.9 mc. The voltage should vary not more than 6 volts when transmitter is properly aligned. Check voltage against the following table:

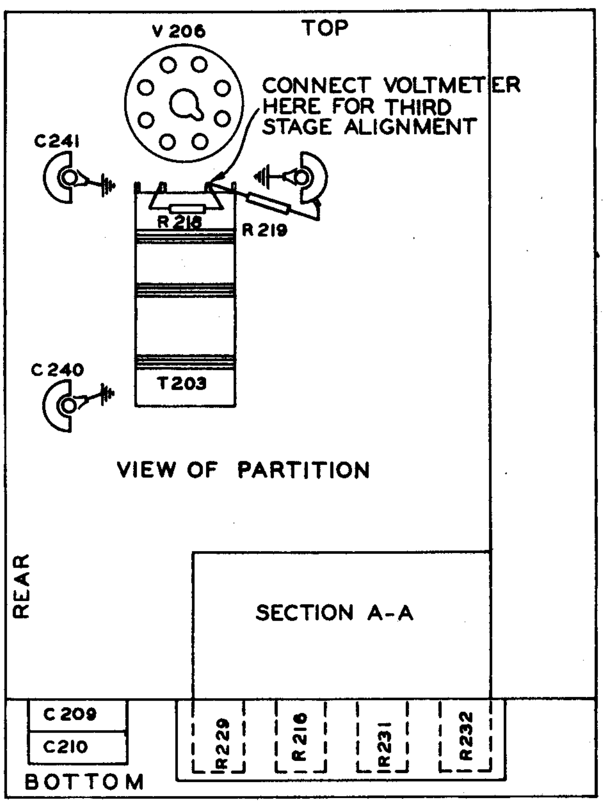
27.0 mc	24 volts	33.0 mc	22 volts
30.0 mc	18 volts	35.0 mc	19 volts
		38.9 mc	22 volts

9. Lock all capacitors that were adjusted, taking care that the adjustments are not disturbed.

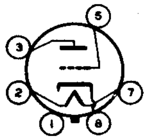
LOCATION OF ALIGNMENT ADJUSTMENTS



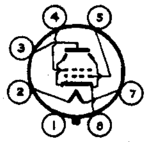
BOTTOM VIEW



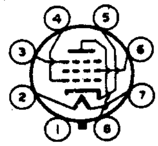
TUBE SOCKET TERMINALS, BOTTOM VIEW



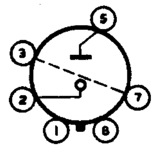
VT-94
RMA TYPE 6J5



VT-107-A
RMA TYPE 6V6GT

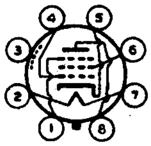


VT-116-B
RMA TYPE 6SJ7Y

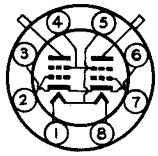


VT-139
RMA TYPE VR-150-30

VT-229
RMA TYPE 6SL7GT



VT-247
RMA TYPE 6AG7



VT-287
RMA TYPE 815

LOCATING TROUBLE

NO OPERATION

1. Check Fuse F-401 located in the mounting. If found blown, correct the trouble or locate and replace the defective unit before installing a new fuse.
2. Check the battery connections between the mounting and the battery.
3. Check the battery voltage under load.

ANTENNA WILL NOT LOAD

4. Check that microphone plug is making proper contact.
5. Test antenna lead for breaks and poor contact.
6. Listen for sidetone in receiver phones.

EXCESSIVE ANTENNA LOADING

7. See that nothing is tied to the antenna and that it is vertical.
8. Try another channel.
9. Check antenna tuning (see alignment procedure).

WEAK OR DEAD SIDETONE

10. Test microphone and headset cords.
11. Check all operating switches for correct position.
12. Vary the SIDETONE volume control.
If these tests do not reveal the trouble check the panel meter readings.
13. Turn CHANNEL SELECTOR sw to highest frequency channel, RADIO-INTER sw to RADIO, and OPERATE-TUNE sw to TUNE.
14. Read panel meter for each METER SW position and compare with the following table:

Sw Position	1	2	3	4	5	6
Indicates	Final Plate Cur	Final Grid Cur	Dblr Grid Cur	Buffer Cathode Cur	Mod Cathode Cur	Osc Grid Cur
Reading 38.9 mc	0	60	29	43	49	9

In general, a reading substantially different from normal will indicate trouble in either the stage under test or the preceding stage.

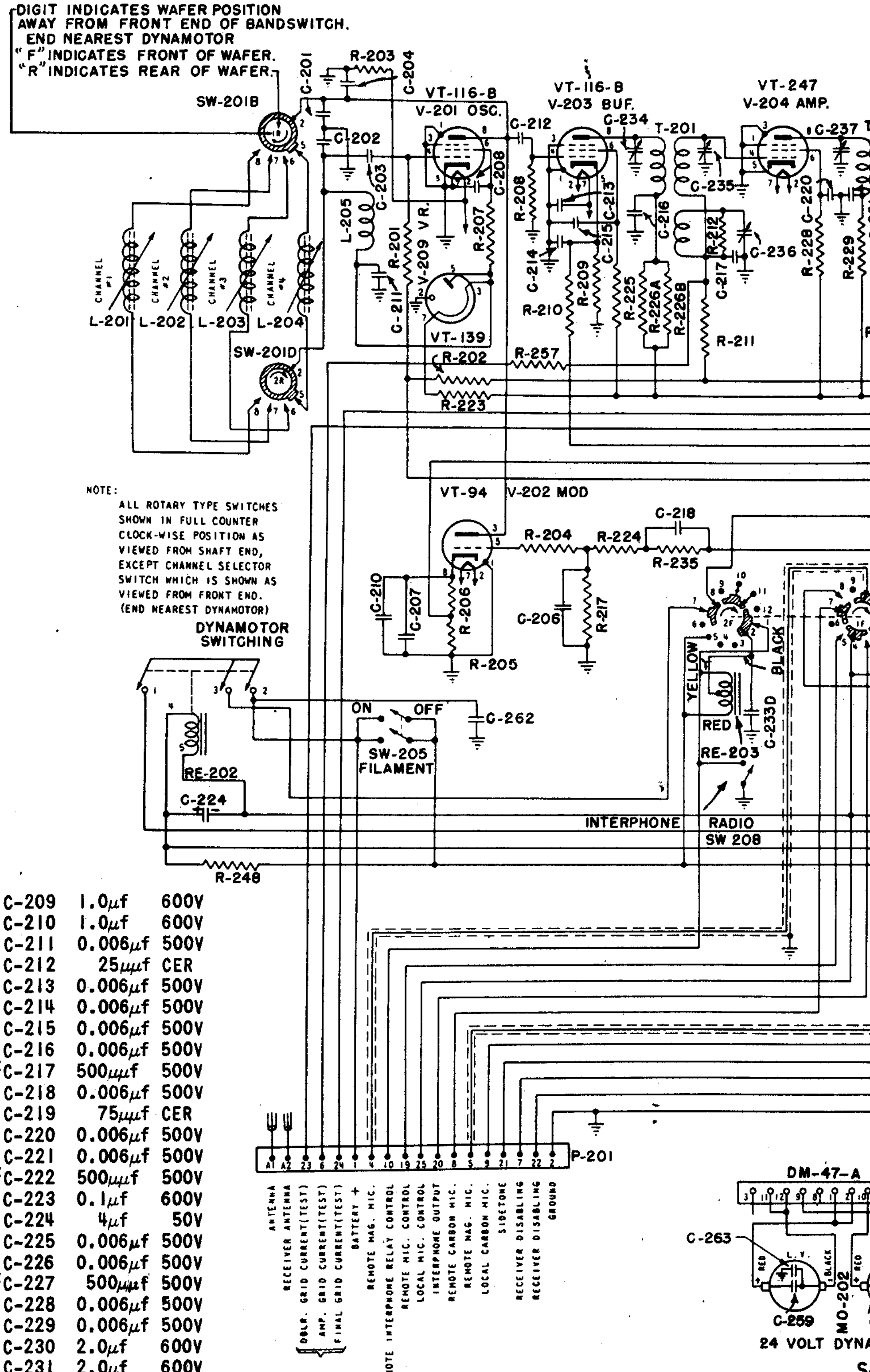
15. Test tubes, measure voltage and resistance of these stages to locate the defective part.

RESISTORS

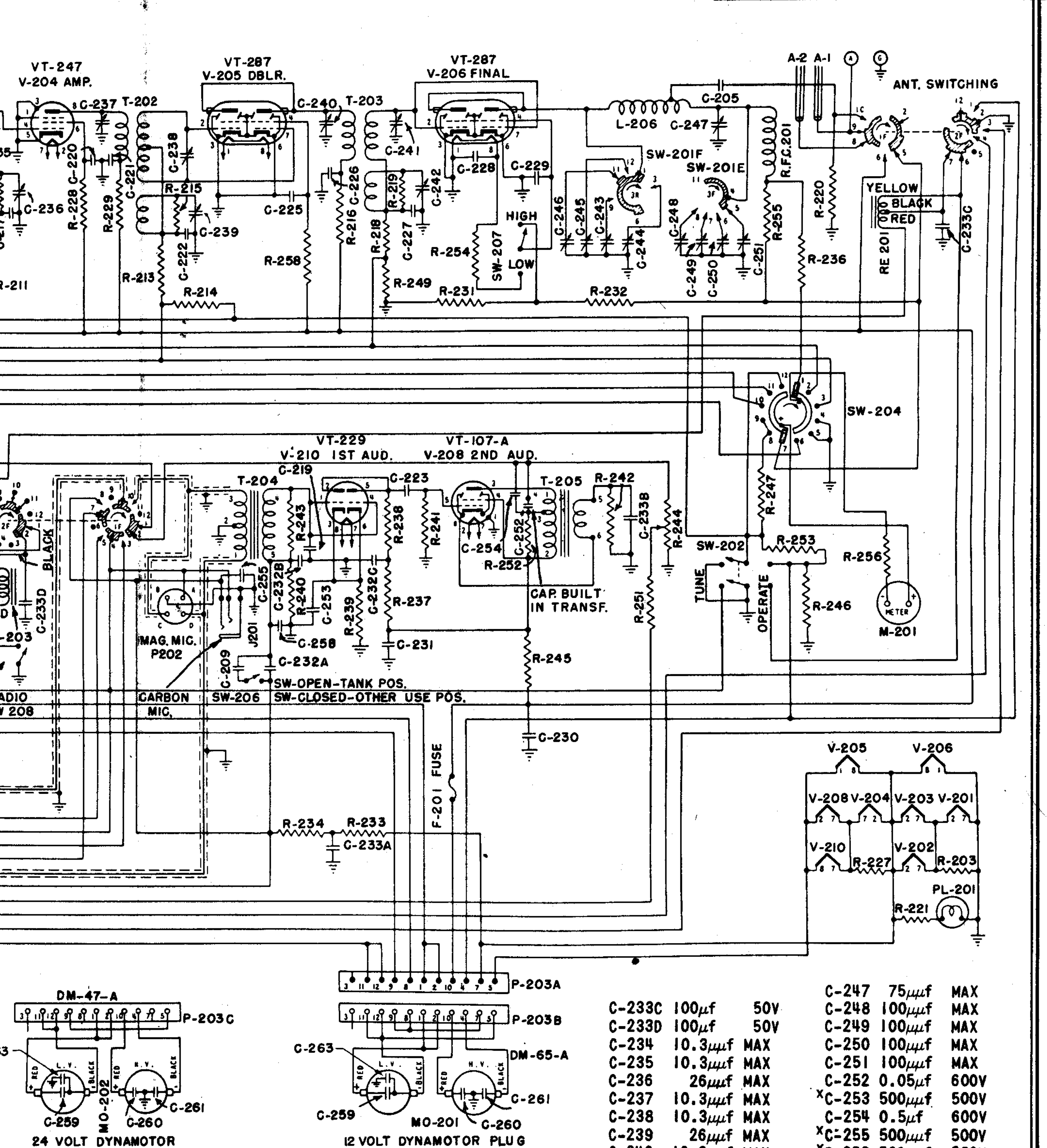
R-201	22,000 Ω	1/2W
R-202	1,000 Ω	1/4W
R-203	19 Ω	2W
R-204	100 Ω	1/2W
R-205	15 Ω	1/4W
R-206	2,200 Ω	1/2W
R-207	22,000 Ω	1/2W
R-208	100,000 Ω	1/4W
R-209	330 Ω	1/2W
R-210	2,200 Ω	1/2W
R-211	330,000 Ω	1/2W
R-212	2,200 Ω	1/2W
R-213	22,000 Ω	1/2W
R-214	10,000 Ω	1/2W
R-215	1,500 Ω	5W
R-216	2,250 Ω	25W
R-217	470 Ω	1/2W
R-218	4,700 Ω	1/2W
R-219	1200 Ω	5W
R-220	1,000,000 Ω	1/4W
R-221	63 Ω	5W
R-223	7,500 Ω	25W
R-224	820 Ω	1/4W
R-225	330,000 Ω	1/2W
R-226A	150,000 Ω	1/2W
R-226B	150,000 Ω	1/2W
R-227	63 Ω	5W
R-228	35,000 Ω	20W
R-229	7,500 Ω	20W
R-231	35,000 Ω	20W
R-232	11,500 Ω	25W
R-233	100 Ω	1/2W
R-234	220 Ω	1W
R-235	33,000 Ω	1/2W
R-236	350 Ω	1/2W
R-237	220,000 Ω	1/2W
R-238	390,000 Ω	1/2W
R-239	4,700 Ω	1/2W
R-240	47,000 Ω	1/2W
R-241	390,000 Ω	1/2W
R-242	270 Ω	1W
R-243	68,000 Ω	1/2W
R-244	50,000 Ω	POT
R-245	2,000 Ω	25W
R-246	1,250 Ω	25W
R-247	10,000 Ω	1/2W
R-248	16 Ω	10W
R-249	1,000 Ω	1/4W
R-251	10,000 Ω	1/2W
R-252	2,500 Ω	5W
R-253	1,250 Ω	5W
R-254	4,700 Ω	1/2W
R-255	2 Ω	1/2W
R-256	39 Ω	1/2W
R-257	100,000 Ω	1/4W
R-258	35,000 Ω	20W

CAPACITORS

C-201	100μμf	CER
*C-202	450μμf	500V
C-203	50μμf	CER
C-204	25μμf	CER
*C-205	0.001μf	1000V
×C-206	500μμf	500V
C-207	0.006μf	500V
C-208	0.006μf	500V
C-209	1.0μf	600V
C-210	1.0μf	600V
C-211	0.006μf	500V
C-212	25μμf	CER
C-213	0.006μf	500V
C-214	0.006μf	500V
C-215	0.006μf	500V
C-216	0.006μf	500V
×C-217	500μμf	500V
C-218	0.006μf	500V
C-219	75μμf	CER
C-220	0.006μf	500V
C-221	0.006μf	500V
×C-222	500μμf	500V
C-223	0.1μf	600V
C-224	4μf	50V
C-225	0.006μf	500V
C-226	0.006μf	500V
×C-227	500μμf	500V
C-228	0.006μf	500V
C-229	0.006μf	500V
C-230	2.0μf	600V
C-231	2.0μf	600V
C-232A	0.2μf	200V
C-232B	0.5μf	200V
C-232C	0.1μf	600V
C-233A	50μf	50V
C-233B	20μf	50V



NOTES: *These Capacitors
×These capacitors
Unmarked moulded-
Replace C-201 an



Schematic

C-233C	100µf	50V	C-247	75µµf	MAX
C-233D	100µf	50V	C-248	100µµf	MAX
C-234	10.3µµf	MAX	C-249	100µµf	MAX
C-235	10.3µµf	MAX	C-250	100µµf	MAX
C-236	26µµf	MAX	C-251	100µµf	MAX
C-237	10.3µµf	MAX	C-252	0.05µf	600V
C-238	10.3µµf	MAX	ˣC-253	500µµf	500V
C-239	26µµf	MAX	C-254	0.5µf	600V
C-240	10.3µµf	MAX	ˣC-255	500µµf	500V
C-241	10.3µµf	MAX	ˣC-258	500µµf	500V
C-242	26µµf	MAX	*C-259	0.005µf	500V
C-243	76µµf	MAX	*C-260	500µµf	1,000V
C-244	76µµf	MAX	*C-261	500µµf	1,000V
C-245	76µµf	MAX	C-262	0.5µf	120V
C-246	76µµf	MAX	*C-263	0.005µf	500V
			F-201	FUSE-1	AMP

ese Capacitors must be mica dielectric.
ese capacitors may be either mica or ceramic
marked moulded-type either mica or paper dielectric
place C-201 and C-204 as a unit

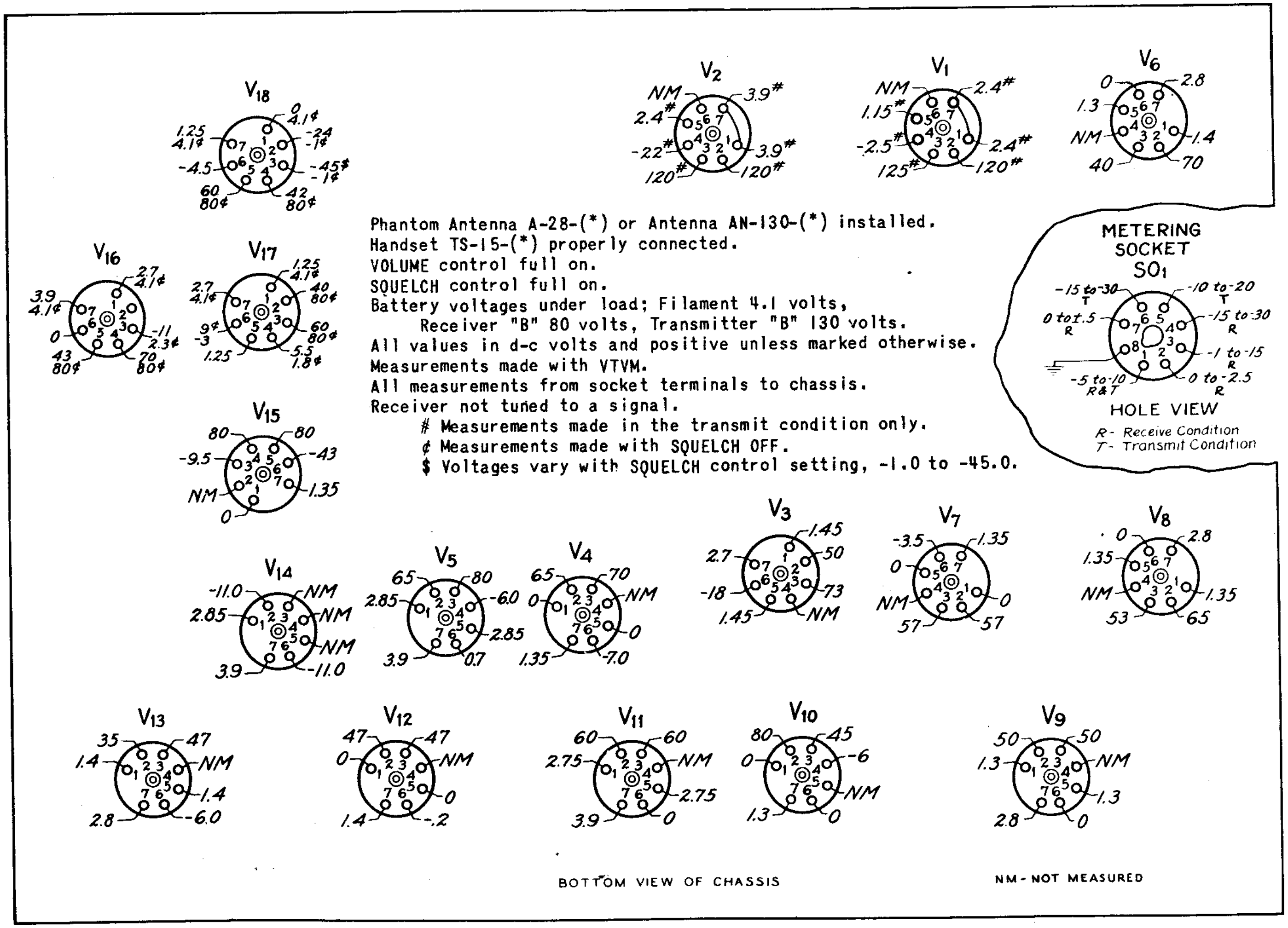
RADIO RECEIVER AND TRANSMITTER BC-1000-(*)

Part of: SCR-300-(*)

BC-1000-(*) = BC-1000-A

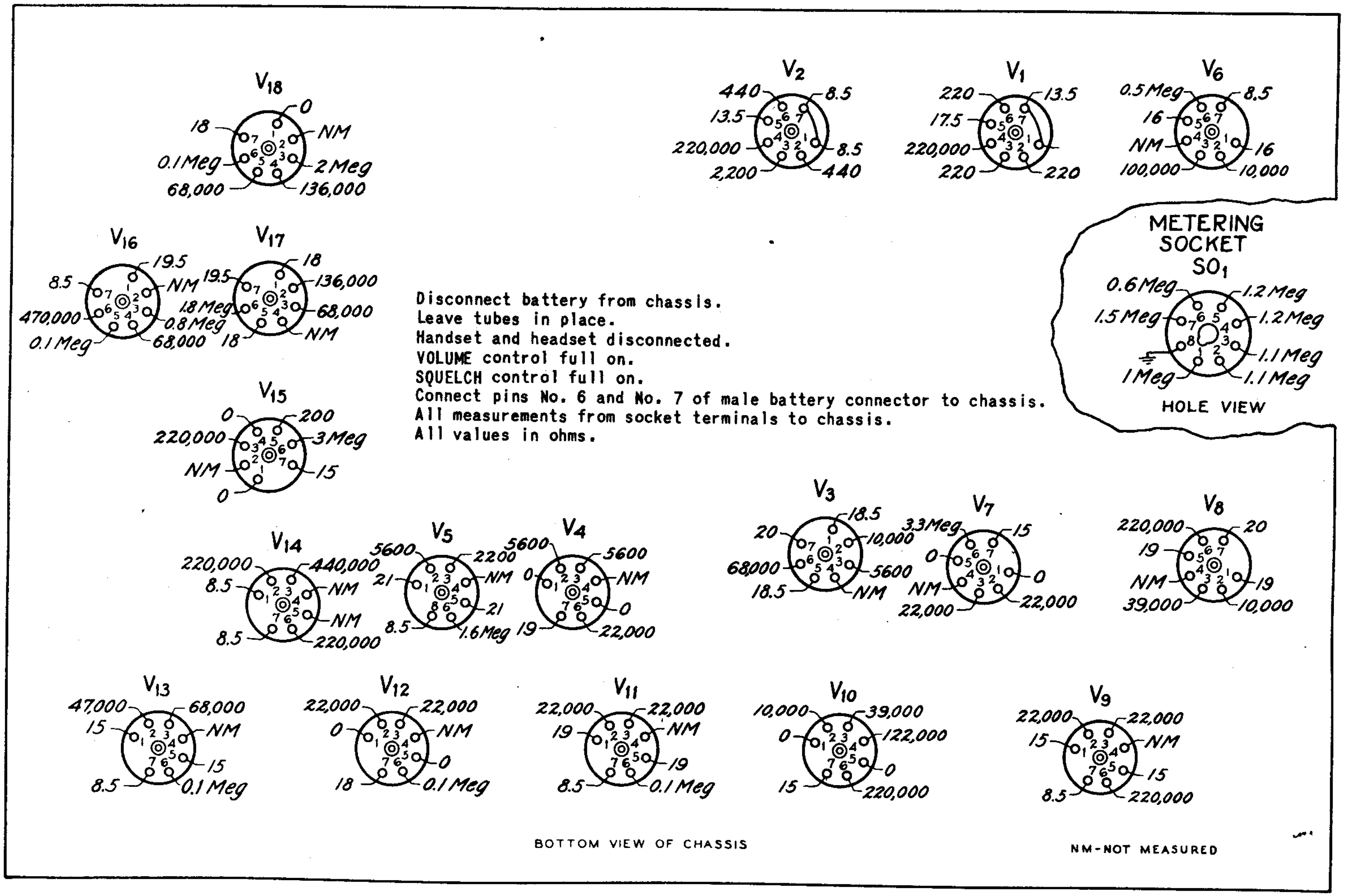
Reference
TM 11-242

VOLTAGE MEASUREMENTS



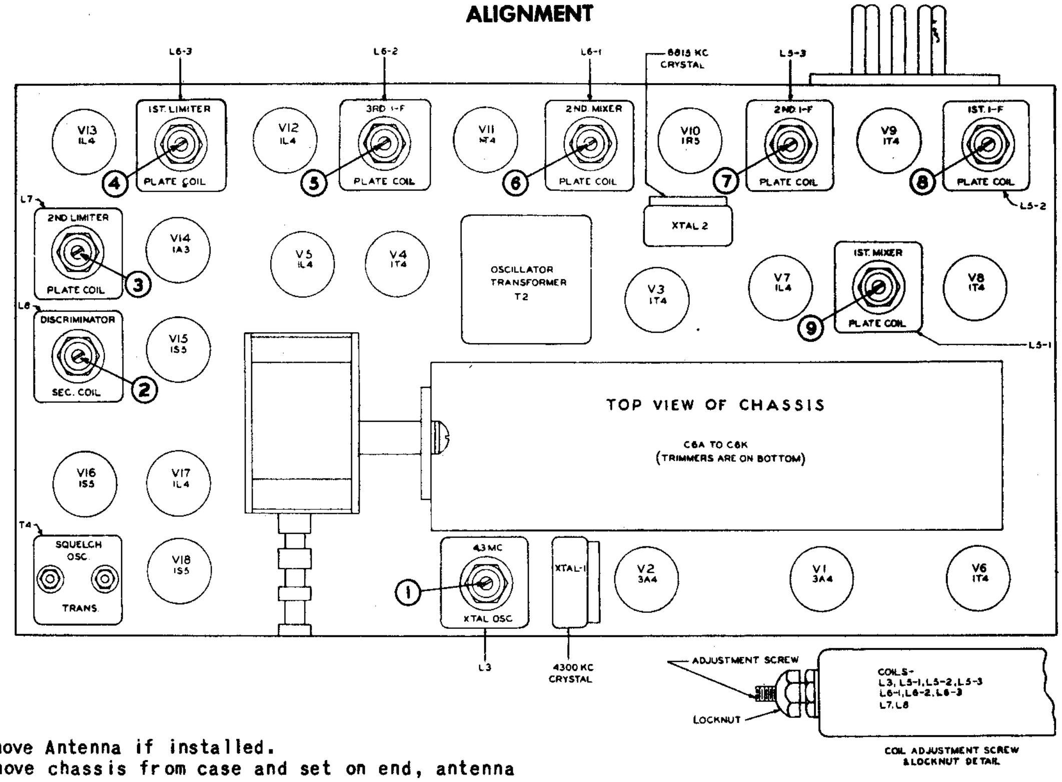
Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed.
Handset TS-15-(*) properly connected.
VOLUME control full on.
SQUELCH control full on.
Battery voltages under load; Filament 4.1 volts,
Receiver "B" 80 volts, Transmitter "B" 130 volts.
All values in d-c volts and positive unless marked otherwise.
Measurements made with VTVM.
All measurements from socket terminals to chassis.
Receiver not tuned to a signal.
Measurements made in the transmit condition only.
¢ Measurements made with SQUELCH OFF.
$ Voltages vary with SQUELCH control setting, -1.0 to -45.0.

RESISTANCE MEASUREMENTS



Disconnect battery from chassis.
Leave tubes in place.
Handset and headset disconnected.
VOLUME control full on.
SQUELCH control full on.
Connect pins No. 6 and No. 7 of male battery connector to chassis.
All measurements from socket terminals to chassis.
All values in ohms.

ALIGNMENT



COIL ADJUSTMENT SCREW & LOCKNUT DETAIL

Remove Antenna if installed.

Remove chassis from case and set on end, antenna post up.

Connect Handset TS-15-(*) to MIC and PHONE 1, and Headset HS-30-(*) to AUX. PHONE jack.

Connect fresh Battery BA-70 with chassis by Cord (Galvin Part No. 1x41796), component of ME-40-(*) and ME-53-(*). Alternatively set battery on end and higher than chassis so battery connectors line up and connect battery directly to chassis.

VOLUME control full on.

SQUELCH OFF.

Loosen locknuts on coils L_3, L_{5-1}, L_{5-2}, L_{5-3}, L_{6-1}, L_{6-2}, L_{6-3}, L_7, and L_8 just enough to allow snug adjustment of screws.

Use Electronic Voltmeter (VTVM) or Alignment Indicator 1-210-(*) (VTVI), connect ground lead to chassis.

All measurements taken at the metering socket are negative d-c voltages unless otherwise specified.

RECEIVER ALIGNMENT

4.3 MC CRYSTAL CIRCUIT ALIGNMENT

1. Insert VTVM probe in No. 4 of metering socket.
2. Push the PRESS FOR DIAL LIGHT & CALIB button.
3. Turn adjustment screw on L_3 at 1, all the way out, then turn it in until the meter reads -30 volts and tighten locknut. In case maximum voltage occurs at exactly -30 volts or less than -30 volts, adjust screw to the maximum voltage and then turn the screw back 1/2 to 3/4 of a turn. Release button.

DISCRIMINATOR AND 2ND LIMITER ALIGNMENT

4. Insert VTVM probe in No. 7 of metering socket.
5. Push the PRESS FOR DIAL LIGHT & CALIB button.
6. Adjust L_8, at 2 for (positive) +0.5 volt. This is a critical adjustment. ±1/8 turn of the screw from the correct position will cause the VTVM reading to go from a positive voltage through zero to a negative voltage or vice versa depending on which way screw is turned.
7. Adjust L_7 at 3 for maximum positive voltage.
8. Readjust L_8 at 2 for zero voltage (critical) and lock. Release button.

I-F AND MIXER ALIGNMENT

Two methods of aligning the I-F stages follow. The first uses the VO-6-(*) Oscillator as a source of I-F signal. The second uses the 4.3 megacycle crystal calibrate circuit in the set as a source of I-F signal.

I-F Alignment with VO-6-(*) OSC.

9. Connect "high" side of VO-6-(*) to control grid of first mixer tube 1L4, No. 6 socket terminal of V_7. See bottom view of chassis.

ALIGNMENT (cont)

10. Connect "low" side to chassis.
11. Insert probe of VTVM in No. 2 of metering socket.
12. Turn on VO-6-(*) by rotating potentiometer knob clockwise. In following alignment adjust potentiometer and "HI" "LO" switch on VO-6-(*) so that VTVM reads about 5 volts.

NOTE: If set is very much out of alignment there may be no voltage indication. In this case adjust screws on L_{5-1} at 9, L_{5-2} at 8, L_{5-3} at 7, L_{6-1} at 6, and L_{6-2} at 5, until they are extended ¼ inch. Disconnect the VO-6-(*) and then adjust screws for maximum noise in Handset TS-15-(*). Reconnect VO-6-(*).

13. Adjust L_{6-1} at 6, L_{6-2} at 5, L_{5-3} at 7, L_{5-2} at 8, and L_{5-1} at 9 for maximum voltage.
14. Insert probe of VTVM in No. 3 of metering socket.
15. Adjust L_{6-3} at 4 for maximum voltage. Control output of VO-6-(*) to keep voltage below -20 volts.
16. Disconnect oscillator VO-6-(*).
17. Insert probe of VTVM in No. 7 of metering socket. If voltage is greater than ± 0.5 volt, a final adjustment of L_{5-2} at 8 and L_{5-1} at 9 will bring the voltage to zero. Be sure the receiver does not pick up a signal.
18. Carefully tighten all locknuts. Recheck voltage No. 7 of metering socket for zero.

I-F Alignment with Crystal Calib. Circuit

NOTE: In this method of alignment the voltage output of the crystal calib. circuit to the i-f stages is reduced by the use of a dummy tube in the first mixer stage. A satisfactory dummy tube can be made by cutting off all pins but the filament pins 1, 5, and 7 on either a 1L4, 1T4, or 1R5 tube whose filament circuit is good.

9. Turn off set, remove the 1st mixer tube V7, and insert dummy tube in its place. Insert probe of VTVM in No. 3 of metering socket.
10. Push the PRESS FOR DIAL LIGHT & CALIB button.
11. Adjust L_{6-3} at 4 for maximum voltage. Note: If the set is considerably out of line it may be necessary to adjust L_{6-2}, L_{6-1}, L_{5-3}, and L_{5-2} in order to obtain an initial reading at No. 3 of metering socket. If the set is nearly aligned and only needs trimming up, then this reading may be over -15 volts; in this case slightly detune L_{5-2} so that when L_{6-3} is adjusted, the meter does not exceed - 15 volts.
12. Insert probe of VTVM in No. 2 of metering socket. Adjust L_{6-2} at 5, L_{6-1} at 6 L_{5-3} at 7, and L_{5-2} at 8 respectively for maximum voltage.
13. Release button and turn off set.
14. Replace dummy tube with good tube and shield. Turn set on.
15. Insert probe of VTVM in No. 3 of metering socket.
16. Adjust L_{5-1} at 9 to maximum voltage. (This is random noise voltage. Be sure receiver does not pick up a signal.)
17. Insert probe of VTVM in No. 7 of metering socket. If voltage is greater than ±0.5 volt, a final adjustment of L_{5-2} at 8 and L_{5-1} at 9 will bring the voltage to zero. Be sure receiver does not pick up a signal.
18. Carefully tighten all locknuts. Recheck voltage at No. 7 for zero.

R-F ALIGNMENT

Transmitter alignment must be completed before aligning receiver R-F. See steps 12 and 13 under TRANSMITTER ALIGNMENT below.

TRANSMITTER ALIGNMENT

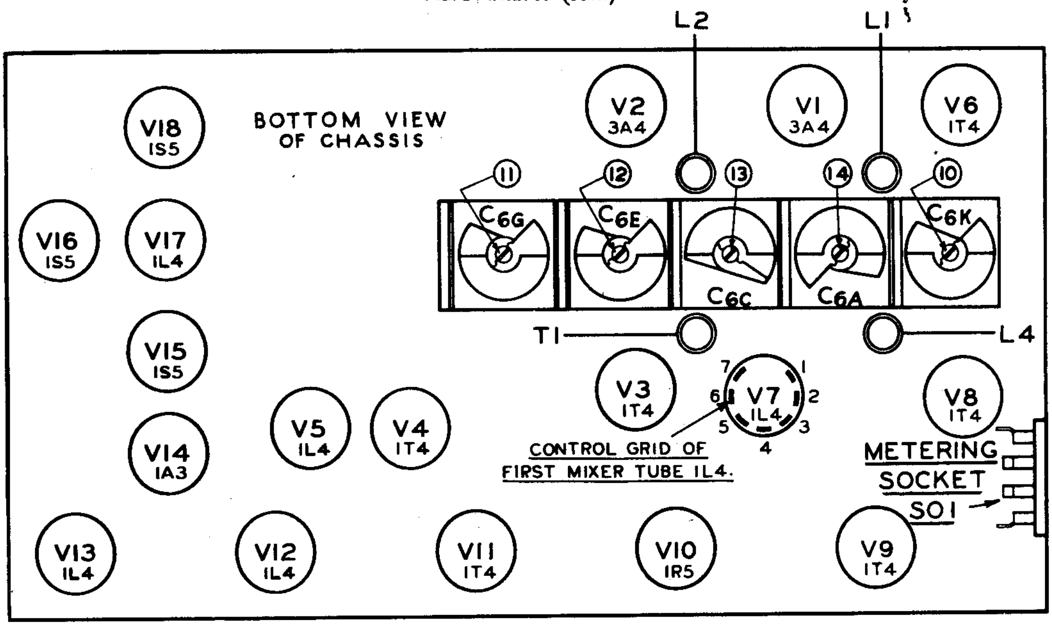
The receiver circuit must be aligned before the transmitter circuit is aligned.

1. Attach phantom antenna A-28 (or antenna AN-130-A).
2. Turn INDICATOR ADJUSTMENT until hairline is in center of window.
3. Tune set to channel 15.
4. Push the PRESS FOR DIAL LIGHT & CALIB button.
5. Adjust trimmer C_{6G} at 11 for zero beat in TS-15-(*). Check calibration point between channels 36 & 37. Release button.
6. Tune set to channel 20.
7. Insert VTVM in No. 5 of metering socket.

CAUTION: Following steps should be made quickly when the set is in the transmit position, otherwise damage to V_1 may result.

8. Press the transmitter switch and adjust C_{6E} at 12 for maximum voltage. Release switch.
9. Press the transmitter switch and adjust C_{6C} at 13 for maximum voltage. This should be at least -10 volts. Release switch.
10. Insert VTVM probe in No. 6 of the metering socket.
11. Press the transmitter switch and adjust C_{6A} at 14 for maximum voltage. This should be at least -20 volts. Release transmit switch.
12. Insert VTVM probe in No. 3 of metering socket.
13. Adjust C_{6K} at 10 for maximum voltage. (This adjustment should be made while no signal is being received.)

ALIGNMENT (cont)



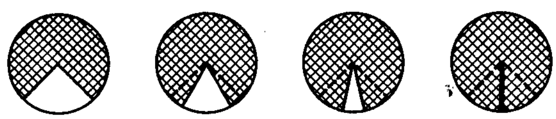
INSTRUCTION IN USE OF COMPONENTS OF ME-40-(*) FOR ALIGNMENT

Alignment Indicator I-210-(*) or VTVI, Oscillator VO-6-(*), and Phantom Antenna A-28-(*) are components of Maintenance Equipment ME-40-(*) and with ME-53-(*) are issued with every six SCR-300's. When these apparatus are available the foregoing procedure can be followed in accordance with the instructions given below.

Antenna A-28 is a phantom antenna designed for loading the BC-1000-A for alignment and test purposes of the transmitter section. It is electrically equivalent to antenna AN-131-(*).

Oscillator VO-6-(*) is a signal generator which is crystal controlled and battery powered. It operates on 4.3 megacycles only. It is turned on by means of a switch controlled by the potentiometer knob. The output is controlled by a "HI" "LO" switch on the terminal box at the end of the cable and the potentiometer.

Alignment Indicator I-210-(*), VTVI, is a vacuum tube voltage indicating instrument employing an electric eye tube. A switch provides a 4.5, 6, and 30-volt range. The instrument is calibrated on all scales by connecting the red lead to the positive terminal of a 4.5-volt battery and the black lead or probe to the negative terminal and adjusting the calibration knob until the shadow just disappears, that is, eye just closes. An approximate calibration can be obtained by shorting the leads together and adjusting the calibrate knob to the point where further movement just starts to close the eye. In this case the eye will be open approximately 90° with no input voltage. Figure 1

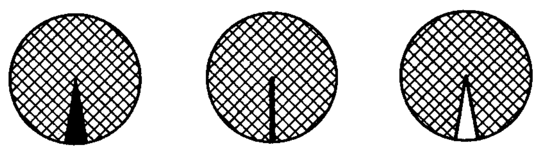


0 VOLTS — -10 VOLTS — -20 VOLTS — -30 VOLTS

Fig. 1.

shows the approximate appearance of the eye when 0, -10, -20, and -30 volts are measured. Range switch is in the 30 volt position.

With the red lead connected to the chassis, a zero, or small negative, or positive voltage, on the black probe can be determined by shorting the probe to the chassis and adjusting the calibrate knob to obtain the hairline closure of the electric eye. Then negative voltage will cause the eye to overlap, a positive voltage will cause the eye to open. Figure 2 shows approximate appearance of the eye when -0.5 volt, zero, and +0.5 volt are impressed on the black probe. The VTVI is calibrated on the 4.5-volt range as per the foregoing.



-0.5 VOLTS — 0 VOLTS — +0.5 VOLTS

Fig. 2.

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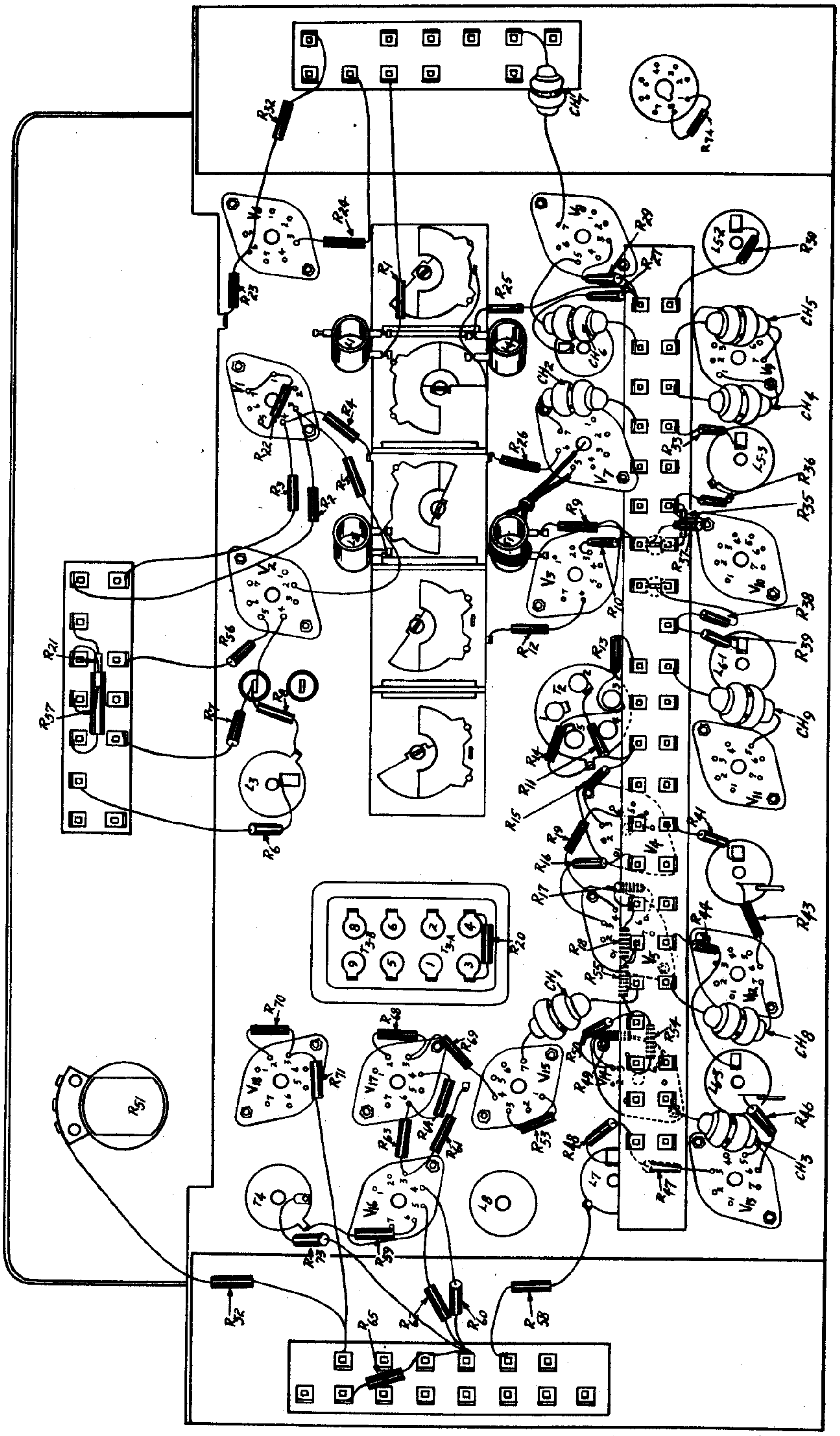
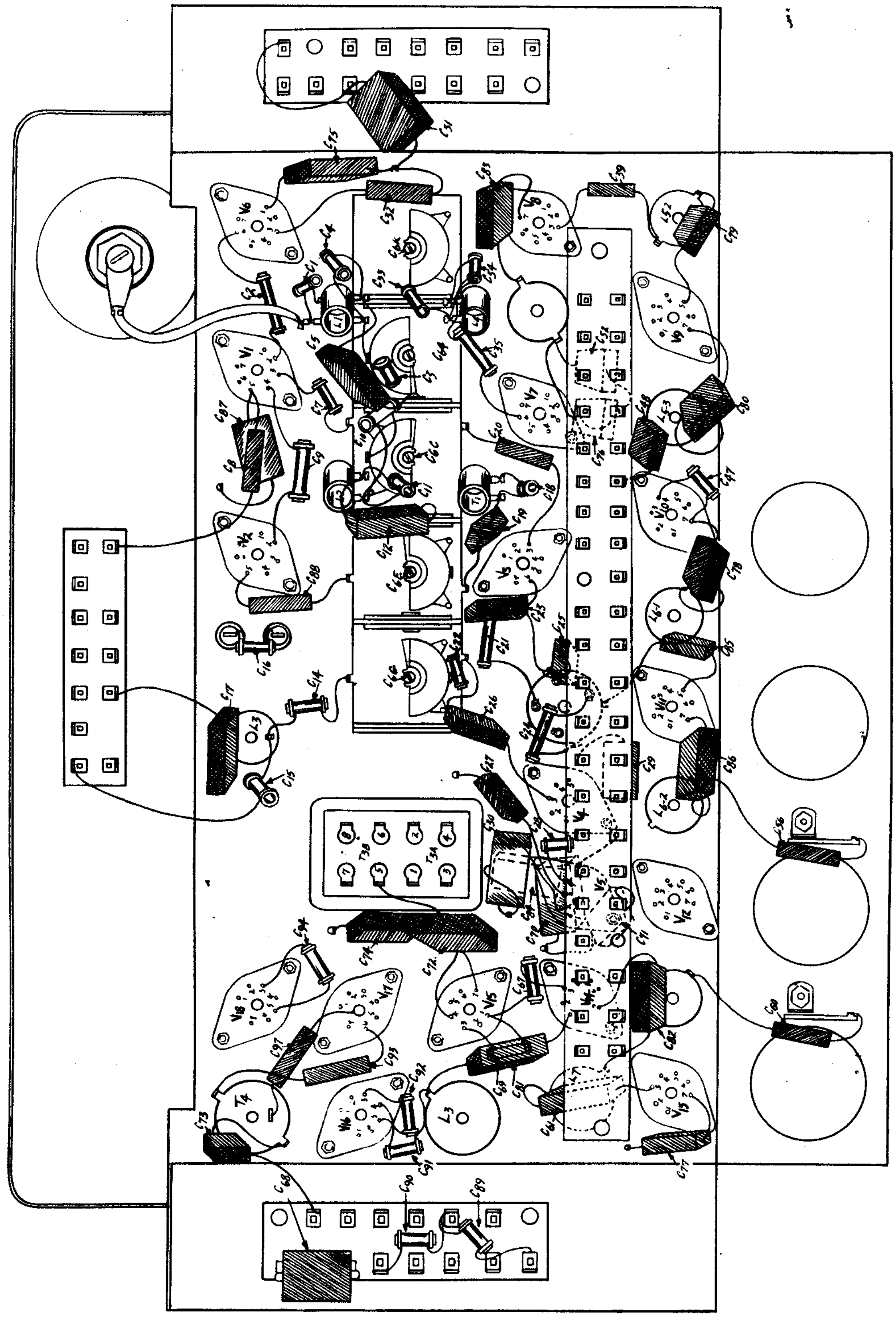
PARTS LAYOUT OF RECEIVER AND TRANSMITTER



BOTTOM VIEW OF CHASSIS SHOWING LOCATION OF RESISTORS

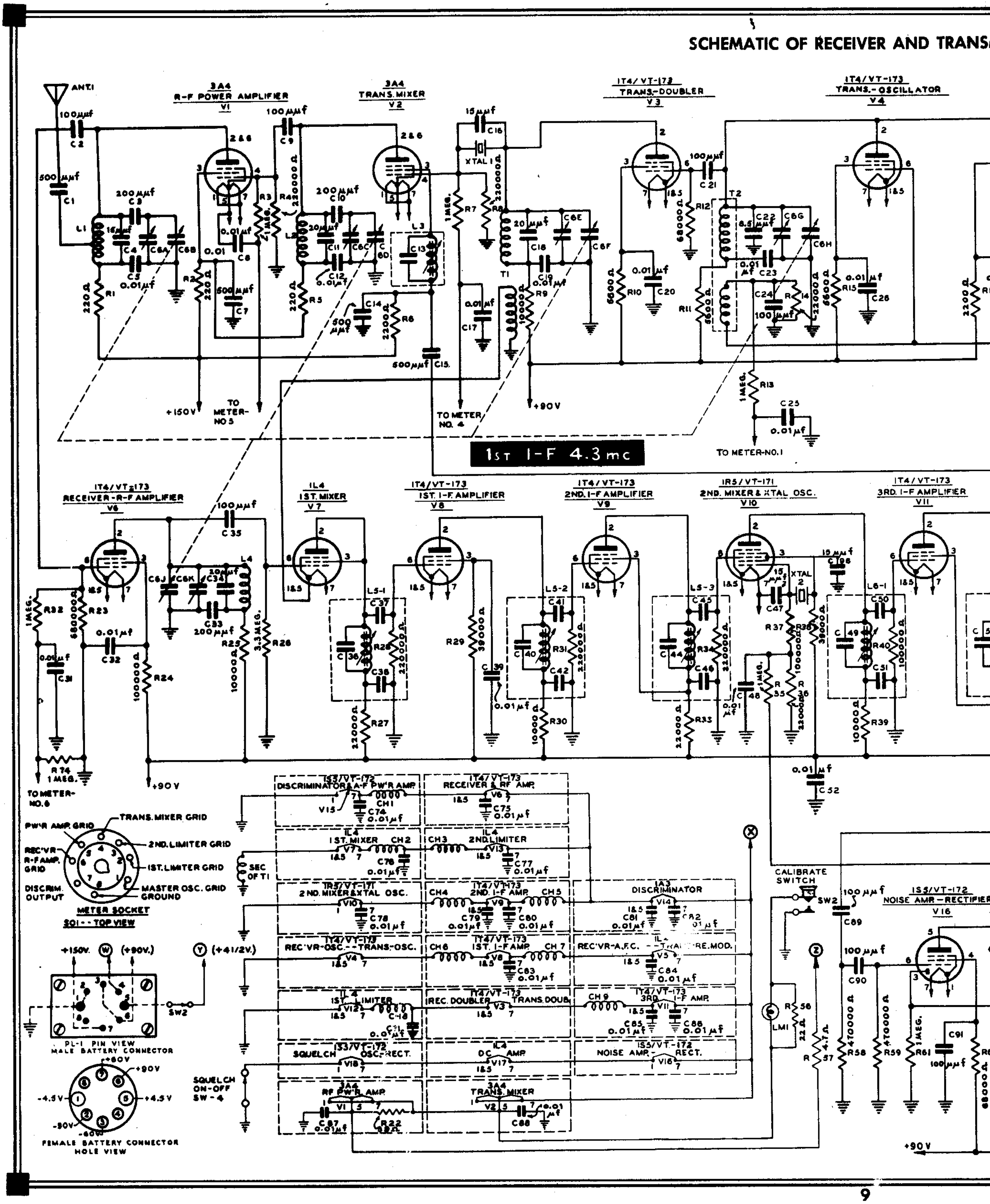
PARTS LAYOUT OF RECEIVER AND TRANSMITTER



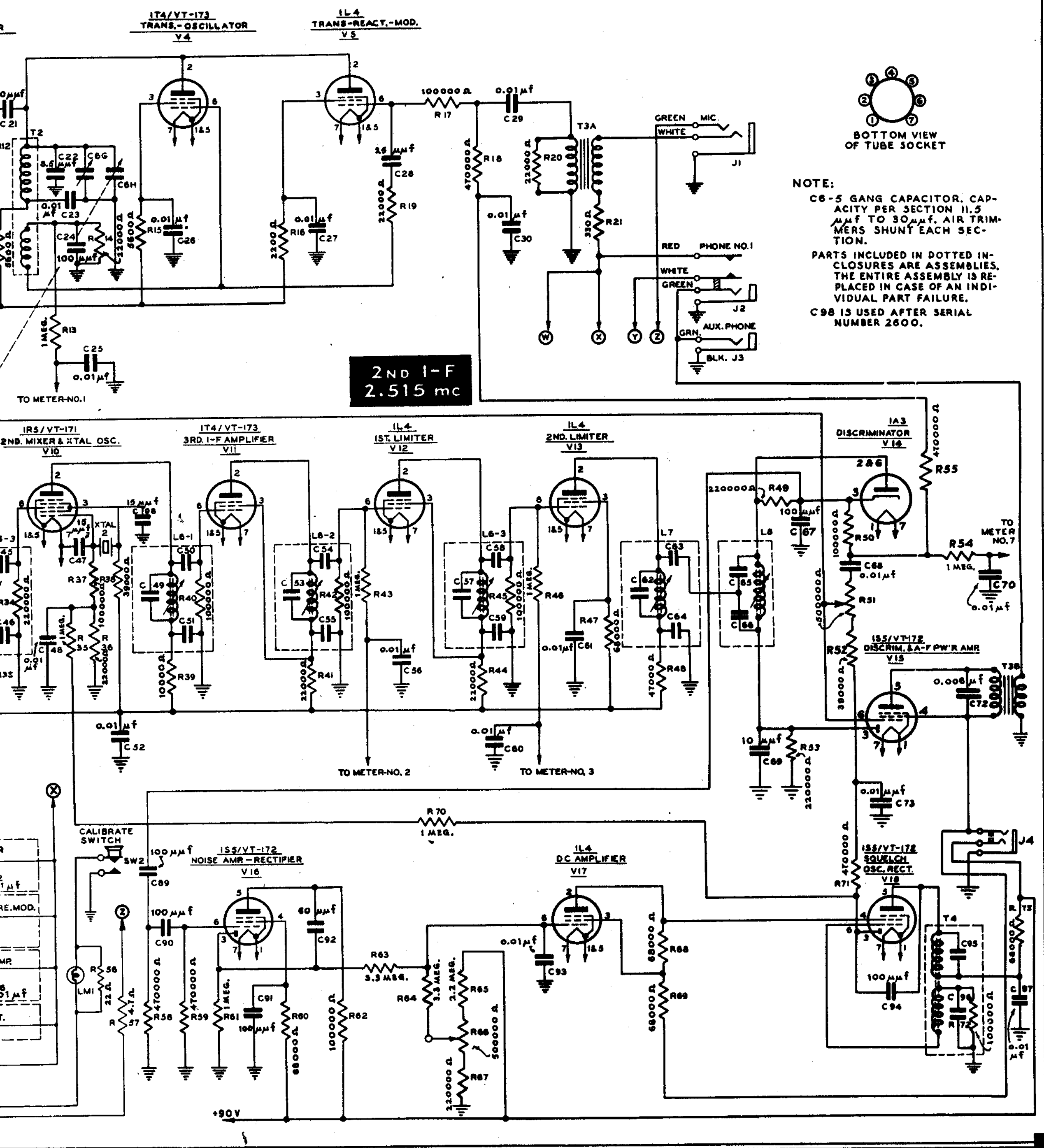
BOTTOM VIEW OF CHASSIS SHOWING LOCATION OF CAPACITORS

COMMON FAULTS AND CORRECTIVE MEASURES

SCHEMATIC OF RECEIVER AND TRANS



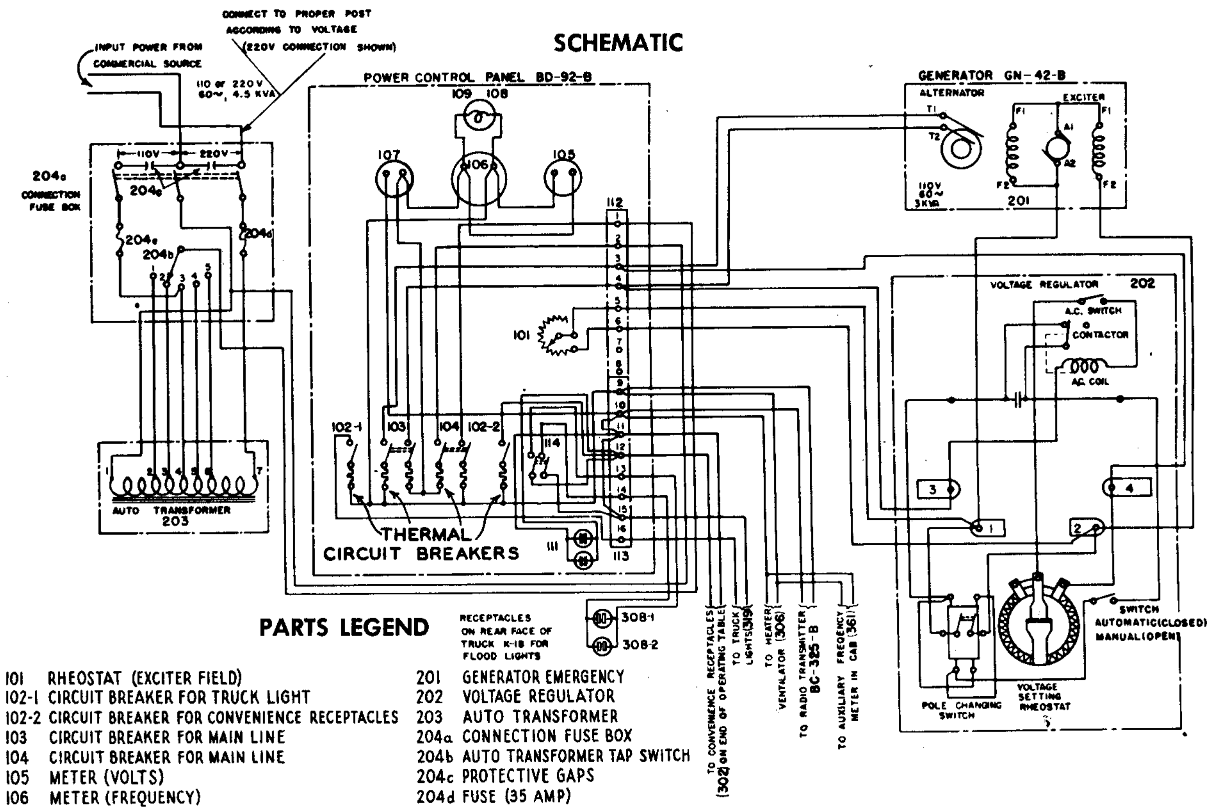
CHEMATIC OF RECEIVER AND TRANSMITTER



POWER CONTROL PANEL BD-92-B

Part of: SCR-197-(*) Reference: TM 11-805

SCHEMATIC



PARTS LEGEND

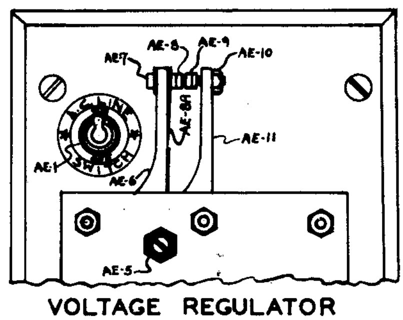
101	RHEOSTAT (EXCITER FIELD)	201	GENERATOR EMERGENCY
102-1	CIRCUIT BREAKER FOR TRUCK LIGHT	202	VOLTAGE REGULATOR
102-2	CIRCUIT BREAKER FOR CONVENIENCE RECEPTACLES	203	AUTO TRANSFORMER
103	CIRCUIT BREAKER FOR MAIN LINE	204a	CONNECTION FUSE BOX
104	CIRCUIT BREAKER FOR MAIN LINE	204b	AUTO TRANSFORMER TAP SWITCH
105	METER (VOLTS)	204c	PROTECTIVE GAPS
106	METER (FREQUENCY)	204d	FUSE (35 AMP)
107	METER (AMPERES)	204e	FUSE (60 AMP)
108	RECEPTACLE (LAMP)		
109	LAMP		

LOCATING TROUBLE

SYMPTOM 1. No indication on panel meters when emergency generator is in operation and switch on panel labelled EMERGENCY is thrown on.
DIAGNOSIS. Generator is not rotating due to failure in truck power takeoff system, belt drive, or pulleys. Worn generator brushes.

SYMPTOM 2. No indication on panel meters when external source of voltage is connected into connection box and connection box switch and switch labelled MAIN on panel are thrown ON.
DIAGNOSIS. Fuse 204d or 204e blown in connection box.

SYMPTOM 3. Voltmeter 105 and frequency meter 106 suddenly indicate wide variations in voltage and frequency.
DIAGNOSIS. Readjust or replace contacts in voltage regulator 202.



VOLTAGE REGULATOR 202

IMPORTANT CONTACTS TO BE ADJUSTED OR REPLACED

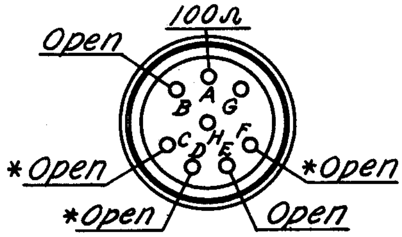
VOLTAGE REGULATOR 202 CONTACT ADJUSTMENTS: Contacts AE-8 and AE-9 may have to be replaced occasionally, as wear indicates. The following procedure should be employed: *First,* loosen set screw AE-5 (refer to adjoining illustration) sufficiently to lift contact arm AE-6 from its socket. *Second,* remove cap nut AE-7 and replace contact AE-8. *Third,* replace cap nut AE-7, making it fairly tight. Caution should be observed in handling these very small parts, as they can be easily broken. Be sure to use the lockwasher under contact AE-8, as this will prevent the contact from working loose. *Fourth,* to remove contact AE-9, loosen locknut AE-10. *Fifth,* replace contact AE-9 and set same so that when contact AE-9 is firmly against contact AE-8, both arms will appear parallel to each other. These contacts must face one another evenly and squarely. This may be accomplished by correctly setting contact arm AE-6, which can be set higher or lower, and contact AE-8, which may be shifted back and forth to the desired position. Use great care in replacing contact AE-8 so that sensitive springs AE-8A will not in any way be damaged or deformed. *Sixth,* tighten locknut AE-10 carefully, as it may easily be broken.

PLATE SUPPLY UNIT PE-97-A

Part of: SCR-510-(*)

Reference: TM 11-605

RESISTANCE AND VOLTAGE MEASUREMENTS



***Use low ohmmeter range. If reading is obtained reverse test leads.**

Fig. 1.—Cable connector resistance readings.

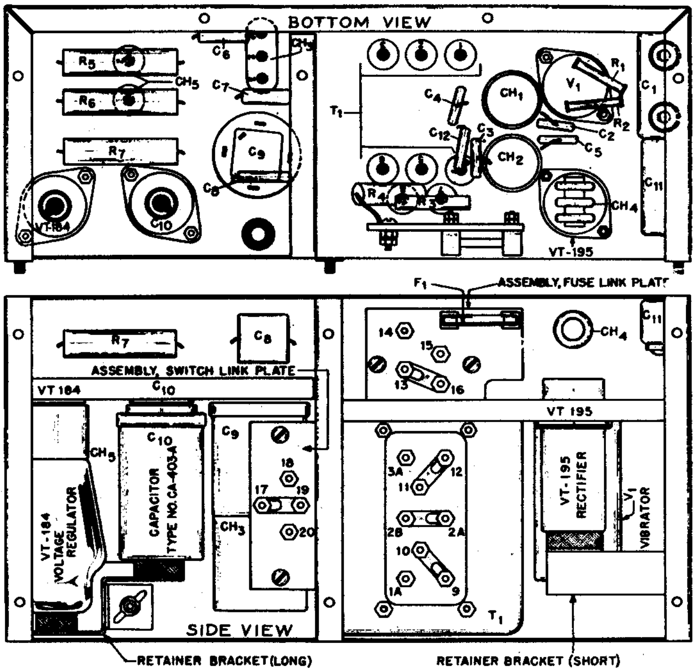


Fig. 2.—Parts layout.

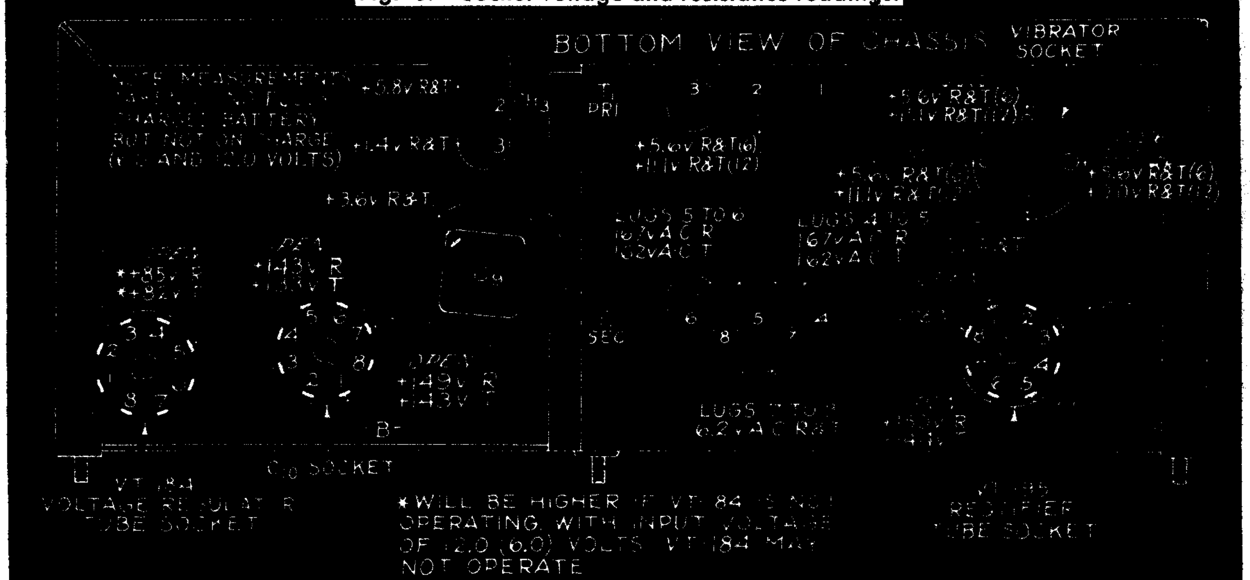
VOLTAGE MEASUREMENTS

PE-97 connected to BC-620.
R or T indicates "RECEIVE" or "TRANSMIT".
(6) or (12) indicates battery voltage.
Voltages are nominal and are measured with VTVM between point indicated and B- (brown lead), except as noted.
Voltages are DC except as noted.

RESISTANCE MEASUREMENTS

Power cable and battery disconnected.
Tubes and vibrator removed.
Socket measurements taken between point indicated and B- (brown lead).
Cable plug receptacle measurements taken between contact indicated and contact "H".

Fig. 3.—Socket voltage and resistance readings.



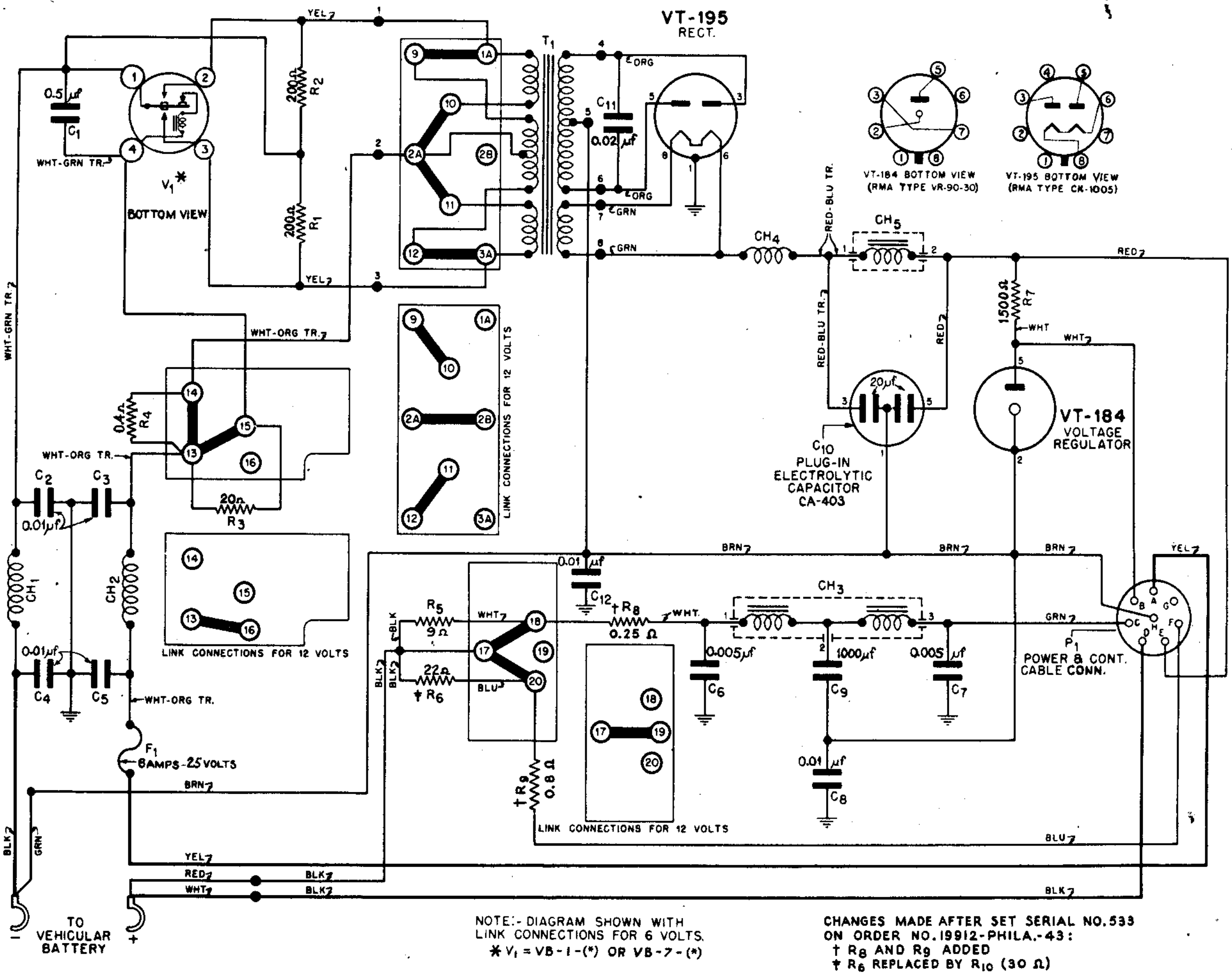


Fig. 4.—Schematic.

COMMON FAULTS AND CORRECTIVE MEASURES

CORDING

The power and control cord and its connectors are subject to failure due to vibration and twisting. Be sure to check the cording and connectors, both electrically and mechanically, before looking for trouble in other parts of the set.

Refer to COMMON FAULTS AND CORRECTIVE MEASURES under SCR-509-510-(*) in this manual for an authorized method of supporting this cording.

SPECIAL NOTES

MOISTURE PROTECTION

A waterproof canvas cover to protect BC-620-A and its associated power supply (PE-97-A or CS-79-(*)) has been added to the parts list of SCR-509-(*) and SCR-510-(*). Organizations having Radio Sets SCR-509-(*) and SCR-510-(*) which lack Cover BG-153, Stock No. 2Z3400-153, should requisition them in the usual manner. This cover is not removed when the equipment is in operation.

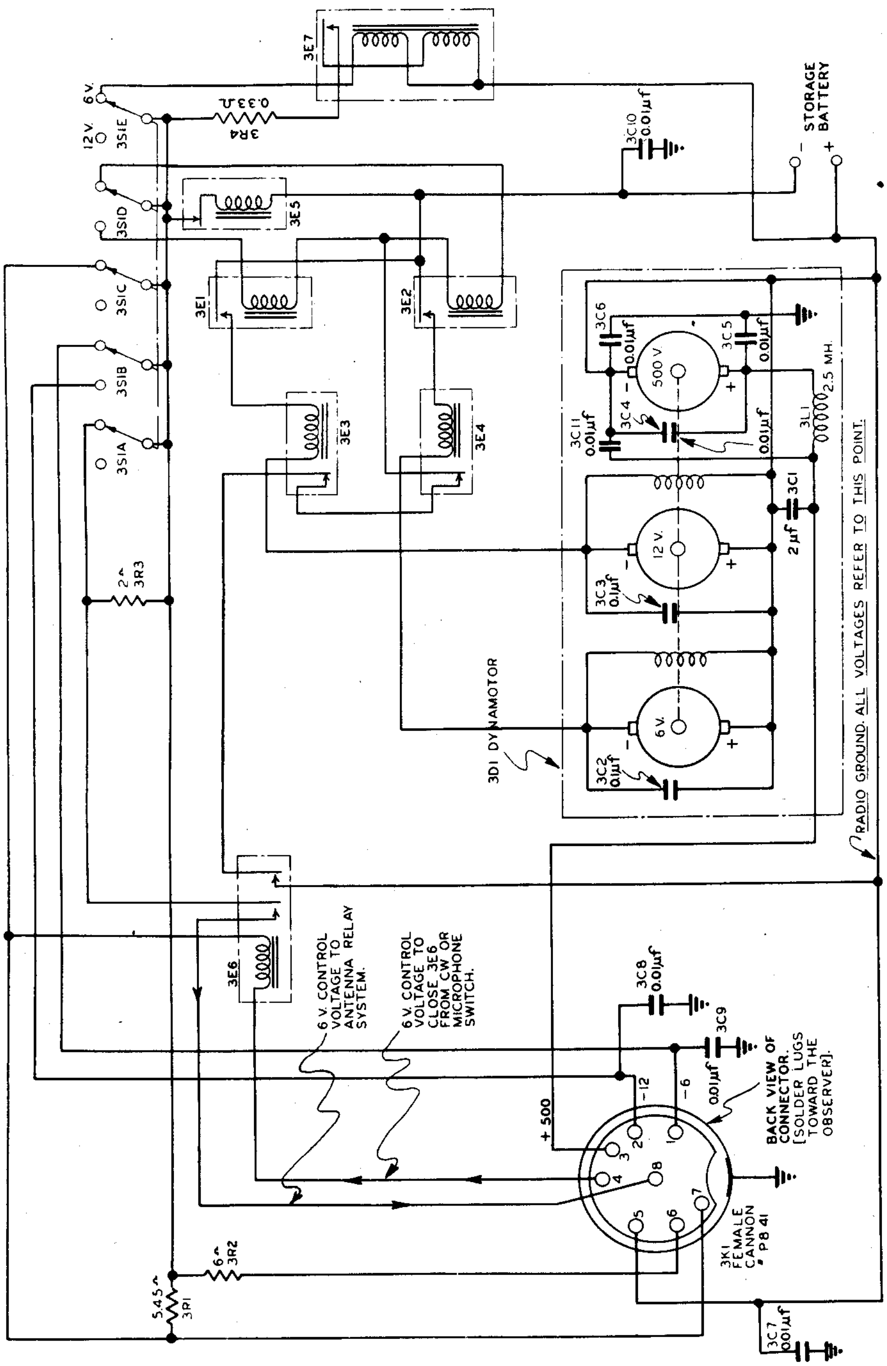
Ref: Supply Letter No. 179 (1943)

POWER UNIT PE-103-A

Part of: SCR-284-A

Reference:
TM 11-275

SCHEMATIC—Sets serial Nos. 1 to 4710 incl.

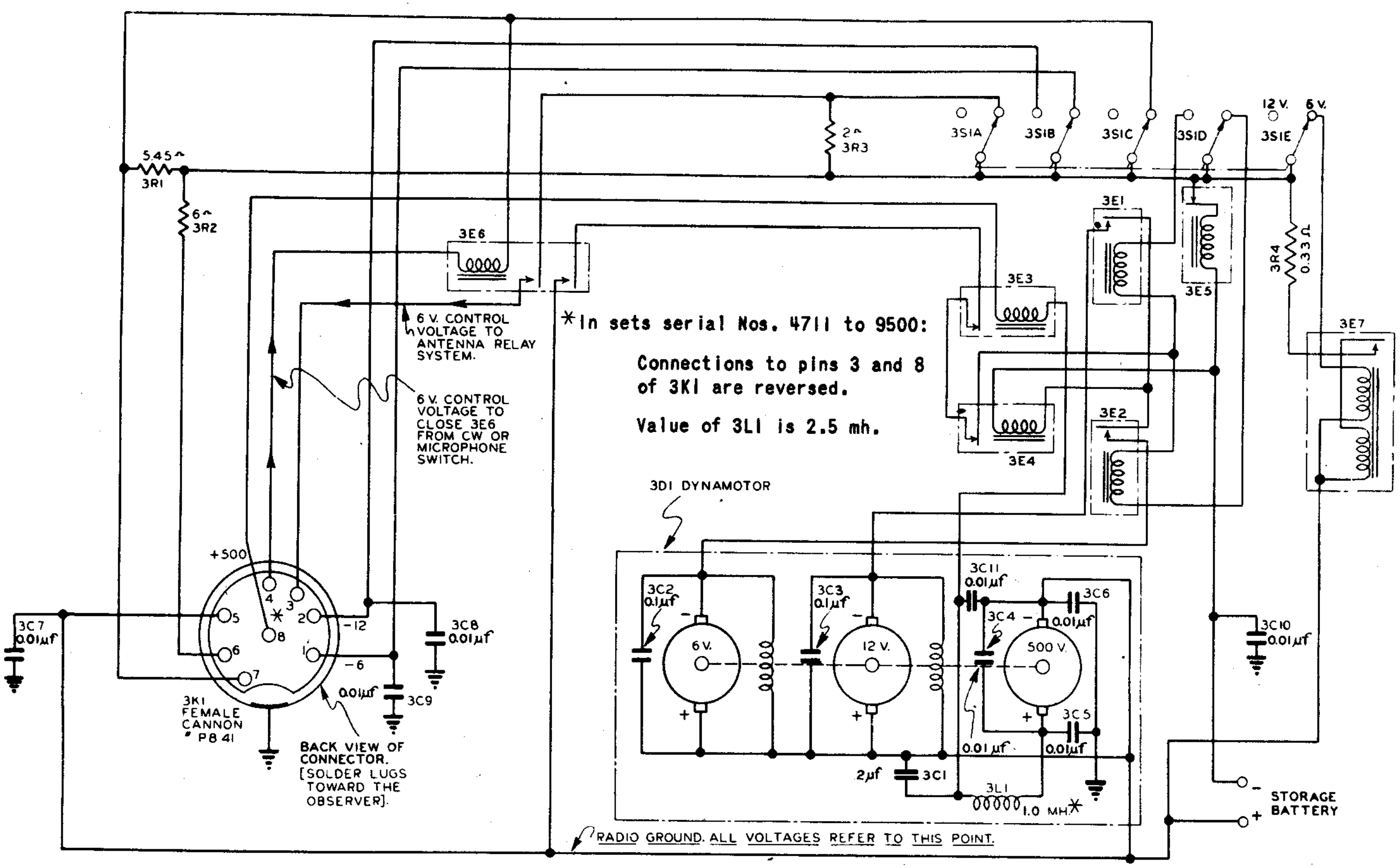


3E1 - Dynamotor (12v) starting relay
3E2 - Dynamotor (6v) starting relay
3E3 - Dynamotor (12v) overload relay
3E4 - Dynamotor (6v) overload relay
3E5 - Main overload relay
3E6 - Control relay
3E7 - 6v/12v safety relay

COMMON FAULTS AND CORRECTIVE MEASURES

See page 2

SCHEMATIC—Sets serial Nos. 4711 and above.



3E1 - Dynamotor (12v) starting relay
3E2 - Dynamotor (6v) starting relay
3E3 - High voltage overload relay
3E4 - Dynamotor overload relay
3E5 - Main overload relay
3E6 - Control relay
3E7 - 6v/12v safety relay

COMMON FAULTS AND CORRECTIVE MEASURES

WATER INSIDE CASE OF PE-103-A

Reports have been received indicating breakdown and corrosion of parts due to water seeping into the case of PE-103-A.

As a temporary corrective measure, drill a 1/8-inch hole in each of the four corners of the bottom of the case to let out any water that may collect. These holes should be far enough from the corners to allow for the future insertion of plugging bolts if deemed necessary.

CAUTION: Protect the case from the weather, since rain and condensation of moisture will damage the unit.

Ref: Maintenance Letter No. 26 (1943)

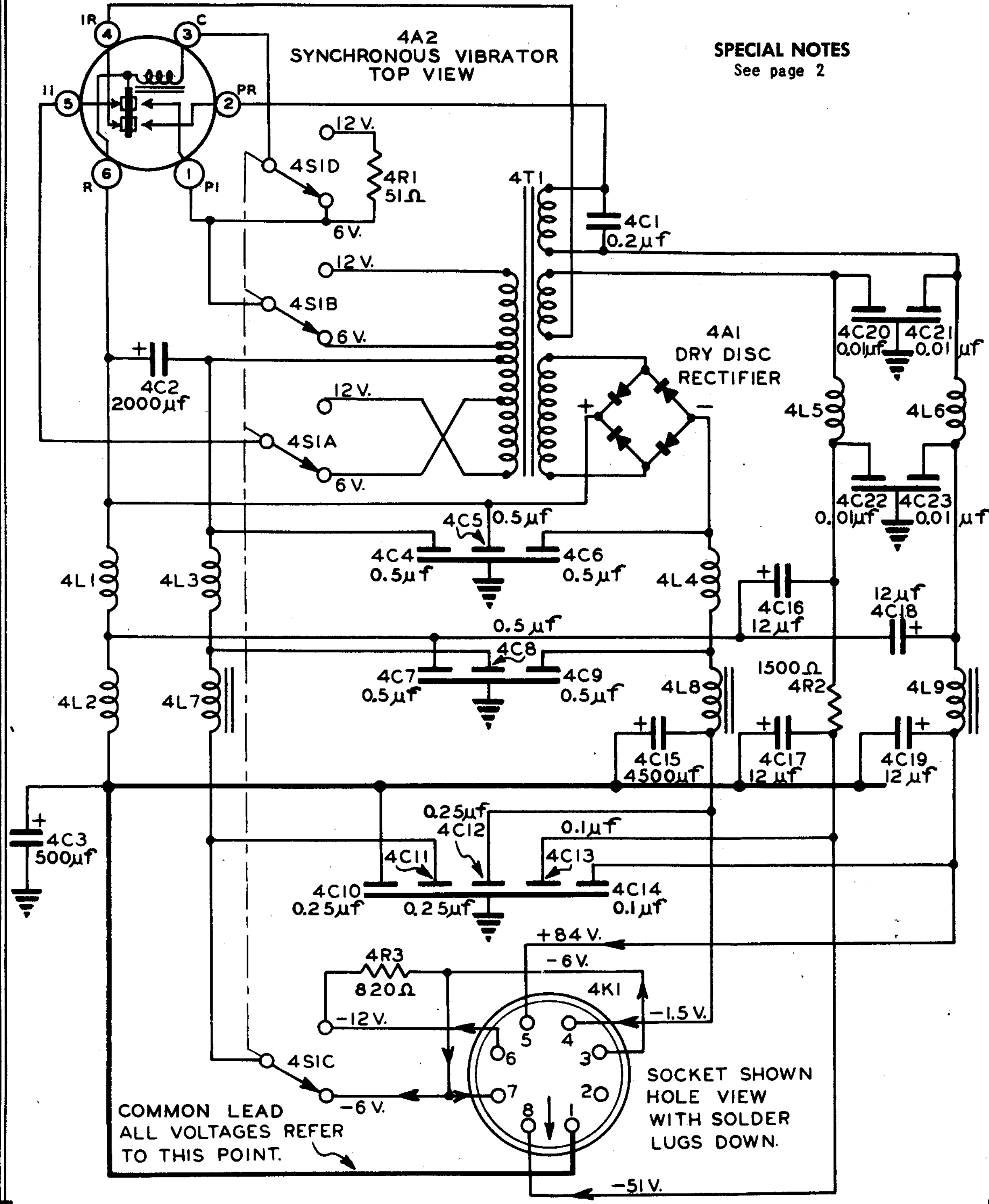
POWER CONVERTER UNIT PE-104-A

SCHEMATIC

Part of: SCR-284-A

Reference:
TM 11-275

SPECIAL NOTES
See page 2



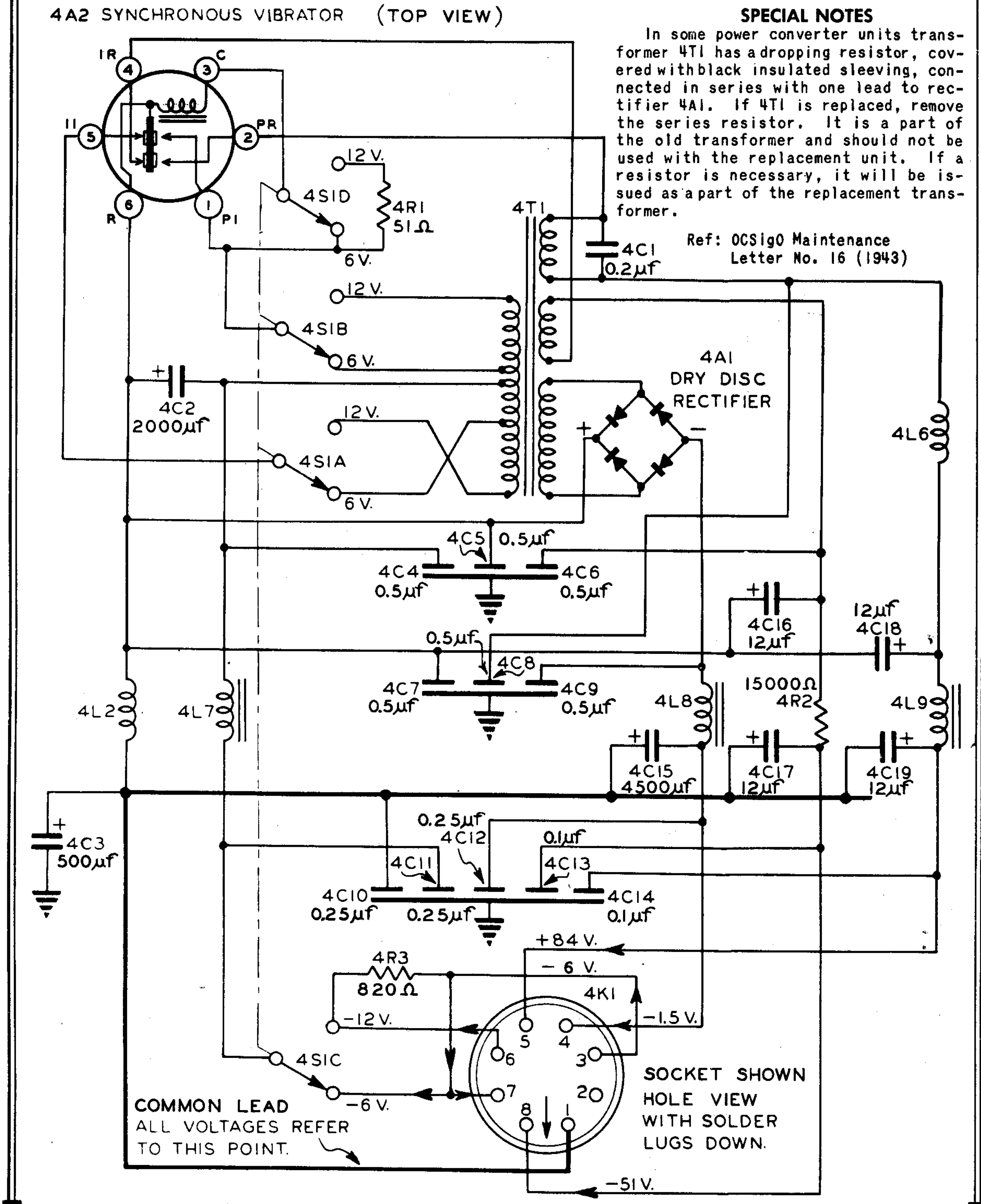
SCHEMATIC (Alternate)

As supplied with some Radio Sets SCR-284-A.

SPECIAL NOTES

In some power converter units transformer 4T1 has a dropping resistor, covered with black insulated sleeving, connected in series with one lead to rectifier 4A1. If 4T1 is replaced, remove the series resistor. It is a part of the old transformer and should not be used with the replacement unit. If a resistor is necessary, it will be issued as a part of the replacement transformer.

Ref: OCSigO Maintenance Letter No. 16 (1943)



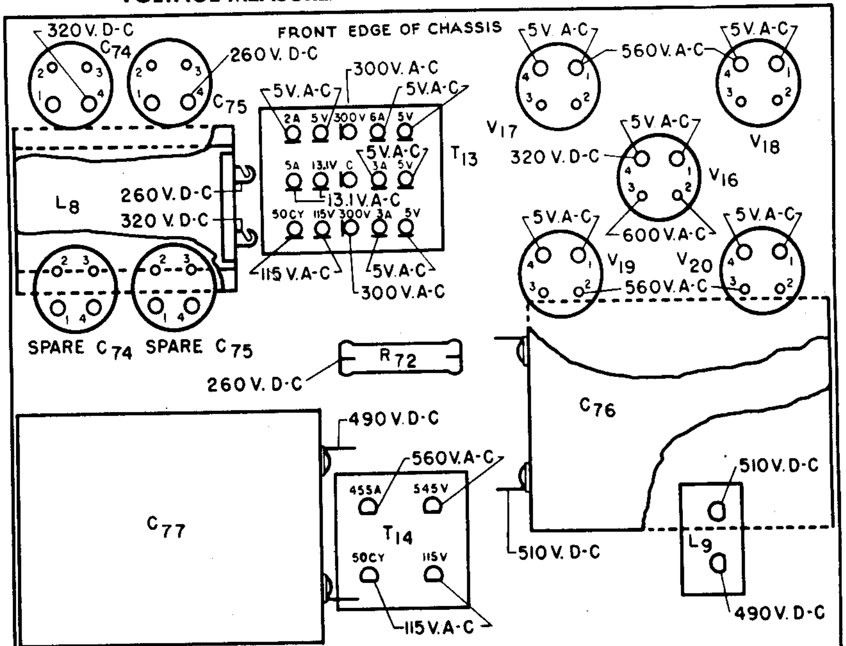
POWER SUPPLY UNIT PE-110-(*)

PE-110-(*) = PE-110-A & PE-110-B

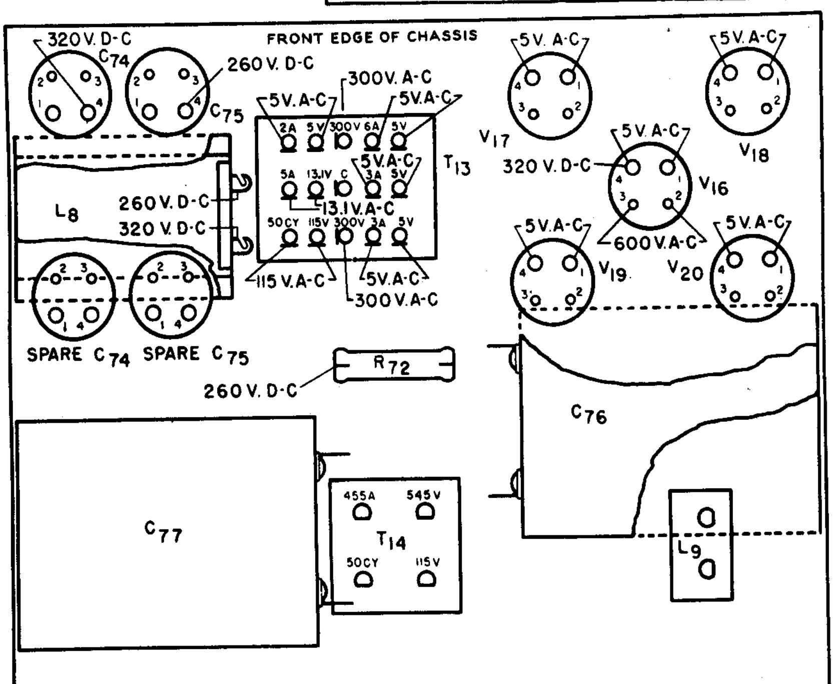
Part of: SCR-543-(*)

Reference:
TM 11-625

VOLTAGE MEASUREMENTS



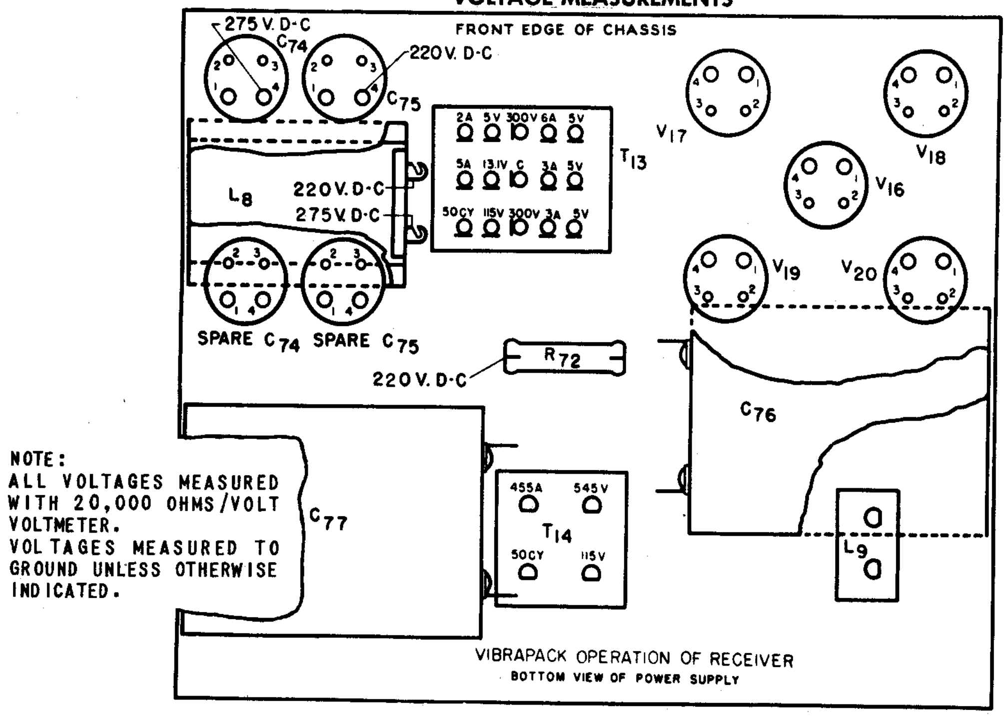
TRANSMIT POSITION
BOTTOM VIEW OF POWER SUPPLY

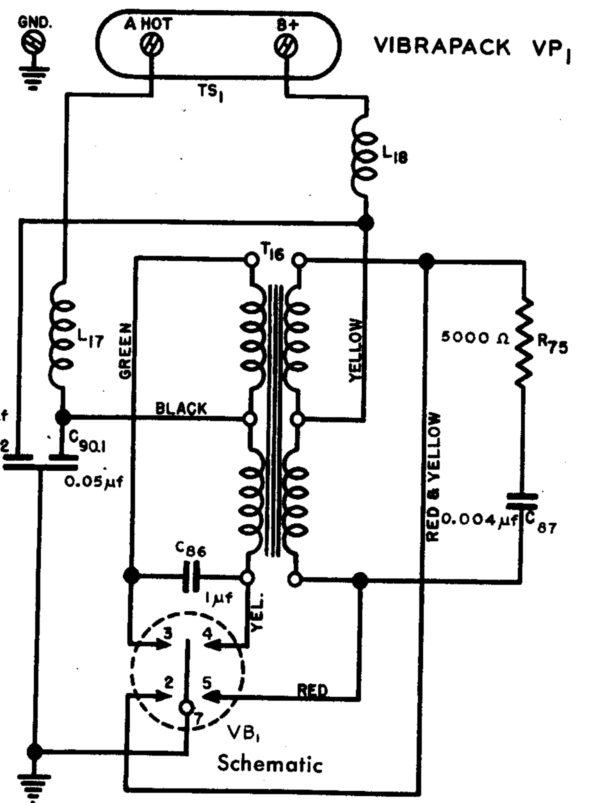


RECEIVE POSITION
BOTTOM VIEW OF POWER SUPPLY

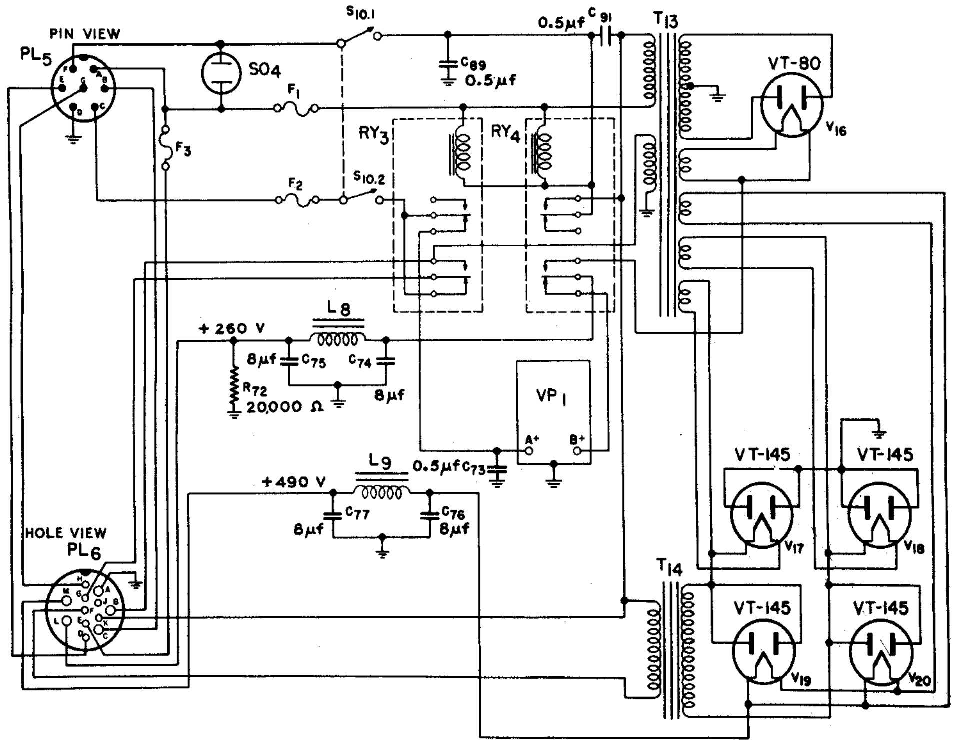
NOTE:
ALL VOLTAGES MEASURED WITH 20,000 OHMS/VOLT VOLTMETER.
VOLTAGES MEASURED TO GROUND UNLESS OTHERWISE INDICATED.

VOLTAGE MEASUREMENTS

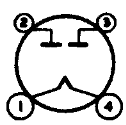




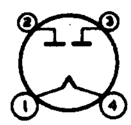
SCHEMATIC



TUBE SOCKET TERMINALS, BOTTOM VIEW



VT-80
RMA TYPE 80



VT-145
RMA TYPE 5Z3

SAFETY NOTICE

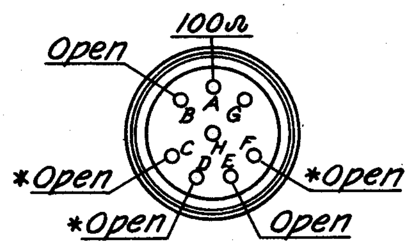
Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

PLATE SUPPLY UNIT PE-117-C

Part of: SCR-610-(*)

Reference: TM 11-615A

RESISTANCE AND VOLTAGE MEASUREMENTS.



**Use low ohmmeter range. If reading is obtained, reverse test leads.*

Fig. 1.—Cable connector resistance readings.

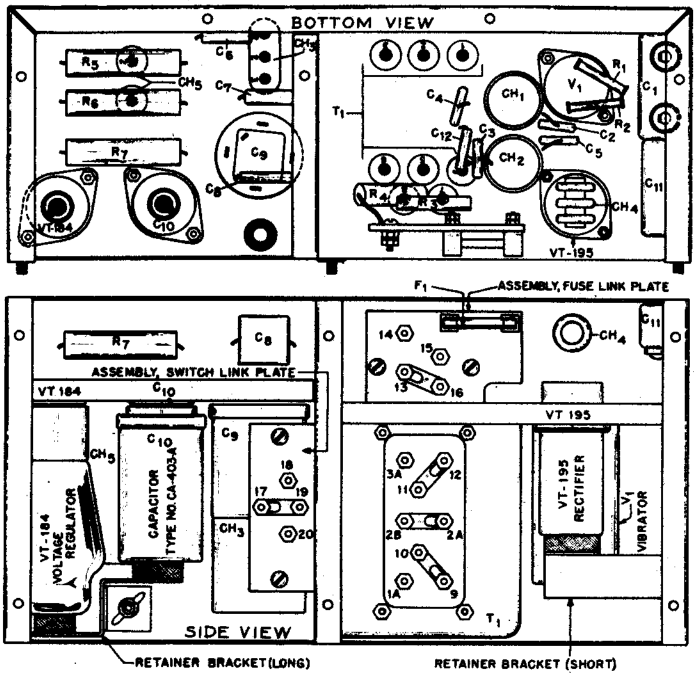


Fig. 2.—Parts layout.

VOLTAGE MEASUREMENTS

PE-117 connected to BC-659.
R or T indicates "RECEIVE" or "TRANSMIT".
(6) or (12) indicates battery voltage.
Voltages are nominal and are measured with VTVM between point indicated and B- (brown lead), except as noted.
Voltages are DC except as noted.

RESISTANCE MEASUREMENTS

Power cable and battery disconnected.
Tubes and vibrator removed.
Socket measurements taken between point indicated and B- (brown lead).
Cable plug receptacle measurements taken between contact indicated and contact "H".

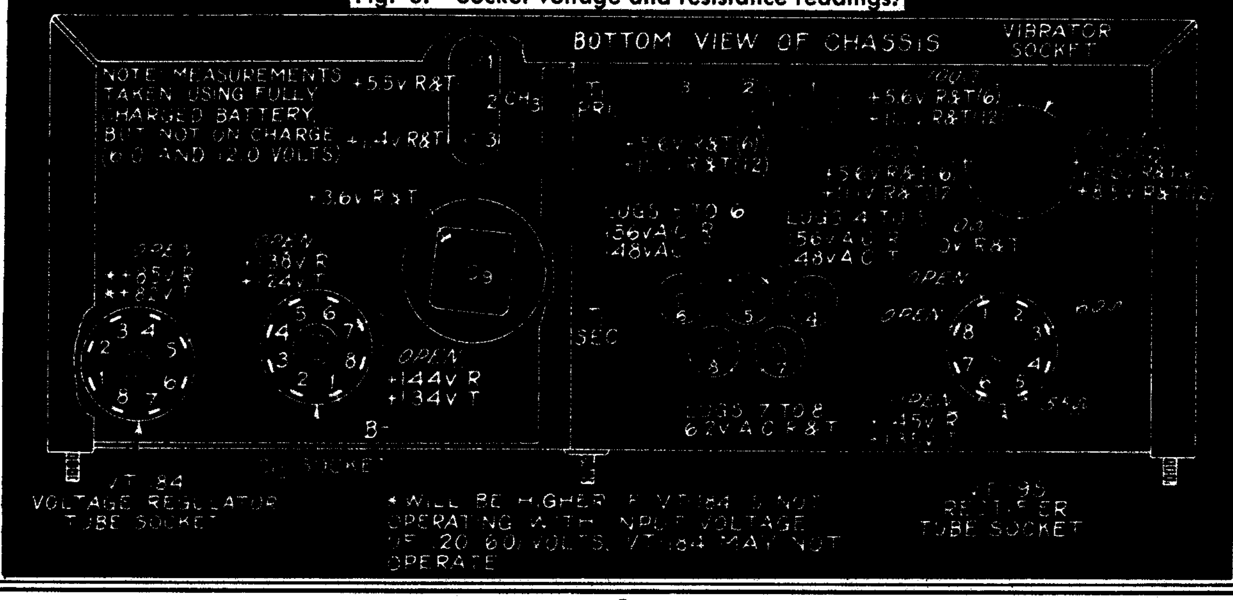


Fig. 3.—Socket voltage and resistance readings.

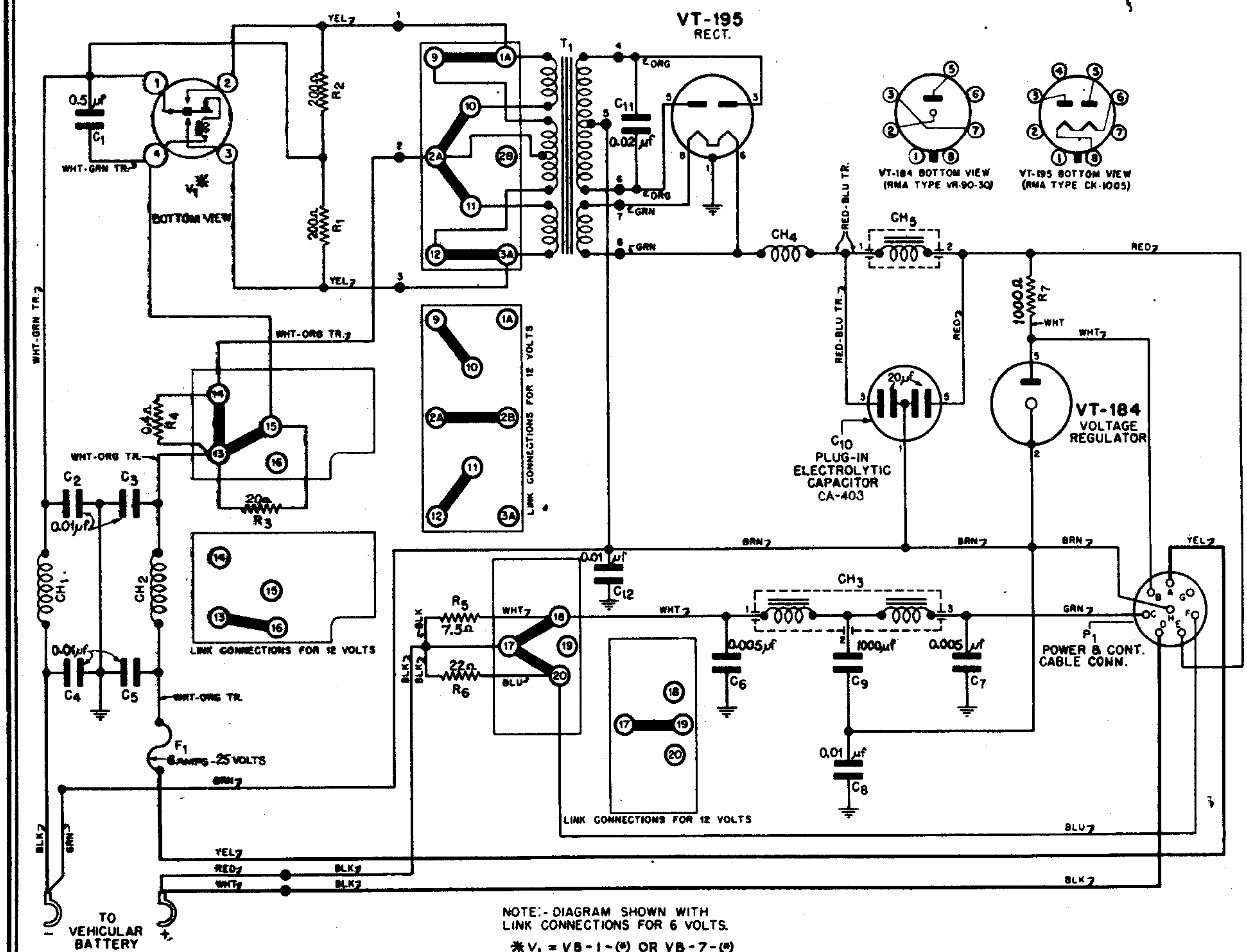


Fig. 4.—Schematic.

COMMON FAULTS AND CORRECTIVE MEASURES

CORDING

The power and control cord and its connectors are subject to failure due to vibration and twisting. Be sure to check the cording and connectors, both electrically and mechanically, before looking for trouble in other parts of the set.

Refer to COMMON FAULTS AND CORRECTIVE MEASURES under SCR-609-610-(*) in this manual for an authorized method of supporting this cording.

SPECIAL NOTES

MOISTURE PROTECTION

A waterproof canvas cover to protect BC-659-(*) and its associated power supply (PE-117-C or CS-79-(*)) has been added to the parts list of SCR-609-(*) and SCR-610-(*). Organizations having Radio Sets SCR-609-(*) and SCR-610-(*) which lack Cover, BG-153, Stock No. 2Z3400-153, should requisition them in the usual manner. This cover is not removed when the equipment is in operation.

Ref: Supply Letter No. 179 (1943)

CONTROL UNIT RM-7-B

Part of: SCR-197-(*)

Reference: TM 11-805

VOLTAGE AND CURRENT MEASUREMENTS

The following measurements are readings obtained with available standard instruments. The voltmeter should have a minimum sensitivity of 1000 ohms/volt.

Tube Element	Voltage	Where Measured	Current	Where Measured
Mic. Amplifier tube 440:				
Plate	240v. d-c	From term. 2 on transf. 412 to chassis.	5.8 ma d-c	In series with lead on term. 2 of transf. 412.
Cathode	11.5v. d-c	Across resistor 409.	- - - -	- - - -
Filament	6.3v. a-c	Across term. 12 and 13 of transf. 441.	0.3A. a-c	Series with lead on term. 12 of transf. 441.
Keyer Tube 432:				
Plate	240v. d-c	From either side of coil relay to chassis.	- - - -	- - - -
Grid	-37v. d-c	Across capacitor 424.	- - - -	- - - -
Filament	2.5v. a-c	Across terms. 5 and 7 of transf. 441.	2.5A. a-c	Series with lead to term. 5 on transf. 441.
Rectifier Tube 427:				
Plates (2)	430v. a-c	Across terms. 8 and 9 and 10 of transformer 430.	- - - -	- - - -
Filaments	5.0v. a-c	Across terms, 5 and 7 of transf. 430.	2.0A. a-c	Series with lead on term. 5 of transf. 430.

RESISTANCE MEASUREMENTS

NOTE: Resistances measured between designated terminals. Values less than one ohm are given as zero.

COMPONENT	PART NO.	WINDING TERMINALS	D-C RESISTANCE OHMS
Filter choke	426	----	270
Filter choke	421a	1, 2	6
Filter choke	421b	3, 4	100
Power transformer	430	1, 4	10
		5, 7	0
		8, 10	750
Power transformer	441	1, 4	15
		5, 7	0
		9, 11	0
		12, 13	0
Audio input transformer	404	1, 3	30
		5, 4	12,000
Audio output transformer	412	1, 2	2,300
		3, 5	58
Telephone transformer	439	1, 2	30
		3, 5	38

LOCATING TROUBLE

All troubles indicated are for "REMOTE" operation.

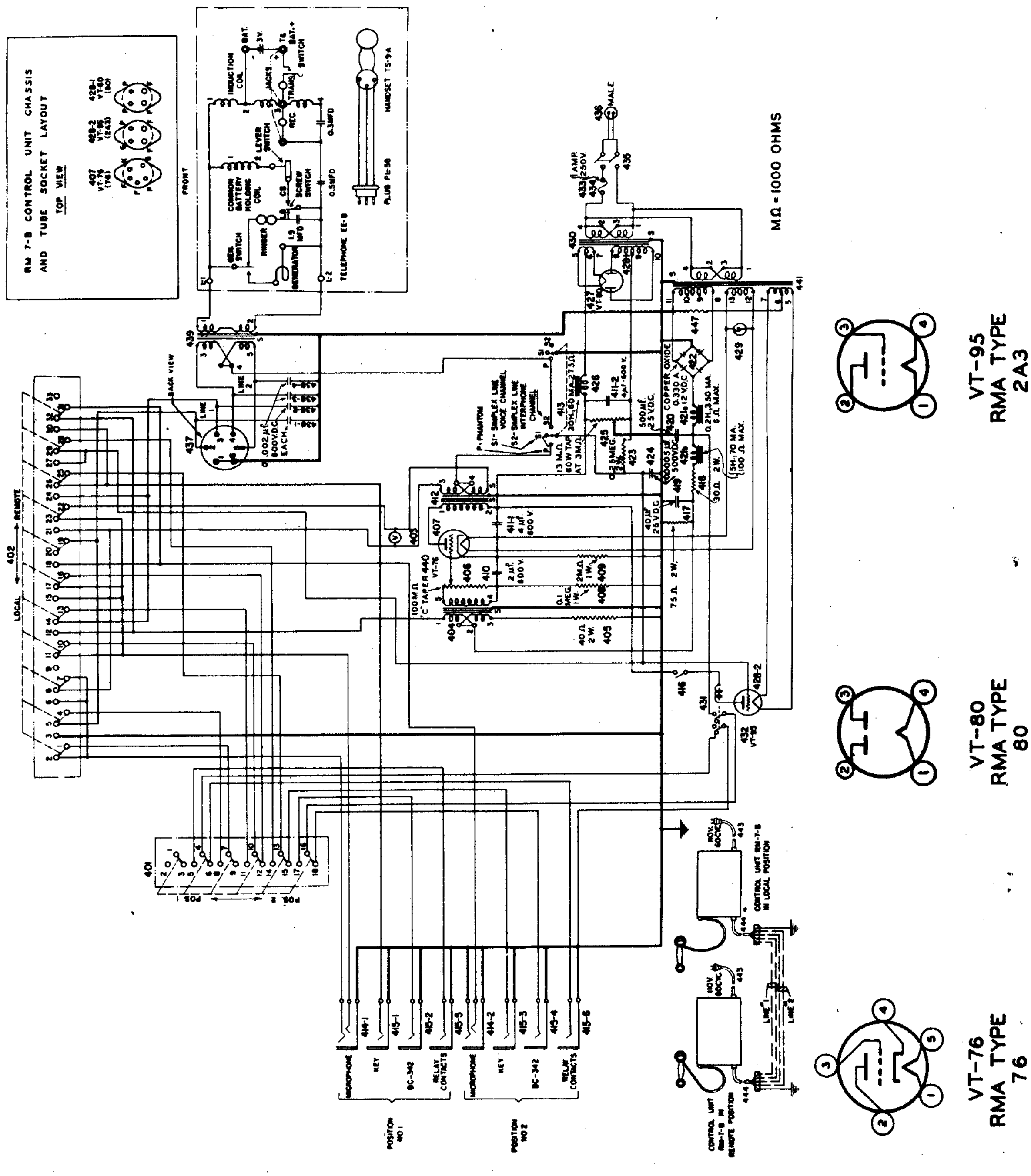
SYMPTOM 1. Will not key or voice modulate radio transmitter from appropriate jacks on position 1 side of panel.

DIAGNOSIS.. Local - Remote switch on radiotransmitter panel not thrown to "REMOTE" position. Position selecting switch on associated local control unit not thrown to POSITION 1. Local - Remote switch on chassis of remotely operated control unit not set for "REMOTE." Position selecting switch on remotely operated control unit not set to POSITION 1. Line 1 and line 2 do not correspond at local and remote control unit. Simplex 1, Simplex 2 and Phantom selecting switches on both local and remote control units are not set to corresponding positions.

SYMPTOM 2. Will not key or voice modulate transmitter from appropriate jacks on position 2 side of panel.

DIAGNOSIS. All likely causes given above for position 1 side of panel, except for the diagnosis given for Symptom 1, which would be -- "position selecting switch not thrown to POSITION 2."

SCHEMATIC


MΩ = 1000 OHMS
VT-95
RMA TYPE
2A3
VT-80
RMA TYPE
80
VT-76
RMA TYPE
76

RECTIFIER RA-34-(*)

RA-34-(*) = RA-34-A, B, C, D, E, F, G, and H.

Part of: SCR-188-A

Reference: TM 11-959 and TM 11-961

VOLTAGE AND CURRENT MEASUREMENTS

RA-34-A voltage measurements on page 4.

RA-34-B, C, and D.

All measurements listed below are made with standard voltmeter (AC-DC), ammeter and milliammeter equipment. The voltmeter must have multipliers designed for high voltage measurements, and a sensitivity of 1,000 ohms per volt for a-c and d-c readings. All readings were obtained with a 115-volt 60-cycle input, and with *no load* on the rectifier.

VOLTAGE:

- Transmitter filament voltage -- 12.0 volts a.c.
- Control rectifier filament voltage ---------- 1.98 volts. a.c.
- Control rectifier plate to ground voltage -------------- 21 volts a.c.
- Voltage across 240.1----------- 5.9 volts a.c.*
- Voltage across 240.2 -- less than 0.01 volt a.c.*
- Control rectifier output ------ 13.5 volts d.c.
- Rectifier filament voltage ---- 2.4 volts a.c.
- Rectifier plate to secondary c.t. ------------------------ 1265 volts a.c.
- Voltage across 241 ------------ 520 volts a.c*
- Voltage across 242 ------------ 2.0 volts a.c*
- Plate output voltage ---------- 1127 volts d.c.

CURRENT:

- Current through 228 -----------0.265 amp. d.c.
- Current in 229 ----------------0.021 amp. d.c.
- Current in 230 ----------------0.022 amp. d.c.
- Current in 215 ----------------0.160 amp. d.c.

*Use series capacitor (.25 or .5 μf), in series with one test prod to block out direct current.

RA-34-E, F, and G.

Conditions of measurements same as that given for RA-34-B, C, and D.

From part	Term.*	To part	Term.*	Volts d.c.
303	45	Ground	--	12.0
303⊛	57	Ground	--	12.0
304§	61	303	55	1,000.0
330	9	330	10	12.0
331.1£	Front	331.1	Rear	0.4
331.2£	Front	331.2	Rear	0.4
331.1£	Front	Ground	--	12.0
331.1£	Rear	Ground	--	11.6
331.2£	Front	Ground	--	11.6
331.2£	Rear	Ground	--	11.2
332¶	Front	339	Front	1,017.0
332¶	Rear	339	Front	1,007.0
333¶	Front	339	Front	1,007.0
333¶	Rear	339	Front	1,000.0
335¶	Left	335	Right	1,007.0
336¶	Front	336	Rear	1,000.0
337¶	Left	337	Right	7.0
339¶	Front	339	Rear	1,000.0

*All terminal locations described from front of rectifier.

⊛ 319 not energized. £ Control load 2.4 amps.

§ Plate on. ¶ Plate load 200 ma.

WARNING: Use extreme caution in making measurements.

RA-34-H.

Conditions of measurements as specified for RA-34-B, C, and D.

From part	Terminal	To part	Terminal	Volts d.c.
903	45	Ground	--	12.0
904	61	903	55	§1,000.0£
927	20	927	21	12.0 depends on setting of aging tap
931	Front	931	Rear	0.06§
931	Front	Ground⊛	--	12.2§
931	Rear	Ground⊛	--	11.6
932	Right	903⊛	55	1,025.0£
932	Left	903⊛	55	1,000.0£
935	Top	935	Bottom	1,000.0£
930	Front	930	Rear	1,000.0£
*925	3	925	4	30.0

NOTE: ⊛ Terminal locations described from front of rectifier.

§ Control load 2.4 amps. Failure to load may be due to open reactor 931.

£ Plate voltage on.

* Should the rectifier (928) circuit fail because of shorted capacitor 934, or open resistor 929, plate voltage cannot be removed.

583099 O - 44 - 3

LOCATING TROUBLE

The procedure for locating trouble in the RA-34-A, and RA-34-E, F, and G, is similar to the notes outlined below for RA-34-B, C, and D models. Reference numbers will, of course be different; and due to slight circuit variations between the RA-34-A, the B, C, and D series, and the E, F, and G series, slightly different troubles may be encountered in each group. Reference to the schematic diagram for each group will reveal the differences, and aid in locating other defects.

RA-34-B,C, & D

To facilitate localizing trouble, careful attention should be given to the operation of the relays in the rectifier. Failure in any of these devices will prevent the application of essential power to the transmitter. The opening of transmitter filament circuit breaker 217, the control rectifier breaker 218, or the rectifier filament breaker 219 will prevent application of plate voltage. A fault in plate interlock relay 216 may open either or both the transmitter filament breaker 217 and control rectifier breaker 218. A fault in either the plate stop-start relay 213, or blower 243 will open either or both the rectifier filament breaker 219 and plate breaker 220.

The attributable causes for improper operation of any of the relays are as follows:

1. *Transmitter filament circuit breaker opens.* (a) If breaker opens only with transmitter connected, fault is in transmitter filament circuit. (b) If breaker opens even though transmitter is disconnected, check for short circuit in primary or secondary of filament transformer 236, short in the coil of plate interlock relay 216, or a short in the cord.
2. *Control rectifier circuit breaker opens.* (a) If breaker opens only with transmitter connected, fault is in transmitter. (b) If breaker remains open, even with transmitter disconnected check for shorted cord, defective tubes, short to ground in reactors 240.1 or 240.2, capacitor 231.1, bleeder resistor 228, or plate control relay 215. (c) If plate clips are removed from rectifier tubes, and relay continues to remain open after above possible defects are eliminated, check for shorted windings in control rectifier transformer 237 or defective plate interlock relay 216.
3. *Rectifier filament circuit breaker opens.* Remove rectifier tubes 226.1 and 226.2. If breaker no longer opens, check tubes for shorted filament. If breaker continues to open, check for short in rectifier filament transformer 238, motor of time delay relay 214, coil of plate start-stop relay 213, or blower 243.
4. *Plate circuit breaker opens.* (a) If breaker opens only with transmitter connected, fault is in transmitter. (b) If breaker still opens when transmitter high voltage cable is disconnected, remove the plate clips from the rectifier tubes 226.1 and 226.2 making certain that they do not touch any grounded surface. If the breaker no longer opens with clips removed, check for a short to terminal 55 of Socket SO-41, or from filter reactors 241 or 242, shorted capacitors 232.1 or 232.2, shorted bleeder resistors 229 or 230. If breaker continues to open, check for short in plate transformer 239, plate start-stop relay 213, or blower 243.
5. *Possible faults with circuit breakers not open.* (a) If power pilot light does not light, check pilot lamp, autotransformer 234, line voltage link 207, interlock switch 206, power switch 205, and power sockets 201 and 202. (b) If primary voltage is present, but no transmitter filament voltage, check circuit breaker 217 and primary and secondary windings of the filament transformer for possible open windings. (c) If no control voltage appears, check control rectifier circuit breaker 218, control rectifier transformer 237, and filter reactors 240.1 and 240.2 for open circuits. (d) If power pilot light 221 lights, but plate pilot light 222 does not, check the pilot lamp 222, the plate thermostat 211, the plate interlock relay 216, the plate circuit breaker 220, the plate control relay 215, and the plate stop-start relay 213. (e) If the plate start-stop switch does not control the plate supply, check plate start-stop switch 209, plate start-stop relay 213, time delay relay 214, and rectifier filament circuit breaker 219. (f) If the control rectifier output voltage is high, check the bleeder resistor 228 for open circuit. After inserting a new tungar tube, the output voltage may be higher or lower than previously experienced, due to variations in arc drop - in the order of 1 or 2 volts. To compensate for this, the control rectifier power transformer 237 has a tapped primary to permit adjustment of this voltage. Primary terminals of this transformer are accessible through the door in the upper right, behind the Line Voltage Link. Normal position for the connection is to the terminals marked 0 (common) and 2.0. If output voltage is low, use terminal higher than 2.0; if voltage is high, use terminal lower than 2.0.
6. *Miscellaneous trouble locating.* (a) If plate rectifier voltage is high, check bleeder resistor 230 for open circuit. (b) If plate voltmeter does not read, check bleeder resistor 229 and voltmeter part 224 for open circuit. (c) If rectifier heaters do not operate at temperatures below 65 deg. F., check thermostat 210. (d) If blower does not operate at temperatures above 85 deg. F., check thermostat 212.

LOCATING TROUBLE (cont.)

RA-34-H

When the Rectifier RA-34-H is being serviced, the first precaution is to observe whether all circuit breakers are on. If they are not, trace, by means of the circuit diagram and instruments, the possible cause for failure to energize any inoperative breakers. Employ the chart below, in the order given, for locating trouble.

NOTE: BE VERY CAREFUL WHEN TRACING TROUBLE. REMOVE PLUG FROM POWER LINE, UNLESS TESTS REQUIRE POWER TO BE "ON". DANGEROUSLY HIGH VOLTAGE IS EMPLOYED IN THIS UNIT.

SYMPTOM 1--Power pilot 923 does not light.
POSSIBLE FAULT--(a) Defective pilot lamp. (b) Defective power socket 901. (c) Defective Power Cord CD-370. (d) Defective POWER switch 906. (e) Defective interlock switches 908.1 or 908.2. (f) Defective transformer 926.
REMEDY--(a) Replace. (b)-(f) Replace defective part.

SYMPTOM 2--Plate pilot does not light.
POSSIBLE FAULT--(a) Defective pilot lamp. (b) Defective PLATE OFF switch 909. (c) Defective PLATE ON switch 910. (d) Defective plate control relay 917. (e) Defective off-on relay 916. (f) Defective time-delay relay 915. (g) Defective thermostat 914. (h) Defective transformer 926.
REMEDY--(a) Replace. (b)-(h) Replace defective part.

SYMPTOM 3--CONTROL CIRCUIT BREAKER 919 opens.
POSSIBLE FAULT--(a) Overload in transmitter. (b) Defective Cord CD-151. (c) Failure of capacitor 933.1. (d) Short to ground in reactor 931. (e) Faulty rectifier 927. (f) Short to + 12 volts in off-on relay 916. (g) Short in Socket SO-41.
REMEDY--(a) Repair fault in transmitter. (b) Repair or replace. (c) Replace. (d) Replace. (e) Replace. (f) Repair or replace. (g) Repair or replace.

SYMPTOM 4--PLATE CIRCUIT BREAKER 920 opens.
POSSIBLE FAULT--(a) Overload in transmitter. (b) Defective Cord CD-151 or CD-152. (c) Failure of capacitor 935. (d) Short to ground in reactor 932. (e) Defective tube (967 or FG-17) 925.1 or 925.2.
REMEDY--(a) Repair fault in transmitter. (b) Repair or replace. (c) Replace. (d) Replace. (e) Replace tube.

SYMPTOM 5--No reading on filament voltmeter in transmitter.
POSSIBLE FAULT--(a) Defective transformer 926. (b) Defective CIRCUIT BREAKER 918. (c) Defective Cord CD-151. (d) Defective meter.
REMEDY--(a) Replace. (b) Repair or replace. (c) repair or replace. (d) Replace.

SYMPTOM 6--No reading on plate milliammeter in transmitter.
POSSIBLE FAULT--(a) Defective meter. (b) Open coil in CIRCUIT BREAKER 920. (c) Defective transformer 926. (d) Open in reactor 932. (f) Defective Cord CD-151 or 152. (f) Defect in transmitter.
REMEDY--(a) Replace. (b) Replace. (c) Replace. (d) Replace. (e) Repair or replace. (f) See transmitter technical manual.

*SYMPTOM 7**--Reading on plate milliammeter in transmitter with control switch OFF.
POSSIBLE FAULT--(a) Short in capacitor 934. (b) Defective control relay 917.
REMEDY--(a) Replace. (b) Repair or replace.

SYMPTOM 8--Tube heaters do not operate (921.1 and 921.2).
POSSIBLE FAULT--(a) Defective heater 921. (b) Defective thermostat 913.
REMEDY--(a) Replace. (b) Replace.

SYMPTOM 9--Blower 922 does not operate.
POSSIBLE FAULT--(a) Defective blower 922. (b) Defective thermostat 912.
REMEDY--(a) Replace. (b) Replace.

* Short of capacitor 934 or opening of resistor 929 will prevent removal of plate voltage. If plate pilot goes out when PLATE OFF switch is operated but plate voltage remains on transmitter, check capacitor 934 and resistor 929.

SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

VOLTAGE MEASUREMENTS

RECTIFIER RA-34-A

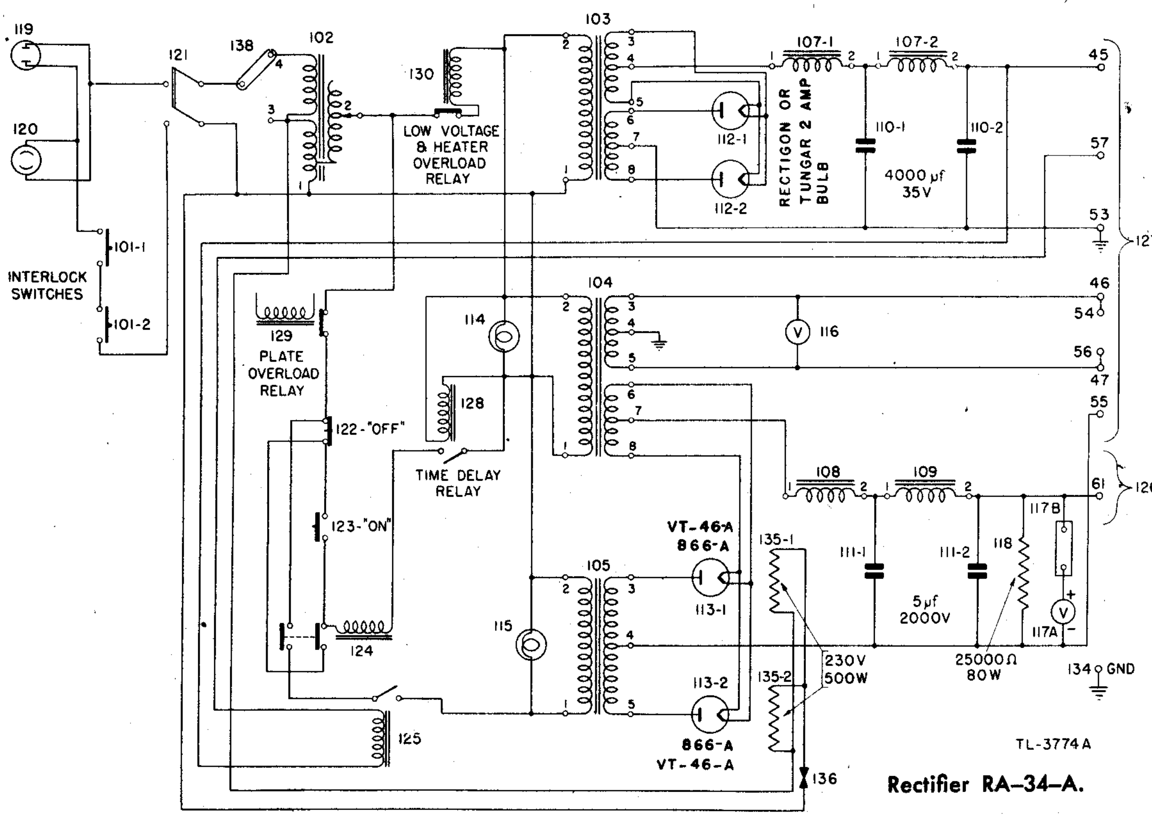
Conditions for measurements same as for RA-34-B, C, and D.

*Terminal	To terminal	Control position	Voltage	Permissable range
47 and 56	46 and 54	Line switch (121) ON. Fil. circuit breaker (130) ON.	12 v a.c.	Adjust with voltage regulator (102).
45	53	Line switch (121) ON. Fil. circuit breaker (130) ON.	12 v a.c.	11.0 v to 15.0 v.
45	57	Remote control OFF.	0.	None
61	55	Line switch (121) ON. Fil. circuit (130) ON. Plate circuit breaker (129) ON.	1,000 v a.c.	950 v to 1,050 v.

SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

SCHEMATIC



Rectifier RA-34-A.

SCHEMATIC
RA-34-B,C &D

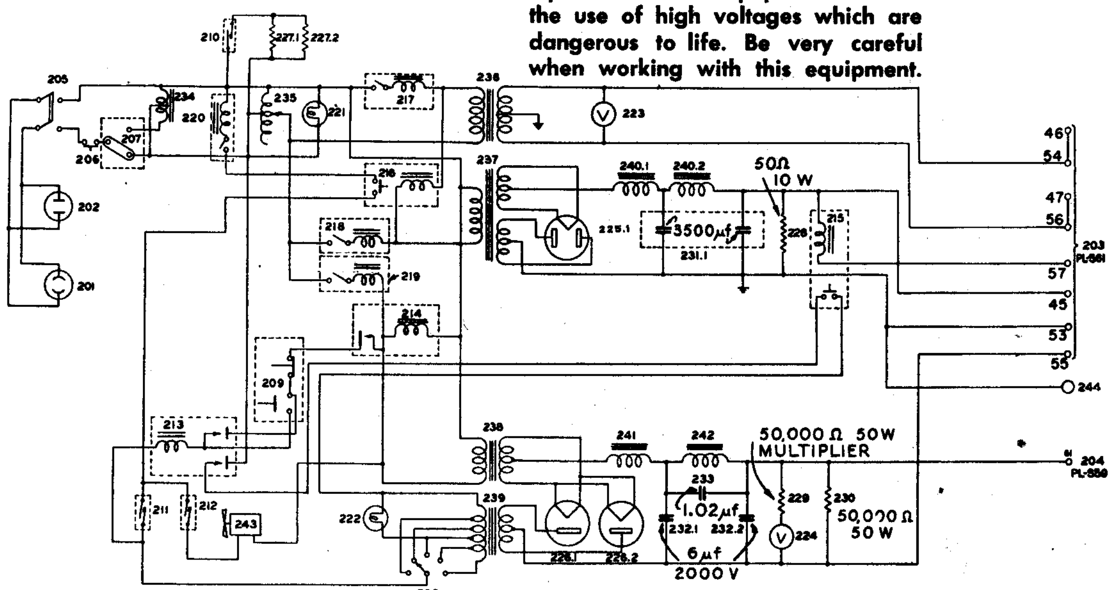
PARTS LEGEND

REFERENCE NUMBER	NAME OF PART	FUNCTION
201	SOCKET	EMERGENCY POWER
202	SOCKET	POWER FOR CORD CD-370
203	RECEPTACLE SO-41	FOR CORD CD-151
204	RECEPTACLE SO-39	FOR CORD CD-152
205	SWITCH	POWER
206	SWITCH	INTERLOCK
207	LINK	LINE VOLTAGE
208	SWITCH	PLATE VOLTAGE ADJUSTING
209	SWITCH	PLATE START-STOP
210	THERMOSTAT	TUBE HEATER
211	THERMOSTAT	PLATE
212	THERMOSTAT	BLOWER
213	RELAY	PLATE START-STOP
214	RELAY	TIME DELAY
215	RELAY	PLATE CONTROL
216	RELAY	PLATE INTERLOCK
217	CIRCUIT BREAKER	TRANSMITTER FILAMENT
218	CIRCUIT BREAKER	CONTROL RECTIFIER
219	CIRCUIT BREAKER	RECTIFIER FILAMENT
220	CIRCUIT BREAKER	PLATE
221	PILOT LIGHT	POWER
222	PILOT LIGHT	PLATE
223	VOLTMETER-IS 161	FILAMENT VOLTMETER
224	VOLTMETER IS-168	PLATE VOLTMETER
225.1	TUBE G.E.199698	CONTROL RECTIFIER
225.2	TUBE G.E.199698	SPARE

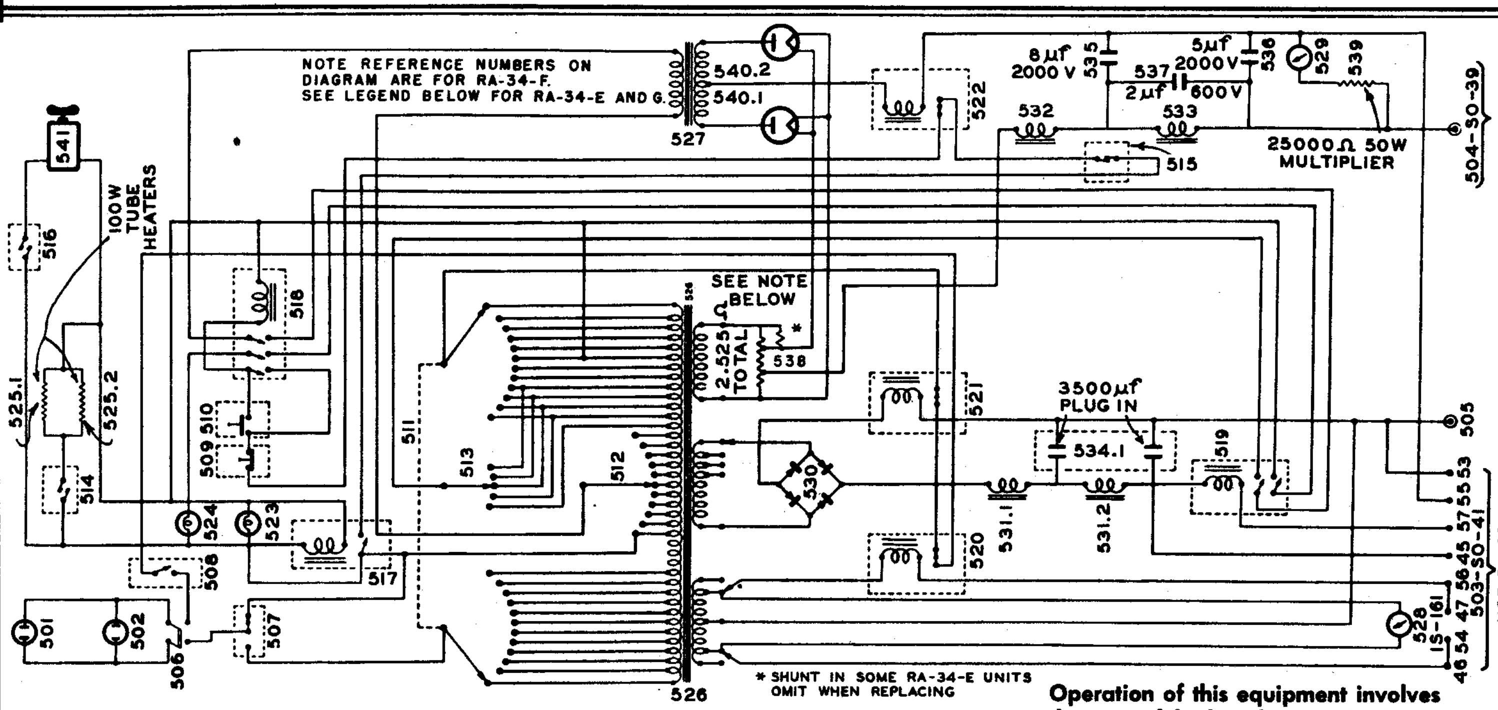
REFERENCE NUMBER	NAME OF PART	FUNCTION
226.1	TUBE VT-46-A	PLATE RECTIFIER
226.2	TUBE VT-46-A	PLATE RECTIFIER
226.3	TUBE VT-46-A	SPARE
226.4	TUBE VT-46-A	SPARE
227.1	HEATER	RECTIFIER TUBE
227.2	HEATER	RECTIFIER TUBE
228	RESISTOR	CONTROL RECTIFIER BLEEDER
229	RESISTOR	PLATE VOLTMETER MULTIPLIER
230	RESISTOR	PLATE RECTIFIER BLEEDER
231.1	CAPACITOR	CONTROL RECTIFIER FILTER
231.2	CAPACITOR	SPARE
232.1	CAPACITOR	PLATE RECTIFIER FILTER
232.2	CAPACITOR	PLATE RECTIFIER FILTER
233	CAPACITOR	PLATE RECTIFIER FILTER TUNING
234	AUTOTRANSFORMER	230-115 VOLT
235	VARIAC	FILAMENT VOLTAGE CONTROL
236	TRANSFORMER	TRANSMITTER FILAMENT
237	TRANSFORMER	CONTROL RECTIFIER
238	TRANSFORMER	PLATE RECTIFIER FILAMENT
239	TRANSFORMER	PLATE RECTIFIER HI-VOLTAGE
240.1	REACTOR	CONTROL RECTIFIER FILTER
240.2	REACTOR	CONTROL RECTIFIER FILTER
241	REACTOR	PLATE INPUT FILTER
242	REACTOR	PLATE OUTPUT FILTER
243	BLOWER	VENTILATING
244	BINDING POST	GROUND

SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.



SCHEMATIC DIAGRAM



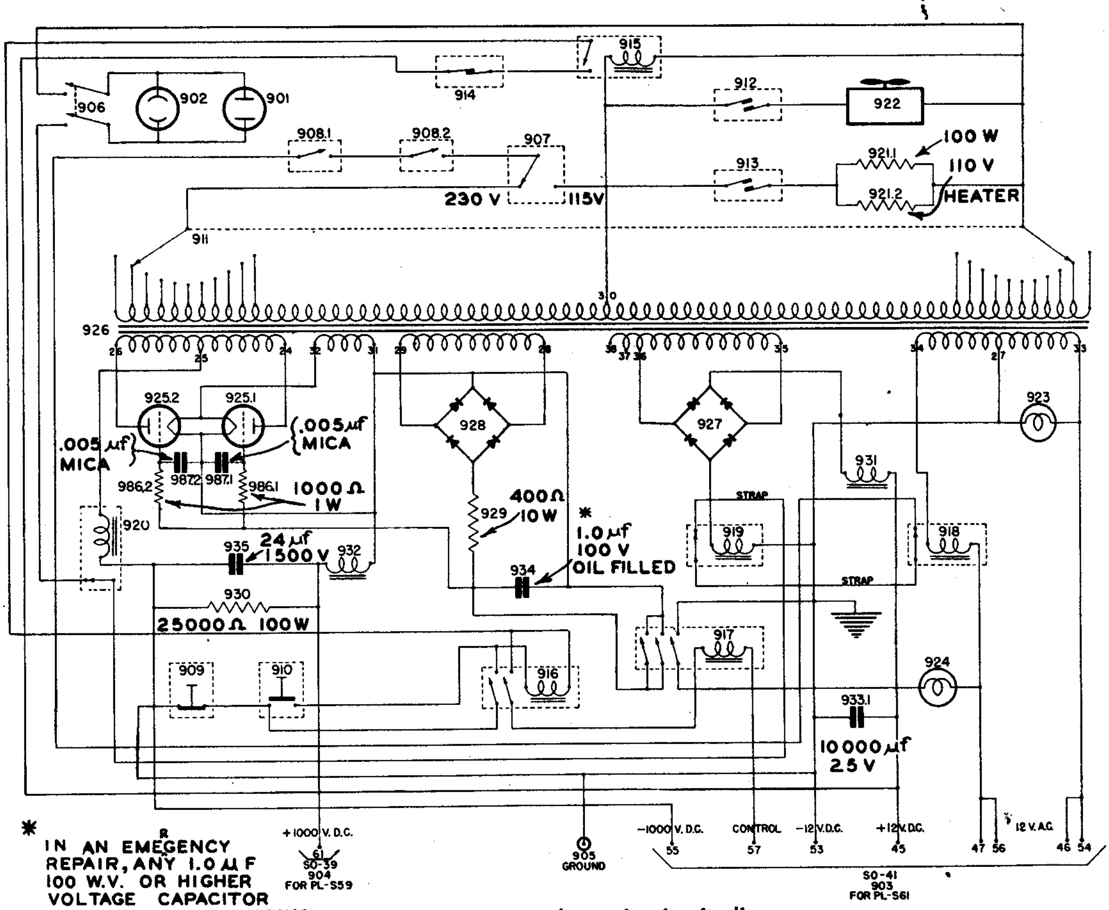
SAFETY NOTICE → **Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.**

REFERENCE NO.(E)	NO.(F)	NO.(G)	NAME OF PART	FUNCTION
301	501	701	POWER SOCKET	FOR CORD CD-370
302	502	702	SOCKET	EMERGENCY SOCKET
303	503	703	SOCKET SO-41	FOR CORD CD-151
304	504	704	SOCKET SO-39	FOR CORD CD-152
305	505	705	BINDING POST	GROUND
306	506	706	SWITCH	POWER
307	507	707	LINK	LINE VOLTAGE
308	508	708	SWITCH	INTERLOCK
309	509	709	SWITCH	PLATE STOP
310	510	710	SWITCH	PLATE START
311	511	711	SWITCH	LINE VOLTAGE ADJUSTING
312	512	712	SWITCH	PLATE VOLTAGE ADJ, COARSE
313	513	713	SWITCH	PLATE VOLTAGE ADJ, FINE
314	514	714	THERMOSTAT	TUBE HEATER
315	515	715	THERMOSTAT	PLATE
316	516	716	THERMOSTAT	BLOWER
317	517	717	RELAY	TIME DELAY
318	518	718	RELAY	PLATE START-STOP
319	519	719	RELAY	PLATE CONTROL
320	520	720	CIRCUIT BREAKER	FILAMENT
321	521	721	CIRCUIT BREAKER	CONTROL
322	522	722	CIRCUIT BREAKER	PLATE
323	523	723	PILOT LIGHT	POWER
324	524	724	PILOT LIGHT	PLATE

REFERENCE NO.(E)	NO.(F)	NO.(G)	NAME OF PART	FUNCTION
325.1	525.1	725.1	HEATER	RECTIFIER TUBE
325.2	525.2	725.2	HEATER	RECTIFIER TUBE
326	526	726	FIL.-AUTOTRANSFORMER	LINE CONTROL & FILAMENT
327	527	727	TRANSFORMER	PLATE
328	528	728	VOLTMETER-IS-161	FILAMENT
329	529	729	VOLTMETER	PLATE
330	530	730	RECTIFIER	CONTROL
331.1	531.1	731.1	REACTOR	CONTROL RECTIFIER FILTER
331.2	531.2	731.2	REACTOR	CONTROL RECTIFIER FILTER
332	532	732	REACTOR	PLATE INPUT FILTER
333	533	733	REACTOR	PLATE OUTPUT FILTER
334.1	534.1	734.1	CAPACITOR	CONTROL RECTIFIER FILTER
334.2	534.2	734.2	CAPACITOR	SPARE
335	535	735	CAPACITOR	PLATE RECTIFIER FILTER
336	536	736	CAPACITOR	PLATE RECTIFIER FILTER
337	537	737	CAPACITOR	PLATE RECT. FILTER TUNING
338	538	738	RESISTOR	FILAMENT DROPPING
339	539	739	RESISTOR	PLATE METER MULTIPLIER
340.1	540.1	740.1	TUBE VT-46-A	PLATE RECTIFIER
340.2	540.2	740.2	TUBE VT-46-A	PLATE RECTIFIER
340.3	540.3	740.3	TUBE VT-46-A	SPARE
340.4	540.4	740.4	TUBE VT-46-A	SPARE
341	541	741	BLOWER	VENTILATING

RA-34-E, F, AND G

SCHEMATIC



* IN AN EMERGENCY REPAIR, ANY 1.0 µF 100 W.V. OR HIGHER VOLTAGE CAPACITOR MAY BE USED PROVIDING CAPACITOR IS INSULATED AT LEAST 1200 VOLTS ABOVE CHASSIS.

Rectifier RA-34-H; schematic circuit diagram.

SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

REFERENCE NUMBER	NAME OF PART	FUNCTION
901	SOCKET	FOR CORD CD-370
902	SOCKET	EMERGENCY POWER
903	SOCKET SO-41	FOR CORD CD-151
904	SOCKET SO-39	FOR CORD CD-152
905	BINDING POST	GROUND
906	SWITCH	POWER
907	LINK	115-230 VOLT LINE SET
908.1	SWITCH	INTERLOCK
908.2	SWITCH	INTERLOCK
909	SWITCH	PLATE OFF
910	SWITCH	PLATE ON
911	SWITCH	LINE VOLTAGE
912	THERMOSTAT	BLOWER
913	THERMOSTAT	TUBE HEATER
914	THERMOSTAT	PLATE
915	RELAY	TIME DELAY
916	RELAY	PLATE ON-OFF
917	RELAY	PLATE CONTROL
918	CIRCUIT BREAKER	FILAMENT
919	CIRCUIT BREAKER	CONTROL
920	CIRCUIT BREAKER	PLATE
921.1	HEATER	RECTIFIER TUBE
921.2	HEATER	RECTIFIER TUBE
922	BLOWER	VENTILATION
923	PILOT LAMP	POWER PILOT
924	PILOT LAMP	PLATE PILOT
925.1	TUBE FG-17 or 967	PLATE RECTIFIER
925.2	TUBE FG-17 or 967	PLATE RECTIFIER
925.3	TUBE FG-17 or 967	SPARE
925.4	TUBE FG-17 or 967	SPARE
926	TRANSFORMER	POWER
927	RECTIFIER	CONTROL VOLTAGE
928	RECTIFIER	GRID VOLTAGE
929	RESISTOR	GRID RECTIFIER FILTER
930	RESISTOR	PLATE RECTIFIER BLEEDER
931	REACTOR	CONTROL RECTIFIER FILTER
932	REACTOR	PLATE RECTIFIER FILTER
933.1	CAPACITOR	CONTROL RECTIFIER FILTER
933.2	CAPACITOR	SPARE
934	CAPACITOR	GRID RECTIFIER FILTER
935	CAPACITOR	PLATE RECTIFIER FILTER
986.1	RESISTOR	GRID ISOLATING
986.2	RESISTOR	GRID ISOLATING
987.1	CAPACITOR	GRID BYPASS
987.2	CAPACITOR	GRID BYPASS

RADIO SET SCR-177-B

For additional data refer to pages covering the BC-191-(*), BC-312-(*), and BC-314-(*)

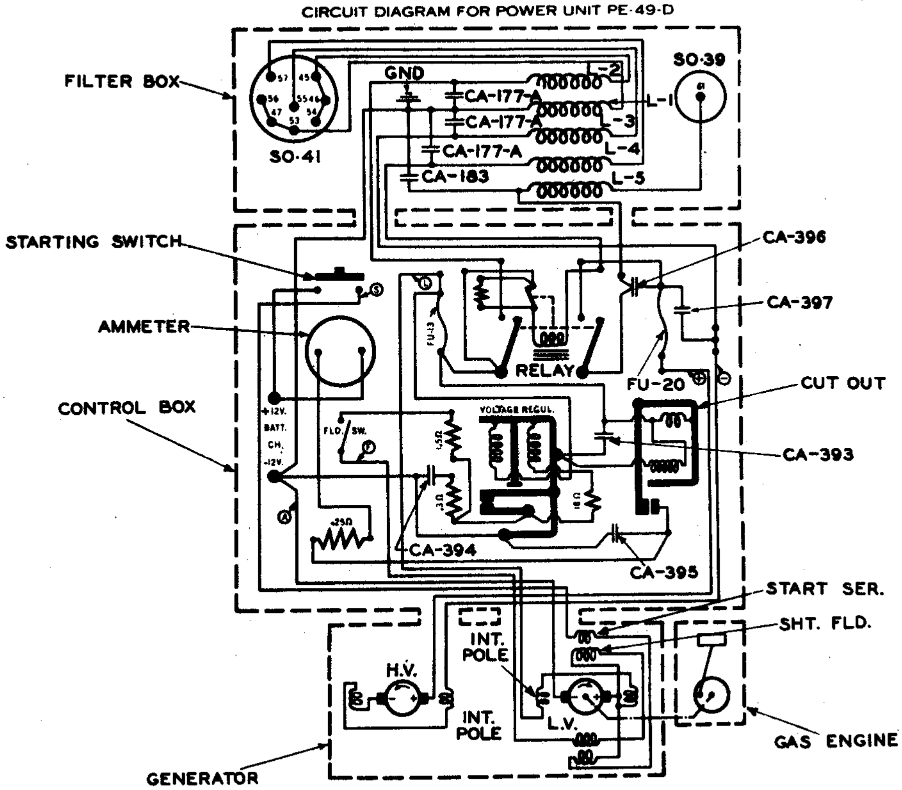
Ref: TM 11-232

COMMON FAULTS AND CORRECTIVE MEASURES

1. It has been reported that a common trouble in the SCR-177-B is caused by an insulation breakdown between high voltage and ground in both the Plug PL-59 and the low-voltage compensating winding of Generator GN-39. See SCR-188-A, page 1, for remedy of plug breakdown.

2. In the PE-49-A and PE-49-B, the plate relay, which is operated by the filament current, has a bakelite rod which swells up and freezes in damp weather. In the event of faulty operation of this relay, it is advisable to first check it for this characteristic fault.

CIRCUIT DIAGRAM FOR POWER UNIT PE-49-D



LEGEND

CA-177-A	CAPACITOR .5 μf	400 V.	FU-13 FUSE .30 AMP. 250 V.
CA-183	CAPACITOR .01 μf	1250 V.	FU-20 FUSE .5 AMP. 1000 V.
CA-393	CAPACITOR .01 μf	600 V.	L-1, L-2 } COILS GROUP 1
CA-394	CAPACITOR .1 μf	200 V.	
CA-395	CAPACITOR .5 μf	200 V.	L-3, L-4, L-5 } COILS GROUP 2
CA-396	CAPACITOR .1 μf	1200 V	
CA-397	CAPACITOR .01 μf	1200 V	

Ⓐ Ⓕ Ⓛ Ⓢ ⊕ ⊖ LEAD IDENTIFICATIONS

Power Unit PE-49-D, schematic diagram.

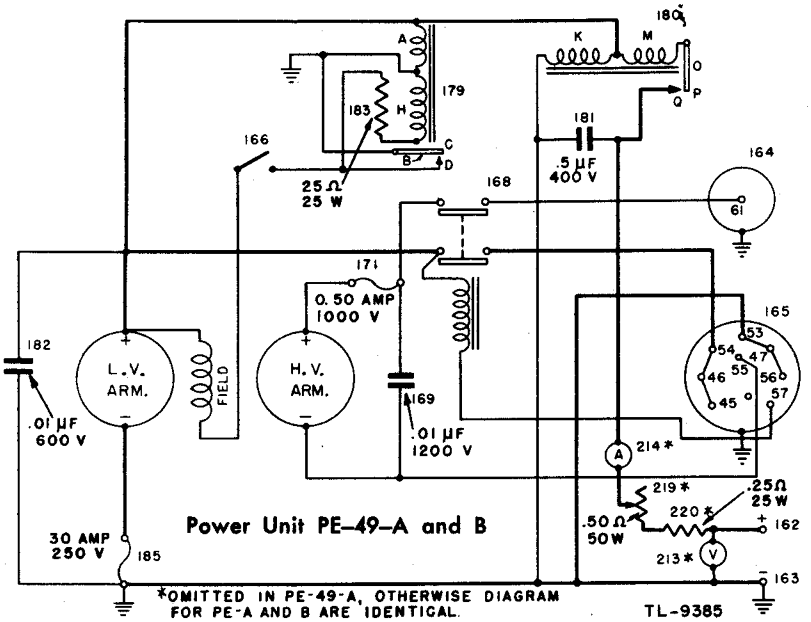
SCHEMATIC DIAGRAM

LEGEND

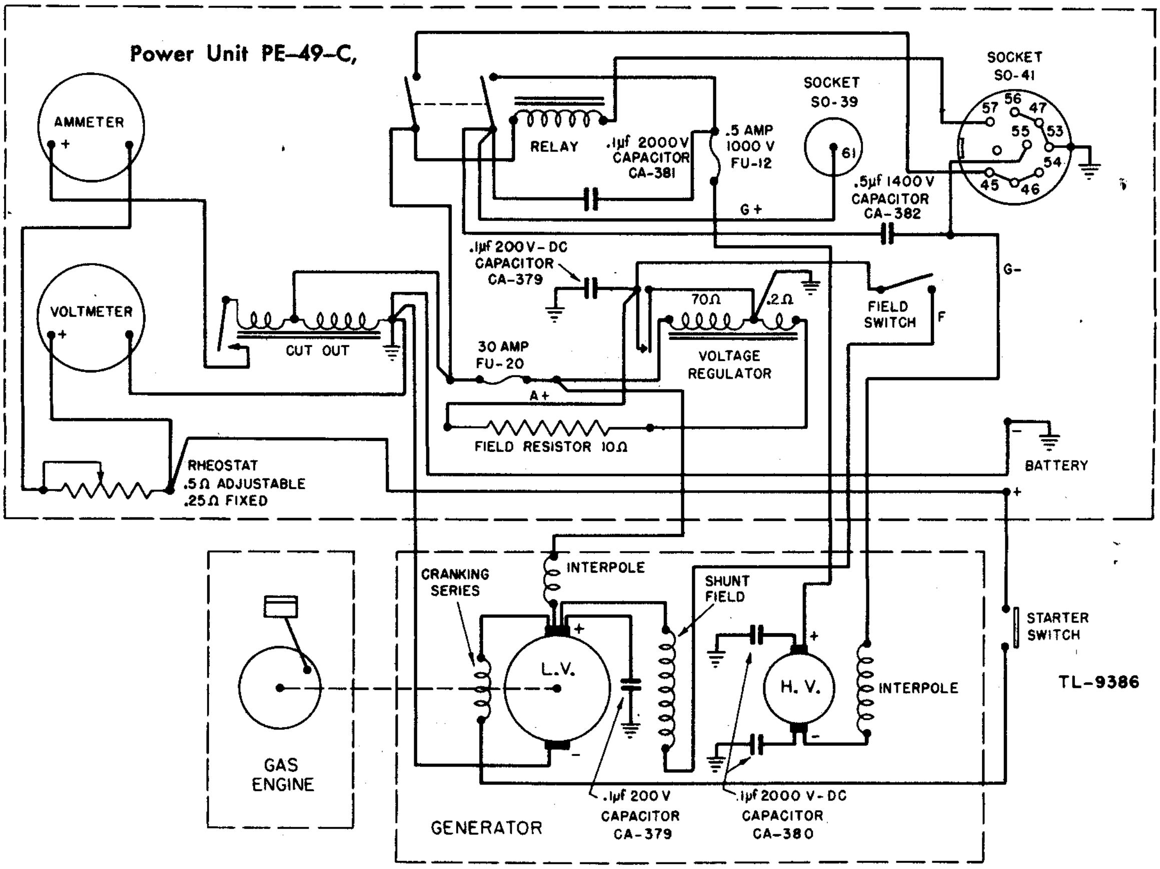
REF. NO.
- 162-BATTERY POST, INSULATED
- 163-BATTERY POST, NON-INSULATED
- 164-SOCKET SO-39
- 165-SOCKET SO-41
- 166-SWITCH, FIELD
- 168-RELAY, SWITCHING
- 169-CAPACITOR CA-303
- 171-FUSE FU-12
- 179-REGULATOR, VOLTAGE
- 180-CUT-OUT, BATTERY
- 181-CAPACITOR CA-304
- 182-CAPACITOR CA-306
- 183-RESISTOR RS-53, REGULATOR
- 185-FUSE FU-13
- *213-VOLTMETER IS-58
- *214-AMMETER IS-32
- *219-RHEOSTAT, BATTERY CHARGING
- *220-RESISTOR, BATTERY CHARGING

VOLTAGE REGULATOR DETAILS
- A-POTENTIAL COIL
- B-ARMATURE
- C-ARMATURE CONTACT
- D-ADJUSTABLE CONTACT
- H-SECONDARY WINDING

BATTERY CUT-OUT DETAILS
- K-SHUNT WINDING
- M-SERIES WINDING
- O-ARMATURE
- P-ARMATURE CONTACT
- Q-FIXED CONTACT



TL-9385



TL-9386

CORDING

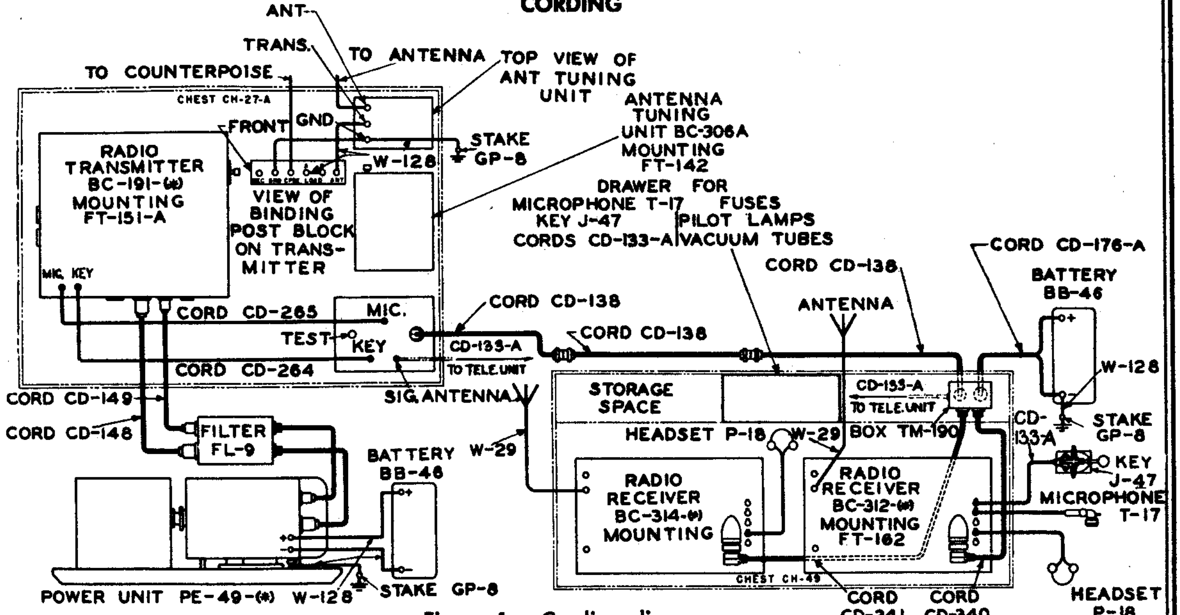


Figure 1.—Cording diagram.

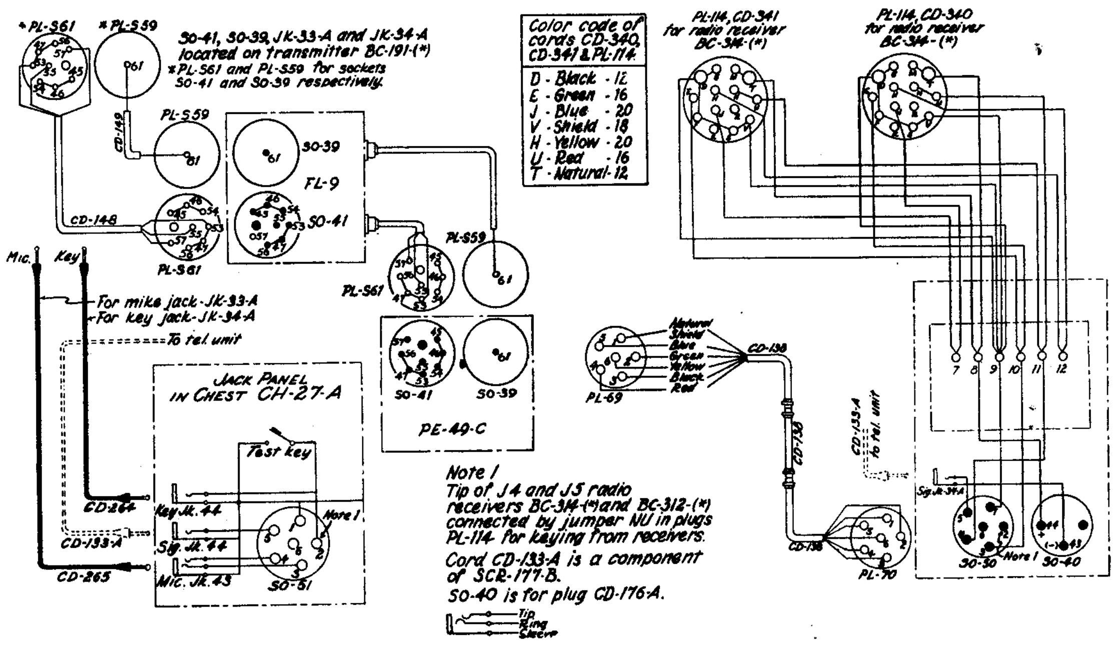


Figure 2.—Cording diagram.

RADIO SET SCR-178, 179

For additional information refer to pages covering the BC-186, BC-187-(*), and BC-188-(*).

Reference: TM 11-231

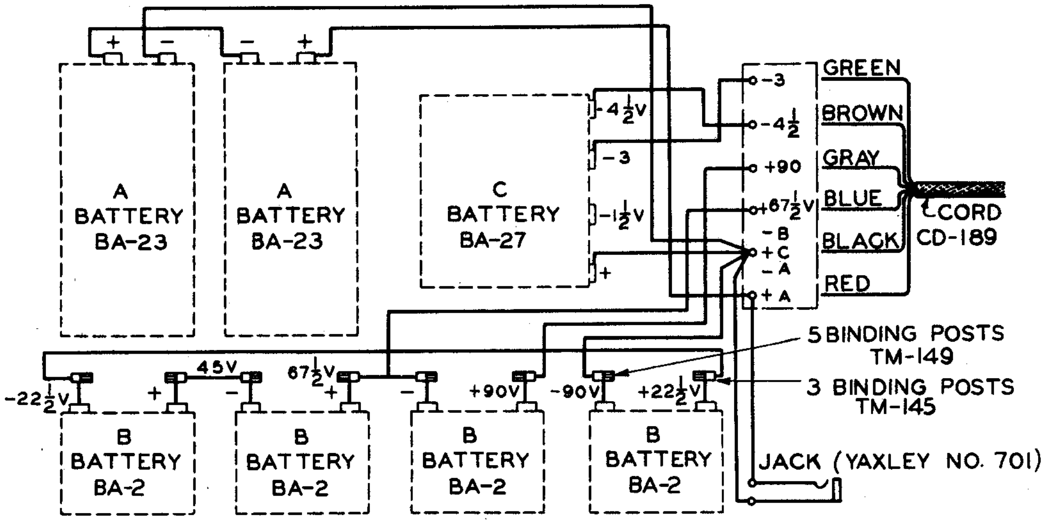


FIG. 1 BOX BX-4 BATTERY CONNECTIONS

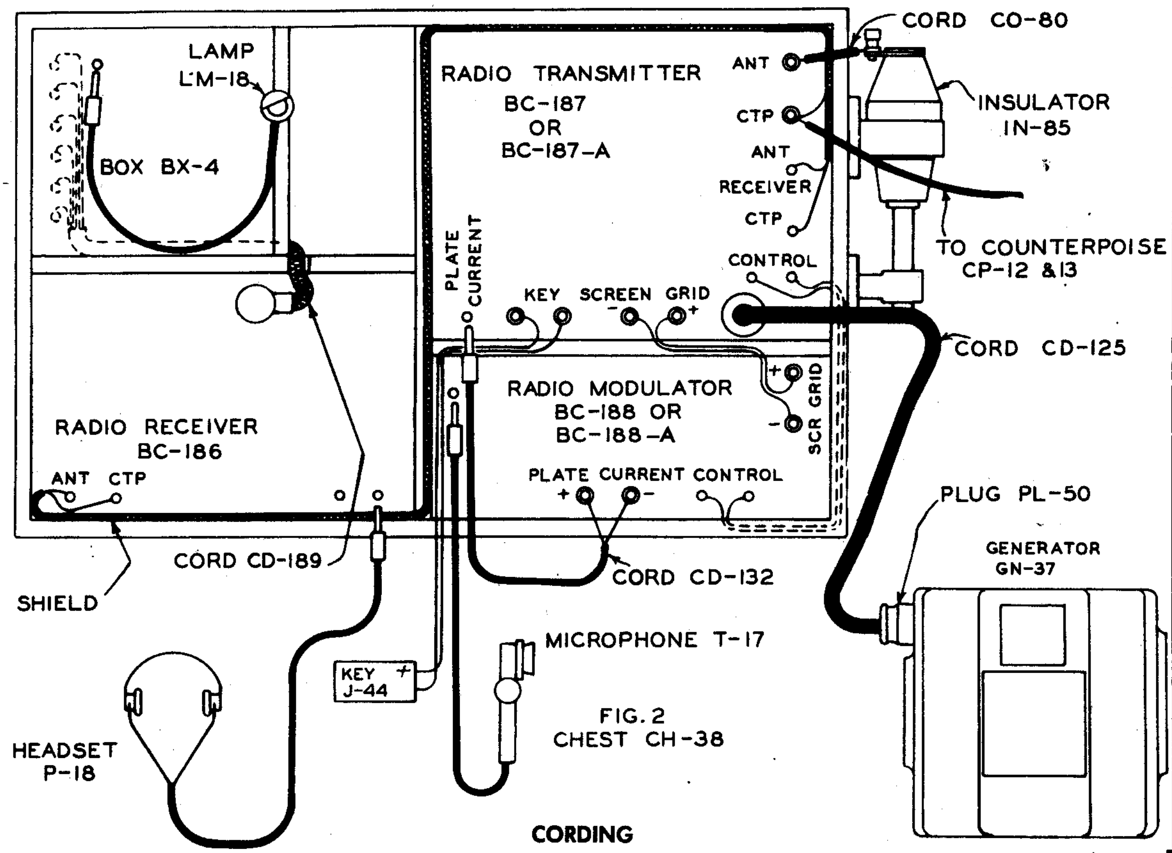


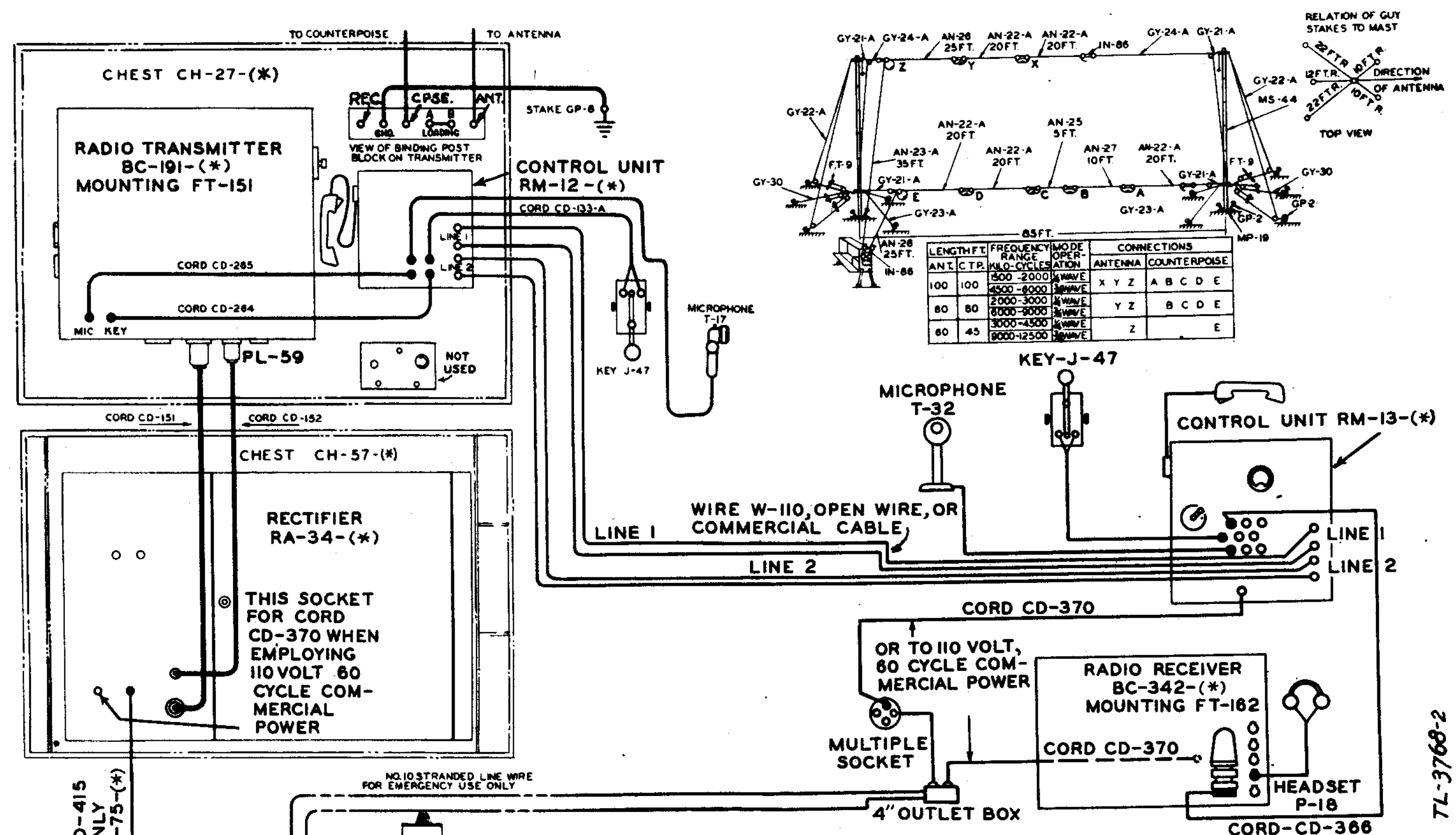
FIG. 2 CHEST CH-38

CORDING

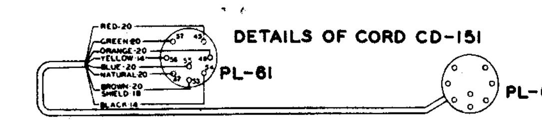
RADIO SET SCR-188-A

Reference: TM 11-233.

TL-3768-2



LENGTH FT. ANT.	LENGTH FT. C.T.P.	FREQUENCY RANGE KILO-CYCLES	MODE OPERATION	CONNECTIONS ANTENNA	CONNECTIONS COUNTERPOISE
100	100	1500 - 2000	¼ WAVE	X Y Z	A B C D E
		4500 - 6000	¾ WAVE		
80	80	2000 - 3000	¼ WAVE	Y Z	B C D E
		6000 - 9000	¾ WAVE		
60	45	3000 - 4500	¼ WAVE	Z	E
		9000 - 12500	¾ WAVE		



DETAILS OF CORD CD-151

SAFETY NOTICE

Operation of this equipment involves the use of high voltages which are dangerous to life. Be very careful when working with this equipment.

For additional data refer to pages covering the Radio Transmitter BC-191-(*), Rectifier RA-34-(*), and Radio Receiver BC-342-(*).

COMMON FAULTS AND CORRECTIVE MEASURES

1. A characteristic fault reported is that of insulation breaking down between high voltage and ground terminals in Plug PL-59, due to moisture. This trouble may be avoided if these plugs and part of the cord are completely wrapped with rubber tape.

RADIO SET SCR-193-(*)

SCR-193-(*) = SCR-193-A, B, C, D, E, G, H, J, K, KB, L, M, P and Q.

For additional data on SCR-193-(*), refer to pages covering the BC-191-(*) and BC-312-(*).

Ref: TM 11-273

MAINTENANCE HINTS

1. It is desirable, under certain conditions, to reduce or eliminate the side tone volume of Radio Sets SCR-193-D and E. This may be accomplished without opening either transmitter or receiver, in the following manner:
 (a) At the terminal block TM-183 (see fig. 1 below), remove the yellow receiver lead from terminal #1, and connect it to terminal #13.
 (b) Remove the natural transmitter lead from terminal #6 and connect it to terminal #12.
 (c) Connect a 50,000-ohm resistor between terminal #12 and terminal #14.
 (d) Connect a toggle switch between terminal #13 and terminal #14, mounting this switch on the terminal box.
 This modification connects the resistor and switch in series with the side tone circuit, reducing the side tone volume and making it possible to eliminate the side tone completely by opening the switch. (Ref: Maintenance Letter No. 20, OCSigO, 31 Mar 43.)

2. Repaired transmitters must have transmitter tuning units with identical serial numbers. Do not interchange transmitter's tuning units with those of other transmitters.

3. Lubrication of the Dynamotors DM-17-(*) and DM-21-(*) (for BC-312-(*) Receivers), and BD-77-(*) (for BC-191-(*) Transmitters), - as well as gears, bearings, and band-changing mechanism in both receiver and transmitter *should be accomplished periodically* and in the manner prescribed in the Lubrication Chart in TM 11-273.

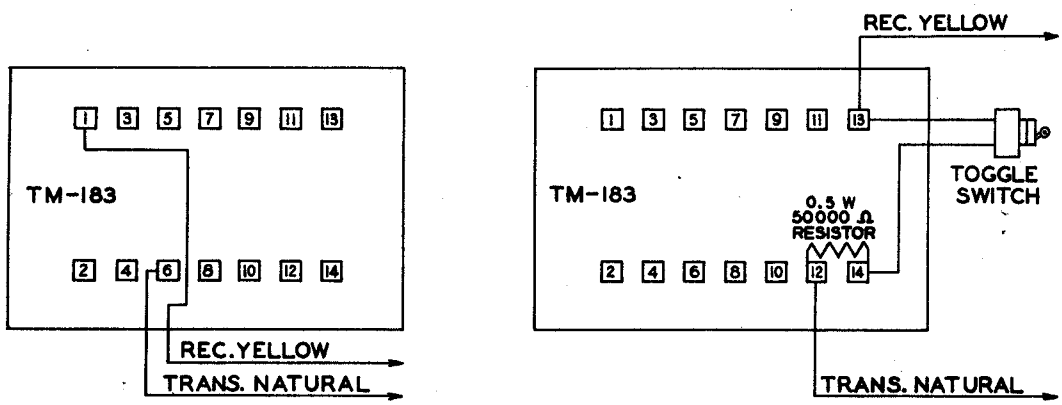
COMMON FAULTS AND CORRECTIVE MEASURES

1. In the Dynamotor Unit BD-77-C, filter capacitor 1607 (.005μf, 5000V) will sometimes become shorted and repeatedly blow dynamotor fuse 1608 *when the transmitting key is depressed.* The remedy, obviously, lies in the replacement of this capacitor.

INSTALLATION HINTS

1. The distance range of this radio set may be increased by the use of a higher and larger antenna than that normally used with the vehicle. A wire antenna longer than the standard mast antenna, properly installed between the mast base and a tree or other elevated object, will serve the purpose.

2. In some situations, where only very short distances are to be covered, the range may be decreased and interference reduced by the removal of one or two of the mast sections.



STANDARD CONNECTIONS   MODIFIED CONNECTIONS

Fig. 1.—Modification of Radio Sets SCR-193-D and 193-E to reduce or eliminate side tone.

583099 O - 44 - 4

RADIO SET SCR-197-(*)

SCR-197-(*) = SCR-197-B, C, D, E, and F.

For additional data, refer to pages covering Radio Transmitter BC-325-(*), Control Unit RM-7-(*), and Control Panel BD-92-B.

Ref: TM 11-241
TM 11-805

MAINTENANCE HINTS

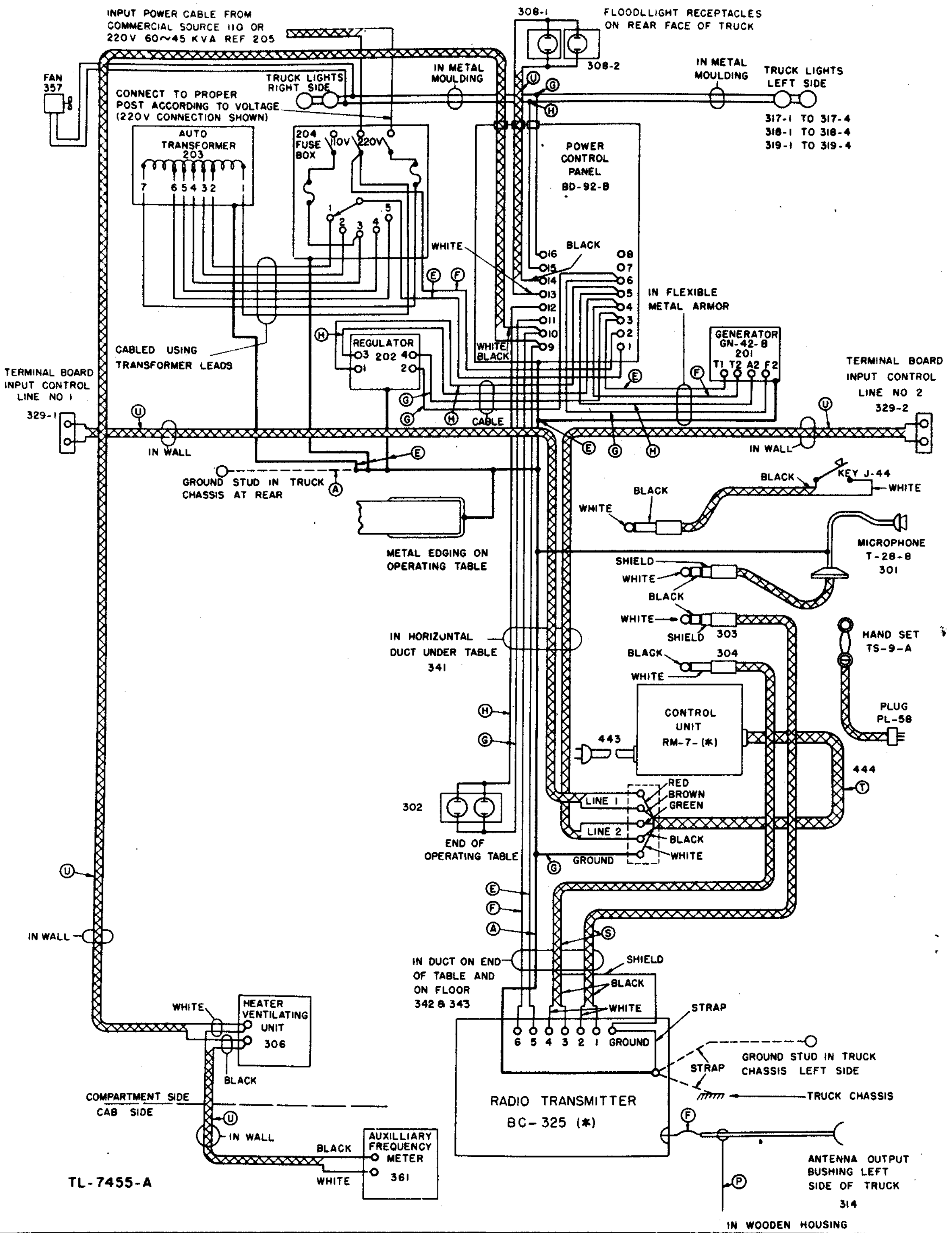
REDUCTION OF POWER OUTPUT. Instructions previously issued limit the maximum power output to be employed on tactical radio sets for training purposes to 100 watts, and further specify that the lowest power practicable should be employed at all times.

To reduce the power output of Radio Transmitter BC-325-(*), part of SCR-197-(*), use the "TUNE-OPERATE" switch which is employed for tune-up purposes. Power outputs of this set are as follows:

(a) Full output--400 watts (CW), switch in OPERATE position.
(b) Switch in TUNE position--100 watts (CW).
(c) Switch in TUNE position--40 watts (phone).

Ref: Supply Letter No. 140, OCSigO, 17 July 1943.

CORDING DIAGRAM

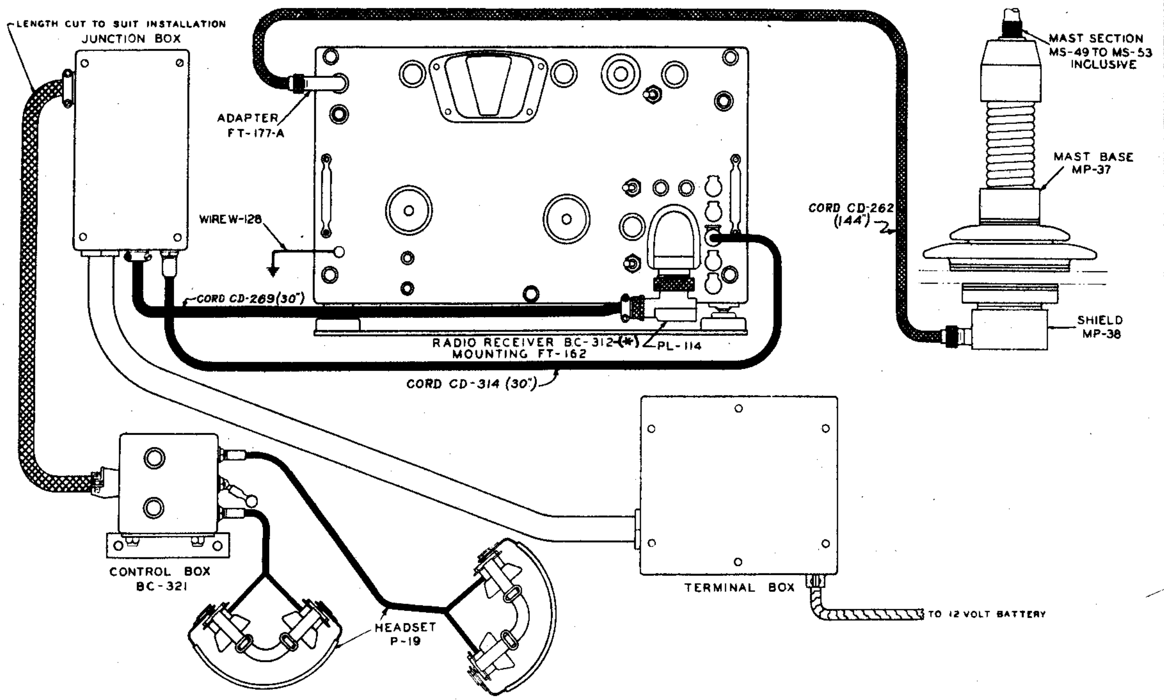


RADIO SET SCR–210–(*)

SCR-210-(*) = SCR-210-A, -B, -C, -D, -E, -F, -G, -H, and -J

See also: BC-312-(*)

Reference: TM 11-272



TYPICAL CORDING DIAGRAM—SCR–210–A

1. Failure of the equipment to operate is usually due to worn, broken, or disconnected cords, plugs, or sockets, run-down storage battery, worn dynamotor brushes or defective tubes. Check these items first.
2. Examine all cords for open or short circuits and make necessary repairs. These defects most frequently occur at point of attachment of a plug.
3. If the dynamotor becomes defective replace it with one known to be in good condition.
   See TM 11-272 and TM 11-850 for lubrication instructions.

RADIO SET SCR-245-(*)

SCR-245-(*)= SCR-245-A, -B, -C, -D, -E, -F, -G, -H, -J, -K, -L, -M, -N, and -P

See also: BC-223-(&)
BC-312-(&)

Reference:
TM 11-272

LOCATING TROUBLE

1. Failure of the equipment to operate is usually due to worn, broken or disconnected cords, plugs or sockets, run-down storage battery, worn dynamotor brushes or defective tubes. Check these items first.
2. If failure of both transmitter and receiver occurs simultaneously, the trouble is usually in the primary power source or connecting leads. If only one component fails to operate, first determine if it is receiving proper supply voltages. Check fuses in the equipment at an early stage in "trouble shooting."
3. Examine all cords for open or short circuits and make necessary repairs. These defects most frequently occur at the point of attachment of the cord to its corresponding plug. Certain Cords CD-261, CD-262, and CD-263 are shielded cables each consisting of flexible shielded conduit containing an inner conductor supported by a series of spaced insulating beads. These cords may be damaged by crushing or bending sharply. If these cords have been badly damaged and the conductor cannot be straightened out, replace them as soon as possible.
4. If the dynamotor becomes defective, replace it with one known to be in good condition. Check Dynamotor Unit PE-55 for loose or defective brushes, defective bearings, and open or short circuited windings. Replace broken brush springs, defective brushes, and clean commutator with carbon tetrachloride. Lubricate each bearing of Dynamotor DM 21-(*) with one drop of SAE 10 mineral oil for each 500 hours of service. Lubricate each bearing of PE-55 with two or three drops of SAE 10 mineral oil for each 300 hours of service. See TM 11-272 and TM 11-850 for lubrication instructions.

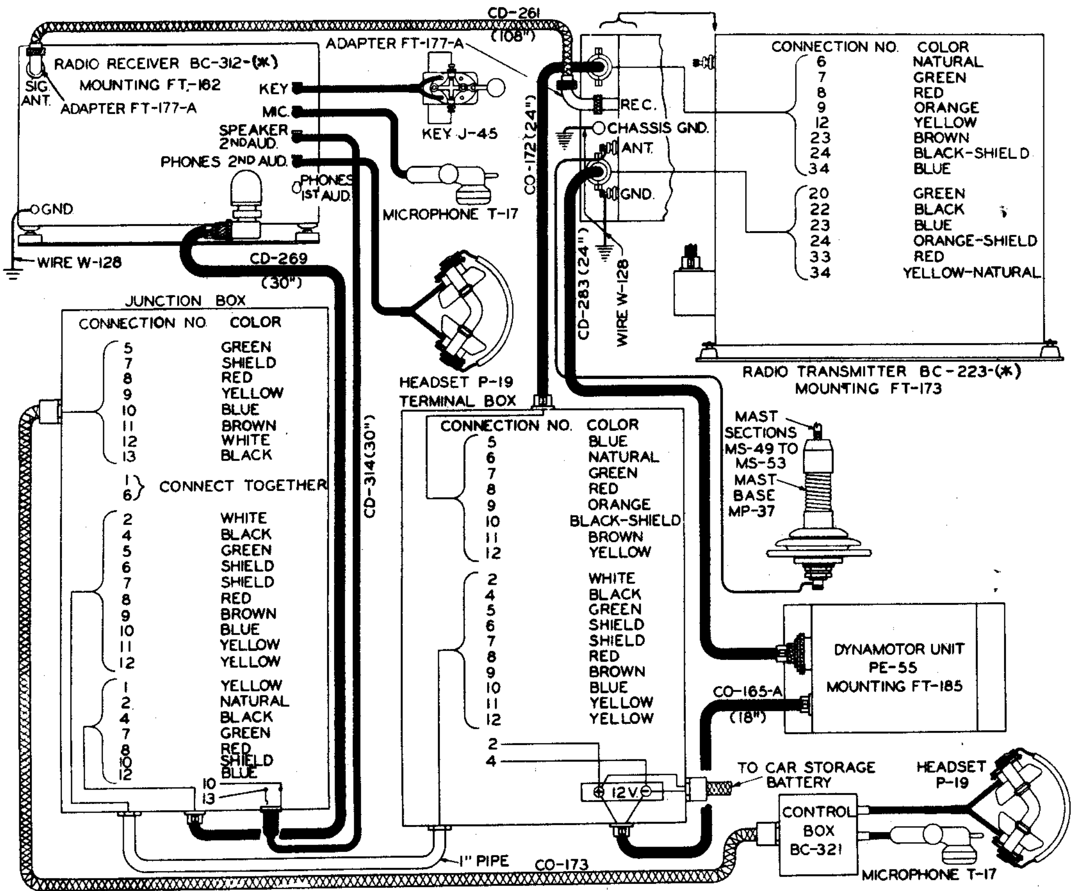


Fig. 1.—Cording diagram—SCR-245-A-B

RADIO SET SCR-299-(*)

SCR-299-(*) = SCR-299-A, B, C, D, and F.

For additional data, see also Radio Transmitter BC-610-(*), Speech Amplifier BC-614-(*), Radio Receivers BC-312-(*) and 342-(*).

Reference: TM 11-280.

PREVENTATIVE MAINTENANCE HINTS

BREAK-IN OPERATION OF RADIO SET SCR-299-A, B, C. Circuit modifications to obtain this feature are outlined below, and in figures 1, 2, and 3. A certain number of these sets have been modified in accordance with this data, and this information should assist shop personnel when servicing these units. Future modifications will be made ONLY when authorized by proper authority, and where found to be ABSOLUTELY NECESSARY. In the event that modified sets come into the shop for repairs, they should not be changed back to original form.

Provision for local c-w break-in operation of SCR-299-A, B, and C is accomplished as follows:

1. Obtain the following materials:
   (a) One D.P.D.T. Switch SW-126, stock no. 3Z8126.
   (b) Four feet of stranded push-back Wire W-140, stock no. 1B140.
2. Remove Speech Amplifier BC-614-(*) from its case and place upon bench with front panel facing operator.
3. Drill a 1/2" hole directly beneath switch marked "BC-342", and centered to the right of jack marked "CARBON MIC. 1".
4. Turn chassis upside down with rear of chassis facing operator, and locate relay RY-101. Remove orange jumper wire from #9 to #7 on RY-101. This will leave #7 open. Remove white and orange wire from #4 of relay RY-101 and connect it on #2. This will leave #4 open. Run a 12" length of wire from #7 of relay RY-101 to #2 of SO-104.
5. On switch SW-104, locate a black wire that runs from left side of this switch to chassis. Remove this wire from switch lug and tape up.
6. Remove the white and green wire from #4 prong of SO-103, and tape it.
7. The following lugs should now be blank:
   (a) #4 on relay RY-101
   (b) #4 on socket SO-103
   (c) A lug on switch SW-104
8. Connect D.P.D.T. Switch SW-126 per figure 3 and mount it in the hole drilled in front of panel with bottom wires facing chassis. Draw wires through hole of relay RY-101.
9. Install wires from switch, as follows:
   (a) 12" length of wire on A of Switch SW-126 to the open lug on switch SW-104.
   (b) 6" length of wire on D of Switch SW-126 to lug #4 of RY-101.
   (c) 18" length of wire on C of Switch SW-126 to lug #4 of SO-103.
   (d) 6 1/2" length of wire on B to ground on resistor block.

When this is completed, turn chassis upright and above Switch SW-126, mark the panel "NORMAL", and below this switch mark the panel "REMOTE".

10. For local break-in c-w or local phone operation, the new switch must be at NORMAL.
11. For remote c-w or remote phone operation, the new switch must be at REMOTE. *(Note:* During entire time remote line is being keyed, the receivers will remain disabled if the RECEIVER CONTROL switches are set to AUTO position.)
12. To tune up the exciter, doubler and intermediate amplifier stages set the C.W.-PHONE switch of the transmitter to PHONE position, and prior to tuning up the final stage and antenna circuit - set the C.W.-PHONE switch to C.W. position. Otherwise proceed in accordance with the operating instructions provided for Radio Set SCR-299-(*).
    (Reference: Gen. Maintenance Letter No. 14, OCSigO, 12 Feb 1943.)

CORDS FOR SCR-299-A, AND B. When replacement of any of the cords for Radio Set SCR-299-A and B becomes necessary, the following complete set of cords should be requisitioned: Cord CO-313, Cord CO-314, Cord CO-315, Cord CO-316, Cord CD-652, and Mounting Bracket for CO-315. (Reference: Supply Letter No. 160, OCSigO, 6 Feb 1943.)

REDUCTION OF POWER OUTPUT. Instructions have been issued to limit the maximum power output to be employed for training purposes (100 watts), and also to employ at all times the lowest power practicable. Radio Transmitter BC-610-(*), part of SCR-299-(*), may be reduced for both c-w or phone operation by a 50% reduction of the voltage applied to the high voltage transformer primary circuit. However, the regulation of the high voltage power supply is adversely affected and may result in lowered frequency stability and some reduction in the quality of modulation when on phone operation.

(1) Normal tune-up and operation of transmitter BC-610-(*), with HIGH VOLTAGE PROTECT switch set on NORMAL and C.W.-PHONE switch on C.W. will provide a power output of 500 watts on c-w.
(2) Resetting the HIGH VOLTAGE PROTECT switch to ON and adjusting the COUPLING control of Antenna Tuning Unit BC-729-(*) until the plate current in the final reaches a value of 125 milliamperes as indicated on P.A. PLATE meter, will provide a power output of 200 watts on c-w.
(3) For reduced power operation, on phone, proceed as follows:
   (a) Reset the HIGH VOLTAGE PROTECT switch to NORMAL.
   (b) Adjust COUPLING of Antenna Tuning Unit BC-729-(*), until the final plate current reads 125 milliamperes, as indicated on the P.A. PLATE meter.

PREVENTATIVE MAINTENANCE HINTS (cont.)

(c) Reset the MODULATOR BIAS control for a reading of 40 milliamperes, as indicated on the MOD. PLATE meter.

(d) Reduce setting of the GAIN control of Speech Amplifier BC-614-(*) until normal use of the microphone results in a maximum modulation swing on voice peaks of 90 milliamperes, as indicated on the MOD. PLATE meter. Resultant power output will be 175 watts on phone.

(Reference: Supply Letter No. 140, OCSigO, 17 July 1942.)

MODIFICATION IN WIRING OF TABLE MC-269 FOR BC-312-(*) AND BC-342-(*) RADIO RECEIVERS. Radio Receiver BC-312-N received on Order 4611-PHILA-42 is unsatisfactory for use with Radio Set SCR-299-(*). The headset jacks J-1 and J-2 are wired in parallel and are connected to the second audio stage. Inasmuch as it is necessary to disable the second audio stage while transmitting, this arrangement leaves no provision for sidetone to the headset.

Fig. 4 shows the changes necessary in the wiring of Table MC-269 so that it will operate with all types of Radio Receivers BC-312-(*) and BC-342-(*).

This circuit change disables the second audio stage when transmitting, but does not affect the first audio stage. The receiving position is not affected.

After the above changes are made, the set shall be tested for overall performance. (Reference: Maintenance Letter No. 11, OCSigO, 15 January 1943.)

MAST BASE CONVERSION OF MP-47, PART OF SCR-299-(*). Reports from the field indicate that considerable trouble is experienced with leaking roof installations of Mast Base MP-47 of Radio Sets SCR-299-A, B, and early production of SCR-299-C. To correct this condition, it is recommended that the following be employed:

(a) Apply rubber cement to the threads of the plug used to terminate the antenna lead-in wire.

(b) Reseat the insulating bowls and gaskets and reassemble the mast base.

(c) Flex the mast base springs enough to insert sufficient rubber cement to reach the base of the spring.

All Radio Sets SCR-299-C under procurement, as well as future procurements, employ a redesigned Mast Base MP-47 which is sufficiently watertight. (Reference: General Maintenance Letter No. 32, OCSigO, 17 April 1943.)

VENTILATING FAN CIRCUIT MODIFICATION. To minimize drain on the 6-volt motor battery, a method for changing the roof ventilating fan in Truck K-51 from this battery to the 12-volt battery, which is the radio set power supply, is described in *Maintenance Letter No. 55, OCSigO, 4 October 1943.*

1. The fan is driven by a 6-volt motor, therefore, the following materials should be requisitioned, and the procedure given below followed to accomplish this modification:

(a) Modification Kit, 2 S 299A/K1.

(b) Plate of #18 gauge sheet metal, cut and drilled as indicated in figure 8. Bakelite or other insulating board, 1/4" thick, may be substituted.

2. To rewire the fan circuit, refer to figures 5, 6, 7, and 9, and proceed as follows:

(a) Mount the 2-ohm resistor (part of modification kit) on the plate, as indicated in figure 9.

(b) Remove the ventilating fan switch from its present position, and mount it on the plate per figure 9.

(c) Mount pilot housing on plate, per figure 9.

(d) Mount plate on left side stringer of truck, and wire it as shown in figure 5. The No. 14 lead is brought from +12 volts, in terminal box at rear of truck, to the switch, which is wired to the resistor and pilot lamp socket. The wire is then put through the grommet, through the hole in roof bracket, and connected to the fan motor lead.

(e) Adjust the sliding contact on the resistor so that the fan motor draws approx. 4 amperes. This setting will be approx. 1 1/2 ohms.

MAINTENANCE HINTS

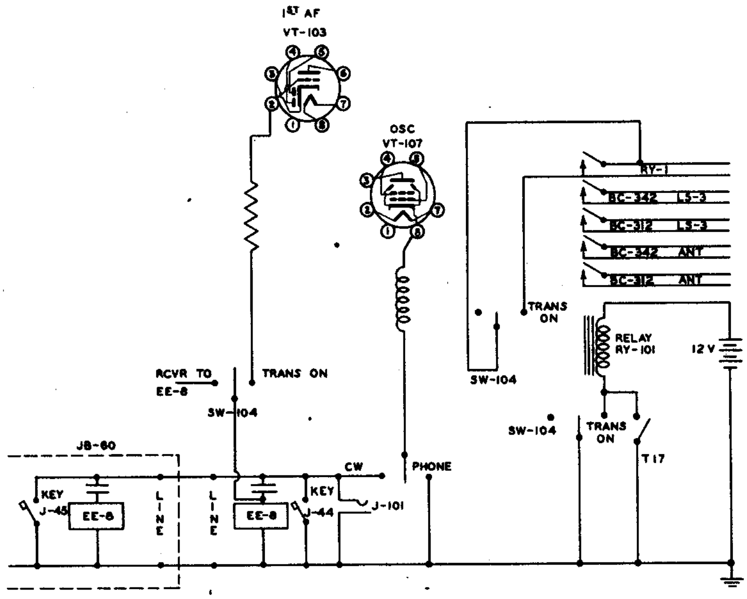


FIG. 1 - ILLUSTRATING CONNECTIONS BEFORE MODIFICATION

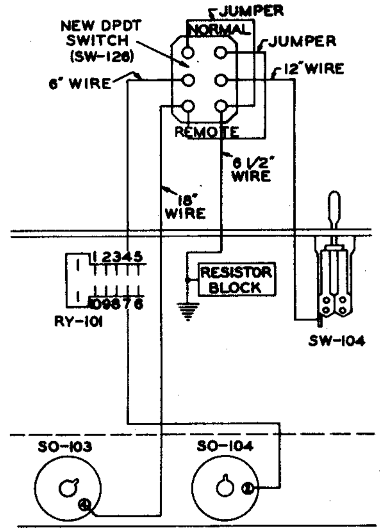


FIG. 3 - REAR OF CHASSIS SPEECH AMPLIFIER BC-614-(*) AND NEW CONNECTIONS

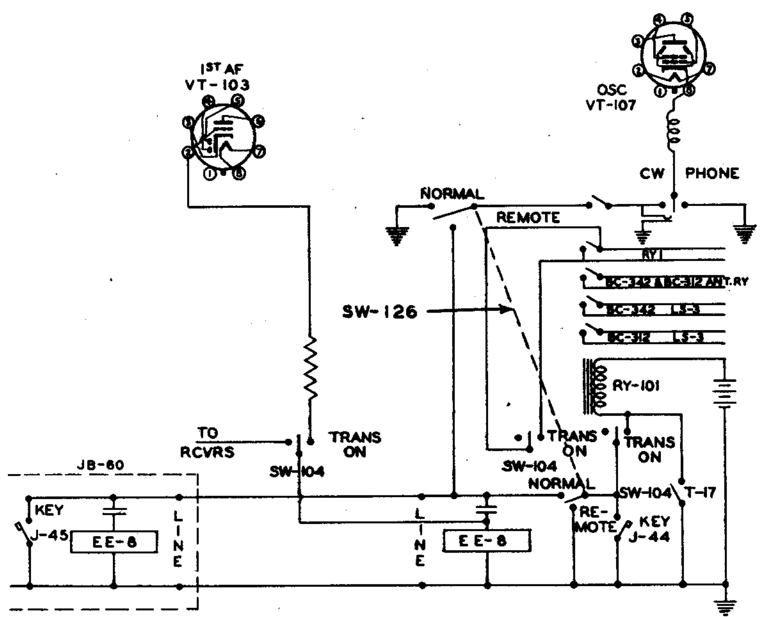


FIG. 2 - CONNECTIONS AFTER MODIFICATION

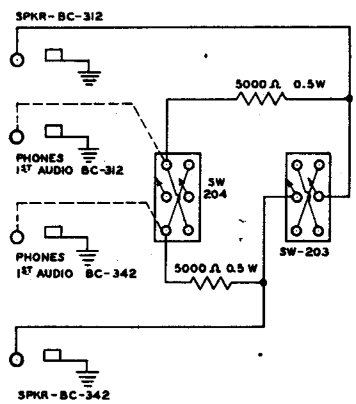


FIG. 4 - MODIFICATION OF TABLE MC-269 FOR BC-312-(*) AND BC-342-(*) RECEIVERS

MAINTENANCE HINTS (cont.)

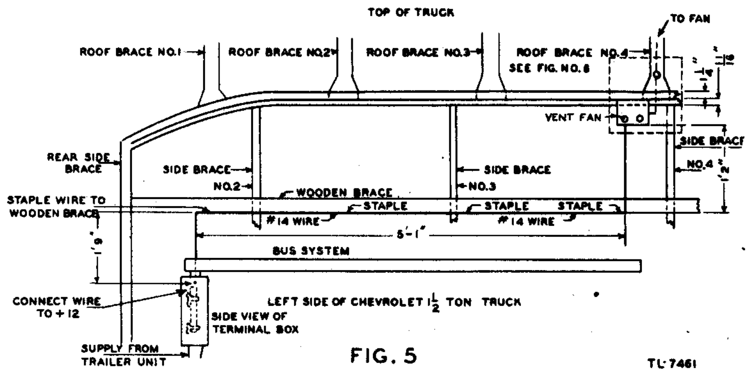


FIG. 5

TL-7461

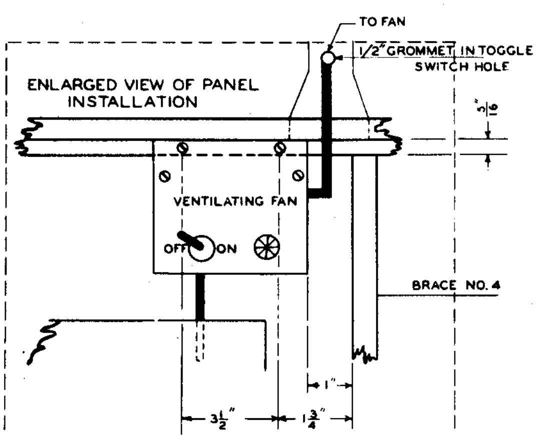


FIG. 6

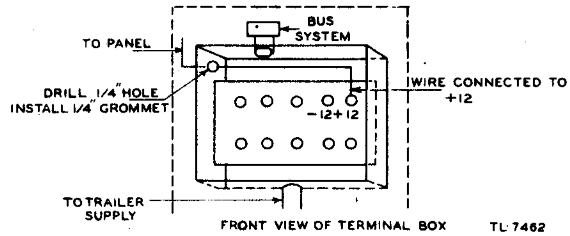


FIG. 7

TL-7462

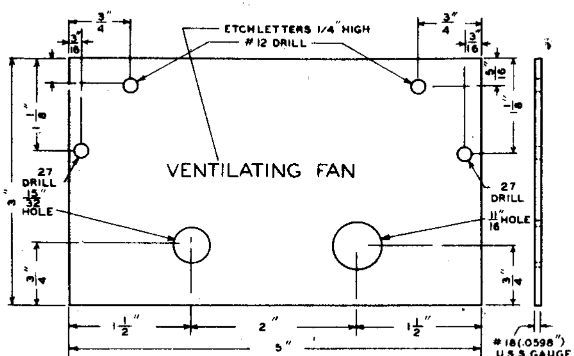


FIG. 8 FRONT VIEW

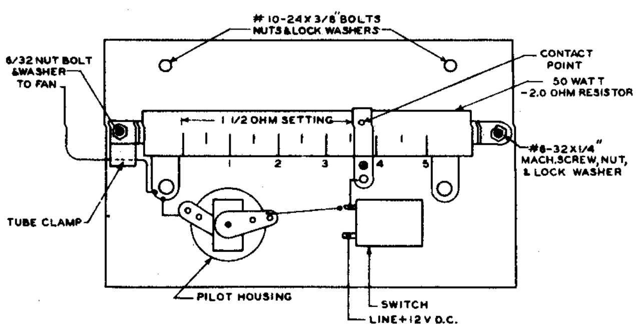
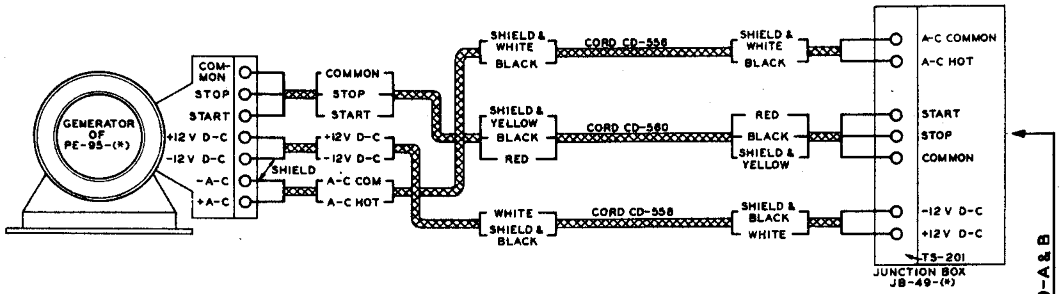


FIG. 9 REAR VIEW

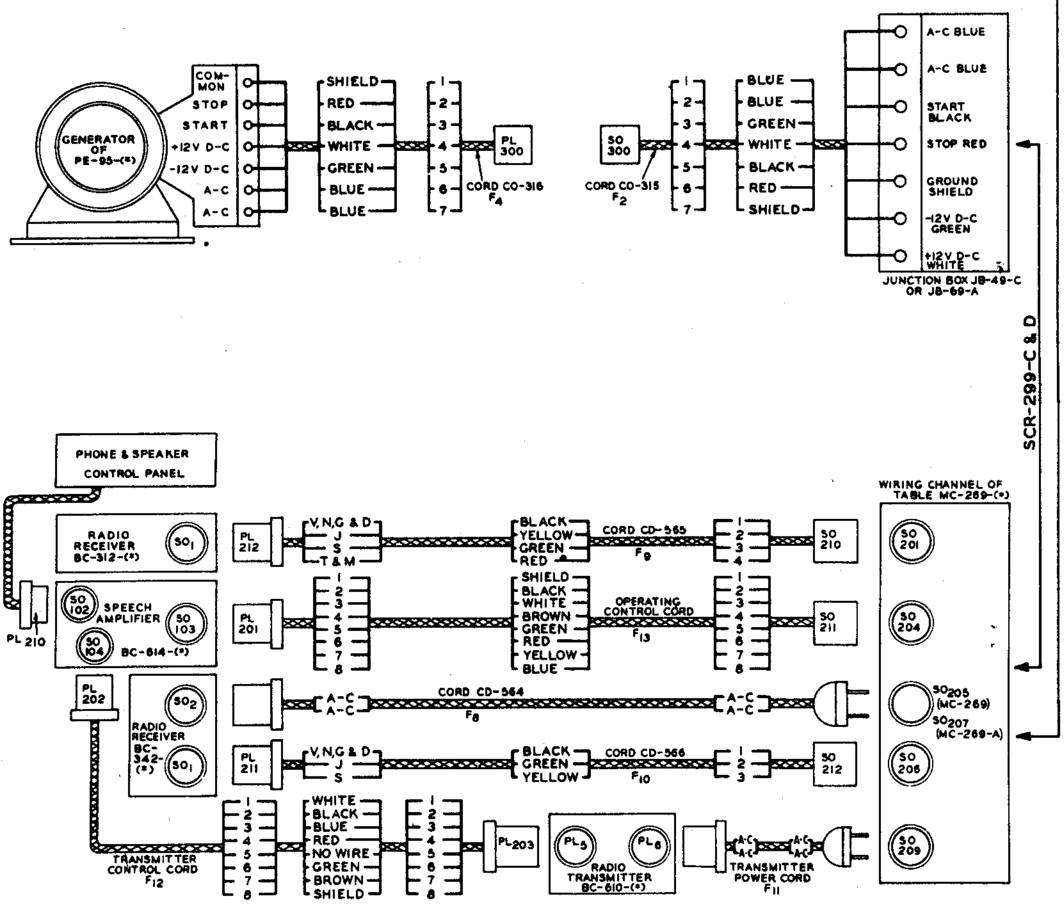
TL-7463

Ventilating fan modification details.

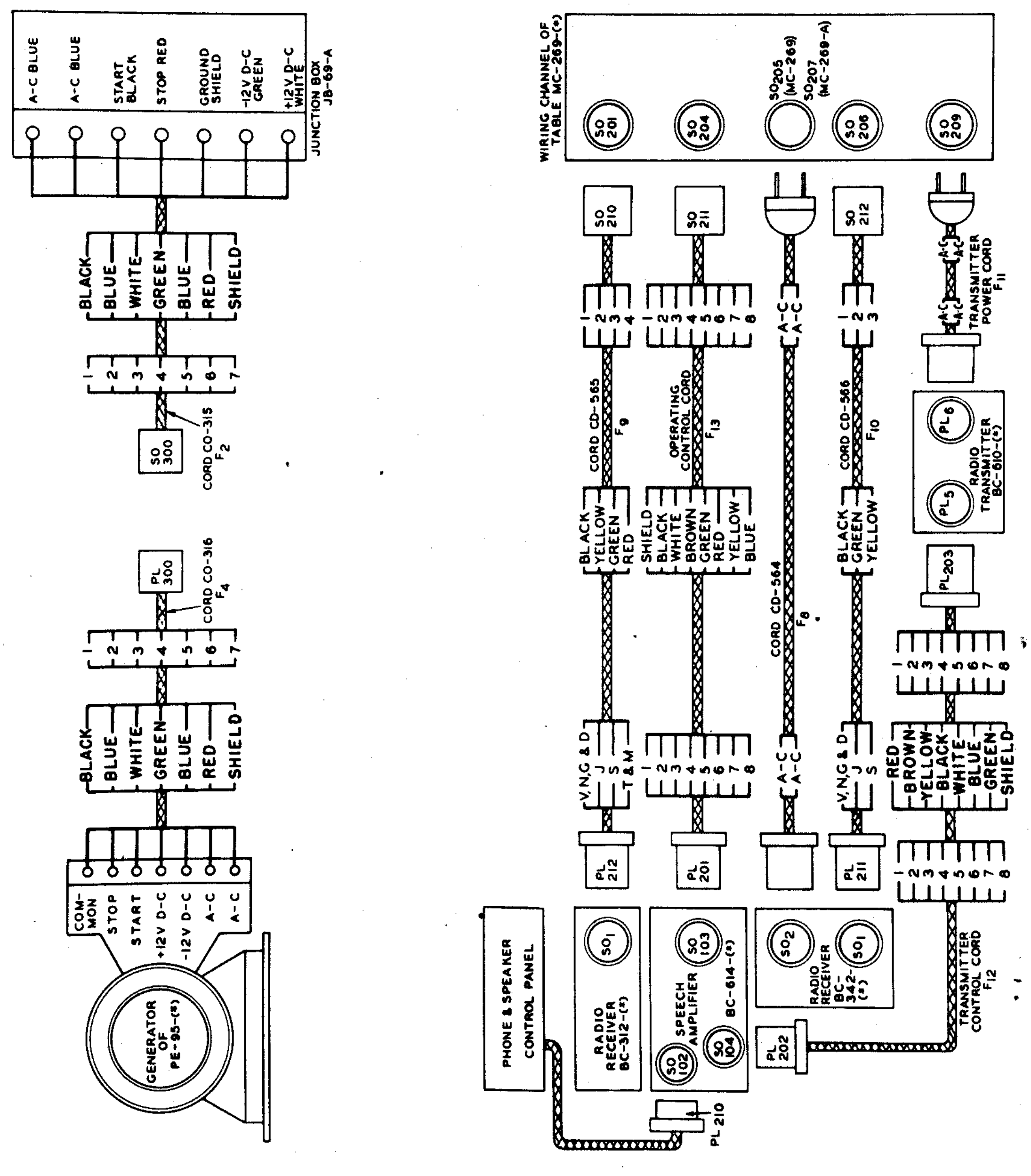
CORDING



Cording diagram. Top and bottom form the complete wiring for SCR-299-A and B. Middle diagram and bottom for SCR-299-C and D.

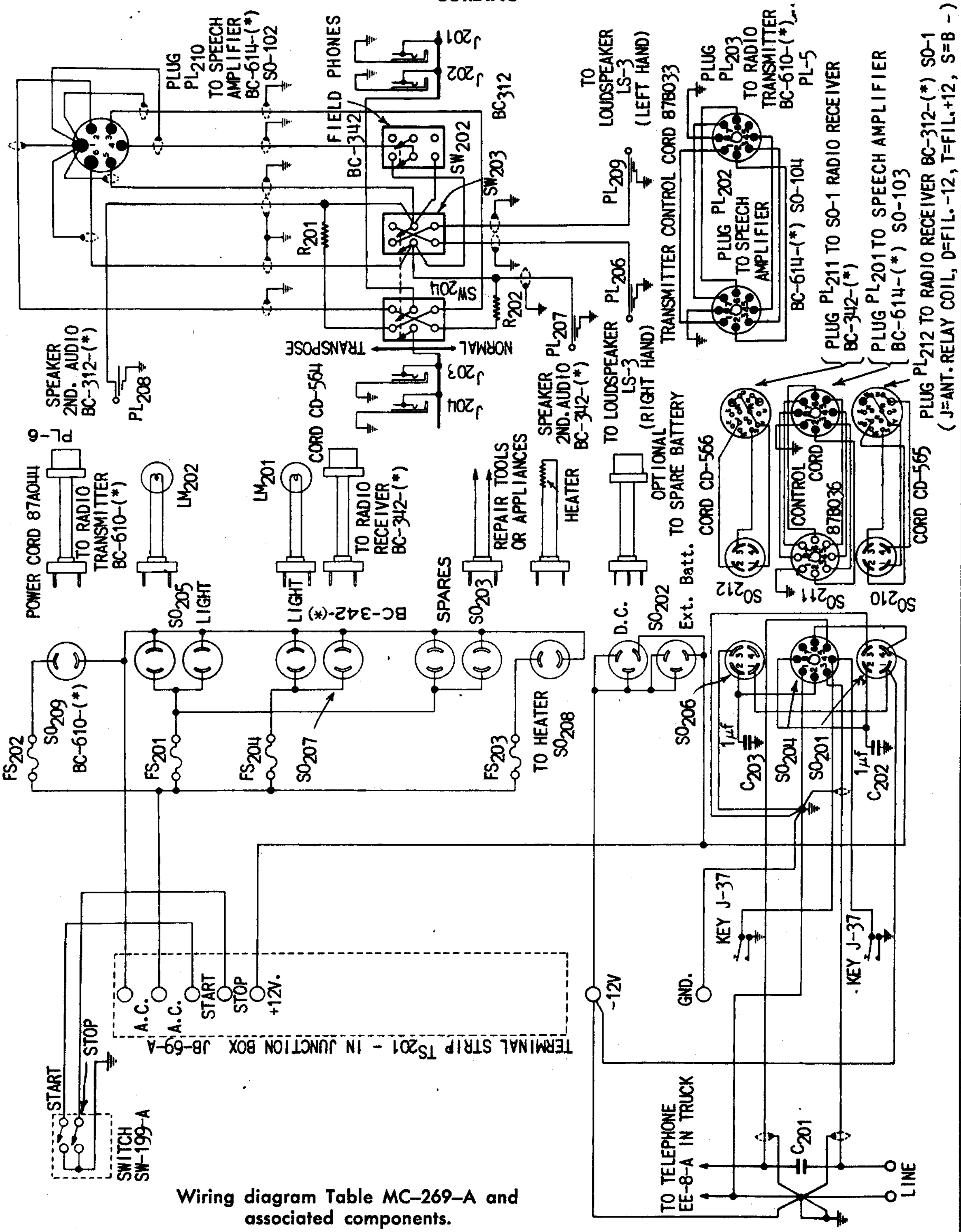


CORDING



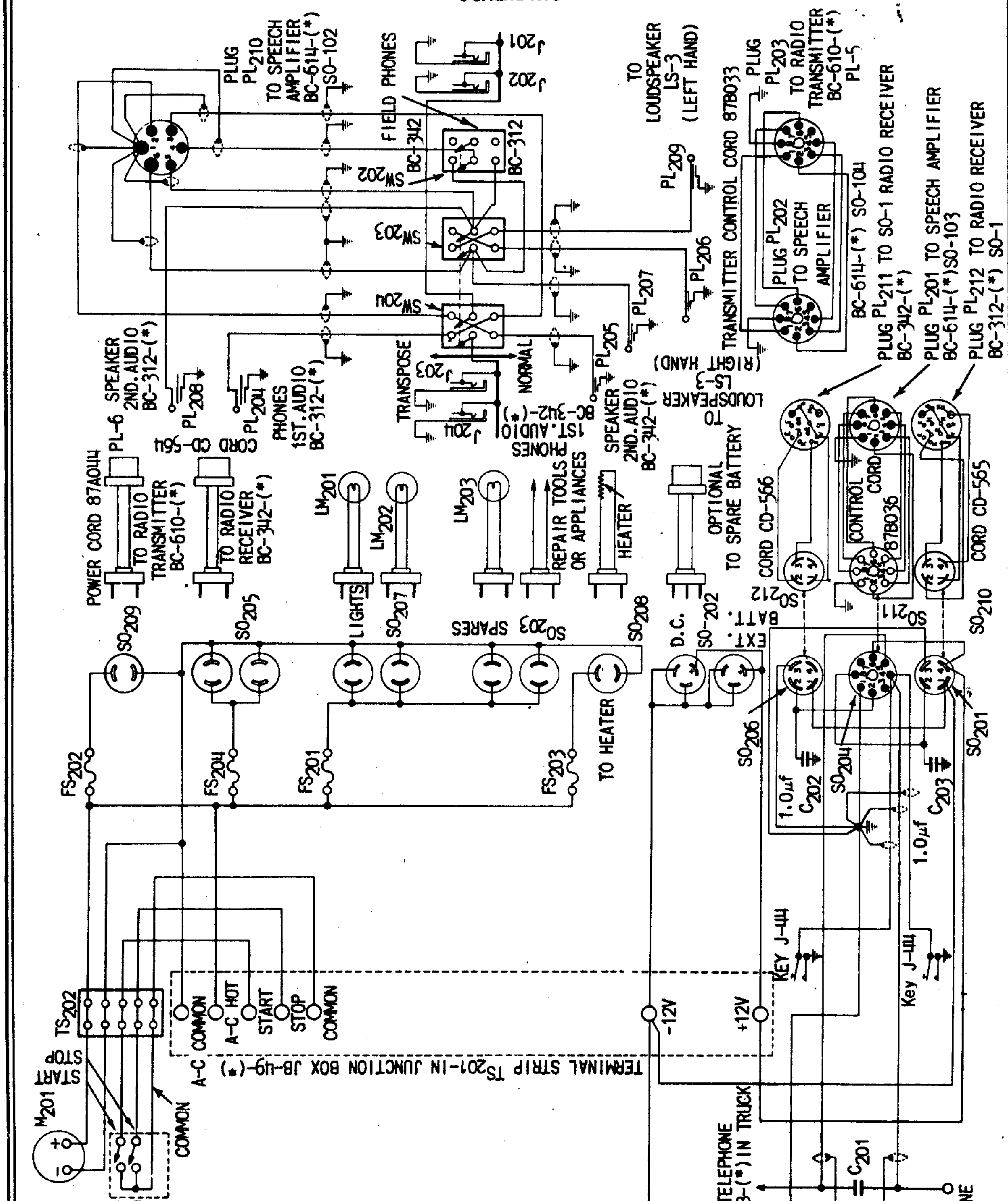
Cording, SCR-299-F.

CORDING



Wiring diagram Table MC-269-A and associated components.

SCHEMATIC



Wiring diagram Table MC-269 and associated components.

RADIO SET SCR-506-A

For additional information refer to pages covering the BC-653-A and BC-652-A.

Reference: TM 11-630

MAINTENANCE HINTS

REDUCTION OF POWER OUTPUT. Instructions previously issued limit the maximum power output to be employed on tactical radio sets for training purposes to 100 watts, and further specify that the lowest power practicable should be employed at all times.

The power output derived from Radio Transmitter BC-653 is determined by the setting of the "POWER AND EMISSION" switch. There are five positions of this switch, marked from left to right: "OFF", "CAL & NET", "C. W. ¼", "C. W. FULL", and "PHONE".

(a) Setting the "POWER AND EMISSION" switch to either "C. W. ¼" or "PHONE" positions results in a reduction of voltages in the intermediate power-amplifier plate, the final power amplifier plate, and the final power amplifier screen grid circuits. After normal tune-up procedure has been performed, with switch set in this position, a power output of from 12 to 22 watts (CW) will be obtained.

(b) Setting the "POWER AND EMISSION" switch to "CAL & NET" provides suitable means for the calibration of the master oscillator and the present channels.

(c) Setting the "POWER AND EMISSION" switch to "C. W. FULL", after normal tune-up procedure, will provide a power output of from 50 to 90 watts in CW operation.

(d) Setting the "POWER AND EMISSION" switch to "PHONE", after normal tune-up procedure, will provide a power output of from 12 to 22 watts in phone operation.

Ref: Supply Letter No. 140, OCSigO, 17 July 1943.

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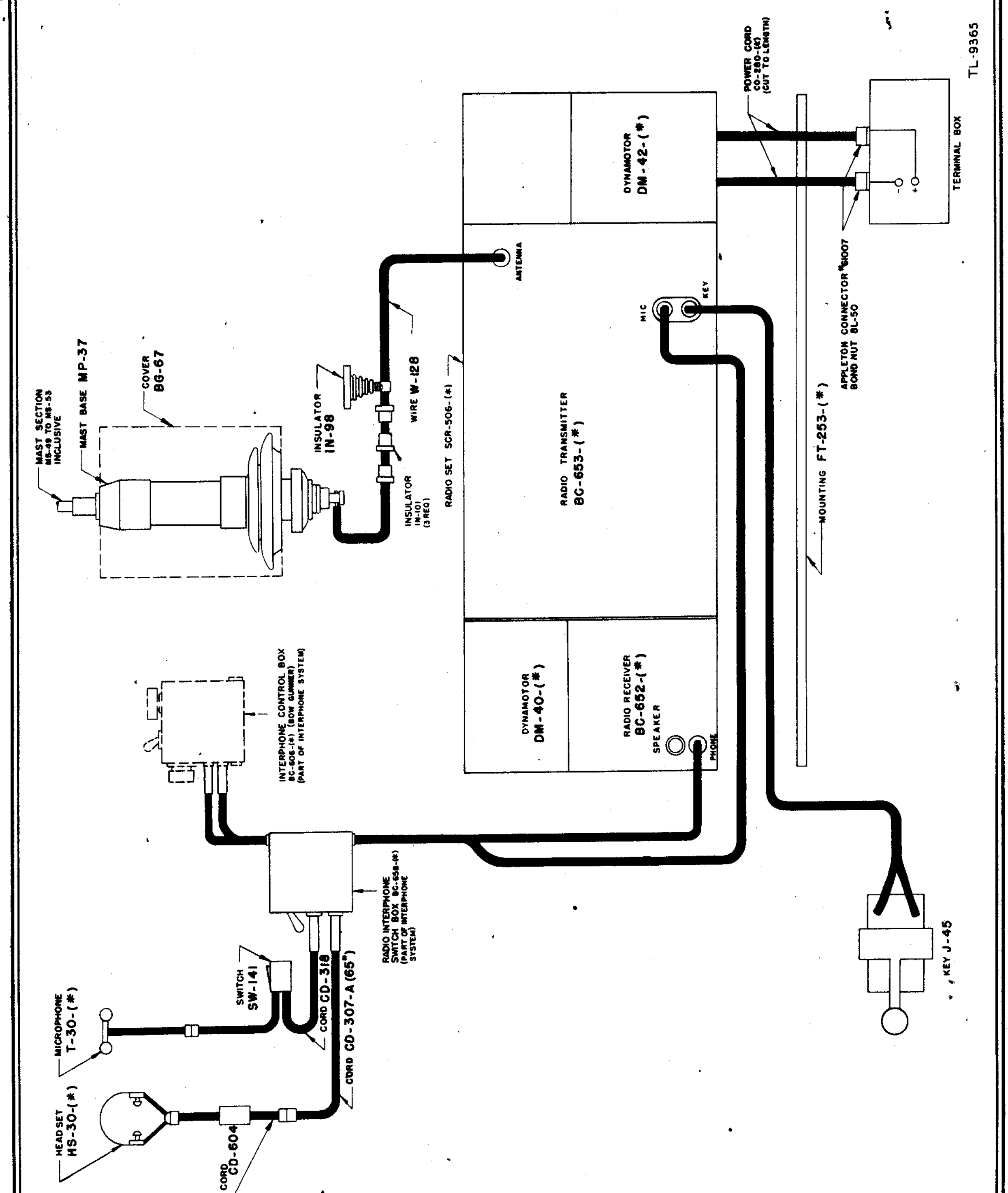
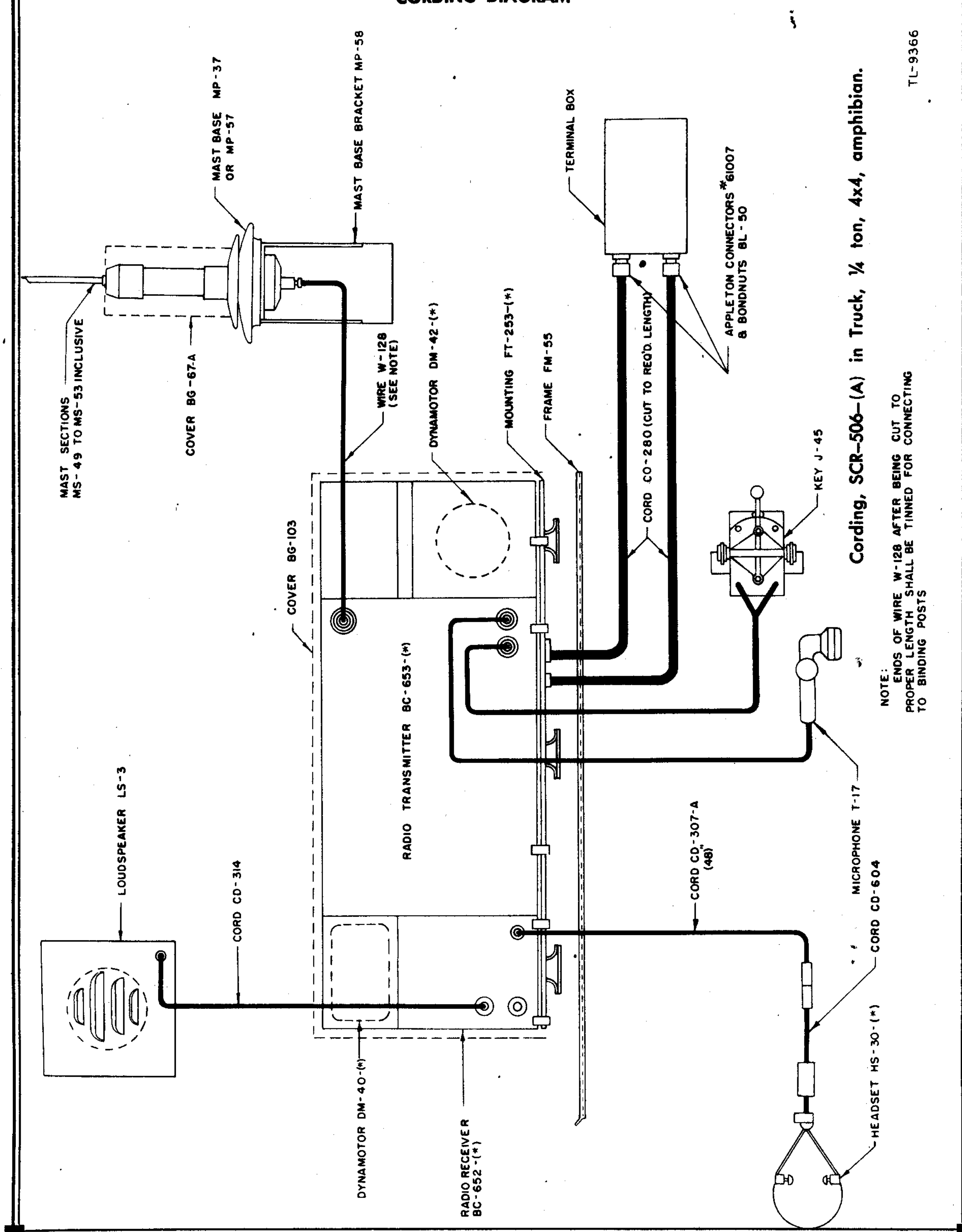
CORDING DIAGRAM



Cording, SCR-506-A in Light Tank M3A1.

CORDING DIAGRAM



Cording, SCR-506-(A) in Truck, 1/4 ton, 4x4, amphibian.

RADIO SET SCR-508-(*)

SCR-508-(*) = SCR-508-A, SCR-508-C, SCR-508-D

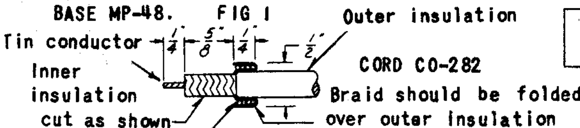
See also: BC-603-(*)
BC-604-(*)

Reference: TM 11-600

ANTENNA INSTALLATION HINTS

1. In installations where the distance between antenna and transmitter is less than 40 inches, connect an antenna lead of Wire W-128 from the TR post on the mounting to the mast base. When the top binding post on Mast Base MP-48 is used with Wire W-128 the internal lead in the mast base must be removed. Mast Base MP-37 may be used with Wire W-128.
2. Use Coaxial Cable CO-282 with Mast Base MP-48 when the antenna lead must be longer than 40 inches. The minimum and maximum permissible lengths of coaxial cable are 8 and 10 feet respectively. Mast Base MP-37 is not recommended for use with coaxial cable. The method of finishing and connecting coaxial cable is shown below.
3. When Mast Base Bracket MP-52 is used to support the mast base only two mast sections will be used. Three mast sections will be used in all other installations.
4. Disconnect regular antenna and use a phantom antenna for test and adjustments when radiation must be kept to a minimum.

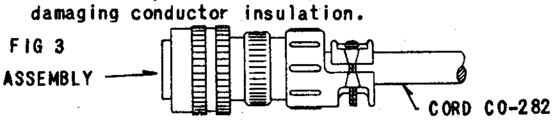
METHOD OF FINISHING ENDS OF CORDAGE CO-282 AND ASSEMBLING COAXIAL CONNECTOR FOR MAST BASE MP-48. FIG 1



Wrap 5 turns of No. 18 or No. 20 solid copper wire over braid. Fold braid back and securely solder wire to shield without damaging conductor insulation.

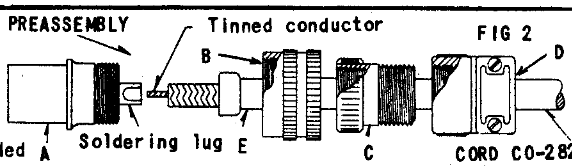
FIG 3

ASSEMBLY



Connect to adapter on MP-48, internal conductor in place.

PREASSEMBLY FIG 2



1. Prepare cordage as shown in figure 1.
2. Slide D, C, & B over cordage E, then solder conductor to lug on A.
3. Hold A firmly. Screw C to A, then D to C. Finally fasten clamp D over prepared braid. Do not crush braid when fastening clamp D.
4. Finish transmitter end as in figure 1 but leave free end of No. 18 or No. 20 wire long enough for connection to ground wire.

5. The ground connection for the set is normally through the contact between the mounting and the frame of the vehicle in which the set is used. Check that the contact is firm and secure.
6. Where there is no direct contact between the mounting and the vehicle frame, complete the connection with grounding straps, leaving sufficient slack to permit free movement of the unit in the shock mounting.
7. When coaxial cable is used for the antenna lead, ground the cable sheath securely at each end. Mast Base MP-48 provides effective grounding of cable sheath at outer end.

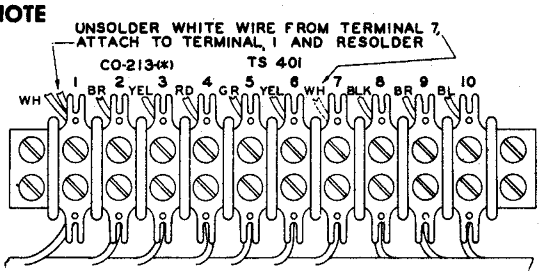
FINAL CHECK

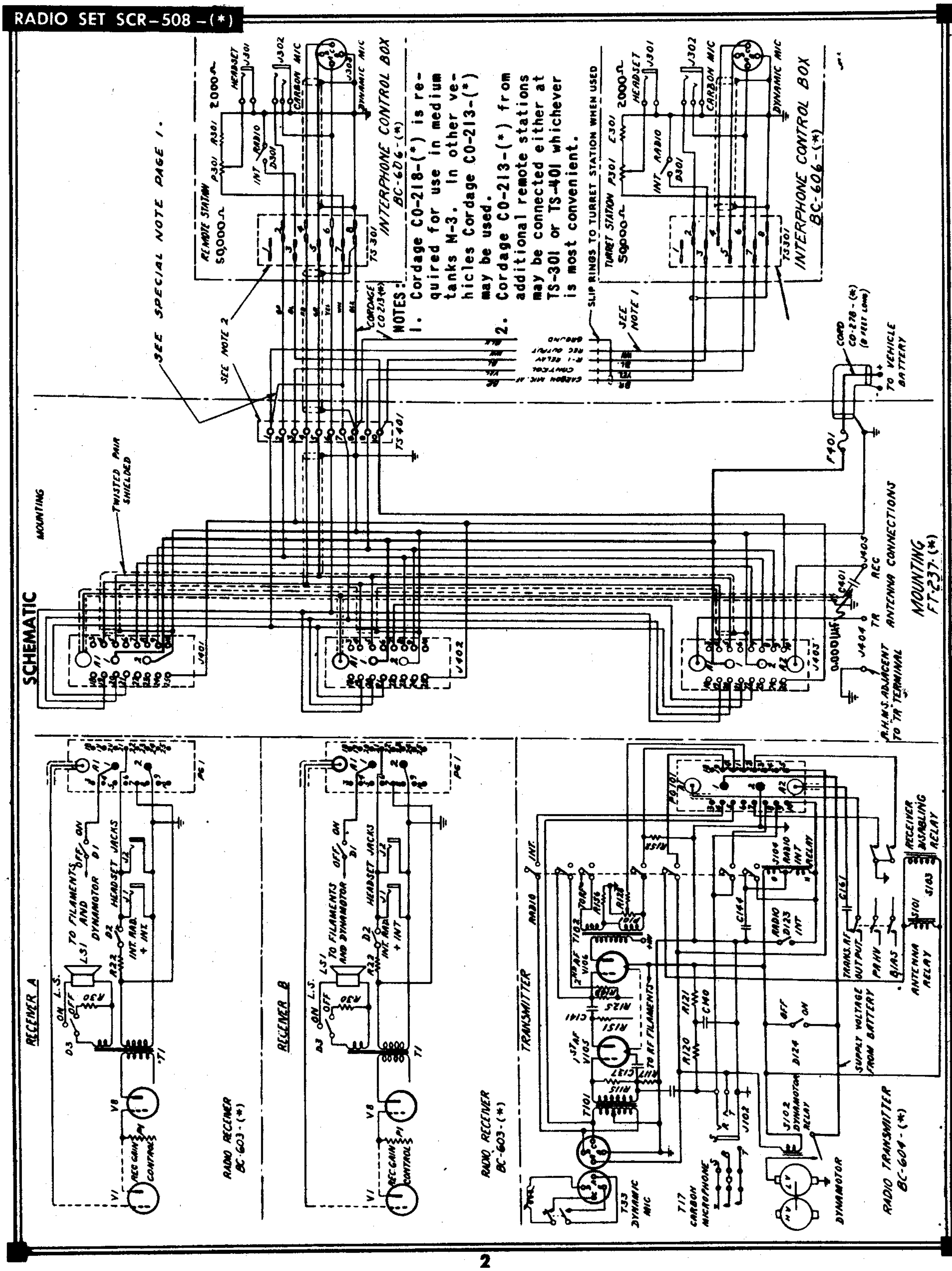
1. Check that dynamotors of correct voltage rating are installed in receiver and transmitter and that name plate on front of mounting shows correct operating voltage.
2. Inspect all ground straps, if used, and all bolted connections in ground circuit. Tighten or resolder any doubtful connections.
3. Plug a microphone and a headset into their respective jacks on the front panel of receiver and transmitter.
4. Throw the TUNE-OPERATE switches to OPERATE, the ON-OFF switches to ON, RADIO-INT sw to INT, and RADIO & INT-INT ONLY sw to RADIO & INT.
5. Press the microphone sw and speak into the microphone. The speech should be heard in either receiver headset.
6. Plug a microphone into jack J-302 and a headset into jack J-301 on a Control Box BC-606-(*). Throw control box RADIO-INT sw to INT.
7. Start the transmitter and establish two-way communication over the interphone system.
8. Throw RADIO-INT sw to RADIO and RADIO and INT-INT ONLY sw to RADIO and INT and establish communication with another vehicle,

SPECIAL NOTE

Modification of interphone wiring as shown will be made to permit radio reception in addition to interphone communication at all remote stations. This modification will, in general, be made by third echelon units. Equipment reaching repair shop with this modification installed shall not be changed to former standards.

See General Maintenance Letter No. 29, OCSigO.




SCHEMATIC
SEE SPECIAL NOTE PAGE 1.
SEE NOTE 2
INTERPHONE CONTROL BOX BC-606-(*)
NOTES:
1. Cordage CO-218-(*) is required for use in medium tanks M-3. In other vehicles Cordage CO-213-(*) may be used.
2. Cordage CO-213-(*) from additional remote stations may be connected either at TS-301 or TS-401 whichever is most convenient.
SLIP RINGS TO TURRET STATION WHEN USED
SEE NOTE 1
TO VEHICLE BATTERY
TWISTED PAIR SHIELDED
MOUNTING
MOUNTING FT-237-(*)
ANTENNA CONNECTIONS
RECEIVER A
RECEIVER B
TRANSMITTER
RADIO RECEIVER BC-603-(*)
RADIO TRANSMITTER BC-604-(*)
DYNAMOTOR
T-17 CARBON MICROPHONE
T-33 DYNAMIC MIC
RECEIVER DISABLING RELAY
ANTENNA RELAY
SUPPLY VOLTAGE FROM BATTERY

RADIO SET SCR-509-510-(*)

SCR-509-510-(*) = SCR-509-A, 510-A and 510-B.

For additional data on SCR-509-(*) and SCR-510-(*), refer to pages covering the BC-620-(*) and PE-97-(*).

Reference: TM 11-605

ANTENNA INSTALLATION HINTS

For installation and service notes on SCR-509- and SCR-510-(*)see pages covering the SCR-609-(*) and 610-(*). The procedure and problems involved for both equipment are identical, (for electrical design differences, see data sheets covering the BC-620-A and BC-659-A) with the following exceptions:

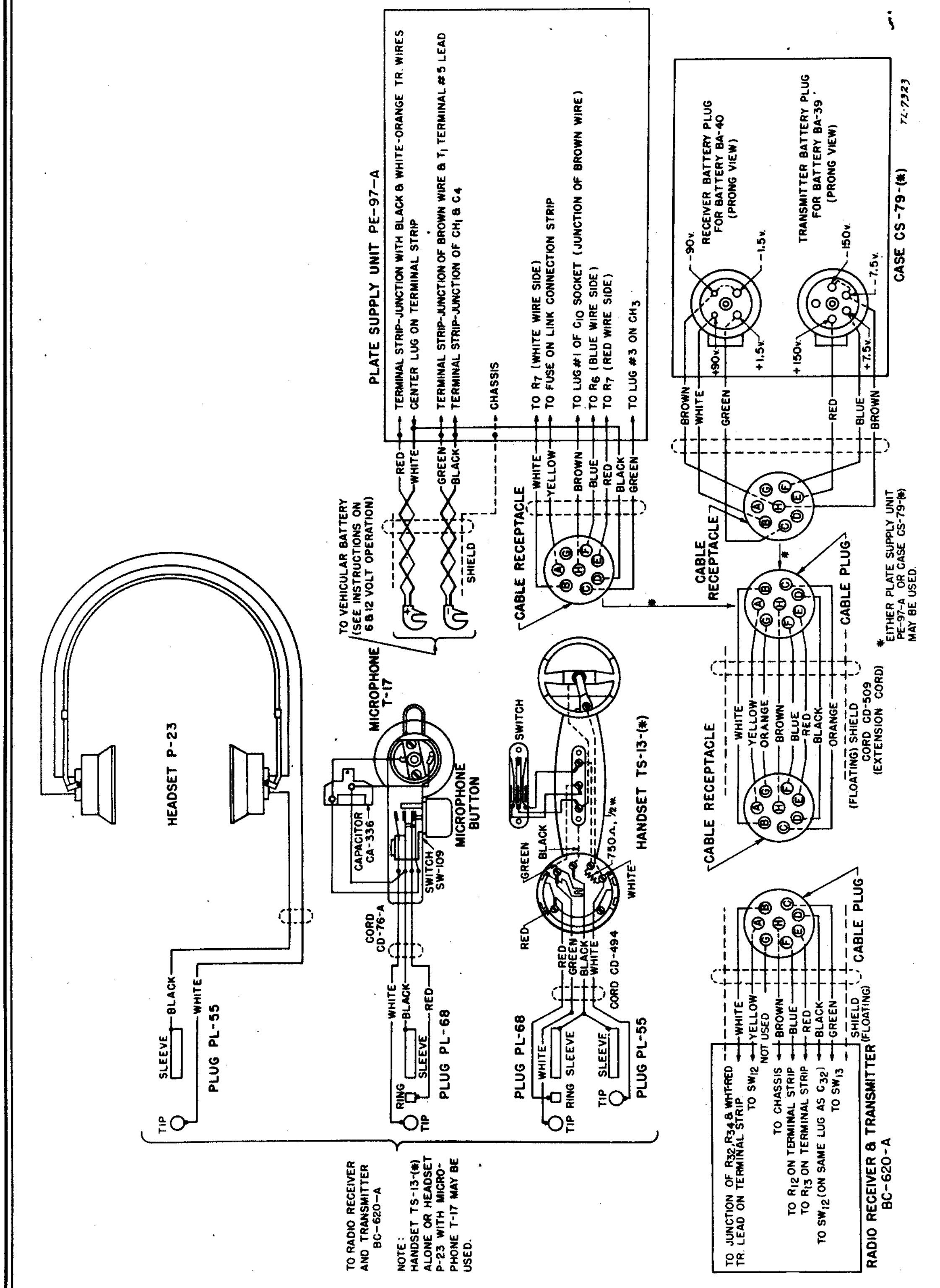
1. A *2 ft* length of W-126 wire is employed for connecting the antenna mast to the antenna terminal of the receiver-transmitter.

2. Collapsible Antenna AN-45-A is provided for use with the radio receiver and transmitter when it is being operated as a portable unit. It may be quickly screwed to the antenna terminal located on the rear of the receiver transmitter case, and is stored in Battery Case CS-79-(*) when not in use.

3. The cording diagram illustrated page 2 should be followed, when necessary, in preference to that shown in pages for SCR-609-(*) and 610-(*). The diagram below has the proper labelling and text for the SCR-509-(*) and 510-(*).

4. Only two mast sections are required for SCR-510-(*) (MS-52, MS-53, and Mast Base MP-48) instead of three as employed in the SCR-610-(*). A 24-inch (plus or minus one inch) Wire W-126 is used as the lead-in with this antenna. In installations where the lead-in requirements exceeds 24 inches (plus one inch tolerance) Coaxial Cable CD-626, Terminal Box TM-206 and Mast Base MP-48 are used *with three mast sections*.

5. In *every case where Mast Base MP-48 is used*, the inner conductor must be removed when the antenna lead-in Wire W-126 is connected to the top binding post of Mast Base MP-48. This is absolutely essential, otherwise the range of the sets will be reduced to about 50 percent of the normal working range.



Cording diagram, SCR-509-A and SCR-510-A.

RADIO SET SCR-528-(*)

SCR-528-(*) = SCR-528-A, SCR-528-C, SCR-528-D

See also: BC-603-(*)
BC-604-(*)

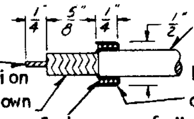
Reference:
TM 11-600

ANTENNA INSTALLATION HINTS

1. In installations where the distance between antenna and transmitter is less than 40 inches, connect an antenna lead of Wire W-128 from the TR post on the mounting to the mast base. When the top binding post on Mast Base MP-48 is used with Wire W-128 the internal lead in the mast base must be removed. Mast Base MP-37 may be used with Wire W-128.
2. Use Coaxial Cable CO-282 with Mast Base MP-48 when the antenna lead must be longer than 40 inches. The minimum and maximum permissible lengths of coaxial cable are 8 and 10 feet respectively. Mast Base MP-37 is not recommended for use with coaxial cable. The method of finishing and connecting coaxial cable is shown below.
3. When Mast Base Bracket MP-52 is used to support the mast base only two mast sections, will be used. Three mast sections will be used in all other installations.
4. Disconnect regular antenna and use a phantom antenna for test and adjustments when radiation must be kept to a minimum.

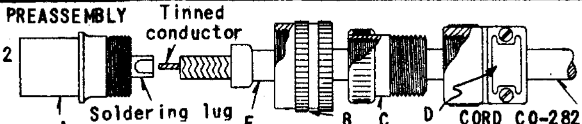
METHOD OF FINISHING ENDS OF CORDAGE CO-282 AND ASSEMBLING COAXIAL CONNECTOR FOR MAST BASE MP-48.

FIG 1



Wrap 5 turns of No. 18 or No. 20 solid copper wire over braid. Fold braid back and securely solder wire to shield without damaging conductor insulation.

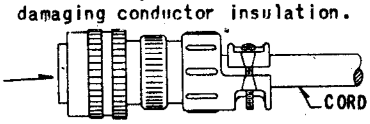
FIG 2 PREASSEMBLY



1. Prepare cordage as shown in figure 1.
2. Slide D, C, & B over cordage E, then solder conductor to lug on A.
3. Hold A firmly. Screw C to A, then D to C. Finally fasten clamp D over prepared braid. Do not crush braid when fastening clamp D.
4. Finish transmitter end as in figure 1 but leave free end of No. 18 or No. 20 wire long enough for connection to ground wire.

FIG 3

ASSEMBLY



Connect to adapter on MP-48, internal conductor in place.

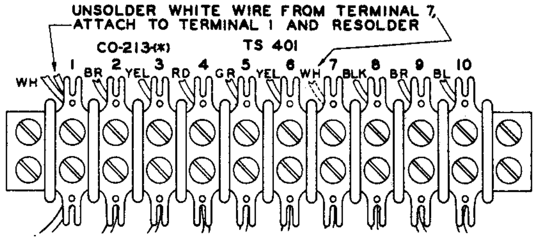
5. The ground connection for the set is normally through the contact between the mounting and the frame of the vehicle in which the set is used. Check that the contact is firm and secure.
6. Where there is no direct contact between the mounting and the vehicle frame, complete the connection with grounding straps, leaving sufficient slack to permit free movement of the unit in the shock mounting.
7. When coaxial cable is used for the antenna lead, ground the cable sheath securely at each end. Mast Base MP-48 provides effective grounding of cable sheath at outer end.

FINAL CHECK

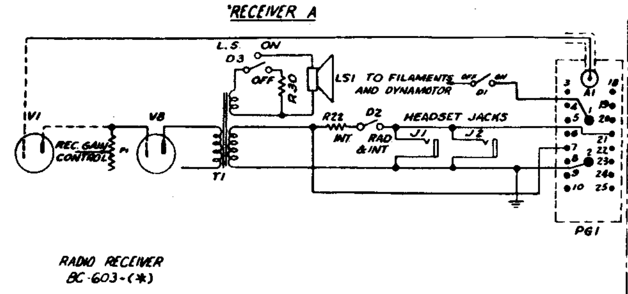
1. Check that dynamotors of correct voltage rating are installed in receiver and transmitter and that name plate on front of mounting shows correct operating voltage.
2. Inspect all ground straps, if used, and all bolted connections in ground circuit. Tighten or resolder any doubtful connections.
3. Plug a microphone and a headset into their respective jacks on the front panel of receiver and transmitter.
4. Throw the TUNE-OPERATE switches to OPERATE, the ON-OFF switches to ON, RADIO-INT sw to INT, and RADIO & INT-INT ONLY sw to RADIO & INT.
5. Press the microphone sw and speak into the microphone. The speech should be heard in either receiver headset.
6. Plug a microphone into jack J-302 and a headset into Jack J-301 on a Control Box BC-606-(*). Throw control box RADIO-INT sw to INT.
7. Start the transmitter and establish two-way communication over the interphone system.
8. Throw RADIO-INT sw to RADIO and RADIO and INT-INT ONLY sw to RADIO and INT and establish communication with another vehicle.

SPECIAL NOTE

Modification of interphone wiring as shown will be made to permit radio reception in addition to interphone communication at all remote stations. This modification will, in general, be made by third echelon units. Equipment reaching repair shop with this modification installed shall not be changed to former standards.
See General Maintenance Letter No. 29, OCSigO.

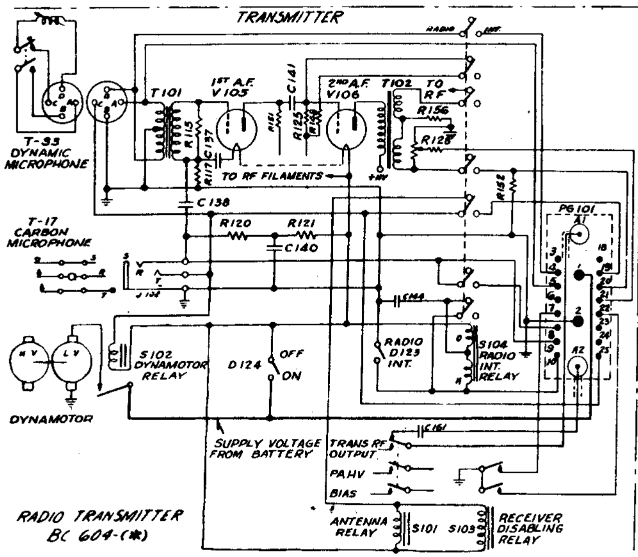


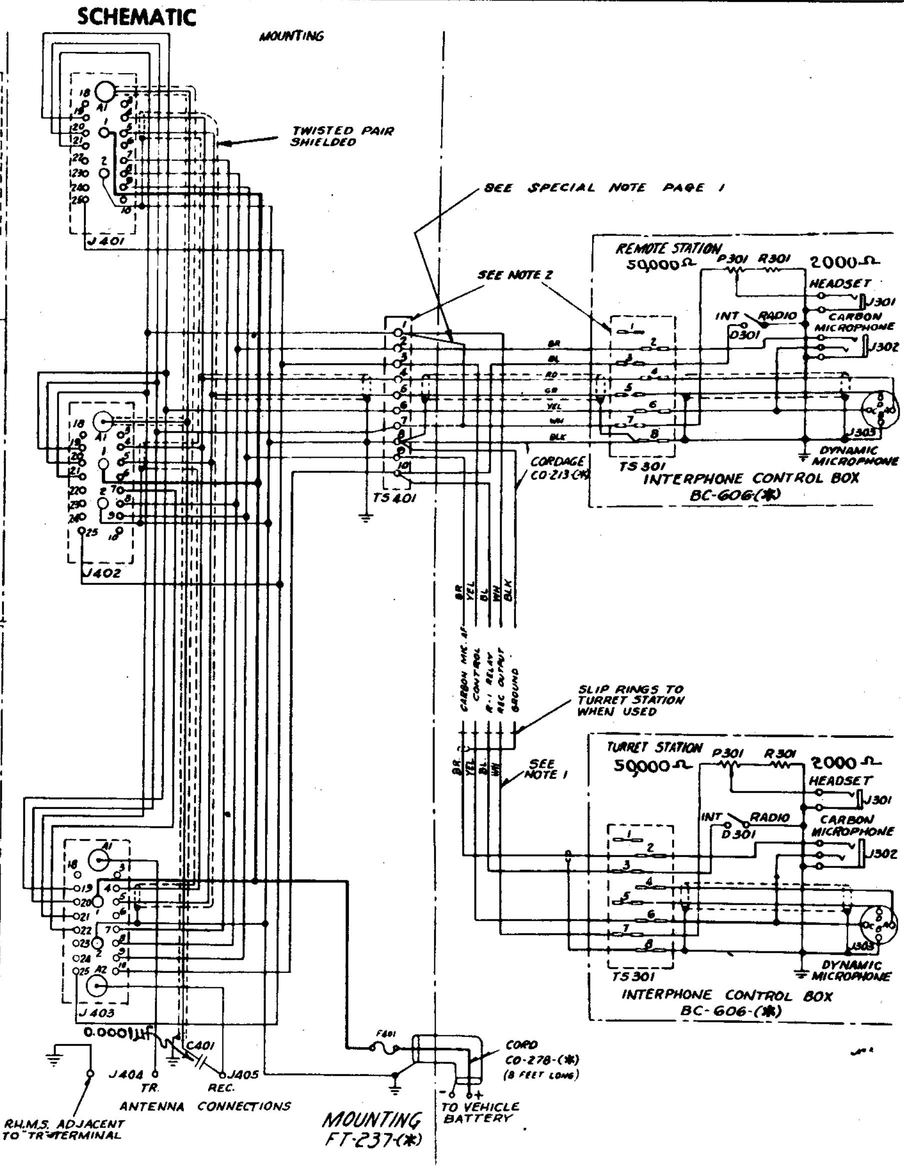
SCHEMATIC



NOTES:

1. Cordage CO-218-(*) is required for use in medium tanks M-3. In other vehicles Cordage CO 213-(*) may be used.
2. Cordage CO-213-(*) from additional remote stations may be connected either at TS-301 or TS-401 whichever is most convenient.





RADIO SET SCR-538-(*)

SCR-538-(*) = SCR-538-A, SCR-538-C, SCR-538-D

See also: BC-603-(*)
BC-605-(*)

Reference:
TM 11-600

ANTENNA INSTALLATION HINTS

1. An antenna lead of Wire W-128 is connected between the REC binding post on the mounting and the mast base in all installations. If the top binding post on Mast Base MP-48 is used, remove the internal lead which if left in place might affect the operation of the squelch and the call signal lamp.
2. The ground connection for the set is normally through the contact between the mounting and the frame of the vehicle in which it is mounted. Check that the contact is firm and secure.
3. Where there is no direct contact between the mounting and the vehicle frame, use grounding straps, leaving sufficient slack to permit free movement of the unit in the shock mounting.

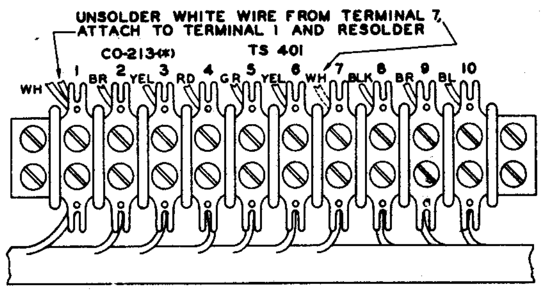
FINAL CHECK

1. Check that dynamotors of correct voltage rating are installed in receiver and amplifier and that name plate on front of mounting shows correct operating voltage.
2. Inspect all ground straps, if used, and all bolted connections in ground circuit. Tighten or resolder any doubtful connections.
3. Plug a microphone and a headset into their respective jacks on the front panel of the amplifier and receiver.
4. Throw the amplifier and receiver ON-OFF switch to ON and receiver RADIO and INT-INT ONLY sw to RADIO and INT.
5. Plug a microphone into jack J-302 and a headset into jack J-301 on a Control Box BC-606-(*) and throw RADIO-INT sw to INT.
6. Establish two-way communication over the interphone system.

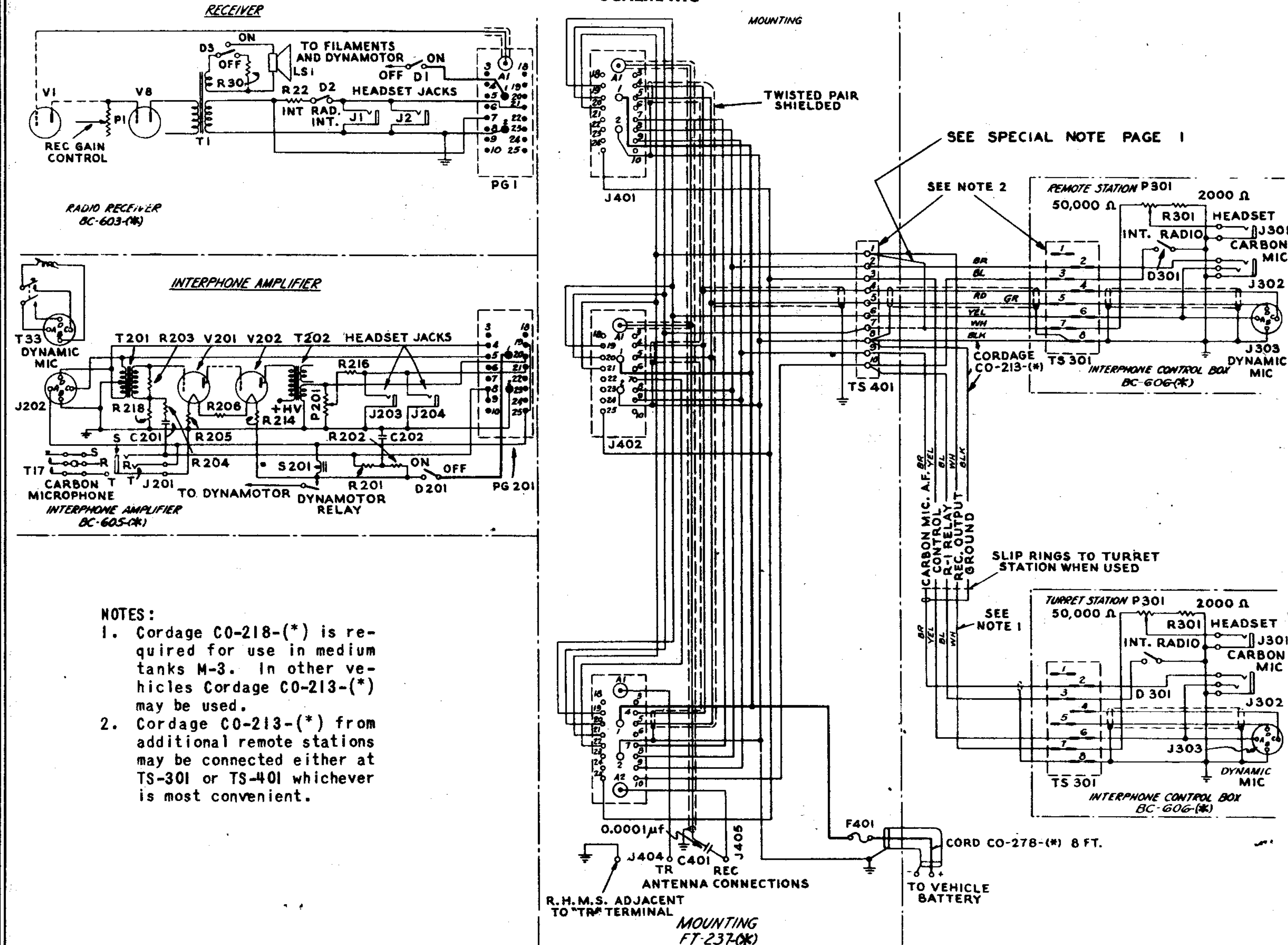
SPECIAL NOTES

Modification of interphone wiring as shown will be made to permit radio reception in addition to interphone communication at all remote stations. This modification will, in general, be made by third echelon units. Equipment reaching repair shops with this modification installed shall not be changed to former standards.

See General Maintenance Letter No. 29, OCSigO.



SCHEMATIC



NOTES:

1. Cordage CO-218-(*) is required for use in medium tanks M-3. In other vehicles Cordage CO-213-(*) may be used.
2. Cordage CO-213-(*) from additional remote stations may be connected either at TS-301 or TS-401 whichever is most convenient.

RADIO SET SCR-543-(*)

SCR-543-(*) = SCR-543-A
SCR-543-B

See also: BC-669-(*)

Reference:
TM 11-625

ANTENNA INSTALLATION HINTS

1. The antenna normally consists of five mast sections mounted on Mast Base MP-37. An additional mast section may be used to increase the range of the set. Guys GY-11 and GY-12 must be used to support the antenna when six mast sections are used. Wire W-128 is used between the mast base and antenna post of the set.
2. In field installations Mast Base MP-37 is supported on Mast Base Bracket MP-50 which is fastened to the side of Chest CH-33-(*). Counterpoise CP-15-(*) connected to the ground post of the set is used to complete the antenna system.
3. In vehicular installations the mast base bracket is fastened on the side of the vehicle body. The antenna lead of Wire W-128 must not rest on metal parts of the vehicle. Make the ground connection directly to the vehicle frame with Wire W-128.

CORDING

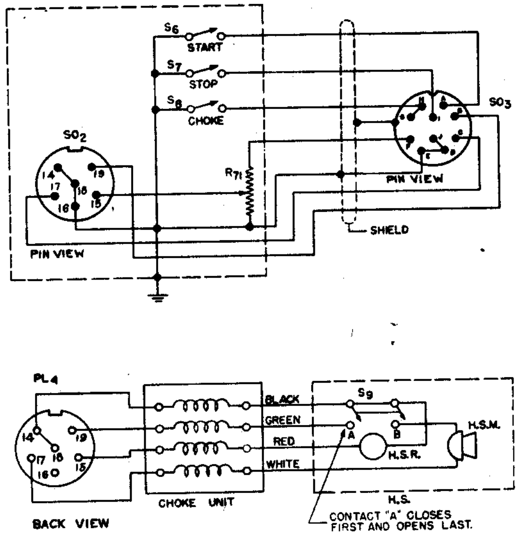
1. In field installations where it is essential that noise be kept to a minimum, Power Unit PE-108-(*) may be installed at a greater distance from the operating position by inserting Cord CD-514-(*) in series with Cord CD-512-(*) and the power unit.
2. Additional distance between operating position and power unit may be secured by inserting Cord CD-513-(*) between the cord attached to Remote Control Unit RM-21-(*) and Receptacle PL_3 on the receiver and transmitter. See cording diagram.

OPERATING PRECAUTIONS

1. Change oil in Power Unit PE-108-(*) after every 48 hours of operation. Approximately 1-3/4 pints are required. To change oil, stop the power unit and proceed as follows:
   a. Place a tray under oil drain located beneath gasoline storage tank.
   b. Remove oil filler and drain plugs, allow oil to drain out completely and replace drain plug.
   c. Using a funnel, pour in oil through filler hole until it overflows, using the proper grade of OE (engine oil) as indicated.
      (1) S.A.E. No. 30 for warm weather, 32° F up
      (2) S.A.E. No. 10 for cold weather, below 32° F.
   d. Replace filler plug and check that drain plug is tightly screwed in place.
2. Keep power unit clean by wiping accumulated oil and foreign matter off the surface of the engine and base.
3. In case of exposure to rain, replace and latch the covers on Chest CH-132-(*) and CH-133-(*) and bring out the cords through the openings provided.
4. In event that radio-frequency potentials should appear on Remote Control Unit RM-21-(*) when Cord CD-513-(*) is used, connect the unit to ground with shortest wire possible.

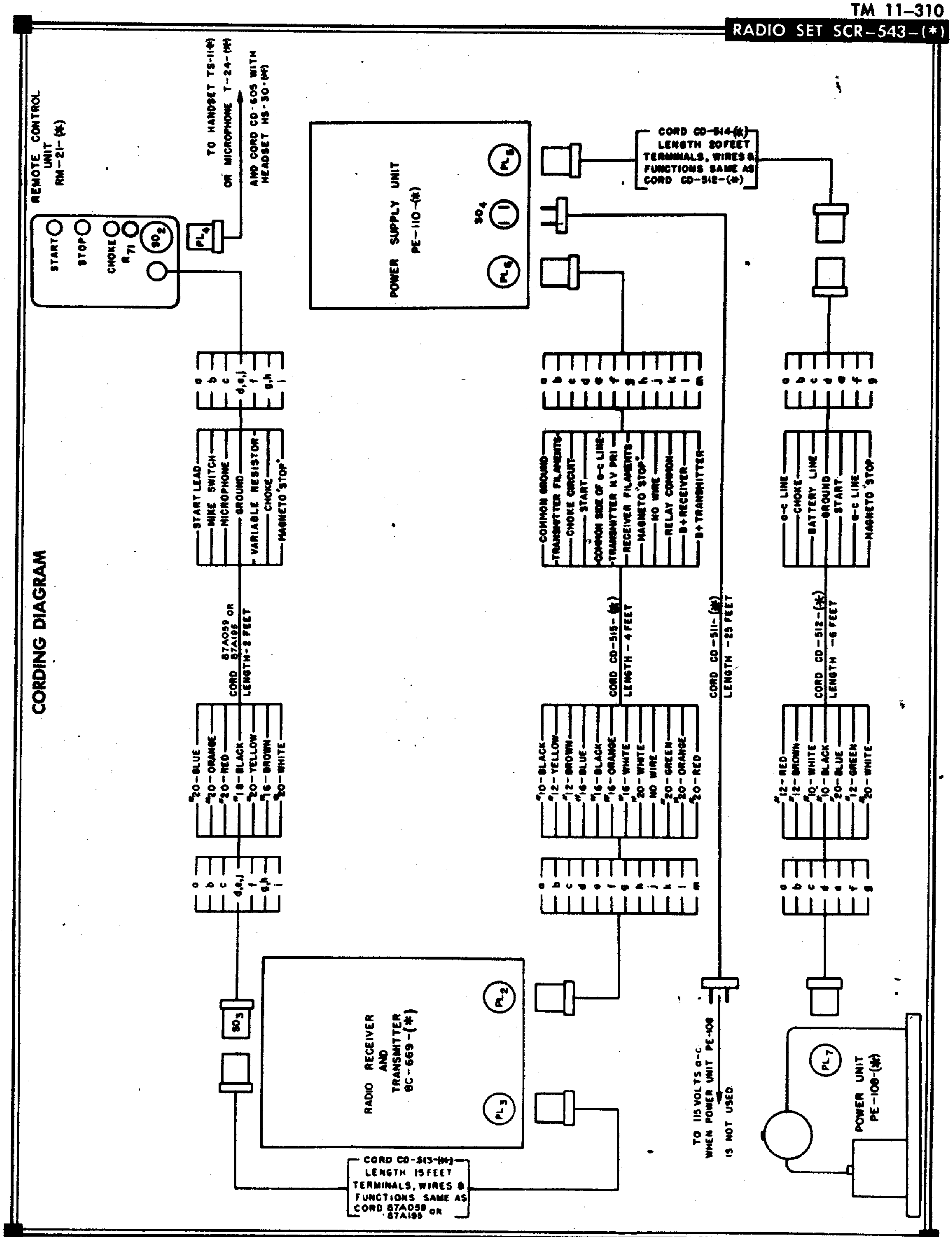
FINAL CHECK

1. Unlatch and lift top covers of transmitter and receiver chest and cabinet.
2. Check that all tubes and crystal holders are firmly seated in their sockets and that plate leads to Tubes VT-100 are in place.
3. Close top covers and see that all cord connections are tight.
4. If mounted in a vehicle, make sure that all components are securely well fastened so that they will not jar out of place or be damaged.



REMOTE CONTROL UNIT RM-21-(*)
SCHEMATIC DIAGRAM

CORDING DIAGRAM



RADIO SET SCR-608-(*)

SCR-608-(*) = SCR-608-A

See also: BC-683-(*)
BC-684-(*)

Reference:
TM 11-620

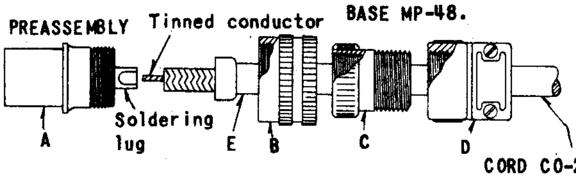
ANTENNA INSTALLATION HINTS

1. An antenna lead of Wire W-128 is connected between the TR post on the mounting and the mast base in installations in which the distance between the antenna and transmitter is less than 40 inches. The internal lead must be removed from Mast Base MP-48 when Wire W-128 is connected to the top binding post of the mast base. Mast Base MP-37 may be used with an antenna lead of Wire W-128.
2. In installations where the antenna lead is more than 40 inches long, use Coaxial Cable CO-282 connected to Mast Base MP-48 with a coaxial cable fitting. The minimum and maximum permissible lengths of coaxial cable are 6 and 8 feet respectively. Mast Base MP-37 is not recommended for use with coaxial cable. The method of finishing and connecting coaxial cable is shown below.
3. Three mast sections are to be used in all installations, except those using Mast Base Bracket MP-52. Only two mast sections are to be used with Mast Base Bracket MP-52.
4. Disconnect the normal antenna lead from the set and connect Phantom Antenna A-83-(*) between the TR post and frame of set for tests and adjustments when radiation must be kept to a minimum. Connect an antenna before operating. See General Maintenance Letter No. 37

METHOD OF FINISHING ENDS OF CORDAGE CO-282 AND ASSEMBLING COAXIAL CONNECTOR FOR MAST BASE MP-48.

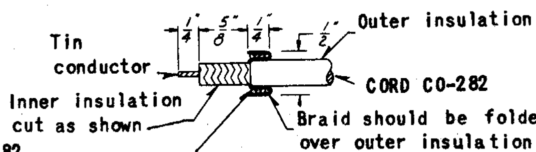
FIG 2

PREASSEMBLY



1. Prepare cordage as shown in figure 1.
2. Slide D, C, & B over cordage E, then solder conductor to lug on A.
3. Hold A firmly. Screw C to A, then D to C. Finally fasten clamp D over prepared braid. Do not crush braid when fastening clamp D.
4. Finish transmitter end as in figure 1 but leave free end of No. 18 or No. 20 wire long enough for connection to ground wire.

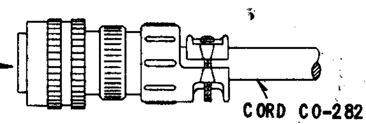
FIG. 1



Wrap 5 turns of No. 18 or No. 20 solid copper wire over braid. Fold braid back and securely solder wire to shield without damaging conductor insulation.

FIG. 3

ASSEMBLY

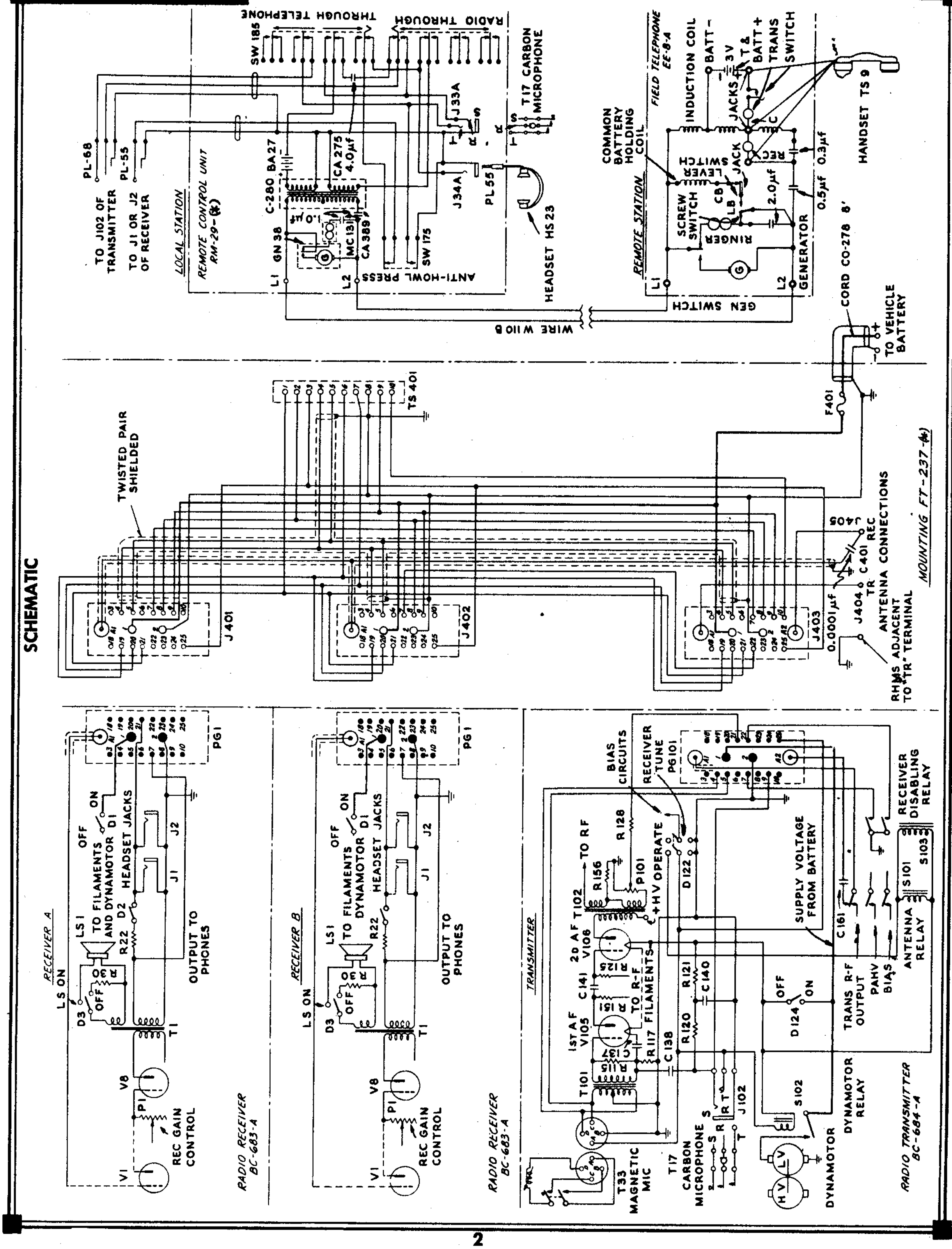


Connect to adapter on MP-48, internal conductor in place.

5. Normally, the ground connection for the set is through the contact between the mounting and the frame of the vehicle in which the set is used. Make sure that this connection is firm and secure.
6. Where there is no direct contact between the mounting and the vehicle frame, connect them together with grounding straps, leaving sufficient slack to permit free movement of the unit in the shock mounting.
7. When coaxial cable is used for antenna lead, ground the cable sheath securely at each end. Mast Base MP-48 provides effective grounding of cable sheath at outer end.

FINAL CHECK

1. Before applying power to the set, check that dynamotors of correct voltage rating are installed in the receiver and transmitter, and that name plate on front of the mounting shows correct operating voltage. Reverse the plate if necessary.
2. Inspect all ground straps and bolted connections in the ground circuit and tighten or resolder any doubtful connection.
3. Plug a microphone into the jack on transmitter panel and a headset into the jack on the receiver panel.
4. Throw the OPERATE-TUNE switches to OPERATE, the ON-OFF switches to ON, and OUTPUT TO PHONES sw ON.
5. Depress microphone switch and establish two-way communication with another vehicle if practical.
6. If remote control unit is to be used, plug its cords into their respective jacks on transmitter and receiver. Establish two-way communication with another vehicle from a remote station.


SCHEMATIC
RECEIVER A
RECEIVER B
TRANSMITTER
RADIO RECEIVER BC-683-A
RADIO TRANSMITTER BC-684-A
MOUNTING FT-237-(*)
LOCAL STATION
REMOTE CONTROL UNIT RM-29-(*)
REMOTE STATION
FIELD TELEPHONE EE-8-A
TWISTED PAIR SHIELDED
HEADSET HS 23
HANDSET TS 9
WIRE W110B
TO VEHICLE BATTERY
CORD CO-278 8'
ANTENNA CONNECTIONS
SUPPLY VOLTAGE FROM BATTERY
DYNAMOTOR RELAY
ANTENNA RELAY
RECEIVER DISABLING RELAY
T17 CARBON MICROPHONE
T33 MAGNETIC MIC
REC GAIN CONTROL
OUTPUT TO PHONES
HEADSET JACKS

RADIO SET SCR-609-610-A

For additional data on SCR-609-(*) and SCR-610-(*), refer to pages covering the BC-659-(*) and PE-117-(*).

Reference: TM 11-615

ANTENNA INSTALLATION HINTS

1. When operating the radio receiver and transmitter as a portable unit, collapsible Antenna AN-29-C may be quickly screwed to the antenna terminal located on the rear of receiver transmitter case. See fig. 1.

2. For vehicular service, use mast type antenna consisting of Mast Section MS-53 screwed into Mast Base MP-48, and Mast Section MS-52 into the top of MS-53, followed by MS-51. The connecting wire, W-126, from the antenna mast to the antenna terminal of the radio set, should be *three feet*, ± one inch. ***SEE FIG. 4***

3. Do not tie down antenna - keep it vertical. Signal strength will be reduced if antenna is tied down in a horizontal or inclined position.

4. In emergencies, it may be necessary to substitute a wire antenna for the mast. This is accomplished by looping the uninsulated end of the wire around the antenna terminal between the knurled nut and the square portion of the terminal (see fig. 2). *A 27 foot length of insulated wire should be used for this* purpose (making a full-wave antenna, which also matches the antenna network).

5. When the lead-in requirements from the three mast sections, employed with SCR-610-(*), is greater than 36 inches (plus the one inch tolerance), Mast Base MP-48, Coaxial Cable CO-282, and Terminal Box TM-210 are used. In this case, the minimum and maximum lengths permissable of Cable CO-282 are 4 and 9 feet respectively.

6. When installation is made in the vehicle, use Connector and Bondnut, as shown in figure 3, to bring battery lead from Plate Supply Unit PE-117-C through metal wall.

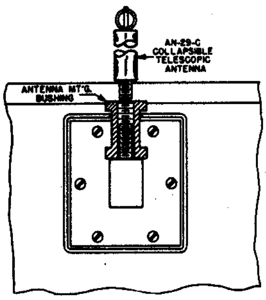


Fig. 1.—Rear view, showing Antenna AN-29-C in position.

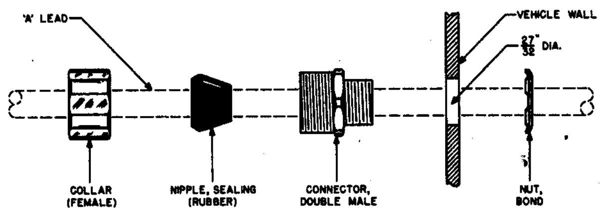


Fig. 3.—Connector and bond nut, installation detail.

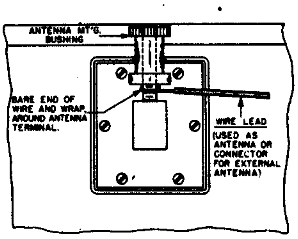


Fig. 2.—Radio Receiver and Transmitter BC-659-A, antenna terminal connections.

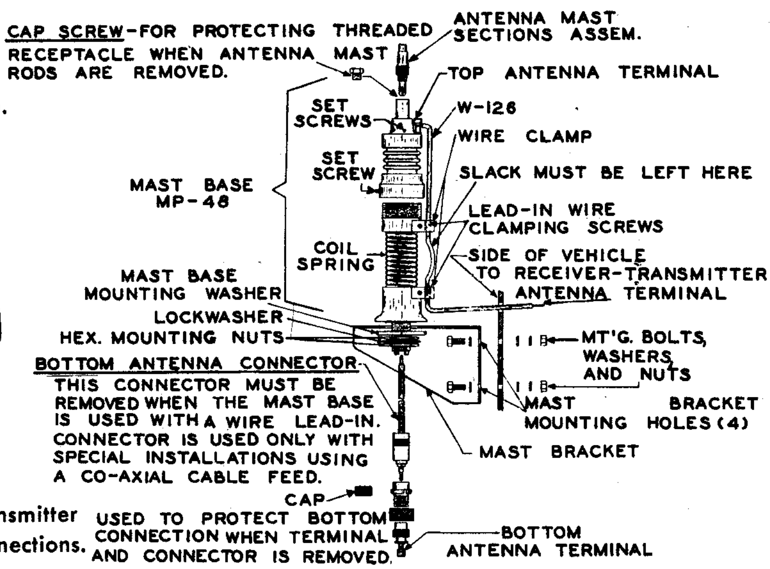


Fig. 4.—Vehicular antenna assembly.

COMMON FAULTS AND CORRECTIVE MEASURES

1. The plug connectors on Cord CD-509 (used to connect transmitter-receiver and Plate Supply PE-117-C when mounted apart. Issued with SCR-610-A only) sometimes develop a short at the inside terminals when exposed to moisture or excessive humidity. It is advisable to wrap rubber tape over each complete connector, to prevent this possibility.

2. Waterproof covers which encase Radio Receiver and Transmitter BC-659 of SCR-609-(*) and SCR-610-(*), and which are *not removed* when equipment is in operation, are available on requisition. Specify, "Cover BG-153, Stock No. 2Z3400-153". (Ref: Supply Letter No. 179, June 1, 1943).

MAINTENANCE HINTS

1. Figure 5 illustrates how Batteries BA-39 and BA-40, contained in Case CS-79-(*), are held securely in place with straps. In addition, space is provided for carrying the handset, alignment tool, antenna, and coil of insulated wire for use as antenna.

2. Mounting FT-250-A (Part of SCR-510-(*) and SCR-610-(*)) has two weak points at which fractures may occur and therefore require welding. For detailed instructions, refer to General Maintenance Letter No. 48, issued by OCSigO, 7 August 1943.

3. When reinstalling equipment, after repairs have been performed, *make sure that the voltage change-over links are set for the voltage of the vehicular battery.* If a 12-volt battery is used with a power unit with the links set for 6-volts, damage is sure to result. Refer to pages covering the PE-117- C , for link connections for 6-or 12-volt operation.

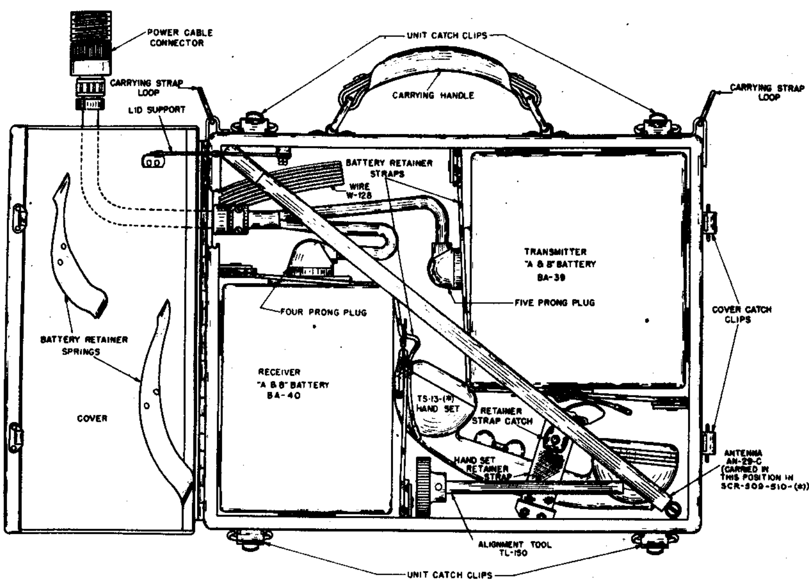


Figure 5.—Case CS-79-(*), layout.

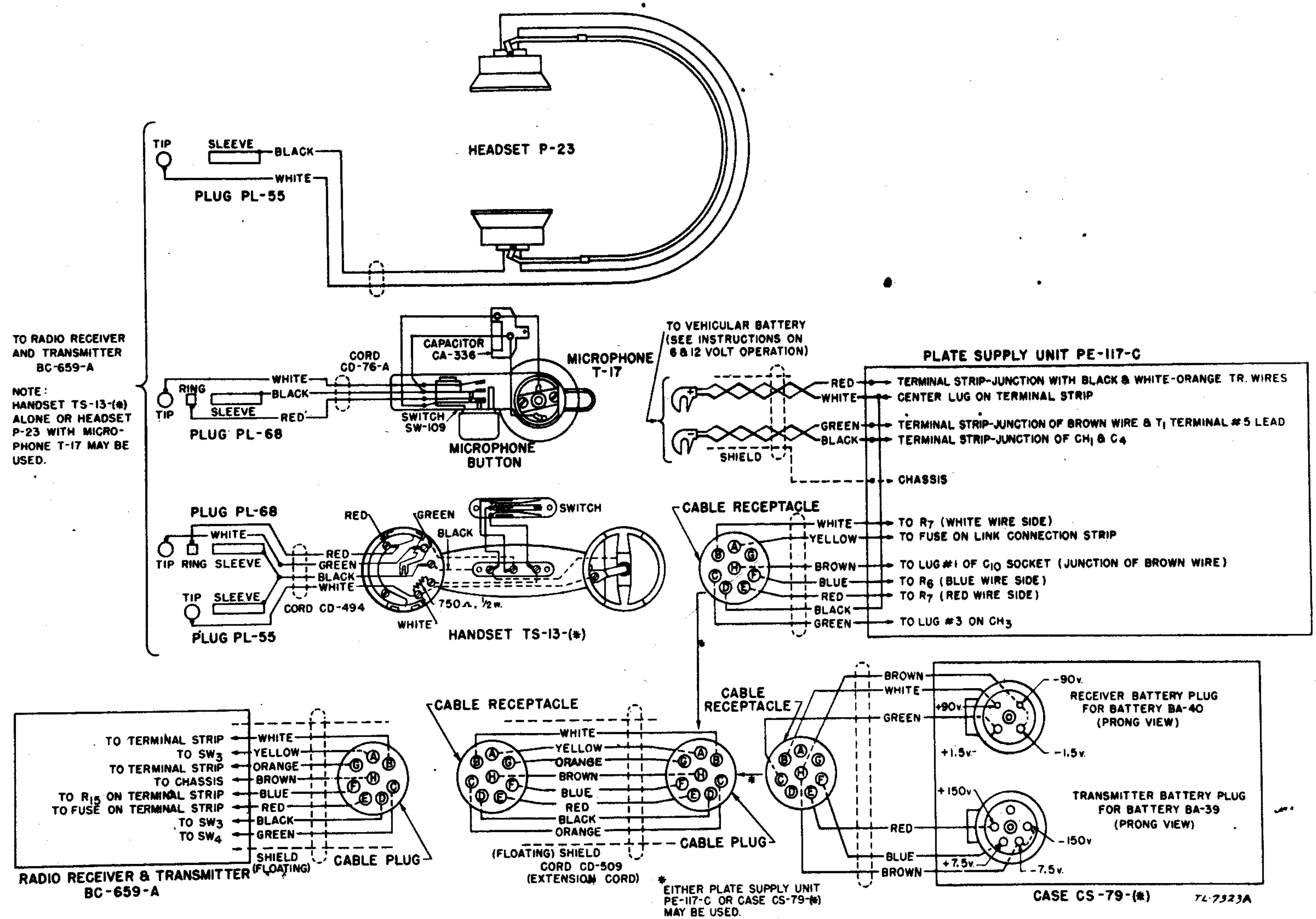


Fig. 6.—Cording diagram, SCR-609-A and SCR-610-A.

RADIO SET SCR-628-(*)

SCR-628-(*) = SCR-628-A

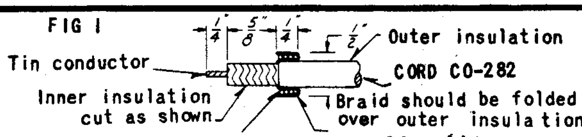
See also: BC-683-(*)
BC-684-(*)

Reference:
TM 11-620

ANTENNA INSTALLATION HINTS

1. An antenna lead of Wire W-128 is connected between the TR post on the mounting and the mast base in installations in which the distance between the antenna and transmitter is less than 40 inches. The internal lead must be removed from Mast Base MP-48 when Wire W-128 is connected to the top binding post of the mast base. Mast Base MP-37 may be used with an antenna lead of Wire W-128.
2. In installations where the antenna lead is more than 40 inches long, use Coaxial Cable CO-282 connected to Mast Base MP-48 with a coaxial cable fitting. The minimum and maximum permissible lengths of coaxial cable are 6 and 8 feet respectively. Mast Base MP-37 is not recommended for use with coaxial cable. The method of finishing and connecting coaxial cable is shown below.
3. Three mast sections are to be used in all installations, except those using Mast Base Bracket MP-52. Only two mast sections are to be used with Mast Base Bracket MP-52.
4. Disconnect the normal antenna lead from the set and connect Phantom Antenna A-83-(*) between the TR post and frame of set for tests and adjustments when radiation must be kept to a minimum. Connect an antenna before operating. See General Maintenance Letter No. 37

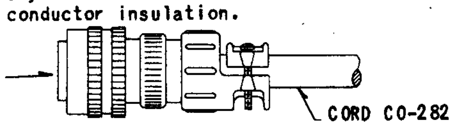
FIG 1



Wrap 5 turns of No. 18 or No. 20 solid copper wire over braid. Fold braid back and securely solder wire to shield without damaging conductor insulation.

FIG 3

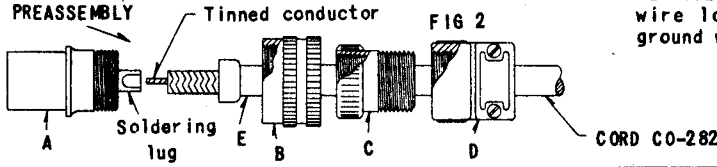
ASSEMBLY



Connect to adapter on MP-48, internal conductor in place.

PREASSEMBLY

FIG 2



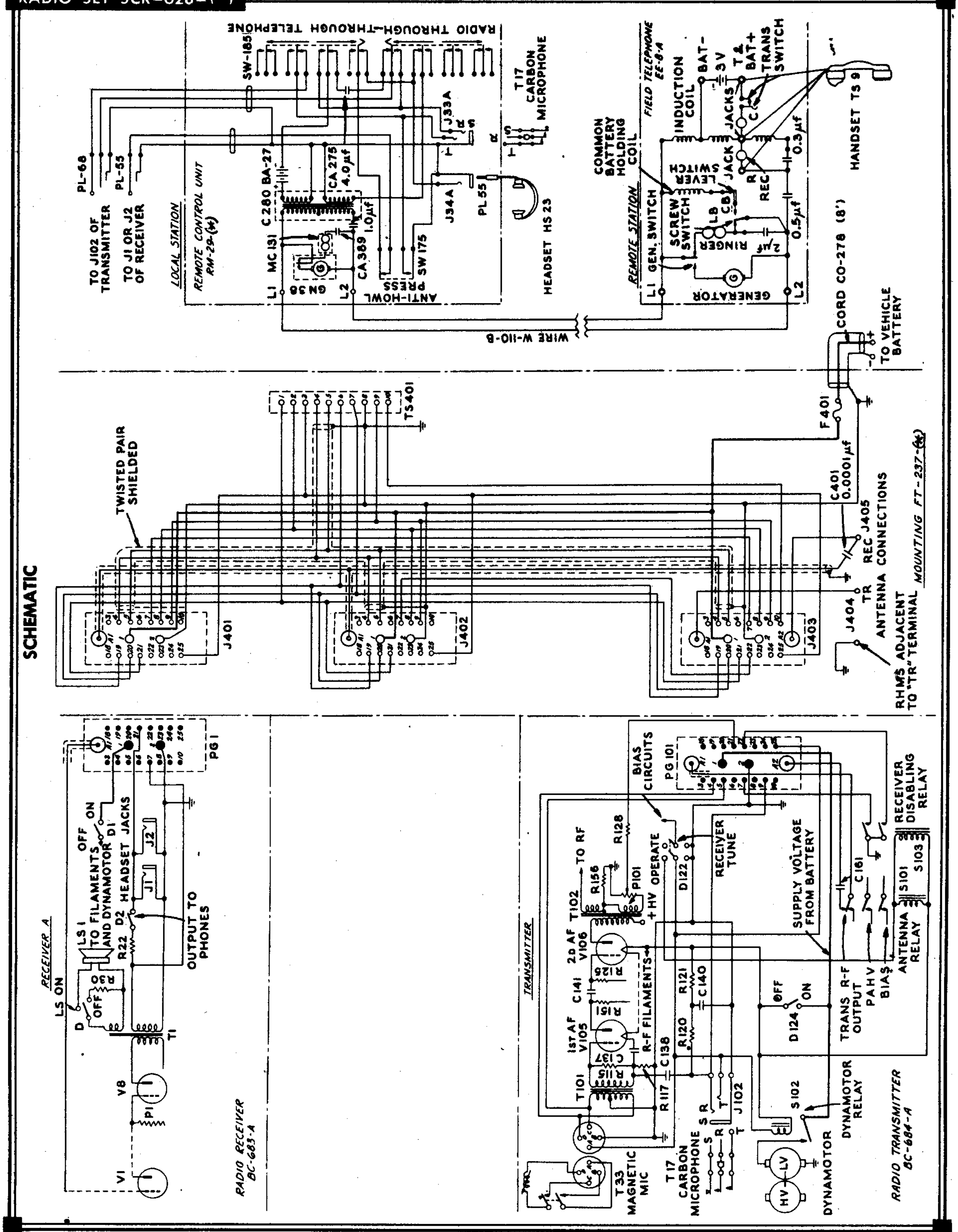
METHOD OF FINISHING ENDS OF CORDAGE CO-282 AND ASSEMBLING COAXIAL CONNECTOR FOR MAST BASE MP-48.

1. Prepare cordage as shown in figure 1.
2. Slide D, C, & B over cordage E, then solder conductor to lug on A.
3. Hold A firmly. Screw C to A, then D to C. Finally fasten clamp D over prepared braid. Do not crush braid when fastening clamp D.
4. Finish transmitter end as in figure 1 but leave free end of No. 18 or No. 20 wire long enough for connection to ground wire.

5. Normally, the ground connection for the set is through the contact between the mounting and the frame of the vehicle in which the set is used. Make sure that this connection is firm and secure.
6. Where there is no direct contact between the mounting and the vehicle frame, connect them together with grounding straps, leaving sufficient slack to permit free movement of the unit in the shock mounting.
7. When coaxial cable is used for antenna lead, ground the cable sheath securely at each end. Mast Base MP-48 provides effective grounding of cable sheath at outer end.

FINAL CHECK

1. Before applying power to the set, check that dynamotors of correct voltage rating are installed in the receiver and transmitter, and that name plate on front of the mounting shows correct operating voltage. Reverse the plate if necessary.
2. Inspect all ground straps and bolted connections in the ground circuit and tighten or resolder any doubtful connection.
3. Plug a microphone into the jack on transmitter panel and a headset into the jack on the receiver panel.
4. Throw the OPERATE-TUNE switches to OPERATE, the ON-OFF switches to ON, and OUTPUT TO PHONES sw ON.
5. Depress microphone switch and establish two-way communication with another vehicle if practical.
6. If remote control unit is to be used, plug its cords into their respective jacks on transmitter and receiver. Establish two-way communication with another vehicle from a remote station.


SCHEMATIC
RADIO RECEIVER BC-683-A
RECEIVER A
LS ON
OFF
ON
LS1 TO FILAMENTS AND DYNAMOTOR
D2 HEADSET JACKS
OUTPUT TO PHONES
PG1
TRANSMITTER
RADIO TRANSMITTER BC-684-A
T33 MAGNETIC MIC
T17 CARBON MICROPHONE
DYNAMOTOR
DYNAMOTOR RELAY
TRANS R-F OUTPUT
PAHV
BIAS
ANTENNA RELAY
RECEIVER DISABLING RELAY
SUPPLY VOLTAGE FROM BATTERY
RECEIVER TUNE
OPERATE
BIAS CIRCUITS
TO RF
+HV
R-F FILAMENTS
1ST AF V105
2D AF V106
PG101
TWISTED PAIR SHIELDED
J401
J402
J403
TS401
J404
ANTENNA TR
REC J405 CONNECTIONS
C401 0.0001µf
F401
RHMS ADJACENT TO "TR" TERMINAL
MOUNTING FT-237-(*)
TO VEHICLE BATTERY
CORD CO-278 (8')
WIRE W-110-B
TO J102 OF TRANSMITTER
TO J1 OR J2 OF RECEIVER
PL-68
PL-55
LOCAL STATION
REMOTE CONTROL UNIT RM-29-(*)
RADIO THROUGH-THROUGH TELEPHONE
SW-185
T17 CARBON MICROPHONE
HEADSET HS 23
ANTI-HOWL PRESS
REMOTE STATION
FIELD TELEPHONE EE-8-A
COMMON BATTERY HOLDING COIL
INDUCTION COIL
GENERATOR
RINGER
HANDSET TS 9

RADIO SET SCR-808-(*)

SCR-808-(*) = SCR-808-A

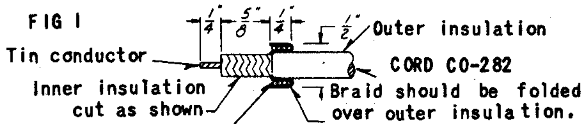
See also: BC-923-(*)
BC-924-(*)

Reference:
TM 11-601

ANTENNA INSTALLATION HINTS

1. In installations in which the distance between the transmitter and antenna is less than 40 inches, use an antenna lead of Wire W-128 connected to the top binding post on Mast Base MP-48. The internal lead to Mast Base MP-48 must be removed whenever top binding post is used. Mast Base MP-37 may also be used with Wire W-128.
2. Use Coaxial Cable CO-282 with Mast Base MP-48 when the antenna lead must be longer than 40 inches. The minimum and maximum permissible lengths of coaxial cable are 6 and 8 feet respectively. Mast Base MP-37 is not recommended for use with coaxial cable. The method of finishing and connecting coaxial cable is shown below.
3. When Mast Base Bracket MP-52 is used to support the mast base only two mast sections will be used. Three mast sections will be used in other installations.
4. Disconnect the normal antenna lead from the set and connect Phantom Antenna A-83-(*) between the TR post and ground for tests and adjustments when radiation must be kept to a minimum.

FIG 1



Wrap 5 turns of No. 18 or No. 20 solid copper wire over braid. Fold braid back and securely solder wire to shield without damaging conductor insulation.

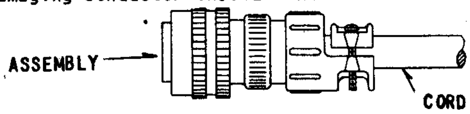


FIG 3

Connect to adapter on MP-48, internal conductor in place.

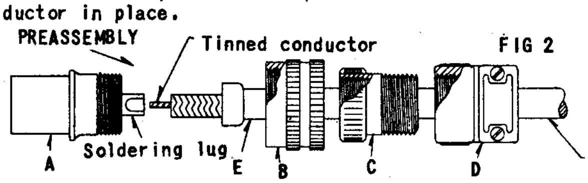


FIG 2

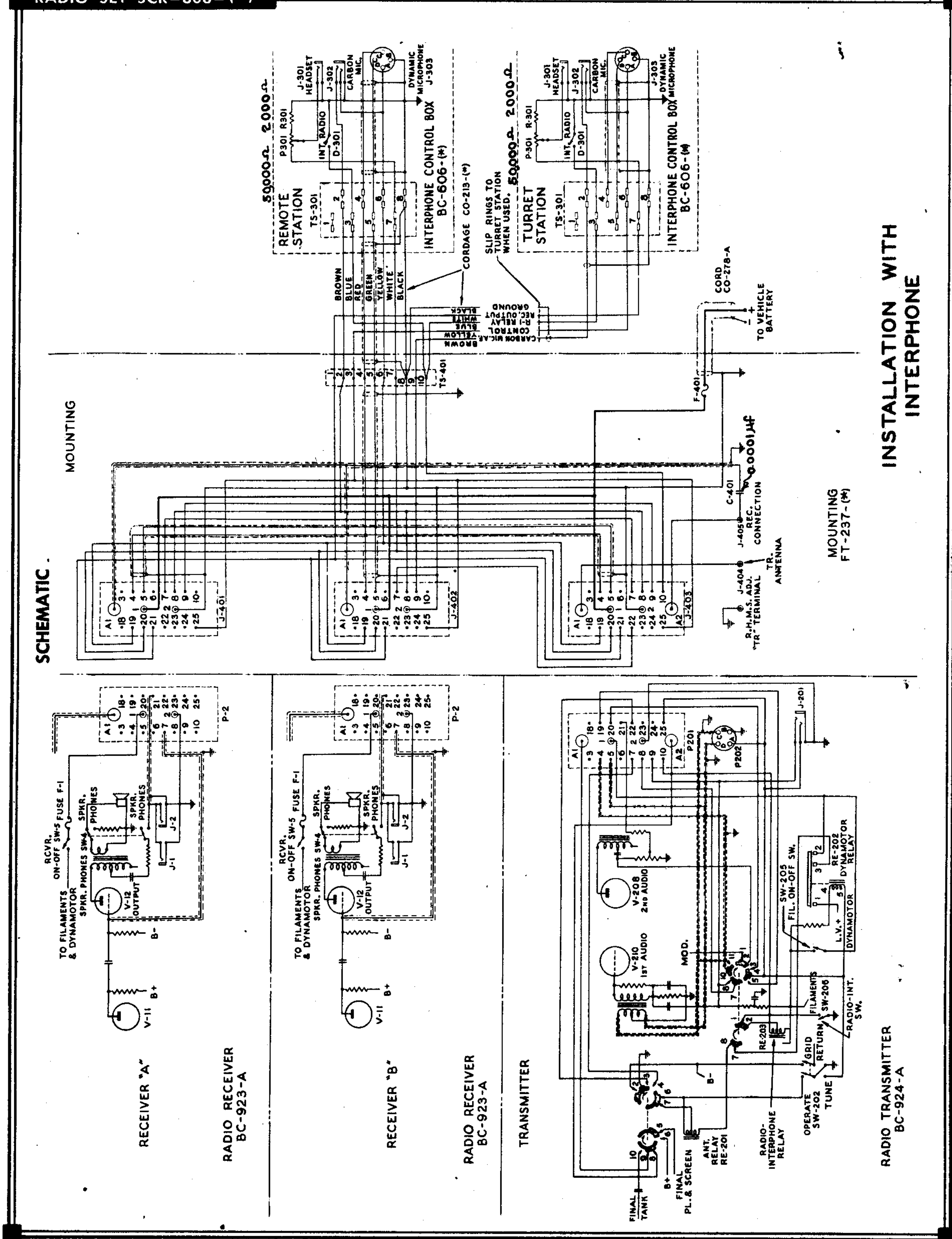
METHOD OF FINISHING ENDS OF CORDAGE CO-282 AND ASSEMBLING COAXIAL CONNECTOR FOR MAST BASE MP-48.

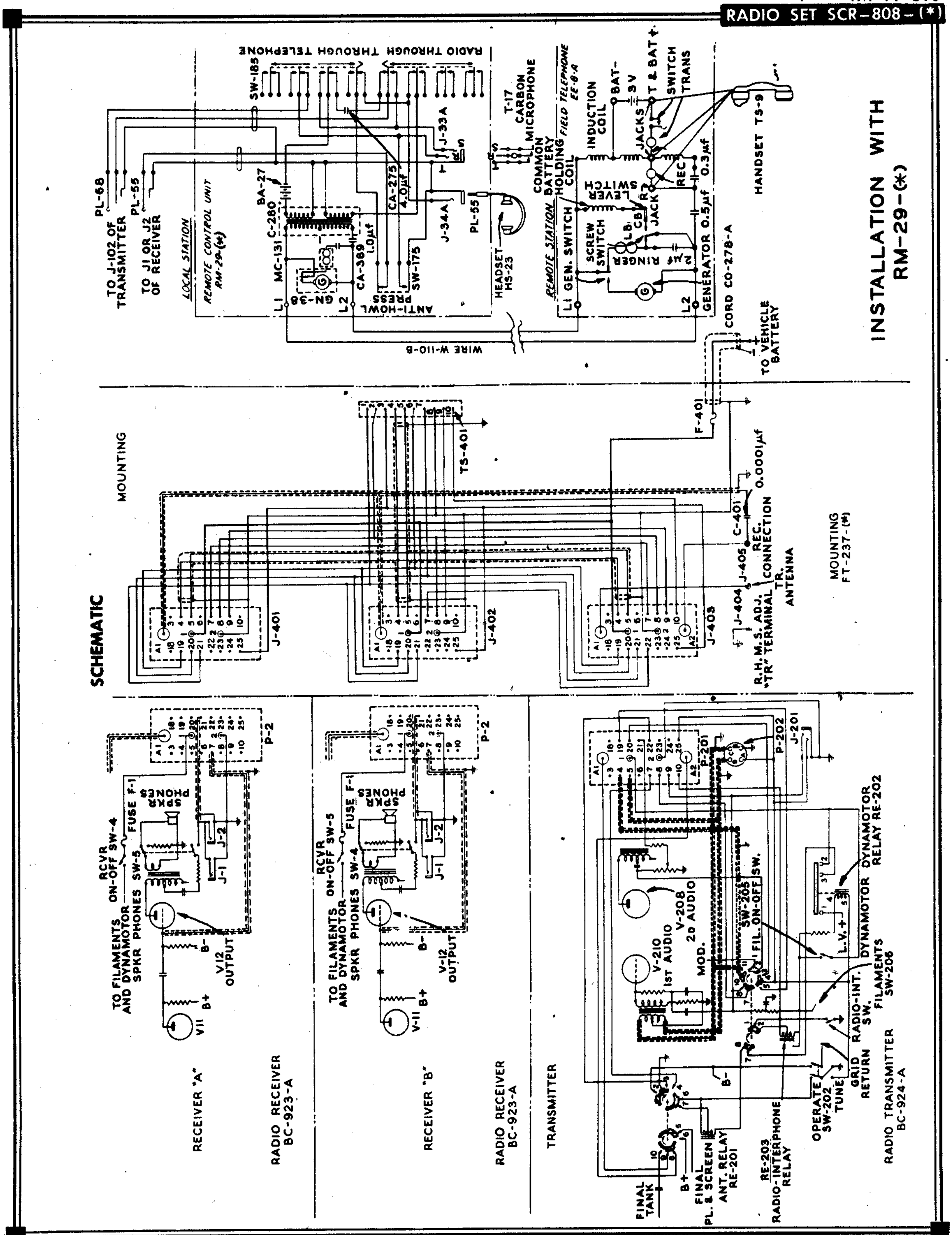
1. Prepare cordage as shown in figure 1.
2. Slide D, C, & B over cordage E, then solder conductor to lug on A.
3. Hold A firmly. Screw C to A, then D to C. Finally fasten clamp D over prepared braid. Do not crush braid when fastening clamp D.
4. Finish transmitter end as in figure 1 but leave free end of No. 18 or No. 20 wire long enough for connection to ground wire.

5. The ground connection for the set is normally through the contact between the mounting and the frame of the vehicle in which it is used. Check that the contact is firm and secure.
6. Where there is no direct contact between the mounting and the vehicle frame, complete the connection with grounding straps, leaving sufficient slack to permit free movement of the unit in the shock mounting.
7. When coaxial cable is used for antenna lead, ground the cable sheath securely at each end. Mast Base MP-48 provides effective grounding of cable sheath at outer end.

FINAL CHECK

1. Check that dynamotors of correct voltage rating are installed and that name plate on mounting shows correct operating voltage.
2. Inspect all ground straps, if used, and all bolted connections in ground circuit. Tighten or resolder any doubtful connections.
3. Plug a microphone and a headset into their respective jacks on the front panel of receiver and transmitter.
4. Throw the OPERATE-TUNE switches to OPERATE, the ON-OFF switches to ON, and RADIO-INTER sw to INTER.
5. Press the microphone sw and speak into the microphone. The speech should be heard in either receiver headset with the PHONE-SPEAKER sw at PHONES.
6. Plug a microphone into jack J-302 and a headset into jack J-301 on a control box. Throw control box RADIO-INTER sw to INTER.
7. Start the transmitter and establish two-way communication over the interphone system. Return control box RADIO-INTER sw to RADIO.
8. Throw RADIO-INTER sw to RADIO and establish communication with another vehicle.
9. Insert the plugs of Remote Control Unit RM-29-(*) into their respective jacks on the receiver and transmitter panels and establish communication with another set from the remote station if remote control is to be used.


INSTALLATION WITH INTERPHONE
SCHEMATIC
MOUNTING
REMOTE STATION
TS-301
INTERPHONE CONTROL BOX BC-606-(*)
CORDAGE CO-213-(*)
TURRET STATION
SLIP RINGS TO TURRET STATION WHEN USED.
CORD CO-278-A
TO VEHICLE BATTERY
TS-401
F-401
C-401
J-401
J-402
J-403
J-404
J-405
REC. CONNECTION
TR. ANTENNA
R.H.M.S. ADJ. "TR" TERMINAL
MOUNTING FT-237-(*)
RECEIVER "A"
RADIO RECEIVER BC-923-A
RECEIVER "B"
RADIO RECEIVER BC-923-A
TRANSMITTER
RADIO TRANSMITTER BC-924-A
BROWN
BLUE
RED
GREEN
YELLOW
WHITE
BLACK
CARBON MIC.
DYNAMIC MICROPHONE
J-301 HEADSET
J-302
J-303
D-301
P301
R301
INT. RADIO
50000Ω
2000Ω
$0.0001\mu f$
P-2
P201
P202
J-201
V-11
V-12 OUTPUT
V-208 2ND AUDIO
V-210 1ST AUDIO
MOD.
RE-202 DYNAMOTOR RELAY
SW-205 FIL. ON-OFF SW.
DYNAMOTOR
RE-203
SW-206
RADIO-INT. SW.
GRID RETURN
OPERATE SW-202 TUNE
RADIO-INTERPHONE RELAY
ANT. RELAY RE-201
FINAL TANK
FINAL PL. & SCREEN
RCVR. ON-OFF SW-5
FUSE F-1
TO FILAMENTS & DYNAMOTOR
SPKR. PHONES SW-4
SPKR.
PHONES
J-1
J-2


INSTALLATION WITH RM-29-(*)
SCHEMATIC
RECEIVER "A"
RADIO RECEIVER BC-923-A
RECEIVER "B"
RADIO RECEIVER BC-923-A
TRANSMITTER
RADIO TRANSMITTER BC-924-A
MOUNTING
MOUNTING FT-237-(*)
LOCAL STATION
REMOTE CONTROL UNIT RM-29-(*)
REMOTE STATION
FIELD TELEPHONE EE-8-A
RADIO THROUGH THROUGH TELEPHONE
HANDSET TS-9
HEADSET HS-23
WIRE W-110-B
TO VEHICLE BATTERY
TO J-102 OF TRANSMITTER
TO J1 OR J2 OF RECEIVER
J-401
J-402
J-403
TS-401
F-401
C-401
0.0001µf
REC. CONNECTION
TR. ANTENNA
R.H.M.S. ADJ. "TR" TERMINAL
P-2
P-201
P-202
J-201
V-208 2D AUDIO
V-210 1ST AUDIO
MOD.
SW-205 FIL. ON-OFF SW.
DYNAMOTOR RELAY RE-202
DYNAMOTOR FILAMENTS SW-206
RADIO-INT. SW.
GRID RETURN
OPERATE SW-202 TUNE
RE-203 RADIO-INTERPHONE RELAY
ANT. RELAY RE-201
FINAL PL. & SCREEN
FINAL TANK
TO FILAMENTS AND DYNAMOTOR
RCVR ON-OFF SW-4
SPKR PHONES SW-5
FUSE F-1
SPKR PHONES
V12 OUTPUT
V11
GENERATOR
RINGER
INDUCTION COIL
SWITCH TRANS
JACKS
CORD CO-278-A
PL-68
PL-55
SW-185
J-33A
J-34A
BA-27
CA-275
C-280
MC-131
GN-38
CA-389
SW-175
ANTI-HOWL PRESS
T-17 CARBON MICROPHONE
COMMON BATTERY HOLDING COIL
GEN. SWITCH
SCREW SWITCH
LEVER SWITCH

RADIO SET SCR-828-(*)

SCR-828-(*) = SCR-828-A

See also: BC-923-(*)
BC-924-(*)

Reference:
TM 11-601

ANTENNA INSTALLATION HINTS

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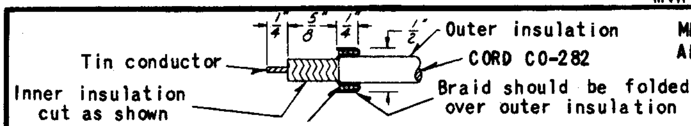
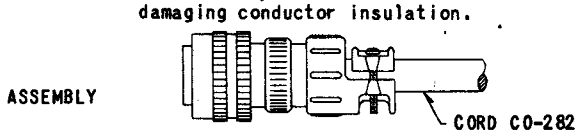


FIG 1. Wrap 5 turns of No. 18 or No. 20 solid copper wire over braid. Fold braid back and securely solder wire to shield without damaging conductor insulation.



Connect to adapter on MP-48, internal conductor in place.

FIG 3.

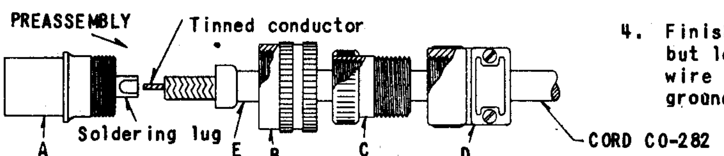


FIG 2.

METHOD OF FINISHING ENDS OF CORDAGE CO-282 AND ASSEMBLING COAXIAL CONNECTOR FOR MAST BASE MP-48

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3. Hold A firmly. Screw C to A, then D to C. Finally fasten clamp D over prepared braid. Do not crush braid when fastening clamp D.
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5. The ground connection for the set is normally through the contact between the mounting and the frame of the vehicle in which it is used. Check that the contact is firm and secure.
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7. When coaxial cable is used for antenna lead, ground the cable sheath securely at each end. Mast Base MP-48 provides effective grounding of cable sheath at outer end.

FINAL CHECK

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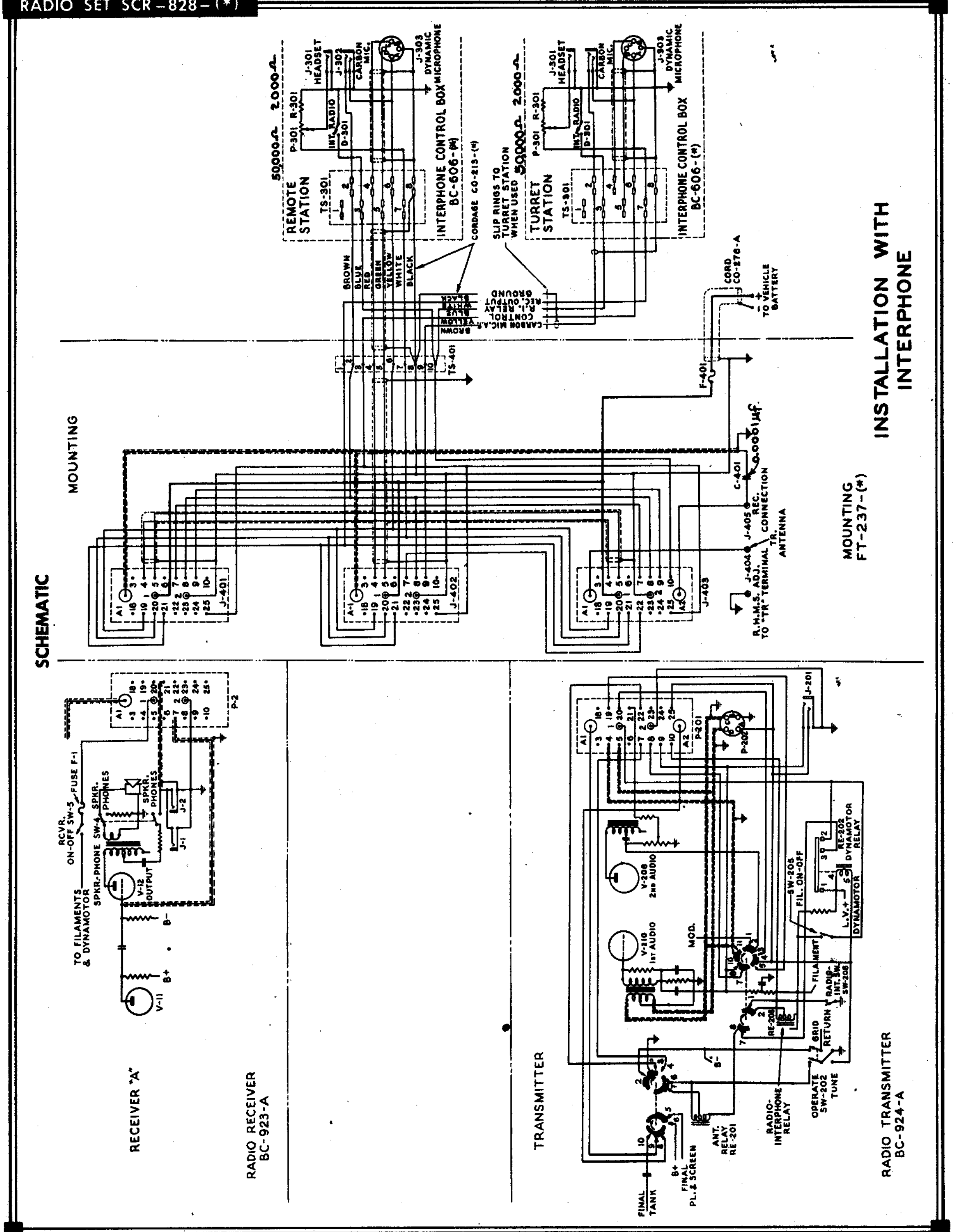
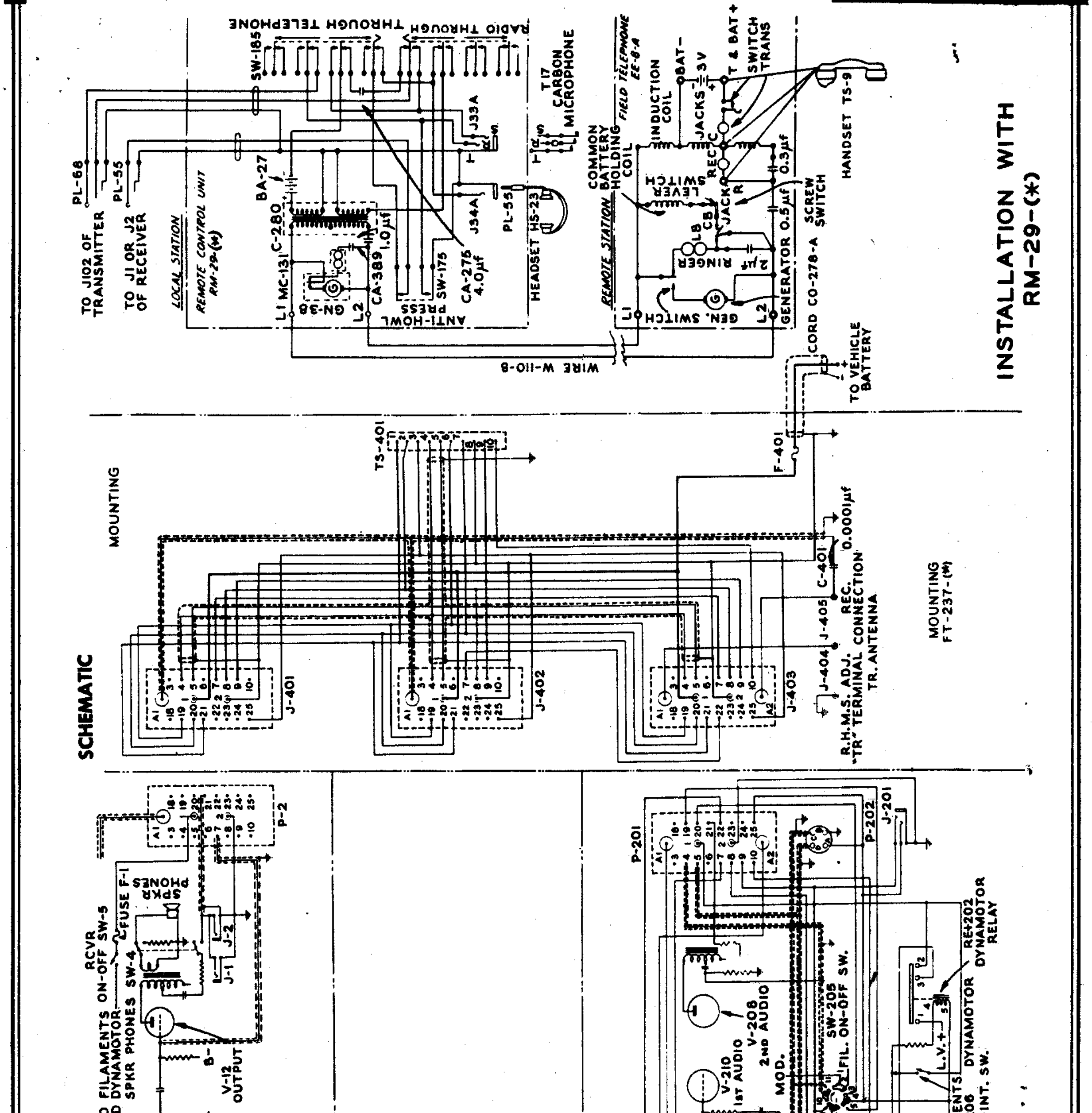
2. Inspect all ground straps, if used, and all bolted connections in ground circuit. Tighten or resolder any doubtful connections.
3. Plug a microphone and a headset into their respective jacks on the front panel of receiver and transmitter.
4. Throw the OPERATE-TUNE switches to OPERATE, the ON-OFF switches to ON, and RADIO-INTER sw to INTER.
5. Press the microphone sw and speak into the microphone. The speech should be heard in either receiver headset with the PHONE-SPEAKER sw at PHONES.
6. Plug a microphone into jack J-302 and a headset into jack J-301 on a control box. Throw control box RADIO-INTER sw to INTER.
7. Start the transmitter and establish two-way communication over the interphone system. Return control box RADIO-INTER sw to RADIO.
8. Throw RADIO-INTER sw to RADIO and establish communication with another vehicle, if practical.
9. Insert the plugs of Remote Control Unit RM-29-(*) into their respective jacks on the receiver and transmitter panels and establish communication with another set from the remote station if remote control is to be used.


SCHEMATIC
RECEIVER "A"
RADIO RECEIVER BC-923-A
TRANSMITTER
RADIO TRANSMITTER BC-924-A
MOUNTING
MOUNTING FT-237-(*)
REMOTE STATION
TURRET STATION
INTERPHONE CONTROL BOX BC-606-(*)
CORDAGE CO-213-(*)
SLIP RINGS TO TURRET STATION WHEN USED
CORD CO-278-A
TO VEHICLE BATTERY
J-303 DYNAMIC MICROPHONE
J-301 HEADSET
J-302 CARBON MIC.
BROWN
BLUE
RED
GREEN
YELLOW
WHITE
BLACK
TS-401
F-401
C-401
J-401
J-402
J-403
J-404
J-405
REC. CONNECTION
TR. ANTENNA
P-2
P-201
P-202
J-201
V-11
V-12 OUTPUT
V-208 2ND AUDIO
V-210 1ST AUDIO
RE-201
RE-202 DYNAMOTOR RELAY
DYNAMOTOR
SW-205 FIL. ON-OFF
OPERATE SW-202 TUNE
RADIO-INTERPHONE RELAY
FINAL TANK
FINAL PL. & SCREEN
INSTALLATION WITH INTERPHONE


SCHEMATIC
MOUNTING
RADIO THROUGH
THROUGH TELEPHONE
SW-185
T17 CARBON MICROPHONE
J33A
J34A
PL-55
HEADSET HS-23
PL-68
TO J102 OF TRANSMITTER
TO J1 OR J2 OF RECEIVER
LOCAL STATION
REMOTE CONTROL UNIT RM-29-(*)
BA-27
C-280
MC-131
CA-389 1.0µf
CA-275 4.0µf
SW-175
ANTI-HOWL PRESS
GN-38
WIRE W-110-B
REMOTE STATION
FIELD TELEPHONE EE-8-A
COMMON BATTERY HOLDING COIL
INDUCTION COIL
LEVER SWITCH
RINGER
GEN. SWITCH
GENERATOR
CORD CO-278-A
SCREW SWITCH
0.5µf
0.3µf
SWITCH TRANS
HANDSET TS-9
TO VEHICLE BATTERY
INSTALLATION WITH RM-29-(*)
TS-401
F-401
C-401
0.0001µf
J-401
J-402
J-403
J-404
J-405
R.H.M.S. ADJ. "TR" TERMINAL
REC. CONNECTION TR. ANTENNA
MOUNTING FT-237-(*)
RECEIVER "A"
RADIO RECEIVER BC-923-A
TO FILAMENTS AND DYNAMOTOR
RCVR ON-OFF SW-5
SPKR PHONES SW-4
FUSE F-1
SPKR PHONES
J-1
J-2
V-11
V-12 OUTPUT
P-2
TRANSMITTER
P-201
P-202
J-201
V-210 1ST AUDIO
V-208 2ND AUDIO
MOD.
SW-205 FIL. ON-OFF SW.
RE-202 DYNAMOTOR RELAY
DYNAMOTOR
L.V.
FILAMENTS SW-206 RADIO-INT. SW.
GRID RETURN
OPERATE SW-202 TUNE
RE-203 RADIO-INTERPHONE RELAY
ANT. RELAY RE-201
FINAL PL & SCREEN
FINAL TANK
RADIO TRANSMITTER BC-924-A