RADIO TRANSMITTERS BC-610-E, -F, -G, -H, -I AND RADIO TRANSMITTER T-213/GRC-26 AND ANTENNA TUNING UNITS BC-939-A AND -B

TM 11-826
TO 31R2-3SCR399-21
CHANGES NO. 4

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *24 October 1960*

TM 11-826/TO 31R2-3SCR399-21, 8 October 1952, is change as follows:

The following information (as added by C 2) changes TM 11-826/TO 31R2-3SCR399-21 so that the manual also applies to the following equipments:

Nomenclature	*Order No.*	*Serial Nos.*
Radio Transmitter BC-610-H.	2521-Phila-54	1 through 58

Page 1 (as changed by C 2). Add the following note at the beginning of chapter 1.

Note. Radio Transmitter BS-610-H procured on Order No. 25210-Phila-54, is similar to Radio Transmitter BC-610-H (late models) and Radio Transmitter BC-610-I covered in TM 11-826/TO 31R2-3SCR399-21, except for certain minor differences which are covered in these changes.

Page 17. (as changed by C 2) figure 14. Under Tube V16, change R-F-PA 250" to read: **R-F PA 250th.**

Page 28.

Table IV.1 (as added by C 2) Tuning Chart for Transmitting Tuning Unit TU-49 (Order No. 25210-Phila-54)

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC-939-(*)		
			M.O.	DOUB.	INT. AMP.	P.A. PLATE TUNING	Band switch position	Coupling	Loading
3200	3200	C-387-D	25	2.2	2.3	58.5	2-10	4.2	35.6
3250	3250	C-387-D	30	2.7	2.7	61.0	2-10	4.3	36.3
3300	3300	C-387-D	35	3.1	3.1	63.0	2-10	4.3	37.0
3350	3350	C-387-D	40	3.5	3.5	65.5	2-10	4.5	37.5
3400	3400	C-387-D	45	3.9	3.9	67.0	2-10	4.6	38.2
3450	3450	C-387-D	50	4.3	4.3	69.5	2-10	4.7	38.7
3500	3500	C-387-D	55	4.7	4.7	71.5	2-10	5.1	39.3
3500	3500	C-388-D	55	4.7	4.7	21.0	2-10	3.4	38.9
3550	3550	C-388-C	59	5.1	5.1	23.5	2-10	3.5	39.5
3600	3600	C-388-C	64	5.4	5.5	26.5	2-10	3.5	39.9
3650	3650	C-388-C	68	5.7	5.8	29.5	2-10	3.6	40.4
3700	3700	C-388-C	72	6.0	6.1	32.0	2-10	3.7	40.9
3750	3750	C-388-C	75	6.3	6.4	35.0	2-10	3.8	41.3
3800	3800	C-388-C	79	6.6	6.7	37.5	2-10	3.9	41.7
3850	3850	C-388-C	82	6.9	7.0	40.5	2-10	3.9	42.2
3900	3900	C-388-C	85	7.1	7.3	43.0	2-10	4.0	42.5
3950	3950	C-388-C	88	7.3	7.6	45.0	2-10	4.0	42.9
4000	4000	C-388-C	91	7.5	7.8	48.0	2-10	4.0	43.2

***These changes supersede C 2, 16 November 1955, and C 3, 5 January 1959; and so much of DA Supply Manual SIG 7 & 8 BC-610, 17 July 1957, including C 2, 12 July 1960, as pertains to first echelon items.**

Page 33, paragraph 21 (as changed by C 3). Add the following note after *j*.

Note. Some hermetically sealed P. A. PLATE current meters have a small negative off-scale reading, because of electrostatic deflection. This deflection is noticeable only when there is no current flow in the meter circuit and does not affect the accuracy of the meter when actual current flow is indicated.

Page 49, paragraph 45a (as changed by C 2). In the third line, delete the second word "mo." Add the following to the first sentence: or as a variable-frequency, electron-coupled Hartley oscillator.

Page 68, figure 45 (as changed by C 2). Add the following at the end of the note 2: AND WITH SERIAL NUMBERS 1 THROUGH 58 ON ORDER NO. 25210–PHILA –54.

Page 68, figure 46 (as changed by C 2). Delete the connecting wire between terminal 8 of TS13 and terminal 12 of TS11. Add a connecting wire between terminal 8 of TS13 and terminal 4 of TS13. Delete the dot which indicates a connection between terminals 1 and 4 of TS14.

Page 68, figure 46 (as changed by C 3). Add the following to the notes:

3. ON TRANSMITTERS MODIFIED IN ACCORDANCE WITH MWO SIG 11-826-1. C 1. THE SW4 CIRCUIT IS CHANGED AS SHOWN IN FIGURE 46.1.

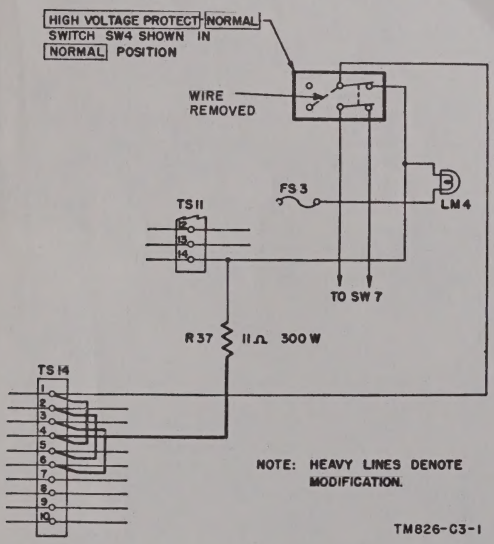


Figure 46.1 Modification of high-voltage protect circuit in F, G, H, and T-213/GRC-26 transmitters (MWO SIG 11-826-1).

Page 68, figure 46.1 (as added by C 3).

Page 69, paragraph 57*b*(1) (page 1 of C 1). (as further changed by C 3).

Page 69, paragraph 57*b*(1) (page 1 of C 1). Change the first sentence to: In the I model and the late H model (fig. 45) **and in all F, G, early H, and T–213/GRC–26 model transmitters which have been modified in accordance with MWO SIG 11–826–1 including Changes No. 1 (fig. 46.1),** resistor R37 is in series with the ac line to transformer T6.

Page 84, figure 62 (as changed by C 2).

Sockets V10 and V11, pin 3. Change "4800 TO TS2 TERM. 1" to read: 4800 **TO TS2 TERM. 4.**

Socket V13, pin. 2. Change the resistance reference to read: **0.**

Socket V13 pin 5. Change the resistance reference to read: **56K.**

Socket V14, pin 5. Change the resistance reference to read: **45K.**

Socket V8, pin 5. Delete "0 V" and insert: See note 10.

Add the following to the "NOTES" on figure 62:

10. GRID VOLTAGE MEASUREMENT MUST BE MADE AT JUNCTION OF R1 AND CH1, VOLTAGE SHOULD BE BETWEEN —30 V. AND —50 V.

Page 87, table XIII (as changed by C 2). In the "Measured from" column, add the following at the end of the last item: and serial No. 1 through 58 (Order No. 25210–Phila–54).

Page 95, paragraph 68 (as changed by C 3). Add the following after *c: d.* On E, F, and G model transmitters, replace any defective R21 and R22 resistors with 47-ohm, 2-watt resistors, Federal Stock Number 5905–247–9327.

Page 144, figure 77 (as changed by C 2). Indicate a wire connection at the second wire of five wires between FS3 20A and LM4.

Page 144, figure 81 (as changed by C 2).

Capacitor C14. Change the capacitance from 56 to **330.**

Resistors R21 and R22. Change the resistance from 51 to **47.**

Add the following at the end of note 3: AND SERIAL NUMBERS 1 THROUGH 58 ON ORDER NO. 25210–PHILA–54.

Change the caption to read: **Radio Transmitter BC–610–I and Radio Transmitter BC–610–H, serial No. 821 through 972 (Order No. 3078–Phila–51), and serial No. 1 through 58 (Order No. 25210–Phila–54), schematic diagram.**

Page 148, figure 87 (as changed by C 2). Change the reference at terminal 10 of TS2 TOP VIEW to read: **TO SW2.** Add the following at the end of the note: AND WITH SERIAL NUMBERS 1 THROUGH 58 ON ORDER NO. 25210–Phila–54. Change the caption to read: **Radio Transmitter BC–601–I and Radio Transmitter BC–610–H, serial No. 821 through 972 (Order No. 3078–Phila–51), and serial No. 1 to 58 (Order No. 25210–Phila–54), practical wiring diagram.**

Page 107 (page 4, C 1).

APPENDIX II

MAINTENANCE ALLOCATION CHART

(Added)

1. General

a. The maintenance allocation chart assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are defined as follows:

(1) *Part or component.* Only the nomenclature or standard item name is shown in this column. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations. These are defined as follows:

(a) Inspect. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(b) Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(c) Repair. To restore to a serviceable condition by replacing unserviceable parts or by any other action required, utilizing equipment and skills available, to include welding, grinding, riveting, straightening, adjusting, etc.

(d) Rebuild. To restore to a condition comparable to new by disassembling the item to determine the condition of its component parts and reassembling it with serviceable, rebuilt, or new assemblies, subassemblies, and parts.

(3) *1st, 2d, 3d, and 4th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column indicates the tool, test, and maintenance equipment required when performing the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the chart allocating tools for maintenance functions are defined as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required when performing the maintenance functions.

(2) *2d, 3, and 4th echelon.* A dagger (†) symbol indicates the echelons allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

3. Mounting Hardware

The basic entries of the maintenance allocation chart do not include mounting hardware such as screws, nuts, bolts, washers, brackets, clamps, etc.

MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
RADIO TRANSMITTER BC-610E,F,G,H,I	inspect	X						Preventative Maintenance
	replace		X				1,2,14	
	repair				X		1,2,3,4,5,6,7,8,9 10,11,12,13,15	
	rebuild				X		1,2,3,4,5,6,7,8,9 10,11,12,13,15	
AMMETERS	replace			X				
BRACKETS	replace			X				
CAPACITORS	replace			X				
CHARTS	replace	X						
CLAMPS	replace			X				
CLIPS	replace			X				
COILS	replace			X				
CONNECTORS	replace			X				
COUPLINGS	replace			X				
DIALS	replace			X				
DRIVE, TUNING	replace			X				
ELECTRON TUBES	replace		X					
FUSES	replace		X					

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
BC-610E,F,G,H,I (continued)								
FUSEHOLDERS	replace			X				
HEATING, ELEMENT, ELECTRICAL	replace			X				
INSULATORS	replace			X				
KNOBS	replace		X					
LAMPS	replace		X					
LAMPHOLDERS	replace			X				
LENS	replace		X					
LIGHT, INDICATORS	replace			X				
LOCK	replace			X				
REACTORS	replace			X				
RELAYS	replace			X				
RESISTORS	replace			X				
RETAINERS	replace		X					
SOCKETS	replace			X				
SPACERS	replace				X			
STRAP	replace			X				
STUD	replace			X				
SWITCHES	replace			X				
TERMINAL BOARDS	replace					X		
TRANSFORMERS	replace			X				
VOLTMETERS	replace			X				

ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST ECH.	(3) 2ND ECH.	(4) 3RD ECH.	(5) 4TH ECH.	(6) 5TH ECH.	(7) TOOL CODE	(8) REMARKS
BC-610E,F,G,H,I (continued)							
TUBE TESTER I-177		+	+	+		1	
MULTIMETER TS-352/U		+	+	+		2	
RF AMMETER			+	+		3	
OSCILLOSCOPE OS-8/U			+	+		4	
FREQUENCY METER SEC SCR-211			+	+		5	
AUDIO OSCILLATOR TS-382A/U			+	+		6	
NEON LAMP			+	+		7	
ELECTRONIC MULTIMETER TS-505/U			+	+		8	
SPEECH AMPLIFIER BC-614-(*)			+	+		9	
POWER UNIT PE-95-(*)			+	+		10	
MICROPHONE T-17,T-30,T-45,or T-50			+	+		11	
KEY, J-37			+	+		12	
RADIO RECEIVER BC-312-(*) or BC-342-(*)			+	+		13	
TOOL EQUIPMENT TE-41		+				14	
TOOL EQUIPMENT TE-113			+	+		15	

APPENDIX III

BASIC ISSUE ITEMS

(Added)

1. Scope

a. This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in the equipment authorization tables and other documents that are a basis for requisitioning.

b. Columns are as follows:

(1) *Source, maintenance, and recoverability code.* (Not used).

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* A dagger (†) indicates the model in which the part is used.

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter nomenclature and description on requisition.

(5) *Unit of issue.* The unit of issue is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Expendable items are indicated by the letter X; nonexpendable items are indicated by NX.

(7) *Quantity authorized.* Under "Items Comprising an Operable Equipment" the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares and Accessory Items", the quantities listed are those issued initially with equipment as sparts parts. The quantities are authorized to be kept on hand by the operator for maintenance of equipment.

(8) *Illustrations.* The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The "Figure No." column lists the figures in which the items appear.

2. Critical Items

A zero slash (ø) in the description column indicates items that are expected to fail during the first year; also items that will make the equipment inoperative if they fail.

3. Dustproofing Kit Note

Organizations entering or contemplating entering areas where damage may result to equipment because of entrance of dust, insects, and other foreign matter should request permission from the Chief Signal Officer to apply MWO 11-5820-324-30/1.

4. References

Additional instructions concerning maintenance of this equipment are contained in the followig DA Supply Manuals.

SIG 7 & 8 TU-47 Transmitter Tuning Unit TU-47
SIG 7 & 8 TU-48 Transmitter Tuning Unit TU-48
SIG 7 & 8 TU-49 Transmitter Tuning Unit TU-49
SIG 7 & 8 TU-50 Transmitter Tuning Unit TU-50
SIG 7 & 8 TU-51 Transmitter Tuning Unit TU-51
SIG 7 & 8 TU-52 Transmitter Tuning Unit TU-52
SIG 7 & 8 TU-53 Transmitter Tuning Unit TU-53
SIG 7 & 8 TU-54 Transmitter Tuning Unit TU-54

FUNCTIONAL PARTS LIST

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL 1	2	3	4	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ILLUSTRATIONS ITEM NO
						ITEMS COMPRISING AN OPERABLE EQUIPMENT					
						RADIO TRANSMITTER BC-610-E,F,G,H,I					
						NOTE: Model Column 1 refers to BC-610-E; Column 2 refers to BC-610-F,G; Column 3 refers to BC-610-H; Column 4 refers to NC-610-I					
	5920-503-3438					RADIO TRANSMITTER BC-610-E,F,G,H,I: AM and CW: 2 to 18 mc freq range; Xtal or MO controlled; 32-5/8 in lg x 21-3/8 in wd x 39-7/8 in h o/a, metal cabinet	ea	NX			
	Ord thru AGC	+	+	+	+	TECHNICAL MANUAL TM11-826	ea	X	2		
	5910-160-0395	+	+	+	+	Ø CAPACITOR, FIXED, VACUUM DIELECTRIC: 50 uuf ± 2%; 2-1/4 in dia x 5 in lg; Eimac type VC50-20	ea	X	1	9	C28
	5895-692-6853	+	+	+	+	CHART SET: calibration charts f/Tuning Units TU-47 thru TU-54	ea	X	1		
	4540-278-9840	+				Ø HEATING ELEMENT, ELECTRICAL: 110v to 120v, 600w to 660w; 2 lamp base term; 4-11/32 in lg x 2 in dia o/a; Eagle Elec part 415A	ea	X	1		R19
	6240-057-2887	+				LAMP LM-27: 6 to 8v; miniature bayonet base;	ea	X	2		LM1, LM2
			+	+	+		ea	X	1		LM2
	5950-222-0348	+	+	+	+	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-387-D; plate tuning ckt; Sig dwg SC-D-23925 GRP I	ea	X	1	10	L7a
	5950-222-0350	+	+	+	+	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-388-C; plate tuning ckt; Sig dwg SC-D-23925 GRP II	ea	X	1	10	L7b
	5950-222-0349	+	+	+	+	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-389-C; plate tank tuning ckt; Sig dwg SC-D-23925 GRP III	ea	X	1	10	L7c
	5950-199-3733	+	+	+	+	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-390-C; plate tank tuning ckt; Sig dwg SC-D-23925 GRP IV	ea	X	1	10	L7d
	5950-189-5015	+	+	+	+	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-447-B: plate tank tuning ckt; Sig dwg SC-D-23907 GRP I	ea	X	1	10	L7e
	5950-199-3725	+	+	+	+	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-448-B: plate tank tuning ckt; Sig dwg SC-D-23907 GRP II	ea	X	1	10	L7f
	5950-230-0975	+	+	+	+	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-449-B, plate tank tuning ckt; Sig dwg SC-D-23907 GRP III	ea	X	1	10	L9g

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL 1	2	3	4	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO.	(9) ILLUSTRATIONS ITEM NO.
						BC-610E,F,G,H,I (continued)					
	5820-164-8137	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter tuning unit TU-47: 2 to 2.5 mc	ea	X	1	11	
	5820-164-8138	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-48: 2.5 to 3.2 mc	ea	NX	1	11	
	5820-164-8139	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-49: 3.2 to 4.0 mc	ea	NX	1	11	
	5820-164-8140	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-50: 4.0 to 5.0 mc	ea	NX	1	11	
	5820-164-8141	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-51: 5.0 to 6.35 mc	ea	NX	1	11	
	5820-164-8142	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-52: 6.35 to 8.0 mc	ea	NX	1	11	
	5820-223-4633	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-53: 8.0 to 12.0 mc	ea	NX	1	11	
	5820-164-8143	+	+	+	+	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-54: 12.0 to 18.0 mc	ea	NX	1	11	
						RUNNING SPARES AND ACCESSORY ITEMS					
						RADIO TRANSMITTER BC-610-E,F,G,H,I					
	5910-160-0395	+	+	+	+	Ø CAPACITOR, FIXED, VACUUM DIELECTRIC: 50 uuf ± 2%; 2-1/4 in dia x 5 in lg; Eimac type VC50-20	ea	X	1	9	
	5895-692-6853	+	+	+	+	CHART SET: calibration charts f/Tuning Units TU-47 thru TU-54	ea	X	1		
	5960-188-8573	+	+	+	+	Ø ELECTRON TUBE: MIL type OD3	ea	X	1		V13 thru V15
	5960-114-3866	+	+	+	+	Ø ELECTRON TUBE: MIL type 2A3	ea	X	1		V1 V2
	5960-108-0252	+	+	+	+	Ø ELECTRON TUBE: MIL type 3B28	ea	X	1		V6 V7
	5960-188-8601	+	+	+	+	Ø ELECTRON TUBE: MIL type 5Z3	ea	X	1		V5 V12
	5960-262-0161	+	+	+	+	Ø ELECTRON TUBE: MIL type 6L6WGB	ea	X	1		V9
	5960-116-9927	+	+	+	+	Ø ELECTRON TUBE: MIL type 6V6GTY	ea	X	1		V8
	5960-116-9979	+	+	+	+	Ø ELECTRON TUBE: MIL type 100TH	ea	X	1		V3 V4
	5960-114-3826	+	+	+	+	Ø ELECTRON TUBE: MIL type 250TH	ea	X	1		V16
	5960-114-4868	+	+	+	+	Ø ELECTRON TUBE: MIL type 807	ea	X	1		V10 V11
	5920-010-6652	+	+	+	+	Ø FUSE, CARTRIDGE: 3 amp; 1-1/4 in lg x 1/4 in dia; MIL type F02G3R00A	ea	X	5		FS5
	5920-199-9482	+	+	+	+	Ø FUSE, CARTRIDGE: 6 amp; 1-1/4 in lg x 1/4 in dia; Bussman part MTH-6	ea	X	3		FS4
	5920-280-5080	+	+	+	+	Ø FUSE, PLUG: 20 amp; 1-1/4 in lg x 1-1/8 in dia; Fed Spec W-F-831	ea	X	3		FS3
	5920-240-4123	+	+	+	+	Ø FUSE, PLUG: 25 amp; 1-7/32 in lg x 1-3/16 in dia; Fed Spec W-F-831, type 11	ea	X	3		FS1 FS2

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL 1	2	3	4	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ILLUSTRATIONS ITEM NO
		1	2	3	4	BC-610E,F,G,H,I (continued)					
	6240-057-2687	†	†	†	†	LAMP LM-27: 6 to 8v; miniature bayonet base	ea	X	2		LM1, LM2
							ea	X	1		LM2
	6240-184-6594	†	†	†	†	Ø LAMP LM-41	ea	X	2		LM3 LM4
	6625-810-1841	†	†	†	†	TEST PROD: shorting stick; 28-1/2 in lg x 5 in w o/a; Sig dwg SC-DL-27351-A	ea	NX	1	21	
	5950-222-0348	†	†	†	†	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-387-D; plate tuning ckt; Sig dwg SC-D-23925 GRP I	ea	X	1	10	L7a
	5950-222-0350	†	†	†	†	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-388-C; plate tuning ckt; Sig dwg SC-D-23925 GRP II	ea	X	1	10	L7b
	5950-222-0349	†	†	†	†	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-389-C; plate tank tuning ckt; Sig dwg SC-D-23925 GRP III	ea	X	1	10	L7c
	5950-199-3753	†	†	†	†	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-390-C; plate tank tuning ckt; Sig dwg SC-D-23925 GRP IV	ea	X	1	10	L7d
	5950-189-5015	†	†	†	†	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-447-B; plate tank tuning ckt; Sig dwg SX-D-23907 GRP I	ea	X	1	10	L7e
	5950-199-3756	†	†	†	†	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-448-B; plate tank tuning ckt; Sig dwg SC-D-23907 GRP II	ea	X	1	10	L7f
	5950-230-6975	†	†	†	†	Ø TRANSFORMER, VARIABLE, RADIO FREQUENCY: Coil Unit C-449-B; plate tank tuning ckt; Sig dwg SC-D-23907 GRP III	ea	X	1	10	L9g
	5820-164-8137	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter, tuning unit TU-47: 2 to 2.5 mc	ea	NX	1	11	
	5820-164-8138	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-48: 2.5 to 3.2 mc	ea	NX	1	11	
	5820-164-8139	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-49: 3.2 to 4.0 mc	ea	NX	1	11	
	5820-164-8140	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-50: 4.0 to 5.0 mc	ea	NX	1	11	
	5820-164-8141	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-51: 5.0 to 6.35 mc	ea	X	1	11	
	5820-164-8142	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-52: 6.35 to 8.0 mc	ea	NX	1	11	
	5820-223-4633	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-53: 8.0 to 12.0 mc	ea	NX	1	11	
	5820-164-8143	†	†	†	†	TUNER, RADIO FREQUENCY: Transmitter Tuning Unit TU-54: 12.0 to 18.0 mc	ea	NX	1	11	

T. O. 31R2-3SCR399-21

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

RADIO TRANSMITTERS BC-610-E, -F, -G, -H, -I AND RADIO TRANSMITTER T-213/GRC-26 AND ANTENNA TUNING UNITS BC-939-A AND -B

C 1, TM 11-826
TO 16-40BC610-6

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON 25, D. C., *20 January 1954*

TM 11-826/TO 16-40BC610-6, 8 October 1952, is changed as follows:

Figure 31. Resistor R39, 1 meg, is added between the negative terminal of P.A. PLATE meter M2 and the meter case. The following note is added:

4. Resistor R39 is added to the I model on Orders Nos. 3357-Phila-52 and 25679-Phila-53.

49. P-a Stage

(fig. 31)

* * * * *

b. 1. (Added) In Radio Transmitter BC-610-I on Orders Nos. 3357-Phila-52 and 25679-Phila-53, resistor R39, 1 meg, has been added between the negative terminal of P.A. PLATE meter M2 and the meter case. Resistor R39 allows the static charge to drain off the meter, thus stabilizing it when the hv is turned on with no excitation applied to the final pa.

* * * * *

Figure 34. Resistor R39, 1 meg, is added between the negative terminal of P.A. PLATE meter M2 and the meter case. The following note is added:

4. Resistor R39 is added to the I model on Orders Nos. 3357-Phila-52 and 25679-Phila-53.

Figure 40. Resistor R39, 1 meg, is added between the negative terminal of P.A. PLATE meter M2 and the meter case. The following note is added:

7. Resistor R39 is added to the I model on Orders No. 3357-Phila-52 and 25679-Phila-53.

56. Control Circuits

(figs. 45, 46, and 47)

* * * * *

d. C. W.-PHONE Switch SW7. C. W.-PHONE Switch * * * V3 and V4. When switch SW7 is in the C. W. position, relay **RY3** is de-energized and one pair of contacts short-circuits the secondary winding of modulation transformer T9; the other pair of contacts removes the operating bias from the class B modulator tubes and causes cutoff bias to be supplied. One pole on * * * plate-power transformer T6.

Figure 45. The connection between terminal 8 of TS13 and terminal 12 of TS11 is deleted. A connection is added between terminal 8 of TS13 and terminal 4 of TS13.

57. Overload and Protection Circuits

(figs. 45, 46, and 47)

The overload and * * * surges or overloads.

* * * * *

b. HIGH VOLTAGE PROTECT Switch SW4. HIGH VOLTAGE PROTECT * * * of the transmitter:

(1) In the I model and the **late** H model (fig. 45), resistor R37 is in series with the a-c line to transformer T6. When switch SW4 * * * supply to normal.

* * * * *

60. Test Equipment Required for Troubleshooting

The test equipment * * * also are listed.

Test equipment	Technical manual
Electron Tube Test Set TV-7/U	TM 11-5083
Multimeter TS-352/U	TM 11-5527
Ammeter IS-76	
Oscilloscope OS-8/U	NAVSHIPS 91, 272
* * *	* *

63. Voltage Measurements

* * * * *

b. Test Set-Up. Whenever voltage measurements * * * is as follows:

(1) Connect a dummy antenna to the transmitter. The dummy antenna **is a 73-ohm noninductive, 400-watt resistor (fig. 72).**

* * * * *

Warning: The h-v power * * * in this transmitter. Contacting the high voltage present in Radio Transmitter **BC-81C-(*)** *can be fatal.* When making this * * * someone else present.

* * * * *

76. Test Equipment Required for Final Testing
(Superseded)

The instruments needed for testing the repaired transmitter are listed below:

a. R-F Ammeter. The meter should be of the thermocouple type with a range of 0 to 5 amperes. It is used to measure the power output of the transmitter. Use Ammeter IS-76 or equivalent.

b. Oscilloscope. Cathode-ray Oscilloscope OS-8/U or equivalent may be used to measure the modulation percentage of the transmitter.

c. Audio Oscillator. The audio oscillator must be capable of producing a 400-cycle output of .30 volt. Use Audio Oscillator TS-382A/U or equivalent.

d. Dummy Antenna. The dummy antenna consists of a noninductive 73-ohm, 400-watt resistor

e. A-c Electronic Voltmeter. This equipment is used to measure the audio input voltage from the audio oscillator. Use Electronic Multimeter ME-6/U or equivalent.

f. Key. A key, such as Key J-37, is needed to key the transmitter during the cw power output test.

g. Speech Amplifier BC-614-(*). The speech amplifier is used in the modulation tests of the transmitter.

77. Power Output and Modulation Tests

* * * * *

b. Preparation for Testing. To measure the * * * Proceed as follows:

* * * * *

(3) (Superseded) Couple the transmitter output to the vertical deflection plates of the oscilloscope by means of a pick-up coil. This is done by using a spare coil unit to match the coil unit in use in the transmitter. Connect a 10- to 100-$\mu\mu$f variable capacitor across the ends of the coil. The coil link is connected to the oscilloscope by means of a twisted-pair line.

* * * * *

c. Power Output Test for C-W Transmission.

* * * * *

(2) Maximum c-w power * * * external r-f ammeter. When a **73**-ohm dummy antenna is used, the required power outputs are obtained when the r-f output currents are as specified in table XV.

* * * * *

Table XV. (Superseded) *Power Output and Modulation Capability*

Frequency range (mc)	Tuning unit	Coil unit	Power C. W.	Output, PHONE, (unmodulated)	R-f output current (amperes)		
					C. W.	PHONE (unmodulated)	PHONE (65% modulated)
2 to 2.5	TU-47	C-387-B	400	300	2. 25	1. 95	2. 15
2.5 to 3.2	TU-48	C-387-B	400	300	2. 25	1. 95	2. 15
3.2 to 4	TU-49	C-387-B	400	300	2. 25	1. 95	2. 15
4 to 5	TU-50	C-388-A	400	300	2. 25	1. 95	2. 15
5 to 6.35	TU-51	C-389-A	400	300	2. 25	1. 95	2. 15
6.35 to 8	TU-52	C-390-A	400	300	2. 25	1. 95	2. 15
8 to 12	TU-53	C-447	300	250	1. 95	1. 69	1. 84
12 to 14	TU-54	C-448	275	200	1. 80	1. 56	1. 70
14 to 18	TU-54	C-449	275	200	1. 80	1. 56	1. 70

e. Modulation Capability.

* * * * *

(2) Insert the audio **oscillator** plug into jack J102 on Speech Amplifier BC–614–(*). Have the **audio oscillator** turned off.

* * * * *

(7) (Superseded) Since the height of the carrier pattern depends on the number of turns in the pick-up coil, it may be increased or decreased by tuning the variable capacitor connected across the coil.

* * * * *

(9) Adjust the audio **oscillator** for a frequency of 400 cycles, and turn it on.

(10) (Superseded) Measure the audio input voltage from the audio oscillator to Speech Amplifier BC–614–(*), using Electronic Multimeter ME–6/U

(11) Adjust the audio **oscillator** for an initial output of .15 volt.

* * * * *

(13) **Sixty-five**-percent modulation is required for satisfactory operation of the transmitter.

(14) At **65**-percent modulation, the r-f current in the external test ammeter will increase approximately **10** percent above the unmodulated value that was obtained in the preceding test; it should equal at least the r-f output current specified in table XV for modulated phone power output.

(15) If the value specified in table XV is not obtained with .15-volt output from the audio **oscillator**, increase the output of the audio **oscillator** up to .30 volt, and set the speech amplifier control near maximum to obtain the specified value.

* * * * *

(17) The maximum height of the modulated wave (H1, fig. 73) as seen on the oscilloscope should be **1.65** times as great as the height (H2) of the unmodulated wave. This indicates a modulation of **65** percent.

(18) If the modulated phone power output reading equals that specified in table XV, and if, with an audio **oscillator** output of .30 volt, wave height H1 is **1.65** times as high as wave height H2, without distortion, then the performance of the transmitter is satisfactory.

* * * * *

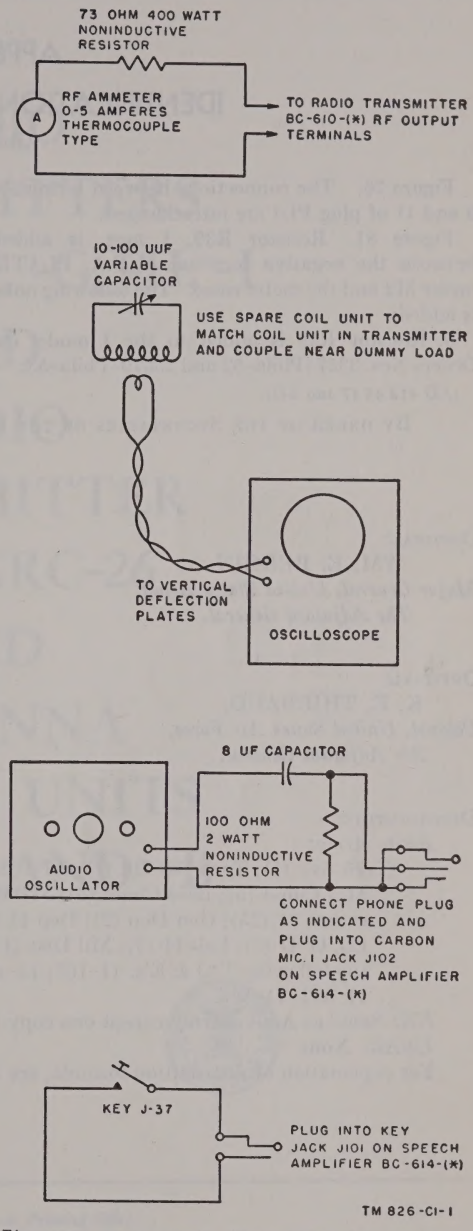


Figure 72. (Superseded). *Test equipment connections.*

APPENDIX II

IDENTIFICATION TABLE OF PARTS

(Rescinded)

Figure 76. The connections between terminals 9 and 11 of plug PL4 are interchanged.

Figure 81. Resistor R39, 1 meg, is added between the negative terminal of P.A. PLATE meter M2 and the meter case. The following note is added:

5. Resistor R39 is added to the I model on Orders Nos. 3357–Phila–52 and 25679–Phila–53.

Figure 97. The connection is deleted between terminals 6 and 8 on terminal strip TS13, and a connection is added between terminals 4 and 8 of TS13. Resistor R39, 1 meg, is added between the negative terminal of meter M2 and the meter case. The following note is added:

1. Resistor R39 is added to the I model on Orders Nos. 3357–Phila–52 and 25679–Phila–53.

[AG 413.44 (7 Jan 54)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

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USAR: None

For explanation of distribution formula, see SR 310–90–1.

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T.O. 31R2-3SCR399-21

TM 11-826

This manual supersedes TM 11-4057, 21 December 1945, including C 1, 7 March 1949; the portion of TM 11-281, 31 March 1945, which pertains to theory and field maintenance of Radio Transmitter BC-610-E; and TB SIG 220, 16 March 1949.

RADIO TRANSMITTERS BC-610-E, -F, -G, -H, -I AND RADIO TRANSMITTER T-213/GRC-26 AND ANTENNA TUNING UNITS BC-939-A AND -B

United States Government Printing Office
Washington : 1952

DEPARTMENTS OF THE ARMY AND
THE AIR FORCE
WASHINGTON, 25, D. C., *8 October 1952*

TM 11–826 is published for the information and guidance of all concerned.
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WARNING

HIGH VOLTAGE

is used in the operation
of this equipment.

DEATH ON CONTACT

may result if personnel fail
to observe safety precautions.

Be careful not to contact high-voltage connections or 115-volt input connections when installing or operating this equipment.

When working inside the equipment, after the power has been turned off, always short-circuit the high-voltage capacitors.

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:
Antenna Tuning Unit BC-939-(*)
Radio Transmitter BC-610-(*)



RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

TREATMENT.

a. Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only,* remove the victim to another location, but no farther than is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(*1*) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(*2*) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib;

(*3*) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim;

(*4*) the operator's elbows are straight and locked.

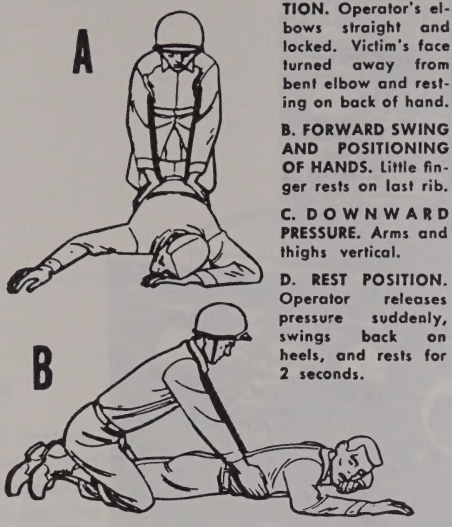
f. The resuscitation procedure is as follows:

(*1*) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(*2*) Swing back, suddenly releasing pressure, and sit up on the heels.

(*3*) After 2 seconds rest, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4

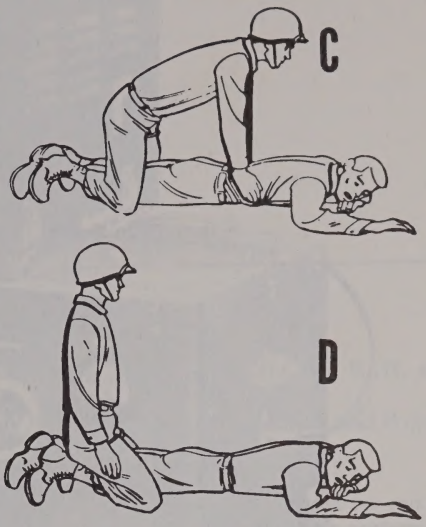


A. CORRECT POSITION. Operator's elbows straight and locked. Victim's face turned away from bent elbow and resting on back of hand.

B. FORWARD SWING AND POSITIONING OF HANDS. Little finger rests on last rib.

C. DOWNWARD PRESSURE. Arms and thighs vertical.

D. REST POSITION. Operator releases pressure suddenly, swings back on heels, and rests for 2 seconds.



seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.

h. Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

RELIEVING OPERATOR.

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

STIMULANTS.

a. If an inhalant stimulant is used, such as aromatic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

b. After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing ½ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

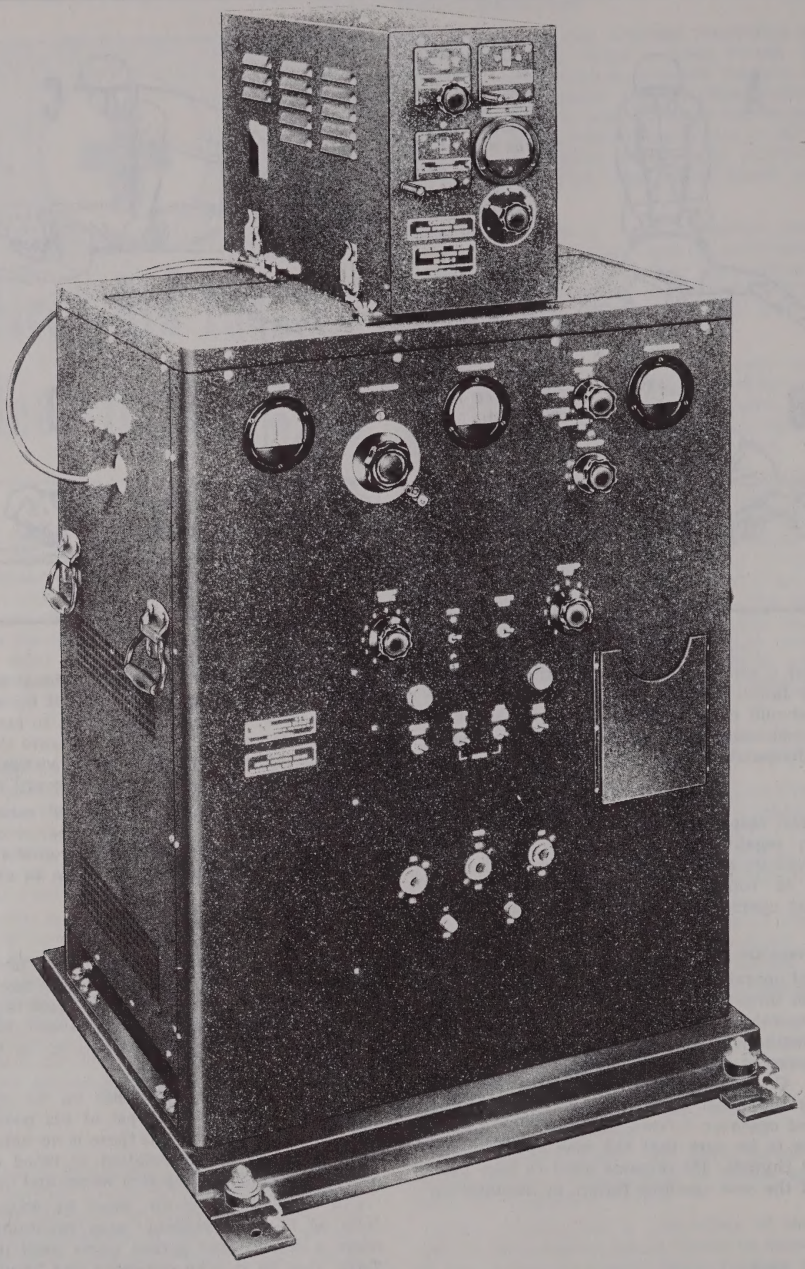
CAUTIONS.

a. After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

b. keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim must be watched carefully as he may suddenly stop breathing. *Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.*

TL 15338-E



TM624-204

Figure 1. Radio Transmitter BC-610-I with Antenna Tuning Unit BC-939-B in position.

This manual supersedes TM 11-4057, 21 December 1945, including C 1, 7 March 1949; the portion of TM 11-281, 31 March 1945, which pertains to theory and field maintenance of Radio Transmitter BC-610-E; and TB SIG 220, 16 March 1949

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains instructions for the installation, operation, maintenance, and repair of Radio Transmitters BC-610-E, -F, -G, -H, -I; Radio Transmitter T-213/GRC-26 (figs. 1 and 2); and Antenna Tuning Units BC-939-A and -B (fig. 3). In addition to these instructions there are two appendixes covering a list of references and an identification table of parts.

b. Official nomenclature followed by (*) is used to indicate the following models of equipments referred to in this manual:

Amplifier AM-141(*)/MRC: Basic, A, and B models.

Antenna Tuning Unit BC-939-(*): A and B models.

Control Unit C-292(*)/TRA-7: Basic, A, and B models.

Power Unit PE-95-(*): All models.

Radio Receiver BC-312-(*): All models.

Radio Receiver BC-342-(*): All models.

Radio Set AN/GRC-26(*): Basic and A models.

Radio Set AN/MRC-2(*): Basic, A, and B models.

Radio Sets SCR-399-(*) and SCR-499-(*): A and B models.

Radio Transmitter BC-610-(*): E through I models and T-213/GRC-26.

Rectifier RA-63-(*): Basic, and A through E models.

Speech Amplifier BC-614-(*): E, H, and I models.

Telephone EE-8-(*): Basic, A, and B models.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army materiel and equipment.

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army) and AFR 71-4 (Air Force).

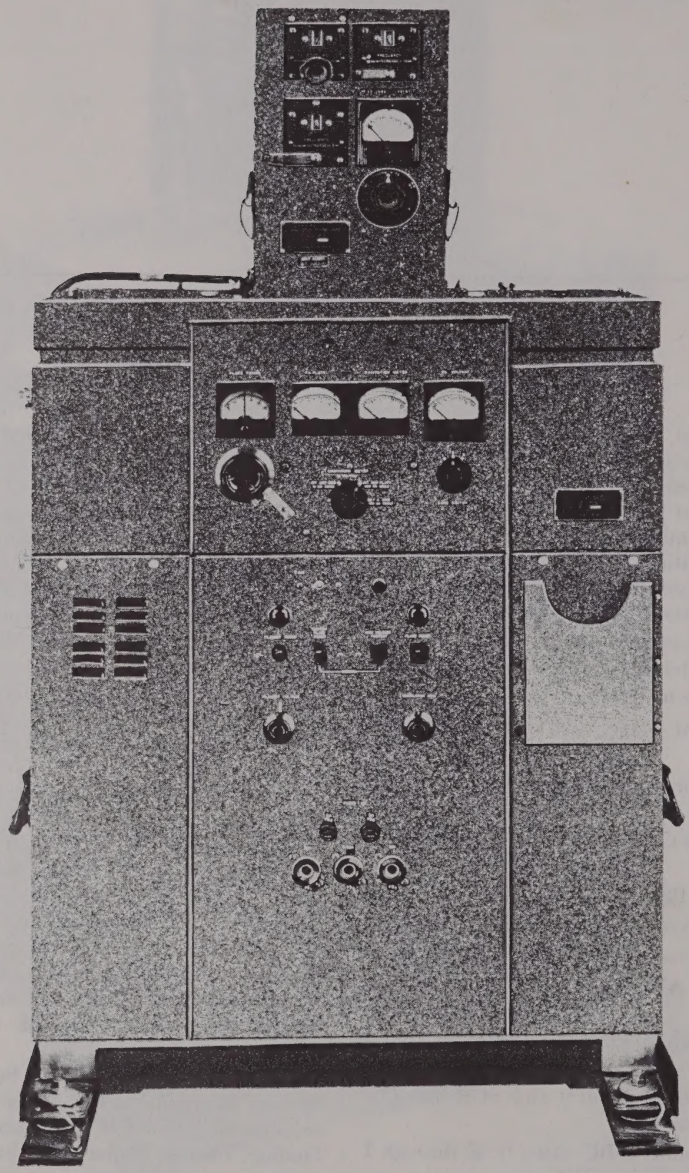
b. DA Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer as prescribed in SR 700-45-5.

c. AF Form 54, Unsatisfactory Equipment Report, will be filled out and forwarded to Commanding General, Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700-45-5 and AFR 65-26.

d. DA AGO Form 11-238, Operator First Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar), will be prepared in accordance with instructions on the back of the form.

e. DA AGO Form 11-239, Second and Third Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar), will be prepared in accordance with instructions on the back of the form.

f. Use other forms and records as authorized.



TL15940

Figure 2. Radio Transmitter BC–610–E with Antenna Tuning Unit BC–939–A in position.

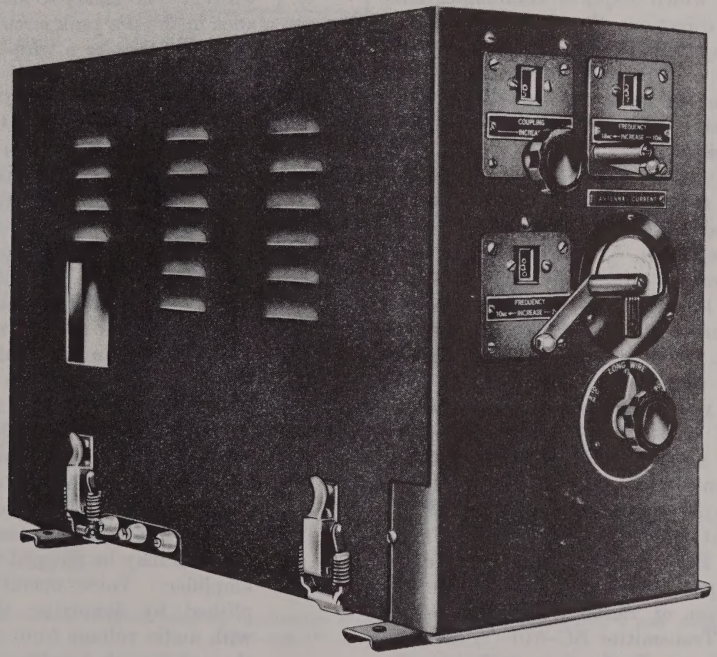
Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Radio Transmitter BC–610–(*) is a medium power r-f (radio-frequency) transmitter which will transmit a-m (amplitude-modulated) or c-w (continuous-wave) signals over a range of more than 100 miles. The frequency range of the transmitter is 2 to 18 mc (megacycles). This frequency range is covered by means of eight plug-in tuning units, seven plug-in coil units, and a plug-in vacuum capacitor. Each tuning unit and associated coil unit, or coil unit with capacitor, covers a portion of the range. (See table I.) The transmitter frequency is controlled by the master oscillator or the crystal oscillator, depending upon the position of the M.O.-XTAL switch on the tuning unit. At frequencies below 8 mc, the power output of the transmitter exceeds 400 watts on cw, and 300 watts on voice or mcw (modulated continuous waves). The power output is somewhat less at the higher frequencies than at the lower ones. The transmitter will operate satisfactorily with input power of 1,700 to 2,000 watts from a 115-volt, 50- to 60-cycle a-c (alternating current) source.

b. Radio Transmitter BC–610–(*) also may be used for transmitting RTT (radioteletype) signals on an FS (frequency-shift) basis. For this type of operation, an external r-f exciter unit is used instead of the oscillator section of the transmitter. Signals from the exciter unit are connected to the oscillator section of the transmitter through the crystal socket of the transmitter tuning units. The exciter unit shifts the frequency of the transmitter r-f output in accordance with the TT (teletypewriter) signal input to the exciter unit.

c. Radio Transmitter BC–610–(*) may be used in mobile operation or in a fixed station. A doublet antenna, cut to the proper length to match the operating frequency, should be used for fixed station operation. For mobile operation, a whip antenna and Antenna Tuning Unit BC–939–(*) are used. Antenna Tuning Unit



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Figure 3. Antenna Tuning Unit BC–939–B.

BC–939–(*) is designed to match the impedance of the transmitter p-a (power-amplifier) stage to that of the antenna when a whip or long-wire antenna is used. The antenna tuning unit connects to the transmitter by a coaxial cable. A meter on the front panel of the antenna tuning unit measures r-f current; maximum current indicates optimum impedance match between the transmitter and the antenna.

4. System Application

a. General.

(1) The usefulness of Radio Transmitter BC–610–(*) as a single unit is limited to the sending of code (c-w) signals by interrupting the r-f carrier. To allow different types of intelligence to be placed on the r-f carrier, the transmitter must be incorporated into a radio system where it becomes a basic component, has accessories, and works in conjunction with other major components.

(2) Generally, this transmitter is used in a system which requires communications in both directions, therefore necessitating receiving equipment. Such systems contain a control section to coordinate operation of both the transmitting and the receiving gear, and to insure efficient and rapid control.

(3) Radio systems are portions of networks, similar to telephone systems, and often are used to replace or supplement telephone systems. The amount of traffic a system will carry and the type of intelligence to be sent are the biggest factors in determining the complexity of the system. Some systems, for example, will handle only c-w signals. Others may handle voice, facsimile, or teletypewriter signals. It is possible for one system to handle several or all of these types of communications.

(4) Radio systems are designed to operate in different frequency ranges. Radio Transmitter BC–610–(*) is used with equipment operating in a range of 2 to 18 mc. Examples of radio systems in which Radio Transmitter BC–610–(*) is incorporated are Radio Sets SCR–399–(*), SCR–499–(*), AN/GRC–26(*), and AN/MRC–2(*). Application in each of these systems will be described briefly in *b* through *d* below. Although these systems are representative of the uses of Radio Transmitter BC–610–(*), they do not constitute all possible uses.

b. Radio Set AN/GRC–26(*).

(1) Radio Set AN/GRC–26(*) is primarily intended for RTT communications at locations near the front lines. The approximate range of the equipment is 250 miles and operation is either fixed or mobile.

(2) A block diagram of Radio Set AN/GRC–26(*) utilizing Radio Transmitter BC–610–(*) as a basic component is shown in A of figure 4. The output frequency of the transmitter is controlled by an external FS exciter in accordance with the teletypewriter intelligence being conveyed. A-m may be placed on the carrier of the transmitter simultaneously with FS RTT signals. C-w operation is possible in emergency.

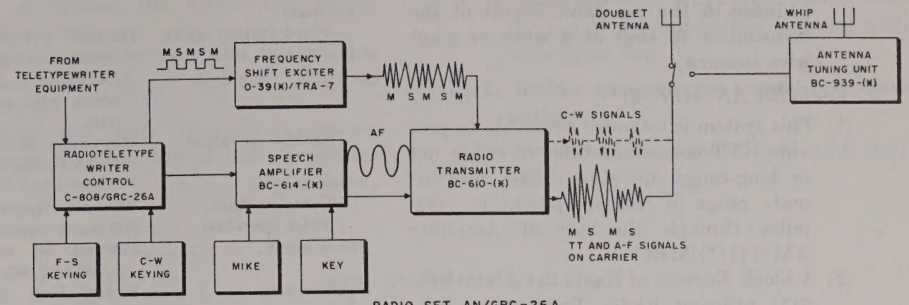
(3) Antenna Tuning Unit BC–939–(*) is used when it is necessary to match the impedance in the p-a tank circuit of the transmitter to that of a whip or a long-wire antenna.

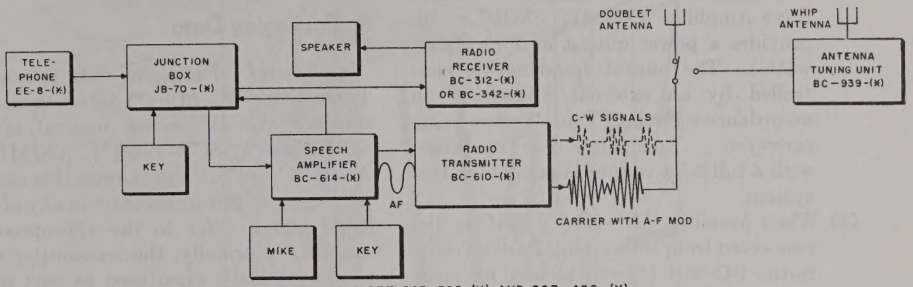
c. Radio Sets SCR–399–(*) and SCR–499–(*).

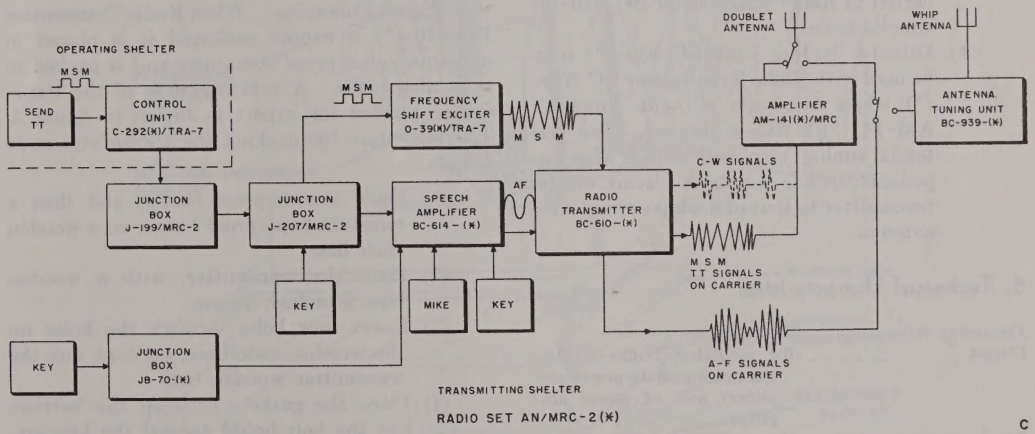
(1) Radio Sets SCR–399–(*) and SCR–499–(*) are designed for voice or c-w communication at locations near the front lines. The approximate range is 250 miles for c-w and 100 miles for voice. Both of these radio sets are basically the same; Radio Set SCR–399–(*) is used as a mobile station and Radio Set SCR–499–(*) is used as a fixed station.

(2) A block diagram of Radio Sets SCR–399–(*) and SCR–499–(*) utilizing Radio Transmitter BC–610–(*) as a basic component is shown in B of figure 4. For c-w operation, the transmitter is keyed with Key J–37 which is cabled through Junction Box JB–70–(*) and Speech Amplifier BC–614–(*) to the transmitter. The key also may be plugged into the speech amplifier. Voice operation is accomplished by supplying the transmitter with audio voltage from the microphone through Speech Amplifier BC–614–(*).

(3) Antenna Tuning Unit BC–939–(*) is used when it is necessary to match the im-







NOTES:
1. M AND S STAND FOR MARK AND SPACE.
2. TT STANDS FOR TELETYPEWRITER.
3. F-S STANDS FOR FREQUENCY-SHIFT
4. C-W STANDS FOR CONTINUOUS-WAVE.

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Figure 4. Simplified block diagram showing application of Radio Transmitter BC-610-(*) and Antenna Tuning Unit BC-939-(*) in radio systems.

pedance in the p-a tank circuit of the transmitter to that of a whip or long-wire antenna.

d. Radio Set AN/MRC–2(*).

(1) This system is intended primarily to provide RTT communications in either net or long-range operation. The approximate range of this equipment is 1,000 miles through the use of Amplifier AM–141(*)/MRC.

(2) A block diagram of Radio Set AN/MRC–2(*) utilizing Radio Transmitter BC–610–(*) as a basic component is shown in C of figure 4. The transmitter is used to drive Amplifier AM–141(*)/MRC which provides a power output of 2 kw (kilowatts). The output frequency is controlled by an external FS exciter in accordance with the TT intelligence being conveyed. Emergency c-w operation with a full 2-kw output is possible in this system.

(3) When Amplifier AM–141(*)/MRC is disconnected from the system, Radio Transmitter BC–610–(*) may be used for voice operation. The characteristics of FS RTT signals allow am to be placed on the carrier of Radio Transmitter BC–610–(*) simultaneously.

(4) Antenna Tuning Unit BC–939–(*) may be used with Radio Transmitter BC–610–(*) when operation without Amplifier AM–141(*)/MRC is desired. The antenna tuning unit will match the impedance in the p-a tank circuit of the transmitter to that of a whip or long-wire antenna.

5. Technical Characteristics

Frequency range	2.0 to 18 mc.
Circuit	R-f oscillator, buffer-doubler, ipa (intermediate-power amplifier), and r-f power amplifier.
Types of signals transmitted.	C-w, voice, and RTT.
Distance range:	
C-w	250 miles.
Voice and RTT	100 miles.
Type of modulation	Amplitude and FS (simultaneously in an emergency).
Required audio-input level.	17 volts.
Number of tubes	16.
Antennas:	
Fixed station operation.	Doublet antenna of proper length to match operating frequency. Long-wire antenna with antenna tuning unit.
Mobile operation	Whip-type antenna with antenna tuning unit.
Power output:	
C-w operation	400 watts (approximately).
Voice operation	300 watts (approximately).
Power input	115-volt, 50- to 60-cycle ac, 1,700 to 2,000 watts.
Power source	Power Unit PE–95–(*) or commercial source.
Weight	401 pounds.

6. Packaging Data

a. General. Packaging data relevant to Radio Transmitter BC–610–(*) is contained in the respective over-all system manual of Radio Set SCR–399–(*), SCR–499–(*), AN/MRC–2(*), or AN/GRC–26(*). For information concerning the packaging of this transmitter in any of the systems listed above, refer to the appropriate technical manual. Normally, the transmitter is not packaged separately when used as part of the above system; it is bolted to the deck of the transmitting shelter and the connecting cables are installed.

b. Export Packaging. When Radio Transmitter BC–610–(*) is export packaged it is placed in moisture-vapor proof containers and is packed in a wooden crate. A cutaway view of the transmitter packed for export is shown in figure 5. The procedure for packing the transmitter is as follows:

(1) Place a waterproof barrier and then a moisture-vaporproof barrier on a wooden crate base.

(2) Place the transmitter, with a wooden base attached, on top.

(3) Insert four bolts through the holes on the wooden crate base, barriers, and the transmitter wooden base.

(4) Place the gaskets between the barriers (at the bolt holes) to seal the barriers.

(5) Bolt the transmitter to the base.

(6) Cover all handles, knobs, switches, and meters with wadding and hold it in place with tape.

(7) Cover the entire front panel with 1-inch thick sheet of wadding.

(8) Run steel bands between the two wooden bases and over the top of the transmitter

to strengthen the transmitter to its wooden base.

(9) Fill the space between the two wooden bases with bags of desiccant, such as silica gel.

(10) Raise the inner moisture-vaporproof barrier over the top of the transmitter and heat-seal.

(11) Raise the outer waterproof barrier over the top of the transmitter and seal with waterproof tape.

(12) Build a wooden crate around the transmitter.

(13) Strengthen the wooden crate with steel bands.

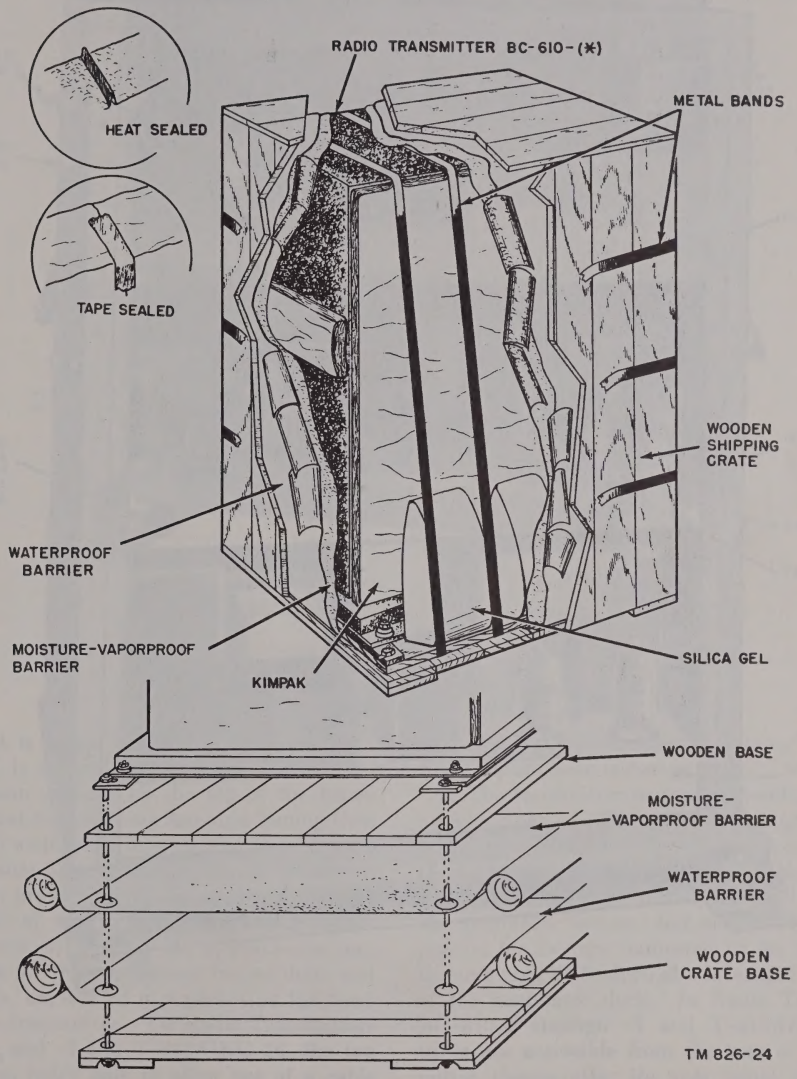


Figure 5. Packaging for export.

7. Description of Transmitter

a. The transmitter assembly is made up of three chassis (figs. 6 and 7). The top chassis (figs. 8 and 9) is referred to as the *r-f deck* and includes all of the r-f components. The center section is called the *modulator deck* since it contains most of the audio and modulator equipment. The bottom chassis includes the h-v (high-voltage) power supply and overload relay; it is called the *power supply deck*. The three chassis are assembled in a sheet steel cabinet with a front panel upon which the external controls and metering instruments are mounted (figs. 1 and 2).

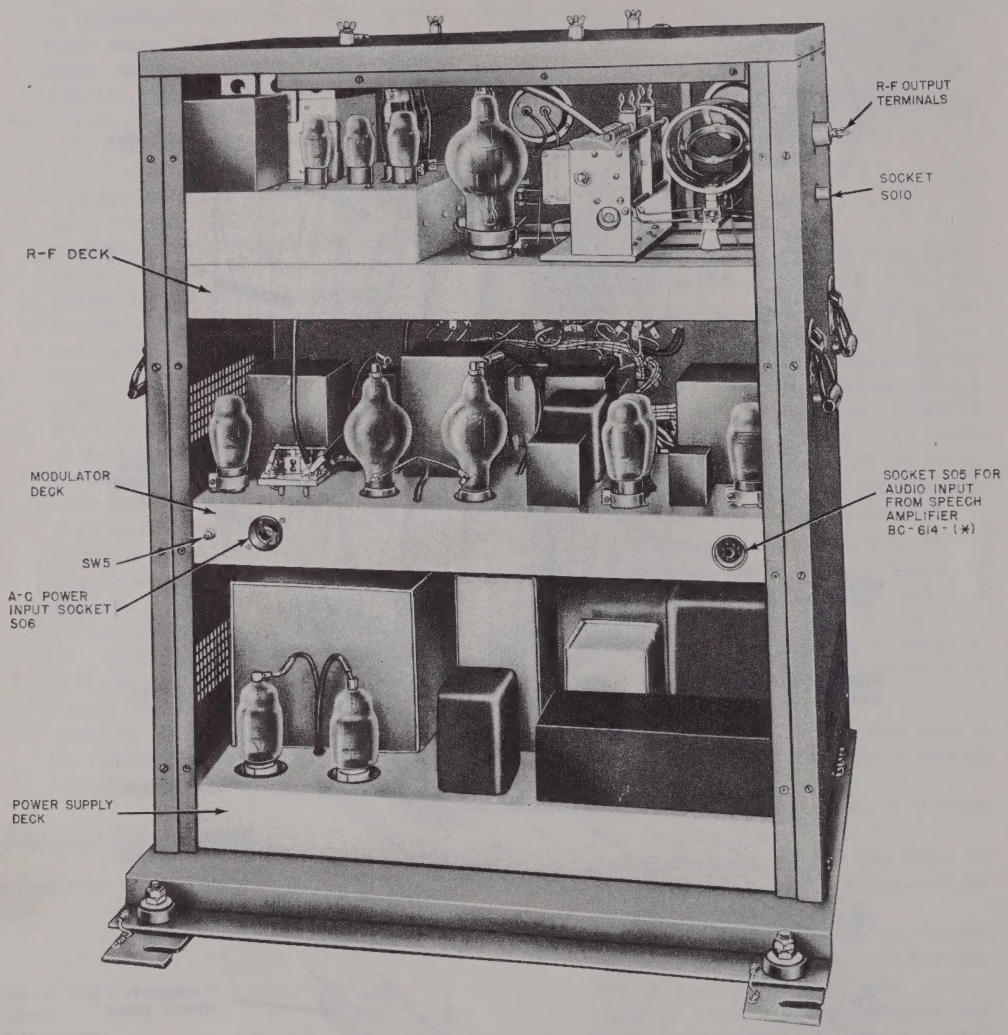


Figure 6. Radio Transmitter BC-610-I, rear view.

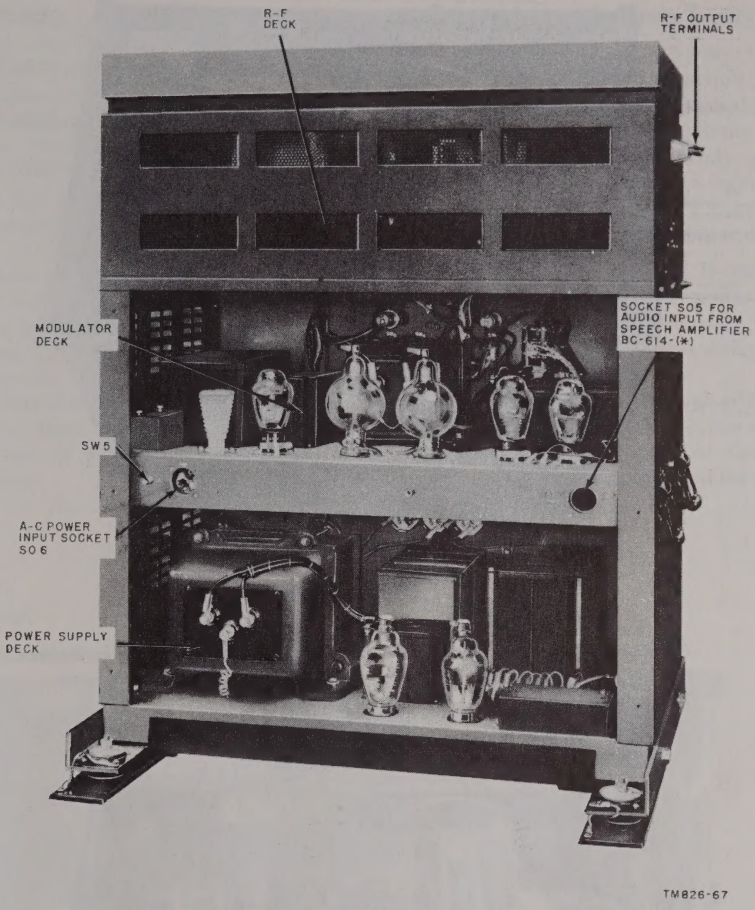


Figure 7. Radio Transmitter BC–610–E, rear view.

The cabinet is bolted to a shock-mounted base. The weight is approximately 400 pounds.

b. Provision is made on the top of the transmitter cabinet for mounting Antenna Tuning Unit BC–939–(*) with four wingnuts (fig. 1). The top panel of Radio Transmitter BC–610–(*) has two doors which provide quick and easy removal and replacement of the r-f coil and tuning units. Tuning charts, which show the approximate control settings for the transmitter tuning units and r-f coil units, are located in a pocket on the front panel of the transmitter. On Radio Transmitters BC–610–H, and –I and T–213/GRC–26, the top panel has an entry hole to allow use of a cable which feeds the r-f output of a FS exciter to the crystal socket in any one of the tuning units when RTT transmission is desired.

c. The transmitter requires 115-volt, 50- to 60-cycle, a-c power. This power is brought from the power source by Cord CD–763 and is connected to the a-c power plug (SO6) located at the rear of the modulator deck (figs. 6 and 7). Audio input to the modulator section, and also the keying connection for cw, are connected to the transmitter through plug SO5 which also is located at the rear of the modulator deck. In Radio Transmitters BC–610–F through –I and T–213/GRC–26, all tubes are accessible from the rear of the transmitter chassis after the rear panel is removed. On Radio Transmitter BC–610–E, the tubes on

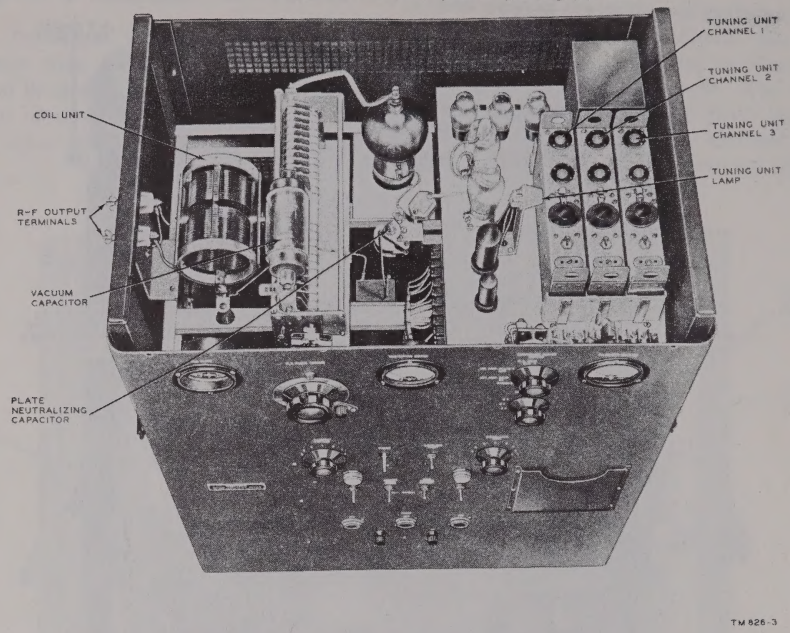


Figure 8. Radio Transmitter BC-610-I with top removed; top view of exciter deck.

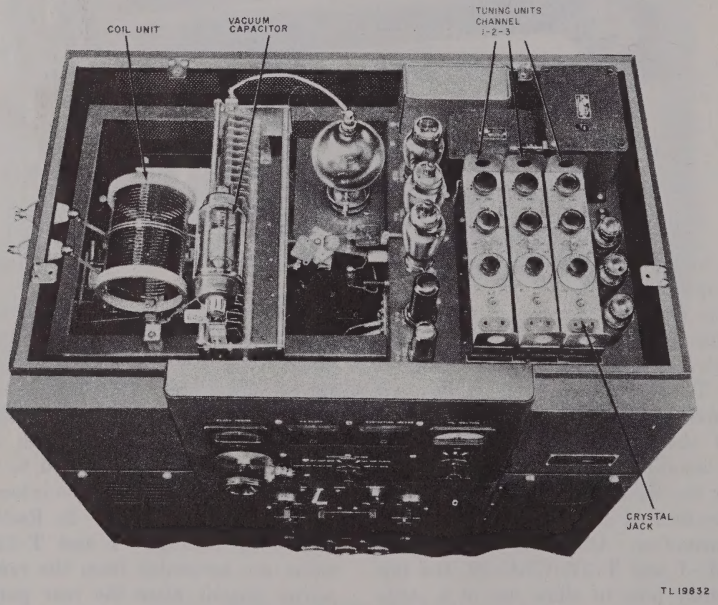


Figure 9. Radio Transmitter BC-610-E with top removed; top view of exciter deck.

the modulator deck and the h-v supply deck are accessible when the rear panel is removed, and the tubes on the r-f deck are accessible after the top panel is removed.

d. Radio Transmitters BC–610–E through –I, have r-f output terminals located on the side panel of the transmitter (fig. 16). In the E, F, and G models, these terminals are used for connection to the doublet antenna or to Antenna Tuning Unit BC–939–(*). In the H and I models, the r-f output terminals are used only for connection to the antenna, and a separate connection (socket SO10), located below the r-f terminals, is provided for feeding the r-f to the antenna tuning unit. Radio Transmitter T–213/GRC–26 has a socket similar to SO10 in place of the r-f output terminals. The removable back cover has entry holes to allow connection of cables to sockets SO5 and SO6 in all models.

8. Description of Antenna Tuning Unit

Antenna Tuning Unit BC–939–(*) (fig. 3) consists of coils, capacitors, a switch, and a meter assembled in a black crackle-finished metal cabinet. It is mounted on top of Radio Transmitter BC–610–(*) (fig. 2) and is firmly secured to the transmitter by means of four wingnuts.

9. Description of Minor Components

a. Cord CD–763. Cord CD–763 is used to connect the transmitter a-c power input socket (SO6) to the a-c power source. This two-conductor, rubber-covered cord is designed for heavy duty usage.

b. R-F Coil Units. Seven plug-in r-f coil units are provided to enable the r-f power amplifier to cover the frequency range of the transmitter. Each coil unit covers a portion of the range (fig. 10).

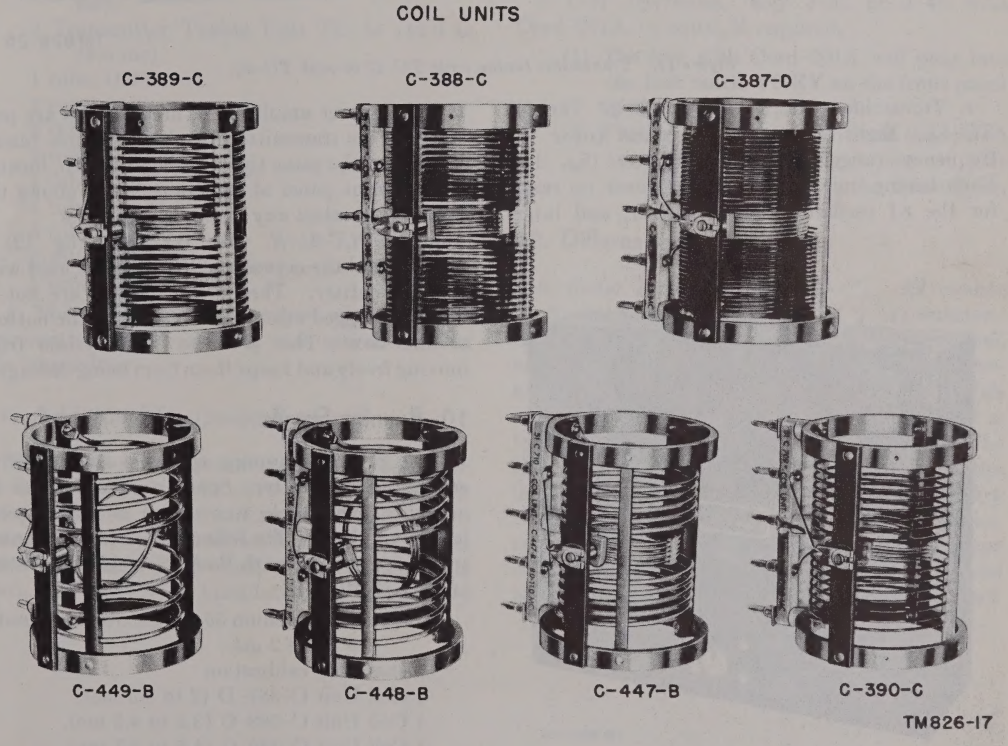
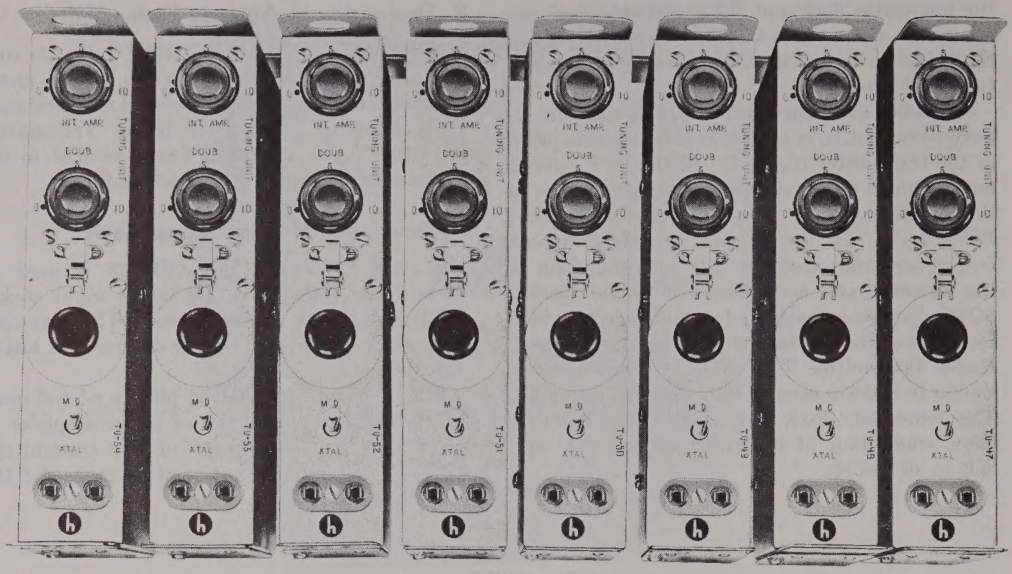


Figure 10. R-f coil units.

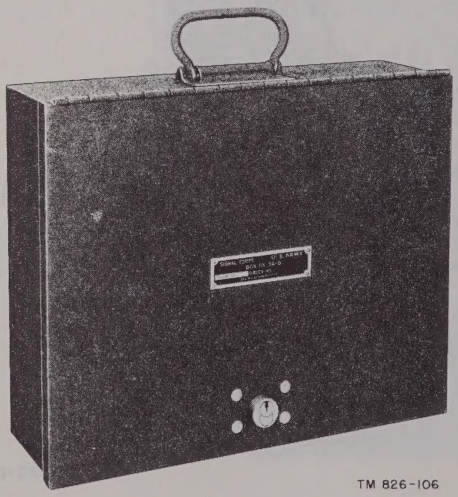


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Figure 11. Transmitter tuning units TU–47 through TU–54.

c. Transmitter Tuning Units TU–47 Through TU–54. Eight plug-in tuning units cover the frequency range of the transmitter (fig. 11). Each tuning unit provides tuning over its range for the r-f oscillator, buffer-doubler, and intermediate power amplifier. Three sockets are provided in the transmitter for plugging three tuning units in at the same time. A band switch, located on the front panel of the transmitter, allows the operator to select any of the tuning units.

d. Box BX–34–B. Box BX–34–B (fig. 12) is used to hold the crystals which are to be used with the transmitter. The crystals, which are not in use, are plugged into sockets built into the bottom of the box. This prevents the crystals from moving freely and keeps them from being damaged.



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Figure 12. Box BX–34–B.

10. Running Spares

a. A group of running spares is supplied with each radio transmitter. Spares are provided for all normally expendable items such as tubes, pilot lamps, and fuses. The following is a list of running spares as provided with Radio Sets AN/GRC–26A and AN/MRC–2B:

1 capacitor, vacuum 55 $\mu\mu$f (micromicrofarad), -5 $\mu\mu$f $+2$ $\mu\mu$f.
1 chart set, calibration.
1 Coil Unit C–387–D (2 to 3.5 mc).
1 Coil Unit C–388–C (3.5 to 4.5 mc).
1 Coil Unit C–389–C (4.5 to 5.7 mc).
1 Coil Unit C–390–C (5.7 to 8.0 mc).

1 Coil Unit C–447–B (8.0 to 11.0 mc).
1 Coil Unit C–448–B (11.0 to 14.0 mc).
1 Coil Unit C–449–B (14.0 to 18.0 mc).
6 Fuse FU–50, cartridge, 3-amp, 250-v, 3AG.
6 fuse, cartridge, 6-amp, 250-v, 3AG.
6 fuse, plug type, 20-amp, 125-v, screw base.
6 fuse, plug type, 25-amp, 125-v, screw base.
1 Lamp LM–27, .25-amp, 6- to 8-v.
2 lamp, 6–w, 120-v, candelabra screw base.
2 Transmitter Tuning Unit TU–47 (2.0 to 2.5 mc).
2 Transmitter Tuning Unit TU–48 (2.5 to 3.2 mc).
2 Transmitter Tuning Unit TU–49 (3.2 to 4.0 mc).
2 Transmitter Tuning Unit TU–50 (4.0 to 5.0 mc).
2 Transmitter Tuning Unit TU–51 (5.0 to 6.35 mc).
2 Transmitter Tuning Unit TU–52 (6.35 to 8.0 mc).
2 Transmitter Tuning Unit TU–53 (8.0 to 12.0 mc).
2 Transmitter Tuning Unit TU–54 (12.0 to 18.0 mc).
1 tube, OD3.
2 tube, 2A3.
2 tube, 3B28.
2 tube, 5Z3.
1 tube, 6L6Y.
1 tube, 6V6Y.
2 tube, 807.
2 tube, 100TH.
1 tube, 250TH.

b. The running spares supplied with the radio transmitter might vary with each procurement of the transmitter.

11. Additional Equipment Required

The additional equipment required for operation of Radio Transmitter BC–610–(*) depends on the type of service to be performed. More specific information may be obtained from the manual for an over-all system of which the transmitter is a part. In all types of installations, it is necessary to have an a-c power source of 110 to 115 volts ac, 2,000 watts minimum, and an antenna system. For fixed operation the antenna should be a doublet, although a long wire may be used. For mobile operation the antenna must be whip-type. Antenna Tuning Unit BC–939–(*) must be used when operating with either a long-wire or whip antenna. The following basic equipment is required for voice or c-w operation of the transmitter:

a. Voice Operation.

(1) Speech Amplifier BC–614–(*) or its equivalent must be provided to supply the modulator section of the transmitter with an audio voltage of 17 volts minimum.
(2) A cable assembly is needed to connect the speech amplifier to the transmitter.
(3) Carbon Microphone T–17, T–45, or equal; or dynamic Microphone T–50, or equal, must be provided for use with the speech amplifier.

b. C-W Operation. Key J–37 or J–45 with Cord–201A, or equal, is required.

(1) The key with Cord–201A will plug into the jack marked KEY on the front panel of the speech amplifier.
(2) The key may be used without the speech amplifier by connecting it between pins 2 and 8 of socket SO5 on the transmitter.

12. Differences in Models

a. Radio Transmitter BC–610–(*). All models of Radio Transmitter BC–610–(*) are substantially the same except for minor external, electrical, and mechanical differences. The external appearance of the F, G, H, I, and T–213/GRC–26 models is similar, and figure 1 may be considered as a typical front panel view of all these models. The E model differs in external appearance from the later models in that it has a slightly different cabinet (fig. 2). Certain components in the earlier models have been replaced with JAN-type components. Specific differences in circuits and components are detailed in the circuit theory

chapter (ch. 5) and are illustrated on the over-all schematic diagrams of each model (figs. 78 to 83). The over-all differences between the models of the transmitter are given in the chart below.

Item	Radio Transmitter BC-610-E	Radio Transmitter BC-610-F, -G, -H, -I, and T-213/GC-26
Meters	All meters have zero-adjust screws. M1 is a multiscale current indicator which reads the plate current of V9, the grid and plate current of V10, and the grid current of V16 directly.	All meters are hermetically sealed and have no zero-adjust screws. M1 is a single scale circuit indicator which reads the same circuit currents as the E model. Actual current readings are those indicated on the meter multiplied by the factor shown at the respective switch positions of SW8.
Final tuning dial	Final tank capacitor tuning dial is a recessed, illuminated, gear-driven dial.	Final tank capacitor tuning dial is a direct coupled type, needing no illumination.
Chassis interconnection	Chassis and front panel are interconnected by means of Jones type plugs and sockets.	Chassis and front panel are interconnected by means of cables running to terminal boards.
Exciter power supply	T4, L1, C16, V12, R4, and R10 are located in r-f section; T5 and RY1 are located in modulator section.	T4 is located in r-f section; T5, L1, C16, C17, V12, R4, and R10 are located in modulator section. RY1 is located in the power supply section.
Transformers and chokes	T6 has a single, tapped primary winding.	T6 has a dual, tapped primary winding.
Switches	SW1 is a SPST switch	SW1 closes both sides of the input a-c line and is a DPST switch.
	SW4 is a SPST switch	SW4 is a DPDT switch.
	SW12 is a push-button type switch	SW12 is a momentary-type toggle switch.
Lamps	LM1 is used to illuminate the final tank capacitor dial.	LM1 is omitted.
High-voltage protect function.	Resistor R19, a 16-ohm, 600-watt heater element, is connected in series with the primary winding of transformer T6 and reduces the plate voltage applied to p-a tube V16 during tune-up operations.	In the F, G, T-213/GRC-26, and early H models, SW4 connects the dual primary windings of transformer T6 in series during tune-up (PROTECT) operations, thereby reducing the voltage applied to a p-a tube V16. In the I and late H models, resistor R37, an 11-ohm 300-watt resistor, is connected in series with the primary winding of T6, thereby reducing the plate voltage applied to p-a tube V16.

b. Antenna Tuning Unit BC-939-(*). There is no electrical difference between the A and B models of the antenna tuning unit covered in this manual. A slight mechanical difference appears on the cabinets, in that the B model has the fasteners for the cabinet in a lower position than the A model. Also, the cabinet and antenna binding post are slightly different in the two models and have separate Signal Corps stock numbers.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF RADIO TRANSMITTER BC-610-(*)

13. Siting

(fig. 13)

a. External Requirements.

(1) The best location for radio equipment depends on the tactical situation and local conditions, such as the following: need to house the equipment where its shelter cannot be seen; type of housing available; possible installation in a vehicle; terrain; and need of easy access for messengers. Signals from Radio Transmitter BC-610-(*) have greater range if the antenna is high and clear of hills, buildings, cliffs, densely wooded areas, and other obstructions. Depressions, valleys, and other low places are poor locations for radio transmission

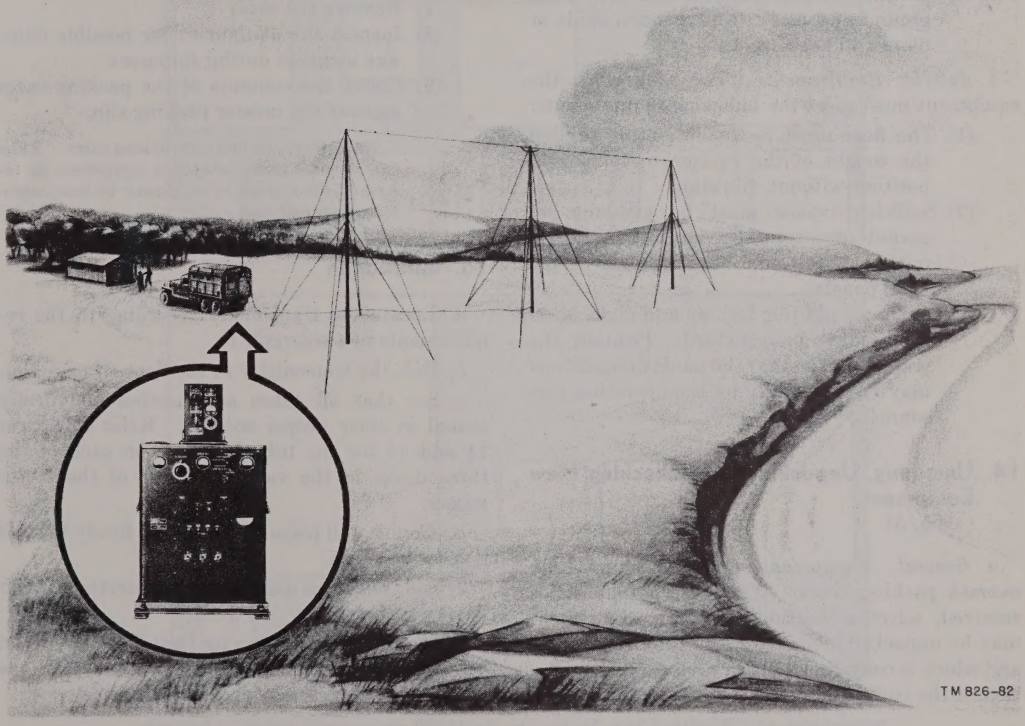


Figure 13. Transmitter siting.

because the surrounding high terrain absorbs r-f energy. Weak or otherwise undesirable signals may be expected if the transmitter is operated under or close to steel bridges, underpasses, or power lines. Choose, if possible, a location on a hilltop or elevation. Flat ground is desirable. Normally, transmission over water is better than over land. See that drainage is adequate to prevent flooding the interior of the shelter. In locating the antenna, avoid obstructions which are 2° or 3° above the horizontal plane of the antenna in the direction of the desired transmission. This is approximately 200 to 300 feet at a distance of 1 mile from the antenna.

(2) If a doublet or long-wire antenna is used, its directional characteristics should be considered. Every precaution should be taken to protect the transmitter from rain and dirt when it is set up in the open. If the installation is made on bare ground, raise the transmitter above the ground and block it on wooden skids or planks to keep the base dry.

b. Interior Requirements. The shelter for the equipment must meet the following requirements:

(1) The floor must be capable of sustaining the weight of the equipment in a level position without vibration.

(2) Sufficient space must be available to permit access to the rear of the transmitter and to allow the removal of the back panels.

(3) Adequate lighting for day and night operation must be provided. Position the transmitter so that the panel designations may be read easily by the operating personnel.

14. Uncrating, Unpacking, and Checking New Equipment

(fig. 5)

a. General. Equipment may be shipped in oversea packing cases. When the equipment is received, select a location where the equipment may be unpacked without exposure to the elements and which is convenient to the permanent installation of the equipment.

Caution: Be careful in uncrating, unpacking, and handling the equipment; it is damaged easily. If it becomes damaged or exposed, a complete overhaul might be required or the equipment might be rendered useless.

b. Step-by-Step Instructions for Uncrating and Unpacking Export Shipments.

(1) Place the packing case as near the operating position as convenient.

(2) Cut and fold back the metal bands.

(3) Remove the nails with a nail puller. Remove the top and sides of the packing case. Do not attempt to pry off the sides and top or the equipment may be damaged.

(4) Cut and fold back the metal bands on the interior pack.

(5) Remove the waterproof or moistureproof barrier, pads of corrugated fiberboard, and all cellulose wadding.

(6) Remove the nuts and bolts which hold the transmitter to the skid (wooden crate base).

(7) Remove the skid.

(8) Inspect the equipment for possible damage incurred during shipment.

(9) Check the contents of the packing cases against the master packing slip.

Note. Save the original packing cases. They can be used again when the equipment is repacked for storage or shipment to base maintenance repair shops.

15. Installation

a. Locate the transmitter according to the requirements of paragraph 13.

b. Bolt the transmitter to the floor (if possible).

c. See that all tubes are inserted and firmly seated in their proper sockets. Refer to figures 14 and 15 for the tube locations on each of the three decks in the various models of the transmitter.

d. Connect all plate and grid caps firmly to their respective tubes.

e. See that fuses and lamps are inserted in their proper sockets.

f. Mount Antenna Tuning Unit BC-939-(*) on the top of the transmitter and fasten with the four wing nuts provided with the transmitter.

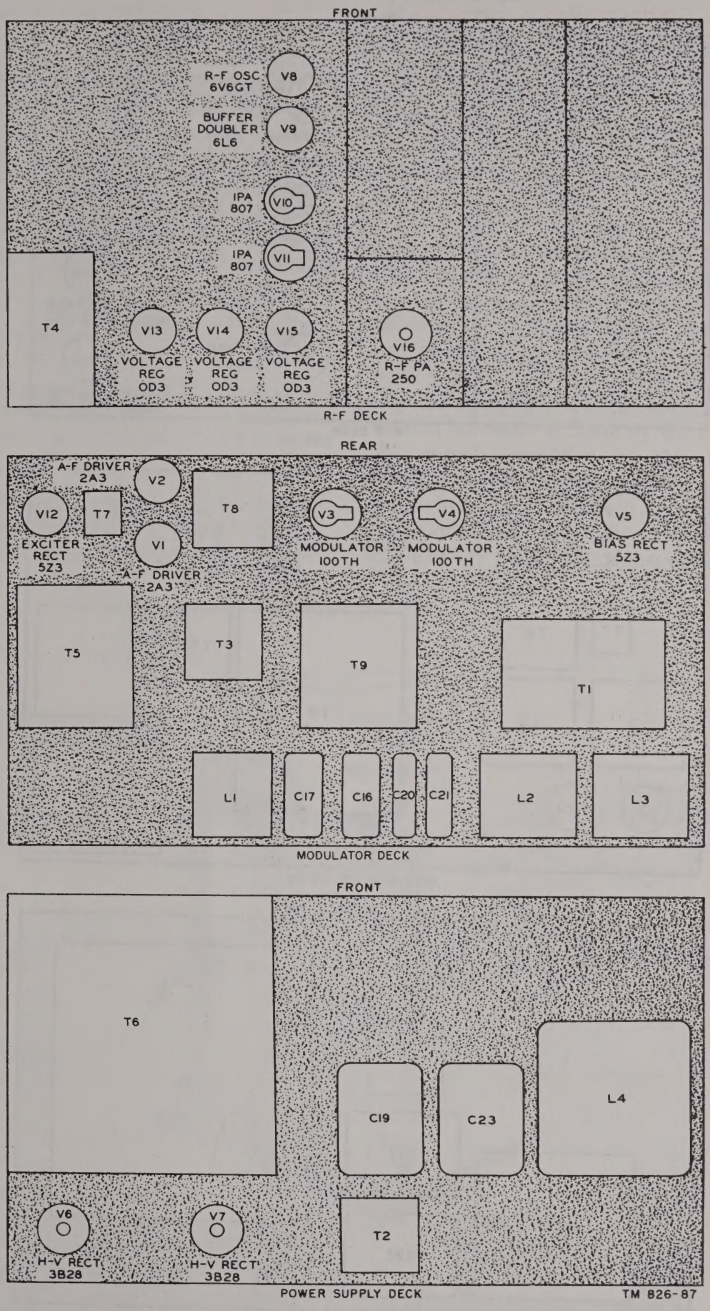


Figure 14. Radio Transmitters BC-610-F, -G, -H, -I, and T-213/GRC-26, tube location.

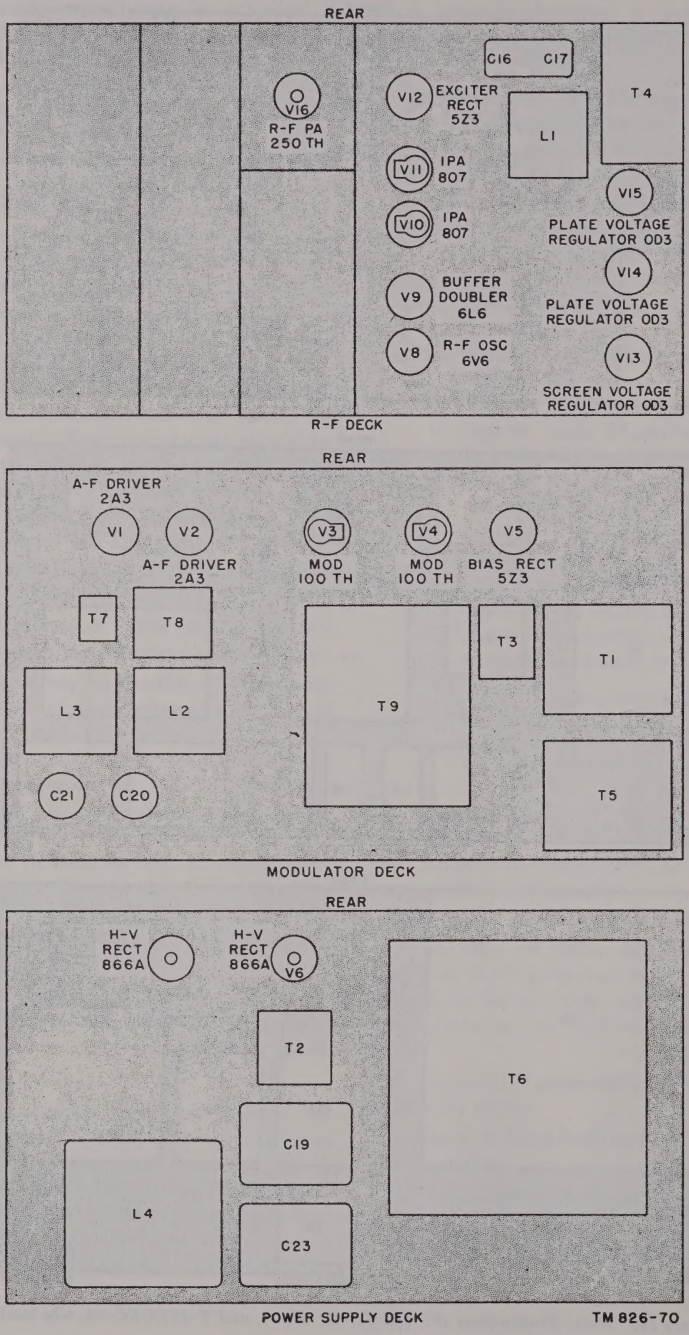


Figure 15. Radio Transmitter BC-610-E, tube location.

16. Connections

(fig. 16)

a. Radio Transmitter BC–610–(*) is used with Radio Sets AN/GRC–26(*), AN/MRC–2(*), SCR–399–(*), and SCR–499–(*). All connections, relative to this transmitter in any of these systems, are covered specifically in the manuals for the respective systems. For information concerning connections of the transmitter in any of these systems, the chart below lists the applicable technical manual.

System	Technical manual
Radio Set AN/GRC–26	TM 11–264
Radio Set AN/MRC–2(*)	TM 11–624
Radio Sets SCR–399–(*) and SCR–499–(*)	TM 11–281

b. A speech amplifier capable of delivering a signal of 17 volts across a 500-ohm load is necessary to drive the modulator section of the transmitter. The amplifier also must have provisions for supplying microphone current if a carbon microphone is used. The output of the speech amplifier is fed to pins 6 and 7 of socket SO5 (which is located at the rear of the transmitter modulator deck). Speech Amplifier BC–614–(*) normally is used with Radio Transmitter BC–610–(*).

c. To key the transmitter, provision must be made to key between pins 2 and 8 of socket SO5. The transmitter usually is keyed from the key jack located on the front panel of Speech Amplifier BC–614–(*) or from a control unit.

d. A milliammeter must be connected between pins 5 and 8 of socket SO5 to determine the amount of modulator cathode current. This connection normally is made by the cable connecting the speech amplifier to the transmitter. A MODULATOR PLATE current meter is located on the front panel of Speech Amplifier BC–614–(*)

e. Connection between Antenna Tuning Unit BC–939–(*) and the transmitter is made by

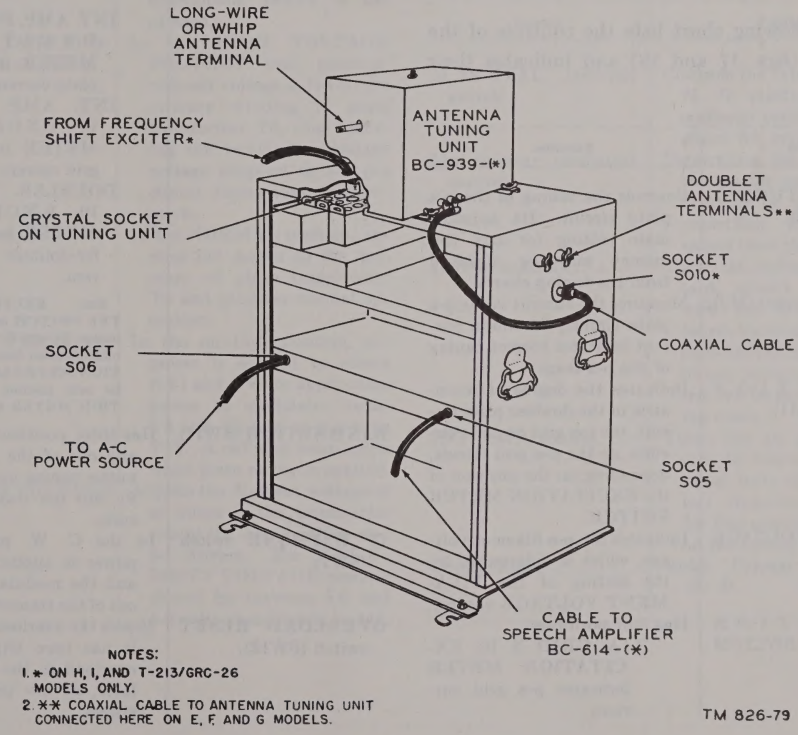


Figure 16. Radio Transmitter BC–610–(*) connections.

coaxial cable. On Radio Transmitters BC–610–E, –F, and –G, the cable to the antenna tuning unit is connected to the doublet antenna terminals (fig. 16). On Radio Transmitters BC–610–H, –I, and T–213/GRC–26, the cable to the antenna tuning unit is fastened to a coaxial connecter on the transmitter. The coaxial connecter is called socket SO10 on the H and I models; on the T–213/GRC–26 the socket does not have a reference symbol but is the same type as used on the H and I models. Connection of the coaxial cable to the antenna tuning unit is the same for all models of transmitters and antenna tuning units.

f. Connect the a-c power to the transmitter through socket SO6 which is located at the rear of the modulator deck (fig. 16).

17. Service upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 14 for uncrating, unpacking, and checking the equipment.

b. Check the used or reconditioned equipment for tags or other indications pertaining to changes in the wiring of the equipment. If any changes in wiring have been made, note the change in this manual, preferably on the schematic diagram applying to the model of equipment in question. Include the serial number of the modified equipment.

c. Check the operating controls for ease of rotation.

d. Perform the installation and connection procedures given in paragraphs 15 and 16.

Section II. CONTROLS AND INSTRUMENTS

18. Radio Transmitter BC–610–(*) Controls and Their Uses

a. The following chart lists the controls of the transmitter (figs. 17 and 18) and indicates their functions:

Control	Function
P. A. PLATE TUNING control (C12).	Controls the tuning of the p-a plate circuit. Its approximate setting for any frequency may be obtained from the tuning charts.
P. A. PLATE meter (M2).	Measures the current in the p-a plate circuit; minimum current indicates correct tuning of the p-a stage.
EXCITATION METER (M1).	Indicates the degree of resonance in the doubler plate circuit, the ipa grid or plate circuits, or the p-a grid circuit, depending on the position of the EXCITATION METER SWITCH.
FILAMENT VOLTAGE meter (M3).	Indicates the p-a filament voltage, which is determined by the setting of the FILAMENT VOLTAGE control.
EXCITATION METER SWITCH (SW8).	Has four positions: P. A. GRID X 10. EXCITATION METER indicates p-a grid current. INT. AMP. PLATE X 20. EXCITATION METER indicates ipa plate current. INT. AMP. GRID X 1. EXCITATION METER indicates ipa grid current. DOUBLER PLATE X 10. EXCITATION METER indicates buffer-doubler plate current. *Note.* EXCITATION METER SWITCH on Radio Transmitter BC–610–E does not show multiplication factor. EXCITATION METER has separate scale for each position of EXCITATION METER SWITCH.
BAND SWITCH (SW11).	Has three positions to connect any one of the three transmitter tuning units (fig. 8 or 9) into the transmitter circuits.
C. W.-PHONE switch (SW7).	In the C. W. position, full power is applied to the p-a and the modulator is taken out of the transmitter circuit.
OVERLOAD RESET switch (SW12).	Resets the overload relay when it has been tripped by an overload in the p-a, modulator, or h-v power supply stages.

Control	Function
FILAMENT POWER switch (SW1).	In the on (up) position, applies power to the filaments of all tubes in the transmitter and the primary of bias-supply transformer T1. The speech amplifier also is supplied with power if it is connected to the transmitter. A green pilot lamp is lighted when this switch is in the on position.
EXCITER PLATE POWER switch (SW3).	In the EXCITER PLATE POWER (up) position, grounds the keying line and applies power to the primary of exciter-rectifier transformer T5. The output of the exciter power supply furnishes the plate power to the r-f oscillator, buffer-doubler, and ipa stages.
	In the NORMAL position, plate power is removed from the keying line and exciter rectifier unless the key or microphone switch is depressed.
HIGH VOLTAGE PROTECT switch (SW4).	In the HIGH VOLTAGE PROTECT (up) position, reduced voltage is fed to the primary winding of plate transformer T6, thus reducing the rectified secondary voltage supplied to the p-a circuit during tune-up operation.
	In the NORMAL position, applies full power to the primary of plate transformer T6 and provides normal operation.
PLATE POWER switch (SW6).	In the on (up) position, a-c power is applied to relays RY1 and RY4 to apply plate power to modulator tubes V3 and V4 and to p-a tube V16. A red pilot lamp lights when plate power is applied.
FILAMENT VOLTAGE control.	Adjusts the filament voltage of all tubes in the transmitter except the bias rectifier and a-f drivers. The FILAMENT VOLTAGE reading should be between 5.0 and 5.3 volts as indicated on M3.
MODULATOR BIAS control.	Adjusts the value of bias on the modulator tube grids when the C. W.-PHONE switch is on PHONE.
FUSES, FS1, FS2, FS3, FS4, and FS5.	Fuses FS1 and FS2 (25A) are line fuses.
	Fuses FS3 (20A) protects the primary circuit of T6.
	Fuse FS4 (6A) (5A in E model) protects transformers T2, T3, T4, and T5.
	Fuse FS5 (3A) protects transformer T1 and T101 in the speech-amplifier power supply.

b. The following table lists the controls of the transmitter tuning units (fig. 19):

Control	Function
M. O.-XTAL (crystal) switch.	Controls the type of operation: M. O. position for master oscillator control, XTAL position for crystal control.
Mo (master oscillator) control.	Determines the frequency of the master oscillator. Calibrations on the dial allow presetting to values obtained from the tuning chart.
DOUB. control	Tunes the buffer-doubler plate tank circuit to resonance with the first, second, or fourth harmonic of the signal from the oscillator. Approximtate settings for this control can be found on the tuning chart.
INT. AMP. control	Tunes the ipa plate tank circuit to resonance with the signal from the buffer-doubler. Approximate settings for this control can be found on the tuning chart.
Crystal socket	Holds Crystal Holder FT-171-B.

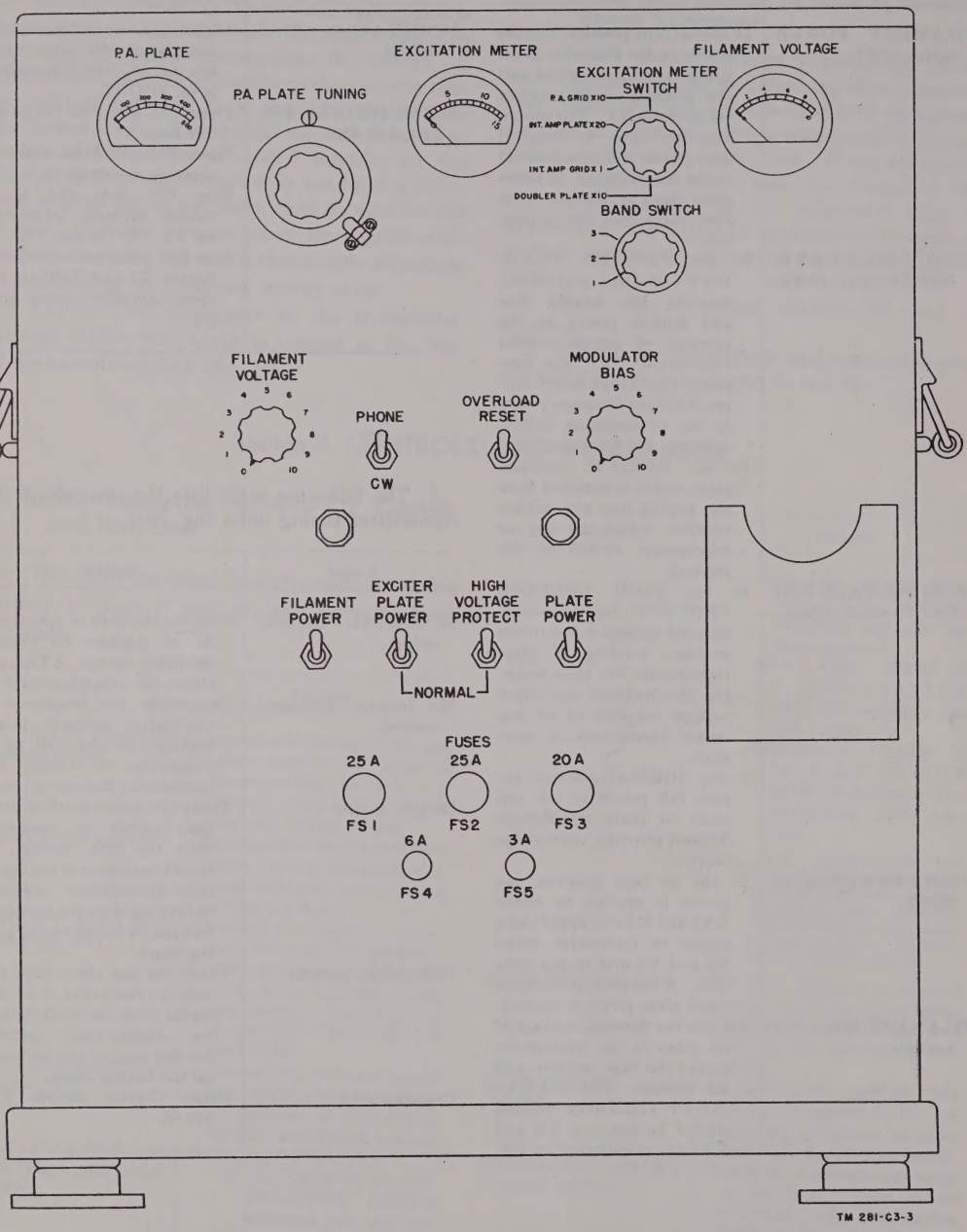


Figure 17. Radio Transmitters BC–610–F, –G, –H, –I, and T–213/GRC–26, location of front panel controls.

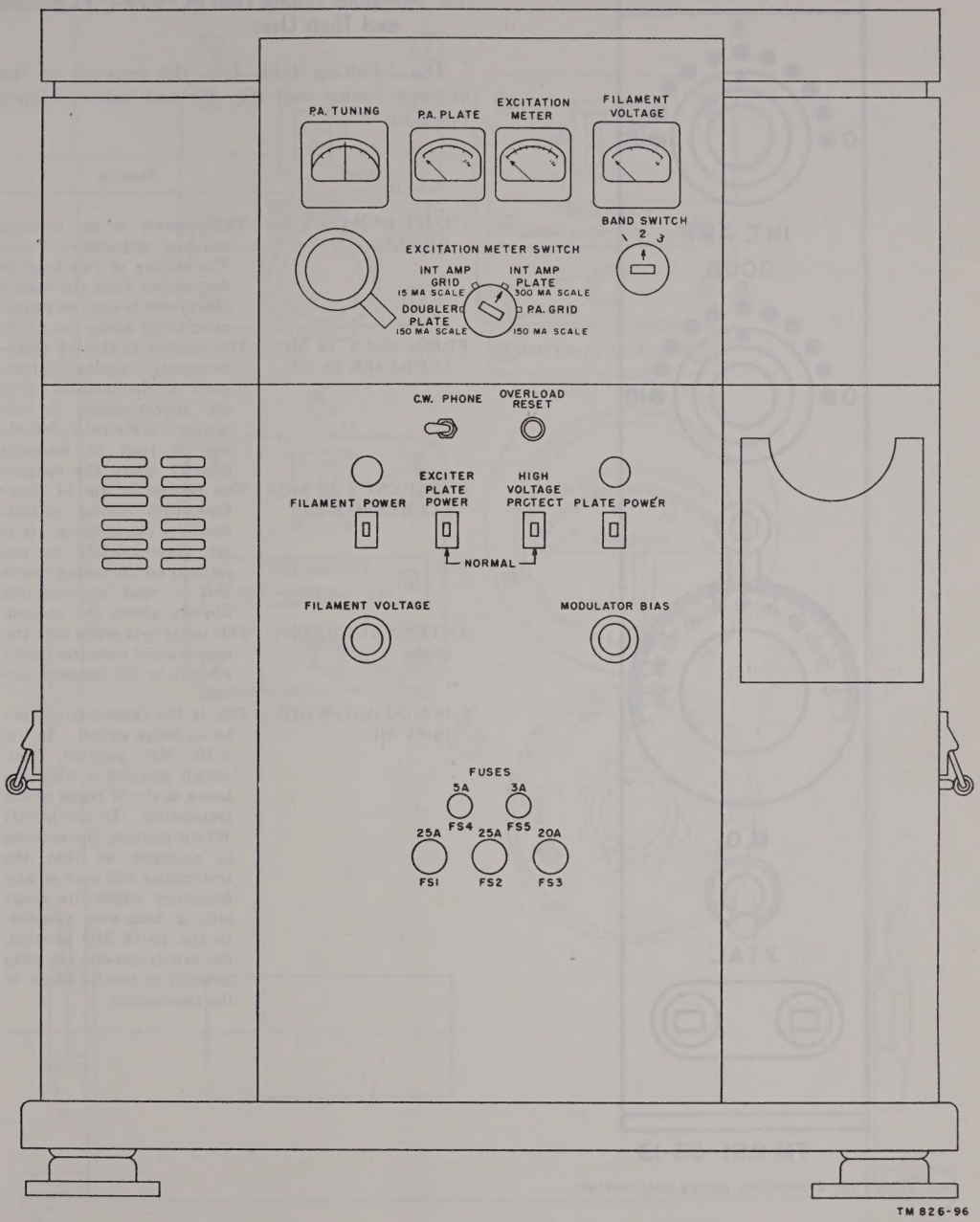


Figure 18. Radio Transmitter BC-610-E, location of front panel controls.

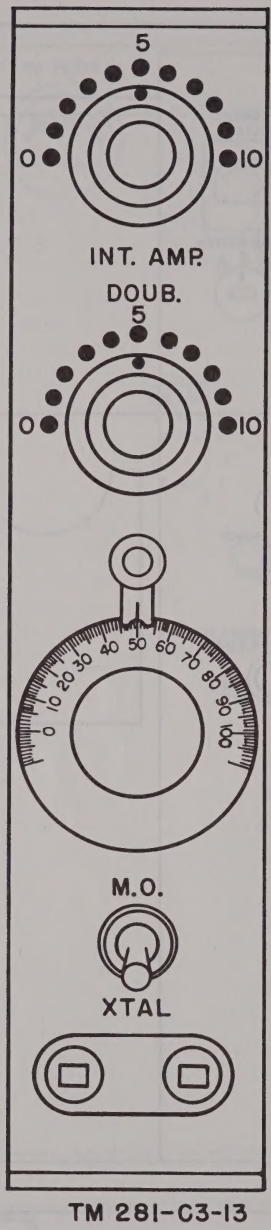


Figure 19. Transmitter tuning unit controls.

19. Antenna Tuning Unit BC-939-(*) Controls and Their Uses

The following table lists the controls of the antenna tuning unit (fig. 20) and indicates their functions:

Control	Function
COUPLING INCREASE.	This control is an antenna coupling adjustment knob. The setting of this knob is determined from the tuning charts and is read on counters directly above the knob.
FREQUENCY 18 MC-INCREASE-10 MC.	This control is the h-f (high-frequency) tuning adjustment for the antenna. It is set approximately to the settings on the tuning charts and is read on counters directly above the control.
FREQUENCY 10 MC-INCREASE-2 MC.	This control is the l-f (low-frequency) tuning adjustment for the antenna. It is set approximately to the settings on the tuning charts and is read on counters directly above the control.
ANTENNA CURRENT meter.	This meter is in series with the antenna and measures the r-f current in the antenna circuit.
2–10 MC-LONG WIRE-10–18 MC.	This is the three-position antenna range switch. In the 2–10 MC position, this switch matches a whip antenna to the l-f range of the transmitter. In the LONG WIRE position, the antenna is arranged so that the transmitter will work on any frequency within its range into a long-wire antenna. In the 10–18 MC position, the switch matches the whip antenna to the h-f range of the transmitter.

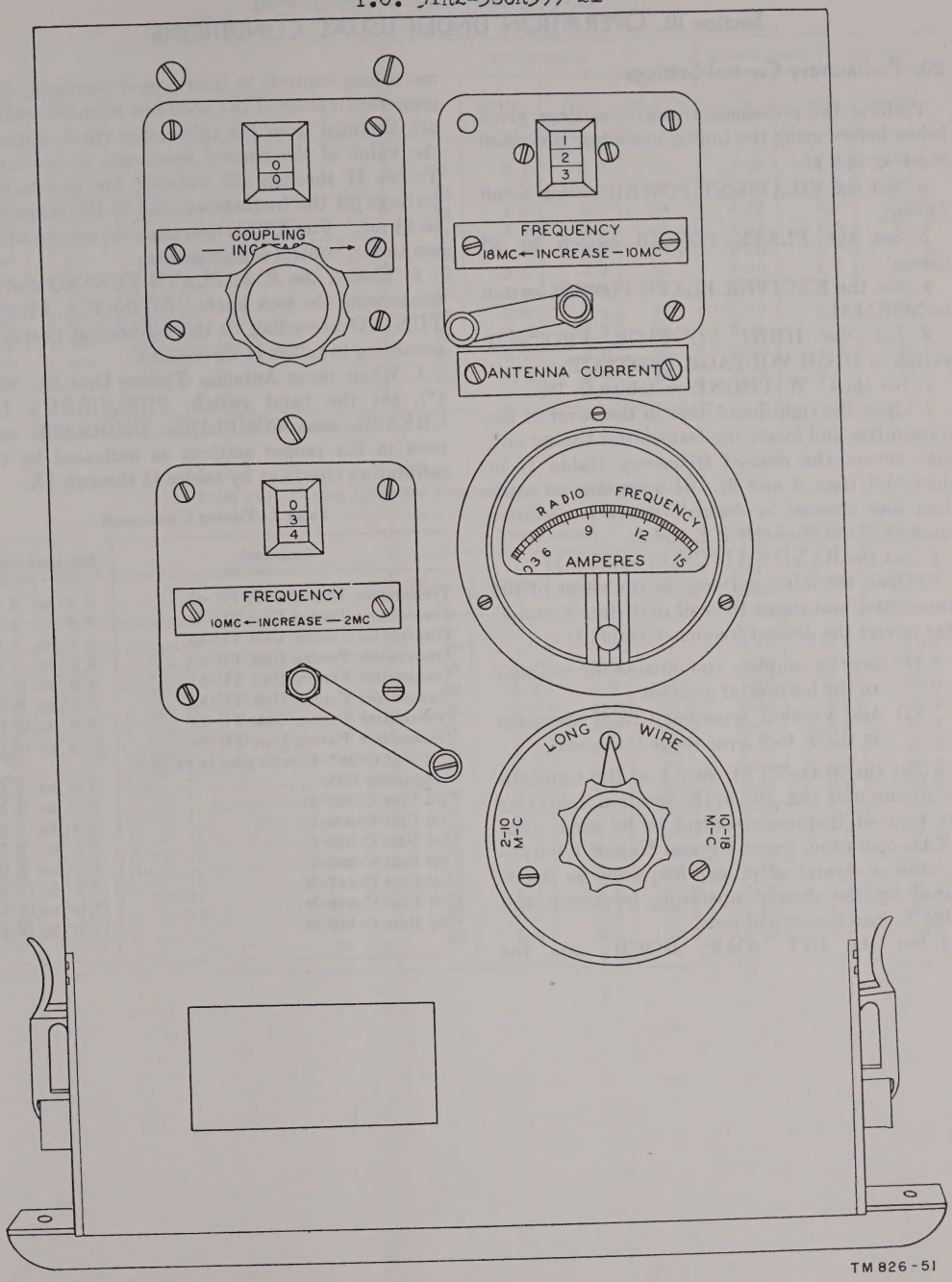


Figure 20. Antenna tuning unit BC-939-(*), front view, showing controls.

Section III. OPERATION UNDER USUAL CONDITIONS

20. Preliminary Control Settings

Perform the preliminary control settings given below before using the tuning procedure described in paragraph 21.

a. Set the FILAMENT POWER switch to off (down).

b. Set the PLATE POWER switch to off (down).

c. Set the EXCITER PLATE POWER switch to NORMAL.

d. Set the HIGH VOLTAGE PROTECT switch to HIGH VOLTAGE PROTECT.

e. Set the C. W.-PHONE switch to C. W.

f. Open the right-hand door in the cover of the transmitter and insert the transmitter tuning unit that covers the desired frequency (table I) in channel 1 (figs. 8 and 9). If operation on more than one channel is desired, insert transmitter tuning units in channels 1, 2, and 3.

g. Set the BAND SWITCH to position 1.

h. Open the left-hand door in the cover of the transmitter and insert the coil unit (figs. 8 and 9) that covers the desired frequency (table I).

(1) Set the coupling coil outside the coil unit to the horizontal position.

(2) Add vacuum capacitor C28 if operation in the 2 to 2.5-mc range is desired.

i. Set the M.O.-XTAL switch of the transmitter tuning unit (fig. 19) to the position indicating the type of frequency control to be used. For XTAL operation, insert Crystal Holder FT–171–B, with a crystal of proper frequency as determined by the desired operating frequency and table X, into the crystal jack.

j. Set the INT. AMP., DOUB., and the mo tuning controls to their proper positions. The numerical values of the positions of these controls are obtained from the calibration chart, opposite the value of the desired frequency of operation. Tables II through IX indicate the *approximate* settings for the frequencies used in the range of 2 to 18 mc. For XTAL operation the setting of the mo tuning control is disregarded.

k. Unlock the P. A. PLATE TUNING dial by unscrewing the lock knob. Set the P. A. PLATE TUNING according to the calibration charts or according to tables II through IX.

l. When using Antenna Tuning Unit BC–939–(*), set the band switch, FREQUENCY INCREASE, and COUPLING INCREASE controls to the proper settings as indicated by the calibration charts or by tables II through IX.

Table I. Tuning Components

Component	Freq range (mc)
Transmitter Tuning Unit TU–47	2.0 to 2.5
Transmitter Tuning Unit TU–48	2.5 to 3.2
Transmitter Tuning Unit TU–49	3.2 to 4.0
Transmitter Tuning Unit TU–50	4.0 to 5.0
Transmitter Tuning Unit TU–51	5.0 to 6.35
Transmitter Tuning Unit TU–52	6.35 to 8.0
Transmitter Tuning Unit TU–53	8.0 to 12.0
Transmitter Tuning Unit TU–54	12.0 to 18.0
Coil Unit C–387–D (with plug-in vacuum capacitor C28)	2.0 to 2.5
Coil Unit C–387–D	2.5 to 3.5
Coil Unit C–388–C	3.5 to 4.5
Coil Unit C–389–C	4.5 to 5.7
Coil Unit C–390–C	5.7 to 8.0
Coil Unit C–447–B	8.0 to 11.0
Coil Unit C–448–B	11.0 to 14.0
Coil Unit C–449–B	14.0 to 18.0

Table II. Tuning Chart for Transmitter Tuning Unit TU–47

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC–939–(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
2, 000	2, 000	C–387–D	11	2. 4	4. 7	20	2–10	4. 9	4. 6
2, 050	2, 050	C–387–D	22	3. 2	5. 2	30	2–10	4. 9	7. 1
2, 100	2, 100	C–387–D	32	3. 8	5. 5	39	2–10	5. 1	9. 4
2, 150	2, 150	C–387–D	41	4. 3	5. 9	47. 5	2–10	4. 9	11. 4
2, 200	2, 200	C–387–D	49	4. 8	6. 3	56. 5	2–10	4. 8	13. 3
2, 250	2, 250	C–387–D	57	5. 2	6. 7	63. 5	2–10	4. 7	15. 1
2, 300	2, 300	C–387–D	63	5. 6	7. 0	70	2–10	4. 6	16. 8
2, 350	2, 350	C–387–D	69	6. 0	7. 4	77	2–10	4. 5	18. 3
2, 400	2, 400	C–387–D	75	6. 3	7. 7	83	2–10	4. 5	19. 8
2, 450	2, 450	C–387–D	81	6. 7	8. 0	88	2–10	4. 6	21. 3
2, 500	2, 500	C–387–D	85	7. 0	8. 2	94	2–10	4. 6	22. 6

NOTE.—Use plug-in vacuum capacitor C28 between 2 and 2.5 mc

Table III. Tuning Chart for Transmitter Tuning Unit TU–48

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC–939–(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
2, 500	2, 500	C–387–D	10	. 7	2. 8	7	2–10	4. 3	22. 6
2, 550	2, 550	C–387–D	18	1. 7	3. 4	12. 5	2–10	4. 3	23. 9
2, 600	2, 600	C–387–D	26	2. 4	3. 9	17	2–10	4. 3	25. 0
2, 650	2, 650	C–387–D	33	3. 1	4. 4	21. 5	2–10	4. 2	26. 2
2, 700	2, 700	C–387–D	40	3. 7	4. 9	25. 5	2–10	4. 2	27. 3
2, 750	2, 750	C–387–D	46	4. 1	5. 3	29. 0	2–10	4. 2	28. 3
2, 800	2, 800	C–387–D	52	4. 5	5. 8	33. 0	2–10	4. 2	29. 3
2, 850	2, 850	C–387–D	58	4. 9	6. 1	36. 5	2–10	4. 2	30. 2
2, 900	2, 900	C–387–D	63	5. 2	6. 5	40. 5	2–10	4. 5	31. 0
2, 950	2, 950	C–387–D	68	5. 6	6. 8	43. 5	2–10	4. 1	32. 0
3, 000	3, 000	C–387–D	73	5. 9	7. 2	47. 0	2–10	4. 1	32. 7
3, 050	3, 050	C–387–D	78	6. 1	7. 4	50. 0	2–10	4. 1	33. 5
3, 100	3, 100	C–387–D	82	6. 4	7. 7	53. 0	2–10	4. 1	34. 2
3, 150	3, 150	C–387–D	87	6. 6	7. 9	55. 5	2–10	4. 2	35. 0
3, 200	3, 200	C–387–D	90	6. 8	8. 0	58. 5	2–10	4. 2	35. 6

Table IV. Tuning Chart for Transmitter Tuning Unit TU–49

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC–939–(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
3, 200	3, 200	C–387–D	25	3. 4	5. 8	58. 5	2–10	4. 2	35. 6
3, 250	3, 250	C–387–D	30	3. 8	6. 1	61. 0	2–10	4. 3	36. 3
3, 300	3, 300	C–387–D	35	4. 2	6. 3	63. 0	2–10	4. 3	37. 0
3, 350	3, 350	C–387–D	40	4. 6	6. 5	65. 5	2–10	4. 5	37. 5
3, 400	3, 400	C–387–D	45	4. 9	6. 7	67. 0	2–10	4. 6	38. 2
3, 450	3, 450	C–387–D	50	5. 3	6. 9	69. 5	2–10	4. 7	38. 7
3, 500	3, 500	C–387–D	55	5. 6	7. 1	71. 5	2–10	5. 1	39. 3
3, 500	3, 500	C–388–D	55	5. 6	7. 1	21	2–10	3. 4	38. 9
3, 550	3, 550	C–388–C	59	5. 9	7. 3	23. 5	2–10	3. 5	39. 5
3, 600	3, 600	C–388–C	64	6. 1	7. 5	26. 5	2–10	3. 5	39. 9
3, 650	3, 650	C–388–C	68	6. 4	7. 7	29. 5	2–10	3. 6	40. 4
3, 700	3, 700	C–388–C	72	6. 6	7. 9	32	2–10	3. 7	40. 9
3, 750	3, 750	C–388–C	75	6. 8	8. 1	35	2–10	3. 8	41. 3
3, 800	3, 800	C–388–C	79	7. 0	8. 3	37. 5	2–10	3. 9	41. 7
3, 850	3, 850	C–388–C	82	7. 2	8. 5	40. 5	2–10	3. 9	42. 2
3, 900	3, 900	C–388–C	85	7. 4	8. 7	43	2–10	4. 0	42. 5
3, 950	3, 950	C–388–C	88	7. 6	8. 8	45	2–10	4. 0	42. 9
4, 000	4, 000	C–388–C	91	7. 8	8. 9	48	2–10	4. 0	43. 2

Table V. Tuning Chart for Transmitter Tuning Unit TU–50

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC–939–(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
4, 000	2, 000	C–388–C	7	2. 2	3. 5	48	2–10	4. 0	43. 2
4, 050	2, 025	C–388–C	13	2. 5	3. 9	50	2–10	4. 0	43. 7
4, 100	2, 050	C–388–C	19	2. 9	4. 3	52	2–10	4. 0	44. 0
4, 150	2, 075	C–388–C	24	3. 2	4. 6	54. 5	2–10	3. 9	44. 3
4, 200	2, 100	C–388–C	29	3. 5	5. 0	56. 5	2–10	3. 9	44. 6
4, 250	2, 125	C–388–C	34	3. 8	5. 3	58. 5	2–10	3. 9	44. 9
4, 300	2, 150	C–388–C	39	4. 1	5. 6	60. 5	2–10	4. 0	45. 2
4, 350	2, 175	C–388–C	44	4. 4	5. 9	62. 5	2–10	4. 0	45. 5
4, 400	2, 200	C–388–C	48	4. 6	6. 1	63. 5	2–10	4. 0	45. 8
4, 450	2, 225	C–388–C	52	4. 8	6. 4	65. 5	2–10	4. 0	46. 1
4, 500	2, 250	C–388–C	56	5. 1	6. 6	67	2–10	4. 0	46. 3
4, 500	2, 250	C–389–C	56	5. 1	6. 6	12. 5	2–10	2. 8	46. 2
4, 550	2, 275	C–389–C	60	5. 3	6. 8	15	2–10	2. 8	46. 4
4, 600	2, 300	C–389–C	64	5. 6	7. 0	17. 5	2–10	2. 9	46. 7
4, 650	2, 325	C–389–C	67	5. 8	7. 2	20	2–10	2. 9	46. 9
4, 700	2, 350	C–389–C	71	6. 0	7. 3	22	2–10	2. 8	47. 2
4, 750	2, 375	C–389–C	74	6. 2	7. 5	24. 5	2–10	2. 9	47. 4
4, 800	2, 400	C–389–C	78	6. 4	7. 7	26. 5	2–10	2. 9	47. 6
4, 850	2, 425	C–389–C	81	6. 6	7. 8	29	2–10	2. 9	47. 9
4, 900	2, 450	C–389–C	84	6. 8	8. 0	31	2–10	2. 9	48. 1
4, 950	2, 475	C–389–C	88	7. 0	8. 2	33	2–10	2. 8	48. 3
5, 000	2, 500	C–389–C	91	7. 1	8. 4	35. 5	2–10	2. 8	48. 5

Table VI. Tuning Chart for Transmitter Tuning Unit TU-51

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC-939-(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
5, 000	2, 500	C-389-C	5	2. 5	4. 0	35. 5	2-10	2. 8	48. 5
5, 050	2, 525	C-389-C	10	2. 8	4. 3	37. 5	2-10	2. 8	48. 7
5, 100	2, 550	C-389-C	15	3. 1	4. 6	39. 5	2-10	2. 8	48. 9
5, 150	2, 575	C-389-C	19	3. 4	4. 8	41. 5	2-10	2. 8	49. 1
5, 200	2, 600	C-389-C	23	3. 7	5. 1	43	2-10	2. 8	49. 3
5, 250	2, 625	C-389-C	27	3. 9	5. 3	45	2-10	2. 8	49. 5
5, 300	2, 650	C-389-C	31	4. 2	5. 6	47	2-10	2. 8	49. 6
5, 350	2, 675	C-389-C	34	4. 4	5. 8	48. 5	2-10	2. 8	49. 8
5, 400	2, 700	C-389-C	38	4. 6	6. 0	50. 5	2-10	2. 8	50. 0
5, 450	2, 725	C-389-C	41	4. 8	6. 2	52	2-10	2. 8	50. 1
5, 500	2, 750	C-389-C	44	5. 0	6. 4	54	2-10	2. 8	50. 4
5, 550	2, 775	C-389-C	48	5. 2	6. 6	55. 5	2-10	2. 8	50. 5
5, 600	2, 800	C-389-C	51	5. 4	6. 7	57	2-10	2. 8	50. 7
5, 650	2, 825	C-389-C	55	5. 5	6. 9	58. 5	2-10	2. 8	50. 9
5, 700	2, 850	C-389-C	58	5. 7	7. 1	60	2-10	2. 8	51. 0
5, 700	2, 850	C-390-C	58	5. 7	7. 1	21	2-10	2. 2	50. 9
5, 750	2, 875	C-390-C	61	5. 9	7. 2	23	2-10	2. 2	51. 0
5, 800	2, 900	C-390-C	64	6. 1	7. 4	25	2-10	2. 3	51. 2
5, 850	2, 925	C-390-C	66	6. 2	7. 5	26. 5	2-10	2. 2	51. 3
5, 900	2, 950	C-390-C	69	6. 4	7. 7	28. 5	2-10	2. 2	51. 4
5, 950	2, 975	C-390-C	72	6. 5	7. 8	29. 5	2-10	2. 3	51. 5
6, 000	3, 000	C-390-C	74	6. 7	8. 0	31. 5	2-10	2. 3	51. 7
6, 050	3, 025	C-390-C	77	6. 8	8. 1	33. 5	2-10	2. 3	51. 9
6, 100	3, 050	C-390-C	79	7. 0	8. 2	35	2-10	2. 3	51. 9
6, 150	3, 075	C-390-C	82	7. 1	8. 4	36. 5	2-10	2. 3	52. 0
6, 200	3, 100	C-390-C	84	7. 2	8. 5	38. 5	2-10	2. 3	52. 2
6, 250	3, 125	C-390-C	87	7. 3	8. 7	40	2-10	2. 3	52. 3
6, 300	3, 150	C-390-C	89	7. 5	8. 8	41. 5	2-10	2. 3	52. 5
6, 350	3, 175	C-390-C	90	7. 5	8. 9	43. 5	2-10	2. 3	52. 5

Table VII. Tuning Chart for Transmitter Tuning Unit TU-52

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC-939-(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
6, 350	3, 175	C-390-C	8	4. 4	2. 8	43. 5	2-10	2. 3	52. 5
6, 400	3, 200	C-390-C	10	4. 6	3. 3	45	2-10	2. 2	52. 7
6, 500	3, 250	C-390-C	17	5. 0	3. 8	47. 5	2-10	2. 2	53. 0
6, 600	3, 300	C-390-C	23	5. 4	4. 2	50. 5	2-10	2. 2	53. 1
6, 700	3, 350	C-390-C	29	5. 8	4. 7	53	2-10	2. 2	53. 4
6, 800	3, 400	C-390-C	35	6. 1	5. 1	55	2-10	2. 2	53. 6
6, 900	3, 450	C-390-C	41	6. 4	5. 6	58	2-10	2. 2	53. 7
7, 000	3, 500	C-390-C	47	6. 6	6. 0	60. 5	2-10	2. 2	54. 0
7, 100	3, 550	C-390-C	52	6. 9	6. 4	63	2-10	2. 2	54. 2
7, 200	3, 600	C-390-C	57	7. 1	6. 8	65	2-10	2. 2	54. 4
7, 300	3, 650	C-390-C	62	7. 3	7. 1	67	2-10	2. 2	54. 5
7, 400	3, 700	C-390-C	67	7. 5	7. 4	69	2-10	2. 2	54. 7
7, 500	3, 750	C-390-C	71	7. 7	7. 7	71	2-10	2. 2	54. 9
7, 600	3, 800	C-390-C	75	7. 9	8. 0	72. 5	2-10	2. 2	55. 1
7, 700	3, 850	C-390-C	79	8. 1	8. 2	74. 5	2-10	2. 2	55. 2
7, 800	3, 900	C-390-C	83	8. 3	8. 4	76	2-10	2. 2	55. 4
7, 900	3, 950	C-390-C	87	8. 4	8. 6	77. 5	2-10	2. 2	55. 5
8, 000	4, 000	C-390-C	91	8. 5	8. 8	78. 5	2-10	2. 2	55. 7

Table VIII. Tuning Chart for Transmitter Tuning Unit TU-53

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC-939-(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
8,000	4,000	C-447-B	6	1.5	1.5	20.5	2-10	1.5	55.5
8,100	4,050	C-447-B	9	1.8	1.8	23.5	2-10	1.5	55.7
8,200	4,100	C-447-B	13	2.0	2.0	26	2-10	1.5	55.9
8,300	4,150	C-447-B	16	2.3	2.3	28.5	2-10	1.5	56.1
8,400	4,200	C-447-B	19	2.6	2.6	31	2-10	1.5	56.1
8,500	4,250	C-447-B	23	2.8	2.8	33.5	2-10	1.5	56.2
8,600	4,300	C-447-B	26	3.1	3.1	36	2-10	1.5	56.4
8,700	4,350	C-447-B	29	3.3	3.3	38.5	2-10	1.5	56.5
8,800	4,400	C-447-B	32	3.6	3.6	41	2-10	1.5	56.7
8,900	4,450	C-447-B	35	3.8	3.8	43	2-10	1.5	56.8
9,000	4,500	C-447-B	38	4.0	4.0	45.5	2-10	1.5	57.1
9,100	4,550	C-447-B	41	4.2	4.2	47.5	2-10	1.5	57.3
9,200	4,600	C-447-B	43	4.3	4.3	49.5	2-10	1.5	57.4
9,300	4,650	C-447-B	46	4.5	4.5	52	2-10	1.5	57.5
9,400	4,700	C-447-B	49	4.7	4.7	53.5	2-10	1.5	57.7
9,500	4,750	C-447-B	51	4.9	4.9	55.5	2-10	1.5	57.7
9,600	4,800	C-447-B	53	5.1	5.1	57.5	2-10	1.5	57.8
9,700	4,850	C-447-B	55	5.3	5.3	59	2-10	1.5	58.0
9,800	4,900	C-447-B	57	5.4	5.4	60.5	2-10	1.4	58.3
9,900	4,950	C-447-B	59	5.6	5.6	63	2-10	1.4	58.4
10,000	5,000	C-447-B	61	5.7	5.7	64.5	2-10	1.4	58.5
10,000	5,000	C-447-B	61	5.7	5.7	64.5	10-18	1.1	2.5
10,100	5,050	C-447-B	63	5.8	5.8	65.5	10-18	1.1	2.7
10,200	5,100	C-447-B	65	6.0	6.0	67	10-18	1.1	3.0
10,300	5,150	C-447-B	67	6.2	6.2	68.5	10-18	1.1	3.4
10,400	5,200	C-447-B	68	6.3	6.3	70	10-18	1.1	3.7
10,500	5,250	C-447-B	70	6.4	6.4	71.5	10-18	1.1	4.0
10,600	5,300	C-447-B	72	6.6	6.6	72.5	10-18	1.1	4.5
10,700	5,350	C-447-B	73	6.7	6.7	74	10-18	1.1	4.7
10,800	5,400	C-447-B	75	6.8	6.8	75	10-18	1.1	5.0
10,900	5,450	C-447-B	76	7.0	7.0	76.5	10-18	1.1	5.3
11,000	5,500	C-447-B	78	7.1	7.1	77.5	10-18	1.1	5.7
11,000	5.500	C-448-B	78	7.1	7.1	37	10-18	1.2	[a] 5.6
11,100	5,550	C-448-B	79	7.2	7.2	39	10-18	1.2	5.8
11,200	5,600	C-448-B	81	7.3	7.3	40.5	10-18	1.2	6.1
11,300	5,650	C-448-B	82	7.4	7.4	42.5	10-18	1.2	6.5
11,400	5,700	C-448-B	83	7.5	7.5	44.5	10-18	1.2	6.7
11,500	5,750	C-448-B	84	7.6	7.6	46	10-18	1.2	7.0
11,600	5,800	C-448-B	85	7.7	7.7	48	10-18	1.2	7.1
11,700	5,850	C-448-B	86	7.8	7.8	49.5	10-18	1.2	7.4
11,800	5,900	C-448-B	87	7.9	7.9	51	10-18	1.2	7.7
11,900	5,950	C-448-B	88	8.0	8.0	52.5	10-18	1.2	7.9
12,000	6,000	C-448-B	90	8.1	8.1	54.5	10-18	1.2	8.1

[a] Set FREQUENCY 10 MC-INCREASE-2 MC loading coil dial at 30.

Table IX. Tuning Chart for Transmitter Tuning Unit TU-54

Operating freq (kc)	Xtal freq (kc)	Coil unit	Tuning controls				Antenna Tuning Unit BC-939-(*)		
			M. O.	DOUB.	INT. AMP.	P. A. PLATE TUNING	Band switch position	Coupling	Loading
12, 000	3, 000	C-448-B	6	.3	1.1	54.5	10-18	1.2	8.1
12, 100	3, 025	C-448-B	9	.4	1.4	55.5	10-18	1.2	8.4
12, 200	3, 050	C-448-B	12	.6	1.6	57	10-18	1.1	8.6
12, 300	3, 075	C-448-B	14	.8	1.8	58.5	10-18	1.1	8.8
12, 400	3, 100	C-448-B	17	1.0	2.1	60	10-18	1.1	9.0
12, 500	3, 125	C-448-B	19	1.2	2.3	61	10-18	1.1	9.2
12, 600	3, 150	C-448-B	21	1.4	2.5	62.5	10-18	1.1	9.5
12, 700	3, 175	C-448-B	23	1.5	2.7	64	10-18	1.1	9.8
12, 800	3, 200	C-448-B	25	1.7	2.9	65	10-18	1.1	9.9
12, 900	3, 225	C-448-B	27	1.8	3.1	66.5	10-18	1.1	10.0
13, 000	3, 250	C-448-B	29	1.9	3.2	67.5	10-18	1.1	10.3
13, 100	3, 275	C-448-B	31	2.1	3.3	69	10-18	1.1	10.4
13, 200	3, 300	C-448-B	33	2.2	3.5	70	10-18	1.1	10.7
13, 300	3, 325	C-448-B	35	2.4	3.7	71	10-18	1.1	10.8
13, 400	3, 350	C-448-B	37	2.5	3.8	72	10-18	1.1	11.0
13, 500	3, 375	C-448-B	38	2.6	4.0	73	10-18	1.1	11.2
13, 600	3, 400	C-448-B	40	2.7	4.1	74.5	10-18	1.1	11.3
13, 700	3, 425	C-448-B	41	2.8	4.3	75	10-18	1.1	11.6
13, 800	3, 450	C-448-B	43	3.0	4.4	76.5	10-18	1.1	11.6
13, 900	3, 475	C-448-B	45	3.1	4.5	77	10-18	1.0	11.8
14, 000	3, 500	C-448-B	46	3.2	4.6	78	10-18	1.0	11.9
14, 000	3, 500	C-449-B	46	3.2	4.6	37.5	10-18	1.1	12.0
14, 200	3, 550	C-449-B	49	3.4	4.8	40.5	10-18	1.1	12.3
14, 400	3, 600	C-449-B	52	3.6	5.1	43	10-18	1.1	12.4
14, 600	3, 650	C-449-B	55	3.8	5.3	46	10-18	1.1	12.8
14, 800	3, 700	C-449-B	58	3.9	5.5	48.5	10-18	1.1	13.0
15, 000	3, 750	C-449-B	61	4.1	5.7	52.5	10-18	1.1	13.2
15, 200	3, 800	C-449-B	63	4.3	5.8	54.5	10-18	1.1	13.6
15, 400	3, 850	C-449-B	65	4.5	6.1	57	10-18	1.0	13.8
15, 600	3, 900	C-449-B	68	4.7	6.2	59	10-18	1.0	14.2
15, 800	3, 950	C-449-B	70	4.8	6.4	61.5	10-18	1.0	14.2
16, 000	4, 000	C-449-B	72	5.0	6.6	63	10-18	1.0	14.4
16, 200	4, 050	C-449-B	74	5.2	6.7	65	10-18	1.0	14.6
16, 400	4, 100	C-449-B	76	5.3	6.8	67	10-18	.9	14.7
16, 600	4, 150	C-449-B	78	5.5	6.9	69	10-18	.9	14.7
16, 800	4, 200	C-449-B	80	5.6	7.1	71	10-18	.8	14.9
17, 000	4, 250	C-449-B	82	5.7	7.2	73	10-18	.8	15.1
17, 200	4, 300	C-449-B	84	5.8	7.4	75	10-18	.8	15.4
17, 400	4, 350	C-449-B	85	5.9	7.5	76.5	10-18	.7	15.4
17, 600	4, 400	C-449-B	87	6.1	7.7	77	10-18	.5	15.6
17, 800	4, 450	C-449-B	89	6.2	7.9	80	10-18	.4	16.0
18, 000	4, 500	C-449-B	91	6.3	8.1	82	10-18	.4	16.3

* Set FREQUENCY 10 MC-INCREASE-2 MC loading coil dial at 30.

Table X. Crystal Sets and Operating Frequencies

Note. Radio Sets SCR-399-(*) and SCR-499-(*) include a set of Crystal Holders FT-171-B whose crystals have the frequencies shown in the first column. For convenience, the additional operating frequencies which may be obtained by using different transmitter tuning units also are listed. Two groups of crystals are available, only one of which is supplied with each radio set.

GROUP 1

Xtal freq (kc)	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit
2,030	2,030	TU-47	4,060	TU-50	-------	-------
2,045	2,045	TU-47	4,090	TU-50	-------	-------
2,065	2,065	TU-47	4,130	TU-50	-------	-------
2,105	2,105	TU-47	4,210	TU-50	-------	-------
2,105	2,105	TU-47	4,210	TU-50	-------	-------
2,125	2,125	TU-47	4,250	TU-50	-------	-------
2,145	2,145	TU-47	4,290	TU-50	-------	-------
2,155	2,155	TU-47	4,310	TU-50	-------	-------
2,220	2,220	TU-47	4,440	TU-50	-------	-------
2,258	2,258	TU-47	4,516	TU-50	-------	-------
2,260	2,260	TU-47	4,520	TU-50	-------	-------
2,282.5	2,282 5	TU-47	4,565	TU-50	-------	-------
2,290	2,290	TU-47	4,580	TU-50	-------	-------
2,300	2,300	TU-47	4,600	TU-50	-------	-------
2,305	2,305	TU-47	4,610	TU-50	-------	-------
2,320	2,320	TU-47	4,640	TU-50	-------	-------
2,360	2,360	TU-47	4,720	TU-50	-------	-------
2,390	2,390	TU-47	4,780	TU-50	-------	-------
2,415	2,415	TU-47	4,830	TU-50	-------	-------
2,435	2,435	TU-47	4,870	TU-50	-------	-------
2,442.5	2,442.5	TU-47	4,885	TU-50	-------	-------
2,532.5	2,532.5	TU-48	5,065	TU-51	-------	-------
2,545	2,545	TU-48	5,090	TU-51	-------	-------
2,557.5	2,557.5	TU-48	5,115	TU-51	-------	-------
3,202.5	3,202.5	TU-49	6,405	TU-52	12,810	TU-54
3,215	3,215	TU-49	6,430	TU-52	12,860	TU-54
3,237.5	3,237.5	TU-49	6,475	TU-52	12,950	TU-54
3,250	3,250	TU-49	6,500	TU-52	13,000	TU-54
3,322.5	3,322.5	TU-49	6,645	TU-52	13,290	TU-54
3,510	3,510	TU-49	7,020	TU-52	14,040	TU-54
3,520	3,520	TU-49	7,040	TU-52	14,080	TU-54
3,550	3,550	TU-49	7,100	TU-52	14,200	TU-54
3,570	3,570	TU-49	7,140	TU-52	14,280	TU-54
3,580	3,580	TU-48	7,160	TU-52	14,320	TU-54
3,945	3,945	TU-49	7,890	TU-52	15,780	TU-54
3,955	3,955	TU-49	7,910	TU-52	15,820	TU-54

GROUP 2

Xtal freq (kc)	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit	Operating freq (kc)	Tuning unit
2,030	2,030	TU-47	4,060	TU-50	-------	-------
2,052.5	2,052.5	TU-47	4,105	TU-50	-------	-------
2,085	2,085	TU-47	4,170	TU-50	-------	-------
2,117.5	2,117.5	TU-47	4,325	TU-50	-------	-------
2,160	2,160	TU-47	4,320	TU-50	-------	-------
2,200	2,200	TU-47	4,400	TU-50	-------	-------
2,217.5	2,217.5	TU-47	4,435	TU-50	-------	-------
2,390	2,390	TU-47	4,780	TU-50	-------	-------
2,415	2,415	TU-47	4,830	TU-50	-------	-------
2,436	2,436	TU-47	4,872	TU-50	-------	-------
2,532.5	2,532.5	TU-48	5,065	TU-51	-------	-------
2,647.5	2,647.5	TU-48	5,295	TU-51	-------	-------
2,772	2,772	TU-48	5,544	TU-51	-------	-------
2,980	2,980	TU-48	5,960	TU-51	-------	-------
3,000	3,000	TU-48	6,000	TU-51	12,000	TU-54
3,035	3,035	TU-48	6,070	TU-51	12,140	TU-54
3,100	3,100	TU-48	6,200	TU-51	12,400	TU-54
3,120	3,120	TU-48	6,240	TU-51	12,480	TU-54
3,150	3,150	TU-48	6,300	TU-51	12,600	TU-54
3,155	3,155	TU-48	6,310	TU-51	12,620	TU-54
3,232.5	3,232.5	TU-49	6,465	TU-52	12,930	TU-54
3,265	3,265	TU-49	6,530	TU-52	13,060	TU-54
3,322.5	3,322.5	TU-49	6,645	TU-52	13,290	TU-54
3,417.5	3,417.5	TU-49	6,835	TU-52	13,670	TU-54
3,475	3,475	TU-49	6,950	TU-52	13,900	TU-54
3,588	3,588	TU-49	7,176	TU-52	14,352	TU-54
3,665	3,665	TU-49	7,330	TU-52	14,660	TU-54
3,725	3,725	TU-49	7,450	TU-52	14,900	TU-54
3,785	3,785	TU-49	7,570	TU-52	15,140	TU-54
3,792.5	3,792.5	TU-49	7,585	TU-52	15,170	TU-54
3,850	3,850	TU-49	7,700	TU-52	15,400	TU-54
3,865	3,865	TU-49	7,730	TU-52	15,460	TU-54
3,905	3,905	TU-49	7,810	TU-52	15,620	TU-54
3,935	3,935	TU-49	7,870	TU-52	15,740	TU-54
3,995	3,995	TU-49	7,990	TU-52	15,980	TU-54
3,997.5	3,997.5	TU-49	7,995	TU-52	15,990	TU-54

21. Tuning Procedure

Refer to paragraph 20 for preliminary control settings before using the tuning procedure.

Caution: Radio Transmitter BC-610-(*) contains extremely high voltages which are dangerous to life if contacted. The protective electrical interlock switches should not be relied upon. A red bull's-eye pilot lamp, labeled PLATE POWER, on the front panel of the transmitter indicates when the h-v supply is turned on. However, since this lamp may burn out, do not rely on it to show that no high voltage is present. When the transmitter is in operation, extremely high r-f voltages are present around the antenna tuning unit. Beware of r-f burns. Make certain that the voltage is off before changing coil units or transmitter tuning units.

a. Set the FILAMENT POWER switch to on (up).

(1) The FILAMENT VOLTAGE meter should register.

(2) Allow 1 minute for the filaments to come up to the proper operating temperature.

(3) Adjust the FILAMENT VOLTAGE control until the FILAMENT VOLTAGE meter indicates between 5 and 5.3 volts.

b. Set the EXCITER PLATE POWER switch to on (up).

c. For M. O. controlled operation, adjust the mo tuning dial on the transmitter tuning unit to the operating frequency; use the following procedure:

(1) Set a frequency meter (such as Frequency Meter Set SCR–211–(*) to the desired operating frequency.

(2) Place the frequency meter on top of the transmitter. Use about a foot of wire for an antenna on the meter.

(3) Adjust the M. O. control on the tuning unit for a zero-beat note in the earphones connected to the frequency meter. The final setting of the control should be close to the chart reading.

(4) Repeat this procedure for the other tuning units if operation is desired on different frequencies in three separate channels.

d. For crystal oscillator controlled operation, measure the operating frequency with a frequency meter to insure operation on the proper frequency.

e. Set the EXCITATION METER SWITCH to DOUBLER PLATE position. Adjust the DOUB. knob of the transmitter tuning unit for *minimum* current indication on the EXCITATION METER.

f. Set the EXCITATION METER SWITCH to INT. AMP. GRID position. Readjust the DOUB. knob for *maximum* indication on the EXCITATION METER.

g. Set the EXCITATION METER SWITCH to INT. AMP. PLATE position. Adjust the INT. AMP. knob of the transmitter tuning unit for *minimum* indication on the EXCITATION METER.

h. Set the EXCITATION METER SWITCH to P.A. GRID position. Readjust the INT. AMP. knob for *maximum* indication on the EXCITATION METER.

i. Repeat *e* through *h* above until *maximum* possible deflection is obtained on the EXCITATION METER with the EXCITATION METER SWITCH in the P.A. GRID position. The EXCITATION METER should indicate between 60 and 100 ma (milliamperes).

Note. Make certain that both doors in the top cover of the transmitter are closed firmly upon the interlock switches; otherwise, plate power cannot be applied. Check that an antenna or dummy load is connected to the transmitter and that the HIGH VOLTAGE PROTECT switch is in the HIGH VOLTAGE PROTECT position.

j. Set the PLATE POWER switch to the on (up) position. (During operation with associated equipment, the functions of the PLATE POWER switch normally will be accomplished by an external switch.)

(1) The red pilot lamp on the transmitter should light.

(2) Rotate the P.A. PLATE TUNING dial until the P.A. PLATE meter dips to a *minimum* reading.

k. If the *minimum* P.A. PLATE meter reading is below 100 ma while tuning with a dummy load or a doublet antenna, turn off the transmitter, open the left-hand top door, and remove the coil unit. Move the coupling coil to about 15° from horizontal and replace the coil unit. Close the door and apply plate power.

(1) Retune P.A. PLATE TUNING dial for *minimum* reading on the P.A. PLATE meter.

(2) If the reading is still below 100 ma, add more coupling in the same manner. Do not couple above 100 ma.

l. If the *minimum* P.A. PLATE meter reading is below 100 ma when tuning with a whip or long-wire antenna in conjunction with Antenna Tuning Unit BC–939–(*), adjust the FREQUENCY INCREASE control for *maximum* deflection of the P.A. PLATE meter. If the P.A. PLATE meter reads above or below 100 ma, adjust the COUPLING INCREASE control for 100 ma. The P.A. PLATE TUNING dial must be retuned for a *minimum* reading on the P.A. PLATE METER whenever adjustments are made on the antenna tuning unit.

m. Set the PLATE POWER switch to the off (down) position. Set the HIGH VOLTAGE PROTECT switch to the NORMAL position. Now set the PLATE POWER switch to the on (up) position. The P.A. PLATE meter should read 290 ma.

(1) If the *minimum* P.A. PLATE meter reading is above or below 290 ma when tuning with a dummy load or doublet antenna, readjust the coupling coil for a plate current reading of 290 ma; follow the procedure in *k* above.

(2) If the *minimum* P.A. PLATE meter reading is above or below 290 ma when tuning

with Antenna Tuning Unit BC–939–(*), alternately adjust the COUPLING INCREASE and the FREQUENCY INCREASE controls on the antenna tuning unit until the maximum r-f current occurs on the ANTENNA CURRENT meter when the P.A. PLATE meter reads 290 ma.

n. This completes the tuning procedure. The transmitter plate current must never exceed 300 ma during tuning or c-w operation.

Table XI. Tuning Ranges for Long-Wire Antennas When Used With Antenna Tuning Unit BC–939–(*)

Antenna lengths (ft)	Useful freq range (mc)
25	2 to 10; 15 to 18
35	2 to 6; 11 to 18
45	2 to 4; 10 to 18
65	2 to 3; 9 to 18

22. Operation

a. Starting Procedure. If the transmitter is being energized initially or if the frequency of operation is being changed, follow the procedure outlined in paragraphs 20 and 21. If the transmitter is to be operated at the frequency last used before the equipment was shut down, perform the following steps:

(1) Set the FILAMENT POWER switch to the on (up) position.

(2) Set the EXCITER PLATE POWER switch to the on (up) position.

(3) Set the PLATE POWER switch to the on (up) position. The P.A. PLATE meter should read 290 ma for C.W. operation or 250 ma for PHONE operation.

(4) Check the P.A. PLATE TUNING.

b. C-W Operation.

(1) Set the EXCITER PLATE POWER switch to NORMAL (down). This will remove the excitation from the transmitter.

(2) Key the transmitter by shorting pins 2 and 8 on socket SO5 with a telegraph key or associated equipment. The P.A. PLATE meter should read 290 ma

c. Phone Operation.

(1) Set the PLATE POWER switch to the off (down) position.

(2) Set the MODULATOR BIAS control on the transmitter to the extreme counterclockwise position (this increases the bias).

(3) Set the C.W.-PHONE switch at PHONE.

(4) Set the PLATE POWER switch to the on (up) position. The P.A. PLATE meter should read 250 ma.

(5) Adjust the MODULATOR BIAS control for 40 ma of modulator current with no audio input to the transmitter. Modulator current normally is shown by a meter in the speech amplifier.

(6) Modulate the transmitter by pressing the microphone button and speaking into the microphone.

d. Stopping Procedure.

(1) Set EXCITER PLATE POWER switch to NORMAL (down).

(2) Set PLATE POWER switch to the off (down) position.

(3) Set FILAMENT POWER switch to the off (down) position.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

23. General

The operation of Radio Transmitter BC–610–(*) may be difficult in regions where extreme cold, heat, humidity and moisture, sand conditions, etc., prevail. Instructions are given in the following paragraphs on procedures for minimizing the effect of these unusual operation conditions.

24. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow:

a. Handle the equipment carefully.

b. Locate the equipment inside a heated inclosure where there is no danger of a cold draft striking the glass tubes when a door is opened. A sudden draft of cold air is often sufficient to shatter the glass envelope of a heated tube. If the inclosure is constructed so that this precaution is impossible, place a blanket or some barrier between the source of the draft and the equipment.

c. When equipment which has been exposed to the cold is brought into a warm room, it will sweat and will continue to do so until it reaches room temperature. This condition also arises when equipment warms up during the day after exposure during a cold night. When the equipment has reached room temperature, dry it thoroughly.

d. Mercury vapor tubes require more time to warm up than other vacuum tubes. Before turning on the plate voltage, turn on the filaments and let the tubes heat until they feel warm to the touch; this may take from 10 to 15 minutes, depending on the temperature of the surrounding air. If the tube is not warm when the plate voltage is turned on, the surge of current due to high voltage may ruin the tube.

e. Keep the equipment warm and dry. If the set is not in a heated inclosure, keep tube filaments turned on.

25. Operation in Tropical Climates

When operated in tropical climates, radio equipment may be installed in tents, huts, or when necessary, in underground dugouts. When equipment is installed below ground and when it is set up in swampy areas, moisture conditions are more acute than normal in the tropics. Ventilation is usually very poor, and the high relative humidity causes condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than the air temperature. To minimize this condition, keep the tube filaments turned on.

26. Operation in Desert Climates

a. Conditions similar to those encountered in tropical climates often prevail in desert areas. Use the same measures to insure proper operation of the equipment.

b. The main problem which arises with equipment operation in desert areas is the large amount of sand or dust and dirt which enters the moving parts of radio equipment. The ideal preventive precaution is to house the equipment in a dustproof shelter. Since such a building is seldom available and would require air conditioning, the next best precaution is to make the building in which the equipment is located as dustproof as possible with available materials. Hang wet sacking over the windows and doors, cover the inside walls with heavy paper, and secure the side walls of tents with sand to prevent their flapping in the wind.

c. Never tie power cords, signal cords, or other wiring connections to either the inside or the outside of tents. Desert areas are subject to sudden wind squalls which may jerk the connections loose or break the lines.

d. Take care to keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (par. 30). Pay particular attention to the condition of the lubrication of the equipment. Excessive amounts of dust, sand, or dirt that come into contact with oil and grease result in grit, which will damage the equipment.

e. Radio Transmitter BC–610–E as supplied with Radio Sets SCR–399–A and SCR–499–A may be modified to provide a means of protection against dust, insects, and other foreign matter in accordance with MWO SIG 11–281–9.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE SERVICES

27. Definition of Preventive Maintenance

Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles from occurring (AR 750–5).

28. General Preventive Maintenance Techniques

a. Use No. 0000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth or a dry brush for cleaning.

(1) If necessary, except for electrical contacts, moisten the cloth or brush with solvent, dry-cleaning (SD); then wipe the parts dry with a cloth.

(2) Clean electrical contacts with a cloth moistened with carbon tetrachloride; then wipe them dry with a dry cloth.

Caution: Repeated contact of carbon tetrachloride with the skin or prolonged breathing of the fumes is dangerous. Make sure adequate ventilation is provided.

c. If available, dry compressed air may be used at a line pressure not exceeding 60 pounds per square inch to remove dust from inaccessible places; be careful, however, or mechanical damage from the air blast may result.

d. Use a safety shorting stick before touching components in the transmitter. A safety shorting stick may be constructed as follows:

(1) Secure a dry piece of wood or some other material which is a good electrical insulator (fig. 21). It should be about 36

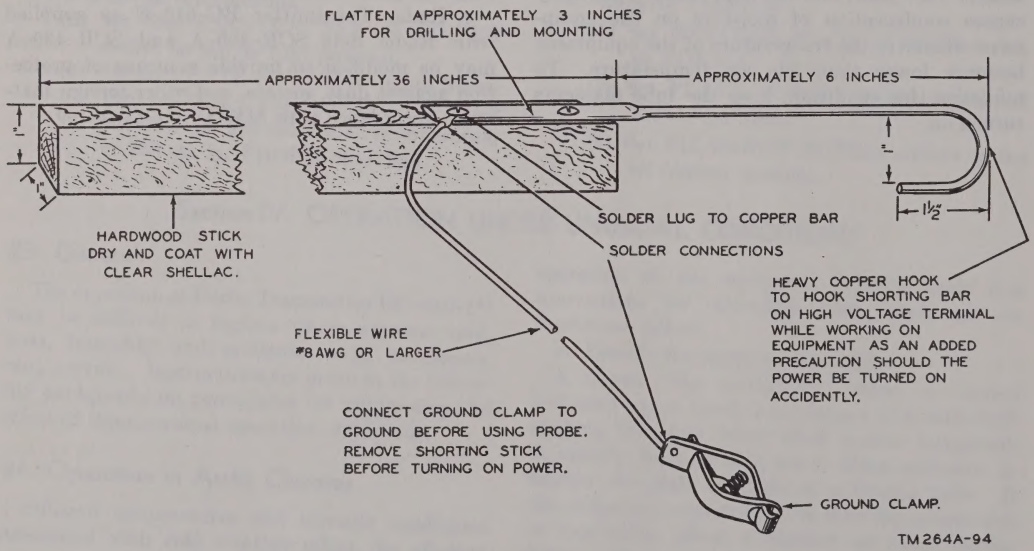


Figure 21. Construction of shorting stick.

inches long and about 1 inch square. The latter dimension is not very important.

(2) Securely fasten a piece of copper or brass rod (or thin tubing) to one end of the stick in such a manner that the rod extends 12 inches beyond the end of the stick. The free end of the rod should be bent in the form of a small hook.

(3) Solder a piece of heavy flexible hook-up wire about 18 inches long to the metal rod at the point where it is fastened to the stick. Attach a heavy clip to the free end of the wire.

e. Use jumper wires as shorting links across h-v capacitors when the equipment is being repaired or cleaned. The jumper wires may be made from heavy flexible wire, about 18 inches long, with heavy clips attached to each end.

f. For further information on preventive maintenance techniques, see TB SIG 178.

29. Use of Preventive Maintenance Forms

a. The information in paragraph 30 is presented as a guide to the individual making an inspection of equipment in accordance with instructions on DA AGO Forms 11–238 and 11–239. The decision as to which items on the forms are applicable to this equipment is a tactical decision to be made in the case of first echelon maintenance by the communication officer/chief or his designated representative, and in the case of second and third echelon maintenance, by the individual making the inspection. Instructions for the use of each form appear on the reverse side of the form.

b. The first two columns in the table in paragraph 30 serve as a cross reference between the item numbers of DA AGO Forms 11–238 and 11–239 and the preventive maintenance information in this manual.

30. Performing Preventive Maintenance

Perform the following preventive maintenance operations at the intervals indicated, unless these intervals are reduced by the local commander.

Caution: Tighten screws, bolts, and nuts carefully. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

DA AGO Form 11–238 item No.	DA AGO Form 11–239 item No.	Preventive maintenance operations
		DAILY
1	1	Check for completeness and satisfactory condition of the radio set (pars. 7, 8, and 9).
2	2	Check suitability of location and installation for normal operation (par. 13).
3	3	Clean dirt and moisture from exterior of cabinet.
4	4	Check seating of tubes, fuses, connectors, plug-in coils and crystals.
5	5	Inspect controls for binding, scraping, excessive looseness, and positive action.
6	6	Check for normal operation (par. 37).
		WEEKLY
		Caution: Disconnect all power before performing the following operations. Upon completion, reconnect power and check for satisfactory operation.
7	7	Clean and tighten exterior of cabinet, coaxial transmission line, and cable connections.
8	8	Inspect metal surfaces and antennas for rust, corrosion, and moisture.
9	9	Inspect cord, cable, wire, and shock mounts for cuts, breaks, fraying, deterioration, kinks, and strain.
10	10	Inspect antenna for eccentricities, corrosion, damaged insulators.
12	12	Inspect for looseness of accessible items: switches, knobs, jacks, connectors, transformers, relays, capacitors, and pilot light assemblies.
15	15	Inspect meters for damaged glass and cases.
16	16	Inspect shelters for adequacy of weatherproofing.
17	17	Check antenna guy wires for looseness and proper tension.
19	--------	If deficiencies noted are not corrected during inspection, indicate action taken for correction.
		MONTHLY
	19	Inspect electron tubes for loose envelopes, loose cap connectors, cracked sockets, and insufficient socket spring tension; remove dust and dirt carefully; check emission of receiver-type tubes.

DA AGO Form 11-238 item No.	DA AGO Form 11-239 item No.	Preventive maintenance operations
		MONTHLY—Continued
	21	Inspect fixed capacitors for leaks, bulges, and discoloration.
	22	Inspect relays for loose mountings; burned, pitted, or corroded contacts; misalinement of contacts and springs; insufficient spring tension; binding of plungers and hinge parts.
	23	Inspect variable capacitor C12 for dirt, moisture, misalinement of plates, and loose mountings.
	24	Inspect resistors, bushings, and insulators for cracks, chipping, blistering, discoloration, and moisture.
	25	Inspect terminals of large fixed capacitors and resistors for corrosion, dirt, and loose contacts.
	26	Clean and tighten switches, terminal boards, relay cases, and interior of cabinet and chassis not readily accessible.
	27	Inspect terminal boards for loose connections, cracks, and breaks.
	28	Check setting of adjustable relay RY5 (par. 74).
	29	Lubricate equipment (par. 31).
	31	Clean and tighten connections and mountings for transformers, chokes, and potentiometers.
	32	Inspect transformers, chokes, potentiometers, and rheostats for overheating and leakage.
	37	Check moisture and fungiproofing, retouch with brush where necessary (par. 32).
	39	If deficiencies noted are not corrected during inspection, indicate action taken for correction.

Section II. LUBRICATION AND WEATHERPROOFING

31. Lubrication

Use oil, engine (OE–10) in temperatures above 0° F.; use oil, lubricating, preservative, special (PL-Special) in temperatures below 0° F.; use grease, instrument (GL) where needed, and in all temperatures. Lubricate only at the points specified, and wipe off excess lubricant. The following points require lubrication every 256 hours:

a. P-A Plate Tuning Shaft Bearings. Place 1 or 2 drops of oil (PL-Special) on each of the bearings (fig. 22).

b. Excitation Meter Switch Bearings. Place 1 or 2 drops of oil (PL-Special) on each of the bearings (fig. 22).

c. Band Switch Bearing. Place 1 or 2 drops of oil (PL-Special) on the bearing (fig. 22).

d. Tuning Control Gears (E Model Only). Lubricate teeth sparingly with oil (PL-Special).

32. Weatherproofing

a. General. Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. Tropical Maintenance. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained fully in TB SIG 13 and TB SIG 72.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained fully in TB SIG 66 and TB SIG 219.

d. Desert Maintenance. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained fully in TB SIG 75.

e. Lubrication. The effects of extreme cold and heat on materials and lubricants are explained in TB SIG 69. Observe all precautions outlined in TB SIG 69 and pay strict attention to all lubrication orders when operating equipment under conditions of extreme cold or heat.

33. Rustproofing and Painting

a. When the finish on the case has been scarred or damaged badly, rust and corrosion can be prevented by touching up bared surfaces. Use No.

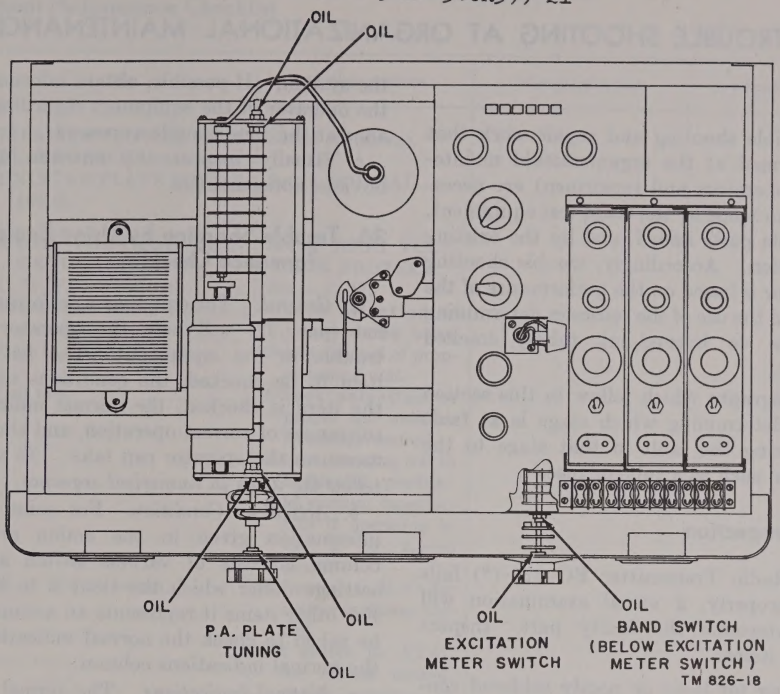


Figure 22. Lubrication points on Radio Transmitters BC–610–F, –G, –H, –I, and T–213/GRC–26.

00 or No. 000 sandpaper to clean the surface down to the bare metal; obtain a bright smooth finish.

***Caution*:** Do not use steel wool. Minute particles frequently enter the case and cause harmful internal shorting or grounding of circuits.

b. When a touch-up job is necessary, apply paint with a small brush. Remove rust from the case by cleaning corroded metal with solvent (SD) to soften the rust and use sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations (TM 9–2851).

Section III. TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

34. Scope

a. The trouble shooting and repair work that can be performed at the organizational maintenance level (operators and repairmen) are necessarily limited in scope by the tools, test equipment, and replaceable parts issued, and by the existing tactical situation. Accordingly, trouble shooting by the operator is based on the performance of the equipment and the use of the senses in determining such troubles as burned-out tubes, cracked insulators, etc.

b. The paragraphs which follow in this section will help in determining which stage is at fault and in localizing the fault in that stage to the defective item, such as a tube or fuse.

35. Visual Inspection

a. When Radio Transmitter BC–610–(*) fails to operate properly, a visual examination will ordinarily determine the faulty part. Inspect the following items:

(1) Wiring for loose or poorly soldered connections, frayed or burned insulation, or stretched leads.
(2) Terminal boards for broken lugs and signs of arcing.
(3) Split, cracked, or broken crystal holders.
(4) Resistors for blistering or discoloration caused by overheating.
(5) Fuses for corrosion or failure.
(6) Worn, broken, or disconnected cords or plugs.
(7) Relay contacts burned because of overloads.
(8) Wires broken because of excessive vibration.
(9) Defective tubes.

b. When failure is encountered and the cause is not immediately apparent, check as many of the above items as is practicable before starting a detailed examination of the component parts of the system. If possible, obtain information from the operator of the equipment regarding performance at the time trouble appeared.

c. Visually inspect the antenna system for obvious abnormalities.

36. Trouble Shooting by Using Equipment Performance Checklist

a. General. The equipment performance checklist (par. 37) will help the operator to locate trouble in the equipment. The list gives the item to be checked, the conditions under which the item is checked, the normal indications and tolerances of correct operation, and the corrective measures the operator can take. *To use this list, follow the items in numerical sequence.*

b. Action or Condition. For some items, the information given in the action or condition column consists of various switch and control settings under which the item is to be checked. For other items it represents an action that must be taken to check the normal indication given in the normal indications column.

c. Normal Indications. The normal indications listed include the visible and audible signs that the operator should perceive when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. Corrective Measures. The corrective measures listed in paragraph 37 are those the operator can make without turning in the equipment for repairs. A reference in the column to chapter 6 indicates that the trouble cannot be corrected during operation and that trouble shooting by an experienced repairman is necessary. If the set is completely inoperative or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

37. Equipment Performance Checklist

	Item No.	Item	Action or condition	Normal indications	Corrective measures
	1	FILAMENT POWER switch	Set to off (down).		
	2	PLATE POWER switch	Do.		
	3	EXCITER PLATE POWER switch.	Set to NORMAL.		
	4	HIGH VOLTAGE PROTECT switch.	Set to HIGH VOLTAGE PROTECT.		
	5	C. W.-PHONE switch	Set to C. W.		
	6	Transmitter tuning unit	Check selection of proper tuning units.		
P	7	BAND SWITCH	Set to channel of proper tuning unit.		
R	8	Coil unit	Check selection of proper coil unit for frequency desired.		
E			Adjust coupling coil to horizontal position.		
P			Add vacuum capacitor C28 if operating in the 2 to 2.5-mc range.		
A	9	M. O. XTAL switch	Set switch to M. O. for master oscillator control.		
R			Set switch to XTAL for crystal control. Check selection of proper crystal.		
A	10	Mo tuning	Set to proper frequency; use calibration chart (unless operation is XTAL controlled).		
T	11	DOUB. knob	Set to proper setting (use calibration chart).		
O	12	INT. AMP. knob	Do.		
R	13	P. A. PLATE TUNING dial	Set to proper reading (use calibration chart).		
Y	14	Band switch (on antenna tuning unit, if used).	Set to proper band or LONG WIRE antenna position.		
	15	FREQUENCY INCREASE dial.	Set to proper setting (use calibration chart).		
	16	COUPLING INCREASE control.	Do.		
S T A R T	17	FILAMENT POWER switch	Set to on (up); wait 1 minute for filaments to reach operating temperature. Wait 30 minutes if transmitter is damp.	Green pilot lamp lights. FILAMENT VOLTAGE meter reads 5 to 5.3 volts.	Replace lamp. Check fuses FS1, FS2, and FS4. Adjust FILAMENT VOLTAGE control.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	18	EXCITER PLATE POWER switch.	Set to on (up) position.	EXCITATION METER should show a reading.	If meter does not indicate in any position check the transmitter tuning unit, setting of BAND SWITCH, and position of M. O.-XTAL switch.
	19	EXCITATION METER SWITCH.	Set to DOUBLER PLATE.	EXCITATION METER reads 25 to 45 ma.	Adjust DOUB. knob.
			Set to INT. AMP. GRID.	1 to 8 ma	Do.
			Set to INT. AMP. PLATE.	125 to 175 ma	Adjust INT. AMP. knob.
			Set to P. A. GRID	60 to 100 ma	Do.
					If readings are still improper, check the crystal, or mo setting, or replace tube V8, V9, V10, or V11, if necessary.
	20	PLATE POWER switch	Set to on (up)	P. A. PLATE meter reads 100 ma. Red pilot lamp lights.	Adjust coupling in coil unit. Adjust COUPLING INCREASE control on antenna tuning unit. Check coil unit L7. Check antenna. Operate OVERLOAD RESET. Replace V6, V7, or V16, if necessary.
	21	PLATE POWER switch	Set to off (down)	P. A. PLATE meter reads 0 ma. Red pilot lamp goes off.	Check contacts on relay RY1.
	22	HIGH VOLTAGE PROTECT switch.	Set to NORMAL (down).		
	23	PLATE POWER switch	Set to on (up)	P. A. PLATE meter reads 290 ma.	Check OVERLOAD RESET. Adjust coupling in coil unit. Adjust COUPLING INCREASE control. Adjust FREQUENCY INCREASE control. Replace V6, V7, or V16, if necessary.
STOP	24	EXCITER PLATE POWER switch.	Set to NORMAL (down).	No reading on P. A. PLATE meter or EXCITATION METER.	Check EXCITER PLATE POWER switch.
	25	PLATE POWER switch	Set to off (down)	Red light goes out	Check relay RY1.
	26	FILAMENT POWER switch.	Set to off (down)	Green pilot lamp goes out. No voltage indication on FILAMENT VOLTAGE meter.	Disconnect a-c power input.

CHAPTER 4

AUXILIARY EQUIPMENT

Section I. FREQUENCY CONVERSION KIT MC–509

38. Description

This kit is used to extend the frequency range of Radio Transmitter BC–610–(*) to cover the additional frequency range of 1 to 2 mc. The component parts of Frequency Conversion Kit MC–509 are—

1 Chest CH–251.
3 Tuning Units TU–61 (range 1.5 to 2 mc).
3 Tuning Units TU–62 (range 1 to 1.5 mc).
2 Coil Units C–454 (range 1.5 to 2 mc.)
2 Coil Units C–455 (range 1 to 1.5 mc).
2 vacuum capacitors, 100 $\mu\mu$f.
2 vacuum capacitors, 55 $\mu\mu$f.
1 Antenna AN–168, long-wire.
7 Mast sections MS–44.
1 Mast Base MP–19.
2 Guy Plates MP–20.
6 Stakes GP–2.
1 Guy GY–24–A (halyard).
4 Guys GY–22–A (2 in use, 2 spares).
1 Roll BG–176, antenna.
1 Bag BG–102–( ), antenna accessories.
1 Wire W–128, 2 ft.
1 bag of hardware, including—
- 1 lug, solder (with ¼-inch hole).
- 1 lug, solder (with 8–32 machine screw hole).
- 1 screw, machine, 8–32 x 1⅛″ long.
- 1 lockwasher, 8–32.
- 1 nut, hexagonal, 8–32.

39. Modification of Antenna Tuning Unit BC–939–(*)

Antenna Tuning Unit BC–939–(*) may be modified by use of Frequency Conversion Kit MC–509 to allow operation of Radio Transmitter BC–610–(*) on frequencies from 1 to 2 mc. To install, refer to figure 25 and proceed as follows:

a. Open the coaxial line *inside* Antenna Tuning Unit BC–939–(*) by removing the center conductor of the coaxial line from point Y. Bend this wire away from the insulator, and tape. Attach one end of a 17-inch length of Wire W–128 to point Y.

b. Remove the lead running from coupling coil L5 to the ANTENNA CURRENT meter M4 at terminal 1.

c. Attach the free end of the 17- inch length of Wire W–128 to the ANTENNA CURRENT meter M4 at terminal 1.

d. Remove the lead from the h-f inductor coil L44 to the ANTENNA CURRENT meter M4 at terminal 2. Do not remove the other lead on terminal 2 which runs to a contact of switch SW9.1.

e. Place the antenna range switch of Antenna Tuning Unit BC–939–(*) in the 2–10 MC position.

Note. For erection and installation of antenna mast, refer to TM 11–281.

40. Modification of Radio Transmitter BC–610–(*)

To protect Radio Transmitter BC–610–(*) while operating on the lower frequency range, follow the procedure outlined in *a* below. Before operating within the normal range of the transmitter, perform the procedure indicated in *b* below.

a. Unsolder one end of resistor R9 which is located adjacent to r-f choke CH4 on the under side of the p-a tank capacitor bakelite mounting panel (figs. 54 and 55).

***Caution*:** Failure to do so before operating the transmitter may result in damage to resistor R9 and r-f choke CH4.

b. To operate on the higher frequency, resolder the open connection of resistor R9.

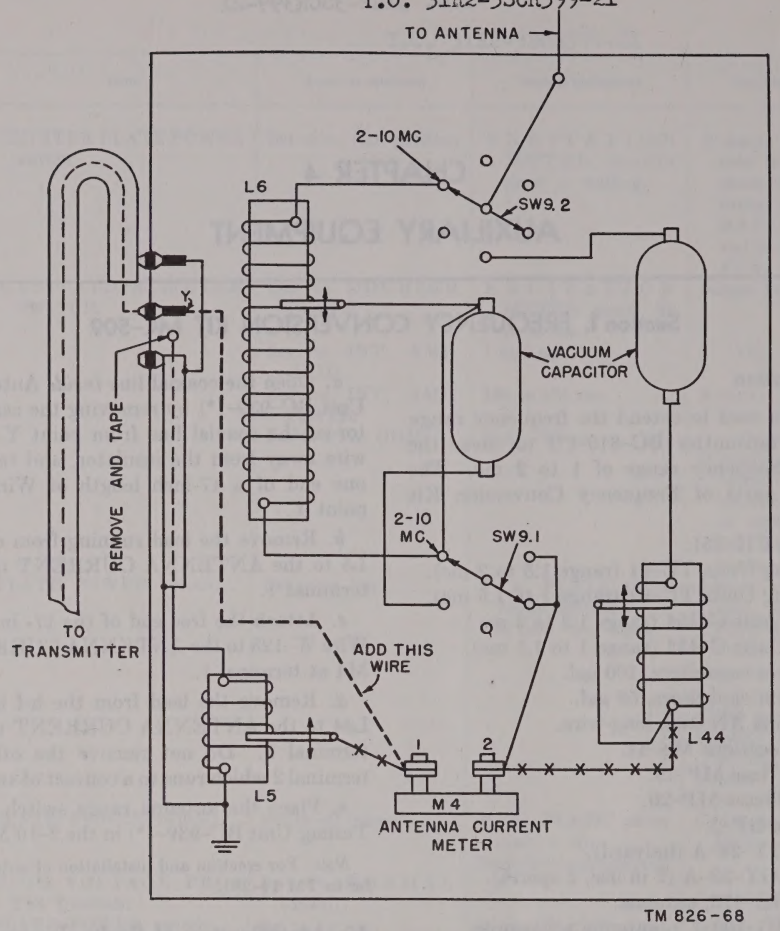


Figure 23. Modification of Antenna Tuning Unit BC-939-(*), practical wiring diagram.

41. Operation of Radio Transmitter BC-610-(*) in Fredquency Range of 1 to 2 mc

To operate Radio Transmitter BC-610-(*) in the frequency range of 1 to 2 mc, set the controls to the approximate dial settings indicated in table XII, and tune the transmitter according to the tuning procedure outlined in paragraph 21. For information pertaining to antenna, refer to TM 11-281.

Table XII. Approximate Dial Settings Using Antenna Tuning Unit BC–939–(*) (MODIFIED)

Frequency	Tuning unit				Transmitter			Antenna tuning crank 2-10 MC	Antenna length (feet)
	Tuning unit	M. O.	DOUB.	INT. AMP.	Coil unit	PLATE TUNING dial	Vacuum capacitor (μμf)		
1. 0	TU–62	4	3. 3	1. 5	C–455	33	100	13	125
1. 1	TU–62	34	4. 7	3. 0	C–455	78	100	20	125
1. 2	TU–62	54	6. 2	5. 0	C–455	37	55	28. 8	125
1. 3	TU–62	69	7. 4	6. 9	C–455	63	55	33. 6	125
1. 4	TU–62	80	8. 5	7. 8	C–455	86	55	38. 8	125
1. 5	TU–62	90	10. 0	9. 0	C–455	20	0	44. 2	125
1. 5	TU–61	12	3. 2	2. 2	C–454	54	55	26	75
1. 6	TU–61	32	4. 6	4. 3	C–454	74	55	29. 7	75
1. 7	TU–61	49	5. 7	5. 2	C–454	9	0	33. 2	75
1. 8	TU–61	63	6. 7	6. 2	C–454	22	0	36. 3	75
1. 9	TU–61	75	7. 3	7. 1	C–454	33	0	39. 6	75
2. 0	TU–61	85	8. 2	8. 0	C–454	42	0	42. 1	75

42. Theory of Equipment

a. General. To extend the frequency range of Radio Transmitter BC–610–(*) from 2 to 1 mc, three factors are involved:

(1) A means must be provided for tuning the oscillator, buffer-doubler, and ipa stages over the range of 2 to 1 mc.

(2) The p-a tank circuit must be provided with increased inductance and capacitance to tune over the required frequency range.

(3) The antenna must operate efficiently on frequencies from 1 to 2 mc, and a means must be provided for coupling the antenna to the p-a tank circuit.

(4) The functions of the electrical components of Frequency Conversion Kit MC–509, which makes possible the extended frequency range of Radio Transmitter BC–610–(*), are discussed in *b*, *c*, and *d* below.

b. Transmitter Tuning Units TU–61 and TU–62. The tuning circuits for the oscillator, buffer-doubler, and ipa stages of the transmitter are included in the plug-in tuning units. Transmitter Tuning Unit TU–61 covers a frequency range of 2 to 1.5 mc, and Transmitter Tuning Unit TU–62 covers a frequency range of 1.5 to 1 mc. The electrical parts of these tuning units perform the same functions as the electrical parts of Transmitter Tuning Units TU–47 through TU–54. Refer to chapter 5 for the functioning of these parts. Refer to figure 83 for Schematic diagrams.

c. Coil Unit C–454 or C–455 and Vacuum Capacitors. The p-a plate circuit of the transmitter is tuned over a frequency range of 1 to 2 mc by the use of a proper combination of Coil Unit C–454 or C–455 and vacuum capacitors of 55 μμf or 100 μμf, respectively (table XII). Coil Units C–454 and C–455 are provided with variable coupling links. By varying the position of the coupling link relative to the p-a tank coil, the operator can secure the required plate power input when loading the transmitter with the antenna.

d. Antenna System. To obtain efficient operation of the transmitter on frequencies from 1 to 2 mc, a long-wire antenna is used. The antenna operates as a grounded quarter-wave antenna. For frequencies from 1 to 1.5 mc the physical length of the antenna is 125 feet, and for frequencies from 1.5 to 2 mc, the physical length is 75 feet. Electrically, these antennas are much shorter than a quarter-wave-length; therefore, tuning the antenna to resonance at the operating frequency requires the use of a variable series inductance. By making a slight wiring change in Antenna Tuning Unit BC–939(*) (par. 39), coil L6 is connected in series with the antenna and the variable coupling link of the p-a tank coil. Figure 24 is a schematic diagram of the p-a plate circuit and Antenna Tuning Unit BC–939–(*) after the tuning unit wiring has been changed.

Note. For additional information concerning antenna systems refer to the system manual, TM 11–281.

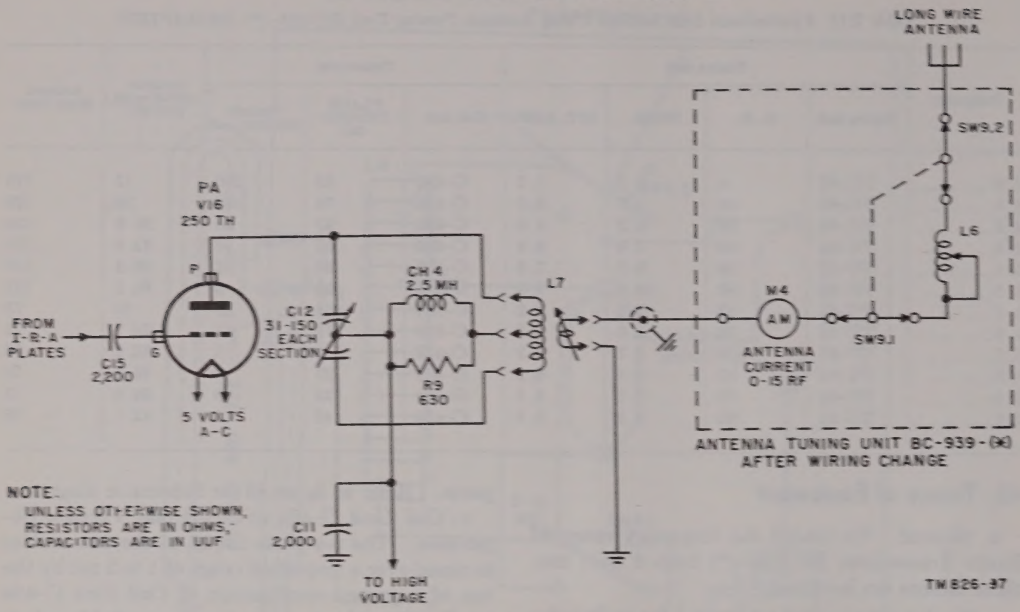


Figure 24. P-a plate circuit and modified Antenna Tuning Unit BC-939-(*), schematic diagram.

Section II. ADDITIONAL AUXILIARY EQUIPMENT

43. Auxiliary Equipment

Radio Transmitter BC-610-(*) may be used in many standard radio communications equipments. The units discussed in the following subparagraphs are used with the transmitter in the various systems to increase the operating facilities of the transmitter.

a. Speech Amplifier BC-614-(*) (fig. 25).

(1) Speech Amplifier BC-614-(*) is an a-f amplifier which is designed for use with Radio Transmitter BC-610-(*). The basic purpose of the speech amplifier is to raise the microphone output to a level suitable for the input of the a-f driver tubes of the transmitter. The speech amplifier has a jack which provides a means of keying the transmitter for c-w transmission from the speech amplifier. The speech amplifier is designed to permit the use of either a carbon microphone (such as Microphone T-17-(*) or T-45) or a dynamic microphone (such as Microphone T-50). A jack is provided for each on the front panel.

(2) Speech Amplifier BC-614-(*) has other uses in addition to those above, depending on the system with which the speech amplifier and radio transmitter are being used. The speech amplifier has two sockets which are located on the front panel (fig. 25). The socket on the lower left side of the panel connects the speech amplifier to the transmitter, and the socket on the right side of the panel connects the speech amplifier to auxiliary equipment. (This auxiliary equipment depends on the use of the speech amplifier and transmitter in the particular system they are being used.)

(3) Connections are provided between the two sockets on the speech amplifier to allow keying of the transmitter from an auxiliary piece of equipment and to allow the plate power relay of the transmitter to be operated from an auxiliary piece of equipment. The socket located on the lower right side of the front panel

provides connections from the speech amplifier for the following purposes:

(*a*) To ground the cathode of the sidetone oscillator when c-w sidetone is desired.

(*b*) To key the transmitter from an auxiliary piece of equipment.

(*c*) To connect Telephone EE–8–(*) for remote control.

(*d*) To connect the press-to-talk mike switch.

(*e*) To connect the output of the sidetone amplifier to headphones for c-w monitoring.

(*f*) To control the plate power and antenna shorting relays in the transmitter.

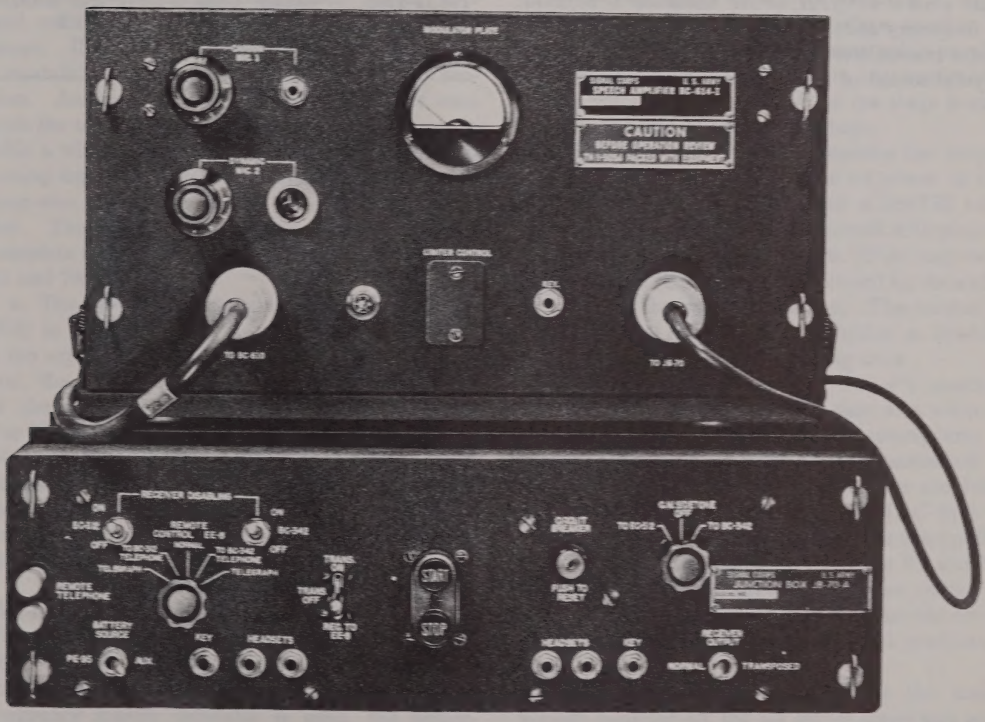
(4) Speech Amplifier BC–614–(*) contains its own plate and filament supply unit which draws approximately 40 watts from a 115-volt, 50–60 cycle, a-c source. When the speech amplifier is used with Radio Transmitter BC–610–(*), the a-c supply for the speech amplifier is provided by the transmitter through the socket marked TO BC–610 (marked TO TRANSMITTER in some procurements).

b. Junction Box JB–70–(*) (fig. 25). Junction Box JB–70–(*) (fig. 25) is a junction point for most of the cords and cables which interconnect the various components of Radio Sets SCR–399–(*), SCR–499–(*), and AN/MRC–2(*). Power and control cords plug into the bottom and the side of the junction box. Key and headset connections are plugged into the jacks on the front panel. Junction Box JB–70–(*) serves as a control center for the station. The front panel controls provide for—

(1) Starting or stopping Power Unit PE–95–(*).

(2) Resetting the circuit breaker in the power mains.

(3) Selection of the 12-volt battery source.



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Figure 25. Speech Amplifier BC–614–I and Junction Box JB–70–A.

(4) Control of transmission and reception.
(5) Remote control operation.
(6) Choice of manual or automatic receiver disabling
(7) Choice of receiver output to headset.
(8) A sidetone signal to monitor transmission during c-w operation.

c. Amplifier AM–141(*)/MRC. This r-f amplifier is used when the power output of Radio Transmitter BC–610–(*) is to low for the projected use. Amplifier AM–141(*)/MRC generally is mounted next to the radio transmitter. The r-f output of the radio transmitter is coupled to the power amplifier which provides an output of approximately 2 kw to the transmitting antenna. Two sets of plug-in coils are provided with the power amplifier to provide the same tuning range as that of the transmitter. The plate and bias power supplies, along with a high-pressure blower necessary for continuous operation, are housed in the amplifier cabinet.

d. Frequency Shift Exciter 0–39(*)/TRA–7, Exciter Unit 0–5(*)/FR, or RF Oscillator 0–86/FRT. A frequency shift exciter may be connected to the radio transmitter by a cord which plugs into the crystal socket of a transmitter tuning unit. The exciter takes the place of the crystal oscillator in the transmitter and provides the frequency shift required for transmission of mark and space signals. Polar signals originating from the d-c output mark and space impulses of a sending teletypewriter shift the oscillator frequency of the exciter. The exciter output provides sufficient r-f driving power to permit multiplying in the buffer-doubler stage of the transmitter.

44. Auxiliary Equipment References

For further information on the auxiliary equipment discussed in paragraph 43, refer to the following publications:

Technical manual	Equipment
TM 11–257	Frequency Shift Exciters 0–39/TRA–7, 0–39A/TRA–7, 0–39B/TRA–7, and 0–39C/TRA–7.
TM 11–281	Radio Sets SCR–399–A and SCR–499–A.
TM 11–2205	Exciter Units 0–5/FR and 0–5A/FR and RF Oscillator 0–86/FRT.
TM 11–5054	Speech Amplifier BC–614–(*).

CHAPTER 5
THEORY

Section I. TRANSMITTER AND ANTENNA TUNING UNIT

45. Block Diagram
(fig. 26)

Radio Transmitter BC–610–(*) is a medium-power r-f transmitter capable of transmitting c-w, a-m, or frequency-shifted signals over a frequency range of 2 to 18 mc. This frequency range is covered by means of eight plug-in transmitter tuning units, seven plug-in coil units, and a plug-in vacuum capacitor. Each tuning unit and coil covers only a portion of the frequency range. The transmitter includes an r-f section, a modulator section, and an h-v power supply section. Antenna Tuning Unit BC–939–(*) is used with the transmitter when it is desirable to operate with a whip or long-wire antenna. The antenna tuning unit will match the impedance of whip or long-wire antenna to that of the r-f power amplifier. The signal path is shown in figure 26, and complete schematic diagrams are shown in figures 43 and 78 through 84.

a. The r-f oscillator stage utilizes a 6V6GT tube (V8) in a circuit which may be operated either as a mo crystal controlled oscillator. For MO control, the frequency can be varied over the range of the particular transmitter tuning unit used. For XTAL control, a fixed frequency is generated whose value depends on the particular crystal plugged into the crystal socket of the proper transmitter tuning unit. Oscillations generated are supplied to the grid circuit of the buffer-doubler stage.

b. The buffer-doubler stage consists of a type 6L6 tube (V9) and its associated circuit elements. The plate circuit of tube V9 is resonated by a parallel coil and capacitor tuned circuit contained in the transmitter tuning units. When the variable-frequency master oscillator is used, the buffer-doubler stage operates as a frequency doubler for all frequencies up to 12 mc, and as a frequency quadrupler for frequencies from 12 to 18 mc. Under crystal control, tube V9 operates as a buffer-amplifier for frequencies up to 4 mc, a frequency doubler for frequencies from 4 to 12 mc, and a frequency quadrupler for frequencies from 12 to 18 mc. R-f voltage from the plate of tube V9 is supplied to the grids of the ipa stage.

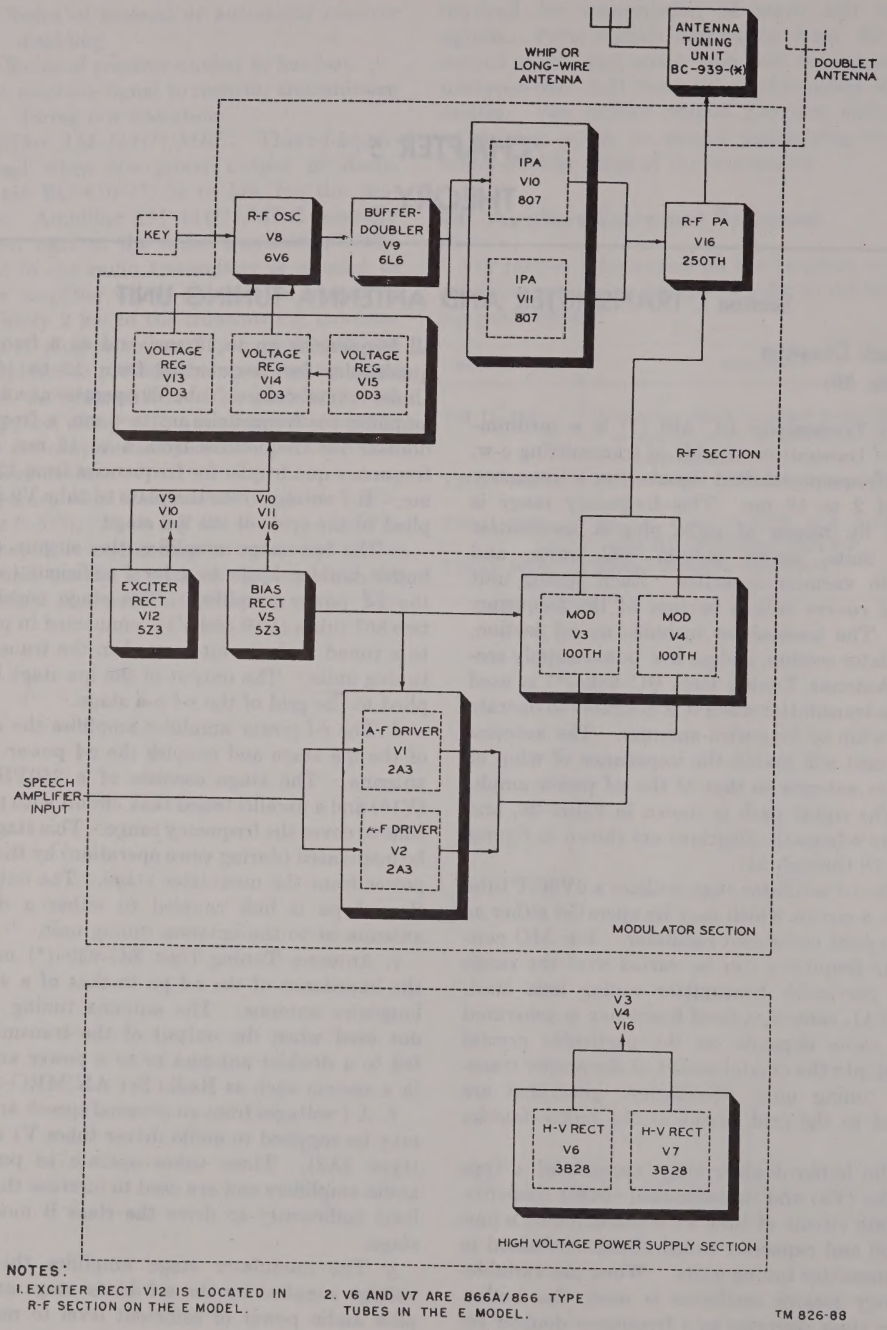
c. The ipa stage amplifies the output of the buffer-doubler stage to a level sufficient to drive the r-f power amplifier. The stage consists of two 807 tubes (V10 and V11) connected in parallel to a tuned tank circuit located in the transmitter tuning units. The output of the ipa stage is supplied to the grid of the r-f p-a stage.

d. The r-f power amplifier amplifies the output of the ipa stage and couples the r-f power to the antenna. The stage consists of a 250TH tube (V16) and a parallel tuned tank circuit with plug-in coils to cover the frequency range. This stage may be modulated (during voice operation) by the audio power from the modulator stage. The output of the r-f pa is link coupled to either a doublet antenna or to the antenna tuning unit.

e. Antenna Tuning Unit BC–939–(*) matches the impedance of the r-f pa to that of a whip or long-wire antenna. The antenna tuning unit is not used when the output of the transmitter is fed to a doublet antenna or to a power amplifier in a system such as Radio Set AN/MRC–2(*).

f. A-f voltages from an external speech amplifier may be supplied to audio driver tubes V1 and V2 (type 2A3). These tubes operate as push-pull audio amplifiers and are used to increase the audio level sufficiently to drive the class B modulator stage.

g. The modulator stage amplifies the audio voltage supplied by the a-f driver stage and supplies audio power of sufficient level to modulate



NOTES:

1. EXCITER RECT V12 IS LOCATED IN R-F SECTION ON THE E MODEL.
2. V6 AND V7 ARE 866A/866 TYPE TUBES IN THE E MODEL.

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Figure 26. Radio Transmitter BC-610-(*), block diagram.

the r-f carrier in the r-f p-a stage. The stage consists of tubes V3 and V4 (type 100TH) operating in a push-pull class B amplifier circuit. Audio power is supplied to the r-f p-a stage only during voice operation.

h. Exciter rectifier tube V12 (type 5Z3) supplies screen and plate power to r-f oscillator V8, buffer-doubler tube V9, and ipa tubes V10 and V11. Screen voltage furnished to r-f oscillator tube V8 is regulated by voltage regulator V13. The plate voltage of V8 is regulated by voltage regulator tubes V14 and V15.

i. Bias rectifier tube V5 (type 5Z3) serves as a source of negative bias voltage for V1 and V2, modulator tubes V3 and V4, ipa tubes V10 and V11, and r-f p-a tube V16, and supplies the plate power for a-f driver tubes V1 and V2. (The plates of the driver are returned to ground and the negative voltage is supplied to the cathodes.)

j. The h-v rectifier uses rectifier tubes V6 and V7 (type 866A/866 or 3B28). The h-v rectifier supplies the plate power for modulator tubes V3 and V4 and r-f p-a tube V16. Provision is made to raise the voltage for C.W. operation or lower the voltage for PHONE operation by taps on the primary of h-v transformer T6.

46. R-f Oscillator Stage

(figs. 27 and 28)

a. General.

(1) The r-f oscillator develops a stable r-f output. The fundamental frequency, second, or fourth harmonic of the signal generated is amplified by latter stages for use as an r-f carrier wave.

(2) Eight plug-in type tuning units, covering the operating range of the transmitter, are available for use with the oscillator (fig. 11). Each tuning unit has an mo section and a crystal section, either of which will control the frequency of oscillation of the r-f oscillator (figs. 27 and 28). The type of operation (mo or crystal) may be selected by setting M.O. XTAL switch SW15 (fig. 19) to the desired position.

(3) Provision is made to plug three separate tuning units into the transmitter at one time (figs. 8 and 9). This enables the operator to choose one of the three tuning units by means of the BAND SWITCH control, located on the front panel of the transmitter.

b. M. O. Control with Tuning Unit TU–47.

(1) The mo section of the tuning unit uses capacitors C31 and C36 in parallel with L8 to form a resonant L-C circuit for controlling the oscillator frequency. The resonant frequency can be varied by means of capacitor C31.

(2) The screen grid of tube V8 acts as the anode (plate) of a triode oscillator, and the control grid and cathode form the other two triode elements. Before the key is closed the cathode is ungrounded. D-c supply voltage is applied between the oscillator cathode and screen grid when the key is closed. This causes a flow of r-f current from the screen through C2, the lower section of L8, and through C1 to the cathode.

(3) This current in the lower section of L8 induces a voltage across both the lower and the upper section of L8 on each side of the center tap. The voltage induced across L8 charges capacitors C31 and C36 and the resonant circuit starts oscillating.

(4) The voltage across the upper section of L8 is coupled through capacitor C42 to the grid; this is the r-f grid excitation voltage at the resonant frequency of L8, C31, and C36. As the excitation voltage varies, corresponding variations of screen voltage occur and additional energy is fed back through C2 to the lower section of L8 in the resonant circuit. The energy thus fed back is sufficient to make up for the losses in the resonant circuit so that its oscillations continue.

(5) As the grid excitation voltage swings the grid positive, C42 charges negatively to a voltage nearly equal to the positive peak of the excitation voltage. The voltage across C42 acts as a bias voltage. Grid-leak resistor R1 prevents C42 from discharging rapidly when the excitation voltage is lower than the grid capacitor voltage. Choke CH1 isolates the r-f voltages on the grid.

(6) The cathode is connected through the low d-c resistance of choke coils CH2 and CH9 to ground. Resistor R35 acts

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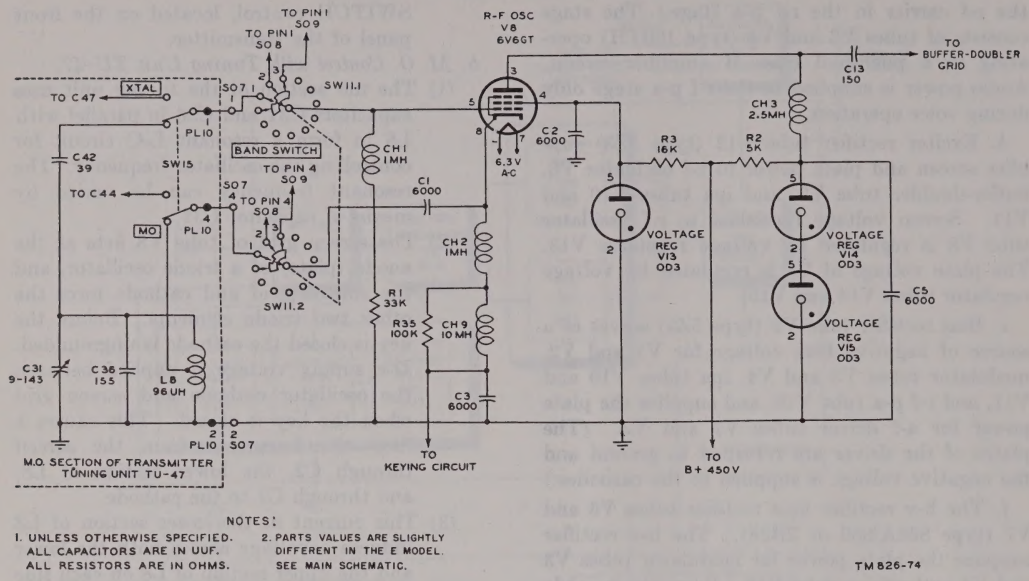


Figure 27. Functional diagram of r-f oscillator as a vfo using Transmitter Tuning Unit TU-47.

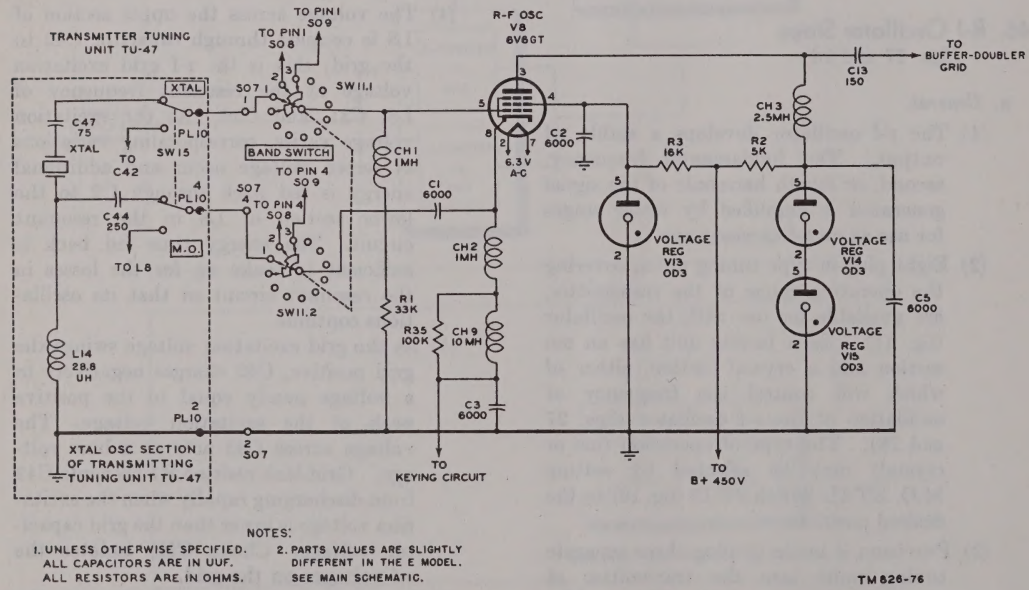


Figure 28. Functional diagram of r-f oscillator as a crystal oscillator using Transmitter Tuning Unit TU-47.

as a parasitic suppressor. Capacitor C3 filters the keying circuit. The high r-f impedance of choke coils CH2 and CH9 forces the r-f variations from the oscillator screen to feed back through the lower r-f impedance of L8. Capacitor C1 is included to keep the dc from flowing through L8, but effectually connects the cathode to the tap on L8 at radio frequencies.

(7) The r-f oscillations in the screen-to-cathode circuit modulate the electron flow between the cathode and plate of the tube. The output voltage is developed across r-f choke CH3 and coupled to the buffer-doubler stage grid through capacitor C13.

(8) The d-c supply voltage is obtained from the exciter power supply. The plate voltage is regulated at 300 volts by the circuit composed of current limiting resistor R2 and voltage regulator tubes V14 and V15. Capacitor C5 bypasses the regulator circuit to ground. The oscillator screen voltage is regulated at 150 volts by the circuit composed of current limiting resistor R3 and voltage regulator tube V13.

c. Crystal Control with Tuning Unit TU–47 (fig. 28). The resonant circuit of L8, C36, and C31 (fig. 27) is the equivalent circuit of a crystal at its resonant frequency. When the M. O. XTAL switch of Transmitter Tuning Unit TU–47 is placed in the XTAL position, the circuit of figure 28 is in use. Examination of this circuit shows that the crystal has been substituted for its equivalent circuit, capacitor C44 has been placed in series with capacitor C1, and inductor L14 has been added to the circuit. The circuit functions the same as explained in *b* above, except that L14 and C44 form a series-resonant circuit between the cathode and ground. The values of L14 and C44 are chosen so that their resonant frequency is somewhat lower than that of the lowest frequency crystal to be used in the circuit. This choice of values provides for feedback close to the frequency of the crystal over the entire range of the tuning unit and eliminates the need for any variable elements. The r-f variations at the oscillator screen are fed back through L14, because of the high r-f impedance of choke coils CH2 and CH9. The voltage thus developed across L14 exerts an electrical strain on the crystal so that it vibrates mechanically and develops the grid excitation voltage.

d. Other Tuning Units. With other tuning units, the operation of the oscillator is the same as described for Transmitter Tuning Unit TU–47. The values of the components in each tuning unit are chosen to give the best results in the frequency range for which the unit is designed. Schematic diagrams are shown in figure 82.

47. Buffer-doubler Stage
(fig. 29)

a. The r-f signal from the oscillator is fed through blocking capacitor C13 to the grid of tube V9, which is operated as a class C amplifier (fig. 29). The operating grid bias is developed across grid-leak resistor R23 when excitation voltage is applied to the grid. When no excitation voltage is applied to the grid, a protective bias is provided by cathode-biasing resistor R24 which is bypassed for rf by capacitor C8. This cathode bias prevents excessive plate current through tube V9 during key-up periods of c-w transmission as well as when the grid is not properly excited because of oscillator failure.

b. The plate-tank circuit consists of the variable capacitor and coil in the tuning unit (C32 and L20 in Tuning Unit TU–47) and it is connected to the plate of tube V9 through contacts on switch SW11.3. The plate-tank circuit is tuned by the variable capacitor, which is controlled from the transmitter tuning unit by the DOUB. knob. Plate voltage is supplied by the exciter power supply and is applied through the tuning unit coil, r-f choke coil CH5, resistor R36, and meter shunt resistor R33. Resistor R33, a 2,000-ohm resistor, is not used in the E and F models, serial numbers 1 through 627. Choke CH5 offers a high impedance to r-f currents and these currents flow to ground through bypass capacitor C26 which has negligible reactance at operating frequencies. The tube receives screen voltage through dropping resistor R25, isolating resistor R36, and meter shunt resistor R33. Bypass capacitor C4 maintains the screen grid at r-f ground potential. When the EXCITATION METER SWITCH (switch SW8) is set to DOUBLER PLATE, EXCITATION METER M1 indicates the sum of the plate and screen currents through tube V9. For all except the E model, the meter reading

must be multiplied by 10. In the E model, meter M1 is direct reading and current is read on the 150-ma scale.

c. When the mo is used as a vfo, the buffer-doubler stage operates as a frequency doubler for all frequencies up to 12 mc; for frequencies from 12 to 18 mc, the buffer-doubler stage operates as a quadrupler. When a crystal oscillator is used, this stage operates as a buffer amplifier in the 2- to 4-mc range, as a frequency doubler in the 4- to 12-mc range, and as a quadrupler in the 12- to 18-mc range. The r-f output from the buffer-doubler tank is coupled through capacitor C14 to the ipa grid circuits.

of the bias power supply circuits and insuring maximum grid excitation voltage.

b. Grid bias for class C operation is furnished by the bias power supply and applied to the grids of tubes V10 and V11 through resistors R21 and R22, r-f choke coil CH7, resistor R8, and meter shunt resistor R28. A small amount of self-bias is obtained as a result of rectified grid current flow through resistor R8. This feature improves the class C operation. When switch SW8 is set to INT. AMP GRID, meter M1 indicates the grid current for tubes V10 and V11.

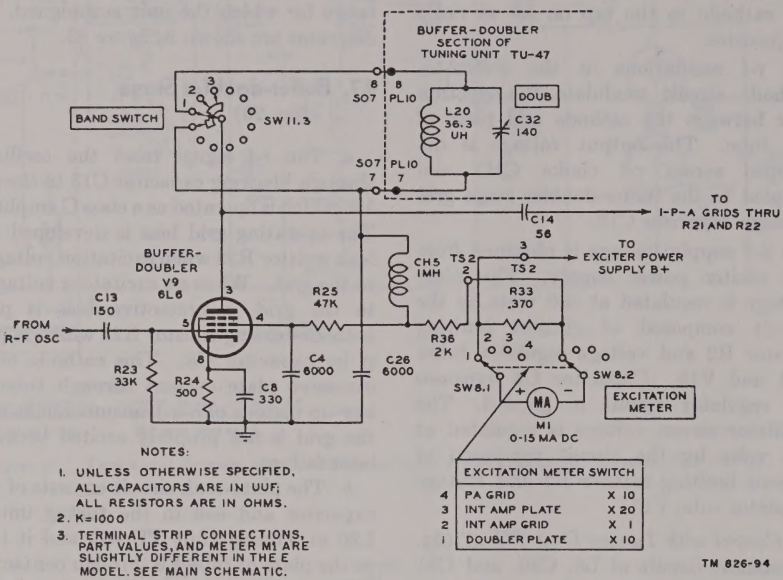


Figure 29. Functional diagram of buffer-doubler stage.

48. Ipa Stage
(fig. 30)

a. Tubes V10 and V11 are connected in parallel and operate as a class C amplifier stage (fig. 30). Grid excitation voltage is obtained from tube V9 through coupling capacitor C14. The excitation voltage is applied to the grids of tubes V10 and V11 through resistors R21 and R22 which effectively prevent this stage from producing parasitic oscillations. The high r-f impedance of choke CH7 confines the r-f excitation voltage to the grids of V10 and V11, thus keeping r-f energy out

c. The plate-tank circuit consists of a variable capacitor and a coil in the tuning unit. This tuned circuit is connected to the plates of tubes V10 and V11 through the contacts on switch SW11. The variable capacitor tunes the plate tank to resonance and is controlled by the INT. AMP. knob on the tuning unit. Plate voltage is supplied by the exciter power supply and is applied to the plates of tubes V10 and V11 through the coil in the tuning unit, r-f choke coil CH6, and meter shunt resistor R27. R-f energy is kept out of the power supply circuit by the action of choke CH6 and bypass capacitor C24. The screen grids obtain voltage through screen-dropping resistors R6 and R7 and meter shunt resistor R27. Capacitors

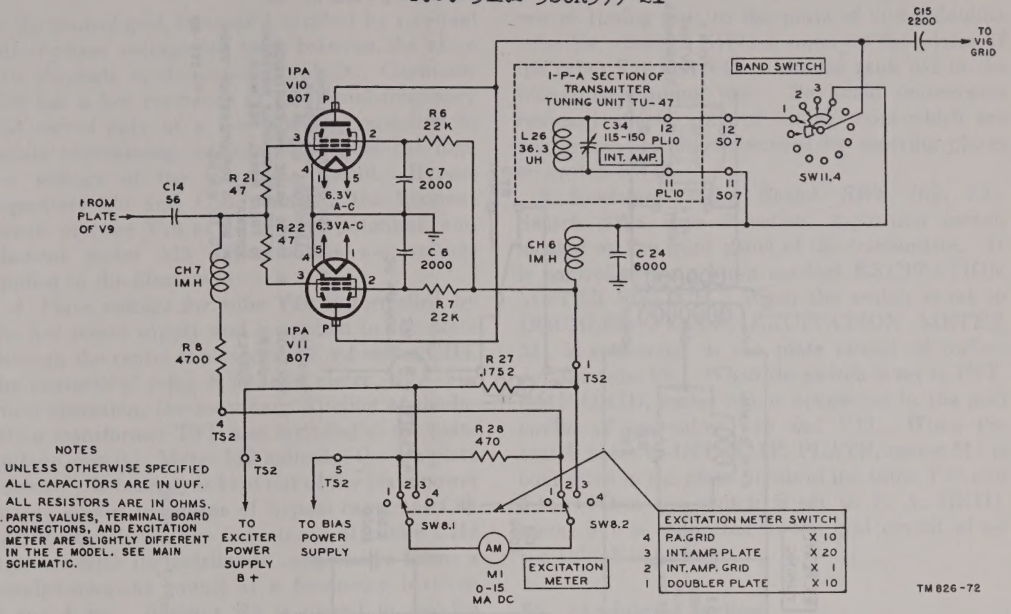


Figure 30. Functional diagram of ipa stage.

C6 and C7 are the screen-grid, r-f bypass capacitors. When switch SW8 is set to INT. AMP. PLATE, meter M1 indicates the total plate and screen current of tubes V10 and V11. In all except the E model the meter reading must be multiplied by 20. In the E model, meter M1 is direct reading and current is read on the 300-ma scale. The r-f output from the ipa tank is coupled through capacitor C15 to the p-a (V16) grid circuit.

49. P-a Stage

(fig. 31.)

a. The r-f output of the ipa is coupled through capacitor C15 to the grid of power amplifier tube V16. Tube V16 is operated as a class C, plate-neutralized, r-f power amplifier. The grid bias required is furnished by the bias power supply through r-f choke coil CH8 and meter shunt resistor R26. Choke CH8 confines the r-f excitation voltage to the grid and keeps r-f energy out of the bias power-supply circuits. When switch SW8 is set to P. A. GRID, meter M1 indicates the p-a grid current. In all except the E model, the meter reading must be multiplied by 10. In the E model, meter M1 is direct reading and current is read on the 150-ma scale.

b. The plate-tank circuit consists of variable capacitor C12 and p-a tank coil L7. For operation in the frequency range of 2 to 2.5 mc, the 55-$\mu\mu$f vacuum capacitor, C28, is inserted in clips provided on the top of capacitor C12. This increases the total capacity in the plate-tank circuit so that tuning may be accomplished within this range. The p-a tank circuit is tuned to resonance by variable capacitor C12 which is controlled by the P. A. PLATE TUNING dial on the front of the transmitter. The primary of p-a tank coil L7 is center tapped and the plate is connected to one end of the primary coil. The voltage at the opposite end of the primary coil with respect to the center tap, is exactly 180° out of phase with the plate-to-center tap voltage and is equal to that volt age in amplitude. The connection from this end of the primary coil in L7 is coupled back to the control grid of tune V16 through capacitors C29 and C18 in series.

c. Variable capacitor C18 is used for neutralizing; it has a range of 3.5 to 5.7 $\mu\mu$f and is adjusted to provide the same amount of capacity between the control grid and plate in the external circuit as there is between these same two elements within the tube. When C18 is adjusted properly, the r-f voltage which is fed back from the plate

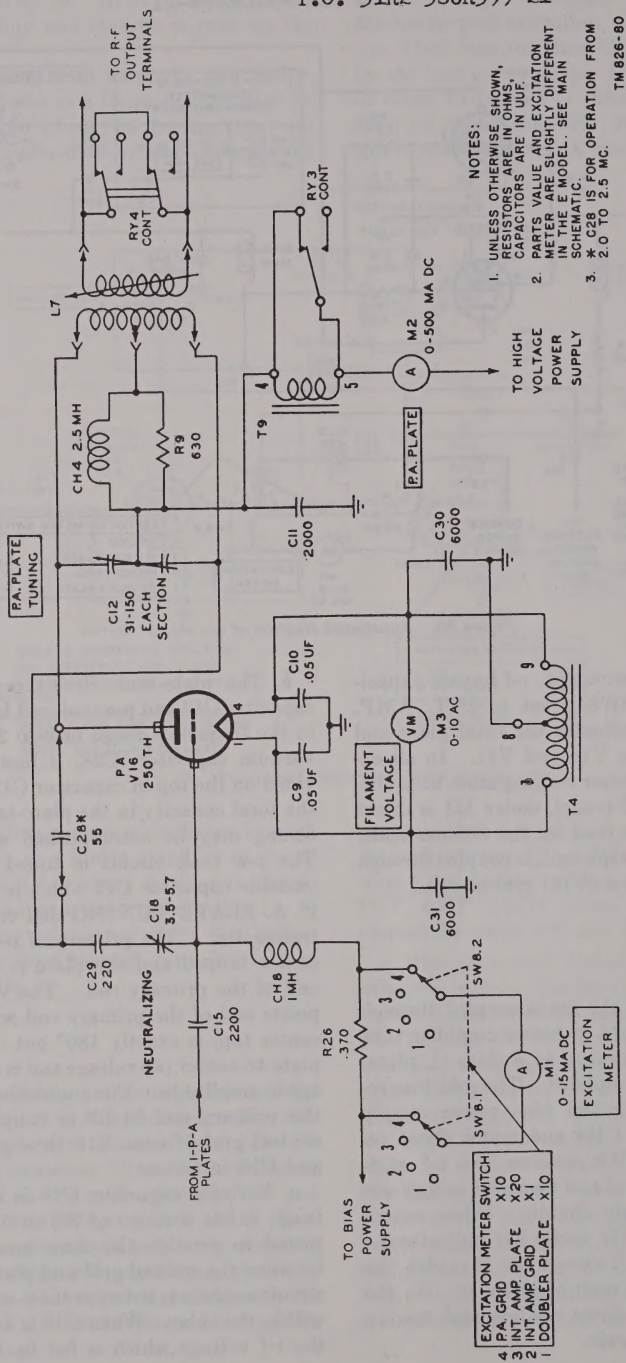


Figure 81. Functional diagram of r-f p-a stage.

to the control grid, internally, is offset by an equal out-of-phase voltage fed back between the same two elements in the external circuit. Capacitor C29 has a low reactance at the signal frequency and serves only as a d-c blocking capacitor to isolate neutralizing capacitor C18 from the high d-c voltage of the p-a plate circuit. Bypass capacitors C9 and C10 maintain the filament circuit of tube V16 at r-f ground potential, and filament meter M3 indicates the a-c voltage applied to the filament.

d. Plate voltage for tube V16 is furnished by the h-v power supply and is applied to the plate through the center tap on coil L7, r-f choke CH4, the contacts of relay RY3, and meter M2. For voice operation, the secondary winding of modulation transformer T9 is also included in the plate voltage circuit. Meter M2 indicates the p-a plate current. R-f energy is kept out of the plate power supply circuit by means of bypass capacitor C11 and choke CH4. The inductance of choke CH4 together with its distributed capacitance forms a parallel-resonant circuit at a frequency between 2 and 4 mc. Resistor R9 is placed in parallel with choke CH4 to prevent parasitic oscillations in the choke coil.

e. R-f power is taken from the p-a tank circuit by means of a link, inductively coupled to the tank coil, and power is fed to the antenna or antenna tuning unit through the r-f output terminals. When the transmitter is not in operation, contacts on relay RY4 short circuit the coupling link and detune the transmitting antenna so that it does not absorb signal energy at the frequency to which the radio receiving equipment is tuned.

50. Band Switch and Excitation Meter Switch

a. Band Switch SW11 (fig. 32). Switch SW11 is a 4-section, 3-position switch, controlled from the front panel of the transmitter by a knob marked BAND SWITCH. It provides selection of any one of three transmitter tuning units which have been set to a predetermined frequency. The switch sections are numbered (on the functional schematic diagram) SW11.1, SW11.2, SW11.3, and SW11.4. Section 1 is the section nearest the front panel of the transmitter. Switches SW11.1 and SW11.2 connect the grid and cathode circuits of oscillator tube V8 to the oscillator circuits in the transmitter tuning unit. Switch SW11.3 connects the buffer-doubler tank coil of the transmitter tuning unit to the plate of buffer-doubler tube V9. Switch SW11.4 connects the plates of ipa tubes V10 and V11 to the ipa tank coil in the transmitter tuning unit. To avoid undesirable resonant effects, coils of tuning units which are not in use are short-circuited by shorting plates on switch SW11.

b. Excitation Meter Switch SW8 (fig. 33). Switch SW8 is a 2-section, 4-position switch located on the front panel of the transmitter. It is controlled by a knob marked EXCITATION METER SWITCH. When the switch is set to DOUBLER PLATE, EXCITATION METER M1 is connected in the plate circuit of buffer-doubler tube V9. When the switch is set to INT. AMP GRID, meter M1 is connected in the grid circuit of ipa tubes V10 and V11. When the switch is set to INT. AMP. PLATE, meter M1 is connected in the plate circuit of ipa tubes V10 and V11. When the switch is set to P. A. GRID, meter M1 is connected in the grid circuit of r-f p-a tube V16.

51. Modulator Section

(fig. 34)

a. A-f Driver Stage. Tubes V1 and V2 (type 2A3) are operated as class AB1 amplifiers connected in a push-pull circuit. The suffix 1 after AB denotes that grid current is not allowed to flow during any part of the input cycle.

(1) A-f voltage usually is fed to the primary winding of transformer T7 over a 500-ohm transmission line, such as a telephone line or the audio pair in Cord CD–764. The secondary winding of transformer T7 is connected to the grids of tubes V1 and V2; the grid circuit is completed to the filaments through the center tap on transformer T7 and resistor R20. The primary-to-secondary turns ratio of transformer T7 is such that when the secondary is loaded by resistors R14 and R15, the impedance, looking into the primary winding, is 500 ohms. This is the correct impedance for proper termination of the a-f transmission line from the speech amplifier.

(2) Plate voltage for tubes V1 and V2 is furnished by the bias-voltage power supply. This power supply has the positive side of the output grounded, and the ungrounded side of the supply is

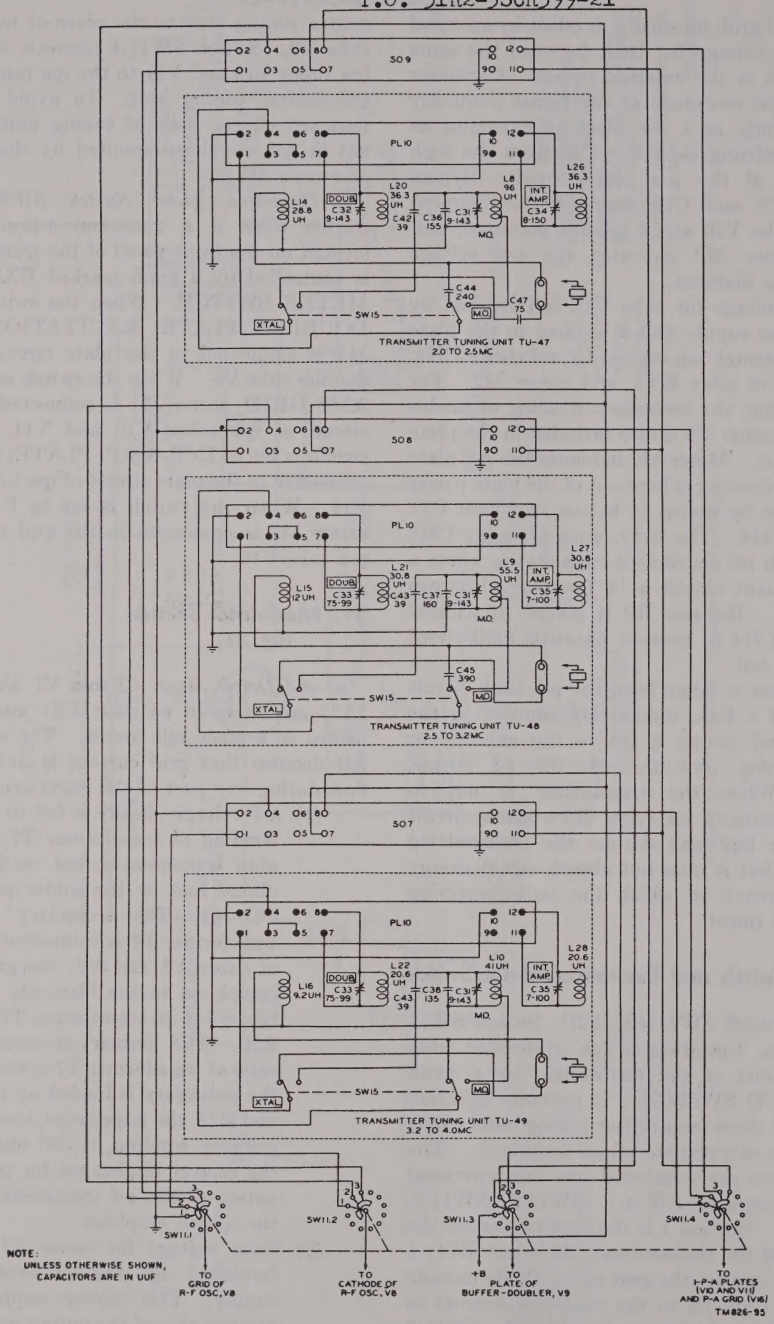


Figure 32. Functional diagram of BAND SWITCH SW11.

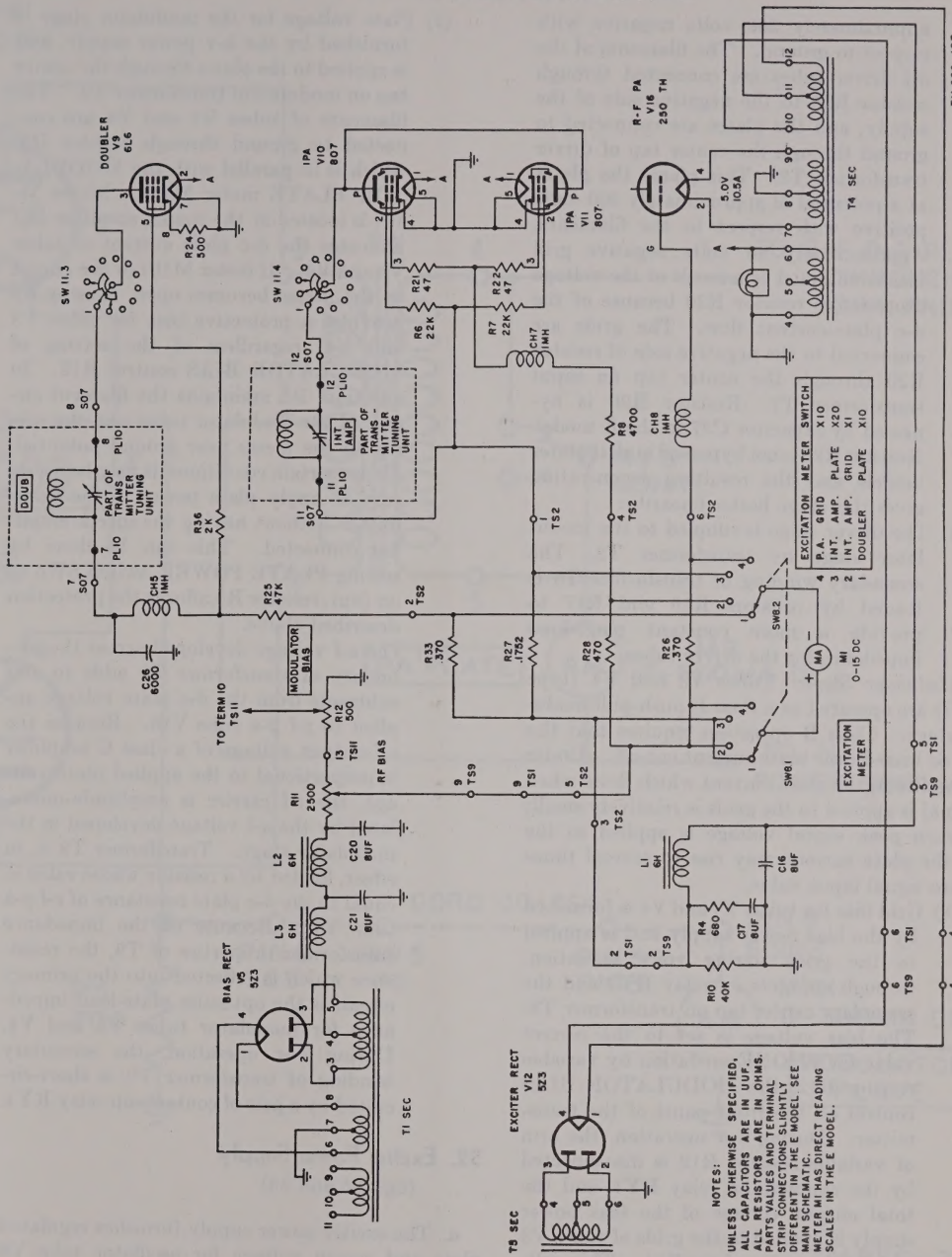


Figure 33. Functional diagram of EXCITATION METER SWITCH.

approximately 360 volts negative with respect to ground. The filaments of the a-f driver tubes are connected through resistor R20 to the negative side of the supply, and the plates are connected to ground through the center tap of driver transformer T8. This places the plates at a potential of approximately 300 volts positive with respect to the filaments. Approximately 60 volts negative grid bias is obtained as a result of the voltage drop across resistor R20 because of the d-c plate-current flow. The grids are connected to the negative side of resistor R20 through the center tap on input transformer T7. Resistor R20 is bypassed by capacitor C27 in the E model. Resistor R20 is not bypassed in all the later models and the resulting degeneration gives this stage better linearity.

(3) The driver stage is coupled to the modulator stage by transformer T8. The secondary winding of transformer T8 is loaded by resistors R16 and R17 to provide a more constant plage-load impedance for the driver tubes.

b. Modulator Stage. Tubes V3 and V4 (type 100TH) are operated as a class B push-pull modulator stage. Class B operation requires that the tubes be biased near plate current cut-off. Under this condition, the plate current which flows when no signal is applied to the grids is relatively small; but when peak signal voltage is applied to the grids the plate current may rise to several times the zero signal input value.

(1) Grid bias for tubes V3 and V4 is furnished by the bias power supply and is applied to the grids during voice operation, through contacts on relay RY3 and the secondary center tap on transformer T8. The bias voltage is set to the correct value for PHONE operation by variable resistor R12, the MODULATOR BIAS control on the front panel of the transmitter. During c-w operation, the arm of variable resistor R12 is disconnected by the contacts on relay RY3, and the total output voltage of the bias power supply is applied to the grids of tubes V3 and V4 through resistor R34. This voltage is sufficient to cause plate current cut-off.

(2) Plate voltage for the modulator stage is furnished by the h-v power supply, and is applied to the plates through the center tap on modulation transformer T9. The filaments of tubes V3 and V4 are connected to ground through resistor R5, which is in parallel with the MODULATOR PLATE meter M101. Meter M-101 is located in the speech amplifier and indicates the d-c plate current of tubes V3 and V4. If meter M101 or the circuit to the meter becomes open, resistor R5 provides a protective bias for tubes V3 and V4, regardless of the setting of MODULATOR BIAS control R12. In addition, R5 maintains the filament circuit of the modulator tubes and the wiring to the meter near ground potential. Under certain conditions, it may be necessary to apply plate power to the transmitter without having the speech amplifier connected. This can be done by setting PLATE POWER switch SW6 to on (up); resistor R5 affords the protection described above.

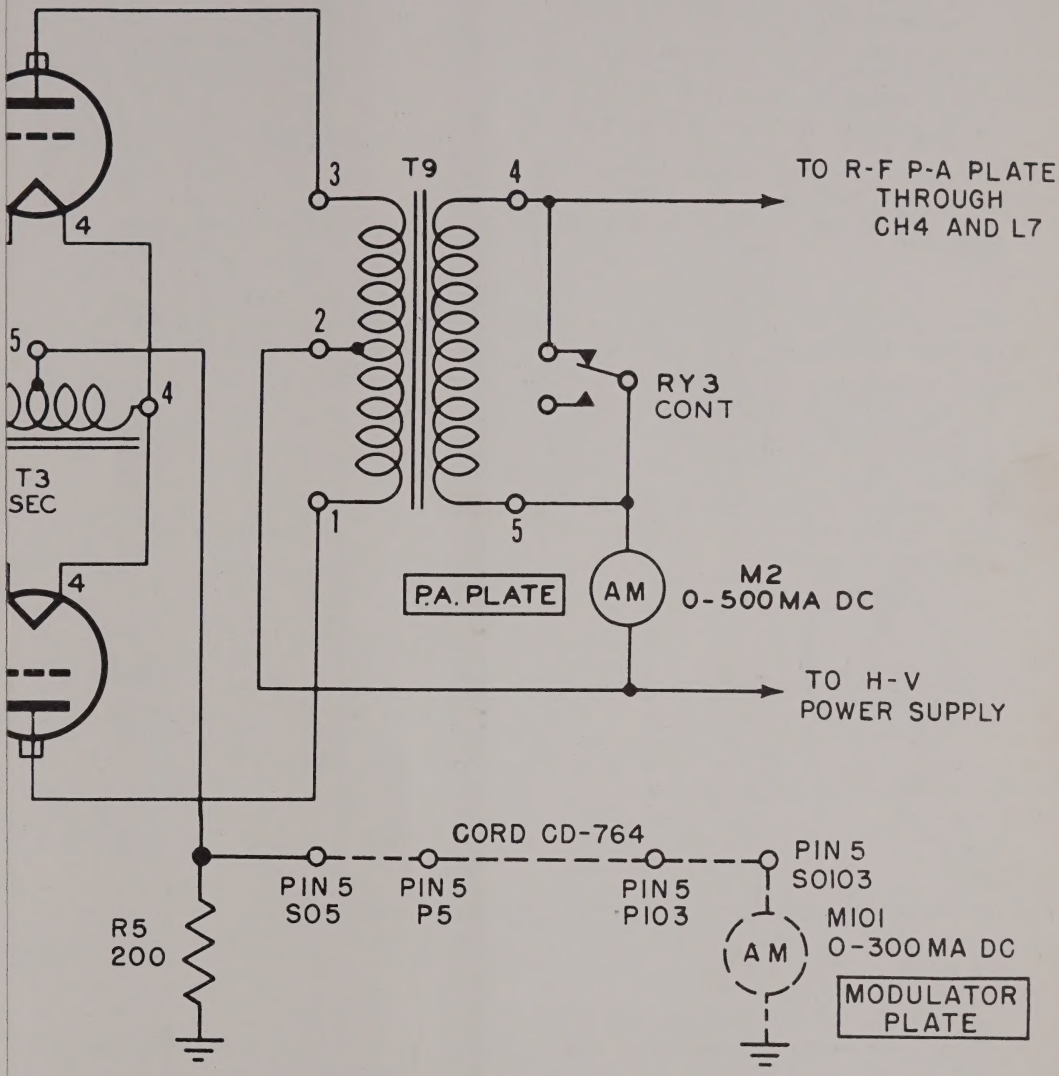
(3) The a-f voltage developed across the secondary of transformer T9 adds to and subtracts from the d-c plate voltage applied to r-f p-a tube V16. Because the r-f output voltage of a class C amplifier is proportional to the applied plate voltage, the r-f carrier is amplitude-modulated by the a-f voltage developed in the modulator stage. Transformer T9 is, in effect, loaded by a resistor whose value is equal to the d-c plate resistance of r-f p-a tube V16. Because of the impedance transformer properties of T9, the resistance which is reflected into the primary circuit is the optimum plate-load impedance for modulator tubes V3 and V4. During c-w operation, the secondary winding of transformer T9 is short-circuited by a pair of contacts on relay RY3.

52. Exciter Power Supply

(figs. 35 and 36)

a. The exciter power supply furnishes regulated plate and screen voltage for oscillator tube V8 and unregulated voltage for buffer-doubler tube V9 and ipa tubes V10 and V11.

ULATOR
V3
00 TH



approximately 360 volts negative with respect to ground. The filaments of the a-f driver tubes are connected through resistor R20 to the negative side of the supply, and the plates are connected to ground through the center tap of driver transformer T8. This places the plates at a potential of approximately 300 volts positive with respect to the filaments. Approximately 60 volts negative grid bias is obtained as a result of the voltage drop across resistor R20 because of the d-c plate-current flow. The grids are connected to the negative side of resistor R20 through the center tap on input transformer T7. Resistor R20 is bypassed by capacitor C27 in the E model. Resistor R20 is not bypassed in all the later models and the resulting degeneration gives this stage better linearity.

(3) The driver stage is coupled to the modulator stage by transformer T8. The secondary winding of transformer T8 is loaded by resistors R16 and R17 to provide a more constant plage-load impedance for the driver tubes.

b. Modulator Stage. Tubes V3 and V4 (type 100TH) are operated as a class B push-pull modulator stage. Class B operation requires that the tubes be biased near plate current cut-off. Under this condition, the plate current which flows when no signal is applied to the grids is relatively small; but when peak signal voltage is applied to the grids the plate current may rise to several times the zero signal input value.

(1) Grid bias for tubes V3 and V4 is furnished by the bias power supply and is applied to the grids during voice operation, through contacts on relay RY3 and the secondary center tap on transformer T8. The bias voltage is set to the correct value for PHONE operation by variable resistor R12, the MODULATOR BIAS control on the front panel of the transmitter. During c-w operation, the arm of variable resistor R12 is disconnected by the contacts on relay RY3, and the total output voltage of the bias power supply is applied to the grids of tubes V3 and V4 through resistor R34. This voltage is sufficient to cause plate current cut-off.

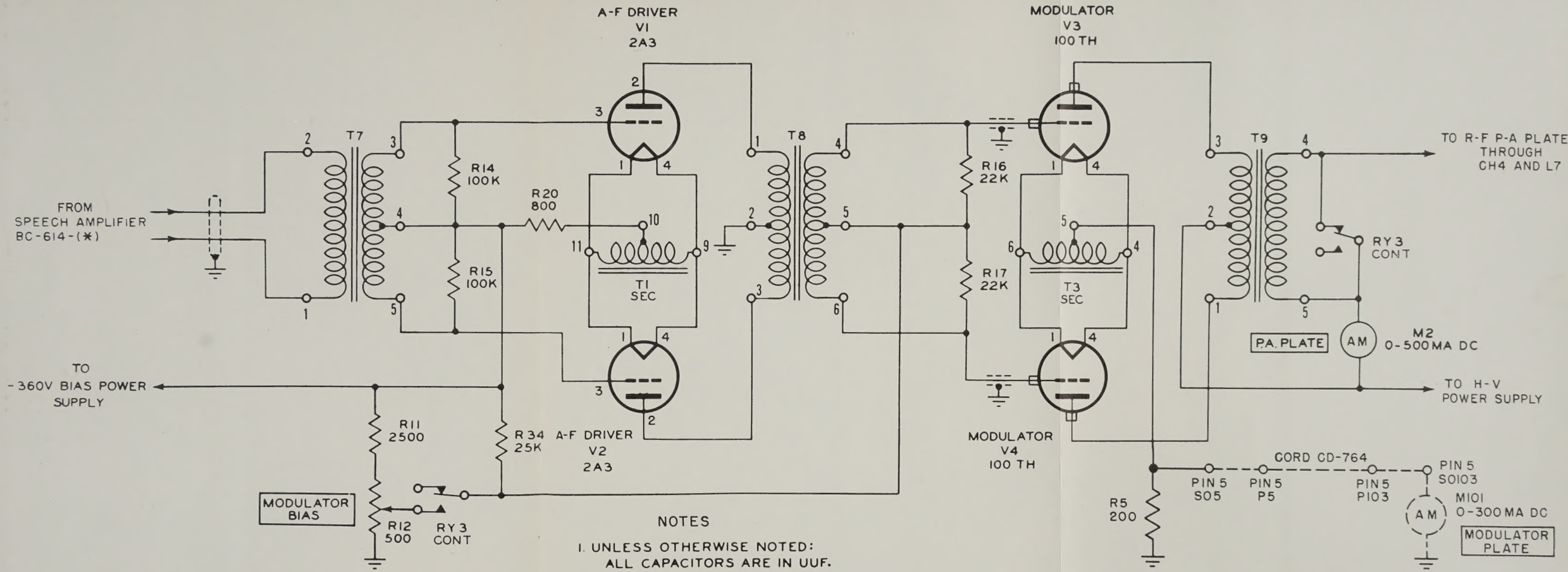
(2) Plate voltage for the modulator stage is furnished by the h-v power supply, and is applied to the plates through the center tap on modulation transformer T9. The filaments of tubes V3 and V4 are connected to ground through resistor R5, which is in parallel with the MODULATOR PLATE meter M101. Meter M-101 is located in the speech amplifier and indicates the d-c plate current of tubes V3 and V4. If meter M101 or the circuit to the meter becomes open, resistor R5 provides a protective bias for tubes V3 and V4, regardless of the setting of MODULATOR BIAS control R12. In addition, R5 maintains the filament circuit of the modulator tubes and the wiring to the meter near ground potential. Under certain conditions, it may be necessary to apply plate power to the transmitter without having the speech amplifier connected. This can be done by setting PLATE POWER switch SW6 to on (up); resistor R5 affords the protection described above.

(3) The a-f voltage developed across the secondary of transformer T9 adds to and subtracts from the d-c plate voltage applied to r-f p-a tube V16. Because the r-f output voltage of a class C amplifier is proportional to the applied plate voltage, the r-f carrier is amplitude-modulated by the a-f voltage developed in the modulator stage. Transformer T9 is, in effect, loaded by a resistor whose value is equal to the d-c plate resistance of r-f p-a tube V16. Because of the impedance transformer properties of T9, the resistance which is reflected into the primary circuit is the optimum plate-load impedance for modulator tubes V3 and V4. During c-w operation, the secondary winding of transformer T9 is short-circuited by a pair of contacts on relay RY3.

52. Exciter Power Supply

(figs. 35 and 36)

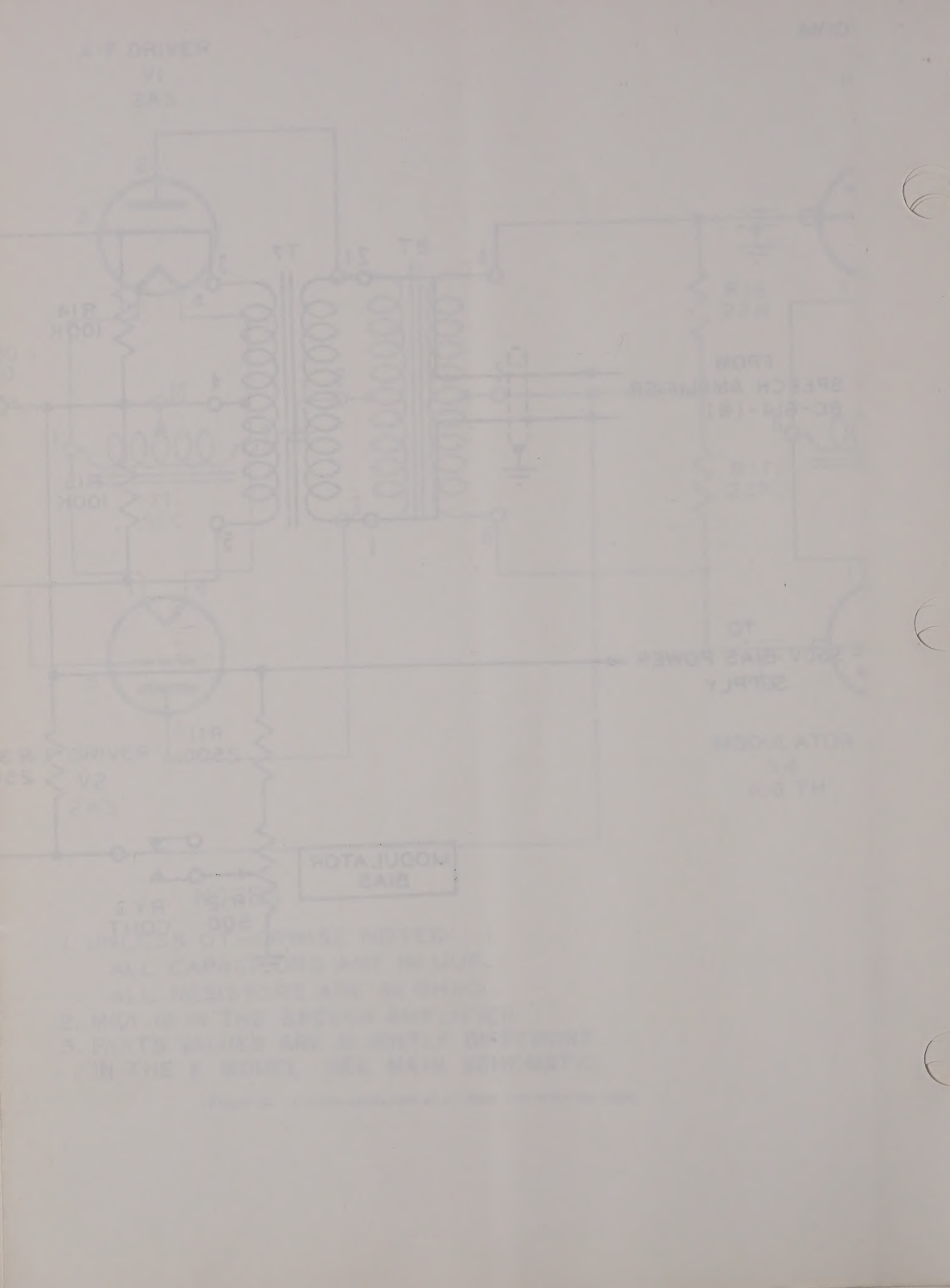
a. The exciter power supply furnishes regulated plate and screen voltage for oscillator tube V8 and unregulated voltage for buffer-doubler tube V9 and ipa tubes V10 and V11.



NOTES

1. UNLESS OTHERWISE NOTED:
   ALL CAPACITORS ARE IN UUF.
   ALL RESISTORS ARE IN OHMS.
2. M101 IS IN THE SPEECH AMPLIFIER.
3. PARTS VALUES ARE SLIGHTLY DIFFERENT IN THE E MODEL. SEE MAIN SCHEMATIC.

Figure 34. Functional diagram of a-f driver and modulator stages.



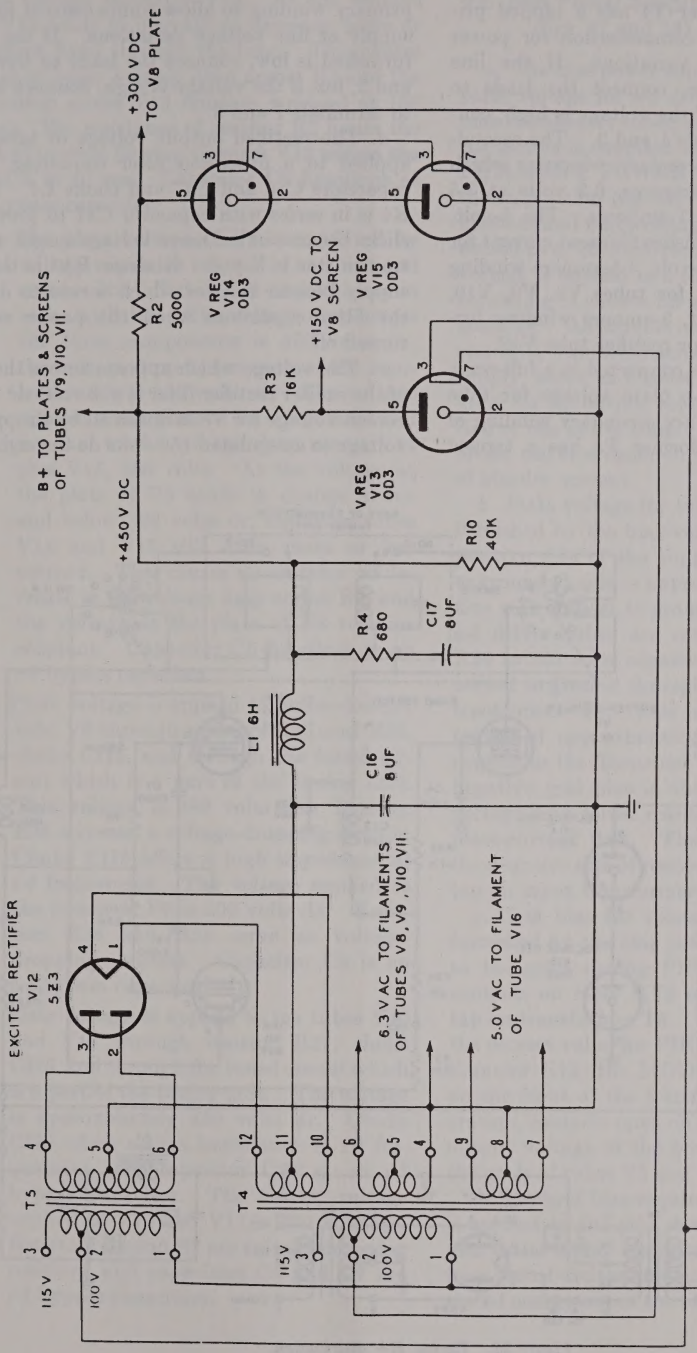


Figure 35. Functional diagram of exciter power supply.

b. Filament transformer T4 has a tapped primary winding to allow compensation for power supply or line voltage variations. If the line voltage furnished is low, connect the leads to terminals 1 and 2, but if the voltage is high, connect the leads to terminals 1 and 3. The secondary of T4 has three secondary windings which supply 5 volts at 10.5 amperes, 6.3 volts at 3.5 amperes, and 5 volts at 3 amperes. The 5-volt, 10.5-ampere winding furnishes filament current for r-f p-a tube V16; the 6.3-volt, 3.5-ampere winding furnishes heater current for tubes V8, V9, V10, and V11; and the 5-volt, 3-ampere winding furnishes filament current for rectifier tube V12.

c. Rectifier tube V12 is connected in a full-wave rectifier circuit. The a-c plate voltage for tube V12 is furnished by the h-v secondary winding of transformer T5. Transformer T5 has a tapped primary winding to allow compensation for power supply or line voltage variations. If the voltage furnished is low, connect the leads to terminals 1 and 2, but if the voltage is high, connect the leads to terminals 1 and 3.

d. The rectified output voltage of tube V12 is applied to a pi-section filter consisting of filter capacitors C16 and C17 and choke L1. Resistor R4 is in series with capacitor C17 to prevent key clicks because of excessive voltage surges when the transmitter is keyed. Resistor R10 is the power supply bleeder resistor which serves to discharge the filter capacitors when the power supply is turned off.

e. The voltage which appears across the output of the exciter rectifier filter is 450 volts dc (fig. 36). Screen voltage for V8 is obtained by dropping this voltage to a regulated 150 volts dc through resistor

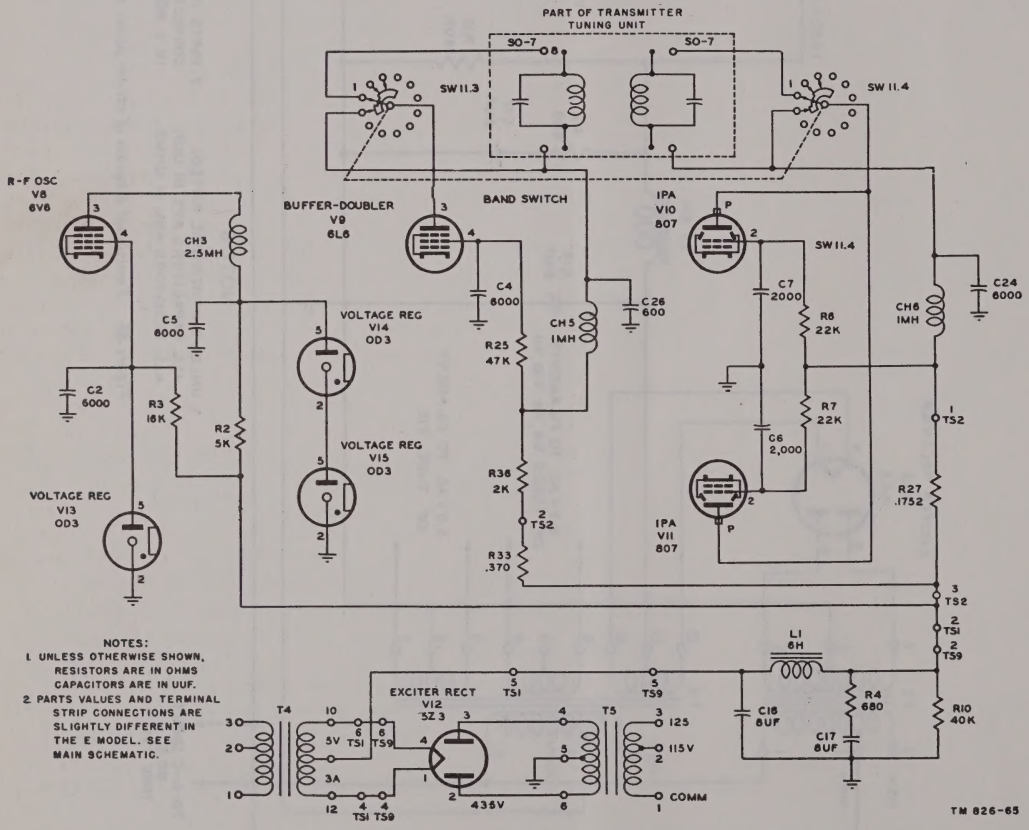


Figure 36. Exciter B+ distribution.

R3 and voltage regulator V13. As the voltage across V13 tends to increase or decrease, more or less current flows through the tube. This causes a greater or lesser voltage drop across R3 and the voltage drop across V13 remains constant at 150 volts dc. The resistance of resistor R3 limits the amount of current flowing through V13 within the range of 5 to 40 ma. Capacitor C2 functions as an r-f bypass capacitor.

(1) The plate voltage of V8 is regulated by voltage regulator tubes V14 and V15 and resistor R2. Tubes V14 and V15 are in series with R2. The voltage drop across the three components is 450 volts dc; the voltage drop across each of the regulator tubes is 150 volts dc. The voltage applied to the plate of V8 is regulated and is equal to the voltage drop across V14 plus V15, 300 volts. As the voltage at the plate of V8 tends to change above and below 300 volts dc, regulator tubes V14 and V15 will draw more or less current. This causes an increase or decrease in the voltage drop across R2, and the voltage at the plate of V8 remains constant. Capacitor C5 functions as an r-f bypass capacitor.

(2) Plate voltage is applied to buffer-doubler tube V9 through resistors R33 and R36, choke CH5, and through the tuned circuit which is a part of the tuning unit. This voltage is 380 volts dc. Resistor R36 serves as a voltage-dropping resistor. Choke CH5 offers a high impedance at r-f frequencies. The voltage applied to the screen of V9 is 200 volts dc. Resistors R36 and R25 serve as voltage-dropping resistors. Capacitor C4 is an r-f bypass capacitor.

(3) Plate voltage is applied to ipa tubes V10 and V11 through resistor R27, choke CH6, and through the tuned circuit which is a part of the tuning unit. The voltage is approximately 450 volts dc. Choke CH6 offers a high impedance at r-f frequencies, and capacitor C24 is an r-f bypass capacitor. The screen voltage applied to V10 and V11 is 320 volts dc. Resistors R6 and R7 are voltage-dropping resistors, and capacitors C6 and C7 are r-f bypass capacitors.

53. Bias Power Supply

(figs. 37 and 38)

a. The bias power supply furnishes filament and plate voltage for a-f driver tubes V1 and V2 and bias voltages for tubes V3, V4, V10, V11, and V16. A-c power is supplied to the primary of T1 when FILAMENT POWER switch SW1 is placed in the on position (fig. 37). Transformer T1 supplies filament and plate voltage to tube V5 which is connected as a full-wave rectifier. The rectifier output voltage is applied to a choke input pi-section filter consisting of chokes L2 and L3 and capacitors C20 and C21. Adjustable resistor R11 and potentiometer R12, connected across the output of the power supply, serve as bleeder resistors as well as a divider for the output voltages. The voltage regulation of this power supply is relatively good because of the use of a choke input filter and a high value of bleeder current.

b. Plate voltage for tubes V1 and V2 (fig. 38) is furnished by the bias-voltage power supply. The positive side of the supply is grounded, and the ungrounded side is approximately 360 volts negative with respect to ground. The filaments of the a-f driver tubes are connected through resistor R20 to 360 volts negative and the plates are connected to ground through the center tap of driver transformer T8. This places the plates at a potential of approximately 300 volts positive with respect to the filaments. Approximately 60 volts negative grid bias is obtained as a result of the voltage drop across resistor R20 because of the d-c plate-current flow. The grids are connected to the negative side of resistor R20 through the center tap on input transformer T7.

c. Grid bias for tubes V3 and V4 (fig. 38) is furnished by the bias power supply and is applied to the grids during PHONE operation through contacts on relay RY3 and the secondary center tap on transformer T8. The bias voltage is set to the correct value for PHONE operation by potentiometer R12, the MODULATOR BIAS control on the front of the transmitter. During c-w operation, contacts open on relay RY3, and the total output voltage of the power supply is applied to the grids of tubes V3 and V4 through resistor R34.

d. The grid bias required for tube V16 (fig. 38) is applied to the grid through r-f choke coil CH8 and meter shunt resistor R26. Choke CH8 confines the r-f excitation voltage to the grid and keeps the r-f energy out of the bias power supply circuits.

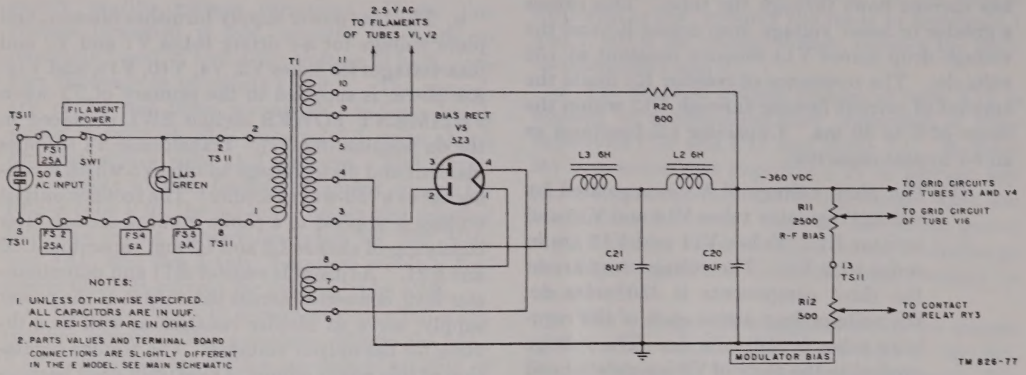


Figure 87. Functional diagram of bias power supply.

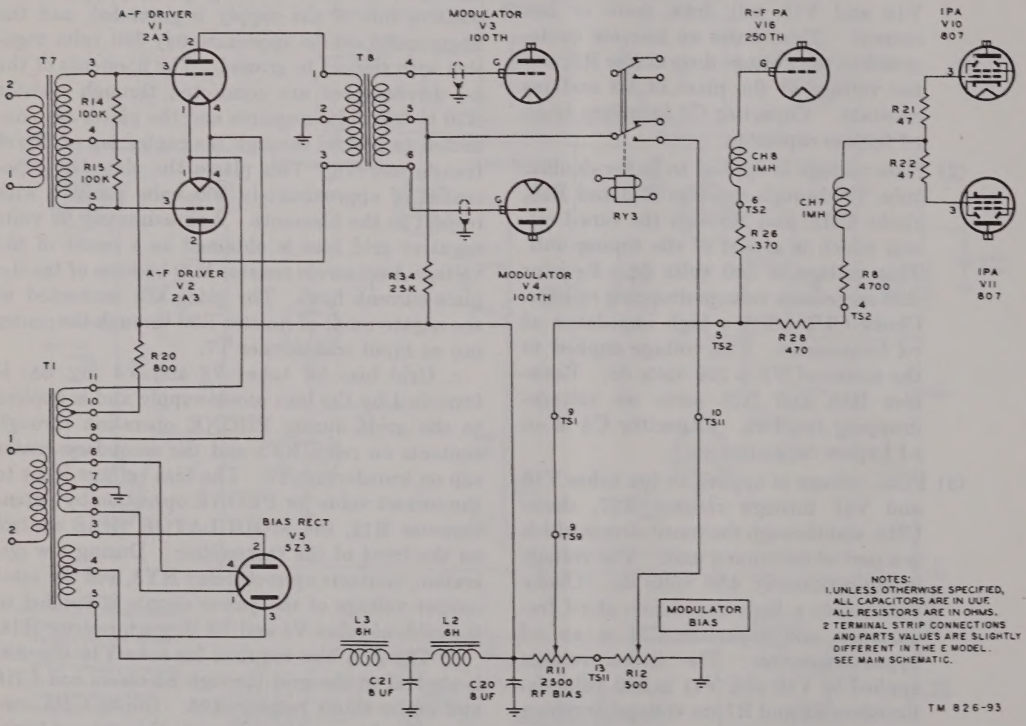


Figure 88. Bias and negative supply distribution.

e. Grid bias voltage is applied to the grids of tubes V10 and V11 through resistors R21 and R22, r-f choke CH7, resistor R8, and meter shunt resistor R28.

54. H-v Power Supply

(figs. 39 and 40)

a. The h-v power supply furnishes d-c voltage for modulator tubes V3 and V4, and r-f p-a tube V16. Tubes V6 and V7, tube 3B28, are connected in a full-wave rectifier circuit (fig. 41). (Type 3B28 tubes may be used as replacements for the 866A/866-type tubes in the E model.) Transformer T2 furnishes filament current to the rectifier tubes; transformer T6 furnishes the h-v alternating current to the rectifier plates. The rectifier high voltage is applied to an L-section filter consisting of choke L4 and capacitors C19 and C23. Resistor R13 is the bleeder resistor and serves to discharge capacitors C19 and C23 when power is turned off.

b. In the H and I models, filter choke L4 has a very closely spaced spark gap across its terminals. A surge voltage appears at the input to the filter choke when power to transformer T6 is switched on or off. When this surge is greater than the break-down voltage rating of the gap, its energy is dissipated across the gap. This action prevents a voltage which may be in excess of the insulation rating of the choke from developing across filter choke L4. The spark gap may be added to Radio Transmitters BC–610–F, –G, and T–213/GRC–26 models in accordance with MWO SIG 66. The E model does not have a spark gap.

c. Overload relay RY5 is connected between the center tap of the h-v secondary winding of transformer T6 and ground to prevent damage to the h-v rectifier tubes from overloads. For theory and operation of relay RY5 refer to paragraph 57.

d. The plate voltage for modulator tubes V3 and V4 is applied through the center tap on the primary of modulation transformer T9 (fig. 40). During c-w operation, plate voltage for tube V16 is applied through coil L7, r-f choke CH4, and the contacts of relay RY3. For phone operation, the secondary winding of transformer T9 provides the path for the plate voltage instead of the contacts of relay RY3. The voltage supplied is 2,500 volts for c-w operation and 2,000 volts for phone operation. For theory and operation of the methods used in controlling the high voltage in the various models of the transmitter, refer to paragraph 57*b*.

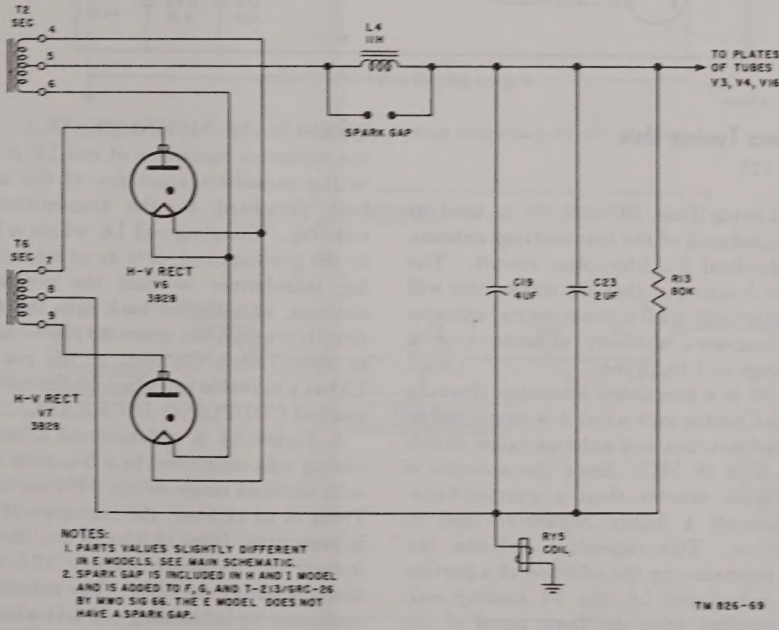


Figure 39. Functional diagram of h-v power supply.

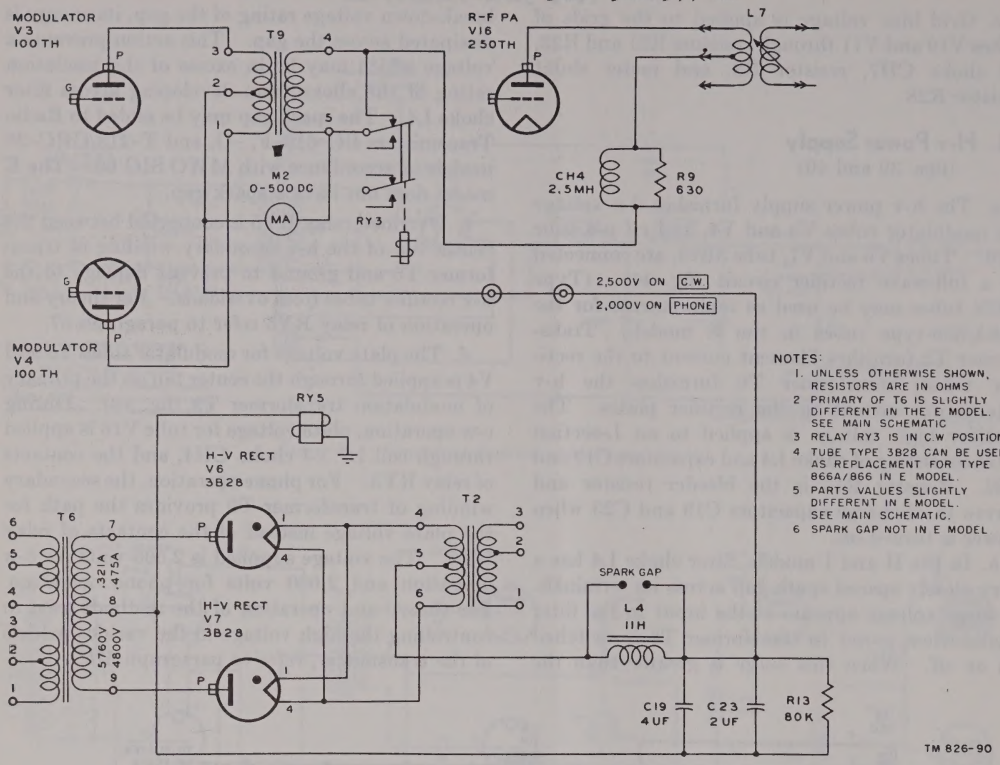


Figure 40. H-v B+ distribution.

55. Antenna Tuning Unit
(fig. 41)

Antenna Tuning Unit BC–939–(*) is used to match the impedance of the transmitting antenna to that of the final p-a tube plate circuit. The tuning unit is designed so that the transmitter will operate satisfactorily with a 5-section rod antenna or with a long-wire auxiliary antenna over a frequency range of 2 to 18 mc.

a. Figure 42 is a functional schematic drawing of the antenna tuning unit when it is connected to a 5-section rod antenna and antenna range switch SW9 is set to 2–10 MC. Since the antenna is electrically much shorter than a quarter-wavelength, it presents a highly capacitive load to the transmitter. This capacitive antenna can be tuned to resonance by the addition of a portion of variable inductance L6, the l-f loading coil, which is controlled from the front panel of the tuning unit by a crank handle marked FREQUENCY 10 MC-INCREASE-2 MC. When the inductive reactance of coil L6 is made equal to the capacitive reactance of the antenna, the load presented to the transmitter is purely resistive. Coupling coil L6, which is link-coupled to the p-a tank coil, acts as an impedance-matching transformer so that the resistance of the antenna, as reflected back into the r-f p-a tank circuit, presents the optimum plate-load resistance, as viewed from the plate of the p-a tube. Coil L5 has a movable tap which is controlled by a knob marked COUPLING INCREASE.

b. Figure 43 is a functional schematic of the tuning unit connected to a 5-section rod antenna, with antenna range switch SW9 set to 10–18 MC. From 10 to 12.5 mc, the reactance of the antenna is capacitive; from 12.5 to 18 mc, the reactance is inductive. At approximately 12.5 mc, the antenna is purely resistive. The antenna is tuned to resonance by h-f loading coil L44 which is variable and is controlled by a crank marked FRE-

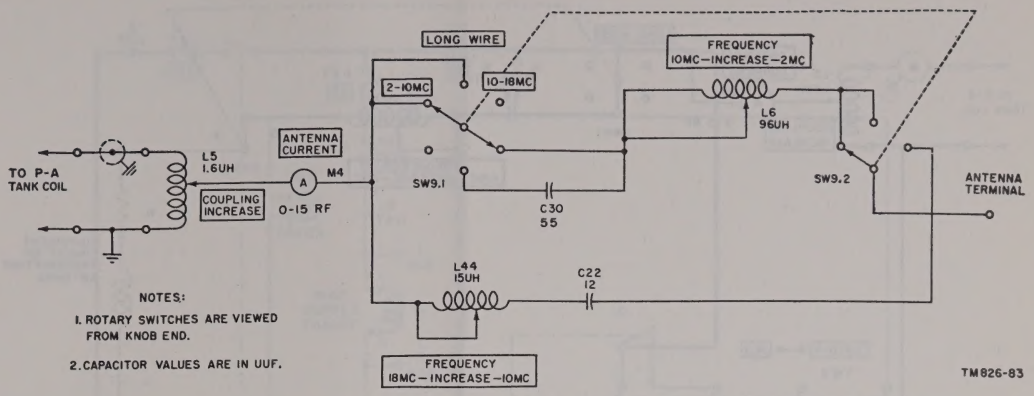


Figure 41. Antenna Tuning Unit BC-939-(*), schematic diagram.

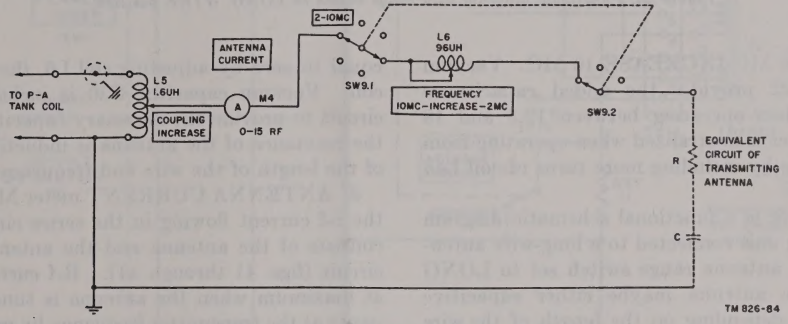


Figure 42. Functional diagram with range switch in 2-10 MC position.

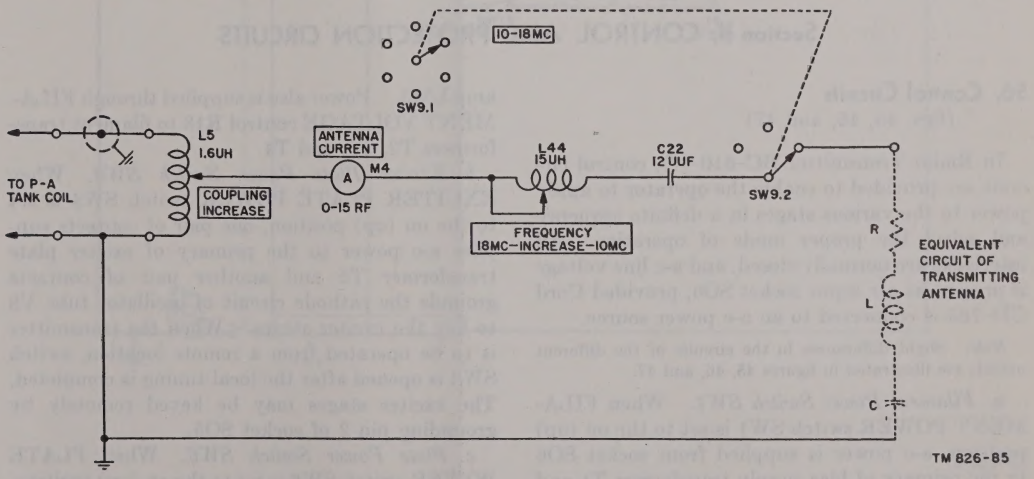


Figure 43. Functional diagram with range switch in 10-18 MC position.

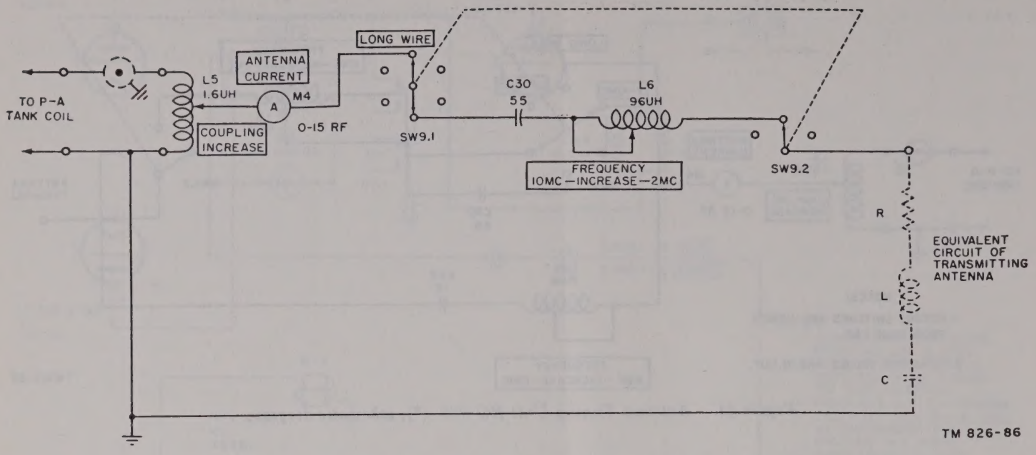


Figure 44. Functional diagram with range switch in LONG WIRE position.

QUENCY 18 MC-INCREASE-10 MC. Vacuum capacitor C22 provides the added capacitance necessary when operating between 12.5 and 18 mc. Its effect is neutralized when operating from 10 to 12.5 mc by including more turns of coil L44 in the circuit.

c. Figure 44 is a functional schematic diagram of the tuning unit connected to a long-wire antenna, with the antenna range switch set to LONG WIRE. The antenna maybe either capacitive or inductive depending on the length of the wire and frequency used. The net reactance is made equal to zero by adjusting coil L6, the l-f loading coil. Vacuum capacitor C30 is included in the circuit to provide the necessary capacitance when the reactance of the antenna is inductive because of the length of the wire and frequency used.

d. ANTENNA CURRENT meter M4 indicates the r-f current flowing in the series circuit which consists of the antenna and the antenna loading circuit (figs. 41 through 44). R-f current will be at maximum when the antenna is tuned to resonance at the transmitter frequency by means of the tuning circuit in the antenna tuning unit.

Section II. CONTROL AND PROTECTION CIRCUITS

56. Control Circuits
(figs. 45, 46, and 47)

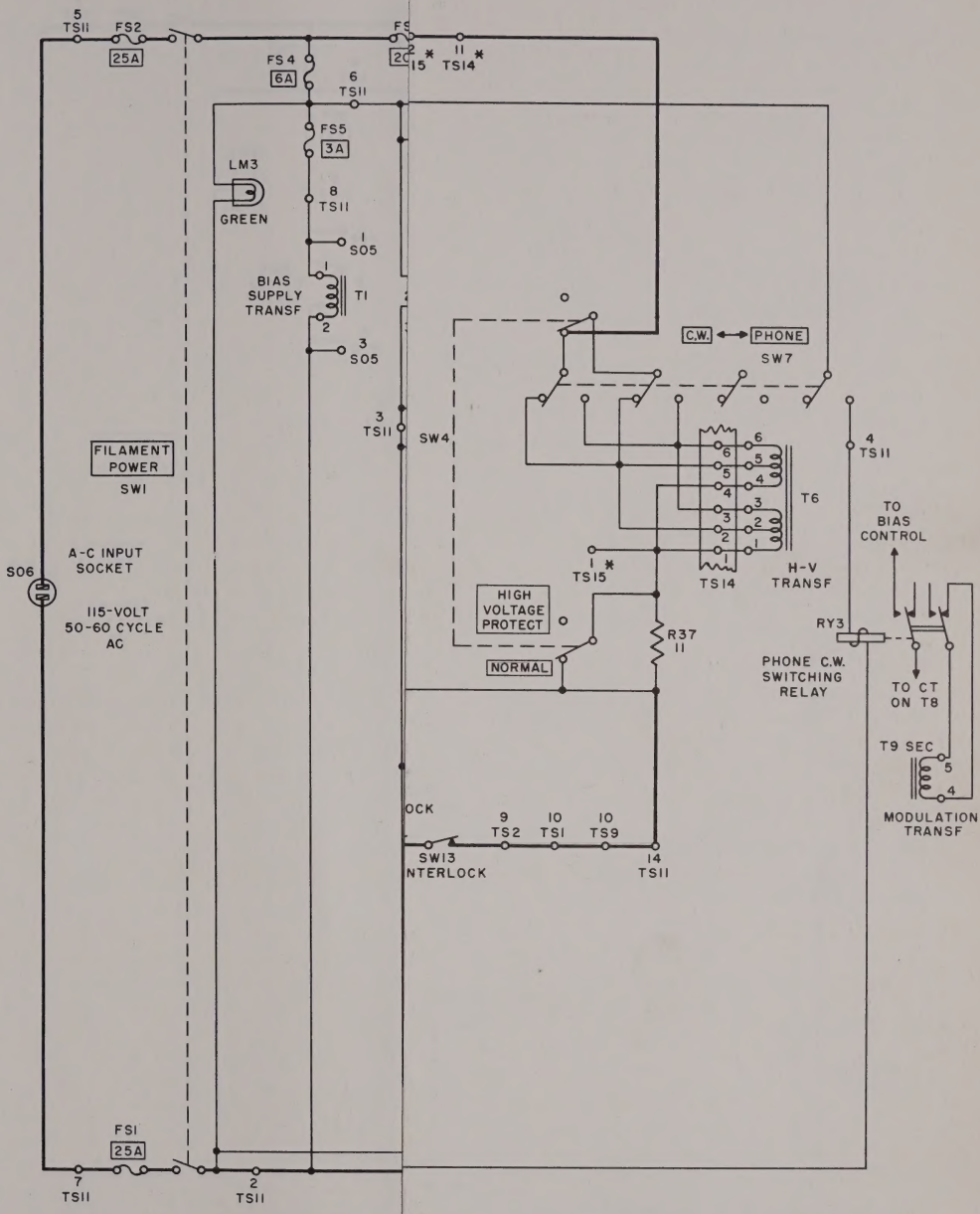
In Radio Transmitter BC–610–(*), control circuits are provided to enable the operator to apply power to the various stages in a definite sequence and select the proper mode of operation. All interlocks are normally closed, and a-c line voltage is present at a-c input socket SO6, provided Cord CD–763 is connected to an a-c power source.

Note. Slight differences in the circuits of the different models are illustrated in figures 45, 46, and 47.

a. Filament Power Switch SW1. When FILAMENT POWER switch SW1 is set to the on (up) position, a-c power is supplied from socket SO6 to the primary of bias supply transformer T1 and amp LM3. Power also is supplied through FILAMENT VOLTAGE control R18 to filament transformers T2, T3, and T4.

b. Exciter Plate Power Switch SW3. When EXCITER PLATE POWER switch SW3 is set to the on (up) position, one pair of contacts supplies a-c power to the primary of exciter plate transformer T5 and another pair of contacts grounds the cathode circuit of oscillator tube V8 to key the exciter stages. When the transmitter is to be operated from a remote location, switch SW3 is opened after the local tuning is completed. The exciter stages may be keyed remotely by grounding pin 2 of socket SO5.

c. Plate Power Switch SW6. When PLATE POWER switch SW6 is set to the on (up) position,


5
TSII
FS2
25A
FS4
6A
6
TSII
FS5
3A
LM3
GREEN
8
TSII
1
SO5
BIAS
SUPPLY
TRANSF
T1
2
3
SO5
3
TSII
SW4
FILAMENT
POWER
SWI
A-C INPUT
SOCKET
SO6
115-VOLT
50-60 CYCLE
AC
C.W.
PHONE
SW7
4
TSII
T6
TO
BIAS
CONTROL
1 *
TSI5
TSI4
H-V
TRANSF
HIGH
VOLTAGE
PROTECT
NORMAL
R37
11
RY3
PHONE C.W.
SWITCHING
RELAY
TO CT
ON T8
T9 SEC
5
4
MODULATION
TRANSF
OCK
9
TS2
10
TSI
10
TS9
SWI3
NTERLOCK
14
TSII
FSI
25A
7
TSII
2
TSII

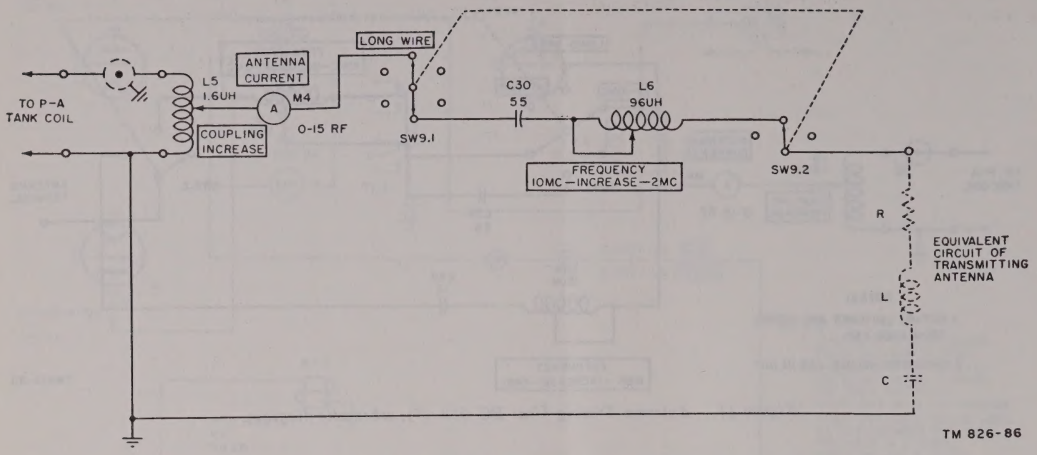


Figure 44. Functional diagram with range switch in LONG WIRE position.

QUENCY 18 MC-INCREASE-10 MC. Vacuum capacitor C22 provides the added capacitance necessary when operating between 12.5 and 18 mc. Its effect is neutralized when operating from 10 to 12.5 mc by including more turns of coil L44 in the circuit.

c. Figure 44 is a functional schematic diagram of the tuning unit connected to a long-wire antenna, with the antenna range switch set to LONG WIRE. The antenna maybe either capacitive or inductive depending on the length of the wire and frequency used. The net reactance is made equal to zero by adjusting coil L6, the l-f loading coil. Vacuum capacitor C30 is included in the circuit to provide the necessary capacitance when the reactance of the antenna is inductive because of the length of the wire and frequency used.

d. ANTENNA CURRENT meter M4 indicates the r-f current flowing in the series circuit which consists of the antenna and the antenna loading circuit (figs. 41 through 44). R-f current will be at maximum when the antenna is tuned to resonance at the transmitter frequency by means of the tuning circuit in the antenna tuning unit.

Section II. CONTROL AND PROTECTION CIRCUITS

56. Control Circuits
(figs. 45, 46, and 47)

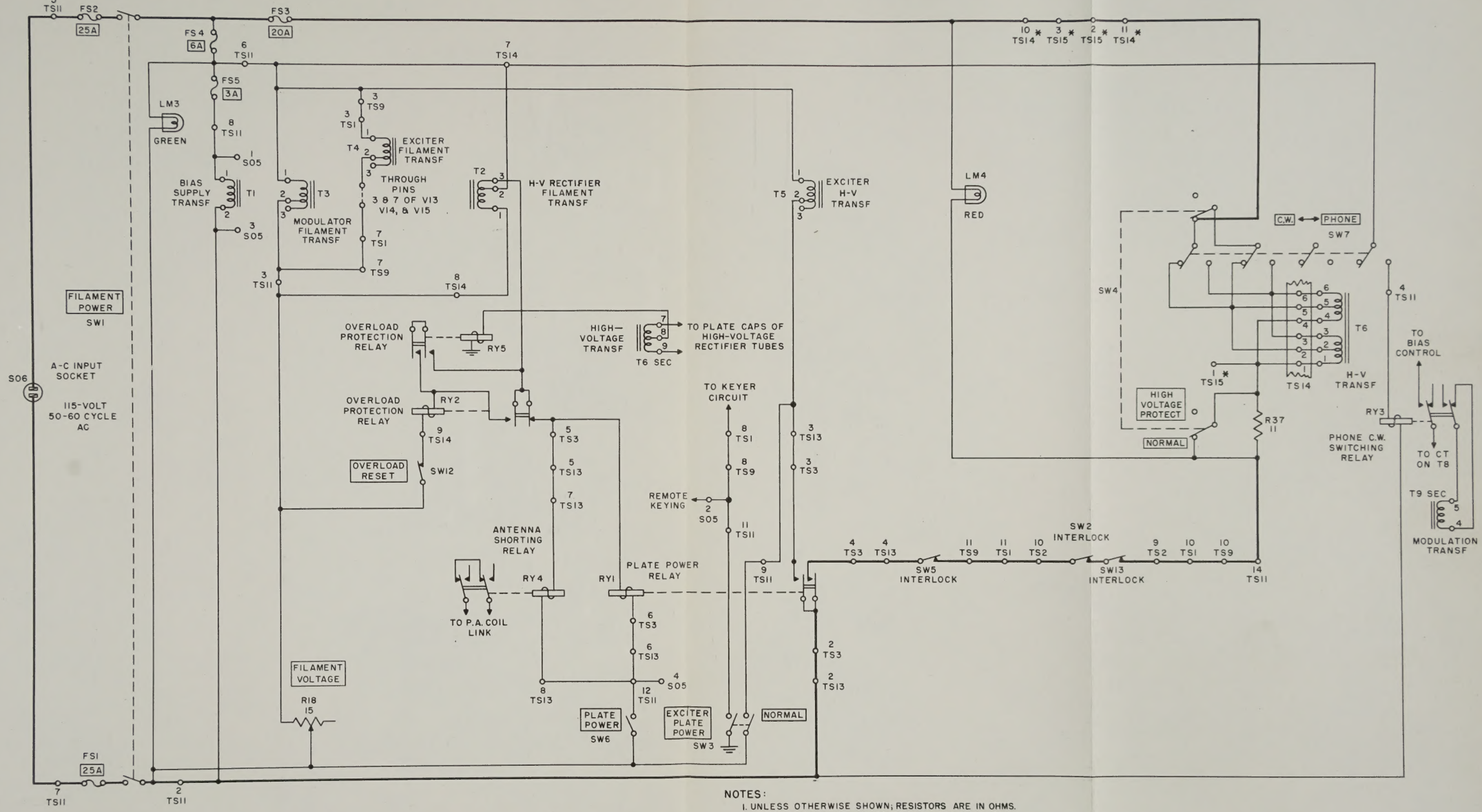
In Radio Transmitter BC–610–(*), control circuits are provided to enable the operator to apply power to the various stages in a definite sequence and select the proper mode of operation. All interlocks are normally closed, and a-c line voltage is present at a-c input socket SO6, provided Cord CD–763 is connected to an a-c power source.

Note. Slight differences in the circuits of the different models are illustrated in figures 45, 46, and 47.

a. Filament Power Switch SW1. When FILAMENT POWER switch SW1 is set to the on (up) position, a-c power is supplied from socket SO6 to the primary of bias supply transformer T1 and amp LM3. Power also is supplied through FILAMENT VOLTAGE control R18 to filament transformers T2, T3, and T4.

b. Exciter Plate Power Switch SW3. When EXCITER PLATE POWER switch SW3 is set to the on (up) position, one pair of contacts supplies a-c power to the primary of exciter plate transformer T5 and another pair of contacts grounds the cathode circuit of oscillator tube V8 to key the exciter stages. When the transmitter is to be operated from a remote location, switch SW3 is opened after the local tuning is completed. The exciter stages may be keyed remotely by grounding pin 2 of socket SO5.

c. Plate Power Switch SW6. When PLATE POWER switch SW6 is set to the on (up) position,

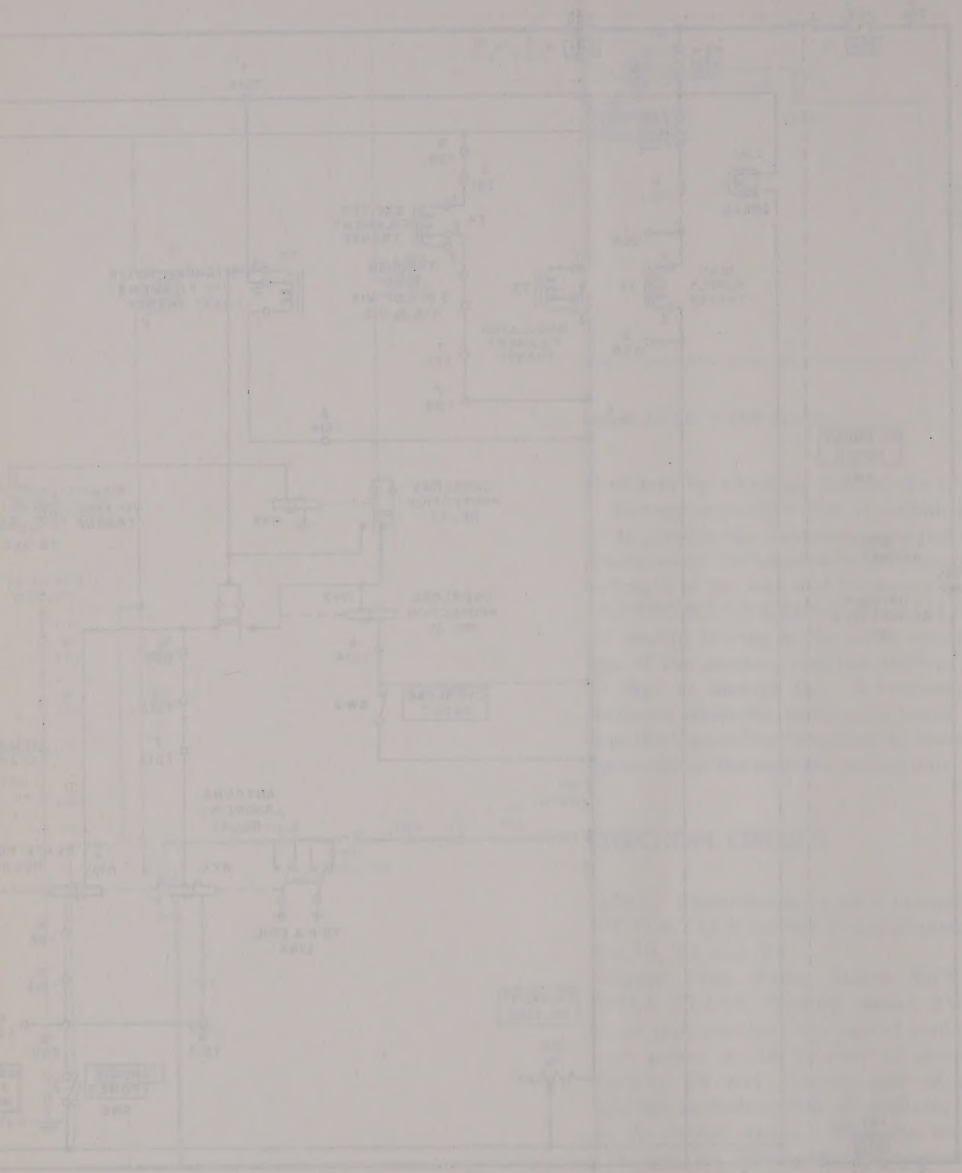


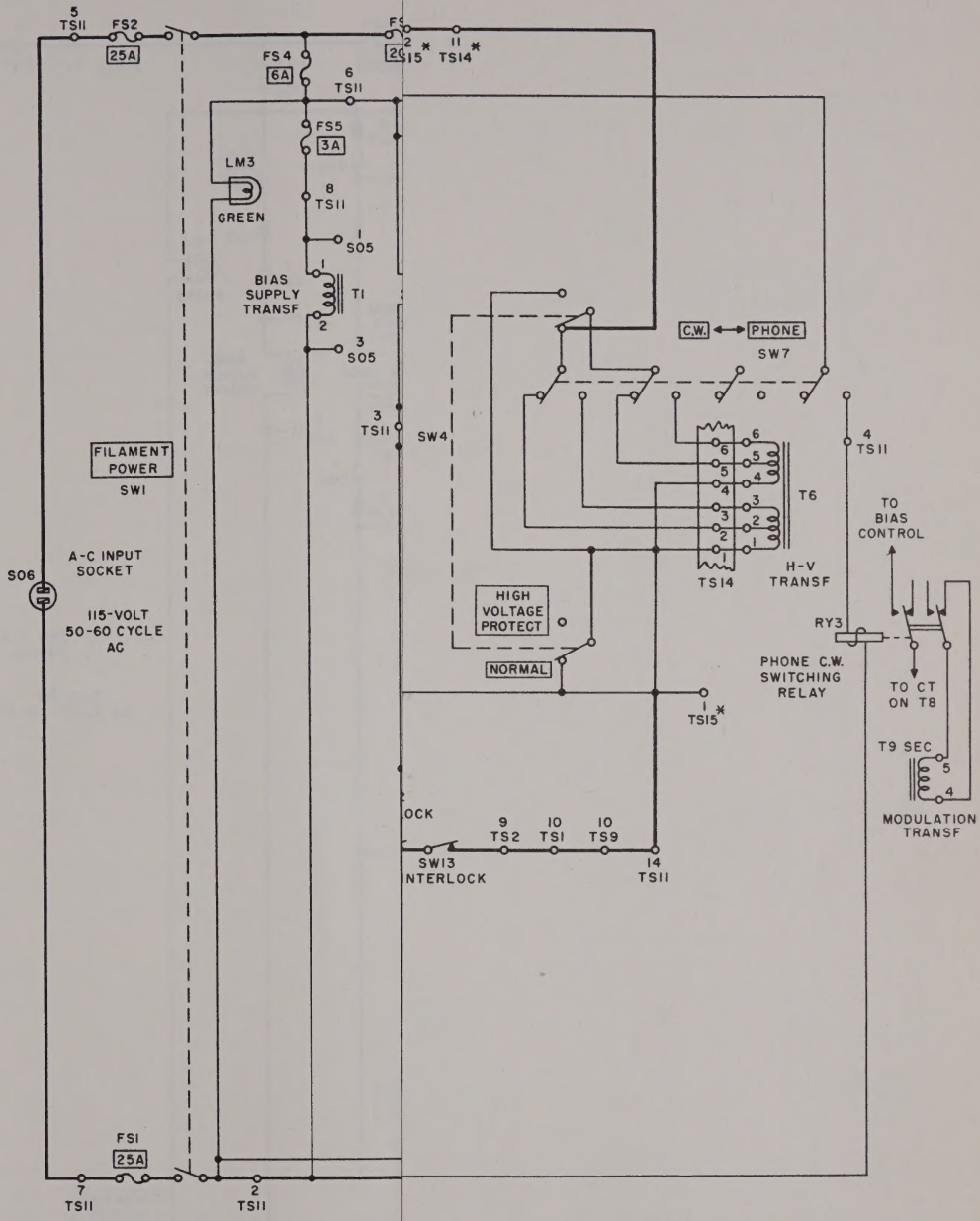
NOTES:
1. UNLESS OTHERWISE SHOWN; RESISTORS ARE IN OHMS.
2. THIS DIAGRAM ALSO APPLIES TO THE H MODELS WITH SERIAL NUMBERS 821 TO 972 ON ORDER NO. 3078-PHILA-51.
3. * THIS DIAGRAM, LESS TERMINAL BOARD TS15 AND TERMINALS 10 AND 11 ON TS14, APPLIES ALSO TO H MODELS, SERIAL NUMBERS 201 TO 346 AND 496 TO 533 ON ORDER NO. 21418-P-50; AND TO SERIAL NUMBERS 594 TO 820 ON ORDER NO. 3078-P-51.

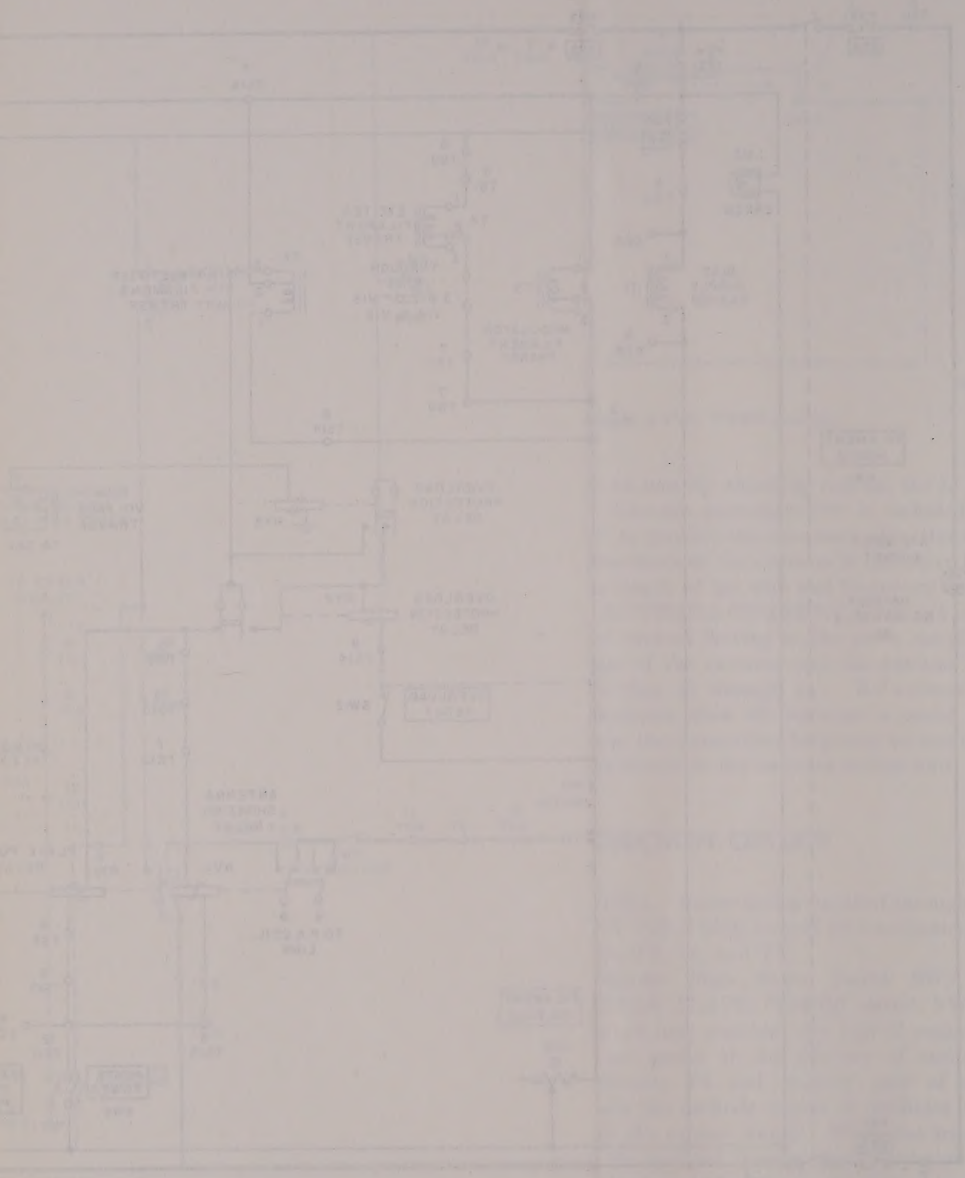
TM 826-98

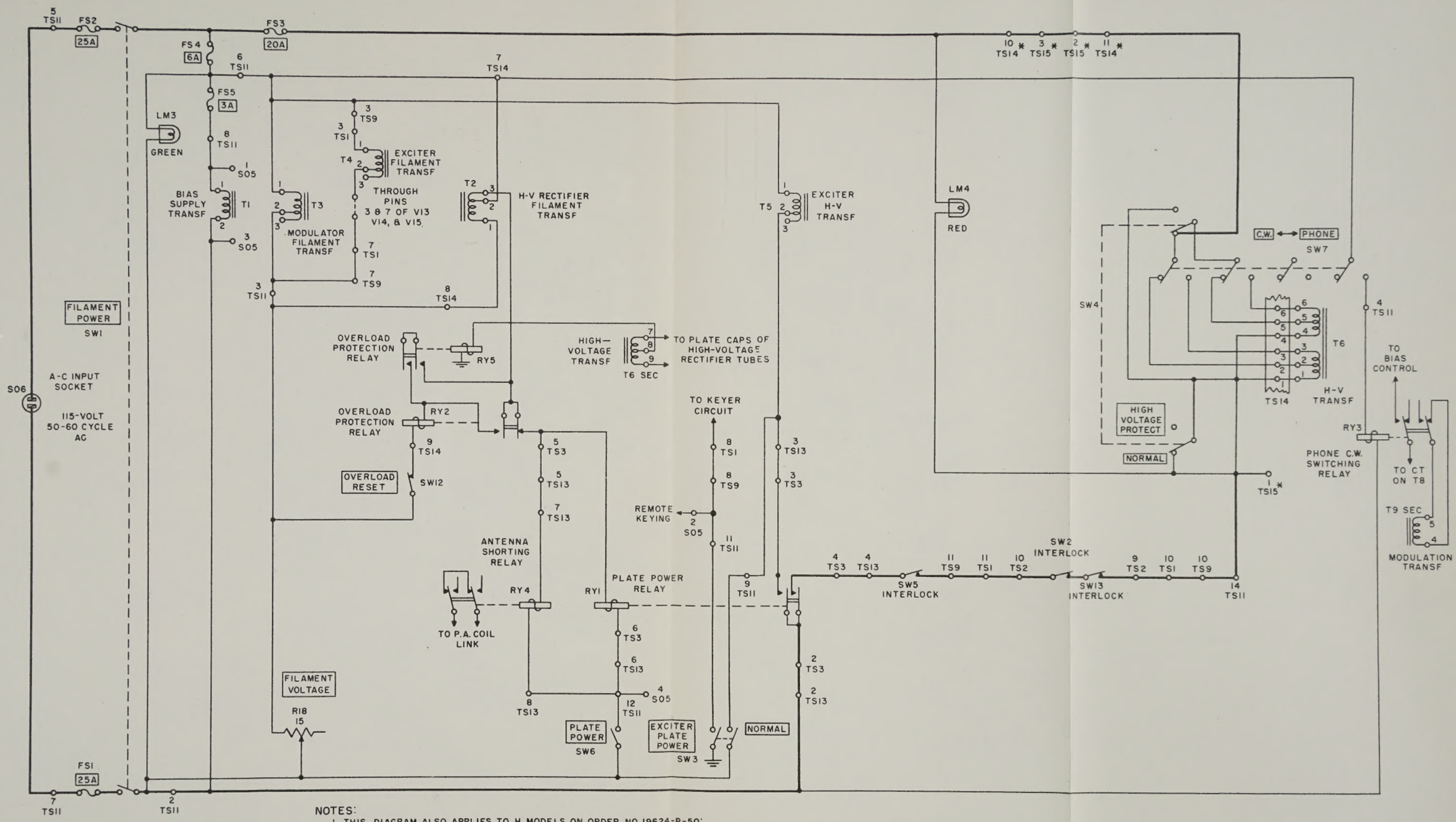
Figure 45. Control circuits, I model and late H model.

341205 O - 55 (Face p. 68) No. 1




5
TS11
FS2
25A
FS4
6A
6
TS11
FS5
3A
LM3
GREEN
8
TS11
1
SO5
BIAS
SUPPLY
TRANSF
T1
2
3
SO5
3
TS11
SW4
FILAMENT
POWER
SW1
A-C INPUT
SOCKET
SO6
115-VOLT
50-60 CYCLE
AC
FS1
25A
7
TS11
2
TS11
C.W.
PHONE
SW7
4
TS11
T6
H-V
TRANSF
TS14
TO
BIAS
CONTROL
HIGH
VOLTAGE
PROTECT
NORMAL
RY3
PHONE C.W.
SWITCHING
RELAY
TO CT
ON T8
T9 SEC
MODULATION
TRANSF
1 *
TS15
SW13
NTERLOCK
9
TS2
10
TS1
10
TS9
14
TS11

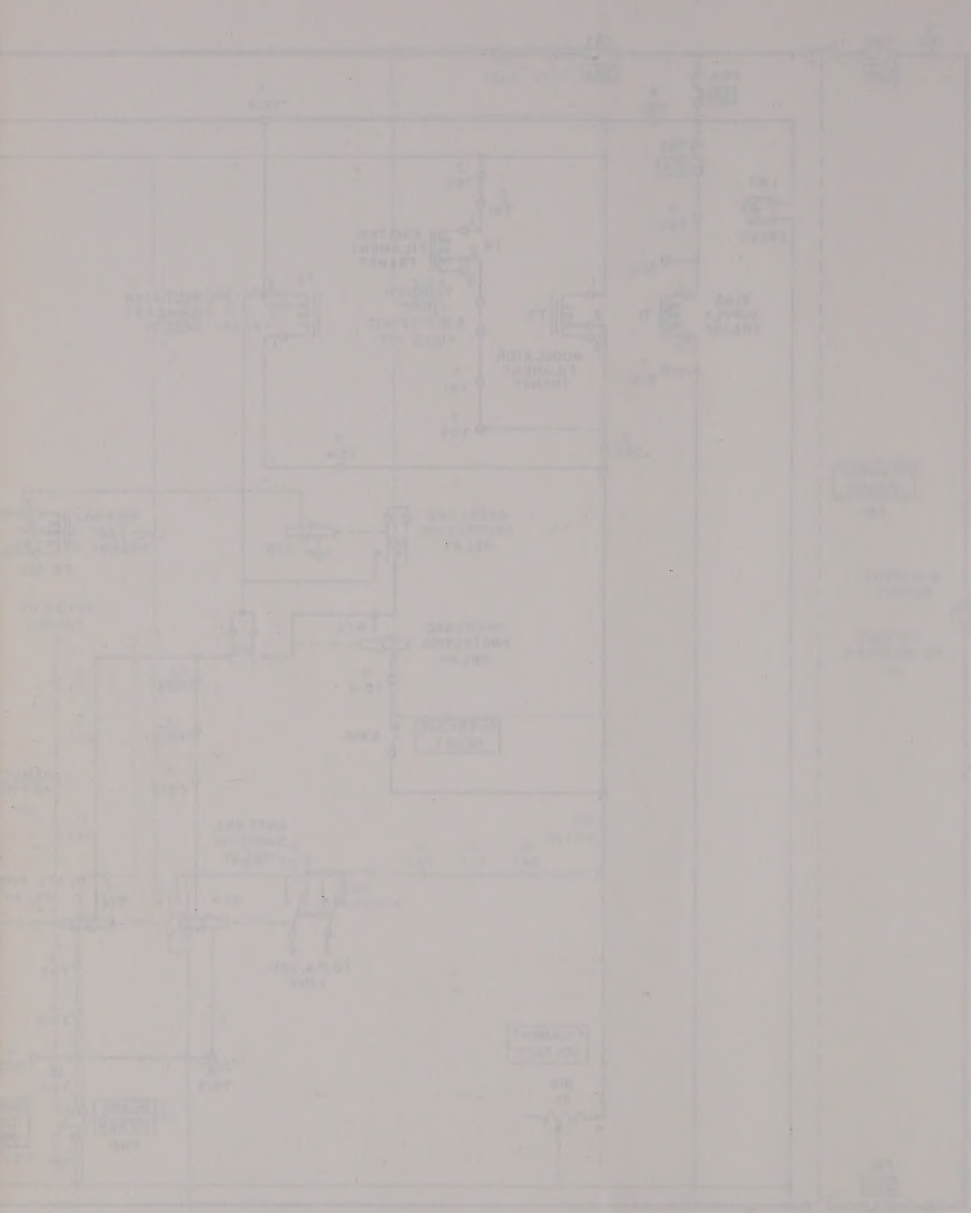


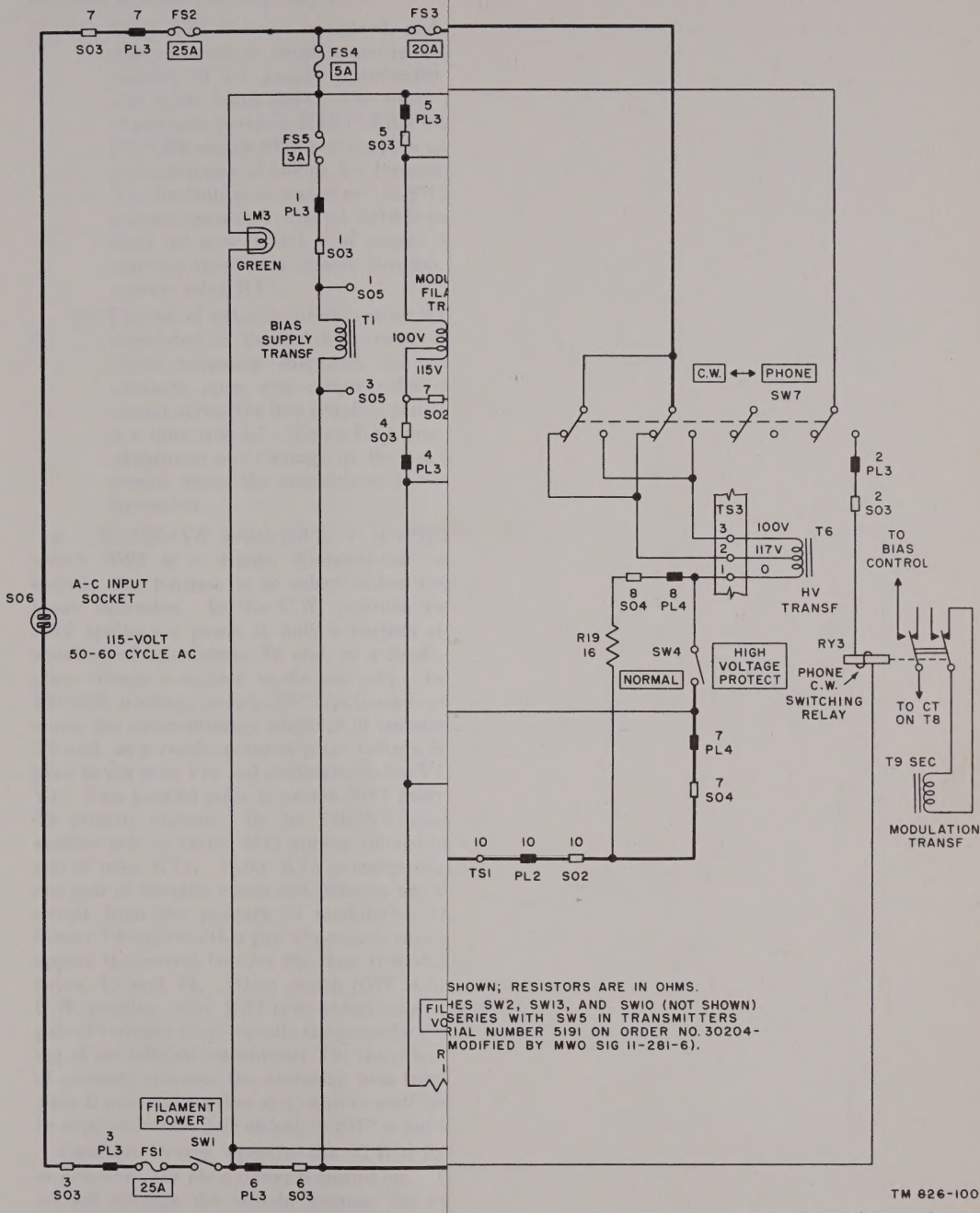


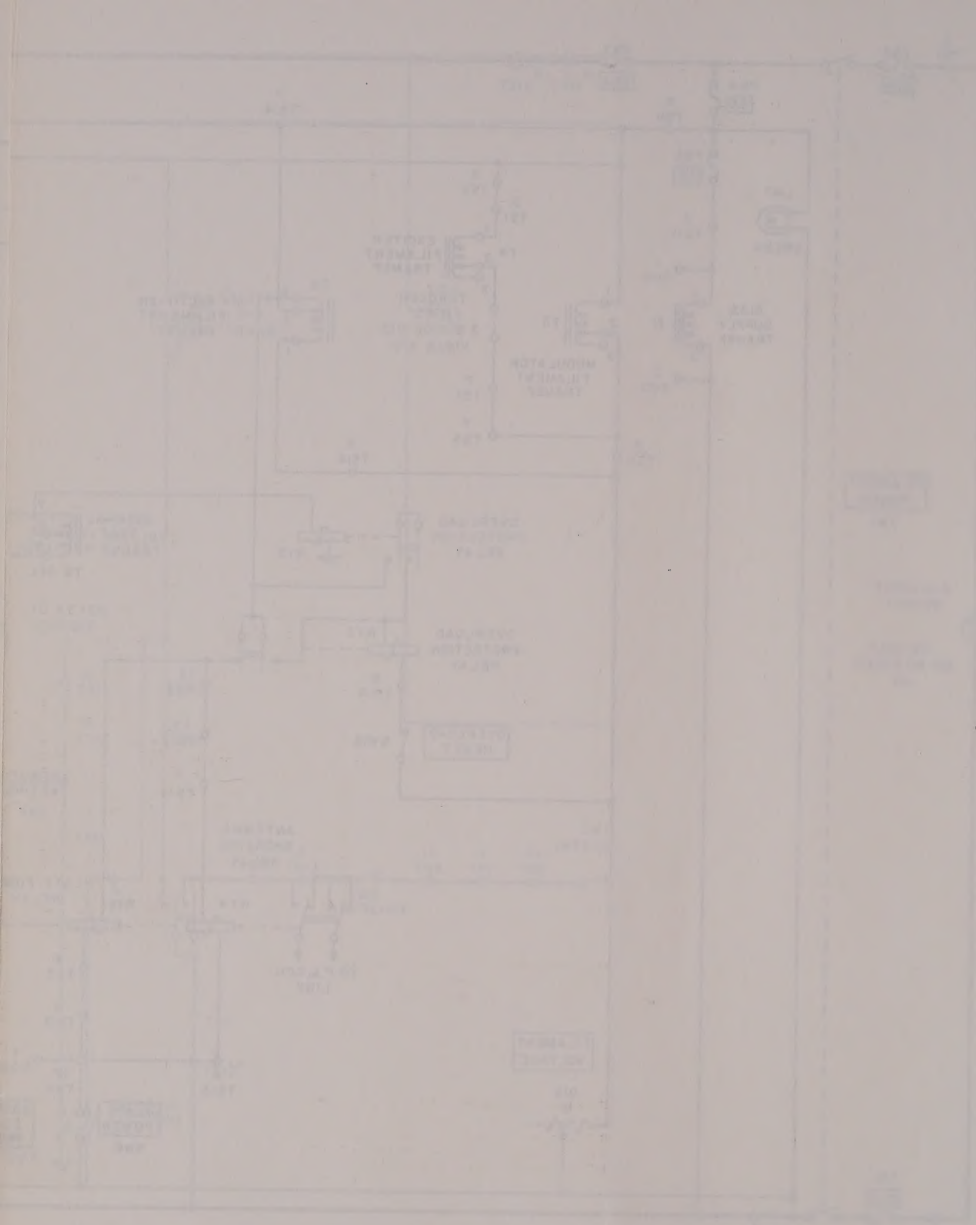
NOTES:

1. THIS DIAGRAM ALSO APPLIES TO H MODELS ON ORDER NO. 19624-P-50; H MODELS OTHER THAN SERIAL NUMBERS 201 TO 346 AND 496 TO 533 ON ORDER NO. 21418-P-50; AND H MODELS OTHER THAN SERIAL NUMBERS 594 TO 972 ON ORDER NO. 3078-P-51.
2. * THESE TERMINAL BOARD CONNECTIONS APPLY ONLY TO THE H MODELS ON ORDER NO. 19624-P-50.

Figure 46. Control circuits, F, G, early H, and T-213/GRC-26 models.




7
S03
7
PL3
FS2
25A
FS3
20A
FS4
5A
5
PL3
FS5
3A
5
S03
1
PL3
LM3
GREEN
1
S03
1
S05
MODU
FILA
TR
BIAS
SUPPLY
TRANSF
T1
100V
115V
3
S05
7
S02
4
S03
4
PL3
C.W.
PHONE
SW7
2
PL3
2
S03
TS3
3
2
1
100V
117V
0
T6
HV
TRANSF
TO
BIAS
CONTROL
S06
A-C INPUT
SOCKET
115-VOLT
50-60 CYCLE AC
8
S04
8
PL4
R19
16
SW4
NORMAL
HIGH
VOLTAGE
PROTECT
RY3
PHONE
C.W.
SWITCHING
RELAY
TO CT
ON T8
T9 SEC
MODULATION
TRANSF
7
PL4
7
S04
10
TS1
10
PL2
10
S02
SHOWN; RESISTORS ARE IN OHMS.
HES SW2, SW13, AND SW10 (NOT SHOWN)
SERIES WITH SW5 IN TRANSMITTERS
RIAL NUMBER 5191 ON ORDER NO. 30204-
MODIFIED BY MWO SIG 11-281-6).
FIL
VO
R
1
FILAMENT
POWER
3
PL3
FS1
SW1
3
S03
25A
6
PL3
6
S03



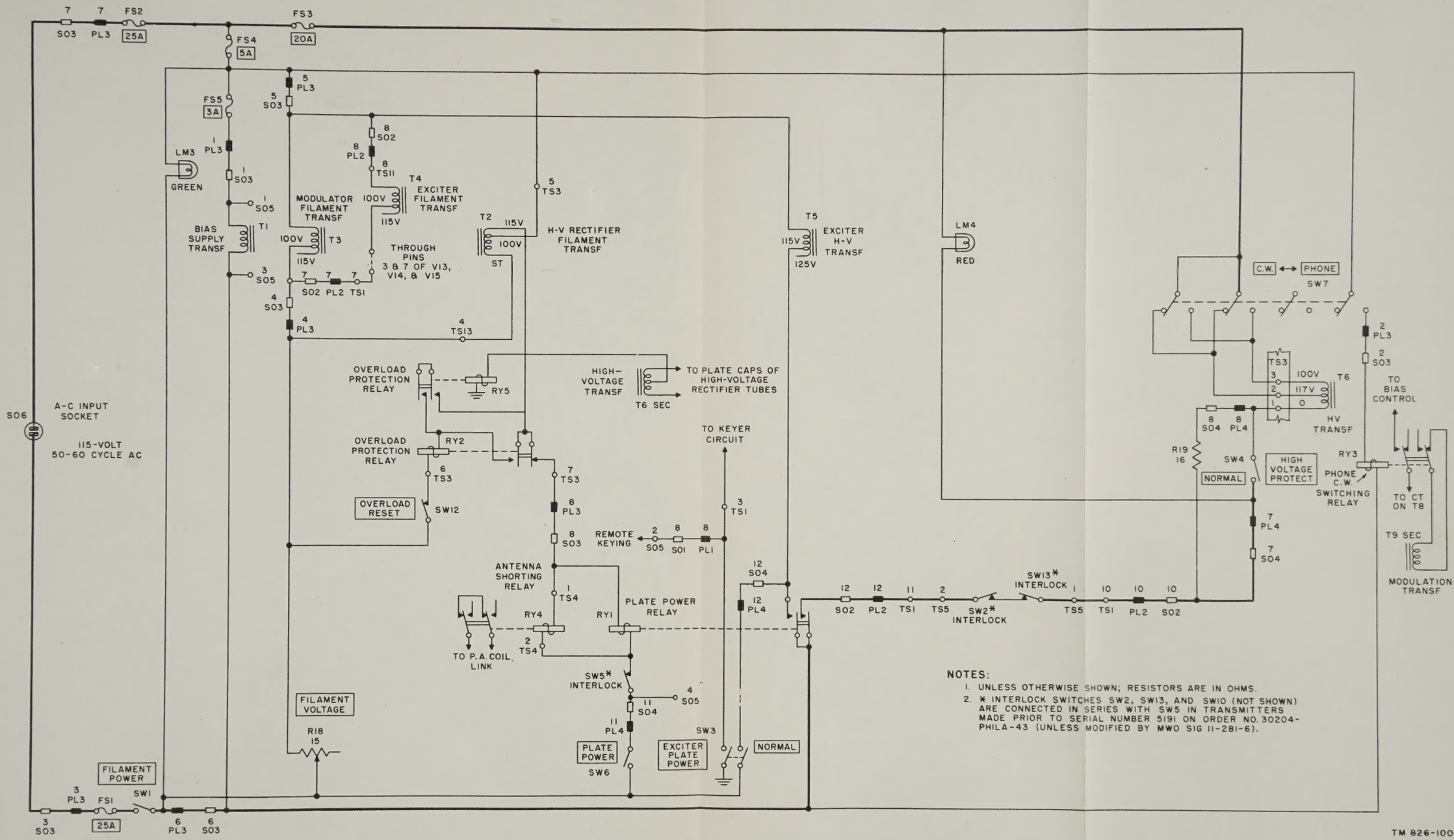
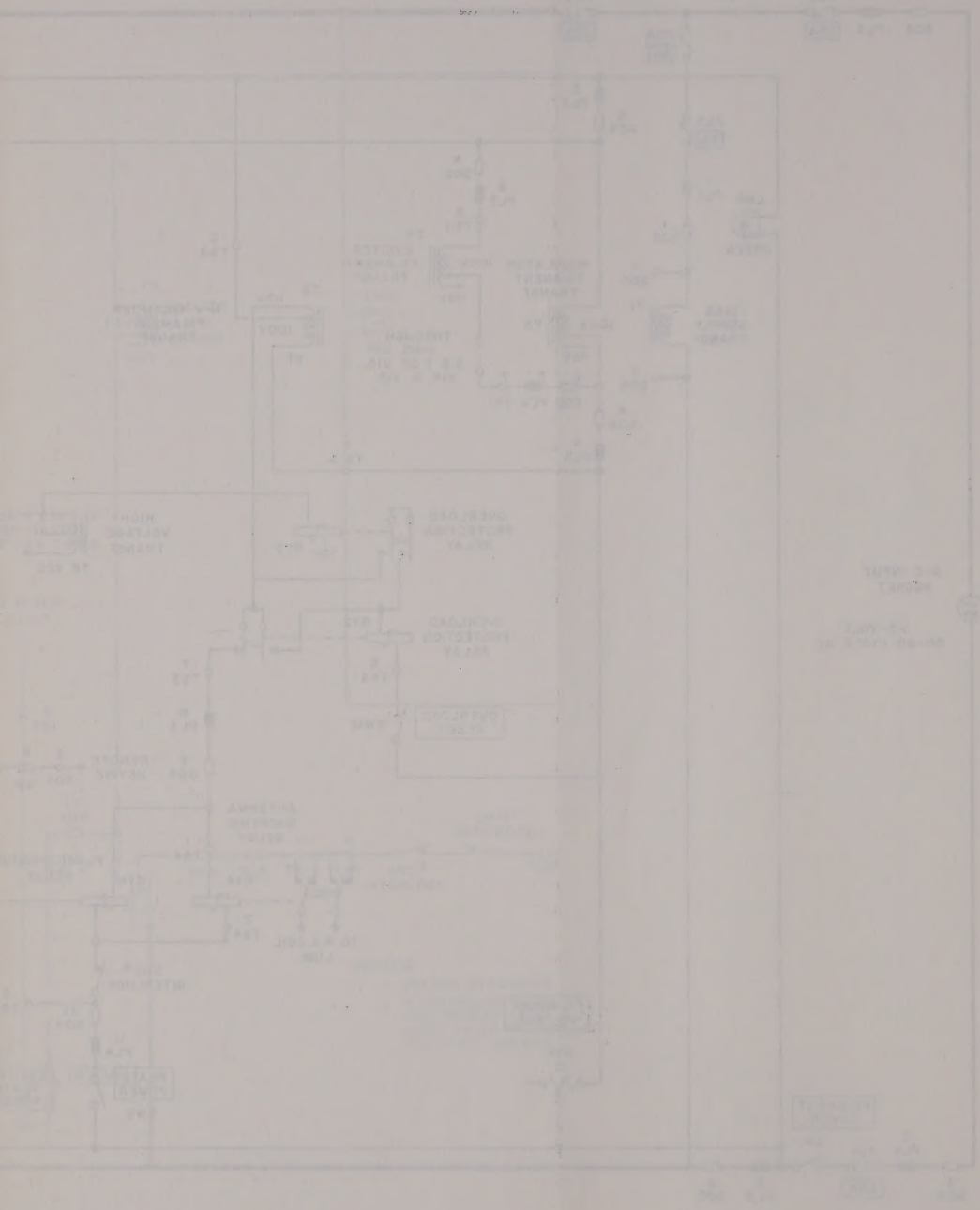


Figure 47. Control circuits, E model.



it supplies voltage to the coils of plate power relay RY1 and antenna shorting relay RY4.

(1) Relay RY1 becomes energized, and one pair of contacts supplies power to the primary of h-v supply transformer T6 and lights lamp LM4. The other pair of contacts parallels EXCITER PLATE POWER switch SW3 and supplies power to the primary of exciter, h-v transformer T5, eliminating the use of switch SW3 for remote operation. Switch SW6 is paralleled by pins 3 and 4 of socket SO5; shorting these at a remote location will operate relay RY1.

(2) The coil of antenna shorting relay RY4 is connected in parallel with relay RY1. Upon becoming energized, the closed contacts open and remove the short circuit across the link coupling coil of the p-a tank coil, L7. Relay RY4 prevents absorption of r-f energy by the p-a tank circuit when the transmitter is not in operation.

d. C.W.-PHONE Switch SW7. C.W.-PHONE switch SW7 is a 4-pole, double-throw toggle switch. Its purpose is to select either c-w or phone operation. In the C.W. position, switch SW7 applies a-c power to only a portion of the windings of transformer T6 and, as a result, full plate voltage is applied to the p-a tube. In the PHONE position, switch SW7 applies a-c power across the entire primary windings of transformer T6 and, as a result, reduced plate voltage is applied to p-a tube V16 and modulator tubes V3 and V4. Two parallel poles of switch SW7 carry the T6 primary current. In the PHONE position, another pole on switch SW7 applies voltage to the coil of relay RY3. Relay RY3 is energized, and one pair of contacts opens and removes the short circuit from the primary of modulation transformer T9 and the other pair of contacts closes and applies the correct bias for the class B modulator tubes, V3 and V4. When switch SW7 is in the C.W. position, relay RR3 is de-energized and one pair of contacts short-circuits the secondary winding of modulation transformer T9; the other pair of contacts removes the operating bias from the class B modulator tubes and causes cutoff bias to be supplied. One pole on switch SW7 is not used.

Caution: Never operate the C.W.-PHONE switch when the plate power is turned on. To do so will damage the switch, because the switch is not designed to break the primary current to h-v plate-power transformer T6.

57. Overload and Protection Circuits

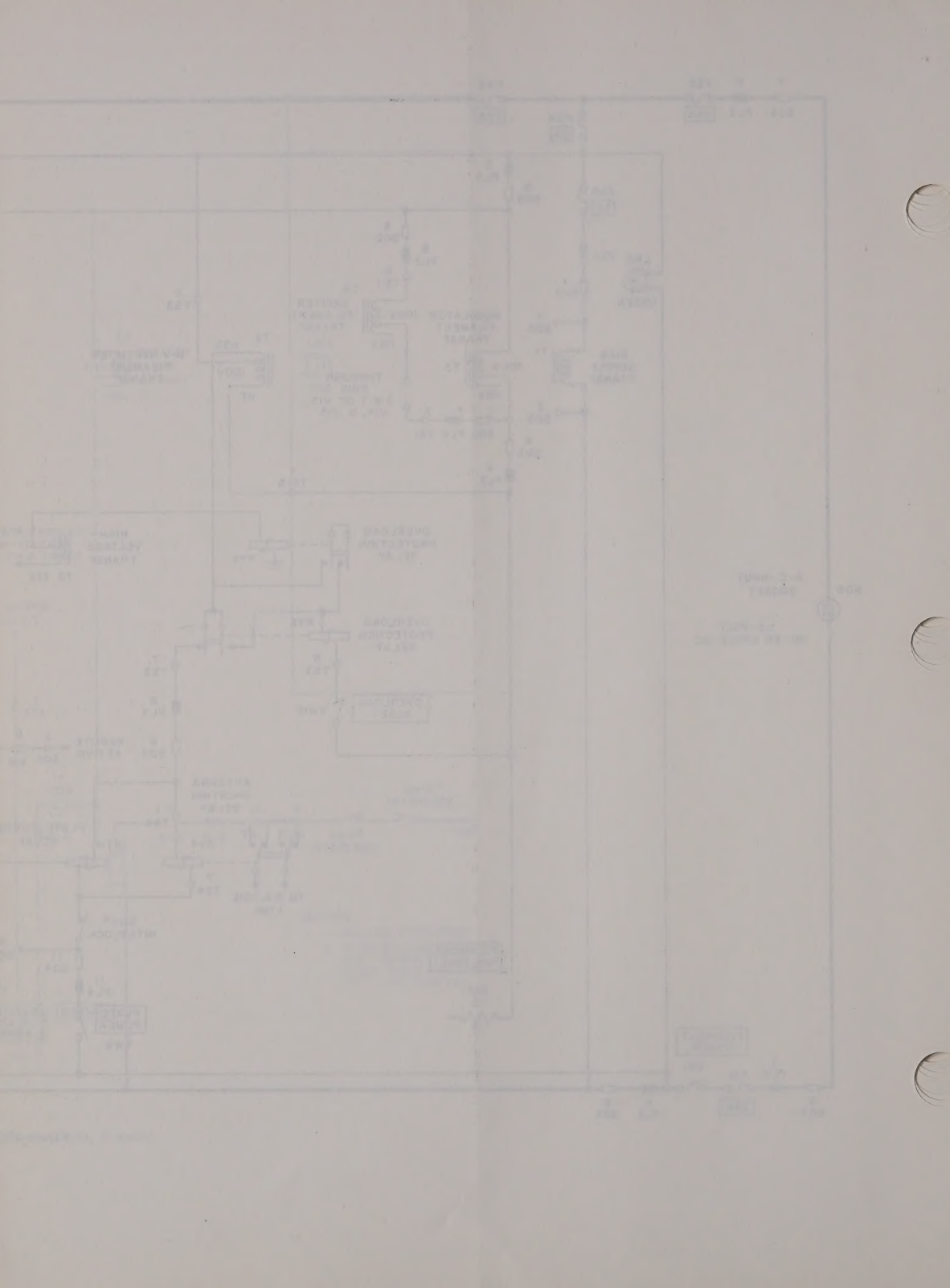
(figs. 45, 46, and 47)

The overload and protection circuits in Radio Transmitter BC–610–(*) prevent operating personnel from coming in contact with extremely dangerous potentials and protect the equipment from serious damage due to current surges or overloads.

a. Overload Protection Relays RY2 and RY5. Relays RY2 and RY5 protect h-v rectifier tubes V6 and V7 and p-a tube V15 from damage caused by heavy current surges or serious overloads. All current drawn from the h-v power supply must pass through the coil of relay RY5 which is connected between the center tap on the secondary of h-v transformer T6 and ground. Relay RY5 is designed to energize when the current through the coil exceeds 670 to 710 ma. When relay RY5 is energized, an a-c path is completed through its contacts to the coil of relay RY2. Relay RY2 is energized and one pair of its contacts closes and maintains the energizing current in the coil; another pair of contacts opens and breaks the path supplying a-c voltage to the coils of relays RY1 and RY4. Relay RY1 becomes de-energized, its contacts open and remove power from the primary of h-v transformer T6. Contacts of RY4 short the p-a coil link. Relay RY2 remains energized until the relay current is interrupted by pressing OVERLOAD RESET switch SW12. The armature then returns to its relaxed position and closes the pair of contacts which supplies energizing current to the coils of relays RY1 and RY4; this restores plate power to the transmitter and removes the short on the p-a coil link.

b. HIGH VOLTAGE PROTECT Switch SW4. HIGH VOLTAGE PROTECT switch SW4 is provided to reduce the high voltage in the transmitter during tune-up operations and thereby prevent the occurrence of overloads. Switch SW4 is wired as follows in the various models of the transmitter:

(1) In the I model and the plate H model (fig. 45), resistor R37 is in series with the a-c line to transformer T6. When switch SW4 is in the HIGH VOLTAGE PROTECT position (up), resistor R37 remains in series with the a-c line to transformer T6; this reduces the output volt-



it supplies voltage to the coils of plate power relay RY1 and antenna shorting relay RY4.

(1) Relay RY1 becomes energized, and one pair of contacts supplies power to the primary of h-v supply transformer T6 and lights lamp LM4. The other pair of contacts parallels EXCITER PLATE POWER switch SW3 and supplies power to the primary of exciter, h-v transformer T5, eliminating the use of switch SW3 for remote operation. Switch SW6 is paralleled by pins 3 and 4 of socket SO5; shorting these at a remote location will operate relay RY1.

(2) The coil of antenna shorting relay RY4 is connected in parallel with relay RY1. Upon becoming energized, the closed contacts open and remove the short circuit across the link coupling coil of the p-a tank coil, L7. Relay RY4 prevents absorption of r-f energy by the p-a tank circuit when the transmitter is not in operation.

d. C.W.-PHONE Switch SW7. C.W.-PHONE switch SW7 is a 4-pole, double-throw toggle switch. Its purpose is to select either c-w or phone operation. In the C.W. position, switch SW7 applies a-c power to only a portion of the windings of transformer T6 and, as a result, full plate voltage is applied to the p-a tube. In the PHONE position, switch SW7 applies a-c power across the entire primary windings of transformer T6 and, as a result, reduced plate voltage is applied to p-a tube V16 and modulator tubes V3 and V4. Two parallel poles of switch SW7 carry the T6 primary current. In the PHONE position, another pole on switch SW7 applies voltage to the coil of relay RY3. Relay RY3 is energized, and one pair of contacts opens and removes the short circuit from the primary of modulation transformer T9 and the other pair of contacts closes and applies the correct bias for the class B modulator tubes, V3 and V4. When switch SW7 is in the C.W. position, relay RR3 is de-energized and one pair of contacts short-circuits the secondary winding of modulation transformer T9; the other pair of contacts removes the operating bias from the class B modulator tubes and causes cutoff bias to be supplied. One pole on switch SW7 is not used.

Caution: Never operate the C.W.-PHONE switch when the plate power is turned on. To do so will damage the switch, because the switch is not designed to break the primary current to h-v plate-power transformer T6.

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(figs. 45, 46, and 47)

The overload and protection circuits in Radio Transmitter BC–610–(*) prevent operating personnel from coming in contact with extremely dangerous potentials and protect the equipment from serious damage due to current surges or overloads.

a. Overload Protection Relays RY2 and RY5. Relays RY2 and RY5 protect h-v rectifier tubes V6 and V7 and p-a tube V15 from damage caused by heavy current surges or serious overloads. All current drawn from the h-v power supply must pass through the coil of relay RY5 which is connected between the center tap on the secondary of h-v transformer T6 and ground. Relay RY5 is designed to energize when the current through the coil exceeds 670 to 710 ma. When relay RY5 is energized, an a-c path is completed through its contacts to the coil of relay RY2. Relay RY2 is energized and one pair of its contacts closes and maintains the energizing current in the coil; another pair of contacts opens and breaks the path supplying a-c voltage to the coils of relays RY1 and RY4. Relay RY1 becomes de-energized, its contacts open and remove power from the primary of h-v transformer T6. Contacts of RY4 short the p-a coil link. Relay RY2 remains energized until the relay current is interrupted by pressing OVERLOAD RESET switch SW12. The armature then returns to its relaxed position and closes the pair of contacts which supplies energizing current to the coils of relays RY1 and RY4; this restores plate power to the transmitter and removes the short on the p-a coil link.

b. HIGH VOLTAGE PROTECT Switch SW4. HIGH VOLTAGE PROTECT switch SW4 is provided to reduce the high voltage in the transmitter during tune-up operations and thereby prevent the occurrence of overloads. Switch SW4 is wired as follows in the various models of the transmitter:

(1) In the I model and the plate H model (fig. 45), resistor R37 is in series with the a-c line to transformer T6. When switch SW4 is in the HIGH VOLTAGE PROTECT position (up), resistor R37 remains in series with the a-c line to transformer T6; this reduces the output volt-

age by 50 percent. When switch SW4 is in the NORMAL position (down), one pole of SW4 forms a short circuit across resistor R37; this provides a direct path for the a-c to the primary of T6 and thereby returns the output of the h-v supply to normal.

(2) In the F, G, early H, and the T-213/GRC-26 models (fig. 46), the plate voltage is reduced by switching the dual windings of transformer T6. When switch SW4 is in the HIGH VOLTAGE PROTECT position (up), the dual primary windings of transformer T6 are connected in series and thereby reduce the output by 50 percent. When SW4 is returned to the NORMAL position (down), the two primary windings are connected in parallel and the output voltage is normal.

(3) In the E model (fig. 47), the h-v supply transformer has a single primary winding. When switch SW4 is in the HIGH VOLTAGE PROTECT position (up), resistor R19 is in series with the a-c power supplied to the primary of T6. When switch SW4 is returned to the NORMAL position (down), one pole of SW4 forms a short-circuit across resistor R19; this provides a direct path for the a-c power to the primary of T6.

c. Interlock Switches. Interlock switches are provided wherever opening a door or removing a cover of the transmitter would expose a person to dangerously high voltages. The purpose of these switches is to disconnect the a-c power from the primary windings of h-v power transformer T6. Switches SW2, SW5, and SW13 are all in series with each other and with one pair of contacts on relay RY1 (in the E model, SW5 is in series with the coil of relay RY1). These switches provide protection from high-voltages even if the contacts of relay RY1 should freeze closed.

d. Fuses. Fuses are provided in the a-c power circuits to prevent damage to transformers and the external a-c supply. Fuses FS1 and FS2 are the main a-c line fuses. Fuse FS3 protects the h-v power supply. Transformers T1, T2, T3, and T4 are protected by fuse FS4, and fuse FS5 protects the bias supply transformer, T1.

CHAPTER 6

FIELD MAINTENANCE INSTRUCTIONS

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available, and by the skill of the repairman.

Section I. TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

Warning: When servicing the radio transmitter, be extremely careful because of the high voltages exposed. Keep one hand in a pocket when measuring socket voltages with the probe. Before touching any part after the voltage is shut off, short the part to ground.

58. Trouble-shooting Procedures

The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to the *major component or circuit* responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective *part* responsible for the abnormal condition. Some faults such as burned-out resistors, r-f arcing, and shorted transformers can often be located by sight, smell, and hearing. The majority of faults, however, must be localized by *checking voltage and resistance.* The items listed below aid in isolating the source of trouble. To be effective, the procedure should be followed in the order given. Remember that the servicing procedure should cause

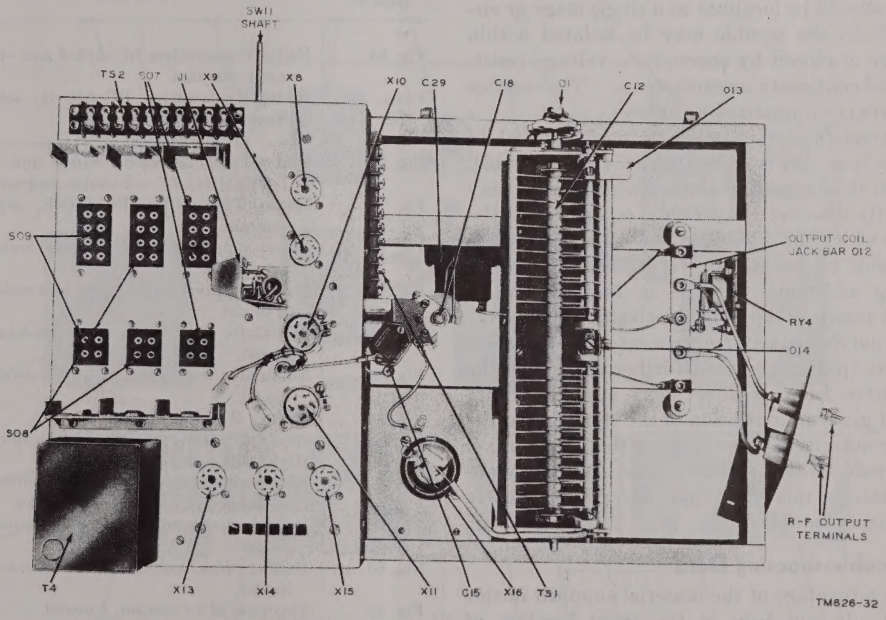


Figure 48. Top view of r-f section, I model.

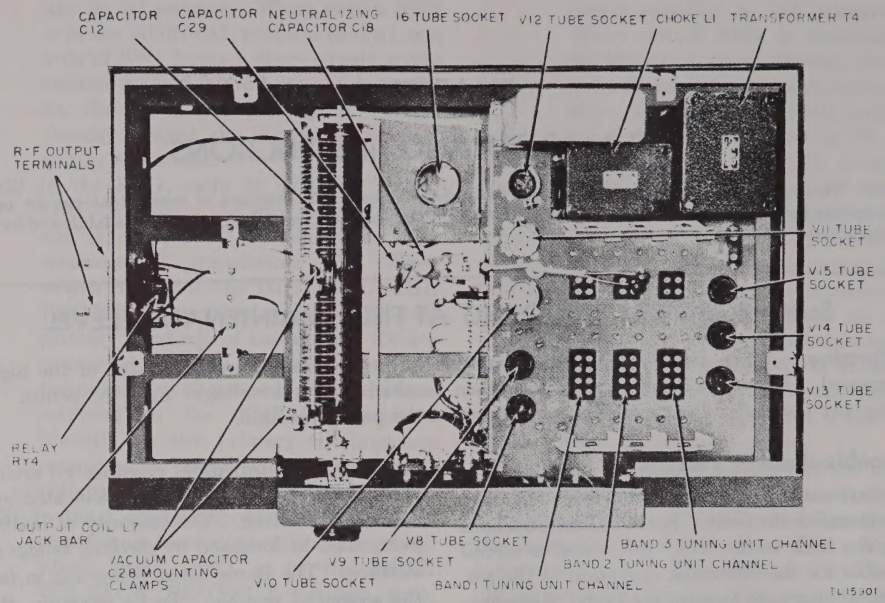


Figure 49. Top view of r-f section, E model.

no further damage to the transmitter. First, trouble should be localized to a single stage or circuit. Then the trouble may be isolated within the stage or circuit by appropriate voltage, resistance, and continuity measurements. The service procedure is summarized as follows:

a. Visual Inspection. The purpose of visual inspection (par. 35) is to locate any visible trouble. Through this inspection alone, the repairman may frequently discover the trouble, or determine the stage in which the trouble exists. This inspection is valuable in forestalling future failures and in avoiding additional damage to the transmitter through improper servicing methods.

b. Input Resistance Measurements. These measurements (par. 62) prevent further damage to the transmitter from possible short circuits. Since this test gives an indication of the condition of the filter circuits, its function is more than preventive.

c. Trouble-shooting Chart. The trouble symptoms listed in this chart (par. 64) will aid greatly in localizing trouble.

59. Trouble-shooting Data

Take advantage of the material supplied in this manual. It will help in the rapid location of faults. Consult the following trouble-shooting data:

Figure or paragraph No.	Description
Fig. 81	Radio Transmitters BC–610–I and –H, schematic diagram.
Figs. 78, 79, and 80.	Radio Transmitter BC–610–H, schematic diagram.
Fig. 77	Radio Transmitters BC–610–F and –G and T–213/GRC–26, schematic diagram.
Fig. 76	Radio Transmitter BC–610–E, schematic diagram.
Fig. 67	Power supply deck voltages and resistances, I model.
Fig. 68	Power supply deck voltages and resistances, E model.
Fig. 65	Modulator deck voltages and resistances, I model.
Fig. 66	Modulator deck voltages and resistances, E model.
Fig. 36	Exciter B+ distribution.
Fig. 38	Bias and negative supply distribution.
Fig. 40	High-voltage B+ distribution.
Fig. 64	Exciter deck resistor and capacitor board voltages and resistances, I model.
Fig. 62	Exciter deck voltages and resistances, I model.
Fig. 63	Exciter deck voltages and resistances, E model.
Fig. 48	Top view of r-f section, I model.
Fig. 49	Top view of r-f section, E model.
Fig. 50	Top view of modulator section, I model
Fig. 51	Top view of modulator section, E model.

Figure or paragraph No.	Description
Fig. 52	Top view of power supply section, I model.
Fig. 53	Top view of power supply section, E model.
Fig. 54	Bottom view of r-f section, I model.
Fig. 55	Bottom view of r-f section, E model.
Fig. 56	Bottom view of modulator section, I model.
Fig. 57	Bottom view of modulator section, E model.
Fig. 58	Bottom view of power supply section, I model.
Fig. 59	Bottom view of power supply section, E model.
Fig. 60	Rear view of power panel, I model.
Fig. 61	Rear view of power panel, E model.
Fig. 69	Cross section of a representative transmitter tuning unit.
Fig. 70	Antenna Tuning Unit BC–939–(*), interior view.
Fig. 71	Overload relay RY5.
Fig. 72	Test equipment connections.
Fig. 73	Oscilloscope pattern for modulation percentage test.
Par. 35	Equipment performance checklist.
Par. 60	Checking key circuits for shorts.
Par. 62	Trouble-shooting chart.
Par. 63	D-c resistances of transformers and coils.
Par. 64	Continuity tests for cables and terminal strips.

60. Test Equipment Required for Trouble Shooting

The test equipment required for trouble shooting Radio Transmitter BC–610–(*) is listed below. The technical manuals associated with the test equipment also are listed.

Test equipment	Technical manual
Tube Tester I–177	TM 11–2627
Multimeter TS–352/U	TM 11–5527
R-f ammeter.	
Oscilloscope OS–8/U	NAVSHIPS 91,272
Frequency Meter Set SCR–211–(*).	TM 11–300
Audio Oscillator TS–382A/U	TM 11–2684A
Neon lamp.	
Electronic Multimeter TS–505/U.[a]	TM 11–5511
Speech Amplifier BC–614–(*)[a]	TM 11–281
Power Unit PE–95–(*)[a]	TM 11–904
Microphone T–17, T–30, T–45, or T–50.[a]	
Key J–37.[a]	
Radio Receiver BC–312–(*) or BC–342–(*).[a]	TM 11–850

[a] Supplementary equipment needed.

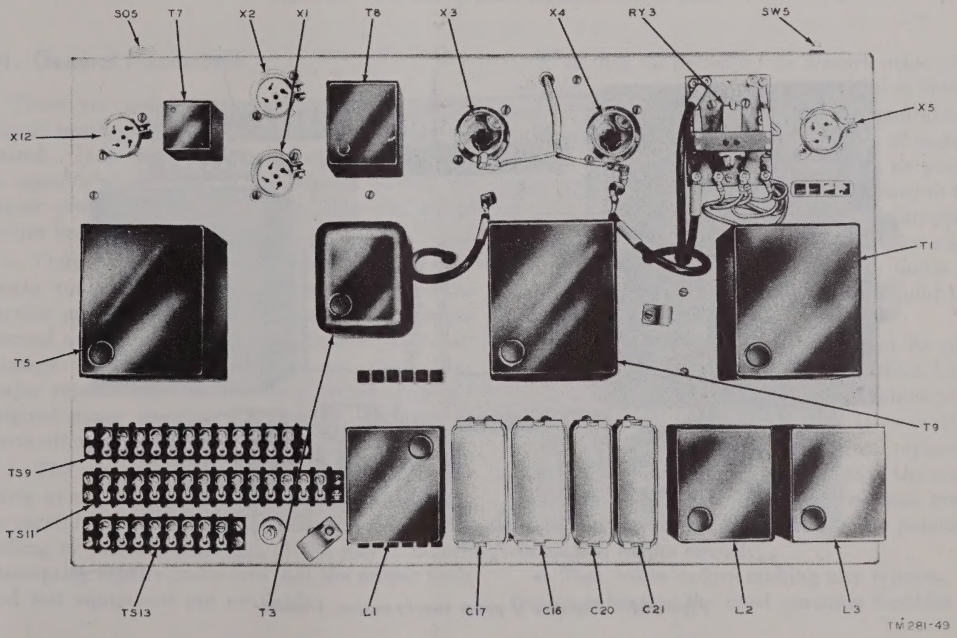


Figure 50. Top view of modulator section, I model.

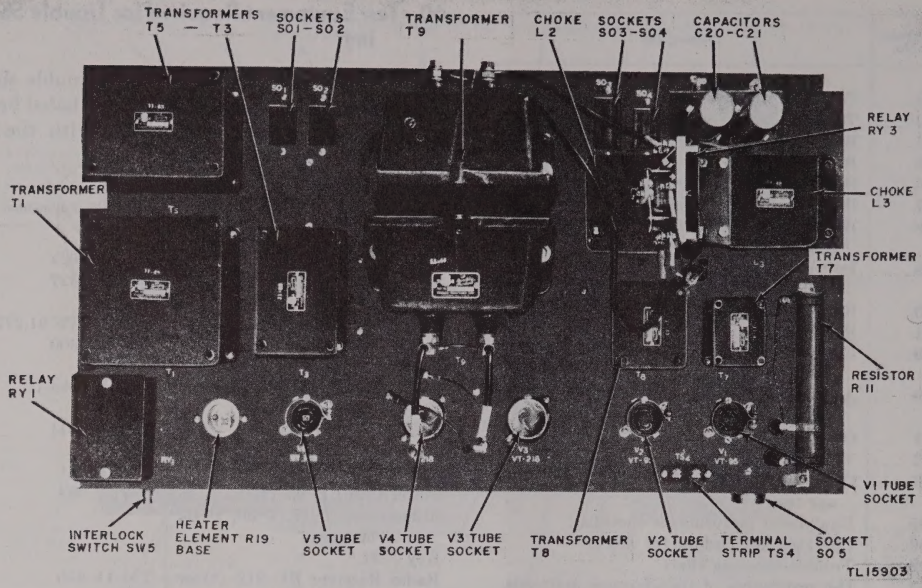


Figure 51. Top view of modulator section, E model.

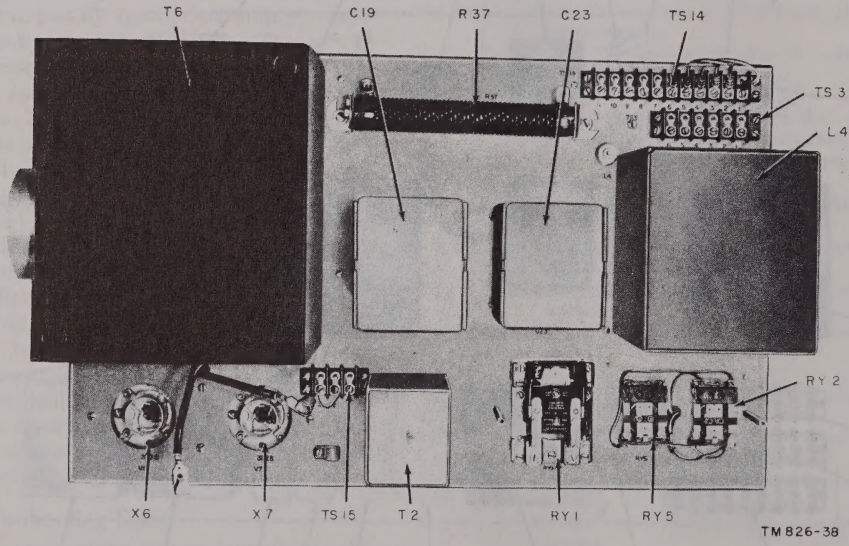


Figure 52. Top view of power supply section, I model.

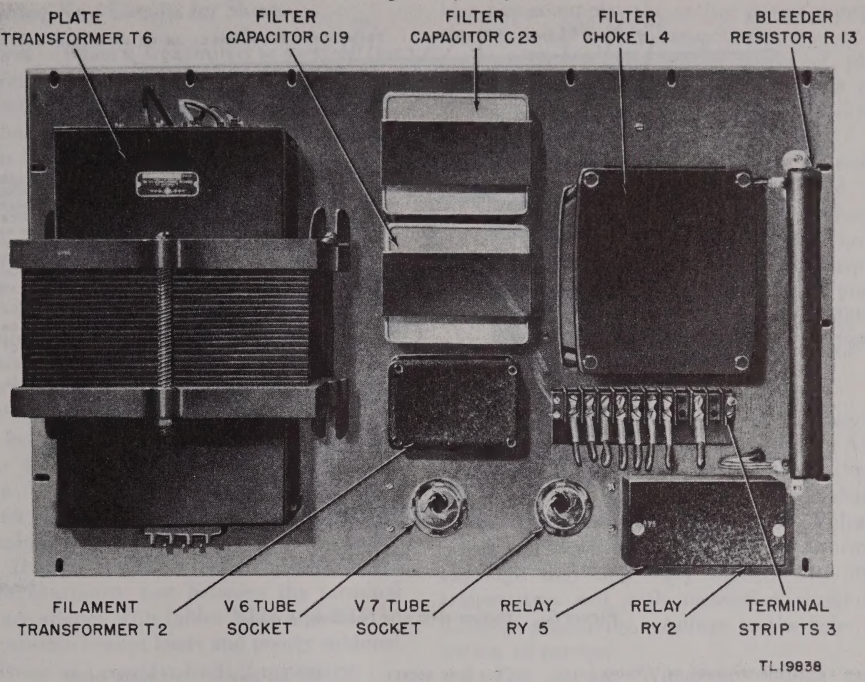


Figure 53. Top view of power supply section, E model.

61. General Precautions

There are definite general precautions which should be observed when any radio set is being repaired. It is to the advantage of the repairman to observe these rules to the utmost during the repair process in order to save time and avoid future break-down of the set.

a. Only competent personnel supplied with adequate tools and equipment are authorized to service and repair this equipment. An inexperienced operator attempting to make repairs may damage the equipment to such an extent that major repairs may be necessary rather than the original minor repairs. Careless replacement of parts often makes new faults inevitable.

b. The removal and replacement of defective parts or circuit elements are sometimes difficult; be careful not to damage leads or other parts by pulling or pushing them out of the way. Before attempting repairs make sure that the proper tools and test equipment are available.

c. It may be necessary to remove other circuit elements and parts to remove or replace a defective part. Make a careful record of the connections to each part removed and of the position of each part in the unit. Clip all leads as short as possible. Avoid using more solder than is necessary to make a secure connection. Solder carelessly dropped in the unit may cause short circuits and may create a new fault. It is very important to make well-soldered joints, since a poorly soldered joint is one of the most difficult faults to find.

d. When a part is replaced it must be placed exactly as the original one. A part which has the same electrical value but different physical size may cause trouble in h-f circuits. Give particular attention to proper grounding when replacing a part. Use the same ground point as in the original circuit wiring. Failure to observe these precautions may result in decreased gain or possibly in oscillation of the circuit.

e. Test tubes before making any repairs. Defective tubes are the most common troubles.

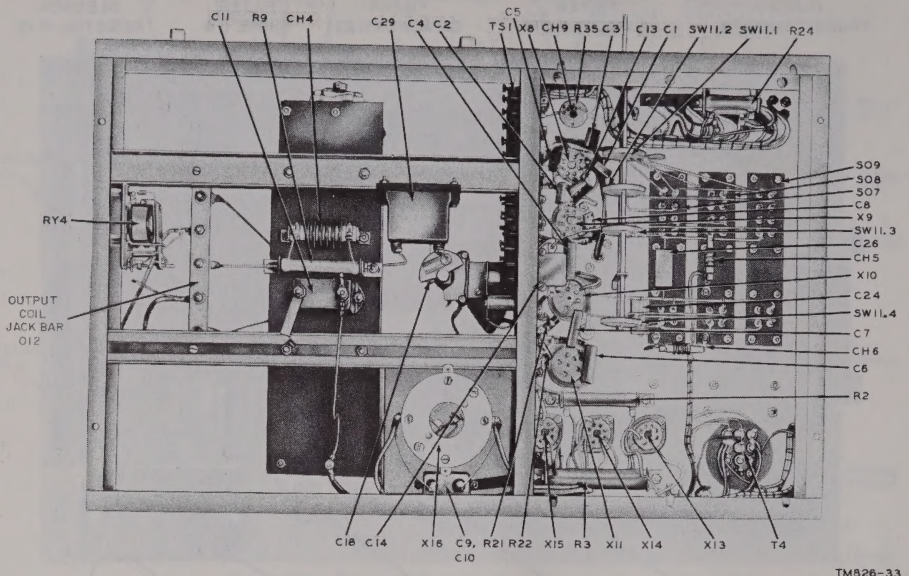


Figure 54. Bottom view of r-f section, I model.

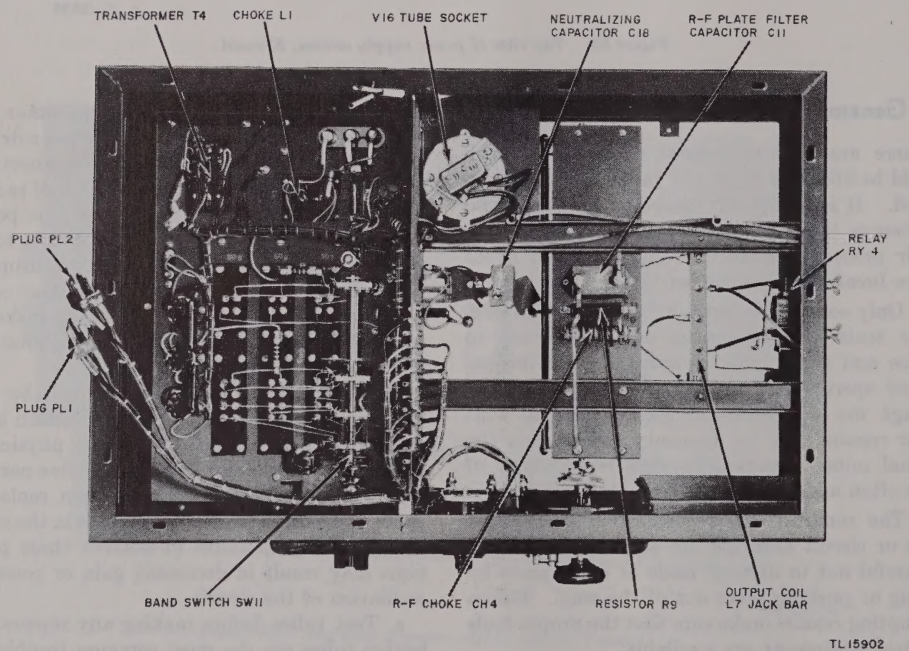


Figure 55. Bottom view of r-f section, E model.

62. Checking Key Circuits for Shorts

a. General. When a transmitter is serviced, no further damage to it should occur. The procedure which the repairman is to follow should assist in the reduction of time in making the repair. Trouble in the transmitter often may be localized by checking the resistance of the filament, bias, and h-v circuits before applying power to the equipment, thereby, preventing damage to the equipment. Leaky or low resistance capacitors will draw excessive current from the rectifier systems. If a short, or a near short, is detected by an ohmmeter reading, the defective part is usually a shorted or leaky filter capacitor or an r-f bypass capacitor. A suspected defective capacitor must be disconnected at one end in order to check it individually. Note the polarity of the ohmmeter leads; do not check the electrolytic capacitors with reverse polarity. Figures 62 through 68 give the resistance readings between each terminal of the tube sockets and chassis ground. If the resistance values are normal, make the circuit continuity test between the terminal strips in accordance with tables XIII and XIV to discover possible broken leads and poorly soldered joints. Dress and resolder leads if necessary.

b. Resistance Measurements. The following tests indicate the output resistance to ground of the bias power supply, the exciter power supply, and the h-v power supply, respectively.

(1) With all transmitter power off, place an ohmmeter from pin 2 or pin 3 of bias rectifier tube V5 to ground. This reading should be at least 3,000 ohms.

(2) Make an ohmmeter check between terminal 2 of TS9 (terminal 8 of TS2 in E model) and ground. A reading of at least 40,000 ohms will indicate no shorts in the exciter rectifier supply output.

(3) Check the resistance from the plate cap of r-f p-a tube V16 to ground. The reading should be at least 80,000 ohms.

63. Voltage Measurements

a. General. If the resistance measurements (par. 66) or the continuity checks (table XIII) do not determine the source of trouble in the transmitter, voltage measurements may be taken in an effort to ascertain the defective part. Voltage values should be as specified on figures 62 through 68, although they may vary slightly with different transmitters and with measuring equipment of different sensitivity. Adhere to the listed values within 10 percent.

b. Test Set-up. Whenever voltage measurements are taken, the stages being measured should be operated under normal loaded conditions. The

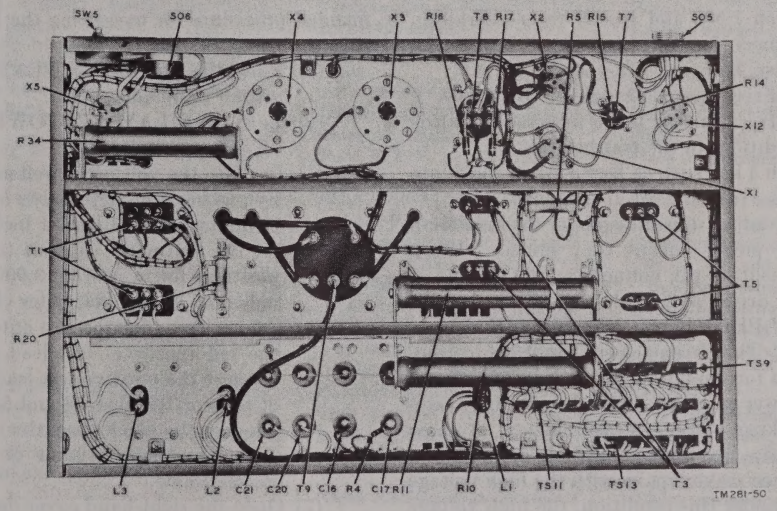


Figure 56. Bottom view of modulator section, I model.

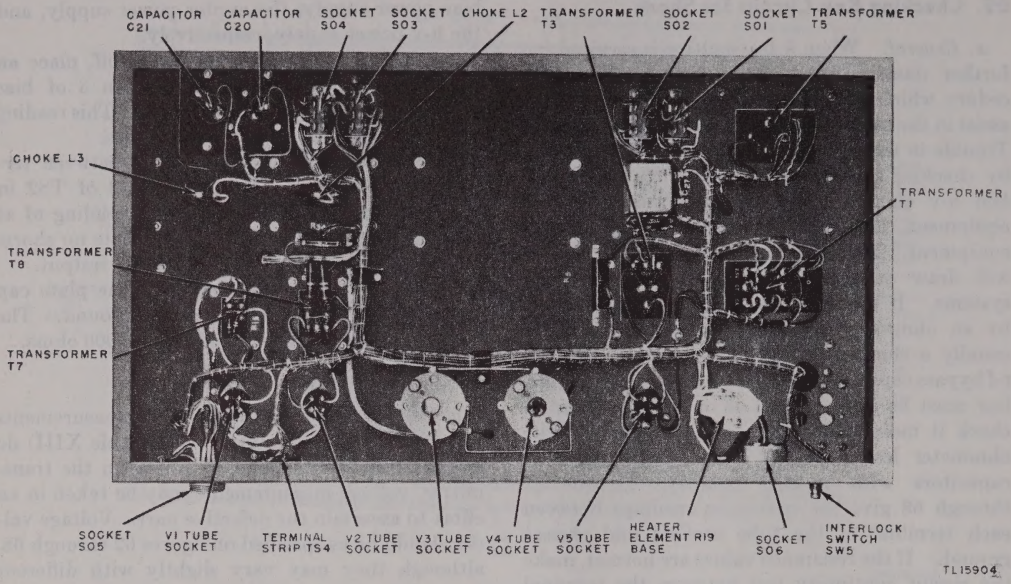


Figure 57. Bottom view of modulator section, E model.

test set-up for measuring the voltages of the power supplies is as follows:

(1) Connect a dummy antenna to the transmitter. The dummy antenna consists of a series-connected 146-ohm, 400-watt resistor and a 50-$\mu\mu$f capacitor rated between 7,500 and 10,000 volts (working).

(2) Connect the transmitter to a 5-kw, single-phase, 60-cycle, 115-volt source.

(3) Connect Speech Amplifier BC–614–(*), which is known to be in good operating condition, to the transmitter.

(4) With a key such as Key J–37 plugged into jack J101 on Speech Amplifier BC–614–(*), adjust the transmitter for maximum c-w power output (key down). When measuring the voltages at the sockets of the driver and modulator tubes, set the CW-PHONE switch at PHONE.

Warning: The h-v power supply furnishes plate voltage for modulator tubes V3 and V4 and for the r-f power amplifier V16. Be extremely careful when taking voltage measurements on these tubes when the h-v power supply is on. Do not change fuses or make repairs with the high voltage on because, under this condition, the high voltage is present on all three decks of the transmitter. Be very careful when making all d-c (direct current) voltage tests. It is extremely dangerous to measure the high voltage in this transmitter. Contacting the high voltage present in Radio Transmitter BC–610–I *can be fatal.* When making this test, always arrange to have someone else present.

c. High-voltage Power Supply. The recommended procedure for measuring the high voltage is given below.

(1) Turn the transmitter PLATE POWER switch to off (down).

(2) Turn the FILAMENT POWER switch to off (down).

(3) Insulate the voltmeter well above ground by placing it on dry boards or other insulating material at least 1 inch thick.

(4) Set the voltmeter controls to the proper positions for measuring 3,000 volts d-c as indicated on the voltmeter chart.

(5) Connect an alligator clip onto the end of the red (positive) test lead prod. Now connect the positive test lead to one side of resistor R9 (figs. 54 and 55).

(6) Connect the black (negative) test lead to any convenient ground on the transmitter frame.

(7) Open the right-hand cover door (over the transmitter tuning units) to open its interlock switch. (This switch will be

used to close the circuit in the step given in (15) below.)

(8) Fasten down the interlock switch at the left-hand cover door so that its circuit is closed.

(9) See that the back screen is in place so that its interlock switch is closed.

(10) Arrange the red (positive) test prod with cord so that it is extremely well insulated. It should be supported carefully, free and clear from the door and frame of the transmitter and any components.

(11) STAND CLEAR OF THE RED (POSITIVE) TEST LEAD, AND SEE THAT NO ONE COMES IN CONTACT WITH IT WHEN HIGH VOLTAGE IS BEING CHECKED.

(12) Set the FILAMENT POWER switch to on (up). Allow the transmitter to warm up.

(13) Set the PLATE POWER switch of the transmitter to on (up).

(14) PUT YOUR LEFT HAND IN YOUR POCKET.

(15) With your right hand, turn on the high voltage by pressing the interlock switch at the right-hand cover door.

(16) Read the voltage indication on the voltmeter and release the interlock switch.

(17) Set the PLATE POWER switch to off (down) and remove the fastening (if used) from the left-hand cover interlock when finished.

64. Trouble-shooting Chart

The following chart is supplied as an aid in locating trouble in the radio transmitter. This chart lists the symptoms which the repairman observes, either visually or audibly, while making a few simple tests. *The chart also indicates how to localize trouble quickly to a particular stage of the transmitter.* Once the trouble has been localized to a stage or circuit, a tube check and voltage and resistance measurements of this stage or circuit should ordinarily be sufficient to isolate the defective part. Normal voltage and resistance measurements are given in figures 62 through 68.

Symptom	Probable trouble	Correction
1. FILAMENT POWER switch in on position. FILAMENT VOLTAGE meter indicates voltage. Green pilot lamp does not light.	1. Lamp LM3 burned out or loose in socket. Leads broken or defective. Socket defective.	1. Replace LM3 or tighten in socket. Repair. Replace socket.
2. FILAMENT POWER switch in on position. FILAMENT VOLTAGE meter indicates no voltage. Green pilot lamp does not light.	2. Fuse FS1, FS2, or FS4 burned out. Switch SW1 defective. Damaged Cord CD–763 or poor contacts at socket.	2. Replace. Replace. Repair Cord CD–763 or socket SO201 or SO6.
3. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates no voltage.	3. Tube V13, V14, or V15 not in socket. FILAMENT VOLTAGE resistor R18 defective. Open connection at terminals 3 or 7 of terminal strip TS1 or TS9. (Open connection at terminals 7 or 8 of terminal strip TS1 or terminal 3 or 4 of terminal strip TS2 on E model.)	3. Place tube properly in its socket. Check sliding arm for contact. Repair or replace resistor. Check connections at terminal strips TS1 and TS9. Clean or tighten as required. (Check connections at terminal strips TS1 and TS2. Clean or tighten as required.)
4. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates voltage. Filaments of tubes V1, V2, and V5 are not heated.	4. Fuse FS5 open. Open terminal 2 or 8 on terminal strip TS11. (Open connection at terminal 1 or 6 on socket SO3 or plug PL3 in E model.)	4. Replace. Check connections at terminals 2 and 8 on terminal strip TS11. Clean or tighten as required. (Check connections at terminals 1 and 6 on socket SO3 and plug PL3. Clean or tighten as required.)

Symptom	Probable trouble	Correction
5. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates voltage. Filaments of tubes V1, V2, and V5 are heated. Filaments of tubes V6 and V7 are not heated.	5. Open connection at terminal 7 or 8 on terminal strip TS14. (Open connection at terminal 4 or 5 on terminal strip TS3 in E model.)	5. Check connections at terminals 7 and 8 on terminal strip TS14. Clean or tighten as required. (Check connections at terminals 4 and 7 on terminal strip TS3. clean and tighten as required.)
6. EXCITER PLATE POWER switch in up position. No indications on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE, INT. AMP. GRID, or INT. AMP. PLATE position.	6. Defective switch SW3 or SW8. Open choke CH1 or CH2. Open connection at terminal 2 or 5 of terminal strip TS1 or TS9. (Open connection at terminal 8 of terminal strip TS2 in E model.) Defective rectifier tube V12. Open ground lead at terminal 5 of transformer T5.	6. Replace. Replace. Check connections; clean or tighten as required. (Check connection; clean or tighten as required.) Replace. Repair connection.
7. EXCITER PLATE POWER switch in up position. Normal indications on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE position. No reading on EXCITER METER when EXCITATION METER SWITCH is in INT. AMP. GRID, INT. AMP. PLATE, or P. A. GRID position.	7. Open resistor R8 or choke CH7. Open connection at terminal 4 or 5 of terminal strip TS2, terminal 9 of terminal strip TS1 or TS9, or terminal 13 of terminal strip TS11. (Open connection at terminal 6 or 7 of terminal strip TS2 in E model.) Open resistor R11 or R12. Open tap contact on resistor R11.	7. Replace. Check terminal strip connections. Clean or tighten as required. (Check terminal strip connections. Clean or tighten as required.) Replace. Clean or tighten tap contact as required.
8. EXCITER PLATE POWER switch in up position. Current excessive on EXCITATION METER when EXCITATION METER SWITCH is in INT. AMP. GRID, INT. AMP. PLATE or P. A. GRID position.	8. Open filter choke L2 or L3. Defective rectifier tube V5. Open ground connection at terminal 7 of transformer T1. Open resistor R11.	8. Replace. Replace defective tube. Repair open ground circuit. Replace.
9. EXCITER PLATE POWER switch in up position. No current when EXCITATION METER SWITCH is in P. A. GRID position. Normal current on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE, INT. AMP. GRID, or INT. AMP. PLATE position.	9. Open choke coil CH8. Defective tube V16. Open ground circuit at terminal 8 on transformer T4. Open grid cap clip connection on side of tube V16.	9. Replace. Replace. Repair open ground circuit. Clean or tighten clip connection as required.
10. PLATE POWER switch in on position. No current on P. A. PLATE meter. All other indications normal.	10. Defective switch SW6. Open coil in relay RY1. Defective contacts on relay RY1 or RY2. Open fuse FS3. Open interlock switch SW2, SW5, or SW13. Overload relay RY2 energized. Open filter choke L4. Defective switch SW4. Open plate cap clip connection on top of tube V16. Open primary coil in plug-in unit L7. Open connections between plug-in coil L7 and jack.	10. Replace. Replace. Clean or replace defective contacts as required. Replace. Check position of top access doors and tightness of transmitter back cover. Press OVERLOAD RESET switch. Replace. Replace. Clean or tighten clip connection as required. Replace plug-in unit L7. Clean or tighten connections as required.

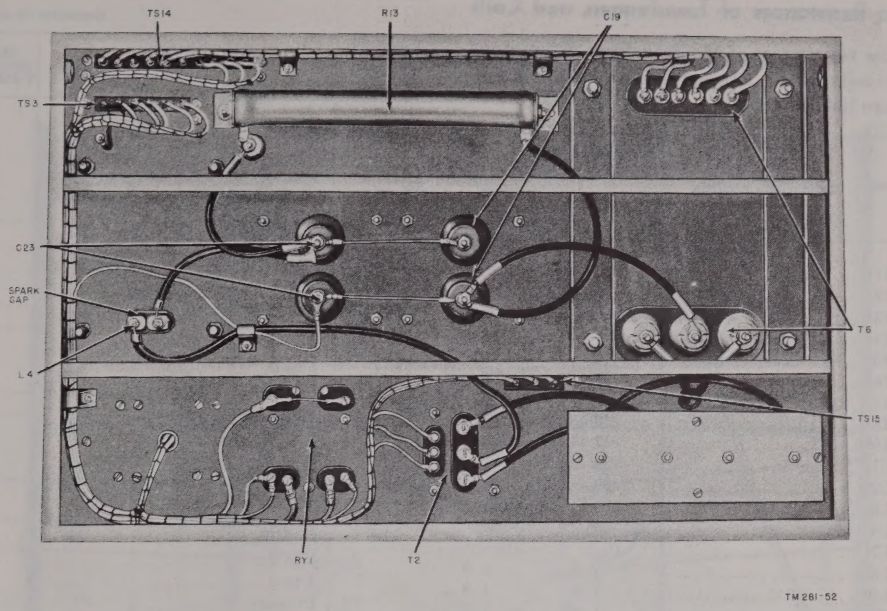


Figure 58. Bottom view of power supply section, I model.

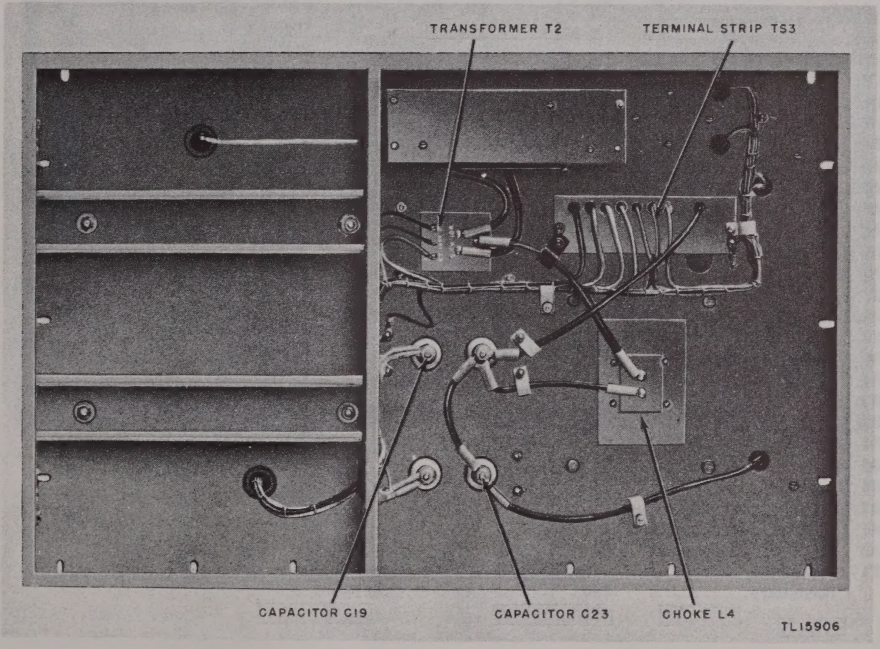


Figure 59. Bottom view of power supply section, E model.

65. D-c Resistances of Transformers and Coils

The d-c resistances of the transformer windings and the coils in the various models of the transmitter are listed below.

Transformer or coil	Terminals or windings	Resistance (in ohms)	
		Model E	Models F through I and T-213/GRC-26
CH1		20	20
CH2		20	20
CH3		25	25
CH4		8.5	8.5
CH5		20	20
CH6		20	20
CH7		20	20
CH8		20	20
CH9		42	42
L1		125	110
L2		125	110
L3		125	110
L4		68	55
L7		(1)	(1)
L8		2.5	2.5
L9		1.8	1.8
L10		1.8	1.8
L11		1	1
L12		(1)	(1)
L13		1	1
L14		3.5	3.5
L15		2.3	2.3
L16		1	1
L17		4	4
L18		2	2
L19		1.5	1.5
L20		(1)	(1)
L21		(1)	(1)
L22		(1)	(1)
L23		(1)	(1)
L24		(1)	(1)
L25		(1)	(1)
L26		(1)	(1)
L27		(1)	(1)
L28		(1)	(1)
L29		(1)	(1)
L30		(1)	(1)
L31		(1)	(1)
L32		(1)	(1)
L33		(1)	(1)
L34		(1)	(1)
L35		(1)	(1)
L36		(1)	(1)
L37		(1)	(1)
L41		1	1
L42		(1)	(1)
T1	Primary	1.5	----------
	Secondary	120	----------
T1	1 to 2	----------	1.5
	3 to 5	----------	120
	6 to 8	----------	(1)
T2	Primary	11	----------
	Secondary	(1)	----------
T2	1 to 2	----------	10.5
	1 to 3	----------	12.5
	4 to 6	----------	(1)
T3	Primary	3	----------
	Secondary	(1)	----------
T3	1 to 2	----------	3
	4 to 6	----------	(1)
T4	Primary	1.5	----------
	Secondary	(1)	----------
T4	1 to 2	----------	2
	4 to 6	----------	(1)
	7 to 9	----------	(1)
	10 to 12	----------	(1)
T5	Primary	1.5	----------
	Secondary	80	----------
T5	1 to 2	----------	1.5
	4 to 6	----------	60
T6	Primary	(1)	----------
	Secondary	140	----------
T6	1 to 3	----------	(1)
	4 to 6	----------	(1)
	7 to 9	----------	120
T7	Primary	35	----------
	Secondary	950	----------
T7	1 to 2	----------	23
	3 to 4	----------	625
	3 to 5	----------	1,250
	4 to 5	----------	625
T8	Primary	200	----------
	Secondary	170	----------
T8	1 to 2	----------	130
	1 to 3	----------	260
	2 to 3	----------	130
	4 to 5	----------	75
	4 to 6	----------	150
	5 to 6	----------	75
T9	Primary	300	----------
	Secondary	120	----------
T9	1 to 2	----------	350
	1 to 3	----------	700
	2 to 3	----------	350
	4 to 5	----------	160
RY1		425	106
RY2		700	400
RY3		250	400
RY4		480	400
RY5		6	6

(1) Less than .1.

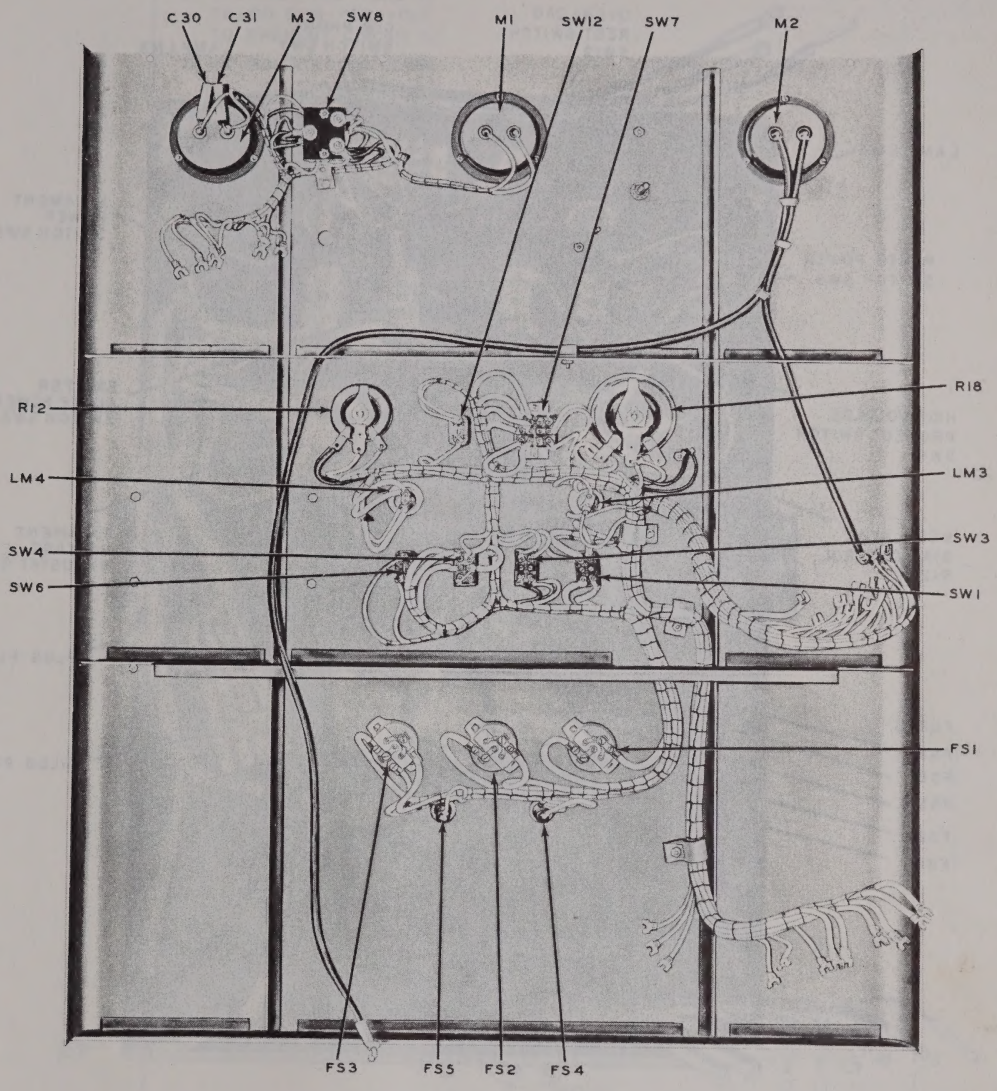


Figure 60. Rear view of power panel, I model.

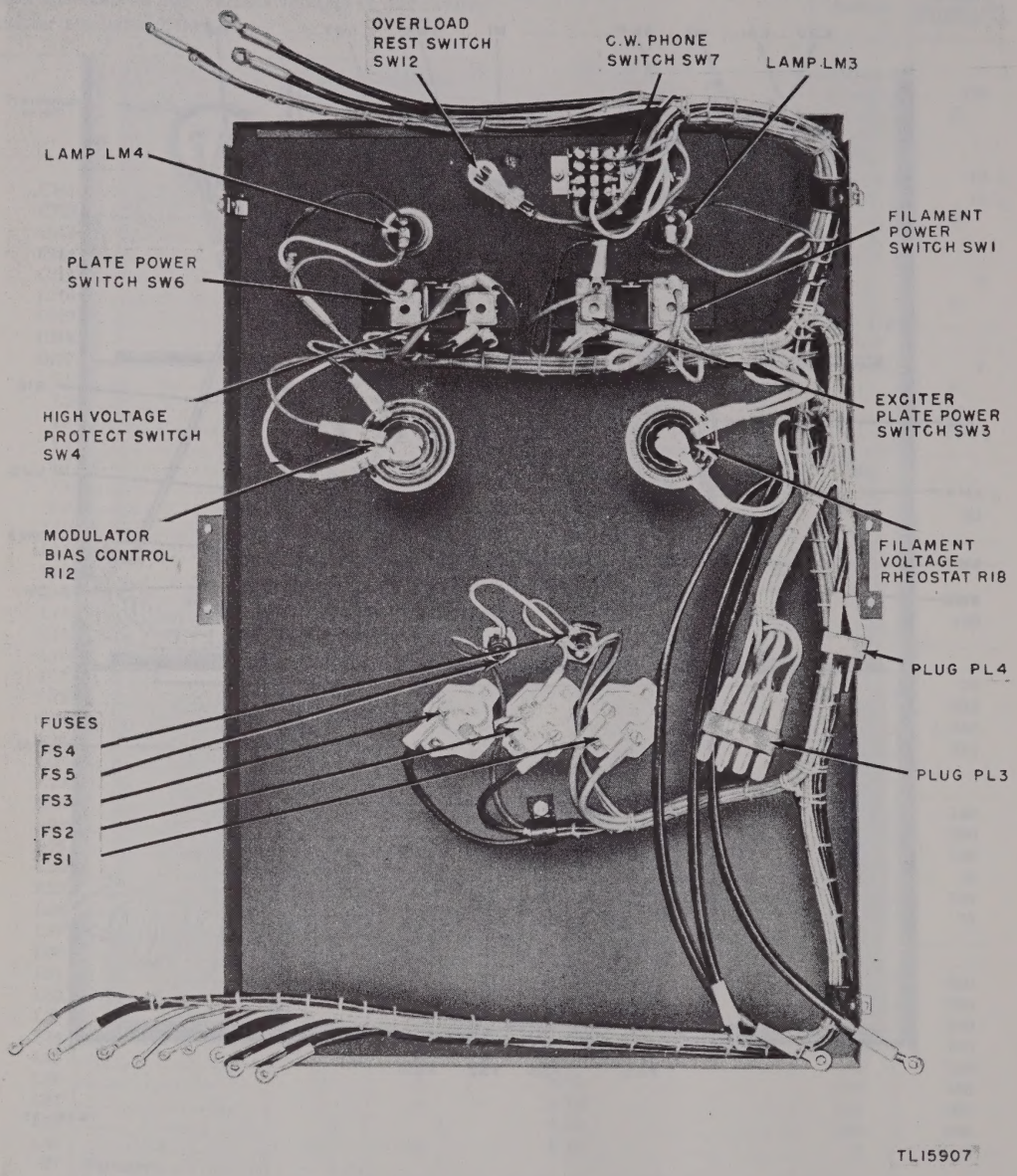
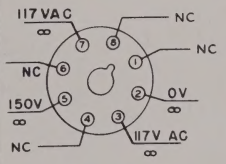


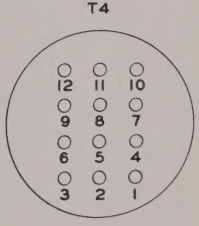
Figure 61. Rear view of power panel, E model.

1. 115V A-C INPUT
2. VOLTAGES AND RESISTAN
   20,000 OHM-PER-VOLT
   TO PREVENT CIRCUIT L
3. NC INDICATES NO CONNE
4. * INDICATE MEASUREME
5. NM INDICATES NOT MEA
6. REFER TO TROUBLE SH
   TAKING HIGH VOLTAGE
7. DO NOT MAKE RESISTA
   CONNECTED.
8. DISCHARGE STORED VO
   TO CHASSIS BEFORE AT
9. FINAL TANK COIL L7 AN

VOLTAGE REG
V13
0D3



T4



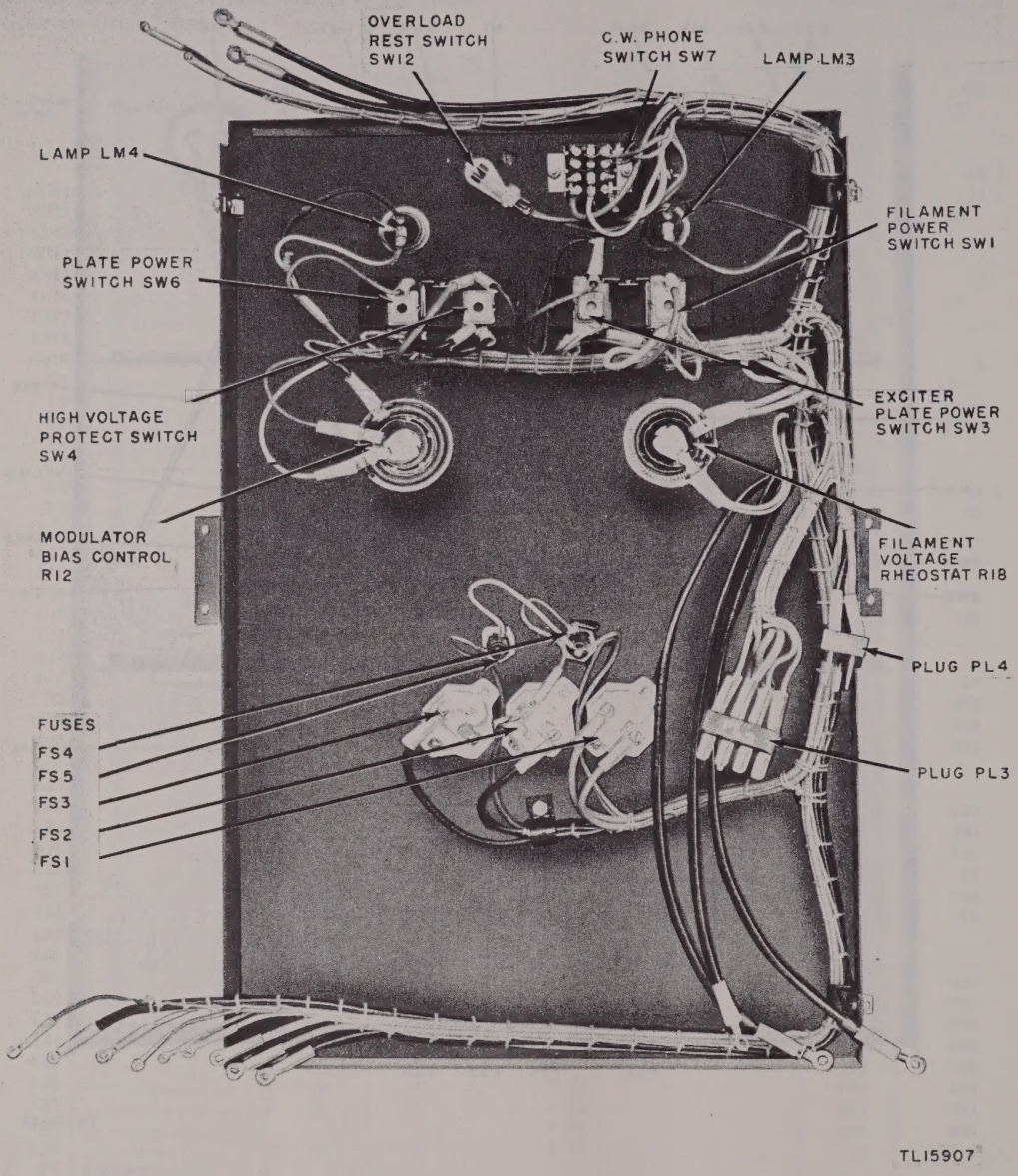
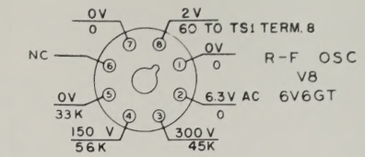
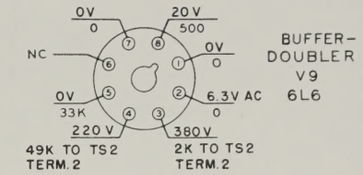


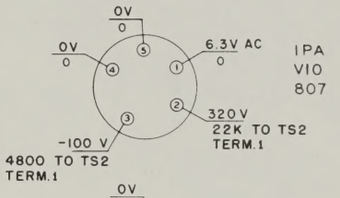
Figure 61. Rear view of power panel, E model.

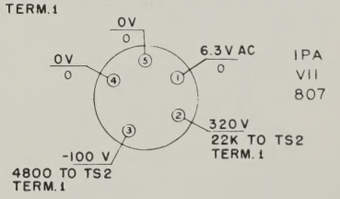
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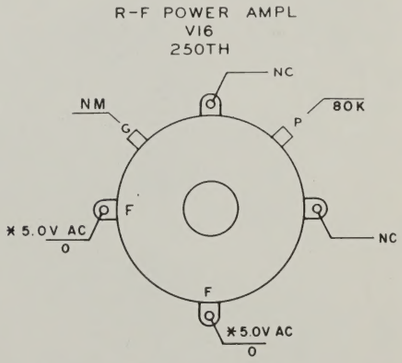
1. 115 V A-C INPUT
2. VOLTAGES AND RESISTANCES MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER, USE HIGHER METER RANGES TO PREVENT CIRCUIT LOADING.
3. NC INDICATES NO CONNECTION.
4. * INDICATE MEASUREMENT ACROSS FILAMENT.
5. NM INDICATES NOT MEASURED.
6. REFER TO TROUBLE SHOOTING SECTION IN TEXT BEFORE TAKING HIGH VOLTAGE MEASUREMENTS.
7. DO NOT MAKE RESISTANCE MEASUREMENTS WITH AC LINE CONNECTED.
8. DISCHARGE STORED VOLTAGES BY SHORTING CHECK POINTS TO CHASSIS BEFORE ATTEMPTING RESISTANCE MEASUREMENTS.
9. FINAL TANK COIL L7 AND TUNING UNITS INSERTED.

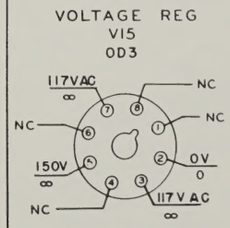


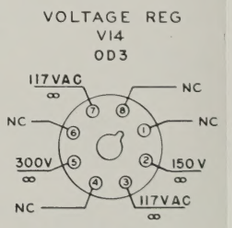


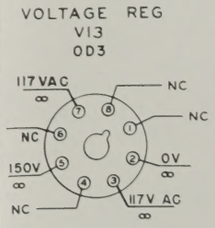












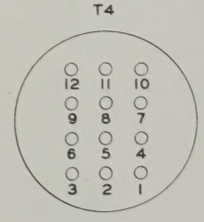


Figure 62. Exciter deck voltages and resistances, I model.



66. Continuity Tests for Cables and Terminal Strips

a. Defects in the transmitter can be detected by performing resistance tests of continuity through cables and terminals in accordance with the procedure outlined in tables XIII and IV.

b. Perform tests on an ohmmeter range that permits a reading close to the center of the scale. If the readings obtained do not agree with those specified in the tables, within plus or minus 10 percent, the circuit is defective. If an infinite reading is obtained in a test for which less than .1 ohm is specified, there is an open circuit in the circuit under test. Check the circuit for poorly soldered or broken connections, burned-out fuses, poor contacts between plug and sockets, and loose connection at terminal strips. Also, by these tests, short circuits and defective parts may be located. Make the necessary repairs and replacements.

c. Perform these tests with the a-c power off, the tubes removed, except where indicated otherwise, three transmitter tuning units inserted, and all plugs connected in their proper sockets.

Caution. Be sure that the switches are in the specified positions required for the test.

Table XIII. Continuity Checks for Terminal Strips Radio Transmitters BC-610-F, -G, -H, and -I and T-213/GRC-26

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
Terminal strip TS1	1		Ground or chassis	(1)
	1		Terminal 1 of TS9	(1)
	2		Terminal 3 of TS2	(1)
	2		Terminal 2 of TS2	.4
	2		Terminal 1 of TS2	.2
	2	Remove tube V8 from its socket.	Pin 3 of socket for tube V8	5,000
	2	Remove tube V8 from its socket.	Pin 4 of socket for tube V8	16,000
	2		Terminal 2 of TS9	(1)
	3		Terminal 3 of TS9	(1)
	3		Terminal 7 of TS1	2
	4		Terminal 4 of TS9	(1)
	4		Terminal 5 of TS1	(1)
	4		Terminal 6 of TS1	(1)
	5		Terminal 5 of TS9	(1)
	6		Terminal 6 of TS9	(1)
	7		Terminal 7 of TS9	(1)
	8		Terminal 8 of TS9	(1)
	8	Remove tube V8 from its socket.	Pin 8 of socket for tube V8	60
	9		Terminal 9 of TS9	(1)
	9		Terminal 5 of TS2	(1)
	10		Terminal 10 of TS9	(1)
	10		Terminal 9 of TS2	(1)
	11	Interlock switches SW2 and SW13 closed.	Terminal 9 of TS2	(1)
	11		Terminal 11 of TS9	(1)
	11		Terminal 10 of TS2	(1)
Terminal strip TS2	1	Remove tube V10 from its socket.	Terminal 2 of socket for tube V10	22,000
	1	Remove tube V11 from its socket.	Terminal 2 of socket for tube V11	22,000
	1	Switch SW11 in position 1	Plate caps of tubes V10 and V11	(1)
	1	Switch SW11 in position 2	Plate caps of tubes V10 and V11	(1)
	1	Switch SW11 in position 3	Plate caps of tubes V10 and V11	(1)
	2	Remove tube V9 from its socket.	Terminal 4 of socket for tube V9	49,000
	2	Remove tube V9 from its socket; switch SW11 in position 1.	Terminal 3 of socket for tube V9	2,000
	2	Remove tube V9 from its socket; switch SW11 in position 2.	Terminal 3 of socket for tube V9	2,000
	2	Remove tube V9 from its socket; switch SW11 in position 3.	Terminal 3 of socket for tube V9	2,000
	4	Remove tube V10 from its socket.	Terminal 3 of socket for tube V10	4,800
	4	Remove tube V11 from its socket.	Terminal 3 of socket for tube V11	4,800
	4		Terminal 5 of TS2	470

(1) Less than .1.

Table XIII. Continuity Checks for Terminal Strips Radio Transmitters BC–610–F, –G, –H, and –I and T–213/GRC–26—Continued

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
Terminal strip TS2	5		Terminal 6 of TS2	.4
	6		Grid cap of V16	18
	7		Ground or chassis	(1)
	7		Meter M3	(1)
	8		Ground or chassis	(1)
	9	Top panel access doors closed	Terminal 10 of TS2	(1)
Terminal strip TS3	1		Ground or chassis	(1)
	1		Terminal 1 of TS13	(1)
	2		Terminal 2 of TS13	(1)
	2	Close relay RY1 manually	Terminal 3 of TS13	(1)
	2	Close relay RY1 manually	Terminal 4 of TS13	(1)
	3		Terminal 3 of TS13	(1)
	4		Terminal 4 of TS13	(1)
	5		Terminal 5 of TS13	(1)
	5	Close relay RY5 manually	Terminal 9 of TS14	400
	5		Terminal 6 of TS3	86
	5		Terminal 7 of TS14	2
	6		Terminal 6 of TS13	(1)
Terminal strip TS9	1		Ground or chassis	(1)
	1	Ground wire from terminal 1 of TS9 or TS11 removed.	Terminal 1 of TS11	(1)
	1	Ground wire from terminals 1 of TS3 and TS11 removed.	Terminal 1 of TS13	(1)
	2		Ground or chassis	40, 000
	3		Terminal 6 of TS11	(1)
	3		Terminal 9 of TS11	1
	3		Terminal 3 of TS13	1
	5		Ground or chassis	40, 000
	7		Terminal 3 of TS11	(1)
	8		Terminal 11 of TS11	(1)
	8		Pin 2 of SO5	(1)
	9		Slider arm of R11	(1)
	10		Terminal 14 of TS11	(1)
	11	Close interlock SW5 on modulator.	Terminal 4 of TS13	(1)
Terminal strip TS11	1		Ground or chassis	(1)
	2		Terminal 3 of TS11	0–15
	2		Pin 3 of SO5	(1)
	2		Terminal 2 of TS13	(1)
	2	Switch SW7 in C. W. position	Terminal 4 of TS11	400
	2	Switch SW1 in up position	Terminal 7 of TS11	(1)
	2	Switch SW3 in up position	Terminal 9 of TS11	(1)
	2	Switch SW6 in up position	Terminal 12 of TS11	(1)
	3		Terminal 8 of TS14	(1)
	4	Switch SW7 in PHONE position.	Terminal 6 of TS11	(1)
	4		Terminal 2 of TS13	400
	5	Switch SW1 in FILAMENT POWER position.	Terminal 6 of TS11	(1)
	5		One side of SO6	(1)
	6		Terminal 8 of TS11	(1)
	6		Terminal 7 of TS14	(1)
	7	Switch SW1 in FILAMENT POWER position.	Terminal 2 of TS11	(1)
	7		One side of SO6	(1)
	8		Pin 1 of SO5	(1)

[1] Less than .1.

Table XIII. Continuity Checks for Terminal Strips Radio Transmitters BC–610–F, –G, –H, and –I and T–213/GRC–26—Continued

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
Terminal strip TS11	9		Terminal 3 of TS13	(1)
	9	Switch SW3 in EXCITER PLATE POWER position.	Terminal 2 of TS11	(1)
	10		Ground or chassis	0–500
	10		Grid caps of tubes V3 and V4	28, 000
	10	Close relay RY3 manually	Grid caps of tubes V3 and V4	75
	11	Switch SW3 in EXCITER PLATE POWER position.	Ground or chassis	(1)
	12	Switch SW6 in PLATE POWER position.	Terminal 2 of TS11	(1)
	12		Pin 4 of SO5	(1)
	12		Terminal 6 of TS13	(1)
	12		Terminal 8 of TS13	(1)
	13		Ground or chassis	500
	14		Terminal 4 of TS14	(1)
	14	Switch SW4 in NORMAL position.	Terminal 1 of TS14	(1)
Terminal strip TS13	5		Terminal 7 of TS13	(1)
	5		Terminal 8 of TS13	86
	6		Terminal 8 of TS13	(1)
Terminal strip TS14	1		Terminal 2 of TS14	(1)
	1		Terminal 3 of TS14	(1)
	1		Terminal 4 of TS14	(1)
	2		Terminal 5 of TS14	(1)
	3		Terminal 6 of TS14	(1)
	7		Terminal 6 of TS11	(1)
	7		Terminal 5 of TS3	2
	8		Terminal 3 of TS11	(1)
	8		Terminal 9 of TS14	(1)
	9	Close relay RY5 manually	Terminal 5 of TS3	400
Terminal strip TS15 (only on I model and the H models Serial No. 821 through 972, Order No. 3078–P–51; and Serial No. 1 thru 539, Order No. 19624–P–50).	1		Terminal 4 of TS14	(1)
	2		Terminal 11 of TS14	(1)
	3		Terminal 6 of TS11	(1)
	3		Terminal 10 of TS14	(1)

(1) Less than .1.

Table XIV. Continuity Test for Cables and Terminal Strips Radio Transmitter BC-610-E

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
Terminal strip TS3	1		Terminal 0 of transformer T6	(1)
	2		Terminal 2600 of transformer T6	(1)
	3		Terminal 2000 of transformer T6	(1)
	4		Terminal ST of transformer T2	(1)
	5		Terminal 100 of transformer T2	(1)
	5		Terminal 7 of terminal strip TS3	(1)
	6		Open contact on relay RY2	700
	8		Terminal CT of transformer T2	50
	9		Ground or chassis	(1)
	1		Terminal 8 of plug PL4	(1)
	1	SW4 at NORMAL	Terminal 7 of plug PL4	(1)
	2	SW7 at C. W	Terminal 7 of plug PL3	(1)
	3	SW7 at PHONE	Terminal 7 of plug PL3	(1)
	4	SW12 closed (not pressed)	Terminal 6 of terminal strip TS3	(1)
	5	SW7 at PHONE	Terminal 2 of plug PL3	(1)
	7		Terminal 8 of plug PL3	(1)
	8		Terminal + of meter M2	(1)
	9		Terminal 9 of plug PL4	500
Modulator socket SO1	7		Ground or chassis	(1)
	8		Terminal 2 on socket SO5	(1)
	9		Terminal 11 on socket SO1	80
Modulator socket SO2	7		Terminal 4 on socket SO3	(1)
	8		Terminal 5 on socket SO3	(1)
	10		Terminal 4 on socket SO5	(1)
	11		Tap on resistor R11	(1)
	12	Switch SW5 closed	Terminal 8 on socket SO3	200
Modulator socket SO3	1		Terminal 1 on socket SO5	(1)
	2		Terminal 6 on socket SO3	250
	3		One side of a-c line at socket SO6	(1)
	7		One side of a-c line at socket SO6	(1)
Modulator socket SO4	7		Terminal 8 of socket SO4	16
	9		Terminal CT of 500-0-500 winding of transformer T1.	2750
	11		Terminal 4 of socket SO5	(1)
	12		Terminal 5 of socket SO3	1.5
Modulator plug PL1	7		Ground or chassis	(1)
	8		Terminal 3 of terminal strip TS1.	(1)
	9		Terminal 4 of terminal strip TS1.	(1)
	11		Terminal 5 of terminal strip TS1.	(1)
Modulator plug PL2	7		Terminal 7 of terminal strip TS1.	(1)
	8		Terminal 8 of terminal strip TS1.	(1)
	10		Terminal 10 of terminal strip TS1.	(1)
	11		Terminal 9 of terminal strip TS1.	(1)
	12		Terminal 11 of terminal strip TS1.	(1)
Modulator plug PL3	1		Terminal 5 of plug PL3	(1)
	3	Switch SW1 at on (up)	Terminal 6 of plug PL3	(1)
	4	Switch SW12 closed	Terminal 6 of terminal strip TS3	(1)
	5		Terminal 7 of plug PL3	(1)
Modulator plug PL4	10		Variable arm of MODULATOR BIAS control R12.	(1)
	11	Switch SW6 at on (up)	Variable arm of FILAMENT VOLTAGE control R18.	(1)
	12	Switch SW3 at on (up)	Variable arm of FILAMENT VOLTAGE control R18.	(1)
Modulator socket SO5	1		Terminal 1 of socket SO3	(1)
	3		Terminal 6 of socket SO3	(1)

(1) Less than .1.

Table XIV. Continuity Test for Cables and Terminal Strips Radio Transmitter BC-610-E—Continued

Measured from	Terminal number	Action or condition	Measured to	Resistance (in ohms)
Modulator socket SO5	6		Terminal 7 of socket SO5	35
	8		Ground or chassis	(1)
Terminal strip TS1	1		Ground or chassis	(1)
	4		Terminal 2 or 3 of socket for tube V12.	(1)
	5		Terminal 2 or 3 of socket for tube V12.	(1)
	7		Terminal ST of transformer T4	(1)
	8		Terminal ST of transformer T4	(1)
	9		Terminal 6 of terminal strip TS2	(1)
	10	Switches SW10, SW13, and SW2 closed.	Terminal 11 of terminal strip TS1.	(1)
Terminal strip TS2	3		Terminal F of socket for tube V16.	(1)
	4		Terminal F of socket for tube V16.	(1)
	5		Grid connection of tube V16	20
	7		Terminal 3 of socket for tube V10 and V11.	4770
	8		Terminal CT of 5-volt, 3-amp winding on transformer T4.	125
	9		Terminal 4 of socket for tube V9	50, 000
	10		Terminal 2 of socket for tube V10 or V11.	(1)
	11		Ungrounded filament terminal of tubes V8, V9, V10 and V11.	(1)
	12		Ground or chassis	(1)
	3		A terminal of meter M3	(1)
	4		Other terminal of meter M3	(1)
	5	Switch SW8 at P. A. GRID	Terminal — of meter M1	(1)
	6		Terminal + of meter M1	(1)
	7	Switch SW8 at INT. AMP. GRID.	Terminal — of meter M1	(1)
	8	Switch SW8 at DOUBLER PLATE.	Terminal + of meter M1	(1)
	9	Switch SW8 at DOUBLER PLATE.	Terminal — of meter M1	(1)
	10	Switch SW8 at INT. AMP. PLATE.	Terminal — of meter M1	(1)
	11		*Hot* lead on lamp socket (LM1)	(1)
	12		Ground or chassis	(1)
Tuning unit sockets SO7, SO8, and SO9.	1	Switch SW11 in Nos. 1, 2, and 3 positions, respectively, for the following checks on SO7, SO8, and SO9.	Terminal 5 of socket for tube V8	(1)
	2		Ground or chassis	(1)
	4		Terminal on capacitor C1 opposite to connection from this capacitor to the cathode of tube V8.	(1)
	7		Terminal 9 of TS2	20
	8		Terminal 3 of socket for tube V9	(1)
	10		Ground or chassis	(1)
	11		Terminal 10 at terminal strip TS2.	20
	12		Plate caps of tubes V10 and V11	

[1] Less than .1.

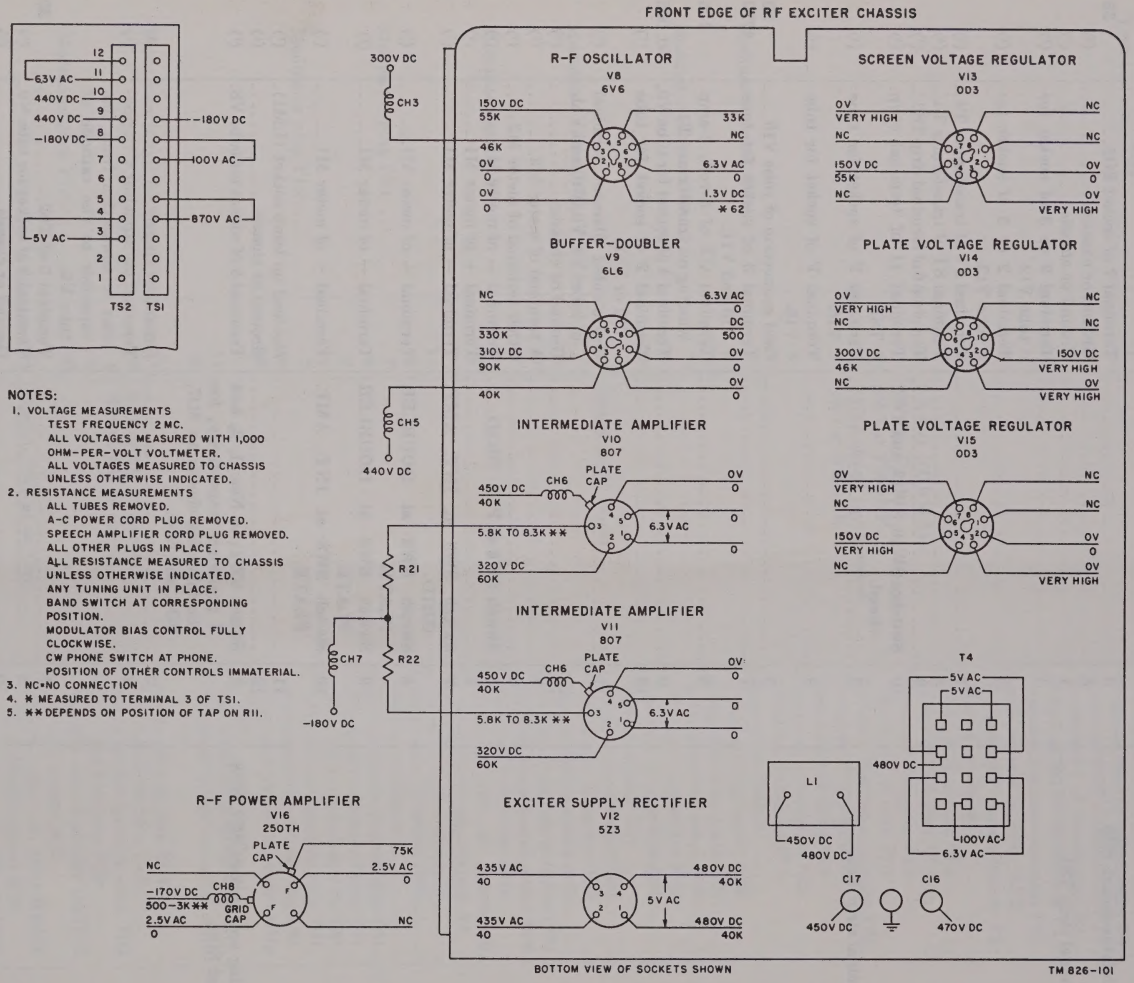


Figure 63. Exciter deck voltages and resistances, E model.

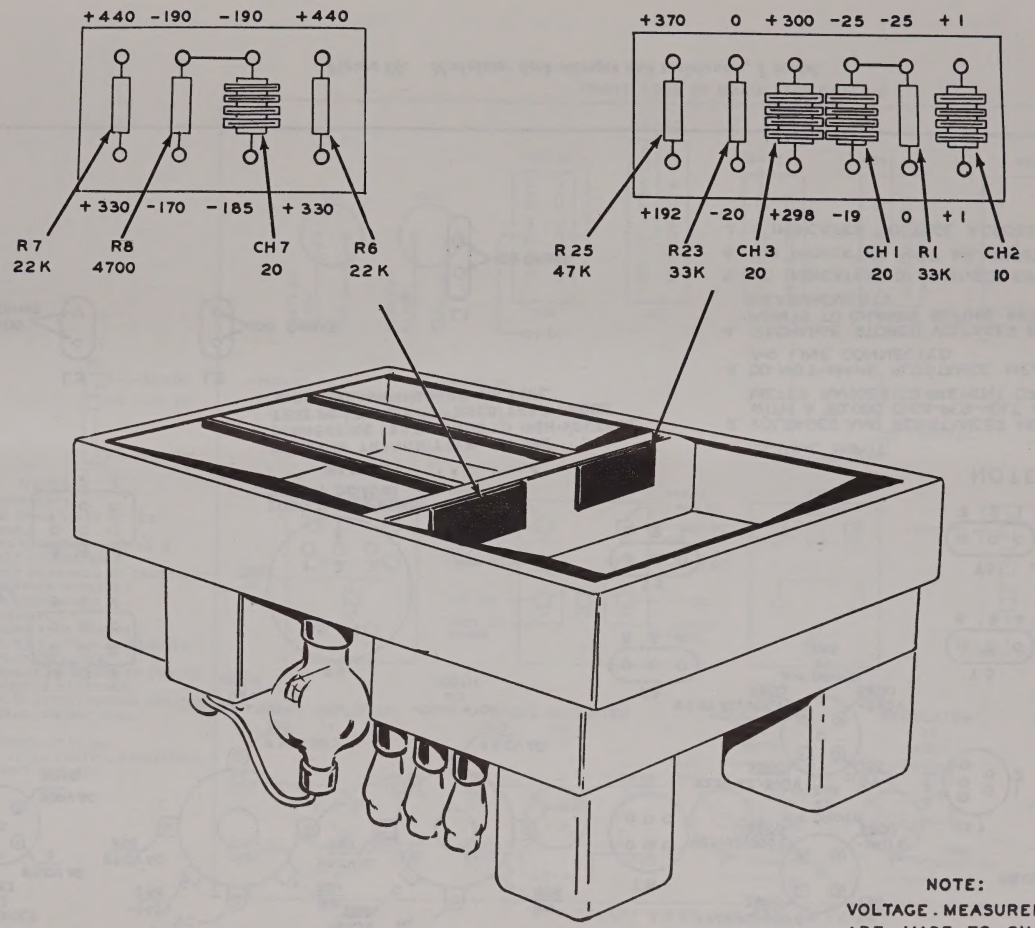


Figure 64. Exciter deck resistor and capacitor board voltages and resistances, I model.

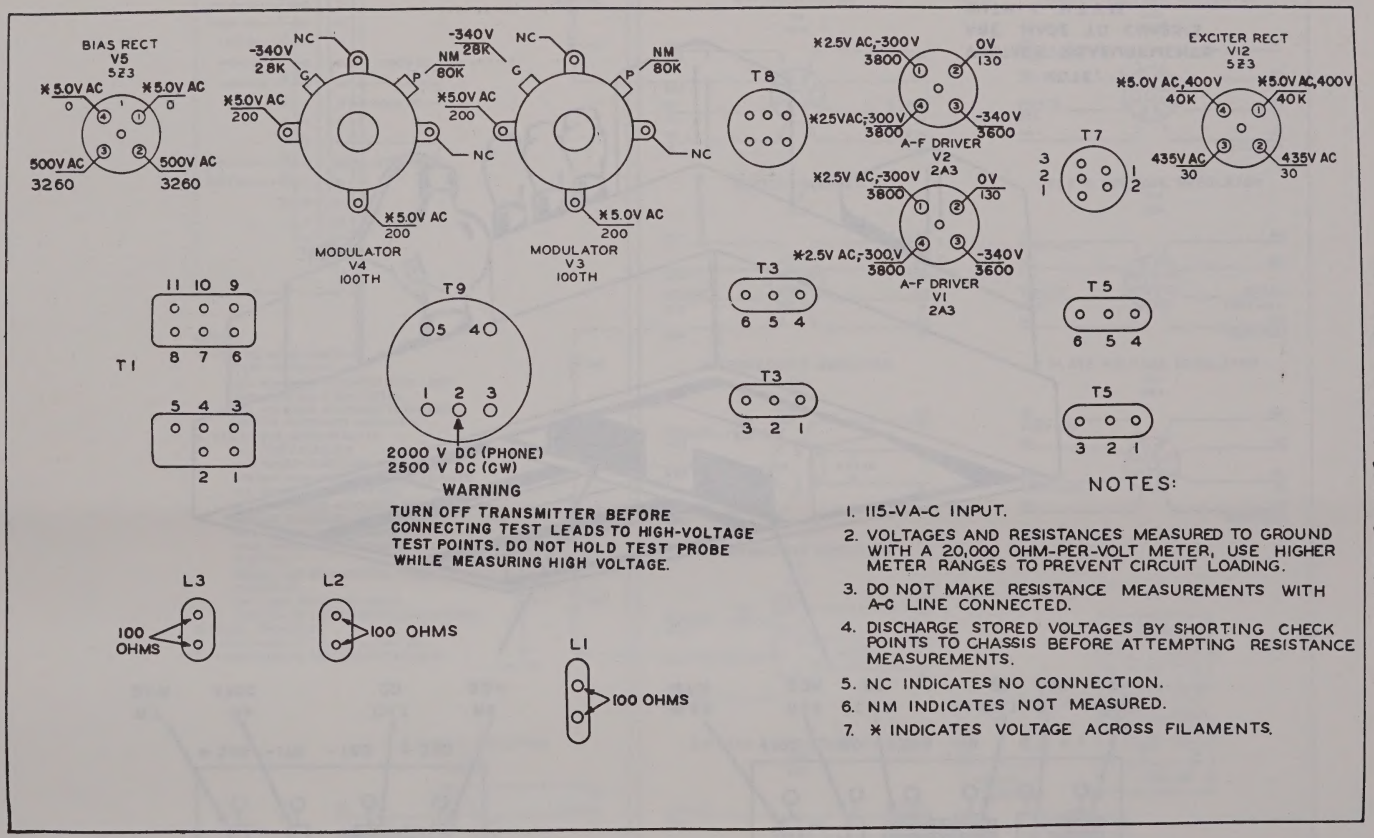
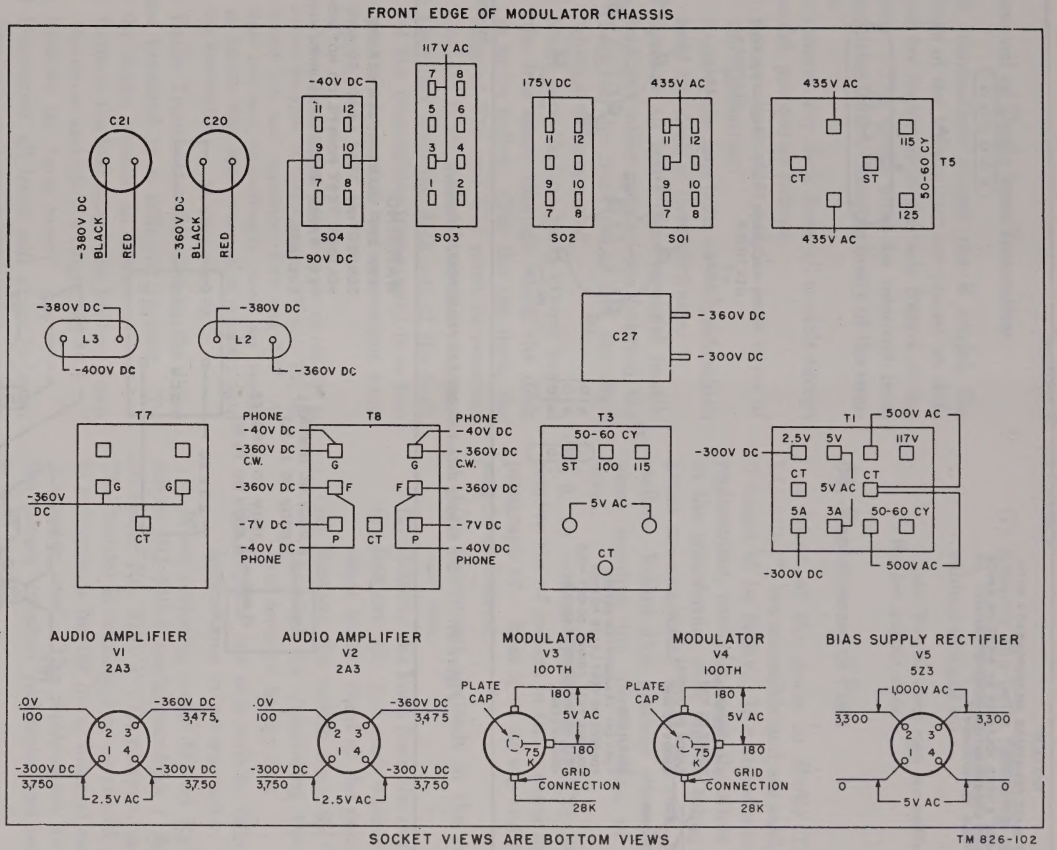


Figure 65. Modulator deck voltages and resistances, I model.



NOTES

1. VOLTAGE MEASUREMENTS
   - LINE VOLTAGE 117-118 VOLTS AC. TEST FREQUENCY 2MC.
   - ALL VOLTAGES MEASURED WITH 1,000 OHM-PER-VOLT VOLTMETER.
   - ALL VOLTAGES MEASURED TO CHASSIS UNLESS OTHERWISE INDICATED.
2. RESISTANCE MEASUREMENTS
   - ALL TUBES REMOVED.
   - A-C POWER CORD PLUG REMOVED.
   - SPEECH AMPLIFIER CORD PLUG REMOVED.
   - ALL OTHER PLUGS IN PLACE.
   - ALL RESISTANCES MEASURED TO CHASSIS UNLESS OTHERWISE SPECIFIED.
   - BAND SWITCH AT CORRESPONDING POSITION.
   - MODULATOR BIAS CONTROL FULLY CLOCKWISE.
   - C.W., PHONE SWITCH AT PHONE.
   - POSITION OF OTHER CONTROLS IMMATERIAL ANY TUNING UNIT IN PLACE.

Figure 66. Modulator deck voltages and resistances, E model.

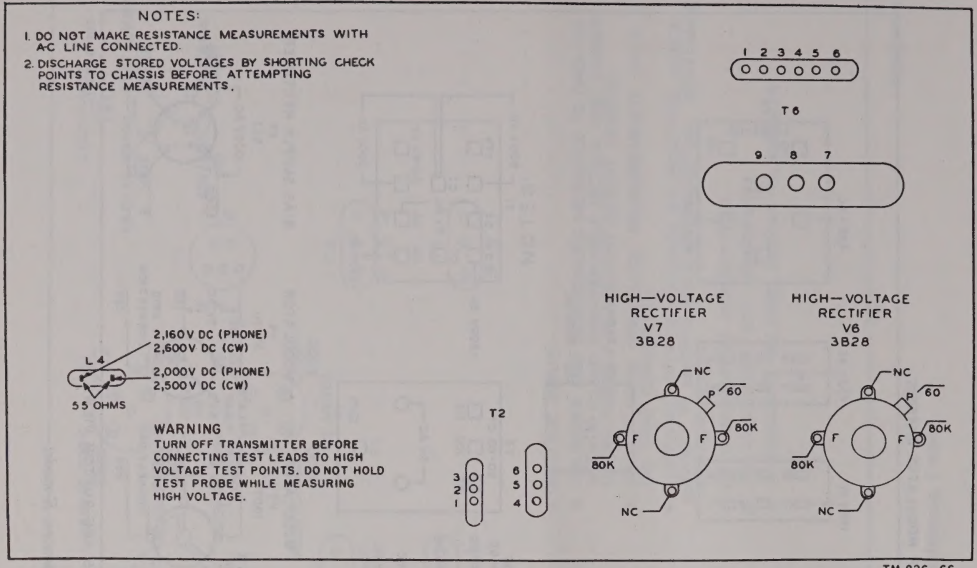


Figure 67. Power supply deck voltages and resistances, I model.

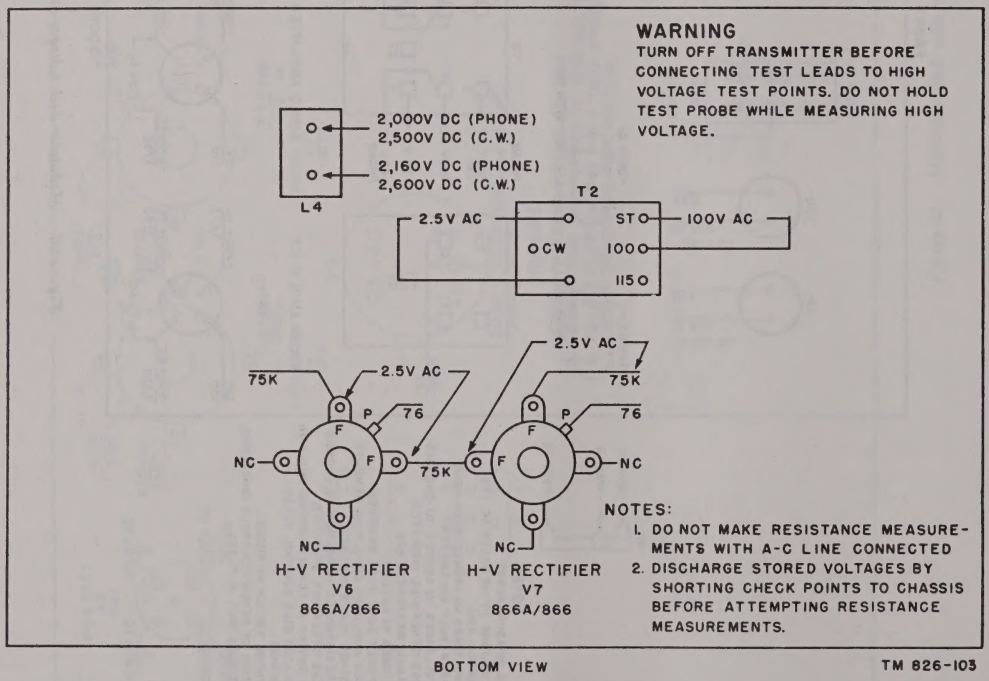


Figure 68. Power supply deck voltages and resistances, E model.

67. Removal of Decks from Transmitter

In all transmitters except the E model, the three decks of the transmitter are placed on slide bases and are mounted in the side frames of the transmitter. The decks must be removed from the transmitter before changing many of the components.

a. To remove any deck from all models except the E model, proceed as follows:

(1) Remove both sides and the back cover of the transmitter.
(2) Remove the four bolts on each side which hold the deck to the side frame.
(3) Remove all leads from terminal boards and any other connections between the back of the front panel and the deck which is to be removed.
(4) Make sure that no parts extend beyond the free space through which the deck is to be pulled. (For the top deck, the caps of V10 and V11 must be removed and the tubes taken out of their sockets.)
(5) Carefully slide the deck out of the back of the transmitter frame until it is free and can be carried to a convenient work space.

Note. The bottom deck (h-v power supply) is heavy because of transformers T6 and T2, inductor L4, and capacitors C19 and C23. At least two men, or preferably three, are needed to handle this deck when it is removed from the transmitter.

b. In Radio Transmitter BC–610–E, the three decks are mounted in a different manner. To remove the decks, proceed as follows:

(1) Remove the four wing bolts holding down the cover and lift it straight up.
(2) Remove the back cover.
(3) Disconnect all leads and plugs between the decks and the control panel.
(4) Remove the screws and nuts that tie the upper lip of the modulator section to the lower lip of the r-f section.
(5) Lift the r-f section from the remaining units.
(6) While two men support the modulator chassis, remove the bolts that fasten the modulator deck to the sides of the cabinet.
(7) Remove the bolts fastening the cabinet to the h-v power supply and lift the cabinet straight up.

Note. Two or three men are needed to handle the h-v supply deck.

68. Replacement of Parts

a. Most of the parts in Radio Transmitter BC–610–(*) are accessible and are easily replaced if found to be faulty. If a transformer requires replacement, carefully mark the wires connected to the transformer with tags or other devices to avoid misconnection when the new part is installed. Follow this practice whenever replacement requires the disconnection of numerous wires.

b. To replace BAND SWITCH SW11, first remove the r-f section in the manner described in paragraph 67. Rest it on its top and remove the switch as follows:

(1) Disconnect all leads to the switch; tag each one.
(2) Remove the knob from the shaft.
(3) Remove the nut and washer from the shaft on the front of the panel.
(4) Remove the switch from the bottom of the deck by unscrewing the five nuts that secure it to the deck.
(5) Replace the new switch, following these instructions in reverse order.

c. When replacing meter M1 on Radio Transmitter BC–610–I (serial numbers 1 through 300 on Order No. 3131–P–51), remove resistor R38. This resistor is connected in series with meter M1 to compensate for the lower internal resistance in the meter used. The replacement meters have the proper internal resistance and resistor R38 is not needed.

69. Removal of Antenna Tuning Unit BC–939–(*)

To remove the antenna tuning unit proceed as follows:

a. Disconnect the antenna and ground leads.

b. Disconnect the coaxial cable leading from the transmitter.

c. Take off the four wingnuts holding the tuning unit to the top of the transmitter.

d. Lift the unit up and forward.

70. Refinishing

Instructions for refinishing badly marred panels on exterior cabinets are given in TM 9–2851. Refer also to paragraph 33.

Section III. ALINEMENT AND ADJUSTMENT PROCEDURES

71. Test Instruments Used for Alinement and Adjustment

a. Multimeter TS–352/U is a portable, sealed, general-purpose instrument consisting of Multimeter ME–9/U and Multiplier Kit MX–815/U, both mounted in one transit case. Two test leads, one 5,000-volt lead, one multiplier patch cord, several test clips, and battery connection links are furnished with the instrument. It is used for circuit analysis and trouble shooting in electrical and electronic equipment. Multiplier Kit MX–815/U is used to extend the range of the instrument to the 5,000-volt d-c range.

b. The other test instruments used are listed in paragraph 60 and described in their respective manuals.

72. Neutralization

a. The radio transmitter has been adjusted for neutralization and normally will not require adjustment in the field, except when the setting of neutralizing capacitor C18 has been changed, or when r-f p-a tube V16 has been replaced.

b. If necessary, readjustment may be made as follows:

(1) Install Transmitter Tuning Unit TU–52 and associated Coil Unit C–390–C.

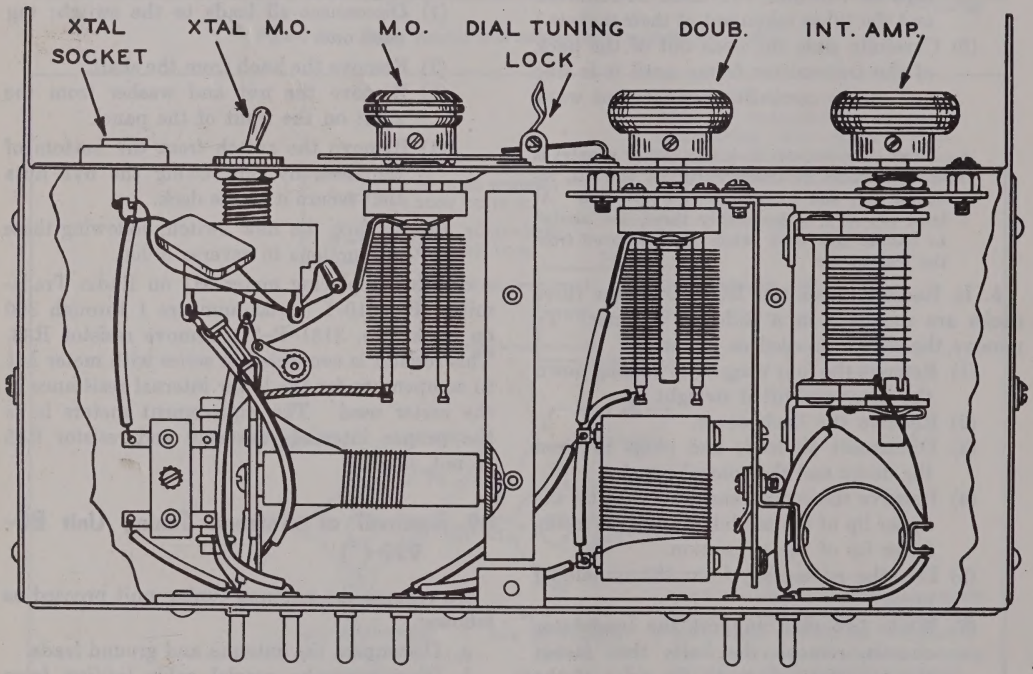


Figure 69. Cross section of representative transmitter tuning unit.

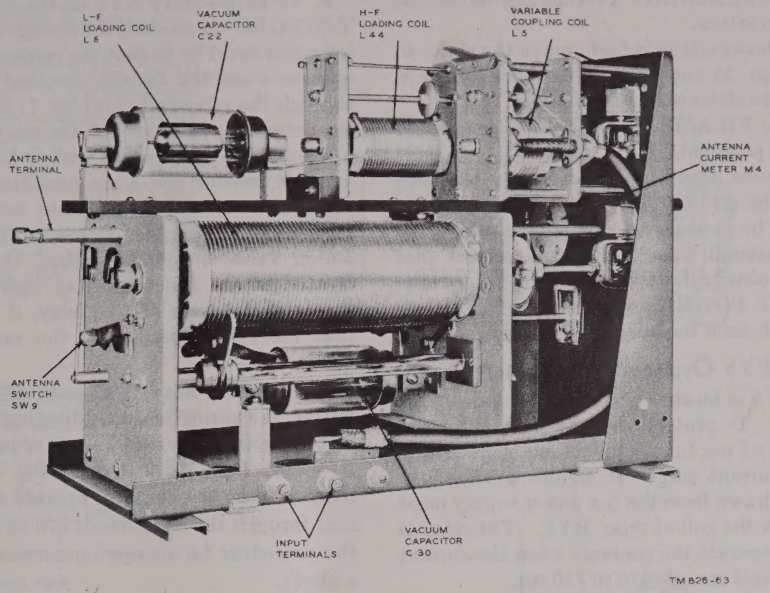


Figure 70. Antenna Tuning Unit BC–939–(*), interior view.

(2) Disconnect the two leads of the coaxial cable from the transmitter output terminals.

(3) Set the FILAMENT POWER switch to the on (up) position.

(4) Set the PLATE POWER switch on the transmitter to off (down) position. In this operation h-v plate power is not applied.

(5) Set the EXCITATION METER switch at P. A. GRID.

(6) Set the EXCITER PLATE POWER switch to the on (up) position.

(7) Adjust the controls of the tuning unit to resonance at some frequency near the h-f end of the range.

(8) Turn the PLATE TUNING wheel slowly to obtain a resonance indication. If neutralization is faulty, resonance will be indicated by a sharp dip in the reading of the P. A. GRID current reading.

(9) Adjust neutralizing capacitor C18 little by little, checking after each adjustment, until only a slight dip in the reading of the GRID CURRENT meter occurs at resonance. When properly neutralized, this dip will not exceed 3 ma.

73. R-F Bias Adjustment (R11)

Caution: Always set the FILAMENT POWER switch to the off (down) position before making slider adjustments on R11. This is a necessary precaution to prevent being shocked by the bias power supply. This adjustment determines the value of the bias voltage at the grid of r-f p-a tube V16 and at the grids of ipa tubes V10 and V11. Resistor R11 is located on the bottom of the modulator deck (top of modulator deck on E model) and is fitted with a slider adjustment which varies the position of the tap. By moving the tap to the proper position, the correct bias may be obtained at the grids of V10, V11, and V16. The slider on R11 is adjusted for 110 volts, plus or minus 5 percent, between the grid of V16 and ground. To make this adjustment, follow the procedure below:

a. Place the PLATE POWER switch to the off (down) position and the EXCITER PLATE POWER switch at NORMAL.

b. Connect a voltmeter between the grid of V16 and ground (chassis).

c. Set the FILAMENT POWER switch to the on (up) position.

d. Read the voltmeter to determine whether the present bias voltage is above or below the desired 110 volts, plus or minus 5 percent value.

e. Set the FILAMENT POWER switch to the off (down) position.

f. If the bias voltage is high, move the slider to the right (figs. 51 and 56). If the bias voltage is low, move the slider on R11 to the left.

g. Set the FILAMENT VOLTAGE switch to the on (up) position.

h. Determine again, as in *c* above, the bias voltage at the grid of V16.

i. It may be necessary to change the position of the slider several times before the correct bias voltage is obtained. Be certain to place the FILAMENT POWER switch to the off (down) position each time the slider is adjusted.

74. Relay RY5 Overload Adjustment

Relay RY5 is located on the lower deck of the transmitter. It protects h-v rectifier tubes V6 and V7 and r-f p-a tube V16 from damage caused by heavy current surges or serious overloading. All current drawn from the h-v power supply must pass through the coil of relay RY5. The relay is designed to operate the contacts when the current through the coil exceeds 670 to 710 ma.

a. To adjust relay RY5 on the F, G, H, I, and T–213/GRC–26 models, the spring-tension adjusting screw must be so that the contacts of the relay operate when the current specified above passes through the relay coil (A of fig. 71). To measure the current flowing through the relay coil, connect a 6-volt battery in series with a 5-ohm, 10-watt variable resistor and a d-c ammeter (0 to 1 ampere) between the ungrounded terminal of the relay coil and ground. Decrease the value of the 5-ohm variable resistor, noting the current indicated at the time the relay operates. Adjust the spring tension of the relay, if necessary, so that the relay operates in the range indicated above.

b. To adjust relay RY5 in the E model transmitter, the spring-tension adjusting bracket must be bent, either way, with a pair of long-nose pliers (B of fig. 71). Adjust the spring tension of the relay so that the contacts operate when the current through the coil exceeds 670 to 710 ma. Use the procedure for measuring current described in *a* above.

Section IV. FINAL TESTING

75. General

This section is intended as a guide to be used in determining the quality of a repaired radio transmitter. The tests outlined in paragraph 77 below may be performed by maintenance personnel with adequate test equipment and the necessary skills. Repaired equipment meeting these requirements listed will furnish uniformly satisfactory operation.

76. Test Equipment Required for Final Testing

The instruments needed for testing the repaired transmitter are listed below:

a. R-F Ammeter. This meter should be of the thermocouple type with a range of 0 to 2.5 amperes. It is used to measure the power output.

b. Oscilloscope. Cathode-ray Oscilloscope OS–8/U or BC–1060–(*) may be used to measure the percentage modulation of the transmitter.

c. Audio Signal Generator. This generator must be capable of producing a 400-cycle output of .30 volt.

d. Dummy Antenna. The dummy antenna consists of a series-connected 146-ohm, 400-watt resistor and a 50-$\mu\mu$f capacitor with a working voltage of 7,500 to 10,000 volts dc.

e. A-C Electronic Voltmeter. This equipment is used to measure the audio input voltage from the audio signal generator.

f. Key. A key is needed to key the transmitter during the c-w power output test.

g. Speech Amplifier BC–614–(*). The speech amplifier is used in the modulation tests of the transmitter.

77. Power Output and Modulation Tests

a. General. After the repairs in the transmitter have been completed, make a final test to ascertain that the unit is in proper condition for tactical use. Although the transmitter may be adjusted correctly during the repair procedure, make a recheck of the neutralization, and then proceed to final testing of the power output and modulation.

b. Preparation for Testing. To measure the power output and modulation capabilities of the transmitter, connect the test circuits as shown in figure 72. Proceed as follows:

(1) Disconnect the coaxial cable which is between the transmitter and Antenna Tuning Unit BC–939–(*).

(2) Connect the dummy antenna to the transmitter r-f output terminals with the r-f test ammeter in series with one lead.

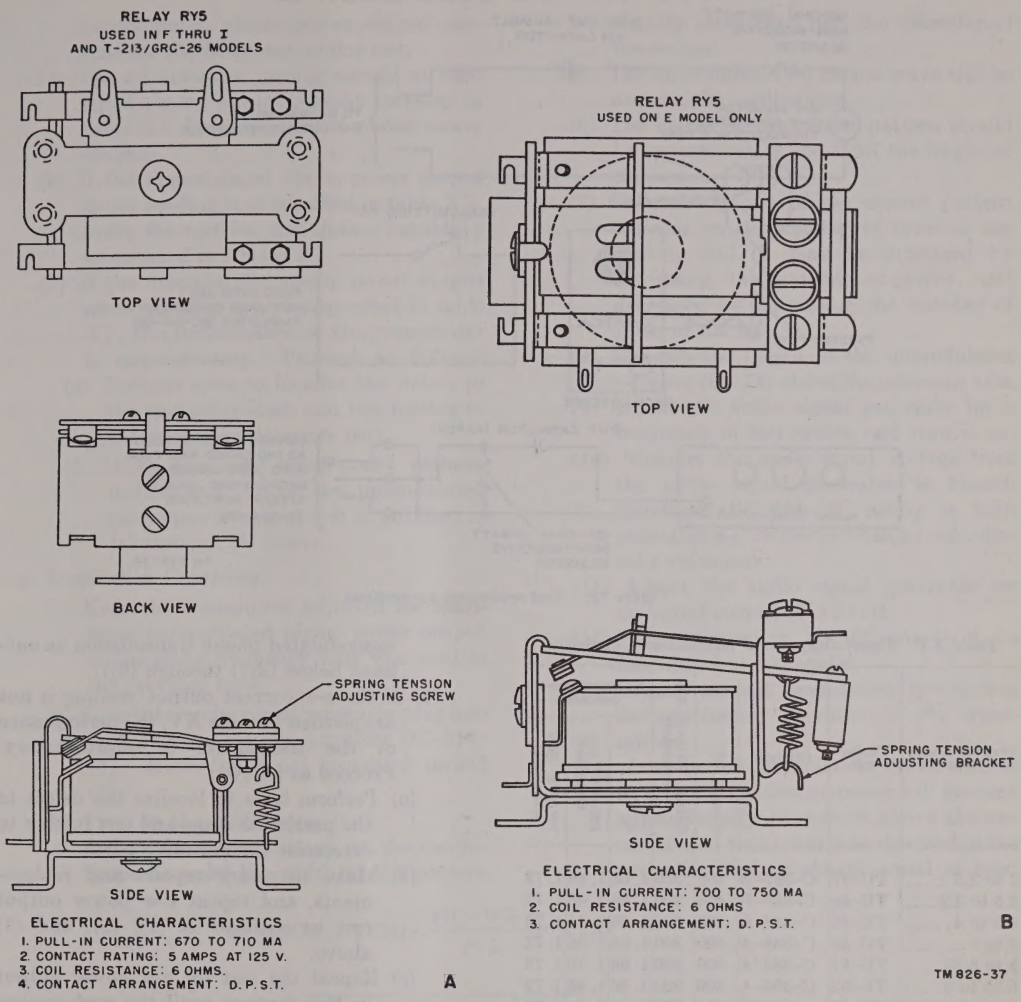


Figure 71. Overload relay RY5.

(3) Couple the transmitter output to the vertical deflection plates of the oscilloscope by means of a pick-up coil. This is done by winding 2 to 4 turns of insulated wire (No. 14 gage, soft-drawn copper) over a winding space of 3 inches around one of the r-f leads which connects the dummy antenna to the transmitter output post. Connect the ends of the coil to the oscilloscope by means of a twisted-pair line.

(4) Connect the transmitter to a 5-kw, single-phase, 60-cycle, 115-volt power source.

(5) Connect to the transmitter a Speech Amplifier BC–614–(*) which is known to be in good operating condition.

c. Power Output Test for C-W Transmission.

(1) With a transmitter key, such as Key J–37, plugged into jack J101 on Speech Amplifier BC–614–(*), adjust the transmitter for maximum c-w power output (key down); test at the middle of the 2- to 2.5-mc frequency band in accordance with table XV.

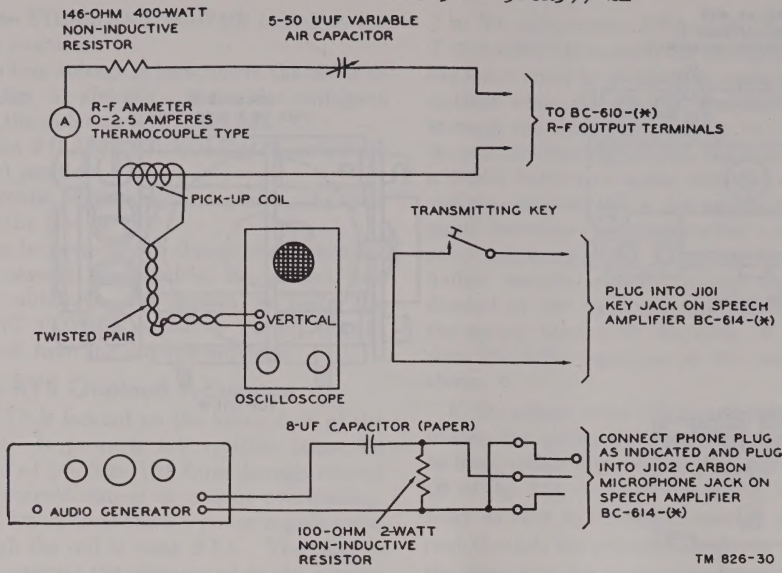


Figure 72. Test equipment connections.

Table XV. Power Output and Modulation Capability

Frequency range (mc)	Tuning unit	Coil unit	Power C. W.	Output, PHONE, (unmodulated)	R-f output current (amperes)		
					C. W.	PHONE (unmodulated)	PHONE (90% modulated)
2 to 2.5	TU–47	C–387–B	400	300	1. 66	1. 46	1. 72
2.5 to 3.2	TU–48	C–387–B	400	300	1. 66	1. 46	1. 72
3.2 to 4	TU–49	C–387–B	400	300	1. 66	1. 46	1. 72
4 to 5	TU–50	C–388–A	400	300	1. 66	1. 46	1. 72
5 to 6.35	TU–51	C–389–A	400	300	1. 66	1. 46	1. 72
6.35 to 8	TU–52	C–390–A	400	300	1. 66	1. 46	1. 72
8 to 12	TU–53	C–447	300	250	1. 46	1. 3	1. 53
12 to 14	TU–54	C–448	275	200	1. 37	1. 17	1. 38
14 to 18	TU–54	C–449	275	200	1. 37	1. 17	1. 38

(2) Maximum c-w power output for the frequency under test is obtained when a maximum reading is indicated on the external r-f ammeter. When a 146-ohm dummy antenna is used, the required power outputs are obtained when the r-f output currents are as specified in table XV.

(3) If the c-w r-f current output is as specified in table XV, make power output test for unmodulated phone transmission as outlined below (*d*(1) through (6)).

(4) If the c-w current output reading is not as specified in table XV, the performance of the transmitter is unsatisfactory. Proceed as follows:

(*a*) Perform tests to localize the defect to the particular stage and test further to determine the defective part.

(*b*) Make necessary repairs and replacements, and repeat c-w power output test as outlined in (1), (2), and (3) above.

(*c*) Repeat the test for c-w power output in this manner until the performance of the transmitter is satisfactory.

d. Power Output Test for Unmodulated Phone Transmission.

(1) Remove transmitter Key J–37 from jack J101 on Speech Amplifier BC–614–(*).

(2) Change transmitter operation from C–W to PHONE transmission (par. 22).

(3) Adjust the transmitter for maximum unmodulated phone power output at the same frequency that was used in the c-w power output test.

(4) The maximum reading on the external r-f ammeter will indicate the maximum

unmodulated phone power output current for the frequency under test.

(5) The r-f ammeter reading should at least equal the r-f output current specified in table XV for unmodulated phone power output.

(6) If the unmodulated phone power output meter reading is as specified in table XV, make the test for modulation capability as outlined in *e* below.

(7) If the unmodulated phone power output meter reading is *not* as specified in table XV, the performance of the transmitter is unsatisfactory. Proceed as follows:

(*a*) Perform tests to localize the defect to the particular stage and test further to determine the defective part.

(*b*) Make necessary repairs and replacements, and repeat the unmodulated phone power output test as outlined in (1) through (6) above.

e. Modulation Capability.

(1) Keep the transmitter adjusted for maximum unmodulated phone power output at the same frequency that was used in the previous tests.

(2) Insert the audio signal generator plug into jack J102 on Speech Amplifier BC–614–(*). Have the signal generator turned off.

(3) Turn on the oscilloscope.

(4) Adjust the sweep voltage on the oscilloscope to make the width of the pattern slightly more than half the diameter of the screen.

(5) The unmodulated r-f carrier wave will be seen on the oscilloscope.

(6) The height of the carrier pattern should be approximately one-third the height of the screen.

(7) Since the height of the carrier pattern depends on the number of turns in the pick-up coil, it may be increased by increasing the number of turns, and decreased by decreasing the number of turns of the coil.

(8) Measure the height of the unmodulated r-f wave (fig. 73) above the reference axis.

(9) Adjust the audio signal generator for a frequency of 400 cycles, and turn it on.

(10) Measure the audio input voltage from the audio signal generator to Speech Amplifier BC–614–(*), using a high resistance a-c voltmeter or an a-c vacuum-tube voltmeter.

(11) Adjust the audio signal generator for an initial output of .15 volt.

(12) The transmitter output now will be modulated at 400 cycles.

(13) Ninety-percent modulation is required for satisfactory operation of the transmitter.

(14) At 90-percent modulation, the r-f current in the external test ammeter will increase approximately 18 percent above the unmodulated value that was obtained in the preceding test; it should equal at least

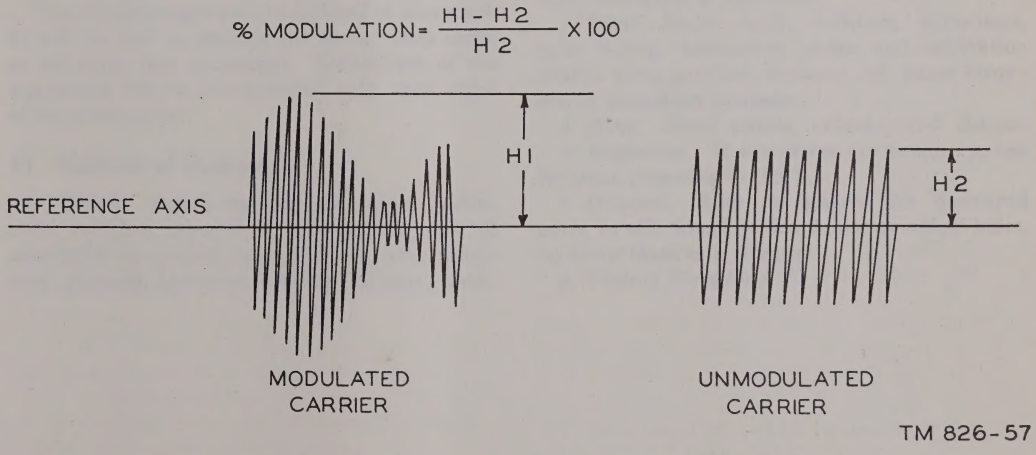


Figure 73. Oscilloscope pattern for modulation percentage test.

the r-f output current specified in table XV for modulated phone power output.

(15) If the value specified in table XV is not obtained with .15-volt output from the audio signal generator, increase the output of the audio signal generator up to .30 volt, and set the speech amplifier control near maximum to obtain the specified value.

(16) Observe the modulated wave on the oscilloscope screen to make certain that the sine-wave pattern remains undistorted.

(17) The maximum height of the modulated wave (H1, fig. 73) as seen on the oscilloscope should be 1.9 times as great as the height (H2) of the unmodulated wave. This indicates a modulation of 90 percent.

(18) If the modulated phone power output reading equals that specified in table XV, and if, with an audio signal generator output of .30 volt, wave height H1 is 1.9 times as high as wave height H2, without distortion, then the performance of the transmitter is satisfactory.

(19) If it has been impossible to meet the foregoing requirements of this test, the performance of the transmitter is unsatisfactory. Proceed as follows:

(*a*) Perform tests to localize the defect to the particular stage, and test further to determine the defective part.

(*b*) Make the necessary repairs and replacements, and repeat the test for modulation capability as outlined in (1) through (16) above.

f. Tests for All Bands. The foregoing tests present a procedure for testing the c-w power output, the unmodulated phone power output, and the modulation capability in the frequency band 2 to 2.5 mc. Perform these three tests as outlined above on all of the other bands specified in table XV, testing each band in the order listed.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

78. Disassembly

The preparation of Radio Transmitter BC–610–(*) for transportation and storage depends upon the installation. When the transmitter is used in a small installation with little or no auxiliary equipment, disconnect Antenna Tuning Unit BC–939–(*), cords, and antenna lead-in. When the transmitter is used in a system, reference should be made to the systems manual which applies to the specific installation.

79. Repacking for Shipment or Limited Storage

a. The exact procedure in repacking for shipment or limited storage depends on the material available and the conditions under which the equipment is to be shipped or stored. Refer to the instructions in paragraph 6.

b. Whenever practicable, place a dehydrating agent such as silica gel inside the chests. Protect the transmitter with a waterproof paper barrier. Seal the seams of the paper barrier with waterproof sealing compound or tape. Pack the protected transmitter in a padded wooden case, providing at least 3 inches of excelsior padding or some similar material between the paper barrier and the packing case.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

80. General

The demolition procedures outlined in paragraph 81 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon order of the commander.

81. Methods of Destruction

a. Smash. Smash the crystals, meters, tubes, coils, switches, capacitors, transformers, and all associated equipment, using sledges, axes, handaxes, pickaxes, hammers, crowbars, or heavy tools.

b. Cut. Cut cords, headsets, and wiring, using axes, handaxes, or machetes.

c. Burn. Burn cords, resistors, capacitors, coils, wiring, instruction books, and calibration charts, using gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend panels, cabinet, and chassis.

e. Explosives. If explosives are necessary, use firearms, grenades, or TNT.

f. Disposal. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them into streams.

g. Destroy Everything.

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310–20–3, SR 310–20–4, and SR 310–20–5. Check Department of the Army Supply Catalog SIG 1 for Signal Corps Supply Catalog pamphlets.

1. Army Regulations

AR 380–5	Military Security (Safeguarding Military Information).
AR 750–5	Maintenance of Supplies and Equipment (Maintenance Responsibilities and Shop Operation).

2. Supply Bulletins

SB 11–6	Dry Battery Supply Data.
SB 11–47	Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11–76	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Auxiliary Equipment and Test Equipment

NAVSHIPS 91, 254.	Instruction Book for Tube Tester TV–3/U.
NAVSHIPS 91, 272	Oscilloscope OS–8/U.
TM 11–257	Frequency Shift Exciters O–39/TRA–7, O–39A-TRA–7, O–39B/TRA–7, and O–39C/TRA–7.
TM 11–262	Control Units C–292/TRA–7, C–292A/TRA–7, and C–292B/TRA–7.
TM 11–264	Radio Set AN/GRC–26.
TM 11–281	Radio Sets SCR–399–A and SCR–499–A.
TM 11–300	Frequency Meter Sets SCR–211–A, B, C, D, E, F, J, K, L. M, N, O, P, Q, R, T, AA, AC, AE, AF, AG. AH, AJ, AK, AL.
TM 11–303	Test Sets I–56–C, I–56–D, I–56–H, and I–56–J.
TM 11–321	Test Set I–56–E.
TM 11–472	Repair and Calibration of Electrical Measuring Instruments.
TM 11–624	Radio Set AN/MRC–2 and –2A.
TM 11–2205	Exciter Units O–5/FR and O–5A/FR and RF Oscillator O–86/FRT.
TM 11–2524	Oscillators I–151–A and I–151–E.
TM 11–2526	Oscilloscope BC–1060–A.
TM 11–2613	Voltohmmeter I–166.
TM 11–2624B	Voltohmmeters, TS–294/U, TS–294B/U, and TS–294C/U.
TM 11–2626	Test Unit I–176, I–176–A, and I–176–B.
TM 11–2627	Tube Tester I–177 and I–177–A.
TM 11–2684A	Audio Oscillator TS–382A/U.
TM 11–4700	Electrical Indicating Instruments, and Test Sets, Repair Instructions.
TM 11–5511	Electron Multimeter TS–505/U.
TM 11–5527	Multimeter TS–352/U.

4. Painting, Preserving, and Lubrication

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.
TM 9–2851	Painting Instructions for Field Use.

5. Camouflage, Decontamination, and Demolition

FM 5–20	Camouflage, Basic Principles.
FM 5–25	Explosives and Demolitions.
TM 3–220	Decontamination.

6. Other Publications

FM 24–18	Field Radio Techniques.
FM 72–20	Jungle Warfare.
SR 310–20–3	Index of Training Publications.
SR 310–20–4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment.
SR 700–45–5	Unsatisfactory Equipment Report (Reports Control Symbol CSGLD–247).
SR 745–45–5 AFR 71–4	Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD–66 (Army) and AF–MC–U2 (Air Force)).
TB SIG 4	Methods for Improving the Effectiveness of Jungle Radio Communication.
MWO SIG 11–281–9	Modification of Radio Sets SCR–399–A and SCR–499–A: To prevent entrance of Dust, Insects, and Other Foreign Matter into Radio Transmitter BC–610–E and Tuning Unit BC–939–A.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.
TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.
TB SIG 223	Field Expedients for Wire and Radio.
TB 11–499–( )*	Basic Radio Propagation Predictions.
TM 11–314	Antennas and Antenna Systems.
TM 11–415	Dry Batteries.
TM 11–453	Shop Work.
TM 11–455	Radio Fundamentals.
TM 11–466	Radar Electronic Fundamentals.
TM 11–483	Suppression of Radio Noises.
TM 11–486	Electrical Communication Systems Engineering.
TM 11–496	Training Text and Applicatory Exercises for Amplitude-Modulated Radio Sets.
TM 11–499	Radio Propagation Handbook.
TM 11–661	Electrical Fundamentals (Direct Current).
TM 11–681	Electrical Fundamentals (Alternating Current).
TM 11–4000	Trouble Shooting and Repair of Radio Equipment.
TM 11–850	Radio Receivers BC–312–A, –C, –D, –E, –F, –G, –J, –L, –M, –N, –HX and –NX, BC–342–A, –C, –D, –F, –J, –L, –M, and –N, and BC–314–C, –D, –E, –F, and –G, and BC–344, and –D.
TM 11–904	Power Units PE–95–A, –B, –C, –F, –G, and –H.

* A new TB in this series is issued monthly which gives propagation predictions 3 months in advance.

7. Abbreviations

AGO	Adjutant General's Office
a-c	alternating-current
amp	ampere
a-m	amplitude-modulation
app	appendix
AR	Army Regulations
a-f	audio-frequency
c-w	continuous-wave
xtal	crystal
cps	cycles per second
d-c	direct-current
DPDT	double-pole, double-throw
DPST	double-pole, single-throw
FS	frequency shift
h-v	high-voltage
JAN	Joint Army-Navy
kw	kilowatt
meg	million ohms
mtg	mounting
pri	primary
RTT	radioteletype
sec	secondary
SPDT	single-pole, double-throw
SPST	single-pole, single-throw
sw	switch
TT	teletypewriter
transf	transformer
VTVM	vacuum-tube voltmeter
v	volt

APPENDIX II
IDENTIFICATION TABLE OF PARTS

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis such as T/O&E, T/A, SIG 7 & 8, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalogs applicable to the equipment covered in this manual are SIG 7 & 8–BC–610, SIG 7 & 8 AN/GRC–26 (for the T–213/GRC–26), SIG 7 & 8 BC–939, and SIG 7, 8 & 10 MC–509. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1.

1. Identification Table of Parts for Antenna Tuning Units BC–939–A and BC–939–B

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TUNING UNIT, RF: Sig C Antenna Tuning units BC–939–A, and –B; incl var loading coil, coupling coil, 0 to 15 amp r-f meter, vacuum capacitor; steel, painted black; matches output of Radio Transmitter BC–610–( ) to 15 ft whip or lg wire ant. over freq range of 2 to 18 mc; 11¼'' lg x 23½'' d x 14½'' h; has 4 holes to clear ¼'' —20 bolts on 10½'' x 16⅜'' ctr for mtg on top of Radio Transmitter BC–610–( ).	Couples transmitter output to whip or long wire antenna.	2C527–939
C22	CAPACITOR, fixed: vacuum dielectric; 12 $\mu\mu$f ± 1 $\mu\mu$f; 20,000 v ac peak; 28 amp max.	H-f antenna tuning capacitor	3D9012–11
C30	CAPACITOR, fixed: vacuum dielectric; sect. 55 $\mu\mu$f — 5 $\mu\mu$f + 2 $\mu\mu$f ;32,000 v peak; 28 amp max; 2 metal ferrule term. on ends.	Long wire antenna tuning capacitor.	3D423
	CLIP, electrical: fuse; ¾'' jaw opening; Penn Union type #31–60; B&W part #M58.	Clip for vacuum capacitors	3Z1026–1
L5	COIL, RF: single wdg 5¼ turns of #12 tinned copper wire; 2⅛'' max dia x 4½'' lg incl shafts; 2'' OD x 1 11/16'' lg; B&W part/dwg #X114.	Couples transmitter to antenna tuning unit.	3C302B–3
L44	COIL, RF: single wdg 24 turns #12 tinned copper wire; 2⅛'' max dia x 6⅝'' lg incl shafts; B&W part/dwg #X113.	H-f loading coil	3C302B–4
L6	COIL, RF: single wdg 61 turns #10 tinned copper wire; 3½'' max dia x 13¼'' lg incl shafts; B&W part/dwg #X112.	L-f and long wire loading coil	3C302B–2
	COLLAR, shaft: coil, rear; brass, nickel pl; B&W part/dwg M–121.	Holds rear end of h-f coil in place.	2Z2935–19
	COLLAR, shaft: coil, rear; brass, nickel pl; B&W part/dwg M–8.	Holds rear end of l-f coil in place.	2Z2935–1
	CONTACT, coil: sliding; brass, silver pl; wheel cont w/"V" groove; B&W part/dwg #M103.	Sliding contact on coupling and h-f coils.	2ZA1350–3

1. Identification Table of Parts for Antenna Tuning Units BC–939–A and BC–939–B—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	CONTACT, electrical: contains 2 points 7/8" wd on 1.665" rad; Hallicrafters part/dwg #18A074.	Switch contact for shorting unused turns of l-f rotary coil.	2Z3194–9
	COUNTER, mechanical: direct drive; die cast aluminum; 1 23/64" x 2 7/32" x 1 5/32" o/a w/shaft extension 7/8"; 2 digits counter-clockwise rotation; two #6–32 tapped mtg holes on 1 1/8" ctr; top row to record ea single revolution and bottom row to record ea 1/10 revolution; Veeder-Root part #CB114134; B&W part #M36–1.	Counter meter for coupling coil.	2Z3263–2
	COUNTER, mechanical: direct drive; die cast aluminum; 1 23/64" x 2 7/32" x 1 5/32" o/a, shaft extends 7/8"; 3 digits; clockwise rotation; two #6–32 tapped mtg holes on 1 1/8" ctr; 2 top rows record ea revolution and bottom row records 1/10 revolution; Veeder-Root part #R114144; B&W part #M36.	Counter meter for l-f and h-f coils.	2Z3263–1
	COUPLING, flexible: phosphor bronze springs, nickel pl, ceramic ins, 1/4" ID x 2 1/8" lg x 2 3/4" OD; four #8–32 setscrews, 2 on ea end; Cardwell type C; B&W part #M–26.	Couplings for l-f coil and switch shaft.	3G1350–53
	COUPLING, rigid: split flanged type, ins; fits 1/4" dia shaft ea end; two #8–32 set-screws ea end; 1 3/8" dia x 7/8" lg; brass, nickel pl; Cardwell #FNF; B&W #M57–1.	For coupling coil shaft	3G1350–56
	COUPLING, rigid: split flanged type, ins; fits 1/4" dia shaft ea end; two #8–32 set-screws ea end; 1 3/8" dia x 1 3/8" lg; brass, nickel pl; Cardwell type #ENF; B&W part #M57.	For h-f coil shaft	2Z3300–2
	COVER: steel, copper pl; black finish; 21 1/4" lg x 9 3/32" wd x 13 15/16" h; Halli-crafters part/dwg #66D120.	Dust and protective cover for antenna tuning unit (B model only).	2Z3351–260
	CRANK ASSEMBLY, hand: h-f antenna tuning 1/4" dia shaft w/arm and black bakelite handle; steel, nickel finish, black bakelite handle; 6" lg o/a incl handle, crank offset 1 1/2"; inserts through bearing hole; B&W part/dwg #X111.	Tuning crank for h-f coil	2Z3407.15
	CRANK ASSEMBLY, hand: i-f antenna tuning 1/4" dia shaft w/arm and black bakelite handle; steel, nickel finish, black bakelite handle; 6 1/2" lg o/a incl handle, crank offset 2 1/4"; inserts through bearing hole; B&W part/dwg #X110.	Tuning crank for l-f coil	2Z3407.14
	HANDLE, crank: 1/2" OD x 1 1/2" lg x 1/4" ID; mts w/special screw thru ID (screw not incl); B&W part/dwg #M30.	Handle for tuning crank assemblies of l-f and h-f coils.	2Z4926.10
	INSULATOR, feedthru: conical round-shank shape; white steatite, glazed; 5/8" lg; 5/8" OD x .156" ID; JAN type NS4W4102.	Part of input terminals (male part).	3G3541–02
	INSULATOR, feedthru: round ctb; white steatite, glazed; 3/8" lg; 5/8" OD x 3/8" ID, 1/4" d; JAN type NS4W4202.	Part of input terminals (female part).	3G3542–02.2

1. Identification Table of Parts for Antenna Tuning Units BC-939-A and BC-939-B—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	INSULATOR, plate: rectangular flat type; white ceramic, glazed; 4⅞" lg x 5/16" thk; two 5/16" dia mtg holes on 4¼" mtg/c.	Insulation support for h-f and coupling coils.	3G1150-78
	INSULATOR, plate: rectangular flat type; white ceramic, glazed; 8¼" lg; 7¾" wd x ½" thk; two ½" dia mtg holes on 5¾" mtg/c.	Insulation support for l-f coil.	3G1150-132
	INSULATOR, stand-off: electrical; Pyrex, clear; 10½" lg, ⅝" dia.	Slider rod mounting shorting switch contact for l-f rotary coil.	3G1816-74A021
	INSULATOR, stand-off: cyl pillar shape; white ceramic, glazed; 2" lg; 1" dia; one ¼"-20 thd tapped mtg hole ea end; JAN type NS4WO416.	Insulator for mounting end of vacuum capacitor in l-f coil circuit.	3G3504-16.1
	INSULATOR, stand-off: pillar shape; white ceramic, glazed; 1" lg; ¾" sq; one #10-32 tapped mtg hole ea end; JAN type NS4W1208.	Insulator for mounting vacuum capacitor in h-f circuit.	3G3512-08.1
	KNOB: round, fluted; black phenolic; for ¼" dia shaft; two #10-32 setscrews; 1⅝" dia x ¾" thk; brass insert; ⅝" d shaft hole; Kurz-Kasch #S-309-64BB, w/o pointer.	Coupling coil adjustment knob.	2Z5822-88
	KNOB: round, fluted; black phenolic; for ¼" dia shaft; two #10-32 setscrews; 1⅝" x ¾" thk; brass insert; ⅝" d shaft hole; vinylite pointer attached; Kurz-Kasch #S-309-64BB-40263-519.	Antenna range switch SW9 knob.	2Z5788-63
M4	METER, ammeter: RF; 0 to 15 amp; JAN type MR34WO15RFAA; spec JAN-1-6 w/amend #1.	Antenna current meter	3F1015-27
	POST, binding: screw type; ½" dia x 15/16" lg, #8-32 stud x ½" lg; brass, nickel pl.	Antenna and grounding unit case and cover connection (B model only).	3Z737-4.4
	POST, binding: screw type, No. 10-32 thd	Antenna and grounding unit case and cover connection (A model only).	3Z737-16
	SHAFT: glass bonded mica; ⅜" sq x 8 19/64" lg; 2 holes .150" dia, ¼" from ea end; B&W part/dwg #M-303.	Switching shaft for SW9, coupling between sections of three-position switch.	3Z7650-2
	SHAFT: round; cont wheel; brass, silver pl; ¼" dia x 4 1/16" lg; ¼"-28 thd ea end, 1 end drilled and tapped #6-32 x ½" d; B&W part/dwg #M-104.	Mounting for wheel switch contact on coupling coil.	2Z8203-6
	SHAFT: round; cont wheel; brass, silver pl; ¼" dia x 6 3/16" lg; ¼"-28 thd ea end, 1 end drilled and tapped #6-32 x ½" d; B&W part/dwg #M104-1.	Mounting for wheel switch contact on h-f coil.	2Z8203-73
	SLEEVE, spacer: incl cont shoe, tension spring posts, and flat braid; brass, silver pl; 3 15/16" wd x 2⅞" h o/a x ⅛" thk; B&W part/dwg X101-2.	Holds and guides switch contact shoe on l-f coil.	2C527-729A/S1
SW9.1, SW9.2	SWITCH, rotary: 2 sect.; 3 positions; 4 stator cont in front sect. and 3 stator cont in rear.	Antenna range selector, mounts on shaft making up part of switch assembly.	2C527-939A/S4

1. Identification Table of Parts of Antenna Tuning Units BC-939-A and BC-939-B—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
SW9.1	SWITCH, rotary: 4 stator cont; 3-position incl ceramic plate w/switch cont and shaft bushings; white glazed steatite ins; switch cont, silver graphite on brass stud; rectangular 8¼'' h x 7¾'' wd x ½'' thk; mts w/bakelite block and 2 mtg holes to clear #10-32 screws on 2⅞'' mtg ctr; B&W part/dwg #X115.	Coupling circuit selector, front, mounts on shaft which makes up part of the coupling assembly.	3Z9903A-15.1
SW9.2	SWITCH, rotary: incl ceramic plate w/switch cont and shaft bushings; white glazed steatite ins, switch cont silver graphite on brass stud; rectangular, 8¼'' h x 7¾'' wd x ½'' thk; mts w/bakelite block and two mtg holes to clear #10-32 screws on 2⅞'' ctr; B&W part #X116.	Coupling circuit selector, rear, mounts on shaft which is coupled to shaft of SW9.1.	3Z9903A-15.2

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26

Note. In this table, model 1 is Radio Transmitter BC–610–E; model 2 is Radio Transmitter BC–610–F, –G, and T–213/GRC–26; and model 3 is Radio Transmitter BC–610–H and –I.

Ref. symbol	Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3			
				TRANSMITTER, radio: Radio Transmitter BC–610–E, –F, –G, 2 to 18 mc freq range; power output cw 400 w, phone 300 w; input 115 v ac, 50 to 60 cyc, 2,000 w; encl in metal cabinet; 32¼″ lg x 21″ wd x 39¾″ h; incl 3 sets of plug-in tuning units, 2 sets of coils, tuning charts, spare tubes, fuses, and lamps.	Transmits c-w or voice signals	2C6500
				TRANSMITTER, radio: Radio Transmitter T–213/GRC–26; 2 to 18 mc freq range; output cw 400 w, 300 w voice; input 115 v, 50 to 60 cyc; mtd on shock-mounted base which is bolted to floor of shelter; o/a dimen 30″ lg x 21″ wd x 45″ h; xtal or mo controlled (no xtal furnished); incl 14 coil units (7 spares), 24 tuning units, 1 set of spare tubes and fuses; c/o Radio Transmitter BC–610–F or G modified as follows: slotted hole w/rubber grommet provided on front panel to accom Cord CG–389/U; Sig C Socket SO–239 installed on left side panel to accom RF Cable Assembly CG–557/U; ceramic feedthru insulators removed; furnished w/transmitter; US Army spec 71–3334.	Transmits frequency shift, c-w, or voice signals.	2C6900–213
				TRANSMITTER, radio: Radio Transmitter BC–610–H; 2 to 18 mc freq range; power output cw 400 w, phone 300 w; input 115 v ac, 50 to 60 cyc, 2,000 w; encl in metal cabinet; 32¼″ lg x 21″ wd x 39¾″ h; incl 3 sets of plug-in tuning units, 2 sets of coils, tuning charts, spare tubes, fuses, and lamps.	Transmits c-w or voice signals	2C6500H
				TRANSMITTER, radio: Radio Transmitter BC–610–I; 2 to 18 mc freq range; power output cw 400 w, phone 300 w; input 115 v ac, 50 to 60 cyc, 2,000 w; encl in metal cabinet; 32¼″ lg x 21″ wd x 39¾″ h; incl 3 sets of plug-in tuning units, 2 sets of coils, tuning charts, spare tubes, fuses, and lamps.	do	2C6500I
TS5	(*)			BOARD, terminal: tip jack strip for ac outlet for sw; 2 jack term.; 2″ lg x 1 1/16″ wd x ⅞″ d o/a.	Terminal board for top door interlock switches.	2Z9502.1

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	2	3	Name of part and description	Function of part	Signal Corps stock No.
TS4	(*)			BOARD, terminal: ac outlet for relay; 2 Bind H screw term. on bakelite strip; 2″ lg x 1 1/16″ wd x 1/16″ thk.	Terminal board for a-c connections to RY4.	2Z9402
TS1, TS2	(*)			BOARD, terminal: 12 Bind H screw and solder lug term.; bakelite, vacuum impr; 6 7/8″ lg x 1 3/16″ wd, base 1/8″ thk.	TS1: Exciter deck cable connections to modulator. TS2: Exciter deck cable connections to front panel.	2Z9412.27
TS3,	(*)			BOARD, terminal: 6 19/32″ lg x 1 15/16″ wd x 3/8″ d less term.; clearance holes for #8 screw on 7/16″ x 6 7/16″ mtg/c.	TS3: H-v power supply chassis cable connections.	2Z9410.11
TS2,		(*)	(*)		TS2: Exciter chassis cable connections.	
TS14					TS14: Cable connection in h-v power supply.	
TS3		(*)	(*)	BOARD, terminal: 4 17/32″ lg x 1 15/16″ wd x 3/8″ d less term.; clearance holes for #8 screw on 7/16″ x 5 1/16″ mtg/c.	H-v power supply chassis cable connections.	3Z777–6.49
TS15			(*)	BOARD, terminal: w/o term.; accom 3 term.; stamped w/ckt symbols.	Meter shunt mounting	3Z770–3.58
TS1, TS9		(*)	(*)	BOARD, terminal: 7 23/32″ lg x 1 5/16″ wd x 3/8″ d less term.; clearance holes for #8 screw on 7/16″ x 7 5/16″ mtg/c.	Cable connections between exciter and modulator chassis.	3Z770–12.40
TS11		(*)	(*)	BOARD, terminal: 8 27/32″ lg x 1 15/16″ wd x 3/8″ d less term.; clearance holes for #8 screw on 7/16″ x 8 7/16″ mtg/c.	Cable connection from modulator chassis to front panel.	3Z770–14.19
TS13		(*)	(*)	BOARD, terminal: 5 15/32″ lg x 1 15/16″ wd x 3/8″ d less term.; clearance holes for #8 screw on 7/16″ x 5 1/16″ mtg/c.	Connects modulator chassis	2Z9408.134
TS7			(*)	BOARD, terminal: turret type; 3 1/4″ lg x 2 3/8″ wd x 1/2″ thk o/a.	Resistor and choke mounting	3Z770–8.85
TS8			(*)	BOARD, terminal: 12 turret type term.; 5 1/4″ lg x 2 5/8″ wd x 1/2″ thk.	do	3Z770–12.95
	(*)			BRACKET: "Z" shape, spring type grip	Supports resistor	2Z1231–1
	(*)			BRACKET: "Z" shape, spring type grip	do	2Z1247.1
C28	(*)	(*)	(*)	CAPACITOR, fixed: vacuum dielectric; 55 μμf −5 +2 μμf; 32,000 v peak.	Padder for final amplifier	3D423
C14			(*)	CAPACITOR, fixed: mica; 56 μμf ±10%; 2500 vdcw; JAN type CM45B560K. (H model serial Nos. 201 through 346 and 496 through 533 on Order No. 21418–P–50, and serial Nos. 594 through 972 on Order No. 3078–P–51.)	Coupling between tube V9 and tubes V10 and V11.	3K4556021

C13	(*)	(*)	(*)	CAPACITOR, fixed: mica; 150 μμf ±10%; 500 vdcw; JAN type CM20B151K.	Coupling between tubes V8 and V9.	3K2015121
C14	(*)	(*)	-----	CAPACITOR, fixed: mica; 200 μμf ±5%; 2,500 vdcw; JAN type CM45B201J.	Coupling between tube V9 and tubes V10 and V11.	3K4520122
C29	(*)	(*)	-----	CAPACITOR, fixed: mica; 200 μμf ±5%; 5,000 vdcw; JAN type CM70B201J.	Isolation for h-v neutralizing	3K702122
C29	-----	-----	(*)	CAPACITOR, fixed: mica; 220 μμf ±2%; 5,000 vdcw; JAN type CM70B221G.	do	3K7022123
C8	(*)	(*)	-----	CAPACITOR, fixed: mica; 300 μμf ±5%; 500 vdcw; JAN type CM20B301J.	V9 cathode r-f bypass	3K2030122
C8	-----	-----	(*)	CAPACITOR, fixed: mica; 330 μμf ±10%; 500 vdcw; JAN type CM20B331K.	do	3K2033121
C14	-----	-----	(*)	CAPACITOR, fixed: mica; 330 μμf ±10%; 2,500 vdcw; JAN type CM45B331K (H model only).	Coupling between tube V9 and tubes V10 and V11.	3K4533121
C6, C7	-----	-----	(*)	CAPACITOR, fixed: paper; 2,000 μμf ±20%; 1,000 vdcw; JAN type CN42A202M.	C6: V11 screen r-f bypass. C7: V10 screen r-f bypass.	3DA2–218
C6, C7	(*)	(*)	-----	CAPACITOR, fixed: paper; 2,000 μμf ±20%; 800 vdcw; JAN type CN30A202M.	C6: V11 screen r-f bypass C7; V 10 screen r-f bypass.	3DA2–191
C11	-----	-----	(*)	CAPACITOR, fixed: mica; 2,000 μμf ±5%; 6,000 vdcw.	V16 plate return r-f bypass	3DA2–217
C11	(*)	(*)	-----	CAPACITOR, fixed: mica; 2,000 μμf ±5%; JAN type CM70B202J.	do	3K7020222
C15	(*)	(*)	-----	CAPACITOR, fixed: mica; 2,000 μμf ±5%; 2,500 vdcw; JAN type CM50B202J.	Coupling between tubes V10 and V11 and tube V16.	3K5020222
C15	-----	-----	(*)	CAPACITOR, fixed: mica; 2,200 μμf ±20%; 2,500 vdcw; JAN type CM56B222K.	do	3K5622221
C24	(*)	-----	-----	CAPACITOR, fixed: paper; 5,000 μμf ±20%; 1,000 vdcw.	V10 and V11 plate return r-f bypass.	3DA5–108
C4, C24, C26	(*)	(*)	-----	CAPACITOR, fixed: paper; 6,000 μμf ±20%; 1,000 vdcw; JAN type CN42E602M.	C4: V9 screen r-f bypass C24: V10 and V11 plate return r-f bypass. C26: V9 plate return r-f bypass.	3DA6–127
C1, C2, C3, C5, C25	(*)	(*)	-----	CAPACITOR, fixed: paper; 6,000 μμf ±20%; 600 vdcw; JAN type CN41A602M.	C1: V8 cathode coupling C2: V8 screen r-f bypass. C3: V8 cathode return r-f bypass. C5: V8 plate return r-f bypass. C25: V8 filament r-f bypass.	3DA6–101
C1, C2, C3, C5, C25, C30, C31.	-----	-----	(*)	CAPACITOR, fixed: paper; 6,000 μμf ±20%; 600 vdcw; JAN type CN35A602M.	C1: V8 cathode coupling C2: V8 screen r-f bypass. C3: V8 cathode return r-f bypass. C5: V8 plate return r-f bypass. C25: V8 filament r-f bypass. C30 and C31: M3 r-f bypasses.	3DA6–67
C4, C24, C26	-----	-----	(*)	CAPACITOR, fixed: paper; 6,000 μμf ±20%; 1,000 vdcw; JAN type CN42A602M.	C4: V9 screen r-f bypass C24: V10 and V11 plate return r-f bypass. C26: V9 plate return r-f bypass.	3DA6–137

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	2	3	Name of part and description	Function of part	Signal Corps stock No.
C26	(*)			CAPACITOR, fixed: paper; 6,000 μμf ±10%; 1,500 vdcw; JAN type CP26A1EH602K.	V9 plate return r-f bypass	3DA6–98
C9, C10			(*)	CAPACITOR, fixed: paper; 2 sect.; .05 μf ±40% −15% ea sect.; 600 vdcw; JAN type CP54B6FF503X.	V16 filament r-f bypasses	3DA50–157
C9, C10	(*)	(*)		CAPACITOR, fixed: paper; 2 sect.; .05 μf ±5% ea sect.; 600 vdcw; JAN type CP53B4FF503L.	do	3DA50–291
C23			(*)	CAPACITOR, fixed: paper; 2 μf +20% −10%; 4,000 vdcw; JAN type CP70E1EM205V.	H-v power supply filter	3DB2–271
C19			(*)	CAPACITOR, fixed: paper; 4 μf +20% −10%; 4,000 vdcw; JAN type CP70E1EM405V.	do	3DB4–346
C19, C23	(*)	(*)		CAPACITOR, fixed: paper; 4 μf +40% −15%; 4,000 vdcw; JAN type CP70E1DM405X.	do	3DB4–335
C20, C21			(*)	CAPACITOR, fixed: paper; 8 μf +40% −15%; 600 vdcw; JAN type CP70B1FF805X.	Bias power supply filters	3DB8–226
C16, C17			(*)	CAPACITOR, fixed: paper; 8 μf +20% −10%; 1,000 vdcw; JAN type CF70B1FG805V.	Exciter power supply filters	3DB8–225
C16, C17		(*)		CAPACITOR, fixed: paper; 8 μf +20% −10%; 1,000 vdcw; JAN type CP70B1DG805V.	do	3DB8–214
C20, C21	(*)			CAPACITOR, fixed: paper; 8 μf +20% −10%; 600 vdcw.	Bias power supply filters	3DB8–161
C20, C21		(*)		CAPACITOR, fixed: paper; 8 μf +40% −15%; 600 vdcw; JAN type CP70B1DG805V.	do	3DB8–215
C16, C17	(*)			CAPACITOR, fixed: paper; 2 sect.; 8.5–8.5 μf +20% −10%; 1,000 vdcw.	Exciter power supply filters	3DB8E5
C27	(*)			CAPACITOR, fixed: electrolytic; 40 μf +65% −10%; 100 vdcw.	V1 and V2 cathode bypass	3DB40–21
C18	(*)	(*)	(*)	CAPACITOR, variable: air; plate meshing type; 3.5 to 5.7 μμf; 3 aluminum plates; 2 solder lug term.; adjusting stud w/scdr slot.	Final amplifier neutralizing capacitor.	3D9005VE5
C12	(*)	(*)	(*)	CAPACITOR, variable: air; plate meshing type dual sect.; 31 to 151 μμf ea sect.; SLC characteristics; extension shaft adj; 46 aluminum plates; stud and lug term.	P. A. PLATE TUNING control	3D9150V–4
	(*)	(*)		CHART: tuning	Tuning charts for Transmitter Tuning Units TU–47 through TU–54.	6D10105–9
			(*)	CHART: tuning	Tuning chart for Transmitter Tuning Units TU–47 and TU–48.	6D10105–48

			(*)	CHART: tuning	Tuning chart for Transmitter Tuning Units TU–49 and TU–50.	6D10105–49
			(*)	CHART: tuning	Tuning chart for Transmitter Tuning Units TU–51 and TU–52.	6D10105–50
			(*)	CHART: tuning	Tuning chart for Transmitter Tuning Unit TU–53.	6D10105–51
			(*)	CHART: tuning	Tuning chart for Transmitter Tuning Unit TU–54.	6D10105–52
H12			(*)	CLAMP: dial locking	Locks p-a plate tuning dial	2Z2643.65
H12		(*)		CLAMP: dial locking	do	2Z6196–7
	(*)			CLAMP: dial locking	do	2Z6195.7
H15, H15a through H15e.			(*)	CLAMP, electrical: holds material $1\frac{3}{8}$'' max dia	Holds electron tubes in sockets	2Z2642.415
04 through 06			(*)	CLIP, electrical: plate cap; silver pl beryllium copper; $\frac{59}{64}$'' lg x $2\frac{7}{64}$'' wd x $\frac{25}{64}$'' h; 1 solder lug connection; for $\frac{3}{8}$'' plate caps; Natl Co. #24.	Provide electrical connection to plates of V3, V4, and V16.	2Z2724
09 through 011			(*)	CLIP, electrical: 1'' lg x $\frac{3}{8}$'' h	do	2Z2712.208
02, 03			(*)	CLIP, electrical: plate cap; ceramic with tin pl beryllium cont; $1\frac{1}{8}$'' lg x $\frac{3}{8}$'' wd x $\frac{9}{16}$'' h; 1 solder lug connection; Natl Co. #SPP–3.	Provide electrical connection to the plates of V10 and V11.	2Z2712.1
07, 08			(*)	CLIP, electrical: cad pl brass; $1\frac{3}{8}$'' lg x $\frac{1}{2}$'' h x $2\frac{7}{32}$'' wd; 1 solder lug connection; for $\frac{9}{16}$'' plate caps; Natl Co. #12.	Provide electrical connection to plates of V6 and V7.	2Z2712
013, 014			(*)	CLIP, electrical: beryllium copper, silver pl; $1\frac{7}{32}$'' lg x $1\frac{3}{16}$'' wd x $\frac{3}{4}$'' h; one #8 screw connection thru base and spring type sliding connection thru ears; Littelfuse part #129001; B&W part #10–171C.	For mounting vacuum capacitor C28.	3Z1013.8
CH1, CH2, CH5, CH6, CH7, CH8.	(*)	(*)	(*)	COIL, RF: 3 pie universal wdg; unshielded; 1 mh, 10 ohms; $2\frac{1}{8}$'' lg x $\frac{9}{16}$'' dia; steatite form; form $1\frac{1}{4}$'' lg x $\frac{1}{4}$'' dia; mts by two $2\frac{3}{4}$'' pigtails; Natl Co. #R–300.	CH1: V8 grid return r-f choke CH2: V8 cathode r-f choke. CH5: V9 plate return r-f choke. CH6: V10 and V11 plate return r-f choke. CH7: V10 and V11 grid return r-f choke. CH8: V16 grid return r-f choke.	3C363
CH3		(*)	(*)	COIL, RF: 3 pie universal wdg; unshielded; 2.5 mh, 17.5 ohms; $2\frac{1}{8}$'' lg x $2\frac{1}{32}$'' dia; steatite form; $1\frac{3}{16}$'' lg x $\frac{1}{4}$'' dia; mts by two $2\frac{3}{4}$'' pigtails; Natl Co. #R–300.	V8 plate r-f choke	3C550–1
CH3, CH4	(*)			COIL, RF: choke; 6 pie universal wdg; unshielded;	CH3: V8 plate r-f choke	3C308–3
	(*)	(*)	(*)	2.5 mh, 10 ohms; $2\frac{3}{4}$'' lg x $\frac{31}{32}$'' dia less mtg brackets and solder lugs; steatite form; $2\frac{17}{32}$'' lg x $\frac{15}{32}$'' dia; mts by #8 screws thru brackets at ea end on $3\frac{1}{4}$'' ctr; 1 solder lug at ea end; Millen part #34156.	CH4: V16 plate return r-f choke.	

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	Models 2	Models 3	Name of part and description	Function of part	Signal Corps stock No.
CH9	-----	-----	(*)	COIL, RF: 1 pie universal wdg; unshielded; 10 mh, 70 ohms; 3 1/32" h x 1 1/16" dia less solder lugs; steatite form; 3/4" x 1/2" dia form with 3/16" x 1 1/16" dia molded on base; mts by #6 screw passing through clearance hole in ctr of form; 2 solder lugs; Millen part #34210.	V8 cathode return r-f choke	2C341–20
CH9	(*)	(*)	-----	COIL, RF: choke; unshielded; 10 mh	V8 cathode return r-f choke	3C550
SO10	-----	-----	(*)	CONNECTOR, receptacle: Socket SO–239; 1 round female cont and shell; straight; 25/32" lg on 1" x 1" base less rear cont; molded mica filled phenolic insert; 4 clearance holes for #4 screws on 2 3/32" x 2 3/32" mtg/c; Amphenol #83–1R.	SO10: R-f output connector for coaxial cable. R-f output connector on T–213/GRC–26.	2Z8799–239
SO7, SO8, SO9	-----	-----	(*)	CONNECTOR, receptacle: 12 round female cont; pol; straight type.	SO7: Receptacle for channel 1 tuning unit. SO8: Receptacle for channel 2 tuning unit. SO9: Receptacle for channel 3 tuning unit.	2Z3073
SO7, SO8, SO9	(*)	(*)	-----	CONNECTOR, receptacle: 12 tubr female cont; straight type.	SO7: Receptacle for channel 1 tuning unit. SO8: Receptacle for channel 2 tuning unit. SO9: Receptacle for channel 3 tuning unit.	2Z8639–5
SO6	-----	-----	(*)	CONNECTOR, receptacle: 2 male cont; ea approx 70° of arc; straight type; 1 5/16" lg x 1 5/16" dia less mtg ears; 20 amp, 250 v; cylindrical nickel pl brass body w/molded black bakelite base, locking cont; 2 clearance holes for #10 screws on 2 3/32" mtg/c; B&W part #10–72C.	A-c power input	6Z7560–10
SO6	(*)	(*)	-----	CONNECTOR, receptacle: 2 wire, half round blade, male cont; straight type; flush base.	A-c power input	6Z7588
SO5	(*)	(*)	(*)	CONNECTOR, receptacle: 8 female cont, flat yoke shape, pol by key in ctr; straight type; 1 1/4" dia x 1 1/8" lg o/a; cylindrical brass body w/cad plate and cronak dip; molded black bakelite insert; mts in 1 1/4" dia hole w/1 1/4"–20 thd on mtg end, lockwasher and hex. nut opposite end, 1.387"–20 thd for cable coupling ring; Amphenol #79–PO8F.	Input connection from speech amplifier.	2Z8678.13

SO1, SO2, SO4	(*)			CONNECTOR, receptacle: 6 flat parallel rect pol female cont; straight.	SO1 and SO2: Receptacles on modulator chassis for connection to exciter chassis. SO4: Receptacle on modulator chassis for connection to front panel.	2Z8639
SO3	(*)			CONNECTOR, receptacle: 8 flat parallel rect pol female cont; straight type.	Receptacle on modulator chassis for connection to front panel.	2Z9678.43
SO11	(*)			CONNECTOR, receptacle: 8 flat pol female cont; straight type.	Receptacle on upper control panel for connection to exciter chassis.	2Z3069–20
PL1, PL2, PL4	(*)			CONNECTOR, receptacle: 6 flat parallel male blade pol cont; straight type.	PL1 and PL2: Exciter chassis to modulator chassis cable connector. PL4: Front panel to modulator chassis cable connector.	2Z7116.22
PL3, PL11	(*)			CONNECTOR, receptacle: 8 flat parallel male blade pol cont; straight type.	PL3: Front panel to modulator chassis cable connector. PL11: Exciter chassis to upper front panel cable connector.	2Z7228–1
O12	(*)	(*)	(*)	CONNECTOR ASSEMBLY, receptacle: female c/o steatite bar 7½'' lg x ¾'' wd x 5/16'' thk w/5 holes to mount fittings on 1¼'' ctr, 2 holes on 6½'' mtg/c; 3 female cont and two spring type cont ea w/2 tinned solder lug; steatite bar; 7½'' lg ¾'' wd x 1 7/16'' h; B&W part #10574.	Mounts and provides electrical contacts for final amplifier tank coil.	2Z5594.11
	(*)			COUPLING, flexible	For switch SW11	2Z3270–8
O1	(*)	(*)	(*)	COUPLING, flexible: steatite base w/phosphor bronze springs; 5,000 v peak; cross shaped steatite form w/springs mtd on it; 2⅛'' x 2⅛'' x 1 15/32''; mts on two ¼'' shafts by 2 setscrews for ea shaft; B&W part #10–156C.	Connects final tank capacitor to control shaft.	2Z3291–3
I1		(*)	(*)	DIAL, control: black bakelite knob w/chrome dial plate; 1 1/16'' h x 4'' dia plate and 2⅜'' dia knob; mts on ¼'' shaft by 2 setscrews; dial plate calibrated 180° from 0 to 100 clockwise; B&W part #10–166C.	P. A. PLATE TUNING dial	2Z3764.8
	(*)			DIAL, control	do	2Z3708–4
	(*)			DIAL, lock: disk brake device	Locks plate tuning dial	2Z3708–5
	(*)			DRIVE, tuning: dial mechanism	Tuning mechanism for plate tuning control.	2Z3719–7
		(*)	(*)	ELECTRODE, spark gap	Prevents peak voltage build-ups across reactor L4.	2Z5727–51
FS5	(*)	(*)	(*)	FUSE, cartridge: Fuse FU–50; opens in 1 hr at 135% load, in 2 min at 200% load, rated continuously at 110% load; 3 amp; 250 v; 1 time; glass body; ferrule term.; 1¼'' lg x ¼'' dia; Littelfuse part #312003; B&W part #10–25C.	Protects T1 and speech amplifier power supply primaries.	3Z1950

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	2	3	Name of part and description	Function of part	Signal Corps stock No.
FS4	(*)	(*)	(*)	FUSE, cartridge: 6 amp opens in 1 hr at 135% load, in 2 min at 200% load, rated continuously at 110% load; 250 v; 1 time; glass body; ferrule term.; 1¼" lg x ¼" dia; Littelfuse part #312006; B&W part #10–24C.	Protects T1 through T5, T103 (speech amplifier), LM3, and RY1 through RY4.	3Z2606.3
FS3	(*)	(*)	(*)	FUSE, plug: 20 amp; 125 v; 1 time; long time delay; 1 3/16" lg x 1 3/16" dia o/a; B&W part #10–23C.	Protects T6 primary	3Z2020
FS1, FS2	(*)	(*)	(*)	FUSE, plug: 25 amp; 125 v; 1 time; long time delay; 1 3/16" lg x 1 3/16" dia o/a; B&W part #10–22C.	Line fuses	3Z2025
E4, E5			(*)	FUSEHOLDER: extractor post type; holds 1 clip; 15 amp, 250 v max; 2¼" lg x 45/64" max dia less rear solder lug; ⅝" dia threaded body, for panel hole mtg; 2 solder lug term.; Littelfuse #340030.	E4: Fuseholder for FS4 E5: Fuseholder for FS5.	3Z1939
E4, E5		(*)		FUSEHOLDER: extractor post type; for ¼" x 1¼" fuse.	do	3Z2876–6.1
E4, E5	(*)			FUSEHOLDER: extractor post type; for single 3 AG cartridge fuse.	do	3Z3275–1
R19	(*)			HEATING ELEMENT, electrical: nichrome wire coil type; 115 v, 600 w, 16 ohms.	Reduces primary voltage of transformer T6 in HIGH VOLTAGE PROTECT position.	2Z5016–4
E16		(*)	(*)	INSULATOR, bowl; rd ctb shape; ⅜" lg o/a; ⅝" dia tapered to ½" OD w/.156" dia axial hole, ctb ⅜" dia x ¼" d from ⅝" OD end; JAN type NS4W4202.	Provides for connection to plates of V10 and V11 through exciter chassis from SW11.	3G3542–02.2
E15		(*)	(*)	INSULATOR, bushing: conical shape; JAN type NS4W4102.	Provides for connection to plates of V10 and V11 through exciter chassis from SW11.	3G3541–02
E19, E20			(*)	INSULATOR, feedthru: conical shape; JAN type NS4W4204.	R-f output feedthru insulators	3G3542–04.1
E19, E20		(*)		INSULATOR, bushing: truncated conical shape; steatite, grade #L–3, white glazed finish; ¾" lg o/a; 1⅛" large dia x 1" small dia, ¾" ID x 9/16" d w/.200" dia axial mtg hole; JAN type NW3W4204.	do	3G3542–04
E17, E18			(*)	INSULATOR, feedthru: conical shape; JAN type NS4W104.	do	3G3541–04.1
E17, E18		(*)		INSULATOR, bushing: truncated conical head shape; steatite, grade #L–3, white glazed finish; 1 5/16" lg; 1⅛" large dia x 1" small dia; 23/32" dia x 9/16" lg shank w/.200" dia axial mtg hole; JAN type NS3W4104.	do	3G354104

E24, E26		(*)	(*)	INSULATOR, feedthru: cup shape female bushing; steatite, grade #L–4, white glazed finish; ½'' lg o/a; ⅞'' OD x ½'' w/.200'' dia through hole; JAN type NS4W4203.	B+ voltage feedthru insulators for modulator chassis.	3G3542–03.1
E23, E25		(*)	(*)	INSULATOR, feedthru: rd male bushing w/extension; steatite, grade #L–4 white glazed finish; ⅞'' lg o/a; ⅞'' OD x .200'' ID w/$^{15}/_{32}$'' dia shank, ⅜'' lg; JAN type NS4W4103.	B+ feedthru insulators for modulator chassis.	3G3541–03.1
E13, E14		(*)	(*)	INSULATOR, stand-off: conical shape; steatite, grade #L–4, white glazed finish; 1'' lg o/a; one end 1'' dia, other end ½'' dia; #8–32 thd hole ea end ⅜'' d; JAN type NS4W2008.	Support plug-in jack bar for final tank coil.	3G3520–08.1
E6 through E9		(*)	(*)	INSULATOR, stand-off: cylindrical; steatite, grade #L–4, white glazed finish; 1'' lg x ½'' dia; #8–32 thd hole ea end ⅜'' d; JAN type NS4W0208.	Component mountings	3G3502–08.1
E10 through E12, E21, E22		(*)	(*)	INSULATOR, stand-off: cylindrical pillar shape; steatite, grade #L–4, white glazed finish; .500'' lg o/a; ⅜'' dia; #6–32 hole ea end $^{3}/_{32}$'' d; JAN type NS4W0104.	Support tie points	3G3501–04.1
E30			(*)	INSULATOR, stand-off: paper base phenolic, natural color, white E finish; round mtg ring; 2¾'' ID x 3½'' OD x ½'' thk; six #6–32 tapped mtg holes equally spaced on 1.58'' r; ID tapers from 3'' to 2¾'', $^{3}/_{16}$'' d.	Meter mounting insulator	3G350–139
	(*)	(*)		INSULATOR, feedthru: 2 conical shape cones; white por, glazed finish; $^{15}/_{16}$'' h; 1¼'' dia at bottom, $^{13}/_{16}$'' dia at top.	R-f output feedthru insulators	3G1050–30
E29			(*)	INSULATOR, plate: natural phenolic, semigloss finish; rectangular flat; 9'' lg x 3'' wd x ¼'' thk.	Tube socket mounting	3G320–236
E28			(*)	INSULATOR, plate: natural phenolic, semigloss finish; rectangular flat; 3⅛'' lg x 2'' wd x ¼'' thk.	Mounts capacitor C29	3G320–237
E27			(*)	INSULATOR, plate: natural phenolic, semigloss finish; rectangular plate; 13¾'' lg x 4¼'' wd x ⅜'' thk.	Mounts tuning capacitor C12	3G320–238
	(*)			INSULATOR, stand-off: black bakelite; 1'' lg o/a; both ends drilled and tapered ⅜'' d for #6–32 mach screw; ⅝'' dia.	Mounts choke CH8	3G1837–32.8
	(*)			INSULATOR, stand-off: conical shape; steatite, grade #L–3, white glazed finish; 1'' lg o/a; 1'' dia one end, ½'' dia other end, #8–32 thd hole ea end ⅜'' d; JAN type NS3W2008.	Mounts components	3G3520–08.2
	(*)			INSULATOR, stand-off: rd post shape; steatite, grade #L–3, white glazed finish; 1'' lg o/a; ½'' dia w/1 hole ea end tapped #8–32 x ⅜'' d; JAN type NS3W0208.	Mounts components	3G1250–16
	(*)			KNOB, round: black bakelite body; for ¼'' dia shaft; depressed indicating arrow.	For band switch and excitation meter switch.	2Z5821–3

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	2	3	Name of part and description	Function of part	Signal Corps stock No.
	(*)	-----	-----	KNOB, round: black bakelite; for ¼″ dia shaft; numbered 0 to 9 w/360° cir line below numbers.	For filament voltage and modulator bias controls.	2Z5849.10
		(*)		KNOB, round: black bakelite body; for ¼″ dia shaft	-----	2Z5788–12
		(*)		KNOB, round: black molded phenolic; for ¼″ dia shaft; white filler.	-----	2Z5822–5
H13, H13.1, H13.2, H13.3.	-----	-----	(*)	KNOB, round: fluted, skirt type; black bakelite; for ¼″ shaft; two #10–32 screws; white line on skirt; 1″ h x 2 1/16″ dia; brass insert; ½″ d shaft hole; B&W part #10–164C.	H13: BAND SWITCH SW11 knob. H13.1: EXCITATION METER SWITCH SW8 knob. H13.2: MODULATOR BIAS control knob. H13.3: FILAMENT VOLTAGE control knob.	2Z5835
LM2, LM1	(*) (*)	(*)	(*)	LAMP, incandescent: Sig C Lamp LM–27; 6 to 8 v, .25 amp; bulb T3–¼″ clear; 1 3/16″ lg; miniature bayonet base; burn any position; GE part #44; B&W part #10–36C.	LM2: Tuning unit compartment illumination. LM1: Dial illumination.	2Z5927
LM3, LM4	(*)	(*)	(*)	LAMP, incandescent: Sig C Lamp LM–41; 120 v, 6 w; bulb S–6 clear; 1⅞″ lg max; candelabra screw base; C–7A tung fil; burn in any position; Mazda part #6S6; B&W part #10–37C.	LM3: Filament on-off indicator LM4: H-v power supply on-off indicator.	2Z5941
E1, E2, E3	-----	(*)	(*)	LAMPHOLDER: med screw base; ceramic; 660 w, 600 v; 1 7/16″ h x 2 5/16″ lg x 1⅝″ wd; 2 holes for #8–32 screws on 1 13/16″ mtg/c; two #8 screw type term.; B&W part #10–118C.	E1: Fuseholder for FS1. E2: Fuseholder for FS2. E3: Fuseholder for FS3.	6Z8357–1.1
J1	(*)	(*)	(*)	LAMPHOLDER: miniature bayonet type socket; steel body; 6 to 8 v, .25 amp; 27/32″ lg x 15/32″ wd x 1¼″ h excluding solder lugs; two 5/32″ holes on 15/16″ mtg/c; mtd by means of 2 clearance holes for #6 screws on ears of U-shaped mtg bracket, 2 solder lugs at rear coming out opposite sides; Dialco #711; B&W part #10–122C.	Holds LM2	2Z5883–342
I2	(*)	(*)	(*)	LIGHT, indicator: w/lens; 1⅛″ dia green lens w/frosted back; for candelabra screw bore; brass black nickel pl; 2 3/16″ lg x 1⅛″ dia less lugs; 1 1/32″ mtg hole required; socket horizontally mtd lamp replaceable from front; threaded jewel; 2 solder lug term. located on opposite sides of bore of socket; Dialco #51101–XP10–112; B&W part #10–121C.	Filament power on-off indicator	2Z5988–9

I3	(*)	(*)	(*)	LIGHT, indicator: w/lens; 1⅛" dia red lens w/frosted back; for candelabra screw bore; brass black nickel pl; 2 3/16" lg x 1⅛" dia less lugs; 1 1/32" mtg hole required; socket horizontally mtd lamp replaceable from front; threaded jewel; 2 solderless lug term located on opposite sides of bore of socket; Dialco #51101–XP10–111; B&W part #10–120C.	Plate power on-off indicator	2Z5988–5
M1		(*)	(*)	METER, ammeter: dc; 0 to 15 ma; JAN type MR36W015DCMA.	EXCITATION METER	3F901E5–19
M2		(*)	(*)	METER, ammeter: dc; 0 to 500 ma; JAN type MR36W500DCMA.	P. A. PLATE meter	3F950–61
M3		(*)	(*)	METER, voltmeter: ac; 0 to 10v; JAN type MR36W010ACW.	FILAMENT VOLTAGE indicator for V16.	3F8010–25
M1	(*)			METER, ammeter: dc; 0 to 15 ma, 0 to 150 ma, 0 to 300 ma.	EXCITATION METER	3F901E5–14
M2	(*)			METER, ammeter: dc; 0 to 500 ma; JAN type MR35W500DCMA.	P. A. PLATE meter	3F950–31
M3	(*)			METER, voltmeter: ac; 0 to 10 v, 25 to 125 cyc; JAN type MR34WO10ACVV.	FILAMENT VOLTAGE indicator for V16.	3F8010–20
L1, L2, L3			(*)	REACTOR: 1 sect.; 6 hy +20%−10%, .25 amp; 105 ohms ±10%; 2,000 v rms test; HS metal case; 4¼" h x 3 3/16" lg x 3 1/16" wd o/a; four #8–32 studs on 2⅝" x 2½" mtg/c; 2 solder lug term. on bottom; B&W part #10–26C.	L1: Exciter power supply filter L2 and L3: Bias power supply filters.	3C557N
L1, L2, L3	(*)	(*)		REACTOR: single wdg; 6 hy, 250 ma; 90 ohms d-c resistance; encl in metal case.	L1: Exciter power supply filter L2 and L3: Bias power supply filters.	3C344–21
L4	(*)	(*)	(*)	REACTOR: 1 sect.; 11 h min, .5 amp; 55 ohms; 10,000 v rms test; HS metal case; 9 1/16" h x 7" lg x 6⅛" wd o/a; four #5/16–18 studs on 4⅝" x ⅝" mtg/c; two #8–32 stud term. on stand-off insulators; B&W part #10–28C.	H-v power supply filter	3C557N–1
RY4		(*)	(*)	RELAY, armature: DPDT, double break, normally closed; 5 amp at 125 v ac; single wdg 117 v ac coil; #6 screw term. for coil and cont; 3" lg x 1¾" wd x 1 25/32" h; clearance holes for #6 screws on 2⅜" x ⅝" mtg/c; fast acting; coil impr for tropical use; B&W part #10–69C.	Antenna shorting relay	2Z7587–223
RY4	(*)			RELAY, armature: DPDT, double break, normally closed; col, single wdg, oper 117 v ac.	do	2Z7717.3
RY5		(*)	(*)	RELAY, armature: DPST, single wdg, 600 ma at 4.2 v dc, ins coil; solder lug term. on coil and cont; 2¾" lg x 1 15/16" wd x 1½" h; clearance holes for #6 screws on 1¼" x 1⅝" x ¾" mtg/c; fast acting; coil impr for tropical use; B&W part #10–70C.	Overload protection in h-v power supply.	2Z7588–115
RY5	(*)			RELAY, armature: DPST, magnetic type; pull in current 700 ma to 750 ma.	do	2Z7717.4

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	2	3	Name of part and description	Function of part	Signal Corps stock No.
RY3	-----	(*)	(*)	RELAY, armature: DPDT; 5 amp 2,500 v dc cont; single wdg 115 v ac, ins coil; #6 screw lug term. on cont and coil; 1⅝'' h x 2⅞'' wd x 3 $^{5}/_{16}$'' lg; 4 clearance holes for #6 screw pierced at points of a diamond 2⅜'' lg x 1⅛'' wd; fast acting; coil impr for tropical use; B&W part #10–88C.	Switching for phone or c-w operation.	2Z7590–188
RY3	(*)	-----	-----	RELAY, armature: DPDT; single wdg coil	do	2Z7717.2
RY1	-----	-----	(*)	RELAY, armature: DPST, normally open; 30 amp at 110 v; single wdg, 125 v ac, 20 w oper, 3.5 w hold, ins coil; metal spacer term, tapped for #8–32 screw; 4'' lg x 3¼'' wd x 3'' h o/a; 3 clearance holes for #10 screw on 2 $^{5}/_{16}$'' mtg/c; fast acting; coil impr for tropical use; B&W part #10–66C.	Plate power on-off relay	2Z7599A–326
RY1	(*)	(*)	-----	RELAY, armature: DPST, normally open; solenoid, 115 v ac.	do	2Z7590–88
RY2	(*)	(*)	(*)	RELAY, armature: DPDT; 5 amp at 117 v; single wdg, 125 v ac, ins coil; solder lug term. on coils and cont; 1 $^{5}/_{16}$'' h x 2¾'' lg x 1⅞'' wd; 4 clearance holes for #6 screws on 2⅜'' x ⅝'' mtg/c; fast acting; coil impr for tropical use; B&W part #10–67C.	Overload protection in h-v power supply.	2Z7590–187
R27	-----	(*)	(*)	RESISTOR, fixed: WW; .1752 ohm ±5%; ⅓ w; JAN type RB11BR1752D.	Shunt for meter M1, INT. AMP PLATE position.	3RB1–1752
R27	(*)	-----	-----	RESISTOR, fixed: WW; .351 ohm ±5%; temp coef .015% special.	do	3F3802–300
R26, R33	-----	(*)	(*)	RESISTOR, fixed: WW; .370 ohm ±5%; ⅓ w; JAN type RB11BR3700D.	R26: Shunt for meter M1, P. A. GRID position. R33: Shunt for meter M1, DOUBLER PLATE position.	3RB1–3700
R26, R33	(*)	-----	-----	RESISTOR, fixed: WW; .741 ohm ±5%; temp coef, .015% special.	R26: Shunt for meter M1, P. A. GRID position. R33: Shunt for meter M1, DOUBLER PLATE position.	3F3802–150
R37	-----	-----	(*)	RESISTOR, fixed: WW; 11 ohms ±10%; 300 w; 8½'' lg x 1¼'' dia; Ohmite type #CORIB "COSOS" (H models serial Nos. 201 thru 346 and 496 thru 533 on Order No. 21418–P–50, and 594 thru 972 on Order No. 3078–P–51 only).	Series voltage-dropping resistor for T6 when SW4 is in HIGH VOLTAGE PROTECT position.	3Z6001A1–23
R21, R22	-----	-----	(*)	RESISTOR, fixed; comp; 47 ohms ±10%; 2 w; JAN type RC4BF470K.	R21: Parasitic suppressor for grid of tube V10. R22: Parasitic suppressor for grid of tube V11.	3RC42BF470K

R21, R22	(*)	(*)		RESISTOR, fixed: comp; 51 ohms ±5%; ½ w; JAN type RC21BF501J.	R21: Parasitic suppressor for grid of tube V10. R22: Parasitic suppressor for grid of tube V11.	3RC21BF501J
R5	(*)	(*)		RESISTOR, fixed: WW; 180 ohms ±5%; 16 w; JAN type RW32G181.	Bias resistor to protect tubes V3 and V4.	3RW19804
R5			(*)	RESISTOR, fixed: WW; 200 ohms ±5%; 12 w; JAN type RW32F201.	do	3RW20120
R28			(*)	RESISTOR, fixed: comp; 470 ohms ±10%; 1 w; JAN type RC30BF470K.	Shunt for meter M1, INT. AMP GRID position.	3RC30BF471K
R28	(*)			RESISTOR, fixed: WW; 510 ohms ±5%; ½ w; JAN type RC21BF511J.	do	3RC21BF511J
R28		(*)		RESISTOR, fixed: W; 470 ohms ±5%; ½ w; JAN type RU3C471J.	do	3RU32002
R24			(*)	RESISTOR, fixed: WW; 500 ohms ±5%; 10 w; JAN type RW31G501.	V9 cathode bias	3RW22507
R24	(*)	(*)		RESISTOR, fixed: WW; 500 ohms ±5%; 12 w; JAN type RW32G501.	do	3RW22508
R9			(*)	RESISTOR, fixed: WW; 630 ohms ±5%; 18 w; JAN type RW33G631.	Shunt for plate return choke on tube V16.	3RW23122
R4			(*)	RESISTOR, fixed: comp; 680 ohms ±10%; 1 w; JAN type RC30BF681K.	Part of filter in exciter power supply.	3RC30BF681K
R9, R20	(*)	(*)		RESISTOR, fixed: WW; 710 ohms ±5%; 16 w; JAN type RW32G711.	R9: Shunt for plate return choke on tube V16. R20: Filament-cathode bias for V1 and V2.	3RW23407
R4	(*)	(*)		RESISTOR, fixed: comp; 750 ohms ±5%; 1 w; JAN type RC31BF751J.	Part of filter in exciter power supply.	3RC31BF751J
R20			(*)	RESISTOR, fixed: WW; 800 ohms ±5%; 10 w; JAN type RW31F801.	Filament-cathode bias for V1 and V2.	3RW23722
R36			(*)	RESISTOR, fixed: WW; 2,000 ohms ±5%; 12 w; JAN type RW32F202.	Stabilizes plate and screen grid voltages in tube V9.	3RW26125
R8			(*)	RESISTOR, fixed: comp; 4,700 ohms ±10%; 2 w; JAN type RC42BF472K.	Grid bias for tubes V10 and V11	3RC42BF472K
R8	(*)	(*)		RESISTOR, fixed: comp; 4,700 ohms ±10%; 2 w; JAN type RC41BF472K.	do	3RC41BF472K
R2			(*)	RESISTOR, fixed: WW; 5,000 ohms ±5%; 18 w; JAN type RW33G502.	Stabilizes plate voltage on tube V8	3RW28532
R2	(*)	(*)		RESISTOR, fixed: WW; 5,000 ohms ±5%; 18 w; JAN type RW33F502.	do	3RW28519
R3	(*)			RESISTOR, fixed: WW; 15,000 ohms ±5%; 20 w	Stabilizes screen grid voltage of tube V8.	3Z6615–131
R3		(*)		RESISTOR, fixed: WW; 16,000 ohms ±5%; 38 w; JAN type RW35F163.	do	3RW31605
R3			(*)	RESISTOR, fixed: WW; 16,000 ohms ±5%; 38 w; JAN type RW35G163.	do	3RW31521

2. Identification Table of Parts for Radio Transmitters BC-610-E, -F, -G, -H, -I, and T-213/GRC-26—Continued

Ref. symbol	Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3			
R6, R7, R16, R17	(*)	(*)		RESISTOR, fixed: comp; 20,000 ohms ±5%; 2 w; JAN type RC41BF203J.	R6: Decreases voltage on screen grid of tube V10. R7: Decreases voltage on screen grid of tube V11. R16 and R17: Loadings for secondary of T8.	3RC41BF203J
R6, R7, R16, R17			(*)	RESISTOR, fixed: comp; 22,000 ohms ±10%; 2 w; JAN type RC42BF223K.	R6: Decreases voltage on screen grid of tube V10. R7: Decreases voltage on screen grid of tube V11. R16 and R17: Loadings for secondary of T8.	3RC42BF223K
R34			(*)	RESISTOR, fixed: WW; 25,000 ohms ±5%; 78 w; JAN type RW37G253.	Grid d-c return for V3 and V4	3RW32717
R34	(*)	(*)		RESISTOR, fixed: WW; 25,000 ohms ±5%; 78 w; JAN type RW37F253.	do	3RW32709
R1	(*)			RESISTOR, fixed: comp; 30,000 ohms ±5%; ½ w; JAN type RC21BF303J.	V8 grid bias	3RC21BF303J
R23	(*)	(*)		RESISTOR, fixed: comp; 33,000 ohms ±10%; 2 w; JAN type RC40BF333K.	V9 grid bias	3RC40BF333K
R1, R23			(*)	RESISTOR, fixed: comp; 33,000 ohms ±5%; 2 w; JAN type RC42BF333K.	R1: V8 grid bias. R23: V9 grid bias.	3RC42BF333K
R1		(*)		RESISTOR, fixed: comp; 33,000 ohms ±10%; 2 w; JAN type RC41BF333K.	V8 grid bias	3RC41BF333K
R10			(*)	RESISTOR, fixed: WW; 40,000 ohms ±5%; 110 w; JAN type RW38G403.	Bleeder for exciter power supply	3RW33910
R10		(*)		RESISTOR, fixed: WW; 40,000 ohms ±5%; 78 w; JAN type RW37F403.	do	3RW33906
R10	(*)			RESISTOR, fixed: WW; 40,000 ohms ±5%; 20 w	do	3Z6640-16
R25			(*)	RESISTOR, fixed: comp; 47,000 ohms ±10%; 2 w; JAN type RC42BF473K.	V9 screen grid-voltage dropping	3RC42BF473K
R25	(*)	(*)		RESISTOR, fixed: comp; 47,000 ohms ±10%; 2 w; JAN type RC41BF473K.	V9 screen grid-voltage dropping	3RC41BF473K
R13	(*)	(*)		RESISTOR, fixed: WW; 75,000 ohms ±5%; 200 w	Bleeder for h-v power supply	3Z6675-15
R13			(*)	RESISTOR, fixed: WW; 80,000 ohms ±10%; Ward Leonard #D80000WL.	Bleeder for h-v power supply	3Z6680-36
R14, R15, R35			(*)	RESISTOR, fixed: comp; 100,000 ohms ±10%; 1/2 w; JAN type RC20BF104K.	R14 and R15: Loadings for secondary of T7. R35: V8 cathode parasitic suppressor.	3RC20BF104K

R14, R15, R35	(*)	(*)		RESISTOR, fixed: comp; 100,000 ohms ±10%; 1/2 w; JAN type RC21BF104K.	R14 and R15: Loadings for secondary of T7. R35: V8 cathode parasitic suppressor.	3RC21BF104K
R11			(*)	RESISTOR, adjustable: WW; 2,500 ohms ±5%; 110 w; 8" lg x 1⅛" OD excluding term.; Ward Leonard #D2500WL.	R-f bias control	3Z6250–144
R11	(*)	(*)		RESISTOR, adjustable: WW; 2,500 ohms ±10%; 100 w.	R-f bias control	3Z6250–27
R18			(*)	RESISTOR, variable: WW; 1 sect.; 15 ohms ±10%; 100 w; JAN type RP251FE150K.	FILAMENT VOLTAGE control	3RP3920
R18	(*)	(*)		RESISTOR, variable: WW; 15 ohms ±10%; 50 w; JAN type RP151FK150KK.	FILAMENT VOLTAGE control	3RP3091
R12			(*)	RESISTOR, variable: WW; 1 sect.; 500 ohms ±10%; 50 w; JAN type RP151FE501KK.	MODULATOR BIAS control	3RP6919
R12	(*)	(*)		RESISTOR, variable: WW; 500 ohms ±10%; 50 w; JAN type RP151FK501KK.	MODULATOR BIAS control	3RP6905
X16	(*)	(*)	(*)	SOCKET, tube: 4 cont, 50 w; above chassis mtg; two 7/32" mtg holes on 2 13/16" mtg/c; 3⅜" dia steatite body, 1" thk, aluminum indexing ferrule 2" OD x 1 5/16" h; beryllium copper cont, silver pl; Johnson EF #123–211–11–SB.	Mounts tube V16	2Z8759.3
X3, X4, X6, X7	(*)	(*)	(*)	SOCKET, tube: 4 cont, med bayonet; above chassis mtg; four 3/16" mtg holes on 1⅝" x 1⅝" mtg/c; 2 13/16" dia steatite body, ⅞" thk aluminum indexing; phosphor bronze cont, silver pl; Johnson EF #123–209S.	X3: Mounts tube V3 X4: Mounts tube V4. X6: Mounts tube V6. X7: Mounts tube V7.	2Z8759.4–1
X1, X2, X5, X12		(*)	(*)	SOCKET, tube: 4 cont, med size; under chassis saddle mtg; two ⅛" dia mtg holes on 1⅞" mtg/c; 1⅜" round steatite body, ⅜" thk excluding term.; phosphor bronze cont, silver pl; Natl Co. #CIR–4.	X1: Mounts tube V1 X2: Mounts tube V2. X5: Mounts tube V5. X12: Mounts tube V12.	2Z8757.3
	(*)			SOCKET, tube: 4 cont; 1 piece saddle mtg	Mounts tubes V1, V2, V5, and V12	2Z8654.1
X10, X11			(*)	SOCKET, tube: 5 cont, med size; under chassis saddle mtg; two ⅛" dia mtg holes on 1⅞" mtg/c; 1⅜" round steatite body, ⅜" thk excluding term.; phosphor bronze cont, silver pl; Natl Co. #CIR–5.	X10: Mounts tube V10. X11: Mounts tube V11.	2Z8675.29
X10, X11		(*)		SOCKET, tube: 5 cont, med size; 1 piece saddle mtg	X10: Mounts tube V10 X11: Mounts tube V11.	2Z8711
	(*)			SOCKET, tube: 5 cont, med size; mts in 1 5/32" chassis cutout.	Mounts tubes V10 and V11	2Z8659–2
X8, X9, X13, X14, X15.			(*)	SOCKET, tube: octal type; under chassis saddle mtg; two .152" dia mtg holes on 1½" mtg/c; round ceramic body 1 3/16" dia x ⅜" thk excluding term.; phosphor bronze cont, silver pl; Natl Co. Socket–CIR–8, dwg #SD71.	X8: Mounts tube V8 X9: Mounts tube V9. X13: Mounts tube V13. X14: Mounts tube V14. X15: Mounts tube V15.	2Z8678.327

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	2	3	Name of part and description	Function of part	Signal Corps stock No.
X8, X9, X13, X14, X15.	-----	(*)	-----	SOCKET, tube: octal type; metal mtg plate	X8: Mounts tube V8. X9: Mounts tube V9. X13: Mounts tube V13. X14: Mounts tube V14. X15: Mounts tube V15.	2Z8678.195
	(*)	-----	-----	SOCKET, tube: 8 cont, octal type; retainer ring mtd.	Mounts tubes V8, V9, V13, V14, and V15.	2Z8799–137
SW2, SW13, SW5	-----	(*)	(*)	SWITCH, interlock: single sect.; bakelite body; momentary action; screw term.	Transmitter safety switches (interrupt voltage).	3Z9560–7
SW8	(*)	(*)	(*)	SWITCH, rotary: 2 pole, 4 position; 2 decks; silver pl cont; steatite wafers; 2 25/32" lg x 1 25/32" wd x 1 11/16" h; nonshorting; solder lug term.; single hole mtg 3/8" bushing, 1/4" lg, 1/4" shaft, 11/16" lg; flush mtd; 60° indexing; B&W part #10–79C.	EXCITATION METER SWITCH.	3Z9825–29.13
SW11	-----	(*)	(*)	SWITCH, rotary: 4 pole, 3 position; 4 decks; silver pl cont; steatite wafers; 9 9/16" lg x 1 25/32" wd x 1 11/16" h; nonshorting; solder lug term.; single hole mtg 3/8" bushing, 1/4" lg, 1/4" shaft, 2 1/2" lg; flush mtd; B&W part #10–80C.	BAND SWITCH	3Z9825–62.406
SW11.1 through SW11.4.	(*)	-----	-----	SWITCH, rotary: 3 position, 4 sect., 8 pole	BAND SWITCH	3Z9825–29.3
SW2, SW5, SW10, SW13.	(*)	-----	-----	SWITCH, push: SPST	Transmitter interlocks	3Z9812–2
SW5	-----	(*)	-----	SWITCH, push: SPST	Rear panel interlock	3Z9824–31.21
SW6	-----	(*)	(*)	SWITCH, toggle: SPST; JAN type ST42A	PLATE POWER on-off switch	3Z9863–42A
SW12	-----	(*)	(*)	SWITCH, toggle: SPST; JAN type ST42B	OVERLOAD RESET switch	3Z9863–42B
SW1, SW4, SW6	(*)	-----	-----	SWITCH, toggle	SW1: FILAMENT POWER on-off switch. SW4: HIGH VOLTAGE PROTECT-NORMAL switch. SW6: PLATE POWER on-off switch.	3Z9851
SW4	-----	(*)	(*)	SWITCH, toggle: DPDT; JAN type ST52N	HIGH VOLTAGE PROTECT-NORMAL switch.	3Z9863–52N
SW1, SW3	-----	(*)	(*)	SWITCH, toggle: DPST; JAN type ST52K	SW1: FILAMENT POWER on-off switch. SW3: EXCITER PLATE POWER on-off switch.	3Z9863–52K
SW3	(*)	-----	-----	SWITCH, toggle: DPST	EXCITER PLATE POWER on-off switch.	3Z9861–1

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SW12	(*)			SWITCH, push: SPST	OVERLOAD RESET switch	3Z9824–274
SW7	(*)	(*)	(*)	SWITCH, toggle: 4 pole, DT; 15 amp at 125 v inductive load; bakelite case mtd on steel front plate; 2⅛" h x 1½" wd x 1½" d excluding bat. handle; nonshorting; bat. handle ⅞" lg; #6 screw term.; 2 holes threaded for #6 screws on $1\frac{13}{16}$" mtg/c; B&W part #10–78C.	PHONE-CW switch	3Z9845–11.5
T7			(*)	TRANSFORMER, AF: input type; pri 500 ohms; secd 20,000 ohms ct; HS metal case; 2⅜" h x 1⅝" lg x 1⅝" wd less lugs; freq response 150 to 3000 cyc ±½ db; breakdown test 1500 v rms; 5 solder lugs on bottom; two 6–32 studs on bottom; B&W part #10–88C.	Interstage between speech amplifier and grids of tubes V1 and V2.	2Z9631.420
T7		(*)		TRANSFORMER, AF: input type; pri 500 ohms impedance; secd 20,000 ohms ct; break-down test 1500 v rms; HS steel case.	Interstage between speech amplifier and grids of tubes V1 and V2.	2Z9632.505
T7	(*)			TRANSFORMER, AF: input; interstage type; pri 500 ohms; secd 20,000 ohms ct; breakdown test 2000 v; fully encl tar Bi-wax impr steel case.	Interstage between speech amplifier and grids of tubes V1 and V2.	2Z9631.72
T9			(*)	TRANSFORMER, AF: modulation type; pri 21,000 ohms ct; secd 8000 ohms at 250 ma dc; 7000 v rms test; HS metal case; $5\frac{31}{32}$" h x $4\frac{21}{32}$" lg x $3\frac{31}{32}$" wd less term.; 250 w max; freq response 150 to 3000 cyc ±2db; five 8–32 stud term. on insulation on bottom of case; four ¼"–20 studs on $3\frac{1}{16}$" x 3" mtg/c; B&W part #10–90C.	Couples plates of modulation tubes V3 and V4 to final amplifier plate circuit.	2Z9633.68
T9		(*)		TRANSFORMER, AF: modulation type; pri 21,000 ohms ct; secd 8000 ohms; 250 ma dc; breakdown test, 7000 v rms; HS steel case.	Couples plates of modulation tubes V3 and V4 to final amplifier plate circuit.	2Z9634.127
T9	(*)			TRANSFORMER, AF: modulation type; pri 16,000 ohms ct; secd 8335 ohms at 250 ma; 7500 v rms test; HS, impr and asphalt potted steel case.	Couples plates of modulation tubes V3 and V4 to final amplifier plate circuit.	2Z9634.3
T8			(*)	TRANSFORMER, AF: plate coupling type; pri 5000 ohms ct; secd 2750 ohms ct; 1750 test v; HS metal case; $2\frac{15}{16}$" h x $2\frac{23}{32}$" lg x $2\frac{23}{64}$" wd less term.; 15 w; freq response 150 to 3000 cyc ±½ db; 4 solder lug term. on bottom; four 6–32 studs on 2⅛" x 1¾" mtg/c; B&W part #10–89C.	Couples plates of a-f driver tubes V1 and V2 to grids of modulator tubes V3 and V4.	2Z9632.636
T8		(*)		TRANSFORMER, AF: plate coupling type; pri 5000 ohms ct; secd 2750 ohms ct; breakdown test, pri 1700 v rms, secd 1500 v rms; HS steel case.	Couples plates of driver tubes V1 and V2 to grids of modulator tubes V3 and V4.	2Z9632.506
T8	(*)			TRANSFORMER, AF: driver, plate coupling type; pri ct to match 5000 ohms PP 2A3 plates in class "A"; secd 9000 ohms ct to match PP 100TH grids, class "B"; potted steel case.	Couples plates of driver tubes V1 and V2 to grids of modulator tubes V3 and V4.	2Z9633.24

2. Identification Table of Parts for Radio Transmitters BC-610-E, -F, -G, -H, -I, and T-213/GRC-26—Continued

Ref. symbol	Models 1	Models 2	Models 3	Name of part and description	Function of part	Signal Corps stock No.
T3			(*)	TRANSFORMER, power: fil type; input 100 v, 115 v, 50 to 60 cyc, single ph; 1 output wdg; secd 5 v, 12.6 amp ct; 1500 v insulation; HS metal case; 3 27/32" h x 3 9/16" lg x 3 1/16" wd excluding term.; 6 solder lug term. on bottom of case; four 8-32 studs on 2 1/8" x 2 5/8" mtg/c; B&W part #10-84C.	Filament supply for tubes V3 and V4.	2Z9621-203
T3		(*)		TRANSFORMER, power: fil type; pri 100 v, 115 v, 50 to 60 cyc, single ph; secd 5 v, 12.6 amp ct; HS steel case.	Filament supply for tubes V3 and V4.	2Z9611.510
T3	(*)			TRANSFORMER, power: fil type; input pri 100 v, 115 v, 50 to 60 cyc, secd 5 v, 16 amp ct; HS steel case.	Filament supply for tubes V3 and V4.	2Z9611.364
T2			(*)	TRANSFORMER, power: fil type; input 100 v, 115 v, 50 to 60 cyc, single ph; 1 output wdg; secd 2.5 v at 10 amp ct; secd to core, 10,000 v insulation, pri to core, 1750 v insulation; HS metal case; 4 7/8" h x 3 9/16" lg x 3 1/16" wd; 6 solder lug term. on bottom; four 8-32 studs on 2 1/8" x 2 5/8" mtg/c; B&W part #10-83C.	Filament supply for tubes V6 and V7.	2Z9621-201
T2		(*)		TRANSFORMER, power: fil type; input pri 100 v, 115 v, 50 to 60 cyc, single ph; secd 2.5 v ct, 10 amp; HS steel case.	Filament supply for tubes V6 and V7.	2Z9611-513
T2	(*)			TRANSFORMER, power: fil type; input pri 100 v, 115 v, 50 to 60 cyc; secd 2.5 v, 10 amp fully encl metal case.	Filament supply for tubes V6 and V7.	2Z9611.362
T4			(*)	TRANSFORMER, power: fil and plate type; input 100 v, 115 v, 50 to 60 cyc, single ph; 3 output wdg; secd #1, 5 v at 10.5 amp ct; secd #2, 6.3 v at 3.5 amp ct; secd #3, 5 v at 3 amp ct; 2000 v insulation; HS metal case; 4 15/32" h x 4 3/32" lg x 3 11/32" wd excluding term.; 12 solder lug term. on bottom; four 10-32 studs on 3 3/16" x 2 11/16" mtg/c; B&W part #10-85C.	Filament supply for tubes V8 through V12 and tube V16.	2Z9621-202
T4		(*)		TRANSFORMER, power: fil type; pri 100 v, 115 v, 50 to 60 cyc, single ph; secd #1, 5 v ct, 10.5 amp; secd #2, 6.3 v ct, 3.5 amp; secd #3, 5 v, 3 amp; HS steel case.	Filament supply for tubes V8 through V12 and tube V16.	2Z9611.511
T4	(*)			TRANSFORMER, power: fil type; input pri 110 v, 115 v, 50 to 60 cyc; secd #1, 5 v, 3 amp ct; secd #2, 6.3 v, 3.5 amp; secd #3, 5 v, 10.5 amp ct; HS steel case.	Filament supply for tubes V8 through V12 and tube V16.	2Z9611.363

T1			(*)	TRANSFORMER, power: fil and plate type; input 117 v, 50 to 60 cyc, single ph; 3 output wdg; secd #1, 1000 v at 220 ma ct; secd #2, 2.5 v at 5 amp ct; secd #3, 5 v at 3 amp ct; 1750 v insulation; HS metal case; 4 29/32" h x 4 21/32" lg x 3 31/32" wd; 11 solder lug term. on bottom; four 1/4"–20 studs on 3" x 3 11/16" mtg/c; B&W part #10–82C.	Filament supply for tubes V1, V2 and V5 and bias voltage supply.	2Z9621–200
T1		(*)		TRANSFORMER, power: fil and plate type; pri 117 v, 50 to 60 cyc; secd #1, 1000 v ct, 220 ma; secd #2, 2.5 v, 5 amp; secd #3, 5 v ct, 3 amp; HS steel case.	Filament supply for tubes V1, V2, and V5 and bias voltage supply.	2Z9613.606
T1	(*)			TRANSFORMER, power: plate and fil type; input pri 117 v, 50 to 60 cyc; secd #1, 544–0–544 v, 220 ma; secd #2, 5 v, 3 amp; secd #3, 2.5 v ct, 5 amp; HS steel case.	Filament supply for tubes V1, V2, and V5 and bias voltage supply.	2Z9613.441
T5			(*)	TRANSFORMER, power: plate type; input 115 v, 125 v, 50 to 60 cyc, single ph; 1 output wdg; secd 870 v at 250 ma dc ct; 2000 v insulation; HS metal case; 4 29/32" h x 4 21/32" lg x 3 31/32" wd less term.; 6 solder lug term. on bottom; four 1/4"–20 studs on 3 11/16" x 3" mtg/c; B&W part #10–86C.	Plate transformer of exciter power supply.	2Z9621–204
T5		(*)		TRANSFORMER, power: plate type; pri 115 v, 125 v, 50 to 60 cyc, single ph; secd 880 v ct, 250 ma; HS steel case.	Plate transformer of exciter power supply.	2Z9612.261
T5	(*)			TRANSFORMER, power: plate type; input 115 v, 125 v, 50 to 60 cyc; secd 946 v, 250 ma; HS steel case.	Plate transformer of exciter power supply.	2Z9612.184
T6			(*)	TRANSFORMER, power: plate type; input 117 v, 50 to 60 cyc, single ph, 2 wdg w/taps to provide 5760 v ct or 4800 v ct, when connected in parallel, and 2880 v ct or 2400 v ct when connected in series; 1 output wdg; secd 5760 v at 321 ma ct or 4800 v at 475 ma ct; 10,000 v rms insulation; HS metal case; 8 1/32" h x 10 23/32" lg x 9 1/32" wd less term.; 6 solder lug term. and three 1/4–20 screw term. on bottom; four 3/8–16 studs on 8 3/4" x 7" mtg/c; B&W part #10–87C.	Plate transformer for h-v power supply.	2Z9621–205
T6		(*)		TRANSFORMER, power: plate type; pri 117 v, 50 to 60 cyc, single ph; ea w/tap to provide secd of 5760 v ct or 4800 v ct when pri are connected in series; secd 5760 v ct, 321 ma dc or 4800 v ct, 475 ma dc; HS steel case.	Plate transformer for h-v power supply.	2Z9612.262
T6	(*)			TRANSFORMER, power: plate type; input pri 115 v, 50 to 60 cyc, single ph, tapped; secd 5030 v ct, 500 ma or 4050 v ct, 250 ma; HS steel case.	Plate transformer for h-v power supply.	2Z9612.1

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	2	3	Name of part and description	Function of part	Signal Corps stock No.
L7A	(*)	(*)	(*)	TRANSFORMER, RF: Sig C Coil Unit C–387–D; plug-in type; 2 wdg, single layer wdg, secd rotatable; unshielded; pri 32 turns of #14 B&S wire, secd 6½ turns of #15 B&S wire; 5½" lg x 5" wd x 6" h; air core; mts on 5 banana plugs on 1¼" mtg/c; 5 banana plug term. on bottom; B&W part #10–29C.	Final amplifier plate tank coil, 2- to 3.5-mc frequency range.	3C280–387D
L7B	(*)	(*)	(*)	TRANSFORMER, RF: Sig C Coil Unit C–388–C; plug-in type; 2 wdg, single layer wdg, secd rotatable; unshielded; pri 24 turns of #12 B&S wire, secd 4½ turns of #15 B&S wire; 5½" lg x 5" wd x 6" h; air core; mts on 5 banana plugs on 1¼" mtg/c; 5 banana plug term. on bottom; B&W part #10–30C.	Final amplifier plate tank coil, 3.5- to 4.5-mc frequency range.	3C280–388C
L7C	(*)	(*)	(*)	TRANSFORMER, RF: Sig C Coil Unit C–389–C; plug-in type; 2 wdg, single layer wdg, secd rotatable; unshielded; pri 18 turns of #12 B&S wire, secd 4½ turns of #15 B&S wire; 5½" lg x 5" wd x 6" h; air core; mts on 5 banana plugs on 1¼" mtg/c; 5 banana plug term. on bottom; B&W part #10–31C.	Final amplifier plate tank coil, 4.5- to 5.7-mc frequency range.	3C280–389C
L7D	(*)	(*)	(*)	TRANSFORMER, RF: Sig C Coil Unit C–390–C; plug-in type; 2 wdg, single layer wdg, secd rotatable; unshielded; pri 14 turns of #12 B&S wire, secd 4½ turns of #15 B&S wire; 5½" lg x 5" wd x 6" h; air core; mts on 5 banana plugs on 1¼" mtg/c; 5 banana plug term. on bottom; B&W part #10–32C.	Final amplifier plate tank coil, 5.7- to 8-mc frequency range.	3C300–390C
L7E	(*)	(*)	(*)	TRANSFORMER, RF: Sig C Coil Unit C–447–B; plug-in type; 2 wdg, single layer wdg, secd rotatable; unshielded; pri 10 turns of #9 B&S wire, secd 4½ turns of #13 B&S wire; 5½" lg x 5" wd x 6" h; air core; mts on 5 banana plugs on 1¼" mtg/c; 5 banana plug term. on bottom; B&W part #10–33C.	Final amplifier plate tank coil, 8- to 11-mc frequency range.	3C300–447B
L7F	(*)	(*)	(*)	TRANSFORMER, RF: Sig C Coil Unit C–448–B; plug-in type; 2 wdg, single layer wdg, secd rotatable; unshielded; pri 8 turns of #7 B&S wire, secd 2½ turns of #13 B&S wire; 5½" lg x 5" wd x 6" h; air core; mts on 5 banana plugs on 1¼" mtg/c; 5 banana plug term. on bottom; B&W part #10–34C.	Final amplifier plate tank coil, 11- to 14-mc frequency range.	3C300–448B

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L7G	(*)	(*)	(*)	TRANSFORMER, RF: Sig C Coil Unit C–449–B; plug-in type; 2 wdg, single layer wdg, secd rotatable; unshielded; pri 6 turns of #7 B&S wire, secd 1½ turns of #13 B&S wire; 5½'' lg x 5'' wd x 6'' h; air core; mts on 5 banana plugs on 1¼'' mtg/c; 5 banana plug term. on bottom; B&W part #10–35C.	Final amplifier plate tank coil, 14- to 18-mc frequency range.	3C300–449B
V13, V14, V15	(*)	(*)	(*)	TUBE, electron: diode; gas filled; type OD3	V13: V8 screen voltage regulator. V14 and V15: V8 plate voltage regulators.	2JOD3
V1, V2	(*)	(*)	(*)	TUBE, electron: triode; type 2A3	A-f drivers	2J2A3
V6, V7	(*)	(*)	(*)	TUBE, electron: diode; gas filled; type 3B28	H-v power supply rectifiers (Replaces 866/866A in BC–610–E model.)	2J3B28
V5, V12	(*)	(*)	(*)	TUBE, electron: duo-diode; type 5Z3	V5: Bias supply rectifier. V12: Exciter supply rectifier.	2J5Z3
V9	(*)	(*)	(*)	TUBE, electron: tetrode; type 6L6Y	Buffer-doubler	2J6L6Y
V8	(*)	(*)	(*)	TUBE, electron: tetrode; type 6V6Y	R-f oscillator	2J6V6Y
V3, V4	(*)	(*)	(*)	TUBE, electron: triode; type 100TH	Modulators	2J100TH
V16	(*)	(*)	(*)	TUBE, electron: triode; type 250TH	Final r-f power amplifier	2J250TH
V10, V11	(*)	(*)	(*)	TUBE, electron: tetrode; type 807	Intermediate power amplifiers	2J807
	(*)	(*)	-----	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU–47; steel case cad pl w/iridite dip, knobs	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8047
U1	-----	-----	(*)	and xtal socket molded phenolic; freq range 2 to 2.5 mc; 6⅛'' h x 9$^{1}/_{16}$'' lg x 1$^{15}/_{16}$'' wd approx; plugs into special 12 cont socket; B&W part #10–91C.		
	(*)	(*)	-----	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU–48; steel case cad pl w/iridite dip, knobs	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8048
U2	-----	-----	(*)	and xtal socket molded phenolic; freq range 2.5 to 3.2 mc; 6⅛'' h x 9$^{1}/_{16}$'' lg x 1$^{15}/_{16}$'' wd approx; plugs into special 12 cont socket; B&W part #10–92C.		
	(*)	(*)	-----	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU–49; steel case cad pl w/iridite dip, knobs and	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8049
U3	-----	-----	(*)	xtal socket molded phenolic; freq range 3.2 to 4 mc; 6⅛'' h x 9$^{1}/_{16}$'' lg x 1$^{15}/_{16}$'' wd approx; plugs into special 12 cont socket; B&W part #10–93C.		
	(*)	(*)	-----	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU–50; steel case cad pl w/iridite dip, knobs and	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8050
U4	-----	-----	(*)	xtal socket molded phenolic; freq range 4 to 5 mc; 6⅛'' h x 9$^{1}/_{16}$'' lg x 1$^{15}/_{16}$'' wd approx; plugs into special 12 cont socket; B&W part #10–94C.		
	(*)	(*)	-----	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU–51; steel case cad pl w/iridite dip, knobs and	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8051
U5	-----	-----	(*)	xtal socket molded phenolic; freq range 5 to 6.35 mc; 6⅛'' h x 9$^{1}/_{16}$'' lg x 1$^{15}/_{16}$'' wd approx; plugs into special 12 cont socket; B&W part #10–95C.		

2. Identification Table of Parts for Radio Transmitters BC–610–E, –F, –G, –H, –I, and T–213/GRC–26—Continued

Ref. symbol	Models 1	Models 2	Models 3	Name of part and description	Function of part	Signal Corps stock No.
	(*)	(*)	-----	TUNING UNIT, RF: Sig C Transmitter Tuning Unit TU–52; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 6.35 to 8 mc; 6⅛" h x 9 1/16" lg x 1 15/16" wd approx; plugs into special 12 cont socket; B&W part #10–96C.	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8052
U6	-----	-----	(*)			
	(*)	(*)	-----	TUNING UNIT, RF: Transmitter Tuning Unit TU–53; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 8 to 12 mc; 6⅛" h x 9 1/16" lg x 1 15/16" wd approx; plugs into special 12 cont socket; B&W part #10–97C.	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8053
U7	-----	-----	(*)			
	(*)	(*)	-----	TUNING UNIT, RF: Transmitter Tuning Unit TU–54; steel case cad pl w/iridite dip, knobs and xtal socket molded phenolic; freq range 12 to 18 mc; 6⅛" h x 9 1/16" lg x 1 15/16" wd approx; plugs into special 12 cont socket; B&W part #10–98C.	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8054
U8	-----	-----	(*)			

3. Identification Table of Parts for Transmitter Tuning Units

a. Transmitter Tuning Unit TU-47.

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU-47: var cap tuned; 2 to 2.5 mc tuning range; metal case; 1 male receptacle term.; 9⅛" lg x 6⅛" h x 2" wd; plug-in mtg.	Tuning of oscillator, doubler, and intermediate power amplifier.	2C8047
C42	CAPACITOR, fixed: ceramic; 39 μμf ±5%; 500 vdcw.	Master oscillator grid coupling	3D9039-34
C47	CAPACITOR, fixed: mica; 75 μμf ±5%; 500 vdcw; JAN type CM20B750J.	Crystal to grid coupling	3K2075022
C36	CAPACITOR, fixed: ceramic; 155 μμf ±2%; 500 vdcw.	Master oscillator padding	3D9155-2
C44	CAPACITOR, fixed: mica; 240 μμf ±5%; 500 vdcw; JAN type CM20B241J.	Crystal to cathode coupling	3K2024122
C31, C32	CAPACITOR, variable: plate meshing type; 9 μμf to 143 μμf; 600 v rms test; JAN type CTIE150.	C31: Master oscillator tuning C32: Buffer-doubler plate tuning.	3D9143V-2
C34	CAPACITOR, variable: plate meshing type; 8 μμf to 150 μμf; 1000 v AC peak.	Intermediate amplifier plate tuning.	3D9150V-14
	CLAMP, electrical: disk tumbler; black index line in ctr; (used on equipments purchased on orders other than Order No. 21418-P-50-7-C).	Locking device on master oscillator tuning dial.	2Z6195.9
	CLAMP, electrical: dial lock; (used on equipment purchased on Order No. 21418-P-50-7-C).	Locking device on master oscillator tuning dial.	2Z2642.486
L20, L26	COIL, RF: 36.3 μh; 2 to 2.5 mc; 1 wdg	L20: Buffer-doubler plate tank L26: Intermediate-amplifier plate tank.	3C1090-12
L8	COIL, RF: [illegible] μh; 2 to 2.5 mc; 1 wdg	Master oscillator tank	3C1090
L14	COIL, RF: 28.8 μh; 2 to 2.5 mc; 1 wdg	Crystal oscillator cathode load inductor.	3C1090-6
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
I4	DIAL, control: knob type; marked "0-100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
A1	MOUNTING	Insulates tuning capacitor from metal panel.	2Z6820.332
X17	SOCKET, crystal: 5/32" dia pins accom, ¾" c to c	Mounts crystal	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M.O. operation.	3Z9858-3.1

b. Transmitter Tuning Unit TU-48.

	TRANSMITTER TUNING UNIT TU-48: var cap tuned; 2.5 to 3.2 mc tuning range; aluminum case; 12 term. male receptacle; 9 1/32" lg x 1⅞" wd x 5⅝" h; plug-in mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8048
C43	CAPACITOR, fixed: 39 μμf ±5%; 500 vdcw; JAN type CC32CH390J.	Master oscillator grid coupling	3D9039-34
C37	CAPACITOR, fixed: ceramic; 160 μμf ±5%; 500 vdcw; JAN type CC35PH161J.	Master oscillator padding	3D9160-6
C45	CAPACITOR, fixed: mica; 390 μμf ±10%; 500 vdcw; JAN type CM20B391K.	Crystal to cathode coupling	3K2039121

3. Identification Table of Parts for Transmitter Tuning Units—Continued

b. Transmitter Tuning Unit TU–48—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C33	CAPACITOR, variable: plate meshing type; 7.5 μμf to 99 μμf; 600 v rms test; JAN type CT1B100.	Buffer-doubler plate tuning	3D9099V–5
C35	CAPACITOR, variable: plate meshing type; 7 μμf to 100 μμf; 800 v rms test; JAN type CT2C100.	Intermediate amplifier plate tuning.	3D9100V–9
C31	CAPACITOR, variable: plate meshing type; 9 μμf to 143 μμf; 600 v rms test; JAN type CT1E150.	Master oscillator tuning	3D9143V–2
	CLAMP, electrical: disk tumbler; black index line in ctr; (used on equipments purchased on orders other than Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z6195.9
	CLAMP, electrical: dial lock; (used on equipment purchased on Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z2642.486
L21, L27	COIL, RF: 30.8 μh; 2.5 mc to 3.2 mc; 1 wdg	L21: Buffer-doubler plate tank. L27: Intermediate-amplifier plate tank.	3C1090–13
L9	COIL, RF: 55.5 μh; 2.5 mc to 3.2 mc; universal wdg; 70 turns copper wire tapped at 25 turns.	Master oscillator tank	3C1090–1
L15	COIL, RF: 12 μh; 2.5 mc to 3.2 mc range; single layer, 62 turns.	Crystal oscillator cathode load inductor.	3C1090–7
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
I4	DIAL, control: knob type; marked "0–100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
A1	MOUNTING	Insulates tuning capacitors from metal panel.	2Z6820.332
X17	SOCKET, crystal: 5/32" dia pins accom, 3/4" c to c.	Mounts crystal	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M. O. operation.	3Z9858–3.1

c. Transmitter Tuning Unit TU–49.

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU–49: var cap tuned; aluminum case; 12 term. male receptacle; 9 1/32" lg x 1 7/8" wd x 5 5/8" h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8049
C43	CAPACITOR, fixed: 39 μμf +5%; 500 vdcw; JAN type CC32CH390J.	Master oscillator grid coupling	3D9039–34
C38	CAPACITOR, fixed: ceramic; 135 μμf ±2%; 500 vdcw.	Master oscillator padding	3D9135–8
C33	CAPACITOR, variable: plate meshing type; 7.5 μμf to 99 μμf; 600 v rms test; JAN type CT1E100.	Buffer-doubler plate tuning	3D9099V–7
C35	CAPACITOR, variable: plate meshing type; 7 μμf to 100 μμf; 800 v rms test; JAN type CT2C100.	Intermediate amplifier plate tuning.	3D9100V–9

3. Identification Table of Parts for Transmitter Tuning Units—Continued

c. Transmitter Tuning Unit TU–49—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C31	CAPACITOR, variable: plate meshing type; 9 μμf to 143 μμf; 600 v rms test; JAN type CT1E150.	Master oscillator tuning	3D9143V–2
	CLAMP, electrical: disk tumbler; black index line in ctr; (used on equipments purchased on orders other than Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z6195.9
	CLAMP, electrical: dial lock; (used on equipment purchased on Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z2642.486
L22, L28	COIL, RF: 20.6 μh; 1 wdg; 30 turns copper wire	L22: Buffer-doubler plate tank L28: Intermediate amplifier plate tank.	3C1090–14
L10	COIL, RF: 41 μh; 3.2 mc to 4 mc; 1 wdg; 56 turns copper wire, tapped at 19½ turns.	Master oscillator tuning	3C1081–13T
L16	COIL, RF: 9.2 μh; 3.4 mc to 4 mc; 1 wdg; 35 turns copper wire.	Crystal oscillator cathode load inductor.	3C1090–8
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
I4	DIAL, control: knob type; marked "0–100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
A1	MOUNTING	Insulates tuning capacitors from metal panel.	2Z6820.332
X17	SOCKET, crystal: 5/32" dia pins accom, ¾" c to c.	Mounts crystal	2Z8672–25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M. O. operation.	3Z9858–3.1

d. Transmitter Tuning Unit TU–50.

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU–50: var cap tuned; 4 mc to 5 mc tuning range; aluminum case; 12 term. male receptacle; 9 1/32" lg x 1⅞" wd x 5⅝" h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8050
C43	CAPACITOR, fixed: 39 μμf ±5%; 500 vdcw; JAN type CC32CH390J.	Master oscillator grid coupling	3D9039–34
C46	CAPACITOR, fixed: mica; 100 μμf ±5%; 500 vdcw; JAN type CM20B101J.	Crystal to cathode coupling	3K2010122
C39	CAPACITOR, fixed: ceramic; 170 μμf ±2%; 500 vdcw.	Master oscillator padding	3D9170–6
C33	CAPACITOR, variable: plate meshing type; 7.5 μμf to 99 μμf; 600 v rms test; JAN type CT1E100.	Buffer-doubler plate tuning	3D9099V–7
C35	CAPACITOR, variable: plate meshing type; 7 μμf to 100 μμf; 800 v rms test; JAN type CT2C100.	Intermediate amplifier plate tuning.	3D9100V–9
C31	CAPACITOR, variable: plate meshing type; 9 μμf to 143 μμf; 600 v rms test; JAN type CT1E150.	Master oscillator tuning	3D9143V–2
	CLAMP, electrical: disk tumbler; black index line in ctr; (used on equipments purchased on orders other than Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z6195.9

3. Identification Table of Parts for Transmitter Tuning Units—Continued

d. Transmitter Tuning Unit TU–50—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	CLAMP, electrical: dial lock; (used on equipment purchased on Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z2642.486
L23, L29	COIL, RF: 12.6 μh; 4 mc to 5 mc; 1 wdg; 25 turns copper wire.	L23: Buffer-doubler plate tank. L29: Intermediate amplifier plate tank.	3C1090–15
L11	COIL, RF: 21.4 μh; 4 mc to 5 mc; 1 wdg; 35 turns copper wire.	Master oscillator tuning	3C1090–3
L17	COIL, RF: 66 μh; 4 mc to 5 mc; 1 wdg; 96 turns copper wire.	Crystal oscillator cathode load inductor.	3C1090–9
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
I4	DIAL, control: knob type; marked "0–100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
A1	MOUNTING	Insulates tuning capacitors from metal panel.	2Z6820.332
X17	SOCKET, crystal: 5/32" dia pins accom, 3/4" c to c.	Mounts crystal	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M. O. operation.	3Z9858–3.1

e. Transmitter Tuning Unit TU–51

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU–51: var cap tuned; 5 mc to 6.35 mc tuning range; aluminum case; 12 term. male receptacle; 9 1/32" lg x 1 7/8" wd x 5 5/8" h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8051
C42	CAPACITOR, fixed: ceramic; 39 μμf ± 5%; 500 vdcw; JAN type CC32CH390J.	Master oscillator grid coupling	3D9039–34
C40	CAPACITOR, fixed: ceramic; 160 μμf ± 2%; 500 vdcw; JAN type CC35RH161G.	Master oscillator padding	3D9160–9
C45	CAPACITOR, fixed: mica; 390 μμf ± 10%; 500 vdcw; JAN type CM20B391K.	Crystal to cathode coupling	3K2039121
C33	CAPACITOR, variable: plate meshing type; 7.5 μμf to 99 μμf; 600 v rms test; JAN type CT1E100.	Buffer-doubler plate tuning	3D9099V–7
C35	CAPACITOR, variable: plate meshing type; 7 μμf to 100 μμf; 800 v rms test; JAN type CT2C100.	Intermediate amplifier plate tuning.	3D9100V–9
C31	CAPACITOR, variable: plate meshing type; 9 μμf to 143 μμf; 600 v rms test; JAN type CT1E150.	Master oscillator tuning	3D9143V–2
	CLAMP, electrical: disk tumbler; black index line in ctr; (used on equipments purchased on orders other than Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z6195.9
	CLAMP, electrical: dial lock; (used on equipments purchased on Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z2642.486
L24, L30	COIL, RF: 8.6 μh; 5 mc to 6.35 mc; 1 wdg; 19 turns copper wire.	L24: Buffer-doubler plate tank. L30: Intermediate amplifier plate tank.	3C1090–16

3. Identification Table of Parts for Transmitter Tuning Units—Continued

e. Transmitter Tuning Unit TU–51—Continued

Ref Symbol	Name of part and description	Function of part	Signal Corps Stock No.
L12	COIL, RF: 14.1 μh; 5 mc to 6.35 mc; 1 wdg; 40 turns copper wire.	Master oscillator tuning	3C1090–4
L18	COIL, RF: 22.8 μh; 5 mc to 6.35 mc; 1 wdg; 73 turns copper wire.	Crystal oscillator cathode load inductor.	3C1090–10
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
I4	DIAL, control: knob type; marked "0–100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
X17	SOCKET, crystal: 5/32" dia pins accom, 3/4" c to c	Mounts crystal	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M. O. operation.	3Z9858–31
A1	MOUNTING	Insulates tuning capacitors from metal panel.	2Z6820.332

f. Transmitter Tuning Unit TU–52

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU–52: var cap tuned, 6.35 mc to 8 mc tuning range; aluminum case; 12 term, male receptacle; 9 1/32" lg x 1 7/8" wd x 5 5/8" h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8052
C42	CAPACITOR, fixed: ceramic; 39 μμf ±5%; 500 vdcw.	Master oscillator grid coupling	3D9039–34
C41	CAPACITOR, fixed: ceramic; 185 μμf ±2%; 500 vdcw.	Master oscillator padding	3D9185–3
C45	CAPACITOR, fixed: mica; 390 μμf ±10%; 500 vdcw; JAN type CM20B391K.	Crystal to cathode coupling	3K2039121
C33	CAPACITOR, variable: plate meshing type; 7.5 μμf to 99 μμf; 600 v rms test; JAN type CT1E100.	Buffer-doubler plate tuning	3D9099V–7
C35	CAPACITOR, variable: plate meshing type; 7 μμf to 100 μμf; 800 v rms test; JAN type CT2C100.	Intermediate amplifier plate tuning.	3D9100V–9
C31	CAPACITOR, variable: plate meshing type; 9 μμf to 143 μμf; 600 v rms test; JAN type CT1E150.	Master oscillator tuning	3D9143V–2
	CLAMP, electrical: disk tumbler; black index line in ctr; (used on equipment purchased on orders other than Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z6195.9
	CLAMP, electrical: dial lock; (used on equipment purchased on Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z2642.486
L25, L31	COIL, RF: 5.66 μh; 6.35 mc to 8 mc; 1 wdg; 14 turns copper wire.	L25: Buffer-doubler plate tank L31: Intermediate amplifier plate tank.	3C1090–17
L13	COIL, RF: 8.1 μh; 6.35 mc to 8 mc; 1 wdg; 28 turns copper wire.	Master oscillator tuning	3C1090–5
L19	COIL, RF; 18 μh; 6.35 mc to 8 mc; 1 wdg; 60 turns copper wire.	Crystal oscillator cathode load inductor.	3C1090–11
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11

3. Identification Table of Parts for Transmitter Tuning Units—Continued

f. Transmitter Turning Unit TU–52—Continued

Ref Symbol	Name of part and description	Function of part	Signal Corps stock No.
I4	DIAL, control: knob type; marked "0–100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustments for doubler and intermediate amplifier.	2Z5849.8
A1	MOUNTING	Insulates tuning capacitors from metal panel.	2Z6820.332
X17	SOCKET, crystal: 5/32" dia pins accom, 3/4" c to c	Mounts crystal	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M. O. operation.	3Z9858–3.1

g. Transmitter Tuning Unit TU–53.

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU–53: var cap tuning; 8 mc to 12 mc tuning; aluminum case; 12 term. male receptacle; 9 1/32" lg x 1 7/8" wd x 5 5/8" h.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8053
C42	CAPACITOR, fixed: ceramic; 39 μμf ±5%; 500 vdcw.	Master oscillator grid leak capacitor.	3D9039–34
C48	CAPACITOR, fixed: ceramic; 65 μμf ±2%; 500 vdcw.	Master oscillator padding	3D9065–6
C44	CAPACITOR, fixed: mica; 240 μμf ±5%; 500 vdcw; JAN type CM20B241J.	Crystal to cathode coupling	3K2024122
C31, C32	CAPACITOR, variable: plate meshing type; 9 μμf to 143 μμf; 600 v rms test; JAN type CT1E150.	C31: Master oscillator tuning C32: Buffer-doubler plate tuning.	3D9143V–2
C34	CAPACITOR, variable: plate meshing type; 8 μμf to 150 μμf; 1000 v ac peak.	Intermediate amplifier plate tuning.	3D9150V–14
	CLAMP, electrical: disk tumbler; black index line in ctr; (used in equipment purchased on orders other than Order No. 21448-P–50–7–C.)	Locking device on master oscillator tuning dial.	2Z6195.9
	CLAMP, electrical: dial lock; (used on equipment purchased on Order No. 21448-P–50–7–C.)	Locking device on master oscillator tuning dial.	2Z2642.486
L33, L34	COIL, RF: 2.56 μh; resonates at 9.92 mc; 1 wdg; 10 turns copper wire.	L33: Buffer-doubler plate tank L34: Intermediate amplifier plate tank.	3C1094P–5
L32	COIL, RF: 7.5 μh; 8 mc to 12 mc; 1 wdg 35 turns copper wire tapped at 11½ turns.	Master oscillator tuning	3C4055–1
L41	COIL, RF: 8 μh; 8 mc to 12 mc; 1 wdg; 32 turns copper wire.	Crystal oscillator cathode load inductor.	3C1084P–1
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
I4	DIAL, control: knob type; marked "0–100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustment for doubler and intermediate amplifier.	2Z5849.8
A1	MOUNTING	Insulates tuning capacitors from metal panel.	2Z6820.332
R29, R30	RESISTOR, fixed: comp; 33,000 ohm ±10%; ½ w; JAN type RC20BF333K.	R29: Master oscillator grid leak R30: Crystal oscillator grid leak	3RC20BF33K
X17	SOCKET, crystal: 5/32" dia pins accom, 3/4" c to c	Mounts crystal	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M.O. operation.	3Z9858–3.1

3. Identification Table of Parts for Transmitter Tuning Units—Continued

h. Transmitter Tuning Unit TU–54.

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU–54: var cap tuning; 12 mc to 18 mc tuning range; aluminum case; 12 term. male receptacle; 9 1/32" lg x 1 7/8" wd x 5 5/8" h; plug-in type mtg.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8054
C49	CAPACITOR, fixed: ceramic; 68 μμf ±2%; 500 vdcw.	Master oscillator padding	3D9065–6
C50	CAPACITOR, fixed: ceramic; 39 μμf ±5%; 500 vdcw; JAN type CC32CH390J.	Master oscillator grid leak capacitor.	3D9039–34
C44	CAPACITOR, fixed: mica; 240 μμf ±5%; 500 vdcw; JAN type CM20B241J.	Crystal to cathode coupling	3K2024122
C31, C32	CAPACITOR, variable: plate meshing type; 9μμf to 143 μμf; 600 v rms test; JAN type CT1E150.	C31: Master oscillator tuning C32: Buffer-doubler plate tuning.	3D9143V–2
C34	CAPACITOR, variable: plate meshing type; 8μμf to 150 μμf; 1000 v ac peak.	Intermediate amplifier plate tuning.	3D9150V–14
	CLAMP, electrical: disk tumbler; black index line in ctr; (used in equipment purchased on orders other than Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z6195.9
	CLAMP, electrical: dial lock; (used on equipment purchased on Order No. 21418–P–50–7–C).	Locking device on master oscillator tuning dial.	2Z2642.486
L36	COIL, 4.48 μh; 12 mc to 18 mc; 1 wdg; 14 turns	Buffer-double plate tank	3C1084P
L37	COIL, 1.15 μh; 12 mc to 18 mc; 1 wdg; 9 turns copper wire.	Intermediate amplifier plate tank.	3C1084P–7
L35	COIL, 12.7 μh; 12 mc to 18 mc; 1 wdg; 47 turns copper wire.	Master oscillator tuning	3C1081–13S
L42	COIL, RF: 14.2 μh; 12 mc to 18 mc; 1 wdg; 50 turns copper wire.	Crystal oscillator cathode load inductor.	3C1084P–6
PL10	CONNECTOR, receptacle: 12 straight pol male cont.	Tuning unit base and terminal prongs, for connection of tuning unit to transmitter.	2Z7122.11
I4	DIAL, control: knob type; marked "0–100" in 180°, left to right.	Frequency indicator for master oscillator.	2Z3717.5
	KNOB: round; black	Manual adjustment for doubler and intermediate amplifier.	2Z5849.8
A1	MOUNTING	Insulates tuning capacitors from metal panel.	2Z6820.332
R31, R32	RESISTOR, fixed: comp; 33,000 ohm ±10% 1/2 w; JAN type RC20BF333K.	R31: Crystal oscillator grid leak R32: Master oscillator grid leak	3RC20BF333K
X17	SOCKET, crystal: 5/32" pins accom, 3/4" c to c	Mounts crystal	2Z8672.25
SW15	SWITCH, toggle: DPDT; JAN type ST26N	Switching for XTAL or M. O. operation.	3Z9858–3.1

4. Identification Table of Parts for Frequency Conversion Kit MC–509

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	FREQUENCY CONVERSION KIT MC–509: transmitter coil and tuning units; for operation on 1 to 2 mc freq band; in carrying chest, includes operating instructions.	Extends the frequency range of Radio Transmitter BC–610–(*).	2Z5725–509
	TECHNICAL MANUAL TM 11–281		Order through AGO.
	ANTENNA AN–168: single-wire type; #14 AWG phosphor bronze wire; one piece; 125 ft lg; w/SIG C Insulator IN–86 spaced 75 ft from one end; includes Fahnestock clip and pigtail for shorting across insulator to obtain 125′ lg.	For transmitting in 1- to 2-mc frequency range.	2A275–168
	BAG BG–102–A: antenna accessories; canvas, olive drab; approx 18″ x 16″ x 9″; w/strap and flap cover.	Holds accessories	2Z502
	CAPACITOR, CA–423: fixed; vacuum; 55 $\mu\mu$f; 32,000 v ac; 1½″ lg x 2¼″ dia o/a.	Padder for final amplifier	3D423
	CAPACITOR, fixed: vacuum; 100 $\mu\mu$f; 20,000 v peak; 6½″ lg x 2¼″ dia o/a.	Padder for final amplifier	3D9100–133
	CHEST CH–251: wood; approx 25″ lg x 14½″ wd x 9½″ h; 9 compartments.	Holds coils and tuning units	2Z2599–251
	GUY GY–22: antenna; braided cotton rope; two 65 ft lg Sig C Rope RP–3; includes 2 Sig C Blocks FT–127, one fastened to ring and harness strap common to both guys, other fastened to ring; harness snap one end, Sig C Fastener FT–9 other end; Sig C dwg #SC–D–1144.	Guy for antenna mast	2A1322
	GUY GY–24: antenna; braided cotton rope; 65 ft lg Sig C Rope RP–3; includes Sig C Block FT–127 w/ring and harness snap; one end free, other end w/harness snap; Sig C dwg #1144.	Guy for antenna mast	2A1324
	GUY PLATE MP–20: antenna mast; metal; 4″ lg x 1 13/16″ wd x 3/16″ thk Sig C dwg #SC–D–1263.	Mounts on mast and provides connection to guys.	2A1350
	MAST BASE MP–19: antenna; metal; 6½″ lg x 2″ wd w/hinge plug 5 1/16″ h; Sig C dwg #SC–D–1156.	Provides mount for mast	2A2079
	MAST SECTION MS–44: antenna; aluminum; 66″ lg x 1⅜″ ID; "MS–44" stenciled on mast in white paint; Sig C dwg #SC–D–1155.	One section of the antenna mast	2A2344
	ROLL BG–176: canvas; 66″ lg x 36″ wd unrolled; w/folding flap for buckle and 3 straps for holding; 7 pockets.	For carrying 7 mast sections	2A3194–176
	ROPE RP–3: cotton; braided; 1/64″ max dia; #5; white; Sig C spec #71–217.		6Z7925
	STAKE GP–2: guy; metal; 16″ lg x ¾″ dia; Sig C dwg #RL–A–120.	Secure mast base and guys to ground.	2A3302
	TRANSFORMER, RF: Coil Unit C–454; power amplifier; freq range, 1.5 to 2 mc; 2 windings; approx 5½″ lg x 4½″ dia o/a; 5 banana type plugs on ceramic strip.	Final amplifier plate tank coil 1.5–2–mc frequency range.	3C280–454
	TRANSFORMER, RF: Coil Unit C–455; power amplifier; freq range, 1 to 1.5 mc; 2 windings; approx 7″ lg x 5″ dia o/a; 5 banana type plugs on ceramic strip.	Final amplifier plate tank coil 1- to 1.5-mc frequency range.	3C280–455

4. Identification Table of Parts for Frequency Conversion Kit MC–509—Continued

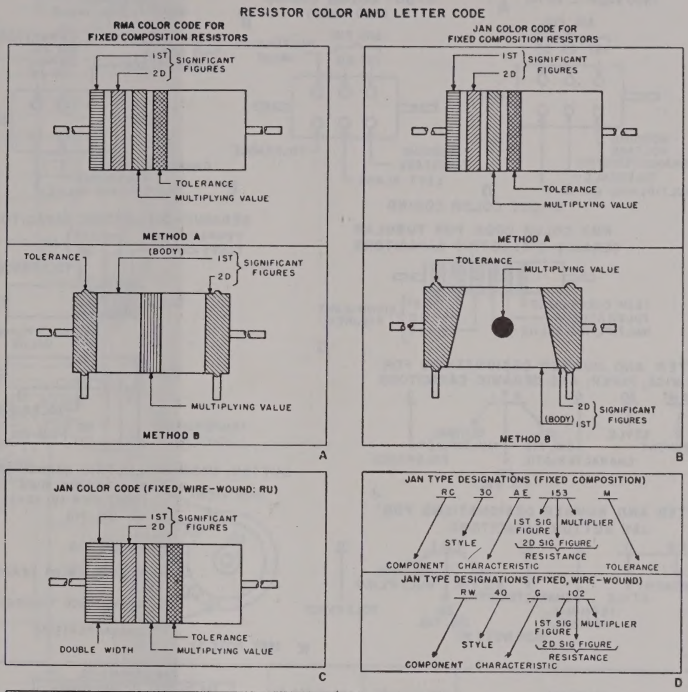
Ref symbol	Name of part and description	function of part	Signal Corps stock No.
	TRANSMITTER TUNING UNIT TU–61: rf; 1.5 to 2 mc; 8⅞'' lg x 5⅝'' h x 1.8125'' thk.	Tuning of oscillator, doubler; and intermediate amplifier.	2C8061
	TRANSMITTER TUNING UNIT TU–62; rf; 1 to 1.5 mc; 8⅞'' lg x 5⅝'' h x 1.8125'' thk.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8062
	WIRE W–128: electrical; insulated; single #14 AWG cond; .350'' dia; copper; stranded; rc; Sig C spec #71–726.	Jumper wire for antenna tuner modification.	1B128

5. Identification Table of Parts for Transmitter Tuning Units TU–61 and TU–62 of Frequency Conversion Kit MC–509

Ref. symbol	Models		Name of part and description	Function of part	Signal Corps stock No.
	TU–61	TU–62			
			TRANSMITTER TUNING UNIT TU–61: rf; 1.5 to 2 mc; 8⅞'' lg x 5⅝'' h x 1.8125'' thk.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8061
			TRANSMITTER TUNING UNIT TU–62; rf; 1 to 1.5 mc; 8⅞'' lg x 5⅝'' h x 1.8125'' thk.	Tuning of oscillator, doubler, and intermediate amplifier.	2C8062
C42	(*)	(*)	CAPACITOR, fixed: ceramic; 40 μμf ±5%; zero temp coef; 500 vdcw; 1.3'' lg x .350'' dia; Hallicrafters #47A019.	Master oscillator grid coupling.	3D9040–10
C48	------	(*)	CAPACITOR, fixed: ceramic; 60 μμf ±5%; neg temp coef .000150 μμf/μμf/°C; 500 vdcw; 1.093'' lg x .225'' dia; Hallicrafters #47A022.	Master oscillator padding	3D9060–5
C62	(*)	------	CAPACITOR, fixed: ceramic; 75 μμf ±2%; neg temp coef .000150 μμf/μμf/°C; 500 vdcw; 1.078'' lg x .878'' dia; Muter #CB–H–75.	Master oscillator padding	3D9075–12
C44	(*)	------	CAPACITOR, fixed: mica; 240 μμf ±5%; 500 vdcw; max body dimen 5/64'' lg x 15/32'' wd x 7/32'' thk; JAN type CM20A-241J.	Crystal to cathode coupling	3K2024112
C61	(*)	------	CAPACITOR, variable: air; 6 to 133 μμf; 1000 v rms test; 1 15/16'' lg x 15/16'' wd x 1 7/32'' h; Hammarlund #APC–501.	Master oscillator tuning	3D9133V
C31	------	(*)	CAPACITOR, variable: air; 6 to 146 μμf;	C31: Master oscillator tuning.	3D9140V–7
C32	(*)	(*)	body 1 15/16'' lg x 15/16'' wd x 1 7/32'' h, shaft and bushing 25/32'' lg x ¼'' dia; Johnson EF #140K8.	C32. Buffer-doubler plate tuning.	
C34	(*)	(*)	CAPACITOR, variable: air; 11.5 to 150 μμf; .024'' air gap; body 2½'' lg x 1 23/32'' wd x 1 1/16'' h, shaft ½'' lg x ¼'' dia; Hallicrafters #48A086.	Intermediate amplifier plate tuning.	3D9150V–14
L57	(*)	------	COIL, RF: buffer; unshielded; 66 turns #30 E copper wire; 1 9/16'' lg x 1'' dia; Hallicrafters #51A700.	Intermediate amplifier plate tank.	3C1084P–17
L53	------	(*)	COIL, RF: buffer; unshielded; 66 turns #15/64 Litz E copper wire; 1 9/16'' lg x 1'' dia; Hallicrafters #51A696.	Intermediate amplifier plate tank.	3C1084P–15
L52	------	(*)	COIL, RF: buffer; unshielded; 80 turns #15/44 Litz E copper wire; 1 9/16'' lg x 1'' dia; Hallicrafters #51A697.	Buffer-doubler plate tank	3C1084P–13

5. Identification Table of Parts for Transmitter Tuning Units TU–61 and TU–62 of Frequency Conversion Kit MC–509—Continued

Ref. symbol	Models		Name of part and description	Function of part	Signal Corps stock No.
L54	------	(*)	COIL, RF: choke; unshielded; 123 turns #34 E copper wire; 1 21/32" lg x 1/2" dia; Hallicrafters #51A695.	Crystal oscillator cathode load inductor.	3C1084P–12
L56	(*)	------	COIL, RF: doubler; unshielded; 58 turns #30 E copper wire; 1 1/16" lg x 1" dia; Hallicrafters #51A701.	Buffer-doubler plate tank	3C1084P–18
L55	(*)	------	COIL, RF: MO; unshielded; 123 turns #15/44 Litz E copper wire; 2 1/8" lg x 1/2" dia; Hallicrafters #51A702.	Master oscillator tank	3C1084P–19
L51	------	(*)	COIL, RF: MO; unshielded; 179 turns #15/44 Litz E copper wire; 2 1/8" lg x 1/2" dia; Hallicrafters #51A698.	Master oscillator tank	3C1084P–14
L58	(*)	------	COIL, RF: oscillator; unshielded; 99 turns #36 E copper wire; 1 21/32" lg x 1/2" dia; Hallicrafters #51A699.	Crystal oscillator cathode load inductor.	3C1084P–16
	(*)	(*)	DIAL: tuning; white brass dial, phenolic knob; w/scale marked 0–100; dial 1 3/4" dia x .025" thk; knob 27/32" dia; includes bushing and setscrews; Hallicrafters #83A151.	Frequency indicator for master oscillator.	2Z3717.5
	(*)	(*)	KNOB: round; black bakelite; for 5/16" dia shaft; single #8–32 setscrew; w/white dot; 5/8" dia x 1 1/8" thk; Hallicrafters #15B004.	Manual adjustments for doubler stage and intermediate amplifier stage.	2Z5849.8
	(*)	(*)	LOCK: dial; disk tumbler; 1 5/16" lg x 15/16" wd x 7/16" thk; Hallicrafters #48A86.	Locking device on master oscillator tuning dial.	2Z6195.9
	(*)	(*)	SOCKET, crystal holder: 2 cont; mica filled bakelite; 1 3/8" lg x 5/8" wd x 3/8" h; Amphenol #33–3T.	Mounts crystal	2Z8672.25
	(*)	(*)	SWITCH, toggle: DPDT; black bakelite; 1 9/32" h x 2 3/32" x 23/32" wd; 3 amp, 250 v; JAN type ST22N.	Switching for XTAL or M. O. operation.	3Z9849.135



STANDARDS

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)	JAN LETTER TOLERANCE
BLACK	0	1	—	—
BROWN	1	10	± 1	F
RED	2	100	± 2	G
ORANGE	3	1,000	± 3	—
YELLOW	4	10,000	± 4	—
GREEN	5	100,000	± 5	—
BLUE	6	1,000,000	± 6	—
VIOLET	7	10,000,000	± 7	—
GRAY	8	100,000,000	± 8	—
WHITE	9	1,000,000,000	± 9	—
GOLD	—	0.1	± 5	J
SILVER	—	0.01	±10	K
NO COLOR	—	—	±20	M

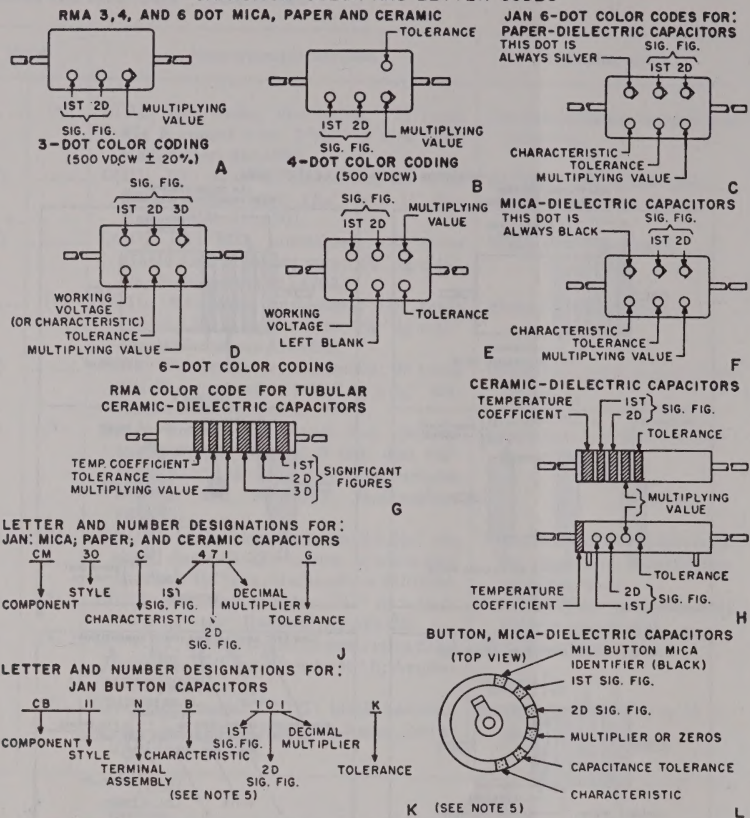
NOTES:

1. RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.
2. RMA: RADIO MANUFACTURERS ASSOCIATION.
3. JAN: JOINT ARMY-NAVY.
4. THESE COLOR AND NUMBER CODES GIVE ALL RESISTANCE VALUES IN OHMS.
5. RESISTIVE COMPONENTS USED FOR LETTER TOLERANCES ARE: RC, RN, AND RU.
6. WATTAGE FOR RW TYPES IS FOUND IN THE JAN SPECIFICATIONS UNDER CHARACTERISTICS.

TMRC

Figure 74. Resistor color and letter code.

CAPACITOR COLOR AND LETTER CODES



- STANDARDS -					JAN MICA-CM		JAN PAPER-CM		JAN CERAMIC-CC					
									CAP. TOL. FOR MORE THAN 10 UUF			CAP. TOL. FOR 10 UUF OR LESS		
COLOR	SIG. FIG.	DECIMAL MULTIPLIER	% TOL.	VDCW	LETTER TOL.	CHARAC-TERISTIC	LETTER TOL.	CHARAC-TERISTIC	DEC. MULT.	%	LETTER DESIG-NATION	UUF	LETTER DESIG-NATION	CHARAC-TERISTIC
BLACK	0	1	±20	500	M	A	M	A	1	±20	M	±2.0	G	C
BROWN	1	10	± 1	100	-	B	-	E	10	± 1	F	-	-	H
RED	2	100	± 2	200	G	C	-	H	100	± 2	G	-	-	L
ORANGE	3	1,000	± 3	300	-	D	N*	J	1,000	-	-	-	-	P
YELLOW	4	10,000	± 4	400	-	E	-	P	-	-	-	-	-	R
GREEN	5	100,000	± 5	500	-	F	-	R	-	± 5	J	±0.5	D	S
BLUE	6	1,000,000	± 6	600	-	G	-	S	-	-	-	-	-	T
VIOLET	7	10,000,000	± 7	700	-	-	-	T	-	-	-	-	-	U
GRAY	8	100,000,000	± 8	800	-	-	-	-	0.01	-	-	±0.25	C	B
WHITE	9	1,000,000,000	± 9	900	-	-	-	-	0.1	± 10	K	±1.0	F	SL
GOLD	-	0.1	± 5	1,000	J	-	-	-	-	-	-	-	-	A
SILVER	-	0.01	±10	2,000	K	-	K	-	-	-	-	-	-	-
NO COLOR	-	-	±20	500	-	-	-	-	-	-	-	-	-	-
*. THE TOLERANCE OF THIS CAPACITOR IS ±30%, NOT ±2%.														

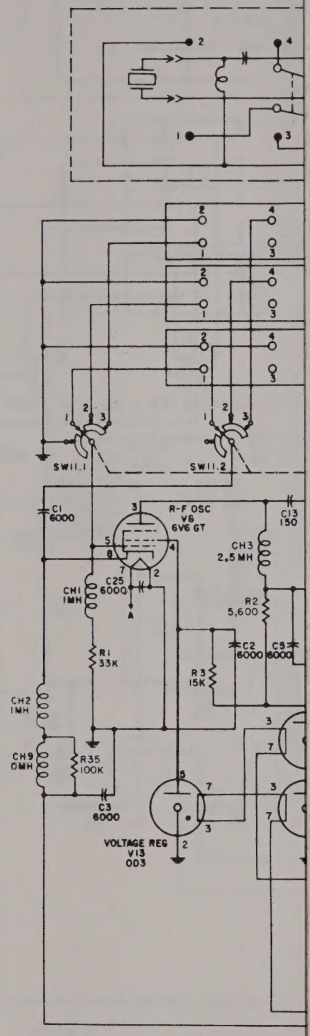
NOTES

JAN: JOINT ARMY-NAVY
RMA: RADIO MANUFACTURERS ASSOCIATION

1. THESE COLOR AND LETTER CODES GIVE CAPACITANCES IN MICROMICROFARADS
2. THIS TABLE IS ADAPTED FOR JAN AND RMA COLOR AND JAN LETTER TYPE DESIGNATIONS
3. CERAMIC AND MICA CAPACITORS, BOTH JAN AND RMA, ARE GENERALLY 500 VDCW
4. BUTTON CAPACITORS ARE GENERALLY 300 VDCW
5. READ BUTTON CAPACITOR TOLERANCE UNDER CERAMICS OF MORE THAN 10 UUF
6. CHARACTERISTICS ARE AVAILABLE IN JAN CAPACITOR SPECIFICATION MANUALS
7. THE COMPONENTS USED ABOVE FOR JAN LETTER TYPE DESIGNATIONS ARE:
   CB MICA BUTTON: *CC* CERAMIC; *CM* MICA MOULDED: *CN* PAPER MOULDED

TM CC

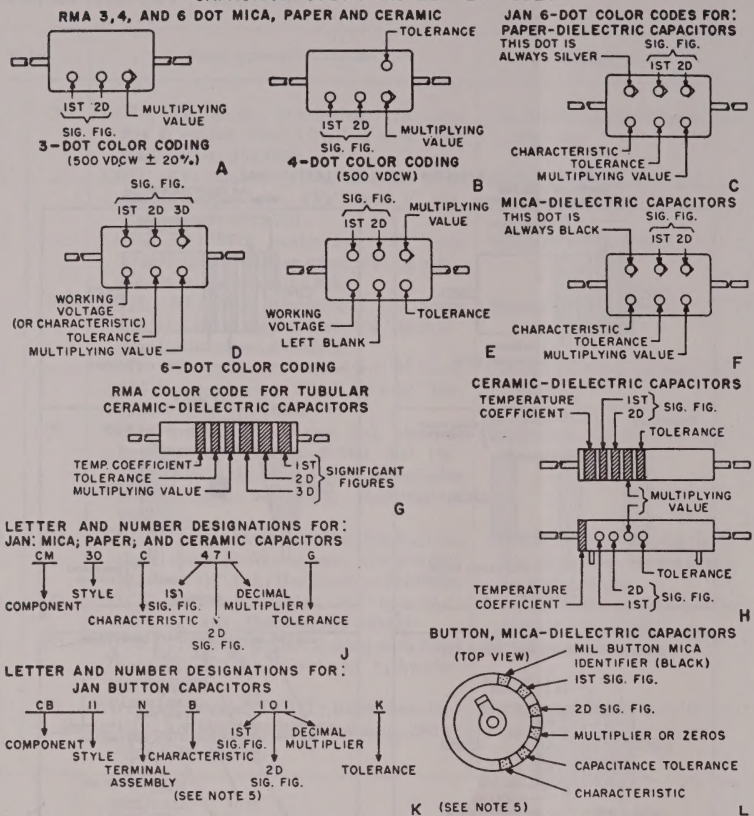
Figure 75. Capacitor color and letter code.



NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. DOTTED LINES SHOW WIRING OF TRAN SERIAL NUMBER 5191 ON ORDER NO MODIFIED BY MWO SIG II-281-6)
3. R36, A 2K RESISTOR IS IN SERIES OF TS2 IN TRANSMITTERS MODIFIED
4. V6 AND V7 TYPE 866A/866 TUBES 3B28 TYPE TUBES.

CAPACITOR COLOR AND LETTER CODES



- STANDARDS -					JAN MICA-CM		JAN PAPER-CM		JAN CERAMIC-CC					
										CAP. TOL. FOR MORE THAN 10 UUF		CAP. TOL. FOR 10 UUF OR LESS		
COLOR	SIG. FIG.	DECIMAL MULTIPLIER	% TOL.	VDCW	LETTER TOL.	CHARAC-TERISTIC	LETTER TOL.	CHARAC-TERISTIC	DEC. MULT.	%	LETTER DESIG-NATION	UUF	LETTER DESIG-NATION	CHARAC-TERISTIC
BLACK	0	1	±20	500	M	A	M	A	1	±20	M	±2.0	G	C
BROWN	1	10	± 1	100	-	B	-	E	10	± 1	F	-	-	H
RED	2	100	± 2	200	G	C	-	H	100	± 2	G	-	-	L
ORANGE	3	1,000	± 3	300	-	D	N*	J	1,000	-	-	-	-	P
YELLOW	4	10,000	± 4	400	-	E	-	P	-	-	-	-	-	R
GREEN	5	100,000	± 5	500	-	F	-	R	-	± 5	J	±0.5	D	S
BLUE	6	1,000,000	± 6	600	-	G	-	S	-	-	-	-	-	T
VIOLET	7	10,000,000	± 7	700	-	-	-	T	-	-	-	-	-	U
GRAY	8	100,000,000	± 8	800	-	-	-	-	0.01	-	-	±0.25	C	B
WHITE	9	1,000,000,000	± 9	900	-	-	-	-	0.1	± 10	K	±1.0	F	SL
GOLD	-	0.1	± 5	1,000	J	-	-	-	-	-	-	-	-	A
SILVER	-	0.01	±10	2,000	K	-	K	-	-	-	-	-	-	-
NO COLOR	-	-	±20	500	-	-	-	-	-	-	-	-	-	-

* THE TOLERANCE OF THIS CAPACITOR IS ±30%, NOT ±25

NOTES

JAN: JOINT ARMY-NAVY
RMA; RADIO MANUFACTURERS ASSOCIATION

1. THESE COLOR AND LETTER CODES GIVE CAPACITANCES IN MICROMICROFARADS
2. THIS TABLE IS ADAPTED FOR JAN AND RMA COLOR AND JAN LETTER TYPE DESIGNATIONS
3. CERAMIC AND MICA CAPACITORS, BOTH JAN AND RMA, ARE GENERALLY 500 VDCW
4. BUTTON CAPACITORS ARE GENERALLY 300 VDCW
5. READ BUTTON CAPACITOR TOLERANCE UNDER CERAMICS OF MORE THAN 10 UUF
6. CHARACTERISTICS ARE AVAILABLE IN JAN CAPACITOR SPECIFICATION MANUALS
7. THE COMPONENTS USED ABOVE FOR JAN LETTER TYPE DESIGNATIONS ARE:
   CB MICA BUTTON: *CC* CERAMIC; *CM* MICA MOULDED: *CN* PAPER MOULDED

TM CC

Figure 75. Capacitor color and letter code.

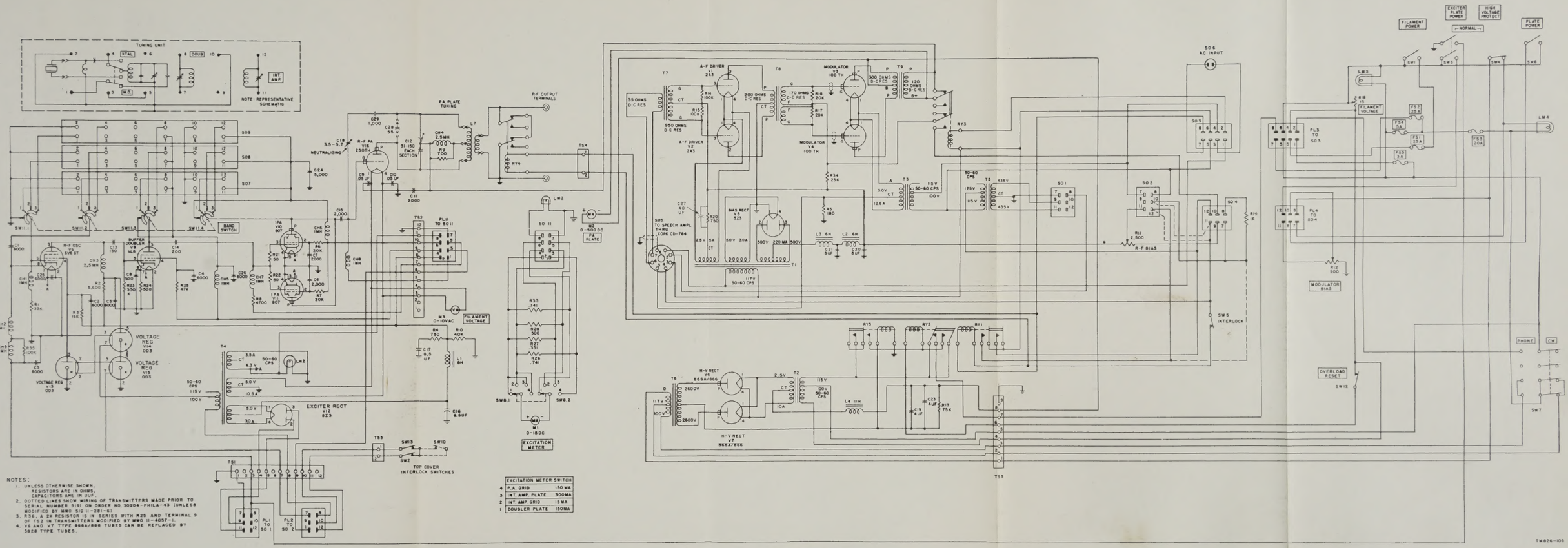
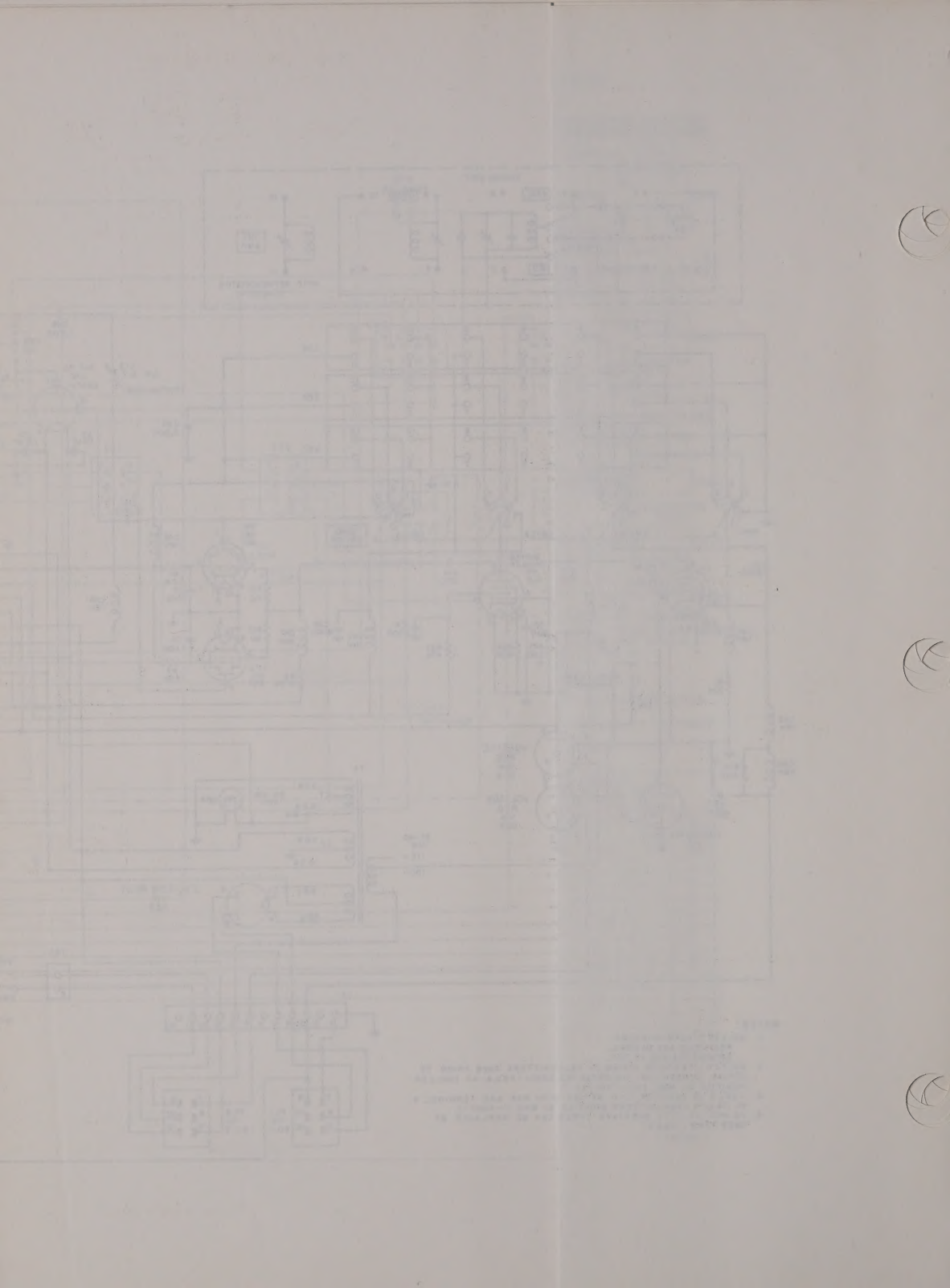
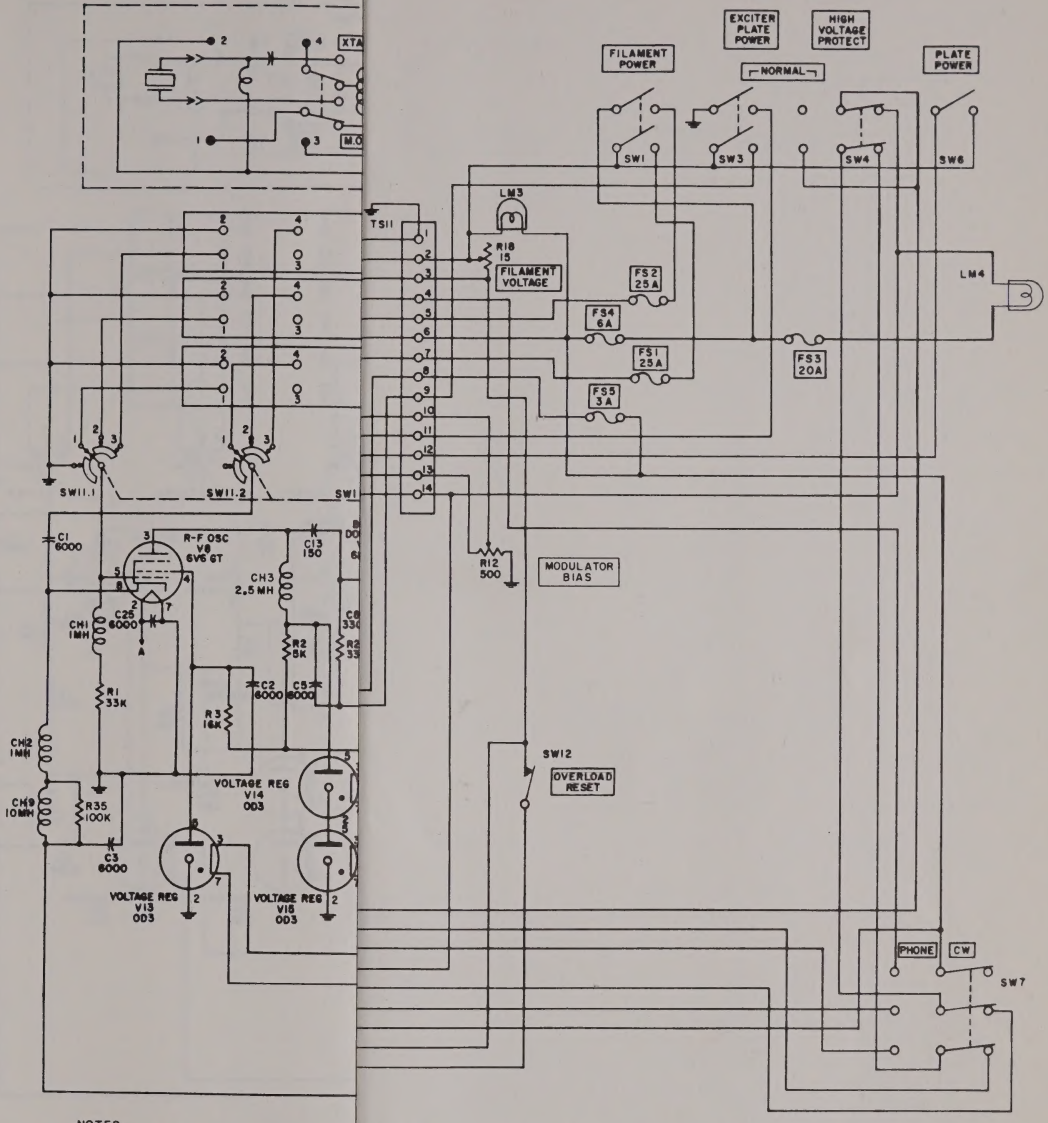


Figure 76. Radio Transmitter BC-610-E, schematic diagram.

341205 O - 55 (Face p. 144) No. 1



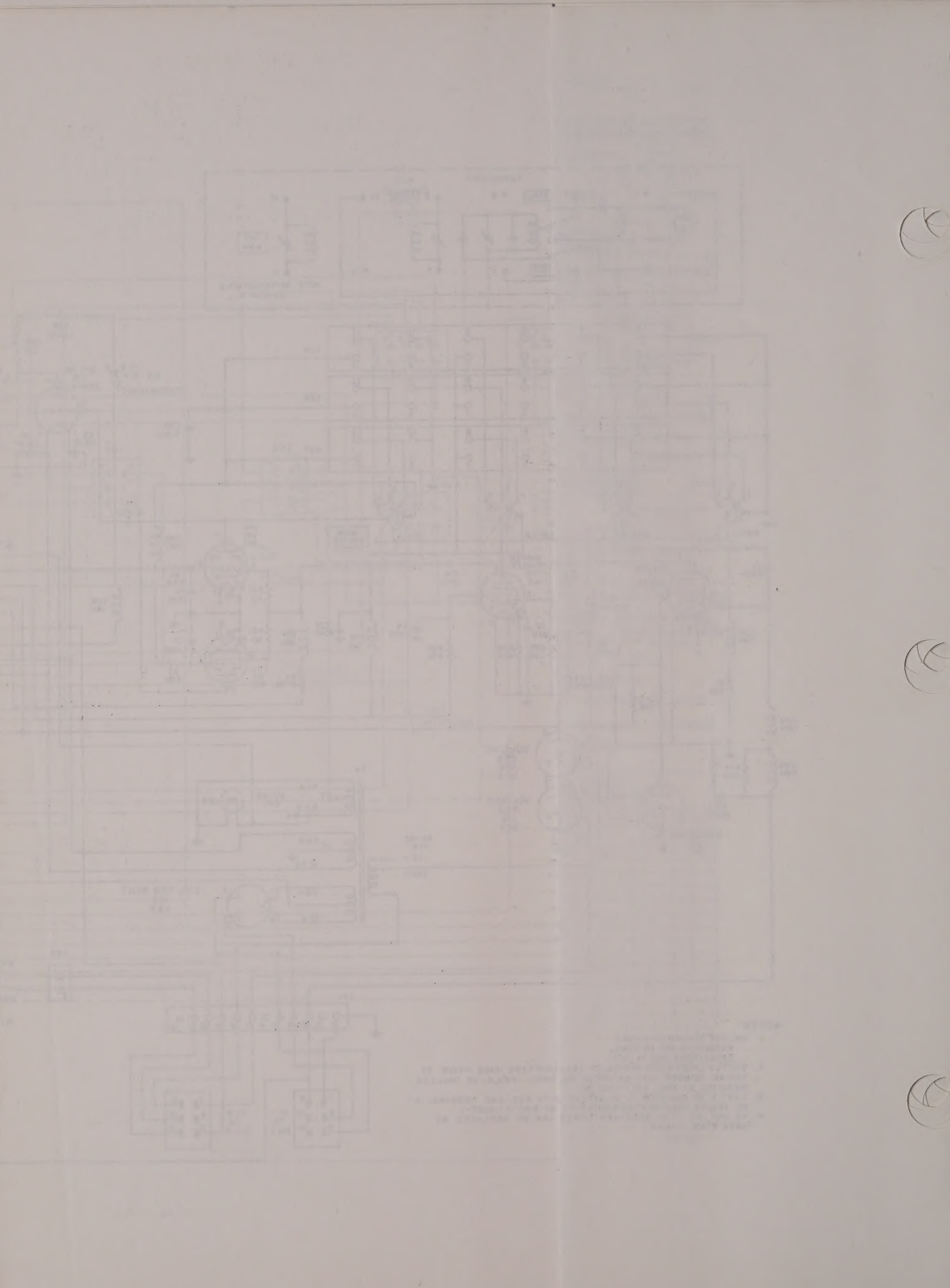


NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. C30 IS CONNECTED DIRECTLY ACROSS MET
3. R23 IS 330K IN SERIAL NUMBERS 1 THRU
4. C31 IS NOT USED IN THE F MODEL.
5. R36 IS NOT USED IN SERIAL NUMBERS 1 TH
6. ## R-F OUTPUT SOCKET IS USED IN THE T-
7. ## R-F OUTPUT TERMINALS ARE NOT US
8. SPARK GAP IS ADDED BY MWO SIG 66.

TM 826-110

341205 O - 55 (Face p. 144) No. 2



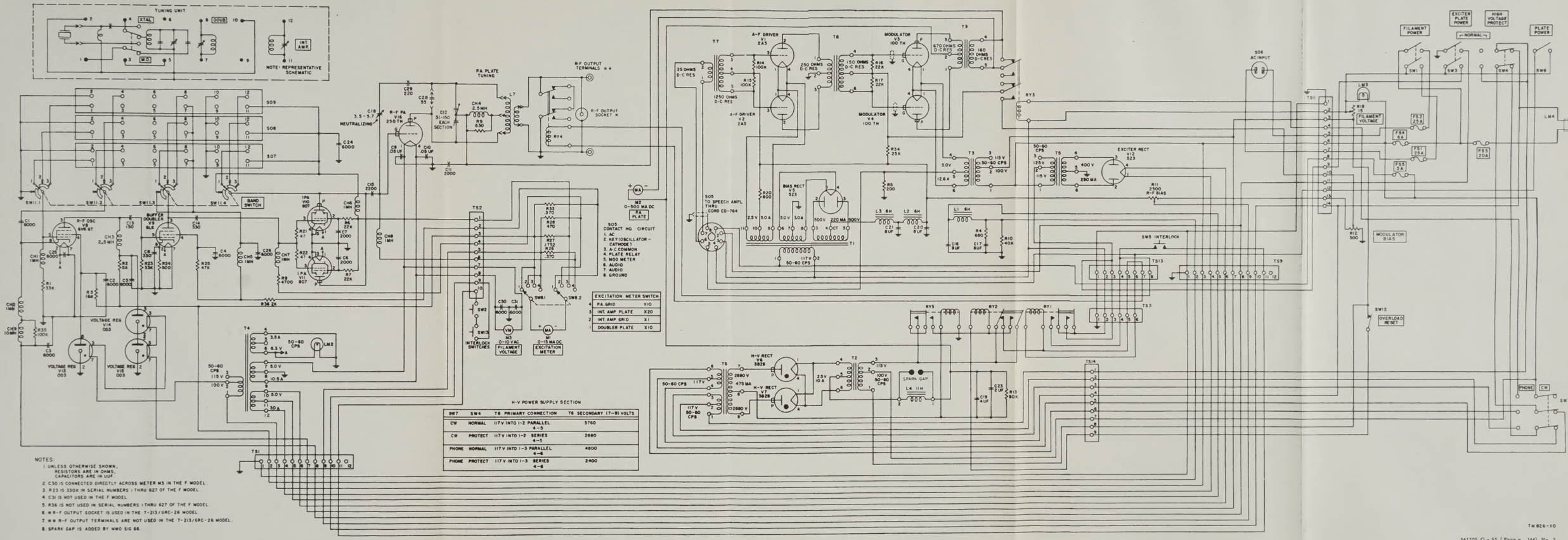
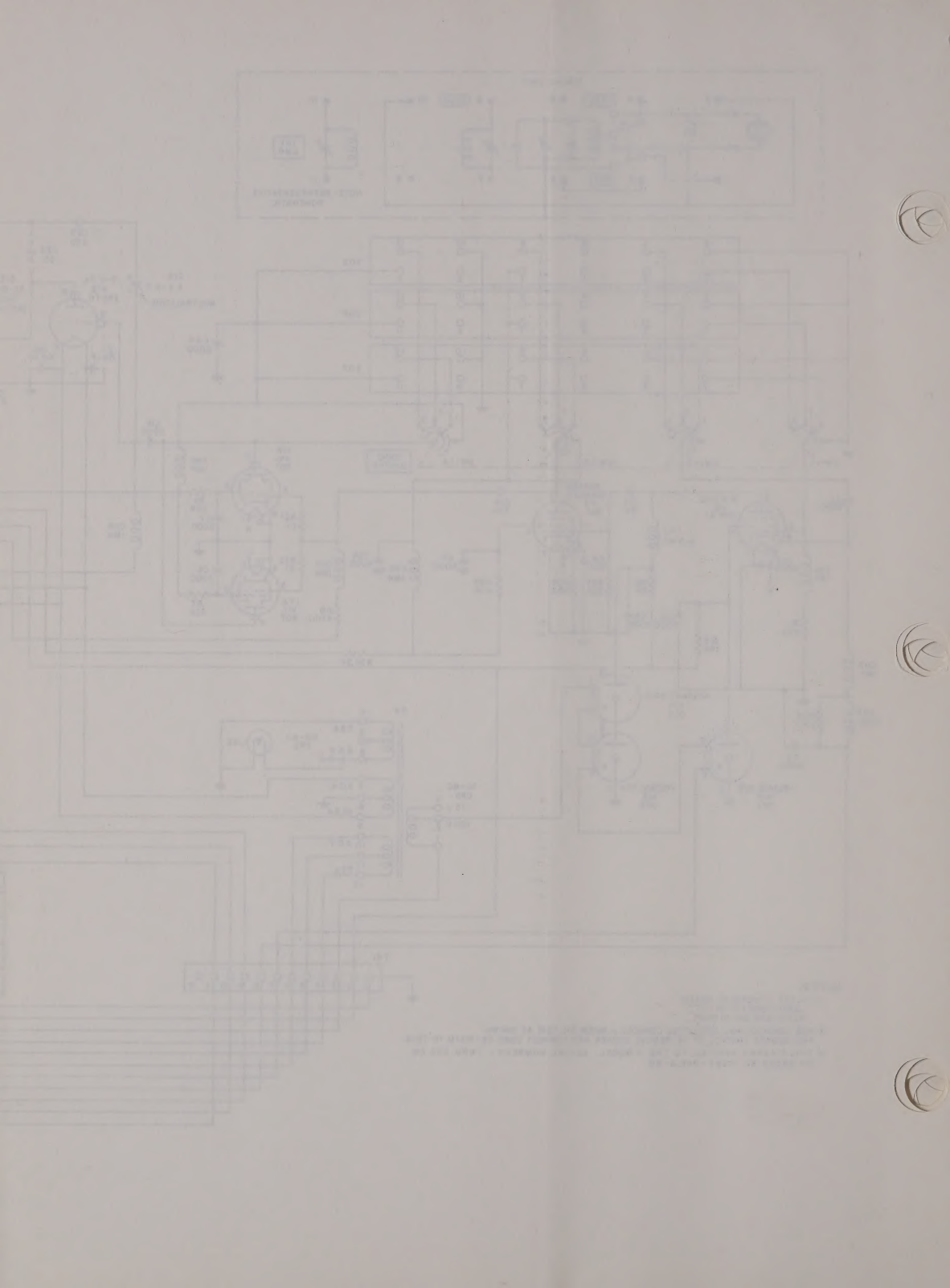
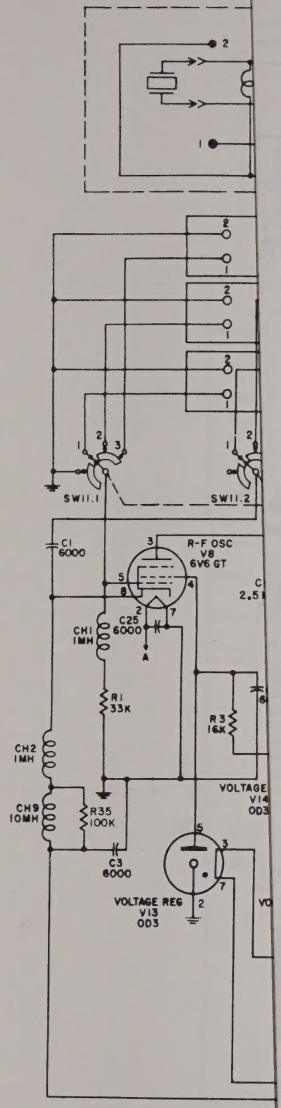
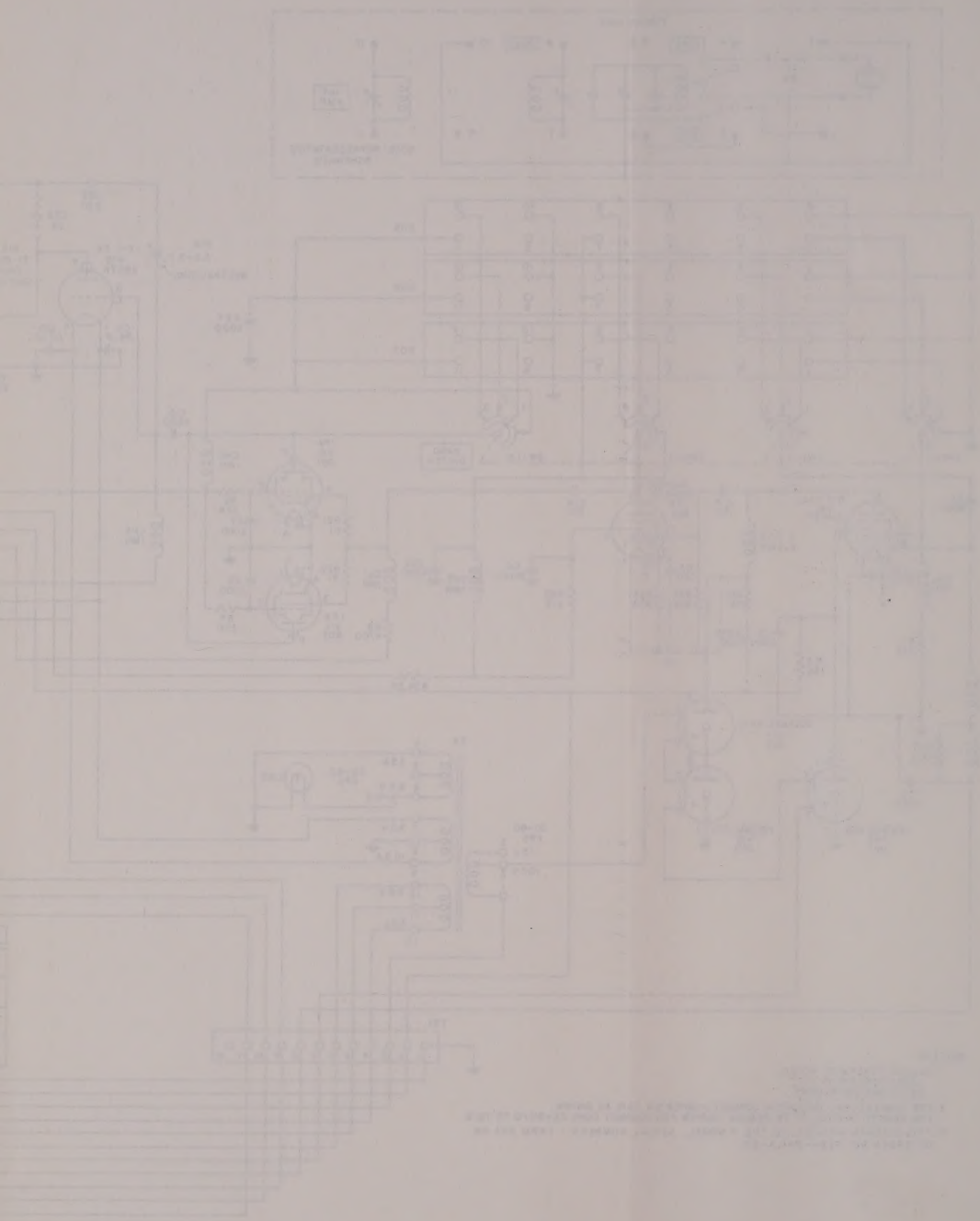


Figure 77. Radio Transmitters BC-610-F, -G, and T-218/GRC-26, schematic diagram.





NOTES:
1. UNLESS OTHERWISE NOTED, CAPACITORS ARE IN UUF, RESISTORS ARE IN OHMS.
2. THIS DIAGRAM APPLIES TO T
201 TO 346, 496 TO 533 ON
AND 594 TO 820 ON ORDER



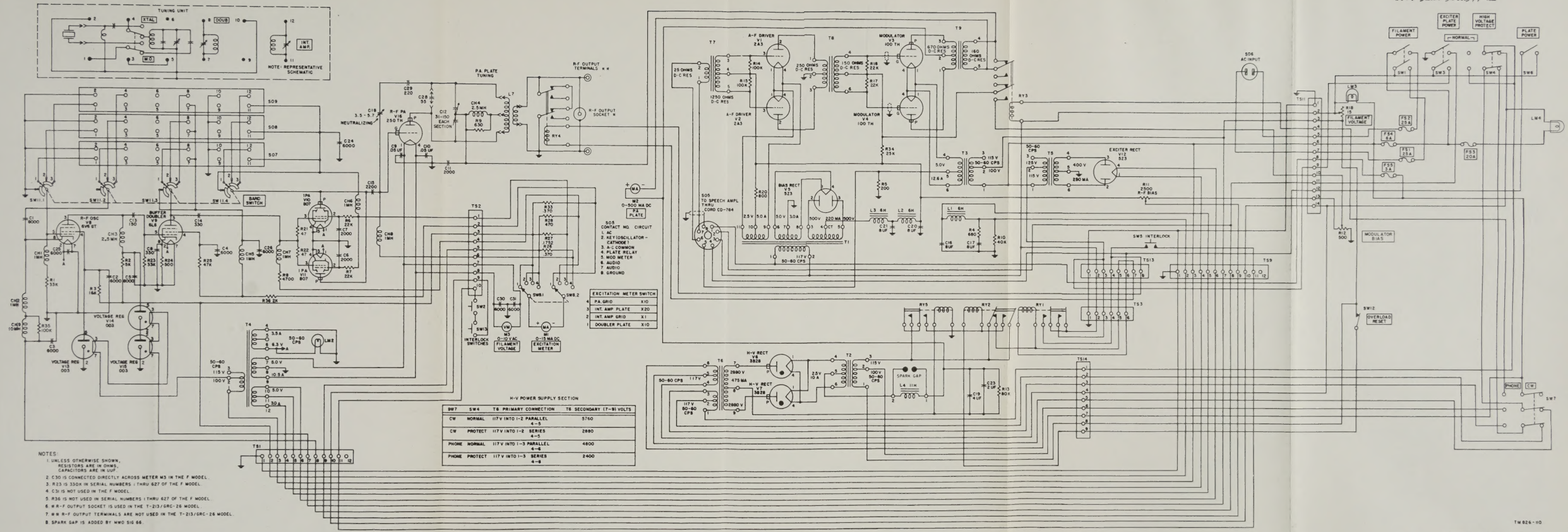
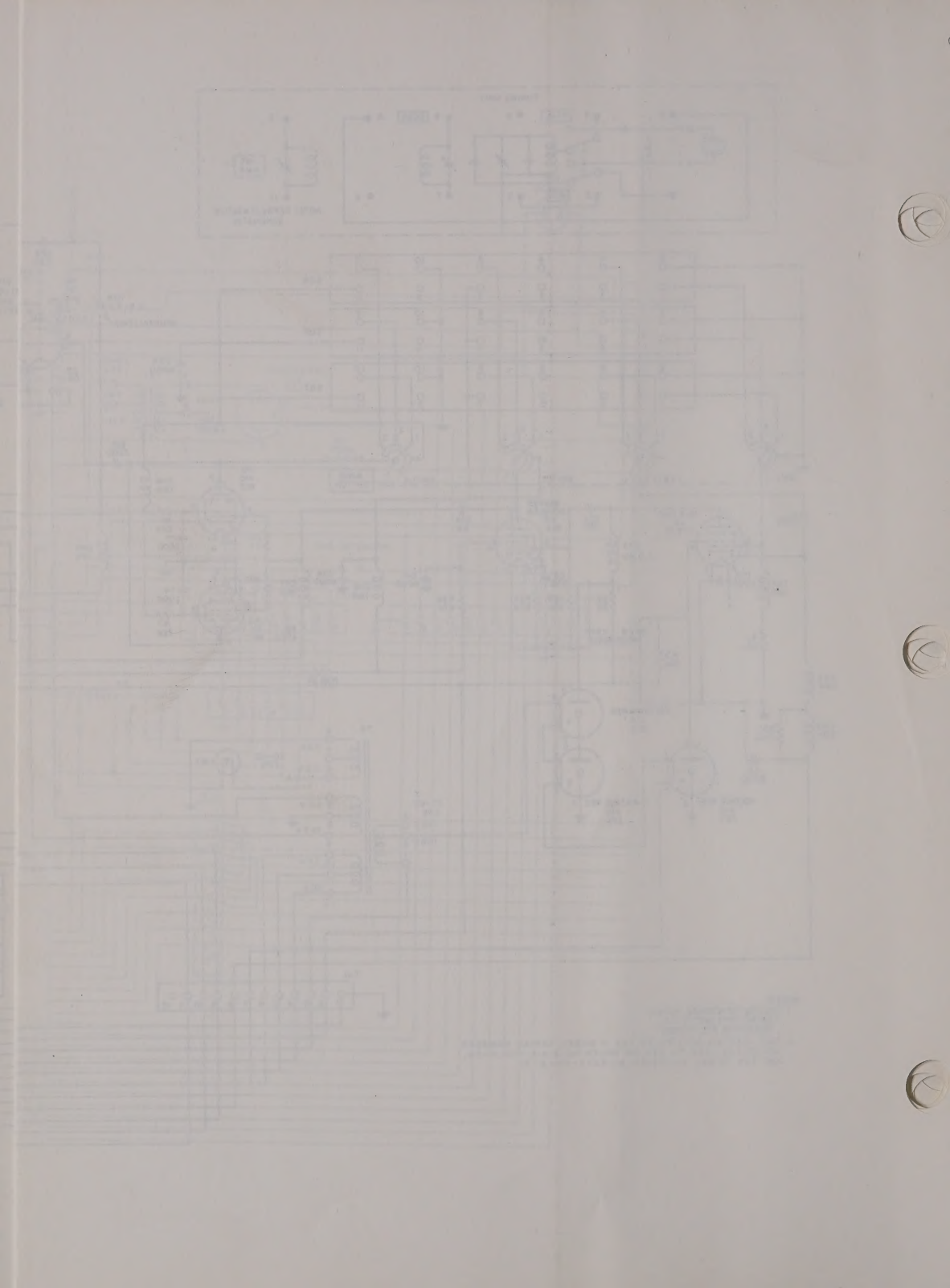
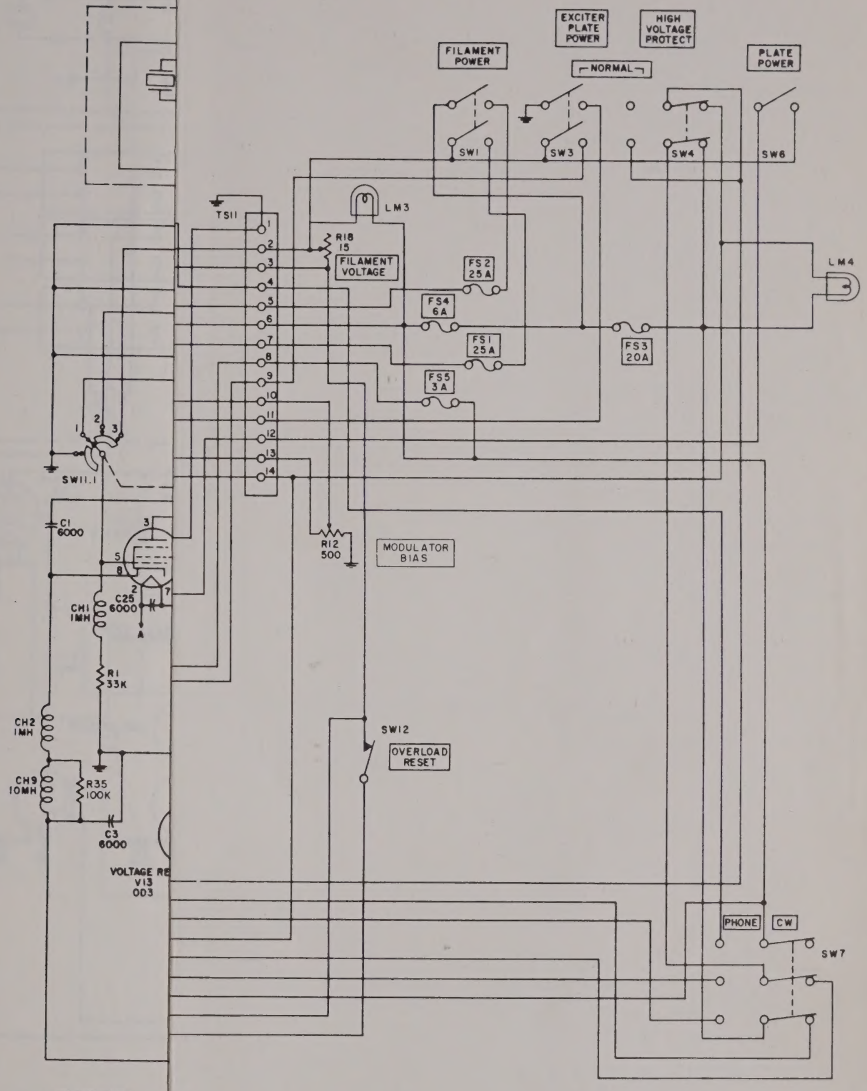


Figure 77. Radio Transmitters BC-610-F, -G, and T-213/GRC-26, schematic diagram.

TM 826-110

341205 O - 55 (Face p. 144) No. 2





NOTES:

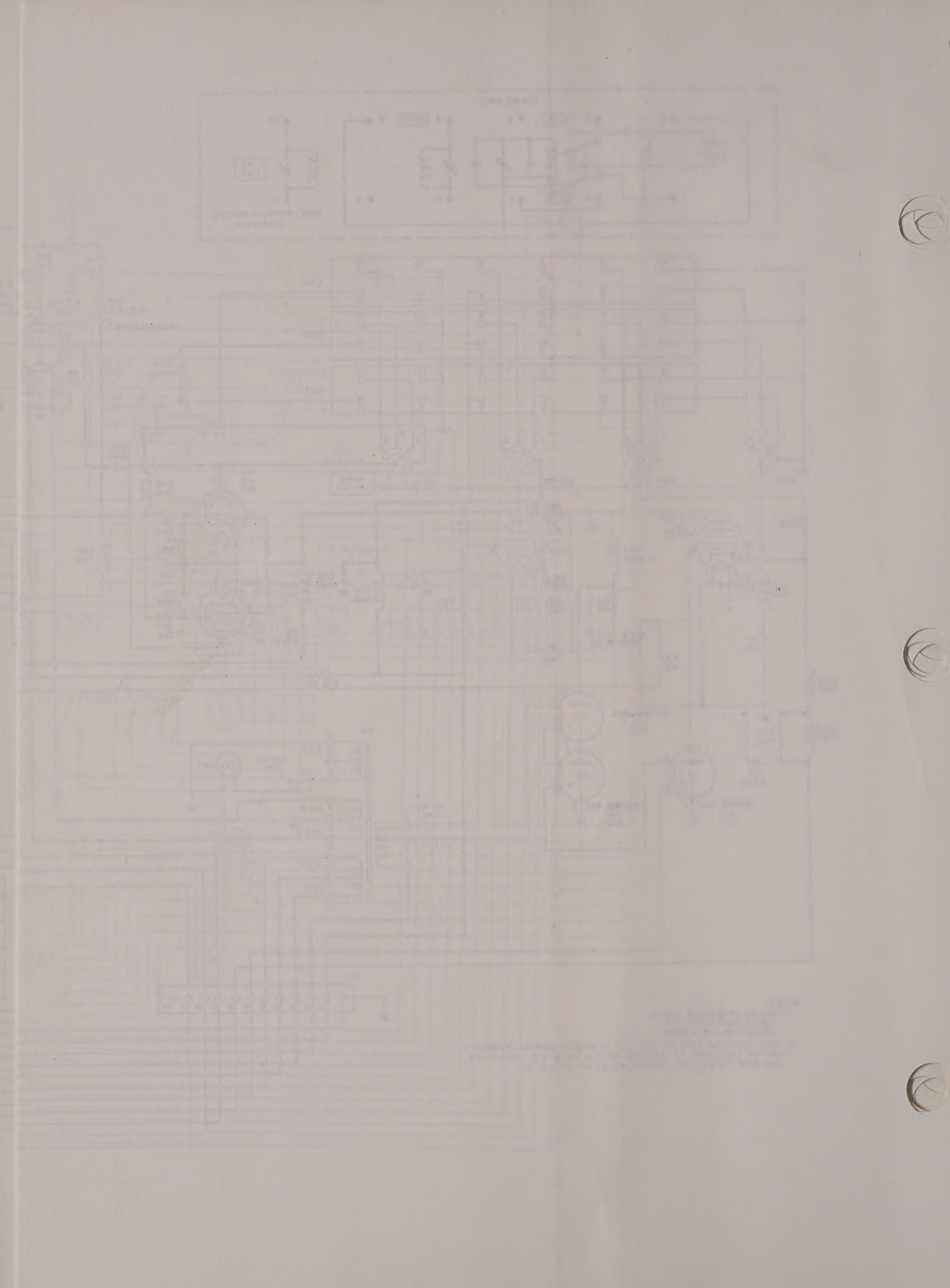
1. UNL
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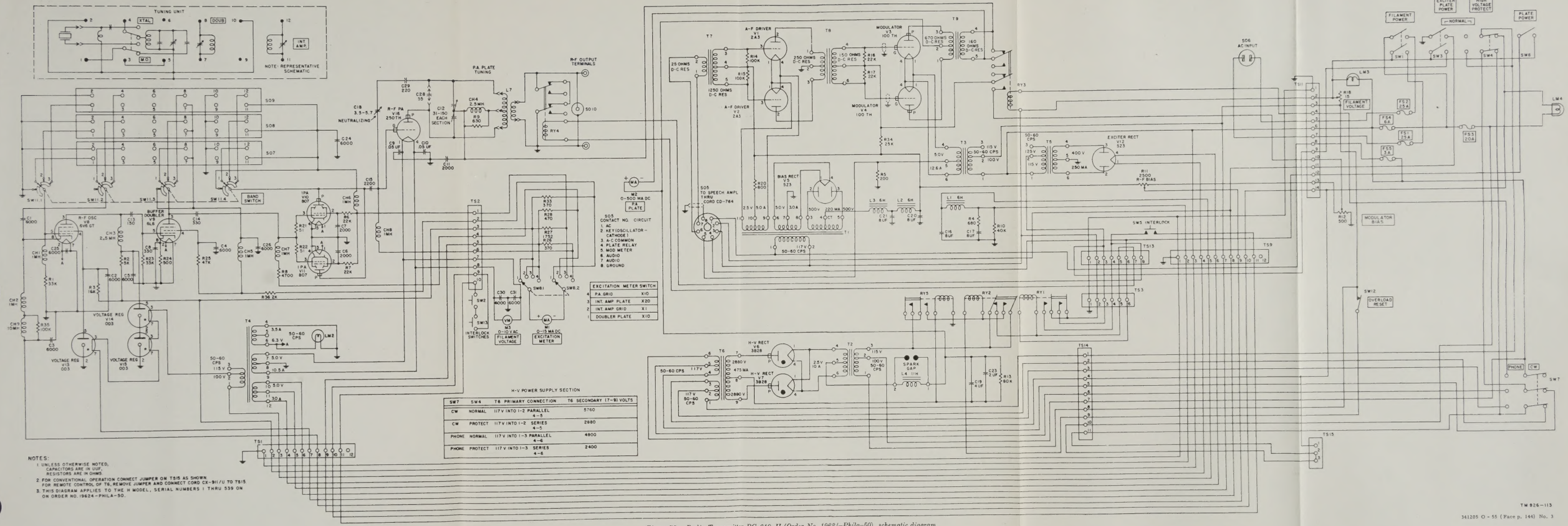
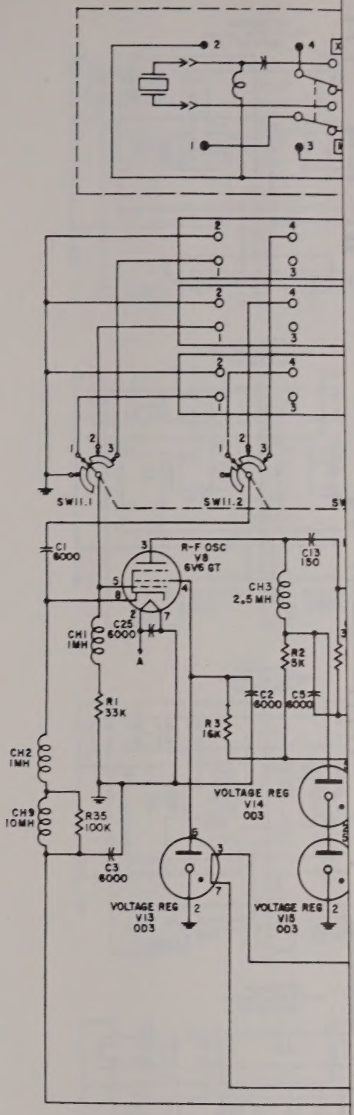


Figure 78. Radio Transmitter BC-610-H (Order No. 19624-Phila-50), schematic diagram.

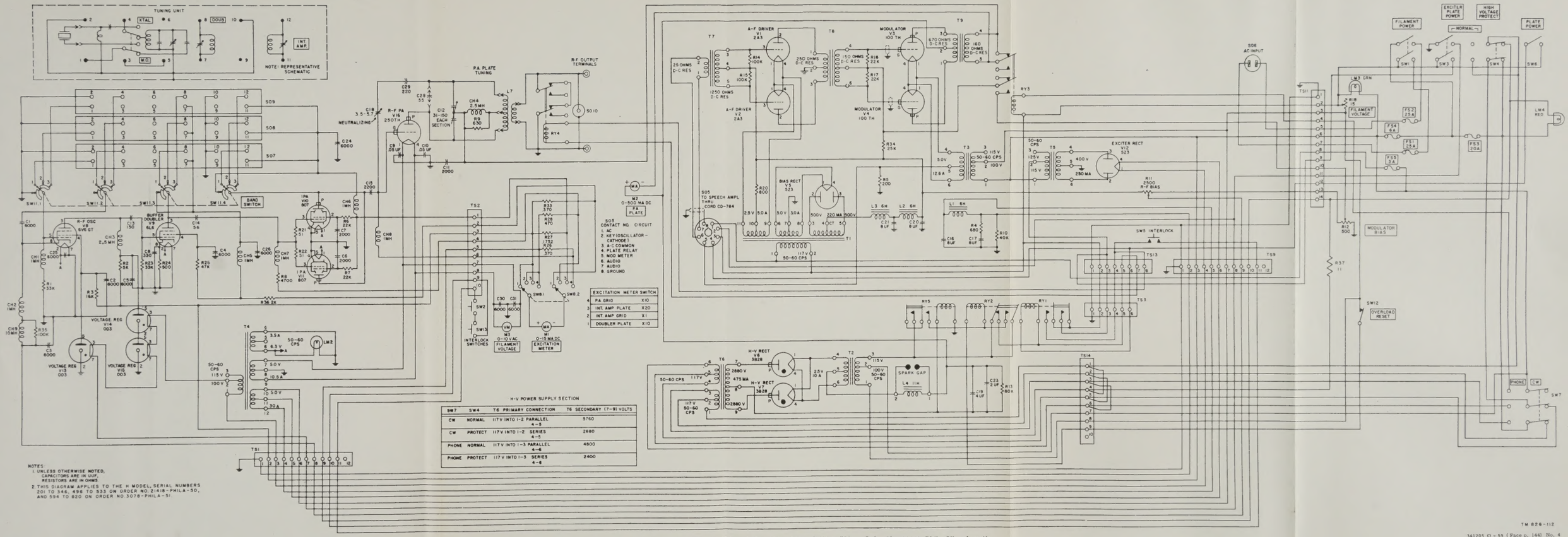




NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. FOR CONVENTIONAL OPERATION CONNEC
   FOR REMOTE CONTROL OF T6, REMOVE J
   CX-911/U TO TS15.
3. THIS DIAGRAM ALSO APPLIES TO THE H
   THRU 972 ON ORDER NO. 3078-PHILA-
4. RESISTOR R38 (2 OHMS) IS ADDED IN S
   MI ON THE I MODEL TRANSMITTERS W
   300 ON ORDER NO. 3131-PHILA-51.



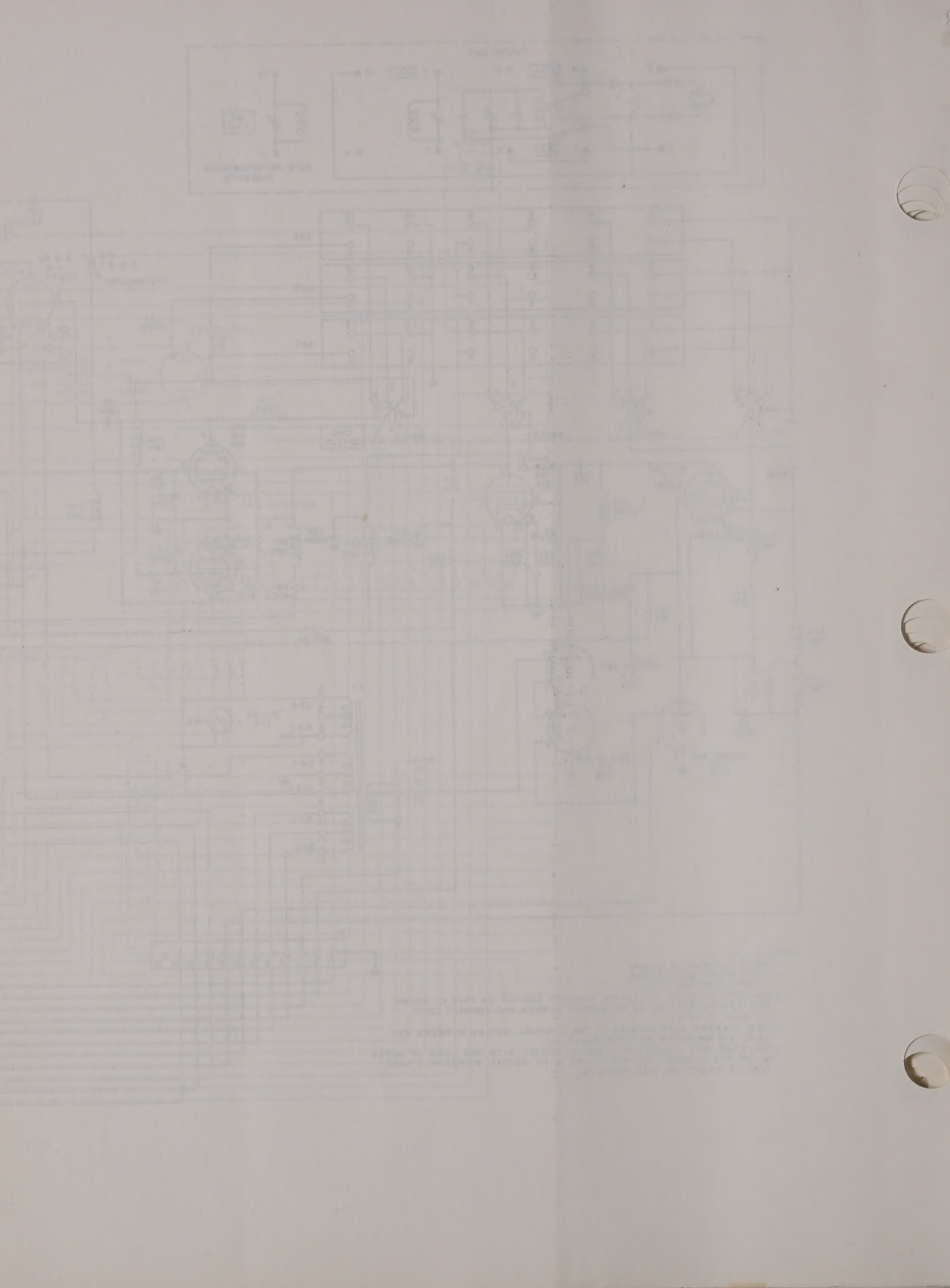


H-V POWER SUPPLY SECTION

SW7	SW4	T6 PRIMARY CONNECTION	T6 SECONDARY (7–9) VOLTS
CW	NORMAL	117 V INTO 1-2 PARALLEL 4-5	5760
CW	PROTECT	117 V INTO 1-2 SERIES 4-5	2880
PHONE	NORMAL	117 V INTO 1-3 PARALLEL 4-6	4800
PHONE	PROTECT	117 V INTO 1-3 SERIES 4-6	2400

NOTES:
1. UNLESS OTHERWISE NOTED, CAPACITORS ARE IN UUF, RESISTORS ARE IN OHMS
2. THIS DIAGRAM APPLIES TO THE H MODEL, SERIAL NUMBERS 201 TO 346, 496 TO 533 ON ORDER NO. 21418-PHILA-50, AND 594 TO 620 ON ORDER NO 3078-PHILA-51.

Figure 79. Radio Transmitter BC-610-H (serial Nos. 201 to 346 and 496 to 533 on Order No. 21418-Phila-50), schematic diagram.



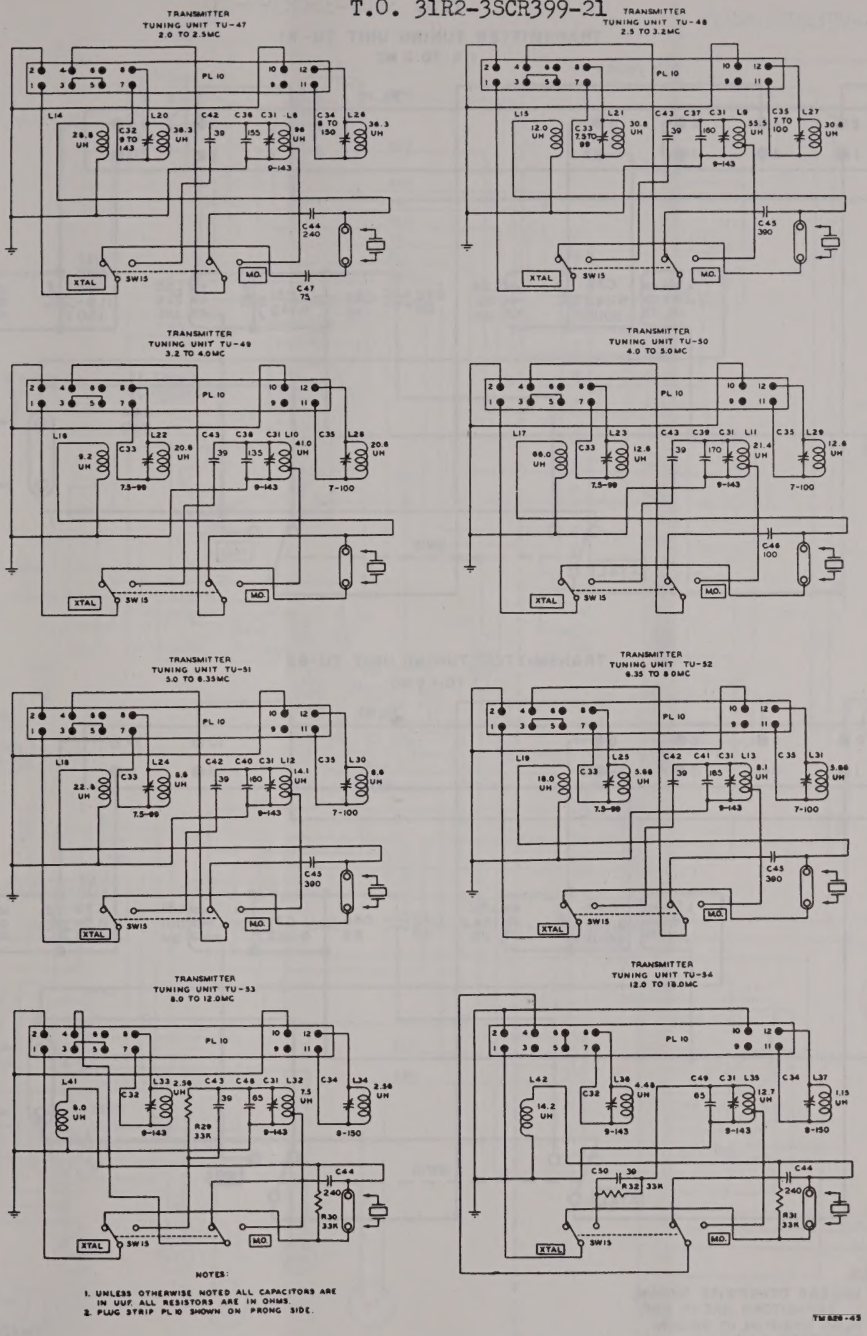
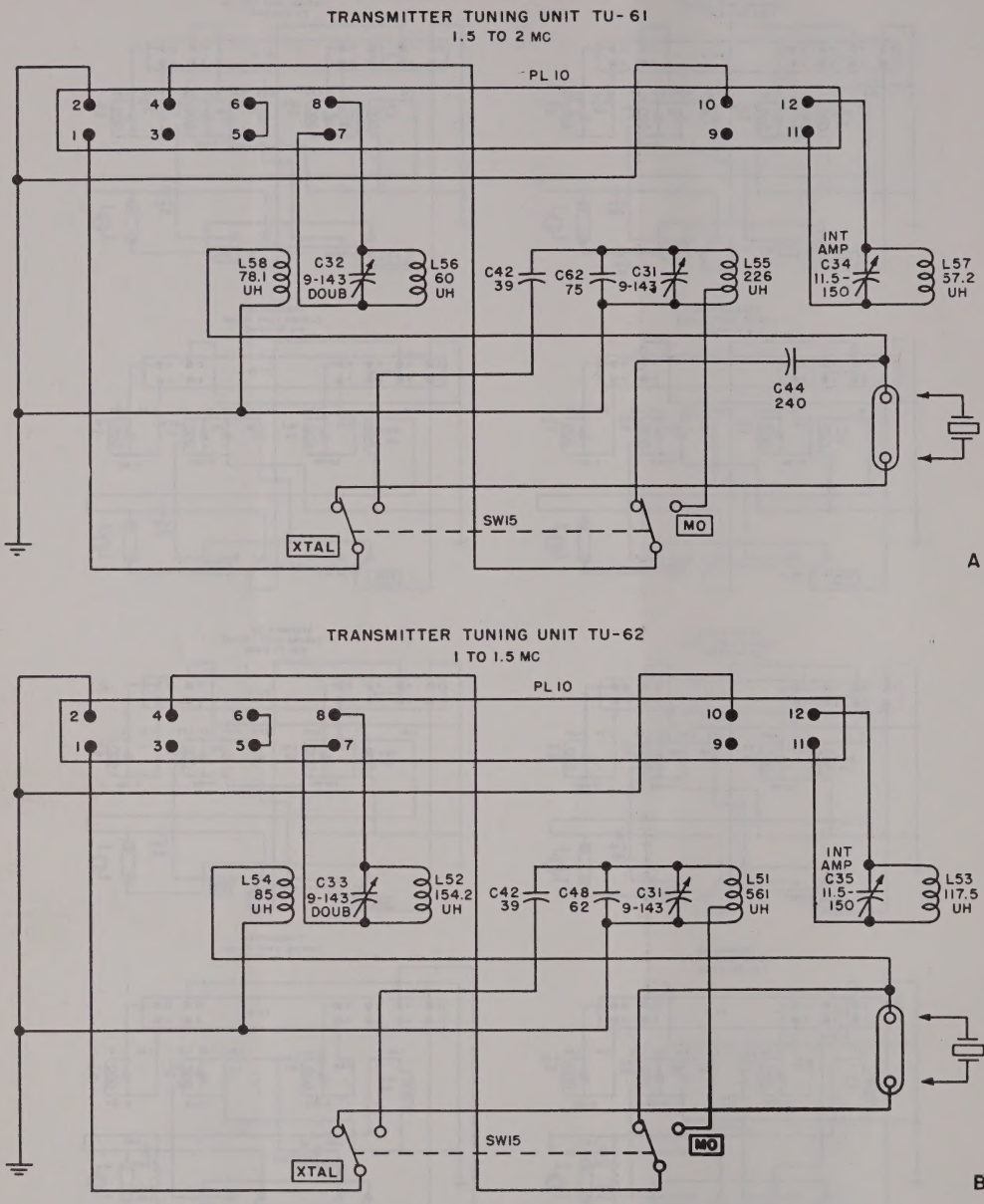


Figure 82. Transmitter Tuning Units TU-47 through TU-54, schematic diagram.

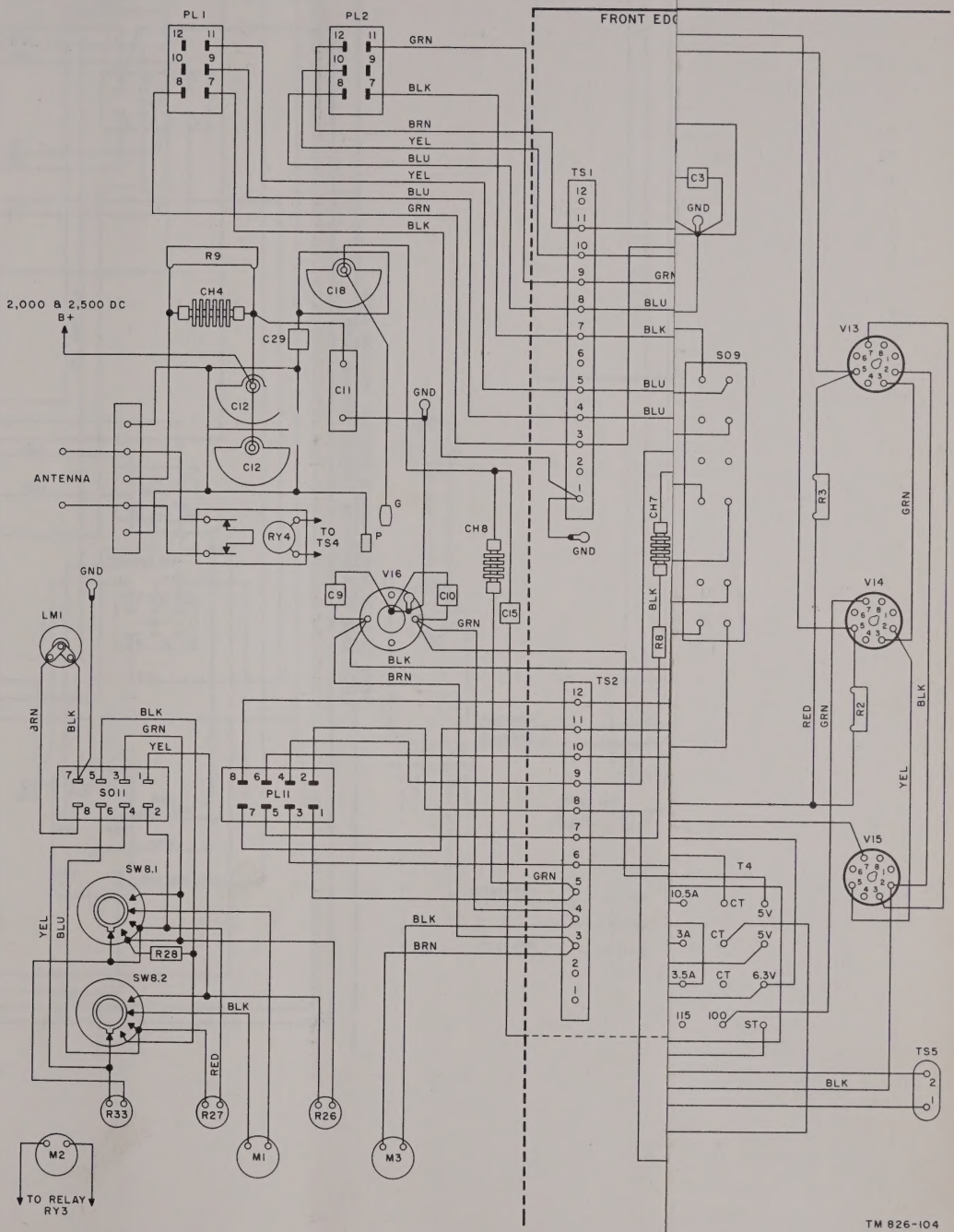


NOTES:

1. UNLESS OTHERWISE SHOWN, CAPACITORS ARE IN UUF.
2. PLUG STRIP PL 10 SHOWN ON PRONG SIDE.

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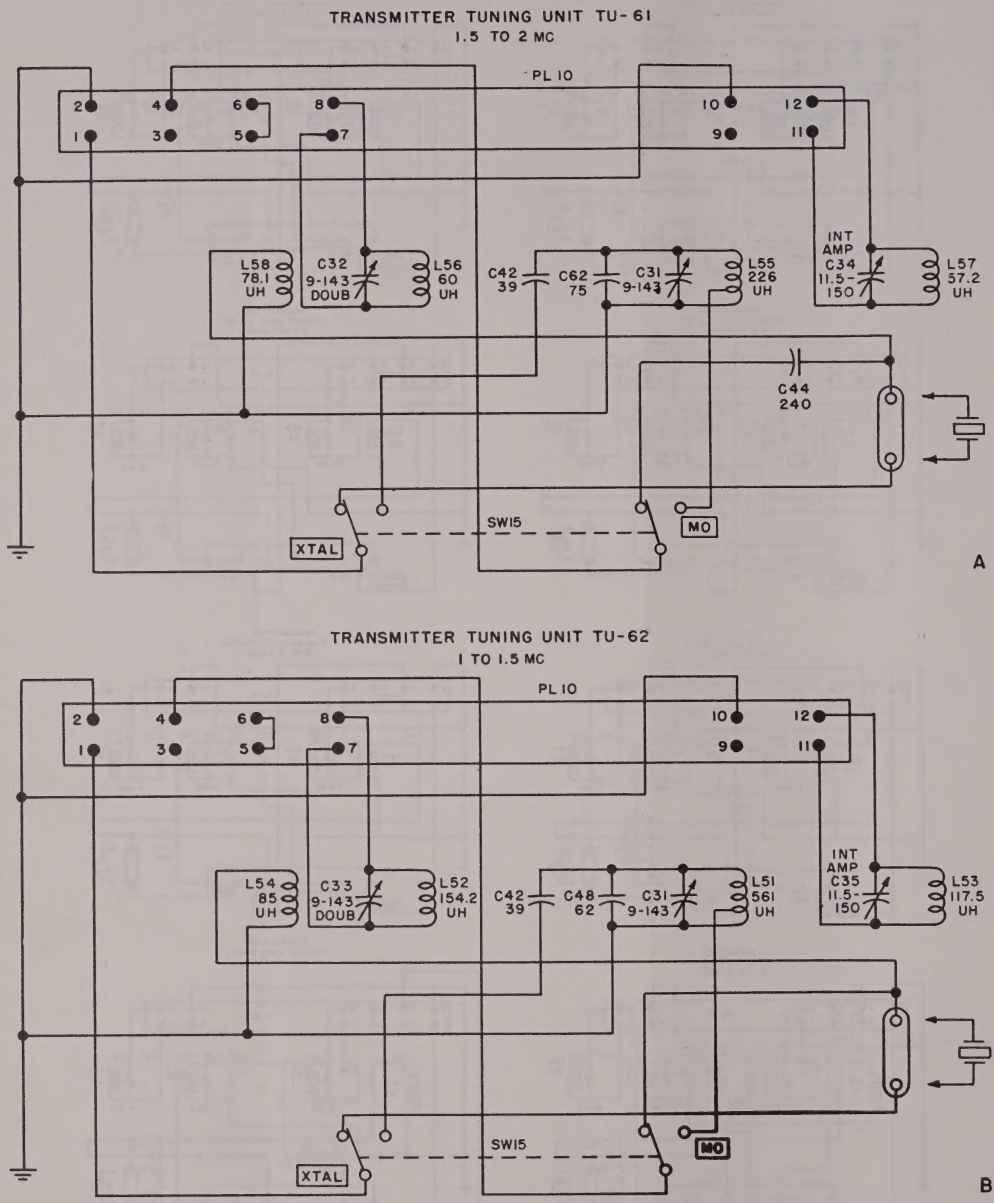
Figure 83. Transmitter Tuning Units TU–61 and TU–62, schematic diagram.



TM 826-104

Figure 84. Radio Transm

341205 O - 55 (Face p. 146) No. 1

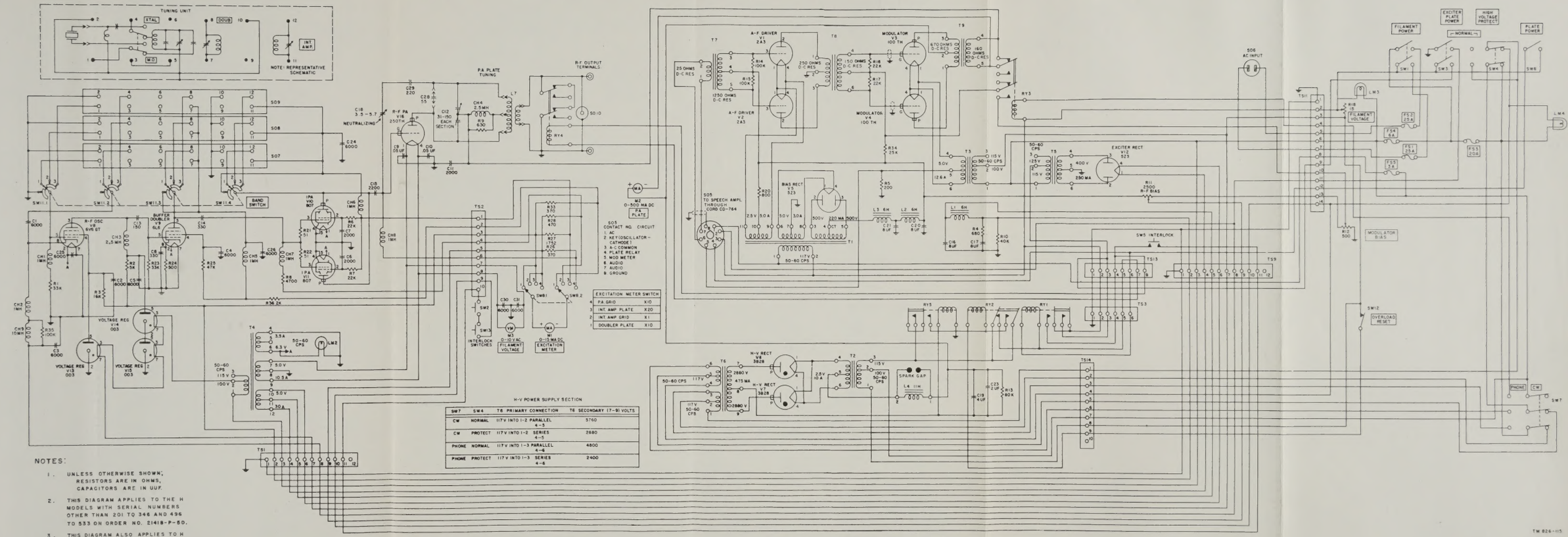


NOTES:

1. UNLESS OTHERWISE SHOWN, CAPACITORS ARE IN UUF.
2. PLUG STRIP PL 10 SHOWN ON PRONG SIDE.

TM 826-114

Figure 83. Transmitter Tuning Units TU–61 and TU–62, schematic diagram.



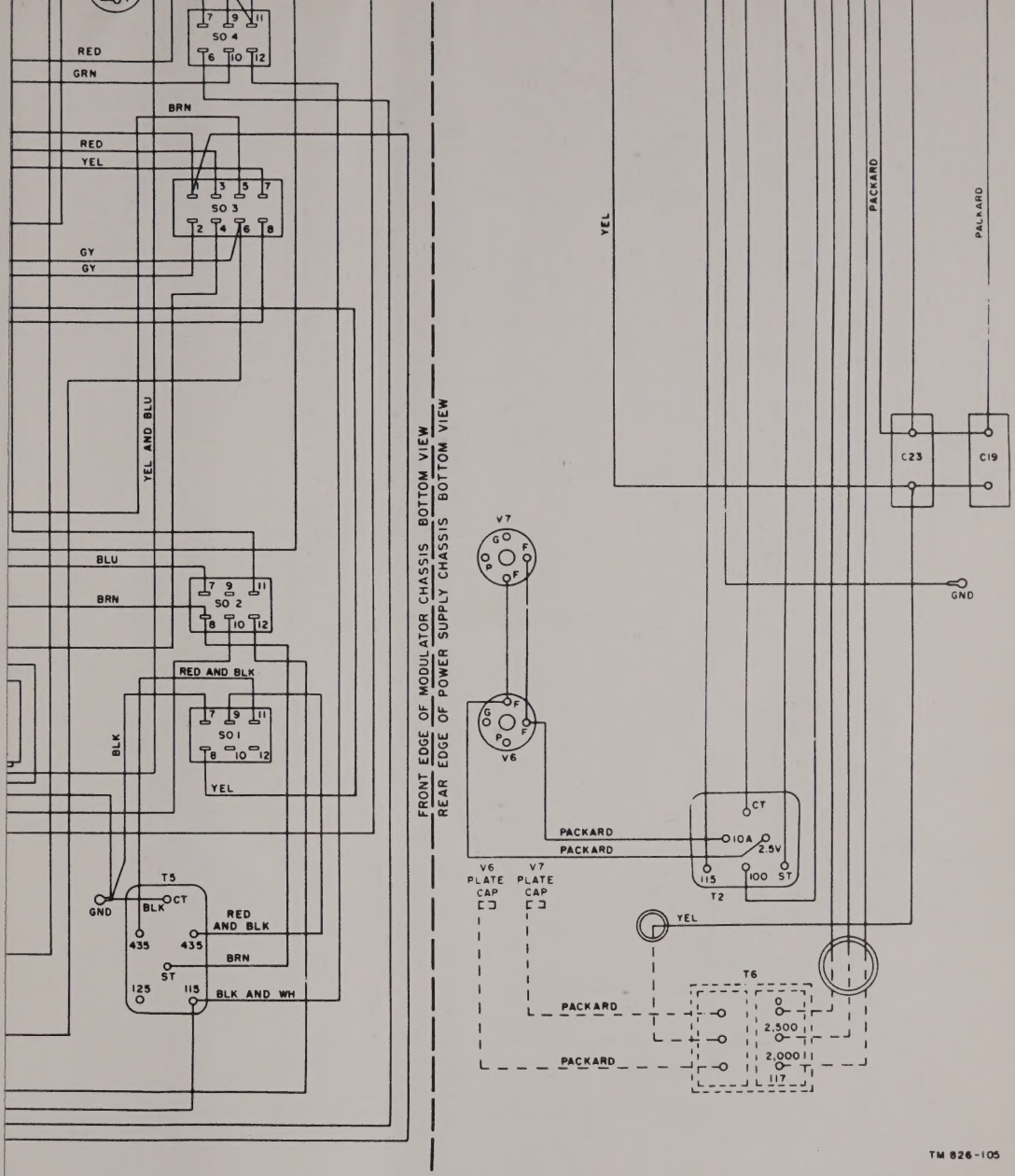
NOTES:

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. THIS DIAGRAM APPLIES TO THE H MODELS WITH SERIAL NUMBERS OTHER THAN 201 TO 346 AND 496 TO 533 ON ORDER NO. 21418-P-50.
3. THIS DIAGRAM ALSO APPLIES TO H MODELS WITH SERIAL NUMBERS 534 TO 821 ON ORDER NO. 3078-P-50.

Figure 80. Radio Transmitter BC-610-H (serial Nos. other than 201 to 346 and 496 to 533 on Order No. 21418-Phila-50 and serial Nos. 534 to 821 on Order No. 3078-Phila-51), schematic diagram.

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TM 826-105

al wiring

341205 O - 55 (Face p. 146) No. 2

146C-146D

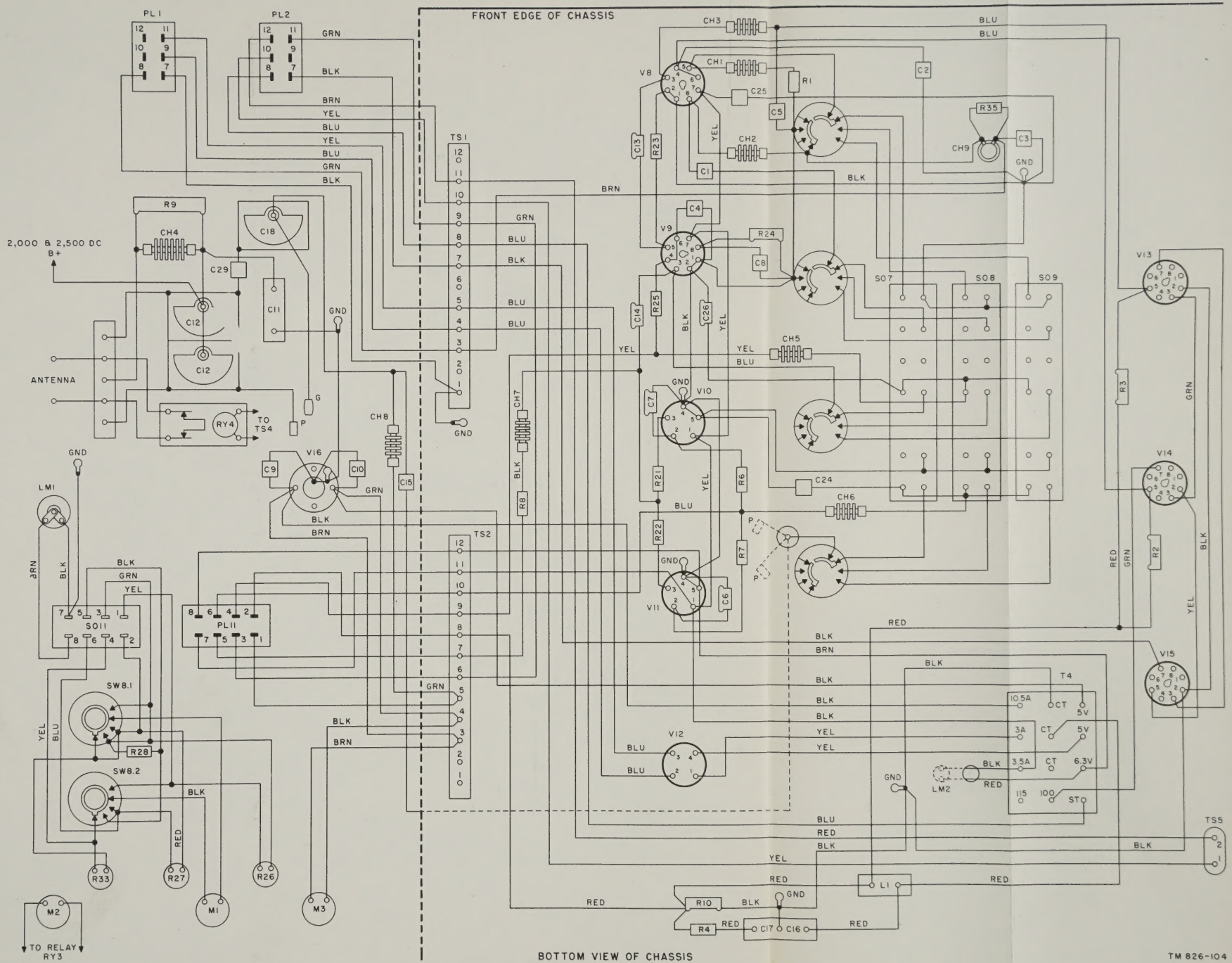


Figure 84. Radio Transmitter BC-610-E, exciter deck, practical wiring diagram.

341205 O - 55 (Face p. 146) No. 1

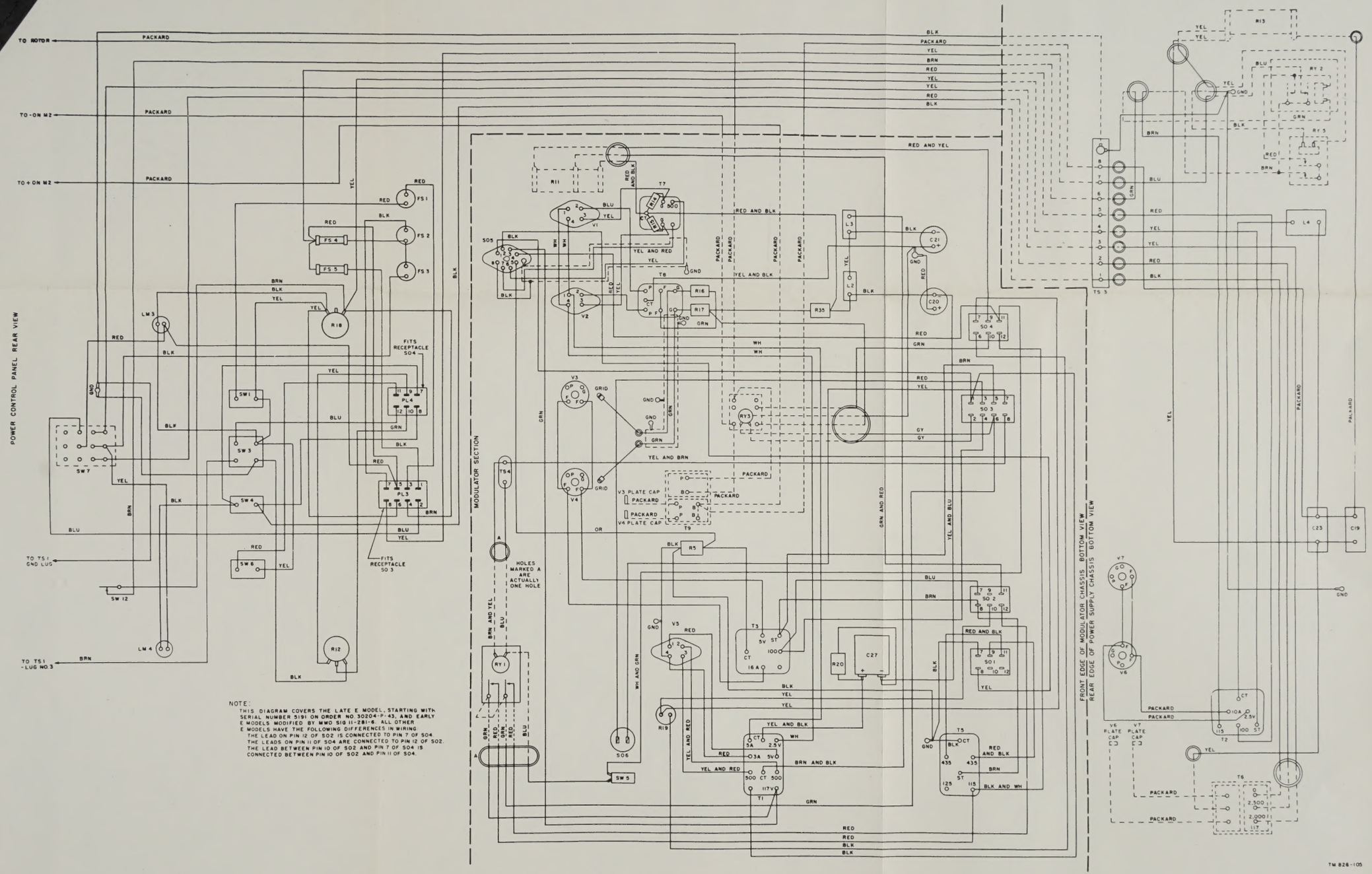
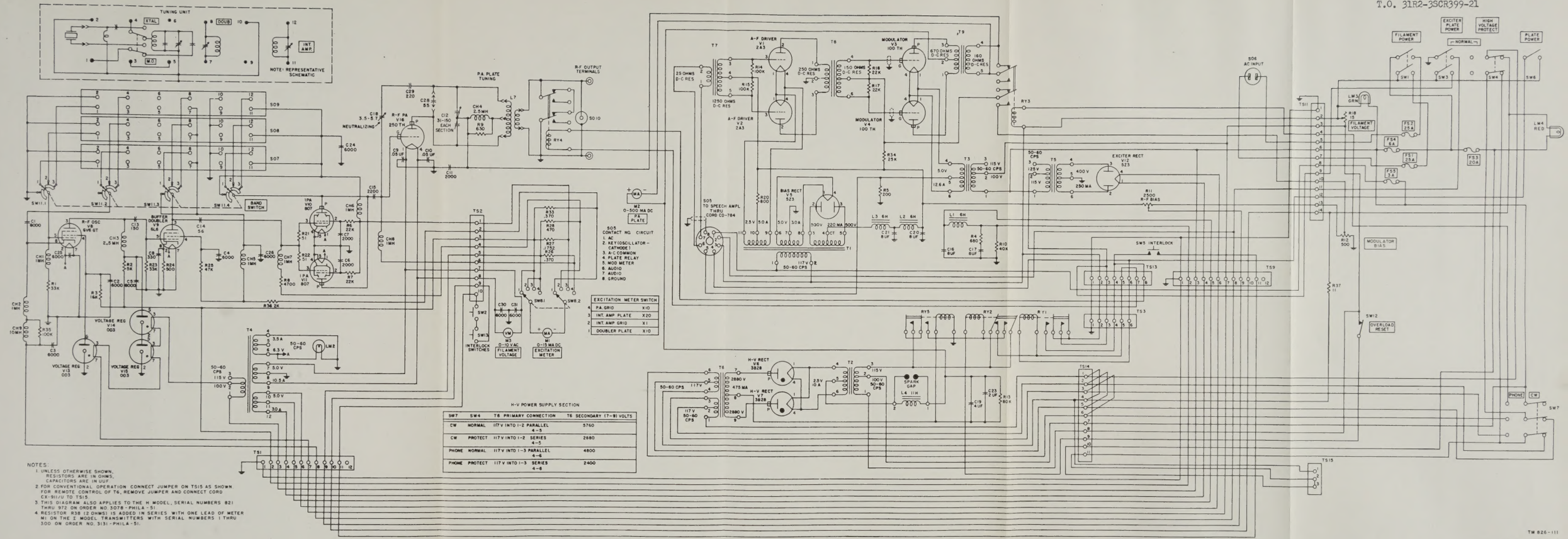


Figure 85. Radio Transmitter BC-610-E, modulator deck, power supply deck, and front panel section, practical wiring diagram.

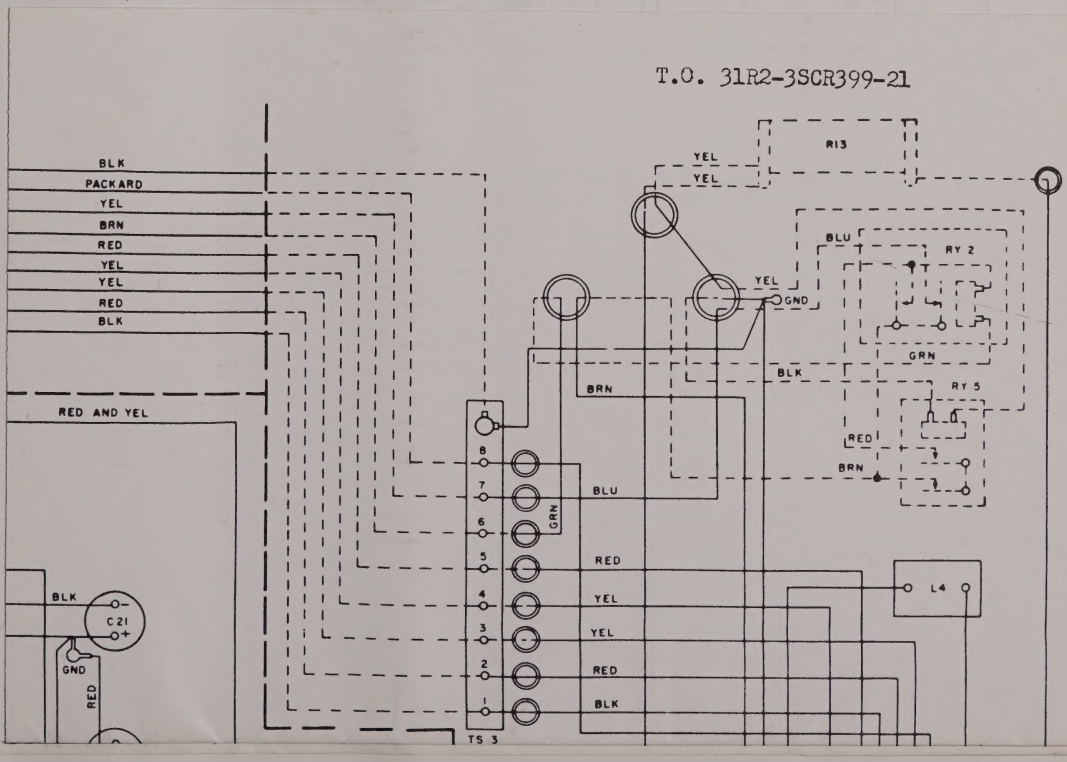
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341205 O - 55 (Face p. 146) No. 2



NOTES:
1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF
2. FOR CONVENTIONAL OPERATION CONNECT JUMPER ON TS15 AS SHOWN FOR REMOTE CONTROL OF T6, REMOVE JUMPER AND CONNECT CORD CX-911/U TO TS15.
3. THIS DIAGRAM ALSO APPLIES TO THE H MODEL, SERIAL NUMBERS 821 THRU 972 ON ORDER NO. 3078-PHILA-51.
4. RESISTOR R38 (2 OHMS) IS ADDED IN SERIES WITH ONE LEAD OF METER M1 ON THE I MODEL TRANSMITTERS WITH SERIAL NUMBERS 1 THRU 300 ON ORDER NO. 3131-PHILA-51.

Figure 81. Radio Transmitter BC-610-I and Radio Transmitter BC-610-H (serial Nos. 821 through 972 on Order No. 3078-Phila-51), schematic diagram.


BLK
PACKARD
YEL
BRN
RED
YEL
YEL
RED
BLK
RED AND YEL
BLK
C21
GND
RED
R13
YEL
YEL
BLU
RY 2
YEL
GND
GRN
BLK
RY 5
BRN
RED
BRN
BLU
GRN
RED
YEL
YEL
RED
BLK
L4
TS 3
8
7
6
5
4
3
2
1

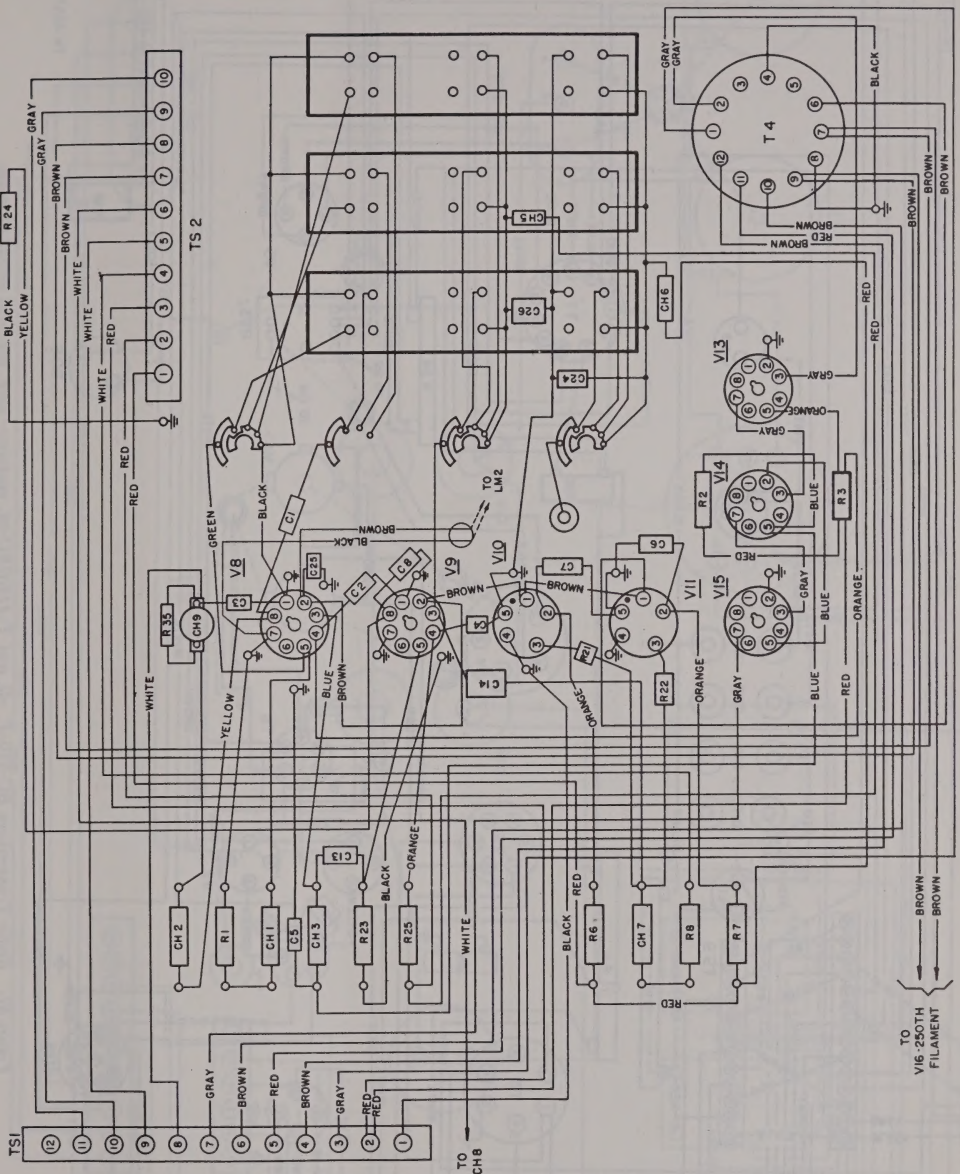


Figure 86. Radio Transmitters BC-610-F, -G, and T-213/GRC-28, r-f deck, practical wiring diagram.

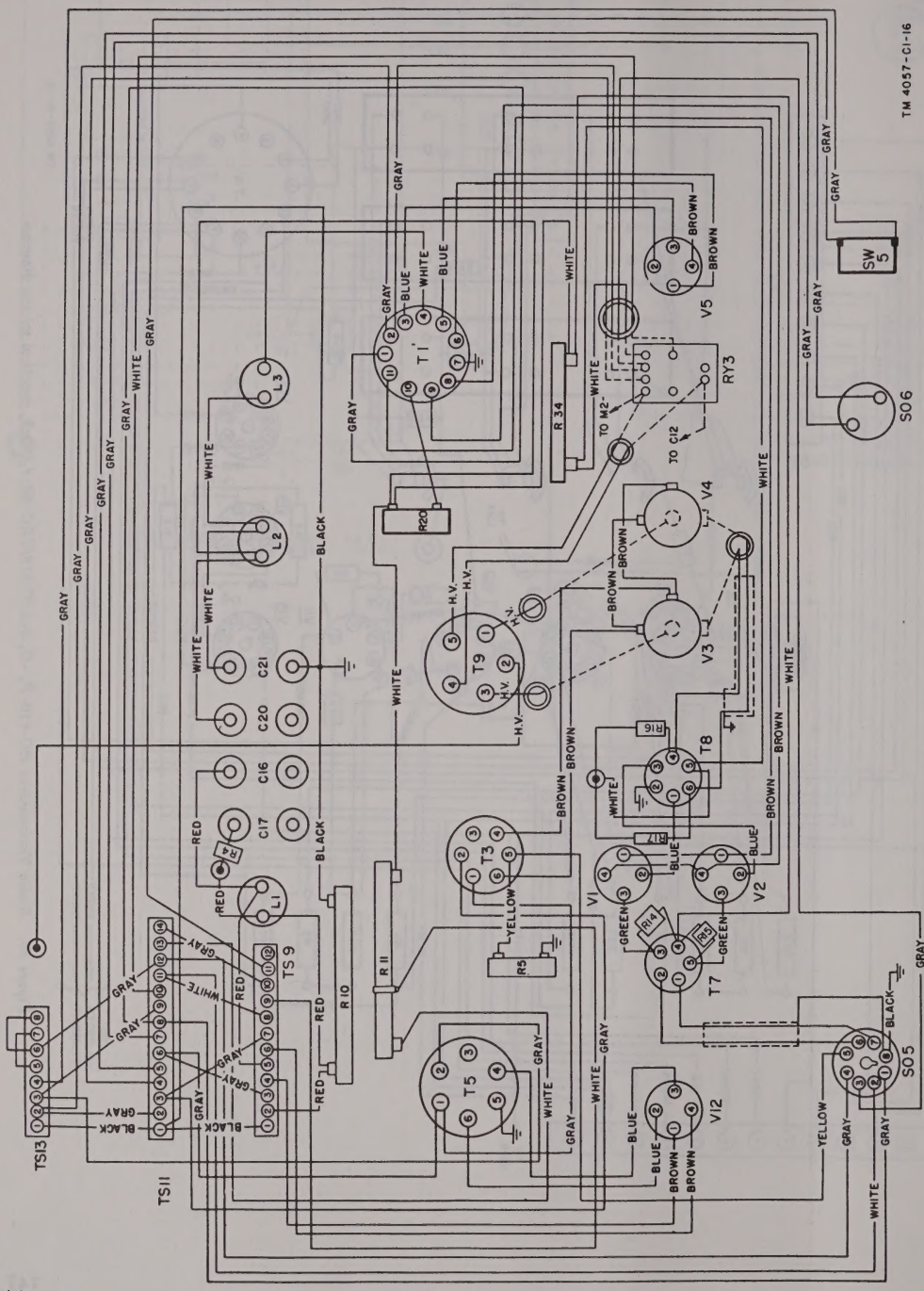


Figure 87. Radio Transmitters BC-610-F, -G, and T-218/GRC-26, modulator deck, practical wiring diagram.

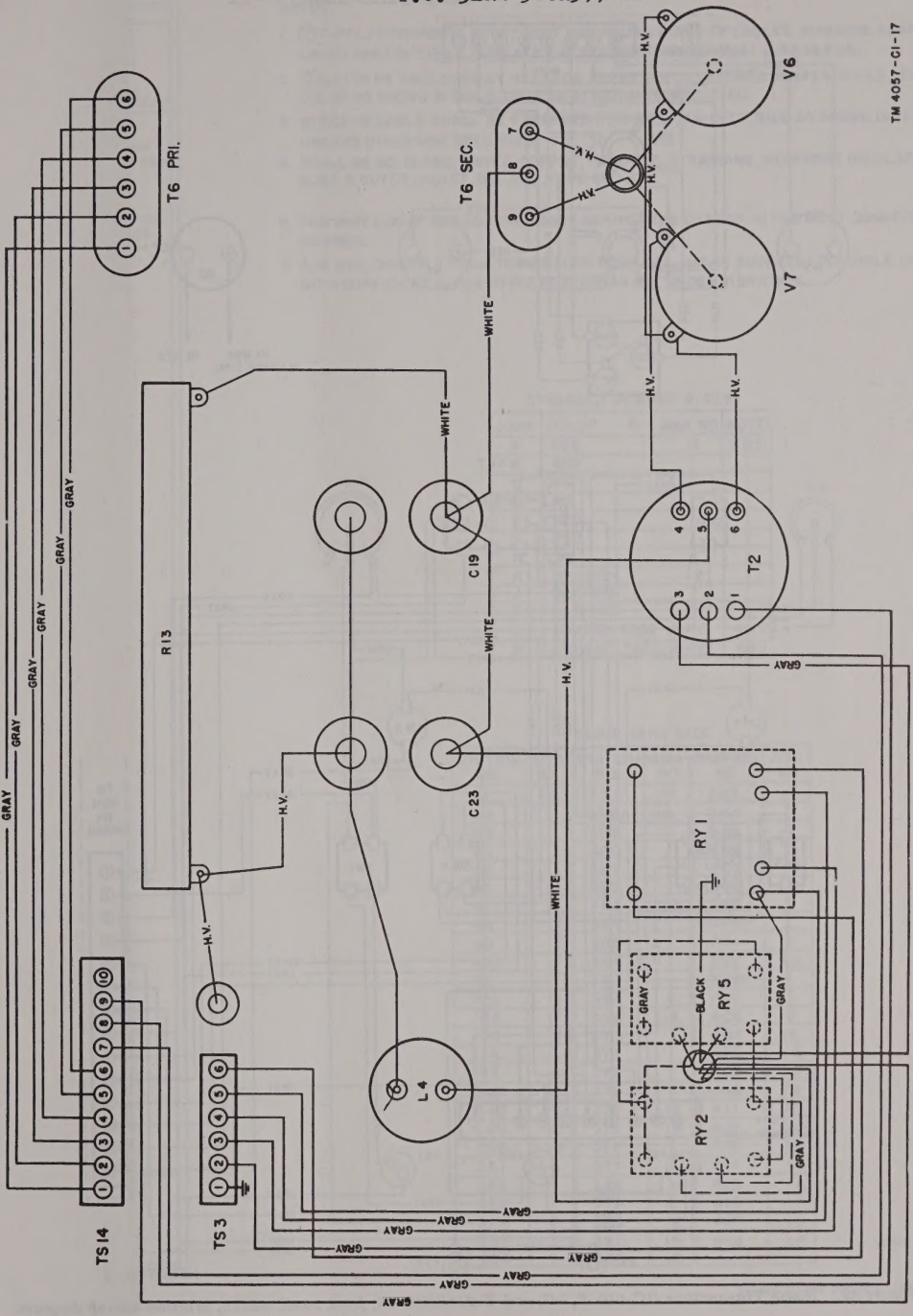


Figure 88. Radio Transmitters BC-610-F, -G, and T-213/GRC-26, power supply deck, practical wiring diagram.

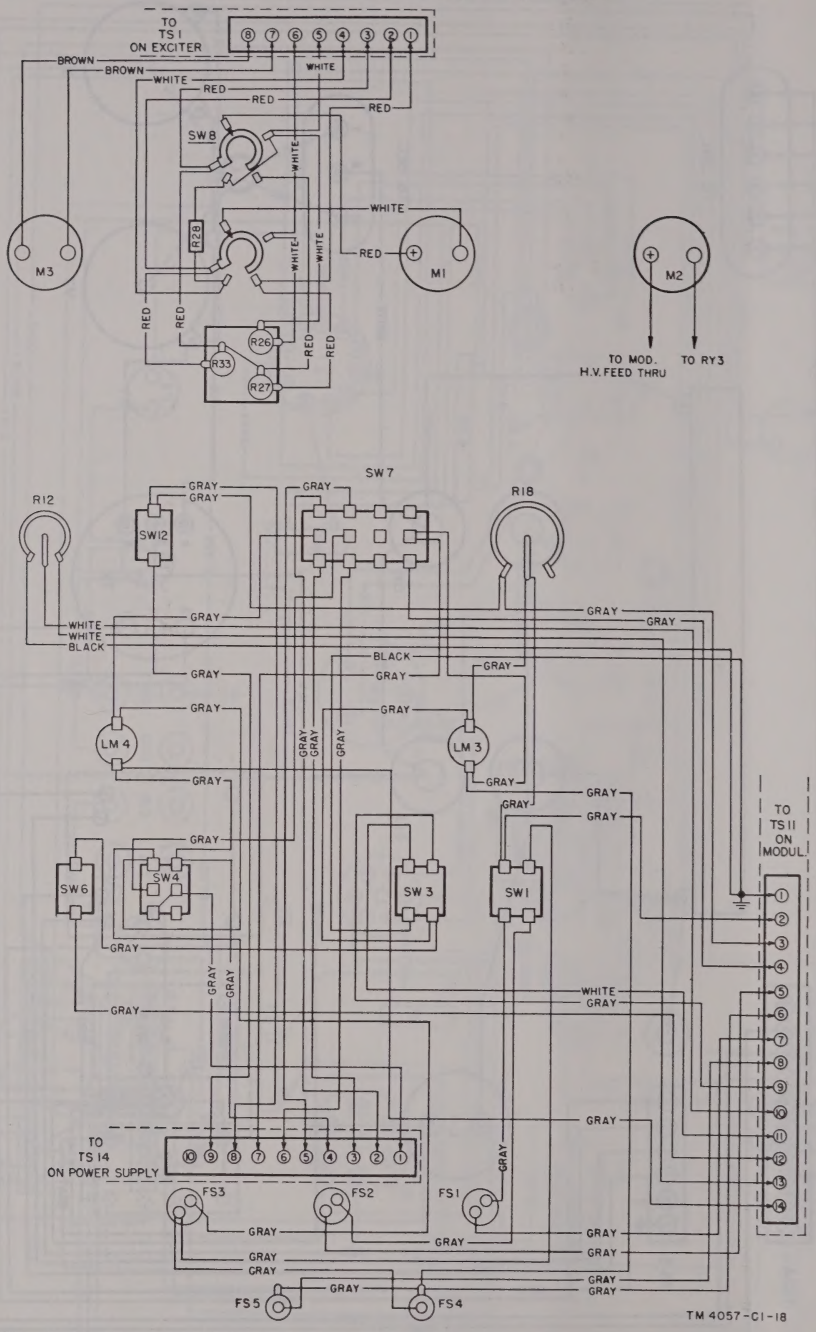


Figure 89. Radio Transmitters BC-610-F, -G, and T-213/GRC-26, front panel section, practical wiring diagram.

NOTES:

1. ① CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. Ⓐ LETTERS ENCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SIZE & COLOR AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
3. WIRES IN CABLE SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
4. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION & BUNA S OUTER JACKET, O.D. .280, TYPE GR.
5. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
6. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

STRANDED JUMPER WIRES

JUMP	COLOR &	AWG NO	NOTE
A	RED	18	2 & 5
B	RED		
C	WH		
D	WH		
E	RED		
F	RED		
G	WH	〃	
H	BLK-GRN	12	
J	BLK-GRN		
K	BLK-GRN	〃	〃
L	HIGH VOLTAGE WIRE		4 & 6
M	HIGH VOLTAGE WIRE		4 & 6

CABLE WIRE SIZE

STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.
91	18	357	18	383	14
92		358		384	
93		359		385	
94		360		386	〃
95		361		387	18
96		362	〃	388	
97		363	14	389	
98		364		390	
99		365		391	〃
100		366		392	10
101		367		393	
102		368	〃	405	
103		369	18	406	〃
104		370		407	18
116		371		408	18
117	〃	372		409	18
347	10	373	〃	410	14
348	18	374	14	411	10
349	10	375	18	412	10
350	18	376		413	18
351		377		414	18
352		378		415	18
353		379	〃	416	14
354		380	12	417	10
355		381	18	418	14
356	〃	382	18		

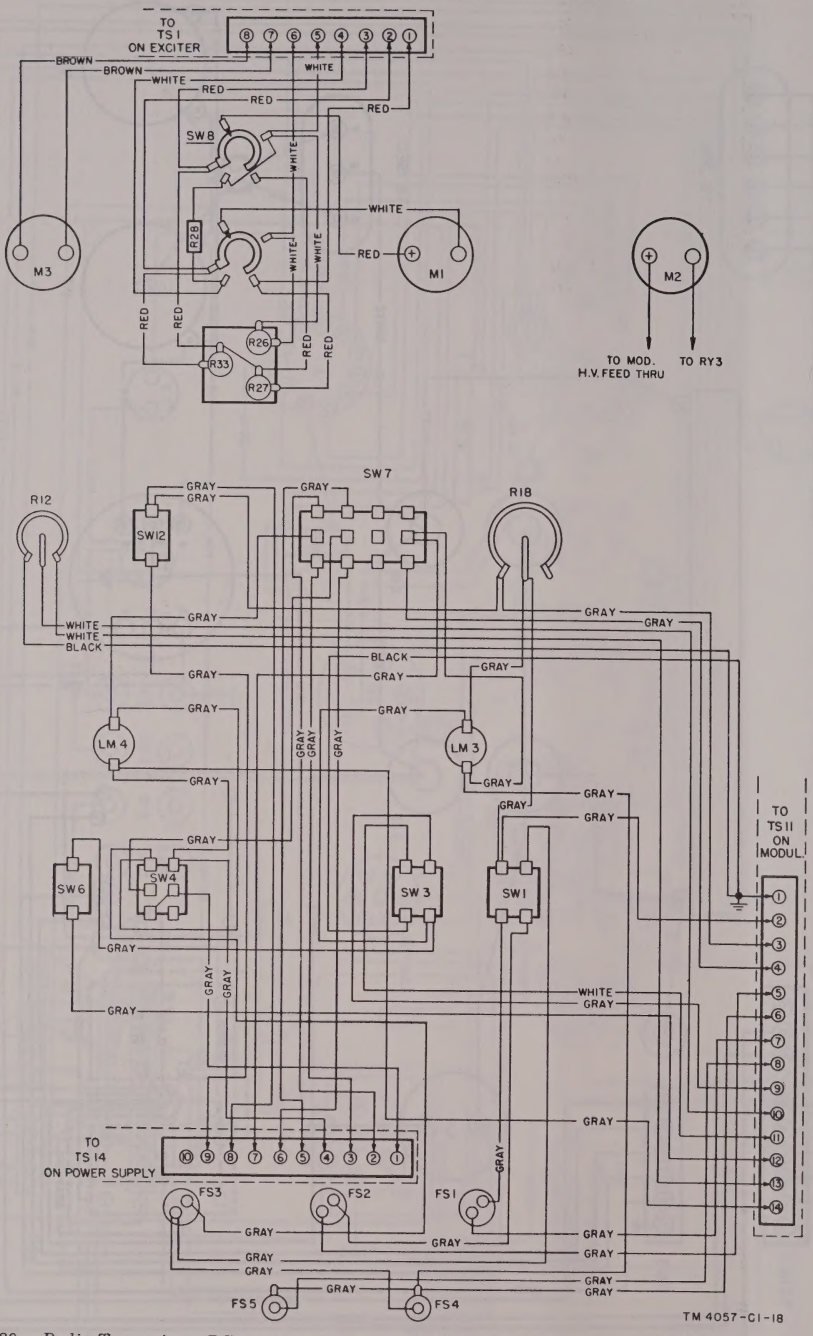


Figure 89. Radio Transmitters BC–610–F, –G, and T–213/GRC–26, front panel section, practical wiring diagram.

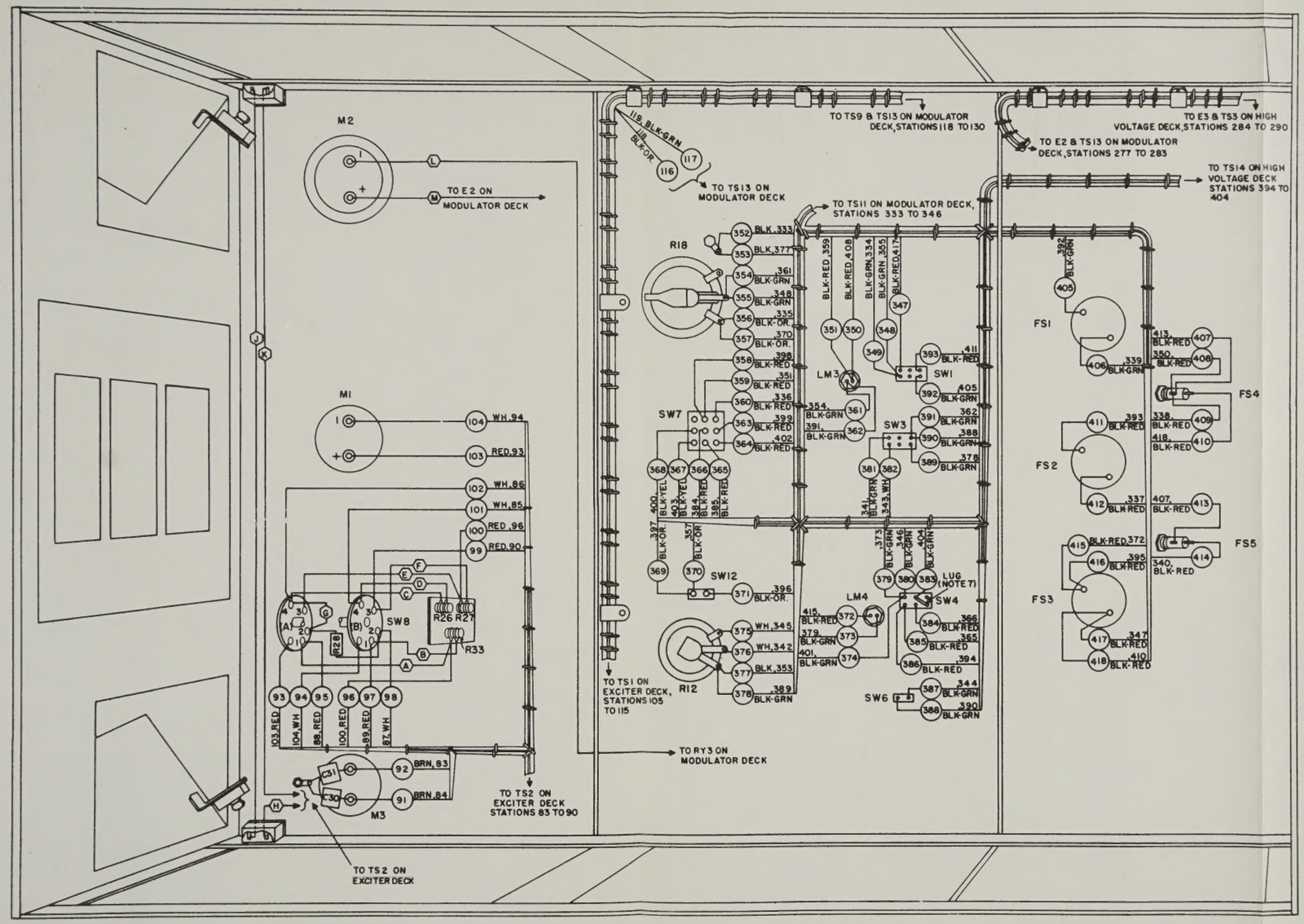


Figure 90. Radio Transmitter BC-610-H (Order No. 19824-Phila-50), front panel section, practical wiring diagram.

NOTES:

1. ⓘ CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. Ⓐ LETTERS ENCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SIZE & COLOR AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
3. WIRES IN CABLE SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
4. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION & BUNA S OUTER JACKET, O.D. .280, TYPE GR.
5. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
6. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

STRANDED JUMPER WIRES

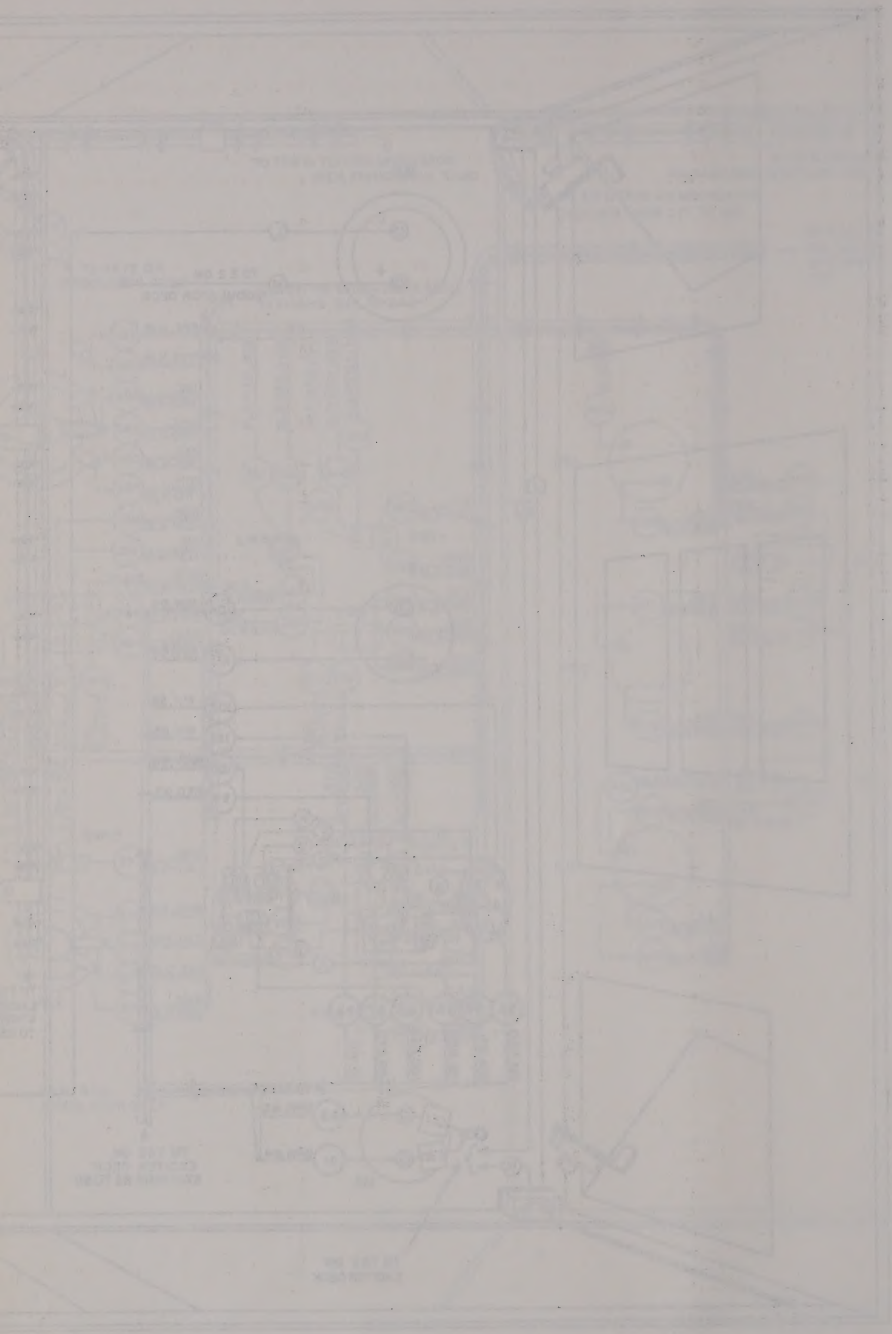
JUMP	COLOR &	AWG NO.	NOTE
A	RED	18	2 & 5
B	RED		
C	WH		
D	WH		
E	RED		
F	RED		
G	WH	↓	
H	BLK-GRN	12	
J	BLK-GRN		
K	BLK-GRN	↓	↓
L	HIGH VOLTAGE WIRE		4 & 6
M	HIGH VOLTAGE WIRE		4 & 6

CABLE WIRE SIZE

STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.
91	18	357	18	383	14
92		358		384	
93		359		385	
94		360		386	↓
95		361		387	18
96		362	↓	388	
97		363	14	389	
98		364		390	
99		365		391	↓
100		366		392	10
101		367		393	
102		368	↓	405	
103		369	18	406	↓
104		370		407	18
116		371		408	18
117	↓	372		409	18
347	10	373	↓	410	14
348	18	374	14	411	10
349	10	375	18	412	10
350	18	376		413	18
351		377		414	18
352		378		415	18
353		379	↓	416	14
354		380	12	417	10
355		381	18	418	14
356	↓	382	18		

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S:

) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE DICATE THE STATION TO WHICH THAT WIRE IS RUN.

RE STRAP WIRES, SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE, SIZE AS SHOWN IN TABLE.

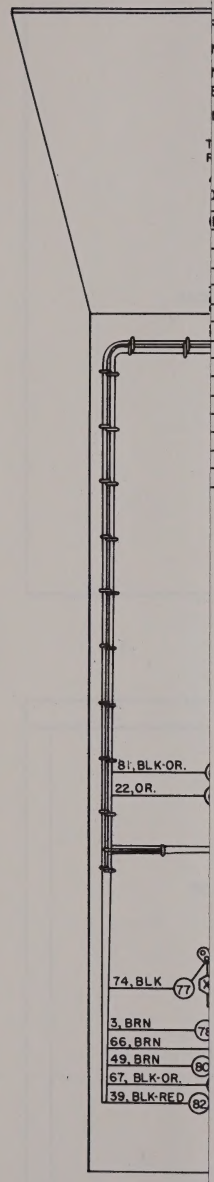
LETTERS ENCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES AND SHALL BE NO. 18 AWG. SEE TABLE FOR COLOR.

RES IN CABLES SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.

N WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.

N WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO EVENT BREAKAGE UNDER VIBRATION.

NUMBERS IN PARENTHESIS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON THE EQUIPMENT.



DED JUMPER WIRES

P.	COLOR	NOTE
	BLK	3&5
	GRN	
	BLK	
	BRN	
	BLK	
	OR.	
	GRN	
	OR.	
	OR.	
	BLK	
	BLU	
	BLU	
	GRN	
	RED	3&6

BARE STRAP WIRES
(SHOWN AS DOUBLE LINE)

FROM PART	FROM TERM.	TO PART	TO TERM.	AWG NO.
CH9	LEFT	CH2	UPPER	18
E1	TOP	C15	LEFT	10
R1	BOTTOM	CH1	BOTTOM	18
R8	BOTTOM	CH7	BOTTOM	18
SWII(A)	1	S07	1	16
	2	S08	1	
	3	S09	1	
	4	S07 S08 S09	2 2 2	
SWII(B)	1	S07	4	
	2	S08	4	
	3	S09	4	
SWII(C)	1	S07	8	
	2	S08	8	
	3	S09	8	
	4	S07 C26 CH5 S08 S09	7 FRONT 7 FRONT 7	
SWII(D)	L1	E1		
	1	S07	12	
	2	S08	12	

FROM PART	FROM TERM.	TO PART	TO TERM.	AWG NO.
SWII(D)	3	S09	12	16
	4	C24 S07 S08 S09	REAR 11 11 11	
V8	GND	R1	UPPER	18
	1	V8	GND	
	5	CH1	UPPER	
	7	V8	GND	
V9	1	V9	GND	
	3	SWII(C)	L1	16
	3	C14	FRONT	16
	5	R23	UPPER	18
	7	V9	GND	
V10	4	V10	GND	
	5	V10	GND	
	GND	C24 C26 S07 S08 S09	FRONT REAR 10 10 10	16
V15	2	V15	GND	18
V13	2	V13	GND	18
V11	4	V11	GND	18
V11	5	V11	GND	18

CABLE WIRE SIZES (NOTE 4)

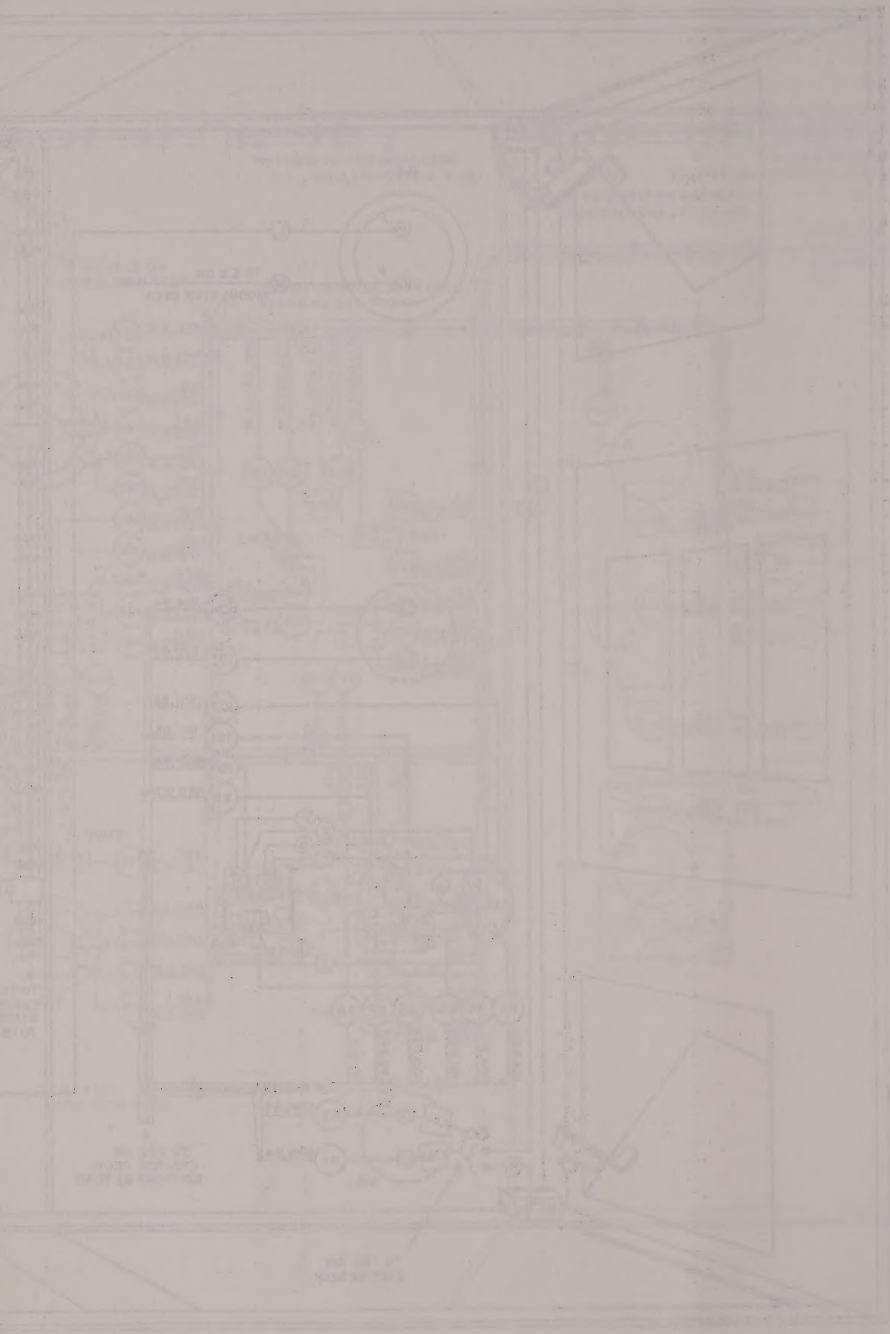
STATION NO.	AWG NO.
1	12
2	12
3	18
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	12
16	12
17	18
18	
19	
20	
21	
22	
23	
24	12
25	18

STATION NO.	AWG NO.
26	18
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	

STATION NO.	AWG NO.
51	18
52	
53	
54	
55	
56	
57	
58	
59	
60	
61	
62	
63	
64	
65	12
66	12
67	18
68	
69	
70	
71	
72	
73	12
74	18
75&76	18

STATION NO.	AWG NO.
77	18
78	18
79	12
80	18
81	
82	
83	
84	
85	
86	
87	
88	
89	
90	
105	
106	
107	
108	
109	
110	
111	
112	
113	
114	12
115	12

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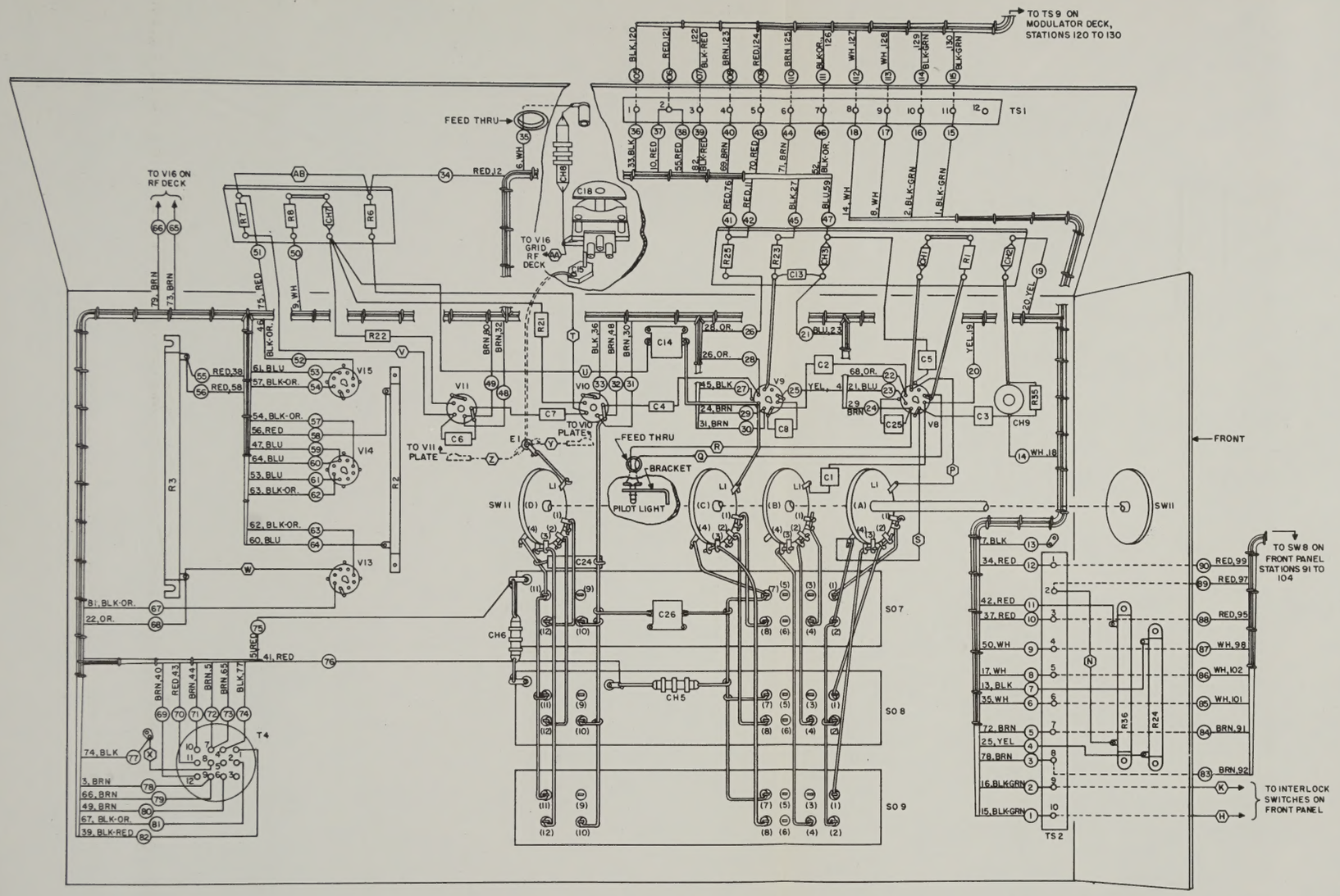


Figure 91. Radio Transmitter BC-610-H (Order No. 19824-Phila-50), exciter section, practical wiring diagram.

NOTES:

1. (I) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. BARE STRAP WIRES, SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE, SIZE AS SHOWN IN TABLE.
3. (N) LETTERS ENCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES AND SHALL BE NO. 18 AWG. SEE TABLE FOR COLOR.
4. WIRES IN CABLES SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
5. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
6. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.
7. (I) NUMBERS IN PARENTHESIS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON THE EQUIPMENT.

STRANDED JUMPER WIRES

JUMP	COLOR	NOTE
N	BLK	3 8 5
P	GRN	
Q	BLK	
R	BRN	
S	BLK	
T	OR.	
U	GRN	
V	OR.	
W	OR.	
X	BLK	
Y	BLU	
Z	BLU	
AA	GRN	↓
AB	RED	3 8 6

BARE STRAP WIRES (SHOWN AS DOUBLE LINE)

FROM PART	FROM TERM.	TO PART	TO TERM.	AWG NO.
CH9	LEFT	CH2	UPPER	18
E1	TOP	C15	LEFT	10
R1	BOTTOM	CH1	BOTTOM	18
R8	BOTTOM	CH7	BOTTOM	18
SW11(A)	1	SO7	1	16
	2	SO8	1	
	3	SO9	1	
	4	SO7 SO8 SO9	2 2 2	
SW11(B)	1	SO7	4	
	2	SO8	4	
	3	SO9	4	
SW11(C)	1	SO7	8	
	2	SO8	8	
	3	SO9	8	
	4	SO7 C26 CH5 SO9 SO8	7 FRONT 7 FRONT 7	
SW11(D)	L1	E1		
	1	SO7	12	
	2	SO8	12	

FROM PART	FROM TERM.	TO PART	TO TERM.	AWG NO.
SW11(D)	3	SO9	12	16
	4	C24 SO7 SO8 SO9	REAR 11 11 11	
V8	GND	R1	UPPER	18
	1	V8	GND	
	5	CH1	UPPER	
	7	V8	GND	
V9	1	V9	GND	
	3	SW11(C)	L1	16
	3	C14	FRONT	16
	5	R23	UPPER	18
	7	V9	GND	
V10	4	V10	GND	
	5	V10	GND	
	GND	C24 C26 SO7 SO8 SO9	FRONT REAR 10 10 10	16
V15	2	V15	GND	18
V13	2	V13	GND	18
V11	4	V11	GND	18
V11	5	V11	GND	18

CABLE WIRE SIZES (NOTE 4)

STATION NO.	AWG NO.
1	12
2	12
3	18
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	↓
15	12
16	12
17	18
18	
19	
20	
21	
22	
23	
24	12
25	18

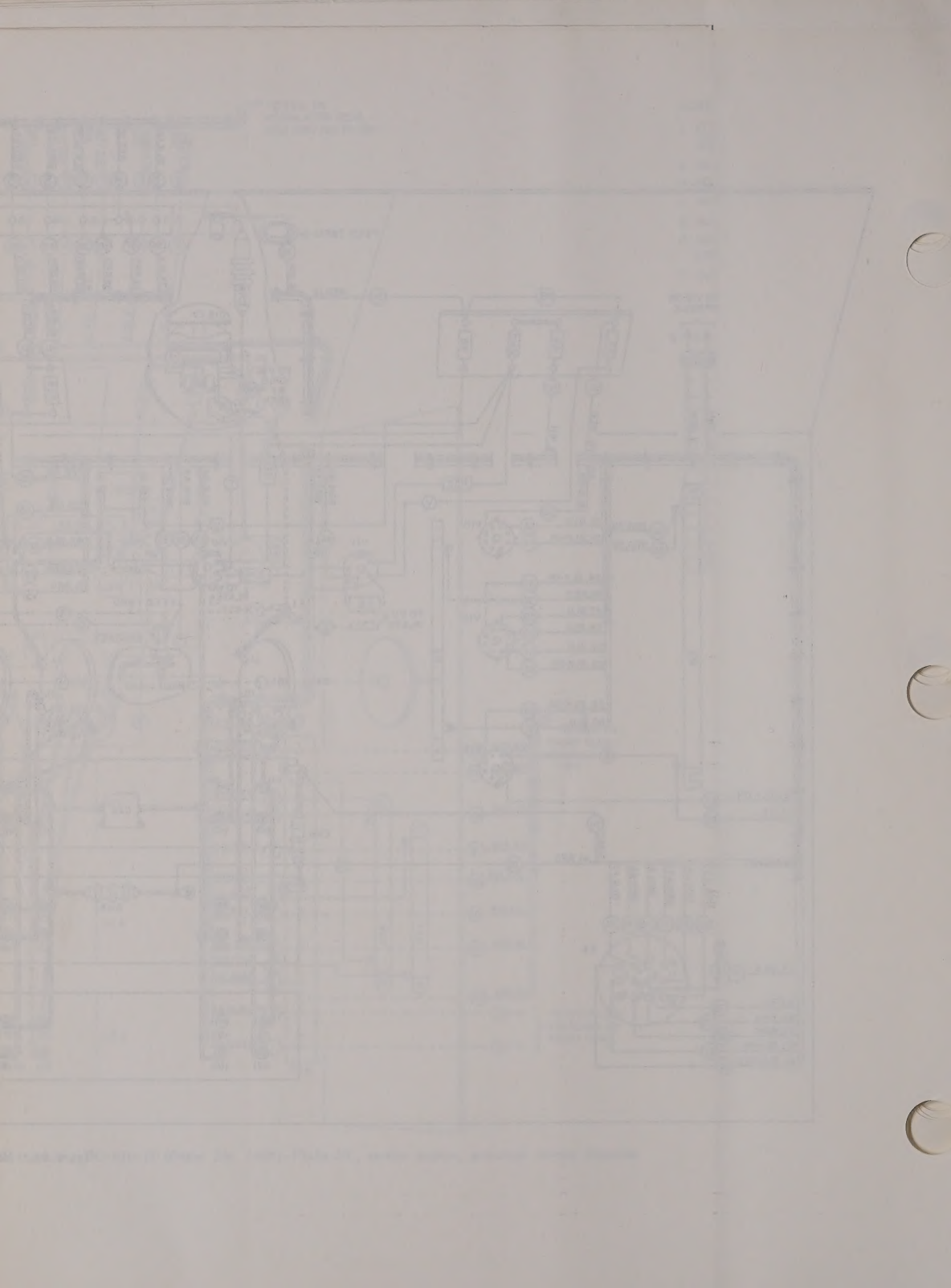
STATION NO.	AWG NO.
26	18
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	↓

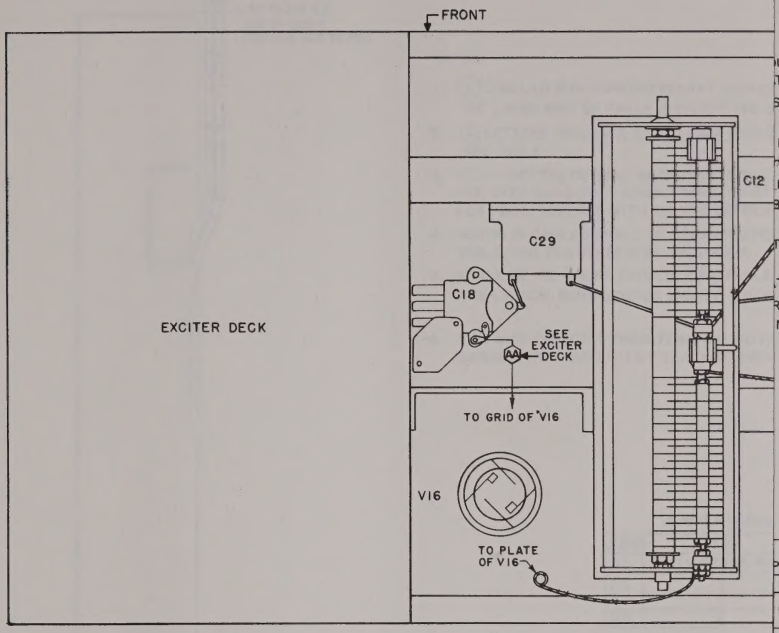
STATION NO.	AWG NO.
51	18
52	
53	
54	
55	
56	
57	
58	
59	
60	
61	
62	
63	
64	↓
65	12
66	12
67	18
68	
69	
70	
71	
72	↓
73	12
74	18
75 & 76	18

STATION NO.	AWG NO.
77	18
78	18
79	12
80	18
81	
82	
83	
84	
85	
86	
87	
88	
89	
90	
105	
106	
107	
108	
109	
110	
111	
112	
113	↓
114	12
115	12

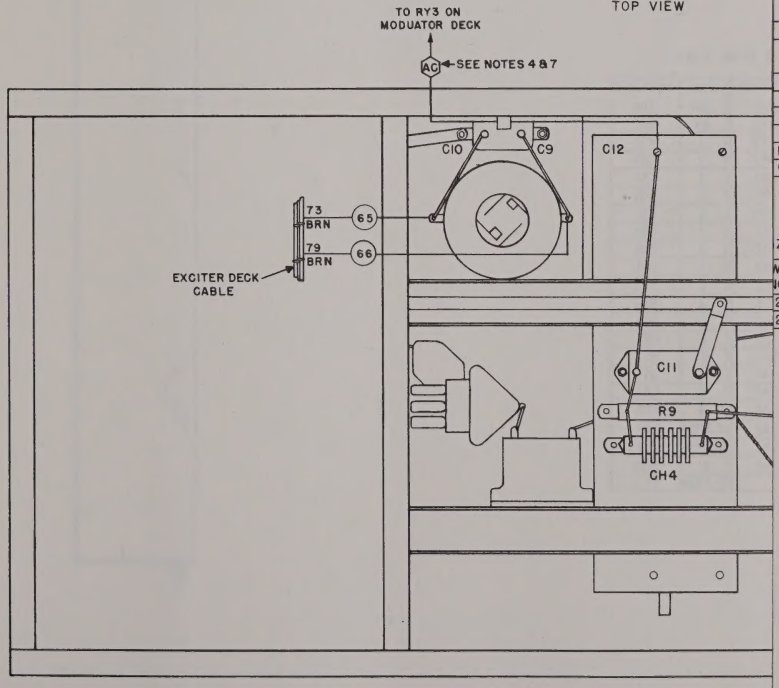
TM 826 - C3 - 50

341205 O - 55 (Face p. 150) No. 2





TOP VIEW



BOTTOM VIEW

Figure 92. Radio Transmitter BC-610-H (

UAL WIRES OF CABLE. NUMBERS NEAR
TION TO WHICH THAT WIRE IS RUN.
S, SHALL BE RUN AS SHORT AND DIRECT

LINES WITH "X'S", SHALL BE RUN AS
HOWN IN TABLE.
EXIBLE STRANDING, NEOPRENE
30, TYPE GR.

TRANDS, 35 WIRES PER STRAND,

T BRAID.
RMINAL, IN THE SHORTEST POSSIBLE
NT BREAKAGE UNDER VIBRATION.

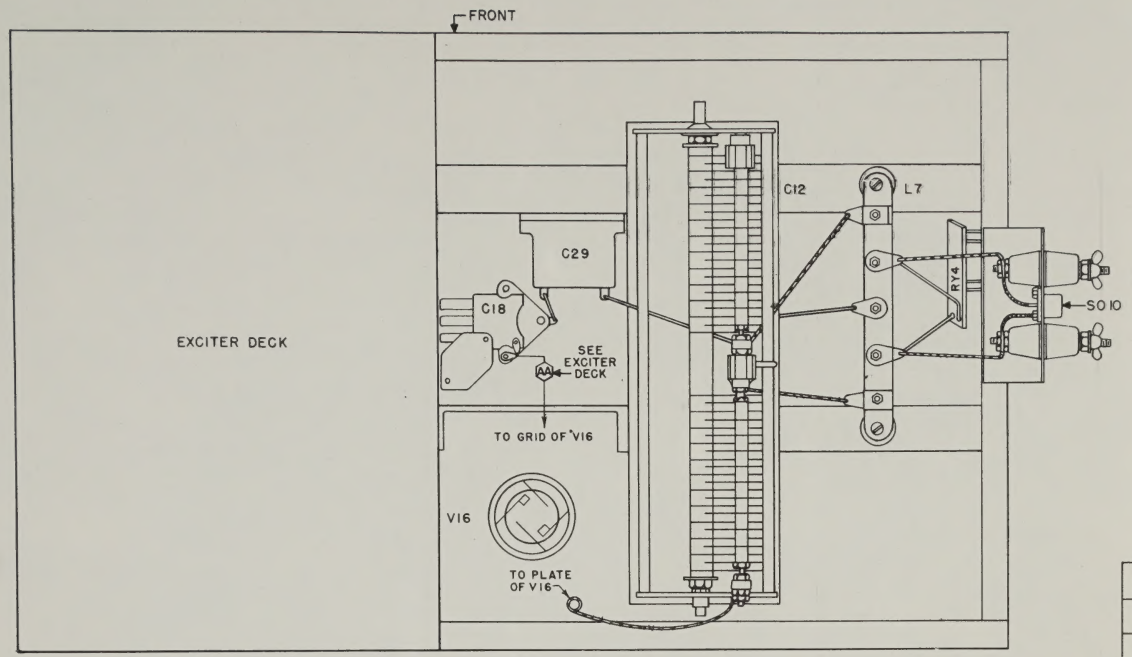
BARE JUMPER WIRES
(NOTE 3)

FROM		TO		AWG NO.
PART	TERM.	PART	TERM.	
C18	MIDDLE	C29	LEFT	10
C29	RIGHT	C12	STATOR FRONT	10
L7	LINK WINDING FRONT	RY4	TOP	16
L7	MIDDLE	R9	RIGHT	10
L7	LINK WINDING REAR	RY4	LOWER	16
C10	LEFT	V16	LEFT	16
C9	RIGHT	V16	RIGHT	16
C11	LEFT	C12	L. REAR	10
C11	LEFT	R9	LEFT	16
R9	LEFT	CH4	LEFT	16
CH4	RIGHT	R9	RIGHT	16

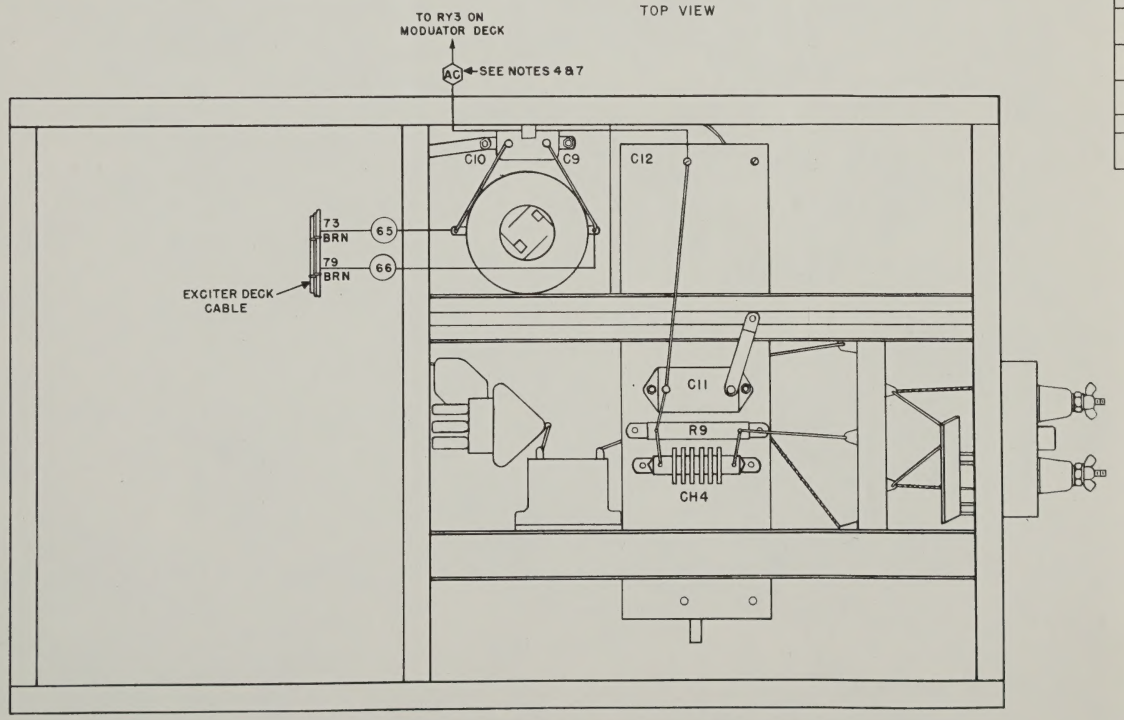
ZE

WG NO.
2
2





TOP VIEW



BOTTOM VIEW

NOTES:

1. (1) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLE. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. BARE STRAP WIRES, SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE, SIZE AS SHOWN IN TABLE.
3. BRAIDED JUMPER WIRES, SHOWN AS DOUBLE LINES WITH "X'S", SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE. SIZE AS SHOWN IN TABLE.
4. (AC) SHALL BE NO. 16 AWG TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION BUNA S OUTER JACKET, O.D. -280, TYPE GR.
5. SHALL BE ROPE BRAID, COPPER, TINNED, 7 STRANDS, 35 WIRES PER STRAND, APPROX .0048" DIA WIRES.
6. SHALL BE 3/16" WIDE, TINNED, COPPER, FLAT BRAID.
7. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

BRAIDED JUMPER WIRES

FROM		TO		NOTE
PART	TERM.	PART	TERM.	
L7	FRONT	C12	STATOR FRONT	5
L7	LINK WINDING FRONT	E4	INSIDE	5
L7	LINK WINDING FRONT	E5	INSIDE	5
L7	REAR	C12	STATOR REAR	5
C12	STATOR REAR	V16	PLATE	6
SO 10	PIN	E4	INSIDE	6
SO 10	MTG SCREW	E5	INSIDE	6

BARE JUMPER WIRES (NOTE 3)

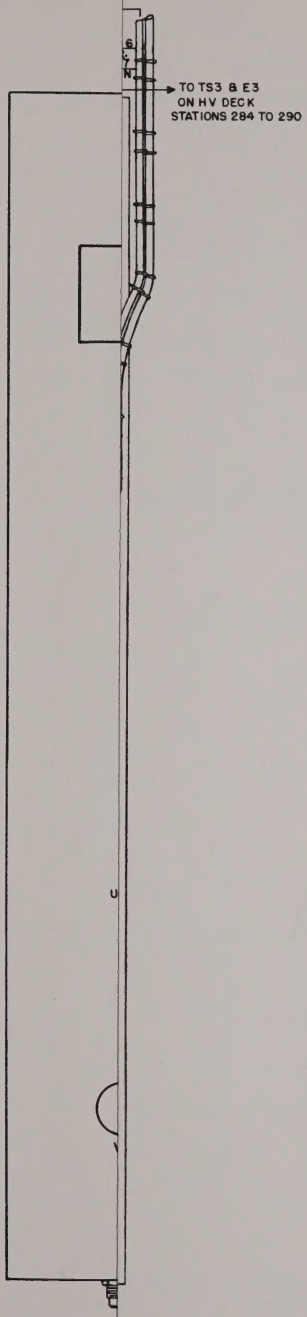
FROM		TO		AWG NO.
PART	TERM.	PART	TERM.	
C18	MIDDLE	C29	LEFT	10
C29	RIGHT	C12	STATOR FRONT	10
L7	LINK WINDING FRONT	RY4	TOP	16
L7	MIDDLE	R9	RIGHT	10
L7	LINK WINDING REAR	RY4	LOWER	16
C10	LEFT	V16	LEFT	16
C9	RIGHT	V16	RIGHT	16
C11	LEFT	C12	L. REAR	10
C11	LEFT	R9	LEFT	16
R9	LEFT	CH4	LEFT	16
CH4	RIGHT	R9	RIGHT	16

CABLE WIRE SIZE

STATION	AWG NO.
65	12
66	12

Figure 92. Radio Transmitter BC-610-H (Order No. 19624-Phila-50), r-f p-a section, practical wiring diagram.





NOTES:

1. (1) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. (A) LETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SEE TABLE.
3. ⊂⊃---- DOTTED OUTLINE REPRESENTS SHIELDED WIRE, TYPE WL-1 1/2 (7)-18-C-8, PER SPEC JAN-C-76, 2 CONDUCTORS, TWISTED TOGETHER APPROXIMATELY 4 TURNS PER FOOT, COVERED WITH TINNED COPPER BRAID, PER SPEC 94-40229.
4. WIRES IN CABLES SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
5. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION, BUNA S OUTER JACKET, O.D. 280, TYPE GR.

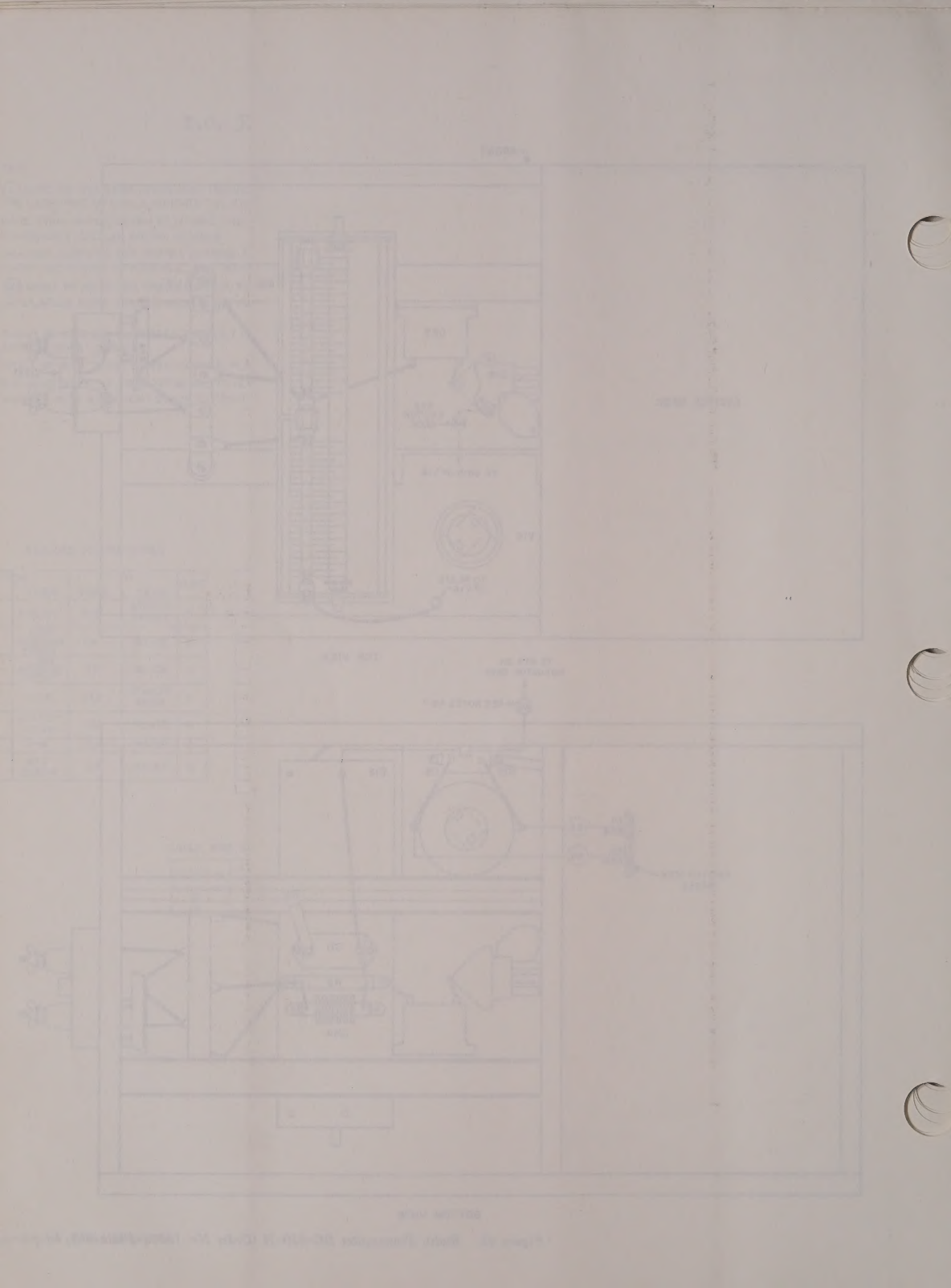
6 RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

JUMPER WIRES

JUMP	TYPE	NOTE
AD	HIGH VOLTAGE WIRE	2,5,6
AE	↓	↓
AF	↓	↓
AG	↓	↓

CABLE WIRE SIZES

STATION NO.	AWG NO.	STATION NO.	AWG NO.
118	18	278	18
119	↓	279	18
120	↓	280	12
121	↓	281	14
122	↓	282	10
123	↓	283	18
124	↓	333	18
125	↓	334	10
126	↓	335	18
127	↓	336	18
128	↓	337	10
129	12	338	18
130	12	339	10
175	18	340	18
176	↓	341	↓
183	↓	342	↓
184	↓	343	↓
188	NOTE 3	344	↓
189	NOTE 3	345	↓
258	18	346	12
277	NOTE 5		



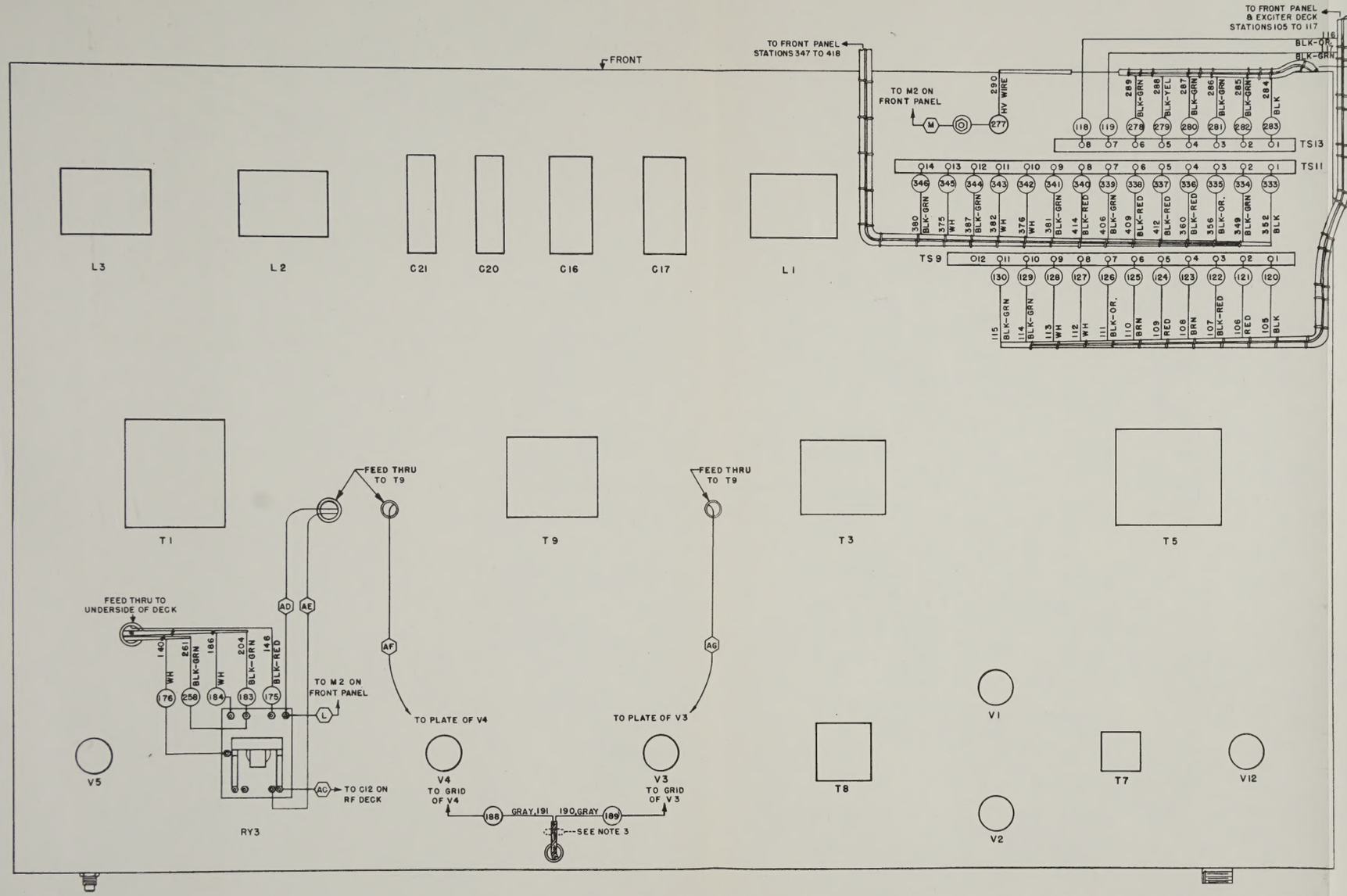


Figure 93. Radio Transmitter BC-610-H (Order No. 19624-Phila-50), top view of modulator deck, practical wiring diagram

NOTES:

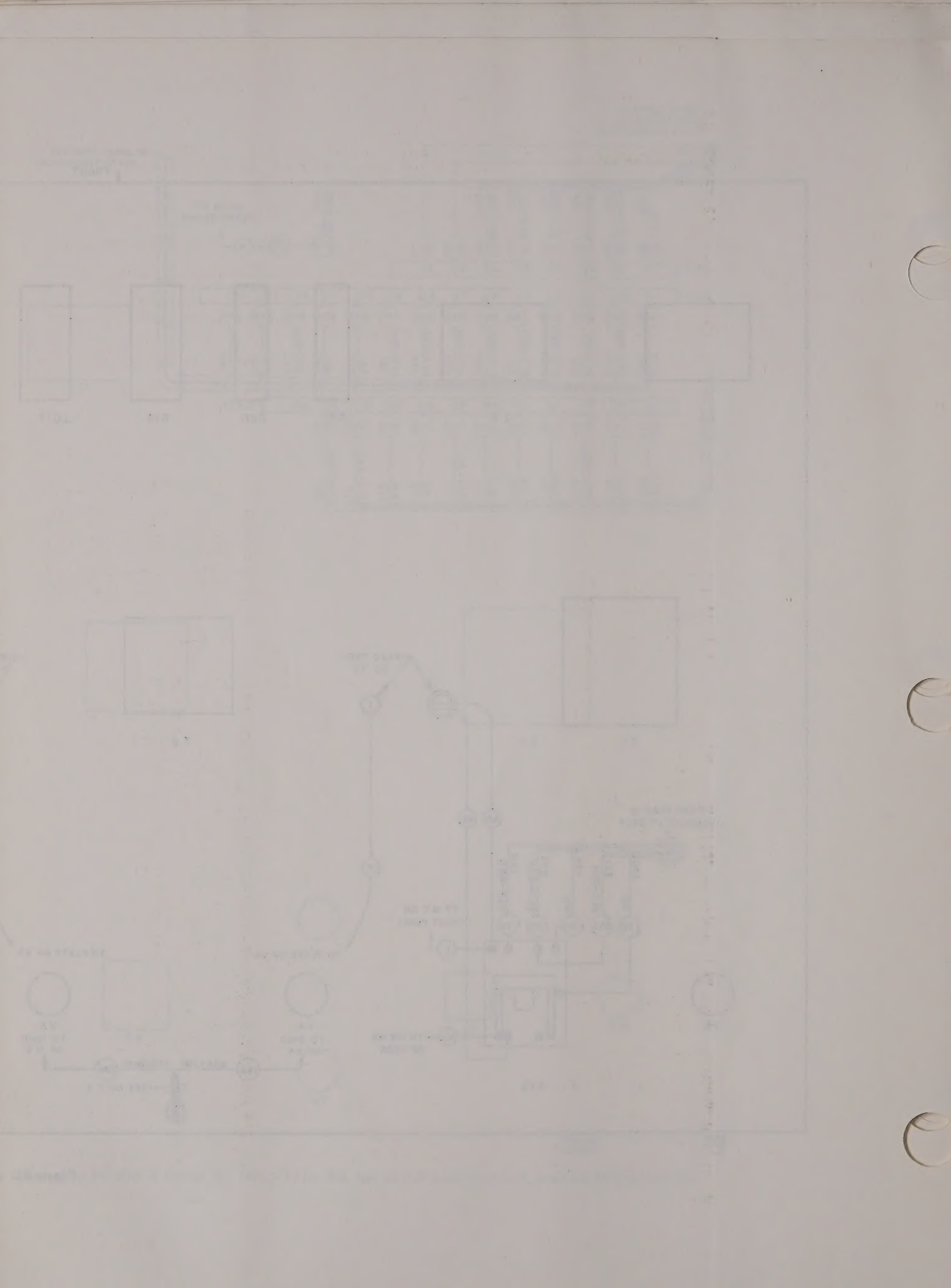
1. (1) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. (A) LETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SEE TABLE.
3. ----- DOTTED OUTLINE REPRESENTS SHIELDED WIRE, TYPE WL-1 1/2 (7)-18-C-8, PER SPEC JAN-C-76, 2 CONDUCTORS, TWISTED TOGETHER APPROXIMATELY 4 TURNS PER FOOT, COVERED WITH TINNED COPPER BRAID, PER SPEC 94-40229.
4. WIRES IN CABLES SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
5. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION, BUNA S OUTER JACKET, O.D. 280, TYPE GR.
6. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

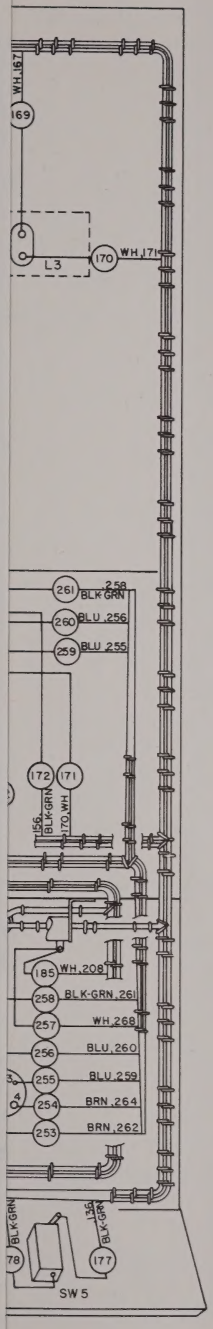
JUMPER WIRES

JUMP	TYPE	NOTE
AD	HIGH VOLTAGE WIRE	2,5,6
AE		
AF		
AG		

CABLE WIRE SIZES

STATION NO.	AWG NO.	STATION NO.	AWG NO.
118	18	278	18
119		279	18
120		280	12
121		281	14
122		282	10
123		283	18
124		333	18
125		334	10
126		335	18
127		336	18
128		337	10
129	12	338	18
130	12	339	10
175	18	340	18
176		341	
183		342	
184		343	
188	NOTE 3	344	
189	NOTE 3	345	
258	18	346	12
277	NOTE 5		





tical wiring

NOTES:

1. ①CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. BARE STRAP WIRES, SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE. SIZE AS SHOWN IN TABLE.
3. ⒶLETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SEE TABLE FOR COLOR AND SIZE.
4. WIRES IN CABLES SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
5. ⊏⊐ DOTTED OUTLINE REPRESENTS SHIELDED WIRE, WHICH SHALL BE WIRE TYPE WL-11/2(7)-18-C-8, PER SPEC JAN-C-76, 2 CONDUCTORS TWISTED TOGETHER APPROXIMATELY 4 TURNS PER FOOT, COVERED WITH TINNED COPPER BRAID, PER SPEC 94-40229.
6. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION, BUNA S OUTER JACKET, O.D. 280, TYPE GR.
7. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
8. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL IN THE SHORTEST POSSIBLE MANNER WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

STRANDED JUMPER WIRES

JUMP.	COLOR	AWG NO.	NOTE
AH	WH	18	3,7
AJ	SEE NOTE 5		3,8
AK	BLK	18	3,8
AL	GRN	18	3,8
AM	BLK	18	3,8

BARE JUMPER WIRES

FROM PART	FROM TERM.	TO PART	TO TERM.	AWG NO.
C16	REAR	C20	REAR	18
C17	REAR	C16	REAR	
C20	REAR	C21	REAR	
C21	REAR	C21	GND	
R10	RIGHT	C17	REAR	▼
TS13	1	TS13	GND	14

CABLE WIRE SIZES

STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.
131	14	166	18	207	18	242	18
132	18	167		208		243	
133	18	168		209		244	
134	18	169		210	▼	245	
135	12	170		211	14	246	
136	12	171		212	18	247	
137	12	172		213	18	248	
138	18	173		214	18	249	
139	18	174	▼	215	14	250	
140	18	177	12	216	18	251	
141	14	178	12	217		252	
142	18	179	10	218		253	
143	10	180	10	219		254	
144	14	181	14	220		255	
145	10	182	14	221		256	
146	18	185	18	222		257	
147	18	186	18	223		258	
148	NOTE 6	187	18	224		259	
149	18	190	NOTE 5	225		260	
150		191	NOTE 5	226		261	
151		192	14	227		262	
152		193	14	228		263	
153	▼	194	18	229		264	
154	12	195	18	230		265	
155	14	196	18	231		266	
156	18	197	14	232		267	
157		198	14	233		268	▼
158		199	18	234		269	14
159		200	18	235		270	
160		201	14	236		271	
161	▼	202	14	237		272	
162	NOTE 6	203	18	238		273	
163	18	204		239		274	
164	18	205		240		275	
165	18	206	▼	241	▼	276	▼

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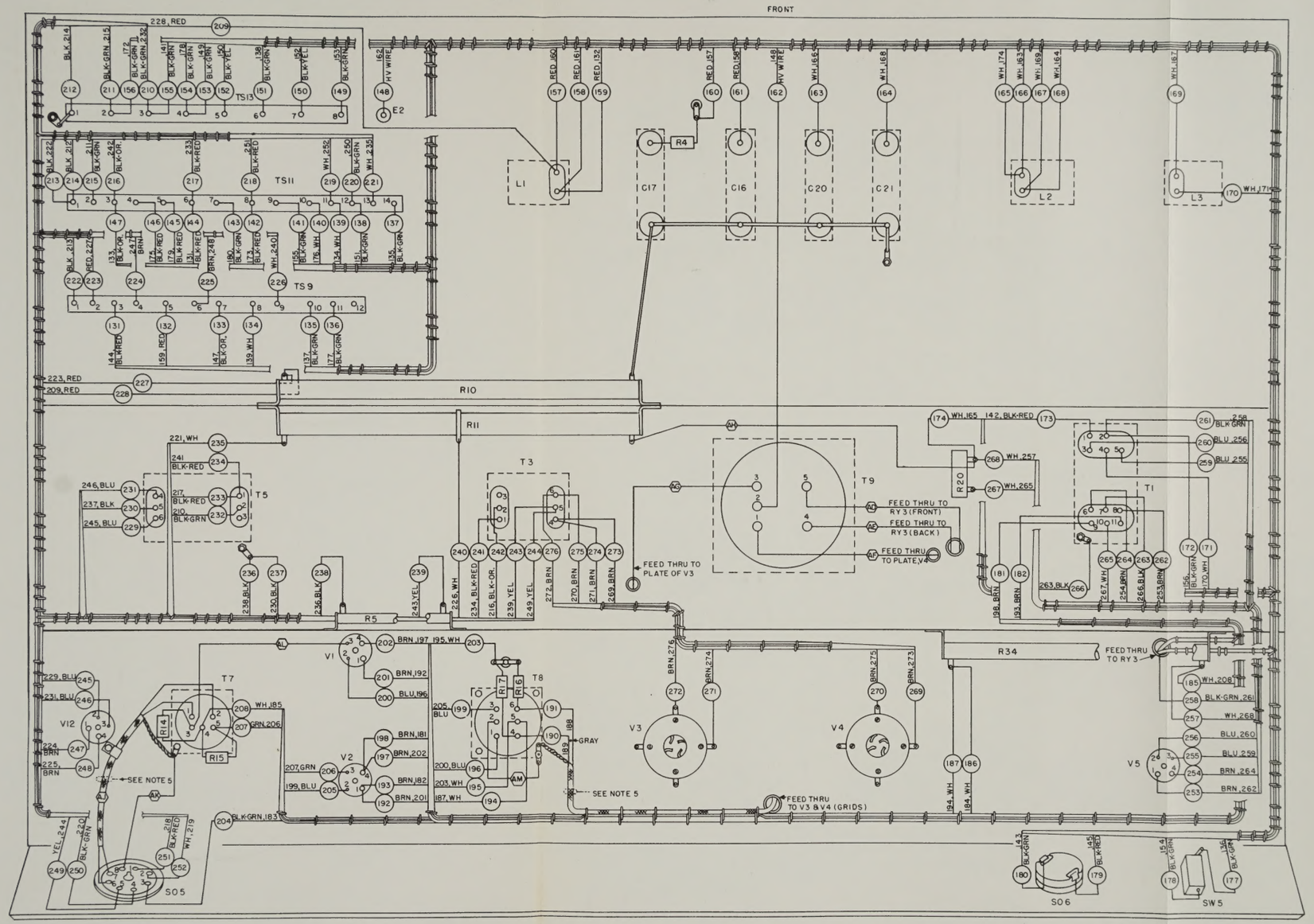


Figure 94. Radio Transmitter BC-610-H (Order No. 19624-Phila-50), bottom view of modulator deck, practical wiring diagram.

NOTES:

1. ⓘ CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. BARE STRAP WIRES, SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE. SIZE AS SHOWN IN TABLE.
3. Ⓐ LETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SEE TABLE FOR COLOR AND SIZE.
4. WIRES IN CABLES SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
5. ⋯⋯ DOTTED OUTLINE REPRESENTS SHIELDED WIRE, WHICH SHALL BE WIRE TYPE WL-11/2(7)-18-C-8, PER SPEC JAN-C-76, 2 CONDUCTORS TWISTED TOGETHER APPROXIMATELY 4 TURNS PER FOOT, COVERED WITH TINNED COPPER BRAID, PER SPEC 94-40229.
6. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION, BUNA S OUTER JACKET, O.D. .280, TYPE GR.
7. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
8. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL IN THE SHORTEST POSSIBLE MANNER WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

STRANDED JUMPER WIRES

JUMP	COLOR	AWG NO.	NOTE
AH	WH	18	3,7
AJ	SEE NOTE 5		3,8
AK	BLK	18	3,8
AL	GRN	18	3,8
AM	BLK	18	3,8

BARE JUMPER WIRES

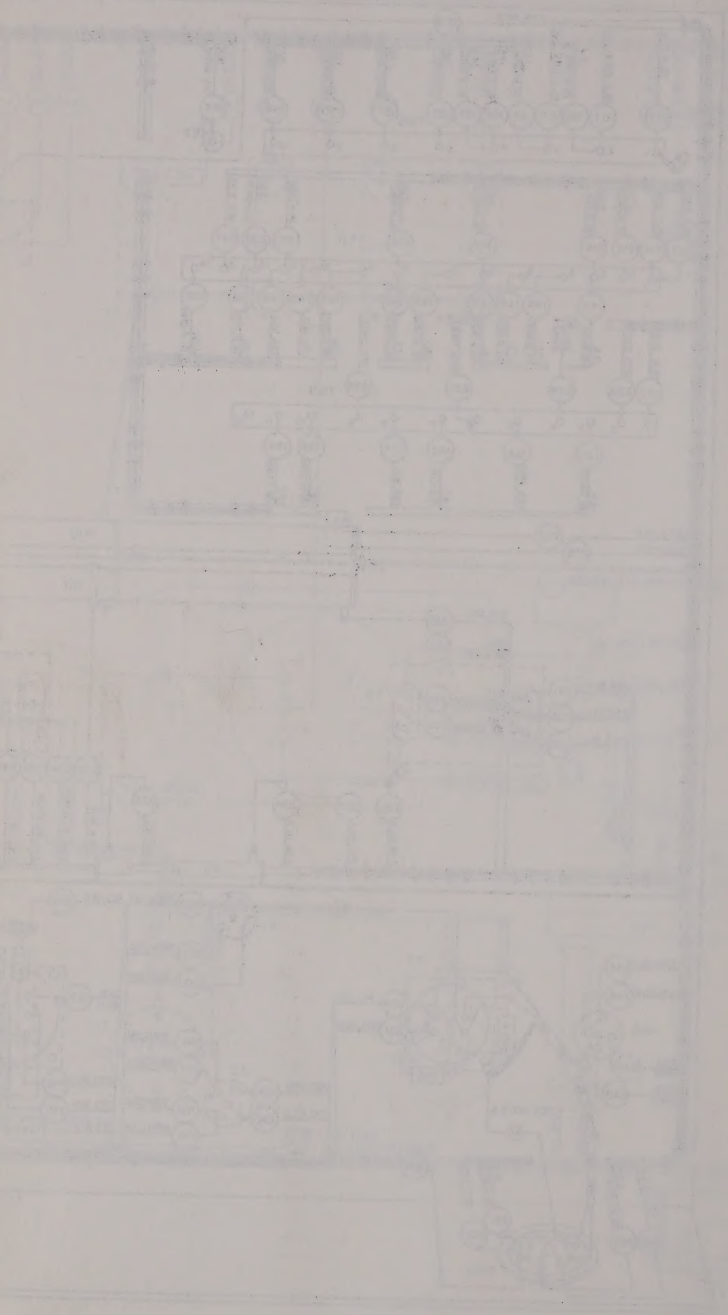
FROM PART	FROM TERM.	TO PART	TO TERM.	AWG NO.
C16	REAR	C20	REAR	18
C17	REAR	C16	REAR	
C20	REAR	C21	REAR	
C21	REAR	C21	GND	
R10	RIGHT	C17	REAR	↓
TS13	1	TS13	GND	14

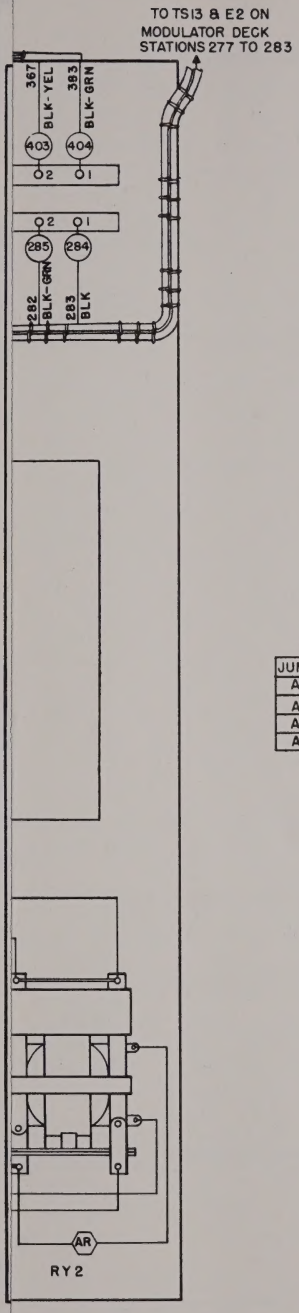
CABLE WIRE SIZES

STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.
131	14	166	18	207	18	242	18
132	18	167		208		243	
133	18	168		209		244	
134	18	169		210	↓	245	
135	12	170		211	14	246	
136	12	171		212	18	247	
137	12	172		213	18	248	
138	18	173		214	18	249	
139	18	174	↓	215	14	250	
140	18	177	12	216	18	251	
141	14	178	12	217		252	
142	18	179	10	218		253	
143	10	180	10	219		254	
144	14	181	14	220		255	
145	10	182	14	221		256	
146	18	185	18	222		257	
147	18	186	18	223		258	
148	NOTE 6	187	18	224		259	
149	18	190	NOTE 5	225		260	
150		191	NOTE 5	226		261	
151		192	14	227		262	
152		193	14	228		263	
153	↓	194	18	229		264	
154	12	195	18	230		265	
155	14	196	18	231		266	
156	18	197	14	232		267	
157		198	14	233		268	↓
158		199	18	234		269	14
159		200	18	235		270	
160		201	14	236		271	
161	↓	202	14	237		272	
162	NOTE 6	203	18	238		273	
163	18	204		239		274	
164	18	205		240		275	
165	18	206	↓	241	↓	276	↓

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NOTES:

1. (1) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. (AN) LETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SIZE & COLOR AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
3. WIRES IN CABLES SHALL BE STRANDED PER JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
4. FOR CONVENTIONAL OPERATION, CONNECT JUMPER ON TS15 AS SHOWN FOR REMOTE CONTROL OF T6, REMOVE JUMPER AND CONNECT CORD CX-911/U TO TS15.
5. SHALL BE NO. 16 AWG, TINNED, COPPER FLEXIBLE STRANDING NEOPRENE INSULATION & BUNA S OUTER JACKET, O.D. .280, TYPE GR.
6. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
7. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.
8. BARE STRAP WIRES, SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE. SIZE AS SHOWN IN TABLE.

STRANDED JUMPER WIRES

JUMP.	COLOR	NOTE
AN	HIGH VOLTAGE WIRE	2,5&6
AP	HIGH VOLTAGE WIRE	2,5&6
AQ	WH 18 AWG	2 & 6
AR	WH 18 AWG	2 & 7

BARE JUMPER WIRES
(NOTE 8,7)

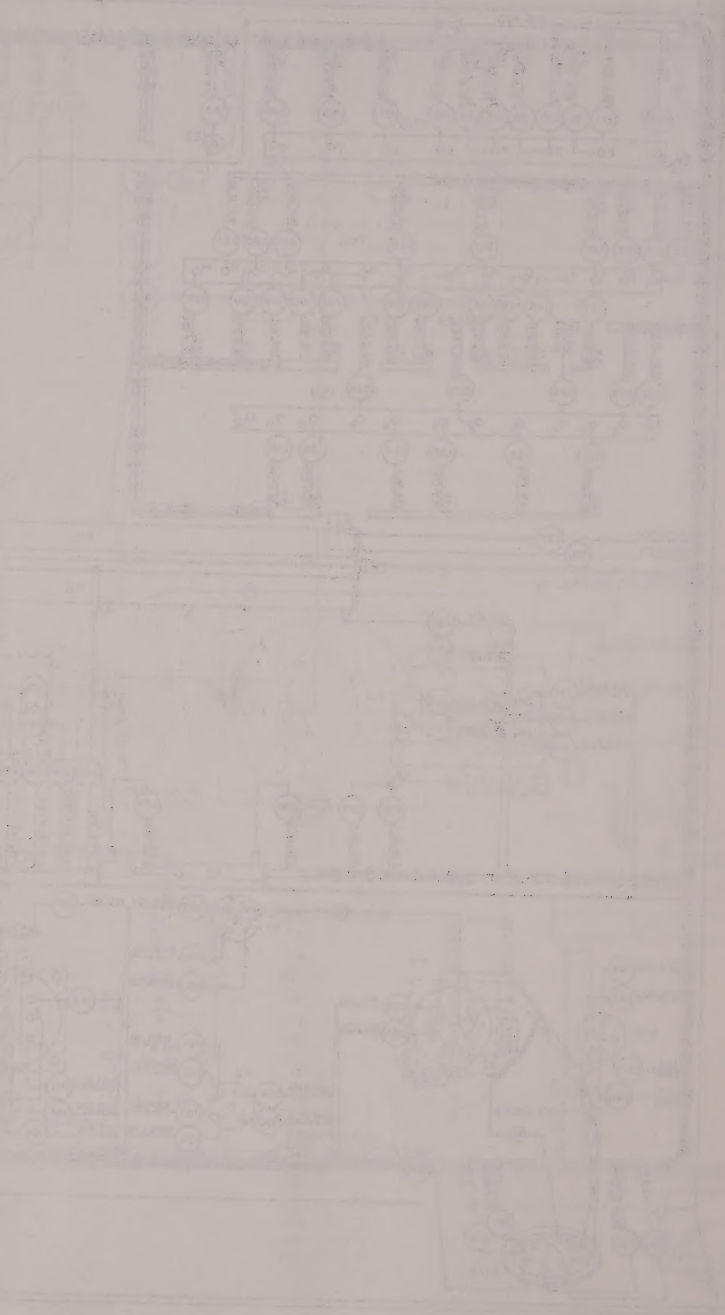
FROM		TO		AWG
PART	TERM.	PART	TERM.	NO.
RY5	L. FRONT	RY5	R. FRONT	18
RY2	L. FRONT	RY2	R. FRONT	18
RY5	R. REAR	RY2	L. REAR	18
TS15	3	TS15	2	16

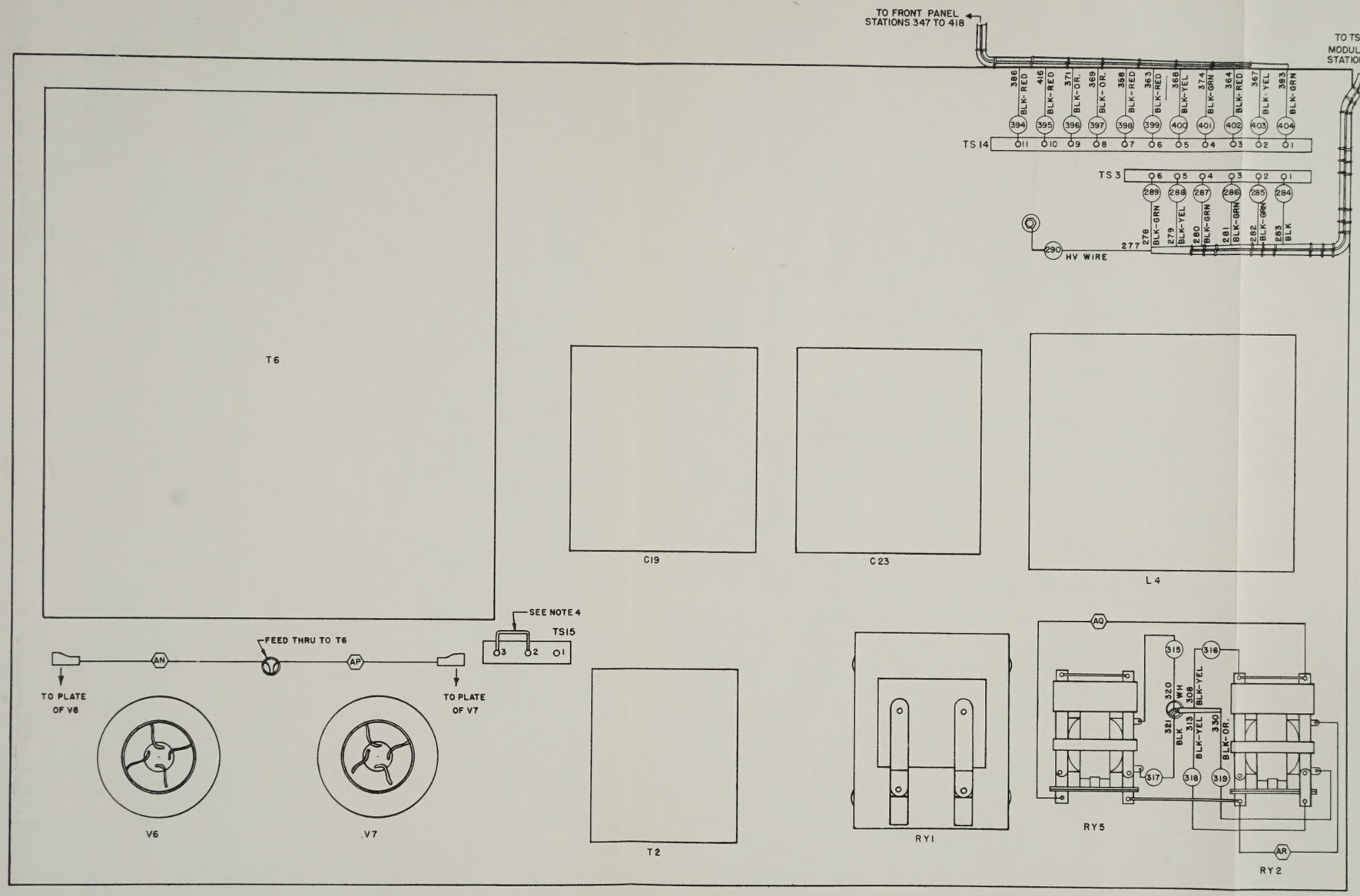
CABLE WIRE SIZE

STATION	AWG NO.
284	18
285	10
286	14
287	12
288	18
289	18
290	NOTE 5
315	18
316	
317	
318	
319	
394	14
395	14
396	18
397	18
398	18
399	14
400	
401	
402	
403	
404	

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NOTES:

1. (1) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. (AN) LETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SIZE & COLOR AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
3. WIRES IN CABLES SHALL BE STRANDED PER JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
4. FOR CONVENTIONAL OPERATION, CONNECT JUMPER ON TS15 AS SHOWN FOR REMOTE CONTROL OF T6, REMOVE JUMPER AND CONNECT CORD CX-911/U TO TS15.
5. SHALL BE NO. 16 AWG, TINNED, COPPER FLEXIBLE STRANDING NEOPRENE INSULATION & BUNA S OUTER JACKET, O.D. .280, TYPE GR.
6. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
7. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.
8. BARE STRAP WIRES, SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE. SIZE AS SHOWN IN TABLE.

STRANDED JUMPER WIRES

JUMP	COLOR	NOTE
AN	HIGH VOLTAGE WIRE	2,5&6
AP	HIGH VOLTAGE WIRE	2,5&6
AQ	WH 18 AWG	2&6
AR	WH 18 AWG	2&7

BARE JUMPER WIRES (NOTE 8,7)

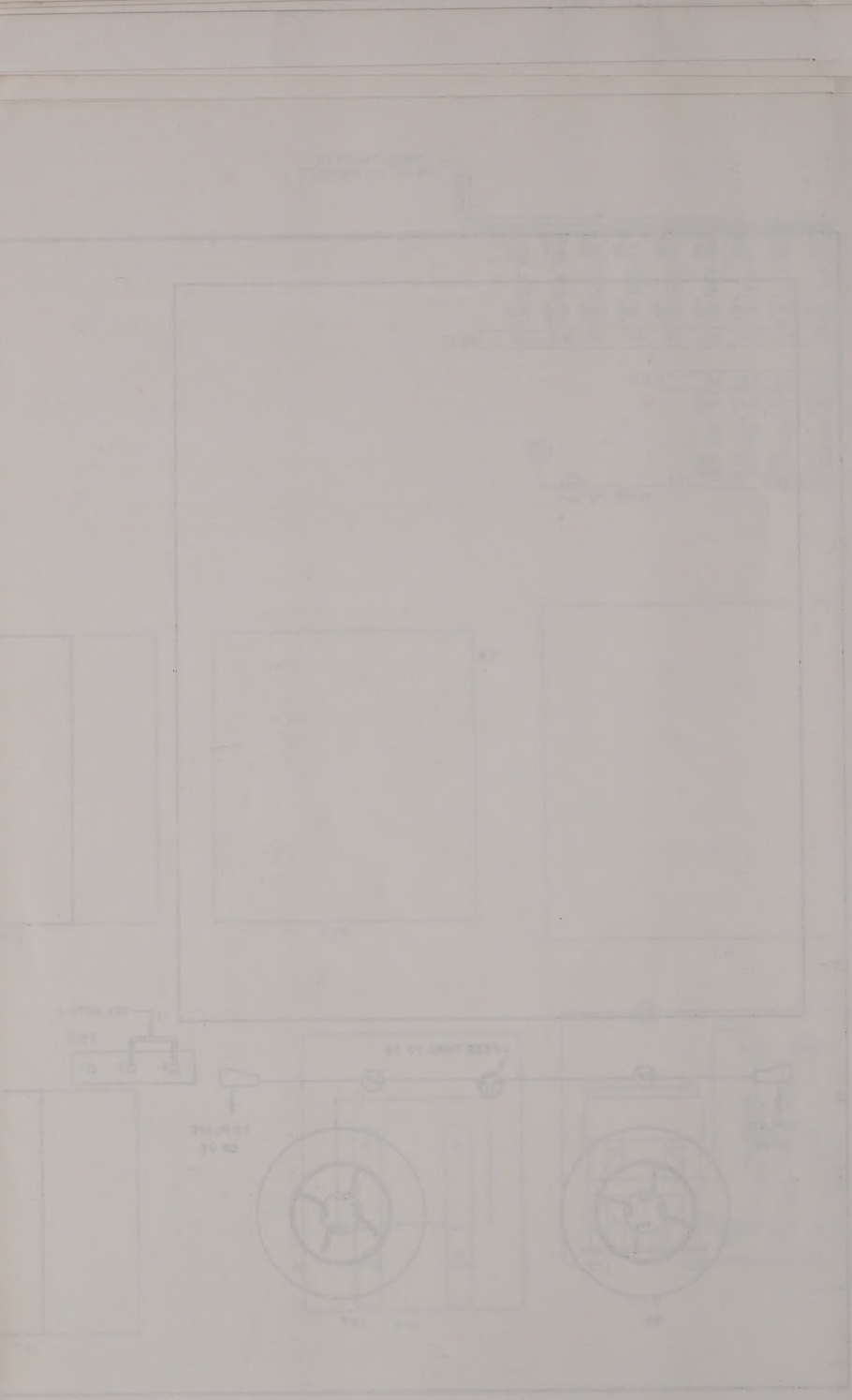
FROM PART	FROM TERM.	TO PART	TO TERM.	AWG NO.
RY5	L. FRONT	RY5	R. FRONT	18
RY2	L. FRONT	RY2	R. FRONT	18
RY5	R. REAR	RY2	L. REAR	18
TS15	3	TS15	2	16

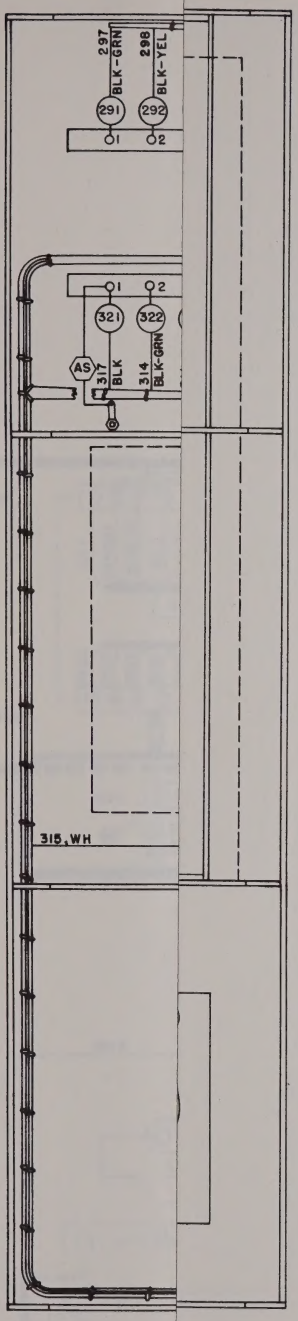
CABLE WIRE SIZE

STATION	AWG NO.
284	18
285	10
286	14
287	12
288	18
289	18
290	NOTE 5
315	18
316	
317	
318	
319	
394	14
395	14
396	18
397	18
398	18
399	14
400	
401	
402	
403	
404	

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Figure 95. Radio Transmitter BC-610-H (Order No. 19624-Phila-50), top view of power supply deck, practical wiring diagram.





NOTES:

1. (1) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LACED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. BARE STRAP WIRES SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE. SIZE AS SHOWN IN TABLE.
3. (A) LETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SIZE AND COLOR AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
4. WIRES IN CABLE SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
5. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION. BUNA S OUTER JACKET, O.D. 280, TYPE GR.
6. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
7. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

BARE JUMPER WIRES
(NOTE 2)

FROM		TO		AWG
PART	TERM.	PART	TERM.	NO.
E3	—	R13	LEFT	18
C23	REAR	C19	REAR	↓
C23	FRONT	C19	FRONT	
RY1	LEFT FRONT	RY1	RIGHT FRONT	14

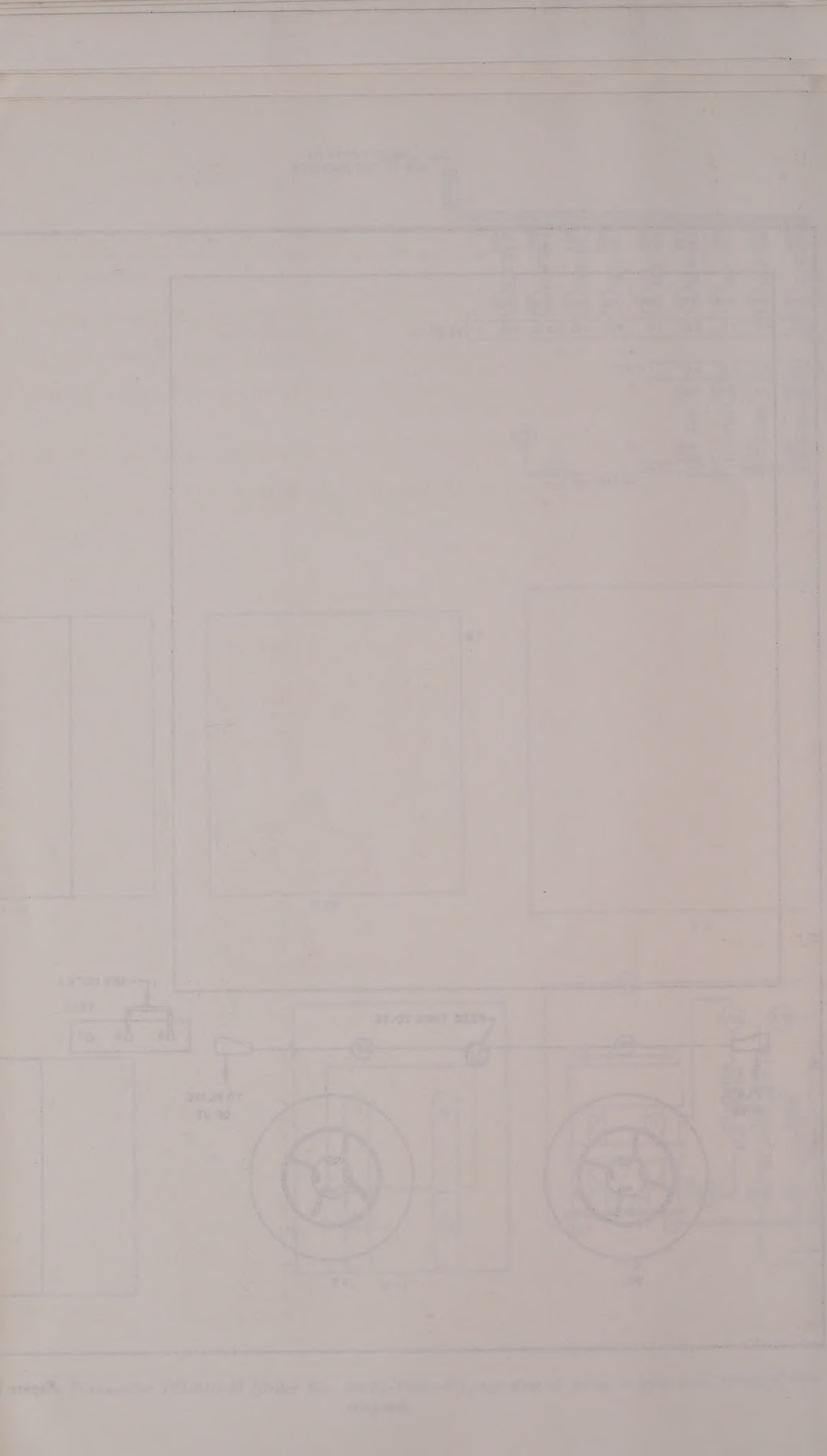
JUMPER WIRES

JUMP	COLOR	AWG NO.	NOTE
AS	BLK	18	3,7
AT	HIGH VOLTAGE WIRE	—	3,5,6
AU	↓	—	3,5,7
AV		—	3,5,6
AW	WH	18	3,6
AX	WH	18	3,6
AY	HIGH VOLTAGE WIRE	—	3,5,6
AZ	↓	—	3,5,6
BA		—	3,5,7
BB		—	3,5,7

CABLE WIRE SIZES

STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.
291	14	304	14	321	18
292	↓	305	14	322	10
293		306	18	323	14
294		307	↓	324	12
295		308		325	18
296		309		326	18
297		310	12	327	14
298		311	14	328	18
299		312	18	329	18
300		313	18	330	18
301		314	10	331	14
302		320	18	332	14
303	↓				

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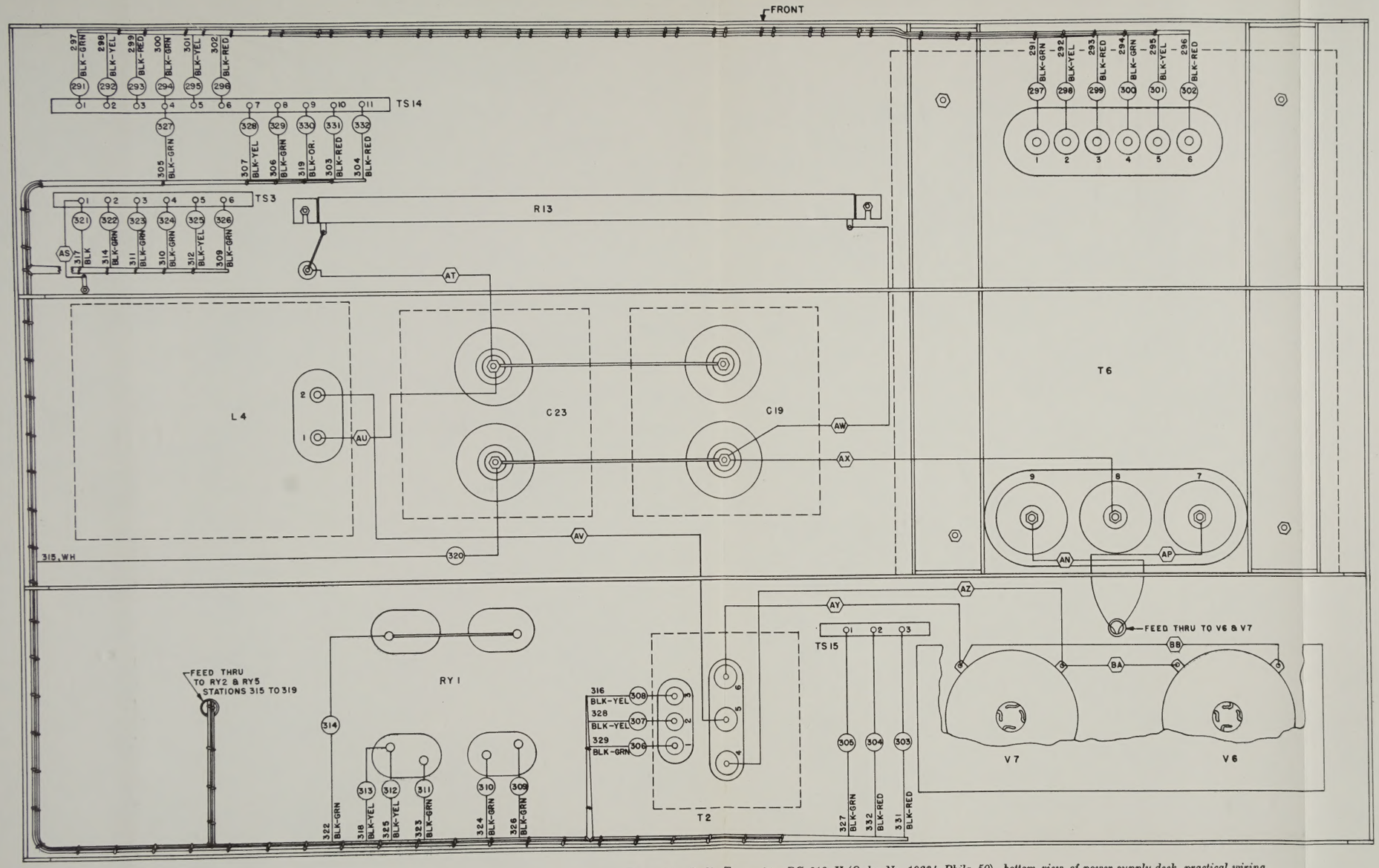


Figure 96. Radio Transmitter BC-610-H (Order No. 19624-Phila-50), bottom view of power supply deck, practical wiring diagram.

NOTES:

1. (1) CIRCLED NUMBERS REPRESENT INDIVIDUAL WIRES OF CABLES. NUMBERS NEAR THE LAGED PART OF CABLE INDICATE THE STATION TO WHICH THAT WIRE IS RUN.
2. BARE STRAP WIRES SHOWN AS DOUBLE LINES, SHALL BE RUN AS SHORT AND DIRECT AS POSSIBLE. SIZE AS SHOWN IN TABLE.
3. (A) LETTERS INCLOSED BY HEXAGON REPRESENT STRANDED JUMPER WIRES. SIZE AND COLOR AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
4. WIRES IN CABLE SHALL BE STRANDED PER SPEC JAN-C-76, SIZE AS SHOWN IN TABLE, UNLESS OTHERWISE SPECIFIED.
5. SHALL BE NO. 16 AWG, TINNED, COPPER, FLEXIBLE STRANDING, NEOPRENE INSULATION. BUNA S OUTER JACKET, O.D. 280, TYPE GR.
6. RUN WIRE LOOSE AND DRESSED BACK AGAINST THE CHASSIS IN THE MOST CONVENIENT MANNER.
7. RUN WIRE DIRECTLY FROM TERMINAL TO TERMINAL, IN THE SHORTEST POSSIBLE MANNER, WITH SUFFICIENT SLACK TO PREVENT BREAKAGE UNDER VIBRATION.

BARE JUMPER WIRES
(NOTE 2)

FROM		TO		AWG
PART	TERM.	PART	TERM.	NO.
E3	—	R13	LEFT	18
C23	REAR	C19	REAR	↓
C23	FRONT	C19	FRONT	
RY1	LEFT FRONT	RY1	RIGHT FRONT	14

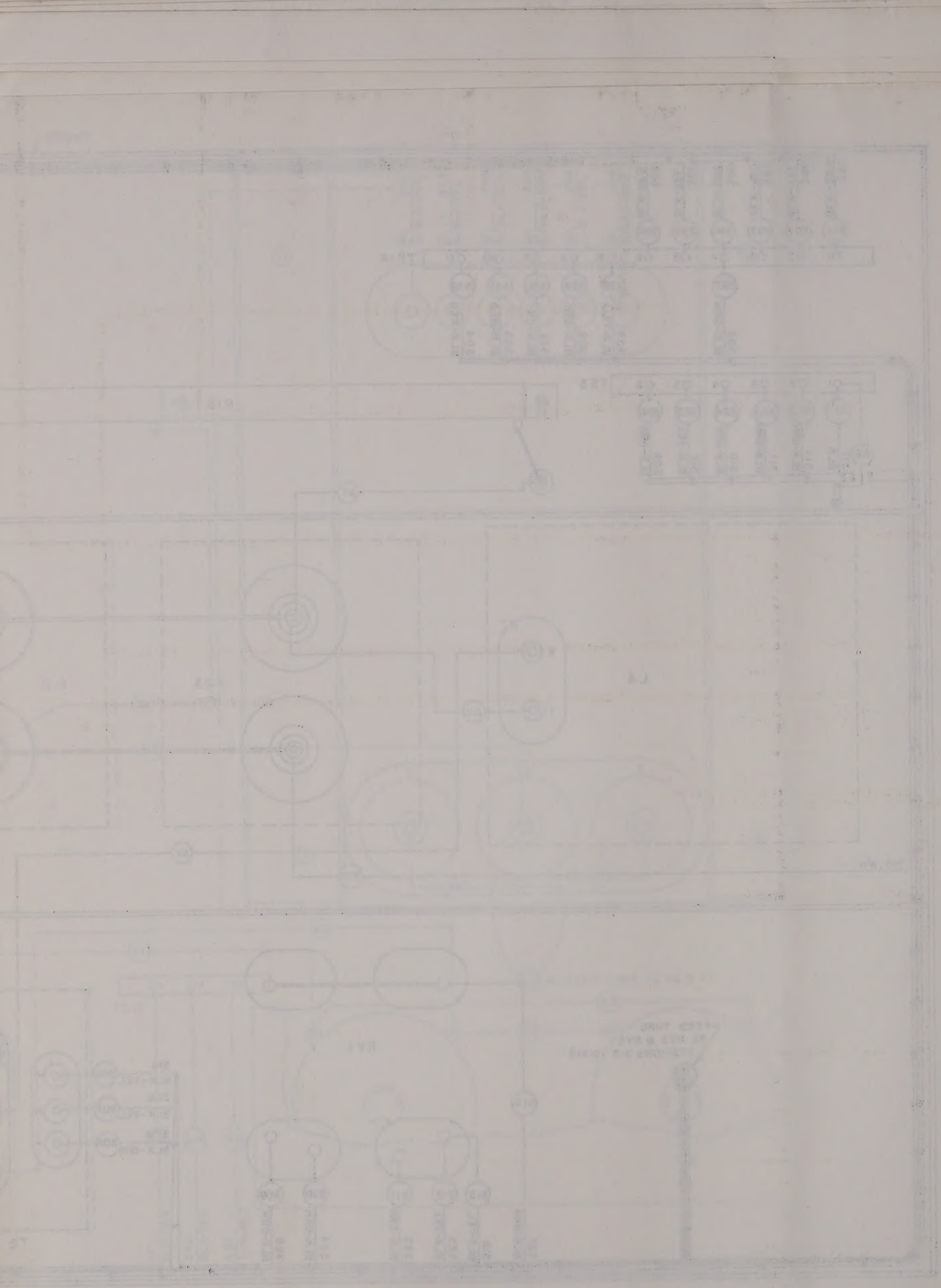
JUMPER WIRES

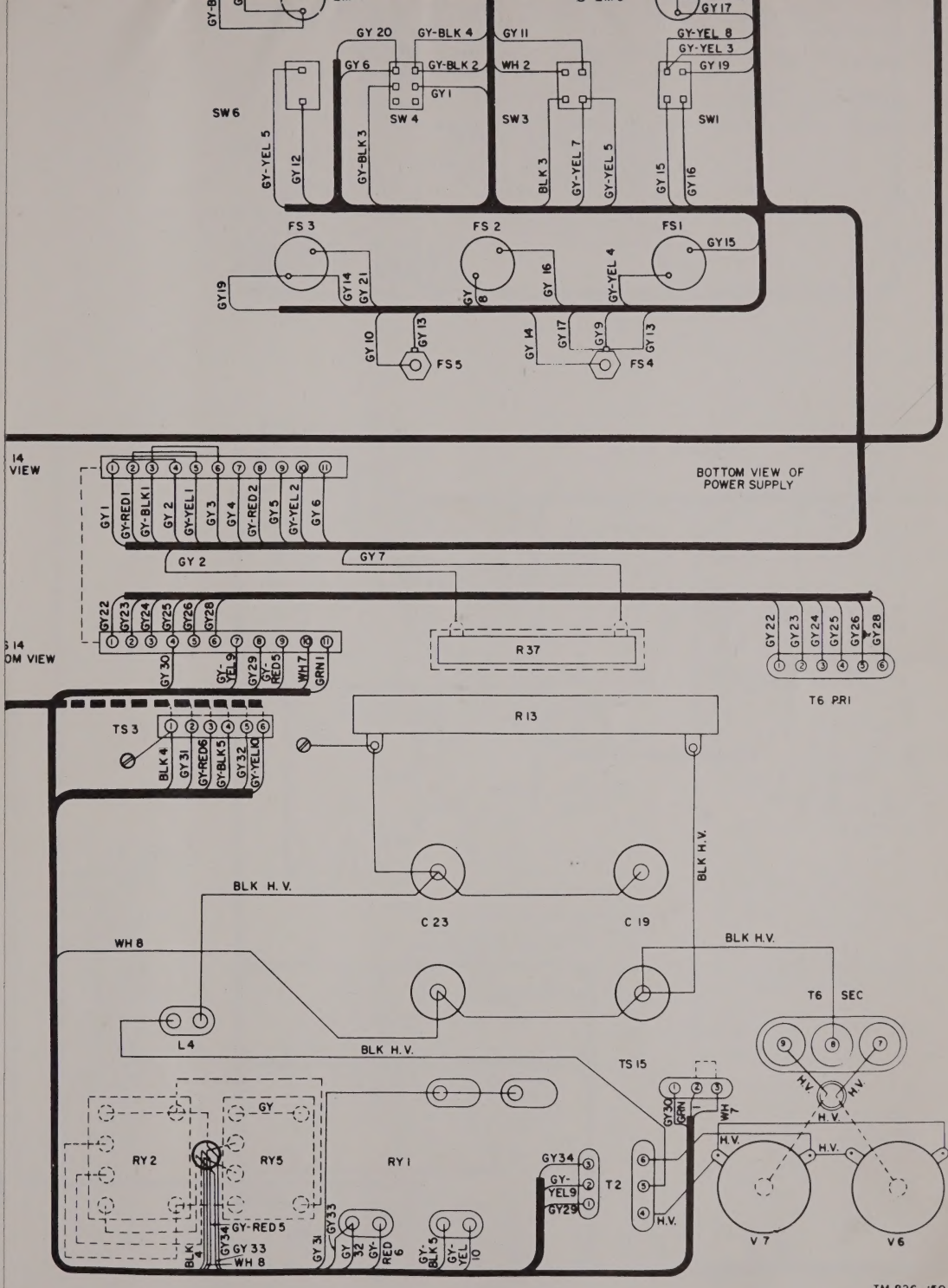
JUMP	COLOR	AWG NO.	NOTE
AS	BLK	18	3,7
AT	HIGH VOLTAGE WIRE	—	3,5,6
AU	↓	—	3,5,7
AV		—	3,5,6
AW	WH	18	3,6
AX	WH	18	3,6
AY	HIGH VOLTAGE WIRE	—	3,5,6
AZ		—	3,5,6
BA		—	3,5,7
BB	↓	—	3,5,7

CABLE WIRE SIZES

STATION NO.	AWG NO.	STATION NO.	AWG NO.	STATION NO.	AWG NO.
291	14	304	14	321	18
292	↓	305	14	322	10
293		306	18	323	14
294		307	↓	324	12
295		308		325	18
296		309		326	18
297		310	12	327	14
298		311	14	328	18
299		312	18	329	18
300		313	18	330	18
301		314	10	331	14
302		320	18	332	14
303	↓				

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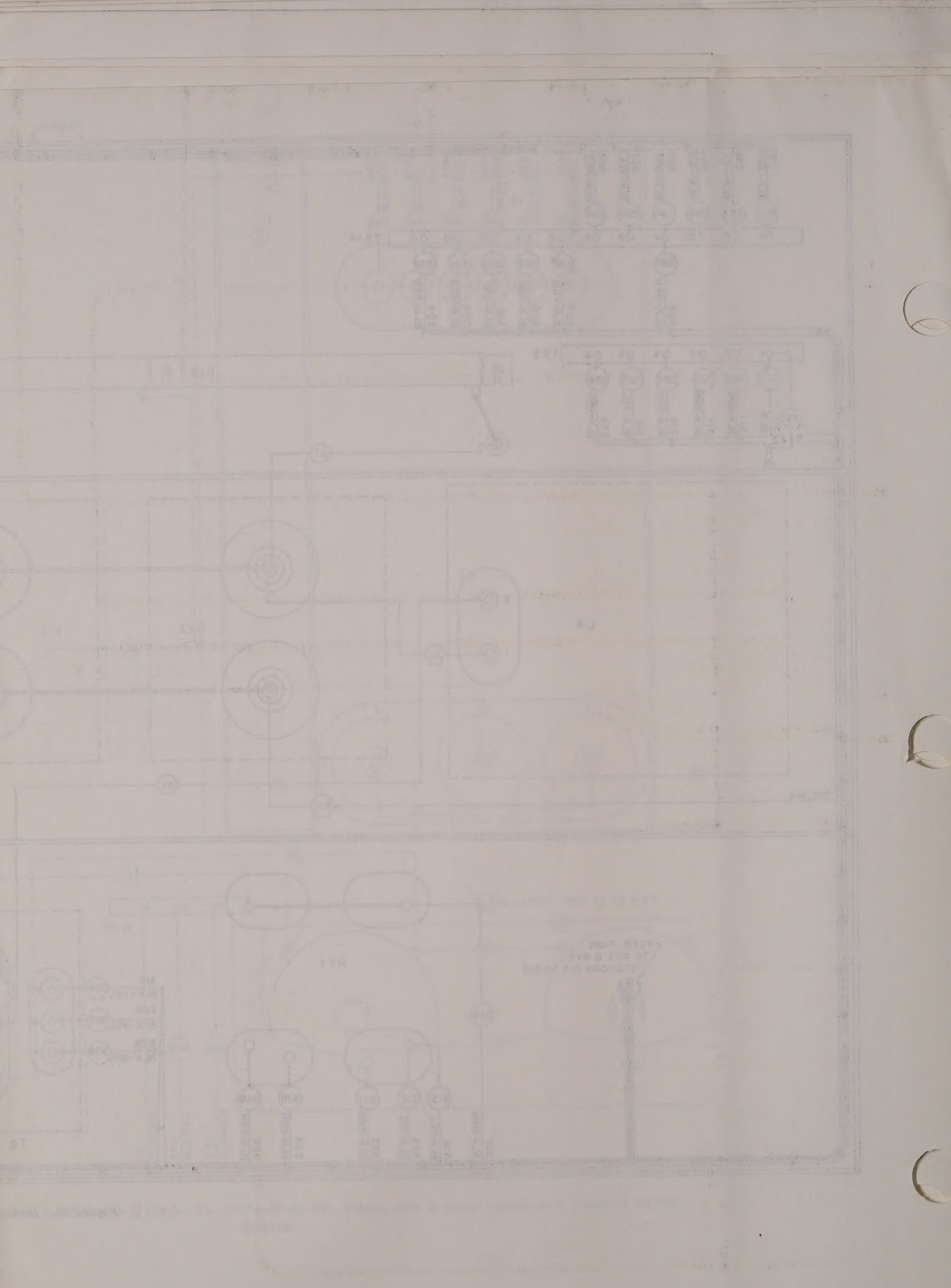




TM 826-150

n Order No.

221882 O - 52 (Face p. 150) No. 8



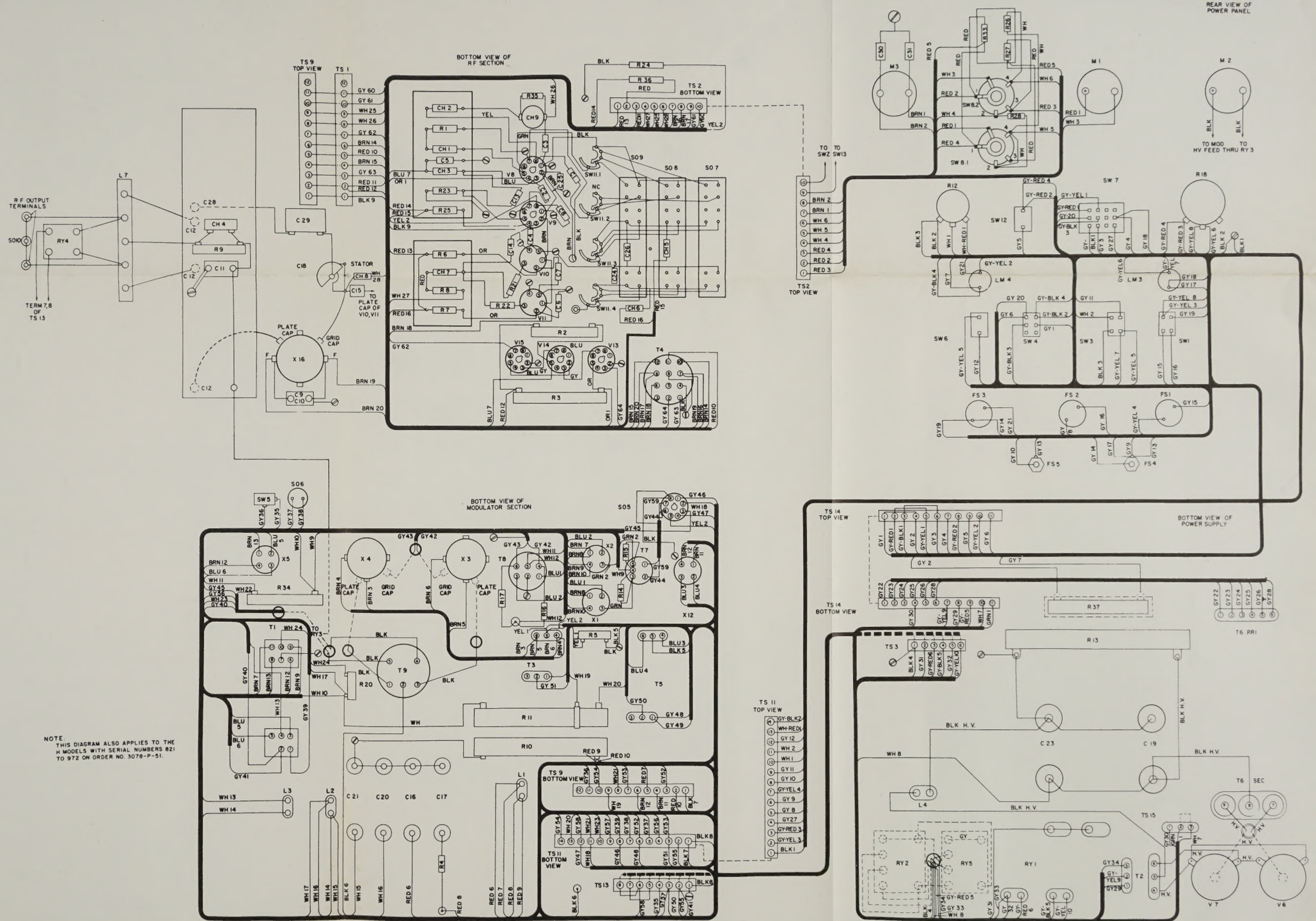
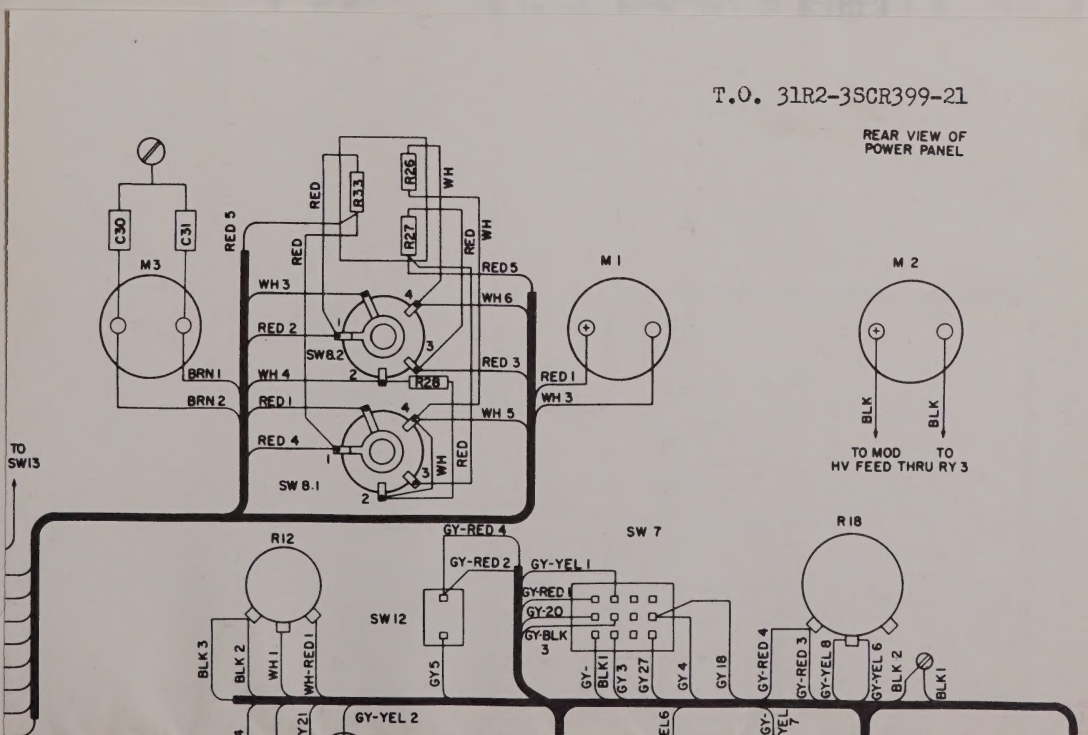


Figure 97. Radio Transmitters BC-610-I and Radio Transmitter BC-610-H (serial Nos. 821 through 972 on Order No. 3078-Phila-51), practical wiring diagram.

TM 826 150

221882 O - 52 (Face p. 150) No. 8


REAR VIEW OF POWER PANEL
M3
C30
C31
RED 5
RED
R33
R26
WH
R27
RED
WH
RED 5
WH 3
WH 6
RED 2
SW8.2
RED 3
BRN 1
WH 4
R28
RED 1
BRN 2
RED 1
WH 3
RED 4
WH 5
SW 8.1
WH
RED
M 1
M 2
BLK
BLK
TO MOD HV FEED THRU
TO RY 3
TO SW13
R12
SW 7
R18
GY-RED 4
GY-RED 2
GY-YEL 1
SW 12
GY-RED
GY-20
GY-BLK 3
BLK 3
BLK 2
WH 1
WH-RED 1
GY5
GY-BLK
GY 3
GY 27
GY 4
GY 18
GY-RED 4
GY-RED 3
GY-YEL 8
GY-YEL 6
BLK 2
BLK 1
GY-YEL 2

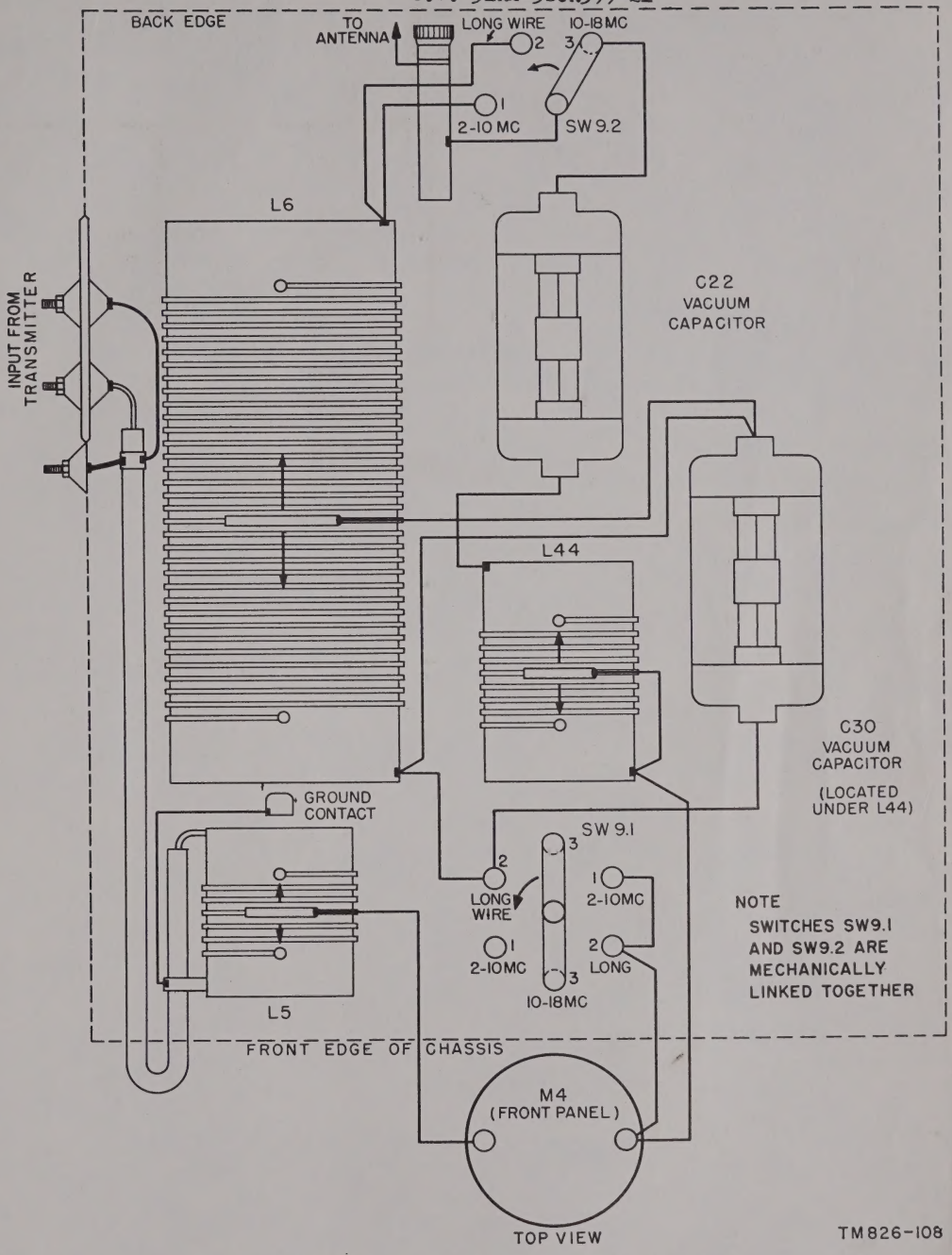


Figure 98. Antenna Tuning Unit BC-939-(*), practical wiring diagram.

