Cathode-Ray Oscillograph

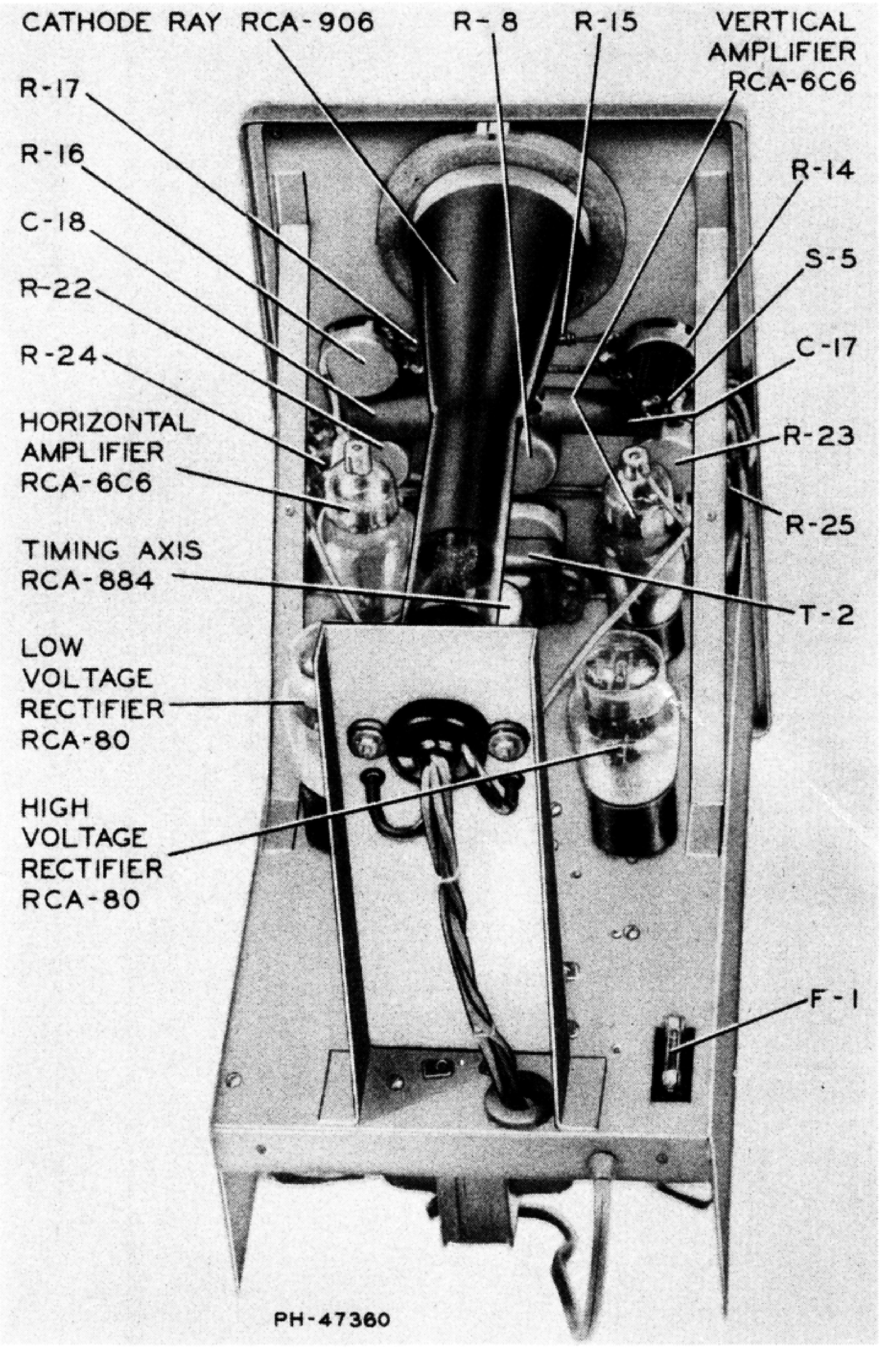
Stock No. 155

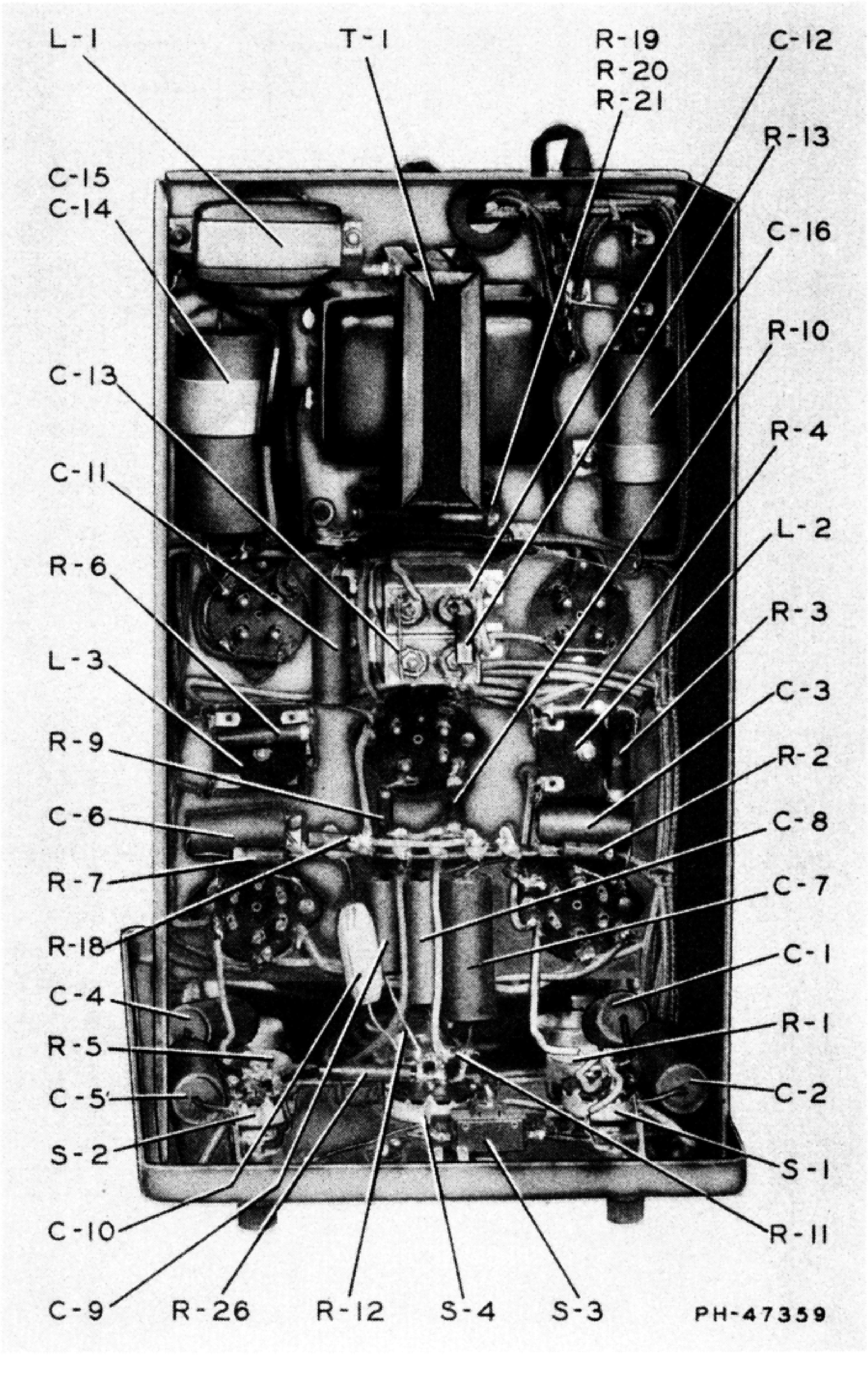
ELECTRICAL CHARACTERISTICS

Power Supply	Rating	110–120 Volts, 50–60 Cycles
	Power Consumption	50 Watts
	Fuse Protection	1.5 Amps.
Operating Limits	Deflection sensitivity at amplifier inputs 0.5 volt per inch (max. "gain.")	
	Deflection sensitivity at cathode-ray tube inputs	20 volts per inch
	Input Characteristics:	
	(1) Through either amplifier	500,000 ohms, approximately 20 mmfd.
	(2) Without either amplifier	2,200,000 ohms, approximately 40 mmfd.
	Frequency response range of amplifiers	20–90,000 Cycles
	Maximum signal input (with amplifier)	700 Volts (RMS)
	Frequency range of timing axis	15–22,000 Cycles
	Maximum d-c voltage across input binding posts	300 Volts
Radiotrons Used and Functions	2 RCA-6C6	Signal amplifiers for vertical and horizontal deflections
	1 RCA-884	"Saw-tooth" oscillator
	1 RCA-906	Cathode-ray tube (3-inch)
	2 RCA-80	High- and low-voltage rectifiers

MECHANICAL SPECIFICATIONS

Overall Dimensions	Height (including carrying-handle)	14⅜ inches
	Width	8 inches
	Depth	14¼ inches
Weight (Net)		21 pounds





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WARNING—A POTENTIAL OF 1000 VOLTS IS PRESENT AT THE CATHODE-RAY TUBE SOCKET AND AT OTHER POINTS ON THE CHASSIS. ALWAYS DISCONNECT THE POWER CORD BEFORE REMOVING THE CHASSIS FROM THE CABINET.

Schematic Circuit Diagram, T-607979

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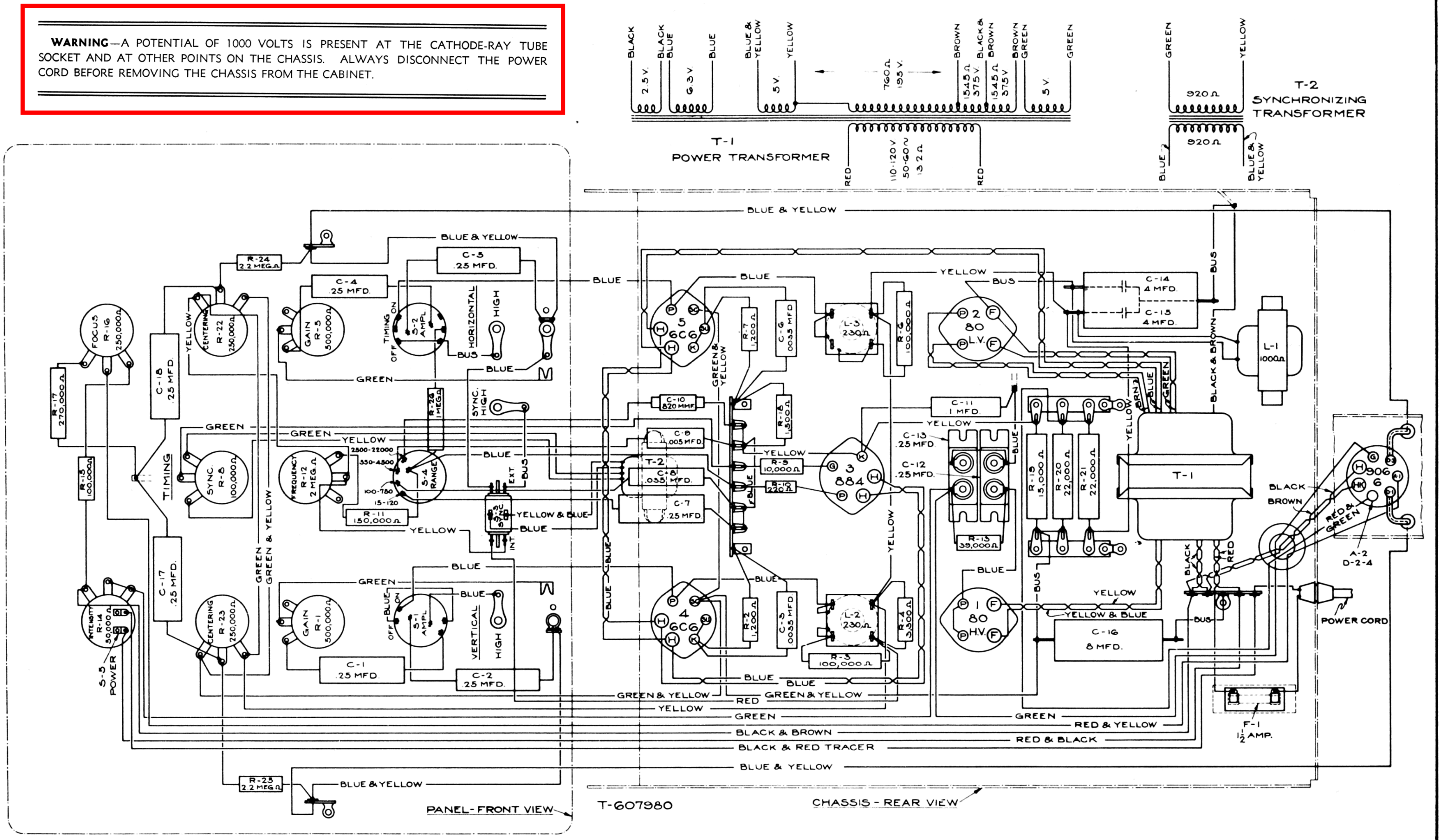

Chassis Wiring Diagram, T-607980

Controls

1. "*Intensity*" control (R-14) is a potentiometer in the low side of the high-voltage bleeder. Its position controls the bias on the grid of the cathode-ray tube, which in turn determines the quantity of electrons emanating from the "gun," thus controlling the spot size. The power switch (S-5) is located on this potentiometer. Initial clockwise rotation of this control closes the switch and additional rotation increases the spot size.

2. "*Focus*" control (R-16) is a potentiometer in the high-voltage bleeder. Its position controls the anode No. 1 voltage, which ,with constant A-2 voltage) determines the distance at which the electron beam focuses. In general, for a given "*Intensity*" setting, the "*Focus*" control should be set for maximum distinctness of spot or image.

3. "*Vertical Amplifier*" switch (S-1) connects the "*Vertical*" binding posts either straight through to the vertical deflecting plates on the cathode-ray tube or through an amplifier to these deflecting plates. In either case, there is a condenser in the input circuit.

4. "*Horizontal Amplifier*" switch (S-2) has three positions: "*Timing,*" "*On,*" and "*Off.*" On "*Timing,*" the "saw-tooth" or timing-axis oscillator feeds through an amplifier to the horizontal deflecting plates on the cathode-ray tube. At "*On,*" the "*Horizontal*" binding posts are connected through an amplifier to these deflecting plates while at "*Off,*" the binding posts are connected straight through to the deflecting plates. In either of the latter two cases, there is a condenser in the input circuit.

5. "*Vertical Gain*" control (R-1) is a potentiometer on the input circuit of the vertical amplifier. With "*Vertical Amplifier*" switch at "*On,*" this potentiometer controls the vertical deflection.

6. "*Horizontal Gain*" control (R-5) is a potentiometer on the input circuit of the horizontal amplifier. With the "*Horizontal Amplifier*" switch at "*Timing*" or "*On,*" this potentiometer controls the horizontal deflection. Due to the capacity load on this input potentiometer, when operating on "*Timing*" at the higher audio frequencies, linear sweep will not be obtained at all settings of this control. For best results, the control should be set for maximum linearity.

7. "*Range*" switch (S-4) selects one of four timing capacitor values. It thus changes the timing-axis oscillator frequency in steps, giving four ranges approximately as shown on the front panel.

8. "*Freq.*" control (R-12) is a rheostat in series with the timing condenser. It changes the timing-axis oscillator frequency gradually as it is rotated, and in conjunction with "*Range*" switch above gives continuous range between the extremes of frequency.

9. "*Sync.*" control (R-8) is a potentiometer controlling the amount of synchronizing voltage fed to the grid of the RCA-884 tube. In general, it should be set as far counterclockwise as is consistent with a locked image, since over-synchronization causes poor wave-form from the timing-axis oscillator.

10. "*Sync.*" switch (S-3) has two positions, "*Int.*" and "*Ext.*" At "*Int.,*" the voltage drop across resistor R-4 in the plate circuit of the vertical amplifier is fed through the "*Sync.*" control and input transformer to the grid of the RCA-884 tube. Thus, the timing-axis oscillator can be synchronized with the signal on the vertical axis at the fundamental frequency or at any small submultiple, such as ½, ⅓....Synchronization is not effective if it is attempted to operate the timing-axis oscillator at a higher frequency than that of the synchronizing voltage. On "*Ext.,*" the "*Sync.*" binding post is connected to the "*Sync.*" control. This allows the use of an external source for synchronizing.

11. The two "centering" controls on the front panel control the amount of d-c potential between the two deflecting plates of each pair, and thereby allow adjustment of the position of the spot or image. There is sufficient voltage across these controls to allow moving the spot completely off-screen. Start with both of these controls at about mid-position.

12. There are five binding posts on the unit. Voltage impressed on the "*Vertical*" posts will give deflection vertically whereas voltage impressed on the "*Horizontal*" posts will give deflection horizontally. The "*Sync.*" post is used when it is desired to synchronize the timing-axis oscillator with some external source. (See 9 above.) The binding posts marked "O" are common ground and the ones marked "HIGH" are insulated from ground. which is the chassis.

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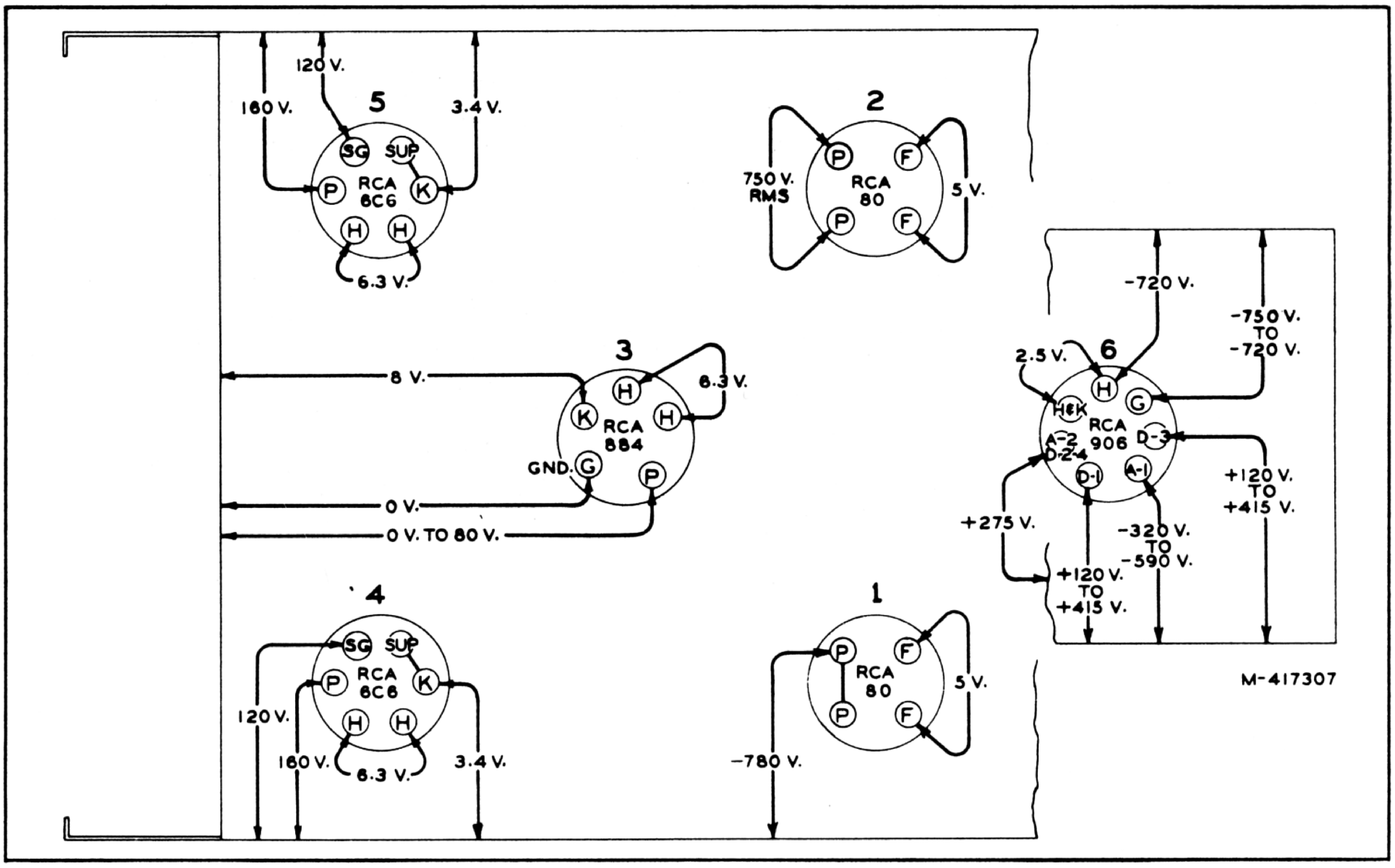

Figure 36—Radiotron Socket Voltage Diagram

RADIOTRON SOCKET VOLTAGE TABLE

115-Volt, 60-Cycle Supply Line

RADIOTRON			Cathode Volts to Ground DC.	Screen Grid Volts To Ground DC.	Plate Volts to Ground DC.	Cathode Current MA-DC.	Anode Volts to Ground DC.		Deflecting Plates to Ground DC.		Filament or Heater Volts AC.
Socket Number	**Type**	**Function**					**No. 1**	**No. 2**	**D_1**	**D_2**	
1	RCA-906	Cathode Ray	—720*	—	—	—	—320 to —590*	+275	+120 to +415	+120 to +415	2.5
2	RCA-80	Low Voltage Rectifier	—	—	375 (RMS)	8	—	—	—	—	5.0
3	RCA-80	High Voltage Rectifier	—	—	+780*	—	—	—	—	—	5.0
4	RCA-6C6	20–90,000 Cycle Amp.	+3.4	+120	+160	3	—	—	—	—	6.3
5	RCA-6C6	20–90,000 Cycle Amp.	+3.4	+120	+160	3	—	—	—	—	6.3
6	RCA-884	15—22,000 Cycle Osc.	+8.0	—	0 to +80*	0.16 to 2.0	—	—	—	—	6.3

* Cannot be correctly measured with ordinary voltmeter.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	Description	
12536	Capacitor—Moulded toothpick capacitor, 820 mmfd (C-10)	
30303	Capacitor—Paper capacitor, 0.0035 mfd (C-3, C-6)	
4838	Capacitor—Paper capacitor, 0.005 mfd (C-9)	
5196	Capacitor—Paper capacitor, 0.035 mfd (C-8)	
4839	Capacitor—Paper capacitor, 0.1 mfd (C-11)	
12484	Capacitor—Paper capacitor, 0.25 mfd (C-1, C-2, C-4, C-5, C-7, C-17, C-18)	
15943	Capacitor—Oil-filled paper capacitor, 0.25 mfd (C-12, C-13)	
14120	Capacitor—Electrolytic capacitor, 4/4 mfd (C-14, C-15)	
13610	Capacitor—Electrolytic capacitor, 8 mfd (C-16)	
4867	Coil—Plate choke coil (L-2, L-3)	
31910	Cushion—Sponge rubber front cushion for RCA-906	
31911	Escutcheon—Control panel escutcheon	
2725	Fuse—Cartridge type fuse, 1½ amperes (F-1)	
7960	Knob—Bar pointer knob	
13210	Mounting—Fuse mounting	
4857	Post—Binding post, "HIGH"	
4607	Post—Binding post, "O"	
31897	Potentiometer—"INTENSITY," 50,000 ohms (R-14)	
31894	Potentiometer—"SYNC.," 100,000 ohms (R-8)	
31898	Potentiometer—"FOCUS" (R-16) and "CENTERING" (R-22, R-23), 250,000 ohms	
31893	Potentiometer—"GAIN," 500,000 ohms (R-1, R-5)	
31896	Potentiometer—"FREQUENCY," 2 megohms (R-12)	
13111	Reactor—Filter reactor (L-1)	
14561	Resistor—Carbon resistor, 220 ohms, ¼ watt (R-10)	
30731	Resistor—Carbon resistor, 1,200 ohms, ½ watt (R-2, R-7)	
30654	Resistor—Carbon resistor, 1,500 ohms, ½ watt (R-18)	
30733	Resistor—Carbon resistor, 3,300 ohms, ½ watt (R-4)	
3078	Resistor—Carbon resistor, 10,000 ohms, ½ watt (R-9)	
14166	Resistor—Carbon resistor, 15,000 ohms, 2 watts (R-19)	
13669	Resistor—Carbon resistor, 22,000 ohms, 2 watts (R-20, R-21)	
30147	Resistor—Carbon resistor, 39,000 ohms, ½ watt (R-13)	
3252	Resistor—Carbon resistor, 100,000 ohms, ½ watt (R-15)	
3058	Resistor—Carbon resistor, 100,000 ohms, 1 watt (R-3, R-6)	
31895	Resistor—Carbon resistor, 150,000 ohms, 1 watt (R-11)	
31899	Resistor—Carbon resistor, 270,000 ohms, 1 watt (R-17)	
2546	Resistor—Carbon resistor, 1 megohm, 1 watt (R-26)	
30649	Resistor—Carbon resistor, 2.2 megohms, ½ watt (R-24, R-25)	
9739	Screen—Cathode-ray tube screen	
30927	Spring—Panel mounting spring	
4794	Socket—Tube socket, 4-contact (for RCA-80)	
4814	Socket—Tube socket, 5-contact (for RCA-884)	
4786	Socket—Tube socket, 6-contact (for RCA-6C6)	
31908	Socket—Tube socket, 7-contact (for RCA-906)	
11851	Switch—D.P.D.T. toggle switch, "SYNCH." (S-3)	
31902	Switch—2-pole, 2-position switch, "VERT. AMPL." (S-1)	
31903	Switch—2-pole, 3-position switch, "HORIZ. AMPL." (S-2)	
31904	Switch—1-pole, 4-position switch, "RANGE" (S-4)	
31906	Transformer—Power transformer, XT-2792 (T-1)	
14119	Transformer—Synchronizing transformer (T-2)	