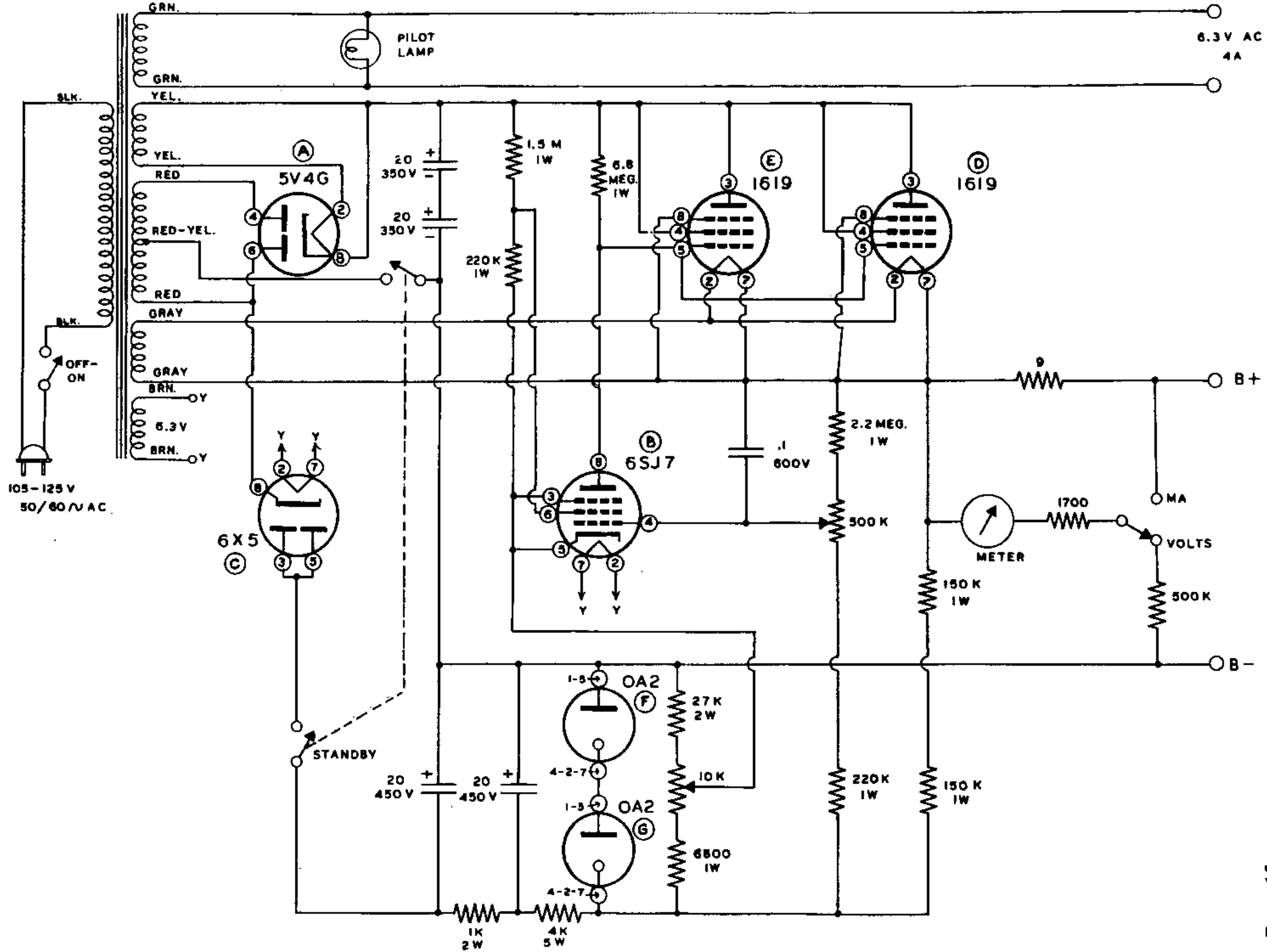


# ASSEMBLY AND OPERATION OF THE HEATHKIT VARIABLE VOLTAGE REGULATED POWER SUPPLY MODEL PS-3



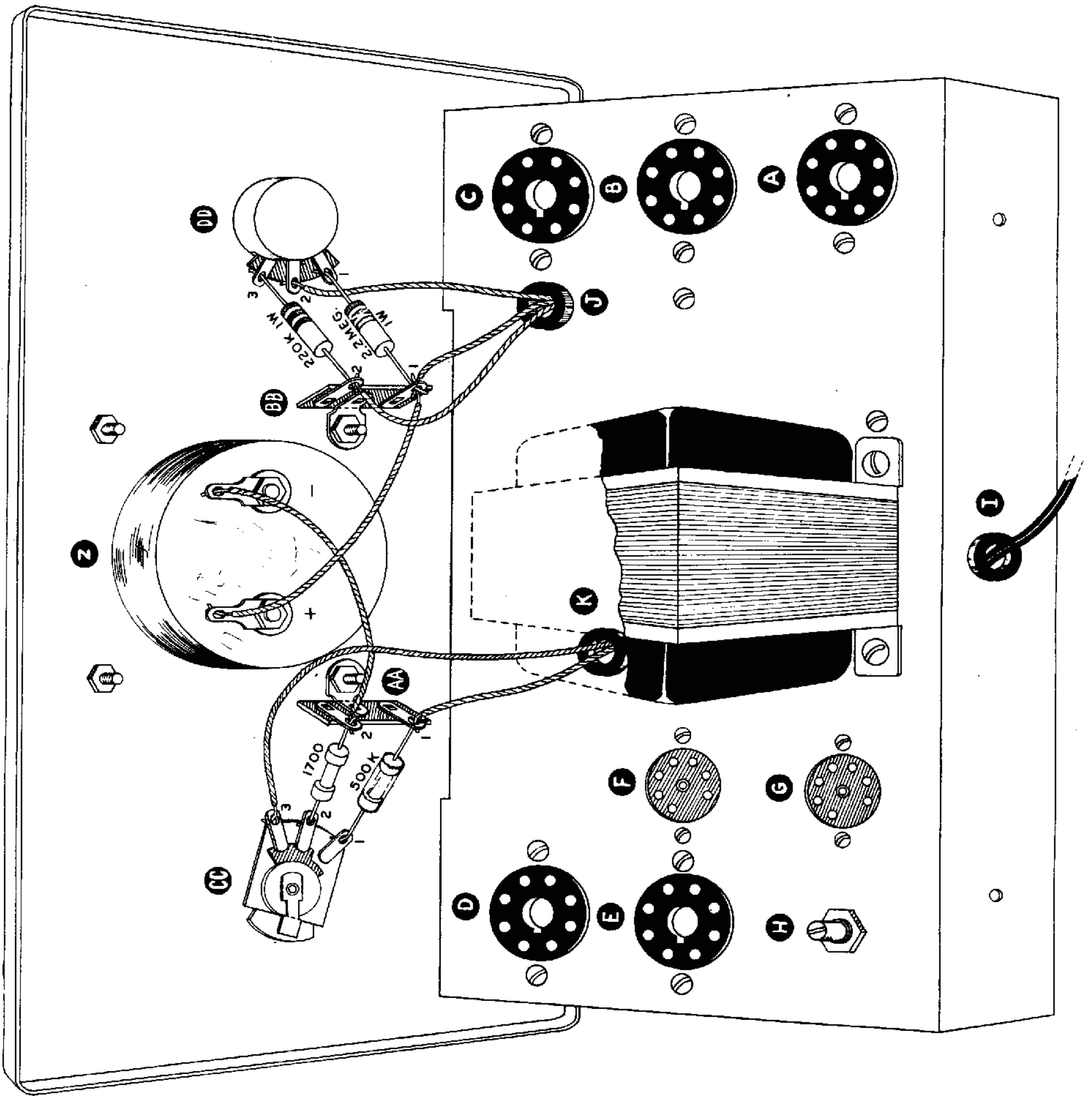
## SPECIFICATIONS

Output.....	Continuously variable from 0-500 volts, no load
Regulation, Line Voltage 117 volts AC.....	Linear from 0-10 MA at 450 volts output
	" " 0-20 MA at 400 " "
	" " 0-40 MA at 350 " "
	" " 0-70 MA at 300 " "
	" " 0-100 MA at 250 " "
	" " 0-130 MA at 200 " "
Meter.....	4 1/2" streamlined case
Sensitivity.....	1 MA full scale
Range.....	0-500 volts DC, 0-200 MA DC
Tubes.....	1 - 5V4G Rectifier
	1 - 6X5GT Rectifier
	2 - OA2 Regulator tubes
	2 - 1619 Control tubes
	1 - 6SJ7 Control Amplifier
Power Requirements.....	105-125 volts 50/60 cycles AC 90 watts
Dimensions.....	8 1/2" high x 13" wide x 7" deep
Shipping Weight.....	17 lbs.

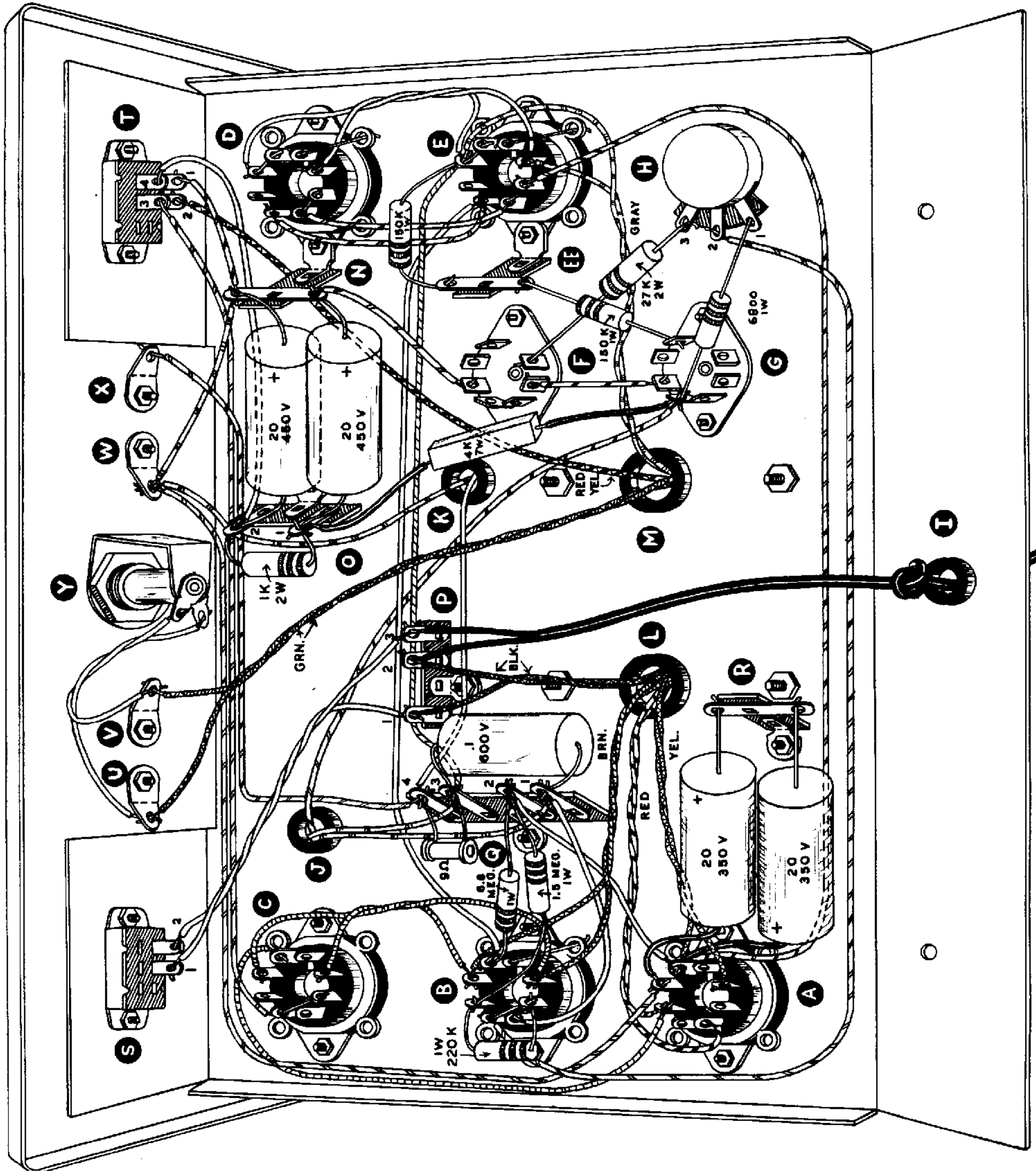


HEATHKIT VARIABLE VOLTAGE REGULATED POWER SUPPLY  
Model PS-3





PICTORIAL 2



PICTORIAL 3

- ( ) Attach the handle to the top of the cabinet by means of the two 10-24 machine screws.
- ( ) Place the four rubber feet in the holes provided in the bottom of the cabinet.
- ( ) The power supply may now be placed in the cabinet. Pass the line cord through the hole in the back and fasten the chassis to the cabinet by means of the two sheet metal screws.

This completes your Heathkit Variable Voltage Regulated Power Supply model PS-3.

### THEORY OF OPERATION

The Heathkit PS-3 Variable Voltage Regulated Power Supply Kit consists of a conventional power supply system utilizing a 5V4G tube as a full wave rectifier followed by a simple capacity filter. The output is connected to the load terminals through the plate-cathode resistance of the parallel 1619 tubes. This resistance may be considered as a variable resistor controlled by the 6SJ7 tube which is connected so that variations in the output voltage will be reflected as grid voltage fluctuations on the 6SJ7. Corresponding changes in plate current in the tube will appear as bias voltage variations on the grids of the 1619 tubes since the 6.8 megohm plate load resistor is common to the plate of the 6SJ7 and the grids of the 1619 tubes. Manual control of the output voltage is accomplished by varying the normal grid bias of the control amplifier tube by adjusting the 500 K $\Omega$  manual voltage control potentiometer.

The 6X5GT rectifier supplies the negative potential that is needed on the cathode of the 6SJ7 control amplifier to keep it within its operating range as the output is varied from 0 to 500 volts. If this negative bias is not supplied, the plate of the 6SJ7 control amplifier would approach cathode potential as the output voltage is reduced, thereby causing the tube to fall out of its operating range. The two OA2 regulator tubes are used to stabilize the cathode bias of the 6SJ7 tube.

The 10 K $\Omega$  zero adjust control adjusts the negative bias on the 6SJ7 control amplifier when the output voltage control is at zero. This adjustment places the correct bias on the 1619 tubes so that they will produce zero output voltage.

The time delay of the regulating system is negligible so that even hum components in the output voltage are greatly reduced. The 0.1 condenser passes noise and undesirable disturbances on the B+ line through the 6SJ7 control amplifier 180<sup>o</sup> out of phase which, in effect, cancels out the disturbance.

The metering circuit is conventional. The single pole double throw rotary switch either shunts the meter with a 9  $\Omega$  precision resistor so the load current can be read, or it places the meter in series with a 500 K $\Omega$  precision multiplier resistor so that the output voltage can be measured.

A separate winding on the power transformer supplies 6.3 volts at 4.0 amperes AC for operation of tube filaments, etc.

### USES

There are many uses of a variable voltage regulated power supply and a few are mentioned here. It is a convenient source of variable high voltage DC, which in many cases will take the place of batteries. It also has a 6.3 volt AC output for operation of tube filaments.

The supply is quite flexible since neither side is grounded. This makes the instrument very useful as a negative bias supply since the B+ terminal may be grounded.

Due to its wide voltage range, this instrument is extremely valuable for determining characteristic curves of vacuum tubes.

This variable voltage supply is a very convenient reference for meter calibration. In checking DC voltmeters, a standard meter and the meter to be calibrated are connected in parallel across the power supply output. DC milliammeters are calibrated by connecting a standard meter, the meter to be calibrated and a proper value of resistance in series across the supply output. Where standard meters are not available, the meter built in the PS-3 serves nicely as a reference standard.



## PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION	PART No.	PARTS Per Kit	DESCRIPTION
<b>Resistors</b>			<b>Wire</b>		
1-25A	1	6800 $\Omega$ 1 watt 10% comp.	340-2	1	Length bare wire
1-29A	2	150 K $\Omega$ 1 watt 10% comp.	344-1	1	Length hookup wire
1-30A	2	220 K $\Omega$ 1 watt 10% comp.	346-1	1	Length insulated sleeving
1-35A	1	1.5 megohm 1 watt 10% comp.	89-1	1	Line cord
1-36A	1	2.2 megohm 1 watt 10% comp.	<b>Tubes</b>		
1-39A	1	6.8 megohm 1 watt 10% comp.	411-13	1	6SJ7 tube
1-6B	1	27 K $\Omega$ 2 watt 10% comp.	411-17	1	6X5GT tube
1-15B	1	1000 $\Omega$ 2 watt 10% comp.	411-28	2	1619 tube
2-19	1	9 $\Omega$ 1% precision	411-35	1	5V4G tube
2-57	1	1700 $\Omega$ 1/2 watt 1% precision	411-59	2	OA2 tube
2-76	1	500 K $\Omega$ 1/2 watt 1% precision	<b>Transformer-Meter</b>		
3-8G	1	4000 $\Omega$ 7 watt wirewound	54-14	1	Power transformer
<b>Condensers</b>			407-18	1	Meter
23-11	1	0.1 $\mu$ fd paper	<b>Chassis-Panel-Cabinet</b>		
25-16	2	20 $\mu$ fd 350 volt electrolytic	200-M74	1	Chassis
25-33	2	20 $\mu$ fd 450 volt electrolytic	203-71F93	1	Panel
<b>Controls-Switches</b>			90-24	1	Cabinet
10-9	1	10 K $\Omega$ control	211-1	1	Handle
10-26	1	500 K $\Omega$ linear control	<b>Hardware</b>		
60-1	1	SPST slide switch	73-1	3	3/8" rubber grommet
60-5	1	DPST slide switch	73-2	2	3/4" rubber grommet
63-3	1	SPDT rotary switch	250-2	4	3-48 x 1/4" machine screw
<b>Sockets-Terminal Strips-Knobs</b>			250-8	2	#6 x 3/8 sheet metal screw
434-2	5	Octal tube socket	250-9	18	6-32 x 3/8 machine screw
434-15	2	7-pin miniature socket	250-18	4	8-32 x 3/8 machine screw
431-1	3	1-lug terminal strip	250-19	2	10-24 x 3/8 machine screw
431-2	3	2-lug terminal strip	250-43	2	8-32 x 1/4" set screw
431-3	1	3-lug terminal strip	252-1	4	3-48 x 7/32 nut
431-5	1	4-lug terminal strip	252-3	23	6-32 x 1/4 nut
462-19	2	Knob w/skirt and index line	252-4	4	8-32 x 3/8 nut
<b>Pilot Lamp Assembly</b>			252-7	3	3/8-32 x 1/8 control nut
434-22	1	Pilot lamp socket	253-1	4	#6 flat fiber washer
412-1	1	#47 pilot lamp	253-2	4	#6 fiber shoulder washer
<b>Binding Post Assembly</b>			253-10	2	3/8 x 5/8 nickel washer
427-2	4	Binding post base	254-1	18	#6 lockwasher
100-M16B	3	Binding post cap, black	254-2	4	#8 lockwasher
100-M16R	1	Binding post cap, red	254-4	3	Control lockwasher
			259-1	4	#6 solder lug
			261-1	4	Rubber feet
			595-101	1	Manual