ASSEMBLY AND OPERATION OF THE 
HEATHKIT REGULATED POWER SUPPLY 
MODEL IP-32

SPECIFICATIONS

Power Requirements: ......................... 105 to 125 volts AC, 50/60 cycle, 150 watts maximum

Output:

B+ Voltage: .................................. 0 to 400 volts DC regulated; 0 to 100 ma continuous (125 ma intermittent)

Bias Voltage: .............................. 0 to -100 volts DC at 1 ma

Filament Voltage: ........................ 6.3 volts AC at 4 amps

(Insulated to withstand 1500 volts DC)

B+ Regulation: ............................ Output variation less than 1% from no load to full load, for outputs of 100 to 400 volts

Output variation less than ±0.5 volt for a ±10 volt variation in the 117 volt AC input

B+ Ripple: ................................ Less than 10 mv RMS ripple, jitter and noise

B+ Output Impedance: ..................... Less than 10 Ω from DC to 1 mc

(See output impedance curve.)
INTRODUCTION

The Heathkit Regulated Power Supply, Model IP-32, has been designed as a convenient source of variable regulated B+ voltage, variable bias voltage, and filament voltage for laboratories and workshops. This supply allows the designer, or experimenter, to develop and test his circuitry without having to construct a power supply each time. The output voltage and current are both continuously monitored by separate panel meters, allowing easy determination of power supply requirements for a particular piece of equipment.

The outputs are isolated from the chassis to allow the B+ to be used as either a positive or negative supply. Separate filament and high voltage transformers are employed so that all high voltage can be switched off, leaving only filament voltage available while changes in circuitry are made. This eliminates filament warmup time.

The bias voltage output control has a special taper for fine adjustment at low voltages and a meter switch is provided to read either the bias or B+ voltage. Built-in circuit protection prevents damage to the unit if the bias voltage output should accidentally be shorted. The supply is also fused for protection against overloads and short circuits.
CIRCUIT DESCRIPTION

The Heathkit Regulated Power Supply is, in essence, a power supply in which the output current may vary over a wide range (from 0 to 100 ma, depending on the load), while the output voltage remains constant at its original setting.

The high voltage (B+) is supplied from a full wave voltagedoubler, using silicon diode rectifiers. This voltage is connected to the plates of the two paralleled 6L6 series regulator tubes, the cathodes of which are connected to the output through the milliammeter. To allow the 6L6's to operate as pentodes*, a separate power supply is employed to supply the screen grid voltage. This supply consists of a half-wave rectifier, using a pair of selenium diode rectifiers feeding a dual section capacity filter. A pair of 100Ω resistors (parasitic suppressors) couples the supply voltage to the screen grids. The common for this supply is returned to the 6L6 cathodes, thus maintaining a relatively constant voltage on the 6L6 screen grids.

Operating in this configuration, the paralleled 6L6’s act as a large variable resistor, the value of which is controlled by a small voltage applied to the control grids. This voltage is produced by the 6BH6 control tube, which operates as a DC voltage feedback amplifier. Its grid is fed from a DC voltage divider connected to the B+ output, while its plate is direct coupled to the 6L6 grids by a pair of 1 KΩ (current limiting parasitic suppressor) resistors. In this manner, any voltage variation** at the B+ output is immediately amplified and fed back (with reverse polarity) to the grids of the paralleled 6L6 series regulator tubes. This produces a corresponding resistance change in the series regulators which is in opposition to the output variation, thus cancelling it out.

*Pentode operation is superior to triode operation in most wide range series regulator applications.
**Voltage variations - caused by changes in output load and/or input voltage.
Screen voltage for the control amplifier is taken from a DC voltage divider, connected between the high voltage supply and the regulated -150 volt supply. The high voltage varies inversely to changes in the output current, and this variation is fed into the screen grid through the divider network. The output impedance of the Power Supply can be made positive or negative by using different values in this divider. Actual values for this network are chosen to give substantially zero output impedance.

The negative output voltage is produced by a 6x4 full wave rectifier, feeding a two section capacity filter. The output of this filter feeds a pair of OA2 voltage regulators connected in series, to supply a stable -150 and -300 volts. These two voltages supply a reference for the 6BH6 control amplifier and its DC divider networks.

The bleeder resistor network, consisting of four 27 KΩ resistors in series, is connected between the B+ output and the -300 volt source. In this manner, current flow through the series regulators is maintained at all output voltage settings.

The 50 KΩ control, connected across the -150 volt source, provides the variable bias voltage, which is coupled to its output terminal through a 22 KΩ (current limiting) resistor. This resistor prevents damage to the unit in event the bias output should accidentally be shorted.

Heater voltage for the unit is supplied by a separate transformer. This transformer also supplies 6.3 volts at 4 amperes for the external filament voltage output.

PRELIMINARY CONSTRUCTION NOTES

UNPACK THE KIT CAREFULLY AND CHECK EACH PART AGAINST THE PARTS LIST. If some shortage or parts damage is found in checking, please notify us promptly and include all inspection slips with your letter.

The large, fold-in pictorials are reproductions of pictorials appearing in the manual. They have been prepared in this manner to be attached to the wall above your work space, to help in the construction of your instrument.

The following instructions are presented in a logical, step-by-step sequence to enable you to complete your kit with the least possible confusion. Be sure to read each step all the way through before you start to do it. When the step is completed, check it off in the space provided. This is particularly important as it may prevent omissions or errors, especially if your work is interrupted.

MOUNTING PARTS

1. Locate the chassis and orient upside down as shown in Pictorial 1 on Page 6.
2. Mount a 1/2" grommet in hole GB.
3. Mount 'l-pin tube sockets in locations V1, V2, V3 and V4. Orient with blank spaces positioned as shown in Pictorial 1, and secure with 3-48 x 1/4" binder head machine screws and nuts.
4. Mount octal tube sockets (8-pin) in locations V5 and V6. Orient with keyway positioned as shown in Pictorial 1, and secure with 6-32 x 3/8" binder head machine screws, lockwashers and nuts. Mount a 3-lug terminal strip under one lockwasher and nut on socket V5 in location TF. Note that there are two types of 3-lug terminal strips furnished in the kit. Be sure to use the correct one and orient as shown.
5. Mount 1-lug terminal strips in locations TA and TB. Orient as shown in Pictorial 1, and secure with 6-32 x 3/8" binder head machine screws, lockwashers and nuts.