PS-6

User Guide

Schematic & Part Values

Thank you for your purchase of **PS-6** low-voltage power supply and high voltage quintupler. The extra-thick PCB is 3 by 6 inches uses 2oz copper traces. The PCB requires that a center-tapped secondary be used (two identical secondaries can be placed in series to create a center-tap). The voltage quintupler magnifies the low-voltage rail voltage by fivefold. For example, a 44Vac center-tap secondary will develop both a bipolar +/-30Vdc rails and a high-voltage B+ rail voltage of about 147Vdc, which can be used to power tube circuits. **Be extremely careful with the high-voltage output from this power supply, as it can be lethal.**

A Quick Overview A low-voltage, center-tapped secondary is required, from 10V-0V-10V to 30V-0V-30V. The PS-6 power supply's voltage quintupler uses a full-wave rectification to establish the high-voltage B+ voltage, which explains why there are so many power supply capacitors. As each end of the secondary swings up and down in voltage, the flanking capacitors charge up and spill their accumulated voltage into the center capacitors, C10 & C13. Capacitors C9, C11, C12, C14, and C10, will each charge up to twice the positive rail voltage; in turn, capacitor C10 will charge up to three times the positive rail voltage. The two low-voltage rail voltages are determined by the secondary voltage against the square root of 2 (1.414), minus the rectifier voltage drop (0.6V to 0.8V).

Assembly Before soldering, be sure that the PCB and all parts are oxidation free and shine brightly. Make sure that both the solder and the part leads are shiny and not dull gray. Steel wool can restore luster and sheen by rubbing off oxidation. (Clean the solder over a waste container and do not breathe any of the micro dust that the steel wool releases.) Clean both sides of the PCB with at least 90% isopropyl alcohol or acetone, wiping away all fingerprints. Next, make sure you are looking at the top of the PCB, although the parts can be mounted on either side. First, solder the shortest parts (diodes D5 to D16) in place, then the next tallest parts, then rectifiers, D1 to D4, and then the next tallest…. Always carefully observe the polarity markings on the capacitors and rectifiers.

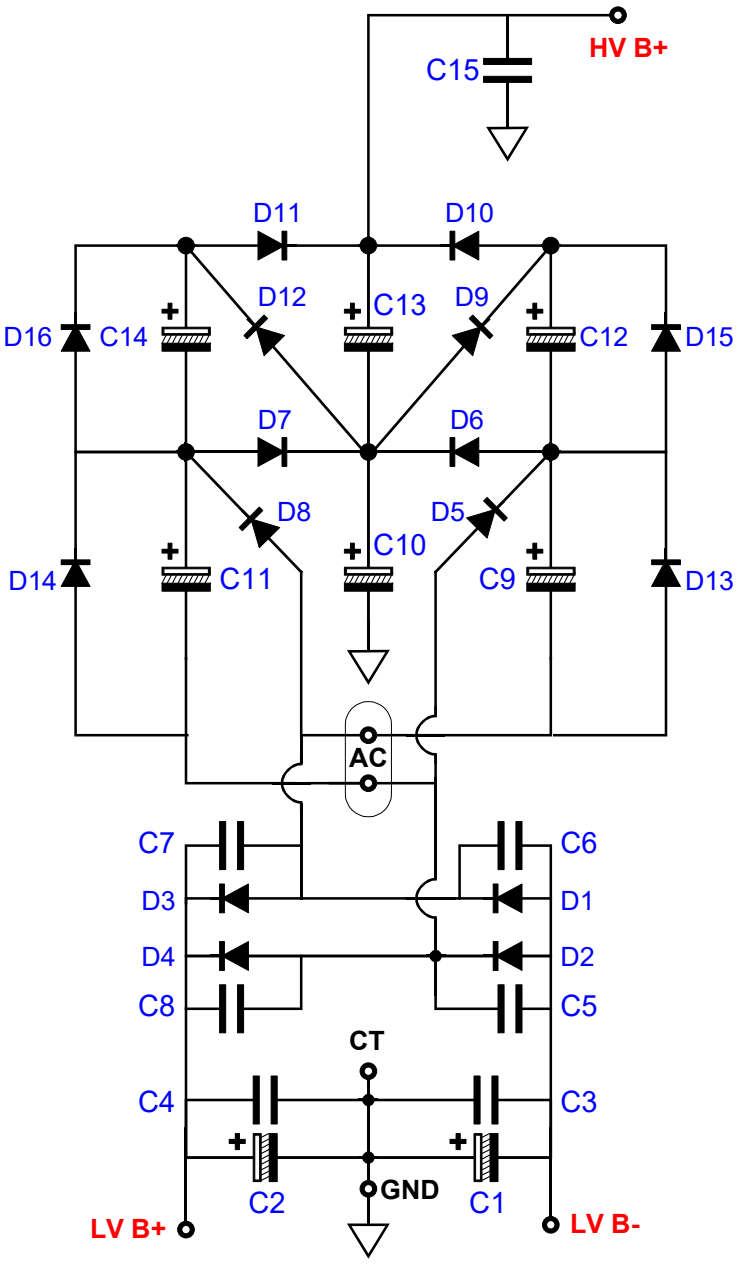
Testing Before attaching the power transformer, be sure to review the PCB for backward rectifiers and capacitors. Always use a variac and no load, when first applying power to the power supply. Slowly bring up the input voltage to 10% of the wall voltage, while looking for smoke or part discoloration. Measure the output voltage at each low-voltage rail and the high-voltage B+ voltage. If the low-voltage rail voltages differ by more than a few millivolts, the power supply was probably misassembled. The high-voltage B+ voltage should roughly be five times greater than the low-voltage rail voltage (the rectifier voltage drops will prove a bigger percentage of loss voltage at low voltages). If the power supply passes these test, then slowly increase the variac output voltage. If the low-voltage rail voltages ever exceed 50Vdc, then a lower-voltage power transformer must be used. If you do not have access to a variac, then a 12Vac (or a 24Vac, if you don't live in the USA) power transformer can be used in its place for initial testing.

Without an external load, the power supply will retain its voltage for a surprisingly long time; thus, be careful not to short out the power supply capacitors or shock yourself when handling the PCB after testing. (A 100-ohm power resistor can be used to discharge the low-voltage and high voltage power supply capacitors.)

Post Filtering The high voltage B+ output voltage will contain a good amount of ripple, which should be smoothed away with an RC or LC or pi filter. The low-voltage bipolar voltage outputs can be regulated for use with low-noise solid-state electronics, such as phono and headphone amplifiers. For solid-state power amplifiers, voltage regulators are seldom used.

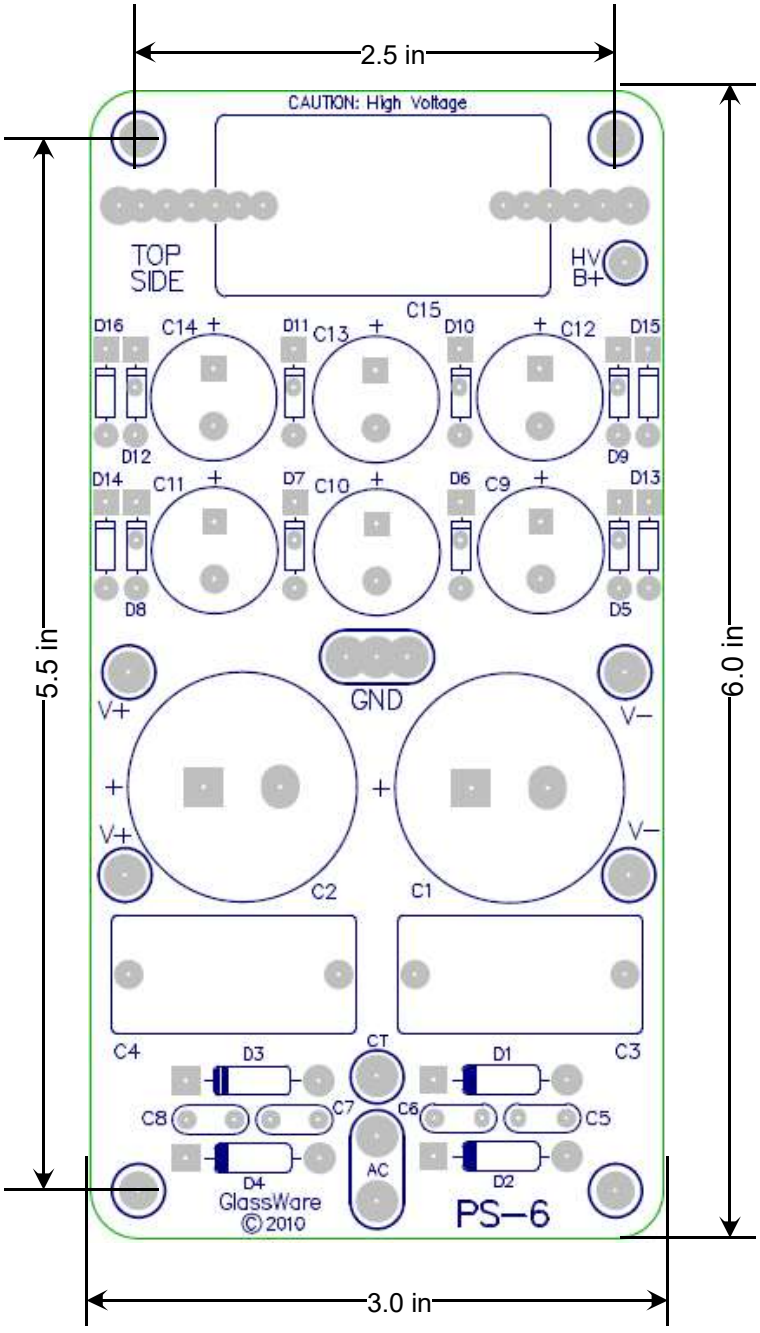
Rectifier Upgrade The voltage quintupler's high-voltage rectifiers, HER108, are quite good, but they can be replaced with faster hexfred rectifiers, which will result in slightly lower high voltage output voltage, due to their greater voltage drop. (Rectifiers D13 to D16 are just safety devices and should not be upgraded.)

PS-6 Schematic & Parts List



C1, C2 = 10KµF - 50V
C3, C4 = 6.8µF - 300V Film
C5 - C8 = 0.1µF - 50V
C9, C11, C12, C14 = 390µF - 100V
C10, C13 = 220µF - 200V
C15 = 33µF - 400V Film
D1 - D4 = MUR410G
D5 - D12 = HER108
D13 - D16 = 1N4007

Vac Input = 24Vac to 64Vac CT



AC input to pads A & C

Vac Center-Tapped	Low-voltage +/-Vdc	High-Voltage B+
6V-0-6V	7.8V	40V
6.3V-0-6.3V	8.2V	42V
8V-0-8V	10.6V	54V
9V-0-9V	12.0V	61V
10V-0-10V	13.4V	68V
12V-0-12V	16.3V	82V
12.6V-0-12.6V	17.1V	86V
15V-0-15V	20.5V	103V
17V-0-17V	23.3V	117V
18V-0-18V	24.8V	124V
20V-0-20V	27.6V	139V
22V-0-22V	30.4V	153V
24V-0-24V	33.2V	167V
25V-0-25V	34.7V	174V
28V-0-28V	38.9V	195V
30V-0-30V	41.7V	209V