

WD7S PRODUCTIONS
HIGH VOLTAGE POWER SUPPLY BOARD
HV-2

WARNING WARNING WARNING
THIS POWER SUPPLY USES *LETHAL VOLTAGES*
THIS IS NOT A BEGINNERS PROJECT!!
IF YOU HAVE NEVER WORKED WITH HIGH VOLTAGE
BEFORE, SEEK ANOTHER'S ADVICE WHO HAS,
IT MAY SAVE YOUR LIFE!!

The high voltage power supply board described here was designed for amateur legal limit amplifiers requiring 2-4.5KV plate supplies. The power supply board is conservatively rated for 4500 VDC @ 2A and contains everything needed on one PC board, except the HV transformer. The voltage rating of the filter capacitors you choose determines the maximum working voltage.

The supply uses snap-in electrolytic capacitors to conserve valuable space and to take advantage of the many surplus offerings of this style of capacitor. The board will accept 30mm, (1.18"), or 35mm, (1.39") diameter capacitors. Ten capacitors are required for the board with each one having its own equalizing/bleeder resistor. The overall dimensions of the board are 4 x 8 inches, (W x D), with the overall height determined by the capacitor used, (3.25 inches nominal for 50mm caps).

A high voltage meter multiplier resistor string is included on the board with adjustment to make use of meter movements with different FS values including 0-1ma movements. A terminal to supply HV sensing protection circuits is also provided. With the values shown the sensing terminal supplies 10 vdc at 5KV plate voltage, (2%). Two mounting holes are provided for a 25-watt, 15-25 ohm wirewound glitch resistor. If you choose to use a higher wattage resistor, the mounts can be jumpered and the glitch resistor mounted elsewhere. This value of resistor was tested with my triode control board and survived a direct short without damage to it or a 6-inch #40 wire in series with it.

The full wave bridge rectifier consists of 20ea, 1N5008 1000v-3a silicon rectifiers. The rectifiers have no spike protection capacitors, as MOV's should *always* be used in the transformer primaries, eliminating the need for capacitors at each diode.

Spade lugs are provided for all board connections to make removal and service of the board easy if ever required. Six .150-inch mounting holes are provided for mounting the board to the chassis. The B- line should be connected to chassis ground, either directly or through a low value 10-25-watt resistor, depending on IP and IG metering requirements.

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HIGH VOLTAGE POWER SUPPLY BOARD
HV-2 ASSEMBLY NOTES

WARNING THIS POWER SUPPLY USES *LETHAL VOLTAGES*

- *ALWAYS DISCONNECT POWER BEFORE SERVICING*
- *ALWAYS WATCH THE HV-METER FALL TO ZERO*
- *ALWAYS KEEP ONE HAND BEHIND YOUR BACK WHILE WORKING ON ANY POTENTIALLY ENERGIZED CIRCUIT*
- *NEVER WORK ON ANY ELECTRONIC CIRCUITRY WHILE UNDER THE INFLUENCE OF DRUGS OR ALCOHOL OR WHEN TIRED OR DROWSY*
- *ALWAYS USE A SHORTING STICK CONNECTED TO A LOW VALUE RESISTOR TO BLEED OFF ANY POTENTIAL RESIDUAL CHARGE ON THE FILTER CAPS*
- *REMEMBER IT'S YOUR LIFE AT STAKE*

Start by marking the mounting holes on the amplifier or power supply cabinet using the unpopulated board for a pattern. The PC board was designed to mount with six 2.25-inch hex stand-offs. To minimize the possibility of HV tracking, the center stand-off must be a nylon type or it can be made of one nylon and one metal hex spacer piggy-backed together and totaling 2.25 inches in length. Next, form the leads of the 5-watt equalizing resistors to fit their holes in the board. Now insert the resistors in their place on a ¼ inch spacer and trim the excess leads below the board with flush-cut diagonal pliers. *Don't* solder the resistors in place yet, set them aside for later. Install and solder the filter caps in place paying close attention to the polarity marked on the paper copy of the silk-screen provided, remember the printing on the PC board is the *TOP* and the caps mount on the bottom. Make sure the caps are tight to the bottom of the PC board and straight. Now the equalizing resistors can be soldered in place, (on the top of the board), with their leads resting on the caps below but not interfering with the caps fit, this results in a ¼ space from the resistor to the board for cooling. Solder the topside only.

The 1N5408 diodes all mount the same, cathodes up and toward the glitch resistor, (positive) end of the board. The glitch resistor mounts on two ¼ x 1/2-inch long metal hex spacers with 6-32 hardware. Be sure to use star type lock washers at board side of the hex spacers supporting the glitch resistor.

The spade lugs are meant to be tight in their holes on the board but if you have too much trouble inserting them, a light touch of a file on their pins will make this easier.

The meter multiplier resistors mount on end with the two 4.99k resistors, R-11 and R-12, at the B- end of the board. When using a 0-1ma meter movement and a lower scale than 5KV is desired the multiplier string total should be lowered. Remove two resistors and jumper their position for each 1000 volts of scale below the 5KV scale. If for any reason the HV meter ground return is not returned to the B- rail, the bottom of the meter multiplier string has to be disconnected from the rail and grounded to the chassis. This is the case when using a multi-meter in place of a dedicated HV meter. The meter multiplier string results in a voltage of 1% of the plate voltage at the input to the variable resistor, R-23 without the meter resistance or the final value of R-23 in parallel. The Zener diode, D-1, is included to protect the protection circuitry in case R-11 or R12 should open. To adjust the HV meter, apply 1% of the desired full-scale reading to the junction of R-11/R-12 with a bench power supply, i.e. 5 volts for 5KV or 3 volts for 3KV etc. Adjust R-23 for a full scale reading on your meter. Check the voltage level of the supply with a high voltage probe while monitoring the voltage at the junction of R-11/R-12. Then with power removed and capacitors bled off apply the previously monitored voltage at R-11/R-12 with a bench supply and calibrate R-23 to match the HV probe reading. **DO NOT ADJUST R-23 WHILE HV IS PRESENT ON THE BOARD!!** If a variable 0-130-vac supply is available, use it to supply the board with ac instead of the plate transformer to check for low voltage operation first. **REMEMBER THIS IS STILL LETHAL VOLTAGE - USE CAUTION!!** This supply has two bleed-down paths for safety, the multiplier resistor string and the equalizing resistor string. **NEVER ASSUME THEY ARE WORKING!! ALWAYS FOLLOW THE SAFETY PROCEDURES ABOVE AND STAY ALIVE!!!**

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WD7S PRODUCTIONS HV-2 PARTS

D1, 16VOLT 1W ZENER

D2 – D21, 1N5408, 3AMP 1000 PIV, MOUSER # 625-1N5408

C1 – C10, SNAP-IN ELECTROLYTIC, YOUR CHOICE, BOARD WORKING VOLTAGE = 10X INDIVIDUAL CAPACITOR VOLTAGE RATING, TOTAL SUPPLY CAPACITANCE = 10% OF INDIVIDUAL CAPACITOR VALUE

R13 – R22, 499K DALE MODEL CMF METAL FILM RESISTOR, THESE RESISTORS ARE RATED 1 WATT FOR COMMERCIAL SERVICE AND ½ WATT FOR MIL SPEC, 900VOLT DIELECTRIC STRENGTH, MOUSER # 71-RN65D-F-499K, *DO NOT SUBSTITUTE WITH CARBON RESISTORS!!*

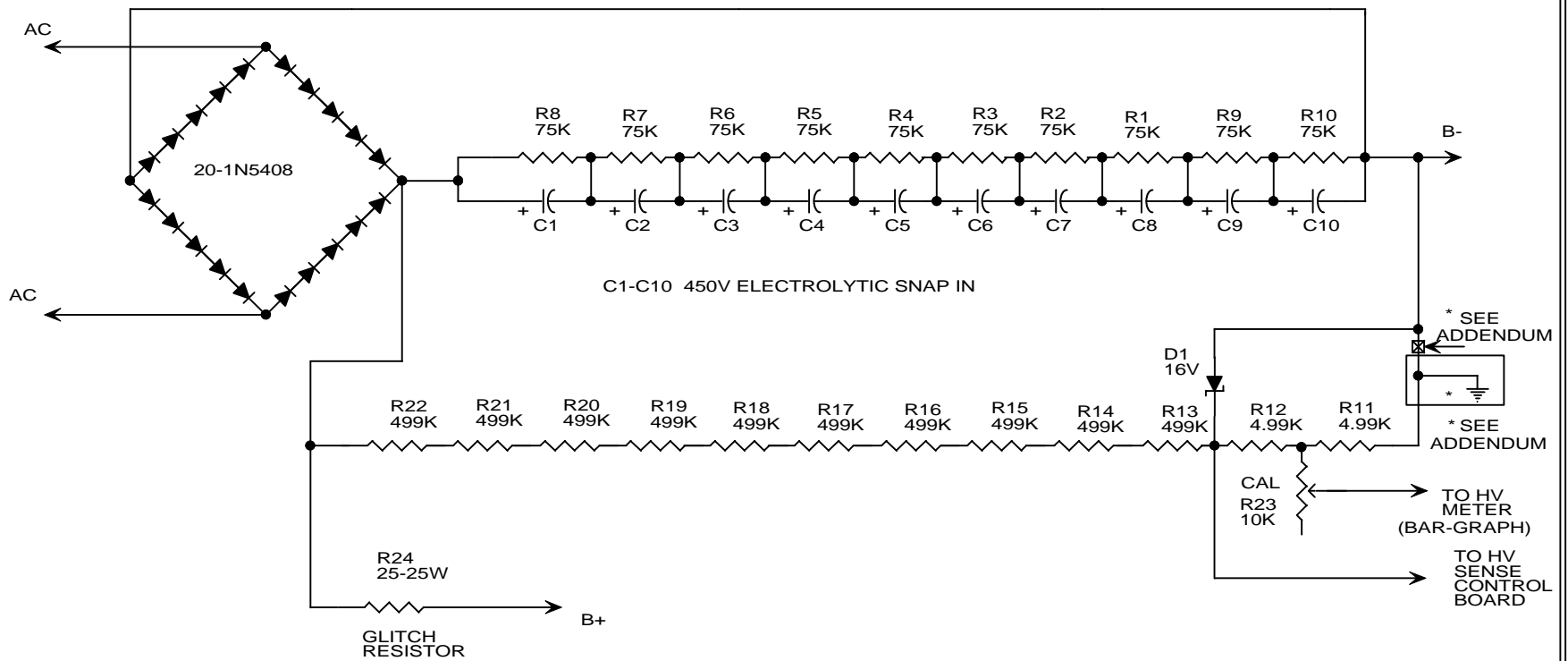
R11, R12, 4.99K DALE MODEL CMF METAL FILM RESISTOR, MOUSER # 71-RN65D-F-4.99K, *DO NOT SUBSTITUTE WITH CARBON RESISTORS!!*

R1 –R10, 75K, 5 WATT DALE TYPE RS SILICONE COATED WIREWOUND RESISTOR, 1KV DIELECTRIC STRENGTH, MOUSER # 71-RS5-75K, *DO NOT SUBSTITUTE WITH CARBON RESISTORS!!*

R23, 10K MULTI-TURN TRIM POT, MOUSER # 72-T93YB-10K, DALE

R24, 25 OHM, 25 WATT, WIRE WOUND POWER RESISTOR, OHMITE, MOUSER # 588-L25J-25

DANGER HIGH VOLTAGE



WD7S PRODUCTIONS

Title: Hv-2.pic

Size A

HIGH VOLTAGE SUPPLY Rev

Date: 1/01/09 Thu

