

A Common High Current PSU

By G8MNY

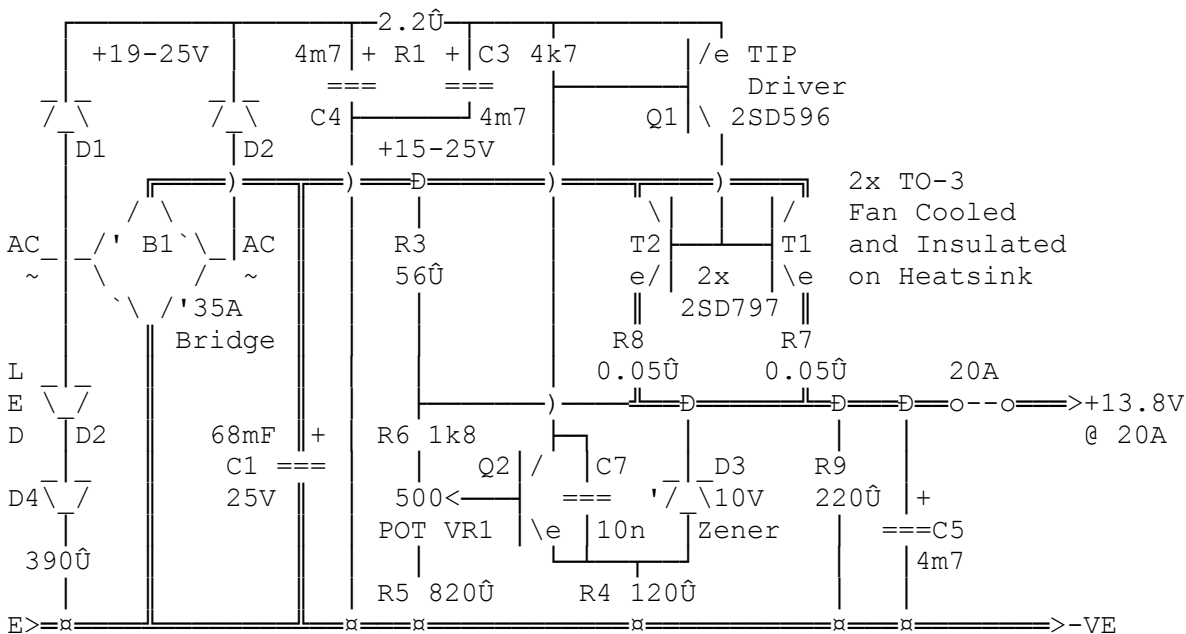
(Updated Dec 12)

(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

This is a simple and therefore reliable common design used on commercial PSU. e.g. TRIO PS30 and ICOM PS55. Component values differ slightly between models.

HOW IT WORKS

The rectifiers charge up C1 to 25V. R3 puts some voltage on the output (>1.5V), a fraction of this turns (pot arm) on Q2 (0.5V on Q2 base). This turns on Q1 that drives the 2 large high current power pass Transistors T1 and 2. When the output voltage is >10V the zener conducts turning off Q2 as it pulls up the emitter voltage compared to Q2's base on the VR1 pot output fraction setting.



Some of the reference numbers are repeated as components are on different PCBs.

AC

The mains transformer is a conventional (not toroidal) type 17V @ 26A (2x 13A) for the 20A rated PSU. The high pulse current AC wiring to the bridge and to the reservoir C, are in thick and twisted wire to keep the losses and magnetic pulse radiation down. A slow blow mains fuse of 6A is used.

PSU FEATURES

It has 2 power rails, this is because the bridge rectifier and capacitor losses under heavy load can give the driver's supply up to 1V more. This allows for better peak drive current when it is needed.

The 2R2 limits the drive current when C5 is exhausted allowing for higher peak currents than the steady rating, but this current limiting is very dependent on the mains voltage! Current "Foldback" is provided with reference zener D3 fed from the output. The start up current comes from the R3 560Ω, and R9 220Ω is the minimum discharge load.

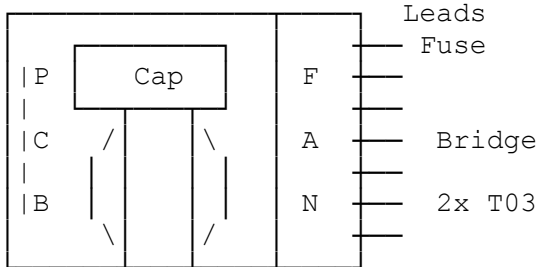
A quiet thermally switched DC cylinder fan comes in when the heatsink is at a scalding 60°C.

On the ICOM unit, the mains is remotely switched on the rig with the same lead as the high current DC output. Polarity of the plug is "VERY CRITICAL", as if

it is forced to accidentally connect upside down, (not easy to do) live mains will flow to the +ve DC side of your Rig! (it may be safer to remotely switch neutral as that current would be light!)

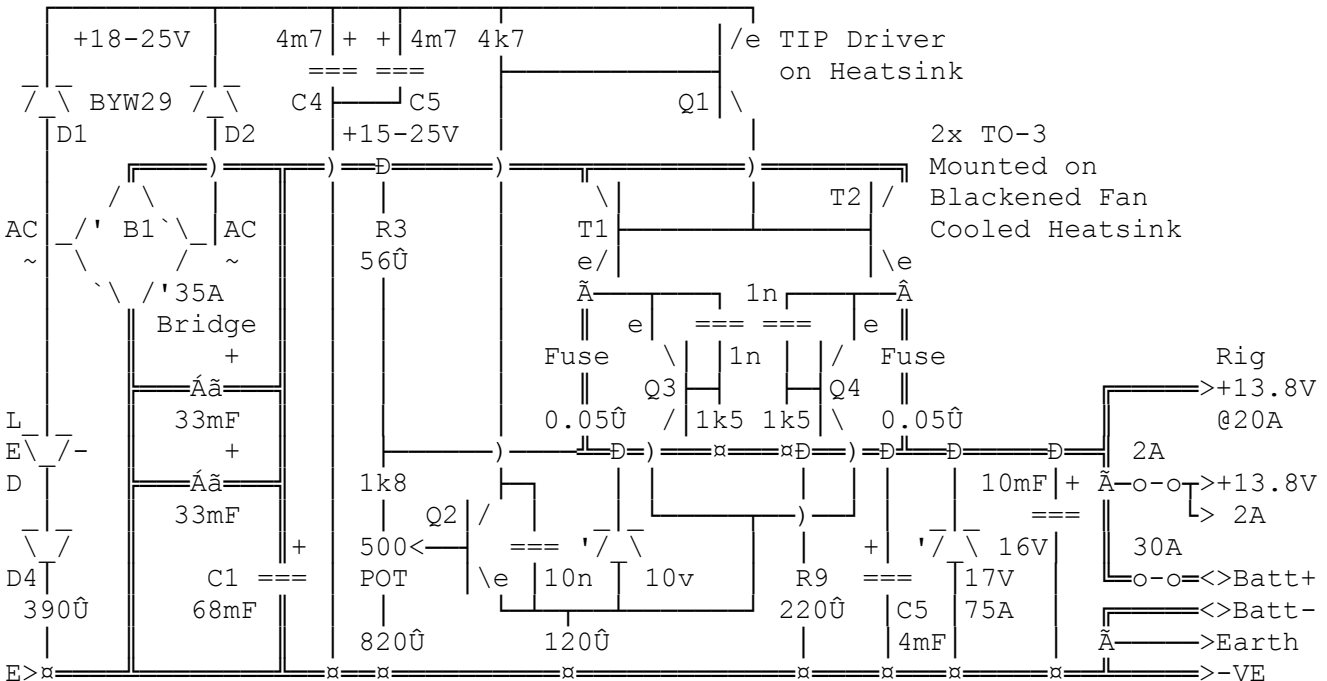
OTHER LIMITATIONS

There is no rig protection from a shorts of T1/2 pass transistors and 25V output will damage your rig!



MODIFICATIONS. I have done to my ICOM one..

- 1/ Heatsink added to Q1 and bolted flat to PCB location provided.
- 2/ Blackened main T1 and T2 heatsink, so the thermal controlled fan runs less.
- 3/ Fused added on T1 and T2 emitters on PCB tags (13A ones soldered in).
- 4/ Squeezed in more main smoothing 2x 33mF @25V for /P work with poor AC power.
- 5/ Proper current limiting (@ 15A/transistor) with 2 extra PNPs Q5 and Q6. These will also shut the PSU down if a 13A fuses blows.
- 6/ Removed the 2R2 the old current limiting method, to gain more output current drive when the AC supply is poor.
- 7/ Changed D1 and 2 for lower voltage drop BYW29, for when the AC supply is poor.
- 8/ Added an output overvoltage protection zener (like an SCR Crowbar).
- 9/ Larger output Cap (10mF 16V) wired across PCB output tags.
- 10/ Mains Transformer tuned (PF=1) for /P work with 1uF 250VAC.
- 11/ Added a trip switch fuse low current output, for accessories.
- 12/ Added Battery "crock leads" and 30A trip.



With these modifications the PS will do 22A @ 13.8V output with 200-240V input.

Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP