

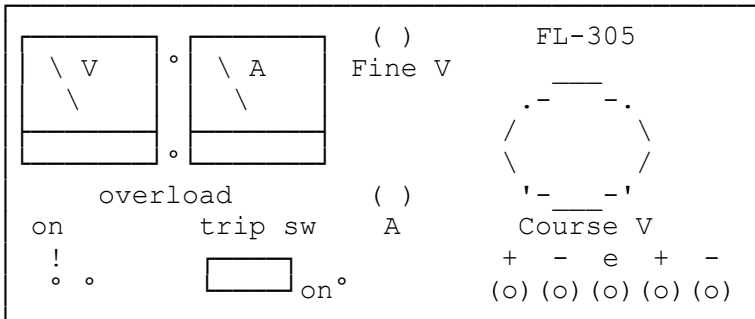
0-35V 0-5A Lab PSU CS FL-305

By G8MNY

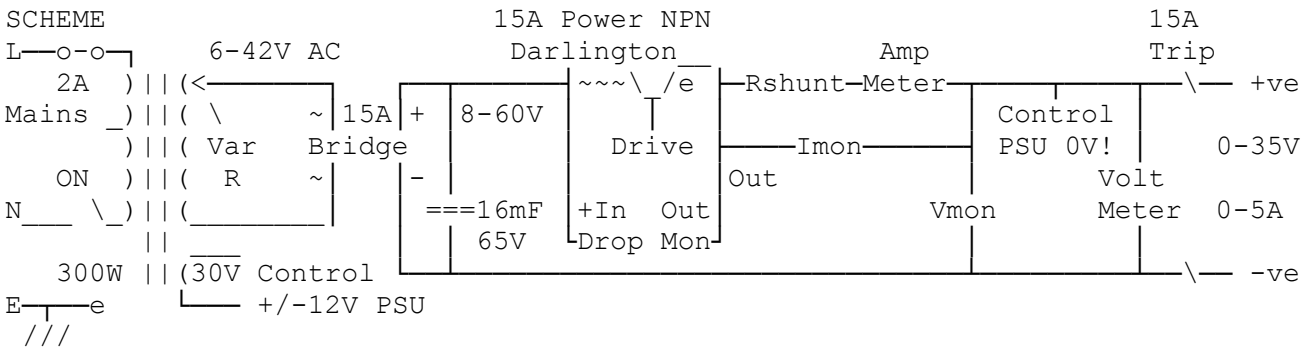
(Updated Oct 17)

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

Here is a very unusual circuit principles of this 0-35V 0-5A PSU. It uses a transformer variac secondary to make an efficient linear regulator, together with variable current limiting & dissipation power fold back.

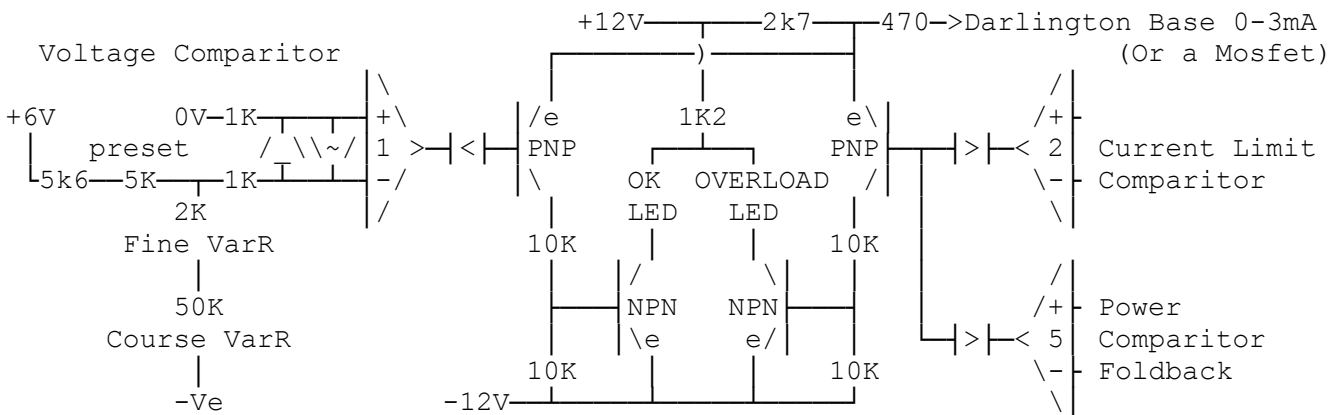


It was all blown up & modified into a simple raw PSU. So I did a lot of reverse engineering, to find out it how it originally worked, before attempting the restoration.



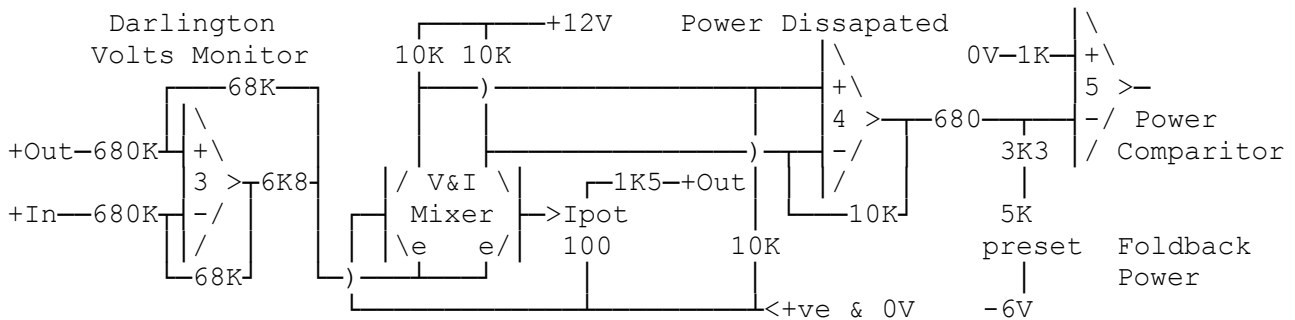
The coarse Voltage Variac control has stops on it to give between 6V - 42V AC, & a 50K Var R to control the regulated Volts. Unusually a separate 30V winding is used to make a floating +/-12V @ 40mA zener PSU on the +ve O/P rail, for 5 Op amps, 6 transistors & 3 LEDs of the complex control circuit.

The 1st Op amp with input protection diodes & 1K Rs, monitors the output Volts, compares PSU -ve through VarR & Fine VarR to +ve from 5K preset & 5K6 using +6V zener reference. And with 2 transistors it shunts away the 3mA drive to the darlington, & lights up the green OK LED.



A 2nd Op amp monitors the output current & compares it to the current set pot & -6V ref zener. Overloads, limit the drive current & with 2 more transistors, by again shunting away the 3mA darlington drive, & lighting the red OVERLOAD LED, instead of the green OK LED.

A 3rd Op amp monitors the voltage drop across the darlington pass transistor. And converts this into current to feed the emmitters of a "dual transistor long tailed pair" mixer, with a sample of PSU O/P current into one of the bases.



The resultant balanced mix product, feeds the 4th Op amp, to give an accurate signal proportional to the power being dissipated. And that then feeds the 5th Op amp & also uses the -6V to set the drive fold back level, & also light the OVERLOAD LED.

CALIBRATION.

A high power DC load is needed, I used a large tapped WW resistor 2+2+4Ω 1kW. Set the start position of the Variac VarR, & then the 4 presets are used to determine, 1 Max overhead voltage, 2 Max Current range, 3 Current foldback sample Ipot, & 4 Max foldback power. When correctly set the head voltage is always just enough for a cool regulator at all output voltages & currents!

DOUBLE CURRENT MODIFICATION

As the PSU has a hugh mains transformer & a roomy chassis, I decided to see if it could be made to do 10A! (350W Regulated DC O/P!)

- 1/ Transfure the 2 heatsink reverse voltage protection tab diodes to the PCB, as they don't need heatsinking.
- 2/ Re-use the 2 spare heatsink holes for 2 more NPN insulated Darlington 15A transistors, pointing away from each other, to spread the heat. File chassis hole to give clearence, & wire them up in parrallel to PCB, with a 3A fuse in each emmitter.
- 3/ Remount 15mF C & bridge, from PCB blanking panel, on to the rear case either side of the VarR, making sure the piller mounted PCB will fit back OK.
- 4/ Remove the PCB metal panel, & add more main 65V smoothing (I used 4x 5000uF) in the new space, to maintain low DC ripple @ 10A before regulation.
- 5/ Shunt 5A meter with resistance wire to now read 10A FSD, & re-label 2x/10A.
- 6/ Shunt the large current sampling 0.1R with resistance wire to bring it down to < 0.06R, & mount it with the left over pillers behind Amp meter mounting screw.

Then do the calibrations again with current limit set to @ 10A max, & the fold back current to 1.5A when set @ 35V. It is all just doo able, right on the limit of the PSU & still not running too hot.

CONCLUSION

This is now quite usefull bench test PSU, able to test low current circuits with the new current limit from "10mA to 10A" @ voltages from "75mV to 35V". Used for testing prototypes, zapping & charging batteries, run modest power rigs (30W) etc.

Be aware not to over voltage kit, as it is a Lab PSU not just a Rig one!

If it is often to be used at this "higher power limit", a 60°C thermal trip glued on the transformer might be a good safety feature to add!

See also tech buls "Lab PSU", "Simple 20A PS", "High AMP Crowbar Protected PSU"

Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP