

DRAE 24A 13.5V PSU

By G8MNY

(New Dec 09)

(8 Bit ASCII Graphics use code page 437 or 850)

I have repaired 2 of this series so far, a 12A and a 24A model.

These are complex linear PS and use some unusual design features....

Short circuit current foldback

Current limit @ 24A

Current fold back to 10A

Temperature limit trip

Over voltage limit @ 14V

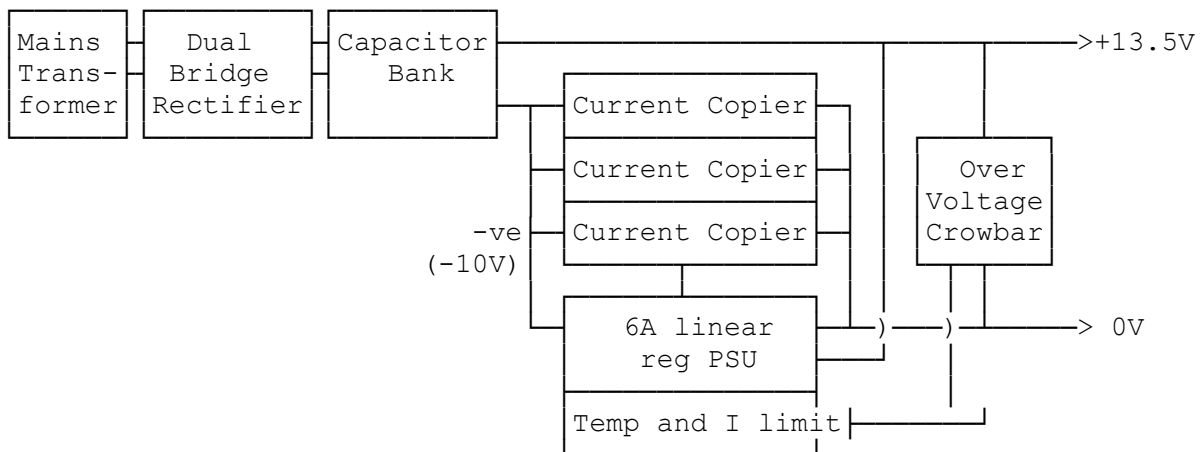
Over voltage Crowbar @ 14.5V

Negative rail regulation

Earthed 2N3055 collectors

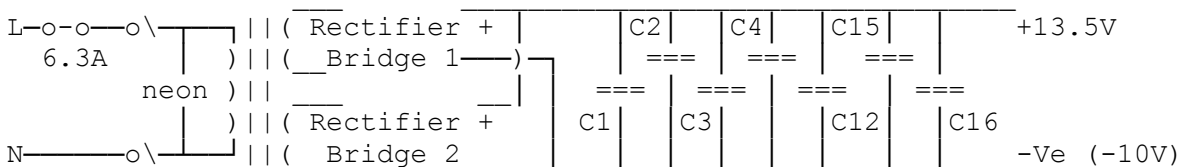
Current copiers extend current to 24A.

BLOCK SCHEMATIC



INPUT

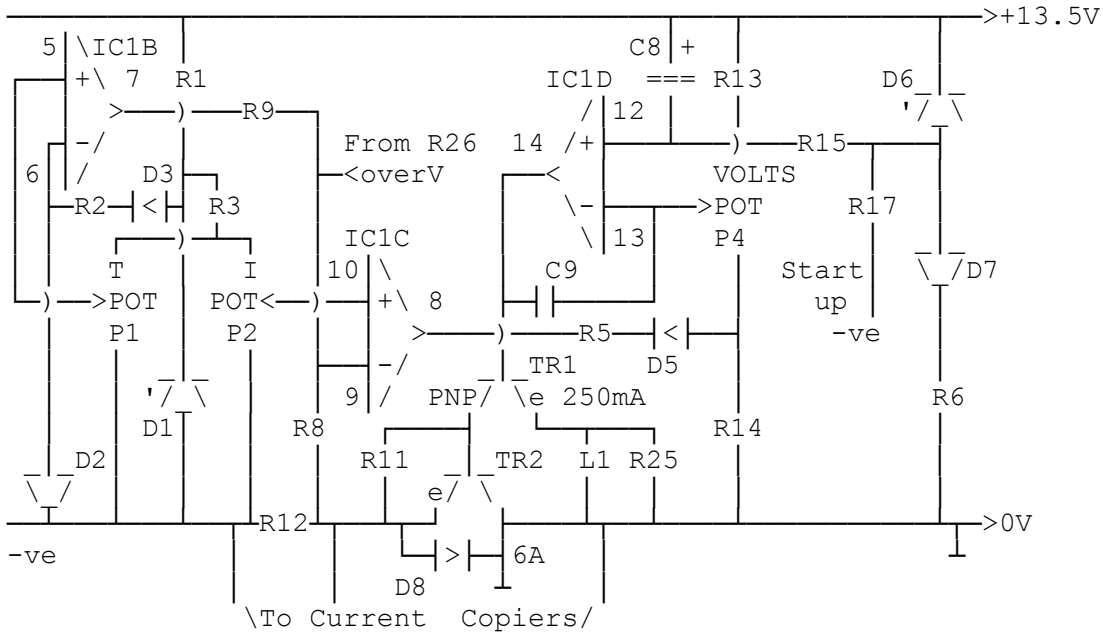
The huge mains transformer's 2 secondary's each feed a bridge rectifier and then on to each side of the capacitor bank. The +ve side is the output in this design, but it goes through several PCB links!



CONTROL CIRCUIT

Three opamps are used in the linear regulator in a cascade set up. IC1B monitors the temperature and it's output together with a overvoltage sensing transistor can affect the current limiter opamp IC1C. This in turn offsets the voltage setting pot on the voltage control opamp IC1D to affect the current limiting.

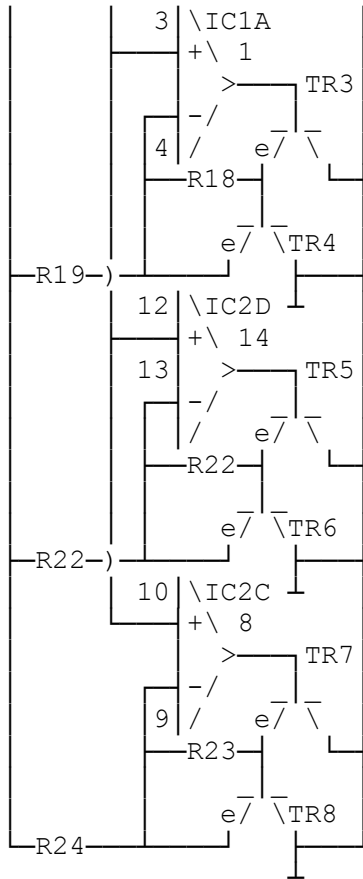
The reference zener D6 is initially powered via R1 and filter R15 and cap C8 to delay power up, then from the output (D7 and R6) this gives the reduced fold-back current on a shorted load, Voltage Opamp IC1C compares this to the output sample from voltage setting pot P4. IC1D operates PNP TR1 to drive the 2N3055 pass transistor TR2 to deliver up to 6A. When 6A is reached IC1C output falls and -ve voltage is feed into P4 to reduce the voltage and hence limit the current.



COMPONENTS

No	R	No	R	C	TR	D	P	IC	TH	L
17	1M	1	3k3	4m7 25V	BD131	5.6V	2k2	LM324N	BTI51	?
18	22R	2	10k	4m7 25V	2N3055	1N4148	2k2	LM324N		
19	0R05 2W	3	6k8	4m7 25V	TIP31B	1N4148	220R			
20		4			2N3055	14V	2k2			
21	22R	5	10k		TIP31B	1N4148				
22	0R05 2W	6	3k3	2m2 16V	2N3055	5.6V				
23	22R	7		10n	TIP31B	1N4148				
24	0R05 2W	8	1k5	?	2N3055	1N4001				
25	22R	9	27k	10n						
26	3k3	10	22R 10W	u1						
27	27k	11	22R	2m2 16V						
28	3M3	12	0R05 2W	4m7 25V						
		13	10k	1n						
		14	15k							
		15	10k	4m7 25V						
		16	3k3	4m7 25V						

CURRENT COPIERS

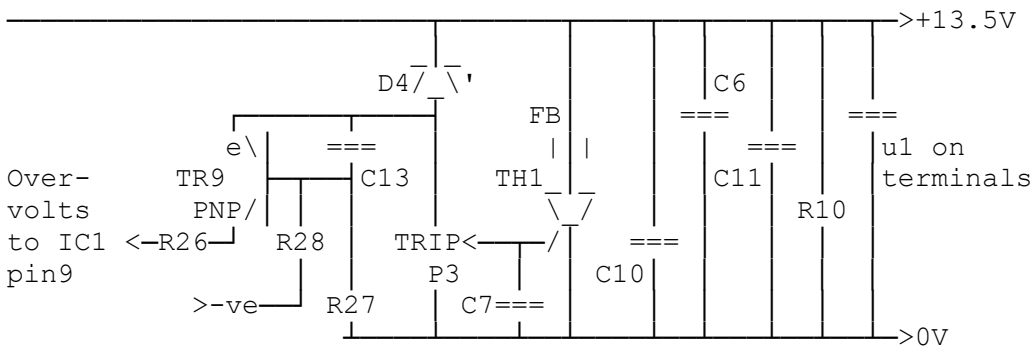


Three more 2N3055 each with a driver and opamp are used to get the current up to 24A.

PROTECTION

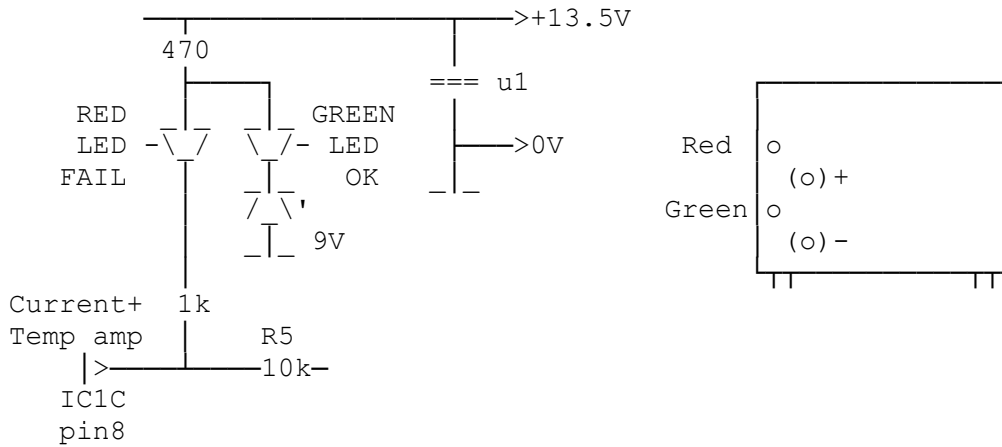
Addition over voltage limiting circuit using TR9 shuts off the drive if output rises above 14V. If there is no control due to a blown up pass transistor, a SCR crowbar circuit will short the output as well (destroying the pass transistor?)

Warning due to the SCR crowbar do not put an unfused battery across the supply!



Several caps are across the output as well as a 10W load R10 these soak up any sudden changes in the loading.

STATUS LED Modification



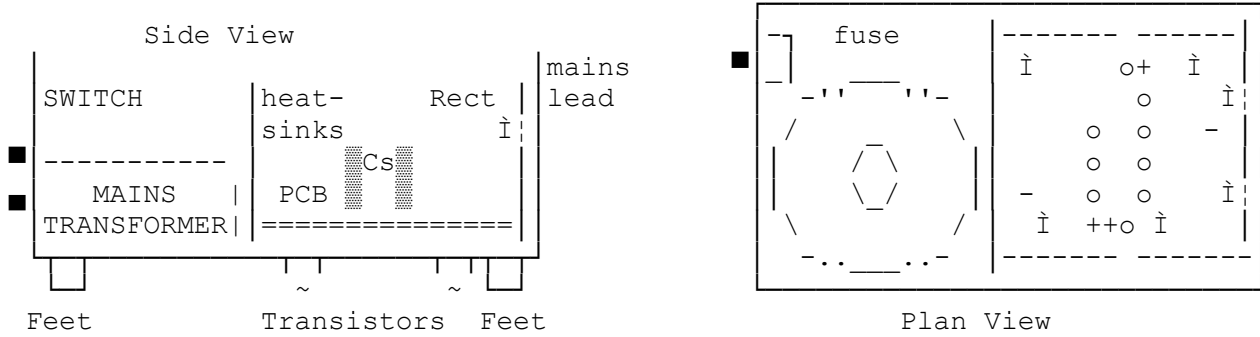
The -Ve going output of current Opamp IC1C that is also operated on over Volts and Temperature, has just enough current to light the RED LED via the 1k and 470R on doing so the GREEN LED goes out. The GREEN LED only lights if the +13.5V output is good enough. All but the 1k are mounted to outside of the output terminals with tight holes drilled for the LEDS, and +13.5 and 0V soldering to the u1 cap leads that are across the terminals.

REPAIRING

Burnt out base emitter Rs means a 2N3055 is dud and has lost it's emitter connection and the driver needed testing too.

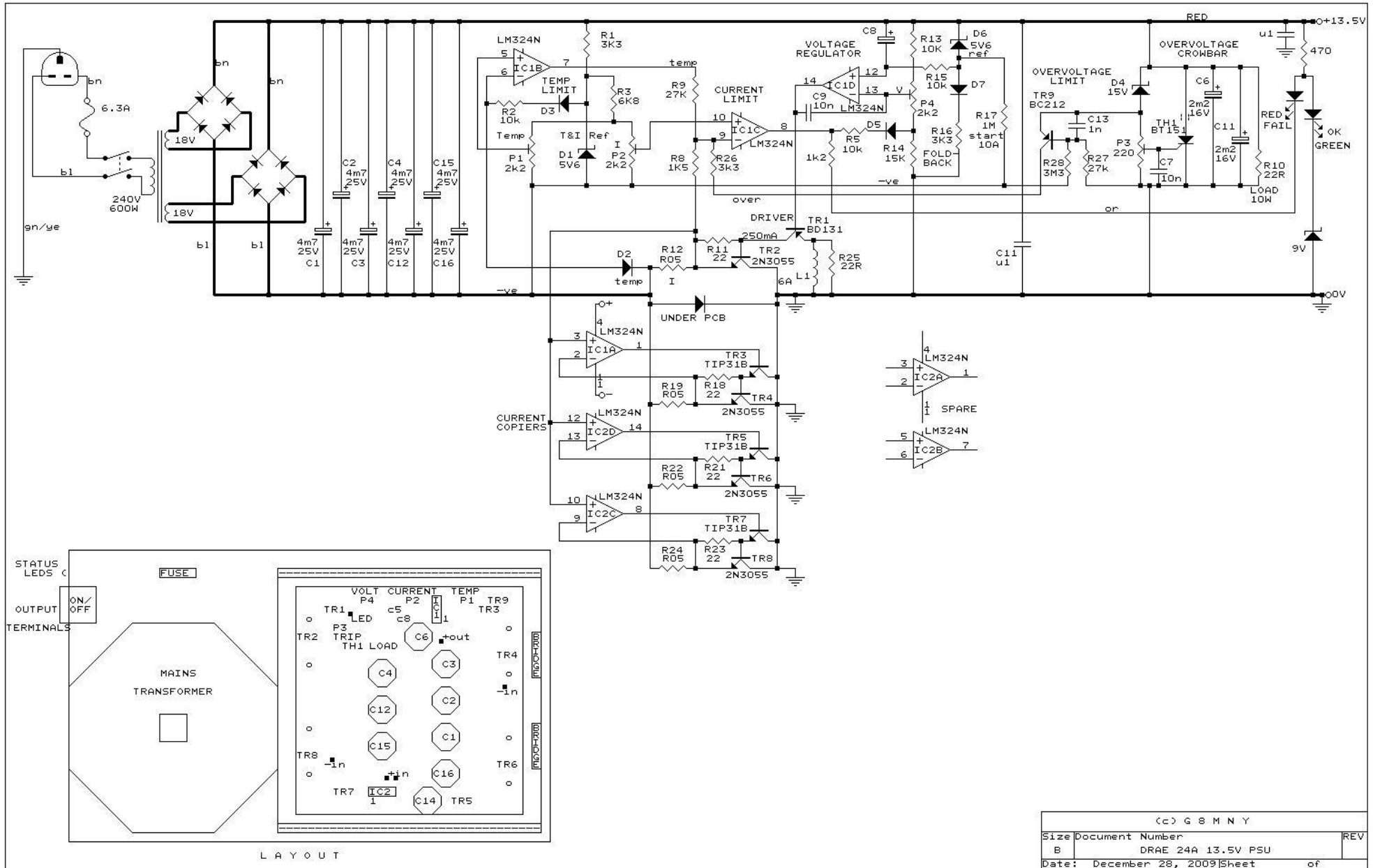
This design is not that easy to work on you do need a flexible shaft 8mm spinner!

The 4 pass transistors are bolted on the underside with 2 sets of nuts, one to hold transistors and internal heatsink to the caatin kit needed in this design!), and the 2nd set with washers holds the PCB in place. But the PCB can only be removed after the 2 rectifiers have been moved out of the way.



Circuit diagram on the next page
Why don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP



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