Laptop Fluorescent Tube Circuit

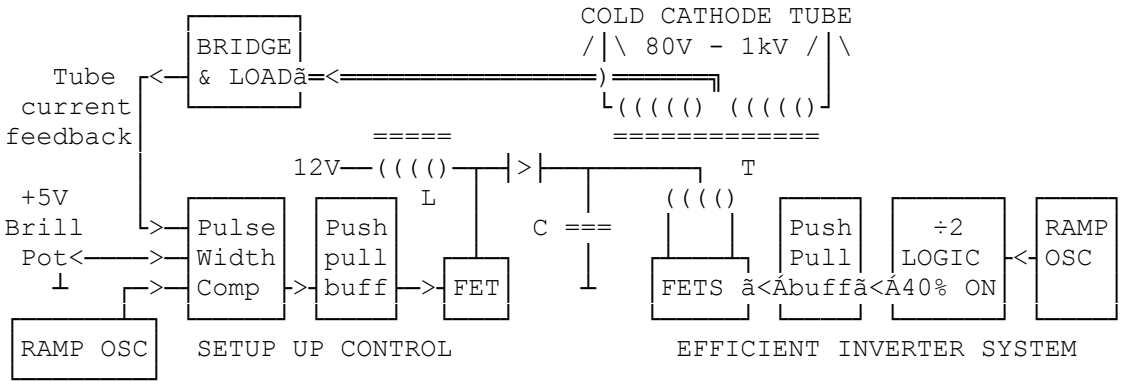
By G8MNY (Update Nov 06)

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

Unlike a simple single ended 12V fluorescent lamp system, that effectively only puts DC pluses on the tube, that reduces the tube life time by half. This one uses a much smaller cold cathode tube that needs very high voltage to start.

After reverse engineering the circuit for an old DEL laptop, I was surprised just how complex it was..

SIMPLIFIED SCHEMATIC



HOW IT WORKS

STEP UP

The left ramp osc is compared with both the brilliance pot & feedback to produce a variable pulse width drive that feeds a complementary buffer before driving a power FET (100V 5A). The FET puts extra current into the L choke & when the FET turns off C is charged to a higher voltage (e.g. 40V to strike)

INVERTER

The tube inverter also has a ramp osc, & this is level compared to give 40% on & on & then divided to give 2 outputs of 40% on. These are both buffered with complementary pairs to drive to higher voltage FET’s (250V 2A). These drive T the push pull step up ferrite transformer. T has a split high voltage secondary, that connects to the tube, but the centre tap feeds a bridge rectifier.

FEEDBACK

The bridge rectifier feeds a small capacitor & load R. The voltage across this is proportional to the tube current & is used to control the overall brilliance.

On power up there is no tube current so the step up runs flat out to produce high voltage for the inverter to run on. With this the inverter produces something like 1kV balanced AC to the tube. In striking, tube current flows & the tube voltage drops to about 80V. The step up circuit now controls the supply voltage to the inverter to maintain the current (brilliance) chosen.

OTHER BITS

Not shown here is the fuse, thermal trip link, & there are loads of protection diodes across the FET’s etc. Also the whole circuit is all SMD about 2cm x 4cm double sided components & the diodes are in the same packages as the SMD transistors making testing horrid! The original fault was short circuit FET’s, non
of the tiny SMD components was faulty. :-)

Why don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP