

Application Note: Assembling the Coleman Regulator V7

1. Parts you will need (NOT supplied in the kit):

1.1 Silicone Heatsink Compound (Apply between power transistors and heatsink).

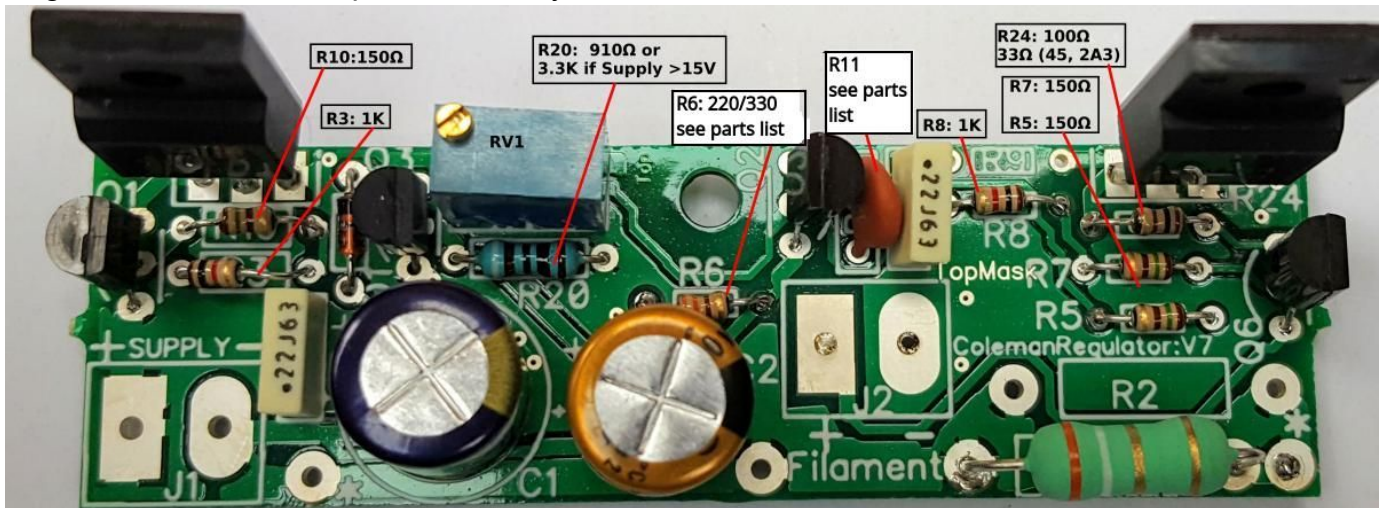
Electrolube HTC10 [eg 10ml syringe, Farnell 317950]. Mouser # 567-120-SA.

1.2 Test Resistors (Cheap Cement wirewound type). When the Regulator is assembled, test the regulator using a resistor, to make sure everything is OK, before connecting it to your filament. The test-resistor is a “fake filament” - its resistance value is: **$R = V_f/I_f$** (**V_f : normal filament voltage, I_f : normal filament current**). Examples: **01A**: $R = 5V/0.25A = 20\Omega$ (can use 18 Ω). **26**: $1.5V/1.05A$; $R = 1.4\Omega$ (use 1.0+0.33 Ω series). **10Y**: $R = 7.5V/1.25A$; $R = 6\Omega$ (2x12 Ω parallel). You can use series or parallel combinations to get to the correct resistance (a little lower is OK). The total power rating should be 2x to 5x the filament power ($V_f \times I_f$).

1.3 Mounting screws. Transistor and PCB mounting holes are suited to M3 screws.

1.4 Components for a raw dc supply: see General Application Note at lyrima.co.uk/heatv7pdf/

2. PCB components: All the components mounted on the PCB come in the kit: Check the diagram and see that all parts are ready to stuff the board:



R1 is stated in the parts-list, or can be calculated:

$R1(\text{ohm}) = 1/(\text{nominal filament current, A})$. Eg.: 0.5 Ω for 2.0A; 2 Ω for 0.5A nominal.

R20 is 910 Ω or 1K for Supply Voltages up to 15V.

For high voltage applications, like Filament Bias, **R20 = 3.3K** (up to 21V) for 21-28V, **R20 = 4.7K**.

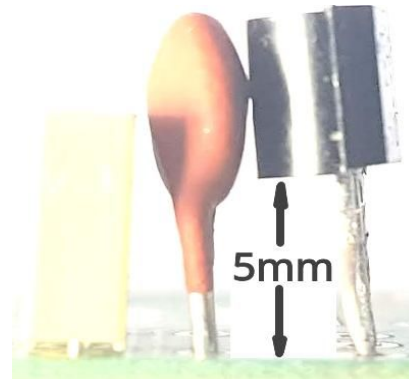
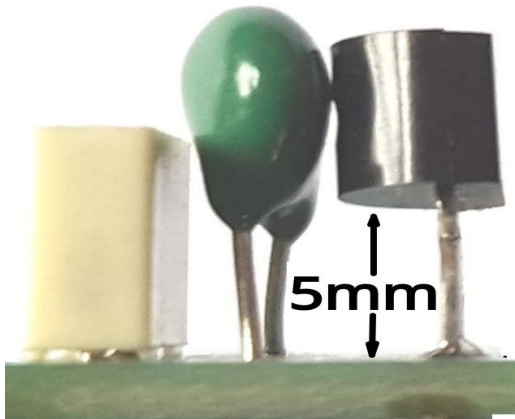
Transistor Types and Capacitor values: See Parts List in the Kit's bag.

3. Component Lead Formation.

3.1 Resistor R1 and R2. These resistors sense the current. They are 2-5W types, but are only stressed at 25 .. 50% of this, to prevent them running very hot. Still **they will reach 150 degrees Centigrade or more**, so be careful not to touch them when running. Mount the resistors so that the body is **12mm or more from the PCB**, or the board may be burned. See photo.

3.2 RV1 trimmer. Mount this so that the adjustment screw is top-left [see Photo].

3.3 Mount Q2 5mm above PCB. Q2 & R11 touching, optimised for each type of R11:



- 3.4 Assembled PCB:** The finished board should look like the photo on page 1 - check the resistor colour codes and the orientation/polarisation of C1, C2 RV1, Q1-6
- 4. Testing the Regulator.** When you have stuffed the board according to the diagram, test it carefully before connecting to a DHT filament.
- 4.1 Inspection.** Use a lens to check that no solder shorts are present.
- 4.2 Meter Test.** Set a DMM to resistance [20K range]. Try the Supply input [red to +]: should only give momentary or high impedance reading. Try Filament Terminals [both directions], should also read HIGH IMPEDANCE.
- 4.3 Dummy load Test. ATTENTION: *Mount the Regulator on a Heatsink.*** Power transistors will be destroyed if the regulator is used - even for less than 1 second - without a heatsink. Mount Q4 directly to the heatsink, using some heatsink compound.
- 4.4 Connect the Test Resistors** [dummy load] to the Filament Output Terminals.
- 4.5 Connect DVMs** to Monitor: (1): supply voltage and (2): Filament (Output) Voltage.
- 4.6 Turn the trimmer RV1** fully anticlockwise. It's a 25-turn trimmer, for precision.
- 4.7 Power ON:** and check Filament Voltage is BELOW the specified value for the target DHT. If too high, immediately power OFF, and look for short circuits, or wrong component values. If OK, use a trimmer screwdriver on Trimmer RV1 to check that the Filament Voltage responds to adjustment.
- 4.8 Connecting the DHT:** Now wire the DHT filament (see *CONNECTING* section of the General Application Note at lyrima.co.uk/heatv7pdf/).
- 4.9 RESET the trimmer RV1** fully anticlockwise (minimum output).
- 4.10 Switch ON filament supply WITHOUT B+** (HT supply) and adjust RV1 until the exact rated voltage appears across the filament (eg 5.0V for 300B).
- 4.11 Keep monitoring filament voltage**, and apply B+. The Voltage may increase a little. Adjust again, and watch filament voltage until the amp is warmed up.
- 4.12 Adjust it finally** after 30-60 minutes of normal running. After that, you should not need to adjust again, right across the lifetime of the DHT. But if you install another DHT, please remember to adjust the current again.