

## Application Note: Assembling the Coleman Regulator RC-V8

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

**1.1 Thermal Grease (Heatsink Compound):** Apply between power transistors and heatsink, on both sides of the mica insulator for Q5. Electrolube HTC10 [eg 10ml syringe, Farnell 317950]. Mouser # 567-120-SA. From TME: ART.AGT-164. Easily bought on Ebay, but check the rated thermal conductivity is  $>2\text{W/mK}$

**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)**. Example: for 845 or 211:  $10\text{V}/3.25\text{A}$ ,  $R = 3\Omega$  (use  $3 \times 1\Omega$   $17\text{W}$ , or similar). 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  $\varnothing 3.3\text{mm}$  for M3 screws.

**1.4 Raw dc supply:** see General Application Note at [lyrima.co.uk/doc/v8/](http://lyrima.co.uk/doc/v8/)

**2. PCB components:** All the components mounted on the PCB come in the kit: the type and value of each part is shown in the parts list label inside the kit. The photo is a guide to component mounting direction [RV1 & all transistors] and polarisation [D1, C1, C2]. Other parts can be mounted in either orientation.



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

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

### 3. Component Lead-Forming:

**3.1 Resistor R1 and R2.** These resistors sense the current. They are  $3\text{-}5\text{W}$  types, but are only stressed at  $25 \dots 50\%$  power, to prevent them running very hot. Still **they will reach  $150^\circ\text{C}$  or more**, so be careful not to touch them when running the heater. Mount the resistors so that the body is  **$12\text{mm}$  or more from the PCB**, for good ventilation.

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

### 3.3 Mount Q2 5mm above PCB. Q2 & R11 touching:



PCB mounting of R11 and Q2

**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. Mount Q5 to the heatsink with the Mica-insulator & shoulder-washer (included in the kit with Q5). Make a **thin and even** layer of thermal grease across Q5 mounting-tab, and on the matching location on the heatsink.

**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/doc/v8](http://lyrima.co.uk/doc/v8)).

**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.