Coleman Shunt Cascode Kit V4: for Triode-connected 6Э5П

1. Assembly - TOP side.

1.1. **IMPORTANT**: Mount U1 reversed, as shown.

1.2. **Mount Power Resistors R4 and R6** away from the PCVB surface, as shown.

1.3. **Mount Q3 on a Heatsink** (10°C/W or lower), or some Alu chassis, 3mm thick, 180 x 180mm or greater. Please use the provided insulator & 'shoulder washer' between Q3 & heatsink.

2. Assembly - BOTTOM side.

Mount Q7 as shown:

3. Application and Schematic

3.1. **The schematic** shows a 6Э5П (6E5P) driver stage for an SE-power amplifier with large power-tubes, for example: 2A3, 300B, GM70, KT88 triode - and many others. The Shunt Cascode driver has sufficient gain (~150x) to drive any of these triodes to full power, with direct connexion from a DAC (with DSP volume control) or via analogue volume control, if the DAC lacks hardware control.

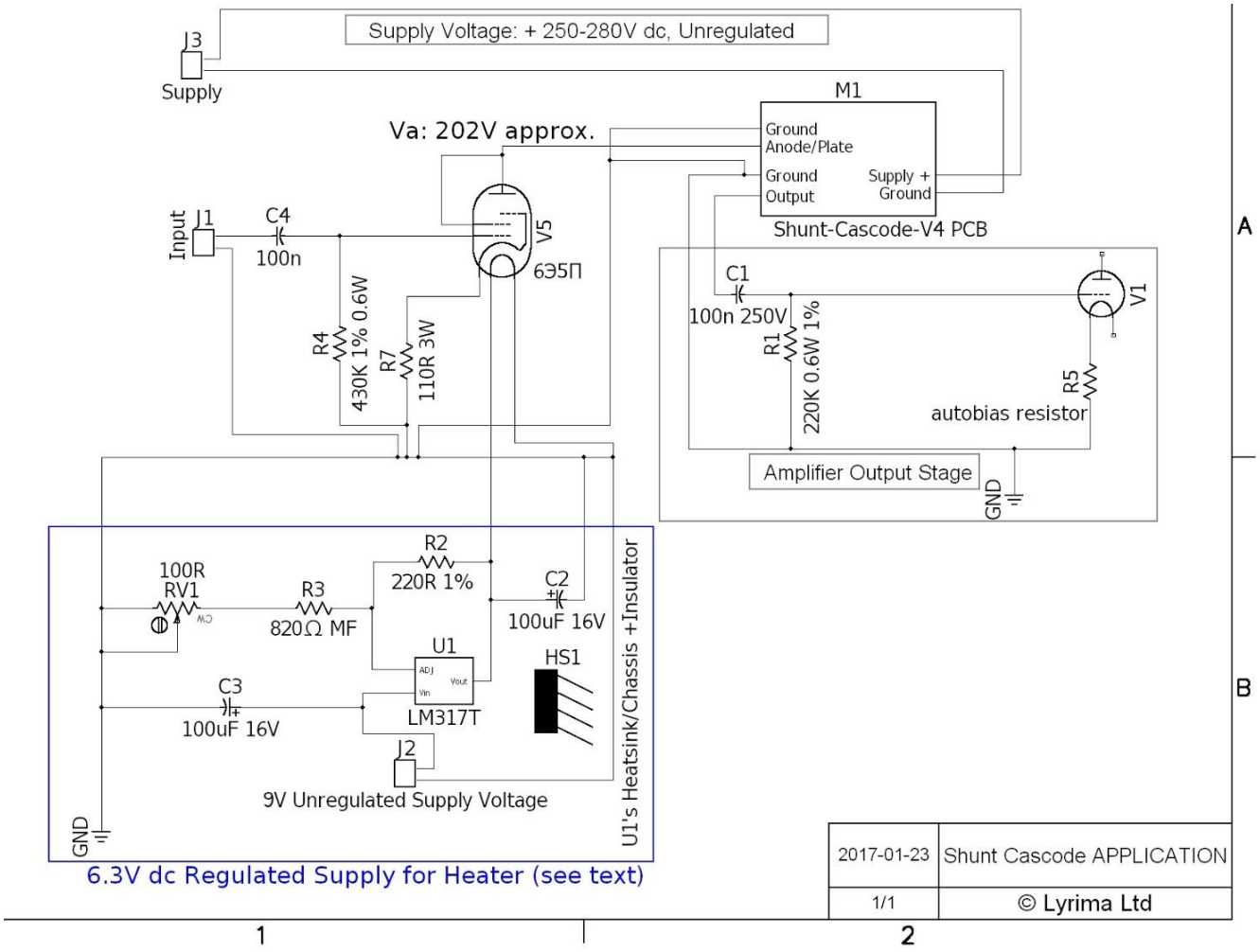
3.2. **Supply for 6Э5П shunt cascode PCB:** 250-280V unregulated, 50mA continuous, 50mA peak.

3.3. **Input Drive for 6Э5П:** Must not have dc offset voltage: a 100n coupling capacitor should be used to enforce this.

3.4. **Output Grid drive:** The shunt-cascode PCB does not feature a power-follower, and so is not designed to drive power tubes into the positive grid-voltage region. A coupling capacitor must be used to drive the power tube's grid: 100nF 250-630V rated. The grid leak resistor must conform to the data sheet of your power triode - usually around 220K.

3.5. **Autobias**: The 6Э5П is shown with an autobias cathode resistor. Please use 110Ω 3W wirewound here, or 2 parallel 220Ω parts.

3.6. **Heater**: the 6Э5П runs badly with ac-heating, including hum and dc drifting. No problem: the circuit within the blue box gives regulated dc heating. The trimmer RV1 is adjusted for 6.3V measured at the heater pins.



4. **PCB Cleaning**. Although the circuit handles only 280V maximum, we must take care not to create leakage paths across the PCB surface. Solder flux contamination is one risk. Old reels of solder with aggressive flux formulations will leave very leaky residues, and are best avoided. If you do use unknown flux types, be sure to clean the board after soldering, using PCB cleaner or a little Isopropyl Alcohol (IPA). Better still, use no-clean flux - and if there is much residue, clean it off. I recommend Stannol Kristall 400 solder. Tin-lead solder can be used, but lead-free solder with 3.5-4.0% silver gives stronger joints.

5. Setup

5.1. **Check for Shorts:** Supply+ to Ground should be >200KΩ; Output to ground should be = Rout (22KΩ); Anode to ground should be >8KΩ (All with Meter Black lead to Ground).

5.2. **Basic Checks:** Heat the driver triode, then apply the power to the board. Check that the tube is taking current: cathode resistor of 110Ω should show 3.3V or so when running normally.

5.3. **Anode voltage** should be around 202V.

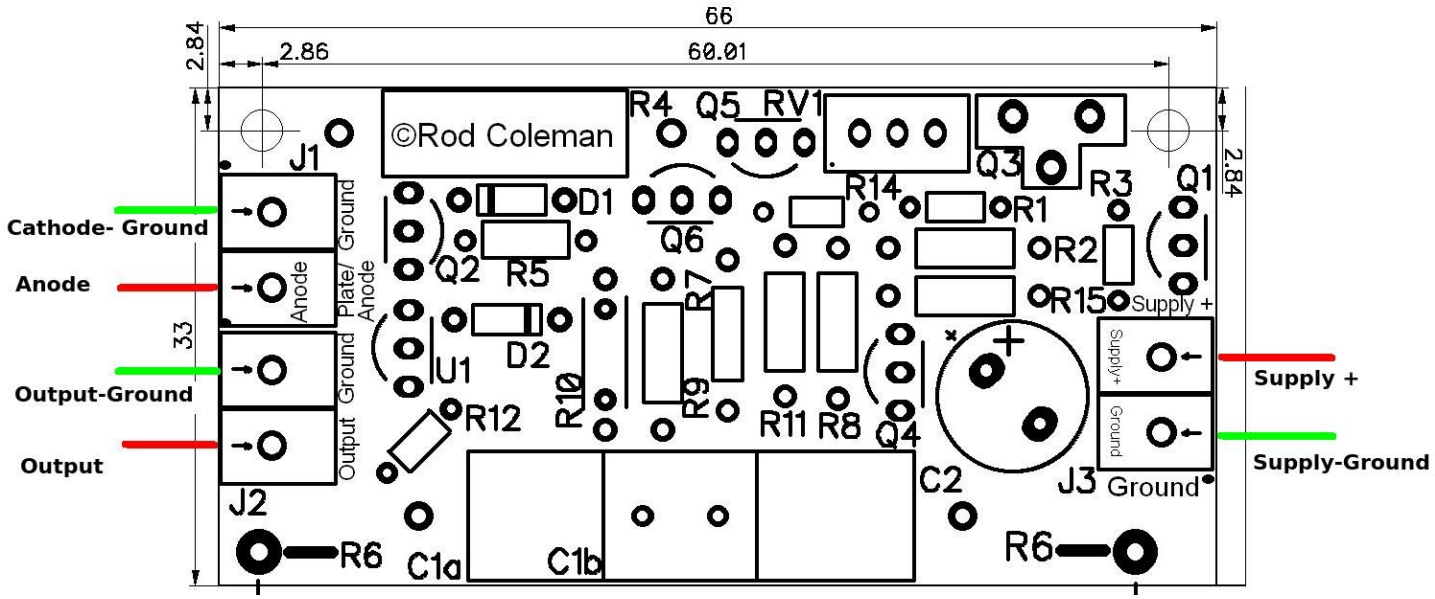
5.4. **Output Voltage** must be adjusted, when above checks are OK. If the output is zero, turn RV1 CLOCKWISE until 100V appears across the output resistor R6. If the output is 200V, turn anti-clockwise.

5.5. **Full-power output swing** of the driver stage depends on the idle output voltage: at 100V idle, ±100V can be driven. If the idle voltage drifts to 120V or 80V, the maximum swing drops to ±80V. Re-check idle voltage after the amp warms up.

5.6. **Tube Stabilization:** A new tube will drift a little, over the first few hours, and re-checking is needed. But in case of bigger drifts, please try a different tube, or check for PCB contamination.

5.7. **No compensation for drift is included**; occasional re-checking of the idle voltage is necessary.

6. Dimensions (mm); Hole Positions, and Input/Output Terminals.



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