#### **1. Rectified DC Voltage**

**Formula:** V\_DC = V\_AC × 1.414 − 2 × V\_diode\_drop  
 **Assuming:**

* V\_AC = 15V (from transformer)
* V\_diode\_drop = 0.7V (per diode in bridge rectifier)  
   **Calculation:** V\_DC = 15 × 1.414 − 1.4 ≈ **20.8V**

#### **2. Ripple Voltage and Filter Capacitance**

**Formula:** C = I / (f × ΔV)  
 **Where:**

* I = 0.25A (load current)
* f = 120Hz (full-wave rectified)
* ΔV = 0.1V (target ripple)  
   **Calculation:** C = 0.25 / (120 × 0.1) = **20,833µF** **Practical Selection:** Using 2 × 2200µF = **4400µF** total per rail (adequate due to regulation)

#### **3. LM317 / LM337 Output Voltage**

**Formula:** V\_OUT = 1.25 × (1 + R2 / R1)  
 **Assuming:**

* R1 = 240Ω
* R2 = 2kΩ to 5kΩ trimpot  
   **Calculation:** V\_OUT(max) = 1.25 × (1 + 5000 / 240) ≈ **28.3V** Adjusted to ±15V via trimpot tuning

#### **4. Power Dissipation in Regulators**

**Formula:** P = (V\_in − V\_out) × I  
 **Assuming:**

* V\_in = 20.8V
* V\_out = 15V
* I = 0.25A  
   **Calculation:** P = (20.8 − 15) × 0.25 = **1.45W** per regulator  
   **Conclusion:** Use TO-220 heatsinks rated ≥ 2W