Dual Power Supply Board

Overview

This project is a compact dual linear regulated power supply designed to provide symmetrical ±12 V DC outputs for analog circuits, audio amplifiers, and op-amp-based systems. The design uses the classic LM317 / LM337 regulator pair to generate adjustable positive and negative voltages with smooth filtering and protection features.

Key Specifications:

- Input: 230 VAC mains
- Transformer: Hammond 162J24 – 36 VA, 0.54 kg, 24 V CT (12-0-12 V RMS @ 1.5 A)
- Rectification: Full-bridge rectifier (KBPC6)
- Filtering: 2 × 22 000 µF electrolytic capacitors for ripple reduction
- Regulation:
  - LM317 (positive) and LM337 (negative) linear regulators
  - Adjustable output: +1.25 V → +12 V / –1.25 V → –12 V via RV1 & RV2
- Output Current: up to 1.5 A (limited by transformer and heat dissipation)
- Output Connectors: Phoenix terminal block (V+, GND, V–)

Functional Description

1. AC Input and Transformer

- The 230 VAC mains input is stepped down by the Hammond 162J24 transformer.
- Secondary windings provide 12-0-12 VAC, with the center tap serving as the circuit ground reference.

2. Rectification and Filtering

- A KBPC6 bridge rectifier converts AC to DC.
- Two 22 000 µF capacitors (C1, C2) smooth out the ripple, providing stable DC rails for the regulators.

3. **Voltage Regulation**

- LM317 and LM337 regulators maintain stable positive and negative outputs.
- RV1 and RV2 potentiometers allow fine adjustment of the output voltages.
- Small ceramic capacitors (C5–C10) provide transient stability and noise suppression.
- Protection diodes prevent reverse-polarity or back-feed damage.

4. **Output Stage**

- Final output is delivered via a 3-pin Phoenix terminal, labeled V+, GND, and V–.
- Designed for easy connection to breadboards, amplifier boards, or test equipment.

PCB Design Highlights

- Optimized layout for short regulator–resistor paths to reduce voltage ripple and oscillation.
- Thick copper traces on the power side to handle up to 1.5 A continuous current.
- Large ground plane and isolation slot between high- and low-voltage areas.
- Transformer footprint centered for balanced heat and mechanical stability.
- Mounting holes aligned for secure installation in enclosures.

Applications

- Op-amp and analog circuit testing
- Audio preamplifiers and tone control boards
- Bench power source for small electronic projects
- Educational demonstration of dual-rail power regulation

$$V_o = -1.25V\ (1 + \frac{RV_2}{120\Omega})$$ **For negative**

$$V_o = 1.25V\ (1 + \frac{RV_1}{240\Omega})$$ **For positive**