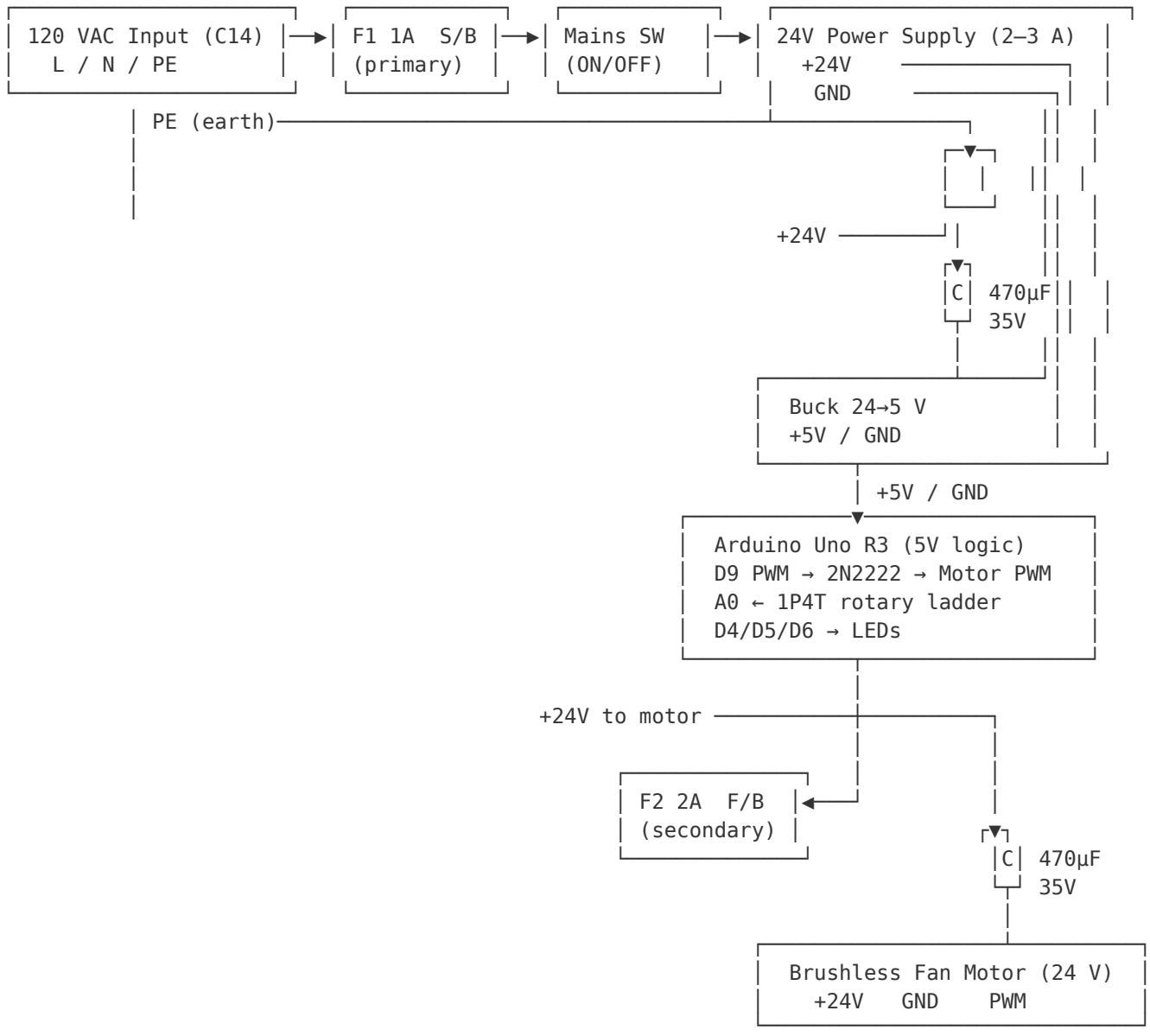
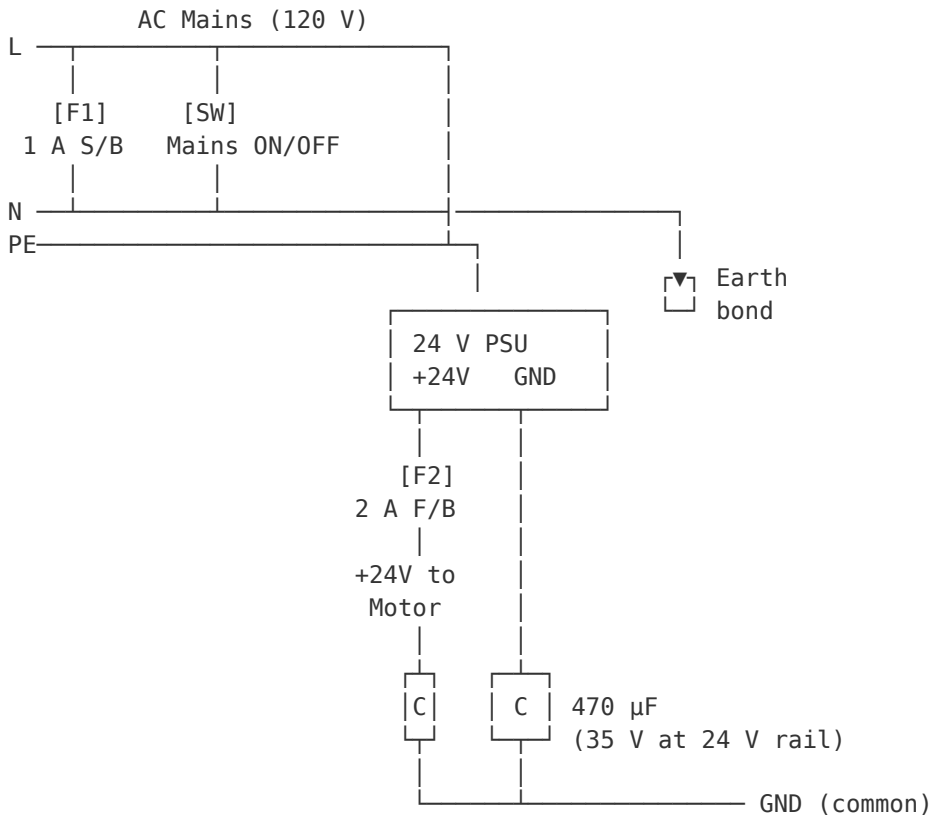
Arduino Uno 24 V Brushless Fan Controller — Block Wiring (with F1/F2 and bulk caps)



Rotary ladder (A0 input):
  +5V — 10k — nodeH — 10k — nodeM — 10k — nodeL — 10k — GND
  OFF → GND, LOW → nodeL (~1.25 V), MED → nodeM (~2.5 V), HIGH → nodeH (~3.75 V)
  A0 = rotary common; add 0.1 µF from A0 → GND near Uno.

Legend: F1 = primary fuse (slow-blow), F2 = 24 V motor fuse (fast-blow), = earth bond, C = bulk capacitor.

Arduino Uno 24 V Brushless Fan Controller — Symbolic Schematic (with F1/F2 and bulk caps)



Buck 24→5 V:
 +24 V ──────────► IN+
  GND ──────────► IN−
  OUT+ (5 V) ─────► Arduino 5V
  OUT− (GND) ─────► Arduino GND

Arduino + PWM driver:
 D9 ──1 kΩ──► base 2N2222 emitter ── GND
                ▲   │
                │   └──────► PWM line to motor
 +5 V ──10 kΩ──┘ (pull-up)   (optional 100 Ω series, 1 nF to GND)

LEDs: D4/D5/D6 → 330 Ω → GND
Rotary: A0 reads 1P4T ladder (+5 V—10k—nodeH—10k—nodeM—10k—nodeL—10k—GND; OFF→GND; LOW/MED/HIGH→nodes)

Note: Add 470 µF / 10 V across Arduino 5 V and GND near the board (bulk decoupling).

Arduino Uno 24 V Brushless Fan Controller — Breadboard / Prototyping (with F1/F2 and bulk caps)

Breadboard / prototype checklist (with fuses and bulk caps):

Primary (AC side):
- IEC C14 → [F1 1 A slow-blow] → Mains Switch → 24 V PSU (L line)
- N line goes directly to PSU N. PE (earth) bonded to chassis ( ).

24 V side (DC):
- PSU +24 V → [F2 2 A fast-blow] → Motor +24 V terminal
- PSU GND → Motor GND and system GND
- Bulk cap 470 µF / 35 V across +24 V and GND near motor/controller
- Optional TVS 33 V across +24 V/GND

5 V logic:
- Buck IN: +24 V / GND from PSU
- Buck OUT: +5 V / GND to Arduino 5V/GND
- Bulk cap 470 µF / 10 V across 5 V/GND near Arduino

PWM stage:
- D9 → 1 kΩ → 2N2222 base; emitter → GND; collector → Motor PWM
- 10 kΩ pull-up from Motor PWM → +5 V
- Optional: 100 Ω in series to Motor PWM, 1 nF C0G to GND at motor end

Rotary ladder (A0):
- +5 V — 10k — nodeH — 10k — nodeM — 10k — nodeL — 10k — GND
- Rotary OFF→GND, LOW→nodeL, MED→nodeM, HIGH→nodeH; common → A0
- 0.1 µF from A0 → GND near Arduino

LEDs:
- D4/D5/D6 → 330 Ω → LEDs → GND

Grounding & layout:
- Keep AC and low-voltage wiring separated; observe creepage/clearance.
- Twist PWM with GND if cable > 30 cm.
- Earth-bond any metal enclosure.