THE STAFF OF THE GREY

HALLOWEEN STAFF BUILD · SLAM-TO-LIGHT

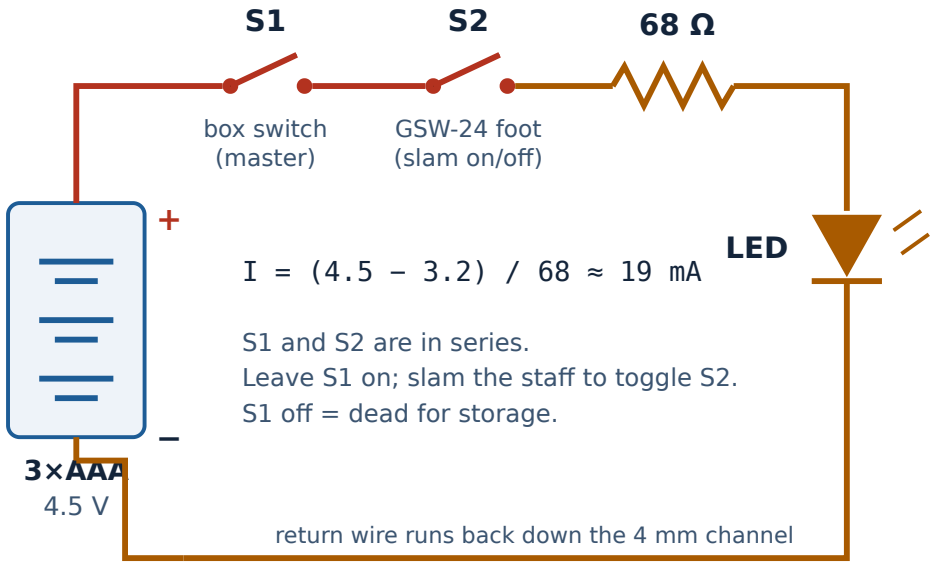


OVERVIEW

A five-foot wizard staff printed in eight pieces and threaded onto a 1/2" hardwood dowel. A warm LED glows inside a clear crystal at the head. Slamming the foot on the ground clicks a push-on/push-off switch hidden in the foot cap, so the staff lights up on a thump.

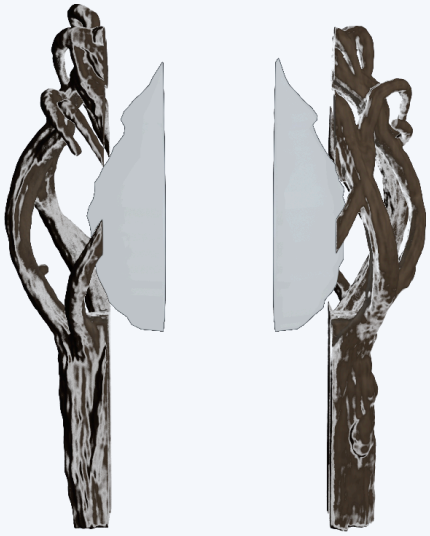
Overall length	≈ 1524 mm as shown · **≈ 1580 mm (5 ft 2 in) with foot cap v2**
Pieces	Head (2 halves + clear crystal), shaft sections 1–6, foot cap v2 (6 small parts)
Core	1/2" × 48" hardwood dowel, cut to ~1155 mm, glued only in sections 1 and 6
Light	10 mm warm-white LED + 68 Ω resistor, ≈ 19 mA
Power	3 × AAA (4.5 V) box with its own switch, in the knot (section 1)
Slam switch	Gardner Bender GSW-24, push-on/push-off, in the foot cap
Wire	2-core 22–26 AWG, ~1.6 m, in a 4 mm channel beside the dowel

CIRCUIT



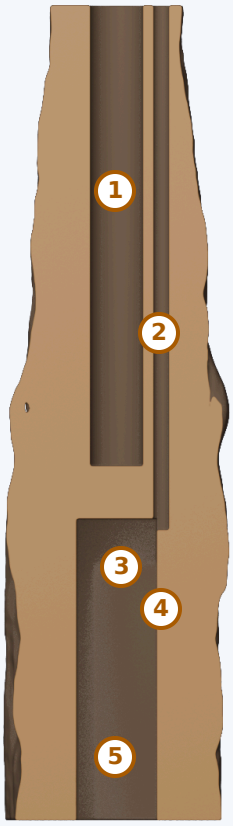
The wires meet in the battery bay: the LED pair comes down the channel from the head, and the switch leads come up from the foot.

A · HEAD & CRYSTAL



- **Two halves**, split down the middle. Each prints flat on its cut face, no supports.
- **Clear crystal halves** print with the head halves (two filaments: bark + clear).
- **10 mm warm-white LED** sits in a pocket under the crystal.
- **4 × 3 mm pins** (filament offcuts, ~11 mm) line the halves up.
- The wire runs straight up the centre of the head's spigot, which drops into section 6.
- **Solder the LED and 68 Ω resistor to the wire before gluing the halves.**

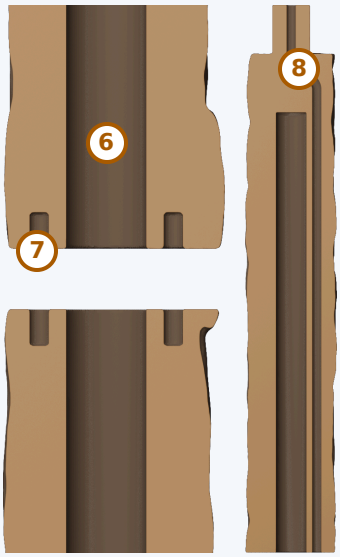
C · SECTION 1 — THE KNOT



1. **Dowel socket**
   the rod bottoms out here; glue it here and in section 6 only
2. **4 mm wire channel**
   11 mm off centre, beside the rod
3. **13 mm solid floor**
   the rod never reaches the batteries
4. **Channel enters the bay**
   LED wire meets the batteries here
5. **Battery bay 52 × 20 × 66 mm**
   3×AAA box with switch, up to 51 × 19 × 65. Open at the bottom; the foot cap plugs in under it.

Print status:
stopped at 150 of 202 mm. Sand the top flat, measure the height H from the bottom face, then print the 54 mm top piece and glue it on.

D · JOINTS & THE CORE



left: one joint, pulled apart · right: top of section 6

6. **Ø 13.2 mm bore**
   the 1/2" (12.7 mm) dowel + 0.5 mm clearance. Measure your dowel first.
7. **Ø 3.2 mm pin holes**
   ±11 mm, 6 deep, two per face; pins line the bark up
8. **Channel moves to centre**
   in section 6's spigot, to meet the head's wire path

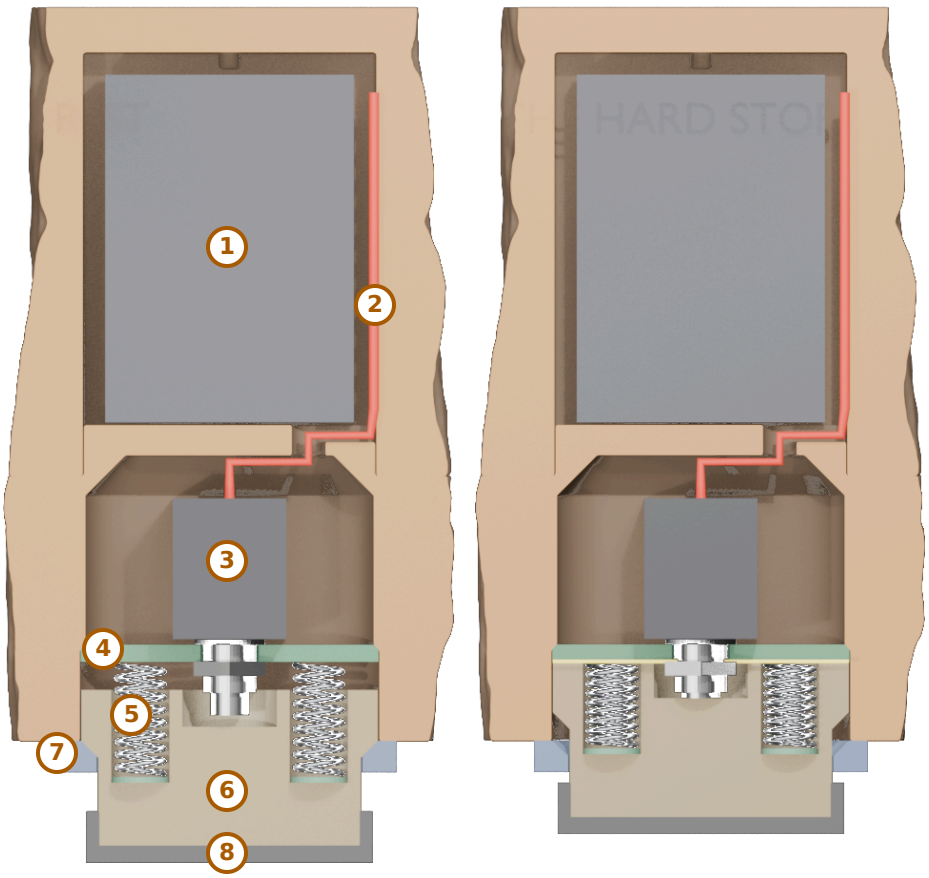
Flat butt joints: the rod is the joint. Every wall is at least 2.0 mm thick.

E · FOOT CAP v2 — THE SLAM SWITCH

CUTAWAY · DRAFT UNTIL THE REAL SWITCH IS MEASURED

AT REST

SLAMMED (HARD STOP)



Left: at rest. Right: slammed. The plunger's rim lands on the switch plate, a hard stop that takes the impact so the switch doesn't. Stroke 5.0 mm = 2.0 gap + 2.5 to the click + 0.5 over.

1. **Battery box**
   in section 1's bay, above the foot. Its own switch is the master on/off.
2. **Switch leads**
   up through a hole in the roof, along a groove on top of the plug, then beside the battery box
3. **GSW-24 switch, button-down**
   push on / push off. Only 0.53 mm of clearance at the sides, so measure the real one.
4. **Printed switch plate**
   the springs hold it on its seat; no glue needed
5. **Two compression springs**
   ≈ 3/8" OD × 1" long, ~1.2 mm wire, ~5 N/mm. 50 N preload together.
6. **Plunger**
   pushed up by the ground when you slam the staff
7. **Retainer + two #4 screws**
   keep the plunger in. Add 1 mm shims (print 4) to stiffen it: 40 → 79 N.
8. **TPU tip**
   soft foot: quiet on floors, and it cuts down double-toggles from bounce

HOW HARD DO YOU HIT IT?

Normal walking step	0.05 – 0.22 J → nothing happens
Click threshold	≈ 0.34 J
Deliberate slam	3 – 9 J → the light toggles ✔
Hard thump while walking	≈ 0.7 J → **will** toggle. Add shims if that gets annoying.

MEASURE THE REAL SWITCH (switch OFF)

- [ ] Bushing diameter and thread
- [ ] Bushing length
- [ ] Nut: across the flats, and thickness
- [ ] O-ring thickness when squashed
- [ ] Body length, width, height
- [ ] Button diameter and how far it sticks out
- [ ] Button travel to the click, and to the bottom

PARTS & BUILD ORDER

WHAT YOU NEED · HOW IT GOES TOGETHER

F · WHAT YOU NEED

HARDWARE

- [ ] 1/2" × 48" hardwood dowel
  cut to ~1155 mm. Measure it: the bore is 13.2 mm.
- [ ] Gardner Bender GSW-24 push button
  push-on/push-off (not the GSW-22, which is momentary)
- [ ] 2 compression springs
  ~3/8" OD × 1" long, ~1.2 mm wire (or an assortment)
- [ ] 2 × #4 screws
  for the foot retainer

ELECTRONICS

- [ ] 10 mm LED, warm white
- [ ] 68 Ω resistor
- [ ] 3 × AAA battery box with switch
  no bigger than 51 × 19 × 65 mm
- [ ] ~1.6 m thin 2-core wire, 22–26 AWG
- [ ] Solder and heat-shrink

SHOP

- [ ] 14 × 3 mm pins
  filament offcuts, ~11 mm long
- [ ] CA glue or 5-minute epoxy
- [ ] Filament: bark brown, clear, TPU

G · BUILD ORDER

1. **Print** head A/B with the crystal, sections 1–6, and the foot cap v2 parts.
2. **Dry-fit** every section on the dowel with the pins in, then take it apart.
3. **Solder** the LED and 68 Ω resistor to the wire.
4. **Thread the wire** from the head down through section 6 to section 1, **before any glue**.
5. **Glue the head halves** around the LED.
6. **Glue the shaft** down the dowel, faces and pins at each joint.
   Glue the dowel only in sections 1 and 6. Through the middle it slides, so wood movement can't crack a joint.
7. **Glue the head** onto section 6's spigot.
8. **Wire** the battery box and foot switch together in the knot.
9. **Fit the foot cap**, turn S1 on, and slam.

STILL OPEN

- [ ] **H**: height of the sanded section-1 stump
  then the 54 mm top piece gets exported
- [ ] **Measure the real GSW-24**
  list on sheet 3 → final foot cap export
- [ ] **OK with +56 mm length?**
  the switch won't fit in section 1's 20 mm bay, so the foot grows
- [ ] **Printer Z-axis** stalls on tall prints
  fix it before re-printing anything over 150 mm