



KH1 CW Key

ASSEMBLY INSTRUCTIONS — AUGUST 18, 2026

△ BEFORE YOU BUILD — VERSION CHECK

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→ ki6cr-labs.com/assembly-assets/kh1/

REVISION HISTORY

August 18, 2026

- Step 17: Clarified lid installation — match the male nubs with the female cavity before pressing into place.

July 17, 2026

- Inventory: Added M3 Washer (Stainless) to the Hardware list — was missing despite being required in Step 9.
- Step 9: Clarified standoff orientation — round (capped) end faces up, hex-faced end mates into the hex cutout in the key body.

July 16, 2026

- Step 7: Removed 5×2mm paddle magnet installation — magnets are now installed in Step 10, paired with their matched body magnets.
- Step 10: Rewritten with a new mate-and-mark process — magnet pairs are identified by mating a 5×2mm and 5×1mm magnet together before installation, rather than marking against an already-installed paddle magnet.

July 8, 2026

- Assembly guide first published.

I. BEFORE YOU BEGIN

INTRO

Gather Your Tools

The following tools are **not included** in your kit. Have them on hand before starting Step 1.

**Bowl or Parts Tray**

Step 1

**Needle-Nose Pliers**

Steps 3 & 7

**Small Flat Screwdriver**

Steps 5 & 16

**Digital Multimeter**

Step 6

**Flush Cut Wire Cutters**

Step 15

**Steel File**

Step 15

**Soldering Iron & Solder**

Steps 14 & 15

**Toothpick or Small Applicator**

Steps 7 & 10

II. ASSEMBLY STEPS

STEP 01 Unpack & Inventory

1. Open the shipping container and remove all contents.
2. **Retain the container and lid** — do not discard them. Both are used as precision assembly jigs throughout this guide.
3. Empty the small hardware bag into a bowl or tray to avoid losing any of the small screws, shims, or magnets.
4. Use the inventory list below to identify and account for all parts before beginning.

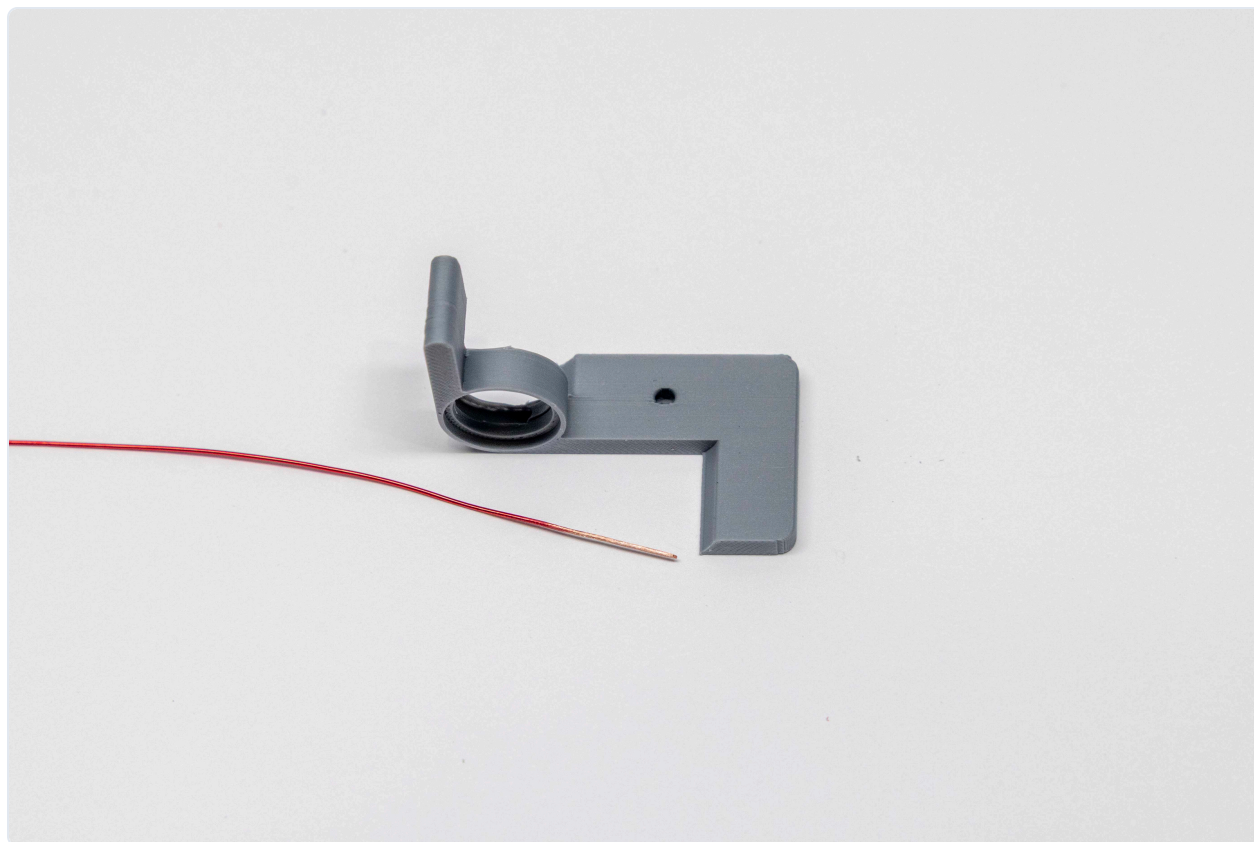
☐	ITEM	QTY
CHASSIS & BODY PARTS		
☐	KH1 Key Body	1
☐	KH1 Paddle Arms	2
☐	KH1 Key Cover	1
☐	Travel Case	1
☐	Travel Case Lid	1
☐	M3 Standoff Cap	2
HARDWARE		
☐	M2.5 Shoulder Bolt, Stainless	1
☐	M2×2mm Set Screws, Stainless	3
☐	M2×3mm Set Screws, Stainless Slotted	3
☐	M3×10mm Socket Head Screw	1
☐	M3×8mm Round Standoff, Stainless	1
☐	M3 Washer, Stainless	1
☐	Stainless Spacers / Shims (0.008 inches / 0.2mm)	6
ELECTRONICS		

☐	ITEM	QTY
☐	3.5mm TRS Jack (through-hole)	1
☐	PCB Breakout Board	1
☐	28ga Magnet Wire, ~10 inches (25cm)	1
BEARINGS & MAGNETS		
☐	F693ZZ Flanged Bearings	2
☐	5×2mm Neodymium Magnets	3
☐	5×1mm Neodymium Magnets	3
SUPPLIES & INCLUDED TOOLS		
☐	0.9mm Hex Tool	1
☐	2.0mm Hex Tool	1
☐	2.5mm Hex Tool	1
☐	Sandpaper Square, 200 grit	1
☐	Super Glue, 3g tube	1

STEP 02 Magnet Wire Prep

1. Cut a 3-inch (76mm) piece of magnet wire. Cut the remaining piece in half.
2. Using the included sandpaper, scuff approximately $\frac{1}{2}$ inch (12mm) of insulation from both ends of each of the two longer paddle wires.
3. For the short 3-inch wire, scuff 2 inches (51mm) of insulation from one end only.

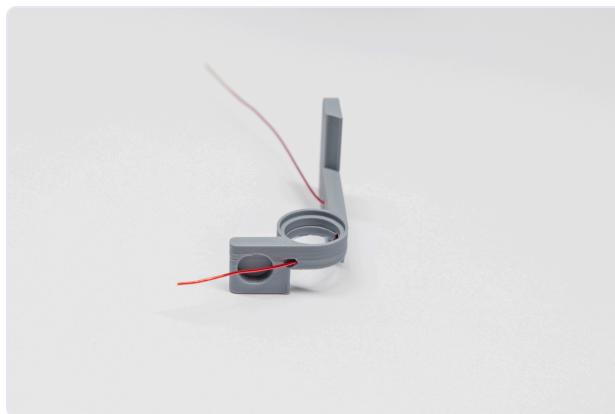
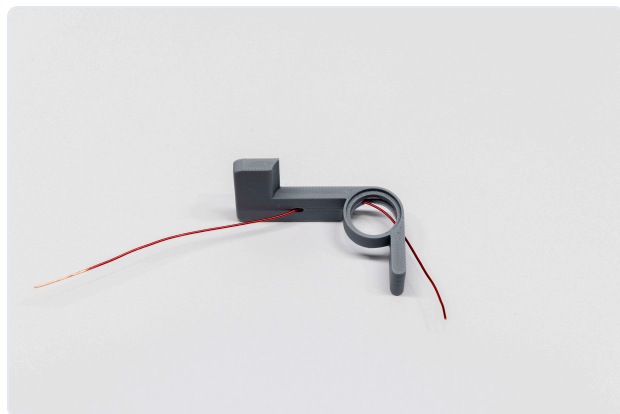
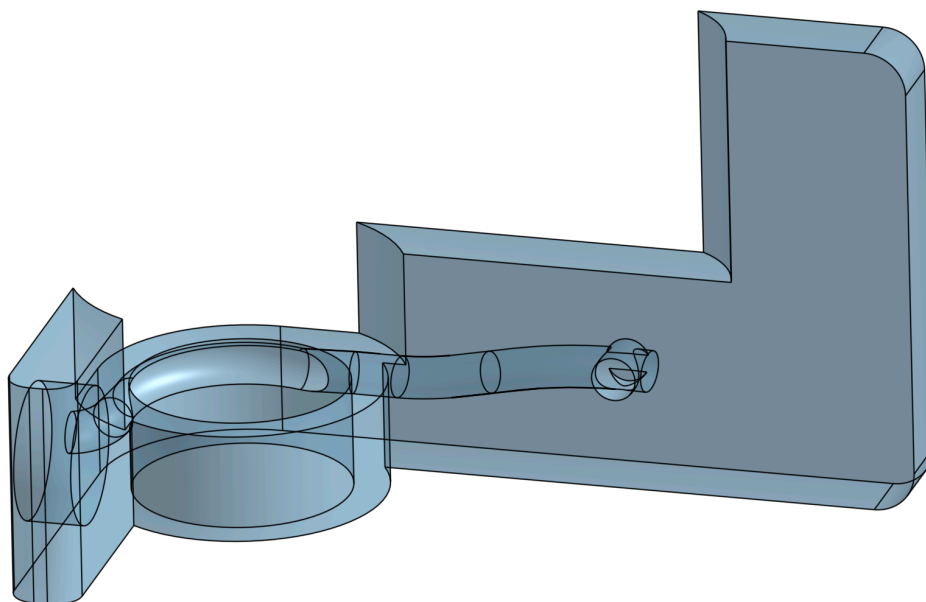
Rotate the wire while scuffing to ensure the insulation is removed from the entire circumference. Set the short 3-inch piece aside — it will be used in Step 09.

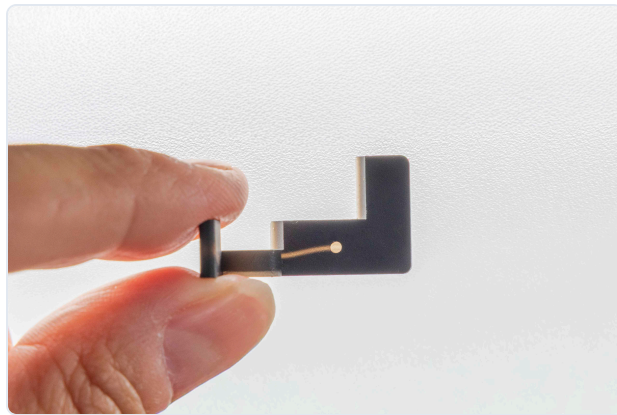
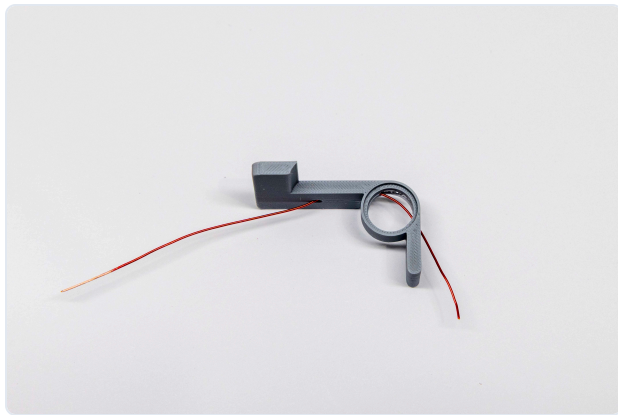


STEP 03 Threading the Paddles

1. Feed the wire through the paddle starting from the paddle arm, feeding toward the bearing ring.
2. Use needle-nose pliers to grab the end and thread the wire through the second hole at the back near the magnet cavity.
3. Repeat for the second paddle.

Pro Tip: The paddle is semi-translucent. If you are having difficulty locating the internal wire channel, hold the paddle up to a flashlight — the channel path will be clearly visible through the material.



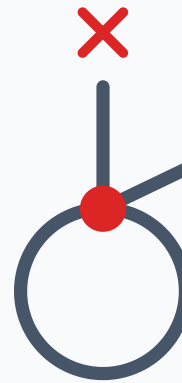
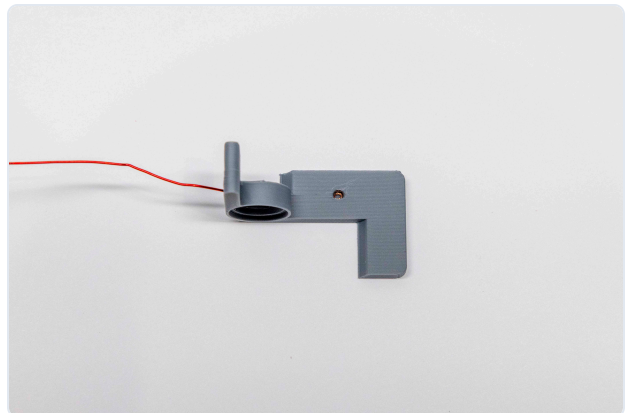
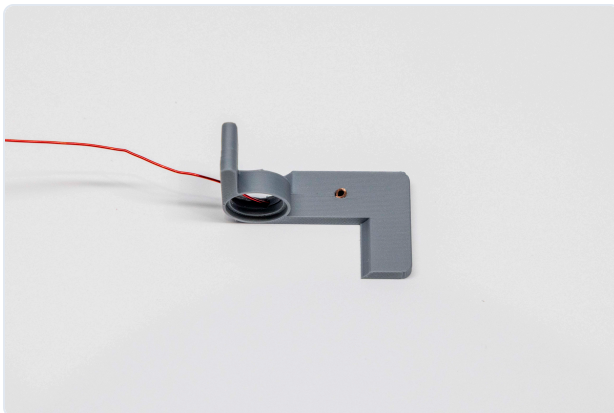
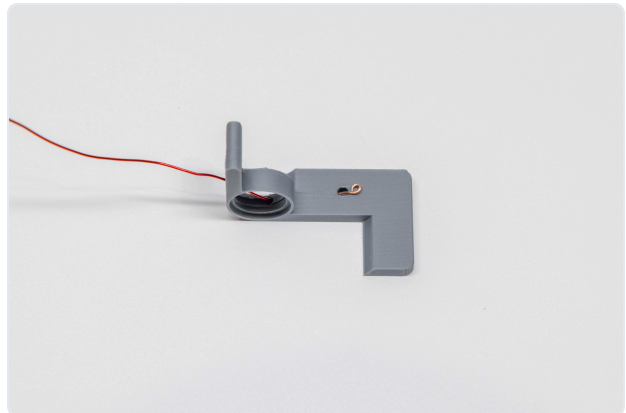
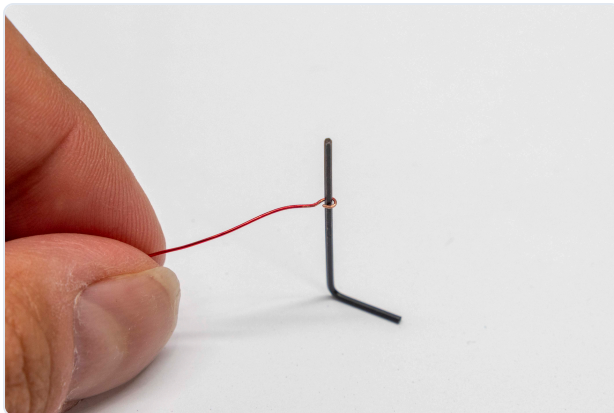


STEP 04 The Wire Loop

1. Using the 0.9mm hex key as a mandrel, form a small loop at the **paddle arm end** of the wire — the end opposite the magnets and bearings.
2. Verify the loop does not overlap itself at any point. A single, clean layer ensures consistent seating depth. See reference diagram below.
3. Gently pull the loose end of the wire through the paddle arm until the loop meets the opening of the wiring hole.
4. The wire may need to be rotated so that the loop rests flat against the bottom of the hole. Using the tip of the 0.9mm hex tool, press the loop firmly down into the wiring hole until it is fully seated.
5. Repeat steps 1–4 for the second paddle.

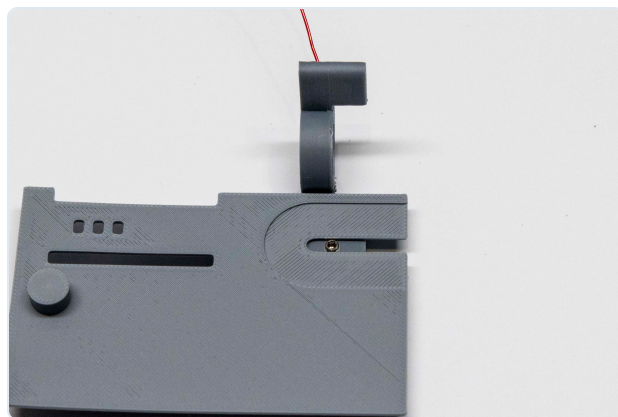
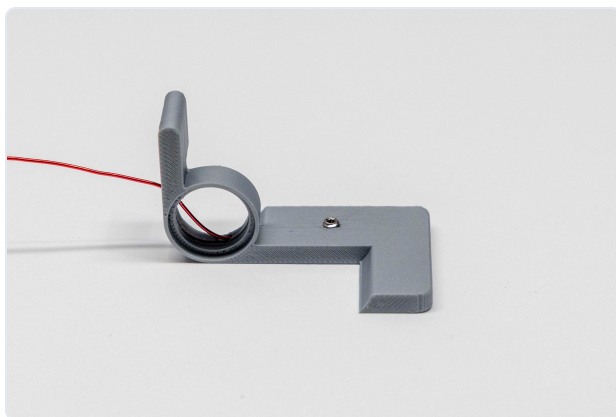


CLEAN LOOP

OVERLAPPED LOOP
— AVOID —

STEP 05 Contact Set Screws

1. Use the 0.9mm hex tool to insert an M2×2mm stainless set screw into the paddle wiring hole and thread it in. **Tighten the set screw exactly 3 and 1/8 turns to snug it against the wire loop. Do not overtighten past 3 and 1/8 turns.** **Pro Tip:** Rather than counting turns of the hex tool, it is easier to press the hex tool down firmly onto the set screw and rotate the paddle itself counter-clockwise 3 and 1/8 turns.
2. **Calibration:** The set screw will sit slightly lower than the 0.5mm feeler gauge shelf. With the gauge resting in place, press lightly with your fingertip — you should not feel the set screw beneath it.



STEP 06 Continuity Check & Wire Marking

1. Using your multimeter set to continuity or resistance, firmly probe the set screw to ensure a good reading against the bare end of the magnet wire.

Fail: Resistance greater than 1 ohm or no continuity. See Troubleshooting — Step 6 (Appendix) before continuing.

Perform the following steps for both paddles.

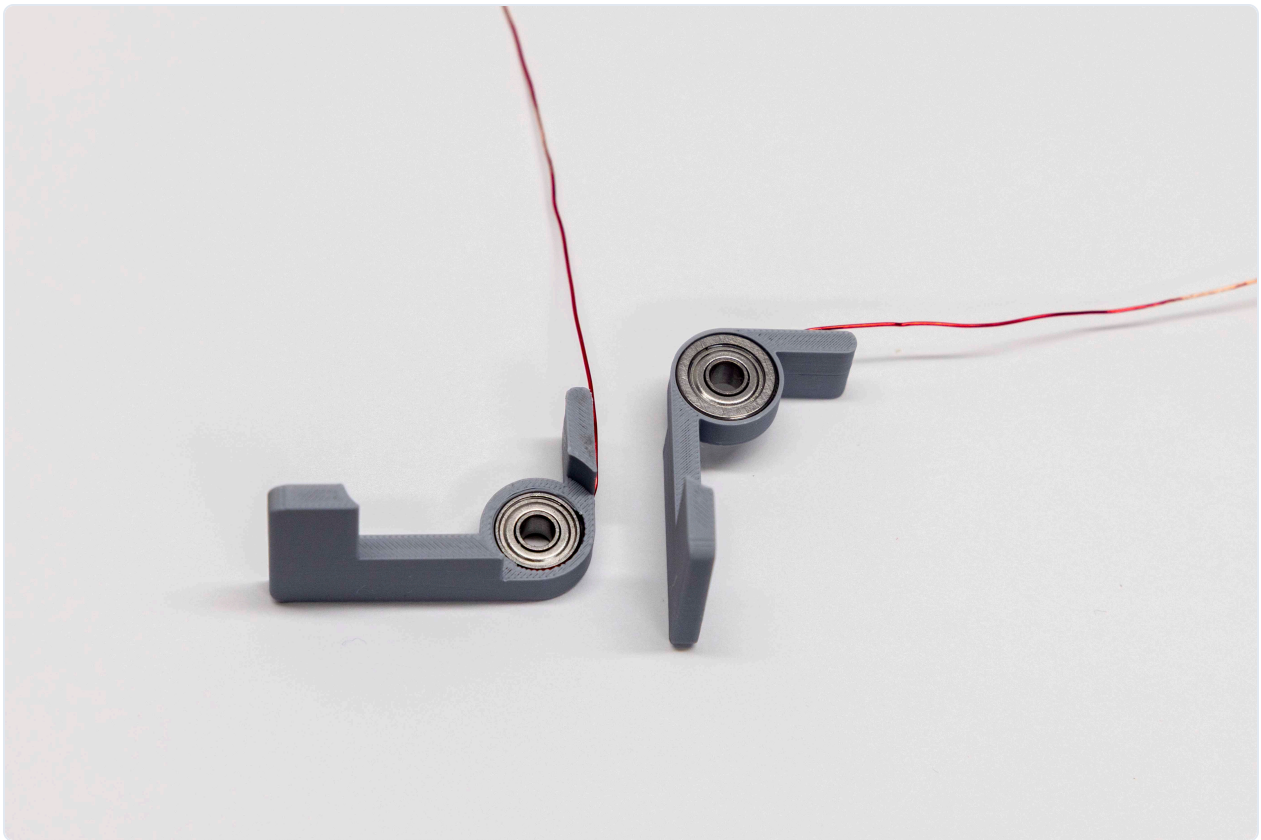
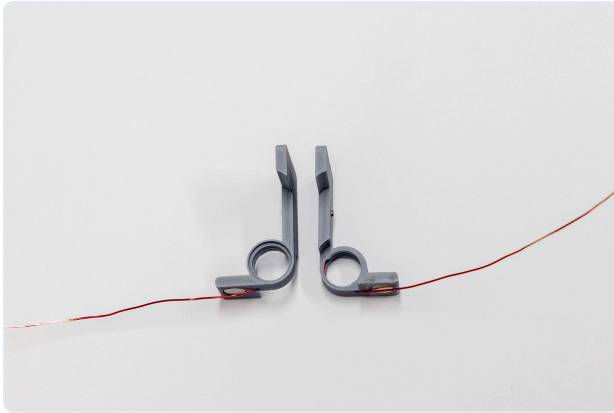
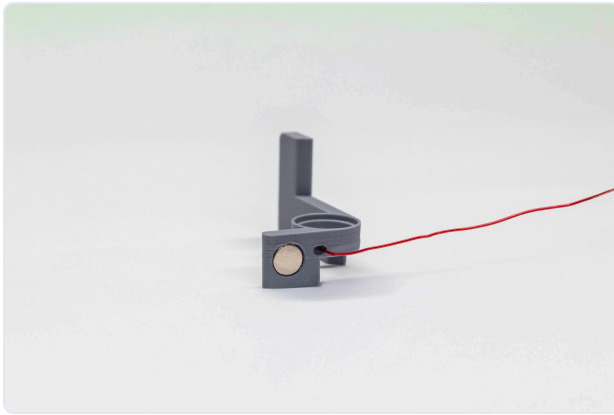
2. Measure 1¾ inches (44mm) of wire extending from the end of the paddle arm. Using a marker, mark a ½ inch (12mm) section of wire at that point — this defines exactly where the insulation will be removed.
3. Using fine-grit sandpaper or the back of a hobby knife blade, scrape the insulation off the marked section. Rotate the wire as you work to expose bare copper on all sides. The marker ink will scrape away along with the insulation.
4. Leave the excess wire attached — it will be trimmed to final length in a later step.

The exposed zone should show bright copper with no remaining enamel. Test with your multimeter if unsure.

STEP 07 Secure Bearings & Magnets

Perform the following steps for both paddles. The 5×2mm paddle magnets are installed later, in Step 10, alongside their matched body magnets — this step covers bearings only.

1. Before applying glue, dispense a small amount onto a scrap surface and confirm it flows as a gel — not a runny liquid. If it runs freely, do not use it on this step; the fit is tight and excess glue can foul the bore.
2. For each paddle, guide the magnet wire into the small channel cut into the wall of the bearing bore.
Check from above: when looking straight down into the bore, the wire should be fully nested in the channel and not visible. If any wire is visible across the opening, press it further into the channel before proceeding. A wire that is not fully seated will be pinched or cut when the bearing is pressed in.
3. Using a toothpick or other small pointy applicator, apply a light bead of glue along the flange shoulder of each bearing. Press each bearing fully into the paddle bore. Confirm the magnet wire is still seated in its cutout and not pinched. Wipe away any excess glue. Set both paddles aside to dry.



Photos pending update: the photos on this step still show magnets installed alongside the bearings, left over from before magnet installation moved to Step 10. We'll be replacing these with bearings-only photos.

STEP 08 Allow Glue to Cure

Set both paddles aside. The adhesive needs a full **15 minutes** to cure before the key can be assembled.

Start your timer, then proceed directly to Step 09. Do *not* advance to Step 10 until 15 minutes have elapsed.

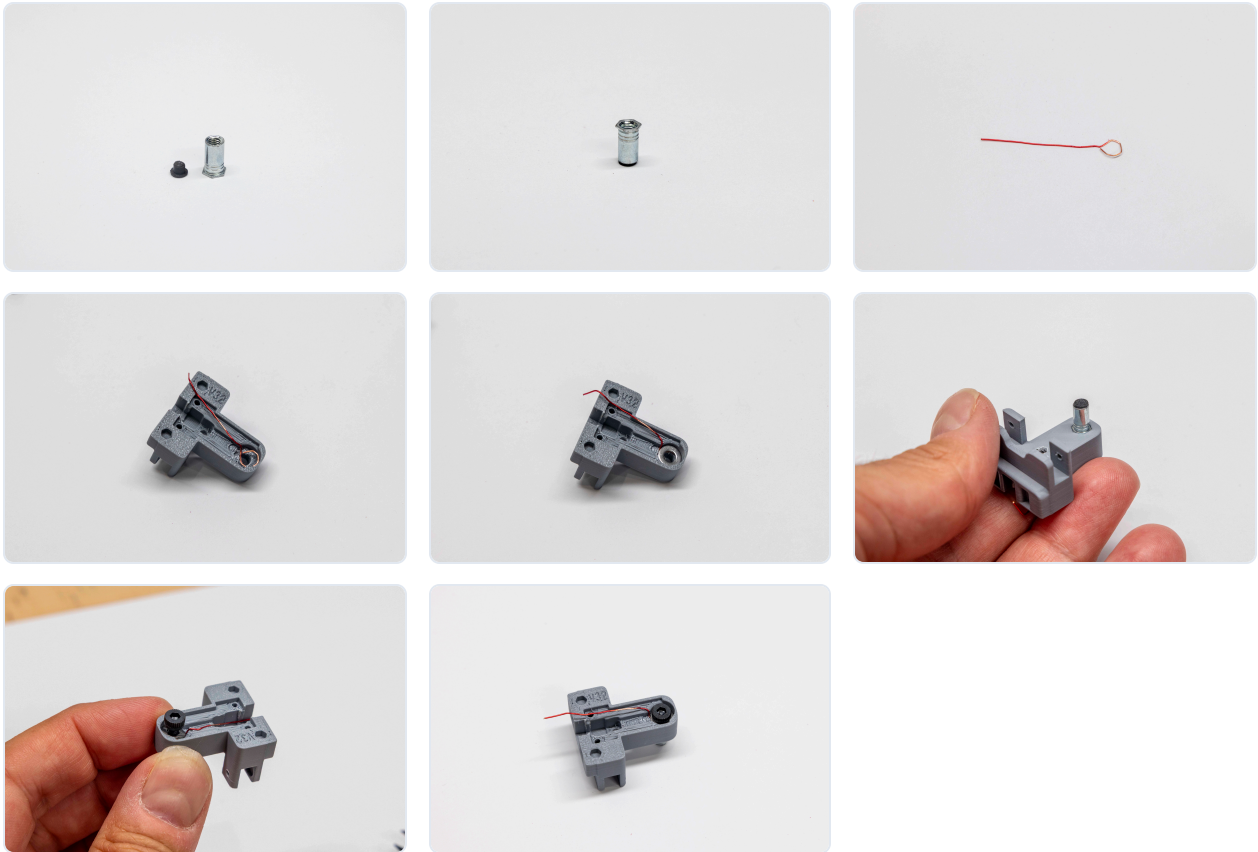
15:00

15 MINUTE CURE TIME — SET A TIMER BEFORE CONTINUING

STEP 09 Center Lug Installation

1. Press-fit the M3 Standoff Cap (small stub nub) onto the round end of the M3×8mm standoff. Lay the nub flat on the workbench. Set the round end of the standoff down onto the nub and press firmly straight down — use a flat tool or a flat surface to apply even pressure. Keep the standoff perfectly vertical as you press; tilting it at an angle will prevent a secure fit.
2. Take the 3-inch piece of magnet wire set aside in Step 2 and form a 270° loop with the long scuffed end of the wire (see photos). Lay it flat in the round cavity in the bottom of the key body, routing the tail toward the opposite end of the key body — where the PCB and 3.5mm jack will be. **Avoid running the wire down the center.** We need clearance for the tension-fit nub of the key cap to fit later. See photo.
3. Set the M3 washer on top of the wire loop to hold it in the cavity.
4. With the key body bottom still facing up, place the M3×8mm standoff in position underneath the key body so the hex end of the standoff rests in the hex-shaped cutout on the key body (currently facing downward).
5. Insert the M3×10mm screw from above, threading down through the wire loop and washer into the standoff. Tighten firmly — the screw threads directly into stainless steel and will hold securely.

Optional: Apply a small drop of thread locker to the M3×10mm screw before final tightening for added security.



STEP 10 Opposing Magnet Polarity

The CW key's return action is driven entirely by magnetic repulsion — each paddle magnet is paired with a body magnet of opposing polarity, pushing the paddle back to center after each press.

This step requires careful, deliberate attention. Installing a body magnet with the wrong orientation — or into the wrong hole — will cause that paddle to attract instead of repel, and it will not return to center. *Work one paddle and its corresponding body magnet at a time. Complete the left paddle fully before touching the right.*

Part 1 — Identify Left and Right

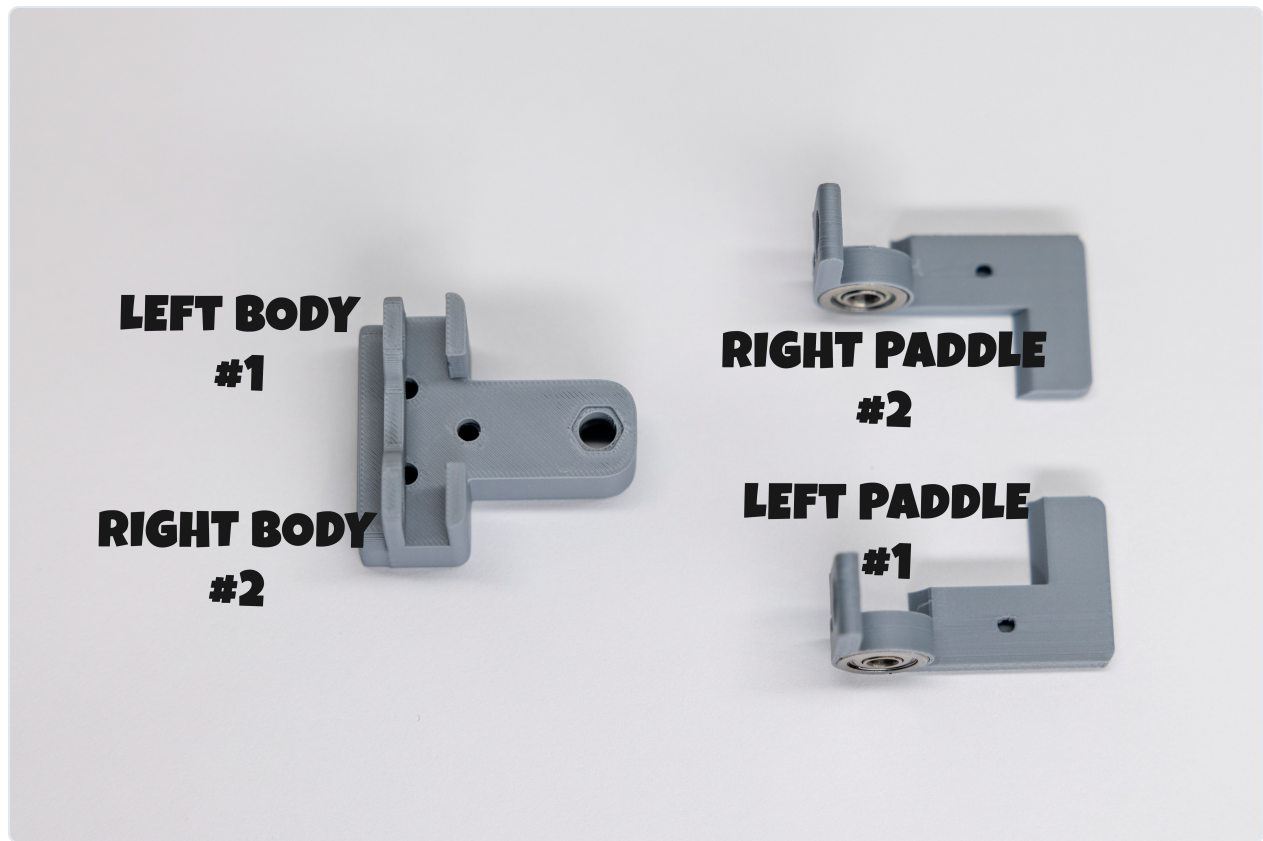
1. Before handling any magnets, lay both paddles onto the key body in their installed position. Looking down from above, note which paddle sits on the left and which sits on the right. The left paddle is **Paddle #1**; the right paddle is **Paddle #2**. See the reference image below.

Pro Tip: Lay your parts out on a piece of paper and write in the nomenclature from Step 10, Part 2 — it keeps Paddle #1 vs. Paddle #2 and their body magnets straight as you work.



Part 2 — Position the Paddles at the Key Body

2. Keeping Paddle #1 and Paddle #2 in the same left/right position you just identified, lay them out next to the key body. **Note:** the body magnet hole corresponding to Paddle #1 is on the **opposite side** of the key body from where Paddle #1 sits. Keep this straight before you begin gluing anything.



Part 3 — Identify the Attracting Faces

- Using a 5×1mm and a 5×2mm neodymium magnet, allow them to mate together freely — do not force or flip either one. Let them find their own attracted orientation. Repeat this to make a second pair, so you end up with **two mated pairs**, each one 5×2mm magnet mated with one 5×1mm magnet. This identifies, for each pair, which faces attract to each other.



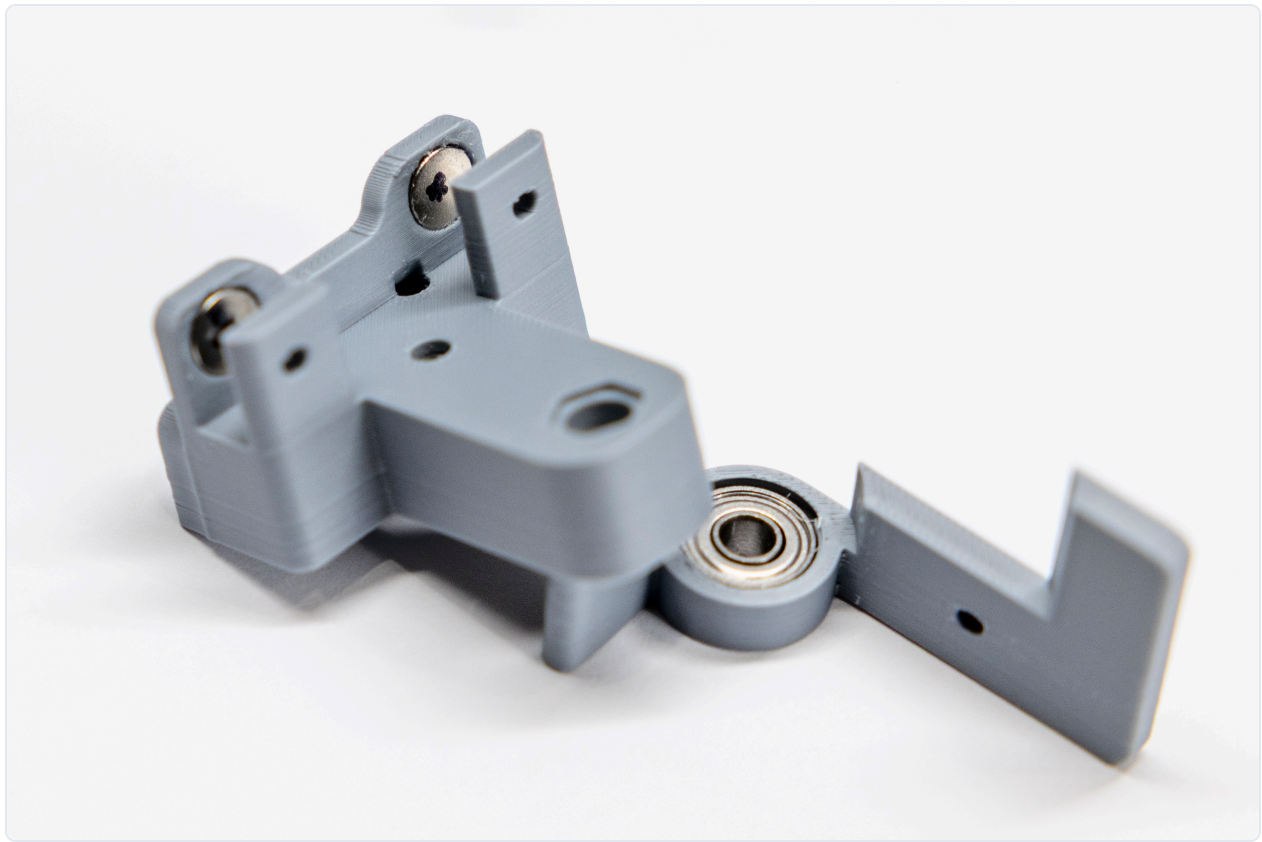
Part 4 — Mark the Magnet Pairs

4. **The Dot System:** With a mated magnet pair from Part 3, use a fine-tip marker to mark the two outward-facing sides — the faces *not* touching each other. Mark the first pair with **one dot (•)** and the second pair with **two dots (••)**. Note: the unmarked faces of a pair attract to each other, and the marked (dotted) faces of a pair also attract to each other. For assembly, each pair will be installed with one magnet's dot facing out and the other magnet's dot facing in — this is what makes the two magnets repel once installed.



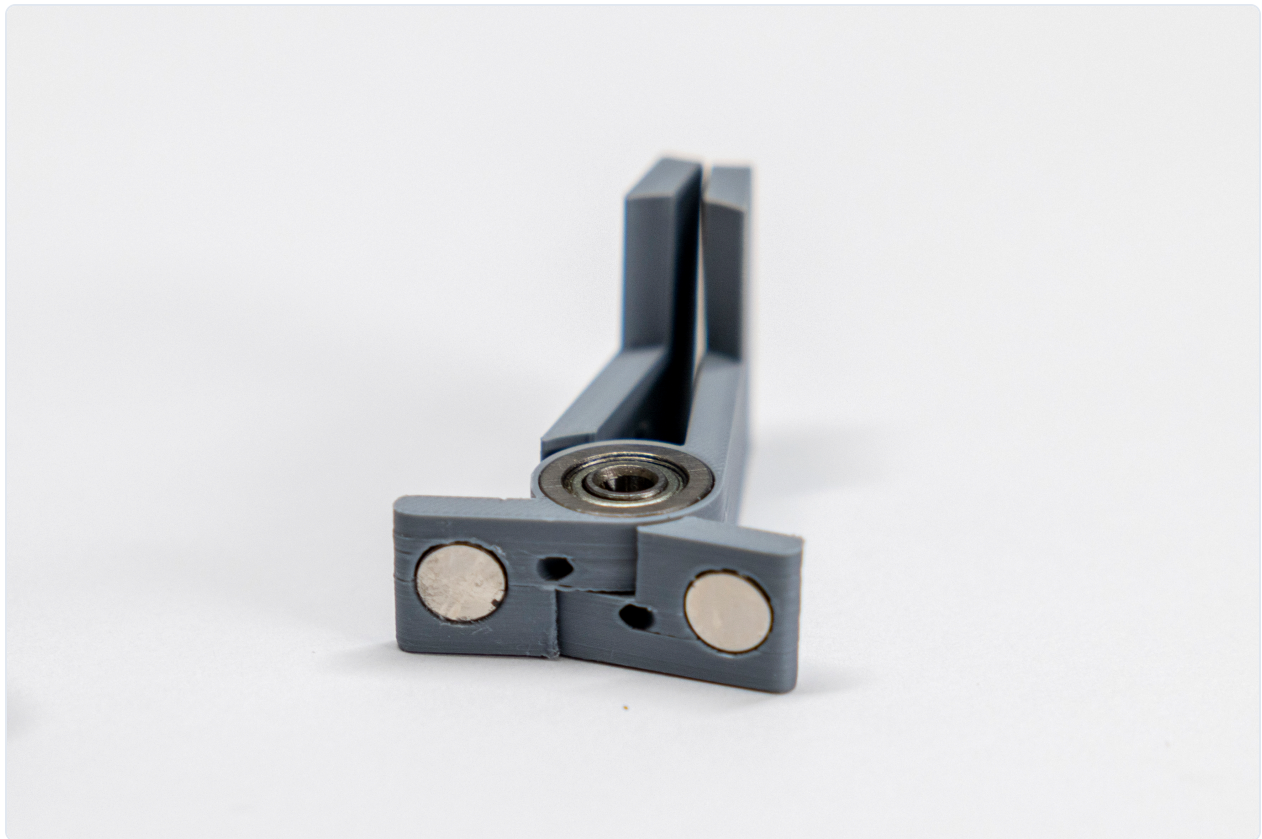
Part 5 — Install the Magnet Pairs

5. Take the one-dot pair. Using a very small dab of glue, insert the 5×2mm magnet into Paddle #1's paddle arm with the dot-marked side facing *in* and the unmarked side facing out. Then, using a small dab of glue, insert the 5×1mm magnet into Paddle #1's corresponding body magnet hole (opposite side of the key body — see Part 2) with the dot-marked side facing *out*. Orienting one magnet dot-in and the other dot-out is what produces the repelling action.
6. Repeat this same process for Paddle #2 (right), using the two-dot pair: 5×2mm magnet into Paddle #2's paddle arm with the dot facing in, and 5×1mm magnet into Paddle #2's corresponding body magnet hole with the dot facing out.



Part 6 — Confirm the Repelling Action

7. Once both pairs are installed, put the paddle arms back into their finished position against the key body to confirm the repelling force for all four magnets.



When both paddles are later seated in the mechanical stack (Step 14), each paddle should spring back to center when pressed. If a paddle stays pressed in, see Troubleshooting — Steps 10-11 (Appendix).

STEP 11 Allow Glue to Cure

Set both paddles and the key body aside. The adhesive on the body magnets needs a full **15 minutes** to cure before assembly can continue.

Start your timer, then proceed directly to Step 12. Do *not* advance to Step 13 until 15 minutes have elapsed.

15:00

15 MINUTE CURE TIME — SET A TIMER BEFORE CONTINUING

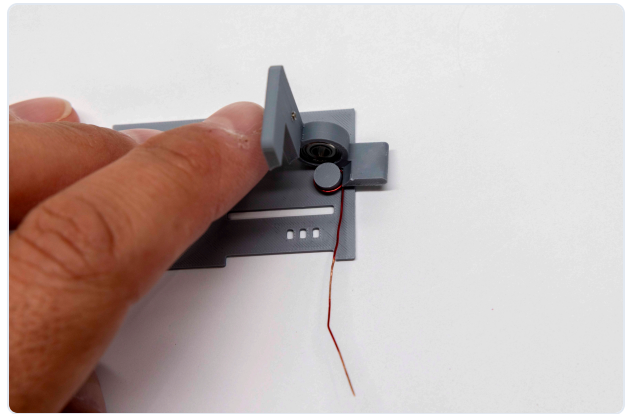
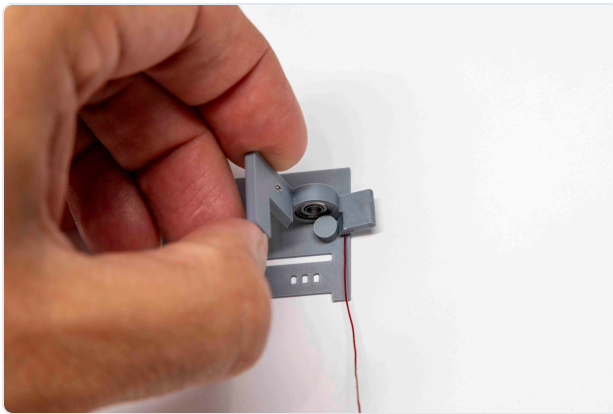
STEP 12 The Stress-Relief Loop

Using the travel case lid as a winding jig, form a stress-relief loop on each paddle wire. The loops reduce tension on the wire during paddle movement. Each paddle is wound differently — follow the instructions for each side carefully.

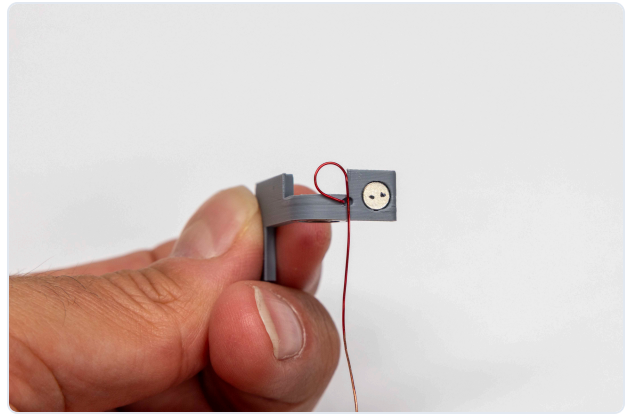
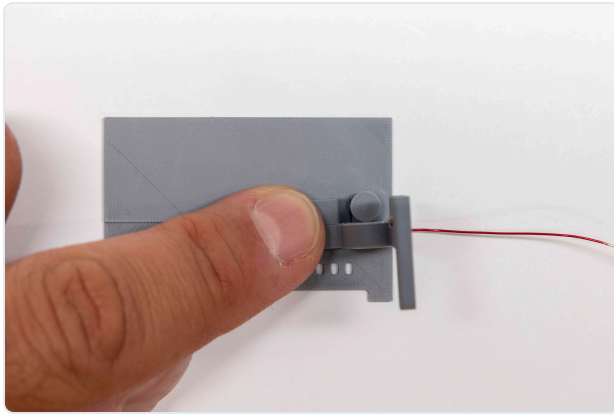
Technique — applies to both paddles: Hold the paddle firmly against the radius guide with one hand so it does not shift during winding. With your other hand, pull the wire snugly against the nub as you rotate it around — firm, steady tension produces a clean, circular loop.

LEFT PADDLE — 360°

1. Rest the left paddle on the radius guide so the paddle arm extension faces directly toward you. The wire should be pointing toward you at the 180° position.
2. Wrap the wire **clockwise 360°** around the radius guide nub for one full turn.

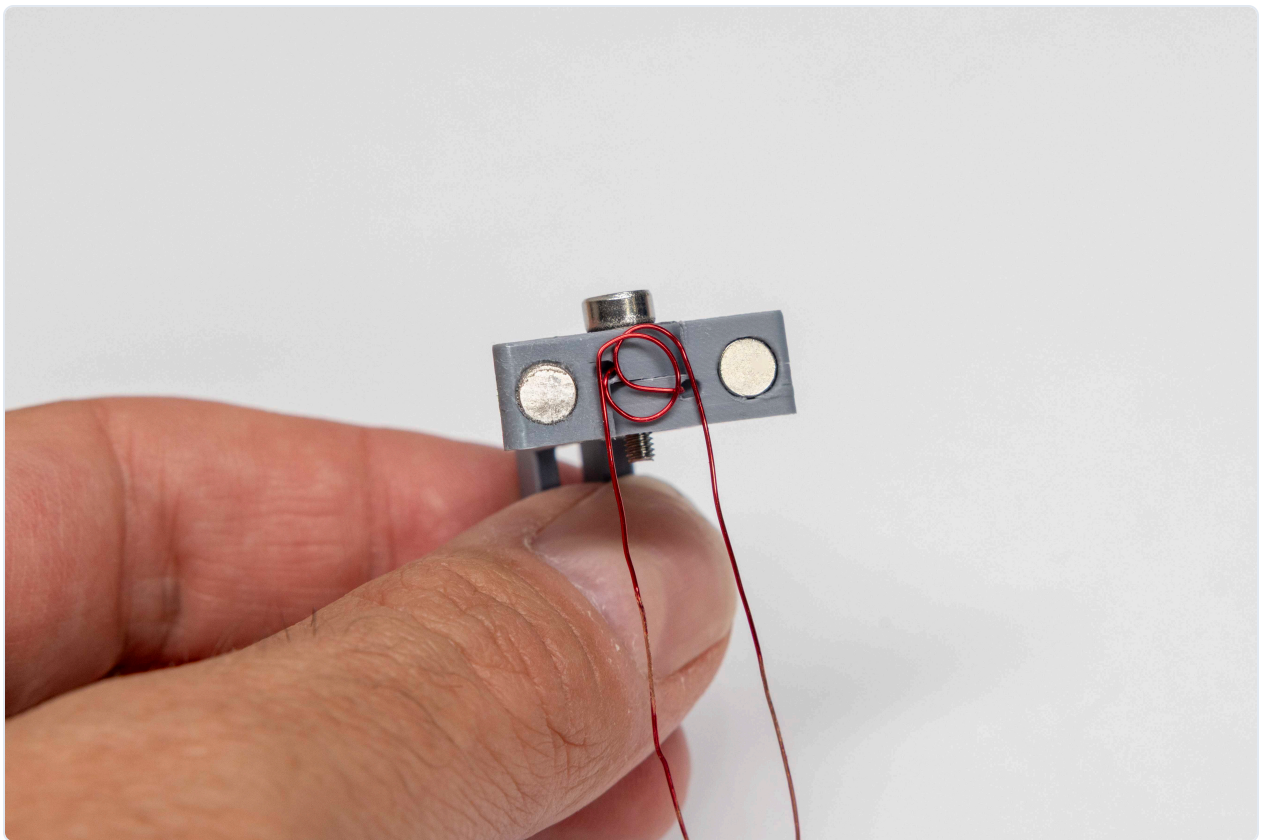
**RIGHT PADDLE — 270°**

1. Rest the right paddle on the radius guide with the paddle handle pointing directly toward you — same orientation as the left paddle. The wire should extend to the right at the 90° position.
2. Wrap the wire **counter-clockwise 270°** around the radius guide nub. After completing the turn, the wire should be pointing directly toward you.



FINAL STEP — SEAT THE LOOPS

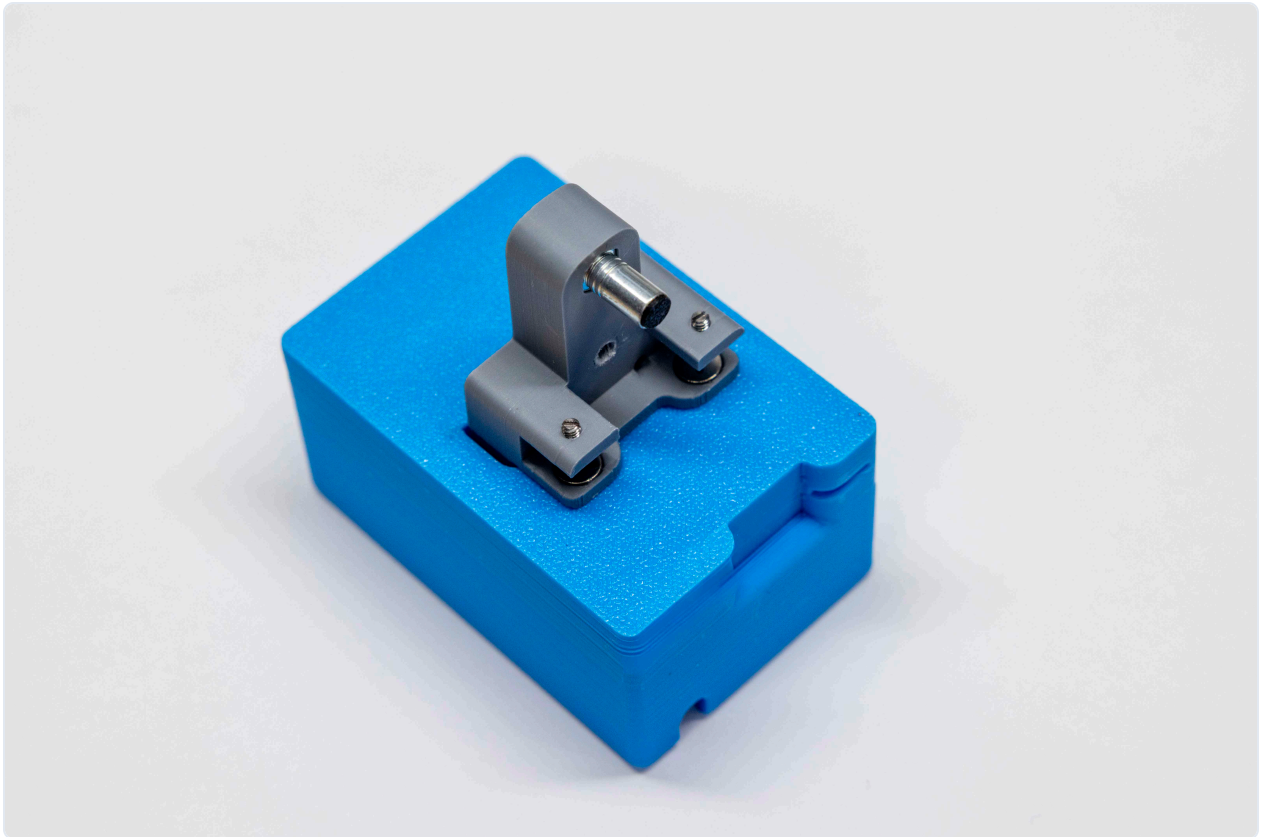
With both loops wound, press each loop firmly with your finger, pushing it as close to the paddle body as possible. This seats the wire flush and keeps the loop from interfering with assembly.



STEP 13 Install Set Screws

1. Place the key body upright in the shipping container vise with the set screw holes facing up and accessible.
2. Using the small flat screwdriver, thread each M2×3mm set screw into its pre-tapped hole by hand first to confirm it catches the threads cleanly.
3. Drive each set screw in slowly until you can just see the tip beginning to protrude through the other side of the hole — then stop. Do not drive it further.

These holes are pre-tapped — the set screws should thread in smoothly with light pressure. If you feel significant resistance, back the screw out and re-seat it. Do not force it.

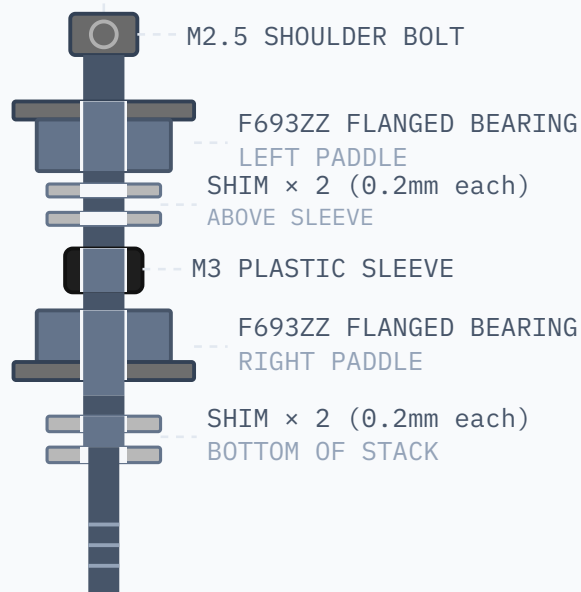
**STEP 14 Mechanical Stack**

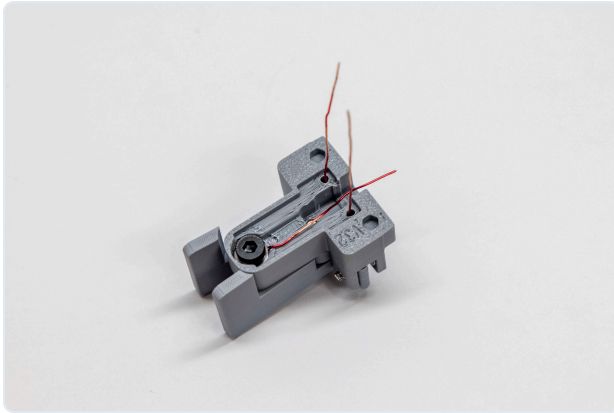
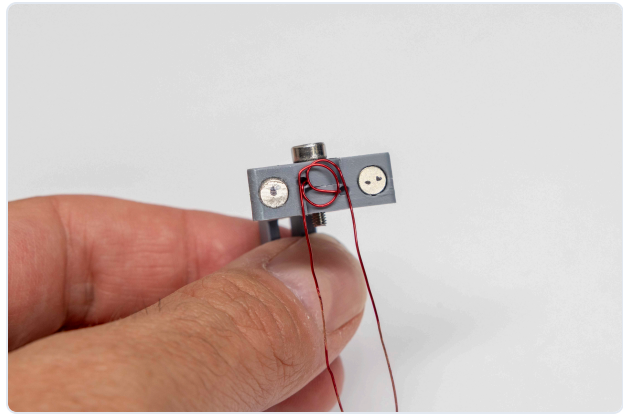
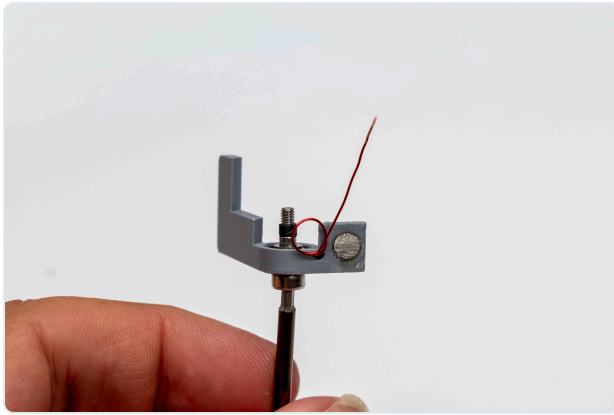
Build the mechanical stack outside the key body first, then lower the complete assembly into position as a unit.

1. Insert the M2.5 shoulder bolt down through the F693ZZ flanged bearing of the left paddle (Paddle #1).

2. Slide two 0.2mm shims onto the shoulder bolt, above the bearing.
3. Position the M3 plastic sleeve over the threaded end of the bolt and thread it on carefully until it seats flush against the shoulder. *(This sleeve extends the effective shoulder length of the bolt.)*
4. Lower the right paddle (Paddle #2) onto the stack, passing its bearing down over the shoulder bolt and sleeve. The sleeve should produce a snug fit between the two paddles.
5. Flip the entire stack upside down and slide two more 0.2mm shims onto the bolt below the right paddle bearing.
6. Feed both paddle wires through their respective holes in the key body. While still holding the stack upside down, lower the key body down onto the stack so the shoulder bolt meets the threaded hole in the key body.
7. Thread the shoulder bolt into the key body and tighten until snug. Do not overtighten.

Do not overtighten the shoulder bolt. The threads are cut directly into the key body — excessive torque will strip them. Snug is sufficient; stop as soon as resistance is felt. If you strip the hole, see [Troubleshooting — Step 14 \(Appendix\)](#).





STEP 15 Preparing the 3.5mm Jack & Breakout Board

1. Place the 3.5mm jack into the cutout on the shipping container. Lay the lid flat on top of the container. Note where the jack's terminals protrude through the guide holes in the lid. Using flush wire cutters, snip each terminal flush with the lid surface. Run your fingertip across the trimmed terminals — if you feel any point or protrusion, the cut was not flush and should be re-trimmed.
2. Remove the lid. Before seating the PCB breakout board, confirm the 3.5mm jack is oriented so it points in the same direction as the arrow printed on the PCB board. Then align the board to the jack terminals using the container's alignment guides.

If the PCB does not drop in freely, use the sandpaper to gently sand both edges of the breakout board equally until it seats without force between the alignment guides.

3. Apply just enough solder to form a solid connection between each terminal and its corresponding PCB pad. Then apply light tinning to the signal pads on the opposite end of the PCB where the paddle wires will attach in Step 16.
4. Insert the plug and PCB assembly into the CW key body. Turn the key body to view it from a profile (side) view and check whether any solder beads are visible above the key body surface. If you see any, determine in Step 17 whether they need to be filed down after the key is fully wired.

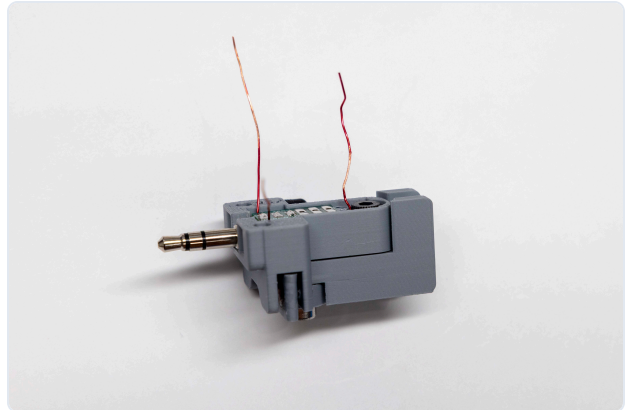
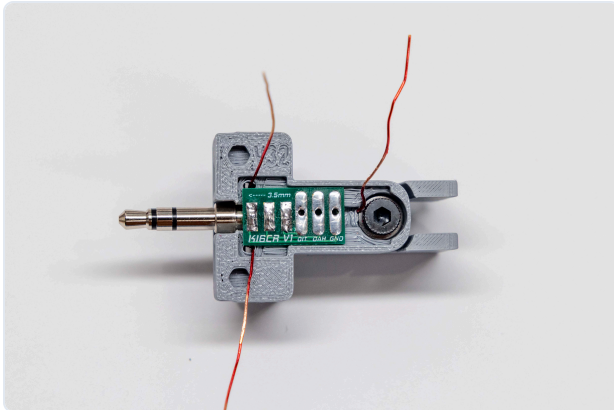
Use as little solder as possible. An oversized bead will protrude above the body surface and require filing before the Key Cover can be installed.



STEP 16 Wiring & Soldering the PCB Board

1. With the PCB board seated in the key body, begin routing each paddle wire so it makes clean 90-degree turns toward its corresponding pad on the PCB breakout board. Route each wire directly to its own pad — do not allow a wire to pass over or across a neighboring pad. A wire crossing over an adjacent pad risks creating an unintended solder bridge when soldering.
2. Thread each wire down through its labeled through-hole — **DIT**, **DAH**, or **GND**. The through-holes will hold the wires in position while you solder. Route any excess wire toward the center lug using the small channel cutout in the key body to keep it out of the way.
3. Once the wires are routed the way you want them, solder each wire in place at its pad.
4. With everything looking good, confirm and solder the DIT, DAH, and GND wires to their respective pads.
5. Plug the key into your radio and test both paddles.

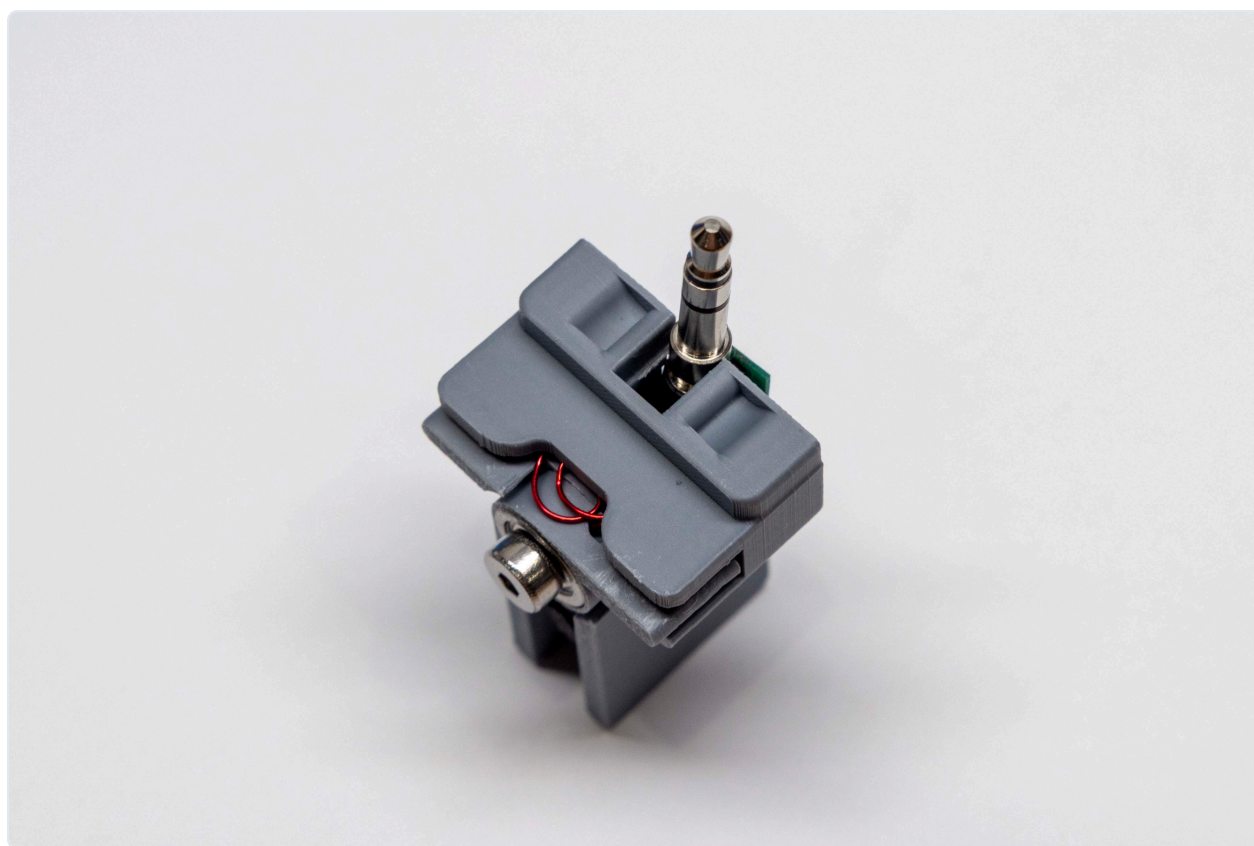
Pro Tip: Before soldering, hold the key in your intended operating position and physically trace each wire to its paddle to confirm correct routing. Rewiring after soldering is difficult.



STEP 17 Calibration & Final Assembly

1. With the key inserted into your radio, slowly turn each body set screw clockwise using the small flathead screwdriver until you hear the radio actuate. Then back the screw out $\frac{1}{8}$ to $\frac{1}{4}$ turn to taste — find what feels right for your operating style. **Note:** Each set screw controls the contact point for the **opposite** paddle. If the key feels erratic or oversensitive, back the set screw out an additional $\frac{1}{8}$ to $\frac{1}{4}$ turn until the action feels clean.
2. Test both paddles thoroughly and fine-tune until the key responds exactly the way you like.

3. Once satisfied with the action, back the M3 shoulder bolt out slightly to relieve any tension on the assembly. Fill the shoulder bolt's threaded hole with a drop of superglue, then apply ample superglue to the entire 3.5mm plug cavity. Work quickly — superglue sets fast.
4. Insert the key into your radio and make any slight positional adjustments to get it into your preferred operating position. Allow the glue to cure fully before removing the key.
5. Before placing the lid, operate the key over a few sessions to confirm everything is working correctly. The lid goes on last — take the time to satisfy yourself the key performs reliably under normal operating conditions.
6. Once confident everything is working correctly, lay the CW key lid on a flat surface with the tension-fit nubs facing up. Set the key body on top, matching the male nubs with the female cavity, and press firmly and evenly into place until the lid seats fully — you should feel it snap into place.



III. TROUBLESHOOTING

STEP 6 — CONTINUITY CHECK FAILURE

Symptom: Resistance greater than 1 ohm, or no continuity between the set screw and the wire end.

Part 1 — Set screw not fully seated: With your multimeter probes still in place, press down firmly on the set screw with your finger. If resistance drops toward zero when you apply pressure, the screw tip is close but not making consistent contact with the wire. Tighten the set screw an additional $\frac{1}{8}$ turn (45 degrees) using the 0.9mm hex key and recheck. Repeat in $\frac{1}{8}$ -turn increments until resistance is less than 1 ohm without applied pressure.

Part 2 — Insulation not fully removed: If resistance remains high regardless of pressure, the issue is likely enamel insulation still present on the wire end beneath the set screw. Remove the set screw and inspect the wire tip — bare copper should be bright and visible on all sides. If any red or reddish coating remains, use the 0.9mm hex key to gently unseat the wire loop from the paddle arm wiring hole, re-sand the end of the wire until clean bare copper is exposed all the way around, re-seat the loop, reinstall the set screw, and recheck continuity.

STEPS 10-11 — PADDLE DOES NOT RETURN TO CENTER

Symptom: One or both paddles stays pressed in rather than springing back.

Most likely cause — magnet polarity: The 5×1mm body magnets may be installed with incorrect orientation. Refer to the dot markings from Step 10 — the marked face must point outward. If the magnets are attracting the paddle instead of repelling it, they are reversed.

Also check — shoulder bolt over-tightened: Excessive torque on the shoulder bolt clamps the bearing inner races together, preventing free rotation. Back the bolt out $\frac{1}{4}$ turn at a time and test paddle movement after each adjustment until both paddles pivot freely.

STEP 15 — TRIMMED TERMINALS NOT FLUSH

Symptom: Running a fingertip across the trimmed jack terminals reveals a point or protrusion above the lid surface.

Most likely cause — wrong cutter type: Standard diagonal cutters leave a pointed stub on the remaining wire because both jaw faces are angled. Flush cut wire cutters have one completely flat jaw face, producing a clean perpendicular cut with no stub. Re-trim using flush cutters.

Do not use a metal file to remove the stub. The jack terminals are thin and fragile — filing will almost certainly snap them off, requiring a replacement jack. Only flush wire cutters should be used for this step.

STEP 15 — KEY COVER WILL NOT SIT FLUSH

Symptom: The Key Cover rocks or will not seat flat against the key body.

Inspect first: Turn the key sideways and visually check whether any solder joints protrude above the face of the key body. A joint that stands even slightly proud will prevent the cover from seating.

Fix — file protruding joints: Using the steel file, gently file any raised joints flat. Use short, light strokes and check fit frequently. The cover should drop into place without force once all joints are flush.

STEP 14 — STRIPPED SHOULDER BOLT HOLE

Symptom: The shoulder bolt spins freely without resistance, or cannot be tightened enough to hold the paddles in place.

Cause: The threads in the key body have been stripped by overtightening.

Workaround: Back the shoulder bolt out completely. Apply a small drop of super glue directly into the stripped hole. While the glue is still wet, reinsert the shoulder bolt and tighten it to the correct snug position. Hold or clamp the bolt firmly in place and allow the glue to fully cure before handling. This is not a permanent fix, but it restores function in most cases.