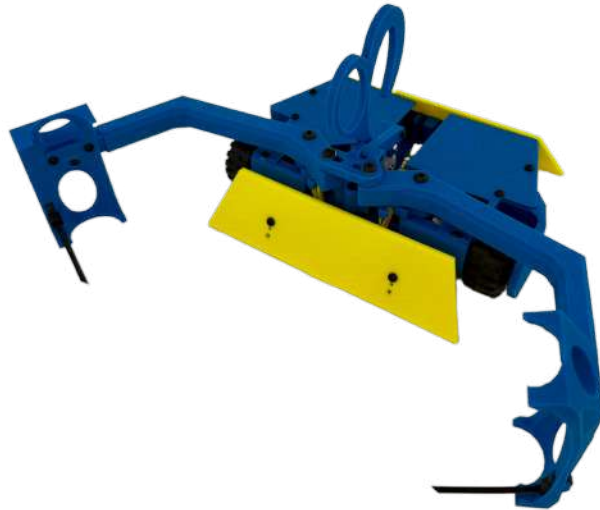# TURNABOT
create compete connect

Creatabots: Gripzilla
Pre-soldered

Version: 2507

Assembly Instructions

🏆 **Pro Tip: Read First, Build Later.** Trust us—Step 12 will totally explain what Step 3 was talking about. It's like a plot twist... but with bolts.
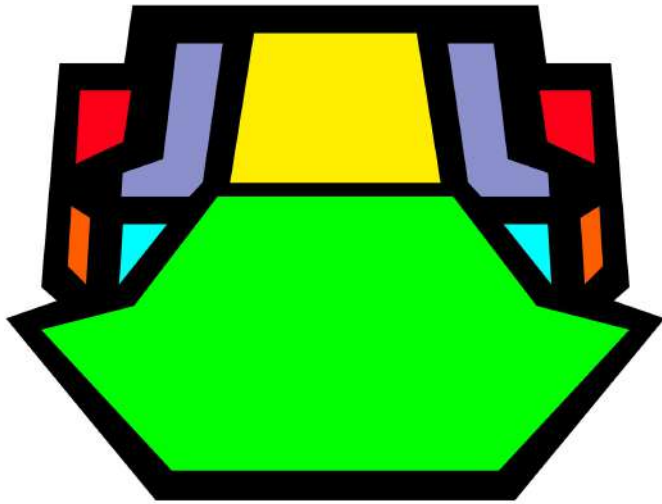
Table of Contents

🏆 **Pro Tip: Read all the steps** at least once before starting. Sometimes a later step will explain what the heck was going on earlier.

1. Meet the Creatabots

Thank you for choosing the **Gripzilla Creatabot**, a non-destructive 8-ounce (225 g) combat robot designed to be **easy** to assemble, battle, maintain, and customize.

Creatabots strike the ideal balance: lightweight enough for small, portable arenas yet substantial enough to support exciting, dynamic designs—with **modular CAD files provided** to spark personalization and creativity—delivering the best of both worlds: creative freedom and a perfect fit inside a TurnaboX arena!

🏆 **Put in the Work – Craft it like your robot's counting on you (because it is)**

Don't rush it. The little details — every screw, every spacer, every alignment — *matter*. A wobbly robot in battle usually means something skipped or rushed in the build process.

Take your time, build it right, and future-you (and your robot) will thank you.

Precision now = power later. Put in the work. You've got this.

🎯 = The Goal

🏆 = Pro Tip

⚠️ = Warnings or Safety Notes

🔄 = Directional or Orientation Tips

✏️ = Note

✅ = Success Indicators

2. Safety First!

Turnabots are among the safest combat robot kits available.

HOWEVER there are still several things to be aware of:

LiPo batteries can be **dangerous**. Charging should ONLY be done in a LiPo bag or FAR from anything flammable.

⚠️ **Do NOT cut both wires of a battery at the same time**. If you need to change connectors, cut one wire, install it in the new connector, then cut the other wire.

If a LiPo has sustained any damage or has "puffed," do NOT charge it. DISCARD it (safely and properly).

⚠️ *Over-discharging a LiPo can **permanently** damage it.

⚠️ Assume that **ALL** electronic joints and components have exposed **lead**.

Do not lick any electronics. Do not allow children or pets to lick any electronics.

After anyone touches any electronics, faces must not be touched and hands must be washed with soap, and cold water, particularly before eating.

3. Parts, Tools, & Assembly Prep

This build is going to challenge you — but every step you take builds real engineering skills, and by the end, you'll have an awesome bot you built yourself and can be proud to compete with.

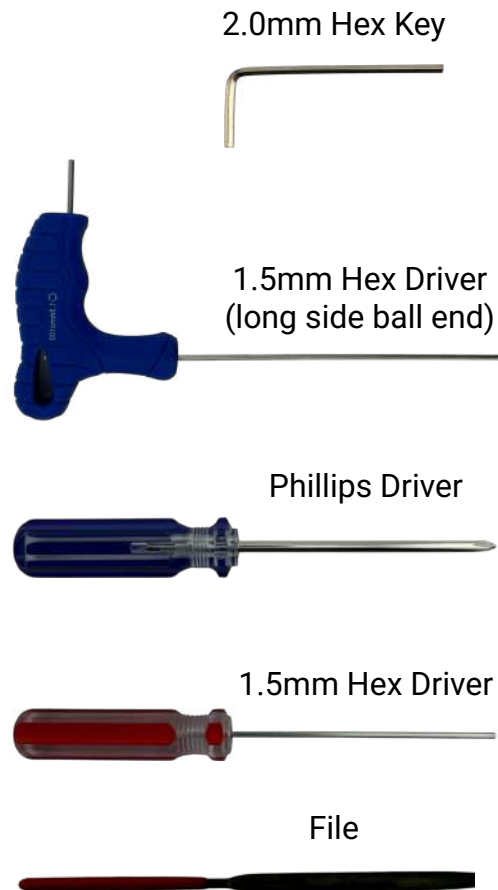🏆 **Start by laying out the parts.** (Note the LEFT side and RIGHT side of the bot).

Creatabot Plastics

Gripzilla Plastics (GZ)
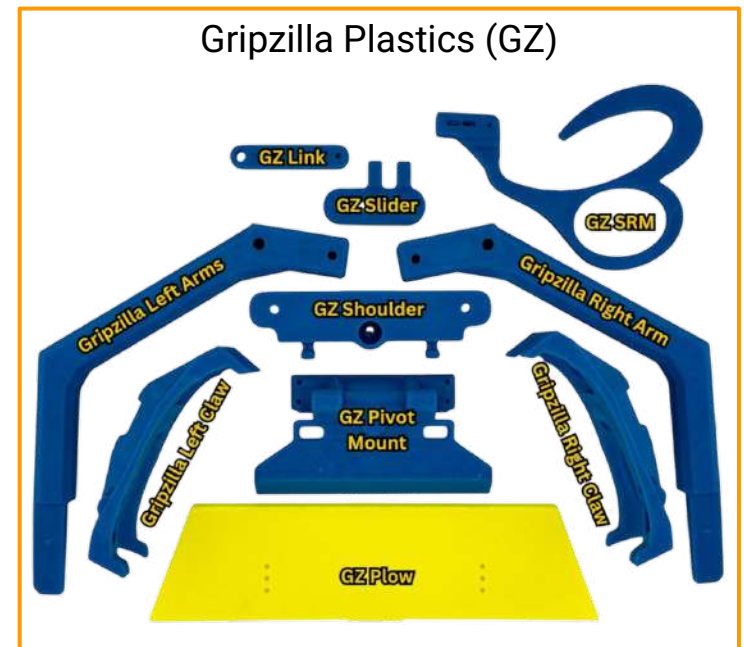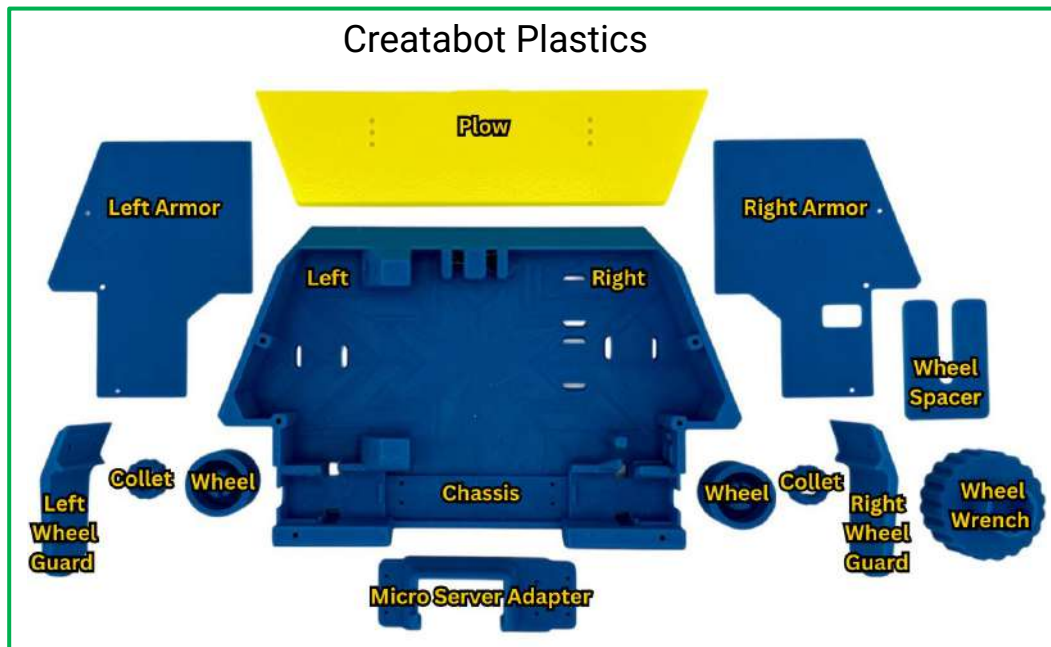
3. Parts, Tools, & Assembly Prep

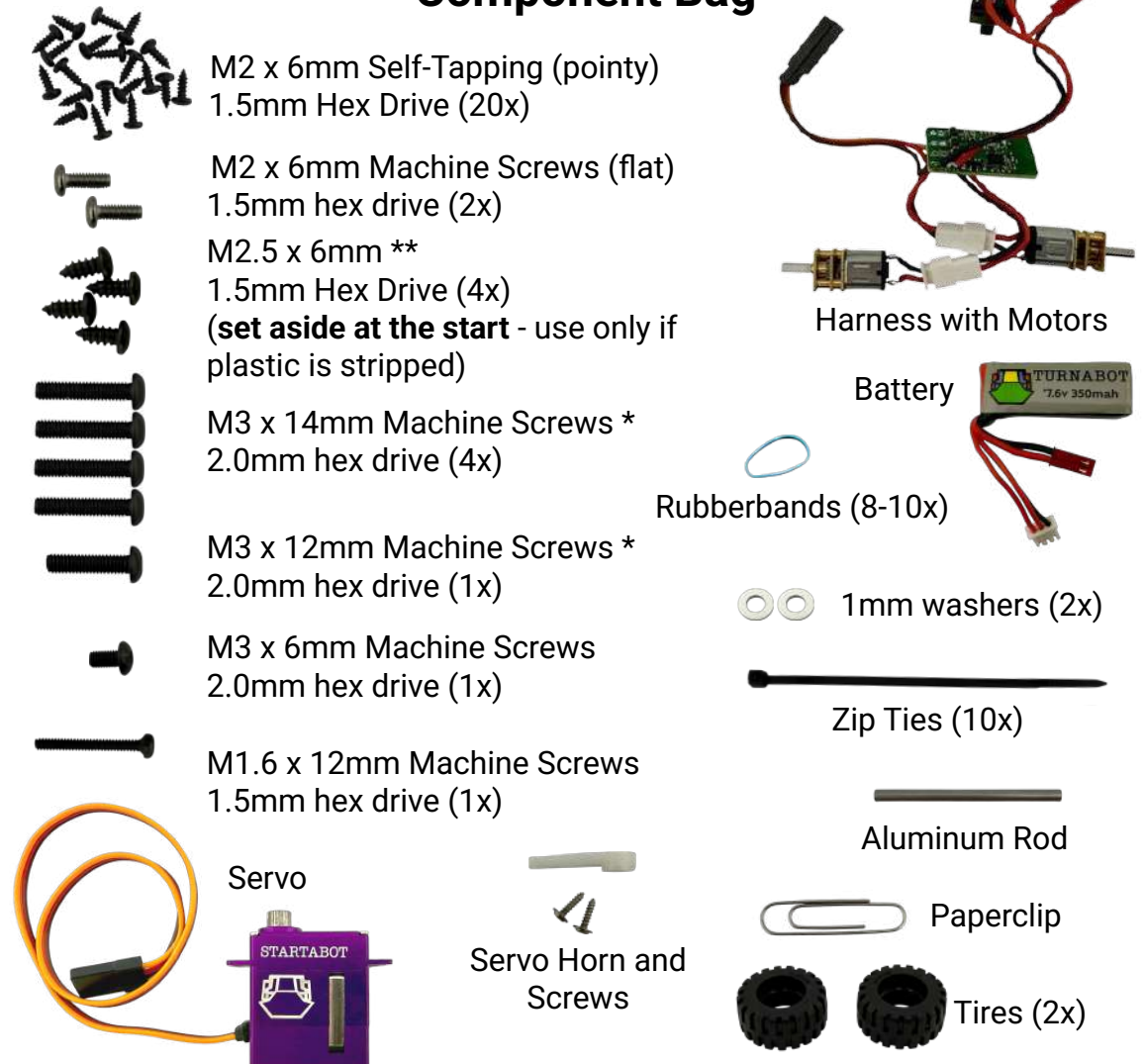💡 **Helpful Tip:** Before building, sort your screws.

* You have one M3 × 12mm, and four M3 × 14mm.

Four of the screws are slightly thicker M2.5 × 6mm and look almost identical to the 20 thinner M2 × 6mm screws. To avoid mixing them up, separate and set aside the four M2.5 × 6mm screws **before opening the bag of 20 M2 × 6mm screws. (If they're already in labeled bags, just leave them there.)

Included Tools

2.0mm Hex Key

1.5mm Hex Driver
(long side ball end)

Phillips Driver

1.5mm Hex Driver

File

Component Bag

M2 x 6mm Self-Tapping (pointy)
1.5mm Hex Drive (20x)

M2 x 6mm Machine Screws (flat)
1.5mm hex drive (2x)

M2.5 x 6mm **
1.5mm Hex Drive (4x)
(**set aside at the start** - use only if plastic is stripped)

M3 x 14mm Machine Screws *
2.0mm hex drive (4x)

M3 x 12mm Machine Screws *
2.0mm hex drive (1x)

M3 x 6mm Machine Screws
2.0mm hex drive (1x)

M1.6 x 12mm Machine Screws
1.5mm hex drive (1x)

Servo

Servo Horn and Screws

Harness with Motors

Battery

Rubberbands (8-10x)

1mm washers (2x)

Zip Ties (10x)

Aluminum Rod

Paperclip

Tires (2x)

3. Parts, Tools, & Assembly Prep

(available at turnabot.com)

Nice to have tools (not included)

High Quality Drivers

SLOW Cordless, Electric Screwdriver

Super Glue / Cyanoacrylate (using "accelerator / activator" is recommended for tires, wheels, repairs, etc.)

Battery Checker

Needle Nose Pliers (helpful for placing servo screws, among other uses)

Flat Jaw Pliers (handy for squeezing things without marking them)

Flush Cutters

4. Malenki-Nano Intro & Harness Assembly

What does the Malenki-Nano do?

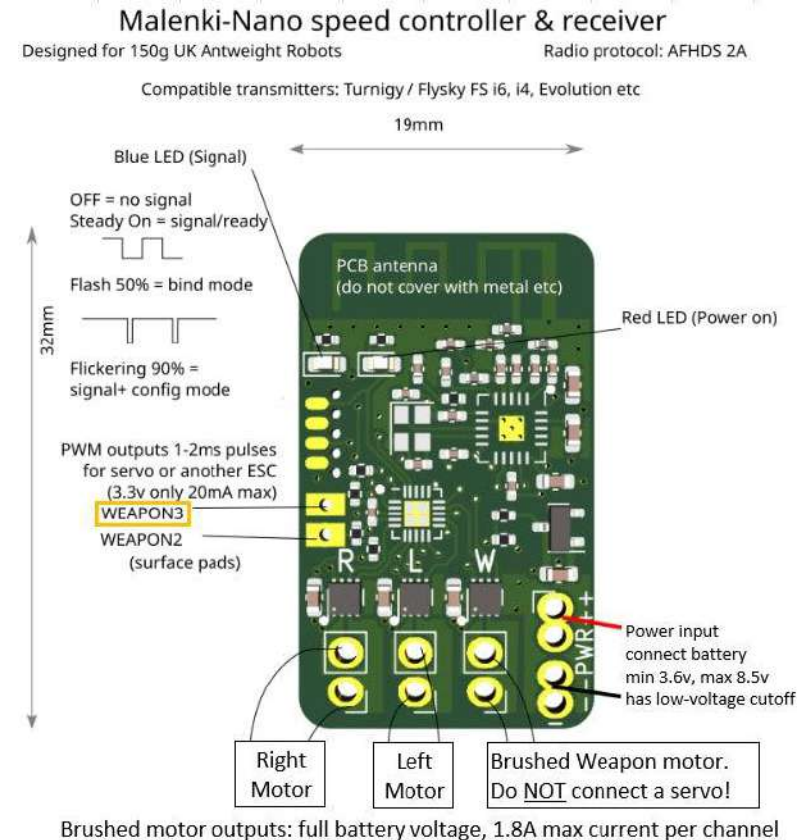The **Malenki-Nano** is a tiny combo board that:

- **Receives signals** from your radio (like the FlySky FS-i6)

- **Drives two motors** — one for the left side, one for the right side (this is how your robot moves!)

- Can control a **third brushed motor** for a weapon

- Supports **Pulse Width Modulation (PWM) outputs -** PWM can be used to drive a servo or brushless motor Electronic Speed Controller (ESC)

- Accepts battery voltage between **3.6V and 8.5V**

✏️ **What's PWM? PWM** stands for **Pulse Width Modulation** — a way of turning power on and off very fast to control speed or position.

- PWM tells the ESC how fast to go.
- It also tells servos where to turn.

Think of PWM like flicking a light switch really fast — longer "on" time = more power!

What's an ESC? An **ESC** (Electronic Speed Controller) tells a motor **how fast** and **which direction** to spin. It gets signals from the receiver chip on the Malenki and powers your motors — like a remote-controlled gas pedal!

Malenki-Nano speed controller & receiver
Designed for 150g UK Antweight Robots   Radio protocol: AFHDS 2A

Compatible transmitters: Turnigy / Flysky FS i6, i4, Evolution etc

19mm

Blue LED (Signal)
OFF = no signal
Steady On = signal/ready

Flash 50% = bind mode

Flickering 90% = signal+ config mode

PCB antenna (do not cover with metal etc)

Red LED (Power on)

32mm

PWM outputs 1-2ms pulses for servo or another ESC (3.3v only 20mA max)
WEAPON3
WEAPON2 (surface pads)

R   L   W

Power input connect battery min 3.6v, max 8.5v has low-voltage cutoff

Right Motor   Left Motor   Brushed Weapon motor. Do NOT connect a servo!

Brushed motor outputs: full battery voltage, 1.8A max current per channel

Quick LED Reference

- 🔴 **Red LED** = Power On

- 🔵 **Blue LED**:
  - Off = no signal
  - Solid = ready
  - Flashing = bind mode

4. Malenki-Nano Intro & Harness Assembly

The Harness has:

- Battery connector
- Switch
- Malenki
- Servo connector
- Right motor connector
- Left motor connector

Step 1: Connect the battery to the harness.
  *Note the wire colors and keeping red-to-red and black-to-black.

Step 2: Connect the servo to the harness.
  *Note the wire colors and keeping brown-to-brown and yellow-to-yellow.

Switch

Battery Connector

Servo Connector

Malenki-Nano Integrated

Right Motor Connector

Right Motor

Left Motor

Left Motor Connector
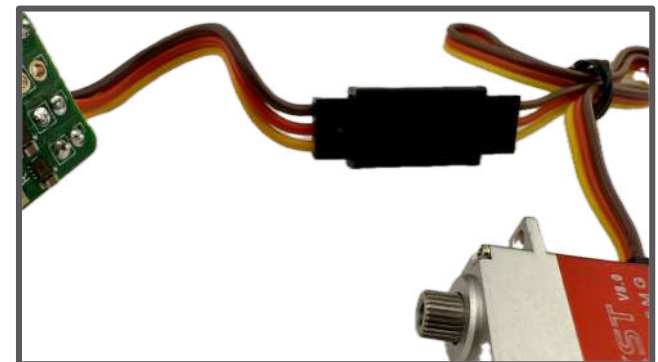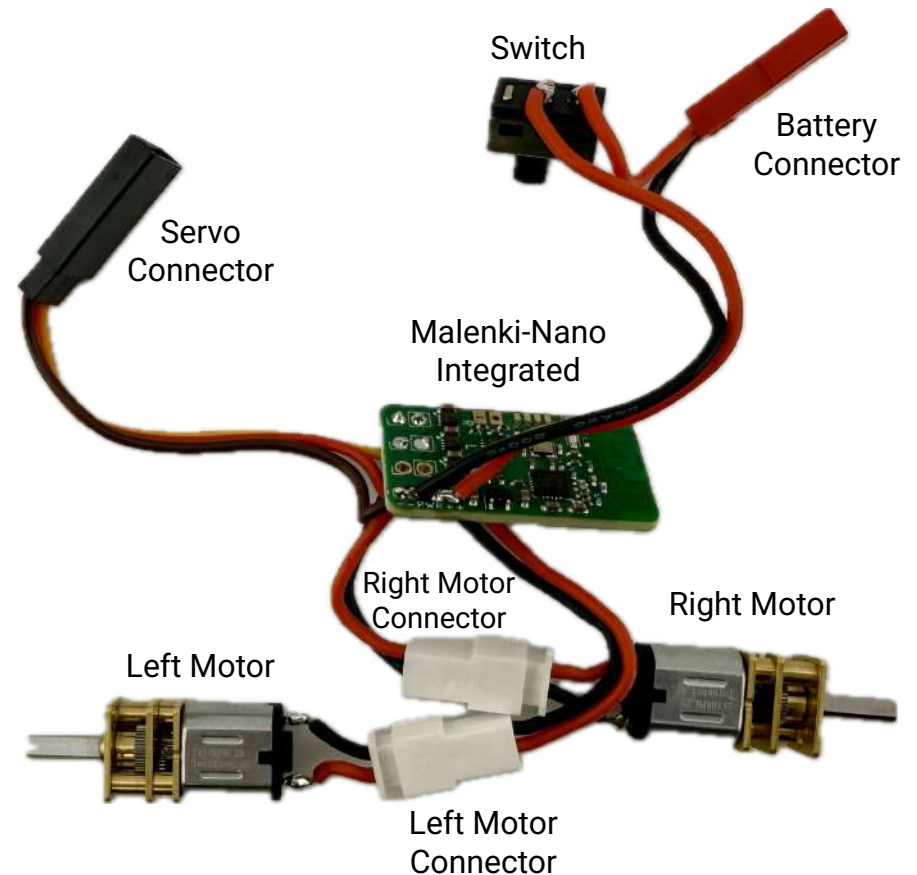
5. Radio Binding

🎯 **The Goal:** To make sure the Malenki-Nano is bound to *your* radio.

Binding is the process of getting the radio (transmitter) to talk to the receiver (Malenki / bot). If your kit was pre-soldered and shipped with a FlySky FS-i6 radio, it's probably already bound.

Switch on the harness with the radio off.

Check the LEDs: Is the Malenki bound to a radio?

- Solid Red LED with Blue LED flashing - It is ready to bind. Go to the "**Binding the Malenki…**" step.
- Solid Red LED only - The Malenki is already bound. (could be your radio or a different radio)

Is the Malenki bound to the radio you are holding? **Turn on your radio.** All top switches must be in the up position and the left stick pushed down. If not, the radio will alert you and prevent transmission until corrected.

- If the Blue LED is now solid, you're done. Go to the next page!
- Still Solid Red LED only - It is bound to another radio. As long as that radio isn't turned on, you can wait 90 seconds after powering on the Malenki and it will go into auto-bind mode.
- Solid Red LED with Blue LED flashing - It is ready to bind. Go to the "**Binding the Malenki…**" step.

🏆 Having the Malenki/harness turned on with radio turned off for **90 seconds** will put the Malenki into auto-bind mode.

Binding the Malenki…

Only do this if the Blue LED is still flashing. Binding needs to be done one at a time and not at the same time as a friend!

1. Hold the **Bind** button while turning on the **FlySky FS-i6 Radio.**
2. The Blue LED on the Malenki should stop flashing and stay solid once it's bound.

✏️ *Note: The Malenki only works with radios using the **AFHDS 2A** protocol. Make sure your radio/transmitter supports this — the* **"2A"** *part is* important!

Setting the Receiver (Rx) Battery Levels

🎯 **The Goal:** To ensure accurate battery monitoring, the **Rx battery range** (the bot's battery) and **alarm settings** must be configured properly in the radio. By default, FlySky radios are set up for different battery types, and incorrect settings can lead to a failure to detect low battery levels. It is **CRITICAL** to monitor the battery in the bot to prevent permanent damage to the battery.

At **Turnabot,** we often configure these settings in pre-soldered kits before shipping, but you should verify and adjust them if necessary.

🔧 **Steps to Check and Set the Battery Levels:**

1. Ensure the radio screen's backlight is on. If not, press any of the 4 buttons at the bottom of the radio to make it respond.
2. Enter the Settings menu:
    a. Hold the **OK** button to open **Settings**.
    b. Press **OK** again to enter **System**.
3. Navigate to RX Battery Settings:
    a. Press the **DOWN** button 5 times to highlight **RX Setup**, then press **OK**.
    b. Press the **DOWN** button 2 more times to highlight **RX Battery**, then press **OK**.
4. Adjust the voltage settings (you must set High, then Alarm, then Low, in order):
    a. Press **OK** three times to navigate to the **High** setting.
    b. Hold the **UP** button until it reaches **8.5V**, then press **OK** three times to move to **Alarm**.
    c. Hold the **UP** button until it reaches **7.4V**, then press **OK** three more times to move to **Low**.
    d. Hold the **UP** button again until it reaches **6.8V**.
5. Save the settings – Hold the **Cancel** button to ensure the values are stored. (Yes, it's weird to use Cancel to Save, but that's what must be done.)
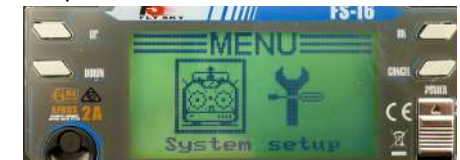
✅ **Final Check:**
Once complete, your FlySky FS-i6 will now accurately monitor the bot battery and alert you when it reaches critical levels.

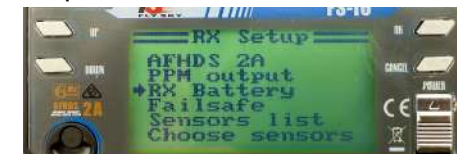⚠️ **Again, running the battery too low can permanently damage it!**
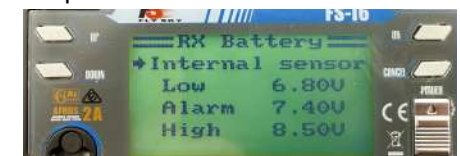
Step 2

Step 3a

Step 3b

Step 4

Final Check

6. Servo Installation

A **servo** (short for servo motor) is a small motor that can rotate the spline (the small gear shaft sticking out of the servo) to a specific position and hold it there. With the servo horn on the spline (black arm in drawing below) it becomes a mechanical arm that turns a set amount — not spinning all the way around like a regular motor. This movement pushes the linkage of the weapon and moves the plow forward and up.

spline
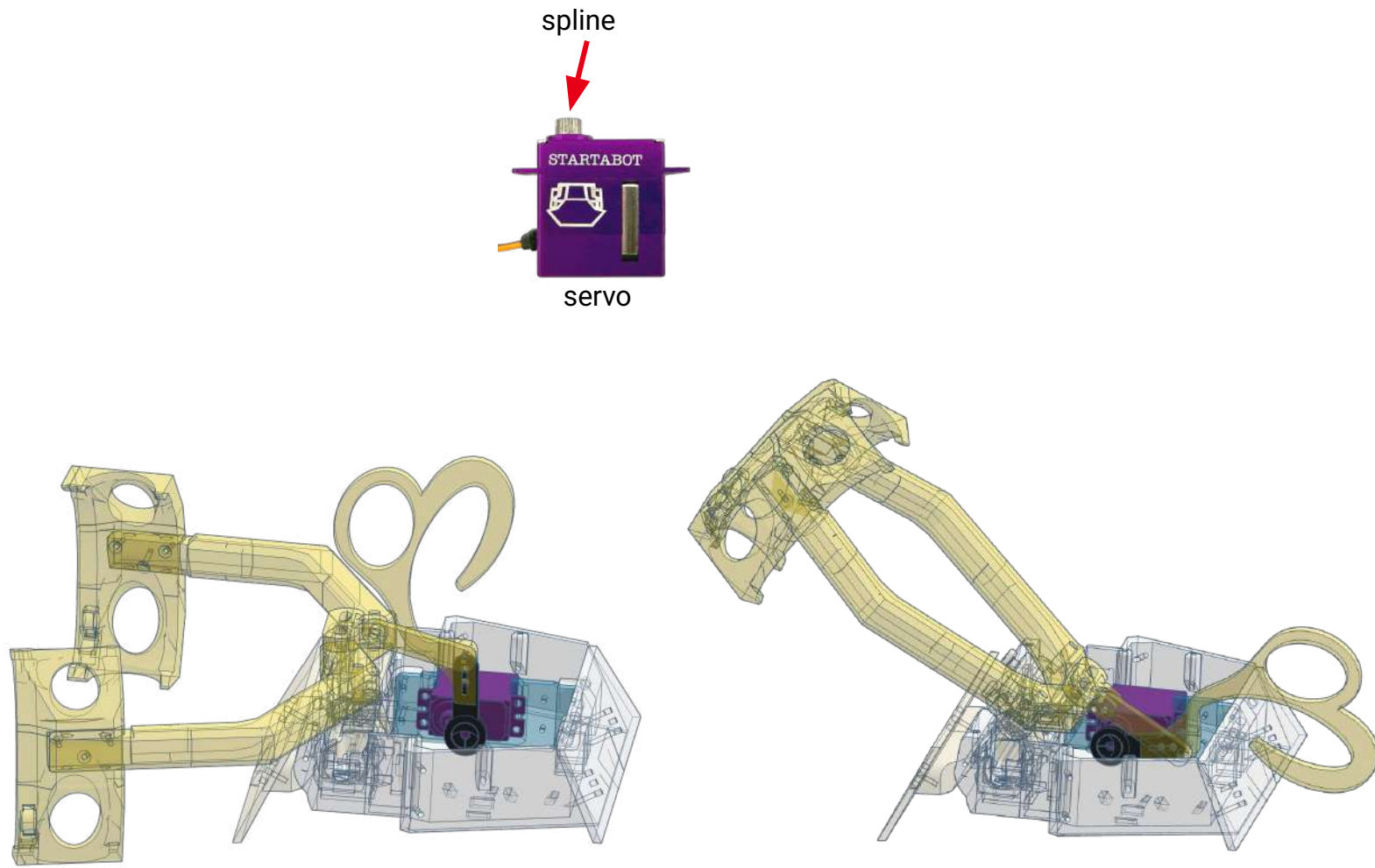
servo

6. Servo Installation

🎯 **The Goal:** To install the servo into the micro servo adapter.

1. Before you begin, **disconnect the battery by pulling on the connectors NOT the wires**. Anytime metal tools are near wiring, it's best to remove any power from the bot.

2. Also, go ahead and **unplug the servo from the harness**, **again pulling on the connectors not the wires** — it's much easier to install when it's free.

3. Aligning the wire with the notch in the micro servo adapter, gently snap in the servo.

4. Be sure to keep the bag with the servo horn and phillips-drive servo horn screw somewhere safe until a later step where they will be installed.

5. While holding the adaptor tight against the servo, install the **black self-tapping screws**, one on each side of the servo.

   🏆 *If you're using an electric screwdriver, go slowly - near 1 revolution per second.* Turning the screw too fast can create heat that may **soften or melt the plastic**, even if the screw doesn't bottom out. The screws should be tight enough to hold the servo firmly, but not so tight that you risk stripping the plastic.

Mounting the Servo Assembly into the Chassis

Now that the servo is in the adapter, it's time to attach the whole unit to the bot's chassis.

1. 🔄 Place the servo+adapter into the chassis - with the **spline closer to the motors**.

2. Secure the adapter to the chassis using four of the **black self-tapping screws** (M2 x 6mm self-tapping (pointy) 1.5 mm hex drive). These screws hold all the power and torque that the weapon uses to throw itself and your opponents around, so it's important they are snug. Tighten them firmly, but be careful not to over-tighten and strip the plastic holes.

🏆 If the holes become stripped, replace the screws with the M2.5 x 6mm screws.

7. Power Switch Installation

Your Creatabot uses a snap-in switch mount that securely holds the power switch in place. Reachable and secure switches are critical to all types and levels of combat robots. The Creatabot **switch mount** uses **retaining features** and a **flex post** to hold the switch firmly.

🎯 **The Goal:** To get the switch securely installed so that it is hard for an opponent's bot to turn it on and off, while still easy for a human.

🔧 **Step-by-Step:**

Step 1. File Chamfers Into the Metal Switch Edges

The **switch mount is intentionally tight** to keep the switch securely in place in battle.

File chamfers into the **indicated metal corner edges on the left side** of the switch to get them at least flush with the plastic. The chamfers allow the switch to press smoothly past the retaining features without the edges of the case digging into the plastic.

🏆 Metal files are designed to work primarily in one direction; most work better when you push them rather than pull them.


What's a Chamfer?
Sharp corner   Chamfered corner
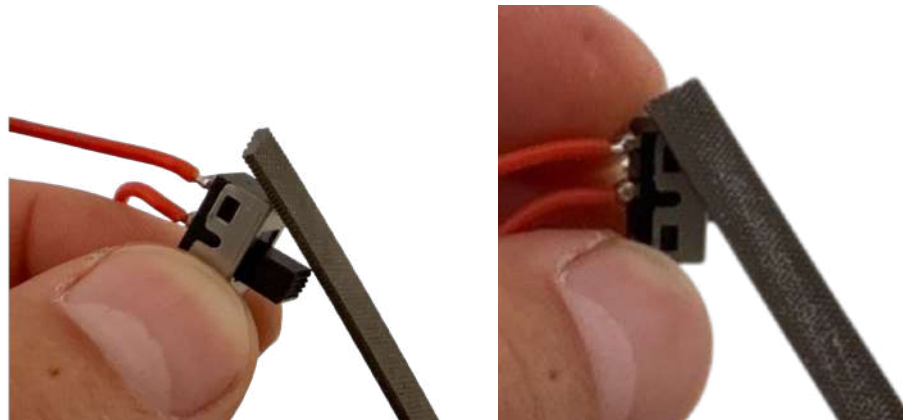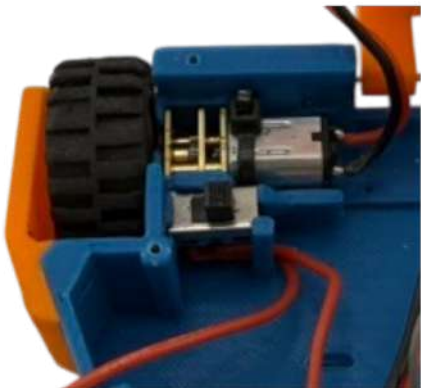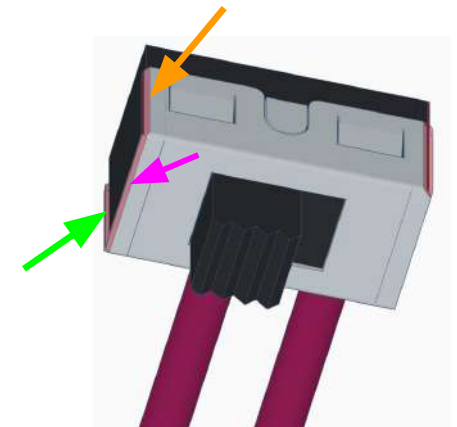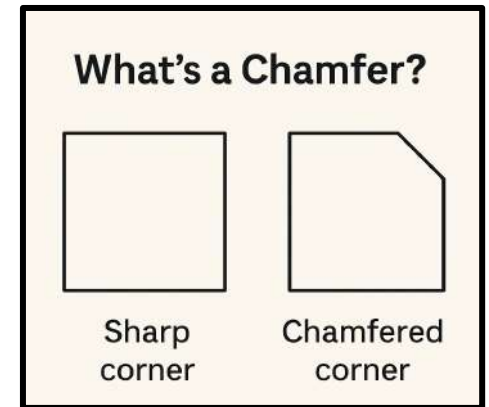
7. Power Switch Installation

🏆 Tips

- Using the right technique, patience, and small movements makes the switch installation fairly easy and reduces the risk of damaging the small retention features.

- If it starts going in crooked or too low in the front, **stop and gently pull it out** and try again from the start.

Step 2. Insert the Switch into the Mount

a. Route the wires between the flex post and the motor mount.

b. Angle the switch to get the short side of the switch against the flex post **and the angled ramp**.

c. You will be be **gently flexing the post** 1-2 millimeters from the corner. **It may help to gently flex the chassis** just a bit to help slide the switch down next to the angled ramp.

d. Making small moves with your thumbs, ease the outer edge of the switch straight down to get it it **square to the chassis.**

e. Once it's square and past the retention features you may want to use the **tip of the plastic arm** to get it fully seated.

flex post

motor mount

angled ramp

plastic arm
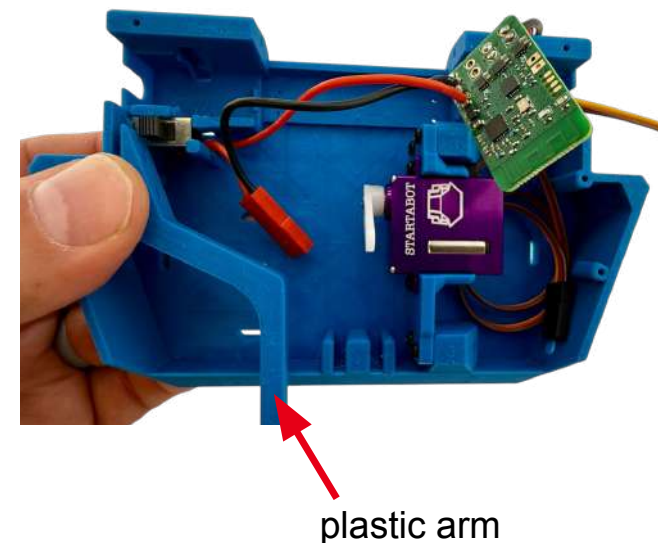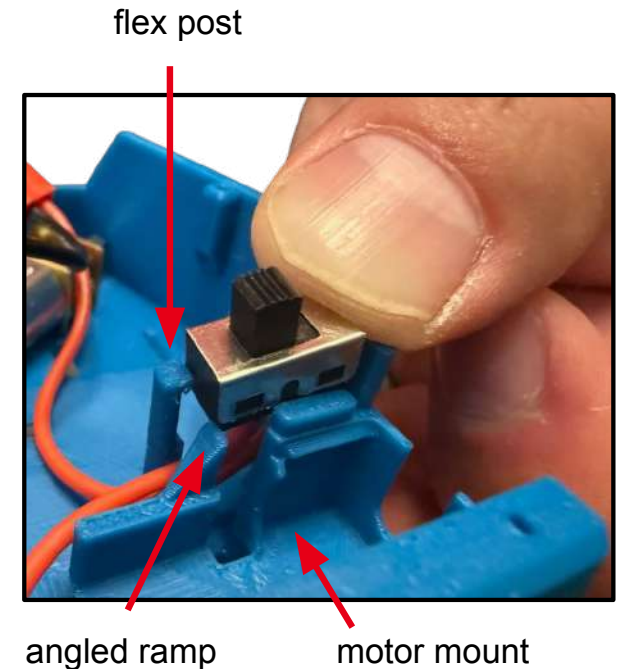
7. Power Switch Installation

Step 3. Fully Seat the Switch

a.   Once the switch is level and fully inserted, the flex post should pop back in against the side of the switch.
b.   If it's too deep, the post won't snap back. Gently pull the switch up, until it clicks into place. The tip of the plastic arm can help with this.
c.   Double-check that the flex post isn't overstretched and that the switch doesn't shift in any direction. If it does, pull the switch out and gently flex the post toward the front corner. As a last resort, glue the switch in place.

✅ **Final Check:** The switch should feel solid and secure.
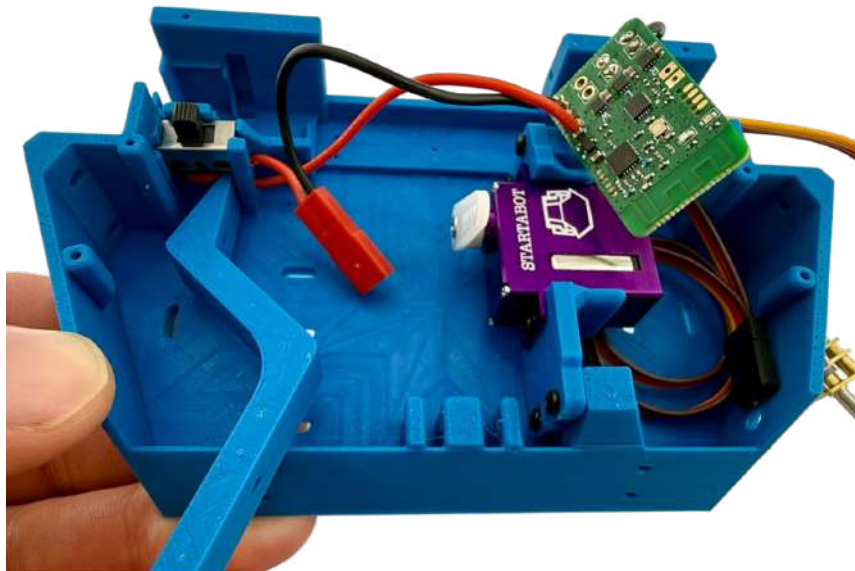
8. Harness & Motor Installation

🎯 **The Goal:** To install the battery, harness, motors, and wiring cleanly into the chassis with the servo wires tucked next to the servo and the wiring all tidy.

Step 1: Install the Battery

a. Make sure the **switch is already installed**.

b. Tuck the **battery discharge cable** (2 wires) tightly against the battery.

c. Carefully plug in the battery connector — 🔴 red to red, ⚫ black to black.

d. Slide the battery into the **top right corner** of the bot:

   ○   No wires should be **underneath** the battery.

   ○   It should fit **snugly**, but not tight enough to bend the chassis.

   ○   If it feels too tight, you can **gently squeeze the cable bundle against the battery** to make room.
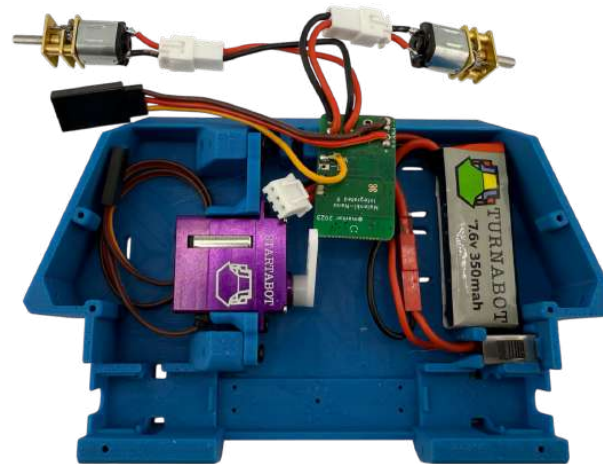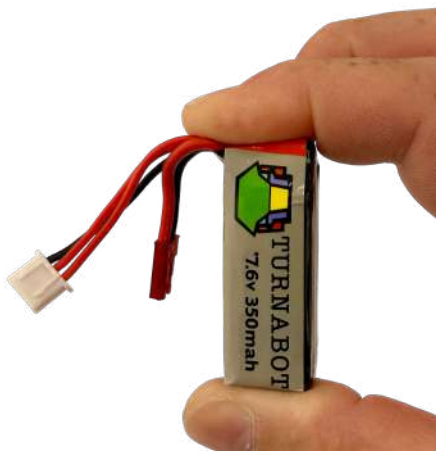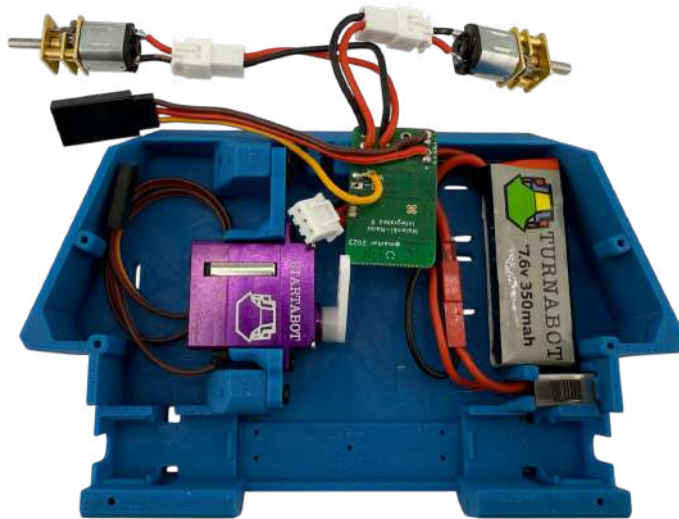
8. Harness & Motor Installation

Step 2: Arrange the Wires

a. Arrange the motors and wires with the right motor wires on top of the left motor wires.

b. ⚠️ Do not snap motors into place in this step. Final motor installation for Gripzilla is after installing the weapon system into the chassis.

Flip the entire harness over from front to back so it matches the picture below on the right, with the motors resting on top of the slots. The right motor wires should now be positioned beneath the left motor wires.

Step 2a

Step 2b
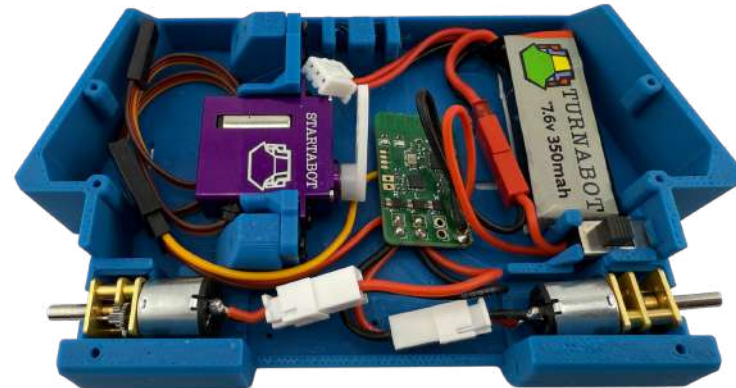
⚠️ Do not snap motors into place in this step. Final motor installation for Gripzilla is after installing the weapon system into the chassis.

8. Harness & Motor Installation
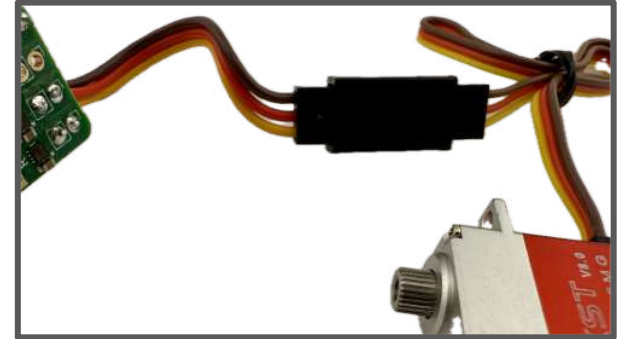
Step 3: Plug in the Servo

a. Plug the servo wire into the servo connector on the Malenki:

  🟫 Brown to brown (ground to ground)

  🟨 Yellow to yellow (signal to signal)

b. Coil the wire **next to and under the servo**.

🏆 If you're trying to save weight, you can hard-wire the servo — but plugging it in makes repairs easier.

Take a final look:

❏ Battery snug, wires tidy

❏ Servo wire connected and tucked

❏ Malenki LEDs visible

❏ Motors NOT snapped in place

9. Weapon Assembly

🎯 **The Goal:** To assemble the weapon mechanism to ensure smooth movement with minimal friction.

🔧 **Step-by-Step:**

Step 1. Attach the Claws to the Arms

a. The claws and arms are sided.

b. The claws should be oriented so that the zip tie mounts are close to the table once assembled — the zip ties will be your ground-scraping forks.

c. ✏️ Make sure **no support material** is left in the claw pocket before you insert the arm.

d. Insert each arm into its claw with the smooth side facing down (toward the table) and the textured side facing up. Once installed, the textured side should be visible from the top of the robot.

e. Slide the arm in until it **bottoms out fully**.

f. Attach the claws using 3 of the **black self-tapping screws** (M2 x 6mm self-tapping "pointy" 1.5 mm hex drive) in each arm.

✅ **Final Check:** The claws should be very firmly attached to the arms.

⚠️ **Do not bend the arm** when testing.

zip tie mounts
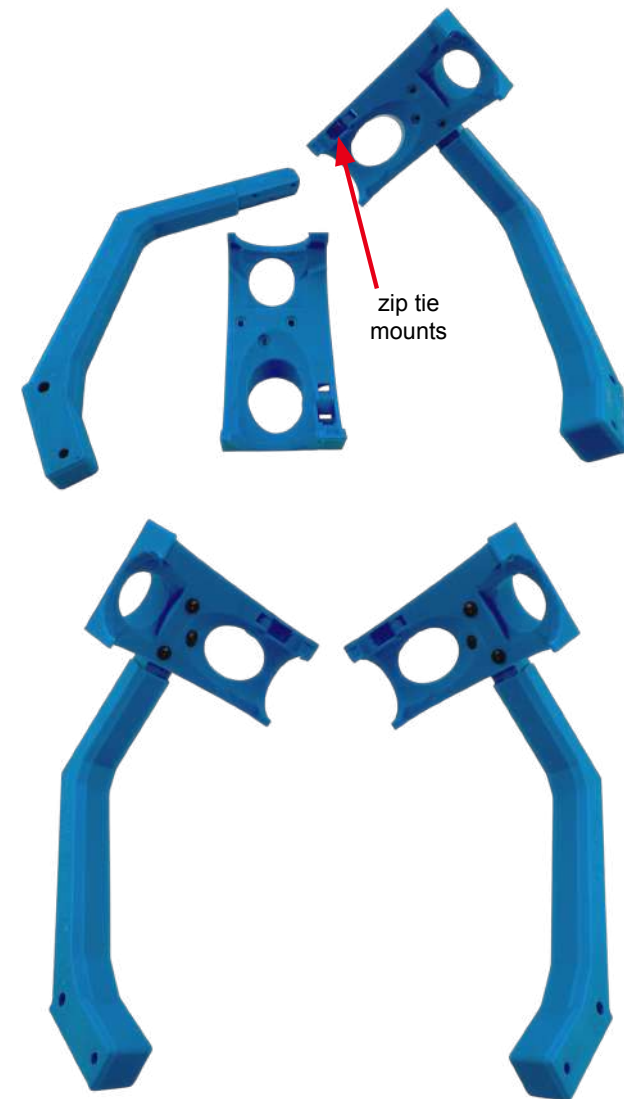
9. Weapon Assembly

Step 2. Install the M3 x 12mm Screw into the Slider and Link.

a. Layout all 5 of the M3 machine screws where you can see their lengths. There are **4** that are **14mm** long and **1** that is **12mm** long. Identify the single **12mm** screw.

b. With the smooth side of the link to the right, install the **12mm** screw through the slider and link, then set that assembly aside.
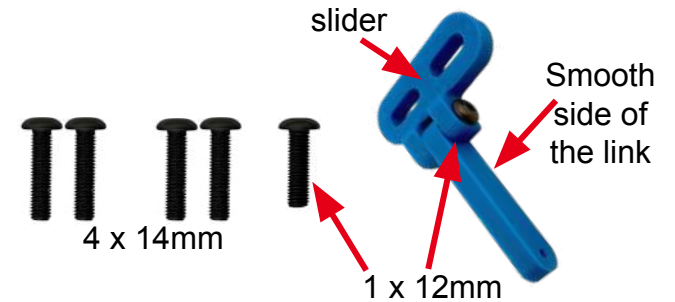
Step 3. Installing the Arms on the Shoulder

a. From the top (textured side) insert one M3 x 14mm screw through the **right arm** (verify zip tie mount down)**.**

b. Hold the arm tight to the shoulder to ensure that the screw stays perpendicular to the shoulder.

c. Use your 2.0mm hex driver or hex key to tighten each bolt:

   ○ **Too loose** = slop / visible gap between the arms and shoulder
   ○ **Too tight** = the arms don't move freely by gravity
   ○ **Just right** = gravity motion with no visible gaps

d. Repeat on the left**.**
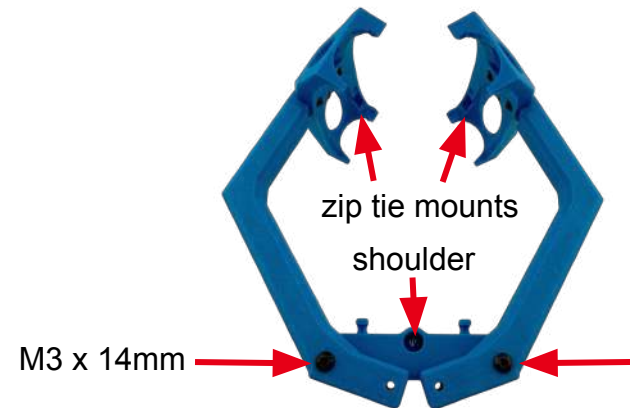
🏆 You can run the screw in until it just binds, then **back off slightly** until the arm swings freely.

9. Weapon Assembly

Step 4. Installing the Link Slider

🏆 **Lightly file the upper textured slider surface** to reduce friction.

a. Put 1 of the aluminum washers on each of the remaining **two M3 x 14mm screws**.

b. On the slider, make sure the link is toward the back of the bot (see picture on right). Insert the screws with the washers through the **slider** and into each **arm**.

c. Make sure each screw is **perpendicular** to the link when looking from two directions, 90 degrees apart, before tightening.

d. ⚠️ If you're using a power driver, **go slow** — no faster than 1 rev/sec. Spinning too fast creates friction heat that can melt the plastic.
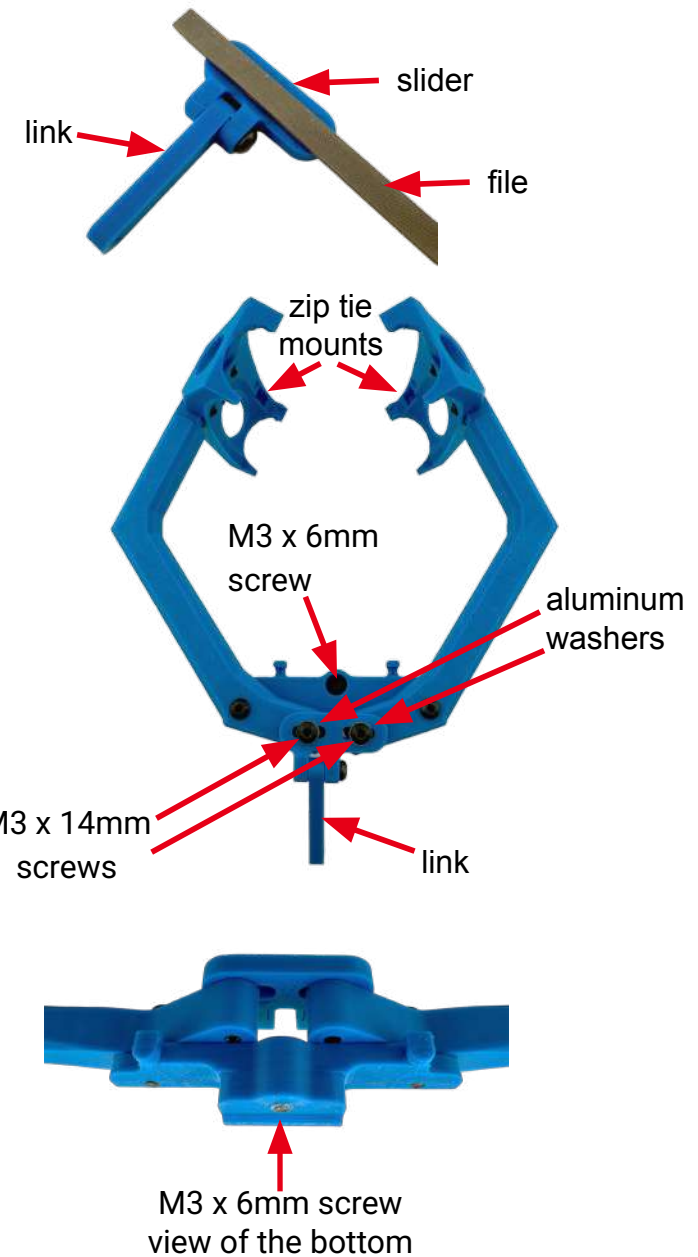
Step 5. Installing the Shoulder Angle Adjustment Screw

a. Install the **M3 x 6mm screw** into the recessed hole in the front of the **shoulder** from the top.

b. Run it in until it sticks out just past the lower surface of the shoulder.

c. ⚠️ If you're using a power driver, **go slow** — no faster than 1 rev/sec.

✅ **Final Check:** Once both sliders are installed:

- ❏ All joints should move freely
- ❏ There should be no slop

slider

link

file

zip tie mounts

M3 x 6mm screw

aluminum washers

M3 x 14mm screws

link

M3 x 6mm screw view of the bottom

9. Weapon Assembly

🎯 **The Goal:** To install the self-righting mechanism (SRM).

Step 6. Identify the Components and Orientations

a. Place the SRM on the table with the hook opening pointing to the left and the mounting holes closest to you. Then place the servo horn on the table with the spline mount (the thicker, raised cylinder) facing up. Insert the servo horn into the SRM.

b. Before adding any screws, check and adjust so that the **first (top) and third mounting holes of the horn** are visible all the way through the SRM.

Step 7. Install Silver M2 x 6mm Machine Screws

a. On the side without the spline-mount, install one **silver M2 × 6mm flat machine screw (1.5mm hex drive)** through the **third hole of the servo horn**, at the bottom of the slot in the self-righter. ✏️ Hold your finger on the opposite side to keep both pieces flush. This prevents the screw from pushing the far side out instead of threading correctly.

b. Flip the SRM over and install one **silver M2 x 6mm Machine Screws (flat) 1.5mm hex drive** into the **top of the slot** on the self-righter**, through the first servo horn hole**. The machine screws are more ideal, but if you're having trouble installing it, you can switch to the self-tapping (pointy) screws. ✏️ Only run this screw in until the tip is flush with the other side of the SRM to prevent it from catching on the link.

✅ **Final Check:** The self-righter should be tight and square against the servo horn.

spline mount

Step 7a third hole

Step 7b first hole
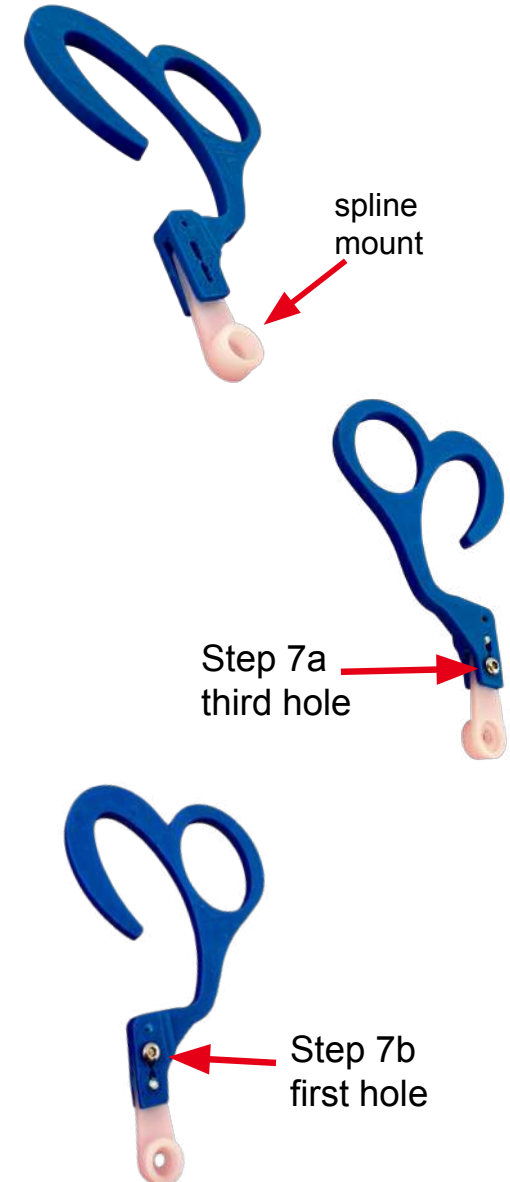
9. Weapon Assembly

🎯 **The Goal:** To mount the weapon assembly.

🔧 **Step-by-Step:**

Step 8. Deforming and Installing the Aluminum Rod

a. Temporarily slide the aluminum rod into the pivot mount. Note (or mark, as has been done in the pictures) where the rod will be contained within the mount. You must ensure that the deformation is within the mount, not in the space between the mount where the shoulder will eventually sit.

b. Remove the aluminum rod. Position the weapon assembly in the mount. Start with the non-squished end of the rod and slide it through the first side of the mount, then through the shoulder, and finally out the other side of the mount.

c. Make sure the deformed portion doesn't push all the way through the mount into the shoulder.

d. Once inserted, the weapon should **pivot freely**, and the rod should feel **well retained**. The aluminum rod will stick out both sides evenly.

pivot mount

shoulder

pivot mount
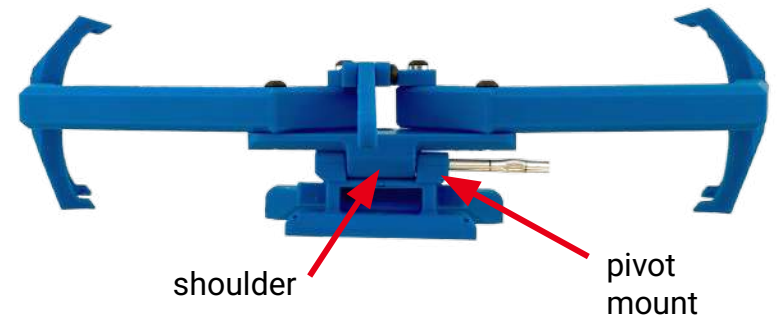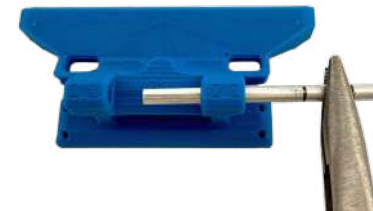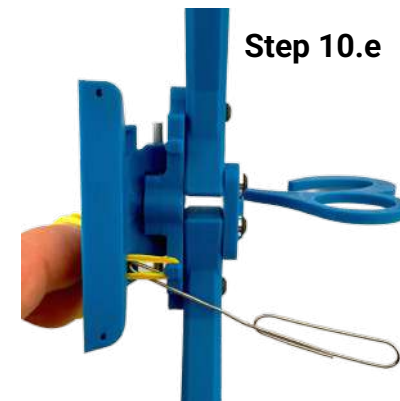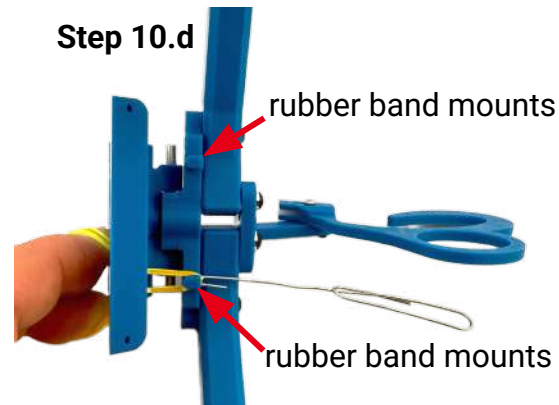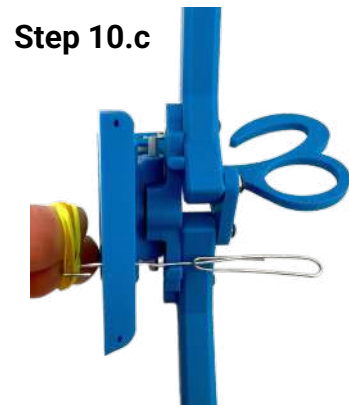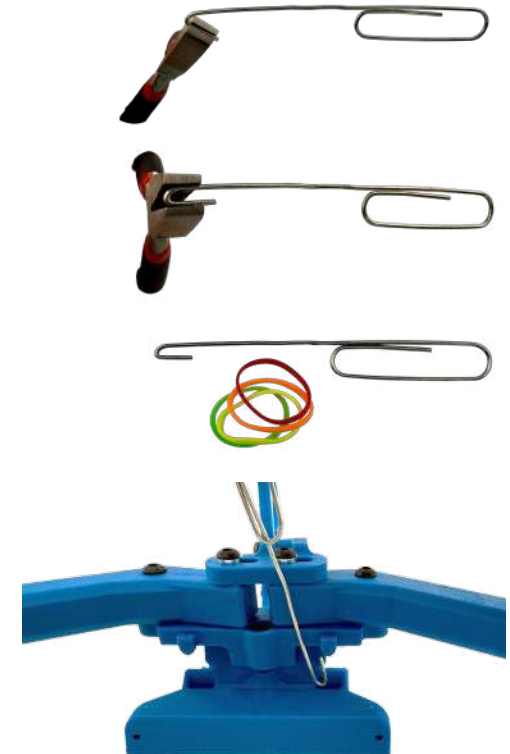
9. Weapon Assembly

Step 9. Installing the SRM

a.   Install the **M1.6 x 12mm screw** through the link from the left side of the bot. The screw should slide into the link, if it's tight, continue turning the driver to intentionally strip the hole and let the link pivot freely on the screw.

b.   The smooth side of the SRM will end up against the smooth side of the link.

c.   Continue turning the screw into the SRM, doing your best to keep the SRM parallel to the link.

M1.6 x 12mm screw

9. Weapon Assembly

Step 10. Installing the Rubber Bands

a. Use pliers to modify the paperclip to work as a hook to pull the rubber bands through the chassis and hook them onto the rubber band mounts.

b. Get approximately 6 of the rubber bands around **2 fingers** on one hand while keeping them as flat as possible. (More bands is more squeezing force before lifting, which is also more strain on the servo for the lift)

c. Insert the hook from the **top side** of the pivot mount, down through the slot in front of the shoulder and hook one side of all of the rubber bands.

d. Keep both fingers in the rubber band slightly separated to make it easier to loop the bands around the mount as you pull the bands through.

e. Once the bands are looped around the mount pushing the hook back toward the bottom of the bot makes it easier to remove the hook.

Step 10.c

Step 10.d

rubber band mounts

rubber band mounts

Step 10.e

9. Weapon Assembly

Step 11. Installing the Rubber Bands

a.   Pull the rubber bands past the other slot.

b.   Again inserting the hook through the slot from the top, catch one side of the rubber bands.

c.   Keep the bands pulled past the slot to keep the loop "wide" to make it easier to loop the bands around the mount.

d.   Once the bands are looped around the mount, pushing the paperclip hook back toward the bottom of the bot will make it easier to remove without dislodging or cutting the rubber bands.

✅   **Final Check:** The bands should be as neat and flat as possible under the pivot.
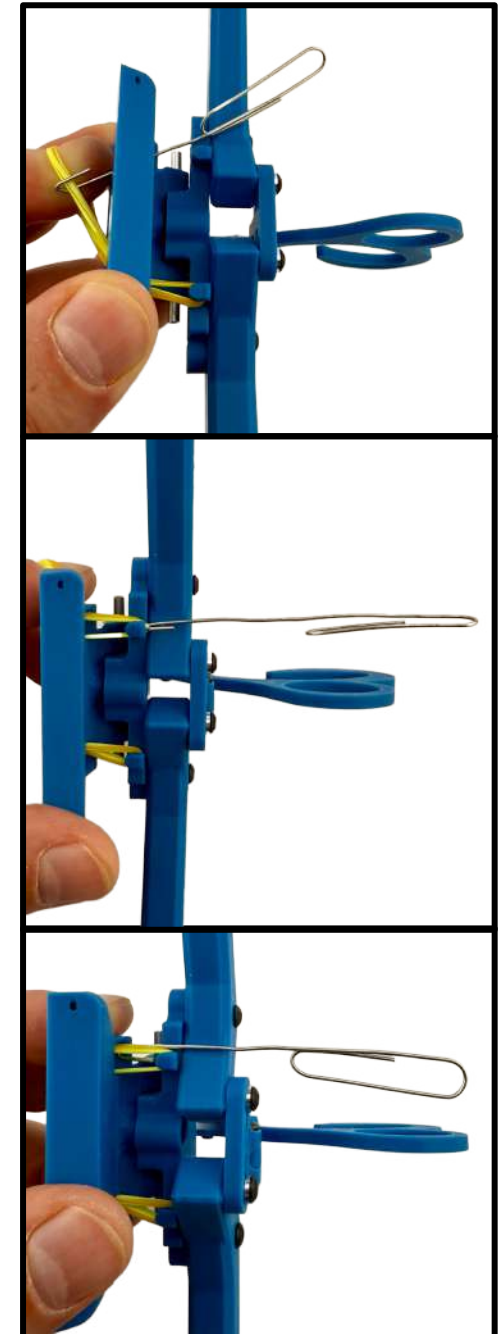
10. Weapon System Installation

🎯 **The Goal:** To install the weapon mechanism into the chassis.

✏️ **Overview:** Gripzilla's weapon mechanism includes a unique self-righter and claw system. In this step, you'll install the full mechanism into the chassis — but unlike other bots, Gripzilla's "rear-mounted" weapon requires that the motors must not be installed while installing the weapon.

🔧 **Step-by-Step:**

Step 1. Prepare for Installation

a. If the motors are already installed, carefully cut and remove the zip ties. Gently flex the chassis to lift the motors out of their mounts.

b. Place the motors out of the way near the battery and servo.

c. Set the assembled Gripzilla weapon into the rear of the chassis. Align the 5 holes in the pivot with the 5 mounting holes in the chassis.

Step 2. Secure the Weapon System

a. Use 5 self-tapping M2 x 6mm screws to secure the weapon to the chassis. These should be installed from the bottom.

b. Use a slow electric screwdriver or hand driver.
    Go slow — about 1 rotation per second. Going too fast can melt the plastic!

c. For final tightening, switch to manual turns to avoid overtightening.

✅ **Final Check:** The weapon assembly should be very firmly attached to the chassis and all 5 screws should be flush or slightly below the bot's floor level.
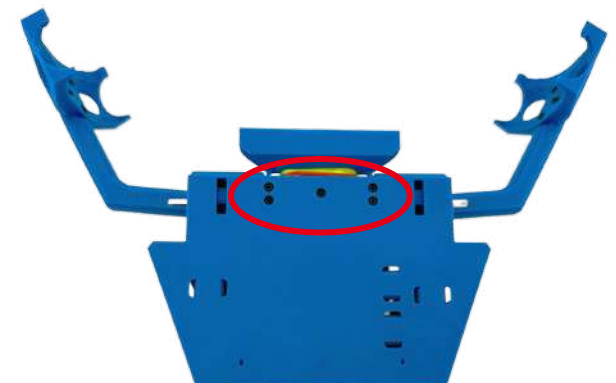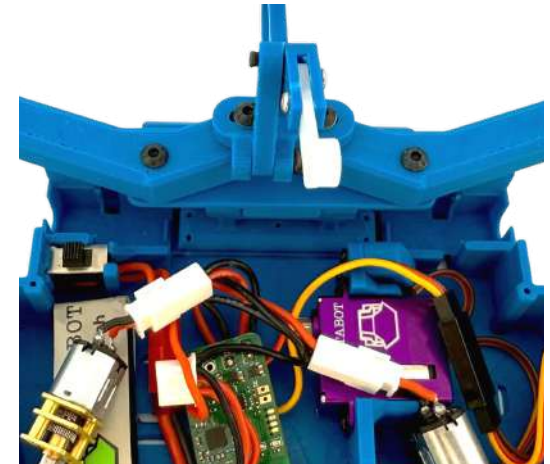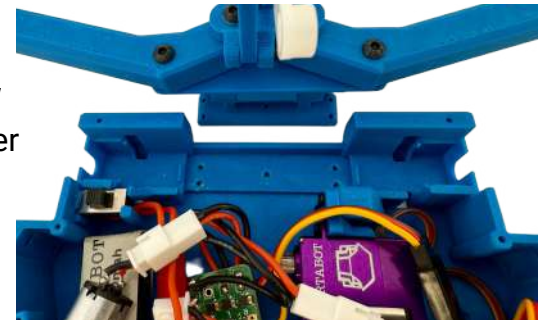
10. Weapon System Installation

Step 3: Install the Motors

⚠️ The chassis has **retention bars** that hold the motors tightly. Don't damage them! The laser-engraved RPM/speed numbers on the motors should be **facing up** so you can see them.

a. Line up the motor squarely in its slot.

b. **DO NOT** push down while the chassis is sitting on the table.

c. Hold the chassis i**n your hands** and **gently flex the side open <u>a little</u>** while you press the motor in.

d. Press straight in — don't twist or force it.

e. When installed correctly:

   ○ The motor will **snap in** securely

   ○ There will be **no stress marks**

   ○ The retention clips will still be in good shape

✏️ Install one motor at a time, ensuring the wires are routed correctly before snapping the second motor into place.
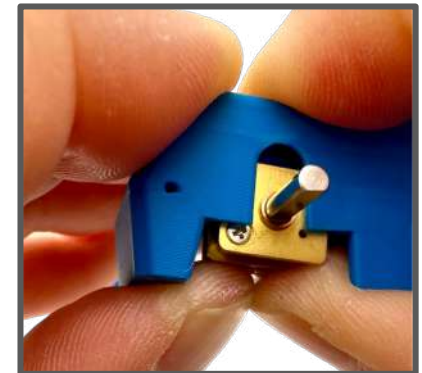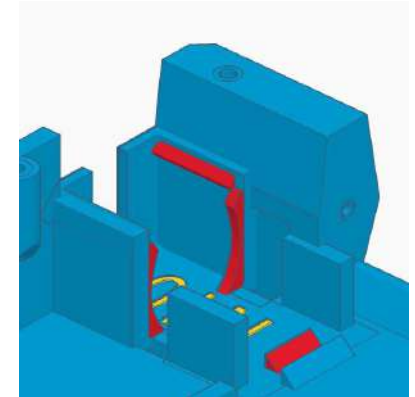
🎯 **The Goal:** To install zip ties with maximum tension to secure the motors.

Step 4:

a. Think about **where the zip tie tail needs to end** — we recommend it ending **toward the back** of the bot.

b. The zip ties start by going down in front of the motors, through the floor, then back up behind the motors.

c. Feed the tail through the head.

d. To get maximum tension, start tightening the zip tie and then slide the head as far forward as possible. This positions the head so the zip tie naturally wants to stay anchored on that side of the motor.

e. Then, pull the tail back across the motor. This stretches the zip tie tightly over the motor, increasing the tension.

f. You can also **roll the zip tie head over** with pliers to pull the tail through the head as far as possible.

g. Trim with flush cutters to leave a smooth edge.

✅ **Final Check:** Zip ties should be tight enough to be flat against the motors.

Step 4b

Step 4d

Step 4e

Step 4f

Final Check
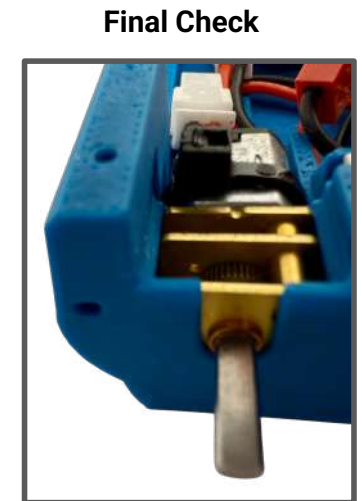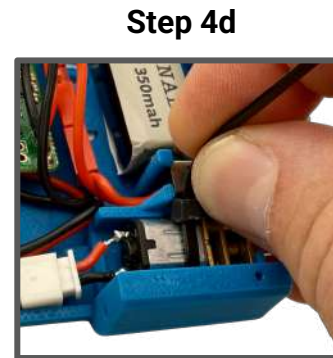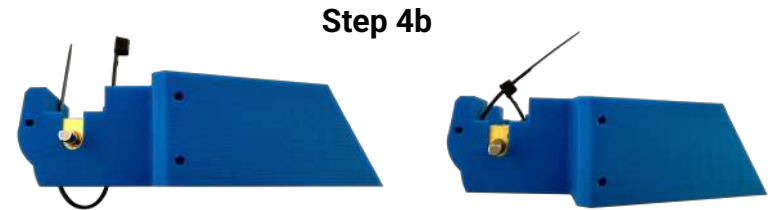
10. Weapon System Installation

🎯 **The Goal:** To get the servo horn installed in the correct position on the spline so that the weapon moves properly with the left stick. When the left stick is down, the horn and self-righting mechanism (SRM) should be up, and the arms wide open, ready to grab your opponent. When the left stick is moved up, the SRM rotates back, the arms close and then go up, grabbing and lifting your opponent.

spline

🔧 **Step 5: Set the Servo Horn Position**

a. Turn on the radio and the bot.

b. Watch the servo spline as you raise the left stick. For Gripzilla, it needs to rotate clockwise. You'll most likely need to adjust this in the radio settings to make it happen. *(On FlipFrenzy and SuplexSlam, the motion is opposite: the spline starts fully clockwise with the stick down and rotates counter-clockwise as the stick is raised.)*

SRM touching the slider

✏️ If Gripzilla's spline rotates counter-clockwise as you raise the stick, you'll need to reverse **Channel 3**. To do this, go to the next step, *"To reverse a channel…on the FS-i6 radio"*. Once the spline rotates clockwise as you raise the stick, return here and continue.

c. Lower the left stick all the way down (arms open) then bring the stick back ever so slightly.

d. Move the SRM forward until it just contacts the slider. Slide the horn onto the spline. You may need to rotate the SRM slightly away from the slider to allow the horn to slide on.

e. Move the left stick all the way down. The SRM should only lightly touch the slider.

10. Weapon System Installation

🔧 **Step 5 continued: Set the Servo Horn Position**

f. Slowly move the left stick up. The servo horn should get near horizontal and the SRM should get near the rear face. If not, you may need to move the horn one spline further counter-clockwise. Later, we will fine tune the weapon's top and bottom positions by using the radio's *end point* settings.

g. Move the left stick from top to bottom. At the bottom the SRM should touch or nearly touch the slider and at the top the horn should be nearly horizontal.

h. Install the phillips-drive servo horn screw tightly into the center of the horn. Because it's a steel screw going into a steel spline and all of weapon power goes through the horn, you should make it nice and snug so the horn doesn't come off during a match.

Servo horn near horizontal
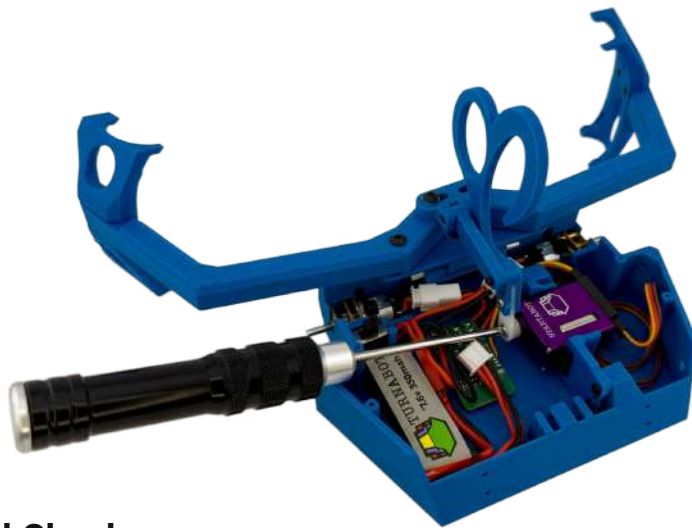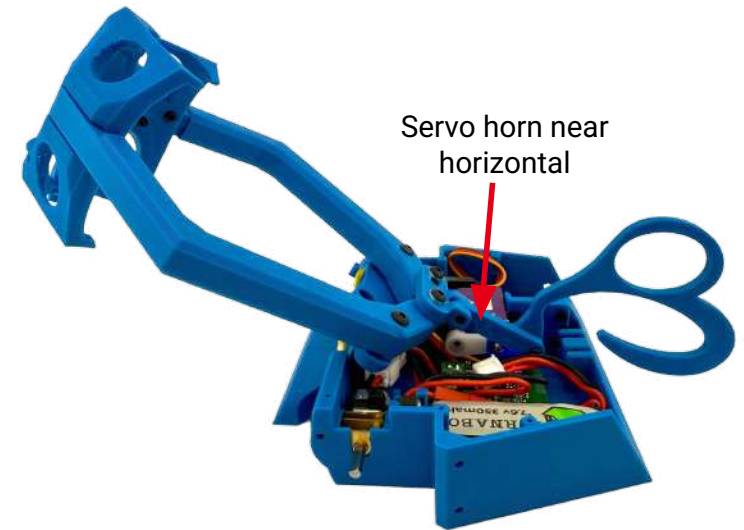
✅ **Final Check:**

Left stick down → weapon down / ready → claws all the way open, SRM near the slider
Left stick up → weapon up / grabbed and lifted → horn near horizontal

10. Weapon System Installation

🎯 **The Goal:** To reverse a channel… on the FS-i6 radio

Use this when the spline on your Gripzilla turns counter-clockwise as you raise the left stick.

🔧 **Step 6: Reverse a Channel**

a.   Turn on the radio → Hold the **[OK]** button to open the menu.

b.   Use the arrow buttons to move over to → **"FUNCTION SETUP"**

c.   Press **[OK]** to enter.

d.   The first item on the list is **"REVERSE"**
     Press **[OK]** again.

e.   You'll now see a list of channels (1–6).

f.   Press **[OK]** twice to highlight the **CH3** (Weapon / Flipper).

g.   Press the **up or down arrow** to reverse it.
     You'll see it switch from **"NOR"** (normal) to **"REV"** (reverse).

h.   Hold **[CANCEL]** to save and exit.

✅ **Final Check:** Test that the spline now moves clockwise when the left stick is raised.

11. Wheel Installation

🎯 **The Goal:** To mount the wheels so they stay on tight and spin freely.

🔧 **Step-by-Step:**

1. Install the tires on the wheels.

2. Turn the D-shaft of the motor until the flat side faces up.

3. Place the spacer on the shaft touching the chassis.

4. Line up the **D-flat** on the wheel with the D-flat on the motor.

5. Push the wheel on until the tire just **touches** the spacer.
   - The tire should touch the spacer gently
   - The wheel should still turn fairly easily.

6. Place the collet, tapered side first, into the wrench.

7. Hold the wheel still and **tighten the collet** using the wrench.

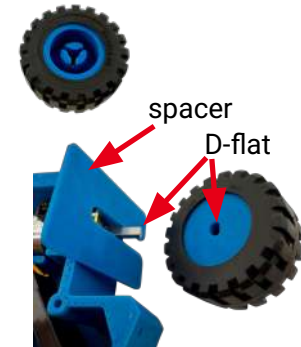8. Remove the spacer, hold the wheel and tighten the wrench nearly as hard as you can.

💪 The tighter the collet, the harder it is for the wheel to come off.

✅ **Final Check:**
Held up to a light, you should just barely see a gap between the tire and the chassis. The collet should be on far enough that there is a full thread visible.
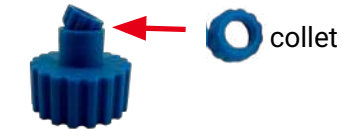
Step 1

spacer
D-flat

Steps 2, 3, and 4

Step 5

Step 6   collet

Step 7

Step 8

12. Armor Modification and Installation

🎯 **The Goal:** To cut the armor along the edges of the thin sections to fit Gripzilla's shoulder.

🔧 **Steps:**

1. Locate the thinner quadrilateral sections highlighted by the red rectangles on the underside of the left and right armor,.

2. Carefully cut the two edges on each armor plate using good scissors or flush cutters in order to end up with the parts visible in the bottom picture.

✅ **Final Check:** The armor should easily fit next to the shoulder.
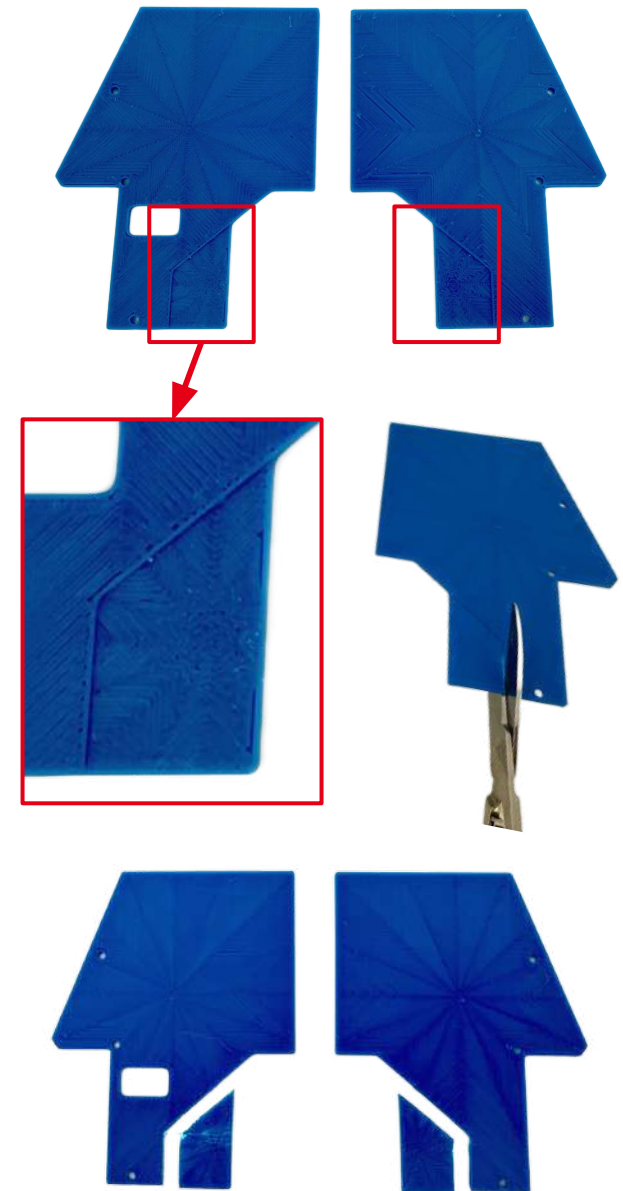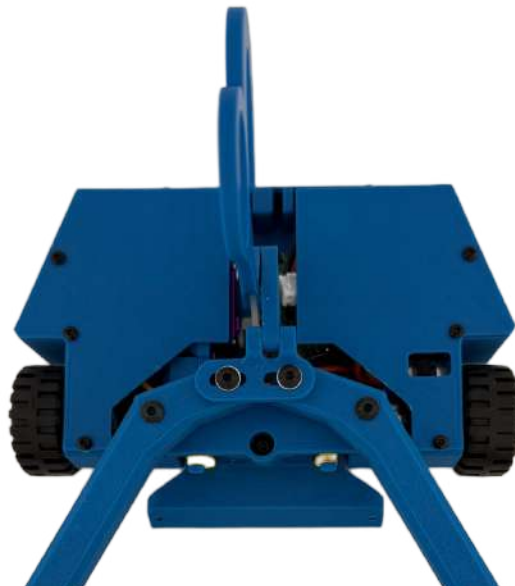
12. Armor Modification and Installation

🎯 **The Goal:** To secure the left, right, front, and rear armor.

🔧 **Steps:**

1. To make it easier to put the screws in, gently close the arms by hand with the bot turned off.

2. Position the **right top armor** in place, noting the opening for the switch.

3. Use a hand driver or slow electric screwdriver to install **3 black self-tapping screws** (M2 x 6mm self-tapping (pointy) 1.5 mm hex drive screws) per side.

   ⚠️ Go slow — 1 rotation per second max. Too fast can melt plastic!

4. Repeat for the **left top armor**.

5. Install **2 black self-tapping screws** (M2 x 6mm self-tapping (pointy) 1.5 mm hex drive screws) into the lowest holes on the "rear" armor and chassis.

6. Install **2 black self-tapping screws** (M2 x 6mm self-tapping (pointy) 1.5 mm hex drive screws) into the highest holes on the "front" armor and chassis.

7. Verify that there is a small gap between the front armor and the floor.

   ○ If there is no gap, raise either the front or rear armor to ensure that the tires make good contact with the ground.

   ○ If the gap is too large, lower the front or rear armor to ensure that other bots don't easily get under the front armor.

✅ **Final Check:** Pressing down on the claws or front armor, the chassis should tilt forward slightly, pivoting on the tires. As it tilts, a small gap should be visible under the back armor. Armor should be snug but not overly tight.

Small gap
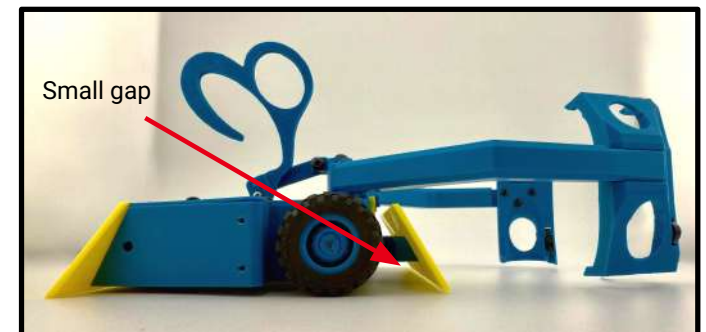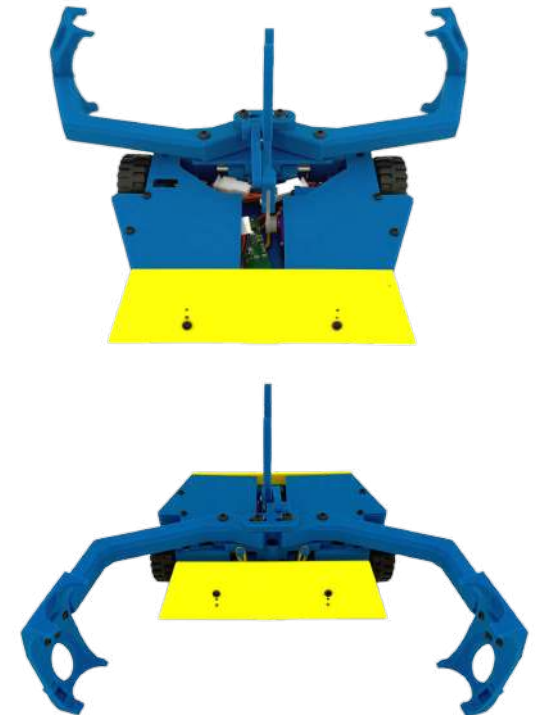
12. Armor Modification and Installation

🎯 **The Goal:** To secure the left and right wheel guards.

🔧 **Steps:**

1. Use a driver to run 1 of the **black self-tapping screws** (M2 x 6mm self-tapping (pointy) 1.5 mm hex drive screws) through the top hole in one of the wheel guards. Continue to spin the screw to intentionally strip the hole.

   ⚠️ Go slow — 1 rotation per second max. Too fast can melt plastic!

2. Repeat on the other wheel guard.

✅ **Final Check:** Wheel guards should be snug but not overly tight.

13. Zip Tie Installation

🎯 **The Goal:** To install the zip ties as ground-scraping forks for the claws and sprung tails for the chassis.

🔧 **Steps:**

1. Insert the zip tie **up through the upper slot in the claw from the inside**, loop it down and around the mount, back out, and through the head.

2. **Tighten it down firmly**, hold the head in place and pull the tail.

3. Create a downward curve by squeezing the tail tightly between your fingers and slowly pulling down, letting it slide through your fingers.
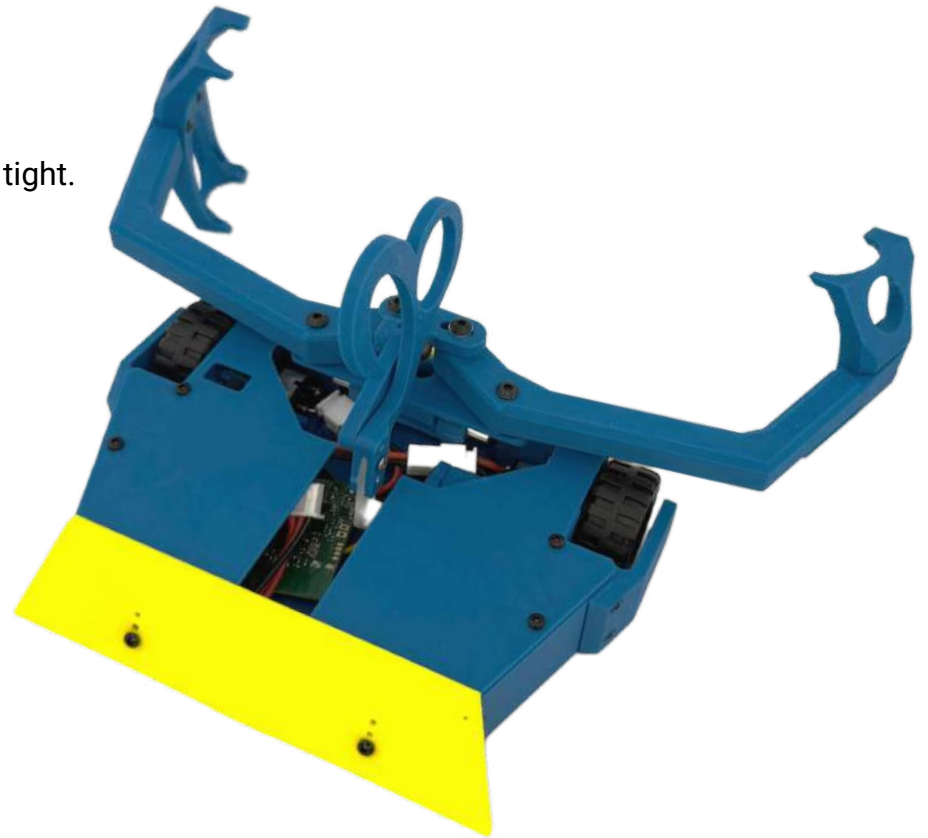
4. Repeat for the other claw.

5. Open the claws all the way and trim the zip ties half-way from the claws to a line extended from the chassis (approximately 1 inch long).

6. Cut at a slight angle to help the claws slide under your opponent.

✅ **Final Check:** Check that the zip tie ends are long enough and rotated down enough to firmly touch the surface beneath the bot.
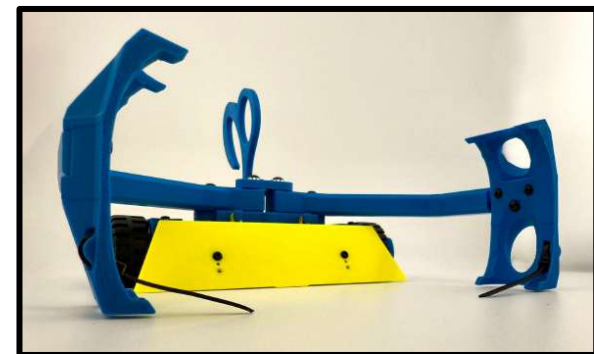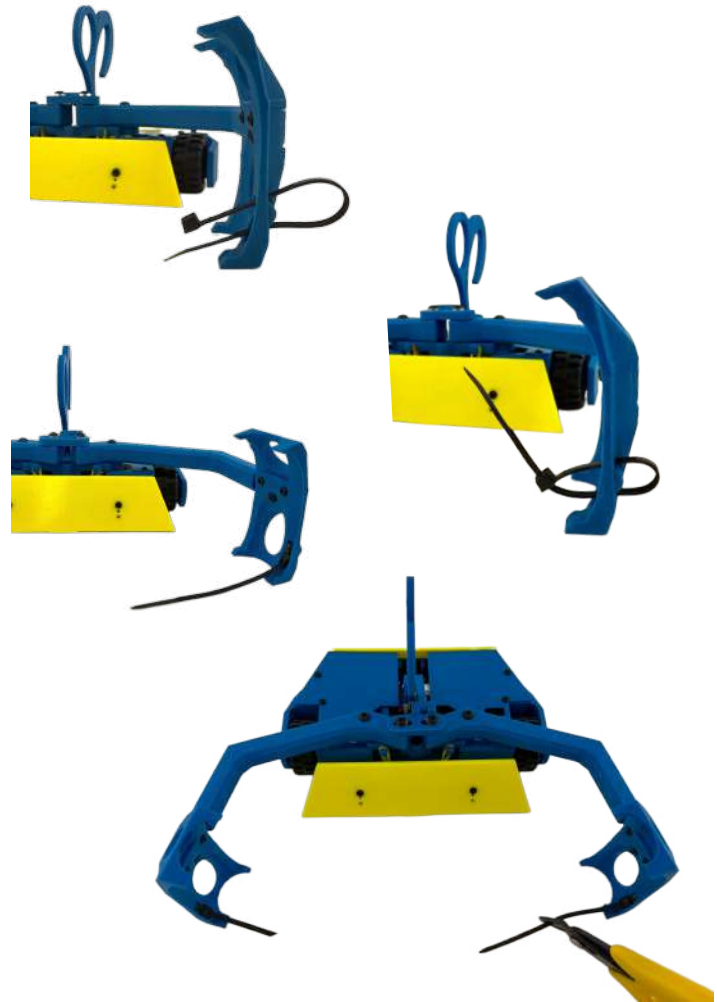
14. Shoulder Angle Adjustment

🎯 **The Goal:** To set the shoulder angle so that the claws themselves sweep just above the floor.

The claws should be positioned close to the floor to slip under opponents, but they must not press down too hard. Otherwise the claws will unweight the tires, losing traction and making driving weak and inconsistent.

🔧 **Steps:**

1. Use the 2.0mm hex key to adjust the shoulder angle adjustment screw so that the claws are just above the floor through the entire sweep.

2. Ensure that you check the claw-to-floor clearance through the entire sweep, you will need to remove the hex key from the screw to check the full-open position.
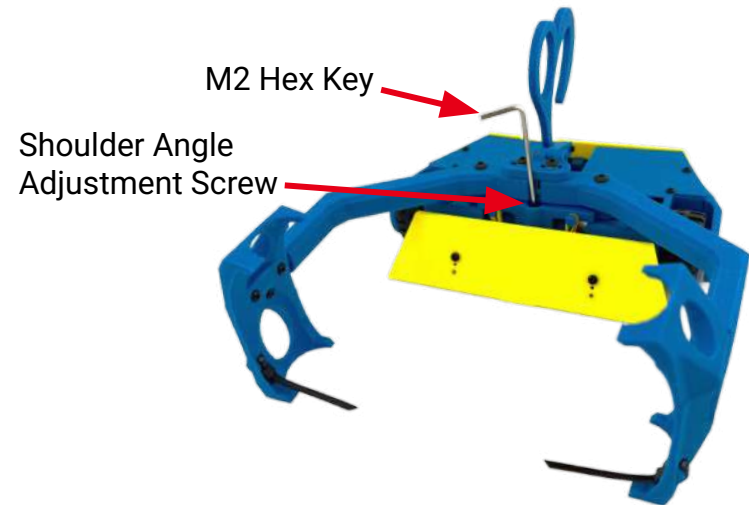
✅ **Final Check:** Ensure that the claws just hover above the floor to give the highest likelihood of making those great grabs.

M2 Hex Key

Shoulder Angle
Adjustment Screw

Notice the slight clearance under the claws
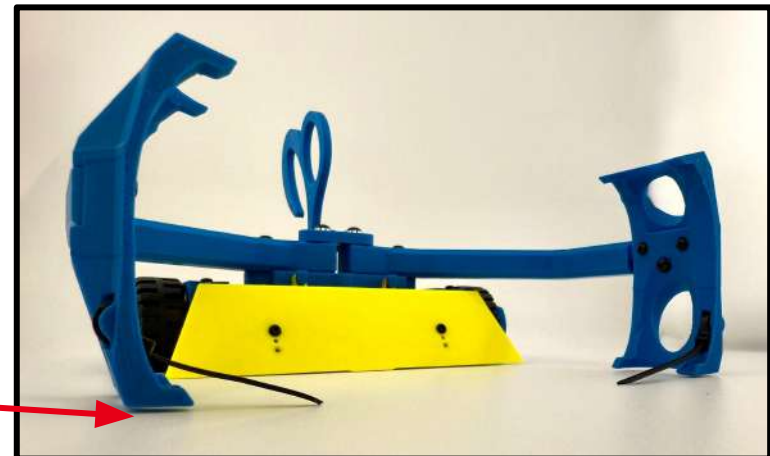
15. Radio Set Up

🎯 **The Goal:** To set weapon end points on FS-i6 radio (channel 3).

Setting the end points tells the servo **how far to move** when you push the stick up or down, so your arms move just enough without stalling the servo (which happens when it tries to move but gets stopped) or damaging the parts.

🔧 Step-by-Step:

1. Turn on the radio.

2. **Before you turn on the bot,** set the left stick (weapon / channel 3) about halfway up so the servo doesn't slam too far in either direction when you turn on the bot. (The servo will "jump" to its position when it turns on.)

3. Turn on the bot.

4. On the radio, as long as the backlight is on, **hold [OK]** to open the menu.

5. Use the arrow buttons to move over to → **"FUNCTION SETUP"** Press **[OK]** to enter.

6. Arrow down to → **"End points"** → Press **[OK]** again.

7. Press **[OK]** 3 more times to move the arrow down to **CH3** (the weapon channel).

🔽 **Set the Bottom (arms open)**

8. Slowly move the left stick down until the slider bolts reach the ends of the slots or the SRM touches the slider (also, the servo is likely to start audibly whining).

9. The arrow should be on the **left number** (this is the "low" endpoint).

10. Use the arrow buttons to adjust the value as you continue to lower the stick. With the stick all the way down, the arm should be wide enough that the longest parts of the arms are near parallel to each other.

15. Radio Set Up

🔼 Set the Top (arms closed and raised)

11. Move the left stick up until the servo horn gets near horizontal, the SRM contacts the rear armor, the SRM stops moving or the servo begins audibly straining again.

12. The arrow will move to the right number (this is the "high" end point).

13. Use the down button to lower the top value as you continue to raise the stick. You want the end of the link to go below the top of the chassis, but not so far that it's heavily loading the servo.

14. Watch the servo to move as you move the stick. As the loading on the servo increases, you'll see that the servo moves less for a given amount of stick travel. You may need to slowly move the stick up and down through the top 25% of travel a few times while adjusting the end point to get it set where the servo is always moving an appropriate amount for the amount of stick travel.

    *** If you are using a Startabot servo it will "sleep" if it's overloaded for more than a few seconds. If it is sleeping, lower the top endpoint until it does not sleep.

Save Your Settings

15. When you're happy with both top and bottom end points, **hold [CANCEL]** to save and exit.

🏆 Generally the end points will be between 60-110.

15. Radio Set Up

🎯 **The Goal:** To set up the radio so that the bot drives and actuates the weapon properly.

Check Driving Direction

1. Move the **right stick up** — the bot should go **forward**.

2. If it goes backward, go to the "**Reverse a Channel…**" section and reverse Ch2.

3. If it **turns**, go to the "**Invert a Drive Side…**" section to invert only one side..

4. If it goes forward, push the **right stick to the right** — the bot should turn **right.**

5. If it goes left, go to the "**Reverse a Channel…**" section and reverse Ch1.

15. Radio Set Up

🎯 **The Goal:** To reverse a channel... on the FS-i6 radio

Use this when your robot **turns the wrong way**, or when the **weapon opens instead of closes**.

🔧 **Step-by-Step:**

1. Turn on the radio → Hold the **[OK]** button to open the menu.

2. Use the arrow buttons to move over to → **"FUNCTION SETUP"**

3. Press **[OK]** to enter.

4. The first item on the list is **"REVERSE"**
   Press **[OK]** again.

5. You'll now see a list of channels (1–6).

6. Press **[OK]** to highlight the channel you want to reverse:

   - **CH1** = Steering (left/right)

   - **CH2** = Throttle (forward/backward)

   - **CH3** = Weapon / Flipper

7. Press the **up or down arrow** to reverse it.
   You'll see it switch from **"NOR"** (normal) to **"REV"** (reverse).

8. Hold **[CANCEL]** to save and exit.

✅ **Final Check:** Test that your bot now moves and grabs properly.

15. Radio Set Up

🎯 **The Goal:** To invert a drive side… use configuration mode

Configuration mode lets you change the Malenki's internal settings — like motor direction, drive mixing, and braking. These settings are saved even when the bot is turned off. Use this when your robot **turns when moving the stick forward or backward**.

🔧 **Step-by-Step:**

Switch D

1. Note which side of the bot moves **backward** when you pushed the stick forward.

2. Turn off the radio and the bot.

3. Turn the bot back on, **wait 5 seconds,** then turn the radio on.
   You are now in **configuration mode** (**blue LED flickers**).

4. On the radio, as long as the backlight is on, hold **[OK]** to open the menu.

5. Use the **DOWN** button to move over to → **"FUNCTION SETUP"** Press **[OK]** to enter.

6. Press the **DOWN** button 3 times → **Aux Channels**. Press **[OK].**

7. Press the **UP** button until **Channel 5 = Switch D (SWD)**.

Up

8. Hold **[CANCEL]** to save and exit.

9. Back out and go to **Display** to verify that Ch5 is **Low**.

10. Flip **Switch D up and down to send the correct number of High-Low pulses:**
    a. If the **Left** side of the bot moves backward then invert the Left drive side by sending **2** pulses.
    b. If the **Right** side of the bot moves backward then invert the Right drive side by sending **3** pulses.

Ch5 Low

11. The blue LED on the Malenki will **flicker back the same number** to confirm.

✅ **Final Check:** Test it again — forward should now be forward. If **left/right** is still reversed go back to the "**Reverse a Channel…**" section and reverse Ch1.

16. Test Drive & Self-Righting

🎯 **The Goal:** Time to make sure everything works!

Steps:

1. Turn on the **radio** and the **bot**.

2. Check motor response:

   ○ Push stick forward/back → bot moves as expected

   ○ Push stick left/right → bot turns as expected

3. Check the **weapon**:

   ○ With the stick down, the arms should be wide but not straining.

   ○ With the stick up, the link should be below the top armor and the servo should still be moving.

   ○ Flip the bot over on a surface and test the **self-righting** by moving the left stick up and down quickly.

If anything is reversed, go to the **Reverse a Channel** section in the radio settings. (Chapter 13)

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17. Optional - Advanced Tuning / Set Up

Adjust the Radio's Dual-Rates for more Control

Make your bot easier to drive precisely. This can also help make it easier to drive for new drivers.

1. On the radio, go to **Function Setup** → **Dual Rates**.
2. Select **Channel 1** (steering).
3. Adjust the **Rate** down to slow the overall steering speed ~80-90% often works well
4. You may notice that the right stick has to move fairly far to make the bot move.
5. Adjusting the **Expo** up to +20 or +25 will get the bot to start moving with less stick motion.
6. Flipping **Switch A** (Top Left) toggles between **Normal mode** and **Sport mode.**
7. You can set the **Rate** even lower in **Normal mode** for newer drivers, and keep the **Rate** higher in **Sport mode** for more experienced drivers!

Rubber Band/Switch Trick

You can use long rubber bands to hold all of the switches up on the radio to reduce the chances for confusion.

Ground Game

Acetate is very thin and flexible plastic. Gluing or double-sided taping acetate so that it sticks off the front edge of the plow by 2-4cm can massively improve your ability to get under your opponents.

Tire Cleaning

Cleaning the tires with duct tape is VERY helpful in competition. We generally tape down a long piece of duct tape, so that we can SLOWLY roll the tires on it between rounds.

Stripped Holes

Remember that you can use the bigger M2.5 screws if holes get stripped. They are in a separate bag of 4.

Switch A   Rubberbands

Expo