

Beetleweight - 3LB Robot Supplies

This resource sheet is just a collection of robot parts that can be used to develop a competitive Beetle Weight robot. These are not sponsors and there are other vendors that sell similar supplies. While I have used many of these products, there could be better parts elsewhere... If you find the pot of gold... please share so I can improve this list in the future.

Drive Motor and transmissions:

<https://rectifiedrobotics.com/products/brushless-drive-kit-beetleweight>

This Brushless Drive Kit comes with two of our 1806 2300kv brushless motors paired with our 22mm planetary gearboxes and **two 35A BLheli-32 ESCs preprogrammed for bidirectional operation**. This means that all you have to do is solder the motors to the ESCs, wire in your battery, and plug them into your receiver to have a fully operational brushless drive for your Beetleweight.

<https://www.fingertechrobotics.com/proddetail.php?prod=ft-bl-mega-spark-1500KV>

- Tuned for the perfect mix of speed and torque. Depending on wheel size, you can outrun or outpush any opponent!
- FingerTech's signature extra long shaft can be used for added inboard/outboard bearing support, or for extra wide wheels! Use a rotary disc to cut off the excess.
- The huge 6mm diameter shaft is plenty strong for mounting drive wheels directly.
- A nearly drop-in replacement for the common 22mm Brushed Planetary Gearmotor, these are 2mm larger diameter, but 3.5mm shorter in length, and 13.1grams (0.46oz) lighter!

<https://www.botkits.com/collections/all-products/products/22mm-dc-gearmotor-with-aluminum-gearbox>

battle-tested 22mm gear motors have been custom manufactured for us to maximize survivability during the heavy impacts of robot combat! The planetary gearbox uses steel gears throughout to minimize failures due to violent impacts. Our output shaft is made from hardened steel to provide maximum strength in combat situations. The output shaft is supported by two ball bearings to maximize efficiency. This is the ultimate motor for beetleweight robots!

780 RPM on 12 volts. A 3S LiPo pack is well suited to drive these motors, and 4S packs have been successfully used with these motors. The Scorpion Mini is a great ESC to drive these motors!

<https://robotmatter.com/collections/beetle-3lbs/products/mercurybox-bundle?variant=32974246772771>

Spec:

Gearbox Type: MercuryBox

Motor Type: BE1806 **1400KV** or 2300KV

Spec(**14:1**, 19:1, 27:1)

Length: L(33mm) + Motor Length(22mm): ~55mm

Weight: MercuryBox(51g) + BE1806(19g) = 70g

Preprogrammed Reversible ESC Spec:

Electronic Speed Controls:

<https://www.vexrobotics.com/276-2193.html>

Vex 29 **drive motor** controller

Red and black wires go to the motor

On the 3 pin side, red and black go to power source, white goes to signal wire on receiver

Vex 29 can NOT exceed 3s (11.1v) batteries

<https://www.fingertechrobotics.com/proddetail.php?prod=BL20A-R>

• 20A Brushless Speed Controller programmed for both Forward and Reverse directions (**for drive motors**)

<https://robotmatter.com/collections/beetle-3lbs/products/robotmatter-reversible-esc?variant=32011041505315>

30A Brushless Speed Controller programmed for both Forward and Reverse directions (**for drive motors**)

https://rectifiedrobotics.com/products/blheli_32-35a-esc-pre-programmed-bi-directional35A

Brushless Speed Controller programmed for both Forward and Reverse directions (**for drive motors**)

LiPo Battery Charger

<https://www.ebay.com/itm/383080641781>

Any lipo charger will work, but this is the best bang for your buck charger

Electrical connectors

<https://www.ebay.com/itm/383057406388>

Xt60 or deans connectors will work for 3lb robots

Batteries

<https://www.ebay.com/itm/131390821208>

This is about the size battery you're looking for in a 3lb robot, can be swapped for a smaller/larger battery depending on weight of bot or size limitations

Weapon ESC and motor Combo

30 amp brushless esc and 1400kv outrunner brushless motor combo

An outrunner brushless motor could also be swapped out for a 2838 inrunner brushless motor.

These are available at most RC stores.

Radio and Receivers:

Spektrum DX6i 6-channel 2.4Ghz DSMX Radio Transmitter Mode 2 - This was the ideal radio system years ago. It is no longer produced, but it might help guide your search for a suitable radio system. Most teams use a **Mode 2 transmitter**. *The weapon throttle on the left stick and drive on the right. (the right stick self centers)*

<https://www.getfpv.com/radios/radio-controllers/frsky-taranis-q-x7-access-2-4ghz-24ch-radio-transmitter.html>

FrSky Taranis Q X7 ACCESS 2.4GHz 24CH Radio Transmitter

The Taranis Q X7 ACCESS features 24 channels with a faster baud rate and lower latency, thanks to its high-speed module digital interface. Just like the rest of the ACCESS transmitters, the Q X7 provides a secure and reliable link, along with wireless firmware, making it compatible with the newest line of OTA receivers.

This is a great system, but you must set up and program the radio. It is NOT something you just take out of the box and it works... However, it is rather easy to program once you figure out how to do so and it provides a lot of adjustments to any channel that most radios do not...

A cheaper alternative is also available from Hobby King:

https://hobbyking.com/en_us/t6-dsmx-dsm2-mode-2.html

OrangeRx R615X DSM2/DSMX Compatible 6Ch 2.4GHz Receiver w/CPMM

Wheel Options

<https://www.fingertechrobotics.com/proddetail.php?prod=ft-twist-hubs>

FingerTech Twist Hubs (pair)

(4mm, .75 hubs for 3lb bots)

Wheels can be purchased from fingertech or be made from .75 foam floor mats cut to size with a holesaw

www.Banebots.com – any of their wheels would work, but they are on slightly the heavier size for a beetleweight robot.

Timing Pulleys & Belts

Pulleys for drive and weapon motors can be made on a lathe or 3d printed with anything but PLA

<https://sdp-si.com/tools/center-distance-designer.php>

Great site to size the timing pulleys and belts – plus you can download solid models which can be 3D printed.

Belts are typically timing belts or o-rings. Timing belts and pulleys can be purchased from **Fingertech Robotics**, they are the smallest and toughest belts around. For the round o-ring belts, the radius of the o-ring should be cut into the pulleys.

<https://www.fingertechrobotics.com/products.php?cat=Pulleys+%26+Belts>

Weapon metals...

Weapons are typically made from AR500, S7 TOOL STEEL, 4140, AND 4130. **S7 will need to be heat treated**

3D Printing:

3D printed parts and even entire chassis frames are common with combat robots. Depending on your application, there are several different filaments to consider: PLA, ABS, PLA+, Nylon, NylonX, and Onyx. PLA should only be used on internal parts that will not be subjected to direct impact since it is more fragile than the other possible options.

Robot Frame and Fasteners

Chassis are typically made from .375-.5 UHMW or HDPE, but they can be made from any material that will allow that bot to make weight.

Robots are typically held together by #8 sheet metal screws or by nut strips. **Nut strips** can be found on Fingertech Robotics – www.fingertechrobotics.com/proddetail.php?prod=ft-nutstrip

Typical arbor diameter is 3/8 and you can use a grade 8 bolt for this purpose.

All material and screws can be found on <https://www.mcmaster.com/>

Web Links:

3lbs builders guide and links – 10/20/2023

https://wiki.robojackets.org/3lb_Beginner%27s_Guide#Introduction

<https://robotcombatwiki.com/wiki/GettingStarted>

https://docs.google.com/document/d/1tXSzwzEM2jNGjZ2KYn00IdeHvEru0y3_zlNkVw-F9il/edit#heading=h.1wa7o4efnhd

https://www.youtube.com/playlist?list=PL_m9B4y_C-qqWCQ_f7wcc6GATmOQs8C-0 - Team Just 'Cuz Robotics – BattleBots veteran – robot Bloodsport. Has some great instructional videos on Beetleweight robots.

https://www.youtube.com/playlist?list=PL0zMZkIMlyC8z7O2rIMjmEsKnhU_e7Vlk - Robert Cowan- a BattleBots veteran - robot Copperhead. Shows how to build smaller robots.

<https://gonrl.org/wp-content/uploads/2018/12/NRL-Team-Resource-Guide-updated-11-18.pdf>

<https://bristolbotbuilders.com/guides.html#beetle>

<http://runamok.tech/AskAaron.html>

<http://azroboticcombat.com/gettingstarted/>

<https://justcuzrobotics.com/resources-main/guides-and-info>

<https://www.youtube.com/c/WitchDoctorTV/videos>
<https://www.youtube.com/c/BotsIQSWPA>
<https://www.youtube.com/c/RECombatRobotics/videos>

Top Current Robot Designs:

<https://www.nhrl.io/rankings>

Combat robot design calculators:

<https://www.technobotsonline.com/timing-pulley-distance-between-centres-calculator.html>
<http://runamok.tech/AskAaron/tools.html>
<https://sdp-si.com/tools/center-distance-designer.php>

Radio Mixing:

<http://www.teamcosmos.com/info/mixing.shtml>

Wheel Molding Guide:

https://docs.google.com/document/d/1gs1NRE-YWHr9Theb3ixVI_gpjp3BVdYdRXkD1FPMolM/edit#heading=h.ogid6qdpv54m

Online user groups:

<https://www.facebook.com/groups/1463505713957474/>

Robot kit Instructions:

<https://absolutechaosrobotics.files.wordpress.com/2023/07/jolt-kit-instruction-manual-v2.pdf>

Robot Parts Sites:

<https://robotmatter.com/collections/beetle-3lbs>
<https://www.getfpv.com/motors.html>
<https://hobbyking.com/>
<https://rectifiedrobotics.com>
<https://emax-usa.com/>
<https://itgres.com/robotics-kits/> - Can buy Fingertech parts without ordering outside of USA
<https://www.fingertechrobotics.com/>
<https://repeat-robotics.com/>
<https://justcuzrobotics.com/blogs/jcr/sourcing-parts>

Blog sites:

<https://www.etotheipiplusone.net/>
<https://thevariableconstant.blogspot.com/> Jamison Go – MIT Graduate – BattleBots Champion

<https://sites.google.com/view/andrewsmith924/fighting-robots/active-robots?authuser=0> *Charlies Wong – MIT Graduate – BattleBots Competitor.*

Robot Events:

<https://www.robotcombatevents.com/>

<https://buildersdb.com/>

<https://www.nhrl.io/>

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