PeasantCopter 3.0
Instruction Manual

Revision 1.0

Manual compiled by John McNelly

Questions or comments? We'd love to hear from you at info@peasantcopter.com

Introduction

Congrats! You opened the instruction manual. In fact, you even started to read the first page! You're way ahead of the game here; I bet half the people with a PeasantCopter didn't even know that this manual existed. Wow, you're on a roll! Nearly five sentences in, and you haven't even broken a sweat. I haven't gone that far into a user's manual in *years*. Have a sticker, you deserve it. (No, seriously, email me at info@peasantcopter.com with the subject line "I read it!" and your shipping address, and I'll send you a free PeasantCopter sticker of some sort).

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I. Assembly Instructions

What's In the Package

The PeasantCopter frame kit comes with everything you need to assemble the frame of your quadcopter, including frame plates and necessary hardware. Upon opening your package, you should find:

1 x 1/4" Plywood Arm Set (4 arms of either the 5" or 6" variety, depending on what you ordered)

1 x 1/8" Plywood Body Plate Set (1 front top plate, 1 battery tray, 1 skid plate, 1 main body plate, 2 side plates)

20 x 5/8" 4-40 Black Nylon Pan Head Machine Screws (arm mounting)

20 x 3/32" 4-40 Black Nylon Nuts (arm mounting)

4 x 2" 4-40 Aluminum Standoffs (camera cage standoffs)

4 x 1" 4-40 Aluminum Standoffs (rear cage standoffs)

10 x 3/8" 4-40 Zinc Steel Pan Head Machine Screws (standoff mounting)

20 x 8mm M3 Zinc Steel Pan Head Machine Screw (motor mounting)

1 x Epic PeasantCopter Sticker

If you think that anything is missing from your package, please shoot us an email immediately at sales@peasantcopter.com and we'll get things sorted ASAP. If you have lost components that were originally included in your package, via the dreaded oh-crap-it-bounced-off-my-workbench-and-I-can't-find-it move or through good 'ol fashioned crashing and bashing of your frame, shoot us an email as well and we'll see what we can do. Many hardware parts are also available separately on the PeasantCopter online store and your local hardware store (most PeasantCopter structural hardware is of the standard 4-40 variety).

Required Tools

Phillips-head screwdriver

Blue (removable) Loctite

Soldering Iron

Solder, Heat Shrink, Zip Ties, etc.

~40min of time

Recommended Components

Despite the fact that it's a 270-ish sized quad (larger with 6" props, smaller with 5" props), the PeasantCopter can run reasonably comfortably on a heavy-duty 250-sized miniquad setup. Here are the basic things that you will need to get in the air that are not included in the PeasantCopter frame kit.

4 x Outrunner Brushless Motor (2204 size or larger)

4 x Propellers (5030 or larger, 2 x CW and 2 x CCW)

4 x 12-20A ESC's (preferably with multirotor-friendly firmware like SimonK, Oneshot, etc.)

1 x Flight Controller (Naze32, CC3D; RIGHT ANGLE PINS RECOMMENDED)

1 x Flight Controller Mounting Kit (recommended, available separately from PeasantCopter.com...but velcro also works)

1 x Receiver

1 x Small Power Distribution Board (I recommend the Mini Hub PDB w/ 2 built-in BECs)

1 x XT60 Pigtail (male)

~2ft x 16AWG Silicone Wire (or thinner)

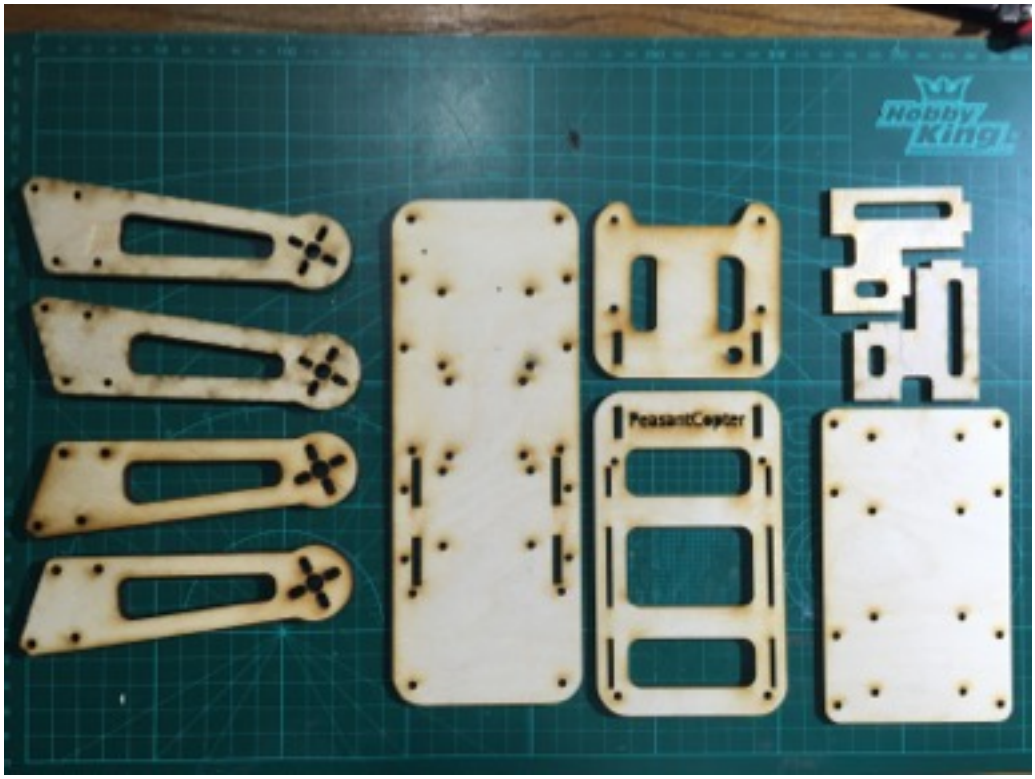
∞ x 3S / 4S Lipo Battery (below 2200mAh for lightweight zippiness, above 2200mAh for endurance)

Assembly Sequence

The parts depicted in these assembly photos may differ slightly from the ones in the frame you are assembling, as these photos were taken during the prototyping and design process, and some changes have since been made. However, the general idea of the build sequence images (4 arms, same number of body panels and screw holes) remains identical to the build process of a current-model PeasantCopter, so this guide should still provide a useful reference during the assembly process.

Step 1: Lay Out the Parts

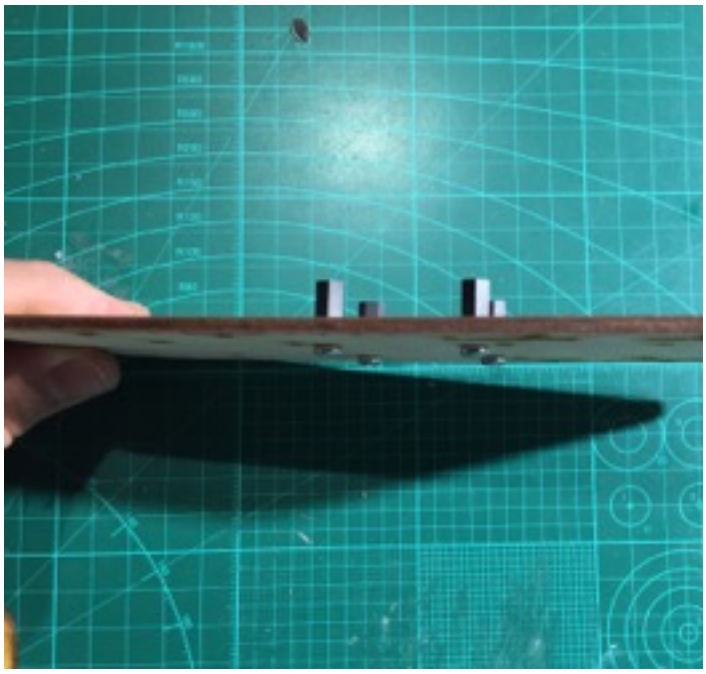
Got everything you need? Good. Let's keep going.

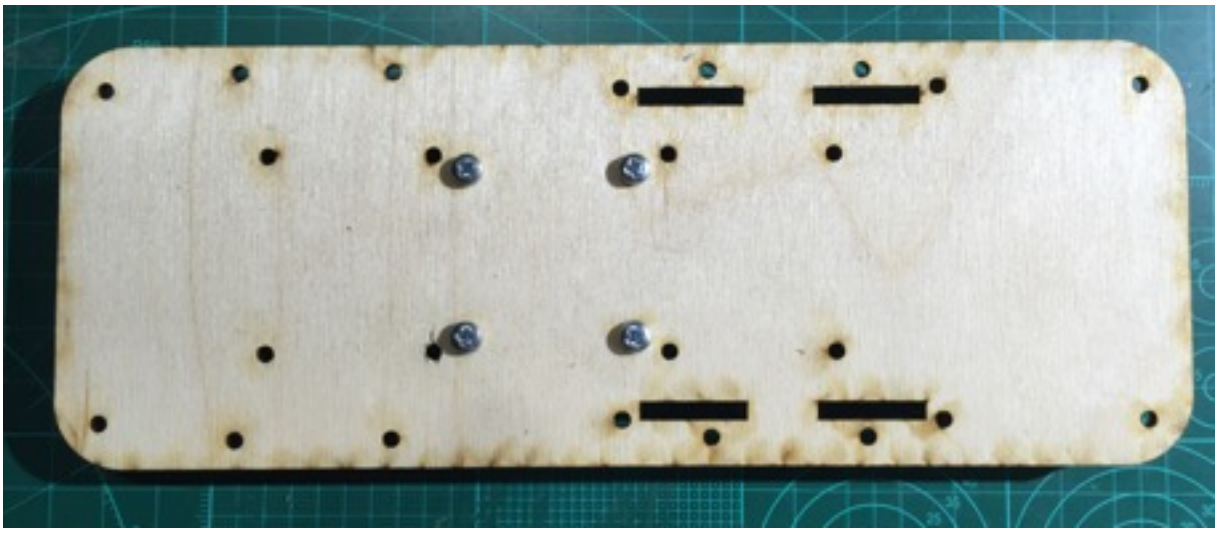


Step 2: Install Flight Controller Standoffs

If you plan to use standoffs to mount your flight controller, now's the time to install them (the bottom screws are tough to get to once you install the bottom

plate). The flight controller hardware kit sold on peasantcopter.com includes 4 M3 10mm nylon standoffs and 8 M3 6mm nylon screws (not what's pictured here). In other news, look at this amazing collage I made about the extremely complex process of installing four screws!

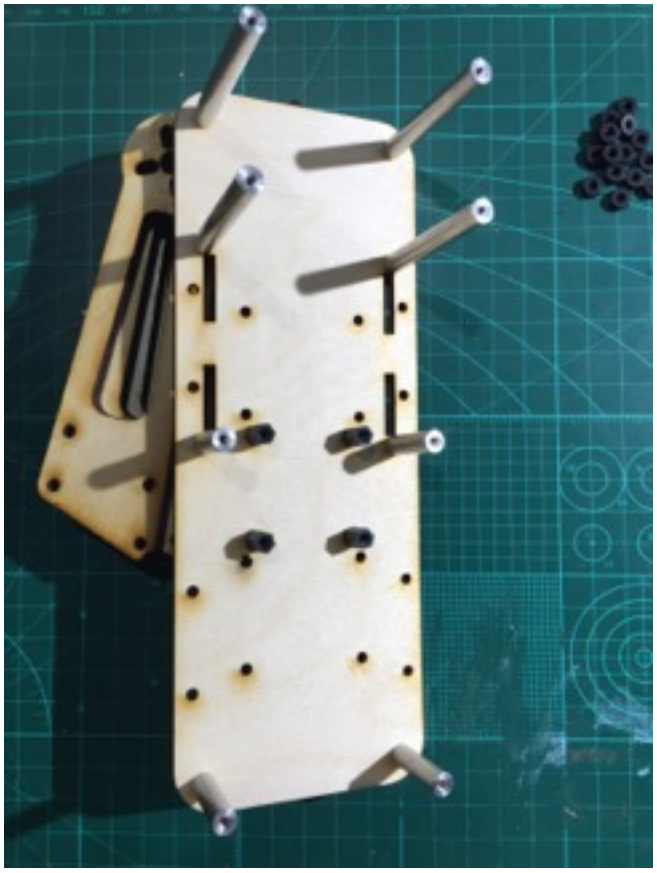




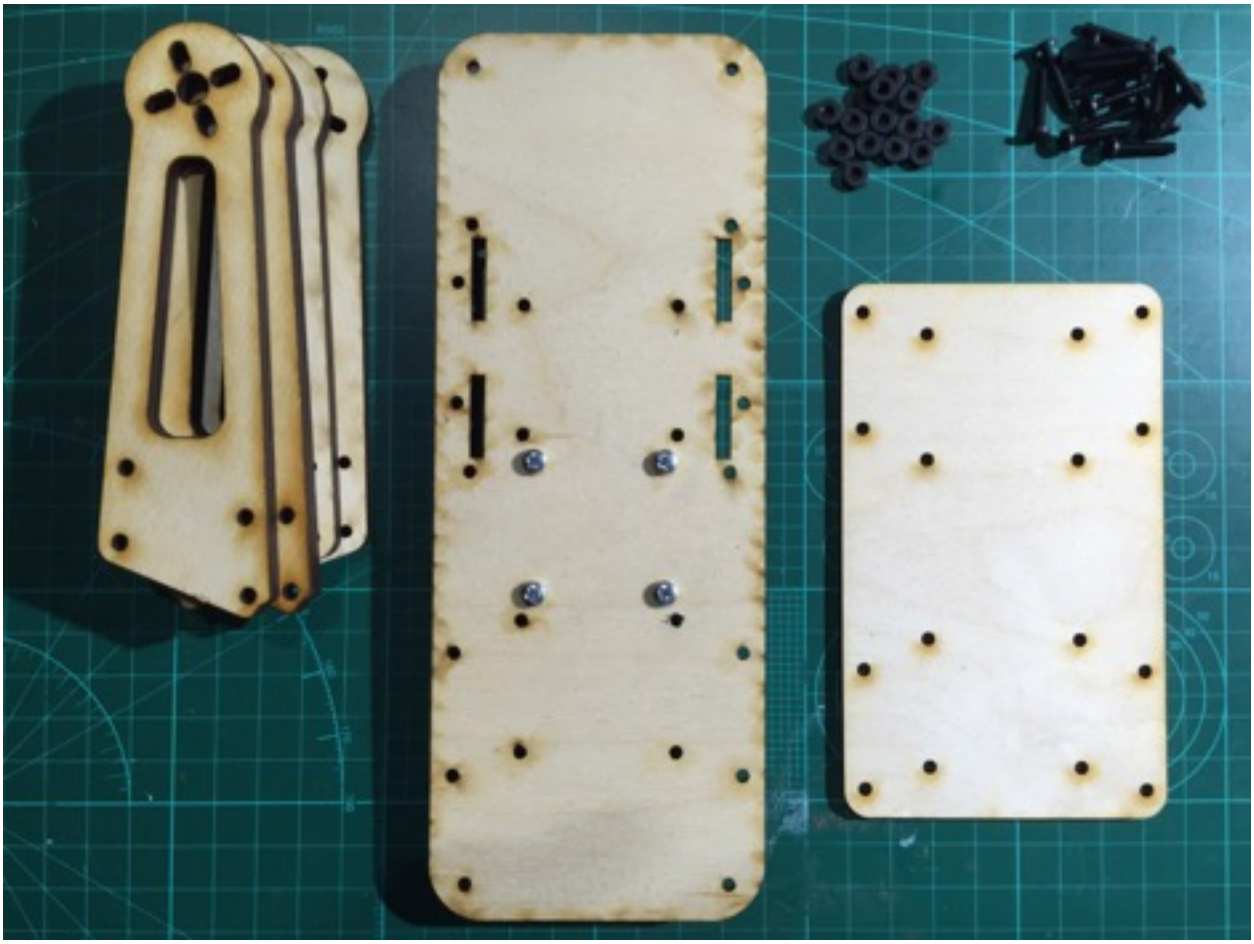
Step 3: Standoff Installation

Let's install the standoffs! Make sure you've got the main body plate (middle), the skid plate (right), the 1" standoffs, the 2" standoffs, and the 3/8" zinc steel screws. For good measure, let's prep for the next step, too; get out the arms (left), and all those little black rod-like things with the rough sides and the "X" on the top. What were they called again? Oh, and those black hexagons with the holes in the center, get those too.

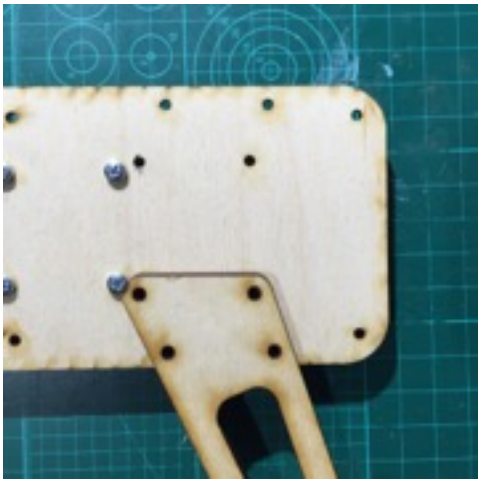
Install the standoffs by screwing in from the underside of the plate, as shown below. The definition of “underside” is up to you; the plate is symmetrical down the center, so either way up works just fine. Adding a dab of blue (removable type) Loctite to the screws and standoffs is a good idea, in case the screws decide to wiggle loose in-flight (they’re kind of hard to get to once you install the arms and the skid plate).



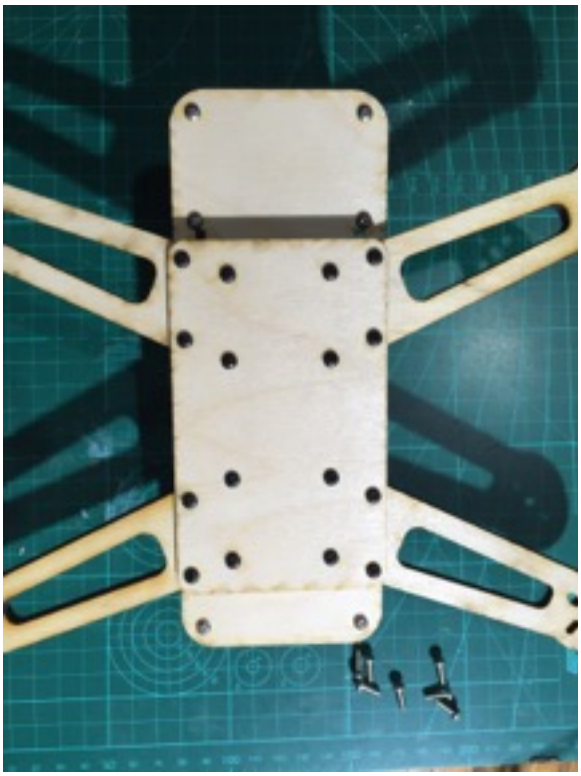
Step 4: Arm Installation

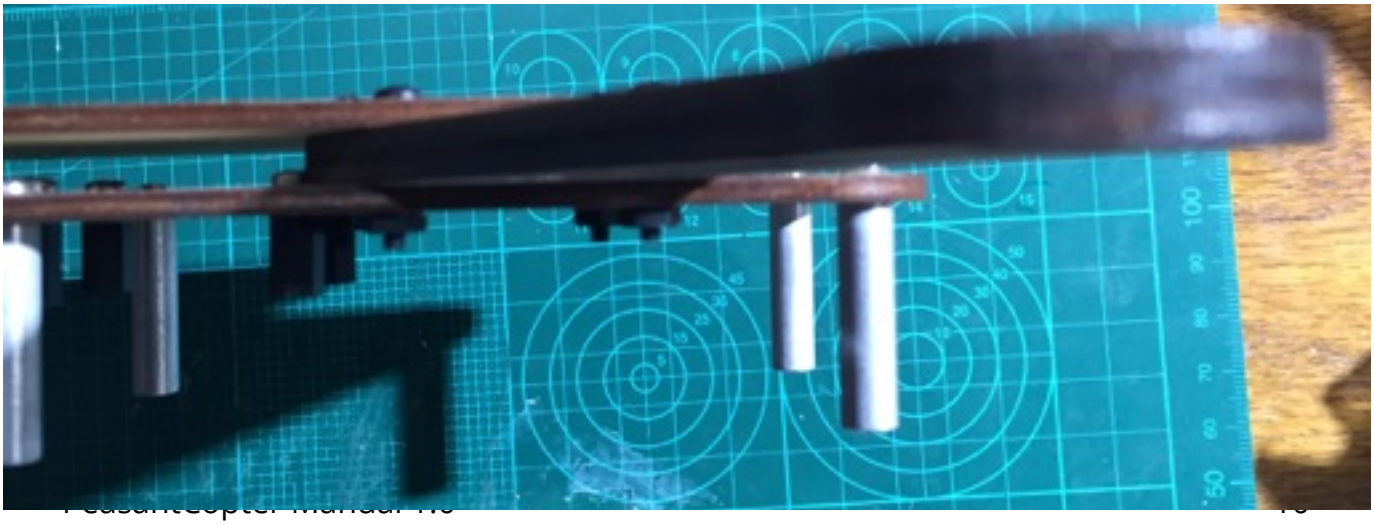


Fun Fact: the little divot in the edges of the arms are there to provide clearance for the screws for the flight controller standoffs. Nifty, right? I bet the guy who designed this was some kind of handsome genius.



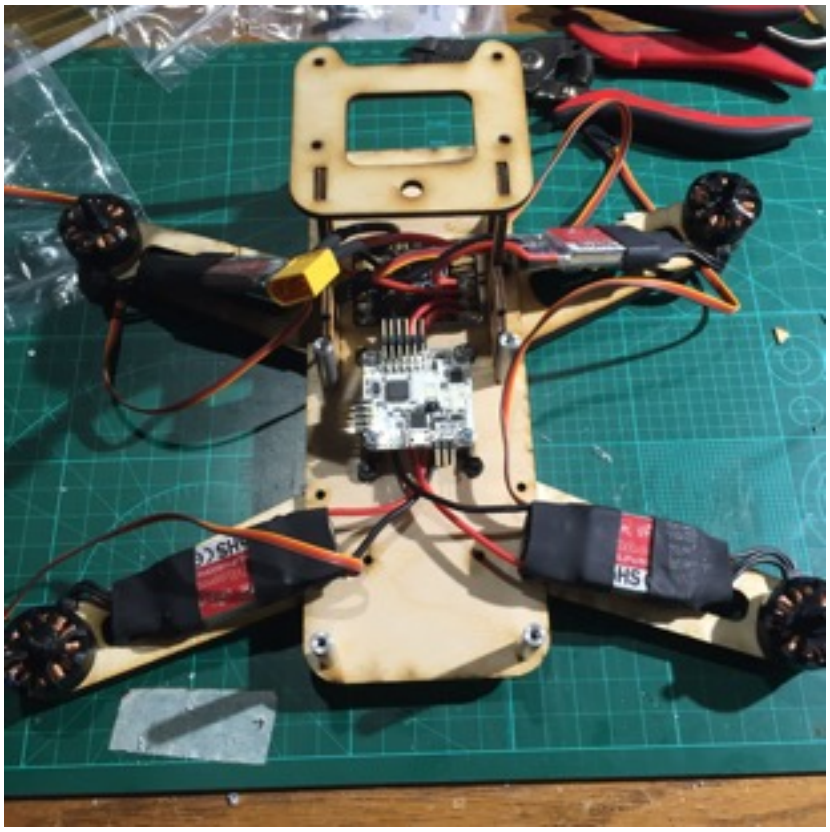
Screw in the 5/8” nylon machine screws from the underside of the skid plate, holding the nylon nuts on the top side with your finger. Be careful while screwing in the nylon machine screws, as they can strip easily. If you encounter difficulties with the screw stripping, proceed more gently and press down hard with the tip of the screw driver to get a better grip in the head of the screw. On the top side of the plate, the screws can be trimmed as necessary using a regular pair of wire cutters, scissors, the edge of a broadsword, or an x-acto knife.





Step 5: Electronics Installation

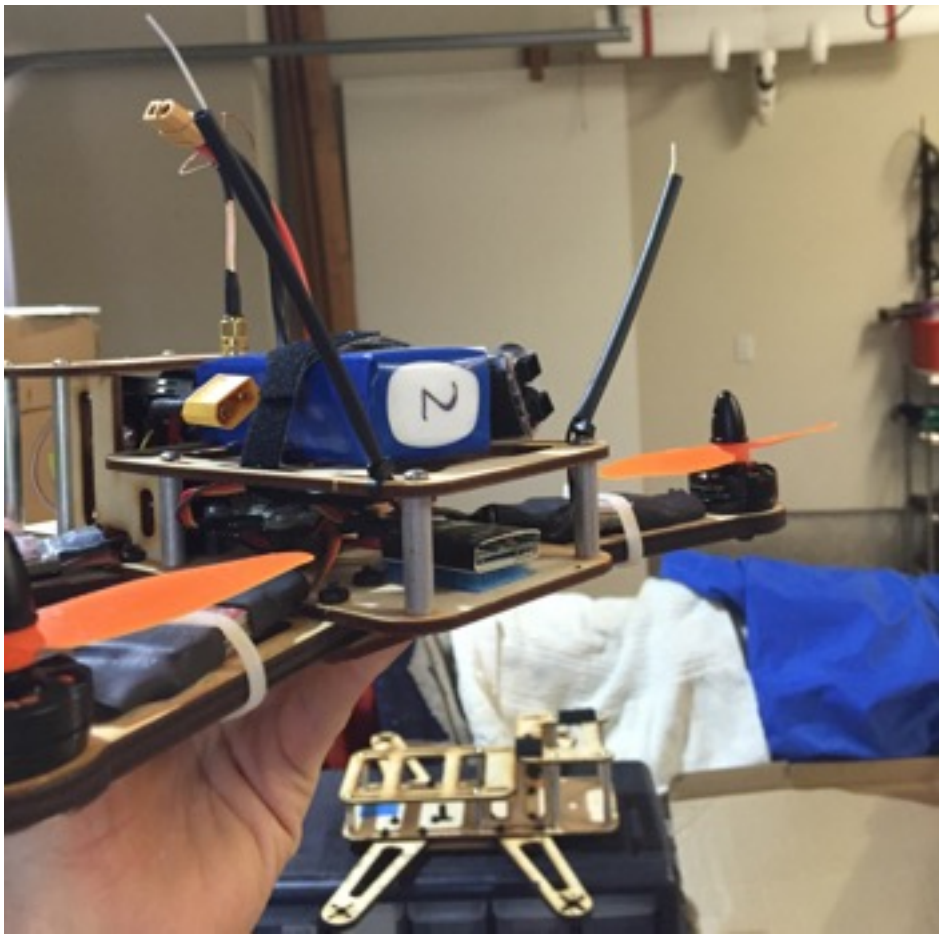
Once you've got the arms installed, it's time to add in your electronics! I recommend installing the PDB on top of the main body plate, in the forward section between the two side plates. If your Flight Control board is mounted on standoffs, it is often convenient to route power wires for the rear ESC's under the flight controller. With the PDB in the front of the frame, the space aft of the flight controller is a convenient mounting position for the receiver; CPPM cables, power wires, and other bits and bobs from the receiver can also be routed under the flight controller for a clean, good-looking build.



Once the motors have been bolted to the arms with the included 6mm M3 zinc steel machine screws, the ESC's have been zip-tied, and the rest of the

electronics have been secured, it's time to attach the top plates! Simply line up the slots and screw the plates in with the remaining 3/8" 4-40 zinc steel screws.

If you are using an FrSky D4R-II telemetry receiver or another receiver with the super long wire antennas, I recommend mounting the antennas with zip ties and heat shrink attached to the rearmost slots on the battery tray. Unsecured long-wire antennas will work, but they risk getting caught in props and generally start to look like a grasshopper's bad hair day after a few rough flights.



Ta-daa! You're done with the basic frame. Slap on some props and a battery and you're good to go! If you're planning to use the PeasantCopter for anything more than daytime LOS, take a look at the following sections for further reference.

Extras: FPV

The PeasantCopter serves wonderfully as an FPV ship, whether you're dodging trees in proximity flying or racing flat-out. The large front camera cage can easily accommodate a GoPro or a Xiaomi Yi action camera, and space is provided on top of the camera cage for a Mobius, Runcam HD, or similar action camera (velcro is my mounting method of choice). If you are planning to use a top-mounted camera like the Mobius as your recording camera, the space inside the camera cage can be used to accommodate a board camera like the PZ0420; small plastic housings for these cameras are available from security camera 2000 and other vendors for $5 shipped, and provide a convenient way to mount the camera in the desired position (screws allow the housing to be panned or tilted to the desired angle).

The top of the forward camera cage has a round hole in the back right corner, intended for mounting an SMA through-hole connector, so that the video transmitter can be stowed inside the frame while the FPV antenna is mounted on the top surface. If your video transmitter does not provide a through-hole mountable video cable, the antenna can also be stuck out the back of the forward camera cage.

II. Recommended Setups

The Air Circulator

If you're looking for a convenient way to get some fresh air into your room, but don't want to risk your quadcopter actually taking off, this build is for you! Slap on some motors smaller than 2204's, add an enormous 3S battery (at least 10,000 mAh), some lead weights, and wala! You've got a semi-useful, extremely dangerous air circulation device. It also doubles as a grass trimmer and basil shredder if you're persistent enough. Keep away from pets!

The Proximity Trainer

If you'd like to learn some proximity flying but don't need the raw punch-out power that you would find in a racing miniquad, the PeasantCopter performs respectably on 3S with 2204 motors and 5030 props. Flips and mild aerobatics are still doable, but the PeasantCopter won't quite be able to keep up with other quads in a race. That said, this setup is perfect for puttering around in the trees. 15mph is plenty fast when you've got a forest in front of you. With a 3S 2200mAh LiPo, the PeasantCopter hovers around half throttle with this setup and can get around 8 minutes of aggressive proximity flight time. Smaller 3S LiPos yield shorter flight times but better acceleration when you're in a tight spot.

The Usual

This setup is comparable to most high-end miniquads in acceleration and handling. With a 4S 2200mAh battery and 5030 props on 2204 motors, the PeasantCopter has enough get-up-and-go to do all kinds of tricky aerobatics, and can holds its own in a race. Proximity flying is also a lot more exciting on 4S, as you'll have enough power to make snappy changes in altitude whenever you please.

If you're a 3S guy, comparable flight performance can be attained with the use of 6030 props on a 3S battery (just be sure to purchase your PeasantCopter with 6"-prop-compatible arms!) Because of the propellers' larger diameter and increased moment of angular inertia, throttle changes won't have the same immediate effect as they would on 4S, but you can still have some epic climb outs and high-speed racing fun times.

The Crack-Addicted Jackrabbit

A 2200mAh 5S (or 6S!) lipo on 2208 motors with 6-inch props, you say? You're crazy. Certifiably insane. Try not to kill anyone, but send me some video. This is gonna be AWESOME.

III. PID Tuning

As of press time of this manual revision (1.1), the PeasantCopter is still a relatively new airframe, and flight testing is still underway. If you're reading these words, you're part of an intrepid band of explorers exploring the rugged frontier of PID tuning a new frame. Every setup has a different bank of optimal PID settings, but for now we're still fleshing those out. If you have a set of PID settings that works super well, let us know! We'd love to hear them. If you're just starting out, the PID settings for the QAV250 seem like a great place to start; they'll get you in the air no problem, and actually work quite well for racing and proximity.

QAV250 PID's for CC3D:

http://www.lumenier.com/images/product-images/qav250/qav250-pids.jpg

QAV250 PID's for Naze32:

http://beta.ivc.no/wiki/images/6/62/QAV250_naze32_pid1_ivc_2014-08-17.png

IV. Disclaimers

I bet you were expecting some legalize mumbo-jumbo, weren't you? Well, I'm not a lawyer, so I don't really speak that language. But, just for good measure, I thought I'd state the obvious; PeasantCopter is made for having fun, but please don't do anything with it that could endanger any person or animal's life, health, or property. And please, please stick to all applicable rules and regulations at all times. The multirotor hobby is a boatload of fun times for us all to enjoy, but it only takes a few people to bring the whole thing crashing down. This isn't to say you can't do stupid stuff with the PeasantCopter; that's what miniquads are for; racing, crashing cartwheeling into trees, and having fun—just be sure to exercise caution and sound judgement when you do. Oh, don't forget to turn on your video camera. I totally want to see some of that awesomeness.