

Drone Build

Table of contents

1	1. Quadcopter Frame	1
2	2. Motors	1
3	3. Electronic Speed Controllers (ESC)	1
4	4. Flight Controller (FC)	1
5	5. Propellers	2
6	6. Battery (LiPo)	2
7	7. Radio Transmitter & Receiver	2
8	8. FPV Camera & Video Transmitter (VTX)	2
9	9. GPS Module (optional)	2
10	10. Power Distribution Board (PDB)	2
11	11. Miscellaneous Parts	3
	11.1 Recommended Parts Table	3

1 1. Quadcopter Frame

- **Frame Size:** Choose based on your requirements (racing, freestyle, camera drone). Common sizes are 150mm (micro), 250mm (freestyle/racing), 450mm (camera/freestyle).
- **Material:** Carbon fiber is lightweight and durable. Avoid plastic unless for toy drones.
- **Mounting:** Ensure the frame supports the components you're planning to use (motor mounting pattern, flight controller size, etc.).

2 2. Motors

- **Motor Size:** Defined by numbers (e.g., 2205). First two digits refer to the stator diameter; the second two are stator height.
- **KV Rating:** Determines motor speed. Higher KV = faster motor, but less torque. Choose based on propeller size and battery.
- **Type:** Brushless motors are most common due to efficiency and durability.

3 3. Electronic Speed Controllers (ESC)

- **Amperage Rating:** Choose ESCs that support the motor's current draw (check motor datasheets). Add a 20-30% safety margin.
- **Number of ESCs:** 4 individual ESCs or a 4-in-1 ESC board. 4-in-1 simplifies wiring but may be harder to replace individually.
- **Firmware:** BLHeli_S or BLHeli_32 are common for advanced features and performance

4 4. Flight Controller (FC)

- **Processor:** F7 or F4 processors are common. F7 provides more future-proofing and features.

- **Gyros:** Look for FCs with high-performance gyros for smoother flight. MPU6000 is reliable for most builds.
- **UART Ports:** Ensure enough ports for your accessories like GPS, telemetry, and receiver.
- **Firmware:** Betaflight or iNav for FPV racing/freestyle, or ArduPilot for more advanced features.

5 5. Propellers

- **Size:** Propeller size should match the motor and frame size. Common sizes are 5-inch for freestyle and racing, 6-8 inch for medium, and larger for camera drones.
- **Pitch:** A higher pitch increases speed but reduces flight time. Choose based on your flying style.
- **Material:** Nylon with glass fiber is durable and affordable.

6 6. Battery (LiPo)

- **Cell Count:** Defined as 3S, 4S, etc. More cells mean higher voltage (3S = 11.1V, 4S = 14.8V).
- **Capacity (mAh):** Larger capacity gives longer flight time but increases weight. Balance capacity with weight for your drone size.
- **C Rating:** Defines discharge rate. Higher C rating = more current output. Choose at least 30C-50C for racing drones.

7 7. Radio Transmitter & Receiver

- **Channels:** At least 6-8 channels are recommended for basic drone control.
- **Range:** Choose a transmitter with sufficient range (consider 2.4GHz or long-range 915MHz systems for FPV).
- **Receiver Type:** FrSky, FlySky, Spektrum, or Crossfire depending on your preferred brand and features.

8 8. FPV Camera & Video Transmitter (VTX)

- **FPV Camera:** Look for low-latency cameras with high-resolution (600TVL to 1200TVL) for a clear FPV feed.
- **Video Transmitter (VTX):** Choose based on the required range (25mW for short-range, 200-600mW for longer ranges).
- **VTX Band:** Make sure your VTX operates on legal frequencies in your country (typically 5.8GHz).

9 9. GPS Module (optional)

- **Purpose:** Adds features like Return-to-Home (RTH) and position hold. Essential for camera drones and advanced features.
- **Compatibility:** Ensure it's compatible with your flight controller firmware.

10 10. Power Distribution Board (PDB)

- **Current Rating:** Ensure it supports the combined current draw of all your components.
- **Built-in Features:** Some PDBs come with built-in voltage regulators or OSD (On-Screen Display) for telemetry.

11 11. Miscellaneous Parts

- **LEDs:** For night flying or visibility.
- **Buzzer:** Helps locate the drone in case of a crash.
- **XT60 Connectors:** Common connectors for LiPo batteries.

11.1 Recommended Parts Table

Component	Recommendation	Description	Price Range
Frame	TBS Source One 5-inch Frame	5-inch freestyle frame, sturdy, affordable	\$30 - \$50
Motors	Emax Eco II 2207 1700KV	Budget-friendly motors, great for 5-inch props on 6S batteries	\$50 - \$70 (set)
ESC	Hobbywing Xrotor 45A 4-in-1 ESC	High-quality, reliable 4-in-1 ESC	\$50 - \$70
Flight Controller	Mamba F405 MK2 Flight Controller	Reliable FC with F405 processor, great for Betaflight builds	\$35 - \$50
Propellers	HQ Prop 5x4.3x3 V1S	5-inch prop with great durability and flight performance	\$3 - \$6 (set)
Battery	Tattu 1300mAh 4S 75C LiPo	Popular LiPo battery for freestyle drones	\$25 - \$40
Transmitter	FrSky Taranis QX7	Reliable transmitter, supports OpenTX for custom setups	\$120 - \$150
Receiver	FrSky R-XSR Receiver	Compact receiver with good range and telemetry	\$20 - \$30
FPV Camera	Runcam Phoenix 2	Low-latency camera with excellent image quality	\$30 - \$40
VTX	TBS Unify Pro 5G8 HV	Trusted, powerful VTX with multiple power output options	\$40 - \$60
GPS Module	Beitian BN-220 GPS	Compact and reliable GPS module	\$15 - \$25
Power Distribution Board	Matek PDB XT60	PDB with built-in 5V/12V BEC for powering peripherals	\$10 - \$15
Buzzer	ViFly Finder 2	Self-powered buzzer with locator function	\$15 - \$20

This guide gives an overview of the essential components needed to build a quadcopter, along with recommendations that balance performance and budget.