

AEDES NETWORK · BUILDER MANUAL

AR-7

Long-Endurance Hybrid-Frame Quadcopter · 320mm 7-inch class

DOCUMENT	BUILDER MANUAL · v1.0
Target build time (experienced)	4–6 hours per unit
First-build time	12–15 hours
Skill level required	Intermediate (prior FPV build experience or completed Disposable Aedes MD build)
Tooling cost (one-time)	\$200–350 for full bench setup
Per-unit BOM cost	\$280–360 at network sourcing
Output cadence (1 builder, full bench)	1 unit per day at quality
Service life	200+ flights with routine maintenance

NOTE · Read this manual end-to-end before starting your first build.

The AR-7 is a multi-use platform. Unlike the Disposable Aedes MD, this airframe will see hundreds of flights and is expected to perform reliably under sustained load. Build quality matters at every step. Skipping ahead in this manual is the most common cause of warranty claims.

TIP · Build the Disposable Aedes MD first if this is your first FPV build.

The Disposable Aedes MD shares 70% of the same techniques but is more forgiving of beginner mistakes. Network builders are encouraged to complete at least 3 Disposable Aedes MD units before attempting their first AR-7.

1. About This Build

What you are building

The AR-7 is a 320mm-class hybrid-frame quadcopter optimized for long-endurance ISR, communications relay, mapping, and repeated logistics. Unlike the Disposable Aedes MD, this airframe is expected to fly hundreds of missions over a service life of multiple years. It is the workhorse of the Aedes platform.

Why hybrid frame architecture

The AR-7 combines 3D-printed body components with pultruded carbon fiber tube arms. This architecture solves the three failure modes that destroy fully-3D-printed airframes at sustained 7-inch loads:

- **Vibration fatigue** — CF tubes are vibrationally inert; printed plastic arms develop micro-cracks at layer lines
- **Heat soak** — CF doesn't soften under sustained motor heat; PETG begins yielding above 75°C
- **Crash recovery** — a bent CF tube is a \$5 swap, completed in 10 minutes; a bent monocoque is a 6-hour reprint

Production parallelism

The AR-7 build is designed to parallelize across a multi-builder cell. A 4-person cell can sustain 8–12 units per week using this division of labor:

ROLE	RESPONSIBILITY	TIME
Print operator	Body component prints across multiple printers	6–8 hr (passive)
Tube prep specialist	Cut, chamfer, deburr CF arms; test-fit motor mounts	10 min/unit
Electronics specialist	Solder motors-to-ESCs, FC integration, firmware pre-flash	90 min/unit
Integration & QC	Final assembly, calibration, bench test, sign-off	2–3 hr/unit

2. Skill Check & Time Commitment

Prerequisites

REQUIREMENT	WHY	WAIVABLE?
Completed Disposable Aedes MD builds (≥3 units)	Establishes baseline soldering and assembly competence	With instructor sign-off
Pass Aedes intermediate certification	Validates firmware, calibration, and bench-test skills	No
Owens or has access to enclosed printer	Required for PETG-CF and ABS prints	Cell-shared OK

Multimeter and continuity testing skills	Required for harness inspection on multi-use airframe	No
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Time breakdown (per unit, experienced builder)

PHASE	DESCRIPTION	TIME
3D printing	Body components across multiple parts	6–8 hr passive
CF tube preparation	Cut, chamfer, deburr 4 arms	10 min
Electronics sub-assembly	Motors-to-ESC, FC stack, peripherals	75 min
Frame integration	Mount motors, install electronics, route harness	60 min
Firmware & configuration	ArduPilot/Betaflight, parameters, calibrations	45 min
Bench test & first-flight prep	Pre-flight protocol, hover trim	30 min
First flight & tune	Outdoor verification of hover, basic flight envelope	30 min
TOTAL ACTIVE BUILD	(printing parallel)	~4–5 hr

3. Workspace Setup & Safety

Workspace requirements

- **Workbench:** minimum 36" × 48" — the AR-7 has a larger footprint than the MD
- **Ventilation:** window or fume extractor; ABS prints in particular require ventilation
- **Static control:** anti-static mat and wrist strap recommended
- **Test flight area:** outdoor field minimum 200m × 200m clear of obstructions for first flight
- **LiPo storage:** fireproof container; AR-7 6S 8000mAh packs hold significantly more energy than 4S 2200mAh

Critical safety standards

CRITICAL · LiPo Battery Safety

Lithium-polymer batteries store significant energy. A puffed, punctured, or short-circuited LiPo can vent flame within seconds. Charge in a fireproof LiPo bag or ammo can. Never leave charging batteries unattended. Store at storage voltage (3.8V/cell) when not in use. Dispose of damaged packs at a battery recycling center, never in household trash.

WARNING · Soldering Safety

Soldering irons reach 350°C+. Work in a ventilated area — leaded or unleaded solder fumes contain rosin flux compounds that should not be inhaled. Use safety glasses; flux occasionally pops. Keep a wet sponge or brass tip cleaner at the bench.

WARNING · Props Off the Bench

Never bench-test motors with propellers installed. A loose prop at full throttle is a projectile. Props go on only after final QC and immediately before flight.

CRITICAL · 6S battery energy is no joke

A 6S 8000mAh LiPo stores about 177 Wh — comparable to a small e-bike battery. A failure event on a 6S pack is significantly more energetic than on a 4S pack. Charge bay should be steel-enclosed, located away from flammable materials, and never left unattended during charge.

4. Tools & Equipment

Required tools (in addition to MD bench)

TOOL	SPECIFICATION / EXAMPLE	EST. COST
Enclosed 3D printer	Required for PETG-CF; Bambu P1S, Prusa MK4 (with enclosure), Voron class	\$500–800
Hardened steel nozzle	0.4mm hardened, required for PETG-CF (regular brass nozzle wears in 100 hours)	\$15
Filament dryer	PETG-CF must be printed dry; sample brands: Sunlu S2, Sovol SH01	\$50–80
Tube cutter (pipe cutter)	Mini pipe cutter, blade rated for carbon fiber	\$15
Bench vise	3"+ jaw, for tube prep work	\$30
Calipers (digital)	0.01mm resolution; required for AR-7 tolerances	\$25
Torque-limiting hex driver	Set to 2.5 N·m for motor mounts; required not optional	\$35
Bench power supply (recommended)	Variable 0–24V, 5A+ current limit for safe initial bring-up	\$50–100
Bind-on-Power transmitter	ELRS-capable: TX16S, RadioMaster Pocket, BetaFPV LiteRadio	\$80–250
FPV goggles	Required for first flight; must match VTX (HDZero or Walksnail)	\$200–600

Recommended bench upgrades

- **Drying box for filament storage** — PETG-CF absorbs moisture and prints poorly when wet
- **Cyanoacrylate (CA) glue + activator** — for bonding optional tube reinforcement sleeves
- **Loctite 243 and 271** — medium and high-strength threadlockers
- **Heat-shrink labels** — for harness identification and serial number marking
- **Bench scope (oscilloscope)** — optional for advanced ESC calibration; not required

5. Bill of Materials

Per-unit BOM. Volume sourcing through the Aedes network reduces these numbers by approximately 25%.

COMPONENT	SPECIFICATION	EST. COST
Body filament	PETG-CF (preferred) or ABS-X, ~250g across 4 parts	\$15
CF tube arms	16×16mm pultruded square tube, 4× 110mm cut from 1m stock	\$20

Hardware kit	Full M3 set: motor bolts, frame bolts, standoffs, vibration grommets	\$8
Motors (×4)	2806.5 1500–1800kv brushless, 6S-rated, with bullet leads	\$120
Propellers	7-inch tri-blade × 8 (4 install + 4 spares)	\$16
4-in-1 ESC	60A continuous BLHeli32/AM32, 6S-rated, 30.5×30.5 mount	\$45
Flight controller	F7-class with dual gyro, ArduPilot/Betaflight compatible	\$50
GPS / compass	u-blox M10 with mast, magnetometer-isolated	\$25
Radio receiver	ELRS 915 MHz with diversity antenna setup	\$15
Video transmitter	HDZero 1W or Walksnail 1.2W (US-friendly digital)	\$60
FPV camera	Digital camera matched to VTX system	\$30
Capacitor (low-ESR)	35V 1000µF, on battery rail at FC	\$3
Wiring & connectors	12AWG silicone × 1m, XT60 male, JST cable kit, heat shrink	\$10
TOTAL (single-unit retail)	(excluding battery and payload)	~\$417
TOTAL (network volume)	(typical at-scale per-unit cost)	\$280–360

WARNING · ESC current rating is non-negotiable

The AR-7 draws 30A+ per motor at peak; a 60A 4-in-1 ESC is the minimum. Substituting a 35A or 45A ESC will work briefly, then fail catastrophically — usually mid-flight. Save money on filament, not on ESCs.

6. 3D Printing the Body

Files you need

- AR7_TopPlate_v1.0.stl — top body plate with electronics tray
- AR7_BottomPlate_v1.0.stl — bottom plate with battery tray
- AR7_MotorMount_v1.0.stl — motor mount housing (4× required)
- AR7_GPSMast_v1.0.stl — GPS module standoff
- AR7_PayloadRail_v1.0.stl — universal quick-release payload interface
- AR7_Profile.3mf — pre-sliced project for Bambu Studio with Aedes profile

Recommended print settings (PETG-CF)

PARAMETER	VALUE	NOTE
Material	PETG-CF (preferred) or ABS-X	Vanilla PETG with 30% infill acceptable
Nozzle	0.4mm hardened steel	Brass nozzles wear out fast on CF
Layer height	0.2 mm	Strength/speed balance
Wall count	4 perimeters	Higher than MD for sustained load
Top / bottom layers	5 / 5	Solid critical surfaces
Infill density	30%	Doubles MD for fatigue life
Infill pattern	Gyroid	Best strength/weight for vibration
Nozzle temperature	240°C (PETG-CF), 250°C (ABS)	Brand-specific; check filament spec
Bed temperature	75°C (PETG-CF), 100°C (ABS)	Heated enclosure required for ABS
Print speed	50 mm/s outer, 80 mm/s infill	CF benefits from slower outer wall
Cooling fan	30% (PETG-CF), 0% (ABS)	Layer adhesion priority
Filament drying	PETG-CF: 65°C × 4 hr before printing	Wet filament prints poorly
Supports	Tree supports under motor mount overhangs	Use Aedes 3MF

		profile
Total print time	6–8 hours across 4 parts	Parallelize across printers

TIP · PETG-CF makes a real difference for the AR-7

The carbon-filled filament is stiffer, more dimensionally stable, and produces a noticeably better gyro signal in flight. The cost premium (\$20/kg vs \$25/kg) and the hardened-nozzle requirement are worth it for a multi-use airframe. Use vanilla PETG only as a backup option.

CF tube preparation

The four arm tubes are cut from 1-meter pultruded carbon fiber square stock. This step takes 10 minutes once you've done it twice.

STEP 1 · Measure and mark

Mark each tube at 110 mm using a steel ruler and a fine-tip permanent marker.

- Always cut slightly long, then trim to final length
- Verify mark with calipers before cutting

STEP 2 · Cut tubes

Use a mini pipe cutter rated for carbon fiber, NOT a hacksaw or rotary tool.

- Pipe cutter produces a clean square cut without splintering
- Hacksaw produces fiber tear-out and an uneven end face
- Rotary tools generate dust that is hazardous to inhale

WARNING · Carbon fiber dust is a respiratory hazard

Inhaled CF dust can cause long-term lung damage. Always cut CF tubes with a non-abrasive method (pipe cutter), wear an N95 mask, and clean the work area with a damp cloth — never compressed air.

STEP 3 · Chamfer and deburr

Lightly chamfer both ends of each tube using fine sandpaper (320 grit) and wipe clean with isopropyl alcohol.

- Light chamfer (0.5mm) helps tubes seat in motor mounts
- Deburr removes loose fibers that could detach during use
- IPA cleaning removes cutting residue and improves CA glue adhesion if used

7. Print Quality Inspection

Visual inspection — body parts

- No layer separation on any printed part
- No warping — parts sit flat on a level surface
- Motor mount tube channels are clean and accept CF tube with light press fit (not loose, not forced)
- FC mount holes accept M3 standoffs without forcing
- No visible voids in walls or top/bottom surfaces
- Parts weight check: top plate ~75g, bottom plate ~80g, motor mounts ~25g each (verify with scale)

Dimensional check (calipers required)

- Body width across motor mount centers: 320 mm \pm 1 mm
- Motor mount hole spacing: 16 mm \times 16 mm
- FC mount hole spacing: 30.5 mm \times 30.5 mm
- CF tube channel ID: 16.1–16.3 mm (for press-fit on 16 mm tube)

CF tube inspection

- Length: 110 mm \pm 0.5 mm
- Both ends square (perpendicular to tube axis)
- No visible delamination of CF layers at cut
- Light chamfer present on all 8 ends (4 tubes \times 2 ends)

8. Electronics Sub-Assembly

This phase produces the integrated electronics stack independent of the frame. The AR-7 stack is similar to the MD but uses higher-current components and includes a digital video transmitter.

STEP 4 · Tin the ESC pads

Apply solder to all 12 motor pads (4 motors \times 3 phases). Use slightly more solder than on the MD — these pads carry 30A+ at peak.

- Iron temperature: 380°C for the AR-7 (heavier copper pours)
- If solder doesn't flow cleanly, the pad needs flux

STEP 5 · Solder motors to ESC

Cut motor leads to length, strip, tin, and bond to ESC pads.

- AR-7 motor leads typically need to be slightly longer than MD; route through tube channels
- Bundle each motor's three phases tightly to reduce gyro noise
- Heat shrink each phase individually after the joint cools

STEP 6 · Stack flight controller

FC stacks above ESC using M3 standoffs and vibration grommets.

- Vibration grommets are required for the AR-7 (not optional as on MD)
- Verify ribbon cable orientation per ESC silkscreen
- Tighten stack standoffs evenly to prevent PCB stress

STEP 7 · Connect peripherals

Peripherals: GPS, ELRS receiver, VTX, FPV camera. The AR-7 has more peripherals than the MD because it supports FPV piloting.

- **GPS:** TX/RX/5V/GND to UART4; compass to I2C
- **ELRS:** TX/RX/5V/GND to UART2 with diversity antenna routing
- **VTX:** power, signal, smart-audio (UART) connections
- **FPV camera:** video signal, 5V/GND, OSD UART if applicable

STEP 8 · Solder battery harness with capacitor

The battery wire harness and low-ESR capacitor protect the ESC from voltage spikes.

- Use 12AWG silicone wire — 16AWG (used on MD) is insufficient at AR-7 currents
- Solder XT60 male connector to battery leads
- Solder 35V 1000 μ F low-ESR capacitor across battery rails AT THE ESC, not at battery end
- Verify capacitor polarity — reverse installation will explode at first power-on

CRITICAL · Capacitor polarity check

Electrolytic capacitors are polarity-sensitive. The negative lead is marked with a stripe on the can. Reverse installation will cause the capacitor to vent or explode within seconds of power application. Verify with multimeter continuity test if there is any uncertainty.

STEP 9 · Smoke test on bench supply

Use a current-limited bench supply rather than LiPo for first power-on. The AR-7 stack costs \$200+; protect that investment.

- Supply: 24V, current limit 1A
- Apply power; verify FC LED, ESC initialization beeps, GPS LED pattern, RX bind LED
- Total current draw at idle should be < 0.4A
- Touch each component briefly (do not hold) — should be cool, not warm
- Disconnect; if any anomaly, do not retry until cause identified

9. Frame Integration

STEP 10 · Insert CF tubes into motor mounts

Press-fit each CF tube into a printed motor mount housing. The fit should be firm but not require excessive force.

- Tube goes 30 mm into the mount housing, leaving 80 mm protruding for the motor
- If fit is loose: apply a wrap of electrical tape on tube before inserting
- If fit is too tight: lightly sand the tube end with 320 grit
- After seating, drill the secured M3 cross-bolt hole through tube and mount (use printed jig)

STEP 11 · Secure tubes with cross-bolts

An M3 bolt passes through the motor mount and the CF tube to lock them mechanically.

- Apply Loctite 243 to cross-bolt threads
- Tighten to 2.0 N·m — snug, not aggressive
- Test by pulling tube; should not move within mount

STEP 12 · Mount motors to motor mount housings

Each motor secures to its mount housing with 4× M3×8 socket cap bolts.

- Apply Loctite 243 to each bolt
- Cross-pattern tighten
- Final torque: 2.5 N·m (use torque-limiting driver)
- Verify motor spins freely after mounting

STEP 13 · Mate tube/motor sub-assemblies to body

Each tube assembly inserts into a slot on the bottom plate, secured with M3 hardware.

- Install vibration-isolation pad in tube slot before inserting tube
- Tighten body-to-tube bolts to 2.0 N·m
- Verify all four arms are coplanar (drone should sit flat on a level surface with all four motors touching)

STEP 14 · Sandwich electronics stack between plates

The electronics stack sits between the top and bottom plates on M3 standoffs.

- Route motor leads through bottom plate channels before installing stack
- Install stack with vibration grommets in place
- Top plate captures the stack; tighten 4× corner bolts evenly

STEP 15 · Install GPS, antennas, VTX, camera, payload rail

Final external installations.

- GPS mast at rear, away from power wiring
- ELRS T-antennas at 90° (true diversity)
- VTX antenna routed to non-conductive mount (printed antenna holder)
- FPV camera in tilt bracket; default 30° forward tilt
- Payload rail to bottom plate, 4× M3 bolts

10. Firmware & Configuration

Software you need

- **Mission Planner** (Windows) or **QGroundControl** (cross-platform)
- **Aedes AR-7 reference parameter file** (AR7_v1.0.param)

- **ELRS Configurator** for receiver bind
- **BLHeli/AM32 Configurator** for ESC tuning
- **HDZero or Walksnail Configurator** for VTX channel/power

STEP 16 · Connect FC and flash ArduPilot

Same procedure as Disposable Aedes MD with one difference: select Quad X with appropriate motor numbering for your physical motor placement.

- Mission Planner > Initial Setup > Install Firmware
- Frame: Quad X
- Wait for flash; reconnect after reboot

STEP 17 · Load Aedes AR-7 reference parameters

The reference parameter file includes pre-tuned PIDs validated against the AR-7 platform.

- Mission Planner > Config > Full Parameter List > Load from file
- Select AR7_v1.0.param
- Write Params; reboot
- Verify parameters loaded correctly with random sample check

STEP 18 · Sensor calibrations

Same procedure as MD but with stricter quality criteria — multi-use airframe means imperfect calibration compounds over hundreds of flights.

- Accelerometer: 6-position calibration, redo if any axis variance >0.05
- Compass: complete CompassMot procedure to compensate for power-wiring magnetic interference
- ESC: standard endpoint calibration
- Pressure / barometer: ground reference set

STEP 19 · Configure VTX and FPV system

Set channel, power, and OSD parameters via the FC's CLI or VTX configurator.

- Channel: per local regulations (US: 5.8 GHz F-band typically)
- Power: 25mW for bench, 200mW–1W for outdoor flight
- OSD: enable battery voltage, link quality, flight time, GPS coords

STEP 20 · Bind ELRS receiver and verify telemetry

Same bind procedure as MD; verify two-way telemetry on the AR-7 because pilot needs in-flight battery and link feedback.

- Bind via 3-cycle power method or Lua script on transmitter
- Verify RSSI, link quality, battery voltage all reporting on transmitter screen
- Adjust failsafe: AR-7 default is RTL (return to launch), not Land

STEP 21 · Motor direction test (PROPS OFF)

Same as MD. AR-7 motors generate substantially more torque; getting direction right matters even more.

- Run motor test in Mission Planner
- Verify rotations match firmware spec (refer to parameter doc)
- Reverse via BLHeli configurator if needed
- Test failsafe behavior

11. Bench Test Protocol

Power-on self-test

- All four motors initialize with consistent beep sequence
- FC reports armed-state LED within 30 seconds
- GPS lock (3D fix, ≥ 10 satellites) within 90 seconds outdoors
- ELRS link RSSI ≥ -55 dBm at 1m, telemetry returning
- VTX broadcasting on programmed channel; goggles receive video
- Battery voltage matches multimeter within 0.05V

Hover trim verification (in-place, no flight)

- Drone armed; throttle held at 50% with drone restrained
- All four motors run smoothly with no detectable harmonic vibration
- Motor temperatures after 30s run: warm but not hot ($< 50^{\circ}\text{C}$)
- FC gyro logs show no excessive vibration (consult Mission Planner vibration tab)

Failsafe verification

- Loss of radio link \rightarrow drone enters RTL mode within 1 second (configurable)
- Low battery (22.0V on 6S) \rightarrow audible warning
- Critical battery (21.0V on 6S) \rightarrow forced RTL or Land
- GPS loss in flight \rightarrow enters Stabilize fallback

12. First Flight Procedure

Unlike the Disposable Aedes MD, the AR-7 is expected to fly hundreds of times. The first flight is a structured verification, not a casual test.

Pre-flight site requirements

- Minimum 200m \times 200m clear area
- No people within 50m radius
- No structures, vehicles, or animals within 30m
- Wind less than 10 mph for first flight
- Visual line of sight maintained throughout
- Spotter present (recommended)

Flight sequence

STEP 22 · Pre-arm checks

Final checks before applying takeoff power.

- Visual: all bolts present, antennas oriented, props seated
- Battery: voltage $> 24.6\text{V}$ (storage charge minimum), securely retained
- Telemetry: GPS lock, link quality good, no warnings on OSD
- Failsafe: confirmed RTL home position is current launch point

STEP 23 · Hover test

Take off to 2m altitude, hover for 30 seconds.

- Smooth ascent — no oscillation or wobble
- Hold position with no drift (small drift acceptable, large drift = compass calibration issue)
- Listen for unusual sound — buzzing or grinding requires landing
- Land immediately at end of test

STEP 24 · Slow forward / backward / left / right

Verify control response and tune.

- Each direction at 5 m/s for 5 seconds
- Drone should respond proportionally to stick input
- No wobble during direction changes
- Yaw response should be authoritative but not snappy

STEP 25 · Altitude and orbit test

Verify altitude hold and waypoint behavior.

- Climb to 30m, hover; verify altitude hold within ± 0.5 m
- Fly a 30m radius circle at altitude — smooth track, no drift
- Test RTL: switch to RTL mode, drone returns and lands within 5m of takeoff point

STEP 26 · Post-flight inspection

Every flight, especially first flight, ends with an inspection.

- Touch each motor — should be warm, not hot
- Inspect props for chips or cracks
- Verify no loose bolts (gentle wiggle test on motors)
- Check battery temperature — warm OK, hot is a problem
- Review flight log for anomalies in Mission Planner

13. Handoff QC Checklist

Mechanical

- All M3 motor bolts torqued to 2.5 N·m and threadlocked
- All CF tube cross-bolts torqued and threadlocked
- All body assembly bolts torqued
- GPS mast secure
- Antennas oriented per spec (true diversity)
- Payload rail M3 hardware torqued
- Battery retention strap functional and tight
- All four arms coplanar (level surface check)
- No loose wires; all harnesses cable-tied

Electrical & firmware

- Smoke test passed
- Power-on self-test passed
- All sensor calibrations complete (accel, compass, ESC, baro)
- Compass-motor (CompassMot) procedure complete
- Receiver bound and link verified
- VTX programmed and FPV system tested
- Failsafe configured to RTL and verified
- Telemetry confirmed both directions

Flight test

- Hover test complete
- Directional test complete
- Altitude / orbit test complete
- RTL test complete
- Post-flight inspection passed
- Flight log reviewed for vibration / power anomalies

Documentation

- Serial number assigned and recorded
- Build photographs taken (frame, electronics, complete unit, first flight) — minimum 6 photos
- Parameter file backup uploaded to Aedes Builder Portal
- Flight log uploaded to Aedes Builder Portal
- Builder sign-off form completed and signed
- Non-weaponization affirmation signed
- Unit tagged with build date, builder ID, and serial

14. Maintenance Schedule

Unlike the Disposable Aedes MD, the AR-7 requires ongoing maintenance for sustained service. Customers receiving AR-7 units must be provided this schedule with their unit.

INTERVAL	TASK	TIME
Every flight	Visual inspection: bolts, props, antennas, battery contacts	5 min
Every 10 flights	Verify motor mount torque; inspect prop balance	15 min
Every 25 flights	Replace propellers; clean motor bearings; check FC vibration log	30 min
Every 50 flights	Re-torque all body bolts; inspect CF tubes for hairline cracks; check ESC heat sinks	60 min
Every 100 flights	Replace motors (proactive bearing replacement); recalibrate accel and compass	2 hr
Every 200 flights	Major overhaul: full disassembly, inspection, electronics re-flow check, antenna replacement	4 hr
After any crash	Full inspection: tubes, motors, props, electronics. Replace any suspect component	30 min–2 hr

15. Troubleshooting

SYMPTOM	LIKELY CAUSE / FIX	DIFFICULTY
Drone wobbles in hover	PID tune issue; bent prop; loose motor; FC vibration isolation failed	Medium
Drift in hover	Compass not calibrated; CompassMot procedure not run; magnetic interference from wiring	Medium
Yaw drift / spin	Compass declination wrong; one motor producing different torque; prop imbalance	Medium
GPS won't lock outdoors	GPS module too close to power wiring; antenna obstructed; LNA failed	Medium
VTX overheats	Antenna disconnected (operating into open circuit); insufficient airflow	Easy
Low link quality at distance	Antenna orientation wrong; receiver power insufficient; transmitter antenna issue	Medium
Motor cogs / vibrates	Bearing failure (replace motor); prop unbalanced; bent shaft	Hard
ESC overheats	Insufficient airflow; current rating exceeded; ESC firmware mismatch	Hard
Battery sags rapidly under load	Aged battery; cell imbalance; counterfeit pack	Medium

Smoke at any time	DISCONNECT IMMEDIATELY. Investigate before reapplying power	Critical
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Compliance & Builder Sign-Off

Non-Weaponization Affirmation

By signing this document, the builder affirms the following under the Aedes Network Builder Agreement:

- The platform was built per these instructions and the published reference specification
- No modifications were made to enable weapons integration, weapons delivery, or prohibited applications
- The platform is configured exclusively for non-weaponized missions: ISR, communications, mapping, logistics, sensor deployment, or search and rescue
- The builder will report any third-party request to weaponize, modify for weapons use, or remove safety features to Aedes Compliance

Regulatory Compliance

The builder confirms understanding of the following regulatory framework:

- Operation in the United States is subject to FAA Part 107 commercial drone rules
- BVLOS, autonomous, and night operations require appropriate FAA waivers
- Remote ID broadcast is required for most operating environments
- International deployment is subject to ITAR, EAR, and host-nation regulations

Builder Sign-Off Form

Complete and retain a copy with each unit. Submit a digital copy to the Aedes Builder Portal.

Builder Name	
Aedes Builder ID	
Build Cell / Location	
Unit Serial Number	
Build Start Date	
Build Completion Date	
Total Build Hours	
QC Inspector (if separate)	
Photos Submitted (Y/N)	
Builder Signature	
Date	