

Comprehensive Field Maintenance Guide - Atmospheric Filtration Drone Swarm

This comprehensive guide provides all necessary protocols, tools, and safety checks for conducting field maintenance on filtration drones deployed in swarm configurations. It is designed for use by field technicians, emergency crews, and DAO-integrated ops managers in real-world and high-risk environments.

This guide includes:

- Daily and pre-flight inspections
- Battery, filter, and sensor replacement protocols
- Firmware updates (manual & automated)
- Modular component swaps
- Damage assessment and logging
- Environmental hardening checks
- Diagnostic routines
- Crew safety protocols

1. Daily Pre-Flight Inspection

Visual check: hull, arms, props, joints

Status LED green and blinking? (Firmware live)

Filter module secure and seated fully

Solar panel clean, undamaged (if applicable)

Battery shows 100% or verified in DAO log

Comms check: ping to swarm and DAO channel

Propeller spin test (manual flick or via debug mode)

2. Battery Handling and Swap Protocol

- Power drone OFF
- Remove cell using insulated gloves
- Scan QR or log serial into registry
- Insert new cell, wait 3s for stabilization LED blink
- Secure cover and run power-up diagnostic

3. Filter Removal and Installation

- Unscrew rear-lock panel (hex key #2)
- Slide out used cartridge with gloves
- Dispose per biohazard protocol if urban/industrial
- Insert new filter type (match to DAO-assigned mission)
- Confirm clip-seal locks into place with audible click

4. Sensor and Firmware Updates

Manual mode: connect USB-C, run update via FieldOS

DAO mode: auto-push via live ops portal if online

Verify: run 'sensor-status' script and match checksum

Reboot drone to finalize firmware update

5. Environmental Hardening Checks

Apply hydrophobic coating if >90% humidity expected

Attach thermal shielding (desert missions)

Sensor membrane check (VOC & PM sensors)

Test shock pad integrity (bottom housing)

6. Emergency Reset and Recovery

- Hold power 15s until double-blink
- Wait for soft-reset mode
- Reconnect manually to swarm
- Run '/reconnect --verify' via mobile ops tablet

7. Component Replacement Matrix

Propellers Detach w/ Phillips screwdriver, replace rubber dampers

Arms Use hex wrench #3, unplug servo wire safely

Sensor Modules Clip-release and replace; recalibrate

Solar Panel Slide/clip mounting, seal edges post-replacement

Main Hull Plate Remove top screws x6, ensure gasket integrity

8. Logging and Reporting

- Every maintenance task must be logged in DAO or offline tablet
- Use mission ID, time, and part ID per replacement

- Critical failures reported under 'maintenance > report critical'
- Include photographic evidence where possible

9. Safety Protocols for Crew

- Gloves required when handling filters or batteries
- Goggles in industrial zones or dust-heavy missions
- Only certified operators may adjust firmware or sensors
- Emergency first-aid kit within 10m of ops site