Autonomous Diagnostics - Atmospheric Filtration Drone Swarm

This document outlines the internal diagnostic protocols run by each drone in the Atmospheric Filtration Swarm. These checks allow for autonomous health monitoring, preemptive maintenance flags, and real-time reporting to the DAO swarm management layer.

Self-Test Cycle (Every 30 Min)

- Sensor calibration check (CO2, PM, VOC, temp/humidity)

- Voltage load test on battery

- Propeller rotation resistance scan

- Memory and CPU utilization ping

- Radio and mesh signal integrity

Smart Error Detection (Live Loop)

- Drift from flight path >3m triggers correction protocol

- Sensor reporting flatline = restart module

- Battery drain delta spike = flag for replacement

- Radio disconnect = auto-reconnect w/ beacon fallback

Fault Reporting Hierarchy

1. Warning (auto-recoverable) log only

2. Flagged (requires maintenance) visual LED + DAO ping

3. Critical (auto-ground or halt flight) RTB triggered + DAO alert

Manual Trigger Commands

`/selfcheck` Runs all onboard diagnostics

`/motortest` Spins each propeller and logs resistance

`/sensorsync` Resets and resyncs sensor array

`/flushlogs` Clears logs post-maintenance

Diagnostic Log Sample

Time: 09:41 UTC

Voltage: 92.1%

PM2.5: 12.6 g/m

VOC: OK

Motors: nominal

Signal: -64dBm (3/5)

Status: GREEN all systems operational

Status: GREEN all systems operational