

FlytBase Drone Dock Coordination System

Standard Operating Procedures (SOPs)

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Introduction

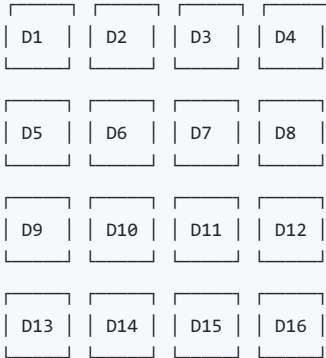
This document outlines the Standard Operating Procedures (SOPs) for managing multiple drone operations at the FlytBase testing site. The system is designed to ensure safe and efficient operations while maximizing throughput in a dense 4x4 grid configuration.

Key Objectives

- Ensure collision-free operations
- Maximize operational efficiency
- Maintain clear communication protocols
- Enable rapid emergency response
- Support scalable operations

Site Layout and Airspace Design

Physical Layout

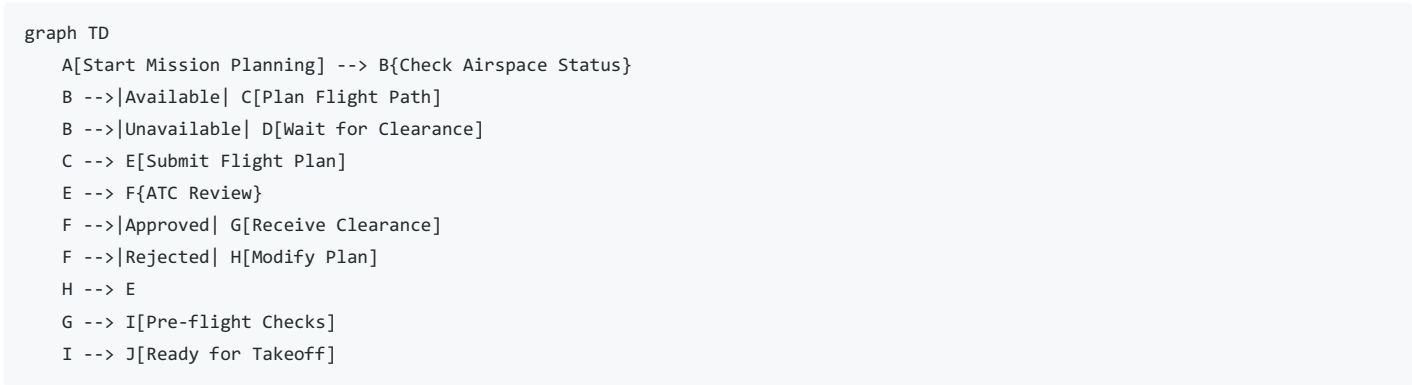


Airspace Layers



Pre-Flight Procedures

Mission Planning Flowchart



Pre-Flight Checklist

- Battery Status Check
 - Minimum 80% charge required
 - Battery health verification
- Communication Systems
 - Radio link test
 - GPS signal strength
 - Telemetry connection
- Flight Path Verification
 - Altitude corridor assignment
 - Waypoint confirmation
 - Emergency landing zones

Takeoff and Landing Procedures

Takeoff Sequence

```
sequenceDiagram
    participant Drone
    participant ATC
    participant System

    Drone->>ATC: Request Takeoff Clearance
    ATC->>System: Check Airspace Status
    System->>ATC: Status Report
    ATC->>Drone: Clearance Granted/Denied
    Drone->>System: Vertical Ascent
    System->>Drone: Altitude Confirmation
    Drone->>System: Enter Assigned Corridor
```

Landing Sequence

```
sequenceDiagram
    participant Drone
    participant ATC
    participant System

    Drone->>ATC: Request Landing Clearance
    ATC->>System: Check Dock Status
    System->>ATC: Status Report
    ATC->>Drone: Clearance Granted/Denied
    Drone->>System: Exit Corridor
    System->>Drone: Descend to Dock
    Drone->>System: Landing Confirmation
```

In-Flight Operations

Airspace Management Rules

- Altitude Separation**
 - Minimum 2m vertical separation
 - Corridor-specific altitude bands
 - No cross-corridor transitions without clearance
- Horizontal Separation**
 - Minimum 3m between drones
 - Grid-based waypoint system
 - No direct crossing of occupied spaces
- Right-of-Way Rules**
 - Emergency operations have priority
 - Return-to-dock missions take precedence
 - Higher altitude traffic has right-of-way

Conflict Resolution Flowchart

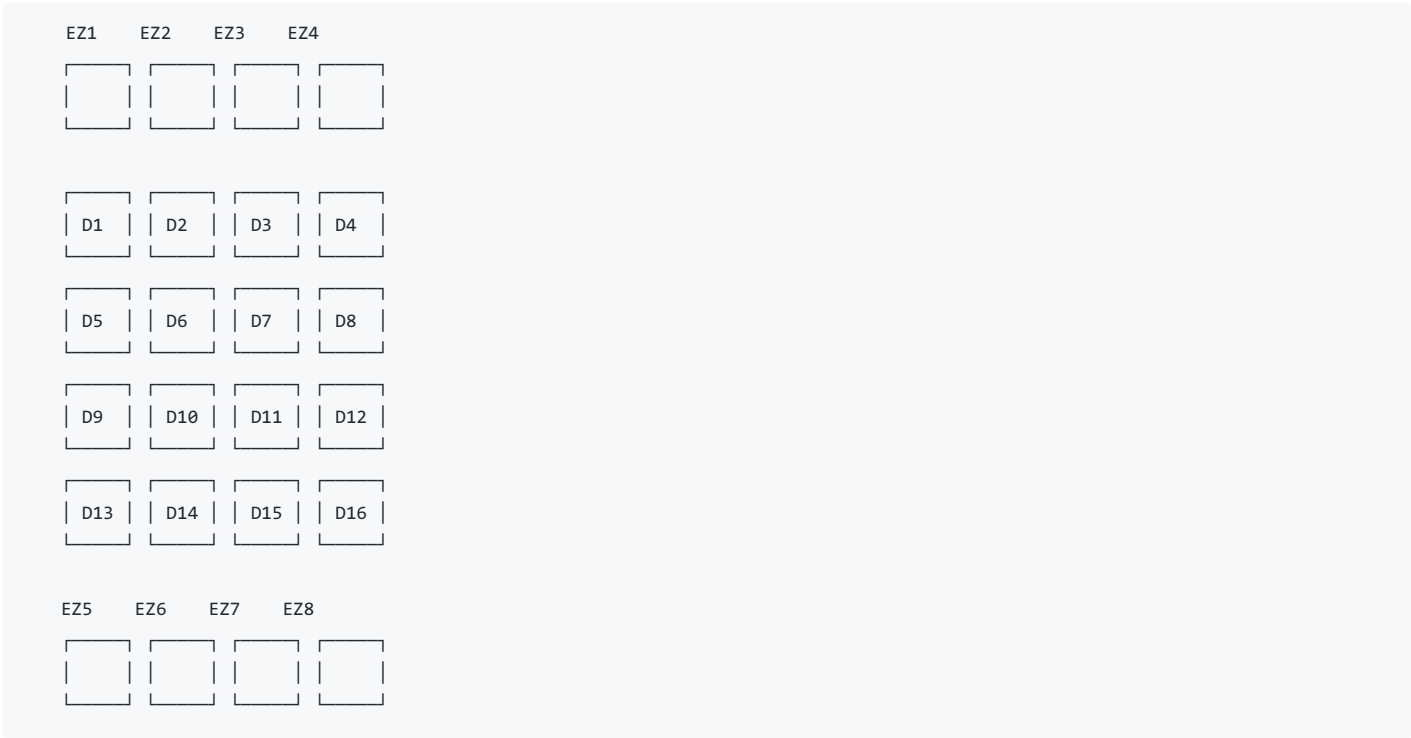
```
graph TD
    A[Conflict Detected] --> B{Type of Conflict}
    B -->|Altitude| C[Adjust Vertical Separation]
    B -->|Horizontal| D[Adjust Course]
    B -->|Emergency| E[Execute Emergency Protocol]
    C --> F[Verify Resolution]
    D --> F
    E --> F
    F -->|Resolved| G[Continue Mission]
    F -->|Unresolved| H[Request ATC Intervention]
```

Emergency Procedures

Emergency Response Flowchart

```
graph TD
    A[Emergency Declared] --> B{Type of Emergency}
    B -->|Communication Loss| C[Execute RTH Protocol]
    B -->|System Failure| D[Initiate Safe Landing]
    B -->|Battery Critical| E[Emergency Landing]
    C --> F[Monitor Status]
    D --> F
    E --> F
    F -->|Resolved| G[End Emergency]
    F -->|Unresolved| H[Deploy Recovery Team]
```

Emergency Landing Zones



Communication Protocols

Communication Hierarchy

- 1. Primary Channel
 - ATC to Drone commands
 - Emergency broadcasts
 - Status updates
- 2. Secondary Channel
 - Drone to Drone coordination
 - Non-critical updates
 - System status
- 3. Backup Systems
 - LTE/5G fallback
 - Local mesh network
 - Emergency radio

Communication Flowchart

```
graph TD
    A[Communication Initiated] --> B{Message Type}
    B -->|Command| C[ATC to Drone]
    B -->|Status| D[Drone to ATC]
    B -->|Emergency| E[Broadcast to All]
    C --> F[Confirmation]
    D --> G[Log Update]
    E --> H[Emergency Response]
```

Maintenance and System Checks

Daily Maintenance Checklist

- Physical Inspection**
 - Dock integrity
 - Communication equipment
 - Power systems
- System Verification**
 - GPS accuracy
 - Communication range
 - Battery charging systems
- Software Updates**
 - Firmware checks
 - System logs review
 - Performance metrics

Maintenance Flowchart

```
graph TD
    A[Start Maintenance] --> B{Check Type}
    B -->|Daily| C[Basic Inspection]
    B -->|Weekly| D[Detailed Check]
    B -->|Monthly| E[Full System Review]
    C --> F[Update Logs]
    D --> F
    E --> F
    F --> G[Generate Report]
    G --> H[End Maintenance]
```

Appendix

A. Definitions and Acronyms

- ATC: Air Traffic Control
- RTH: Return to Home
- EZ: Emergency Zone
- SOP: Standard Operating Procedure

B. Contact Information

- Emergency Contact: [Emergency Number]
- ATC Contact: [ATC Number]
- Technical Support: [Support Number]

C. Revision History

- Version 1.0: Initial Release
- Date: [Current Date]
- Author: [Your Name]