Swarm Drone System Manual

Contents

1. Overview

1.1. Application Scenarios

The Swarm Drone System is mainly applied to intelligent search and strike missions in modern battlefields, especially suitable for high-intensity and high-complexity combat environments. Through intelligent automation and multi-Drone cooperative operations, the system breaks the limitations of traditional Drone combat modes. It can efficiently complete target search, identification, locking, and precise strike without human intervention. Particularly in complex electromagnetic interference environments, the Swarm Drone System uses VIO (Visual-Inertial Odometry , VIO) technology to ensure the continuous and seamless execution of missions.

1.2. Product

The Swarm Drone series has completely transformed the coordination between search and strike missions. Through intelligent automation, it can control 1 search Drone and up to 15 strike Drones simultaneously, realizing automatic target assignment, precise locking, and multi-batch joint strikes, with the entire process requiring no manual control. The search Drone independently searches for and transmits military targets in real time, while the strike Drones accurately track and quickly lock onto targets. In interference environments, the system ensures seamless mission execution through VIO.

2. Introduction

2.1. System Composition

The Swarm Drone System consists of three key modules: (1) AI Search Drone,(2) AI Strike Drone, and (3) Ground Station.

(1) **AI Search Drone:** The AI Search Drone can automatically fly to a designated area for search and automatically identify potential targets.

(2) **AI Strike Drone:** After receiving the target location and image information transmitted by the search Drone, the AI Strike Drone can automatically fly to the target location, identify and lock onto the target, and execute the strike mission.

Note: The AI Search Drone and AI Strike Drone use the same model of equipment. However, during mission execution, a separate Drone must be assigned to perform the AI search task, and it can return after the search is completed.

(3) **Ground Station**: The Ground Station is the communication and control center of the AI Drone Swarm System, as well as a scheduling platform for integrating search and firepower.

2.2. Feature

2.2.1. Search

- **Reconnaissance-Strike Coordination**

  The search Drone automatically searches for targets and transmits data to strike Drones in real time, simplifying the target information transmission process and accelerating strike efficiency.

- **Automatic Area Reconnaissance**

  Users can designate a reconnaissance area, and the Drone automatically plans the reconnaissance route within the area and identifies potential targets.

- **Manual Reconnaissance**

  Supports users to switch to manual reconnaissance mode during reconnaissance missions. Users can manually operate the Drone, frame targets to add to the target list, and up to more than 300 types of targets can be added by framing.

- **Custom AI Strike Targets**

  Provides an end-to-end dedicated target training framework. Users can use their own datasets to train exclusive AI recognition models. It supports one-click integration of models into the mission system and provides a complete local (offline) deployment solution to fully ensure the confidentiality of models and data.

- **Anti-Jamming Reconnaissance**

  Possesses strong operational capabilities in GPS-denied environments. No need to import satellite maps in advance; the Drone relies on VIO and multi-source fusion perception technology to perform reconnaissance missions. After completion, it can automatically return and transmit the target data identified during reconnaissance.

2.2.2. Strike

- **Automatic Identification and High-Speed Strike**

  Based on AI vision, it can automatically identify and match targets recognized by the reconnaissance Drone. The maximum strike speed can reach 30 m/s to ensure rapid suppression of targets. Users only need to monitor the strike situation at the Ground Station without any operation.

- **Swarm Saturated Strike on Multiple Targets**

  Users can select 16 strike targets at a time for swarm strike. The system automatically plans the swarm flight route and matches targets to achieve high-speed and precise strikes. Users can also assign multiple Drones to perform saturated strikes on a single target to significantly improve mission success rate.

- **Point Strike**

  Users can set strike points for high-speed and precise strikes, with strike accuracy reaching the centimeter level.

- **Mixed-Type Target Strike**

  Users can select both visual targets and position targets for strike at the same time. The system automatically coordinates the swarm flight route and strike time window to ensure the orderly execution of the mission.

- **Anti-Jamming Strike**

  Possesses strong operational capabilities in GPS-denied environments. No need to import satellite maps in advance; the Drone relies on VIO and multi-source fusion perception technology to complete missions even in strong interference environments. The strike Drone switches to visual guidance mode to complete locking and strike, ensuring mission continuity.

- **Single-Drone Reconnaissance-Strike Integration**

  Suitable for regular patrols or individual soldier operation scenarios. Users can conduct free reconnaissance, and once a target is found, they can immediately frame it and trigger the single-Drone automatic strike process to realize the quick operation of "detect and strike immediately".

- **Strike on Specific Parts of Buildings**

  Supports framing narrow targets such as windows and doors of buildings. The strike Drone performs precise strikes according to the designated targets and planned trajectories.

2.2.3. Ground Station

- **Long-Distance Control of Multiple Drones**

  Can control up to 16 Drones, with a maximum control distance of 15 km.

- **Easy to Operate and Learn**

  Graphical operation interface, default mission processes and shortcut commands, enabling users to master operations quickly within 10 minutes.

- **Portable Design**

  Foldable support frame, combined with a shoulder strap design, is convenient for individual soldiers to carry and reduces hand-held load, suitable for rapid mobile deployment.

- **Sensitive Touch**

  To adapt to outdoor glove operation or complex environments such as strong light/low temperature, the screen supports stylus operation; at the same time, virtual buttons and physical shortcut keys are provided to ensure convenient and sensitive operation for users.

2.3. Operation

When it is necessary to dispatch a search Drone to search for enemy assembly forces and dispatch multiple strike Drones for swarm strike, one operator can complete the entire workflow using the Swarm Drone System.

2.3.1. Task Setup

The Drone swarm operator on standby behind the defense line can use the Ground

Station to set the search area for the search Drone through wireless communication. After that, the search Drone can automatically plan the search route trajectory within the search area, and perform automatic flight and automatic target identification search.
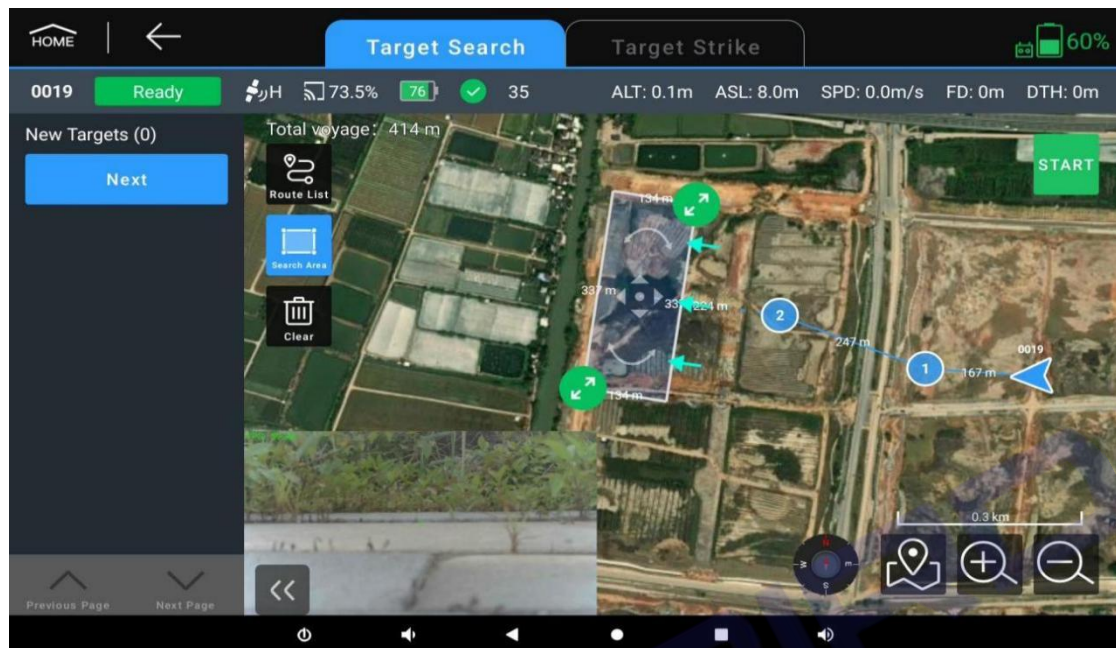

2.3.2. Target Detection

After the AI of the search Drone identifies and detects a target, it calculates the GPS positioning data of the target's location. Finally, it sends a list containing high-resolution images and accurately measured enemy target coordinates to the Ground Station, and hovers nearby to maintain surveillance and provide guidance for strike Drones.
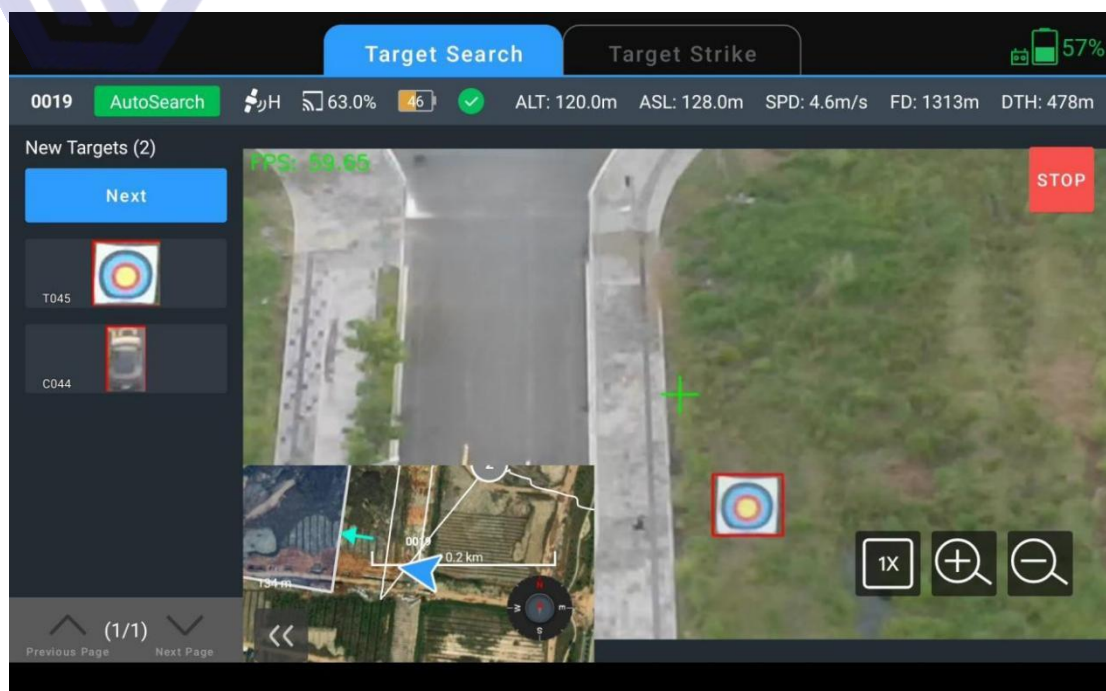
The Ground Station records the target information found in this search into the pending strike target list and marks it on the map for the operator to evaluate the strike sequence.
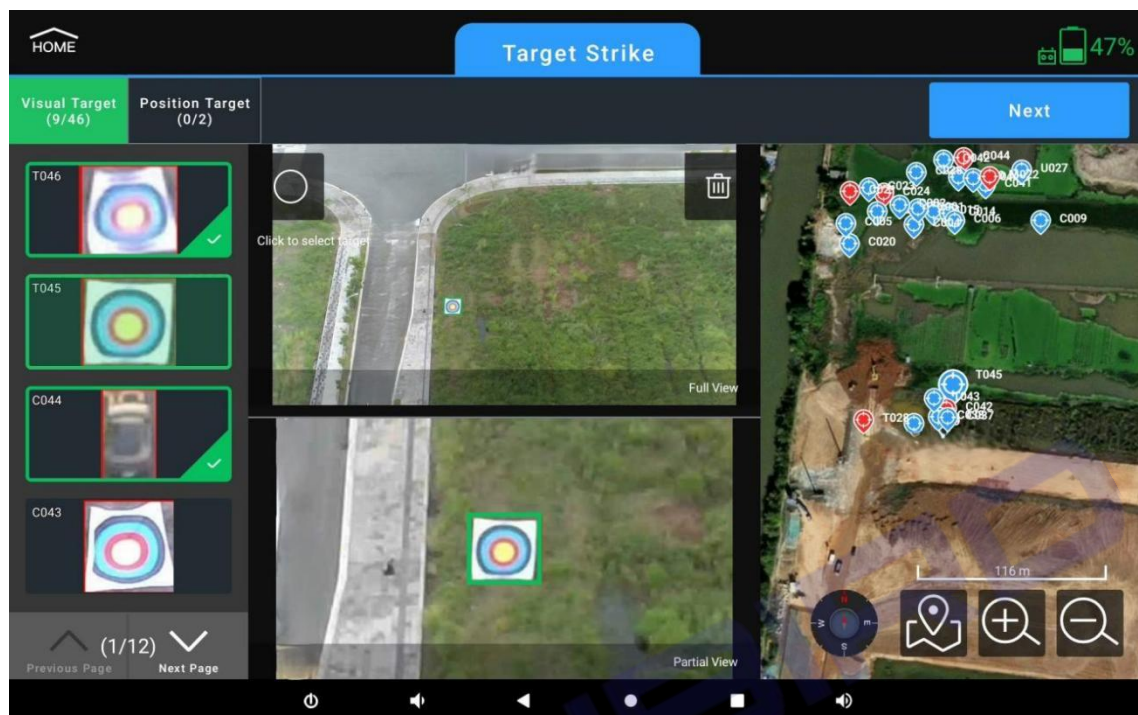

2.3.3. Strike Task Assignment

The operator selects the targets detected by the search Drone on the Ground Station and automatically assigns each target to the strike Drones that are connected to the Ground Station and in standby mode with one click.
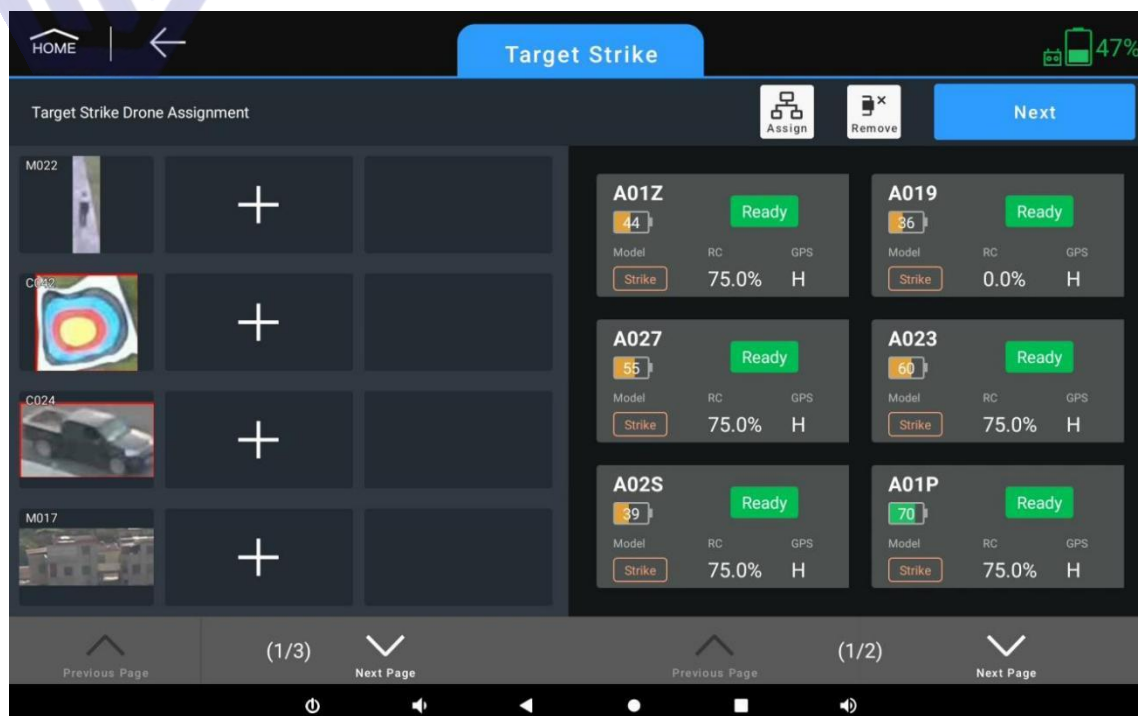
2.3.4. Swarm Strike

After the strike Drone swarm receives the strike mission and target image and coordinate information, all Drones in the swarm will take off automatically. Without manual remote control, they will rely on their own anti-jamming GPS for autonomous navigation and fly to the target area. After reaching the area near the coordinates, they will start target search and use the onboard AI camera to automatically detect and lock onto the target.
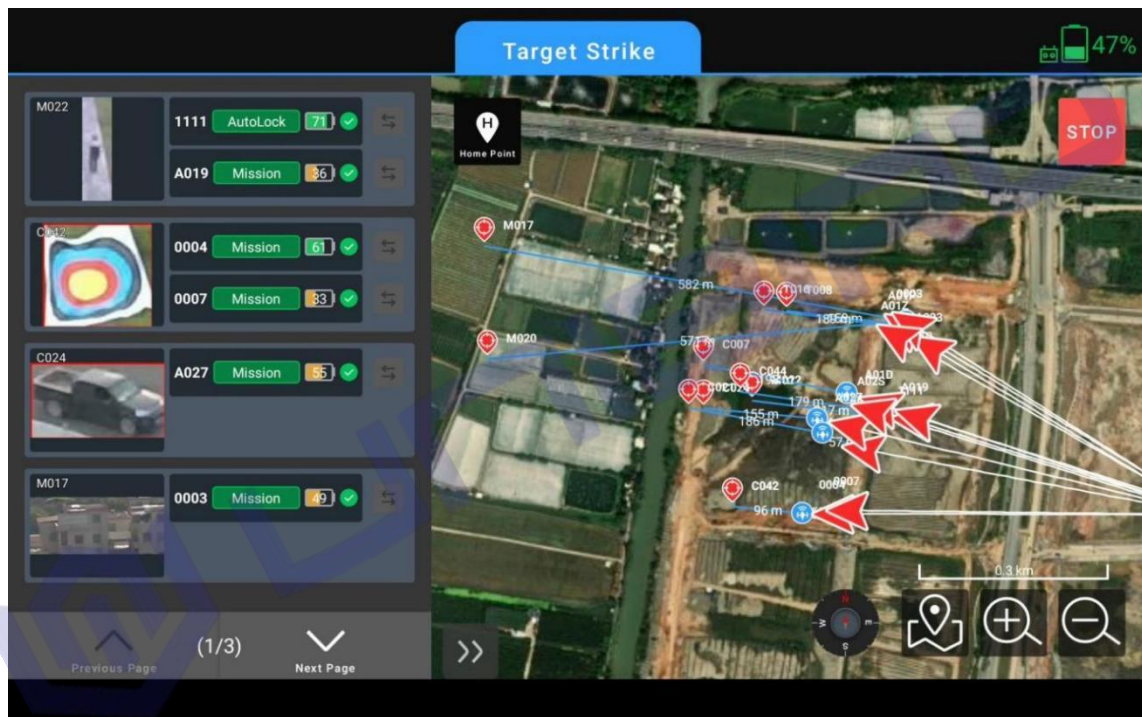
After the strike Drone swarm finds the target, it will automatically enter the locked attack state, automatically plan the attack flight trajectory and execute the suicide attack. During the attack mission, the operator can monitor and confirm the completion effect through the video screen of the search Drone. With one click, the operator can assign a new strike Drone swarm to perform supplementary strikes on surviving targets.

Throughout the process, no multiple pilots are needed; only one operator can manage one search Drone and more than ten strike Drones to complete the entire tactical mission.
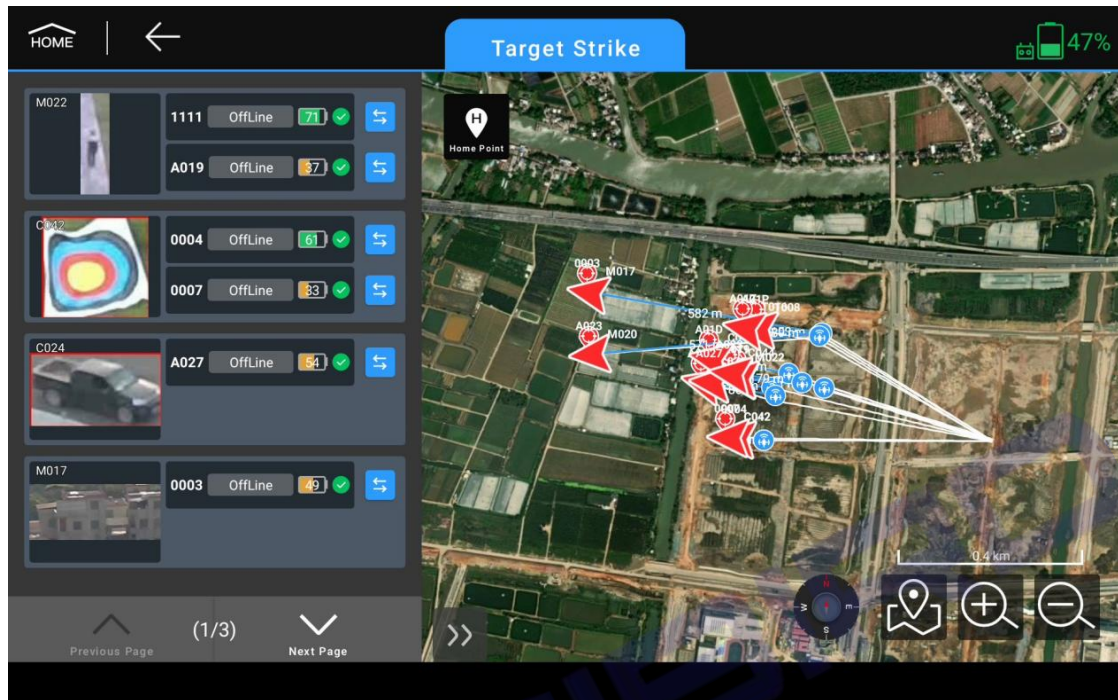
3. Reference Specifications

3.1. Drone Specifications

Type		Spec
Performance	Maximum Payload	3kg
	Maximum Strike Speed	30m/s
	Endurance (No Payload)	30min
	Maximum Recognition Distance	300m
	Maximum Control Range	15km（Dependent on the environment）
Flight Platform	Dimension	383*346*188 mm(no propellers) 595*555*260mm(with propellers)
	Weight	1.47kg(no battery，no payload)
	Motors	3115-900KV
	Propellers	Three-Blade Propeller 10*50
	Electronic Speed Controller	65A 4-in-1 ESC
	Frame	410mm diagonal distance, 10 inch

	Operating Temperature	-10℃～40℃
Gimbal	**Range**	Pitch：±120°
	CMOS Resolution	1920*1080
	FOV	diagonal 29°
	Video	1080p/60fps
Visual Navigation Module	**Navigation Accuracy**	2%-8%
	Output Frequency	30Hz
	Max Flight Altitude	200m
Battery（Reference）	**Recommended Battery**	6S1P Li
	Capacity	10000mAh
	Charge Voltage Limit	26.4V
Digital Video Transmission	**Power Level**	1.4G 25dBm±2
	Transmission Distance	15km（Dependent on the environment）
	RF Frequency Band	1427.9-1447.9MHz

3.2. Ground Station Specifications

Type	Parameters
System	Android 12
Memory & Storage	8G & 128GB
Reticulation	Support 4G network, 2.4GHz Wi-Fi, Bluetooth 4.0
Screen	10.1-inch screen, 1920*1200 resolution
External interface	1*USB2.0/ 1*HDMI/ 1*TF/ 1*SIM
Brightness	1000nit
Dimensions	335*184*69mm
Batteries	12.6V 12Ah
Charging Time	5-6h
Working Time	5-6h
Weight	1.9kg
Operating Temperature	-20~60℃
RC Output	22 channels - dual SBUS outputs

Physical Channel	2*Flight Rocker 1*Gimbal Rocker 6*Three-position toggle 2*Knob 10*Touch buttons
Power Rating	1.4GHz 25dBm±2
Anti-interference	Supports frequency hopping
Maximum number of connected aircraft	16
Transmission Distance	15km（Dependent on the environment）
RF frequency band	1427.9-1447.9 MHz