Loitering Munition System Manual

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1. Overview

1.1. Application Scenarios

This Loitering Munition System is widely used for reconnaissance and strike against enemy targets, especially suitable for rapid-response operations in complex electromagnetic interference environments. Whether for enemy positions, equipment assembly areas, or critical infrastructure, the system provides an efficient and precise automated Search-Strike solution. Its GPS-free navigation capability and intelligent operation features ensure mission execution even in environments where GPS signals are lost or jammed.

1.2. Product

This Loitering Munition System features a fully automated process from reconnaissance and target locking to strike, equipped with VIO (Visual-Inertial Odometry, VIO) navigation, AI visual recognition, and high-speed strike capabilities. In jamming environments, the system achieves precise flight through VIO, and simultaneously identifies, locks onto, and strikes targets during reconnaissance flights—greatly improving operational efficiency and accuracy. It is an ideal choice for frontline reconnaissance, critical target elimination, area denial, and suppression missions.

2. Introduction

2.1. System Composition

The Loitering Munition System consists of two key modules: (1) Search-Strike Integrated Drone, (2) Ground Station.

(1) **Search-Strike Integrated Drone:** Equipped with high-precision sensors and a VIO navigation system, it supports automatic flight, target search, automatic locking, and precise strike.

(2) **Ground Station:** The Ground Station serves as the mission assignment, communication, and control center for the Loitering Munition.

2.2. Feature

- **Integrated Autonomous Kill Chain**

A single Drone integrates the entire mission process from reconnaissance to attack, significantly reducing operational complexity and the need for human intervention, while improving mission efficiency and reliability.

- **Reconnaissance-and-Strike-on-the-Spot**

Relying on the Drone's onboard edge computing capability, it reduces the "detect-strike" response time to seconds, significantly enhancing strike effectiveness against time-sensitive targets.

- **GPS-Denied Environment Resistance:**

It has strong operational capabilities in GPS-denied environments. No pre-imported satellite maps are required; the Drone relies on VIO and multi-source fusion perception technology to achieve precise autonomous navigation, target search and locking, and closed-loop autonomous missions even in strong jamming environments—without relying on external signals.

- **Automatic Target Search**

The system supports generating efficiently covered search routes through a preset "flight route + rectangular area". The Drone automatically subdivides the mission area into multiple routes, traverses them following the optimal path, and the onboard computing unit simultaneously performs real-time image perception and target recognition. It already supports recognition of humans, vehicles, and targets for target placement, meeting the needs of diverse scenarios.

- **Custom AI Strike Targets**

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

- **High-Speed and Precise Target Strike**

The maximum distance for identifying and locking onto targets reaches 300 meters, with a maximum strike speed of 30 m/s and a hit rate exceeding 90%, enabling high-speed and precise strikes.

- **Ultra-Long Control Distance**

The maximum control distance can reach 15 km, greatly expanding the mission coverage range.

- **User-Friendly Operation**

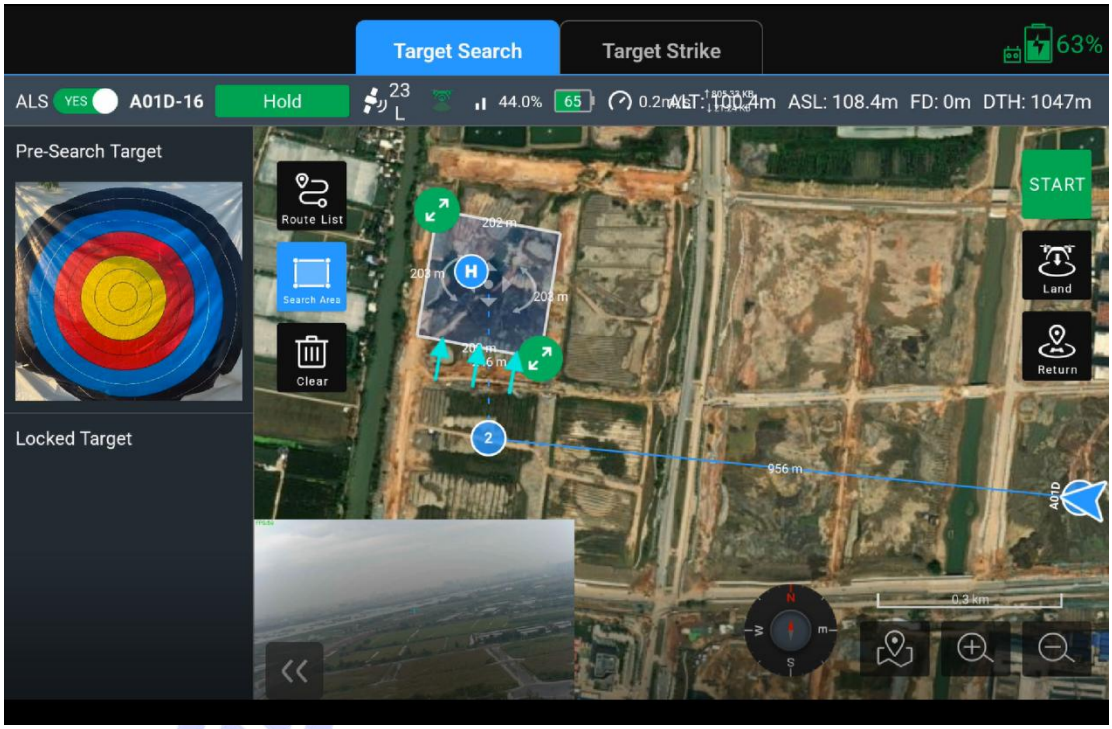
It is the easiest to operate globally, with one-click takeoff and simplified

operation functions—no professional pilots are required for efficient control.

2.3. Operation

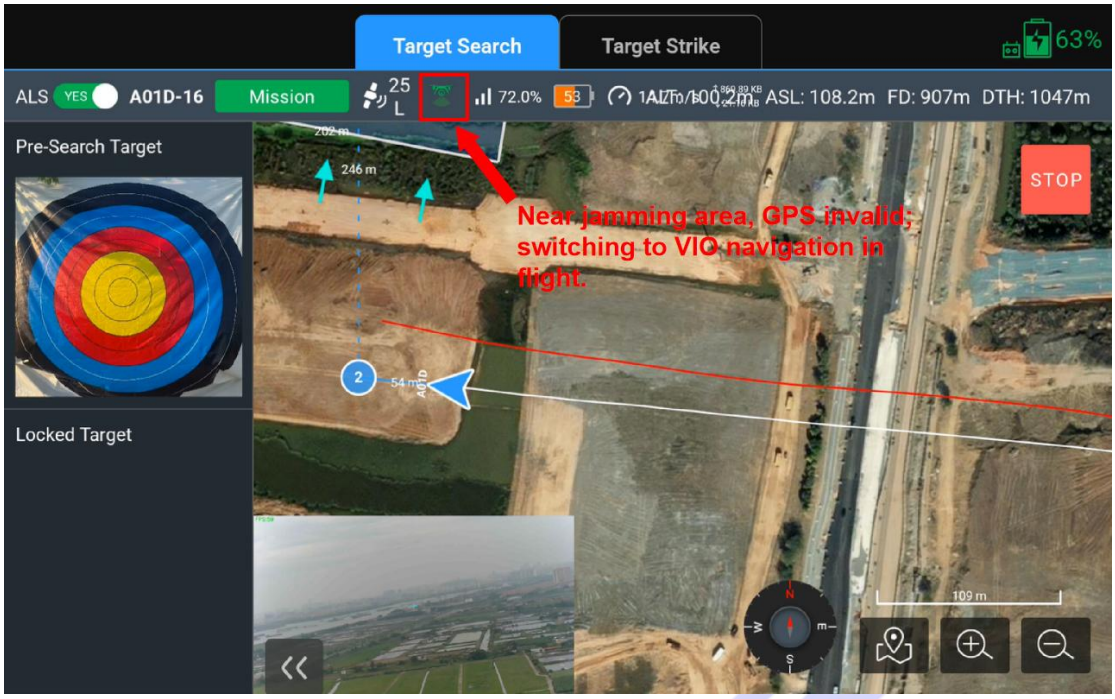
2.3.1. Task Setup

Operators behind the defense line set up missions via the Ground Station, including the size, location, and orientation of the reconnaissance area, flight path, and mission objectives. After confirming the task settings, the operator clicks the "Start" button, and the Drone prepares for takeoff and initiates the mission.



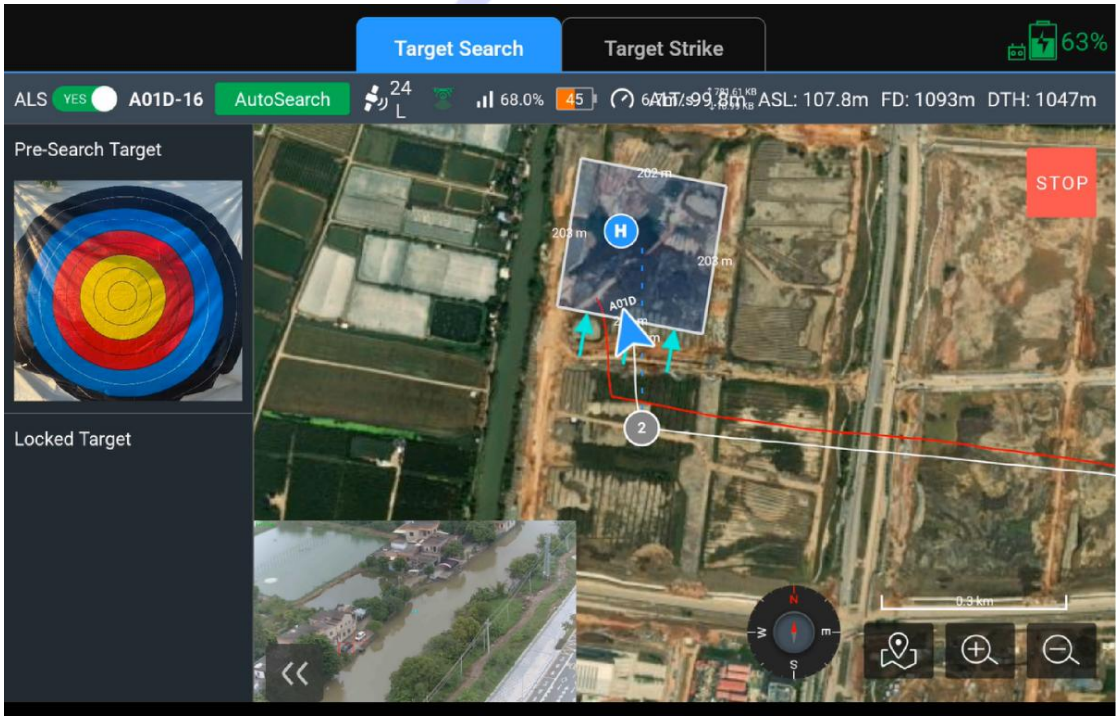
2.3.2. VIO Navigation

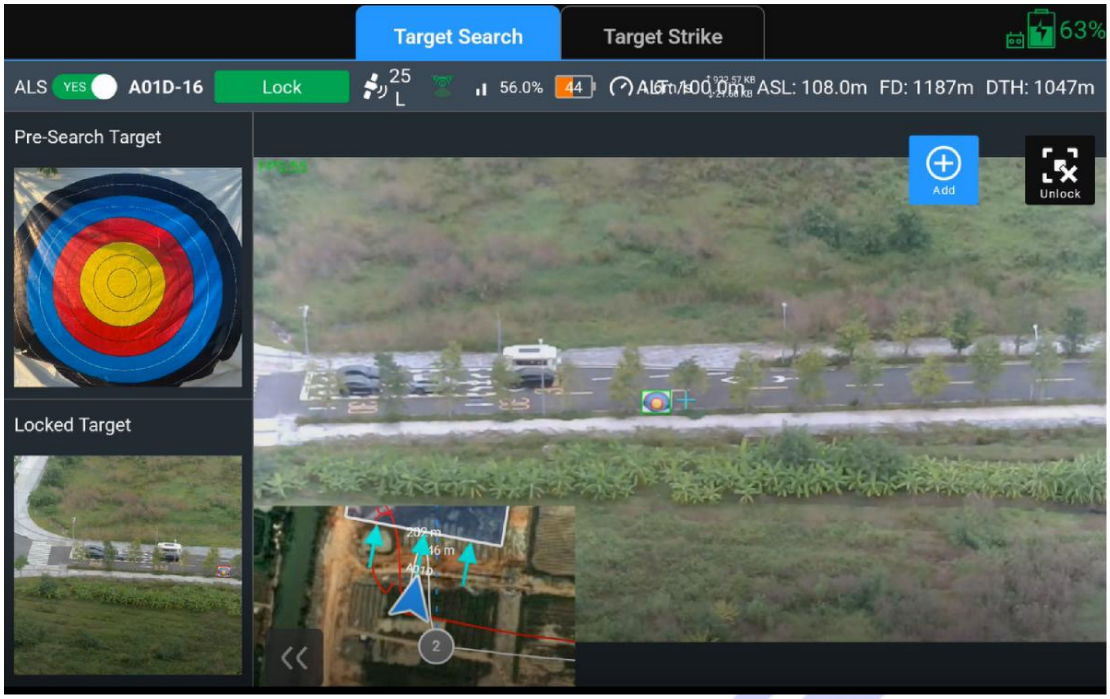
The Loitering Munition uses GPS navigation in normal environments. When approaching and entering a search area with strong GPS jamming, the system seamlessly switches to VIO mode. It uses data fusion from visual sensors and the Inertial Measurement Unit (IMU) in the flight controller to achieve precise autonomous positioning and attitude control, ensuring the normal execution of search and strike missions.



2.3.3. Target Search

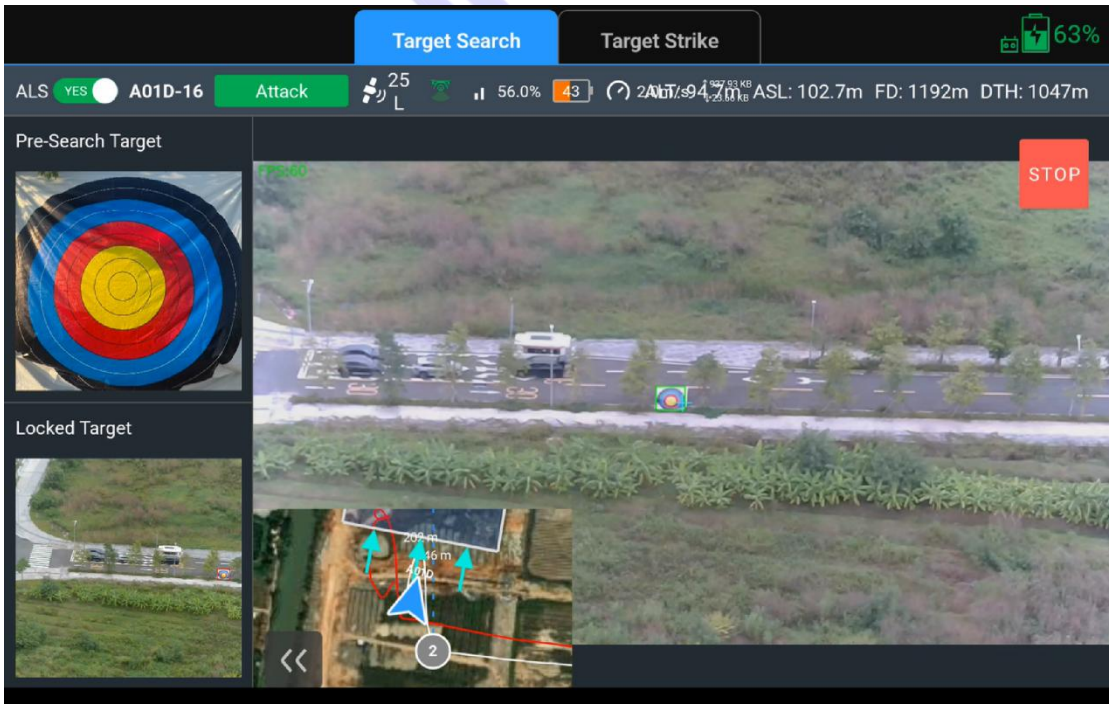
After the user sets the flight route and rectangular search area, the Drone autonomously plans the search path, automatically subdivides the search area, and traverses it one by one. During flight, it continuously performs real-time target recognition; once the first target is detected, it immediately executes the strike mission.





2.3.4. Target Strike

In GPS-free environments, after a target is identified and locked, the Loitering Munition calculates its real-time relative position and angle to the target based on the visual image, continuously adjusts the flight trajectory, and performs a high-speed diving attack on the target.



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）
	Detectable Targets	People, Vehicles, Cloth Targets
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%
	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
Transmission Distance	15km（Dependent on the environment）
RF frequency band	1427.9-1447.9 MHz