

SQ-4 RECON

NANO UNMANNED AERIAL SYSTEMS



the answer to
'over the hill'
observation

- > Reconnaissance
- > Covert Operations
- > Perimeter Checks

Weighing in at just **200 grams (7 oz)**, the SQ-4 RECON system offers a lightweight **vertical take-off and landing (VTOL)** surveillance air-element. Depending on requirement, the SQ-4 RECON system can operate up to **2.5 Kilometres (1.5 miles)**, with flight duration of up to **30 minutes**. The SQ-4 RECON can be operated either by remote control or autonomously flown using GPS waypoint navigation.

Capable of a wide range of tasks, the SQ-4 RECON is very **easy to fly** and operate with minimum of training. The air-element fits snugly into its lightweight pack that contains everything required for instant flight. The SQ-4 RECON is ideal for performing a wide range of tasks for the war-fighter: reconnaissance, perimeter security, forward surveillance, damage assessment, co-ordination, exploration, measurement and observation.

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Introduction

The SQ-4 Recon is believed to be the most advanced nano VTOL UAV available today. It is packed with excellent features which make it ideal for both military and civilian use.

The SQ-4 RECON is a unique micro drone weighing in at around **200 grams (7oz)**. Designed to fly into very small spaces, penetrate heavy RF jamming, and be controlled or observed from literally anywhere in the world. The SQ-4 RECON offers the modern war fighter the ability to carry out reconnaissance tasks without putting themselves in harm's way.

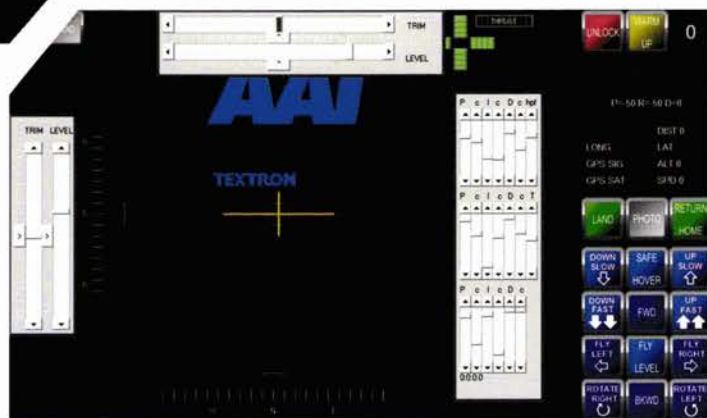
The SQ-4 RECON communications uses **2.4GHz IEEE 802.15.4 standard transceiver**. The RF engine has a high powered on-board processor which allows the creation of a peer to peer network through automatic packet switching and forwarding to modules outside of range. With a **maximum data rate of 1Mbps at 16,000ft line of sight**, the system allows deployment of a number of drones interconnected, communicating with each other as well as with an FOB. All video/still image data is transmitted over the same high powered secure network. The RF system is encrypted using AES128 bit. The system also supports an internet bridge allowing communications to the drones remotely over the internet with little effort. The internet bridge supports 128 bit SSL communications as well as strong authentication and as such can plug into any secure civilian or military Ethernet network.

The purpose made batteries provide **up to 30 minutes of flight**. In a perch and stare mode, the drone draws about 1.1 watts, the power being supplied by a separate battery. The drone currently provides around 8 video/ image hours in perch and stare mode.

The Frame design has been kept simple and light-weight but extremely rugged; there is a current thrust to weight ratio (using 7.7 gram motors) to provide a wind tolerance of around 8-9 m/sec. The SQ-4 RECON has been deliberately designed to fly out of operator sight and can cover a range of up to **2.5 kilometres (1.5 miles) in just a few minutes**.



Launches in under 1 minute.



The SQ-4 Recon Ground Control System (GCS)

The ground control unit is a new purpose made tablet allowing for the customisation of all the features needed to operate the SQ-4 RECON. The GCS provides direct connection to most mesh networks. It is mission autonomous but has two small joysticks for manual control when required.

Features that enable the drone to fly by simply pressing a button have been added, taking the human error out of the equation. It has features such as 'Safe Hover' and 'Auto Home' which allows the operator to simply forget the drone if he or she comes under fire and has to move. A simple touch screen for 'location', and 'fly to location' is under development. The drone will automatically warn the operator once over target so any fine adjustment can be made manually. The centre of the screen is taken up with the downlink camera or mapping view which is over layered with the flight OSD.

For example: pressing the 'SAFE HOVER' button simply starts the motor and places the drone at a pre-determined height. This function can be used prior to flight mission to place it safely out of harm's way, or during a flight mission when the operator comes under duress.



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Durable Perch & Stare for observation

Thanks to its surround ultrasonic sensors, the SQ-4 RECON can land on a very narrow perch position out of the operator's sight. Once landed, the motors can be stopped to allow the SQ-4 RECON camera to be utilised for up to **8 hours**. Motor restart can be activated at any time. Automatic re-start and return to operator will self-activate when the battery is at 30%.

Day and Night use

The SQ-4 RECON is designed to operate both day and night. It is fitted with an array of IR LED's that permit stealth landing at night, or for searching dark buildings and other spaces. The LED's fitted to each of the stabilisation legs provide secure landing and allow the drone to **land on an area less than 30 x 30cm (1 foot) accuracy**.



Small Space and Building Penetration Search

The SQ-4 RECON has 6 highly tuned ultrasonic sonar modules to capture 3D distance data on every axis of the drone. These sensors can be used to fly inside a building and manoeuvre in tight spaces. Using object detection and avoidance it can be flown safely indoors. The drone is fitted with IR LED's to illuminate the forward observation camera allowing it to search in the dark.

Acoustic Infiltrator & Voice-Messaging

The drone's inbuilt technology means that it can be flown to a location and used as an emergency voice communications platform similar to VOIP operating worldwide. A high gain microphone allows the operator to listen for noise or conversations etc. The 0.5 watt speaker enables the operator to speak to people within a 5 meter range.

High Resistance to Weather Conditions

The SQ4-RECON has a wind tolerance of around 8-9 m/sec. It is **self-stabilising**; it returns to level flight instantly if flipped or knocked. The drone uses an active position hold function which recognises wind speed and uses the GPS to compensate accordingly.

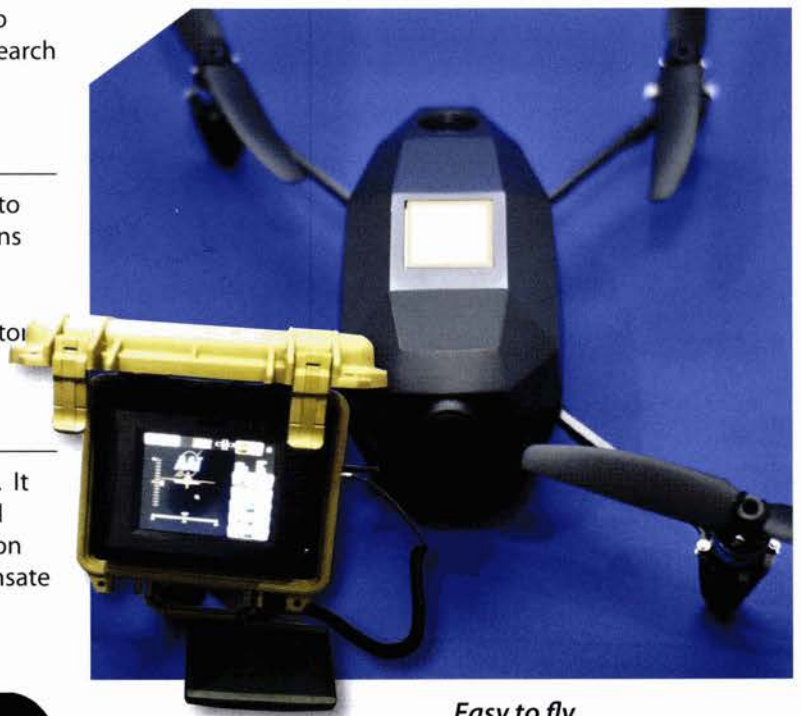
Safe Hover and Return to Operator

Soldiers will find the SQ4-RECON's safe hover and return to operator function handy in a combat situation that requires immediate attention. In such cases the drone can be immediately set to safe hover at its present location or instructed to return to the operator. When the latter function is activated, the drone will return to the location of the Ground Control System (GCS). If the battery safety feature is set, then the **drone will automatically return to the GCS when its power has reached 30%**.

Swarming (Under development)

By using signal strength on the RF transceiver and knowing the position of sister drones, we can further enhance Inertial Navigational System (INS) using a local position triangulation. Swarming and extended range can be achieved by using the mesh network. It is estimated that a single user would be able to **swarm up to 50 drones** from one GCS control station.

“The SQ-4 RECON presents a totally new concept of aerial observation platform with unparalleled functionality and ability.”



Easy to fly.



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Summary

The SQ-4 RECON has been through a process of design, trial and error, and adaptation – the end result is a highly intelligent drone capable of performing a wide range of tasks. Moreover, the unique innovative flight control system allows secure access to a drone from anywhere in the world, both for observation and control.

Its small size and light weight means it can be carried and deployed without any additional strain on the operator. The GCS and spare batteries fit into a simple pouch that can be carried.

The SQ-4 RECON presents a totally new concept of aerial observation platform with unparalleled functionality and ability.

"The base station can be used to operate multiple drones"

Specification Overview:

Weight:

Drone 210 grams (7 oz)

Drone + GCS in pack 968 grams (34 oz)

Approximate Size:

240 x 240 x 110 mm (9 x 9 x 4 inch)

Flight Duration:

30 minutes

Average Flight Speed:

6.5 meters per second (12.6 knots)

Max Legal Operating Height:

400 meters (437 yards)

Operational Range:

2.5 Kilometre (1.5 miles)

Data Link:

2.4GHz IEEE 802.15.4 - 128 Bit Encryption

Video / Still images:

Day / Night 5 megapixel camera

Noise Level:

Inaudible above 15 meters

Heat Signature:

Insignificant

GPS:

Anti-Jamming

Operating Temperature:

-10°C (14°F) to + 50°C (122°F)
(low thermal signature)

Key Features:

- VTOL
- Perch & Stare
- Penetrate & Search (day / Night)
- IR observation and night landing
- Powerful Speaker and high gain Microphone
- Secure VOIP communications between GCS and drone
- Computerised Touch Button GCS Flight System
- Day / Night Digital Camera
- On Screen Display (OSD)
- Emergency Position Hold
- Emergency Recovery
- Return To Operator

Future development:

- Swarming of up to 50+ drones
- Ultrasonic scanning of objects
- Fully Autonomous Mission planning, programming and execution
- Backend direct control of drone using secure internet (worldwide operational control)



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