# Attachment 1 – Boresight 1:M Swarming Capability

## Company Overview

Boresight's Counter Uncrewed Aerial System (CUAS) training capability allows military customers to cost effectively and repeatably train against drone threats. To date, Boresight has sold over 1000x Uncrewed Aerial Targets (UATs) to both Military and Military Industry customers.

Boresight has provided local Australian Military and Military Industry customers a service based swarming CUAS training capability for the past 2 years. Boresight has now developed our swarming capability for international military and Defence Industry customers to operate organically. This new product enables 1-to-Many (1:M) control of Boresight UATs from a single Boresight GCS.

The initial release of the Boresight 1:M capability will be centred around the BQ400 Raider UAT platform which will feature a new mesh-networked radio module to facilitate the 1:M capability. New/future Boresight UAT platforms will be integrated into the new 1:M capability.

**Boresight 1:M Swarming System**

Using its extensive CUAS scenario development and operating experience, Boresight has developed a custom 1:M Swarming System to enable customers to implement CUAS scenarios that are repeatable, scalable, flexible and operator-friendly. Boresight's 1:M Swarming System is modular, supporting a range of UAT platforms, operating modes, and swarm configurations. The core components of this system are:

- **Boresight Uncrewed Aerial Targets:** Boresight's UATs are a cost-effective solution for CUAS testing, training, and evaluation scenarios. They provide a range of capabilities that can be combined with the larger training ecosystem to create complex swarming threat scenarios.
- **Boresight Ground Control System:** Boresight's GCS implements a custom hardware and software system specifically for the CUAS training environment. This system has been developed from the ground up to provide an operator-friendly capability to facilitate a range of CUAS threat emulation scenarios. The GCS laptop is the core operating element that allows the training operations to scale to different UAT types and swarming configurations.
- **Boresight Modular Swarming System (MSS):** Boresight's MSS provides a tightly integrated hardware and software system that pairs with the GCS to enable 1:M operations. This system is scalable and configurable giving operators' choice in how they configure a swarming scenario.

## Boresight Ground Control Station (GCS)

Boresight's 1:M Swarming System is centred around Boresight's custom developed Ground Control Station. Various operational scenarios can be easily deployed, from simple scenarios using a single multirotor UAT to complex swarming scenarios with multiple UAT types. The central GCS allows customers to configure, plan, and operate UAT scenarios, and can be dynamically configured depending to the available Boresight UATs and MSS elements.

Boresight has developed its GCS to operate on a COTS/MOTS laptop. This GCS laptop operates the ground control software, displaying an intuitive user interface for simple configuration of the system and safe control of all UATs.


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The 1:M Swarming System GCS will be delivered with the following components:

- Commercial laptop with mouse,
    - Ruggedised laptop available on request.
- 1:M Software license for 1:10 Operations;
- 1:M Software support for 12-Months;
- Battery charger compatible with purchased Boresight UATs; and
- Ruggedised weatherproof case for all system components.

The Boresight GCS will come with Open Street Maps and be compatible with mapping tiles in MBTiles format.

## Boresight Modular Swarming System (MSS)

Boresight has developed MSS that is compatible with Boresight UATs and designed to be paired with Boresight's GCS. This system has been implemented as a modular system to allow customers to configure their system to best suit their required training scenarios. The Boresight MSS element is software defined to enable up to ten (10) data links, allowing operators to provision a 1:10 Swarming[1] scenario.

A single Boresight MSS element, providing 1:10 Swarming, is delivered as a single unit with all components required for operation with the Boresight GCS. The MSS comprises both hardware and software components, including:

- Boresight MSS Radio Node;
- Extendable mast and fittings for a Boresight Radio Node;
- Weatherproof case for all system components.

The following sections provide additional information regarding the various system components and features.

### Boresight Radio Node

Boresight has developed its custom Radio Node as a self-contained hardware/software component that provides up to ten (10) datalink connections to its UATs. The Radio Node is the core component of an MSS element and makes use of a power-over-ethernet (PoE) connection connectivity to the GCS. When paired with the GCS, it initially allows up to Qty 10 BQ400 Raider UATs to be controlled from the GCS software.

The Boresight Radio Node is supported by ancillary hardware, including the antenna masts and cabling. For best performance, a Radio Node is elevated on top of a mast, then cable connected to the GCS. All equipment is housed in a rugged weatherproof case with custom foam insert for ease of transportation.

The Boresight Radio Node connects each UAT to the GCS via a mesh networked datalink. All command signals and telemetry are routed through the Radio Node to the GCS. Due to the operating limits of the datalink, there is no communication link between each UAT, with coordination between UATs performed by the GCS.

[1] 1:10 Swarming indicates 1 operator to 10 UATs using 10 datalink connections.


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## 1:M Mesh Networked C2 Link Frequencies and Performance

Boresight's Swarming Capability utilises a newly integrated mesh datalink radio. The mesh networked radio is regionally compliant and can be configured to the customers requirements. Table 1, below, provides a high-level overview of the Boresight C2 link when used in the MSS element.

*Table 1 - Boresight C2 Link characteristics.*

| Parameter | Value |
|---|---|
| Frequency Band | 2.4GHz |
| Transmit Power | 1W |
| Link Type | Point-to-Point/Mesh |
| Encryption | AES128/256 |

### BQ4002500 Raider UAT

The 1:M Mesh Networked C2 link detailed in Table 1 and the section above will be integrated into the current BQ400 Raider UAT. The performance specifications for range, endurance, speed and size will remain constant for the BQ400 UAT, with the radio module being the only point of difference.

The new mesh networked C2 radio module will not be interchangeable with the current BQ4002000 radio modules. The new 1:M capable BQ400 UAT will have a new product code (BQ4002500) and new unit pricing detailed in Table 6.

## Boresight Swarming Software

Boresight has developed a 1:M Swarming System allowing customers to operate multiple Boresight UATs for their required CUAS training activities. The Boresight interface has been developed to reduce cognitive burden on operators to facilitate safe and efficient UAT operations. Figure 2 shows a pre-production/beta version of the operating interface, controlling Qty 9 Boresight BQ400 targets in a simulated flying environment for training.

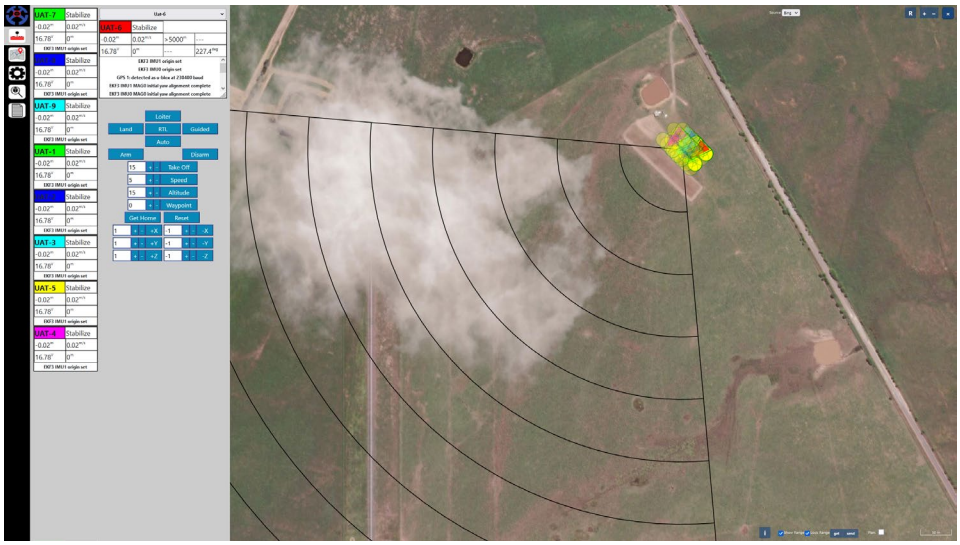


*Figure 1 - Boresight pre-production GCS operation interface showing swarming operation.*


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Piloting operations using the Boresight GCS uses two distinctive piloting modes for control of UATs in swarming training scenarios. These modes, Automatic and Group Guided, are described in Table 3 shown below.

*Table 2 - Boresight UAT Piloting Modes.*

| Automatic Mode | Group Guided Mode |
|---|---|
| • Operator plans a mission consisting of geographic waypoints, speed and altitude commands known as a mission plan.<br>• Operator generates a swarm plan for the required number of UATs in the desired formation (pre-defined or custom formation).<br>• GCS software alerts operator to potential collisions, enabling operator to deconflict before flight execution.<br>• Operator uploads mission plans to swarm.<br>• UATs pass through each waypoint in desired formation.<br>• Mission plans can be saved and loaded.<br>• Mission plans are independent of location and can be *exported* to a new location given home coordinates and heading.<br>• Automatic mode missions enable to execution of identical mission profiles independent of location or which physical UATs are used. | • The UAT swarm follows temporary waypoint commands consisting of latitude, longitude, altitude, and speed controlled by *fly-to-here'* commands selected by the operator on the Boresight GCS map interface.<br>• UAT swarm hover in place until another *fly-to-here* command is given.<br>• Speed, altitude, and formation of UAT swarm can be changed at any time.<br>• Group Guided mode enables the execution of ad-hoc serials with minimal preparation time.<br>• Unlike Automatic mode missions, repeated Group Guided mode missions are not identical. |

## Boresight 12-Month Software Support

The Boresight 1:M Swarming Capability comes with 12-Months of software support. This includes bug fixes and software feature updates for the purchased UAT platforms and swarming capabilities. On completion of the 12-Month software support period, the Boresight GCS, MSS and Software that has purchased will continue to function at its current capability.

Major software capability updates as well as 12-Month software support renewal contracts will be available at the following rates:


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# Attachment 2 – Boresight Training Course

The Boresight Training Course is mandatory for all Boresight 1:M Swarming customers. This is to ensure that customers are trained in safe Boresight 1:M Swarming flight operations and Boresight UATs. The Boresight Training Course would be conducted a location of the customers choice.

The Boresight Training Course is conducted over a 5-day period, with the student to instructor ratio at 1:4. This is subject to local permissive weather during the training course and the facilities available.

There are both theoretical and practical components to the Boresight 1:M Training Course, requiring a classroom and a nearby flight training area. If the classroom and flight training area are not in close vicinity to each other, an extra day may be required to accommodate for additional travel to and from these areas.

When conducting a training course at a customer's location, all required spectrum, frequency, airspace and piloting approvals are the customers responsibility.

## Flight Training Area Requirements

When conducting swarming training at a customer's location, there are specific requirements for a flight training area for the Boresight Training Course. These requirements are listed in Table 3 below.

*Table 5 – Boresight Training Area Operational Requirements*

| Specification | Requirement |
|---|---|
| **Minimum Size** | 400m x 400m |
| **Minimum Altitude** | 0-400ft AGL |
| **Facilities Required** | • Mains Power<br>• Table + Chairs<br>• Shade |
| **Additional Requirements** | • The landscape should be as flat as possible with minimal trees/obstacles in the flying area.<br>• All non-course participants should be removed/excluded from the flying area |

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