Obsidian Counter Drone Solutions

From QINETIQ

drone 98%

drone 131

Detect, Identify, Act

Protect your assets
Improve situational
awareness

Who are QinetiQ?

QinetiQ is a leading global science and engineering company operating primarily in the defence and security space with a strong legacy of delivering specialised bespoke solutions for our customers. QinetiQ works in partnership with its customers to solve real world problems through innovative solutions delivering operational and competitive advantage.

We have been at the forefront of Radar technology since 1942 when the UK Telecommunications Research Establishment was moved to our location in the Malvern Hills, and we continue to develop mission-critical solutions for our global customers.

Obsidian Counter Drone

Features

- **-** Totally automated

- **-** Full Command and Control software (C2)

- **-** Utilises AI

- **-** Low cost of ownership (un-manned)

- **-** 3D Radar technology

- **-** 360 degrees instantaneous coverage
  – 4km diameter

- **-** Classification and tracking

- **-** Multi sensor system

- **-** Persistent surveillance

- **-** Wide range of effectors supported

- **-** QinetiQ Integration services

Keeping pace with a fast-changing threat landscape

The drone threat is varied, ranging from benign hobbyists accidentally flying in the wrong airspace to state-actors intent on causing national disruption. Capable Counter Drone systems need to provide protection against all threats, including those which have been heavily modified to overcome conventional sensing technology.

At QinetiQ, we have been researching the drone threat and developing Counter Drone capability for over six years. Critically, we believe that radar is the most threat-agnostic drone sensor, requiring no specific communications signals to intercept, and requiring no threat library maintenance, which can reduce system effectiveness between updates. Radar is also a reliable technology against non-standard drones which are unlikely to be included in threat libraries.

Detect

Obsidian utilises a purpose-designed 3D staring radar, proving both high accuracy 3D position information and a high update rate (0.5s) – unlike scanning radars which can take several seconds to update. Using this accurate and timely threat location, we can automatically set on a range of other sensors (eg cameras) and effectors (eg Jammers, nets) saving time, and cost.

Track and Identify

As soon as a threat is detected Obsidian continuously monitors its location, setting on a high resolution day/night camera for visual confirmation. The use of 'micro-Doppler' radar techniques to detect drone rotor blades and Advanced Artificial Intelligence (AI) applied to the camera image also provide high confidence of the nature of the threat, minimising false alarms and maintaining business/mission continuity.

Act

Obsidian's highly accurate and timely 3D position updates uniquely allow rapid set-on of drone defeat options, allowing them to be precisely targeted, whilst maximising safe operation.

QinetiQ's approach allows us to work with our customers and partners to provide a range of services and solutions to mission-critical operational requirements.
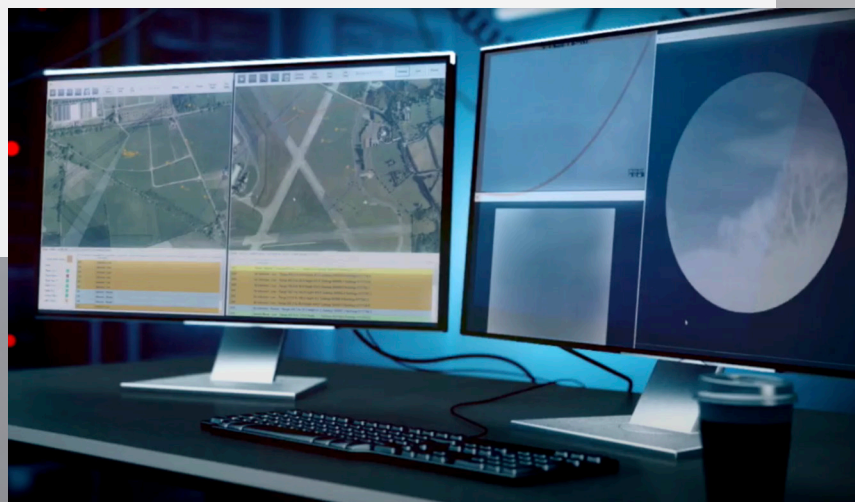
Obsidian Counter Drone

QinetiQ uniquely provides R&D, advice, test and evaluation, consultancy and solutions across the entire Counter-Drone space. Our experience, from advising the UK Ministry of Defence on Counter Drone policy to building drones for the UK military, means we are well placed to select, develop, deliver and support best of breed Counter Drone solutions for our global customers.
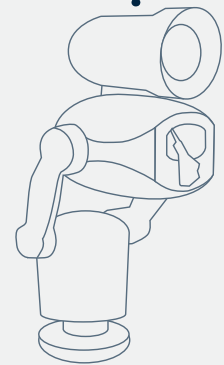
Detect, track, identify
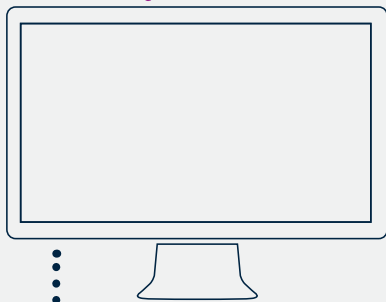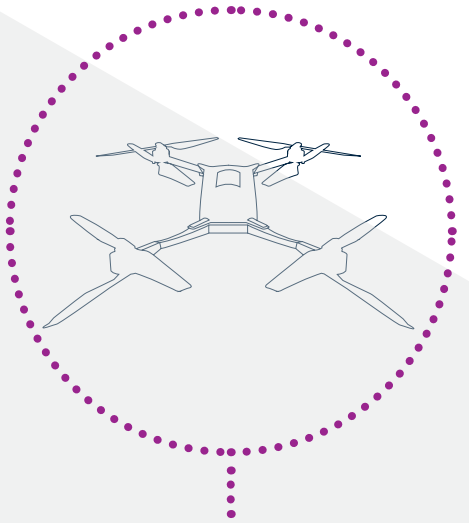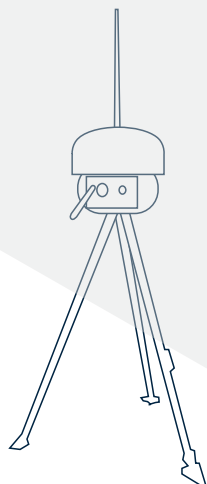
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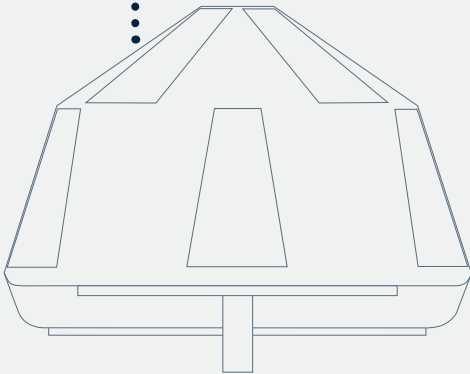
Primary radar systems
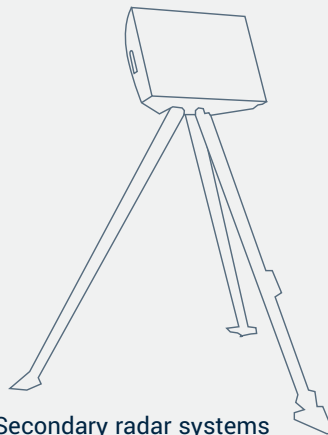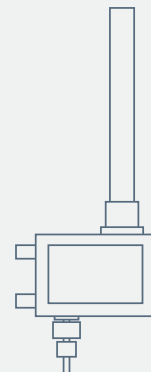
Secondary radar systems

Camera systems

RF Sensing systems

ADSB Receiver

Key Use Cases

– **Sensitive Industry & Secure Environments** eg Critical National Infrastructure Airfields and Perimeters, Chemicals, Civil Nuclear, Communications, Defence, Embassies, Emergency Services, Energy, Finance, Government, Space/Launch Facilities, Law Enforcement, Prisons, Transport, Water

– **Military Force Protection**

– **VIP Protection** eg outdoor events, Luxury Facilities, Private homes, Yachts

– **Industrial Espionage**

Automation

QinetiQ's counter-drone system is a fully automated alerting system that provides minimal false alarms. Competing systems lack the 3D accuracy and update rates required for automation, therefore requiring expensive 24/7 manning.

Low cost of ownership

Our cost-effective radar solution provides market leading accuracy, combined with very rapid update rates, allowing automation and minimising manning.

Innovation

Employs both innovative micro-Doppler technology and Artificial Intelligence to reliably identify drones and minimise false alarms. Purpose-built radar detects very slow-moving targets at lower speeds (including hovering) than competing radar systems,

Speed and accuracy

Staring radar minimises detection latency, providing updates up to ten times more quickly than scanning radar systems, allowing threat position to be precisely tracked

Open standard interfaces

Our Obsidian C2 was originally developed for multi-sensor threat warning systems for demanding military applications, and utilises an open architecture to cost-effectively incorporate 3rd party sensors and effectors.
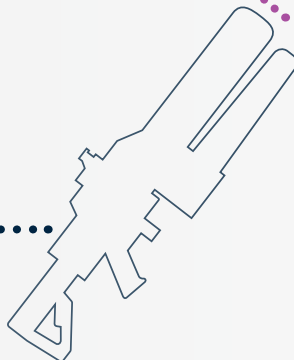
Flexibility

Obsidian is a compact and lightweight solution that can be mounted on a tripod, a vehicle, a mast or directly onto the side of a building.
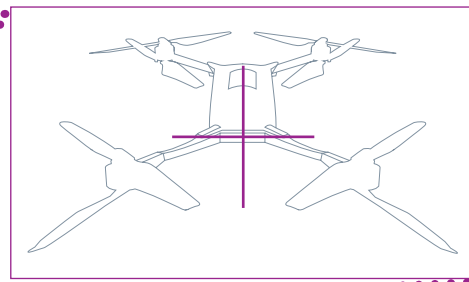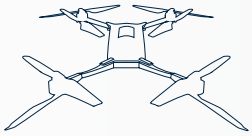
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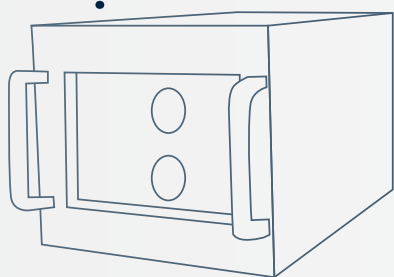
RF Jammers

Nets

Airfields and Perimeters

Operational challenge

Airfields are a target-rich environment, presenting challenges for Counter Drone systems. QinetiQ have unique experience from our support to UK MOD in supporting aircraft, operating aircraft test and evaluation (T&E) ranges, and building and operating target drones for T&E. We are therefore well-placed to understand your requirements, and develop site-specific solutions.

Beyond Detection

Following drone detection, QinetiQ's Obsidian system utilises a range of sensor technologies, such as powerful day/night cameras, to provide additional visual confirmation of potentially dangerous payloads.

Track multiple targets

Necessary for Airport use, and a result of its staring radar technology, Obsidian can track in excess of 100 targets simultaneously, accurately identifying and tracking which ones are drones vs birds, and labelling them accordingly using AI (artificial intelligence). The system camera is automatically slewed to threats, allowing rapid positive ID in a busy control room.

Advanced warning

Each back-to-back pair of QinetiQ's Obsidian 180˚ 3D radars provides 360˚ coverage 90˚ elevation, and 2km range, creating up to a 4km detection 'bubble'. These zones can easily be extended to multiple locations and controlled within the same network, providing a single interface into a distributed system. Interfaces may be replicated in multiple control rooms for situational awareness where it's needed. This provides advanced capability that automatically generates alerts without placing additional demands on operators.
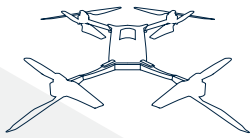
Military Force Protection

Operational Challenge

Recent events have shown that military personnel and equipment are vulnerable to improvised IEDs carried by drones.

Drones (sometimes in swarms) are being increasingly used for low probability of intercept surveillance and reconnaissance, not detectable by conventional sensors.

Detect, Track and ID

Obsidian's staring radar can detect and track over 100 targets simultaneously, differentiating drones from birds and other airborne items. By using AI (artificial intelligence) to rapidly characterise and assess targets, the system provides early warning of approaching threats, allowing appropriate action to be taken.

Defeat

Obsidian alerts can trigger defensive counter drone technology to eliminate any close threat. Obsidian is fully interoperable with most effector systems on the market and can be tailored to match user requirements.
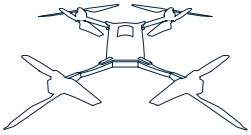
Secure Facilities (CNI)

Operational Challenge

Critical National Infrastructure and Military facilities have become more vulnerable since the proliferation of low-cost drones. Perimeter Security is no longer enough to stop determined individuals from breaching security and providing significant risk to operations and threat to life.

Detect and Track

Obsidian's unparalleled 3D threat location accuracy and rapid location updates provide the ultimate in Situational Awareness of multiple simultaneous threats, allowing the appropriate action to be taken. Furthermore, this 24/7/365 monitoring of the environment is performed completely autonomously, minimising cost of ownership.

Defend

Obsidian alerts provide the accuracy needed to precisely trigger integrated defensive counter drone technologies to eliminate threats. Obsidian's architecture allows cost-effective integration of a range of Counter Drone effector systems, allowing our customers to choose the approach which best suits their environment, threat, and applicable law.
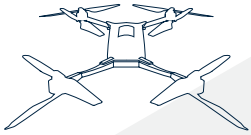
VIP, Property Privacy and Asset Protection

Privacy

People of status are increasingly vulnerable to invasion of privacy from the ever-present paparazzi and members of the public. The advent of affordable drones has increased this threat, allowing invasion of privacy in areas which would previously have been safe from being overlooked, such as large private estates or yachts. Detecting and mitigating threats before they get too close can defend that privacy.

Detect and Track

Obsidian's unparalleled 3D threat location accuracy and rapid location updates provide the ultimate in threat detection, using multi-sensor systems able to detect simultaneous threats. Furthermore, our 24/7/365 monitoring of the environment is performed completely autonomously, minimising cost of ownership and ensuring peace of mind.

Defend

Obsidian alerts provide the accuracy needed to evade the prying eyes of drone cameras or activate a counter drone technology. Obsidian's architecture allows cost-effective integration of a range of Counter Drone effector systems, allowing our customers to choose the approach which best suits their environment, threat, and applicable law.

Typical Specifications*

Command and Control Description

Type	Command and control system with primary purpose of displaying track data from the Obsidian tracker on a map based user interface.

Features

Map display	User definable map image Map pan and zoom controls User definable exclusion zones and Alert prohibit zones User selectable data layers Alert Tracks (UAV) Non- Alert Tracks (non- UAV) Radar detection data plots
Alert detail display	Displaying track ID current location data, target ID and time statistics of alert tracks. Highlighted Alert track on map display
Non Alert display	Displaying track ID current location data, target ID and time statistics
BITE display	Shows BITE status of major subsystem.

Platform

	Hosted on Windows 10 Professional platform Typically Tracker & C2 operate on separate PC/Server

System specification may be subject to modification

Radar General

Radar Type	3D
Cycle Rate	Multi-sector, electronic beam formed (static staring radar)
Frequency	10GHz (10.2 – 10.4GHz)
Band	X-Band.
Waveform	FMCW
Transmit Power	33dBm
Max EIRP	43dBm (13dBW)
Mains power	100VAC to 240VAC 50-60Hz
Consumption	500W
Dimensions	800 x 490 x 565mm W:D:H
Weight	<45Kg
Materials	Fiberglass and Aluminium construction
Ingress Protection	IP54
Operating Temperature	-46 to +49C
Minimum Storage Temperature	-40C

Tracker Performance

Maximum radar inputs per tracker	2 (Future roadmap 4)
Track update rate	~0.5s
Track initiation time	Typically <2s
Maximum simultaneous tracks	>100
Recognition states	Airborne or Ground; Vehicle, or moving Drone or hovering drone or other (eg. pedestrian)
Elevation angle	90 degrees (-10 to +80 degrees)
Simultaneous targets	>100
Minimum Range	20m
Minimum detectable velocity	0.5m/s
Max (Instrumented) Range	2Km
Detection Range	2km for a sub 20kg drone
Range Accuracy	3m
Drone Recognition Range	up to 800m for a sub 20kg drone
Accuracy at 1Km	1 Degree
Accuracy at 2Km	1 Degree
Drone Recognition	Moving, Hovering, single and multi rotor, fixed wing with propellers

Camera

Camera Type	PTZ
Camera Resolution	1920x1080
Frame Rate	25fps
Interface	IP (RJ45)
Ethernet	1000Base-T Minimum
Zoom	x30
Thermal	Uncooled, fixed focal length
IP Rating	IP68
Operating Temperature	-50C to +60C
Minimum Storage Temperature	-40C

*Specification for base system comprising Command and Control System, 2 x Obsidian Counter Drone Radar, Camera