

SMALL ARMS

# DEFENSE

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## QinetiQ's Shoulder-Worn Acoustic Targeting System

**Shoulder-Fired Recoilless: Nammo Talley's M72 FFE**



**Gunshot Detection Special**

**Quick Kill: Rapid Techniques for Snipers**

# SWATS

## A QinetiQ Technology Triumph

By Paul Evancoe

**G**unshot localization systems have been in use for several decades by both the military and law enforcement. Their purpose is to detect the origin of hostile gunshots and instantaneously provide a vector (directional line of fire) and range to the incoming hostile fire from the detector's position. This targeting information allows immediate defensive return fire on target to either suppress or destroy the hostile's firing position.

### FOR MORE INFO

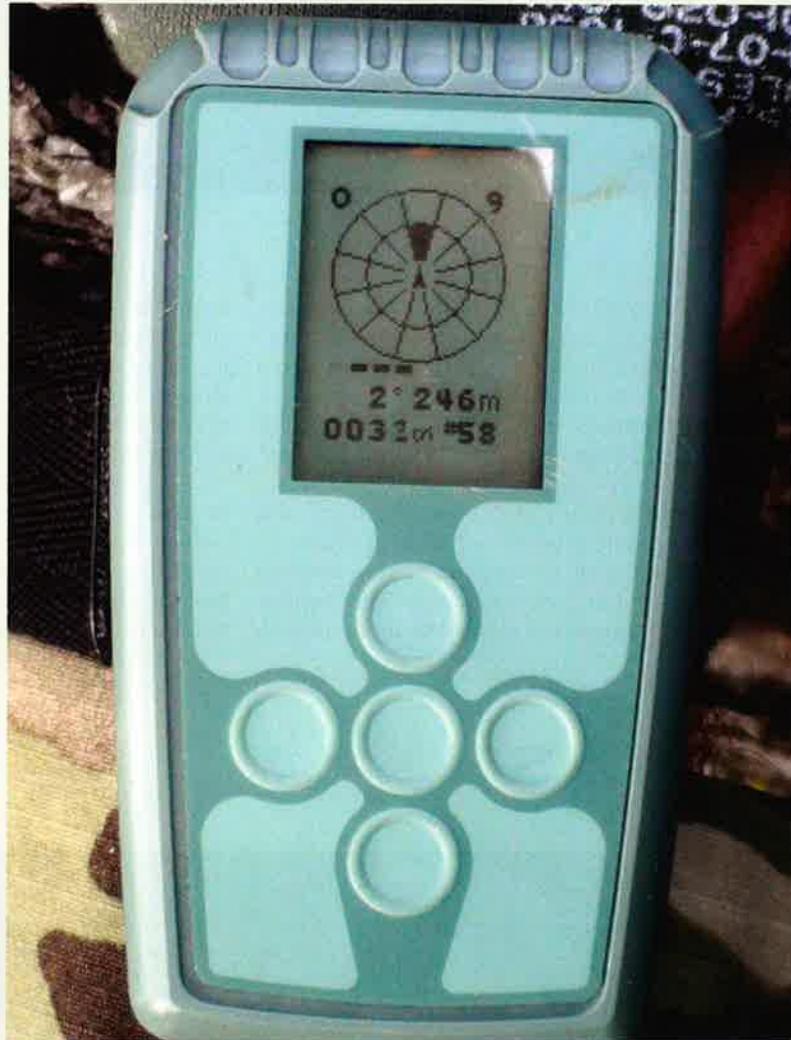
[QinetiQ-NA.com](http://QinetiQ-NA.com)

Historically, most gunshot localization systems have been either hard-mounted on buildings or vehicles, and they have enjoyed varying degrees of success depending upon the level of system sophistication being used. Like everything else, not all gunshot localization systems are created equal. However, there is one that bubbles to the top in all categories of sophistication that include innovation, portability, reliability, maintainability and interoperability.

In response to a U.S. military requirement for an individual (soldier-worn) gunshot detection system (IDGS), QinetiQ North America (QNA), headquartered in Waltham, MA, has developed a Shoulder-Worn Acoustic Targeting System they call SWATS®. With the goal of increasing soldier survivability, SWATS instantly detects, locates and alerts its wearer to the location and range of incoming (hostile) fire. The SWATS system also has a built-in compass, GPS and 9-axis inertial measurement system that compensate for body motion and enable its wearer to effectively navigate on the battlefield. SWATS works reliably in all combat environments to include mountainous, urban and open terrain.

### How Does SWATS Work?

The SWATS system is a self-contained, shoulder-worn, gunshot localization system composed of an array of omni-directional microphones and a custom-built processing computer that detects both the muzzle report sound wave of a fired shot as well as the pres-



Close-up of SWATS visual display that can be either wrist- or chest-worn.

sure wave from the incoming round itself as it zips by. Using sophisticated (and proprietary) algorithms, it computes the differentials between the two pressure waves and instantaneously calculates (less than .25 of a second) both range and directional bearing of the incoming fire from its wearer. This threat information is provided as an alert to the SWATS wearer and is selectable in an audio alert format or wrist-/chest-worn flat screen readout with range and bearing to the source of the hostile fire. This tactical advantage instantaneously provides the warfighter with the necessary information to quickly find, fix and finish a hostile threat. Additionally, SWATS' algorithms provide discrimination so as not to false alert on, or respond to, outgoing friendly fire, even if close by.

As previously mentioned, SWATS alerts its user by providing both audible and visual

threat alerts. Both can be used in parallel or individually to best suit the operational situation and environment. The audible voice warning is available in five languages. The voice alert is volume-adjustable and can be channeled through ear buds worn beneath the helmet, a speaker or the U.S. Army's TCAPS (combat earplugs). If the SWATS user takes fire, the spoken warning in English might say, for example, "Six o'clock, 450 meters." No matter what language is chosen, the warning script is the same. This ensures that a multi-national force using SWATS all get the same information in the same order and react the same way.

The optional 3.9-ounce visual display unit consists of a ruggedized 3.75x2.25-inch flat screen that can be either wrist- or chest-worn with a hardwire power cord attaching it to the shoulder-worn processing unit. The bright-

ness adjustable back-lighted flat screen displays a clock-face omni-directional picture of the hostile shooter's location with range and directional vectors to the incoming fire and it utilizes standard military references in its display. Options for its display include Universal Transverse Mercator, latitude/longitude, Military Grid Reference System and degrees or mils, enabling individual quick reaction and/or call for fire support. Information like shooter grid coordinates tagged with GPS time is formatted for interoperability so it can be shared with other SA and C4ISR systems including Falcon View, Nett Warrior, FBCBz (Force XXI Battle Command Brigade and Below) and heads-up displays. Interconnectivity is achieved through RS-232 or USB serial data ports and interface support for XML, JVMF (Joint Variable Message Format) and CoT.

An additional function of the display provides a target lock-on to the hostile fire location and provides navigation to that location for the SWATS user. During that travel, SWATS will continue to warn its user of new hostile fire locations using the voice alert.

The entire SWATS system weighs in under a pound. This lightweight system (10.6 ounce sensor with batteries) has been designed with a small form factor (3.4in x 3.1in x 1.1in) and a highly versatile mounting solution so it easily mounts on a wide variety of equipment

ensembles to include rucksacks and MOLLE gear. SWATS will operate continuously for 14 hours on two CR123As.

Keeping the above SWATS description in mind, it's obvious that SWATS is a very sophisticated gunshot detection system. However, sophistication in this case doesn't mean complication. Operator training is always a concern with every piece of kit and gadget our soldiers are expected to integrate into service. In many cases, the level of training required to calibrate, operate and maintain a new piece of electronic hardware clearly overtakes its operational benefit to the operator. This is to say that the demands upon a soldier's attention when operating a soldier-carried system must never be such that they require one's constant attentiveness. Much like today's smartphones, SWATS has an intuitive user-friendly mode of operation requiring no formal training. Once it is shoulder-mounted and switched on, it operates autonomously.

SWATS possesses substantial gunshot detection reliability and accuracy. SWATS has a 95% detection rate with a +/- 7.5-degree bearing accuracy. At >700-meter detection range (open terrain), it only has a 10% degradation of range accuracy. This simply means that there is very little, if anything that gets past SWATS without operator warning, and this directly translates to operator confidence and enhanced survival.

## QinetiQ Pays Attention to Manufacturing Detail

SWATS is manufactured at QNA's facilities in the United States. Prior to shipment, every SWATS unit is environmentally stress-screened during assembly and 100% function-checked as part of the manufacturing process. SWATS has been fully qualified against MIL-STD-810F ruggedization and MIL-STD-461E EMI/RFI standards for radiated and conducted emissions and susceptibility. It also exceeds MIL-STD-810F for high and low temperature storage and operation, temperature shock, humidity, drop, shock, vibration, sand, dust, salt fog and blowing rain. To date, more than 19,500 units have been successfully fielded for use in combat by national police and soldiers from 11 NATO member states and other authorized countries, including U.S. Soldiers and Marines serving in Iraq and Afghanistan.

The bottom line: QinetiQ's SWATS is a superbly engineered, highly reliable, easily operated, shoulder-worn acoustic targeting system. It is tried, tested and proven in Iraq and Afghanistan combat operations by U.S. and NATO forces. SWATS works as advertised. Those who have used it say it works better than advertised. SWATS is made in America by Americans, and it's available today. **SADJ**

# Threat Detected. Threat Eliminated.



SWATS® – Shoulder Worn Acoustic Targeting System

Enhanced 360° Situational Awareness provides added Survivability.



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- Instantly detects and reports direction and location of hostile gunfire.
- Over 19,500 deployed to 11 nations.

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