Special forces operators, including Australian soldiers pictured, routinely conduct CQB operations with helmet-mounted night-vision equipment, laser designators and suppressors.

Australian DoD: 1332855

# CQB technologies help forces grapple with short-range front line

With an increased emphasis on hand-to-hand combat during current operations in Afghanistan and Iraq, UK and US forces are welcoming new technologies and training, reports **Andrew White**

**An enemy that seamlessly emerges from and fades back into an indigenous population at will has meant coalition forces operating in Afghanistan have never been more vulnerable to the threat of close-quarter battle (CQB).**

Whether it be a foot patrol through a bustling street market, 'shura' with tribal elders, or compound clearance in search of a high-value target (HVT), troops are now being forced to consider how they can best protect themselves at close quarters while conducting military operations in urban terrain (MOUT), not to mention caves and remote dwellings.

However, even with this in mind, there has been a mixed response from various international governments with regards to the provision of adequate and relevant training and resources for such warfare, whether it be small arms, specialist ammunition, electro-optical devices, mini-unmanned ground vehicles (UGVs) or unarmed combat training.

It is no secret that 'contacts' in Afghanistan occur either at very close range or at between 500-900 m and beyond. The latter has attracted greater consideration over the past few years with the introduction of additional sniper and sharpshooter weapons, light machine guns and improved warheads for anti-tank guided munitions (ATGMs). Far less attention, however, has been paid to assault teams who find themselves storming compounds and buildings, while being unable to identify threats waiting for them on the other side of thick, dried-mud-walls.

This has led to various special forces operators across NATO (who are in a better position than most standard infantry to cherry pick their own equipment) selecting a more varied weapons mixture for such tasks in hand. For example, non-standard issue .45-calibre pistols are being carried in place of 9 mm systems whose 'stopping' power or lethality has been questioned.

Similarly, some operators are choosing to carry 7.62 mm assault rifles in place of issued 5.56 mm weapons, for the same reason. These each carry their own risks when it comes to rounds passing all the way through bodies and causing unintended injury or death to 'background' targets.

In response, the UK Ministry of Defence (MoD) is pursuing a requirement to acquire a specialist weapon system for CQB operations. A request for information (RfI) was released in May 2009 for a "close-quarter lethality" weapon, aimed at providing a 5.56 mm system for use in "confined" spaces, according to contracting authority Defence Equipment & Support's (DE&S's) Light Weapons, Photography and Batteries Team.

Similarly, sources tell *Jane's* that the US Special Operations Command (SOCOM) is firming up plans to equip the entire US special forces community with FNH USA's Special Operations Forces Combat Assault Rifle (SCAR) in 2010, following a limited user-evaluation programme in 2009.

For CQB scenarios, conventional UK forces have access to the 5.56 mm L22A2 carbine, a short-barrelled version of the SA80A2 assault rifle as used by armoured units and the Army Air Corps. Additionally, Heckler & Koch's (H&K's) 9 mm MP5 submachine gun has traditionally been linked to special operations.

However, the MoD is looking to acquire 300 weapons in a contract worth around EUR7.25 million (USD10.3 million). A modified off-the-shelf weapon is expected to be selected. The key user requirements including an ability to "deliver an incapacitating effect on an unarmoured human target" at ranges of up to 200 m and capacity to be brought to bear in "confined" spaces.

According to the DE&S, a weapon system that can be fired from either shoulder and includes a folding or extendable butt is preferred. It must also be capable of carrying the in-service SureFire FA556 suppressor via a threaded barrel muzzle and be able to house a four-MOA (minute of angle) mini red dot/holographic CQB sight.

The MoD said weapons trials had been due to start in December 2009 but the organisation declined to comment on the status of the programme in January.

Industry sources tell *Jane's* that inter-

ested parties are likely to include H&K, Colt Canada and FN Herstal (FNH) among others. More specifically, current 5.56 mm weapon systems on the market that satisfy the MoD's strict length requirements include H&K's G36C; IMI's Micro-Tavor-21; and FNH's SCAR-Light Mk16 Mod 0, which was recently accepted into service with the US Special Forces Command.

Sources added that H&K's HK416 weapon, which has recently been adopted by counter-terrorism specialist unit 1st Special Forces Group Operational Detachment-Delta, is also likely to be considered.

The SCAR weapon, however, has the advantage of being available in both 5.56 mm and 7.62 mm calibres with the Mk16 SCAR-Light and Mk17 SCAR-Heavy respectively. A distinct advantage of this weapon is that it comes with 10, 14 and 18-inch barrels for 5.56 mm (Mk 16) and 13, 16 and 20 inch barrels for 7.62 mm (Mk 17) versions. These shorter barrels are ideally suited for the enclosed spaces encountered during CQB operations.

The same can be said of H&K's HK416 (5.56 mm) and HK417 (7.62 mm) systems which again, come with changeable barrels in differing lengths. It is expected that in the US the SCAR will replace weapons including the Mk18 CQB rifle, which features an upgraded upper receiver for the M4A1 carbine.

## Developing rifle rounds

In line with SOCOM units receiving the SCAR weapon systems, the US Naval Surface Warfare Centre (NSWC) has been focusing on developing two new rounds for the Mk16/Mk17 rifles; namely the Mk318 Mod 0 5.56 mm round and the Mk319 7.62 mm round.

There has been much criticism of the standard NATO 5.56x45 mm round and this came to a head in April 2002 with a 'terminal study' of all 5.56 mm ammunition in service. As one NSWC source tells *Jane's*, this started a debate on whether this ammunition was "... effective, especially in CQB-type environments".

A Joint Operational Requirements Document for SCAR also detailed requirements for 'enhanced ammunition' with a development contract awarded to ATK in September 2006. The benefits of these specially developed rounds include a flash-reducing additive; a bullet tip designed to defeat intermediate barriers; and a solid copper bullet back acting as a rear penetrator.

The Mk318 Mod 0 (5.56 mm Enhanced) is optimised for the Mk16 SCAR with 14-inch (35.5 cm) barrel length and features a 62 grain bullet, which travels at 892 m/s. The Mk319 Mod 0 (7.62 mm Enhanced) is optimised for the Mk17 SCAR with a 16 mm barrel, features a 130 grain bullet that flies at 892 m/s (830 m/s with a 13 mm CQB barrel).

Other options include 'hollow point' or expanding bullet ammunition which has a pit shape at the top of the round and is designed to allow the round to expand on entering a target. This is intended to decrease penetration and disrupt more tissue as it travels into the target. A lesser penetrative effect is favoured in the CQB environment where the risk of higher-calibre ammunition passing through a target (especially applicable in hostage rescue and aircraft operations) and hitting a non-combatant is best avoided.

Going back only a few years, various NATO special forces units used 9 mm submachine guns, such as the H&K MP5, for counter-terrorism duties which invariably involved fighting in buildings, compounds and tight spaces. However, a number of these users have since reverted to using 5.56 mm, not only for increased stopping power, but also because it means operators reduce their logistical burden by operating a single weapon system for all scenarios.

According to Jan Hasslid, vice president at Nammo, weapon and ammunition choice must be both "lightweight and flexible". This, he believes, is one of the reasons why so many NATO forces are continuing to use the relatively light 5.56 mm round compared with 7.62 mm ammunition, affording the user better manoeuvrability.

For CQB operations, Nammo has developed the Short-Range Combat (SRC) round, which is available in standard NATO 5.56 mm and 7.62 mm calibres. "This is a way to ensure maximum stopping effect of any threat while also reducing the collateral damage risk from ricochets," he tells *Jane's*.

According to Hasslid, the SRC round offers the same performance parameters as NATO ball rounds up to a distance of 200 m before dissipating energy and dropping to the ground at 1,500 m and 1,700 m respectively.

Manufactured with a copper body and iron core, the round does not possess any frangible materials and will not fragment in the body on impact. Having been designed initially as a training round, Nammo says the SRC is also "perfect" as an operational round in missions where combat risk zones may be limited, as well as counter-terrorism operations in public areas.

A further option is Black Hills Ammunition's 5.56 mm Reduced Ricochet Limited Penetration (RRLP) cartridge, which is a frangible round, made to break apart when it hits a wall or hard surface. The RRLP was designed to be fired from the 14.5 inch-barrelled Colt Defense M4A1 carbine and 20-inch-barrelled M16A2 rifle as well as FNH USA's M249 Squad Automatic Weapon (SAW) and went into production in 2002.

But, according to the US Army Program Executive Office Soldier, "shot placement" is the most important factor in soldier/system performance in CQB. "Current 5.56 mm ammunition performs well against numerous types of target at both close and longer distances," a spokesman told *Jane's*.

## Minimising collateral damage

Elsewhere, Nammo is looking at the development of plastic, short-range ammunition for 40x46 mm and 40x53 mm grenades, capable of carrying smoke, illumination or flashbang/thunderflash warheads. The latter are used, prior to an assault team entering a room, to keep the heads of the enemy down and act as a distraction.

"The operational requirements will be full functionality at firing distances between 18 and 400 m and a plastic warhead will definitely minimise collateral damage effects," Hasslid explains.

SOCOM is already working on the development of a 40 mm stand-off door-breaching round, to be fired from underslung grenade launchers, for CQB operations. Current procedures for gaining entry into a room or building include the use of either manual devices, explosives or various 12-gauge shotgun rounds. The addition of a 40 mm round would provide operators with a stand-off capability for breaching

**Clearing stairwells in buildings can prove one of the trickiest tasks in CQB operations. Forces can also use ballistic shields for additional protection in such scenarios.**

US DoD: 1347843

doors from a minimum distance of 10 m.

Rheinmetall Arges has also developed a 40 mm Door-Breaching Cartridge for enhanced forced entry and Chemring has told *Jane's* that it too has the materials required for such a round.

A further development for explosive method of entry into a building, aside from more traditional shaped charges, is the introduction of thermobaric or 'enhanced blast' grenades. Available in 40 mm (such as the XM1060 munition) and hand-thrown grenades configuration, they were first developed and fielded by the US Army Picatinny Arsenal within a four-month time span during 2008.

Their development followed calls from forces on the ground for an 'enhanced blast' explosive especially designed for MOUT and CQB, and sources tell *Jane's* that they proved popular during cave warfare in Afghanistan as well as when gaining entry into buildings in Iraq.

However, guaranteeing entry into a building is only a first step in the CQB chain of events. How operators conduct their drills once inside is critical to a successful mission and with much of the work being conducted at night, an electro-optical capability becomes paramount.

Red dot sights, used in conjunction with laser pointers and night-vision devices (NVDs), are gaining in popularity and have become a staple requirement for small-arms programmes around the world. Although limited to a range of around 100 m or so, red dot sight allow an operator to keep both eyes open for maximum situational awareness in a building or compound while looking through the optic.

Aimpoint's CompM2 and M3 sights offer this capability and are widely used among coalition forces, as is Ernst Leitz Canada (ELCAN) Optical Technologies' Specter-DR (dual role) sight, which offers both 4x magnification as well as a 1x red dot sight for CQB.

Despite daily fighting at close quarters involving UK forces in Afghanistan's Helmand province, the MoD has selected a modified ELCAN sight that does not include

## Training for the up close and personal role

**A NATO special forces operator conducts a room entry drill during a 'hard arrest' operation in Afghanistan. On entering the room, an insurgent grabs his assault rifle and a grapple ensues.**

**Removing his left hand from the foregrip of his weapon, the operator strikes the assaulter's throat and face resulting in a destruction of cognitive brain function and then, using his left hand and rifle, snaps the neck. Within seconds, the operator has two hands back on his weapon and continues with his mission.**

**This is a single event among dozens currently being played out on operations in Afghanistan and Iraq which have seen a dramatic rise in demand for self-defence training, especially given the nature of operations in these countries in dealing with an undefined enemy.**

**"In Afghanistan and Iraq, hand-to-hand skills are becoming more of a part of modern warfare because of the nature of the job, meaning that the enemy is not so clearly defined and forces are seeing a more up close and personal type of combat," says Tremaine Kent, a former British Army operative and founder of H2H Defence.**

H2H Defence: 1347848

**Hand-to-hand combat is becoming a much more prevalent predeployment training package for forces deploying to Afghanistan and Iraq.**

**"Specialist operators and conventional foot soldiers need to be trained in an environment where hand-to-hand skills are going to be prevalent because of the [extreme] proximity to the enemy," he adds, while describing how insurgents in Afghanistan easily blend into the indigenous population by disposing of an AK-47 assault rifle.**

**US forces are now being taught 'Lines' (Linear Involuntary Neurological override Engagement System); a series of individual exercises ranging from hand-to-eye co-ordination through to reflex practices. Elsewhere, a number of US Army special forces and the New Zealand Defence Force have signed up for the Rapid-Action Initiation Defence (RAID) solution, which focuses on multiple threat defence, counter-knife drills as well as counter-pistol and rifle defensive moves.**

**Israeli special forces continue to be instructed in 'Kapap-Krav Maga', while US Navy SEALs rely on the 'Rapid Assault Tactics' programme. Australia has also recognised the importance of this skill with the founding of the Military Unarmed Combat cell in Canberra, aimed at delivering a self-defence capability to the army.**

**"There has been an upsurge [in hand-to-hand combat training], especially since the middle of the Iraq conflict and now Afghanistan," Kent explains.**

**"Hand-to-hand combat is used in co-operation with firearm systems allowing them to use both, in order to buy you time to then deploy your next weapon system such as a pistol." Moreover, current training is normally conducted in clean fatigues and Kent, who has recently won a contract to train an undisclosed NATO special forces unit, says more emphasis should be put on conducting drills while wearing body armour, webbing and bergens.**

**However, Kent is critical of the UK's approach to hand-to-hand combat: "A lot of [UK] military units have taken on 'Restrain and Arrest' [training] predominantly from operations dating back 30 to 40 years in Northern Ireland. Now, recruits go into basic training and within months or even weeks, can find themselves on the frontline in Afghanistan.**

**"That is why the UK needs to start looking outside the box and realising what was good for [the First and Second World Wars] and Northern Ireland, is not necessarily right for operations today. This is why hand-to-hand combat should really be the first line of defence," he adds.**

**Currently, unarmed combat duties within the UK military fall under the remit of the Physical Training Corps, which instructs unit physical training instructors (PTIs). However, Kent says the MoD should be doing more to equip soldiers with the correct skills for front-line operations in Afghanistan.**

**"It is ludicrous to send soldiers out to the frontline without any decent hand-to-hand skills. They should be taking this up full board to teach PTIs on a regular basis to get them to a teaching level," enabling them to disseminate such skills among their unit, Kent states.**

**It is common knowledge in unarmed combat circles that the US 'Lines' approach focuses much more on lethality even though much emphasis for training remains with specialist units.**

**"In basic training, if PTIs were taught unarmed combat, they could take those skills back to unit and apply them to predeployment training packages prior to shipping out to theatre. Entire regiments could be trained for hand-to-hand combat applicable for operations in Iraq and Afghanistan," Kent believes. Having trained personnel from the UK Royal Marines, army and air force PTIs and various other specialists, Kent is in no doubt that unarmed combat is a prerequisite for operations. "With the few that I do train, [in the UK] there is no question that this is an important part of their professional development as trained soldiers and they say it is invaluable to what they do from an operational point of view."**

the 1x red dot capability. As part of a GBP7 million contract for the Future Infantry Soldier Technology (FIST) programme, 10,835 SpecterOS4X optical sights will be delivered to satisfy a requirement for reduced engagement times, plus improved detection and recognition ranges and general effectiveness of soldiers in CQB scenarios.

According to Lieutenant Colonel Joseph Capobianco, US Army product manager Soldier Maneuver Sensors, between 80 and 100 per cent of US soldiers questioned in post-combat surveys described their thermal weapon sight (TWS) as "effective" with 88-96 per cent equally as positive when describing the PVS-14 NVDs. Negative feedback, he tells *Jane's*, centred around size, weight and power (SWAP) issues.

Currently, of the 1.14 million combat troops in the US Army, 700,000 are equipped with the helmet-mounted PVS-14 NVDs. TWS I and II systems are manufactured by BAE Systems, DRS Technologies and Raytheon.

"There should not be a [single] soldier without NVDs on the battlefield. So every member of a warfighting formation conducting CQB will have night vision," he says while describing the US Army policy of providing its soldiers with a "dominant overmatch" advantage over the enemy: "We don't want a fair fight but overwhelming superiority."

US forces, more specifically army special forces, have been equipped with enhanced night-vision goggles (ENVGs), which combine both image-intensification and infrared or thermal technologies in a single device. This allows an operator to see 'through' glass, a useful capability for operations inside buildings denied by early systems.

## Target illumination

The US Army's P215A aiming laser has become a staple for CQB operations, providing red or infrared lasers ,which can be zeroed in to match a rifle's boresight, usually at a range of 25 or 50 m. Such a capability allows an operator to fire more 'instinctive' shots on target.

"Lasers are a double-edged sword. They are great for increasing accuracy and reflex of fire. Where the laser is, the bullet will soon follow, but in an operational scenario, once a laser is switched on, anybody with night vision is aware something is happening," Lt Col Capobianco continues.

According to the US Army, there are "several" continuing assessments into the night-vision capability of insurgents operating in Afghanistan and Iraq. "We know the insurgents have some capability, but the question is how much?"

In a bid to counter this, the army is conducting research and development (R&D) in several fields for CQB operations. The first is a thermal laser designation system, which would create a heatspot on a target that could not be picked up by the basic NVDs that the enemy might be operating with.

US DoD: 1347844

**Sense Through Wall sensors will soon be fielded to US forces in order to improve situational awareness before entering buildings and compounds.**

US DoD: 1347846

**ITT's ENVG system, soon to be developed into a digital sensor, provides operators with not only infrared capability but also thermal imaging for increased detection in built-up areas.**

Many CQB operations will see forces 'stacking' or lining up outside a house before gaining entry. With night operations, this can mean a rapid switch from ambient light to no light at all, thereby requiring minimal adjustment of NVDs and/or TWSs by an operator as he switches between light levels.

To this end, the US Army is looking at multispectral weapon-aiming sights combining thermal and night-vision capabilities. A total of 1,300 systems have already been issued to SOCOM units.

Other R&D efforts include work on rigging up a helmet-mounted NVD to include the additional projection of TWS capabilities. Lt Col Capobianco tells *Jane's* that industry has come back with a variety of prototype systems that work, although he describes them as "extremely" power dependent.

"They include several pounds of battery packs, cabling and a processor. Operational feedback shows that the capability is absolutely what [soldiers] want, but industry has yet to deliver what it needs for an operational scenario," he adds.

Warfighter tests have already been conducted in conjunction with the US Marine Corps (USMC), which is currently looking for a lighter system suitable for operations. Elsewhere, the ENVG digital project will allow a variety of information to be displayed on a soldier's NVD via wireless connections. This could include geolocation of his own position as well as other assault team member positions in a building using digital magnetic compasses and downloads from sensors, including from unmanned aerial vehicles (UAVs) and UGVs.

BAE Systems, DRS Technologies, ITT and L-3 are understood to be bidding for this contract with the army looking at 2014-15 as a possible in-service date for the technology. It will also be tied into the Ground Soldier System programme, Lt Col Capobianco explains.

Finally, the army is progressing with a 'Sense Through Wall' vision capability, which would enable operators to visually penetrate walls up to 20 cm thick at a stand-off distance of up to 20 m. This radar technology picks up 'biologics' either moving or at rest, by recognising heartbeats and respiratory patterns.

"CQB is a very fast and very dynamic environment," Lt Col Capobianco tells *Jane's*. "Imagine trying to enter buildings or rooms and before you breach, you can stand back and do an assessment and get a feel for [the] number of people inside."

Such systems have already been fielded in Afghanistan and/or Iraq, with SOCOM procuring four systems for combat evaluation and the US Army Rapid Equipping Force purchasing an additional 12 units. Feedback shows that operators described the capability as "fantastic" but again, cited various SWAP issues.

The US Department of Defense (DoD) has released a request for proposals for two industry partners to design a 1.4-3 kg system, equivalent in size to three personal data assistants. A contract is due to be awarded by the end of 2010 for an army requirement of 7,000 systems, with the potential to extend this to the USMC and other DoD organisations.

Providing an alternative to Sense Through Wall vision technology is the growing use of mini-UGVs by forces conducting immediate building searches in Iraq and compound

clearances in Afghanistan. US forces in both theatres operate a total of 200 ReconRobotic Scout XT mini-UGVs, used to provide immediate, real-time intelligence before entering a building, compound or negotiating an obscured obstacle.

"We are going to see a lot more. This is a fairly sporadic use compared with what I think it will end up being," explains Ernest Langdon, director of military sales at ReconRobotics. "This is something every fire team can carry with them as it has an all-up system weight of 3 lb [1.3 kg]."

Costing USD13,000 for each XT model, compared with approximately USD8,000 for a set of NVGs, Langdon is in no doubt that mini-UGVs are saving lives in combat theatres. "I've talked to generals through to younger guys who all know soldiers who have been killed and have said if they'd had this equipment [mini-UGVs], they might still be alive. They would not have had to go into that room or jumped over that wall and instead, would have done something different," says the former USMC scout sniper.

So far, US Navy SEALs, USMC special operations teams and the US Army have been using ReconRobotics systems for operations and, Langdon believes, they will have a tangible effect on existing tactics, techniques and procedures (TTPs).

## Awkward position

With compound walls in Afghanistan standing more than 2.4 m tall, troops are able to throw the mini-UGV over and positively identify threats as well as civilians, women and children. Although a UGV lacks the subtlety of a see-through wall system, its use enables quick battle orders to be made on the ground, before gaining entry to a compound or building, thus reducing the risk of collateral damage especially to the population. This is in line with International Security Assistance Force (ISAF) commander, General Stanley McChrystal's latest strategy for operations in Afghanistan.

"Troops really couldn't do these things before [they had] mini-UGVs in that weight class. They are re-evaluating the way they are doing things but it will take time to look at TTPs," Langdon says.

However, forces may lose the element of surprise in assaulting a compound by employing mini-UGVs. An alternative is the use of German Shepherd dogs sent into a house ahead of an assault team, a TTP used by various NATO special forces units.

Currently, both the USMC and US Army are drafting mini-UGV programme documents and conducting capability research programmes, designed to work out how best they will use such systems 'en masse' in the future.

According to ReconRobotics' president and CEO, Alan Bignall, there is plenty more to come in this field beyond the current camera-only models.

"Right now, we just have eyes-on capability in the system. Adding more and more sensors is clearly in our plans and this could include sound and CBNRE (chemical, biological, nuclear, radiological and explosive) sensors on board a throwable remote-controlled device," he explains. ReconRobotics' Scout IR (infrared) system was developed in conjunction with US Navy SEALs, who had a requirement to see in the dark. *Jane's* understands that SEAL teams are currently operating with 150 Scout IR systems, although no other details were disclosed due to operational security.

The XT version was formed from an army requirement in Afghanistan, building on the original Scout system, which proved popular with the military for searching houses in Baghdad.

Additional requirements called for a more rugged and faster machine with improved climbing capability allowing it to be thrown into caves, operate on sand and clear obstacles up to 8 cm high.

The mini-UGVs can be thrown 36 m horizontally and survive multiple 9 m vertical drops, although Bignall tells *Jane's* that they are looking to increase the latter to 15 m.

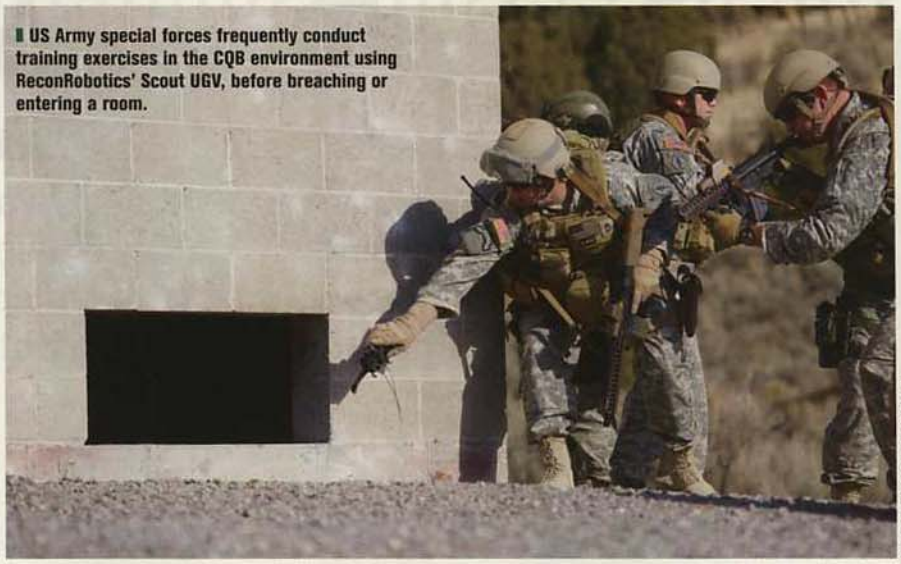
With a radio-frequency range of around 100 m in buildings, there are no current plans to arm the mini-UGV, but as Bignall explains, "... you can see how this technology could be used to do that".

Options could include arming the Scout with plastic explosive, tear gas canisters, flashbang grenades and laser designation devices.

To minimise noise during more covert CQB operations, the Scout's flexible tail was rubber coated allowing it to "sneak in anywhere as quietly as a human whisper" and position itself under a table and watch, Bignall describes. At the moment, the Scout mini-UGVs incorporate a 60-degree wide-angle lens, which can show a 1.8 m tall figure at a distance of 1.2 m. ■

US DoD: 1347845

**P215A laser designators give both special and conventional forces improved instinctive snapshooting capabilities for rapid engagement of a target, but can be seen with relatively basic night-vision optics.**



ReconRobotics: 1347847

**US Army special forces frequently conduct training exercises in the CQB environment using ReconRobotics' Scout UGV, before breaching or entering a room.**

**RELATED ARTICLE @janes.com**

● **Training and technology help US forces break down the barriers of urban warfare, *idr.janes.com*, 13.02.08**