



Where Next For UK Artillery?

by Colonel David Challes

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Following the cancellation of two new weapon platforms¹ in the last two years and the Government's recently announced intent to agree to a treaty banning artillery-fired and other cluster munitions, one might be forgiven for thinking that the future for UK Field Artillery was looking bleak; nothing could be further from the truth. UK Artillery is widely employed supporting current operations, so much so that although the Royal Artillery only comprises 7% of the British Army, some 8% of the operationally deployed manpower are Gunners and they are all in a Gunner role.

Before looking in detail at the future plans for UK Artillery it's worth stepping back and noting some strategic trends as this will enable the plans to be seen in context.

UK Military Doctrine has for many years cited the Core Functions of Find, Fix, Strike and Exploit. In recent years, there has been a widely acknowledged strategic shift from Strike to Find, and this was re-emphasised by the Commander UK Field Army at the recent RUSI Future Land Warfare Conference when he said, "Find is the turn-key; the 21st Century's opportunity".

Unmanned Air Vehicles

UK Field Artillery is following, and in some respects leading, this shift. Under the Future Army Structures work in 2004, the Army's UAV Regiment grew from three batteries, equipped with the Phoenix UAV, to four batteries in anticipation of the introduction into service of the Watchkeeper UAV. The Army's Surveillance and Target Acquisition (STA) Regiment also grew, from two batteries to three, on the introduction into service of the Cobra and Mamba Weapon Locating Radars (WLR) and these capabilities have been continuously deployed on operations ever since. There has also been an explosive growth in the number of Forward Air Controllers (FAC), who are increasingly integrated into Fire Support Teams (FST), combining both FACs and Forward Observation Officers into a single team able to plan, call for and direct the fire of surface-to-surface and air-to-surface fires. Forming these teams and equipping them with the latest STA systems is enabling a huge step forward in the UK's Joint Fires capability.

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equipment, with by far the biggest single procurement being the Watchkeeper UAV, which will provide persistent all-weather ISTAR support to the land commander. Watchkeeper is due to enter service in 2010 and is derived from the proven HERMES 450, but significantly modified to meet UK user requirements:

- Twin STA payload (Electro-Optic/Infra-Red Full Motion Video (EO/IR FMV) and radar).
- Secure, jam resistant, frequency agile datalinks.
- Rugged undercarriage for tactical landing strips and expeditionary operations.
- Automatic take-off and landing system.
- De-icing to enable all-weather operations.
- Laser range finder/marker/designator.

The Watchkeeper programme buys three batteries of equipment, although there will be another battery of manpower to meet the requirement to support enduring operations. Each battery of equipment will provide up to four lines of tasking with ten Air Vehicles and four Ground Control Stations (GCS).

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Operationally the Royal Artillery is also responsible for manning two UAVs procured under Urgent Operational Requirement (UOR) arrangements:

- **Desert Hawk 3 (DH3) UAV.** This system provides dedicated 'next block/over the hill' situational awareness support to the Battlegroup Commander and below. It is currently deployed in both Iraq and Afghanistan, and has even featured in recent Army recruiting videos. The outline capability has: EO/IR FMV Sensors, one-hour endurance and range limited to about 10km. DH 3 is deployed as a system comprising a Ground Station, Remote Viewing Terminal and up to eight air vehicles. Having been procured as a UOR, the requirement for a Mini-UAV capability seems likely to endure.
- **Hermes 450.** This system was procured as a UOR to fill the FMV gap resulting from Phoenix going out of service in 2008, and Watchkeeper's entry into service in the next



GMLRS is rapidly becoming the weapon of choice for ground manoeuvre commanders [Royal Artillery]

decade. Although it provides a step change in capability from Phoenix, it is less capable than Watchkeeper. It currently provides two missions of 14 hours EO/IR FMV per day in both operational theatres and will eventually be comprised of two GCS and five UAV. The capability is provided as a service by Thales/Elbit with military UAV operators from 32 Regiment RA controlling the mission and contractor UAV pilots controlling the take-off/landing phase.

Weapon Locating

Continuing with ISTAR, a decision was also taken in the last budgetary planning round to consolidate the Army's Weapon Locating Radars (WLR) into a single fleet. This will result in the retirement of the existing Cobra and Mamba systems and their replacement with a single make of WLR, possibly on two different mobility platforms. Whilst Cobra and Mamba have performed admirably to date, and continue to do so, the logistic and training overheads of having two small fleets (7 Cobra and 4 Mamba) in one regiment result in an inefficient use of resources, when looked at from a Through-Life Capability Management perspective. There are also operational inefficiencies, given the different capabilities and mobility characteristics of both systems and, when combined with the logistic support and training issues, this led to the decision to fund the procurement of a single WLR fleet; a major investment in artillery STA at a time of scarce resources.

UK artillery is also employing the US-developed Lightweight Counter Mortar Radar on operations as it provides a 360° detection capability that is useful in small outposts to provide

vital warning of incoming indirect fire, thus allowing troops to take cover. With its two-man detachment, it is more suited to this role than the much bigger and more sophisticated Cobra and Mamba, which only cover a 90° arc, but which provide much greater range and accuracy of location of firing points. The choice of radar is, of course, threat and context related.

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The increasing availability of precision weapons such as Guided MLRS (GMLRS) and GPS-guided bombs has driven a commensurate need to improve the ability of FSTs to acquire targets with the same degree of precision – otherwise the weapons 'precisely miss'. There have been two significant advances in technology that have enabled this improvement at the tactical level. The first is the ability to use geo-referenced or 'mensurated' imagery to produce 3-D coordinates from overhead imagery. Although the principles and technology are not that new, it is the advances in

processing power and data storage on portable computing devices that have enabled this capability to be employed at the lowest tactical levels. The second technique is the use of differential GPS to allow an accurate azimuth to be determined. When coupled with the accurate ranges produced by laser rangefinders, this is enabling FSTs to establish 3-D coordinates of targets to better than 10m spherical error probability (SEP).

Meteorology

Finally, in the ISTAR area, there is the often neglected area of meteorology (met). Hitherto, field artillery units have relied on sondes carried by balloons to measure meteorological data and pass it to a ground station where a 'met message' is then compiled and distributed to artillery units. This has been a manpower- and resource-intensive process with some significant logistic limitations,² which has only produced met data local to the launch area. As the ranges of artillery munitions have increased, the lack of target area met has been an increasing limitation in improving accuracy.

Recent developments in the collection of met data from other sources, coupled with significant improvements in forecasting capabilities, has introduced the prospect of 'gridded met', essentially a 3-D forecast of met for a given area for a given period of time, thus resulting in a 4-D met message. The use of such met is currently being trialled and the results to date are very encouraging.

Having looked at current and near-future improvements in the UK artillery's ability to acquire targets, it is logical to look next at the improvements in the ability to engage these targets. Here the emphasis is also on increasing precision. The introduction in 2007 of the Lockheed Martin GMLRS with an HE unitary warhead has proven to be a step change in capability. Deployed to Afghanistan almost immediately after entering service, GMLRS is rapidly becoming the 'weapon of choice' for ground manoeuvre commanders engaged with 'troops in contact' (TiC). It provides a persistent, all-weather ability to reach out to 70km from the launch platform and strike with sub-10m SEP precision, thus helping to ensure that



There has been an explosive growth in the number of Forward Air Controllers [MoD UK]



the desired target effect is achieved whilst minimising the risk of collateral damage and unintended casualties.

The IFPA Programme

The UK has been running its Indirect Fire Precision Attack (IFPA) programme for several years and the first weapon to be selected by its Assessment Phase is now on contract. It is the 155mm SMART Ballistic Sensor Fused Munition (BSFM), capable of defeating static and manoeuvring hard-armour targets with precision by virtue of its sophisticated sensors and directionally fired self-forging fragment warhead. As comments in the press have noted, this type of weapon has been specifically excluded from the draft Oslo Treaty banning cluster munitions by virtue of its weight, sensors and self-destruct/neutralisation features. As such, it will substantially fill the capability gap created by the loss of the current 155mm Extended Range Bomblet Shells, which will be banned by the Treaty, assuming it is ratified.

The next munition being considered in the IFPA programme is the Loitering Munition (LM). Following Lord Drayson's announcement at the Farnborough Air Show in 2006, the UK is exploring the development of a LM with 'Team Complex Weapons', the industrial grouping led by MBDA. If it enters service, the LM promises to deliver another step change in capability, allowing ground commanders to engage point, discrete, static and mobile targets at long range (>100km) under tight Rules of Engagement and in complex terrain such as built-up areas. This is because of the LM's EO day/night sensor and datalink back to a manned ground control station. This enables positive target identification and man-in-the-loop engagement of the target, including an abort capability. This is an exciting development and considerable work has already been done to de-risk both a technical solution and the many other issues associated with introducing such a novel capability.

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Beyond LMs, IFPA is looking at longer-range precision 155mm shells, either with a unitary warhead, such as the US Excalibur, or a Guided Sensor Fused Munition, similar to BSFM but with enhanced range. The overall IFPA programme is proving to be a very flexible means of defining a requirement and then delivering it. By having a continuous Assessment Phase



The Lightweight Counter Mortar Radar is valuable in providing vital warning of incoming indirect fire [MoD UK]

and long-term funding stream, it is adaptable to changes in requirement, and driven by policy and/or threat, changes in potential solutions, new technology and, of course, changes in funding; for any combination of requirement, potential solutions and funding IFPA will recommend the most appropriate mix of munitions.

The defining characteristic of an indirect fire system is the separation of the target acquisition system from the weapon launcher

Dumb Munitions

Outside the IFPA programme there are also some exciting opportunities to improve the accuracy of conventional 'dumb' munitions. The miniaturisation and ruggedisation of GPS components is being exploited by various companies in the development of 1-D and 2-D course correcting fuses, which in many cases can be retro-fitted to existing shells. Whilst these currently seem unlikely to deliver the sub-10m SEP accuracies of bespoke GPS guided munitions, the prospective reduction in dispersion offers the potential to significantly reduce the risk of fratricide and collateral damage, as well as the quantity of munitions required to achieve a given effect, with consequent logistic benefits; something of a virtuous circle. As such, there is considerable interest in this new capability.

C4I

As any artilleryman will tell you, the defining characteristic of an indirect fire system is the separation of the target acquisition system from the weapon launcher. This drives the

requirement for communications between the two elements of the system and the associated command and information systems, collectively classed as C4I. The UK has two major programmes designed to improve the C4I element of our indirect fire system. The first of these is the Fire Control Battlefield Information System Application (FC BISA), which was accepted into service in March 2008. Designed to run on the Bowman, ComBAT, Infrastructure and Platform BISA (BCIP), FC BISA is the successor to BATES³ and will enable calls for fire and fire planning, as well as logistic traffic, to be passed over a data network, thus increasing speed of response and reducing the scope for error when sending information over voice radio. Eventually it is hoped that FC BISA will provide a link between all artillery STA systems, the command nodes at each level from division to battery and the weapon platforms.

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The second major programme is the Joint Effects Targeting Toolset (JETTS), although by the time this article appears it will probably have been renamed the Defence Targeting Toolset (DTT). Targeting in the land environment still remains



The small fleet of MAMBA radars result in inefficient use of resources [SAAB Microwave Systems]

in the 20th Century: paper maps, pins and hard copy target folders, although in some cases the latter are now stored and occasionally circulated as spreadsheets and documents using commercial IT! These inherently manual procedures and tools have acted as a serious constraint on the tempo of operations in the land environment, in particular hindering the ability to prosecute so-called Time Sensitive Targets (TSTs) because of the lengthy staffing and approval processes. They have also been prone to error given the need to manually transpose and enter target coordinates and other details. JETTS/DTT aims to automate targeting in the land environment by providing appropriate software tools that can communicate with each other over tactical data networks. If approval is given to fully develop and then field JETTS/DTT then land environment targeting will finally enter the 21st Century.

Launch Platforms

Astute readers will have noticed that I have not yet mentioned UK Artillery's weapon platforms: AS90, Light Gun and the M270B1 used to fire GMLRS. This is because they are already well-developed, mature solutions to our requirement, with significant remaining life. Both guns are currently near the end of significant Capability Enhancement Programmes and the M270 fleet is part way through an upgrade to fire GMLRS, along with various automotive and other vehicle upgrades. Whilst we continue to monitor developments in gun and rocket launcher platforms, we currently have no formal plans to replace any of our current platforms, although funding has been earmarked for a future indirect fire system from around the start of the third decade of the century.

Conclusions

So, far from being in decline, the UK's field artillery capability is not only punching above its weight on current operations, but has an exciting and ambitious future. Significant investment is being made and more is planned to improve STA and C4I, all of which is coherent with the strategic shift from Strike to Find, whilst the considerable investment in precision weapons is enabling artillery to provide significantly greater utility in support of ground manoeuvre commanders. It's still a big glass and it's more than half-full! ■

NOTES

- ¹ The 155mm Light Mobile Artillery Weapons System (Gun) (LIMAWS(G)) and its sister programme, LIMAWS(Rocket), designed to fire the Guided versions of the MLRS family of rockets. See the previous article by Colonel Jon Schreyach
- ² The balloons require hydrogen gas and military air transport fleets are understandably reluctant to fly hydrogen or any chemicals that might be used to generate it
- ³ The Battlefield Artillery Target Engagement System, a digitised data network which ran over the Clansman Combat Net Radio