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Keeping up with the hunt: UK Royal Navy MCM operations

While specialist low-signature vessels will underpin the UK Royal Navy's mine countermeasures capability for at least another decade, the service is looking closely at how to exploit a new generation of unmanned offboard systems. Richard Scott reports from the Gulf.

Low cost, wide proliferation, and high disruptive potential make mines a continuing potent threat to both naval forces and commercial shipping. Easily deployed from non-specialist craft, they are intrinsically 'asymmetric' in that they allow smaller coastal navies - and potentially non-state actors - to deliver an anti-access/area-denial effect out of all proportion to cost.

The Royal Navy mine countermeasures vessels HMS Penzance (top) and HMS Chiddingfold (nearest the camera) and the US Navy mine countermeasures ships USS Devastator (MCM 6) and USS Dextrous (MCM 13) sail in company with the DDG-51 Flight IIA guided-missile destroyer USS Sterett during the IMCMEX 2014 exercise. (USN)

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The mine is an unusual weapon in that it poses a threat without any forces actually being present. Indeed, even a credible threat of mining is enough to alter the maritime commander’s risk calculus.

Another characteristic of the mine threat is its diversity. Old-fashioned ‘horned’ contact mines remain in abundant supply and, while relatively unsophisticated, are still capable of causing extensive disruption to shipping.

Ground mines, laid on the seabed and triggered by one or more influences - magnetic, acoustic, pressure, seismic, and underwater electrical potential - represent an altogether more complex threat. Using advanced software-based control logic, these mines are able to select their preferred target according to a combination of influences, and can ‘count’ the number of vessels passing overhead before selecting a target. The most modern types use advanced materials and clever shaping to minimise sonar echo strength.

Strategic setting

Given the strategic significance of the Gulf, and the importance attached to maintaining safe and open access through the Strait of Hormuz, the RN has for the last decade maintained a forward-deployed MCM force in Bahrain. As of early 2016, that continuous presence was provided by four MCMVs (the Hunt-class vessels HMS Chiddingfold and HMS Middleton, and the Sandown-class craft HMS Bangor and HMS Penzance), plus an afloat forward support base (the landing ship dock vessel RFA Cardigan Bay), a permanent forward support unit, and a permanent 17-strong Mine Warfare Battle Staff (MWBS) under Commander UK MCM Force (COMUKMCMFOR).
Deployed as part of Operation 'Kipion' - the UK's enduring maritime presence across the Gulf, the Strait of Hormuz, the Gulf of Aden, and the Indian Ocean - this round-the-clock MCM presence in the Gulf region serves various purposes: to give crews greater exposure to the difficult MCM operating conditions encountered in the warm, shallow waters of the Gulf; to promote and share MCM experience with regional and partner navies; and to allow for a rapid response should mining threaten sea lines of communication in the 'Kipion' Joint Operating Area (JOA), within which the Strait of Hormuz, the Bab El Mandeb Strait, and the Suez Canal all fall. Forward basing also serves to reassure regional partners, and the wider maritime community, by providing a very visible demonstration of resolve to maintain freedom of navigation.

Taking command

CTF 52 had originally been organised to function as a 'triad' of MCM capabilities in the underwater (CTG 53.1), surface (CTG 52.2), and air (CTG 52.3) domains. However, according to Commander Paul Ottewell, speaking in late 2015 towards the end of his six-month rotation as COMUKMCMFOR, that organisation did not lend itself to the most efficient use of resources. "It stovepiped assets, and meant we were unable to be as flexible in our projection of MCM expeditionary effect," he told IHS Jane's. "So in 2013 we saw a major refinement such that the three task group commanders are now all capable of commanding an adaptive and multi-disciplinary MCM task group.

"We, as a battle staff, are as capable of tasking US force elements as we are at UK force elements; we don't differentiate between the two .... We blend all these technologies together in order to drive safe passage through a live mine field.

"So while I am here as CTG52.2 [the UK-led surface MCM component], I can - and regularly do - take under my command offboard systems, autonomous surface vessels, mine clearance divers, and helicopters. So, too can the other two task group commanders. They do so less frequently, but we are all equally qualified to do so."
Lieutenant Commander Will King is commanding officer of Crew 6 in the RN's 1st Mine Countermeasures Squadron. Normally based at HM Naval Base Clyde in Faslane, Scotland, he assumed the rotational command of the Sandown class mine hunter HMS Penzance in July 2015, with Crew 6 serving in the Gulf through to early 2016; while the ships themselves remain in theatre for about three years, MCMV crews are rotated at 5-7 month intervals.

"From our perspective, it's very easy to plug into the US units," he told IHS Jane's onboard Penzance. "We have a complete understanding of their standard operating procedures, and they likewise have a full understanding of our capability. That interoperability at the tactical level is very close, and benefits hugely I think from having two RN officers embedded into the [CTF 52] staff."

A key part of the regular US/UK exercises in the Gulf is employing the adaptive MCM force package to practise route clearance operations. "Part of that is sending a surface MCM force ahead with an afloat forward support base so you can practise a 'leapfrog' manoeuvre to clear a channel through the mine threat area," explained Lt Cdr King. "We also rehearse how we would operate under the [defensive] umbrella of an air defence destroyer."

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Going offboard

The mix of capabilities available to CTF 52 has provided UKMCMFOR with insights into integrating offboard systems into MCM force packages. For example, Fifth Fleet has introduced a Mine Hunting Unmanned Surface Vehicle (MHU) - integrating an AQS-24A sidescan sonar with an 11 m Naval Special Warfare Rigid Hull Inflatable Boat modified for unmanned operation - as an 'operationalised' proof-of-concept system.

Another recent US development is the establishment of an Expeditionary MCM (ExMCM) company. This agile and rapidly deployable Detect-to-Engage MCM capability mixes EOD diver personnel with the Mk 18 unmanned underwater vehicle (UUV) Family of Systems using the Kongsberg Hydroid REMUS 100 [Mk 18 Mod 1] and REMUS 600 [Mk 18 Mod 2] vehicles.
So are offboard systems ready to replace existing specialised MCM assets? "I personally don't see the surface MCMV being challenged for its dominance soon," said Cdr Ottewell. "Our pairing of the Sandown and Hunt remains a very powerful combination, and I have used operationally and recently both classes of ship through the broader ['Kipion'] JOA and they can cover the full depth in which mines might be laid that could threaten shipping.

"However," he added, "it is inarguable that we can certainly improve the MCM package by giving it offboard systems."

**Future MCM capability**

As MCM desk officer in the RN Maritime Warfare Centre, Lieutenant Commander Kev Giles is responsible for tactical development to maximise the capability delivered by current MCM assets and to understand what 'near future' (within five years) systems may bring. He spoke to *IHS Jane's* while in Bahrain to observe trials of a newly upgraded REMUS 100 UUV.

"The Navy Command approach towards the introduction of offboard systems is a sensible one," said Lt Cdr Giles. "No one has said, 'This is all old hat. Don't invest anything in [surface MCM] anymore. We should put all our eggs in the offboard basket'.

"Instead, we are taking a deliberately conservative approach. We are building demonstrators to de-risk the offboard minehunting and sweeping capabilities that we are seeking to initially integrate on the Hunt class. At the same time, we have made a conscious decision with the Sonar 2093 capability sustainment programme to ensure that the Sandown class remains effective and relevant for the foreseeable future should the French/UK minehunting programme not demonstrate..."
the capability we require - either because the technology isn't there or we are not in a position to use it properly.

The French/UK Maritime Mine Countermeasures programme is intended to demonstrate an 'end-to-end' capability based exclusively on offboard vehicles, sensors and effectors. (Thales)

"So it is a staged approach which, at the very least, maintains the capability that we have now, and ideally - as it evolves in the next five to 10 years - introduces offboard systems onto the Hunt class to keep pace with the threat."

The UK's programme of record to engineer the transition to offboard systems is the Mine Countermeasures and Hydrographic Capability (MHC), which passed its Initial Gate milestone in 2014. Two main strands are currently being pursued during the project's Assessment Phase: the French/UK (FR/UK) Maritime Mine Countermeasures (MMCM) demonstrator programme, under which an Anglo-French industry team led by Thales will prototype an unmanned 'system of systems' capable of performing end-to-end mine detection, classification, identification and neutralisation; and the MHC Sweep capability demonstrator, under which Atlas Elektronik UK has been contracted to design and build a prototype multi-influence minesweeping system deployed from an 11 m unmanned surface vehicle (USV).

"These two demonstrator programmes are our MHC foundation stones," said Lt Cdr Giles. "MMCM is intended to prove an 'end-to-end' capability based exclusively on unmanned vehicles, sensors, and effectors. The demonstrator programme with France is purely about demonstrating offboard capability, not about integrating that capability into a platform. That will be done at national level."

He continued, "The [MHC] Sweep demonstrator programme is going to be a couple of years in the making. Again, if the results are positive then we would expect to see some Hunt-class vessels being fitted to operate with that USV sweep system."

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TAKING THE HEAT: PLATFORM SUSTAINMENT IN THE GULF

Operating in the Gulf, particularly in the searing heat and high humidity of the summer months, is punishing for ships and crews alike. With a decade of operating experience behind it, the RN has put a series of measures into place to improve the sustainability of its MCM platforms in theatre. All MCMVs receive a pre-deployment package that prepares them for operations in the Gulf's high ambient temperatures. This includes an enhanced air-filtration system, uprated air-conditioning plants (ACPs), and improved equipment cooling.

In addition, ships receive a communications uplift including a Deployable Maritime Milsat satellite communications terminal, and additional weapon mounts for force protection. Another theatre fit is a CENTRIXS [Coalition Enterprise Regional Information Exchange System] terminal, which offers both chat facilities and a shared common operational picture with coalition units.

Once in theatre, it is the onset of summer that brings the major challenge to ships' crews, engineering support personnel ashore, and the mix of MoD staff and contractors charged with delivering support to the MCMV force in theatre. High temperatures, salinity, and marine growth all present problems if not attended to.

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