Global coverage: P-8A provides patrol capacity around the world

As maritime patrol returns to the top of the operational agenda, a number of countries are investing in new multimission aircraft to tackle surveillance tasks at sea. *Dr Lee Willett* and *Ridzwan Rahmat* discuss the P-8A Poseidon programmes developing in the European and Asia-Pacific theatres

The world's oceans are increasingly busy. Commercial and military users are seeking secure, sustained access, while state-versus-state and state-versus-non-state competition is generating greater political focus on the maritime environment. Whether to support search-and-rescue (SAR) tasks, monitor sea lines of communication (SLOCs), or prosecute growing numbers of more capable submarines, military forces are seeking to boost maritime surveillance capacity. With its speed, reach, sustainability, flexibility, and wide-area coverage of both bluewater and littoral environments, a multimission-capable maritime patrol aircraft (MMA/MPA) is a primary platform for meeting this requirement.

A Royal Australian Air Force (RAAF) P-8A conducts fast, low-level flying operations over the Royal Australian Navy's new Hobart-class air warfare destroyer, HMAS Hobart in Gulf St Vincent, off Adelaide in early 2017. (Commonwealth of Australia)

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The deepest roots of the US Navy's (USN's) P-8A Poseidon MMA programme date back to before the 1990s. Today, the aircraft - based on the well-proven Boeing 737-800 commercial airframe - is

in operational service with the USN and has been sold to four international customers. The P-8A is becoming a prominent node in the network of maritime surveillance coverage, especially for tasks such as anti-submarine warfare (ASW). Some argue that it offers a step-change in MPA capability.

As P-8A operational experience grows, the answer to the lingering question of how effective a commercial airframe designed for mid- and high-level cruising can be in conducting ASW, including at lower altitudes, will become clearer. Nonetheless, the P-8A is a high-end MMA with room for capability growth. It is also coming online as many navies are regrowing ASW capability in response to rising submarine threats.

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Equipment fit

The four international customers are buying an off-the-shelf capability, initially embarking the USN's standard equipment fit. A broader, bespoke spectrum of system fits to different countries' aircraft might complicate an adversary's ability to counter the P-8. Currently, however, there is only one main exception to the uniform fit. This is in the Indian programme, where the P-8Is will use the traditional magnetic anomaly detector (MAD) boom rather than the P-8A's multistatic active coherent (MAC) acoustic technology for submarine location/tracking.

A Harpoon Block II missile fitted to one of the two weapon stations found on each P-8A wing. Two more weapon stations are sited under the forward fuselage, and the aircraft also has an internal weapons bay. (IHS/Patrick Allen)

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The P-8's core sensors and systems include: Raytheon's AN/APY-10 maritime surveillance radar; L-3's Wescam MX-20HD digital electro-optical/infrared (EO/IR) sensor; Northrop Grumman's

AN/ALQ-240(V)1 electronic support measures (ESM) system; and Terma's AN/ALQ-213(V) electronic warfare management system.

The P-8A has an internal weapons bay, two weapons stations beneath each wing, and two more stations below the forward fuselage. The primary weapons are the Raytheon Mk 54 lightweight torpedo and Boeing's AGM-84L Harpoon Block II anti-ship cruise missile (ASCM). Evolving weapons options include a winged version of the Mk 54, known as the High Altitude ASW Weapons Concept (HAAWC). A key component of the USN's capability for prosecuting submarines from high altitude, HAAWC is designed to be dropped from at least 20,000 ft, glide down close to the target (with updates provided by a datalink), and enter the water with accurate placement prior to the terminal attack. In March 2017, Lockheed Martin was awarded a low-rate initial production (LRIP) contract for the HAAWC wing-kit; a guided test-flight is anticipated late on in fiscal year (FY) 2017.

Other future capabilities include the Raytheon AN/APS-154 Advanced Airborne Sensor (AAS) electronically scanned active array radar system.

A P-8A crew member removes a sonobuoy from its rack prior to preparing it for launch. The cabin holds three, 10-round, rotary launchers. (US Navy)

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The P-8A's cabin holds three 10-round rotary sonobuoy launchers that can be re-loaded in flight; 126 sonobuoys (bringing passive, active, or multistatic active capabilities) can be carried,

increasing the loadout compared with the predecessor P-3C Orion. Within the cabin, there is space for up to seven operator consoles, alongside a mission-planning area.

The aircraft is crewed by nine personnel, including two pilots.

Several upgrade - or Increment - programmes have already been introduced. Increment 1 addressed avionics; Increment 2 covered ASW and acoustic technology; and Increment 3 is focused on network-enabled open architecture. In June 2016, Boeing received a USD71.6 million contract for the development, integration, and testing of increment 3 Block I capabilities, including the Link 16 datalink, the Harpoon Block II+ ASCM (adding GPS, guidance control, and the Strike Common Weapon Data Link to Block 1C missiles), targeting improvements, and various communications upgrades. Increment 3 development work is expected to be completed by the end of February 2019; USN P-8As already in service will be backfitted to Increment 3 standard in due course.

A P-8A from Patrol Squadron (VP) 16 flying over the Nimitz-class nuclear-powered aircraft carrier USS Harry S Truman, off the US east coast in June 2015. Increment 3 of the P-8A upgrade programme includes augmenting aircraft communications systems to boost connectivity with carriers and other surface platforms. (US Navy)

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As far as the difference between conducting low-altitude and high-altitude ASW operations is concerned, USN P-3s have dropped sonobuoys from high up. While previously, crews had to calculate weapon drift in descent, today, precision technologies can be used to locate a target, guide the system being dropped, and place it in the water.

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United response

Rear Adm Cozad said the USN's "view is that a long-range airborne capability that is able to search large areas, that is able to have the speed and the flexibility to be re-tasked on station … is fundamental to countering any future modern and quieter submarine threat that exists today".

In 2013 the USN stood up its first operational P-8A squadron at Jacksonville, Florida, and declared initial operating capability (IOC) when the first two aircraft deployed to Okinawa, Japan. As of March 2017, the USN had 56 P-8As in its inventory. Seven of these aircraft are based in Europe, at Sigonella, Italy.

A P-8A Poseidon aircraft from Patrol Squadron (VP) 45, parked on the flight line at Naval Air Station Keflavik, Iceland, in October 2016. In late 2016, the USN began flying operations out of Keflavik. (US Navy)

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Captain William Ellis, responsible for P-8A operations in Europe as the USN's Commodore MPA and Reconnaissance Operations and Commander Task Force 67 (CTF 67), told *Jane's* that the seven P-8As are deployed in a 'hub and spoke' model. "Sigonella serves as our 'hub', and we send detachments of aircraft out to 'spoke' sites based on operational demands, such as places like Keflavik, Iceland," he said.

Currently, Sigonella is the only European base with USN P-8As stationed permanently. While USN P-8As began operating from Keflavik in 2016, Capt Ellis confirmed the navy has no current plans for the permanent basing of P-8A squadrons there. "Instead, we're focused on upgrades in co-ordination with Icelandic authorities to support the new aircraft," he said.

Another potential 'spoke' could be Rota, Spain, where the USN is establishing a strong presence.

In terms of what the P-8A delivers in Europe for the USN and its partners, Capt Ellis said that "ASW is our top priority." Maritime situational awareness (MSA), maritime ISR, and direct support to the fleet are other primary tasks.

Doing everything the P-3 did, the P-8A "has brought a significantly greater capability to our theatre", said Capt Ellis. This is provided through improved capacity (with only four P-3Cs deployed to Europe), but also with the individual airframes enabling the USN to operate with greater frequency and greater range.

Europe's three P-8A partners - Norway, the United Kingdom, and the United States - are all NATO members, and the P-8A gives them an opportunity to support the alliance's renewed emphasis on exercising as a means of augmenting capability, presence, and deterrence. The P-8A's improved communications capability also has seen the aircraft "folded into alliance and NATO communications architectures seamlessly", he said.

Alongside the ASW focus, the improved communications capability is one of the P-8A's key benefits, said Capt Ellis. The greater connectivity means that "we're able to see what the aircraft is doing in real time, vice waiting for post-flight reports", he said. Connectivity is boosted by improved computing power and integrated datalinks and workstations. The connectivity also augments sonobuoy processing capability; this, along with improved sensors and higher-resolution displays, "greatly improves operator 'recognition differential'", Capt Ellis added.

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Bridging the gap

A P-8A pictured during the Farnborough Air Show in the United Kingdom in 2016. At Farnborough that year, the country announced its intent to procure nine airframes. The aircraft's internal weapons bay is shown here. (IHS/Patrick Allen)

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The United Kingdom announced its P-8A purchase in the 2015 Strategic Defence and Security Review (SDSR). There has been a gap in the UK's maritime patrol capability since 2010, with the retirement of the Nimrod MR2 aircraft and SDSR 2010's decision to scrap the Nimrod MRA4 programme. The 2010 review was published in the same week that media reports surfaced of Russian submarines patrolling off UK waters.

In SDSR 2015, the P-8A announcement was perhaps the biggest equipment headline. According to the review, the P-8A will provide maritime surveillance, ASW, and anti-surface warfare (ASuW) capability, and will "increase further the protection of [the UK's] nuclear deterrent and [its] new aircraft carriers …. [It] will also have an overland surveillance capability".

In March 2016, the US Department of State approved the sale, worth USD3.2 billion (including training and support), with a contract announced in July that year. Tony Douglas, head of UK procurement agency Defence Equipment and Support (DE&S), said at the time that "the P-8A aircraft was the best solution to fill our maritime patrol aircraft capability gap; it is tried, tested, and can be delivered in the timeline we need". This timeline includes the desire for rapid availability of

the capability, in part to help provide an MPA task line (three aircraft) ready to support the UK's regenerated Carrier Strike capability.

The UK's MPA requirement can be broadly summarised as follows: protection of strategic assets; enhanced ASW and ASuW, including an attack capability; maritime reconnaissance and strategic intelligence collection; defence of UK territory, including overseas territories; and wide-ranging at-sea coverage, including for maritime counterterrorism, counterpiracy, border control, environmental protection, and SAR.

In early April 2017, Boeing announced the receipt of an order to build the next 17 P-8As. The contract covered 11 more airframes for the USN, four for the RAAF, and the first two for the RAF.

The UK's nine airframes are set to be delivered from April 2019 through to early 2022 and will be based at RAF Lossiemouth, Scotland. *Jane's* understands that all UK aircraft will be Increment 3 standard.

Speaking at the TDN UK conference, Wing Commander Richard Berry (from the P-8A programme on the UK Royal Air Force's [RAF's] air capability desk) said that the UK's initial P-8A training programme will start in September 2018 in the United States with USN patrol squadron VP-30, based in Jacksonville. The UK's first aircraft will be delivered to Jacksonville in 2019, before redeploying to Lossiemouth in 2020.

In 2021, the UK's P-8A training construct, including its own simulators, will be up and running at Lossiemouth. "Our challenge is to create a robust and sustainable training system that will allow us to build the force that we need," said Wg Cdr Berry.

Lossiemouth is a busy base, with one - soon to be two - Typhoon Quick Reaction Aircraft (QRA) fighter squadrons deployed there. "There is only a limited amount of infrastructure and space available," said Wg Cdr Berry, "so a piece of work that's going on just now is to work out how to integrate that extra Typhoon squadron - potentially two squadrons' worth of people to support the P-8, plus new buildings - and all the bits and pieces that go in to support that."

Alongside logistics and continuing resource constraints, a key challenge for the United Kingdom is bringing in the right people numbers and skills. Under the 'Seedcorn' programme, the UK is growing a crop of P-8A personnel, drawing on former Nimrod operators (Australia, Canada and New Zealand). "The idea [is] that we keep those maritime skills going to the point where we want to draw them back in, and they form - as the name suggests - the seedcorn of our new capability," said Wg Cdr Berry. Currently, 12 UK personnel are based at Jacksonville, with others at the USN's VX-1 air test and evaluation squadron at Patuxent River, Maryland.

A key UK focus is P-8A integration with the UK Royal Navy (RN), NATO partners, and others. Wg Cdr Berry told the conference, "There's a number of things we've got to join up. We've got lots of little bits of string that come out of the aeroplane; we need to know where to tie them to, to make the quality and the amount of data coming off the aeroplane worthwhile and relevant."

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Up high

In March 2017, Norway signed a NOK10 billion (USD1.17 billion) contract with the United States to purchase five P-8As to replace the six P-3s and three Dassault Falcon 20 aircraft currently in

service. Delivery is set for 2022-23. The contract includes modern sensors, monitoring, and support systems, and new anti-submarine weapons.

In a 30 March statement, the Norwegian Ministry of Defence (MoD) noted the increasing military-strategic importance of maritime matters, and added that the procurement fits with the requirements and costs of Norway's long-term defence strategy, as set out in the June 2016 'Combat Power and Sustainability' plan.

When the deal was first confirmed in November 2016, Søreide said the P-8A's maritime patrol capability "is crucial [in enabling] Norway to maintain a leading position and expertise in strategic conditions in northern areas". Such areas include the High North. With Norway having vast areas of maritime interest, the minister noted that the country "has an important task in maintaining the situational awareness in national and adjacent waters, both on and below the surface, on behalf of the [NATO] alliance." With the evolving regional security situation mandating increased focus on MSA, said the minister, the P-8A "is exactly what we need to maintain our important contribution to the alliance".

MoD spokesperson Lars Gjemble told *Jane's* that while Norway considered other options, "the P-8 is the only … MPA with the right combination of the necessary sensor suite, range, and endurance. It's an advantage that the P-8 is, and will be, in use by allied nations". He described Norway as "NATO in the north", adding, "It is important [that] NATO members equip their forces to handle security in their own area… Being [a neighbour] to Russia, it is relevant that Norway continues to possess modern surveillance technology," he added.

Russian submarine developments are of particular focus for Western navies. "Modern submarines necessitate modern sensor platforms," said Gjemble. "The P-8 will meet the ASW challenges that Norway expects."

Alongside ASW and wider maritime patrol tasks, Norway's P-8As will support maritime counter-terrorism, fisheries protection, and SAR operations.

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Commonality ashore and at sea

With the P-8 user community buying into a common airframe, systems, and support network for a fully qualified and in-service platform, potential collaboration opportunities will improve programme and operational efficiency, not only through plugging into the US infrastructure but also through developing bespoke co-operation constructs within the five-strong P-8 club.

In January 2017, Washington and London signed an agreement to collaborate on P-8A operations and support in the European theatre. The agreement comes online in 2019, when the first UK aircraft arrives. According to a US Department of Defense (DoD) statement, "Through seeking opportunities to share logistics and support bases and [to] optimise the use of P-8A aircraft, particularly in Europe, the declaration should ensure increased value for money and operational effectiveness."

The Norwegian MoD told *Jane's* that "all aspects of possible co-operation, both bilaterally and trilaterally, will be explored and addressed in due [course]".

While a primary focus will be on support and maintenance, a common training framework in Europe would offer clear benefits. "As an operational commodore," said Capt Ellis, "I can tell you

that having a robust training facility in theatre that we can access would be a tremendous benefit. There are several training events that are most effective when conducted in a simulator, and if a deployed squadron had [simulator] access they could keep their upgrading aircrew progressing through their syllabus vice having breaks in their training. The end result is shorter times-to-qualify, and the pay-off is more experienced and effective aircrews on station."

Within the P-8A programme, there is a robust focus on simulation in training, with as much as 70% conducted in simulators. This not only delivers high-quality training, but eases the availability burden on limited airframe numbers and helps maximise aircraft service life.

While the P-8A comes with a standard systems and support package, some of the programme customers remain keen to involve their national industrial bases where possible. For Norway, the government seeks industrial co-operation for all its major acquisitions. For P-8A, understanding how Norway's defence industry might participate "from the initial acquisition throughout the life-cycle … is an integral part of this project," the MoD told Jane's. "It is still too early to say anything specific about how to engage Norwegian companies, but maintenance and logistics are concrete possibilities," the MoD added.

A P-8A Poseidon from CTF 67 flying over the Mediterranean Sea during the NATO exercise 'Dynamic Manta' in 2017. The Mediterranean is seeing an increase in submarine activity. (US Navy)

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Improving support, maintenance, and infrastructure co-operation "are all crucial enablers that will allow greater flexibility and responsiveness" in P-8A operations, said Capt Ellis. "There is literally no downside to co-operative arrangements," he added, "so it will remain a priority for us to build and maintain close relationships with the RAF and RNoAF."

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PACIFIC POSEIDON

In the Asia-Pacific region, the P-8 is proving to be an instrument of defence diplomacy for the United States, on top of enhancing its own security interests in the region. The USN deploys rotational detachments of P-8 aircraft forward deployed in Japan to partner nations in South and Southeast Asia as part of its forward presence in the region, Lieutenant Commander Arlo Abrahamson, a spokesperson for Task Force 73, told *Jane's*.

"The rotational detachments provide strategic presence and help us maintain strong partnerships with other navies and air forces in the region," he added. The service pointed to certain notable examples, such as the search for missing Malaysian commercial flight MH370, as instances where the P-8 has played a part in fostering closer relationships and assisting nations during times of crisis.The P-8 has also been featured in prominent multilateral and bilateral military exercises in the region, such as Exercises 'Komodo' and 'Cooperation Afloat Readiness and Training - CARAT', with armed forces from countries that include Malaysia, the Philippines, Singapore, Indonesia, Sri Lanka, Australia, and India.

Although a majority of these drills lean more towards search-and-rescue, humanitarian assistance and disaster relief (HADR), and other peacetime operations, more complex drills have also been conducted with selected countries. For example at 'CARAT' 2016 a P-8 aircraft collaborated with a guided-missile frigate from a participating Southeast Asian navy's vessels in a ship anti-submarine warfare readiness/effectiveness measuring (SHAREM) exercise. "A part of [SHAREM] includes a component where signals from sonobuoys dropped by the P-8A are transmitted and interpreted by [the participating navy's] ships," said Lieutenant Morgan Williams from the US Navy's Patrol Squadron Five (VP-5), who spoke to *Jane's* during a demonstration flight onboard the aircraft.

"These signals are transmitted over the Link 11 serial data link system [in use by navies of the two countries] and include acoustic signatures that will help in the identification and location of submarines", added the lieutenant, who serves as a tactical co-ordinator onboard the aircraft.

The USN has indicated that P-8 platforms are an important aspect and capability for the service and help foster closer maritime relationships and interoperability. "The US Navy will continue to seek opportunities with our partners to operate together and learn from each other," Lt Cdr Abrahamson said.

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