

MMA for Australia

by Dr Carlo Kopp



Australia seems likely to join a multinational program to develop the production configuration of the new US Navy Multimission Maritime Aircraft (MMA), the intended replacement for the US Navy P-3C fleet.

Should this occur, it presents a tremendous opportunity for Australia to exploit this program to further expand its developing Intelligence, Surveillance & Reconnaissance (ISR) 'constellation', and position itself formidably in this role for decades to come.

Australia operates two squadrons of upgraded AP-3C Orions in the 'classical' Long Range Maritime Patrol (LRMP) role, tasked with Anti Submarine Warfare (ASW), Anti Surface Warfare (ASuW), maritime and electronic reconnaissance. More recently, Maritime Patrol Group has conducted maritime patrols in support of civil authorities. These conventional Maritime Patrol along with Intelligence Surveillance and Reconnaissance roles may also be supplemented with a strike role using the AIR 5418 Follow On Stand Off Weapon (FOSOW) if the current strike fleet plan is pursued.

The MMA is the winning Boeing proposal for the US Navy, built around the Boeing 737-800 airframe, but using a much heavier 737-900 series wing to accommodate the more demanding low level patrol environment. The US Navy currently intend to replace 223 P-3s with 108 new MMAs as a 'long-range ASW, ASuW, ISR aircraft that is capable of broad-area, maritime and littoral operations'.

Unlike the commercial 737-800, the MMA will have external pylons for a wide range of stores, a sonobuoy dispensing system, an internal weapon bay for guided ASW torpedoes, depth charges or other stores, and a comprehensive maritime mission avionics suite. The aircraft will be powered by a pair of 27.3 klb CFM56-7B27A fans, common to the Wedgetail. The aircraft has a max zero fuel weight of 138,300 lb and carries 75,169 lb of internal fuel.

The proposed mission suite is yet to be disclosed but it will likely comprise similar high performance racked-COTS technology computing equipment used in the Wedgetail, a modern surface search radar with an ISAR capability, an ESM package, a thermal imager (probably including a daylight TV channel), and a magnetic anomaly detector. Whether the MMA suite will include a Lidar or other technology diesel exhaust fume-sniffer remains to be seen. Public disclosures indicate the MMA's electro-optical/infrared (EO/IR) sensor, ESM, DIRCM and datalinks will be supplied by Northrop-Grumman; the APS-137 Maritime Surveillance Radar and SIGINT hardware will be supplied by Raytheon.

The Boeing MMA is a radical philosophical departure from the approach taken in maritime patrol aircraft design since the 1940s. The earliest maritime patrol aircraft were typically obsolete, with later current production strategic bomber airframes retrofitted with surface search radar and other maritime role equipment and weapons. These aircraft could loiter for long hours at low altitude hunting submarines, and when opportunity permitted, surface vessels. This philosophy in LRMP aircraft design persisted for decades, even if later airframes such as the P-3 and Soviet Il-38 may be based on turboprop airliners rather than bombers - the massive LRMP Tu-142M Bear F being the exception to the recent trend.

This 'classical' LRMP mission profile involved a cruise to the patrol area at an efficient altitude, descent to lower altitude to perform the ASW patrol work, and sustained and typically slow on station patrol intended to burn as little fuel as possible. Turboprops, like pistons, generally perform more efficiently at lower altitudes, as power requirements per thrust delivered increase in propeller systems with increasing altitude. The modest cruise speed of the 'classical' LRMP mission profile is a byproduct of the propulsion used, itself driven by the need for long endurance during the patrol phase of the mission.

What is characteristic of the 'classical' LRMP mission profile is that the aircraft acts as a sensor platform and as the strike platform once a target is detected. Slow transit speeds to patrol areas are the price to be paid for highly fuel-efficient loiter on station.

The Boeing MMA breaks from this tradition by providing an airframe with a fast high altitude transit profile and considerably higher patrol altitudes for radar surface search roles. Suffice to say after many decades of operating piston and then turboprop LRMP aircraft, the US Navy looked very carefully before it selected the 737-based proposal over the Lockheed Martin design, derived from the P-3/P-7 turboprop model.

The rationale for the fast transit LRMP model is that the MMA will be used in conjunction with the BAMS (Broad Area Maritime Surveillance) UAV, to be chosen soon between a maritime RQ-1 Predator derivative called the Mariner, and a maritime derivative of the US Air Force RQ-4 Global Hawk. The concept of operations for the BAMS + MMA system is that most of the long endurance surface search work will be performed by the HALE UAV, with the MMA tasked to deal with contacts, which require the more capable manned platform and its more extensive sensor and weapons suite. In this model, the MMA is often used reactively, and launched on demand, conditions where the fast turbofan cruise climb profile works to an advantage.

During the Cold War LRMP aircraft were almost solely dedicated to ASW and ASuW patrol work, and they carried specialised mission packages and weapons. Since the end of the Cold War the role of LRMP aircraft has significantly broadened, with conventional ASW tasks often displaced by more general surface traffic surveillance, electronic reconnaissance, and reactive strike operations. This reflects the realities of a decade-long blockade of Saddam's Iraq, ongoing close surveillance of Iran and North Korea and often the

PRC, plus surveillance of smaller maritime vessels in areas known to be maritime transit paths for terrorists. While the US Navy S-3B Viking is now retired from its blue water ASW role, some were used as strike platforms carrying weapons such as the AGM-65 Maverick missile.

While current LRMP fleets could still be swung into ASW, ASuW and sea-mining operations as during the Cold War, increasingly they are being exploited as persistent maritime and littoral ISR platforms. The US Navy performed a number of trials using the Norden (NG) APG-76/APY-6 Ku-band high resolution SAR ground-mapping and GMTI ground vehicle search and targeting on both the S-3B and NP-3B 'Hairy Buffalo' platforms. Without an E-8 JSTARS, the US Navy experimented with an analogous albeit smaller SAR/GMTI radar on available LRMP airframes.

Most well equipped LRMP aircraft now carry ESM systems, but many have also been retrofitted with SIGINT (Signal Intelligence) suites to expand the basic ISR capability into broader intelligence gathering roles.



The Boeing MMA is based on the 737-800 airframe, but uses the heavier -900 series wing.



*Opposite page:
And the winner is Boeing ... the US Navy intend to replace more than 200 P-3 aircraft with 108 Boeing MMAs. The Boeing MMA is intended to be a 'long-range ASW, ASuW, ISR aircraft that is capable of broad-area, maritime and littoral operations'.*



Australia's AP-3C Orions are expected to run out of airframe fatigue life in the latter half of the next decade. In replacing the aircraft with new Boeing MMAs, there are pragmatic reasons for buying later in the build rather than earlier.



Australia vs the MMA

For Australia, participation in the MMA program raises two important issues.

The first is when to replace the AP-3C, and the second is the manner of Australia's participation.

The issue of when to best buy MMAs as AP-3C replacements is one which should be driven by MMA program risks and overall RAAF investment budgets, rather than by haste to retire the AP-3C fleet. Claims that the existing AP-3Cs will run out of fatigue life in the latter half of the next decade could create a situation where there is pressure to buy MMAs early when the aircraft is on its most expensive part of the production cost curve, and is immature in terms of development. At that time Australia will also be paying for a new F/A-18A replacement, probably the JSF. This places two very expensive block replacements into a narrow window of several years, a situation that would create Defence Budget 'pain'.

There is a good case for pre-empting such a situation by proactively analysing the opportunities in AP-3C structural work with the aim to extend the fatigue life of the fleet into a time window within the latter phase of US Navy MMA production. While the acquisition of HALE UAVs will take some load off the AP-3C fleet, the RNZAF Hawker Pacific (now EADS/Australian Aerospace) Kestrel program to put considerable additional life into its P-3Bs by structural rebuilds could be explored.

The bottom line is that buying MMAs in the latter part of the US Navy production run is better in raw flyaway cost and technological risk terms, compared to buying early. The US Navy envisage MMA LRIP between 2010 and 2013, transitioning to full rate production in 2013.

If Australia is to participate in the MMA program, it should exploit that participation to ensure that the mission package in the MMA is flexible enough to accommodate future roles and missions which the US Navy may not currently be considering, but which would be important for Australia. Australia has used its AP-3C in roles which are often broader than those used in the US.

Unlike the JSF program where such adaptation may often impose significant pressures on the airframe and propulsion design, the MMA program will be largely centred in the large mission avionics suite.

The reality is that buying a dozen or more MMAs as AP-3C replacements presents a golden opportunity to introduce absent or enhance currently inadequate ISR capabilities in the ADF fleet – and many of these capabilities will amount to synergies with future US Navy needs. The US Navy has generally preferred to have its own independent ISR assets, rather than rely on the US Air Force. The RAAF needs a measure of self reliance and given its often different global deployment patterns to the US Air Force, it cannot always rely on US Air Force assets being available.

With the general trend to now use LRMP aircraft as 'armed ISR platforms' this presents an opportunity to cast the MMA at an early phase into a configuration which is flexible and adaptable enough to evolve once in service.

A good example of a derivative configuration is the provision of the replacement and growth ELINT/SIGINT system for the RAAF. Australia has some ELINT capability in the existing AP-3C configuration and a limited amount of SIGINT capability. But configuring some fraction of a future MMA fleet to be genuine ELINT/SIGINT platforms – analogous to the EP-3C ARIES, RC-135V/W Rivet Joint and planned ERJ-145 Aerial Common Sensor - plugs an important hole in the current RAAF Orbat. In an information centric future not having this type of capability would severely limit Australia's ability to independently gather such intelligence.

A second capability that could be actively pursued in concert with the US Navy is the provision of a genuine stand-off X-band SAR/GTMI radar capability for some fraction of MMA airframes. The US Air Force currently operates the E-8 JSTARS with this capability, and intends to introduce within the decade the new E-10A MC2A as a JSTARS replacement.

This capability would be valuable to both the US Navy and the RAAF, for supporting littoral operations, amphibious operations and littoral/land strike operations – emulating the basic role of the E-8 JSTARS and E-10A MC2A on a smaller scale. Moreover, an emerging role for both the E-8 JSTARS and E-10A MC2A is cruise missile defence, using the X-band radar in Air Moving Target Indicator (AMTI) mode to track cruise missiles and vector interceptors. The US Navy is reliant on the UHF band E-2C system and Australia the L-band MESA, neither of which are specialised cruise missile defence radars. Having an X-band AMTI radar on a persistent platform provides both services with a much enhanced air defence capability.

The MC2A will employ the new X-band MP-RTIP (Multi-Platform Radar Technology Insertion Program) AESA for this purpose - a modular radar which in smaller configuration will be used for the Global Hawk.

Electronic surveillance and SAR/GMTI/MMTI/AMTI radar surveillance capabilities are the most obvious synergies that would yield high payoffs for both the US Navy and the RAAF. These are by no means the only ones. For instance, MMAs equipped with an MP-RTIP derived SAR/GMTI/MMTI/AMTI radar system opens up interesting possibilities such as accurate over-the-horizon targeting and guidance of naval Surface-Air-Missiles against anti-ship cruise missiles. The reality observed in ISR and LRMP platforms over the last decade has been very rapid evolution. Configuring the future

MMA as early as possible to facilitate ongoing and rapid ISR (and weapons) evolution through its future life cycle is essential.

What is clear is that if Australia is to sign up for the MMA program, it should be done as part of a carefully thought out strategy for future replacement of the AP-3Cs, with proactive measures to position AP-3C retirement into an advantageous budgetary window, and early provisions to exploit the MMA to plug existing gaps in ADF ISR capabilities.

