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AUSTRALIA'S NEEDS FOR MARITIME AREA AIR DEFENCE

Any operation undertaken by the ADF will necessarily rely heavily on Sea Power and maritime transport to move, protect, project, support and sustain troops and equipment, both in transit and when in an area of operations. This clearly requires the ADF to be able to gain and maintain Sea Control and Control of the Air to allow us to use an area for our own purposes for a period of time and, if necessary, to deny its use to an adversary. As an island nation, this control will be critical for *all* ADF operations offshore and even for most operations on Australian territory.

Control of the Air is defined as that ability to use the third dimension and the surface below it, without being threatened or attacked by an opponent's air power. It is the prerequisite for successful military operations, both in attack and defence, in the presence of a hostile air threat.¹ Sea Control is that condition that exists when one has freedom of action to use an area of sea for one's own purposes for a period of time and, if required, deny its use to an adversary. This includes the air space above, the water mass and areas. seabed below, adjoining land and the electromagnetic spectrum.²

The current Surface-to-Air Missile (SAM) systems in RAN ships are no longer capable of ensuring Control of the Air, nor of defending against most modern Anti-Ship Missiles (ASM). RAN warships can provide only limited protection for themselves, and offer little ability to provide air defence for other high-value assets such as amphibious/sealift ships carrying Australian troops. There are a number of highly capable and modern combat and weapon systems that do provide an excellent air defence capability over a much wider area. It is essential that such a capability be included in the Navy's new destroyers if the ADF is to develop the ability to successfully operate away from Australian shores.

To provide complete protection from an air threat, there is a clear requirement to be able to engage a threat as far away as possible. Protecting other dispersed units from air attack at long range is known as 'Area Air Warfare', as distinct from 'Anti Ship Missile Defence' which refers to the close range protection (within 20 km) of one's own ship. The RAN introduced an Area Air Warfare capability with the *Perth* class guided missile destroyer (DDG) in the 1960s, however these have all now decommissioned.

The Adelaide class guided missile frigates (FFG) currently in service use the same Standard SM1 missile as the DDGs. First developed in the 1960s, the SM1 has a nominal range of 50km. Modern regional anti ship missiles can now be fired from aircraft well outside that range (in excess of 120km) and many can out-manoeuvre the SM1



missile. Additionally, the FFG can only engage two air targets simultaneously, whereas many countries increasingly have the ability to program multiple missiles, fired with impunity from outside SM1 range, to arrive simultaneously and swamp a ship's defences.



RIM-66M-2 Standard SM2-MR surface-to-air missile

Furthermore, the SM1 missile requires a dedicated Fire Control radar to illuminate the target throughout its flight, which provides warning to the aircraft that it is being targeted and gives the pilot time to evade. In addition to these technical limitations, the SM1 missile is no longer in production and consequently the system has a limited support life.

There are a number of future ADF capabilities being developed to facilitate Control of the Air. These include the new destroyer (the so called 'Air Warfare Destroyer'), the Joint Strike Fighter (JSF), new Air-to-Air Refuelling (AAR) aircraft, Airborne Early Warning and Control (AEW&C) aircraft, Over the Horizon Radar (OTHR), and new generation Army Ground Based Air Defence (GBAD)



systems. It is critical that these capabilities work as a complementary package, as no single capability will see its potential maximised working alone. The concept of Network Centric Warfare (NCW) provides connectivity between these assets to share tactical and targeting information and ensure that the 'whole is greater than the sum of the parts'.

Importantly, an Area Air Warfare combat system in the new destroyers will act as a force multiplier, by allowing surveillance aircraft to operate over a much wider area. The extended range of the destroyer's missile envelope means that such aircraft can operate independently, then safely retreat under the protective umbrella of the ship once an emerging threat is detected. This will enable them to operate effectively even in situations where fighter escort is unavailable, which will significantly extend the surveillance capabilities of a deployed Task Group and free up the JSF to conduct other tasks.

Modern Area Air Warfare systems, such as the AEGIS system employed by the United States, Spain, Japan and Korea, have a true Area Air Warfare capability. The *current* generation of missile used by these systems - the Standard SM2 - has a range in excess of 160 km, allowing hostile aircraft to be targeted and destroyed well beyond the range of most anti-ship missiles, such as Exocet and Harpoon. This allows them to not only provide for their own protection, but to protect friendly maritime, land and air assets operating over a large geographical area. Moreover, the SM2 missile is far more manoeuvrable than the SM1 and modern high performance combat aircraft, improving the probability of interception.

The Phased Array radar technology incorporated into these systems has fixed antennas that allow the radar beam to be electronically steered to any point in space. The radar is controlled by the combat system to focus its search in areas of highest threat, or where targets have already been detected. This permits a much higher update rate of areas (and targets) of interest and allows the radar to accurately track both the missile and target and to pass updated orders to the missile in flight. It also permits up to 14 targets to be engaged concurrently which will counter the simultaneous arrival of multiple anti-ship missiles discussed earlier. Furthermore, the system only requires the target to be illuminated with Fire Control radar in the final few seconds of homing, which means that it does not have advanced warning that it has been engaged. Further variants of the SM2 missile will enter service in the next 5-10 years that have even greater utility; including a significant capability over land. This will be important in providing Control of the Air for land operations in the littoral, with the ability of the ship to integrate with the Army's ground based air defence systems.

Advanced Area Air Defence combat systems also have upgrade paths to allow the full potential of the next generation of missiles to be realised, some of which may be used for Theatre Ballistic Missile Defence. While the Government is yet to decide on whether this capability will be required by the ADF, and it is *not* a driving force behind the requirement for an Area Air Warfare capability, it is an attractive benefit. A further advantage is the potential to remain fully interoperable with key allies, particularly the US



and UK. This provides a niche capability that is similar to that fielded by the US, and which can be easily upgraded by leveraging off US technological developments. This is very much in our own interests as well as those of any coalition, and will provide the Government with further options to provide a meaningful (rather than symbolic) contribution to high-end coalition operations.

On 7 November 2003 the Government announced the outcome of its review of the Defence Capability Plan (DCP) in light of changes to the strategic environment, recent operational experience and more mature costings. In recognition of the need to enhance the protection of troops being transported and deployed from air attack, the RAN's air warfare capability is to be substantially enhanced. Four of the Adelaide class FFGs will be upgraded with SM2 missiles to increase their air warfare capability. In addition, three new destroyers will be acquired, incorporating the SM2 missile and a combat system probably derived from the AEGIS system currently in operation with the US Navy. This will provide the ADF with a capability to detect, track and engage simultaneously multiple aircraft at ranges in excess of 150km. To offset these enhancements, the two oldest FFGs will be laid off from 2006 when the last of the Anzac class frigates is delivered.

Clearly, the optimum solution for ADF Area Air Warfare is a complementary package of ships, GBAD, JSF and AEW&C aircraft. However, Australia's geography and the increasingly mobile focus of short-notice ADF operations mean that surface combatants may be the only assets available to project power over a large area of operations. Additionally, ships operating in international waters may often be the only politically acceptable option for the government to use in a tense situation without the risk of escalation. In essence, the Navy's new destroyers will often be the only ADF assets with the range, capability and attributes to ensure both Sea Control and Control of the Air in many of the areas the ADF is expected to operate in. The Government's decision means that the Navy's next generation surface combatants will have a robust, modern and highly capable Area Air Warfare capability, providing the ADF with a credible ability to gain and maintain Sea Control and Control of the Air.

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¹ Fundamentals of Australian Aerospace Power

² Australian Maritime Doctrine

