

# The Importance of the Growler to Australia's National Security

**The Growler will significantly improve Air Force's ability to operate in a complex and increasingly hostile battlespace. It will also considerably decrease the risk to land sea and air operations.**

**Chief of Air Force Air Marshal Geoff Brown AO**

The conversion of 12 of the RAAF's F/A-18Fs to EA-18G Growlers will ensure Australia's air power retains its leading-edge effectiveness well into the middle of this century. But why is airborne electronic warfare, and the Growler in particular, so important to Australia's national security? The beginnings of airborne electronic warfare can be traced back to World War II, where the first widespread use of radar for navigation and targeting occurred, as did the listening to and disrupting of electronic communications. Airborne electronic warfare systems such as the British Mandrel airborne radar noise jammer and Window (chaff), were the first line of electronic protection systems. The almost immediate by-product of these advances were technologies to counter these electronic warfare capabilities, then counter-counter, and a continuing spiral of counter developments to the nth degree. The age of electronic warfare had begun, and the ability to dominate the electro-magnetic spectrum became a key determinant in achieving success across the operational domains.

Throughout World War II the 'Mark one eyeball' remained the primary means of identifying airborne targets. The extended range radar allowed detection of targets well beyond visual range, facilitating long-range targeting consequently negating much of the element of surprise. Today, nearly every weapon system relies on radar for detection, tracking, or targeting. In fighter aircraft, head-up displays are slewed to radar information, and guns and close combat missiles rely on radar for developing their firing solutions. Advanced optical and infrared systems offset some of this reliance, but radar is still an important element in all facets of aerial engagements. The lesson from this is clear; reduce an enemy's ability to gain information from radar and the operational advantage can shift firmly in one's favour. Airborne electronic warfare provides this advantage.

Electronic warfare advances, however, were not confined to airborne systems alone. Surface-to-air missile (SAM) systems were developed to provide point and area-defence against air attack and evolved over time to become significant threats to military aircraft. It was not long before missiles, both surface and air launched, contained their own radars and fire-and-forget systems, substantially increasing the lethality and threat posed by them. In addition, the widespread deployment of SAMs made high-altitude flight, even at high-speed, extremely hazardous. Flying low and fast in aircraft such as the F-111 substantially increased survivability in contested airspace. Air power's advantages of speed and altitude had rapidly eroded.

Air power has rarely operated unimpeded over an adversary's airspace, whether it was threatened by anti-aircraft artillery or fighter aircraft; the exploitation of the electro-magnetic spectrum through surface to air missiles and other means only complicated the equation. Suppression of Enemy Air Defences (SEAD), an air mission that dates back to World War I, evolved to exploit the electro-magnetic spectrum, swinging the pendulum back in favour of offensive air power. Aircraft such as the EF-111A Raven and the EA-6B Prowler, provided specialist electronic surveillance, airborne jamming, and electronic countermeasures to defeat or deceive radar and disrupt communications, swinging the tactical advantage back to air power.

Today, most modern combat platforms, both fighters and transports, employ some degree of electronic warfare in the form of self protection systems. From chaff, a countermeasure to hide aircraft or provide a more attractive target for a radar-guided missile, to decoys that deceive enemy radars on the position of the target, to jammers that overwhelm radar receivers, electronic warfare has become an integral element of modern combat aircraft. But suppressing and deceiving radars are only two aspects of electronic warfare.

Success in military operations has long been closely tied to the ability to exchange data between tactical elements, as well as communications between commanders, their headquarters and operational and tactical units. Communication technology is heavily reliant on the electronic spectrum, and therefore prone to exploitation through electronic warfare. Whether



**An artist's impression of the EA-18G Growler.  
Source: RAAF Image Library**



gaining intelligence and situational awareness by listening in on the adversary's communications or degrading or disrupting the enemy's voice and data traffic, airborne electronic warfare will play a key role in the decision making capability of commanders across the operational and tactical battlespace.

In any form of conflict, the better electronic eyes you have the better you are able to fight, be it with the use of a radar-guided missile from the ground or air or synchronised anti-aircraft artillery. The lethality of modern weapon systems means that survivability in an aerial engagement with a near peer competitor is in no way assured. With the performance of current air-to-air missiles, mutual assured destruction is the most likely outcome of aerial combat—an outcome small air forces cannot accept. Growler can swing the advantage onto the friendly side by blinding or distorting the opposition's electronic eyes.

Onboard electronic warfare systems provide aircraft some degree of protection, but with the growing complexity of weapon systems much of this protection is localised to the individual platform. Growler will deliver a much broader span of protection to combat packages, such as a combat air patrol or strike force, and has the ability to electronically attack a threat source, or if needed, use anti-radiation missiles to kinetically neutralise the offending radar.

Jamming is the primary role of a specialist electronic warfare platform, as is the case with the Growler. High power low, medium and high band jammers enable the electro-magnetic spectrum to be targeted, whether they cover voice or data communications, GPS, and/ or surveillance and fire control systems. The jamming equipment is so effective, a Growler can disrupt the electronic devices of some improvised explosive devices used by the enemy to set off the charge.

Australia's national security is fundamentally based around a maritime strategy. Air power underpins this strategy. Australian air power, with its extant electronic protection equipment, is able to deliver the required effects across the nation's regional area of interest. However, continuing advances in regional defensive capabilities are likely to diminish this freedom. Australian national security requirements demand an integrated airborne electronic warfare platform capable of surviving in high threat environments and able to ensure the survival of other combat packages. Growler is this platform.

The Growler will deliver enhanced protection against emerging traditional and non-traditional threats, while holding at risk the adversary's electro-magnetic capabilities. Growler places the balance of risk on the enemy's side, maximising the RAAF's ability to obtain and maintain control of the air while minimising the risk to own forces. It truly will be a game changer.

## Key Points

- The EA-18G Growler will be a key capability element in Australia's air power system.
- The role that electronic warfare plays is a significant determinant in the effectiveness of air power.
- In an increasingly complex battlespace, the
- Growler's electronic warfare capabilities will ensure Australian air power continues to meet its national security obligations.

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## EW in offensive Air Operations

Ever since military forces started to use the electromagnetic spectrum in support of air operations, opposing forces have attempted to prevent their use through either a hard kill (German attacks on the RAF Chain Home Radar sites during the Battle of Britain) or soft kill (German attempts to disrupt or bend the radio beams (Oboe) used to direct RAF Bomber Command Pathfinder aircraft towards their targets in WWII). Like all aspects of warfare, there is no "silver bullet" since countermeasures are usually developed to offset the attack. This is particularly relevant in EW since the very use of a portion of the spectrum against operational forces is of itself a training cycle for the target of the emissions.

Because of the size and weight of equipment and the need for human interface with that equipment, early airborne EW systems were developed using multi-crew aircraft. However, these large aircraft were vulnerable to attack particularly with development of Integrated Air Defence Systems (IADS) that integrated surveillance, tracking and guidance radars with the full range of air defence weapons: air defence fighters, SAMs and AAA guns. Fielding of IAD Systems resulted in development of aircraft able to operate in a hostile air environment and support strikes against defended targets.

The F105 Wild Weasel used by the USAF over North Vietnam was an early example of the type used to support strike missions through attacks against the IADS including systems such as the SA-2 Ground-to-Air missiles employed by North Vietnam. The Wild Weasel systems were able to detect and analyse electromagnetic signals and direct anti-radiation missiles against missile guidance systems. Accompanying F105 aircraft armed with bombs were used to attack air defence systems pinpointed by the Wild Weasels.

With continued development of EW systems in both weight/size and capability fighter type aircraft are now capable of conducting many of the missions once restricted to

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large multi-crew aircraft. These missions include passive operations such as Enemy Order of Battle (EOB) analysis and Kill Chain analysis and active operations such as Suppression of Enemy Air Defences (SEAD), Force Protection and Maritime Support as follows:

- EOB analysis involves development of detailed information on the location, frequencies and capabilities of possible enemy systems that could diminish the capabilities of friendly systems. Since air defence systems include long (early warning) and short (missile guidance) range systems, EOB analysis requires systems able to monitor as much of the electromagnetic spectrum as possible. Even then physics decrees that the higher the frequency the more accurate the location.
- Kill Chain Analysis is the term given to analysis of the electromagnetic spectrum in a hostile environment and disseminating that information electronically to other parties in near real time so that fleeting targets such as mobile SAM sites can be engaged. The aim is to shorten the decision cycle of friendly forces and lengthen the decision cycle of enemy forces: in air force terminology affect OODA (Observe, Orientate, Decide, Act) loop of both friendly (reduce cycle time) and enemy (increase cycle time) forces.
- SEAD involves the degradation or defeat of integrated enemy air defence systems thus enabling attack forces to enter defended enemy territory. Hard and soft kills are usually made in combination to degrade IADS capability
- Force Protection involves prevention of enemy use of the electromagnetic spectrum to conduct attacks against friendly ground forces. These operations could be used

to deny the enemy use of the spectrum to communicate and/or initiate Improvised Explosive Devices (IED).

- Maritime Support is the term given to operations to protect the fleet from attack by anti-ship missiles and radar directed gunfire. It involves degradation or defeat of electronic location, targeting and guidance systems.

The EA-18G Growler, the latest Western development of fighter type EW capability, is replacing the EA-6B Prowler in US service. Whereas the Prowler is manned by one pilot and three systems operators the Growler is a two place aircraft developed from the FA-18F: the EW role is considered too complex at this stage for single pilot operation. It is understood that even with two seats the USN tends to operate the Growler in pairs to provide full EW capability, accuracy and self-protection. The capability and flexibility of the Growler was demonstrated recently when a squadron operating over Iraq in the Force Protection role switched to SEAD over Libya in under 48 hours.

While very capable in self-protection as well as its primary EW roles, the Growler in the USN is not an attack fighter. While the Growler is capable of utilizing guided weapons the USN has separated the two roles apparently because Growler crews are stretched maintaining skills in their primary EW role.

Without fighter type EW systems in the Air Order of Battle the ADF could suffer significant losses during any attempt to operate in contested airspace. If required to operate in contested airspace the ADF would have to rely on allied support.

*By Errol McCormack, Chairman of The Sir Richard Williams Foundation*

USN EA-18G and EA-6B over Mt Rainier, near Seattle Washington State. Photo: US Navy

