Wedgetail and the Region
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The recent decision by the government to delay the acquisition of the RAAF's new Wedgetail AEW&C aircraft until the White Paper is released, has produced wide and frequently very intense criticism, in political circles, the defence community and the daily press. With the delay being widely described as a prelude to an intended cancellation, the government's decision has raised a wide range of questions about what the government actually does plan as the nation's future defence strategy.

In this month's analysis we will explore some of the developing issues to place the Wedgetail acquisition into its proper context.

1 The Region

The most important developments in the region over the last year all relate to a strong push by both the PRC and India to improve their ability to project conventional air and missile power at greater distances. In last month's issue we detailed the proliferation of supersonic anti-shipping cruise missiles into the region, specifically India's acquisition of the 3M-54E1 Alfa and the PRC's further purchases of the 3M-80 Moskit/Sunburn.

These acquisitions are part of a much broader effort by both players to produce modern and competitive air forces, and must be considered in the context of the PRC's commitment to field around 400 Su-27SK and

Su-30MKK Flanker variants, and India's plans to eventually expand their planned force of 50 Su-30MKI to 200 aircraft.

The PRC planned to field several A-50I Phalcon AWACS aircraft, with the Israeli Elta EL-2075 phased array radar derived from the same system as the failed Wedgetail bid. This order was very recently cancelled by Israel, who buckled under pressure from the US (we can speculate that Israel's known interest in acquiring 50 F-22A fighters played a major role in the rapid Israeli retreat on this issue). India's tit-for-tat response was to lease a pair of baseline Russian A-50 AWACS for evaluation, while negotiations have started aimed at acquiring the A-50I Phalcon for the IAF.

Both India and the PRC have a stated intent to field AAR tankers, and some reports, though yet to be confirmed, suggest that some Il-78 aircraft may have already been supplied for this purpose.

The combination of AWACS, tankers and Su-27/30 would provide both players with the capability to project modern tactical airpower to regionally significant distances. A tanker supported Su-27/30 flying from Port Blair in the Andaman Islands or Hainan-Dao can cover the Malayan Peninsula, Sumatra and Java.

Of much greater concern however, is India's fleet expansion and upgrade program for the Tu-142M Bear and lease of the Tu-22M Backfire. The Bear, sortied from its home base at INS Rajali in Tamil Nadu state, has the operating radius without aerial refuelling to cover Western Australia. The Backfire, the former mainstay of the Soviet Dalnaya Aviatsiya and Aviatsiya Voenno-Morskovo Flota, has the operating radius from the Andamans, without aerial refuelling, to cover an arc between the Gascoyne and Darwin. Russian sources indicate that an effort is under way to convince India to convert the Backfire lease into a purchase, and acquire more aircraft.

China tried very hard to acquire the Backfire in 1993, but the Russians yielded to intense political pressure from the US and Japan and backed out of negotiations for the aircraft. Russian sources now indicate that Russia is expected to reopen discussions on the sale of the aircraft to the PRC, who are likely to respond favourably to the idea. To date most Russian sourced reports on impending weapons sales to India and China have proved to be correct.

With tit-for-tat purchases of Su-30 aircraft and tit-for-tat pursuit of AWACS and tanking, the only obstacle to the PRC acquiring the Backfire in response to India's interest in the aircraft would have to be a major policy change in Russia. Given Russia's dire economic position, graphically

illustrated by the tragic loss of the K-141 Kursk SSGN, the opportunity to exchange some of the 250 or so Backfire airframes in stock for hard cash is likely to be an irresistable temptation. A Backfire sortied from Hainan-Dao can cover an arc between Darwin and Learmonth.

Details of the Indian Bear upgrade have yet to be released, reports in the Indian press indicate that the 3M-54E1 Alfa anti-ship cruise missile is the leading candidate, as this weapon is already committed for the Kilo SSKs and Krivak FFGs. A Bear, fitted with a rotary launcher and wing pylons, could carry around ten rounds. As yet no details have been made available on the intended missile fit for the Tu-22M Backfire. The aircraft has existing interfaces for the large Mach 3 Raduga Kh-22/22M Buran (Kitchen) cruise missile, and has the payload capability to accommodate a wide range of Russian cruise missile types. Land attack versions of the Kh-22/22M Buran have been available since the sixties, and fitted with Glonass/GPS/inertial guidance, would have useful accuracy. A Glonass/inertial guided land attack version of the Tomahawk-like Alfa, the 3M-14E, is on offer and has been openly discussed in the Indian press as a weapon for the Kilos and Krivaks. Should the Bear be fitted for the 3M-54E1, it could also carry the 3M-14E with no major modifications.

The strategic significance to Australia of these developments cannot be understated. Once India has fielded its upgraded Bears and the Backfire, it will have the capability to deliver anti-shipping and land attack cruise missiles against targets in W.A. and the N.T. from bases in Indian territory. Moreover, if the PRC fields the Backfire, it will possess a similar capability.

The argument that these capabilities have yet to be fielded is spurious since both countries could have a basic operational capability fielded within a few months of a decision, there is little lead time involved in activating a mothballed RuAF Backfire.

Hitherto the ADF's force structuring has been largely based upon capabilities fielded in the nearer region, since neither India nor China had the reach to potentially threaten the Australian continent with modern weapons. This premise is now invalid, and all force structuring assumptions which have been based upon it no longer hold. Within the next few years, both India and China will have the capability to simply bypass the nearer region.

2 Australia's Vulnerability - the Pilbara and Timor Sea

Australia's economic well being is based largely upon the export of commodities, with iron ore, minerals, coal and agricultural products the mainstays of the primary industries. However, in recent years the export of liquefied natural gas and condensates from the Pilbara offshore oil and gas fields has begun to rival iron ore as W.A.'s primary revenue earner. Recent proposals for an onshore refinery in the Pilbara, to produce fuels and petrochemical feedstock products, are likely to result in further growth in this valuable export commodity.

Of perhaps greater importance are the Timor Sea oil and gas fields, which are now being described as 'Australia's North Sea'. Current plans and proposals will see shipping lines from a number of Timor Sea production platforms, off the N.T. and Kimberley coasts, carry natural gas to coastal processing facilities for both export and domestic consumption by the mining industry.

With a growing world demand for energy and greenhouse gas emission policies favouring natural gas over oil, we can expect to see massive growth in the gas production infrastructure in the Timor Sea and the Pilbara. The energy industry in the North is very likely to become the central pillar of Australia's commodity export industry over the next two decades. Moreover, the mining industry will exploit this cheap energy to move from exporting raw materials to processed materials, which are frequently much more profitable.

Is there a downside to this impending economic bonanza ? There is - Australia's economic position will become increasingly dependent upon the uninterrupted flow of gas and oil from the Timor Sea and Pilbara wells. Should these facilities be shut down or restricted in production, dire economic consequences will follow very shortly indeed.

Can these facilities be easily threatened in a military confrontation ? The answer is without doubt - yes. A cruise missile or guided bomb hit can result in an gas production platform fire which may be impossible to control. Doubters should carefully consider the fate of the North Sea Piper Alpha platform. Without the effect of several 1,000 lb high explosive warhead hits, this platform burned down to wreckage in mere days.

The big strategic issue the ADF will have to grapple with in the coming two decades is that of ensuring that the Timor Sea and Pilbara installations

are reliably protected from air and missile attack.

Should current trends in Indian and Chinese power projection capability growth follow through, within 2-5 years both nations will have the capability to put a cruise missile firing bomber or submarine within launch range of the Timor Sea and Pilbara facilities, operating from their home bases. For the mere cost of firing a few dozen cruise missiles, they could cause Australia critical economic damage within mere hours of an order to engage. An offshore production platform is a target which is tailor made for an anti-shipping cruise missile, and too big to protect with decoys and jammers.

The question which Cabinet should be asking itself in relation to the current defence debate is a very simple one: if faced with the prospect of a punitive cruise missile attack on the Timor Sea and Pilbara gas installations, would it be prepared to stand its ground in a political, diplomatic or military dispute with the PRC or India ?

If the ADF is not equipped to protect the Timor Sea and Pilbara gas installations, it is reasonable to surmise that Australia's foreign policy would very rapidly become more akin to that of Finland during the Cold War.

Of course, the other alternative would be for Canberra to ingratiate itself to Washington and persuade the US to deploy a Air Expeditionary Force of F-22 fighters and supporting AWACS and tankers in Darwin, should a crisis arise.

Current trends being what they are, our political leadership should carefully weigh the alternatives - either we equip to defend our air space, or we collectively accept the alternative of reliance upon USAF deployments in the North, if the Americans can be convinced to do so. That is a major issue within itself.

3 Defending the Timor Sea and Pilbara

The task of protecting the Timor Sea and Pilbara offshore gas infrastructure is formidable by any measure. These facilities could be attacked by cruise missiles fired from bombers and submarines, and should circumstances permit basing in Java, also by mobile intermediate range ballistic missiles with Glonass/GPS terminal guidance, or missile firing Su-27/30. While the latter capabilities could eventuate at short notice over the coming two decades, this discussion will be confined to the cruise missile, as its regional deployment is now imminent.

To defeat a cruise missile attack by a submarine or aircraft, it is necessary to detect the attack and destroy the cruise missiles either by SAM or AAM attack. To deter a cruise missile attack, it is necessary to have the capability to reliably kill the launch platform. In US Navy terms, 'kill the archer, rather than the arrow'.

In either case, there is a need to detect an attack in progress, put a missile firing platform between the intended target and the launch platform, and either destroy the launch platform or the cruise missiles once launched.

While our naval lobby will argue that a dozen Aegis ships can perform this task, the reality is that even an Aegis cruiser cannot see a sea skimming cruise missile more than 25 nautical miles away, as it is hidden below the radar horizon (refer diagram). Unless an Aegis ship is virtually tethered to each offshore platform, the problem cannot be solved by naval power.

The notion that two or three Collins subs, each firing twenty Tomahawks against the air bases sortiing cruise missile carrying bombers, could deter such an attack equally stretches one's credulity. By the time the submarines reach their targets, the bases could be evacuated and the bombers placed well out of reach. This is regardless of the questionable damage effects produced by a mere 40-60 Tomahawks against an airfield or two.

Whether such an attack is delivered by air or by submarine, the most reliable way of defeating the attack is to have fighter aircraft destroy the cruise missiles once launched, and the bomber should the opportunity arise. A submarine is likely to get away, although P-3C and Collins SSK patrols could make its life very difficult on ingress and egress from the launch area.

Detecting, tracking, engaging and destroying cruise missiles is not a trivial task to perform. Since they are physically small and frequently designed for low radar signatures, they can only be found with a large microwave band radar. Since time is required for an engagement, early detection is a must and geography dictates that a fighter Combat Air Patrol be on station over the area to be defended. With the cruise missiles proliferating in the region having ranges between 120 and 300 nautical miles, a launch platform need get no closer to launch its attack. A couple of Bears or Backfires could fire 10-20 rounds, a submarine 6-12 easily.

The basic problem can be divided into two distinct problem areas:

- Early warning of an attack in progress, detection and tracking of the cruise missiles, and vectoring of a CAP to engage them.

- Maintaining a CAP on station with a sufficient load of gas and missiles to prosecute the engagement.

The latter problem is no less challenging than the former. The F/A-18A, even post HUG, is not well suited for this regime of operations. If we assume a runway alert scramble from Learmonth, Curtin, Darwin or even Baucau, to engage an inbound bomber, the operating radius limitation of the F/A-18A even with generous external gas leaves enough holes in coverage for a cruise missile attack to be safely prosecuted. CAP radius without tanker support is adequate only to cover a portion of the Pilbara, the Timor Sea is well out of reach.

Let us now assume that robust tanker support is available. This would allow the F/A-18A operating from Tindal and Learmonth to cover the area of interest, with the caveat that a tanker is sortied at the same time. However, another problem rears its ugly head.

The external stores capacity of the Hornet is inadequate if it is to carry three external gas tanks and more than six AMRAAMs. If we budget 1.5-2 AMRAAMs per cruise missile kill, a safe margin, the CAP must carry anything up to 40 AAMs in total to stop a modestly sized attack. A Hornet can carry ten AMRAAMs, so a 4 aircraft CAP can arguably do the job. However, only if the fighters are limited to a single centreline gas tank.

Given the distances involved, what happens if an aerial refuelling fails ? The Hornet will not have the remaining fuel to make it safely back to a runway. Therefore, the only safe choice is to limit the missile load on the Hornets and sortie 6-8 instead of 4 fighters. This means 50-100% more airframe time and 50-100% more pilots needed, and possibly another tanker.

This problem is not unique to the Hornet, and would be an issue with the Super Hornet, Eurofighter Typhoon, Rafale, and F-16C. Indeed, the size of the F-14, F-15, Su-27 and F-22 is a direct consequence of sizing for this very category of mission.

If AIR 6000 is to robustly address the developing air defence needs in the Pilbara and Timor Sea, the only choices will be an F-15E derivative or the F-22A, both of which carry over 23,000 lb of internal fuel (F-15 with CFTs), allowing for a generous load of AAMs on external stations. The F-22 can carry 8 externally, and 6 internally, an F-15 with additional outer pylons a total of 12 AAMs. Whatever arguments may be raised about counter-air performance and power projection capabilities, the basic reality of defending the North against cruise missile attacks alone dictates that AIR 6000 be

focussed upon a large fighter, by default the F-22A or an F-15E variant.

The problem of detecting and tracking an attack in progress, and vectoring fighters, is no less daunting.

If the launch platform is a bomber, then JORN can provide early raid warning and offers the opportunity to sortie a CAP and tanker early, to effect a long range point intercept and kill the target before it can launch. Even at more modest radii, JORN yields important economies in numbers of sorties to be flown.

This is not the case should the cruise missiles be launched by submarine, since first detection can only occur once they emerge from the water. JORN is unlikely to acquire cruise missile sized targets, since they are too small for HF band resonances to occur. Therefore the only means of detecting them is by using a microwave radar on an aircraft patrolling the likely launch zone. The bigger the radar, the better the detection range and the more warning time to effect an intercept.

The established technique for dealing with this situation is an AEW&C / AWACS aircraft, which has sufficient antenna size and power to detect even a very small cruise missile. The MESA phased array on the Wedgetail, with its ability to perform narrow sector scans electronically, is exactly the class of radar required for this task. While the APG-77 carried by the F-22 is likely to be the next best available choice, its smaller size and 120 degree sector coverage mean that several F-22 aircraft would be required to achieve the same detection capability as a single Wedgetail does.

Once the targets are detected and tracked, fighters are vectored into position and destroy the cruise missiles, reattacking should the initial shots fail.

The Wedgetail combines the MESA radar, an integrated IFF secondary radar capability, an ESM package for the passive detection of emitting radars, and a comprehensive command-control-communications system. This allows it to completely manage and control multiple concurrent engagements by multiple fighters.

An important issue is the tradeoff between the capability of the AEW&C / AWACS system and the fighter radars being used. The smaller the fighter radar, the lesser its detection range against a cruise missile, which forces a much more capable AEW&C / AWACS radar. This situation will not change as cruise missiles acquire radar signature reduction features.

Smaller fighters generally carry smaller radars, and are heavily dependent upon AEW&C / AWACS support even to perform basic air defence work -

generally they are not considered suitable for strategic air defence against cruise missiles. Indeed, the Sovs deployed the Su-27P and MiG-31, both massive aircraft, precisely to meet the need for carrying a large radar.

Are there any alternatives to the Wedgetail for dealing with a cruise missile threat situation ? If the RAAF is to continue operating the F/A-18A/HUG for the coming decade, then Wedgetail is an unavoidable necessity, and the proposed number of 6 aircraft and 1 option may prove to be appropriate for the task.

If the RAAF retires the F/A-18A early and replaces it with an F-22A, then some economies in the number of Wedgetail aircraft may be possible, by exploiting the powerful APG-77 on the F-22A. While the new phased array being fitted to some USAF F-15Cs is a huge improvement over the existing APG-63, it is acknowledged not to be in the class of the APG-77.

It is conceivable that in a decade's time, an alternative package could be devised which would perform all of the tasks currently incorporated into the Wedgetail. A MESA derivative radar carried by a variant of the RQ-4 Global Hawk UAV (or Proteus) could provide a better long range radar and IFF footprint than the MESA carried by the Wedgetail, a proposal which is currently being discussed in the US. An ESM package on the Global Hawk would supplement this with passive detection. The F-22A, with its APG-77 radar and ALR-94 Weasel class ESM, would be less dependent upon AEW&C / AWACS support. Tankers fitted as microwave satellite datalink relay platforms could be used to connect the F-22As, MESA/AEW Global Hawks and ground based command, if the tanker itself is not serving as a command post.

However, at this time the Global Hawk is not committed to production, the F-22A is yet to be committed to production, the proposal for a MESA/AEW Global Hawk is being mooted by engineers, and the ADF does not have the communications satellite capability to support such a scheme, let alone the tankers. The scheme is eminently feasible from an engineering perspective, albeit difficult to integrate. Within the next decade, it is unlikely that such a UAV based distributed AEW&C / AWACS system will be operational. Unless the USAF commit major resources to pursue the idea, it may not materialise at all.

In the light of the regional proliferation of cruise missiles and strategic bombers, it follows that a decision to abandon the Wedgetail project altogether would represent a very high risk defence strategy for the ADF. A more prudent approach would be to revise the split between options and

committed aircraft, and explore carefully the economics of a mix of F-22As, strategic tankers with satellite relay capability, satellite communications and the possible MESA/AEW Global Hawk UAV. This provides a fallback position should the latter not be achievable in the timelines of interest, and still provides the ADF with the option of pursuing its original intent.

The other consequence of the regional proliferation of cruise missiles is that the supercruising F-22A and strategic tankers such as the Boeing KC-25/747 look increasingly attractive, considered against the alternatives in AIR 6000. This is not only due to their better suitability for the cruise missile defence role over the Timor Sea and Pilbara regions, but also because they provide the means of mounting a credible and rapid 'counter-force' retaliatory strike against a base from which cruise missile launching bombers can be sortied. Therefore they achieve deterrence at the strategic level, and make cruise missile launching bomber strikes into Australian airspace a suicidal proposition, this also producing a deterrent effect.

The arms race between the PRC and India is likely to continue, and an inherent side effect of this will be a growing capability to project aerospace power into Australia's area of interest. The assumptions upon which previous White Papers were based will no longer hold true, the new White Paper must address this issue robustly. The notion that Australia can first decide what is convenient to spend on defence, and then fit a force structure to these numbers, is becoming nothing less than wishful thinking, if not childish naivete by parties who have yet to grasp the significance of recent regional developments.

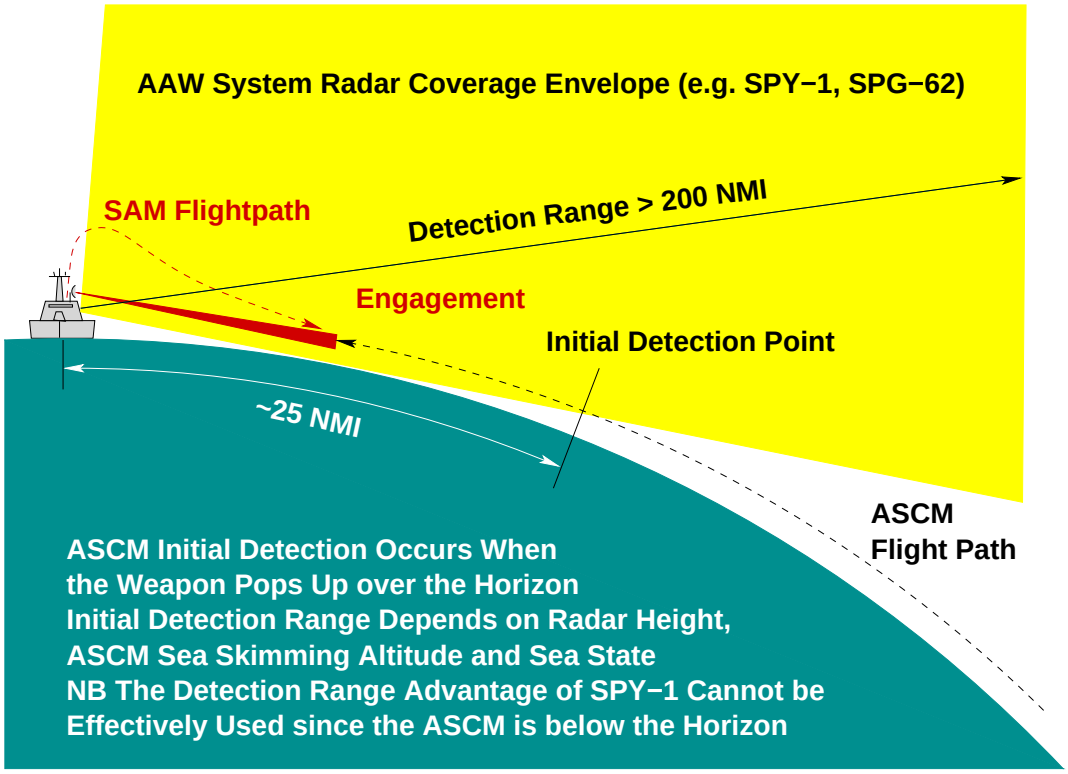
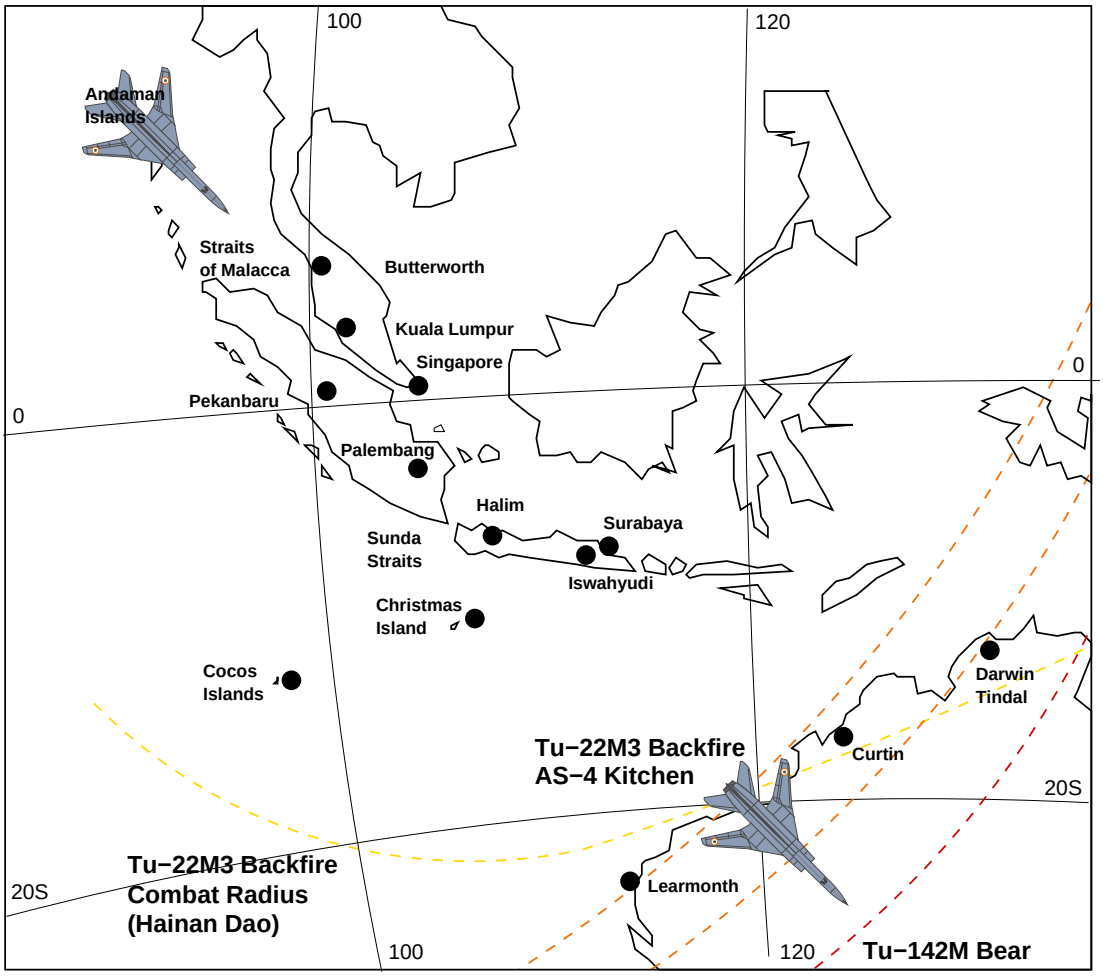


Figure 1: *One popular but factually incorrect idea is that a surface warship can provide wide area defence against low altitude cruise missiles. As this diagram depicts, unless the missiles fly within several nautical miles of the warship, they cannot be engaged as they are hidden from the Aegis system below the radar horizon (Author).*



Indian Naval Air Arm Backfire Striking Radius (FOB Andaman Is.)

Operating radius for probable PLA−AF Backfire deployment in yellow.

Figure 2: *Tu-22M3 Radius performance (Author).*

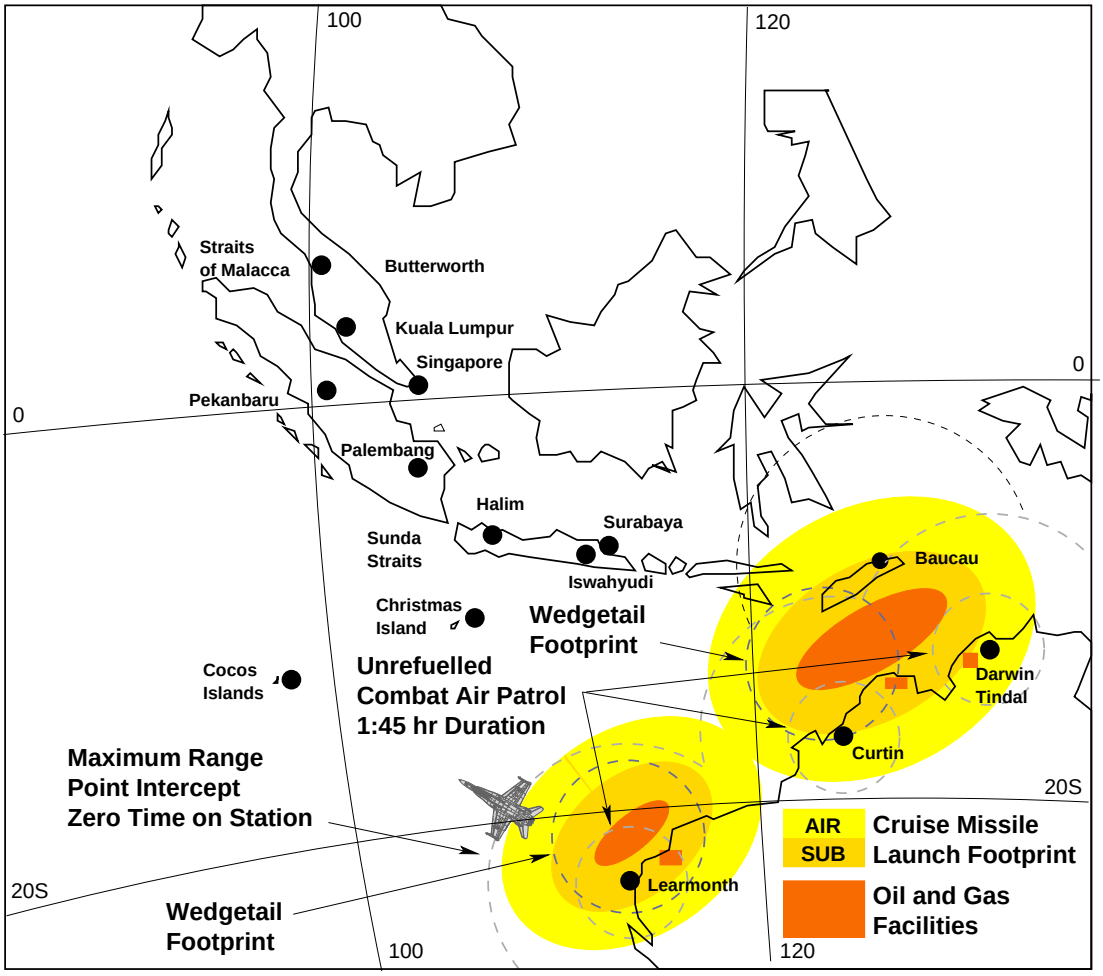


Figure 3: *Gascoyne-Darwin Arc (Author).*

Figure 4: *The Wedgetail program has been deferred and numerous reports from Canberra suggest that a cancellation may be imminent. The Wedgetail is based upon a Boeing 737-700/800 series airframe, equipped with a Northrop Grumman MESA phased array radar/IFF system, supplemented by an ESM receiver package and comperhensive communications suite. The MESA radar is widely acknowledged to have exceptional performance against small radar targets which makes it a particularly good choice for detecting and engaging cruise missiles.*

Figure 5: *Regardless of which fighter is chosen as an F/A-18 replacement under AIR 6000, the RAAF will need a respectable number of tankers to support Combat Air Patrols under any circumstances where the threat of a cruise missile attack arises. Tankers can perform a useful additional support function as communications relays. For instance JTIDS messages to and from fighters can be relayed over a satellite link to the continental air defence infrastructure or a Wedgetail system. Satcom installations are widely used by the USAF, this E-4B command post, based on the same airframe as a KC-25/KC-747 tanker, illustrates such an installation (USAF).*

Figure 6: *In terms of diversion range on internal fuel, total missile load and radar capability, the best candidate fighter to deal with a cruise missile threat is the F-22A, followed by a phased array equipped F-15E variant. The F-22A carries 6 AAMs internally and up to 8 on external pylons, the F-15 4 rounds on fuselage stations, 4 on inboard pylons and should provisioned for outboard pylons be fitted, an additional 4 rounds. The F-22A's APG-77 has by far the best detection range performance against small targets of any current fighter radar (USAF).*

Figure 7: *The Tu-22M3 Backfire C has the operating radius from the Andamans and Hainan Dao to cover the arc between Learmonth and Darwin, and has provisions for aerial refuelling. The aircraft is currently being leased by India, with the Russian reports indicating a concerted effort to sell the aircraft. Other reports from Russia indicate that the cancelled sale to the PRC may be revived soon. The aircraft can carry a range of land attack and anti-shipping cruise missiles, depicted are a pair of Kh-22 Buran (FAS).*