POLICY ANALYSIS ASPI

ASPI AUSTRALIAN STRATEGIC POLICY INSTITUTE

The generation gap: Australia and the Super Hornet by Andrew Davies

5

13 February 2007

The government recently announced that it was in discussions with the US Government regarding the purchase of twenty-four Boeing F/A-18F Super Hornet aircraft for the RAAF. This is a very significant development. It is essentially an admission that unacceptable risks have developed since the formulation of the previous plan for sustaining Australia's air combat capability. But it is also a move that begs several questions in its own right.

The rationale for the Super Hornet discussions is that the original plan now carries too high a risk of a 'capability gap' developing. The plan involved extending the life of the current F/A-18A/B Hornet fleet and operating them in conjunction with Wedgetail airborne early warning and control aircraft and new air-to-air refuelling tankers in order to maintain a credible air combat capability until the Joint Strike Fighter (JSF) becomes available next decade.

The JSF is a 'fifth generation aircraft', the primary characteristics of which are high levels of stealth against adversary radar and infrared detection systems and very sophisticated sensor fits, allowing for the collection, processing and sharing of large quantities of battlespace data. The JSF is one of only two fifth generation aircraft. The other is the F-22 Raptor. Both aircraft are built by the US-based Lockheed Martin company. The F-22 has the additional capabilities of being able to cruise supersonically without afterburner (super cruise) and greater agility. The Raptor is in service now, while the JSF has just begun flight trials.

To understand the significance of the recent announcement, a little history is in order. In the late 1990s, the need to replace the 'classic' 1980s vintage fourth generation Hornets and the 1960s vintage F-111 fleet came up for consideration. In 2000, Defence began a study to evaluate the performance and suitability of a range of contenders. But in 2002 the government announced that the evaluation would be cut short. Australia would join an international consortium to fund and collaborate on the development of the JSF, which could replace both current types.

That was a good decision given the information available at the time. Consolidating our air combat capability onto a single type made a lot of sense, and would result in considerable savings on maintenance, training and

personnel. At the time of the decision, the F-22 was extraordinarily expensive, had a limited strike capability and availability from the US was unclear. The US Congress had decreed that no funds would be available for export marketing. While not as capable in the air-to-air role as the F-22, the projected capabilities of the JSF would provide us with air-to-air and strike capabilities that would allow us to conduct a wide range of operations even in high-end conflict. Its fifth generation characteristics would ensure that the RAAF could operate against even the most capable fourth generation aircraft and sophisticated ground defences, albeit at a higher risk than with the F-22, which would deliver unchallenged air dominance.

The only hitch was that the JSF wouldn't be available until 2012 at the earliest. The F-111 fleet was slated for retirement in 2010 and the 'classic' Hornets were getting long in the tooth. But there were plans to provide the Hornet airframes with new avionics, sensors and weapon fits as well as major structural refurbishments that would allow them to fly on into the middle of next decade. That Hornet upgrade (HUG) program was included in the endorsed Defence Capability Plan at a cost of over three billion dollars. It should provide a sizeable number of Hornets through to 2018 or so.

And there things stood for a while. The JSF acquisition received 'first pass' approval in Cabinet. In the government's process for defence acquisition, that means that the concept was endorsed, and that Defence could proceed to gather detailed information on cost, risk and capability in preparation for a 'second pass' in 2008. At the second pass, there should be adequate data on which to base a considered decision. That also fits quite well with the JSF program. The first flight was made in December 2006, and there are half a dozen aircraft in the final stages of assembly. By mid-2008, the status of the schedule for JSF production should be much clearer, though there is still much testing to be done after 2008.

Now something has changed. Last year the government announced that it wanted Defence to develop a backup plan to avoid an unacceptable risk of a 'capability gap'. This was possibly sparked by the announcement in mid-2006 by Boeing and Defence that the Wedgetail project—a vital component of the plan to keep the classic Hornets competitive—had slipped by at least two years. (It is now three.) The considerations that went into the Super Hornet plan have never been made public, yet the government is now preparing to spend in excess of $4.1 billion to acquire this fourth generation 'stopgap' aircraft.

There are some benefits from the new plan. Moving from one type to another is resource intensive for an air force. The choice of the Super Hornet may well be driven by the relative ease of introducing an aircraft with some commonality with the existing Hornet fleet. (Note that, despite similar names and designations, the Super Hornets and the 'classic' Hornets are very different aircraft, with only partial commonality in hardware and software fits.) Another factor is the more-or-less immediate availability of the Super Hornet, being built on an existing production line for the US Navy. Both of those factors mean that the RAAF could have them in service early enough to allow some breathing space before the bigger task of transitioning to the JSF comes up.

But there is a serious problem with this plan in that it does little to deal with the

biggest risk in the future air combat capability plan—our comparative capability late next decade. While filling in a short-term hole when the F-111s retire and providing a measure of comfort if the HUG program has problems, the biggest risk by far is of slippages or big cost increases in the JSF program. (They are related problems—early aircraft cost more. Buying early in the production history comes at a premium. Conversely, deferring a purchase translates into a real cost saving.)

US Department of Defense budget papers for 2008 released last week raise some serious doubts about the cost and timing of the JSF for an Australian purchase. The USAF has requested funding sufficient to build seventy-two fewer JSF aircraft between now and 2013 than was planned last year. That can only drive up the price of aircraft purchased mid-next decade when Australia is planning to buy. If those USAF budget figures are not revised when scrutinised by the US Congress, Australia (and all of the other JSF consortium members) will be faced with a deal that looks considerably less cost-effective than it did hitherto. We may well have to choose between paying more, waiting longer, or buying fewer aircraft. Or we could opt for a combination of some or all of those options.

The bulk of the current fleet is the seventy-one Hornets. They cannot be kept indefinitely and if we can't get the JSF in time, the real capability gap—much larger than any short-term one—will open up late next decade. Of course, we could always purchase more Super Hornets, which would be an obvious choice to capitalise on existing infrastructure and support services. But that is where the capability limitations of the Super Hornet would begin to present a real problem for us.

The rationale for the JSF decision was the need to move to a fifth generation aircraft in order to have a superior capability to the high-end fourth generation threats we were likely to encounter from 2015 on. But the Super Hornet is not even the best fourth generation option. Other than the US Navy (who had the aircraft designed specifically to operate off aircraft carriers), no one has opted to buy it so far, despite serious marketing efforts. Plusses include a powerful radar, good networking abilities and stealth design features not available when the classic Hornet was designed (though the latter will be of little benefit when non-stealthy external strike weapons are carried). On the downside, its design for operations from aircraft carriers means that it has structural strengthening in the undercarriage and other parts that lead to extra weight, and a wing design optimised for low rather than high speeds. It is therefore behind the performance curve from the beginning when compared to land-based aircraft.

Other nations shopping for Western fourth generation aircraft have selected designs like the European Typhoon or the American F-15. Buyers of the latter include South Korea, Singapore and Israel—all canny purchasers of military hardware. Many nations around the Indian and Pacific Ocean rims have opted for Russian designs like the formidable Sukhoi Su-27/30 Flanker family of fighter aircraft. Large, agile, fitted with a powerful radar and heavily armed, these aircraft present a significant challenge to Western fourth generation fighters. By far the best placed fourth-generation aircraft to counter them is the F-15. Critically, the performance of the Super Hornet means that it cannot realistically be expected to defeat well-flown Flankers in combat.
The fifth generation F-22 Raptor is the world's best fighter aircraft. Its stealth

and performance puts it well ahead of the pack. And, while still relatively expensive (no modern combat aircraft is cheap), costs have come down as production has matured. The strike capability of the Raptor has been improved and demonstrated in exercises since 2005 and the reluctance to export the aircraft may be waning. Japan has been actively sounding out Washington about acquiring the Raptor, and a USAF squadron is about to deploy to Okinawa for three months. That is no doubt part of the plan to deploy high-end capability to the East Asian arena, but there is likely to be an element of marketing to the move. Most importantly, the Raptor is the only proven fifth generation aircraft flying today. If we continue to believe that fifth generation technology is crucial to our air combat capability, it is the only currently available alternative.

The unit cost of the F-22 continues to look unattractive, but we need to take a whole-of-capability view. If we add up the total funds being considered for allocation to the future air combat, the sums begin to look suggestive. To be conservative, we will take the current JSF costs (without any escalation that may flow on from USAF decisions) and the costs of the F-22 as currently in production for the USAF. In reality, the former will tend to become more expensive as our buy moves up the learning curve and the latter would tend to become cheaper in later production. The table below shows the totals.

<table>
<tr><th colspan="2">HUG - Super Hornet - JSF</th><th colspan="2">F-22</th></tr>
<tr><td>HUG</td><td>> $3 billion</td><td rowspan="3">Current unit procurement cost for USAF

= US$170 million each.

60 F-22 aircraft + project costs (estimated at 60% of aircraft cost)

= $21.7 billion</td><td rowspan="3"></td></tr>
<tr><td>Super Hornet</td><td>> $4 billion</td></tr>
<tr><td>JSF
(70-100 aircraft)</td><td>$11-15 billion</td></tr>
<tr><td>Total</td><td>$18-22 billion</td><td>Total</td><td>$21.7 billion</td></tr>
</table>

Table. Total costs of two possible future air combat approaches.

So even with cost estimates that favour the Super Hornet/JSF combination, it appears that the very advanced F-22 is starting to look competitive, albeit in numbers less than the proposed buy of JSFs. On the other hand, the effectiveness of the F-22 is significantly higher than the JSF to at least 2018, and probably beyond, offsetting any numerical advantage of the latter. That should give us pause for thought.

As well, there is another alternative. That is, if the F-22 is still considered too expensive, or is unavailable for export after a formal request is made, we could fall back to a fourth generation option that is selected from the world market as the most cost-effective aircraft. South Korea's F-15 fleet will cost approximately the same per aircraft as our proposed Super Hornet buy.

We also need to understand that, no matter what we do, we lose significant capability when the F-111 retires. No other aircraft (including the Super Hornet, Raptor and JSF) has its range and load carrying capability. Effectively each

F-111 provides better than twice the combat effect of smaller aircraft like the JSF or the Super Hornet. For that reason, it might well be worth looking at how many years extra service we could get from them for part of the four billion dollars that the Super Hornets would cost. That might be a more cost-effective way of avoiding a capability gap.

So where does all that leave us? Our biggest risk of a capability gap remains. We could conceivably find ourselves faced with a difficult decision towards the end of next decade. We could have a mix of Super Hornets and barely viable Hornets and be desperately waiting for JSF capability to become affordable and mature.

These are very complex considerations and it would be reckless to suggest that the sort of high-level analysis presented here could provide a definitive answer. However, at the very least, there seems to be sufficient uncertainty about the cost-capability trade-off in the government's plan to justify a rigorous review of the alternatives.

A deferral of the decision to purchase Super Hornets would seem sensible. This could be for 6-12 months, during which the government could:

- Gather availability, cost and capability data for the F-22, so that we understand the affordability and feasibility of moving quickly to a high-end fifth generation solution. Only if that proves unfeasible should we move to a fourth generation fallback.

- Evaluate the fourth generation options available in the world marketplace and choose the one most likely to provide us with high-end capability through the decade beginning 2020 should we need to go that way.

About the Author

Dr Andrew Davies is ASPI's Operations and Capability Program Director

About Policy Analysis

Generally written by ASPI experts, **POLICY ANALYSIS** is provided online to give readers timely, insightful opinion pieces on current strategic issues, with clear policy recommendations when appropriate. They reflect the personal views of the author and do not in any way express or reflect the views of the Australian Government or represent the formal position of ASPI on any particular issue.

ASPI
Tel + 61 2 6270 5100
Fax + 61 2 6273 9566
Email enquiries@aspi.org.au
Web www.aspi.org.au